SDU-12

SCUseries » SCU Slaves

DESCRIPTION

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

- 14 Safe digital inputs
- Up to 4 safe digital outputs
- 5 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 one axis
» 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-shorting detection of digital input signals
» 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
» Allows the connection of 2 rotary encoders per axis (SSI, SinCos, TTL, Proxy)
» 2nd encoder interface also supports HTL (200 kHz), SinCos High-Resolution and Resolver

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SAFETY RELATED CHARACTERISTIC DATA

Performance Level	PL e (EN ISO 13849-1)
PFH / architcture	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)		2 / 3 **
Encoder technology (See Encoder specifications)		**D-SUB Enc 1.1:** SSI-Absolut, SinCos, Incremental-TTL **D-SUB Enc 1.2:** SSI-Absolut, SinCos (HighRes), Incremental-TTL, Resolver **Terminal X23:** HTL proximity sensor (10 kHz), **Terminals X27 , X28:** Incremental-HTL (200 kHz)
Ccyle time PLC		8 ms
Fast Channel		2 ms
Safe Slave		FSoE

* pn/pp are configurable via SafePLC²

** maximum 2 encoder / axis

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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-12	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-12	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)*

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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-12	100x115x90
Weight [g]	SDU-12	410
Mounting		to snap on top-hat rail
Min. terminal cross-section / AWG		0,2 mm² / 24
Max. terminal cross-section / AWG		2,5 mm² / 12

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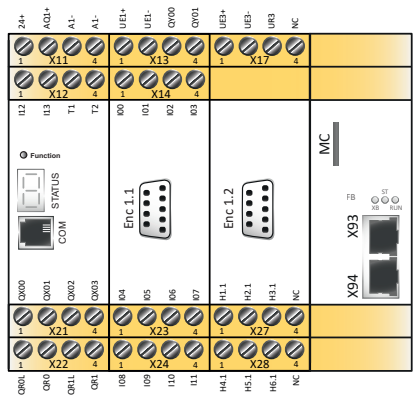
DEVICE INTERFACES



FSoE-Salve

Interface	Description of interface
X11 – X14 / X17 – X24	Voltage supply and I/O interface
COM	Diagnostic- and configuration interface
MC	Memory card for safety peogram
X93 - ECAT IN / X94 - ECAT OUT	Fieldbus interfaces
X23 / X27 – X28	Encoder interfaces
Enc 1.1 / Enc 1.2	Encoder interfaces

VOLTAGE SUPPLY AND I/O INTERACE

X11		
Pin	1 - 24+	Volatge 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
X17		
Pin	1 - UE3+ 2 -UE3-	Voltage supply +24 VDC encoder
	3 - UR3	Voltage supply 0 V
	4 - NC	No function

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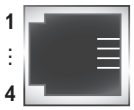
DIAGNOSTIC AND CONFIGURATION INTERFACE

Pin assignment

RJ 10, 4-pin

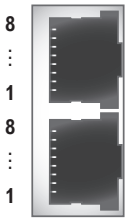
Pin	Description	COM front side
1	GND	
2	RS485-	
3	RS485+	
4	VCCH	

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

FIELDBUS 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)			
		MC	1x Mini SD (front side)
Status LED`s			3

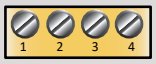
ENCODER INTERFACES

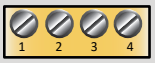
Pin assignment Enc 1.1 , Enc 1.2

Pin	Enc 1.1 Inc / Sin/Cos / SSI	Enc 1.2 Inc / Sin/Cos / SSI	Enc 1.2 Resolver	Front side SDU
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 (Ā) / A (Ā)*	
2	*– – / B ($\overline{B}$)*	
3	*A (Ā) / A (Ā)*	
4	*– – / B ($\overline{B}$)*	

Pin	A+/A-	A+ Signal	
1 – H1.1	A +	24V	X27 
2 – H2.1	A -	A	
3 – H3.1	A +	GND	
4 – NC	—	—	

Pin	B+/B-	B+ Signal	
1 – H4.1	B +	24V	X28 
2 – H5.1	B -	B	
3 – H6.1	B +	GND	
4 – NC	—	—	

ENCODERSPECIFICATIONS

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 / 250 kHz
Sin/Cos		
	Physical Layer	RS-422 compatible
	Measuring signal A/B	Track with 90 degree phase difference
	Type of connenction	D-SUB 9pole
	Standard Mode	
	Max. frequency of input clock pulses (Enc 1.1 / Enc 1.2)	200 kHz / 250 kHz
	High Resolution Mode	
	Max. frequency of input clock pulses (Enc 1.2)	15 kHz

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SSI-Absolut		
	Data interface	**S**erial **S**ynchronous **I**nterface (**SSI**) with variable data length of 12 – 28 Bit
	Data format	Binary, Gray code
	Physical Layer	RS-422 compatible
	Type of connenction	D-SUB 9pole
	Mode	**Listener**
	SSI-Listener Mode	
	Clock rate (Enc 1.1 / Enc 1.2)	100 kHz ... 250 kHz / 100 kHz ... 350 kHz
	Min. clock pause time	150 µsec
	Max. clock pause time	1 msec
Resolver		
	Measuring signal	Sin/Cos – track with 90 degree phase difference
	Signal frequency	max. 600 Hz (900 Hz Deep pass)
	Input voltage	max. 8 Vss (at 4,7 kΩ)
	Resolution	9 Bit / pole
	Supported pole number	2 - 16
	Type of connection (Enc 1.2)	D-SUB 9-pole
	Mode	**Listener**
	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°
Incremental - 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

ORDER INFORMATION

FSoE SLAVES

item	description	item no.
SDU-12	Decentralized axis expansion module for one axis	2395

ACCESSORIES

item	description	item no.
SMX91	Programming cable SCU	1010
SX*xxxx-x*	Terminal connector, screw terminals (set), encoded for cabling SDU-12	on request
SX*xxxx-x*	Terminal connector, spring terminals (set), encoded for cabling SDU-12	on request

SOFTWARE

item	description	item no.
SafePLC² 1st	Programming software, 1te License incl. Hardlock	1244
SafePLC² 2nd	Programming software, 2te License incl. Hardlock	1646
SafePLC² 3rd	Programming software, 3te License incl. Hardlock	1647

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