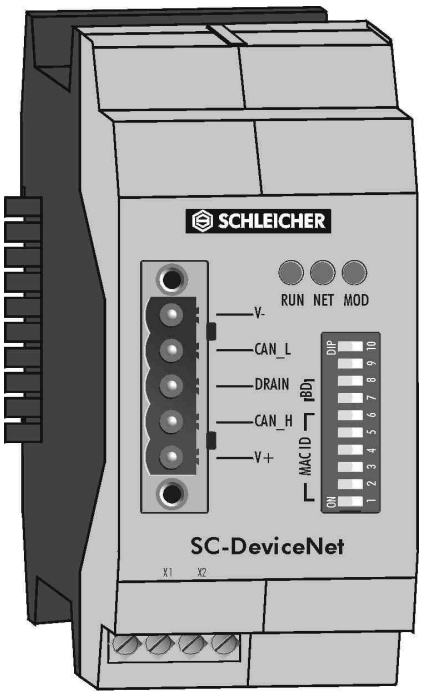
SAFETY CENTER Bus Coupler Module — SC-DeviceNet-A

PI 0118-0502 E



EN 954-1	Safety Category	4

Bus coupler module for the modular Safety Center (SC) safety control unit for emergency-off, safety door applications and selenoid-operated switch monitoring.

- diagnostics through DeviceNet field bus
- baud rate up to 500 kBaud
- 27 bytes SC system information
- 2 outputs for remote start of the SC system

Equipment Description

The SC-DeviceNet bus coupler module is mounted in a 45 mm wide rack designed for 35 mm standard rails according to EN 50022. The device is equipped with a plug-in screw-type terminal block.
Power is supplied through the internal SC bus.

Features

- Not a safety-related bus coupler.
- Operation with one Master.
- SC-DeviceNet can be shut down during bus operation. The operation of other Slaves can be continued.
- Slave addresses (MAC IDs) can be entered from 0 – 63.
- Each bus coupler module has a device-specific identification number.
- Transfers max. 27 bytes SC System information.
- 2 outputs (short-circuit-proof) for Safety Center control (remote start).

Functional Description

The SC-DeviceNet bus coupler module provides the user with 27 bytes (depending on configuration and number of SCI) SC system information from the Safety Center. This information can be transferred through the DeviceNet to other bus subscribers (e.g., PLC). The system information includes input levels for all SC modules, error messages and status information.

Proper Use / Intended Purpose

The SC-DeviceNet is the bus for the DeviceNet fieldbus in the modular Safety Center control unit.
The Safety Center is used to monitor signal transmitters, e.g., emergency-off momentary contact switches, position switches, etc., that are used as safety devices on machinery for the protection of people, material and equipment.
To achieve the protection function, safe outputs are switched on or off depending on the state of the signal transmitter. These safe outputs are turned off to avoid hazardous situations around the machinery. The control can be used for applications with stop categories 0 and 1 according to EN 60204-1.
A Safety Center consists of one basic module type SCB for a supply voltage of 24 VDC, at least one (maximum 4) input module(s) type SCI, and one bus coupler module (if necessary).
A connector is integrated into the housing to provide the connection between modules.

Assembly

Place the SC-DeviceNet on the standard rail and lock it in. The standard rail must be connected with protection earth (PE) conductor. Connect the basic module and the input modules with the SC-DeviceNet. It is very important that a solid connection is ensured in the finished installation (e.g., using rail stop elements).
Then the SC-DeviceNet must be connected to the fieldbus and the basic module (if applicable).
The Safety Center must be installed in a control cabinet with a protection type of at least IP54.

Disassembly

See Safety Instructions!
Remove the wires by pulling out the plug-in terminal and the fieldbus cable.
Push apart the modules on the standard rail until the module connector is accessible. Release the standard rail lock at the bottom of the device and remove the module.

Note

The safety category according to EN 954-1 depends on external wiring, the selected command source, and the local layout at the machinery.

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SC-System Bytes Overview

Module	System Bytes		DeviceNet-Configuring			
	In (Tx-Bytes)	Out (Rx-Bytes)	1	2	3	4
SCB	BAD	PBOUT	x	x	x	x
	BKD	--				
	BSD	--				
SCI (Add. 0)	EED0_A	--	x	x	x	x
	EED0_B	--				
	EFD0_A	--				
	EFD0_B	--				
	EKD0_A	--				
	EKD0_B	--				
			9 In / 1 Out			
SCI (Add. 1)	EED1_A	--		x	x	x
	EED1_B	--				
	EFD1_A	--				
	EFD1_B	--				
	EKD1_A	--				
	EKD1_B	--				
				15 In / 1 Out		
SCI (Add. 2)	EED2_A	--			x	x
	EED2_B	--				
	EFD2_A	--				
	EFD2_B	--				
	EKD2_A	--				
	EKD2_B	--				
					21 In / 1 Out	
SCI (Add. 3)	EED3_A	--				x
	EED3_B	--				
	EFD3_A	--				
	EFD3_B	--				
	EKD3_A	--				
	EKD3_B	--				
						27 In / 1 Out

The SCI modules must be installed with an ascending address sequence (0 - 1 - 2 - 3).

Output Data

One byte digital output data is transmitted. Only inputs (SA4 resp. SB4) of the SCB (SC basic module) can be connected to this outputs. All other loads are not permitted. Mind: A H/L-signal to the SA4 resp. SB4 starts the SCB.

byte structure **PBOUT**

bit	7	6	5	4	3	2	1	0
	x	x	x	x	x	x	0	0

bit 0 ⇒ output X1
bit 1 ⇒ output X2
bit 2 to bit 7 ⇒ not used

Input Data

Max 27 byte input data are transmitted.

byte structure **BAD**

bit	7	6	5	4	3	2	1	0
	0	0	0	0	0	0	0	0

bit 0-3 ⇒ error Input Module address 0-3
bit 4 ⇒ error Basic Module
bit 5 ⇒ error feedback circuit
bit 6 ⇒ 0 = enable current paths of group A open; 1 = enable current paths of group A closed
bit 7 ⇒ 0 = enable current paths of group B open; 1 = enable current paths of group B closed

byte structure **BKD**

bit	7	6	5	4	3	2	1	0		
	0	0	1	0	0	0	0	0	20h	⇒ 0 s
	0	0	0	1	0	0	0	0	10h	⇒ 0.5 s or 5 s
	0	0	0	0	1	0	0	0	08h	⇒ 1.0 s or 10 s
	0	0	0	0	0	1	0	0	04h	⇒ 1.5 s or 15 s
	0	0	0	0	0	0	1	0	02h	⇒ 2.0 s or 20 s
	0	0	0	0	0	0	0	1	01h	⇒ 3.0 s or 30 s

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byte structure **BSD**

bit	7	6	5	4	3	2	1	0
	0	0	0	0	0	0	0	0

bit 0 ⇒ level to terminal SA4 of the SCB
bit 1 ⇒ operation 1: AB 0: A/B
bit 2 ⇒ level to terminal YA2 of the SCB
bit 3 ⇒ level to terminal YA3 of the SCB
bit 4 ⇒ level to terminal SB4 of the SCB
bit 5 ⇒ enter button 1: inactive 0: active
bit 6 ⇒ level to terminal YB2 of the SCB
bit 7 ⇒ level to terminal YB3 of the SCB

byte structure **EED** input

8	7	6	5	4	3	2	1	
0	0	0	0	0	0	0	0	⇒ 8

0 ⇒ L level
1 ⇒ H level

byte structure **EFD** input pairs

8+7		6+5		4+3		2+1		
0	0	0	0	0	0	0	0	⇒ 4

00 ⇒ no error
01 ⇒ synchronous timeout
10 ⇒ sequence error
11 ⇒ bridge-fault (in case of bridge-fault all data pairs are set to 11)

byte structure **EKD**

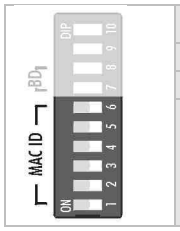
bit	7	6	5	4	3	2	1	0	
	0	0	1	0	0	0	0	0	20h ⇒ switch position 1
	0	0	0	1	0	0	0	0	10h ⇒ switch position 2
	0	0	0	0	1	0	0	0	08h ⇒ switch position 3
	0	0	0	0	0	1	0	0	04h ⇒ switch position 4
	0	0	0	0	0	0	1	0	02h ⇒ switch position 5
	0	0	0	0	0	0	0	1	01h ⇒ switch position 6

LED Indicators

LED	Color/Status	Meaning
RUN	Green	The bus coupler processor is running.
NET (network status)	OFF	The bus coupler has not yet successfully completed the DUP MAC Check.
	Green/flashing	The bus coupler is operating on the bus but has not yet been detected by a master or no logical connection to the bus coupler has been established.
	Green	The bus coupler has been detected by a master and a logical connection to the bus coupler has been established.
	Red/flashing	The master connection is in the Timeout status.
	Red	The bus coupler has found another device with the same MAC ID whilst performing the DUP MAC Check.
MOD (module status)	Green	The bus coupler is ready.

DIP Switch MAC ID

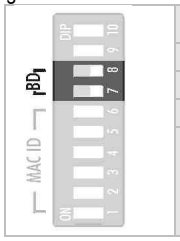
The node number (MAC ID) is set using DIP switches 1 to 6. The node number is set using a binary value. DIP1 is the lowest bit (2^0) and DIP6 is the highest bit (2^5). Node numbers can be between 0 and 63. Example of MAC IDs 1, 5 and 63



MAC ID	DIP1	DIP2	DIP3	DIP4	DIP5	DIP6
1	ON	OFF	OFF	OFF	OFF	OFF
5	ON	OFF	ON	OFF	OFF	OFF
63	ON	ON	ON	ON	ON	ON

DIP Switch BD (BAUD)

The baud rate is set using DIP7 and DIP8.



Baud rate in kBaud	DIP7	DIP8
125	OFF	OFF
250	ON	OFF
500	OFF	ON
125	ON	ON

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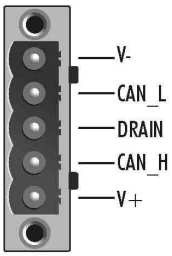
Pin-Assignment BUS Interface

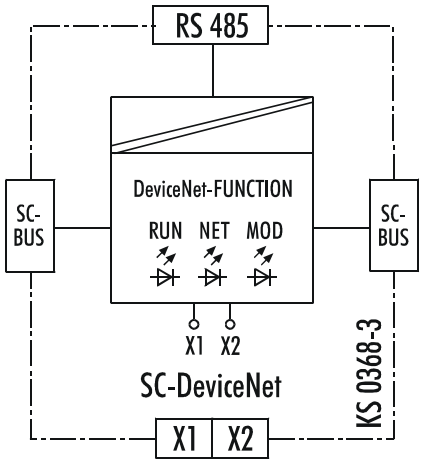


1	V-	Ground / 0V
2	CAN_L	CAN Low
3	DRAIN	Shield connection optional
4	CAN_H	CAN High
5	V+	Power supply Rated value +24V DC (+18V to +30V)

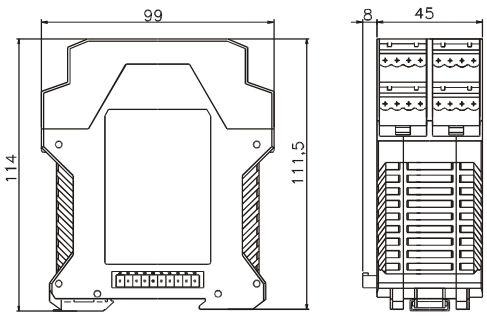
Specifications

Supply Circuit	
rated voltage U_N, DC	24 VDC (through SC-Bus)
residual ripple	2.4 Vpp
rated power	3.5 W
operating range, U_{bmin}, U_{bmax}	0.85 to 1.1 U_N
Electrical Safety	
air and leakage paths	DIN VDE 0110 –1: 1997-04
over-voltage category	III
contamination level	2 internal, 3 external
rated voltage	24 V
housing / terminals protection type (DIN EN 60529: 2000-09)	IP 40/ IP 20
DC isolation supply circuit / interface	yes
Output Circuits X1, X2	
semiconductor	short-circuit-proof
rated output voltage	24 VDC
rated current	10 mA
Interfaces	
interface level	RS 485
connection technology	DeviceNet (Open Style Connector, 5 screw terminals)
Climatic Conditions	
ambient operating temperature	-25 to +50 °C
storage temperature	-25 to +70 °C
relative humidity	30 to 95 % non-condensing
climatic application class (DIN 40040)	H V F
Dimensions	
weight	0.18 kg
size HxWxD	99 x 53 x 117
Removable Terminals X1, X2	
1-wire or fine wire	1 x 0.14 mm² to 2.5 mm² 2 x 0.14 mm² to 0.75 mm²
fine wire with wire-end sleeve acc. to DIN 46228	1 x 0.25 mm² to 2.5 mm² 2 x 0.25 mm² to 0.5 mm²
max. torque	0.5 to 0.6 Nm
for UL and CSA approbations	Use only copper wire AWG 18-16
max. torque	5.25 lbs-in

Connection Diagram



Dimensional Diagram S9-3 device type -A



Subject to changes

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