

Elster EK2x0 – Modbus-TCP (IP) – V5

Requirements for a Successful Commissioning



Dear customer,

The Honeywell-Elster Volume Conversion Devices (VC) type EK205, EK220, EK260 and EK280 support data communication via Modbus. The Modbus protocol is open to transfer almost any value, it offers very individual configuration options. For a successful commissioning, the configuration must be defined in advance. This document should help you to gather the necessary parameters so that they are clarified and available at the time of commissioning.

Please clarify the below described parameters with the end user.

Please note that the clarification of these parameters cannot be made shortly, during commissioning.

Our experience shows that the definition of the required parameters, especially when using such a technique for the first time, raises some questions among the users.

Honeywell offers you a support in the form of a small project, in which we clarify all the necessary issues. If all parameters are available, we may create a corresponding parameter file. This can be loaded into the device via the optical interface via enSuite and OPTO head. Thus, a commissioning on site can be done quickly and smoothly.

On request, commissioning on site can also be done by our service. The billing of the use is done according to our service conditions for service technicians on site.

It is strongly recommended that an end user of the later system operator (Modbus programmer) is available during commissioning. This allows fine-tuning of the Modbus settings and final acceptance by retrieving the data.

For more information or if you would like to accept our support offer, in the form of a small project, please contact your local sales representative or our electronics support at

telephone number: **+49 (0)6134 / 605-123** or

via email to elstersupport@honeywell.com

Station

Station Information	
Plant operator (Company)	
Name of measuring point	
Street / City	
Country	
Local contact person (Name, Surname)	
Tel. No. (Mobile)	
email address	

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Contact person:

Name	Owner of the device	Modbus User
Name, Surname		
Company		
Street		
City Code / City		
Country		
Telephone No.		
Mobile No.		
E-mail Address		
	@	@

Used Volume Conversion Device (if known)

Device			
Type	<input type="checkbox"/> EK205*1	<input type="checkbox"/> EK260	<input type="checkbox"/> EK280
Serial No. EK2xx		Software-Version	
Serial No. FE260			

*1: EK205 supports also the TCP protocol, but no support of the 2G/3G/4G modem or Ethernet card

Hardware Connection

1. Internal 2G/3G/4G modem or Ethernet card inside (only EK280)
2. Via ext. FE260 with internal 2G/3G/4G modem (EK280)
3. Via ext. FE260 with internal Ethernet card (EK220, EK260, EK280)
4. Via terminals inside EK2xx – see separate document

Interface	Customized value
Internal modem (only EK280)	<input type="checkbox"/> 2G <input type="checkbox"/> 3G <input type="checkbox"/> 4G modem inside EK280 <input type="checkbox"/> Ethernet card (AK-Nord) inside EK280
External modem inside FE260 (only EK280)	<input type="checkbox"/> 2G <input type="checkbox"/> 3G <input type="checkbox"/> 4G modem inside FE260 <input type="checkbox"/> Ethernet card (AK-Nord) inside FE260
External modem inside FE260 (EK220 / EK260 / EK280)	<input type="checkbox"/> TCPServ modem - no longer available <input type="checkbox"/> Ethernet card (INSYS) - no longer available!
Installation of the EK2xx in:	<input type="checkbox"/> Ex Zone 1 <input type="checkbox"/> Ex Zone 2 <input type="checkbox"/> Outside Ex areas

Modbus Setting

Parameter	Factory setting	Customized value
Modbus Transmission mode	<input type="checkbox"/> RTU over TCP	<input type="checkbox"/> TCP
Slave address (ID; 1...247)	1	
Data order (L-word / H-word)	<input type="checkbox"/> L-word first	<input type="checkbox"/> H-word first
Data order (L-byte / H-byte)	„High Byte first“ (fixed set)	
Register size (16 / 32 Bit)	16 Bit („2“)	
Address mode (Log./Phys.) *1	Logical mode	

*1: If the logical address mode is used (factory setting of the Ek2xx) please subtract “1” to get the right value (e.g. for the pressure ask for address 336_{Dec} (=150_{Hex}) in logical mode)!

APN Data (2G / 3G / 4G)

For an IP connection via 2G/3G/4G modem the radius server from the Network provider, some “access data” of the server must be known. To receive a "fixed" IP address for the application TCPServ, the access to the 2G/3G/4G network takes place via a VPN ("virtual private network"). This information must be available from the network provider or the IT department of the customer:

Access data to the server	Customized value
GPRS Provider name in clear text (e. g. Elster - VPN)	
Access Point Name (APN) (e.g. elstermz.t-mobile)	
Optional: APN – User name (e.g. test)	
Optional: APN – Pass word (e.g. xyz-123)	
Used port (e g. „40000“)	
From provider or IT department defined fixed IP address (received from the network)	
Polling cycle between two requests to one device	<input type="checkbox"/> OK; Polling cycle ≥ 2 seconds

Network Information

For an IP connection via LAN connection (Ethernet card), the “access data” of the network must be known. This information must be available from the IT department of the customer:

Access data to the network	Customized value
Network name in clear text (e. g. Elster - LAN)	
DHCP (on / off)	<input type="checkbox"/> on <input type="checkbox"/> off
From IT department defined fixed IP address	
Used port (e.g. „40000“)	
Net mask / Subnet mask (e.g. 255.255.255.0)	
Gateway address (e.g. 0.0.0.0)	
Polling cycle between two requests to one device	<input type="checkbox"/> OK; Polling cycle ≥ 2 seconds <input type="checkbox"/> Poll. cycle ≥ 2 sec. not possible ^{*1}
<u>EK280 until V2.55 only:</u> Modbus polling starts 30s earliest after initialisation of the Ethernet card by EK280 (e.g. Start call time window, switch-on ext. power supply)	<input type="checkbox"/> Waiting time ≥ 30 s after initialization is taken into account <input type="checkbox"/> Waiting time not possible ^{*2}
Network connection from PLC to EK280 (Connect-, Disconnect - behavior)	<input type="checkbox"/> IP connection established for each Modbus request <input type="checkbox"/> IP connection stays online ^{*3}

^{*1} All values in the volume converter are updated every 2 seconds at most. A query cycle <2s can lead to the interface of the volume converter designed for battery operation being overloaded.

^{*2} Only affects EK280 up to V2.55:
If the required waiting time of 30s after initialization of the Ethernet card (start of call time window, switching on the power supply or PoE) cannot be taken into account, problem-free operation on the network cannot be guaranteed.

A correct answer to a "PING" request only confirms the availability of the EK280 in the connected network. However, the Modbus requests can only be started after 30s. Otherwise the interface may block.

If the interface is blocked, an interface reset must be carried out on site!

^{*3} In the event of a power failure of the EK280 or the PoE supply, for example, the IP connection is disconnected. In this case, ^{*2} must be taken into account!

Elster EK2x0 – Modbus-TCP (IP) – V5

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Modbus Map

Up to 70 parameters can be used for the Modbus map. Below you'll find the factory setting. For the first test, we recommend to use this map. Later, a customized Modbus map is easily programmable via enSuite.

Factory setting:

No.	Register Address	Data type	No. of Reg.	Designation / value	LIS200 address	Used
1	1	UShort	1	Remaining battery life	2:404	
2	2	UShort	1	Momentary status total	1:100	
3	3	UShort	1	Vm total, fractional digits	4:302_2	
4	4	UShort	1	Vb total, fractional digits	2:302_2	
5	5	UShort	1	W total, fractional digits	1:302_2	
6	101	ULong	2	Vm total, pre-decimal position	4:302_1	
7	103	ULong	2	Vb total, pre-decimal position	2:302_1	
8	105	ULong	2	W total, pre-decimal position	1:302_1	
9	301	IEEEFloat	2	Pressure at base conditions	7:312_1	
10	303	IEEEFloat	2	Temperature at base conditions	6:312_1	
11	305	IEEEFloat	2	Measured absolute pressure value	6:210_1	
12	307	IEEEFloat	2	Measured pressure value	6:211_1	
13	309	IEEEFloat	2	Measured temperature value	5:210_1	
14	311	IEEEFloat	2	Conversion factor	5:310	
15	313	IEEEFloat	2	Compressibility	8:310	
16	315	IEEEFloat	2	Substitute pressure value	7:311_1	
17	317	IEEEFloat	2	Substitute temperature value in °C	6:311_1	
18	319	IEEEFloat	2	Nitrogen content	14:314	
19	321	IEEEFloat	2	Hydrogen content	12:314	
20	323	IEEEFloat	2	Carbon dioxide content	11:314	
21	325	IEEEFloat	2	Standard gas density	13:314_1	
22	327	IEEEFloat	2	Operational load	4:310	
23	329	IEEEFloat	2	Standard load	2:310	
24	331	IEEEFloat	2	Power	1:310	
25	333	IEEEFloat	2	Calorific value	10:314_1	
26	335	IEEEFloat	2	Relative density	15:314	
27	337	IEEEFloat	2	Used pressure for conversion (bar)	7:310_1	
28	339	IEEEFloat	2	Used temperature for convers. (°C)	6:310_1	
29	501	Counter6	3	Vm total	4:302	
30	504	Counter6	3	Vb total	2:302	
31	507	Counter6	3	W total	1:302	
32	801	Array8, BCD	4	Vm total	4:302	
33	805	Array8, BCD	4	Vb total	2:302	
34	809	Array8, BCD	4	W total	1:302	
35	813	Array8, BCD	4	Date and time	1:400	
36	817	Array6, BCD	3	Device number (serial number)	1:180	
37	820	Array2, BCD	1	Day boundary	2:141_1	

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Modbus Map	
Use of the standard Modbus Map (see below) ?	<input type="checkbox"/> yes <input type="checkbox"/> no











Own list / supplement to the default list:

No.	Register Address	Data type	No. of. Reg.	Designation / value	LIS200 address
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					

...

Important notes:

-  By installation of the EK2xx in Ex zone 1 there must be an Ex-barrier like the FE260 used. If you use your own Ex barrier, please check the relevant Ex parameter of the User manual of the EK2xx.
-  For a cyclic data communication (e.g. every hour or faster !) an external power supply is strictly recommended, to take care about the service lifetime of the device battery. For EK280 there is an internal power supply module 230VAC available for use in Ex zone 2.
-  **The basic setup of the EK2x0 should be strictly done by the parameterisation software enSuite to take care about all internal communication values (timings etc.).** The enSuite can be downloaded free-of charge from the Elster website (<https://www.elster-instromet.com/en/ensuite>). The necessary optical head (conform to the international standard IEC62056:21) is also available by Elster (order No.: 04115530).
-  **The configuration of the Modbus map can be done only via enSuite.**
-  To transmit any data via Modbus there must be one lock opened. We recommend leaving the customer lock or the data supplier lock opened (Factory setting of this locks = "0").
-  If you want to change some parameter via Modbus, the responsible lock must be opened! The used key of the used lock and also the status of the lock itself (for closing the lock later on) must be included in the Modbus map.
-  One connection (call acceptance window) for the used interface must be opened to get answers from the EK2xx via Modbus.
-  2G/3G/4G: The SIM card used must be enabled for the APN (VPN) being used.
-  2G/3G: The size of the SIM card is "Mini SIM card" (2FF).
4G: For the 4G modem inside EK280 (FE260) you'll need a "Nano SIM" (4FF)
-  2G/3G/4G: Before commissioning the IP configuration data inside EK2xx, the defined access must have been set up on the RADIUS server (in the VPN)! Otherwise, the 2G/3G/4G-Modem tries in vain to log on to the RADIUS server!
-  2G/3G/4G: Access to the RADIUS server and thus to your VPN is set up by the administrator of your RADIUS server. Depending on the nature of your VPN, this is administered by your IT department or by your provider.
-  2G/3G/4G: The firewall must allow the use of the set IP address and the specified port.

-  **4G: Take care about the used 4G network: a 4G network for mobile phones is not usable. The 4G modem can only be used in CAT-M1 or NB-IoT subnet of the 4G network!**
 -  2G/3G/4G: On site, the reception level should be stable above 50% (4G > 20%), so the access to the device can be stable established.
 -  2G/3G/4G: The authentication method between the EK2x0 and the Radius server may need to be set (no protocol, PAP, CHAP protocol).
 -  **Ethernet: In the case of an Ethernet connection, the first query may only take place approx. 30 seconds after switching on the supply voltage of the EK280, since the EK280 must configure the Ethernet card at the beginning. This must be observed in the event of a power failure or a reset of the EK280 (e.g. closing and opening the call acceptance window) or when supplied via "Power-over-Ethernet" (PoE).**
 -  Ethernet: Since the EK280 works independently of the PLC, the synchronization can be lost in the event of an error (e.g. power failure EK280) without the PLC being able to determine this case. Therefore, in case of communication loss, it is necessary to interrupt the IP connection for about 1 minute
 -  Please note that the uppercase and lowercase letters are always case sensitive, as well as possibly used special characters, as these must correspond exactly to the settings in the RADIUS server!
 -  The Modbus master must have access to the same VPN in order to be able to open a TCP socket.
 -  Since the devices have an internal operating cycle of 2 seconds, a query every second does not make sense. If there are several "partial" queries from the same slave (different Modbus registers), a waiting time of at least 2 seconds should therefore be observed.
 -  Please take also care about the notes in the user manual of the EK2xx and of the application manual for each EK2xx. This can be downloaded via the Elster "Docuthek": (<http://docuthek.kromschroeder.com/documents/index.php>).
- There are many notes regarding Modbus communication included.
-  On request, there is an additional Modbus Compendium for all members of the EK2x0 family available. Sent an e-mail to elstersupport@honeywell.com.