SMX 111-2/2/D

SMXSERIES » Modular » Decentral expansion » 1 Axis module

BBH PRODUCTS

DESCRIPTION

Decentral axis extension module for safe speed and position of 1 axis for further evaluation in SMXMODULAR - basic modules and with extended encoder functionality

- 14 Digital inputs
- 5 Encoder interfaces *
- 2 Relay outputs
- 2 Auxiliary / pulse outputs
- 2 /4 pn- or pp-switching outputs
- Safety controller up to PL e acc. to EN ISO 13849-1 or SIL3 acc. to IEC 61508

CHARACTERISTIC OF THE MODULE

» Decentralised axis expansion module
- Decentralised: Communication with base module SMX100-x via communication interface (/D)
- Central: Communication with base module SMX100-x via backplane bus
» Movement monitoring of one axis up to Pl e EN ISO 13849-1 or SIL 3 acc. to IEC 61508
» Speed monitoring:
» RPM-monitoring
» Standstill monitoring
» Sense of rotation monitoring
» Safe incremental dimension
» Emergency Stop monitoring
» Position monitoring
» Position range monitoring
» Trend range monitoring
» Target position monitoring
» Pulse outputs for cross-shorting detection of digital input signals
» External contact monitoring of connected switchgear (EMU)
» Switchable safe semi-conductor outputs pn-, pp- switching for safety-relevant functions
» Monitored relay outputs for safety relevant functions
» Comprehensive diagnostics functions integrated
» Parameter management for expansion modules in base device
» Coded status display via front-side 7 segment display and status LEDs
» Extended functionality:
- Allows the connection of 2 rotary encoders per axis (SSI-Absolut, SinCos, Incremental-TTL,HTL-proximity sensor)
- 2nd encoder interface also supports HTL (200 kHz), Sin/Cos High-Resolution and Resolver

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SAFETY RELATED CHARACTERISTIC DATA

Performance Level	PL e (EN ISO 13849-1)
PFH [1] / architecture	12,6 FIT / Cat 4
Safety Integrity Level	SIL 3 (IEC 61508)
Proof test interval	20 years = max. operating period

GENERAL DATA

Max. no. of expansion modules		–
Interface for expansion modules		Communication interface (/D) or T-bus connector, pluggable in top-hat rail, RJ-45 (Ethernet)
Number of safe digital inputs		14
Number of safe digital outputs		
	pp-switching **	4
	pn-switching **	2
Number of safe digital I/O		–
Number of relay outputs		2
Number of safe analogue inputs		–
Number of auxiliary outputs		2
Number of pulse outputs (clock outputs)		2
Type of connection		Plug-in terminals with spring or screw connection
Axis monitoring		1
Encoder interfaces (D-Sub / screw terminals)		2 / 3 *
Encoder technology (See table Encoder specifications)		**D-SUB X31:** SSI-Absolut, SinCos, Incremental-TTL **D-SUB X33:** SSI-Absolut, SinCos (HighRes), Incremental-TTL, Resolver **Terminal X23:** HTL-proximity sensor (10 kHz), **Terminals X27, X28:** Incremental-HTL (200 kHz)

  *   Maximum 2 Encoder / Axis

** pn/pp are configurable via SafePLC²

[1] Value applies only for extension module. For total assessment in accordance with EN ISO 13849-1 one must use a series connection with the corresponding basic device => $PFH_{Logic} = PFH_{Basic} + PFH_{Extension}$

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ELECTRICAL DATA

Supply voltage (tolerance)		24 VDC; 2A (-10%, +20%)
Fuse	X11.1	min. 30 VDC; max. 3,15A
	X11.2	min. 30 VDC; max. 10A
Max. Power consumption (logic)		
	SMX111-2/2/D	5,2 W
Rated data digital inputs		24 VDC; 20 mA Typ1 acc. to IEC 61131-2
Rated data digital outputs		
	pn-switching	24 VDC; 2A *
	pp-switching	24 VDC; 2A *
	auxiliary outputs	24 VDC; 250mA
	pulse outputs (clock outputs)	24 VDC; 250mA
Rated data relays		
Normally open	DC 13	24 VDC; 2A
	AC 15	230 VAC; 2A

* see „Derating outputs"

DERATING OUTPUTS

» **Maximum current load based on temperature.**
» **The maximum total current is 10A.**

type of module	outputs	temperature 30°C / 50°C
SMX1xx/2/x	Q 1 – Q 4	2A / 1,8A

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ENVIRONMENTAL DATA

Temperature	0°C … +50°C operation
	-25°C … +70°C storage and transport
Class of protection	IP 20
Climatic category	3K3 acc. to DIN EN 60721-3
Min-, Maximum relative humidity (no condensation)	5% - 85%
EMC	DIN EN 61000-6-2, DIN EN 61000-6-4, DIN EN 61000-6-7, DIN EN 61800-3, DIN EN 61326-3, DIN EN 62061
Operating altitude	2000m

MECHANICAL DATA

Dimension (HxDxW [mm])		
	SMX111-2/2/D	100x115x90
Weight [g]		
	SMX111-2/2/D	490
Mounting		to snap on top-hat rail
Number of T-Bus		4
Min. terminal cross-section / AWG		0,2 mm² / 24
Max. terminal cross-section / AWG		2,5 mm² / 12

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SMX 111-2/2/D

SMX*SERIES* » *Modular* » *Decentral expansion* » *1 Axis module*

DEVICE INTERFACES

Basic module

Decentral axis extension module
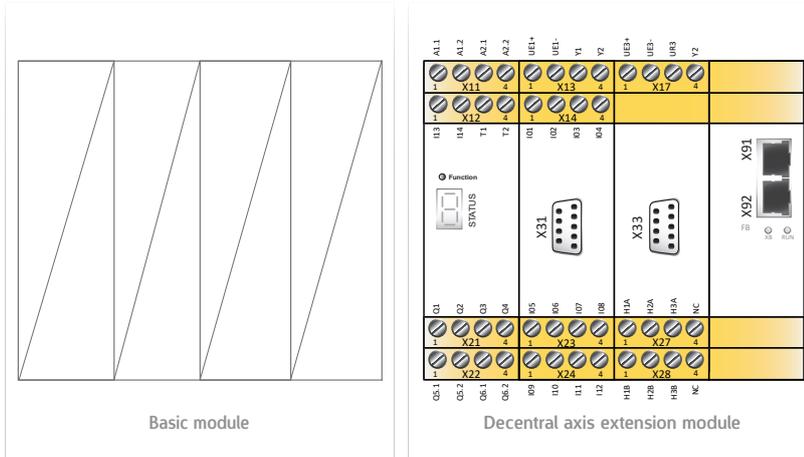
Interface	Description of interface
X11 – X14 / X17 – X24	Voltage supply and I/O interface
X91 / X92	Decentralised SDDC ETH and SMMC interface
X23 / X27 – X28	Encoder interfaces *
X31 – X33	Encoder interfaces *
* can be configured in the SafePLC²	

VOLTAGE SUPPLY AND I/O INTERFACE

X 11			
Pin	1 - A1.1	Voltage supply device +24 VDC	
	2 - A1.2	Voltage supply device +24 VDC outputs	
	3 - A2.1	Voltage supply device 0 VDC	
	4 - A2.2		

X 12		
Pin	1 - I13	Safe didigtal inputs
	2 - I14	
	3 - T1	Clock outputs
	4 - T2	

X 13		
Pin	1 – UE1+	Voltage supply Encoder +24V DC X31
	2 – UE1-	Voltage supply Encoder 0V DC X31
	3 - Y1	Auxiliary outputs
	4 - Y2	

X 14		
Pin	1 - I01	Safe digital inputs
	2 - I02	
	3 - I03	
	4 - I04	

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X 17		
Pin	1 – UE3+	Voltage supply Encoder +24V DC X33
	2 – UE3-	Voltage supply Encoder 0V DC X33
	3 - UR3	Reference voltage Encoder X33
	4 - NC	No function

X 21		
Pin	1 - Q1	Output of the pn-switching Q1_PP / pp-switching Q1
	2 - Q2	Output of the pn-switching Q2_PN / pp-switching Q2
	3 - Q3	Output of the pn-switching Q3_PP / pp-switching Q3
	4 - Q4	Output of the pn-switching Q4_PN / pp-switching Q4

X 22		
Pin	1 - Q5.1	Safe relay output
	2 - Q5.2	
	3 - Q6.1	Safe relay output
	4 - Q6.2	

X 23		
Pin	1 - I05	Safe digital inputs
	2 - I06	
	3 - I07	
	4 - I08	

X 24		
Pin	1 - I09	Safe digital inputs
	2 - I10	
	3 - I11	
	4 - I12	

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DECENTRALISED SDDC ETH AND SMMC INTERFACE

Pin assignment female connector

Communication interface (RJ45)				Front side
Pin	Name	Description	Colour	X91 / X92
1	TX+	Transmit Data +	white-orange	
2	TX-	Transmit Data -	orange	
3	RX+	Receive Data +	white-green	
4	nc	not used	blue	
5	nc	not used	white-blue	
6	RX-	Receive Data -	green	
7	nc	not used	white-brown	
8	nc	not used	brown	

Safe Master – Master Communication (SMMC)

SMMC communication enable a secure data exchange of 2 bytes between multiple SDDC masters. Communication takes place without a master for coordinating the data. This means that data exchange between available subscribers is always possible. This principle means that an incomplete or separates network can work in part areas without chnaging the configuration.

Each port can be configured in the SafePLC².

INTEGRATED COMMUNICATION INTERFACE

General data		
	Decentralised communication interface	
	/D	2x RJ 45 *

*   optional for SDDC or SMMC

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ENCODER INTERFACES

Pin assignment X31

Pin	X31 Inc / Sin/Cos / SSI	X33 Inc / Sin/Cos / SSI	X33 Resolver	Front side SMX
1	n.c.	n.c.	Ref_Out +	
2	GND_ENC	GND_ENC	GND_ENC	
3	n.c.	n.c / n.c. / Clk +	Ref_In +	
4	B- / COS - / Clk -	B- / COS - / n.c.	COS -	
5	A + / SIN + / Data +	A + / SIN + / Data +	SIN +	
6	A- / SIN - / Data -	A- / SIN - / Data -	SIN -	
7	n.c.	n.c. / n.c. / Clk -	Ref -	
8	B+ / COS + / Clk +	B+ / COS + / n.c.	COS +	
9	U_ENC	U_ENC	U_ENC	

Pin assignment X23 , X27 , X28

Pin	Z1 − Z1 / Z2 − Z2	Terminals
1	$A\,(\bar{A})\,/\,A\,(\bar{A})$	**X23**
2	$--\,/\,B\,(\bar{B})$	
3	$A\,(\bar{A})\,/\,A\,(\bar{A})$	
4	$--\,/\,B\,(\bar{B})$	

Pin	A+/A-	A+ Signal	
1 − H1A	A+	24V	**X27**
2 − H2A	A-	A	
3 − H3A	A+	GND	
4 − NC	—	—	

Pin	B+/B-	B+ Signal	
1 − H1B	B+	24V	**X28**
2 − H2B	B-	B	
3 − H3B	B+	GND	
4 − NC	—	—	

ENCODER SPECIFICATIONS

Incremental - TTL

Physical Layer	RS-422 compatible
Measuring signal A/B	Track with 90° phase difference
Type of connection	D-SUB 9pole
Max. frequency of input cycles (X31 / X33)	200 kHz / 250 kHz

Sin/Cos

Physical Layer	RS-422 compatible
Measuring signal A/B	Track with 90° phase difference
Type of connenction	D-SUB 9pole

Standard Mode

Max. frequency of input clock pulses (X31 / X33)	200 kHz / 250 kHz

High Resolution Mode

Max. frequency of input clock pulses (X33)	15 kHz

SSI-Absolut

Data interface	**S**erial **S**ynchronous **I**nterface (**SSI**) with variable data length of 12 − 28 Bit
Data format	Binary, Gray code

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Physical Layer	RS-422 compatible
Type of connection	D-SUB 9pole
Mode	**Master or Listener**
SSI-Master operation	
Clock rate	150 kHz
SSI-Listener operation	
Clock rate (X31 / X33)	100 kHz ... 250 kHz / 100 kHz ... 350 kHz
Min. clock pause time	150 µsec
Max. clock pause time	1 msec

Resolver

Measuring signal	Sin/Cos – track with 90° phase difference
Signal frequency	max. 600 Hz (900 Hz Deep pass)
Input voltage	max. 8 Vss (an 16 kΩ)
Resolution	9 Bit / pole
Supported pole number	2 - 16
Type of connection (X33)	D-SUB 9-pole
Mode	**Master or Listener**
Resolver-Master operation	
Reference frequency	8 kHz
Resolver-Listener operation	
Reference frequency	4 kHz – 16 kHz
Reference amplitude	8 Vss – 28 Vss
Reference signal form	Sinusoidal, triangle
Transformation ratio	2:1; 3:1; 4:1
Phase fault	max. 8°

Incremental - HTL

Signal level	24V / 0V
Physical Layer	PUSH / PULL
Max. counting pulse frequency	200 kHz
Type of connection (X27 / X28)	Plug-in terminals with spring or screw connection

HTL proximity sensor

Signal level	24V / 0V
Max. counting pulse frequency (circuit logic de-bounced)	10 kHz
Pulse width	50 µsec
Type of connection (X23)	Plug-in terminals with spring or screw connection

HTL proximity switch - extended monitoring

Signal level	24V / 0V
Max. counting frequency (circuit logic de-bounced)	4 kHz
Physical Layer	PUSH / PULL
Measuring signal A/B	Track with 90° phase difference
Type of connection (X23)	Plug-in terminals with spring or screw connection

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ORDER INFORMATIONS

EXTENSIONS

item	description	item no.
SMX111-2/2/D	Decentral Axis extension module for 1 axis + extended encoder functionality	1631

ACCESSORIES

item	description	item no.
FSoE License	Fieldbus license for FSoE	2366
SX*xxxx-x*	Terminal connector, screw terminals (set), encoded for cabling SMX111-2/2/D	on request
SX*xxxx-x*	Terminal connector, spring terminals (set), encoded for cabling SMX111-2/2/D	on request
SX0000-9	T-Bus connector voltage-carrying (grey)	1015

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