



DESCRIPTION

FSoE slave module for safe speed and Position of 1 axis for further evaluation in an FSoE master module

- 14 safe digital inputs
- 2 Encoder interfaces
- 2 Relay outputs
- 2 Auxiliary outputs
- Up to 4 safe digital outputs
- Safety controller up to PL e acc. to EN ISO 13849-1 or SIL3 acc. to IEC 61508

CHARACTERISTIC OF THE MODULE

- » Decentralized safe axle assembly for the EtherCAT environment
- » Safe detection of speed and position from one axis
- » Complete speed and position-related safety functions for drive monitoring IEC 61800-5-2 integrated into firmware
- » 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-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
- » Function plan-oriented parametrization
- » Parameter management for expansion modules in base device
- » Comprehensive diagnostics functions integrated
- » Coded status display via front-side 7 segment display and status LEDs

SAFETY RELATED CHARACTERISTIC DATA

Performance Level	PL e (EN ISO 13849-1)
PFH / architecture	$2,0 * 10^{-9}$ / 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	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)	1 / 1 **
Encoder technology (See Encoder specifications)	D-SUB Enc 1.1: SSI-Absolut, SinCos, Incremental-TTL Terminal X23: HTL proximity sensor (10kHz)
Cycle time PLC	8 ms
Fast Channel	2 ms
Safe Slave	FSoE

* pn/pp are configurable via SafePLC²

** maximum 2 encoder / axis

ELECTRICAL DATA

Supply voltage (tolerance)		24 VDC; 2A (-10%, +20%)
Fuse	24+	min. 30 VDC; max. 3,15A
	AQ1+	min. 30 VDC; max. 10A
Max. Power consumption (logic)		
	SDU-11	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

DERATING OUTPUTS

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

type of module	outputs	temperature 30°C / 50°C
SDU-11	QX 00 – QX 03	2A / 1,8A

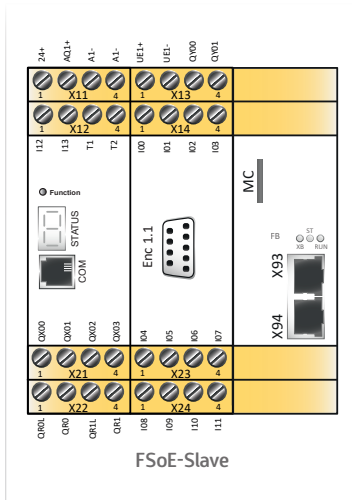
ENVIRONMENTAL DATA

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])	SDU-11	100x115x67,5
Weight [g]	SDU-11	390
Mounting		to snap on top-hat rail
Min. terminal cross-section / AWG		0,2 mm ² / 24
Max. terminal cross-section / AWG		2,5 mm ² / 12

DEVICE INTERFACES



Interface	Description of interface
X11 – X14 / X21 – X24	Voltage supply and I/O interface
COM	Diagnostic- and configuration interface
X93 - ECAT IN / X94 - ECAT OUT	Fieldbus interfaces
I04 - I07 / Enc 1.1	Encoder interfaces

VOLTAGE SUPPLY AND I/O INTERFACE

X11			
Pin	1 - 24+	Voltage supply device +24 VDC	
	2 - AQ1+	Voltage supply device +24 VDC outputs	
	3 - A1- 4 - A1-	Voltage supply device 0 VDC	
X12			
Pin	1 - I12 2 - I13	Safe digital inputs	
	3 - T1 4 - T2	Clock outputs	
	X21		
	Pin	1 - QX00	Safe output pn-/ pp-switching 00
2 - QX01		Safe output pn-/ pp-switching 01	
3 - QX02		Safe output pn-/ pp-switching 02	
4 - QX03		Safe output pn-/ pp-switching 03	
X22			
Pin	1 - QR0L	Safe relay input	
	2 - QR0	Safe relay output	
	3 - QR1L	Safe relay input	
	4 - QR1	Safe relay output	

X13			
Pin	1 – UE1+	Voltage supply encoder +24 VDC	
	2 – UE1-		
	3 - QY00 4 - QY01	Auxiliary outputs	
	X14		
Pin	1 - I00 2 - I01 3 - I02 4 - I03	Safe digital inputs	
	X23		
	Pin	1 - I04 2 - I05 3 - I06 4 - I07	Safe digital inputs
		X24	
Pin		1 - I08 2 - I09 3 - I10 4 - I11	Safe digital inputs

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.

FIELD BUS INTERFACES

Pin assignment, ethernet-based interface

EtherCAT interface (RJ45)				
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	

INTEGRATED COMMUNICATION INTERFACE

» The integrated communication interface of the FSoE slave includes a safe EtherCAT interface for decentralized communication with an FSoE-Master unit.

General data			
Fieldbus interface			
X93 / X94	EtherCAT	2x RJ 45	
Memory Card (safety program)			
1x Mini SD (front side)			
Status LED's	3		

ENCODER INTERFACES

Pin assignment Enc 1.1

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

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
High Resolution Mode	
Max. frequency of input clock pulses (X31)	-
SSI-Absolut	
Data interface	Serial Synchronous Interface (SSI) with variable data length of 12 – 28 Bit
Data format	Binary, Gray code
Physical Layer	RS-422 compatible
Type of connection	D-SUB 9pole
Mode	Listener
SSI Listener Mode	
Clock rate (Enc 1.1.)	100 kHz ... 250 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 INFORMATIONS

FSoE SLAVES

item	description	item no.
SDU-11	Decentralized axis expansion module for one axis	2394

ACCESSORIES

item	description	item no.
SMX91	Programming cable SCU	1010
SXxxx-x	Terminal connector, screw terminals (set), encoded for cabling SDU-11	on request
SXxxx-x	Terminal connector, spring terminals (set), encoded for cabling SDU-11	on request

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