User manual

Function blocks
EasyMode and IO-Link Parameter
RFID-head IQT1-…-IO-V1 on
ICE3 IO-Link Master
TIA Portal

IO-Link RFID-head IQT1-…-IO-V1

Project Name:	**IO-Link RFID-head ISO15693 13,56MHz**
Date:	**16.09.2019**
Creator:	**Karsten Reinhardt**

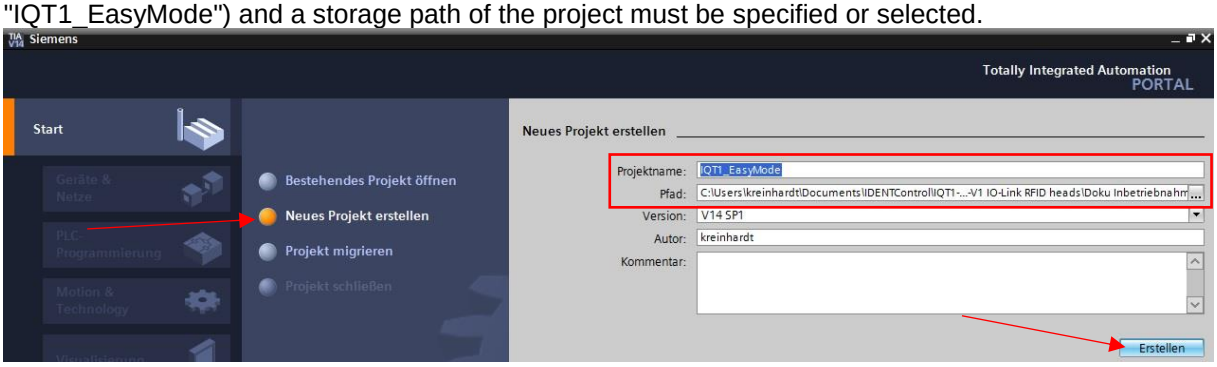
Version history

Version	Release Date	Comment
A	**11.09.2019**	Initial Version

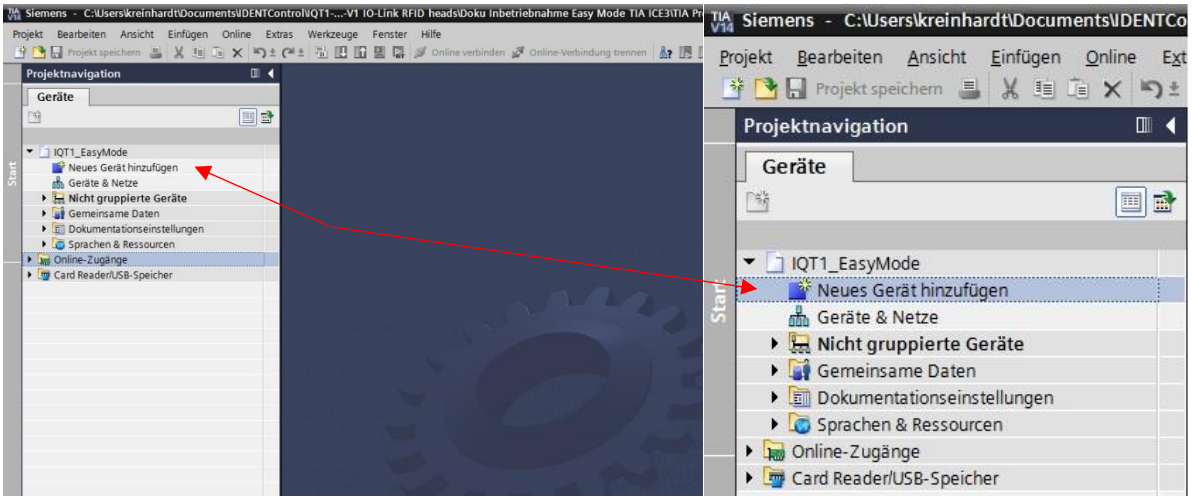
Table of contents

1. Basic PLC configuration

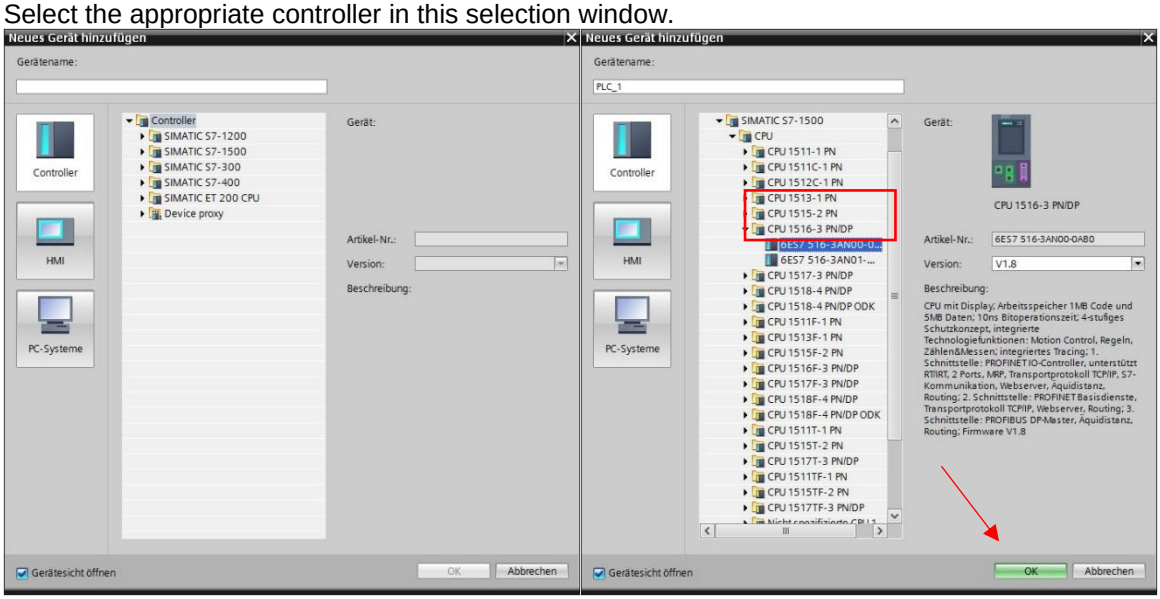
The first step is to create a new control project. For this purpose, a project name (e.g. "IQT1_EasyMode") and a storage path of the project must be specified or selected.

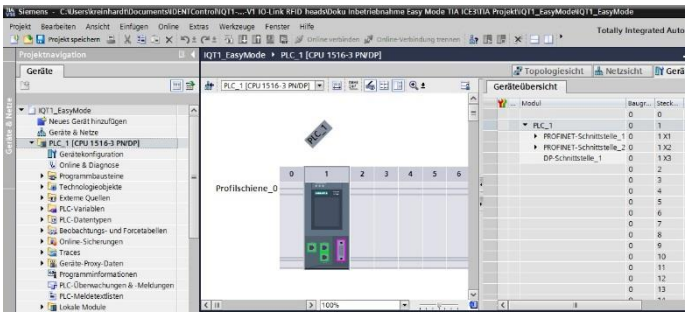


After creating the empty control project, switch to the project view. A selection window opened by "Add new device" in the left-hand project navigation.

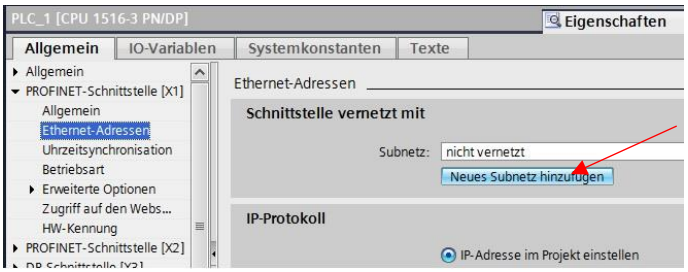


Select the appropriate controller in this selection window.

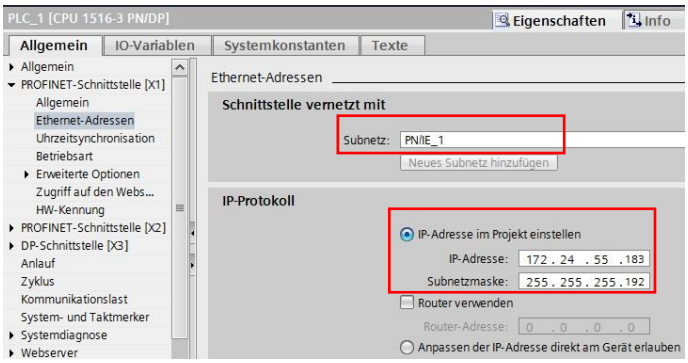




After the assignment of the PLC the project view changes to the setting of the control parameters.

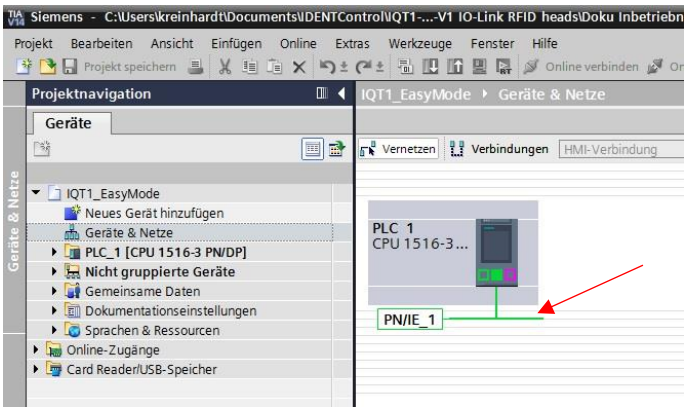


For the Profinet interface X1 a Profinet subnet has to be added under the selection "Ethernet addresses" via the selection "New subnet". This creates a subnet with the designation "PN/IE_1".

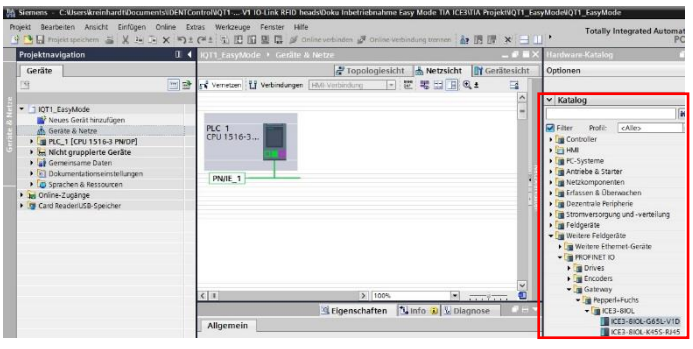


The network parameters (IP address, subnet mask) of the controller must then be set.

IP address: 172.24.55.183
Subnet mask: 255.255.255.192



The network view symbolically shows the set control. Starting from the CPU, the subnet "PN/IE_1" is located.



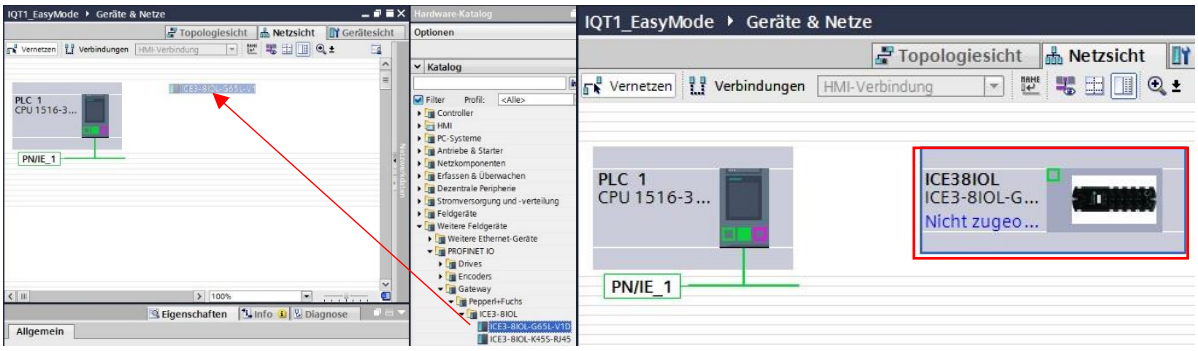
On the right side, you have to call up the hardware catalog and select the GSDML file of the IO-Link Master.

"Additional field devices" → "Profinet IO" → "Gateway" → "Pepperl+Fuchs" ICE3-8IOL

If the GSDML file is not in the catalog, it must first be imported.

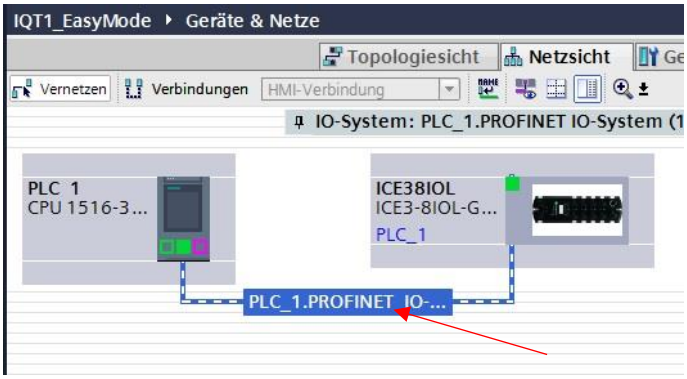
2. Hardware configuration ICE3 IO-Link Master

The GSDML for the IO-Link Master has to pull over from the hardware catalog into the central window of the device view.

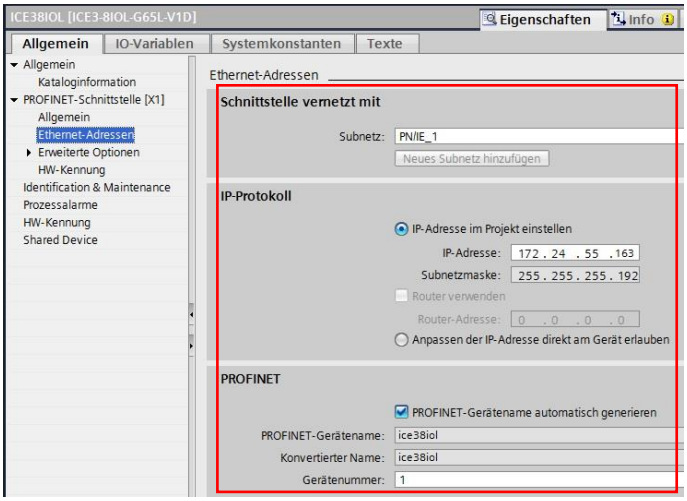


The Profinet connection between IO-Link Master and controller connected manually in the network view via the mouse pointer.

This connects the IO-Link master to the subnet "PN/IE_1".

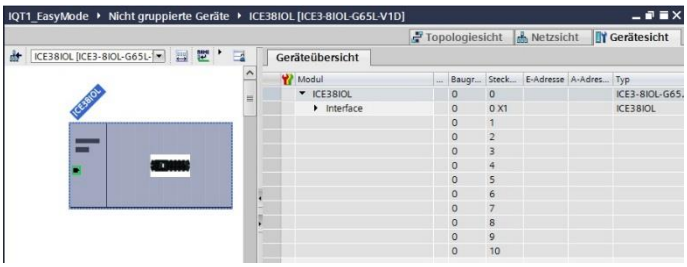


The correct Profinet connection displayed in green. The assignment to the CPU is visible at the IO-Link master (PLC_1).



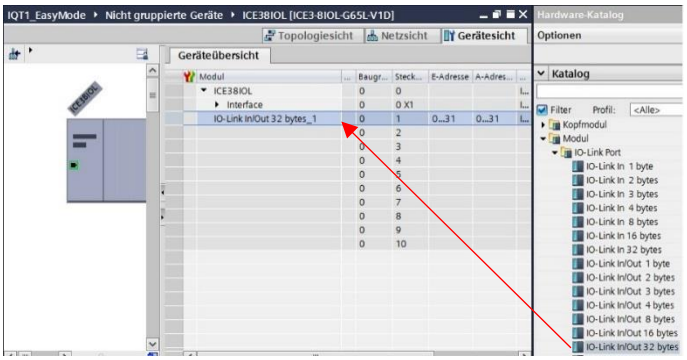
Then the network parameters (IP address, subnet mask) as well as the Profinet name of the IO-Link master must be set.

IP address:	172.24.55.163
Subnet mask:	255.255.255.192
Profinet Name:	ice38iol



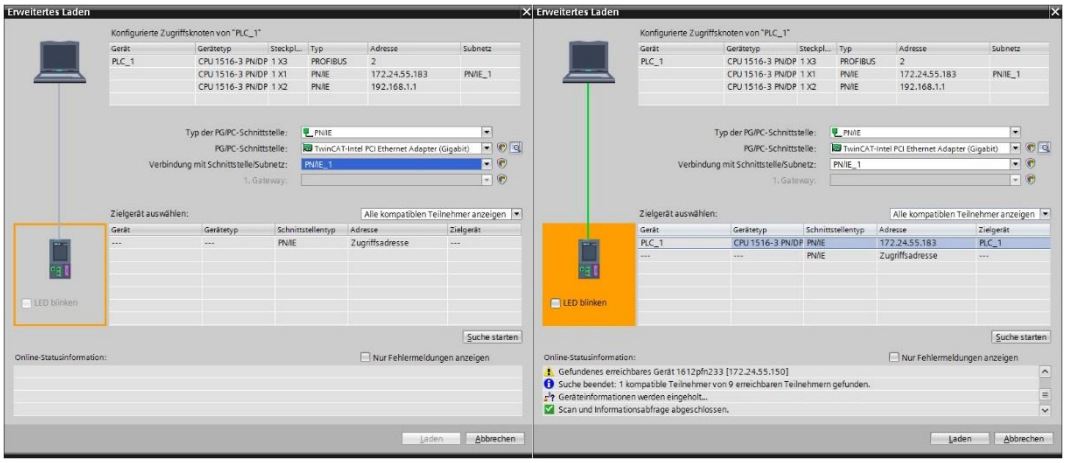
Double-click on the symbol image of the IO-Link Master to open the device view. Here the used communication modules of the IO-Link Master displayed in the delivery state.

No module preset at the factory.



The module has a length of 32 bytes input and 32 bytes output data. It must take from the hardware catalog at slot 1. The address range for the input data starts from input byte 0. The address range for the output data starts from address 0.

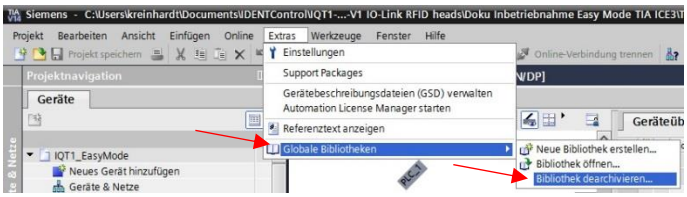
The project engineering must transferred to the controller. To do this, the target partner (control system) must first searched. A list with the possible connection partners displayed. The corresponding partner must selected here.



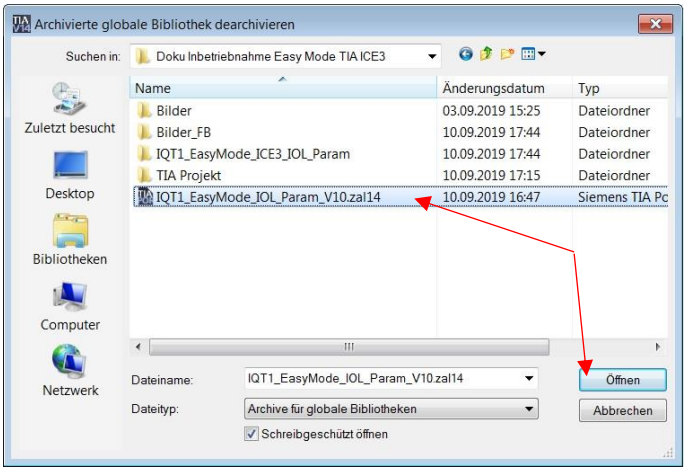
The configuration then transferred to the controller via "Load". The start of the charging process displayed. Additional settings may have to make during the charging process.

3. Import library “IQT1_EasyMode_IOL_Param“

The function blocks "IQT1_EasyMode" and "IO_Link_Device" are located in a library. This library must first be de-archived.

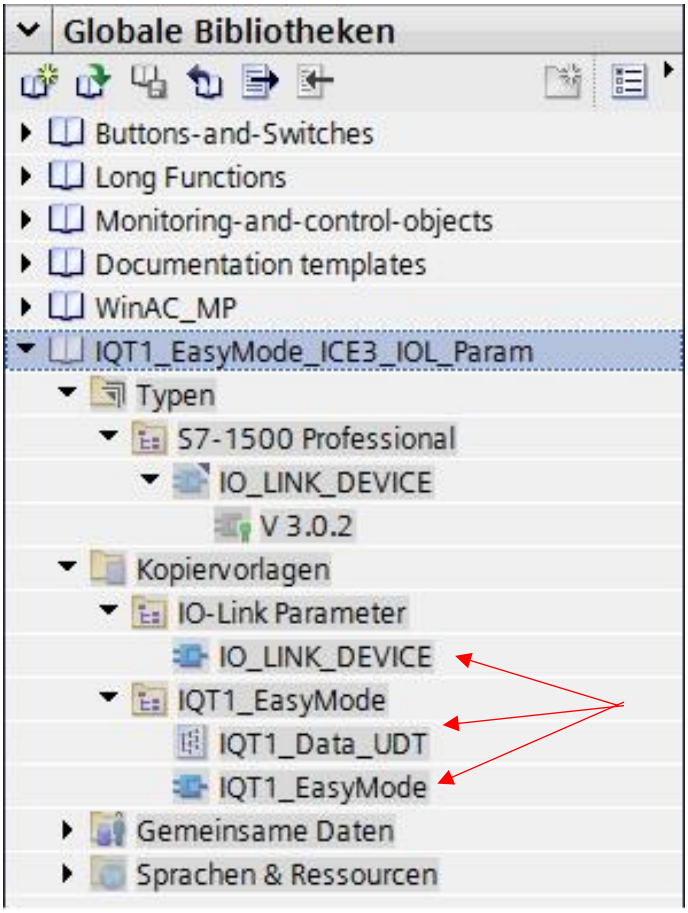


De-archive library:
Extras → Global Libraries → De-archive Library



Select library:

Here:
IQT1_EasyMode_IOL_Param_V10.zal14



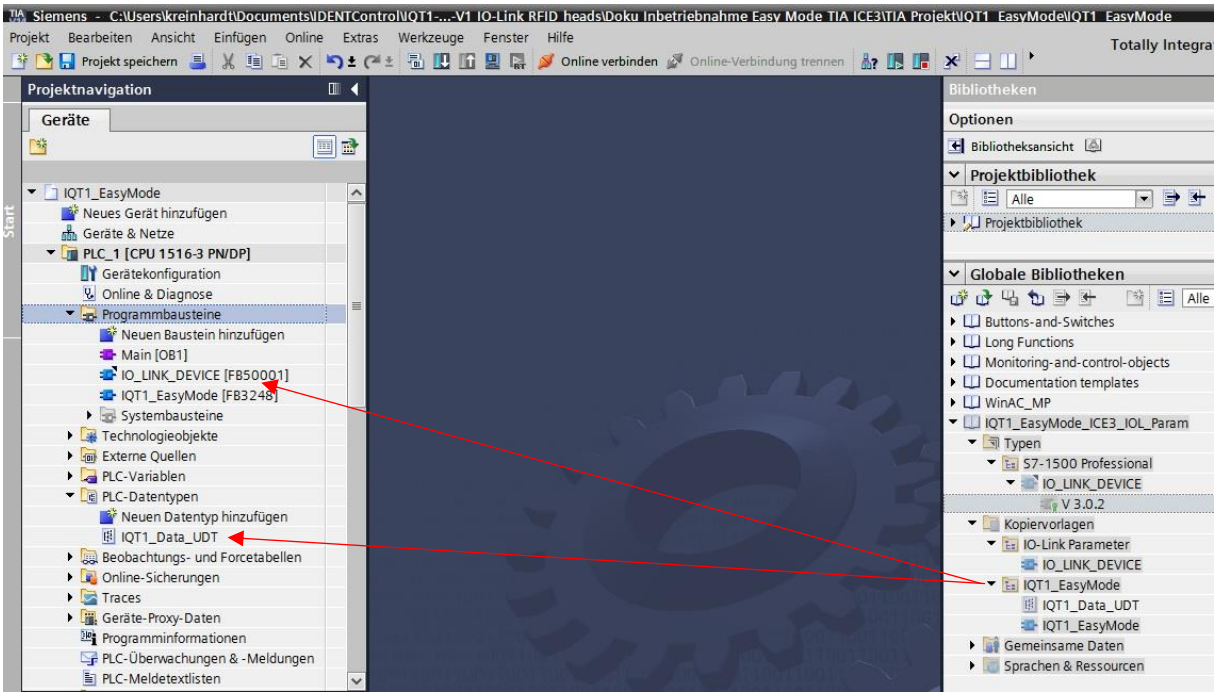
The inserted library "IQT1_EasyMode_ICE3_IOL_Param" appears in the right window. The following blocks are contained in the copy templates:

IO_Link_Device → Function block for access to the IO-Link parameters

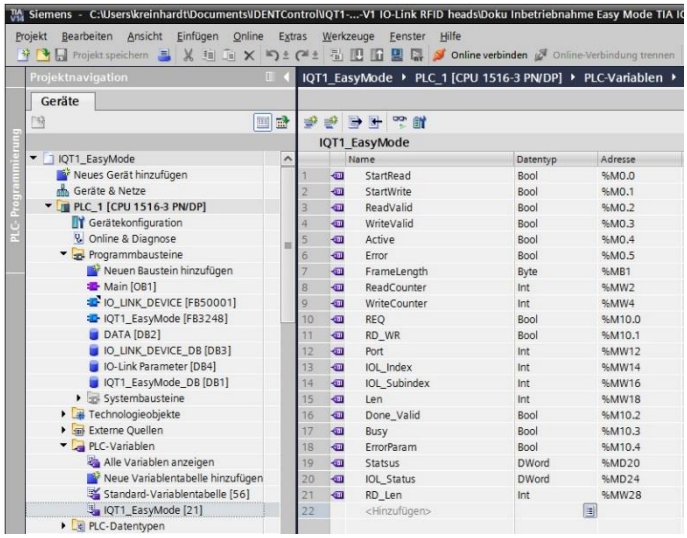
IQT1_Data_UDT → UDT for function block IQT1_EasyMode

IQT1_EasyMode → Function block for communication with the RFID head IQT1-...-IO-V1

The function blocks "IQT1_EasyMode" and "IO_LINK_DEVICE" as well as the UDT "IQT1_Data_UDT" must dragged from the library into the project navigation area.

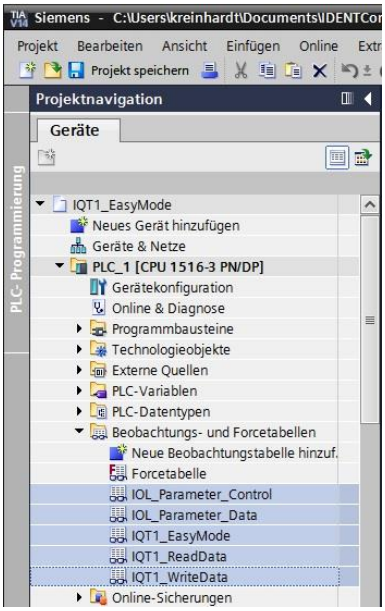


4. Insert observation and variable table



To test the control of the function blocks it recommended create auxiliary variables. To do this, create a new variable table in the "PLC variables" area.

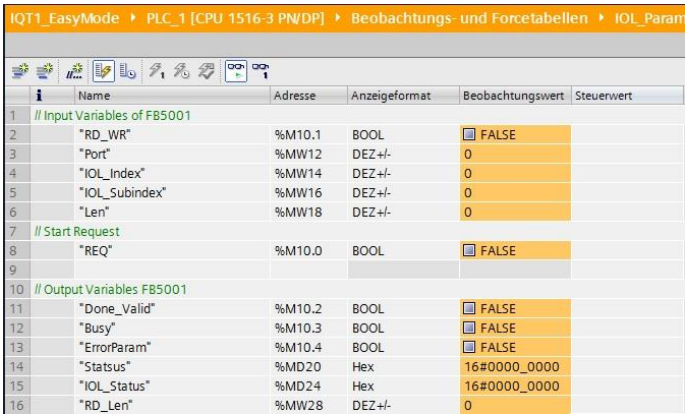
These auxiliary variables (flags) assigned to the inputs and outputs of the function blocks.



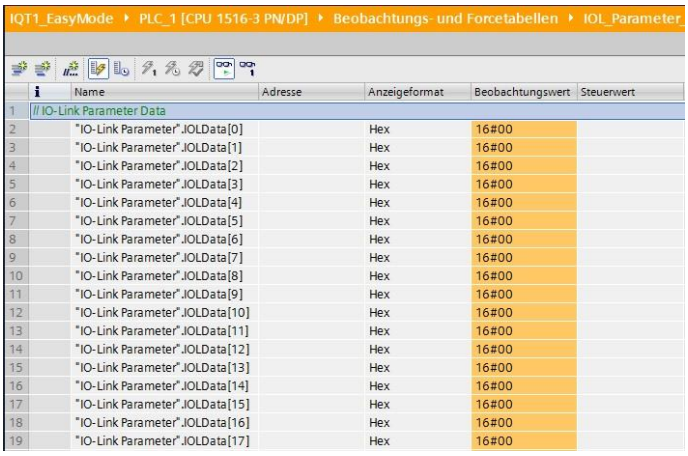
The easiest way to control the function blocks is to use a variable table. Various variable tables must create for this purpose.

IOL_Parameter_Control
→ Control of the function block "IO_LINK_DEVICE".
IOL_Parameter_Data
→ IO-Link data

IQT1_EasyMode
→ Control of the "IQT1_EasyMode" function block
IQT1_ReadData
→ Data read from a data carrier
IQT1_WriteData
→ Data to written to a data carrier



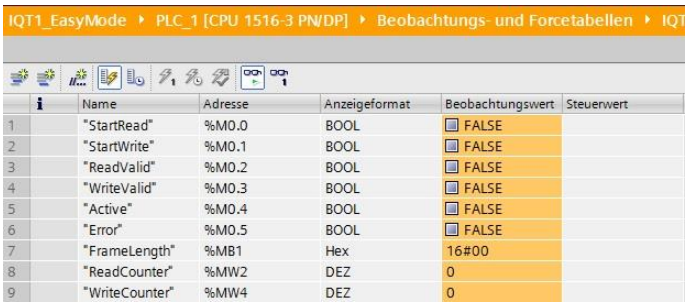
Variable table “IOL_Parameter_Control“



IQT1_EasyMode ▸ PLC_1 [CPU 1516-3 PN/DP] ▸ Beobachtungs- und Forcetabellen ▸ IOL_Parameter_

	Name	Adresse	Anzeigeformat	Beobachtungswert	Steuerwert
1	// IO-Link Parameter Data				
2	"IO-Link Parameter".IOLData[0]		Hex	16#00	
3	"IO-Link Parameter".IOLData[1]		Hex	16#00	
4	"IO-Link Parameter".IOLData[2]		Hex	16#00	
5	"IO-Link Parameter".IOLData[3]		Hex	16#00	
6	"IO-Link Parameter".IOLData[4]		Hex	16#00	
7	"IO-Link Parameter".IOLData[5]		Hex	16#00	
8	"IO-Link Parameter".IOLData[6]		Hex	16#00	
9	"IO-Link Parameter".IOLData[7]		Hex	16#00	
10	"IO-Link Parameter".IOLData[8]		Hex	16#00	
11	"IO-Link Parameter".IOLData[9]		Hex	16#00	
12	"IO-Link Parameter".IOLData[10]		Hex	16#00	
13	"IO-Link Parameter".IOLData[11]		Hex	16#00	
14	"IO-Link Parameter".IOLData[12]		Hex	16#00	
15	"IO-Link Parameter".IOLData[13]		Hex	16#00	
16	"IO-Link Parameter".IOLData[14]		Hex	16#00	
17	"IO-Link Parameter".IOLData[15]		Hex	16#00	
18	"IO-Link Parameter".IOLData[16]		Hex	16#00	
19	"IO-Link Parameter".IOLData[17]		Hex	16#00	

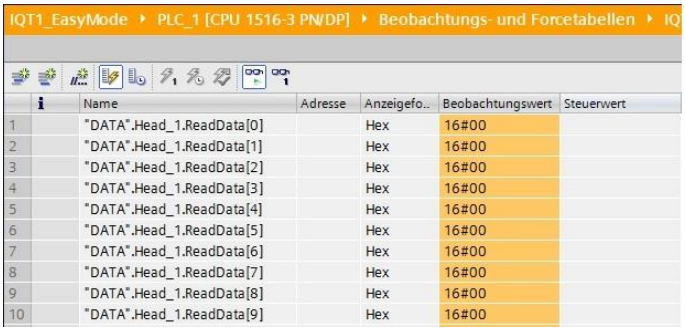
Variable table “IOL_Parameter_Data“



IQT1_EasyMode ▸ PLC_1 [CPU 1516-3 PN/DP] ▸ Beobachtungs- und Forcetabellen ▸ IQT

	Name	Adresse	Anzeigeformat	Beobachtungswert	Steuerwert
1	"StartRead"	%M0.0	BOOL	FALSE	
2	"StartWrite"	%M0.1	BOOL	FALSE	
3	"ReadValid"	%M0.2	BOOL	FALSE	
4	"WriteValid"	%M0.3	BOOL	FALSE	
5	"Active"	%M0.4	BOOL	FALSE	
6	"Error"	%M0.5	BOOL	FALSE	
7	"FrameLength"	%MB1	Hex	16#00	
8	"ReadCounter"	%MW2	DEZ	0	
9	"WriteCounter"	%MW4	DEZ	0	

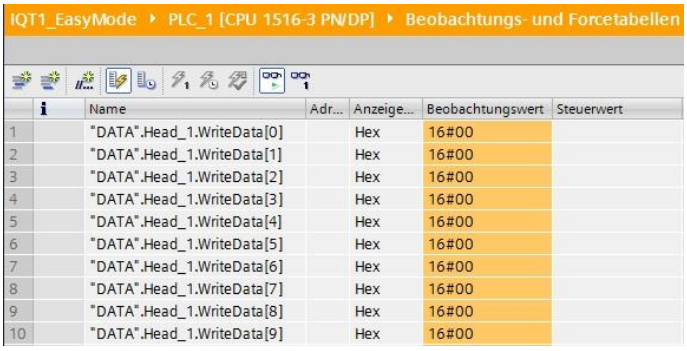
Variable table “IQT1_EasyMode“



IQT1_EasyMode ▸ PLC_1 [CPU 1516-3 PN/DP] ▸ Beobachtungs- und Forcetabellen ▸ IQ

	Name	Adresse	Anzeigefo..	Beobachtungswert	Steuerwert
1	"DATA".Head_1.ReadData[0]		Hex	16#00	
2	"DATA".Head_1.ReadData[1]		Hex	16#00	
3	"DATA".Head_1.ReadData[2]		Hex	16#00	
4	"DATA".Head_1.ReadData[3]		Hex	16#00	
5	"DATA".Head_1.ReadData[4]		Hex	16#00	
6	"DATA".Head_1.ReadData[5]		Hex	16#00	
7	"DATA".Head_1.ReadData[6]		Hex	16#00	
8	"DATA".Head_1.ReadData[7]		Hex	16#00	
9	"DATA".Head_1.ReadData[8]		Hex	16#00	
10	"DATA".Head_1.ReadData[9]		Hex	16#00	

Variable table “IQT1_ReadData“



IQT1_EasyMode ▸ PLC_1 [CPU 1516-3 PN/DP] ▸ Beobachtungs- und Forcetabellen

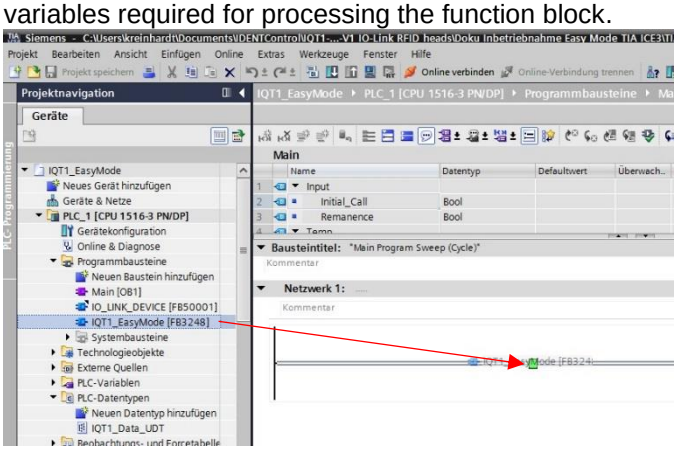
	Name	Adr...	Anzeige...	Beobachtungswert	Steuerwert
1	"DATA".Head_1.WriteData[0]		Hex	16#00	
2	"DATA".Head_1.WriteData[1]		Hex	16#00	
3	"DATA".Head_1.WriteData[2]		Hex	16#00	
4	"DATA".Head_1.WriteData[3]		Hex	16#00	
5	"DATA".Head_1.WriteData[4]		Hex	16#00	
6	"DATA".Head_1.WriteData[5]		Hex	16#00	
7	"DATA".Head_1.WriteData[6]		Hex	16#00	
8	"DATA".Head_1.WriteData[7]		Hex	16#00	
9	"DATA".Head_1.WriteData[8]		Hex	16#00	
10	"DATA".Head_1.WriteData[9]		Hex	16#00	

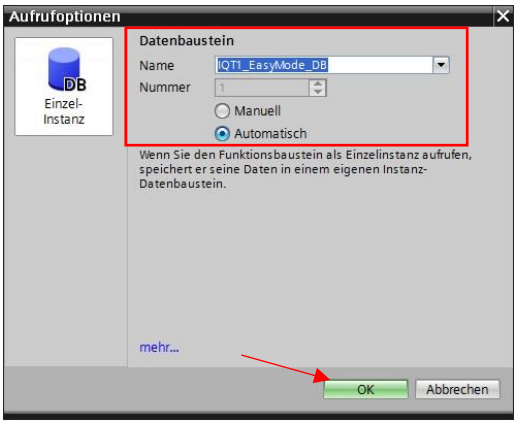
Variable table “IQT1_WriteData“

5. Inserting the function blocks into the PLC project

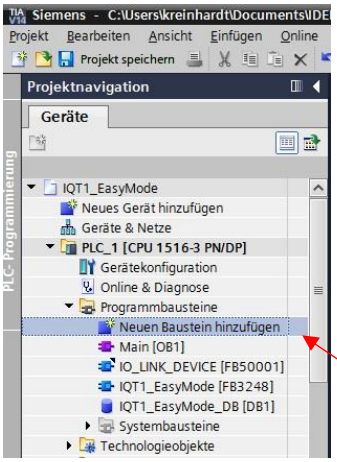
5.1 Function block “IQT1_EasyMode“

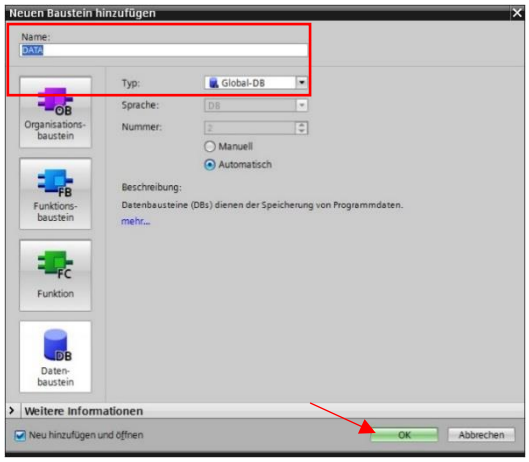
The function block is to be dragged from the project navigation into OB1. Then a window opens for creating the corresponding instance data block "IQT1_EasyMode_DB". This data block contains all variables required for processing the function block.

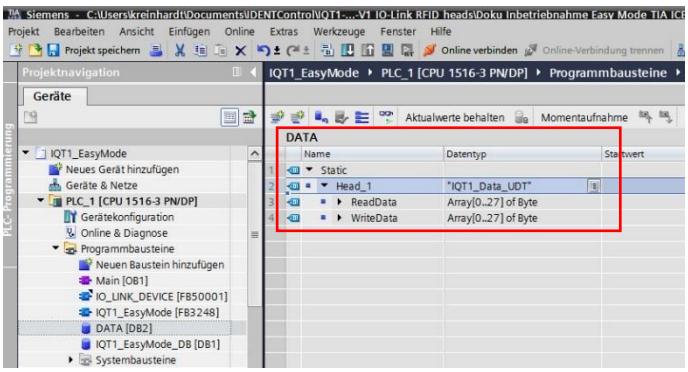




Then a further data block "DATA" must be displayed. This block contains the data read from a data carrier or the write data for a data carrier. The data block parameterized as an IO variable on the function block.



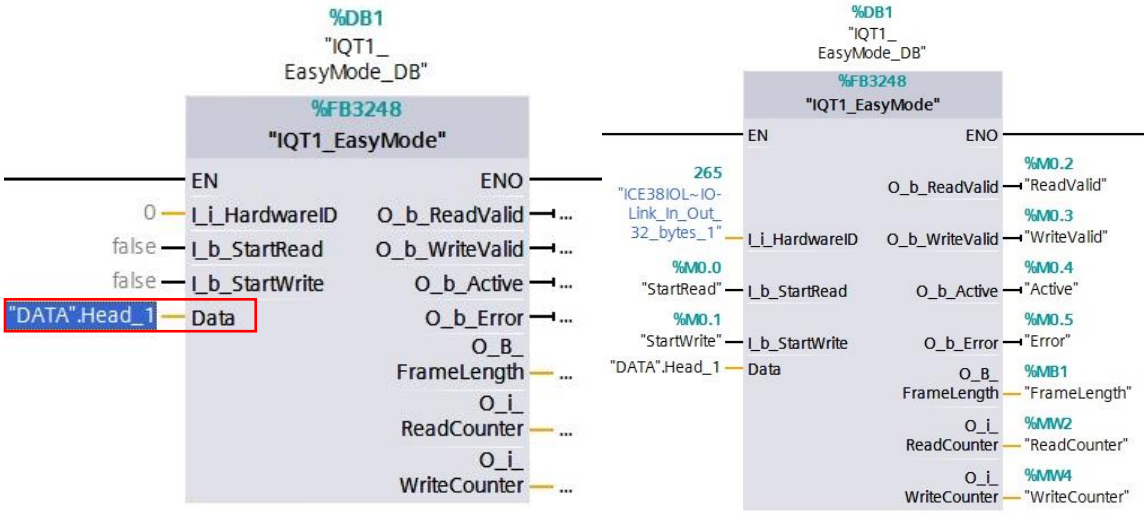




Create a data structure "Head_1" of the data type "IQT1_Data_UDT" within the data block "DATA".

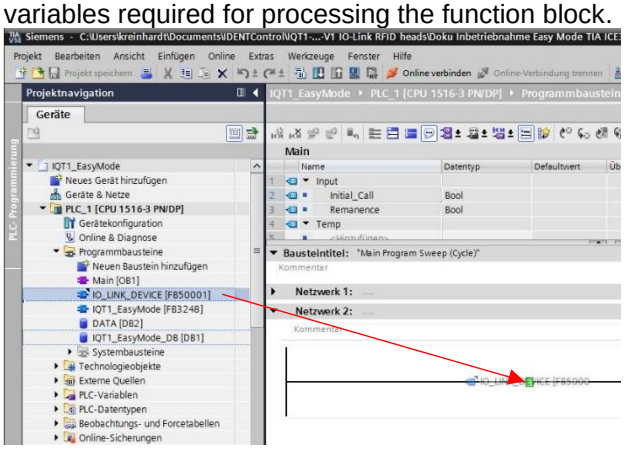
The data structure defined by the UDT.

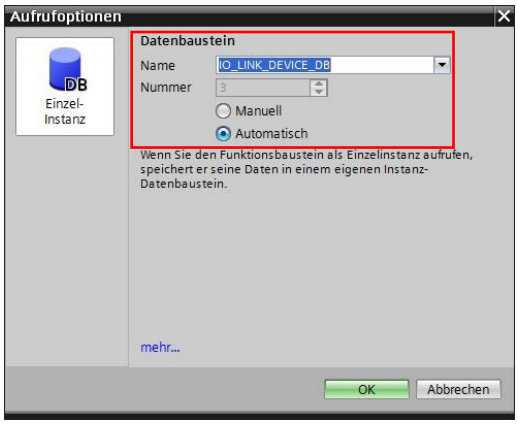
The function module must then connected with the auxiliary variables.



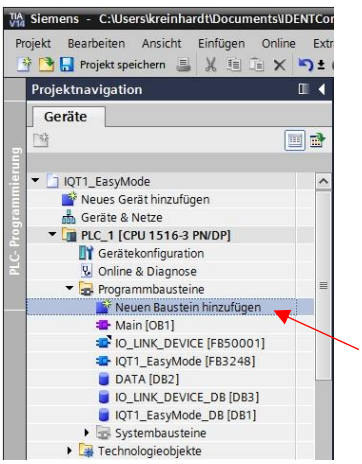
5.2 Function block “IO_LINK_DEVICE““

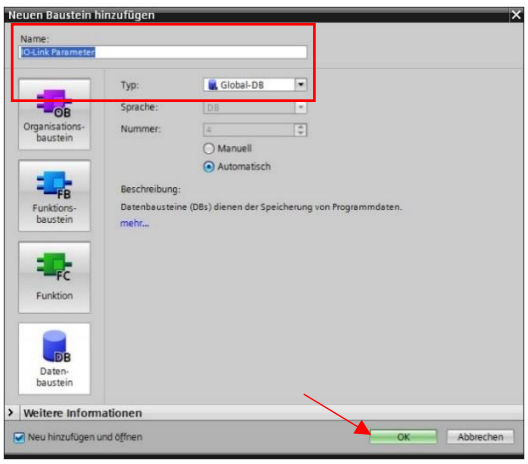
The function block is to be dragged from the project navigation into OB1. Then a window opens for creating the corresponding instance data block "IO_LINK_DEVICE_DB". This data block contains all variables required for processing the function block.

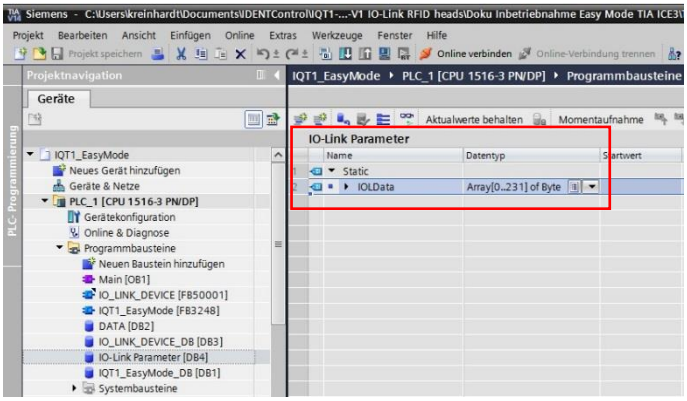




Then a further data block "IO-Link Parameter" must create. This data block contains the parameter values read in by the IO-Link Device or the values to transfer to the device. The data block is parametrized as an IO variable to the function block.

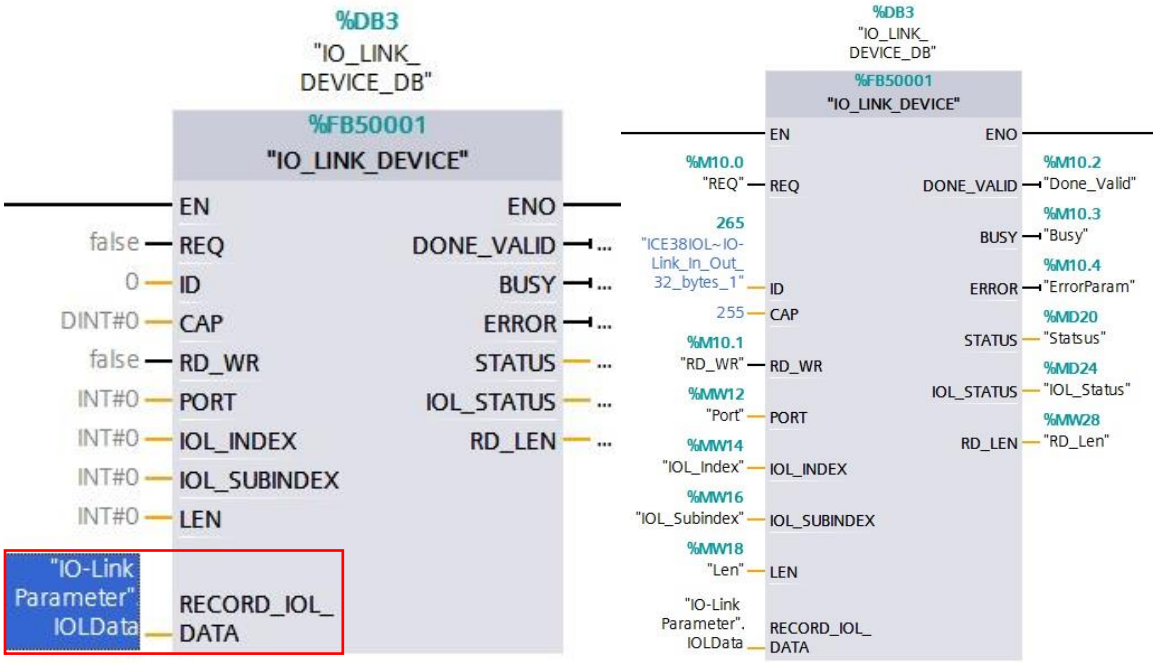






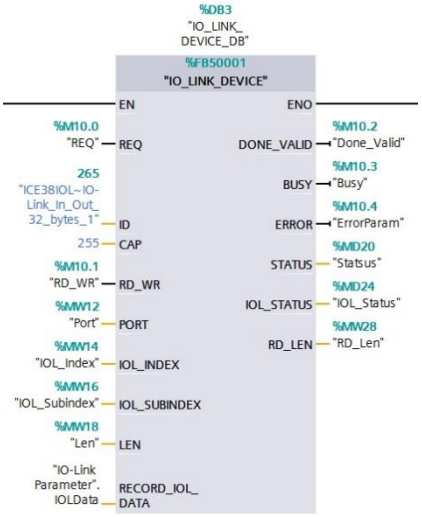
Create a data structure "IOLData". The data structure created as an "array of bytes". The length must be 232 bytes.

The function module must then connected with the auxiliary variables.



6. Function block FB50001 “IO_LINK_DEVICE“

Within the control project, there is a FB50001 "IO_LINK_DEVICE". This function block called together with the data block "IO_LINKDEVICE_DB". This function block can read and change the IO-Link parameters of the RFID head IQT1-...-IO-V1. The following figure shows the call of the function block.

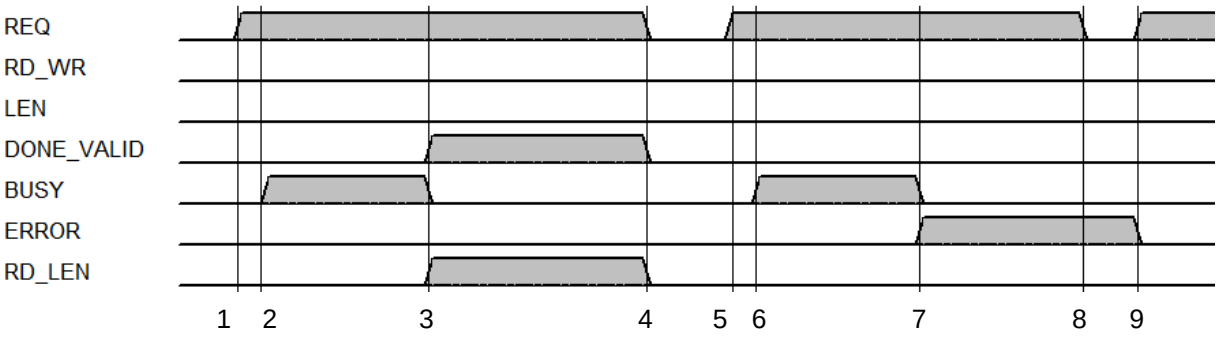


The following table shows the meaning of the input and output variables:

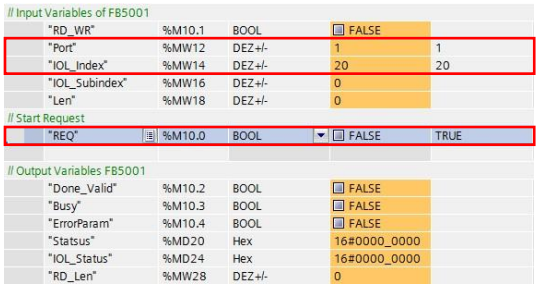
Name	Input / Output	Data type	significance
REQ	Input	Bool	New request / task
ID	Input	HW_IO	Hardware identification of the 32 Byte IO module from the hardware configuration
CAP	Input	DINT	Client Access Point; always 255
RD_WR	Input	Bool	Read and write request to IO-Link Device 0: Read, 1: Write
PORT	Input	INT	Port/ channel number at which the IO-Link Device operated.
IOL_INDEX	Input	INT	Address parameter Index (IO-Link Device)
IOL_SUBINDEX	Input	INT	Address parameter Subindex (IO-Link Device) 0 total Record;
LEN	Input	INT	Length of the data to be written (net data)
RECORD_IOL_DATA	InOut	DB	Data area for READ / WRITE (max. 232 bytes)
DONE_VALID	Output	Bool	Validity 0: Data not valid; 1: Data valid
BUSY	Output	Bool	0: Request completed 1: Request in process
ERROR	Output	Bool	Error Flag 0: no error; 1: abort function with error
STATUS	Output	DWord	DP/ PNIO - error status; ERROR flag = 1 - detailed communication error status
IOL_STATUS	Output	DWord	IO-Link error status; ERROR flag = 1 - detailed IO-Link error status
RD_LEN	Output	INT	Length of the read data record (number of bytes)

The read access to the IO-Link parameters of the RFID head IQT1-...-IO-V1 started by the input variable "REQ" of the function block "IO_LINK_DEVICE". The read access is terminated when the output "DONE_VALID" changes from 0 to 1.

The following figure shows the flow chart for a read access to the IO-Link parameters.

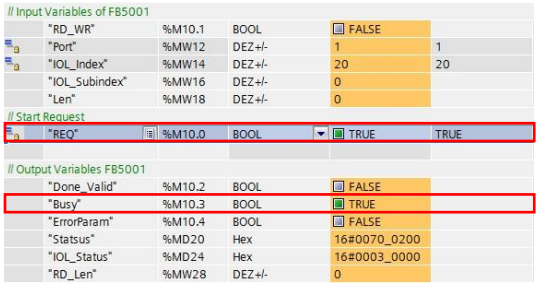


Event	Significance
1	Start request by changing edge from 0 to 1 at input "REQ"; input "RD_WR" remains at 0 to execute read access; input "REQ" remains permanently set; before executing a new request, input "REQ" must first be set to 0; input "LEN" is irrelevant when executing read access
2	“BUSY" output changes from 0 to 1; read access is executed
3	Output "DONE_VALID" changes from 0 to 1 and output "BUSY" changes from 1 to 0; request successfully completed and IO-Link parameters correctly read in; output "RD_LEN" shows the length (in bytes) of the data read in
4	Reset input "REQ" from 1 to 0; all outputs are thus also set to 0.
5	Start request by changing edge from 0 to 1 at input "REQ"; input "RD_WR" remains at 0 to execute read access; input "REQ" remains permanently set; before executing a new request, input "REQ" must first be set to 0; input "LEN" is irrelevant when executing read access
6	“BUSY" output changes from 0 to 1; read access is executed
7	Output "ERROR" changes from 0 to 1 and output "BUSY" changes from 1 to 0; an error has occurred during request processing; an error code is output at the outputs "STATUS" and "IOL_STATUS".
8	Reset of input "REQ" from 1 to 0; output "ERROR" remains set until start of a new request
9	Start request by changing edge from 0 to 1 at input "REQ"; input "RD_WR" remains at 0 to execute read access; reset output "ERROR" to 0



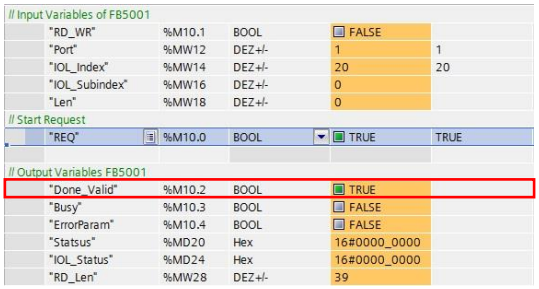
Before executing read request the first time:

RD_WR	:= False	→ Read access
Port	:= 1	→ IO-Link Port 1
IOL_Index	:= 20	→ Product Text
IOL_Subindex	:= 0	→ full index
Len	:= 0	→ not relevant
REQ	:= False	→ Read access not started



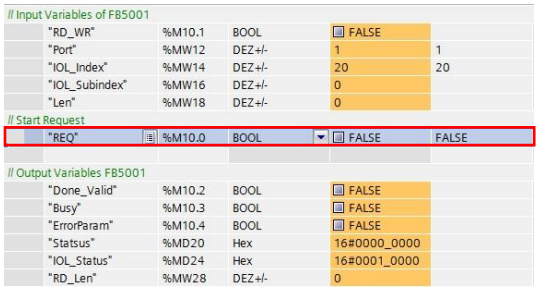
Read access enabled:

REQ	:= True	→ request active
DONE_VALID	= False	→ not finished
BUSY	= True	→ active



Read access successfully completed:

REQ	:= True	→ request active
DONE_VALID	= True	→ finished
BUSY	= False	→ not active
RD_LEN	= 39	→ length of data

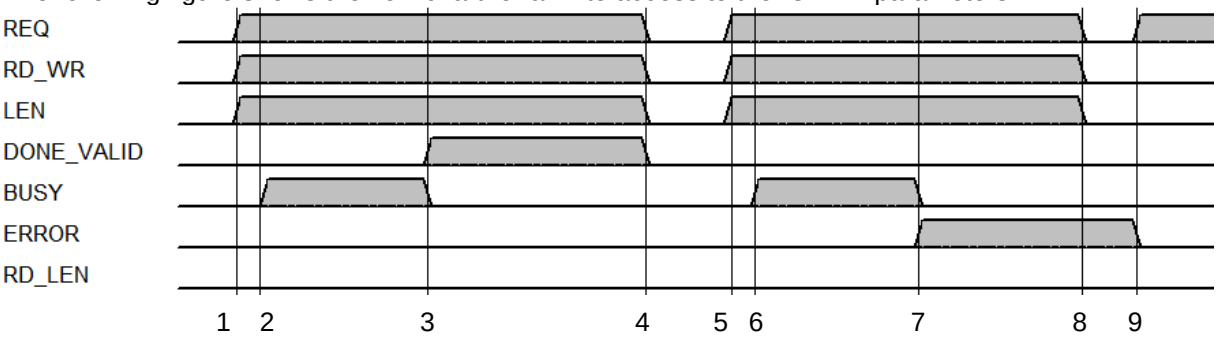


Reset REQ input:

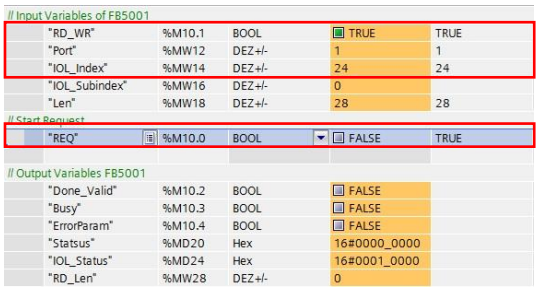
REQ	:= False	→ reset request
DONE_VALID	= False	
BUSY	= False	
RD_LEN	= 0	

The write access to the IO-Link parameters of the RFID head IQT1-...-IO-V1 started by the input variable "REQ" of the function block "IO_LINK_DEVICE". In addition, the input parameter "RD_WR" must be set and the length of the parameter must specified by the input "LEN". The write access is terminated when the output "DONE_VALID" changes from 0 to 1.

The following figure shows the flow chart for a write access to the IO-Link parameters.

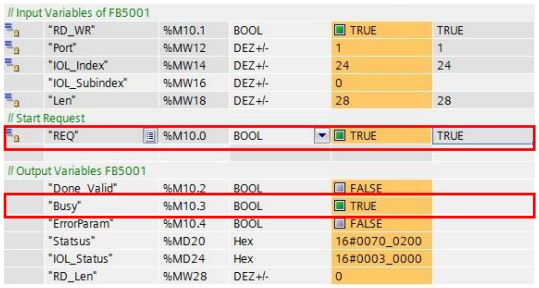


Event	Significance
1	Start request by edge change from 0 to 1 at input "REQ"; input "RD_WR" is set to 1 to execute a write access; the required length information specified by input "LEN".
2	Output "BUSY" changes from 0 to 1; write access is executed
3	Output "DONE_VALID" changes from 0 to 1 and output "BUSY" changes from 1 to 0; request successfully completed and IO-Link parameters correctly transferred or written to
4	Reset input "REQ" from 1 to 0; also reset all other inputs to 0; all outputs are thus also set to 0.
5	Start task by edge change from 0 to 1 at input "REQ"; input "RD_WR" is set to 1 to execute a write access; the required length information is specified by input "LEN"
6	Output "BUSY" changes from 0 to 1; write access is executed
7	Output "ERROR" changes from 0 to 1 and output "BUSY" changes from 1 to 0; an error has occurred during request processing; an error code is output at the outputs "STATUS" and "IOL_STATUS".
8	Reset of input "REQ" from 1 to 0; output "ERROR" remains set until start of a new request
9	Start task by changing edge from 0 to 1 at input "REQ"; input "RD_WR" remains at 0 to execute read access; reset output "ERROR" to 0



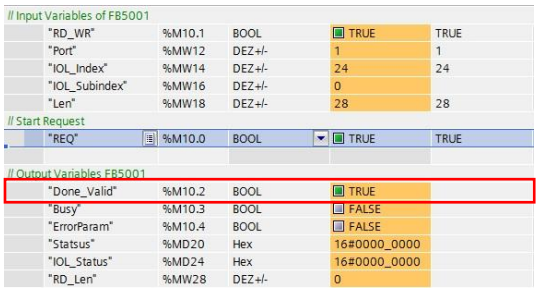
Before write access start:

RD_WR	:= True	→ Write access
Port	:= 1	→ IO-Link Port 1
IOL_Index	:= 24	→ Application specific tag
IOL_Subindex	:= 0	→ full Index
Len	:= 28	→ 28 Byte data



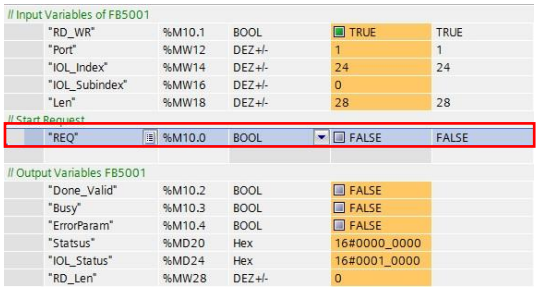
Write access active:

REQ	:= True	→ request active
DONE_VALID	= False	→ not finished
BUSY	= True	→ active



Write access successfully finished:

REQ	:= True	→ request active
DONE_VALID	= True	→ finished
BUSY	= False	→ not active
RD_LEN	= 0	→ not relevant



Reset REQ input:

REQ	:= False	→ Reset request
DONE_VALID	= False	
BUSY	= False	
RD_LEN	= 0	

The parameters differ in standard parameters and device-specific parameters. Every IO-Link device supports the standard parameters. The device-specific parameters only apply to the RFID heads IQT1-...-IO-V1.

Standard parameter:

Parameter 12 „Device Access Locks“:
The parameter "Device Access Locks" offers the possibility to activate write protection for the device parameters. This means that the IO-Link device parameters can no longer changed. In addition, the data storage of the device can switched off.

// Input Variables of FB5001				
"RD_WR"	%M10.1	BOOL	FALSE	
"Port"	%MW12	DEZ+/-	1	1
"IOL_Index"	%MW14	DEZ+/-	12	12
"IOL_Subindex"	%MW16	DEZ+/-	0	
"Len"	%MW18	DEZ+/-	0	
// Start Request				
"REQ"	%M10.0	BOOL	TRUE	TRUE
// Output Variables FB5001				
"Done_Valid"	%M10.2	BOOL	TRUE	
"Busy"	%M10.3	BOOL	FALSE	
"ErrorParam"	%M10.4	BOOL	FALSE	
"Statsus"	%MD20	Hex	16#0000_0000	
"IOL_Status"	%MD24	Hex	16#0000_0000	
"RD_Len"	%MW28	DEZ+/-	2	

// IO-Link Parameter Data		
"IO-Link Parameter".IOLData[0]	Hex	16#00
"IO-Link Parameter".IOLData[1]	Hex	16#00

The following table shows the structure of the "Device Access Locks" parameter.

Index	Sub Index	Length	Value (HEX)	Access	Significance
12	0	2 Byte	16#0000	Read / Write	Not locked, parameters can be changed
12	0	2 Byte	16#0001	Read / Write	Lock for changing parameters
12	0	2 Byte	16#0002	Read / Write	Data storage lock
12	0	2 Byte	16#0003	Read / Write	Lock for changing parameters and data storage

Parameter 16 „Vendor Name“:
Parameter 16 can used to read out the manufacturer name of the IO-Link device.
Here: Pepperl+Fuchs

// Input Variables of FB5001				
"RD_WR"	%M10.1	BOOL	FALSE	
"Port"	%MW12	DEZ+/-	1	1
"IOL_Index"	%MW14	DEZ+/-	16	16
"IOL_Subindex"	%MW16	DEZ+/-	0	
"Len"	%MW18	DEZ+/-	0	
// Start Request				
"REQ"	%M10.0	BOOL	TRUE	TRUE
// Output Variables FB5001				
"Done_Valid"	%M10.2	BOOL	TRUE	
"Busy"	%M10.3	BOOL	FALSE	
"ErrorParam"	%M10.4	BOOL	FALSE	
"Statsus"	%MD20	Hex	16#0000_0000	
"IOL_Status"	%MD24	Hex	16#0000_0000	
"RD_Len"	%MW28	DEZ+/-	13	

// IO-Link Parameter Data		
"IO-Link Parameter".IOLData[0]	Zeichen	'P'
"IO-Link Parameter".IOLData[1]	Zeichen	'e'
"IO-Link Parameter".IOLData[2]	Zeichen	'p'
"IO-Link Parameter".IOLData[3]	Zeichen	'p'
"IO-Link Parameter".IOLData[4]	Zeichen	'e'
"IO-Link Parameter".IOLData[5]	Zeichen	'r'
"IO-Link Parameter".IOLData[6]	Zeichen	'l'
"IO-Link Parameter".IOLData[7]	Zeichen	'+'
"IO-Link Parameter".IOLData[8]	Zeichen	'F'
"IO-Link Parameter".IOLData[9]	Zeichen	'u'
"IO-Link Parameter".IOLData[10]	Zeichen	'c'
"IO-Link Parameter".IOLData[11]	Zeichen	'h'
"IO-Link Parameter".IOLData[12]	Zeichen	's'

Parameter 17 „Vendor Text“:
Parameter 17 contains an additional text to the manufacturer designation.
Here: http://www.pepperl-fuchs.com/io-link

// Input Variables of FB5001				
"RD_WR"	%M10.1	BOOL	FALSE	
"Port"	%MW12	DEZ+/-	1	1
"IOL_Index"	%MW14	DEZ+/-	17	17
"IOL_Subindex"	%MW16	DEZ+/-	0	
"Len"	%MW18	DEZ+/-	0	
// Start Request				
"REQ"	%M10.0	BOOL	TRUE	TRUE
// Output Variables FB5001				
"Done_Valid"	%M10.2	BOOL	TRUE	
"Busy"	%M10.3	BOOL	FALSE	
"ErrorParam"	%M10.4	BOOL	FALSE	
"Statsus"	%MD20	Hex	16#0000_0000	
"IOL_Status"	%MD24	Hex	16#0000_0000	
"RD_Len"	%MW28	DEZ+/-	36	

// IO-Link Parameter Data		
"IO-Link Parameter".IOLData[0]	Zeichen	'h'
"IO-Link Parameter".IOLData[1]	Zeichen	't'
"IO-Link Parameter".IOLData[2]	Zeichen	't'
"IO-Link Parameter".IOLData[3]	Zeichen	'p'
"IO-Link Parameter".IOLData[4]	Zeichen	':'
"IO-Link Parameter".IOLData[5]	Zeichen	'/'
"IO-Link Parameter".IOLData[6]	Zeichen	'/'
"IO-Link Parameter".IOLData[7]	Zeichen	'w'
"IO-Link Parameter".IOLData[8]	Zeichen	'w'
"IO-Link Parameter".IOLData[9]	Zeichen	'w'
"IO-Link Parameter".IOLData[10]	Zeichen	'.'
"IO-Link Parameter".IOLData[11]	Zeichen	'p'
"IO-Link Parameter".IOLData[12]	Zeichen	'e'
"IO-Link Parameter".IOLData[13]	Zeichen	'p'

Parameter 18 „Product Name“:
The designation or the name of the connected IO-Link RFID head can read out via parameter 18.

// Input Variables of FB5001				
"RD_WR"	%M10.1	BOOL	FALSE	
"Port"	%MW12	DEZ+/-	1	1
"IOL_Index"	%MW14	DEZ+/-	18	18
"IOL_Subindex"	%MW16	DEZ+/-	0	
"Len"	%MW18	DEZ+/-	0	
// Start Request				
"REQ"	%M10.0	BOOL	TRUE	TRUE
// Output Variables FB5001				
"Done_Valid"	%M10.2	BOOL	TRUE	
"Busy"	%M10.3	BOOL	FALSE	
"ErrorParam"	%M10.4	BOOL	FALSE	
"Statsus"	%MD20	Hex	16#0000_0000	
"IOL_Status"	%MD24	Hex	16#0000_0000	
"RD_Len"	%MW28	DEZ+/-	13	

// IO-Link Parameter Data		
"IO-Link Parameter".IOLData[0]	Zeichen	'I'
"IO-Link Parameter".IOLData[1]	Zeichen	'Q'
"IO-Link Parameter".IOLData[2]	Zeichen	'T'
"IO-Link Parameter".IOLData[3]	Zeichen	'1'
"IO-Link Parameter".IOLData[4]	Zeichen	'-'
"IO-Link Parameter".IOLData[5]	Zeichen	'F'
"IO-Link Parameter".IOLData[6]	Zeichen	'P'
"IO-Link Parameter".IOLData[7]	Zeichen	'-'
"IO-Link Parameter".IOLData[8]	Zeichen	'I'
"IO-Link Parameter".IOLData[9]	Zeichen	'O'
"IO-Link Parameter".IOLData[10]	Zeichen	'-'
"IO-Link Parameter".IOLData[11]	Zeichen	'V'
"IO-Link Parameter".IOLData[12]	Zeichen	'1'

Parameter 19 „Product ID“:
The article number of the RFID head read out via parameter 19.

// Input Variables of FB5001				
"RD_WR"	%M10.1	BOOL	FALSE	
"Port"	%MW12	DEZ+/-	1	1
"IOL_Index"	%MW14	DEZ+/-	19	19
"IOL_Subindex"	%MW16	DEZ+/-	0	
"Len"	%MW18	DEZ+/-	0	
// Start Request				
"REQ"	%M10.0	BOOL	TRUE	TRUE
// Output Variables FB5001				
"Done_Valid"	%M10.2	BOOL	TRUE	
"Busy"	%M10.3	BOOL	FALSE	
"ErrorParam"	%M10.4	BOOL	FALSE	
"Statsus"	%MD20	Hex	16#0000_0000	
"IOL_Status"	%MD24	Hex	16#0000_0000	
"RD_Len"	%MW28	DEZ+/-	6	

// IO-Link Parameter Data		
"IO-Link Parameter".IOLData[0]	Zeichen	'2'
"IO-Link Parameter".IOLData[1]	Zeichen	'9'
"IO-Link Parameter".IOLData[2]	Zeichen	'9'
"IO-Link Parameter".IOLData[3]	Zeichen	'9'
"IO-Link Parameter".IOLData[4]	Zeichen	'2'
"IO-Link Parameter".IOLData[5]	Zeichen	'9'

Parameter 20 „Product Text“:
Parameter 20 contains an additional text to the product description:
Here: RFID read/write station (HF, ISO 15693)

// Input Variables of FB5001				
"RD_WR"	%M10.1	BOOL	FALSE	
"Port"	%MW12	DEZ+/-	1	1
"IOL_Index"	%MW14	DEZ+/-	20	20
"IOL_Subindex"	%MW16	DEZ+/-	0	
"Len"	%MW18	DEZ+/-	0	
// Start Request				
"REQ"	%M10.0	BOOL	TRUE	TRUE
// Output Variables FB5001				
"Done_Valid"	%M10.2	BOOL	TRUE	
"Busy"	%M10.3	BOOL	FALSE	
"ErrorParam"	%M10.4	BOOL	FALSE	
"Statsus"	%MD20	Hex	16#0000_0000	
"IOL_Status"	%MD24	Hex	16#0000_0000	
"RD_Len"	%MW28	DEZ+/-	39	

// IO-Link Parameter Data		
"IO-Link Parameter".IOLData[0]	Zeichen	'R'
"IO-Link Parameter".IOLData[1]	Zeichen	'F'
"IO-Link Parameter".IOLData[2]	Zeichen	'I'
"IO-Link Parameter".IOLData[3]	Zeichen	'D'
"IO-Link Parameter".IOLData[4]	Zeichen	' '
"IO-Link Parameter".IOLData[5]	Zeichen	'r'
"IO-Link Parameter".IOLData[6]	Zeichen	'e'
"IO-Link Parameter".IOLData[7]	Zeichen	'a'
"IO-Link Parameter".IOLData[8]	Zeichen	'd'
"IO-Link Parameter".IOLData[9]	Zeichen	'/'
"IO-Link Parameter".IOLData[10]	Zeichen	'w'
"IO-Link Parameter".IOLData[11]	Zeichen	'r'
"IO-Link Parameter".IOLData[12]	Zeichen	'i'
"IO-Link Parameter".IOLData[13]	Zeichen	't'

Parameter 21 „Serial Number“:
The RFID head has a unique serial number. This can read out via parameter 21.

// Input Variables of FB5001				
"RD_WR"	%M10.1	BOOL	FALSE	
"Port"	%MW12	DEZ+/-	1	1
"IOL_Index"	%MW14	DEZ+/-	21	21
"IOL_Subindex"	%MW16	DEZ+/-	0	
"Len"	%MW18	DEZ+/-	0	
// Start Request				
"REQ"	%M10.0	BOOL	TRUE	TRUE
// Output Variables FB5001				
"Done_Valid"	%M10.2	BOOL	TRUE	
"Busy"	%M10.3	BOOL	FALSE	
"ErrorParam"	%M10.4	BOOL	FALSE	
"Statsus"	%MD20	Hex	16#0000_0000	
"IOL_Status"	%MD24	Hex	16#0000_0000	
"RD_Len"	%MW28	DEZ+/-	14	

// IO-Link Parameter Data		
"IO-Link Parameter".IOLData[0]	Zeichen	'4'
"IO-Link Parameter".IOLData[1]	Zeichen	'0'
"IO-Link Parameter".IOLData[2]	Zeichen	'0'
"IO-Link Parameter".IOLData[3]	Zeichen	'0'
"IO-Link Parameter".IOLData[4]	Zeichen	'0'
"IO-Link Parameter".IOLData[5]	Zeichen	'0'
"IO-Link Parameter".IOLData[6]	Zeichen	'6'
"IO-Link Parameter".IOLData[7]	Zeichen	'6'
"IO-Link Parameter".IOLData[8]	Zeichen	'7'
"IO-Link Parameter".IOLData[9]	Zeichen	'5'
"IO-Link Parameter".IOLData[10]	Zeichen	'2'
"IO-Link Parameter".IOLData[11]	Zeichen	'8'
"IO-Link Parameter".IOLData[12]	Zeichen	'0'
"IO-Link Parameter".IOLData[13]	Zeichen	'8'

Parameter 22 „Hardware Revision“:
The hardware version of the RFID head is contained in parameter 22.

// Input Variables of FB5001				
"RD_WR"	%M10.1	BOOL	FALSE	
"Port"	%MW12	DEZ+/-	1	1
"IOL_Index"	%MW14	DEZ+/-	22	22
"IOL_Subindex"	%MW16	DEZ+/-	0	
"Len"	%MW18	DEZ+/-	0	
// Start Request				
"REQ"	%M10.0	BOOL	TRUE	TRUE
// Output Variables FB5001				
"Done_Valid"	%M10.2	BOOL	TRUE	
"Busy"	%M10.3	BOOL	FALSE	
"ErrorParam"	%M10.4	BOOL	FALSE	
"Statsus"	%MD20	Hex	16#0000_0000	
"IOL_Status"	%MD24	Hex	16#0000_0000	
"RD_Len"	%MW28	DEZ+/-	7	

// IO-Link Parameter Data		
"IO-Link Parameter".IOLData[0]	Zeichen	'H'
"IO-Link Parameter".IOLData[1]	Zeichen	'W'
"IO-Link Parameter".IOLData[2]	Zeichen	'0'
"IO-Link Parameter".IOLData[3]	Zeichen	'1'
"IO-Link Parameter".IOLData[4]	Zeichen	'.'
"IO-Link Parameter".IOLData[5]	Zeichen	'0'
"IO-Link Parameter".IOLData[6]	Zeichen	'1'

Parameter 23 „Firmware Revision“:
The RFID head contains two different software. The software designation and the release date can read out via parameter 23.

// Input Variables of FB5001				
"RD_WR"	%M10.1	BOOL	FALSE	
"Port"	%MW12	DEZ+/-	1	1
"IOL_Index"	%MW14	DEZ+/-	23	23
"IOL_Subindex"	%MW16	DEZ+/-	0	
"Len"	%MW18	DEZ+/-	0	
// Start Request				
"REQ"	%M10.0	BOOL	TRUE	TRUE
// Output Variables FB5001				
"Done_Valid"	%M10.2	BOOL	TRUE	
"Busy"	%M10.3	BOOL	FALSE	
"ErrorParam"	%M10.4	BOOL	FALSE	
"Statsus"	%MD20	Hex	16#0000_0000	
"IOL_Status"	%MD24	Hex	16#0000_0000	
"RD_Len"	%MW28	DEZ+/-	35	

// IO-Link Parameter Data		
"IO-Link Parameter".IOLData[0]	Zeichen	'1'
"IO-Link Parameter".IOLData[1]	Zeichen	'8'
"IO-Link Parameter".IOLData[2]	Zeichen	'3'
"IO-Link Parameter".IOLData[3]	Zeichen	'3'
"IO-Link Parameter".IOLData[4]	Zeichen	'2'
"IO-Link Parameter".IOLData[5]	Zeichen	'9'
"IO-Link Parameter".IOLData[6]	Zeichen	'8'
"IO-Link Parameter".IOLData[7]	Zeichen	':'
"IO-Link Parameter".IOLData[8]	Zeichen	' '
"IO-Link Parameter".IOLData[9]	Zeichen	'1'
"IO-Link Parameter".IOLData[10]	Zeichen	'4'
"IO-Link Parameter".IOLData[11]	Zeichen	'.'
"IO-Link Parameter".IOLData[12]	Zeichen	'0'
"IO-Link Parameter".IOLData[13]	Zeichen	'6'

Parameter 24 „Application Specific Tag“:
This parameter can used to store user information in the IO-Link parameters. For example, the installation location can saved.

// Input Variables of FB5001				
"RD_WR"	%M10.1	BOOL	FALSE	
"Port"	%MW12	DEZ+/-	1	1
"IOL_Index"	%MW14	DEZ+/-	24	24
"IOL_Subindex"	%MW16	DEZ+/-	0	
"Len"	%MW18	DEZ+/-	0	
// Start Request				
"REQ"	%M10.0	BOOL	TRUE	TRUE
// Output Variables FB5001				
"Done_Valid"	%M10.2	BOOL	TRUE	
"Busy"	%M10.3	BOOL	FALSE	
"ErrorParam"	%M10.4	BOOL	FALSE	
"Statsus"	%MD20	Hex	16#0000_0000	
"IOL_Status"	%MD24	Hex	16#0000_0000	
"RD_Len"	%MW28	DEZ+/-	29	

// IO-Link Parameter Data		
"IO-Link Parameter".IOLData[0]	Zeichen	'Y'
"IO-Link Parameter".IOLData[1]	Zeichen	'o'
"IO-Link Parameter".IOLData[2]	Zeichen	'u'
"IO-Link Parameter".IOLData[3]	Zeichen	'r'
"IO-Link Parameter".IOLData[4]	Zeichen	' '
"IO-Link Parameter".IOLData[5]	Zeichen	'a'
"IO-Link Parameter".IOLData[6]	Zeichen	'u'
"IO-Link Parameter".IOLData[7]	Zeichen	't'
"IO-Link Parameter".IOLData[8]	Zeichen	'o'
"IO-Link Parameter".IOLData[9]	Zeichen	'm'
"IO-Link Parameter".IOLData[10]	Zeichen	'a'
"IO-Link Parameter".IOLData[11]	Zeichen	't'
"IO-Link Parameter".IOLData[12]	Zeichen	'i'
"IO-Link Parameter".IOLData[13]	Zeichen	'o'

Device specific Parameter:

Parameter 201 „TagType“:

The "TagType" parameter used to set the chip type of the data carrier. The RFID head IQT1-...-IO-V1 supports various chip types. Chip type "20" is set on delivery. Thus, the Fixcode of all ISO15693 compatible data carriers can read out.

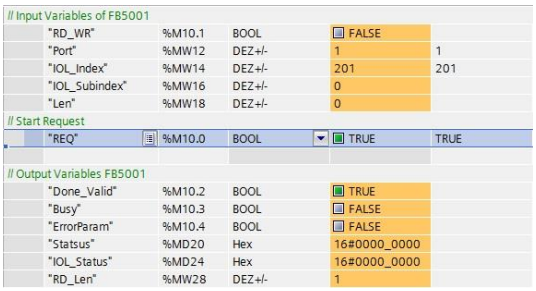
The adjustment of the data carrier recommended in order adjust the RFID head appropriately. The value of the data carrier type corresponds to the two digits after "IQCxx". Otherwise, the manufacturer's designation of the chips applies.

The following table shows the supported tag types.

Name	Tag Type	Value (HEX)	Access	Fixcode	Data	Block size	Chip	Frequency
	20	16#14	Read Fixcode	8 Byte	-	-	All ISO15693 data carrier	13,56MHz
IQC21	21	16#15	Read Fixcode Read / Write Data	8 Byte	112 Byte	4	I-Code SLI(X)	13,56MHz
IQC22	22	16#16	Read Fixcode Read / Write Data	8 Byte	256 Byte	4	Tag-It HF-I Plus	13,56MHz
IQC23	23	16#17	Read Fixcode Read / Write Data	8 Byte	224 Byte	4	My-d SRF55V02P	13,56MHz
IQC24	24	16#18	Read Fixcode Read / Write Data	8 Byte	928 Byte	4	My-d SRF55V10P	13,56MHz
IQC27	27	16#1B	Read Fixcode Read / Write Data	8 Byte	288 Byte	4	EM4135	13,56MHz
IQC31	31	16#1F	Read Fixcode Read / Write Data	8 Byte	32 Byte	4	Tag-It HF-I Standard	13,56MHz
IQC32	32	16#20	Read Fixcode Read / Write Data	8 Byte	32 Byte	4	Tag-It HF-I Pro	13,56MHz
IQC33	33	16#21	Read Fixcode Read / Write Data	8 Byte	2000 Byte	8	MB89R118	13,56MHz
IQC34	34	16#22	Read Fixcode Read / Write Data	8 Byte	232 Byte	4	MB89R119	13,56MHz
IQC35	35	16#23	Read Fixcode Read / Write Data	8 Byte	160 Byte	4	I-Code SLI-S	13,56MHz
IQC36	36	16#24	Read Fixcode Read / Write Data	8 Byte	32 Byte	4	I-Code SLI-L	13,56MHz

Readout Parameter 201 „TagType“:

For readout, the IOL_INDEX must set to 201. The read request starts with input "REQ".



Readout Parameter 201:

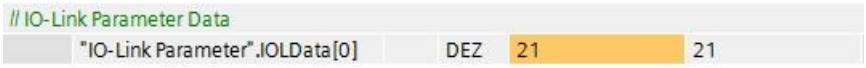
RD_WR	:= False	→ Read access
Port	:= 1	→ IO-Link Port 1
IOL_Index	:= 201	→ Parameter „Tag-Type“
IOL_Subindex	:= 0	→ full Index
Len	:= 0	→ not relevant

The read-in parameter "TagType" has a length of 1 byte (RD_Len = 1) and is located in the data structure IO-Link Parameter.IOLData[0].

Read-in TagType:
TagType = 20

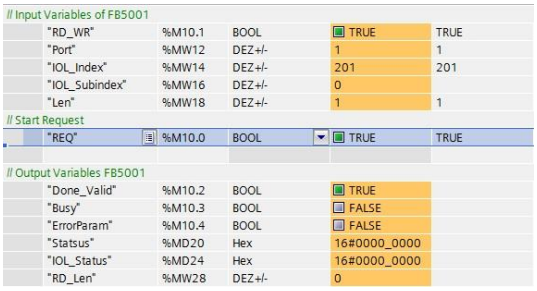
Writing Parameter 201 „TagType“:

Before executing the write request, the new value for "TagType" must be transferred to the data field IO-Link Parameter.IOLData[0]. For example, the value "21" transferred to set the RFID head to the data carrier IQC21.



Configuration TagType “21”

To execute the write request, input "RD_WR" and parameter length "Len" must be set to 1.



Writing Parameter 201:

RD_WR	:= True	→ Write access
Port	:= 1	→ IO-Link Port 1
IOL_Index	:= 201	→ Parameter „Tag-Type“
IOL_Subindex	:= 0	→ full Index
Len	:= 1	→ 1 Byte length

Parameter 203 „Easy Mode“

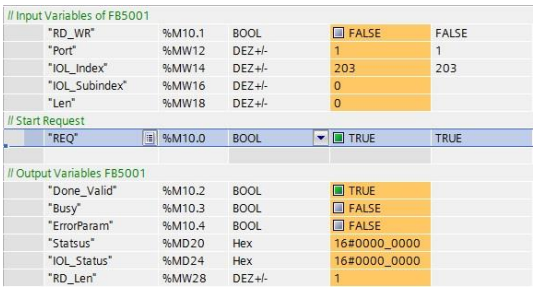
The "Easy Mode" parameter can used to switch between Easy and Expert mode. The Easy mode preset at the factory and allows simplified data access to the data carrier. This means that no additional function block is required for data transmission.

The "Expert Mode" allows access to large amounts of data using a handshake procedure. This requires the use of a function block to transfer the data.

Index	Sub Index	Length	Value (HEX)	Access	Significance
203	0	1 Byte	16#80	Read / Write	Easy mode active; factory setting; allows simplified data access to a maximum of 28 bytes of user data or fixed code
203	0	1 Byte	16#00	Read / Write	Expert mode active; setting for transferring large amounts of data using handshake methods; use of a function module required

Readout Parameter 203 „Easy Mode“:

For readout, the IOL_INDEX must set to 203. The read request starts with input "REQ".



// Input Variables of FB5001				
"RD_WR"	%M10.1	BOOL	FALSE	FALSE
"Port"	%MW12	DEZ+/-	1	1
"IOL_Index"	%MW14	DEZ+/-	203	203
"IOL_Subindex"	%MW16	DEZ+/-	0	
"Len"	%MW18	DEZ+/-	0	
// Start Request				
"REQ"	%M10.0	BOOL	TRUE	TRUE
// Output Variables FB5001				
"Done_Valid"	%M10.2	BOOL	TRUE	
"Busy"	%M10.3	BOOL	FALSE	
"ErrorParam"	%M10.4	BOOL	FALSE	
"Statsus"	%MD20	Hex	16#0000_0000	
"IOL_Status"	%MD24	Hex	16#0000_0000	
"RD_Len"	%MW28	DEZ+/-	1	

Readout Parameter 203:

RD_WR	:= False	→ Read access
Port	:= 1	→ IO-Link Port 1
IOL_Index	:= 203	→ Parameter „Easy Mode“
IOL_Subindex	:= 0	→ full Index
Len	:= 0	→ not relevant

The read-in parameter "Easy Mode" has a length of 1 byte (RD_Len = 1) and is located in the data structure IO-Link Parameter.IOLData[0].

// IO-Link Parameter Data		
"IO-Link Parameter".IOLData[0]	Hex	16#80

Parameter „Easy Mode“
Easy Mode active (16#80)

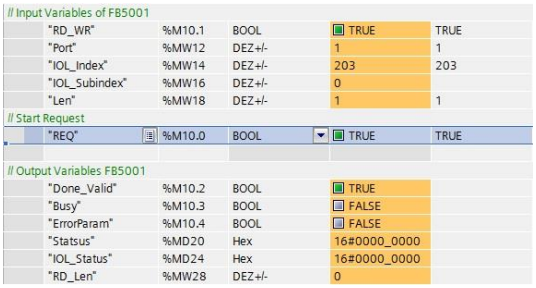
Writing Parameter 203 „Easy Mode“:

Before executing the write request, the new value for "Easy Mode" must transferred to the data field IO-Link Parameter.IOLData[0]. For example, the value 16#00 transferred to activate the expert mode.

// IO-Link Parameter Data			
"IO-Link Parameter".IOLData[0]	Hex	16#00	16#00

Activate Expert Mode

To execute the write request, input "RD_WR" and parameter length "Len" must be set to 1.



// Input Variables of FB5001				
"RD_WR"	%M10.1	BOOL	TRUE	TRUE
"Port"	%MW12	DEZ+/-	1	1
"IOL_Index"	%MW14	DEZ+/-	203	203
"IOL_Subindex"	%MW16	DEZ+/-	0	
"Len"	%MW18	DEZ+/-	1	1
// Start Request				
"REQ"	%M10.0	BOOL	TRUE	TRUE
// Output Variables FB5001				
"Done_Valid"	%M10.2	BOOL	TRUE	
"Busy"	%M10.3	BOOL	FALSE	
"ErrorParam"	%M10.4	BOOL	FALSE	
"Statsus"	%MD20	Hex	16#0000_0000	
"IOL_Status"	%MD24	Hex	16#0000_0000	
"RD_Len"	%MW28	DEZ+/-	0	

Writing Parameter 203:

RD_WR	:= True	→ Write access
Port	:= 1	→ IO-Link Port 1
IOL_Index	:= 203	→ Parameter „Easy Mode“
IOL_Subindex	:= 0	→ full Index
Len	:= 1	→ 1 Byte length

Parameter 204 „Read Task“

The "Read task" parameter used to configure read access to the data carrier. This includes the setting whether the Fixcode or the user data read. In addition, the number of bytes to read and the start address defined. Additionally it is possible to activate an Autostart function. Thus, a permanent read command executed automatically after a reset of the supply voltage without additional control.

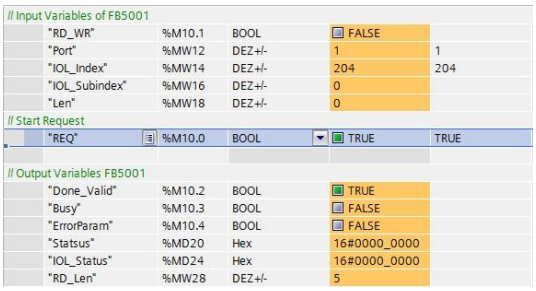
The following table shows the structure of the "Read Task" parameter.

Index	Sub Index	Length	Value (HEX)	Access	Significance
204	1	1 Byte	16#00	Read / Write	Access read execution to user data; factory setting is 16#00
204	1	1 Byte	16#80	Read / Write	Access reading execution to fixcode
204	2	1 Byte	16#00 … 16#1C	Read / Write	Number of bytes of user data to be read in; value must be a multiple of 4; if the IQC33 data carrier is used, a multiple of 8 must be set; factory setting is 16#08 for access to 8 byte user data
204	3	2 Byte (1 Word)	16#0000 …. 16#FFFF	Read / Write	Start address on data carrier when accessing user data (user data); value must be a multiple of 4; when using the IQC33 data carrier, a multiple of 8 must be set; factory setting is the value 16#0000

204	4	1 Byte	16#80	Read / Write	Autostart function active; the Autostart function can be used to activate a permanent reading execution; additional control is then no longer required; factory setting is 16#80
204	4	1 Byte	16#00	Read / Write	Autostart function deactivated; read/write must be started by triggering the "Read" or "Write" bit in the output data field

Readout Parameter 204 „Read Task“:

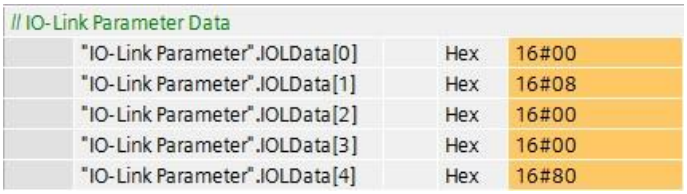
For readout, the IOL_INDEX must set to 204. The read request starts with input "REQ".



Readout Parameter 204:

RD_WR	:= False	→ Read access
Port	:= 1	→ IO-Link Port 1
IOL_Index	:= 204	→ Parameter „Read Task“
IOL_Subindex	:= 0	→ full Index
Len	:= 0	→ not relevant

The read parameter "Read Task" has a length of 5 bytes (RD_Len = 5). The read data are located in the data structure IO-Link Parameter.IOLData[0...4].

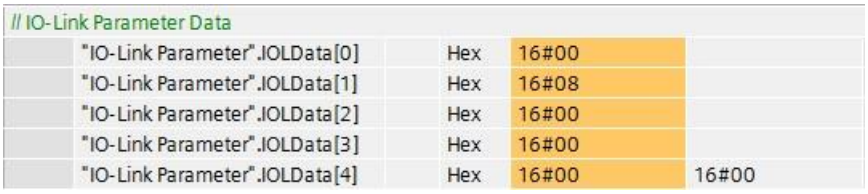


Parameter „Read Task“:

[0]	= 16#00	→ Access to user data
[1]	= 18#08	→ 8 Byte user data
[2][3]	= 16#0000	→ Start address 0
[4]	= 16#80	→ Autostart activated

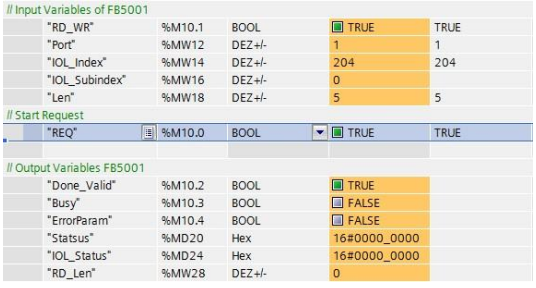
Writing Parameter 204 „Read Task“:

Before executing the write task, the new values for the "Read Task" parameter must be transferred to the IO-Link Parameter.IOLData[0...4] data field. For example, the value 16#00 in the data field IO-Link Parameter.IOLData[4] deactivates the Autostart function.



Switch off Autostart function:

To execute the write operation, input "RD_WR" and parameter length "Len" must be set to 5.



Writing Parameter 204:

RD_WR	:= True	→ Write access
Port	:= 1	→ IO-Link Port 1
IOL_Index	:= 204	→ Parameter „Read Task“
IOL_Subindex	:= 0	→ full Index
Len	:= 5	→ 5 Byte length

Parameter 205 „Write Task“

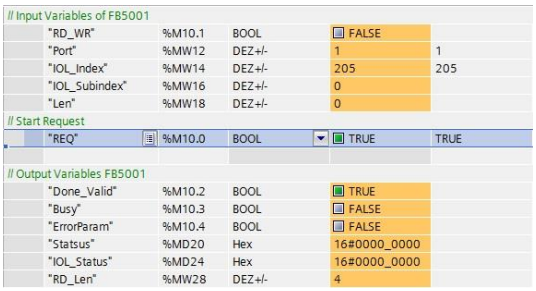
Parameter 205 "Write Task" configures the write access to the data carrier. Only the user data can accessed by writing. In addition, the number of bytes to written and the start address are set. The configuration of the Autostart function is not possible for the write task. The write task activated via the "Start write" bit in the process output data field. The Autostart function must switched off beforehand.

The following table shows the structure of the parameter "Write Task".

Index	Sub Index	Length	Value (HEX)	Access	Significance
205	1	1 Byte	16#00	Read / Write	Access write task to user data; no change possible; factory setting 16#00
205	2	1 Byte	16#00 … 16#1C	Read / Write	Number of bytes of user data to be written; value must be a multiple of 4; when using the IQC33 data carrier, a multiple of 8 must be set; factory setting 16#08
205	3	2 Byte	16#0000 …. 16#FFFF	Read / Write	Start address on data carrier when accessing user data (user data); value must be a multiple of 4; when using the IQC33 data carrier, a multiple of 8 must be set; factory setting 16#0000

Readout Parameter 205 „Write Task“

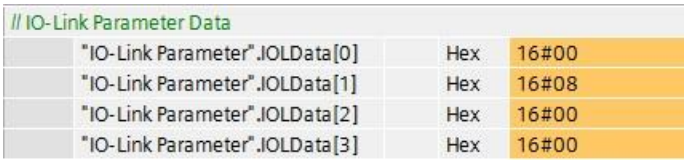
For readout, the IOL_INDEX must set to 205. The read job starts with input "REQ".



Readout Parameter 205:

RD_WR	:= False	→ Read access
Port	:= 1	→ IO-Link Port 1
IOL_Index	:= 205	→ Parameter „Write Task“
IOL_Subindex	:= 0	→ full Index
Len	:= 0	→ not relevant

The read parameter "Write Task" has a length of 4 bytes (RD_Len = 4). The read-in data are located in the data structure IO-Link Parameter.IOLData[0...3].

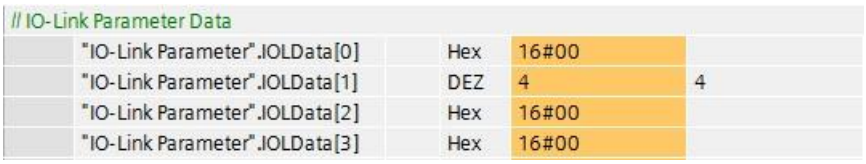


Parameter Write Task:

[0]	= 16#00	→ Access to user data
[1]	= 18#08	→ 8 Byte user data
[2][3]	= 16#0000	→ start address 0

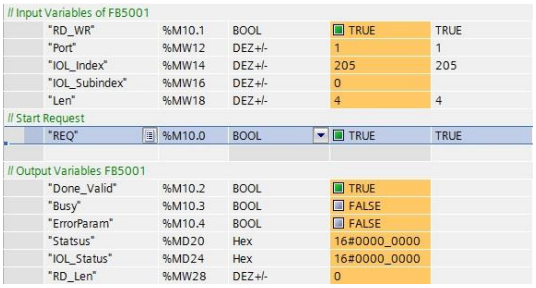
Writing Parameter 205 „Write Task“:

Before executing the write task, the new values for the "Write Task" parameter must be transferred to the IO-Link Parameter.IOLData[0...3] data field. For example, the value 4 in the IO-Link Parameter.IOLData[1] data field changes the number of write data to 4 bytes.



Changing the number of write data to 4 bytes:

To execute the write operation, input "RD_WR" must set to true and parameter length "Len" must set to 4.



// Input Variables of FB5001				
	"RD_WR"	%M10.1	BOOL	TRUE	TRUE
	"Port"	%MW12	DEZ+/-	1	1
	"IOL_Index"	%MW14	DEZ+/-	205	205
	"IOL_Subindex"	%MW16	DEZ+/-	0	
	"Len"	%MW18	DEZ+/-	4	4
// Start Request					
	"REQ"	%M10.0	BOOL	TRUE	TRUE
// Output Variables FB5001					
	"Done_Valid"	%M10.2	BOOL	TRUE	
	"Busy"	%M10.3	BOOL	FALSE	
	"ErrorParam"	%M10.4	BOOL	FALSE	
	"Statsus"	%MD20	Hex	16#0000_0000	
	"IOL_Status"	%MD24	Hex	16#0000_0000	
	"RD_Len"	%MW28	DEZ+/-	0	

Writing Parameter 205:

RD_WR	:= True	→ Write access
Port	:= 1	→ IO-Link Port 1
IOL_Index	:= 204	→ Parameter „Write Task“
IOL_Subindex	:= 0	→ full Index
Len	:= 4	→ 4 Byte length

7. Easy-Mode – Process data structure

The process data is transferred between the IQT1-...-IO-V1 RFID head and the controller via the process data fields. There is a process data field for input data, i.e. from the direction of the head to the controller, and a process data field for output data, i.e. from the direction of the controller to the RFID head. Both process data fields have a fixed length of 32 bytes. This length is constant and is always 32 bytes. A deviating length parameterization is not possible.
The following table shows the structure of the process data field for the output data:

Byte	Content							
0	0	0	0	0	0	0	Start Write	Start Read
1	Unused							
2	Unused							
3	unused							
4	Write Data							
5	Write Data							
6	Write Data							
….	Write Data							
31	Write Data							

If the "Autostart" function activated, no output data must sent. The head performs a permanent read access to user data (factory setting, 8-byte length) or fixed code. When using the "Autostart" function, the bits "Start Read" and "Start Write" have no relevance.

The "Autostart" function can switched off via parameter 204 "Read Task". If the function is switched off, a read task or a write task can be started via the "Start reading" or "Start writing" bit.

A read or write task is executed as long as the corresponding start bit is set. The task can only aborted by resetting the corresponding start bit.

The parameters required for data carrier access such as "memory area", "number of bytes" and "start address" be set for the read task via parameter 204 and for the write task via parameter 205.

The following table shows the structure of the process data field for the input data:

Byte	Content							
0	0	0	0	0	Error	Active	Write Valid	Read Valid
1	Length data							
2	Unused							
3	Unused							
4	Read Data							
5	Read Data							
6	Read Data							
…	Read Data							
31	Read Data							

As soon as a read or write task is started and executed, this is indicated by the "Active" bit. This bit remains set for the entire period of the task execution. Only when the read or write task is aborted does the "Active" bit reset itself.
If a read task is active, the "Read Valid" bit is set if the data carrier is within the detection range and the data has read. The bit remains set for the duration of the data carrier's stay in the detection area. This bit only reset again, when the data carrier leaves the detection range.

The bit "Write Valid" behaves identically. It is set when the data carrier is in the detection zone and the data has successfully written to the data carrier. The reset takes place as soon as the data carrier leaves the detection zone again.

The byte "Length data" contains the length specification of the read data in bytes. The length depends on the number of bytes set via parameter 204. When accessing the Fixcode, the length is 8 bytes and when accessing the user data, the length is a multiple of 4 bytes (or 8 bytes when using an IQC33 transponder).

An error may occur during the execution of a read or write task. The „Error“ bit indicates the error state. If there is an error state, additional error information transmitted via the input data field. This information contains an error code as well as an error description in plain text (ASCII character). A check of the error description provides an indication of the cause of the error condition.

The following table shows the structure of the process data field of the input data in the error state:

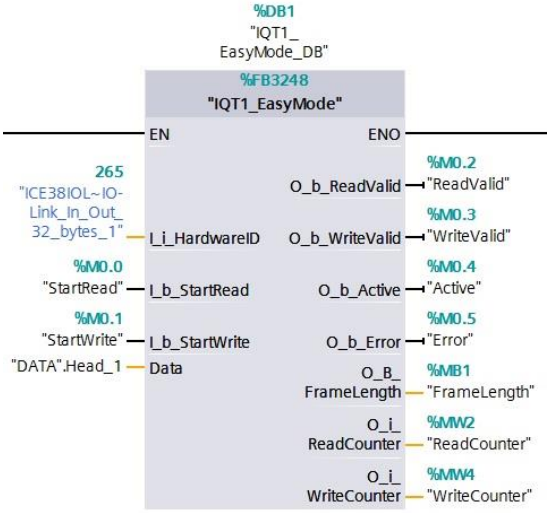
Byte	**Content**							
0	0	0	0	0	Error	Active	Write Valid	Read Valid
1	Length data							
2	Unused							
3	Unused							
4	Error Code (HEX)							
5	Error String							
6	Error String							
…	Error String							
31	Error String							

8. Function block FB3248 “IQT1_EasyMode“

Within the control project, there is a FB3248 "IQT1_EasyMode". This function block called together with the data block "IQT1_EasyMode_DB". This function block can control the IQT1-...-IO-V1 RFID head if the "Easy-Mode" operating mode is activated for the head.

In the delivery state of the RFID head, the Autostart function activated. The head itself automatically start a read task. If the Autostart function switched off, read and write tasks can controlled by the function block.

The following figure shows the call of FB3248 "IQT1_EasyMode" together with the data block "IQT1_EasyMode_DB" within OB1.



The following table shows the meaning of the input and output variables:

Name	Input / Output	Data type	Significance
I_i_HardwareID	Input	HW_IO	Hardware identification of the 32 Byte IO module from the hardware configuration
I_b_StartRead	Input	Bool	Start reading task; with edge change from 0 → 1; starts execution of the read task; end of read task with edge change from 1 → 0;
I_b_StartWrite	Input	Bool	Start write task; with edge change of 0 → 1; starts the execution of the write task; end of write task with edge change 1 → 0;
Data	InOut	DB	Data area for read and write data (28 bytes)
O_b_ReadValid	Output	Bool	Successful reading; 1 := Data carrier within detection zone and data successfully read; 0 := Data carrier outside detection zone; no data read
O_b_WriteValid	Output	Bool	Writing successful; 1 := Data carrier written successfully within detection zone; 0 := data carrier outside detection zone; no data written
O_b_Active	Output	Bool	Read or write task active; 1 := Read or write task active; 0 := no read or write task active; RFID head off
O_b_Error	Output	Bool	Error 1 := Error occurred during read or write task 0 := no error condition active
O_B_FrameLength	Output	Byte	Length of the imported data; Specification of the length of the read data in bytes; in the event of an error, the length of the error message is specified.
O_i_ReadCounter	Output	Integer	Counter for read operations; Number of successful read accesses during execution of a read task
O_i_WriteCounter	Output	Integer	Counter write operations; Number of successful write accesses during the execution of a write task

9. Example: Read user data with Autostart function

In the delivery state of the IQT1-...-IO-V1, the Autostart function activated and 8 bytes of the user data read in starting from memory address 0. The following figure shows the values of parameter 204 "Read Task" as delivered.

// IO-Link Parameter Data			
"IO-Link Parameter".IOLData[0]		Hex	16#00
"IO-Link Parameter".IOLData[1]		Hex	16#08
"IO-Link Parameter".IOLData[2]		Hex	16#00
"IO-Link Parameter".IOLData[3]		Hex	16#00
"IO-Link Parameter".IOLData[4]		Hex	16#80

Parameter 204 „Read Task“ – default setting

[0] = 16#00 → Access to user data
[1] = 18#08 → 8 Byte user data
[2][3] = 16#0000 → Start address 0
[4] = 16#80 → Autostart active

The reading task starts automatically by the RFID head. Control by the "I_b_StartRead" input of the FB3248 is not required.

"StartRead"	%M0.0	BOOL	FALSE
"StartWrite"	%M0.1	BOOL	FALSE
"ReadValid"	%M0.2	BOOL	FALSE
"WriteValid"	%M0.3	BOOL	FALSE
"Active"	%M0.4	BOOL	TRUE
"Error"	%M0.5	BOOL	FALSE
"FrameLength"	%MB1	Hex	16#00
"ReadCounter"	%MW2	DEZ	0
"WriteCounter"	%MW4	DEZ	0

Initial state after device start-up; no data carrier within detection zone
ReadValid = False
Active = True
FrameLength = 0
ReadCounter = 0

"StartRead"	%M0.0	BOOL	FALSE
"StartWrite"	%M0.1	BOOL	FALSE
"ReadValid"	%M0.2	BOOL	TRUE
"WriteValid"	%M0.3	BOOL	FALSE
"Active"	%M0.4	BOOL	TRUE
"Error"	%M0.5	BOOL	FALSE
"FrameLength"	%MB1	Hex	16#08
"ReadCounter"	%MW2	DEZ	1
"WriteCounter"	%MW4	DEZ	0

Data carrier A read
ReadValid = True
Active = True
FrameLength = 8
ReadCounter = 1

"StartRead"	%M0.0	BOOL	FALSE
"StartWrite"	%M0.1	BOOL	FALSE
"ReadValid"	%M0.2	BOOL	FALSE
"WriteValid"	%M0.3	BOOL	FALSE
"Active"	%M0.4	BOOL	TRUE
"Error"	%M0.5	BOOL	FALSE
"FrameLength"	%MB1	Hex	16#00
"ReadCounter"	%MW2	DEZ	1
"WriteCounter"	%MW4	DEZ	0

Data carrier A has left detection zone
ReadValid = False
Active = True
FrameLength = 0
ReadCounter = 1

"StartRead"	%M0.0	BOOL	FALSE
"StartWrite"	%M0.1	BOOL	FALSE
"ReadValid"	%M0.2	BOOL	TRUE
"WriteValid"	%M0.3	BOOL	FALSE
"Active"	%M0.4	BOOL	TRUE
"Error"	%M0.5	BOOL	FALSE
"FrameLength"	%MB1	Hex	16#08
"ReadCounter"	%MW2	DEZ	2
"WriteCounter"	%MW4	DEZ	0

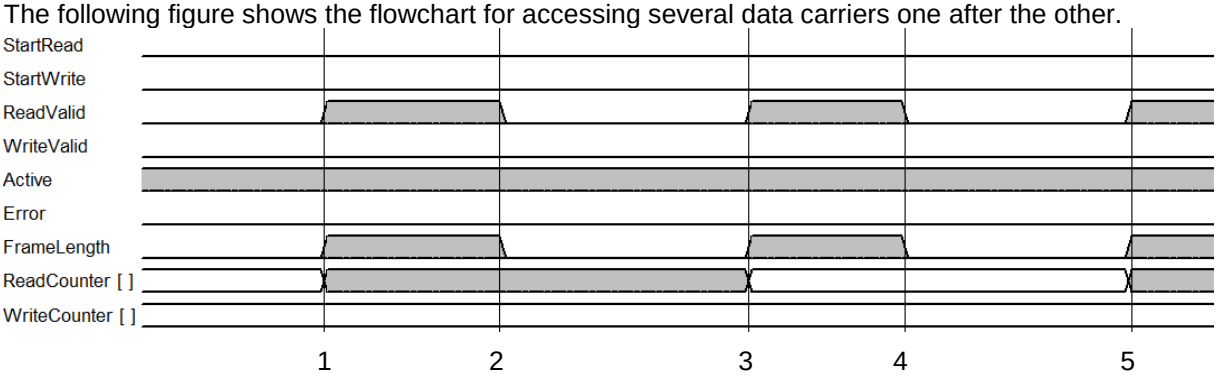
Data carrier B read
ReadValid = True
Active = True
FrameLength = 8
ReadCounter = 2

"DATA".Head_1.ReadData[0]	Hex	16#01
"DATA".Head_1.ReadData[1]	Hex	16#02
"DATA".Head_1.ReadData[2]	Hex	16#03
"DATA".Head_1.ReadData[3]	Hex	16#04
"DATA".Head_1.ReadData[4]	Hex	16#05
"DATA".Head_1.ReadData[5]	Hex	16#06
"DATA".Head_1.ReadData[6]	Hex	16#07
"DATA".Head_1.ReadData[7]	Hex	16#08

The read data are located in the data structure DATA.Head_1.ReadData[0...7]. The data can copied from this structure for further processing.

The last read data remain available in the data structure DATA.Head_1.ReadData[] until a new data carrier has been read. The data field is not moved over with 16#00 when a data carrier leaves the detection range. The contents of the structure do not change until a new data carrier read in.

The following figure shows the flowchart for accessing several data carriers one after the other.



Event	Significance
1	Data carrier A enters the detection zone and the data read. ReadValid := True; Active := True; FrameLength := 8; ReadCounter := 1;
2	Data carrier A leaves the detection zone of the RFID head ReadValid := False; Active := True; FrameLength := 0; ReadCounter := 1;
3	Data carrier B enters the detection zone and the data read. ReadValid := True; Active := True; FrameLength := 8; ReadCounter := 2;
4	Data carrier B leaves the detection zone of the RFID head ReadValid := False; Active := True; FrameLength := 0; ReadCounter := 2;
5	Data carrier C enters the data entry area and the data read. ReadValid := True; Active := True; FrameLength := 8; ReadCounter := 3;

The number of bytes to read in set by parameter 204.

"IO-Link Parameter".IOLData[0]	Hex	16#00
"IO-Link Parameter".IOLData[1]	DEZ	28
"IO-Link Parameter".IOLData[2]	Hex	16#00
"IO-Link Parameter".IOLData[3]	Hex	16#00
"IO-Link Parameter".IOLData[4]	Hex	16#80

Parameter 204 „Read Task“ – read in 28 Byte

[0] = 16#00 → Access to user data
[1] = 28 → 28 Byte user data
[2][3] = 16#0000 → Start address 0
[4] = 16#80 → Autostart active

If a data carrier enters the detection zone and the data has read in, the output signals at FB3248 have the following states:

"StartRead"	%M0.0	BOOL	FALSE
"StartWrite"	%M0.1	BOOL	FALSE
"ReadValid"	%M0.2	BOOL	TRUE
"WriteValid"	%M0.3	BOOL	FALSE
"Active"	%M0.4	BOOL	TRUE
"Error"	%M0.5	BOOL	FALSE
"FrameLength"	%MB1	DEZ	28
"ReadCounter"	%MW2	DEZ	3
"WriteCounter"	%MW4	DEZ	0

Data carrier read
ReadValid = True;
Active = True;
FrameLength = 28:
ReadCounter = 3;

The value of "ReadCounter" depends on the number of previous read accesses.

"DATA".Head_1.ReadData[0]	Hex	16#01
"DATA".Head_1.ReadData[1]	Hex	16#02
"DATA".Head_1.ReadData[2]	Hex	16#03
"DATA".Head_1.ReadData[3]	Hex	16#04
"DATA".Head_1.ReadData[4]	Hex	16#05
"DATA".Head_1.ReadData[5]	Hex	16#06
"DATA".Head_1.ReadData[6]	Hex	16#07
"DATA".Head_1.ReadData[7]	Hex	16#08
"DATA".Head_1.ReadData[8]	Hex	16#39
"DATA".Head_1.ReadData[9]	Hex	16#30
"DATA".Head_1.ReadData[10]	Hex	16#31
"DATA".Head_1.ReadData[11]	Hex	16#32
"DATA".Head_1.ReadData[12]	Hex	16#33
"DATA".Head_1.ReadData[13]	Hex	16#34

The read data are located in the data structure DATA.Head_1.ReadData[0...27]. The data can be copied from this structure for further processing.

The last read data remain available in the data structure DATA.Head_1.ReadData[] until a new data carrier has been read. The data field is not moved over with 16#00 when a data carrier leaves the detection range. The contents of the structure do not change until a new data carrier read in.

10. Example: Read Fixcode with Autostart function

In addition to the user data, it is also possible to read the fixcode of the data carrier. The fixcode is an 8-byte long number, which is unique to every ISO15693 compliant 13.56MHz data carrier. To read the fixcode, the access to the fixcode has to change within parameter 204 "Read Task". The autostart function remains switched on.

"IO-Link Parameter".IOLData[0]	Hex	16#80
"IO-Link Parameter".IOLData[1]	Hex	16#08
"IO-Link Parameter".IOLData[2]	Hex	16#00
"IO-Link Parameter".IOLData[3]	Hex	16#00
"IO-Link Parameter".IOLData[4]	Hex	16#80

Parameter 204 „Read Task“ – Read Fixcode (UID)

[0] = 16#80 → Access to Fixcode (UID)
[1] = 16#08 → not relevant
[2][3] = 16#0000 → not relevant
[4] = 16#80 → Autostart active

The reading task for reading the fixed code (UID) automatically starts by the RFID head. Control by the "I_b_StartRead" input of the FB3248 is not required.

"StartRead"	%M0.0	BOOL	FALSE
"StartWrite"	%M0.1	BOOL	FALSE
"ReadValid"	%M0.2	BOOL	FALSE
"WriteValid"	%M0.3	BOOL	FALSE
"Active"	%M0.4	BOOL	TRUE
"Error"	%M0.5	BOOL	FALSE
"FrameLength"	%MB1	DEZ	0
"ReadCounter"	%MW2	DEZ	0
"WriteCounter"	%MW4	DEZ	0

Initial state after device start-up; no data carrier within detection zone
ReadValid = False
Active = True
FrameLength = 0
ReadCounter = 0

"StartRead"	%M0.0	BOOL	FALSE
"StartWrite"	%M0.1	BOOL	FALSE
"ReadValid"	%M0.2	BOOL	TRUE
"WriteValid"	%M0.3	BOOL	FALSE
"Active"	%M0.4	BOOL	TRUE
"Error"	%M0.5	BOOL	FALSE
"FrameLength"	%MB1	DEZ	8
"ReadCounter"	%MW2	DEZ	1
"WriteCounter"	%MW4	DEZ	0

Data carrier A read
ReadValid = True
Active = True
FrameLength = 8
ReadCounter = 1

"StartRead"	%M0.0	BOOL	FALSE
"StartWrite"	%M0.1	BOOL	FALSE
"ReadValid"	%M0.2	BOOL	FALSE
"WriteValid"	%M0.3	BOOL	FALSE
"Active"	%M0.4	BOOL	TRUE
"Error"	%M0.5	BOOL	FALSE
"FrameLength"	%MB1	DEZ	0
"ReadCounter"	%MW2	DEZ	1
"WriteCounter"	%MW4	DEZ	0

Data carrier A has left the detection zone
ReadValid = False
Active = True
FrameLength = 0
ReadCounter = 1

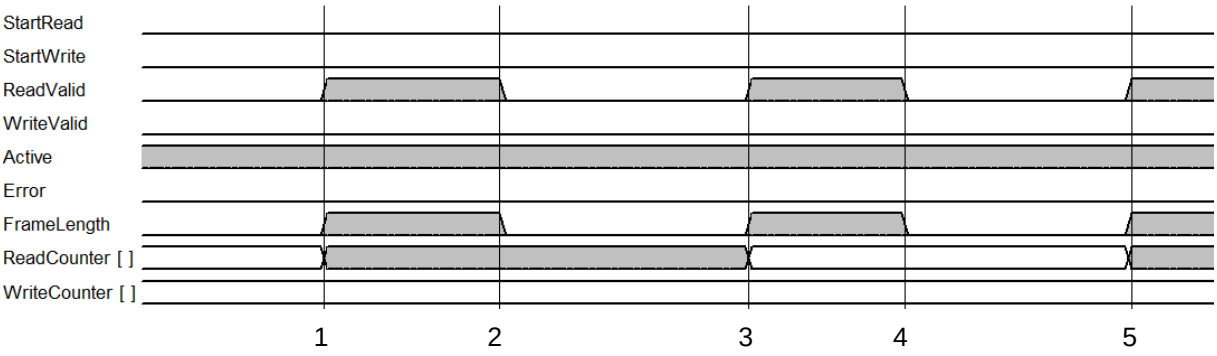
"StartRead"	%M0.0	BOOL	FALSE
"StartWrite"	%M0.1	BOOL	FALSE
"ReadValid"	%M0.2	BOOL	TRUE
"WriteValid"	%M0.3	BOOL	FALSE
"Active"	%M0.4	BOOL	TRUE
"Error"	%M0.5	BOOL	FALSE
"FrameLength"	%MB1	DEZ	8
"ReadCounter"	%MW2	DEZ	2
"WriteCounter"	%MW4	DEZ	0

Data carrier B read
ReadValid = True
Active = True
FrameLength = 8
ReadCounter = 2

"DATA".Head_1.ReadData[0]	Hex	16#E0
"DATA".Head_1.ReadData[1]	Hex	16#04
"DATA".Head_1.ReadData[2]	Hex	16#01
"DATA".Head_1.ReadData[3]	Hex	16#50
"DATA".Head_1.ReadData[4]	Hex	16#BD
"DATA".Head_1.ReadData[5]	Hex	16#2D
"DATA".Head_1.ReadData[6]	Hex	16#F3
"DATA".Head_1.ReadData[7]	Hex	16#CD

The read in Fixcode (UID) is located in the data structure DATA.Head_1.ReadData[0...7]. The fixcode always has a length of 8 bytes and starts with the value 16#E0. The data can copied from this structure for further processing.

The following figure shows the flowchart for accessing several data carriers one after the other.



Event	Significance
1	Data carrier A enters the detection zone and Fixcode A read in. ReadValid := True; Active := True; FrameLength := 8; ReadCounter := 1;
2	Data carrier A leaves the detection zone of the RFID head ReadValid := False; Active := True; FrameLength := 0; ReadCounter := 1;
3	Data carrier B enters the detection zone and Fixcode B read in. ReadValid := True; Active := True; FrameLength := 8; ReadCounter := 2;
4	Data carrier B leaves the detection zone of the RFID head ReadValid := False; Active := True; FrameLength := 0; ReadCounter := 2;
5	Data carrier C enters the detection and Fixcode C read in. ReadValid := True; Active := True; FrameLength := 8; ReadCounter := 3;

11. Example: Read user data without Autostart function

In the delivery state of the IQT1-...-IO-V1, the Autostart function activated and 8 bytes of the user data read in starting from memory address 0. The Autostart function must switched off by the IO-Link parameter 204 "Read Task".

"IO-Link Parameter".IOLData[0]		Hex	16#00
"IO-Link Parameter".IOLData[1]		Hex	16#08
"IO-Link Parameter".IOLData[2]		Hex	16#00
"IO-Link Parameter".IOLData[3]		Hex	16#00
"IO-Link Parameter".IOLData[4]		Hex	16#00

Parameter 204 „Read Task“ – Read user data without Autostart function

[0] = 16#00 → Access to user data
[1] = 16#08 → 8 Byte user data
[2][3] = 16#0000 → Start address 0
[4] = 16#00 → no Autostart function active

The RFID head itself due to the Autostart function switched off no longer start the reading task. It is necessary to start the read task via the "I_b_StartRead" input on the FB3248.

"StartRead"	%M0.0	B...	FALSE	TRUE
"StartWrite"	%M0.1	BOOL	FALSE	
"ReadValid"	%M0.2	BOOL	FALSE	
"WriteValid"	%M0.3	BOOL	FALSE	
"Active"	%M0.4	BOOL	FALSE	
"Error"	%M0.5	BOOL	FALSE	
"FrameLength"	%MB1	DEZ	0	
"ReadCounter"	%MW2	DEZ	0	
"WriteCounter"	%MW4	DEZ	0	

Initial state after device start-up; no read task active
ReadValid = False
Active = False
FrameLength = 0
ReadCounter = 0

The read task starts as soon as "StartRead" is set to True.

"StartRead"	%M0.0	BOOL	TRUE	TRUE
"StartWrite"	%M0.1	BOOL	FALSE	
"ReadValid"	%M0.2	BOOL	FALSE	
"WriteValid"	%M0.3	BOOL	FALSE	
"Active"	%M0.4	BOOL	TRUE	
"Error"	%M0.5	BOOL	FALSE	
"FrameLength"	%MB1	DEZ	0	
"ReadCounter"	%MW2	DEZ	0	
"WriteCounter"	%MW4	DEZ	0	

Read task active; no data carrier inside the detection zone
StartRead = True
ReadValid = False
Active = True
FrameLength = 0
ReadCounter = 0

"StartRead"	%M0.0	BOOL	TRUE	TRUE
"StartWrite"	%M0.1	BOOL	FALSE	
"ReadValid"	%M0.2	BOOL	TRUE	
"WriteValid"	%M0.3	BOOL	FALSE	
"Active"	%M0.4	BOOL	TRUE	
"Error"	%M0.5	BOOL	FALSE	
"FrameLength"	%MB1	DEZ	8	
"ReadCounter"	%MW2	DEZ	1	
"WriteCounter"	%MW4	DEZ	0	

Read task active; data carrier A in detection zone; data read in
StartRead = True
ReadValid = True
Active = True
FrameLength = 8
ReadCounter = 1

"StartRead"	%M0.0	BOOL	TRUE	TRUE
"StartWrite"	%M0.1	BOOL	FALSE	
"ReadValid"	%M0.2	BOOL	FALSE	
"WriteValid"	%M0.3	BOOL	FALSE	
"Active"	%M0.4	BOOL	TRUE	
"Error"	%M0.5	BOOL	FALSE	
"FrameLength"	%MB1	DEZ	0	
"ReadCounter"	%MW2	DEZ	1	
"WriteCounter"	%MW4	DEZ	0	

Read task active; no data carrier inside detection zone
StartRead = True
ReadValid = False
Active = True
FrameLength = 0
ReadCounter = 1

"StartRead"	%M0.0	BOOL	TRUE	TRUE
"StartWrite"	%M0.1	BOOL	FALSE	
"ReadValid"	%M0.2	BOOL	TRUE	
"WriteValid"	%M0.3	BOOL	FALSE	
"Active"	%M0.4	BOOL	TRUE	
"Error"	%M0.5	BOOL	FALSE	
"FrameLength"	%MB1	DEZ	8	
"ReadCounter"	%MW2	DEZ	2	
"WriteCounter"	%MW4	DEZ	0	

Read task active; data carrier B inside detection zone; data read in

StartRead	= True
ReadValid	= True
Active	= True
FrameLength	= 8
ReadCounter	= 2

"StartRead"	%M0.0	BOOL	FALSE	FALSE
"StartWrite"	%M0.1	BOOL	FALSE	
"ReadValid"	%M0.2	BOOL	FALSE	
"WriteValid"	%M0.3	BOOL	FALSE	
"Active"	%M0.4	BOOL	FALSE	
"Error"	%M0.5	BOOL	FALSE	
"FrameLength"	%MB1	DEZ	0	
"ReadCounter"	%MW2	DEZ	2	
"WriteCounter"	%MW4	DEZ	0	

Read task completed

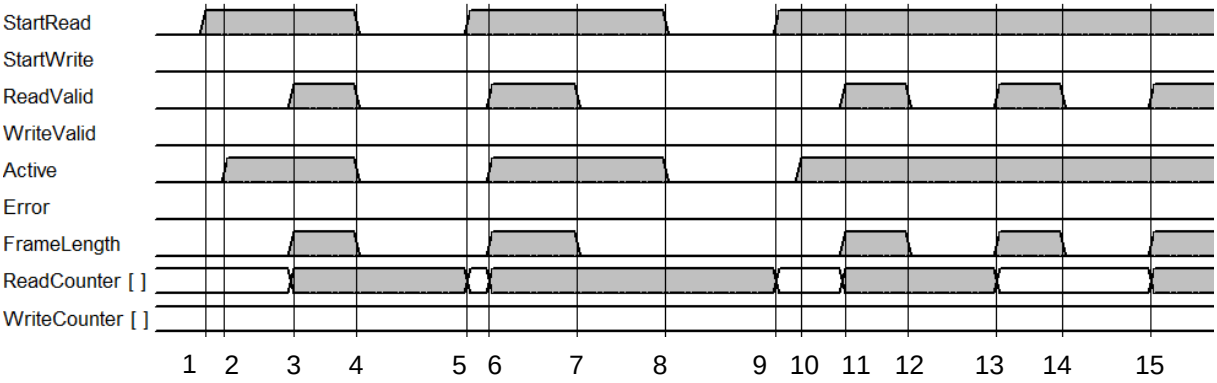
StartRead	= False
ReadValid	= False
Active	= False
FrameLength	= 0
ReadCounter	= 2

"DATA".Head_1.ReadData[0]	Hex	16#01
"DATA".Head_1.ReadData[1]	Hex	16#02
"DATA".Head_1.ReadData[2]	Hex	16#03
"DATA".Head_1.ReadData[3]	Hex	16#04
"DATA".Head_1.ReadData[4]	Hex	16#05
"DATA".Head_1.ReadData[5]	Hex	16#06
"DATA".Head_1.ReadData[6]	Hex	16#07
"DATA".Head_1.ReadData[7]	Hex	16#08

The read data are located in the data structure DATA.Head_1.ReadData[0...7]. The data can copied from this structure for further processing.

The last read data remain available in the data structure DATA.Head_1.ReadData[] until a new data carrier has been read. The data field is not moved over with 16#00 when a data carrier leaves the detection range. The contents of the structure do not change until a new data carrier read in.

The following figure shows the flowchart for accessing data carrier in different situations:



Event	Significance
1	Start read task StartRead := True
2	Read task is activated; no data carrier inside detection zone StartRead := True; ReadValid := False; Active := True; FrameLength := 0; ReadCounter := 0;
3	Read task is activated; data carrier A read in StartRead := True; ReadValid := True; Active := True FrameLength := 8; ReadCounter := 1;
4	Read task completed StartRead := False; ReadValid := False; Active := False; FrameLength := 0; ReadCounter := 1;
5	Start read task StartRead := True; ReadValid := False; Active := False; FrameLength := 0; ReadCounter := 0;
6	Read task is activated; data carrier B read in StartRead := True; ReadValid := True; Active := True; FrameLength := 8; ReadCounter := 1;
7	Read task is activated; data carrier B has left the detection zone. StartRead := True; ReadValid := False; Active := True; FrameLength := 0; ReadCounter := 1;
8	Read task completed StartRead := False; ReadValid := False; Active := False; FrameLength := 0; ReadCounter := 1;

9	Start read task StartRead := True; ReadValid := False; Active := False; FrameLength := 0; ReadCounter := 0;
10	Read task is activated; no data carrier inside detection zone StartRead := True; ReadValid := False; Active := True; FrameLength := 0; ReadCounter := 0;
11	Read task is activated; data carrier C read in StartRead := True; ReadValid := True; Active := True; FrameLength := 8; ReadCounter := 1;
12	Read task is activated; data carrier C has left the detection zone StartRead := True; ReadValid := False; Active := True; FrameLength := 0; ReadCounter := 1;
13	Read task is activated; data carrier D read in StartRead := True; ReadValid := True; Active := True; FrameLength := 8; ReadCounter := 2;
14	Read task is activated; data carrier D has left the detection zone StartRead := True; ReadValid := False; Active := True; FrameLength := 0; ReadCounter := 2;
15	Read task is activated; data carrier E read in StartRead := True; ReadValid := True; Active := True; FrameLength := 8; ReadCounter := 3;

12. Example: Write user data

In the delivery state of the IQT1-...-IO-V1, the Autostart function activated and 8 bytes of the user data read in starting from memory address 0. A write operation to a data carrier is not possible when the Autostart function is active. The Autostart function must switched off by the IO-Link parameter 204 "Read Task".

"IO-Link Parameter".IOLData[0]		Hex	16#00
"IO-Link Parameter".IOLData[1]		Hex	16#08
"IO-Link Parameter".IOLData[2]		Hex	16#00
"IO-Link Parameter".IOLData[3]		Hex	16#00
"IO-Link Parameter".IOLData[4]		Hex	16#00

Parameter 204 „Read Task“ – Switch off Autostart function

[0] = 16#00 → Access to user data
[1] = 16#08 → 8 Byte user data
[2][3] = 16#0000 → Start address 0
[4] = 16#00 → no Autostart function active

The settings required for executing the write task are carried out by the IO-Link parameter 205 "Write Task". In the delivery state, 8 bytes of user data are written starting at address 0.

"IO-Link Parameter".IOLData[0]		Hex	16#00
"IO-Link Parameter".IOLData[1]		Hex	16#08
"IO-Link Parameter".IOLData[2]		Hex	16#00
"IO-Link Parameter".IOLData[3]		Hex	16#00

Parameter 205 „Write Task“ – default setting

[0] = 16#00 → Access to user data
[1] = 16#08 → 8 Byte user data
[2][3] = 16#0000 → Start address 0

"DATA".Head_1.WriteData[0]	Hex	16#31	16#31
"DATA".Head_1.WriteData[1]	Hex	16#32	16#32
"DATA".Head_1.WriteData[2]	Hex	16#33	16#33
"DATA".Head_1.WriteData[3]	Hex	16#34	16#34
"DATA".Head_1.WriteData[4]	Hex	16#35	16#35
"DATA".Head_1.WriteData[5]	Hex	16#36	16#36
"DATA".Head_1.WriteData[6]	Hex	16#37	16#37
"DATA".Head_1.WriteData[7]	Hex	16#38	16#38

Assignment of the write data into the data structure DATA.Head_1.WriteData[0...7]

"StartRead"	%M0.0	BOOL	FALSE	
"StartWrite"	%M0.1	BOOL	FALSE	TRUE
"ReadValid"	%M0.2	BOOL	FALSE	
"WriteValid"	%M0.3	BOOL	FALSE	
"Active"	%M0.4	BOOL	FALSE	
"Error"	%M0.5	BOOL	FALSE	
"FrameLength"	%MB1	DEZ	0	
"ReadCounter"	%MW2	DEZ	0	
"WriteCounter"	%MW4	DEZ	0	

Initial state after device start-up; no write task active
WriteValid = False
Active = False
FrameLength = 0
WriteCounter = 0

The write task starts as soon as "StartWrite" is set to True.

"StartRead"	%M0.0	BOOL	FALSE	
"StartWrite"	%M0.1	BOOL	TRUE	TRUE
"ReadValid"	%M0.2	BOOL	FALSE	
"WriteValid"	%M0.3	BOOL	FALSE	
"Active"	%M0.4	BOOL	TRUE	
"Error"	%M0.5	BOOL	FALSE	
"FrameLength"	%MB1	DEZ	0	
"ReadCounter"	%MW2	DEZ	0	
"WriteCounter"	%MW4	DEZ	0	

Write task active: no data carrier inside detection zone
StartWrite = True
WriteValid = False
Active = True
FrameLength = 0
WriteCounter = 0

"StartRead"	%M0.0	BOOL	FALSE	
"StartWrite"	%M0.1	BOOL	TRUE	TRUE
"ReadValid"	%M0.2	BOOL	FALSE	
"WriteValid"	%M0.3	BOOL	TRUE	
"Active"	%M0.4	BOOL	TRUE	
"Error"	%M0.5	BOOL	FALSE	
"FrameLength"	%MB1	DEZ	0	
"ReadCounter"	%MW2	DEZ	0	
"WriteCounter"	%MW4	DEZ	1	

Write task active; data carrier A inside detection zone; data successfully written
StartWrite = True
WriteValid = True
Active = True
FrameLength = 0
WriteCounter = 1

"StartRead"	%M0.0	BOOL	FALSE	
"StartWrite"	%M0.1	BOOL	TRUE	TRUE
"ReadValid"	%M0.2	BOOL	FALSE	
"WriteValid"	%M0.3	BOOL	FALSE	
"Active"	%M0.4	BOOL	TRUE	
"Error"	%M0.5	BOOL	FALSE	
"FrameLength"	%MB1	DEZ	0	
"ReadCounter"	%MW2	DEZ	0	
"WriteCounter"	%MW4	DEZ	1	

Write task active; no data carrier inside detection zone
StartWrite = True
WriteValid = False
Active = True
FrameLength = 0
WriteCounter = 1

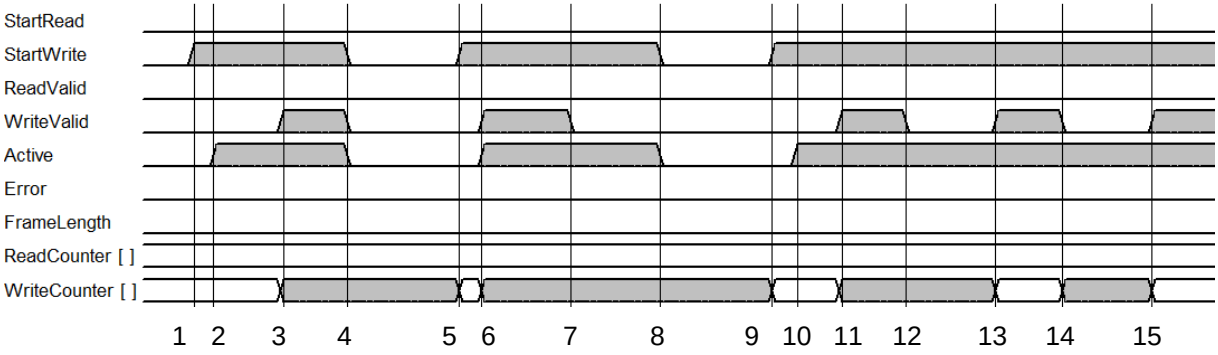
"StartRead"	%M0.0	BOOL	FALSE	
"StartWrite"	%M0.1	BOOL	TRUE	TRUE
"ReadValid"	%M0.2	BOOL	FALSE	
"WriteValid"	%M0.3	BOOL	TRUE	
"Active"	%M0.4	BOOL	TRUE	
"Error"	%M0.5	BOOL	FALSE	
"FrameLength"	%MB1	DEZ	0	
"ReadCounter"	%MW2	DEZ	0	
"WriteCounter"	%MW4	DEZ	2	

Write task active; data carrier B inside detection zone; data successfully written
StartWrite = True
WriteValid = True
Active = True
FrameLength = 0
WriteCounter = 2

"StartRead"	%M0.0	BOOL	FALSE	
"StartWrite"	%M0.1	BOOL	FALSE	FALSE
"ReadValid"	%M0.2	BOOL	FALSE	
"WriteValid"	%M0.3	BOOL	FALSE	
"Active"	%M0.4	BOOL	FALSE	
"Error"	%M0.5	BOOL	FALSE	
"FrameLength"	%MB1	DEZ	0	
"ReadCounter"	%MW2	DEZ	0	
"WriteCounter"	%MW4	DEZ	2	

Write task completed
StartWrite = False
WriteValid = False
Active = False
FrameLength = 0
WriteCounter = 2

The following figure shows the flowchart for write access to data carrier in various situations.



Event	Significance
1	Start write task StartWrite := True
2	Write task is activated; no data carrier inside detection zone StartWrite := True; WriteValid := False; Active := True; FrameLength := 0; WriteCounter := 0;
3	Write task is activated; data carrier A written StartWrite := True; WriteValid := True; Active := True; FrameLength := 0; WriteCounter := 1;
4	Write task finished StartWrite := False; WriteValid := False; Active := False; FrameLength := 0; WriteCounter := 1;
5	Start write task StartWrite := True; WriteValid := False; Active := False; FrameLength := 0; WriteCounter := 0;
6	Write task is activated; data carrier B written StartWrite := True; WriteValid := True; Active := True; FrameLength := 0; WriteCounter := 1;
7	Write task is activated; data carrier B leaves detection zone StartWrite := True; WriteValid := False; Active := True; FrameLength := 0; WriteCounter := 1;
8	Write task finished StartWrite := False; WriteValid := False; Active := False; FrameLength := 0; WriteCounter := 1;
9	Start write task StartWrite := True; WriteValid := False; Active := False; FrameLength := 0; WriteCounter := 0;
10	Write task activated; no data carrier inside detection zone StartWrite := True; WriteValid := False; Active := True; FrameLength := 0; WriteCounter := 0;
11	Write task activated; data carrier C written StartWrite := True; WriteValid := True; Active := True; FrameLength := 0; WriteCounter := 1;
12	Write task activated; data carrier C leaves detection zone StartWrite := True; WriteValid := False; Active := True; FrameLength := 0; WriteCounter := 1;
13	Write task activated; data carrier D written StartWrite := True; WriteValid := True; Active := True; FrameLength := 0; WriteCounter := 2;
14	Write task activated; data carrier D leaves detection zone StartWrite := True; WriteValid := False; Active := True; FrameLength := 0; WriteCounter := 2;
15	Write task is activated; data carrier E written StartWrite := True; WriteValid := True; Active := True; FrameLength := 0; WriteCounter := 3;

The memory address of the data carrier from which the data written is defined by parameter 205 "Write Task". The address is byte-related and must be either a multiple of 4 or 8 (IQC33).

"IO-Link Parameter".IOLData[0]	Hex	16#00
"IO-Link Parameter".IOLData[1]	Hex	16#08
"IO-Link Parameter".IOLData[2]	Hex	16#00
"IO-Link Parameter".IOLData[3]	Hex	16#04

Parameter 205 “Write Task“ – Start address 4

[0] = 16#00 → Access to user data
[1] = 16#08 → 8 Byte user data
[2][3] = 16#0004 → Start address 4

13. Example: Error message via process data field

The IQT1-...-IO-V1 RFID head sends an error message via the process data field to the controller as soon as an error condition occurs when a read or write task is executed. The error message consists of an error code and a short description of the error, which coded in ASCII characters. At the same time, the output "O_b_Error" is set on the FB3248 "IQT1_Easy-Mode". The output "O_B_FrameLength" indicates the length of the error message.

The following is an example of an error message from the RFID head. A number of 4 bytes to read in was set. This number is not compatible with the IQC33 data carriers. This data carrier type requires a multiple of 8 as the amount of data to be read in. The Autostart function switched on.

Parameter 204 „Read Task“:
[0] = 16#00 → Access to user data
[1] = 16#04 → 4 Byte user data
[2][3] = 16#0000 → Start address 0
[4] = 16#80 → Autostart function active

"StartRead"	%M0.0	BOOL	FALSE
"StartWrite"	%M0.1	BOOL	FALSE
"ReadValid"	%M0.2	BOOL	FALSE
"WriteValid"	%M0.3	BOOL	FALSE
"Active"	%M0.4	BOOL	FALSE
"Error"	%M0.5	BOOL	TRUE
"FrameLength"	%MB1	DEZ	16
"ReadCounter"	%MW2	DEZ	0
"WriteCounter"	%MW4	DEZ	0

Data carrier IQC33 inside detection range
ReadValid = False
Active = False
Error = True
FrameLength = 16
ReadCounter = 0

The error status and the text of the error message are located in the corresponding block instance "IQT1_EasyMode_DB".

"IQT1_EasyMode_DB".INDATA.ReadIN[0]	Hex	16#04
"IQT1_EasyMode_DB".INDATA.ReadIN[1]	Zeichen	'i'
"IQT1_EasyMode_DB".INDATA.ReadIN[2]	Zeichen	'n'
"IQT1_EasyMode_DB".INDATA.ReadIN[3]	Zeichen	'v'
"IQT1_EasyMode_DB".INDATA.ReadIN[4]	Zeichen	'a'
"IQT1_EasyMode_DB".INDATA.ReadIN[5]	Zeichen	'l'
"IQT1_EasyMode_DB".INDATA.ReadIN[6]	Zeichen	'i'
"IQT1_EasyMode_DB".INDATA.ReadIN[7]	Zeichen	'd'
"IQT1_EasyMode_DB".INDATA.ReadIN[8]	Zeichen	' '
"IQT1_EasyMode_DB".INDATA.ReadIN[9]	Zeichen	'c'
"IQT1_EasyMode_DB".INDATA.ReadIN[10]	Zeichen	'o'
"IQT1_EasyMode_DB".INDATA.ReadIN[11]	Zeichen	'm'
"IQT1_EasyMode_DB".INDATA.ReadIN[12]	Zeichen	'm'
"IQT1_EasyMode_DB".INDATA.ReadIN[13]	Zeichen	'a'
"IQT1_EasyMode_DB".INDATA.ReadIN[14]	Zeichen	'n'
"IQT1_EasyMode_DB".INDATA.ReadIN[15]	Zeichen	'd'

Error status and text

In this example, the error code is 16#04 and signals a parameter error. Starting from element "ReadIN[1]" an error text is transmitted. The error text transferred in ASCII. The length of the text depends on the error. The error text is "invalid command". This makes it clear that read access to 4 bytes of user data is not possible when using the IQC33 data carrier.

An error message also generated if both inputs "StartRead" and "StartWrite" are set simultaneously. Only one task may activated at a time.

"StartRead"	%M0.0	B...	TRUE	TRUE
"StartWrite"	%M0.1	BOOL	TRUE	TRUE
"ReadValid"	%M0.2	BOOL	FALSE	
"WriteValid"	%M0.3	BOOL	FALSE	
"Active"	%M0.4	BOOL	FALSE	
"Error"	%M0.5	BOOL	TRUE	
"FrameLength"	%MB1	DEZ	19	
"ReadCounter"	%MW2	DEZ	0	
"WriteCounter"	%MW4	DEZ	0	

Read and Write activate at the same time
ReadValid = False
Active = False
Error = True
FrameLength = 19
ReadCounter = 0

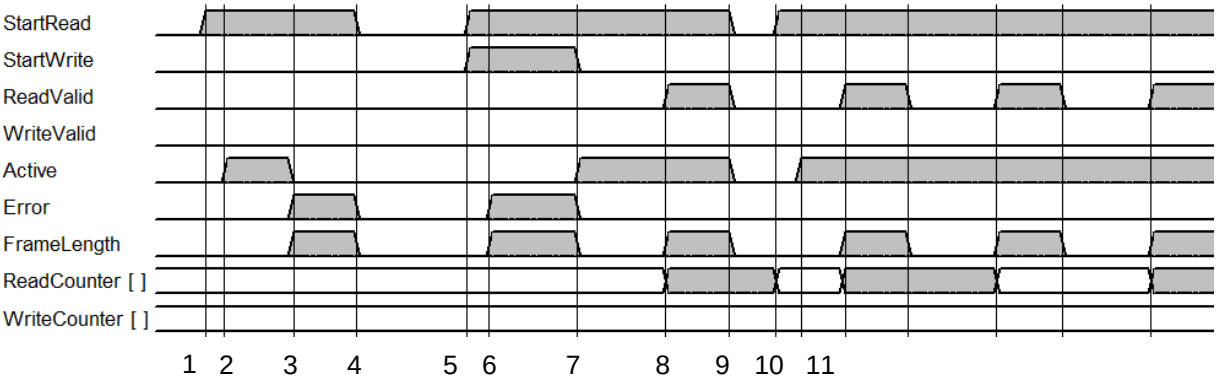
The error status and the text of the error message are located in the corresponding block instance "IQT1_EasyMode_DB".

"IQT1_EasyMode_DB".INDATA.ReadIN[0]	Hex	16#04
"IQT1_EasyMode_DB".INDATA.ReadIN[1]	Zeichen	'r'
"IQT1_EasyMode_DB".INDATA.ReadIN[2]	Zeichen	'e'
"IQT1_EasyMode_DB".INDATA.ReadIN[3]	Zeichen	'a'
"IQT1_EasyMode_DB".INDATA.ReadIN[4]	Zeichen	'd'
"IQT1_EasyMode_DB".INDATA.ReadIN[5]	Zeichen	' '
"IQT1_EasyMode_DB".INDATA.ReadIN[6]	Zeichen	'A'
"IQT1_EasyMode_DB".INDATA.ReadIN[7]	Zeichen	'N'
"IQT1_EasyMode_DB".INDATA.ReadIN[8]	Zeichen	'D'
"IQT1_EasyMode_DB".INDATA.ReadIN[9]	Zeichen	' '
"IQT1_EasyMode_DB".INDATA.ReadIN[10]	Zeichen	'w'
"IQT1_EasyMode_DB".INDATA.ReadIN[11]	Zeichen	'r'
"IQT1_EasyMode_DB".INDATA.ReadIN[12]	Zeichen	'i'
"IQT1_EasyMode_DB".INDATA.ReadIN[13]	Zeichen	't'
"IQT1_EasyMode_DB".INDATA.ReadIN[14]	Zeichen	'e'
"IQT1_EasyMode_DB".INDATA.ReadIN[15]	Zeichen	' '
"IQT1_EasyMode_DB".INDATA.ReadIN[16]	Zeichen	's'
"IQT1_EasyMode_DB".INDATA.ReadIN[17]	Zeichen	'e'
"IQT1_EasyMode_DB".INDATA.ReadIN[18]	Zeichen	't'

Error status and text:

In this example, the error code is 16#04 and signals a parameter error. Starting from element "ReadIN[1]" an error text is transmitted. The error text transferred in ASCII. The length of the text depends on the error. The error text is "read AND write set". This makes it clear that a read and a write task controlled simultaneously.

The following figure shows the flowchart when an error message occurs:



Event	Significance
1	Start read task StartRead := True
2	Read task activated; no data carrier inside detection range StartRead := True; ReadValid := False; Active := True; FrameLength := 0; ReadCounter := 0;
3	Data carrier IQC33 enters detection zone; error state StartRead := True; ReadValid := False; Active := True; Error := True; FrameLength := 16; ReadCounter := 0;
4	Read task finished StartRead := False; ReadValid := False; Active := False; Error := False; FrameLength := 0; ReadCounter := 0;
5	Start read and write task StartRead := True; StartWrite := True;
6	Read and write task activated; error message transmitted StartRead := True; StartWrite := True; Active := False; Error := True; FrameLength := 19; ReadCounter := 0;
7	Stop write task; read task still activated StartRead := True; StartWrite := False; Active := True; Error := False; FrameLength := 0; ReadCounter := 0;
8	Data carrier inside detection zone StartRead := True; ReadValid := True; Active := True; Error := False; FrameLength := 8; ReadCounter := 1;
9	Stop read task StartRead := False; ReadValid := False; Active := False; Error := False; FrameLength := 0; ReadCounter := 1;
10	Start read task StartRead := True; ReadCounter := 0;
11	Read task activated; no tag inside detection zone StartRead := True; ReadValid := False; Active := True; FrameLength := 0; ReadCounter := 0;

14. Trouble shooting

Index	Error description	Correction
1	Website of the ICE3 IO-Link Master cannot be called up	1. set the rotary switch of the ICE3 master to 0 2. factory setting IP address is 192.168.1.250 3. test connection via PING to IP address 4. otherwise setting the last 3 digits of the IP address via the coding switches 5. alternatively via Primary Setup Tool or Proneta Scan for connected devices
2	A user name and password are required when accessing the website.	1. in the factory setting, no password has been assigned for any user level 2. an admin password must be assigned for complete access to the device functions 3. To reset the password to the factory setting (i.e. no password), set the rotary switches to position 888; then switch on the power supply.
3	IQT1-...-IO-V1 correctly connected to the ICE3 IO-Link master, but no LED on the head lit.	1. Check in the menu "Diagnostics" → "IO-Link" whether the parameter "Port Mode" has the setting "IOLink" at the corresponding port (e.g. port 1). 2. If the IQT1-...-IO-V1 connection is correct, a green LED flashes every 2 seconds and a blue LED constantly and continuously (if Autostart is active).
4	No blue LED on the IQT1-...-IO-V1; only the green LED flashes.	1. the blue LED on the head indicates the execution of a read or write task 2. Check if Autostart function is active. If Autostart is deactivated, the read or write task must be started via the process output data field. 3. switching on via IO-Link parameter 204 "read task"
5	No orange LED if data carrier is within detection range	1. orange LED signals successful access to the data carrier 2. Check whether the appropriate data carrier type is set. Read out IO-Link parameter 201 and compare with data carrier list in chapter 4. 3. Check whether the number of bytes matches the block size of the data carrier. IQC33 requires a number of bytes as a multiple of 8 bytes. All other data carriers as multiples of 4
6	Writing the data carrier does not work	1. check whether the set data carrier type (parameter 201) matches the existing data carrier 2. change by parameter 201
7	Byte 0 of the input process data has the value 0x40	1. the Expert mode is active instead of the Easy mode 2. change to Easy Mode by parameter 203 "Easy Mode" with value 0x80
8	Access to the process output data field for starting write and read task is not possible.	1. an admin password must be assigned for access to the process output data field (PDO) 2. password assignment takes place in the menu "Advanced" → "Accounts 3. open the website again and log in with your admin password 4. the release must be enabled in the "Configuration" → "Misc" menu 5. The selection "Enable PDO Write" must be set to "Enable".
9	IO-Link IQT1-...-IO-V1 parameters are not displayed or cannot be changed	1. for easy access to the IO-Link parameters, the IODD file must be uploaded to the web server 2. switch to the menu "Attached Devices" → "IODD Files" for this purpose 3. select and upload the IODD file
10	The name of the IODD file highlighted in red.	1. the IODD file consists of several files including image files 2. the red mark indicates that parts of the IODD file (e.g. image file) are missing 3. Delete the old IODD file from the web server and upload the complete IODD folder again. 4. the complete.zip file can be uploaded