App note 0033

FW extension module

IEC 104

Document revision	Release date	For version		
		Hardware	Firmware	Software ENVIS
1.0	31.08.2024	G3	≥ 4.13.1	≥ 2.2.38

For a current revision of this document, please visit the manufacturer's website at http://www.kmb.cz/.

Contents

1 About

Extension FW module IEC 104 activates in compatible devices communication according to protocol defined in IEC 60870-5-104. It is network communication standard for SCADA systems based on IEC 60870-5-101. IEC 104 works on TCP/IP, which allows connection flexibility and gives function for flow control and error correction. It is master-slave communication, where master requires data or it sends commands and slave (like measuring device) reacts to these commands. Application layer of IEC 104 is specified by the standard and defines format and types of messages, their addressing and method of communication between devices. Each message contains head and can contains data frame – ASDU (Application Service Data Unit).

Compatible devices with this module are all devices of generation G3 with Ethernet interface and corresponding FW version.
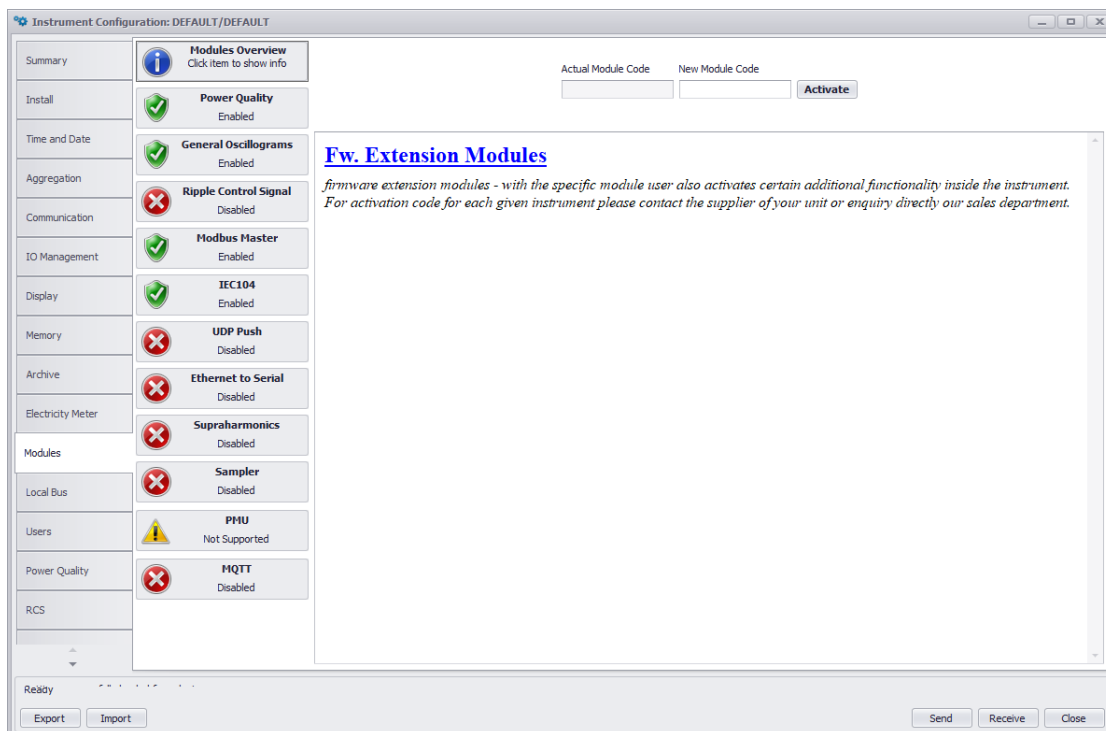
2 Settings of IEC 104 in KMB devices

For set up IEC 104 in devices, it is necessary to have compatible devices with activated FW module and suitable FW version and PC with *ENVIS.Daq* program.

2.1 Device modules

Compatible and active modules in device is possible to see in *ENVIS.Daq* program. After connecting to device, active modules are on top of main screen or in *Configs* window, on *Modules* tab.
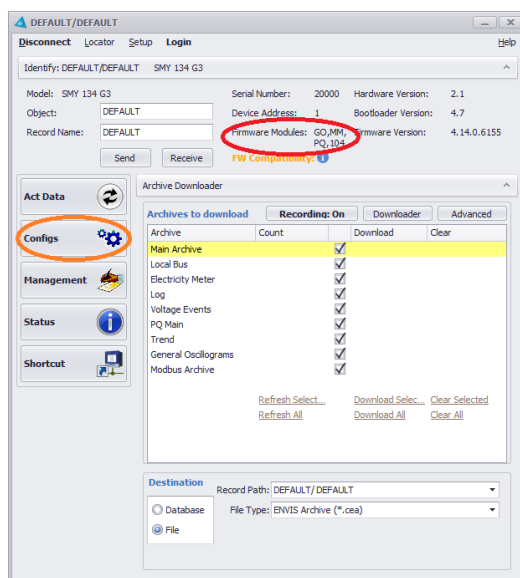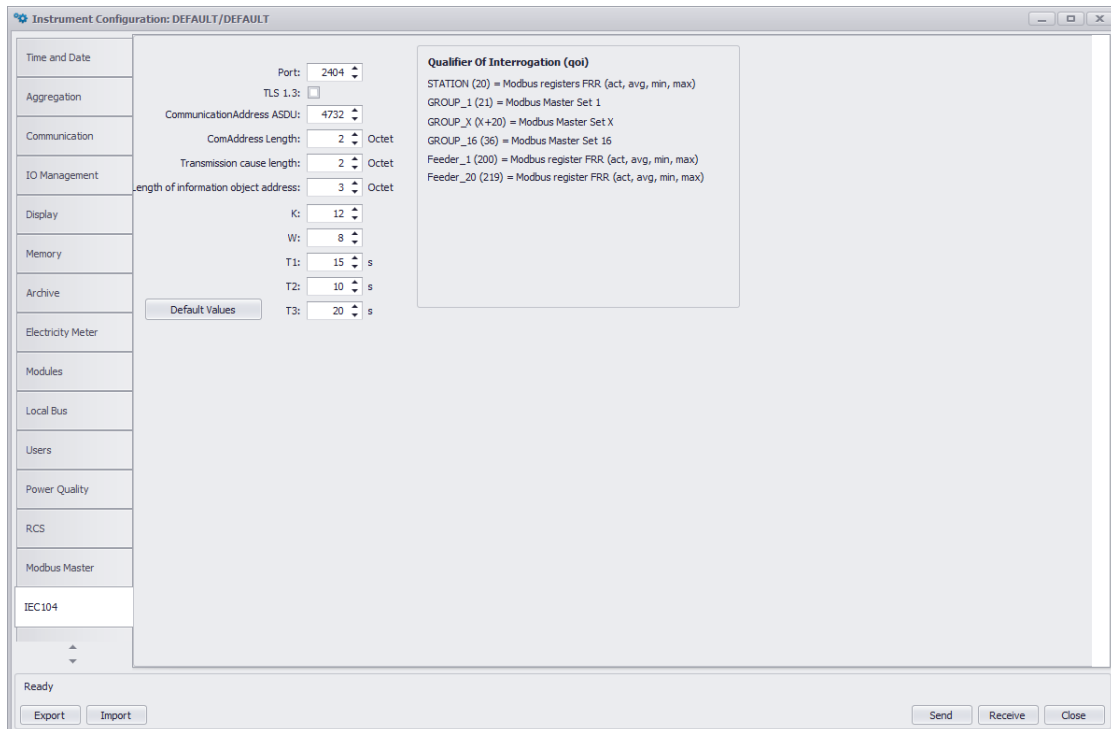

Obrázek 1: Main screen of ENVIS.Daq program, after device connect

Obrázek 2: Active modules in device

2.2 Settings

Setting of device parameters can be done using *ENVIS.Daq* program, in *Configs* window, *IEC 104* tab.

Obrázek 3: Settings of IEC 104 parameters

Port – TCP port

TLS 1.3 – Option to encrypt communication with TLS protocol

In common cases, following parameters is not recommended to change. If parameters change caused stop of communication work, all parameters can be restored with "Default Values" button. Parameters are based on serial communication IEC101.

Communication address ASDU – Communication address of ASDU frame

Communication address length – Length of ASDU address (previous parameter) in octets = 8^n-1.

Transmission cause length – Length of message type[1] in octets = 8^n-1.

Length of information object address – Length of read registers address from device (QoI) in octets = 8^n-1.

K – Maximal count of information frames which can be send without acknowledgement of receive.

W – Threshold of information frames count for acknowledgement sent.

T1, T2, T3 – Timers

- T1 – Acknowledgement timer
    - Maximal waiting time for acknowledgement.

- T2 – Acknowledgement transmission timer
    - Maximal waiting time when inactivity for acknowledgement of receive less than **W** information frames.

- T3 – Idle timer
    - Maximal inactive time before send of control frame for verification connection.

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[1]Type message is part of slave message head and informs about type of message, which can be send without previous request – alarm, IO event. . .

2.3 Data reading

For data reading, IP address, port and register address is necessary to set.

QoI – Address of read registers of device.

- 20 – Master device values.

- 21-40 – Modbus master sets values

- 200-220 – Local bus feeders values

Registers – Addresses of read registers are based on modbus registers of device – see Modbus manual.

- Minimum values start at register 16 852.

- Maximum values start at register 17 464.

- Actual values are at registers corresponding to modbus manual.

- Registers with average values are in same layout in registers 300 000 larger.

  – Example: actual value of voltage U1 is at register 19 000
    average value of voltage U1 is at register 319 000