ENERGY PLUS

ANALIZADOR DE RED MONOFÁSICO AC / DC (TRMS)

VAC IDC COSφ VRMS ARMS W Hz KW/H

10A
600Vac
1000Vdc

ac ~
dc =
V, i
RS485
USB
24V AC/DC

PANTEC

SOFTWARE DE CONFIGURACIÓN GRATUITO

REGISTRADOR POR PENDRIVE

Conexión microUSB

PROGRAMACIÓN POR CABLE

i ..10A

AC/DC **ENTRADAS**

V ..600VAC ..1000VDC

SALIDAS

0-4/20mA

RS485

0/10V

RELÉ

ALIMENTACIÓN **24VDC-AC**

CARACTERÍSTICAS

- Analizador de red monofásico AC/DC (TRMS) aislado.
- Convertidor de señal 1000VDC / 600VAC, 10A AC/DC. ** versión -L (100VDC / 60VAC).*
- Medición de energía, tensión, intensidad, potencia, frecuencia, ..
- Configurable a través de USB, mediante software gratuito.
- Montaje en raíl DIN. Bornas enchufables.
- Alimentación 24VAC/DC.
- Salidas: analógica, de contacto de alarma y Modbus RS485.
- Registrador a través de memoria externa USB y posibilidad de descarga de datos en formato Excel.
- Reloj RTC integrado, con tiempo real.

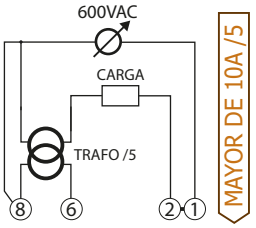
®

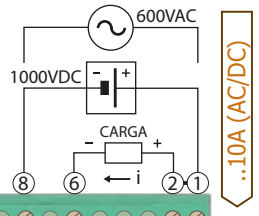
CONEXIONADO y CARACTERÍSTICAS

ENTRADAS

ENTRADA

TENSIÓN	versión -L
0.. 1000Vcc / ..600Vac	0.. 100Vcc / ..60Vac
INTENSIDAD	
0.. 10A (AC) / 0.. 10A (DC)	
mayores DE 10A (AC) TRAFO /5	





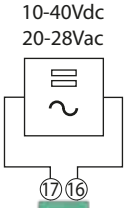
② ① UNIDOS INTERNAMENTE

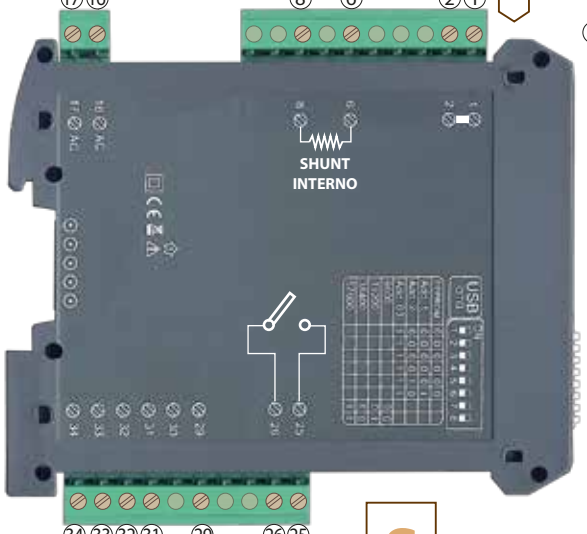
ALIMENTACIÓN

ALIMENTACIÓN

DC	10.. 40Vdc
AC	20.. 28Vac

24VAC/DC





AISLAMIENTO

ENTRADA
ALIMENTACIÓN
RS485 Y USB
SALIDA ANALÓGICA Y DIGITAL

4 vías

REGISTRADOR CON RELOJ

** Pendrive opcional*

Pendrive micro USB
Exportación a Excel
(formato .csv)

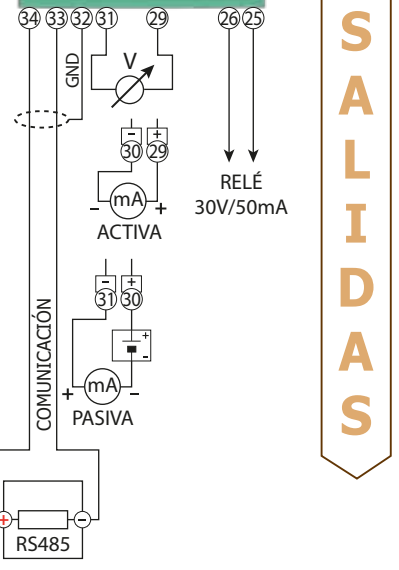
AMBIENTALES

Temperatura de trabajo	- 15/+65ºC
Temperatura de almacenamiento	- 40/+85ºC

SALIDAS

INTENSIDAD Pasiva / Activa	
0-4/20mA configurable	
Resistencia de carga máxima	600Ohm
TENSIÓN	
0/10V configurable	
Resistencia de carga mínima	2KOhm
Relé de alarma	
30V/50mA SPDT programable por software	
RS485 Modbus	
Configurable	

SALIDA



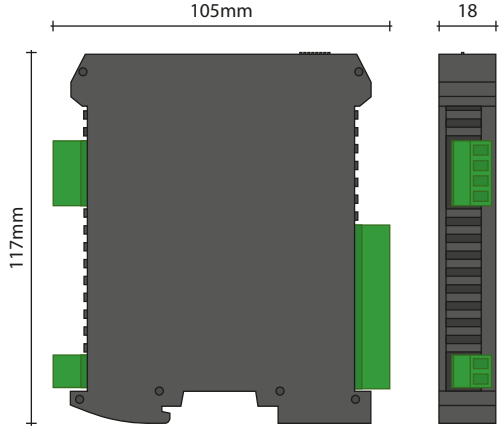
FORMATO

Protección	IP20
Clase de combustibilidad Vo según UL94	
Caja Ergonómica. Montaje rápido raíl EN50022	
Material Poliamida	PA6.6
Conexión: bornas enchufables por tornillo	
par de apriete tornillos(M3)	0,5Nm
Cable conexión: <2,5mm², 12AWG 250V/12A	
Peso	90 grs

configuración para programar (neutra)

INDICACIÓN DE LEDS

- **POWER** Alimentación correcta
- **FAIL** Fallo en el equipo
- **Rx / Tx** Comunicación RS485 activa (led parpadeante)
- **DOUT** Salida digital activa

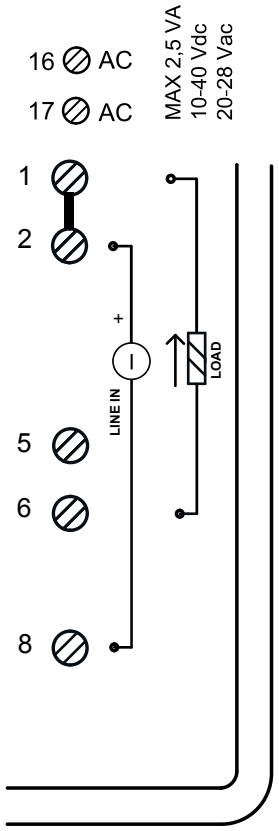


INSTRUCTION MANUAL

DESCRIPTION:

The ENERGY Plus is an isolated VOLTAGE and CURRENT converter and SINGLE PHASE NETWORK ANALYZER. The module has a programmable analog output (voltage or current) and a digital output (optomos). Thanks to the presence of the RS485 serial port can perform advanced functions such as I / O Module with Modbus RTU protocol. The ENERGY Plus behaves as a slave device by placing Current or Voltage Input, n°1 AO and n°1 DO.

ELECTRICAL CONNECTIONS



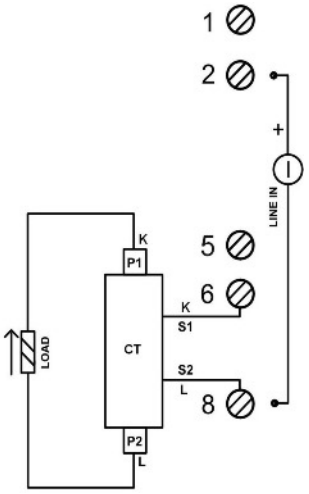
POWER SUPPLY:

10...40 Vdc or 20...28 Vac - Connectors 16 and 17, or by T-BUS connector (optional tool) on the base of the module (see the picture placed on the bottom of this page).

VOLTAGE/CURRENT INPUT (DIRECT INSERTION):

the input Voltage (LINE) has to be connected on terminals 2 (+) and 8, the Load has to be connected on terminals 1 (+) and 6.
FOR VOLTAGE: up to 600 VAC, 1000 VDC (up to 60 VAC, 100 VDC for LV version).
FOR CURRENT: up to 10 A AC/DC.
You can set the measurement range as per your need using the software or by RS485 using the modbus registers.

INSERTION WITH EXTERNAL CURRENT TRANSFORMER (CT):



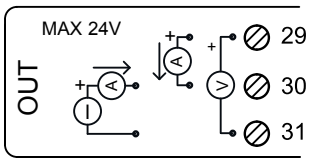
The input Voltage (LINE) has to be connected on terminals 2 (+) and 8 (as for the direct insertion).

The external CT (current transformer), must be connected as follows:

- S1 terminal of the CT connected to the terminal 6;
- S2 terminal of the CT connected to the terminal 8.

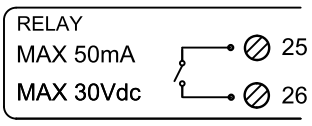
For the connection of the LOAD to the CT, follow the wiring diagram on the left side (INPUT P1 side and OUTPUT P2 side.

WITH THIS CONFIGURATION, SET THE CURRENT RATIO VIA FACILE SOFTWARE (SEE PAGE 3).



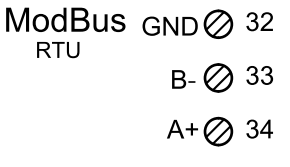
ANALOG OUTPUT:

for Voltage analog output, connect terminals 31 and 29 (positive).
For ACTIVE current analog output, connect terminals 29 (positive) and 30. For PASSIVE current analog output, connect terminals 30 (positive) and 31. Analog output supply: 13 Vdc, max 30 mA.



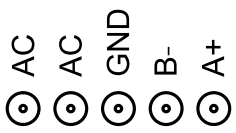
DIGITAL OUTPUT:

relay Output is an Optomos contact. Connection are with terminals 25 and 26. The contact can be used like an pulse output (you can set by FACILE the value of the pulse) or like Alarm contact (you can set the associated parameter by FACILE).



SERIAL OUTPUT RS485:

available on connectors 32 (GND), 33 (B-), 34 (A+), or by T-BUS connector to be mounted on the module.



T-BUS CONNECTION (OPTION), needs T-BUS connector:

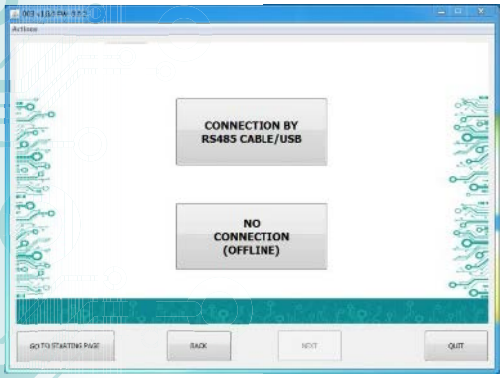
it may be affixed to the accessory T-BUS based on the module to bring both power and serial communication. The number of modules supported by the bus is a function of the power supply used (check the absorption of the modules).

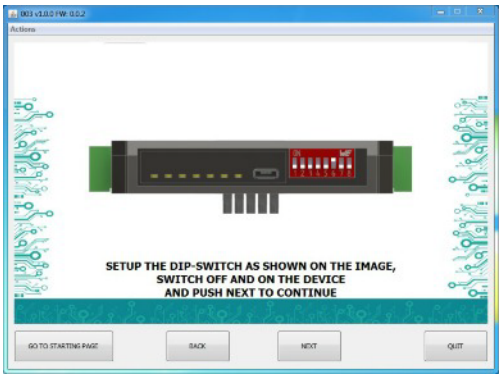
SETTING THE DEVICE VIA SOFTWARE

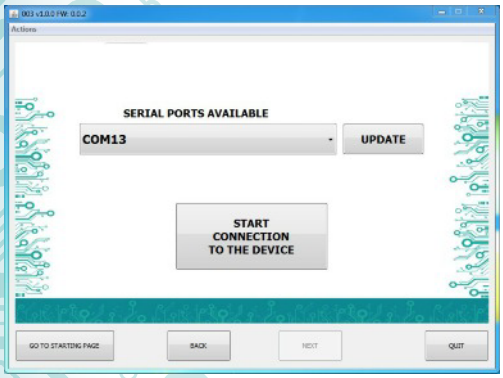
The programming of the module may be performed in two different ways:

- via the free interface program through the microUSB port on the module or via RS485 connection;
- via the RS485 serial connection (from terminal or T-Bus).

The ENERGY Plus has two microprocessors, you can configure the module by connecting it to the USB port of your PC without the power lead, this is possible because the microprocessor that manages the configuration is powered directly from the USB port.



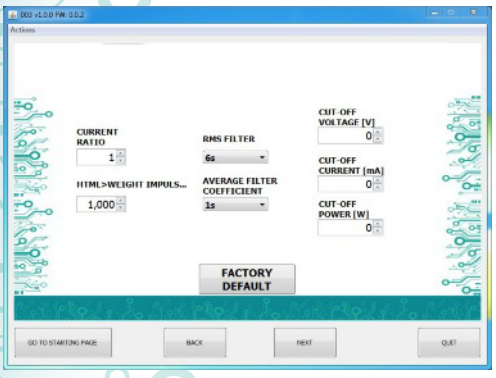




It is possible to use the program without connecting to the module, in this mode you can SAVE the configuration on your PC, which can then be sent to the ENERGY Plus at a later time.

SERIAL PORTS AVAILABLE:

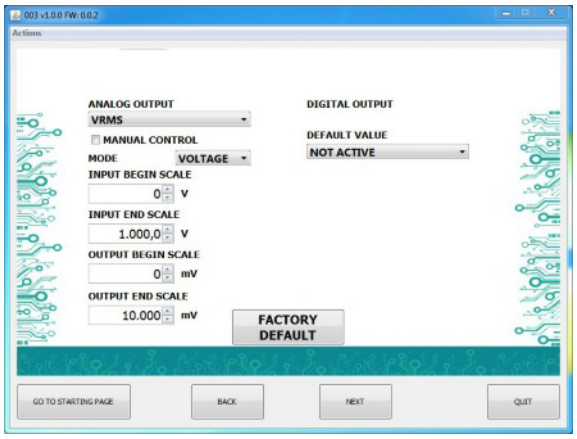
Check the available COM ports, press the UPDATE button. Your PC will assign a virtual COM connection with the ENERGY Plus. Press START CONNECTION WITH THE DEVICE. It will confirm you the connection was successful with the module. If the connection does not happen, please check the RS485 serial connection (A +, B-), the position of the dip-switches (switching off and on the device) and the COM generated automatically by the device. After connecting, you can proceed with the configuration of the device.

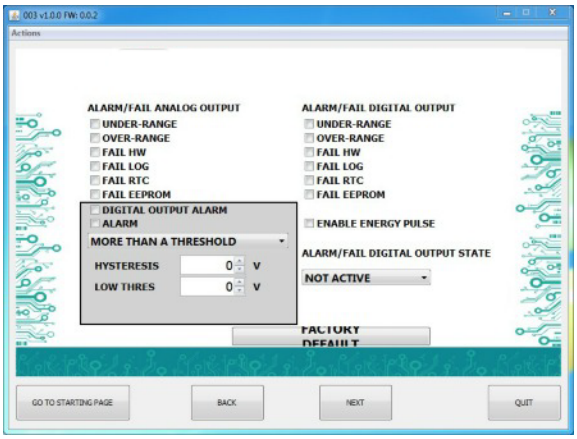


CURRENT RATIO, PULSE MANAGEMENT, FILTERS & CUT-OFF SETTINGS:

This step on the software allow to
to define the Current Ratio by setting “CURRENT RATIO”.
The Pulse weight of the digital output can be setted by the WEIGHT IMPULSE FOR ENERGY CALC (Wh).
RMS FILTER and AVERAGE FILTER COEFFICIENT are two different types of filters that allow you to introduce a delay of the answer in order to have more stabilty of the reading.
CUT OFF settings: you can set the cut off values for VOLTAGE, CURRENT and POWER measurement. Under these value setted the measurement will be Zero.

SETTING THE DEVICE VIA SOFTWARE





FAIL MESSAGE / ANOMALY:

FAIL HW: problems in the measurement chain (electrical connections, microprocessor that manages the measurement, sensor disconnected or faulty).
FAIL LOG: problem on recording data (without the availability of stick usb memory stick usb not recognized).
FAIL RTC: problem on backup battery (dead or defective).
FAIL EEPROM: problem microprocessor configuration (not calibrated module, takes no configuration).

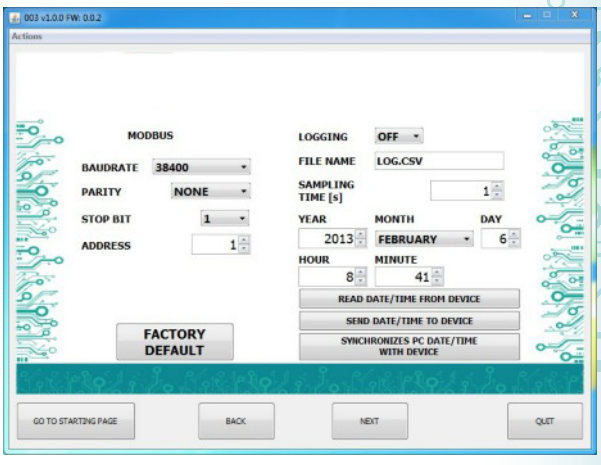
MODBUS COMUNICATION:

This is the last window of the device configuration. The left column contains the parameters to be set for the communication speed BAUDRATE (from 1200 to 115200), the PARITY (None, Odd, Even), the STOP BIT (1 or 2), the Modbus address to be assigned to the device. You do not need to configure these parameters for the use of the module with digital / analog output. It is possible to use the module with RS485 serial output with Modbus output analog and digital simultaneously.

LOGGING :

On the right side of the window you can enable the feature LOG for the acquisition of data on usb pendrive. You can name the log file by associating the extension .Xls, .Xlsx, .Csv, .Txt, .Dat, .Logs. The default file is in text format. The minimum sampling time is 1 second, the maximum is about 18 hours.

ANALOG OUTPUT: the first drop-down menu in the upper left allow you to associate the analog output to a single selectable **Vrms, Irms, Active Power, Reactive Power, Apparent Power, Cosφ, Frequency**. The mode of the analog output is VOLTAGE or CURRENT. The ENERGY Plus as the ability to scale the input and output as required, then select the measurement range of input (INPUT BEGIN SCALE and INPUT END SCALE) to assign to the analog output signal (OUTPUT BEGIN SCALE and OUTPUT END SCALE). Depending on the choices made in the two menu will change the units of measurement values in the input and output. If you select the MANUAL CONTROL (via modbus), you can manage the module as if it were an AO (Analog Output), thus freeing the analog output from the input selected. The analog output will be handled via RS485 Modbus RTU (see register map).
DIGITAL OUTPUT: the digital output default set is NOT ACTIVE. If you want to ACTIVE the digital output please set it on the right window.
ALLARM / FAIL ANALOG OUTPUT: it is possible to use the analog output to control any supervening anomaly Hardware HW FAIL, FAIL RTC Real Time Clock anomaly that stores the date and time, FAIL EEPROM for the anomaly on the microprocessor, FAIL LOG if an anomaly occurred during data acquisition, UNDER RANGE scale of measurement set, OVER RANGE scale of measurement set. It is possible to select multiple items in the menu. In case of alarm the analog output will go to 21 mA or 10.5 V depending on the selection made in the previous window.
ALARM WINDOW: you can activate the ALARM functionality (in the gray box), on the digital output or on the analog output, or both simultaneously. In this window you can manage HOW and WHEN activate the alarm by selecting the options from the dropdown menu: MORE THAN A THRESHOLD, LESS THAN A THRESHOLD, NOT BETWEEN TWO THRESHOLD, BETWEEN TWO THRESHOLD. We therefore have the possibility to insert the values of THRESHOLD and the value of HYSTERESIS. In the case where it is selected the value of a ***Higher threshold*** when the signal falls below, the alarm switched off at the threshold value minus the value of hysteresis. In the event that you have chosen the value of a ***Minor threshold***, when the value exceeds the threshold plus the hysteresis value, the alarm is disactivated. In the case where it is selected ***between two thresholds***, the hysteresis is external. In case you have selected ***Not included between two thresholds***, the hysteresis is internal.
ALARM / FAIL DIGITAL OUTPUT: it is possible to use the digital output to control any supervening anomaly Hardware HW FAIL, FAIL RTC Real Time Clock anomaly that stores the date and time, FAIL EEPROM for the anomaly on the microprocessor, FAIL LOG if an anomaly occurred during data acquisition, UNDER RANGE scale of measurement set, OVER RANGE scale of measurement set. It is possible to select multiple items in the menu. By clicking on the "ENABLE ENERGY PULSE" is enabled the pulse. STATE DIGITAL ALARM / FAIL allows you to define the status of contact in case of alarm (NOT ACTIVE or ACTIVE).



DATALOGGER

Serial Number	Data (yyyy-mm-dd) & Time	Status ID	Vpk	Ipk	Vrms	Irms	P	Q	S	Cosφ	Freq Total	Energy	Energy +	Energy -	Outpul Value	Output Type
12345678	2015/03/12-14-23-25	0	270	0	123		85,7			0,91	52	21	0			
12345678	2015/03/12-14-23-26	0	270	0	123		88,3			0,92	52,6	21	0			
12345678	2015/03/12-14-23-27	0	273	0	123		87,8			0,92	52,4	21	0			
12345678	2015/03/12-14-23-28	0	273	0	123		88,1			0,93	52,1	21	0			

The ENERGY Plus provides, on a local memory type PEN DRIVE USB (USB KEY) connected to the module via the microusb port, a series of information concerning the operation of the module, alarm status, type of input, the output type, the reading of the measured data, the measure of the output value from the module.

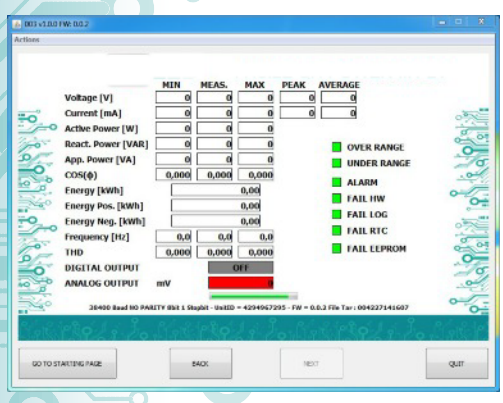
For each row correspond to a precise time reference. The module is equipped with an RTC Real Time Clock powered by a backup battery that lets you record data with YEAR / MONTH / DAY / HOUR-MIN-SEC.

The first number listed is the **SERIAL NUMBER** of the module, which allows it to be uniquely identified.

The second column give you information about: **DATE** (YEAR / MONTH / DAY / HOUR-MIN-SEC).

It is then reported the **STATUS ID** (Registry STATE) in binary mode to 16 bit. The binary number corresponds to the Modbus register 40005 that represents the state of the machine (Status: bit 0 = fail global, bit 1 = alarm, bit 2 = over range, bit 3 = under range, bit 4 = ?, bit 5 = dout status, bit 6 = fail hw, bit 7 = fail log, bit 8 = fail rtc, bit 9 = fail eeprom).

The following coloumns are **Vpk, Ipk, Vrms, Irms, Active Power (P), Reactive Power (Q), Apparent Power (S), Cosφ, Frequency, Energy Total, Energy +, Energy -, Output Value, Output type** (bit 0=Voltage/Current, bit 1-4=input Vrms, Irms, Active Power, Reactive Power, Apparent Power, Cosφ, Frequency, bit 5 = fail ur, bit 6 = fail or, bit 7 = fail hw, bit 8 = fail log, bit 9 = fail rtc, bit 10 = fail eeprom, bit 11 = fail alarm, bit 12-13 = 1 threshold over/1 threshold min/2 thresholds external/2 threshold internal, bit 14 = Manual mode), this value follows the setting made via software or via RS485.

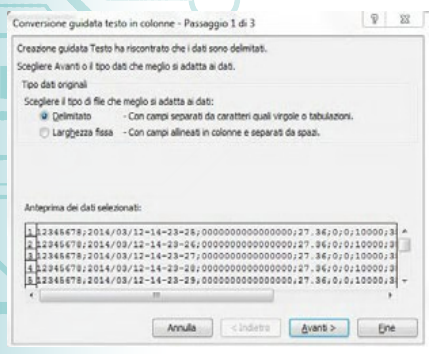


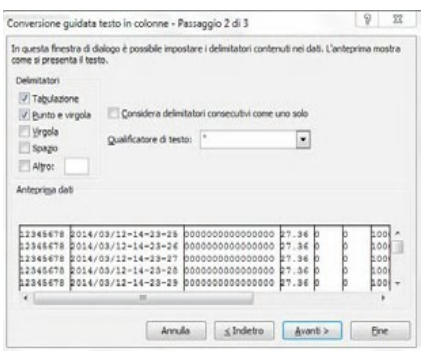
LIVE DATA USING SOFTWARE

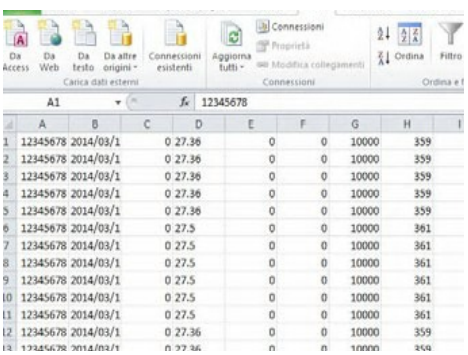
once confirmed the configuration, the software allow you to see the data reading by the device directly. Please remind that you have to supply the device by external power supply .

HOW TO IMPORT LOG DATA FROM EXCEL VERSION BEFORE 2003:

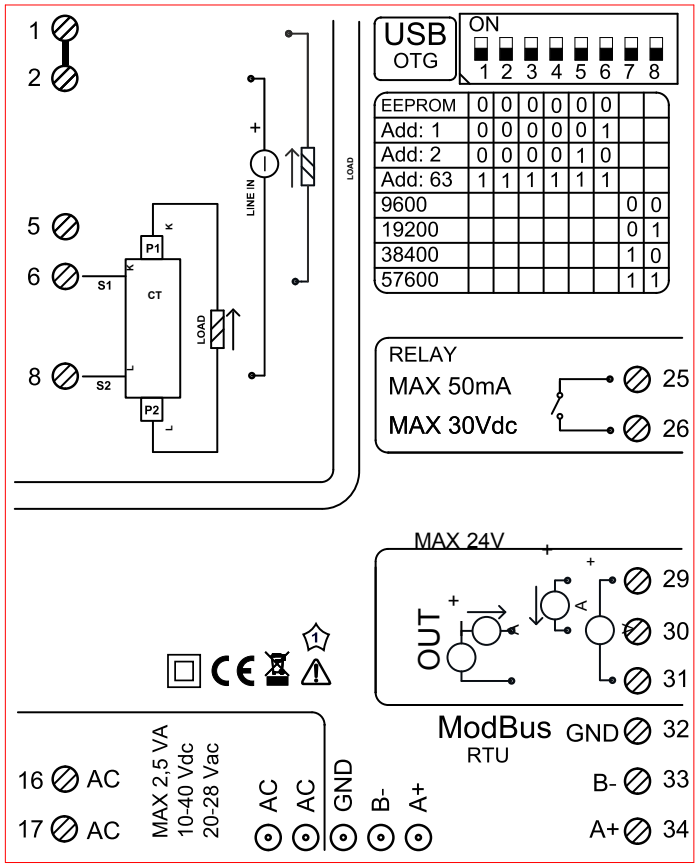
it's possible to import the data stored on the USB Memory Stick at any time (even if the log is not finished). Once you open the file with Excel (or Open Office), you will have to act on the functionality of the program for wrapping the data as described above. To do this, you can perform the following steps: select the first column, go to the option data, click on TEXT COLUMN, then choose the option that provides for the separation of the data by tabs or commas, the next step endorse the option POINT and COMMA.







QUICK GUIDE



MODBUS ADDRESS CONFIGURATION AND BAUD RATE BY DIP-SWITCH

Through the dip-switch on the front panel of the module, you can change the Modbus address and baud rate.
In the case in which all the dip switches are set to zero, the module will take the calibration from EEPROM, otherwise it will take parameters from a dip-switch.
In order to assign addresses more than 62 assignments you need to take advantage of the interface software
In order to assign values of
baud rates different from those selectable dip you should take advantage of the interface software..
For changing the addresses and the baud rate it can also be done by writing directly on the related registers.

POWER SUPPLY

10...40 Vdc or 20...28 Vac - Connectors 16 and 17, or by T-BUS connector (optional tool) on the base of the module.

POWER SUPPLY by T-BUS CONNECTION (T-BUS connector required):

it is possible to mount the accessory T-BUS to carry both power and serial communication. The number of modules supported by the function of the power supply bus is used (check the absorption of the modules).

INTERFACE PROGRAM

It is the configuration software for ENERGY Plus module. The software is free and downloadable from the website . To communicate with the module you have to connect via USB port directly on your PC.
You can configure the module via RS485 using the registers' map on the website.

LEDS - FRONT SIGNALS:

Power: power presence on the device.
Fail: presence of a failure/error on the device. It is activated in the case have been activated by FAIL messages on software.
One or more events FAIL are active.
Rx, Tx: the module is communicating via RS485 (LED blinking).
Dout: digital output active.

MOUNTING INSTRUCTIONS:

To mount the card on DIN rail, we recommend to place the top of the form on the edge of the bar omega, then pushing the bottom until it clicks. The module is equipped with a slider fastening that will be pushed forward in order to ensure the perfect fastening of the module on the bar.

NOTE: through the hole on the case of ENERGY Plus (shown in the figure), you can access an internal DIP SWITCH. Turning up the "DIP 1" you can activate the dynamic terminating of the Modbus.

Modbus Registers Map

Register Name	Comment	Register Type	R/W	Default Value	Range	Modbus Address
Machine ID	Machine ID (1)	Unsigned short	R	3		**40001**
FW version	Firmware version (0)	Unsigned short	R			**40002**
STATUS	Status : bit 0 = fail global, bit 1 = alarm, bit 2 = overrange, bit 3 = underrange, bit 4= ?, bit 5=dout status, bit 6 = fail hw, bit 7=fail log, bit 8=fail rtc, bit 9=fail eeprom	Unsigned short	R/W		0...65535	**40005**
Output Value	mV or uA	Unsigned short	R/W		0...20000	**40006**
Digital Output	bit 0=disabled/enabled	Unsigned short	R/W	0		**40007**
Dip switch status	bit 0-7=dip switch status, pos 1=bit 7,..., pos 8=bit 0	Unsigned short	R/W			**40008**
Vrms	Voltage measurement rms (V)	Float (MSW)	R/W		0...10000	**40009** **40010**
Irms	Current measurement rms (mA)	Float (MSW)	R/W		0...14000	**40011** **40012**
P	Active Power Measurement (W)	Float (MSW)	R			**40013** **40014**
Q	Reactive Power Measurement (VAR)	Float (MSW)	R			**40015** **40016**
S	Apparent Power Measurement (VA)	Float (MSW)	R			**40017** **40018**
Cosφ	Cosφ Measurement	Float (MSW)	R		0...1	**40019** **40020**
Frequency	Frequency Measurement (Hz)	Float (MSW)	R			**40021** **40022**
THD	THD Measurement	Float (MSW)	R			**40023** **40024**
Energy	Totale Energy Measurement (Wh)	Float (MSW)	R/W			**40025** **40026**
Energy positive	Only positive Energy Measurement (Wh)	Float (MSW)	R/W			**40027** **40028**
Energy negative	Only negative Energy Measurement (Wh)	Float (MSW)	R/W			**40029** **40030**
V peak	Instantaneous Voltage Peak (V)	Float (MSW)	R/W			**40031** **40032**
I peak	Instantaneous Current Peak (mA)	Float (MSW)	R/W			**40033** **40034**
V MAX	Max RMS Voltage (V)	Float (MSW)	R/W			**40035** **40036**
V min	Min RMS Voltage (V)	Float (MSW)	R/W			**40037** **40038**
I MAX	Max RMS Current (mA)	Float (MSW)	R/W			**40039** **40040**
I min	Min RMS Current (mA)	Float (MSW)	R/W			**40041** **40042**
P MAX	Max RMS Active Power (W)	Float (MSW)	R/W			**40043** **40044**
P min	Min RMS Active Power (W)	Float (MSW)	R/W			**40045** **40046**
Q MAX	Max Reactive Power (VAR)	Float (MSW)	R/W			**40047** **40048**
Q min	Min Reactive Power (VAR)	Float (MSW)	R/W			**40049** **40050**
S MAX	Max Apparent Power (VA)	Float (MSW)	R/W			**40051** **40052**
S min	Min Apparent Power (VA)	Float (MSW)	R/W			**40053** **40054**
Cosφ MAX	Max Cosφ	Float (MSW)	R/W			**40055** **40056**

Modbus Register Map

Register Name	Comment	Register Type	R/W	Default Value	Range	Modbus Address
Cosφ min	Min Cosφ	Float (MSW)	R/W			**40057**
						40058
Frequency MAX	Max Frequency (Hz)	Float (MSW)	R/W			**40059**
						40060
Frequency min	Min Frequency (Hz)	Float (MSW)	R/W			**40061**
						40062
THD MAX	Max THD	Float (MSW)	R/W			**40063**
						40064
THD min	Min THD	Float (MSW)	R/W			**40065**
						40066
Vavg	V average (V)	Float (MSW)	R			**40067**
						40068
Iavg	I average (mA)	Float (MSW)	R			**40069**
						40070
Totalizer	Total Pulse Dout	UINT 32 (MSW)	R			**40071**
						40072
data L	Calibration data L	UINT 16	R			**40073**
data M	Calibration data M	UINT 16	R			**40074**
data H	Calibration data H	UINT 16	R			**40075**
Output Analog mode	bit 0=Voltage/Current, bit 1-4=input Vrms,Irms, Active Power, Reactive Power, Apparent Power, cos (Φ), Frequency, bit 5 = fail ur, bit 6 = fail or, bit 7 = fail hw, bit 8 = fail log, bit 9 = fail rtc, bit 10 = fail eeprom, bit 11 = fail alarm, bit 12-13 = 1 threshold over/1threshold under/2thresholds external/2 thresholds internal , bit 14= Manual mode	UINT 16	R/W	0		**40101**
Current Ratio	Current Ratio	Float (MSW)	R/W	1		**40102**
						40103
Output Analog Input Begin Scale	Output Analog Input Begin Scale	Float (MSW)	R/W	0		**40104**
						40105
Output Analog Input End Scale	Output Analog Input End Scale	Float (MSW)	R/W	300		**40106**
						40107
Output Analog Begin Scale	Output Analog Begin Scale	UINT 16	R/w	0		**40108**
Output Analog End Scale	Output Analog End Scale	UINT 16	R/W	10		**40109**
Delta ENERGY	Delta Energy (Wh) per pulse (50ms)	Float (MSW)	R/W	10		**40110**
						40111
Digital Output	bit 0=default value, bit 1 = fail ur, bit 2 = fail or, bit 3 = fail hw, bit 4 = fail log, bit 5 = fail rtc, bit 6 = fail eeprom, bit 7 = fail alarm, bit 8-9 = manual/pulse/fail, bit 10=low/high	UINT 16	R/W	0		**40112**
ALARM LOW	Alarm Low Trip value	Float (MSW)	R/W	0		**40113**
						40114
ALARM HIGH	Alarm High Trip value	Float (MSW)	R/W	0		**40115**
						40116
ALARM HYSTERESIS	Alarm Hysteresis value	Float (MSW)	R/W	0		**40117**
						40118
Modbus Address + Parity + StopBits	MSB modbus address, bit 0-1 = parity none/odd/even, bit 2=stop bits 1/2	UINT 16	R/W	260		**40119**
Modbus Baudrate	value 0=1200,1=2400,2=4800,3=9600,4=19200,5=38400,6 =57600,7=115200	UINT 16	R/W	5		**40120**
Log Mode	bit 0=disabled/enabled	UINT 16	R/W	0		**40121**
Log Sample time	Log sample time (s)	UINT 16	R/W	0		**40122**
Log name	Log name (15caratteri MAX)	UINT 16	R/W			**40123**
Log name	Log name (15caratteri MAX)	UINT 16	R/W			**40124**
Log name	Log name (15caratteri MAX)	UINT 16	R/W			**40125**
Log name	Log name (15caratteri MAX)	UINT 16	R/W			**40126**
Log name	Log name (15caratteri MAX)	UINT 16	R/W			**40127**
Log name	Log name (15caratteri MAX)	UINT 16	R/W			**40128**
Log name	Log name (15caratteri MAX)	UINT 16	R/W			**40129**
Log name	Log name (15caratteri MAX)	UINT 16	R/W			**40130**
RMS Filter	Coeff. Filter RMS (0.99990 – 0.99999)	Float (MSW)	R/W	0,99990		**40131**
						40132
Average measurement filter	Average measurement filter (0.99990 – 0.99999)	Float (MSW)	R/W	0,9990		**40133**
						40134

Modbus Registers Map

Register Name	Comment	Register Type	R/W	Default Value	Range	Modbus Address
Cut off Voltage	Cut off Voltage (V)	Float (MSW)	R/W	0		**40135**
						40136
Cut off Current	Cut off Current (mA)	Float (MSW)	R/W	0		**40137**
						40138
Cut off P	Cut off P (W)	Float (MSW)	R/W	0		**40139**
						40140
Vrms SW	Vrms (V)	Float (LSW)	R			**40201**
						40202
Irms SW	Irms (mA)	Float (LSW)	R			**40203**
						40204
P SW	Active Power (W)	Float (LSW)	R			**40205**
						40206
Q SW	Reactive Power (VAR)	Float (LSW)	R			**40207**
						40208
S SW	Apparent Power (VA)	Float (LSW)	R			**40209**
						40210
Cosφ SW	Cosφ	Float (LSW)	R			**40211**
						40212
Frequency SW	Frequency (Hz)	Float (LSW)	R			**40213**
						40214
THD SW	THD	Float (LSW)	R			**40215**
						40216
TOTAL ENERGY SW	Total Energy (Wh)	Float (LSW)	R/W			**40217**
						40218
Positive Energy SW	Positive Energy (Wh)	Float (LSW)	R/W			**40219**
						40220
Negative Energy SW	Negative Energy (Wh)	Float (LSW)	R/W			**40221**
						40222
Vpeak SW	Vpk (V)	Float (LSW)	R/W			**40223**
						40224
Ipeak SW	Ipk (mA)	Float (LSW)	R/W			**40225**
						40226
Vrms MAX SW	Vrms MAX (V)	Float (LSW)	R/W			**40227**
						40228
Vrms min SW	Vrms MIN (V)	Float (LSW)	R/W			**40229**
						40230
Irms MAX SW	Irms MAX (A)	Float (LSW)	R/W			**40231**
						40232
Irms min SW	Irms MIN (mA)	Float (LSW)	R/W			**40233**
						40234
P MAX SW	Active Power MAX (W)	Float (LSW)	R/W			**40235**
						40236
P min SW	Active Power MIN (W)	Float (LSW)	R/W			**40237**
						40238
Q MAX SW	Reactive Power MAX (VAR)	Float (LSW)	R/W			**40239**
						40240
Q min SW	Reactive Power MIN (VAR)	Float (LSW)	R/W			**40241**
						40242
S MAX SW	Apparent Power MAX (VA)	Float (LSW)	R/W			**40243**
						40244
S min SW	Apparent Power MIN (VA)	Float (LSW)	R/W			**40245**
						40246
Cosφ MAX SW	Cosφ MAX	Float (LSW)	R/W			**40247**
						40248
Cosφ min SW	Cosφ min	Float (LSW)	R/W			**40249**
						40250
Frequency MAX SW	Frequency MAX (Hz)	Float (LSW)	R/W			**40251**
						40252
Frequency MIN SW	Frequency MIN (Hz)	Float (LSW)	R/W			**40253**
						40254

Modbus Registers Map

Register Name	Comment	Register Type	R/W	Default Value	Range	Modbus Address
THD MAX SW	THD MAX	Float (LSW)	R/W			**40255**
						40256
THD min SW	THD MIN	Float (LSW)	R/W			**40257**
						40258
Vrms x 100	Vrms (V) x 100	SIGNED LONG(MSW)	R			**40301**
						40302
Irms x 100	Irms (mA) x 100	SIGNED LONG(MSW)	R			**40303**
						40304
P x 100	Active Power (W) x 100	SIGNED LONG(MSW)	R			**40305**
						40306
Q x 100	Reactive Power (VAR) x 100	SIGNED LONG(MSW)	R			**40307**
						40308
S x 100	Apparent Power (VA) x 100	SIGNED LONG(MSW)	R			**40309**
						40310
Cosφ x 100	Cosφ x 100	SIGNED LONG(MSW)	R			**40311**
						40312
Frequency x 100	Frequency (Hz) x 100	SIGNED LONG(MSW)	R			**40313**
						40314
THD x 100	THD x 100	SIGNED LONG(MSW)	R			**40315**
						40316
ENERGY x 100	Energy (Wh) x 100	SIGNED LONG(MSW)	R/W			**40317**
						40318
Positive Energy x 100	Positive Energy (Wh) x 100	SIGNED LONG(MSW)	R/W			**40319**
						40320
Negative Energy x 100	Negative Energy (Wh) x 100	SIGNED LONG(MSW)	R/W			**40321**
						40322
V peak x 100	Vpk (V) x 100	SIGNED LONG(MSW)	R/W			**40323**
						40324
I peak x 100	Ipk (mA) x 100	SIGNED LONG(MSW)	R/W			**40325**
						40326
Vrms MAX x 100	Vrms MAX (V) x 100	SIGNED LONG(MSW)	R/W			**40327**
						40328
Vrms min x 100	Vrms MIN (V) x 100	SIGNED LONG(MSW)	R/W			**40329**
						40330
Irms MAX x 100	Irms MAX (mA) x 100	SIGNED LONG(MSW)	R/W			**40331**
						40332
Irms min x 100	Irms MIN (mA) x 100	SIGNED LONG(MSW)	R/W			**40333**
						40334
P MAX x 100	Active Power MAX (W) x 100	SIGNED LONG(MSW)	R/W			**40335**
						40336
P min x 100	Active Power MIN (W) x 100	SIGNED LONG(MSW)	R/W			**40337**
						40338
Q MAX x 100	Reactive Power MAX (VAR) x 100	SIGNED LONG(MSW)	R/W			**40339**
						40340
Q min x 100	Reactive Power MIN (VAR) x 100	SIGNED LONG(MSW)	R/W			**40341**
						40342
S MAX x 100	Apparent Power MAX (VA) x 100	SIGNED LONG(MSW)	R/W			**40343**
						40344
S min x 100	Apparent Power MIN (VA) x 100	SIGNED LONG(MSW)	R/W			**40345**
						40346
Cosφ MAX x 100	Cosφ MAX x 100	SIGNED LONG(MSW)	R/W			**40347**
						40348
Cosφ min x 100	Cosφ MIN x 100	SIGNED LONG(MSW)	R/W			**40349**
						40350
Frequency MAX x 100	Frequency MAX (Hz) x 100	SIGNED LONG(MSW)	R/W			**40351**
						40352
Frequency min x 100	Frequency MIN (Hz) x 100	SIGNED LONG(MSW)	R/W			**40353**
						40354

Modbus Registers Map Q

Register Name	Comment	Register Type	R/W	Default Value	Range	Modbus Address
THD MAX x 100	THD MAX x 100	SIGNED LONG(MSW)	R/W			**40355**
						40356
THD min x 100	THD MIN x 100	SIGNED LONG(MSW)	R/W			**40357**
						40358
RTC YEAR	RTC : year (2000-2099)	UINT16	R/W			**41001**
RTC MONTH	RTC : month (1-12)	UINT16	R/W			**41002**
RTC DAY	RTC : day month (1-31)	UINT16	R/W			**41003**
RTC HOUR	RTC : hour (0-23)	UINT16	R/W			**41004**
RTC MINUTE	RTC : minute (0-59)	UINT16	R/W			**41005**
RTC SEC	RTC : second (0-59)	UINT16	R/W			**41006**

REMARKS:

- Modbus connections: A+ and B- as per Modbus RTU standards;
- Modbus Register reference: with reference to the logical address, for ex. 40010, corresponds to physical address n°9 as per Modbus RTU standard;
- Dip Switch Settings: the setting is not enabled if the first sixth dip-switches are set to 000000, the rest of dip-switch are disabled. All settings coming from EEPROM.
- Modbus functions supported: 3 (Read multiple registers), 6 (Write single), 16 (Write multiple).
- **Any changes made by dip-switch required to switch off the power supply**

PANTEC