

# SMX 121-2/2

SMX<sub>SERIES</sub> » Modular » Central expansion » 1 Axis module

**BBH**  
PRODUCTS



## DESCRIPTION

Central axis extension for safe speed and position of 1 axis for further evaluation in SMX<sub>MODULAR</sub> - basic modules

- 12 Digital inputs
- 5 Encoder interfaces \*
- Safety controller up to PL e acc. to EN ISO 13849-1 or SIL3 acc. to IEC 61508

## CHARACTERISTIC OF THE MODULE

- » 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
- » Parameter management for expansion modules in base device
- » Comprehensive diagnostics functions integrated
- » 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

## SAFETY RELATED CHARACTERISTIC DATA

Performance Level	PL e (EN ISO 13849-1)
PFH <sup>1)</sup> / architecture	3,0 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	T-bus connector, pluggable in top-hat rail
Number of safe digital inputs	12
Number of safe digital outputs	–
Number of safe digital I/O	–
Number of relay outputs	–
Number of safe analogue inputs	–
Number of auxiliary outputs	–
Number of pulse outputs (clock outputs)	–
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)	<p><b>D-SUB X31:</b> SSI-Absolut, SinCos, Incremental-TTL</p> <p><b>D-SUB X33:</b> SSI-Absolut, SinCos (HighRes), Resolver</p> <p><b>Terminal X23:</b> HTL-proximity sensor (10 kHz),</p> <p><b>Terminals X27, X28:</b> Incremental-HTL (200 kHz)</p>

\* Maximum 2 Encoder / Axis

<sup>1)</sup> 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)	-
Max. Power consumption (logic)	-
Rated data digital inputs	24 VDC; 20 mA Typ1 acc. to IEC 61131-2
Rated data digital outputs	-
Rated data relays	-
Rated data analogue inputs	-

## 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

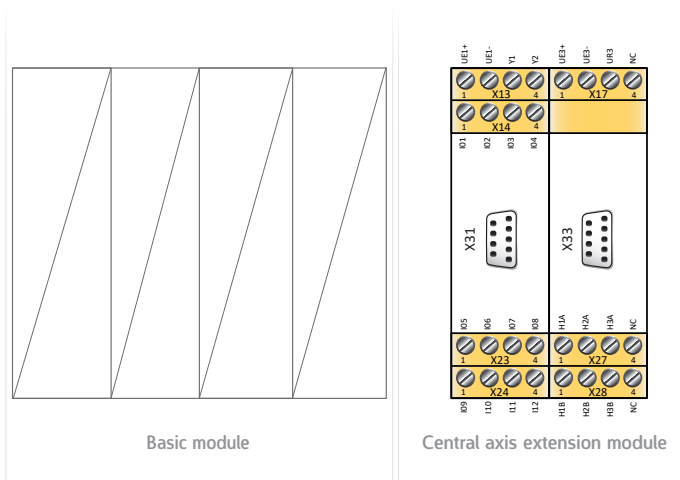
## MECHANICAL DATA

Dimension (HxDxW [mm])	SMX121-2/2	100x115x45
Weight [g]	SMX121-2/2	390
Mounting	to snap on top-hat rail	
Number of T-Bus	2	
Min. terminal cross-section / AWG	0,2 mm <sup>2</sup> / 24	
Max. terminal cross-section / AWG	2,5 mm <sup>2</sup> / 12	

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## DEVICE INTERFACES



Interface	Description of interface
X13 – X17 / X23 – X24	Voltage supply and I/O interface
X31 / X33	Encoder interfaces *
X23 / X27 / X28	Encoder interfaces *

\* can be configured in the SafePLC<sup>2</sup>.

## VOLTAGE SUPPLY AND I/O INTERFACE

X13		
Pin	1 – UE1+	Voltage supply Encoder +24V DC X31
	2 – UE1-	Voltage supply Encoder 0V DC X31
	3 – NC	No function
	4 – NC	No function
X14		
Pin	1 - I01	Safe digital inputs
	2 - I02	
	3 - I03	
	4 - I04	
X17		
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

X23		
Pin	1 - I05	Safe digital inputs
	2 - I06	
	3 - I07	
	4 - I08	
X24		
Pin	1 - I09	Safe digital inputs
	2 - I10	
	3 - I11	
	4 - I12	

## ENCODER INTERFACES

### Pin assignment X31 , X33

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 ( $\bar{A}$ )	
2	-- / B ( )	
3	A ( $\bar{A}$ ) / A ( $\bar{A}$ )	
4	-- / B ( )	

Pin	A+/A-	A+ Signal	Terminals
1 – H1A	A+	24V	
2 – H2A	A-	A	
3 – H3A	A+	GND	
4 – NC	—	—	

Pin	B+/B-	B+ Signal	Terminals
1 – H1B	B+	24V	
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 degree 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 degree phase difference
Type of connection	D-SUB 9pole
Standard Mode	
Max. frequency of input clock pulse (X31 / X33)	200 kHz / 250 kHz
High Resolution Mode	
Max. frequency of input clock pulse (X33, X34)	15 kHz
SSI-Absolut	
Data interface	Serial Synchronous Interface (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 ... 200 kHz / 100 kHz ... 250 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 4,7 kΩ)

Resolution 9 Bit / pole

Supported pole number 2 - 16

Type of connection (X33, X34) 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, rectangle

Transformation ratio 2:1; 3:2; 4:1

Phase fault max. 8°

## Inkremental - 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 degree phase difference

Type of connection (X23) Plug-in terminals with spring or screw connection

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## ORDER INFORMATION

### EXTENSIONS

item	description	item no.
SMX121-2/2	Axis extension module for one axis with extended encoder functionality	2187

### ACCESSORIES

item	description	item no.
SXxxx-x	Terminal connector, screw terminals (set), encoded for cabling SMX121-2/2	on request
SXxxx-x	Terminal connector, spring terminals (set), encoded for cabling SMX121-2/2	on request
SX0000-9	T-Bus connector, voltage-carrying (grey)	1015

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