

SP01262 Fieldbus Specification

Ethernet: PROFINET

Ethernet/IP

RS-485: MODBUS RTU

V1.0

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1 General

The SP01262 fieldbus module communicates internally with the frequency converter.

The internal communication and firmware of the frequency converter are independent of the selected fieldbus protocol.

2 Fieldbus Parameter SP01262

Depending on parameter P002A SW options

2.1 General Parameters

P...	Name	Factory Setting	Min	Max	Unit	Type
A001	Enable Fieldbus	Deactivated				⚙️
A010	FB State					👁️
A020	FB Protocol					👁️
A030	FB PCB FW-Version					👁️
A031	FB PCB Serial Number					👁️
A060	FB PLC Enable					👁️
A061	FB PLC Setpoint				%	👁️
A062	FB PLC Frequency				Hz	👁️
A063	FB PLC Phase				°	👁️
A064	FB PLC Mode					👁️
A0F0	FB Start Bootloader					⚙️

PA001 FB Mode

Activates or deactivates the fieldbus.

Value	Description
Deactivated	Fieldbus is deactivated.
Activated	Fieldbus is activated.

PA010 FB State

Displays the state of the fieldbus.

Value	Description
OFF	Fieldbus is deactivated
Fieldbus module not connected	No data from fieldbus module
Internal connection broken	Data cable to fieldbus module is disconnected
Fieldbus disconnected	Fieldbus (X30, X31) not connected
Fieldbus connected	Network connection detected
Run	Fieldbus master detected
MODBUS inactive	No fieldbus communication
Error	Fieldbus error

PA020 FB Protocol

Displays the protocol type of the fieldbus module.

PA030 FB Module FW-Version

Displays the firmware version of the fieldbus module.

PA031 FB Module Serial Number

Displays the serial number of the fieldbus module.

PA060 FB Enable

Displays the enable state of the fieldbus.

Value	Description
OFF	Disabled
ON	Enabled

PA061 FB Setpoint

Displays the fieldbus setpoint.

PA062 FB Frequency

Displays the fieldbus frequency setting.

PA063 FB Phase

Displays the fieldbus phase setting.

2.2 Ethernet Parameters (EtherNet/IP & PROFINET)

P...	Name	Factory Setting	Min	Max	Unit	Type
A101	FB Protocol Stack					👁
A110	FB Station Name					👁
A111	FB IP-Address					👁
A120	FB Port State 0					👁
A121	FB Port State 1					👁

PA101 FB Protocol Stack

Displays information about the protocol stack in use.

PA110 FB Station Name (PROFINET only)

Displays the station name.

Value	Description
{empty}	Factory default state, fieldbus module has not yet been initialized by a PROFINET master.
e.g. „sp01262“	Assigned station name

PA111 FB IP-Address (PROFINET only)

Displays the IP-Address.

Value	Description
0.0.0.0	Factory default state, fieldbus module has not yet been initialized by a PROFINET master.
n.n.n.n.	Assigned IP-Address

PA120 FB State X30

Shows the status of connector X30.

Value	Description
Not connected	Network not active, no link detected
10 Mbit	Connection with 10 Mbit
100 Mbit	Connection with 100 Mbit

PA121 FB State X31

Shows the status of connector X31.

Value	Description
Not connected	Network not active, no link detected
10 Mbit	Connection with 10 Mbit
100 Mbit	Connection with 100 Mbit

2.3 MODBUS Parameters

The MODBUS interface parameters of the fieldbus module can be set both via SP01262 and via the fieldbus using the MODBUS register (see 4.1).

P...	Name	Factory Setting	Min	Max	Unit	Type
A201	Device Address	1	1	247		⚙
A202	Baud Rate	19200			Bit/s	⚙
A203	Parity	Even				⚙
A204	Bus Termination	Deactivated				⚙

PA201 Device Address

Setting the MODBUS device address.

PA202 Baud Rate

Setting of the MODBUS baud rate.

Value	Description
9600	9600 Bit/s
19200	19200 Bit/s
38400	38400 Bit/s
56000	56000 Bit/s
115200	115200 Bit/s

PA203 Parity

Setting of the parity generation

Value	Description
Even	
Odd	
None	

PA204 Bus Termination

Setting of the bus termination

Value	Description
Deactivated	The termination resistor for the RS485 bus is deactivated.
Activated	The termination resistor for the RS485 bus is activated.

3 Fieldbus Ethernet (Ethernet/IP & PROFINET)

3.1 Data Exchange

Cyclic data exchange is used for communication between the PLC and SP01262.

Acyclic communication is not used.

The update rate of the cyclic data is determined by the fieldbus master (PLC).

The toggle bit is inverted as soon as new, consistent data has been written to the data structure.

When the fieldbus module detects a change in the PLC output data toggle bit, the PLC output data is read and forwarded internally to the frequency inverter.

The frequency inverter processes the data and sends the results back to the fieldbus module.

The fieldbus module writes the results to the PLC input data structure and inverts the PLC input data toggle bit.

The maximum transit time from the inversion of the PLC output data toggle bit to the inversion of the PLC input data toggle bit is defined as 100 ms.

3.2 Byte-Order

The byte order for 16/32-bit values is little-endian format.

That is, for a 16-bit value **0x1234**, the value **0x34** is written to the first byte, and the value **0x12** is written to the following byte:

0x1234 → [0] = 0x34 [1] = 0x12

3.3 Output-/Input Data Structure

- The data structures for PROFINET and EtherNet/IP are identical.
- The data structure for output and input data each corresponds to a 22-byte field.
- Values written via the fieldbus are not stored persistently.
- Parameters of the data type **String** are not read/written.

Byte Index	Data from PLC to SP01262 (Request)	Data from SP01262 to PLC (Response)
	PLC Output Data	PLC Input Data
[0]	Toggle <i>(uint8)</i> [Bit 0] Toggle-Bit	Toggle <i>(uint8)</i> [Bit 0] Toggle-Bit
[1]	Control <i>(uint8)</i> 0x00 Read Parameter	Control <i>(uint8)</i> 0x00 Read Parameter

	0x01 Write Parameter 0x02 Set Value 0x03 Extended Set Value	0x01 Write Parameter 0x02 Set Value 0x03 Extended Set Value 0xE0 Unknown Control-Byte 0xE1 Parameter Address not exists 0xE2 Parameter Value limited or not allowed 0xE3 Set value faulty 0xE4 no connection to frequency inverter
[2] ... [5]	Data 0 (32 Bit) Control = 0x00, 0x01: Parameter Address (<i>uint32</i>) Control = 0x02, 0x03: Set Value (<i>float</i>) (via P7101) Otherwise: 0	Data 0 (32 Bit) Control = 0x00, 0x01, 0xE1, 0xE2: Parameter Address (<i>uint32</i>) Control = 0x02, 0x03: Actual acceleration (<i>float</i>) (P8021) Otherwise: 0
[6] ... [9]	Data 1 (32 Bit) Control = 0x00, 0x02: 0 Control = 0x01: Parameter Value Control = 0x03: Frequency (<i>float</i>) (via P7201) Otherwise: 0	Data 1 (32 Bit) Control = 0x00, 0x01, 0xE2: Parameter Value Control = 0x02, 0x03: Vibration frequency (<i>float</i>) (P7220) Otherwise: 0
[10] ... [13]	Data 2 (32 Bit) Control = 0x00, 0x01, 0x02: 0 Control = 0x03: Phase (<i>float</i>) (P6020) Otherwise: 0	Data 2 (32 Bit) Control = 0x00, 0x01, 0xE2: Parameter data type Control = 0x02, 0x03: Output voltage (<i>float</i>) (P7330) Otherwise: 0
[14] ... [17]	Data 3 (32 Bit) Always: 0	Data 3 (32 Bit) Control = 0x00, 0x01: 0 Control = 0x02, 0x03: Output current (<i>float</i>) (P7332) Otherwise: 0
[18] ... [19]	Mode (16 Bit) [Bit 0] Enable (via P7020, 1 = ON)	State (16 Bit) [Bit 0] Enable state (P7040, 1 = ON) [Bit 1] Enable state (P7050, 1 = ON)

	[Bit 1] Resonance search (P8201, 1 = Start) [Bit 2] Reset errors (PE010, 1 = Reset)	[Bit 2] Error active (1 = Error) [Bit 3] Warning active (1 = Warning) [Bit 4] SVO State (1 = SVO active) [Bit 5] Voltage limiter (1 = active) [Bit 6] Current limiter (1 = active) [Bit 7] Resonance search (1 = active)
[20] ... [21]	Reserved (16 Bit) Always 0	Message (16 Bit) Message Number (<i>uint16</i>) (P0080)

3.4 Data Format

When reading and writing parameters, the data format of the parameter value depends on the parameter address.

The 32-bit value **Data1** must be generated or evaluated accordingly..

DType		
0	Undefined	
1	UInt32	0 to 4.294.967.295 0x0000.0000 to 0xFFFF.FFFF
2	Int32	-2.147.483.648 to 2.147.483.647 0x8000.0000 to 0x7FFF.FFFF
3	float	32 Bit (single precision floating point) Converter: https://www.h-schmidt.net/FloatConverter/IEEE754de.html
4	Bool	0 / 1
5	Enum	UInt16-Value
8	Time	Timespan in seconds

3.5 Error Handling

Control-Byte	Description
0xE0	Unknown control byte
0xE1	Parameter address not exists
0xE2	Parameter value limited or not allowed
0xE3	Set value faulty
0xE4	No connection to frequency inverter

3.5.1 0xE0 - Unknown control byte

If the PLC output data control byte contains an unknown value, the fieldbus module sets the PLC input data control byte to "Unknown Control Byte" (=0xE0).

All other data fields are set to "0".

The data record with the unknown control byte is not forwarded to the frequency inverter.

3.5.2 0xE1 - Parameter address not exists

When a non-existent parameter is read or written, the control byte of the PLC input data is set to "Parameter address does not exist" (=0xE1).

Data fields 0...3 are set to "0".

3.5.3 0xE2 - Parameter value limited or not allowed

When a non-writable parameter is written to, the control byte of the PLC input data is set to "parameter value limited/invalid" (=0xE2).

The parameter value corresponds to the currently read value.

3.5.4 0xE3 - Set value faulty

If an incorrect setpoint is specified, the control byte of the PLC input data is set to "Setpoint incorrect" (=0xE3).

3.5.5 0xE4 - No connection to frequency inverter

If the fieldbus module has sent data to the frequency converter and receives no response after 1000ms, the fieldbus module sets the control byte of the PLC input data to 0xE4. With the exception of the toggle byte, all other PLC input data is set to zero (0x00).

3.6 Adjusting the IP Address

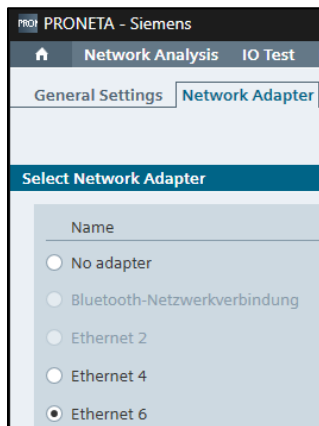
The following explains how the IP address can be adjusted using various PC tools, depending on the fieldbus protocol.

3.6.1 Adjust IP address for PROFINET

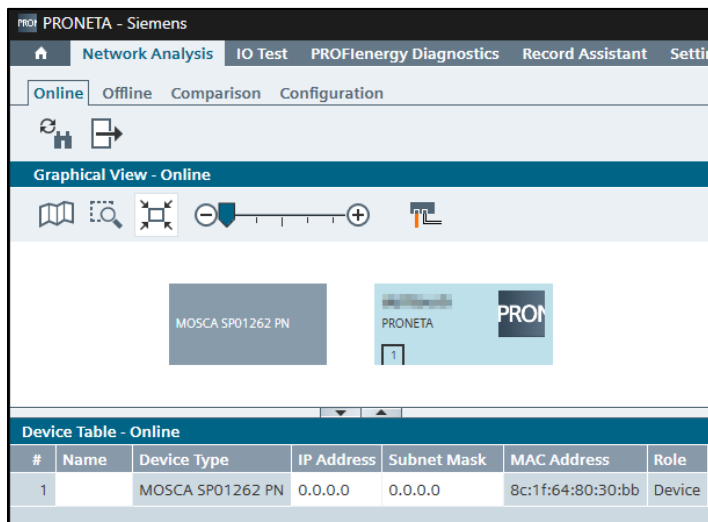
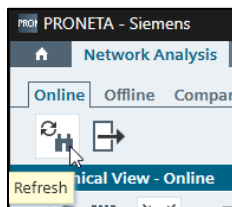
The SP01262 PROFINET fieldbus modules are delivered according to PROFINET specifications without an IP address and without a device name.

3.6.1.1 Siemens PRONETA

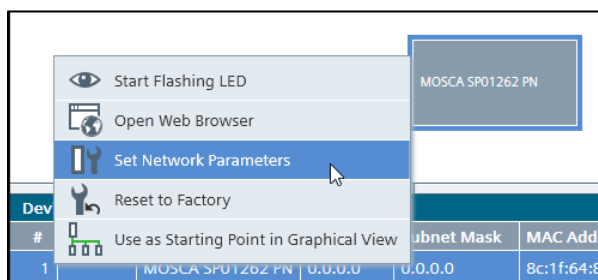
- Settings → Network Adapter → select used network adapter



- Search devices



- Right click on device



- Adjust station name and IP configuration

- Check „Apply settings permanently” !

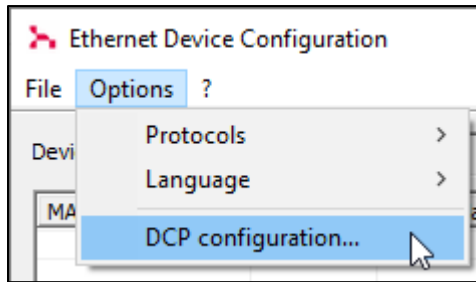
#	Name	Device Type	IP Address	Subnet Mask	MAC Address	Role
1	sp01262	MOSCA SP01262 PN	10.0.0.2	255.255.255.0	8c:1f:64:80:30:bb	Device

3.6.1.2 Hilscher Ethernet Device Configuration

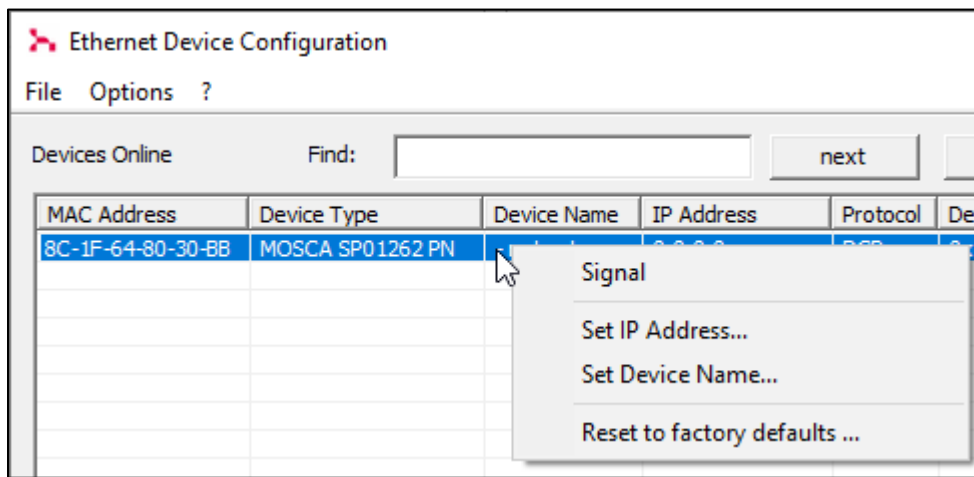
Download-Link: <https://hilscher.atlassian.net/wiki/spaces/ETHDEVCFG/overview>

- Adjust protocol selection, mark DCP (Discovery and Basic Configuration Protocol) for PROFINET

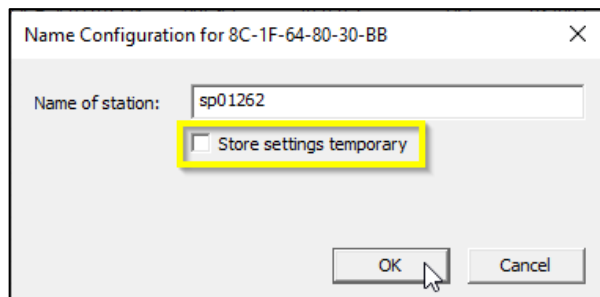
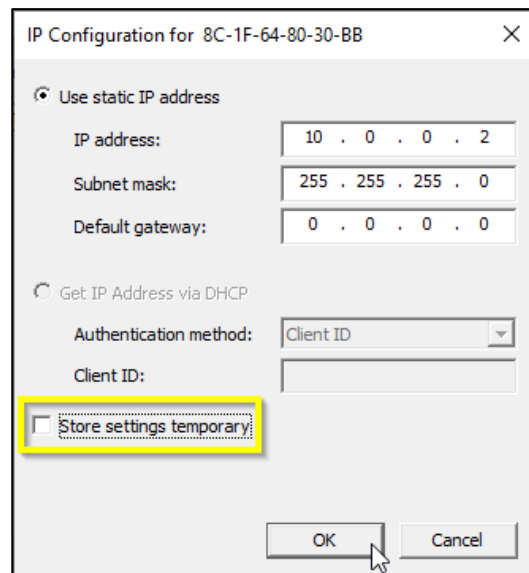
- Select used network adapter



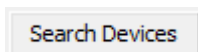
- Search Devices
- Right click on selected device

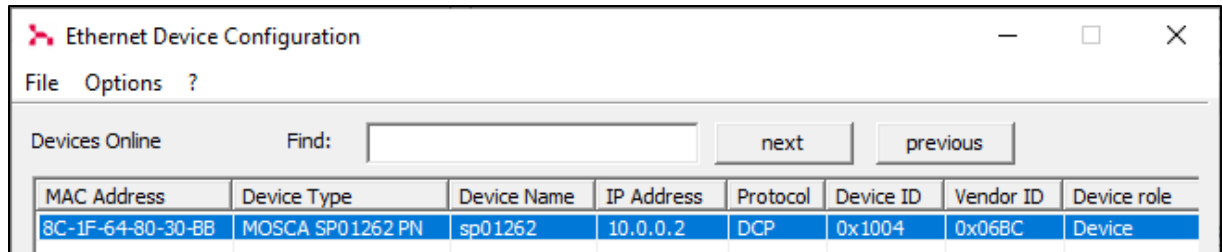


- IP Adresse oder Gerätenamen setzen



- Unmark „Store settings temporary“ !
- search for a new device again





- IP Address and station name are permanently stored

3.6.2 Adjust IP address for Ethernet/IP

The SP01262 Ethernet/IP fieldbus modules are delivered from the factory with the IP address **10.0.0.2**.

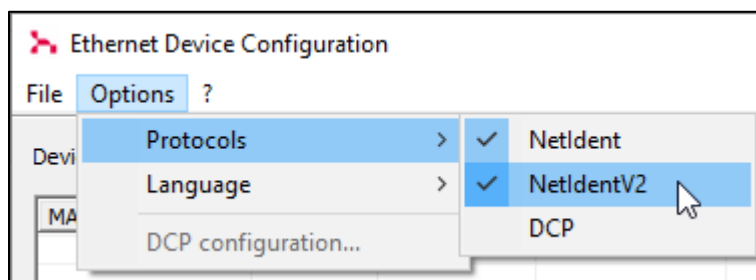
3.6.2.1 Hilscher Ethernet/IP Tool

Download-Link:

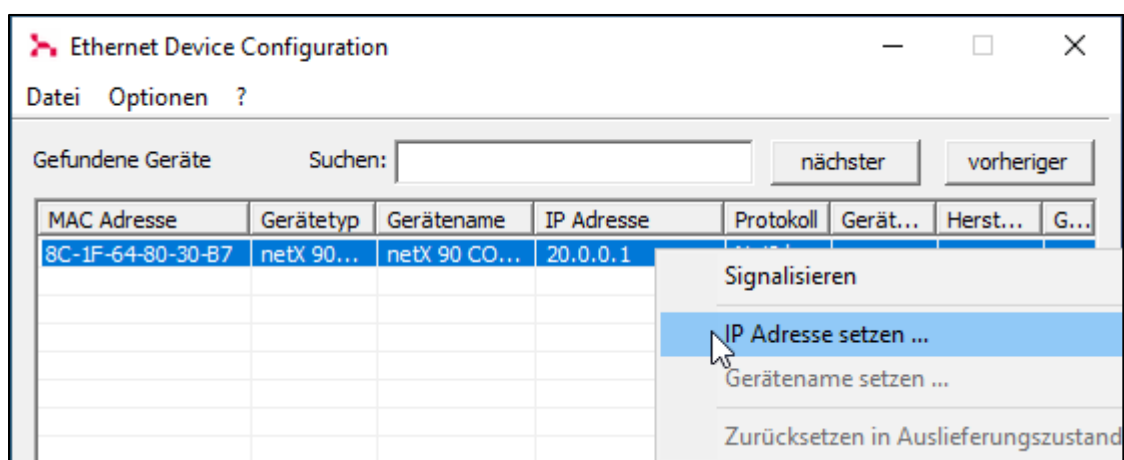
<https://hilscher.atlassian.net/wiki/spaces/EIS2V7/pages/123994946/Hilscher+EtherNet+IP+Tool>

If the current IP address does not match the subnet mask of the network adapter, the Ethernet/IP device can be found using "Hilscher Ethernet Device Configuration".

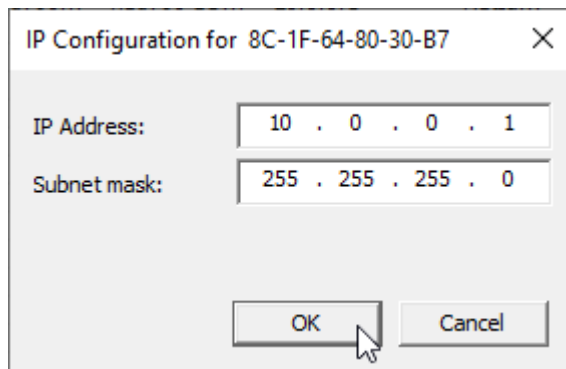
- Mark protocols "NetIdent" and "NetIdentV2"



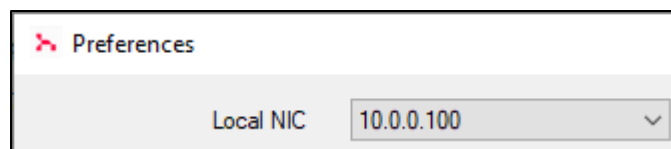
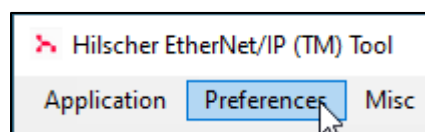
- Search Devices
- e.g. device IP address = 20.0.0.1, network adapter IP address = 10.0.0.100



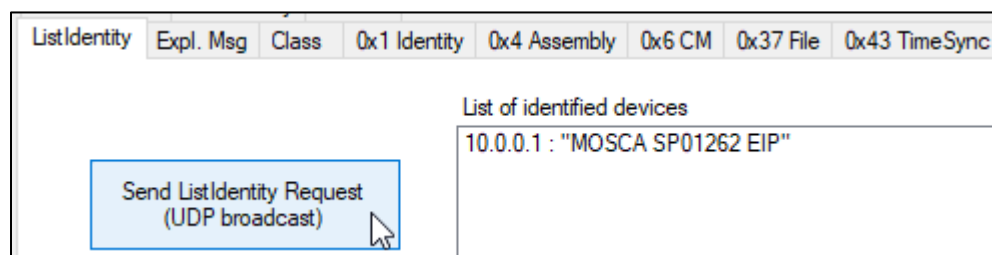
- adjust new IP configuration



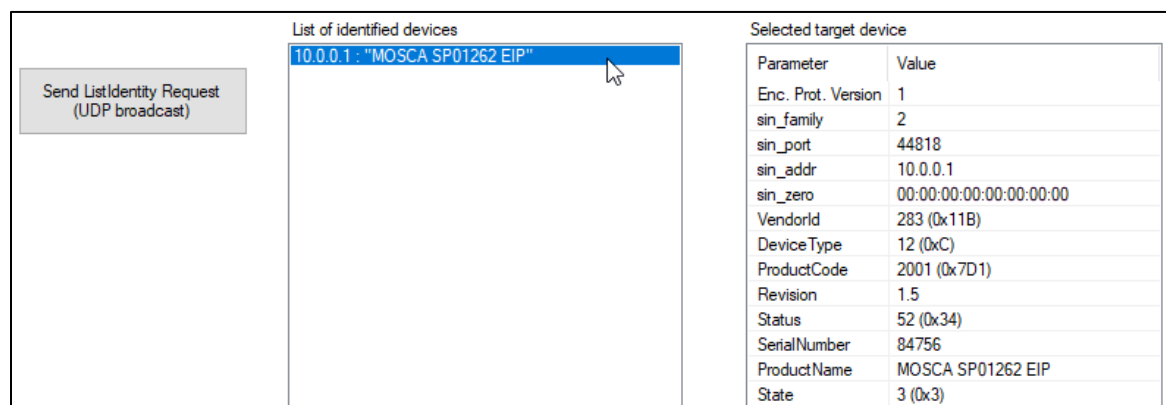
- Configuration is only saved temporarily! Do not switch off the device!
- „Hilscher EtherNet/IP Tool“ → select network adapter



- Search devices



- Select device → device information is displayed



- Click tab **0xF5 TCP/IP**, read „Interface Config.“ with **Get**

Process Data - On Security

ListIdentity Expl. Msg Class 0x1 Identity 0x4 Assembly 0x6 CM 0x37 File 0x43 TimeSync 0x47 DLR 0x48 QoS 0xF3 Conn. Config. 0xF5 TCP/IP

Instance 1

(1) Status

(2) Config. Capability

(3) Config. Control

(4) Physical Link Obj.

(5) Interface Config.

(11) LastConflictDetected

ARP PDU in which a conflict was detected

- Adjust IP address and subnet mask, write to device with

(5) Interface Config.

- The IP address remains permanently stored.

4 Fieldbus MODBUS RTU

4.1 Communication Parameter

Parameter	Default Value	Valid Values
Device Address	1	1...247
Baud rate	19200	• 9600 • 19200 • 38400 • 56000 • 115200
Parity	Even	• None • Even • Odd

4.2 MODBUS Functions

The device supports the following MODBUS function codes:

MODBUS function code		Function description
Decimal	Hexadecimal	
3	0x03	Read holding register
4	0x04	Read input register
6	0x06	Write single holding register
8	0x08	Serial diagnostic
11	0x0B	Get communication event counter
16	0x10	write multiple registers
23	0x17	Read/write multiple registers
43 / 14	0x2B / 0E	Read device ID

4.2.1 Read device ID response

Number	Type	Value
0	VendorName	„MOSCA Elektronik GmbH“
1	ProductCode	„FW00138“
2	MajorMinorRevision	„V01.00“
3	VendorURL	“ www.mosca-elektronik.de ”
4	ProductName	„SP01262-MODBUS“

4.3 MODBUS Register Table

The device uses the PDU (Protocol Data Unit) addressing mode.

This means that the serially transmitted register address corresponds to the register address of the device application.

Register	Description	Read/ Write Access	Type	Range of value [Unit] (Parameter number)
	Set values			
100	Set value	R/W	Uint16	0...1000 [0.1 %] (via P7101)
101	Frequency	R/W	Uint16	50...20000 [0.1 Hz] (via P7201)
102	Phase	R/W	Uint16	0...359 [°] (P6020)
103	Enable	R/W	Uint16	0 / 1 (via P7020)
104	Start resonance search	R/W	Uint16	0 / 1 (P8201)
105	Reset errors	R/W	Uint16	0 / 1 (PE010)
	Actual values			
200	Acceleration	R	Uint16	[0.1 g] (P8021)
201	Vibration frequency	R	Uint16	[0.1 Hz] (P7220)
202	Output voltage	R	Uint16	[100mV] (P7330)
203	Output current	R	Uint16	[10mA] (P7332)
204	State	R	Uint16	[Bit 0] Enable state (P7040, 1 = ON)

				[Bit 1] Enable state (P7050, 1 = ON) [Bit 2] Error active (1 = Error) [Bit 3] Warning active (1 = Warning) [Bit 4] SVO-State (1 = SVO active) [Bit 5] Voltage limiter (1 = active) [Bit 6] Current limiter (1 = active) [Bit 7] Resonance search (1 = active)
205	Message number	R	Uint16	(P0080)
	Communication parameter			
1000	Device address	R/W	Uint16	1...247
1001	Baud rate	R/W	Uint16	• 0 = 9600 • 1 = 19200 (default) • 2 = 38400 • 3 = 56000 • 4 = 115200
1002	Parity	R/W	Uint16	• 0 = None • 1 = Even (default) • 2 = Odd
1003	Bus termination	R/W	Uint16	0 / 1