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CURRENT / VOLTAGE CONVERTER
4 way isolated - RS485 MODBUS- Datalogger

QA-VI

MADE IN **ITALY** CE UKCA

ISOLATED V/I SIGNAL CONVERTER, **USB configurable**, DIN rail mounting, **4-way galvanically isolated**, universal power supply AC/DC, **Programmable alarm contact**, **RS485 Modbus**. **DATALOGGING via USB** with pen drive stick memory and download storage data on excel importable files. **RTC Real Time Clock** integrated.
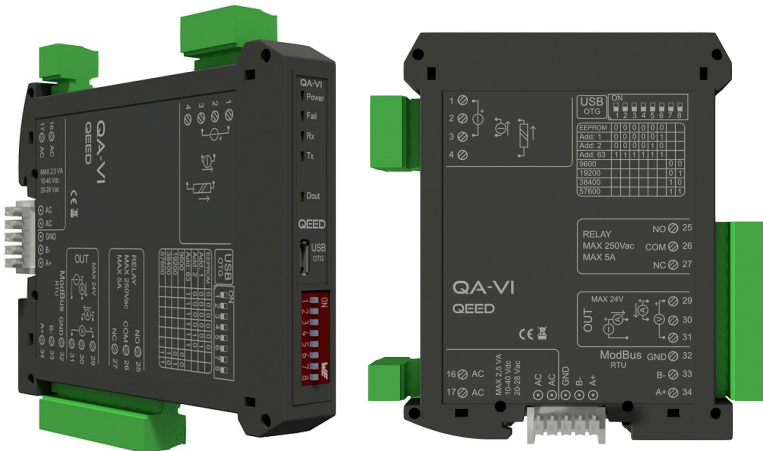
The images/schemes proposed are to be considered indicative and not binding

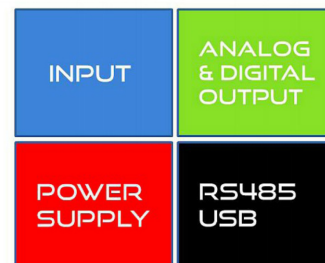|	
POWER SUPPLY	10..40 Vdc, 20-28 Vac, 50-60 Hz
RETRASMISSION OUTPUT	On isolated analog output, Voltage and Current (impressed) programmable; Active or Passive supply output. Sensor power supply 13 Vdc, 30 mA max
ABSORPTION	Maximum 2 VA
PROTECTION INDEX	IP20
ACCURACY	0,1% F.S.
RESOLUTION REJECTION	16 bit
THERMAL STABILITY AT 25°C	50-60 Hz
WORKING TEMPERATURE	< 100 ppm/°C -
STORAGE TEMPERATURE	15...+65°C
ISOLATION	-40°C... +85°C
	Input, analog and digital output, serial output RS485 and USB port, Power supply, are 4-way galvanically isolated at 1,5 kV
HUMIDITY	10...90% non condensing
ALTITUDE	Up to 2000 m s.l.m.
MOUNTING	DIN rail mounting with removable terminals, RS485 bus and Supply connection ready on the base of module (connector not included, on request)
CONNECTIONS	Removable terminals 5,08 mm
CE STANDARDS	EN61000-6-4/2006 + A1 2011; EN64000-6-2/2005; EN61010-1/2010
DIMENSIONS	17,5 x 100 x 112 mm (terminals excluded)
DATA LOGGER	Non-volating memory. Log on USB OnTheGo port by Pen Drive stick memory. The software FACILE QA-VI (free of charge) allow you to configure Log, all conversion parameters, set contact alarm, set Modbus address. RTC Real Time Clock integrated
CONFIGURATION	By free software FACILE QA-VI to configure all of the conversion parameters like span, zero, alarm contact and log via USB port or via RS485. Dip-switch for setting modbus address and baudrate

QA-VI

CURRENT / VOLTAGE CONVERTER
4 way isolated - RS485 MODBUS- Datalogger

INPUT

VOLTAGE: up to 10 Vdc programmable, input impedence 100 kohm, 1 mV resolution.
CURRENT: up to 20 mA programmable, input impedence 20 ohm, max resolution 2 µA.

OUTPUT

CURRENT: 0...20 mA programmable, max load resistence 600 kOhm.
VOLTAGE: 0...10 V programmable, min load resistence 2 kOhm.
CONTACT ALARM: 5 A, 230 Vac, SPDT relay fully programmable by FACILE QA-VI.
RS485 MODBUS: bus connection on the base of module by adapter (option) or on terminals. Dip-switch for setting address and baudrate.

4-WAY GALVANIC ISOLATION

INPUT	ANALOG & DIGITAL OUTPUT
POWER SUPPLY	RS485 USB

4...20mA
0...10V

FIELD SENSOR

→ Analog output
→ Contact Alarm
→ RS485 Modbus
→ DATALOGGER

ENGLISH

1 06 2023

INSTRUCTION MANUAL   QA-VI

DESCRIPTION:

The QA-VI is a 4-way isolated Voltage or Current converter, with an analog input and three different outputs. The module has a programmable analog output (voltage or current), one digital output (5 A, SPDT relay) and one serial RS485 slave output. Thanks to the presence of the RS485 serial port can perform advanced functions such as I/O Module with Modbus RTU protocol. The QA-VI behaves as a slave device by placing n°1 AI, n°1 AO and n°1 DO.
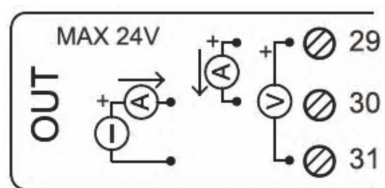
ELECTRICAL CONNECTIONS:
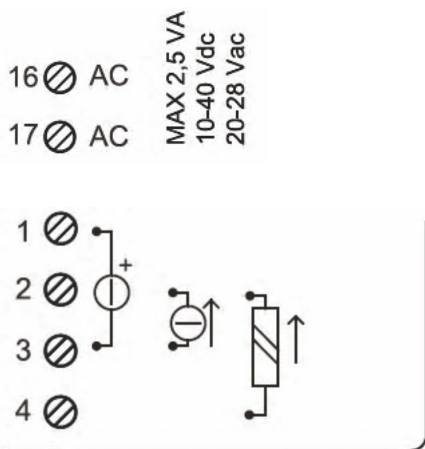
POWER SUPPLY:

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).

ANALOG INPUT:

for ACTIVE current input use the connectors 2 (positive) and 3. For PASSIVE current input use connectors 2 (positive) and 4 . For Voltage input use connectors 1 (positive) and 3.
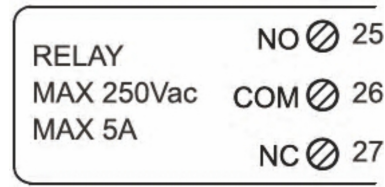
ANALOG OUTPUT:

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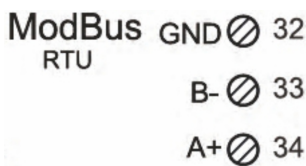
DIGITAL OUTPUT:

SPDT Relay Output. Connect the terminals 25 Normally Open and 27 Normally Closed. The default setting is Normally Open (NO).

SERIAL OUTPUT RS485 Modbus RTU:

available on terminals 32 GND, 33 (B-), 34 (A+), or by using T-BUS connector to be mounted on the base of the module. To configure the device use the software FACILE QA-VI or by direct connection via RS485 using the Modbus.

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).
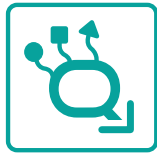
PROGRAMMING THE DEVICE BY SOFTWARE FACILE   QA-VI

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

- via the interface program free FACILE QA-VI through the microUSB port on the module or via RS485 connection;

- via the RS485 serial connection (from terminal or T-Bus).

The QA-VI 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.

To use the program FACILE QA-VI, go on our website **www.qeed.it** section DOWNLOAD / SOFTWARE AND DRIVERS / SIGNAL CONVERTERS / QA-VI: CONFIGURATION SOFTWARE, you can install the program on your PC. Once downloaded, install it in the desired directory and run the program.
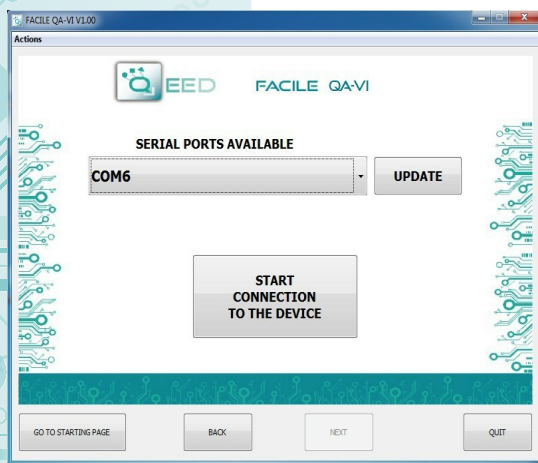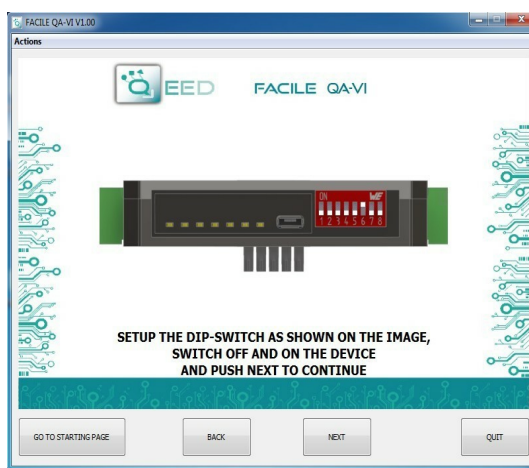
It is possible to use the program without connecting to the module, in this mode you can SAVE the configuration on your PC, which can then be sent to the QA-VI at a later time.

SERIAL PORTS AVAILABLE:

check the available COM ports, press the UPDATE button. Your PC will assign a virtual COM connection with the QA-VI. 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.

ANALOG INPUT:

on the left you find the pull-down menu where you can select the type of input signal: VOLTAGE, CURRENT. The QA-VI sampling data every 100 ms, you can choose to mediate the input value up to a maximum of 32 samples.
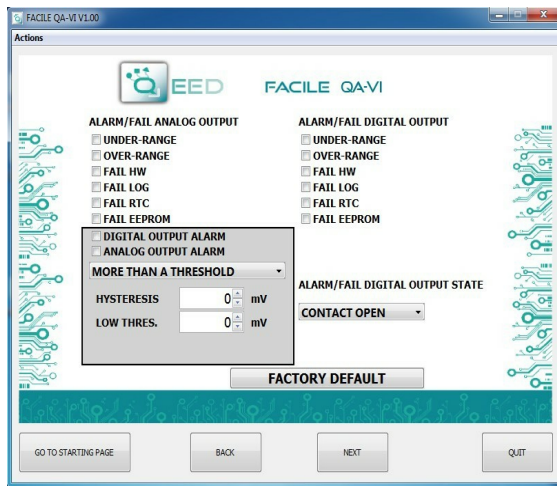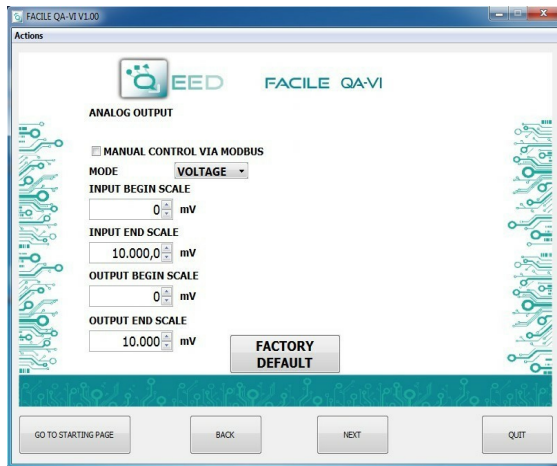
PROGRAMMING THE DEVICE BY SOFTWARE FACILE   QA-VI

ANALOG OUTPUT:

you can associate the analog output to a single INPUT (you have already performed the selection in the previous screen). The mode of the analog output could be VOLTAGE or CURRENT. The QA-TEMP has the ability to scale the inputs and outputs as required, then select the range of measurement inputs (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 you make will change the units of the values in the input and output.

If you select MANUAL CONTROL VIA MODBUS, you can manage the module as an AO (Analog Output) or a DO (Digital Output), thus freeing the analog output and digital input selected.

The analog output will be handled via RS485 Modbus RTU (see register map).

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 THRESHOLDS, BETWEEN TWO THRESHOLDS. We therefore have the possibility to insert the values of THRESHOLD (Upper and Lower) and the value of HYSTERESIS. In the case where it is selected the value of a **Higher threshold** 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 switch off. 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. The alarm can be associated with the state of the digital input (HIGH or LOW) for up to 15 cycles per minute. STATE DIGITAL ALARM / FAIL allows you to define the status of contact in

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).

EEPROM FAIL: 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:

in the right side of the window you can enable the feature LOG for the acquisition of data on usb pendrive. You can assign a name to 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.

The QA-VI provides, on a local memory type PEN DRIVE USB (USB KEY) connected to the module via the microUSB, 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.

EXAMPLE OF LOG FILE: 0…10 V analog input , one sample per minute, 4-20 mA output.

Serial Number	Data (yyyy-mm-dd) & Time	Status ID	Analog Input	Analog Output	Input type	Output type
12345678	2014/03/12-14-23-25	0	5.00	12000	0	1
12345678	2014/03/12-14-24-25	0	6.00	13600	0	1
12345678	2014/03/12-14-25-25	0	6.00	13600	0	1
12345678	2014/03/12-14-26-25	0	7.00	15200	0	1

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 1 = fail global, bit 2 = alarm, bit 3 = OVER RANGE, bit 4 = UNDER RANGE, bit 5 = din status, bit 6 = dout status, bit 7 = fail hw, bit 8 = fail log, bit 9 = fail RTC, bit 10 = fail EEPROM, bit 11 = fail sensor).

The fourth column we find the information from **ANALOG INPUT:** voltage or current.

ANALOG OUTPUT: the value uA or in mV output of the module. This value follows the setting made via FACILE .

INPUT TYPE: refered to the **Modbus Register 101** that indicate the type of the Input sensor (Analog Input type: value 0 = Voltage, 1 = Current).

OUTPUT TYPE: refered to the **Modbus Register 106** that indicate the output configuration (Output Analog mode: bit 0=Voltage/Current, bit 1-2=analog input,frequency, period, totalizer, bit 3 = fail UNDER RANGE, bit 4 = fail OVER RANGE, bit 5 = fail hardware, bit 6 = fail log, bit 7 = fail RTC, bit 8 = fail EEPROM, bit 9 = fail alarm, bit 10-11 = 1 threshold high/1 threshold low/2 thresholds external/2 thresholds internal , bit 12 = Manual mode).

AVAILABLE ON THE WEBSITE www.qeed.it the MACRO for charge the .csv file logged directly on a Excel file

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.
Following the procedure as soon as you get the data displayed in columns.
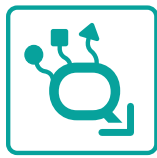
MODBUS REGISTER MAP

Q A - V I

REMARKS:
- Modbus connections: A+ and B-**;**
- Modbus Register reference: with reference to the logical address, for ex. 40010, corresponds to physical address n°9 as per Modbus RTU standard**;**
- 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.**

Q A - V I

MODBUS REGISTER MAP

Register Name	Comment	Register type	R/W	Default Value	Range	Modbus Address
Machine ID	Machine ID	UNIT16 UNIT16	R	11		**40001**
Firmware ID	Firmware ID	UNIT16	R	0		**40002**
ID	Serial Number		R		0...65535	**40003 (MSW)**
						40004 (LSW)
Status	Status Register: **bit 0**= fail global, **bit 1**=alarm, **bit 2** = over range, **bit 3** = under range, **bit 4** din status, **bit 5** dout status, **bit 6** fail hw, **bit 7** fail log, **bit 8** fail rtc, **bit 9** fail eeprom, **bit 10**=fail sensor	UNIT16	R			**40005**
Input Value	Input Value Normalized	UNIT16	R		0...10000	**40006**
	NOT USED					**40007**
						40008
Output Value	Output Value (mV or uA)	UNIT16	R/W		0...65535	**40009**
Input Value	Input Value	FLOAT (MSW)	R			**40010**
						40011
	NOT USED					**40012**
						40013
	NOT USED					**40014**
						40015
	NOT USED					**40016**
						40017
	NOT USED					**40018**
						40019
Digital Output	Digital Output: bit 0= disabled/enabled	UNIT16	R/W			**40020**
Dip-switch status	DIPSW status: **bit 0-7**=dip switch status, pos 1=bit 8,..., pos 8=bit 1	UNIT16	R			**40021**
	NOT USED					**40022**
						40023
Analog input type	Analog Input type: value 0=Voltage, 1=Current		R/W	0	0...1	**40101**
	NOT USED					**40102**
Analog input filter	Temperature mode : **bit 0-1** = unit measure °C/°F, **bit 7-15** analog filter value					**40103**
	NOT USED					**40104**
	NOT USED					**40105**
Output Analog mode	Output Analog mode: **bit 0** =Voltage/Current, **bit 1-2**=analog input, frequency, period, totalizer, **bit 3** = fail ur, **bit 4**= fail or, **bit 5** = fail hw **bit 6**= fail log, **bit 7** = fail rtc, **bit 8** = fail eeprom, **bit 9** = fail alarm, **bit 10-11** = 1 threshold greater/1 threshold less/2 thresholds external/2 thresholds inside, **bit 12**=Manual mode	UNIT16	R/W	0		**40106**

MODBUS REGISTER MAP QA-VI

Register Name	Comment	Register type	R/W	Default Value	Range	Modbus Address
Output Analog Input Begin scale	Output Analog Input Begin Scale	FLOAT (MSW)	R/W	0.0		40107 40108
Output Analog Input End scale	Output Analog Input End Scale	FLOAT (MSW)	R/W	10000.0		40109
						40110
	Output Analog Begin Scale	UNIT16	R/W	0	0...65535	40111
Output Analog Begin scale						
Output Analog End scale						
	Output Analog End Scale	UNIT16	R/W	10000	0...65535	40112
Digital Output	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= fail din, bit 9= din/din inv, bit 10 =low/high	UNIT16	R/W	0		40113
Alarm Low Trip value						
Alarm High Trip value	Alarm Low trip value	FLOAT (MSW)	R/W	0.0		40114 40115
Alarm Hysteresis value	Alarm High trip value	FLOAT (MSW)	R/W	0.0		40116 40117
	Alarm Hysteresys value	FLOAT (MSW)	R/W	0.0		40118
Modbus Baudrate	Modbus Baudrate : value 0=1200, 1=2400, 2=4800, 3=9600, 4=19200, 5=38400, 6=57600, 7=115200					40119
Modbus Address	Modbus address +parity +stopbits : MSB Modbus address, bit 0-1=parity none/odd/even, bit 2=stop bits 1/2	UNIT16	R/W	256		40120
Log mode	Log mode : bit 0-1=disable/enable/old	UNIT16	R/W	0		
		UNIT16	R/W	3	0...7	40121
						40122
Log sample time	Log sample time (sec)	UNIT16	R/W	1	1...65535	40123
Log name	Log name 15 letters max	UNIT16	R/W	0		40124
Log name	Log name 15 letters max	UNIT16	R/W	0		40125
Log name	Log name 15 letters max	UNIT16	R/W	0		40126
Log name	Log name 15 letters max	UNIT16	R/W	0		40127
Log name	Log name 15 letters max	UNIT16	R/W	0		40128
Log name	Log name 15 letters max	UNIT16	R/W	0		40129
Log name	Log name 15 letters max	UNIT16	R/W	0		40130
Log name	Log name 15 letters max	UNIT16	R/W	0		40131
RTC Year	RTC Year	UNIT16	R/W		2000...2099	41001
RTC Month	RTC Month	UNIT16	R/W		1...12	41002
RTC Day	RTC Day	UNIT16	R/W		1...31	41003
RTC Hour	RTC Hour	UNIT16	R/W		1...23	41004
RTC Minute	RTC Minute	UNIT16	R/W		0...59	41005
RTC Second	RTC Second	UNIT16	R/W		0...59	41006
Command	Command : value 1=Reset, 2=Save Cfg to EEPROM, 3=Set factory CFG	UNIT16	R/W			42001
Command 1	Command parameter 1	UNIT16	R/W			42002
Command 2	Command parameter 2	UNIT16	R/W			42003

Upgrade FIRMWARE

The QA-VI is designed to upgrade the firmware via the USB port using a standard pen drive where the file will be placed.

The firmware will allow you to implement the functionality of the card and correct any anomalies that may occur.

In order to upgrade the firmware simply, remove power from the module, insert the pen drive with the file, restore power, at this point the card will automatically discharge the file and update the firmware without altering the configuration loaded during programming.

During the update phase the LED light will be intermittent FAIL.

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QA-VI

EEPROM	0	0	0	0	0			
Add: 1	0	0	0	0	0	1		
Add: 2	0	0	0	0	1	0		
Add: 63	1	1	1	1	1	1		
9600							0	0
19200							0	1
38400							1	0
57600							1	1

RELAY MAX 250Vac MAX 5A — NO ⊘ 25, COM ⊘ 26, NC ⊘ 27

MAX 24V — OUT — 29, 30, 31

ModBus RTU — GND ⊘ 32, B- ⊘ 33, A+ ⊘ 34

QA-VI QEED

CE UKCA

MAX 2,5 VA 10-40 Vdc 20-28 Vac

16 ⊘ AC
17 ⊘ AC

AC AC GND B- A+

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 FACILE QA-VI In order to assign values of baud rates different from those selectable dip you should take advantage ofthe interface software FACILE QA-VI.
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 FACILE QA-VI

FACILE QA-VI is the configuration software for QA-VI module.
The software is free and downloadable from the website: www.qeed.it
To communicate with the module you have to connect via USB port directly on your PC.
It is possible to configure the module via RS485 through the register map contained on this manual.

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 FACILE QA-VI. 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 QA - VI (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.