

System integration

Modbus TCP – documentation

1 Integration with Modbus TCP

Modbus TCP is available on the Ethernet port only with prior activation.

(For activation via the operating panel follow the steps showed below)

Activation via RS-232 serial communication: using command ETH MODBUS ON [Port]. Modbus can be deactivated by entering ETH MODBUS OFF. Please refer to chapter 2 for detailed information on serial communication.

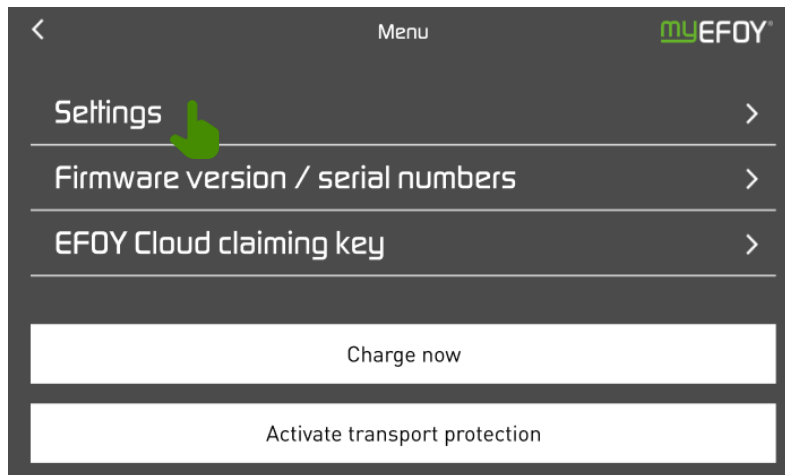
CAUTION: this mode opens an unsecure port into the network and thus requires a secure local network with firewall, to avoid risk of attacks on the EFOY.

Requirements:

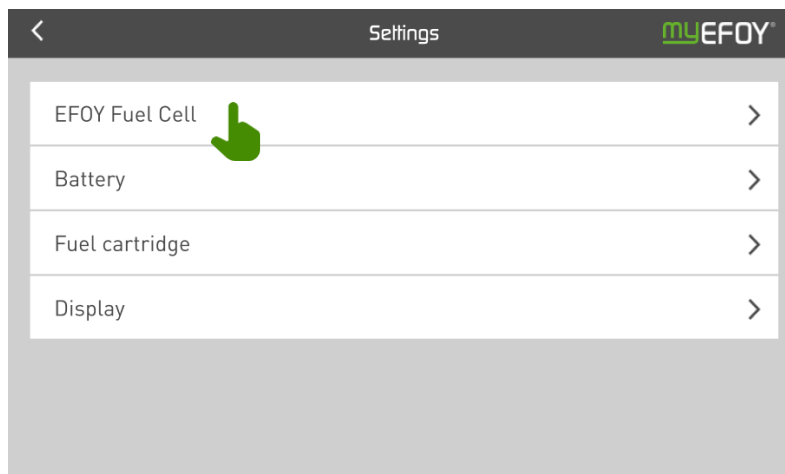
- 🔌 The default TCP port is 502, but configurable via RS-232 communication at ETH command.
- 🔌 The byte ordering for a 16-bit word is Big-endian. The word order is Little-endian for all 32bit/64bit values.
- 🔌 The EFOY accepts up to eight concurrent TCP connections from the local subnet (defined by IPv4 Mask via DHCP or via ETH command).
- 🔌 The MODBUS TCP client must support TCP Keep-Alive (every 15 minutes).
- 🔌 The input registers and discrete inputs are updated with 1Hz at maximum. (Therefore, higher polling rates are useless).
- 🔌 Coil values are OFF by default. To apply the function, set the coil to ON. The EFOY will clear the coil on execution starting.
- 🔌 Holding register values are -1 for integer and NAN for floats by default. To apply a new value, set the input register to the new value. The EFOY will clear the value on successfully altering the underlying preference.

Activation of the Modbus TCP via operating panel:

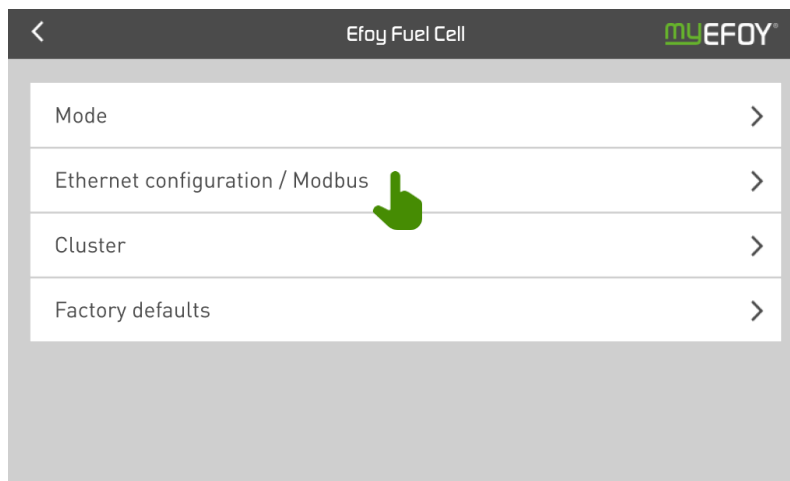
- Go to Menu and select «Settings»



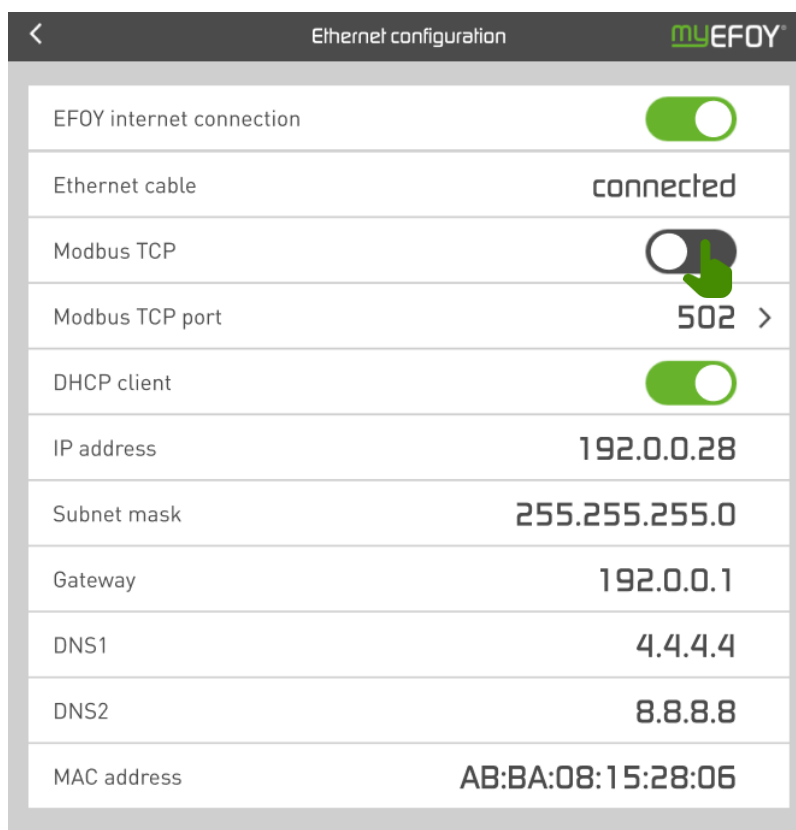
- Then go to «EFOY Fuel Cell»



- 🔌 Select «Ethernet configuration / Modbus»



- 🔌 To activate the Modbus TCP functions you have to press the «Modbus TCP switch»
- 🔌 Modbus TCP port is by default set to 502



- 🔌 Your Modbus TCP is now activated

Green marked registers are implemented with the EFOY firmware 24.14.284

1.1 Discrete Inputs (read)

Name	Type	Address	Description
LogSystemOffOk	bit	10001	Indicates whether the system can be turned off manually
LogSystemOnOk	bit	10002	Indicates whether the system can be turned on manually
CurrentErrorActive	bit	10003	A critical problem will prevent the fuel cell from operating correctly. Immediate maintenance is required for continued operation.
CurrentWarningActive	bit	10004	Whether any warning is active. A warning indicates that maintenance should be done on the system soon.
NewBatConfigBad	bit	10005	Whether the new configuration as entered by the user is invalid
fuelBelow75	bit	10009	Remaining fuel in cartridge or all active FM (Fuel Manager) ports is less than 75%
fuelBelow50	bit	10010	Remaining fuel in cartridge or all active FM ports is less than 50%
fuelBelow40	bit	10011	Remaining fuel in cartridge or all active FM ports is less than 40%
fuelBelow30	bit	10012	Remaining fuel in cartridge or all active FM ports is less than 30%
fuelBelow25	bit	10013	Remaining fuel in cartridge or all active FM ports is less than 25%
fuelBelow20	bit	10014	Remaining fuel in cartridge or all active FM ports is less than 20%
fuelBelow15	bit	10015	Remaining fuel in cartridge or all active FM ports is less than 15%
fuelBelow10	bit	10016	Remaining fuel in cartridge or all active FM ports is less than 10%
fuelBelow5	bit	10017	Remaining fuel in cartridge or all active FM ports is less than 5%
FmdPort1EnabledStatus	bit	10021	Fuel Manager (FM) port 1 enabled
FmdPort2EnabledStatus	bit	10022	FM port 2 enabled
FmdPort3EnabledStatus	bit	10023	FM port 3 enabled
FmdPort4EnabledStatus	bit	10024	FM port 4 enabled

FmdPort5EnabledStatus	bit	10025	FM port 5 enabled
FmdPort6EnabledStatus	bit	10026	FM port 6 enabled
FmdPort7EnabledStatus	bit	10027	FM port 7 enabled
FmdPort8EnabledStatus	bit	10028	FM port 8 enabled
FmdPort1ActiveStatus	bit	10029	FM port 1 active
FmdPort2ActiveStatus	bit	10030	FM port 2 active
FmdPort3ActiveStatus	bit	10031	FM port 3 active
FmdPort4ActiveStatus	bit	10032	FM port 4 active
FmdPort5ActiveStatus	bit	10033	FM port 5 active
FmdPort6ActiveStatus	bit	10034	FM port 6 active
FmdPort7ActiveStatus	bit	10035	FM port 7 active
FmdPort8ActiveStatus	bit	10036	FM port 8 active
FmdFS2Sensor	bit	10037	Current status from the Fmd FS Sensor 1 = Fuel level above sensor or no sensor connected 0 = Fuel level below sensor

1.2 Input Register (read)

Name	Type	Unit	Address	Description
SystemType	uint32		30001	First part of the serial number
AssemblyDate	uint32		30003	Middle part of the serial number
SequentialNumber	uint32		30005	Last part of the serial number
FirmwareVersionMajor	uint16		30007	Major firmware version
FirmwareVersionMinor	uint16		30008	Minor firmware version
FirmwareRevision	uint32		30009	Firmware revision
RatedOutputPower	uint16	W	30011	The rated output power.
LogPOut	float32	W	30021	Actual power output
LogUBat	float32	V	30023	Battery voltage
LogTAmb	float32	°C	30025	Ambient temperature
LogWOutCum	uint32	Wh	30027	Cumulative power generated by the EFOY
LogBatSoc	int16		30029	State of the charge of the smart battery,
LogSystemOnReason	uint16, enum		30030	Reason the system has turned on (details see chapter 1.6)
LogSystemOffReason	uint16, enum		30031	Reason the system has turned off (details see chapter 1.6)
CurrentErrorCode	uint16, enum		30032	The actual error code (Major) when ErrorActive is set, 0 otherwise.

CurrentErrorCodeMinor	uint16, enum		30033	Minor value of error code
LastErrorCode	uint16, enum		30034	The previously set error code.
LastErrorCodeMinor	uint16, enum		30035	Minor value of error code
CurrentWarningCode	uint16, enum		30036	The actual warning code when WarningActive is set, 0 otherwise.
CurrentWarningCodeMinor	uint16, enum		30037	Minor value of warning code
LastWarningCode	uint16, enum		30038	The previously set warning code.
LastWarningCodeMinor	uint16, enum		30039	Minor value of warning code
SystemState	uint16, enum		30040	Current EFOY state (for details, see chapter 1.5)
OperatingMode	uint16, enum		30041	Current EFOY operating mode (for details, see chapter 1.5)
CMAutoAvg	uint32	sec	30051	Average cycle duration of automatic cycles
CMAutoLast	uint32	sec	30053	Last automatic cycle duration
CMAutoCum	uint32	sec	30055	Total duration of all automatic cycles.
CMAutoCnt	uint32	sec	30057	Total number of automatic cycles
CManAvg	uint32	sec	30059	Average cycle duration of manual cycles
CManLast	uint32	sec	30061	Last manual cycle duration
CManCum	uint32	sec	30063	Total duration of all manual cycles.
CManCnt	uint32	sec	30065	Total number of manual cycles
CMDDPAvg	uint32	sec	30067	Average cycle duration in deep discharge protection mode
CMDDPLast	uint32	sec	30069	Last deep discharge protection cycle duration
CMDDPCum	uint32	sec	30071	Total duration of all deep discharge protection cycles.
CMDDPCnt	uint32	sec	30073	Total number of cycles in deep discharge protection mode
CMFPAvg	uint32	sec	30075	Average cycle duration in frost protection mode
CMFPLast	uint32	sec	30077	Last frost protection cycle duration

CMFPCum	uint32	sec	30079	Total duration of all frost protection cycles.
CMFPCnt	uint32	sec	30081	Total number of cycles in frost protection mode
CMErrAvg	uint32	sec	30083	Average duration of cycles aborted by an error
CMErrLast	uint32	sec	30085	Last duration of a cycle aborted by an error
CMErrCum	uint32	sec	30087	Total duration of all cycles aborted by an error.
CMErrCnt	uint32	sec	30089	Total number of cycles aborted by an error
CMRstAvg	uint32	sec	30091	Average duration of cycles aborted by a system reset
CMRstLast	uint32	sec	30093	Last duration of a cycle aborted by a system reset
CMRstCum	uint32	sec	30095	Total duration of all cycles aborted by a system reset.
CMRstCnt	uint32	sec	30097	Total number of cycles aborted by a system reset
BatIdStatus	uint16, enum		30101	The current battery type (see chapter 1.7)
BatBocStatus	float32	V	30103	Current begin of charge voltage (= switch on voltage)
BatBocMin	float32	V	30105	Minimum configurable begin of charge voltage
BatBocMax	float32	V	30107	Maximum configurable begin of charge voltage
BatBocDef	float32	V	30109	Default begin of charge voltage
BatEocStatus	float32	V	30111	Current end of charge voltage (= switch off voltage)
BatEocMin	float32	V	30113	Minimum configurable end of charge voltage
BatEocMax	float32	V	30115	Maximum configurable end of charge voltage
BatEocDef	float32	V	30117	Default end of charge voltage
BatCocStatus	float32	A	30119	Current cut-off current (Switch-off current)

BatCocMin	float32	A	30121	Minimum configurable cut-off current
BatCocMax	float32	A	30123	Maximum configurable cut-off current
BatCocDef	float32	A	30125	Default begin cut-off current
BatCapStatus	float32	Ah	30127	Current battery capacity
BatCapMin	float32	Ah	30129	Minimum configurable battery capacity
BatCapMax	float32	Ah	30131	Maximum configurable battery capacity
BatCapDef	float32	Ah	30133	Default battery capacity
BatCotStatus	float32	min	30135	Current cut off ime (switch-off time)
BatCotMin	float32	min	30137	Minimum configurable switch-off time
BatCotMax	float32	min	30139	Maximum configurable switch-off time
BatCotDef	float32	min	30141	Default switch-off time
BatMaxCtStatus	float32	h	30143	Current maximum charge time
BatMaxCtMin	float32	h	30145	Minimum configurable max. charge time
BatMaxCtMax	float32	h	30147	Maximum configurable max. charge time
BatMaxCtDef	float32	h	30149	Default max. charge time
BatMinCtStatus	float32	min	30151	Current minimum charge time
BatMinCtMin	float32	min	30153	Minimum configurable min. charge time
BatMinCtMax	float32	min	30155	Maximum configurable min. charge time
BatMinCtDef	float32	min	30157	Default min. charge time
BatSodStatus	float32	sec	30159	Current switch on delay
BatSodMin	float32	sec	30161	Minimum configurable switch-on delay
BatSodMax	float32	sec	30163	Maximum configurable switch-off delay
BatSodDef	float32	sec	30165	Default switch-off delay
BatDdpStatus	float32	V	30167	Current deep discharge protection voltage
BatDdpMin	float32	V	30169	Minimum configurable deep discharge protection voltage
BatDdpMax	float32	V	30171	Maximum configurable deep discharge protection voltage
BatDdpDef	float32	V	30173	Default deep discharge protection
BatMaxSocStatus	float32	%	30175	Current maximum state of charge
BatMaxSocMin	float32	%	30177	Minimum configurable state of charge
BatMaxSocMax	float32	%	30179	Maximum configurable state of charge
BatMaxSocDef	float32	%	30181	Default state of charge
BatMaxDodStatus	float32	%	30183	Current maximum depth of discharge
BatMaxDodMin	float32	%	30185	Minimum configurable depth of discharge

BatMaxDodMax	float32	%	30187	Maximum configurable depth of discharge
BatMaxDodDef	float32	%	30189	Default depth of discharge
BatDdpSocStatus	float32	%	30191	Current SOC at which deep discharge protection for smart batteries becomes active
BatDdpSocMin	float32	%	30193	Minimum configurable deep discharge protection SOC
BatDdpSocMax	float32	%	30195	Maximum configurable deep discharge protection SOC
BatDdpSocDef	float32	%	30197	Default deep discharge protection SOC
CartCurTypeStatus	uint16, enum		30201	The current cartridge type (see chapter 1.8)
CartCapStatus	float32	l	30203	Capacity of the current cartridge.
CartRlVolStatus	float32	%	30205	Remaining relative volume in the currently configured cartridge
CartAbVolStatus	float32	l	30207	Remaining absolute volume in the fuel cartridge
FmdNumPort	uint16		30221	Number of Ports (2,4 or 8)
FmdPort1TypeStatus	uint16, enum		30222	FM port 1 actual cartridge type (see chapter 1.8)
FmdPort2TypeStatus	uint16, enum		30223	FM port 2 actual cartridge type (see chapter 1.8)
FmdPort3TypeStatus	uint16, enum		30224	FM port 3 actual cartridge type (see chapter 1.8)
FmdPort4TypeStatus	uint16, enum		30225	FM port 4 actual cartridge type (see chapter 1.8)
FmdPort5TypeStatus	uint16, enum		30226	FM port 5 actual cartridge type (see chapter 1.8)
FmdPort6TypeStatus	uint16, enum		30227	FM port 6 actual cartridge type (see chapter 1.8)
FmdPort7TypeStatus	uint16, enum		30228	FM port 7 actual cartridge type (see chapter 1.8)
FmdPort8TypeStatus	uint16, enum		30229	FM port 8 actual cartridge type (see chapter 1.8)
FmdActivePortNum	uint16		30230	The number of the active port
FmdPort1RlVolStatus	float32	%	30231	FM port 1 remaining relative vol
FmdPort2RlVolStatus	float32	%	30233	FM port 2 remaining relative vol

FmdPort3RlVolStatus	float32	%	30235	FM port 3 remaining relative vol
FmdPort4RlVolStatus	float32	%	30237	FM port 4 remaining relative vol
FmdPort5RlVolStatus	float32	%	30239	FM port 5 remaining relative vol
FmdPort6RlVolStatus	float32	%	30241	FM port 6 remaining relative vol
FmdPort7RlVolStatus	float32	%	30243	FM port 7 remaining relative vol
FmdPort8RlVolStatus	float32	%	30245	FM port 8 remaining relative vol
FmdPort1CapStatus	float32	l	30247	FM port 1 capacity of the current cartridge
FmdPort2CapStatus	float32	l	30249	FM port 2 capacity of the current cartridge
FmdPort3CapStatus	float32	l	30251	FM port 3 capacity of the current cartridge
FmdPort4CapStatus	float32	l	30253	FM port 4 capacity of the current cartridge
FmdPort5CapStatus	float32	l	30255	FM port 5 capacity of the current cartridge
FmdPort6CapStatus	float32	l	30257	FM port 6 capacity of the current cartridge
FmdPort7CapStatus	float32	l	30259	FM port 7 capacity of the current cartridge
FmdPort8CapStatus	float32	l	30261	FM port 8 capacity of the current cartridge
FmdErrorMajor	uint16		30263	The actual error code major when a Fmd Error is set, 0 otherwise.
FmdErrorMinor	uint16		30264	The actual error code minor when a Fmd Error is set, 0 otherwise.
FmdLastErrorMajor	uint16		30265	The previously set Fmd error code.
FmdLastErrorMinor	uint16		30266	The previously set Fmd error code minor.
LogStackOpTime	float	h	30271	Stack Operating Time in hours
LogIOut	float	A	30273	Output Current in A
LogUOut	float	V	30275	Output Voltage in V
LogMeOHTotal	float	l	30277	Total dosed methanol in liter
ClusterRole	uint16, enum		30279	Cluster Role
ClusterOpMode	uint16, enum		30280	Currently active cluster operation mode
ClusterClientCnt	uint16		30281	Total number of cluster clients connected to the cluster controller
ClusterControllerIP	uint32		30282	Currently configured IP of the cluster controller
ClusterControllerPin	uint32		30284	The cluster controller pin, if 0 then there is no pin.
ClusterClientPin	uint32		30286	Currently configured client pin, if 0 then there is no pin configured.
LogTStack	float32	°C	30288	Stack temperature.

LogTHE	float32	°C	30290	Heat exchanger temperature.
LogTMeOH	float32	°C	30292	Methanol temperature.
LogpDifComp	float32	hPa	30294	Compensated differential pressure. The zero point offset is taken into consideration.
LogpAmb	float32	hPa	30296	Ambient pressure.
LogRH	float32	%	30298	Relative humidity.
LogFL	float32	%	30300	Fill level of the fluid in the internal system (intermediate tank + tubes).
LogDSV	float32	µl	30302	Internal value
LogFilltimeTotal	float32	sec	30304	Internal value
LogSysOpTime	float32	h	30306	System operating time (hours the system is connected to a battery).
LogSystemStarts	uint32		30308	Number of system starts.
LogStackStarts	uint32		30310	Number of stack starts.
LogDmfcState	uint16, enum		30312	Internal value
LogDmfcPhase	uint16, enum		30313	Operation phase of the DMFC (0 = idle, 1 = start phase, 2 = charging).
LogStackState	uint16, enum		30314	Internal value
LogStackOcvState	uint16, enum		30315	Internal value
LogStackCtrl	uint16, enum		30316	Internal value
LogHTState	uint16, enum		30317	Internal value
LogTStackMin	float32	°C	30318	Minimum stack temperature.
LogTStackMax	float32	°C	30320	Maximum stack temperature.
LogActiveErrors	uint16		30322	Number of currently active errors.
LogActiveWarnings	uint16		30323	Number of currently active warnings.
LogTStackMinTime	int32		30324	Minimum stack temperature time stamp (UNIX time stamp)*.
LogTStackMaxTime	int32		30326	Maximum stack temperature time stamp (UNIX time stamp)*.
LogErrorTime	int32		30328	RTC date and time when the currently active error was set (UNIX time stamp)*.
LogLastErrorTime	int32		30330	RTC date and time when the previously active error was set (UNIX time stamp)*.

LogWarningTime	int32	30332	RTC date and time when the currently active warning was set (UNIX time stamp)*.
LogLastWarningTime	int32	30334	RTC date and time when the previously active warning was set (UNIX time stamp)*.
LogSystemTime	int32	30336	System time (UNIX time stamp)*.

*UNIX time stamp are set to "0" (01.January 1970 00:00:00), if no valid time stamp is available.

1.3 Coil (write)

Name	Type	Address	Description
SystemOn	bit	1	Turn the EFOY on manually.
SystemOff	bit	2	Turn the EFOY off manually
SystemAuto	bit	3	Let the EFOY decide when to turn itself on and off automatically.
SystemReset	bit	4	Reset any warnings and errors, clear the warning and error registers.
BatDefaultConfig	bit	5	Reset Battery Config to default
CartVolReset	bit	6	Reset cartridge level to 100%
ResetCycleMonitor	bit	9	Reset all cycle monitoring units. The values average duration, last duration and count are set to zero. The cumulated cycle durations are not reset. Causes battery degraded error to be reset.
ResetAutoCm	bit	10	Reset the automatic charge cycle monitoring unit. The values average duration, last duration and count are set to zero. The cumulated cycle duration is not reset. Causes battery degraded error to be reset.
ResetManCm	bit	11	Reset the manual charge cycle monitoring unit. The values average duration, last duration and count are set to zero. The cumulated cycle duration is not reset.
FmdPort1Enable	bit	21	Enable FM port 1
FmdPort2Enable	bit	22	Enable FM port 2
FmdPort3Enable	bit	23	Enable FM port 3
FmdPort4Enable	bit	24	Enable FM port 4
FmdPort5Enable	bit	25	Enable FM port 5
FmdPort6Enable	bit	26	Enable FM port 6
FmdPort7Enable	bit	27	Enable FM port 7
FmdPort8Enable	bit	28	Enable FM port 8

FmdPort1Disable	bit	31	Disable FM port 1
FmdPort2Disable	bit	32	Disable FM port 2
FmdPort3Disable	bit	33	Disable FM port 3
FmdPort4Disable	bit	34	Disable FM port 4
FmdPort5Disable	bit	35	Disable FM port 5
FmdPort6Disable	bit	36	Disable FM port 6
FmdPort7Disable	bit	37	Disable FM port 7
FmdPort8Disable	bit	38	Disable FM port 8
UnlockTLP	bit	39	Unlock the system when it is in transport lock mode.

1.4 Holding Register (write)

Name	Type	Unit	Address	Description
BatIdConfig	int16, enum		40001	Configure the battery type (see chapter 1.7)
BatBocConfig	float32	V	40003	New switch-on voltage
BatEocConfig	float32	V	40005	New switch-off voltage
BatCocConfig	float32	A	40007	New switch-off current
BatCapConfig	float32	Ah	40009	New battery capacity
BatCotConfig	float32	min	40011	New switch-off time
BatMaxCtConfig	float32	h	40013	New maximum charge time
BatMinCtConfig	float32	min	40015	New minimum charge time
BatSodConfig	float32	sec	40017	New switch on delay
BatDdpConfig	float32	V	40019	New deep discharge protection voltage
BatMaxSocConfig	float32	%	40021	New maximum state of charge
BatMaxDodConfig	float32	%	40023	New maximum depth of discharge
BatDdpSocConfig	float32	V	40025	New SOC at which deep discharge protection for smart batteries becomes active
CartCurTypeConfig	int16, enum		40031	New fuel cartridge type (see chapter 1.8)
CartCustTypeVolConfig	float32	l	40033	Set the capacity of a custom fuel cartridge
CartRlVolConfig	float32	%	40035	Set the cartridge level to a relative fill level
FmdPort1TypeConfig	int16, enum		40041	FM port 1 new cartridge type (see chapter 1.8)

FmdPort1CapConfig	float32	l	40042	FM port 1 new capacity (custom cartridge type only)
FmdPort1RlVolConfig	float32	%	40044	FM port 1 new relative vol
FmdPort2TypeConfig	int16, enum		40046	FM port 2 new cartridge type (see chapter 1.8)
FmdPort2CapConfig	float32	l	40047	FM port 2 new capacity (custom cartridge type only)
FmdPort2RlVolConfig	float32	%	40049	FM port 2 new relative vol
FmdPort3TypeConfig	int16, enum		40051	FM port 3 new cartridge type (see chapter 1.8)
FmdPort3CapConfig	float32	l	40052	FM port 3 new capacity (custom cartridge type only)
FmdPort3RlVolConfig	float32	%	40054	FM port 3 new relative vol
FmdPort4TypeConfig	int16, enum		40056	FM port 4 new cartridge type (see chapter 1.8)
FmdPort4CapConfig	float32	l	40057	FM port 4 new capacity (custom cartridge type only)
FmdPort4RlVolConfig	float32	%	40059	FM port 4 new relative vol
FmdPort5TypeConfig	int16, enum		40061	FM port 5 new cartridge type (see chapter 1.8)
FmdPort5CapConfig	float32	l	40062	FM port 5 new capacity (custom cartridge type only)
FmdPort5RlVolConfig	float32	%	40064	FM port 5 new relative vol
FmdPort6TypeConfig	int16, enum		40066	FM port 6 new cartridge type (see chapter 1.8)
FmdPort6CapConfig	float32	l	40067	FM port 6 new capacity (custom cartridge type only)
FmdPort6RlVolConfig	float32	%	40069	FM port 6 new relative vol
FmdPort7TypeConfig	int16, enum		40071	FM port 7 new cartridge type (see chapter 1.8)
FmdPort7CapConfig	float32	l	40072	FM port 7 new capacity (custom cartridge type only)
FmdPort7RlVolConfig	float32	%	40074	FM port 7 new relative vol
FmdPort8TypeConfig	int16, enum		40076	FM port 8 new cartridge type (see chapter 1.8)
FmdPort8CapConfig	float32	l	40077	FM port 8 new capacity (custom cartridge type only)

FmdPort8RlVolConfig	float32	%	40079	FM port 8 new relative vol
ClusterRoleConfig	uint16, enum		40081	Config Cluster Role of the EFOY
ClusterControllerIPConfig	uint32		40082	Config Cluster Controller IP address
ClusterClientPin	uint32		40084	Config Cluster Client Pin (numeric between 0 and 100'000'000)

1.5 SystemState and OperatingMode

SystemState

0	off
1	standby
2	in operation
3	shut down
4	frost protection
5	deep discharge protection
6	transport lock procedure
7	transport lock
8	reset
9	factory defaults
10	error
11	frost protection
12	pending
13	pending
14	update EFOY accessories

Operating Mode

0	Automatic
1	off

1.6 SystemOnReason / OffReason

SystemOn

Reason the system has turned on:

- 0: None
- 1: System has been turned on manually.
- 2: The system has turned on automatically because the battery required charging.
- 3: The system has turned on automatically to enter frost protection mode.
- 4: The system turned on automatically to enter deep discharge protection mode.

SystemOff	Reason the system has turned off:
	0: None
	1: System has been turned off manually.
	2: The system turned off automatically because the battery has been fully charged.
	3: The system has turned off automatically because the maximum charge time has been reached.
	4: The system has turned off automatically because an overvoltage at the output was detected.
	5: The system has turned off because frost protection mode has finished.
	6: The system has turned off because the fuel cartridge has depleted.
	7: The system has turned off because methanol in reservoir and tubes is depleted for UN3363 requirement.
	8: The system has turned off because an error has occurred.
	9: The system was reset.

1.7 Battery types

Battery types	0: No Battery
	1: Lead Acid 12V
	2: Lead Acid 24V
	3: LiFePO4 12V
	4: LiFePO4 24V
	5: EFOY Battery

1.8 Cartridge types

Cartridge types	0: unspecified
	1: fuel container with custom capacity
	2: M5
	3: M10
	4: M28
	5: MT60
	6: FM (only register 30201)

2 Serial communication and ethernet configuration

2.1 Serial communication with EFOY fuel cells

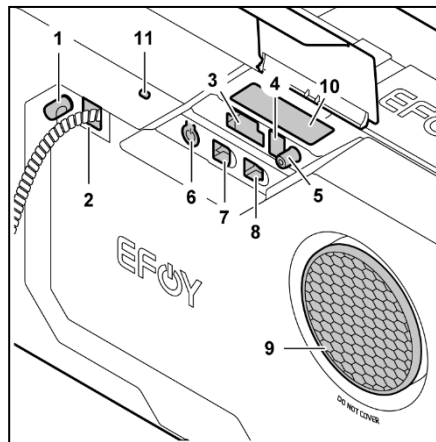
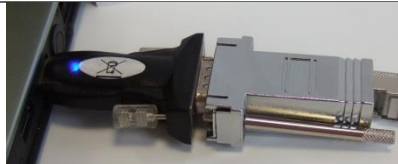
The SIO-commands can be used for serial communication with the EFOY fuel cell via a Terminal program.

For example: Terminal 2014, v.1.39b – provided by SFC

Required components:

Interface Adapter IA1	151 075 011
USB Adapter	151 906 018
Data Cable RJ-45 / RJ-12	158 906 008 (in urgent cases a cable RJ-12 / RJ-12 can also be used)
Windows PC	With installed terminal program, example: Terminal 2014

1. Connect the EFOY fuel cell to a windows PC by using the EFOY Interface Adapter IA1, USB Adapter and data cable
2. Connect the RJ-12 connector into the plug nr. 8 on the fuel cell.
3. Open the Terminal and follow the instructions in the PDF



2.2 ETH command

SFC>ETH <ARGUMENT>

Displays or sets the Ethernet configuration.

Possible transmission parameters:

Argument	Description
	Display DHCP client state, IP, mask, gateway, hardware address, device name
DHCP [ON OFF]	Turn DHCP client on or off. Renew DHCP with ON command.
SET <IP> <Mask> <Gateway>	Set the current IP configuration, DHCP must be turned off before.
CLAIMING	Get claiming key if one is set and not expired.
MODBUS [ON [<Port>] OFF]	Caution: The mode opens an unsecure port into the network and thus requires a secure local network with firewall, otherwise there are great risks for attacks on the EFOY. Enables the unsecure Modbus mode at user defined port. (Default port is 502). EFOY must reset after turn off command to disable the Modbus mode or after changing the port.
CN	Common name (Device name)
RXER	Error counter, irrelevant to end user
LINK	Physical link and DHCP client state

Example 1

SFC>ETH

Ethernet cable connected

Connected to IoT Hub

DHCP client: On

IP: 10.1.6.56

Mask: 255.255.0.0

Gateway: 10.1.255.1

Hardware Address: E4:1E:0A:6F:AC:B1