

DESCRIPTION

FSoE slave module for safe speed and Position of up to 2 axes for further evaluation in an FSoE master module

- 14 Safe digital inputs
- Up to 4 safe digital outputs
- 4 Encoder interfaces
- 2 Relay / pulse outputs
- 2 Auxiliary 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 of up to two axes
- » Fast response time with integrated Fast Channel Task with guaranteed processing time of 2 ms
- » 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
- » Functionplan-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	2
Encoder interfaces (D-Sub / screw terminals)	2 / 2 **
Encoder technology (See Encoder specifications)	<p>D-SUB Enc 1.1: SSI-Absolut, SinCos, Incremental-TTL</p> <p>D-SUB Enc 1.2: SSI-Absolut, SinCos, Incremental-TTL</p> <p>Terminal X23: HTL proximity sensor (10kHz)</p>
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	X11.1 / 24+	min. 30 VDC; max. 3,15A
	X11.2 / AQ1+	min. 30 VDC; max. 10A
Max. Power consumption (logic)	SDU-21	4,7 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-21	QX 00 – QX 03	2A / 1,8A

2A outputs can be fully loaded at an ambient temperature of up to 30°C. From a ambient temperature from 30°C to maximum 50°C, the 2A outputs can be loaded to a maximum of 1.8A.

The maximum total current is 10A. (IO-Board)

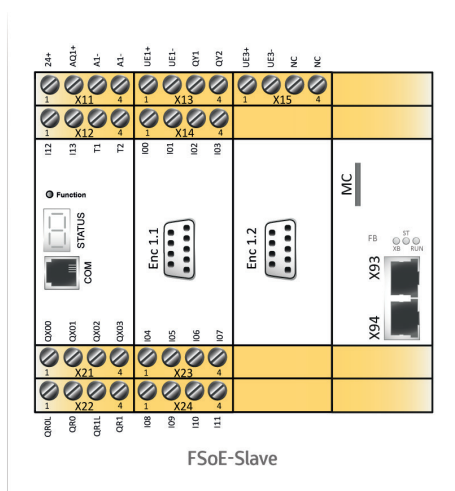
ENVIRONMENTAL DATA

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-21	100x115x90
Weight [g]	SDU-21	410
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 / X15 – X24	Voltage supply and I/O interface
COM	Diagnostic- and configuration interface
X93 - ECAT IN / X94 - ECAT OUT	Fieldbus interfaces
ENC 1.1 / ENC 1.2	Encoder interfaces
X23	Encoder interfaces

VOLTAGE SUPPLY AND I/O INTERACE

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+ 2 - UE1-	Voltage supply +24 VDC encoder	
	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
		X15	
Pin		1 - UE3+ 2 - UE3-	Voltage supply +24 VDC encoder
		3 - UR3	Voltage supply 0 V
	4 - NC	No function	

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

Safe 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 decentralised communication with an FSoE-Master unit.

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

ENCODER INTERFACES

Pin assignment Enc 1.1 , Enc 1.2

Pin	Enc 1.1 / Enc 1.2 Inc / Sin/Cos / SSI	Front side SDU
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 (Enc 1.1 / Enc 1.2)	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 (Enc 1.1, Enc 1.2)	200 kHz

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, Enc 1.2)	100 kHz ... 250 kHz
Min. clock pause time	150 µsec
Max. clock pause time	1 msec

ENCODER SPECIFICATIONS

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

FSoE SLAVES

item	description	item no.
SDU-21	Decentralized axis expansion module for 2 axes	2396

ACCESSORIES

item	description	item no.
SMX91	Programming adapter	1010
SXxxx-x	Terminal connector, screw terminals (set), encoded for cabling SDU-21	on request
SXxxx-x	Terminal connector, spring terminals (set), encoded for cabling SDU-21	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