Application Note

FESTO

Servo press kit YJKP - Host interface

Host interface of the servo press kit YJKP: YJKP
- Communication possibilities
- Workflow
- Object directory
- Communication protocol
- Communication Mobus TCP
- Communication EtherNet/IP
- Communication TCP/IP
- Communication Profinet IO

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Table of contents

1 Components/Software used

Type/Name	Version Software/Firmware	Date of manufacture
Servo press kit YJKP	general	--
Application software YJKP (GSAY-A4-F0-Z4-1.1.1)	V1.2.1	--
Firmware controller (CECC-X)	V3.4.6	--
Firmware motor controller (CMMP-AS)	V4.0.1501.2.4	--

Table 1.1: 1 Components/Software used

2 Application description

This application note describes how you can communicate with a higher level plc with the servo press kit.
Following descriptions are part of the application note:

- Communication possibilities
- Workflow
- Object directory
- Communication protocol
- Communication Mobus TCP
- Communication EtherNet/IP
- Communication TCP/IP
- Communication Profinet IO

3 Communication possibilities

The standard fieldbus of the servo press kit are:

- TCP/IP
- Modbus TCP
- EtherNet/IP

Other fieldbus can be used over a Anybus X-gateway Modbus-TCP (Gateway is not part of the servo press kit package!):

- CANopen-Slave
- CC-Link-Slave
- ControlNet-Slave
- DeviceNet-Slave
- EtherCAT-Slave
- EtherNet/IP-Slave
- Modbus-RTU-Slave
- Modbus-TCP-Slave
- Profibus-Slave
- Profinet IO Device

4 Workflow

The Figure 4-1: Workflow describes the workflow of the host interface of the servo press kit.

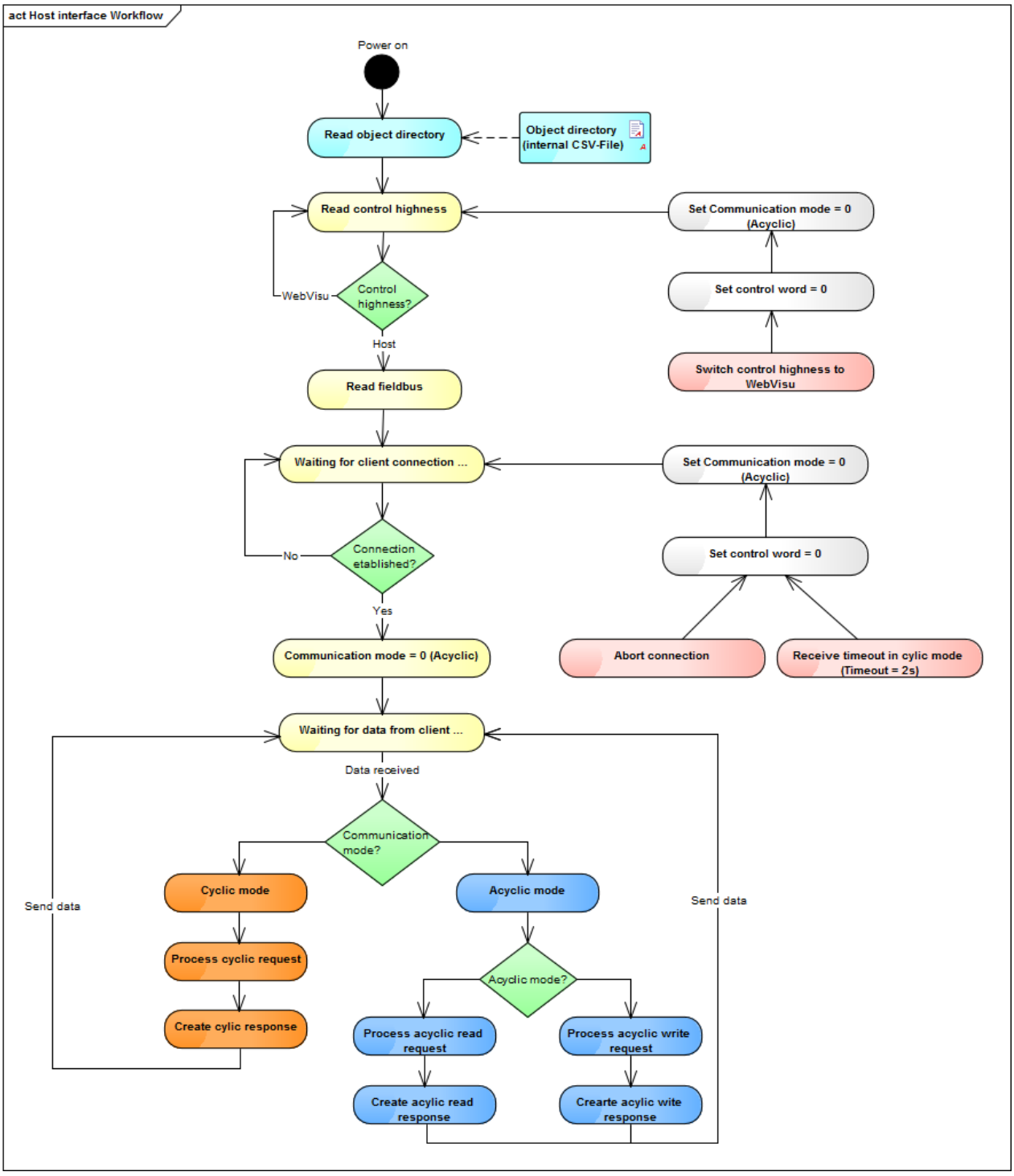


Figure 4-1: Workflow

5 Object directory

The object directory is a list of objects, which describes communication and application parameters. You can see the whole objects of the object directory in the appendix 0. The object directory describes the whole functionality of the system. A CSV-File which is stored internally represents the object directory. This file contains all objects needed to control the system or get the status of the system.

5.1 Object description

A object is a data structure which includes all properties of a parameter. Afterwards all structure elements will be described.

5.1.1 Identifier

Is a description of a object as string.

5.1.2 Index

The index in connection with the sub index is a unique identification number for a object.

5.1.3 Sub Index

For standard objects the sub index is 0. Objects with a structure and more elements are separated through the sub index, but are part of the structure through the same index.

5.1.4 Value

Actual value of the object.

5.1.5 Data type

The data type describes how the byte order for the object must be interpreted.

Index	Type	Bytes	Description	Range of values
0x00	--	--	Unbekannter Datentyp	--
0x01	BOOL	1	8 bit boolean	0 (FALSE) ... 1 (TRUE)
0x02	SINT	1	8 bit signed short integer	-128 ...127
0x03	USINT	1	8 bit unsigned short integer	0 ... 255
0x04	INT	2	16 bit signed integer	-32768 ... 32767
0x05	UINT	2	16 bit unsigned integer	0 ... 65535
0x06	DINT	4	32 bit signed long integer	-2147483648 ... 2147483647
0x07	UDINT	4	32 bit unsigned long integer	0 ... 4294967295
0x08	BYTE	1	8 bit unsigned short integer	0 ... 255
0x09	WORD	2	16 bit unsigned integer	0 ... 65535
0x0A	DWORD	4	32 bit unsigned long integer	0 ... 4294967295
0x0B	REAL	4	32 bit float	1.400e-45 ... 3.403e+38

Table 5-1: Data types

5.1.6 Data size

Size of the object in order to the data type.

5.1.7 Access type

Defines how the object can be accessed:

- RO: read only
- WO: write only
- RW: readable and writeable

6 Communication protocol

The basic functionality between the control device and the servo press kit is the client server principle. The servo press kit is the server and shares all his supported functions. The control device is the client and can use all shared functions after established connection. The communication with the servo press kit performs on basic of the request response principle. That means after established connection the servo press kit is waiting for a request from the client and sends after receiving the request the response to the client.

There are two ways to access to a object within the object directory:

- Acyclic data exchange
- Cyclic data exchange

6.1 Acyclic data exchange

- Acyclic access to an object can be performed only in the acyclic mode (value = 0) of the object “communication mode” (index = 0x2002).
- Depending on the access type property of the specified object, read access, write access or both can be done.

6.1.1 Data types

Index	Type	Bytes	Description	Range of values
0x00	--	--	Unbekannter Datentyp	--
0x01	BOOL	1	8 bit boolean	0 (FALSE) ... 1 (TRUE)
0x02	SINT	1	8 bit signed short integer	-128 ...127
0x03	USINT	1	8 bit unsigned short integer	0 ... 255
0x04	INT	2	16 bit signed integer	-32768 ... 32767
0x05	UINT	2	16 bit unsigned integer	0 ... 65535
0x06	DINT	4	32 bit signed long integer	-2147483648 ... 2147483647
0x07	UDINT	4	32 bit unsigned long integer	0 ... 4294967295
0x08	BYTE	1	8 bit unsigned short integer	0 ... 255
0x09	WORD	2	16 bit unsigned integer	0 ... 65535
0x0A	DWORD	4	32 bit unsigned long integer	0 ... 4294967295
0x0B	REAL	4	32 bit float	1.400e-45 ... 3.403e+38

Table 6-1: Data types

6.1.2 Acyclic read request

In order to read an object from the object directory following telegram should be sent by the client:
Acyclic read request (Client => Server) => 18 Byte

Data byte	Function	Data type	Data size	Description
1	Service ID	BYTE	1	**0x10 = Read object acyclic**
2-5	Message ID	UDINT	4	Free usable message ID of the application. Can be set from the client, in the related answer the same message ID will be send to the client. A unique assignment of the request and response is possible. TCP/IP: Can be set to zero in this request. (Handshake: Automatically) Modbus TCP: Toogle or count for handshake (Handshake: Manual) EtherNet/IP: Toogle or count for handshake (Handshake: Manual)
6-9	Data length	UDINT	4	Must be 0x04 at this request. (Object index, Sub index, Reserved) (Data length without header)
10	Acknowledge	BYTE	1	Can be set to 0x00 in this request.
11-14	Read type	UDINT	4	**Read object with one sub index (0x00):** always zero => read object value **Read object with more sub index (e.g. 0x00-0x02) and read sub index is 0x00:** 0 = read number of objects 1 = read all values of all objects **Read object with more sub index (e.g. 0x00-0x02) and read sub index is unequal 0x00:** always zero => read object value
15-16	Index	UINT	2	Index of the object to be read.
17	Sub index	USINT	1	Sub index of the object to be read.
18	Reserved	USINT	1	Can be set to 0x00 in this request.

Table 6-2: Telegram acyclic read request

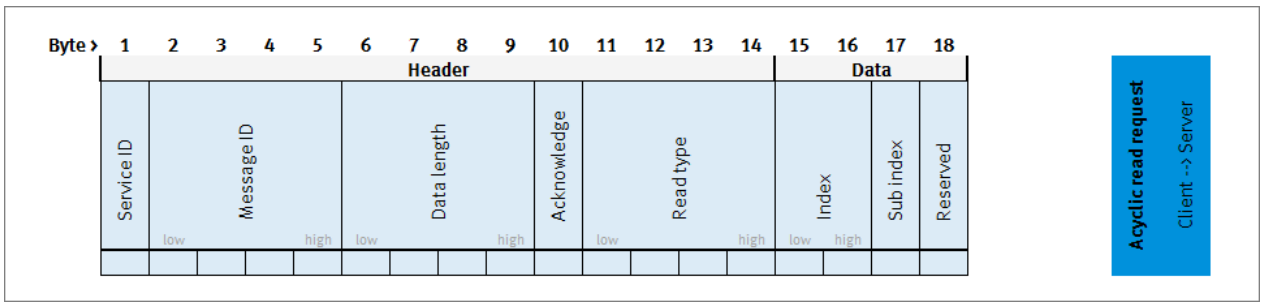


Figure 6-1: Telegram acyclic read request

6.1.3 Acyclic read response

Acyclic read response (Server => Client) => max. 94 Byte

Data byte	Function	Data type	Data size	Description
1	Service ID	BYTE	1	Service ID related to the request sent by the client.
2-5	Message ID	UDINT	4	Message ID related to the request sent by the client.
6-9	Data length	UDINT	4	0x04 (Object index, Sub index, Data type)+ data length of the Object to be read. (Data length without header) e.g. for reading an UINT (2 Bytes) object, 4+2 = 0x06 will be sent.
10	Acknowledge	BYTE	1	0x00 if the access was OK or value unequal 0x00 if not. See Table 6-6: Acknowledge description.
11-14	Read type	UDINT	4	Read type related to the request sent by the client.
15-16	Index	UINT	2	Index of the object to be read.
17	Sub index	USINT	1	Sub Index of the object to be read.
18	Data type	USINT	1	Data type of the object to be read.
19	Data byte 1	BYTE	1	LSB (last significant byte) of the read value
19 + n	Data byte n	BYTE	1	MSB (Most significant byte) of the read value

Table 6-3: Telegram acyclic read response

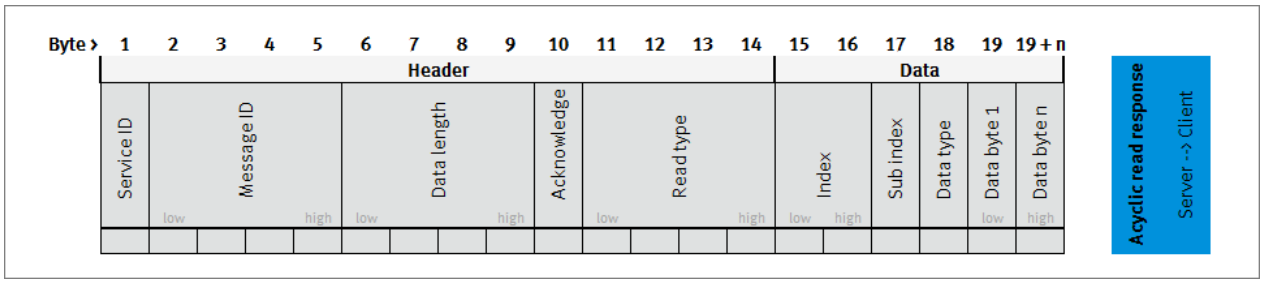


Figure 6-2: Telegram acyclic read response

6.1.4 Acyclic write request

In order to write an object from the object directory following telegram should be sent by the client:

Acyclic write request (Client => Server) => max. 94 Byte

Data byte	Function	Data type	Data size	Description
1	Service ID	BYTE	1	**0x11 = Write object acyclic**
2-5	Message ID	UDINT	4	Free usable message ID of the application. Can be set from the client, in the related answer the same message ID will be send to the client. A unique assignment of the request and response is possible. TCP/IP: Can be set to zero in this request. (Handshake: Automatically) Modbus TCP: Toogle or count for handshake (Handshake: Manual) EtherNet/IP: Toogle or count for handshake (Handshake: Manual)
6-9	Data length	UDINT	4	0x04 (Object index, Sub index, Data type)+ data length of the Object to be written. (Data length without header) e.g. for writing an UINT (2 Bytes) object, 4+2 = 0x06 will be sent.
10	Acknowledge	BYTE	1	Can be set to 0x00 in this request.
11-14	Write type	UDINT	4	**Write object with one sub index (0x00):** always zero => write object value **Write object with more sub index (e.g. 0x00-0x02) and read sub index is 0x00:** always zero => write all values of all objects **Write object with more sub index (e.g. 0x00-0x02) and read sub index is unequal 0x00:** always zero => write object value
15-16	Index	UINT	2	Index of the object to be written.
17	Sub index	USINT	1	Sub Index of the object to be written.
18	Data type	USINT	1	Data type of the object to be written.
19	Data byte 1	BYTE	1	LSB (last significant byte) of the written value
19 + n	Data byte n	BYTE	1	MSB (Most significant byte) of the written value

Table 6-4: Telegram acyclic write request

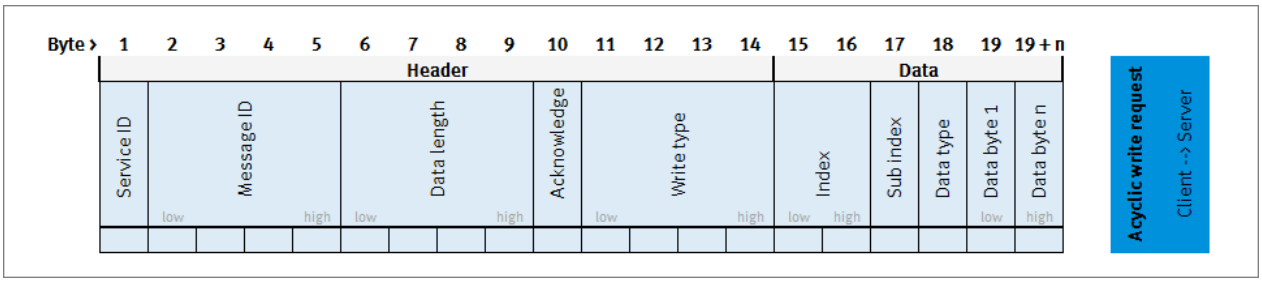


Figure 6-3: Telegram acyclic write request

6.1.5 Acyclic write response

Acyclic write response (Server => Client) => 18 Byte

Data byte	Function	Data type	Data size	Description
1	Service ID	BYTE	1	Service ID related to the request sent by the client.
2-5	Message ID	UDINT	4	Message ID related to the request sent by the client.
6-9	Data length	UDINT	4	Must be 0x04 at this response. (Object index, Sub index, Data type) (Data length without header)
10	Acknowledge	BYTE	1	0x00 if the access was OK or value unequal 0x00 if not. See Table 6-6: Acknowledge description.
11-14	Write type	UDINT	4	Write type related to the request sent by the client.
15-16	Index	UINT	2	Index of the object to be written.
17	Sub index	USINT	1	Sub Index of the object to be written.
18	Data type	USINT	1	Data type of the object to be written.

Table 6-5: Telegram acyclic write response

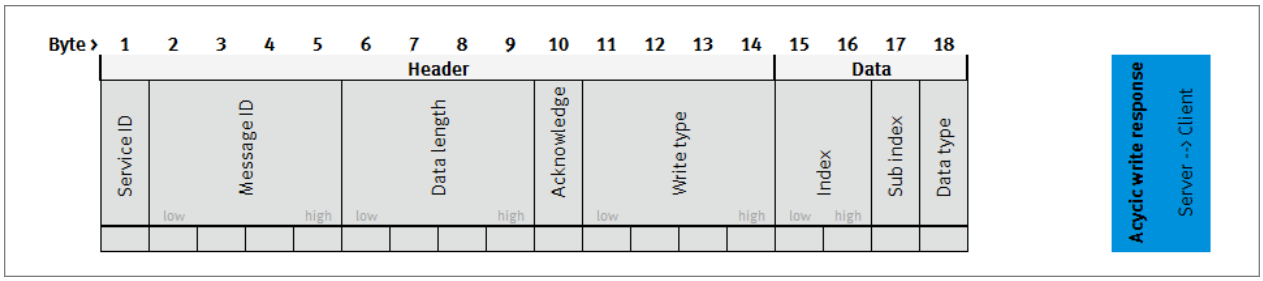


Figure 6-4: Telegram acyclic write response

6.1.6 Acknowledge-Beschreibung

Ack	Description	Recovery
0x00	OK	--
0x01	Service is not supported	Check service ID in the request data
0x02	Data length invalid	Check data length in the request data
0x03	Object index invalid	Check index and sub index of the object in the request data
0x04	Access type invalid	Check access type of the object in the request data
0x05	Data type invalid	Check data type of the object in the request data
0x06	Value invalid	Check range of values of the object in the request data
0x07	Read type invalid	Check read type in the request data
0x08	Write type invalid	Check write type in the request data
0x09	Values invalid	Check range of values of the object in the request data

Table 6-6: Acknowledge description

6.2 Cyclic data exchange

- Cyclic access to an object can be performed only in the cyclic mode (value =1) of the object “communication mode” (index = 0x2002).
- The server is expecting an cyclic request from the client. After receiving this frame the data received will be processed and an cyclic response will be sent to the client.

6.2.1 Cyclic request

In order to write the corresponding objects of the cyclic request the object directory following telegram should be sent by the client:

Cyclic request (Client => Server) => 26 Byte

Data byte	Function	Data type	Data size	Description
1	Service ID	BYTE	1	**0x12 = Write/Read objects cyclic**
2-3	Data length	UINT	2	Must be 0x15 at this request. (Data length without header)
4	Acknowledge	BYTE	1	Can be set to 0x00 in this request.
5	Message ID	BYTE	1	Free usable message ID of the application. Can be set from the client, in the related answer the same message ID will be send to the client. A unique assignment of the request and response is possible. TCP/IP: Can be set to zero in this request. (Handshake: Automatically) Modbus TCP: Toogle or count for handshake (Handshake: Manual) EtherNet/IP: Toogle or count for handshake (Handshake: Manual)
6-9	Control word (CW)	DWORD	4	Bit 0 = Manual mode Bit 1 = Automatic mode Bit 2 = Start homing Bit 3 = Start press process Bit 4 = Abort press process (low active) Bit 5 = Load program Bit 6 = Quit error Bit 7 = Enable press Bit 8 = Tare Bit 9 = Move Bit 10 = Stop move Bit 11 = Jog pos Bit 12 = Jog neg Bit 13 = Load hardware configuration Bit 14 = Logging USB Bit 15 = Logging SD-Card Bit 16 = System reset Bit 17 = Reset statistic Bit 18 = Step mode Bit 19-31 = Reserved
10	Communication mode	BYTE	1	0x00 = Acyclic communication 0x01 = Cyclic communication

Data byte	Function	Data type	Data size	Description
11-14	Offset force sensor	DINT	4	Unit [N] (2 decimal places) (multiplied by 100 ǀ 0.01 = 100)
15	Motion mode	BYTE	1	0x00 = Jog 0x01 = Move absolute 0x02 = Move relative
16-19	Motion velocity	DINT	4	Unit [mm/s] (2 decimal places) (multiplied by 100 ǀ 0.01 = 100)
20-23	Motion position/distance	DINT	4	Unit [mm] (2 decimal places) (multiplied by 100 ǀ 0.01 = 100)
24-25	Program selection	UINT	2	
26	Digital inputs	BYTE	1	Bit 0 = Input 1 Bit 1 = Input 2 Bit 2 = Input 3 Bit 3 = Input 4 Bit 4 = Input 5 Bit 5 = Input 6 Bit 6 = Input 7 Bit 7 = Input 8

Figure 6-5: Telegram cyclic request

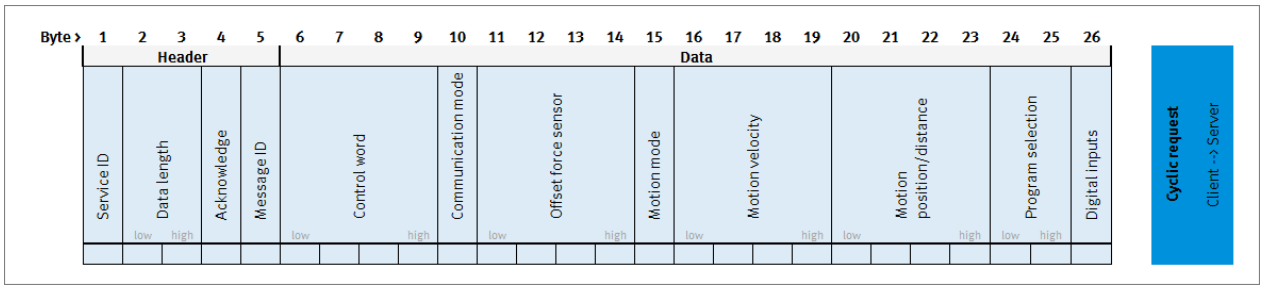


Figure 6-6: Telegram cyclic request

6.2.2 Cyclic response

Cyclic response (Server => Client) => 48 Byte

Data byte	Function	Data type	Data size	Description
1	Service ID	BYTE	1	Service ID related to the request sent by the client.
2-3	Data length	UINT	2	Must be 0x2B at this response. (Data length without header)
4	Acknowledge	BYTE	1	0x00 if the access was OK or value unequal 0x00 if not. See Table 6-6: Acknowledge description.
5	Message ID	BYTE	1	Message ID related to the request sent by the client.
6-9	Status word (SW)	DWORD	4	Bit 0 = Manual mode Bit 1 = Automatic mode Bit 2 = Homing required Bit 3 = Program loaded Bit 4 = Step mode Bit 5 = In operation Bit 6 = Step done Bit 7 = OK Bit 8 = NOK Bit 9 = Press enabled Bit 10 = Tared Bit 11 = Status ready Bit 12 = Status servo press ready Bit 13 = Status error Bit 14 = Status warning Bit 15 = Status safety Bit 16 = Status hardware configuration Bit 17 = Status logging USB Bit 18 = Status logging SD-Card Bit 19-31 = Reserved
10	Communication mode	BYTE	1	0x00 = Acyclic communication 0x01 = Cyclic communication
11-14	Offset force sensor	DINT	4	Unit [mm] (2 decimal places) (multiplied by 100 ǀ 0.01 = 100)
15	Motion mode	BYTE	1	0x00 = Jog 0x01 = Move absolute 0x02 = Move relative
16-19	Motion velocity	DINT	4	Unit [mm/s] (2 decimal places) (multiplied by 100 ǀ 0.01 = 100)
20-23	Motion position/distance	DINT	4	Unit [mm] (2 decimal places) (multiplied by 100 ǀ 0.01 = 100)
24-25	Loaded program	UINT	2	

Data byte	Function	Data type	Data size	Description
26	Digital outputs	BYTE	1	Bit 0 = Output 1 Bit 1 = Output 2 Bit 2 = Output 3 Bit 3 = Output 4 Bit 4 = Output 5 Bit 5 = Output 6 Bit 6 = Output 7 Bit 7 = Output 8
27-30	Actual position	DINT	4	Unit [mm] (2 decimal places) (multiplied by 100 I 0.01 = 100)
31-34	Actual force	DINT	4	Unit [N] (2 decimal places) (multiplied by 100 I 0.01 = 100)
35-38	Actual velocity	DINT	4	Unit [mm/s] (2 decimal places) (multiplied by 100 I 0.01 = 100)
39-42	Maximum position	DINT	4	Unit [mm] (2 decimal places) (multiplied by 100 I 0.01 = 100)
43-46	Maximum force	DINT	4	Unit [N] (2 decimal places) (multiplied by 100 I 0.01 = 100)
47-48	NOK reason	WORD	2	

Figure 6-7: Telegram cyclic response

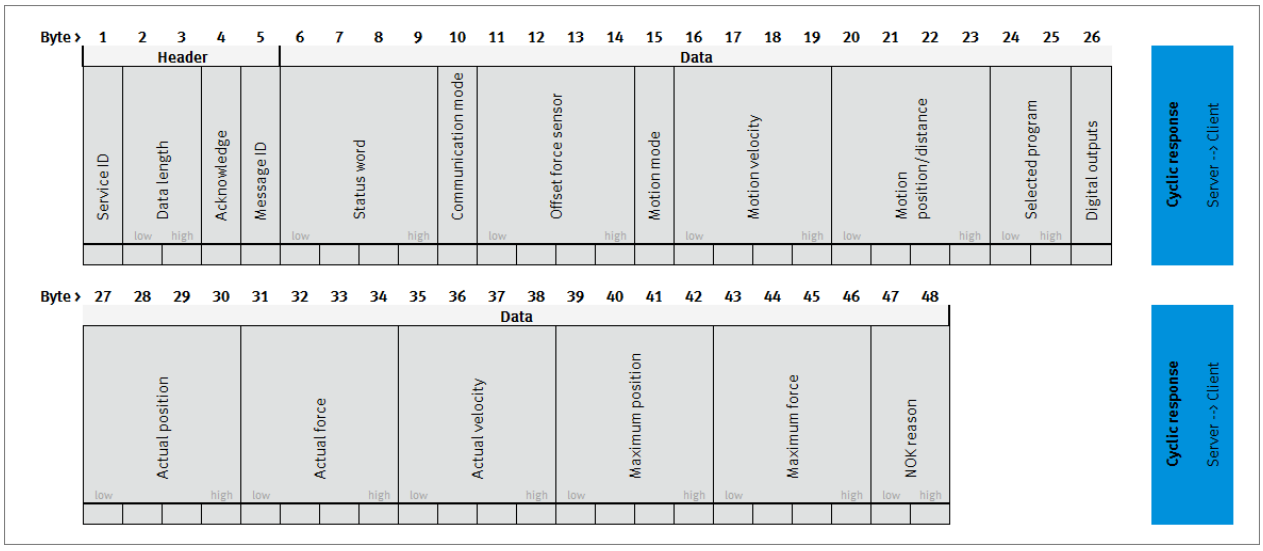


Figure 6-8: Telegram cyclic response

6.2.3 Monitoring communication

A timeout mechanism is implemented within the cyclic communication. The server will reset the communication if the timeout (2s) is elapsed without receiving any data from the client. The communication will be set to acyclic communication inside the server and the control word will be set to zero. In this case the client must reconnect (TCP/IP) again to the server. The elapsed time will be reset each time the server receives data from the client in cyclic communication.

7 Communication Modbus TCP

This example is to show, how to set up the connection between a client and a server based on Codesys.

7.1 Communication task and devices

The communication task between client and server has to be set to 4ms.

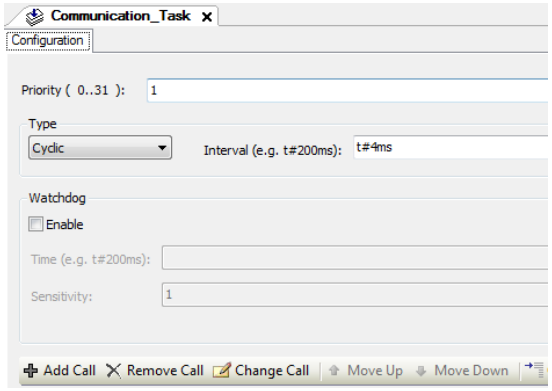


Figure 7-1: Communication task

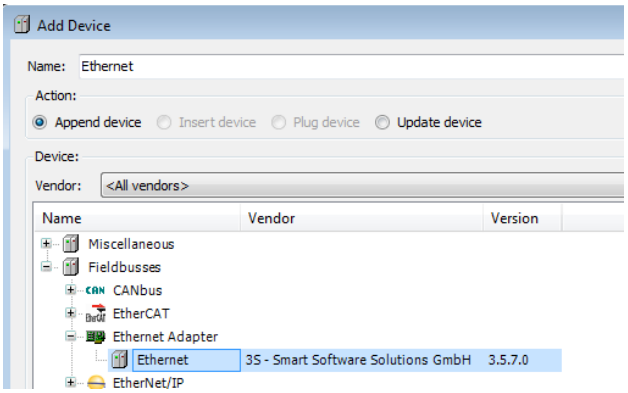


Figure 7-2: Add Ethernet

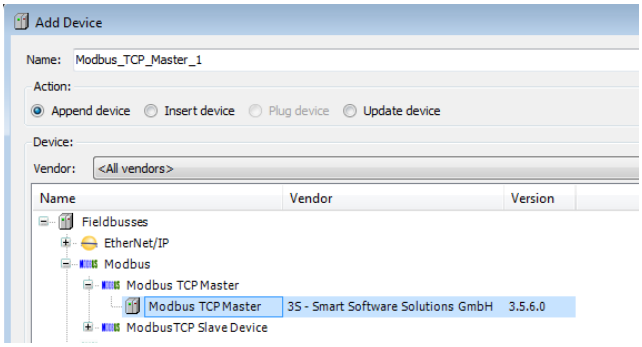


Figure 7-3: Add Modbus TCP Master

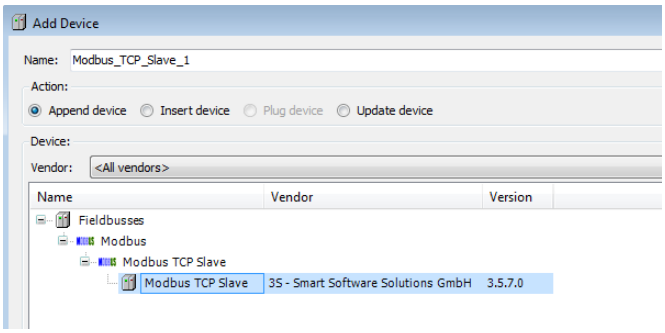


Figure 7-4: Add Modbus TCP Slave

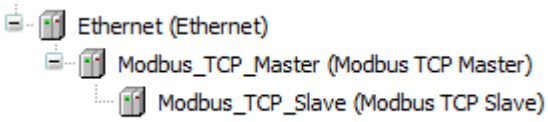


Figure 7-5: All necessary components

7.2 Example settings Modbus TCP Client (CODESYS)

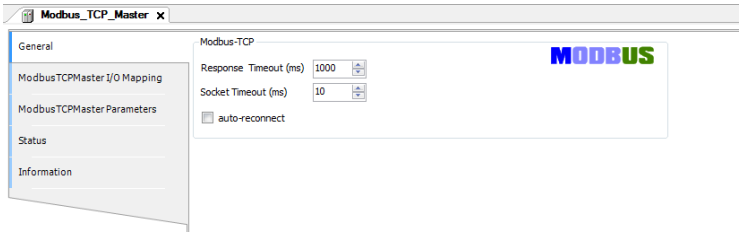


Figure 7-6: Modbus TCP Client "General"

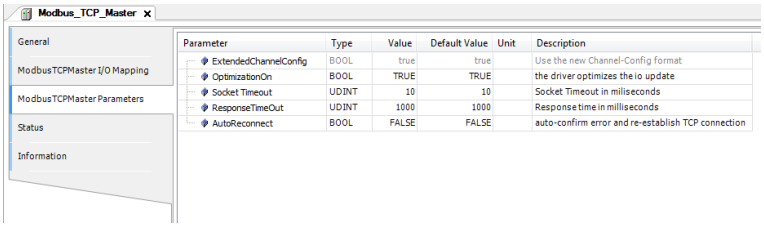


Figure 7-7: Modbus TCP Client "ModbusTCPMaster Parameters"

7.3 Example settings Modbus TCP Server (CODESYS)

Slave IP address: IP address of the controller CECC-X

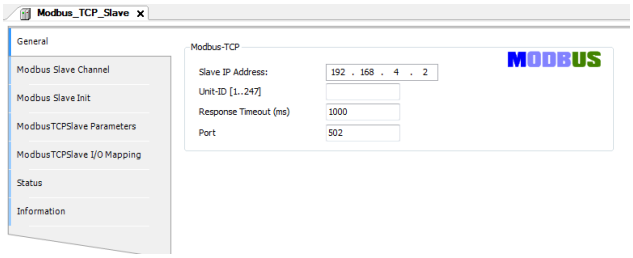


Figure 7-8: Modbus TCP Server "General"

Add a new slave channel “Read Input Registers (Function Code 4) with a length of 52 (104 Bytes).

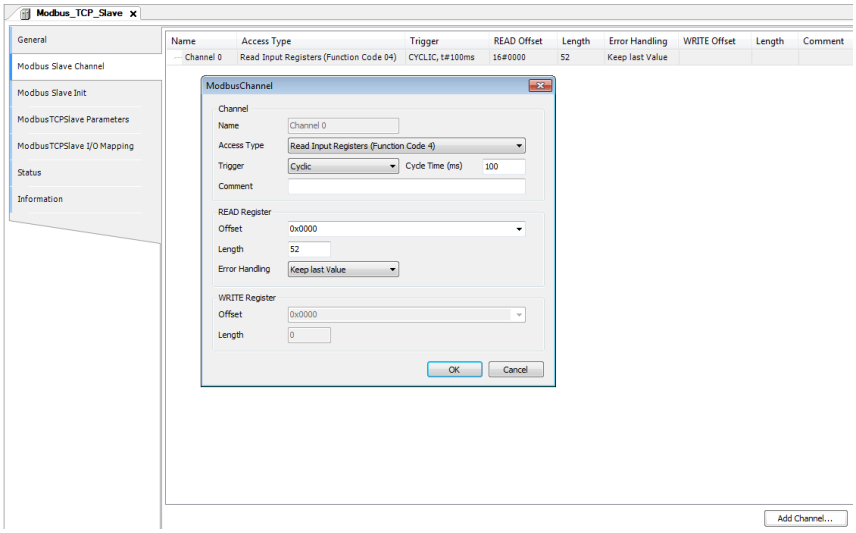
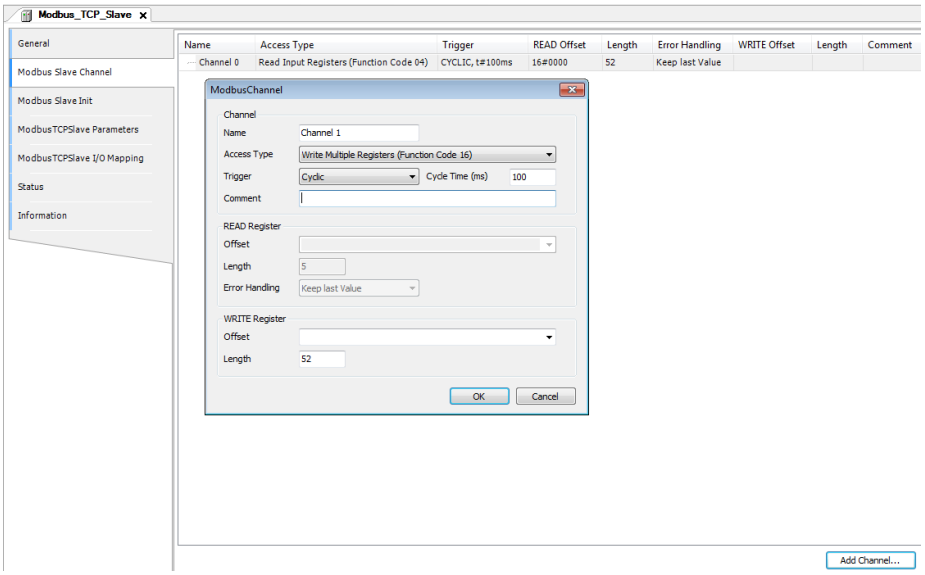


Figure 7-9: Modbus TCP Server Read Channel

Add a new slave channel “Write Multiple Registers (Function Code 16) with a length of 52 (104 Bytes).



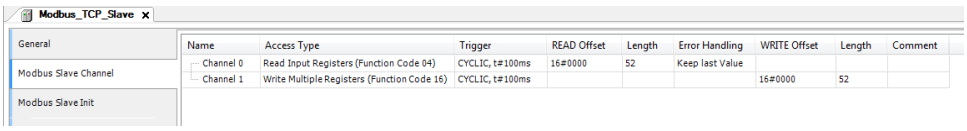


Figure 7-10: Final view slave channels

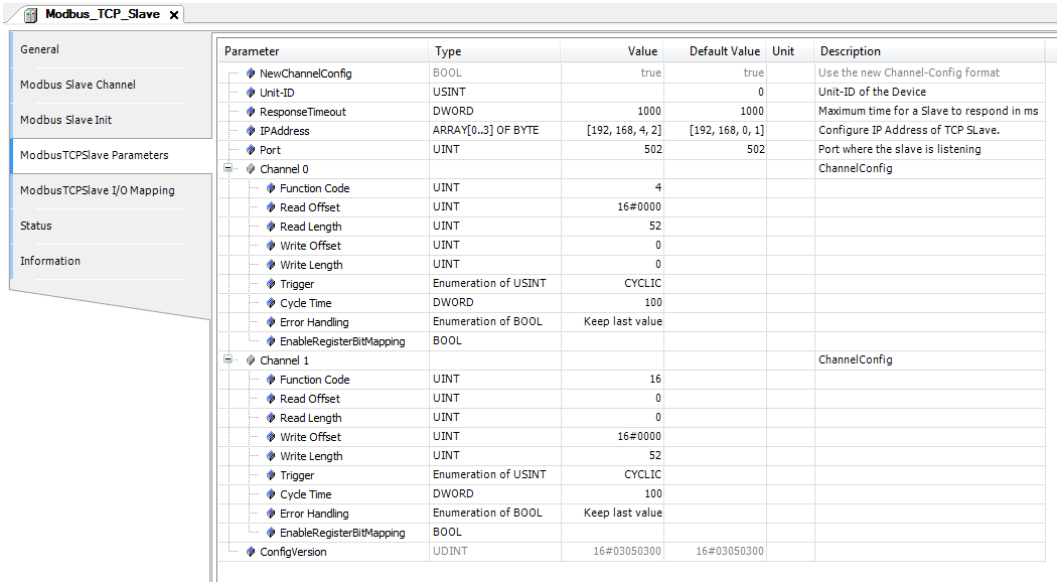


Figure 7-11: Modbus TCP Server "ModbusTCPSlave Parameters"

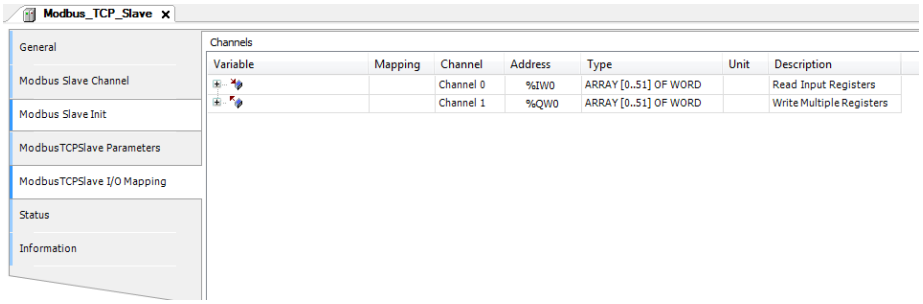


Figure 7-12: Modbus TCP Server "MadbusTCPSlave I/O Mapping

7.4 Handshake

Handshake must be done manually. For handshake toogle or count Message ID. A change in the Message ID (toogle/count) means that the request will be processed. If you don’t change the Message ID (toogle/count) means that the request won’t be processed. At start up of the system the Message ID is always zero.

7.5 Communication example

1. Change control highness of the servo press kit to “Host” and fieldbus to “Modbus TCP”

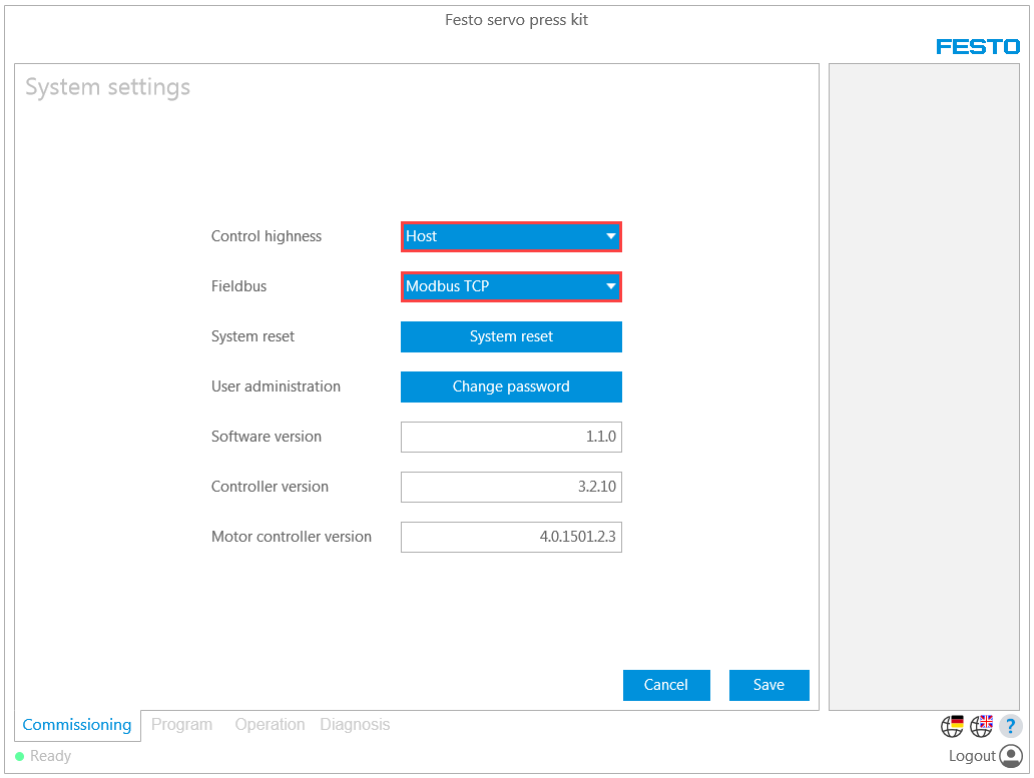


Figure 7-13: Change control highness and fieldbus

2. Connect with your client to the server.

3. Switch communication mode from acyclic communication to cyclic communication

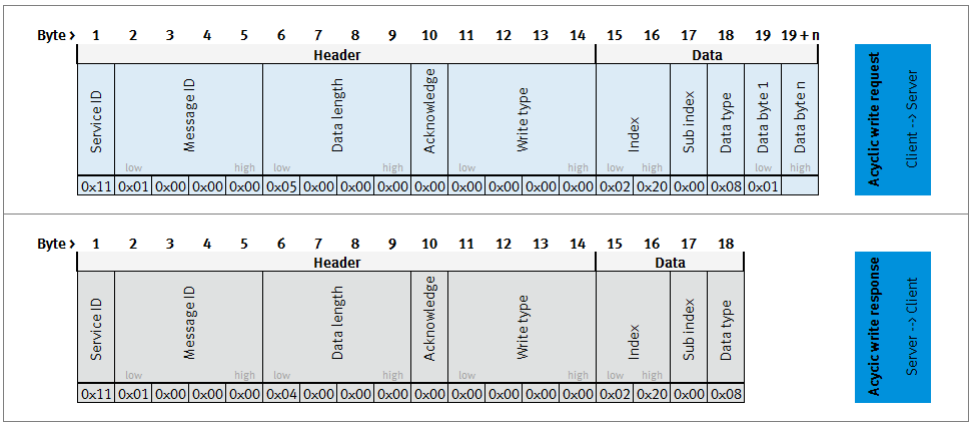


Figure 7-14: Acyclic write request to change communication mode (Byte)

Channel	Address	Type	Value
Channel 0 [0]	%IW0	WORD	0x0111
Channel 0 [1]	%IW1	WORD	0x0000
Channel 0 [2]	%IW2	WORD	0x0500
Channel 0 [3]	%IW3	WORD	0x0000
Channel 0 [4]	%IW4	WORD	0x0000
Channel 0 [5]	%IW5	WORD	0x0000
Channel 0 [6]	%IW6	WORD	0x0000
Channel 0 [7]	%IW7	WORD	0x2002
Channel 0 [8]	%IW8	WORD	0x0800
Channel 0 [9]	%IW9	WORD	0x0001
Channel 0 [10]	%IW10	WORD	0x0000

Channel	Address	Type	Value
Channel 1 [0]	%QW0	WORD	0x0111
Channel 1 [1]	%QW1	WORD	0x0000
Channel 1 [2]	%QW2	WORD	0x0400
Channel 1 [3]	%QW3	WORD	0x0000
Channel 1 [4]	%QW4	WORD	0x0000
Channel 1 [5]	%QW5	WORD	0x0000
Channel 1 [6]	%QW6	WORD	0x0000
Channel 1 [7]	%QW7	WORD	0x2002
Channel 1 [8]	%QW8	WORD	0x0800
Channel 1 [9]	%QW9	WORD	0x0000
Channel 1 [10]	%QW10	WORD	0x0000

Figure 7-15: Acyclic write request to change communication mode (Word)

4. Send cyclic request.
   To process the cyclic communication all the time you have to toogle or count the Message ID, when you have received a response. Then you can only change the bits or bytes you want in the request.

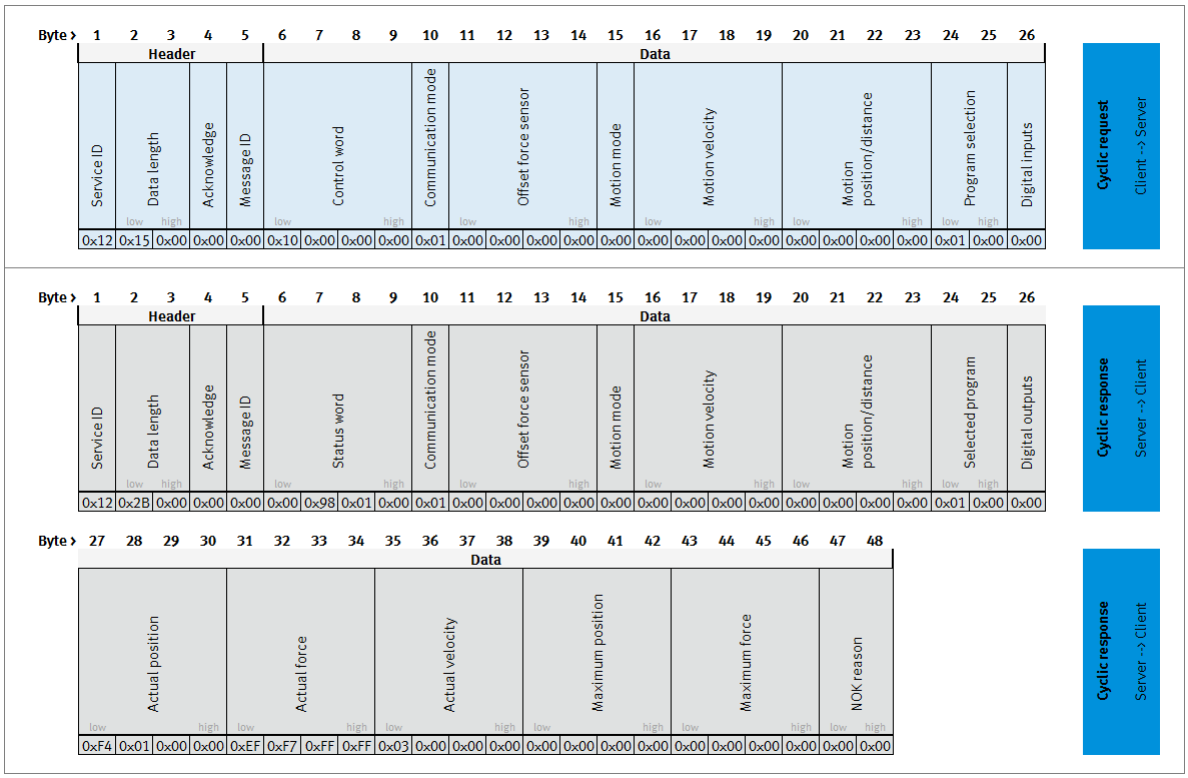


Figure 7-16: Cyclic request (Byte)

Channel	Address	Type	Value
Channel 0 [0]	%IW0	WORD	0x1512
Channel 0 [1]	%IW1	WORD	0x0000
Channel 0 [2]	%IW2	WORD	0x1000
Channel 0 [3]	%IW3	WORD	0x0000
Channel 0 [4]	%IW4	WORD	0x0100
Channel 0 [5]	%IW5	WORD	0x0000
Channel 0 [6]	%IW6	WORD	0x0000
Channel 0 [7]	%IW7	WORD	0x0000
Channel 0 [8]	%IW8	WORD	0x0000
Channel 0 [9]	%IW9	WORD	0x0000
Channel 0 [10]	%IW10	WORD	0x0000
Channel 0 [11]	%IW11	WORD	0x0100
Channel 0 [12]	%IW12	WORD	0x0000
Channel 0 [13]	%IW13	WORD	0x0000
Channel 0 [14]	%IW14	WORD	0x0000
Channel 0 [15]	%IW15	WORD	0x0000
Channel 0 [16]	%IW16	WORD	0x0000
Channel 0 [17]	%IW17	WORD	0x0000
Channel 0 [18]	%IW18	WORD	0x0000
Channel 0 [19]	%IW19	WORD	0x0000
Channel 0 [20]	%IW20	WORD	0x0000
Channel 0 [21	%IW21	WORD	0x0000
Channel 0 [22]	%IW22	WORD	0x0000
Channel 0 [23]	%IW23	WORD	0x0000
Channel 0 [24]	%IW24	WORD	0x0000
Channel 0 [25]	%IW25	WORD	0x0000

Channel	Address	Type	Value
Channel 1 [0]	%QW0	WORD	0x2B12
Channel 1 [1]	%QW1	WORD	0x0000
Channel 1 [2]	%QW2	WORD	0x0000
Channel 1 [3]	%QW3	WORD	0x0198
Channel 1 [4]	%QW4	WORD	0x0100
Channel 1 [5]	%QW5	WORD	0x0000
Channel 1 [6]	%QW6	WORD	0x0000
Channel 1 [7]	%QW7	WORD	0x0000
Channel 1 [8]	%QW8	WORD	0x0000
Channel 1 [9]	%QW9	WORD	0x0000
Channel 1 [10]	%QW10	WORD	0x0000
Channel 1 [11]	%QW11	WORD	0x0100
Channel 1 [12]	%QW12	WORD	0x0000
Channel 1 [13]	%QW13	WORD	0x01F4
Channel 1 [14]	%QW14	WORD	0x0000
Channel 1 [15]	%QW15	WORD	0xF7EF
Channel 1 [16]	%QW16	WORD	0xFFFF
Channel 1 [17]	%QW17	WORD	0x0003
Channel 1 [18]	%QW18	WORD	0x0000
Channel 1 [19]	%QW19	WORD	0x0000
Channel 1 [20]	%QW20	WORD	0x0000
Channel 1 [21	%QW21	WORD	0x0000
Channel 1 [22]	%QW22	WORD	0x0000
Channel 1 [23]	%QW23	WORD	0x0000
Channel 1 [24]	%QW24	WORD	0x0000
Channel 1 [25]	%QW25	WORD	0x0000

Figure 7-17: Cyclic request (Word)

8 Communication EtherNet/IP

This example is to show, how to set up the connection between a client and a server based on Codesys. But this will not work with Codesys 3.5 SP7. Until now it is tested on Codesys 3.5 SP9.

8.1 Communication task and devices

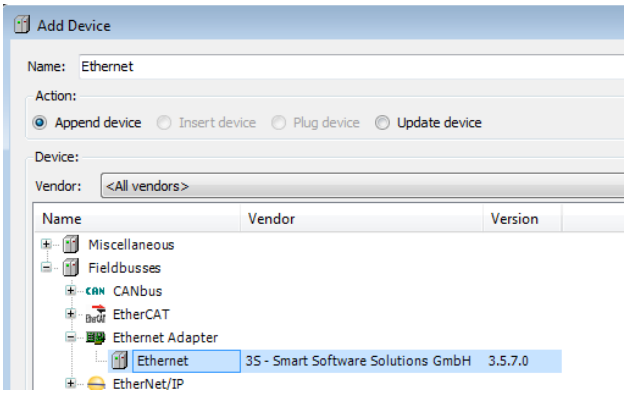


Figure 8-1: Add Ethernet

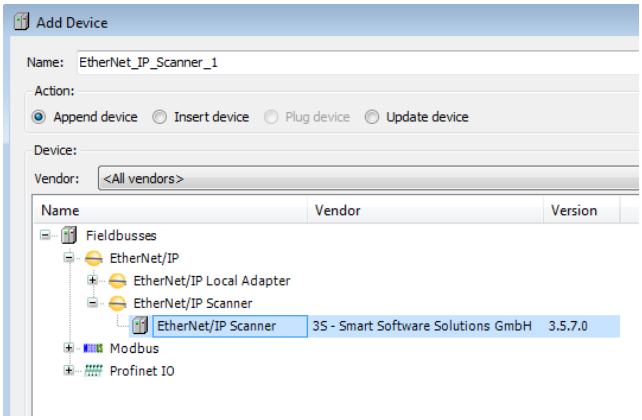


Figure 8-2: Add EtherNet/IP Scanner

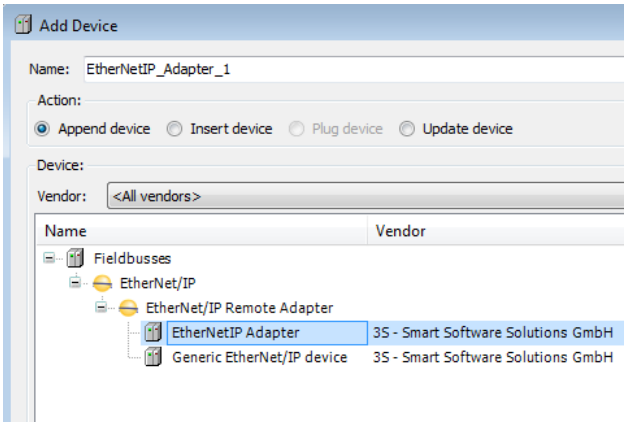


Figure 8-3: Add EtherNetIP Adapter

Two Tasks are added automatically.
The communication task between client and server has to be set to 4ms.

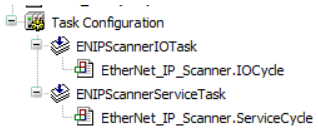


Figure 8-4: Ethernet Tasks

8.2 Example setting EtherNet/IP Client (CODESYS)

After adding the devices, client for communication with YJKP has to be set.
It is only necessary to change the settings of the EthernetIP_Adapter.

IP Address has to be set to the address of the YJKP.

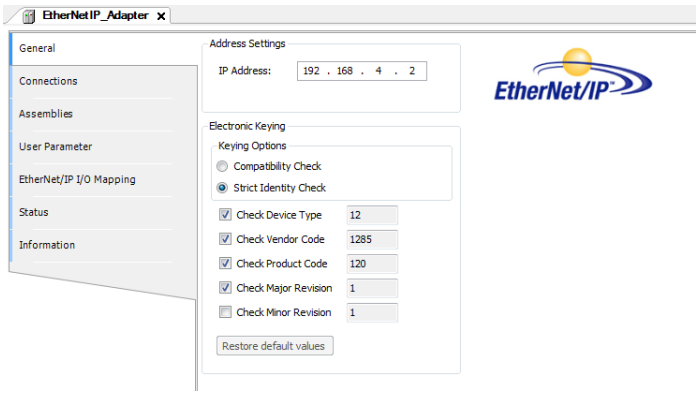


Figure 8-5: EtherNet/IP Client "General"

Edit connection parameter to 104 Byte input and output

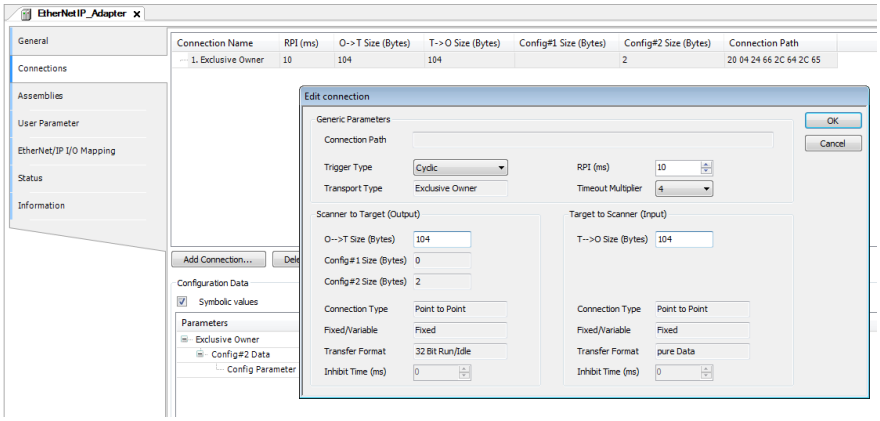


Figure 8-6: EtherNet/IP Client "Connections"

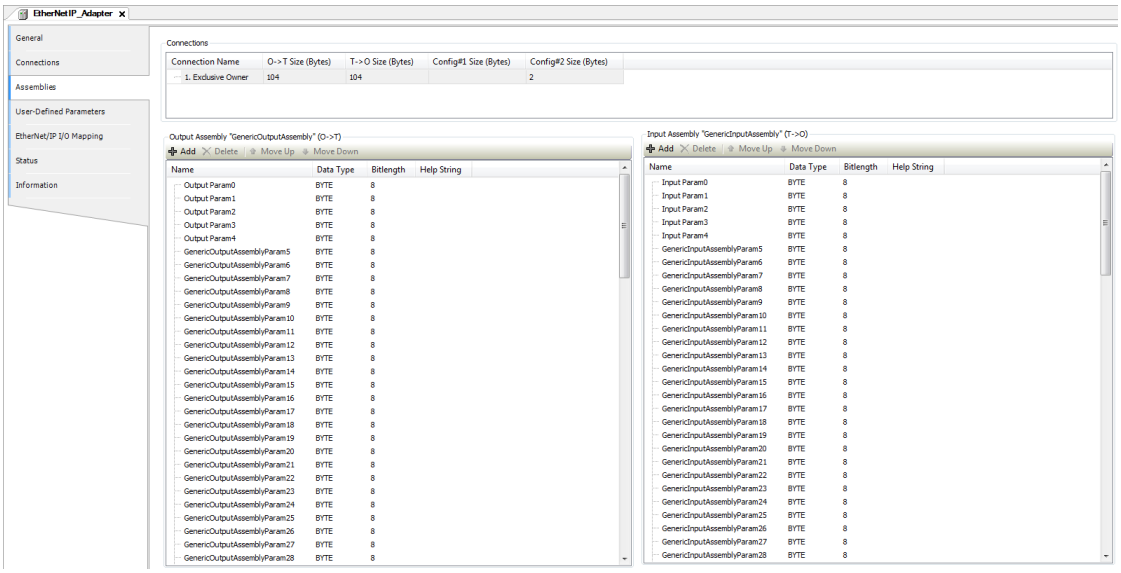


Figure 8-7: EtherNet/IP Client "Assemblies"

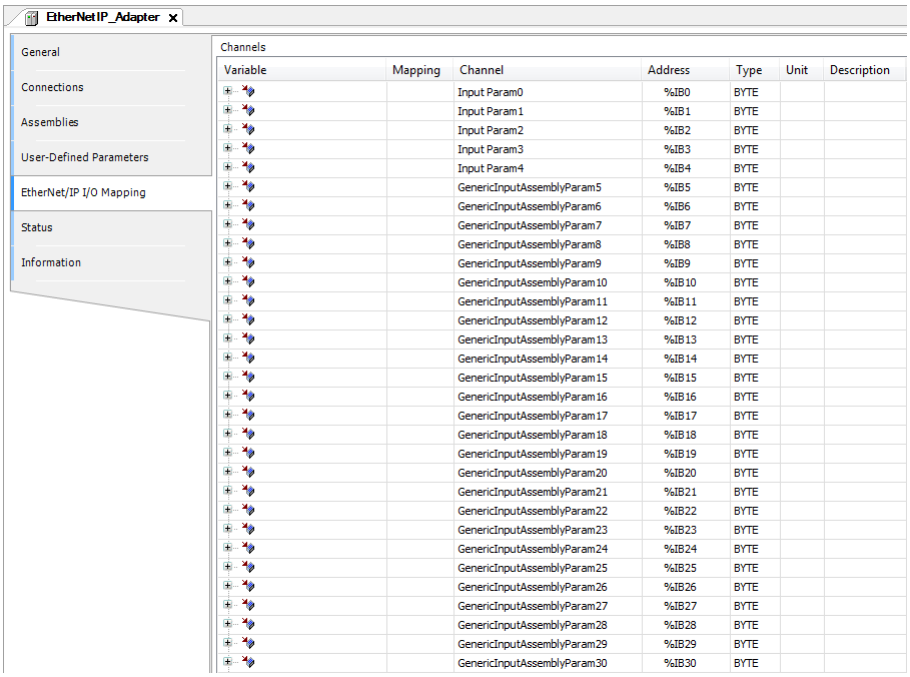


Figure 8-8: EtherNet/IP Client "EtherNet I/O Mapping (%IB0 - %IB30)"

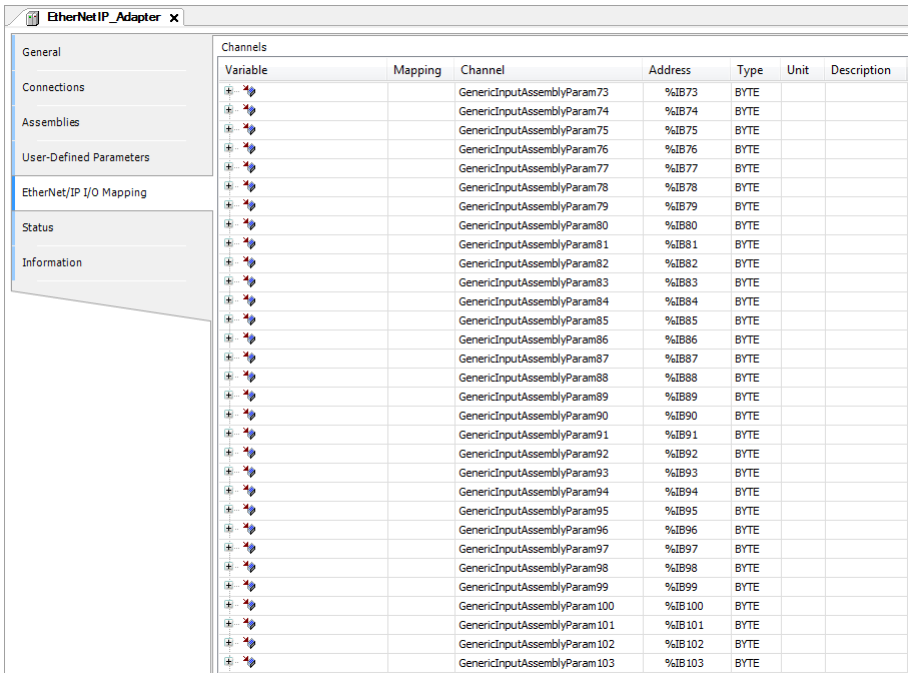


Figure 8-9: EtherNet/IP Client "EtherNet I/O Mapping (%IB73 - %IB103)"

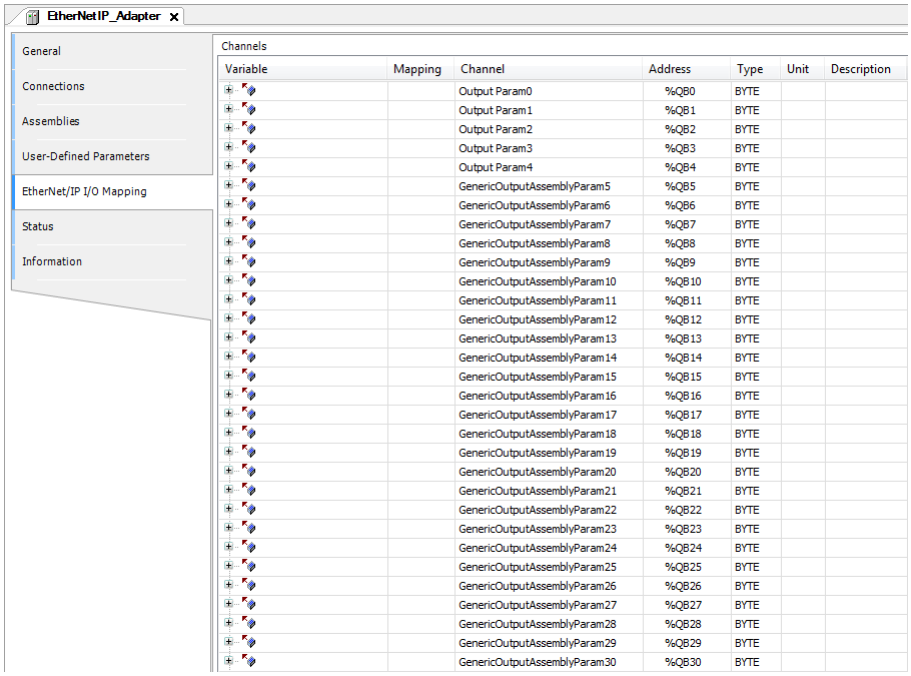
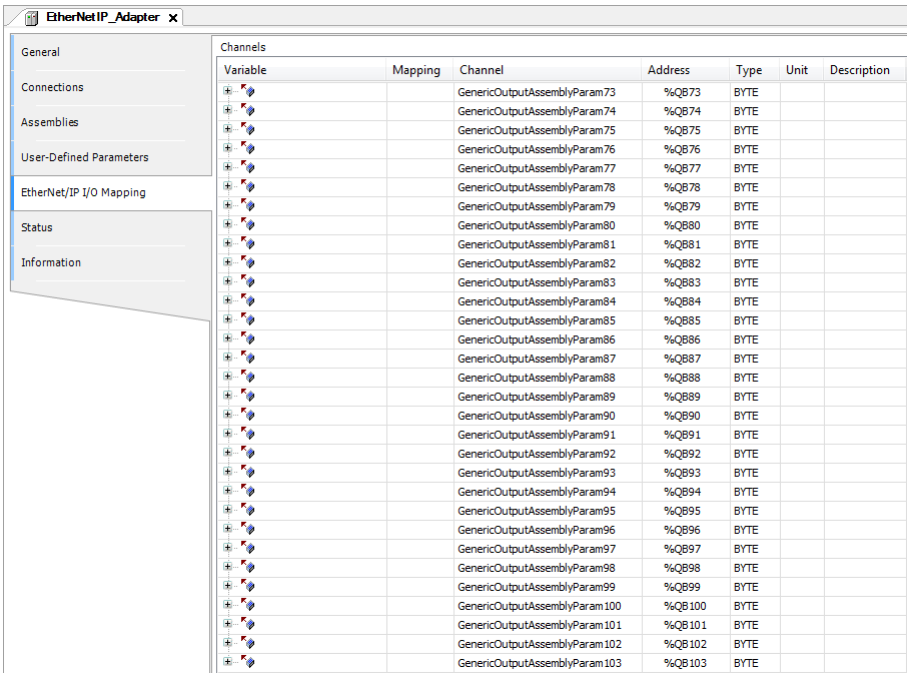


Figure 8-10: EtherNet/IP Client "EtherNet I/O Mapping (%QB0 - %QB30)"



Variable	Mapping	Channel	Address	Type	Unit	Description
		GenericOutputAssemblyParam73	%QB73	BYTE		
		GenericOutputAssemblyParam74	%QB74	BYTE		
		GenericOutputAssemblyParam75	%QB75	BYTE		
		GenericOutputAssemblyParam76	%QB76	BYTE		
		GenericOutputAssemblyParam77	%QB77	BYTE		
		GenericOutputAssemblyParam78	%QB78	BYTE		
		GenericOutputAssemblyParam79	%QB79	BYTE		
		GenericOutputAssemblyParam80	%QB80	BYTE		
		GenericOutputAssemblyParam81	%QB81	BYTE		
		GenericOutputAssemblyParam82	%QB82	BYTE		
		GenericOutputAssemblyParam83	%QB83	BYTE		
		GenericOutputAssemblyParam84	%QB84	BYTE		
		GenericOutputAssemblyParam85	%QB85	BYTE		
		GenericOutputAssemblyParam86	%QB86	BYTE		
		GenericOutputAssemblyParam87	%QB87	BYTE		
		GenericOutputAssemblyParam88	%QB88	BYTE		
		GenericOutputAssemblyParam89	%QB89	BYTE		
		GenericOutputAssemblyParam90	%QB90	BYTE		
		GenericOutputAssemblyParam91	%QB91	BYTE		
		GenericOutputAssemblyParam92	%QB92	BYTE		
		GenericOutputAssemblyParam93	%QB93	BYTE		
		GenericOutputAssemblyParam94	%QB94	BYTE		
		GenericOutputAssemblyParam95	%QB95	BYTE		
		GenericOutputAssemblyParam96	%QB96	BYTE		
		GenericOutputAssemblyParam97	%QB97	BYTE		
		GenericOutputAssemblyParam98	%QB98	BYTE		
		GenericOutputAssemblyParam99	%QB99	BYTE		
		GenericOutputAssemblyParam100	%QB100	BYTE		
		GenericOutputAssemblyParam101	%QB101	BYTE		
		GenericOutputAssemblyParam102	%QB102	BYTE		
		GenericOutputAssemblyParam103	%QB103	BYTE		

Figure 8-11: EtherNet/IP Client "EtherNet I/O Mapping (%QB73 - %QB103)"

8.3 Handshake

Handshake must be done manually. For handshake toogle or count Message ID. A change in the Message ID (toogle/count) means that the request will be processed. If you don’t change the Message ID (toogle/count) means that the request won’t be processed. At start up of the system the Message ID is always zero.

8.4 Communication example

1. Change control highness of the servo press kit to “Host” and fieldbus to “EtherNet/IP”

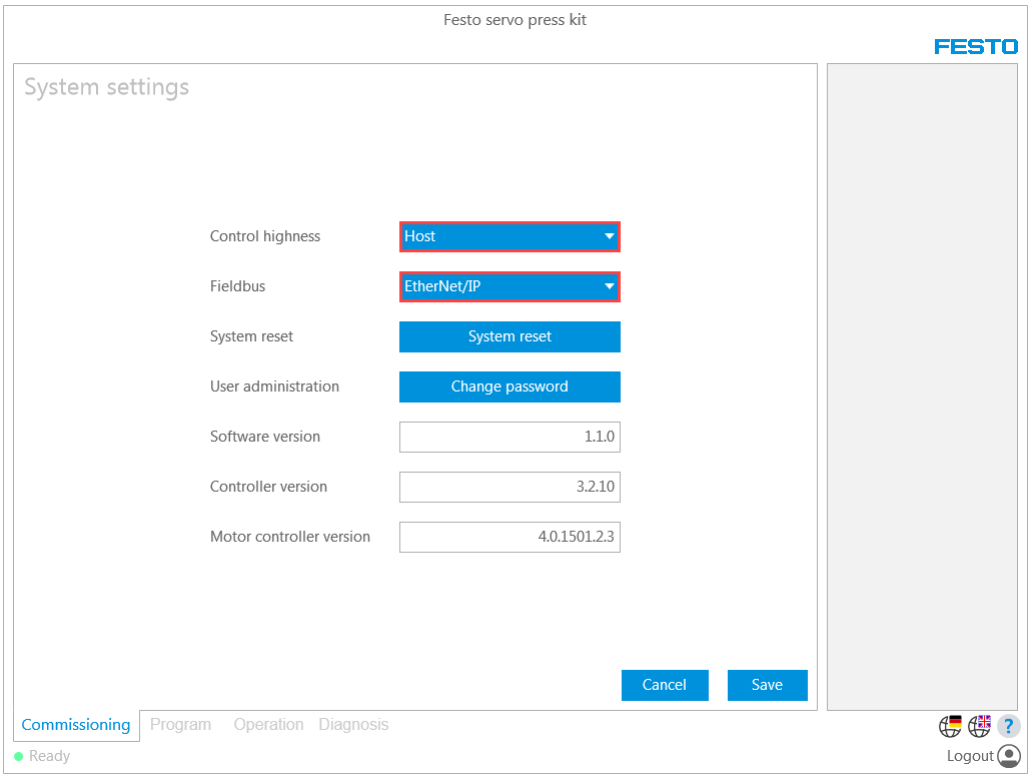


Figure 8-12: Change control highness and fieldbus

2. Connect with your client to the server.

3. Switch communication mode from acyclic communication to cyclic communication

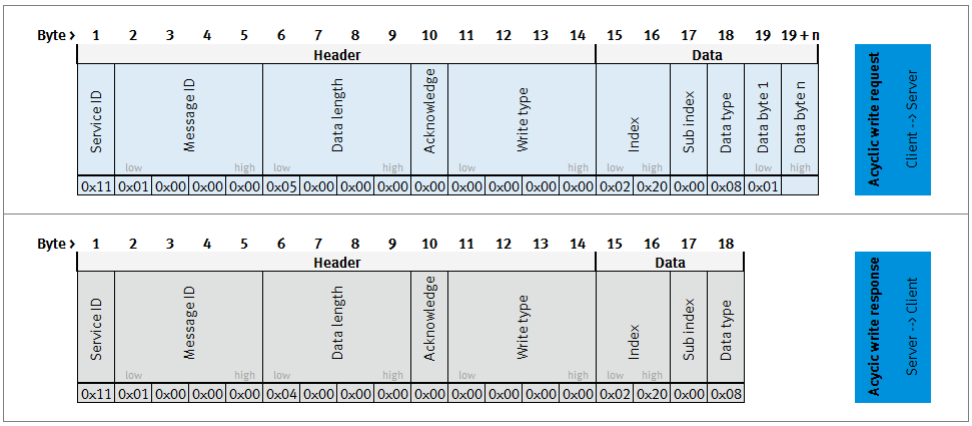


Figure 8-13: Acyclic write request to change communication mode (Byte)

4. Send cyclic request.
   To process the cyclic communication all the time you have to toogle or count the Message ID, when you have received a response. Then you can only change the bits or bytes you want in the request.

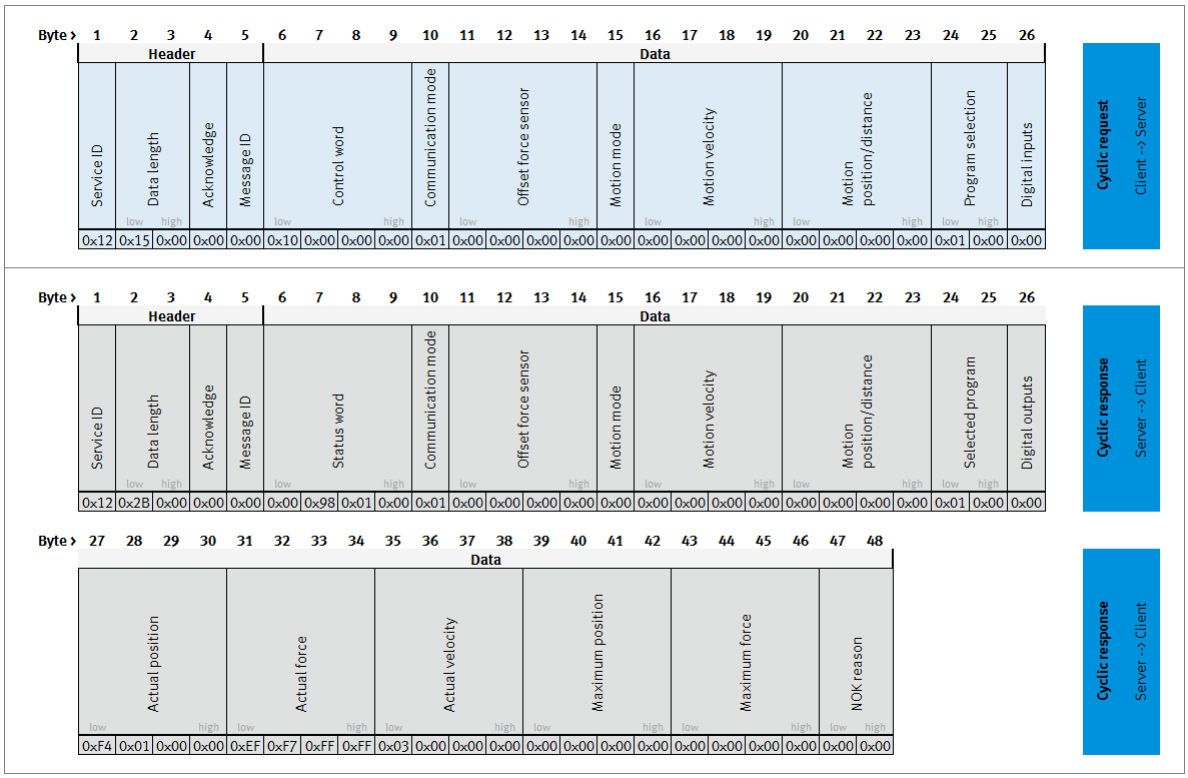


Figure 8-14: Cyclic request (Byte)

9 Communication TCP/IP

9.1 Implementation TCP/IP (CODESYS)

Communication task: 4ms

IP address: IP address of the controller CECC-X
Port: 4444

Input data: 104 Bytes
Output data: 104 Bytes

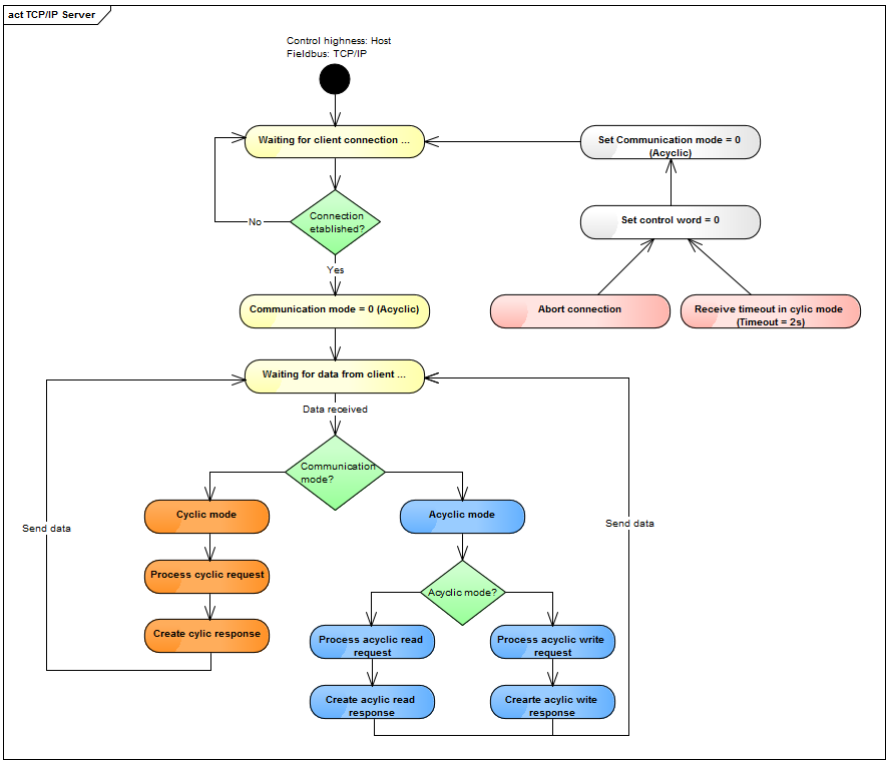


Figure 9-1: TCP/IP Server

9.2 Example implementation TCP/IP Client (CODESYS)

Communication task: 4ms

Input data: 104 Bytes
Output data: 104 Bytes

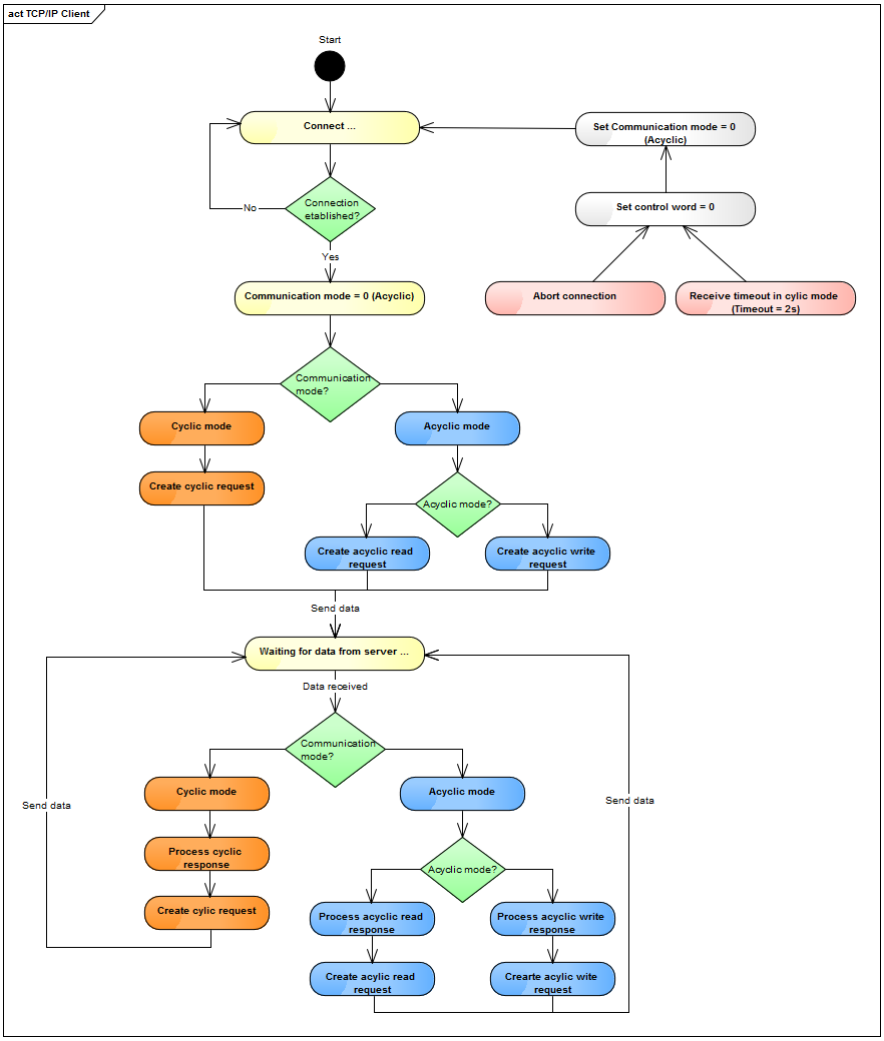


Figure 9-2: TCP/IP Client

9.3 Handshake

Handshake is done automatically. Client and server gets a signal if there is data received.

9.4 Communication example

1. Change control highness of the servo press kit to “Host” and fieldbus to “TCP/IP”

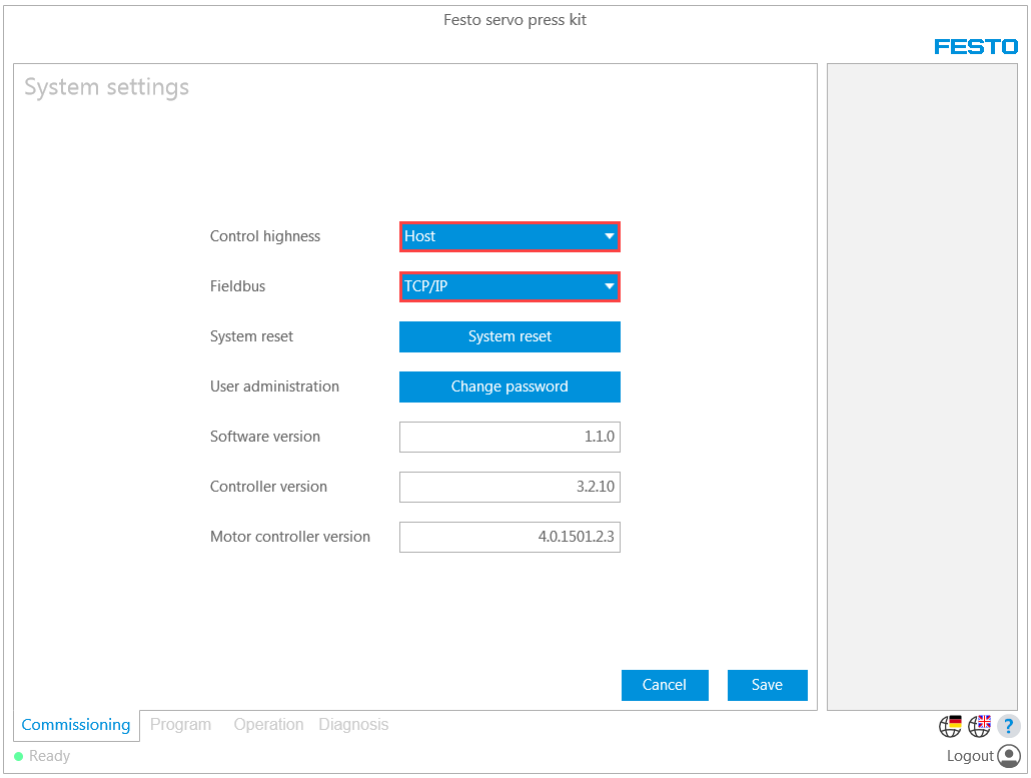


Figure 9-3: Change control highness and fieldbus

2. Connect with your client to the server.

3. Switch communication mode from acyclic communication to cyclic communication

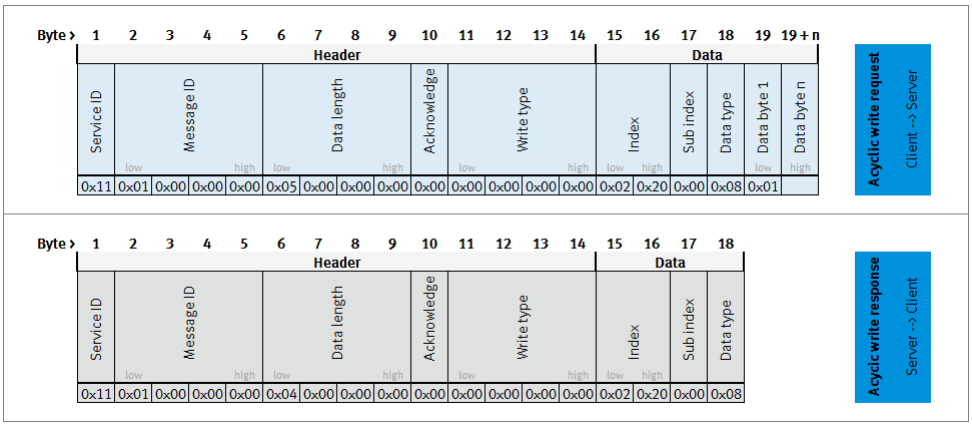


Figure 9-4: Acyclic write request to change communication mode (Byte)

4. Send cyclic request.
   To process the cyclic communication all the time you have to toogle or count the Message ID, when you have received a response. Then you can only change the bits or bytes you want in the request.

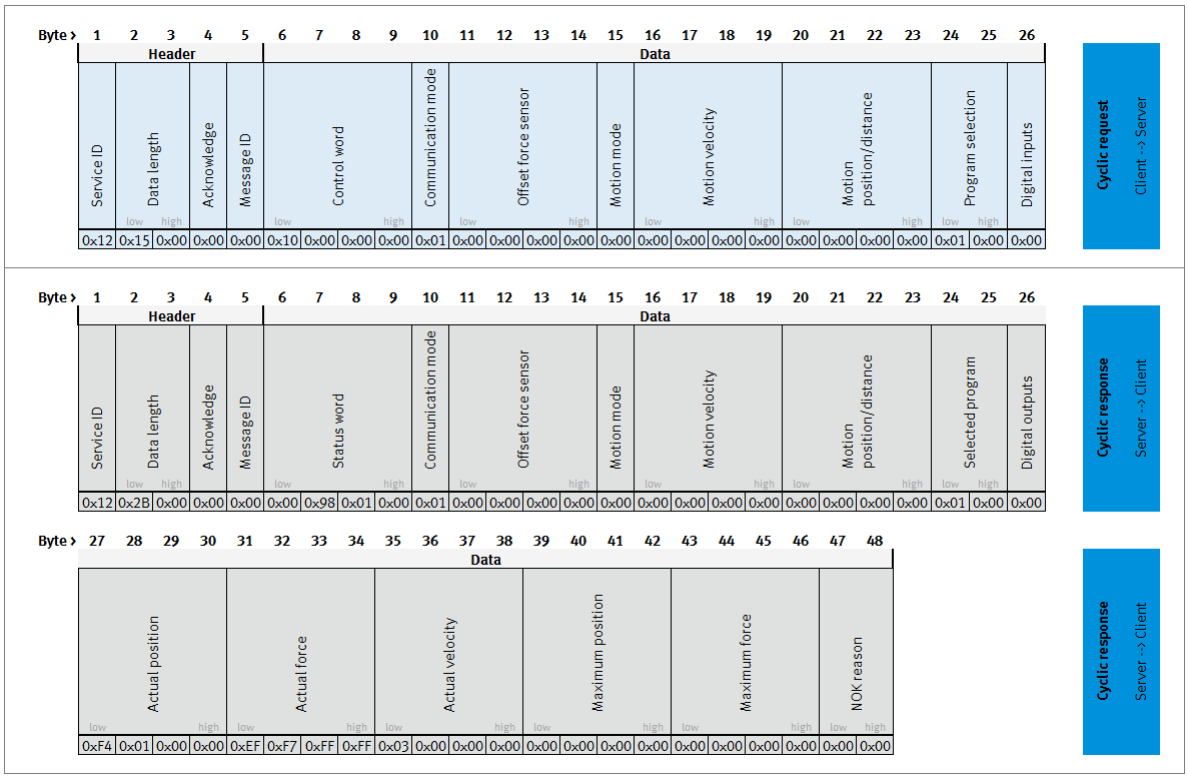


Figure 9-5: Cyclic request (Byte)

10 Communication Profinet IO

Please follow the instructions in the application note “AppNote Servo Press Kit YJKP - Integration of host function blocks in Siemens SIMATIC Step 7 *”, which you can find on our support portal searching for YJKP in the tab expert knowledge.

A Object directory

Identifier	Index	Sub index	Value	Data Type	Data Size	Access	Comment
Control word (CW)	0x2000	0x00	--	DWORD	4	RW	
Status word (SW)	0x2001	0x00	--	DWORD	4	RO	
Communication mode	0x2002	0x00	--	BYTE	1	RW	
Offset force sensor	0x2003	0x00	--	DINT	4	RW	Unit [N] (2 decimal places) (multiplied by 100 | 0.01 = 100)
Motion mode	0x2004	0x00	--	BYTE	1	RW	
Motion velocity	0x2005	0x00	--	DINT	4	RW	Unit [mm/s] (2 decimal places) (multiplied by 100 | 0.01 = 100)
Motion position/distance	0x2006	0x00	--	DINT	4	RW	Unit [mm] (2 decimal places) (multiplied by 100 | 0.01 = 100)
Selected program number	0x2007	0x00	--	UINT	2	RW	
Digital inputs	0x2008	0x00	--	BYTE	1	RW	
Digital outputs	0x2009	0x00	--	BYTE	1	RW	
Actual position	0x200A	0x00	--	DINT	4	RO	Unit [mm] (2 decimal places) (multiplied by 100 | 0.01 = 100)
Actual force	0x200B	0x00	--	DINT	4	RO	Unit [N] (2 decimal places) (multiplied by 100 | 0.01 = 100)
Actual velocity	0x200C	0x00	--	DINT	4	RO	Unit [mm/s] (2 decimal places) (multiplied by 100 | 0.01 = 100)
Maximum position	0x200D	0x00	--	DINT	4	RO	Unit [mm] (2 decimal places) (multiplied by 100 | 0.01 = 100)
Maximum force	0x200E	0x00	--	DINT	4	RO	Unit [N] (2 decimal places) (multiplied by 100 | 0.01 = 100)
NOK reason	0x200F	0x00	--	WORD	2	RO	
Part number	0x2010	0x00	--	UDINT	4	RO	
Part number OK	0x2011	0x00	--	UDINT	4	RO	
Part number NOK	0x2012	0x00	--	UDINT	4	RO	
Loaded program number	0x2013	0x00	--	UINT	2	RO	
Statistic	0x2100	0x00	49	UDINT	4	RO	
Part number	0x2100	0x01	--	UDINT	4	RO	
Program name 1	0x2100	0x02	--	BYTE	1	RO	
Program name 2	0x2100	0x03	--	BYTE	1	RO	
Program name 3	0x2100	0x04	--	BYTE	1	RO	
Program name 4	0x2100	0x05	--	BYTE	1	RO	
Program name 5	0x2100	0x06	--	BYTE	1	RO	
Program name 6	0x2100	0x07	--	BYTE	1	RO	

Identifier	Index	Sub index	Value	Data Type	Data Size	Ac-cess	Comment
Program name 7	0x2100	0x08	--	BYTE	1	RO	
Program name 8	0x2100	0x09	--	BYTE	1	RO	
Program name 9	0x2100	0x0A	--	BYTE	1	RO	
Program name 10	0x2100	0x0B	--	BYTE	1	RO	
Program name 11	0x2100	0x0C	--	BYTE	1	RO	
Program name 12	0x2100	0x0D	--	BYTE	1	RO	
Program name 13	0x2100	0x0E	--	BYTE	1	RO	
Program name 14	0x2100	0x0F	--	BYTE	1	RO	
Program name 15	0x2100	0x10	--	BYTE	1	RO	
Program name 16	0x2100	0x11	--	BYTE	1	RO	
Program name 17	0x2100	0x12	--	BYTE	1	RO	
Program name 18	0x2100	0x13	--	BYTE	1	RO	
Program name 19	0x2100	0x14	--	BYTE	1	RO	
Program name 20	0x2100	0x15	--	BYTE	1	RO	
Program ID	0x2100	0x16	--	UINT	2	RO	
Timestamp	0x2100	0x17	--	DWORD	4	RO	
Result	0x2100	0x18	--	BOOL	1	RO	
Maximum position	0x2100	0x19	--	DINT	4	RO	Unit [mm] (2 decimal places) (multiplied by 100 ǀ 0.01 = 100)
Maximum force	0x2100	0x1A	--	DINT	4	RO	Unit [N] (2 decimal places) (multiplied by 100 ǀ 0.01 = 100)
NOK source	0x2100	0x1B	--	WORD	2	RO	
Cycle time	0x2100	0x1C	--	UDINT	4	RO	
Message	0x2200	0x00	31	UDINT	4	RO	
Message ack	0x2200	0x01	--	BOOL	1	RO	
Message id	0x2200	0x02	--	DWORD	4	RO	
Message table	0x2200	0x03	--	WORD	2	RO	
Message ident additional 01	0x2200	0x04	--	DWORD	4	RO	
Message ident additional 02	0x2200	0x05	--	DWORD	4	RO	
Message source device	0x2200	0x06	--	UINT	2	RO	
Message source system	0x2200	0x07	--	UINT	2	RO	
Message reaction	0x2200	0x08	--	UINT	2	RO	
Message category	0x2200	0x09	--	UINT	2	RO	
Message timestamp	0x2200	0x0A	--	DWORD	4	RO	
Variable 1 - 10	0x2300	0x00	44	UDINT	4	RW	
Variable 1	0x2300	0x01	--	DINT	4	RW	Value (2 decimal places) (multiplied by 100 ǀ 0.01 = 100)

Identifier	Index	Sub index	Value	Data Type	Data Size	Access	Comment
			...				
Variable 10	0x2300	0x0A	--	DINT	4	RW	Value (2 decimal places) (multiplied by 100 | 0.01 = 100)
			...				
Variable 91 - 100	0x2309	0x00	44	UDINT	4	RW	
Variable 91	0x2309	0x01	--	DINT	4	RW	Value (2 decimal places) (multiplied by 100 | 0.01 = 100)
			...				
Variable 100	0x2309	0x0A	--	DINT	4	RW	Value (2 decimal places) (multiplied by 100 | 0.01 = 100)
Curves no.	0x3000	0x00	--	UINT	2	RO	
Curve 1	0x3100	0x00	14	UDINT	4	RO	
Curve 1 maximum position	0x3100	0x01	--	DINT	4	RO	Unit [mm] (2 decimal places) (multiplied by 100 | 0.01 = 100)
Curve 1 maximum force	0x3100	0x02	--	DINT	4	RO	Unit [N] (2 decimal places) (multiplied by 100 | 0.01 = 100)
Curve 1 NOK source	0x3100	0x03	--	WORD	2	RO	
Curve 1 window 1	0x3111	0x00	54	UDINT	4	RO	
Curve 1 window 1 intersection	0x3111	0x01	--	WORD	2	RO	
Curve 1 window 1 up side position	0x3111	0x02	--	DINT	4	RO	Unit [mm] (2 decimal places) (multiplied by 100 | 0.01 = 100)
Curve 1 window 1 up side force	0x3111	0x03	--	DINT	4	RO	Unit [N] (2 decimal places) (multiplied by 100 | 0.01 = 100)
Curve 1 window 1 down side position	0x3111	0x04	--	DINT	4	RO	Unit [mm] (2 decimal places) (multiplied by 100 | 0.01 = 100)
Curve 1 window 1 down side force	0x3111	0x05	--	DINT	4	RO	Unit [N] (2 decimal places) (multiplied by 100 | 0.01 = 100)
Curve 1 window 1 left side position	0x3111	0x06	--	DINT	4	RO	Unit [mm] (2 decimal places) (multiplied by 100 | 0.01 = 100)
Curve 1 window 1 left side force	0x3111	0x07	--	DINT	4	RO	Unit [N] (2 decimal places) (multiplied by 100 | 0.01 = 100)
Curve 1 window 1 right side position	0x3111	0x08	--	DINT	4	RO	Unit [mm] (2 decimal places) (multiplied by 100 | 0.01 = 100)
Curve 1 window 1 right side force	0x3111	0x09	--	DINT	4	RO	Unit [N] (2 decimal places) (multiplied by 100 | 0.01 = 100)

Identifier	Index	Sub index	Value	Data Type	Data Size	Access	Comment
Curve 1 window 1 minimum position	0x3111	0x0A	--	DINT	4	RO	Unit [mm] (2 decimal places) (multiplied by 100 | 0.01 = 100)
Curve 1 window 1 maximum position	0x3111	0x0B	--	DINT	4	RO	Unit [mm] (2 decimal places) (multiplied by 100 | 0.01 = 100)
Curve 1 window 1 minimum force	0x3111	0x0C	--	DINT	4	RO	Unit [N] (2 decimal places) (multiplied by 100 | 0.01 = 100)
Curve 1 window 1 maximum force	0x3111	0x0D	--	DINT	4	RO	Unit [N] (2 decimal places) (multiplied by 100 | 0.01 = 100)
...							
Curve 1 window 5	0x3115	0x00	54	UDINT	4	RO	
Curve 1 window 5 intersection	0x3115	0x01	--	WORD	2	RO	
Curve 1 window 5 up side position	0x3115	0x02	--	DINT	4	RO	Unit [mm] (2 decimal places) (multiplied by 100 | 0.01 = 100)
Curve 1 window 5 up side force	0x3115	0x03	--	DINT	4	RO	Unit [N] (2 decimal places) (multiplied by 100 | 0.01 = 100)
Curve 1 window 5 down side position	0x3115	0x04	--	DINT	4	RO	Unit [mm] (2 decimal places) (multiplied by 100 | 0.01 = 100)
Curve 1 window 5 down side force	0x3115	0x05	--	DINT	4	RO	Unit [N] (2 decimal places) (multiplied by 100 | 0.01 = 100)
Curve 1 window 5 left side position	0x3115	0x06	--	DINT	4	RO	Unit [mm] (2 decimal places) (multiplied by 100 | 0.01 = 100)
Curve 1 window 5 left side force	0x3115	0x07	--	DINT	4	RO	Unit [N] (2 decimal places) (multiplied by 100 | 0.01 = 100)
Curve 1 window 5 right side position	0x3115	0x08	--	DINT	4	RO	Unit [mm] (2 decimal places) (multiplied by 100 | 0.01 = 100)
Curve 1 window 5 right side force	0x3115	0x09	--	DINT	4	RO	Unit [N] (2 decimal places) (multiplied by 100 | 0.01 = 100)
Curve 1 window 5 minimum position	0x3115	0x0A	--	DINT	4	RO	Unit [mm] (2 decimal places) (multiplied by 100 | 0.01 = 100)
Curve 1 window 5 maximum position	0x3115	0x0B	--	DINT	4	RO	Unit [mm] (2 decimal places) (multiplied by 100 | 0.01 = 100)
Curve 1 window 5 minimum force	0x3115	0x0C	--	DINT	4	RO	Unit [N] (2 decimal places) (multiplied by 100 | 0.01 = 100)
Curve 1 window 5 maximum force	0x3115	0x0D	--	DINT	4	RO	Unit [N] (2 decimal places) (multiplied by 100 | 0.01 = 100)

Identifier	Index	Sub index	Value	Data Type	Data Size	Access	Comment
Curve 1 threshold 1	0x3121	0x00	14	UDINT	4	RO	
Curve 1 threshold 1 intersection	0x3121	0x01	--	WORD	2	RO	
Curve 1 threshold 1 position	0x3121	0x02	--	DINT	4	RO	Unit [mm] (2 decimal places) (multiplied by 100 | 0.01 = 100)
Curve 1 threshold 1 force	0x3121	0x03	--	DINT	4	RO	Unit [N] (2 decimal places) (multiplied by 100 | 0.01 = 100)
...							
Curve 1 threshold 5	0x3125	0x00	14	UDINT	4	RO	
Curve 1 threshold 5 intersection	0x3125	0x01	--	WORD	2	RO	
Curve 1 threshold 5 position	0x3125	0x02	--	DINT	4	RO	Unit [mm] (2 decimal places) (multiplied by 100 | 0.01 = 100)
Curve 1 threshold 5 force	0x3125	0x03	--	DINT	4	RO	Unit [N] (2 decimal places) (multiplied by 100 | 0.01 = 100)
Curve 1 envelope 1	0x3131	0x00	22	UDINT	4	RO	
Curve 1 envelope 1 intersection	0x3131	0x01	--	WORD	2	RO	
Curve 1 envelope 1 up side position	0x3131	0x02	--	DINT	4	RO	Unit [mm] (2 decimal places) (multiplied by 100 | 0.01 = 100)
Curve 1 envelope 1 up side force	0x3131	0x03	--	DINT	4	RO	Unit [N] (2 decimal places) (multiplied by 100 | 0.01 = 100)
Curve 1 envelope 1 down side position	0x3131	0x04	--	DINT	4	RO	Unit [mm] (2 decimal places) (multiplied by 100 | 0.01 = 100)
Curve 1 envelope 1 down side force	0x3131	0x05	--	DINT	4	RO	Unit [N] (2 decimal places) (multiplied by 100 | 0.01 = 100)
...							
Curve 1 envelope 5	0x3135	0x00	22	UDINT	4	RO	
Curve 1 envelope 5 intersection	0x3135	0x01	--	WORD	2	RO	
Curve 1 envelope 5 up side position	0x3135	0x02	--	DINT	4	RO	Unit [mm] (2 decimal places) (multiplied by 100 | 0.01 = 100)
Curve 1 envelope 5 up side force	0x3135	0x03	--	DINT	4	RO	Unit [N] (2 decimal places) (multiplied by 100 | 0.01 = 100)
Curve 1 envelope 5 down side position	0x3135	0x04	--	DINT	4	RO	Unit [mm] (2 decimal places) (multiplied by 100 | 0.01 = 100)
Curve 1 envelope 5 down side force	0x3135	0x05	--	DINT	4	RO	Unit [N] (2 decimal places) (multiplied by 100 | 0.01 = 100)
Curve 2	0x3200	0x00	14	UDINT	4	RO	
Curve 2 window 1	0x3211	0x00	54	UDINT	4	RO	

Identifier	Index	Sub index	Value	Data Type	Data Size	Ac-cess	Comment
			...				
Curve 2 window 5	0x3215	0x00	54	UDINT	4	RO	
Curve 2 threshold 1	0x3221	0x00	14	UDINT	4	RO	
			...				
Curve 2 threshold 5	0x3225	0x00	14	UDINT	4	RO	
Curve 2 envelope 1	0x3231	0x00	22	UDINT	4	RO	
			...				
Curve 2 envelope 5	0x3235	0x00	22	UDINT	4	RO	
Curve 3	0x3300	0x00	14	UDINT	4	RO	
Curve 3 window 1	0x3311	0x00	54	UDINT	4	RO	
			...				
Curve 3 window 5	0x3315	0x00	54	UDINT	4	RO	
Curve 3 threshold 1	0x3321	0x00	14	UDINT	4	RO	
			...				
Curve 3 threshold 5	0x3325	0x00	14	UDINT	4	RO	
Curve 3 envelope 1	0x3331	0x00	22	UDINT	4	RO	
			...				
Curve 3 envelope 5	0x3335	0x00	22	UDINT	4	RO	
Curve 4	0x3400	0x00	14	UDINT	4	RO	
Curve 4 window 1	0x3411	0x00	54	UDINT	4	RO	
			...				
Curve 4 window 5	0x3415	0x00	54	UDINT	4	RO	
Curve 4 threshold 1	0x3421	0x00	14	UDINT	4	RO	
			...				
Curve 4 threshold 5	0x3425	0x00	14	UDINT	4	RO	
Curve 4 envelope 1	0x3431	0x00	22	UDINT	4	RO	
			...				
Curve 4 envelope 5	0x3435	0x00	22	UDINT	4	RO	
Curve 5	0x3500	0x00	14	UDINT	4	RO	
Curve 5 window 1	0x3511	0x00	54	UDINT	4	RO	
			...				
Curve 5 window 5	0x3515	0x00	54	UDINT	4	RO	
Curve 5 threshold 1	0x3521	0x00	14	UDINT	4	RO	
			...				
Curve 5 threshold 5	0x3525	0x00	14	UDINT	4	RO	
Curve 5 envelope 1	0x3531	0x00	22	UDINT	4	RO	
			...				
Curve 5 envelope 5	0x3535	0x00	22	UDINT	4	RO	
Sequencer steps	0x4000	0x00	--	UINT	2	RO	
Sequencer step 1	0x4001	0x00	60	UDINT	4	RO	

Identifier	Index	Sub index	Value	Data Type	Data Size	Access	Comment
Sequencer step 1 input 1	0x4001	0x01	--	DWORD	4	RO	
Sequencer step 1 input 2	0x4001	0x02	--	DWORD	4	RO	
Sequencer step 1 input 3	0x4001	0x03	--	DWORD	4	RO	
Sequencer step 1 input 4	0x4001	0x04	--	DWORD	4	RO	
Sequencer step 1 input 5	0x4001	0x05	--	DWORD	4	RO	
Sequencer step 1 input 6	0x4001	0x06	--	DWORD	4	RO	
Sequencer step 1 input 7	0x4001	0x07	--	DWORD	4	RO	
Sequencer step 1 input 8	0x4001	0x08	--	DWORD	4	RO	
Sequencer step 1 input 9	0x4001	0x09	--	DWORD	4	RO	
Sequencer step 1 input 10	0x4001	0x0A	--	DWORD	4	RO	
Sequencer step 1 input 11	0x4001	0x0B	--	DWORD	4	RO	
Sequencer step 1 input 12	0x4001	0x0C	--	DWORD	4	RO	
Sequencer step 1 input 13	0x4001	0x0D	--	DWORD	4	RO	
Sequencer step 1 input 14	0x4001	0x0E	--	DWORD	4	RO	
Sequencer step 100	0x4100	0x00	60	UDINT	4	RO	
...							
Recipes no.	0x5000	0x00	--	USINT	1	RO	
Recipe 1 windowing active	0x5100	0x00	--	BOOL	1	RO	
Recipe 1 window 1	0x5111	0x00	38	UDINT	4	RO	
Recipe 1 window 1 active	0x5111	0x01	--	BOOL	1	RO	
Recipe 1 window 1 mode config.	0x5111	0x02	--	BOOL	1	RO	
Recipe 1 window 1 config. min. position	0x5111	0x03	--	BOOL	1	RO	
Recipe 1 window 1 min. position value	0x5111	0x04	--	DINT	4	RO	Unit [mm] (2 decimal places) (multiplied by 100 | 0.01 = 100)
Recipe 1 window 1 min. position variable	0x5111	0x05	--	UINT	2	RO	
Recipe 1 window 1 config. max. position	0x5111	0x06	--	BOOL	1	RO	
Recipe 1 window 1 max. position value	0x5111	0x07	--	DINT	4	RO	Unit [mm] (2 decimal places) (multiplied by 100 | 0.01 = 100)
Recipe 1 window 1 max. position variable	0x5111	0x08	--	UINT	2	RO	
Recipe 1 window 1 config. min. force	0x5111	0x09	--	BOOL	1	RO	
Recipe 1 window 1 min. force value	0x5111	0x0A	--	DINT	4	RO	Unit [N] (2 decimal places) (multiplied by 100 | 0.01 = 100)
Recipe 1 window 1 min. force variable	0x5111	0x0B	--	UINT	2	RO	
Recipe 1 window 1 config. max. force	0x5111	0x0C	--	BOOL	1	RO	

Identifier	Index	Sub index	Value	Data Type	Data Size	Access	Comment
Recipe 1 window 1 max. force value	0x5111	0x0D	--	DINT	4	RO	Unit [N] (2 decimal places) (multiplied by 100 | 0.01 = 100)
Recipe 1 window 1 max. force variable	0x5111	0x0E	--	UINT	2	RO	
Recipe 1 window 1 config. down side	0x5111	0x0F	--	USINT	1	RO	
Recipe 1 window 1 config. up side	0x5111	0x10	--	USINT	1	RO	
Recipe 1 window 1 config. left side	0x5111	0x11	--	USINT	1	RO	
Recipe 1 window 1 config. right side	0x5111	0x12	--	USINT	1	RO	
...							
Recipe 1 window 5	0x5115	0x00	38	UDINT	4	RO	
Recipe 1 window 5 active	0x5115	0x01	--	BOOL	1	RO	
Recipe 1 window 5 mode config.	0x5115	0x02	--	BOOL	1	RO	
Recipe 1 window 5 config. min. position	0x5115	0x03	--	BOOL	1	RO	
Recipe 1 window 5 min. position value	0x5115	0x04	--	DINT	4	RO	Unit [mm] (2 decimal places) (multiplied by 100 | 0.01 = 100)
Recipe 1 window 5 min. position variable	0x5115	0x05	--	UINT	2	RO	
Recipe 1 window 5 config. max. position	0x5115	0x06	--	BOOL	1	RO	
Recipe 1 window 5 max. position value	0x5115	0x07	--	DINT	4	RO	Unit [mm] (2 decimal places) (multiplied by 100 | 0.01 = 100)
Recipe 1 window 5 max. position variable	0x5115	0x08	--	UINT	2	RO	
Recipe 1 window 5 config. min. force	0x5115	0x09	--	BOOL	1	RO	
Recipe 1 window 5 min. force value	0x5115	0x0A	--	DINT	4	RO	Unit [N] (2 decimal places) (multiplied by 100 | 0.01 = 100)
Recipe 1 window 5 min. force variable	0x5115	0x0B	--	UINT	2	RO	
Recipe 1 window 5 config. max. force	0x5115	0x0C	--	BOOL	1	RO	
Recipe 1 window 5 max. force value	0x5115	0x0D	--	DINT	4	RO	Unit [N] (2 decimal places) (multiplied by 100 | 0.01 = 100)
Recipe 1 window 5 max. force variable	0x5115	0x0E	--	UINT	2	RO	
Recipe 1 window 5 config. down side	0x5115	0x0F	--	USINT	1	RO	
Recipe 1 window 5 config. up side	0x5115	0x10	--	USINT	1	RO	

Identifier	Index	Sub index	Value	Data Type	Data Size	Access	Comment
Recipe 1 window 5 config. left side	0x5115	0x11	--	USINT	1	RO	
Recipe 1 window 5 config. right side	0x5115	0x12	--	USINT	1	RO	
Recipe 1 threshold active	0x5101	0x00	--	BOOL	1	RO	
Recipe 1 threshold 1	0x5121	0x00	50	UDINT	4	RO	
Recipe 1 threshold 1 active	0x5121	0x01	--	BOOL	1	RO	
Recipe 1 threshold 1 mode config.	0x5121	0x02	--	BOOL	1	RO	
Recipe 1 threshold 1 mode	0x5121	0x03	--	BOOL	1	RO	
Recipe 1 threshold 1 config. position	0x5121	0x04	--	BOOL	1	RO	
Recipe 1 threshold 1 position value	0x5121	0x05	--	DINT	4	RO	Unit [mm] (2 decimal places) (multiplied by 100 | 0.01 = 100)
Recipe 1 threshold 1 position variable	0x5121	0x06	--	UINT	2	RO	
Recipe 1 threshold 1 config. min. position	0x5121	0x07	--	BOOL	1	RO	
Recipe 1 threshold 1 min. position value	0x5121	0x08	--	DINT	4	RO	Unit [mm] (2 decimal places) (multiplied by 100 | 0.01 = 100)
Recipe 1 threshold 1 min. position variable	0x5121	0x09	--	UINT	2	RO	
Recipe 1 threshold 1 config. max. position	0x5121	0x0A	--	BOOL	1	RO	
Recipe 1 threshold 1 max. position value	0x5121	0x0B	--	DINT	4	RO	Unit [mm] (2 decimal places) (multiplied by 100 | 0.01 = 100)
Recipe 1 threshold 1 max. position variable	0x5121	0x0C	--	UINT	2	RO	
Recipe 1 threshold 1 config. force	0x5121	0x0D	--	BOOL	1	RO	
Recipe 1 threshold 1 force value	0x5121	0x0E	--	DINT	4	RO	Unit [N] (2 decimal places) (multiplied by 100 | 0.01 = 100)
Recipe 1 threshold 1 force variable	0x5121	0x0F	--	UINT	2	RO	
Recipe 1 threshold 1 config. min. force	0x5121	0x10	--	BOOL	1	RO	
Recipe 1 threshold 1 min. force value	0x5121	0x11	--	DINT	4	RO	Unit [N] (2 decimal places) (multiplied by 100 | 0.01 = 100)
Recipe 1 threshold 1 min. force variable	0x5121	0x12	--	UINT	2	RO	
Recipe 1 threshold 1 config. max. force	0x5121	0x13	--	BOOL	1	RO	
Recipe 1 threshold 1 max. force value	0x5121	0x14	--	DINT	4	RO	Unit [N] (2 decimal places) (multiplied by 100 | 0.01 = 100)

Identifier	Index	Sub index	Value	Data Type	Data Size	Access	Comment
Recipe 1 threshold 1 max. force variable	0x5121	0x15	--	UINT	2	RO	
Recipe 1 threshold 1 config.	0x5121	0x16	--	USINT	1	RO	
...							
Recipe 1 threshold 5	0x5125	0x00	50	UDINT	4	RO	
Recipe 1 threshold 5 active	0x5125	0x01	--	BOOL	1	RO	
Recipe 1 threshold 5 mode config.	0x5125	0x02	--	BOOL	1	RO	
Recipe 1 threshold 5 mode	0x5125	0x03	--	BOOL	1	RO	
Recipe 1 threshold 5 config. position	0x5125	0x04	--	BOOL	1	RO	
Recipe 1 threshold 5 position value	0x5125	0x05	--	DINT	4	RO	Unit [mm] (2 decimal places) (multiplied by 100 | 0.01 = 100)
Recipe 1 threshold 5 position variable	0x5125	0x06	--	UINT	2	RO	
Recipe 1 threshold 5 config. min. position	0x5125	0x07	--	BOOL	1	RO	
Recipe 1 threshold 5 min. position value	0x5125	0x08	--	DINT	4	RO	Unit [mm] (2 decimal places) (multiplied by 100 | 0.01 = 100)
Recipe 1 threshold 5 min. position variable	0x5125	0x09	--	UINT	2	RO	
Recipe 1 threshold 5 config. max. position	0x5125	0x0A	--	BOOL	1	RO	
Recipe 1 threshold 5 max. position value	0x5125	0x0B	--	DINT	4	RO	Unit [mm] (2 decimal places) (multiplied by 100 | 0.01 = 100)
Recipe 1 threshold 5 max. position variable	0x5125	0x0C	--	UINT	2	RO	
Recipe 1 threshold 5 config. force	0x5125	0x0D	--	BOOL	1	RO	
Recipe 1 threshold 5 force value	0x5125	0x0E	--	DINT	4	RO	Unit [N] (2 decimal places) (multiplied by 100 | 0.01 = 100)
Recipe 1 threshold 5 force variable	0x5125	0x0F	--	UINT	2	RO	
Recipe 1 threshold 5 config. min. force	0x5125	0x10	--	BOOL	1	RO	
Recipe 1 threshold 5 min. force value	0x5125	0x11	--	DINT	4	RO	Unit [N] (2 decimal places) (multiplied by 100 | 0.01 = 100)
Recipe 1 threshold 5 min. force variable	0x5125	0x12	--	UINT	2	RO	
Recipe 1 threshold 5 config. max. force	0x5125	0x13	--	BOOL	1	RO	
Recipe 1 threshold 5 max. force value	0x5125	0x14	--	DINT	4	RO	Unit [N] (2 decimal places) (multiplied by 100 | 0.01 = 100)

Identifier	Index	Sub index	Value	Data Type	Data Size	Access	Comment
Recipe 1 threshold 5 max. force variable	0x5125	0x15	--	UINT	2	RO	
Recipe 1 threshold 5 config.	0x5125	0x16	--	USINT	1	RO	
Recipe 1 envelope active	0x5102	0x00	--	BOOL	1	RO	
Recipe 1 envelope 1	0x5131	0x00	6	UDINT	4	RO	
Recipe 1 envelope 1 active	0x5131	0x01	--	BOOL	1	RO	
Recipe 1 envelope 1 mode config.	0x5131	0x02	--	BOOL	1	RO	
Recipe 1 envelope 1 up side	0x5132	0x00	76	UDINT	4	RO	
Recipe 1 envelope 1 points up side	0x5132	0x01	--	INT	2	RO	
Recipe 1 envelope 1 point up side 1 config. position	0x5132	0x02	--	BOOL	1	RO	
Recipe 1 envelope 1 point up side 1 position value	0x5132	0x03	--	DINT	4	RO	Unit [mm] (2 decimal places) (multiplied by 100 | 0.01 = 100)
Recipe 1 envelope 1 point up side 1 position variable	0x5132	0x04	--	UINT	2	RO	
Recipe 1 envelope 1 point up side 1 config. force	0x5132	0x05	--	BOOL	1	RO	
Recipe 1 envelope 1 point up side 1 force value	0x5132	0x06	--	DINT	4	RO	Unit [N] (2 decimal places) (multiplied by 100 | 0.01 = 100)
Recipe 1 envelope 1 point up side 1 force variable	0x5132	0x07	--	UINT	2	RO	
...							
Recipe 1 envelope 1 point up side 5 config. position	0x5132	0x19	--	BOOL	1	RO	
Recipe 1 envelope 1 point up side 5 position value	0x5132	0x1A	--	DINT	4	RO	Unit [mm] (2 decimal places) (multiplied by 100 | 0.01 = 100)
Recipe 1 envelope 1 point up side 5 position variable	0x5132	0x1B	--	UINT	2	RO	
Recipe 1 envelope 1 point up side 5 config. force	0x5132	0x1C	--	BOOL	1	RO	
Recipe 1 envelope 1 point up side 5 force value	0x5132	0x1D	--	DINT	4	RO	Unit [N] (2 decimal places) (multiplied by 100 | 0.01 = 100)
Recipe 1 envelope 1 point up side 5 force variable	0x5132	0x1E	--	UINT	2	RO	
Recipe 1 envelope 1 down side	0x5133	0x00	76	UDINT	4	RO	
Recipe 1 envelope 1 points down side	0x5133	0x01	--	INT	2	RO	
Recipe 1 envelope 1 point down side 1 config. position	0x5133	0x02	--	BOOL	1	RO	
Recipe 1 envelope 1 point down side 1 position value	0x5133	0x03	--	DINT	4	RO	Unit [mm] (2 decimal places) (multiplied by 100 | 0.01 = 100)

Identifier	Index	Sub index	Value	Data Type	Data Size	Access	Comment
Recipe 1 envelope 1 point down side 1 position variable	0x5133	0x04	--	UINT	2	RO	
Recipe 1 envelope 1 point down side 1 config. force	0x5133	0x05	--	BOOL	1	RO	
Recipe 1 envelope 1 point down side 1 force value	0x5133	0x06	--	DINT	4	RO	Unit [N] (2 decimal places) (multiplied by 100 | 0.01 = 100)
Recipe 1 envelope 1 point down side 1 force variable	0x5133	0x07	--	UINT	2	RO	
...							
Recipe 1 envelope 1 point down side 5 config. position	0x5133	0x19	--	BOOL	1	RO	
Recipe 1 envelope 1 point down side 5 position value	0x5133	0x1A	--	DINT	4	RO	Unit [mm] (2 decimal places) (multiplied by 100 | 0.01 = 100)
Recipe 1 envelope 1 point down side 5 position variable	0x5133	0x1B	--	UINT	2	RO	
Recipe 1 envelope 1 point down side 5 config. force	0x5133	0x1C	--	BOOL	1	RO	
Recipe 1 envelope 1 point down side 5 force value	0x5133	0x1D	--	DINT	4	RO	Unit [N] (2 decimal places) (multiplied by 100 | 0.01 = 100)
Recipe 1 envelope 1 point down side 5 force variable	0x5133	0x1E	--	UINT	2	RO	
...							
Recipe 1 envelope 5	0x513D	0x00	6	UDINT	4	RO	
Recipe 1 envelope 5 active	0x513D	0x01	--	BOOL	1	RO	
Recipe 1 envelope 5 mode config.	0x513D	0x02	--	BOOL	1	RO	
Recipe 1 envelope 5 up side	0x513E	0x00	76	UDINT	4	RO	
Recipe 1 envelope 5 points up side	0x513 E	0x01	--	INT	2	RO	
Recipe 1 envelope 5 point up side 1 config. position	0x513E	0x02	--	BOOL	1	RO	
Recipe 1 envelope 5 point up side 1 position value	0x513E	0x03	--	DINT	4	RO	Unit [mm] (2 decimal places) (multiplied by 100 | 0.01 = 100)
Recipe 1 envelope 5 point up side 1 position variable	0x513E	0x04	--	UINT	2	RO	
Recipe 1 envelope 5 point up side 1 config. force	0x513E	0x05	--	BOOL	1	RO	
Recipe 1 envelope 5 point up side 1 force value	0x513E	0x06	--	DINT	4	RO	Unit [N] (2 decimal places) (multiplied by 100 | 0.01 = 100)
Recipe 1 envelope 5 point up side 1 force variable	0x513E	0x07	--	UINT	2	RO	

Identifier	Index	Sub index	Value	Data Type	Data Size	Ac-cess	Comment
			...				
Recipe 1 envelope 5 point up side 5 config. position	0x513E	0x19	--	BOOL	1	RO	
Recipe 1 envelope 5 point up side 5 position value	0x513E	0x1A	--	DINT	4	RO	Unit [mm] (2 decimal places) (multiplied by 100 | 0.01 = 100)
Recipe 1 envelope 5 point up side 5 position variable	0x513E	0x1B	--	UINT	2	RO	
Recipe 1 envelope 5 point up side 5 config. force	0x513E	0x1C	--	BOOL	1	RO	
Recipe 1 envelope 5 point up side 5 force value	0x513E	0x1D	--	DINT	4	RO	Unit [N] (2 decimal places) (multiplied by 100 | 0.01 = 100)
Recipe 1 envelope 5 point up side 5 force variable	0x513E	0x1E	--	UINT	2	RO	
Recipe 1 envelope 5 down side	0x513F	0x00	76	UDINT	4	RO	
Recipe 1 envelope 5 points down side	0x513F	0x01	--	INT	2	RO	
Recipe 1 envelope 5 point down side 1 config. position	0x513F	0x02	--	BOOL	1	RO	
Recipe 1 envelope 5 point down side 1 position value	0x513F	0x03	--	DINT	4	RO	Unit [mm] (2 decimal places) (multiplied by 100 | 0.01 = 100)
Recipe 1 envelope 5 point down side 1 position variable	0x513F	0x04	--	UINT	2	RO	
Recipe 1 envelope 5 point down side 1 config. force	0x513F	0x05	--	BOOL	1	RO	
Recipe 1 envelope 5 point down side 1 force value	0x513F	0x06	--	DINT	4	RO	Unit [N] (2 decimal places) (multiplied by 100 | 0.01 = 100)
Recipe 1 envelope 5 point down side 1 force variable	0x513F	0x07	--	UINT	2	RO	
			...				
Recipe 1 envelope 5 point down side 5 config. position	0x513F	0x19	--	BOOL	1	RO	
Recipe 1 envelope 5 point down side 5 position value	0x513F	0x1A	--	DINT	4	RO	Unit [mm] (2 decimal places) (multiplied by 100 | 0.01 = 100)
Recipe 1 envelope 5 point down side 5 position variable	0x513F	0x1B	--	UINT	2	RO	
Recipe 1 envelope 5 point down side 5 config. force	0x513F	0x1C	--	BOOL	1	RO	
Recipe 1 envelope 5 point down side 5 force value	0x513F	0x1D	--	DINT	4	RO	Unit [N] (2 decimal places) (multiplied by 100 | 0.01 = 100)
Recipe 1 envelope 5 point down side 5 force variable	0x513F	0x1E	--	UINT	2	RO	
Recipe 2 windowing active	0x5200	0x00	--	BOOL	1	RO	
Recipe 2 window 1	0x5211	0x00	38	UDINT	4	RO	

Identifier	Index	Sub index	Value	Data Type	Data Size	Ac-cess	Comment
			...				
Recipe 2 window 5	0x5215	0x00	38	UDINT	4	RO	
Recipe 2 threshold active	0x5201	0x00	--	BOOL	1	RO	
Recipe 2 threshold 1	0x5221	0x00	50	UDINT	4	RO	
			...				
Recipe 2 threshold 5	0x5225	0x00	50	UDINT	4	RO	
Recipe 2 envelope active	0x5202	0x00	--	BOOL	1	RO	
Recipe 2 envelope 1	0x5231	0x00	6	UDINT	4	RO	
Recipe 2 envelope 1 up side	0x5232	0x00	76	UDINT	4	RO	
Recipe 2 envelope 1 down side	0x5233	0x00	76	UDINT	4	RO	
			...				
Recipe 2 envelope 5	0x523D	0x00	6	UDINT	4	RO	
Recipe 2 envelope 5 up side	0x523E	0x00	76	UDINT	4	RO	
Recipe 2 envelope 5 down side	0x523F	0x00	76	UDINT	4	RO	
Recipe 3 windowing active	0x5300	0x00	--	BOOL	1	RO	
Recipe 3 window 1	0x5311	0x00	38	UDINT	4	RO	
			...				
Recipe 3 window 5	0x5315	0x00	38	UDINT	4	RO	
Recipe 3 threshold active	0x5301	0x00	--	BOOL	1	RO	
Recipe 3 threshold 1	0x5321	0x00	50	UDINT	4	RO	
			...				
Recipe 3 threshold 5	0x5325	0x00	50	UDINT	4	RO	
Recipe 3 envelope active	0x5302	0x00	--	BOOL	1	RO	
Recipe 3 envelope 1	0x5331	0x00	6	UDINT	4	RO	
Recipe 3 envelope 1 up side	0x5332	0x00	76	UDINT	4	RO	
Recipe 3 envelope 1 down side	0x5333	0x00	76	UDINT	4	RO	
			...				
Recipe 3 envelope 5	0x533D	0x00	6	UDINT	4	RO	
Recipe 3 envelope 5 up side	0x533E	0x00	76	UDINT	4	RO	
Recipe 3 envelope 5 down side	0x533F	0x00	76	UDINT	4	RO	
Recipe 4 windowing active	0x5400	0x00	--	BOOL	1	RO	
Recipe 4 window 1	0x5411	0x00	38	UDINT	4	RO	
			...				
Recipe 4 window 5	0x5415	0x00	38	UDINT	4	RO	
Recipe 4 threshold active	0x5401	0x00	--	BOOL	1	RO	
Recipe 4 threshold 1	0x5421	0x00	50	UDINT	4	RO	
			...				
Recipe 4 threshold 5	0x5425	0x00	50	UDINT	4	RO	
Recipe 4 envelope active	0x5402	0x00	--	BOOL	1	RO	
Recipe 4 envelope 1	0x5431	0x00	6	UDINT	4	RO	

Identifier	Index	Sub index	Value	Data Type	Data Size	Ac-cess	Comment
Recipe 4 envelope 1 up side	0x5432	0x00	76	UDINT	4	RO	
Recipe 4 envelope 1 down side	0x5433	0x00	76	UDINT	4	RO	
			...				
Recipe 4 envelope 5	0x543D	0x00	6	UDINT	4	RO	
Recipe 4 envelope 5 up side	0x543E	0x00	76	UDINT	4	RO	
Recipe 4 envelope 5 down side	0x543F	0x00	76	UDINT	4	RO	
Recipe 5 windowing active	0x5500	0x00	--	BOOL	1	RO	
Recipe 5 window 1	0x5511	0x00	38	UDINT	4	RO	
			...				
Recipe 5 window 5	0x5515	0x00	38	UDINT	4	RO	
Recipe 5 threshold active	0x5501	0x00	--	BOOL	1	RO	
Recipe 5 threshold 1	0x5521	0x00	50	UDINT	4	RO	
			...				
Recipe 5 threshold 5	0x5525	0x00	50	UDINT	4	RO	
Recipe 5 envelope active	0x5502	0x00	--	BOOL	1	RO	
Recipe 5 envelope 1	0x5531	0x00	6	UDINT	4	RO	
Recipe 5 envelope 1 up side	0x5532	0x00	76	UDINT	4	RO	
Recipe 5 envelope 1 down side	0x5533	0x00	76	UDINT	4	RO	
			...				
Recipe 5 envelope 5	0x553D	0x00	6	UDINT	4	RO	
Recipe 5 envelope 5 up side	0x553E	0x00	76	UDINT	4	RO	
Recipe 5 envelope 5 down side	0x553F	0x00	76	UDINT	4	RO	

Table 10-1: Object directory