SCHMERSAL

AS-i Speed Monitor

User Manual

AS-i INTERFACE SAFETY AT WORK

Revision date: 2013-02-22

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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AS-i Speed Monitor

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EC Declaration of conformity

Translation of the original declaration of conformity	K.A. Schmersal GmbH & Co. KG Möddinghofe 30, 42279 Wuppertal Germany Internet: www.schmersal.com

We hereby certify that the hereafter described safety components both in its basic design and construction conform to the applicable European Directives.

Name of the safety component:	**Safe speed monitoring**
Type:	ASSM-2A-HTL
Description of the safety component:	Safe AS-i speed monitoring for two axes with HTL-signals
Relevant EC-Directives:	2006/42/EC EC-Machinery Directive 2004/108/EC EMC-Directive
Person authorized for the compilation of the technical documentation:	Oliver Wacker Möddinghofe 30 42279 Wuppertal
Notified body for the prototype test:	TÜV NORD CERT GmbH Langemarckstraße 20 45141 Essen, Germany ID n°: 0044
EC-prototype test certificate:	44 205 12 410213 009
Place and date of issue:	Wuppertal, September 03, 2012

Authorised signature
Philip Schmersal
(Managing Director)

Issue date: 22.2.2013

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We hereby certify that the hereafter described safety components both in its basic design and construction conform to the applicable European Directives.

Name of the safety component:	**Safe speed monitoring**
Type:	ASSM-2A-SINCOS
Description of the safety component:	Safe AS-i speed monitoring for two axes with SIN-COS signals
Relevant EC-Directives:	2006/42/EC EC-Machinery Directive 2004/108/EC EMC-Directive
Person authorized for the compilation of the technical documentation:	Oliver Wacker Möddinghofe 30 42279 Wuppertal
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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

AS-i	AS-interface (actuator sensor interface)
I/O	Input/output
EMC	Electromagnetic compliance
PELV	Protective extra-low voltage
PFD	Probability of failure on demand
SaW	Safety at Work, safety technic

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2. General Remarks

Please read this chapter carefully before working with the documentation and the "AS-i Speed Monitor".

2.1 Product information

This user manual is valid for the following Schmersal devices

2.1.1 AS-i Speed Monitor

AS-i Speed Monitor for Sinus/Cosinus signals	**ASSM-2A-SINCOS**
AS-i Speed Monitor for HTL signals	**ASSM-2A-HTL**

2.2 Function of this manual

This manual instructs for the safe assembly, electrical installation, addressing, start-up as well as for the operation and for the maintenance of the Speed Monitor.

This manual does ***not*** provide instructions for operating machines, on which this module is built in. Please view the appropriate machine manual for corresponding information.

Information!

Additional information concerning the technical data as well as the parameterization of the Speed Monitor can be found in data sheet ASSM-2A-SINCOS / ASSM-2A-HTL that can be located at http://www.schmersal.net.

2.3 Target group

This manual is intended for designers, developers and operators of systems that will be safeguarded by one or more Speed Monitors. The manual is also targeted to people integrating Speed Monitors into machinery, performing the initial start-up, or maintaining them.

2.4 AS-i 3.0 specification

The AS-i Speed Monitor is designed according to the AS-i 3.0 specification.

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3. Safety

This chapter contains user safety information.

Warning!

Please read this chapter carefully before using the Speed Monitor in combination with other machine safeguarding components on protected machinery.

3.1 Experienced staff

The AS-i Speed Monitor must only be installed, operated, and maintained by qualified staff.

Qualified is a person who

- has a suitable technical education
- has been instructed in operating the machinery and has been informed about the valid safety guidelines by the machinery operator
- has access to the user manual.

3.2 Application area of the device

The AS-i Speed Monitor monitors the speeds of maximum two axes and sends a safety signal over the AS-i bus when the speeds fall below a preset threshold value.

3.2.1 Safety category

- SIL 3 according to EN 62 061
- PLe according to EN 13 849
- Cat 4 according to EN 954-1

Information!

Safety categories SIL 3, Cat. 4, PLe can be met for ASSM-2A-HTL only if both connected HTL encoders are monitoring the same axis and the speed monitor is configured for this mode.

3.3 Correct use

The AS-i Speed Monitor must only be used as defined in chap. <Application area of the device>. The AS-i Speed Monitor must only be used on the system, at which it was installed in accordance with this manual by adept personnel.

Information!

If used in a way differing from this description or if the device has been changed in any way – even during installation – any warranty claims with respect to Schmersal are invalid.

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3.4 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.

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4. Product Description

This chapter is intended to inform the reader about the special characteristics of the AS-i Speed Monitor. It describes the design and the functionality of the devices.

Warning!

This chapter must be read before installation and operation of the device in conjunction with other safety components on protected machinery.

4.1 Technical data

Article no.	ASSM-2A-SINCOS / ASSM-2A-HTL
Connection	
Connection	4-fold COMBICON clamp and 2 AMP Mini-IO plug connections
AS-i	
Profile	safe input slaves: S-0.B.E., ID1=F diagnostic slaves: S-7.A.5., ID1=7 (default)
Voltage	18 - 31,6V
Max. current consumption	150mA
AUX	
Voltage	18 - 30V
Input	
Number	2 x encoder
Parameterisation range for the speed limit	2Hz - 200kHz
Display	
LED 1 ASI (green)	AS-i voltage present
LED 2 FLT (red)	offline
LED 3 AUX (green)	24V DC AUX present
LED 4 CONF (yellow)	OFF = Normal mode
LED 5 ST1 (yellow)	state encoder 1 (ENC 1)
LED 6 F1 (yellow)	safety, low frequency or zero-speed axis 1
LED 7 F2 (yellow)	safety, low frequency or zero-speed axis 2
LED 8 ST2 (yellow)	state encoder 2 (ENC 2)
Environment	
Applied standards	EN 62 061:2005 SIL 3 EN 954-1 cat 4 EN ISO 13 849-1:2008/PLe
Housing	Phoenix-ME-MAX housing
Storage temperature	0°C ... +55 °C
Operating temperature	-25°C ... +85 °C
Protection class DIN 60 529	housing IP20 (only suitable for use in electrical operating rooms / control cabinets with IP54 minimum protection rating)
Tolerable loading referring to humidity	according to EN 61 131-2
Dimensions (W / H / D in mm)	22,5 / 99,6 / 114

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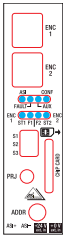
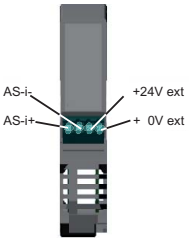
Article no.	ASSM-2A-SINCOS	ASSM-2A-HTL
Input		
Input type	sinus/cosine	HTL
Input level	–	High-level-HTL: 16V ... 28,8V
Supply of the inputs	internal 5V (100mA max.), external 5V	external 24V
AUX		
Max. current consumption	200mA	50mA

ASSM-2A-SINCOS / ASSM-2A-HTL Used designations on front foil:					
ENC 1	ENC 2	S1, S2, S3	CHIP CARD	PRJ	ADDR
Encoder 1	Encoder 2	Function selector switch	Chip card	Projecting button	Address socket

Connections, switches, chip card:



Terminal assignment:



4.2 Safety relevant data

Identification data	value	standard
Safety category	4	EN 954-1
		EN ISO 13849-1: 2008
Performance Level (PL)	E	
Safety Integrity Level (SIL)	3	EN 62061
Usage time (TM) [year]	20	EN ISO 13849-1: 2008
Max. power-on time [month]	12	EN 62061
PFH_D	2,77 x 10^{-09}	IEC 61508, EN 62061

(Probability of a dangerous failure per hour)

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4.2.1 ASSM-2A-SINCOS, ASSM-2A-HTL

Ident.-no. ≥ 14335

(see lateral label)

Max. system response time [ms] as a function of frequency limit	$\frac{5}{f_{limit}} + 30ms$	
Accuracy over the entire frequency range:	± (0,1% * f_{in} + 1 Hz)	
Tolerance of the frequencies mutually in **synchronous mode**:	f_{in} < 100 Hz: 10 Hz	Frequency differences of up to 100 ms are tolerated. Then the safety monitor is locked out.
	f_{in} > 100 Hz: 10%	

Tab. 4-2.

Attention!

*If when in **synchronous mode** (2 encoders / 4 sensors per axis) using two HTL encoders only one encoder is recognized for more than 2 s, the safety monitor is locked out.*

Information!

Safety categories SIL 3, Cat. 4, PLe can be met for ASSM-2A-HTL only if both connected HTL encoders are monitoring the same axis and the speed monitor is configured for this mode.

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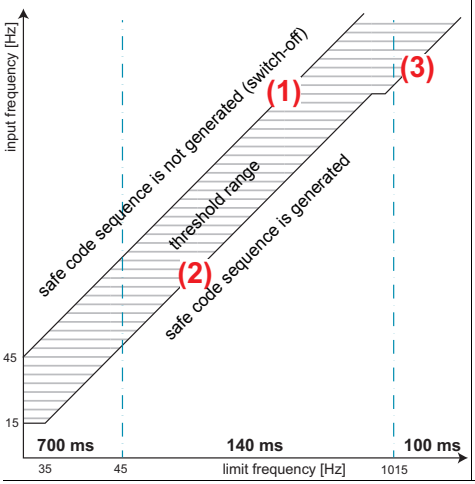
4.2.2 ASSM-2A-SINCOS

Ident.-no. < 14335

(see lateral label)

Max. system response time [ms] as a function of frequency limit	
1015 Hz < f_{limit}	**100 ms**
45 Hz < f_{limit} < 1015 Hz	**140 ms**
f_{limit} < 45 Hz	**700 ms**



Frequency limit for 0-sequence
(1) $f_{in} = (f_{limit} + 20Hz) * 100.5\%$

Frequency limit for safety code sequence
35 Hz < f_{limit} < 900 Hz
(2) $f_{in} = (f_{limit} - 20Hz) * 99.5\%$

980 Hz < f_{limit}
(3) $f_{in} = (f_{limit} - 100Hz) * 99.5\%$

Tab. 4-3.

The diagram shows the function of the highest input frequencies at which the code sequence is reliably generated (lower curve) and the function of the lowest input frequencies at which the code sequence is reliably not generated (upper curve) as a function of the parameterized frequency limit.

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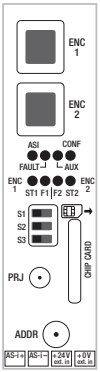
4.3 Front view and connections



ENC 1, ENC 2
encoder

ADDR
addressing port

Chip Card
chip card //

S 1, S 2, S 3
function selector switch

PRJ
configuration push button

ASI+, ASI–
AS-i connection

$AUX+_{ext.in}$, $AUX-_{ext.in}$
voltage supply for the input

4.3.1 Operating elements

The operating elements are located on the top side beneath the transparent folding cover.

The addressing socket is and projecting buttons are accessible through holes even when the cover is closed.

To open the cover, for example to remove the chip card or set the switches, both encoders must be unplugged.

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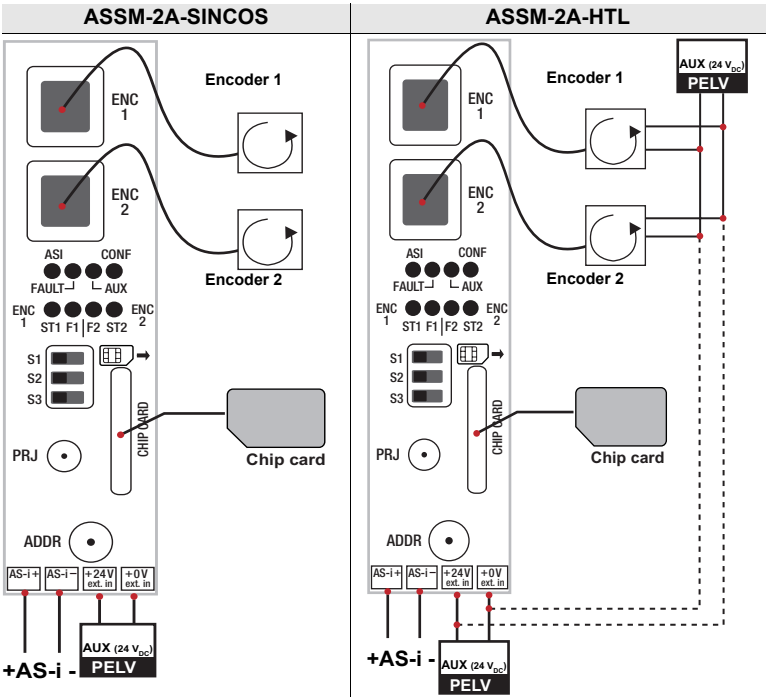
4.4 Electrical connection

The Speed Monitor has a 4x Combicon terminal and 2 AMP Mini-IO connectors. The Speed Monitor is powered from AS-i and an external 24 V.

The pin configuration of the Mini-IO plugs depends on the sensor type and power supply type. The terminal functions must be matched to the sensor used as well as the application (power from the Speed Monitor or from the drive).



Attention!

With Speed Monitors for HTL encoder (ASSM-2A-HTL) the rotary encoders are to be powered externally out of 24 V power supply!

Attention!

The AS-I power supply for the AS-I components must have isolation per IEC 60 742 and be able to handle momentary power interruptions of up to 20 ms. The power supply for the 24 V supply must also have isolation per IEC 60 742 and be able to handle momentary power interruptions of up to 20 ms. The maximum output voltage of the power supply must also be less than 42 V in case of a fault.

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The correct safety function of the device must be verified once installed within the protected machinery!

4.5 LEDs

LEDs	Status	Signal // Description
ASI green		AS-i supply power not OK
		periphery fault or address '0', configuration not validated
		AS-i supply power OK
FAULT red		on-line
		periphery fault, configuration not validated
		off-line, address '0'
AUX green		24 V_{DC} AUX missing
		24 V_{DC} AUX present
CONF yellow		normal operation
	2 x 1Hz	chip card is written
		frequency being stored via projecting button (see chap. <Projecting button>)
ST1, ST2 yellow		the corresponding encoder *not* connected
		error message
		the corresponding encoder connected
F1, F2 yellow		no safe, low frequency or stop axis 1/2
		error message
		safe, low frequency or stop axis 1 / 2

LED on | LED flashing | LED off

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4.5.1 Error messages via LED

ST1	F1	F2	ST2	error
☀	☀	—	—	error encoder 1
—	—	☀	☀	error encoder 2
☀	☀	○	○	chip card and device containing unequal, non-empty data
○	○	☀	☀	chip card is faulty
☀	☀	☀	☀	fatal error

Tab. 4-5.

Information!

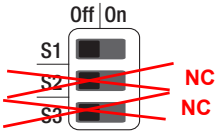
*For devices with the delivered default settings (yet no projected configuration), the two LEDs **Fault** and **ASI** flashing alternately.*

4.5.2 Function selection switches

S1 - Off (RUN)
normal operationing state

S1 - On (Clear)
factory setting mode

S2, S3 (NC)
reserved



Information!

Function selection switches S2 and S3 currently have no function. In the future these will be used for selecting various options (e.g. encoder or resolver).

Factory setting mode

The function selection switch S1 can be used to reset the device to its default settings.

- ☐ Disconnect AS-i voltage.
- ☐ Set the function selection switch S1 to the On position (Clear).
- ☐ Finally connect AS-i voltage again.

⇒ A run light on LEDs ST1, ST2, F1 and F2 appears for 5 s.

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- ☐ During this time push and hold the projecting button as long as the running light stops flashing.

⇒ The device is reset to its factory default settings.

- ☐ Set the function selection switch S1 to the Off position (Run).

⇒ The device is in the normal operating state.

4.6 Projecting button

The Projecting button can be used to store currently present frequencies. The stored values can then be loaded via software.

While values are being stored the **CONF** LED flashes.

The **CONF** LED goes out again as soon as the stored values have been loaded. Values stored using the Projecting button are deleted at **Power-on**.

Information!

The exact sequence of the parameterization is described in Sec. <Parameter Setting>.

4.7 Chip card

The chip card is used for storing the device parameters, speeding up the time required to replace defective units. Exchanging the chip card moves all parameters from the old unit to the new one.

Unit replacement: Chip card "not blank" in a non-configured unit (unit in factory default state)

If a non-blank chip card is plugged into a configured unit, the data are copied to the unit.

Blank chip card in a configured unit

If a blank chip card is plugged into a configured unit, the data are copied to the chip card.

Data in the unit and the chip card are not the same

If the chip card and the unit are not blank and contain different data, there will be an error message (see Sec. <LEDs>).

Warning!

Verify the safety functions after replacing the unit!

4.8 Sensors

In the present design (Ident.-no. ≥ 14335) only rotary and linear encoders may be connected.

Information!

Please note additional information in Sec. <Sinus/cosinus encoder requirements>.

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4.9 AS-i data

The Speed Monitor includes 2 to 9 Slaves:

- 1 … 8 **AS-i SaW Slaves** settable via software using the diagnostic slave.
- A **diagnostic slave** acc. to the profile S-7.A.5 (A/B Slave) for conventional setting, e.g. using an AS-i Addresse.

4.9.1 AS-i data for SaW slaves

A safety signal is output (code sequence generated) when the frequency falls below the set threshold.

	Diagslv DO2	**f < 25Hz**	**25Hz< f < f_{max}**	**f_{max} < f**	**f > f_{limit}** (or other failure)
AS-i SaW sequence safe speed	0	SaW Code	SaW Code	0-sequence	F-sequence
	1	0-sequence	0-sequence		
AS-i SaW sequence stop	0	SaW Code			
	1	0-sequence			

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Information!

f_{max} is the set upper limit for the safety frequency range, f_{limit} is the frequency limit of the unit (250 kHz).

Information!

0-sequence can be enforced in the diagnostic slave via the DO2.

The speed monitor offers the following settings for SaW slaves:

- Represent multiple signals as a collective message on just one SaW input slave
- Any number of safe signals acts on up to eight SaW input slaves (input slaves for each channel: safe speed, safe stop, right- and left-rotation).

4.9.2 AS-i data of the diagnsotic slave

The diagnostic slave provides 2 analog input data, the current frequency of the 2 axes, scaled in 10 Hz increments (0 … 20,000 corresponds to 0 … 200,000 Hz). For diagnostics all safety signals are also available in the diagnostic slave.

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4.9.2.1 AS-i data

DO3	DO2	DO1	DO0
reserved	Mute SaW	S-7.5 data	S-7.5 data
DI3	**DI2**	**DI1**	**DI0**
S-7.5 Data	S-7.5 Data	f (Axis 2) < SLS[1]	f (Axis 1) < SLS[1]

1. The input bits always refer to the PLC frequency; the stop frequency plays no role here. For a better diagnostics of short switch-offs, a turn-on and switch-off delay time (holding time) for this bit can be configured via the vendor object 23.

Analog Ch. 0:
Frequency Axis 1/10 Hz

Analog Ch. 1:
Frequency Axis 2/10 Hz

4.9.2.2 Vendor objects

Vendor objects which can be read using the S-7.5 profile of the diagnostics slave:

Index (Vendor-Specific)	description	type	length in byte
1	Name of the safety representative who release the device	C-String	29 max.
2	Name of the configuration	C-String	27 max.
3	Date on which the configuration was loaded into the device.	C-String, YYYY-MM-DD hh:mm	17 max.
4	Date on which the configuration was released.	C-String, YYYY-MM-DD hh:mm	17 max.
20	Number of configurations which have been loaded into the device so far	uint16_t	2
21	Checksum/release code of the current configuration	uint16_t	2
22	0 : No frequency is stored 1 : A frequency was saved using the projecting button. Objects 40-43 contain valid data.	uint8_t	1
23	Holding time for bits DI1 and DI0 One value (in milliseconds) for rising and falling edge	2x uint16_t	4

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Index (Vendor-Specific)	description	type	length in byte
30	Frequency currently present on Axis 1	uint32_t	4
31	Frequency currently present on Axis 2	uint32_t	4
32	Current rotation direction of Axis 1	uint8_t: 0: slow 1: counter-clock-wise rotation 2: clockwise rota-tion	1
33	Current rotation direction of Axis 2	uint8_t: 0: slow 1: counter-clock-wise rotation 2: clockwise rota-tion	1
35	Collector‘s item for all present actual speeds / directions (cumulated, objects 30-33)		10
40	Frequency of Axis 1 when projecting button is pressed	uint32_t	4
41	Frequency of Axis 2 when projecting button is pressed	uint32_t	4
42	Rotation direction of Axis 1 when projecting button is pressed	uint8_t: 0: slow 1: counter-clock-wise rotation 2: clockwise rota-tion	1
43	Rotation direction of Axis 2 when projecting button is pressed	uint8_t: 0: slow 1: counter-clock-wise rotation 2: clockwise rota-tion	1
50	Projected limit frequency for STOP Axis 1	uint32_t	4
51	Projected limit frequency for PLC Axis 1	uint32_t	4
60	Projected limit frequency for STOP Axis 2	uint32_t	4
61	Projected limit frequency for PLC Axis 2	uint32_t	4
65	Collector‘s item for all configured speed limits (cumulated, objects 50, 51, 60, 61)		16
80	Instantaneous error status / cause for switch-off (see tab. <Bitmaps for error states>)	4 * uint_8	4

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Index (Vendor-Specific)	description	type	length in byte
81	History error states / cause for switch-off (see tab. <Bitmaps for error states>)	4 * uint_8	4
82	Signal quality of error light, one byte for each axis (only for SIN/COS) 0: very gut (GREEN) 1: OK (YELLOW) 2: Borderline (RED) 3: Error detected 4: Encoder not connected	2 * uint_8	2
83	History of signal quality. Worst value of the error light since the last reset. "Encoder not connected" will be ignored.	2 * uint8_t	2
90	Projected AS-i address for STOP Axis 1	uint8_t: 0: no address	1
91	Projected AS-i address for PLC Axis 1	uint8_t: 0: no address	1
92	Projected AS-i address for STOP Axis 2	uint8_t: 0: no address; 128: synchron mode	1
93	Projected AS-i address for PLC Axis 2	uint8_t: 0: no address; 128: synchron mode	1
94	Projected AS-i address for right rotation Axis 1	uint8_t: 0: no address	1
95	Projected AS-i address for right rotation Axis 2	uint8_t: 0: no address	1
96	Projected AS-i address for left rotaton Axis 1	uint8_t: 0: no address	1
97	Projected AS-i address for left rotaton Axis 2	uint8_t: 0: no address	1
98	Collector‘s item for all safety addresses (cumulated, objects 90-97)		8
112	Current operating mode of speed monitor. 0: no configuration 1: Valid configuration, no release 2: Valid, released configuration	uint8_t: 0: no configuration 1: Valid configura-tion, no release 2: Valid, released configuration	1

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Bitmaps for error states

Vendor-Object	description	byte 0	byte 1	byte 2	byte 3
80 (Read)	current error	cause for switch-off Axis 1	Error Axis 1	cause for switch-off Axis 2	Error Axis 2
81 (Read)	error history	cause for switch-off Axis 1	Error Axis 1	cause for switch-off Axis 2	Error Axis 2
81 (Write)	reset history	write „0“: reset now, auto reset off			
		write „1“: reset automatically after each reading			
82 (Write)	reset history error light	write „0“: reset now, auto reset off			
		write „1“: reset automatically after each reading			

Tab. 4-8. Bitmaps for error states

Error description	SAW	bit	description
no error, frequency safe	code sequence		
frequency exceeded (STOP)	0-sequence	0	cause for switch-off
frequency exceeded (SLS)	0-sequence	1	cause for switch-off
diagnostic slave bit DO2 set	0-sequence	2	cause for switch-off
no encoder connected	0-sequence	3	cause for switch-off
configuration mode / n. validated	0-sequence	4	cause for switch-off
amplitude is too high	F-sequence	0	error
amplitude is too small	F-sequence	1	error
f_limit (250kHz) eceeded	F-sequence	2	error
safe coupling, axes not equal	F-sequence	3	error
internal error	F-sequence	4	error

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4.9.3 Examples:

- Safety speed axis 1 = e.g. Address 17
- Safety speed axis 2 = e.g. Address 17

Stopped is also the safety state.

Stopped is required separately:

- Safety stopped axis 1 = e.g. Address 18
- Safety stopped axis 2 = e.g. Address 18

Code sequence for safe speed and safe stop.

The rotation direction must also be monitored:

- Right rotation direction axis 1 = e.g. Address 19
- Right rotation direction axis 2 = e.g. Address 19

Code sequence for safe speed, safe stop and right rotation.

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5. Maintenance

5.1 Controlling safe shutdowns

The plant safety engineer is responsible for verifying that the AS-i Speed Monitor works correctly as part of the safety system.

At least once a year it is necessary to verify the safe shutdown by initiating associated safety-related sensors or switchs:

Attention!

Press each safety-related AS-i slave and watch the reaction of the output circuits of the AS-i Safety Monitor.

Attention!

Check the maximum activated time and the total operating time. These values depend on the PFD value chosen for the total failure probability. Please refer to the information in chap. <Safety relevant data>.

After reaching the projected maximum operating time (three, six, or twelve months) the entire safety system must be checked for proper operation.

After reaching the projected total usage time (20 years) the device must be checked by the manufacturer concerning its proper operation.

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6. Parameter Setting

Parameters are set either using the PC or by using an AS-i Master with integrated safety monitor:

- The Projecting button is used to teach frequencies which can then be confirmed on the display of an AS-i Master with integrated Safety Monitor. In this case the set parameters must be documented via PC or manually.
- Similar to the AS-i Safety Monitor using the PC interface and reading back the data per text. Communication between the Speed Monitor and the PC is over AS-i.

6.1 Parameters

ASSM-2A-SINCOS

Each channel uses the following parameters:

- AS-i Address
- Channel activated, channel not activated
- Detection of Safety Stop active, detection of Safety Stop not active
- Maximum allowed safe speed
- Detection of rotating direction.

ASSM-2A-HTL

Each channel uses the following parameters:

- AS-i Address
- Channel activated, channel not activated
- Detection of Safety Stop active, detection of Safety Stop not active
- Maximum allowed safe speed
- Detection of rotating direction
- safe coupling of encoder.

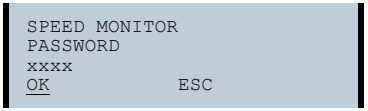
6.2 Setting parameters using AS-i Master with integrated Safety Monitor

Information!

Setting parameters using AS-i Master with integrated Safety Monitor is only possible with ASSM-2A-SINCOS .

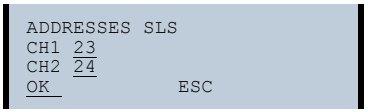
1. The Speed Monitor is connected to the AS-i circuit.
2. The non-safety slave is addressed.
3. The connected axes are brought to safe speed. If multiple Speed Monitors are connected, the Projecting button is actuated. The **CONF** LED flashes.
4. From the menu select "Speed Monitor." If multiple Speed Monitors are connected, you can select which device (AS-i address of the non-safety slave) is parameterized.
5. This menu is displayed

Issue date: 22.2.2013



A 4-digit number can be entered. The factory default setting is password 0000. The password must be set to a different value in order to run the device.

6. In the next menu item the addresses of the safety-limited speed (SLS) are assigned



First the previously set values are shown. These can be overwritten.

If the same address is entered for multiple channels, the results of these channels are overlaid. Only if all frequencies for these channels are within the range of the safety-limited speed is an SaW code sequence sent. This also makes it possible for example to combine Channel 1 and 2 into a single address.

Channels for which 0 is entered as an address are deactivated.

7. In the next menu item the addresses of the safety stop are assigned.

First the previously set values are shown. These can be overwritten.

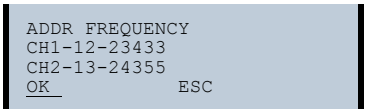
If the same address is entered for multiple channels, the results of these channels are overlaid. Only if all frequencies for these channels are within the range of the safety-limited speed is an SaW code sequence sent. This also makes it possible for example to combine Channel 1 and 2 into a single address.

Channels for which 0 is entered as an address are deactivated.

8. After clicking on OK the following menu appears

Here the taught frequencies + 10% tolerance are shown.

9. The displayed values can be overwritten. To deactivate a channel, set the frequency to 0 or set no AS-i address.
10. After clicking on OK the data are shown again.



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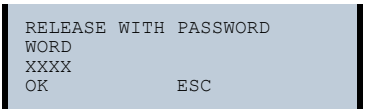
11. After clicking on OK the following menu appears

12. After clicking on OK the following menu appears



Here you must enter the password. If a new password is entered, it is applied immediately.

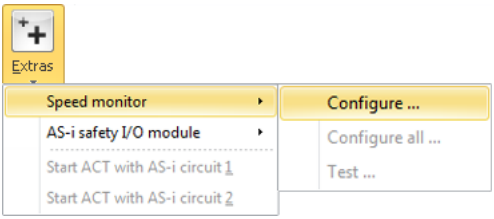
13. This releases the parameter set.
14. The release procedure must be documented with date, name of the person releasing and the set parameters, and stored with the equipment documentation.
15. Before first starting up check the function of the Speed Monitor.

Issue date: 22.2.2013

6.3 Parameter setting via ASIMON 3 G2 software

Via the **Extras->Rotation speed monitor** menu, three modes for the configuration and diagnostics of rotation speed monitors are available:

- Configuring the rotation speed monitor
- Send configuration
- Test.



Information!

Only rotation speed monitors from the Schmersal company can be configured.

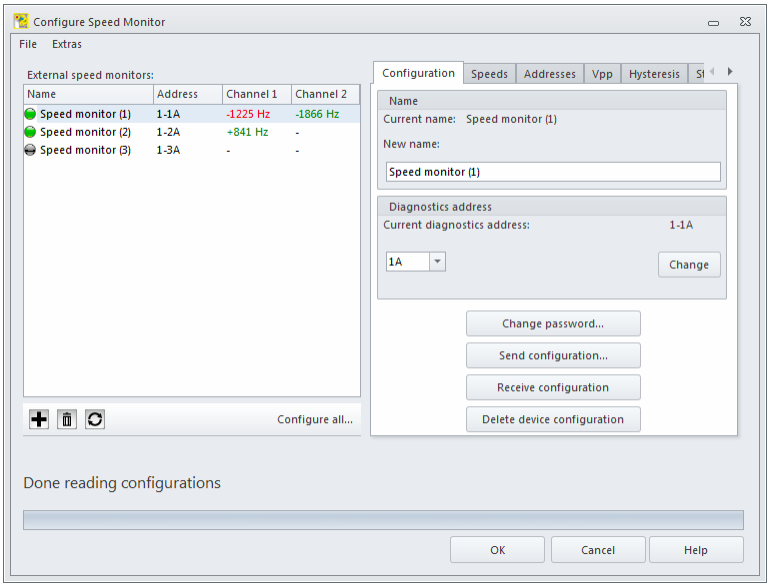
The configuration created in the windows described in the following is saved in a file in the same directory as the **ASIMON 3 G2** configuration. It also has the same file name as the **ASIMON 3 G2** configuration, except the file extension is 'SM3'. As a result, the rotation speed monitor configuration is permanently linked to the **ASIMON 3 G2** configuration.

Information!

*If you manually copy an **ASIMON 3 G2** configuration (.AS3BW), you must also copy the corresponding rotation speed monitor configuration (.SM3)!*

Issue date: 22.2.2013

6.3.1 Configuring the rotation speed monitor



In the **Configure rotation speed monitor** window, both connected as well as unconnected (offline) rotation speed monitors can be configured on the AS-i master. All settings necessary for commissioning rotation speed monitors are made here.

The general procedure during the commissioning of a rotation speed monitor is as follows:

- Configure the rotation speed monitor with **ASIMON 3 G2**
- Send the configuration to the rotation speed monitor
- Validate the sent configuration
- Check the configuration for correctness.

The **Configure rotation speed monitor** window is divided into a left, a right and a lower area and a **File menu**. Located in the left area is a **list of rotation speed monitors**. The right area is used for the **configuration** of the rotation speed monitor selected in the list. **Status messages** and the progress are displayed in the lower area.

Upon opening the window, all rotation speed monitors that are connected to the AS-i master and all saved rotation speed monitors are loaded and displayed in the list. A connected rotation speed monitor is indicated by a green dot, an unconnected rotation speed monitor is indicated by a grey dot.

To configure a rotation speed monitor, the rotation speed monitor is selected in the **list of rotation speed monitors**; the desired settings are made in the **configuration area**.

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6.3.1.1 List of the rotation speed monitors

The list of rotation speed monitors consists of four columns: **Name, Address, Channel 1** and **Channel 2**.

- **Name** contains the name of the rotation speed monitor. This can be freely assigned during configuration and is used to better identify the rotation speed monitor. If a rotation speed monitor is not yet configured, it is displayed as **Speed monitor (address)**.
- The **Address** column displays the AS-i diagnostics address of the rotation speed monitor. The rotation speed monitor can be configured on the AS-i bus under this address. The used format has the following structure: (AS-i circuit)-(AS-i address)(A/B-slave).
- In columns **Channel 1** and **Channel 2**, the currently measured rotational speeds of axes 1 and 2 of the rotation speed monitor are displayed. If limit values for the rotational speeds are already configured in the rotation speed monitor, the displayed rotational speeds appear green if they are below the limit value or red if they are above the limit value. Depending on the type of rotation speed monitor, the system detects whether or not a rotary encoder signal is connected. If no rotary encoder is connected to an axis, – is displayed as the rotational speed. The sign of the measured rotational speed indicates the direction of rotation. See the following table for further information.

Sign	Clockwise	Direction
-	Clockwise	Right
+	Counterclockwise	Left

Located below the list of rotation speed monitors are the **Add** , **Delete** , **Reload** and **Configure all...** buttons.

Use the **Add** button to add a rotation speed monitor to the configuration that is not yet connected to the AS-i master. Clicking **Add** opens the window for selecting the address of the new rotation speed monitor. In this window, select to which AS-i circuit of the AS-i master the rotation speed monitor is to be connected and what its AS-i address will be. An AS-i address that is not yet used and is configured as a standard slave in the ASIMON bus information must be selected.

This function can be used to configure rotation speed monitors before they are connected to the AS-i bus.

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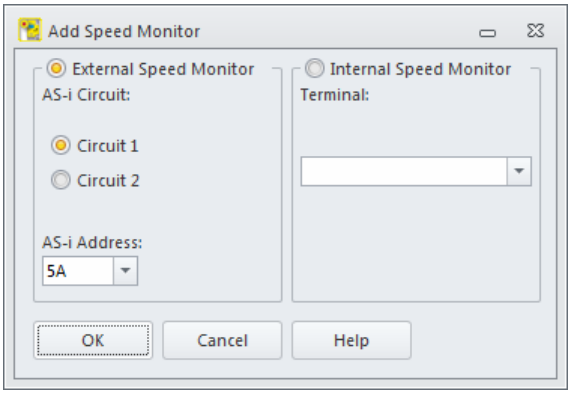


The **Delete** button is only available if a rotation speed monitor is selected in the list. Clicking **Delete** removes the selected rotation speed monitor from the current configuration.

If Reload is clicked, the AS-i bus again searches for rotation speed monitors; all found rotation speed monitors are displayed in the list of rotation speed monitors.

The **Configure all...** button is used to send the configurations to all rotation speed monitors. This takes place in the background; work on the configuration may continue. Click **Configure all...** to open a window for each rotation speed monitor for validating and releasing the configuration. The **Validator name** and the **Password** configured in the rotation speed monitor must be entered here. The settings can be accepted for the subsequent rotation speed monitors by selecting the **Apply for all** check box. The status of the sending of the configuration is displayed in the lower area of the window. Following the configuration of a given rotation speed monitor, the **configuration log** appears in a separate window with the option to save or print it.

Attention!

By validating the configuration, you confirm as safety officer that the system is set up correctly and all safety-relevant regulations and standards for the application have been adhered to!

Issue date: 22.2.2013

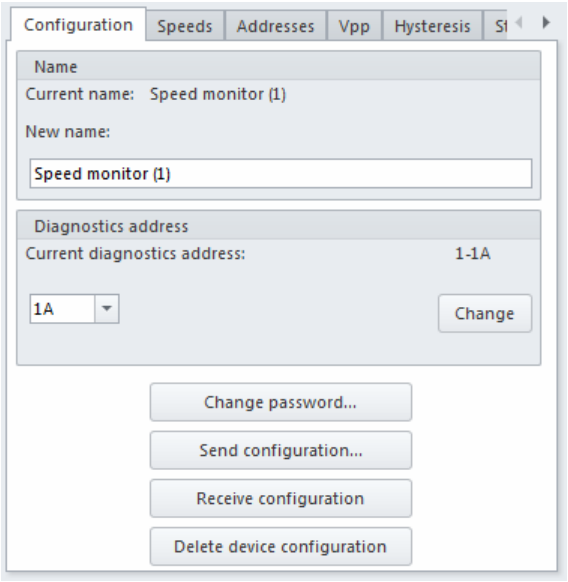
6.3.2 Configuration

In the configuration area, the rotation speed monitor currently selected in the list is configured. If no rotation speed monitor is selected in the list, the configuration area is deactivated.

Grayed-out options are not supported by the connected rotation speed monitor. You need a rotation speed monitor with a new software version to be able to use this option.

The configuration area is divided into three tabs: **Configuration**, **Rotational speeds**, **Addresses** and **Vpp**.

Configuration



- In the **Name** area, the name currently assigned to the rotation speed monitor is displayed and can be changed. The name of the rotation speed monitor is used to better distinguish between multiple rotation speed monitors.
- The rotation speed monitor can be configured on the AS-i bus under the **diagnosis address**. The diagnosis address can be changed here to a free standard slave address in the ASIMON bus information. The bus information can be called up and edited via the **Edit...** list entry.
- The **Change password...** button is used to change the password set in the rotation speed monitor. Click the button to open a new window for entering the old password and the new password. On delivery, the password is set to 0000. The password must be four digits long and may only contain the numbers 0 to 9.

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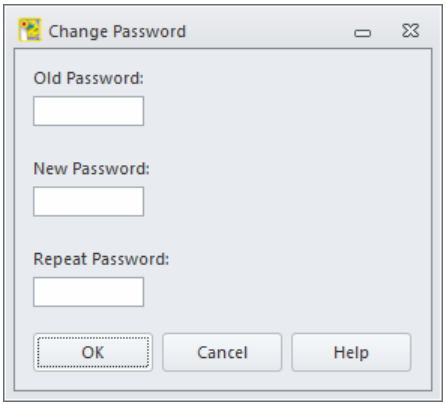
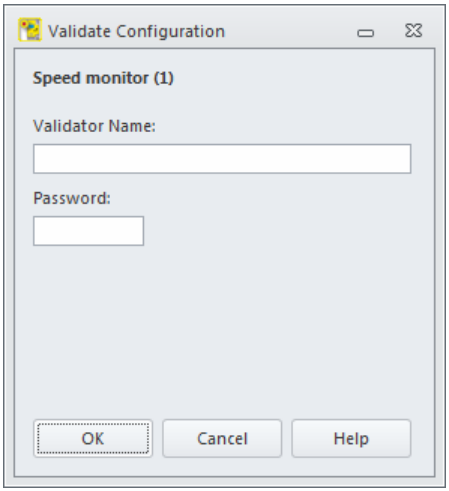


- The **Send configuration...** button sends the current configuration to the rotation speed monitor, validates it and releases it so that the rotation speed monitor can start in safe operation. Click the button to open a window for entering the **Validator name** and the **Password**. After the configuration has been sent and successfully validated, the **configuration log** is displayed in a separate window. The log can be saved there in a file or printed on a printer.

Attention!

By validating the configuration, you confirm as safety officer that the system is set up correctly and all safety-relevant regulations and standards for the application have been adhered to!



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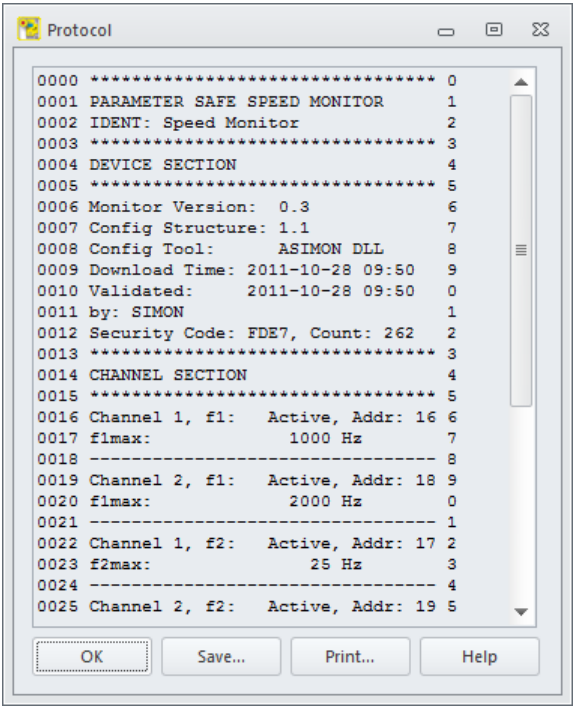
The **Receive configuration** button is used to load the configuration currently saved in the rotation speed monitor and display it in the user interface. In addition, the configuration log is received and displayed in a separate window. The log can be saved there in a file or printed on a printer.



Information!

The configuration log serves as safety-relevant documentation of the application. It contains all information about the configuration of the rotation speed monitor.

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Example of a rotation speed monitor configuration log:

```
0000 ********************************                                0
0001 PARAMETER SAFE SPEED MONITOR                                    1
0002 IDENT: Achsen 1+2                                               2
0003 ********************************                                3
0004 DEVICE SECTION                                                  4
0005 ********************************                                5
0006 Monitor Version:  0.2                                           6
0007 Config Structure: 1.0                                           7
0008 Config Tool:      ASIMON DLL                                    8
0009 Download Time: 2011-10-28 09:50                                 9
0010 Validated:     2011-10-28 09:50                                 0
0011 by: SIMON                                                       1
0012 Security Code: EC11, Count: 277                                 2
0013 ********************************                                3
0014 CHANNEL SECTION                                                 4
0015 ********************************                                5
0016 Channel 1, f1:   Active, Addr: 5                                6
0017 f1max:             1000 Hz                                      7
0018 ---------------------------------                               8
0019 Channel 2, f1:   Inactive                                       9
0020 f1max:           ------ Hz                                      0
0021 ---------------------------------                               1
0022 Channel 1, f2:   Inactive                                       2
0023 f2max:           ------ Hz                                      3
0024 ---------------------------------                               4
0025 Channel 2, f2:   Inactive                                       5
0026 f2max:           ------ Hz                                      6
0027 ********************************                                7
0028 Validated:     2011-10-28 09:50                                 8
0029 by: SIMON                                                       9
0030 Security Code: EC11, Count: 277                                 0
0031 ********************************                                1
0032 END OF CONFIGURATION                                            2
0033 ********************************                                3
```

Line 0000...0003: Header information of the configuration log
- Line 0002: Name of the rotation speed monitor

Line 0004...0013: Information about the rotation speed monitor
- Line 0006: Hardware version of the rotation speed monitor
- **Line 0007:** Version of the configuration data
- Line 0008: Name of the configuration tool
- Line 0009: Time at which the saved configuration was transmitted
- **Line 0010:** Time at which the saved configuration was validated
- Line 0011: Name of the validator

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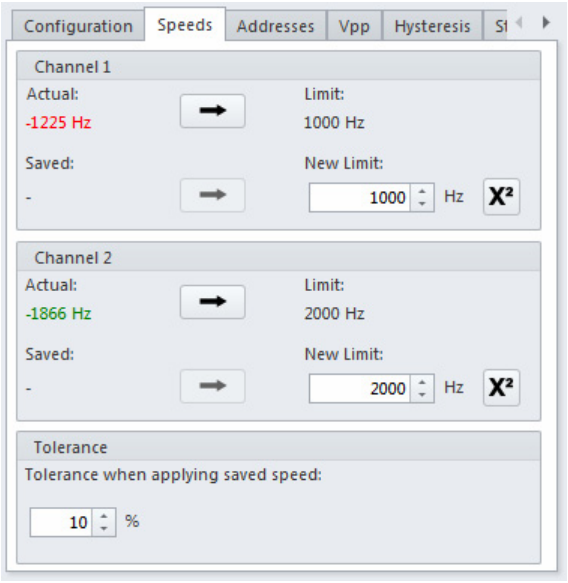
	Line 0012:	Checksum of the configuration and the number of previous configurations for the rotation speed monitor
Line 0014...0027:	Configuration of the channels	
	Line 0016:	Configuration of channel 1 and safe AS-i address
	Line 0017:	Limit frequency for channel 1
	Line 0018-0027:	No other safe addresses configured
Line 0028...0031:	Validation data repeated	
Line 0032...0033:	End of the configuration log	

Rotational speeds



On this tab, the **limit frequencies** for channels 1 and 2 of the rotation speed monitor are configured. The currently measured rotational speeds are displayed to assist in setting the correct limit frequency.

Upon pressing the **PRJ** button on the rotation speed monitor (see the system manual for the rotation speed monitor), the rotation speed monitor temporarily saves the current rotational speeds. These rotational speeds are displayed here under **Saved** and can be accepted by clicking the **Apply** → button. When applying the values, a potential tolerance can be included; this is set in the lower area of the tab under Tolerance.

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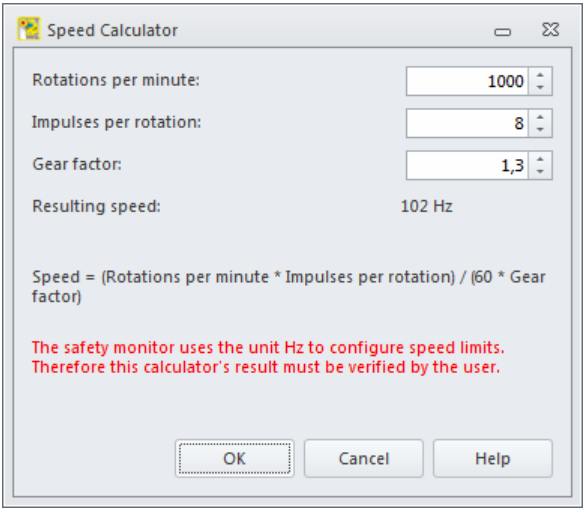
Example: A frequency of 3000Hz is measured at channel 1 and the **PRJ** button is pressed on the rotation speed monitor. The rotation speed monitor temporarily saves the frequency. This value is displayed in the configuration under **Saved**. For **Tolerance when applying saved speed**, 10% is displayed. After clicking **Apply**, 3300 Hz is entered as the **New Limit**.

Rotational speed calculator



Using the rotational speed calculator, a rotational speed can be calculated from the parameters of the encoder. To do this, the **Rotations per minute**, **Pulses per minute** and **Gear factor** parameters are entered. The result is displayed directly in the **Calculated rotational speed** field.

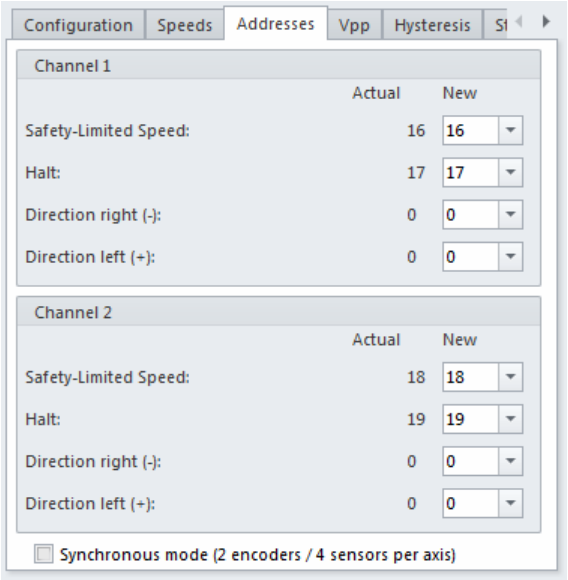
The formula used for calculation is:

Rotational speed = (rotations per minute * pulses per rotation) / (60 * gear factor)

The result calculated is entered in the configuration as the new frequency and the parameters are saved for the next use via the OK button.

Issue date: 22.2.2013

Addresses



Depending on the function range, a rotation speed monitor can simulate up to eight safe AS-i slaves. Depending on the measured rotational speed and direction of rotation, such a simulated safe AS-i slave sends a safe code sequence or a zero sequence. On the **Addresses** tab, the AS-i addresses for the simulated slaves are configured. If a '0' is entered as the address, no AS-i slave is simulated for this event.

Only AS-i addresses can be used which are configured as safe input slaves and free in the ASIMON bus information. The bus information can be called up and edited via the **New...** list entry of the address selection box.

There are four categories for each of the two channels to be monitored:

- **Safety-Limited Speed**: As long as the limit frequency is not exceeded, the safe AS-i slave configured at this address sends a safe code sequence. If the configured limit frequency is exceeded, the safe AS-i slave configured at this address switches off; it sends a zero sequence.
- **Hold**: As long as the hold frequency of 25Hz is not exceeded, the safe AS-i slave configured at this address sends a safe code sequence. If the hold frequency of 25Hz is exceeded, the safe AS-i slave configured at this address switches off; it sends a zero sequence.
- **Direction right (-)**: As long as the direction of rotation is to the right (-), the safe AS-i slave configured at this address sends a safe code sequence. If the direction of rotation changes to the left (+), the safe AS-i slave configured at this address switches off; it sends a zero sequence.

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- **Direction left (+)**: As long as the direction of rotation is to the left (+), the AS-i slave configured at this address sends a safe code sequence. If the direction of rotation changes to the right (-), the safe AS-i slave configured at this address switches off; it sends a zero sequence.

Several categories can also be grouped together and set on one AS-i address (linked with logical AND). To do this, the categories that are to be grouped together are assigned the same

AS-i address. A safe code sequence is then only produced at this address if all categories are fulfilled. Grouping over all categories and over both axes is possible within a rotation speed monitor.

Example: The limit frequency for axis 1 is set to 1000 Hz, for axis 2 it is set to 2000 Hz. In the **Safety-Limited Speed** category, address 10 is selected for both axes. A safe code sequence is now produced at address 10 if the rotational speed at axis 1 is less than 1000 Hz and the rotational speed at axis 2 is less than 2000 Hz. If just one of the two rotational speeds is exceeded, a zero sequence is sent to address 10.

Certain rotation speed monitors offer the option of configuring **Synchronous mode (2 encoders / 2 sensors per axis)**. With this option, both inputs of the rotation speed monitor are compared to one another. If the difference is less than 10%, the signals are treated as one signal and evaluated according to the configuration. If the difference is greater than 10%, a zero sequence is output at all configured AS-i addresses. Thus, it is possible to monitor one axis with two rotary encoders and thereby achieve a higher safety level through this redundancy.

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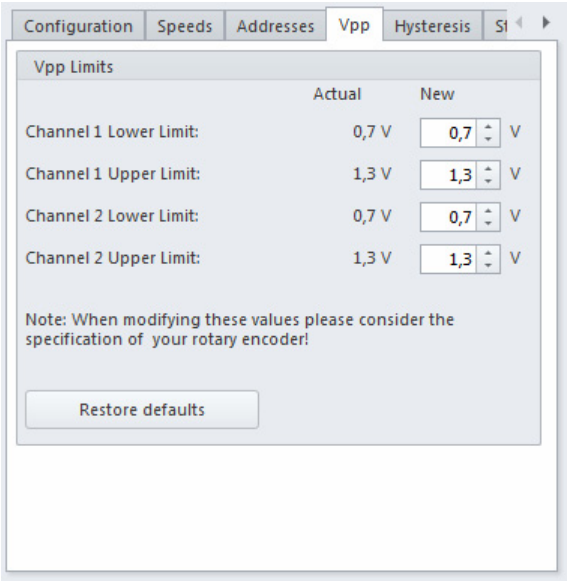
Vpp



Information!

*This page is only visible if it has been activated via the **Extras menu** in **Setup**.*

Information!

These parameters are only relevant for the sine/cosine rotary encoder (and therefore for the ASSM-2A-SINCOS device).

The boundaries for the peak-to-peak voltage (Vpp) of the sine/cosine signal can be adjusted here.

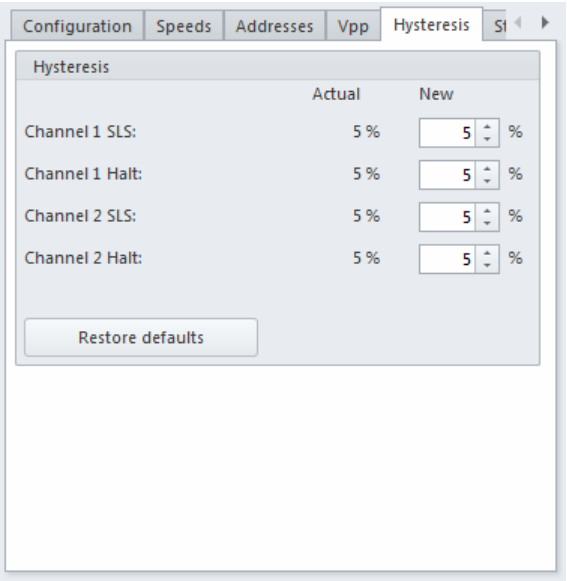
The pre-set range of 0.7 – 1.3 Vpp is suitable for most rotary encoders with nominal 1 Vpp. Should a rotary encoder exhibit another voltage level or should the damping be so strong that the rotation speed monitor incorrectly assesses the signal as invalid, the tolerance range can be adjusted here.

Information!

When changing these parameters, make sure that the safety requirements of the rotary encoder used are observed. The boundaries must be small enough that a possible rotary encoder defect is detected by the rotation speed monitor.

Issue date: 22.2.2013

Hysteresis



Information!

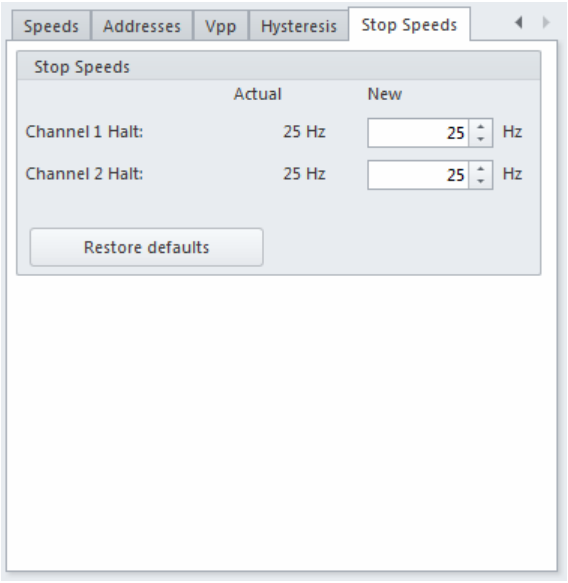
*This page is only visible if it has been activated via the **Extras menu** in **Setup**.*

On this page, the hysteresis can be set percentually for all four rotational speeds. The hysteresis describes the difference from the configured rotational speed which must be undercut so that a safe signal can be generated again.

Example: For channel 1 SLS, 1000 Hz and a hysteresis of 5% are configured. A rotational speed of 1010 Hz is measured, the safe AS-i slave configured at this address thereby does not send a safe code sequence. The rotational speed then sinks to 990 Hz. A safe code sequence is not sent since the frequency must first undercut 950 Hz (1000 Hz - 5%) before a safe code sequence is sent again.

Issue date: 22.2.2013

Standstill



Information!

*This page is only visible if it has been activated via the **Extras menu** in **Setup**.*

The standstill frequencies of both axes are configured here. By default, 25 Hz are configured as the frequency for detecting the standstill. If necessary, the standstill frequencies can be changed to monitor a second rotational speed threshold per axis, for example.

Issue date: 22.2.2013

6.3.2.1 Status messages and progress

In this area of the window, the current status and error messages and the progress of a running process are displayed.

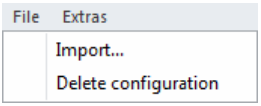
Three buttons are used for saving the configuration and for closing the window:

- Click the **OK** button to save the current configuration and close the window.
- Click **Cancel** to close the window without saving the configuration.

6.3.2.2 File menu

The **File menu** offers two menu entries:

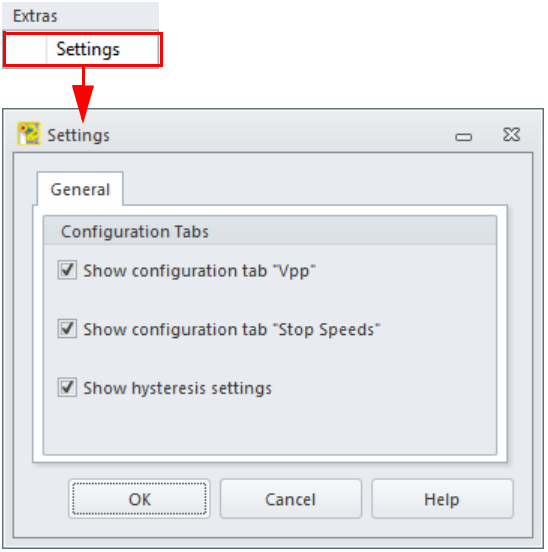
- With **Import...**, an existing rotation speed monitor configuration can be loaded and thereby assigned to the current **ASIMON 3 G2** configuration.
- With **Clear configuration**, all entries in the rotation speed monitor configuration are cleared. After confirming with **OK** or **Cancel**, the '.SM3' file is removed and the symbol in the workspace disappears.



6.3.2.3 Extras menu

The **Extras menu** contains a menu item:

- Under **Setup**, a new window opens to change the program setup. The **Vpp configuration tab** can be displayed or suppressed.



Issue date: 22.2.2013

6.3.3 Configure all

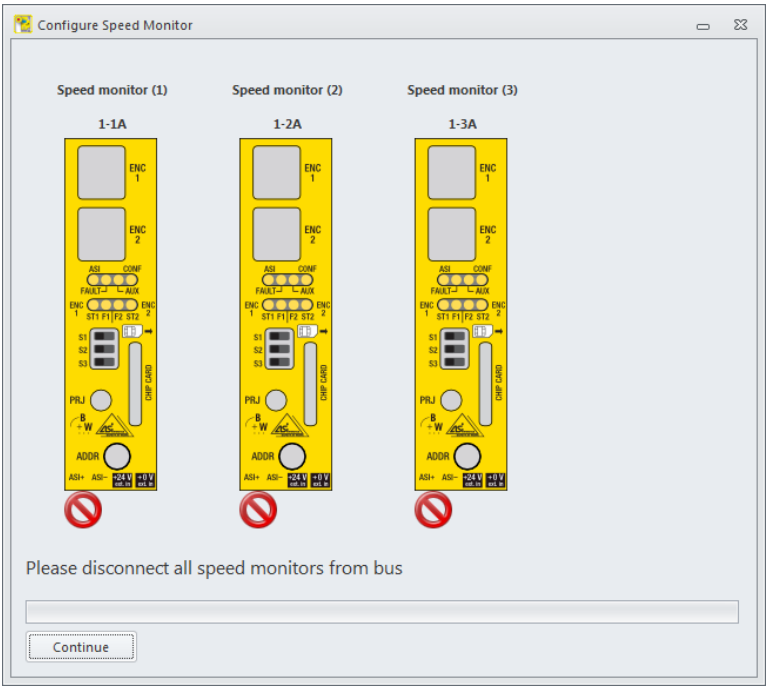
Information!

This mode is only available if a rotation speed monitor configuration has already been created.

In **Send configuration** mode, an already created configuration for one or more rotation speed monitors is automatically sent to the rotation speed monitors, validated and the configuration log read out. The user is guided through the configuration process step-by-step.

This mode is suitable for quickly commissioning preconfigured systems. The rotation speed monitors may be in the state in which they were received on delivery; the correct AS-i address and the desired password are set automatically.

When the **Send configuration** mode is started, the user is prompted to disconnect all rotation speed monitors from the bus. Once that has been done, click **Continue** to advance to the next step. You must now connect the rotation speed monitors to the bus in sequence.

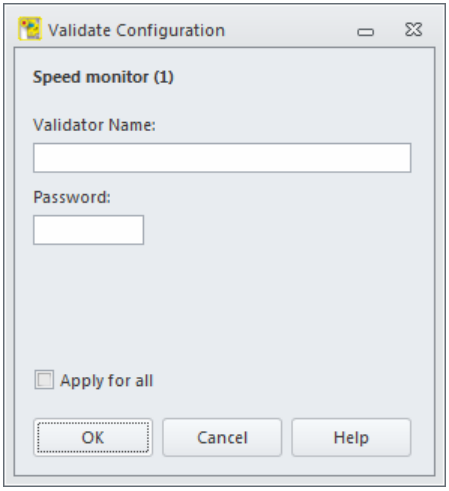


Information!

The rotation speed monitors must either be in the state in which they were received on delivery (diagnostics address is '0') or already set to the correct diagnostics address. If a different diagnostics address is set, the rotation speed monitor cannot be found!

Issue date: 22.2.2013

The **Validator name** and the **Password** are queried for each rotation speed monitor. The settings made here can be applied to all other rotation speed monitors that are to be configured.



After all rotation speed monitors have been connected, the program begins to write and validate the configurations in the rotation speed monitors. Afterward, the **configuration log** is read for each rotation speed monitor and displayed in a separate window. Depending on the number of rotation speed monitors and AS-i slaves on the bus, the configuration process may take some time, but occurs automatically upon connection of the last rotation speed monitor without any further interventions by the user. The remaining time is displayed.

Attention!

By validating the configuration, you confirm as safety officer that the system is set up correctly and all safety-relevant regulations and standards for the application have been adhered to!

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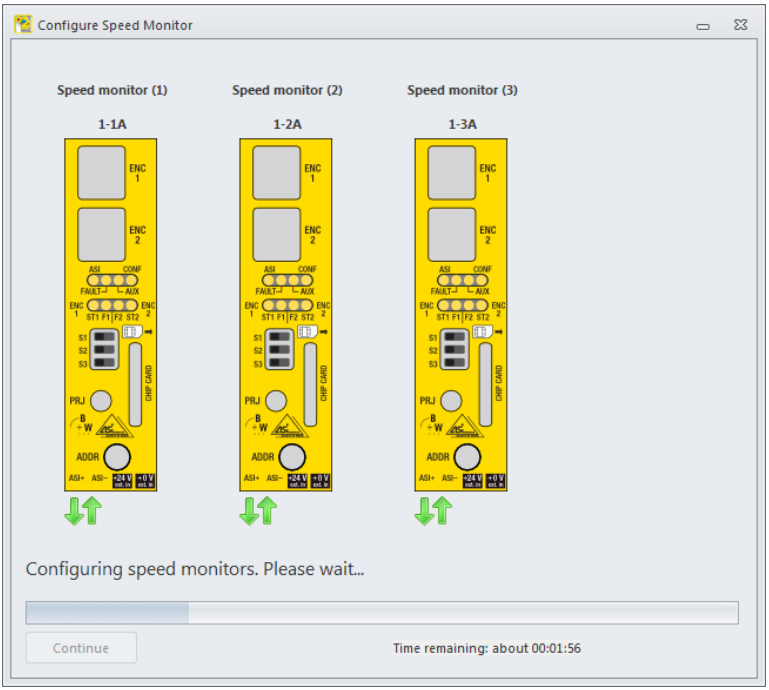
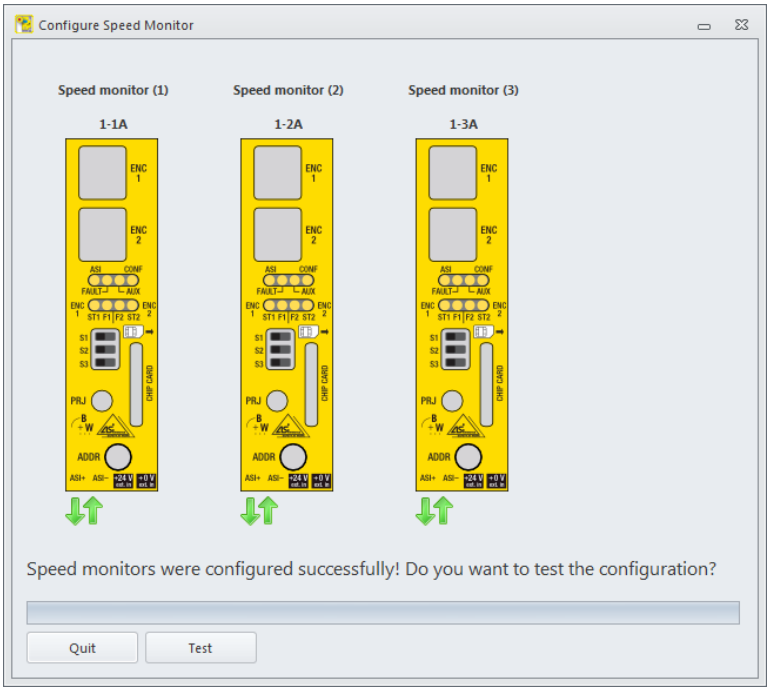
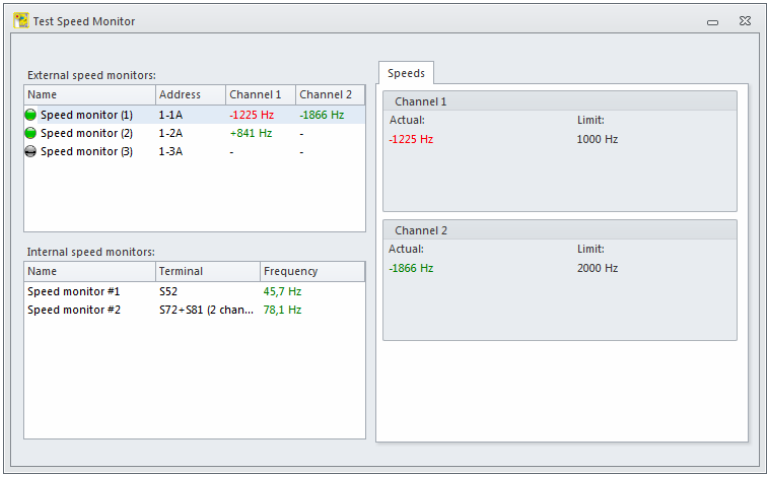


After configuring all rotation speed monitors, the window can be closed with **Quit** or you may switch to test mode with **Test**.



6.3.4 Test



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The window for testing the rotation speed monitors is used to test configured rotation speed monitors and to check whether the desired functionality is achieved. This also includes checking whether the rotary encoders were correctly connected to the rotation speed monitors or if axes are interchanged.

The window displays a list of rotation speed monitors as in configuration mode. To the right of the list are the currently measured rotational speeds of the selected rotation speed monitor as well as the configured limit values. If limit values are configured in the rotation speed monitor, the currently measured rotational speed is displayed in red or green depending on whether the value is above or below the limit.

No settings can be made in this window. It is used only to test the rotation speed monitors that are connected to the AS-i master and to test their configuration.

Issue date: 22.2.2013

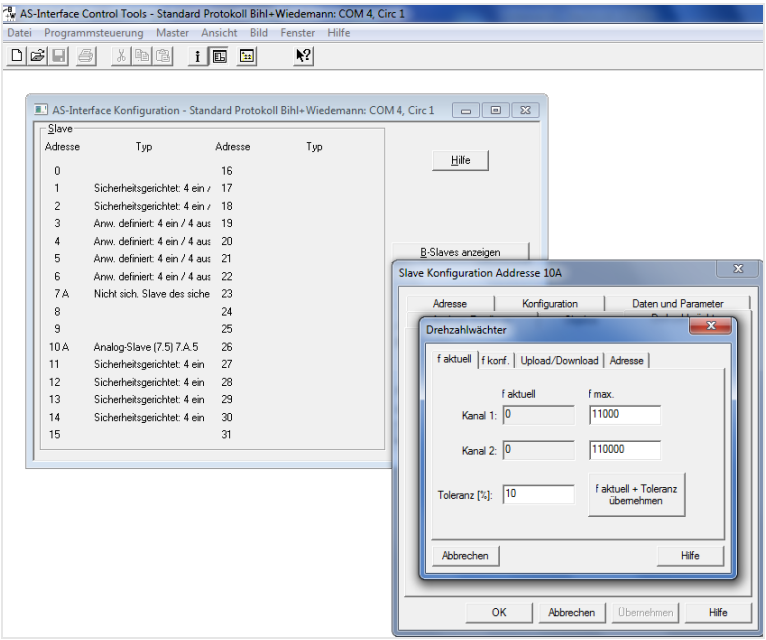
6.4 Procedure for setting parameters using ACT

1. The Speed Monitor is connected to the AS-i circuit.
2. The non-safety slave is addressed.
3. The connected axes are brought to safe speed. If multiple Speed Monitors are connected, the Projecting button is actuated. The CONF LED flashes.
4. From the PC software the AS-i Master is used to select the diagnostic slave of the Speed Monitor.
5. Parameters are set using the PC software (see description in Sec <PC Software>). Either the value stored with the Projecting button can be used or another entered.
6. If the ID should be changed, this can be done.
7. The project planer uses the software to release the data with his name and his ID. Name, date and ID are also stored by both CPUs with a CRC check.
8. The data are written over AS-i to the Speed Monitor and there stored with CRC check. So the data are valid for the Speed Monitor.
9. The PC software reads out the parameters as plain text over AS-i and displays them in a separate window as a release protocol. There is no conversion, rather the data come out of the Speed Monitor as plain text.
10. The release protocol is printed out by the releasing person and filed as a part of the plant documentation.
11. Before first starting up check the function of the Speed Monitor.

Issue date: 22.2.2013

6.4.1 PC Software

The following illustrations show the setting possibilities in schematic form.



In this menu the frequencies set using the Projecting button are displayed and can be uploaded raised by the tolerance factor as f_{max}. Alternately the value f_{max} can also be directly entered.

Information!

Uploading also activates.

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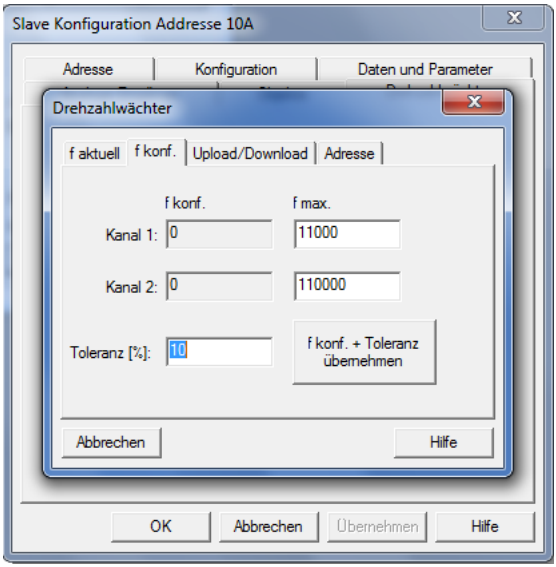


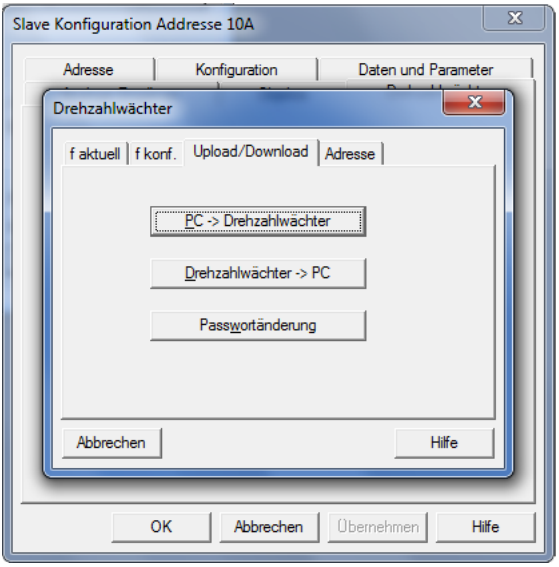
In this menu the frequencies set using the Projecting button are displayed and can be uploaded raised by the tolerance factor as f_{max}. Alternately the value f_{max} can also be directly entered.

Information!

Uploading also activates.

Issue date: 22.2.2013

If the same address is entered for multiple channels, the results of these channels are overlaid. Only if all frequencies for these channels are within the range of the safety-limited speed is an SaW code sequence sent. This also makes it possible for example to combine Channel 1 and 2 into a single address.



In this menu the upload and download procedure is controlled. For downloading (Speed Monitor ' PC) the protocol is read from the Speed Monitor, for uploading (PC ' Speed Monitor) the previously set values are written to the Speed Monitor.

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After uploading the protocol listing appears:

```
0000 ********************************                                0
0001 PARAMETER SAFE SPEED MONITOR                                    1
0002 IDENT: Spiral-Faedler oben                                      2
0003 ********************************                                3
0004 DEVICE SECTION                                                  4
0005 ********************************                                5
0006 Monitor Version:  1.4                                           6
0007 Config Structure: 2.2                                           7
0008 Config Tool:      speedmon-tool_h                               8
0009 Download Time: 2011-11-17 09:28                                 9
0010 Validated:     2011-11-17 09:29                                 0
0011 by: Max Mustermann                                              1
0012 Security Code: 15B6, Count: 52                                  2
0013 ********************************                                3
0014 CHANNEL SECTION                                                 4
0015 ********************************                                5
0016 Channel 1, f1:   Active, Addr: 17                               6
0017 f1max:   1000 Hz Hyst.: -5.0%                                   7
0018 ---------------------------------                               8
0019 Channel 2, f1:   Active, Addr: 19                               9
0020 f1max:  21500 Hz Hyst.: -5.0%                                   0
0021 ---------------------------------                               1
0022 Channel 1, f2:   Active, Addr: 16                               2
0023 f2max:     25 Hz Hyst.: -5.0%                                   3
0024 ---------------------------------                               4
0025 Channel 2, f2:   Inactive                                       5
0026 f2max:           ------ Hz                                      6
0027 ---------------------------------                               7
0028 Channel 1,  cw:  Active, Addr: 20                               8
0029 ---------------------------------                               9
0030 Channel 2,  cw:  Active, Addr: 22                               0
0031 ---------------------------------                               1
0032 Channel 1, ccw:  Active, Addr: 21                               2
0033 ---------------------------------                               3
0034 Channel 2, ccw:  Inactive                                       4
0035 ********************************                                5
0036 Validated:     2011-11-17 09:29                                 6
0037 by: Max Mustermann                                              7
0038 Security Code: 15B6, Count: 52                                  8
0039 ********************************                                9
0040 END OF CONFIGURATION                                            0
0041 ********************************                                1
```

Tab. 6-10. Sample configuration for a HTL Speed Monitor

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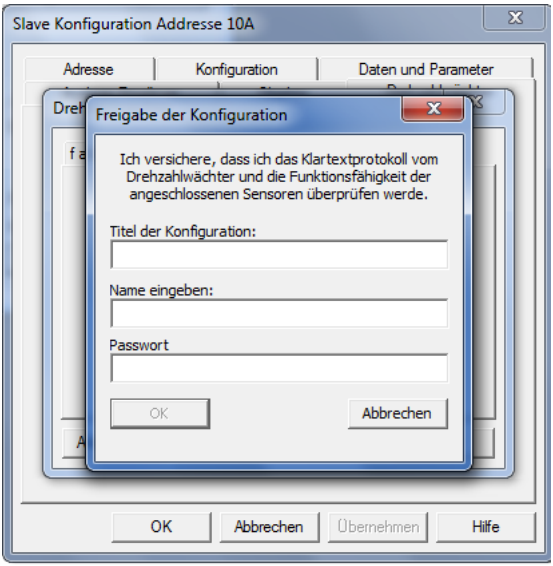
Then the following dialog box is shown:



6.5 Releasing the configuration

Information!

By releasing the configuration you as the safety representative confirm proper construction and maintaining of all safety-relevant regulations and standards for the application.

Information!

Release of the configuration, like some other safety-relevant commands, is password protected.

Issue date: 22.2.2013

6.6 Configuration documentation

Configuration protocol

The configuration protocol is used for safety-relevant documentation of the application. It contains all the information about the configuration of the Speed Monitor.

The preliminary configuration protocol is used for checking the configuration of the Speed Monitor and of the safety-relevant AS-i application by the safety representative.

The final configuration protocol is used for documenting the configuration of the Speed Monitor and of the safety-relevant AS-i application by the safety representative. It is an important component of the safety-relevant documentation for your application and must be stored together with it.

Information!

The configuration protocol is always written uniformly in English.

Information!

*For additional information, please refer to the separate documentation for the "**ASI-MON 3G2**" software.*

Issue date: 22.2.2013

Example of a configuration protocol

```
0000 ********************************                          0
0001 PARAMETER SAFE SPEED MONITOR                              1
0002 IDENT: Spiral-Faedler oben                                2
0003 ********************************                          3
0004 DEVICE SECTION                                            4
0005 ********************************                          5
0006 Monitor Version:  1.4                                     6
0007 Config Structure: 2.2                                     7
0008 Config Tool:      speedmon-tool_h                         8
0009 Download Time: 2011-11-17 09:28                           9
0010 Validated:     2011-11-17 09:29                           0
0011 by: Max Mustermann                                        1
0012 Security Code: 15B6, Count: 52                            2
0013 ********************************                          3
0014 CHANNEL SECTION                                           4
0015 ********************************                          5
0016 Channel 1, f1:   Active, Addr: 17                         6
0017 f1max:   1000 Hz Hyst.: -5.0%                             7
0018 --------------------------------                          8
0019 Channel 2, f1:   Active, Addr: 19                         9
0020 f1max:  21500 Hz Hyst.: -5.0%                             0
0021 --------------------------------                          1
0022 Channel 1, f2:   Active, Addr: 16                         2
0023 f2max:     25 Hz Hyst.: -5.0%                             3
0024 --------------------------------                          4
0025 Channel 2, f2:   Inactive                                 5
0026 f2max:           ------ Hz                                6
0027 --------------------------------                          7
0028 Channel 1,  cw:  Active, Addr: 20                         8
0029 --------------------------------                          9
0030 Channel 2,  cw:  Active, Addr: 22                         0
0031 --------------------------------                          1
0032 Channel 1, ccw:  Active, Addr: 21                         2
0033 --------------------------------                          3
0034 Channel 2, ccw:  Inactive                                 4
0035 ********************************                          5
0036 Validated:     2011-11-17 09:29                           6
0037 by: Max Mustermann                                        7
0038 Security Code: 15B6, Count: 52                            8
0039 ********************************                          9
0040 END OF CONFIGURATION                                      0
0041 ********************************                          1
```

"VALIDATED..." (line 10-12):
Mark for final configuration protocol with release information
- data and time
- name
- code

The protocol in the example consists of 42 lines, 40+1 (linebreak) characters per line = 1722 characters.

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The final configuration protocol is used for safety-relevant documentation of the application by the responsible safety representative.

Print out this protocol and keep it together with the other safety-relevant documentation for your application.

Issue date: 22.2.2013

7. Safety Requirements

- The rotary encoder must have a suitable performance level for the application.
- Please observe the information provided by the rotary encoder manufacturer.

7.1 HTL encoder requirements

- Inkremental encoder.
- HTL signal.
- The rotary encoders are powered externally out of 24 V power supply.

7.2 Sinus/cosinus encoder requirements

- Incremental encoder.
- 1Vpp sine/cosine permissible (also from Hiperface or Endat 01 or Endat 02).
- For error exclusion the signal and symmetrical signal must be connected.
- The encoders are powered either externally or from the Speed Monitor. The Speed Monitor provides 5 V (max. 100 mA). The power source (internal/ external) is determined by the connection wiring. If the encoder is powered externally, the connected voltages must not exceed 5.4 V, and if there is more than 5.4 V the current provided on each line may not exceed 44 mA.

Issue date: 22.2.2013