

Operation Manual

BK5000

Bus Coupler for CAN-CAL

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Version: 1.12

BECKHOFF

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Foreword

Notes on the documentation

This description is only intended for the use of trained specialists in control and automation engineering who are familiar with the applicable national standards. It is essential that the following notes and explanations are followed when installing and commissioning these components.

Liability Conditions

The responsible staff must ensure that the application or use of the products described satisfy all the requirements for safety, including all the relevant laws, regulations, guidelines and standards.

The documentation has been prepared with care. The products described are, however, constantly under development. For that reason the documentation is not in every case checked for consistency with performance data, standards or other characteristics. None of the statements of this manual represents a guarantee (Garantie) in the meaning of § 443 BGB of the German Civil Code or a statement about the contractually expected fitness for a particular purpose in the meaning of § 434 par. 1 sentence 1 BGB. In the event that it contains technical or editorial errors, we retain the right to make alterations at any time and without warning. No claims for the modification of products that have already been supplied may be made on the basis of the data, diagrams and descriptions in this documentation.

Delivery conditions

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Safety Instructions

State at Delivery

All the components are supplied in particular hardware and software configurations appropriate for the application. Modifications to hardware or software configurations other than those described in the documentation are not permitted, and nullify the liability of Beckhoff Automation GmbH.

Description of safety symbols

The following safety symbols are used in this documentation. They are intended to alert the reader to the associated safety instructions..



Danger

This symbol is intended to highlight risks for the life or health of personnel.



Attention

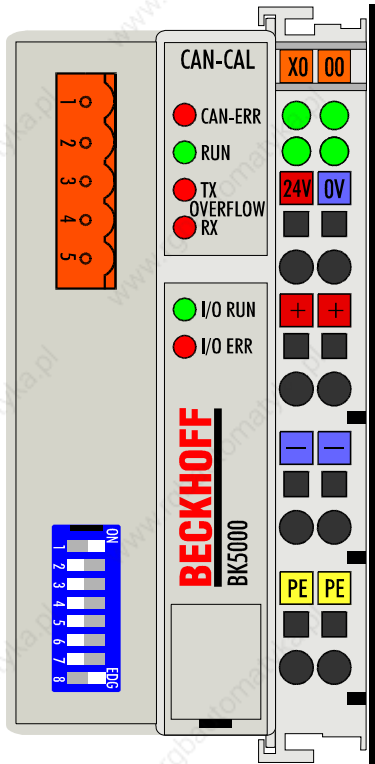
This symbol is intended to highlight risks for equipment, materials or the environment.



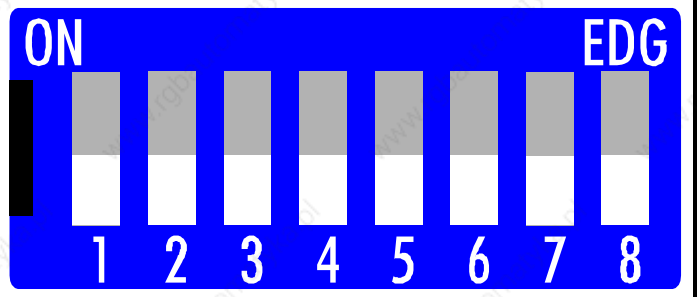
Note

This symbol indicates information that contributes to better understanding.

Configuration of the Bus Coupler



Switch all DIP-Switches to OFF and then power the bus coupler. The four upper status LEDs are blinking. The baud rate is now selected with the DIP-Switches 1 to 3. For details see table below.



All DIP-switches to off, then power bus coupler

Select baud rate

baud rate	1	2	3	4	5	6	7	8
1 MBit	off	off	off					
500 kBit	on	off	off					
250 kBit	off	on	off					
125 kBit	on	on	off					
100 kBit	off	off	on					
50 kBit	on	off	on					
20 kBit	off	on	on					
10 kBit	on	on	on					

Select node class

The node class is now configured with DIP switch 5. Off means node class 0 (without master). Switch 5 to ON means node class 2 (with DBT/NMT master).

Store configuration

The configuration of the DIP switch settings 1, 2, 3 and 5 is stored as soon as Switch 8 is switched to ON. Afterwards the LEDs remain on constantly.

Power down bus coupler

Now power down (switch off) the bus coupler and then select the node ID with DIP switch 1 to 8. Switch 1 is the least significant bit 2^0 and switch 8 is the most significant bit 2^7 . In switch position ON the Bit is set.

Select node ID

With node class 1 an ID between 1 and 255 can be selected. At node class 0 only IDs between 1 and 65 are allowed. The bus coupler is now ready for operation and you can power it again.

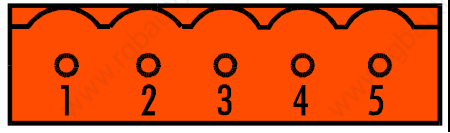
Switch on bus coupler

Connector Pin Assignment

CAN-CAL Connector

For Connecting the CAN bus cable the bus coupler comes with a 5pin connector. Pin 1 is on the top side of the bus coupler. The pictures shows the socket at the bus coupler. The power supply has to be connected at the terminals on the right hand side of the bus couplers (labelled with 24 V and 0 V)

Power supply



Pin assignment CAN-CAL connector	
1	n.c.
2	CAN-H
3	GND
4	CAN-L
5	CAN-GND

Data Exchange

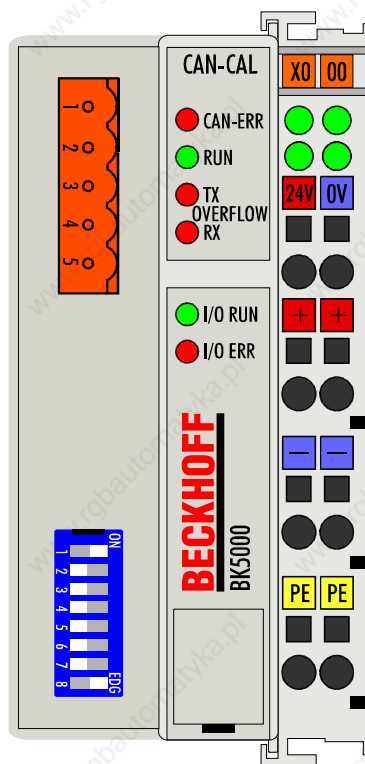
Channel enumeration

All input and output channels of the same kind are enumerated, counting from the bus coupler onwards. So all analogue inputs are enumerated and all analogue outputs get separate numbers. Enumeration starts with 0, so the first channel of the first analog input terminal after the bus coupler has the relative channel number 0. The second channel of this terminal gets channel number 1, and number 2 is assigned to the first channel of the next analog input terminal, assuming that the first terminal has two channels. Analogue inputs and output data is 16 bit wide and transmitted in 2 Bytes: first the LSB and then the MSB.

8 digital inputs form one digital channel

Digital I/O data is transmitted in byte-wise. Therefore the digital I/Os are combined in groups of eight that form one channel. The relatively first digital input after the bus coupler is found in bit 0 of the first digital input channel. The second input is found in Bit 1. The 7th digital input in the terminal row is found in bit 6 of the first channel, and the 9th input is found in bit 0 of the second digital input channel. If there are non-digital terminals in between these are not considered for the digital channels.

LEDs



Module Status LEDs "MS"

LED "CAN-ERR"

The red LED is on:

- CAN warning level exceeded or
- CAN Bus Off Status reached

LED "RUN"

the green LED is on:

- Status O.K.

Network Status LEDs "NS"

LED "TX OVERFLOW"

the red LED is on:

- Transmit Queue Overrun

LED "RX OVERFLOW"

the red LED is on:

- Receive Queue Overrun

Input/Output Status "I/O"

LED "I/O RUN"

the green LED is on:

- the terminal bus works fine

LED "I/O ERR"

the red LED is on:

- I/O error

Appendix

The Register of the bus coupler BK5000

		Description	Value range	Default values
Terminal number	0			
Table number	100	Rd/Wr with Software write protection		
Register number	0	CAL baud rate		4
Register number	1	CAL Node class		0
Register number	2	CAL Guard time		300
Register number	3	CAL Lifetime		2
Register number	4	Mode of the first eight analogue terminals 0 : Polling 1 : Cycle 2 : Change of Value		0
	$4.2*n - 4.2*n+1$	Mode n+1 terminal (n = 0 – 7)	0, 1, 2,	0
Register number	5 – 12	Mode of digital terminals 0 : Polling 1 : Cycle 2 : Change of Value		0xAAAA
	$m.2*n - m.2*n+1$	Mode n+1 terminal (m = 5 – 12; n = 0 – 7)	0, 1, 2	2
Register number	13	Timer 1 Mode Cycle		0
Register number	14	Timer 2 Mode Cycle		100
Register number	15	Timer 3 Mode Cycle		200
Register number	16	Timer 4 Mode Cycle		300
Register number	17	Assignment of the first 8 analogue terminals to timer 0 : Timer 1 1 : Timer 2 2 : Timer 3 3 : Timer 4		0
	$17.2*n - 17.2*n+1$	Assignment n+1st terminal (n = 0 – 7)	0, 1, 2, 3	0
Register number	18 – 25	Assignment of the digital terminals to timer 0 : Timer 1 1 : Timer 2 2 : Timer 3 3 : Timer 4		0
	$m.2*n - m.2*n+1$	Assignment n+1st terminal (m = 18 – 25; n = 0 – 7)	0, 1, 2, 3	0
Register number	26	Fieldbus errors 26.15 : CAN BUSOFF (1) 26.14 : CAN ERROR (0) 26.13 : CAN OVERRUN (0) 26.12 : CAN GUARDFAIL (1) 26.11 : CAN NOTOPERATIONAL (0) 26.10 : -- ... 26.0 : --		0x9000

Default values

		Description	Value range	Default values
Terminal number	0			
Table number	0	Rd/Wr with Software write protection		
Register number	0	reserved for ADS		
Register number	1	Fieldbus interface		
Register content	1.0	PLC Interface	0/1	0
	1.1 - 1.2	Send channel of events	0 - 3	0
Register number	2	Terminal bus		0
	2.0	Auto reset		0
	2.1	Device diagnosis		0
	2.2	Map diagnosis data of digital terminals in process image		1
Register number	3	Process image description		
Register content	3.0	Process image active	0/1	1
	3.1	Configuration type	0/1	1
	3.2	Complex terminal mapping	0/1	0
	3.3	Data format of complex terminals	0/1	0
	3.4	Data format digital terminals	0/1	0
	3.5	Alignment of complex terminals	0/1	0
	3.6	Inputs PI synchronously	0/1	0
	3.7	Output PI synchronously	0/1	0
	3.8 - 3.9	Reaction on fieldbus error	0,1,2	0
	3.10 - 3.11	Reaction on terminal bus error	0,1,2	2
Register number	4,5, 6	--		
Register number	7	Offset PLC Interface Master -> Slave	0 - 255	0
Register number	8	Offset PLC Interface Slave ->Master	0 - 255	0
Register number	9	Waiting time after SYNC_0 Command	0 - 65535	200
Register number	10	Waiting time after SYNC_1 Command	0 - 65535	200
Register number	11	Support of all data formats	0/1	0
	12	Reserved		
	13	Comparison mask for digital Diagnosis 2-Bit terminals		0x0002
	14	Comparison mask for digital Diagnosis 4-Bit terminals		0x0802

Module Capabilities

LMT class [0]

NMT network class[0 or 2]
NMT node class[0 or 2]

DBT class[0 or 2]

Module Identification

Manufacturer Name: BKH__
 Product Name: BUSKL__
 Serial Number: 00000000000000

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