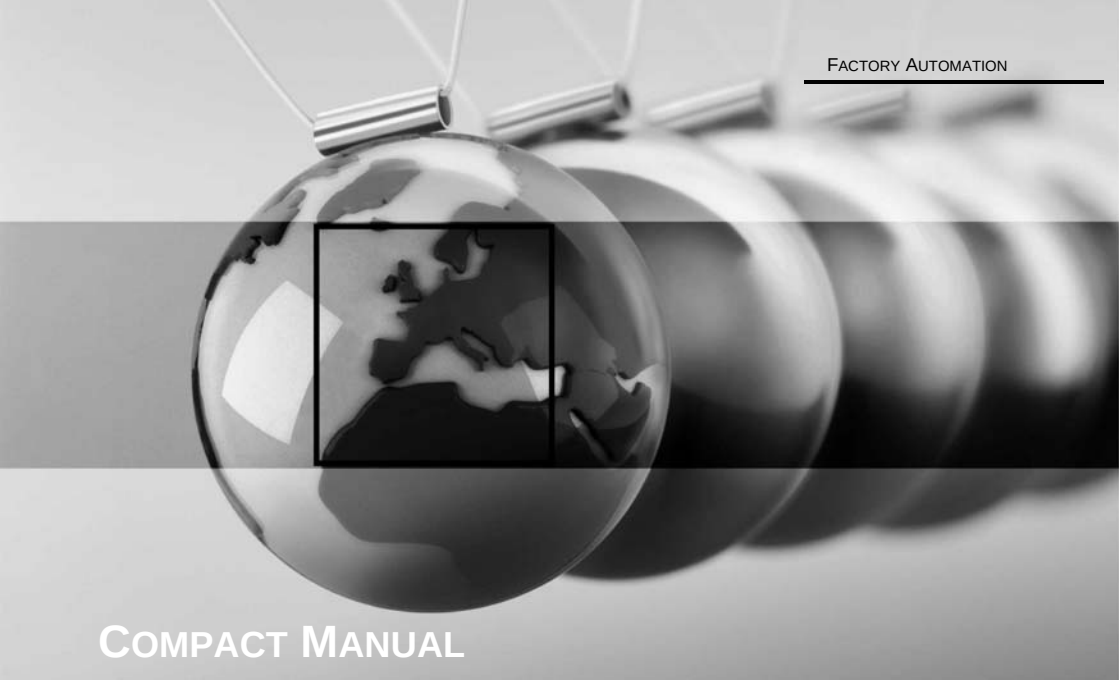
FACTORY AUTOMATION



COMPACT MANUAL

CC-LINK GATEWAYS

PEPPERL+FUCHS
SENSING YOUR NEEDS

Table of contents

CC-Link Gateways

1. Introduction

Congratulations

You have chosen a device manufactured by Pepperl+Fuchs. Pepperl+Fuchs develops, produces and distributes electronic sensors and interface modules for the market of automation technology on a worldwide scale.

Before installing this equipment and put into operation, read this manual carefully. This manual containes instructions and notes to help you through the installation and commissioning step by step. This makes sure bring such a trouble-free use of this product. This is for your benefit, since this:

- ensures the safe operation of the device
- helps you to exploit the full functionality of the device
- avoids errors and related malfunctions
- avoids costs by disruptions and any repairs
- increases the effectiveness and efficiency of your plant

Keep this manual at hand for subsequent operations on the device.

After opening the packaging please check the integrity of the device and the number of pieces of supplied.

Symbols used

The following symbols are used in this manual:

Information!

This symbol indicates important information.

Attention!

This symbol warns of a potential failure. Non-compliance may lead to interruptions of the device, the connected peripheral systems, or plant, potentially leading to total malfunctioning.

Warning!

This symbol warns of an imminent danger. Non-compliance may lead to personal injuries that could be fatal or result in material damages and destruction.

Contact

If you have any questions about the device, its functions, or accessories, please contact us at:

Pepperl+Fuchs GmbH

Lilienthalstraße 200

68307 Mannheim

Telephone: +49 621 776-4411

Fax: +49 621 776-274411

E-Mail: fa-info@pepperl-fuchs.com

2. Declaration of conformity

2.1 Declaration of conformity

This product was developed and manufactured under observance of the applicable European standards and guidelines.

Information!

A Declaration of Conformity can be requested from the manufacturer.

The product manufacturer, Pepperl+Fuchs GmbH, D-68307 Mannheim, has a certified quality assurance system that conforms to ISO 9001.

3. Safety

3.1 Symbols relevant to safety

Information!

This symbol indicates important information.

Attention!

This symbol warns of a potential failure. Non-compliance may lead to interruptions of the device, the connected peripheral systems, or plant, potentially leading to total malfunctioning.

Warning!

This symbol warns of an imminent danger. Non-compliance may lead to personal injuries that could be fatal or result in material damages and destruction.

3.2 General notes on safety

Only instructed specialist staff may operate the device in accordance with the operating manual.

User modification and or repair are dangerous and will void the warranty and exclude the manufacturer from any liability. If serious faults occur, stop using the device. Secure the device against inadvertent operation. In the event of repairs, return the device to your local Pepperl+Fuchs representative or sales office.

The connection of the device and maintenance work when live may only be carried out by a qualified electrical specialist.

The operating company bears responsibility for observing locally applicable safety regulations.

Store the not used device in the original packaging. This offers the device optimal protection against impact and moisture.

Ensure that the ambient conditions comply with regulations.

3.3 Disposal

Information!

Electronic waste is hazardous waste. Please comply with all local ordinances when disposing this product!

The device does not contain batteries that need to be removed before disposing it.

4. Setting up the AS-i bus

1. Connect the unit to power.
2. Connect the AS-i cable to the unit.
3. One after the other connect the AS-i slaves to the AS-i cable and set the slave addresses.
   You may set the addresses directly on the slave using a portable addresser or by using the option **[SLAVE ADR TOOL]** in the display menu of your gateway.
4. In the display menu select **[QUICK SETUP]** to use the configuration of all AS-i circuits connected to the unit.
   Confirm with **[STORE+RUN]**.
5. Set the CC-Link address and connect the gateway to the host fieldbus controller.
   You can set the addresses directly using the option **[CC-LINK]** in the display menu of your gateway or through the PC using the ASIMON software with integrated AS-i Control Tools.

For more detailed information please refer to the installation guide for your gateway which is included with the unit.

5. Configuration and Start-up of the Safety Monitor

Configuration and start-up of the AS-i Safety Monitor is accomplished using a PC/ notebook running the ASIMON configuration software.

Note!
For more detailed information please refer to the separate manual for the ASIMON configuration software.

Configuration should be performed only by a safety specialist. All safety-related commands are password protected.

The correct safety functioning of the unit must absolutely be verified in the system!

Note!
Quick Start Guides for commissioning and service are provided on the website available for download.

6. Data transmission modes of the CC-Link Gateways

There are several modes for the transmission of data in CC-Link:

1. **Standard mode** (see chap. 6.1)
2. Compatibility mode for **VBG-CCL-G4F COMP** (see chap. 6.2)
3. Compatibility mode for **CC-Link V1** (see chap. 6.3)
4. Compatibility mode for **FX2N-32ASI-M CP** (see chap. 6.4)
5. Compatibility mode for **HK-ASICC COMP** (see chap. 6.5)

Information!
The selection of each data transmission mode takes place in the menu of the gateway using the buttons and the display. Additional information can be foand in the description of the display menu of your gateway.

Summary of data transmission modes

	Standard	VBG-CCL-G4F	CC-Link V1	FX2N-32ASI-M	HK-ASICC
occupied stations	3	3	4	4	2
cycle setting	2	1	1	1	1
required CC-Link master	V2	V1	V1	V1	V1
support of 2 AS-i circuits	no	no	no	no	no
support of B-slaves	yes	(yes)	yes	no	no
support of analog slaves	yes	yes	yes	no	no
support of AS-i configuration via CC-Link	yes	yes	yes	no	no

Tab. 6-1.

6.1 Standard mode

The **Standard Mode** has the following features:

- the gateway occupies 3 stations and has a double cycle setting.
- The last 2 words are reserved for "Message Transmission".
- The AS-i process data is mapped into the Buffer Memory Area (BFM).
- All acyclic requests are handled by "Message Transmission" using cyclic data.

6.1.1 Remote IO Points

Remote to Host

Address	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
RXm	reserved															
RXm+1	AS-i circuit 1: EC-Flags and Fault Detector															
RXm+2	reserved															
…																
RXm+9																

Tab. 6-2.

EC-Flags and Fault Detector

Bit	Short Cut	Name
0	Cfg. OK	Configuration OK
1	S0	Slave Address 0 detected
2	Aaasn	Auto Address Assign
3	Aaavail	Auto Address Available
4	CM	Configuration Mode active
5	NA	Normal Operation active
6	APF	AS-i Power Fail (AS-i voltage below 19 V)
7	Offl	Off-line
8	NPF	No Peripheral Fault
9	reserved	reserved
10	PWRw	Power Warning (AS-i voltage below 22.5 V)
11	reserved	reserved
12	EF	Earth Fault
13	OV	Over-voltage on AS-i
14	Noise	Noise
15	reserved	reserved

Tab. 6-3.

Host to Remote

Address	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
RYm													PM	CM	AAE	OFL
RYm+1	reserved															
…																
RYm+9																

Tab. 6-4.

Flags in RYm

Bit	Short Cut	Name
0	OFL	Offline
1	AAE	Auto Address Enable
2	CM	Enter Configuration Mode on rising edge
3	PM	Enter Protected Mode on rising edge
4 … 15		reserved

Tab. 6-5.

6.1.2 Buffer memory area

Buffer memory

for master without integr. safety monitor

Address	1 Master	
	read	write
0 … 7	AS-i 1, input A + single slaves	AS-i 1, output A + single slaves
8 … 15	AS-i 1, input B slaves	AS-i 1, output B slaves
16 … 23	reserved	

Tab. 6-6.

Buffer memory (read)

for master with integr. safety monitor

Address	Bit 15 … 12	Bit 11 … 8	Bit 7 … 4	Bit 3 … 0
RWrm0	AS-i 1: Inp. Slv3	AS-i 1: Inp. Slv2	AS-i 1: Inp. Slv1	flags AS-i 1
RWrm1	AS-i 1: Inp. Slv7	AS-i 1: Inp. Slv6	AS-i 1: Inp. Slv5	AS-i 1: Inp. Slv4
RWrm2	AS-i 1: Inp. Slv11	AS-i 1: Inp. Slv10	AS-i 1: Inp. Slv9	AS-i 1: Inp. Slv8
RWrm3	AS-i 1: Inp. Slv15	AS-i 1: Inp. Slv14	AS-i 1: Inp. Slv13	AS-i 1: Inp. Slv12
RWrm4	AS-i 1: Inp. Slv19	AS-i 1: Inp. Slv18	AS-i 1: Inp. Slv17	AS-i 1: Inp. Slv16
RWrm5	AS-i 1: Inp. Slv23	AS-i 1: Inp. Slv22	AS-i 1: Inp. Slv21	AS-i 1: Inp. Slv20
RWrm6	AS-i 1: Inp. Slv27	AS-i 1: Inp. Slv26	AS-i 1: Inp. Slv25	AS-i 1: Inp. Slv24
RWrm7	AS-i 1: Inp. Slv31	AS-i 1: Inp. Slv30	AS-i 1: Inp. Slv29	AS-i 1: Inp. Slv28
RWrm8	AS-i 1: Inp. Slv3B	AS-i 1: Inp. Slv2B	AS-i 1: Inp. Slv1B	
RWrm9	AS-i 1: Inp. Slv7B	AS-i 1: Inp. Slv6B	AS-i 1: Inp. Slv5B	AS-i 1: Inp. Slv4B
RWrm10	AS-i 1: Inp. Slv11B	AS-i 1: Inp. Slv10B	AS-i 1: Inp. Slv9B	AS-i 1: Inp. Slv8B
RWrm11	AS-i 1: Inp. Slv15B	AS-i 1: Inp. Slv14B	AS-i 1: Inp. Slv13B	AS-i 1: Inp. Slv12B
RWrm12	AS-i 1: Inp. Slv19B	AS-i 1: Inp. Slv18B	AS-i 1: Inp. Slv17B	AS-i 1: Inp. Slv16B
RWrm13	AS-i 1: Inp. Slv23B	AS-i 1: Inp. Slv22B	AS-i 1: Inp. Slv21B	AS-i 1: Inp. Slv20B
RWrm14	AS-i 1: Inp. Slv27B	AS-i 1: Inp. Slv26B	AS-i 1: Inp. Slv25B	AS-i 1: Inp. Slv24B
RWrm15	AS-i 1: Inp. Slv31B	AS-i 1: Inp. Slv30B	AS-i 1: Inp. Slv29B	AS-i 1: Inp. Slv28B
RWrm16	fieldbus bits 15 … 8		fieldbus bits 7 … 0	
RWrm17	Safety Status OSSD2		Safety Status OSSD1	
RWrm18	Safety Status OSSD4		Safety Status OSSD3	
RWrm19	Safety Status OSSD6		Safety Status OSSD5	

Tab. 6-7.

Bits in flags

Bit	Name
0	0: No Config Error
1	0: AS-i Power OK
2	0: Normal Operation active
3	0: Protected Mode active

Tab. 6-8.

Buffer memory (write)

for master with integr. safety monitor

Address	Bit 15 … 12	Bit 11 … 8	Bit 7 … 4	Bit 3 … 0
RWwm0	AS-i 1: Outp. Slv3	AS-i 1: Outp. Slv2	AS-i 1: Outp. Slv1	
RWwm1	AS-i 1: Outp. Slv7	AS-i 1: Outp. Slv6	AS-i 1: Outp. Slv5	AS-i 1: Outp. Slv4
RWwm2	AS-i 1: Outp. Slv11	AS-i 1: Outp. Slv10	AS-i 1: Outp. Slv9	AS-i 1: Outp. Slv8
RWwm3	AS-i 1: Outp. Slv15	AS-i 1: Outp. Slv14	AS-i 1: Outp. Slv13	AS-i 1: Outp. Slv12
RWwm4	AS-i 1: Outp. Slv19	AS-i 1: Outp. Slv18	AS-i 1: Outp. Slv17	AS-i 1: Outp. Slv16
RWwm5	AS-i 1: Outp. Slv23	AS-i 1: Outp. Slv22	AS-i 1: Outp. Slv21	AS-i 1: Outp. Slv20
RWwm6	AS-i 1: Outp. Slv27	AS-i 1: Outp. Slv26	AS-i 1: Outp. Slv25	AS-i 1: Outp. Slv24
RWwm7	AS-i 1: Outp. Slv31	AS-i 1: Outp. Slv30	AS-i 1: Outp. Slv29	AS-i 1: Outp. Slv28
RWwm8	AS-i 1: Outp. Slv3B	AS-i 1: Outp. Slv2B	AS-i 1: Outp. Slv1B	
RWwm9	AS-i 1: Outp. Slv7B	AS-i 1: Outp. Slv6B	AS-i 1: Outp. Slv5B	AS-i 1: Outp. Slv4B
RWwm10	AS-i 1: Outp. Slv11B	AS-i 1: Outp. Slv10B	AS-i 1: Outp. Slv9B	AS-i 1: Outp. Slv8B
RWwm11	AS-i 1: Outp. Slv15B	AS-i 1: Outp. Slv14B	AS-i 1: Outp. Slv13B	AS-i 1: Outp. Slv12B
RWwm12	AS-i 1: Outp. Slv19B	AS-i 1: Outp. Slv18B	AS-i 1: Outp. Slv17B	AS-i 1: Outp. Slv16B
RWwm13	AS-i 1: Outp. Slv23B	AS-i 1: Outp. Slv22B	AS-i 1: Outp. Slv21B	AS-i 1: Outp. Slv20B
RWwm14	AS-i 1: Outp. Slv27B	AS-i 1: Outp. Slv26B	AS-i 1: Outp. Slv25B	AS-i 1: Outp. Slv24B
RWwm15	AS-i 1: Outp. Slv31B	AS-i 1: Outp. Slv30B	AS-i 1: Outp. Slv29B	AS-i 1: Outp. Slv28B
RWwm16	fieldbus bits 15 … 8		fieldbus bits 7 … 0	
… RWwm19	reserved			

Tab. 6-9.

02.05.2016

Bits in flags

Bit	Name
0	0: No Config Error
1	0: AS-i Power OK
2	0. Normal Operation active
3	0: Protected Mode active

Tab. 6-10.

6.1.3 Safety Status

Bits in Safety Status

Bit	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
	one or more devices are red flashing	one or more devices are yellow flashing	reserved		**OSSD Color** 0: green 1: flashing green 2: yellow 3: yellow flashing 4: red 5: flashing red 6: grey 7: reserved			

Tab. 6-11. Bits in Safety Status

6.1.4 Fieldbus Bits

Information!

This functionality is only available in devices in the safety version 'SV 4.3' (see lateral label)!

The fieldbus bits enable communication between the controller and the safety program. The fieldbus bits can be used to pass any acknowledgment signals or similar to the safety program and provide status information to the controller.

The states of the AS-i Safety in- and outputs are sent to the controller via the input data image (see par. <Safety diagnostics in the Input Data Image (IDI)>).

Output data (device fieldbus bit in ASIMON)

2^{15}	2^{14}	2^{13}	2^{12}	2^{11}	2^{10}	2^9	2^8	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
FB_{15}	FB_{14}	FB_{13}	FB_{12}	FB_{11}	FB_{10}	FB_{09}	FB_{08}	FB_{07}	FB_{06}	FB_{05}	FB_{04}	SI 4	SI 3	SI 2	SI 1

Tab. 6-12.

Input data (output assignment fieldbus bit in ASIMON)

2^{15}	2^{14}	2^{13}	2^{12}	2^{11}	2^{10}	2^9	2^8	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
FB_{15}	FB_{14}	FB_{13}	FB_{12}	FB_{11}	FB_{10}	FB_{09}	FB_{08}	FB_{07}	FB_{06}	FB_{05}	FB_{04}	FB_{03}	FB_{02}	FB_{01}	FB_{00}

Tab. 6-13.

FB: fieldbus bit
SI1 … SI4: monitor inputs

Information!

More detailed information can be found in the manual "ASIMON configuration software", sections: "Monitoring devices -> Fieldbus bit" and "Output assignment"..

6.1.5 Message Transmission

"Message Transmission" provides only command interface commands (see separate manual "AS-i 3.0 Command Interface").

Information!

For details on the Message Transmission protocol, please refer to the CC-Link specification. For more information or PLC program examples, how to use Message Transmission, please refer to the documentation of your CC-Link master in use.

6.2 Compatibility mode for VBG-CCL-G4F

The **Compatibility Mode for VBG-CCL-G4F** has the following features:

- 3 stations are occupied using a single cycle setting.
- All functions of VBG-CCL-G4F are implemented.
- The AS-i process data or the command interface is mapped into the buffer memory area (BFM) (as done in the VBG-CCL-G4F).
- "Message Transmission" is not supported (since VBG-CCL-G4F also does not use it).

6.2.1 Remote IO Points

Remote to Host

Address	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
RXm	reserved										BfEAck	MbAck	reserved			
RXm+1 … RXm+5	reserved															

Tab. 6-14.

Flags in RXm

Bit	Short Cut	Name
0 … 3		reserved
4	MbAck	Acknowledge bit for Y4
5	BfEAck	Acknowledge bit for Y5
6 … 15		reserved

Tab. 6-15.

Host to Remote

Address	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
RYm	reserved										BfE	Mb	PM	CM	AAE	OFL
RYm+1 … RYm+5	reserved															

Tab. 6-16.

Flags in RYm

Bit	Short Cut	Name
0	OFL	Offline
1	AAE	Auto Address Enable
2	CM	Enter Configuration Mode on rising edge
3	PM	Enter Protected Mode on rising edge
4	Mb	0: BFM used for IO data only 1: BFM used for command interface
5	BfE	0: Enable use of BFM
6 … 15		reserved

Tab. 6-17.

6.2.2 Buffer Memory Area

Buffer memory (read) when using 'IO data only mode'

Address	Bit 15 … 12	Bit 11 … 8	Bit 7 … 4	Bit 3 … 0
RWrm0	AS-i 1: Inp. Slv3	AS-i 1: Inp. Slv2	AS-i 1: Inp. Slv1	flags
RWrm1	AS-i 1: Inp. Slv7	AS-i 1: Inp. Slv6	AS-i 1: Inp. Slv5	AS-i 1: Inp. Slv4
RWrm2	AS-i 1: Inp. Slv11	AS-i 1: Inp. Slv10	AS-i 1: Inp. Slv9	AS-i 1: Inp. Slv8
RWrm3	AS-i 1: Inp. Slv15	AS-i 1: Inp. Slv14	AS-i 1: Inp. Slv13	AS-i 1: Inp. Slv12
RWrm4	AS-i 1: Inp. Slv19	AS-i 1: Inp. Slv18	AS-i 1: Inp. Slv17	AS-i 1: Inp. Slv16
RWrm5	AS-i 1: Inp. Slv23	AS-i 1: Inp. Slv22	AS-i 1: Inp. Slv21	AS-i 1: Inp. Slv20
RWrm6	AS-i 1: Inp. Slv27	AS-i 1: Inp. Slv26	AS-i 1: Inp. Slv25	AS-i 1: Inp. Slv24
RWrm7	AS-i 1: Inp. Slv31	AS-i 1: Inp. Slv30	AS-i 1: Inp. Slv29	AS-i 1: Inp. Slv28
RWrm8	AS-i 1: Inp. Slv3B	AS-i 1: Inp. Slv2B	AS-i 1: Inp. Slv1B	
RWrm9	AS-i 1: Inp. Slv7B	AS-i 1: Inp. Slv6B	AS-i 1: Inp. Slv5B	AS-i 1: Inp. Slv4B
RWrm10	AS-i 1: Inp. Slv11B	AS-i 1: Inp. Slv10B	AS-i 1: Inp. Slv9B	AS-i 1: Inp. Slv8B
RWrm11	AS-i 1: Inp. Slv15B	AS-i 1: Inp. Slv14B	AS-i 1: Inp. Slv13B	AS-i 1: Inp. Slv12B

Tab. 6-18.

Bits in Flags

Bit	Name
0	0: No Config Error
1	0: AS-i Power OK
2	0. Normal Operation active
3	0: Protected Mode active

Tab. 6-19.

Buffer memory (read) when using 'command interface mode'

Address	Bit 15 … 12	Bit 11 … 8	Bit 7 … 4	Bit 3 … 0
RWrm0	command interface: circuit		command interface: command	
RWrm1	command interface: response byte 2		command interface: response byte 1	
RWrm2	command interface: response byte 4		command interface: response byte 3	
RWrm3	command interface: response byte 6		command interface: response byte 5	
RWrm4	command interface: response byte 8		command interface: response byte 7	
RWrm5	command interface: response byte 10		command interface: response byte 9	
RWrm6	command interface: response byte 12		command interface: response byte 11	
RWrm7	command interface: response byte 14		command interface: response byte 13	
RWrm8	command interface: response byte 16		command interface: response byte 15	
RWrm9	command interface: response byte 18		command interface: response byte 17	
RWrm10	command interface: response byte 20		command interface: response byte 19	
RWrm11	command interface: response byte 22		command interface: response byte 21	

Tab. 6-20.

Buffer memory (write) when using 'IO data only mode'

Address	Bit 15 … 12	Bit 11 … 8	Bit 7 … 4	Bit 3 … 0
RWwm0	AS-i 1: Outp. Slv3	AS-i 1: Outp. Slv2	AS-i 1: Outp. Slv1	flags
RWwm1	AS-i 1: Outp. Slv7	AS-i 1: Outp. Slv6	AS-i 1: Outp. Slv5	AS-i 1: Outp. Slv4
RWwm2	AS-i 1: Outp. Slv11	AS-i 1: Outp. Slv10	AS-i 1: Outp. Slv9	AS-i 1: Outp. Slv8
RWwm3	AS-i 1: Outp. Slv15	AS-i 1: Outp. Slv14	AS-i 1: Outp. Slv13	AS-i 1: Outp. Slv12
RWwm4	AS-i 1: Outp. Slv19	AS-i 1: Outp. Slv18	AS-i 1: Outp. Slv17	AS-i 1: Outp. Slv16
RWwm5	AS-i 1: Outp. Slv23	AS-i 1: Outp. Slv22	AS-i 1: Outp. Slv21	AS-i 1: Outp. Slv20
RWwm6	AS-i 1: Outp. Slv27	AS-i 1: Outp. Slv26	AS-i 1: Outp. Slv25	AS-i 1: Outp. Slv24
RWwm7	AS-i 1: Outp. Slv31	AS-i 1: Outp. Slv30	AS-i 1: Outp. Slv29	AS-i 1: Outp. Slv28
RWwm8	AS-i 1: Outp. Slv3B	AS-i 1: Outp. Slv2B	AS-i 1: Outp. Slv1B	
RWwm9	AS-i 1: Outp. Slv7B	AS-i 1: Outp. Slv6B	AS-i 1: Outp. Slv5B	AS-i 1: Outp. Slv4B
RWwm10	AS-i 1: Outp. Slv11B	AS-i 1: Outp. Slv10B	AS-i 1: Outp. Slv9B	AS-i 1: Outp. Slv8B
RWwm11	AS-i 1: Outp. Slv15B	AS-i 1: Outp. Slv14B	AS-i 1: Outp. Slv13B	AS-i 1: Outp. Slv12B

Tab. 6-21.

Buffer memory (write) when using 'command interface mode'

Address	Bit 15 … 12	Bit 11 … 8	Bit 7 … 4	Bit 3 … 0
RWwm0	command interface: circuit		command interface: command	
RWwm1	command interface: request byte 2		command interface: request byte 1	
RWwm2	command interface: request byte 4		command interface: request byte 3	
RWwm3	command interface: request byte 6		command interface: request byte 5	
RWwm4	command interface: request byte 8		command interface: request byte 7	
RWwm5	command interface: request byte 10		command interface: request byte 9	
RWwm6	command interface: request byte 12		command interface: request byte 11	
RWwm7	command interface: request byte 14		command interface: request byte 13	
RWwm8	command interface: request byte 16		command interface: request byte 15	
RWWm9	command interface: request byte 18		command interface: request byte 17	
RWwm10	command interface: request byte 20		command interface: request byte 19	
RWwm11	command interface: request byte 22		command interface: request byte 21	

Tab. 6-22.

6.3 CC-Link V1 Mode

CC-Link V1 Mode is an enxanced version of the compatibility mode for VBG-CCL-G4F.

Features:

- 4 stations are occupied using a single cycle setting.
- The AS-i process data or the mailbox is mapped into the buffer memory area (BFM) (as done in the VBG-CCL-G4F).
- "Message Transmission" is not supported.

6.3.1 Remote IO Points

Remote to Host

Address	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
RXm	reserved										BfEAck	MbAck	reserved			
RXm+1 … RXm+7	reserved															

Tab. 6-23.

Flags in RXm

Bit	Short Cut	Name
0 … 3		reserved
4	MbAck	Acknowledge bit for Y4
5	BfEAck	Acknowledge bit for Y5
6 … 15		reserved

Tab. 6-24.

Host to Remote

Address	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
RYm	reserved										BfE	Mb	PM	CM	AAE	OFL
RYm+1 … RYm+7	reserved															

Tab. 6-25.

Flags in RYm

Bit	Short Cut	Name
0	OFL	Offline
1	AAE	Auto Address Enable
2	CM	Enter Configuration Mode on rising edge
3	PM	Enter Protected Mode on rising edge
4	Mb	0: BFM used for IO Data only 1: BFM used for command interface
5	BfE	0: Enable use of BFM
6 … 15		reserved

Tab. 6-26.

6.3.2 Buffer Memory Area

Buffer memory (read) when using 'IO data only mode'

Address	Bit 15 … 12	Bit 11 … 8	Bit 7 … 4	Bit 3 … 0
RWrm0	AS-i 1: Inp. Slv3	AS-i 1: Inp. Slv2	AS-i 1: Inp. Slv1	flags
RWrm1	AS-i 1: Inp. Slv7	AS-i 1: Inp. Slv6	AS-i 1: Inp. Slv5	AS-i 1: Inp. Slv4
RWrm2	AS-i 1: Inp. Slv11	AS-i 1: Inp. Slv10	AS-i 1: Inp. Slv9	AS-i 1: Inp. Slv8
RWrm3	AS-i 1: Inp. Slv15	AS-i 1: Inp. Slv14	AS-i 1: Inp. Slv13	AS-i 1: Inp. Slv12
RWrm4	AS-i 1: Inp. Slv19	AS-i 1: Inp. Slv18	AS-i 1: Inp. Slv17	AS-i 1: Inp. Slv16
RWrm5	AS-i 1: Inp. Slv23	AS-i 1: Inp. Slv22	AS-i 1: Inp. Slv21	AS-i 1: Inp. Slv20
RWrm6	AS-i 1: Inp. Slv27	AS-i 1: Inp. Slv26	AS-i 1: Inp. Slv25	AS-i 1: Inp. Slv24
RWrm7	AS-i 1: Inp. Slv31	AS-i 1: Inp. Slv30	AS-i 1: Inp. Slv29	AS-i 1: Inp. Slv28
RWrm8	AS-i 1: Inp. Slv3B	AS-i 1: Inp. Slv2B	AS-i 1: Inp. Slv1B	
RWrm9	AS-i 1: Inp. Slv7B	AS-i 1: Inp. Slv6B	AS-i 1: Inp. Slv5B	AS-i 1: Inp. Slv4B
RWrm10	AS-i 1: Inp. Slv11B	AS-i 1: Inp. Slv10B	AS-i 1: Inp. Slv9B	AS-i 1: Inp. Slv8B
RWrm11	AS-i 1: Inp. Slv15B	AS-i 1: Inp. Slv14B	AS-i 1: Inp. Slv13B	AS-i 1: Inp. Slv12B
RWrm12	AS-i 1: Inp. Slv19B	AS-i 1: Inp. Slv18B	AS-i 1: Inp. Slv17B	AS-i 1: Inp. Slv16B
RWrm13	AS-i 1: Inp. Slv23B	AS-i 1: Inp. Slv22B	AS-i 1: Inp. Slv21B	AS-i 1: Inp. Slv20B
RWrm14	AS-i 1: Inp. Slv27B	AS-i 1: Inp. Slv26B	AS-i 1: Inp. Slv25B	AS-i 1: Inp. Slv24B
RWrm15	AS-i 1: Inp. Slv31B	AS-i 1: Inp. Slv30B	AS-i 1: Inp. Slv29B	AS-i 1: Inp. Slv28B

Tab. 6-27.

Bits in Flags

Bit	Name
0	0: No Config Error
1	0: AS-i Power OK
2	0. Normal Operation active
3	0: Protected Mode active

Tab. 6-28.

Buffer memory (read) when using 'command interface mode'

Address	Bit 15 … 12	Bit 11 … 8	Bit 7 … 4	Bit 3 … 0
RWrm0	command interface: circuit		command interface: command	
RWrm1	command interface: response byte 2		command interface: response byte 1	
RWrm2	command interface: response byte 4		command interface: response byte 3	
RWrm3	command interface: response byte 6		command interface: response byte 5	
RWrm4	command interface: response byte 8		command interface: response byte 7	
RWrm5	command interface: response byte 10		command interface: response byte 9	
RWrm6	command interface: response byte 12		command interface: response byte 11	
RWrm7	command interface: response byte 14		command interface: response byte 13	
RWrm8	command interface: response byte 16		command interface: response byte 15	
RWrm9	command interface: response byte 18		command interface: response byte 17	
RWrm10	command interface: response byte 20		command interface: response byte 19	
RWrm11	command interface: response byte 22		command interface: response byte 21	
RWrm12	command interface: response byte 24		command interface: response byte 23	
RWrm13	command interface: response byte 26		command interface: response byte 25	
RWrm14	command interface: response byte 28		command interface: response byte 27	
RWrm15	command interface: response byte 30		command interface: response byte 29	

Tab. 6-29.

Buffer memory (write) when using 'IO data only mode'

Address	Bit 15 … 12	Bit 11 … 8	Bit 7 … 4	Bit 3 … 0
RWwm0	AS-i 1: Outp. Slv3	AS-i 1: Outp. Slv2	AS-i 1: Outp. Slv1	flags
RWwm1	AS-i 1: Outp. Slv7	AS-i 1: Outp. Slv6	AS-i 1: Outp. Slv5	AS-i 1: Outp. Slv4
RWwm2	AS-i 1: Outp. Slv11	AS-i 1: Outp. Slv10	AS-i 1: Outp. Slv9	AS-i 1: Outp. Slv8
RWwm3	AS-i 1: Outp. Slv15	AS-i 1: Outp. Slv14	AS-i 1: Outp. Slv13	AS-i 1: Outp. Slv12
RWwm4	AS-i 1: Outp. Slv19	AS-i 1: Outp. Slv18	AS-i 1: Outp. Slv17	AS-i 1: Outp. Slv16
RWwm5	AS-i 1: Outp. Slv23	AS-i 1: Outp. Slv22	AS-i 1: Outp. Slv21	AS-i 1: Outp. Slv20
RWwm6	AS-i 1: Outp. Slv27	AS-i 1: Outp. Slv26	AS-i 1: Outp. Slv25	AS-i 1: Outp. Slv24
RWwm7	AS-i 1: Outp. Slv31	AS-i 1: Outp. Slv30	AS-i 1: Outp. Slv29	AS-i 1: Outp. Slv28
RWwm8	AS-i 1: Outp. Slv3B	AS-i 1: Outp. Slv2B	AS-i 1: Outp. Slv1B	
RWwm9	AS-i 1: Outp. Slv7B	AS-i 1: Outp. Slv6B	AS-i 1: Outp. Slv5B	AS-i 1: Outp. Slv4B
RWwm10	AS-i 1: Outp. Slv11B	AS-i 1: Outp. Slv10B	AS-i 1: Outp. Slv9B	AS-i 1: Outp. Slv8B
RWwm11	AS-i 1: Outp. Slv15B	AS-i 1: Outp. Slv14B	AS-i 1: Outp. Slv13B	AS-i 1: Outp. Slv12B
RWwm12	AS-i 1: Outp. Slv19B	AS-i 1: Outp. Slv18B	AS-i 1: Outp. Slv17B	AS-i 1: Outp. Slv16B
RWwm13	AS-i 1: Outp. Slv23B	AS-i 1: Outp. Slv22B	AS-i 1: Outp. Slv21B	AS-i 1: Outp. Slv20B
RWwm14	AS-i 1: Outp. Slv27B	AS-i 1: Outp. Slv26B	AS-i 1: Outp. Slv25B	AS-i 1: Outp. Slv24B
RWwm15	AS-i 1: Outp. Slv31B	AS-i 1: Outp. Slv30B	AS-i 1: Outp. Slv29B	AS-i 1: Outp. Slv28B

Tab. 6-30.

Buffer memory (write) when using 'command interface mode'

Address	Bit 15 … 12	Bit 11 … 8	Bit 7 … 4	Bit 3 … 0
RWwm0	command interface: circuit		command interface: command	
RWwm1	command interface: request byte 2		command interface: request byte 1	
RWwm2	command interface: request byte 4		command interface: request byte 3	
RWwm3	command interface: request byte 6		command interface: request byte 5	
RWwm4	command interface: request byte 8		command interface: request byte 7	
RWwm5	command interface: request byte 10		command interface: request byte 9	
RWwm6	command interface: request byte 12		command interface: request byte 11	
RWwm7	command interface: request byte 14		command interface: request byte 13	
RWwm8	command interface: request byte 16		command interface: request byte 15	
RWwm9	command interface: request byte 18		command interface: request byte 17	
RWwm10	command interface: request byte 20		command interface: request byte 19	
RWwm11	command interface: request byte 22		command interface: request byte 21	
RWwm12	command interface: request byte 24		command interface: request byte 23	
RWwm13	command interface: request byte 26		command interface: request byte 25	
RWwm14	command interface: request byte 28		command interface: request byte 27	
RWwm15	command interface: request byte 30		command interface: request byte 29	

Tab. 6-31.

6.4 Compatibility Mode for FX2N-32ASI-M

The **Compatibility Mode for FX2N-32ASI-M** is used to facilitate the migration of applications using the obsolete Mitsubishi FX2N-32ASI-M-Module (AS-i Master 2.04) for FX2N SPS.

Features:

- 4 stations are occupied using a single cycle setting (CC-Link V1).
- 'Message Transmission' is not supported.

Not all functions of FX2N-32ASI-M are implemented:

- no command buffer.
- no list of slaves with differences in the configuration.
- no module 'Error Status', no module 'Identifier' (specific for the FX2N series).

6.4.1 Remote IO Points

not used

6.4.2 Buffer Memory Area

Buffer memory (read)

Address	Bit 15 … 12	Bit 11 … 8	Bit 7 … 4	Bit 3 … 0
RWrm0	AS-i 1: Inp. Slv3	AS-i 1: Inp. Slv2	AS-i 1: Inp. Slv1	flags
RWrm1	AS-i 1: Inp. Slv7	AS-i 1: Inp. Slv6	AS-i 1: Inp. Slv5	AS-i 1: Inp. Slv4
RWrm2	AS-i 1: Inp. Slv11	AS-i 1: Inp. Slv10	AS-i 1: Inp. Slv9	AS-i 1: Inp. Slv8
RWrm3	AS-i 1: Inp. Slv15	AS-i 1: Inp. Slv14	AS-i 1: Inp. Slv13	AS-i 1: Inp. Slv12
RWrm4	AS-i 1: Inp. Slv19	AS-i 1: Inp. Slv18	AS-i 1: Inp. Slv17	AS-i 1: Inp. Slv16
RWrm5	AS-i 1: Inp. Slv23	AS-i 1: Inp. Slv22	AS-i 1: Inp. Slv21	AS-i 1: Inp. Slv20
RWrm6	AS-i 1: Inp. Slv27	AS-i 1: Inp. Slv26	AS-i 1: Inp. Slv25	AS-i 1: Inp. Slv24
RWrm7	AS-i 1: Inp. Slv31	AS-i 1: Inp. Slv30	AS-i 1: Inp. Slv29	AS-i 1: Inp. Slv28
RWrm8	EC-Flags			
RWrm9	reserved			
RWrm10	LDS Slave 15 … 12	LDS Slave 11 … 8	LDS Slave 7 … 4	LDS Slave 3 … 0
RWrm11	LDS Slave 31 … 28	LDS Slave 27 … 24	LDS Slave 23 … 20	LDS Slave 19 … 16
RWrm12	LAS Slave 15 … 12	LAS Slave 11 … 8	LAS Slave 7 … 4	LAS Slave 3 … 0
RWrm13	LAS Slave 31 … 28	LAS Slave 27 … 24	LAS Slave 23 … 20	LAS Slave 19 … 16
RWrm14	LPS Slave 15 … 12	LPS Slave 11 … 8	LPS Slave 7 … 4	LPS Slave 3 … 0
RWrm15	LPS Slave 31 … 28	LPS Slave 27 … 24	LPS Slave 23 … 20	LPS Slave 19 … 16

Tab. 6-32.

Bits in Flags

Bit	Name
0	0: No Config Error
1	0: AS-i Power OK
2	0. Normal Operation active
3	0: Protected Mode active

Tab. 6-33.

EC-Flags

Bit	Short Cut	Name
0	Cfg. Err	Configuration Error
1	S0	Slave Address 0 detected
2	Aaasn	Auto Address Assign
3	Aaavail	Auto Address Available
4	CM	Configuration Mode active
5	!NA	Normal Operation not active
6	APF	AS-i Power fail (AS-i voltage below 19V)
7	Offl	Offline
8	NPF	No Peripheral Fault
9 … 15		reserved

Tab. 6-34.

Buffer memory (write)

Address	Bit 15 … 12	Bit 11 … 8	Bit 7 … 4	Bit 3 … 0
RWwm0	AS-i 1: Outp. Slv3	AS-i 1: Outp. Slv2	AS-i 1: Outp. Slv1	flags
RWwm1	AS-i 1: Outp. Slv7	AS-i 1: Outp. Slv6	AS-i 1: Outp. Slv5	AS-i 1: Outp. Slv4
RWwm2	AS-i 1: Outp. Slv11	AS-i 1: Outp. Slv10	AS-i 1: Outp. Slv9	AS-i 1: Outp. Slv8
RWwm3	AS-i 1: Outp. Slv15	AS-i 1: Outp. Slv14	AS-i 1: Outp. Slv13	AS-i 1: Outp. Slv12
RWwm4	AS-i 1: Outp. Slv19	AS-i 1: Outp. Slv18	AS-i 1: Outp. Slv17	AS-i 1: Outp. Slv16
RWwm5	AS-i 1: Outp. Slv23	AS-i 1: Outp. Slv22	AS-i 1: Outp. Slv21	AS-i 1: Outp. Slv20
RWwm6	AS-i 1: Outp. Slv27	AS-i 1: Outp. Slv26	AS-i 1: Outp. Slv25	AS-i 1: Outp. Slv24
RWwm7	AS-i 1: Outp. Slv31	AS-i 1: Outp. Slv30	AS-i 1: Outp. Slv29	AS-i 1: Outp. Slv28
… RWwm15	reserved			

Tab. 6-35.

6.5 Compatibility Mode for HK-ASICC

The **Compatibility Mode for HK-ASICC** uses compatible EA data for easy transfer of existing HK-ASICC applications.

Features:

- 2 stations are occupied using a single cycle setting (CC-Link V1).
- "Message Transmission" is not supported.

Not all functions of HK-ASICC are implemented:

- no ’Status Command Area’
- AS-i input / output area is supported in compatibility mode.

6.5.1 Remote IO Points

not used

6.5.2 Buffer Memory Area

Buffer memory (read)

Address	Bit 15 … 12	Bit 11 … 8	Bit 7 … 4	Bit 3 … 0
RWrm0	AS-i 1: Inp. Slv3	AS-i 1: Inp. Slv2	AS-i 1: Inp. Slv1	reserved
RWrm1	AS-i 1: Inp. Slv7	AS-i 1: Inp. Slv6	AS-i 1: Inp. Slv5	AS-i 1: Inp. Slv4
RWrm2	AS-i 1: Inp. Slv11	AS-i 1: Inp. Slv10	AS-i 1: Inp. Slv9	AS-i 1: Inp. Slv8
RWrm3	AS-i 1: Inp. Slv15	AS-i 1: Inp. Slv14	AS-i 1: Inp. Slv13	AS-i 1: Inp. Slv12
RWrm4	AS-i 1: Inp. Slv19	AS-i 1: Inp. Slv18	AS-i 1: Inp. Slv17	AS-i 1: Inp. Slv16
RWrm5	AS-i 1: Inp. Slv23	AS-i 1: Inp. Slv22	AS-i 1: Inp. Slv21	AS-i 1: Inp. Slv20
RWrm6	AS-i 1: Inp. Slv27	AS-i 1: Inp. Slv26	AS-i 1: Inp. Slv25	AS-i 1: Inp. Slv24
RWrm7	AS-i 1: Inp. Slv31	AS-i 1: Inp. Slv30	AS-i 1: Inp. Slv29	AS-i 1: Inp. Slv28

Tab. 6-36.

Buffer memory (write)

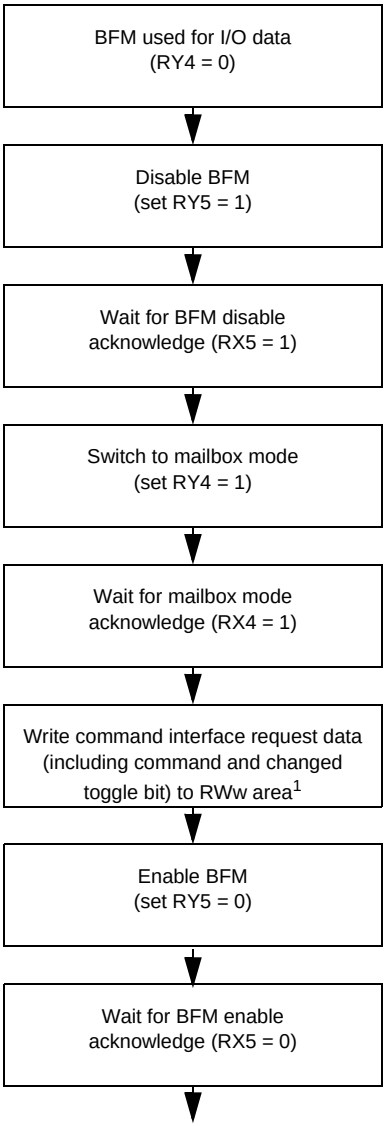
Address	Bit 15 … 12	Bit 11 … 8	Bit 7 … 4	Bit 3 … 0
RWwm0	AS-i 1: Outp. Slv3	AS-i 1: Outp. Slv2	AS-i 1: Outp. Slv1	reserved
RWwm1	AS-i 1: Outp. Slv7	AS-i 1: Outp. Slv6	AS-i 1: Outp. Slv5	AS-i 1: Outp. Slv4
RWwm2	AS-i 1: Outp. Slv11	AS-i 1: Outp. Slv10	AS-i 1: Outp. Slv9	AS-i 1: Outp. Slv8
RWwm3	AS-i 1: Outp. Slv15	AS-i 1: Outp. Slv14	AS-i 1: Outp. Slv13	AS-i 1: Outp. Slv12
RWwm4	AS-i 1: Outp. Slv19	AS-i 1: Outp. Slv18	AS-i 1: Outp. Slv17	AS-i 1: Outp. Slv16
RWwm5	AS-i 1: Outp. Slv23	AS-i 1: Outp. Slv22	AS-i 1: Outp. Slv21	AS-i 1: Outp. Slv20
RWwm6	AS-i 1: Outp. Slv27	AS-i 1: Outp. Slv26	AS-i 1: Outp. Slv25	AS-i 1: Outp. Slv24
RWwm7	AS-i 1: Outp. Slv31	AS-i 1: Outp. Slv30	AS-i 1: Outp. Slv29	AS-i 1: Outp. Slv28

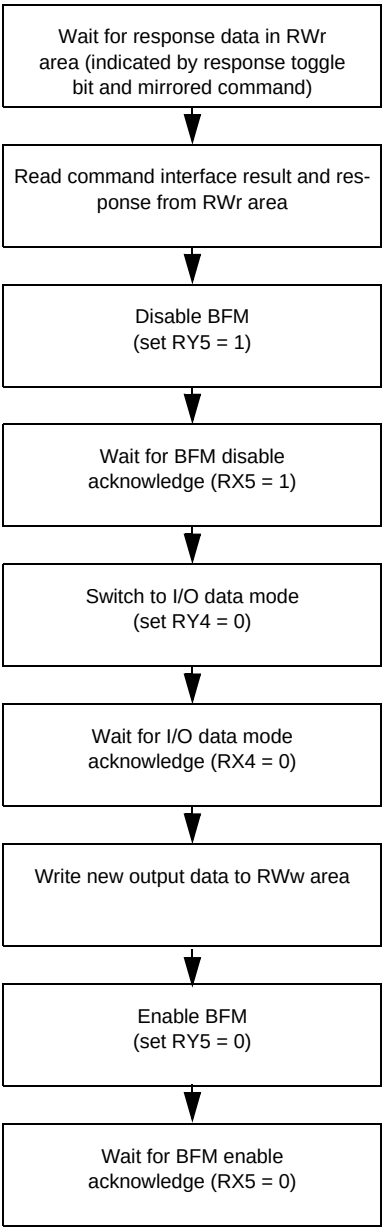
Tab. 6-37.

7. Accessing command interface

7.1 Using BFM

This example describes one method of accessing a command interface when it is mapped into the cyclic buffer memory area (when using **VBG-CCL-G4F Mode**, or **CC-Link V1 Mode**)




Wait for response data in RWr area (indicated by response toggle bit and mirrored command)
Read command interface result and response from RWr area
Disable BFM (set RY5 = 1)
Wait for BFM disable acknowledge (RX5 = 1)
Switch to I/O data mode (set RY4 = 0)
Wait for I/O data mode acknowledge (RX4 = 0)
Write new output data to RWw area
Enable BFM (set RY5 = 0)
Wait for BFM enable acknowledge (RX5 = 0)

1.) Example:

For example, when the first command used is reading the list of detected slaves (command 0x46), write the following to the RWw area:

Adresse	Bit 15 … 12	Bit 11 … 8	Bit 7 … 4	Bit 3 … 0
RWwm0	0x80 (command interface: toggle bit and circuit)		0x46 (command interface: command)	

Tab. 7-38.

The rest of RWw area is not used by this command, because other request bytes are not needed.

If there is no error during command execution and there are slaves 1A, 2A and 3A detected, the response data in the RWr area will be:

Address	Bit 15 … 12	Bit 11 … 8	Bit 7 … 4	Bit 3 … 0
RWrm0	0x80 (command interface: mirrored toggle bit and result)		0x46 (command interface: mirrored command)	
RWrm1	0x00 (command interface: response byte 2)		0x0E (command interface: response byte 1)	
RWrm2	0x00 (command interface: response byte 4)		0x00 (command interface: response byte 3)	
RWrm3	0x00 (command interface: response byte 6)		0x00 (command interface: response byte 5)	
RWrm4	0x00 (command interface: response byte 8)		0x00 (command interface: response byte 7)	

Tab. 7-39.

The rest of the RWr area is not used by this command, because the response data does not require the complete RWw area.

Information!
For a list of all command interface commands and the request/response data structures, please refer to the separate manual "AS-i 3.0 Command interface".

In standard mode, "Message Transmission" is used to access the command interface.

7.2 Using "Message Transmission"

"Message Transmission" is a method to map acyclic requests in the cyclical CC-Link Process data. All data transfers are initiated by the CC-Link Master module. Information if telegram transmission is supported or not by the master, see the documentation of your CC-Link Master.

Example:

The Mitsubishi CC-Link master module QJ61BT11N for the Mitsubishi Q-Serie supports the command G(P).RDMSG for telegram transmission. A detailed description of this instruction can be found in the user's manual of the QJ61BT11N.

This instruction requires various parameters, such as the CC-Link station number of the target remote device and a buffer to hold the response data. These are described in the QJ61BT11N user's manual.

Information!
The structure of the transmission and response data of the command interface command is independent of the used CC-Link master and it is described in the separate manual "AS-i 3.0 command interface".

Example:

For example, when reading the list of detected slaves (command 0x46) and the register D1 of the Mitsubishi QCPU is assigned as a parameter to G(P).RDMSG as start number of the device that stores the data to be sent. The following data must be stored in D1:

Address	Bit 15..12	Bit 11..8	Bit 7..4	Bit 3..0
D1	0x00 (command interface: toggle bit and circuit)		0x46 (command interface: command)	

Tab. 7-40.

Note that the toggle bit does not have to be changed for each new request.

The send data size in bytes must be set to 2 and given as parameter to G(P).RDMSG.

If register D10 of the Mitsubishi QCPU is given as parameter to G(P).RDMSG as start number of the device to store the received data, the receivable data size in bytes for G(P).RDMSG is set to at least 10, there is no error during command execution and there are slaves 1A, 2A and 3A detected the following will be stored starting from register D10:

Address	Bit 15..12	Bit 11..8	Bit 7..4	Bit 3..0
D10	0x00 (command interface: toggle bit and result)		0x46 (command interface: mirrored command)	
D11	0x00 (command interface: response byte 2)		0x0E (command interface: response byte 1)	
D12	0x00 (command interface: response byte 4)		0x00 (command interface: response byte 3)	
D13	0x00 (command interface: response byte 6)		0x00 (command interface: response byte 5)	
D14	0x00 (command interface: response byte 8)		0x00 (command interface: response byte* 7)	

Tab. 7-41.

The device given as parameter to G(P).RDMSG to store the received data size in bytes will be set to 10 by the system.

Information!
For a list of all command interface commands and the request/response data structures, please refer to the separate manual "AS-i 3.0 command interface".

8. Diagnostics

8.1 System diagnostics on the PC

8.1.1 Software for diagnostics, service and release measurements

The intuitively constructed software for diagnostics, service and release measurements enables PC-assisted measurement using the high-level measuring technology built into the masters.

This specially developed software assists both machine and systems builders in release measurements and preventive troubleshooting as well as end users in preventive maintenance and fast, self-performed error elimination. As an option the analysis data can also be sent to our technical support group and used as the basis for fast, reliable help with problem handling.

8.1.2 AS-i Control Tools

The Software AS-i Control Tools provide you with all the key testing and configuration possibilities of your AS-i circuit in organized fashion on your PC.

A graphic representation of your AS-i network provides you with a quick overview of the system status, showing for example any missing or unprojected slaves. In addition, peripheral errors and the status of the "AS-i Monitors" integrated into the Masters. The **diagnostic buffer** (not available with all devices!) stores with a time stamp in a ring buffer up to 1024 events. The AS-i Control Tools software also provides a simple and convenient way to configure new AS-i circuits or modify already existing configurations. This software is also a component of the ASIMON software.

8.1.3 ASIMON

The ASIMON software is used to configure the safety unit. Already configured systems can be diagnosed live using the software. The status of all in- and outputs is graphically represented as are the results of the preparatory processing.

When projecting the user has the ability to assign unique identifiers to the individual devices. These also appear in the device displays in connection with error messages. To prevent errors in the projecting stage the ASIMON software provides advance warning at the relevant points.

The AS-i Control Tools software is also part of the ASIMON.

8.1.4 Web server

Units having an Ethernet port provide all the diagnostics data through a web server. If necessary this also allws the system information to be viewed from any PC connected to the network without any additional software, simply using a standard internet browser and Java.

To be able to take advantage of the full scope of diagnostics functions and configuration possibilities of the AS-i Masters, you will however need the ASIMON software with integrated AS-i Control Tools and ideally also the software for diagnostics, service and release measurement.

8.2 Diagnostics on the host controller

All the diagnostics information is also provided on the host controller.

8.2.1 Diagnostics through process data

Diagnostics through the process data provides a very simple means of incorporating diagnostics information into the controller program and displaying it on a control panel.

For useful diagnostics we recommend use of the following options:

8.2.1.1 Diagnosing the AS-i circuits

- Flags + Fault Detector (see chap. 6.1.1).

When a configuration error is reported, e.g. because an AS-i slave has failed, the AS-i master continues to communicate with the remaining slaves. In many cases however a good and simple solution is to terminate running of the PLC program in case of a configuration error.

8.2.1.2 Diagnosing the Safety Monitor

- Safety diagnostics in the Input Data Image
  Diagnostics for the states of the safety AS-i in- and outputs. To obtain diagnostics information for a safety AS-i output the associated diagnostics slave address must be incorporated (see paragraph <A>).
- Fieldbus Bits and Safety Status
  User-specific diagnosing and diagnosing the states of the release circuits (see chap. 6.1.4 and chap. 6.1.3)

Paragraph A: Safety diagnostics in the Input Data Image (IDI)

- Safety diagnostics of safe AS-i inputs

Diagnostics in the IDI is a way of sending the key diagnostics functions to the controller without a command interface (Mailbox) or any additional effort. The diagnostics information is sent in the input data image, coded for the input bits of the address of the safety input slave.

The switching state of Channels 1 and 2 of the safety input is shown with negligible time lag in bits 0 and 1 and can be directly read:

Bit3	Bit2	Bit1	Bit0	Description
X	X	0	0	Both channels open
X	X	0	1	2nd channel open, 1st channel closed
X	X	1	0	2nd channel closed, 1st channel open
X	X	1	1	Both channel closed

Tab. 8-42.

Bits 2 and 3 are used to send the status of the safety input (the device color of the ASIMON):

Bit3	Bit2	Bit1	Bit0	Description
0	0	X	X	Device color: red, green or gray
0	1	X	X	Device color: yellow ("waiting")
1	0	X	X	Device color: yellow flashing ("testing")
1	1	X	X	Device color: red flashing ("Error")

Tab. 8-43. Stae of safety input

- Safety diagnostics of safe AS-i outputs

The diagnostic informations are transfered via the Input Data Image, coded to the input bits of the diagnostic address (diagnostic slave) of an AS-i safety slave. The diagnostics information for the safety output is encoded to the input data of the diagnostics slave of the respective safety output.

Bit value of the input bits of the diagnostic slaves

Bit	AS-i input
E0	diagnostics (see table device colors)
E1	
E2	
E3	reserved for EDM input

Tab. 8-44. Bit value of input bits of the diagnostic slaves

Device colors

The colors refer to the diagnostics in the ASIMON.

Value	Color	Description	state change	LED "OUT"[1]
0	green	output on	–	on
1	green flashing	–	–	–
2	yellow	restart inhibit	auxiliary signal 2	1 Hz
3	yellow flashing	–	–	–
4	red	output off	–	off
5	red flashing	waiting for reset of error condition	auxiliary signal 1	8 Hz
6	gray	connection or internal error	only via **Power On** on device	all LEDs flashing
7	green/yellow	output released, but not switched on	switched on by setting the output bit[1]	off

Tab. 8-45. Device colors

1. See documentation of the AS-i slave.

Important!

The following points must be noted for processing:

- The information for switching state and error status are not processed time-synchronous.
- When there is a configuration error all bits having value 0 are sent; this must be noted when processing the data.
- When the Monitor is stopped the device color is "gray".
- When regularly switching, the status "yellow flashing" can be recognized as a transition status. This depends on the component model set. This status cannot be understood as a testing request until it is stably reported (see Monitor Info and Safety Control/Status Byte). This is not the case until bit ’6’ is set in the Monitor Info and Safety Control/Status Byte ("At least one module in Test status"). This means the diagnostics information in the input data image does not serve as a trigger for the testing request, but rather only as detailed information after the Monitor Info and Safety Control/Status byte have indicated that at least one component has reported a testing request.

Changing the base setting

Setting and changing the diagnostics type is done using the device display (**`[SAFETY]->[AS-I SAFETY]->[SAFE SUBST VAL]`**)

8.2.2 Diagnosing the safety unit using the command interface

All the diagnostics data can also be queried individually and acyclic using the command interface commands. This method does however involve greater programming effort.

8.2.3 LEDs

The LEDs located on the device allow you to quickly see the status of the main function parameters, such as power, communication with the host controller, communication on the AS-i circuit and state of the safety in- and outputs.

8.2.4 LC-Display

In the display of the Gateways plain text messages are shown spontaneously for any detected errors (e.g. missing slaves, earth fault, duplicate address…).

8.2.5 AS-i Monitor

Comprehensive, standard measuring technology built into the AS-i Masters make it possible to simply localize even sporadically occurring configuration errors and interference sources affecting AS-i communication.

8.2.5.1 Duplicate address detection

The Master detects when two slaves having the same address are present in the AS-i circuit.

8.2.5.2 Earth fault monitor

The earth fault monitor checks the symmetry of the AS-i voltage. If the voltage is no longer sufficiently symmetrical, the noise immunity of data transmission is compromised.

8.2.5.3 Noise voltage detection

Noise voltages on the AS-i cable can cause telegram errors. The noise voltage detector monitors the AS-i circuit for AC voltages which have been generated by neither the AS-i Master nor the slaves.

8.2.5.4 Overvoltage detection

Normally UASi+ and UASi- are in symmetry with system ground. If this potential rises significantly, the overvoltage detector reports this anomaly.

9. Appendix

Quick Start Guides for commissioning and service are provided on the website available for download.

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