SSB-x

SCU SERIES » SCU Slaves

DESCRIPTION

FSoE slave module for safe speed and Position of up to 6 axes for further evaluation in an FSoE master module

- Depending on the encoder type and combination, applications up to PL e or SIL3 can be realized
- Update time minimal up to 1 ms
- 1 ms for safe data; 62,5 µs for non-safe encoder values
- Optional additional safe inputs and outputs

CHARACTERISTIC OF THE MODULE

» Safe detection of speed and position for up to 6 axes suitable for applications up to SIL3 (IEC 61508) / PL e (EN ISO 13849-1)

» Parametriable interface for digital and analog digital encoders

» With an update time of minimal up to 1ms, applications with a high dynamic security requirement can also be implemented

» Time resolution 1 ms for safe data of speed and position, 62.5 µs for non-safe encoder values

» Optional: additional safe inputs and outputs (8/8)

» The mechanical construction of the SSB-x* is dependent on the respective forms of the module

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SAFETY RELATED CHARACTERISTIC DATA

Performance Level		PL e (EN ISO 13849-1)	
PFH / architecture	**EnDat 2.2** $1{,}713*10^{-8}$ / Cat. 4	**DSL** $1{,}795*10^{-8}$ / Cat.4	
MTTFd	43 years	41,7 years	
DCavg	high	high	
Safety Integrity Level		SIL 3 (IEC 61508)	
Proof test interval		20 years = max. operating period	

GENERAL DATA

Number of safe digital inputs (optional)		8
Number of safe digital outputs (optional)		8
Resolution of safe speed		2^{16}
Resolution secure position		2^{24}
Resolution non-safe position		up to 2^{48}
Cycle time safe data		Min 1 ms
Cycle time non-safe data		Min 62,5 µs
Number of pulse outputs (clock outputs)		2
Type of Connection		plug connection
	Encoder	M8-plug
	EtherCAT fieldbus interface	M12-plug
	Supply voltage I/O	M12-plug
	Supply voltage device	M12-plug
Axis monitoring (axis / encoder interfaces)		
	SSB-3-x	3 / 6
	SSB-6-x	6 / 6
Encoder technology*		EnDAT 2.2, Hiperface DSL, Digital-analogue Encoder technology: SINCOS/ Resolver (in preperation)
Encoder voltage supplies (monitoring)		5 V, 8V, 10V, 12V, 20V, 24V

* see „ encoder specifications"

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ELECTRICAL DATA

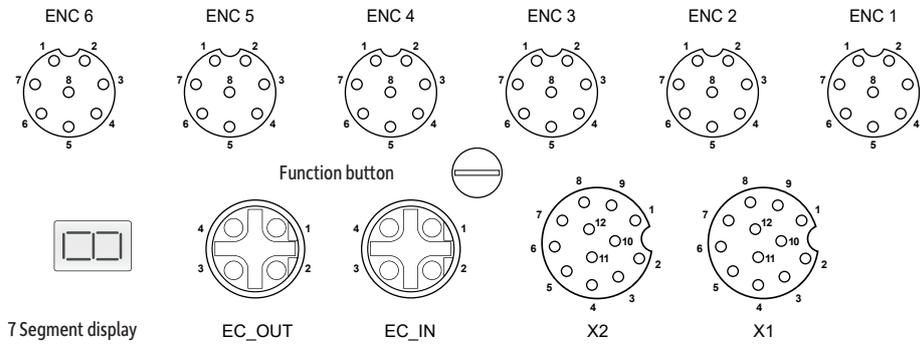|		
Supply voltage		19,2 V ... 30 V, Type SELV / PELV
Fuse	device supply	8A
	brake supply	8A
Max. Power consumption (logic)		
	SSB-x	3 W
Rated data digital inputs		24 VDC; 20 mA, Type1 acc. to EN 61131-2
Rated data digital outputs		4x 0,5A, 5x 1A, 1x 2A
2x	SDO_7 - 8	0,5 A (leakage current <1,2 mA)
5x	SDO_1 - 5	1 A (leakage current < 5 mA)
1x	SDO_6	2 A (leakage current < 5mA)
	pulse outputs (clock outputs)	2x 0,5 A
Securing of voltage supply device / outputs		2A / 10 A

ENVIRONMENTAL DATA

Temperature	0°C … +50°C operation
	-25°C … +70°C storage and transport
Classs of protection	IP 67
Climatic category	3K3 acc. to DIN EN 60721-3
Min-, Maximum relative humidity (no condensation))	5% - 85%
EMC	DIN EN 55011, DIN EN 61000-6-2, DIN EN 61131-2:2007

MECHANICAL DATA

Dimension (HxDxW [mm])		
	SSB-x	ca. 64x176x170mm
Weight [g]		
	SSB-x	720
Mounting		mounting plate

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DEVICE INTERFACES

ENC 6   ENC 5   ENC 4   ENC 3   ENC 2   ENC 1

Function button

7 Segment display   EC_OUT   EC_IN   X2   X1

PIN ASSIGNMENTS SSB-6-ENDAT-X[1]

EC_IN		
Pin	1 - TX1_P	Transmit Data +
	2 - RX1_P	Receive Data +
	3 - TX1_N	Transmit Data −
	4 - RX1_N	Receive Data −

EC_OUT		
Pin	1 -TX2_P	Transmit Data +
	2 - RX2_P	Receive Data +
	3 - TX2_N	Transmit Data −
	4 - RX2_N	Receive Data −

ENC 1-6 [2]		
Pin	1 - ENC_**x**_DATA_P	Encoder Data input +
	2 - ENC_**x**_DATA_N	Encoder Data input −
	3 - ENC_**x**_CLK_P	Encoder Clock +
	4 - ENC_**x**_CLK_N	Encoder Clock −
	5 - UB_ENC_**x**	Voltage supply encoder +24 VDC
	6 - UE-	Voltage supply encoder 0 VDC
	7 - SDO_**x**	Safe digital output **(optional)**
	8 - GND	Ground

X2 (optional) [2]		
Pin	1 - SDO_7	Safe digital outputs
	2 - SDO_8	
	3 - T1	Clock outputs
	4 - T2	
	5 - AQ-	Voltage supply Safe Outputs 0 VDC
	6 - AQ+	Voltage supply Safe Outputs +24 VDC
	7 - AQ+	
	8 - AQ+	Voltage supply Safe Outputs +24 VDC
	9 - AQ+	
	10 - AQ-	Voltage supply Safe Outputs 0 VDC
	11 - AQ-	
	12 - AQ-	

X1 [2]		
Pin	1 - SDI_1	Safe dgital Inputs **(optional)**
	2 - SDI_2	
	3 - SDI_3	Safe dgital Inputs **(optional)**
	4 - SDI_4	
	5 - SDI_5	Safe dgital Inputs **(optional)**
	6 - SDI_6	
	7 - SDI_7	Safe dgital Inputs **(optional)**
	8 - SDI_8	
	9 - GND	Voltage supply device 0 VDC
	10 - U24+	Voltage supply device +24 VDC
	11 - U24+	
	12 - GND	Voltage supply device 0 VDC

x = 1 ... 6
[1] = **SSB-6-EnDat-IO:** with I/O`s, **SSB-6-EnDat:** without I/O´s
[2] = optional available with I/O`s

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DEVICE INTERFACES

ENC 6 ENC 5 ENC 4 ENC 3 ENC 2 ENC 1

Function button

7 Segment display   EC_OUT   EC_IN   X2   X1
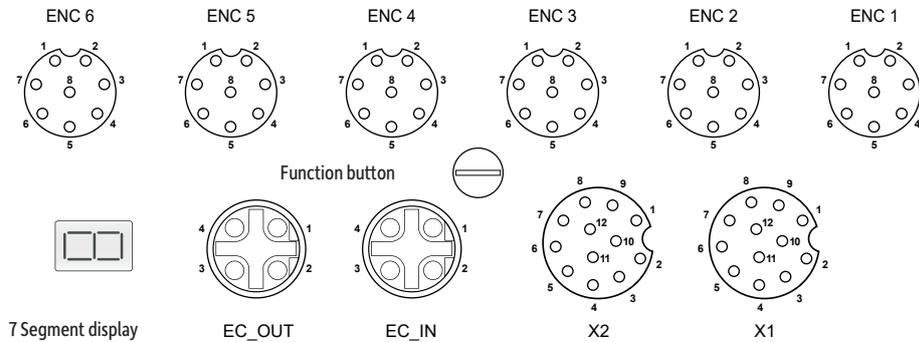
PIN ASSIGNMENTS SSB-6-DSL-x[1]

EC_IN		
Pin	1 - TX1_P	Transmit Data +
	2 - RX1_P	Receive Data +
	3 - TX1_N	Transmit Data −
	4 - RX1_N	Receive Data −

EC_OUT		
Pin	1 - TX2_P	Transmit Data +
	2 - RX2_P	Receive Data +
	3 - TX2_N	Transmit Data −
	4 - RX2_N	Receive Data −

ENC 1-6 [2]		
Pin	1 - DSLx_P	Encoder Data input +
	2 - DSLx_N	Encoder Data input −
	3 - NC	
	4 - NC	No function
	5 - NC	
	6 - GND	Ground
	7 - SDO_x	Safe digital Outputs (optional)
	8 - NC	No function

X2 (optional) [2]		
1 - SDO_7		Safe digital outputs
2 - SDO_8		
3 - T1		Clock outputs
4 - T2		
5 - AQ-		Voltage supply Safe Outputs 0 VDC
6 - AQ+		Voltage supply Safe Outputs +24 VDC
7 - AQ+		
8 - AQ+		Voltage supply Safe Outputs +24 VDC
9 - AQ+		
10 - AQ-		Voltage supply Safe Outputs 0 VDC
11 - AQ-		
12 - AQ-		

X1 [2]		
Pin	1 - SDI_1	Safe digital Inputs (optional)
	2 - SDI_2	
	3 - SDI_3	Safe digital Inputs (optional)
	4 - SDI_4	
	5 - SDI_5	Safe digital Inputs (optional)
	6 - SDI_6	
	7 - SDI_7	Safe digital Inputs (optional)
	8 - SDI_8	
	9 - GND	Voltage supply device 0 VDC
	10 - U24+	Voltage supply device +24 VDC
	11 - U24+	
	12 - GND	Voltage supply device 0 VDC

x = 1 ... 6
[1] = **SSB-6-DSL-IO:** with I/O`s, **SSB-6-DSL:** without I/O´s
[2] = optional available with I/O`s

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DEVICE INTERFACES

ENC 6   ENC 5   ENC 4   ENC 3   ENC 2   ENC 1

Function button

7 Segment display   EC_OUT   EC_IN   X2   X1
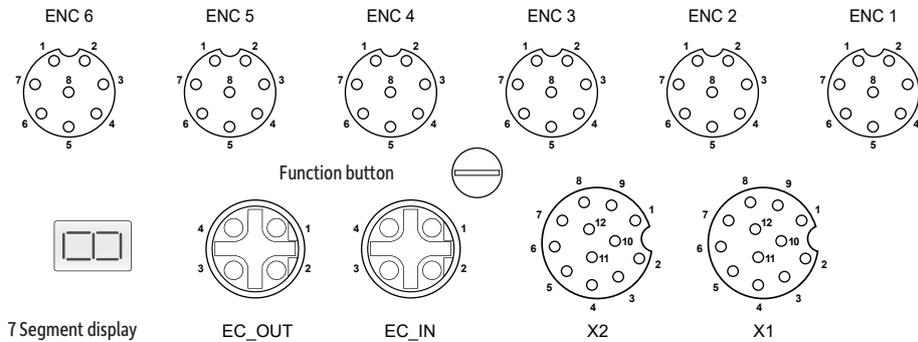
PIN ASSIGNMENTS SSB-6-A-x[1)]

EC_IN

Pin		
	1 - TX1_P	Transmit Data +
	2 - RX1_P	Receive Data +
	3 - TX1_N	Transmit Data −
	4 - RX1_N	Receive Data −

EC_OUT

Pin		
	1 -TX2_P	Transmit Data +
	2 - RX2_P	Receive Data +
	3 - TX2_N	Transmit Data −
	4 - RX2_N	Receive Data −

ENC 1-6 [2)]

Pin		
	1 - ENC_SIN +	Encoder SIN +
	2 - ENC_SIN -	Encoder SIN −
	3 - ENC_COS +	Encoder COS +
	4 - ENC_COS -	Encoder COS -
	5 - UB_V+ / Ref +	Voltage supply encoder / reference + + 24 VDC
	6 - UB_V - / Ref -	Voltage supply encoder / reference - 0 VDC
	7 - SDO_**x**	Safe digital outputs **(optional)**
	8 - GND	Ground

X2 (optional) [2)]

Pin		
	1 - SDO_7	Safe digital outputs
	2 - SDO_8	
	3 - T1	Clock outputs
	4 - T2	
	5 - AQ-	Voltage supply Safe Outputs 0 VDC
	6 - AQ+	Voltage supply Safe Outputs +24 VDC
	7 - AQ+	
	8 - AQ+	Voltage supply Safe Outputs +24 VDC
	9 - AQ+	
	10 - AQ-	Voltage supply Safe Outputs 0 VDC
	11 - AQ-	
	12 - AQ-	

X1 [2)]

Pin		
	1 - SDI_1	Safe digital Inputs **(optional)**
	2 - SDI_2	
	3 - SDI_3	Safe digital Inputs **(optional)**
	4 - SDI_4	
	5 - SDI_5	Safe digital Inputs **(optional)**
	6 - SDI_6	
	7 - SDI_7	Safe digital Inputs **(optional)**
	8 - SDI_8	
	9 - GND	Voltage supply device 0 VDC
	10 - U24+	Voltage supply device +24 VDC
	11 - U24+	
	12 - GND	Voltage supply device 0 VDC

x = 1 ... 6
[1)] = **SSB-6-A-IO:** with I/O`s, **SSB-6-A:** without I/O´s
[2)] = optional available with I/O`s

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ENCODER SPECIFICATIONS

EnDAT 2.2	
Standard specification	Mixed / Clk+ Date
Encoder type	EQI1131, ECI1119, ECI1319
Resolution	12 bit multi turn (only EQI) 19 bit single turn for non-safe position 10 bit single turn for safe position
Clock frequency	10 MHz
Cable length	20 m
Sampling cycle	Non-safe position: 62,5 µs, safe position. 1 ms
Transmission of non-safe position (EtherCAT)	62,5 µs / 125 µs / 250 µs (configurable)

Hiperface DSL	
Standard specification	Mixed / Clk+ Date
Encoder type	EKM36-2KF0A018A EKM36-2KF0A020A EKS36-2KF0A018A
Resolution	11 bit / 12 bit multi turn (only EKM) 18 bit / 20 bit single turn for non-safe position 9 bit single turn for safe position
Cable length	100 m
Sampling cycle	Non-safe position: 125 µs, safe position. 1 ms
Transmission of non-safe position (EtherCAT)	125 µs / 250 µs (configurable)

SinCos / TTL	in preparation
Amplitude SinCos	1 VSS + / - 0,3 V
Phase fault	max. 30°
Type of connection	M8-plug
High Resolution Mode	
Max. frequency of input clocks	500 kHz
Physical Layer	± 0.5Vss (without voltage offset)
Measuring signal A/B	Track with 90 degree Phase difference

SSI-Absolut	in preparation
Data interface	**S**erial **S**ynchronous **I**nterface (**SSI**) with variable data length of 12 – 28 bits
Data format	Binary, gray-code
Type of connection	M8-plug
Mode	**Master or Listener**
SSI-Master operation	
clock rate	250 - 1500 kHz
SSI-Listener operation	
clock rate	250 - 1500 kHz
Max frame length/data length	32 / 28
Pos. user data	adjustable

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Resolver		in preparation
Measuring signal A/B	SIN/COS-track with 90 degree Phase difference	
Input	max. 16 VSS (an 16 Ω)	
Resolution	9 Bit / Pol	
Support poles	2 - 6	
Type of connection	M8-plug	
Mode	**Master or Listener**	
Resolver-Master operation		
Reference frequency	8 kHz	
Resolver-Listener operation		
Reference frequency	4 kHz - 16 kHz	
Reference amplitude	8 VSS - 28 VSS	
Reference signal	Sinusoidal, triangle	
Transmission ratio	2:1, 3:1, 4:1	
Phase fault	max. 8°	

ENCODER COMBINATIONS

		2. Encoder				
1. Encoder		none	SSI	SinCos	Resolver	TTL
6-axis	EnDAT 2.2	V/P [1]				
	Hiperface DSL	V/P [1]				
	SinCos	V [2]				
	Resolver	V				
	TTL [4]	V [3]				
3-axis	EnDAT 2.2		V/P	V/P	V/P	V/P
	Hiperface DSL		V/P	V/P	V/P	V/P
	SSI [4]		V/P	V/P	V/P	V/P
	SinCos [4]			V	V	V
	Resolver [4]			V	V	V
	TTL [4]			V	V	V

SIL2/PL d
SIL3/PL e

V	safe speed
P	safe position
[1]	SIL3/PL e in preparation
[2]	SIL3/PL e only in conjunction with qualified encoder types
[3]	Only allowed for dynamic monitoring (no standstill monitoring)
[4]	in peparation

ORDER INFORMATIONS

SLAVES

	item	description	item no.
	SSB-6-EnDAT	FSoE Slave, Axes expansion module 6 Axes, EnDat2.2, without IO	1656
	SSB-6-EnDAT-IO	FSoE Slave, Axes expansion module 6 Axes, EnDat2.2 with IO	on request
	SSB-6-DSL	FSoE Slave, Axes expansion module 6 Axes, HiperfaceDSL, without IO	1665
	SSB-6-DSL-IO	FSoE Slave, Axes expansion module 6 Axes, HiperfaceDSL, with IO	on request
in preparation	SSB-6-A	FSoE Slave, Axes expansion module 6 Axes, SinCos / resolver, without IO	on request
in preparation	SSB-6-A-IO	FSoE Slave, Axes expansion module 6 Axes, SinCos / resolver, with IO	on request

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