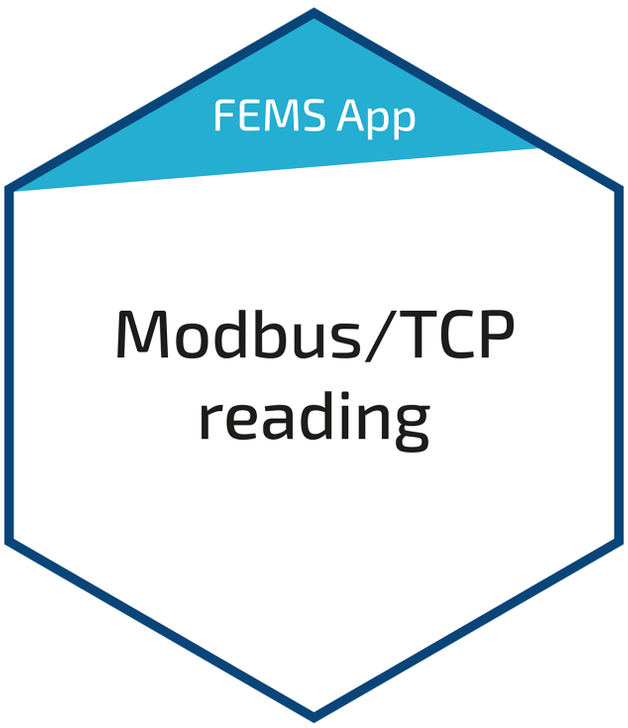


FEMS App Modbus/TCP Read Access

Version:2023.6.1

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1. FEMS App Modbus/TCP Read Access

These instructions describe read access to a FENECON electrical energy storage system using the Modbus/TCP API. The basics of the protocol are described first. Then, the functionality of the interface is explained.



The readable data is collected in real time and may contain deviations or inaccuracies. This data is for information purposes only and must not be used as a basis for legally binding decisions or actions.

1.1. Prerequisites

The device accessing the electrical energy storage system (e. g. notebook/PC) must have direct access to the IP address of the FEMS - i. e. be connected to the same physical network, for example.

1.2. Basics Modbus/TCP

The Modbus protocol is a communication protocol based on a client/server architecture. It was created in 1979 by Gould-Modicon for communication with its programmable logic controllers. Modbus has become a de facto standard in the industry as it is an open protocol. The Modbus TCP version has been part of the IEC 61158 standard since 2007.

Wikipedia: Modbus/TCP

Modbus can be used to connect a client (e. g. a PC/EMS) and several servers (e. g. measurement and control systems, battery storage, PV system, EV charging station). There are two versions: One for the serial interface (EIA-232 and EIA-485) and one for Ethernet. This manual describes the version for Ethernet. TCP/IP packets are used to transmit the data.

Read and write access is possible to the following object types:

Object type	Access	Size	Function code
Single input/output "Coil"	read & write	1-bit	01 / 05 / 15
Single input "Discrete Input"	read only	1-bit	02
(Analog) inputs "Input Register"	read only	16-bits	04
(Analog) inputs/outputs "Holding Register"	read & write	16-bits	03 / 06 / 16



The interface for read access is already included and pre-installed ex works.

The Modbus interface is configured as follows:

Device address	*IP address of the EMS* (e. g. 192.168.0.20)
Port	**502**
Unit ID	**1**
Function Codes	03 (Read Holding Registers)
	04 (Read Input Registers)

Table 1. Parameters for read access

The interface enables access to the channels of the *_sum* component by default.

1.3. Modbus table

Via the Online Monitoring you can conveniently download the individual Modbus table for your system as an Excel file as follows:

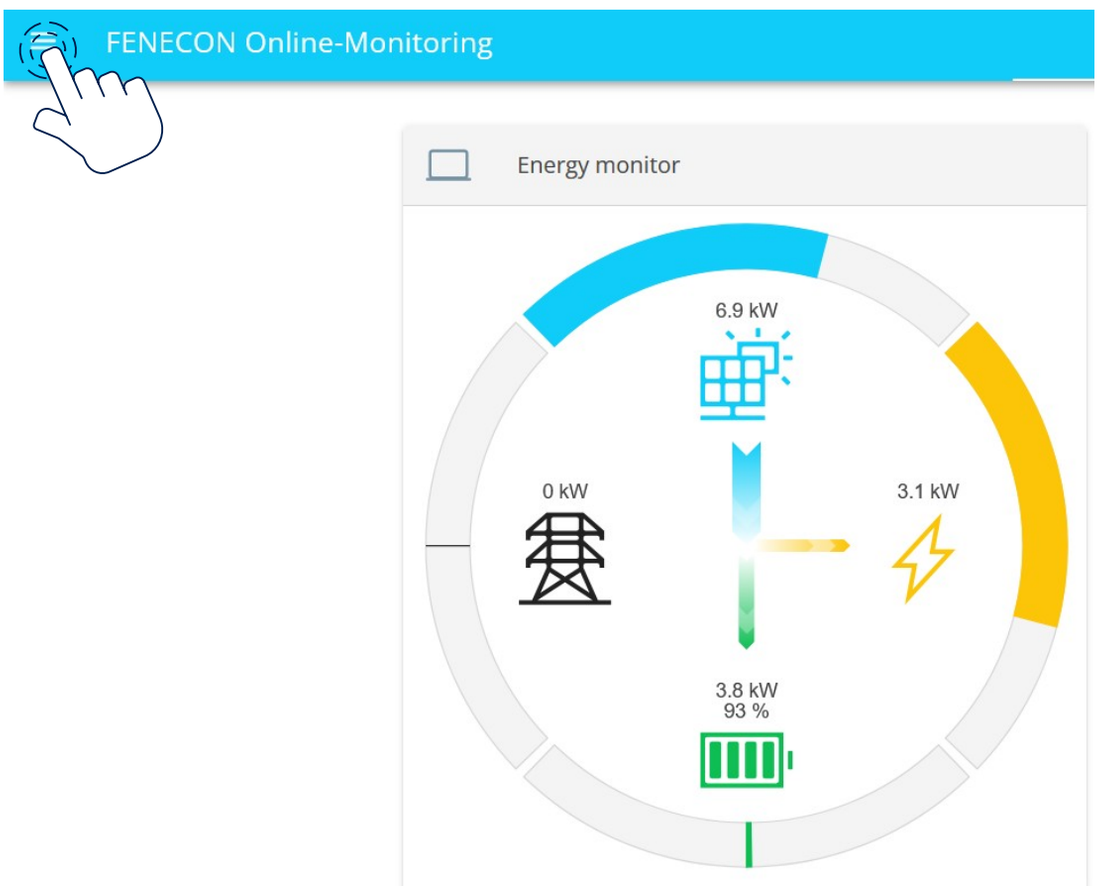


Image 1. Open the tab at the top left of Online Monitoring

1.3. Modbus table



Image 2. Open "Settings"

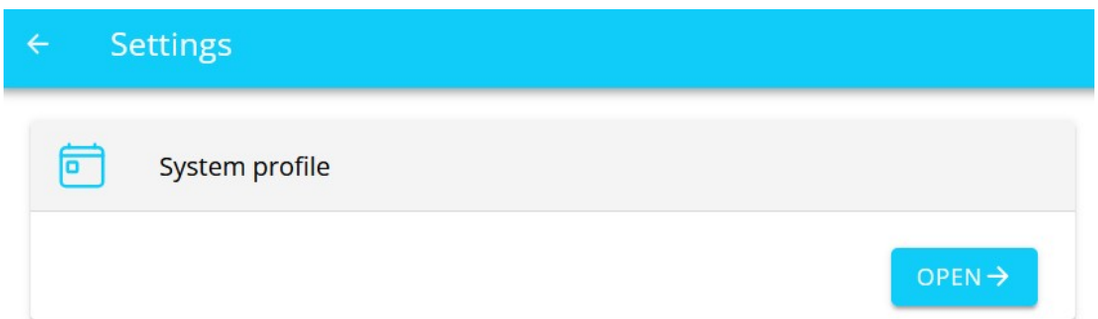


Image 3. Open system profile



Image 4. Open ctrlApiModbusTcp and click on "DOWNLOAD PROTOCOL".

You can also find the most important data points here in the quick overview:

Address (address)	**Name** (Name)	**Type** (Type)	**Value/Description** (Value/Description)	**Unit** (Unit)	**Access** (Access)

200	Component-ID	string16	_sum		RO
222	State	enum16	0:Ok, 1:Info, 2:Warning, 3:Fault		RO
302	EssSoc	uint16	State of charge [0 - 100]	Percent [%]	RO
303	EssActivePower	float32	AC-side active power of the electrical energy storage including excess DC generation with hybrid inverter	Watt [W]	RO
309	EssReactivePower	float32	AC-side reactive power of the electrical energy storage	Volt Ampere Reactive [var]	RO
315	GridActivePower	float32	Active power at grid connection point	Watt [W]	RO
317	GridMinActivePower	float32	Minimum active power measured per grid connection point	Watt [W]	RO
319	GridMaxActivePower	float32	Maximum active power per measured active power at the grid connection point	Watt [W]	RO
327	ProductionActivePower	float32	Active power of the PV yield and, if applicable, yield from external inverters	Watt [W]	RO
329	ProductionMaxActivePower	float32	Maximum measured active power of the PV system	Watt [W]	RO
331	ProductionAcActivePower	float32	Active power of the external AC inverters	Watt [W]	RO
339	ProductionDcActualPower	float32	Power of the DC generation of the hybrid inverter	Watt [W]	RO
343	ConsumptionActivePower	float32	Active power of the electrical consumption	Watt [W]	RO
345	ConsumptionMaxActive-Power	float32	Maximum active power of electrical consumption ever measured	Watt [W]	RO
351	EssActiveChargeEnergy	float64	Cumulative electrical energy of the AC-side battery charging incl. excess PV generation at the hybrid inverter	Watt hours [Wh]	RO
355	EssActiveDischargeEnergy	float64	Cumulative electrical energy from electrical energy storage to consumption via AC output of the inverter incl. PV generation	Watt hours [Wh]	RO

359	GridBuyActiveEnergy	float64	Cumulative electrical energy from grid consumption	Watt hours [Wh]	RO
363	GridSellActiveEnergy	float64	Cumulative electrical energy of the grid feed-in	Watt hours [Wh]	RO
367	ProductionActiveEnergy	float64	Cumulative electrical energy of PV generation + external inverter generation	Watt hours [Wh]	RO
371	ProductionAcActiveEnergy	float64	Cumulative electrical energy of the external inverters	Watt hours [Wh]	RO
375	ProductionDcActiveEnergy	float64	Cumulative electrical energy of the PV generation of the inverter	Watt hours [Wh]	RO
379	ConsumptionActiveEnergy	float64	Cumulative electrical consumption	Watt hours [Wh]	RO
383	EssDcChargeEnergy	float64	Cumulative DC electrical energy of battery charging	Watt hours [Wh]	RO
387	EssDcDischargeEnergy	float64	Cumulative DC electrical energy of storage discharge	Watt hours [Wh]	RO
415	EssDischargePower	float32	Actual AC-side active power of the electrical energy storage	Watt [W]	RO
417	GridMode	enum16	1:On-Grid, 2:Off-Grid		RO

Table 2. Modbus table component Sum

1.4. Example 1: Read access battery charge status with QModMaster

The following is an example of read access to the state of charge (SoC) of the battery using the free tool *QModMaster*.

Download the tool using this link:
Online: https://sourceforge.net/projects/qmodmaster/

The value of the state of charge is stored as follows (see above):

Address	Name	Type	Value/Description	Unit	Access
302	_sum/EssSoc	uint16		Percent [%]	RO

Table 3. Register address for the state of charge of the battery

By default, the *Base Address* is set to **1** in QModbusMaster. This value must be changed to **0**. Otherwise, the register addresses from the system profile are shifted by 1.

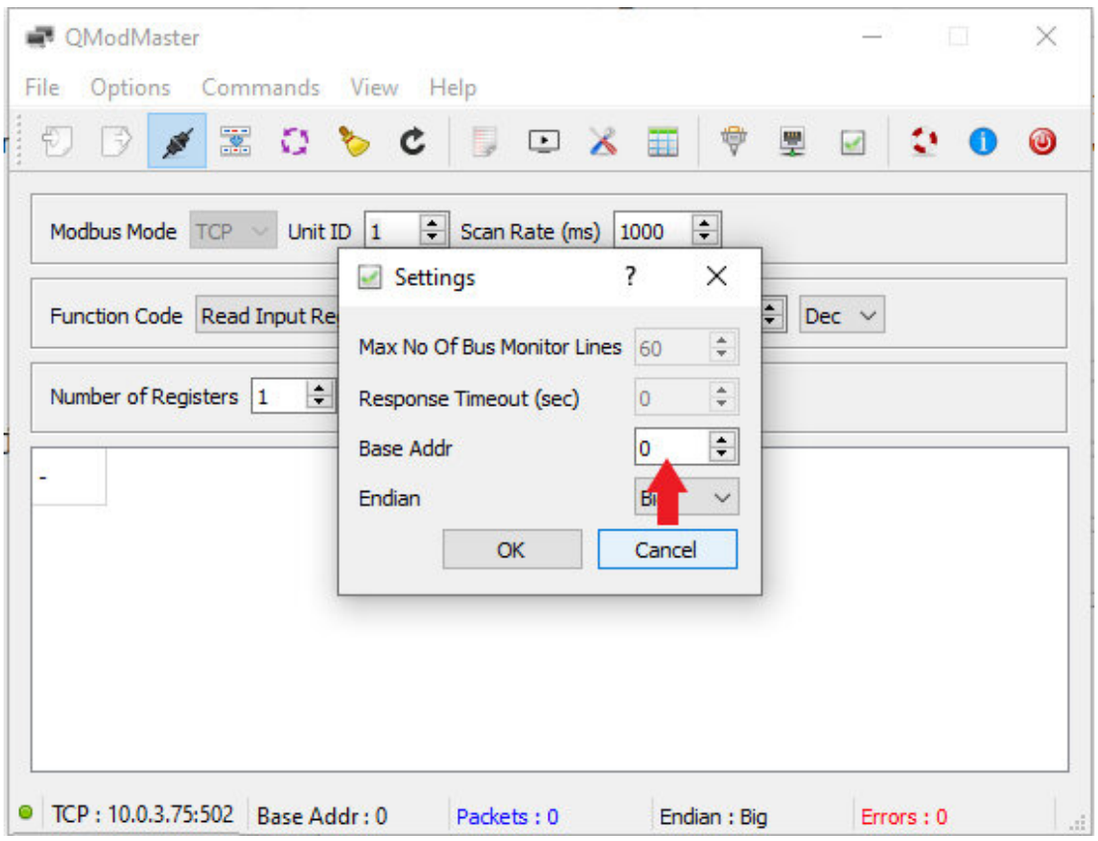


Image 5. Settings

Under *Modbus TCP Settings*, *Slave IP* and *TCP Port* must be configured correctly.

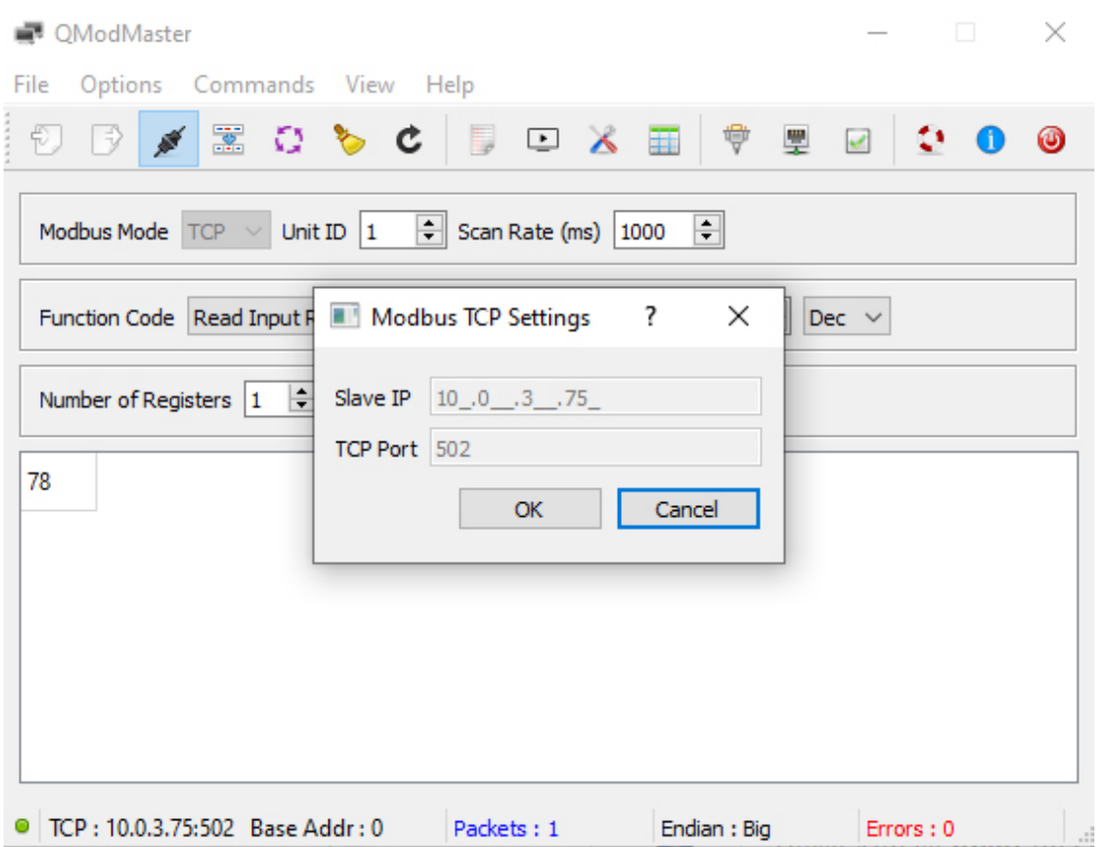


Image 6. Modbus TCP settings

1.4. Example 1: Read access battery charge status with QModMaster

As this is a *unit16*, a 16-bit word, i. e. a register, must be read out. After setting the values, click on the "Read/Write" menu item. The read value appears below.

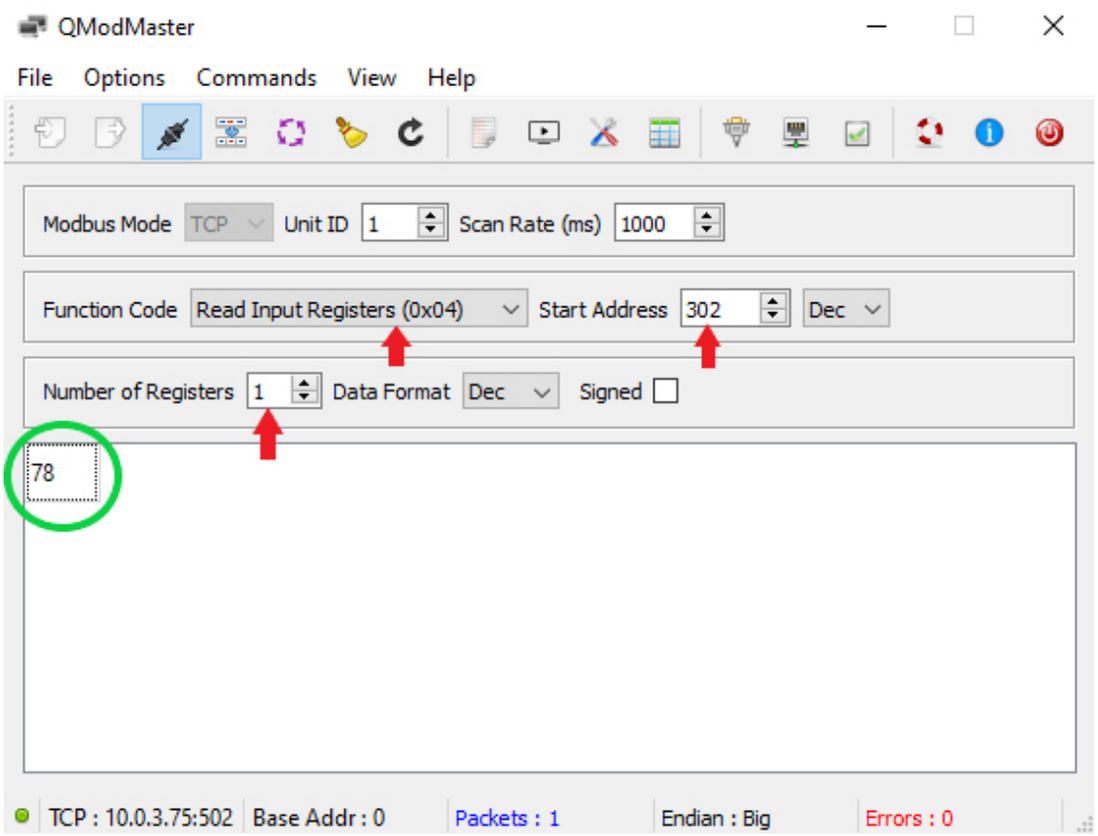


Image 7. Read value

The comparison with Online Monitoring confirms the correctness of the read value.

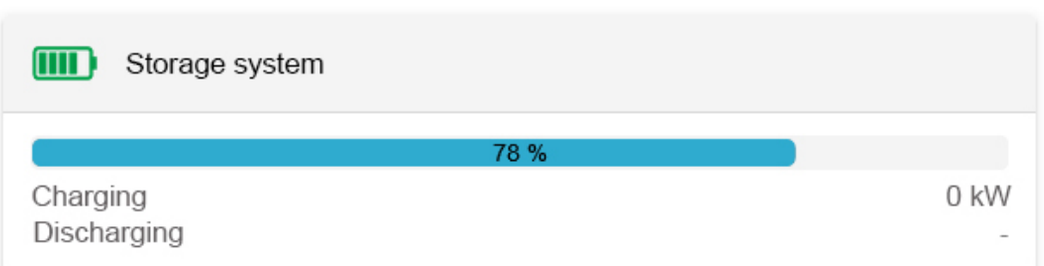


Image 8. Comparison with Online Monitoring

Other read operations are performed in the same way.

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3. Directories

3.1. List of illustrations

Image 1. Open the tab at the top left of Online Monitoring
Image 2. Open "Settings"
Image 3. Open system profile
Image 4. Open ctrlApiModbusTcp and click on "DOWNLOAD PROTOCOL".
Image 5. Settings
Image 6. Modbus TCP settings
Image 7. Read value
Image 8. Comparison with Online Monitoring

3.2. List of tables

Table 1. Parameters for read access
Table 2. Modbus table component Sum
Table 3. Register address for the state of charge of the battery