## SMART MODULE FOR MULTIVERT® I-XTENSIO Modbus RTU version for Energy monitoring

## IEC FUSE SWITCH DISCONNECTORS

# **USER MANUAL**

IMPROVING SERVICE EFFICIENCY OF LOW VOLTAGE NETWORKS





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## 1. DOCUMENT

All documentation on our SMART Module RTU is available on the MERSEN website **EP.MERSEN.COM** 

#### Additional instruction manuals

- Datasheet
- Mounting instruction / Legal notice
- Configuration Software (on request)
- Software for firmware upgrade (on request)
- Modbus configuration table (on request)



## 2. HAZARDS AND WARNINGS

The assembly, use, servicing and maintenance of this equipment must only be carried out by trained, qualified professionals.

MERSEN shall not be held responsible for failure to comply with the instructions in this manual.

#### 2.1 Risk of electrocution, burns

- This device must only be installed and serviced by qualified personnel who have in-depth knowledge of installing, commissioning and operating the device and who have had appropriate training. He or she should have read and understood the various safety measures and warnings stated in the instructions.
- Before carrying out any work on the device, switch off the power supply to the device.
- Always use an appropriate voltage detection device to confirm the absence of voltage.
- Replace all devices, doors and covers before turning on power to this equipment.
- Always power the device with the correct rated voltage.
- Install the device following the recommended installation instructions and in a suitable electrical cabinet.
- Failure to take these precautions could cause serious injuries

#### 2.2 Risk of damaging the device

To ensure that the device operates correctly, make sure that:

- The device is correctly installed.
- The auxiliary power supply voltage indicated on the product is observed: 24 VDC  $\pm$  6V.

Failure to respect these precautions could cause damage to the device

#### 2.3 Liability

- Assembly, connection and use must be carried out in accordance with the installation standards currently in force.
- The device must be installed in accordance with the rules given in this manual.
- Failure to observe the rules for installing this device may compromise the device's intrinsic protection.
- The device must be positioned within an installation which complies with the standards currently in force.
- Any cable which needs to be replaced may only be replaced with a cable having the correct rating



## **3. PRELIMINARY OPERATIONS**

To ensure the safety of personnel and the product, please carefully read the contents of these instructions before installation.

Check the following points as soon as you receive the package containing the device:

- The packaging is in good condition
- The device has not been damaged during transportation
- The device reference number conforms to your order

#### 4. PREREQUISITES

Before commissioning your SMART module, make sure it operates under the latest firmware versions.

The latest firmware versions are available on the MERSEN website.

The firmware upgrade is done using the "SmartModbusModuleSoftwareSetup" software, by connecting a laptop to your SMART module. Have a look on the description done in the further chapter.



## 5. PRODUCT OVERVIEW

5.1 Overview of ProGrid

equipped with Smart Module and sensor devices





Example of Multivert i-Xtensio 1x3 pole switching overview with Smart Module solution

5.2 Overview of Smart Module - Modbus RTU version

U







## 5.3 Smart Module Focus



## 1 Modbus RTU connections

RJ45 plugs to connect the Smart Module on the Modbus RTU network or to use with a laptop to upload new software or make calibration.

*Daisy chain functionality:* 2 connection plugs are available to make a daisy chain for the Modbus RTU communication between modules, to the Master device (not in this scope). Daisy chain functionality can also be used for the power supply (see point n°2).

## 2 Smart Module Power Supply

24VDC connection to supply the Smart Module

Using the Daisy chain functionality, power supply can be distributed from one Module to another using the RJ45 connections/cables.

## **3** Status Communication LED

- Green Flashing : Module connected and functional
- Off : Module not functional
- Green/Red Flashing : Module without Modbus information

#### 4

#### Reset button

- Short press : reset the parameters of Modbus communication links, thresholds, timeouts
- Long press (>5 s) : full reset including all calibration parameters (factory reset)
- $\rightarrow$  LED becomes orange with these 2 actions.

## **5** Digital Outputs connections

Digital outputs to get alarm on fuse blown and temperature max thresholds / Normally opened

6

#### Dip Switch

- Allow presetting of slave address
- Activate termination resistance



## 5.4 Engineering Software installation

The module is delivered with a software to test, calibrate and set some parameters of the Smart Module using a laptop.

Once you got the last updated software under Mersen website, you should :

- → Unzip the file "SmartModbusModuleSoftwareSetup\_X.X.XX\_x64"
- → Launch "SmartModbusModuleSoftwareSetup\_X.X.XX\_x64" file using

#### 5.5 Test & Programming using computer connection to the Smart module

Computer connection is needed to update the firmware of the Smart Module, if it is necessary, or to use the Engineering software presented above. In order to connect the Smart Module to the computer, a specific Modbus cable USB  $\leftarrow \rightarrow$  RJ45 is needed, as described in appendix.



To be able to use this cable, a driver should be installed : <u>HTTPS://FTDICHIP.COM/DRIVERS/VCP-DRIVERS/</u>

Instructions to connect the computer to the Smart Module :

You can should your language English or Deutsch, by selecting the right language at the flags area.





## 5.5.1 Connection

- 1 Connect the specific cable on the COM port number of the laptop peripheral and on the Smart module. Choose the good connection port in the drop-down menu.
- 2 Specifies the address of the module used, depending on its configuration. (configuration can be done via software or dip switch).
- **3** On the opened Software, select "Connection". If the COM port number is not available, use the "Refresh" button.



If the connection is completed it is shown by the "Connected" button

	art Modbus Modul Software	e		-		×
Lapertize, a						
N		Verbindung				
Verbind	dung	Port- Verbindung	PC MODBUS Por	t9 • C		
Haupts	cite	Hauptparameter des M	Unterbrechung	•		
Modul- Kommu Parame	und Inikations- ter					
Messun		6.4	erse			
Alarm			, our source of energy	-		
	Verbunden					
				_		
	-	us Module Software			_	
	M Smart Modbe				-	
a	-					
a		р М				
a		Alarms	u			
a	Connection Main page	Alarms Status	L1 Communication error	×	-	
		Alarms Satus Fuse blow Fuse blow	Communication error		-	
a	Connection Main page	Alarms Satus Fuse blow Fuse blow	12		-	
rt	Connection Plan page Modular & commun Modular scormun	Alarms Satus Fuse blow Fuse blow	12 Communication error		-	
	Connection Main page Module & commun pettings	Alarms Satus Fuse blow Fuse blow	Communication error		-	
rt	Connection Plan page Modular & commun Modular scormun	Alarms Start Real blow Fror during the co	Communication error			
rt rt	Connection Hean page Headwall & comment Matering	Alarms Start Real blow Fror during the co	Communication error		•	
rt rt	Connection Hean page Headwall & comment Matering	Alarms Start Real blow Fror during the co	Communication error		-	
rt rt	Connection Hean page Headwall & comment Matering	Alarms Start Real blow Fror during the co	Communication error		-	
rt rt	Connection Hean page Headwall & comment Matering	Alarms Start Real blow Fror during the co	Communication error		-	
rt rt	Connection Hean page Headwall & comment Matering	Alarms Start Real blow Fror during the co	Communication error		-	

If there is an issue of the connection, a message will appear, you must :

- Check the address of the module,
- Check the port you use,
- Check you have the latest version of Smart Modbus Module Software
- Check you download the virtual com Port Drivers to communicate in Modbus RTU (see page 8)



5.5.2 Main page

6

8

- $\rightarrow$  Module serial number: coming from the module directly for traceability
- ightarrow FSD ID: free space of 5 characters to identify the fusegear
- $\rightarrow$  Installation date: date of installation to be completed using the agenda
- 4 → Status of the module:
  - empty : no connection
  - Green : no issue
  - Red : issue, have a look on Alarms sheet

5 → Current transformer selection: should be selected following the current transformer installed at the back of the fusegear : several possibilities

- 250A/5A
- 300A/5A
- 400/1A
- 400/5A
- 600/1A
- 600/5A
- $\rightarrow$  Temperature threshold value: to be selected between 60°C and 90°C
- → Firmware version: coming from the module directly to follow the firmware versioning

→ Upload new firmware version: press "Start update", "Open" the new firmware version and "update" the firmware (*file*.bin)

M Smart Modbus Module Software			- 🗆	×
		C Refresh	Apply	
	Main page		1	
Connection	Module serial number FSD ID	Error	2	
Main page	Installation date Status	14/07/2022	3	
Module & communication settings Measurement	Current transformer selection	400A / 5A	4 ▼ 5 ∝ 6	
Alarms	Firmware version	518	7	
Connected	Upload new firmware version Installation date Update firmware		<mark>8</mark>	
Connected	File selection: 0	4		
	Update Upload new firmware version	St		



 $\rightarrow$  Before to change the page, don't forget to "Apply" your changes

2 → otherwise, you will get an Error message

M Smart Modbus Mod	ule Software		-		×
		C Refresh		Apply	1
	Main page				
Connection	Module serial number FSD ID	Error			
Main page	Installation date	14/07/2022			
Module & communication settings	Modification without applying	×			
Measurement	Please, save or refresh datas.	2	•C		
Alarms 🔴		510			
Connected	Upload new firmware version	Start update			



### 5.5.3 Module & communication settings

On this page you have several subchapters to adjust the settings of the module and the Modbus communication

M Smart Modbus Module Softwa	are	—	
	C Refresh	Appl	у
	Module & communication settings		
Connection	General Settings	▲ ▲	
Main page	CT phase visualization		
Module & communication settings	Voltage & current thresholds Others	▲ ▲	
Measurement			
Module & communication settings		Y	

This configuration tab is used to display "read" and to adjust "write", if needed, the different values available in the Smart Module



#### 5.5.3.1 General

- ightarrow Password: could be used by the customer if needed
- ightarrow Last boot: given by the module
- $\rightarrow$  Firmware version: given by the module
- 4  $\rightarrow$  Hardware version: given by the module
  - → Synchronization: status of Synchronization: "No synchronization" in the last 24H or "Synchronized"
- $\rightarrow$  Date / hour: update of the date of the last synchronization
- → Date / hour synchronization: press "Start" button
- $\rightarrow$  Time duration for means: could be modified by the customer
- → Active power calculated on: 2 possibilities "Wideband" or "Fundamental", could be modified by the customer
- $\rightarrow$  Frequency: 50Hz or 60Hz, could be modified by the customer

M Smart Modbus Module Software		_	
		C Refresh	bly
	Module & communicati	on settings	
Connection	General Password	•	1
Main page 02/05/22 17:20	Last boot	03/10/22 18:19	
Module & communication settings	Firmware version	771	2 3
Measurement	Hardware version	1024	4
Alarms 🔴	Synchronization Date / hour	Synchronized 03/10/22 18:20	5 6
Connected	Date / hour synchronization	Start	7
	Time duration for means	<u> </u>	8
	Active power calculated on	Wideband      Fundamental	9
	Frequency	50Hz	10
	Frequency	() 50Hz	
	Active power calculated on	🔘 Wideband 🔘 Fundamental	





## 5.5.3.2 Settings

1 → Slave address: 247 as max value and preset value, could be modified by the customer

ightarrow Baudrate: 19200 as preset value, could be modify by the customer

Several possibilities : 19200 / 38400 / 57600 / 115200

3  $\rightarrow$  Parity: Even as preset value, could be modified by the customer

Several possibilities : none / even / odd

#### 5.5.3.3 CT phase visualization

 $\rightarrow$  CT ratio: confirmation of the selection done on Main page of Current transformer

M Smart Modbus Module Softwa	re	—	X
		C Refresh Apply	
	Module & communicati	ion settings	
Connection	General		
	Settings	▼	
Main page	Slave address	247 1	
Module & communication	Baudrate		
settings	Parity	19200 ▼ 2 Even ▼ 3	
Measurement	CT phase visualization	▼	
Alarms 🛑		Phase 1 Phase 2 Phase 3	
	CT ratio	400/5A 400/5A 400/5A <b>4</b>	
Connected	Voltage & current thresholds		
	Others		



## 5.5.3.4 Voltage & current threshold

1 $\rightarrow$ Voltage threshold U< <lx-e: be="" by="" could="" customer<="" modified="" th="" the=""></lx-e:>
<b>2</b> $\rightarrow$ Voltage threshold U< <lx-e be="" by="" could="" customer<="" duration:="" modify="" th="" the=""></lx-e>
3 $\rightarrow$ Over Current threshold I >: could be modify by the customer
4 $\rightarrow$ Current threshold I > duration: could be modified by the customer
5 $\rightarrow$ Noise reduction : could be modified by the customer?
6 $\rightarrow$ Overcurrent threshold I>> :could be modified by the customer?
<b>7</b> $\rightarrow$ Overcurrent threshold I>> duration : could be modified by the customer?
8 $\rightarrow$ Current nominal value I : could be modified by the customer?
9 $\rightarrow$ Voltage nominal value U : could be modified by the customer?
<b>10</b> $\rightarrow$ Current hysteresis value : could be modified by the customer?
<b>11</b> $\rightarrow$ Voltage hysteresis value : could be modified by the customer?

M Smart Modbus Module Software			-	
		C Refresh	Appl	ly
	Module & communication se	ttings		
Connection	Voltage & current thresholds		•	
Connection	Voltage threshold U< <lx-e< td=""><td>10</td><td>%</td><td>1</td></lx-e<>	10	%	1
Main page	Voltage threshold U< <lx-e duration<="" td=""><td>1</td><td>s</td><td>2</td></lx-e>	1	s	2
	Overcurrent threshold I>	80	%	3
Module & communication settings	Overcurrent threshold I> duration	1	s	4
Measurement	Noise reduction	2	<u>‰</u>	5
	Overcurrent threshold I>>	100	%	6
Alarms	Overcurrent threshold I>> duration	0	s	7
	Current nominal value I	400	A	8
Disconnected	Voltage nominal value U	230	V	9
	Current hysteresis value	5	%	10
	Voltage hysteresis value	2	%	11
	Others		•	



### 5.5.3.5 Others

- 1 → Call monitoring time: time to get a call of the master, could be modified by the customer
- 2 → Minimum time message: time minimum to get a message, could be modified by the customer
- 3 → Modbus Waiting time before answer : time to wait for having an answer from the module , could be modified by the customer

M Smart Modbus Module Software			- 🗆 ×
		C Refresh	Apply
	Module & communication se	ettings	
Connection	General		
	Settings		
Main page	CT phase visualization		
Module & communication	Voltage & current thresholds		
settings	Others		<b>T</b>
Measurement	Call monitoring time	10	s 1
	Minimum time message	2	s 2
Alarms	Modbus waiting time before answer	10	ms 3
Disconnected			

#### 5.5.4 Measurement

On this page you have several subchapters to visualize the measured or calculated values

1 → Time and date of means values: date and time of the last mean calculation
 2 → Temperature Measurement: value of the temperature

M Smart Modbus Module Software		-		X
		C Refresh		
	Measurement			
Connection	Fuses status Current values			
Main page	Voltage values	4		
Module & communication settings	Power Calculations			
Measurement	Time and date of mean values Temperature Measurement	02/05/22 17:32 Error	1	
Alarms <b>Connected</b>			2	



#### 5.5.4.1 Fuses status



### 5.5.4.2 Current values

- <sup>2</sup>  $\rightarrow$  Current: values measured for each phase 1, 2, and 3
- 3  $\rightarrow$  Current mean: mean calculated on current values for each phase
- $4 \rightarrow$  Current min: current value min found during current mean calculation
- 5  $\rightarrow$  Current max: current value max found during current mean calculation
- 6  $\rightarrow$  Cosphi : cosphi calculated

M Smart Modbus Module Software		- 🗆 X
		C Refresh
	Measurement	
Connection	Fuses status	•
		Phase 1 Phase 2 Phase 3
Main page	Fuses status	0 0 0 1
Module & communication	Current values	•
settings		L1 L2 L3 Neutral
Measurement	Current	0.00 A 0.00 A 0.00 A
	Current mean	0.00 A 0.00 A 0.00 A 0.00 A 3
Alarms 🛑	Current min	0.08 A 0.00 A 0.08 A 0.00 A 4
		<u> </u>
Connected		Phase 1 Phase 2 Phase 3
	Cosphi	111.13 73.13 107.13 6
	Voltage values	
		v





 $1 \rightarrow$  Voltage value: voltage value for each phase, phase -neutral and phase-phase

#### 5.5.4.4 Power calculations

- $2 \rightarrow$  Active power: active power calculated for each phase 1, 2, and 3 and in total
- $3 \rightarrow$  Active power mean: active power calculated on active power values
- 4 → Active power min: active power value min found during active power mean calculation
- 5 → Active power max: active power value max found during active power mean calculation
- $6 \rightarrow$  Reactive power: reactive power calculated for each phase 1, 2, and 3 and in total
- $7 \rightarrow$  Reactive power mean: reactive power calculated on active power values
- 8 → Reactive power min: reactive power value min found during reactive power mean calculation
- 9 → Reactive power max: reactive power value max found during reactive power mean calculation

Smart Modbus Module Sof	tware				_	
			C	Refresh		
	Measurement					
	Voltage values				•	
nection	V1N V2N	V3N	V12	V23	V31	
n page	V V	V	V	V	V	1
, page	Power Calculations				▼	i –
lule & communication		ΣΡ	P1	P2	P3	
	Active Power	W	W	W	W	2
urement	Active Power mean	W	W	W	W	3
ns 🛑	Active Power min	W	W	W	W	
	Active Power max	W	W	W	W	4
Connected						5
Connected		ΣQ	Q1	Q2	Q3	
	Reactive Power	VAR	VAR	VAR	VAR	6
	Reactive Power mean	VAR	VAR	VAR	VAR	7
	Reactive Power min	VAR	VAR	VAR	VAR	8
	Reactive Power max	VAR	VAR	VAR	VAR	
	d.			_	_	9
	Reading Powernax.				N98.10	
	ReadingPosition					
	Region Powermeen					



#### 5.5.5 Alarms

1  $\rightarrow$  Module status: coming from the module directly for traceability

- Green : no issue
- Red : issue, have a look on below data or master communication missing

<sup>2</sup> → Fuse status 1 / Fuse status 2 / Fuse status 3:

- Green : no issue
- Red : gap of voltage measurements per phase : Fuse blow or Fusegear opened

 $3 \rightarrow$  Temperature status:

- Green : no issue, temperature below the temperature threshold
- Red : temperature over the temperature threshold

M Smart Modbus Module Software		-	X
	Alarms		
Connection	Module status Fuse status L1	1	
Main page	Fuse status L2	2	
Module & communication settings	Fuse status L3 Temperature status	3	
Measurement			
Alarms			
Disconnected			
Disconnected			



## 6. TERMINAL CONNECTIONS

### 6.1 Back connections

#### Back connection,

#### **Voltage connections**

Terminal	Signal	Cable	Color
Т	L3 voltage input to get Fuse blown information	1,5 mm2 ~ Ø 1,3mm,690V	Red
W	L3 voltage input	1,5 mm2 ~ Ø 1,3mm,690V	Purple
S	L2 voltage input to get Fuse blown information	1,5 mm2 ~ Ø 1,3mm,690V	Black
V	L2 voltage input	1,5 mm2 ~ Ø 1,3mm,690V	Green
R	L1 voltage input to get Fuse blown information	1,5 mm2 ~ Ø 1,3mm,690V	Brown
U	L1 voltage input	1,5 mm2 ~ Ø 1,3mm,690V	Yellow

#### Voltage measurement inputs connections



#### Current measurement inputs connections

## Back connection,

### Current connections

Terminal	Signal	Cable	Number
N	Neutral input if needed (should be connected on master	1,5 mm2 ~ Ø 1,3mm	N
iR1	L1 Current sensing signal Positive	1,5 mm2 ~ Ø 1,3mm	1
iR2	L1 Current sensing signal Negative	1,5 mm2 ~ Ø 1,3mm	2
iS1	L2 Current sensing signal Positive	1,5 mm2 ~ Ø 1,3mm	3
iS2	L2 Current sensing signal Negative	1,5 mm2 ~ Ø 1,3mm	4
iT1	L3 Current sensing signal Positive	1,5 mm2 ~ Ø 1,3mm	5
iT2	L3 Current sensing signal Negative	1,5 mm2 ~Ø1,3mm	6
N	Neutral input if needed (should be connected on master	1,5 mm2 ~ Ø 1,3mm	N



## 6.2 Front connections



## Front connection,

#### **Current connections**

Terminal	Signal	Cable
P100 +	24VDC power supply input	0,75 to 1,5 mm2
P100 -	24V GND (0V)	0,75 to 1,5 mm2
DOUT 1	D1 digital ouput 1, 30V/2A	0,75 to 1,5 mm2
DOUT 2	D0 digital output 0, 30V/2A	0,75 to 1,5 mm2
J510	Connection with the master	RJ45
	1 = Not connected	
	2 = GND (or 0V)	
	3 = Not connected	
	4 = D1 (A)	
	5 = D0 (B)	
	6 = 24V	
	7 = 24V	
	8 = GND	
J500	Connection daisy chain with other slaves	RJ45
	1 = Not connected	
	2 = GND (or 0V)	
	3 = Not connected	
	4 = D1 (A)	
	5 = D0 (B)	
	6 = 24V	
	7 = 24V	
	8 = GND	
ADDR	Dip switch 1234 position	/



## 6.3 Slave address available

To help you to put the parameters the modules in a faster way into a cabinet :

- plug the daisy chain on 8 modules
- set manually the dip switch follow the below table with different address
- send the requested parameters for each module to one channel using the right module address
- If you have more than 8 modules, you can give another "hard" address of your module, the set address is the one recognized by the module, the address given by the dip switch is forgotten and you can reuse the dip switch address to pursue the parametrization of your daisy chain



ATTENTION: If your module's address has been previously configured using appropriate software, you must first reset the module to give it a new address using the dip switch.

dip switch position	address
0000	247
0100	111
0010	112
0110	113
0001	114
0101	115
0011	116
0111	117

1	2	3	4	position
				1 / top
				0 / bottom



## 6.3 Wiring and Termination resistance

The power supply should be connected at the first module, then the power supply is established via the RJ45 connection through the daisy chain using ethernet cable. No need to add additional supply of other module linked by the daisy chain.

If you have more than 8 modules a termination resistance is needed.

This termination resistance is included in the module and can set by using the pin n°1 of the DIP switch.

If termination resistance must be activated, put the 1st pin of the DIP switch in position 1 regardless of other positions of the dip switch pins.

The module is delivered with disabled termination resistance with 1st pin of the DIP switch positioned at 0:

1	2	3	4	position
				1 / top
Х				0 / bottom

Termination resistance position at 1

1	2	3	4	position
х				1 / top
				0 / bottom





#### 7. POWER DIRECTION SETTING

According to the load power direction of the fusegear, the value of the current could be positive or negative. Below you will find the description by default values, when using standard load connection  $\rightarrow$  feeding side = Busbar side

#### STANDARD LOAD CONNECTION OTH

OTHER SIDE LOAD CONNECTION

Feeding side = Busbar side



2 options :

- Change current transformer side of installation as shown on the upper pictures
- Or reverse the connection of the module as shown below





#### 8. TECHNICAL DATA

	Accuracy class	+/-1% on voltage and current for the module (to be added to the sensors tolerance) +/-1% on temperature (in range from 0°C to 60°C)			
	Degree of protection	IP20			
General	Visual displays	1 LED for Module status (RUN)			
	Operating Temperature	-20 °C+70 °C			
	Storage/Transportation Temperature	-40 °C+70 °C			
	Humidity	Max. 95 %, without condensation			
	Operating Voltage	DC24V (+/- 6V)			
	Allowed interruptions of DC power supply, according to EN 61131-2	Interruption < 4 ms, time between 2 interruptions > 1 s			
	Protection against reverse polarity	Yes			
Electrical characteristics	Typical power consumption	1,2W / 24V - 50mA			
Characteristics	Internal resistance L – N	L – Ν: 3,0ΜΩ			
	Measuring range L – N	AC400V (+/- 10%)			
	Frequency	50/60 Hz ( +/-5%) - parametrizable			
	Current transformer secondary current	1A or 5A - parametrizable			
	Standard	EN 61000-6-2			
	Impulse withstand voltage	2kV – 1,2/50µs			
	Radio noise field strength	Class A			
	Air discharge	8kV			
Electromagnetic	Contact discharge	4kV			
compatibility	Radio emitted disturbances	10V/m			
	Conducted disturbances	1kV line to line, 2kV line to earth			
	Creepage distances	The creepage distances and clearances meet the requirements of the overvoltage category II, pollution degree 2.			
	Voltage connection	1 per phase, spring type			
	Fuse control connection	1 per phase, spring type			
Analog Inputs	Neutral connection	2 available, spring type			
	Current transformer connections	2 per phase, spring type			
	Potential separation	Yes			
Digital Outputs	Digital output	Static relay 30V/2A			
	ModBus RTU	APS V1.1b, Configurable via software			
	Number of channels	1			
Modbus RTU interface	Physical connection type	2 x RJ45			
interface	Max. Bus participants	up to 247			
	Transmission speed	1200 – 115200 b/s (default = 57kb/s)			
	Mounting	Horizontal			
Mechanical	Housing	Classification V-2 according to UL 94			
characteristics	Dimensions HxWxD	39,5x95x102 mm			
	Weight	200 g			



#### 9. MODBUS PARAMETERS

Modbus PDU	Modbus-Model of	Designation			Access			
Address (16bit)	data	(note: with float32 -> HW = high word; LW = low	Status	Data type	(R = read;	Min/Max-value	Preset value	Comments
/1001055 (20010)	(DI = Digital inputs/	word)	Status	Dutu type	W = write)	inity max value	· · · · · · · · · · · · · · · · · · ·	connicito
	IP= Input registers)	,			,			1
30000	ы	Status	0/1	BS1	P	_	_	1= no error 0 = error
30001		Reserve	0/1	001	N.			
								1 = No synchronization in the last 24H
30002	DI	Synchronization	0/1	BS1	R	-	-	0 = Synchronized
30003 to 30499	DI	Reserve						
30501		Password	-	BS1	w	-	-	1 = Password is reset to the default value
30502 to 30999	Coil	Resreve						
31000		Last Boot Millis	ms	ulnt16	R	0 to 59999	0	
31001 31002		Last Boot Minute Last Boot Hour	min	ulnt16 ulnt16	R	0 to 59 0 to 23	0	
31002		Last Boot Day	Hour Day	ulnt16	R	1 to 31	1	
31005		Last Boot Month	Month	ulnt16	R	1 to 12	1	
31005		Last Boot Year	Year	ulnt16	R	20 to 99	20	
31006	IR	Firmware version		ulnt16	R	0 to 65535	-	MSB = major / LSB = minor (0x0103 = 1.3)
31007	IR	Hardware version		ulnt16	R	0 to 65535	-	MSB = major / LSB = minor
31008 to 31499	IR	Reserve						
31500		Date/Hour			W/R			
31501		Date/Hour			W/R			
31502		Date/Hour			W/R			
31503 31504		Date/Hour	min	ulpt9	W/R W	1 to 60	-	1. For 10 min; tappling to all mean values
31504	LIN .	Time Duration for mean	min	ulnt8	**	1 to 60 0= none	5	1, 5 or 10 min; t applies to all mean values
				1		u= none 1= even		
31505	HR	Modbus Parity	-	1	W/R	2=odd	1	
51505			1	1		19200		
						38400		
						57600		
31506	HR	Modbus Baudrate (HW)	Bit/s		W/R	115200	19200	
						19200		
						38400		
			a:			57600		
31507 31508		Modbus Baudrate (LW)	Bit/s		W/R W/R	115200	19200 247	
31508 31509 to 31999	HR	Modbus Slave address Reserve	-		W/K	1 to 247	247	
31303 10 31333								//choice 0 = wideband active power or 1 =
50000	DI	ADDR_FCT_PRIVATE_WIDEBAND_FUNDAMENTAL	0/1	BS1	W/R	0 to 1	0	fundamental
50001		ADDR_FCT_PRIVATE_50HZ_60HZ	0/1	BS1	W/R	0 to 1		//choice 0 = 50H or 1 = 60Hz
								//CT value = I primary / I secondary x 10 (see CT
50501	HR	ADDR_FCT_PRIVATE_CT_A_PHASE_1	-	UINT16	W/R	1 to 65535	-	parameter sheet as reference)
50502	HR	ADDR_FCT_PRIVATE_CT_B_PHASE_1	-					//not use
		ADDR_FCT_PRIVATE_CT_A_PHASE_2	-	UINT16	W/R			//CT value = I primary / I secondary x 10 (see CT
50503					,	1 to 65535	-	parameter sheet as reference)
50504	HR	ADDR_FCT_PRIVATE_CT_B_PHASE_2	-					//not use
50505	цр	ADDR_FCT_PRIVATE_CT_A_PHASE_3	-	UINT16	W/R	1 to 65535		<pre>//CT value = I primary / I secondary x 10 (see CT parameter sheet as reference)</pre>
50505		ADDR_FCT_PRIVATE_CT_B_PHASE_3	_			1 10 05555	-	//not use
50500								The use
		//customer configuration						
50507	HR	ADDR_FCT_PRIVATE_LIMITE_V	V	UINT16	W/R	0 to 65535	65535	voltage threshold
50508		ADDR_FCT_PRIVATE_LIMITE_V_DURATION	s	UINT16	W/R	0 to 65535		duration voltage threshold
50509		ADDR_FCT_PRIVATE_LIMITE_I	A	UINT16	W/R	0 to 65535		current threshold
50510	HR	ADDR_FCT_PRIVATE_LIMITE_I_DURATION	s	UINT16	W/R	0 to 65535	255	duration current threshold
		ADDR_FCT_PRIVATE_MINIMUM_TIME_MESSAGE	s	UINT16	W/R			
50511			-			1 to 6000		minimum duration time to display alerte message
50512	нк	ADDR_FCT_PRIVATE_CALL_MONITORING_TIME //Firmware update settings	5	UINT16	W/R	1 to 3600	10	Modbus message missing alerte time
				1				0 = application
50521	DI	ADDR_FCT_PRIVATE_BOOTLOADER_STATUS	0/1	BS1	R	0 to 1		1 = bootloader
50522		ADDR_FCT_PRIVATE_BOOTLOADER_RESET	1	BS1	w	1		1 = to launch bootloader
50523	HR	ADDR_FCT_PRIVATE_APP_LENGTH_MSB	-	UINT16	w	0 to 65535		firmware size MSB
50524		ADDR_FCT_PRIVATE_APP_LENGTH_LSB	-	UINT16	w	0 to 65535		firmware size LSB
50525		ADDR_FCT_PRIVATE_APP_CHECKSUM_MSB	-	UINT16	w	0 to 65535		firmware CRC32 MSB
50526		ADDR_FCT_PRIVATE_APP_CHECKSUM_LSB	-	UINT16	w	0 to 65535		firmware CRC32 LSB
50527		ADDR_FCT_PRIVATE_APP_DATA_OFFSET_MSB	-	UINT16	w	0 to 65535		write offset MSB
50528		ADDR_FCT_PRIVATE_APP_DATA_OFFSET_LSB	-	UINT16	W	0 to 65535		write offset LSB
		ADDR_FCT_PRIVATE_APP_DATA1 ADDR_FCT_PRIVATE_APP_DATA2	-	UINT16	W	0 to 65535		firmware data
50529		ADDR_FCT_PRIVATE_APP_DATA2 ADDR_FCT_PRIVATE_APP_DATA3	Ľ	UINT16 UINT16	w	0 to 65535 0 to 65535		firmware data firmware data
50530			<u> </u>	UINT16 UINT16	w	0 to 65535 0 to 65535		firmware data
50530 50531	HR		-		1	0 00 00 00 00 00 00 00 00 00 00 00 00 0		
50530 50531 50532	HR HR	ADDR_FCT_PRIVATE_APP_DATA4	-		w	0 to 65535		
50530 50531 50532 50533	HR HR HR	ADDR_FCT_PRIVATE_APP_DATA4 ADDR_FCT_PRIVATE_APP_DATA5	-	UINT16	w w	0 to 65535 0 to 65535		firmware data
50530 50531 50532	HR HR HR	ADDR_FCT_PRIVATE_APP_DATA4	- - -		w w w	0 to 65535 0 to 65535 0 to 65535		
50530 50531 50532 50533 50533 50534	HR HR HR HR HR	ADDR_FCT_PRIVATE_APP_DATA4 ADDR_FCT_PRIVATE_APP_DATA5 ADDR_FCT_PRIVATE_APP_DATA6	- - - -	UINT16 UINT16	w	0 to 65535		firmware data firmware data
50530 50531 50532 50533 50533 50534 50535	HR HR HR HR HR	ADDR_FCT_PRIVATE_APP_DATA4 ADDR_FCT_PRIVATE_APP_DATA5 ADDR_FCT_PRIVATE_APP_DATA6 ADDR_FCT_PRIVATE_APP_DATA7	- - -	UINT16 UINT16 UINT16	w w	0 to 65535 0 to 65535		firmware data firmware data firmware data

\*Excel file of Modbus communication table available on request



#### **10. MODBUS MEASUREMENT PROVIDED**

JALOU         D1         D4         D4 <thd< th=""><th></th><th></th><th>Γ</th><th>1</th><th></th><th></th><th>,</th></thd<>			Γ	1			,
no.no.no.no.no.no.no.no.no.no.DistanceIII </th <th>Modbus PDU Address</th> <th></th> <th>Designation</th> <th></th> <th></th> <th>Access</th> <th></th>	Modbus PDU Address		Designation			Access	
non-startingnon-startingnon-startingnon-startingnon-startingnon-starting200				Status	Data type	(R = read;	Comments
None Use Data Fragmant BoxTransmission Use Data SolutionNone Use Data SolutionNone Use Data Solution2000<						W = write)	
1300<	Noto: Up to 2000 DL con		upputelegraph 9 DI fit into ano buto in the respon	so tologram			
SixeNNNormalNNNormal Nor			Jery telegram. 8 DI fit into one byte in the respor	ise telegram			
DiamPDiamDiamDiamDiamPP <td></td> <td></td> <td>U&gt; addressed</td> <td>0/1</td> <td>BS1</td> <td>R</td> <td>always "0"</td>			U> addressed	0/1	BS1	R	always "0"
Description         No.         No. addressed         No.         No.         No. No. Statement of the State						R	
Image         Image <th< td=""><td>32302</td><td>DI</td><td>U&lt; addressed</td><td>0/1</td><td>BS1</td><td>R</td><td></td></th<>	32302	DI	U< addressed	0/1	BS1	R	
No.         No. <td>32303</td> <td>DI</td> <td>U&lt;&lt; addressed</td> <td>0/1</td> <td>BS1</td> <td>R</td> <td></td>	32303	DI	U<< addressed	0/1	BS1	R	
International         Or         Or         Dist         Dist         Dist         Dist         Dist         Dist           1255         0         UNCL2 & addressed         M1         Bit         Bit         Dist         Dis         Dist         Dist							
Image: state in the s	32304	DI	U<< L1-E addressed	0/1	BS1	R	
3255         0         1.4 × L 2 6 addressed         0/1         51.1         8         1.4 × C 1				.,			
1115         PA         PA     PA         PA         PA <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>							
14205         0         0         0         1 <th1< th="">         1         1         1</th1<>							
Image: state in the s	32305	DI	U<< L2-E addressed	0/1	BS1	R	
José         Unc Lif addressed         Pittel         Bisla         Res         Life Circle State St							
1295         0         U-C 14 5 addressed         0/1         81         8         Notes addressed of the set							
Diame         Ori         Diameter         Ori         Bit Mark         Barendo         Barendo           2327         Di         New man available         VI         Bit         R         Barnest Arceitable Solval after dourfing           2328         Di         Di         Di doursettable Solval after dourfing         Di doursettable Solval after dourfing           2329         Di         Di doursettable         VI         Bit         R         Di doursettable Solval after dourfing           2329         Di         Di doursettable         VI         Bit         R         Di doursettable Solval after dourfing           23201         Di         Voltage quality         VI         Bit         R         Di doursettable Solval after dourfing           23211         Di         Tare L         Vi         Bit         R         Di four tarbitable Solval after dourfing           23131         Di         Tare L         Vi         Bit         R         Di four tarbitable Solval after dourfing           23132         Di         Tare L         Rearen         Pit         Pit four tarbitable           23134         Di         Merchable         Pit four tarbitable         Pit four tarbitable           23134         Di         Merchable				o / t			
22370Nex mean available0151818Met mean available men available men available men available men available men available22380obdersed01	32300	DI	U<< L3-E addressed	0/1	851	ĸ	threshold
JALOU         Dif         Park minin shapping         U 1         Bits         Park         Bits mining         Bits mining           32308         Di         > addressed         Di         Disdiessed							
Image: Section of the sectio	32307	DI	New mean available	0/1	BS1	R	Bit must be reset by the slave after querying
2198PP- AddressedP1<	52507	51	New mean available	0/1	551	K.	
B2208         D         b addressed         0/1         B1         R         Hended B + C & A correct threshold B + D & D & D & D & D & D & D & D & D & D							
Image: Constraint Section 2016         Image:	32308	DI	I> addressed	0/1	BS1	R	
Jack         Description         Description         Plan         Reserve         Plan							
b         b         b         b         b         B							
L         L         L         B         R         No         B         R         Advery TW Worksig           23310         D         Note 11         0/1         B1         R         Advery TW Worksig           23312         D         Fore 12         0/1         B1         R         Infrest blown           2332         D         Fore 12         0/1         B1         R         Infrest blown           2333         D         Fore 13         Control 10         B1         R         Infrest blown           2333         D         Fore 13         Control 10         B1         R         Infrest blown           2332         D         B         Metersky         K/W KAR         Rott 22         R         Infrest blown           26200 19835         B         Metersky         Adversk fracture power         W/W KAR         Rott 22         R         Infrest blown           26201 19835         B         Metersky mean max and min         A         Rott 22         R         Infrest blown           26241 19836         B         Metersky mean max and min         A         Rott 22         R         Infrest blown           262421 19849         B         AdvethyRotche power m	32309	DI	l>> addressed	0/1	BS1	R	
Display         Display <t< td=""><td>52305</td><td>5</td><td>1&gt;&gt; auutesseu</td><td>0/1</td><td>031</td><td>n.</td><td></td></t<>	52305	5	1>> auutesseu	0/1	031	n.	
Image Norm         Image Norm         Image Norm         Image Norm         Image Norm           23111         DI         Fuse L1         VI         BS1         R         D Finge Norm           2312         DI         Fuse L2         VI         BS1         R         D Finge Norm           2313         DI         Fuse L3         VI         BS1         R         D Finge Norm           2314         DI         Fuse L3         VI         BS1         R         D Finge Norm           2334         DI         Fuse L3         VI         M Norm         B Norm         D = fuse functional           2343         DI         Fuse Born         Fuse Born         B Norm         D = fuse functional           2343         DI         Fuse Born         Fuse Participant         R         Encore         R           2343         DI Sarab requested with one enert Magain         A         Fuse Participant         R         Encore         R           2343         DI Sarab requested with one enert Magain         A         Fuse Participant         R         Encore         R           23620         DI Sarab requested with one enert Magain         A         Fuse Participant         R         Encore         R </td <td>22210</td> <td>DI</td> <td>Voltage quality</td> <td>0/1</td> <td>DC1</td> <td>p</td> <td></td>	22210	DI	Voltage quality	0/1	DC1	p	
D1         Fue L1         O1         B1         R         D = fue functional           23132         D1         fue L2         O1         B1         B1         R         D = fue functional           23134         D1         fue L3         O1         B1         R         D = fue functional           23134         D1         fue data         P         Reserve         R         D = fue functional           23134         D1         Reserve         R         R         D = fue functional           23234         D3353         R         Ather and resche power         N/ KMSR         Gold 22         R         P           25835         D36530         R         R         Teme and data for the mean values         I         R         Ather and resche power           25845         D36530         R         Reserve         R         R         R         R         R         R           25845         D36333         R         Intensity mean max and min         A         R         R         R         Ather Anter Ante	52510	וע	vortage duality	0/1	1001	n	
2312         DI         Fuse 12         Of 1         B51         R         1 Fuse 10000           2313         DI         Fuse 13         O/1         B51         R         2 Fuse 10000           2314 bits 5011         Reserve         R         Reserve         R         Reserve           2314 bits 5011         Reserve         R         Reserve         R         Reserve           5812 bits 5011         R         Intendity and reserve         N/1 VAR         Rot122         R           5812 bits 5013         R         Intendity and reserve         N/1 VAR         Rot22         R         Intendity and reserve           5869 bits 50830         R         Reserve         R         Reserve         R         Allocation according to time belgram structs           5869 bits 50830         R         Reserve         R         R	32311	DI	Fuse L1	0/1	BS1	R	
12112         Di         Fuel I         O'I         BS1         P         D         Fuel IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII					L		
1233         0         Fuel 3         0/1         851         R         1 - fue Blown 0 - fue functional           1234         B5011         Reserve         R         R         0 - fue functional           1234         B5012         R         R         R         R           15612         D56355         R         Active and reactive power         R         R           15612         D56355         R         Receive misintaneoux value         R         R         Allocation according to time telegram struct.           15664         D5655         R         Receive misintaneoux value         R         R         Allocation according to time telegram struct.           15664         D5655         R         Receive         R         R         R           15664         D5675         R         Receive         R         R         R           15664         D5675         R         Receive         R         R         R         R           15664         R         Receive         R         R         R         R         R           15640         R         According to time telegram struct         N         R         N         N         N         N	32312	DI	Fuse L2	0/1	BS1	R	
2131         0 <sup>1</sup> Note Up 12							
12314 bis 38911         Reserve         R         R         R           35212 to 3835         R         Intensity         A         60:312         R           35812 to 3835         R         Active and reactive gover         V/V/VAR         Roat22         R           3583 to 3835         R         Reserve instantaneous value         PAR         Roat22         R           3586 to 3685         R         Reserve instantaneous value         PAR         R         Allocation according to time telegram structs           3586 to 3685         R         Reserve         PAR         Roat22         R         PAR           3586 to 3685         R         Reserve         PAR         Roat22         R         PAR           3586 to 3685         R         Active/factive gover maan         KW / KVAR         Roat22         R         PAR           3586 to 3685         R         Active/factive gover maan and min         A         Roat32         R         PAR           3584 to 36971         R         Active/factive gover maan and min         A/V AlaR         Roat32         R         VIX value           3594 to 36971         R         Active factive gover maan and min         A/V Roat32         R         VIX value	32313	DI	Fuse L3	0/1	BS1	R	
Note: Up 123 IR and be requested with one query telegram         Intensity         A         Result         Intensity           36820 to 3683         IR         Active and reactive power         KV / KVAR         float22         R           36820 to 3685         IR         Reserve instantenous value         *         *         R         Allocation according to time telegram struct           36860 to 3687         IR         Time and date of the mean values         *         *         R         Allocation according to time telegram struct           36860 to 36873         IR         Reserve          Intensity mean max and min         A         float22         R         VIA value           26000 to 36903         IR         Intensity mean max and min         A         float22         R         VIA value           5040 IR         IR         ADDR, FCT PRIVATE VOLTAGE 1.MS         V         float32         R         VIA value           50541 IR         ADDR, FCT PRIVATE VOLTAGE 2.MS         V         f	32314 bis 36811		Reserve			R	
5812 to 3839         IR         Intensity         A         Montal 2         R           5828 to 3835         IR         Active and reactive power         M/ VAR         float22         R           5858 to 3858         IR         Reserve instantaneous value         *         *         R         Allocation according to time telegram structu           5858 to 3858         IR         Intensity due for the mean values         *         *         R         Allocation according to time telegram structu           5858 to 3858         IR         Intensity mean         A         float22         R         Intensity mean           5858 to 3858         IR         Intensity mean max and min         A/         float22         R         Intensity mean max and min           5962 to 39393         IR         Intensity mean max and min         A/         float22         R         Intensity mean           5962 to 39393         IR         Active fleatche power max and min         A/         float22         R         VIN value           5964 to 39971         IR         Active fleatche power max and min         A/         float22         R         VIN value           5954 to 39991         IR         Active fleatche power max and min         Float22         R         VIN value <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>							
9688 to 36859         IR         Reserve instantaneous value         Inc.add acts of the mean values         *         *         R         All           9686 to 36863         IR         Bescreve         Inc.add acts of the mean values         *         *         *         *         R         All           9686 to 38683         IR         Intersity mean         A         ft.8322         R         Intersity mean         A         ft.8322         R         Intersity mean         Intersity mean         No         Intersity mean         Intersity m				A	float32	R	
58860 10 8863         IR         The and date of the mean values         *         *         *         R         Allocation according to time telegram struct.           5887 to 26893         IR         Intensity mean         A         Inpat2         R         Intensity mean           5887 to 26890         IR         Active/Reactive power mean         IV/ IVAR         Inpat2         R         Intensity mean           5800 to 269023         IR         Active/Reactive power mean and min         A         Inpat22         R         Intensity mean           5800 to 269023         IR         Active/Reactive power max and min         A         Inpat22         R         Intensity mean           5804 to 36903         IR         Reserve         Intensity mean         R         R         Intensity mean         R         Intensit	36820 to 36835	IR	Active and reactive power	kW / kVAR		R	
36661 0.3687.5         R         Reserve         Intensity mean         A         Result         Reserve         R           36884 0.3689.9         R         Active/Reactive power mean         W/ VXAR         Roat22         R           36884 0.3689.9         R         Intensity mean max and min         A         Roat32         R           36924 0.3697.1         R         Active/Reactive power max and min         K         VIA         Roat32         R           36924 0.3697.1         R         Active/Reactive power max and min         K         VIA         Roat32         R         Intensity mean           3697.10         R         Active/Reactive power max and min         K         VIA         Roat32         R         VIN value           3697.10         R         Active/Reactive power max and min         K         VIA         Roat32         R         VIN value           3697.10         R         Active/Reactive power max and min         K         VIA         Roat32         R         VIN value           3654.1         R         ADDR_FCT PRIVATE_VOLTAGE_LMSB         VIE         Roat32         R         VIN value           3054.1         R         ADDR_FCT PRIVATE_VOLTAGE_LMSB         VIE         Roat32         R <td>36836 to 36859</td> <td>IR</td> <td>Reserve instantaneous value</td> <td></td> <td>float32</td> <td>R</td> <td></td>	36836 to 36859	IR	Reserve instantaneous value		float32	R	
368/To 19883         R         Intensity mean         A         forat2         R           36800 10 369023         R         Reserve         W / WAR         forat2         R           36800 10 369023         R         Intensity mean max and min         A         forat22         R           36900 10 369071         R         Active/Reactive power max and min         A         fforat22         R           36940 10 369071         R         Active/Reactive power max and min         A         fforat22         R	36860 to 36863	IR	Time and date of the mean values	•	•	R	Allocation according to time telegram structure
Sig880 10 36890         R         Attive/ Reactive power mean         KV / KVAR         Rota12         R           Sig820 10 36923         R         Intensity mean max and min         A         Rota12         R           Sig821 00 36923         R         Intensity mean max and min         A         Rota12         R           Sig821 00 36931         R         Actue/Reactive power max and min         KV / KVAR         Rota12         R         Intensity mean max and min           Sig921 00 36931         R         Actue/Reactive power max and min         KV / KVAR         Rota12         R         Intensity           Sig921 00 36931         R         Actue/Reactive power max and min         KV / KVAR         Rota12         R         VIN value           Sig940 01 36971         R         Actue/Reactive power p			Reserve				
36900 to 36923         IR         Reserve         Intensity mean max and min         A         Foat32         R           36940 to 36997         IR         Active/Readive power max and min         KW / kVAR         Foat32         R         Image: Comparison of the comp				A		R	
36240 to 36939         IR         Intensity mean max and min         A         ftoal22         R           3697 to 36971         IR         Actury/Readitye power max and min         KV / KVAR         ftoal32         R         -           3697 to 49999         IR         Reserve         R         R         -         -           3697 to 49999         IR         ADDR, FCT PRIVATE VOLTAGE, 1, MSB         V         ftoal32         R         V14 value           50540         IR         ADDR, FCT PRIVATE VOLTAGE, 2, MSB         V         ftoal32         R         V14 value           50541         IR         ADDR, FCT PRIVATE VOLTAGE, 2, MSB         V         ftoal32         R         V24 value           50542         IR         ADDR, FCT PRIVATE VOLTAGE, 2, MSB         V         ftoal32         R         V24 value           50545         IR         ADDR, FCT PRIVATE VOLTAGE, 3, MSB         V         ftoal32         R         V24 value           50546         IR         ADDR, FCT PRIVATE CURRENT 1, MSB         N         ftoal32         R         Current 1 value           50546         IR         ADDR, FCT PRIVATE CURRENT 1, MSB         A         ftoal32         R         Current 1 value           50547         I				kW / kVAR	float32	R	
36940 to 36971         IR         Active/Reactive power max and min         KW / KVAR         float32         R           2072 to 49999         IR         Meserve         N         R         R           50540         IR         ADDR, FCT PRIVATE VOLTAGE 1 MSB         V         Roat32         R         V1N value           50541         IR         ADDR, FCT PRIVATE VOLTAGE 1 MSB         V         Roat32         R         V1N value           50542         IR         ADDR, FCT PRIVATE VOLTAGE 2 MSB         V         Roat32         R         V2N value           50543         IR         ADDR, FCT PRIVATE VOLTAGE 2 MSB         V         float32         R         V2N value           50544         IR         ADDR, FCT PRIVATE VOLTAGE 2 MSB         V         float32         R         V2N value           50545         IR         ADDR, FCT PRIVATE VOLTAGE 2 MSB         V         float32         R         V2N value           50546         IR         ADDR, FCT PRIVATE CURRENT 1 MSB         A         float32         R         Current 1 value           50547         IR         ADDR, FCT PRIVATE CURRENT 2 MSB         A         float32         R         Current 1 value           50548         IR         ADDR, FCT PRIVATE					a		
39372 to 49999         IR         Reserve         R         R           1/display.voltage VIN         Inc.         Inc.         Inc.           50540         IR         ADDR, FCT_PRIVATE_VOLTAGE, 1, MSB         V         Inc.         Inc.           50541         IR         ADDR, FCT_PRIVATE_VOLTAGE, 2, MSB         V         Inc.         Inc.           50542         IR         ADDR, FCT_PRIVATE_VOLTAGE, 2, LSB         V         Inc.         Inc.           50543         IR         ADDR, FCT_PRIVATE_VOLTAGE, 2, LSB         V         Inc.         Inc.           50544         IR         ADDR, FCT_PRIVATE_VOLTAGE, 3, LSB         V         Inc.         Inc.           50545         IR         ADDR, FCT_PRIVATE_VOLTAGE, 3, LSB         V         Inc.         Inc.           50546         IR         ADDR, FCT_PRIVATE_VOLTAGE, 3, LSB         V         Inc.         Inc.           50547         IR         ADDR, FCT_PRIVATE_VOLRERNT, 1, MSB         A         Inc.         Inc.           50548         IR         ADDR, FCT_PRIVATE_VOLRERNT, 2, MSB         A         Inc.         Inc.           50549         IR         ADDR, FCT_PRIVATE_VOLRERNT, 3, MSB         A         Inc.         Inc.         Inc.				A		ĸ	
Image: Constraint of the second sec				KW / KVAK	noat32		
S0540         IR         ADDE, FCT, PRIVATE, VOLTAGE 1, MSB         V         float32         R         V1N value           50541         IR         ADDE, FCT, PRIVATE, VOLTAGE 1, MSB         V         float32         R         V1N value           50542         IR         ADDE, FCT, PRIVATE, VOLTAGE 2, MSB         V         float32         R         V2N value           50543         IR         ADDE, FCT, PRIVATE, VOLTAGE 2, LSB         V         float32         R         V2N value           50544         IR         ADDE, FCT, PRIVATE, VOLTAGE 3, MSB         V         float32         R         V2N value           50545         IR         ADDE, FCT, PRIVATE, VOLTAGE 3, LSB         V         float32         R         V3N value           50546         IR         ADDE, FCT, PRIVATE, CURRENT 1, MSB         A         float32         R         Current 1 value           50547         IR         ADDE, FCT, PRIVATE, CURRENT 2, MSB         A         float32         R         Current 1 value           50548         IR         ADDE, FCT, PRIVATE, CURRENT 2, LSB         A         float32         R         Current 1 value           50550         IR         ADDE, FCT, PRIVATE, CURRENT 3, LSB         A         float32         R         Current 3 v	3037210 43333	IN .				n	
S0541         IR         ADDR_FCT_PRIVATE_VOLTAGE_1_ISB         V         float32         R         VIN value           50542         IR         ADDR_FCT_PRIVATE_VOLTAGE_2_NSB         V         float32         R         V2N value           50543         IR         ADDR_FCT_PRIVATE_VOLTAGE_2_LSB         V         float32         R         V2N value           50544         IR         ADDR_FCT_PRIVATE_VOLTAGE_3_LSB         V         float32         R         V3N value           50544         IR         ADDR_FCT_PRIVATE_VOLTAGE_3_LSB         V         float32         R         V3N value           50545         IR         ADDR_FCT_PRIVATE_VOLTAGE_3_LSB         V         float32         R         V3N value           50546         IR         ADDR_FCT_PRIVATE_VOLTAGE_3_LSB         V         float32         R         Current 1 value           50547         IR         ADDR_FCT_PRIVATE_CURRENT_1_LSB         A         float32         R         Current 1 value           50548         IR         ADDR_FCT_PRIVATE_CURRENT_1_SMS         A         float32         R         Current 2 value           50549         IR         ADDR_FCT_PRIVATE_CURRENT_1_SMS         A         float32         R         Current 2 value <td< td=""><td>50540</td><td>IR</td><td></td><td>v</td><td>float32</td><td>R</td><td>V1N value</td></td<>	50540	IR		v	float32	R	V1N value
Image: Construct State         Image: Construct State         Image: Construct State         Image: Construct State           50542         IR         ADDE, FCT, PRIVATE, VOLTAGE, 2, MSB         V         float32         R         V2N value           50543         IR         ADDE, FCT, PRIVATE, VOLTAGE, 2, LSB         V         float32         R         V2N value           50544         IR         ADDR, FCT, PRIVATE, VOLTAGE, 3, MSB         V         float32         R         V3N value           50545         IR         ADDR, FCT, PRIVATE, VOLTAGE, 3, LSB         V         float32         R         V3N value           50546         IR         ADDR, FCT, PRIVATE, CURRENT 1, MSB         A         float32         R         Current 1 value           50547         IR         ADDR, FCT, PRIVATE, CURRENT 2, MSB         A         float32         R         Current 2 value           50548         IR         ADDR, FCT, PRIVATE, CURRENT 2, LSB         A         float32         R         Current 2 value           50550         IR         ADDR, FCT, PRIVATE, CURRENT 3, MSB         A         float32         R         Current 3 value           50551         IR         ADDR, FCT, PRIVATE, PHI 1, MSB         F         float32         R         Current 3 value				v		R	
S0542         IR         ADDR,FCT,PRIVATE,VOLTAGE_2,MSB         V         float32         R         V2N value           50543         IR         ADDR,FCT,PRIVATE,VOLTAGE_2,SS         V         float32         R         V2N value           50544         IR         ADDR,FCT,PRIVATE,VOLTAGE_3,LSS         V         float32         R         V2N value           50545         IR         ADDR,FCT,PRIVATE,VOLTAGE_3,LSS         V         float32         R         V3N value           50546         IR         ADDR,FCT,PRIVATE,CURRENT_1,LSS         A         float32         R         Current 1 value           50547         IR         ADDR,FCT,PRIVATE,CURRENT_2,MSB         A         float32         R         Current 1 value           50548         IR         ADDR,FCT,PRIVATE,CURRENT_2,MSB         A         float32         R         Current 2 value           50549         IR         ADDR,FCT,PRIVATE,CURRENT_2,MSB         A         float32         R         Current 2 value           50551         IR         ADDR,FCT,PRIVATE,CURRENT_3,LSB         A         float32         R         Current 3 value           50551         IR         ADDR,FCT,PRIVATE,PH1_1,MSB         Float32         R         PH1 value           50552							
Image: space	50542	IR		V	float32	R	V2N value
S0544         IR         ADDR_FCT_PRIVATE_VOLTAGE_3_MSB         V         float32         R         V3N value           50545         IR         ADDR_FCT_PRIVATE_VOLTAGE_3_ISB         V         float32         R         V3N value           50546         IR         ADDR_FCT_PRIVATE_CURRENT_I_MSB         A         float32         R         Current 1 value           50547         IR         ADDR_FCT_PRIVATE_CURRENT_I_SB         A         float32         R         Current 1 value           50548         IR         ADDR_FCT_PRIVATE_CURRENT_2_MSB         A         float32         R         Current 2 value           50549         IR         ADDR_FCT_PRIVATE_CURRENT_2_MSB         A         float32         R         Current 2 value           50550         IR         ADDR_FCT_PRIVATE_CURRENT_3_MSB         A         float32         R         Current 3 value           50551         IR         ADDR_FCT_PRIVATE_URRENT_3_LSB         A         float32         R         PHI 1 value           50552         IR         ADDR_FCT_PRIVATE_PHI_1_MSB         *         float32         R         PHI 1 value           50554         IR         ADDR_FCT_PRIVATE_PHI_2_LSB         *         float32         R         PHI 1 value	50543	IR		V	float32	R	V2N value
50545         IR         ADDR, FCT_PRIVATE_VOLTAGE_3_LSB         V         ffoat32         R         V31 value           50546         IR         ADDR, FCT_PRIVATE_CURRENT_1_KSB         A         ffoat32         R         Current 1 value           50547         IR         ADDR, FCT_PRIVATE_CURRENT_1_LSB         A         ffoat32         R         Current 1 value           50547         IR         ADDR, FCT_PRIVATE_CURRENT_2_LSB         A         ffoat32         R         Current 2 value           50548         IR         ADDR, FCT_PRIVATE_CURRENT_2_LSB         A         ffoat32         R         Current 2 value           50549         IR         ADDR, FCT_PRIVATE_CURRENT_3_MSB         A         ffoat32         R         Current 3 value           50550         IR         ADDR, FCT_PRIVATE_CURRENT_3_MSB         A         ffoat32         R         Current 3 value           50551         IR         ADDR, FCT_PRIVATE_PHI_1_LSB         *         ffoat32         R         PH1 value           50552         IR         ADDR, FCT_PRIVATE_PHI_1_LSB         *         ffoat32         R         PH1 value           50554         IR         ADDR, FCT_PRIVATE_PH1_2_LSB         *         ffoat32         R         PH1 value							
Image: Second				•			
50546         IR         ADDR_FCT_PRIVATE_CURRENT_1_NSB         A         ffoat32         R         Current 1 value           50547         IR         ADDR_FCT_PRIVATE_CURRENT_1_NSB         A         ffoat32         R         Current 1 value           50548         IR         ADDR_FCT_PRIVATE_CURRENT_2_MSB         A         ffoat32         R         Current 2 value           50549         IR         ADDR_FCT_PRIVATE_CURRENT_2_LSB         A         ffoat32         R         Current 2 value           50550         IR         ADDR_FCT_PRIVATE_CURRENT_3_LSB         A         ffoat32         R         Current 3 value           50551         IR         ADDR_FCT_PRIVATE_CURRENT_3_LSB         A         ffoat32         R         Current 3 value           50551         IR         ADDR_FCT_PRIVATE_CURRENT_3_LSB         A         ffoat32         R         PH1 value           50552         IR         ADDR_FCT_PRIVATE_PH1_J_MSB         *         ffoat32         R         PH1 value           50554         IR         ADDR_FCT_PRIVATE_PH1_J_MSB         *         ffoat32         R         PH1 value           50555         IR         ADDR_FCT_PRIVATE_VH1_SUB         *         ffoat32         R         PH1 value           5	50545	IR		v	float32	R	V3N value
S0547         IR         ADDR_FCT_PRIVATE_CURRENT_1_SB         A         In Dat32         R         Current 1 value           50548         IR         ADDR_FCT_PRIVATE_CURRENT_2_MSB         A         Ifloat32         R         Current 2 value           50549         IR         ADDR_FCT_PRIVATE_CURRENT_2_LSB         A         Ifloat32         R         Current 2 value           50550         IR         ADDR_FCT_PRIVATE_CURRENT_3_LSB         A         Ifloat32         R         Current 3 value           50551         IR         ADDR_FCT_PRIVATE_CURRENT_3_LSB         A         Ifloat32         R         Current 3 value           50552         IR         ADDR_FCT_PRIVATE_CURRENT_1_LSB         +         Ifloat32         R         Current 3 value           50551         IR         ADDR_FCT_PRIVATE_PHI_1_MSB         *         Ifloat32         R         PHI 1 value           50553         IR         ADDR_FCT_PRIVATE_PHI_2_LSB         *         Ifloat32         R         PHI 2 value           50554         IR         ADDR_FCT_PRIVATE_PHI_3_LSB         *         Ifloat32         R         PHI 2 value           50557         IR         ADDR_FCT_PRIVATE_VILLSGE 12_LMSB         *         Ifloat32         R         PHI 3 value	EOE AG	ID		4	float22	D	Current 1 value
Image: space of the space o				A			
So548     IR     ADDR_FCT_PRIVATE_CURRENT_2_MSB     A     float32     R     Current 2 value       50549     IR     ADDR_FCT_PRIVATE_CURRENT_2_LSB     A     float32     R     Current 2 value       50550     IR     ADDR_FCT_PRIVATE_CURRENT_3_LSB     A     float32     R     Current 3 value       50550     IR     ADDR_FCT_PRIVATE_CURRENT_3_LSB     A     float32     R     Current 3 value       50551     IR     ADDR_FCT_PRIVATE_CURRENT_3_LSB     A     float32     R     Current 3 value       50552     IR     ADDR_FCT_PRIVATE_PHI_1_LSB     *     float32     R     PHI 1 value       50554     IR     ADDR_FCT_PRIVATE_PHI_2_LSB     *     float32     R     PHI 2 value       50555     IR     ADDR_FCT_PRIVATE_PHI_3_LSB     *     float32     R     PHI 2 value       50555     IR     ADDR_FCT_PRIVATE_PHI_3_LSB     *     float32     R     PHI 2 value       50556     IR     ADDR_FCT_PRIVATE_PHI_3_LSB     *     float32     R     PHI 3 value       50557     IR     ADDR_FCT_PRIVATE_PHI_3_LSB     *     float32     R     PHI 3 value       50557     IR     ADDR_FCT_PRIVATE_VOLTAGE_12_MSB     *     float32     R     V12 value	50547	in .		^	108032	K	Current 1 Value
S0549     IR     ADDR_FCT_PRIVATE_CURRENT_1_S.SR     A     ffloat32     R     Current 2 value       50550     IR     ADDR_FCT_PRIVATE_CURRENT_3_MSB     A     float32     R     Current 3 value       50551     IR     ADDR_FCT_PRIVATE_CURRENT_3_LSB     A     float32     R     Current 3 value       50552     IR     ADDR_FCT_PRIVATE_CURRENT_3_LSB     A     float32     R     PHI 1 value       50552     IR     ADDR_FCT_PRIVATE_PHI_1_MSB     *     float32     R     PHI 1 value       50553     IR     ADDR_FCT_PRIVATE_PHI_1_MSB     *     float32     R     PHI 1 value       50554     IR     ADDR_FCT_PRIVATE_PHI_2_LSB     *     float32     R     PHI 2 value       50555     IR     ADDR_FCT_PRIVATE_PHI_3_MSB     *     float32     R     PHI 2 value       50557     IR     ADDR_FCT_PRIVATE_PHI_3_LSB     *     float32     R     PHI 3 value       50557     IR     ADDR_FCT_PRIVATE_VOLTAGE_12_MSB     V     float32     R     PHI 3 value       50557     IR     ADDR_FCT_PRIVATE_VOLTAGE_12_MSB     V     float32     R     V12 value       50567     IR     ADDR_FCT_PRIVATE_VOLTAGE_12_MSB     V     float32     R     V12 value	50548	IR		A	float32	R	Current 2 value
Image: State of the state o				A		R	
SOS50     IR     ADDR_FCT_PRIVATE_CURRENT_3_MSB     A     float32     R     Current 3 value       SOS51     IR     ADDR_FCT_PRIVATE_CURRENT_3_LSB     A     float32     R     Current 3 value       SOS52     IR     ADDR_FCT_PRIVATE_CURRENT_3_LSB     A     float32     R     PHI 1 value       SOS52     IR     ADDR_FCT_PRIVATE_PHI_1_MSB     Infoat32     R     PHI 1 value       SOS53     IR     ADDR_FCT_PRIVATE_PHI_2_LSB     Infoat32     R     PHI 2 value       SOS54     IR     ADDR_FCT_PRIVATE_PHI_2_LSB     Infoat32     R     PHI 2 value       SOS56     IR     ADDR_FCT_PRIVATE_PHI_3_LSB     Infoat32     R     PHI 2 value       SOS56     IR     ADDR_FCT_PRIVATE_PHI_3_LSB     Infoat32     R     PHI 3 value       SOS57     IR     ADDR_FCT_PRIVATE_PHI_3_LSB     Infoat32     R     PHI 3 value       SOS57     IR     ADDR_FCT_PRIVATE_VOLTAGE_12_MSB     Infoat32     R     Y12 value       SOS57     IR     ADDR_FCT_PRIVATE_VOLTAGE_12_MSB     Infoat32     R     Y12 value       SOS57     IR     ADDR_FCT_PRIVATE_VOLTAGE_12_MSB     Infoat32     R     Y12 value       SOS56     IR     ADDR_FCT_PRIVATE_VOLTAGE_14_MSB     Infoat32     R     Y12 value			//display current I3				
SOS51     IR     ADDR, FCT_PRIVATE_CURRENT_3_LSB     A     ffoat32     R     Current 3 value       50552     IR     ADDR, FCT_PRIVATE_PHI_1_MSB     *     ffoat32     R     PHI 1 value       50553     IR     ADDR, FCT_PRIVATE_PHI_1_LSB     *     ffoat32     R     PHI 1 value       50553     IR     ADDR, FCT_PRIVATE_PHI_1_LSB     *     ffoat32     R     PHI 2 value       50554     IR     ADDR, FCT_PRIVATE_PHI_2_MSB     *     ffoat32     R     PHI 2 value       50555     IR     ADDR, FCT_PRIVATE_PHI_2_SB     *     ffoat32     R     PHI 2 value       50556     IR     ADDR, FCT_PRIVATE_PHI_3_SB     *     ffoat32     R     PHI 3 value       50557     IR     ADDR, FCT_PRIVATE_PHI_3_SB     *     ffoat32     R     PHI 3 value       50557     IR     ADDR, FCT_PRIVATE_PHI_3_SB     *     ffoat32     R     PHI 3 value       50557     IR     ADDR, FCT_PRIVATE_VOLTAGE_12_MSB     V     ffoat32     R     V12 value       50568     IR     ADDR, FCT_PRIVATE_VOLTAGE_12_MSB     V     ffoat32     R     V12 value       50569     IR     ADDR, FCT_PRIVATE_VOLTAGE_12_MSB     V     ffoat32     R     V12 value       50570			ADDR_FCT_PRIVATE_CURRENT_3_MSB	A	float32		Current 3 value
S0552         IR         ADDR_FCT_PRIVATE_PH1_LMSB         *         float32         R         PH1 value           50533         IR         ADDR_FCT_PRIVATE_PH1_LSB         *         float32         R         PH1 value           50554         IR         ADDR_FCT_PRIVATE_PH1_2         *         float32         R         PH1 value           50554         IR         ADDR_FCT_PRIVATE_PH1_2         *         float32         R         PH1 2 value           50555         IR         ADDR_FCT_PRIVATE_PH1_2         *         float32         R         PH1 2 value           50556         IR         ADDR_FCT_PRIVATE_PH1_3_LSB         *         float32         R         PH1 3 value           50557         IR         ADDR_FCT_PRIVATE_PH1_3_LSB         *         float32         R         PH1 3 value           50567         IR         ADDR_FCT_PRIVATE_VOLTAGE_12_MSB         V         float32         R         V12 value           50567         IR         ADDR_FCT_PRIVATE_VOLTAGE_12_MSB         V         float32         R         V12 value           50568         IR         ADDR_FCT_PRIVATE_VOLTAGE_12_MSB         V         float32         R         V23 value           50570         IR         ADDR_FCT_PRI	50551	IR	ADDR_FCT_PRIVATE_CURRENT_3_LSB	A	float32	R	Current 3 value
S0553     IR     ADDR_FCT_PRIVATE_PHI_1_LSB     *     float32     R     PHI 1 value       S0554     IR     ADDR_FCT_PRIVATE_PHI_2_MSB     *     float32     R     PHI 2 value       S0555     IR     ADDR_FCT_PRIVATE_PHI_2_LSB     *     float32     R     PHI 2 value       S0555     IR     ADDR_FCT_PRIVATE_PHI_3_LSB     *     float32     R     PHI 2 value       S0556     IR     ADDR_FCT_PRIVATE_PHI_3_MSB     *     float32     R     PHI 3 value       S0556     IR     ADDR_FCT_PRIVATE_PHI_3_LSB     *     float32     R     PHI 3 value       S0557     IR     ADDR_FCT_PRIVATE_VOLTAGE_12_MSB     *     float32     R     V12 value       S0567     IR     ADDR_FCT_PRIVATE_VOLTAGE_12_MSB     V     float32     R     V12 value       S0568     IR     ADDR_FCT_PRIVATE_VOLTAGE_12_MSB     V     float32     R     V12 value       S0567     IR     ADDR_FCT_PRIVATE_VOLTAGE_12_MSB     V     float32     R     V12 value       S0568     IR     ADDR_FCT_PRIVATE_VOLTAGE_13_MSB     V     float32     R     V12 value       S0569     IR     ADDR_FCT_PRIVATE_VOLTAGE_23_MSB     V     float32     R     V23 value       S0571							
Image: Constraint of the image in the image.         Image: The image in the image in the image in the image in the image.         Image: The image in the image in the image.         Image: The image in the image in the image.         Image: The image in the image in the image in the image.         Image: The image in the ima			ADDR_FCT_PRIVATE_PHI_1_MSB	•			
S0554     IR     ADDR_FCT_PRIVATE_PHI_2_MSB     *     float32     R     PHI 2 value       S0555     IR     ADDR_FCT_PRIVATE_PHI_2_LSB     *     float32     R     PHI 2 value       S0556     IR     ADDR_FCT_PRIVATE_PHI_3_MSB     *     float32     R     PHI 3 value       S0556     IR     ADDR_FCT_PRIVATE_PHI_3_LSB     *     float32     R     PHI 3 value       S0557     IR     ADDR_FCT_PRIVATE_PHI_3_LSB     *     float32     R     PHI 3 value       S0567     IR     ADDR_FCT_PRIVATE_PUITAGE_12_MSB     V     float32     R     V12 value       S0568     IR     ADDR_FCT_PRIVATE_VOLTAGE_12_MSB     V     float32     R     V12 value       S0569     IR     ADDR_FCT_PRIVATE_VOLTAGE_12_MSB     V     float32     R     V12 value       S0569     IR     ADDR_FCT_PRIVATE_VOLTAGE_31_SB     V     float32     R     V23 value       S0570     IR     ADDR_FCT_PRIVATE_VOLTAGE_31_SB     V     float32     R     V23 value       S0571     IR     ADDR_FCT_PRIVATE_VOLTAGE_31_SB     V     float32     R     V31 value       S0571     IR     ADDR_FCT_PRIVATE_VOLTAGE_31_LSB     V     float32     R     V31 value       S0572	50553	IR		•	float32	R	PHI 1 value
50555     IR     ADDR_FCT_PRIVATE_PHI_2_LSB     *     float32     R     PHI 2 value       50556     IR     ADDR_FCT_PRIVATE_PHI_3_MSB     *     float32     R     PHI 3 value       50557     IR     ADDR_FCT_PRIVATE_PHI_3_LSB     *     float32     R     PHI 3 value       50557     IR     ADDR_FCT_PRIVATE_PHI_3_LSB     *     float32     R     PHI 3 value       50567     IR     ADDR_FCT_PRIVATE_VOLTAGE_12_MSB     V     float32     R     V12 value       50567     IR     ADDR_FCT_PRIVATE_VOLTAGE_12_MSB     V     float32     R     V12 value       50568     IR     ADDR_FCT_PRIVATE_VOLTAGE_23_MSB     V     float32     R     V12 value       50569     IR     ADDR_FCT_PRIVATE_VOLTAGE_23_LSB     V     float32     R     V12 value       50570     IR     ADDR_FCT_PRIVATE_VOLTAGE_23_LSB     V     float32     R     V12 value       50569     IR     ADDR_FCT_PRIVATE_VOLTAGE_31_MSB     V     float32     R     V23 value       50570     IR     ADDR_FCT_PRIVATE_VOLTAGE_31_MSB     V     float32     R     V31 value       50571     IR     ADDR_FCT_PRIVATE_VOLTAGE_31_MSB     V     float32     R     V31 value       50572	EDEE4	10		0	float??	0	DHI 2 value
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S0556         IR         ADDR_FCT_PRIVATE_PHI_3_MSB         *         ffoat32         R         PHI 3 value           50557         IR         ADDR_FCT_PRIVATE_PHI_3_LSB         *         ffoat32         R         PHI 3 value           50557         IR         ADDR_FCT_PRIVATE_VOLTAGE_12_MSB         *         ffoat32         R         PHI 3 value           50567         IR         ADDR_FCT_PRIVATE_VOLTAGE_12_MSB         V         ffoat32         R         V12 value           50568         IR         ADDR_FCT_PRIVATE_VOLTAGE_12_LSB         V         ffoat32         R         V12 value           50569         IR         ADDR_FCT_PRIVATE_VOLTAGE_23_MSB         V         ffoat32         R         V12 value           50569         IR         ADDR_FCT_PRIVATE_VOLTAGE_23_MSB         V         ffoat32         R         V23 value           50570         IR         ADDR_FCT_PRIVATE_VOLTAGE_23_MSB         V         ffoat32         R         V23 value           50571         IR         ADDR_FCT_PRIVATE_VOLTAGE_31_MSB         V         ffoat32         R         V31 value           50572         IR         ADDR_FCT_PRIVATE_VOLTAGE_31_LSB         V         ffoat32         R         V31 value           50574	20122	IIX.			nudisz	n.	r i i z value
S0557         IR         ADDR_FCT_PRIVATE_PHI_3_LSB         *         float32         R         PHI 3 value           0557         IR         ADDR_FCT_PRIVATE_VOLTAGE_12_MSB         V         float32         R         V12 value           50567         IR         ADDR_FCT_PRIVATE_VOLTAGE_12_MSB         V         float32         R         V12 value           50568         IR         ADDR_FCT_PRIVATE_VOLTAGE_12_LSB         V         float32         R         V12 value           50569         IR         ADDR_FCT_PRIVATE_VOLTAGE_23_LSB         V         float32         R         V23 value           50570         IR         ADDR_FCT_PRIVATE_VOLTAGE_23_LSB         V         float32         R         V23 value           50570         IR         ADDR_FCT_PRIVATE_VOLTAGE_23_LSB         V         float32         R         V23 value           50571         IR         ADDR_FCT_PRIVATE_VOLTAGE_31_LSB         V         float32         R         V31 value           50572         IR         ADDR_FCT_PRIVATE_VOLTAGE_31_LSB         V         float32         R         V31 value           1//Temperature         I         Intershold temperature value         Intershold temperature value         V31 value           50574         DI <td>50556</td> <td>IR</td> <td></td> <td>0</td> <td>float32</td> <td>R</td> <td>PHI 3 value</td>	50556	IR		0	float32	R	PHI 3 value
Image: Solution of the				•			
S0567         IR         ADDR_FCT_PRIVATE_VOLTAGE_12_MSB         V         ffoat32         R         V12 value           S0568         IR         ADDR_FCT_PRIVATE_VOLTAGE_12_USB         V         ffoat32         R         V12 value           S0569         IR         ADDR_FCT_PRIVATE_VOLTAGE_23_MSB         V         ffoat32         R         V12 value           S0569         IR         ADDR_FCT_PRIVATE_VOLTAGE_23_MSB         V         ffoat32         R         V23 value           S0570         IR         ADDR_FCT_PRIVATE_VOLTAGE_23_LSB         V         ffoat32         R         V23 value           S0571         IR         ADDR_FCT_PRIVATE_VOLTAGE_31_MSB         V         ffoat32         R         V31 value           S0572         IR         ADDR_FCT_PRIVATE_VOLTAGE_31_MSB         V         ffoat32         R         V31 value           S0571         IR         ADDR_FCT_PRIVATE_VOLTAGE_31_MSB         V         ffoat32         R         V31 value           S0572         IR         ADDR_FCT_PRIVATE_VOLTAGE_31_MSB         V         ffoat32         R         V31 value           S0574         IR         ADDR_FCT_PRIVATE_TEMP_ALERT         I// Temperature alert         I         I// Temperature value         I > threshold temperature val							
S0558         IR         ADDR_FCT_PRIVATE_VOLTAGE_12_LSB         V         float32         R         V12 value           50569         IR         ADDR_FCT_PRIVATE_VOLTAGE_23_MSB         V         float32         R         V12 value           50570         IR         ADDR_FCT_PRIVATE_VOLTAGE_23_LSB         V         float32         R         V12 value           50570         IR         ADDR_FCT_PRIVATE_VOLTAGE_23_LSB         V         float32         R         V12 value           50570         IR         ADDR_FCT_PRIVATE_VOLTAGE_23_LSB         V         float32         R         V12 value           50571         IR         ADDR_FCT_PRIVATE_VOLTAGE_31_LSB         V         float32         R         V31 value           50572         IR         ADDR_FCT_PRIVATE_VOLTAGE_31_LSB         V         float32         R         V31 value	50567	IR	ADDR_FCT_PRIVATE_VOLTAGE_12_MSB	V	float32	R	V12 value
Image: constraint of the second sec				V		R	
S0570         IR         ADDR_FCT_PRIVATE_VOLTAGE_23_LSB         V         ffloat32         R         V23 value           50570         IR         ADDR_FCT_PRIVATE_VOLTAGE_31_MSB         V         ffloat32         R         V31 value           50571         IR         ADDR_FCT_PRIVATE_VOLTAGE_31_MSB         V         ffloat32         R         V31 value           50572         IR         ADDR_FCT_PRIVATE_VOLTAGE_31_LSB         V         ffloat32         R         V31 value           50574         IR         ADDR_FCT_PRIVATE_VOLTAGE_31_LSB         V         ffloat32         R         V31 value           50574         I/Temperature alert         Image: Comparison of the temperature value							
S0570         IR         ADDR_FCT_PRIVATE_VOLTAGE_31_SB         V         ffloat32         R         V23 value           50570         IR         ADDR_FCT_PRIVATE_VOLTAGE_31_MSB         V         float32         R         V31 value           50571         IR         ADDR_FCT_PRIVATE_VOLTAGE_31_MSB         V         float32         R         V31 value           50572         IR         ADDR_FCT_PRIVATE_VOLTAGE_31_LSB         V         float32         R         V31 value           50574         IR         ADDR_FCT_PRIVATE_VOLTAGE_31_LSB         V         float32         R         V31 value           50574         IR         ADDR_FCT_PRIVATE_VOLTAGE_31_LSB         V         float32         R         V31 value           50574         DI         ADDR_FCT_PRIVATE_TEMP_ALERT         0/1         BS1         R         1 > threshold temperature value 0            50574         DI         ADDR_FCT_PRIVATE_TEMP_ALERT         0/1         BS1         R         1 > threshold temperature value			ADDR_FCT_PRIVATE_VOLTAGE_23_MSB	v			V23 value
S0571         IR         ADDR_FCT_PRIVATE_VOLTAGE_31_MSB         V         float32         R         V31 value           50572         IR         ADDR_FCT_PRIVATE_VOLTAGE_31_LSB         V         float32         R         V31 value           50574         IR         ADDR_FCT_PRIVATE_VOLTAGE_31_LSB         V         float32         R         V31 value           1         //Temperature         Image: Value         Image: Value         Image: Value         Image: Value           1         //Temperature alert         Image: Value         Image: Value         Image: Value         Image: Value           50574         DI         ADDR_FCT_PRIVATE_TEMP_ALERT         0/1         BS1         R         Image: Value         Image: Value           50574         Image: Value         Image	50570	IR		v		R	V23 value
S0572         IR         ADDR_FCT_PRIVATE_VOLTAGE_31_SB         V         float32         R         V31 value           Image: S0574			//display voltage V31				
//Temperature         //Temperature alert         //Temperature alert           0//Temperature alert         //Temperature alert         //Temperature value           50574         DI         ADDR_FCT_PRIVATE_TEMP_ALERT         0/1         BS1         R         1 > threshold temperature value           /// Temperature measurement         // Temperature measurement         0         threshold temperature value	50571			V			
Image: system of the	50572	IK	ADDK_FCT_PRIVATE_VOLTAGE_31_LSB	v	rioat32	к	V31 value
Image: system of the			//*		I		
S0574         DI         ADDR_FCT_PRIVATE_TEMP_ALERT         0/1         BS1         R         1 > threshold temperature value 0 < threshold temperature value           0         // Temperature measurement         0			// remperature				
50574         DI         AUDK_LI_PRIVALE_LEMP_ALERI         U/1         BS1         K         0 < threshold temperature value           // Temperature measurement         // Temperature measurement         // Temperature value         // Temperature         // Temperature							1 > threshold temperature value
// Temperature measurement	50574	DI	ADDR_FCT_PRIVATE_TEMP_ALERT	0/1	BS1	R	
			// Temperature measurement	1		1	
50575 IR ADDR_FCT_PRIVATE_TEMP_MEASUREMENT *C float32 R temperature value	50575	IR		°C	float32	R	temperature value

\*Excel file of Modbus communication table available on request



## **11. TROUBLE SHOOTING**

Fault Description	Fault Analysis	Trouble shooting method
Off LED	Module not functional	Check the supply of the module
Detected current value cannot match to actual current	Switch rated current may not be set correctly	Check rated current setting in the software in the <u>Module &amp;</u> <u>communication settings</u> page, CT phase visualization. If not compliant, the settings should be updated in the software in the <u>Main page</u>
No voltage data shown	Failure of the module connection	Check the connector position at the back of the module
Voltage data partially shown	Failure of the module connection	Check the connector position at the back of the module



## 12. CYBER SECURITY

#### 12.1 Disclaimer

It is the sole responsibility of the customer to provide and continuously ensure a secure connection between the product and the customer network or any other network. The customer is required to establish and maintain any appropriate measures (including but not limited to the installation of firewalls, application of authentication measures, encryption of data, installation of anti- virus programs, etc.) to protect the product, the network, its system and the interface against any kind of security breach, unauthorized access, interference, intrusion, leakage and/or theft of data or information. MERSEN and its affiliates are not liable for damage and/or losses related to such security breaches, unauthorized access, interference, intrusion, leakage and/or theft of data or information.

#### 12.2 Secure Deployment

The user of the product should be aware that the unsecure nature of the serial Modbus protocol exposes the communication between the product and the control system. Encryption, authentication or integrity of transmitted data are not provided by the protocol. To prevent equipment to operate in an unsafe or undesirable manner due to malicious activities the product must be positioned in a trusted network, strictly limited and in a hosted portion of a network or control system. The recommendation is also to restrict physical access to the product/system to only allow authorized people to make changes to the system. Besides, the user can setup system to trigger alarm when communication is interrupted (device stops responding) and check if there are any unsafe condition.



## 13. APPENDIX – Modbus cable USB $\leftarrow \rightarrow$ RJ45



## TECHNICAL DATA

Isolated USB - Modbus / RS485 converter

This cable is a 2 wire RS485 adapter, with automatic receive / transmit switching, and RJ45 connection according to the Modbus specifications.

The cable have a 2.5kV isolation barrier that ensures a high quality electrically separation between the PC and remote device, thus offering excellent protection of the PC if the remote device should fail.

Just connect it and use it like any other COM port in the PC having the needed driver.

Com-port specs Baud rates : 19200, 38400, 57600,115200Bps Start bits : 1 Data bits: 7, 8 Parity: None, even, odd, mark, space Stop bits: 1, 2 Flow control: Auto switching Buffers: 128 bytes Rx and 256 bytes Tx fifo.

RS485 specifications Powerful RS485, able to drive 256 nodes ±15 kV ESD protection on RS485 pins No termination resistor Fail safe

Modbus connections - RJ45 According to Modbus specification "Modbus over serial line" - Pin 4 : B (D-) - Pin 5 : A (D+) - Pin 8 : Gnd.



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