

AS-Interface 3.0 Master/Scanner for ALLEN-BRADLEY

User manual



AS-i 3.0 specification

Subject to modifications without notice.

Generally, this manual refers to products without mentioning existing patents, utility models, or trademarks.

The absence of any such references does not indicate that a product is patent-free.

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Conformity Statement

according to 89/336/EEC and 73/23/EEC

Bihl+Wiedemann GmbH, Mannheim, Germany, hereby declares under its sole responsibility that the products mentioned below are according to the listed harmonized standards or normative documents and (where necessary) a competent body has been released.

Item no.	Description
BWU1488	AS-Interface 3.0 Master/Scanner for ALLEN-BRADLEY

Applied harmonized Standards: Applied national standards or normative documents:	EN 50 295 Prüfungsordnung für AS-i Master
---	--

Manufacturer:

Bihl+Wiedemann GmbH
Flosswoerthstrasse 41
68199 Mannheim
Germany

Date: 15.04.02

Bernhard Wiedemann

1. Symbol catalog



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.

1.1 Abbreviations



Information!

Additional information can be found in section <Glossary>.

2. General

2.1 Product information

This system manual applies to the following Bihl+Wiedemann GmbH equipment:

AS-Interface 3.0 Master/Scanner for ALLEN-BRADLEY	BWU1488
---	----------------

Tab. 2-1.

2.2 AS-i specification 3.0

The AS-i 3.0 devices already fulfil the AS-i specification 3.0.

The previous specifications (2.1 and 2.0) are supported as well.

Advanced Diagnostics

Diagnostics, which go far beyond the standard diagnostics facilitate the simple detection of the occasionally occurring configuration errors and further irritations towards the AS-i communication. So in case of an error the down time of machines can be minimized or you can initiate preventive maintenance.

Commissioning and monitoring

Commissioning, debugging and setting up of the AS-i parameters can also be accomplished with the use of push-buttons on the frontside of the gateway, the display and the LEDs. It is also possible to do the configuration with the software "AS-i Control Tools".

2.3 Conformity statement

The AS-Interface 3.0 Master/Scanner for ALLEN-BRADLEY has been developed and manufactured in accordance with the applicable european standards and directives.



Information!

The corresponding conformity statement can be found at the very beginning of this system manual.

2.4 Certification according to DIN EN ISO 9001 : 2000

The manufacturer of the product possesses a certified quality assurance system in accordance with ISO 9001.



Information!

*The current certificate can be viewed in internet:
<http://www.bihl-wiedemann.de>*

3. Safety

3.1 Intended use



Warning!

This symbol warns of a possible danger. The protection of operating personnel and the system against possible danger is not guaranteed if the control interface unit is not operated in accordance to its intended use.

3.2 General safety information



Warning!

Safety and correct functioning of the device cannot be guaranteed if any operation other than described in this operation manual is performed. Connecting the equipment and conducting any maintenance work under power must exclusively be performed by appropriately qualified personnel. In case a failure cannot be eliminated, the device must be taken out of operation and inadvertently operation must be prevented. Repair work must be performed by the manufacturer only. Additions or modifications to the equipment are not permitted and will void the warranty.



Information!

The operator is responsible for the observation of local safety standards.

3.2.1 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.

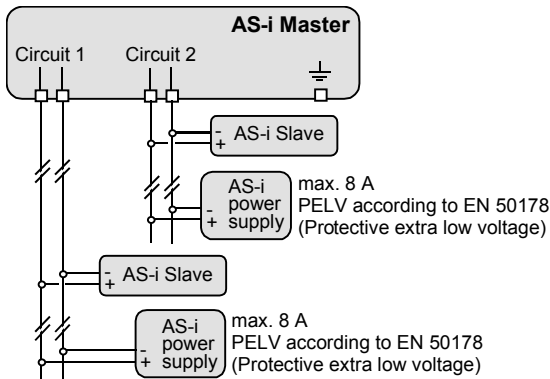
4. Description

4.1 LED Indicators

Indicator	Color	Description
PWR	green	AS-i Master power
OK	green/red	PLC mode
SYS		Connection to PLC
AS-i	green/red	Communication and control information
AS-i act.	green	Normal operation active
prg enable	green	Automatic addressing enable
prj mode	yellow	Configuration mode

4.2 Connection of the AS-i Scanner

4.2.1 Connection samples for the AS-i power supply:



Attention!

In the wiring schemes above the current through the connector must not exceed 8 A.

4.3 Display and Operating Elements

4.3.1 LEDs of the Double Masters

4.3.2 Push-Buttons

The detailed operation is described in chap. <Operating the AS-i Scanner>.

PWR	The master's power supply is sufficient.
OK	<ul style="list-style-type: none"> red: internal fault, self test flashing red: communication fault green: OK, PLC in run mode flashing green: OK, PLC in program mode or no PLC
SYS	<ul style="list-style-type: none"> green: A connection to a PLC exists off: No connection to a PLC
AS-i	<p><u>Communication and control information</u></p> <ul style="list-style-type: none"> green: AS-i is OK flashing green: AS-i is OK, Config Mode selected off: AS-i is not sufficiently powered flashing red: <u>Peripheral Fault</u> <p>This LED blinks if there is at least one periphery fault at one AS-i slave in the AS-i network. If there are configuration errors as well as periphery faults, only configuration error is displayed.</p> <ul style="list-style-type: none"> red: <u>Config error</u> <p>At least one configured slave is missing, or at least one detected slave is not projected or for at least one projected and detected slave the actual configuration data does not match the nominal configuration data.</p>
AS-i act.	Normal operation active.
prg enable	<p>Automatic address programming enabled.</p> <p>Exactly one slave is missing in protected operating mode. The slave can be replaced by another slave of the same type with address zero. The master addresses the new slave to the faulty address and thus eliminates the configuration error.</p>
prj mode	The AS-i master is in configuration mode.
mode	Switching between configuration mode and protected operating mode and saving the current AS-i configuration as the nominal configuration.
set	Selecting and assigning the address to a slave.

5. Configuration

5.1 I/O Data Interpretation

5.1.1 Input Data Array

The input data array consist of 50 words for scanner revisions prior to 1.3 and 50 or 244 words for revision 1.3 (ID 11607) and up.

These words of data are as follows:

word	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
circuit 1:																
0	flags				slave 1/1A				slave 2/2A				slave 3/3A			
	F3	F2	F1	F0	D3	D2	D1	D0	D3	D2	D1	D0	D3	D2	D1	D0
1	slave 4/4A				slave 5/5A				slave 6/6A				slave 7/7A			
2	slave 8/8A				slave 9/9A				slave 10/10A				slave 11/11A			
3	slave 12/12A				slave 13/13A				slave 14/14A				slave 15/15A			
4	slave 16/16A				slave 17/17A				slave 18/18A				slave 19/19A			
5	slave 20/20A				slave 21/21A				slave 22/22A				slave 23/23A			
6	slave 24/24A				slave 25/25A				slave 26/26A				slave 27/27A			
7	slave 28/28A				slave 29/29A				slave 30/30A				slave 31/31A			
8	reserved				slave 1B				slave 2B				slave 3B			
9	slave 4B				slave 5B				slave 6B				slave 7B			
10	slave 8B				slave 9B				slave 10B				slave 11B			
11	slave 12B				slave 13B				slave 14B				slave 15B			
12	slave 16B				slave 17B				slave 18B				slave 19B			
13	slave 20B				slave 21B				slave 22B				slave 23B			
14	slave 24B				slave 25B				slave 26B				slave 27B			
15	slave 28B				slave 29B				slave 30B				slave 31B			
circuit 2:																
16	flags				slave 1/1A				slave 2/2A				slave 3/3A			
	F3	F2	F1	F0	D3	D2	D1	D0	D3	D2	D1	D0	D3	D2	D1	D0
17	slave 4/4A				slave 5/5A				slave 6/6A				slave 7/7A			
18	slave 8/8A				slave 9/9A				slave 10/10A				slave 11/11A			
19	slave 12/12A				slave 13/13A				slave 14/14A				slave 15/15A			
20	slave 16/16A				slave 17/17A				slave 18/18A				slave 19/19A			
21	slave 20/20A				slave 21/21A				slave 22/22A				slave 23/23A			
22	slave 24/24A				slave 25/25A				slave 26/26A				slave 27/27A			
23	slave 28/28A				slave 29/29A				slave 30/30A				slave 31/31A			
24	reserved				slave 1B				slave 2B				slave 3B			
25	slave 4B				slave 5B				slave 6B				slave 7B			
26	slave 8B				slave 9B				slave 10B				slave 11B			
27	slave 12B				slave 13B				slave 14B				slave 15B			
28	slave 16B				slave 17B				slave 18B				slave 19B			
29	slave 20B				slave 21B				slave 22B				slave 23B			

Issue date: 16.4.2010

word	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	
30	slave 24B				slave 25B				slave 26B				slave 27B				
31	slave 28B				slave 29B				slave 30B				slave 31B				
command interface																	
32	command								T	result							
33	response parameter byte 1								response parameter byte 2								
34	response parameter byte 3								response parameter byte 4								
35	response parameter byte 5								response parameter byte 6								
36	response parameter byte 7								response parameter byte 8								
37	response parameter byte 9								response parameter byte 10								
38	response parameter byte 11								response parameter byte 12								
39	response parameter byte 13								response parameter byte 14								
40	response parameter byte 15								response parameter byte 16								
41	response parameter byte 17								response parameter byte 18								
42	response parameter byte 19								response parameter byte 20								
43	response parameter byte 21								response parameter byte 22								
44	response parameter byte 23								response parameter byte 24								
45	response parameter byte 25								response parameter byte 26								
46	response parameter byte 27								response parameter byte 28								
47	response parameter byte 29								response parameter byte 30								
48	response parameter byte 31								response parameter byte 32								
49	response parameter byte 33								response parameter byte 34								

For revision 1.3 (ID11607) and up, the input data array may be extended by additional 194 words:

word	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	
second command interface																	
50	command (mirrored)								T	result							
51	response parameter byte 1								response parameter byte 2								
52	response parameter byte 3								response parameter byte 4								
53	response parameter byte 5								response parameter byte 6								
54	response parameter byte 7								response parameter byte 8								
55	response parameter byte 9								response parameter byte 10								
56	response parameter byte 11								response parameter byte 12								
57	response parameter byte 13								response parameter byte 14								
58	response parameter byte 15								response parameter byte 16								
59	response parameter byte 17								response parameter byte 18								
60	response parameter byte 19								response parameter byte 20								
61	response parameter byte 21								response parameter byte 22								
62	response parameter byte 23								response parameter byte 24								
63	response parameter byte 25								response parameter byte 26								
64	response parameter byte 27								response parameter byte 28								

Issue date: 16.4.2010

word	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
65	response parameter byte 29								response parameter byte 30							
66	response parameter byte 31								response parameter byte 32							
67	response parameter byte 33								response parameter byte 34							
analog input data circuit 1, slaves 10 ... 31																
68	slave 10, channel 1															
69	slave 10, channel 2															
70	slave 10, channel 3															
71	slave 10, channel 4															
72	slave 11, channel 1															
73	slave 11, channel 2															
...	...															
150	slave 30, channel 3															
151	slave 30, channel 4															
152	slave 31, channel 1															
153	slave 31, channel 2															
154	slave 31, channel 3															
155	slave 31, channel 4															
analog input data circuit 2, slaves 10 ... 31																
156	slave 10, channel 1															
157	slave 10, channel 2															
158	slave 10, channel 3															
159	slave 10, channel 4															
160	slave 11, channel 1															
161	slave 11, channel 2															
...	...															
238	slave 30, channel 3															
239	slave 30, channel 4															
240	slave 31, channel 1															
241	slave 31, channel 2															
242	slave 31, channel 3															
243	slave 31, channel 4															

Flags	
F0	ConfigError
F1	APF
F2	PeripheryFault
F3	ConfigurationActive

ConfigError: 0 = ConfigOK, 1 = ConfigError

APF: 0 = AS-i-Power OK, 1 = AS-i-Power Fail

PeripheryFault: 0 = PeripheryOK, 1 = PeripheryFault

ConfigurationActive: 0 = ConfigurationActive, 1 = ConfigurationInactive

5.1.2 Output Data Array

The output data array consist of 50 words for scanner revisions prior to 1.3 and 50 or 244 words for revision 1.3 (ID 11607) and up.

These words of data are as follows:

word	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
0	flags				slave 1/1A				slave 2/2A				slave 3/3A			
	F3	F2	F1	F0	D3	D2	D1	D0	D3	D2	D1	D0	D3	D2	D1	D0
circuit 1:																
1	slave 4/4A				slave 5/5A				slave 6/6A				slave 7/7A			
2	slave 8/8A				slave 9/9A				slave 10/10A				slave 11/11A			
3	slave 12/12A				slave 13/13A				slave 14/14A				slave 15/15A			
4	slave 16/16A				slave 17/17A				slave 18/18A				slave 19/19A			
5	slave 20/20A				slave 21/21A				slave 22/22A				slave 23/23A			
6	slave 24/24A				slave 25/25A				slave 26/26A				slave 27/27A			
7	slave 28/28A				slave 29/29A				slave 30/30A				slave 31/31A			
8	reserved				slave 1B				slave 2B				slave 3B			
9	slave 4B				slave 5B				slave 6B				slave 7B			
10	slave 8B				slave 9B				slave 10B				slave 11B			
11	slave 12B				slave 13B				slave 14B				slave 15B			
12	slave 16B				slave 17B				slave 18B				slave 19B			
13	slave 20B				slave 21B				slave 22B				slave 23B			
14	slave 24B				slave 25B				slave 26B				slave 27B			
15	slave 28B				slave 29B				slave 30B				slave 31B			
circuit 2:																
16	flags				slave 1/1A				slave 2/2A				slave 3/3A			
	F3	F2	F1	F0	D3	D2	D1	D0	D3	D2	D1	D0	D3	D2	D1	D0
17	slave 4/4A				slave 5/5A				slave 6/6A				slave 7/7A			
18	slave 8/8A				slave 9/9A				slave 10/10A				slave 11/11A			
19	slave 12/12A				slave 13/13A				slave 14/14A				slave 15/15A			
20	slave 16/16A				slave 17/17A				slave 18/18A				slave 19/19A			
21	slave 20/20A				slave 21/21A				slave 22/22A				slave 23/23A			
22	slave 24/24A				slave 25/25A				slave 26/26A				slave 27/27A			
23	slave 28/28A				slave 29/29A				slave 30/30A				slave 31/31A			
24	reserved				slave 1B				slave 2B				slave 3B			
25	slave 4B				slave 5B				slave 6B				slave 7B			
26	slave 8B				slave 9B				slave 10B				slave 11B			
27	slave 12B				slave 13B				slave 14B				slave 15B			
28	slave 16B				slave 17B				slave 18B				slave 19B			
29	slave 20B				slave 21B				slave 22B				slave 23B			

Issue date: 16.4.2010

word	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		
30	slave 24B				slave 25B				slave 26B				slave 27B					
31	slave 28B				slave 29B				slave 30B				slave 31B					
command interface																		
32	command								T	–	circuit							
33	request parameter byte 1								request parameter byte 2									
34	request parameter byte 3								request parameter byte 4									
35	request parameter byte 5								request parameter byte 6									
36	request parameter byte 7								request parameter byte 8									
37	request parameter byte 9								request parameter byte 10									
38	request parameter byte 11								request parameter byte 12									
39	request parameter byte 13								request parameter byte 14									
40	request parameter byte 15								request parameter byte 16									
41	request parameter byte 17								request parameter byte 18									
42	request parameter byte 19								request parameter byte 20									
43	request parameter byte 21								request parameter byte 22									
44	request parameter byte 23								request parameter byte 24									
45	request parameter byte 25								request parameter byte 26									
46	request parameter byte 27								request parameter byte 28									
47	request parameter byte 29								request parameter byte 30									
48	request parameter byte 31								request parameter byte 32									
49	request parameter byte 33								request parameter byte 34									

For revision 1.3 (ID11607) and up, the input data array may be extended by additional 194 words:

word	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	
second command interface																	
50	command (mirrored)								T	result							
51	response parameter byte 1								response parameter byte 2								
52	response parameter byte 3								response parameter byte 4								
53	response parameter byte 5								response parameter byte 6								
54	response parameter byte 7								response parameter byte 8								
55	response parameter byte 9								response parameter byte 10								
56	response parameter byte 11								response parameter byte 12								
57	response parameter byte 13								response parameter byte 14								
58	response parameter byte 15								response parameter byte 16								
59	response parameter byte 17								response parameter byte 18								
60	response parameter byte 19								response parameter byte 20								
61	response parameter byte 21								response parameter byte 22								
62	response parameter byte 23								response parameter byte 24								
63	response parameter byte 25								response parameter byte 26								
64	response parameter byte 27								response parameter byte 28								

word	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
65	response parameter byte 29								response parameter byte 30							
66	response parameter byte 31								response parameter byte 32							
67	response parameter byte 33								response parameter byte 34							
analog output data circuit 1, slaves 10 ... 31																
68									slave 10, channel 1							
69									slave 10, channel 2							
70									slave 10, channel 3							
71									slave 10, channel 4							
72									slave 11, channel 1							
73									slave 11, channel 2							
...									...							
150									slave 30, channel 3							
151									slave 30, channel 4							
152									slave 31, channel 1							
153									slave 31, channel 2							
154									slave 31, channel 3							
155									slave 31, channel 4							
analog output data circuit 2, slaves 10 ... 31																
156									slave 10, channel 1							
157									slave 10, channel 2							
158									slave 10, channel 3							
159									slave 10, channel 4							
160									slave 11, channel 1							
161									slave 11, channel 2							
...									...							
238									slave 30, channel 3							
239									slave 30, channel 4							
240									slave 31, channel 1							
241									slave 31, channel 2							
242									slave 31, channel 3							
243									slave 31, channel 4							

Flags	
F0	Off-line
F1	LOS-master-bit
F2	→ ConfigurationMode
F3	→ ProtectedMode

Off-Line: 0 = OnLine, 1 = Off-Line
LOS-master-bit 0 = Off-Line by ConfigError deactivated
 1 = Off-Line by ConfigError activated

A rising edge of the "LOS master bit" effects that all bits in the LOS are set. A falling edge effects that all bits are reset.

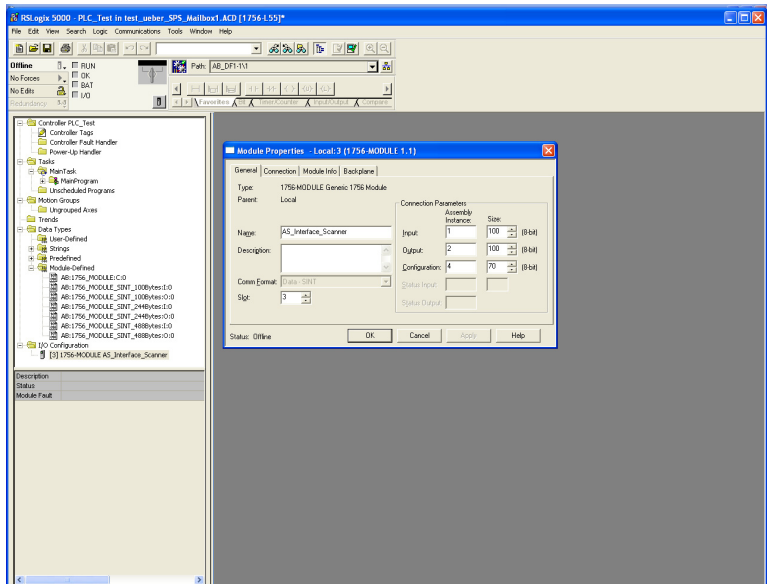
A rising edge of F2 and F3 switch the master to the desired mode.

5.2 Swap IO

Swap IO is another way to organise IO data in the backplane of the AB-Scanner.

This will change the high and low byte position and should help AB users to get the informations in the common way.

To switch the „Swapped byte - first configure the „configuration: Assembly Interface 4 “ size „70“.



Depending on, whether we want to swap data or not, we make the following setting:

In order to swap data: Refer to the output word with Index 68 (Word Number 69!) in the following screenshot.

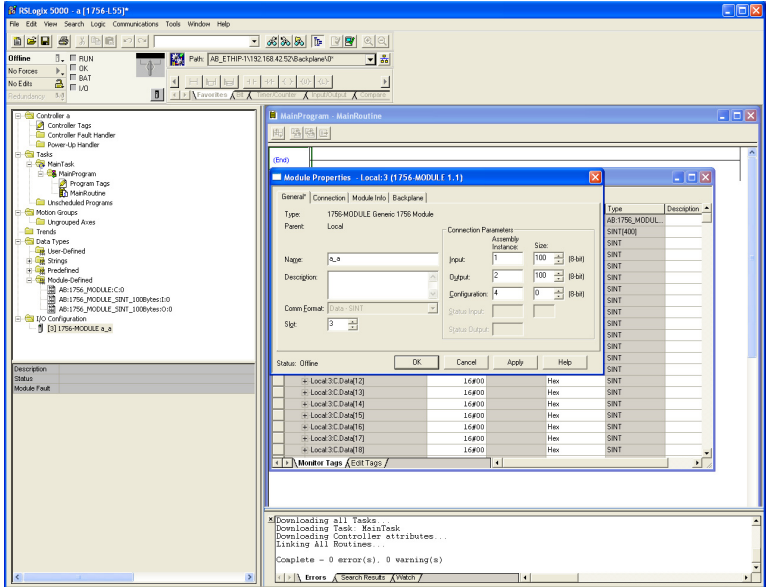


Information!

If it is „1“ the swapping is ACTIVE!

Tag Name	Value	Force Mask	Style	Z	Type	Description
Local 3.C.Dat#62	1.6#na		Hex		SINT	
Local 3.C.Dat#63	1.6#na		Hex		SINT	
Local 3.C.Dat#64	1.6#na		Hex		SINT	
Local 3.C.Dat#65	1.6#na		Hex		SINT	
Local 3.C.Dat#66	1.6#na		Hex		SINT	
Local 3.C.Dat#67	1.6#na		Hex		SINT	
Local 3.C.Dat#68	1.6#01		Hex		SINT	
Local 3.C.Dat#69	1		Decimal		BOOL	
Local 3.C.Dat#81	0		Decimal		BOOL	
Local 3.C.Dat#82	0		Decimal		BOOL	
Local 3.C.Dat#83	0		Decimal		BOOL	
Local 3.C.Dat#84	0		Decimal		BOOL	
Local 3.C.Dat#85	0		Decimal		BOOL	
Local 3.C.Dat#86	0		Decimal		BOOL	
Local 3.C.Dat#87	0		Decimal		BOOL	
Local 3.C.Dat#69	1.6#00		Hex		SINT	
Local 3.C.Dat#71	1.6#00		Hex		SINT	
Local 3.C.Dat#72	1.6#00		Hex		SINT	
Local 3.C.Dat#73	1.6#00		Hex		SINT	
Local 3.C.Dat#74	1.6#00		Hex		SINT	

□ The configuration without swapping:



- View in the configuration data field without swapping:

The screenshot shows the RSLogix 5000 interface with the 'Controller Tags - a(controller)' dialog box open. The 'Value' column is set to 'Hex' for all tags. The 'Description' column shows 'AB1756_MODULE_SINT_100[Hex:I:0]' for all tags.

Tag Name	Value	Face Mask	Style	Type	Description
Local3C	(...)	(...)	(...)	AB1756_MODULE	
Local3C.Data	(...)	(...)	Hex	SINT[400]	
Local3C.Data[0]	16000		Hex	SINT	
Local3C.Data[1]	16000		Hex	SINT	
Local3C.Data[2]	16000		Hex	SINT	
Local3C.Data[3]	16000		Hex	SINT	
Local3C.Data[4]	16000		Hex	SINT	
Local3C.Data[5]	16000		Hex	SINT	
Local3C.Data[6]	16000		Hex	SINT	
Local3C.Data[7]	16000		Hex	SINT	
Local3C.Data[8]	16000		Hex	SINT	
Local3C.Data[9]	16000		Hex	SINT	
Local3C.Data[10]	16000		Hex	SINT	
Local3C.Data[11]	16000		Hex	SINT	
Local3C.Data[12]	16000		Hex	SINT	
Local3C.Data[13]	16000		Hex	SINT	
Local3C.Data[14]	16000		Hex	SINT	
Local3C.Data[15]	16000		Hex	SINT	
Local3C.Data[16]	16000		Hex	SINT	
Local3C.Data[17]	16000		Hex	SINT	
Local3C.Data[18]	16000		Hex	SINT	

The screenshot shows the RSLogix 5000 interface with the 'Controller Tags - a(controller)' dialog box open. The 'Value' column is set to 'Decimal' for all tags. The 'Description' column shows 'AB1756_MODULE_SINT_100[Dec:I:0]' for all tags.

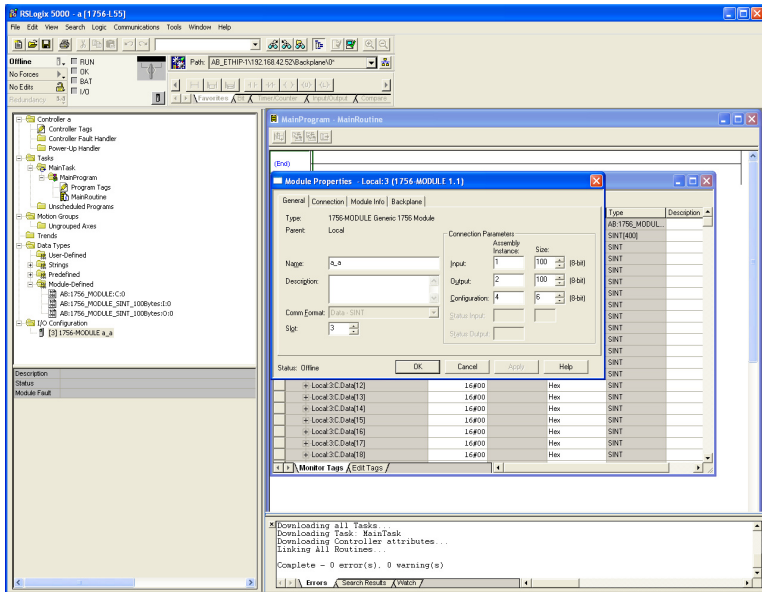
Tag Name	Value	Face Mask	Style	Type	Description
Local3C	(...)	(...)	(...)	AB1756_MODULE	
Local3C.Data	(...)	(...)	Hex	SINT[400]	
Local3C[0]	(...)	(...)	(...)	AB1756_MODULE	
Local3C.Data	(...)	(...)	Decimal	SINT[100]	
Local3C.Data[0]	-1		Decimal	SINT	
Local3C.Data[1]	-97		Decimal	SINT	
Local3C.Data[2]	-9		Decimal	SINT	
Local3C.Data[3]	-16		Decimal	SINT	
Local3C.Data[4]	0		Decimal	SINT	
Local3C.Data[5]	0		Decimal	SINT	
Local3C.Data[6]	0		Decimal	SINT	
Local3C.Data[7]	0		Decimal	SINT	
Local3C.Data[8]	0		Decimal	SINT	
Local3C.Data[9]	0		Decimal	SINT	
Local3C.Data[10]	0		Decimal	SINT	
Local3C.Data[11]	0		Decimal	SINT	
Local3C.Data[12]	0		Decimal	SINT	
Local3C.Data[13]	0		Decimal	SINT	
Local3C.Data[14]	0		Decimal	SINT	
Local3C.Data[15]	0		Decimal	SINT	
Local3C.Data[16]	0		Decimal	SINT	
Local3C.Data[17]	0		Decimal	SINT	
Local3C.Data[18]	0		Decimal	SINT	

Issue date: 16.4.2010

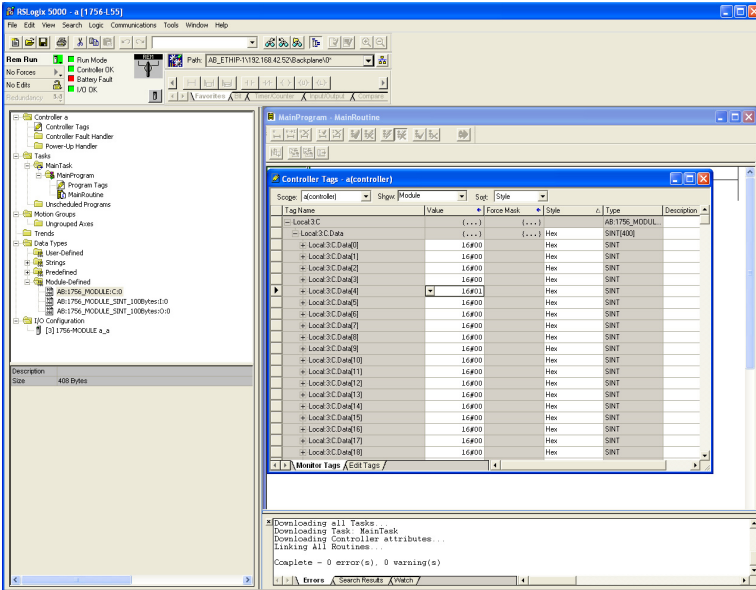
Configuration

Automatisierungstechnik

- Setting the length of the configuration data field in case that one only want to swap without sending of configuration data:

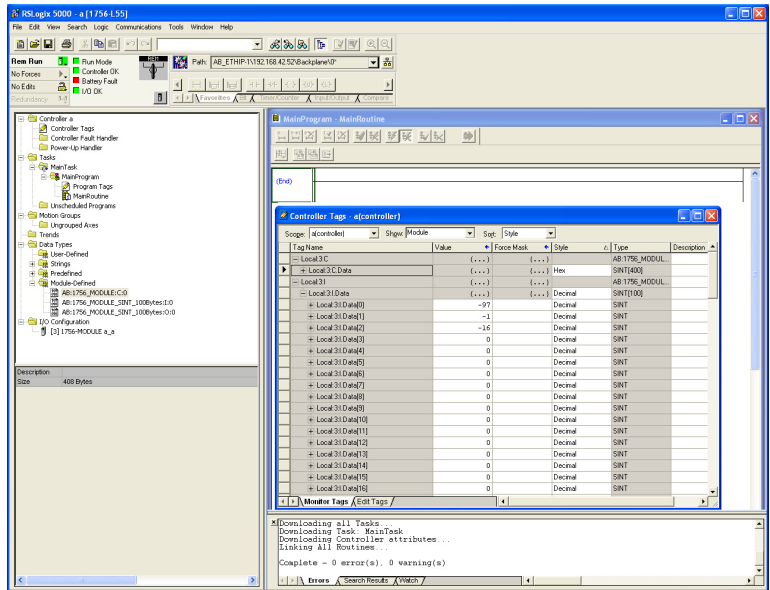


- Setting of the swapping bit, when we don't need configuration data (in the configuration data field):



Configuration

- Position of the saved input data after the swapping bit in Byte 5 (Index 4) has been activated:



Issue date: 16.4.2010

6. Operating the AS-i

6.1 Master Start-Up

After starting up, all segments of the figure display and all LEDs light up for approximately one second (self-test). Afterwards, the LC display the condition of their respective flags. The LC display shows the state of the master:

40: Offline Phase

The AS-i master initializes - there is no data communication happening on the AS-i.



Attention!

If the AS-i circuit is insufficiently powered ("U AS-i" does not light up).

41: Detection Phase

Start-up phase, in which the system looks for slaves located on the AS-i. The master remains in the detection phase until it finds at least one slave.

42¹: Activation Phase

End of the start-up operation when the parameters are transmitted to all connected and recognized slaves. This enables access to the AS-i slaves' data connections.

43²: Start of Normal Operation

The AS-i master can exchange data with all active slaves. It transmits management messages and looks for and activates newly connected slaves. During normal operation, the system keeps the maximum cycle time of 5 milliseconds.

6.2 Configuration Mode

The configuration mode serves to configure the AS-i circuit.



Attention!

In the configuration mode, all recognized slaves are activated even when the desired and actual configurations do not match.

Pressing the "" button for at least five seconds switches to configuration mode. While in configuration mode, the yellow "" LED lights up.

If the display is empty, no slaves have been connected to the AS-i circuit. In configuration mode, all recognized slaves are activated except for slave zero. The AS-i master is in normal operation. Data exchange between the AS-i master and all AS-i slaves has been detected by the master, regardless of whether the detected AS-i slaves have been projected before.



Attention!

When delivered the device is in configuration mode.

-
1. Activation phase and the start of normal operation maybe so short that the numbers can not be seen in the display.
 2. Activation phase and the start of normal operation maybe so short that the numbers can not be seen in the display.

6.3 Protected Operating Mode



Information!

Unlike the configuration mode, the protected mode allows data exchange between the AS-i master and the projected AS-i slaves only.



Attention!

If there is no communication between the host and the AS-I master, the AS-i master clears the output data of all slaves.

6.3.1 Switching to Protected Operating Mode

The configuration mode can be left by pressing the "" button.

Pressing the button shortly:

Exits the configuration mode without saving the current AS-i configuration.

Pressing the button for more than five seconds:

Exits the configuration mode and projects the actual AS-i configuration. Simultaneously the actual AS-i configuration is stored as nominal configuration in the EEPROM.



Information!

If the system detects an AS-i slave with address zero on the AS-i, it can not leave the configuration mode.

In the protected operating mode, only AS-i slaves which are projected and whose actual configurations match the nominal configurations will be activated.

6.3.2 Configuration Errors in Protected Operating Mode

As long as there is no configuration error, the numeric display is turned off while in protected operating mode. Otherwise, the address with the faulty assignment is displayed. A faulty assignment occurs when a slave has been recognized or projected but cannot be activated.

If there are more than one faulty assignments the one that was first detected is displayed. Pressing the "" button shortly displays the next higher faulty address.

Shortly appearing configuration errors are stored in the device (advanced AS-i diagnosis). The last error that occurred can be displayed by pressing the "" button. If a short AS-i power failure is responsible for the configuration error the display will show a "39".

6.4 Assigning an AS-i Address in Configuration Mode

To assign a slave with an address unequal zero to a different address unequal zero, please follow the following instructions in reverse order:

6.4.1 Assigning a Slave Address

(assigning an available address to a slave with address zero)

In configuration mode, the addresses of all detected slaves are displayed in succession. To display the next higher available operating address, press the "" button shortly. Each time you press the "" button, the next available address is displayed.

Choose the displayed address as your target address by pressing the "" button for more than five seconds. The address display flashes. The master is ready for programming; pressing the "" button again addresses the connected slave with address zero to the target (flashing address).

Any errors will be displayed by their error codes according to chap. <Appendix: Codes indicated by the Display>. Otherwise, the detected slaves are displayed again as described in chap. <Configuration Mode>.

**Information!**

Only slaves with address 0 can get a new address by the master.

**Attention!**

There must not be two AS-i slaves with the same address on the AS-i circuit, since this would cause malfunctions.

6.4.2 Erasing the Slave Address

(assigning address zero to a detected slave)

In configuration mode, the addresses of all recognized slaves are displayed in succession. By pressing the "" button repeatedly, the master will display the next available address. Pressing the button more than five seconds while the address of a detected slave is displayed, this slave will get the address zero and the display will show "0".

When you release the button, the display continues to display the detected slaves.

6.5 Programming the Address in Case of Configuration Errors

6.5.1 Automatic Address Assignment

**Information!**

One of AS-i's major advantages is the automatic address assignment. If a slave fails, it can be replaced by another one of the same type with the address zero. The master will detect the replacement and automatically address the new slave with the address of the faulty one.

For automatic programming, the following requirements must be met:

1. The AS-i master must be in the protected operating mode.
2. The "Auto_Address_Assign"¹ release flag must be set.
3. Only one of the projected slaves may not be detected.

If these requirements are met, the AS-i master's "" LED lights up and a slave with address zero will be automatically be assigned to the operating address of the missing slave. The "Automatic Address Assignment" can be activated and deactivated with the software "AS-i Control Tools".

**Information!**

Only slaves with address 0 can get a new address by the master, since this would cause malfunctions.

1. By deleting the flag "Auto_Address_Assign", the user can deactivate "automatic addressing".



Attention!

If the two slaves have different configuration data, i.e. are not of the same type as far as AS-i is concerned, the automatic address assignment will not be carried out.

6.5.2 Manual Address Assignment



Information!

If several slaves fail, they cannot be replaced automatically by the AS-i master. These addresses have to be set manually. If this should not be done with the host interface or with a handheld addressing device, the slave addresses can also be changed by using the push-buttons and the LC display of the device.

In protected operating mode, wrong assignments are displayed as errors (see chap. <Protected Operating Mode>). By pressing the "" button all faulty assignments will be displayed in succession. By pressing the "" button for more than five seconds the currently displayed address will be selected as a potential target address, and the display starts to flash.

If the faulty slave was previously replaced by a slave with address zero, the new slave can now be programmed for the blinking address by pressing the "" key again. As a requirement, the new slave's configuration data must match the configuration data for the flashing address.

After the address has been successfully set, the next faulty assignment is displayed and the address assignment can be carried out again. Otherwise, the system displays an error code (see also chap. <Appendix: Codes indicated by the Display>). When all faulty assignments are eliminated, the display will be empty.

6.6 Error Messages



Attention!

The system displays error codes for error messages that do not point to faulty assignments on the AS-i circuit. The code numbers are larger than 50 and therefore outside the slave address range. These codes are described in the appendix (see chap. <Appendix: Codes indicated by the Display>).

7. Reference List

7.1 Manual: "AS-i 3.0 Command Interface"

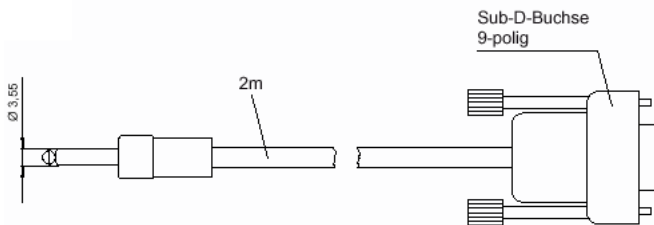
This Manual contains a detailed description of the AS-i 3.0 Command Interface.

8. Commissioning Tools and Accessories

The AS-i circuit on the AS-i master can be put into operation with the comfortable Windows software "AS-i Control Tools" (art. no. BW1203).

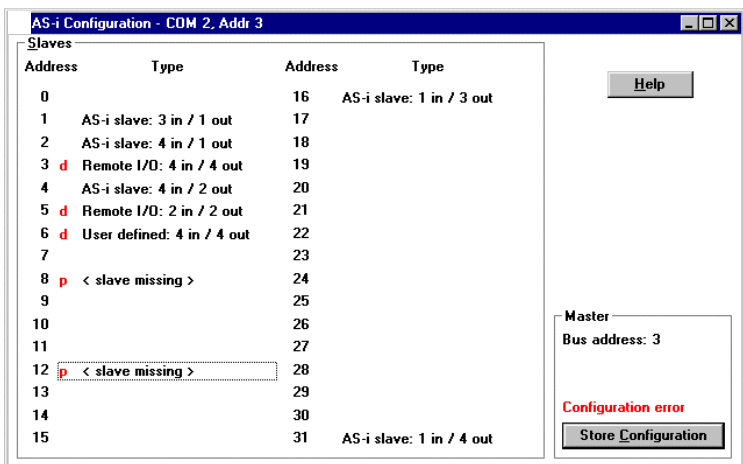
8.1 Serial Cable

The software package communicates with the AS-i master via a serial cable (art. no. BW1417).

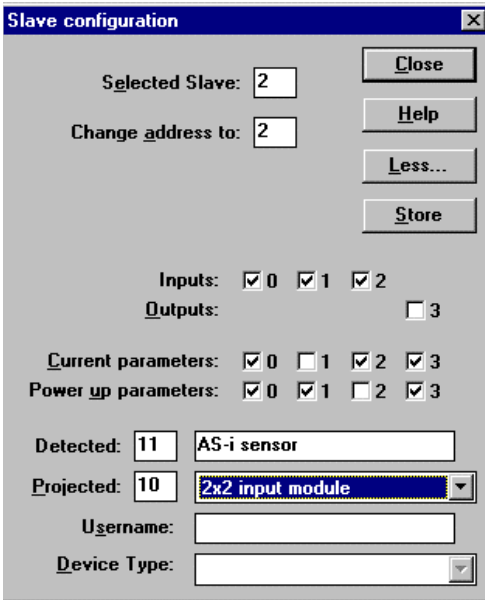


8.2 Windows Software AS-i Control Tools

4. Start the AS-i Control Tools.
5. Call the command Master | New.
6. Choose Rockwell as protocol.
7. Do the appropriate settings.
8. Call the command Master | AS-i configuration.
The AS-i configuration editor will be started. All detected and projected AS-i slaves are displayed in this window.



9. Click on a slave entry to open the dialog box slave configuration. Changing a slave address, setting AS-i parameters or AS-i configuration data is possible here. Additionally, inputs and outputs can be tested.



A very easy approach to configure the AS-i circuit is connecting each AS-i slave to the line and setting the AS-i slave address one after the other. After that press the button “Store configuration” to adopt the detected AS-i circuit to the AS-i master as projected data.

Furthermore you can use the **AS-i Address Assistant**. This tool automatically changes the address of an AS-i slave to the desired address after connecting the slave to the AS-i line. The desired AS-i configuration can be created offline before and then be stored to a file. When building up the plant you only have to connect the AS-i slaves to the AS-i line one after the other.

Further descriptions to all features of the software can be obtained from the integrated help.

9. Appendix: Codes indicated by the Display

In the basic state of the configuration mode, the display shows the addresses of all detected slaves at a rate of two per second one after the other. A blank display indicates that the LDS is empty, no slaves were detected.

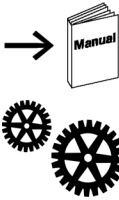
In the basic state of the protected operating mode, the display is either blank or displays the address of a faulty assignment (see chap. <Configuration Errors in Protected Operating Mode>).

During manual address programming, the slave address display has a different meaning (see chap. <Assigning an AS-i Address in Configuration Mode> and chap. <Programming the Address in Case of Configuration Errors>).

All displayed numbers bigger than 31 which can not be interpreted as a slave address are status or error messages of the master. They have the following meanings:

39	Advanced AS-i diagnostics: After pressing the 'set'-button a short-time AS-i power failure occurred.
40	The AS-i master is in offline phase.
41	The AS-i master is in detection phase.
42	The AS-i master is in activation phase.
43	The AS-i master starts the normal operating mode.
70	Hardware error: The AS-i master's EEPROM cannot be written.
72	Hardware error: The PIC processor does not respond.
73	Hardware error: The PIC processor does not respond.
74	Checksum error in the EEPROM.
80	Error while attempting to exit the configuration mode: A slave with address zero exists.
81	General error while changing a slave address.
82	The front panel operation is blocked. Until repowering-up the device can only be accessed from the host via the interface or if the key switch is set to run turn it to program.
90	Error while changing a slave address in protected operating mode: No slave with address 0 existing.
91	Error while changing slave address: Target address is already used.
92	Error while changing slave address: New address could not be set.
93	Error while changing slave address: New address could only be stored volatilyly in the slave.
94	Error while changing the slave address in protected operating mode: Slave has wrong configuration data.
95	Error while changing slave address in protected operating mode: The configuration error was caused by a superfluous slave (instead of a missing slave).

10. Appendix: Installation/Commissioning Instructions
AS-i-Master/Scanner Art.-No. BWU1488

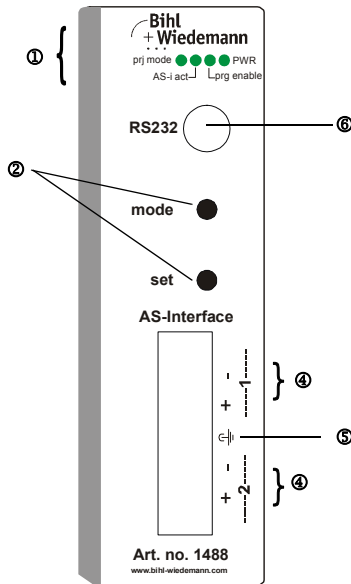
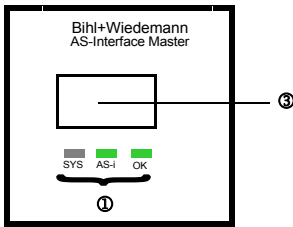


Dokumentation AS-i-Master/Scanner (**deutsch**):
1556

Zubehör Art.-Nr. BW1563/Accessories art. no. BW1563/
Accessoires no. d'art. BW1563/Accessori no. di art. BW1563/
Accesorios no. del art. BW1563



10.1 Front view and connections



- ① LED-Statusanzeige
- ② Tasten für Handbedienung
- ③ LED-Anzeige
- ④ AS-Interface®-Anschluss
- ⑤ Erde
- ⑥ RS232-Anschluss

- ① Visualizzazione a LED
- ② Pulsanti per le impostazioni manuali
- ③ Indicazione LED
- ④ Collegamento interfaccia AS-Interface®
- ⑤ Terra
- ⑥ Collegamento RS232

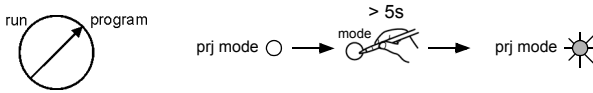
- ① LED status display
- ② Buttons for hand operation
- ③ LED display
- ④ AS-interface® connection
- ⑤ Earth
- ⑥ RS232 connection

- ① LED visualización
- ② Teclas para accionamiento manual
- ③ Indicación LED
- ④ Conexión AS-Interface®
- ⑤ Tierra
- ⑥ Conexión RS232

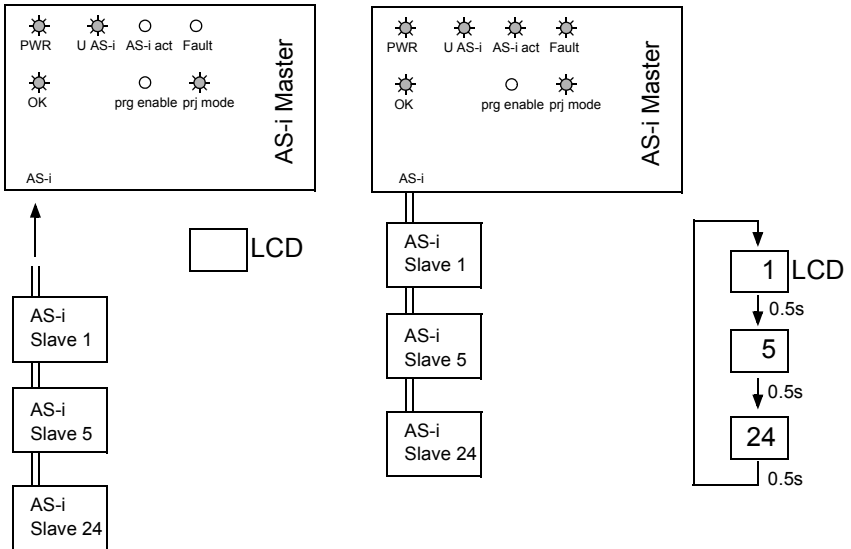
- ① Afficheur d'état DEL
- ② Boutons pour commande manuelle
- ③ Afficheur LED
- ④ Connexion AS-Interface®
- ⑤ Terre
- ⑥ Raccordement RS232

10.2 Startup

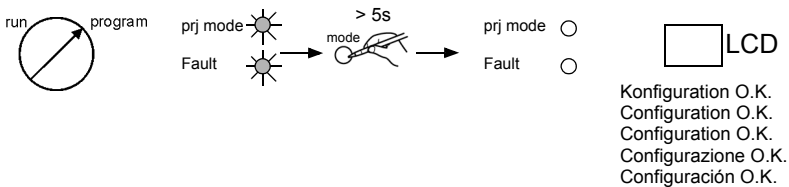
10.2.1 Switch to configuration mode



10.3 Connect AS-i Slaves

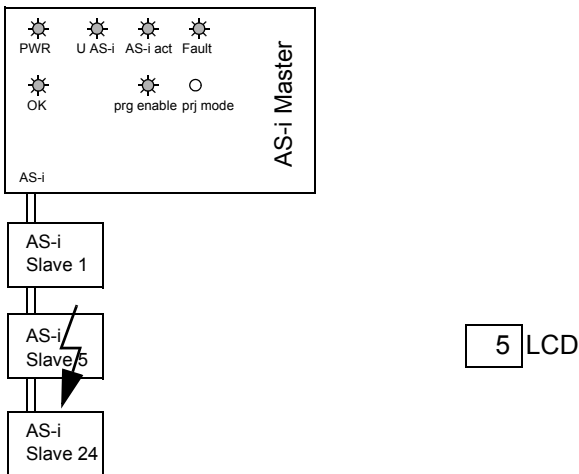


10.4 Store AS-i Configuration

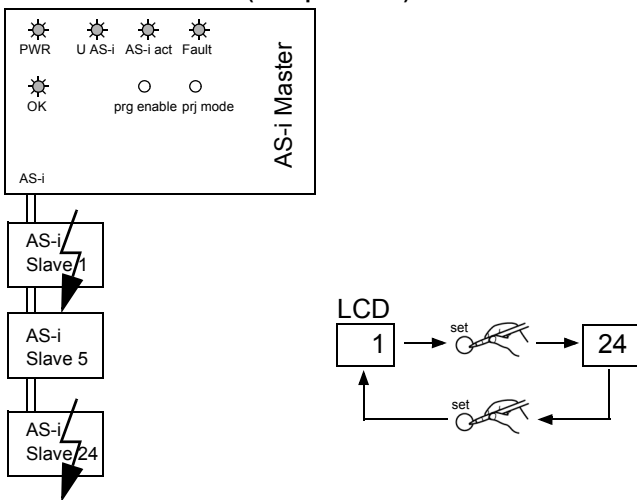


10.5 Error tracking

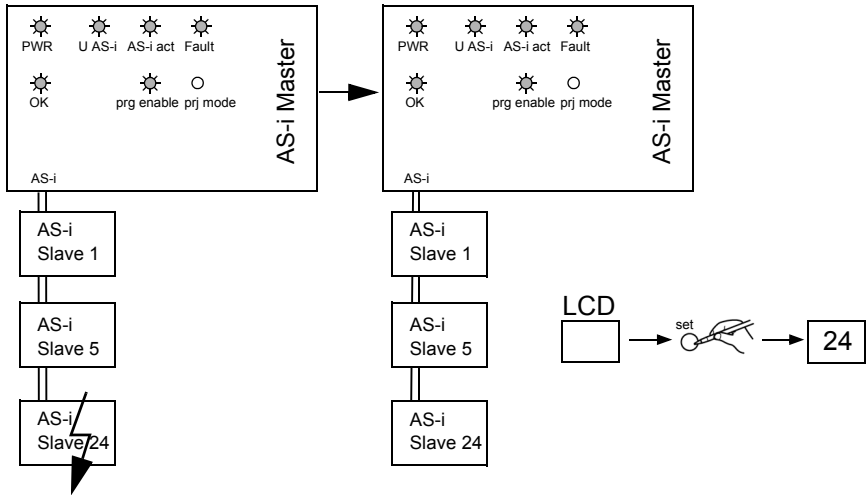
10.5.1 Incorrect slaves (one error)



10.5.2 Incorrect Slaves (multiple errors)

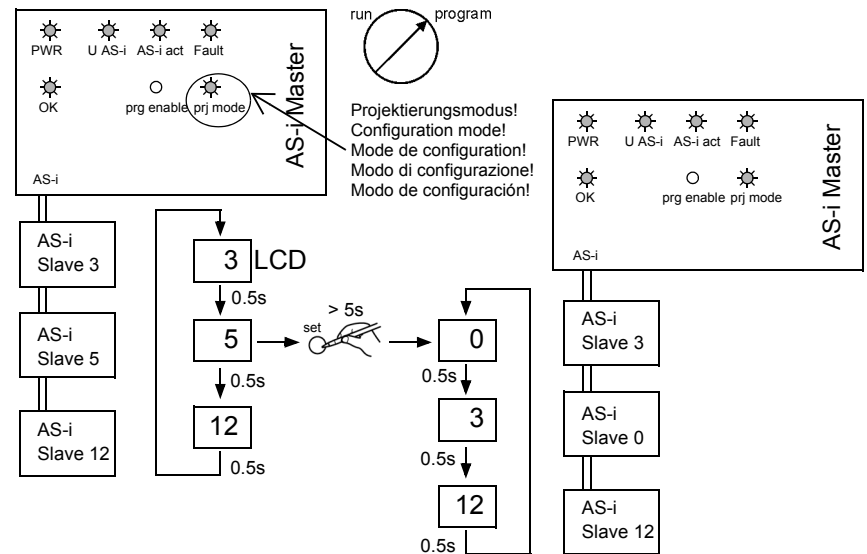


10.5.3 Error Display (last error)



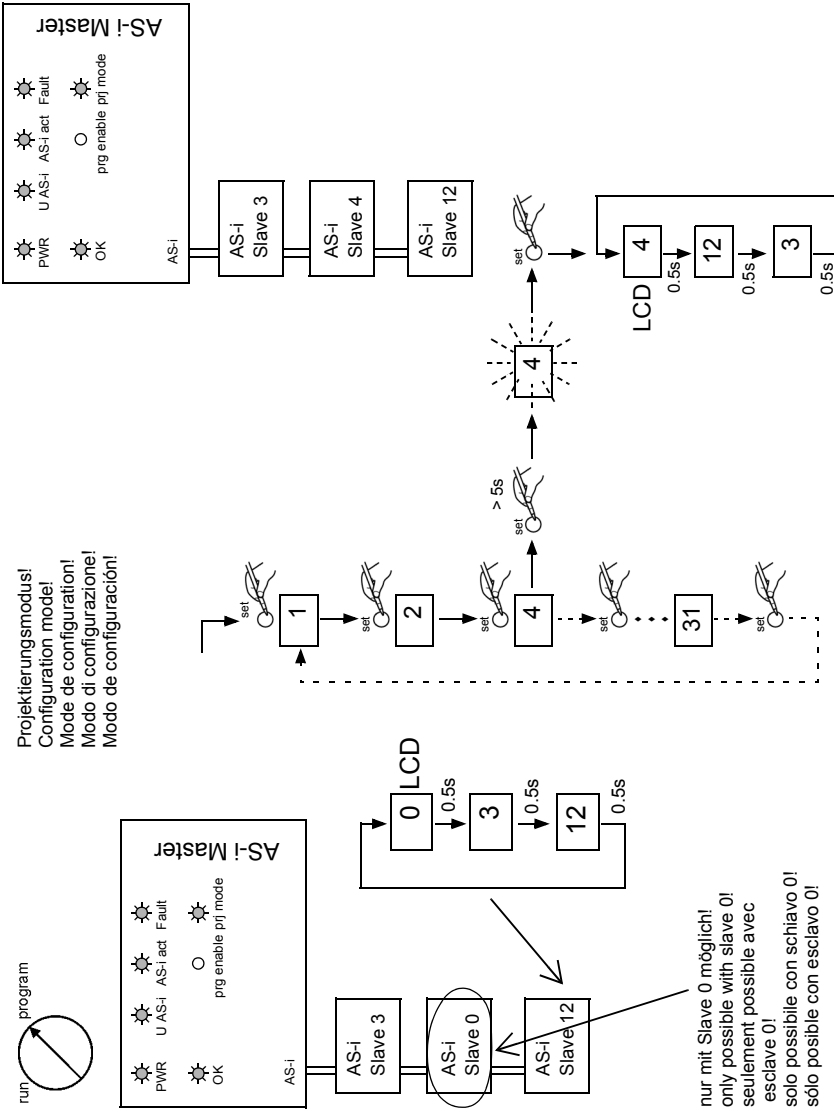
10.6 Addressing

10.6.1 Delete Slave Address 5



Issue date: 16.4.2010

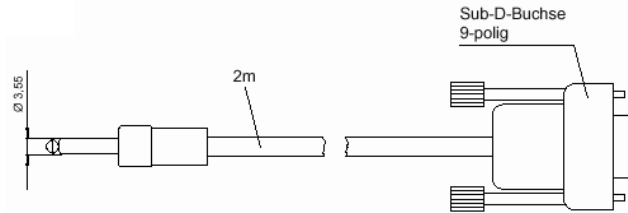
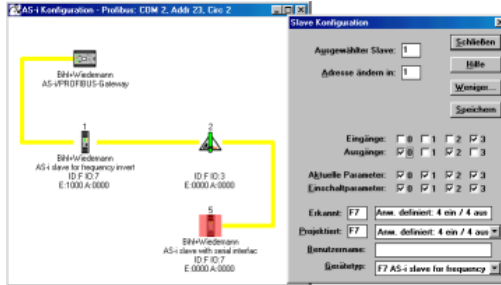
10.6.2 Program Slave 0 to Address 4



Issue date: 16.4.2010

10.7 Accessories

10.7.1 Software "AS-i Control Tools" with serial transmission cord for Allen-Bradley AS-i Master, art. no. BW1563



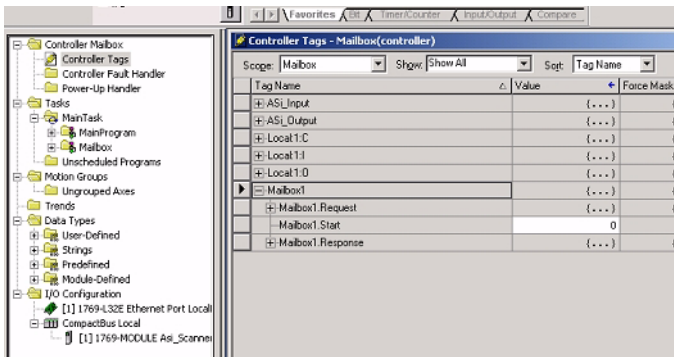
10.7.2 Example programs

Download:	http://www.bihl-wiedemann.de/deutsch/download.htm
Download:	http://www.bihl-wiedemann.de/englisch/download.htm
Téléchargement:	http://www.bihl-wiedemann.de/englisch/download.htm
Trasferimento diretta:	http://www.bihl-wiedemann.de/englisch/download.htm
Transferencia directa:	http://www.bihl-wiedemann.de/englisch/download.htm

11. Appendix: Putting the AS-Interface Scanner into Operation with ControlLogix

This chapter shows exemplarily the putting into operation of the AS-Interface Master/Scanner BWU1488 for Allen Bradley ControlLogix with the software RSLogix 5000 version 11.11.00 and the 1769-L20 1756-L55 ControlLogix5555 Controller.

- Download the example "AS-Interface-Scanner for Allen-Bradley ControlLogix" from the download area of the Bihl+Wiedemann website and unzip the files.
This example can be found in the download area of <http://www.bihl-wiedemann.com> under Software - Examples: AS-Interface Master/Gateway/Link/Scanner - AS-Interface-Scanner for Allen-Bradley ControlLogix.
- Start the software RSLogix 5000.
- Open the file Module.acd. This sample file contains a program that shows how to use the 2 mailboxes.
- Look at the description of the controller tags, where you find the tags mailbox1/2. Here you can edit Mailbox commands. How is written in the Mbx0Main routine of the program mailbox.

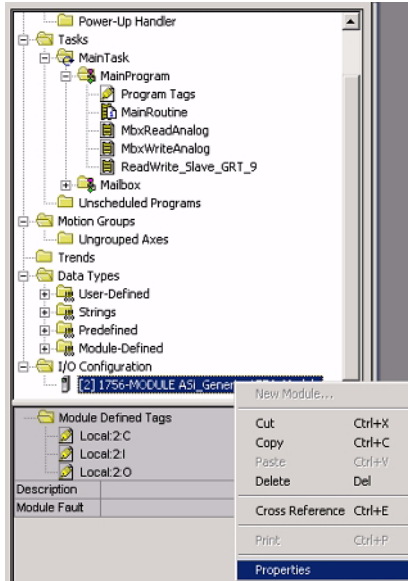


- You find some other examples:
 - A02_RD_WR.ACD, A03_Get_LAS.ACD, A04_READ_IDI.ACD, A05_GET_DELTA.ACD, A06_GET_TECA.ACD, A07_SET_LOS.ACD, A08_GET_LOS.ACD, A09_GET_LCS.ACD, A10_GET_LPF.ACD.

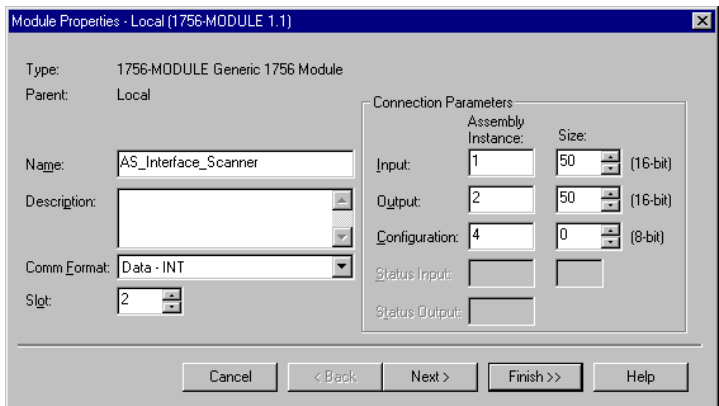
The task MainProgram of these examples, show you, how to use some commands of the mailbox with help of the task Mbx0Main.

- DataExchange.ACD.
This sample file contains a very simple program, that shows how to read and write digital AS-Interface inputs and outputs.

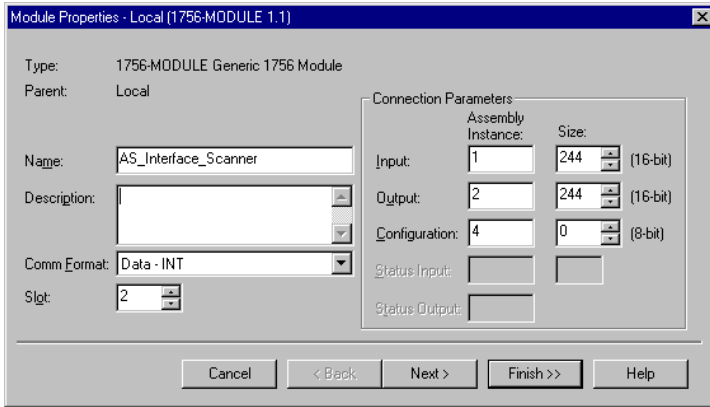
- If your AS-Interface Scanner is not mounted in slot 2, you can change this setting.
Click with the right mouse-button in the Controller Organizer window on [2] 1756 MODULE ASI_Generic_1756_Module and choose Properties.



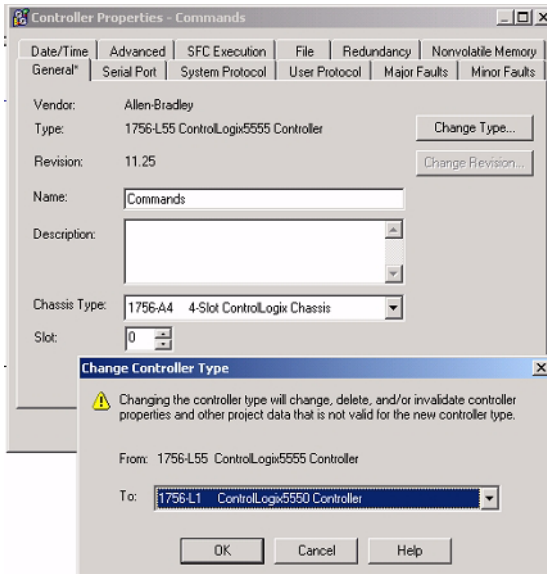
Properties window for scanner revisions prior to 1.3



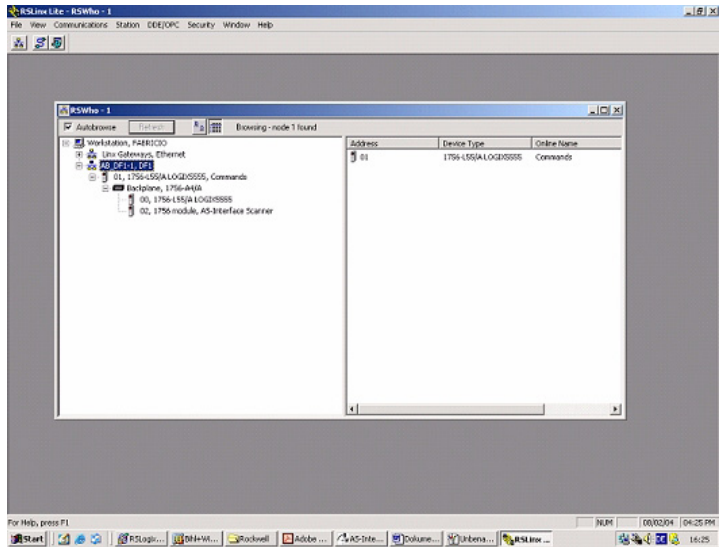
Properties window for scanner revisions higher as 1.3:



- if you use another controller type than the 1756-L55 ControlLogix5555 Controller, you can change the controller type. Execute the command Edit | Controller Properties then press Change Type.



8. Adjust the communication settings by using the program RSLinx:



12. Glossary

A/B slave

An AS-i slave with extended addressing. The address range of an A/B slave extends from 1A to 31A and 1B to 31B. As the master needs the fourth output data bit for switching between A and B address, A/B slaves only have three output data bits maximum.

Activation phase

In the activation phase the detected slaves are activated by sending the parameter. This is indicated by a "42" on the Master's Display. This phase takes only 10 ms, tops, to short to be displayed.

AS-i Power Fail

Voltage drop on the AS-i line; If the voltage drops below a specific value, the master changes to the ⇒ Offline phase.

Initiation phase

After the initial data exchange with all AS-i slaves the master is looking for new slaves. For this purpose an inquiring call is sent to one AS-i address. If a reply is received, the master tries to read the ⇒ current configuration of the slave. Depending on the mode (⇒ protected mode or ⇒ configuration mode) and on the current configuration, the detected slave will be activated.

After each data exchange with all AS-i slaves exactly one inquiring call is sent to one slave address. Hence, the AS-i cycle always includes one more telegram than the number of activated slaves (⇒ LAS).

Autoprogram flags

Auto Address Enable; flag from the operating system to the AS-i Master.

With this flag, automatic addressing can be enabled or disabled. This flag is saved in non-volatile memory in the Master.

Auto Address Assign, Auto Address Possible; flag from the AS-i Master to the operating system.

Automatic programming is not disabled and no configuration error was found.

If a slave fails, it could be addressed automatically.

Auto Address Available, flag from the AS-i Master to the operating system. Exactly one AS-i slave is missing and the automatic single node replacement is not disabled.

If at this point a slave with the address 0 and the profile of the missing slave is connected, it automatically receives the address of the missing slave.

I/O code

The first digit of the slave profile, which indicates how many in- and outputs the slave has. A 4I/4O slave has for example a "7", and a slave with 4 digital inputs a "0".

Detection phase

In the detection phase, after the startup the master is scanning for AS-i slaves. The master remains in this phase until at least one slave was detected. If the master remains in the detection phase no slave was found. Most of the time, the reason for this is a wrong power supply or a wiring error.

The detection phase is indicated by code "41".

Protected mode

In protected operating mode only those slaves that are registered in the \Rightarrow LPS and whose current configuration matches the target configuration are activated.

Also see \Rightarrow configuration mode. This mode is intended for normal operation, since all AS-i protective measures are activated.

ID code

The ID code is set by the slave manufacturer and cannot be changed. The AS-i Association determines the ID codes which are assigned for a particular class of slaves. For example, all \Rightarrow A/B slaves have ID code "A".

ID1 Code, extended ID1 code

The ID1 code is set by the slave manufacturer. In contrast to the other codes, which determine the profile, it can be changed from the master or using an addressing device. The user should however only use this feature in exceptional circumstances, since otherwise *configuration errors* may occur.

In the case of A/B slaves, the MSB of the ID1 code is used for distinguishing between the A and the B address. Therefore, only the lowest 3 bits are relevant for these slaves.

Since this code was not introduced until AS-i Specification 2.1, it is also referred to as extended ID1 code.

ID2 Code, extended ID2 code

The ID2 code is set by the slave manufacturer and cannot be changed. The AS-i Association determines the ID2 codes, which are assigned for a particular class of slaves. For example, all 2-channel 16 bit input slaves having an S-7-3 bit code use ID2 code "D". Since this code was not introduced until AS-i Specification 2.1, it is also referred to as extended ID2 code.

Current configuration

The configuration data of all slaves detected by the master. The configuration data of a slave, the \Rightarrow slave profile, consists of:

\Rightarrow IO code, \Rightarrow ID code, \Rightarrow extended ID1code , \Rightarrow extended ID2 code.

Current parameter

The AS-i parameter that have most recently been sent to the AS-i slave, as opposed to \Rightarrow permanent parameters.

Configuration Error/Config Error

An configuration error is displayed if the target and the current configuration of the connected slaves do not match. A configuration error could be due to the following:

Missing slave:A slave entered in the \Rightarrow LPS is not available

Wrong type of slave:The \Rightarrow slave profile of the connected slave does not comply with the configuration.

Unknown slave: A connected slave is not entered in the \Rightarrow LPS.

LAS - List of Activated Slaves

The master exchanges I/O data with the slaves entered in the LAS. In protected mode only the detected slaves (\Rightarrow LDS) that are expected by the master and are entered in the \Rightarrow LPS are activated. In configuration mode all slaves entered in the \Rightarrow LDS are activated.

LDS - List of Detected Slaves

If the master was able to read the \Rightarrow slave profile, the slave is entered in the LDS.

LPF - List of Peripheral Faults

The list of peripheral faults was introduced with specification 2.1. This list includes an entry for each slave that signals a \Rightarrow peripheral fault.

LPS - List of Projected Slaves

The list of projected slaves includes all slaves expected by the master. When saving the current configuration all entries in the \Rightarrow LDS are stored in the LPS (except for a slave with address 0).

Offline phase

In the offline phase all input and output data is reset. This phase is entered after the startup of the master, after a \Rightarrow AS-i power fail, and during the transition from the \Rightarrow configuration mode to the \Rightarrow protected mode.

Furthermore, the master can actively be transferred into the offline phase by setting the offline flag.

During the offline phase, masters with a LED display show code "40".

Peripheral fault

A peripheral fault is indicated by a red flashing LED on the master and on the slave.

Depending on the slave type this indicates an overflow, an overload of the sensor's power supply, or another fault regarding the periphery of the slave.

Permanent configuration

The configuration data of all expected slaves stored in the master (\Rightarrow slave profile). If the \Rightarrow permanent configuration differs from the \Rightarrow actual configuration, a configuration error exists.

Permanent parameter

The parameters saved in the master and sent to the slave after startup of the master during the \Rightarrow activation phase.

Configuration mode

During the configuration mode the master exchanges data with all connected slaves, no matter which of the slaves were configured. Thus, in this mode it is possible to operate a system without the necessity to configure it before.

See also \Rightarrow protected mode.

Single Slave

A single slave can in contrast to a \Rightarrow A/B slave only be addressed from range 1 to 31; the fourth output data bit can be used. All slaves as defined by the older AS-i Specification 2.0 are single slaves.

There are however also single slaves as defined by Specification 2.1, for example the new 16 bit slaves.

Slave profile

Configuration data for a slave, consisting of:

\Rightarrow I/O configuration and \Rightarrow ID-Code, as well as \Rightarrow extended ID1-Code and \Rightarrow extended ID2-Code.

The slave profile is used to distinguish between various slave classes. It is specified by the AS-i Association and set by the slave manufacturer.

AS-i 2.0 slaves do not have extended ID1 and ID2 codes. A 2.1 or 3.0 AS-interface master enters in this case an "F" for each of the extended ID1 and ID2 codes.

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We read every note or comment, no matter how small, and incorporate them into the documentation whenever possible.

Fill out the form on the following page and fax it to us or send your remarks, suggestions for improvement etc. to the following address:

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Comments:

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