



## DESCRIPTION

### Open programmable modular compact-type safety controller

- integrated axle monitoring for one axis
- 14 Digital inputs
- 2 Safe Digital outputs
- 3 Encoder interfaces\*
- 2 Relay outputs
- 2 Auxiliary / pulse outputs
- Safety controller up to PL e (EN ISO 13849-1) / SIL3 (IEC 61508), use as a PESSRAL acc. to DIN EN 81-20/50:2014
- optional: safe/non-safe Feldbusinterface

## CHARACTERISTIC OF THE MODULE

### » Extendable up to:

- max. 42 safe digital inputs,
- max. 12 safe digital outputs,
- max. 20 safe digital I/O's,
- max. 9 safe relay outputs,
- max. 10 auxiliary outputs,
- max. 1 safe axis

- » Logic processing up to PL e acc. to EN ISO 13849-1 or SIL 3 acc. to IEC 61508
- » 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
- » Freely programmable modular controller for up to 800 IL instructions
- » Logic diagram oriented programming via SafePLC<sup>2</sup>
- » Pulse outputs for cross-shortening 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

- » Complete speed and position-based safety functions for drive monitoring in accordance with IEC 61800-5-2 are integrated in firmware:
  - Spatial functions for safe speed and are monitoring are possible Comprehensive diagnostics functions integrated
- » Parameter management for expansion modules in base module
- » Coded status display via front-side 7 segment display and status LEDs
- » Multifunction buttons (quit, start, reset) can be operated from the front side
- » Configurable via SafePLC<sup>2</sup> über USB serial adapter or Ethernet based field bus
- » **Optional: expandable with communication module (SMX5x):**
  - Standard and safe field bus protocols for communication with a higher level controller (PROFIBUS, PROFINET, DeviceNet, CANopen, CAN2.0, EtherCAT)
  - Field bus protocols with the same hardware can be switched with SafePLC<sup>2</sup>
  - Safe remote I/O communication for data exchange with distributed I/O systems
- » CAN-Communication in connection with the SMX5x for diagnostics via backplane bus assembly on hat rail
- » The mechanical construction of the SMX11P (/5x\*) is dependent on the respective forms of the base module

*\* Optional: expandable with Communication modules: SMX51 CAN2.0 / SMX52 PROFIBUS / SMX53 PROFINET / SMX54 CANopen / SMX 55 EtherCAT / SMX55 DeviceNet*

## SAFETY RELATED CHARACTERISTIC DATA

Performance Level	PL e (EN ISO 13849-1)
PFH / 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	1	
Interface for expansion modules	T-bus connector, pluggable in top-hat rail (CAN/ Ethernet)	
Number of safe digital inputs	14	
Number of safe digital outputs		
	pp-switching **	–
	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 / Terminals)	1 / 2 *	
Encoder technology (Siehe Encoder specifications)	<b>D-SUB X31:</b> SSI-Absolut, SinCos, Incremental-TTL	
	<b>Terminal X23:</b> HTL proximity sensor (10kHz)	

\* maximum 2 encoder / axis

\*\* pn/pp are configurable via SafePLC<sup>2</sup>

## ELECTRICAL DATA

Supply voltage (tolerance)		24 VDC; 2A (-15%, +20%)
Fuse	X11.1	min. 30 VDC; max. 3,15A
Max. Power consumption (logic)	SMX 11P	2,4 W
Rated data digital inputs		24 VDC; 20 mA Typ1 acc. to IEC 61131-2
Rated data digital outputs		
	pn-switching	24 VDC; 250 mA
	pp-switching	-
	auxiliary outputs	24 VDC; 250mA
	pulse outputs (clock outputs)	24 VDC; 250mA
Rated data relays outputs		
	Normally open	DC 13
		24 VDC; 2A
		AC 15
		230 VAC; 2A
	Normally closed (Readback contact)	DC 13
		24 VDC; 2A

## ENVIRONMENTAL DATA

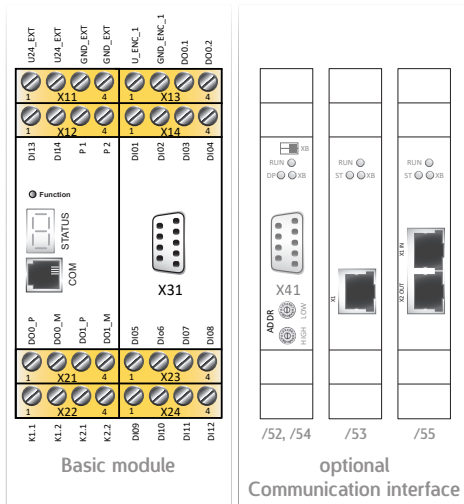
Temperature	0°C ... +50°C operation
	-25°C ... +70°C storage and transport
Class of protection	IP 20
Climatic category	3K3 acc. to DIN EN 60721-3
Min-, Maximum relative humidity (no condensation)	5% - 85%
EMC	DIN EN 61000-6-2, DIN EN 61000-6-4, DIN EN 61000-6-7, DIN EN 61800-3, DIN EN 61326-3, DIN EN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

## MECHANICAL DATA

Dimensions (HxDxW [mm])	SMX11P	100x115x45
	SMX11P (/5x*)	100x115x67,5
Weight [g]	SMX11P	310
	SMX11P (/5x*)	410
Mounting	to snap on top-hat rail	
Number of T-Bus	SMX11P	2
	SMX11P (/5x*)	3
Min. terminal cross-section / AWG	0,2 mm <sup>2</sup> / 24	
Max. terminal cross-section / AWG	2,5 mm <sup>2</sup> / 12	

\* Optional, See: „ Datasheet SMX5x“

## DEVICE INTERFACES



Interface	Description of interface
X11 – X14 / X21 – X24 /	Voltage supply and I/O interface
COM	Diagnostic- and configuration interface
X23 / X31	Encoder interfaces

## VOLTAGE SUPPLY AND I/O INTERFACE

X 11		
Pin	1 - U24_EXT	Voltage supply device +24 VDC
	2 - U24_EXT	Voltage supply device +24 VDC outputs
	3 - GND_EXT	Voltage supply device 0 VDC
	4 - GND_EXT	
X 12		
Pin	1 - DI13	Safe digital inputs
	2 - DI14	
	3 - P1	Clock outputs
	4 - P2	

X 13		
Pin	1 - U_ENC_1	Voltage supply Encoder +24V DC X31
	2 - GND_ENC_2	Voltage supply Encoder 0V DC X31
	3 - DO 0.1 4 - DO 0.2	Auxiliary outputs
X 14		
Pin	1 - DI1	Safe digital inputs
	2 - DI2	
	3 - DI3	
	4 - DI4	

X 21		
Pin	1 - D00_P	Output pn-switching
	2 - D00_M	Output pn-switching
	3 - D01_P	Output pn-switching
	4 - D01_M	Output pn-switching
X22		
Pin	1 - K1.1	Safe relay output
	2 - K1.2	
	3 - K2.1	Safe relay output
	4 - K2.2	

X 23		
Pin	1 - DI5	Safe digital inputs
	2 - DI6	
	3 - DI7	
	4 - DI8	
X 24		
Pin	1 - DI9	Safe digital inputs
	2 - DI10	
	3 - DI11	
	4 - DI12	

## DIAGNOSTIC AND CONFIGURATION INTERFACE

### Pin assignment

RJ 10, 4-pin		
Pin	Description	COM Front side
1	GND	
2	RS485-	
3	RS485+	
4	VCCH	

» With existing Ethernet-based fieldbus interface, it can be used as a diagnostic and configuration interface.

## ENCODER INTERFACES

### Pin assignment X31

Pin	Inc / Sin/Cos / SSI	Front side SMX
1	n.c.	
2	GND	
3	n.c.	
4	B / COS - / Clk -	
5	A + / SIN + / Data +	
6	A - / SIN - / Data -	
7	n.c.	
8	B + / COS + / Clk +	
9	VCC +	

### Pin assignment X23

Pin	Z1 - Z1 / Z2 - Z2	Terminal
1	A ( $\bar{A}$ ) / A ( $\bar{A}$ )	
2	-- / B ( $\bar{B}$ )	
3	A ( $\bar{A}$ ) / A ( $\bar{A}$ )	
4	-- / B ( $\bar{B}$ )	



## 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)	200 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 pulses (X31)	200 kHz
SSI-Absolut	
Data interface	<b>Serial Synchronous Interface (SSI)</b> with variable data length of 12 – 28 Bit
Data format	Binary, Gray code
Physical Layer	RS-422 compatible
Type of connection	D-SUB 9-pole
<b>Mode</b>	<b>Master or Listener</b>
SSI-Master operation	
Clock rate	150 kHz
SSI-Listener operation	
Clock rate (X31)	100 kHz ... 200 kHz
Min. clock pause time	150 µsec
Max. clock pause time	1 msec
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

## ORDER INFORMATION

### BASIC MODULES

item	description	item no.
SMX11P	Basic module, with Safe motion for 1 axis	1999

### ACCESSORIES

item	description	item no.
SMX91	Programming cable SMX	1010
SXxxx-x	Terminal connector, screw terminals (set), encoded for cabling SMX11P	on request
SXxxx-x	Terminal connector, spring terminals (set), encoded for cabling SMX11P	on request
SX0000-9	T-Bus connector voltage-carrying (grey)	1015
SXxxx-x	Y-cable for encoder splitting	on request

### EXTENSIONS

item	description	item no.
SMX52	Communication processor PROFIBUS	1004
SMX53	Communication processor PROFINET	1096
SMX54	Communication processor CANopen	1002
SMX55	Communication processor EtherCAT	1107
SMX57	Communication processor DeviceNet	1014
SMX57	Kommunikationsprozessor DeviceNet	1014

### SOFTWARE

item	description	item no.
SafePLC <sup>2</sup> 1st	Programming software, 1te License incl. Hardlock	1244
SafePLC <sup>2</sup> 2nd	Programming software, 2te License incl. Hardlock	1646
SafePLC <sup>2</sup> 3rd	Programming software, 3te License incl. Hardlock	1647