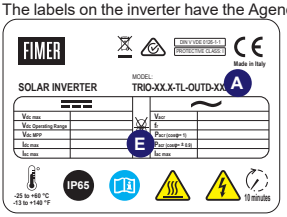
FIMER

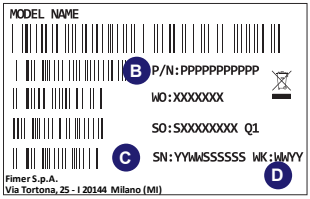

# Solar Inverter
# TRIO-20.0/27.6-TL-OUTD
## Quick Installation Guide

In addition to what is explained in this quick installation guide, the safety and installation information provided in the product manual must be read and followed. The technical documentation for the product is 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.

# 1. Labels and Symbols

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




- A Inverter model
- B Inverter part number
- C Inverter serial number
- D Week/Year of manufacture
- E Main technical data

**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: YYWWSSSSSS- of the upper part (inverter)**

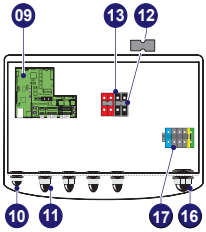
**In the manual and/or in some cases on the equipment, the danger or hazard zones are indicated with signs, labels, symbols or icons.**

| | | | |
|---|---|---|---|
| Always refer to instruction manual | IP XX Protection rating of equipment | ⊕ ⊖ | Positive pole and negative pole of the input voltage (DC) |
| General warning - Important safety information | Temperature range | | Always use safety clothing and/or personal safety devices |
| Hazardous voltage | Without isolating transformer | | Point of connection for grounding protection |
| Hot surfaces | Direct and alternating currents, respectively | XX MIN | Time need to discharge stored energy |

# 2. Inverter Models and Components

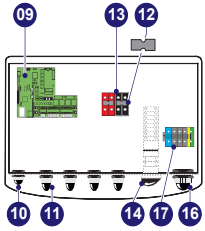
The models of inverter to which this guide refers are available in 2 power ratings: 20 kW / 27.6 kW.
For inverters of equal output power, the variant between the various models is the layout of the wiring box.

**TRIO-XX.X-TL-OUTD**



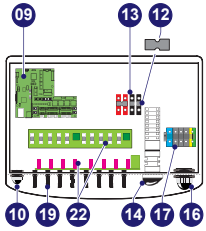

**Standard** wiring box version:
- DC cable infeed cable gland
- DC cable connection terminal block

**TRIO-XX.X-TL-OUTD-S2**



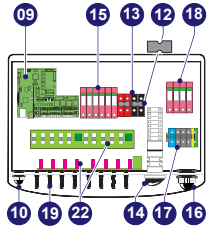

**S2** wiring box version:
- DC cable infeed cable gland
- DC cable connection terminal block
- AC+DC disconnect switch

**TRIO-XX.X-TL-OUTD-S2F**




**S2F** wiring box version:
- Quick fit connectors
- String protection fuses
- AC+DC disconnect switch

**TRIO-XX.X-TL-OUTD-S2X**

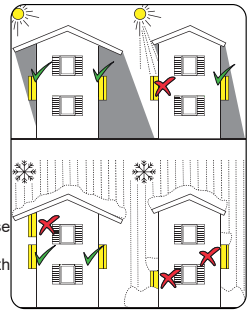



**S2X** wiring box version:
- Quick fit connectors-
- String protection fuses
- DC overvoltage surge arresters
- AC overvoltage surge arresters
- AC+DC disconnect switch

**Main components**

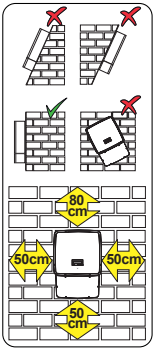
| | | | | | |
|---|---|---|---|---|---|
| 09 | Communication board | 13 | DC input terminal board | 17 | AC output terminal board |
| 10 | Service cable glands | 14 | AC+DC disconnect switch | 18 | AC overvoltage surge arresters |
| 11 | DC cable glands | 15 | DC overvoltage surge arresters | 19 | Input connectors |
| 12 | Jumpers | 16 | AC cable gland | 22 | String fuses |

# 3. Choice of installation location

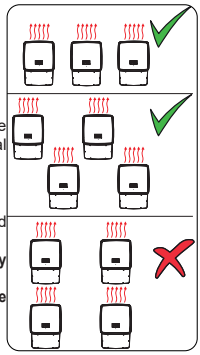


**Environmental checks**
-Consult the technical data to check the environmental parameters to be observed
-Installation of the unit in a location exposed to direct sunlight must be avoided as it may cause:
1. power limitation phenomena in the inverter (with a resulting decreased energy production by 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 FIMER Service department.**



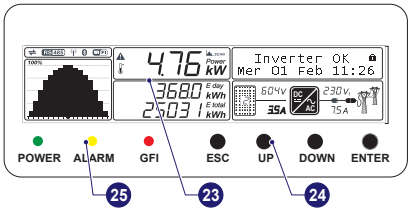

**Installation position**
-Install on a wall or strong structure suitable for bearing the weight
-Install in safe, easy to reach places
-If possible, install at eye-level so that the display and status LEDs can be seen easily
-Install at a height that considers the heaviness of the equipment
-Install 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.**



# 4. Instruments

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.

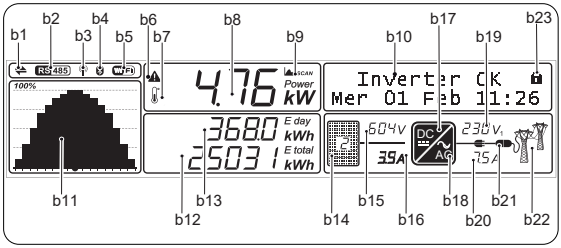
| | |
|---|---|
| **LED POWER** | **GREEN** On if the inverter is working correctly. Flashes when checking the grid or if there is insufficient sunlight. |
| **LED ALARM** | **YELLOW** The inverter has detected an anomaly. The anomaly is shown on the display. |
| **LED GFI** | **RED** Ground fault on the DC side of the PV generator. The error is shown on the display. |




| | |
|---|---|
| **ESC** | 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. |
| **UP** | It is used to scroll up the menu options or to shift the numerical scale in ascending order. |
| **DOWN** | It is used to scroll down the menu options or to shift the numerical scale in descending order. |
| **ENTER** | It can be used to conrm 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 **(23)**: 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** | |

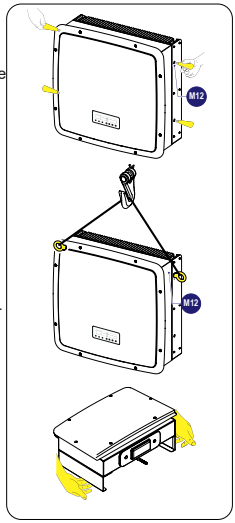



# 5. Lifting and transport

**Transport and handling**
Transport of the equipment, especially by road, must be carried out with by suitable ways and means for protecting the components (in particular, the electronic components) from violent shocks, humidity, vibration, etc.

**Lifting**
Where indicated and/or where there is a provision, eyebolts or handles, which can be used as anchorage points, are inserted and/or can be inserted.
The ropes and means used for lifting must be suitable for bearing 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 FIMER.




**Weight of the equipment units**

| | Mass weight | Lifting points n°# | Minimum rope height H ≥ mm | Holes or Eyebolts UNI2947 ø M mm |
|---|---|---|---|---|
| INVERTER unit | TRIO-20.0: 60 kg<br>TRIO-27.6: 65 kg | 4 | 1.200 mm | M 12 - assembly kit with 4 handles and 2 eyebolts (to order: TRIO HANDLING KIT) |
| WIRING BOX unit | Standard / -S2: 7 kg<br>-S2F / -S2X: 15 kg | 2 | - | - |

# 6. List of supplied components

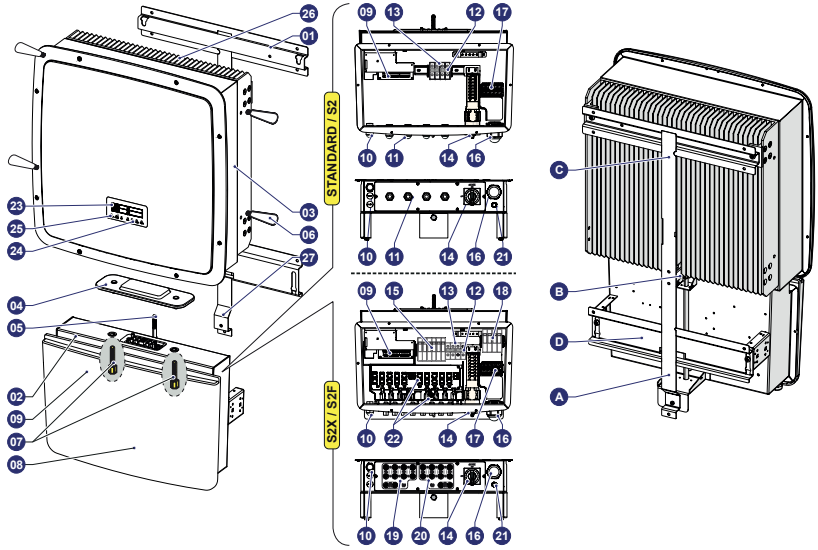
| Components available for all models | Quantity |
|---|---|
| Connector for connecting the configurable relay | 2 |
| Connector for the connection of the communication | 4 |
| L-key, TORX TX20 | 1 |
| Two-hole gasket for M25 signal cable glands and cap | 2+2 |
| Two-hole gasket for M20 signal cable glands and cap | 1+1 |
| Bracket for wall mounting | 1 |

| Components available for all models | Quantity |
|---|---|
| Jumpers for configuration of the parallel input channels | 2 |
| Quick Installation Guide | 1 |

| Additional components for (-S2F/-S2X) models | Quantity |
|---|---|
| Female quick fit connectors | 8 (20.0kW)<br>10 (27.6kW) |
| Male quick fit connectors | 8 (20.0kW)<br>10 (27.6kW) |
| Fuses gPV - 1000V DC - 15.0 A | 16 (20 kW)<br>20 (27.6 kW) |

# 7. Assembly instruction

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **01** | Bracket | **08** | Front cover | **15** | DC overvoltage surge arresters | **22** | String fuses |
| **02** | Wiring box | **09** | Communication board | **16** | AC cable gland | **23** | Display |
| **03** | Inverter | **10** | Service cable glands | **17** | AC output terminal board | **24** | Keypad |
| **04** | Cover | **11** | DC cable glands | **18** | AC overvoltage surge arresters | **25** | LEDpanel |
| **05** | Clamp screw | **12** | Jumpers | **19** | Input connectors (MPPT1) | **26** | Heatsink |
| **06** | Handles | **13** | DC input terminal board | **20** | Input connectors (MPPT2) | **27** | Locking screw |
| **07** | Connector screws | **14** | AC+DC disconnect switch | **21** | Anti-condensation valve | | |



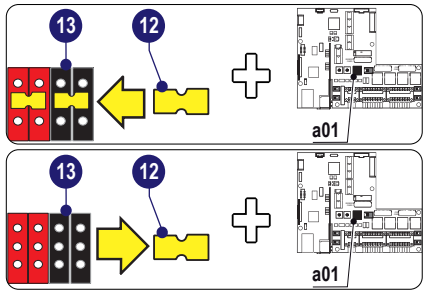

- With the help of a spirit level mark the 2 holes in the vertical strip **(A)** to ensure it is mounted vertically. Drill a hole with a bit which is suitable for the depth required by the plug and fit the plugs into the holes, using the spirit level to check it is vertical
- Tighten the pin **(B)** on the **(A)** vertical strip
- Position the bracket **(C)** in the slot on the vertical strip **(A)** and mark the 4 holes, using a spirit level to check it is horizontal
- Position the bracket **(D)** in the slot on the strip **(A)** and mark the 2 holes, using a spirit level to check it is horizontal
- Drill with a bit which is suitable for the depth required by the plug and fit the plugs into the holes just made
- Fit the bracket **(C)** into the slot of the **(A)** and tighten the screws, using a spirit level to check it is horizontal
- Fit the bracket **(D)** into the slot of the **(A)** and tighten the screws, using a spirit level to check it is horizontal
- Fasten the Wiring Box **(02)** inserting the head of the rear screws into the slots in the bracket, remove the front cover and carry out all the necessary connections.

**NOTE –** The inverter does not need to be installed **(03)** at this stage

- Unscrew the connection screws **(07)** and remove the cover **(04)** so that you can access the connector between the Wiring Box and the Inverter
- Mount the inverter by putting the heads of the rear screws into the slots in the bracket. To make this operation easier, handles **(06)** or 2 eyebolts (M12) can be fitted in the side holes. The threaded wall plug in the lower part of the heat sink makes contact with the pin **(B)**, keeping the inverter in the ideal position.
- Use the prefitted screw or insert the coupling screw **(05)** (optional coupling screw) and tighten it bringing the Wiring Box towards the inverter until it makes easy contact.
- Tighten the 2 internal screws **(07)** fully to the centring pins in the Wiring Box ensuring the gasket adheres correctly
- Fix the assembled inverter to the bracket by tightening the locking screw **(27)** located at the bottom.
- Remove the coupling screw **(05)** used for coupling carefully as it could come out from below

**NOTE –** The rear coupling screw **(05)** is not included in the inverter supply. It can be purchased separately and used as a fitting tool during installation. This tool must be extracted from the wiring box after assembly and can be used in other installations. Before removal, make sure that the connection screws **(07)** are tightened and that the assembled inverter is secured to the wall bracket. Be careful when removing the coupling screw as it is free to come out from below.

# 8. DC input configuration




All versions of the inverter are equipped with two input channels (therefore with double maximum power point tracker MPPT) independent of each other, which can however be connected in parallel using a single MPPT.

**- Configuration of parallel-connected channels**

This configuration involves the use of the two input channels (MPPT) connected in parallel. This means that the jumpers **(12)** between the two channels (positive and negative) of the DC input terminal board **(13)** must be installed and that the switch a01 situated on the communication card **(09)** must be set to "PAR".

**- Configuration of independent channels (default configuration)**

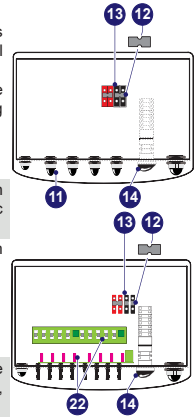
This configuration involves the use of the two input channels (MPPT) in independent mode. This means that the jumpers **(12)** between the two channels (positive and negative) of the DC input terminal board **(13)** must not be installed and that the switch a01 situated on the communication card **(09)** must be set to "IND"

# 9. Input connection (DC)

⚠ **WARNING –** 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.
The inside of the inverter may only be accessed after the equipment has been disconnected from the grid and from the photovoltaic generator.
The inverter is only to be used with photovoltaic units with ground insulated input poles unless accessories allowing grounding of the inputs have been installed. In this case it is compulsory to install an isolation transformer on the AC side of the system.

**- Connection of inputs on the Standard and S2 models**

For these two models, connection with the DC input terminal board **(13)** is made by inserting the cables in the DC cable glands **(11)**. The maximum accepted cable cross-section ranges from 10 to 17 mm, whereas each individual terminal of the terminal board accepts a cable with cross-section of up to 50 mm2 (tightening torque 6Nm).
Unscrew the cable gland, remove the cover, insert the cable of suitable cross-section and connect it to the terminals on the DC input terminal board **(13)**. Once the connection to the terminal board is complete, screw in the cable gland firmly (tightening torque 5.0Nm) and check the tightness.




**- Connection of inputs on the S2F / S2X model**

⚠ **WARNING –** Reversing polarity may result in serious damage. Always check the polarity before connecting up each string! Each input is equipped with protection fuses: check that the fuse current rating is properly sized for the photovoltaic modules installed.

For string connections using the S2F / S2X wiring box, the quick fit connectors (multicontact or weidmuller) situated at the bottom of the mechanics are used.
For each input channel, there are two groups of connectors:
- Input connectors (MPPT1) **(19)** with codes 1A, 1B, 1C, ...
- Input connectors (MPPT2) **(20)** with codes 2A, 2B, 2C, ...

Connect all the strings included in the design of the system and always check the tightness of the connectors.

⚠ **ATTENTION –** In these versions of the wiring box, you MUST directly connect the individual strings coming into the inverter (do not make field switchboards for parallel strings). This is because the string fuses **(22)**, situated on each input, are not sized to take strings in parallel (array).

If some string inputs are not used, check that there are covers on the connectors and install them if they are missing.
This operation is necessary for the tightness of the inverter and to avoid damaging the free connector that could be used at a later date.

# 10. Line cable and protection devices

**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:

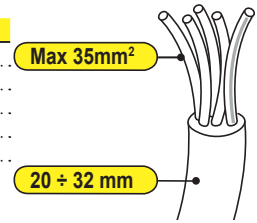
| | TRIO-20.0-TL-OUTD | TRIO-27.6-TL-OUTD |
|---|---|---|
| Type | Automatic circuit breaker with differential thermal magnetic protection | |
| Voltage/Current rating | 400V /40A | 400V /63A |
| Magnetic protection characteristic | B/C | |
| Number of poles | 3/4 | |
| Type of differential protection | A/AC | |
| Differential sensitivity | 300mA | |

FIMER declares that the FIMER transformerless 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**

For the connection of the inverter to the grid, you can choose between a star connection (3 phases + neutral) and a delta connection (3 phases).
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

| Cross-section of the line conductor (mm2) | Maximum length of the line conductor (m) | |
|---|---|---|
| | TRIO-20.0-TL-OUTD | TRIO-27.6-TL-OUTD |
| 10 | 42m | 30m |
| 16 | 70m | 50m |
| 25 | 100m | 78m |
| 35 | 138m | 98m |



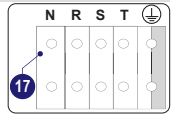

The values are calculated in nominal power conditions, taking into account:
1. a power loss of not more than 1% along the line. 2. copper cable, with EPR/XLPE insulation, laid in free air

# 11. Output connection (AC)

For the connection of the inverter to the grid, you can choose between a star connection (3 phases + neutral) and a delta connection (3 phases).

⚠ **WARNING –** In any case, connection of the inverter to ground is mandatory.
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, connection with the AC output terminal board **(17)** is made by inserting the cables in the AC cable gland **(16)**.
The maximum accepted cable cross-section ranges from 20 to 32 mm, whereas each individual terminal of the terminal board accepts a cable with cross-section of up to 35 mm2 (tightening torque 2.5Nm).

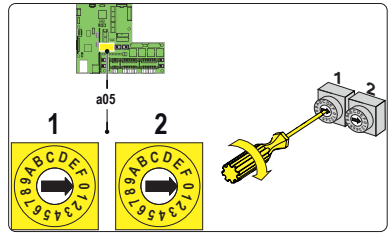



Unscrew the cable gland, remove the cover, insert the cable of suitable cross-section and connect the conductors(Neutral, R, S, T and Ground) to the terminals on the AC output terminal board **(17)**.
**Be careful not to change round one of the phases with neutral!**
Once the connection to the terminal board is complete, screw in the cable gland firmly (tightening torque 7.5Nm) 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 a05.**

# 12. Setting the grid standard

Before connecting the inverter to the distribution grid it is necessary to set the country standard by manipulating the two rotary switches a05:
Table: country standard and language

| Switch 1 | Switch 2 | Country Grid Standard (name displayed) | Display language |
|---|---|---|---|
| 0 | 0 | NON-ASSIGNED | ENGLISH |
| 0 | 1 | GERMANY VDE 0126@400V | ENGLISH |
| 0 | 4 | UL 1741 @ 277V Three Phase | ENGLISH |
| 0 | 5 | ENEL@400V (ENEL) | ENGLISH |
| 0 | 6 | SPAIN@400V (RD 1699) | SPANISH |
| 0 | 8 | UK - G59@400V (UK G59) | ENGLISH |
| 0 | 9 | IRELAND@400V (IRELAND) | ENGLISH |
| 0 | A | AUSTRALIA@400V (AS 4777) | ENGLISH |
| 0 | B | ISRAEL@400V (ISRAEL) | ENGLISH |
| 0 | C | GERMANY - BDEW@400V (BDEW) | GERMAN |
| 0 | D | FRANCE@400V (FRANCE) | FRENCH |
| 0 | E | NETHERLANDS@400V | DUTCH |
| 0 | F | GREECE@400V (GREECE) | ENGLISH |
| 1 | 0 | PORTUGAL@400V (PORTUGAL) | ENGLISH |
| 1 | 1 | CORSICA@400V (CORSICA) | FRENCH |
| 1 | 2 | HUNGARY@400V (HUNGARY) | ENGLISH |
| 1 | 3 | CHINA@400V (CHINA) | ENGLISH |
| 1 | 4 | KOREA@380V (KOREA) | ENGLISH |
| 1 | 5 | TAIWAN@400V (TAIWAN) | ENGLISH |
| 1 | 6 | CHECA REPUBLIC@400V (CZECH) | CZECH |
| 1 | 7 | GERMANY-VDE AR-N-4105@400V | GERMAN |
| 1 | 8 | CEI-021@400V EXT. prot. (CEI021 EX) | ITALIAN |
| 1 | B | SOUTH AFRICA@400V (S.AFRICA) | ENGLISH |
| 1 | C | SPAIN RD 1565@400V (RD 1565) | SPANISH |
| 1 | D | BELG C10-11 100% @ 400V (C1011 100) | FRENCH |
| 1 | E | BELG C10-11 110% @ 400V (C1011 110) | FRENCH |
| 1 | F | BRAZIL@380V (BRAZIL) | ENGLISH |
| 2 | 0 | TURKEY LV@400V (TURKEY LV) | ENGLISH |
| 2 | 1 | ROMANIA@400V | ENGLISH |
| 2 | 2 | SLOVENIA @400V | ENGLISH |
| 2 | 3 | TURKEY HV@400V | ENGLISH |
| 2 | 4 | CEI-016 @ 400V | ITALIAN |
| 2 | 5 | EN50438 generic @ 400V | ENGLISH |
| 2 | 8 | FRANCE VFR 2019 @ 230V | ENGLISH |
| 2 | 9 | THAILAND MEA @ 230V | ENGLISH |
| 2 | C | VDE 0126 3W @ 230V | ENGLISH |
| 2 | D | THAILAND PEA @ 220V | ENGLISH |
| 2 | E | SINGAPORE @ 230V | ENGLISH |
| 2 | F | CHINA HV @ 230V | ENGLISH |
| 3 | 6 | DUBAI MV | ENGLISH |
| 3 | 7 | DUBAI LV EX | ENGLISH |
| 4 | 6 | GERMANY-VDE AR-N-4105@230V | ENGLISH |
| 4 | 7 | UK – G99 @ 230V | ENGLISH |
| 4 | 9 | EN 50549-1/2019 (LV)@230V | ENGLISH |
| 4 | A | EN 50549-2/2019(MV)@230V | ENGLISH |

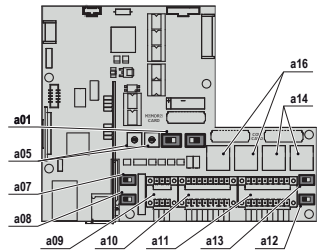



📖 **READ THE MANUAL –** The settings become fixed after 24 hours of operation of the inverter (the PV generator simply has to be under power).
The standard for the Italian grid which must be set during installation is 1 -8 (CEI-021 @ 400V EXTERNAL Protection)

# 13. Connection of the communication and control signals

The following table shows the main components and the connections available on the control and communication board. Each cable that must be connected to the communication board must go through the three service cable glands **(10)**.

| Ref. inverter | Ref. manual | Description |
|---|---|---|
| S5 | a01 | Switch for setting parallel-connected or independent input channels |
| S7 e S8 | a05 | Rotary switches for setting the standard of the country and the language of the display |
| S3 | a07 | Switch for setting analogue sensor 1 to Volts or mA |
| S1 | a08 | Switch for setting analogue sensor 2 to Volts or mA |
| J2 | a09 | Terminal block connecting to the configurable relay that allows connection of external devices which, according to the mode selected in the menu SETTINGS>Alarm can, for example, signal malfunctions. The operating modes that can be set are: Production; Alarm; Alarm (configurable); Crepuscolar |
| J3 | a10 | Terminal block for connection of: Environmental sensors; Environmental sensor power supply (24Vdc); Tachometer signal (WIND version) |
| J4 | a11 | Terminal block for connection of: PC RS485 serial connection (to connect local or remote monitoring systems); PMU serial connection (to manage active/reactive power infeed by the grid company); Remote ON/OFF. |
| S2 | a12 | Switch for setting the termination resistance of the RS485 (PMU) line |
| S4 | a13 | Switch for setting the termination resistance of the RS485 (PC) line |
| J7 e J8 | a14 | Connection of the RS485 (PC) line on RJ45 connector |
| J5 e J6 | a16 | Connection of the RS485 (PMU) line on RJ45 connector |




📖 **READ THE MANUAL –** The RS485 PMU communication line can be configured to operate with a ModBus communication protocol.

📖 **READ THE MANUAL –** Please refer to the manual for details of the connections and functions available on the control and communication board

# 14. Commissioning

**FORBIDDEN –** Do not place objects of any kind on the inverter during operation!
Do not touch the heatsink while the inverter is operating!Some parts may be very hot and cause burns.

The inverter commissioning procedure is as follows:
-Turn the AC+DC disconnect switch **(14)** 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. There is no order of priority for opening the disconnect switches.
-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.
2. If the DC input voltage is higher than the Vstart voltage the b14 icon is displayed and the inverter goes to the next stage of the controls.

In both cases the voltage levels and input current are displayed in the b15 and b16 fields.
-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.
4. flashing, if the mains voltage is present but outside the parameters dictated by the standard of the country of installation.
5. turns on, if the mains voltage is present and within the parameters dictated by the standard of the country of installation. In this condition, the inverter starts the sequence of grid connection.

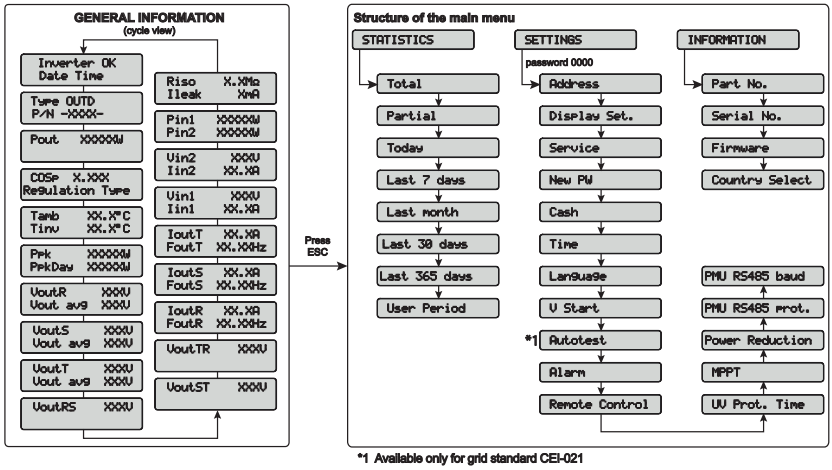
**If the input voltage and the grid voltage are within the inverter operating intervals, connection to the grid will commence. After the inverter is connected, the icons on the whole line b21 will come on steady.**
**Once the connection sequence has been completed, the inverter starts to operate and indicates its correct operation by making a sound and by the green LED coming on steady on the LED panel (25).**
**If the inverter signals any errors/warnings the messages and their codes will be indicated on the display (23). 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.**

# 15. Structure of the display menu

The display **(23)** has a section b10 (graphic display) for moving through the menu using the buttons of the LED panel **(25)**. 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.
By pressing ENTER it is possible to lock scrolling on a screen to be constantly displayed.
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

**READ THE MANUAL –** Refer to the manual for details regarding use and functions available in the menu.




*1 Available only for grid standard CEI-021

# 16. Characteristics and technical data

| | TRIO-20.0-TL-OUTD | TRIO-27.6-TL-OUTD |
|---|---|---|
| **Input** | | |
| Rated input DC power ($P_{dcr}$) | 20750 Wp | 28600 Wp |
| Maximum Input Power ($P_{dcmax}$) | 22700 Wp | 31000 Wp |
| Rated Input Voltage ($V_{dcr}$) | 620 V | |
| Input Activation Voltage ($V_{start}$) | 360 V (adj. 250...500 V) | |
| Input operating range ($V_{dcmin}$...$V_{dcmax}$) | 0.7 x Vstart...950 V | |
| Input voltage interval for MPP | 200...950V | |
| Maximum Input Power for each MPPT | 12000 W | 16000 W |
| Input voltage Range for Operation at rated power with configuration of the MPPTs in parallel | 440...800 V | 500...800 V |
| DC Power Limitation for each MPPT with Independent Configuration of MPPT at Pacr,max unbalance example | 12000 W [480V≤VMPPT≤800V] the other channel: Pdcr-12000W [350V≤VMPPT≤800V] | 16000 W [500V≤VMPPT≤800V] the other channel: Pdcr-16000W [400V≤VMPPT≤800V] |
| Absolute Maximum Input Voltage ($V_{max,abs}$) | 1000 V | |
| Power derating vs. Input voltage (parallel or independent MPPT configuration) | Linear Derating From MAX to Null [800V≤VMPPT≤950V] | |
| Number of Independent MPPTs | 2 | |
| Maximum current for each MPPT | 25.0 A | 32.0 A |
| Maximum Backfeed current (from AC to DC side) | Negligible | |

| | TRIO-20.0-TL-OUTD | TRIO-27.6-TL-OUTD |
|---|---|---|
| Number of Pairs of DC Connections at Input | 1 for each MPPT (Standard and -S2 versions)<br>4 for each MPPT (-S2F / -S2X versions) | 1 for each MPPT (Standard and -S2 versions)<br>5 for each MPPT (-S2F / -S2X versions) |
| Type of Input DC Connectors | Tool Free PV Connector WM / MC4 (Screw Terminal Block on Standard and -S2 versions) | |
| Type of photovoltaic panels that can be connected at input according to IEC 61730 | Class A | |
| **Input protection** | | |
| Reverse polarity protection | Protection for Inverter only, from current limited source, for standard and -S2 versions, and for versions with fuse with max 2 strings connected | |
| Input Overvoltage Protection - Varistors | 2 for each MPPT | |
| Input Overvoltage Protection - DIN rail surge arrester (-S2X version) | 3 (Class II) for each MPPT | |
| Maximum short-circuit current for each MPPT | 30.0A | 40.0A |
| Isolation Control | In accordance with the local standard | |
| Characteristics of DC disconnect switch for each MPPT (Version with DC disconnect switch) | 40 A / 1000 V | |
| Fuses (-S2F and -S2X versions) | gPV / 1000 V / Max. 20A | |
| Maximum current for each input connector (only versions -S2F/-S2X/-S1J/-S2J) | 13.5 A | |
| **Output** | | |
| AC connection to the Grid | Three phase 3W or 4W+PE | |
| Rated output voltage ($V_{acr}$) | 400 Vac | |
| Output Voltage Range ($V_{acmin}$...$V_{acmax}$) | 320...480 Vac (1) | |
| Rated Output Power ($P_{acr}$) | 20000 W | 27600 W |
| Maximum Output Power ($P_{acmax}$) | 22000 W (3) | 30000 W (4) |
| Maximum apparent Output Power ($S_{acmax}$) | 22200 VA | 30000 VA |
| Maximum Output Current ($I_{acmax}$) | 33.0 A | 45.0 A |
| Inrush Current | Negligible | |
| Maximum output fault current | <63Arms(100mS) | |
| Rated Output Frequency ($f_r$) | 50 Hz / 60 Hz | |
| Output Frequency Range ($f_{min}$...$f_{max}$) | 47...53 Hz / 57...63 Hz (2) | |
| Nominal Power Factor (Cosphiac,r) and adjustable range | > 0.995 (adj. ± 0.9, or fixed by display down to ± 0.8 with max 22 kVA ) | > 0.995 (adj. ± 0.9, or fixed by display down to ± 0.8 with max 30 kVA ) |
| Total Harmonic Distortion of Current | < 3% | |
| Type of AC Connections | Screw terminal block, maximum cross-section 35 mm2 | |
| **Output Protection** | | |
| Anti-Islanding Protection | According to local standard | |
| Maximum AC Overcurrent External protection | 34.0 A | 46.0 A |
| Output Overvoltage Protection - Varistors | 4 | |
| Output Overvoltage Protection - DIN Rail surge arrester (-S2X version) | 4 (Class II) | |
| **Operating performance** | | |
| Maximum efficiency ($\eta_{max}$) | 98.2% | |
| Weighted efficiency (EURO/CEC) | 98.0% / 98.0% | |
| Stand-by Consumption | < 8W | |
| Night-time consumption | < 1.0 W | |
| **Communication** | | |
| Wired Local Monitoring | PVI-USB-RS485_232 (opt.), PVI-DESKTOP (opt.) | |
| Remote Monitoring | PVI-AEC-EVO (opt.), VSN700 Data Logger (opt.) | |
| Wireless Local Monitoring | PVI-DESKTOP (opt.) with PVI-RADIOMODULE (opt.) | |
| User Interface | Graphic Display | |
| **Environmental** | | |
| Ambient Temperature | -25...+60°C /-13...140°F with derating above 45°C/113°F | |
| Relative humidity | 0...100% condensing | |
| Noise Emission | < 50 db(A) @ 1 m | |
| Maximum Operating Altitude | 2000 m / 6560 ft | |
| Environmental pollution classification for external environment | 3 | |
| Environmental Category | External | |
| **Physical** | | |
| Environmental Protection Rating | IP 65 | |
| Cooling system | Natural | |
| Overvoltage Category in accordance with IEC 62109-1 | II (DC input) III (AC output) | |
| Dimensions (H x W x D) | 1061 x 702 x 292 mm | 41.7" x 27.6" x 11.5" |
| Weight | Standard and S2: 67 kg/147lb<br>S2F / S2X: 75 kg / 165 lb | Standard and S2: 72 kg/158lb<br>S2F / S2X: 80 kg / 176 lb |
| **Safety** | | |
| Isolation level | Transformerless (TL) | |
| Safety class | I | |
| Marking | CE (50Hz only) | |

1. The AC voltage range may vary depending on specific country grid standard
2. The Frequency range may vary depending on specific country grid standard
3. Limited to 20000 W for Germany
4. Limited to 27600 W for Germany

**Remark. Features not specifically listed in the present data sheet are not included in the product**