ABB solar inverters

Product manual
Aurora Manager LITE

Power and productivity
for a better world™

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IMPORTANT SAFETY INSTRUCTIONS

Operators must read this manual and follow its instructions strictly, as ABB will not accept responsibility for damage caused to individuals and/or goods, or suffered by the equipment, if the conditions described below are not complied with.

Product Manual

Aurora Manager LITE - Advanced configuration software

1 - Introduction and general information

2 - Specifications

3 - Guide to using the software

4 - Description of the menus

5 - Inverter working area

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Introduction and general information

1

Document and intended readers

Scope and structure of the document

This user manual constitutes a valid guide which permits advanced configuration of the ABB inverters to optimize their operation.

⚠️ *The main language in which the document has been written is ITALIAN; however, in the case of any inconsistencies or doubts ask the manufacturer for the original document.*

Characteristics of the personnel

The Customer must ensure that the operator has the expertise and the training necessary to fulfill their duties. Personnel responsible for the use or maintenance of the equipment must be expert, knowledgeable, and mature enough for the tasks described and must be able to be relied upon to interpret that described in the manual correctly.

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Field of use, general conditions

ABB does not accept any responsibility for damage of any kind that may be caused by incorrect or careless operations.

Use of the software for any purpose that does not conform to that specified in the field of use is prohibited. The software MUST NOT be used by inexperienced personnel, or personnel who are experienced but perform operations on the equipment which are not in accordance with that described in this manual and in the documentation attached.

Specified or permitted use

Aurora Manager LITE is technical software used for the following operations:
- Monitoring
- Advanced configuration
- Updating of the firmware of the ABB inverters.

Limits of the field of use

Aurora Manager LITE can be used on the operating systems Windows XP, 7, 8 (framework .NET version 4.0 or later).

The installation and running of Aurora Manager Lite is only permitted if you have administrator rights.

Aurora Manager LITE CAN be used with 32 bit and 64 bit operating systems.
This manual is applicable for Aurora Manager LITE version 5.0.0.56 or later.

Aurora Manager LITE can be used linked to the following inverters:
UNO-2.0/2.5-I-OUTD
UNO-2.0/3.0/3.6/4.2-TL-OUTD
TRIO-5.8/7.5/8.5-TL-OUTD
PVI-10.0/12.5-TL-OUTD
TRIO-20.0/27.6-TL-OUTD
TRIO-50.0-TL-OUTD
CORE
PLUS-PLUS -(HV).(firmware updating only)

Access to the INSTALLER level which permits advanced configuration of the inverter is password-protected.

Improper or unauthorized use

IT IS STRICTLY PROHIBITED:
• *To use Aurora Manager LITE without having read and understood the content of the user manual correctly.*
• *To use the software to change internal parameters of the inverter which may render it NOT IN CONFORMITY with the regulations in force in the country of installation.*

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Characteristics

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General conditions

A description of the equipment characteristics is provided to identify its main components and specify the technical terminology used in the manual.

This chapter contains information about the models, details of the equipment, characteristics and technical data, overall dimensions and equipment identification.

The customer/Installer takes full responsibility if, when reading this manual, the chronological order of its presentation provided is not observed. All information is provided considering occasional inclusion of information in previous chapters.

In certain cases, there may be a need to separately document software functionality or attach supplementary documentation to this manual which is intended for more qualified professionals.

Description of the Aurora Manager LITE software

For the characteristics and functions that Aurora Manager LITE makes available is indicated for:

1. Local monitoring of the inverter.
It is possible to monitor the main parameters relating to:
General state
Statistical data relating to the production of energy
Input and output values
Internal temperature
Values relating to the insulation of the photovoltaic generator
Date and time

2. Advanced configuration of the inverter (INSTALLER access level):
Offers the option of applying advanced settings for the inverter. Access to this section of the software is password protected as it permits the modification of sensitive parameters such as those relating to the standard for connection to the grid in force in the country of installation.

The password can be obtained by registering on the site
https://registration.abbsolarinverters.com/

3. Updating of the inverter firmware.
Updating the inverter Firmware is process which may become necessary to improve the performance of the inverter or increase its functions.

In order to use the software a connection must be established between the PC and the inverter (by means of an RS485 communication line) using a PVI-USB-RS485_232 signal converter.
In all cases, the use of ABB products is recommended to avoid problems of incompatibility with the inverter.

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Structure of the software interface
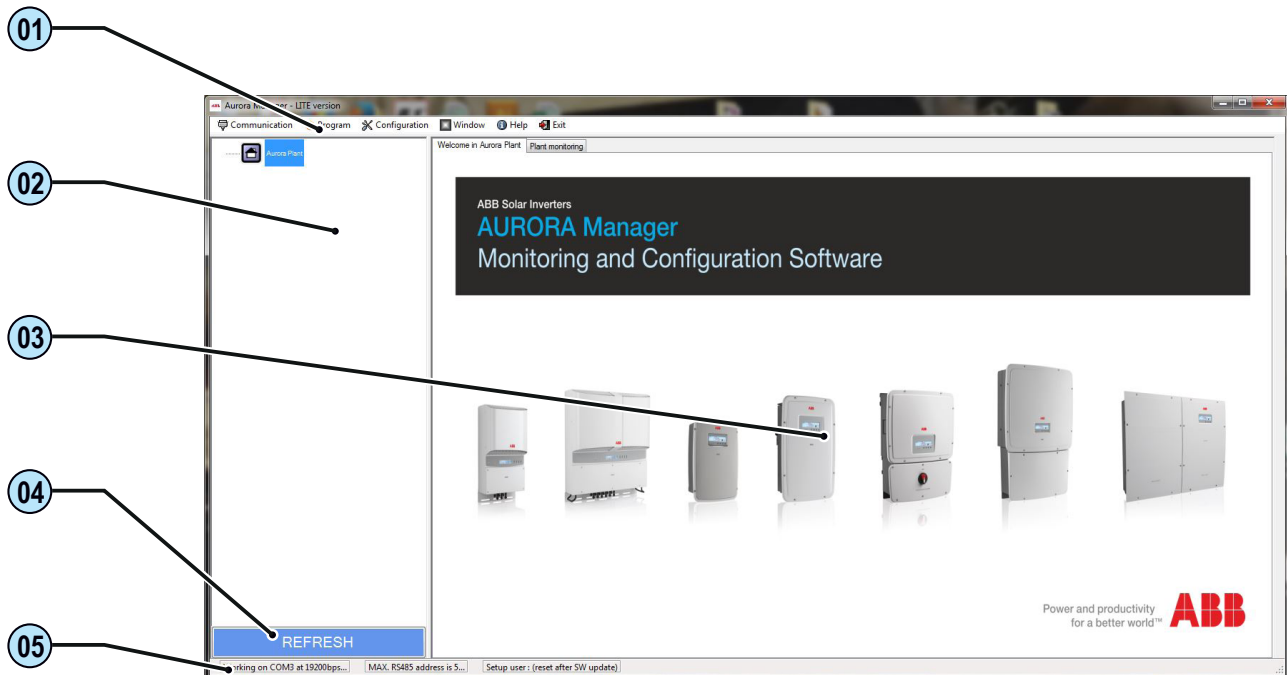
1. Menu bar

Contains the menus by means of which the functions of the Software can be accessed.
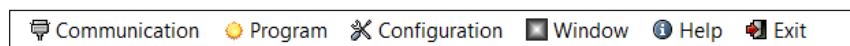
2. Tree diagram of the system

This section shows all the inverters connected to the RS485 line and identified during the scanning process. The inverters are arranged and displayed based on their Serial Number.
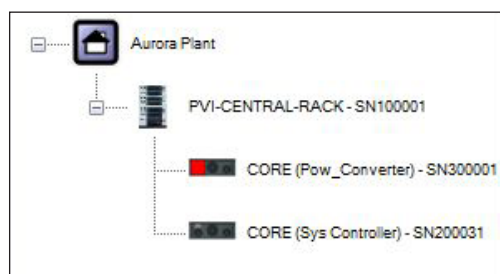
For the centralized inverters, the internal components of the inverter will also be displayed.

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3. Inverter working area

When an inverter shown in the tree diagram of the system is selected, the multitab structure of the program which permits configuration of the inverter is displayed. Depending on the access level (USER or IN-STALLER), the configuration option and therefore also the displaying of the work area will be different.
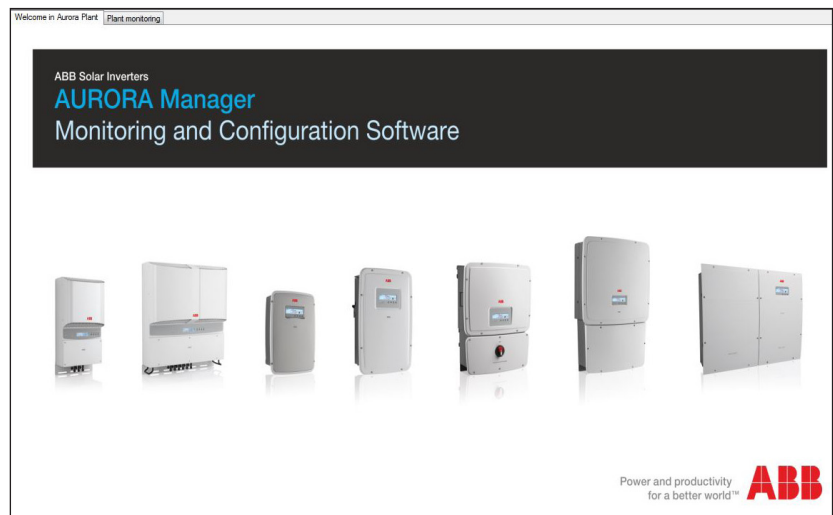
4. RS485 bus update key

Permits scanning of the inverters connected to the RS485 bus.

5. Information bar

Contains the values of the settings made relating to the Communication menu.

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Structure of Aurora Manager LITE

Structure of the menus

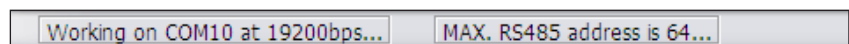| Menu	Submenu	Command/Option	Description
Communication	COM Setting	COM Port to use	Selection of the COM port used for communication
		Baud Rate	Speed of the communication (19200bps)
	Unit Scan setting	▶	Possibility of limiting the number of addresses in the RS485 bus scanning phase
Program	Device update	▶	Updating of the inverter Firmware using the .tib file
Configuration	Assign RS485 addresses	▶	Possibility of automatic (or personalized) assigning of the addresses of the inverters connected to the RS485 bus
	Setup Area Access	▶	Selection of the access level. The personal information and the password obtained by registering on the site https://registration.abbsolarinverters.com/ are requested
Window	Restore default window	▶	Resizing of the window
Help	About this...	▶	Information about the version of the Aurora Manager LITE Software
	Aurora Service	▶	ABB Service contacts
Exit		▶	Closing of the program

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Structure of the work area

TAB	Level 1 TAB.	Level 2 TAB.	Command/Option	Description
Unit ID	▶	▶	▶	Inverter identification information (FW version, Device info, Manufacturing info, Device settings)
Monitoring	▶	▶	▶	Acquisition of the inverter input and output data in real time
Partner Devices	Display	Partner ID	▶	"Display" board identification information (S/N, P/N, WK, etc.)
	Communication board	Partner ID	▶	"Communication" board identification information (S/N, P/N, WK, etc.)
		States	▶	State of the devices monitored by the "Communication" board
		Measures	▶	Acquisition of the "Communication" board data in real time
		Analogic Input Settings	▶	Settings of the analogic inputs
	Fuse control board	Partner ID	▶	"Fuse control" board identification information (S/N, P/N, WK, etc.)
		States	▶	State of the devices monitored by the "Fuse control" board
		Measures	▶	Acquisition of the "Fuse control" board data in real time
		Parameters	▶	Copies the input configuration to the whole chain or to selected inverters by means of the dedicated 485 address.
		Global Settings	▶	Setting of the common parameters for monitoring the strings (overcurrent, minimum average current for unbalanced current alarm, etc.)
		Strings Settings	▶	Setting of the monitoring of the strings (string current weight, tolerance, string current control enable/disable, etc.)
	PMU board	Partner ID	▶	"Service board" identification information (S/N, P/N, WK, etc.)
		States	▶	State of the devices monitored by the "Service board"
		Measures	▶	Acquisition of the "Service board" data in real time
		Analogic inputs settings	▶	Setting of the "Service board" analogic inputs
		Aux RS_485	▶	Settings of the communication protocol and baud rate
		PMU	▶	Settings of the active and reactive power management modes
	Ethernet board	Partner ID	▶	"Ethernet board" identification information (S/N, P/N, WK, etc.)
	Wi-fi board	Partner ID	▶	"Wi-Fi board" identification information (S/N, P/N, WK, etc.)
Data logger	▶	▶	▶	Acquisition of the system data in real time
Event log	Alarms & Warnings	▶	▶	Reading and downloading of the alarms and warnings log
	Variables	▶	▶	Reading and downloading of the variables log

TAB	Level 1 TAB.	Level 2 TAB.	Command/Option	Description
Setup	DC Side	►	Vstart1	Setting of the value of the activation voltage of channel 1
		►	Vstart2	Setting of the value of the activation voltage of channel 2
		►	TprotUV	Setting of the duration of intervention of the UnderVoltage protection (time during which the inverter remains connected to the grid following the detection of an input UV)
		►	MPPT Scanning	Possibility of activating/deactivating the MPPT scanning function and setting the time interval between scans
		►	MPPT Noise Amplitude	possibility of modifying the MPPT noise amplitude
	AC Side	Grid connection (parameters which define the possibility of the inverter connecting to the grid)	Max grid voltage for connection	Maximum permitted grid voltage allowing connection to the grid
			Min grid voltage for connection	Minimum permitted grid voltage allowing connection to the grid
			Max grid frequency for connection	Maximum permitted grid frequency allowing connection to the grid
			Min grid frequency for connection	Minimum permitted grid frequency allowing connection to the grid
			Check time before connection or after generic fault	Time at which the inverter performs the checks of the grid before connection to the grid as first connection or after a generic fault (not a grid fault)
			Check time before connection after grid fault	Time at which the inverter performs the checks of the grid before connection to the grid after a fault of one of the grid parameters
			Slow ramp enable/disable	Enables/disables the ramp for admission of power to the grid
			Ramp Slope [%Pn/min]	Slope of the ramp for admission of power to the grid
			Ramp Slope fault [%Pn/min]	Slope of the ramp for admission of power to the grid after disconnection due to a fault
		Grid protection (parameters which define the possibility of disconnection of the inverter from the grid)	U>> Maximum grid voltage	Protection enabling/disabling
				Protection threshold value
				Duration of intervention of the protection
			U> Maximum grid voltage	Protection enabling/disabling
				Protection threshold value
				Duration of intervention of the protection
			U< Minimum grid voltage	Protection enabling/disabling
				Protection threshold value
				Duration of intervention of the protection
			U<< Minimum grid voltage	Protection enabling/disabling
				Protection threshold value
				Duration of intervention of the protection
			U<<< Minimum grid voltage	Protection enabling/disabling
				Protection threshold value
				Duration of intervention of the protection
			F>> Maximum grid frequency	Protection enabling/disabling
				Protection threshold value
				Duration of intervention of the protection
			F> Maximum grid frequency	Protection enabling/disabling
				Protection threshold value
				Duration of intervention of the protection
			F< Minimum grid frequency	Protection enabling/disabling
				Protection threshold value
				Duration of intervention of the protection
			F<< Minimum grid frequency	Protection enabling/disabling
				Protection threshold value
				Duration of intervention of the protection
			K LVRT	Low voltage ride-through coefficient, regulates the reactive current during a grid dip

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TAB	Level 1 TAB.	Level 2 TAB.	Command/Option	Description
Setup	AC side	High frequency derating (reduction of the active power admitted to the grid due to high grid frequency)	Frequency threshold for power derating start	Limit frequency value for starting derating
			Frequency threshold for derating stop	Limit frequency value for stopping derating
			Power/frequency slew rate	Slew (W/Hz) for limiting the active power due to a high grid frequency
			Restore time after OF derating	Time necessary to restore normal operation of the inverter after the frequency has returned to within the range
			Derating Mode	Disabled
				BDEW mode
				VDE AR-N mode
				CEI 0-21 mode
			Intentional delay time	Setting of the delay starting frequency derating
			Release ramp EN/DIS	Enables/disables the ramp for admission of power to the grid
		Vgrid rise suppression (max AVG Vgrid) (protection/derating due to high average grid voltage values)	Protection enable/disable	Enables/disables the disconnection of the grid if the average grid voltage value exceeds the limit set
			Derating enable/disable	Enables/disables the derating of the active power to prevent the average grid voltage from exceeding the threshold value set and causing disconnection of the inverter from the grid.
			Protection threshold	Threshold value of the average voltage overvoltage protection
		Anti Islanding	Active A.I.	Enables/disables the islanding protection (active)
			Active A.I. freq drift	Enables/disables the checking of the grid by means of a frequency chirp
			Passive A.I.	Enables/disables the islanding protection (passive)
			Passive A.I. Δt	Checks the passive protection at a given time
			Passive A.I. DEG	Checks the passive protection for an grid frequency amplitude
		LVRT/HVRT LFRT/HFRT	►	Low voltage ride-through coefficient, regulates the reactive current during a grid dip
	Special functions	►	Remote On/Off contact management (ext command)	Enables disables the switching off of the inverter by of the remote ON/OFF signal
			Reset mode	Manual unlocking in the event of errors linked with the grid parameters (for the Japanese grid standard)
			Radio frequency Inj	Sets a frequency interval for any conveyed wave signals, which the inverter must not identify as grid errors
			Digital alarm cont.	Sets the configuration of the alarm contact
	Ground Fault Interface	►	Minimum R_iso	Setting of the R_iso limit value allowing connection to the grid
			Minimum time for R_iso check	Setting of the insulation resistance (R-iso) measurement time
	Clock	►	►	Inverter data and time settings
	Digital input	►	User Inputs	Setting of the digital input contacts
	Digital output	►	User Outputs	Setting of the digital output contacts
	Serial Links	►	User links	Settings of the communication protocol, RS485 line serial address, baud rate
	Night startup mode	►	Night mode EN/DIS	Enables/disables night operation
			Max Vin for connection	Sets the max input voltage allowing connection of the inverter
			Min Vbulk for connection	Sets the min bulk voltage allowing connection of the inverter
			Check for connection timeout	Sets the waiting time before connection to the grid

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TAB	Level 1 TAB.	Level 2 TAB.	Command/Option	Description
Power reduction	User power reduction	Actual max power value percent	▶	percentage limitation of power set leaving the inverter
		New max power percent	▶	new percentage power limitation value set leaving the inverter
		Smooth time [s]	Slope mode	fixes the slope of the ramp, time necessary to range from 0 to 100% of the Pmax
			Trip-time mode	Time necessary to pass from the current Pout to the new power value set
	P. limits	P regulation max value [W]	▶	limitation of power leaving the inverter
		P regulation value at cos-phi=0.9 [W]	▶	limitation of power leaving the inverter at cos-phi 0.9
		Smax [VA]	▶	Maximum apparent power
		P regulation MIN smooth time [s]	▶	Minimum power regulation for smooth time
Reactive Power Regulation	Select regulation mode	Regulation mode	No regulation	No regulation of the reactive power
			cos(phi) fixed	Setting of the power factor to a fixed value
			Q fixed	Setting of Tan-phi (Q/P) to a fixed value
			cos(phi)=f(P)	Power factor as a function of the active power supplied by the inverter
			Q(U)	Reactive power as a function of the grid voltage measures by the inverter
	cos(phi)=f(P) curve set-up	▶	cos(phi)=f(P) characteristic construction (4 points)	Setting of the 4 values of P/Pn% and of the relative values of cos-phi necessary to create the curve of admission of reactive power required
			Lock-in/lock-out voltage thresholds enable/disable	Enabling/disabling of the lock-in/lock-out voltage thresholds
			Lock-in/lock-out voltage thresholds setting	Setting of the lock-in and lock-out voltage thresholds
			Check and graph my table	Displaying of the cos(phi)=f(P) curve created by setting the values of P/Pn% and relative cos-phi
			Read table from device	Reading of the cos(phi)=f(P) curve set on the inverter
			Restore default curve	Restoring of the original cos(phi)=f(P) curve
			Write my table on device	Memorization of the cos(phi)=f(P) curve in the inverter
	Q(U) curve set-up	▶	Q(U) characteristic construction (4 points)	Setting of the 4 values of the Vout and of the relative values of Q/Pn% necessary to create the curve of admission of reactive power required
			Lock-in/lock-out active power thresholds en/dis	Enabling/disabling of the lock-in/lock-out voltage thresholds
			Lock-in/lock-out active power thresholds setting	Setting of the lock-in and lock-out voltage thresholds
			Check and graph my table	Displaying of the Q=f(U) curve created by setting the values of P/Pn% and relative cos-phi
			Read table from device	Reading of the Q=f(U) curve set on the inverter
			Restore default curve	Restoring of the original Q=f(U) curve
			Write my table on device	Memorization of the Q=f(U) curve in the inverter

The sections (TABs) highlighted in grey, relating to the advanced configuration of the inverter (INSTALLER access level), are only available by logging in on the menu "Configuration > Setup Area access".

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Checking the communication

1 - Connect the inverter to the signal converter (refer to the instructions given in the product manual)
2 - Connect the converter to the PC

To check with which COM port the converter has been associated, refer to the procedure "Checking the COM port associated with the signal converter" in this manual

3 - Open the Aurora Manager LITE software
4 - Apply the communication configuration settings (refer to the Communication Menu paragraph in this manual)
5 - Scan the RS485 bus (using the refresh button)
6 - Check the functions available on the Unit ID and Monitoring tabs (refer to the paragraph relating to the Unit ID tab and the Monitoring tab in this manual)

Checking the COM port associated with the signal converter

1 - From START, go to the "Control panel"
2 - Select "Device management"
3 - Select "Ports (COM and LPT)"
4 - Check "Communication port (COM)"

Next to the port selected is indicated the name of the COM (in the example COM4) that must be selected in the Aurora Manager Software communication settings.
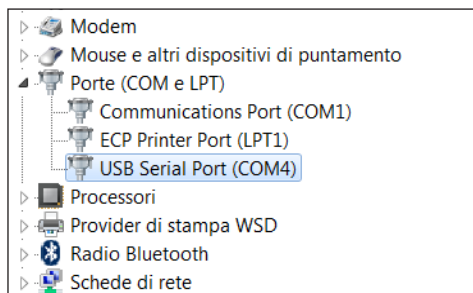
5 - Double-clicking on the USB port takes you to the port properties screen. On the "general" tab, check that the manufacturer is FTDI.
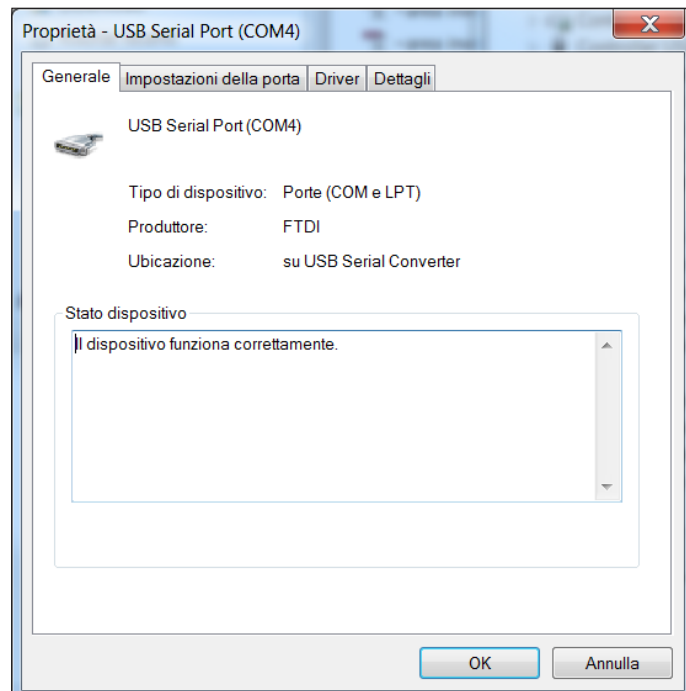
Analogic inputs configuration procedure

1 - Follow the procedure for "Checking the communication"
2 - Apply the settings relating to the ANALOGIC INPUTS (refer to the "Partner devices - Communication Board" tab in this manual)

String monitoring configuration procedure

1 - Follow the procedure for "Checking the communication"
2 - Apply the settings relating to the STRING MONITORING (refer to the "Partner devices - Fuse Control Board" tab - "Global settings" tab)

Inverter firmware updating procedure

1 - Carry out the procedure for "Checking the communication"
2 - Check that you have the .tib file containing the new FW to be installed on the inverter
3 - Follow the instructions given in the paragraph relating to the "Program" menu in this manual

Description of the menus

4

"Communication" menu

Used to configure the parameters relating to the communication with the inverters connected to the RS485 bus.

🖥 Communication	⚙ Program	✖ Configuration	⬛ Window	ⓘ Help	🔌 Exit
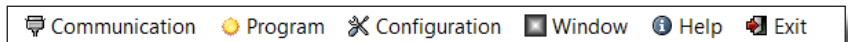
The Communication menu consists of two submenus:

🖥 Communication
COM setting
Unit scan setting
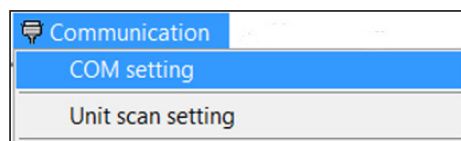
Cᴏᴍ Setting:

Used to select the COM port to which the converter being used for communication with the unit(s) is connected and the baud rate (speed of communication of the devices on the RS485 bus).

To identify the COM port to which the converter is connected, follow the dedicated procedure (Checking the COM port associated with the signal converter).
The baud rate must be set at 19200.

Communication

COM settings

COM to use	COM4 ▼
Baud-rate	19200 ▼

Apply
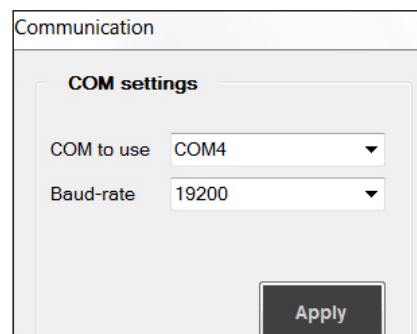
The maximum scanning address that has been set is displayed on the information bar (at the bottom left):

Working on COM10 at 19200bps...	MAX. RS485 address is 64...

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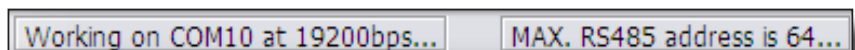
Unit Scan setting:

Used to set a limit for the number of addresses that the Software scans during use. The default value set is 64 (maximum value that can be set on the inverters), so the software scans the entire RS485 bus.

E.g. if the communication line consists of 5 inverters to which have been assigned (from the display) the addresses 2, 3, 4, 5, 6, in this section "6" can be set to limit the time required for scanning.
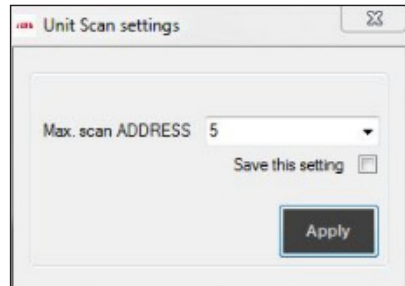
"Program" menu

This section of the program permits updating of the inverter Firmware.
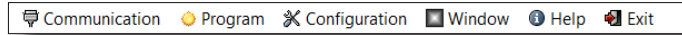
Updating the inverter Firmware is process which may become necessary to improve the performance of the inverter or increase its functions. Updating the Firmware requires the availability of the Firmware package with which to carry out the update itself: this can be downloaded from the site https://registration.abbsolarinverters.com/ or requested from ABB Service and is issued as a .tib file, to be used directly via Aurora Manager LITE in accordance with the instructions described below.

Disconnect the inverter from the grid before reprogramming the firmware. This can be done using Aurora Manager Lite on the tab Setup> Special Function> Remote ON/OFF at OFF and enter SET.

The Program menu consists of a single submenu:
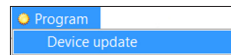
As the first operation, the settings of the "Communication Setup" field must be applied:

Not configurable: the converter used is model PVI-USB-RS485_232.

The Scan all addresses function can be used to select all the inverter addresses during the scan of the RS485 bus (to be carried out during the following steps).
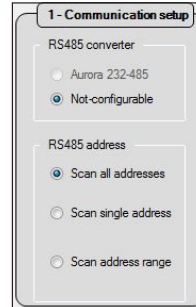
Next the RS485 bus must be scanned to identify the inverters connected, using the "SEARCH RS485 LINE" button
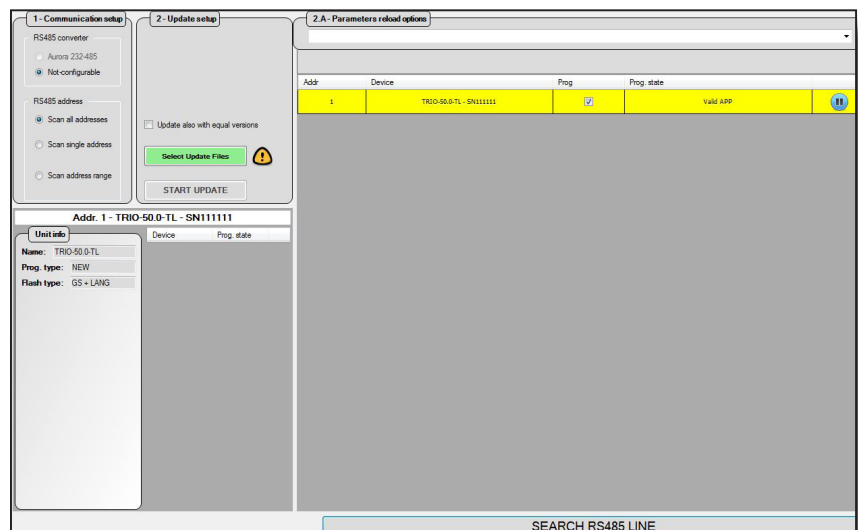
Once the scan is complete, the inverters that require a Firmware update must be selected (by default all inverters detected during the scan are selected). If several inverters are selected, Aurora Manager LITE will program the units selected sequentially

Select the file containing the new Firmware to be installed using the "Select Update Files" button. The extension of the file to be used should be [.tib]. Once the new Firmware has been uploaded correctly, Aurora Manager will display the following window:

The last operation to be carried out is to confirm the Firmware upgrade using the "START UPDATE" button.

The Firmware upgrade process takes place sequentially for all the inverters that require it based on the Firmware present in the .tib file
The entire reprogramming process takes approximately 20 minutes per inverter

Once the programming is complete, the inverter connects to the grid automatically, resetting the remote OFF command set previously.

The end of the programming phase will be indicated by the following window.
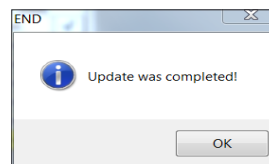
Once the programing phase is complete, a report relating to the outcome of the reprogramming will be generated automatically and filed on C:\Programmi\ABB\Aurora Manager\ liteFW_update_reports. To check that the reprogramming has taken place, the UNIT ID > device info > Update version tab will indicate the new file with extension .tib.

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"Configuration" menu

Used to assign/change the address of the inverters connected to the RS485 bus.
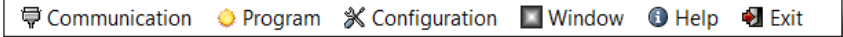
The Configuration menu consists of two submenus:
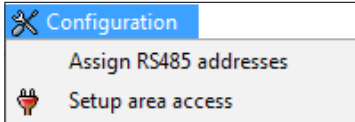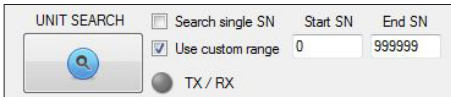

Assign RS485 address:

This function is particularly useful if there is a large number of inverters in the RS485 chain as it can be used to assign the RS485 address automatically, therefore without having to interact with the display of each inverter in the system.
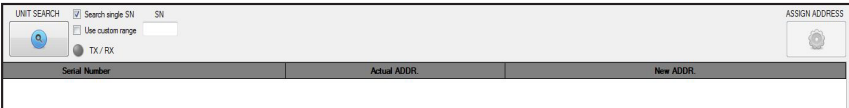
By putting a check mark in the search for an individual inverter by serial number and clicking on "UNIT SEARCH", you see in the table the inverter searched for with indication of the S/N of the inverter, the current RS485 address and the new RS485 address that you wish to assign.
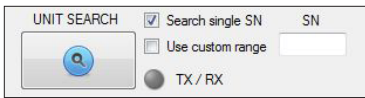
For systems consisting of several units, it is possible to scan all the inverters by putting a check mark in "Use Custom Range"


Displaying a table that shows: serial number of the inverters - current address - new address.

The "Assign Address" button can be used to change the 485 addresses, defined in the "New ADDR" field.
For the commissioning phase (all inverters have an address pre-set at 1) Aurora Manager Lite will display a progressive address (editable)

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For the maintenance phase (the inverters already have an assigned progressive address) the field "New ADDR" will give the address already set, to be changed manually if necessary.
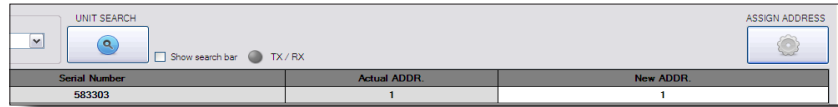
On completion of the RS485 address assigning procedure, it is advisable to refresh the list of inverters to check that the address has been assigned to each inverter correctly.

Setup area access:

Used to enter the personal data required for access to the INSTALLER level and so unlock the areas of Aurora Manager Lite relating to the advanced configuration of the inverter.

The personal data and the password to be entered are the same as those used when registering on the site https://registration.abbsolarinverters.com/

Once the personal data has been entered, press ENTER. Aurora Manager LITE will allow you to carry out the advanced configuration of the inverter.
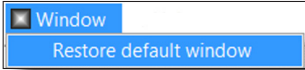

To obtain the password, register on the site https://registration.abbsolarinverters.com/ where, on entering your personal data, you will receive an e-mail with the login details.

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"Window" menu

Used to resize the software interface window to the default size.

| 🖥 Communication | ☀ Program | ✂ Configuration | ▣ Window | ⓘ Help | 🔌 Exit |
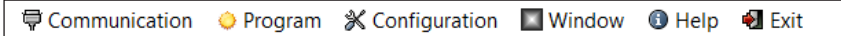
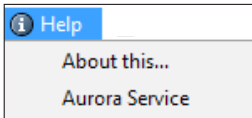The Window menu consists of a single submenu:

| ▣ Window |
| Restore default window |

"Help" menu

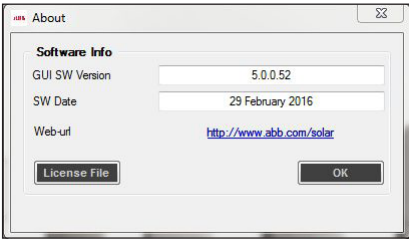Used to obtain the ABB Service contact details and information about the Aurora Manager LITE Software version
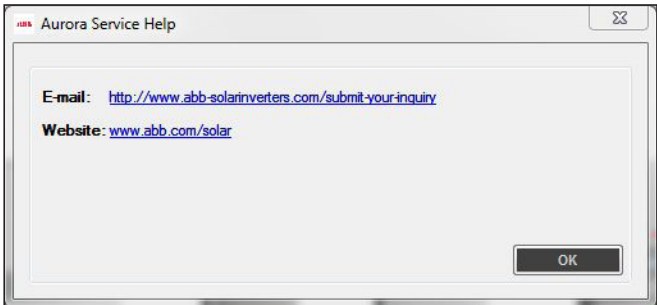
| 🖥 Communication | ☀ Program | ✂ Configuration | ▣ Window | ⓘ Help | 🔌 Exit |
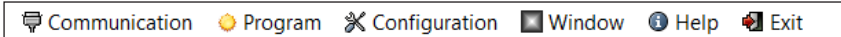
The Help menu consists of two submenus:

| ⓘ Help |
| About this... |
| Aurora Service |

About this:

Go to the "About This" submenu for information about the Aurora Manager LITE software such as, for example, the Software version

About

Software Info

GUI SW Version	5.0.0.52
SW Date	29 February 2016
Web-url	http://www.abb.com/solar

License File   OK

Aurora Service:

Go to the "Aurora Service" submenu for the ABB Service contact details

Aurora Service Help

E-mail: http://www.abb-solarinverters.com/submit-your-inquiry

Website: www.abb.com/solar

OK

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Inverter working area

5

After having configured the parameters relating to the Communication menu, the RS485 bus can be scanned to search for the inverters connected to it via the PVI-USB-RS485_232 signal converter.
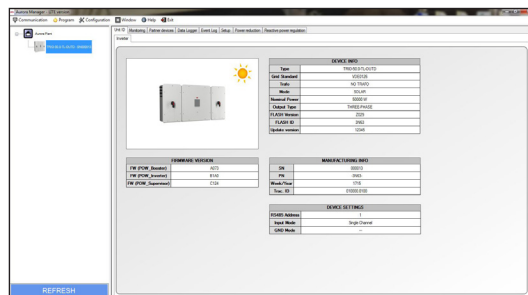
The scan is carried out by clicking on the "REFRESH" button at the bottom left.

Once the scan is complete, the inverters identified are shown in the tree structure of the system.
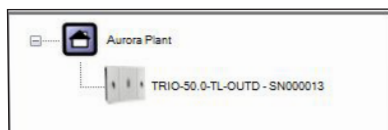
By selecting one of the inverters, the functions are made available in the work area relating to the inverter.

The default functions of Aurora Manager Lite (gaining access with the USER level) are:

1 - **Unit ID tab**
2 - **Monitoring tab**
3 - **Partner Devices tab**
4 - **Data Logger tab**
5 - **Event Log tab**
6 - **Setup tab (**INSTALLER access level**)**
7 - **Power Reduction tab**
8 - **Reactive power regulation tab** (some functions active with INSTALLER access)

"Unit ID" tab

Displays the "identity card" of the inverter selected.
Tabs relating to TRIO-50.0-TL-OUTD string inverter:

Tabs relating to CORE centralized inverter (Power Converter):

Tabs relating to CORE centralized inverter (System Controller):

The information available is divided into 4 categories:

Device Info: General information relating to the inverter.
Manufacturing Info: Inverter identification information.
Device Settings: General information relating to the settings applied on the inverter.
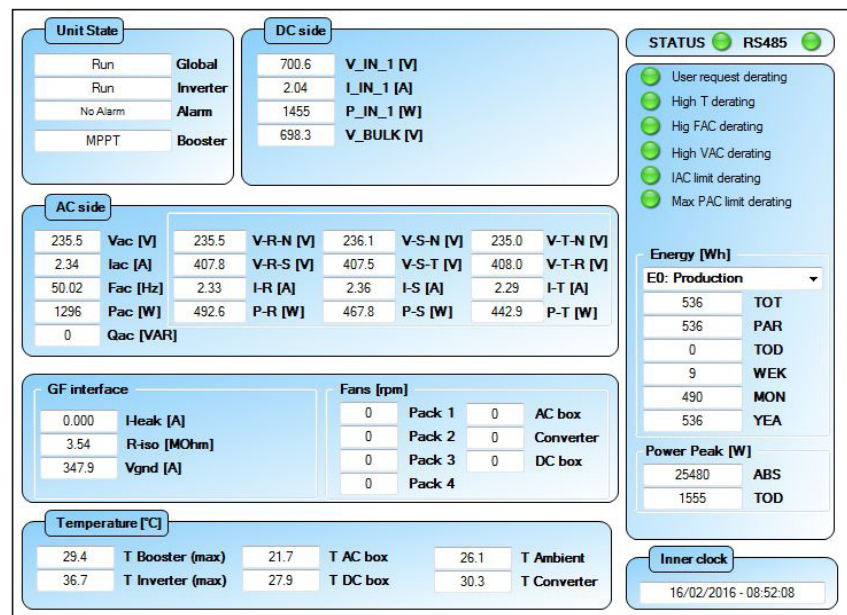Firmware version: Information relating to the firmware installed on the inverter.

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"Monitoring" tab

The displaying of this menu differs depending on the type of inverter to which Aurora Manager Lite is connected:
1 - TRIO-50.0-TL string three-phase
2 - TRIO-20./27.6-TL string three-phase
3 - CORE centralized inverters

1 - Displaying of the TRIO-50.0-TL string inverter instantaneous monitoring data:

Unit State		DC side						STATUS ● RS485 ●
Run	Global	700.6	V_IN_1 [V]					
Run	Inverter	2.04	I_IN_1 [A]					● User request derating
No Alarm	Alarm	1455	P_IN_1 [W]					● High T derating
MPPT	Booster	698.3	V_BULK [V]					● Hig FAC derating

AC side

235.5	Vac [V]	235.5	V-R-N [V]	236.1	V-S-N [V]	235.0	V-T-N [V]
2.34	Iac [A]	407.8	V-R-S [V]	407.5	V-S-T [V]	408.0	V-T-R [V]
50.02	Fac [Hz]	2.33	I-R [A]	2.36	I-S [A]	2.29	I-T [A]
1296	Pac [W]	492.6	P-R [W]	467.8	P-S [W]	442.9	P-T [W]
0	Qac [VAR]						

STATUS indicators:
- ● High VAC derating
- ● IAC limit derating
- ● Max PAC limit derating

GF interface

0.000	I-leak [A]
3.54	R-iso [MOhm]
347.9	Vgnd [A]

Fans [rpm]

0	Pack 1	0	AC box
0	Pack 2	0	Converter
0	Pack 3	0	DC box
0	Pack 4		

Energy [Wh] — E0: Production

536	TOT
536	PAR
0	TOD
9	WEK
490	MON
536	YEA

Power Peak [W]

25480	ABS
1555	TOD

Temperature [°C]

29.4	T Booster (max)	21.7	T AC box	26.1	T Ambient
36.7	T Inverter (max)	27.9	T DC box	30.3	T Converter

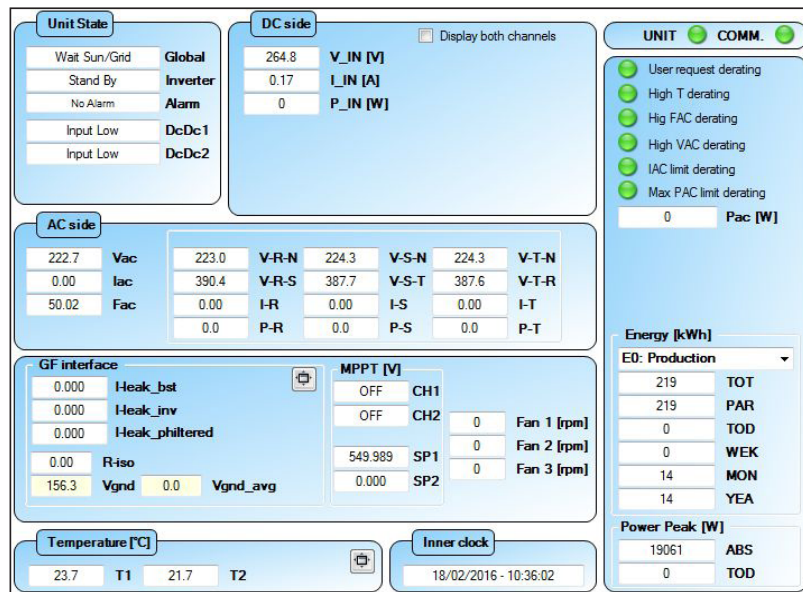**Inner clock**

16/02/2016 - 08:52:08

The data available relates to:
- "Unit State": General state of the inverter
- "DC side": Input parameters
- "AC side": Output parameters
- "GF Interface": Parameters relating to the insulation of the PV generator
- "Fans": Information about the fans in the inverter (revolutions per minute rpm)
- "Temperature [°C]": Internal temperature of the Inverter
- "Inner Clock": Inverter Date and Time
- Indicators relating to the general state of the inverter (status), to the 485 (RS 485) serial communication and power derating
- Statistical data relating to the production of energy by the inverter

The indicators can assume three different states:
- Green LED indicates correct operation
- Red LED indicates alarm
- Orange LED indicates warning

2 - Displaying of the TRIO-20.0/27.6-TL string inverter instantaneous monitoring data:

Unit State		DC side		Display both channels	UNIT ● COMM. ●

The data available relates to:
- "Unit State": General state of the inverter
- "DC side": Input parameters
- "AC side": Output parameters
- "GF Interface": Parameters relating to the insulation of the PV generator
- "MPPT[V]: Automatic scanning of MPPT ON/OFF, SP1-SP2 voltage values at which the inverter works if MPPT is at OFF.
- "Fans": Information about the fans in the inverter (revolutions per minute rpm)
- "Temperature [°C]": Internal temperature of the Inverter
- "Inner Clock": Inverter Date and Time
- Indicators relating to the general state of the inverter (status), to the 485 (RS 485) serial communication and power derating
- Statistical data relating to the production of energy by the inverter

The indicators can assume three different states:
- Green LED indicates correct operation
- Red LED indicates alarm
- Orange LED indicates warning

The "GF Interface" field can be expanded to display more information about the Leakage current and the ground insulation resistance measured by each of the inverter's calculation devices.
The "MPPT [V]" field, if ON (default), permits automatic scanning of the maximum power point. If OFF, only scans after a reconnection to the grid. SP1-SP2 indicate the inverter working input voltages if the MPPT point search function is disabled.

000132BG
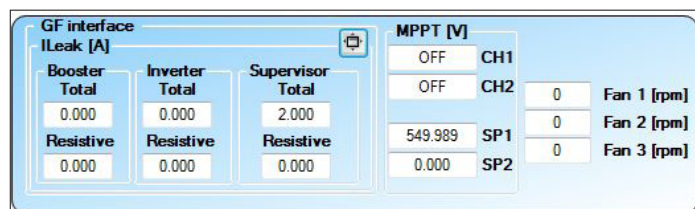
The "temperature [°C]" field can be expanded to display more information about the temperatures measured by the various temperature sensors in the inverter:

Temperature [°C]			
21.7	T Booster	23.5	T Inverter R
23.7	T Inverter (max)	23.3	T Inverter S
28.1	T Ambient	23.7	T Inverter T

3 - Displaying of theinstantaneous monitoring data of the CORE centralized inverter CORE (Power Converter).


The data available relates to:
- "Unit State": General state of the conversion box
- "DC side": Box input parameters
- "AC side": Box output parameters
- "Fans": Parameters relating to the operating state of the fans (revolutions per minute: rpm)
- "Temperature [°C]": Internal temperature of the Inverter
- "Inner Clock": Inverter Date and Time
- Indicators relating to the general state of the inverter (status), to the 485 (RS 485) serial communication and power derating
- Statistical data relating to the production of energy by the inverter

*The indicators can assume three different states:*
- Green LED indicates correct operation
- Red LED indicates alarm
- Orange LED indicates warning

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"Partner Devices" tab

Displays the tree structure of the logic and/or signal acquisition boards present in the inverter.
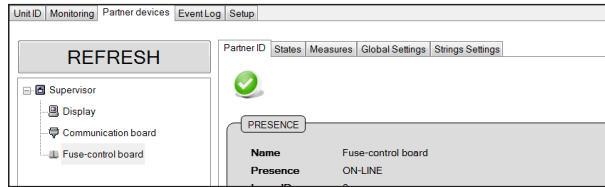
Used to associate a new component of the inverter, either in the event of replacement of an auxiliary part or in the event of the addition of an expansion board.
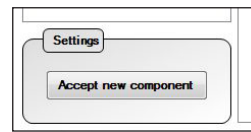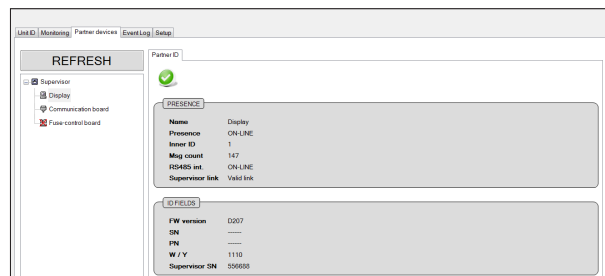

Select one of the boards present in the tree structure for more information.

"Partner ID" tab (display board)

(Depending on the inverter model, the tab may differ or may not be present, refer to the product manual)
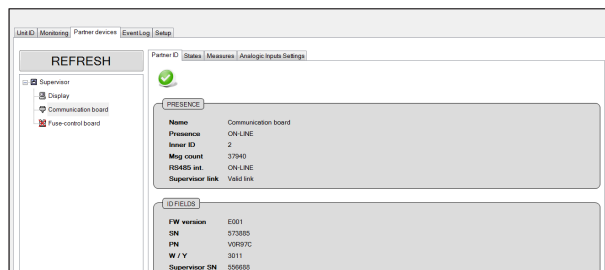Displays the display identity card

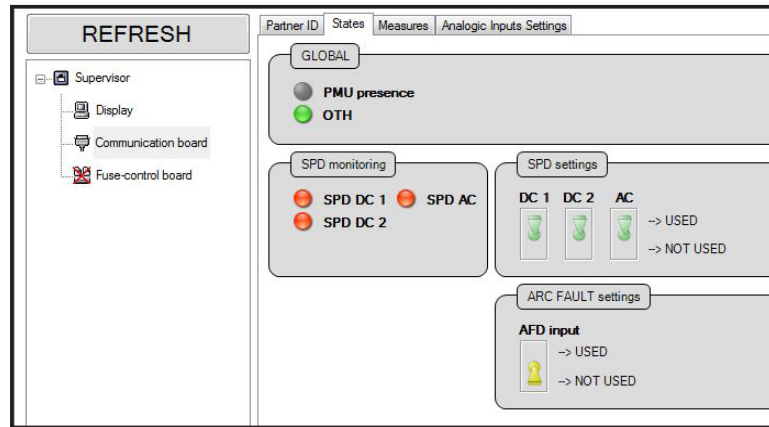# "Partner ID" tab (Communication board)

(Depending on the inverter model, the tab may differ or may not be present, refer to the product manual)
Displays the communication board identity card

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"States" tab (Communication board)

Displays the operating state of the devices monitored by the board.

In particular in the Global section:

PMU presence indicates the presence of the PMU device

OTH indicates the state of the temperature protection

In the SPD monitoring section:

The state of the dischargers (SPD) is indicated, DC side and AC side.

In the SPD settings section:

The monitoring of the DC and AC dischargers is enabled.

Arc fault settings section:

The Arc fault protection is enabled.

The indicators can assume three different states (colors):

- green correct operation

- red damage to the part indicated

- gray functionality not checked

## "Measurements" tab (Communication board)

Displays the values of the analogic and environmental inputs acquired

The number of measurement values acquired varies according to the settings applied on the "Analog Input Settings" tab as, if the reading of the analogic sensors is enabled the value of the measurement converted to the actual value is displayed

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"Analog Input Settings" tab (Communication board)

Used to enable/disable the analogic inputs connected to the inverter in addition to the possibility of applying the settings relating to the AN1 and AN2 analogic inputs. For each of the analogic sensors it is possible to set the Gain, the offset and the unit of measurement. The data will be saved in the inverter on confirming by pressing the SET button.
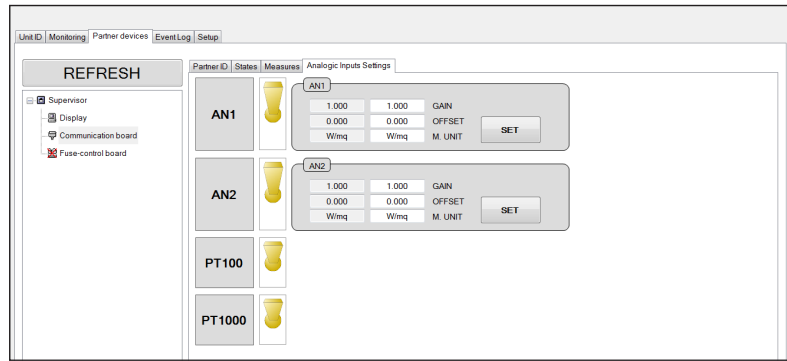
Below are indicated the values to be set for the ABB sensors that can be connected to the inverter:

	Type	Gain	Offset	U.of.M.
PVI-AEC-IRR	Radiation sensor	120	0	W/m²
PVI-AEC-IRR-T	Radiation sensor with integrated cell temp. sensor	Radiation: 120 Cell temp.: 10.869	Radiation: 0 Cell temp.: -20	Radiation: W/m² Cell temp.: °C
PVI-AEC-RAD-13TC	Radiation sensor	130	0	W/m²
PVI-AEC-RAD-13-TC-T	Radiation sensor with integrated cell temp. sensor	Radiation: 130 Cell temp.: 11.507	Radiation: 0 Cell temp.: -26.1	Radiation: W/m² Cell temp.: °C
PVI-AEC-CONV-T100	PT100/0...10V converter	15	-50	°C at 0...10V
PVI-AEC-T1000-INTEGR	Ambient temperature sensor with integrated converter	10	-50	°C
PVI-AEC-WIND-COMPACT	Wind speed sensor	5	0	m/s
PVI-AEC-PYR-1300	Pyranometer (0...1300W/m²)	65	0	W/m²
PVI-AEC-T100-ADH	Module temperature sensor (back cell) PT100 adhesive	N/A	N/A	N/A
PVI-AEC-T1000-BOX	Ambient temperature sensor PT1000	N/A	N/A	N/A

"Partner ID" tab (Fuse Control Board)

(Depending on the inverter model, the tab may differ or may not be present, refer to the product manual)
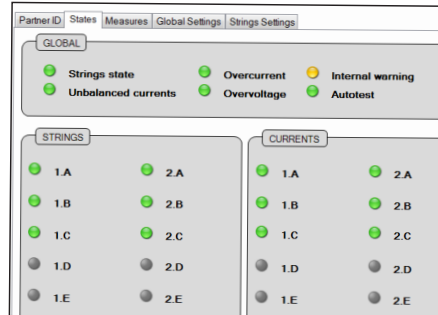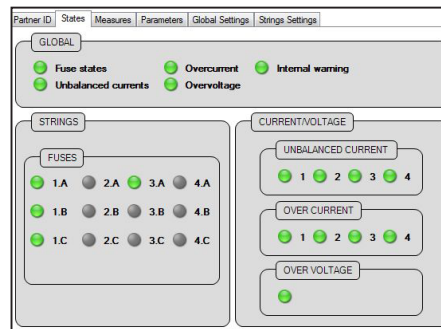Displays the board's identity card
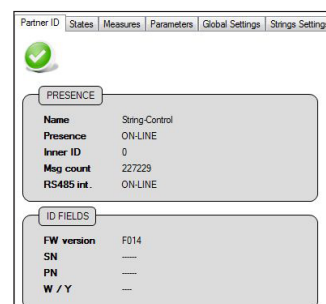
"States" tab (Fuse Control Board)

Displays theoperating state of the parameters monitored:

- Image relating to the TRIO-20.0-TL

- Image relating to the TRIO-50.0-TL

The "Global" subfield indicates the general state of the protections.

The "Strings" subfield indicates the string fuses state indicators

The "Currents" subfield relating to the TRIO-20.0/27.6-TL-OUTD indicates the state indicators for the individual string currents which in the event of an imbalance change color to red. The monitoring and displaying of the state of the string fuses can be enabled on the "Strings Setting" tab (fuse control board).

The "Current/Voltage" subfield relating to the TRIO-50.0-TL-OUTD indicates the monitoring of the voltage and of the input currents. In particular the protections relating to the currents are monitored in groups. Each group consists of 3 or 4 strings, depending on the DC wiring box model installed on the inverter (12 or 16 inputs).

The indicators can assume 4 different states (colors)
- green correct operation
- red alarm active
- orange warning active
- gray function not enabled (OFF position on the "strings settings" tab)

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"Measures" tab (Fuse Control Board)

Displays the values of the parameters relating to the strings connected as input (image relating to the TRIO-50.0-TL)

Name	Value	Measure Unit
STRNG_VOLTAGE_1A	817.005	V
STRNG_VOLTAGE_1B	816.655	V
STRNG_VOLTAGE_1C	817.005	V
STRNG_VOLTAGE_1D	0.927	V
STRNG_VOLTAGE_2A	59.393	V
STRNG_VOLTAGE_2B	59.393	V
STRNG_VOLTAGE_2C	60.094	V
STRNG_VOLTAGE_2D	0.577	V
STRNG_VOLTAGE_3A	819.105	V
STRNG_VOLTAGE_3B	61.844	V
STRNG_VOLTAGE_3C	62.544	V
STRNG_VOLTAGE_3D	0.927	V
STRNG_VOLTAGE_4A	57.993	V
STRNG_VOLTAGE_4B	59.393	V
STRNG_VOLTAGE_4C	60.794	V
STRNG_VOLTAGE_4D	0.577	V
STRNG_VOLTAGE_GROUP1	811.753	V
GROUP_CURRENT_1	16.612	A
GROUP_CURRENT_2	0.179	A
GROUP_CURRENT_3	5.529	A
GROUP_CURRENT_4	0.052	A

"Parameters" tab (Fuse Control Board)

Displays the parameters set via "Global settings" and "String Settings" (Fuse control board) during the installation phase.
It is possible to extend the configuration of the strings and protections to all or some of the inverters connected to the same 485 line.

| Partner ID | States | Measures | Parameters | Global Settings | Strings Settings |

Name	Value	Measure Unit
CURRENT_CHECK_FLAG	15	--
CURRENT_WEIGHT_1	1	--
CURRENT_WEIGHT_2	1	--
CURRENT_WEIGHT_3	1	--
CURRENT_WEIGHT_4	-1	--
CURRENT_WEIGHT_5	0	--
CURRENT_WEIGHT_6	0	--
CURRENT_WEIGHT_7	0	--
CURRENT_WEIGHT_8	-1	--
CURRENT_WEIGHT_9	1	--
CURRENT_WEIGHT_10	0	--
CURRENT_WEIGHT_11	0	--
CURRENT_WEIGHT_12	-1	--
CURRENT_WEIGHT_13	0	--
CURRENT_WEIGHT_14	0	--
CURRENT_WEIGHT_15	0	--
CURRENT_WEIGHT_16	-1	--
MIN_CURRENT_CHECK_TH	4.000	A
OVER_VOLTAGE_TH	1000.000	V
MAX_CURRENT_DEVIATION	12.000	A
OVER_CURRENT_TH	12.000	A
MAX CURRENT DEVIATION TRIP TIME	30	s

| Write this configuration on all connected inverters | Write this configuration choosing inverter by serial number and RS485 address |

Pressing the *"Write this configuration on all connected inverters"* button extends to all the inverters that make up the system, connected to the same 485 serial.
Pressing the *"Write this connection choosing inverter by s/n and RS485 address"* button extends the configuration only to the inverters required in 485 address order.

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"Global Settings" tab (Fuse Control Board)

Used to apply the settings relating to the check of the input currents. Depending on the type of inverter, different screens will be displayed:

1. Screen relating to the TRIO-20.0/27.6-TL-OUTD

Unbalanced currents check threshold
- Absolute value of enabling of the check of imbalance of the currents (one for each of the two input MPPTs). The default value is 2A.

Overcurrent threshold
- Overcurrent threshold (one for each of the two input MPPTs). The default value is 10A.

Unbalanced currents check trip time
- Duration for which the current imbalance must be present in order for the alarm to be generated. It is recommended that this parameter is set to more than 900 seconds to avoid false alarms.

By clicking on "SET" the values are set in the fuse control board of the inverter selected.

The "DC strings self-test" function is used to enable the function for checking the polarity of the string voltages during the first start-up of the inverter.

2. Screen relating to the TRIO-50.0-TL-OUTD

Minimum currents check threshold
- Absolute value of enabling of the check of imbalance of the currents (one for each group of 3/4 input strings). The default value is 2A.

Overcurrent threshold
- Overcurrent threshold (one for each group of input strings). The default value is 12A.

Max currents deviation
- Maximum imbalance permitted before the alarm is triggered. The default value is 2A.

Max currents deviation trip time
- Duration for which the current imbalance must be present in order for the alarm to be generated. The default value is 300 seconds.

Overvoltage threshold
- Overvoltage threshold (one for each group of input strings). The default value is 1000V.

By clicking on "SET" the values are set in the fuse control board of the inverter selected.

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"Strings setting" tab (Fuse Control Board)

Used to apply the monitoring settings for each string.

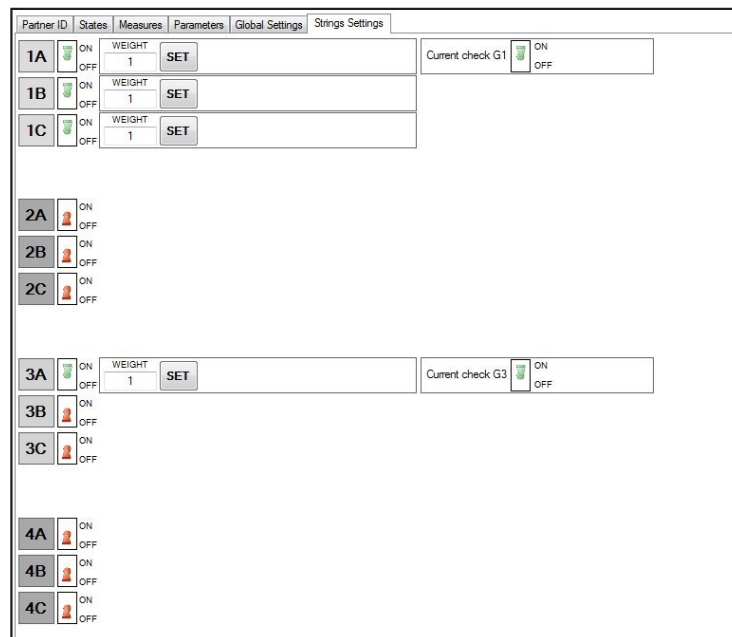Image relating to the TRIO-20.0/27.6-TL:

In particular it permits:

1. Enabling of the check of the presence of each of the input strings connected.
   The check of the presence of the individual input string is enabled by switching the selector from the OFF position to ON (by clicking on the selector)

2. Enabling of the check of the current imbalance on each input string andsetting of its current reading weight (weight = N° of strings connected in parallel to the individual string input) and tolerance (maximum imbalance permitted before the alarm is triggered) expressed as a percentage.
   The check of the string current imbalance is enabled by switching the selector from the OFF position to ON (by clicking on the selector)

By clicking on "SET" the values are set in the fuse control board of the inverter selected.

The state of enabling of the presence of each string is displayed on the "States" tab (fuse control board) together with the state of the relative fuse.

Image relating to the TRIO-50.0-TL:

In particular it permits:

1. Enabling of the check of the presence of each of the input strings connected.
   The check of the presence of the individual input string is enabled by switching the selector from the OFF position to ON (by clicking on the selector).
   When at least one string is activated, the current imbalance check is enabled (default active).

2. Setting of the current reading weight (weight = n° of strings connected in parallel to the individual input).
   The tolerance (maximum imbalance permitted before the alarm is triggered) can be set from the "Global settings - Max Currents Deviation" tab (default 2A).
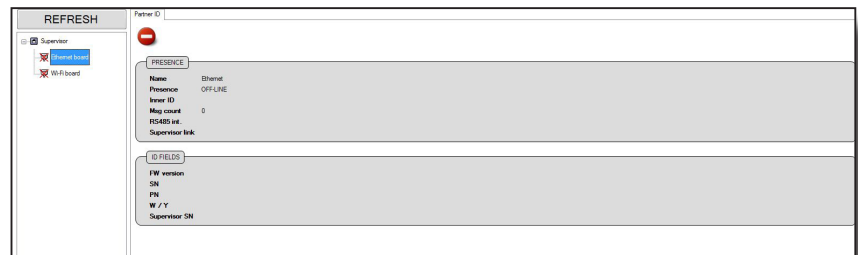
"Partner ID" tab (wi-fi board)

(Depending on the inverter model, the tab may differ or may not be present, refer to the product manual)
Displays the board's identity card
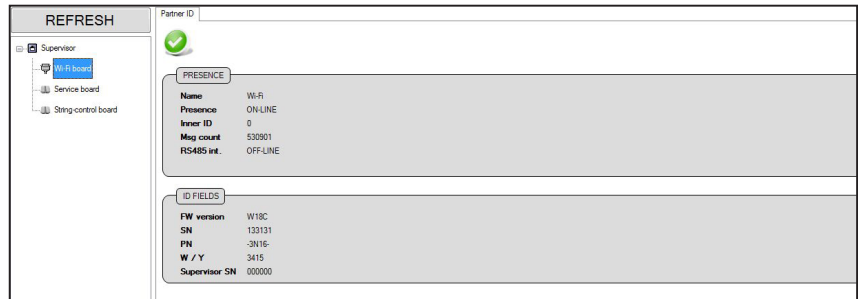
"Partner ID" tab (Ethernet board)

(Depending on the inverter model, the tab may differ or may not be present, refer to the product manual)
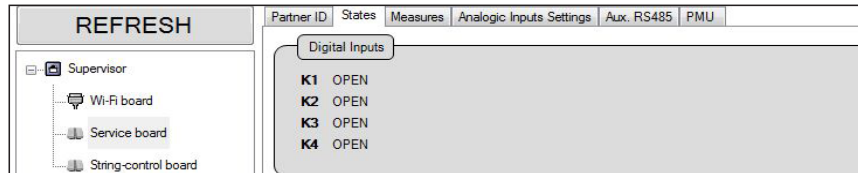Displays the board's identity card

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"Partner ID" tab (PMU board)

(Depending on the inverter model, the tab may differ or may not be present, refer to the product manual)
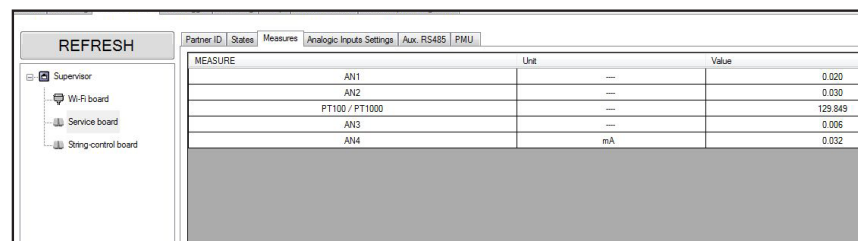Displays the board's identity card
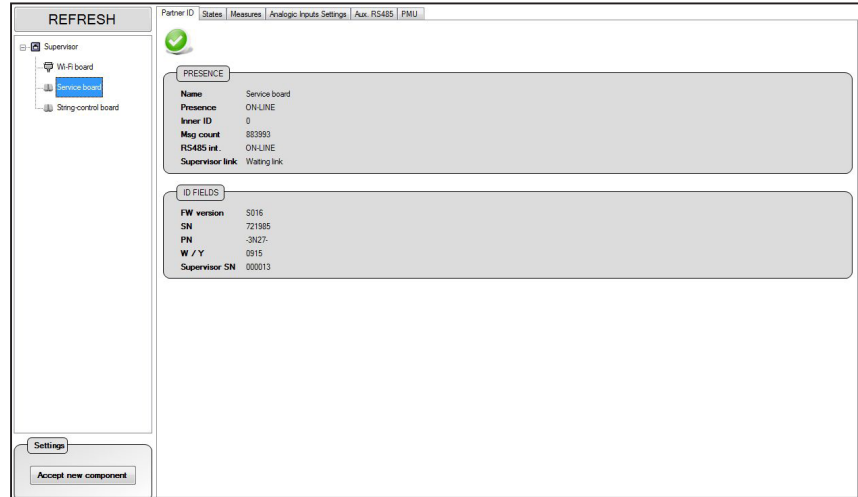
"States" tab (PMU board)

Displays the operating state of the digital inputs

"Measures" tab (PMU board)

Displays the values of the parameters relating to the analogic and environmental inputs. The parameters read will have a meaningful value if correctly enabled and configured on the "Analogic input settings" tab.

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"Analogic inputs settings" (PMU board)

Displays the settings relating to the analogic inputs
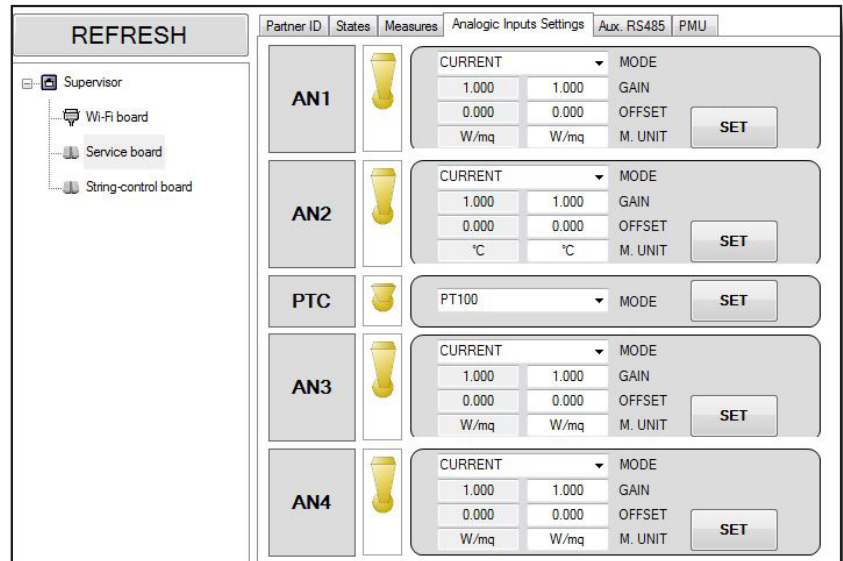
Used to enable/disable the analogic inputs connected to the inverter in addition to the possibility of applying the settings relating to the AN1/AN2/AN3/AN4 analogic inputs. For each of the analogic sensors it is possible to set the GAIN, the offset and the unit of measurement. The data will be saved on confirming by pressing the SET button.

The PTC function permits enabling/disabling of the input in PT100 or PT1000 mode according to the type of sensor connected.

Below are indicated the values to be set for the ABB sensors connected to the inverter:

|	Type	Gain	Offset	U.of.M.
PVI-AEC-IRR	Radiation sensor	120	0	W/m²
PVI-AEC-IRR-T	Radiation sensor with integrated cell temp. sensor	Radiation: 120 Cell temp.: 10.869	Radiation: 0 Cell temp.: -20	Radiation: W/m² Cell temp.: °C
PVI-AEC-RAD-13TC	Radiation sensor	130	0	W/m²
PVI-AEC-RAD-13-TC-T	Radiation sensor with integrated cell temp. sensor	Radiation: 130 Cell temp.: 11.507	Radiation: 0 Cell temp.: -26.1	Radiation: W/m² Cell temp.: °C
PVI-AEC-CONV-T100	PT100/0...10V converter	15	-50	°C at 0...10V
PVI-AEC-T1000-INTEGR	Ambient temperature sensor with integrated converter	10	-50	°C
PVI-AEC-WIND-COMPACT	Wind speed sensor	5	0	m/s
PVI-AEC-PYR-1300	Pyranometer (0...1300W/m²)	65	0	W/m²
PVI-AEC-T100-ADH	Module temperature sensor (back cell) PT100 adhesive	N/A	N/A	N/A
PVI-AEC-T1000-BOX	Ambient temperature sensor PT1000	N/A	N/A	N/A

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"Aux RS485" tab (PMU board)

Displaying and setting relating to the 485 communication protocol and relative baud rate
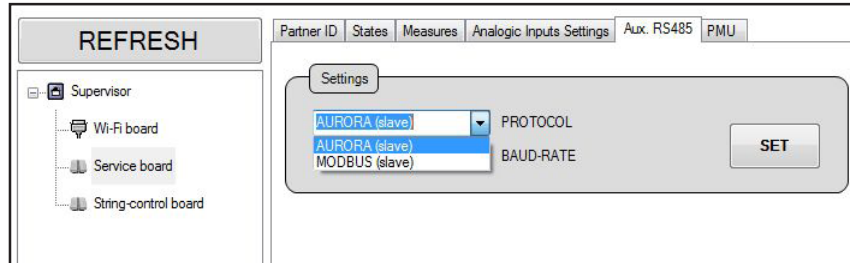
"PMU" tab (PMU board)

Displaying and setting relating to the active and reactive power management mode.
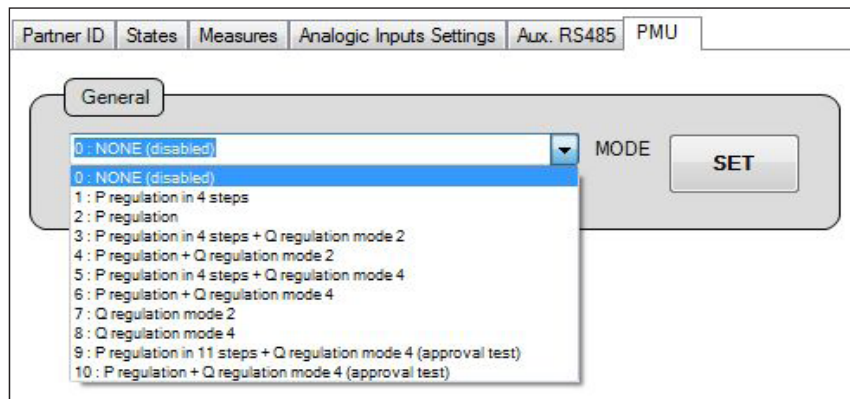
The following table indicates the active power limitation/reactive power management modes that can be selected via the PMU board:

Name on the display	Operation	Inputs
Mode 0	No PMU function selected	-
Mode 1	Reduction of the active power in 4 steps	K1, K2, K3, K4
Mode 2	Reduction of the active power by means of analogic inputs	AN3
Mode 3	Reduction of the active power in 4 steps	K1, K2, K3, K4
	Check of the reactive power by means of analogic inputs	AN4 (Type 2)
Mode 4	Reduction of the active power by means of analogic inputs	AN3
	Check of the reactive power by means of analogic inputs	AN4 (Type 2)
Mode 5	Reduction of the active power in 4 steps	K1, K2, K3, K4
	Check of the reactive power by means of analogic inputs	AN4 (Type 4)
Mode 6	Reduction of the active power by means of analogic inputs	AN3
	Check of the reactive power by means of analogic inputs	AN4 (Type 4)
Mode 7	Check of the reactive power by means of analogic inputs	AN4 (Type 2)
Mode 8	Check of the reactive power by means of analogic inputs	AN4 (Type 4)
Mode 9	Reduction of the active power in 11 steps	K1, K2, K3, K4
	Check of the reactive power by means of analogic inputs	AN4 (Type 4)
Mode 10	Reduction of the active power by means of analogic inputs	AN3
	Check of the reactive power by means of analogic inputs	AN4 (Type 4)

- Check of the active power by means of digital inputs in 4 steps
This type of check is used in operating modes 1, 3, 5.
The digital inputs for limiting the active power are K1, K2, K3 and K4

K1	K2	K3	K4	Maximum active power as % of the nominal power of the inverter
Closed	Open	Open	Open	100
Open	Closed	Open	Open	60
Open	Open	Closed	Open	30
Open	Open	Open	Closed	0

- Check of the active power by means of digital inputs in 11 steps.
This type of check is used in operating mode 9.
The digital inputs for limiting the active power are K1, K2, K3 and K4

| K1	K2	K3	K4	Maximum active power as % of the nominal power of the inverter
Open	Closed	Open	Closed	100
Closed	Open	Open	Closed	90
Open	Open	Open	Closed	80
Closed	Closed	Closed	Open	70
Open	Closed	Closed	Open	60
Closed	Open	Closed	Open	50
Open	Open	Closed	Open	40
Closed	Closed	Open	Open	30
Open	Closed	Open	Open	20
Closed	Open	Open	Open	15
Closed	Closed	Open	Closed	0

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- Check of the active power by means of an analogic input (AN3).
This type of check is used in operating modes 2, 4, 6, 10.
The analogic input for the limitation of the active power is AN3.
With this type of check the output active power can be managed dynamically based on the value of the analogic input signal. This signal may be a current (4...20mA) or a voltage (0...10V).
The limitation of the nominal output power is applied to the inverter in accordance with the graphs below (on the left → input current; on the right → input voltage):
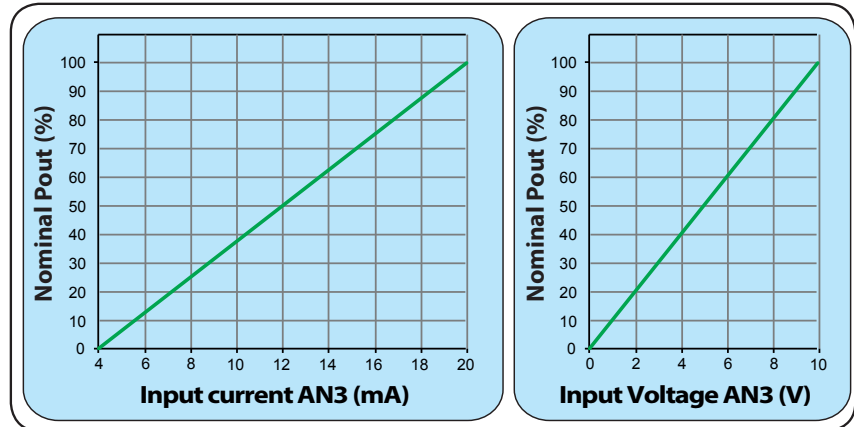
- Check of the reactive power by means of an analogic input (AN4).
This type of check is used in operating modes 3, 4, 5, 6, 7, 8, 9 and 10.
The management modes have different behaviors described below.
The analogic input for checking the reactive power is AN4.
With this type of check the reactive power can be managed dynamically based on the value of the analogic input signal. This signal may be a current (4...20mA) or a voltage (0...10V).
There are 2 reactive power management modes:

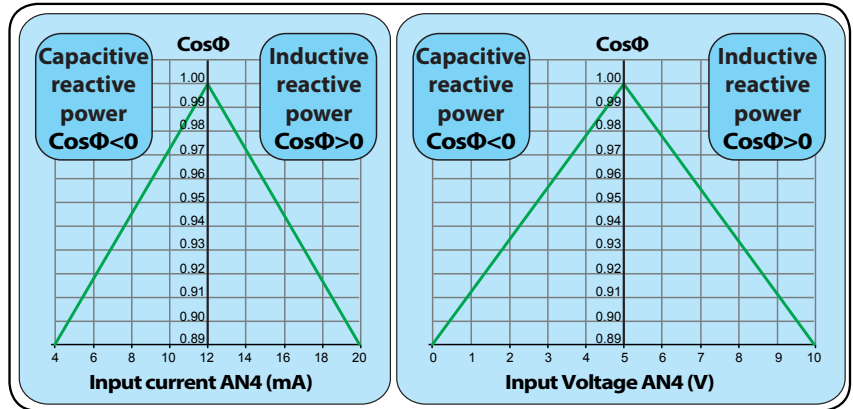**Type 2** → Tan(ϕ) fixed based on the instantaneous output power
Type 4 → Cos(ϕ) fixed based on the instantaneous output power
The management of the reactive power is applied to the inverter in accordance with the graphs below (on the left → input current; on the right → input voltage):

Operating mode Type 2

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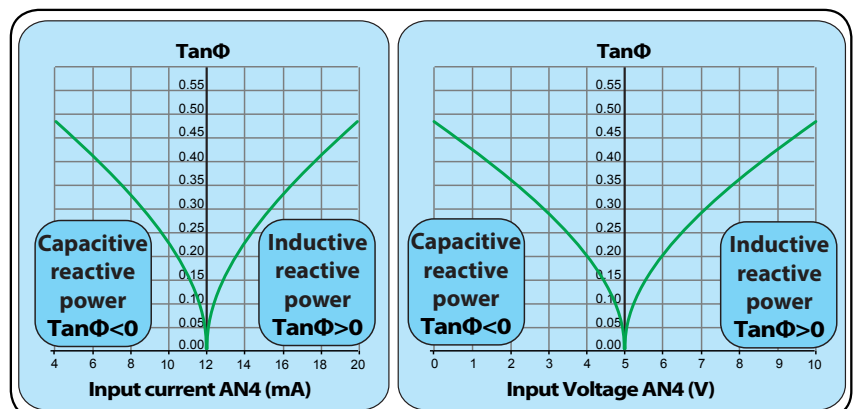
Operating mode Type 4

"Data logger" tab

Displays the values of the input and output parameters detected by the inverter:

- Data logger setting: Used to set the recording period (minimum time 2 seconds) and ticking "Stop after N samples" sets the number of samples.
- Data logger Enable: Enables/disables the recording of the sample.
- File setting: Text mode for saving the logger data.
- Configuration setting: used to upload a customized list of parameters (for service use only).
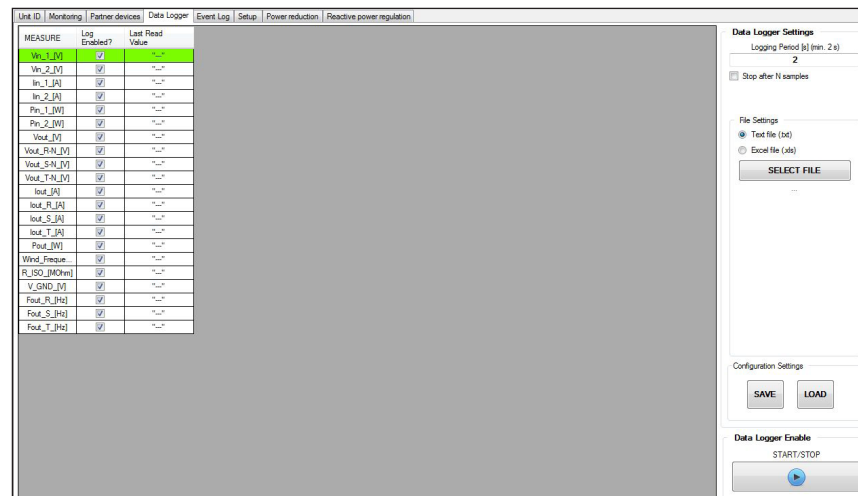

"Event log" tab

Used to download the alarms and warnings logs and the configuration of the internal variables.
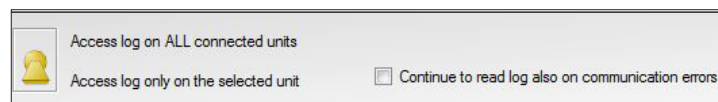
All of the settings that can be applied in this section can be extended to all of the inverters connected to the RS485 bus by positioning the selector on "Apply access log on ALL connected units". The default position applies the setting only to the inverter selected in the tree structure of the system.

By ticking the "continue to read log also on communication errors" field, the scan of the 485 line continues even if communication errors on the part of one or more inverters are detected.
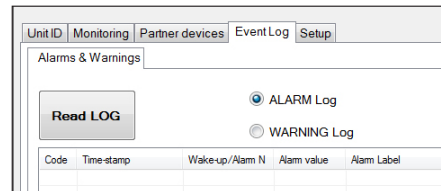
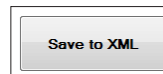000134BG
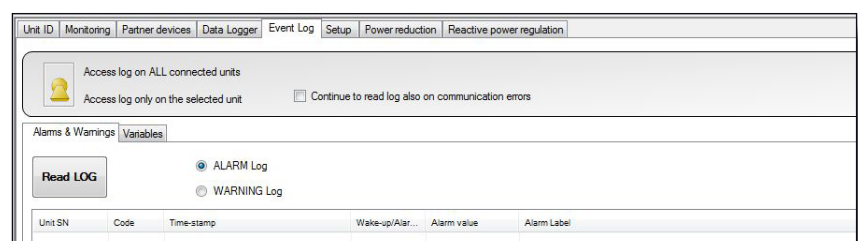
"Alarms & warnings" tab

Used to download the Alarms and Warnings logs.
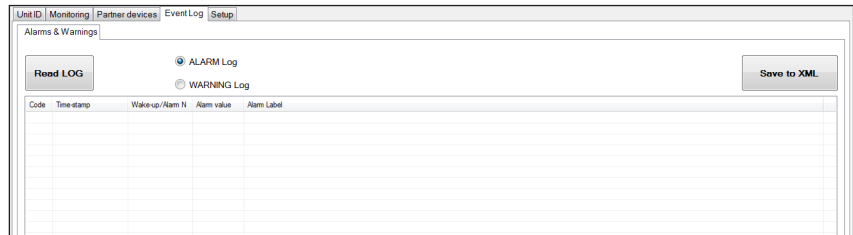
By means of the two radio buttons "ALARM Log" and "WARNING Log", the type of events to be downloaded can be selected.
Then, downloading is by means of the "Read LOG" button.

The "Save to XML" button can be used to export the log as an xml file.
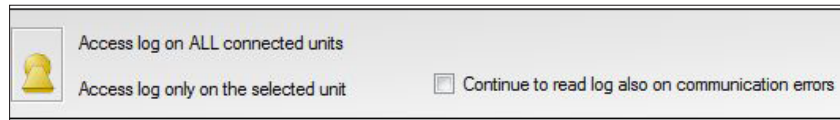
"Variables" tab

Used to download the variables that have changed compared to the default configuration of the inverter.

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"Setup" tab Available only with the INSTALLER access level

Permits advanced configuration of the inverter (by entering the login details obtained after registering on the site https://registration.abbsolarinverters.com/ on the "Configuration > Setup area Access" menu).
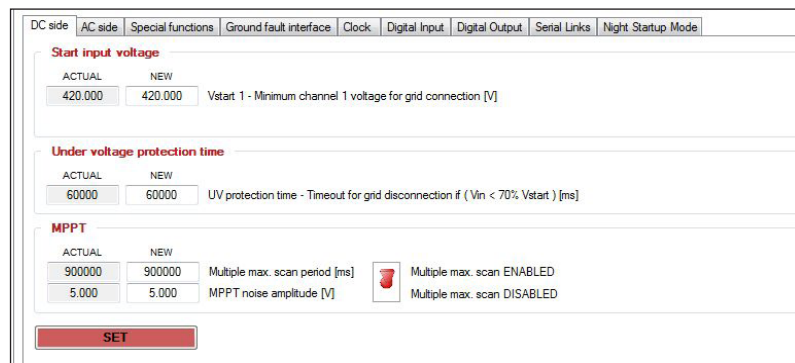
All of the settings that can be applied in this section can be extended to all of the inverters connected to the RS485 bus by positioning the selector on "Access log on ALL connected units". The default position applies the setting only to the inverter selected in the tree structure of the system. By ticking the "Continue to read log also on communication errors" field, the scan of the 485 line continues even if communication errors on the part of one or more inverters are detected.

All of the parameters that can be set in this section of Aurora Manager LITE are described in the "Structure of the work area" in the Specifications section

"DC side" tab:

Used to configure the parameters Vstart (Start input voltage), UV protection time (Low voltage protection time) and MPPT.

In particular it permits the application of the following settings:
- Minimum channel voltage for grid connection: Activation voltage (Vstart) for every input channel.
- Timeout for grid disconnection (UV protection time): Time during which the inverter draws power from the grid in the presence of an input UnderVoltage. Once the time set has elapsed, the inverter disconnects from the grid.
- Enable/disable the "Multiple Max scan" (MPPT scan) function and setting of the time interval between one scan and the next "Multiple max scan period".
- MPPT noise amplitude: used to change the noise amplitude set by the inverter for the maximum power point search.

"AC side" tab:

Used to configure the parameters which permit connection to the grid and the relative protections and/or power limits.

In particular there are 6 sections (tabs) which permit:

Grid connection

Used to set the grid parameters that must be observed during the connection phase:

In particular it permits the application of the following settings:
- Max grid voltage for connection. Maximum Voltage threshold for connection to the grid.
- Min grid voltage for connection. Minimum Voltage threshold for connection to the grid.
- Max grid frequency for connection. Maximum Frequency threshold for connection to the grid.
- Min grid frequency for connection. Minimum Frequency threshold for connection to the grid.
- Time for V/F check before connection or after generic fault. Grid check interval before connection or after a generic fault. Can be set from 0 … 3600s.
- Time for V/F check after grid fault. Grid check interval before connection after a grid fault. Can be set from 0 … 3600s.
- Slow ramp enable/disable. Enabling of the function for gradual delivery of the power after connection to the grid.
- Ramp slope [%Pn/min]. Slope of the ramp for admission of power to the grid indicated as a percentage of the nominal power per minute.
- Ramp Slope Fault [%Pn/min]. Slope of the ramp for admission of power to the grid after a disconnection caused by a fault, indicated as a percentage of the nominal power per minute.

Grid protection

Used to enable/disable and/or set the limit values and intervention times for the protections relating to the grid voltage:

In particular it permits the application of the following settings:

- U>> Max grid voltage. Grid over-voltage (OV) threshold (extended range). Can be set from Unom to Unom x 1.3
- U> Max grid voltage. Grid over-voltage (OV) threshold. Can be set from Unom to Unom x 1.3
- U< Min grid voltage. Grid under-voltage (UV) threshold. Can be set from 10V to Unom.
- U<< Min grid voltage. Grid under-voltage (UV) threshold (extended range). Can be set from 10V to Unom.
- U<<< Min grid voltage. Third grid under-voltage (UV) threshold. Can be set from 10V to Unom (active for UL Rule 21-Hawaii grid).
- F>> Max grid frequency. Grid over-frequency (OF) threshold (extended range). Can be set from Fnom to Fnom + 5Hz.
- F> Max grid frequency. Grid over-frequency (OF) threshold. Can be set from Fnom to Fnom + 5Hz.
- F< Min grid frequency. Grid under-frequency (UF) threshold. Can be set from Fnom - 5Hz to Fnom.
- F<< Min grid frequency. Grid under-frequency (UF) threshold (extended range). Can be set from Fnom - 5Hz to Fnom.
- K LVRT low voltage ride-through coefficient. Regulates the reactive current that can be injected into the grid during a grid dip.

High frequency derating

Used to set the parameters relating to the power derating due to a high grid frequency:

- Image relating to the TRIO-20.0-TL-OUTD
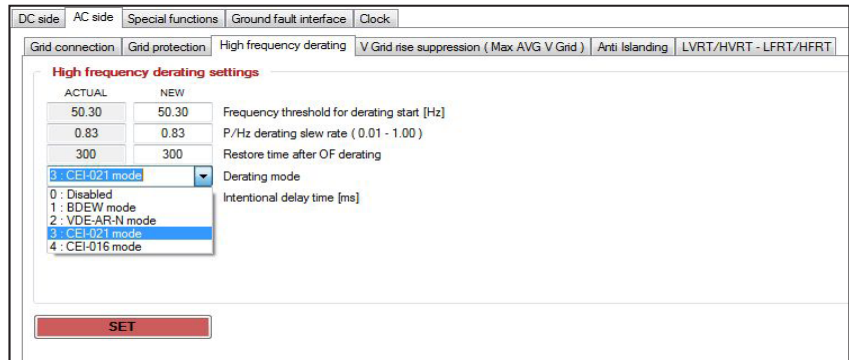
- Image relating to the TRIO-50.0-TL-OUTD
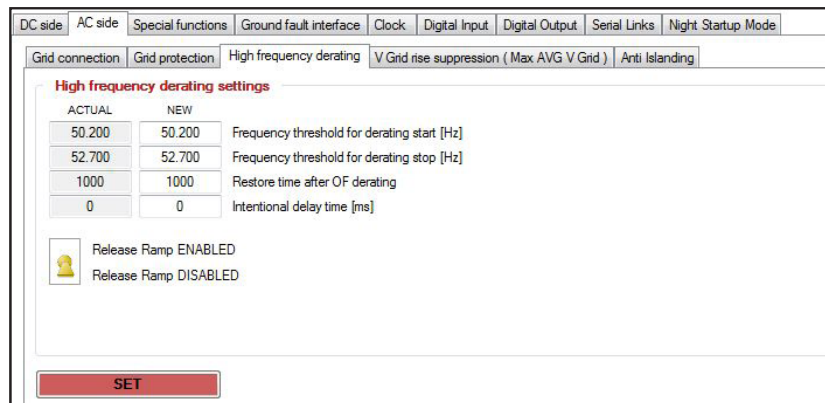
In particular it permits the application of the following settings:

- Frequency threshold derating start/stop: Setting of the frequency threshold at which the inverter starts/stops the power derating.
- Power/frequency slew rate: Setting of the speed of reduction of the power value due to the derating.
- Restore time after OF derating: Time necessary to restore normal operation of the inverter after the frequency has returned to within the range.
- Derating Mode: Selection of the power derating mode in the event of a grid over-frequency. The modes that can be selected, defined by the grid standard set, are: Derating Disabled; BDEW derating; VDE-AR-N derating; CEI derating.
- Intentional delay time: setting of the intentional delay for reduction of the active power in accordance with the grid frequency.
- Release ramp EN/DIS: enabling/disabling of the ramp for derating due to a high grid frequency.

Vgrid rise suppression (Max AVG grid)

Used to enable/disable and/or set the parameters relating to the over-voltage protection of the average grid voltage value. It is also possible to enable the derating that could prevent disconnection from the grid (the intervention of the protection) by reducing the active power.
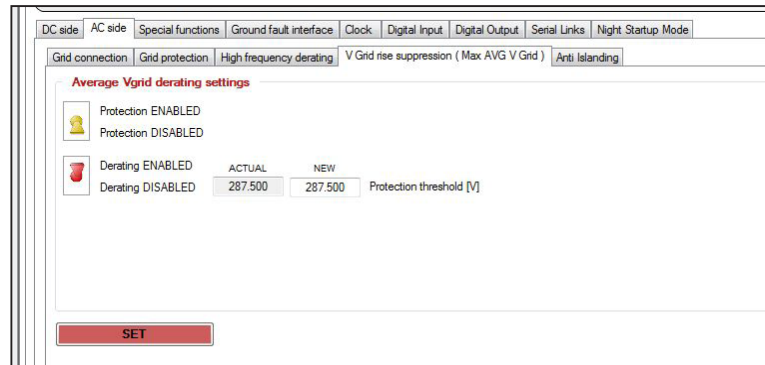
In particular it permits the application of the following settings:

- Protection EN/DIS: Enabling/Disabling of the U> protection threshold (10Min).
- Derating EN/DIS: Enabling of the power derating mode due to high values of the average of the readings taken on the grid voltage.
- Protection threshold: Grid over-voltage (OV) threshold (average measurement of the grid voltage value). Can be set from Unom to Unom x 1.3

Anti Islanding

Used to enable/disable the parameters relating to the anti islanding protection for disconnection of the inverters in the event of loss of the grid, or this protection intervenes to prevent the inverter from working as an island in the event of loss of the grid.

- Image of the TRIO-20.0/27.6-TL-OUTD

In particular it permits the application of the following settings:
- Active Anti islanding reactive pulse: enables/disables the anti islanding protection. To check the presence of the grid, the inverter generates a frequency variation by means of a reactive power at regular intervals. If the inverter is connected to the grid, the reactive power does not generate any variation in the frequency.
- Active Anti islanding frequency drift: enables/disables the anti islanding protection for three-phase inverters. To check the presence of the grid the inverter generates a frequency chirp at regular intervals. If the inverter is connected to the grid, the chirp does not generate any variation in the grid frequency.
- Passive Anti islanding: enables/disables the passive anti islanding protection. The inverter does not admit chirps to the grid but passively checks the grid parameters. In particular, the protection will be configured with time (expressed in seconds) and grid frequency offset (expressed in degrees) limits.
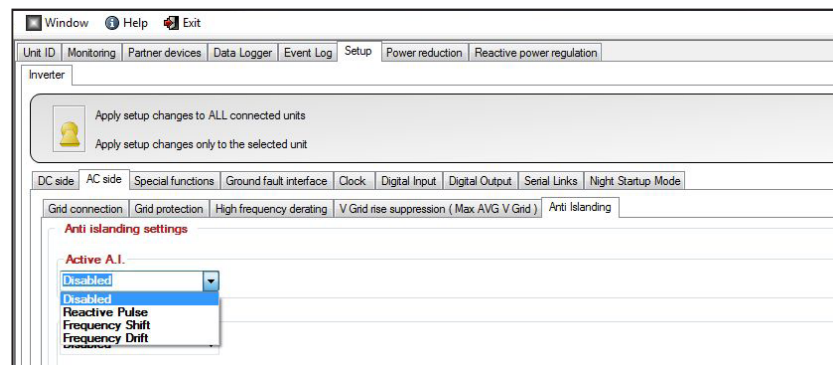
- Image of the TRIO-50.0-TL-OUTD

In particular it permits the application of the following settings:
- Active Anti islanding Disabled: disables the active anti islanding protection.
- Active Anti islanding reactive pulse: enables/disables the anti islanding protection. To check the presence of the grid, the inverter generates a frequency variation by means of a reactive power at regular intervals. If the inverter is connected to the grid, the reactive power does not generate any variation in the frequency.
- Active Anti islanding frequency shift: enables/disables the anti islanding protection for single-phase inverters. To check the presence of the grid the inverter generates a frequency chirp at regular intervals. If the inverter is connected to the grid, the chirp does not generate any variation in the grid frequency.
- Active Anti islanding frequency drift: enables/disables the anti islanding protection for three-phase inverters. To check the presence of the grid the inverter generates a frequency chirp at regular intervals. If the inverter is connected to the grid, the chirp does not generate any variation in the grid frequency.
- Passive Anti islanding Disabled: disables the passive anti islanding protection.
- F.derivate: enables/disables the passive anti islanding protection. The inverter does not admit chirps to the grid but passively checks the variations in the grid frequency within the time limits which can be set (expressed in seconds).

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LVRT/HVRT-LFRT/HFRT

(Depending on the inverter model, the tab may differ or may not be present, refer to the product manual)

Used to enable/disable and set the value of the coefficient which regulates the reactive power admitted to the grid during a grid dip.

| DC side | AC side | Special functions | Ground fault interface | Clock |

| Grid connection | Grid protection | High frequency derating | V Grid rise suppression (Max AVG V Grid) | Anti Islanding | LVRT/HVRT - LFRT/HFRT |

Voltage grid support

I_{90} En/Dis	READ	WRITE	
	0.00	0.00	K LVRT
SET			
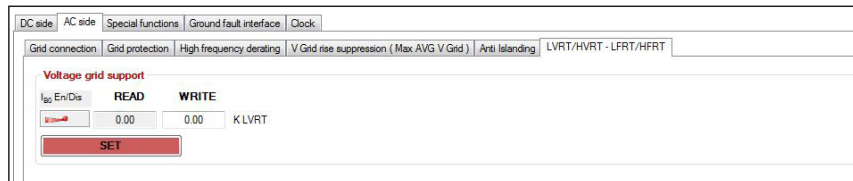
"Special Function" tab

- TRIO-20.0/27.6-TL-OUTD

Permits the application of the following settings:

- Remote ON/OFF: Enabling/disabling of the function for switching the inverter off/on remotely.
- Remote ON/OFF (ext command): Switches the inverter off (OFF command) and on (ON command) via software.
- Reset mode: Inverter restart mode after an alarm relating to the grid parameters. The restart can be set to manual or automatic.
- Radio Frequency Injection: Setting of a frequency value for any PLC signals which the inverter must not identify as errors relating to the grid parameters. If reactive power is admitted to the grid, the PLC signals which fall within the range set will not be reduced.
- Digital alarm contact: Setting of the operating mode of the alarm contact (further details relating to the operating modes can be found in the product manual, "Operation" section, "Settings menu" paragraph).

- TRIO-50.0-TL-OUTD

Used to switch the inverter off/on via software:

"Ground Fault Interface" tab

Used to set the parameters relating to the measurement of the photovoltaic generator insulation resistance:

In particular it permits the application of the following settings:
• Minimum Riso: Minimum value of the insulation resistance (Riso) which permits connection of the inverter to the grid.
• Minimum time for Riso check: Duration of measurement of the insulation resistance before connection.

Only for TRIO-50.0-TL-OUTD:
• Enables the grounding kit function (Negative ground) and sets the maximum voltage between the negative pole and the ground.

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"Clock" tab

Used to set the inverter's internal date and time.
The inverter date and time can be aligned with those of the PC "Use PC time" or set manually "Select time".
The data will be saved in the inverter on confirming by pressing the "SET" button.
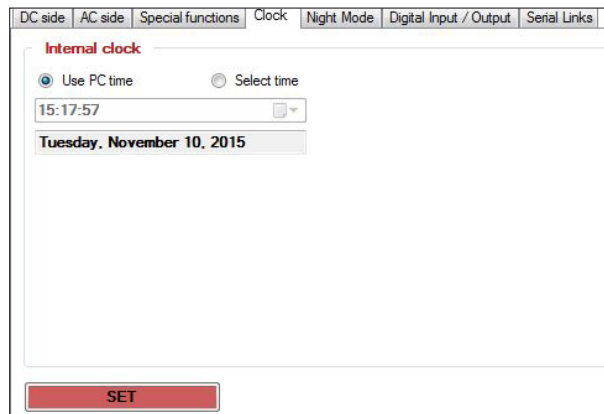
"Digital input" tab

(Depending on the inverter model, the tab may differ or may not be present, refer to the product manual)

Used to enable the inverter's digital input signals.
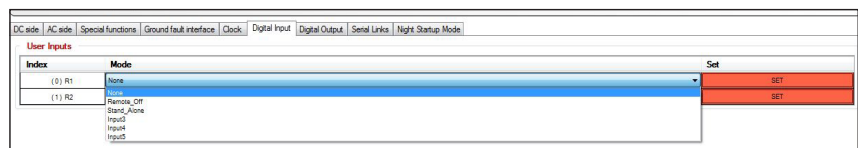
User Inputs:
Used to set the digital inputs of the pull-down menu:
• Remote off: enables the remote switching off of the inverter.
• Stand_Alone: enables islanding, in the event of a black-out, using the optional dedicated board. Further details relating to the operating mode can be found in the product manual, "Installation" section, "Stand alone output connection enabling" paragraph.
• Input3/4/5: not used.

"Digital output" tab

(Depending on the inverter model, the tab may differ or may not be present, refer to the product manual)

Used to enable the inverter's digital output signals.

In particular it permits the enabling of:
- OUT Slot: permits the selection of one of the two inverter digital output signals [AUX-ALARM]

- Slot setting: permits setting of the digital output functions of the pull-down menu:
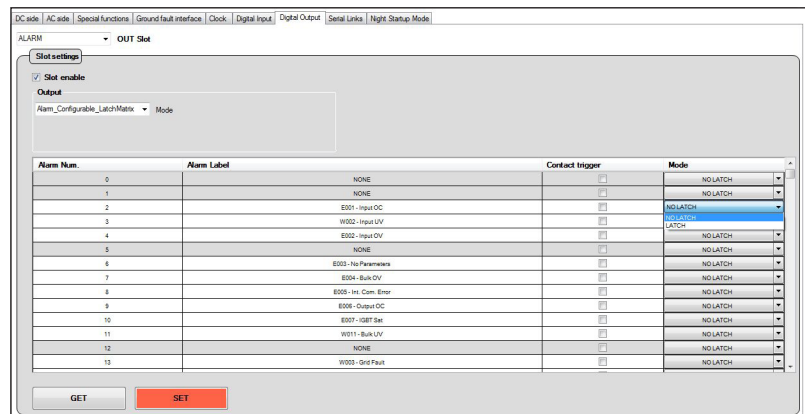• Production: the relay is activated when the inverter connects to the grid and returns to the rest position when the inverter disconnects from the grid.
• Alarm_All_no_latch: the relay is activated each time a grid parameters outside tolerances error or warning arises and returns to the rest position when the error or warning ceases.
• Alarm_configurable _no_latch: the relay is activated each time an error or warning among those selected from the list on the pull-down menu arises and returns to the rest position when the error or warning ceases.
• Crepuscular: the relay is activated as soon as the input voltage exceeds the activation voltage and returns to the rest position when the input voltage falls below 70% of the V start set.
• Alarm_all_latch: the relay is activated each time an error or warning arises and returns to the rest position when the inverter returns to normal operation and has reconnected to the grid.
• Alarm_configurable_latch: the relay is activated each time an error or warning among those selected from the list on the pull-down menu arises and returns to the rest position when the inverter returns to normal operation and has reconnected to the grid.
• Alarm_configurable_latchmatrix: the relay is activated each time an error or warning among those selected from the list on the pull-down menu arises and the "latch" or "no latch" mode can be set for each individual indication.

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"Serial Link" tab

Used to change the parameters of the serial communication.
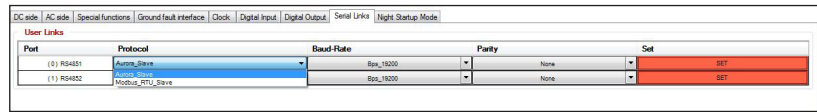
In particular it permits changing in the two 485 inputs of the communication protocol and the baud rate.
(Parity checks that the datum received is correct).

"Night Startup Mode" tab

(Depending on the inverter model, the tab may differ or may not be present, refer to the product manual)

Used to enable night-time operation of the logic functions of the inverter.
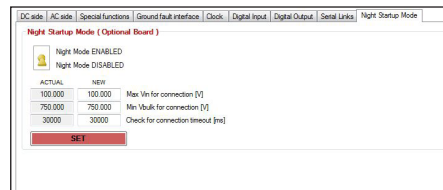
In particular, enabling this command keeps the functions of the logic card active, which permits consultation of the display (where present) and of the communication.

- Max Vin for connection: sets the maximum input voltage permitting connection of the inverter.
- Min VBulk for connection: sets the minimum bulk voltage permitting connection of the inverter.
- Check for connection timeout: sets the waiting time for connection to the grid.

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"Power Reduction" tab

This section permits regulation of the limitation of the active power that the inverter admits to the grid by setting the percentage value of the nominal power at which the limitation should take place.

Setting 100% restores the default maximum power value.

Smooth time: this the time necessary to reach the power reduction set, with two different modes:
- Slope mode: Fixes the slope of the ramp, or the time necessary to range from 0 to 100% of the power.
- Trip-time mode: Time necessary to pass from the current output power to the new power value set.
- P limits: displaying of the limits of the inverter's active power.

All of the settings that can be applied in this section can be extended to all of the inverters connected to the RS485 bus by positioning the selector on "Apply setup changes to ALL connected units". The default position applies the setting only to the inverter selected in the tree structure of the system.

"Reactive Power Regulation" tab

This section permits regulation of the admission of reactive power delivered to the grid by the inverter.

The regulation of the reactive power is set by selecting from the pull-down menu one of the following modes:
- no regulation
- cos-phi fixed
- Q fixed
- cos-phi =f(P)
- Q(U)

All of the settings that can be applied in this section can be extended to all of the inverters connected to the RS485 bus by positioning the selector on "Apply setup changes to ALL connected units". The default position applies the setting only to the inverter selected in the tree structure of the system.

- Q limits: displaying of the limits of the inverter's reactive power.

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"Select regulation mode" tab

Used to select the management mode for admission of the reactive power to the grid. Five possible selections are available.
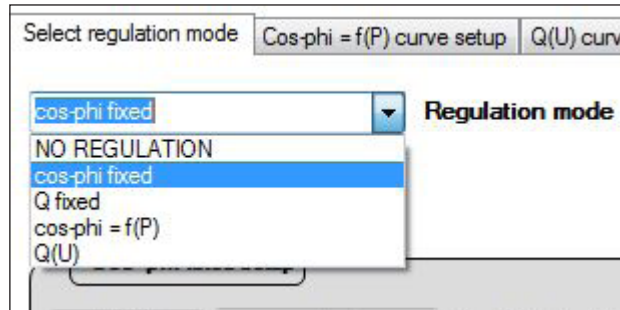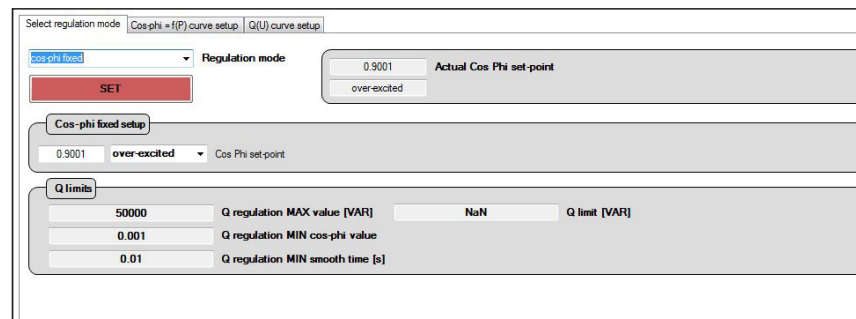

1. No regulation
No mode for admission of reactive power to the grid is enabled.
(default configuration).

2. Cos-phi fixed
Setting of the power factor to a fixed value.
Once the mode has been selected, the "Cos-phi fixed setup" field appears, permitting setting of the value of the cos-phi (over or under excited).
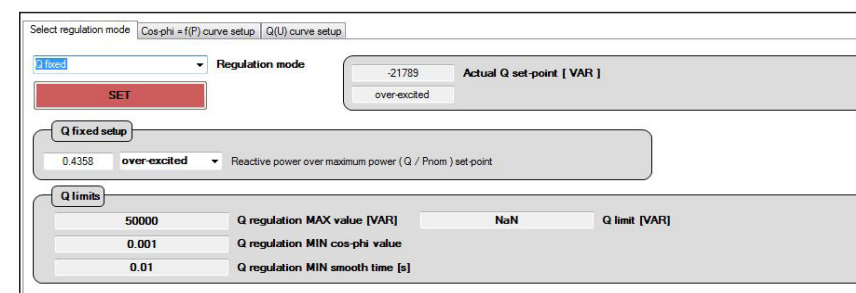The selection of the mode must be confirmed using the SET button.

3. Q- fixed
Setting of Tan-phi (Q/P) to a fixed value.
Once the mode has been selected, the "Q fixed setup" field appears, permitting setting of the value of Q (over or under excited).
The selection of the mode must be confirmed using the SET button.

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4. Cos-phi = f (P)

Power factor as a function of the active power supplied by the inverter.

The selection of the mode must be confirmed using the SET button.
The default graph set can be displayed and modified by going to the "Cos-phi=f(P) curve setup" tab described below.

5. Q=(U)

Reactive power as a function of the grid voltage measures by the inverter.

The selection of the mode must be confirmed using the SET button.
The default graph set can be displayed and modified by going to the "Q(U) curve setup" tab described below.

"Cos-phi f(P) curve setup" tab Available only with the INSTALLER access level

In this section the default graph is displayed, which can be modified by setting the values P/Pn% and relative cos-phi (under or over excited)
Four points can be set which will define the trend of the graph.

Once the values have been set it will be possible to display the graph created by means of the "Check and graph my table" button.

If the graph created is that required it can be memorized in the inverter by pressing the "Write my table on device" button.

The correct writing in the inverter can be checked using the "Read table from device" button which will display the graph set correctly on the inverter.

In the event of an error or to set the default curve again, use the "Restore default curve" button.
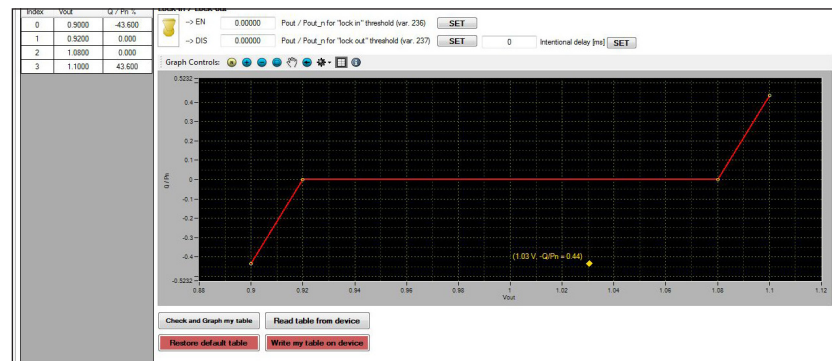

It is possible to activate/deactivate and set the value of the activation (lock-in) and deactivation (lock-out) threshold for admission of the reactive power to the grid in accordance with the graph set previously.

"Q(U) curve set-up"

In this section the default graph is displayed, which can be modified by setting the values of the output voltage Vout and relative Q/Pn%.
Four points can be set which will define the trend of the graph.
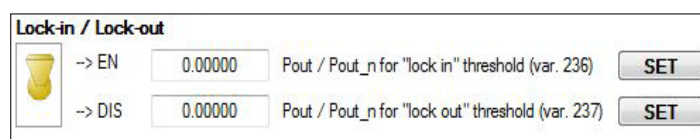

Once the values have been set it will be possible to display the graph created by means of the "Check and graph my table" button.

If the graph created is that required it can be memorized in the inverter by pressing the "Write my table on device" button.

The correct writing in the inverter can be checked using the "Read table from device" button which will display the graph set correctly on the inverter.

In the event of an error or to set the default curve again, use the "Restore default curve" button.

It is possible to activate/deactivate and set the value of the activation (lock-in) and deactivation (lock-out) threshold for admission of the reactive power to the grid in accordance with the graph set previously.

Further information

For more information on ABB solar products and services,
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Contact us

www.abb.com/solarinverters