

Frequency Converter

Multi-Ethernet Card

Instruction Manual R912006860 Edition 02





Record of Revision

Edition	Release Date	Notes
DOK-RCON0*-XFCX610*MUL-IT01-EN-P	2016.01	First release
DOK-RCON0*-XFCX610*MUL-IT02-EN-P	2016.05	New functions

Reference

For documentations available in other type or language, please consult your local sales partner or check www.boschrexroth.com.

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1 Safety Instruction

The Safety Instructions in the available application documentation contain specific signal words (DANGER, WARNING, CAUTION or NOTICE) and, where required, a safety alert symbol (in accordance with ANSI Z535.6-2011).

The signal word is meant to draw the reader's attention to the safety instruction and identifies the hazard severity.

The safety alert symbol (a triangle with an exclamation point), which precedes the signal words DANGER, WARNING and CAUTION, is used to alert the reader to personal injury hazards.

In case of non-compliance with this safety instruction, death or serious injury $\boldsymbol{\mathsf{will}}$ occur.

In case of non-compliance with this safety instruction, death or serious injury $\ensuremath{\textbf{could}}$ occur.

In case of non-compliance with this safety instruction, minor or moderate injury could occur.

NOTICE

In case of non-compliance with this safety instruction, property damage could occur.

Do not attempt to install and operate the components of the electric drive and control system without first reading all documentation provided with the product. Read and understand these safety instructions and all user documentation prior to working with these components. If you do not have the user documentation for the components, contact your responsible Bosch Rexroth sales partner.

2 Introduction

2.1 About This Documentation

This documentation contains necessary data and information descriptions related to the Multi-Ethernet Platform (MEP) extension card, which is one of the fieldbus communication module accessories of EFC x610 series frequency converter.

As the name indicates, this extension card incoroporates multiple industrial Ethernet protocols listed as below.

- PROFINET IO
- EtherNet/IP
- SERCOS III
- EtherCAT
- Modbus/TCP

This extension card fully supports the EFCx610 firmware the version 03V08 and above, while more industrial Ethernet protocols will be developed to be incorporated in the MEP extension card, please always check for the latest version of this manual for a most up-to-date reference.

Chapters 1 through 3 provide the general information of the MEP extension card, while chapters 5 through 9 contain detailed technical information relevant to different industrial Ethernet protocol. The common configuration, parameters and diagnosis are described in chapter 4, 10 and 11.

2.2 Engineering Tools

For using the MEP extension card, an engineering connection from laptop / PC to the EFC series frequency converter is necessary. Such a connection can be established with using following methods:

- Via Ethernet using IndraWorks. In this case, the MEP can be browsed and the IP address can be set.
- Via USB using ConverterWorks or IndraWorks. Plug the cable and connect.

The figure below shows an overview of ConverterWorks.

rameterization Diagnostics Service To	ols Help		<i>a</i> ta -	
Back 👻 🔘 👻 📠 🗎 🚖 🏘 📰 📃	🔜 🔒 🔩			
Drive	Active Fieldbus		Commands	
Axis	Fieldbus	Multi Ethernet	Frequency Command 0.00	Active]
- Search Parameters	Application Status	Not Running		
Wizards	Protocol	Sercos 3		
- Can Monitoring	MAC Address	00-60-34-11-51-00		
I/O Monitor	MAG ADDIESS	000004110100		
Field Bus	2			
Error Memory	Source	Run Command Source	Frequency Setting Source	
	Emt	Extension card	Communication	
	Canad	M di function distal insut	Pagel patentiamator	
	Second	Multi-function digital input	ranei potentiometer	
		Status Word	Control Word	
	Latest Error	> StoP Converter stopped		
	Fault	> 0	Control Word >	0
	Stall Over Current	> 0	Stop Acceleration/deceleration >	0
	Stall Over Voltage	> 0	Fault Reset >	0
	Deceleration	> 0	E-Stop >	0
	Acceleration	> 0	Stop(Parameter setting) >	0
	Jogging	> 0	Reverse >	0
	Running	> 0	Jog >	0
	Reverse	> 0	Run command >	0

Fig. 2-1: Overview of ConverterWorks

2.3 Reference Documentations

Туре	Typecode	Language	Material Number
Operating Instructions	DOK-RCON03-EFC-x610***-ITRS-ZH-P	Chinese	R912005853
	DOK-RCON03-EFC-x610***-ITRS-EN-P	English	R912005854
Quick Start Guida	DOK-RCON03-EFC-x610***-QURS-ZH-P	Chinese	R912005855
Quick Start Guide	DOK-RCON03-EFC-x610***-QURS-EN-P	English	R912005856
Instruction Manual (UL)	DOK-RCON01-REX*F*UL***-INRS-EN-P	English	R912004711
Extension Card Module	DOK-RCON0*-XFC-X610***-ASRS-EN-P	English	R912006261
Mounting Instructions	DOK-RCON0*-XFC-X610***-ASRS-ZH-P	Chinese	R912006262
Product Insert	DOK-RCON0*-XFC-X610***-ISRS-EN-P	English	R912006326
(I/O module)	DOK-RCON0*-XFC-X610***-ISRS-ZH-P	Chinese	R912006327
	DOK-RCON**-SAFETY*****-SARS-BP-P	Portuguese	R911339218
	DOK-RCON**-SAFETY*****-SARS-DE-P	German	R911339363
	DOK-RCON**-SAFETY*****-SARS-EN-P	English	R911339362
Safety Instructions	DOK-RCON**-SAFETY*****-SARS-ES-P	Spanish	R911339216
Salety Instructions	DOK-RCON**-SAFETY*****-SARS-FR-P	French	R911339213
	DOK-RCON**-SAFETY*****-SARS-IT-P	Italian	R911339215
	DOK-RCON**-SAFETY*****-SARS-RU-P	Russian	R911339217
	DOK-RCON**-SAFETY*****-SARS-ZH-P	Chinese	R912004727
Product Insert	DOK-RCON0*-XFCX610*MUL-ISRS-ZH-P	Chinese	R912006846
(Multi-Ethernet Card)	DOK-RCON0*-XFCX610*MUL-ISRS-EN-P	English	R912006847

Tab. 2-1: Reference documentations

3 Hardware Installation

3.1 Hardware Description



Fig. 3-1: Hardware illustration

The MEP extension card is provided with two shielded female RJ45 connectors.

3.2 Installing the Card in Frequency Converter

The MEP extension card must be installed in combination with the extension card module in the EFCx610 frequency converter. For details, please refer to Extension Card Module Mounting Instructions.

The MEP extension card does not support hot plug.

3.3 Cables

At least CAT 5e standard Ethernet cable is required for data transmission. The shielded cables are recommended for the use in industrial environments.

The transmission rate is fixed at 100 Mbps.

3.4 LEDs

Two slots are provided in the extension card module. On each slot, four dual-color LEDs are equipped for state indication if the MEP extension card is applied.

The network status (NS: H11/H21) and module status (MS: H12/H22) LEDs are red/green. The physical status of port 1 (P1: H13/H23) and port 2 (P2: H14/H24) are yellow/green.

The figure below shows an overview of LED indications on the extension card.



Fig. 3-2: Multi-Ethernet card LED

The LED functionality is described in chapter 11.

3.5 Power Supply

Please make sure the main circuit power supplied during commissioning and firmware update. External 24 V will keep the basic communication when main power loss, but only limited parameter access and no run possible.

4 General Configuration

4.1 Protocol Selection

The parameter H3.40 is used to define the type of Industrial Ethernet protocol to be used with MEP card. And parameter H3.41 indicates which industrial Ethernet protocol is currently engaged. Once the request protocol is changed, a cycle power or a reboot is needed to activate the selected protocol.

Code	Name	Setting range
		S3: SERCOS III
		PN: PROFINET IO
H3.40	MEP: Industrial Ethernet Protocol Request	EI: Ethernet/IP
		EC: EtherCAT
		MB: Modbus/TCP
H3.41	MEP: Industrial Ethernet Protocol Active	Read-only

Tab. 4-1: Protocol selection parameters

The values of H3.40 and H3.41 are two characters representation that only accepts upper case letter. Figure 4-1 gives an example of PROFINET IO request.

EC 112		
re nov		
Ax	is 🙀 🛤 🐱	
Name	MEP: Industrial Ethernet Protocol Request	
Status	ОК	
Min		
Max	0x50014x	
Value	PN	
	.:!	

Fig. 4-1: Protocol request setting

4.2 Communication Channel Setting

The fieldbus communication channel should be configured according to the actual application when the MEP communication extension card is applied.

If the first control command and frequency setting are both transmitted via communication channel, parameters in table 4-2 should be set to open the first communication channel.

Code	Name	Value
E0.00	First frequency setting source	20: Communication
E0.01	First run command source	2: Communication

Tab. 4-2: First communication channel parameters

And if the second communication channel is used with the MEP extension card, the parameters in table 4-3 should be set to open the second communication channel.

Code	Name	Value
E0.02	Second frequency setting source	20: Communication
E0.03	Second run command source	2: Communication

Tab. 4-3: Second communication channel parameters

After configuration is completed for the communication channel, the parameter E8.00 should be set to redirect to the communication extension card.

Code	Name	Value
E8.00	Communication protocol	1: Extension card

 Tab. 4-4:
 Communication selection parameter

4.3 Process Data Setting Range

The range of both output and input process data is listed in the table below. If the setting values exceed the range, "FPC-" error will be triggered.

The output process data list includes the cyclic data objects that can be transferred from controller to peripheral devices.

Code	Name
H0.00	Control word
H0.10	Frequency command
H0.40	Dummy PZD
F0.20	ASF command01
F0.21	ASF command02
F0.22	ASF command03
F0.23	ASF command04

Tab. 4-5: Output process data parameter list

And the input process data list includes the cyclic data objects that can be transferred from peripheral devices to controller. Normally, the monitoring data are collected by controller.

Code	Name	Code	Name
H0.01	Status word	d0.43	I/O card digital input
d0.00	Output frequency	d0.45	DO1 output
d0.01	Actual speed	d0.47	I/O card EDO output
d0.02	Setting frequency	d0.50	Pulse input frequency
d0.03	Setting speed	d0.55	Pulse output frequency
d0.04	User-defined setting speed	d0.60	Relay output
d0.05	User-defined output speed	d0.62	I/O card relay output
d0.10	Output voltage	d0.63	Relay card output
d0.11	Output current	d0.70	PID reference engineering value
d0.12	Output power	d0.71	PID feedback engineering value
d0.13	DC-bus voltage	d0.80	ASF Display00
d0.16	Output torque	d0.81	ASF Display01
d0.17	Setting torque	d0.82	ASF Display02
d0.20	Power module temperature	d0.83	ASF Display03
d0.21	Actual carrier frequency	d0.84	ASF Display04
d0.22	Control stage running time	d0.85	ASF Display05
d0.23	Power stage running time	d0.86	ASF Display06
d0.30	Al1 input	d0.87	ASF Display07
d0.31	Al2 input	d0.88	ASF Display08

Code	Name	Code	Name
d0.33	I/O card EAI input	d0.89	ASF Display09
d0.35	AO1 output	d0.98	High resolution output current
d0.37	I/O card EAO output	H0.40	Dummy PZD
d0.40	Digital input 1		

Tab. 4-6: Intput process data parameter list

The parameter H0.40 can be used for filler in the output / input configurations.

4.4 Device Profile

The Rexroth device profile described below is used as common profile for the MEP extension card.

The following table is a general description of the H0.00 control words which are used to send commands from master to slave.

Bit	Value	Meaning
159	-	Reserved
Q	1	Freewheeling stop
0	0	Inactive
7	1	Control word active
ſ	0	Inactive
6	1	Stop Acc. / Dec. active (stop the internal Acc. / Dec. ramp generator)
0	0	Inactive
Б	1	Fault reset active
5	0	Inactive
1	1	E-stop active
4	0	Inactive
2	1	Stop according to parameter setting
3 0		Inactive
2	1	Reverse
2	0	Forward
1	1	Jog active (jogging direction determined by bit 2)
1	0	Inactive
0	1	Run command active
	0	Inactive

 Tab. 4-7:
 Control word definition

• Bit 8 Freewheeling stop

Freewheeling stops that ignore the frequency converter stop mode setting. Only active start from frequency converter firmware version 03V12.

• Bit 6 Stop acceleration/deceleration active

The current acceleration/deceleration process will be paused when bit 6 = 1, and it will be recovered when bit 6 = 0.

• Bit 4 E-stop active

Freewheel stop will be triggered in conjunction with panel display error 'E-St' when bit 4 = 1.

• Bit 3 Stop according to parameter setting

The parameter E0.50 Stop Mode is referenced when bit 3 = 1.

• Bit 1 Jog active

Jog frequency and acceleration/deceleration time are set by the parameters E0.60, E0.61, and E0.62.

The control bits (bit 6...0) in the control word are all edge sensitive. It is recommended to reset value 0x0080 at the time when the program starts to run initially.

The H0.01 status words are used to supply the real-time status information to master from slave.

Bit	Value	Meaning
158	-	Error code
7	1	Error
I I	0	No error
6	1	Stall over current
0	0	Normal
Б	1	Stall over voltage
5	0	Normal
1	1	Decelerating
4	0	Not in decelerating
3	1	Accelerating
5	0	Not in accelerating
2	1	Jogging
2	0	Not in jogging
1	1	Running
1	0	Stop
0	1	Reverse
0	0	Forward

Tab. 4-8: Status word definition

• Bit 15...8 Error code

Please refer to chapter 13.4 of EFC x610 Operating Instructions for detailed error code description. The error code as referred in table 4-8 is the error occurring currently when the frequency converter is in error mode (i.e. bit 7 = 1); and the last error occurred when the frequency converter is in normal mode (i.e. bit 7 = 0).

4.5 Fault Management

The response of the frequency converter can be configured via parameter E8.03 when the process data are lost.

Code	Name	Setting range
		0: Decelerating stop
E8.03	Communication process data loss behavior	1: Freewheeling stop
		2: Keep running

Tab. 4-9: Parameter E8.03

5 PROFINET IO

5.1 Protocol Configuration

5.1.1 Device Name

A PROFINET IO device is addressed through the so-called device name. Each PROFINET IO device operating in the same network must have unique device name.

The device name can be assigned locally via: H3.20 MEP: Station Name (PROFINET), or through device naming by a configuration software tool.

5.1.2 IP Settings

All PROFINET IO devices follow the TCP/IP protocol, thus they need an IP address when operating on the Ethernet.

Code	Name
H3.00	MEP: MAC Address Device
H3.01	MEP: MAC Address Port 1
H3.02	MEP: MAC Address Port 2
H3.03	MEP: IP Address
H3.04	MEP: Subnet Mask
H3.05	MEP: Gateway Address
H3.06	MEP: IP Options

Table below gives an overview of all IP-related parameters.

Tab. 5-1: IP-related parameters

The parameter H3.06 can be set to enable the MEP in receiving IP address from a DHCP server, see chapter 10.2.2. In most cases, the IP address of IO devices are assigned by IO controller. If not assigned by the PNIO controller, user should manually set IP address, Subnet Mask, and Gateway Address.

It is recommended, either to use a static IP address at fieldbus project for engineering access via SERCOS/IP, which was already parameterized to the MEP or to ensure, that the IP address assigned dynamically by the PNIO controller at fieldbus startup is equal to the parameterized IP address at MEP. If static and dynamically assigned IP address differ, an engineering connection (SERCOS/IP) already established will be lost, when PNIO controller assigns new IP address.

5.2 System Configuration

5.2.1 GSD file

R

A GSD file which contains the setup information of IO device communication is required when configuring the PROFINET IO controller.

Users can download the GSD file through the following steps:

- 1. Click on http://www.boschrexroth.com/dcc.
- 2. Choose "Frequency converter -> EFC 3610 (or EFC 5610)" from the navigation bar on left-hand side of the operation interface.
- 3. Choose "Download area" tab from right-hand side of the interface.
- 4. Click on "DEVICE_DESCRIPTIONS_MULTI-ETHERNET_EFCX610_xxxx-xxxx.ZIP" to download the ZIP file.
- 5. Extract the ZIP file and get the GSD file.

"xxxx-xx-xx" indicates the date.

The following is the instruction of installing the GSD file on the Simatic Manager software tool. It can be found in the hardware catalog.



Fig. 5-1: Hardware catalog

Two GSDML schema versions are supported. For configuration tools, which don't support GSDML schema version 2.1, please use with version 2.0.

5.2.2 IO Device

In the configuration of project hardware, user can configure the EFC x610 as an IO device in the PROFINET IO system. The **Properties**window below shows the key information of the IO device.

Chart description:	auto	
short description.		
		()
Order No./ firmware:	MEP_XFC / V1.0	
Family:	xFC0x	
Device name:	axis	
GSD file:	GSDML-V2.1-BoschRexroth-011F-xFC01-20151105.xml	
GSD file: - Node in PROFINET	GSDML-V2.1-BoschRexroth-011F-xFC01-20151105.xml Change Release Number	
GSD file: - Node in PROFINET Device number:	GSDML-V2.1-BoschRexroth-011F-xFC01-20151105.xml Change Release Number IO System 1 PROFINET-IO-System (100)	
GSD file: Node in PROFINET Device number: IP address:	GSDML-V2.1-BoschRexroth-011F-xFC01-20151105.xml Change Release Number IO System 1 PROFINET-IO-System (100) 192.168.0.1 Ethernet	
GSD file: −Node in PROFINET Device number: IP address: IZ Assign IP addres	GSDML-V2.1-BoschRexroth-011F-xFC01-20151105.xml Change Release Number IO System 1 PROFINET-IO-System (100) 192.168.0.1 Ethernet ss via IO controller	
GSD file: - Node in PROFINET Device number: IP address: IP address: Assign IP address Comment:	GSDML-V2.1-BoschRexroth-011F-xFC01-20151105.xml Change Release Number IO System 1 PROFINET-IO-System (100) 192.168.0.1 Ethernet ss via IO controller	
GSD file: - Node in PROFINET Device number: IP address: IP address: IP address: Comment:	GSDML-V2.1-BoschRexroth-011F-xFC01-20151105.xml Change Release Number IO System 1 PROFINET-IO-System (100) 192.168.0.1 Ethernet ss via IO controller	

Fig. 5-2: IO device Properties window

The configured device name here must match the setting value of parameter H3.20 MEP: Station Name (PROFINET).

The IO modules should be configured here according to the acutal application. The figure below shows the two input and output words by default. User can freely configure the IO modules from 1 to 15 words.



Fig. 5-3: Hardware configuration window

5.2.3 Topology

The MEP communication extension card integrates a Cut-Through-Switch that enables the possibility for connecting several MEP communication extension cards in a line topology as an alternative to the typical star topology.

Typically a mixed line and star topology connecting with an industrial Ethernet switch is applied in the field.

5.2.4 Process Data

The process data that are used for cyclic communication are configured via parameters H3.30 and H3.31.

The two parameters are list type that consist of parameter function codes. Figure below shows the default configurations.

C H3.31	- 🕲 🥑 📇 🚝 🜌 🗹	FC H3.30	0 🔹 🕄 🕲 🕲 📩 🛃 🛃
Axis	🏘 🛤 🐱	Axis	: 🙀 🔜 🛃
Name	MEP: List of Output Process Data	Name	MEP: List of Input Process Data
Status	ОК	Status	OK
Min / Max	/ 0x50014x	Min / Ma	ax / 0x50014x
Elements	Act: 2 Max: 15	Element	ts Act: 2 Max: 15
0	H0.00	0	H0.01
1	H0.10	1	d0.02

Fig. 5-4: Process data default configurations

5.3 Acyclic Communication

5.3.1 Principle

Acyclic communication is mainly used for parameter read/write accesses from controller, supervisor etc. The PROFINET service "read/write record" (RPC over UDP) is utilized to realize the object addressing.

With the SFB52 "RDREC" and SFB53 "WRREC", a data record with the number INDEX can be read from or written to a PROFINET IO device module defined by ID. The key arguments ID and INDEX are described below.

When parameter write access on the two bytes type parameter, any values exceed 65,535 (0xFFFF) will be reduced automatically to a two bytes value. If the reduced two bytes value is in the valid range, then it will be accepted and without value exceed limits indication.

5.3.2 Module ID

The diagnostic address of the PROFINET IO device can be treated as the module ID when read/write record is called. It can be found in the hardware configuration of the software tool.

	(1) axis01					
Slot	Module	Order number	I address	Q address	Diagnostic address:	Comment
0	in axis01	MEP_XFC			8188*	
XI	PN-10				8187*	
XT P1	Port 1 · RJ45				8184*	
X1 P2	Port 2 · RJ45				8183°	
1	Input 15 Words		256285			
2	Output 15 Words			256285		
3						
4						
5						

Fig. 5-5: Diagnostic address

5.3.3 Record Index

The record index corresponds exactly to the function code parameter to be accessed. The address of the function code parameter is composed of a higher byte representing the parameter group and a lower byte representing the sub-index in the group.

The parameter group map is shown as below.

Group	Index	Value	Example
b	09	0x000x09	b0: 0x00
d	09	0x100x19	d0: 0x10
С	09	0x200x29	C3: 0x23
E	09	0x300x39	E8: 0x38
U	09	0x400x49	U1: 0x41

Group	Index	Value	Example
F	09	0x500x59	F0: 0x50
Н	09	0x600x69	H3: 0x63

Tab. 5-2: Parameter group mapping

An offset of 0x30 must be added on the parameter sub-index to form the record index. For example, the record index of E0.26 Acceleration Time is:

0x3000 + 0x1A + 0x30 = 0x304A

5.4 Example

A simple program fragment example that utilizes the mapped I/Q addresses is shown as below. The process data configuration is by defaults.

🙀 LAD/STL/FBD - [OB1 testprofinet\SIMATI	C 300(1)/CPU 317F-2 PN/DP]	- 8 🗙
File Edit Insert PLC Debug View Options V	/indow Help	_ 8 ×
🗅 😅 🗣 🖬 🍪 👗 🗞 📾 🕞 🗠 🖂	💼 🔁 🗣 🕼 (포) 🔲 🛄 🔛 (표 제 주 이 🖻 다 그 도 📢	
Image: Section of the section of t	NU Image: State St	
Egg Egg <td>M.1.2 M.1.2 WELSO</td> <td>5.2 Nev 2 Inset (hg)</td>	M.1.2 M.1.2 WELSO	5.2 Nev 2 Inset (hg)

Fig. 5-6: Program example

6 EtherNet/IP

6.1 Protocol Configuration

The master communication address for EtherNet/IP is an IP address. It is set manually in the frequency converter side by using an engineering tool. The parameter H3.06 can be set to enable the MEP in receiving IP address from a DHCP server, see chapter 10.2.2.

Code	Name
H3.00	MEP: MAC Address Device
H3.01	MEP: MAC Address Port 1
H3.02	MEP: MAC Address Port 2
H3.03	MEP: IP Address
H3.04	MEP: Subnet Mask
H3.05	MEP: Gateway Address
H3.06	MEP: IP Options

Tab. 6-1: IP-related parameters

6.2 System Configuration

6.2.1 EDS File

An EDS file is provided with the EtherNet/IP application of MEP extension card.

Users can download the EDS file through the following steps:

- 1. Click on http://www.boschrexroth.com/dcc.
- 2. Choose "Frequency converter -> EFC 3610 (or EFC 5610)" from the navigation bar on left-hand side of the operation interface.
- 3. Choose "Download area" tab from right-hand side of the interface.
- 4. Click on "DEVICE_DESCRIPTIONS_MULTI-ETHERNET_EFCX610_xxxx-xxxx.ZIP" to download the ZIP file.
- 5. Extract the ZIP file and get the EDS file.

"xxxx-xx-xx" indicates the date.

6.2.2 Generic Device

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The MEP extension card is implemented as a 'Generic Device' when it is configured into the EtherNet/IP network. The EtherNet/IP object directory implemented contains the objects:

- Identity Object (0x01)
- Message Router Object (0x02)
- Ethernet Link Object (0xF6)
- TCP/IP Object (0xF5)
- Port Object (0xF4)
- Connection Manager Object (0x06)
- Assembly Object (0x04)

The cyclic communication is implemented via the "EtherNet/IP-I/O messaging" (Class 1). It can be configured up to 15 items in both data direction.

6.2.3 Topology

The star and line topology are both supported.

6.2.4 Process Data Configuration

The process data that are used for cyclic communication are configured on frequency converter via parameters H3.30 and H3.31.

The two parameters are list type that consist of parameter function codes. Figure below shows the default configurations.

FC H3.31	- 🕲 🖉 🚝 🚝 🗹	FC H3.30	🔹 😳 🥑 🛍 🖶 🗮 🗹
Axis	🏘 📖 🐱	Axis	🌺 📰 🔛 🦉
Name	MEP: List of Output Process Data	Name	MEP: List of Input Process Data
Status	OK	Status	ОК
Min / Max	/ 0x50014x	Min / Max	/ 0x50014x
Elements	Act: 2 Max: 15	Elements	Act: 2 Max: 15
0	H0.00	0	H0.01
1	H0.10	1	d0.02

Fig. 6-1: Process data default configurations

- The set of allowed functions codes for input and output process data is contained at [b8.61] and [b8.62] respectively. Maximum supported input and output process data length is 30 bytes, each. Hence, as current supported process data function codes are all two bytes in data length, maximum number of configurable function codes is 15.
- Following the instructions of the EDS installation tool to import the file into the RSLogix. See the item in below picture.

	module biscovery ravoir	les			
Ent	er Search Text for Module Ty			Show Filters	•
Ca	talog Number	Description	✓ Vendor	Category	~
In-Sight 1700 Series In-Sight 3400 Series In-Sight 5000 Series		Vision System Vision System Vision System	Cognex Corporat Cognex Corporat Cognex Corporat Cognex Corporat	Communication Communication Communication	
	MEP XFC	Bosch Revroth xFC0x	Bosch Rexroth	Generic Device/k	
•	1305-ACDrive-EN1 1336E-IMPACTDrive-EN1 1336F-PLUSIIDrive-EN1 1336F-PLUSDriveLG-EN1 1336S-PLUSDriveLG-EN1 1336S-PLUSDriveCM 1336T-FORCEDriveCN 1336T-FORCEDrive_Std-E	AC Drive via 1203-EN1 AC Drive via 1203-EN1 AC Drive via 1203-EN1 Brake via 1203-EN1 D07-600 HP Code AC Drive via 1203-EN1 F05-F100 HP Code AC Drive via 1203-EN1 AC Drive, ControlNet Adapter via 1203-EN1 AC Drive, PLC Comm Adapter via 1203-EN1 MC Drive, Standard Adapter via 1203-EN1 III	Allen-Bradley Allen-Bradley Allen-Bradley Allen-Bradley Allen-Bradley Allen-Bradley Allen-Bradley Allen-Bradley Allen-Bradley	Drive Drive Drive Drive Drive Drive Drive Drive	1
405	of 405 Module Types Found	đ		Add to Favorite	es

Fig. 6-2: Device catalog

• Select MEP XFC and click "Create", then type **Name** and **IP Address** in the following interface.

àeneral* Co	nnection	Module Info	Internet Protocol	Port Configuration		
Type: Vendor:	MEP . Bosch	XFC Bosch Re n Rexroth Corp	xroth xFC0x oration			
Parent:	Local	ENB				
Na <u>m</u> e:	xFC_	MEP			Ethernet Address	
Description:				~	Private Network: IP <u>A</u> ddress: <u>H</u> ost Name:	192.168.1.
Module De	finition					
Revision:		1.1				
Connectio	Keying: ns:	Exclusive O	odule wner Connection			
				Change		

Fig. 6-3: MEP name and IP address

• The frequency converter was added to the project.



Fig. 6-4: Add frequency converter to project

• Download the project to RSLogix controller. The MEP monitor tag was added to the project.

🚊 🗠 🔁 Data Types	
🚂 User-Defined	
🕁 🔙 Strings	
- 🕞 Add-On-Defined	
🕀 🔙 Predefined	
🖃 🖼 Module-Defined	
011F:MEPXFC_01FDA06C:O:0	
_011F:MEPXFC_2E978C58:I:0	
Trends	
🗄 🖓 📇 I/O Configuration	
🚊 🗐 Backplane, CompactLogix System	
1769-L32E Test151008	
1769-L32E Ethernet Port LocalENB	
1769-L32E Ethernet Port LocalE	
MEP XFC xFC MEP	
III CompactBus Local	

Fig. 6-5: MEP monitor tags

• Right-click then choose **Monitor Tags**. The interface is shown as below.

Name	10	Value 🔹	Force Mask	Style	Data Type	Description	Constant	<u>^</u>	Properties	, p
- xFC_MEP:0		{}	{}		_011F:MEPXFC				🔝 41 💷 🖌	1
= xFC_MEP:0.0	ata	{}	{}	Decimal	INT[15]				General	
FC_MEP.0	.D	- 0		Decimal	INT				Name	xFC_MEP O Dat
H xFC_MEP.0	.D	0		Decimal	INT				Usage	
H xFC_MEP:0	.D	0		Decimal	INT				Type	Base
IE xFC_MEP:0	I.D	0		Decimal	INT				Alas For	
H xFC_MEP:0	I.D	0		Decimal	INT				Base Tag	
E xFC_MEP.0	.D	0		Decimal	INT				Data Type	INT
+ xFC_MEP.0	.D	0		Decimal	INT				Scope	Test 151008
+ xFC MEP.0	.D	0		Decimal	INT				External Acce	Read/Write
+ xFC MEP.0	.D	0		Decimal	INT				Style	Decimal
+ xFC MEP.0	.D	0		Decimal	INT				Backing	140
F xFC MEP.0	.D	0		Decimal	INT				Visible	
F xFC MEP.0	I.D	0		Decimal	INT				Description	
F XFC MEP.0	.D	0		Decimal	INT				🗆 Data	
F XFC MEP.0	I.D	0		Decimal	INT			-	Value	
ELVEC MEPO	D	0		Decimal	INT				Force Mask	

Fig. 6-6: MEP monitor tags 1

• Change the monitor tags xFC_MEP.O.0.data value to 129, the frequency converter will running.

Name == A	Value	 Force Mask. 	Style	Data Type	Description	Constant	^ P	roperties	
- xFC_MEP:0	() ()		_011F:MEPXFC				🖬 🕼 💷 🖌	
⇒ xFC_MEP:0.Data	() ()	Decimal	INT[15]				General	
* xFC_MEP:0.D	▼ 12	9	Decimal	INT				Name	xFC_MEP O Dat
I xFC_MEP.0.D	7 6	4 3 2 1 0	Decimal	INT				Usage	
	7-0 1 0	0 0 0 0 1	Decimal	INT				Туре	Base
* xFC_MEP:0.D	15-8 0 0	00000	Decimal	INT				Alias For	
* xFC_MEP:0.D		0	Decimal	INT				Base Tag	
* xFC_MEP:0.D		0	Decimal	INT				Data Type	INT
+ xFC_MEP:0.D		0	Decimal	INT				Scope	Test151008
+ xFC_MEP:0.D		0	Decimal	INT				External Acce	Read/Write
+ xFC_MEP:0.D		0	Decimal	INT				Constant	No
+ xFC_MEP:0.D		0	Decimal	INT				Required	140
+ xFC_MEP:0.D		0	Decimal	INT				Visible	
+ xFC_MEP.0.D		0	Decimal	INT				Description	
+ xFC_MEP.0.D		0	Decimal	INT			6	Data	
# xFC_MEP.0.D		0	Decimal	INT				Value	1
+ xFC MEP.0.D.		0	Decimal	INT				Force Mask	

Fig. 6-7: Change the data value of monitor tags 1

• Change the monitor tags xFC_MEP.O.0.data value to 136, the frequency converter will stop.

🚺 Test151008	▼ S	how	_0	11F:	MEI	PXFI	C_01	FD/	4060	0:0:0
	Value			٠	Fo	rce M	lask	(٠	Style
_MEP:0			{	.}				{	•}	
FC_MEP:0.Data			{	.}				{	•}	Decimal
-xFC_MEP:0.D	-		1	36						Decimal
-xFC_MEP:0.D		7	6	5	4	3	2	1	0	Decimal
-xFC_MEP:0.D	7-0	1	0	0	0	1	0	0	0	Decimal
-xFC_MEP:0.D	15-8	0	0	0	0	0	0	0	0	Decimal
-xFC_MEP:0.D			_	0				-		Decimal

Fig. 6-8: Change the data value of monitor tags 2

6.3 Acyclic Communication

6.3.1 Message Parameters

To allow parameter for being set via Ethernet/IP interface, all function code parameters can be accessed, via a manufacturer-specific class object, with corresponding instances for each function code parameter. The function code parameters can be either addressed via an "Unconnected Explicit Message" (UCM) or via a "Connected Explicit Message" (Class 3).

In EtherNet/IP communication, the objects are addressed according to the following scheme: CLASS \rightarrow INSTANCE \rightarrow ATTRIBUTE.

Class: All parameters of the EFCx610 frequency converter are mapped to the manufacturer-specific classes 100 (0x64) + Subdevice index, i.e.: Subdevice 0 --> Class 100, Subdevice 1 --> Class 101 ... Subdevice 98 --> Class 198.

Instance: The instance number is identical to the numeric coding of the EFCx610 parameters.

Attribute: The attribute number is identical to the element number during access via function code parameters.

-	Communication 1	ag		
Message	Type: CIP Gener	ńc	•	
Service	Get Attribute Single	•	Source Element:	
Type.			Source Length:	0 🔶 (Bytes)
Ser <u>v</u> ice Code:	e (Hex) <u>C</u> lass:	64 (Hex)	Destination	Read_Function_Code 🚽
Instance	: 12314 Attribute	e: 7 (Hex)	Element:	New Tag
O Enable O Error C	◯ Enable Waiting ode: Extende	◯ Start ed Error Code:	Done []	Done Length: 2 □ Timed Out ←

Message configuration below shows an example of parameter E0.26.

Fig. 6-9: Message configuration

Refer to chapter 8 for the numeric coding of EFCx610 parameters.

6.3.2 Error Codes

If a manufacturer-specific error occurs during the parameter access, the supplementary error code provides pointers to the cause of the error. Excerpts of the main error codes are listed in the following table:

Error number (hex)	Meaning				
	Invalid parameter value				
	Value is less than minimum value				
002	Value is greater than maximum value				
0x03	Value is not correct				
	Invalid indirect addressing				
	Command execution not possible (invalid or wrong parameters)				
0x0E	Parameter cannot be changed				
0x0F	Parameter is password protected				
	Parameter is write-protected				
	Parameter currently write-protected				
	Parameter is write-protected, as configured cyclically in the MDT				
0x10	• Parameter write-protected on account of other settings (parameters, operation mode,)				
	• Command execution is not possible now (e.g. command cannot be enabled in this phase)				
0x13	Parameter transmitted for too short period				
0x15	Parameter transmitted for too long period				
0,11	Command is already active				
UXIF	Command interruption is not possible				

Tab. 6-2: Error codes

When parameter write access on the two bytes type parameter, any values exceeding 65,535 (0xFFF) will be reduced automatically to a two bytes value. If the reduced two bytes value is in the valid range, then it will be accepted without sending value exceed limits indication.

6.4 Example

The following code fragment shows an example of explicit message: modifying frequency converter parameter E0.26.



Fig. 6-10: Modify E0.26 to 1.0 s

The configuration of the message box:

Configuratio	on* Co	mmunic	ation Ta	g			
Message	Type:	C	IP Generic	•		•	
Service Type:	Set Att	ribute S	ingle		•	Source Element:	Modify_Function_Code 🚽
Service Code:	10	(Hex)	<u>C</u> lass:	64	(Hex)	Source L <u>e</u> ngth: Destination	2 😭 (Bytes)
Instance:	12314]	Attri <u>b</u> ute:	7	(Hex)	Element	Ne <u>w</u> Tag
) Enable	OB	nable W	aiting	⊖ St	art	O Done D	Done Length: 0
) Error Co ror Path:	de:		Extende	d Error	Code:	ľ	Timed Out 🗲

Fig. 6-11: Message box configuration

7 SERCOS III

7.1 Protocol Configuration

After the SERCOS III protocol is activated (H3.41 = S3), the unique device address in the SERCOS III network must be set via parameter H3.23.

Paran	net	ter editor
FC H3.23		23 🔹 🕄 🕲 🚵 🖶 🖶 📓 🗟
	Axi	is 🏘 🛤 🔛 🦉
Nan	ıe	MEP: Device Address
Stat	us	OK
Min		
Max	8	0x50014x
Valu	e	253

Fig. 7-1: Device address setting

Or the SERCOS address can be assigned within project from automatically calculated topology index. The resulted address reflects in parameter H3.24.

7.2 System Configuration

7.2.1 XML file

R

The SDDML and SPDML xml files are provided to add the EFCx610 to the device database of IndraWorks Engineering.

Users can download the XML file through the following steps:

- 1. Click on http://www.boschrexroth.com/dcc.
- 2. Choose "Frequency converter -> EFC 3610 (or EFC 5610)" from the navigation bar on left-hand side of the operation interface.
- 3. Choose "Download area" tab from right-hand side of the interface.
- 4. Click on "DEVICE_DESCRIPTIONS_MULTI-ETHERNET_EFCX610_xxxx-xxxx.ZIP" to download the ZIP file.
- 5. Extract the ZIP file and get the XML file.

"xxxx-xx-xx" indicates the date.

After installation, you can find the device in device database as showing below.

endor:	<all vendors=""></all>		•	Add Devices
Name		Vendor	Version *	Remove Devices
œ− <i>₿</i>	## Profinet IO			
B-1	S sercos			
(🗄 🚮 CSoS Module		=	
1	• S Master			
	B Module			
1	S Slave			
	FC-*k*-1P2-MDA-7P-NNNN	Bosch Rexroth	Revision	
	HCS0x	Bosch Rexroth AG	Revision	
	HMD01	Bosch Rexroth AG	Revision	
		Bosch Rexroth AG	Revision	
		Bosch Rexroth AG	Revision +	
•			۲	
Group	by category			
Displa	y all versions (for experts only)			
Displa	v outdated versions			Details
				Deconstru

Fig. 7-2: Device database

7.2.2 Topology

Physical network topology shall be either a ring structure or a line structure.

7.2.3 Process Data

The process data configuration is transmitted from master during bus startup.

7.2.4	SERCOS	Ш	Control	Word	and	Status	Word
-------	--------	---	---------	------	-----	--------	------

Bit No.	Value	Description
15	0	Drive OFF
15	1	Drive ON
11	0	Drive disable
	1	Drive enable
13	0	Drive halt
15	1	Drive restart
108	000	Primary operation mode $^{ extsf{T}}$

Tab. 7-1: SERCOS III control word (S-0-0134)

Bit No.	Value	Description
	00	Drive not ready
15 14	01	Drive ready for main power on
1514	10	Drive ready and main power applied
	11	Drive enabled
13	0	No error
15	1	Error
108	000	Primary operation mode $^{\textcircled{2}}$
Λ	0	Drive halt is not active
4	1	Drive halt is active
3	0	Drive ignores the command values
	1	Drive follows the command values

Tab. 7-2: SERCOS III status word (S-0-0135)

⁽¹⁾ and ⁽²⁾: The drive modes of operation defined by S-0-0032 become active when the operation mode is selected via bits 10, 9 and 8 in the Drive control (S-0-0134). The activated operation mode is indicated by bits 10, 9 and 8 of the Drive status (S-0-0135).

For more information about "Primary operation mode", please refer to parameter S-0-0032. Currently, only the operation mode "Velocity control" (0x02) is supported.

7.3 Acyclic Communication

The MEP with SERCOS III supports two channels for object exchange: SERCOS service channel and SERCOS/IP.

When accessing frequency converter parameters via service channel, the function blocks IL_SIIISvcRead and IL_SIIISvcWrite shall be used.

When parameter write access on the two bytes type parameter, any values exceeding 65,535 (0xFFF) will be reduced automatically to a two bytes value. If the reduced two bytes value is in the valid range, then it will be accepted without sending value exceed limits indication.

7.4 Example

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An example with XLC L65 is shown below.

• Creating project in IndraWorks Engineering Suite 14V10, add XLC65 into the project and configure the interface of SERCOS master.

Compatibility mode must be matched with XLC / MLC firmware version!



Fig. 7-3: Creating project in IndraWorks_1

Device configuration		
Device type:	IndraLogic XLC L65	✓ CML65.1-3P
Firmware version:	XLC14VRS	•
Firmware release:	FWA-CML65*-XL*-14V10	•
Ethernet communication		
IP address:	192.168.1.1 👻	
PLC gateway:	localhost 👻	
PLC communication:	© TCP ◯ UDP	
Connection test:	Communication test to control successful: Firmware: CML65s-XLC-14/10.0467 Device name: IndraLogicXlc1 Author: wah2xi	Execute
	PLC communication successful: Address: 192.168.1.1	

Fig. 7-4: Creating project in IndraWorks_2

sercos (X7E1/X7E2): SercosIII Master Profibus DP (X7P): Profibus DP Master Realtime Ethemet (X7E3/X7E4): Not Used Ethemet (X7E5): Not used Funktionsmodule: Not used Not used Not used Not used Not used Not used	•
Profibus DP (X7P): Profibus DP Master Reatime Ethemet (X7E3/X7E4): Not Used Ethemet (X7E5): Not used Funktionsmodule: Not used Not used Not used Not used Not used Not used Not used	
Not Used Ethemet (X7E5): Not used Funktionsmodule: Not used Not used Not used Not used Not used	•
Ethemet (X7E5): Not used Funktionsmodule: Not used Not used Not used Not used Not used	•
Funktionsmodule: Not used Not used Not used Not used	•
Not used Not used	•
Not used	~
Not used	v
	~

Fig. 7-5: Creating project in IndraWorks_3

 In the "tools" menu, select "Device Database", click "Add devices" for suitable XML file for EFC x610 converter, then drag the device from "Periphery" -> "Sercos" into the "Sercos" of project explorer.

🗃 Project Explorer 🛛 👻	₽ ×
Froject 1	
🔅 🛅 General Module Folder	
indraLogicXic1	
📺 ········ 🚮 🖡 Logic	
Motion	
Onboard_I_O	
10 Inline_I_0	
Generation Profibus_DP_Master	
••••••••••••••••••••••••••••••••••••••	
Sercos	
🖨 🗤 🖬 🔂 🔂 🔂 🔂 🔂 🔂 🔂 🔂 🔂 🔂 🔂 🔂 🔂	_NNNN
Drive (Drive)	

Fig. 7-6: Project Explorer window

• Double click on device name, modify the SERCOS address with values to be identical to that of EFCx610 MEP [H3.23].

Project Explorer +	FC_k_1P2_MDA	_7P_NNNN
General Module Folder	sercos Slave Status	Information
	Identification	
Application	sercos Address	253 🚖
UserVarGlobal	Logical Address	253 🚖
MotionProg (PRG) PICProg (PRG)	Vendor Code	100
Symbol configuration Task Configuration	Vendor Name	Bosch Rexroth
Motion	Vendor Device ID	xFCBx
Inline_I_O	Device Name	*FC*-%*-1P2-MDA-7P-NNNN
Profibus_DP_Master	FSP Type	16#00020001
S Sercos	NMN	

Fig. 7-7: Modify SERCOS address_1

The SERCOS address can also be modified through the following steps:

1. Right click on "Sercos" and select "Scan Bus Configuration".

Project									10	Control							
Add		Device Name	Axis Name	No.	Device Identification	lpo Drive	Closed Loop	Exp packa	a.	Addr.	Device Identification	Extended Identification	Topology				
1	Drive1		Drive1	1	SERCOS Pack Profile		V										
									+								
									+								
									+								
									÷								
				_		-			-								
h	id Bevices											Conty show newly scanned devices Scan	A	oply Addresses			

Fig. 7-8: Modify SERCOS address_2

2. Click "Scan" to scan the EFC device, then modify the address in the "Addr." column.

	Project									Control							
	Addr.	Device Name	Axis Name	No.	Device Identification	lpo Drive	Closed Loop	Exp packa		Addr.	Device Identification	Extended Identification	Topology				
1	253	VFC3610_00k40_1P2		253	xFC0x (Bosch Rexroth AG)				9	1 23 -	xFC0x (Bosch Rexroth AG)	FWA-EFC01*-NNN-03V12-NN	1				
1									1								
	Add	Devices										Only show newly scanned devices Scan	Apply Addresses				

Fig. 7-9: Modify SERCOS address_2

3. Click "Apply Addresses".

R

You can modify the SERCOS address of multiple devices at the same time.

After the address is modified, right click on "Sercos" and select "Sercos configuration", make sure the "Status" is OK.

_FC_k_1P2_MDA_7P_	NNNN	Serc	os configuration of the co	ontrol - IndraLogicXlc1						• ×
IndraLogicXlc1		•	+ • • • 9							Online
	Co	ntrol	configuration						Connected Device	
Name	Address	Туре	Device Identification	Extended Identification	Status	Address	Top. Addr.	Туре	Device Identification	Extended Identification
FC_k_1P2_MDA_7P_NNNN	253		xFC0x (Bosch Rexroth AG)		0	253	1		xFC0x (Bosch Revroth AG)	FWA-EFC01*-NNN-03T07.06-NM

Fig. 7-10: Device status

• Double click on the "Drive", click further into "General inputs and outputs". Using "Add", the parameters of producer can be added at left-hand side and parameters of consumer can be added at right-hand side.

	the second se	a inputs and outputs i an information		
Ell IndraLogicXic1	Inputs	U ROMBOUT	Outruta	
Action Action	Name	Datatype IDN-SLSE	Name	Datatype IDN-SLS

Fig. 7-11: Drive window

It is mandatory that S-0-0135 (Drive status) and P-0-1098.0.1 (Status word "H0.01") must be always added to the input list in sequential order, also S-0-0134 (Drive control) and P-0-1098.0.0 (Control word "H0.00") must be added to the output list sequentially*.

Name			Outputs		
	Datatype	IDN.SI.SE	Name	Datatype	IDN.SI.SE
Drive status	WORD	S-0-0135.0.0	Drive control	WORD	S-0-0134.0.0
Z Status word	UINT	P-0-1098.0.1	✓ P-0-1098	UINT	P-0-1098.0.0
Setting frequency d0.0	UINT	P-0-1058.0.2	Frequency command	UINT	P-0-1098.0.10
H0.80_Input	UINT	P-0-1098.0.80	H0.80_Output	UINT	P-0-1098.0.80
H0.81_Input	UINT	P-0-1098.0.81	H0.81_Output	UINT	P-0-1098.0.81
H0.82_Input	UINT	P-0-1098.0.82	H0.82_Output	UINT	P-0-1098.0.82
H0.83_Input	UINT	P-0-1098.0.83	H0.83_Output	UINT	P-0-1098.0.83
HO.84_Input	UINT	P-0-1098.0.84	H0.84_Output	UINT	P-0-1098.0.84
H0.85_Input	UINT	P-0-1098.0.85	H0.85_Output	UINT	P-0-1098.0.85
H0.86_Input	UINT	P-0-1098.0.86	H0.86_Output	UINT	P-0-1098.0.86
H0.87_Input	UINT	P-0-1098.0.87	H0.87_Output	UINT	P-0-1098.0.87
H0.88_Input	UINT	P-0-1098.0.88	H0.88_Output	UINT	P-0-1098.0.88
H0.89_Input	UINT	P-0-1098.0.89	H0.89_Output	UINT	P-0-1098.0.89
H0.90_Input	UINT	P-0-1098.0.90	tutput_00_08.0H	UINT	P-0-1098.0.90
H0.91_Input	UINT	P-0-1098.0.91	H0.91_Output	UINT	P-0-1098.0.91
H0.92_Input	UINT	P-0-1098.0.92	H0.92_Output	UINT	P-0-1098.0.92

Fig. 7-12: General inputs and outputs

R

*: This only holds for MEP version 01V02. Starting from version 01V04, also velocity control profile is supported by MEP.

• In order to control the frequency converter and monitor on the status, Drive control, Control word, Drive status and Status word need to be mapped to PLC variable.

Channels							
Variable	Mapping	Channel	Address	Туре	Default Value	Unit	Description
Application.PlcProg.Drive_control	*	Drive control	🔕 %QW2	WORD			
- Application.PlcProg.Control_word_UINT	٠	P-0-1098	🔞 %QW4	UINT			
Application.PlcProg.Frequency_command_UINT		Frequency command	🚷 %QW6	UINT			
- 🦘 Application.PlcProg.Drive_status	20	Drive status	🚷 %IW2	WORD			
Application.PlcProg.Status_word_UINT		Status word	🚷 %IW4	UINT			
Application.PlcProg.Monitor_setting_freg	20	Setting frequency d0.02	M %IW6	UINT			

Fig. 7-13: IO Mapping

• Run / Stop the frequency converter

Example:

```
(*Control word xFCx610*)
IF wCwEFC3610.xRun AND NOT wCwEFC3610.xEStop AND NOT wCwEFC3610.xErrorReset
AND NOT wSwEFC3610.byStatus.xFault_Bit7
                                         THÈN
wCwEFC3610.xRun
                  := TRUE;
        Drive_control:= 16#E000; // Drive ON, Drive enable and Drive restart
ELSE
        Drive_control:= 16#A000; //Drive ON, Drive disable and Drive restart
        wCwEFC3610.xRun
                           := FALSE;
END_IF
IF wCwEFC3610.xJog AND NOT wCwEFC3610.xRun AND NOT wCwEFC3610.xEStop AND
NOT wCwEFC3610.xErrorReset AND NOT wSwEFC3610.byStatus.xFault_Bit7 THEN
        wCwEFC3610.xJog
                           := TRUE;
        Drive_control:= 16#E000;
ELSE
        wCwEFC3610.xJog
                         := FALSE:
END_IF
wCwEFC3610.xControlActive
                                 := TRUE;
        wControl.0 := wCwEFC3610.xRun;
        wControl.1 := wCwEFC3610.xJog;
        wControl.2 := wCwEFC3610.xReverse;
        wControl.3 := wCwEFC3610.xStop;
        wControl.4 := wCwEFC3610.xEstop;
wControl.5 := wCwEFC3610.xErrorReset;
        wControl.6 := wCwEFC3610.xAccStop;
        wControl.7 := wCwEFC3610.xControlActive;
Frequency_command_UINT:=WORD_TO_UINT(wCwEFC3610.wSetValue);
        Control_word_UINT:= WORD_TO_UINT(wControl);
```

Fig. 7-14: Example code_1

• Read/Write acyclic data

```
Write 60(udiPar_Value_Dummy) to [E0.26]:
IF NOT Normal_Par_group_test_write_finished THEN
        fbSIIISvcWrite.Execute:=TRUE;
        fbSIIISvcWrite.SercosAdr:=253;
        fbSIIISvcWrite.Element:=IL_OPDATA;
        fbSIIISvcWrite.Idn:=IL_SIIIElementsToIdn(IL_P_PARAM, 0, 1074, 0, 26);
        fbSIIISvcWrite.SizeOfValue:=SIZEOF(udiPar_Value_Dummy);
        fbsIIISvcWrite();
IF fbsIIISvcWrite();
IF fbsIIISvcWrite.Done THEN
                  Normal_Par_group_test_Write_finished:= TRUE;
        END_IF
END_IF
Read [E0.26] to udiPar_Value_E7:
IF NOT Normal_Par_group_test_Read_finished THEN
        fbSIIISvcRead.Execute:=TRUE;
        fbSIIISvcRead.SercosAdr:=253;
        fbSIIISvcRead.Element:=IL_OPDATA;
        fbSIIISvcRead.Idn:=IL_SIIIElementsToIdn(IL_P_PARAM, 0, 1074, 0, 26);
        fbSIIISvcRead.SizeOfValue:=SIZEOF(udiPar_Value_E7);
        fbSIIISvcRead.ValueAdr:=ADR(udiPar_Value_E7);
        fbSIIISvcRead();
        IF fbSIIISvcRead.Done THEN
                 Normal_Par_group_test_Read_finished:= TRUE;
        END IF
END_IF
```

Fig. 7-15: Example code_2

8 EtherCAT

8.1 Protocol Configuration

For EtherCAT, the IP address configuration is done on master's side. From Ether-CAT state PreOp, Ethernet over EtherCAT (EoE) is started and IndraWorks can be used.

8.2 System Configuration

8.2.1 Configuration File

An EtherCAT master requires both, an EtherCAT Slave Information (ESI) and an Electronic Data Sheet (EDS) file in order to fully support an EtherCAT slave running CoE (CAN over EtherCAT). The former provides a slave device description for EtherCAT PLCs and some information for configuring the EtherCAT communication. The latter describes accessible CAN objects of the device.

Users can download the target files through the following steps:

- 1. Click on http://www.boschrexroth.com/dcc.
- 2. Choose "Frequency converter -> EFC 3610 (or EFC 5610)" from the navigation bar on left-hand side of the operation interface.
- 3. Choose "Download area" tab from right-hand side of the interface.
- 4. Click on "DEVICE_DESCRIPTIONS_MULTI-ETHERNET_EFCX610_xxxx-xxxx.ZIP" to download the ZIP file.
- 5. Extract the ZIP file and get the target files.

"xxxx-xx-xx" indicates the date.

After putting the files into dedicated path, you can find the device showing below.

arch:		Name:	Multiple: 1 🚔	OK
pe:	Beckholf Automation GmbH & Co. KG XTS XTS EthercAT Infrastructure components EtherCAT Infrastructure components System Couplers Communication Terminals (EL6xxx) System Couplers (BK1xxx, Lxxxx+B10) Couplerts Panel Couplers Panel Couplers Panel Couplers Safety Terminals EtherCAT Fieldbus Boxes (EPxxx) EtherCAT Fieldbus EtherC			Cancel Pot A D B (Ethernet) C
	Extended Information Show Hidden Devices	V Show Sub Groups		

Fig. 8-1: Add EtherCAT device

8.2.2 Mode Selection

Beside the Rexroth profile mode described in chapter 4.4, the CiA 402 velocity profile mode is also supported by MEP card when the EtherCAT protocol is active. These two modes are selected by CAN object index [0x6060].

Mode	Value	Default Process Data Configuration
Poyroth mode	100	Consumer {[H0.00], [H0.10]}
nexiolitimode	-120	Producer {[H0.01], [d0.02]}
CiA 402 valacity made	2	Consumer {[0x6040], [0x6042]}
CIA 402 velocity mode	2	Producer {[0x6041], [0x6044]}

Tab. 8-1: Mode selection

A mode selection has to be carried out before cyclic data exchange can start. Failing to do so will make MEP deliver "invalid settings" when switching from PreOp to SafeOp. The user parameters can be configured freely. After changing a process data configuration, the first switch to SafeOp yields "unknown" error. A second attempt should succeed and no errors are thrown in case the process data configuration did not change.

8.2.3 Topology

The line topology is supported.

When setting up an EtherCAT network with MEP cards, it should be ensured that

- Ethernet port 1 is used as Input ("IN")
- Ethernet port 2 is used as Output ("OUT")

8.2.4 Process Data

The process data can be configured by writing CAN object indexes to the following lists:

- Producer data list [0x1A15]
- Consumer data list [0x1615]

Only the asynchronous transmission type "Free Run Mode" is supported.

8.3 Acyclic Communication

With supporting of CAN over Ethernet (CoE), all function code parameters of the EFC series frequency converter can be read, and if permitted can be written, directly by SDO.

Table below shows the CAN indexes corresponding to the function code parameters.

Function Code Range	CAN Index Range
b0.00b9.99	0x20000x23E7
d0.00d9.99	0x23E80x27CF
C0.00C9.99	0x27D00x2BB7
E0.00E9.99	0x27B80x2F9F
U0.00U9.99	0x2FA00x3387
F0.00 F9.99	0x33880x376F
H0.00H9.99	0x37700x3B57

 Tab.
 8-2:
 CAN indexes corresponding to the function code parameters

When parameter write access on the two bytes type parameter, any values exceed 65,535 (0xFFFF) will be reduced automatically to a two bytes value. If the reduced two bytes value is in the valid range, then it will be accepted and without value exceed limits indication.

9 Modbus/TCP

9.1 Protocol Configuration

For Modbus/TCP, three IP addresses need to be set via parameters:

- IP address H3.03
- Subnet mask H3.04
- Gateway address H3.05

A Modbus/TCP client can connect to default TCP port 502. Additionally, a user can specify another port by writing a port number to parameter H3.51. However, only one client connection is accepted by the MEP card.

9.2 System Configuration

The process data configuration is setting via the parameters H3.30 and H3.31, respectively for the input and output.

Modbus Function Code	Transaction Name	Max. Value of N
3	Read N register words	16
6	Write one register word	-
16	Write N register words	16
23	Read / write N register words	16/16
43	Pood Davica Identification	_
(sub-function code 14)		

The following Modbus/TCP transactions are supported by the MEP card:

Tab. 9-1: Modbus / TCP transactions

Besides accessing parameters by their function code virtual address, there are some special register addresses, that can be used, e.g. for reading/writing the complete process data image. The following table gives an overview:

Register Address	Contents
0x7F00	Control word H0.00
0x7F01	Frequency command value H0.10
0x7FA0	Status word H0.01
0x7FE0	Input Process Data Image as specified by H3.30
0x7FF0	Output Process Data Image as specified by H3.31

Tab. 9-2: Overview of special register addresses

R.	1.	When a Modbus/TCP client established a new connection to the MEP card, output process data status initially is set invalid at the MEP. The output data status changes to valid, as soon as all parameters at output process data list are written at least once. The output data status then remains valid, until the TCP connection is closed or terminated.
	2	Special Register Addresses mentioned above, only can be used

 Special Register Addresses mentioned above, only can be used without any offset. Example: It is not allowed to use address 0x7FF2 for accessing second output process data item.

9.3 Exception Codes

With Modbus/TCP, in error cases, the MEP card returns Exception Codes at the Modbus response telegram. The Exception Codes are listed in the following table:

Exception Code	Name	Meaning/Possible Causes
1	Illegal function	Unknown Function Code, transaction contained a Modbus Function Code not supported by the MEP card.
2	Illegal data address	Access to unknown address
2		Error occurred while Function Code 43 transaction
3	Illegal data value	Invalid read/write length value at Modbus transaction
		Malformed request telegram
		 Invalid object ID at Function Code 43 transaction
4	Server device fail- ure	Read / Write access failed

Tab. 9-3: Exception codes

10 Parameters

10.1 Parameter Address

Each EFCx610 function code parameter XX.YY has a unique virtual address word. It's composed of two bytes that the low byte is the hex value of YY and the high-byte can be derived from XX using the following table.

Function Code Class	Numerical Representation (High-Byte)
b0b9	0x000x09
d0d9	0x100x19
C0C9	0x200x29
E0E9	0x300x39
U0U9	0x400x49
F0F9	0x500x59
H0H9	0x600x69

Tab. 10-1: Parameter address

For instance, the virtual address word of E0.26 is 0x301A.

The function code parameter IDN addresses which used for SERCOS III parameter access are summarized in the table below.

Code Range*	IDN Range
b0.00b0.99	P-0-1050.0.0 P-0-1050.0.99
d0.00d0.99	P-0-1058.0.0 P-0-1058.0.99
C0.00C0.99	P-0-1066.0.0 P-0-1066.0.99
C1.00C1.99	P-0-1066.0.100 P-0-1066.0.199
C2.00C2.99	P-0-1067.0.0 P-0-1067.0.99
C3.00C3.99	P-0-1067.0.100 P-0-1067.0.199
E0.00E0.99	P-0-1074.0.0 P-0-1074.0.99
E1.00E1.99	P-0-1074.0.100 P-0-1074.0.199
E2.00E2.99	P-0-1075.0.0 P-0-1075.0.99
E3.00E3.99	P-0-1075.0.100 P-0-1075.0.199
E4.00E4.99	P-0-1076.0.0 P-0-1076.0.99
E5.00E5.99	P-0-1076.0.100 P-0-1076.0.199
E8.00E8.99	P-0-1078.0.0 P-0-1078.0.99
E9.00E9.99	P-0-1078.0.100 P-0-1078.0.199
U0.00U0.99	P-0-1082.0.0 P-0-1082.0.99
U1.00U1.99	P-0-1082.0.100 P-0-1082.0.199
F0.00F0.99	P-0-1090.0.0 P-0-1090.0.99

Code Range*	IDN Range
F1.00F1.99	P-0-1090.0.100 P-0-1090.0.199
F2.00F2.99	P-0-1091.0.0 P-0-1091.0.99
F3.00F3.99	P-0-1091.0.100 P-0-1091.0.199
F4.00F4.99	P-0-1092.0.0 P-0-1092.0.99
F5.00F5.99	P-0-1092.0.100 P-0-1092.0.199
H0.00H0.99	P-0-1098.0.0 P-0-1098.0.99
H1.00H1.99	P-0-1098.0.100 P-0-1098.0.199
H2.00H2.99	P-0-1099.0.0 P-0-1099.0.99
H3.00H3.99	P-0-1099.0.100 P-0-1099.0.199
H4.00H4.99	P-0-1100.0.0 P-0-1100.0.99
H8.00H8.99	P-0-1102.0.0 P-0-1102.0.99
H9.00H9.99	P-0-1102.0.100 P-0-1102.0.199

Tab. 10-2: Parameter address

*: It is a summarized illustration. Some function code parameters are not available, either the related IDNs.

10.2 MEP Parameters

10.2.1 Terminology and Abbreviation

- Attri.: Parameter attribute
 - Run: Parameter setting can be modified when the converter is in run or stop state
 - Stop: Parameter setting can only be modified when the converter is in stop state
 - Read: Parameter setting is read-only and cannot be modified
- <MANU>: Depend on manufacturing
- -: Not available

10.2.2	Parameter	List

Function Code	Parameter Name	Data Type	Factory Default	Attri.
H3.00	MEP: MAC Address Device	BYTE LIST	<manu></manu>	Read
H3.01	MEP: MAC Address Port 1	BYTE LIST	<manu></manu>	Read
H3.02	MEP: MAC Address Port 2	BYTE LIST	<manu></manu>	Read
H3.03	MEP: IP Address	BYTE LIST	192.168.0.1	Run
H3.04	MEP: Subnet Mask	BYTE LIST	255.255.255.0	Run
H3.05	MEP: Gateway Address	BYTE LIST	0.0.0.0	Run
H3.06	MEP: IP Options	DWORD	0	Run
LI2 07	MEP: Local Hostname	CUADLIST	hostnamo	Dup
пз.07	(SERCOS/IP, EtherNet/IP)		nostname	Run
H3.08	MEP: Application Type	CHAR LIST	Frequency Con- verter	Read
H3.10	MEP: Device ID (PROFINET)	WORD	0x2802	Read
H3.11	MEP: Order ID	CHAR LIST	<manu></manu>	Read
H3.12	MEP: Product Name	CHAR LIST	MEP	Read
H3.13	MEP: Serial Number	ULONG	<manu></manu>	Read
H3.14	MEP: Product Code (EtherNet/IP)	WORD	0x0024	Read
H3.18	MEP: Visual Status Indicators	ULONG	-	Read
H3.20	MEP: Station Name (PROFINET)	CHAR LIST	axis01	Stop
H3.21	MEP: Station Type (PROFINET)	CHAR LIST	Rexroth-Multi- Ethernet	Read
H3.22	MEP: Subdevice ID (PROFINET)	DWORD	0x011F2802	Read
H3.23	MEP: Device Address	WORD	1	Run
H3.24	MEP: Active Device Address (Topology)	WORD	0	Read

Function Code	Parameter Name	Data Type	Factory Default	Attri.
H3.25	MEP: IP address is remnant (PROFINET)	DWORD	0	Run
H3.26	MEP: EtherCAT List of Input Process Data (Master)	WORD LIST	0x0000, 0x0000	Read
H3.27	MEP: EtherCAT List of Output Process Data (Master)	WORD LIST	0x0000, 0x0000	Read
H3.28	MEP: Input Process Data Length (Master)	USHORT	0	Read
H3.29	MEP: Output Process Data Length (Master)	USHORT	0	Read
H3.30	MEP: List of Input Process Data	WORD LIST	0x6001, 0x1002	Stop
H3.31	MEP: List of Output Process Data	WORD LIST	0x6000, 0x600A	Stop
H3.32	MEP: Input Process Data Length (Slave)	USHORT	4	Read
H3.33	MEP: Output Process Data Length (Slave)	USHORT	4	Read
H3.34	MEP: Communication Platform State	DWORD	-	Read
H3.35	MEP: Communication Diagnosis Flags	DWORD	-	Read
H3.36	MEP: ComCycle Periods [ns]	ULONG	0,0,0	Read
H3.37	MEP: Communication Phase	USHORT	0	Read
H3.40	MEP: Industrial Ethernet Protocol Request	CHAR LIST	S3	Run
H3.41	MEP: Industrial Ethernet Protocol Active	CHAR LIST	S3	Read
H3.42	MEP: Industrial Ethernet Protocol Logicware	CHAR LIST	S3L	Read
H3.49	MEP: EtherCAT State	USHORT	1	Read
H3.51	MEP: Modbus/TCP Alternative TCP port	USHORT	0	Run
H3.63	MEP: List of external parameters	WORD	-	Read
H3.71	MEP: Subsystem identification parameter	CHAR LIST	<manu></manu>	Read
H3.96	MEP: FWA string	CHAR LIST	<manu></manu>	Read

Tab. 10-3: Parameter List

• H3.06 MEP: IP Options

Bit 0: DHCP enabled (MEP receives IP address H3.03 from a DHCP server), other Bits unused.

• H3.18 MEP: Visual Status Indicators

This parameter gives a data representation of the LED indications.

Bit	Name	Function
3118	-	Reserved
17	Link P2	1 = Ethernet link present
16	Link P1	0 = No Ethernet link

Bit	Name	Function
1512	Network Status Red LED	155 = Reserved
118	Network Status Green LED	4 = Steady On
74	Module Status Red LED	3 = Blink 4 Hz
		2 = Blink 2 Hz
30	Module Status Green LED	1 = Blink 1 Hz
		0 = Off

Tab. 10-4: Parameter H3.18

• H3.34 MEP: Communication Platform State

This parameter describes the internal communication platform state.

Value	State	Description
0	NOP	Communication platform inactive
1	START	Running boot process
2	STARTERR	Error at boot process
3	SYSRDY	System up, preparing for configuration
4	CONFIG	System basic configuration done
5	CFGERR	Error at system basic configuration
6	COMCFG	Fieldbus selection done
7	COMCFGERR	Error at fieldbus selection
8	COMINIT	Ready for being connected by fieldbus master
9	COMINITERR	Error at fieldbus configuration
10	COMRDY	Preparing for cyclic communication
11	COMACTV	Cyclic communication active
12	COMERR	Error / Breakdown of cyclic communication
13	UPDATE	Update in progress

Tab. 10-5: Parameter H3.34

• H3.35 MEP: Communication Diagnosis Flags

This parameter gives some detailed diagnosis on internal events. However, all diagnosis flags are assigned to some error codes and corresponding display messages.

Bit	Name	Description
3128	-	Reserved
27	Host Watchdog	Internal communication to base system timed out.
26	FW CRC-Error	Communication Platform Firmware consistency check failed.
2518	-	Reserved

Bit	Name	Description
17	FW CRC-OK	Communication Platform Firmware consistency check done and status is OK.
1615	-	Reserved
14	PDC Invalid	Process Data Configuration contains unknown/unsupported parameters or exceeds maximum data length of 15 parameters for input and output data, each.
13	PDC Difference	Process Data Configuration of Communication Platform ([H3.30]/[H3.31]) and Process Data Configuration of Field- bus Master are differing in data length.
12	Connection Timeout	An existing cyclic communication was terminated because of missing master telegrams.
11	Connection Closed	An existing cyclic communication was closed by the fieldbus master.
10	Connection Idle	Fieldbus master set process data status to "invalid".
9	Connection Error	An existing cyclic communication got broken because of a communication problem.
8	Fieldbus Initiate Error	Error while starting fieldbus stack
76	-	Reserved
5	Identify Error	Invalid identification parameters
4	DHCP Error	DHCP request: No response from DHCP server.
3	MAC Address Error	Invalid MAC address
2	IP Initiate Error	Error while starting IP stack
1	IP Address Error	IP address already present at subnet
0	Link Error	No Ethernet link

Tab. 10-6: Parameter H3.35

• H3.36 MEP: ComCycle Periods [ns]

This parameter consists of three values that define current communication cycle periods. All values are given in nanoseconds.

- Value 1: Transmission Cycle On Bus
- Value 2: Producer Cycle (Input Data Cycle)
- Value 3: Consumer Cycle (Output Data Cycle)

11 Diagnosis

11.1 LED Indications

The Network Status LED (Hx1) expresses the status of the MEP and the field-bus:

Network status LED	Meaning
PROFINET IO, EtherNet/IP and	Modbus/TCP
	Multi-Ethernet card
	 does not have a valid IP address
Continuous off	 has not seen an Ethernet link
	powered off
	 an MEP firmware update process was running
Blinking green	Does have a valid IP address, but no cyclic connection was established
Continuous green	Cyclic connection is established and it is free of errors
Blinking red	Cyclic connection was terminated unexpectedly
Continuous red	Duplicate IP address in network detected
Blinking green/red	Multi-Ethernet card is in power up mode and is conducting a self-test
SERCOS III	
Continuous off	NRT state (no SERCOS III communication)
Continuous orange	Communication phase 0
Orange with 1 green pulse	Communication phase 1
Orange with 2 green pulses	Communication phase 2
Orange with 3 green pulses	Communication phase 3
Continuous green	Communication phase 4
Blinking green/orange	Hotplug phase 0
Green with 1 orange pulse	Hotplug phase 1
Green with 2 orange pulses	Hotplug phase 2
Plinking groon	Switched from Fast-Forward to Loopback
	(e.g. due to link loss at one port)
Blinking red/orange	Application error
Blinking green/red	Warning for MST losses exceeded half of tolerable losses
Continuous red	Communication error
Blinking orange	Identification
Blinking red	Firmware watchdog error
EtherCAT	
Off	Status Init

Network status LED	Meaning
Blinking green	Status Pre-Operational
Green light blinking once	Status Safe-Operational
Green light steady on	Status Operational
Blinking red	Configuration error
Red light blinking once	Synchronization error
Red light blinking twice	Timeout – watchdog

Tab. 11-1: LED (Hx1) status

The Module Status LED (Hx2) expresses the status of drive application:

Module status LED	Meaning
Continuous off	Frequency converter is powered off or no communication between fieldbus platform and base drive system
Blinking green	Frequency converter is in STOP state, no errors pending
Continuous green	Frequency converter is in RUN state, no errors pending
Blinking red	Frequency converter is in RUN state, a warning is pending
Continuous red	Frequency converter is in STOP state, an error is pending
Blinking green/red	N/A

Tab. 11-2: LED (Hx2) status

The PHY status LEDS (Hx3/Hx4) are expressing the Ethernet line status:

PHY status LED	Meaning
PROFINET IO, EtherNet/IP, SEI	RCOS III and Modbus/TCP
Continuous off	No Ethernet link established at the appropriate Ethernet port.
Green	Ethernet link was established.
Flickering yellow	Activity on Ethernet line (telegram transmission).
EtherCAT	
Continuous off	No Ethernet link established at the appropriate Ethernet port
Green	Ethernet link was established
Flickering green	Activity on Ethernet line (telegram transmission)

Tab. 11-3: LED (Hx2) status

R ³	• H11, H12 and H13/H14 are available when the Multi-Ethernet card is installed on the left card slot
	• H21, H22 and H23/H24 are available when the Multi-Ethernet card is installed on the right card slot

11.2 Warning Code

Panel display	Description	Cause	Countermeasures
Fdi	Fieldbus proc- ess data inva- lid	 Cyclic communication had been established, but was stop- ped because of an error. 	 Check fieldbus master status, if the controller is in stop mode Fdi warn- ing will appear also.
		 Cyclic communication is run- ning but fieldbus master has 	• Check Ethernet cable and switches.
		set data status invalid.	and/or process data status valid.

Tab. 11-4: Warning code

11.3 Error Code

Panel display	Description	Cause	Countermeasures
Fin-	Initialization failed	 Parametrization of MEP has errors. MEP could not start up completely. H3.03 IP Address and H3.05 Gateway Address are not matching. 	 Check H3.62 List of Invalid Parameters and rewrite invalid parameters with valid values. Write a consistent set of H3.03 IP Address, H3.04 Subnet Mask and H3.05 Gateway Address. If no gateway is needed, set H3.05 to 0.0.0.0.
FnC-	Network set- up error	 Parametrized IP address already present in network. No DHCP response from DHCP server. Fieldbus parametrization at MEP erroneous. 	 Change H3.03 IP Address to a valid IP address in the subnet. Check if the DHCP server is up and running. Check the installed GSD file if it is right.
FPC-	Process data configuration mismatch	Parametrized process data config- uration between MEP and fieldbus master are differing in length. Check H3.28/H3.29 and H3.32/ H3.33 to have a comparison.	Correct process data configuration ei- ther at MEP (H3.30/H3.31) or at mas- ter. Before correcting the process data configuration at MEP side, the active connection between master and MEP should be disabled. And after correc- tion, set up the connection to reset this fault.
Fdi-	Fieldbus proc- ess data inva- lid	Telegram losses or error occurs when frequency converter is in running mode.	 Check the master status and cable connection. Check the switch status if any. Check shielding and laying of cables if EMC problems. Reduce Ethernet traffic, built up separate network for fieldbus communication if bus load is too high.
OCd-	MEP exten- sion card error	 Two fieldbus extension cards are installed simultaneously. Internal communication was disturbed. 	 Keep only one fieldbus extension card in the slots. Check the installation of MEP card and try to reset the error.
FCd-	Internal com- munication watchdog error	Internal communication is timed out.	Reset the error, if the problem persists, H3.38 Input Data Timeout could be in- creased.

Bosch Rexroth AG

Diagnosis

Panel display	Description	Cause	Countermeasures
FnF-	Subsystem corrupted	Firmware file corrupted	Update the MEP firmware. If the prob- lem persists, exchange the MEP hard- ware.
FCE-	Internal error	Fatal error or exception	Reboot the frequency converter. If the problem persists, exchange the MEP hardware.

Tab. 11-5: Error code

Notes

The Drive & Control Company



Bosch Rexroth (Xi'an)

Electric Drives and Controls Co., Ltd. No. 3999, Shangji Road, Economic and Technological Development Zone, 710021 Xi'an, P.R. China Phone +49 9352 40 5060 Fax +49 9352 18 4941 service.svc@boschrexroth.de www.boschrexroth.com



DOK-RCON0*-XFCX610*MULIT02-EN-P