

# User Manual

## 7" TOUCH-SCREEN DISPLAY PHV





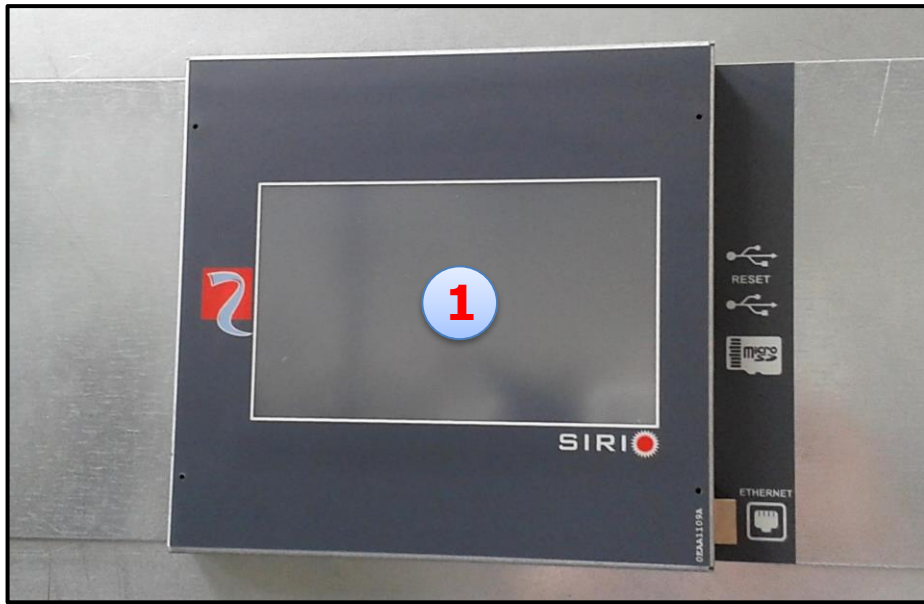
**RPS SpA**  
via Somalia, 20  
20032 Cormano (MI)  
[www.riello-solartech.it](http://www.riello-solartech.it)

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# PRESENTATION



1. 7" TOUCH-SCREEN display
2. Micro-USB port
3. Display RESET button
4. USB port
5. MicroSD SLOT
6. ETHERNET port

*NOTE: the display screenshots appearing in this document are purely indicative; certain images may vary in relation to software upgrades.*

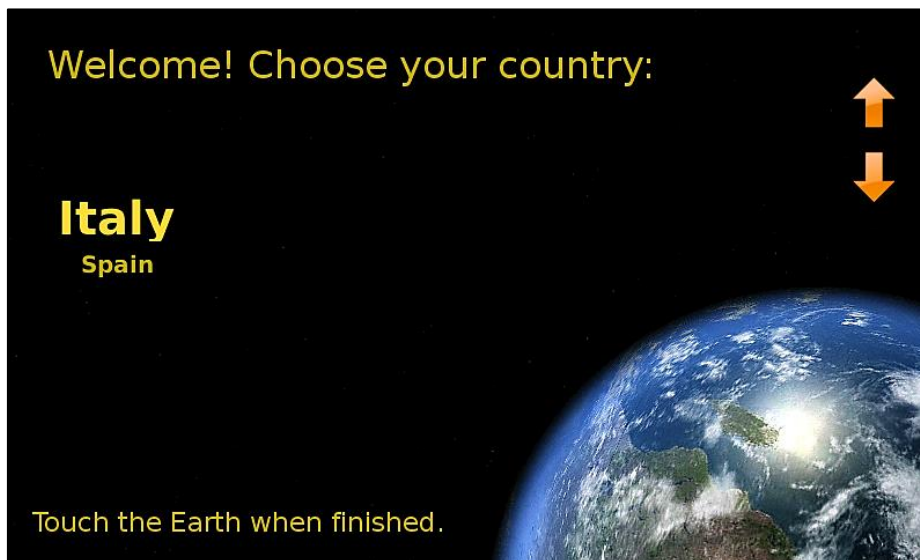
# INTRODUCTION

## Overview

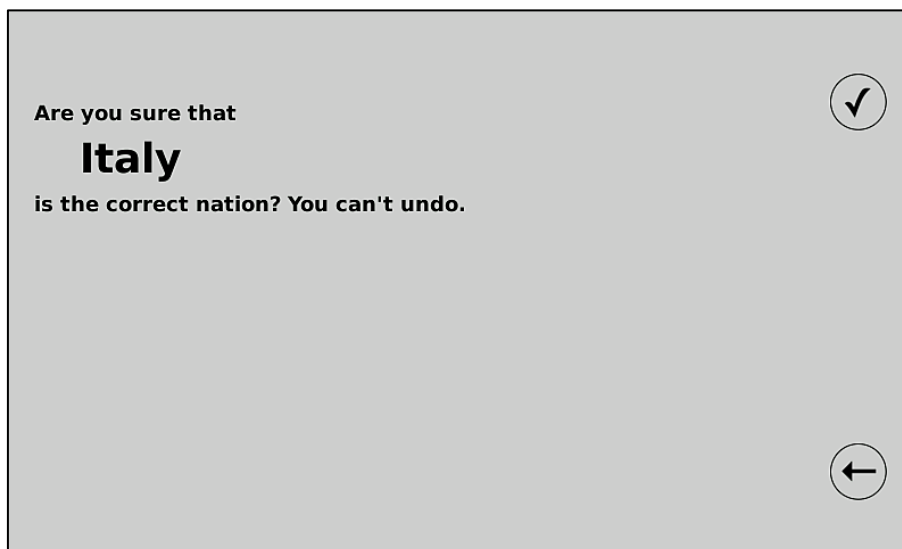
SIRIO centralised inverters include – as a standard feature – a man-machine interface (MMI) consisting of a 7" colour touch-screen LCD. The characteristics and quantity of the information enrich the user's interaction experience with the solar inverter.



Any activity can be completed with the touch of your finger.

When the inverter is started for the first time for commissioning, the screen for selecting the inverter's country of installation will appear on the display:



The user can scroll through the countries currently managed using the arrows on the right of the screen; after selecting the correct country, simply touch the earth image to proceed with the configuration:



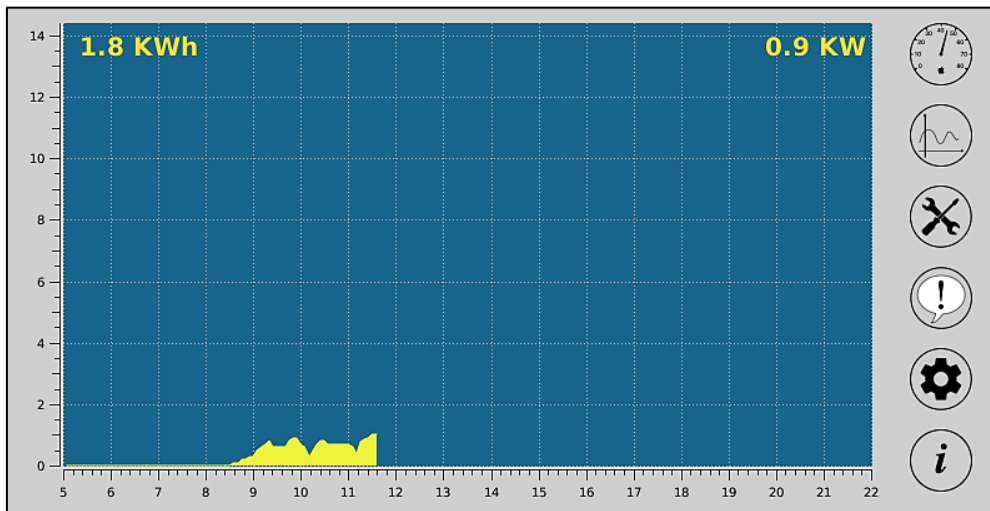
Confirm by pressing the TICK  key or cancel your selection by returning to the previous screen through the LH ARROW  button.

## CHOICE OF THE COUNTRY



**WARNING:** the choice of the country allows for automatically configuring the inverter to the values specified in the regulations in force in the country of installation. Once the choice has been made, the settings can only be modified with the intervention of Technical Assistance Service personnel. The interface language may nonetheless be modified at a later stage through the [USER SETTINGS](#) menu.

On subsequent start-ups, after the RIELLO welcome logo, the display will appear as in the picture below, which for practical reasons we shall refer to as the **MAIN SCREEN** (the background colour may vary in relation to the inverter's operating conditions):



**MAIN SCREEN**

The screen is divided into the following main areas:


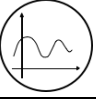




1. The upper section of the screen includes – from left to right – the model name, the inverter's rated power and, lastly, the date and time.
2. The centre of the screen shows the daily graph of the power output. The time (from 5:00 to 22:00) is shown on the horizontal scale and the kW on the vertical scale. The instantaneous power value appears on the top right-hand side of the graph, while the energy produced during the current day appears on the left.
3. The lower section of the screen includes an informative strip with messages that alternate every second.
4. To the right of the screen is a row of buttons that allow for browsing through the interface.

After 5 minutes of inactivity, the LCD enters the screen-saver mode; simply touch the display to restore the normal visualisation mode. During the daytime, the following symbols may appear on the screen in screen-saver mode:

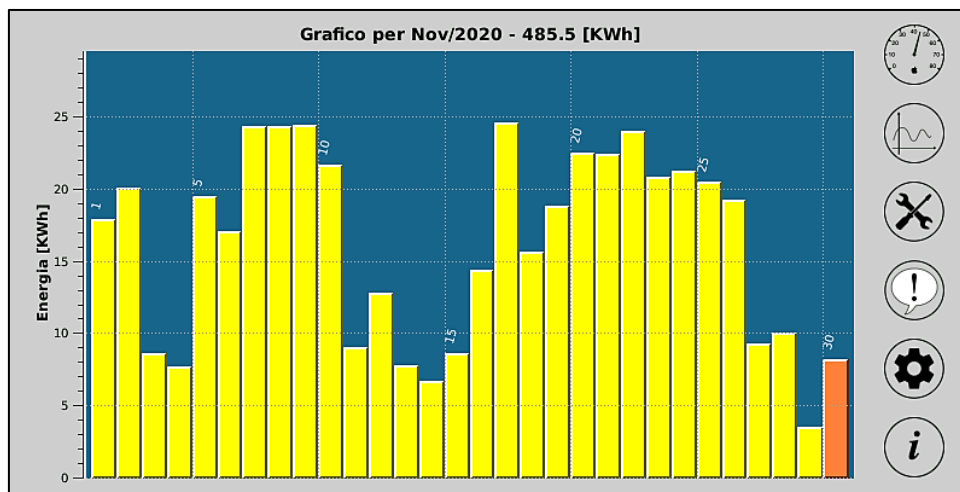


The first symbol indicates that the inverter is functioning normally, the second symbol indicates low exposure to sunlight and the third symbol signals the presence of an alarm.

The buttons of the column along the right-hand side allow for accessing the main functions; the relevant symbols have the following meaning:

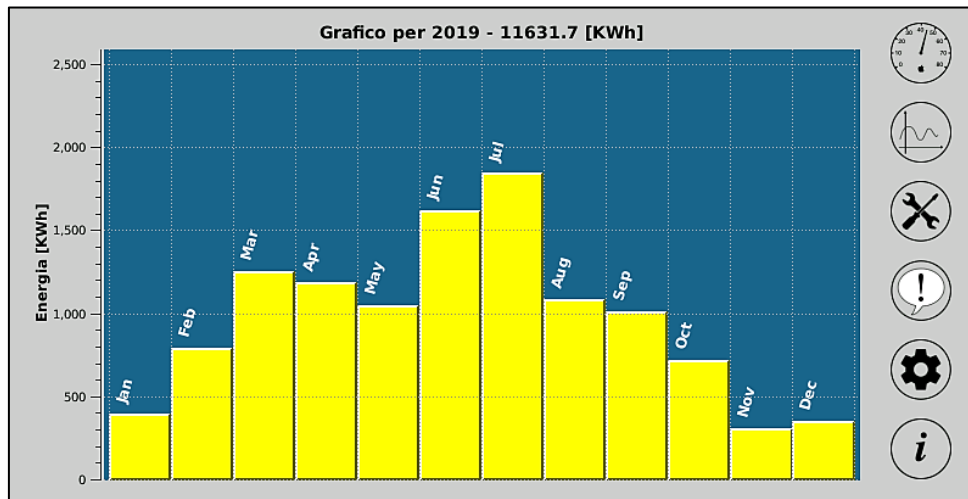
	<b>Inverter readings</b>	<b>Page 6</b>
	<b>Logs</b>	<b>Page 8</b>
	<b>System configuration</b>	<b>Page 13</b>
	<b>Inverter statuses and alarms</b>	<b>Page 26</b>
	<b>Actions on the inverter</b>	<b>Page 27</b>
	<b>Information</b>	<b>Page 28</b>

As you will notice, touching the graph section on the Main Screen allows for viewing the monthly energy production:



Sliding the finger while keeping it pressed on the screen from left to right, or from right to left, allows for scrolling the months back/forth.

Touching the screen again will visualise the annual graph:



Sliding the finger while keeping it pressed on the screen from left to right, or from right to left, allows for scrolling the years back/forth.

Press the screen again to return to the MAIN SCREEN.

---

## Basic interactions

All the system's functions and customised features can be queried through the following gestures:

- **TOUCHING:** touching the button or specific area of the screen with a finger;
- **SLIDING:** sliding the finger while keeping it pressed on the screen from left to right, or from right to left. This gesture may be required for browsing through the daily graphs or through different screens in certain situations.

Once a touching or sliding gesture is recognised, the MMI will emit a beep.




*A USB flash drive with a single FAT32 partition is required to transfer files, otherwise the data saving procedure cannot be terminated correctly.*

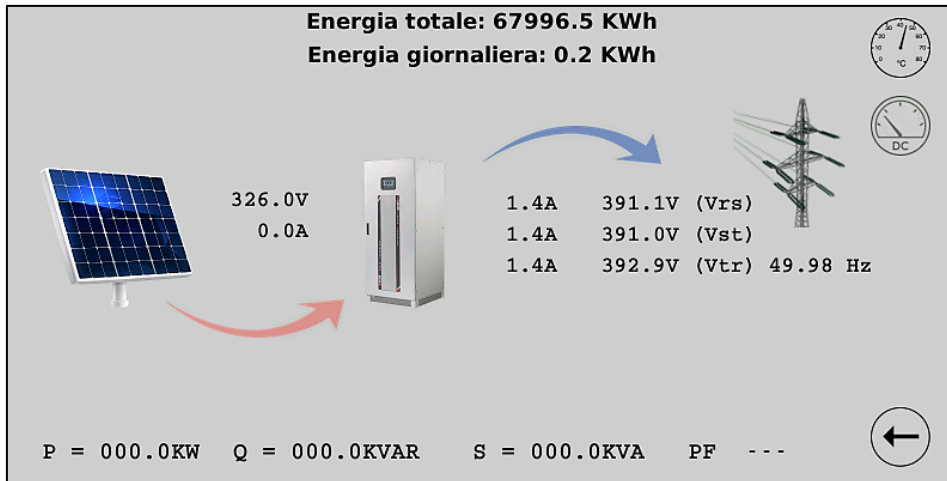


# MENU DESCRIPTION

## Inverter readings

Intervening on the buttons on the right of the Main Screen allows for accessing the main functions.

Pressing the  button allows for accessing the Inverter readings screen:



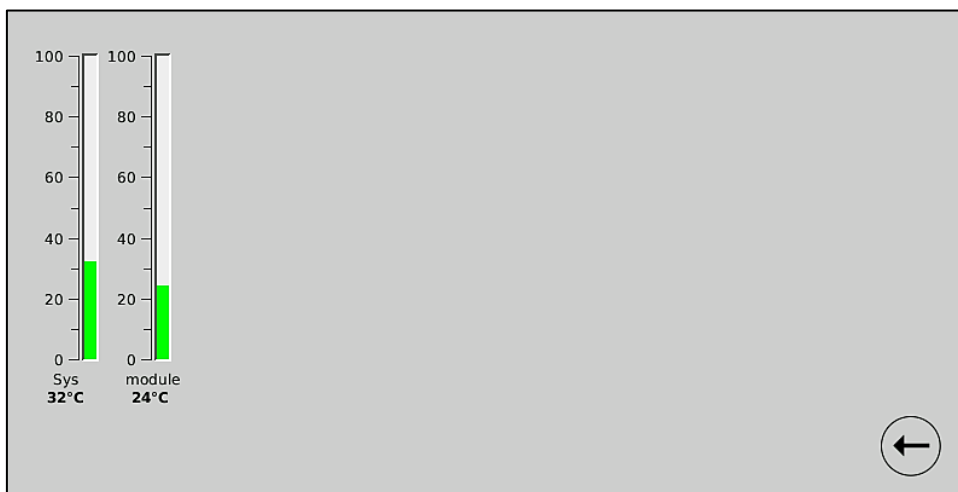
The summary screen shows all the device's main readings.

The three buttons on the right-hand side allow for viewing the following data:

- 1- The temperatures measured inside the inverter.
- 2- The readings of the 4 analogue probes (if connected).
- 3- The DC-BOX (if present and configured) currents.


Press the button on the bottom right to return to the Main Screen.

- TEMPERATURES 




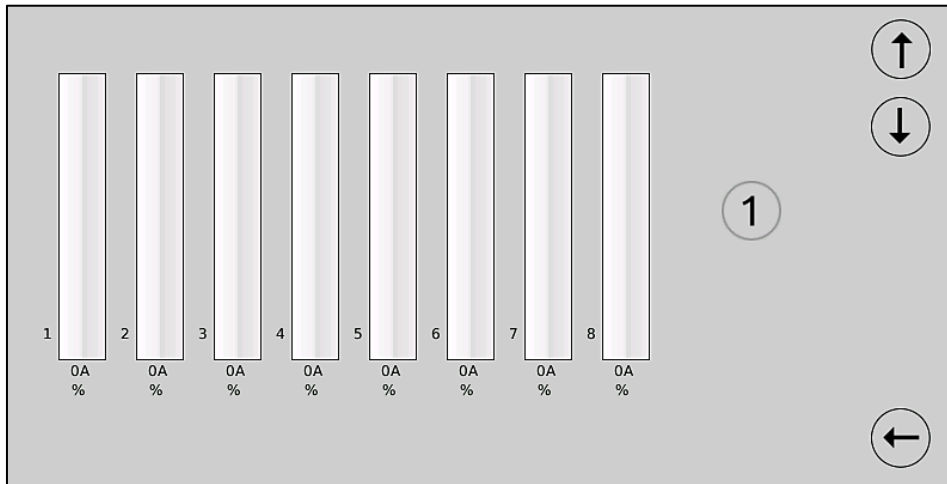
The temperature called SYS is the internal temperature of the machine.

Module temperatures refer to power modules that vary in number depending on the size of the inverter.

- DC-BOX currents 

If a DC-BOX is present that monitors the current for each individual input

(and suitably configured), pressing the  button allows for viewing the current readings for each input.



In this window it is possible to change the 'weight' parameter for each input in relation to the photovoltaic panels supplied, by pressing the relative '%' key located beneath each reading.

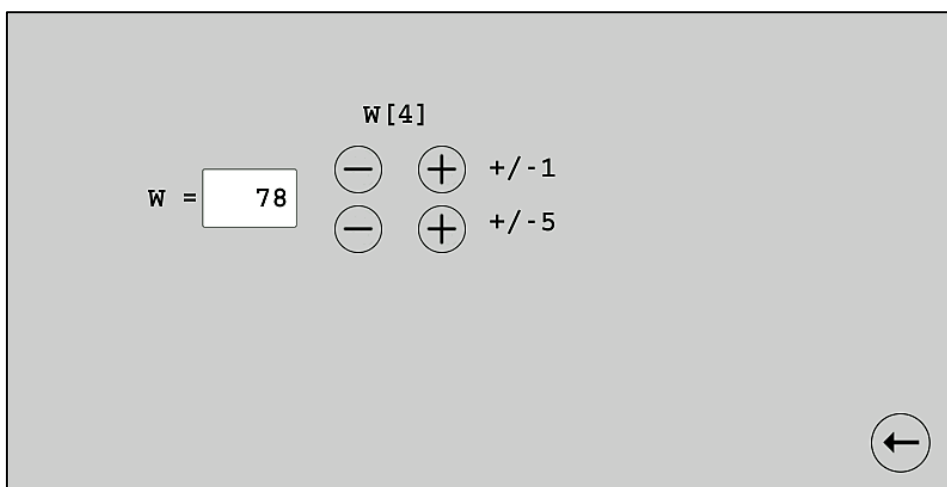
For example: if inputs 1, 2, 3, 5, 6, 7 and 8 have a rated current of 180 A while input 4 has a rated current of 140 A, the relevant settings are:

$$\%1 = 100\% - \%2 = 100\% - \%3 = 100\% - \%5 = 100\% - \%6 = 100\% - \%7 = 100\% - \%8 = 100\%;$$

$$\%4 = 140/180 * 100 = 77.7 \rightarrow \underline{78\%}$$

See the next screen screen.


Press the '%' key to access the following screen where the weight of the single string (in this example, 78) can be set through the + / - buttons.











**NOTE:**

in the event that not all of the 8 inputs are used, the free input reading must be deactivated. Press the '%' key corresponding to the free input and set the 'weight' to zero.



## Logs

The  button allows for accessing the management screen for the inverter's **Logs**:

Use buttons to view logs,		→ 1 view LOGS
to copy logs on a USB key,		→ 2 save LOGS
to delete year logs,		→ 3 delete LOGS
to download logs from sysboard		→ 4 save SYS LOGS
and to copy sysboard logs on a USB key.		→ 5 save total LOGS
		

 1- To view the logs, press the button with the  symbol.

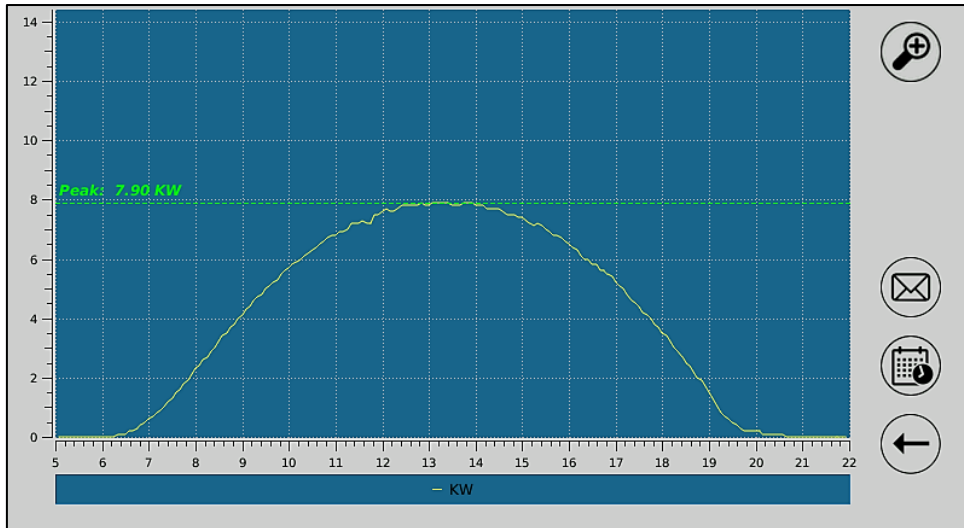
Subsequently, select the readings to be viewed (only two series of readings can be viewed simultaneously):

<input checked="" type="checkbox"/> KW	KWh	Aac	Vac	
Adc	<input checked="" type="checkbox"/> Vdc	Hz	Tinv	
Kvar	Tsys	Ext		
				


To select a reading, press the corresponding button; a white tick sign will appear on a green background to highlight the selection.


To deselect an entry, simply press the button again.


To read the graphs press the  button on the top right-hand side.





It is possible to shift back and forth by one day by sliding the finger on the screen from left to right or from right to left.

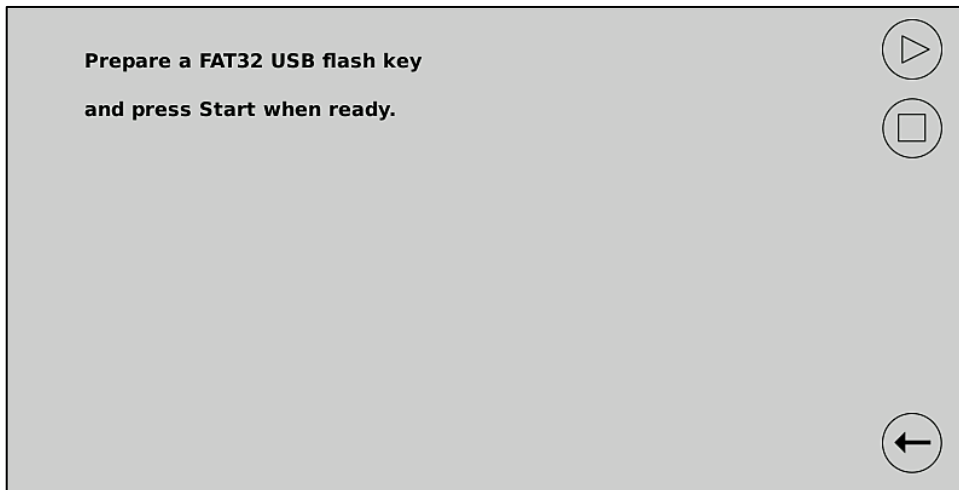
Zoom the graph using the  button.

Use the  button to select the day for which to view the graph.


Moreover, it is possible to send the graph via e-mail using the  button (which will only appear if the e-mail service is configured).

The units of measurement appear on the bottom. The horizontal axis always refers to the time (5:00–22:00 interval); the vertical axis on the left indicates the kW, in this case.

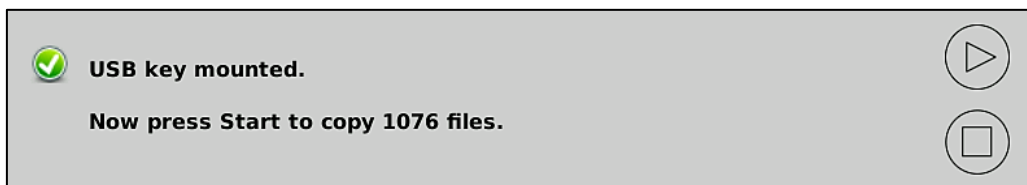
-  2- To save the production logs on a USB flash drive, press the button with the  symbol; the following window will appear:



As mentioned previously, the USB flash drive must be formatted in FAT32 (VFAT) and have a single partition. Many USB flash drives containing dedicated security software with special partitioning schemes may not work.


After inserting the USB flash drive, wait for a few seconds then press the button with the  symbol so that the system can detect the memory (this does not occur automatically).

If the operation is successful, the following message will appear:

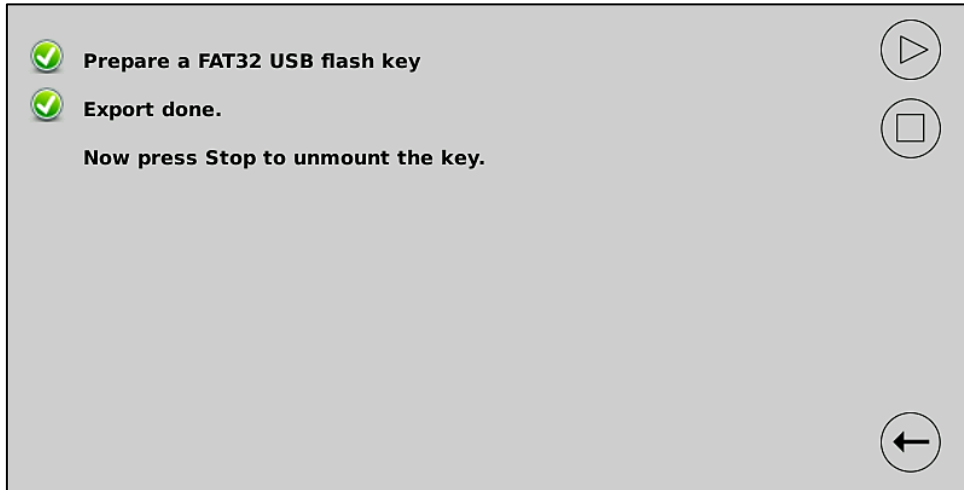



otherwise:





If the USB flash drive is detected, press the  button to copy the log.

The copying process may last a few minutes, after which the following screen will appear:




Press the button with the  symbol to safely remove the USB flash drive.

-  3- Over time the stored logs will occupy the device's memory.  
The  button allows for managing archives and eliminating the oldest data or annual data that is no longer relevant :



Pressing the button allows for accessing the following screen :



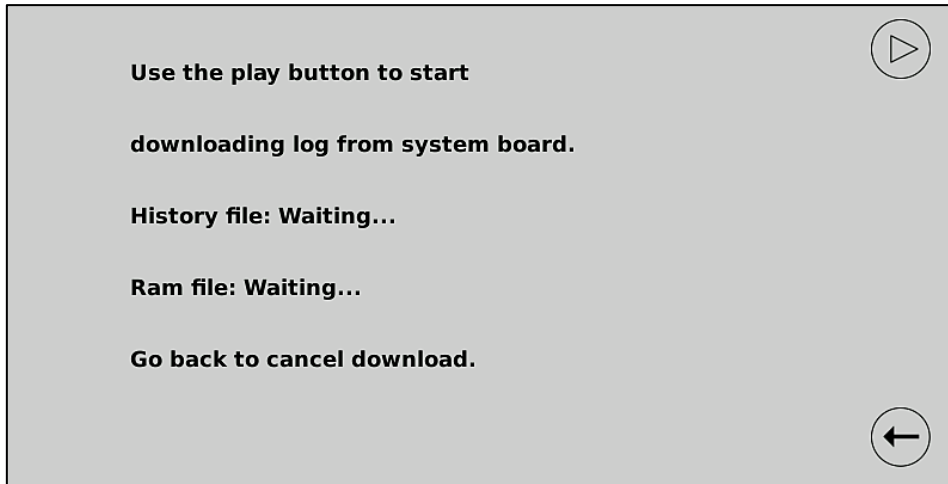
To select the year, slide the finger from right to left or from left to right.



After pressing the  button, the year will be highlighted in red; confirm its deletion by touching the screen.

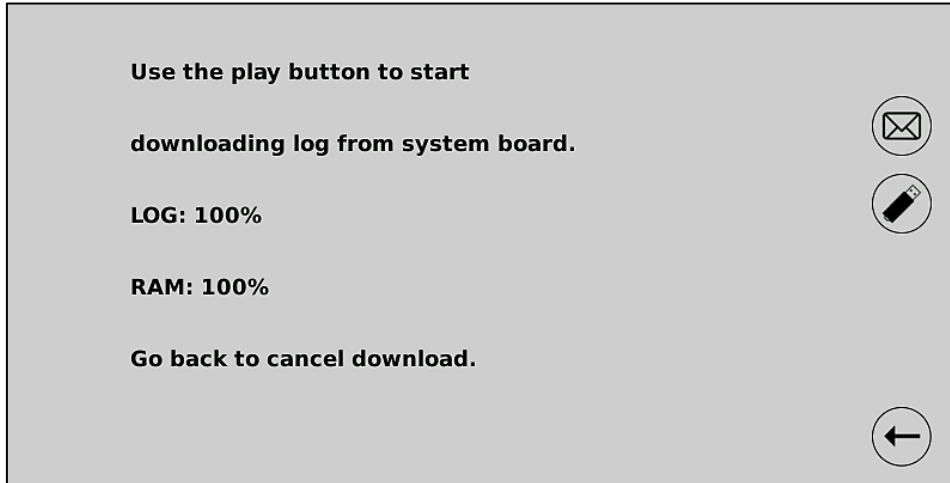
Bear in mind that data cancellation is irreversible.



-  4- To download from the control board the 'current' system logs and those in real time (useful if requested by the Technical Assistance Service for diagnosing any problems), press the button with the symbol 



Pressing the button allows for accessing the following screen :




To start downloading of the logs from the system board, press the  button. Alternatively, press the  button to cancel the operation and return to the previous screen.









Once downloading terminates, the logs can be sent via e-mail using the  button or copied to a USB flash drive through the  button.

-  5- The  button allows for downloading the 'past' logs of the system board and of the display to a USB flash drive; adopt the same procedure and precautions as those used for copying the log archives.

## System configuration

Pressing the  button from the Main Screen allows for accessing the parameter Configuration Screen:


Use buttons to change user settings,  
to change system settings,  
to access serial terminal  
and to access Service section  
(service section is password protected).










	→ 1 user
	→ 2 advanced
	→ 3 terminal
	→ 4 service
	→ 5 e-mail
	

On the right are the buttons that allow for setting the various parameters, namely:


- user settings
- advanced settings
- access to the terminal mode for low-level interactions with the inverter
- Service section, protected by password
- e-mail configuration section: this screen allows for setting the periodicity of the e-mails on an alarm or event basis

### USER SETTINGS

Pressing the user button  allows for accessing the user settings area (see the following screen page) where it is possible to manually set the €/kWh ratio, reset the partial meter of the energy produced and the ratio between the photovoltaic field peak and the inverter's rated power; this parameter is necessary when monitoring software is used, for comparing the various inverters of a single system.

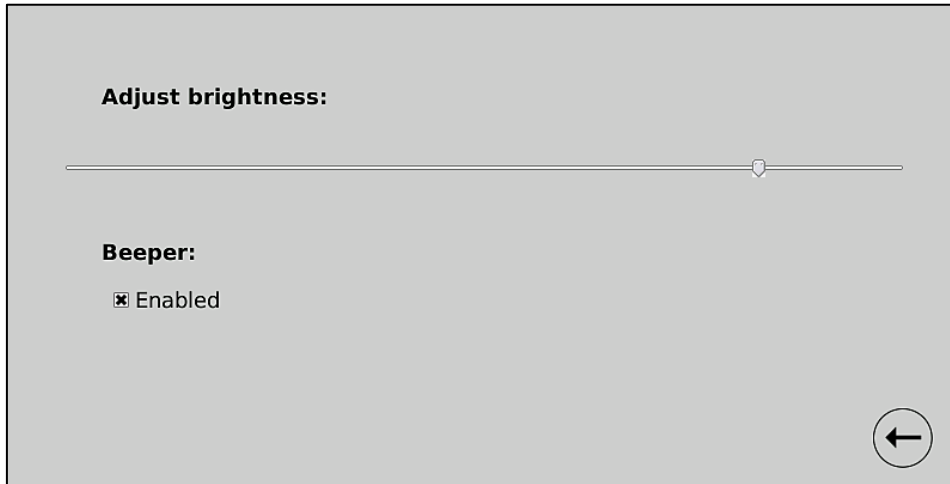
€/kWh:	<input type="text" value="0.25"/>			
User Energy Counter:	<input type="text" value="53003.3"/>			
KWp/KWac[%]	<input type="text" value="100"/>			<input type="text" value="Abc"/>
				
				




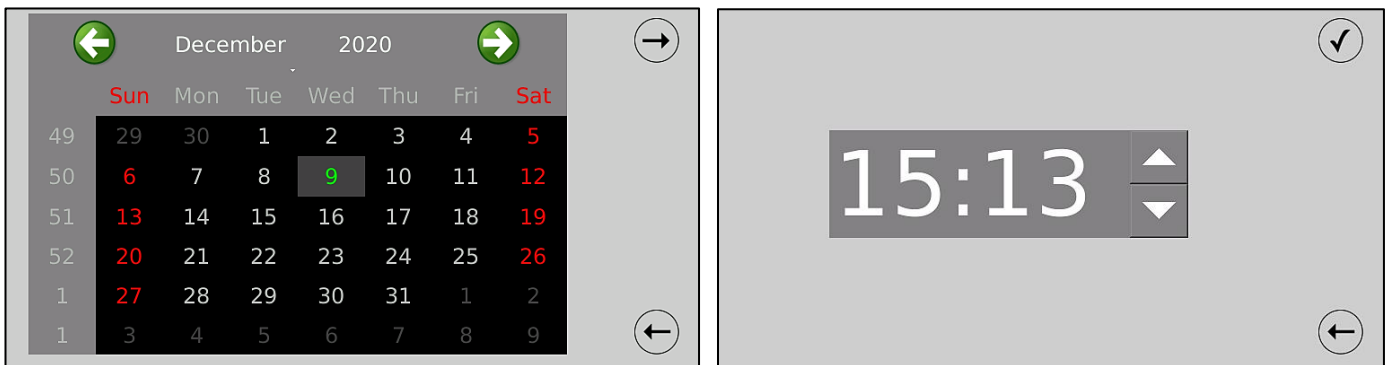
Pressing the  button allows for accessing the screen from which to set the display's

brightness and disable/enable the beeper if enabled, the beeper will emit a beep when the inverter is in alarm mode; the beep will stop when the alarm ends.

The beeper alarm sound changes by dropping in tone and level whenever an operator interacts with the touch-screen; after 20 minutes of inactivity, if the alarm situation persists the sound returns to how it was at the beginning.





Pressing the  button allows for accessing the screen for setting the date and time

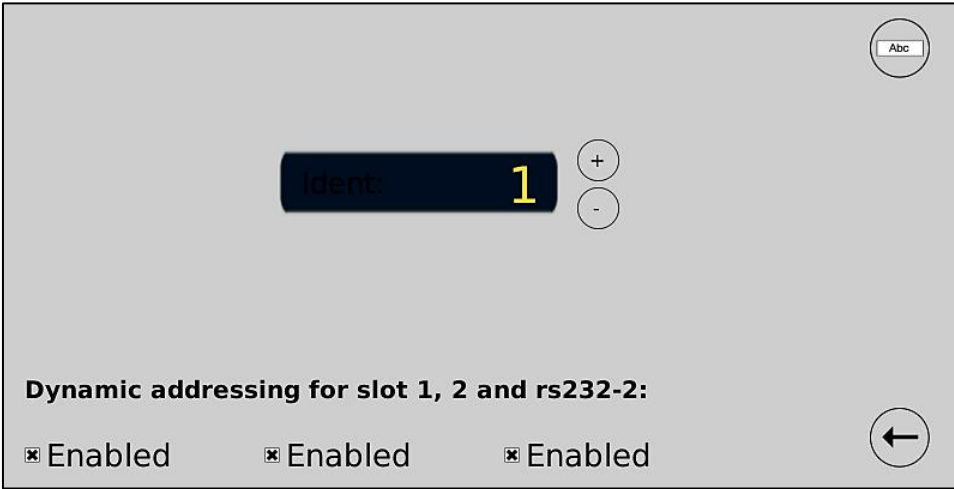


Press on the Month and Year to modify them.


**WARNING**

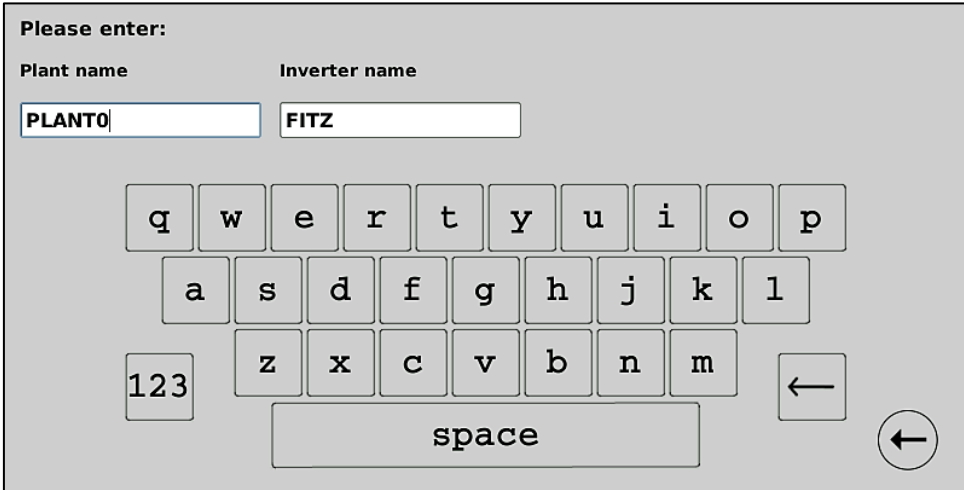
 Modifying the Date and Time values during normal operation may alter the graphic depiction of the memorised data.

By pressing the  button it is possible to set the inverter identification number required for using the protocols on the 485 serial line and for identifying the machine when transferring the inverter's log data to a USB flash drive. If the system comprises multiple inverters, the identification numbers must all be different.



In the same window it is possible – for every serial port – to indicate if the addressing is dynamic or static <sup>1</sup>. This is a technical aspect that concerns the compatibility of the communication protocols; in particular, this configuration data concerns the PVSER protocol (Proprietary Protocol).

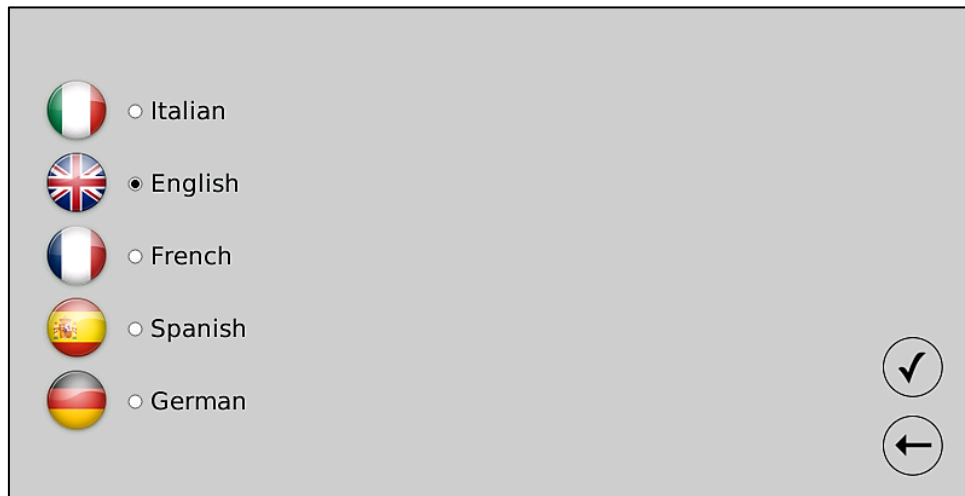
In addition, by pressing the  button from this window it is possible to indicate the name of the system on which the inverter or system section is installed:



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<sup>1</sup> For further information consult the user manual of the SunVision 2 software

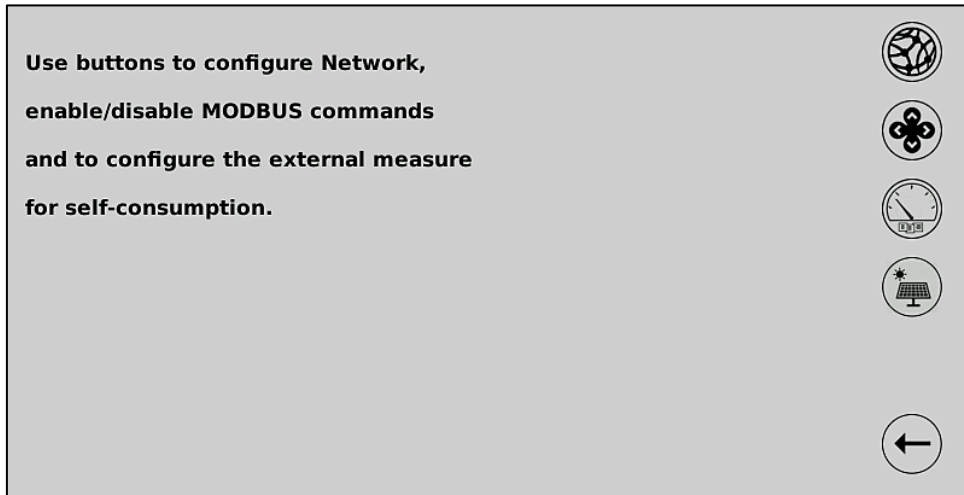
From the User settings window, pressing the  button allows for accessing the window for setting the display language.




 **ADVANCED SETTINGS**

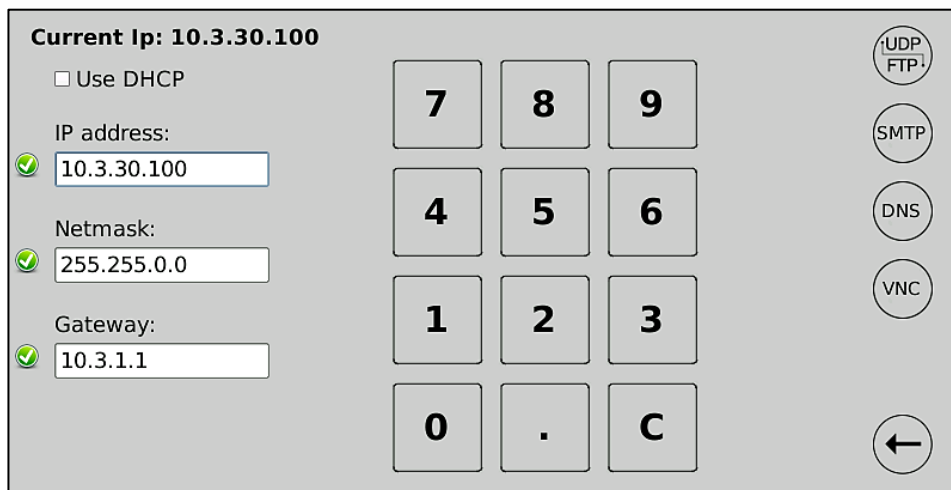
From the Configuration Screen, pressing the  button allows for setting the following features:

- network settings;
- activating or deactivating external commands through MODBUS;
- configuring the external reading for the self-consumption function (by means of an external multimeter via MODBUS).
- Insertion of the ratio between the peak power of the photovoltaic field with respect to the nominal power of the inverter, in percentage.



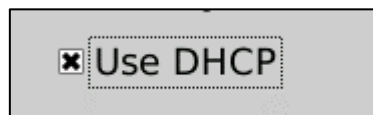
Pressing the  button allows for accessing the network parameters configuration window.

To operate within this section, an in-depth knowledge of network-related issues is required.





The IP address can be assigned statically, as in the previous figure, or can be obtained through a DHCP server.

Touch the selection box to choose this setting:



Press the button with the tick symbol  after selecting the desired network configuration.

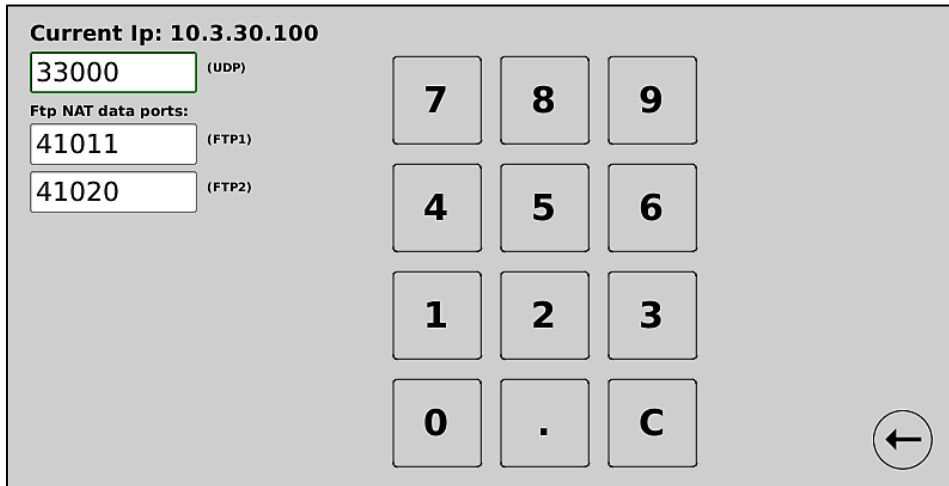
When entering the IP addresses, the software runs a check that shows next to each address entered the  and  symbols: these indicate whether the addresses were entered correctly or not. The other options are explained below:

### UDP + FTP:

in the first line the user can set the value of the UDP port used for communications via UDP on the Ethernet network (e.g. SunVision2 monitoring software).

The value 33000 is pre-defined; it is possible to modify it and enter the desired value.

The subsequent lines can be used for setting the port range for using the NAT-FTP from remote.




### SMTP:


allows for configuring the outgoing electronic mail server.

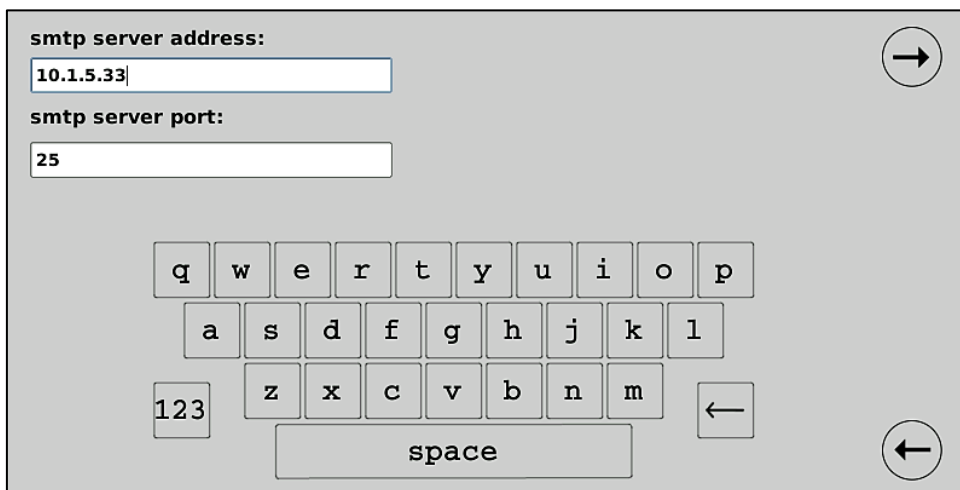
The following features can be configured:

- 1 SMTP server address and relative port (first page).
- 2 Message header fields (From: To: Cc:; second page).
- 3 The username and password for authentication on the SMTP server (optional).

At the end of the configuration procedure, it is possible to send a test e-mail message to verify

whether the settings are correct, by pressing the  button.

Lastly, press the  button to confirm the electronic mail configuration.



From:

To:

Cc:

1 2 3 4 5 6 7 8 9 0

- \_ . @ / \* , ( )

abc

space

Don't use SmtP Auth.

Use Encryption (TLS/SSL)

1 2 3 4 5 6 7 8 9 0

- \_ . @ / \* , ( )

abc

space

### DNS:

in this screen the user can enter any addresses of the DNS servers necessary for resolving the names of the outgoing e-mail servers:

DNS 1:

DNS 2:

1 2 3 4 5 6 7 8 9 0

- \_ . @ / \* , ( )

abc

space

### VNC:

thanks to a dedicated software (available on the Internet both as freeware and subject to payment), it is possible to connect to the display in remote mode from a personal computer:

From the screen below you can set a password for the connection and the port used for the service.

The default password is "secret".

Pass:

Conf:

5900

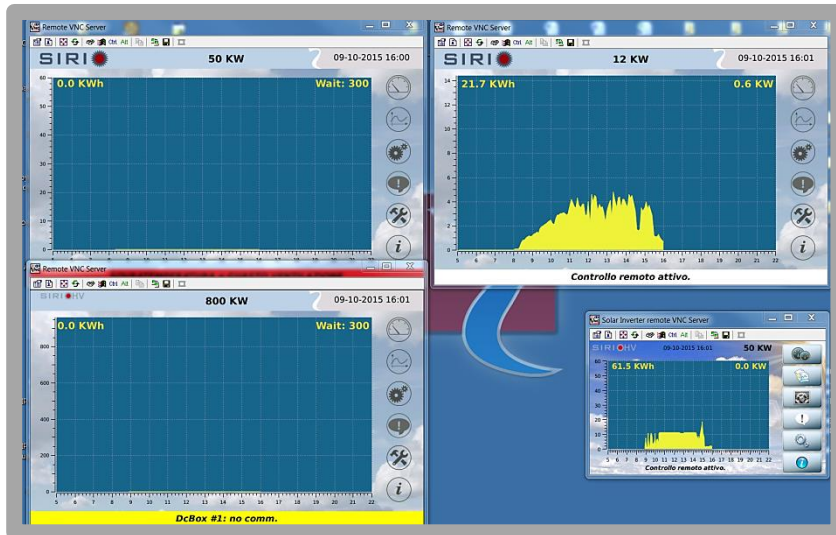
q w e r t y u i o p


a s d f g h j k l

123 z x c v b n m

space

Example of remote connection with multiple photovoltaic inverters.




Pressing the  button from the Advanced Settings screen allows for accessing the window for selecting the source on which to send the Modbus commands to the inverter for the following functions:


- ACTIVE POWER REDUCTION
- REACTIVE POWER PRODUCTION
- POWER FACTOR (COS  $\phi$ ) SETTING
- INVERTER SWITCH-ON/OFF
- POWER GRADIENT SETTING

Choose source of commands:




- None
- Slot 1
- Slot 2
- RS232-2
- Ethernet




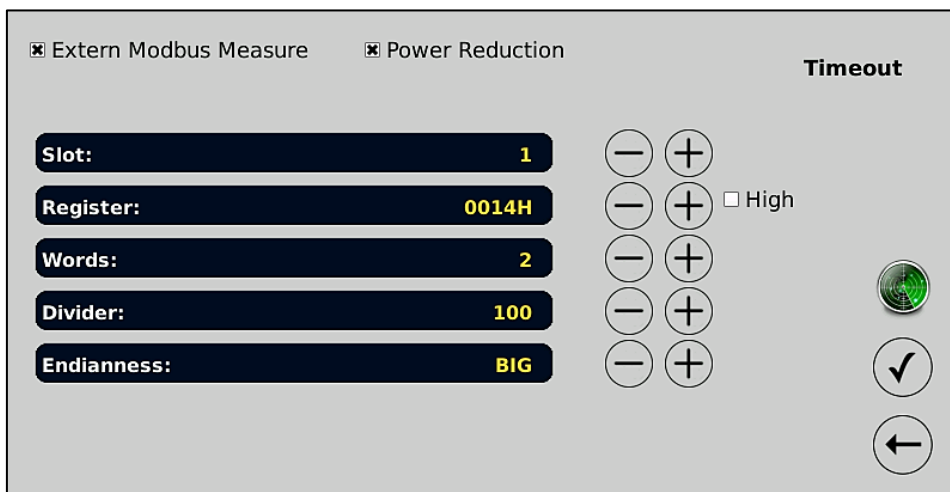
For further details consult the ModBus mapping document (IT2037).

Pressing the  button from the Advanced Settings screen allows for accessing the window for configuring the external reading, which can be used for the self-consumption function:

If External Modbus Measure is selected, the interface proposes a set of parameters, the default values of which are configured for the instrument supplied by RIELLO Solar Tech. Other instruments can be connected on the chosen 485 bus; we recommend reading the manual of the relevant instrument for defining the correct set of parameters to be used:

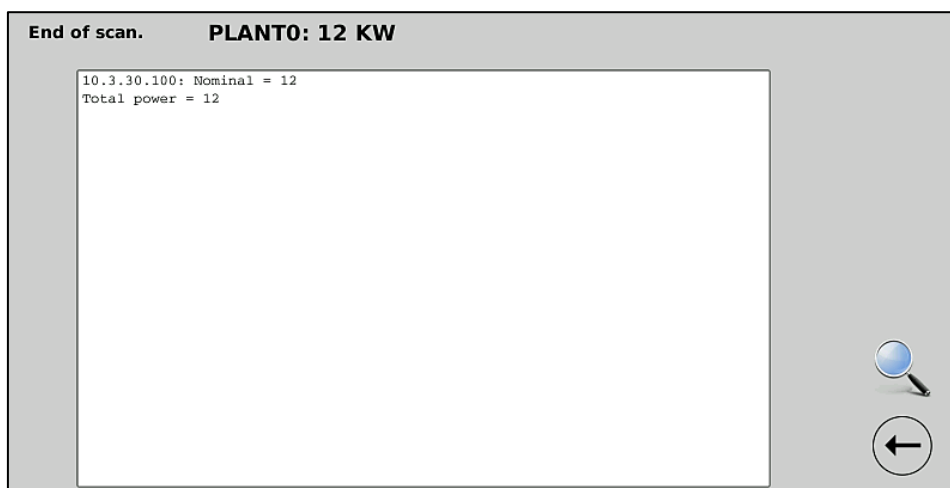
Use the  and  buttons for modifying the chosen parameters. Tick the 'High' box to modify the top part of the register. If the parameters are correct the desired measure appears and the configuration can be stored by pressing the  button.


Selecting the 'Power Reduction' function and pressing the  button again allows for configuring the inverter as a master of a set of other inverters.




At this stage, the RADAR icon will appear that allows for accessing the LAN network scan.

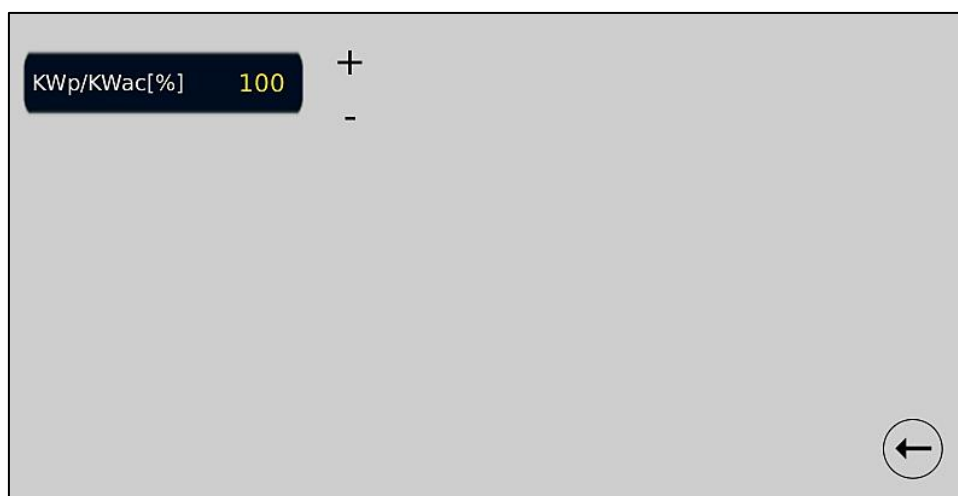
To run the scan, press the  button to access the following screen :



When the  button is pressed, the inverter runs a LAN scan to search for other inverters belonging to the same system. All the inverters must have the same label name. Consult the self-consumption document for further information.



Pressing the  button accesses the window where it is possible to modify the ratio between peak power of the photovoltaic field with respect to the nominal power of the inverter, in percentage.



## **TERMINAL MODE**



From the Configuration Screen, pressing the  button allows for accessing the Terminal Mode, an advanced configuration screen reserved exclusively for technical assistance personnel (service).

## **SERVICE**

From the Configuration Screen by pressing the  button you can access the following screen.



From this screen you can access various password protected functions, reserved exclusively for technical assistance personnel.

From the same screen it is possible to recalibrate the touch-screen; to perform this operation, press the  button then press the tick symbol  to confirm: a guided procedure will start that allows for recalibrating the screen; follow the instructions appearing on the display.

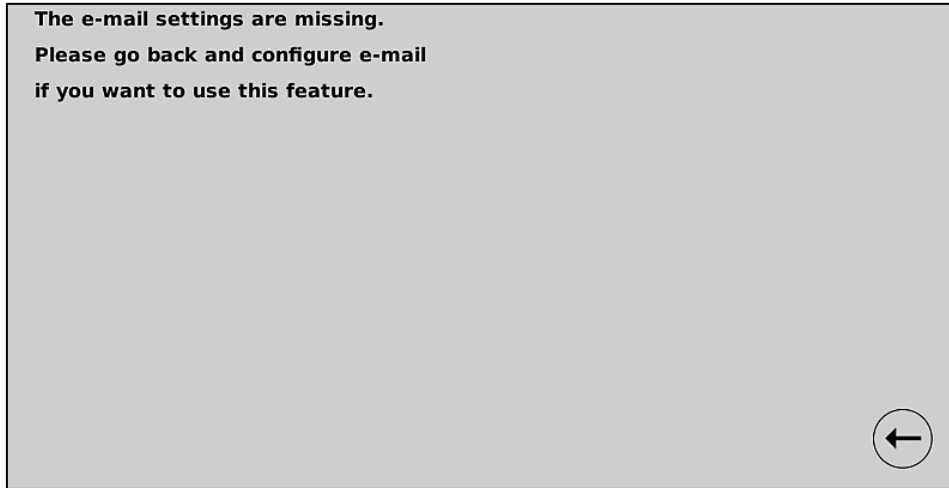
## E-MAIL CONFIGURATION

From the Configuration Screen, pressing the

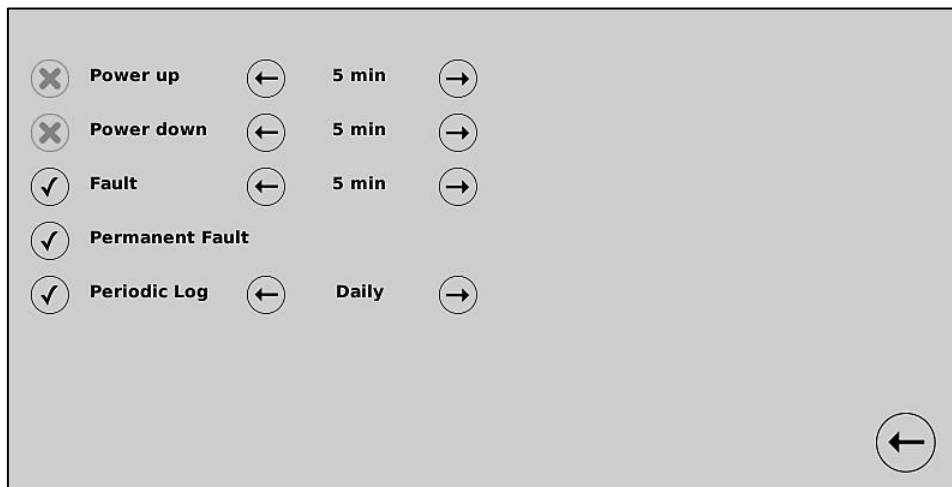


button allows for accessing the settings screen for automatic e-mail transmission.



If the procedure described in the ADVANCED SETTINGS section, under the [SMTP](#) paragraph, is not completed correctly, it will not be possible to configure the e-mail transmission.



If the e-mail configuration procedure was carried out correctly, the following screen will appear:



Press the  button to enable sending of e-mails for a certain type of 'action'.

Using the  and  buttons it is possible to increase or decrease the delay time, expressed in minutes, of individual e-mail message transmissions.

For example, for sending an e-mail 10 minutes after powering up and one 12 minutes after powering down, the following configuration must be set:

<input checked="" type="checkbox"/>	Power up	<input type="text" value="←"/>	10 min	<input type="text" value="→"/>
<input checked="" type="checkbox"/>	Power down	<input type="text" value="←"/>	12 min	<input type="text" value="→"/>
<input type="checkbox"/>	Fault	<input type="text" value="←"/>	5 min	<input type="text" value="→"/>
<input type="checkbox"/>	Permanent Fault			
<input type="checkbox"/>	Periodic Log	<input type="text" value="←"/>	Daily	<input type="text" value="→"/>


It is also possible to configure sending of an e-mail for a fault and also with daily, weekly or monthly logs.



*It is advisable to insert a delay time of at least 10 minutes to avoid sending e-mails during power-up and power-down attempts normally occurring in the morning and evening.*

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## **Statuses and alarms**

Pressing the  button from the Main Screen allows for accessing the window with the inverter Alarms and Statuses:




The list of alarms (if any) can be scrolled with the finger.

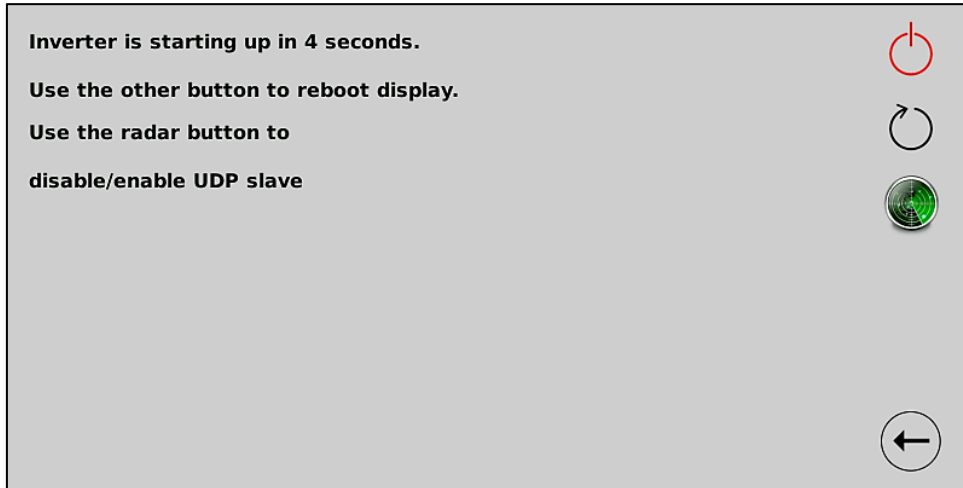
Bear in mind that in case of an alarm a beep will be emitted every 5 seconds until the alarm disappears or the user touches the screen.



When the screen is touched the sound's intensity and tone will change; if after 20 minutes the user fails to eliminate the alarm, the original sound will return.


The alarm sound can be enabled or disabled in the relevant CONFIGURATION section, under [User settings](#).

## Actions

Pressing the  button from the Main Screen you enter the window where it is possible to execute Actions on the inverter




The first button allows for SWITCHING the inverter ON and OFF.  

The second button  allows for restarting the graphic interface for any display software updates; this action does not hamper the inverter's operation in any way.

If pressed, the  button disables the self-consumption function.

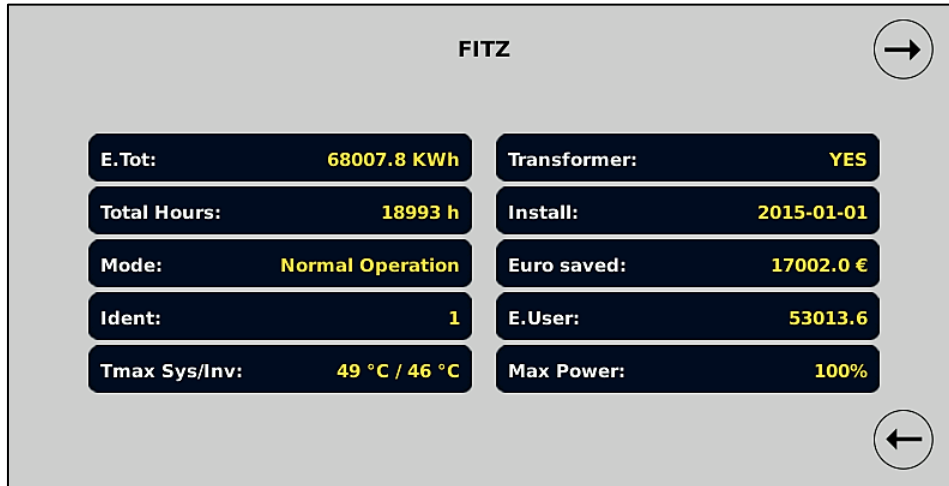
It is possible to disable an inverter (Master or Slave) to receive the power reduction commands, therefore free to produce all the power generated by the photovoltaic field, this procedure is indicated for maintenance or when it is necessary to check the operation of the inverter without power limitations external.

To restore the function, press the same button, which in the meantime will have changed to look like .

For further details refer to the manual of the self-consumption kit "Power Management guide".


## **i** Information

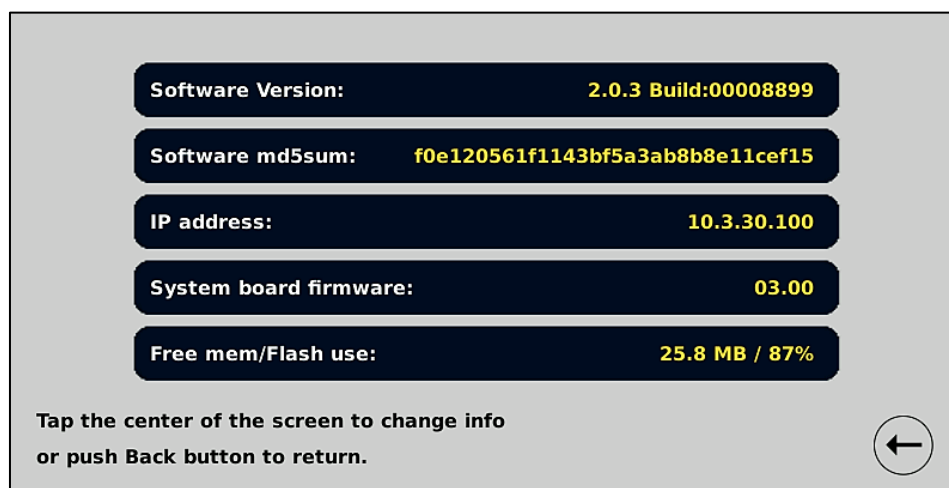
Pressing the **i** button from the Main Screen allows for accessing the following information window:



It contains all the information relative to the inverter:

- Total energy produced by the inverter
- Total hours of operation
- Operating mode
- Identification number
- The maximum temperatures reached by the system (machine internal temperature) and by the inverter (probes on the power module heat sinks)
- Presence of the integrated insulation transformer
- Date of installation (Year-Month-Day)
- Money saved (in Euro)
- The Energy User meter (resettable by the user)
- The maximum power reached

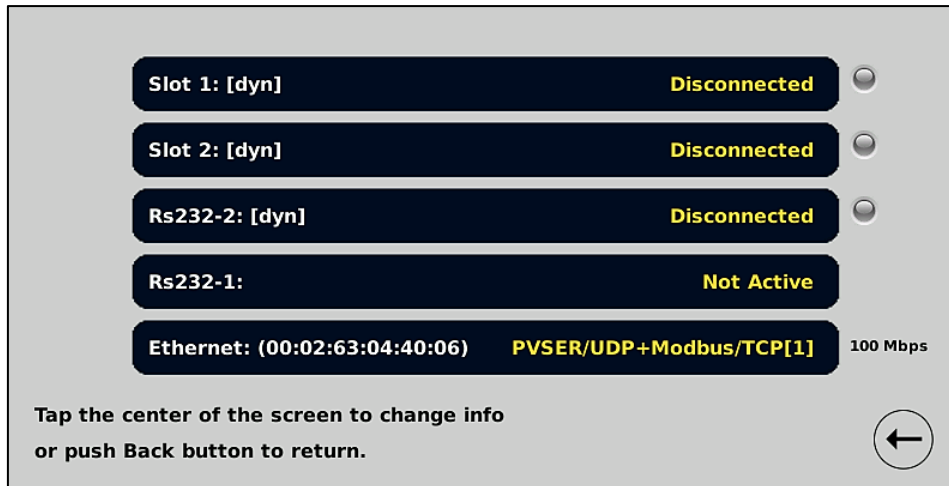
Pressing the left arrow button  allows for accessing the second information screen:



This screen contains other information:

- Touch-screen software version
- Firmware version of the control board
- Network interface IP address
- Quantity of free memory and percentage of flash memory occupied

Touching the screen allows for viewing further information relative the status of communications:



The above example shows a PVSER/UDP and Modbus TCP connection on the Ethernet port and a connection to an external reading on serial port no. 2, which in this case corresponds to the DC-BOX current readings.

The flashing green/red LED indicates that communication activities are being received on the relevant slot/port. The grey LED signals the absence of incoming communication on the relative slot/port.



## STATUS BAR

The lower part of the TOUCH-SCREEN contains the so-called STATUS BAR zone, which displays real time information concerning the inverter status.

Various types of information are included, such as:

- normal operation, alarms, counting pauses, etc.

In order to provide an easier and more intuitive understanding of the situation, this bar takes on different colours depending on the inverter status.

### GREEN BAR:

- Normal operation

### WHITE BAR:

- Pause, awaiting a re-start

### YELLOW BAR:

- Alarm/notice/warning that does not cause the inverter to switch off

### RED BAR:

- Inverter stoppage due to serious alarm
- Switch-off command from the panel

# SPECIFICATIONS

## **TECHNICAL FEATURES**

- Resistive touch-screen LCD, TFT, 7-inch
- One Ethernet port
- One USB port
- One micro-USB port
- One microSD memory slot

## **COMPATIBILITY OF PROTOCOLS**

- PVSER<sup>2</sup>, dynamic and static addressing
- PVSER/UDP<sup>2</sup> (default port: 33000, configurable)
- MODBUS
- MODBUS/TCP
- RFB protocol (usable from screen sharing programmes, such as VNC), protected by password (configurable); the default password is "**secret**"
- Sunvision 2 (from version 2.0.5 upwards) may request the access credentials for retrieving past data of readings and alarms; In this case the username is **ftpuser** and the password is **arosftp**

## **SOFTWARE VERSION**

- This manual refers to software version **02.01.XX** of the touch-screen; there may be some differences with later versions of the software

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<sup>2</sup> Proprietary protocol





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