trafag
industrial components

ITM
IO-Link Master

Operating instructions manual

IO-Link PROFINET Modbus TCP MQTT OPC UA EtherNet/IP

CE UKCA

INDEX:

SECURITY ALERT

GENERAL INFORMATION

To ensure safe operation, the device must be operated according to the instructions in the manual. When using the device, legal and safety regulation are required for each individual application. The same applies also when using accessories.

INTENDED USE

Machines and systems must be designed so the faulty conditions do not lead to a dangerous situation for the operator (i.e. independent limit switches, mechanical interlocks, etc.).

QUALIFIED PERSONNEL

The device can be used only by qualified personnel, strictly in accordance with the specifications.
Qualified personnel are people who are familiar with the installation, assembly, commissioning and operation of this equipment and who have appropriate qualifications for their job.

RESIDUAL RISKS

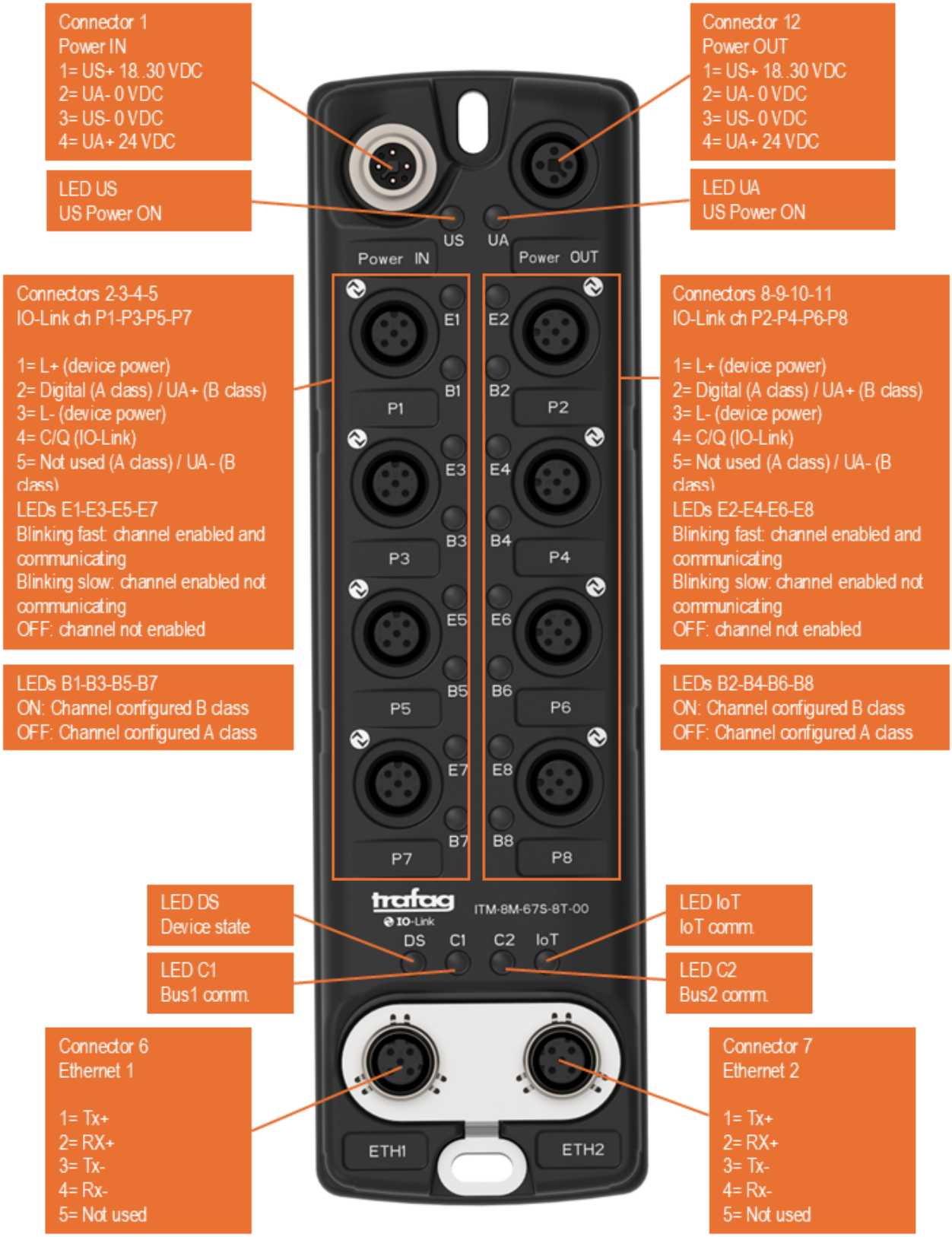
The device is state-of-the-art and is safe. The instruments can represent a potential hazard if they are inappropriately installed and operated by untrained personnel. These instructions refer to residual risks with the following symbol:

This  symbol indicates that non-observance of the safety instructions is a danger for people that could lead to serious injury or death and / or the possibility of damage.

CE CONFORMITY

The declaration is made by our company.
You can send an email to support.it@trafag.com or give us a call if you need it.

CONNECTION SCHEMES



CHARACTERISTICS

The ITM-8X is a IO-Link / Multi-Protocol converter.

It allows the following characteristics:

- Two-directional information between Ethernet protocols and IO-Link.
- Configurable Ethernet protocol.
- Configurable IO-Link Class.
- IP rating from IP67 (ITM-8X-67S-8T-XXX) to IP69K (ITM-8X-69K-8T-XXX).
- Wide power supply input range: 18…30V DC.
- Wide temperature range: -40°C / 85°C [-40°F / +185°F].

CONFIGURATION

You need K-EASY SOFTWARE software on your PC to perform the following:

- Define the parameters of IO-Link.
- Define the parameters of Ethernet protocols.
- Define IO-Link variables to be read.
- Define IO-Link variables to be written.
- Monitor live data from/to IO-Link.
- Update the device.

POWER SUPPLY

The devices can be powered between a wide range of voltages. The power supply ports use M12 T-coded connectors.

In the same connector, it is possible to wire US power supply and UA power supply (for IO-Link Class B):

- UA power supply: used to feed the converter itself and provide the US power for IO-Link channels.
- US power supply: used to provide UA power for Class B IO-Link devices.

For more details see the two tables below.

	US power supply	
	Vmin	Vmax
ITM-8X	18V DC	30V DC
	UA power supply	
	Vmin	Vmax
ITM-8X	24 V DC	24 V DC

Consumption at 24V DC (no load on IO-Link side):

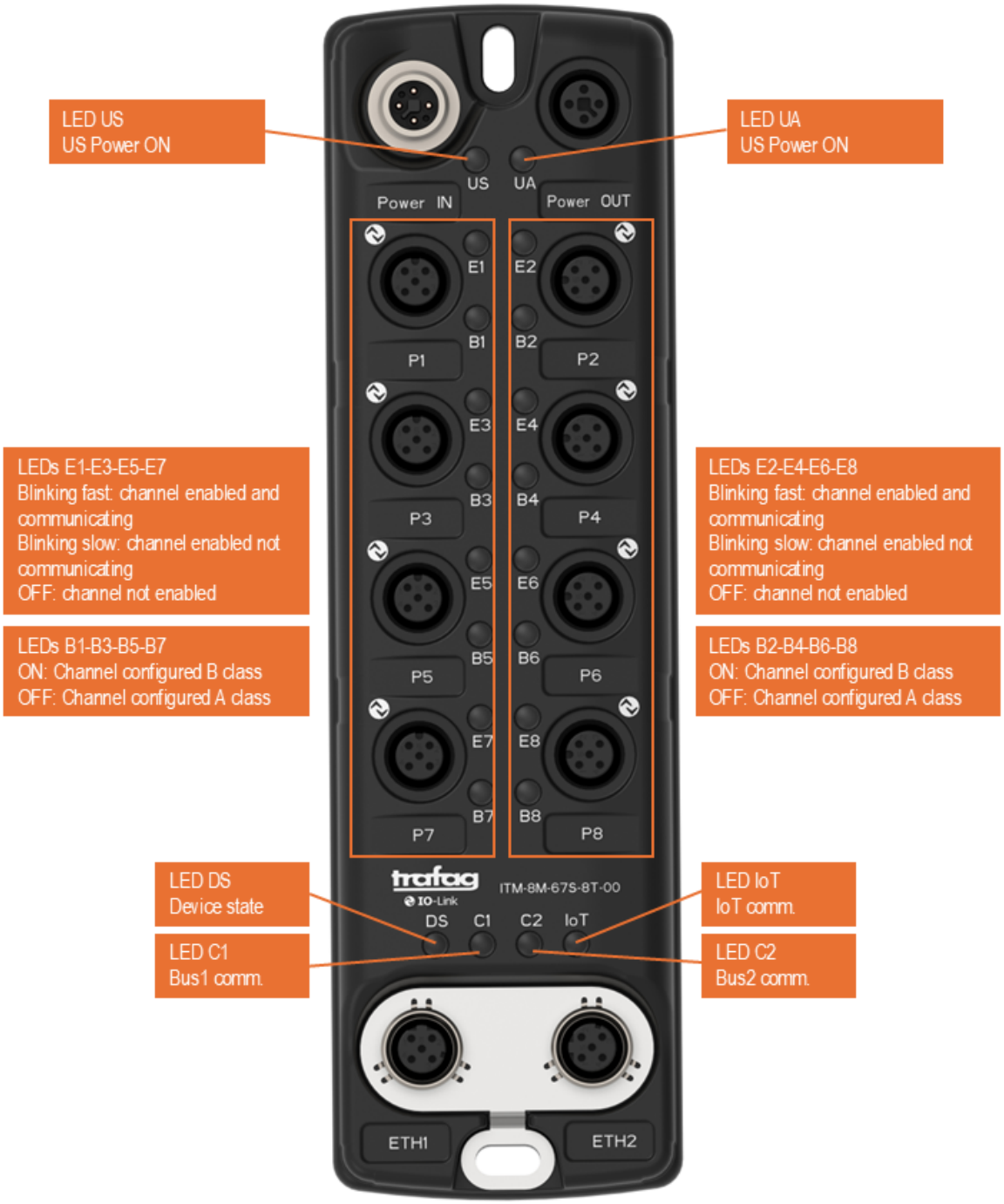
Device	W/VA
ITM-8X	4

Warning:

It is necessary to add to this consumption the one required by the IO-Link devices connected to the IO-Link channels.

LEDS

The device has got 22 LEDs that are used to give information of the functioning status.
The various meanings of the LEDs are described in the table below.



LED	Normal Mode	Boot Mode
LED US: Device State	**ON:** US power supply present **OFF:** US power supply not present	**ON:** US power supply present **OFF:** US power supply not present
LED UA: Device State	**ON:** UA power supply present **OFF:** UA power supply not present	**ON:** UA power supply present **OFF:** UA power supply not present
LED Ex: IO-Link status	**Flashing quickly:** IO-Link channel configured and communicating **Flashing slowly:** IO-Link channel configured, but not communicating **OFF:** IO-Link channel not configured	**Blinks quickly:** Boot state **Blinks very slowly (~0.5Hz):** update in progress
LED Bx: IO-Link Class B	**ON:** IO-Link channel configured as Class B, no issues **Fast blink:** IO-Link channel configured as Class B, current exceeding the maximum limit configured **OFF:** IO-Link channel configured as Class A	**Blinks quickly:** Boot state **Blinks very slowly (~0.5Hz):** update in progress
LED DS: Device State	Blinks slowly (~1Hz)	**Blinks quickly:** Boot state **Blinks very slowly (~0.5Hz):** update in progress
LED C1: IO-Link comm.	**Flashing:** IO-Link communication **OFF:** No IO-Link communication	**Blinks quickly:** Boot state **Blinks very slowly (~0.5Hz):** update in progress
LED C2: Ethernet comm.	**Flashing:** Ethernet communication **OFF:** No Ethernet communication	**Blinks quickly:** Boot state **Blinks very slowly (~0.5Hz):** update in progress
LED IoT: IoT comm.	**Flashing:** IoT communication **OFF:** No IoT communication	**Blinks quickly:** Boot state **Blinks very slowly (~0.5Hz):** update in progress

IO-LINK

IO-Link is the first globally standardized IO technology (IEC 61131-9) that communicates from the controller down to the lowest automation level. This universally applicable interface is a fieldbus-neutral point-to-point connection which uses standard unshielded cables. IO-Link sends all the sensor and actuator signals to the controller and in turn carries controller data to the sensor/actuator level with revolutionary consequences.
It is possible to have IO-Link device of two different types: IO-Link Class A and IO-Link Class B.
IO-Link Master / Multi-Protocol converter can manage both thanks to the configurable IO-Link channels.
IO-Link channels use M12 A-coded connectors.

IO-LINK CLASS A:

If the IO-Link channels are configured as IO-Link Class A, they use 4 pins on connectors.
The Class A devices are normally sensors and actuators that don't require UA power.

IO-LINK CLASS B:

If the IO-Link channels are configured as IO-Link Class A, they use 5 pins on connectors and they can provide an additional aux power supply (UA power supply) used for the actuation.

The Class B devices are normally actuators that require UA power.

ETHERNET

The Ethernet connection must be made using connectors 6-7 of ITM-8X with at least a Category 5E cable. The maximum length of the cable should not exceed 100m. The cable must conform to the T568 norms relative to connections in cat.5 up to 100 Mbps. To connect the device to a Hub/Switch is recommended the use of a straight cable, to connect the device to a PC/PLC/other is recommended the use of a cross cable.
Ethernet ports use M12 D-coded connectors.

USE OF K-EASY SOFTWARE

To configure the Converter, use the available software that runs with Windows called K-EASY. It is downloadable HERE and its operation is described in this document. *(This manual is referenced to the last version of the software present on our web site)*. The software works with MSWindows (XP, Vista, Seven, 8, 10, 11; 32/64bit).

When launching the K-EASY, the window below appears (Fig. 2).

Note:

It is necessary to have installed .Net Framework 4.

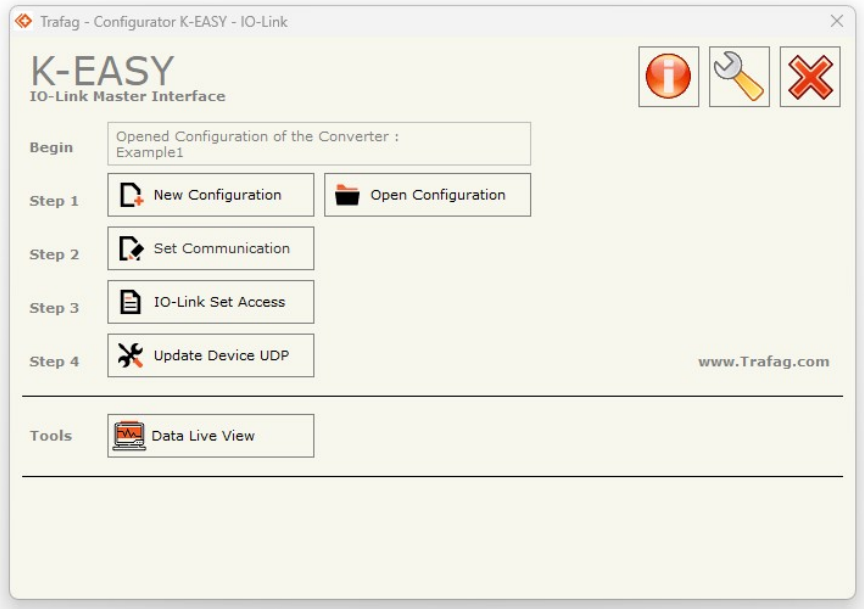
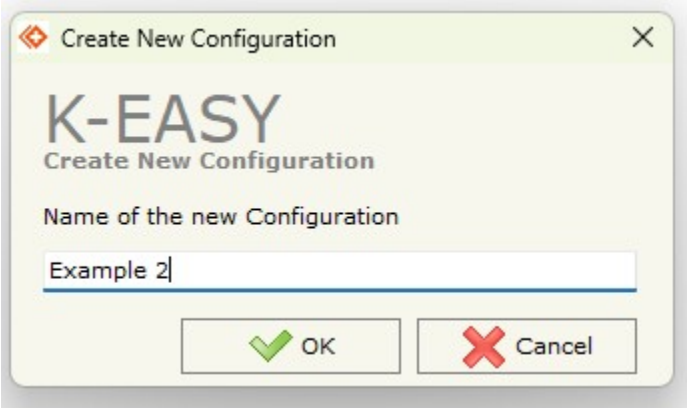


Figure 2: Main window for K-EASY

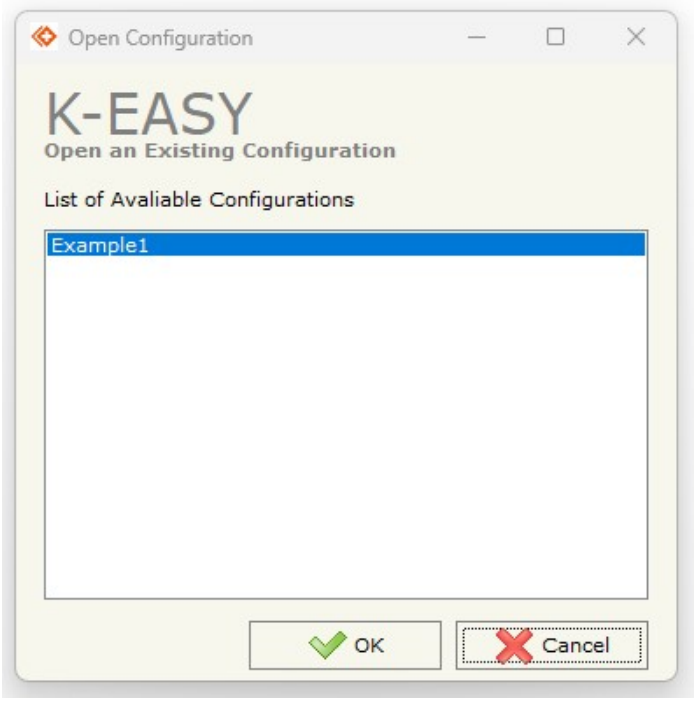
NEW CONFIGURATION / OPEN CONFIGURATION

The "**New Configuration**" button creates the folder which contains the entire device's configuration.



A device's configuration can also be imported or exported:

- To clone the configurations of a programmable "IO-Link Master / Multi-Protocol - Converter" in order to configure another device in the same manner, it is necessary to maintain the folder and all its contents.
- To clone a project in order to obtain a different version of the project, it is sufficient to duplicate the project folder with another name and open the new folder with the button "**Open Configuration**".


Open Configuration
K-EASY
Open an Existing Configuration
List of Avaliable Configurations
Example1
OK
Cancel

SET COMMUNICATION

By Pressing the "**Set Communication**" button from the main window for K-EASY (Fig. 2) the window "Set Communication" appears (Fig. 3).

The window is divided in different sections in order to define the different parameters of the converter:

- Select Device
- Select Protocol
- Select IIoT Protocol
- Ethernet Connection
- PROFINET or EtherNet/IP or Modbus TCP
- MQTT or OPC UA Client
- Ethernet
- TLS (Transport Layer Security)
- NTP (Network Time Protocol)
- Webserver
- PLC

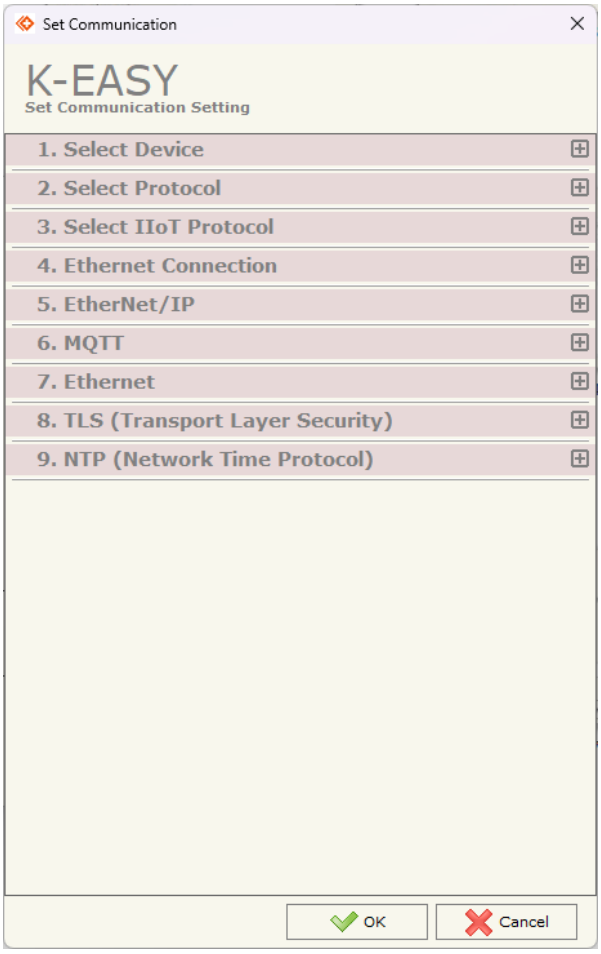
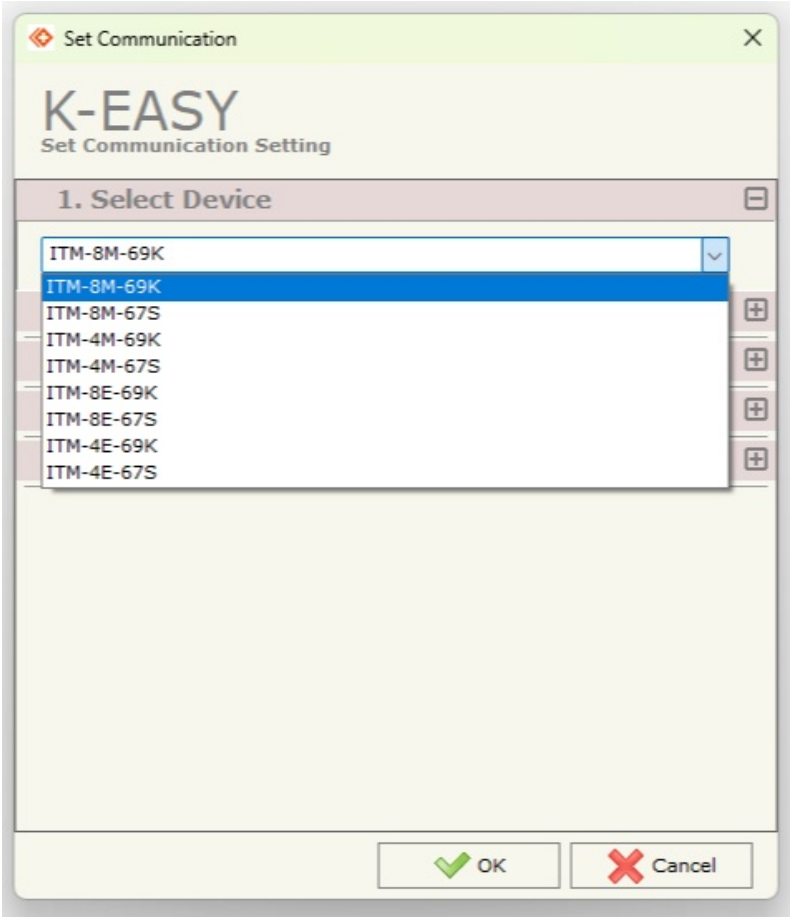


Figure 3: "Set Communication" window

SELECT DEVICE:

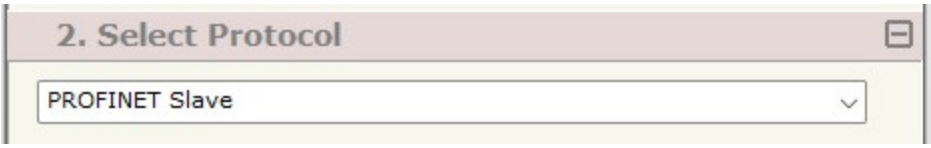
This section is used to select the type of converter in use.



SELECT PROTOCOL:

This section is used to select the main protocol used. It is possible to select:

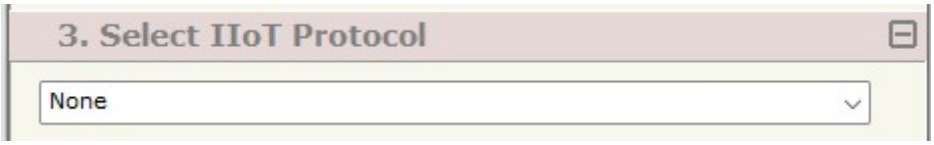
- PROFINET Slave.
- EtherNet/IP Slave.
- Modbus TCP Slave.



SELECT IIOT PROTOCOL:

This section is used to select the main protocol used. It is possible to select:

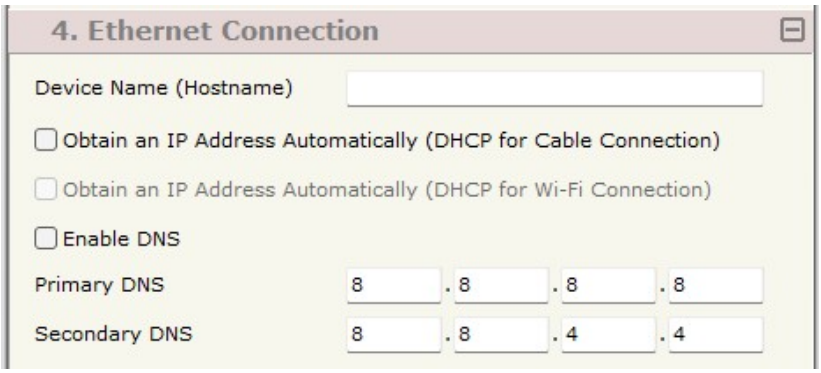
- MQTT.
- OPC UA Client.



ETHERNET CONNECTION:

This section is used to define the general parameters of Ethernet communication.
The means of the fields are:

- In the field "**Device Name (Hostname)**" the Hostname to assign to the converter is defined.
- If the field "**Obtain an IP Address Automatically (DHCP for Cable Connection)**" is checked, DHCP for LAN connection is enabled.
- If the field "**Obtain an IP Address Automatically (DHCP for Wi-Fi Connection)**" is checked, DHCP for Wi-Fi connection is enabled.
- If the field "**Enable DNS**" is checked, DNS protocol is enabled.
- In the field "**Primary DNS**" the IP Address of the primary DNS server is defined.
- In the field "**Secondary DNS**" the IP Address of the secondary DNS server is defined.



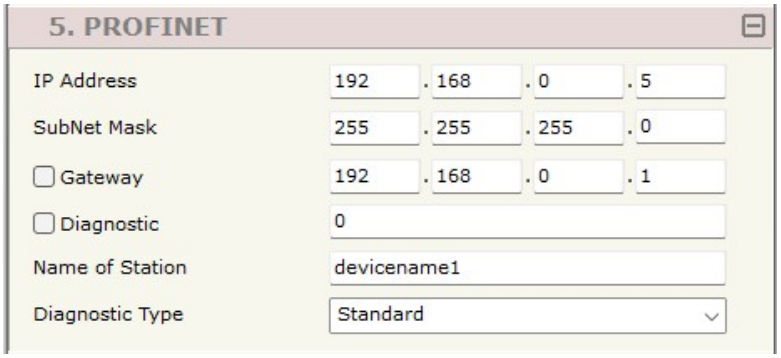
Warning:

When activating the DHCP function, you will need to repeat the operation twice while loading the new configuration. After the first attempt, it is normal for a loading error to appear (close the window and repeat the procedure).

PROFINET:

This section is used to define the general parameters of PROFINET communication.
The means of the fields are:

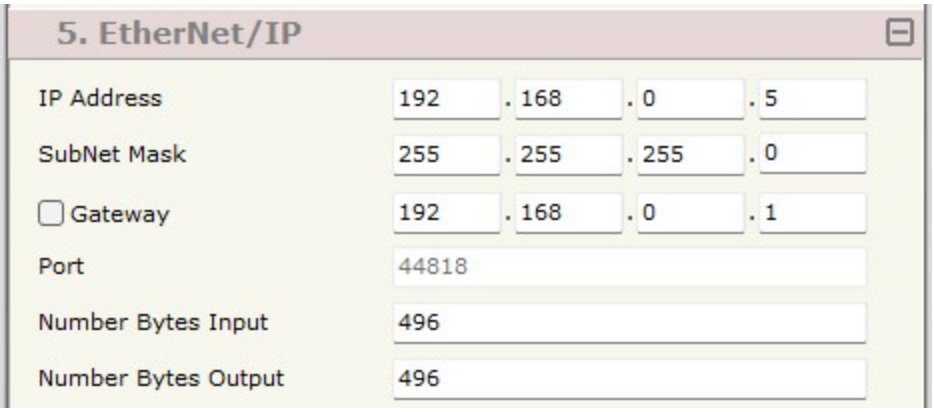
- In the field "**IP Address**" the IP address to assign to the converter is defined.
- In the field "**Subnet Mask**" the SubNet Mask is defined.
- In the field "**Gateway**" the default gateway of the net is defined.
- In the field "**Name of Station**" the name of the PROFINET node is defined.
- If the field "**Diagnostic**" is checked, the status of the IO-Link communication is transferred to PROFINET side. The status is mapped starting from the byte defined.
- In the field "**Diagnostic Type**" the type of diagnostic is defined. It is possible to select:
    - Standard: a single bit for each IO-Link channel is reserved.
    - Extended: a byte for each IO-Link channel is reserved.



ETHERNET/IP:

This section is used to define the general parameters of EtherNet/IP communication.
The means of the fields are:

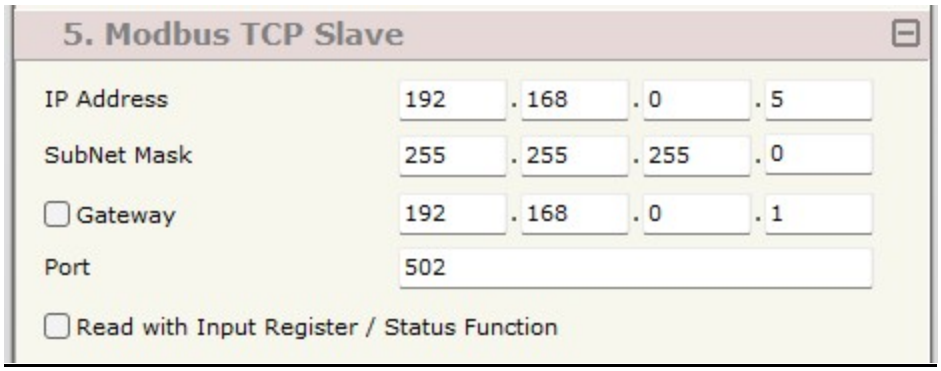
- In the field "**IP Address**" the IP address to assign to the converter is defined.
- In the field "**Subnet Mask**" the SubNet Mask is defined.
- In the field "**Gateway**" the default gateway of the net is defined.
- In the field "**Port**" the port used for EtherNet/IP communication is defined.
- In the fields "**Number Byte IN**" the number of input byte of the slave station is defined.
- In the fields "**Number Byte Out**" the number of output byte of the slave station is defined.



MODBUS TCP SLAVE:

This section is used to define the main parameters of Modbus TCP line. The means of the fields are:

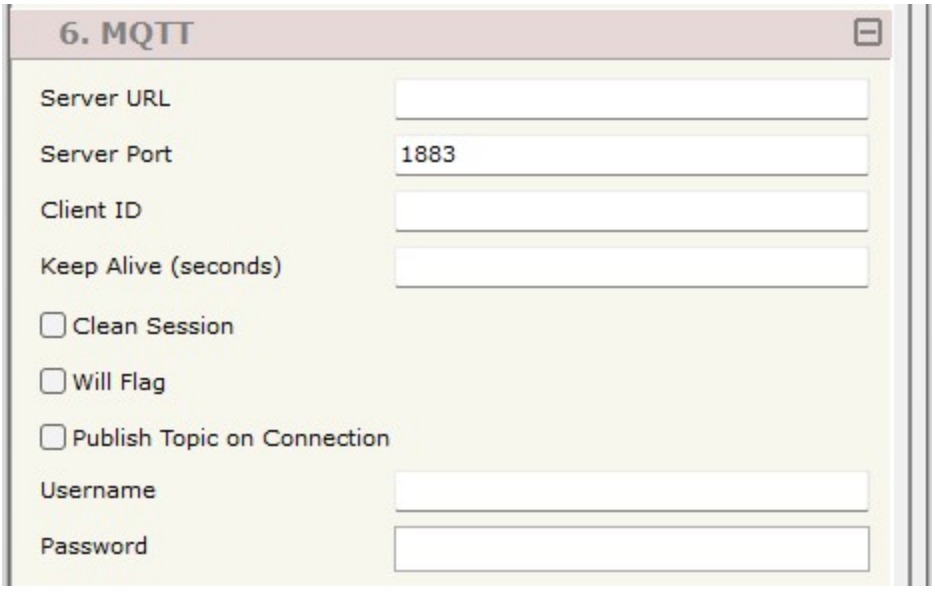
- In the field "**IP Address**" the IP address of the converter is defined.
- In the field "**SubNet Mask**" the Subnet Mask of the converter is defined.
- In the field "**Gateway**" the default gateway of the net is defined.
- In the field "**Port**" the TCP port to use for Modbus TCP communication is defined.
- If the field "**Read with Input Register / Status Function**" is checked, it is possible to read the Input bytes of IO-Link side with Input Registers (Function 04) and write the Output bytes of IO-Link side with Holding Registers (Function 06/16). The Output bytes are readable with Function 03. Otherwise, only Holding Registers will be used and the Output bytes of IO-Link side cannot be read back.



MQTT:

This section is used to define the main parameters of MQTT line. The means of the fields are:

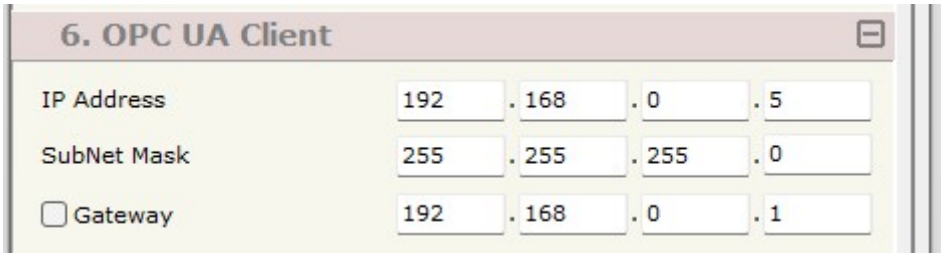
- In the field "**Server URL**" the URL or the IP Address of the MQTT Server is defined.
- In the field "**Server Port**" the port used for MQTT communication is defined.
- In the field "**Client ID**" the Client ID of the converter is defined (if ned).
- In the field "**Keep Alive (seconds)**" the delay with which the Keep Alive message is sent on MQTT is defined.
- If the field "**Clean Session**" is checked, the last MQTT messages are deleted by the Server and the Client in case of missing ACK. If unchecked, the Server and the Client hold the last MQTT messages and, in case of incorrect disconnection or missing ACK, they try to send again them since all the ACK messages are exchanged correctly (valid only for QoS 1 and QoS 2).
- If the field "**Will Flag**" is checked, the converter will publish the Will topic at the connection to the Server. With this feature, in case of incorrect disconnection, the Server will publish this topic to all the MQTT Clients that subscribed it.
- In the field "**Topic Name Will**" the topic used for Will message is defined.
- In the field "**Message Will**" the payload of the Will message is defined.
- In the field "**Retained Will**" the converter will send the Will message with Retain flag enabled. In this way, the Server will hold the last Will message.
- In the field "**QoS Will**" the QoS type for Will message is defined.
- If the field "**Publish Topic on Connection**" is checked, the converter will publish a topic at the connection to the Server.
- In the field "**Topic Name Connection**" the topic used for the connection message is defined.
- In the field "**Message Connection**" the payload of the connection topic is defined.
- In the field "**Retained Connection**" the converter will send the connection topic with Retain flag enabled. In this way, the Server will hold the last Connection message received
- In the field "**Username**" the username for the connection to the MQTT server is defined.
- In the field "**Password**" the password for the connection to the MQTT server is defined.



OPC UA CLIENT:

This section is used to define the main parameters of OPC UA line. The means of the fields are:

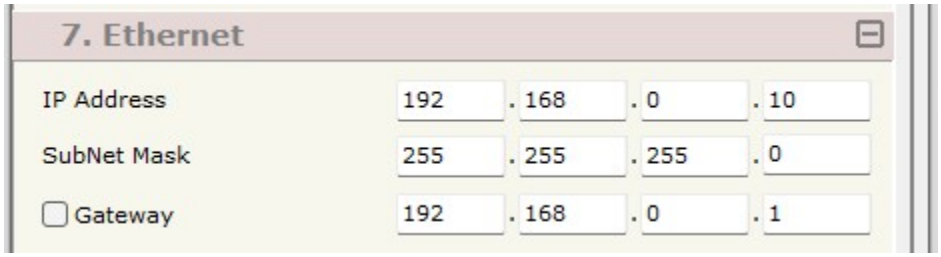
- In the field "**IP Address**" the IP address of the converter is defined.
- In the field "**SubNet Mask**" the Subnet Mask of the converter is defined.
- In the field "**Gateway**" the default gateway of the net is defined.



ETHERNET:

This section is used to define the general parameters of Ethernet. The means of the fields are:

- In the field "**Ip Address**" the IP address of the converter is defined.
- In the field "**SubNet Mask**" the Subnet Mask of the converter is defined.
- In the field "**Gateway**" the default gateway of the net is defined.



TLS (TRANSPORT LAYER SECURITY):

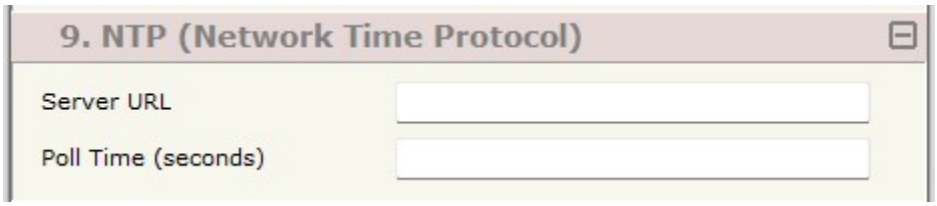
This section is used to define the parameters of TLS protocol. The means of the fields are:

- If the field "**Enable TLS**" is checked, the TLS protocol for secure connection is enabled.
- If the field "**Server Authentication**" is checked, the authentication of the Server using TLS is enabled. If enabled, in the field "**Server Certificate**" the certificate from the Server is defined.
- If the field "**Client Authentication**" is checked, the authentication of the Client using TLS is enabled. If enabled:
  - in the field "**CA Certificate**" the CA certificate is defined.
  - in the field "**Client Certificate**" the certificate from the Client is defined.
  - in the field "**Client Key**" the private key of the Client is defined.
  - in the field "**Client Key Password**" the password for the private key of the Client is defined.

NTP (NETWORK TIME PROTOCOL):

This section is used to define the parameters of NTP protocol. The means of the fields are:

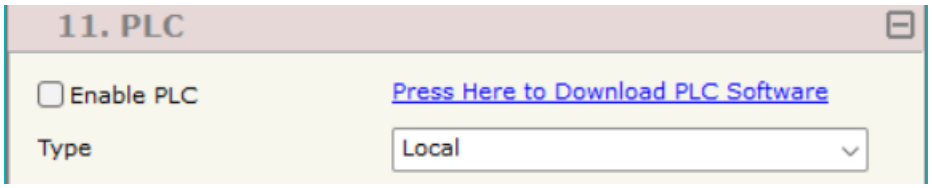
- In the field "**Server URL**" the URL or the IP Address of the NTP Server is defined.
- In the field "**Poll Time (seconds)**" the polling time for the time synchronization is defined.



PLC:

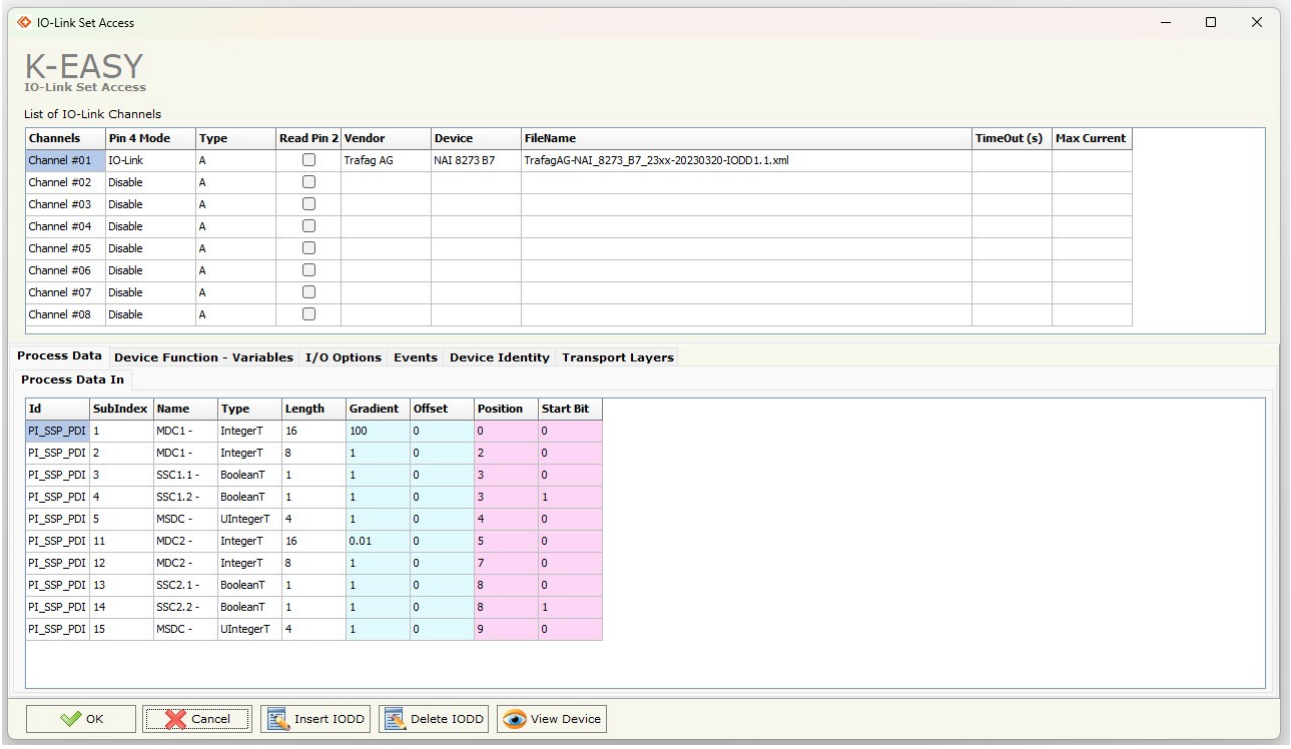
This section is used to define the parameters of the integrated PLC. The means of the fields are:

- If the field "**Enable PLC**" is checked, the internal PLC engine is enabled.
- In the field "**Type**" the type of PLC engine is defined.



IO-LINK SET ACCESS

By Pressing the "**IO-Link Set Access**" button from the main window for K-EASY (Fig. 2) the window "IO-Link Set Access" appears (Fig. 4a). This section is used to define the list of IO-Link variables accessible from Ethernet side.



In the "List of IO-Link Channel" section it is possible to configure all the IO-Link channels of the converter (Fig. 4a).

Channels	Pin 4 Mode	Type	Read Pin 2	Vendor	Device	FileName	TimeOut	Max Current
Channel #01	IO-Link	A	☐	Trafag AG	FPI 8237 80	TrafagAG-FPI_8237_80_23xx-20230331-IODD1.1.xml	0	0.25A
Channel #02	IO-Link	A	☐	Trafag AG	FPI 8237 80	TrafagAG-FPI_8237_80_23xx-20230331-IODD1.1.xml	0	0.25A
Channel #03	IO-Link	A	☐	Trafag AG	FPI 8237 80	TrafagAG-FPI_8237_80_23xx-20230331-IODD1.1.xml	0	0.25A
Channel #04	IO-Link	A	☐	Trafag AG	FPI 8237 80	TrafagAG-FPI_8237_80_23xx-20230331-IODD1.1.xml	0	0.25A

The meanings of the fields are:

- In the field "**Channels**" the index of the IO-Link channel is defined.
- In the field "**Pin 4 Mode**" the mode of the pin 4 of the IO-Link device is defined (if "IO-Link" is selected, a file IODD is need).
- If the field "**Pin 2 Mode**", select "Din" to read the pin 2 state (only for Class A channels).
- In the field "**Vendor**" the vendor of the IO-Link device is defined.
- In the field "**Device**" the name of the IO-Link device is defined.
- In the field "**FileName**" the name of the IODD file inserted is defined.
- In the field "**TimeOut**", a timeout in seconds is defined. If the communication is not running for this time, the data on Ethernet side are reset to '0'.
- In the field "**Max Current**" the maximum current allowed on UA line is defined (only for Class B channels).

By clicking on "**Insert IODD**", the window "IO-Link IODD Catalog" appears (Fig. 4b). This section is used to select an IO-Link device. By clicking on "**Add IODD**" it is possible to add a new IODD file (the extension must be .xml).

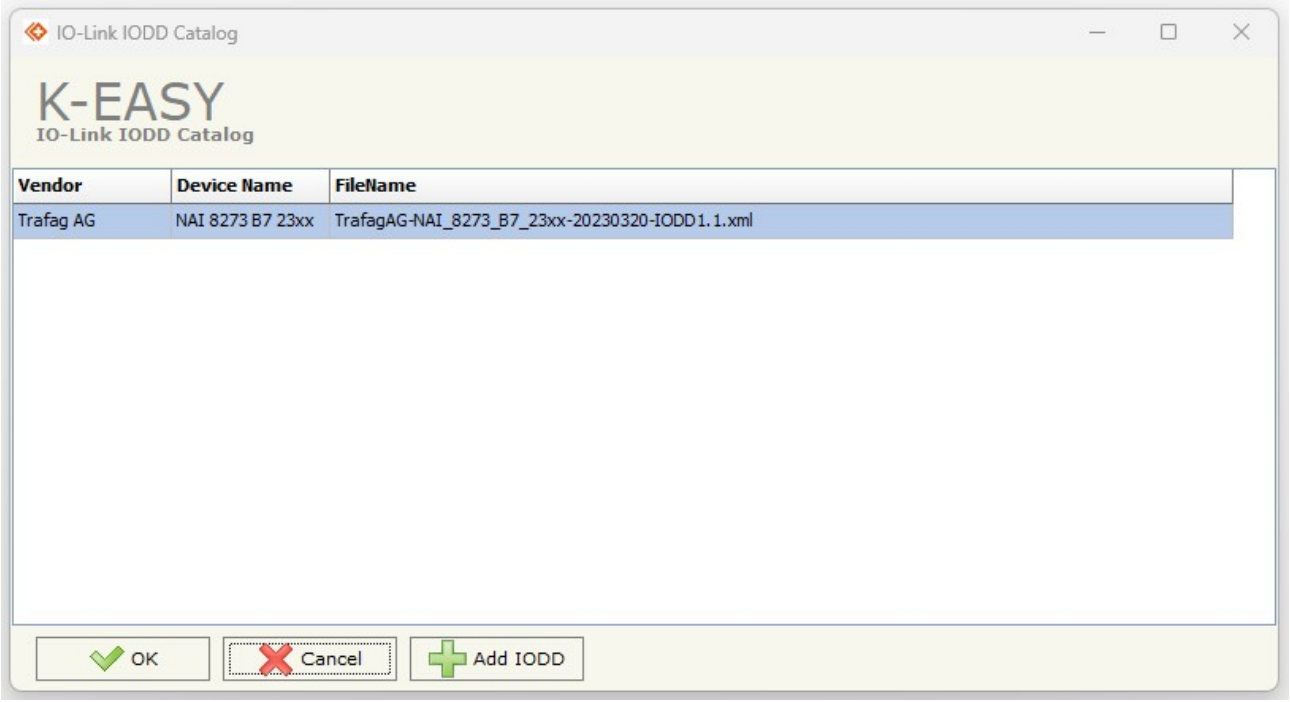
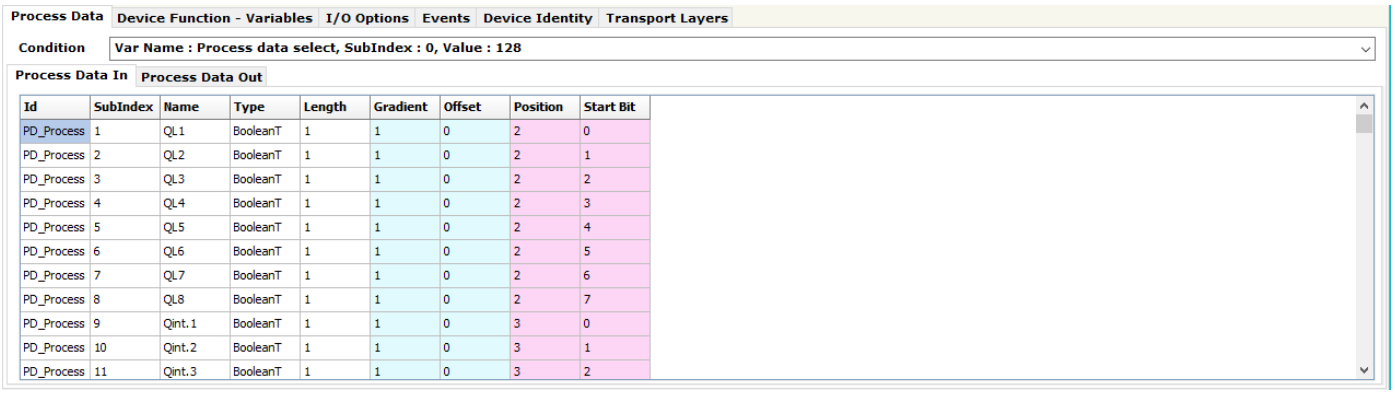


Figure 4b: "IO-Link IODD Catalog" section

The "Process Data" section is used to map the variables of the Process Data of the selected IO-Link device to Ethernet side (Fig. 4c).



Id	SubIndex	Name	Type	Length	Gradient	Offset	Position	Start Bit
PD_Process	1	QL1	BooleanT	1	1	0	2	0
PD_Process	2	QL2	BooleanT	1	1	0	2	1
PD_Process	3	QL3	BooleanT	1	1	0	2	2
PD_Process	4	QL4	BooleanT	1	1	0	2	3
PD_Process	5	QL5	BooleanT	1	1	0	2	4
PD_Process	6	QL6	BooleanT	1	1	0	2	5
PD_Process	7	QL7	BooleanT	1	1	0	2	6
PD_Process	8	QL8	BooleanT	1	1	0	2	7
PD_Process	9	Qint.1	BooleanT	1	1	0	3	0
PD_Process	10	Qint.2	BooleanT	1	1	0	3	1
PD_Process	11	Qint.3	BooleanT	1	1	0	3	2

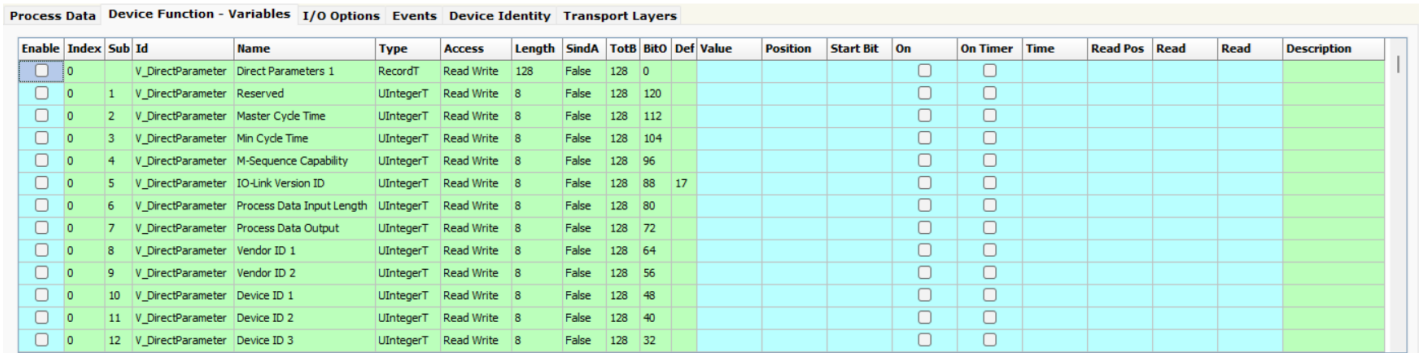
Figure 4c: "Process Data" section

The meanings of the fields are:

- In the field "**Id**" the Id of the variable is defined.
- In the field "**SubIndex**" the subindex of the variable is defined.
- In the field "**Name**" the name of the variable is defined.
- In the field "**Type**" the data format of the variable is defined.
- In the field "**Length**" the length in bit of the variable is defined.

- In the field "**Gradient**" the multiplication factor of the variable is defined.
- In the field "**Offset**" the offset of the variable is defined.
- In the field "**Position**" the starting byte of the internal memory arrays where mapping/getting the value is defined.
- In the field "**Start Bit**" the starting bit of the "Position" is defined.
- In the field "**Modbus Add**" the address of the Modbus register is defined (only if Modbus TCP protocol is used on Ethernet side).

The "Device Function – Variables" section is used to select which parameters reading and writing from Ethernet side (Fig. 4d).


Process Data | Device Function - Variables | I/O Options | Events | Device Identity | Transport Layers

Enable	Index	Sub	Id	Name	Type	Access	Length	SindA	TotB	BitO	Def	Value	Position	Start Bit	On	On Timer	Time	Read Pos	Read	Read	Description
☐	0		V_DirectParameter	Direct Parameters 1	RecordT	Read Write	128	False	128	0					☐	☐					
☐	0	1	V_DirectParameter	Reserved	UIntegerT	Read Write	8	False	128	120					☐	☐					
☐	0	2	V_DirectParameter	Master Cycle Time	UIntegerT	Read Write	8	False	128	112					☐	☐					
☐	0	3	V_DirectParameter	Min Cycle Time	UIntegerT	Read Write	8	False	128	104					☐	☐					
☐	0	4	V_DirectParameter	M-Sequence Capability	UIntegerT	Read Write	8	False	128	96					☐	☐					
☐	0	5	V_DirectParameter	IO-Link Version ID	UIntegerT	Read Write	8	False	128	88	17				☐	☐					
☐	0	6	V_DirectParameter	Process Data Input Length	UIntegerT	Read Write	8	False	128	80					☐	☐					
☐	0	7	V_DirectParameter	Process Data Output	UIntegerT	Read Write	8	False	128	72					☐	☐					
☐	0	8	V_DirectParameter	Vendor ID 1	UIntegerT	Read Write	8	False	128	64					☐	☐					
☐	0	9	V_DirectParameter	Vendor ID 2	UIntegerT	Read Write	8	False	128	56					☐	☐					
☐	0	10	V_DirectParameter	Device ID 1	UIntegerT	Read Write	8	False	128	48					☐	☐					
☐	0	11	V_DirectParameter	Device ID 2	UIntegerT	Read Write	8	False	128	40					☐	☐					
☐	0	12	V_DirectParameter	Device ID 3	UIntegerT	Read Write	8	False	128	32					☐	☐					

*Figure 4d: "*Device Function - Variables*" section*

The meanings of the fields are:

- If the field "**Enable**" is checked, the parameters is enabled to reading and/or writing.
- In the field "**Index**" the Index of the IO-Link parameter is defined.
- In the field "**SubIndex**" the Subindex of the IO-Link parameter is defined.
- In the field "**Id**" the Id of the IO-Link parameter is defined.
- In the field "**Name**" the name of the IO-Link parameter is defined.
- In the field "**Type**" the data format of the IO-Link parameter is defined.
- In the field "**Access**" the access type of the IO-Link parameter is defined.
- In the field "**Length**" the length in bit of the IO-Link parameter is defined.
- In the field "**SindAccSupp**" the value of subindexAccessSupported attribute of the IO-Link parameter is defined.
- In the field "**TotBitLen**" the length in bit of the array to which the IO-Link parameter refers is defined.
- In the field "**BitOff**" the bit offset of the IO-Link parameter is defined.
- In the field "**Default**" the default value of the IO-Link parameter is defined.
- In the field "**Value**" the value to be written to the IO-Link parameter at start-up is defined.
- In the field "**Position**" the starting byte of the internal memory arrays where getting the value to write from Ethernet is defined.
- In the field "**Start Bit**" the starting bit of the byte of the field "Position" is defined.
- If the field "**OnCMD**" is checked, the IO-Link parameter is written when a writing from Ethernet is received (available only for Modbus TCP and EtherNet/IP (explicit communication).
- If the field "**On Change**" is checked, the IO-Link parameter is written when the data from Ethernet side changes the value.
- If the field "**On Timer**" is checked, the IO-Link parameter is written cyclically.

- In the field "**Time**" the delay in ms for writing commands is defined (used if "On Timer" is checked).
- In the field "**Read Pos**" the starting byte of the internal memory arrays where mapping the value is defined.
- In the field "**Read Start Bit**" the starting bit of the "Read Pos" is defined.
- In the field "**Read Time**" the delay in ms for reading requests is defined.
- In the field "**Description**" a description of the IO-Link parameter is defined.

Note:

- In the register allocation section, pay attention to the data size to ensure correct reading.
- For "Device Functin-Variables", assign registers starting from value 512 (reg.256).

The "I/O Options" section is used to define how mapping the pin2 to Ethernet side (only if "Read Pin 2" is checked) (Fig. 4e).

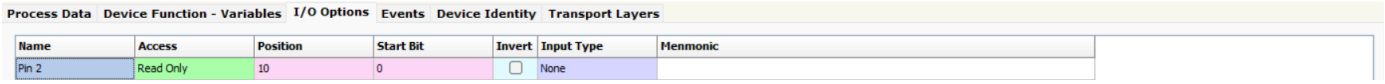


Figure 4e: "I/O Options" section

The meanings of the fields are:

- In the field "**Name**" the name of the pin is defined.
- In the field "**Access**" the access of the IO-Link pin is defined.
- In the field "**Position**" the starting byte of the internal memory arrays where mapping/getting the value is defined.
- In the field "**Start Bit**" the starting bit of the byte of the field "Position" is defined.
- If the field "**Invert**" is checked, the value to map/get is inverted.
- In the field "**Input Type**" the type of digital signal is defined.
- In the field "**Mnemonic**" a description of the variable is defined.

The "Events" section is used to define the IO-LINK events to map on Ethernet side (Fig. 4f).

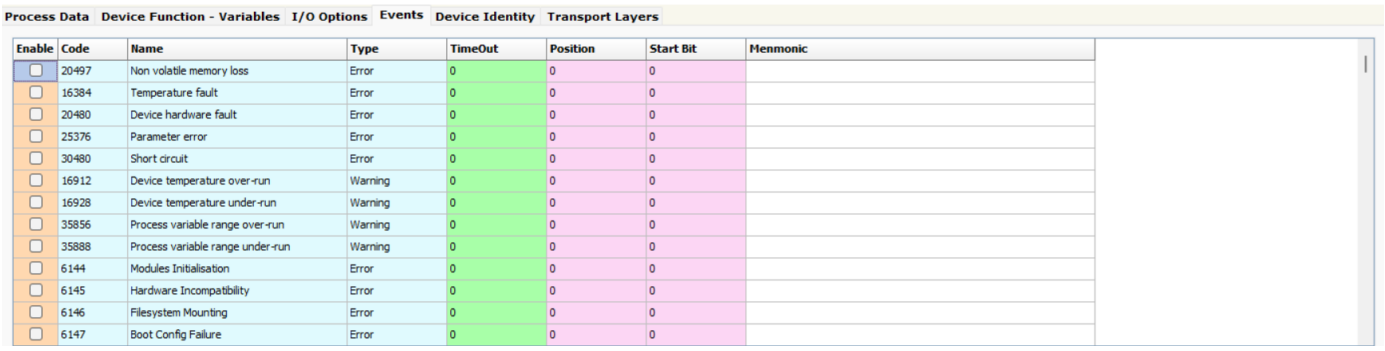


Figure 4f: "Events" section

The meanings of the fields are:

- If the field "**Enable**" is checked, the event reading is enabled.
- In the field "**Code**" the code of the IO-Link event is defined.
- In the field "**Name**" the name of the IO-Link event is defined.

- In the field "**Type**" the type of the IO-Link event is defined.
- In the field "**TimeOut**" the duration of the IO-Link event after its activation is defined.
- In the field "**Position**" the starting byte of the internal memory arrays where mapping the value is defined.
- In the field "**Start Bit**" the starting bit of the byte of the field "Position" is defined.
- In the field "**Mnemonic**" a description of the variable is defined.

In "Device Identity" section (Fig.4g) and "Transport Identity" section (Fig. 4h), the main features of the selected IO-Link device are reported. These characteristics are read from the IODD file.

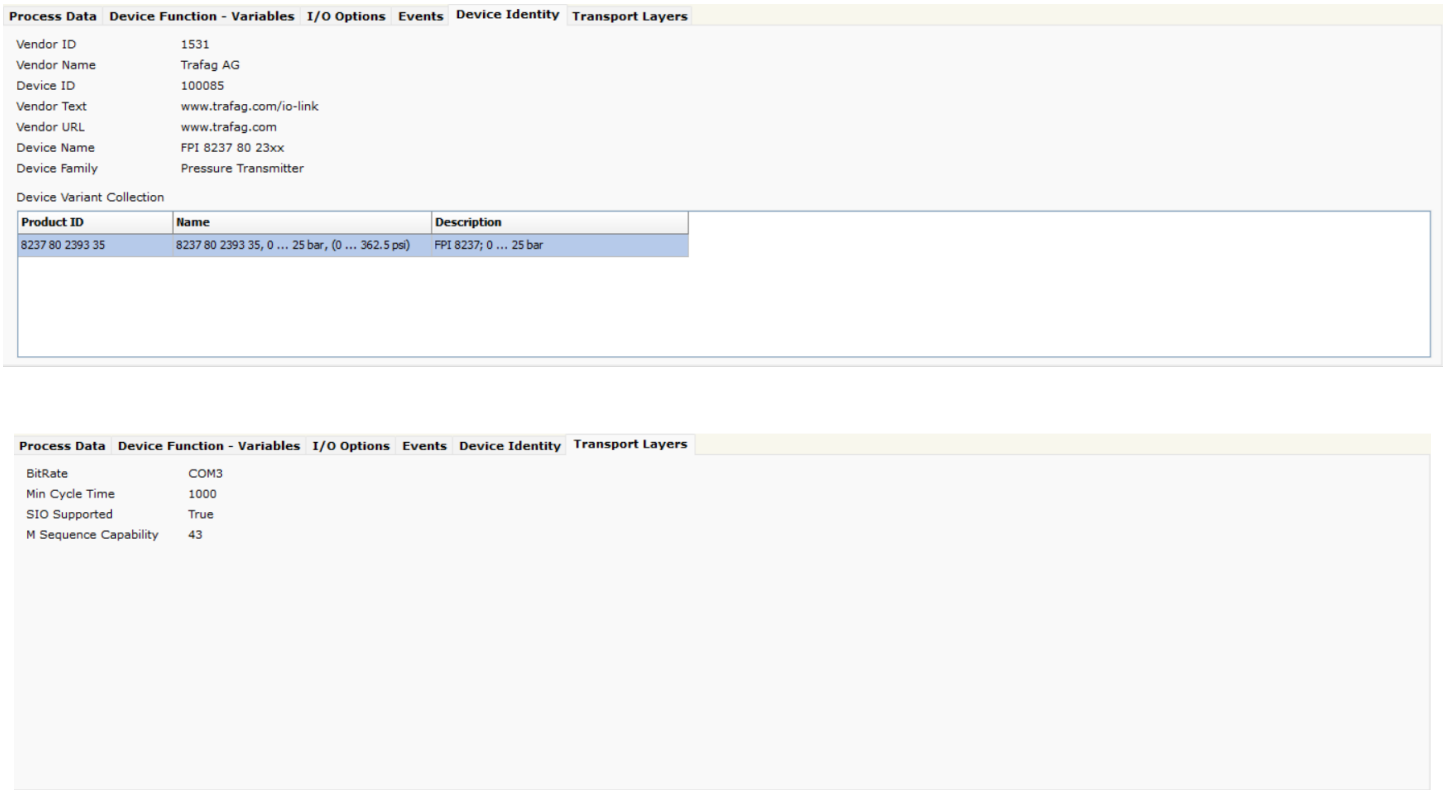


Figure 4h: "Transport Layers" section section

MQTT SET TOPIC (if "MQTT" is enabled):

By Pressing the "**MQTT Set Topic**" button from the main window for K-EASY (Fig. 2) the window "Set MQTT Topics" appears (Fig. 5a).
This section is used to define the MQTT topics the converter will publish with the data from IO-Link and the topic that the converter will subscribes for writing the data to IO-Link.

MQTT PUBLISH

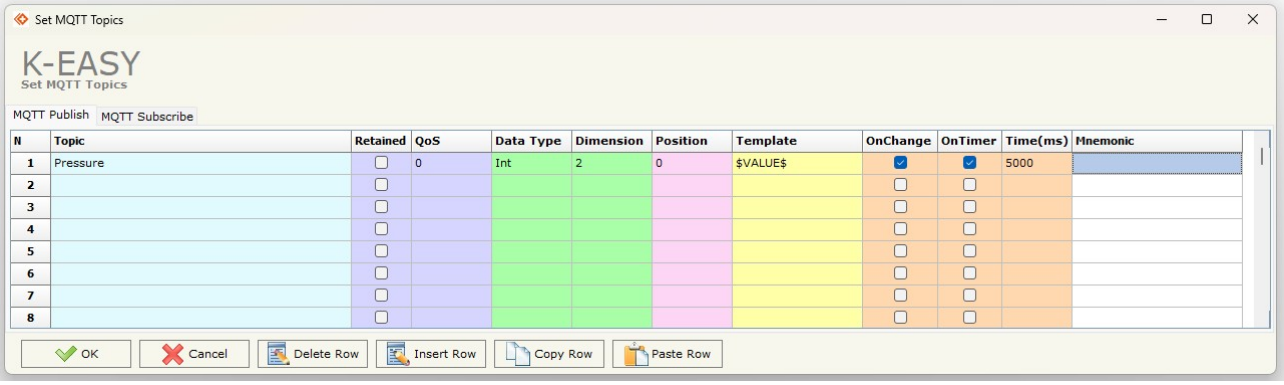


Figure 5a: "Set MQTT Topics → MQTT Publish" window

The means of the fields are:

- In the field "**Topic**" the MQTT topic is defined.
- If the field "**Retained**" is defined, the retained flag is enabled. The MQTT server will hold the last topic published.
- In the field "**QoS**" the QoS level is defined.
- In the field "**Data Type**" the type of data to use is defined.
- In the field "**Dimension**" the dimension in byte of the data is defined.
- In the field "**Position**" the starting byte of the internal memory array where taking the data is defined.
- In the field "**Template**" the structure of the MQTT payload is defined. With a double click on it, it is possible to open a window to edit it;
- If the field "**On Change**" is checked, the converter publishes the topic when the data from IO-Link changes.
- If the field "**On CMD**" is checked, the converter publishes the topic when a new response from IO-Link is received.
- If the field "**On Timer**" is checked, the converter publishes the topic cyclically with the delay defined in the field "**Time (ms)**".
- In the field "**Mnemonic**" a description of the topic is defined.

MQTT SUBSCRIBE

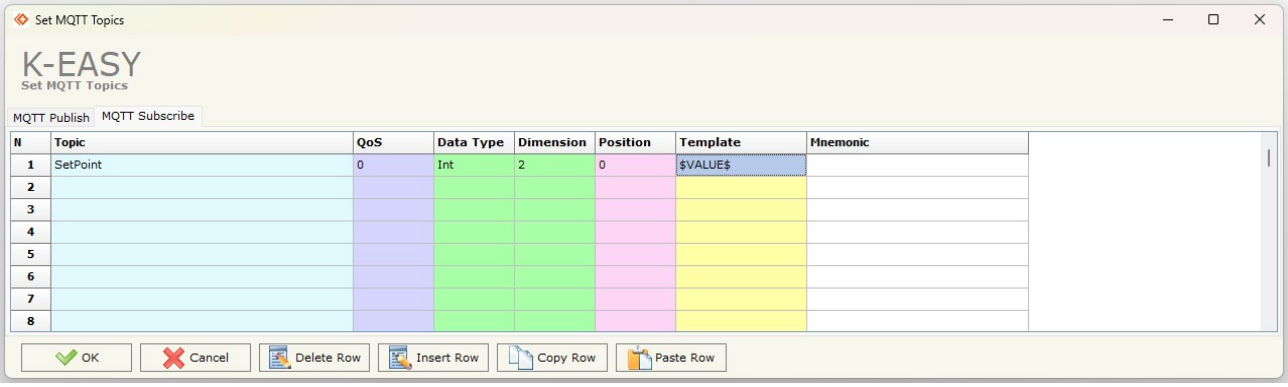


Figure 5b: "Set MQTT Topics → MQTT Subscribe" window

The means of the fields are:

- In the field "**Topic**" the MQTT topic is defined.
- In the field "**QoS**" the QoS level is defined.
- In the field "**Data Type**" the type of data to use is defined.
- In the field "**Dimension**" the dimension in byte of the data is defined.
- In the field "**Position**" the starting byte of the internal memory array where placing the data is defined.
- In the field "**Template**" the structure of the MQTT payload is defined. With a double click on it, it is possible to open a window to edit it.
- In the field "**Mnemonic**" a description of the topic is defined.

OPC UA ACCESS (if "OPC UA Client" is enabled)

By Pressing the "**OPC UA Client Access**" button from the main window for K-EASY (Fig. 2) the window "OPC UA Client Access" appears (Fig. 6a).
This section is used to define the list of the OPC UA Servers to read/write with the OPC UA Client.

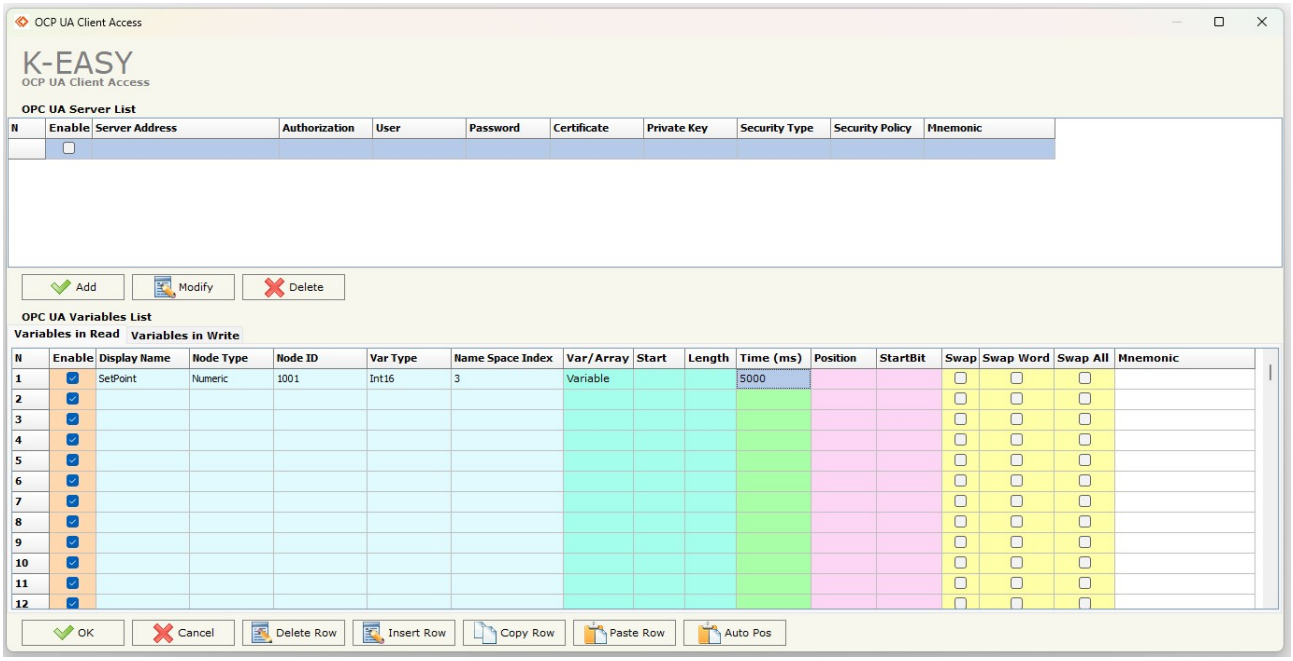


Figure 6a: "OPC UA Client Access" window

By clicking on "**Add**" or "**Modify**", it is possible to add or modify a new OPC UA Server inserting its characteristics (Server Address, Authorization, Security Type…). The window "Add OPC UA Server" appears (Fig. 6b).

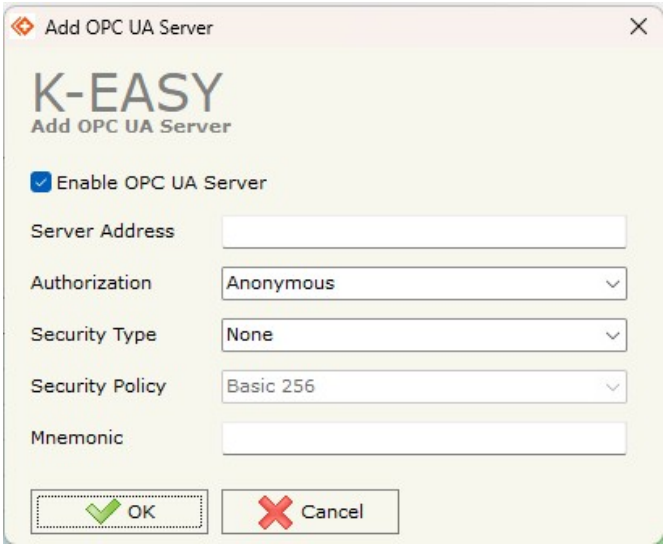
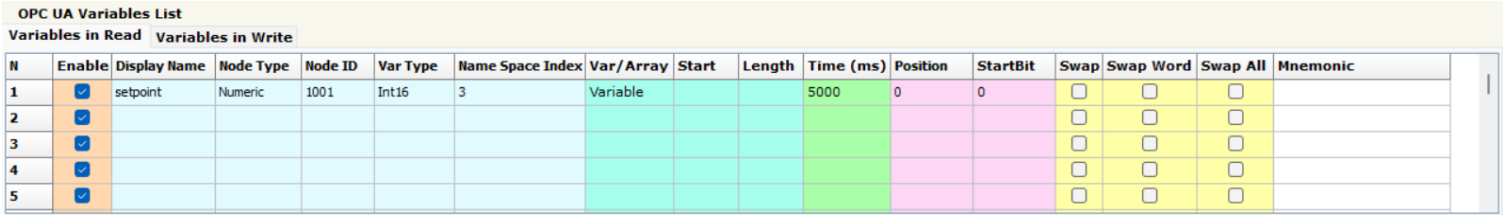


Figure 6b: "Add OPC UA Server" window

The “Variables in Read” section is used to define the OPC UA variables to read on Ethernet side (Fig. 6c).


OPC UA Variables List

Variables in Read | Variables in Write

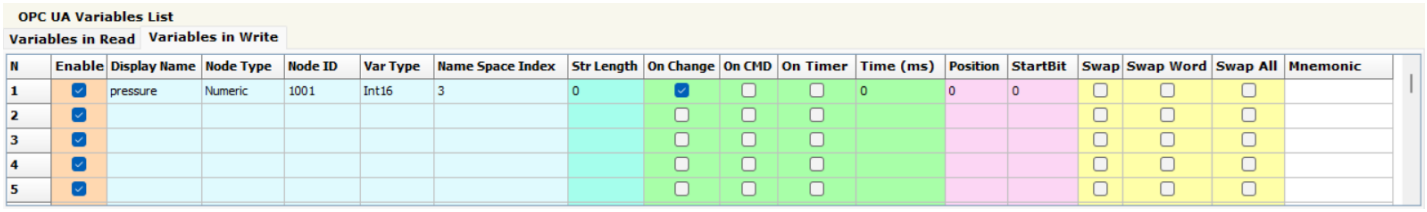
N	Enable	Display Name	Node Type	Node ID	Var Type	Name Space Index	Var/Array	Start	Length	Time (ms)	Position	StartBit	Swap	Swap Word	Swap All	Mnemonic
1	☑	setpoint	Numeric	1001	Int16	3	Variable			5000	0	0	☐	☐	☐	
2	☑												☐	☐	☐	
3	☑												☐	☐	☐	
4	☑												☐	☐	☐	
5	☑												☐	☐	☐	

Figure 6c: “Variables in Read” section

The means of the fields are:

- If the field “**Enable**” is checked, the OPC UA variable is enabled.
- In the field “**Display name**” the name of the OPC UA variable is defined.
- In the field “**Node Type**” the type of the identification of the OPC UA variable in the server is defined.
- In the field “**Node ID**” the identification of the OPC UA variable is defined.
- In the field “**Var Type**” the data format of the OPC UA variable is defined.
- In the field “**Name Space Index**” the Name Space Index of the variable is defined.
- In the field “**Var/Array**” the format of the value is defined.
- In case of Array format, the fields “**Start**” and “**Length**” are used to define which bytes of the array taken.
- In the field “**Time (ms)**” the delay in ms between two readings of the variable is defined.
- In the field “**Position**” the starting byte of the internal memory array where saving the value is defined.
- If the field “**Swap**” is checked, the bytes’ of the words are swapped.
- If the field “**Swap Word**” is checked, the words are swapped each other.
- If the field “**Swap All**” is checked, the bytes’ order is fully reversed.
- In the field “**Mnemonic**” a description of the variable is defined.

The “Variables in Write” section is used to define the OPC UA variables to write from Ethernet side (Fig. 6d).


OPC UA Variables List

Variables in Read | Variables in Write

N	Enable	Display Name	Node Type	Node ID	Var Type	Name Space Index	Str Length	On Change	On CMD	On Timer	Time (ms)	Position	StartBit	Swap	Swap Word	Swap All	Mnemonic
1	☑	pressure	Numeric	1001	Int16	3	0	☑	☐	☐	0	0	0	☐	☐	☐	
2	☑							☐	☐	☐				☐	☐	☐	
3	☑							☐	☐	☐				☐	☐	☐	
4	☑							☐	☐	☐				☐	☐	☐	
5	☑							☐	☐	☐				☐	☐	☐	

Figure 6d: “Variables in Write” section

The means of the fields are:

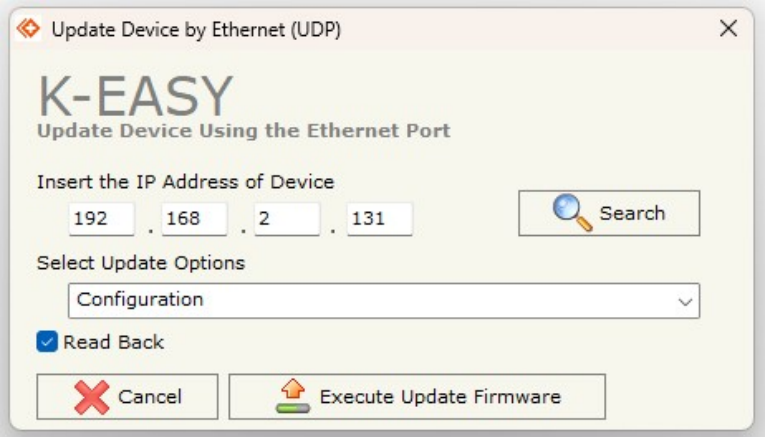
- If the field "**Enable**" is checked, the OPC UA variable is enabled.
- In the field "**Display name**" the name of the OPC UA variable is defined.
- In the field "**Node Type**" the type of the identification of the OPC UA variable in the server is defined.
- In the field "**Node ID**" the identification of the OPC UA variable is defined.
- In the field "**Var Type**" the data format of the OPC UA variable is defined.
- In the field "**Name Space Index**" the Name Space Index of the variable is defined.
- If the field "**On Change**" is checked, the OPC UA variable is written when the data from IO-Link changes.
- If the field "**On CMD**" is checked, the OPC UA variable is sent when a IO-Link response is received.
- If the field "**On Timer**" is checked, the OPC UA variable is sent cyclically.
- In the field "**Time (ms)**" the delay in ms between two writings of the variable is defined (if "On Timer" is checked).
- In the field "**Position**" the starting byte of the internal memory array where getting the value is defined.
- If the field "**Swap**" is checked, the bytes of the words are swapped.
- If the field "**Swap Word**" is checked, the words are swapped each other.
- If the field "**Swap All**" is checked, the bytes order is fully reversed.
- In the field "**Mnemonic**" a description of the variable is defined.

UPDATE DEVICE

By pressing the "**Update Device**" button, it is possible to load the created Configuration into the device, and also the Firmware, if necessary. This is by using the Ethernet port.

If you don't know the actual IP address of the device, it is possible to use the "Search" function and follow these steps:

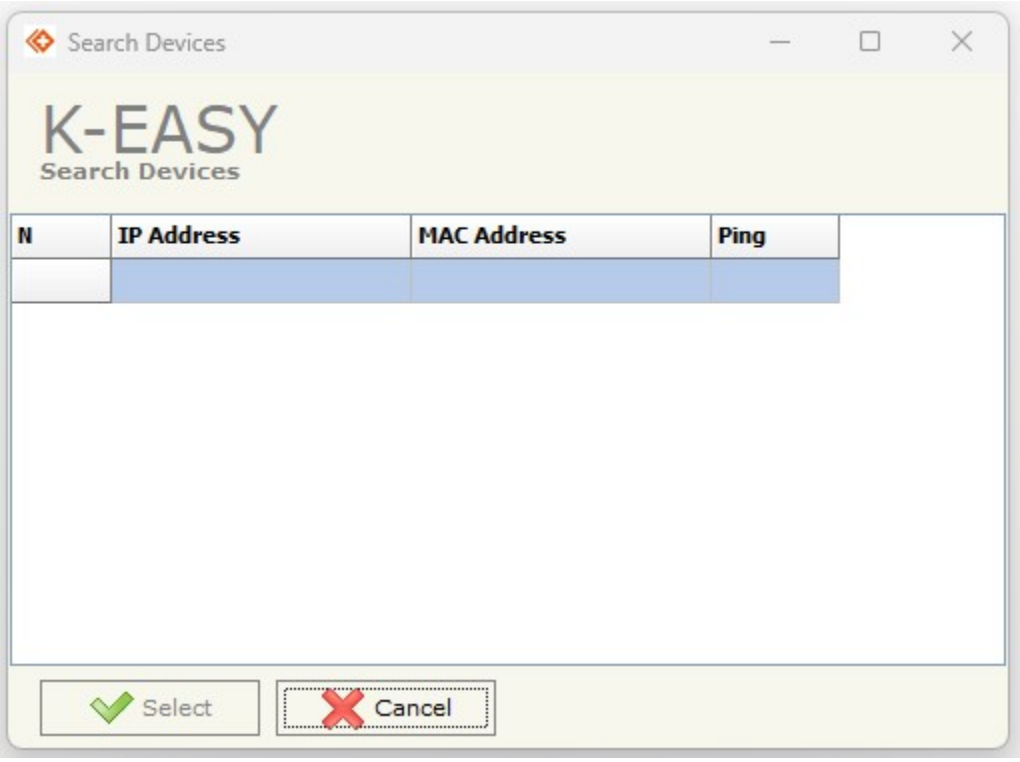
- Turn OFF the device.
- Connect Ethernet cable.
- Click on "Search" button.
- Turn ON the device.
- The IP Address and the MAC Address of the device will appear.
- Press "Select" button.
- Set the IP Address of your PC in the same range of the IP Address of the device.
- Select which operations you want to do.
- Press the "**Execute update firmware**" button to start the upload.
- When all the operations are "OK, the update is complete, and the window can be closed.



If you know the actual IP address of the device, you have to use this procedure:

- Turn ON the device.
- Connect Ethernet cable.
- Insert the actual IP of the Converter.
- Select which operations you want to do.
- Press the "**Execute update firmware**" button to start the upload.
- When all the operations are "OK, the update is complete, and the window can be closed.

At this point the configuration/firmware on the device is correctly updated.



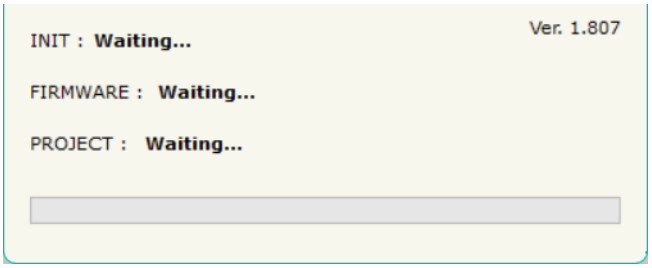
Note:

When you receive the device for the first time, you also have to update the firmware in the ITM-8X device.

Warning:

If Fig. 8 appears when you try to do the update, try these points before seeking assistance:

- Try to repeat the operations for the updating.
- Try with another PC.
- Try to restart the PC.
- Check the LAN settings.
- If you are using the program inside a Virtual Machine, try to use it in the main Operating System.
- If you are using Windows Seven, Vista, 8, 10 or 11 make sure that you have the administrator's privileges.
- In case you have to program more than one device, using the "UDP Update", you have to cancel the ARP table every time you connect to a new device on Ethernet. For do this you have to launch the "Command Prompt" and write the command "arp -d". Pay attention that with Windows Vista, Seven, 8, 10, 11 you have to launch the "Command Prompt" with Administrator Rights.
- Pay attention at Firewall lock.



DATA LIVE VIEW FUNCTION

"Data Live View" functions are integrated in the configurator software K-EASY. It is possible to access to these functions by simple click on the "Data Live View" button from main window of K-EASY (Fig. 2).

It has the following characteristics:

- Possibility to scan IO-Link channels.
- Live monitor of IO-Link data.
- Writing process data and parameters.

MODBUS MAP (if “Modbus TCP Slave” is enabled)

Read with Input Register / Status Function not enabled

Data in reading:

Type	Address	Function	Description
Holding Register	0	03	Input Bytes 0-1 of internal memory array
Holding Register	1	03	Input Bytes 2-3 of internal memory array
Holding Register	2	03	Input Bytes 4-5 of internal memory array
.			
.			
Holding Register	719	03	Input Bytes 1438-1439 of internal memory array

Data in writing:

Type	Address	Function	Description
Holding Register	0	06/16	Output Bytes 0-1 of internal memory array
Holding Register	1	06/16	Output Bytes 2-3 of internal memory array
Holding Register	2	06/16	Output Bytes 4-5 of internal memory array
.			
.			
Holding Register	719	06/16	Output Bytes 1438-1439 of internal memory array

Note:

The data can be read/written as single bits too using Coil Status (Function 01 and Functions 05/15).

Read with Input Register / Status Function enabled

Data in reading:

Type	Address	Function	Description
Input Register	0	04	Input Bytes 0-1 of internal memory array
Input Register	1	04	Input Bytes 2-3 of internal memory array
Input Register	2	04	Input Bytes 4-5 of internal memory array
.			
.			
Input Register	719	04	Input Bytes 1438-1439 of internal memory array

Data in writing:

Type	Address	Function	Description
Holding Register	0	R: 03 W: 06/16	Output Bytes 0-1 of internal memory array
Holding Register	1	R: 03 W: 06/16	Output Bytes 2-3 of internal memory array
Holding Register	2	R: 03 W: 06/16	Output Bytes 4-5 of internal memory array
.			
.			
Holding Register	719	R: 03 W: 06/16	Output Bytes 1438-1439 of internal memory array

Note:

The data can be read/written as single bits too using Input/Coil Status (Function 02 and Functions 01/05/15).

TEMPLATE STRING: DEFINITION OF MQTT PAYLOAD

Mode 1: mapping a single variable for each topic using tables

In this mode, it is possible to define which is the IO-Link data to map inside the MQTT topics using the Position field inside “MQTT Set Topic” section. This simplifies the configuration because the variable to be mapped is selected using the table, but it allows you to map a single variable for each topic.
In order to link the data into the MQTT topic, you can use the keyword $VALUE$. The keyword will be replaced with the real value coming from/to IO-Link.

Mode 2: mapping more variables for each topic using keywords

In this mode, it is possible to define which is the Modbus data to map inside the MQTT topics specific keywords. Position field, format and dimension of “MQTT Set Topic” section will be ignored.
In order to link the data into the MQTT topic, you can use these keywords:

@	f	sss	.	nnn	@

Starting char	Format of the variable	Starting bit of the internal memory array	Separator	Dimension in bit	Ending char

Below is the type of format allowed:

FORMAT	IDENTIFIER
Unsigned Integer	u
Signed Integer	i
Float	f
Binary	b
String	s
Hexadecimal	x
Base64	l

Example:

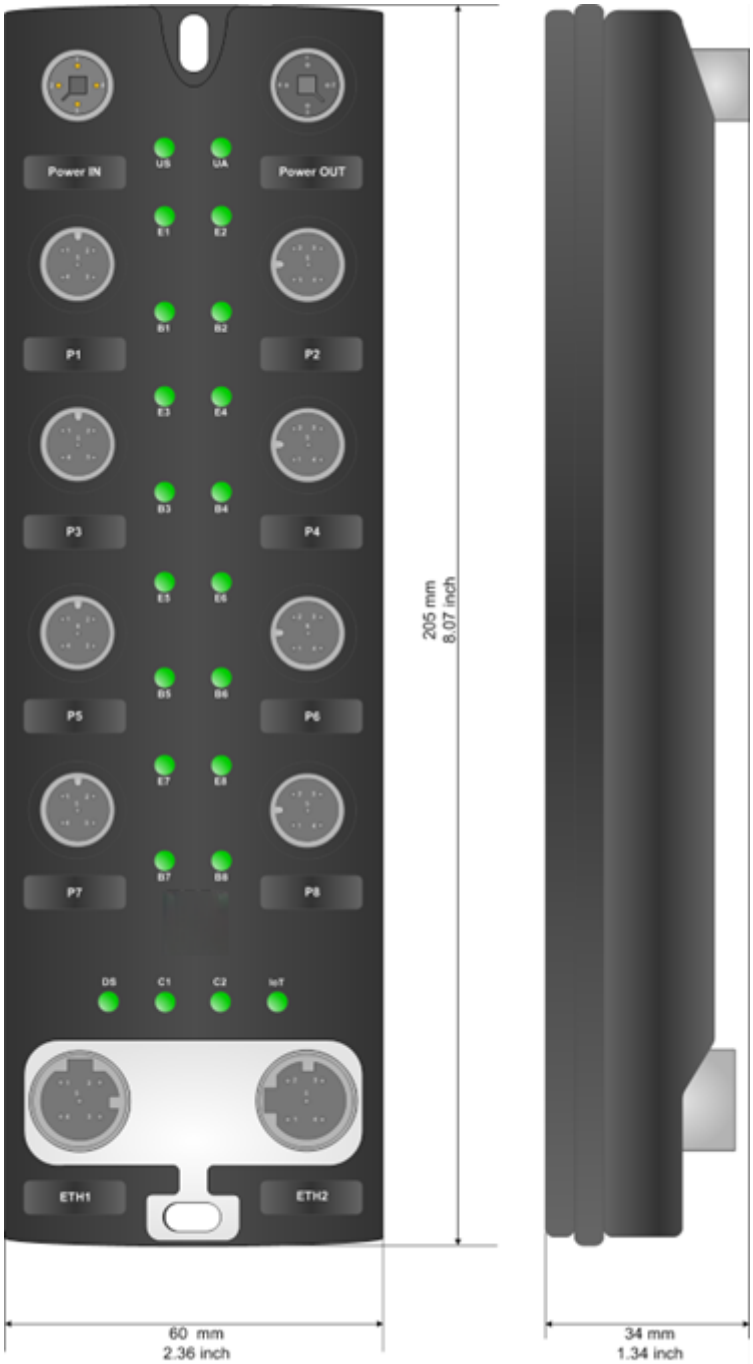
We have two variables mapped respectively into Position 0 and 4. The first one is a signed integer value of 16 bit, the second one is a floating point. In order to compose a JSON, the template can be filled in this way:

```
{
        “var1”: @i0.16@,
        “var2”: @f32.32@
}
```

Note:

It is not possible to use both modes in the template.

MECHANICAL DIMENSIONS



Housing: PBT
Weight: 200g (Approx)

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WEEE INFORMATION

Disposal of old electrical and electronic equipment (as in the European Union and other European countries with separate collection systems).

This symbol on the product or on its packaging indicates that this product may not be treated as household rubbish. Instead, it should be taken to an applicable collection point for the recycling of electrical and electronic equipment. If the product is disposed correctly, you will help prevent potential negative environmental factors and impact of human health, which could otherwise be caused by inappropriate disposal. The recycling of materials will help to conserve natural resources. For more information about recycling this product, please contact your local city office, your household waste disposal service or the shop where you purchased the product.

RESTRICTION OF HAZARDOUS SUBSTANCES DIRECTIVE

The device respects the 2002/95/EC Directive on the restriction of the use of certain hazardous substances in electrical and electronic equipment (commonly referred to as Restriction of Hazardous Substances Directive or RoHS).

CE MARKING

The product conforms with the essential requirements of the applicable EC directives.

WARRANTIES AND TECHNICAL SUPPORT

For fast and easy technical support for your Trafag Italia SRL products, consult our internet support at www.trafag.com. Otherwise contact us at the address support.it@trafag.com

RETURN POLICY

Whether you have any problem with using your product and you wish to exchange or repair it, please do the following:

- Obtain a Product Return Number (PRN) from our internet support at www.trafag.com. Together with the request, you need to provide detailed information about the problem.
- Send the product to the address provided by the PRN, having prepaid the shipping costs (shipment costs billed to us will not be accepted).

If the product is within the warranty of twelve months, it will be repaired or exchanged and returned within three weeks. If the product is no longer under warranty, you will receive a repair estimate.