Additional instructions

Videographic recorder
LINAX DR3000

EtherNet/IP® Adapter

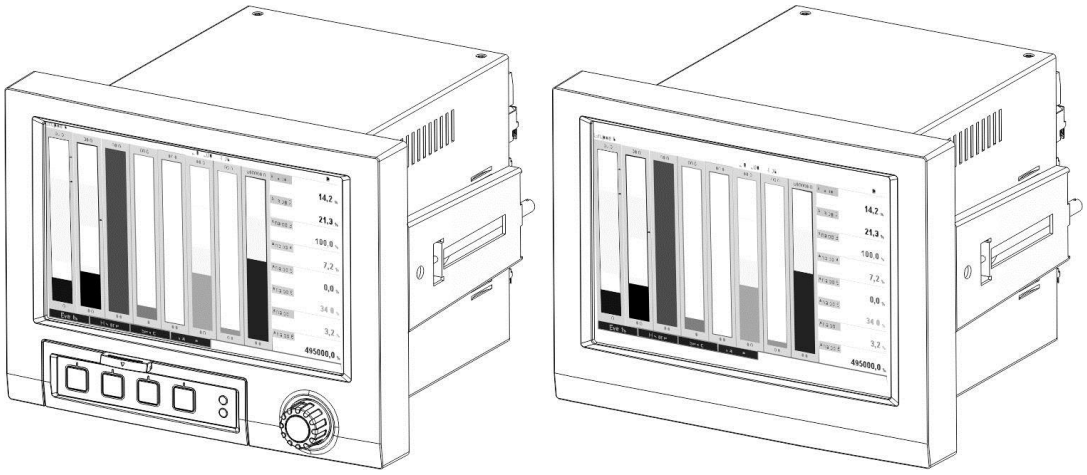

Table of contents:

1 General information

Symbols:

NOTICE **Note**
Failure to observe this sign can result in a device (adapter) defect or a malfunction!

Tip
Indicates additional information.

The data types used in this document are described in Section 4.4 Data types used.

1.1 Registered trademarks

EtherNet/IP ® is a registered trademark of the Open DeviceNet Vendor Association, Inc. (ODVA)

1.2 Firmware history

Overview of unit software history:

Unit software version / date	Software modification	PROFINET Operating Instructions
V2.00.06 / 12.2015	Original software	BA01607O/09/01.16
V2.01.04 / 06.2016	Extended functionality AOP/ bug fixes	BA01607O/09/02.16

1.3 Scope of delivery

These instructions provide an additional description of a special software option.

These additional instructions do **not** replace the Operating Instructions provided with the delivery!
Detailed information can be found in the Operating Instructions and additional documentation.

The EDS file suitable for the device can be found on the CD-ROM included in the scope of delivery, in the "EDS" directory.

1.4 Connections

1	Network status LED
2	Module status LED
3	Port 1 status LED
4	Port 2 status LED

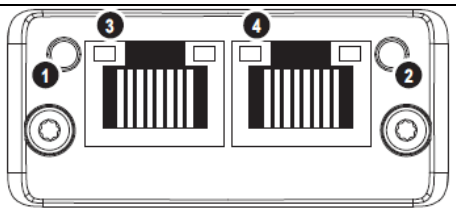

Table 1: View of the EtherNet/IP connection on the back of the device (adapter)

1.4.1 Network status LED

Network status LED	Indicator for
Off	No voltage or no IP address
Green	Online, at least one connection is established (CIP Class 1 or Class 3)
Green, flashing	Online, no connection established
Red	IP address assigned twice or critical error in the EtherNet/IP module (module status LED is also lit red)
Red, flashing	At least one established connection has timed out (CIP Class 1 or Class 3)

Table 2: Functional description of the network status LED

1.4.2 Module status LED

Module status LED	Indicator for
Off	No voltage
Green	Connection to the scanner in the "Run" state
Green, flashing	No configuration or connected. Scanner is in the "Idle" state
Red	Critical error in the EtherNet/IP module
Red, flashing	Correctable error in EtherNet/IP module (e.g. duplicate IP address)

Table 3: Functional description of the module status LED

1.4.3 Port 1/2 status LED

Port status LED	Indicator for
Off	Disconnected from the network
Green	Connected to the network (transmission rate: 100Mbit/s)
Green, flashing	Receiving/sending data (transmission rate: 100Mbit/s)
Yellow	Connected to the network (transmission rate: 10Mbit/s)
Yellow, flashing	Receiving/sending data (transmission rate: 10Mbit/s)

Table 4: Functional description of the port status LED

1.5 Checking for the presence of the EtherNet/IP module

The following menus can be used to check whether an installed EtherNet/IP module has been detected:

a) "Main menu / Diagnostics / Device information / Device option / Fieldbus":

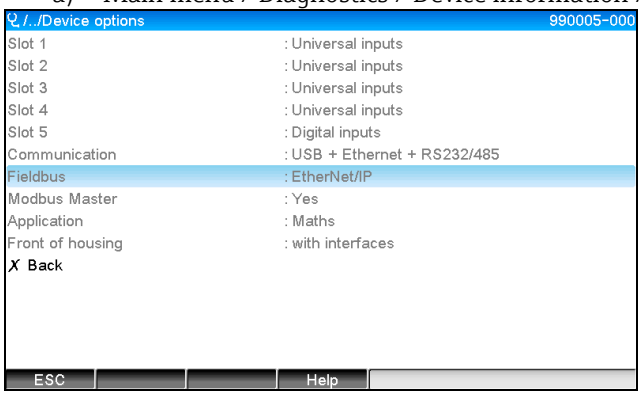

Figure 1: Checking for the presence of the EtherNet/IP module under "Device options"

The "Fieldbus" menu item indicates whether and which fieldbus module has been detected. If it is an EtherNet/IP module, this is indicated as shown above.

b) "Main menu / Diagnostics / EtherNet/IP":

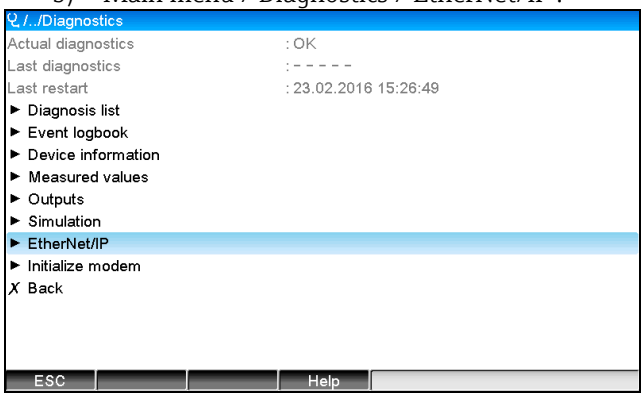

Figure 2: Checking for the presence of the EtherNet/IP module under "Diagnostics"

In contrast to option a) this menu item is only displayed if an EtherNet/IP module has been detected. A more detailed description of this menu can be found in 3.3 EtherNet/IP configuration currently **used**.

If an EtherNet/IP module has been detected, the additional information "Anybus", "Firmware version" and "Serial number" relating to the detected module is displayed under "Main menu / Diagnostics / Device information / Hardware".

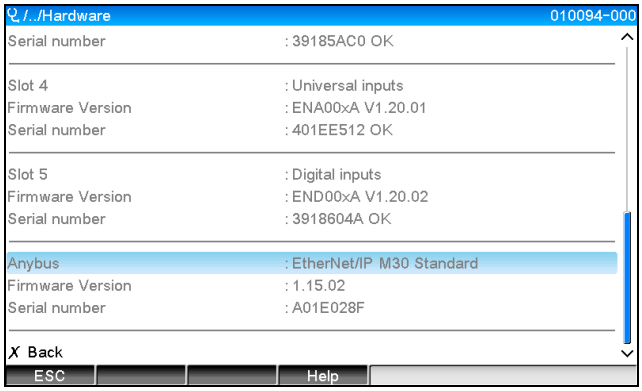

Figure 3: Information about the detected EtherNet/IP module under "Hardware"

2 Commissioning

2.1 Network settings

The network settings can be changed/checked via local operation, a DTM or via the Web server. In addition, the network settings can be made via 4.3.5 Object 0xF5, TCP/IP Interface and 4.3.6 Object 0xF6, Ethernet Link Object.

The following parameters are available to configure the network settings in the device (adapter):

Parameter	Options	Type of access	Info
MAC address	xx:xx:xx:xx:xx:xx, x= 0 to F	Read	The MAC address is a unique hardware address that is stored in the device (adapter) and cannot be changed.
DHCP	YES NO	Read/write	In the default settings, DHCP is enabled so that the IP configuration ("IP address", "Subnetmask", "Gateway") is retrieved from a DHCP server.
IP address	xxx.xxx.xxx.xxx (x=0..9)	Read/write	Can only be written if DHCP is set to "No".
Subnetmask	xxx.xxx.xxx.xxx (x=0..9)	Read/write	
Gateway	xxx.xxx.xxx.xxx (x=0..9)	Read/write	

Tab. 5: Parameters for configuring the network settings

NOTICE

Only one of the methods described should be used to change the network settings. If the settings are changed using several methods simultaneously, this can result in inconsistent data.

2.1.1 Network settings via local operation

The parameters described in 2.1 Network settings can be found in the menus

a) Main menu / Setup / Advanced setup / Communication / EtherNet/IP
b) Main menu / Expert / Communication / EtherNet/IP

and are displayed as follows (DHCP enabled).

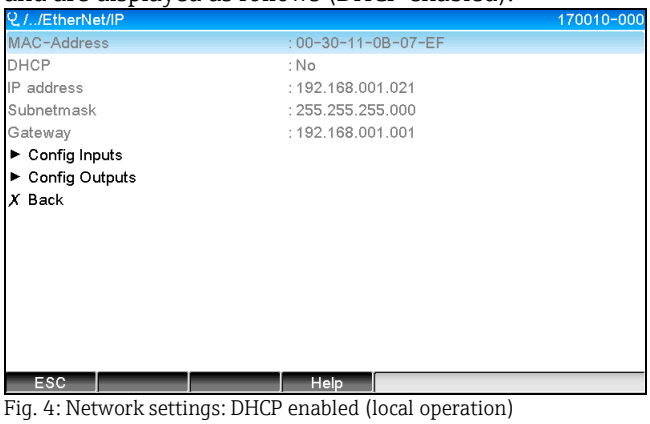

Fig. 4: Network settings: DHCP enabled (local operation)

The DHCP parameter must be set to "No" to enter the configuration manually.

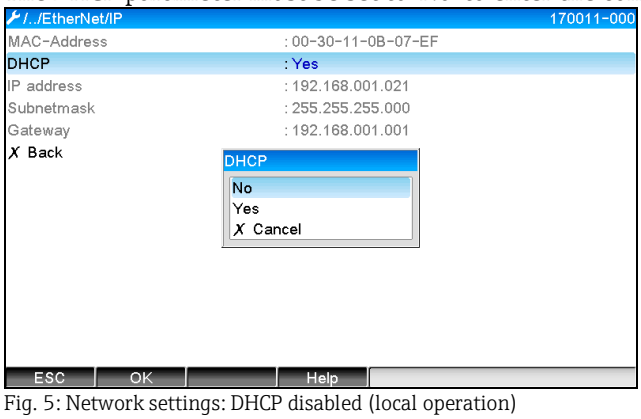

Fig. 5: Network settings: DHCP disabled (local operation)

As a result, the IP address, Subnetmask and Gateway parameters can be written to and configured accordingly. Make sure that only values that are valid for the network are entered.
In this state the settings can be changed as often as required because the changes are only adopted by the EtherNet/IP interface when the user exits the "Setup" or "Expert" menu.

NOTICE

If the DHCP parameter is set from "No" back to "Yes", the previously writable IP address, Subnetmask and Gateway parameters are write-protected once more. However, any change already made is retained. These can change, however, if other network settings have been assigned to the device (adapter) by the DHCP server.

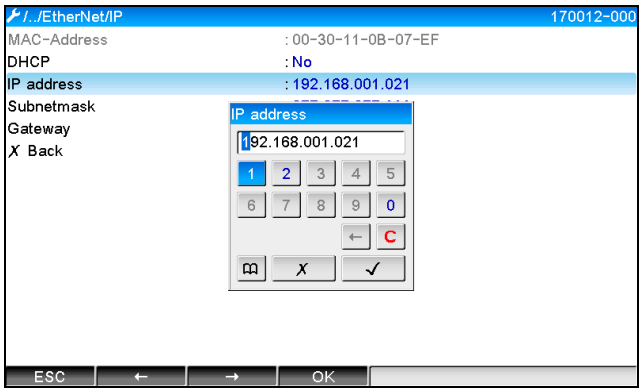

Fig. 6: Network settings: example: changing the IP address (local operation)

The following messages are entered in the event logbook to confirm that modified settings have been adopted successfully:

Message text	Meaning
EtherNet/IP: IP configuration changed	The new configuration has been successfully transmitted to the EtherNet/IP interface
Anybus module: interface restart	The EtherNet/IP interface is restarted so that the new configuration is used. Any open network connections (Class 1 and/or Class 3) are disconnected here.

Tab. 6: Confirmation that network settings have been changed

2.1.2 Network settings via Web server

NOTICE

It is not possible to access the Web server via the EtherNet/IP interface. The process for accessing the Web server is described in the standard Operating Instructions. Please refer to them for more information.

The parameters described in 2.1 Network settings can be found in the menus

a) Menu / Setup / Advanced setup / Communication / EtherNet/IP
b) Menu / Expert / Communication / EtherNet/IP

and are displayed as follows (DHCP enabled).

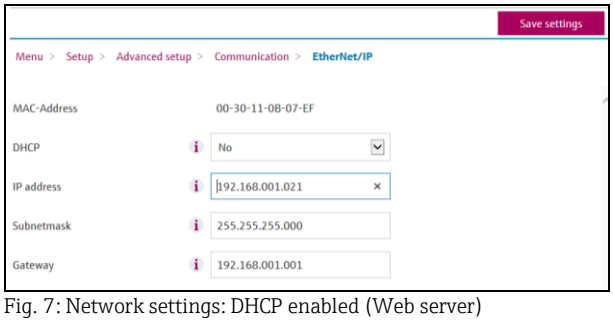

Fig. 7: Network settings: DHCP enabled (Web server)

The procedure for configuring the network settings is identical to that for local operation except for the following differences.

a) When a parameter is changed, "OK" appears on the right. The user must click "OK" to confirm the change. In other words the parameter change is only communicated to the device (adapter) once "OK" is pressed. The changes are discarded if the user leaves the EtherNet/IP menu before confirming the change.

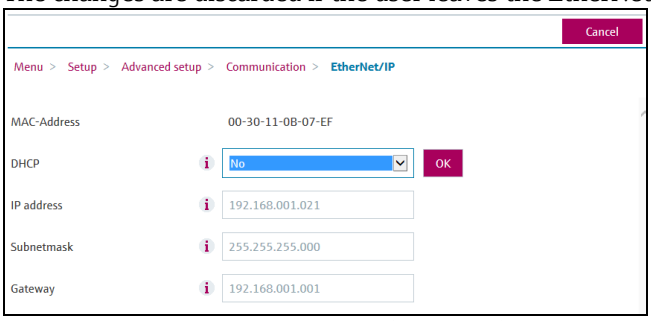

Fig. 8: Network settings: confirm changes (Web server)

b) When "OK" is clicked the change is sent to the device (adapter) but the transmitted changes are only adopted by the EtherNet/IP interface when the user exits the menu, e.g. by clicking "Save settings" (appears as soon as a parameter has been changed in the "Setup" or "Expert" menu) or closing the browser,....

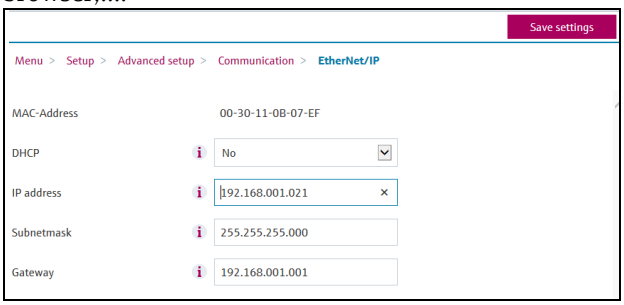

Fig. 9: Network settings: accept changes (Web server)

c) The messages described in 2.1.1 Network settings via local operation, Tab. 6 are also entered in the event logbook in the device (adapter) when the configuration is changed. These messages cannot be read out via the Web server, however.

2.2 Integration into a control system

2.2.1 EDS file and AOP

The electronic data sheet (EDS) file and the AOP installation can be obtained from the following sources:

System files	Version	Description	How to acquire
Electronic Data Sheet (EDS system file)	2.1	Certified in accordance with the following ODVA guidelines: • Conformance test • Performance test • PlugFest Embedded EDS Support (File Object 0x37) not supported	see CD-ROM supplied
AOP (Add-On-Profile)	1.5		see CD-ROM supplied

2.2.2 RSLogix5000

NOTICE

If an Custom AOP is installed at the same time, it has priority over the EDS file. If you have installed an AOP, the EDS file does not appear in the device catalog since the AOP takes over the function of the EDS file.

The EDS file can be installed in RSLogix5000 offline at any time. To do so, run the "EDS Hardware Installation Tool Wizard" in the "Tools from RSLogix5000" menu.

Custom-AOPs are installed with Logix Designer. Subsequently, the custom AOP also can be installed with the downloadable installation package.

2.2.2.1 Adding a device to the project

Open the device catalog via the menu “File/New Component/New Module”

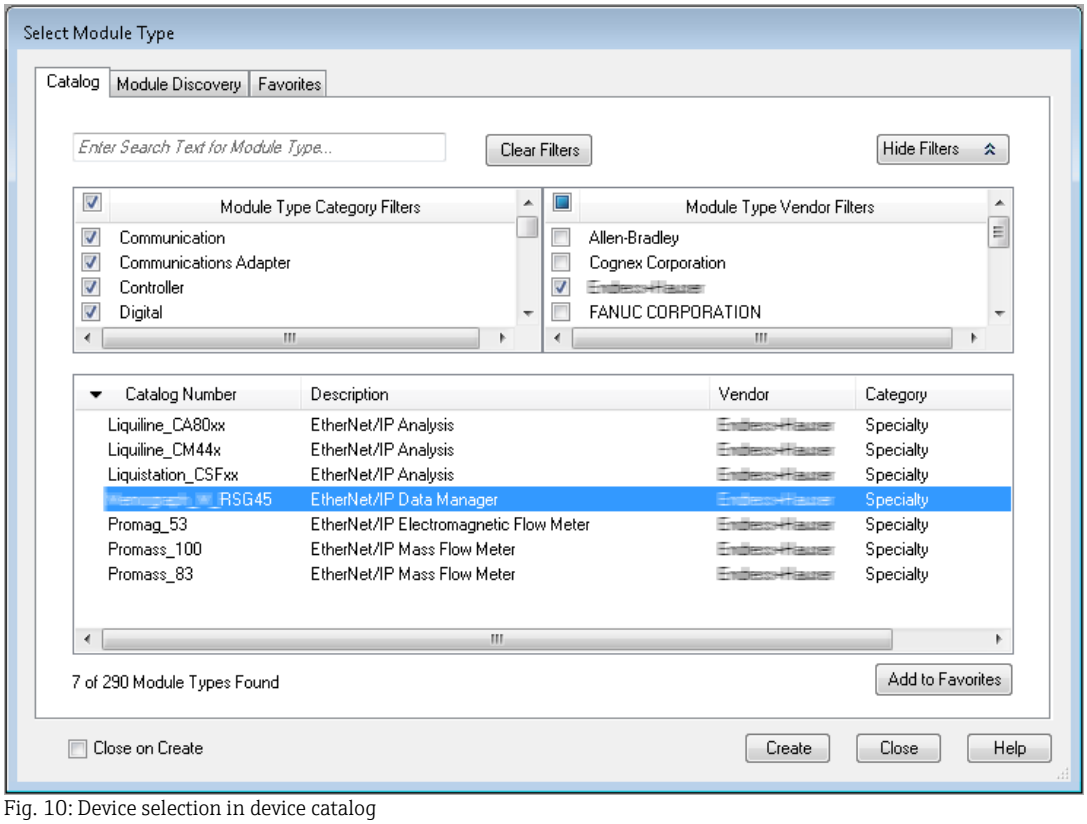

Fig. 10: Device selection in device catalog

Select your device and click "Create" to add it to the project.

In the screen that follows, enter a name for the device and the device's IP address. Check the connection setting (default: IO w/Config) and change it if necessary.

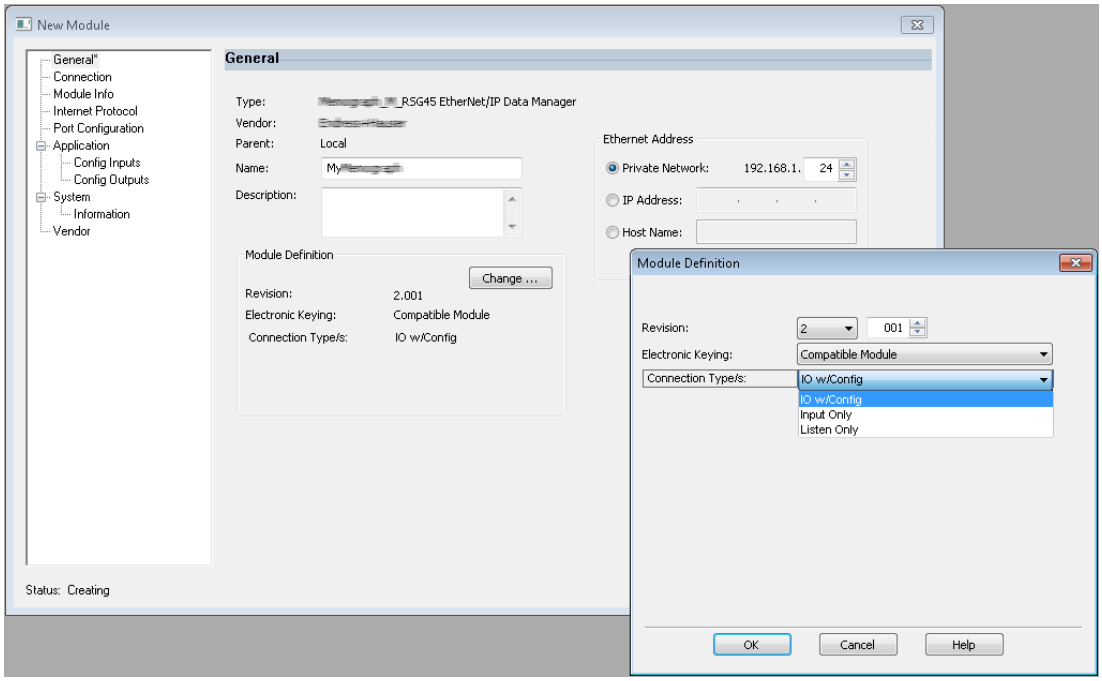

Fig. 11: Selection of the connection type

After downloading, the device appears in the project tree and you can go online with the device.

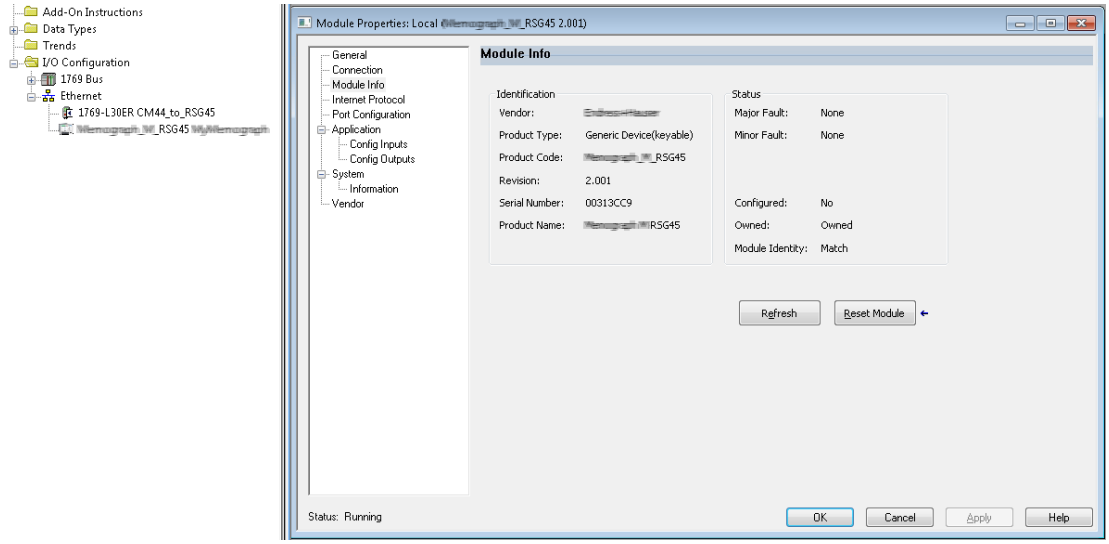

Fig. 12: Device is shown in project tree

3 Operation

3.1 Cyclic data transfer

EtherNet/IP can be used to cyclically transfer the values of universal inputs 1-40, digital inputs 1-20, and mathematics channels 1-12.

The cyclic data transfer is configured exclusively via the EtherNet/IP scanner, which sends the configuration to the device (adapter) when the connection for cyclic data transfer is established. The device (adapter) receives the configuration, checks its validity, and adapts to the new configuration provided this is valid. No settings regarding cyclic data transfer are made in the device (adapter) itself. A more detailed description of the process is provided in Section 3.1.4 Configuration of cyclic data transfer.

Every value of an input/channel is always transferred with a status byte, which describes its usability. The meaning of the status byte is described in Section 3.1.3 Coding of the status byte.

3.1.1 Input data: data transmission from device (adapter) -> EtherNet/IP scanner (T->O)

Input data consist of values that are sent from a device (adapter) to the EtherNet/IP scanner during cyclic data transmission.
The following values can be transmitted:

Value	Data structure	Read from
Instantaneous value	Value: REAL Status: SINT	Universal inputs, mathematics channels
Digital state	Value: REAL Status: SINT	Digital inputs, mathematics channels
Totalizer	Value: REAL Status: SINT	Universal inputs, digital inputs, mathematics channels

Table 7: Transferable input data

NOTICE

A math channel can return either an instantaneous value or a state depending on the setting for the result of the calculation.

The interpretation of the read value depends on the configuration of the input/channel. The instantaneous value of a universal input, for example, can be the result of a thermocouple measurement or a current measurement, for example.
For a detailed description of how to configure the inputs/channels, see the standard Operating Instructions.

3.1.2 Output data: data transmission from EtherNet/IP scanner -> device (adapter) (O->T)

Output data consist of values that are sent from an EtherNet/IP scanner to the device (adapter) during cyclic data transfer.
The following values can be transmitted:

Value	Data structure	Written to
Instantaneous value	Value: REAL Status: SINT	Universal inputs
Digital state	Value: REAL Status: SINT	Digital inputs

Table 8: Transferable output data

NOTICE

The transferred REAL value is interpreted by the digital channels as follows:

- 0x00000000 (= 0.0) corresponds to FALSE / inactive
- All other values correspond to TRUE / active

The input (universal/digital) must be configured accordingly in order for a value transmitted by the EtherNet/IP scanner to be used. For this, "EtherNet/IP" must be selected as the signal in the input. If this is not the case, the received value incl. status byte is only buffered; it is not further processed or saved in the device (adapter).

Example for universal input 5:

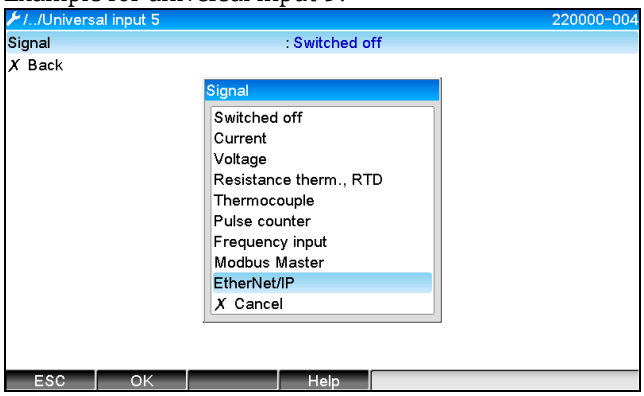

Figure 13: EtherNet/IP as input signal

3.1.3 Coding of the status byte

3.1.3.1 Input data status byte

The status byte of an input/channel that is sent to the EtherNet/IP scanner can contain the following values:

Value	Meaning	Possible causes
0x0C	Transferred value cannot be used	• Cable open circuit • Short-circuit • Sensor/input error • Calculated value invalid • Sensor measuring range undershot • Sensor measuring range exceeded
0x40	Value uncertain	• Input/channel returns equivalent value instead of the calculated value
0x80	Value OK	

Table 9: Coding of the status byte for input data

3.1.3.2 Output data status byte

The status byte of an input that is received by an EtherNet/IP scanner is interpreted by the device as follows:

Value	Meaning
0x00 – 0x3F	Value cannot be used
0x40 – 0x7F	Value uncertain => value is used (additional error display for universal inputs)
0x80 – 0xFF	Value OK

Table 10: Interpretation of the status byte for output data

3.1.4 Configuration of cyclic data transfer

The aforementioned input and output data are cyclically transmitted using an Input or Output Assembly.

Each Input/Output Assembly contains 48 "placeholders" that can be assigned input/output data:

- Input Assembly:
  "Input xx Value" = value read from the input/channel
  "Input xx State" = status byte of the read value
- Output Assembly:
  "Output yy Value" = value to be written to the input/channel
  "Output yy State" = status byte of the value to be written

The input/output data are assigned to the "placeholders" via the Configuration Assembly. This assignment is defined as follows:

Configuration Assembly		"Placeholder"	Data source
"Config Input xx"	"Off"	"Input xx Value" "Input xx State"	Disabled or not used
	"Analog uu Instantaneous value"		Instantaneous value of universal input uu
	"Analog uu Totalizer"		Totalizer of universal input uu
	"Digital vv State"		State of digital input vv
	"Digital vv Totalizer"		Totalizer of digital state vv
	"Math ww Process value"		Instantaneous value or state of math channel ww (depends on the configuration of the channel)
	"Math ww Totalizer"		Totalizer of math channel ww
"Config Output yy"	"Off"	"Output yy Value" "Output yy State"	Disabled or not used
	"Analog uu Instantaneous value"		Instantaneous value of universal input uu
	"Digital vv State"		State of digital input vv

xx = 1 to 48
yy = 1 to 48
uu = 1 to 40
vv = 1 to 20
ww = 1 to 12

A detailed overview of the configuration options available and of the structure of the aforementioned assemblies is provided in Sections 4.3.2.5 Instance Attributes (Instance = 100, Input Assembly Configurable), 4.3.2.6 Instance Attributes (Instance = 150, Output Assembly Configurable) and 4.3.2.4 Instance Attributes (Instance = 5, Configuration Assembly).

All "Config Input xx" and "Config Output yy" are set to "Off" by default. This cancels the link to the value of an input/channel. The setting has the following effect in the device (adapter):

- Input Assembly:
  "Input xx Value" is set to the value 0.0
  "Input xx State" is set to the value 0x0C
- Output Assembly:
  While "Output yy Value" and "Output yy State" are received, they are neither saved nor forwarded to an input/channel

The configuration procedure is identical for all input/output data and is explained in the following section taking the example of a Rockwell Automation PLC (e.g. ControlLogix) or the "Studio 5000 Logix Designer" configuration tool. As a prerequisite, the device (adapter) must already be configured and a valid IP address must be assigned.

NOTICE

It is described on the basis of the EDS AOP. The Custom AOP will be shown on the basis of figures.
The settings are the same for both AOPs.

3.1.4.1 Selection of the type of connection using "Studio 5000 Logix Designer":

The type of connection is selected in the "General" tab by clicking the "Change" button in this tab. This displays a new window with which the setting can be made:

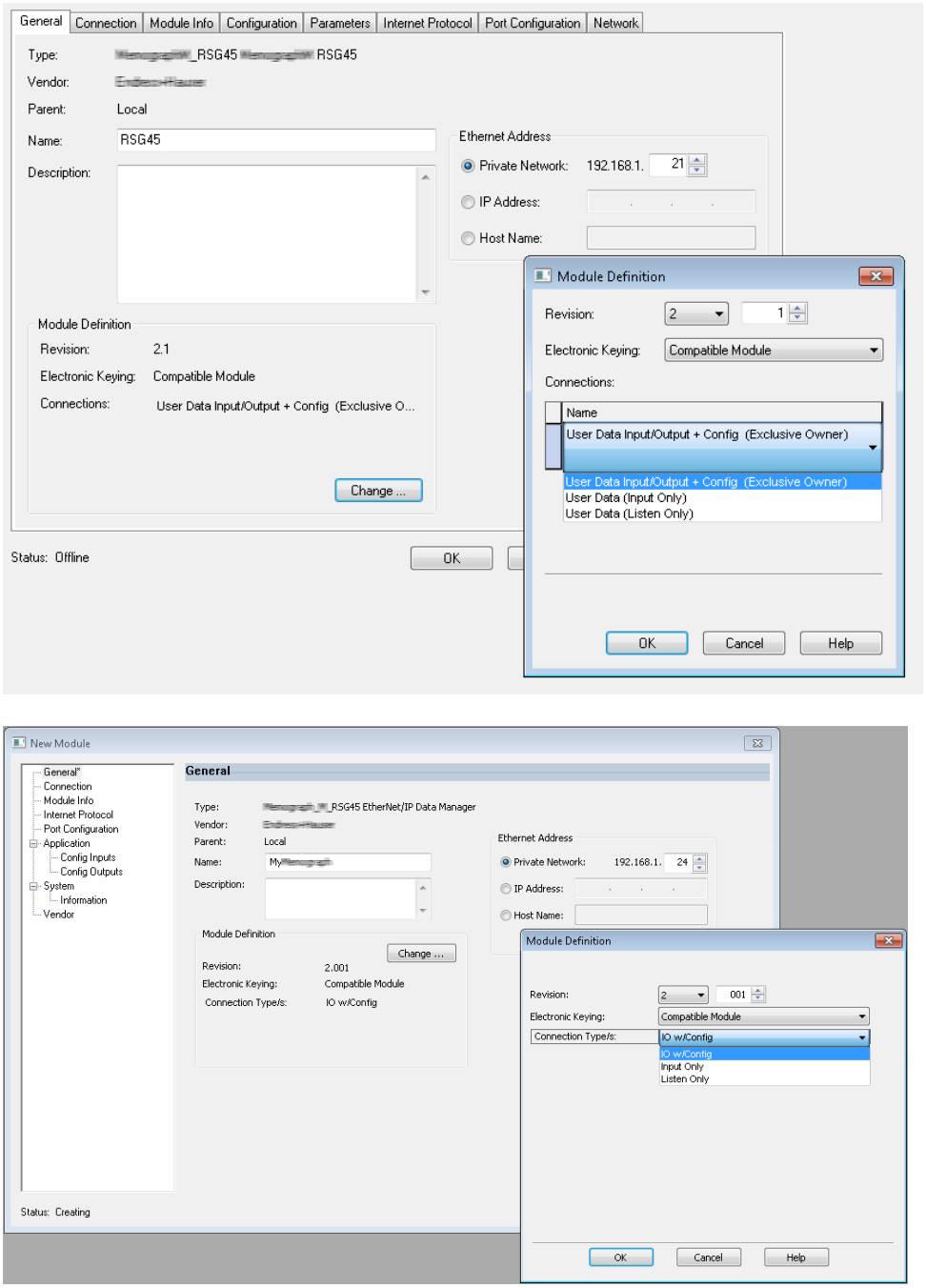

Fig. 14: Selecting the type of connection (EDS AOP / Custom AOP)

Three types of connection are supported, as illustrated in the graphic above.

- "Exclusive Owner":
  The input and output data are transmitted cyclically and the configuration is transmitted when the connection is established
- "Input Only" / "Listen Only":
  Only input data are transmitted cyclically. The configuration is not transmitted. Instead, the configuration currently saved in the device (adapter) is used.

To send a configuration to the device (adapter), the "Exclusive Owner" type of connection must be selected.

3.1.4.2 Configuration of the IO data to be transmitted using "Studio 5000 Logix Designer":

The IO data to be transmitted are configured via the Configuration Assembly, which can be set via the "Configuration" tab.

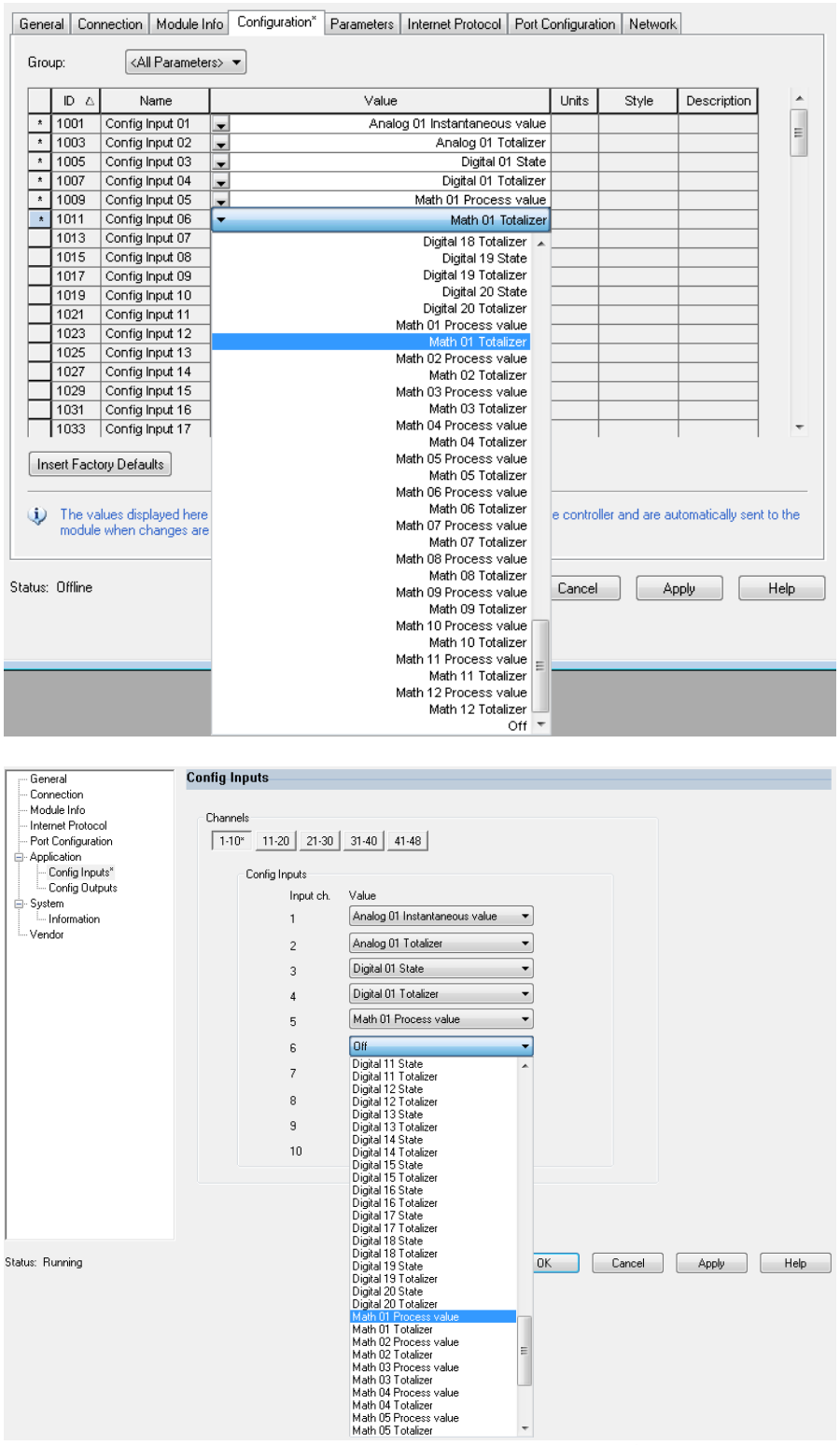

Fig. 15: Configuration of input/output data using Configuration Assembly (EDS AOP / Custom AOP)

By selecting "Config Input xx" or "Config Output yy", you select the "placeholder" which should contain the input or output data. The data source is selected via the picklist under "Config Input xx" or "Config Output yy".

Example in Fig. 15:

Configuration Assembly:
"Config Input 01" = "Analog 01 Instantaneous value"
"Config Input 02" = "Analog 01 Totalizer"
"Config Input 03" = "Digital 01 State"
"Config Input 04" = "Digital 01 Totalizer"
"Config Input 05" = "Math 01 Process value"
"Config Input 06" = "Math 01 Totalizer"
Remaining "Config Input xx" and all "Config Output yy" = "Off"

Input Assembly assigned as follows:
"Input 01 Value" = Instantaneous value of universal input 01
"Input 01 State" = Status byte of instantaneous value of universal input 01
"Input 02 Value" = Totalizer of universal input 01
"Input 02 State" = Status byte of totalizer of universal input 01
"Input 03 Value" = Status of digital input 01
"Input 03 State" = Status byte of state of digital input 01
"Input 04 Value" = Totalizer of digital input 01
"Input 04 State" = Status byte of totalizer of digital input 01
"Input 05 Value" = Instantaneous value/state of math channel 01
"Input 05 State" = Status byte of instantaneous value/state of math channel 01
"Input 06 Value" = Totalizer of math channel 01
"Input 06 State" = Status byte of totalizer of math channel 01
Remaining "Input xx Value" = 0.0
Remaining "Input xx State" = 0x0C (=value cannot be used, see 3.1.3.1 Input data status byte)

Output Assembly:
All "Output yy Value" = Not evaluated
All "Output yy State" = Not evaluated

After configuring the input/output data, the configuration must be uploaded to the scanner. The scanner now attempts to establish the previously configured "Exclusive Owner" connection which contains the configuration of the Configuration Assembly.

3.1.4.3 Verification of cyclic data transfer

The event logbook in the device (adapter) is used to verify whether a configuration has been received and whether cyclic data transfer has been established with the EtherNet/IP scanner. The following messages are entered here:

Message text	Meaning
EtherNet/IP: new IO configuration saved	A valid configuration which differs from the configuration currently used has been received via an Exclusive Owner connection. The new configuration has been saved and the content of the Input/Output Assemblies has been adapted accordingly.
Cyclic measurement transfer is active	Cyclic data transfer has been established with an EtherNet/IP scanner. The configuration of the input/output data used for the data transfer can be checked in the "EtherNet/IP" menu (see 3.3.1 EtherNet/IP menu).
No cyclic measurement transfer	Is only displayed if cyclic data transfer that was active beforehand is terminated again.

Tab. 11: Cyclic data transfer messages

Furthermore, the configuration of the IO data currently used in the device (adapter) can be read out and checked, see 3.3 EtherNet/IP configuration currently used.

3.1.4.4 Visualization of the IO data using "Studio 5000 Logix Designer"

It is possible to visualize the transmitted input/output data via "Monitor Tags" (see Fig. 16). For this, there must be an online connection to the EtherNet/IP scanner and a cyclic data connection must be established.

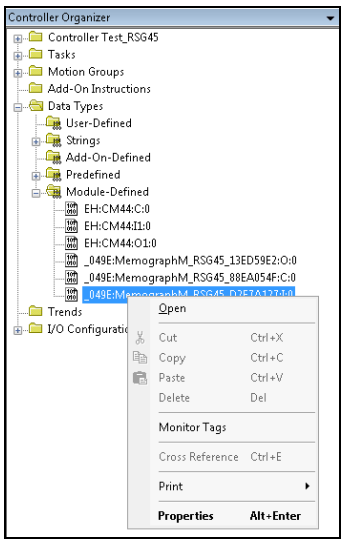

Fig. 16: Selecting "Monitor Tags"

The following two images show the input data selected in Fig. 15 which are transmitted to the EtherNet/IP scanner via the Input Assembly.

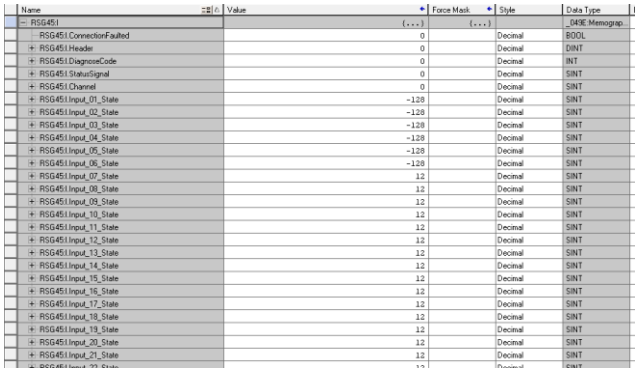

Figure 17: Visualization of "Input xx State" of the input data

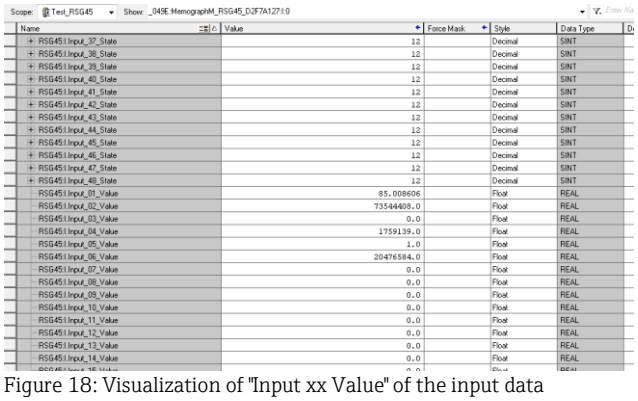

Figure 18: Visualization of "Input xx Value" of the input data

Depending on the tool used, the visualization of the transmitted status byte (Fig. 17 "Input_xx_State") and the value (Fig. 18 "Input_xx_Value") can differ. For this reason, it might be necessary to convert the displayed data to an appropriate format for the purpose of comparing/processing the data. For example, the status bytes in Fig. 17 are displayed as decimal numbers with a sign and not as hexadecimal numbers as indicated in 3.1.3.1 Input data status byte. This is why -128 (=0x80) or 12 (=0x0C) is shown here. Similarly, it would be possible for values to be displayed as hexadecimal numbers => 0x3F800000 corresponds to 1.0 (according to IEEE-754) rather than already converted floating point numbers according to IEEE-754 (as in Fig. 18).

3.2 Acyclic data transfer

3.2.1 Transferring texts

The Application Object is used for this purpose (see 4.3.10 Object 0x325, Application).

Texts can be saved in the device's (adapter's) event list. The maximum length is 40 characters. If the text is longer than 40 characters, the device (adapter) responds with the General Status Code 0x15 (Too Much Data) and the text written to the device (adapter) is not accepted.

Example: Entering message "Pump 1 is active" in the event list

Service	ClassID	Instance	Attribute	Type	Data
Set_Attribute_Single (0x10)	0x325	0	10	STRING[40]	"Pump 1 is active"

You always receive the "Enter new message" text with Get_Attribute_Single.

3.2.2 Batch data

Batches can be started and stopped. The batch name, batch designation, batch number and preset counter can also be written for stopping the batch. The texts (ASCII) can have a maximum length of 30 characters (8 characters for preset counter). If the text entered is longer than the maximum permitted length, the device responds with the General Status Code 0x15 (Too Much Data) and the data written to the device (adapter) are not accepted.

The Batch Object is used for this purpose (see 4.3.9 Object 0x324, Batch).

3.2.2.1 Reading the batch description

The description of the batch is read out here (direct access 490014). Read only.

Service	ClassID	Instance	Attribute	Type	Data
Get_Attribute_Single (0x0E)	0x324	2	2	STRING[16]	"Charge 2"

3.2.2.2 Starting a batch

Example: Start batch 2

Service	ClassID	Instance	Attribute	Type	Data
Set_Attribute_Single (0x10)	0x324	2	1	SINT	2 (Start)

The entry "Batch 2 started" is saved in the event list. This message also appears on the screen for a few seconds. The batch can only be started if the entries that are declared in the device (adapter) as required inputs have been written beforehand (see 3.2.2.4 Necessary inputs).

3.2.2.3 Ending a batch

Example: End batch 2

Service	ClassID	Instance	Attribute	Type	Data
Set_Attribute_Single (0x10)	0x324	2	1	SINT	1 (Stop)

The entry "Batch 2 ended" is saved in the event list. This message also appears on the screen for a few seconds.

3.2.2.4 Necessary inputs

Here it is possible to determine which inputs are declared as required inputs in the device (adapter) settings (direct access 490005, 490006, 490007 and 490008).

Example: Batch designation and batch number are required inputs

Service	ClassID	Instance	Attribute	Type	Data
Get_Attribute_Single (0x0E)	0x324	0	12	SINT	5 .0 = 1 batch designation .2 = 1 batch number

3.2.2.5 Setting the batch designation

Can only be set if the batch has not yet been started. It does not have to be set if it is not required by the device (adapter) settings (direct access 490005), see also 3.2.2.4 Necessary inputs.

Example: Batch designation "Identifier" for batch 2

Service	ClassID	Instance	Attribute	Type	Data
Set_Attribute_Single (0x10)	0x324	2	3	STRING[30]	"Identifier"

3.2.2.6 Setting the batch name

Can only be set if the batch has not yet been started. It does not have to be set if it is not required by the device (adapter) settings (direct access 490006), see also 3.2.2.4 Necessary inputs.

Example: Batch name "Name" for batch 2

Service	ClassID	Instance	Attribute	Type	Data
Set_Attribute_Single (0x10)	0x324	2	4	STRING[30]	"Name"

3.2.2.7 Setting the batch number

Can only be set if the batch has not yet been started. It does not have to be set if it is not required by the device (adapter) settings (direct access 490007), see also 3.2.2.4 Necessary inputs.

Example: Batch number "Num" for batch 2

Service	ClassID	Instance	Attribute	Type	Data
Set_Attribute_Single (0x10)	0x324	2	5	STRING[30]	"Num"

3.2.2.8 Setting the preset counter

Can only be set if the batch has not yet been started. It does not have to be set if it is not required by the device (adapter) settings (direct access 490008), see also 3.2.2.4 Necessary inputs.

- Maximum 8 characters ('.', '0' to '9')
- Maximum value 99999999
- Only positive numbers

Example: Preset counter to 12.345 for batch 2

Service	ClassID	Instance	Attribute	Type	Data
Set_Attribute_Single (0x10)	0x324	2	6	STRING[8]	"12.345"

3.2.2.9 Reading out the batch status

This can be used to read out the status of every batch.

Example: Batch 2 started

Service	ClassID	Instance	Attribute	Type	Data
Get_Attribute_Single (0x0E)	0x324	2	9	SINT	2 = Running

3.2.2.10 Reading out the communication status

This can be used to read out the last communication status after a write access.

Example: Start batch 2 even though it is already running, read out communication status

Service	ClassID	Instance	Attribute	Type	Data
Get_Attribute_Single (0x0E)	0x324	0	10	SINT	4 = Batch already running

3.2.2.11 Example of process

Start batch:

Action	Service,ClassID,Inst,Attr.	Data
Read batch status	0x0E, 0x324, 2, 9	0 = Not Running
Necessary inputs	0x0E, 0x324, 0, 12	5 .0 = 1 batch designation .2 = 1 batch number
Set the batch designation	0x10, 0x324, 2 ,3	"Identifier"
Set the batch number	0x10, 0x324, 2, 5	"Num"
Start a batch	0x10, 0x324, 2, 1	2 (Start)

3.2.3 Relays

Relays can be set if they were set to "Remote" in the device (adapter) settings (see 3.2.3.3 Checking for remote setting).
The Application Object is used for this purpose (see 4.3.10 Object 0x325, Application).

3.2.3.1 Setting relays

Example: Setting relay 6 to the active state

Service	ClassID	Instance	Attribute	Type	Data
Set_Attribute_Single (0x10)	0x325	0	16	SINT	1

If relays that are not set to remote are set, the device (adapter) replies with General Status Code 0x0E (attribute not settable).

3.2.3.2 Reading out the relay status

Read out all relay states:

Service	ClassID	Instance	Attribute	Type	Data
Get_Attribute_Single (0x0E)	0x325	0	29	INT	0x0003 .0 = 1 relay 1 enabled .1 = 1 relay 2 enabled

Read out a relay directly:

Service	ClassID	Instance	Attribute	Type	Data
Get_Attribute_Single (0x0E)	0x325	0	16	SINT	1 Relay 6 enabled

3.2.3.3 Checking for remote setting

Read out which relays are set to remote:

Service	ClassID	Instance	Attribute	Type	Data
Get_Attribute_Single (0x0E)	0x325	0	30	INT	0x0002 .1 = 1 relay 2 controllable

3.2.4 Changing the limit values

It is possible to change limit values if they have been switched on in the device (adapter) settings.
The Limits Object is used for this purpose (see 4.3.8 Object 0x323, Limits).

The procedure described here must be followed when changing limit values:
1. Initialize a change to limit values (see 3.2.4.2 Initializing a change to limit values)
2. Change limit values (see 3.2.4.3 Changing limit values)
3. State reason for the change, if necessary (see 3.2.4.4 Specifying a reason for changing the limit values)
4. Accept limit values (see 3.2.4.5 Accepting limit values)

Any changes since the last initialization can be discarded when a subsequent limit value change is initialized.

3.2.4.1 Checking the limit values

Check limit value 1 (upper limit) and limit value 2 (switched off):

Service	ClassID	Instance	Attribute	Type	Data
Get_Attribute_Single (0x0E)	0x323	1	1	SINT	0x01 = Upper limit value
Get_Attribute_Single (0x0E)	0x323	1	2	REAL	130.0 = Limit value
Get_Attribute_Single (0x0E)	0x323	1	6	STRING[6]	"m" = Unit
Get_Attribute_Single (0x0E)	0x323	1	4	DINT	0x00000001 = 1 s
Get_Attribute_Single (0x0E)	0x323	2	1	SINT	0x00 = Switched off

3.2.4.2 Initializing a change to limit values

Initialization must be performed in order to make changes. The access mode must be changed to "Write access" for this purpose:

Service	ClassID	Instance	Attribute	Type	Data
Set_Attribute_Single (0x10)	0x323	0	10	SINT	1 = Write access granted. Limit changes possible.

When this attribute is then read out, the value 1 is returned.

3.2.4.3 Changing limit values

The access mode must first be set to "Write access" to set limit value 1 to 120.0 and the time delay to 2 s:

Service	ClassID	Instance	Attribute	Type	Data
Set_Attribute_Single (0x10)	0x323	1	2	REAL	120.0
Set_Attribute_Single (0x10)	0x323	1	4	REAL	0x00000002

3.2.4.4 Specifying a reason for changing the limit values

Before the changes are accepted it is possible to specify a reason for the change, which then appears in the event list:

Service	ClassID	Instance	Attribute	Type	Data
Set_Attribute_Single (0x10)	0x323	0	11	STRING[30]	"Reason"

3.2.4.5 Accepting limit values

The access mode must be changed to "Save" in order to accept changes:

Service	ClassID	Instance	Attribute	Type	Data
Set_Attribute_Single (0x10)	0x323	0	10	SINT	2 = Saving all limit changes. Write access not allowed.

When this attribute is then read out, the value 0 is returned as the system returned to the "Read mode" once the changes were saved.

3.2.4.6 Discarding limit value changes

The access mode must be changed to "Discard" in order to discard changes:

Service	ClassID	Instance	Attribute	Type	Data
Set_Attribute_Single (0x10)	0x323	0	10	SINT	0 = Read only / Cancel changes

When this attribute is then read out, the value 0 is returned.

3.2.4.7 Reading out the execution status

The execution status can be queried after every write command:

Service	ClassID	Instance	Attribute	Type	Data
Get_Attribute_Single (0x0E)	0x323	0	12	SINT	0x00 = OK

3.3 EtherNet/IP configuration currently used

3.3.1 EtherNet/IP menu

This menu is used to check the communication settings currently used by the device (adapter) and the input/output data configuration last saved.
The parameters in this menu and in the submenus can only be read-accessed.

Parameter	Display	Info
MAC address	xx:xx:xx:xx:xx:xx, x= 0 to F	The MAC address is a unique hardware address that is stored in the device (adapter) and cannot be changed.
DHCP	Yes No	DHCP = "Yes": IP address, subnetmask and gateway assigned by a DHCP server DHCP = "No": IP address, subnetmask and gateway manually set
IP address	xxx.xxx.xxx.xxx (x=0..9)	
Subnetmask	xxx.xxx.xxx.xxx (x=0..9)	
Gateway	xxx.xxx.xxx.xxx (x=0..9)	
Config Inputs		See 3.3.1.1 Config Input
Config Outputs		See 3.3.1.2 Config Output

Tab. 12: EtherNet/IP settings currently used

3.3.1.1 Config Inputs submenu

In this submenu it is possible to check the configuration currently used for the input data to be transmitted.

This submenu is subdivided as follows to provide a better overview:

Submenu	Parameter	Display	Info
Config Input 1-10	Input1	"Kn - P"	Configuration of "Config Input 01" as formatted text (see 4.3.2.4 Instance Attributes (Instance = 5, Configuration Assembly)
	...	...	...
	Input10	"Kn - P"	Configuration of "Config Input 10" as formatted text (see 4.3.2.4 Instance Attributes (Instance = 5, Configuration Assembly)
Config Input 11-20	Input11	"Kn - P"	Configuration of "Config Input 11" as formatted text (see 4.3.2.4 Instance Attributes (Instance = 5, Configuration Assembly)
	...	...	...
	Input20	"Kn - P"	Configuration of "Config Input 20" as formatted text (see 4.3.2.4 Instance Attributes (Instance = 5, Configuration Assembly)
Config Input 21-30	Input21	"Kn - P"	Configuration of "Config Input 21" as formatted text (see 4.3.2.4 Instance Attributes (Instance = 5, Configuration Assembly)
	...	...	...
	Input30	"Kn - P"	Configuration of "Config Input 30" as formatted text (see 4.3.2.4 Instance Attributes (Instance = 5, Configuration Assembly)
Config Input 31-40	Input31	"Kn - P"	Configuration of "Config Input 31" as formatted text (see 4.3.2.4 Instance Attributes (Instance = 5, Configuration Assembly)
	...	...	...
	Input40	"Kn - P"	Configuration of "Config Input 40" as formatted text (see 4.3.2.4 Instance Attributes (Instance = 5, Configuration Assembly)
Config Input 41-48	Input41	"Kn - P"	Configuration of "Config Input 41" as formatted text (see 4.3.2.4 Instance Attributes (Instance = 5, Configuration Assembly)
	...	...	...
	Input48	"Kn - P"	Configuration of "Config Input 48" as formatted text (see 4.3.2.4 Instance Attributes (Instance = 5, Configuration Assembly)

Tab. 13: Breakdown of the Config Inputs submenu

The "Kn - P" text displayed has the following structure:

Placeholder	Text segment	Info
"K"	"Off" "Analog" "Digital" "Math"	-> Input x disabled, "n - P" placeholders are not displayed. -> Value of an analog channel is read -> Value of a digital channel is read -> Value of a math channel is read
"n"	Channel number as text	
" – "	" – "	Separator between channel/channel number and value read
"P"	"Instantaneous value" "State" "Process value" "Totalizer"	Instantaneous value incl. status State incl. status Instantaneous value or state incl. status Totalizer incl. status

Tab. 14: Text display of configuration of input x

3.3.1.2 Config Outputs submenu

In this submenu it is possible to check the configuration currently used for the output data to be transmitted.

This submenu is subdivided as follows to provide a better overview:

Submenu	Parameter	Display	Info
Config Output 1-10	Output1	"Kn - P"	Configuration of "Config Output 01" as formatted text (see 4.3.2.4 Instance Attributes (Instance = 5, Configuration Assembly)
	...	...	...
	Output 10	"Kn - P"	Configuration of "Config Output 10" as formatted text (see 4.3.2.4 Instance Attributes (Instance = 5, Configuration Assembly)
Config Output 11-20	Output 11	"Kn - P"	Configuration of "Config Output 11" as formatted text (see 4.3.2.4 Instance Attributes (Instance = 5, Configuration Assembly)
	...	...	...
	Output 20	"Kn - P"	Configuration of "Config Output 20" as formatted text (see 4.3.2.4 Instance Attributes (Instance = 5, Configuration Assembly)
Config Output 21-30	Output 21	"Kn - P"	Configuration of "Config Output 21" as formatted text (see 4.3.2.4 Instance Attributes (Instance = 5, Configuration Assembly)
	...	...	...
	Output 30	"Kn - P"	Configuration of "Config Output 31" as formatted text (see 4.3.2.4 Instance Attributes (Instance = 5, Configuration Assembly)
Config Output 31-40	Output 31	"Kn - P"	Configuration of "Config Output 31" as formatted text (see 4.3.2.4 Instance Attributes (Instance = 5, Configuration Assembly)
	...	...	...
	Output 40	"Kn - P"	Configuration of "Config Output 40" as formatted text (see 4.3.2.4 Instance Attributes (Instance = 5, Configuration Assembly)
Config Output 41-48	Output 41	"Kn - P"	Configuration of "Config Output 41" as formatted text (see 4.3.2.4 Instance Attributes (Instance = 5, Configuration Assembly)
	...	...	...
	Output 48	"Kn - P"	Configuration of "Config Output 48" as formatted text (see 4.3.2.4 Instance Attributes (Instance = 5, Configuration Assembly)

Tab. 15: Breakdown of the Config Outputs submenu

The "Kn - P" text displayed has the following structure:

Placeholder	Text segment	Info
"K"	"Off" "Analog" "Digital"	-> Output x disabled, "n - P" placeholders are not displayed. -> Value of an analog channel is written -> Value of a digital channel is written
"n"	Channel number as text	
" – "	" – "	Separator between channel/channel number and written value
"P"	"Instantaneous value" "State"	Instantaneous value incl. status State incl. status

Tab. 16: Text display of configuration of output x

3.3.2 Visualization with local operation

The parameters described in 3.3.1 EtherNet/IP menu can be found under
Main menu / Diagnostics / EtherNet/IP
and are displayed as follows:

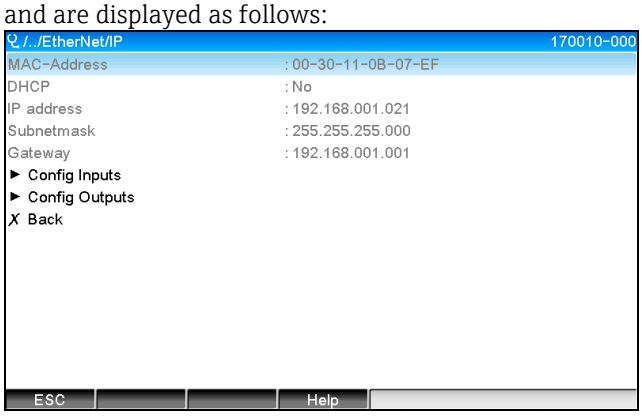

Fig. 19: Visualization of EtherNet/IP menu (local operation)

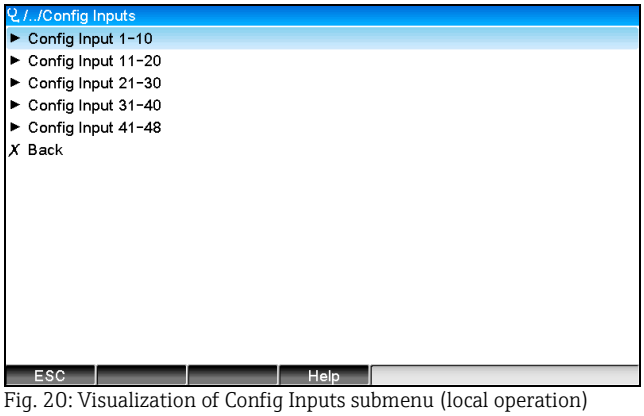

Fig. 20: Visualization of Config Inputs submenu (local operation)

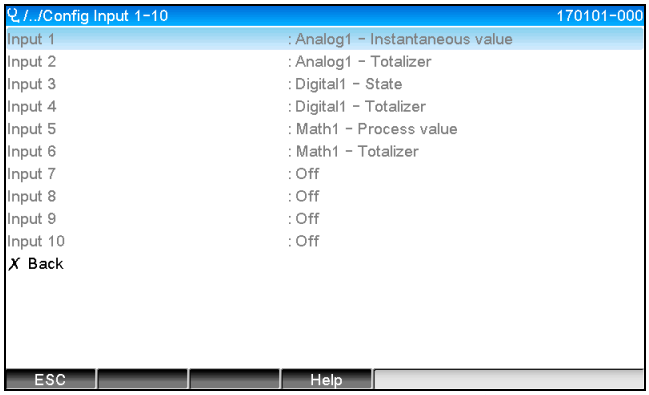

Fig. 21: Visualization of Config Input 1-10 submenu (local operation)

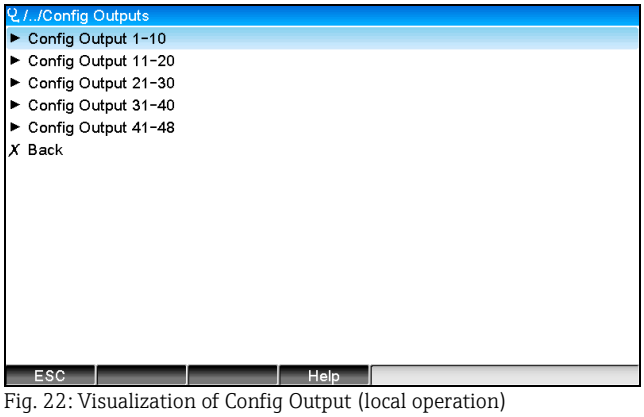

Fig. 22: Visualization of Config Output (local operation)

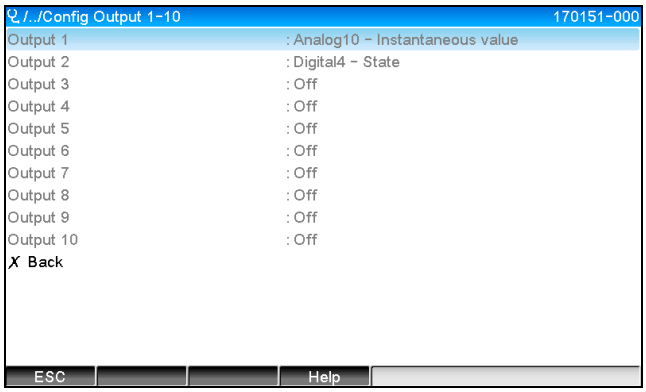

Fig. 23: Visualization of Config Output 1-10 (local operation)

3.3.3 Web server visualization

The parameters described in 3.3.1 EtherNet/IP menu can be found under
Menu / Diagnostics / EtherNet/IP
and are displayed as follows:

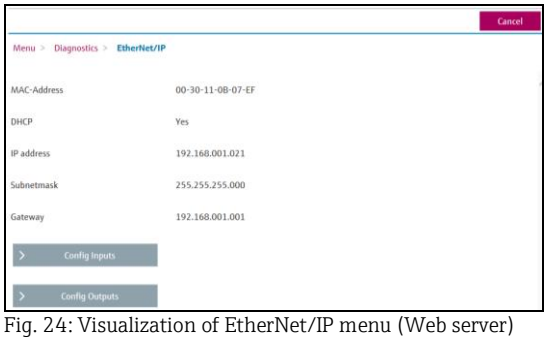

Fig. 24: Visualization of EtherNet/IP menu (Web server)

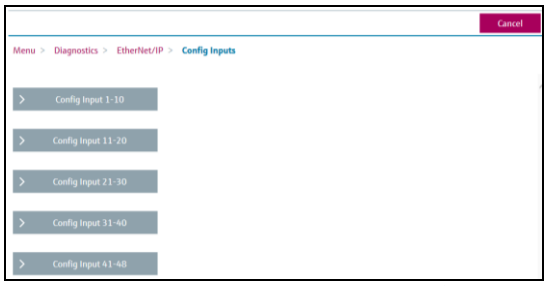

Fig. 25: Visualization of Config Inputs submenu (Web server)

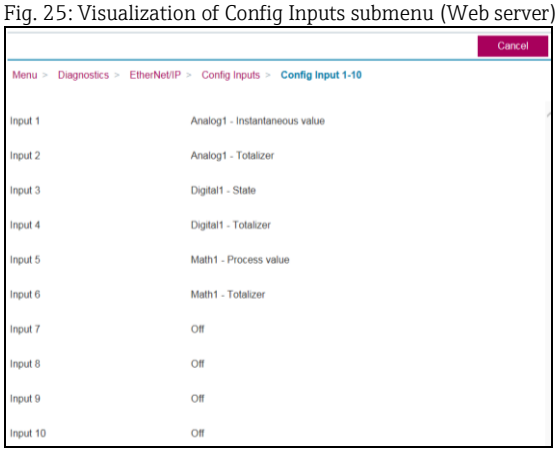

Fig. 26: Visualization of Config Input 1-10 submenu (Web server)

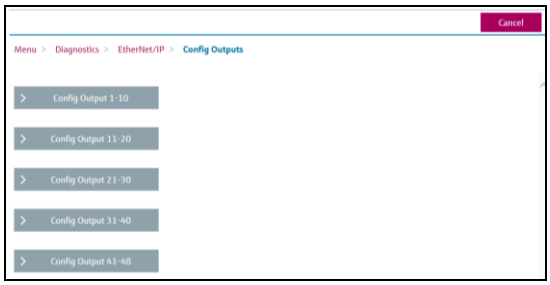

Fig. 27: Visualization of Config Output submenu (Web server)

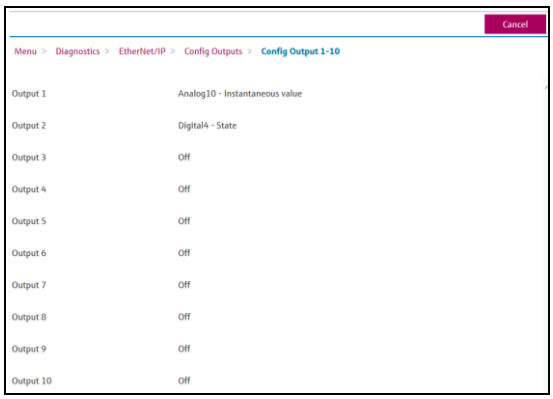

Fig. 28: Visualization of Config Output 1-10 submenu (Web server)

3.4 Custom AOP

Add-on Profile (AOP) for RSLogix™ 5000 and Studio 5000© from Rockwell Automation.

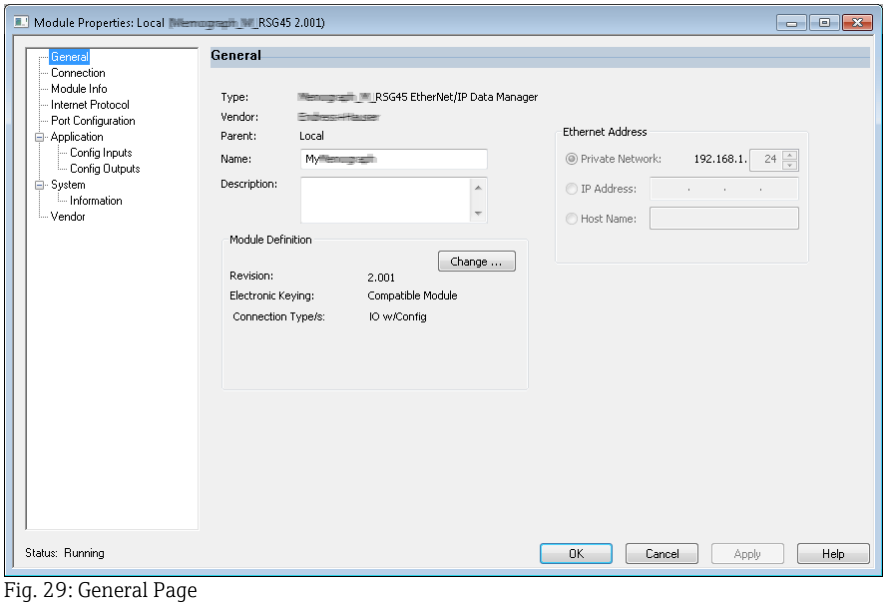

Fig. 29: General Page

Use this page to create/view module properties for the selected module.

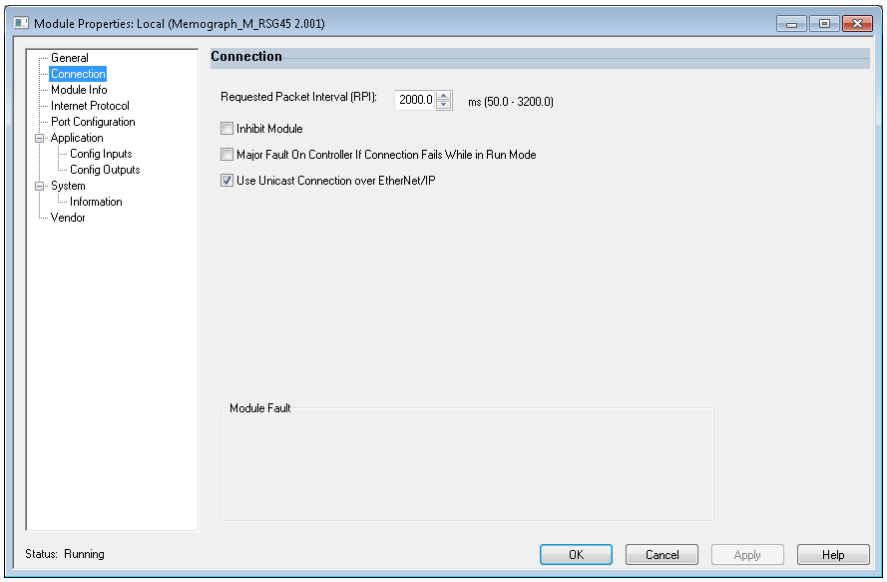

Fig. 30: Connection Page

Use this page to define controller-to-module behavior. You can do the following on this tab:

- select a requested packet interval.
- choose to inhibit the module.
- configure the controller so that a loss of connection to this module causes a major fault.
- select between Unicast and ulticast EtherNet/IP connections
- view module faults

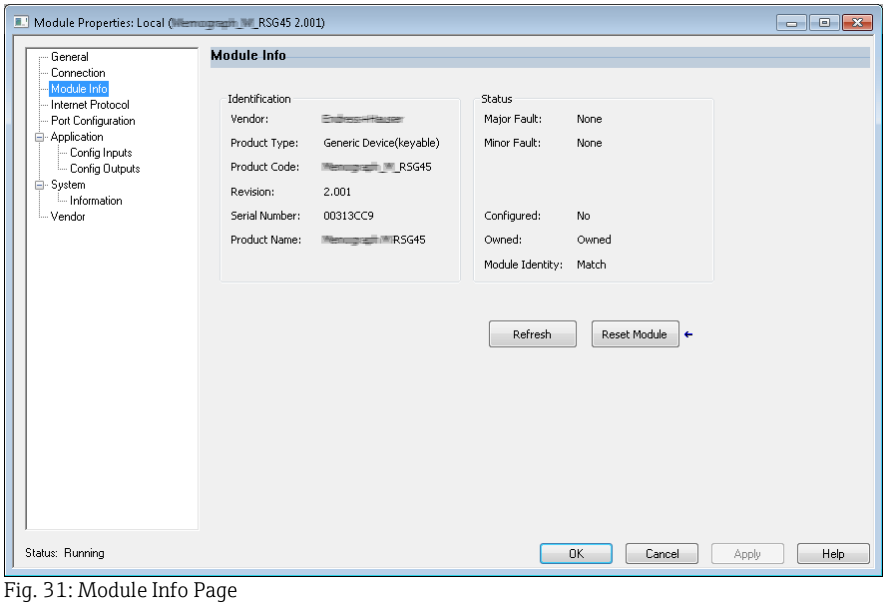

Fig. 31: Module Info Page

The Module Info Page displays module and status information about the module. It also lets you reset a module to its power-up state.

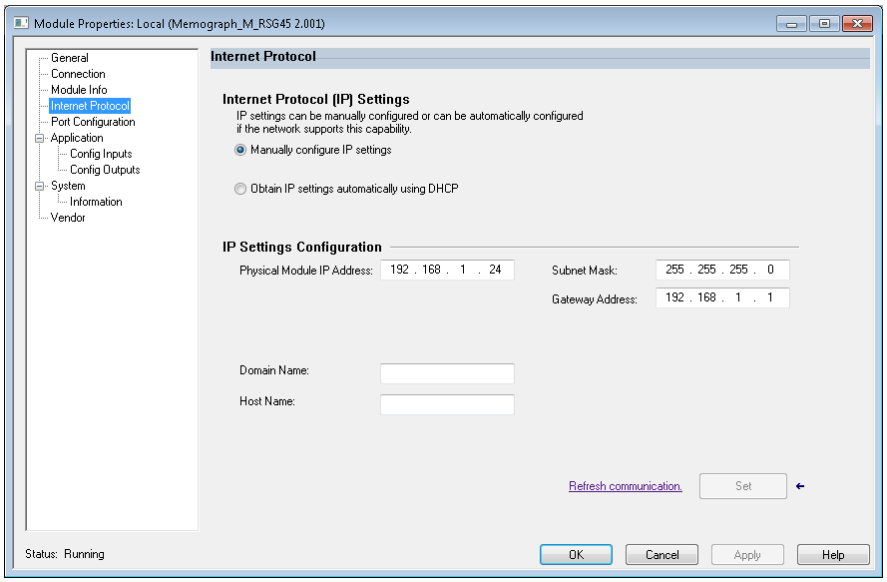

Fig. 32: Internet Protocol Page

Use the Internet Protocol page to configure IP settings.

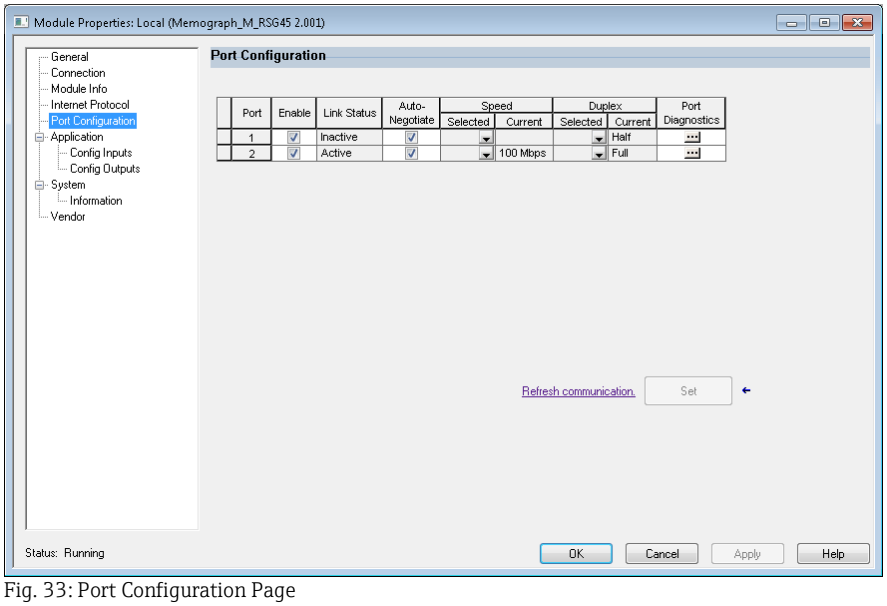

Fig. 33: Port Configuration Page

Use this page to configure a multiple port module.

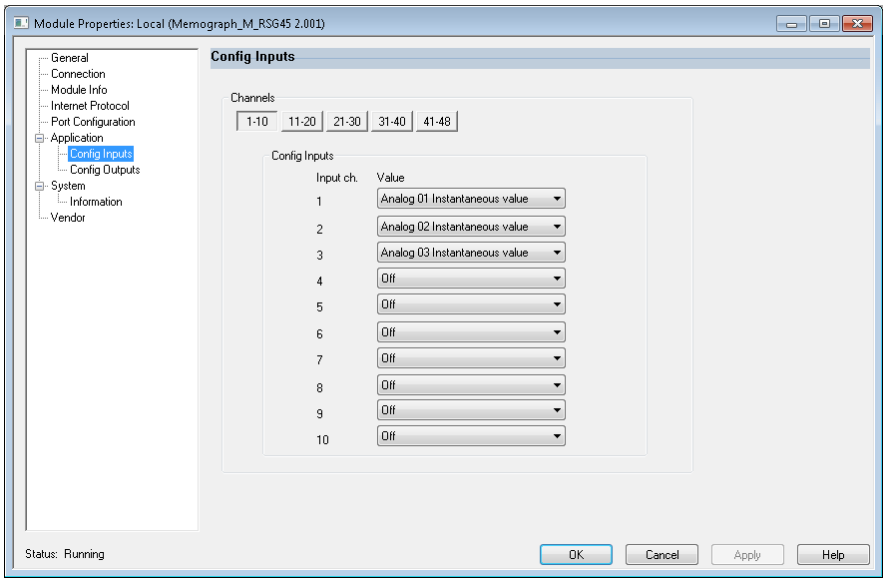

Fig. 34: Config Inputs Page

Use this page (Fig. 34) to configure the input assembly (Adapter → Scanner; class 0x4, instance 100, attribute 3).

The 48 configurable inputs are grouped into 5 groups. The inputs can be assigned the following values:

- Off
- Analog x Instantaneous value (x = 1..40)
- Analog x Totalizer (x = 1..40)
- Digital x State (x = 1..20)
- Digital x Totalizer (x = 1..20)
- Math x Process value (x = 1..12)
- Math x Totalizer (x = 1..12)

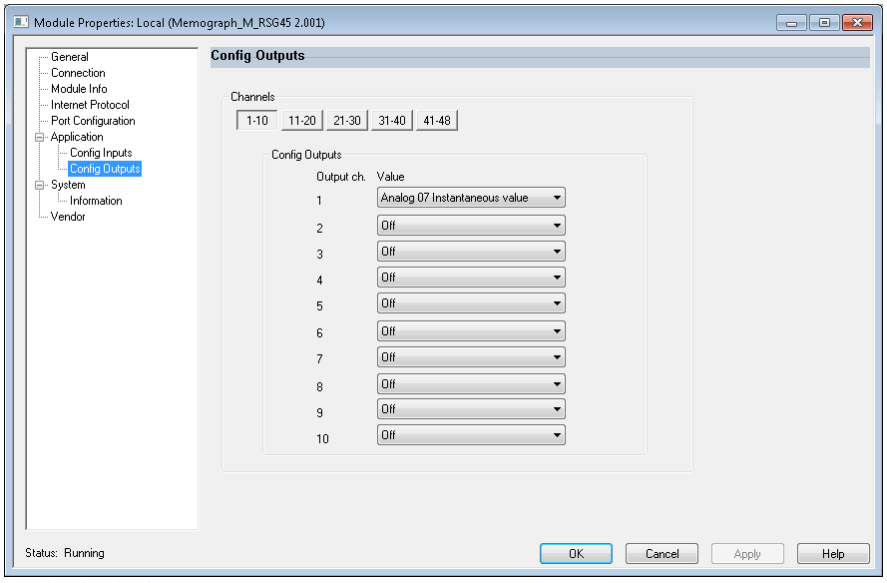

Fig. 35: Config Outputs Page

Use this page (Fig. 35) to configure the output assembly (Scanner→ Adapter; class 0x4, instance 150, attribute 3).

The 48 configurable outputs are grouped into 5 groups. The outputs can be assigned the following values:

- Off
- Analog x Instantaneous value (x = 1..40)
- Digital x State (x = 1..20)

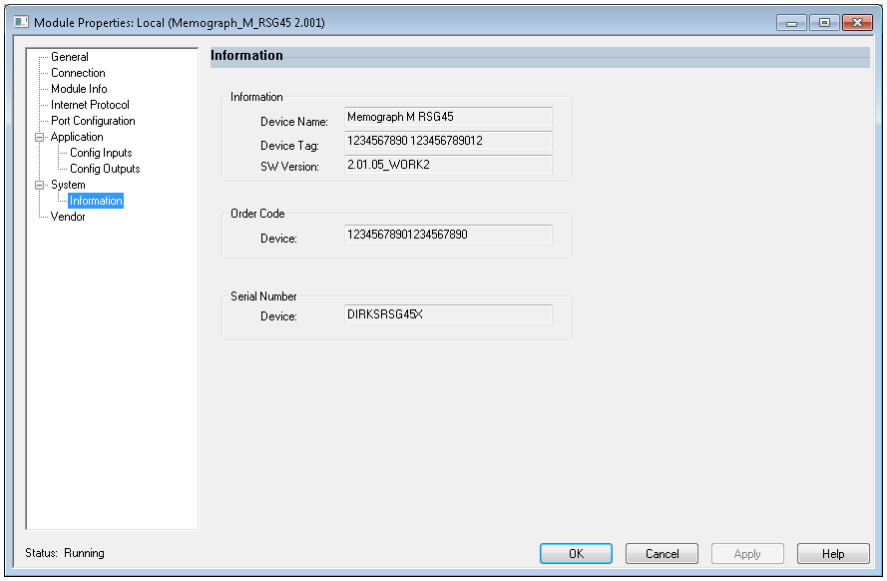

Fig. 36: Information Page

Use this page so see some additional information about the device.

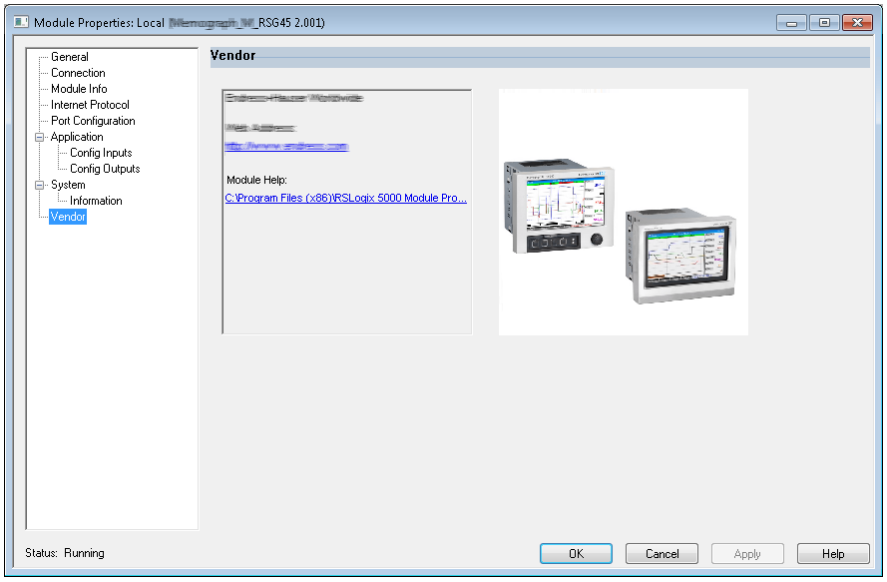

Fig. 37: Vendor Page

Use this page to access vendor information.

4 Appendix

4.1 Technical data

Protocols		EtherNet/IP
ODVA certification		Yes
Communication type		Ethernet
Connection		2x RJ45
Device profile		Generic device (product type: 0x2B)
Manufacturer ID		0x049E
Device type ID		0x107A
Baud rates		10/100 MBps
Polarity		Auto-MDI-X
Connections	IO	A maximum of 4 connections in total are supported: - Exclusive Owner: max. 1 - Input Only: up to 4 - Listen Only: up to 4
	Explicit Message	Max. 16 connections
Minimum RPI		50 ms (default 100 ms)
Maximum RPI		3200 ms
System integration	EtherNet/IP	EDS
	Rockwell	Add-on-Profile Level 3
IO data	Input (T→O)	Device status and diagnostic message with highest priority Measured values: ▪ 48 inputs (configured input) + status
	Output (O→T)	Actuating values: ▪ 48 outputs (configured output) + status

4.2 Connections

User Data Input/Output + Config (Exclusive Owner)	Assembly instance	Size (bytes)
O → T	150	240
T → O	100	248
Configuration	5	398
User Data (Input Only)	Assembly instance	Size (bytes)
O → T	3	0
T → O	100	248
Configuration	5	0
User Data (Listen Only)	Assembly instance	Size (bytes)
O → T	4	0
T → O	100	248
Configuration	5	0

4.3 Device-specific objects

4.3.1 Object 0x01, Identity

4.3.1.1 Class Attributes (Instance = 0)

Services: Get_Attribute_All (Attr. 1), Get_Attribute_Single

Attribute	Parameter	R/W	Data type	Info
1	Revision	R	UINT	Revision of object (1)

4.3.1.2 Instance Attributes (Instance = 1)

Services: Get_Attribute_All (Attr. 1-7, 11-12), Get_Attribute_Single, Set_Attribute_Single, Reset

Attribute	Parameter	R/W	Data type	Info
1	VendorID	R	UINT	ID of vendor (1182)
2	Device Type	R	UINT	Device type (43 = Generic Device)
3	Product Code	R	UINT	ID of device (4218)
4	Revision	R	Struct of {USINT, USINT}	Firmware revision (2.1): {Major (2), Minor (1)}
5	Status	R	WORD	Device status, bit-encoded - Bit0: Owned 0 = No connection 1 = Connection established to a scanner - Bit1: Not used (0) - Bit2: Configured 0 = EtherNet/IP interface uses default settings 1 = At least one setting of the EtherNet/IP interface has been changed - Bit3: Not used (0) - Bit4-7: Extended Device Status 0 = Unknown 2 = At least one bad IO connection 3 = No IO connections established 4 = Saved configuration incorrect

				6 = At least one IO connection in the "RUN" state 7 = All established IO connections in the "Idle" state - Bit8: Minor recoverable faults 0 = No error 1 = At least 1 error active - Bit9: Minor unrecoverable faults 0 = No error 1 = At least 1 error active - Bit10: Minor recoverable faults 0 = No error 1 = At least 1 error active - Bit11: Minor recoverable faults 0 = No error 1 = At least 1 error active - Bit12-15: Not used (0)
6	Serial Number	R	UDINT	Device-specific serial number
7	Product Name	R	SHORT_STRING	Device name
11	Active Language	R/W	Struct of {USINT, USINT, USINT}	Language used {USINT => 0x65 ("e"), USINT => 0x6E ("n"), USINT} =>0x67 ("g")}
12	Supported Language List	R	Array of [Struct of {USINT, USINT, USINT}]	List of supported languages: - "English" {0x65, 0x6E, 0x67}

4.3.2 Object 0x04, Assembly

4.3.2.1 Class Attributes (Instance = 0)

Services: Get_Attribute_Single

Attribute	Parameter	R/W	Data type	Info
1	Revision	R	UINT	Revision of object (2)
2	MaxInstance	R	UINT	Highest instance number (150)

4.3.2.2 Instance Attributes (Instance = 3, Heartbeat Input-Only)

Services: Set_Attribute_Single
This instance acts as a heartbeat for input-only connections.
The data length specification in a forward-open request should be 0. Other data length specifications are also accepted, however.

Attribute	Parameter	R/W	Data type	Info
3	Data	W	-	Data length = 0

4.3.2.3 Instance Attributes (Instance = 4, Heartbeat Listen-Only)

Services: Set_Attribute_Single

This instance acts as a heartbeat for listen-only connections.
The data length specification in a forward-open request should be 0. Other data length specifications are also accepted, however.

Attribute	Parameter	R/W	Data type	Info
3	Data	W	-	Data length = 0

4.3.2.4 Instance Attributes (Instance = 5, Configuration Assembly)

Services: Get_Attribute_Single, Set_Attribute_Single

Attribute	Parameter	R/W	Data type	Info
3	Data	R/W	Array of [Byte]	Data length = 398 bytes

Data format:

Byte	Size	Type	Name	Info
0	4	DINT	Reserved1	
4	1	SINT	Reserved2	
5	1	SINT	Reserved3	
6	2	INT	Config Input 01	See 4.3.2.7 Config Input picklist
8	2	INT	Config Input 02	
…	…	…	…	
98	2	INT	Config Input 47	
100	2	INT	Config Input 48	
102	2	INT	Config Output 01	See 4.3.2.8 Config Output picklist
104	2	INT	Config Output 02	
…	…	…	…	
194	2	INT	Config Output 47	
196	2	INT	Config Output 48	
198	200		None	

4.3.2.5 Instance Attributes (Instance = 100, Input Assembly Configurable)

Services: Get_Attribute_Single

Attribute	Parameter	R/W	Data type	Info
3	Data	R	Array of [BYTE]	Data length = 248 bytes

Data format:

Byte	Size	Type	Name	Info
0	4	DINT	Header	0 = Connection o.k.
4	2	INT	DiagnoseCode	Diagnostic number See 5.2.1 Input Assembly diagnostic information (cyclic data)
6	1	SINT	StatusSignal	Status signal according to Namur NE107 See 5.2.1 Input Assembly diagnostic information (cyclic data)
7	1	SINT	Channel	Channel assignment of diagnostics See 5.2.1 Input Assembly diagnostic information (cyclic data)
8	1	SINT	Input 01 State	See 3.1.3.1 Input data status byte
9	1	SINT	Input 02 State	
…	…	…	…	
54	1	SINT	Input 47 State	

55	1	SINT	Input 48 State	
56	4	REAL	Input 01 Value	
60	4	REAL	Input 02 Value	
...	...	...	...	
240	4	REAL	Input 47 Value	
244	4	REAL	Input 48 Value	

The Instance Attributes (Instance = 5, Configuration Assembly) are used to specify which value should be read out of an input/channel. The number in the Configuration Assembly defines the position of the value read. This means that if "Config Input xx" is configured in the Configuration Assembly, "Input xx Value" contains the read value and "Input xx State" contains the associated status byte.
Example:
"Config Input 01" = "Analog 01 Instantaneous value"
"Input 01 Value" = Instantaneous value of analog input 1
"Input 01 State" = Status byte of instantaneous value of analog input 1

4.3.2.6 Instance Attributes (Instance = 150, Output Assembly Configurable)

Services: Set_Attribute_Single

Attribute	Parameter	R/W	Data type	Info
3	Data	W	Array of [BYTE]	Data length = 240 Bytes

Data format:

Byte	Size	Type	Name	Info
0	1	SINT	Output 01 State	See 3.1.3.2 Output data status byte
1	1	SINT	Output 02 State	
...	...	...	...	
46	1	SINT	Output 47 State	
47	1	SINT	Output 48 State	
48	4	REAL	Output 01 Value	
52	4	REAL	Output 02 Value	
...	...	...	...	
232	4	REAL	Output 47 Value	
236	4	REAL	Output 48 Value	

The Instance Attributes (Instance = 5, Configuration Assembly are used to specify which value should be written to an input/channel. The number in the Configuration Assembly defines the position of the value to be written. This means that if "Config Output xx" is configured in the Configuration Assembly, the value of "Output xx Value" and the status byte from "Output xx State" are written to the input/channel specified via "Config Output xx".
Example:
"Config Output 02" = "Digital 01 State"
"Output 01 Value" = State to be written to digital input 1
"Output 01 State" = Status byte of the state to be written to digital input 1

4.3.2.7 Config Input picklist

Dez	Hex	Value
0	0x0000	Off
4113	0x011	Analog 01 Instantaneous value
4115	0x013	Analog 01 Totalizer
4129	0x1021	Analog 02 Instantaneous value

Dez	Hex	Value
8210	0x2012	Digital 01 State
8211	0x2013	Digital 01 Totalizer
8226	0x2022	Digital 02 State

Dez	Hex	Value
12305	0x3011	Math 01 Process value
12307	0x3013	Math 01 Totalizer
12321	0x3021	Math 02 Process value

4131	0x1023	Analog 02 Totalizer
4145	0x1031	Analog 03 Instantaneous value
4147	0x1033	Analog 03 Totalizer
4161	0x1041	Analog 04 Instantaneous value
4163	0x1043	Analog 04 Totalizer
4177	0x1051	Analog 05 Instantaneous value
4179	0x1053	Analog 05 Totalizer
4193	0x1061	Analog 06 Instantaneous value
4195	0x1063	Analog 06 Totalizer
4209	0x1071	Analog 07 Instantaneous value
4211	0x1073	Analog 07 Totalizer
4225	0x1081	Analog 08 Instantaneous value
4227	0x1083	Analog 08 Totalizer
4241	0x1091	Analog 09 Instantaneous value
4243	0x1093	Analog 09 Totalizer
4257	0x10A1	Analog 10 Instantaneous value
4259	0x10A3	Analog 10 Totalizer
4273	0x10B1	Analog 11 Instantaneous value
4275	0x10B3	Analog 11 Totalizer
4289	0x10C1	Analog 12 Instantaneous value
4291	0x10C3	Analog 12 Totalizer
4305	0x10D1	Analog 13 Instantaneous value
4307	0x10D3	Analog 13 Totalizer
4321	0x10E1	Analog 14 Instantaneous value
4323	0x10E3	Analog 14 Totalizer
4337	0x10F1	Analog 15 Instantaneous value
4339	0x 10F3	Analog 15 Totalizer
4353	0x1101	Analog 16 Instantaneous value
4355	0x1103	Analog 16 Totalizer
4369	0x1111	Analog 17 Instantaneous value
4371	0x1113	Analog 17 Totalizer
4385	0x1121	Analog 18 Instantaneous value
4387	0x1123	Analog 18 Totalizer
4401	0x1131	Analog 19 Instantaneous value
4403	0x1133	Analog 19 Totalizer
4417	0x1141	Analog 20 Instantaneous value
4419	0x1143	Analog 20 Totalizer
4433	0x1151	Analog 21 Instantaneous value
4435	0x1153	Analog 21 Totalizer
4449	0x1161	Analog 22 Instantaneous value
4451	0x1163	Analog 22 Totalizer
4465	0x1171	Analog 23 Instantaneous value
4467	0x1173	Analog 23 Totalizer
4481	0x1181	Analog 24 Instantaneous value
4483	0x1183	Analog 24 Totalizer
4497	0x1191	Analog 25 Instantaneous value

8227	0x2023	Digital 02 Totalizer
8242	0x2032	Digital 03 State
8243	0x2033	Digital 03 Totalizer
8258	0x2042	Digital 04 State
8259	0x2043	Digital 04 Totalizer
8274	0x2052	Digital 05 State
8275	0x2053	Digital 05 Totalizer
8290	0x2062	Digital 06 State
8291	0x2063	Digital 06 Totalizer
8306	0x2072	Digital 07 State
8307	0x2073	Digital 07 Totalizer
8322	0x2082	Digital 08 State
8323	0x2083	Digital 08 Totalizer
8338	0x2092	Digital 09 State
8339	0x2093	Digital 09 Totalizer
8354	0x20A2	Digital 10 State
8355	0x20A3	Digital 10 Totalizer
8370	0x20B2	Digital 11 State
8371	0x20B3	Digital 11 Totalizer
8386	0x20C2	Digital 12 State
8387	0x20C3	Digital 12 Totalizer
8402	0x20D2	Digital 13 State
8403	0x20D3	Digital 13 Totalizer
8418	0x20E2	Digital 14 State
8419	0x20E3	Digital 14 Totalizer
8434	0x20F2	Digital 15 State
8435	0x20F3	Digital 15 Totalizer
8450	0x2102	Digital 16 State
8451	0x2103	Digital 16 Totalizer
8466	0x2112	Digital 17 State
8467	0x2113	Digital 17 Totalizer
8482	0x2122	Digital 18 State
8483	0x2123	Digital 18 Totalizer
8498	0x2132	Digital 19 State
8499	0x2133	Digital 19 Totalizer
8514	0x2142	Digital 20 State
8515	0x2143	Digital 20 Totalizer

12323	0x3023	Math 02 Totalizer
12337	0x3031	Math 03 Process value
12339	0x3033	Math 03 Totalizer
12353	0x3041	Math 04 Process value
12355	0x3043	Math 04 Totalizer
12369	0x3051	Math 05 Process value
12371	0x3053	Math 05 Totalizer
12385	0x3061	Math 06 Process value
12387	0x3063	Math 06 Totalizer
12401	0x3071	Math 07 Process value
12403	0x3073	Math 07 Totalizer
12417	0x3081	Math 08 Process value
12419	0x3083	Math 08 Totalizer
12433	0x3091	Math 09 Process value
12435	0x3093	Math 09 Totalizer
12449	0x30A1	Math 10 Process value
12451	0x30A3	Math 10 Totalizer
12465	0x30B1	Math 11 Process value
12467	0x30B3	Math 11 Totalizer
12481	0x30C1	Math 12 Process value
12483	0x30C3	Math 12 Totalizer

4499	0x1193	Analog 25 Totalizer
4513	0x11A1	Analog 26 Instantaneous value
4515	0x11A3	Analog 26 Totalizer
4529	0x11B1	Analog 27 Instantaneous value
4531	0x11B3	Analog 27 Totalizer
4545	0x11C1	Analog 28 Instantaneous value
4547	0x11C3	Analog 28 Totalizer
4561	0x11D1	Analog 29 Instantaneous value
4563	0x11D3	Analog 29 Totalizer
4577	0x11E1	Analog 30 Instantaneous value
4579	0x11E3	Analog 30 Totalizer
4593	0x11F1	Analog 31 Instantaneous value
4595	0x11F3	Analog 31 Totalizer
4609	0x1201	Analog 32 Instantaneous value
4611	0x1203	Analog 32 Totalizer
4625	0x1211	Analog 33 Instantaneous value
4627	0x1213	Analog 33 Totalizer
4641	0x1221	Analog 34 Instantaneous value
4643	0x1223	Analog 34 Totalizer
4657	0x1231	Analog 35 Instantaneous value
4659	0x1233	Analog 35 Totalizer
4673	0x1241	Analog 36 Instantaneous value
4675	0x1243	Analog 36 Totalizer
4689	0x1251	Analog 37 Instantaneous value
4691	0x1253	Analog 37 Totalizer
4705	0x1261	Analog 38 Instantaneous value
4707	0x1263	Analog 38 Totalizer
4721	0x1271	Analog 39 Instantaneous value
4723	0x1273	Analog 39 Totalizer
4737	0x1281	Analog 40 Instantaneous value
4739	0x1283	Analog 40 Totalizer

4.3.2.8 Config Output picklist

Dec	Hex	Value
0	0x0000	Off
4113	0x1011	Analog 01 Instantaneous value
4129	0x1021	Analog 02 Instantaneous value
4145	0x1031	Analog 03 Instantaneous value
4161	0x1041	Analog 04 Instantaneous value
4177	0x1051	Analog 05 Instantaneous value
4193	0x1061	Analog 06 Instantaneous value
4209	0x1071	Analog 07 Instantaneous value
4225	0x1081	Analog 08 Instantaneous value
4241	0x1091	Analog 09 Instantaneous value
4257	0x10A1	Analog 10 Instantaneous value
4273	0x10B1	Analog 11 Instantaneous value
4289	0x10C1	Analog 12 Instantaneous value
4305	0x10D1	Analog 13 Instantaneous value
4321	0x10E1	Analog 14 Instantaneous value
4337	0x10F1	Analog 15 Instantaneous value
4353	0x1101	Analog 16 Instantaneous value
4369	0x1111	Analog 17 Instantaneous value
4385	0x1121	Analog 18 Instantaneous value
4401	0x1131	Analog 19 Instantaneous value
4417	0x1141	Analog 20 Instantaneous value
4433	0x1151	Analog 21 Instantaneous value
4449	0x1161	Analog 22 Instantaneous value
4465	0x1171	Analog 23 Instantaneous value
4481	0x1181	Analog 24 Instantaneous value
4497	0x1191	Analog 25 Instantaneous value
4513	0x11A1	Analog 26 Instantaneous value
4529	0x11B1	Analog 27 Instantaneous value
4545	0x11C1	Analog 28 Instantaneous value
4561	0x11D1	Analog 29 Instantaneous value
4577	0x11E1	Analog 30 Instantaneous value
4593	0x11F1	Analog 31 Instantaneous value
4609	0x1201	Analog 32 Instantaneous value
4625	0x1211	Analog 33 Instantaneous value
4641	0x1221	Analog 34 Instantaneous value
4657	0x1231	Analog 35 Instantaneous value
4673	0x1241	Analog 36 Instantaneous value
4689	0x1251	Analog 37 Instantaneous value
4705	0x1261	Analog 38 Instantaneous value
4721	0x1271	Analog 39 Instantaneous value
4737	0x1281	Analog 40 Instantaneous value

Dec	Hex	Value
8210	0x2012	Digital 01 State
8226	0x2022	Digital 02 State
8242	0x2032	Digital 03 State
8258	0x2042	Digital 04 State
8274	0x2052	Digital 05 State
8290	0x2062	Digital 06 State
8306	0x2072	Digital 07 State
8322	0x2082	Digital 08 State
8338	0x2092	Digital 09 State
8354	0x20A2	Digital 10 State
8370	0x20B2	Digital 11 State
8386	0x20C2	Digital 12 State
8402	0x20D2	Digital 13 State
8418	0x20E2	Digital 14 State
8434	0x20F2	Digital 15 State
8450	0x2102	Digital 16 State
8466	0x2112	Digital 17 State
8482	0x2122	Digital 18 State
8498	0x2132	Digital 19 State
8514	0x2142	Digital 20 State

4.3.3 Object 0x47, Device Level Ring (DLR)

4.3.3.1 Class Attributes (Instance = 0)

Services: Get_Attributes_All (Attr. 1), Get_Attribute_Single

Attribute	Parameter	R/W	Data type	Info
1	Revision	R	UINT	Revision of object (1)

4.3.3.2 Instance Attributes (Instance = 1)

Services: Get_Attribute_Single, Set_Attribute_Single

Attribute	Parameter	R/W	Data type	Info
1	Network Topology	R	USINT	Topology of the network - 0: "Linear" - 1: "Ring"
2	Network status	R	USINT	Status of the network - 0: "Normal" - 1: "Ring Fault" - 2: "Unexpected Loop Detected" - 3: "Partial Network Fault" - 4: "Rapid Fault/Restore Cycle"
10	Active Supervisor Address	R	Struct of {UDINT, Array of [6x USINT]}	Contains the IP address (IPv4) and/or MAC address of the active ring supervisor UDINT => IP address Array of 6 USINTs => MAC address
12	Capability Flags	R	DWORD	Function range, bit-encoded (=0x81) - Bit0: "Flush_Tables frame” - Bit7: "Announce-based ring node"

4.3.4 Object 0x48, Quality of Service (QoS)

4.3.4.1 Class Attributes (Instance = 0)

Services: Get_Attribute_Single

Attribute	Parameter	R/W	Data type	Info
1	Revision	R	UINT	Revision of object (1)

4.3.4.2 Instance Attributes (Instance = 1)

Services: Get_Attribute_Single, Set_Attribute_Single

Attribute	Parameter	R/W	Data type	Info
1	802.1Q Tag Enable	R/W	USINT	Switch transmission of 802.1Q frames on/off - 0: Switched off (default) - 1: Switched on
4	DSCP Urgent	R/W	USINT	Priority for processing CIP Transport Class1 Messages with "Urgent" priority level Default: 55
5	DSCP Scheduled	R/W	USINT	Priority for processing CIP Transport Class1 Messages with "Scheduled" priority level Default: 47
6	DSCP High	R/W	USINT	Priority for processing CIP Transport Class1 Messages with "High" priority level

				Default: 43
7	DSCP Low	R/W	USINT	Priority for processing CIP Transport Class1 Messages with "Low" priority level Default: 31
8	DSCP Explicit	R/W	USINT	Priority for processing CIP UCMM and CIP Transport Class 3 Messages Default: 27

4.3.5 Object 0xF5, TCP/IP Interface

4.3.5.1 Class Attributes (Instance = 0)

Services: Get_Attribute_All (Attr. 1), Get_Attribute_Single

Attribute	Parameter	R/W	Data type	Info
1	Revision	R	UINT	Revision of object (4)

4.3.5.2 Instance Attributes (Instance = 1)

Services: Get_Attribute_All (Attr. 1-13), Get_Attribute_Single, Set_Attribute_Single

Attribute	Parameter	R/W	Data type	Info
1	Status	R	DWORD	Interface status, bit-encoded - Bit0-3: Interface Configuration Status 0 = Not configured 1 = Valid IP configuration via DHCP or static 2 = IP configuration via hardware (e.g. Dip switch) - Bit4: Mcast pending 0 = No changes 1 = Attribute 8 (TTL Value) and/or Attribute 9 (MCast Config) changed - Bit5: Not used (0) - Bit6: AcdStatus 0 = No IP address conflict 1 = IP address conflict detected - Bit7: AcdFault 0 = No IP address conflict 1 = IP address conflict detected; the IP configuration cannot be used due to this conflict - Bit8-31: Not used (0)
2	Configuration Capability	R	DWORD	Configuration options, bit-encoded (0x94) - Bit0: BOOTP client not supported (0) - Bit1: DNS client not supported (0) - Bit2: DHCP client supported (1) - Bit3: DHCP-DNS update not supported (0) - Bit4: Communication settings modifiable via the network (1) - Bit5: Configuration via hardware not supported (0) - Bit6: Changes to interface configuration have direct effect (0) - Bit7: ACD supported (1) - Bit8-31: Not used (0)
3	Configuration Control	R/W	DWORD	Specifies from where the configuration should be retrieved

				- Bit0-3: Configuration method (0 = static IP configuration, 2= IP configuration from DHCP server) - Bit4: Switch on DNS (not supported, always 0) - Bit5-31: Not used (0)
4	Physical Link Object	R	Struct of {UINT, Padded EPATH}	Path to Ethernet Link Object 0xF6, Instance 3: {UINT, => Length of path (2) Padded EPATH} => path information (0x20 0xF6 0x24 0x03)
5	Interface Configuration	R/W	Struct of {UDINT, UDINT, UDINT, UDINT, UDINT, STRING}	IP configuration {UDINT, => IP address UDINT, => Subnetmask UDINT, => Default gateway UDINT, => Primary DNS UDINT, => Secondary DNS STRING} => Default domain
6	Host Name	R/W	STRING	Host name of module
7	Not used			
8	TTL Value	R/W	USINT	Time-to-Live (TTL) value which is used for EtherNet/IP multicast packets (default 1)
9	Mcast Config	R/W	Struct of {USINT, USINT, UINT, UDINT}	Configuration of IP Multicast addresses {USINT, => Alloc Control: method of IP address generation: - 0: Default algorithm (default) - 1: Generation using data from NumMcast and McastStartAddr) USINT, => May not be changed (0) UINT, => NumMcast: number of multicast addresses to be generated UDINT} => Start address with which the multicast addresses should be generated.
10	SelectACD	R/W	BOOL	Switch Address Conflict Detection (ACD) on/off - 0 = Switched off - 1 = Switched on (default)
11	LastConflictDetected	R/W	Struct of {USINT, Array of [6x USINT], Array of [28x USINT]}	ACD diagnostic parameter that contains the information on the last address conflict detected {USINT, =>ACD status at the time of the last address conflict detected Array of [6xUSINT], => MAC address of the network node indicated in ARP PDU in which an address conflict has been detected Array of [28xUSINT]} => Copy of the ARP PDU in which an address conflict has been detected
12	EtherNet/IP QuickConnect	R/W	BOOL	EtherNet/IP QuickConnect not used (0)
13	Encapsulation Inactivity Timeout	R/W	UINT	Waiting time in seconds until a TCP connection is closed due to inactivity. - 0 = Switched off, connection is not closed automatically - 1-3600 = Connection is closed after 1-3600 seconds (default 120)

4.3.6 Object 0xF6, Ethernet Link Object

4.3.6.1 Class Attributes (Instance = 0)

Services: Get_Attribute_All (Attr. 1), Get_Attribute_Single

Attribute	Parameter	R/W	Data type	Info
1	Revision	R	UINT	Revision of object (3)
2	Max Instance	R	UINT	Highest instance number (3)
3	NumberOfInstances	R	UINT	Number of instances (3)

4.3.6.2 Instance Attributes (Instance = 1..3)

Services: Get_Attribute_All (Attr. 1-13), Get_Attribute_Single, Set_Attribute_Single

Attribute	Parameter	R/W	Data type	Info
1	Interface Speed	R	UDINT	Current transmission speed (10 or 100)
2	Interface Flags	R	DWORD	- Bit0: Link status 0 = Inactive; 1 = Active - Bit1: Half/full duplex 0 = Half duplex; 1 = Full duplex - Bit2-4: Negotiation status 0 = Performing auto-negotiation 1 = Auto-negotiation and detection of transmission speed failed 2 = Auto-negotiation failed but transmission speed detected 3 = Auto-negotiation performed successfully 4 = Auto-negotiation switched off; settings used from attribute 6 - Bit5: Manual settings required 0 = Interface can use changes to parameters at run time 1 = Restart is required to use changes to parameters - Bit7-31: Not used (ignored)
3	Physical Address	R	Array of [6x USINTS]	MAC address
4	Interface Counters	R	Struct of {UDINT, UDINT, UDINT, UDINT, UDINT, UDINT, UDINT, UDINT, UDINT, UDINT, UDINT}	Interface-specific counters for: {UDINT, => In Octets: octets received UDINT, => In Ucast Packets: unicast packets received UDINT, => In NUcast Packets: non-unicast packets received UDINT, => In Discards: incoming packets that have been discarded UDINT, => In Errors: incoming packets that contained errors (excluding In Discards) UDINT, => In Unknown Protos: incoming packets with an unknown protocol UDINT, => Out Octets: octets sent UDINT, => Out Ucast Packets: unicast packets sent UDINT, => Out NUcast Packets: non-unicast packets sent UDINT, => Out Discards: outgoing packets that have been discarded UDINT} => Out Errors: outgoing packets that contained errors (excluding Out Discards)

5	Media Counters	R	Struct of {UDINT, UDINT, UDINT, UDINT, UDINT, UDINT, UDINT, UDINT, UDINT, UDINT, UDINT}	Transmission-specific counters for: {UDINT, => Alignment Error: frames received with incorrect octet lengths UDINT, => FCS Error: frames received with checksum errors UDINT, => Single Collisions: frames that were sent successfully but caused a single collision UDINT, => Multiple Collisions: frames that were sent successfully but caused multiple collisions UDINT, => SQE Test Errors: 0, as not supported UDINT, => Deferred Transmissions: UDINT, => Late Collisions UDINT, => Excessive Collisions UDINT, => MAC Transmit Errors UDINT, => Carrier Sense Errors UDINT, => Frame Too Long UDINT} => MAC Receive Errors
6	Interface Control	R/W	Struct of {WORD, UINT}	Interface control: {WORD, => Control Bits: - Bit0: Auto negotiation 0 = Disabled; 1 = Enabled - Bit1: Force Duplex Mode 0 = Half duplex; 1 = Full duplex - Bit2-15: Not used (0) UINT} => Forced Interface Speed: 10 or 100 Mbit/s
7	Interface Type	R	USINT	Interface type: - Instance #1: Twisted-pair (2) - Instance #2: Twisted-pair (2) - Instance #3: Internal Interface (1)
8	Interface State	R	USINT	State of the interface - 0 = Unknown state; - 1 = Enabled; - 2 = Disabled; - 3 = Testing
9	Admin State	R/W	USINT	- 1 = Enabled or enable - 2 = Disabled or disabled
10	Interface Label	R	SHORT_STING	Name of interface - Instance #1: "Port 1" - Instance #2: "Port 2" - Instance #3: "Internal"

4.3.7 Object 0x315, ENP

4.3.7.1 Class Attributes (Instance = 0)

Services: Get_Attributes_All (Attr. 1-3), Get_Attribute_Single

Attribute	Parameter	R/W	Data type	Info
1	Revision	R	INT	Revision of object (1)
2	MaxInstance	R	INT	Highest instance number (1)
3	NumberOfInstances	R	INT	Number of instances (1)

4.3.7.2 Instance Attributes (Instance = 1)

Services: Get_Attributes_All (Attr. 1-5), Get_Attribute_Single, Set_Attribute_Single

Attribute	Parameter	R/W	Data type	Info
1	Firmware version	R	STRING[16]	Firmware version of device (e.g. "2.01.00”)
2	Ordercode	R	STRING[32]	Order code
3	Serialnumber	R	STRING[16]	Serial number
4	DeviceTag	R/W	STRING[32]	Device name
5	ENPVersion	R	STRING[16]	ENP version (e.g. "2.00.00")

4.3.8 Object 0x323, Limits

4.3.8.1 Class Attributes (Instance = 0)

Services: Get_Attributes_All (Attr. 1-3), Get_Attribute_Single, Set_Attribute_Single

Attribute	Parameter	R/W	Data type	Info
1	Revision	R	INT	Revision of object (1)
2	MaxInstance	R	INT	Highest instance number (1)
3	NumberOfInstances	R	INT	Number of instances (1)
10	Limits Handling	R/W	SINT	State chart 0 = Read only / Cancel changes 1 = Write access granted. Limit changes possible. 2 = Saving all limit changes. Write access not allowed.
11	Limits Changing Reason	R/W	STRING[30]	Reason for change
12	Limits Status	R	SINT	Diagnostics 0 = OK 1 = Bad limit number 2 = Data missing 3 = Limit not active 4 = Value outside the permitted range 5 = Function currently not possible 6 = Failure

4.3.8.2 Instance Attributes (Instance = 1..60)

Services: Get_Attributes_All (Attr. 1-6) , Get_Attribute_Single, Set_Attribute_Single

Attribute	Parameter	R/W	Data type	Info
1	Mode	R	SINT	Limit value mode
2	Value	R/W	REAL	Limit value or dy for gradient
3	Value 2	R/W	REAL	2nd limit value (inband, outband) or dt[s] for gradient
4	Delay	R/W	DINT	Time delay
5	Identifier	R	STRING[16]	Description of limit value
6	Unit	R	STRING[6]	Unit

4.3.9 Object 0x324, Batch

4.3.9.1 Class Attributes (Instance = 0)

Only available with the batch option.
Services: Get_Attributes_All (Attr. 1-3), Get_Attribute_Single

Attribute	Parameter	R/W	Data type	Info
1	Revision	R	INT	Revision of object (1)
2	MaxInstance	R	INT	Highest instance number (1)
3	NumberOfInstances	R	INT	Number of instances (1)
10	Batch Com Status	R	SINT	Is reset following a write access in the instance. 0 = OK 1 = Not all the necessary data were transmitted (mandatory entries) 2 = User responsible not logged on 3 = Batch running 4 = Batch already running 5 = Batch controlled via control input 6 = Automatic batch no active 7 = Error, text contains characters that cannot be displayed, text too long, incorrect batch number Function number out of range
11	Batch Number Behavior	R	SINT	0 = Manual 1 = Increases automatically
12	Batch Required Inputs	R	SINT	.0 = 1 Input of batch designation required .1 = 1 Input of batch name required .2 = 1 Input of batch number required .3 = 1 Input of preset counter required

4.3.9.2 Instance Attributes (Instance = 1..4)

Only available with the batch option.
The instance corresponds to the number of the batch.

Services: Get_Attributes_All (Attr. 1-6, 9) , Get_Attribute_Single, Set_Attribute_Single

Attribute	Parameter	R/W	Data type	Info
1	Batch x Start/Stop	R/W	SINT	1 = Stop, 2 = Start
2	Batch x Description	R	STRING[16]	Description of batch
3	Batch x Identifier	R/W	STRING[30]	Identifier of batch
4	Batch x Name	R/W	STRING[30]	Name of batch
5	Batch x Number	R/W	STRING[30]	Number of batch
6	Batch x Preset Counter	R/W	STRING[8]	Preset counter of batch
9	Batch x Status	R	SINT	0 = Not available, 1 = Not Running, 2 = Running

Attributes 2-6 must only be written if indicated in Instance 0, Attribute 12.

4.3.10 Object 0x325, Application

4.3.10.1 Class Attributes (Instance = 0)

Relay can only be controlled with tele-alarm option.
Services: Get_Attribute_Single, Set_Attribute_Single

Attribute	Parameter	R/W	Data type	Info
10	Message	R/W	STRING[40]	
11	Relay 1	R/W	SINT	0 = Enabled, 1 = Not enabled
12	Relay 2	R/W	SINT	0 = Enabled, 1 = Not enabled
13	Relay 3	R/W	SINT	0 = Enabled, 1 = Not enabled
14	Relay 4	R/W	SINT	0 = Enabled, 1 = Not enabled
15	Relay 5	R/W	SINT	0 = Enabled, 1 = Not enabled
16	Relay 6	R/W	SINT	0 = Enabled, 1 = Not enabled
17	Relay 7	R/W	SINT	0 = Enabled, 1 = Not enabled
18	Relay 8	R/W	SINT	0 = Enabled, 1 = Not enabled
19	Relay 9	R/W	SINT	0 = Enabled, 1 = Not enabled
20	Relay 10	R/W	SINT	0 = Enabled, 1 = Not enabled
21	Relay 11	R/W	SINT	0 = Enabled, 1 = Not enabled
22	Relay 12	R/W	SINT	0 = Enabled, 1 = Not enabled
29	RelaysStates	R	INT	.0 = 1 Relay 1 enabled .1 = 1 Relay 2 enabled .2 = 1 Relay 3 enabled .3 = 1 Relay 4 enabled .4 = 1 Relay 5 enabled .5 = 1 Relay 6 enabled .6 = 1 Relay 7 enabled .7 = 1 Relay 8 enabled .8 = 1 Relay 9 enabled .9 = 1 Relay 10 enabled .10 = 1 Relay 11 enabled .11 = 1 Relay 12 enabled
30	IsRelayRemote	R	INT	.0 = 1 Relay 1 is controllable .1 = 1 Relay 2 is controllable .2 = 1 Relay 3 is controllable .3 = 1 Relay 4 is controllable .4 = 1 Relay 5 is controllable

				.5 = 1 Relay 6 is controllable .6 = 1 Relay 7 is controllable .7 = 1 Relay 8 is controllable .8 = 1 Relay 9 is controllable .9 = 1 Relay 10 is controllable .10 = 1 Relay 11 is controllable .11 = 1 Relay 12 is controllable .15 = 1 Relay 7 to 12 are available

4.3.11 Object 0x326, Input Info

4.3.11.1 Class Attributes (Instance = 0)

Information about the Input Assembly can be retrieved here.
Services: Get_Attributes_All (Attr. 1-3) , Get_Attribute_Single

Attribute	Parameter	R/W	Data type	Info
1	Revision	R	INT	Revision of the object (1)
2	MaxInstance	R	INT	Highest instance number (48)
3	NumberOfInstances	R	INT	Number of instances (48)

4.3.11.2 Instance Attributes (Instance = 1..48)

The instance corresponds to the number xx of the corresponding Config Input xx .
Services: Get_Attributes_All (Attr. 1-3) , Get_Attribute_Single

Attribute	Parameter	R/W	Data type	Info
1	Input x Configured	R	SINT	0 = Not configured, 1 = Configured
2	Input x Tag	R	STRING[16]	Channel identifier
3	Input x Unit	R	STRING[6]	Unit of the channel

4.4 Data types used

Data type	Size (bytes)	Value range		Interpretation
		Minimum	Maximum	
BOOL	1	0	1	Binary state (0 = FALSE, 1 = TRUE)
SINT	1	-128	127	Integer
USINT	1	0	255	Integer without sign
INT	2	-32768	32767	Integer
UINT	2	0	65535	Integer without sign
DINT	4	-2^{31}	$2^{31}-1$	Integer
UDINT	4	0	$2^{32}-1$	Integer without sign
REAL	4	1.17549435E-38	3.40282347E+38	Floating point number according to IEEE-754, simple accuracy
SHORT_STRING	1 + n			Byte 0: Length of text Byte 1-(n+1): Text
STRING[n]	2 + n			Byte 0-1: Length of text Byte 2-(n+2): Text Example: STRING[16] => Max. 16 characters Total length: 18 bytes (2 + 16)

See also:
The CIP Networks Library Volume 1: Common Industrial Protocol V1.19, Appendix C-2 Data Type Specification

5 Diagnostics

5.1 Diagnostic information via light emitting diodes

EtherNet/IP specific light emitting diodes are only located on the EtherNet/IP interface installed on the back. The interpretation of the light emitting diodes is described under 1.4 Connections.

5.2 Diagnostic information via EtherNet/IP

5.2.1 Input Assembly diagnostic information (cyclic data)

The following diagnostic information is transmitted in the Input Assembly:

Input Assembly 100	Values	Meaning
DiagnoseCode	0 to 999	Diagnostic number
StatusSignal	0 = Ok 1 = Failure 2 = Function Check 4 = Maintenance required 8 = Out of Specification	No error Failure Function check Maintenance required Process condition is outside specifications
Channel	0 = Device 1 = Analog 1 … 40 = Analog 40 … 41 = Digital 1 … 60 = Digital 20 61 = Math 1 … 72 = Math 12	Channel number

5.2.2 EtherNet/IP specific diagnostics codes

An overview of the diagnostics codes is provided in the standard Operating Instructions. The diagnostics codes that can only appear in conjunction with the EtherNet/IP fieldbus interface are described here.

Code	Message	Corrective measure
F537	EtherNet/IP: IP address conflict found	Change the communication settings set manually or switch to DHCP as the current communication settings are already being used in the network.
F537	EtherNet/IP: IP configuration not adopted or only partially adopted	Check or correct the communication settings set manually because at least one item (IP address, Subnetmask, Gateway, DHCP, etc.) contains incorrect values.

5.3 EtherNet/IP troubleshooting

- Is the Ethernet connection to the device (adapter) OK?
- Does the device (adapter) have a valid IP configuration?
- Is the right EDS file being used?
- Are the IO data configured correctly?
- Are device errors pending?

6 List of abbreviations/glossary of terms

T->O: Target-> Originator => data direction: device (adapter) to EtherNet/IP scanner
O->T: Originator->Target => data direction: EtherNet/IP scanner to device (adapter)
IO: Input/Output
RPI: Requested Packet Interval