![advanticsys logo]

AIM-8
User Manual

10/2024

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1. Abbreviations

Xn – A number representing a socket. This information is provided for the manufacturer's purposes and is used in data schemas and connection diagrams.

Ethernet – A family of computer networking technologies for local area networks (LANs), commercially introduced in 1980. Standardized in IEEE 802.3, Ethernet has largely replaced competing wired LAN technologies. This interface is used for connecting to a LAN (Local Area Network).

IP address – An Internet Protocol (IP) address is a numerical label assigned to devices participating in a network that uses the Internet Protocol for communication between its nodes.

TCP/IP – Transmission Control Protocol, used for communication between computers, serves as the standard for transmitting data over networks and as the basis for standard Internet protocols.

MAC address – Media Access Control address, a unique identifier assigned to most network adapters.

UART – A Universal Asynchronous Receiver/Transmitter is a type of "asynchronous receiver/transmitter," a part of computer hardware that translates data between parallel and serial forms. UARTs are commonly used in conjunction with communication standards such as EIA RS-232, RS-422, or RS-485. Records (UARTx) on top of the enclosure are also used as the serial interface number.

GND – Ground wire contact.

RS232 – The traditional name for a series of standards for serial binary single-ended data and control signals connecting a DTE (Data Terminal Equipment) and a DCE (Data Circuit-terminating Equipment). It is commonly used in computer serial ports. The standard defines the electrical characteristics and timing of signals, the meaning of signals, and the physical size and pin-out of connectors. RS232 interfaces are prepared for the connection of peripheral devices (e.g., energy meters, controllers, machines, etc.).

TD – Contact for the transfer data wire of the RS232 socket.

RD – Contact for the read data wire of the RS232 socket.

DTR – Contact for the Data Transmit Ready wire of the RS232 socket.

RS485 – A standard defining the electrical characteristics of drivers and receivers for use in balanced digital multipoint systems. Published by the ANSI Telecommunications Industry Association/Electronic Industries Alliance (TIA/EIA), digital communications networks implementing the EIA-485 standard can be used effectively over long distances and in electrically noisy environments. Multiple receivers may be connected to such a network in a linear, multi-drop configuration. RS485 interfaces are prepared for the connection of peripheral devices (e.g., energy meters, controllers, machines, etc.).

A+ – Contact for the positive wire of the RS485 socket.

B- – Contact for the negative wire of the RS485 socket.

USB – Universal Serial Bus is an industry standard that defines the cables, connectors, and protocols used for connection, communication, and power supply between computers and electronic devices. The USB Type-B socket is prepared for connection to a PC (Personal Computer). The USB Type-A socket is prepared for connection to peripheral devices (e.g., memory sticks, etc.).

Socket – An endpoint of a bidirectional inter-process communication flow across an Internet Protocol-based computer network, such as the Internet.

Status – Device status indicating LED.

Uoutput – Status of power for the external device indicating LED.

TX/RX – Data transfer/receive indicating LED.

TXD – Data transfer LED indicator.

RXD – Data receiving LED indicator.

Central computer – A server or computer to which data can be sent.

2. Preface

2.1 Symbols

International electrical symbol list. Some or all symbols can be used on controller marking or in this user manual.

Symbol	Explanation
$C \in$	With the **CE** marking on a product the manufacturer ensures that the product conforms with the essential requirements of the applicable **EC** directives.
⎓	**DC** (Direct Current)
⚠	Caution
⏚	Grounding
⬤	LED indicator
1	Contact number on plug
RoHS	Directive on the restriction of the use of certain hazardous substances in electrical and electronic equipment 2002/95/EC. Commonly referred to as the Restriction of Hazardous Substances Directive or **RoHS**)
🗑	Waste Electrical and Electronic Equipment Directive

2.2 Safety instructions

To install and set up the device, special technical knowledge is required. Contact the seller or certified professionals to connect and set up the device!

Before connecting to the power supply, ensure that:
1. The device is not damaged (no cracks, melted, broken, or exposed areas).
2. The device is used with the correct cables of appropriate thickness.
3. The device and antenna are installed indoors.
4. The device is intended for supply from a Limited Power Source (LPS) with a current rating of over-current protective devices not greater than 2A.
5. The highest transients on the DC secondary circuit of the LPS, derived from the AC main supply, shall be less than 71V peak.
6. The associated equipment (AE), such as the PC and PSU (LPS), shall comply with the requirements of Standard EN 60950-1.
7. The device is dry.
8. Ambient temperature and humidity are within the normal range.
9. Other types of devices (e.g., sensors, etc.) are connected correctly according to the manufacturer's regulations.
10. The end of stranded conductors shall not be consolidated by soft soldering and must be terminated properly.
11. The device, PC, and other peripheral devices must be strictly connected through a double-pole breaker (with a current break less than 5A and a space between breaker contacts greater than 3mm). The pole breaker must be part of the building's wiring and located in an accessible place with proper markings.

Don't use:
- The device in open water (in the rain or if water is splashing on the controller or connected devices).
- The device if the enclosure, connected cables, or other connected devices are damaged.
- External backup batteries

⚠️ **Use the device according to the manufacturer's regulations; otherwise, you may damage the controller or other devices, and in such a case, the manufacturer's warranty may not be valid.**

⚠️ **If you suspect that the device is not operating correctly or has visible issues, please contact the manufacturer or your distributor for inspection or maintenance.**

2.3 Connecting to device

The USB port is used for local configuration of the device. It is also possible to configure the device via Ethernet or any of the UARTs if they are used as Modbus slaves. All configuration is done using the Modbus protocol and the device configuration tool software, which can be downloaded from the manufacturer's website.

Use a USB Type-A to Type-B cable to connect the device to a computer:
- a) To device: USB Type-B
- b) To computer: USB Type-A

If the USB drivers are not installed automatically, you need to install them manually. Follow these steps:

1. In the search box, type *Device Manager* and then click on it.
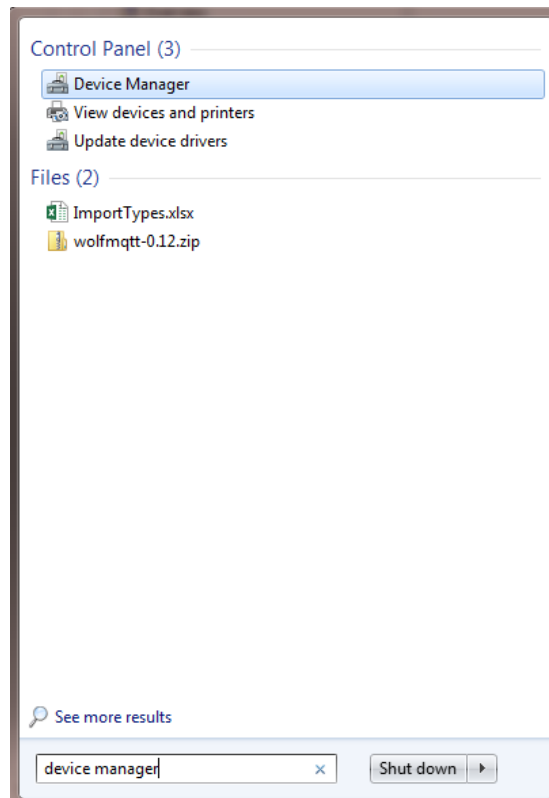
2. Double-click the device category, and then double-click the device you want.

3. Click *Update Driver* and follow the instructions.
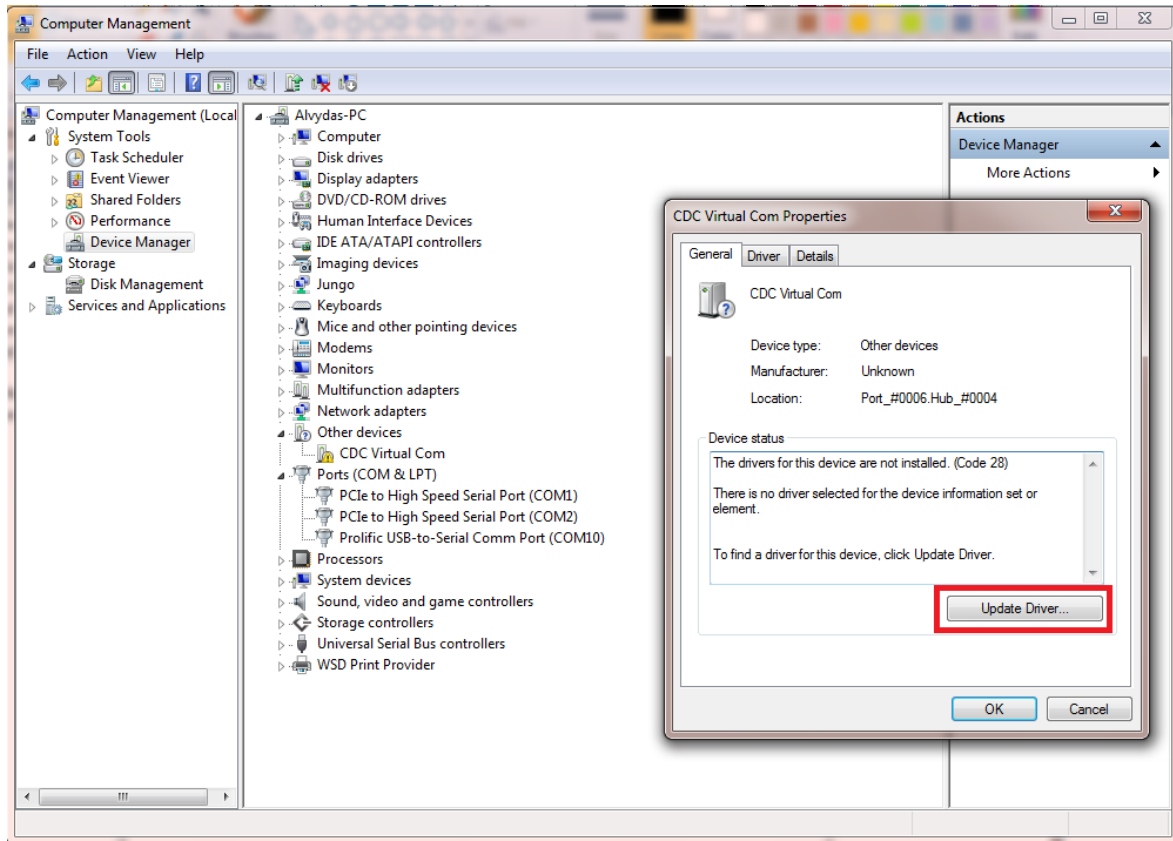
4. Select *Browse my computer for driver software*, click *Browse*, and select the configuration software folder.

5. Click *Next*.

6. Wait while Windows installs the driver. If you see the message, "Windows can't verify the publisher," select *Install this driver software anyway*.

7. After installation, you will see something like "EVK1XXX Virtual Com Port" and a COM port number. Use this COM port to connect with the configuration tool.
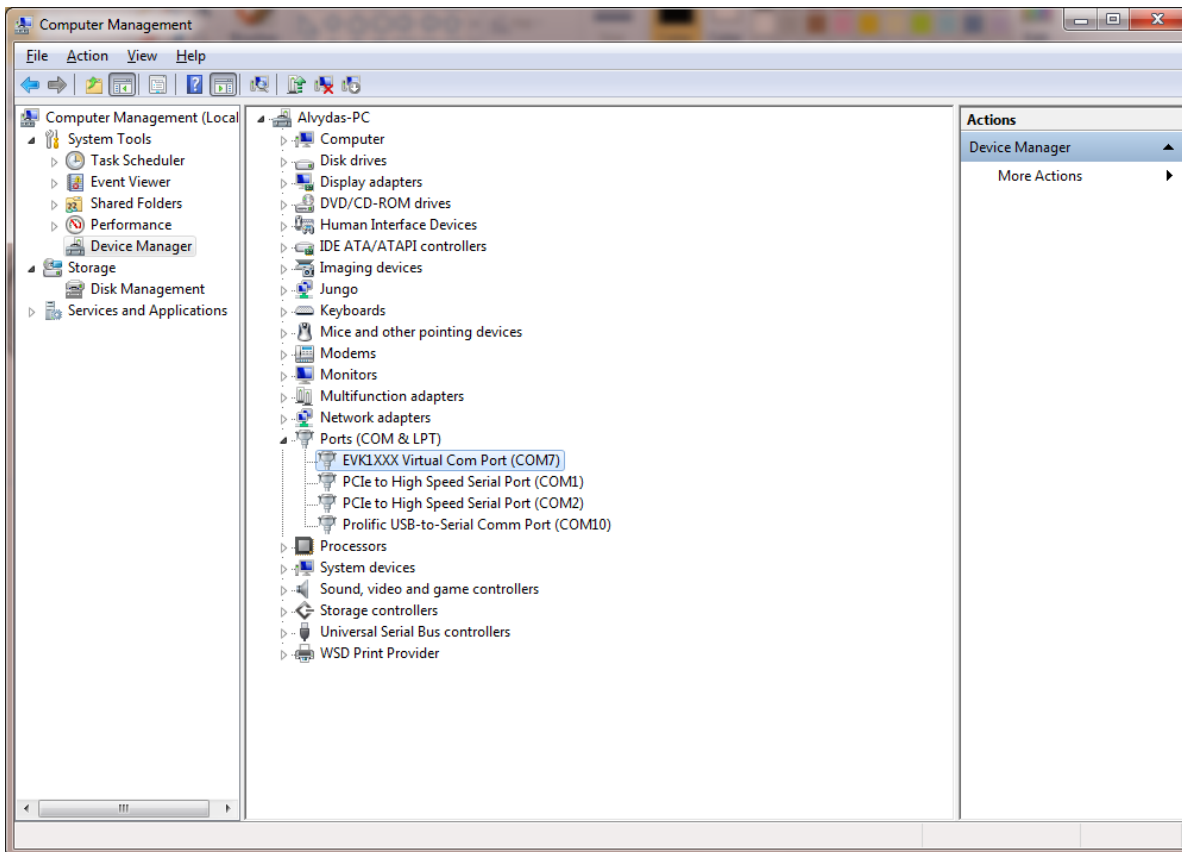
⚠️ **On some Windows versions (Windows 8, Windows 10), you may need to disable third-party driver signature checking before installing the device driver. Please check online for instructions on how to do this.**

Configuration tool software

Once the USB driver is installed, run the device configuration tool software. Select the connection type *Modbus RTU* and the appropriate COM port. Press *Get all configuration* to read the entire device configuration. Other functions include:

- *Get all configuration* button: Reads all configuration from the device.
- *Save to file* button: Saves all configuration to a file, so it can be loaded back to the device later.
- *Load from file* button: Loads saved configuration from a file.
- *Write all configuration*: Writes the loaded configuration to the device.
- *Get all at connection* checkbox: Reads all configuration when connecting over a TCP/IP connection.
- Connection type *Modbus RTU*: Connects to the device over USB or serial port.
- Connection type *Modbus TCP/IP*: Connects to the device over a TCP/IP connection.
- *User identification* section: User-configured device ID.
- *Number of controller* section: Device serial number.
- *Reserve power control* section: This is visible only if the device has a backup battery installed.
  - *After which time switch off* time: Powers off the device after the configured time if the main power supply is disconnected.
- *Float number format*: Floating-point data byte order (E - exponent, M1, M2, M3 - Mantissa).
- *Last restart information*: Time of the last reset and reset code. The reset code values are:
  1. No TCP packet over GPRS in the configured time.
  2. GPRS task stops working.
  3. Not enough heap memory.
  4. Firmware update reset.
  5. Modbus reset.

6. Unable to connect to GPRS.
7. External pin reset.
8. Watchdog reset.
9. Brownout reset.
10. Power-up reset.
11. No TCP packet over ETHERNET in the configured time.
12. ETHERNET task stops working.
13. All TCP sockets are used (if defined UIP_RESET_ALL_CONN_USED).
14. Periodic reset.
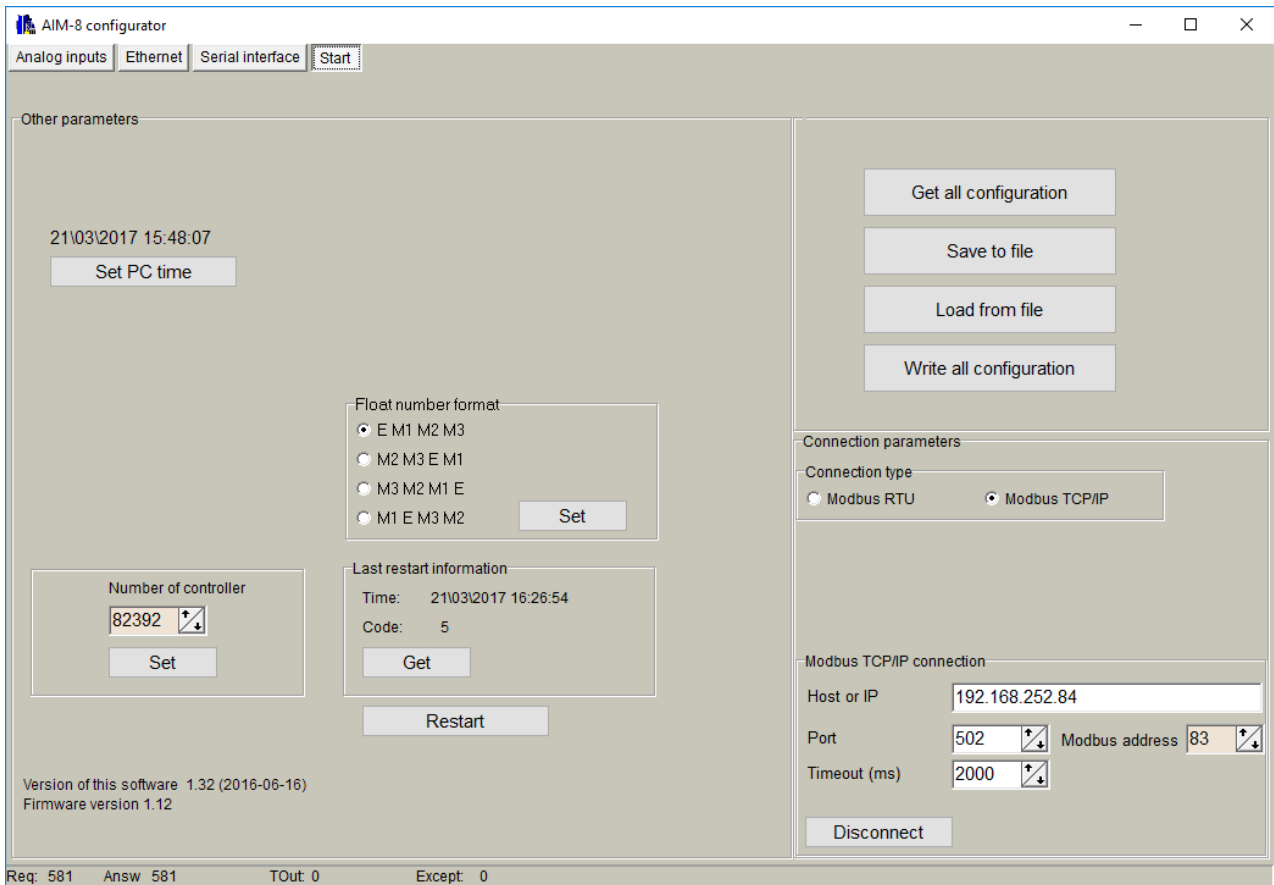
3. Hardware

3.1 Ethernet configuration

The Ethernet interface is used to connect the device to Local Area Networks (LANs) and to remotely access the device. The device supports both 10 Mbps and 100 Mbps networks. The Ethernet interface is used for:

- Data transfer
- Device configuration
- Firmware upgrade

Ethernet configuration

Ethernet interface configuration is done in the *"Ethernet"* tab. The device does not support DHCP, so before installation, you need to set its network settings manually:

- **"MAC number"** – The device's individual MAC address.
- **"IP address"** – The device's IP address.
- **"Gateway IP"** – The gateway IP address.
- **"Mask"** – The network mask.

After configuration is completed, click on "Set" button to save changes.
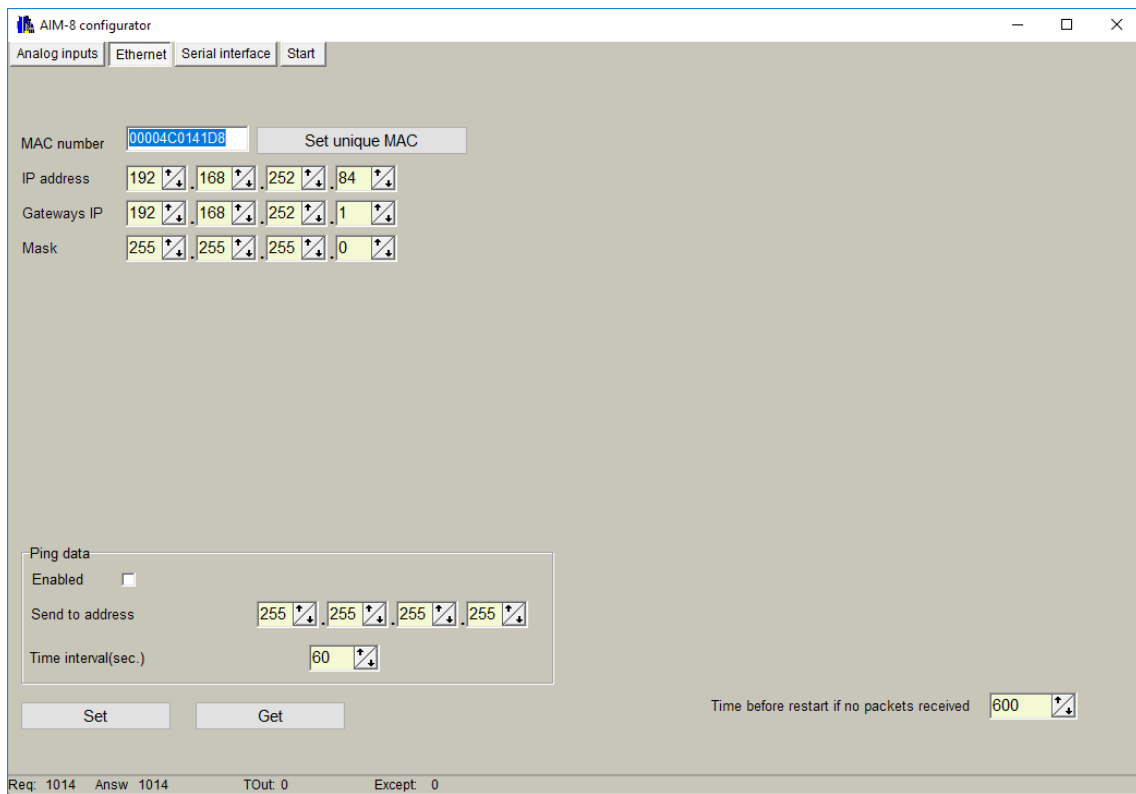
Default settings

Parameter name	Default value
IP address	192.168.1.125
Gateway IP	192.168.1.254
Mask	255.255.255.0

3.2   Serial interface

Three serial bus connections are available for the connection of RS485, RS232 Modbus devices.

| Port number	Available options
UART 1	RS232 or RS485

UART characteristics:

Port number	Supported baud rates	Supported parity	Supported data bits	Supported stop bits
UART 1	300 - 38400	Even, Odd, Mark, Space, None	5,6,7,8	1,2

UART settings

The UART interface configuration is done in the *"Serial Interface"* tab under "Serial Interface parameters" section.

- **"Baud"** – The appropriate UART baud rate.
- **"Parity"** – The appropriate UART parity.
- **"Data bits"** – The appropriate UART data bits.
- **"Stop bits"** – The appropriate UART stop bits.
- **"Set" button** – Writes the configuration to the device.
- **"Get" button** – Reads the configuration from the device.
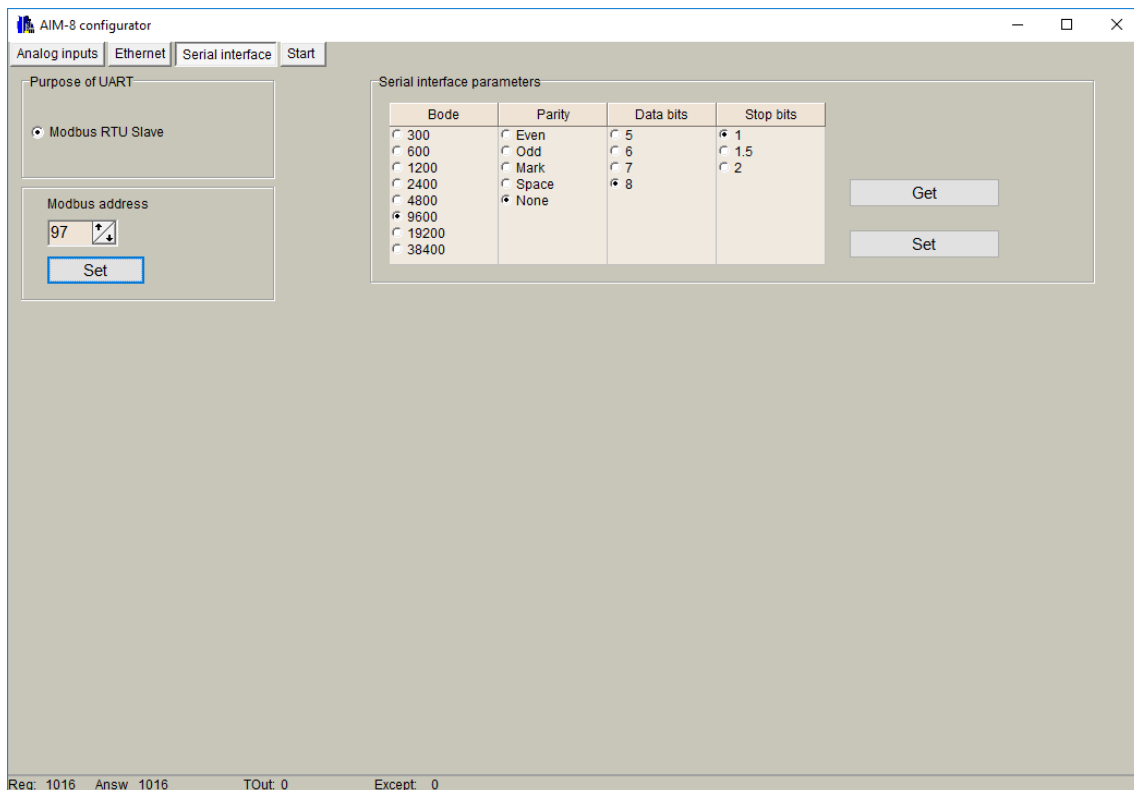
3.3 Analog inputs

The device has six single-ended resistance, voltage, or current analog inputs. Each analog input can be used as:
- **Current 0/4..20mA** analog input
- **Voltage 0..+5V** analog input
- **Voltage 0..+10V** analog input
- **Thermistor (PT100)** analog input
- **Thermistor (PT1000)** analog input
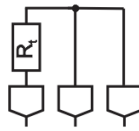- **Resistance 0..10kΩ** analog input

The purpose of the analog input is specified when ordering the device.

Wiring diagram

All the connection terminal blocks are removable, which facilitate the wiring process.
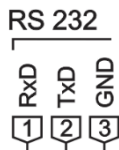

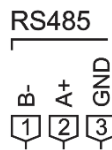Voltage input (0..5/0..10 V)   R input (PT100 / 0..30KΩ)   Current input
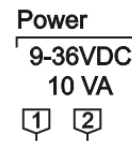

RS232 port   RS485 port   Power supply (w/o polarity)

The wiring diagram above shows how to connect all different types of analog input sources (current, voltage, and resistance) and communication interfaces.

⚠️ **The purpose of the analog input is selected when you order the device, and different types of analog sources cannot be connected to the same analog input.**

Configuration

To configure the analog inputs, go to *"Analog Inputs > Configuration"*:
- **Range**: Select the sensor's output range.
- **Min. value / Max. value**: Define the sensor's operational range.
- **Current value**: Displays the current sensor reading, adjusted based on the configured operational range.
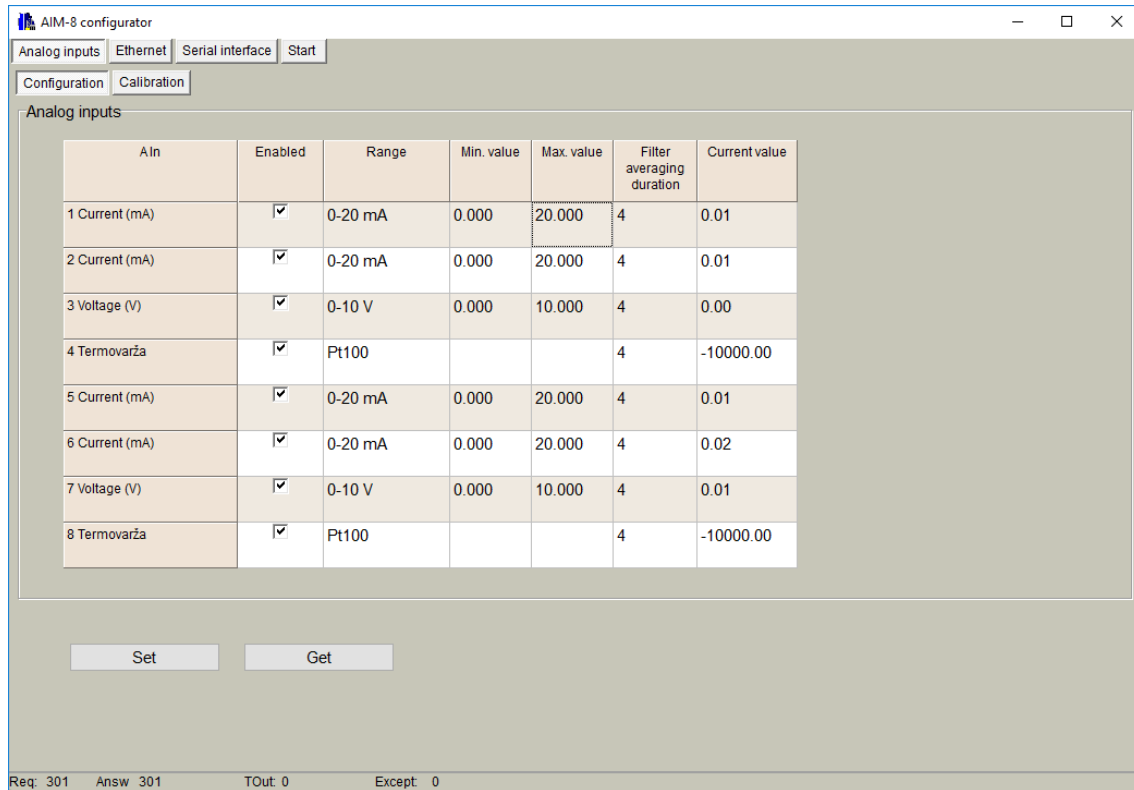
You can also check the analog inputs' performance using the "Current value" column in the AIM-8 configuration tool or directly read the corresponding Modbus registers using Modbus function 3. The relevant registers are:

Modbus register	Register name	Format	Type
0-7	Analog input ADC value	Int16[8]	Read-only
8-23	Measured value	Float[8]	Read-only

The "Measured value" registers are updated every second with real-time data.

4. Manufacturer's warranty

ADVANTICSYS guarantees that all its products are free from defects in materials and workmanship under normal use and service for a period of two years from the date of shipment. This warranty excludes any damage resulting from accidents, misuse, or unauthorized modifications to the product.

This warranty supersedes all other warranties, whether expressed or implied, including implied warranties of merchantability or fitness for a particular purpose, whether arising by law, custom, or conduct. The remedies provided under this warranty are exclusive and replace any other rights or remedies. ADVANTIC SISTEMAS Y SERVICIOS S.L. shall not, under any circumstances, be held liable for any consequential or incidental damages. If you believe your product is defective and still under warranty, please contact ADVANTICSYS at info@advanticsys.com or by phone at +34 914221023. After confirmation from our support team that the product is defective, we will issue a Return Merchandise Authorization (RMA) number and arrange for the replacement of your product.

This warranty covers the cost of repair, including labor and materials, for any manufacturing defect that impedes the proper operation of the product. Replacement of any component or equipment does not extend the original warranty period. If, upon inspection by ADVANTICSYS, the product is found to be defective, we will cover the shipping costs to return the product to the customer, as well as all costs associated with the inspection. If the product is found not to be defective, the customer will be responsible for the return shipping costs.

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