

DESCRIPTION

Free programmable and configurable modular safety controller with integrated drive monitoring for up to 12 axes

- 14 Safe digital inputs
- 10 Auxiliary outputs
- 40 Safe digital I/Os
- 2 Safe relay / 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
- Optional: safe/non-safe Fieldbus interface

CHARACTERISTIC OF THE MODULE

- » Extendable up to:
 - max. 126 safe digital inputs
 - max. 36 safe digital outputs,
 - max. 120 safe digital I/O's,
 - max. 50 safe relay outputs,
 - max. 34 auxiliary outputs
 - and/or 12 safe axes
- » Freely programmable modular controller for up to 3000 IL instructions
- » 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
- » Functionplan oriented programming via SafePLC²
- » Pulse outputs for cross-shortening detection of digital input signals
- » External contact monitoring of connected switchgear (EMU)
- » Monitored relay outputs for safety relevant functions
- » Switchable safe semi-conductor outputs pn-, pp-switching for safety-relevant functions
- » Comprehensive diagnostics functions integrated
- » Status monitoring by coded 7-segment-display and status LEDs
- » Multifunction button (quit, start, reset) can be operated from the front side
- » Configurable via SafePLC² Serial USB-adapter or ethernet-based fieldbus
- » Optional fieldbus interface (Expansion module for PROFIBUS, PROFINET, DeviceNet, CANopen, EtherNET/IP, EtherCAT, Modbus TCP/IP, PROFI-safe, FSoE)
- » **Optional: Communication interface (/DNM, /DBM):**
 - Standard and safe field bus protocols for communication with a higher level controller (PROFIBUS, PROFINET, DeviceNet, CANopen, EtherNET/IP, EtherCAT, Modbus TCP, PROFI-safe, FSoE)
 - Safe cross communication (SMMC) for data exchange between multiple base devices
 - Field bus protocols with the same hardware can be switched with SafePLC²
 - Safe remote I/O communication for data exchange with distributed I/O systems
- » The mechanical construction of the SMX100-4/2 (/x*) is dependent on the respective forms of the base module

SAFETY RELATED CHARACTERISTIC DATA

Performance Level	PL e (EN ISO 13849-1)
PFH / architecture	16,6 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 *	8
Interface for expansion modules	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	40
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	-
Encoder interfaces (D-Sub / screw terminals)	-

* Of which maximum of 6 axis modules

** pn/pp are configurable via SafePLC²

ELECTRICAL DATA

Supply voltage (tolerance)		24 VDC; 2A (-15%, +20%)
Fuse	X41.1 / A1.1	min. 30 VDC; max. 3,15A
	X41.2 / A1.2, X45.1 / A1.3, X49.1 / A1.5, X53.1 / A1.7, X57.1 / A1.9	min. 30 VDC; max. 10A
Max. Power consumption (logic)		
	SMX100-4/2	4,0 W
	SMX100-4/2/x	5,2 W
Rated data safe 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; 250 mA
	safe digital I/O	
	01 - 05 11 - 15 21 - 25 31 - 35	24 VDC; 0,5A
	06 - 10 16 - 20 26 - 30 36 - 40	24 VDC; 2A*
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 / IQx6 – IQx0	2A / 1,8A

ENVIRONMENTAL DATA

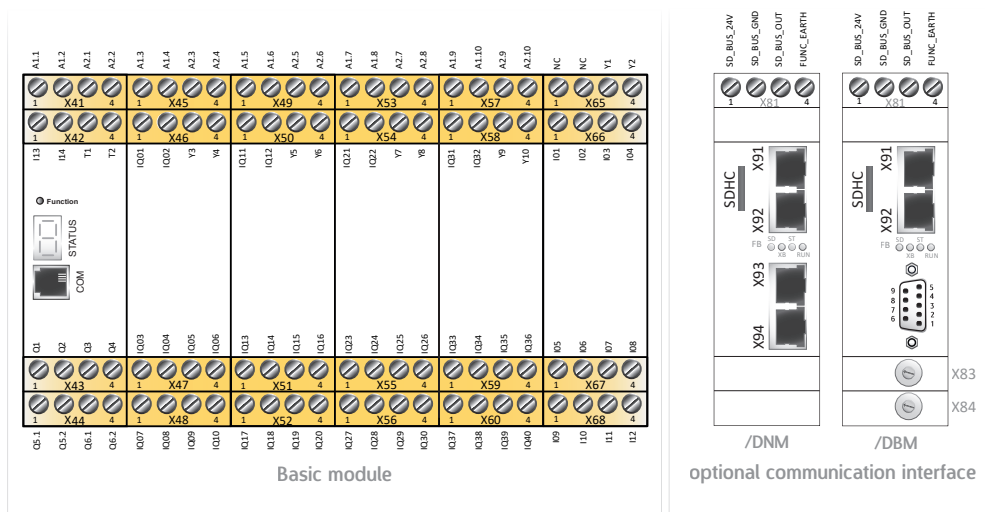
Temperature	0°C ... +50°C operation -25°C ... +70°C storage and transport
Class of protection	IP 20
Climatic category	3K3 acc. to DIN EN 60721-3
Min-, Maximum relative humidity (no condensation)	5% - 85%
EMC	DIN EN 61000-6-2, DIN EN 61000-6-4, DIN EN 61000-6-7, DIN EN 61800-3, DIN EN 61326-3, DIN EN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

MECHANICAL DATA

Dimension (HxDxW [mm])	SMX100-4/2	100x115x135
	SMX100-4/2/x *	100x115x157,5
Weight [g]	SMX100-4/2	760
	SMX100-4/2/x *	860
Mounting	to snap on top-hat rail	
Number of T-Bus	SMX100-4/2	6
	SMX100-4/2/x *	7
Min. terminal cross-section / AWG	0,2 mm ² / 24	
Max. terminal cross-section / AWG	2,5 mm ² / 12	

* Specification, see: „Optional integrated communication interface“

DEVICE INTERFACES



Interface	Description of interface
X41 – X44 / X45 – X60 / X65 - X68 / X81	Voltage supply and I/O interface
SDHC	Memory Card for safety program
COM	Diagnostic- and configuration interface
X91 / X92	Decentralised SDDC ETH and SMMC interface
X93 / X94	Fieldbus interfaces

VOLTAGE SUPPLY AND I/O INTERFACE

X 41		
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	Voltage supply device 0 VDC
X 42		
Pin	1 - I13	Safe digital inputs
	2 - I14	
	3 - T1	Clock outputs
	4 - T2	

X 43		
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 44		
Pin	1 - Q5.1	Safe relay output
	2 - Q5.2	
	3 - Q6.1	Safe relay output
	4 - Q6.2	

X 45		
Pin	1 - A1.3	Voltage supply device +24 VDC outputs
	2 - A1.4	
	3 - A2.3	Voltage supply device 0 VDC
	4 - A2.4	
X 46		
Pin	1 - IQ01	Safe digital inputs, outputs pp-switching
	2 - IQ02	
	3 - Y3	Auxiliary outputs
	4 - Y4	
X 47		
Pin	1 - IQ03	Safe digital inputs, outputs pp-switching
	2 - IQ04	
	3 - IQ05	
	4 - IQ06	
X 48		
Pin	1 - IQ07	Safe digital inputs, outputs pp-switching
	2 - IQ08	
	3 - IQ09	
	4 - IQ10	
X 49		
Pin	1 - A1.5	Voltage supply device +24 VDC outputs
	2 - A1.6	
	3 - A2.5	Voltage supply device 0 VDC
	4 - A2.6	
X 50		
Pin	1 - IQ11	Safe digital inputs, outputs pp-switching
	2 - IQ12	
	3 - Y5	Auxiliary outputs
	4 - Y6	
X 51		
Pin	1 - IQ13	Safe digital inputs, outputs pp-switching
	2 - IQ14	
	3 - IQ15	
	4 - IQ16	
X 52		
Pin	1 - IQ17	Safe digital inputs, outputs pp-switching
	2 - IQ18	
	3 - IQ19	
	4 - IQ20	

X 53		
Pin	1 - A1.7	Voltage supply device +24 VDC outputs
	2 - A1.8	
	3 - A2.7	Voltage supply device 0 VDC
	4 - A2.8	
X 54		
Pin	1 - IQ21	Safe digital inputs, outputs pp-switching
	2 - IQ22	
	3 - Y7	Auxiliary outputs
	4 - Y8	
X 55		
Pin	1 - IQ23	Safe digital inputs, outputs pp-switching
	2 - IQ24	
	3 - IQ25	
	4 - IQ26	
X 56		
Pin	1 - IQ27	Safe digital inputs, outputs pp-switching
	2 - IQ28	
	3 - IQ29	
	4 - IQ30	
X 57		
Pin	1 - A1.9	Voltage supply device +24 VDC outputs
	2 - A1.10	
	3 - A2.9	Voltage supply device 0 VDC
	4 - A2.10	
X 58		
Pin	1 - IQ31	Safe digital inputs, outputs pp-switching
	2 - IQ32	
	3 - Y9	Auxiliary outputs
	4 - Y10	
X 59		
Pin	1 - IQ33	Safe digital inputs, outputs pp-switching
	2 - IQ34	
	3 - IQ35	
	4 - IQ36	
X 60		
Pin	1 - IQ37	Safe digital inputs, outputs pp-switching
	2 - IQ38	
	3 - IQ39	
	4 - I40	

X 65		
Pin	1 - NC	No function
	2 - NC	
	3 - Y1	Auxiliary outputs
	4 - Y2	
X 66		
Pin	1 - I01	Safe digital inputs
	2 - I02	
	3 - I03	
	4 - I04	
X 67		
Pin	1 - I05	Safe digital inputs
	2 - I06	
	3 - I07	
	4 - I08	

X68		
Pin	1 - I09	Safe digital inputs
	2 - I10	
	3 - I11	
	4 - I12	
X 81 *		
Pin	1 - SD_BUS_24V	Power supply SD-BUS +24 VDC
	2 - SD_BUS_GND	Power supply SD-BUS 0 VDC
	3 - SD_BUS_OUT	SD-BUS Output
	4 - FUNC_EARTH	Funktional Earth
* only available at fieldbus interfaces		

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.

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.

FIELDBUS INTERFACES

Pin assignment female connector

Ethernet-based fieldbus interface /xNx (RJ45)				Front side
Pin	Name	Description	Colour	X93 / X94
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	

CAN-based fieldbus interface /DBM, /xBM (D-Sub)				Front side
Pin	CANopen	PROFIBUS	DeviceNet	
1	—	—	V-	
2	CAN_L	—	CAN_H	
3	isoGND	RXD/TXD-P (B)	DRAIN	
4	—	CNTR-P	CAN_L	
5	—	GND	V+	
6	—	VP (+5V)	—	
7	CAN_H	—	—	
8	—	RXD/TXD-N (A)	—	
9	—	CNTR-N	—	

OPTIONAL INTEGRATED COMMUNICATION INTERFACE

- » Subsequent expansion capability of standard to safe field bus via additional Mini SD card on the back of the module is possible (/xNx und /xBx)
- » Different specifications can be combined

General data	
Decentralised communication interface	
/D	2x RJ 45 *
Field bus interface	
/xN	2x RJ 45 **
/xB	1x Sub-D ***
MemoryCard (safety program)	
/xxM	1x Mini SD (front side, SDHC)
Memory Card (license for safe field bus)	
/xNx	1x Mini SD (rear side)
/xBx	
SD bus	plug-in terminals
status LEDs	4
Field bus adress rotary switch	
/xBx	2

* optional for SDDC or SMMC

** available field buses PROFINET, EtherCAT, Modbus TCP and Ethernet TCP/IP

*** available field buses PROFIBUS, CANopen und DeviceNet

Combination options

	/D	/DNM	/xNM	/xxM	/DBM	/xBM
Field bus protocols						
PROFIBUS			X			
DeviceNet			X			
CANopen			X			
PROFINET					X	X
Ethernet IP					X	X
EtherCAT					X	X
Modbus TCP					X	X
PROFIsafe *	X		X		X	X
FSoE *					X	X

* Specification required in your order

» The CAN-based and Ethernet-based fieldbus interfaces can be switched via the SafePLC² between the fieldbus protocols

ORDER INFORMATIONS

BASIC MODULES

item	description	item no.
SMX100-4/2	Modular Basic module with 40 safe I/O's, without Safe Motion	2111
SMX100-4/2/D	Modular Basic module + decentralised communication	2112
SMX100-4/2/DNM	Modular Basic module + decentralised communication + Ethernet-based field bus interface + Memory Card	2114
SMX100-4/2/DNM -FSoE	Modular Basic module + decentralised communication + Ethernet-based field bus interface + Memory Card	2115
SMX100-4/2/xNM	Modular Basic module + Ethernet-based field bus interface + Memory Card	2171
SMX100-4/2/xNM -FSoE	Modular Basic module + Ethernet-based field bus interface + Memory Card	2172
SMX100-4/2/xxM	Modular Basic module + Memory Card	2173
SMX100-4/2/DBM	Modular Basic module + decentralised communication + CAN-based field bus interface + Memory Card	2174
SMX100-4/2/xBM	Modular Basic module + CAN-based field bus interface + Memory Card	2175

ACCESSORIES

item	description	item no.
SMX91	Programming adapter SMX	1010
SXxxxx-x	Terminal connector, screw terminals (set), encoded for cabling SMX100-4/2	on request
SXxxxx-x	Terminal connector, spring terminals (set), encoded for cabling SMX100-4/2	on request
SX0000-9	T-Bus connector voltage-carrying (grey)	1015
SXxxx-x	Y-cable for encoder splitting	on request
FSoE License	Fieldbus license for FSoE	2366
PROFIsafe License	Fieldbus license for PROFIsafe	2319

EXTENSIONS

item	description	item no.
SMX131/2	I/O expansion module	1616
SMX131R/2	I/O expansion module with relay option	1617
SMX131R-4/2	I/O expansion module with relay option	2232
SMX132-0/2/D	Decentral I/O expansion module	1573
SMX132-0R/2/D	Decentral I/O expansion module with relay option	2233
SMX132-1/2/D	Decentral I/O expansion module	1577
SMX132-1R/2/D	Decentral I/O expansion module with relay option	1634
SMX121-2/2	Axis extension module for 1 axis + extended encoder functionality	2187
SMX121-PXV/2	Axis extension module for 1 axis with safePXV encoder interface	2610
SMX122/2	Axis extension module for up to 2 axes	2188
SMX122-2/2	Axis extension module for up to 2 axes + extended encoder functionality	2189
SMX122-1-PXV/2	Axis extension module for up to 2 axes + extended encoder functionality + safePXV encoder interface	2658
SMX122A/2	Axis extension module for up to 2 axes + analogue option (voltage + current)	2169
SMX122A-I/2	Axis extension module for up to 2 axes + analogue option (current)	2170
SMX122A-U/2	Axis extension module for up to 2 axes + analogue option (voltage)	2311
SMX122-2A/2	Axis extension module for up to 2 axes + extended encoder functionality + analogue option (voltage + current)	2190

item	description	item no.
SMX122-2A-I/2	Axis extension module for up to 2 axes + extended encoder functionality + analogue option (current)	2312
SMX122-2A-U/2	Axis extension module for up to 2 axes + extended encoder functionality + analogue option (voltage)	2313
SMX111/2/D	Decentral axis extension module for 1 axis	2191
SMX111-2/2/D	Decentral axis extension module for 1 axis + extended encoder functionality	1631
SMX111-PXV/2/D	Decentral axis extension module for 1 axis with safePXV encoder interface	on request
SMX112/2/D	Decentral axis extension module for up to 2 axes	2192
SMX112-1-PXV/2/D	Decentral axis extension module for up to 2 axes with extended encoder functionality + safePXV encoder interface	on request
SMX112-2/2/D	Decentral axis extension module for up to 2 axes + extended encoder functionality	2230
SMX112A/2/D	Decentral axis extension module for up to 2 axes + analogue option (voltage + current)	2167
SMX112A-I/2/D	Decentral axis extension module for up to 2 axes + analogue option (current)	2168
SMX112A-U/2/D	Decentral axis extension module for up to 2 axes + analogue option (voltage)	2314
SMX112-2A/2/D	Decentral axis extension module for up to 2 axes + extended encoder functionality + analogue option (voltage + current)	2231
SMX112-2A-I/2/D	Decentral axis extension module for up to 2 axes + extended encoder functionality + analogue option (current)	2315
SMX112-2A-U/2/D	Decentral axis extension module for up to 2 axes + extended encoder functionality + analogue option (voltage)	2316

SOFTWARE

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