Leading Conversion Technology for Power Resilience

MONITORING - T2S ETH WITH INVIEW X

User Manual V3.0

THE NEW GENERATION OF MONITORING

- EXTENDED LOG CAPABILITIES
- WEB-BASED USER INTERFACE

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Leading Conversion Technology for Power Resilience

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Release Note:

Version	Release date (DD/MM/YYYY)	Modified page number	Modifications
1.0	11/04/2016	-	First release of the manual
1.1	27/01/2017	17, 32 and 39	Catena and SNMP details updated
		46	Added Annex
1.2	18/09/2017	42 - 47	Modbus Testing Procedure
1.3	10/08/2018	-	Added SNMP details
1.4	03/10/2018	76	Updated Modbus details
2.0	26/03/2020	-	New layout
2.1	09/04/2020	60	Added SNMP details
2.2	25/05/2020	-	Additional information included
2.3	18/06/2020	104	Additional information included
2.4	19/05/2022	33 & 70	Added Digital input information and updated an action
3.0	04/10/2023	-	Replaced Catena with Inview X

1. Introduction to CE+T

CE+T Power designs, manufactures, and markets a range of products for industrial operators with mission critical applications, who are not satisfied with existing AC backup system performances and related maintenance costs.

Our product is an innovative AC backup solution that unlike most UPS's available.

- Maximizes the operator's applications uptime;
- Operates with lowest OPEX;
- Provides best protection to disturbances;
- Optimizes footprint.

Our systems are:

- Modular
- Truly redundant
- Highly efficient
- Maintenance free
- Battery friendly

CE+T power puts 60+ years expertise in power conversion together with worldwide presence to provide customized solutions and extended service 24/7 - 365 days per year.

2. Abbreviations

AC	Alternating current
DC	Direct current
DHCP	Dynamic Host Configuration Protocol
DSP	Digital Signal Processor
ECI	Enhanced Conversion Innovation
EPC	Enhanced Power Conversion
ESD	Electro Static Discharge
ETH	Ethernet
HTTP	HyperText Transfer Protocol
HTTPS	Secure HyperText Transfer Protocol
LAN	Local Access Network
MBB	Measure Box Battery
MBP	Manual By-pass
MET	Main Earth Terminal
MIB	Management Information Base
N	Neutral
NTP	Network Time Protocol
NUA	Non-Urgent Alarm
PCB	Printed Circuit Board
PE	Protective Earth (also called Main Protective Conductor)
PWR	Power
REG	Regular
SNMP	Simple Network Management Protocol
TCP/IP	Transmission Control Protocol/Internet Protocol
TRS	True Redundant Structure
TSI	Twin Sine Innovation
UA	Urgent Alarm
USB	Universal Serial Bus

3. Warranty and Safety Conditions*

The electronics in the power supply system are designed for an indoor, clean environment.

When installed in a dusty and/or corrosive environment, outdoor or indoor, it is important to:

- Install an appropriate filter on the enclosure door or on the room's air conditioning system. Installation of filters may result in de-rating of module.
- Keep the enclosure door closed during operation.
- Replace the filters on a regular basis.

Important Safety Instructions, Save These Instructions.

3.1 Disclaimer

- The manufacturer declines all responsibilities if equipment is not installed, used, or operated according to the instructions herein by factory certified technicians according to local regulations.
- Warranty does not apply if the product is not installed, used, and handled according to the instructions in the manuals.

3.2 Technical care

- This electronic equipment can only be repaired or maintained by a "qualified employee" with adequate training. Even personnel who are in charge of simple repairs or maintenance are required to have knowledge or experience related to product maintenance.
- Please follow the procedures contained in this Manual, and note all the "DANGER", "WARNING" AND "NOTICE" marks contained in this Manual. Warning labels must not be removed.
- Qualified employees are trained to recognize and avoid any dangers that might be present when working on or near exposed electrical parts.
- Qualified employees understand how to lock out and tag out machines so the machines will not accidentally be turned on and injure employees working on them.
- Qualified employees also understand safety related work practices, including those by OSHA and NFPA, as well as knowing what personal protective equipment should be worn.
- All operators are to be trained to perform the emergency shut-down procedure.
- Never wear metallic objects such as rings, watches, or bracelets during installation, service and maintenance of the product.
- Insulated tools must be used at all times when working with live systems.
- When handling the system/units pay attention to sharp edges.

* These instructions are valid for most CE+T Products/Systems. Some points might however not be valid for the product described in this manual.

3.3 Installation

- This product is intended to be installed only in restricted access areas.
- The user must observe the recommended upstream and downstream circuit breaker requirements as per the local regulations.
- Please use extreme caution when accessing circuits that may be at hazardous voltages or energy levels.
- The modular inverter rack is a dual input power supply. The complete system shall be wired in a way that both input and output leads can be made power free.
- In REG systems, to comply with local and international safety standards the N (output) and PE shall be bonded. The bonded connection between N (output) and PE must be removed once the AC input is connected.
- AC and DC circuits shall be terminated with no voltage / power applied.
- The safety standard IEC/EN62040-1-1 requires that, in the event of an output short circuit, the inverter must disconnect in 5 seconds maximum. The parameter can be adjusted on T2S ETH monitoring; however, if the parameter is set at a value > 5 seconds, an external protection must be provided so that the short circuit protection operates within 5 seconds. Default setting is 60 seconds.
- The system is designed for installation within an IP20 or IP21 environment. When installed in a dusty or humid environment, appropriate measures (air filtering) must be taken. Installation of filters may result in de-rating of module.
- All illustrations in the manual are for general reference, refer to the technical drawing which is received along with the system for exact information.

3.3.1 Handling

- The cabinet shall not be lifted using lifting eyes.
- Remove weight from the cabinet by unplugging the inverters. Mark inverters clearly with shelf and position for correct rebuild. This is especially important in dual or three phase configurations.
- Empty T2S positions should not be left open. Replace either with a T2S or blank cover.

3.3.2 Surge and transients

The mains (AC) supply of the modular inverter system shall be fitted with Lightning surge suppression and Transient voltage surge suppression suitable for the application at hand. Manufacturer's recommendations of installation shall be adhered to. Selecting a device with an alarm relay for function failure is advised.

Indoor sites are considered to have a working lightning surge suppression device in service.

- Indoor sites Min Class II.
- Outdoor sites Min Class I + Class II or combined Class I+II. The modular inverter system/rack can reach hazardous leakage currents. Earthing must be carried out prior to energizing the system. Earthing shall be made according to local regulations.

3.3.3 Other

- Isolation test (Hi-Pot) must not be performed without instructions from the manufacturer.

3.4 Pre-cautions before maintenance

- The modular inverter system/rack can reach hazardous leakage currents. Earthing must be carried out prior to energizing the system. Earthing shall be made according to local regulations.
- Prior to any work conducted on a system/unit make sure that AC input voltage and DC input voltage are disconnected.
- Inverter modules and shelves contain capacitors for filtering and energy storage. Prior to accessing the system/modules after power down, wait at least 5 minutes to allow capacitors to discharge.
- Some components and terminals carry high voltage during operation. Contact may result in fatal injury.

3.5 Replacement and Dismantling

- ESD Strap must be worn when handling PCBs and open units.
- CE+T cannot be held responsible for disposal of the Inverter system and therefore the customer must segregate and dispose of the materials which are potentially harmful to the environment, in accordance with the local regulations in force in the country of installation.
- If the equipment is dismantled, to dispose of its component products, you must comply with the local regulations in force in the country of destination and in any case avoid causing any kind of pollution.

To download the latest:

- Documents - www.cet-power.com
- Softwares - my.cet-power.com

4. Product Code and Identification

T2S-ETH product code with regards to sub rack:

A) T2S-ETH Monitor

Product Description	Part Number
TSI-T2S-ETH-NOVA - VEDA	T312010010
TSI-T2S-ETH-BRAVO-MEDIA 24/48 Vdc	T322010100
TSI-T2S-ETH-BRAVO-MEDIA 60/110/220 Vdc	T322051000

B) Filler (Blank module to cover empty slots)

Product Description	Part Number
TSI-T2S-ETH-NOVA - VEDA	T312010001
BLANK PLASTIC T2S ETH ECI RED	T522010001

4.1 Identification labels for T2S-ETH

Note:

The part number, serial number, and burn in date are essential information when you contact CE+T to get help in commissioning or in troubleshooting or when the item is sent back for repair.

5. Introduction

The T2S ETH stands for T2S Ethernet. It replaces the former T2S with the same form factor but with a front Ethernet connector replacing the former USB one. Like his predecessor, T2S ETH is a monitoring solution for the full TSI inverter range and is able to monitor up to 32 inverters through a friendly web-based interface and it consumes power of 2W. T2S also supports Modbus Serial communication (RTU) and SNMP v1 Communication.

This new monitoring device provides a graphical user interface, embeds an SNMPv2c/SNMP v3 agent, and Modbus TCP support with Inview X.

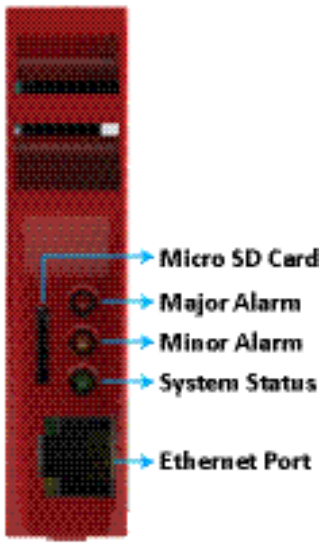
6. Hardware

6.1 T2S ETH

The T2S ETH provides 3 LED's: Red for major alarm signaling, orange led for minor alarm signaling, and green led for power and network connection status.

The RJ45 is a standard ETH connector that could be connected to any IPv4 network.

T2S ETH software can be upgraded using the Micro SD card. The latest device softwares are available in my.cet-power.com



6.1.1 LEDs code during operations

S - Flash slow
FS - Flash fast
SA - Sequence one after the other
X - Not used LED

6.1.1.1 LEDs code during normal operation

LEDs code below corresponds to system in operation and T2S ETH fully operational.

Green	Orange	Red	Status
S			Slave mode (when several T2S ETH on the same bus)
			Master Mode « master »
			Minor alarm / Alarme Mineure
			Major alarm / Alarme Majeure

6.1.1.2 LED Error Code - upgrade or system start up

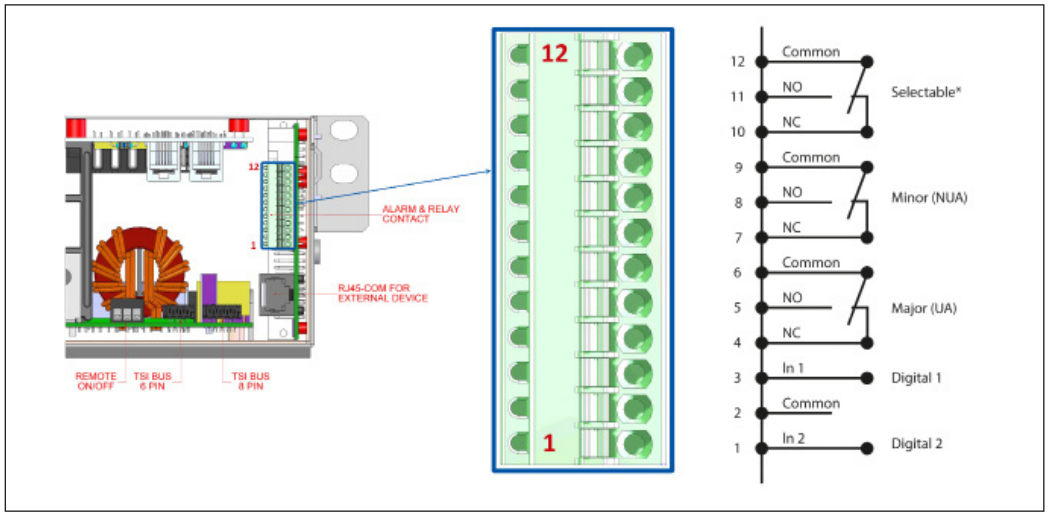
This section explains the state of the boot loader in function of his LED state. During start up, soft upgrade, configuration change or micro SD card changes.

Green	Orange	Red	Status
			Booting
			Cannot copy to flash
		FS	No micro SD card or file *.bcf not valid or not present
			File *.acf found
SA	SA		Installation *.saf please wait
		FS	System error or no micro SD card
S		FS	Configuration.ini found waiting network

Green	Orange	Red	Status
●		FS	Boot loader Web interface ON and in operation
	S	FS	System file OK but no config file *.ini
S	S	S	Error SD Card / File
S	S		Error no configuration.ini

6.1.2 Signaling Information

As it is designed to be used in the same shelf as former T2S, T2S ETH inherits the connections on the back.



Note: The terminal connector accepts maximum wire size of 0.5 mm^2.

Important remarks:

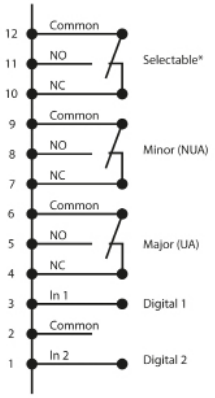
In a system with several shelves, T2S ETH is usually located in the top (although it is not mandatory), but relay signaling contacts will be terminated in the T2S ETH installed shelf. The above connection is an example, actual connection will be based on your shelf design and connections.

If the T2S ETH is included in a complete system, the alarm terminals will be located somewhere in the system. For exact location, refer to the system user manual.

6.1.2.1 Alarm relay

There are 3 alarm contacts:

- Major
- Minor
- User selectable



As one can see in the picture: contacts 5 and 6 are closed when no major alarm is present, contact 8 and 9 are closed when no minor alarm is present.

Remark: Default mapping and level of each available alarm of the monitoring unit is available in “Annex 1: Supervisor alarms - T2S ETH”, page 68.

NB: Alarm relay are active (energized) when no alarm are present.

- Alarms relay features
  - Max current: 2 A @ 30 VDC or 1A @ 60 VDC
  - Max Power: 60 W
  - Max Voltage: 60 VDC SELV

Note that for higher voltages, it is mandatory to install an additional relay with appropriate characteristics – especially for 60/110/220 VDC.

6.1.2.2 Digital Inputs

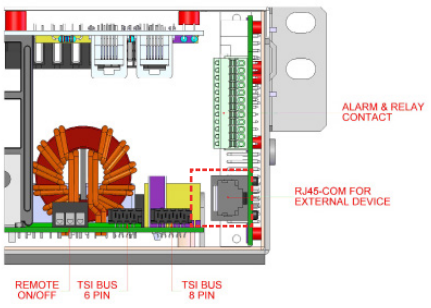
Two potential free Digital inputs are reserved for optional equipment.

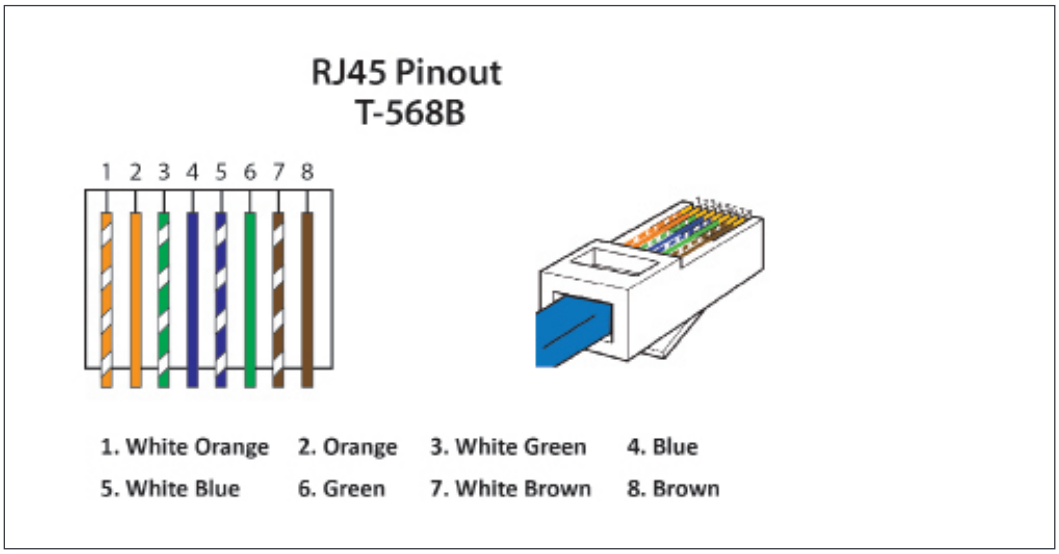
- Digital Input 1 is assigned for MBP operation if used.
- Digital Input 2 is assigned for Surge Arrester if used.

The voltage present on terminal 1 and 3 is +5 V (galvanic insulation). Care should be taken to avoid connecting any external voltage on terminal 1 to 3. External signals should be applied to these terminals via Volt-free contacts. The function is activated when the two terminals concerned are short-circuited (i.e., when the external Volt-free contact is closed).

6.1.2.3 Communication

An RJ45 connector is present at rear of the shelf and can be used for **Candis** display and **Modbus** (RTU) communication.





Note: The colour of wires is irrelevant and may vary, but make sure the position of wires is exactly crimped.

Pin Number	Name	Description
1	CANH	CANH pin for Candis
2	CANL	CANL pin for Candis
3	GND_IAX	Digital Communication Ground
4	GND_IAX	Digital Communication Ground
5	12V_IAX	+12 V unregulated
6	COM_A	RS 485 A
7	GND_IAX	Digital Communication Ground
8	COM_B	RS 485 B

RJ45 Pinout - Details

Important remark:

T2S ETH comes in only one type in terms of serial communication RS485 and support Modbus RTU (read-only).

Currently, no protocol is available for customer use on CAN bus connection and it is dedicated for Candis accessory.

The unregulated +12 V power supply is designed for powering CE+T accessories and should not be used for any other purpose.

6.2 Monitoring - Inview X

Inview X is an advanced monitoring and controller unit for power systems. It allows the user to easily view and access the system information through LCD screen graphic display and configure through web interface. The home screen of both LCD and web interface provides a summary of system power, batteries, and events information.

Inview X is featured with the following:

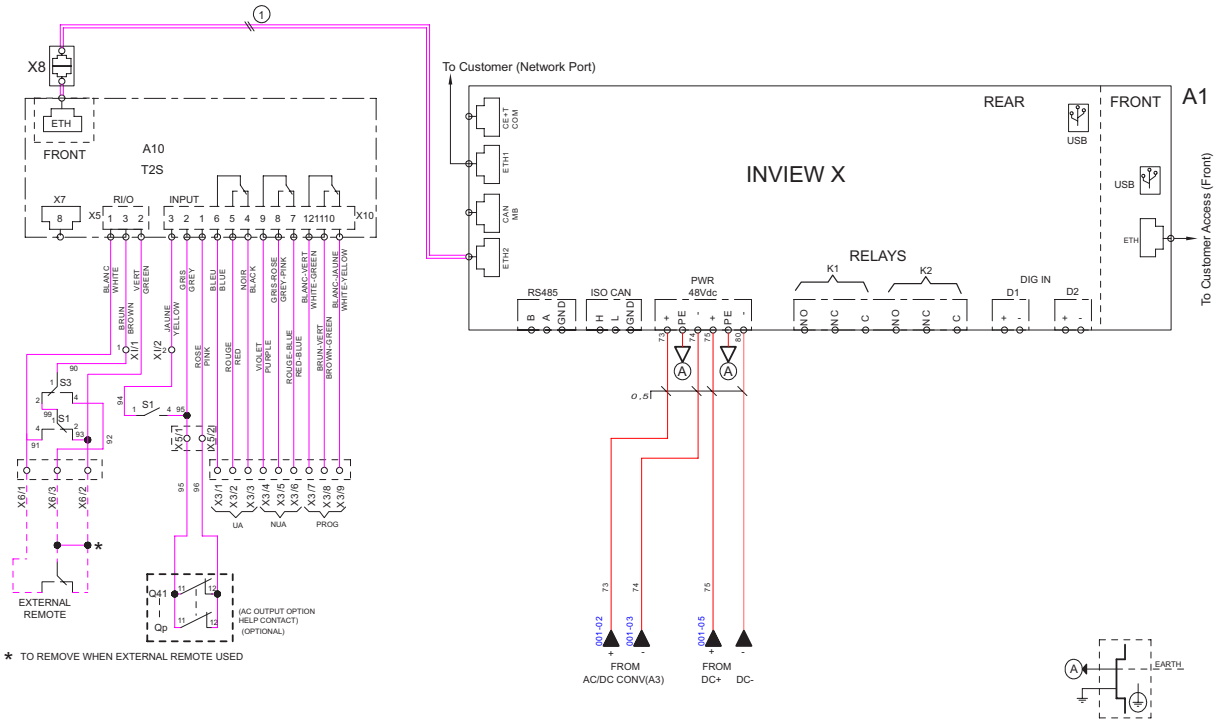
- 7" LCD touch screen display with LED strip around the screen to indicate Major alarm, minor alarm and system status.
- Two Digital Inputs and two Output Relay contacts.
- Records 5000 events as FIFO.

6.2.1 Inview X - Connections

Inview X has multiple network ports and inbuilt free potential contacts.

- **ETH** ports are used for network connectivity, and user can access the system information through the web interface.
  - **ETH Front:** DHCP server, providing access to the configuration at URL https://inview.local or https://10.250.252.1
    - Intended for direct connection of a laptop computer.
      Warning: Do not connect this port to the network, as it might interfere with other DHCP servers.
  - **ETH1:** Main network interface
    - Default static IP address: 10.250.250.1/24
    - It can be configured to other static addresses or as a DHCP client in a web-based configuration interface
  - **ETH2:** Secondary network interface
    - Static IP address: 192.168.0.3/24
    - It is dedicated to T2S ETH and does not connect to the network
- **Power**: The unregulated separate +48 V power supply is required for powering Inview X and this power should not be shared with other devices.

6.3 Wiring


X8
ETH
FRONT
A10
T2S
X7
RI/O
INPUT
X5
X10
To Customer (Network Port)
INVIEW X
REAR
FRONT
A1
USB
ETH
To Customer Access (Front)
RELAYS
K1
K2
RS485
ISO CAN
PWR
48Vdc
DIG IN
D1
D2
CE+T COM
ETH1
CAN MB
ETH2
EXTERNAL REMOTE
(AC OUTPUT OPTION HELP CONTACT) (OPTIONAL)
* TO REMOVE WHEN EXTERNAL REMOTE USED
FROM AC/DC CONV(A3)
FROM DC+ DC-
EARTH

7. User Interface

7.1 Graphical User Interface - Inview X

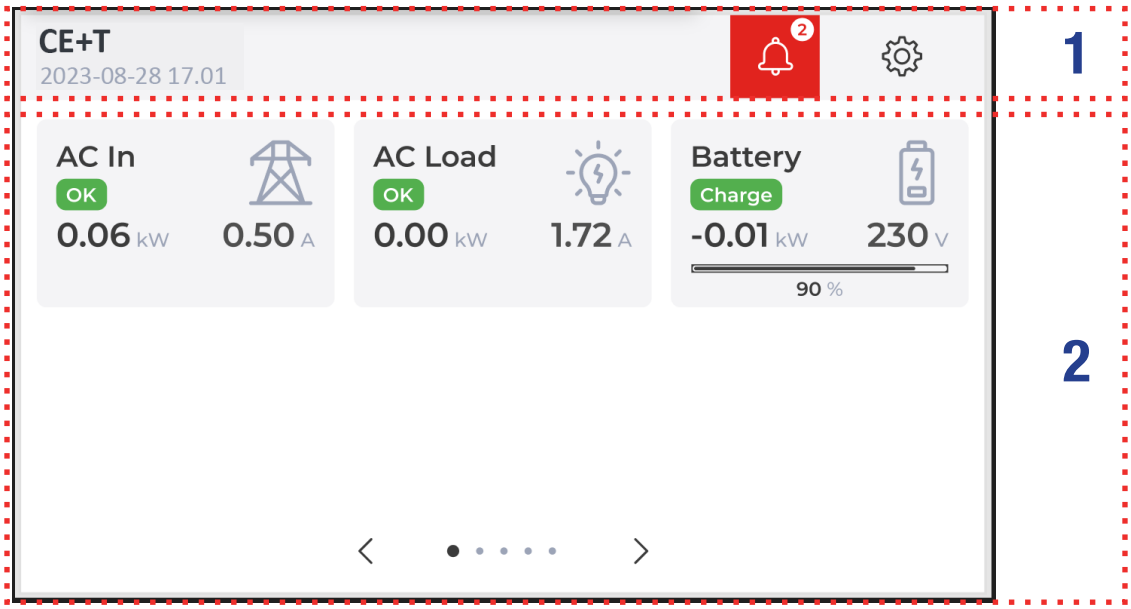
The user interface is the same if accessed with a laptop connected on front ETH connection, remotely on a network, or through Inview X if one is present.

The interface has a “top-down” philosophy: the first screen gives a general overview, then one can go deeper and get more information on a specific area by clicking the “magnifier icon.”

7.1.1 Inview X - LCD Interface

Inview X LCD interface is a 7-inch touch screen. Through the LCD interface, the user can view and access the system details. Once the system is powered upon, the Inview X is up and ready for operation.

Note: Interface graphics and layout may change based on firmware version.



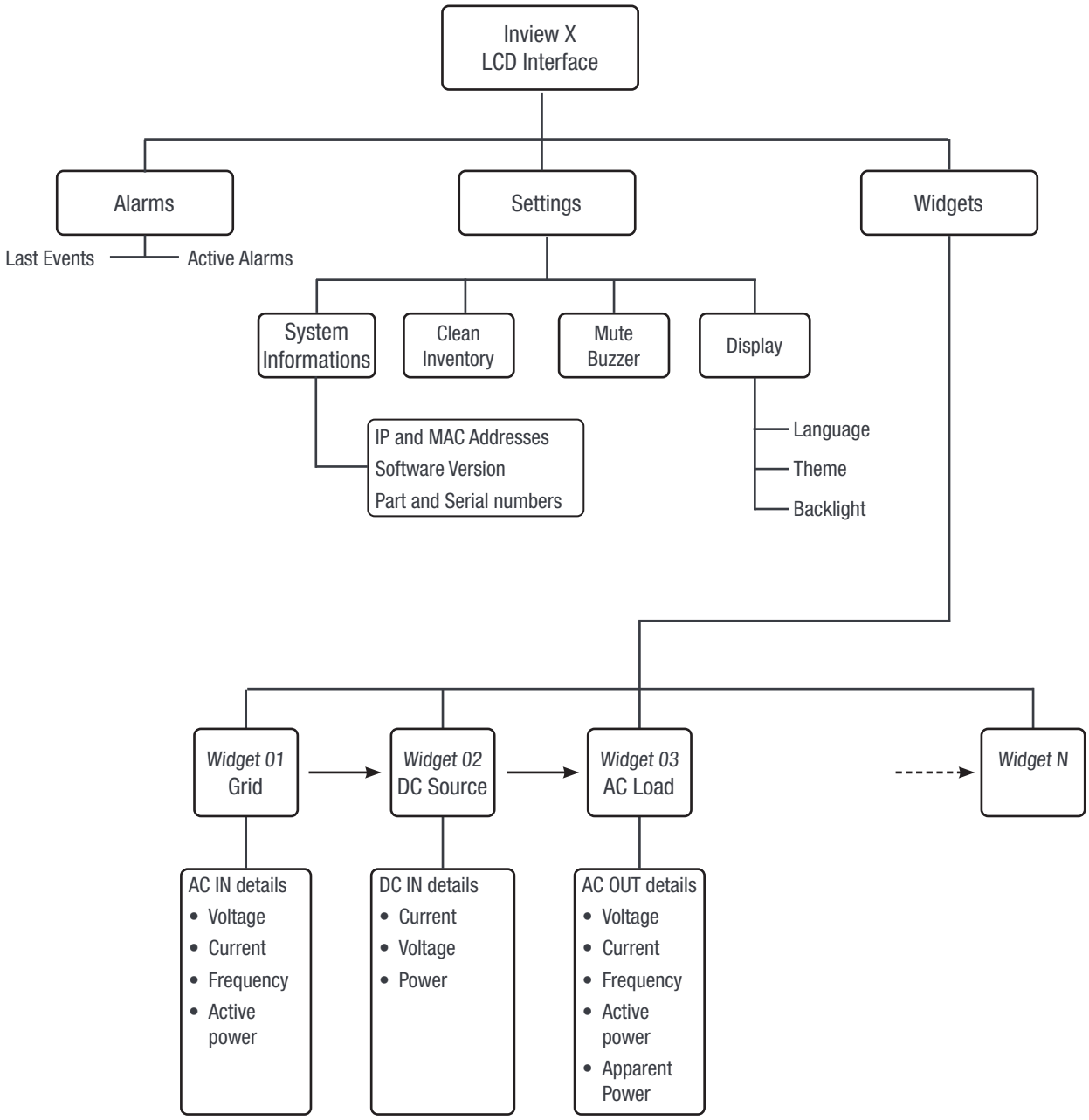
- **[1] Header:** Displays the Site name, Date and Time.
  - **Events:** Tapping on goes to Alarms and Events screen.
  - **Administration:** Tapping on provide access to different action screens.
- **[2] Interface Area:** Tapping on the widget provides the corresponding parameter information.

  Provides information about the corresponding screen. In some screens, left and right navigation buttons appear, indicating more screens are present.

Navigation arrows for the next and previous pages. Up and down arrows appear on some screens, indicating more information is present.

7.1.2 Menu Structure

The below tree provides an overview of the menu structure in the Inview X LCD interface.



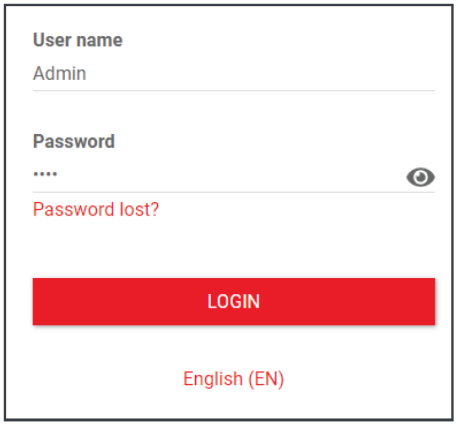
7.1.3 Inview X Web UI

Open the web browser and type the default IP address **10.250.250.1/site,** in the address field and press enter.

Inview X has three login – Basic, Expert and Admin. All three logins are password protected.

The default password for all three logins is “1234”. It can be modified, refer to Inview user manual for more details.

NOTE: The user is not allowed to modify any converter system parameter inside the Inview X Web UI.



7.1.4 Software Overview

The software embedded in Inview X allows complete system supervision through web browser, and provides functionalities such as:

- System setting and configuration (password protected).
- System status and information display.
- System alarms and events log file.

In addition to these, there is minimal information available via “touch screen display”.

7.2 T2S Web UI

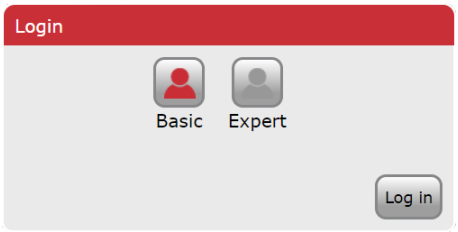
NOTE: The controller will perform a short self-test as it boots up. Alarm alerts are normal.

- Initiate the start-up routine by applying power to the T2S ETH (close protection breaker powering the controller).
- Use a laptop to connect to the system.

If the system does not have Inview X, the default IP address of the T2S ETH user interface is http://192.168.0.2

If the system has Inview X, the T2S ETH web UI can be accessed through http://10.250.250.1

There are two access levels:



- **Basic login** can only browse the pages and download the files.
- **Expert login** can access and also modify the system parameter values. The default password is **pass456** but it's strongly advised to users to change that password.

NOTE: System modification and setting may result in alarm event. Be careful while applying modification.

An auto-logout feature is available to avoid a user being connected all the time, blocking the system. Refer section "Regional settings", page 33 for more information.

No password is required for Basic, but Expert mode is protected with a default password "***pass456".*** This password can be modified, and the option is available in section "Passwords", page 34.

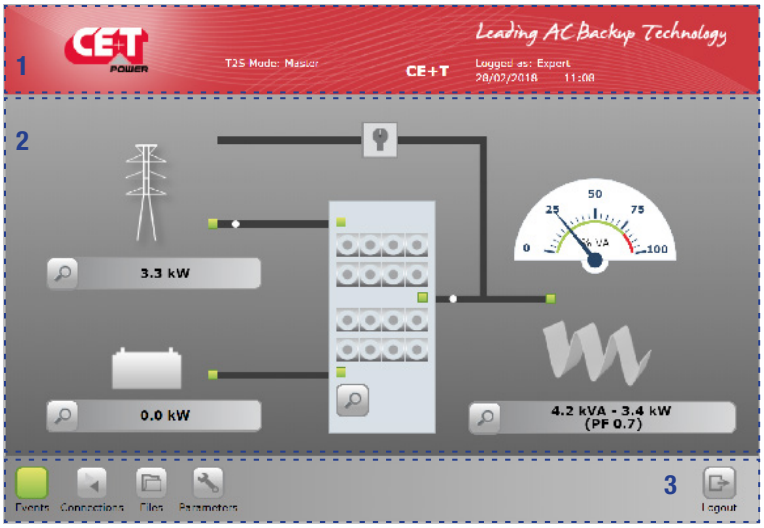
In case of lost password, please refer to FAQ at page 63

7.3 Interface Areas

1 → Banner

2 → Main Area

3 → Tool bar



7.3.1 Banner

1 → T2S Mode

T2S ETH can be used redundant (2 in the same system), one being master, the second is a slave. When used alone, T2S ETH automatically becomes master.

2 → Site name

It's a customizable field from the configuration menu. Users can set any string as required.

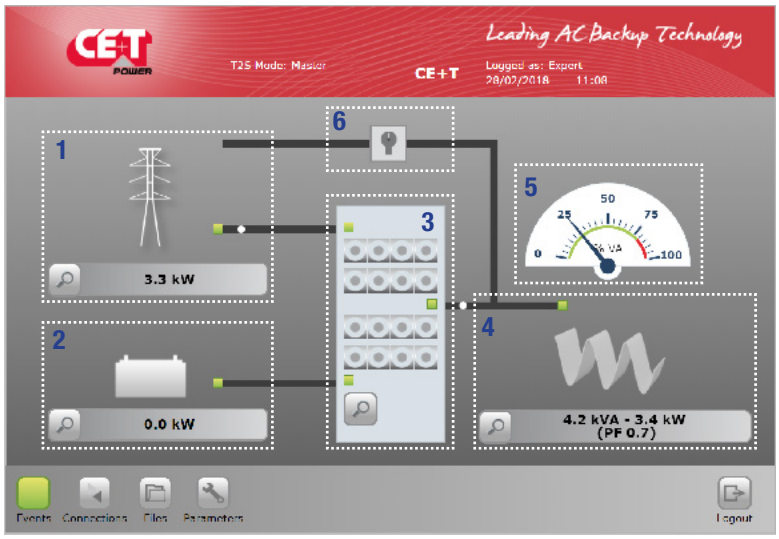
3 → Access level

Display the level in use to browse the interface. It can be either Expert or Basic.

4 → Date and time

This is the device time and date which can be adjusted in configuration menu.

7.3.2 Main Area



The above screen is a "Classic" home page, and the moving white ball appears, while the load consumes power from the module. While in the "Alternate" home page, displays brief information of the system.

1 → AC IN

Clicking the magnifier will bring the user to all measurements regarding the AC input.
The LEDs show the status of the input: if the source is absent, this LED's becomes red.
Flowing (moving white ball) from this item to the system means power is taken from the source.
The power displayed is the total power consumed, regardless of the system is 1P or 3P.

2 → DC input

Clicking the magnifier will bring the user to all measurements regarding DC input.
Given the system can be configured with up to 2 DC groups, power is the total power consumption.
Flowing (moving white ball) from this item to the system means power is taken from the DC source.

3 → System

Clicking the magnifier will bring the user to information regarding the system, such as redundancy, available power, and so on. It is also the path to module level monitoring.
The three LEDs are showing the state of each converter.
Example: if any one of the internal converter of the module is in problem, then the led will turn to the corresponding color.

4 → AC out

Clicking the magnifier will bring the user to all measurements regarding AC Out.
Regardless of the system configuration (1P, 3P), displayed power is the total amount of power fed to the load.
Power is expressed in both KW and KVA, and the Power Factor (PF) is computed.

5 → Gauge

In a 1P output system, the gauge depicts the percentage of power used in VA.
In a "more than 1P" system, the gauge depicts the "worst case," i.e., if the system is unbalanced, it shows the most loaded phase.

6 → MBP

MBP is configured in the system.

7.3.3 Toolbar

The tool bar is always accessible and provides quick access to the following pages:

- **Events page**
  The events icon has the color of the highest priority alarm currently present in the system:
  - Green: system healthy, no event present.
  - Grey: at least one event is present in the system but not configured as major or minor.
  - Orange: at least one minor event present in the system. No major event but other events could be present also.
  - Red: at least one major event is present in the system. Other events or minor events could be present.

If more than one event is present, regardless of its level, a counter is present on the icon. It displays the total number of event currently present in the system.

- **Connections**
  This brings to digital input and relays status. For configuring these inputs and outputs, it's in the configuration section.
- **Files**
  This leads to the file management page. Files such as configuration, update and log download.
- **Parameters**
  The parameters page allows user to change every parameter related to the system.

Throughout the browsing, the user can see the following icons:

When accessing a page of depth of two or more (such as module or log page), the user can go back to previous page by clicking “back” icon

Clicking on “Home” icon goes to the home page from any page you are accessing in the interface.

Clicking on “Logout” icon goes to the login page

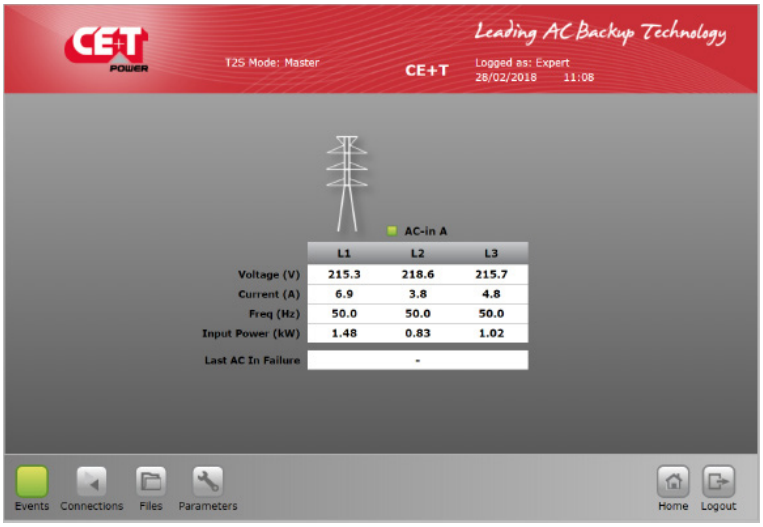
7.4 Pages and Feature

7.4.1 AC IN

This page displays the measurements made by the modules on the AC input.

Available values are:

Measure	Unit
Voltage (V)	Volts (V)
Current (I)	Ampere (A)
Frequency(f)	Hertz (Hz)
Input Power(P)	Kilo Watts (kW)



The system also keeps track of last AC In failure timestamp.

Remark:

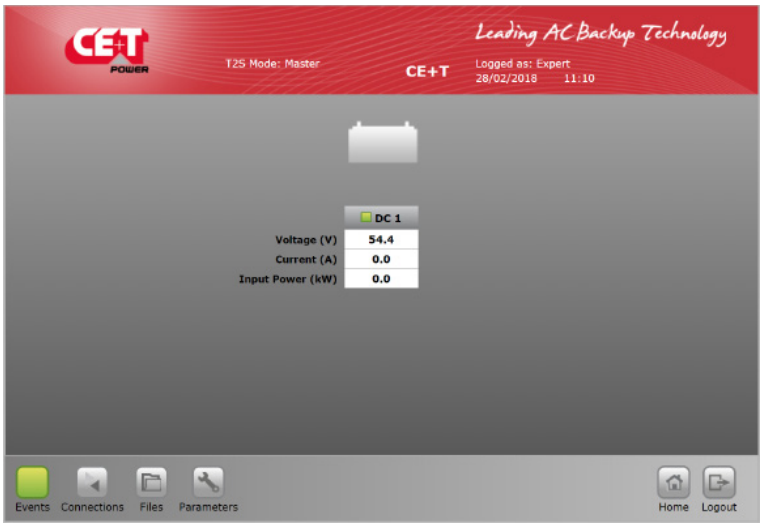
Modules have a Power Factor of 1, that’s why power is only displayed in KW. This would be the same value in KVA.
The Last AC in failure is non-persistent information. It means that it will be lost if the device is reset.

7.4.2 DC IN

This page displays the measurements made by the modules on the DC input.

Available values are:

Measure	Unit
Voltage (V)	Volts (V)
Current (I)	Ampere (A)
Input Power(P)	Kilo Watts (kW)

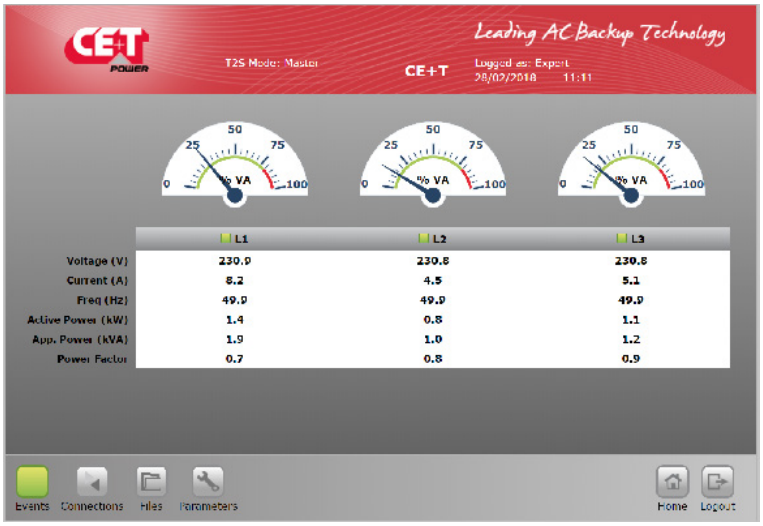


7.4.3 AC Out

This page displays the measurements made by the modules on the AC output

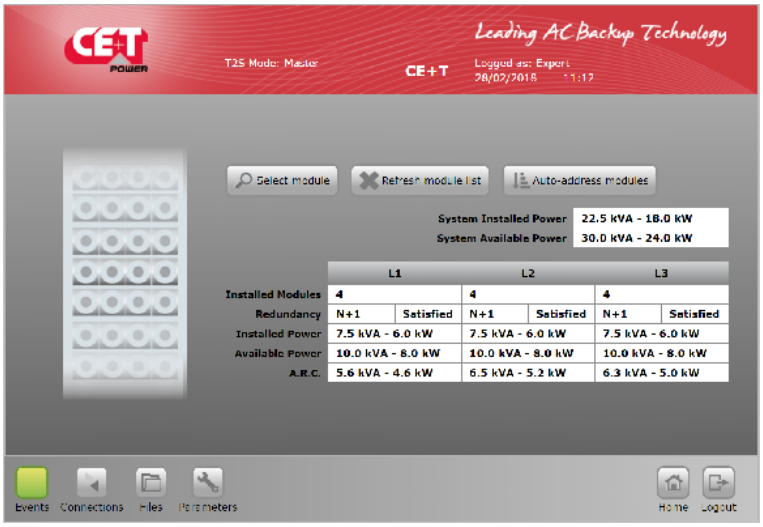
Available values are:

Measure	Unit
Voltage (V)	Volts (V)
Current (I)	Ampere (A)
Frequency(f)	Hertz (Hz)
Active Power(P)	Kilo Watt (KW)
Apparent Power(S)	Kilo Volt Ampere (KVA)
Power factor	-



7.4.4 System

Clicking the system picture on the home page brings the user to the related page, and the following information are displayed:



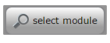
System level:

- **Installed power** - It is the total power of the configured modules, including redundancy.
- **Available power** -It is the total power of active modules present in the system.

Phase level:

For each output phase, the following information are given:

- Number of installed modules
- Redundancy: defined or not, satisfied or not
- Installed and available power following the same logic as per system level
- A.R.C. (Available Redundant Capacity) is the remaining available power before reach the redundancy level.

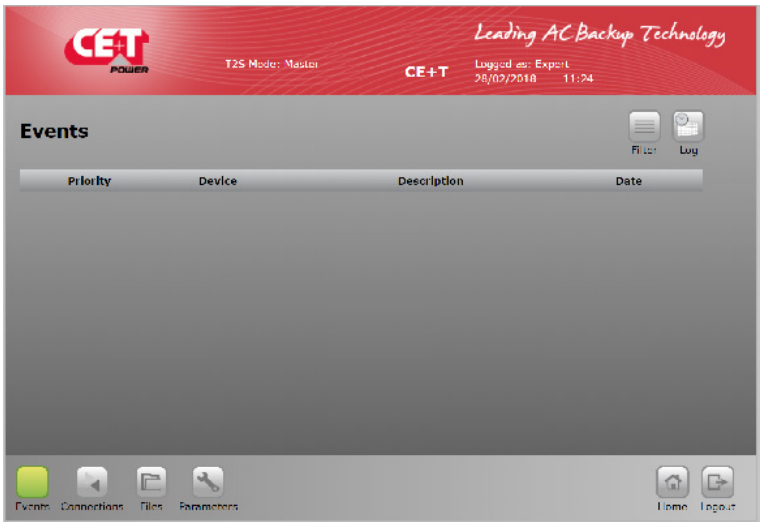
Clicking the 

button will launch the module selection pop-up. Each module's information can be accessed by clicking the corresponding button. A legend is always present to recall the color scheme:

- White: no module in slot
- Grey: module manually off

- Green: module OK
- Orange: module in recoverable error
- Red: module with unrecoverable error

For last two, refer to module manual for troubleshooting.

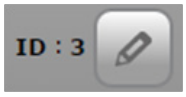


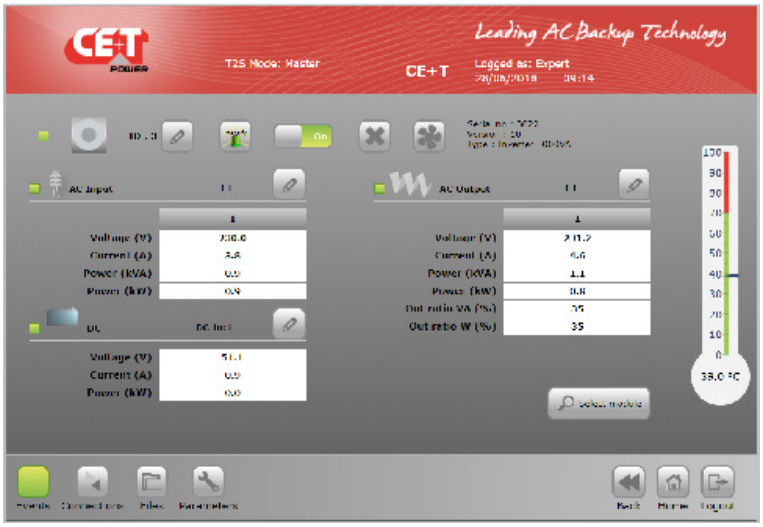
7.4.5 Module

This page gives the module by module measurement.

T2S ETH is the monitoring solution for inverters, which are all one phase module.

Many controls are available from this page to manage the module:





Users can set the module address as required between 1 and 32.

Clicking on this button, the corresponding module LED's blink for few seconds. It helps to identify the module in the system and also the assigned phase of the module..

A module can be manually turned off through user interface. It will be still on the communication bus, but only the output is turned off. When you click on this button, it will change the state from display one to opposite.

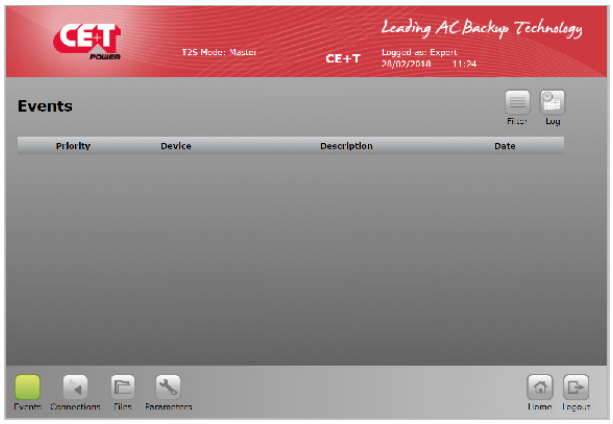
T2S ETH keeps track of all modules which appear on the bus, and it means no installation is needed when a new module is plugged in. But when a module is removed, it's mandatory to tell the system about it, by "uninstalling" it, clicking this button. If not, the system will detect a missing module and raise the alarm.

For each of its converters, the module can be assigned an AC in phase, an AC out phase and a DC group. User can do so by using this control number to each converter measures. Module should be manually off to do changes for AC out phases.

If module fan is replaced, click this icon to clear the corresponding alarm.

7.4.6 Events

The events page lists all events currently ongoing in the system. These are sorted by event occurrence time, and the latest event will be on top of the list. T2S ETH records maximum number of 2000 events as FIFO.



"Device" column provides the source of the alarm, which can be down to converter of a given module (example: module 4 AC IN) to System or monitoring level.

Events appear with a color corresponding to their alarm level
(Grey – event, orange – minor, red – major).

A filter, as shown below is available to display only a subset of these events.

7.4.7 Log

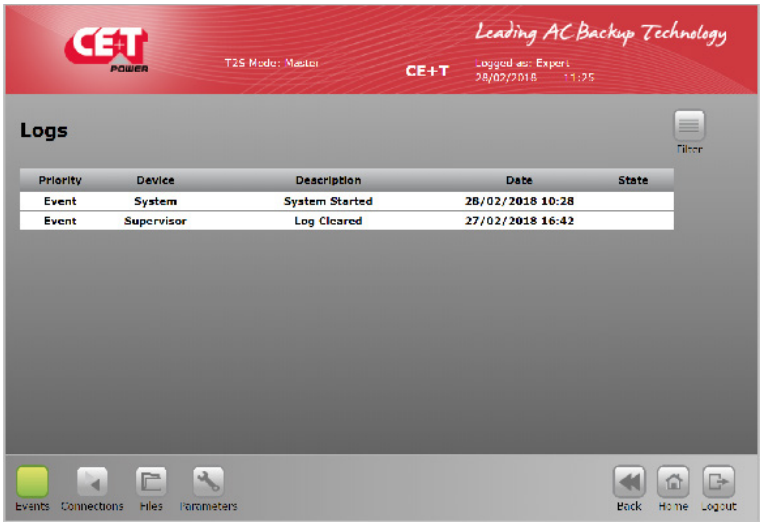
Log file lists all events which have occurred in the system since last log clear.

Compared to the event page, an extra column display if event has appeared or disappeared.

For each event, there are two log lines: one with the timestamp of the event appearing and the second one with the timestamp of the event disappearing.

Users can filter the log like in event page.

Users can see the difference between event and log page: no color for alarm level is used in log page, a column states it.



Log download and clear functions are available in “Files” menu.

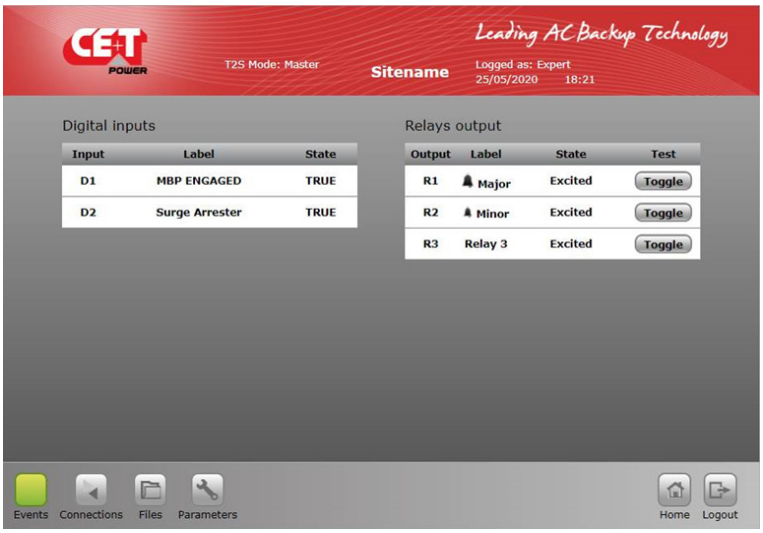
7.4.8 Connections

As described before, T2S ETH has two digital inputs and three alarm relays.

State of each of these connections can be read through the “connections” page.

An extra “toggle” allows the user to test each relay manually, toggling it for a few seconds to detect a mechanically failing device over time.

Note: For Digital Inputs, the inputs are active high and pulled to “0” on the alarm condition. Therefore, a TRUE state indicates the input is not active. A FALSE state indicates the input is active.



7.4.9 Files

The Files page has three tabs.

The **Transfer tab** allows the user to download the log file and configuration files.

Users have the option to clear the log file by clicking “Clear” icon.

The **Update tab** allows the user to install the latest software version and get the latest features. Software is available through the CE+T customer area on the website (my.cet-power.com).

Software are provided in a proprietary format called “*.saf” file. Once uploaded, the system will restart, installing the new application after verifications.

The dedicated procedure will be provided at the same location if needed.

The **Language tab** helps the user to upload a language file and translate the whole interface to the corresponding language. These files are available for certain languages in my.cet-power.com.

If the required language is not available, get in touch with sales representative to request the interface translation.

The first line **Install language file** allows uploading any language file while other lists are installed language. English is the default installed language. Apart from English, the user can install up to two different languages. Contact my.cet-power.com to find supported Language packs.

7.4.10 Parameters

The **Parameters page** is divided into multiple tabs, which are compound of sub menus. As shown below, the whole list of parameters, organized as in the interface with remarks and comments about their use. Monitoring, Input relays, SNMP, Modbus, Power, and Info are the sub menus.

Note: The following parameter sections provide brief information, to know more about each field, its function and values refer to section "16. Annex 3: Configuration parameters - T2S ETH", page 74.

Disclaimer: The configuration file should be manually edited only by CE+T crew or any especially trained operator. All modifiable values contained here are easily accessible through the T2S ETH web interface which allow you to change the configuration carefully. Any mistake done in this file could lead to system malfunction and CE+T shall not guarantee the behavior of the whole system once this file has been corrupted.

7.4.10.1 Monitoring Tab

- **Time**

  Time and date information of the T2S ETH system can be configured

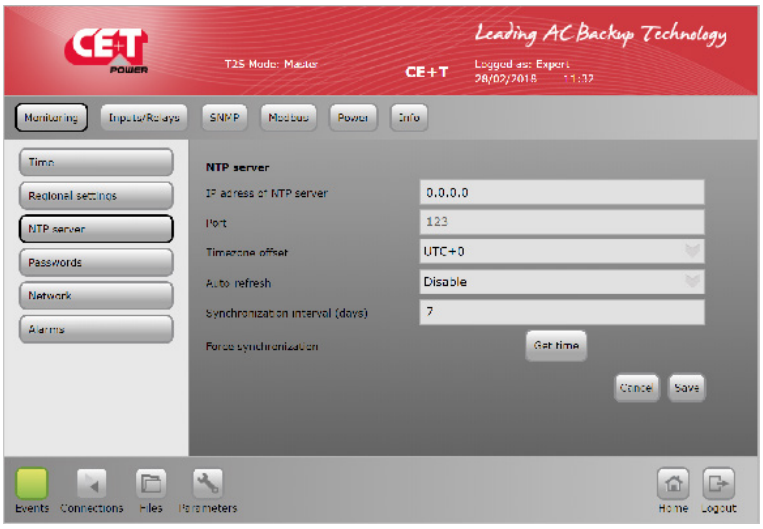
  Note: If the system has no power, the Real-Time Clock in T2S ETH can run up to 24 hours. After that, the clock will reset the date to 01/10/2013 and time to 8.00.

- **Regional settings**

  - **Language**: users can select a language from the list. Refer the "Files" menu for installing the language pack.
  - **Sitename**: it's a standard string that is displayed in the banner.
  - **Location** is the place where the system is installed.
  - **Auto logout delay**: number of seconds after which any user will have to login again.
    When set to 0, auto-logout is disabled. A maximum value of 6000 seconds can be configured for the Auto-logout option.
  - **Keyboard layout**: useful when using a Inview X with the T2S ETH for in-display keyboard. It has two options AZERTY and QWERTY
  - **New module identifier**: Always Ask, Always replace and Never Replace are the options available for New Module Identifier.
  - **Home page**: Two different home page layouts are available and they are "Classic" and "Alternate" home page.
  - **Display format**: DD/MM/YYYY, YYYY/MM/DD, MM/DD/YYYY are the different display format available
  - **Time format**: 24 Hours and 12 Hours options are available.
  - **Temperature format**: Celsius and Fahrenheit options are available.

- **NTP Server**

  NTP Server: System date and time can be synchronized with NTP server. NTP configuration parameters.



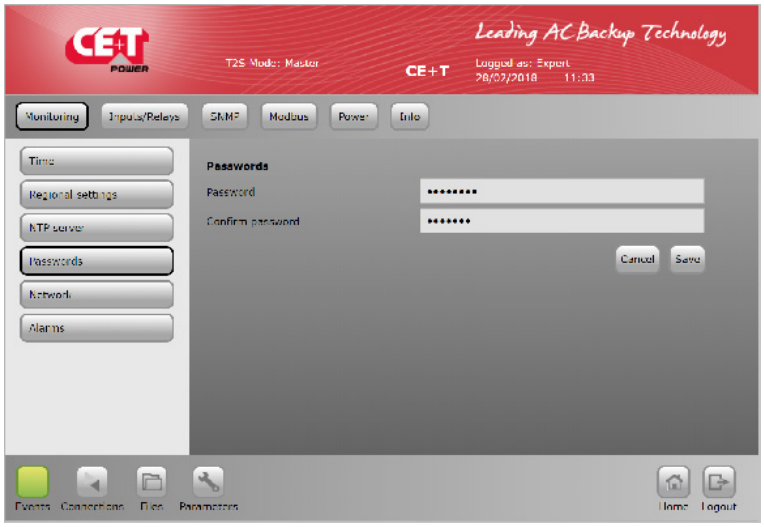
  - IP Address of NTP server
  - Port Number
  - Time zone offset
  - Auto-refresh
  - Synchronization interval (days)
  - Force Synchronization.

- **Passwords**

  Expert password: default is "pass456" but it's strongly recommended to change it.

  Software update do not change your password.

  In case of lost password, please refer to FAQ at page 63



- **Network**

  In Connection mode, Select Hardware setup as "**Standalone**". Do not select other options.

  Network address is configuration of the T2S ETH

  - **DHCP status:** DHCP Disable allows configuring static IP to T2S ETH card. When DHCP is enabled, IP to T2S will be assigned by the DHCP server or the Router to which T2S ETH is connected. To find the IP address of T2S ETH card IP Scanner tools can be used. For more information refer section 8.3, page 46.
  - IP address
  - Subnet mask
  - Default gateway
  - Primary DNS
  - Secondary DNS

DNS has to be configured where server has host name.

- **Alarms**

MBP configured: If MBP is present in the system, this parameter should be configured and connected to Digital input 1. T2S ETH use this input to tell modules that MBP is engaged.

Remote MBP: It should be configured when a CE+T **external MBP unit** is present and it is applicable only for the systems in the US market.
If it is enabled, the Relay 3 cannot be used.

Surge arrester configured: If a surge arrester is installed in the system, this parameter should be configured and connected to Digital input 2.

Log full alarms: Alarm will be generated once it reaches the maximum limit and record as FIFO.
It is recommended to download the log.

7.4.10.2 Input/Relays tab

- **Inputs Label**
  - **Digital Input 1:** label for DigIn1
  - **Digital Input 2:** label for DigIn2

Note: *If the digital input label name is other than "MBP ENGAGED" or "Surge Arrester", it will display the given name in the web interface, but in the log file, it shows only as "Digital Input 1" and "Digital Input 2".*

- **Relays Label**
  - **Major Relay Name:** dedicated to major relay – not possible to change
  - **Minor Relay Name:** dedicated to minor relay – not possible to change
  - **Relay 3 name:** It is a programmable relay, and the user can select a particular alarm.
    Relay 3 cannot be used if remote MBP is enabled

- **Relays Delay**
  - **Major Relay delay:** delay in seconds before toggling when the condition is met (major alarm present)
  - **Minor Relay delay:** delay in seconds before toggling when the condition is met (minor alarm present)
  - **Relay 3 delay:** delay in seconds before toggling when the condition is met.

- **Relays Mapping**
  - Relay mapping page is a matrix: all events can be mapped on one relay, all relays can be mapped on one event, or any other combination the customer would like.

    Note: While selecting an alarm type for a relay, choose either Major or Minor. If both selected, only the major alarm will be enabled during that relay energized.

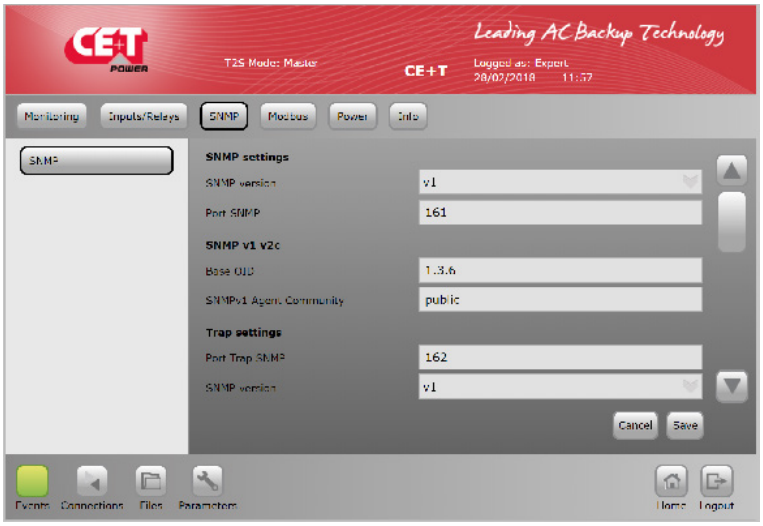
- **SNMP Traps**
  - Traps can be enabled for different events and alarms under this section. Trap receiver configuration has to be done under the SNMP tab.
  - Test Traps can also verified.

7.4.10.3 SNMP

- **SNMP**

  SNMP configuration can be done from T2S ETH web page when logged in as expert login.T2S ETH when used as a standalone communication card; it supports only SNMP V1. When T2S ETH is connected to Inview X Display, then user can configure SNMPV2C and SNMPV3.

  For configuration refer to section “SNMP”, page 42.



7.4.10.4 Modbus

- **Modbus**

  Modbus RTU configuration can be done from T2S ETH web page when logged in as expert login.T2S ETH when used as a standalone communication card; it supports only Modbus RTU.

NOTE! Modbus TCP/IP can be accessed and configured through Inview X only.

For configuration refer to the sections “Modbus”, page 79 and “Modbus over RTU”, page 93.

7.4.10.5 Power

- **General**

Redundancy: The number of redundant modules can be set for each output phase.

Source power ratio DC vs. AC: percentage of power fed by DC. By default, this parameter is set to 0.
0% - Only AC source (EPC mode), 100% - Only DC source (On-line mode).

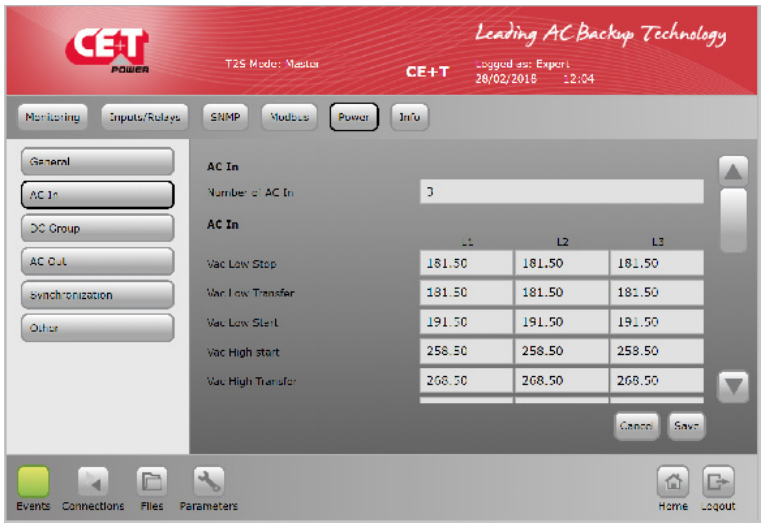
Battery test: enable it to test the battery while the system is in live condition. (Before enabling the test, make sure to label as "Battery Test" and set the logic selection in Inputs/Relay page.

Battery test src pow ratio: set the percentage of load sharing from the DC during the battery test. For example, if the value is 70%, the load sharing will be 70% from DC and 30% from the AC source.

Booster 10x Iin: enable the boost (see the manual of power module used for information on this feature).

AC In grid feed Disable: enable this feature, if "Booster."

- **AC In**



Threshold values for module operation on the AC input side. User shall modify it ONLY if he has followed a proper training by CE+T.

Note: To know more about each field, refer to "AC In", page 81.

- **DC Group**

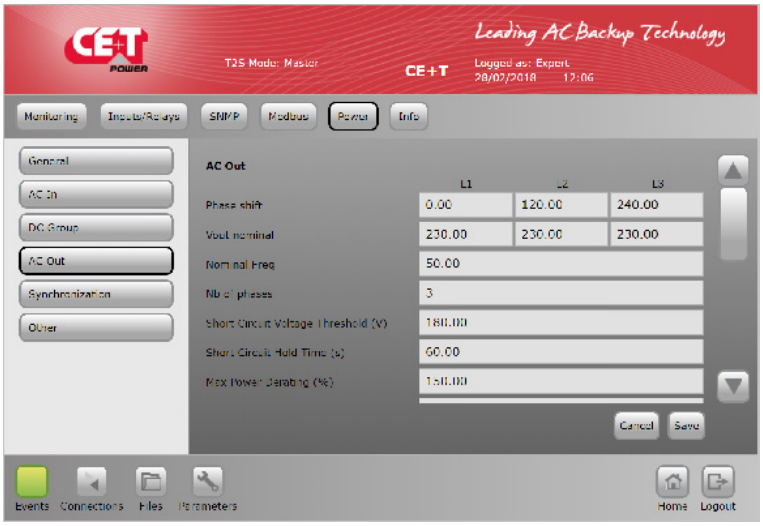
  User can configure the DC input as per the number of battery bank installed.

  Maximum two DC groups can be configured. First column for DC 1 and second column for DC 2.

  By default, both columns will have default battery parameters. User can modify according to the installed battery bank.

  Note: Two columns are for A+B Rectifier DC Plants. When only one DC Plant is used, the second column is not applicable. To know more about each field, refer to “DC Group”, page 82.

- **AC Out**



  Phase shift & Vout for each phase: define phase shift between phase.

  Nominal Freq: nominal frequency 50 or 60 Hz.

  Nb of phases: Number of phase single or three phase.

  Short circuit voltage & hold time: short circuit hold time before shut down 10 to 600 seconds (default 60).

  Max power/current derating.

  Max overload duration.

  Saturation Threshold: Saturation level (default 80%) generate alarm if AC output power exceed 80% of the total installed power.

  Delta mode: operation mode delta for 3 phase configuration only.

  Note: To know more about each field, refer to “AC Out”, page 82.

- **Synchronization**

  Synchronization parameters are used to configure in the higher capacity system (> 32 inverter modules) by using TUS.

  TUS is a synchronization kit.

  Note: To know more about each field, refer to “Synchronization”, page 83.

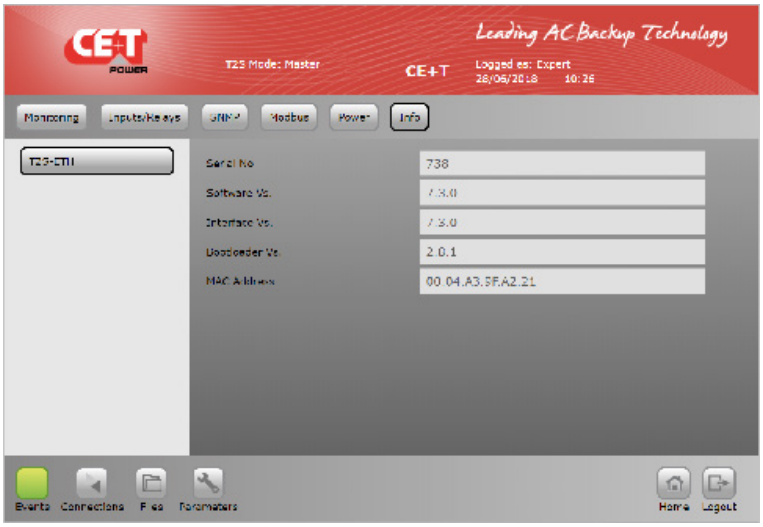
- **Other**
  - Remote OFF disable AC power.
  - Walk in mode time.
  - Airco mode.
  - Force start without T2S.
  - No power from AC IN phase 1
  - No power from AC IN phase 2
  - No power from AC IN phase 3

Note: To know more about each field, refer to “Other”, page 84

7.4.10.6 Info

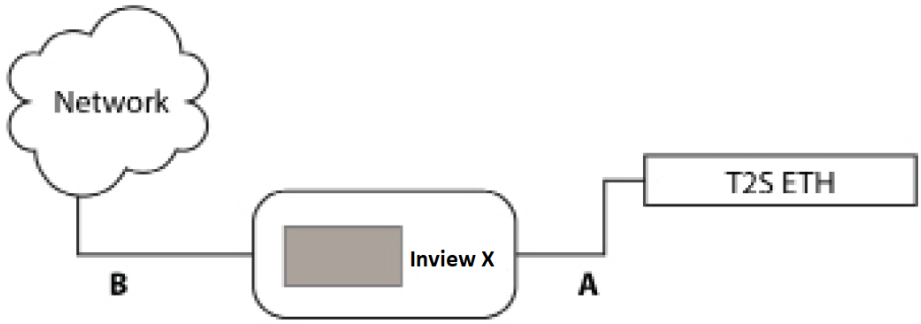
- **T2S-ETH**

  This tab provides information about the T2S ETH:
  - Serial Number
  - Software version
  - Interface version
  - Bootloader version
  - MAC Address: In case of required support, it’s mandatory to provide information listed in this page or a screenshot of it.



7.4.11 Network architecture

When using Inview X with T2S ETH, the network architecture is the following:



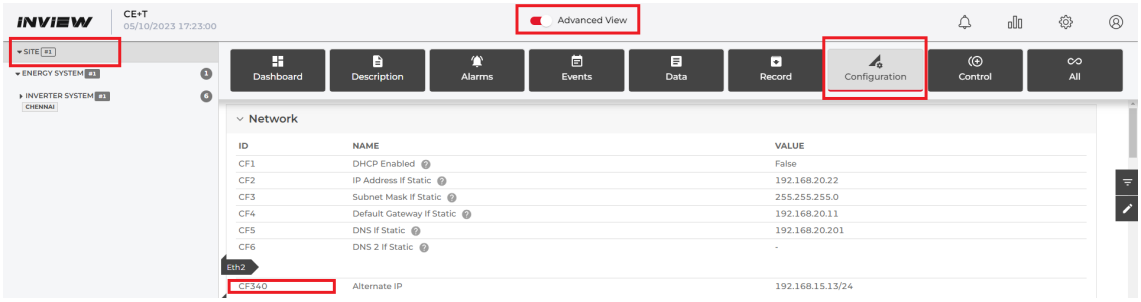
“A” is a private network between Inview X and T2S ETH. Inview X provides a proxy IP address to T2S ETH.

“B” is the user “permanent network connection” to the Inview X. It can be either in DHCP client or in fixed IP address. When using a Inview X, the customer can access T2S ETH interface through the proxy.

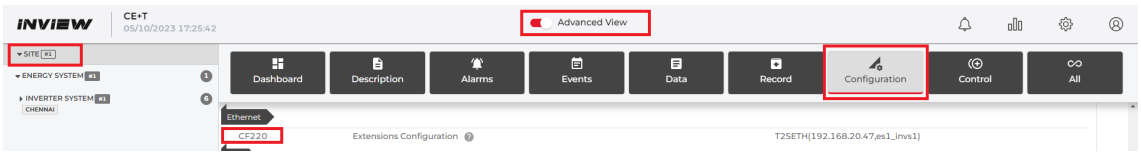
7.5 T2S ETH - Inview X configuration

When a complete system is bought from CE+T, the communication between T2S ETH and Inview X is already configured in the factory. If the products are bought as A la carte, establish the communication by following the below procedure.

- Go to Inview X web UI, select Advanced view > Site > Configuration.
- Scroll down to ‘Network’ and make sure that the parameter CF340 value is 192.168.0.5/24.



- Scroll down to ‘Ethernet’ and make sure that the parameter CF220 value is T2SETH(192.168.0.2,es1_invs1).



- If the T2S ETH IP address is changed by the user, then the same has to be entered in CF340 and CF220 values acordingly.
- Ensure that the Dashboard and data are on the GUI screen.

8. SNMP

8.1 SNMP Configuration via T2S ETH

8.1.1 Introduction

This document describes the Management Information Base (MIB) schema design for standalone T2S ETH for SNMPv1 configuration and T2S ETH with Inview X for SNMP V2C and V3 configuration. A MIB schema describes the structure of information served by a Simple Network Management Protocol Subsystem (SNMP) agent.

8.1.2 General NMS, SNMP Agent and MIB Role

This section describes the Management Information Base's (MIB's) and SNMP Agent's roles.

8.1.2.1 NMS Role

SNMP's purpose is to report operational status information about networked computing devices to a centralized Network Management System (NMS) endpoint. The status information is typically polled from an SNMP Agent on regular intervals by a Network Management System (NMS) Endpoint. The SNMP Agent can also check internal status at regular intervals, and when status of certain metrics falls outside pre-defined acceptable tolerances, an asynchronous Notification is transmitted to the NMS. This notification is termed as a Trap.

8.1.2.2 MIB Role

The MIB file describes the specific format of data provided by the SNMP agent running within the subsystem. The data is grouped in terms of high-level objects and therefore models a top-down hierarchical design. There exist a high-level object defined in a TOP LEVEL MIB file; they are CET-TSI-MIB and CET-TSI-SMI

8.1.2.3 SNMP Agent Role

An agent is a network-management software module that resides on a managed device. An agent has local knowledge of management information and translates that information to or from an SNMP-specific form. A network management station (NMS) executes applications that monitor and control managed devices. As mentioned above, the SNMP agent's purpose is reporting data elements to a Network Management System tool, such as MG Soft, I reasoning on a periodic basis. Also, if the system is exhibiting non-ideal behavior, Notifications can be distributed to the NMS on a per incident basis called the Traps. After Notifications that denote non-conforming or malfunctioning behavior are triggered, the system may further distribute Notifications indicating the system is back to its normal state.

8.1.3 MIB General Design

This section describes the general design for the T2S ETH and Inview X products

8.1.3.1 Industry Identification

The private CET MIB shall be represented by the object identifier 1.3.6.1.4.1.12551, or iso.org.dod.internet.private.enterprise.cetMIB.

The TSI MIB shall be named cetTSI and will be located as a child object of the cetMIB, using object identifier 1.3.6.1.4.1.12551.4, taking the next available spot at the top level of the cet MIB's Products node.

8.1.3.2 MIB Design in the T2S ETH and Inview X Products

Each component in the system or device shall be monitored, and therefore will be described by its own Management Information Base (MIB) structure file, which describes the data provided by that MIB. The data elements in a MIB are grouped in objects, and each object may hold any number of child objects specified as either scalar values or tabular values.

In CET-TSI MIB Device objects are grouped to a high level table tsiObjects, a Table is effectively specified as a group of scalar values each scalar is a column in the table. Tables are used to provide multiple groups of information (multiple rows).The first child of tsiObjects are tsiModules,tsiPhases, tsiACGroups, tsiDcGroups, tsiAlarms, tsiTraps, tsiEventDescription, tsiT2SInfo, tsiConfiguration

For example, tsiModules is the table which holds all module information; if there are multiple Module components on a given system, the tsiModuleseen MIB table will provide an instance (row) for each module like tsiModuleSeen.1 (.1) is the instance referring to the first module.

Inview X provides Inview specific MIB. Customer can download this MIB from Inview. Refer to “8.2.2 MIB”, page 46

8.1.4 SNMP V1 Configuration

SNMP version 1: the oldest flavor. Easy to set up - only requires a plaintext community. A community string sent in plaintext, possibly from a restricted range of allowed IP addresses, is as good as the security gets.

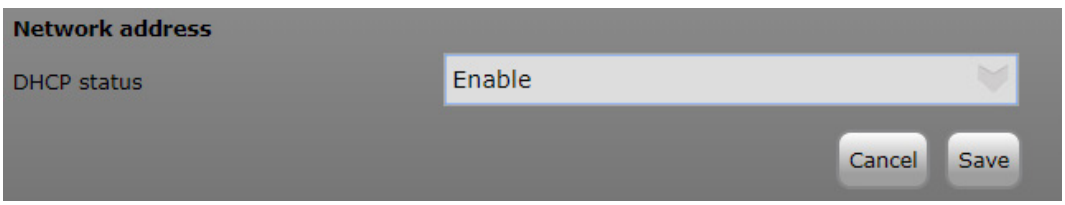
8.1.4.1 T2S ETH web

SNMP configuration can be done from T2S ETH web page when logged in as expert login.T2S ETH when used as a standalone communication card; it only supports SNMP V1. When T2S ETH is connected to Inview X Display, then the user can configure SNMPV2C and SNMPV3.

8.1.4.2 Network Configurations for T2S ETH Standalone

1. Login to T2S web link http://192.168.0.2/index.html as Expert login.
2. Click “**Parameters**” button in the toolbar.
3. Go to “**Monitoring**” tab and click “**Network**”.
4. In Connection mode the “Hardware setup” should be **Standalone**.

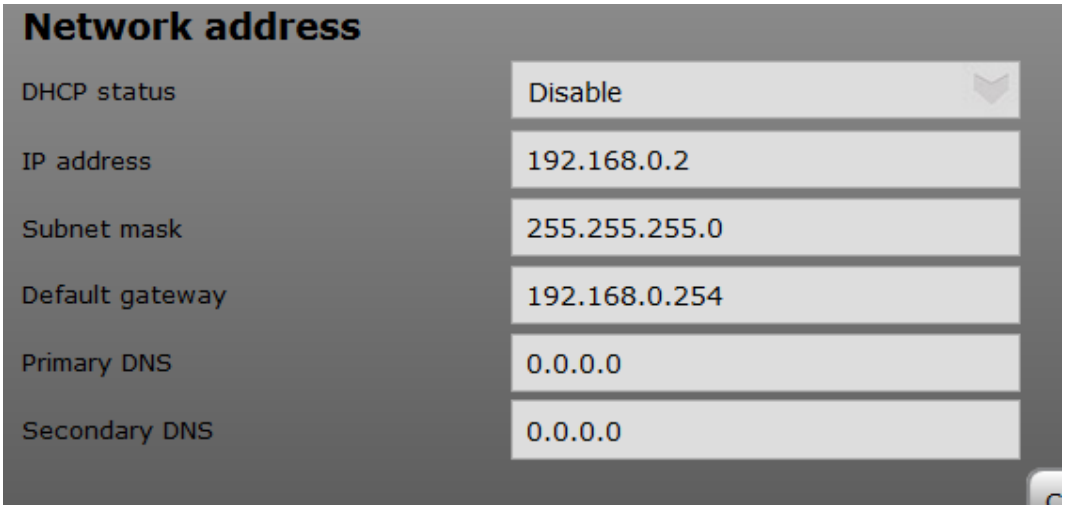
5. If you are on a network with DHCP, you can enable the DHCP inside the Network submenu of the “**Monitoring**” menu.
6. Turn DHCP to “Enable”.



7. Click “Save”.

8. When DHCP is enabled IP to T2S will be assigned by the DHCP server or the Router to which T2S ETH is connected.
9. To find the IP address of T2S ETH card IP Scanner tools can be used.
10. Refer section 8.3, page 46 for more information.
11. If DHCP status is "**Disable**".

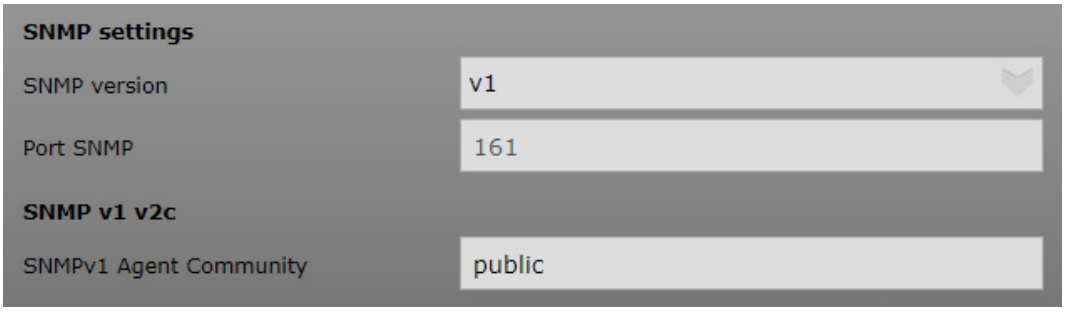
12. Configure Network



13. If your Trap receiver is a server with host name, then configure DNS if you want your trap to be received.

8.1.4.3 SNMP V1 agent configuration

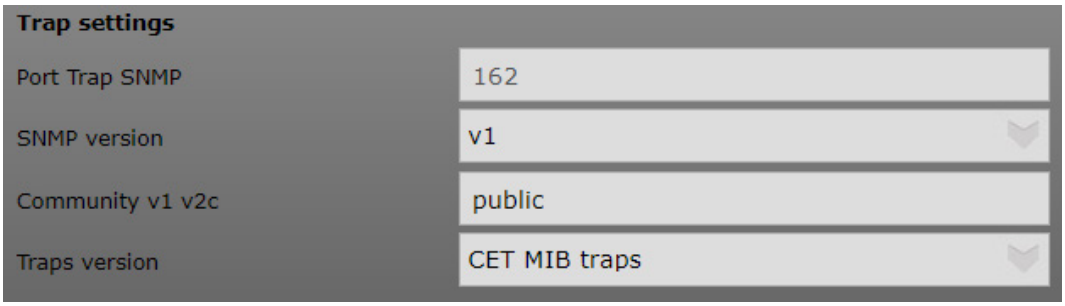
1. Once your network is ready, you can configure the SNMP server, and the TRAP
2. Click "**Parameters**" button in the toolbar.
3. Click "**SNMP**" tab.
4. As mentioned earlier, T2S ETH standalone card supports only SNMP V1 configuration, here you can select only SNMP V1. Ignore SNMP V2C and SNMP V3 from the drop down list and these configurations will not communicate with T2S ETH card.
5. SNMP Port is configurable through **Expert login**



6. SNMP Port number is standard port 161 for V1 communication
7. SNMP V1 will not communicate when port number is changed from default port number even if the same port number is configured at the NMS end.
8. SNMP Agent Community is configurable, the same agent community name has to be used in NMS SNMP V1 profile.
9. Community name accepts a maximum of 15 ASCII characters.

8.1.4.4 SNMP V1 trap settings

1. Port Trap Chooses the port on which the trap is send and default port is port 162
2. Traps will not be received if the port number is changed.
3. Choose SNMP Version V1 as T2S ETH only supports SNMP V1 communication.
4. Community for V1 traps can be ignored as V1 traps does not consider community name.
5. Trap version for T2S ETH is CET MIB Traps
6. Traps will not be received when UPS MIB Traps are selected.



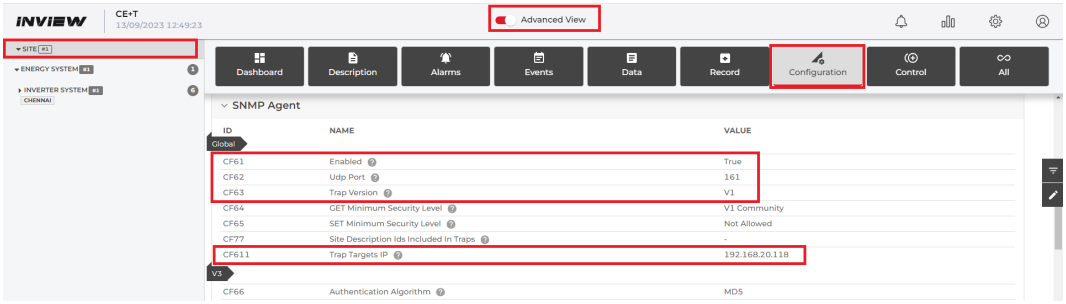
8.2 SNMP Configuration via Inview X

8.2.1 SNMPV1, V2 and SNMPv3 configuration

For the SNMP configuration via Inview X web UI, go to *Advanced View* > *Site* > *Configuration*, scroll down to the SNMP Agent section and select the following options.

- In the ID CF61, select “True” to enable the SNMP function and enter the port address in the ID CF62.
- In the ID CF63, select the SNMP version V1, V2c and V3.

- In the ID CF611, enter the Trap Targets IP.

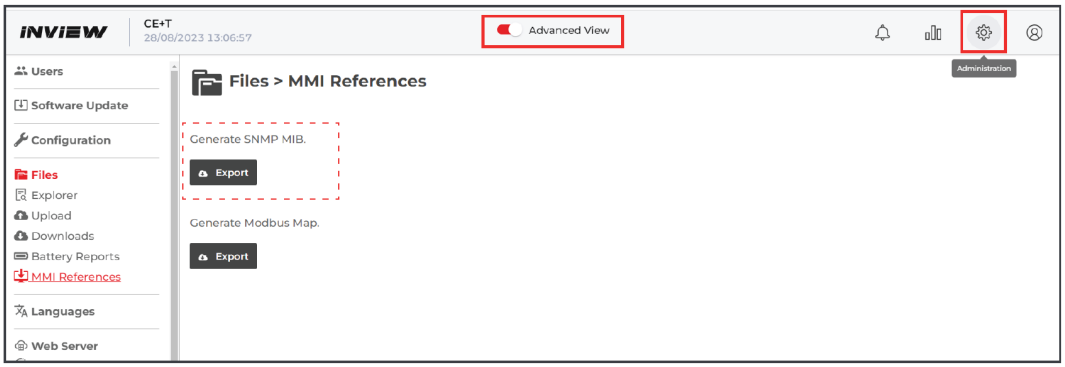


8.2.2 MIB

This section describes the Inview Management Information Base (MIB) schema design for SNMP V1, V2c and V3 configuration. A MIB schema describes the structure of information served by a Simple Network Management Protocol Subsystem (SNMP) agent.

The data is grouped in terms of high-level objects and therefore models a top-down hierarchical design.

To download the SNMP MIB file, go to *Administration > Files > MMI References* and click SNMP MIB “Export” button.

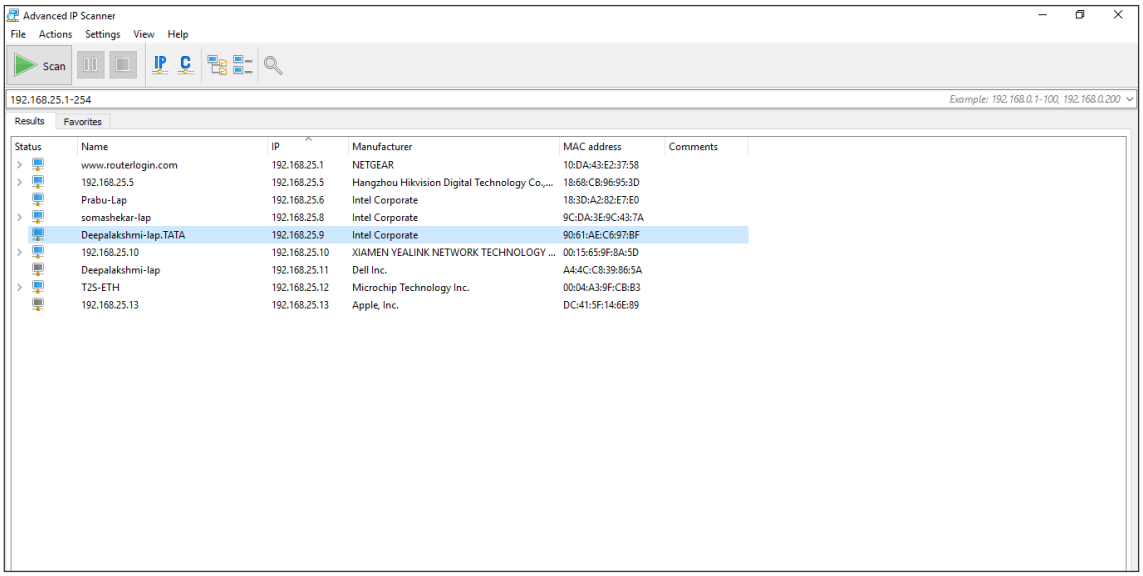


8.3 Advanced IP Scanner

This section helps you identify your T2S ETH IP when DHCP is enabled. Advanced IP Scanner open-source software is available in online, and this application needs not be installed in local machine. It is a reliable and free network scanner to analyze LAN. The program shows all network devices, gives you access to shared folders, and provides remote control of computers.

Download the application from https://www.advanced-ip-scanner.com

Run the .exe file when the application opens, click on RUN scan.

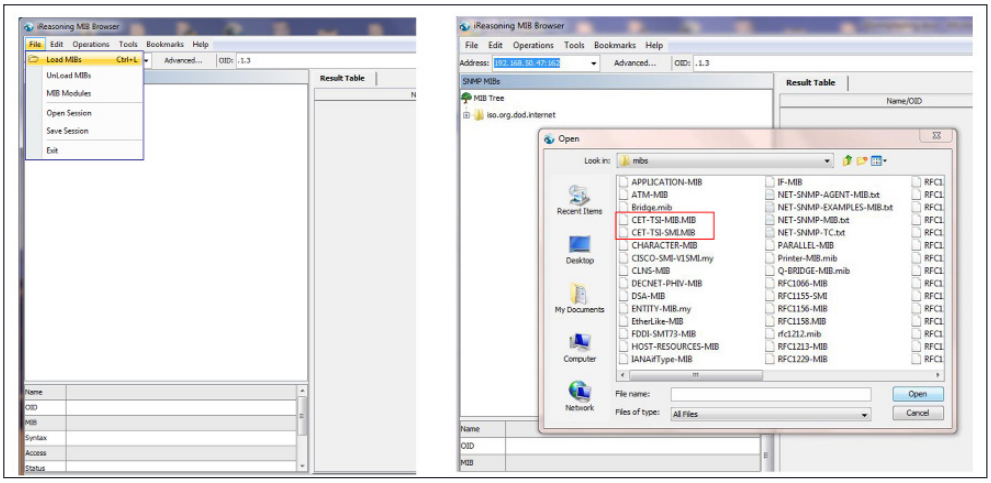

Advanced IP Scanner
File Actions Settings View Help
Scan
192.168.25.1-254
Example: 192.168.0.1-100, 192.168.0.200
Results Favorites
Status Name IP Manufacturer MAC address Comments
www.routerlogin.com 192.168.25.1 NETGEAR 10:DA:43:E2:37:58
192.168.25.5 192.168.25.5 Hangzhou Hikvision Digital Technology Co,... 18:68:CB:96:95:3D
Prabu-Lap 192.168.25.6 Intel Corporate 18:3D:A2:82:E7:E0
somashekar-lap 192.168.25.8 Intel Corporate 9C:DA:3E:9C:43:7A
Deepalakshmi-lap.TATA 192.168.25.9 Intel Corporate 90:61:AE:C6:97:BF
192.168.25.10 192.168.25.10 XIAMEN YEALINK NETWORK TECHNOLOGY ... 00:15:65:9F:8A:5D
Deepalakshmi-lap 192.168.25.11 Dell Inc. A4:4C:C8:39:86:5A
T2S-ETH 192.168.25.12 Microchip Technology Inc. 00:04:A3:9F:CB:B3
192.168.25.13 192.168.25.13 Apple, Inc. DC:41:5F:14:6E:89

8.4 SNMP V1 Testing

This section helps you to test the SNMP of your T2S ETH unit. There are several different software programs (some are free) is available online to download. Current example is given using "*iReasoning MIB Browser*".

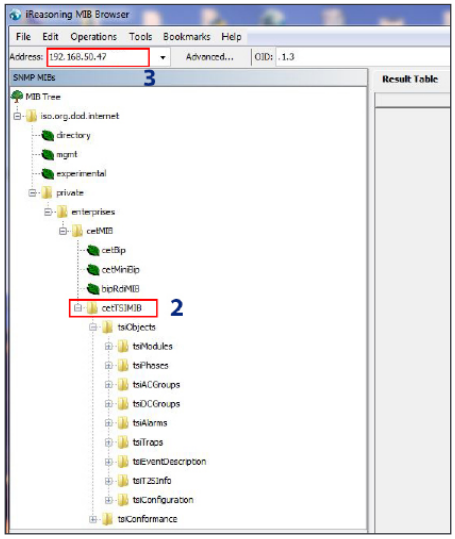
Here are the steps to follow:

1. Click *File* > Load MIBs and browse to locate on your hard drive, where the files downloaded on my.cet-power.com portal (CET-TSI-MIB.mib & CET-TSI-SMI.mib).

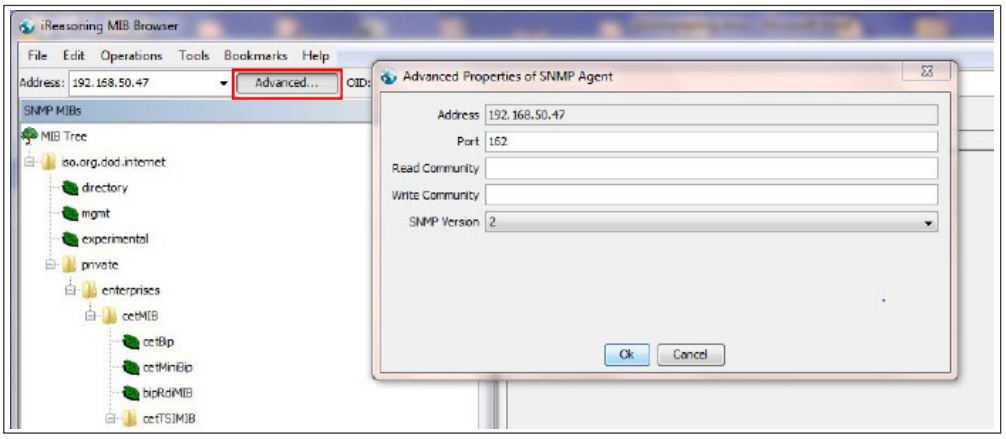


2. Once it is done, you can browse the MIB content under
MIB Tree > *iso.org.dod.internet* > *private* > *enterprises* > *cetMIB* > *cetTSIMIB*

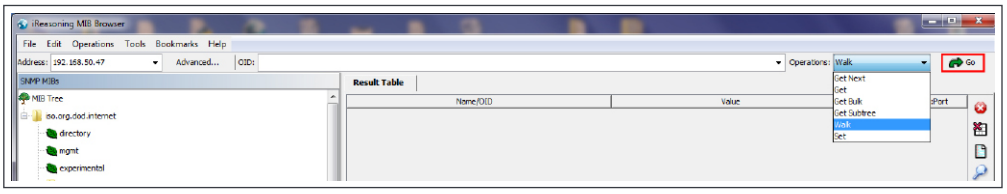
3. Fill the address field with your unit IP address.



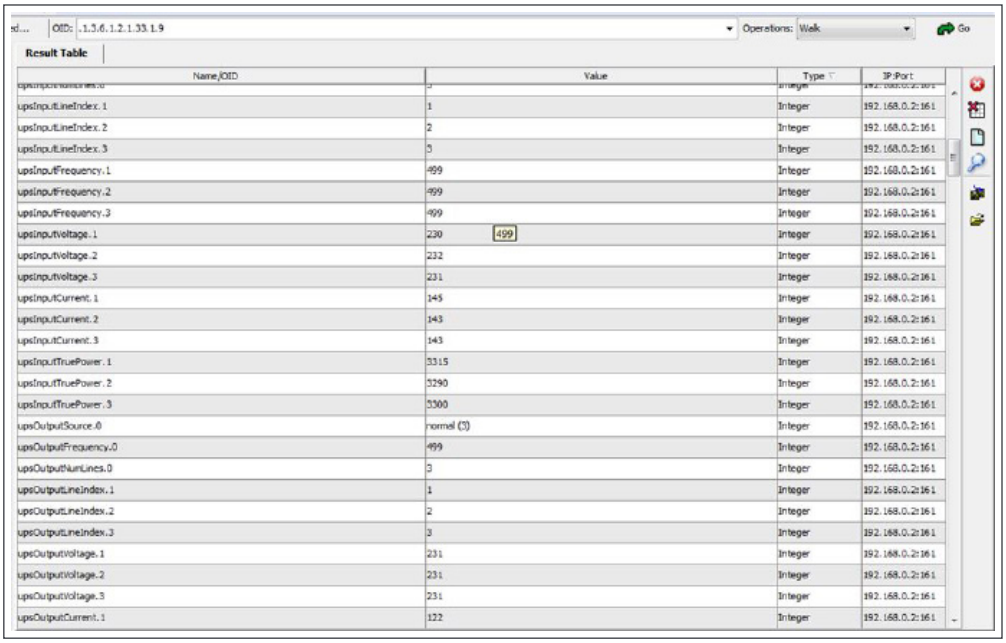
4. Click "*advanced*" if you changed settings like Read Community.



5. Select the operation, for example "WALK" and click "Go".



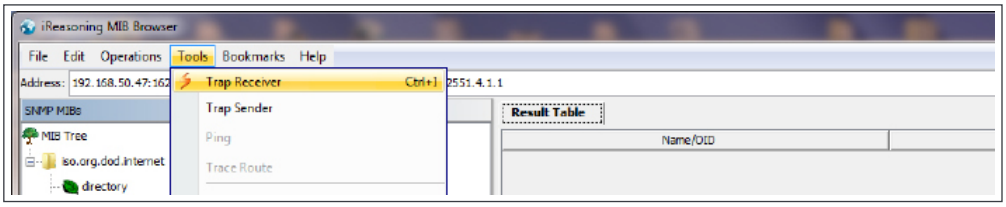
6. The result looks like



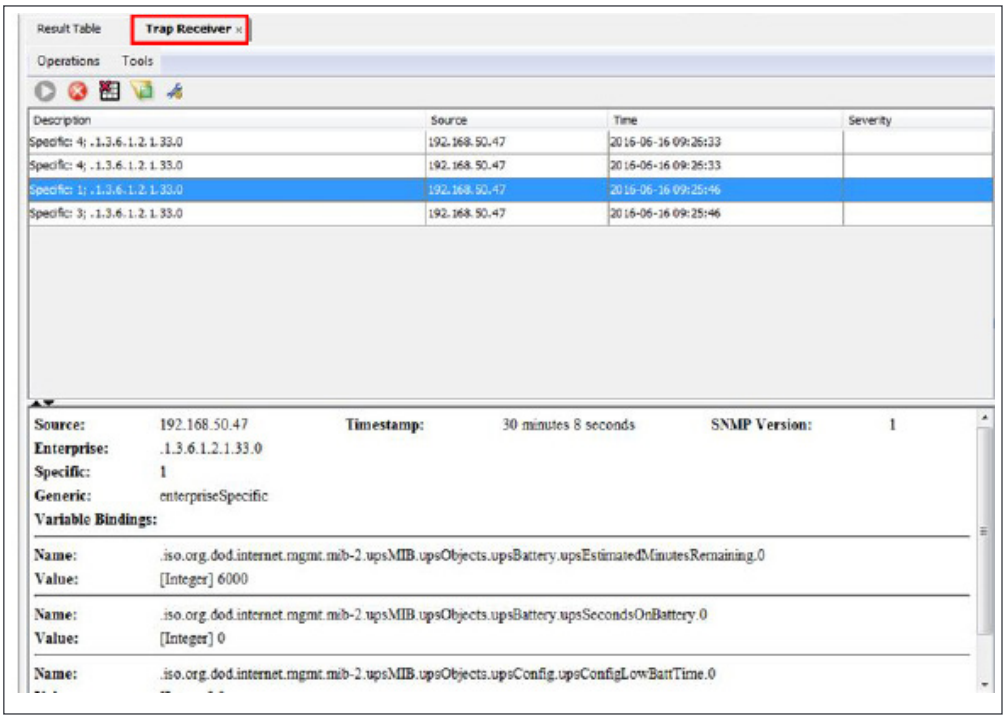
8.5 SNMP V1 Traps

To check the SNMP V1 traps,

1. Click *Tools* > *Trap Receiver* on the menu bar.



2. You should have defined the IP address of the laptop running MIB Browser in the T2S ETH configuration in order to retrieve trap.



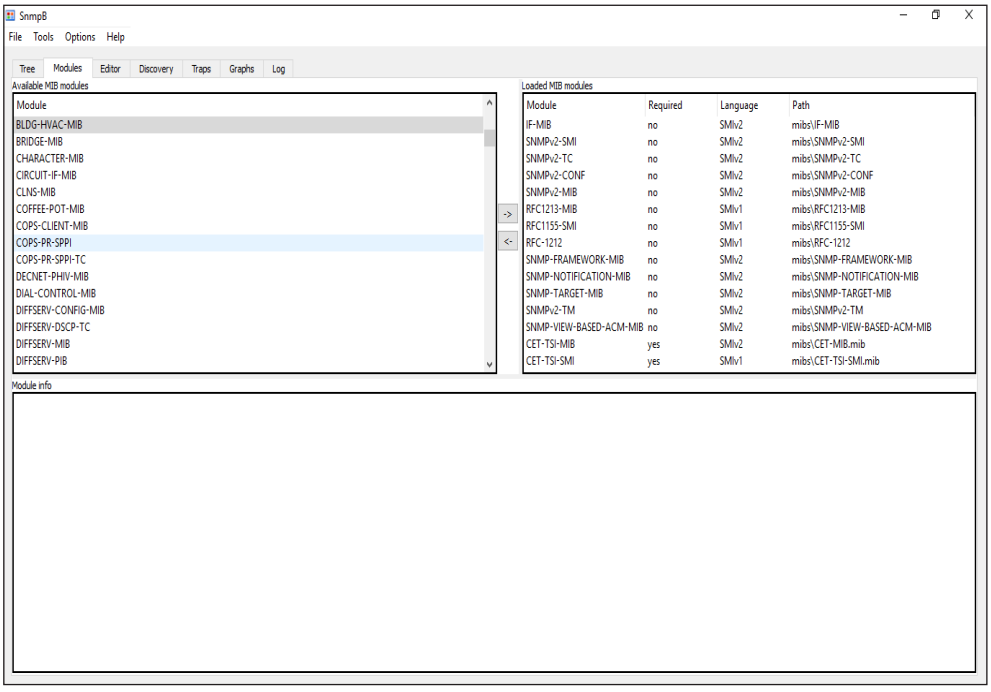
8.6 SNMP V3 Testing

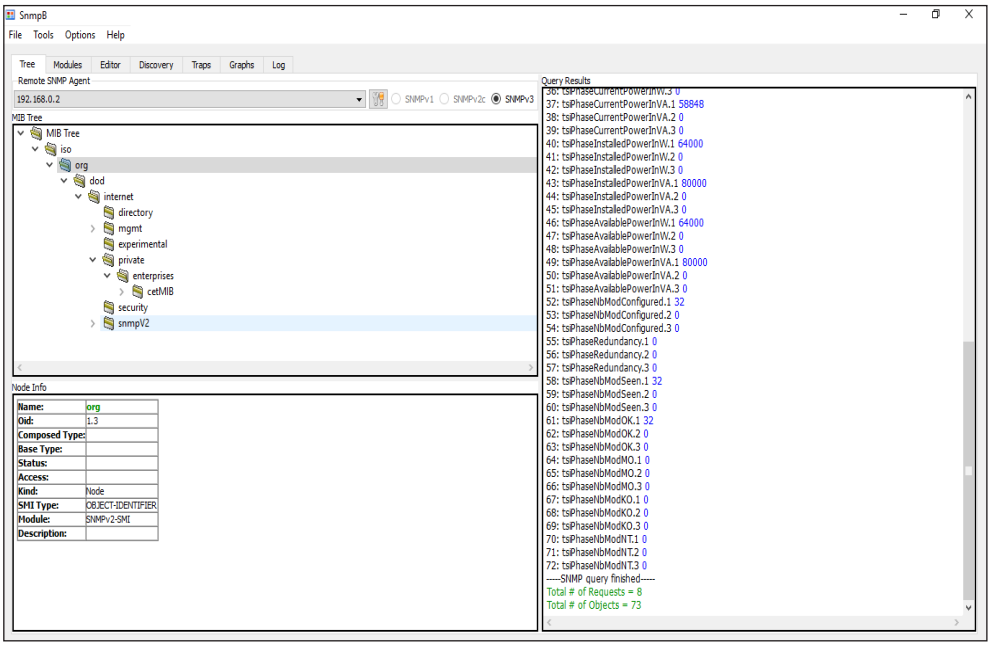
Snmpb-0.8.exe is the latest version of snmp tool. Download the file from this URL https://sourceforge.net/projects/snmpb/ and run the exe to install the application.

8.6.1 Steps to Load CET MIB

1. Open the application and navigate to editor.
2. Open CET-TSI-MIB and paste it in the editor.
3. Press Ctrl + S to save the file with the same file name.
4. Open CET-TSI-SIM and paste it in the editor.

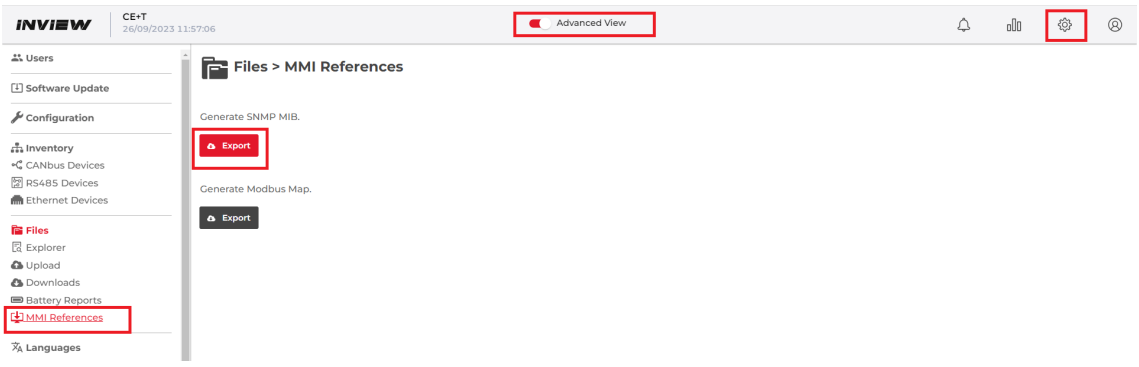
5. Press Ctrl + S to save the file with the same file name.
6. Navigate to Modules Tab.
7. Check CET-TSI-MIB and CET-TSI-SIM are listed under available MIB Modules.
8. Select the above files and Press right arrow to move the files to Loaded MIB Module.
9. By doing this CET MIB files are loaded to SNMPB MIB tree.
10. Navigate to tree tab and check for CET MIB under iso-org-dod-internet-private-enterprises-cetMIB.





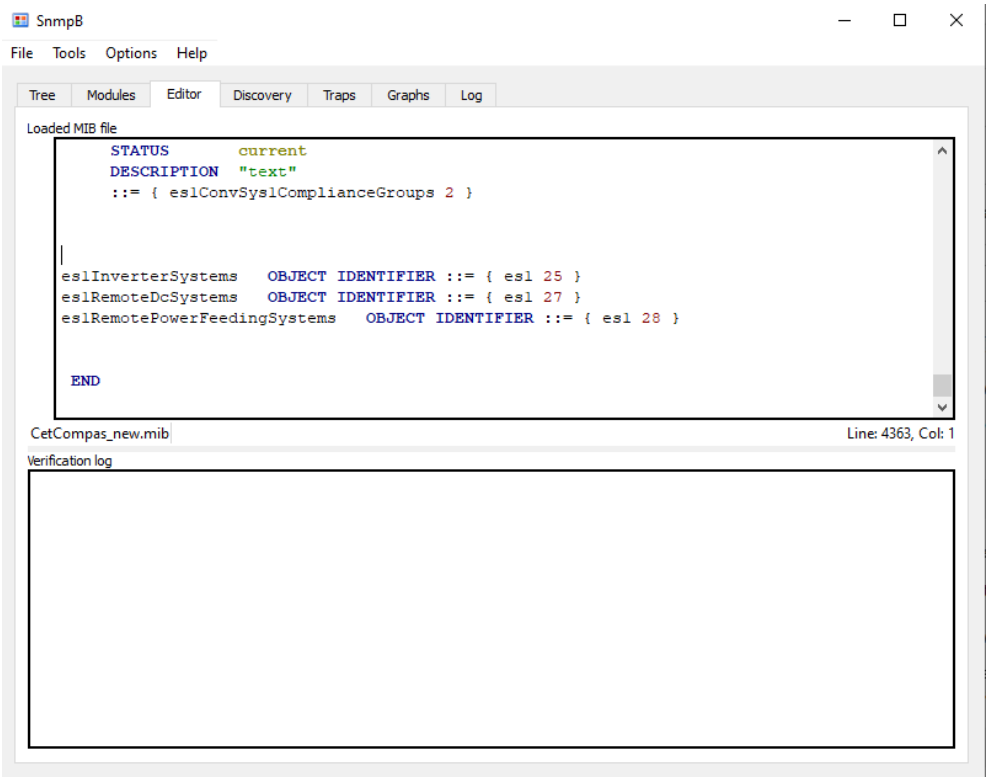
8.6.2 Steps to Load Inview MIB

1. Go to Inview Web UI, select ‘Advanced View’ and click the Settings icon.
2. Click on ‘MMI References’ and click on ‘Export’ button under ‘Generate SNMP MIB’ option.
3. Save the file in your computer.



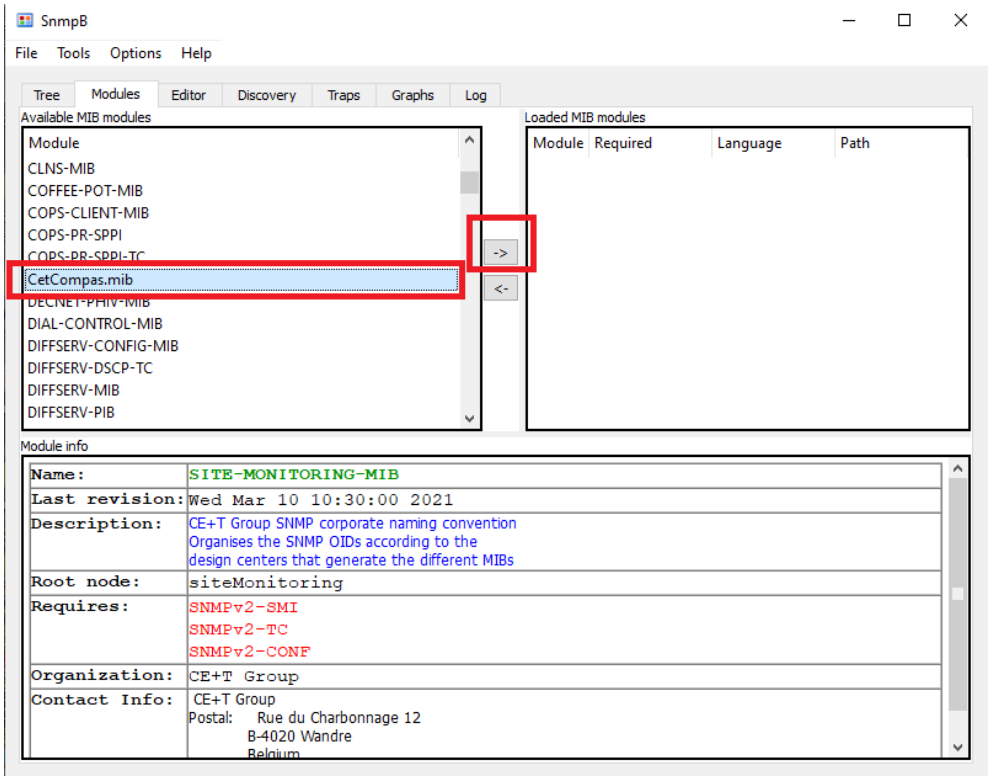
4. Open the snmpb application and navigate to editor.

5. Open the downloaded MIB file, copy the content and paste it in the editor.

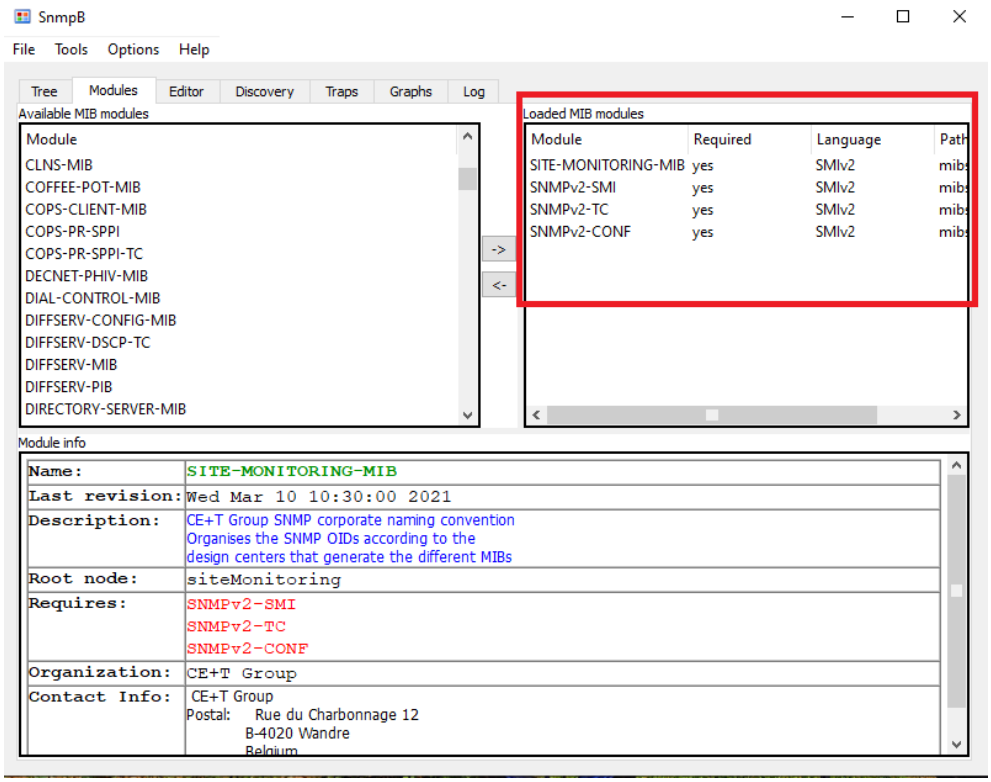


6. Press Ctrl + S to save the file with the same file name.
7. Navigate to Modules Tab.
8. Check if 'CetCompas.mib' is listed under available MIB Modules.

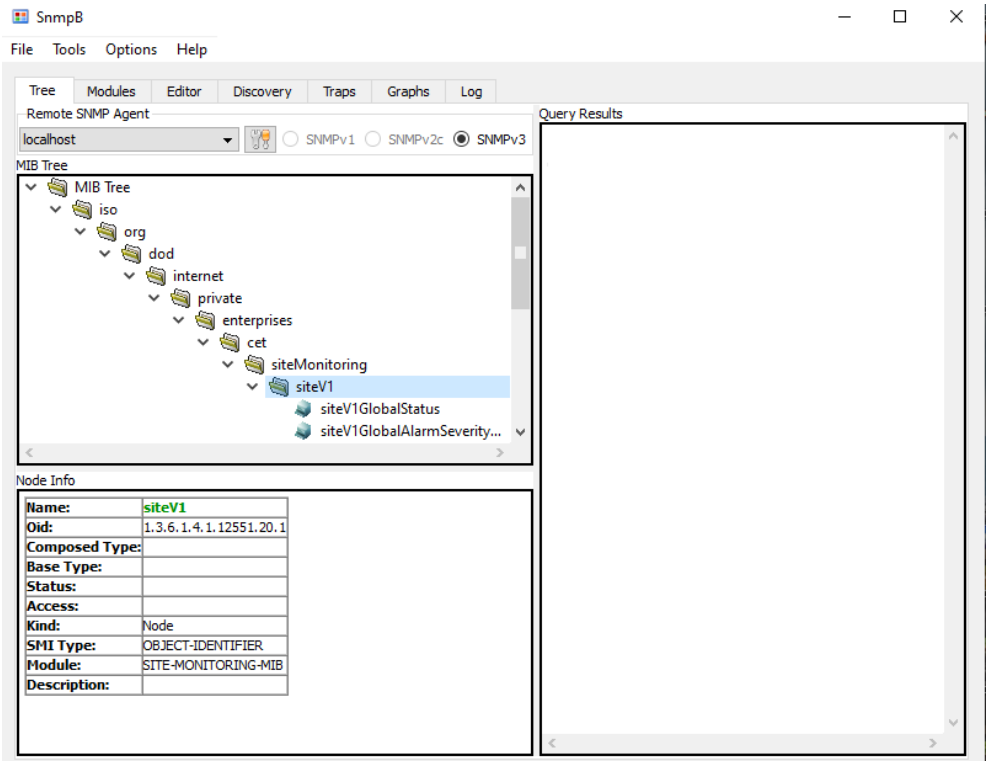
9. Select the file and Press right arrow to move the it to Loaded MIB Modules window.



10. By doing this CET MIB files are loaded to SNMPB MIB tree.

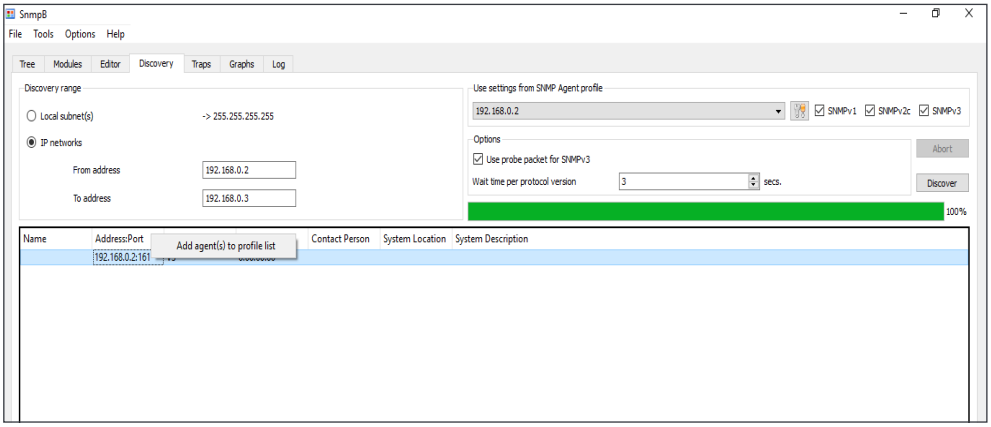


11. Navigate to tree tab and check for CET MIB under iso-org-dod-internet-private-enterprises-cet-siteMonitoring.



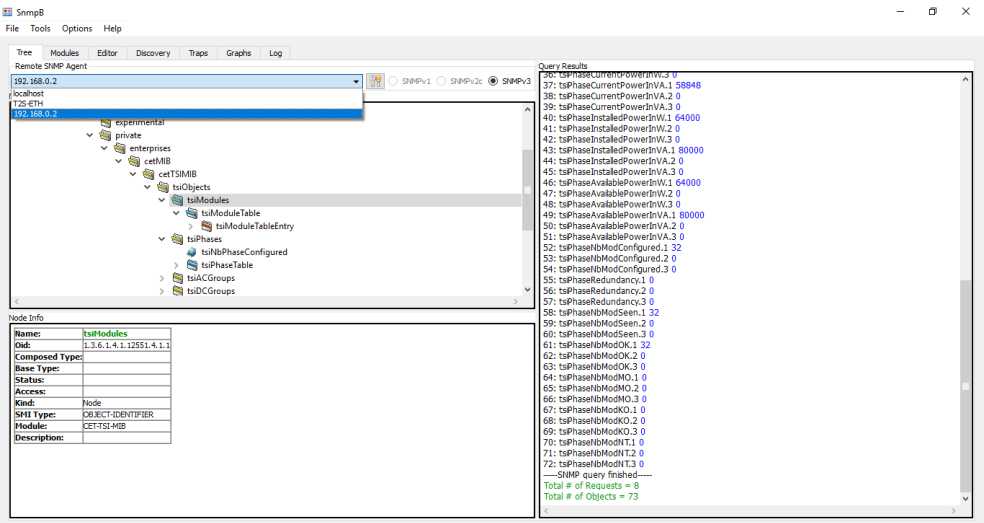
8.6.3 Steps to Discover Device

1. Navigate to Discovery tab.
2. Select IP option and enter From and To IP addresses, this would be the IP address range of T2S ETH IP.
3. SNMP Agent profile to be selected based on the type of SNMP communication.
4. Click on discover device.
5. T2S device will be discovered.
6. Right click on the device and add device to agent profile list.



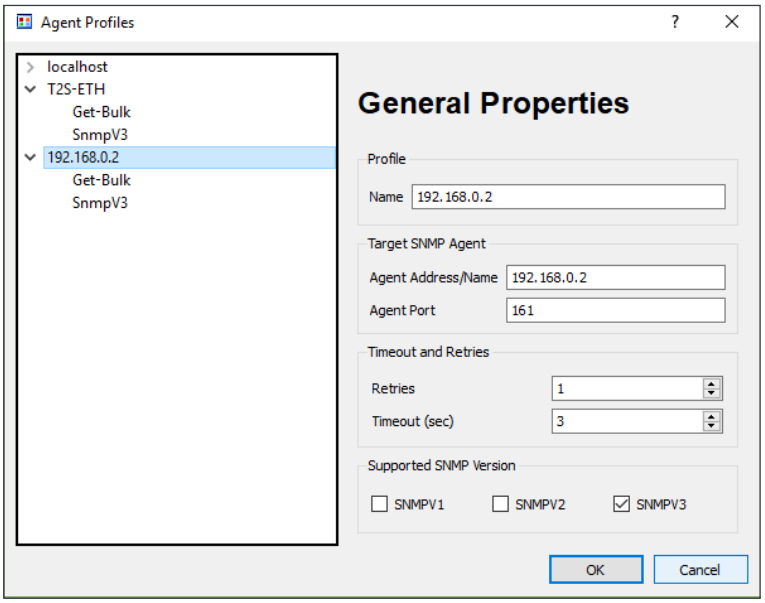
8.6.4 Steps to Get / Walk OID

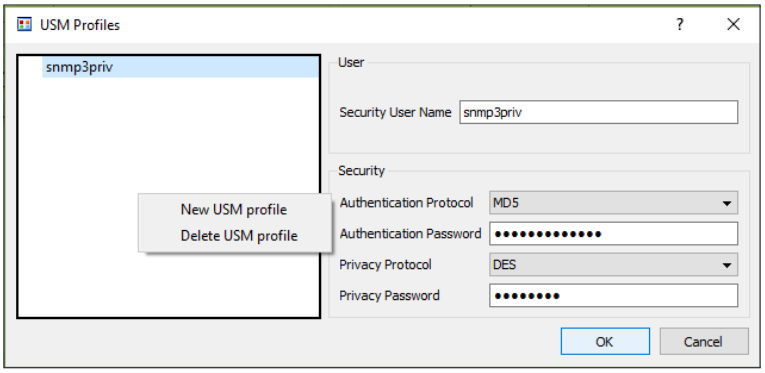
1. Select the SNMP Agent under remote SNMP agent.
2. The Added SNMP Agent has to be listed in the list.
3. Right click on the OID to perform walk or Get.

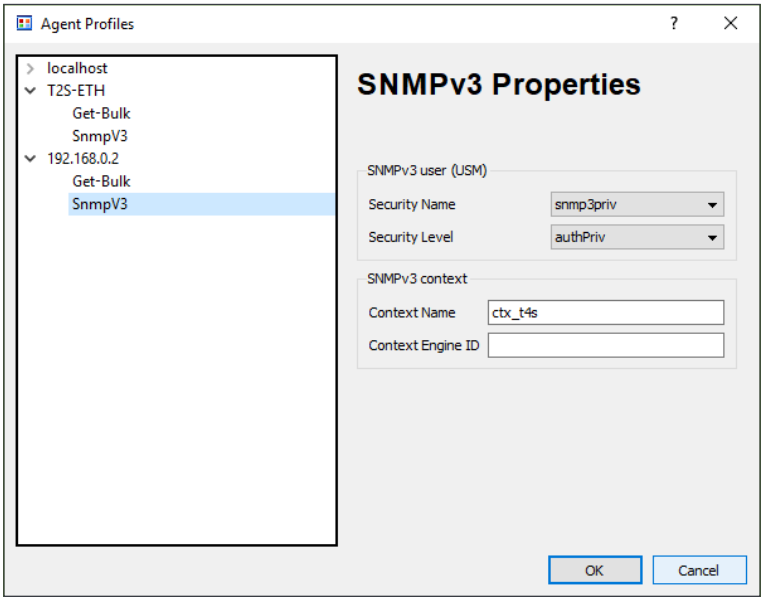


8.6.5 Steps to add SNMP V3 User

1. Navigate to Options – manage Agent Profile.
2. Select the Agent Profile and select the supported SNMP Version.
3. Select Manage SNMP3 USM User.
4. Right click on User profile and add new user profile.
5. Security username should be the Priv user name given in T2S ETH web page.
6. Authentication protocol, Authentication password, Privacy Protocol and Privacy password should also match with the values given in T2S ETH web page.
7. Click OK.
8. Navigate to Options – manage Agent Profile.
9. Select SNMP agent and select SNMP v3, under SNMP properties security name drop down list select the USM user created.
10. Select Security level NoAuth/NoPriv or Auth/NoPriv or AuthPriv as the once configured in T2S ETH web page.
11. Enter SNMP content text same as in T2S ETH web page.


Agent Profiles
localhost
T2S-ETH
Get-Bulk
SnmpV3
192.168.0.2
Get-Bulk
SnmpV3
General Properties
Profile
Name 192.168.0.2
Target SNMP Agent
Agent Address/Name 192.168.0.2
Agent Port 161
Timeout and Retries
Retries 1
Timeout (sec) 3
Supported SNMP Version
SNMPV1
SNMPV2
SNMPV3
OK
Cancel


USM Profiles
snmp3priv
New USM profile
Delete USM profile
User
Security User Name snmp3priv
Security
Authentication Protocol MD5
Authentication Password
Privacy Protocol DES
Privacy Password
OK
Cancel


Agent Profiles
localhost
T2S-ETH
Get-Bulk
SnmpV3
192.168.0.2
Get-Bulk
SnmpV3
SNMPv3 Properties
SNMPv3 user (USM)
Security Name snmp3priv
Security Level authPriv
SNMPv3 context
Context Name ctx_t4s
Context Engine ID
OK
Cancel

8.7 Reading alarms in SNMP

This section helps you to read Alarms in SNMP from your T2S ETH unit using CET MIB file. All Alarm related information are available under tsiAlarms, which is located at OID 1.3.6.1.4.1.12551.4.1.5.

The number of alarms ongoing in the system could be retrieved from following OID in this section:

- tsiNbMinorAlarm (OID 1.3.6.1.4.1.12551.4.1.5.1) gives the count of active minor alarms in the system
- tsiNbMajorAlarm (OID 1.3.6.1.4.1.12551.4.1.5.2) gives the count of active major alarms in the system
- tsiTotalAlarmNumber (OID 1.3.6.1.4.1.12551.4.1.5.3) gives the count of all active alarms in the system

The tsiAlarmTable (OID 1.3.6.1.4.1.12551.4.1.5.4) is the child table under tsiAlarms, which has details of all the active alarms in the system. When an event or an alarm is published in the T2S ETH user interface, the same active alarm list will be seen in the Alarm table in SNMP (i.e) event occurred first will be last in the table and the recent event will be on the top of the table. A maximum of 50 Alarms are captured in SNMP like in T2S ETH user interface.

Each entry in this table has the following objects:

- tsiAlarmIndex
- tsiAlarmID
- tsiAlarmType
- tsiAlarmSource
- tsiAlarmDescription
- tsiAlarmTime

tsiAlarmIndex (OID 1.3.6.1.4.1.12551.4.1.5.4.1.1)

It captures the index of active alarms, like the ID of the row in the table.

tsiAlarmID (OID 1.3.6.1.4.1.12551.4.1.5.4.1.2)

It will list the ID's of Each active Alarm. Alarm ID list is available in section "Annex 1: Supervisor alarms - T2S ETH", page 68 and "Annex 2: Module alarms - T2S ETH", page 70.

Example: Alarm is Source V Too Low Stop has the ID 179. When we get this alarm, 179 will be read from tsiAlarmID.1 in that entry.

tsiAlarmType (OID 1.3.6.1.4.1.12551.4.1.5.4.1.3)

It provides the severity of the alarm. When an alarm is configured as event Alarmtype would be displayed as noAlarm (0) in SNMP. Alarm type can be either:

- noAlarm (0)
- minor (1)
- major(2)

Example: tsiAlarmType.1 minor(1) as Source V Too Low Stop is configured as Minor Alarm

tsiAlarmSource (OID 1.3.6.1.4.1.12551.4.1.5.4.1.4)

It will list the source of the generated alarm. There are three different alarm sources: t2s (monitoring), Module and System. Values are given below:

- t2s(0),
- module01(1), module02(2), … until module32(32)
- system(33)

tsiAlarmDescription (OID 1.3.6.1.4.1.12551.4.1.5.4.1.5)

It is the event string of the alarms available in your system.

Example:

- tsiAlarmDescription.1 Source V Too Low Stop
- tsiAlarmDescription.2 Output Failure
- tsiAlarmDescription.3 Output Fault

tsiAlarmTime (OID 1.3.6.1.4.1.12551.4.1.5.4.1.6)

It gives you the information of time stamp of when the alarm was generated.

Example

In the following sequence, we explain how the Index of the Alarm change when a new alarm occurs and provides an example for each field of many entries.

1. The Alarm Index of Alarm output fault is 1.

Instance	tsiAlarmIndex	tsiAlarmID	tsiAlarmType	tsiAlarmSource	tsiAlarmDescription	tsiAlarmTime
1	1	275	noAlarm(0)	system(33)	Output Fault	2020-3-16, 23:44:39
2	2	7	minor(1)	system(33)	Too Many Starts	2020-3-16, 23:44:39
3	3	268	major(2)	system(33)	Output Failure	2020-3-16, 23:44:33

2. A new alarm Manual or Remote Off new added to the list. Now the Alarm Index of Output fault is 2 and Manual or Remote off is 1.

Instance	tsiAlarmIndex	tsiAlarmID	tsiAlarmType	tsiAlarmSource	tsiAlarmDescription	tsiAlarmTime
1	1	274	noAlarm(0)	module01(1)	Manual or Remote Off	2020-3-18, 6:41:29
2	2	275	noAlarm(0)	system(33)	Output Fault	2020-3-16, 23:44:39
3	3	7	minor(1)	system(33)	Too Many Starts	2020-3-16, 23:44:39
4	4	268	major(2)	system(33)	Output Failure	2020-3-16,23:44:33

3. DC Source Low is the new alarm in the list. Which takes the Alarm index 1 and rest follows.

Instance	tsiAlarmIndex	tsiAlarmID	tsiAlarmType	tsiAlarmSource	tsiAlarmDescription	tsiAlarmTime
1	1	265	major(2)	system(33)	DC Source Low	2020-3-18,6:43
2	2	274	noAlarm(0)	module01(1)	Manual or Remote Off	2020-3-18,6:41:29
3	3	275	noAlarm(0)	system(33)	Output Fault	2020-3-16,23:44:39
4	4	7	minor(1)	system(33)	Too Many Starts	2020-3-16,23:44:39
5	5	268	major(2)	system(33)	Output Failure	2020-3-16,23:44:33

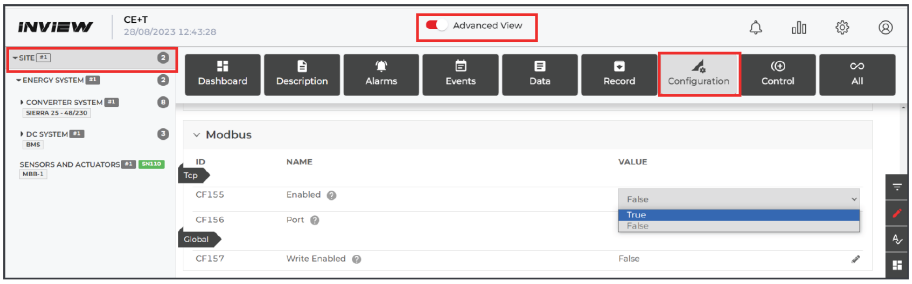
9. ModBus TCP/IP via Inview X

Modbus over TCP/IP is available in read mode, which means that Modbus can be used for monitoring the system.

Port is fixed to standard **Modbus TCP/IP port 502**. This protocol can be either enabled or disabled.

For the Modbus configuration, go to *Advanced View* > *Site* > *Configuration*, scroll down to the *Modbus* section and select the following options.

In the ID CF155, select “True” to enable the Modbus TCP/IP function.



The following device/equipment mapping has been defined:

Device ID	Equipment
11	Inverter System 1
91	Energy System 1
100	Site

When the equipment does not exist, it will respond with function code 4.

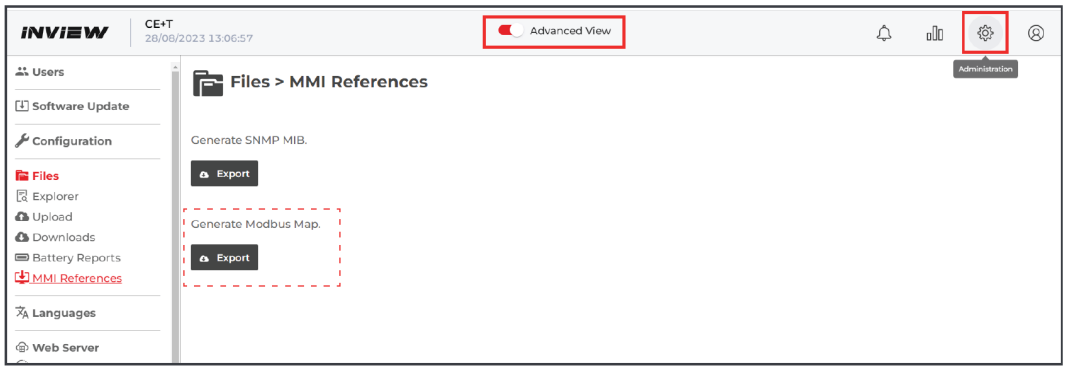
- Each discrete input is associated with the alarm of the equipment, with the same id. Reading 1 means that the alarm is active.
- Each input register corresponds to the data of the equipment. All these values are coded assigned 16 bit. A correction factor is often applied. All the values are not available (like strings. Some status are coded as uint)
- Each discrete coil corresponds to the entries for controlling the equipment. It supports only simple control, without any parameters.
- Each holding register corresponds to the configuration of the equipment. It only supports entries that can be read and of numeric type. It includes advanced controls with parameters, complimentary with discrete coils.

The Modbus transport layer is Ethernet over TCP/IP. The default used port is 502:

- Discrete Inputs, alarm reading (Read Only), using modbus command 01
- Input Registers, data reading (Read Only), using modbus command 03

If you want to use Modbus to monitor other types of systems, please contact us. We will study the business case and make a proposal.

To download the Modbus data, log in to the Inview web interface, go to Administration > Files > MMI References and click the Modbus Map “Export” button.



For Modbus Data and Alarm details, refer to”17.5 ModBus Table”, page 103 .

10. FAQ

1. I am unable to change the output phase of a module?
    - Check that the number of phases is correctly configured in Configuration > Power > AC OUT > Nb of phase.
    - Module should be manually turned off (module page).
    - Don't forget to turn the module back on when the phase is changed.

2. I have a system properly running with T2S USB, can I replace it with T2S ETH?

    Of course, T2S ETH and T2S are 100% compatible. Once the load is fed, monitoring cannot cause any issue to it. Feel free to replace your old T2S with a new T2S ETH.
    - T2S ETH is compatible with Candis.
    - T2S ETH featured with SNMP and SNMP supports only V1. So, the TCP IP section is not required. (SNMP V2c and V3 are available through Inview X.)

    Pay attention to:
    - MBP monitoring is a T2S configuration parameter that should be reconfigured in your new T2S ETH once it's up and running.
    - Operating parameter need to be cross check, and IP setting must reconfigured.

3. I want to replace a power module in my system. What should I do?
    - Remove the module
    - Browse to module selection pop-up.
    - The removed module appears in red. Click on it.
    - This brings you to module page. Uninstall the module by clicking the uninstall button.
    - Insert the new module.
    - Module will appears on module selection pop-up.
    - Its address can be changed by browsing to module page.

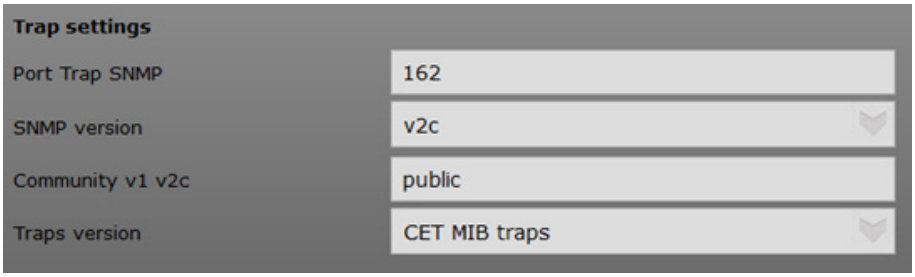
4. How can I reset my admin password if I have unfortunately forgotten it?

    In case of password lost, a new temporary password (valid 24 hrs after creation) can be issued by CE+T Power. To receive a temporary password, send an email with your T2S ETH serial Number and the date at which you expect to go back on site to change the password to customer.support@cet-power.com specifically requesting a new temporary password. The serial number can be found on the sticker on the T2S ETH, or on screen in "Parameters" then "Info".

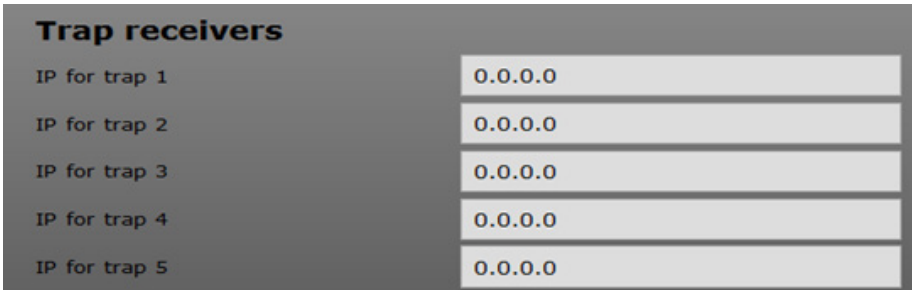
5. What is the purpose of the SNMP trap community?

   T2S ETH device features the ability to send SNMP Trap events to a configured SNMP trap receiver. This could be Test Traps and Traps sent when there is an alarm.

   These traps receivers can be configured in T2S ETH web page under parameters -> SNMP -> Trap receiver in Expert Login.



   A maximum of 5 Trap receivers can be configured in T2S ETH.



The purpose of SNMP trap community string:

- This is an added measure of security, operators may configure a trap community string which is used by the trap receiver to determine which traps are to be accepted from a device.
- This parameter is useful to avoid unwanted floods of Traps from a malicious source, by configuring Trap community string only relevant traps are processed by the trap receiver.
- Filtering on Trap Community string is used to process relevant Traps.

6. How the DC flow indicator is managed in the user interface of T2S ETH (& Inview X)?

   The DC Flow indicator depends on the system Configured power (W) and DC Input power (W).

   The DC flow will stop when DC Input power (W) is Less than 5 % of Configured System power (W). The minimum DC Input Power must be at least 5% of the configured power in the system to be shown; this is to prevent a lack of accuracy of converters measures when the system is almost not loaded.

11.Trouble Shooting and Defective Situations Fixing

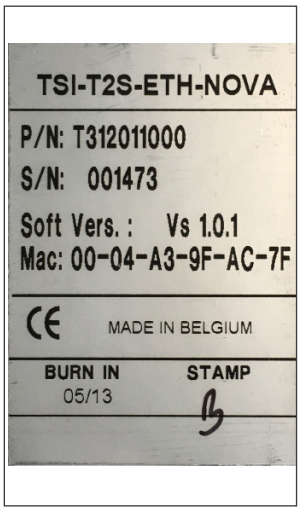
11.1 Defective T2S ETH

11.1.1 Return defective T2S interface

A T2S totally dark (indication area) or that cannot interface with your laptop are evidence of failure.

11.1.2 Return defective T2S ETH

- A repair request should follow the regular logistics chain:
  End-user => Distributor => CE+T Power.
- Before returning a defective product, a RMA number must be requested through the http://my.cet-power.com extranet. Repair registering guidelines may be requested by email at repair@cet-power.com.
- The RMA number should be mentioned on all shipping documents related to the repair.
- Be aware that products shipped back to CE+T Power without being registered first will not be treated with high priority!
- Information on failure occurrence as well as module status in “Events” page shall be attached to defective unit return package or recorded in RMA.



12. Service

For Service

- Check Service Level Agreement (SLA) of your vendor. Most of the time they provide assistance on call with integrated service. If such SLA is in place, you must call their assistance first.
- If your vendor doesn't provide such assistance (*) you may call CE+T directly. Toll free Number **1(855) 669 - 4627**(**), or log your tickets in - https://my.cet-power.com/mportal/request_technical_support.asp.

Service is available from 8:00 A.M. to 10:00 P.M. EST, Monday through Friday, except closing periods for holidays or inclement weather.

Major Incidents and Emergency conditions can be invoked for immediate handling of same number or by dropping a mail on customer.support@cetamerica.com (***)

(*) CE+T will redirect your call to your vendor if he has such SLA in place.

(**) Valid in USA and Canada only.

(***) Messages that are not Major Incident or Emergency will be served at the next scheduled working a day.

13. Maintenance Task

As maintenance will perform on live system, all task should perform only by trained people with sufficient knowledge on TSI and ECI product.

Tasks:

- Identify the site, customer, responsible, cabinet number, product type.
- Download and save configuration file for back up.
- Check configuration file to be in accordance with operational site conditions.
- Read and save log file for back up.
- Check and analyze log file, and if alarm are present.
- Replace dust filter if present. Filter is mandatory in dusty environment.
- Check module temperature and log value. If the internal temperature is higher than the previous year, determine if this is due to increased load, accumulated dust or reduced airflow. It is common to have a delta of 15°C by 30% of the load between the ambient and the internal temperature. If temperature increases due to internal dust built up, clean the module by air suction blower or vacuum cleaner.
- Clean cabinet (vacuum cleaner or dry cloth)
- Control the inverter mapping (AC Group, DC Group, Address)
- Check load level and record the rate value (print in word document the 4 screen modules information for the 32 modules, the 3 screen for the phases value and the 2 screens for the group AC and DC value)
- Change the configuration file for AC and DC mix mode to check that all TSI work on both power supply
- Check alarm operation (e.g., redundancy lost, mains failure, DC failure) on dry contact and through SNMP system or web interface.
- Switch OFF AC IN and check alarms.
- Check temperature terminal and temperature wiring. If possible use an infrared camera.
- Read and record value as wave form, power factor, Crest factor, THD I from power analyzer.
- Take cabinet picture
- Keep track of report and provide end user with a copy.
- Perform a MBP procedure. This task is not really recommended*, but could be demanded by site manager.

* It is not recommended because when you perform a By-pass procedure, generally there is no back up on AC input line, and the load shutdown if mains disappear.

14. Annex 1: Supervisor alarms - T2S ETH

This is the list of alarms issued by the supervisor. Other alarms are issued by other modules (see section 15, page 70). The supervisor is able to generate alarms that are related to the system, to inverter modules, or to itself. Alarms related to inverters will be seen as system alarms when module alarm is present on all inverters.

Each alarm has a priority level. The level can be (disabled, event, minor, major). If the level can be configured in the user interface, then it is marked as “mappable”.

System Alarms				
Text ID	**Name**	**Level**	**Default Mapping**	**Description**
256	MBP Engaged	mappable	major	When the Inverter system operates in bypass mode, T2S ETH will display the alarm by using auxiliary contact from MBP switch through Digital input 1. Digital input 1 is dedicated to MBP if it is installed in the system.
257	Surge Arrester	mappable	minor	In the inverter system, if surge arrester fails, T2S ETH will display the alarm by using auxiliary contact from surge arrester through Digital input 2. Digital input 2 is dedicated to surge arrester if it is installed in the system.
258	Redundancy Lost	mappable	minor	It is a lost of inverter redundancy. Redundancy is configured, and redundancy is lost on any output group.
259	Redundancy +1 Lost	mappable	minor	It is a lost of inverter redundancy + 1 inverter. Redundancy is configured and more than redundancy is lost on any output group.
260	Main Source Lost	mappable	major	Priority source is lost (depend on the configuration EPC or Online). Any of the groups from the main source does not conform. Example: there are 3 AC input groups, and the AC source is the main source. If one AC input is offline, the alarm is triggered.
261	Secondary Source Lost	mappable	minor	Secondary source is lost (depend on the configuration EPC or Online) Any of the groups from secondary source does not conform.
262	AC Source Lost	mappable	R3	Any AC input group does not conform.
263	DC Source Lost	mappable	disabled	Any DC input group does not conform.
264	AC Source Not Sync	mappable	minor	Any AC input group is not synchronized with AC output or has an out of range frequency.
265	DC Source Low	mappable	major	Check Vdc parameter and live value. Any DC input group has a voltage lower that defined threshold.
266	Output Saturated	mappable	disabled	The load on any output group is higher than the saturation threshold (80% of configured output power).
267	Output Overloaded	mappable	major	The load on any output group is higher than the configured output power.
268	Output Failure	mappable	major	Any output group has 0 seen modules, or no module running (and they are not manually off).
269	System Started	event		System just started.

System Alarms				
Text ID	**Name**	**Level**	**Default Mapping**	**Description**
272	Missing Module	event		Module is removed or defect. No module is detected on system bus.
273	New Module	event		All modules have just been detected on system bus.
274	Manually OFF	mappable	disabled	Inverter are switched OFF by the OFF function in hyper terminal. All modules outputs are manually turned off.
275	Output Fault	event		All modules outputs are turned off because of a fault.
276	Brownout Derating	event		AC in below threshold - reduce power from the AC input and pulls power form the DC input. All modules AC inputs are derated because of a brown-out.
278	Temperature Derating	event		Heat sink temperature is over rating. All modules outputs are derated because of an over temperature.
279	Overtemperature	event		Temperature is too high in the room or bad cooling, or component defective inside inverter. All modules outputs are turned off because of an over temperature.

Supervisor T2S ETH Alarms				
Text ID	**Name**	**Level**	**Def. Map**	**Description**
512	Digital Input 1	mappable	disabled	Digital input 1 is in low state and digital input 1 is NOT used for MBP signaling.
513	Digital Input 2	mappable	disabled	Digital input 2 is in low state and digital input 2 is NOT used for surge arrester signaling.
514	Log Nearly Full	mappable	disabled	Log file is nearly full.
515	Log Full	mappable	disabled	Log file is full (with information loss).
516	Log Cleared	event		Log file has just been cleared.
517	Config modified	event		Configuration has just been modified.

15. Annex 2: Module alarms - T2S ETH

Module not Recoverable Alarms				
Text ID	**Name**	**Level**	**Def. Map**	**Check and Action**
1	Fan Failure	Minor		Fan replacement
2	Permanent Fault (2)	Minor		
3	Permanent Fault (3)	Minor		
4	Permanent Fault (4)	Minor		
5	Permanent Fault (5)	Minor		
6	Permanent Fault (6)	Minor		
7	Too Many Starts	Minor		To clear the alarm, either increase the AC input voltage hysteresis or turn OFF the module and turn ON the module through the web interface or remote ON/OFF.
8	Permanent Fault (8)	Minor		
9	Permanent Fault (9)	Minor		
10	Permanent Fault (10)	Minor		
11	Permanent Fault (11)	Minor		
12	Permanent Fault (12)	Minor		
13	Output Polarity	Minor		
14	Overload Too Long	Minor		Check load condition
15	Output Fuse	Minor		
16	Permanent Fault (16)	Minor		
18	Permanent Fault (18)	Minor		
19	Permanent Fault (19)	Minor		
28	Permanent Fault (28)	Minor		
29	Permanent Fault (29)	Minor		
30	Permanent Fault (30)	Minor		
31	Permanent Fault (31)	Minor		
32	Permanent Fault (32)	Minor		

Module Recoverable Alarms				
Text ID	**Name**	**Level**	**Def. Map**	**Check and Action**
33	Output Synchronization	Minor		Check frequency TSI and Mains
34	Temperature Too High	Minor		Check temperature inside inverter
35	Com. Bus Failure	Minor		T2S bus failure or no T2S seen. TSI blinks red - hardware problem
36	Com. Bus Conflict	Minor		When two TSI have the same ADX - will self repair
37	No Power Source	Minor		No input AC and inout DC availlable
38	Com. Bus Failure	Minor		TSI has not started must have a T2S - orange LED
39	Parameter Query	Minor		Inverter is updating his parameters
40	Parameter Mismatch	Minor		Parameters incompatible with configuration file

Module Recoverable Alarms				
Text ID	**Name**	**Level**	**Def. Map**	**Check and Action**
41	Parameter Not Ready	Minor		Check AC, configuration and allocated phases
42	Recoverable Fault (42)	Minor		
43	Inv Mismatch	Minor		Inverter incompatible with inverter installed in system (pack with “a la carte”)
44	Backfeed Error	Minor		Inverter OFF due backfeed error
45	Recoverable Fault (45)	Minor		
46	Ext. Clock Fault	Minor		System OFF due external clock failure
47	Overload Triangle	Minor		Inverter OFF due internal failure

Module Alarms				
Text ID	**Name**	**Level**	**Def. Map**	**Check and Action**
65	TSI Com. Bus Failure	Minor		synchronization problem
66	T2S Com. Bus Failure	Minor		problem will be stored in internal black box- return for investigation
67	TSI Com. Bus Failure	Minor		cabling or module problem
68	T2S Com. Bus Failure	Minor		Problem will be stored in internal black box- return for investigation
69	Recoverable Fault (69)	Minor		
70	Recoverable Fault (70)	Minor		
71	Output Volt. Changing	Minor		Happens when there is a config change to the voltage- lasts 1 min for a change from 100V to 120V - never insert a new module while this is happening!
72	Output Overload (I)	Minor		Check load condition
73	Com. Bus Mismatch	Minor		Alarm- triggered when it sees more or less modules on bus A vs bus B - used to identify a module problem while the module is still running - module needs to be replaced
74	Imminent Start	Minor		reported from a stopped module 10 seconds before it is going to start
75	Booster Not Ready	Minor		Wait 1 minute to recover the situation
76	Overload Not Ready	Minor		Wait 1 minute to recover the situation
77	Temperature Derating	Minor		temperature measured from the heat sink - 88C for bravo and 70C for media
78	Output Overload (P)	Minor		Check load condition
79	Recoverable Fault (79)	Minor		
80	Brownout Derating	Minor		AC in below 180V - reduce power from the AC input and pulls power form the DC input
81	Fan Life	Minor		Write an event “FAN LIFE ELAPSED” in log file when the counter elapsed time is reach for one inverter.
82	Remote Off	Minor		Write an event “REMOTE OFF” in log file when inverter is set OFF through REM ON/OFF terminal

Module Alarms				
Text ID	**Name**	**Level**	**Def. Map**	**Check and Action**
83	Manual Off	Minor		Write an event “MANUALLY OFF” in log file when module is set OFF through hyperterminal
84	Triangle Off	Minor		Inverter in OFF position due triangle mode failure
85	Recoverable Fault (85)	Minor		
86	Recoverable Fault (86)	Minor		
88	Recoverable Fault (88)	Minor		

Module AC Input Alarms				
Text ID	**Name**	**Level**	**Def. Map**	**Check and Action**
160	Ok			No error on AC IN
161	Source V Too Low Transfert	Minor		Check AC IN configuration and live value
162	Source V Too High Transfert	Minor		Check AC IN configuration and live value
163	Error (163)	Minor		
164	Error (164)	Minor		
165	Source V Too Low Transfert	Minor		Check AC IN configuration and live value
166	Source V Too High Transfert	Minor		Check AC IN configuration and live value
167	Source Not conform	Minor		Check AC IN configuration and live value
168	Source Not conform	Minor		Check AC IN configuration and live value
169	Source Not conform	Minor		Check AC IN configuration and live value
170	Power Disabled	Minor		AC input converter is only use for synchronization
171	Source Not conform	Minor		Check AC IN configuration and live value
172	THD Too High	Minor		Check AC IN configuration and live value
173	Output Synchronization	Minor		Check AC IN configuration and live value
174	Error (174)	Minor		
175	Output Synchronization	Minor		Check synchronization between AC IN and AC OUT
176	Inv. Synchronization	Minor		Check synchronization between AC IN and AC OUT
177	Synchronization failure	Minor		Check synchronization between AC IN and AC OUT
179	Source V Too Low Stop	Minor		Check AC IN configuration and live value
180	Source V Too High Stop	Minor		Check AC IN configuration and live value
181	Source Frequ. Too Low	Minor		Check AC IN configuration and live value
182	Source Frequ. Too High	Minor		Check AC IN configuration and live value
183	Phase Not Ready	Minor		Check AC IN configuration and live value
184	Backfeed Error	Minor		Inverter in backfeed protection

Module AC Input Alarms				
Text ID	**Name**	**Level**	**Def. Map**	**Check and Action**
188	Error (188)	Minor		
189	Error (189)	Minor		
190	Error (190)	Minor		
191	Error (191)	Minor		

Module DC Input Alarms				
Text ID	**Name**	**Level**	**Def. Map**	**Check and Action**
193	Ok			No error on DC IN
194	Source V Too Low Transfert	Minor		Check VDC parameter and live value
195	Source V Too High Transfert	Minor		Check VDC parameter and live value
196	Error (196)	Minor		
202	Source V Too Low Transfert	Minor		Check VDC parameter and live value
203	Source V Too High Transfert	Minor		Check VDC parameter and live value
204	Source V Too Low Stop	Minor		Check VDC parameter and live value
210	Source V Too Low Stop	Minor		Check VDC parameter and live value
211	Source V Too High Stop	Minor		Check VDC parameter and live value
217	Error (217)	Minor		
220	Error (220)	Minor		

16. Annex 3: Configuration parameters - T2S ETH

16.1 Montioring

Disclaimer: The configuration file should be manually edited only by CE+T crew or any especially trained operator. All modifiable values contained here are easily accessible through the T2S ETH web interface which allow you to change the configuration carefully. Any mistake done in this file could lead to system malfunction and CE+T shall not guarantee the behavior of the whole system once this file has been corrupted.

- Time

Text ID	Name	Values	Description
	Time	HH : MN : SS	Set the Time in Hours : Minutes : Seconds
	Date	DD : MM : YY	Set the Date in Day : Month : Year

- Regional settings

Text ID	Name	Values	Description
Regional settings			
525	Language	English French German	Select a language for User interface
523	Sitename	CE+T	Enter the site name which will appear in user interface banner
524	Location	Belgium	Enter the location of the system installed.
562	Auto logout delay	1 - 6000 seconds	The auto logout time for Expert login
561	Keyboard layout	azerty qwerty	Keyboard layout for Inview X touch screen
631	New module identifier	Always ask Always replace Never replace	Select a function to perform while inserting a new module. • Always ask - System will ask to assign the address of every newly inserted module. • Always replace - System will assign the address of the replaced module automatically. • Never replace - System will assign the module address randomly.
634	Home page	Classic homepage Alternate homepage	User interface display for home page. • Classic home page - Displays information of AC IN, DC IN, and AC OUT parameters, for more information user has to click Magnifier button. • Alternate homepage - Displays brief information of parameters in single page without clicking Magnifier button.
Display format			
620	Date format	DD/MM/YYYY YYYY/MM/DD MM/DD/YYYY	Date format for user interface and user log
621	Time format	24H 12H	Time format for user interface and user log

Text ID	Name	Values	Description
622	Temperature format	Celcius °C	Temperature format for user interface and user log
		Fahrenheit °F	

- NTP Server

Text ID	Name	Values	Description
NTP server			Time to be synchronized with Global Time Zone Offset by using NTP server IP.
554	IP address of NTP server	0.0.0.0	Enter the NTP Server IP address. It is used to synchronize the clocks of the inverter system to local time.
555	Port	123	NTP server port
556	Timezone offset	UTC-12 to UTC+12	UTC – Coordinated Universal Time, set your country UTC time zone.
557	Auto-refresh	Disable	Enable or disable the automatic synchronization to NTP server.
		Enable	
558	Synchronization interval (days)	Integer : 1 - 365	Interval in days between two automatic time synchronizations to NTP server.

- Passwords

Text ID	Name	Values	Description
Passwords			Password is used for Expert login, the default password is “pass456”. It is recommended to change the password.
	Password	-	Type your new password
	Confirm Password	-	Re-type the same password

- Network

Text ID	Name	Values	Description
Connection mode			
627	Hardware setup	With Inview X	Select “With Inview X” option if monitoring device (Inview X) is installed in the system. In this option user can access the network connection through Inview X at rear. SNMP available version: v1, v2c and v3
		Standalone	Select “Standalone” option if monitoring device (Inview X) is not installed. User can access the network connection from T2S ETH at front (Wait at least 3 minutes to establish connection). SNMP available version: v1
Network address			
517	DHCP status	Disable	Disable: It allows to configure static IP to T2S ETH card Enable: IP to T2S will be assigned by the DHCP server or the Router to which T2S ETH is connected. To find the IP address of T2S ETH card IP Scanner tools can be used
		Enable	
512	IP address	192.168.0.2	Default IP address is 192.168.0.2, user can set their own System IP address

Text ID	Name	Values	Description
513	Subnet mask	255.255.255.0	Enter the system subnet mask address
514	Default gateway	192.168.0.254	Enter the system default gateway address
515	Primary DNS	0.0.0.0	Enter the system Primary DNS address
516	Secondary DNS	0.0.0.0	Enter the system Secondary DNS address

- Alarms

Text ID	Name	Values	Description
Alarms			
552	MBP Configured	Disable	Enable: If MBP switch is installed in the system and engaged, the alarm will generate through Digital Input 1. Disable: If not installed, user can utilize the Digital Input 1 for other inputs.
		Enable	
559	Remote MBP	Disable	Enable: If remote MBP is engaged, the alarm will generate through Digital Input 1 and relay 3 is connected to remote MBP unit. Disable: If not installed, user can utilize the Digital Input 1 for other inputs. (It is applicable only for the systems in USA market)
		Enable	
553	Surge arrester configured	Disable	Enable: If Surge arrested is installed and activated, the alarm will generate through Digital Input 2. Disable: If not installed, user can utilize the Digital Input 2 for other inputs.
		Enable	
538	Log full alarms	Disable	If enabled, an alarm will be generated once it reaches the maximum limit. It is recommended to download the log files before it goes to FIFO.
		Enable	

16.2 Inputs/Relays

- Inputs Label

Text ID	Name	Values	Description
Labels			
521	Digital Input 1	MBP	By default the label is “MBP ENGAGED”. If MBP switch is not installed, user can define the name of their Digital Input 1.
522	Digital Input 2	Surge Arrester	By default the label is “Surge Arrester”. If Surge Arrester is not installed, user can define the name of their Digital Input 2.

- Relays Label

Text ID	Name	Values	Description
Relays Label			
535	Major Relay Name	Major	User label for major alarm relay and cannot be modified.
536	Minor Relay Name	Minor	User label for minor alarm relay and cannot be modified.
537	Relay 3 Name	Relay 3	User can define the label name according to the selected alarm in Relays Mapping page.

- Relays Delay

Text ID	Name	Values	Description
Relays Delay			
532	Major Relay delay	2 to 60 seconds	User can set the time (2 to 60s) for Relay to get energize after the alarm is generated.
533	Minor Relay delay		
534	Relay 3 delay		

- Relays Mapping

Text ID	Name	Values	Description
Relays Mapping			
543	MBP Engaged	Major	In this page, all the alarms from the modules and systems will be listed. User can set these alarms as major or minor. T2S ETH has one user selectable Alarm – Relay 3. It can be assigned any one alarm from the list.
549	Surge Arrester		
545	Redundancy Lost		
550	Redundancy +1 lost		
563	Sync Redundancy Lost		
564	All Sync Modules Lost		
580	Main Source Lost		
581	Secondary Source Lost		
539	AC Source Lost		
585	DC Source Lost		
546	AC Source Not Sync		
586	DC Source Low		
551	Output Saturated	Minor	
544	Output Overload		
540	Output Failure		
590	System Manual Off		
582	Missing Module		
583	Module Manual Off	Relay 3	
584	Module Output fault		
589	Module Brownout Derating		
591	Module Temperature Derating		
548	Module Over Temperature		
541	Dig Input 1		
542	Dig Input 2		
587	Log Nearly Full		
588	Log Full		

- Snmp traps

Text ID	Name	Values	Description
General			
543	MBP Engaged	Disable Enable	If enabled, by using SNMP protocol these alarms can be used for TRAP receivers. (number of TRAP receivers can set in SNMP page)
549	Surge Arrester		
545	Redundancy		
550	Redundancy +1 lost		
563	Sync Redundancy Lost		
564	All Sync Modules Lost		
580	Main Source Lost		
581	Secondary Source Lost		
539	AC Source Lost		
585	DC Source Lost		
546	AC Source Not Sync	Disable Enable	If enabled, by using SNMP protocol these alarms can be used for TRAP receivers. (number of TRAP receivers can set in SNMP page)
586	DC Source Low		
551	Output Saturated		
544	Output Overload		
540	Output Failure		
590	System Manual Off		
582	Missing Module		
583	Module Manual Off		
584	Module Output fault		
589	Module Brownout Derating		
591	Module Temperature Derating		
548	Module Over Temperature		
541	Dig Input 1		
542	Dig Input 2		
587	Log Nearly Full		
588	Log Full		
633	Other alarms		

16.3 SNMP

- SNMP

Text ID	Name	Values	Description
SNMP settings			
626	SNMP version	v1	Select the SNMP version • T2S ETH supports SNMP v1.
571	Port SNMP	161	The SNMP default value is 161 and should not modify it.
597	SNMPv1 Agent Community	public	Set the community string for V1.
Trap Settings			
572	Port Trap SNMP	162	Set the port to which SNMP trap are sent.
630	SNMP version	v1	Select the SNMP version for traps sent by agent. V1 can be used in Stand-Alone mode.
629	Community v1	public	Set the community string for traps in SNMP V1.
632	Traps version	0 : 'No trap'	Select among the MIBs in T2S-ETH which one is allowed to send traps.
		1 : 'CET MIB traps'	
		2 : 'UPS MIB traps'	
Trap receivers			
573	IP for trap 1	0.0.0.0	Set SNMP traps receiver IP.
574	IP for trap 2		
575	IP for trap 3		
576	IP for trap 4		
577	IP for trap 5		

16.4 Modbus

- Modbus

Text ID	Name	Values	Description
Inview X's modbus TCP/IP			
635	Port status	Enable	Enable of ModBus TCP slave on Inview X. Available only through Inview X.
		Disable	
636	Port select	1 to 65535	Set port for ModBus TCP on Inview X.
Modbus RTU slave			
566	RTU slave	Enable	Enable or disable ModBus RTU slave on T2S-ETH.
		Disable	
567	Slave address	1,2,…	Set slave address for ModBus RTU.
568	Baud rate	9600	Set baud rate for ModBus RTU.
		19200	
		38400	
		115200	
569	Parity	Even Odd No parity	Set parity for ModBus RTU.

Text ID	Name	Values	Description
570	Stop bit(s)	1 bit , 2 bits	Set stop bit(s) for ModBus RTU.

16.5 Power

- General

Text ID	Name	Values	Description
General			
529	Redundancy	L1	Define the number of redundant modules for each phase.
530		L2	
531		L3	
96	Source power ratio DC vs AC (%)	0 to 100	Defines the priority source. Default value is “0” **0** - Feeding from AC IN has priority (Inverter AC/AC - EPC mode) **100** - Feeding from DC has priority (Inverter DC/AC - On Line mode)
102	Booster 10X In	Enable	Allow to inhibit the Booster option which generates a current of 10In for 20ms in case of short-circuit (For Nova inverter - 9In for 20 ms).
		Disable	
547	AC in present	Enable	If enabled the T2S ETH monitor and display the AC input source parameter in the web interface. If disabled, alarms related to AC source will be inactive and it will not display in the web interface.
		Disable	
104	AC In grid feed Disable	Enable	If enable, power will re-inject to AC input source.
		Disable	

- AC In

Text ID	Name	Values		Description
		230 Vac	120 Vac	
AC In				
637	Number of AC In	1 to 3		Define the number of AC Input phase
AC In				
56	Vac Low Stop	182	98	Define the minimum and maximum for AC Input voltage range. Note: AC input low and high values have fixed hysteresis between stop and restart. Hysteresis is fixed to 10 Vac for 230 Vac module and 5 vac for 120 VAC modules.
57				
58				
52	Vac Low Transfer	185	100	
53				
54				
48	Vac Low Start	195	105	
49				
50				
60	Vac High start	255	135	
61				
62				
64	Vac High Transfer	260	139	
65				
66				
68	Vac High Stop	265	140	
69				
70				
73	Freq AC Low Stop	47.0	57.0	Define the minimum and maximum of AC input frequency range. Note: It is recommended not to change the AC input frequency values.
72	Freq AC Low Start	47.3	57.3	
74	Freq AC High Start	52.7	62.7	
75	Freq AC High Stop	53.0	63.0	
97	Synchro speed (s)	-2, -1, 0, 1 & 2		Set the speed at which modules try to synchronize AC output with AC input. Integer from -2 (very fast) to 2 (very slow).
101	Mode On Line (Safe)	Enable		If enabled, Load feed by DC source. If DC out of range, Load transfer to AC IN with delay transfer of 10 ms.
		Disable		

- DC Group

Text ID	Name	Values					Description
		24 Vdc	48 Vdc	60 Vdc	110 Vdc	220 Vdc	
DC Group							
16	Vdc Low Stop	19.0	39.0	49.0	90.0	165.0	Define the minimum and maximum of DC input voltage range. Note: It is recommended not to change the DC input values.
17							
8	Vdc Low Transfer	19.5	40.0	50.0	92.0	169.0	
9							
0	Vdc Low Start	23.0	45.0	56.0	100.0	18.0	
1							
24	Vdc High Start	31.0	57.0	71.0	150.0	280.0	
25							
32	Vdc High Transfer	34.5	60.0	74.0	158.0	296.0	
33							
40	Vdc High Stop	35.0	61.0	75.0	160.0	300.0	
41							
593	DC Source Low Threshold	0 to 300					Set DC source low threshold voltage in volts. If DC source voltage drops under this threshold a “DC source low” alarm is raised.”

- AC Out

Text ID	Name	Values		Description
		230 Vac	120 Vac	
AC out				
78	Phase shift	L1 - 0.00		Phase shift between AC input phase 1 and AC output phase 1.
79		L2 - 120.00		Phase shift between AC input phase 1 and AC output phase 2.
80		L3 - 240.00		Phase shift between AC input phase 1 and AC output phase 3.
86	Vout nominal	L1 - 230	L1 - 120	Define AC output voltage for AC output phase 1, 2 and 3. Output voltage per phase can be selectable (N-L : 200 V,220 V, 230 V & 240 V)
87		L2 - 230	L2 - 120	
88		L3 - 230	L3 - 120	
76	Nominal Freq	50	60	Free running AC output frequency when AC input is not available.
77	Nb of phases	1 to 3		Define the number of system output phase. It should be same as number of AC input phase.
94	Short Circuit Voltage Threshold (V)	80	60	Minimum AC output voltage under which module considers output as in short-circuit.
95	Short Circuit Hold Time (s)	1 to 60		Default value is 60 seconds. This is the maximum time duration during which module tries to eliminate the short-circuit existing on output. If the voltage remains under the “Short Circuit Voltage Threshold” for this duration the module stops.
98	Max Power Derating (%)	150% (TSI)		Maximum power that module can supply.
99	Max Current Derating (%)	125% (ECI)		Maximum current that module can supply.

Text ID	Name	Values		Description
		230 Vac	120 Vac	
100	Max Overload Duration (s)	15 to 600 s		Maximum time duration in seconds for modules to run in overload.
592	Saturation Threshold	80		Set saturation threshold in %. If the saturation i.e. the ratio between output power and rated power reaches this threshold an “Output saturated” alarm is raised.
107	Delta Mode	Enable		Enable Delta Mode, if the load has 3 phase input, without Neutral.
		Disable		

- Synchronization

Text ID	Name	Values	Description
Synchronization			TUS (TSI Universal Synchronization) is used for paralleling the system having more than 32 numbers of modules.
638	Sync Type	Disable	Select the type of synchronizator module (TUS) in the system.
		ALS	
		PLS	
105	In case of sync failure	Never stop	Select the expected behavior of the system in case of synchronization failure.
		Stop after 1 min	
		Stop directly	
118	Number of sync modules	1 or 2	Set number of TUS modules in the system.
119	System ID	1, 2, 3, ...	Set the ID for each sub-system and T2S ETH must have a different ID.
120	Output phase ID	1	Select the sub-system phase. Each sub-system belongs to one and only one output phase.
121	Group ID	1	This parameter is used for configuring A + B system. In this case Group ID can be either 1 or 2 if sub system belongs to group A or group B. These systems can be either mono dual or tri-phases given the output phase ID configured.
122	Number of lines in system	3	Set the number of lines in the system. This is the number of phases.
123	Aux X power supply alarm	Don’t care	Set the option as “Don’t care”
		On AC source	
124	Aux Y power supply alarm	On DC source	
		Via module	
125	DC sync ID	Disable	If each sub-system has its own independent DC group then this parameter should be set to ‘0’. If the user want to share a DC group between multiple sub-systems all of these should have the same value for this parameter.
		DC 1 to DC 8	

- Other

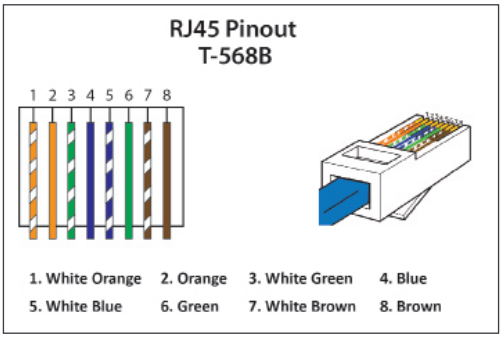
Text ID	Name	Values	Description
103	Remote Off Disable AC Power	Enable Disable	Enable special mode in which “remote off” disables only AC input stage. AC input source is still used for synchronization.
106	Other;Walk In Mode Time (x10 s.)	Integer	The Walk-in mode allow at the TSI to comeback progressively on the AC priority source after an outage. Friendly use on Genset.
108	Airco Mode	Enable Disable	Enable airco mode. It allows to start load with high inrush current and it is applicable only for TSI modules.
109	Force Start Without T2S	Enable Disable	Enable modules start without T2S
110	Pdc Max (W)	0.000000	Maximum power allowed on DC even during overload. 0 means no limit.
111	No power from ACin phase 1	Enable Disable	Not Applicable for EPC mode operation. It is recommended to set in “Disable”
112	No power from ACin phase 2	Enable Disable	
113	No power from ACin phase 3	Enable Disable	

17. Annex 4: Modbus

17.1 Hardware Requirements

17.1.1 Cabling:

ModBus RTU is available on the RJ45 connector located on the back plane of the rack containing the T2S ETH controller. The below image provides the pinout details of the connector.



Pin Number	Name	Description
1	CANH	CANH pin for Candis
2	CANL	CANL pin for Candis
3	GND_IAX	Digital Communication Ground
4	GND_IAX	Digital Communication Ground
5	12V_IAX	+12 V unregulated
6	COM_A	RS 485 A
7	GND_IAX	Digital Communication Ground
8	COM_B	RS 485 B

17.1.2 Baud rate, parity and mode

Only RTU mode is supported.

Item	Value	Default
Slave address	From 1 to 247	1
Baud Rate	9600, 19200, 38400 or 115200	19200
Parity	Even, odd, none	Even
Stop bits	One, two	One
Mode	RTU	-
Electrical interface	RS485	-

17.2 Database Description

17.2.1 Typographic convention:

In this document, the following naming convention will be used to represent the type of a variable:

The first letter will indicate if the variable is signed (S) or unsigned (U). Then the following digit(s) will indicate the number of bits needed to store the variable.

Thus:

- U8 will represent an unsigned variable stored in an 8-bit wide memory
- U16 will represent an unsigned variable stored in a 16-bit wide memory
- U32 will represent an unsigned variable stored in a 32-bit wide memory

And:

- S8 will represent a signed variable stored in an 8-bit wide memory
- S16 will represent a signed variable stored in a 16-bit wide memory
- S32 will represent a signed variable stored in a 32-bit wide memory

What is more, the Modbus RTU register base type is a 16-bit wide variable. This means it is possible to store two 8-bit variables in a register. These two variables will be accessed using the same index in the structure. Thus in order to know if the variable is stored in the upper byte or in the lower byte, letter **H(High)** or **L(Low)** is added to the index.

As specified by the protocol, variables longer than 8-bit are always represented in big-Endian format (MSB first).

17.2.2 Data types:

Modbus RTU protocol defines four types of variables class described in the following table.

Name	Type	Access	Supported by T2S ETH
Discrete input	1-bit wide	Read-only	No
Coil	1-bit wide	Read-write	No
Input register	16-bit wide	Read-only	Yes
Holding register	16-bit wide	Read-write	No

Data address mapping and signification are described in the following sections.

17.2.3 Supported function:

Accordingly to Modbus RTU specification, supported functions by the T2S ETH controller are the following:

- Read Input registers (0x04)

17.2.3.1 INPUT REGISTERS ELEMENTS (Read-Only 16-bit wide)

Module table (0x0000)

The table described below represents the information that can be retrieved regarding a particular module. The Maximum amount of the module is set to 32. Each of them is identified by an address ranging from 1 to 32.

BASE ADDRESS: 0(0x0000) + 31*(Module address – 1).

Index	Name	Description	Type
0H	eStatusACOut	AC output status number (see 17.3.1.1, page 91)	U8
0L	eStatusACIn	AC input status number (see 17.3.1.2, page 92)	U8
1H	eStatusDCIn	DC Input status number (see 17.3.1.3, page 92)	U8
1L	bAddress	Configured address	U8
2H	bLoadPosition	Position of the load regarding input power sources (0:AC, 100:DC, 50:mixed, 101:unknown)	U8
2L	bLoadRatioW	Loading ratio regarding power in watts (%)	U8
3H	bLoadRatioVA	Loading ratio regarding power in VA (%)	U8
3L	bPhaseNumber	Number of the phase module is belonging to	U8
4	wVout	Output voltage value (0.1V)	U16
5	wIout	Output current value (0.1A)	U16
6	wPoutW	Output power value (W)	U16
7	wPoutVA	Output power value (VA)	U16
8	wVinAC	AC input voltage value (0.1V)	U16
9	wIinAC	AC input current value (0.1A)	U16
10	wPinACW	AC input power value (W)	U16
11	wPinACVA	AC input power value (VA)	U16
12	wACInFreq	AC input frequency value (0.1Hz)	U16
13	wVinDC	DC input voltage value (0.1V)	U16
14	wIinDC	DC input current value (0.1A)	U16
15	wPinDC	DC input power value (W)	U16
16	wTemperature	Temperature value (K)	U16
17	wSoftVersion	Software version number	U16
18	lSerialNumber	Serial number	U32
22H	bStatusMod	Event number of the status related to the output stage and the module internal status	U8
22L	bStatusAC	Event number of the status related to the AC input stage	U8
23H	bStatusDC	Event number of the status related to the DC input stage	U8
23L	bPresent	Flag (true or false) that indicates if module is seen by T2S ETH or not	U8
24H	bGroupAC	AC input group number module is belonging to	U8
24L	bGroupDC	DC input group number module is belonging to	U8
25H	bRestrained	Flag (true or false)that indicates if module cannot cope with more than five other module or not	U8
25L	bNoEPC	Flag (true or false) that indicates if module has an AC input (EPC) or not	U8
26	wPoutNominalW	Nominal output power (W)	U16

Index	Name	Description	Type
27	wPoutNominalVA	Nominal output power (VA)	U16
28	wVinNominalAC	Nominal AC input voltage (0.1V)	U16
29	wVinNominalDC	Nominal DC input voltage (0.1V)	U16
30	wVinNominalFreqAC	Nominal AC frequency (0.1Hz)	U16

Phase table (0x0640)

The following table described represents the information that can be retrieved regarding a particular phase. The Maximum amount of phase is set to 8. Each of them is identified by a label ranging from 1 to 8.

BASE ADDRESS: 600(0x0640) + 27*(Phase label – 1).

Index	Name	Description	Type
0H	bRatioAvailableW	Ratio between output load and available power in watts (%)	U8
0L	bRatioAvailableVA	Ratio between output load and available power in VA (%)	U8
1H	bRatioInstalledW	Ratio between output load and installed power (Nb modules – redundancy) in watts (%)	U8
1L	bRatioInstalledVA	Ratio between output load and installed power (Nb modules – redundancy) in VA (%)	U8
2	wVout	Output voltage value (0.1V)	U16
3	wIout	Output current value (0.1A)	U16
4H	bNbOndCfg	Number of modules configured in the phase	U8
4L	bRedundancy	Amount of redundancy configured in the phase	U8
5	wACOutFreq	AC output frequency value (0.1Hz)	U16
6	lPinDC	DC input power value (W)	U32
8	lPinACW	AC input power value (W)	U32
10	lPinACVA	AC input power value (VA)	U32
12	lCurrentPowerInVA	Output power value (VA)	U32
14	lCurrentPowerInW	Output power value (W)	U32
16	lInstalledPowerInW	Installed power value (W)	U32
18	lInstalledPowerInVA	Installed power value (VA)	U32
20	lAvailablePowerInW	Available power value (W)	U32
22	lAvailablePowerInVA	Available power value (VA)	U32
24H	bNbInvSeen	Number of module seen by T2S ETH in that phase	U8
24L	bNbInvOK	Number of modules that are delivering output in the phase	U8
25H	bNbInvMO	Number of modules manually off in the phase	U8
25L	bNbInvKO	Number of modules that are not delivering output due to a failure in the phase	U8
26H	bNbInvNT	Number of modules not seen by T2S ETH in the phase (accordingly to bNbOndCfg)	U8

AC group table (0x0730)

The table described below represents the information that can be retrieved regarding a particular AC group. The Maximum amount of AC group is set to 4. Each of them is identified by a label ranging from 1 to 4.

BASE ADDRESS: 1840(0x0730) + 10*(AC group label – 1).

Index	Name	Description	Type
0H	bNbInvOK	Number of modules that are delivering output in the group	U8
0L	bNbInvMO	Number of modules manually off in the group	U8
1H	bNbInvKO	Number of modules that are not delivering output due to a failure in the group	U8
1L	bNbInvSeen	Number of module seen by T2S ETH in that group	U8
2	lPinACW	AC input power value (W)	U32
4	lPinACVA	AC input power value (VA)	U32
6	wVinAC	AC input voltage value (0.1V)	U16
7	wIinAC	AC input current value (0.1A)	U16
8	wACInFreq	AC input frequency value (0.1Hz)	U16
9H	bACInOk	Number of modules stating that their AC input stage is fully functional	U8

DC group table (0x076C)

The table described below represents the information that can be retrieved regarding a particular DC group. The Maximum amount of DC group is set to 8. Each of them is identified by a label ranging from 1 to 8.

BASE ADDRESS: 1900(0x076C) + 7*(DC group label – 1).

Index	Name	Description	Type
0H	bNbInvOK	Number of modules that are delivering output in the group	U8
0L	bNbInvMO	Number of modules manually off in the group	U8
1H	bNbInvKO	Number of modules that are not delivering output due to a failure in the group	U8
1L	bNbInvSeen	Number of module seen by T2S ETH in that group	U8
2	lPinDC	DC input power value (W)	U32
4	wVinDC	DC input voltage value (0.1V)	U16
5	wIinDC	DC input current value (0.1A)	U16
6H	bDCInOk	Number of modules stating that their DC input stage is fully functional	U8

Miscellaneous information table (0x07BC)

The table described below represents the miscellaneous information that can be retrieved regarding T2S ETH and system.

BASE ADDRESS: 1980(0x07BC)

Index	Name	Description	Type
0H	bOldVersionNumber	Deprecated. Always 0x00	U8
0L	ePhaseNumber	Number of phase configured in the system	U8

Index	Name	Description	Type
1	lSerialNumber	T2S ETH serial number	U32
3	wTempoMajorAl	Temporization of major alarm relay	U16
4	wTempoMinorAl	Temporization of minor alarm relay	U16
5H	bNbMajor	Number of major alarm in the system	U8
5L	bNbMinor	Number of minor alarm in the system	U8
6H	bNbTotalAlarmNumber	Total number of alarm in the system	U8
6L	bACInputPresent	Flag (true or false) that indicates if AC input should be considered as present or not	U8
7H	bSaturationThresh	Value of the ratio over which the saturation alarm will be raised (%)	U8
7L	bNbGroupsDC	Number of DC groups configured in the system	U8
8H	bNbGroupsAC	Number of AC groups configured in the system	U8
8L	bProgRelay	Always 0xFF	U8
9	wSoftMainRevision	Main revision software number of T2S ETH	U16
10	wSoftSubRevision	Sub revision software number of T2S ETH	U16
11H	bSystemLoadPosition	Position of the load at the system level (0:AC, 100:DC, 50:mixed, 101:unknown)	U8
11L	bT2S ETHMaxKnownParameters	Version number of TSI modules configuration parameters	U8
13H	bNbrModConf	Total number of module configured on the installation	U8
13L	bNbrModSeen	Total number of module configured on the installation	U8

Date and time table (0x07D0)

The table described below represents the information that can be retrieved regarding date and time.

BASE ADDRESS: 2000(0x07D0)

Index	Name	Description	Type
0	lTime	Time in epoch	U32
2H	bSeconds	Seconds number	U8
2L	bMinutes	Minutes number	U8
3H	bHours	Hours number	U8
3L	bDay	Day of the month	U8
4H	bMonth	Month number	U8
4L	bDaylightSaving	Flag (true or false) that specify if daylight saving is enable or not	U8
5	wYear	Year number	U16

Alarm table (0x07DA)

The table described below represents the information that can be retrieved regarding alarms. Maximum amount of entries is set to 50. A valid entry represents an alarm present in the system. An invalid entry is an entry where all bits of each field are set. All entries following an invalid entry will be invalid.

BASE ADDRESS: 2010(0x07DA) + 2*(Entry number – 1)

Index	Name	Description	Type
0H	bDeviceNumber	Identifier that specifies which device is responsible of this alarm (see 17.3.1, page 91)	U8
0L	bEventType	Type of the alarm (Major or minor) (see 17.3.1, page 91)	U8
1	wEventNumber	Alarm number identifier	U16

Rem: See alarm types in the annexes for *bEventType* description.

Configuration table (0x1040)

The table described below represents the information that can be retrieved regarding parameters that can be configured in the T2S ETH controller. Maximum amount of entries is set to 500. Not all entries are valid. An invalid entry is an entry where all bits of each field are set. Invalid entries might be interleaved with valid entries.

BASE ADDRESS: 4160(0x1040) + 20*(Entry number – 1)

Index	Name	Description	Type
0	swParameter	Configured value of the parameter	S16
1	wValidity	Value indicating if last configured parameter value is valid (see 17.3.4, page 93)	U16
2	wIdentifier	Unique value identifying the parameter	U16
3	wUnit	Value indicating in which units the parameter is expressed (see 17.3.4, page 93)	U16
4	strParamDescription	Textual description of the parameter	32*U8

Event string table (0x4114)

The table described below represents the information that can be retrieved regarding event textual description. Maximum amount of entries is set to 300. Each event is identified by an unique number (Event 0 exists!).

BASE ADDRESS: 16660(0x4114) + 8*Event number

Index	Name	Description	Type
0	strEventTxt	Textual description of event	16*U8

17.3 Status and Constants Description

17.3.1 Module status explanation (A1):

17.3.1.1 eStatusACOut:

Name	Description	Value
SBR	Standby running. This means that the module is delivering output	0
SB	Standby. This mean that the module is manually OFF	1
SBWE	Standby with error. This means that the module is not delivering output due to an unrecoverable error	2

Name	Description	Value
SBWRE	Standby with recoverable error. This means that the module is not delivering output due to a recoverable error.	3
UNKNOWN	Unknown. This means status is unknown	4

17.3.1.2 eStatusACIn:

Name	Description	Value
OK	OK. This means the AC input is OK for the module	0
SAFE	Safe. This means the AC input is not considered as “good” but some power can still be drawn from it.	1
NOT_SYNC	Not synchronized. This means that the AC input and output are not synchronized together thus invalidating AC input.	2
OFF	Off. This means that the AC input stage of the module has been turned off due to an invalid AC input (maybe not safe).	3
UNKNOWN	Unknown. This means the status is unknown	4

17.3.1.3 eStatusDCIn:

Name	Description	Value
OK	OK. This means the AC input is OK for the module	0
FAIL	Fail. This means the DC input voltage is out of valid range.	1
UNKNOWN	Unknown. This means the status is unknown	2

17.3.2 Alarm types:

Name	Description	Value
NO_ALARM	Defines an event that is not considered as an alarm	0
MINOR	Defines an event that is to be considered as a minor alarm	1
MAJOR	Defines an event that is to be considered as a major alarm	2

17.3.3 Alarm sources:

Name	Description	Value
T2S ETH	Device responsible of the alarm is the T2S ETH controller.	0
MOD XX	Device responsible of the alarm is the module number XX where XX is the value	1-32
SYSTEM	Source of the alarm is the whole system (e.g. if all module are sharing the same alarm).	33

17.3.4 Validity and Unit description (A2):

wValidity should be interpreted as follow:

Name	Description	Value
PARAM_OK	Parameter value is valid	0
PARAM_TOO_LOW	Parameter value is too low	1
HYST_TOO_LOW	Parameter value is in an acceptable range but is too close from another related parameter value	2
PARAM_TOO_HIGH	Parameter value is too high	3
TSI_MUST_BE_OFF	Parameter value can only be changed if TSI modules are not delivering output	4
BAD_VALUE	Parameter value is not acceptable	5
INV_MISMATCH	Parameter cannot be configured for that type of module	6

wUnit is divided in two part:

- High byte is exponent value for parameter conversion (e.g. 2 means to be divided by $10^2 = 100$).
- Low byte represents the unit in which the parameter is expressed. This unit can be one of the one represented in the array below.

Name	Description	Value
NO_UNIT	No unit. Represented by a blank character	0
VOLT	Volt. Represented by the “V” character	1
AMPERE	Ampere. Represented by the “A” character	2
HERTZ	Hertz. Represented by the “Hz” characters	3
SECOND	Second. Represented by the “s” character	4
ANGLE	Angle. Represented by the “deg” or “°” characters	5
WATT	Watt. Represented by the “W” character	6
VA	VA. Represented by the “VA” character	7
PERCENT	Percent. Represented by the “%” character	8
DEGREE	Degree. Represented by the “deg” or “°” characters	9
OHM	Ohm. Represented by the “Ohm” character	10
Example: if wUnit value is 0x0201 the parameter is expressed in centiVolts.		

17.4 Modbus over RTU

17.4.1 Introduction

In all the following examples, assumption will be made that T2S ETH controller Modbus RTU slave address is 1 (0x01).

17.4.1.1 Reading simple variables:

Ex 1: Reading output voltage of module #5

Field	Value	Description
Function	4 (0x04)	Read input register
Address	128 (0x0080)	31*(5-1) + 4 = 128 (see module table, page 87)
Number of registers	1 (0x01)	Vout value is 16-bit wide

Master frame: 0x01 0x04 0x00 0x80 0x00 0x01 0x71 0xE3

T2S ETH frame: 0x01 0x04 0x02 0x09 0x1B 0xFF 0x6B

Received value: 0x091B = 2331 ➔ Output voltage is 233.1V (see module table, page 87)

Ex 2: Reading T2S ETH serial number

Field	Value	Description
Function	4 (0x04)	Read input register
Address	128 (0x0080)	31*(5-1) + 4 = 128 (see module table, page 87)
Number of registers	1 (0x01)	Vout value is 16-bit wide

Master frame: 0x01 0x04 0x07 0xC5 0x00 0x02 0x60 0x82

T2S ETH frame: 0x01 0x04 0x04 0x00 0x01 0x00 0x07 0xEB 0x86

Received value: 0x0001 and 0x0007 ➔ T2S ETH revision is Vs1.7

17.4.1.2 Reading alarm and history log:

Reading entry #1

Field	Value	Description
Function	4 (0x04)	Read input register
Address	2010 (0x07D4)	2010 + 2*(1-1) = 2010 (see alarm table, page 90)
Number of registers	2 (0x02)	Alarm entry is 2 registers wide

Master frame: 0x01 0x04 0x07 0xDA 0x00 0x02 0x51 0x44

T2S ETH frame: 0x01 0x04 0x04 0x21 0x01 0x00 0xB3 0xE1 0xCD

Alarm entry #1 is a minor (0x01) alarm generated by the system (0x21) and this alarm has the ID 179 (0x00B3)

Reading an invalid entry

Let's assume that there are only 2 alarms present in the system. Then reading alarm entry #3 should return an invalid entry

Field	Value	Description
Function	4 (0x04)	Read input register
Address	2014 (0x07DE)	2010 + 2*(3-1) = 2014 (see alarm table, page 90)
Number of registers	2 (0x02)	Alarm entry is 2 registers wide

Master frame:	0x01 0x04 0x07 0xDE 0x00 0x02 0x10 0x85
T2S ETH frame:	0x01 0x04 0x04 0xFF 0xFF 0xFF 0xFF 0xFA 0x10

Conclusion, there is no alarm entry #3 and nor are there further entries. This leads to the conclusion that only 2 alarms are present at the time in the system.

Linking alarm ID to alarm description text:

If we consider the alarm ID #179 of example above, we can get description text for this alarm by reading related entry in the "Event string table".

Field	Value	Description
Function	4 (0x04)	Read input register
Address	18092 (0x46AC)	16660 + 8*179 = 18092
Number of registers	8 (0x08)	Event description string is 16 characters long

Master frame:	0x01 0x04 0x46 0xAC 0x00 0x08 0x24 0xA5
T2S ETH frame:	0x01 0x04 0x10 0x56 0x61 0x63 0x5F 0x69 0x6E 0x20
	0x54 0x4F 0x4F 0x20 0x4C 0x4F 0x57 0x20 0x20 0x36 0x7C

String description: Vac_in TOO LOW

17.4.1.3 Reading configuration:

Reading entry #1

Field	Value	Description
Function	4 (0x04)	Read input register
Address	4160 (0x1040)	4160 + 20*(1-1) = 4160
Number of registers	20 (0x14)	Alarm entry is 20 registers wide

Master frame:	0x01 0x04 0x10 0x40 0x00 0x14 0xF5 0x11
T2S ETH frame:	0x01 0x04 0x28 0x01 0xB8 0x00 0x00 0x01 0x04 0x01
	0x01 0x44 0x43 0x20 0x31 0x20 0x3A 0x20 0x56 0x64
	0x63 0x5F 0x69 0x6E 0x20 0x4C 0x6F 0x77 0x20 0x53
	0x74 0x61 0x72 0x74 0x20 0x20 0x20 0x20 0x20 0x20
	0x20 0x20 0x20 0x64 0x36

Configured Value:	0x01B8 ➔ 440
Validity:	0x0000 ➔ PARAM_OK (see 17.3.4, page 93)
Parameter ID:	0x0104 ➔ 260
Units:	0x0101 ➔ unit is dV (0.1V) (see 17.3.4, page 93)
String description:	DC 1 : Vdc_in Low Start

Reading an invalid entry

Let's assume that entry #189 is invalid

Field	Value	Description
Function	4 (0x04)	Read input register
Address	7920 (0x1EF0)	4160 + 20*(189-1) = 7920
Number of registers	20 (0x14)	Alarm entry is 20 registers wide

Master frame:	0x01 0x04 0x1E 0xF0 0x00 0x14 0xF6 0x1E
T2S ETH frame:	0x01 0x04 0x28 0xFF 0xFF 0xFF 0xFF 0xFF 0xFF 0xFF
	0xFF 0xFF 0xFF 0xFF 0xFF 0xFF 0xFF 0xFF 0xFF 0xFF
	0xFF 0xFF 0xFF 0xFF 0xFF 0xFF 0xFF 0xFF 0xFF 0xFF
	0xFF 0xFF 0xFF 0xFF 0xFF 0xFF 0xFF 0xFF 0xFF 0xFF
	0xFF 0xFF 0xFF 0xF0 0x04

Due to internal memory organization, the configuration might have valid entries interleaved with invalid ones. Thus, in order to read all configurations, one should read all entries to determine which ones are valid and which ones are not.

Exceptions: Textual parameter

The configured value field is 16 bit wide. Consequently, only integer values can be read (or further configured) using this way. There are 3 parameters that are not integer values but strings. Thus, the values returned in the "Configured value" field of the configuration table for those 3 IDs are dummy values that have no meaning.

Those IDs are the following

ID	Description	Remark
901	Digital input 1 label	Can be read in the digital inputs table in the holding registers (0x0686)
902	Digital input 2 label	Can be read in the digital inputs table in the holding registers (0x0686)

Note 1:

Caution should be taken while changing the module address because it will affect the addresses where to retrieve information regarding this module. What is more, there can be a delay between the moment where the change address order is received and the moment where the module address has been physically changed. Moreover, a module address can be changed to a new address that is already assigned to another module! In this case, the modules will swap their addresses.

For all those reasons, the best and secure way to change a module address is the following one:

1. Get module serial number using "Module information table" using the current address to calculate the index.
2. Send to the new address for this module using the "Module action table" using the current address to calculate the index.
3. Poll the serial number using "Module information table" using the new address as index until there is a match with the serial number collected at point 1.

17.4.2 Modbus RTU - Testing

In order to test the Modbus communication functionalities, please install the program "**Radzio ! Master Modbus Simulator**" on your computer.

- **Website**: http://en.radzio.dxp.pl/modbus-master-simulator/
- **Direct download**: http://en.radzio.dxp.pl/modbus-master-simulator/RMMS.zip

17.4.2.1 Requirement

- USB to RS485 interface cable (For example USB-RS485-WE cable, FTDI chip), Fig 1

Fig 1: FTDI cable

- RJ45-TERM (Gravitech.us) Fig 2

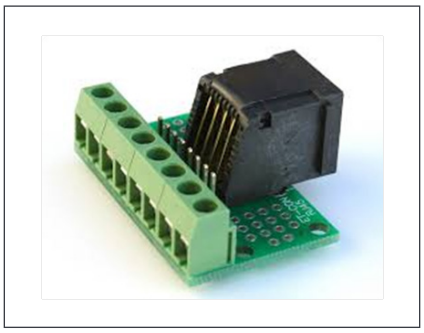


Fig 2: Adapter for RJ45

17.4.2.2 Modbus RTU - Testing procedure

Perform the following steps to test the Modbus:

1. Connect FTDI cable on the **RJ45 port** at the back plane of the T2S-ETH with
    - Yellow on pin 8.
    - Orange on pin 6.
    - Black on pin 7.
2. Use RJ45-TERM to help you.
3. Read the COM port number in your computer settings (In the device manager), Fig 3.

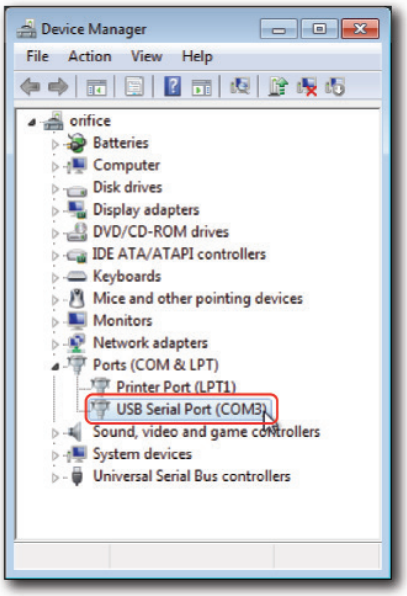


Fig 3: COM port number

4. Open the downloaded **Radzio!**, Fig 4

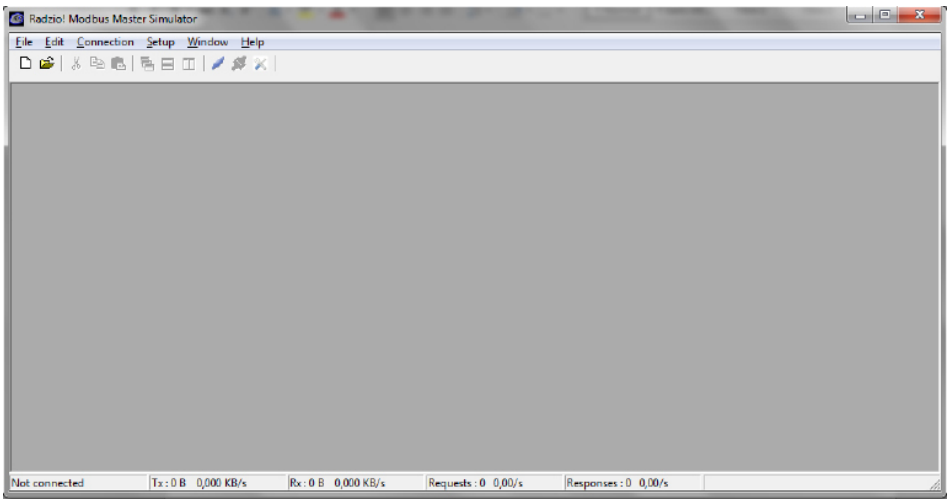


Fig 4: Radzio! Home Screen

5. Click on the **Connection settings** icon in the tool bar.

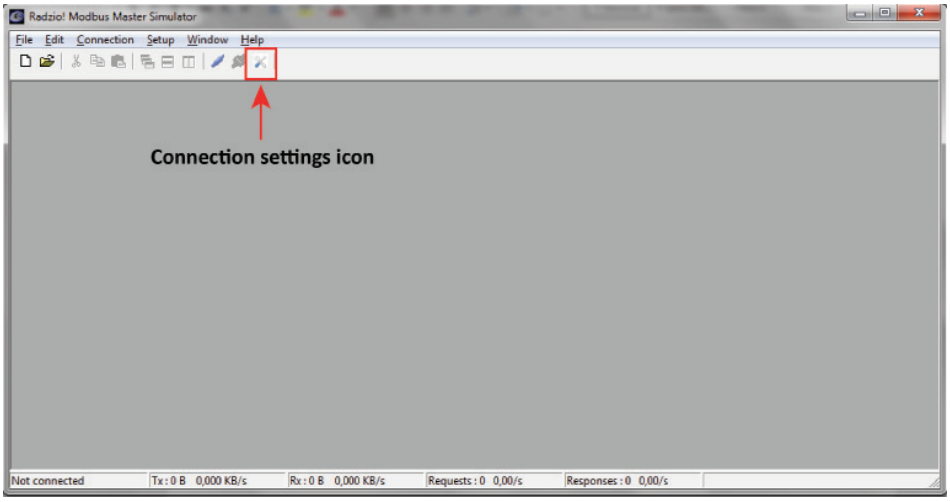


Fig 5: Connection settings icon

6. Select **Modbus RTU** in the Connections settings window

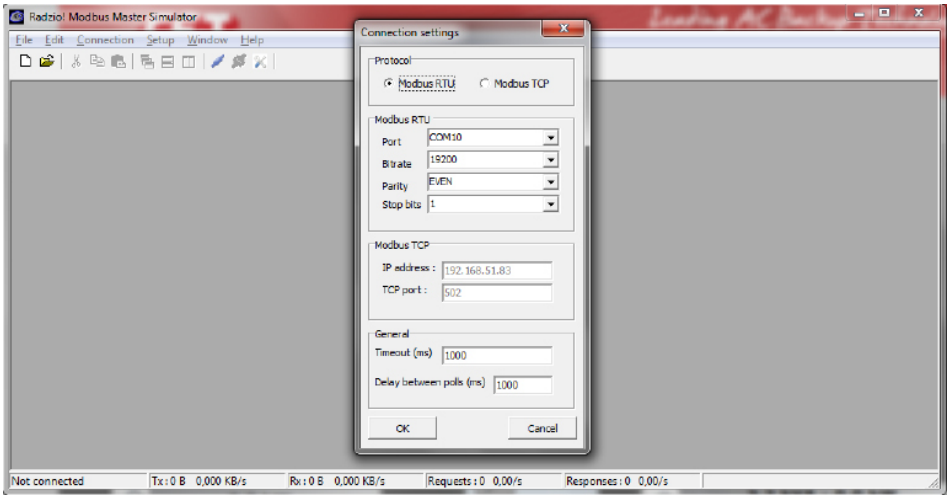


Fig 6: Connection settings window

7. Verify the **Modbus RTU** parameters are matching with the **T2S-ETH** in the Modbus section (Fig 7).

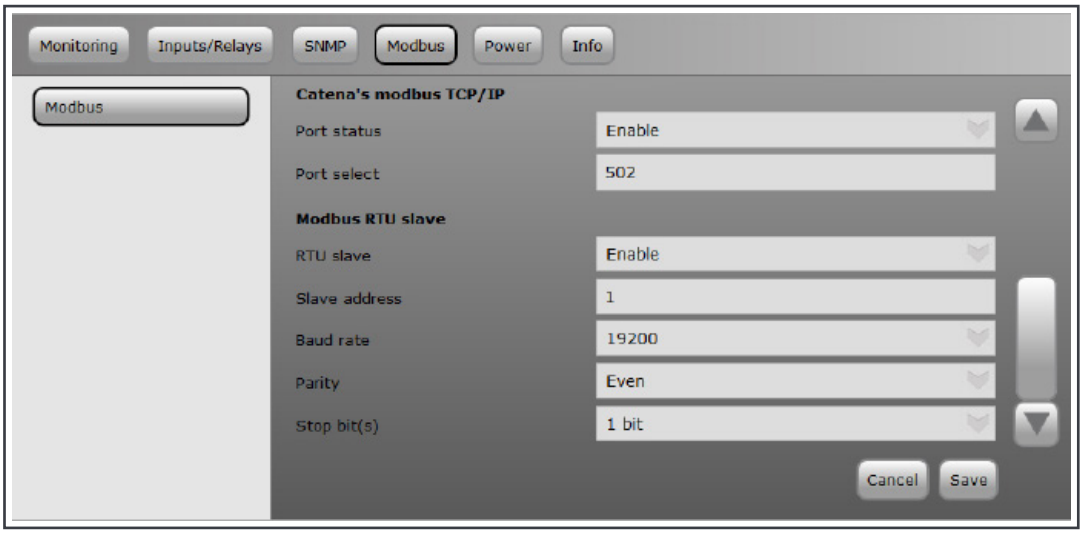


Fig 7: Modbus settings in T2S ETH

8. Close the **Connection settings window** in Radzio!.

9. Click on the **Connect** icon in the Radzio tool bar in order to establish the connections. (Fig 8)

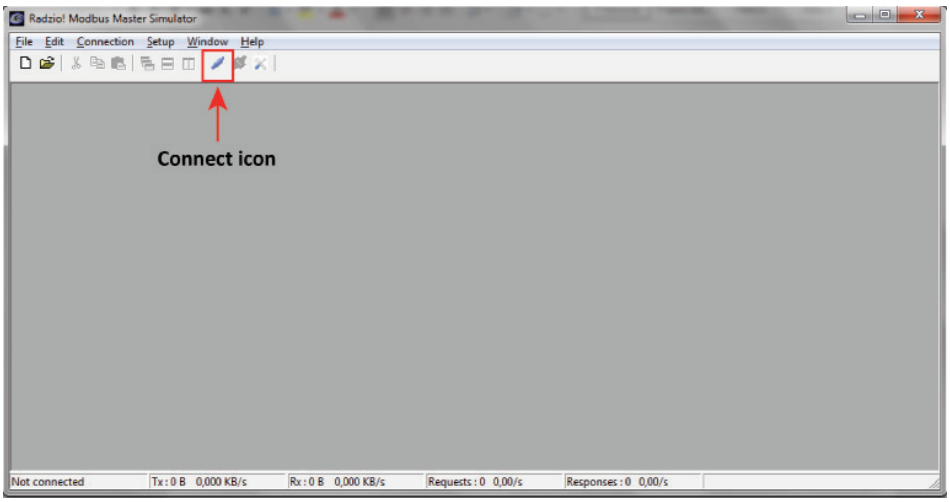


Fig 8: Connect icon

10. Click **New Modbus sheet** icon, to open the new Modbus sheet. (Fig 9)

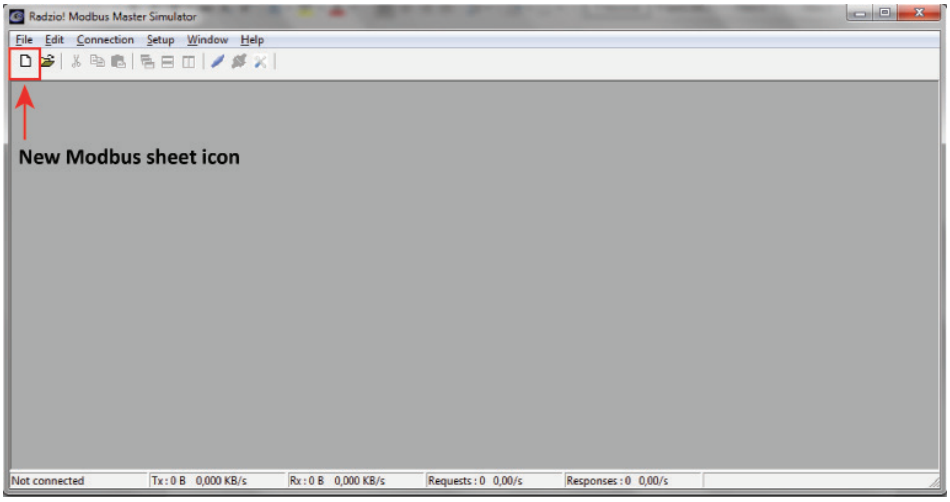


Fig 9: New Modbus sheet icon

11. Modify the **Device Settings** in the new modbus sheet. (Fig 10)

    - Set the **Device ID** (Default value is 1)
    - Set the **entity** of Device ID as **Input Register** (Default value is Coil status)

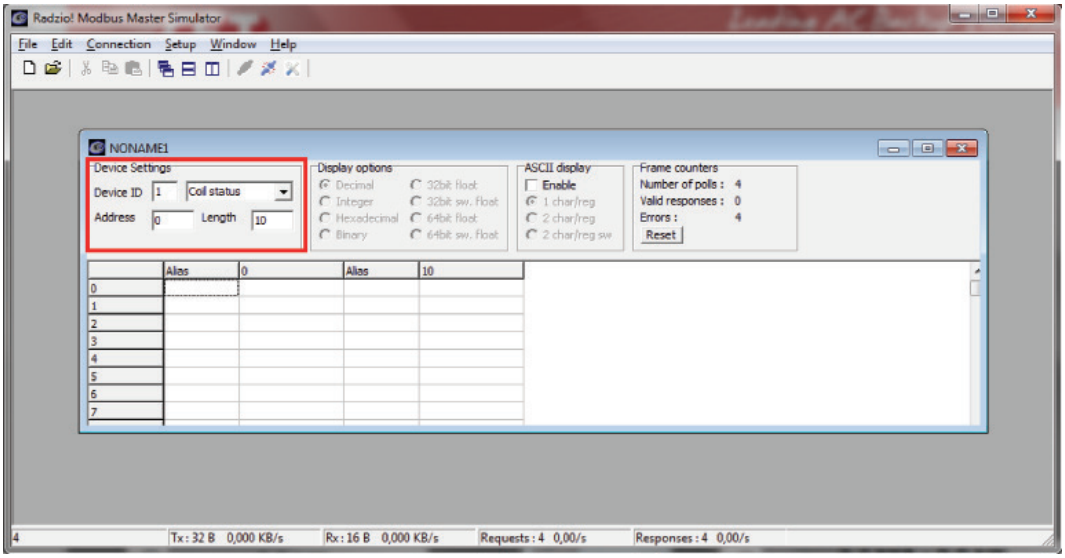


Fig 10: Default Radzio settings to Modify

12. Access the desired addresses at the Modbus sheet in Radzio (Fig 11) as described in the Modbus document (Fig 12).

    If you only see zeros or bad values, check the Frame counter (Fig 11) to be sure that you receive “Valid responses”. If not, the settings may be wrong.

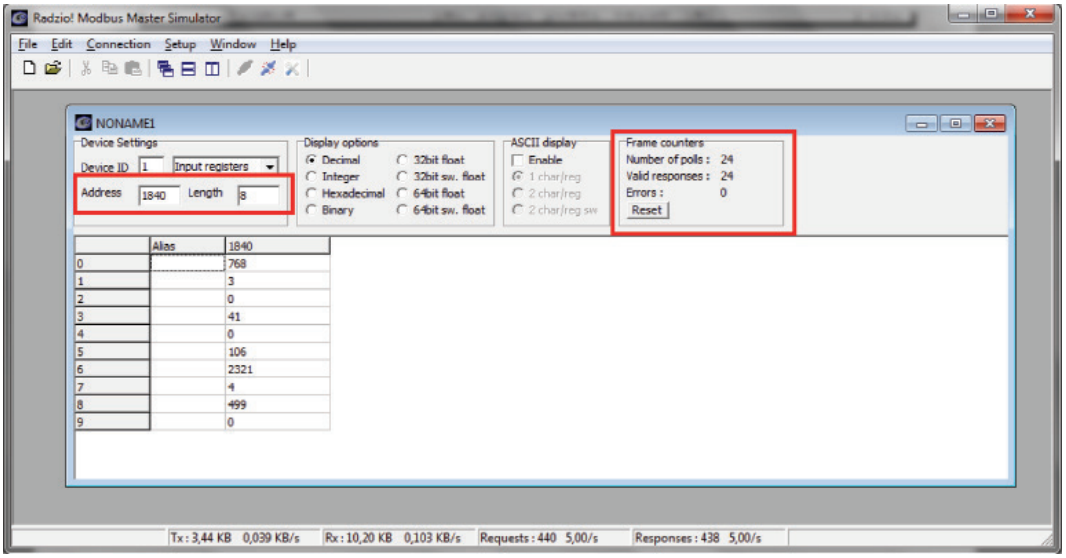


Fig 11: Modbus Example

4	lPinACVA	AC input power value (VA)	U32
6	wVinAC	AC input voltage value (0.1V)	U16
7	wIinAC	AC input current value (0.1A)	U16
8	wACInFreq	AC input frequency value (0.1Hz)	U16

Fig 12: MODBUS_protocol_for_T2S_Vs4.pdf

For example, you can read from base address 1840 (AC input L1)

AC input power value (U32 so address 4 will be MSB and address 5 LSB) = 106 [VA]

- Input voltage (U16) at address 6 = 2321 [0.1 V] = 232.1 [V]
- Input current (U16) at address 7 = 4 [0.1 A] = 0.4 [A]
- Input frequency (U16) at address 8 = 499 [0.1 HZ] = 49.9 [Hz]

17.5 ModBus Table

17.5.1 Data table

Device ID	Modbus Address	Scale	Description	Unit	Register type function 03
100	30015	No Conversion - Signed Short	Megabytes Received	MB	Input register
100	30016	No Conversion - Signed Short	Megabytes Sent	MB	Input register
100	30031	Divided By 100	Monitoring Memory Used	kB	Input register
100	30032	Multiplied by 100	CPU Percentage Usage	%	Input register
100	30033	No Conversion - Signed Short	Free Flash Memory Space	MB	Input register
100	30036	Multiplied by 10	CPU Temperature	°C	Input register
100	30037	No Conversion - Signed Short	CPU Frequency	MHz	Input register
100	30041	No Conversion - Signed Short	Total Fifo Size Of Second Records		Input register
100	30042	No Conversion - Signed Short	Total Fifo Size Of Minute Records		Input register
100	30043	No Conversion - Signed Short	Total Fifo Size Of Hour Records		Input register
100	30044	No Conversion - Signed Short	Total Fifo Size Of Day Records		Input register
100	30047	No Conversion - Signed Short	Number Of Active Major		Input register
100	30048	No Conversion - Signed Short	Number Of Active Minor		Input register
100	30049	No Conversion - Signed Short	Number Of Active Warning		Input register
100	30501	No Conversion - Signed Short	State		Input register
100	30502	No Conversion - Signed Short	Counter		Input register
100	30506	No Conversion - Signed Short	State		Input register
100	30507	No Conversion - Signed Short	Counter		Input register
91	30511	No Conversion - Signed Short	Power	kW	Input register
91	30512	Multiplied by 10	Voltage	V	Input register
91	30521	No Conversion - Signed Short	Power	kW	Input register
91	30522	Multiplied by 10	Voltage	V	Input register
91	30523	Multiplied by 10	Current	A	Input register
91	30531	No Conversion - Signed Short	Power	kW	Input register
91	30532	Multiplied by 10	Voltage	V	Input register
91	30533	Multiplied by 10	Current	A	Input register
31	30101	Multiplied by 10	Voltage	V	Input register
31	30102	Multiplied by 10	Current	A	Input register
31	30103	Divided By 100	Active Power	W	Input register
31	30104	Divided By 100	Apparent Power	VA	Input register
31	30105	Multiplied by 10	Frequency	Hz	Input register
31	30121	Multiplied by 10	Voltage	V	Input register
31	30122	Multiplied by 10	Current	A	Input register
31	30123	Divided By 100	Active Power	W	Input register
31	30124	Divided By 100	Apparent Power	VA	Input register
31	30125	Multiplied by 10	Frequency	Hz	Input register
31	30131	Divided By 100	Installed Active Power	W	Input register
31	30132	Divided By 100	Installed Apparent Power	VA	Input register

31	30133	Divided By 100	Available Active Power	W	Input register
31	30134	Divided By 100	Available Apparent Power	VA	Input register
31	30135	Multiplied by 100	Power Factor		Input register
31	30141	Multiplied by 10	Voltage	V	Input register
31	30142	Multiplied by 10	Current	A	Input register
31	30143	Divided By 100	Active Power	W	Input register
31	30144	Divided By 100	Apparent Power	VA	Input register
31	30145	Multiplied by 10	Frequency	Hz	Input register
31	30151	Divided By 100	Installed Active Power	W	Input register
31	30152	Divided By 100	Installed Apparent Power	VA	Input register
31	30153	Divided By 100	Available Active Power	W	Input register
31	30154	Divided By 100	Available Apparent Power	VA	Input register
31	30155	Multiplied by 100	Power Factor		Input register
31	30161	Multiplied by 10	Voltage	V	Input register
31	30162	Multiplied by 10	Current	A	Input register
31	30163	Divided By 100	Active Power	W	Input register
31	30164	Divided By 100	Apparent Power	VA	Input register
31	30165	Multiplied by 10	Frequency	Hz	Input register
31	30171	Divided By 100	Installed Active Power	W	Input register
31	30172	Divided By 100	Installed Apparent Power	VA	Input register
31	30173	Divided By 100	Available Active Power	W	Input register
31	30174	Divided By 100	Available Apparent Power	VA	Input register
31	30175	Multiplied by 100	Power Factor		Input register
31	30301	Multiplied by 10	Voltage	V	Input register
31	30303	Divided By 100	Active Power	W	Input register
31	30304	Divided By 100	Apparent Power	VA	Input register
31	30305	Multiplied by 10	Frequency	Hz	Input register
31	30306	No Conversion - Signed Short	Status		Input register
31	30321	Multiplied by 10	Voltage	V	Input register
31	30322	Multiplied by 10	Current	A	Input register
31	30323	Divided By 100	Active Power	W	Input register
31	30324	Divided By 100	Apparent Power	VA	Input register
31	30325	Multiplied by 10	Frequency	Hz	Input register
31	30331	Divided By 100	Installed Active Power	W	Input register
31	30332	Divided By 100	Installed Apparent Power	VA	Input register
31	30333	Divided By 100	Available Active Power	W	Input register
31	30334	Divided By 100	Available Apparent Power	VA	Input register
31	30341	Multiplied by 10	Voltage	V	Input register
31	30342	Multiplied by 10	Current	A	Input register
31	30343	Divided By 100	Active Power	W	Input register
31	30344	Divided By 100	Apparent Power	VA	Input register
31	30345	Multiplied by 10	Frequency	Hz	Input register
31	30351	Divided By 100	Installed Active Power	W	Input register

31	30352	Divided By 100	Installed Apparent Power	VA	Input register
31	30353	Divided By 100	Available Active Power	W	Input register
31	30354	Divided By 100	Available Apparent Power	VA	Input register
31	30361	Multiplied by 10	Voltage	V	Input register
31	30362	Multiplied by 10	Current	A	Input register
31	30363	Divided By 100	Active Power	W	Input register
31	30364	Divided By 100	Apparent Power	VA	Input register
31	30365	Multiplied by 10	Frequency	Hz	Input register
31	30371	Divided By 100	Installed Active Power	W	Input register
31	30372	Divided By 100	Installed Apparent Power	VA	Input register
31	30373	Divided By 100	Available Active Power	W	Input register
31	30374	Divided By 100	Available Apparent Power	VA	Input register
31	30501	Multiplied by 10	Voltage	V	Input register
31	30502	Multiplied by 10	Current	A	Input register
31	30503	Divided By 100	Power	W	Input register
1	30011	Multiplied by 10	Voltage	V	Input register
1	30012	Multiplied by 10	Current	A	Input register
1	30013	Divided By 100	Power	W	Input register
1	30014	Divided By 100	Available Power	W	Input register

17.5.2 Alarm Table

Device ID	Modbus Address	Modbus Id	Name	Register type function 01	Remarks
100	10010	10	Missing Devices	Input status	1=Active, 0=Inactive
100	10300	300	Weak Password Detected	Input status	1=Active, 0=Inactive
91	10510	510	Not connected to any equipment	Input status	1=Active, 0=Inactive
91	10520	520	Not connected to any equipment	Input status	1=Active, 0=Inactive
91	10530	530	Not connected to any equipment	Input status	1=Active, 0=Inactive
31	10002	2	Firmware Version	Input status	1=Active, 0=Inactive
31	10228	228	Main source lost	Input status	1=Active, 0=Inactive
31	10229	229	Secondary source lost	Input status	1=Active, 0=Inactive
31	10050	50	Communication Failure	Input status	1=Active, 0=Inactive
31	10112	112	OFF manual	Input status	1=Active, 0=Inactive
31	10200	200	Incorrect time configuration in T4S	Input status	1=Active, 0=Inactive
31	10233	233	Aux power supply fail	Input status	1=Active, 0=Inactive
31	10238	238	DigIn 3	Input status	1=Active, 0=Inactive
31	10239	239	DigIn 4	Input status	1=Active, 0=Inactive
31	10240	240	DigIn 5	Input status	1=Active, 0=Inactive
31	10241	241	DigIn 6	Input status	1=Active, 0=Inactive
31	10242	242	DigIn 7	Input status	1=Active, 0=Inactive

31	10243	243	DigIn 8	Input status	1=Active, 0=Inactive
31	10245	245	Log full	Input status	1=Active, 0=Inactive
31	10248	248	DigIn 1	Input status	1=Active, 0=Inactive
31	10249	249	DigIn 2	Input status	1=Active, 0=Inactive
31	10251	251	Missing SBP	Input status	1=Active, 0=Inactive
31	10253	253	SBP engaged	Input status	1=Active, 0=Inactive
31	10255	255	MBP procedure	Input status	1=Active, 0=Inactive
1	10149	149	Source- too low - stop	Input status	1=Active, 0=Inactive
1	10152	152	Source+ no voltage	Input status	1=Active, 0=Inactive