COMBICONTROL

Mat. No.	Rev.
CC000E0-K100	1A

KEB

Table of Contents

KEB

1. Introduction

1.1 Preface

We welcome you as a customer of the Karl E. Brinkmann GmbH and congratulate you to the aquisition of this product. You have chosen a product on highest technical standard.

The enclosed documents as well as the specified hard- and software are developments of KEB. The Karl E. Brinkmann GmbH have prepared the documentation, hardware and software to the best of their knowledge, however, no guarantee is given that the specifications will provide the efficiency aimed at by the user. Karl E. Brinkmann GmbH reserves itself the right to change/adapt specifications and technical data without previous notification. Errors and ommissions excepted!

For a safe operation observe the safety and warning directions in this instruction manual as well as in further documentation. The safety and warning directions specified in this manual is not exhaustive.

The pictographs used in this manual have following meaning:

Danger
Warning
Caution

Attention
observe at all costs

Information
Aid
Tip

The information contained in the technical documentation, as well as any user-specific advice in spoken and written and through tests, are made to best of our knowledge and information about the application. However, they are considered for information only without responsibility. This also applies to any violation of industrial property rights of a third-party.

Inspection of our units in view of their suitability for the intended use must be done generally by the user. Inspections are particulary necessary, if changes are executed, which serve for the further development or adaption of our products to the applications (hardware, software or download lists). Inspections must be repeated completely, even if only parts of hardware, software or download lists are modified.

Application and use of our units in the target products is outside of our control and therefore lies exclusively in the area of responsibility of the user.

1.2 List of literature

[1]: CANopen communication profile DS301 V4.02 of CAN in automation user group (CiA).
[2]: CiA Draft Standard 102 Version 2.0

2. Hardware

2.1 Product Despriction

The CAN interface is optional fixed mounted at position X6D in units of the series COMBICONTROL C5/C6, H6 or P6.

2.2 CAN Bus interface

Pin	Signal	Description
1	reserved	not connected here
2	CAN_L	CAN bus signal dominant low
3	CAN_GND	not connected here
4	reserved	not connected here
5	CAN_SHLD	not connected here
6	GND	not connected here
7	CAN_H	CAN bus signal dominant high
8	reserved	not connected here
9	CAN_V+	not connected here

LED	Signal	Light sample	Meaning
LD5	Ready	on	ready for operation
		off	not ready for operation
LD6	CAN node status	on	OPERATIONAL
		off	other
		flashing	Pre_Operational, cyclic with 200 ms OFF

LD6 LD5

The fundamental physical characteristics and the connection are described in [2] and are not explained here.

3. Software

3.1 Reference values of the C5 CAN connection

The CAN interface of the C5 control supports the CAN protocol V2.0B. On the higher protocol layers the communication profile DS301 of CAN in Automation user group (CiA) is supported. A device profile is not supported.

The control can be integrated via the CAN interface into a CAN net as (single) slave. Thereby up to 32 byte (16 words) process input data and up to 32 byte (16 words) process output data as well as parameter data (SDO) can be exchanged. Dependent on the adjustment of the object 5FFFh (Fieldbus COMM Axis) the parameterizing data have access to the control (Fieldbus COMM Axis = 0) or to parameters of the connected axis (1… n). This operation is only valid for parameters in the index range (2000h...5FFFh). Parameters of the communication profile (DS301) are only available in the control and changed there independently of the value of the parameter Fieldbus COMM Axis.

Since the CAN protocol can transfer maximally 8 byte of data (4 words), the possible 32 byte process data are devided upto 4 PDO telegrams.

The process data of up to 4 PDO telegrams are shown in the image of the control as follows:

Process data from master to C5 control (slave):

Addressing in the control program	Word no.	CAN-PDO word marking
%IW72	1	PDO1-Rx.word1
:	:	:
%IW75	4.	PDO1-Rx.word4
%IW76	5.	PDO2-Rx.word1
:	:	:
%IW79	8.	PDO2-Rx.word4
%IW80	9.	PDO3-Rx.word1
:	:	:
%IW83	12.	PDO3-Rx.word4
%IW84	13.	PDO4-Rx.word1
:	:	:
%IW87	16.	PDO4-Rx.word4

Process data of the C5 control (slave) to the master:

Addressing in the control program	Word no.	CAN-PDO word marking
%QW72	1	PDO1-Tx.word1
:	:	:
%QW75	4.	PDO1-Tx.word4
%QW76	5.	PDO2-Tx.word1
:	:	:
%QW79	8.	PDO2-Tx.word4
%QW80	9.	PDO3-Tx.word1
:	:	:
%QW83	12.	PDO3-Tx.word4
%QW84	13.	PDO4-Tx.word1
:	:	:
%QW87	16.	PDO4-Tx.word4

Since the process data are stored in the intel format (LSByte first) on CAN, but the C5 control internally operates in Motorola format, all process data are turned word by word (16-Bit). That meanshigh and low byte are exchanged.

3.2 CAN parameter channel (SDO)

The CAN master requests writing/ reading of a parameter in the C5 control via SDO-Rx telegram. The C5 control transmits the response with a SDO-Tx telegram. The C5 control supports only the short form (expedited) of the SDO data transfer. A maximum of 4 byte compressed data can be transferred at this:

SDO-Rx telegram (request from master): Identifier = 600h + Node_Id(SY.06):

Byte0	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7
CMD	Index(LB)	Index(HB)	Subindex	Data1(LSB)	Data2	Data3	Data(MSB)

CMD for write request:

B7	B6	B5	B4	B3	B2	B1	B0
0	0	1	0	n	n	1	s

CMD for read request:

B7	B6	B5	B4	B3	B2	B1	B0
0	1	0	0	0	0	0	0

SDO-Tx-telegram (confirmation of C5): Identifier = 580h + Node_Id(SY.06):

Byte0	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7
CMD	Index(LB)	Index(HB)	Subindex	Data1(LSB)	Data2	Data3	Data(MSB)

CMD for write acknowledgement:

B7	B6	B5	B4	B3	B2	B1	B0
0	1	1	0	0	0	0	0

CMD for read achnowledgement:

B7	B6	B5	B4	B3	B2	B1	B0
0	1	0	0	n	n	1	1

,nn':   Number of not assigned byte in the data range (only valid, if s = 1)
,s':   Size-Indicator (see above)
,Index':   16-Bit-parameter addressing
,Subindex':   8-Bit-parameter subaddressing

3.3 Bootup-Message and Node-Guarding

The CAN interface connection of the C5 control generates a bootup message in accordance with [1] after changing into Pre_Operational. The telegram is transmitted on the Node-Guarding Identifier (700h + Node_Id (SY.06) and contains 1 byte data with the value = 0.

The Node-Guarding is supported by the same way. The master must send a remote frame on the Node-Guarding-Identifier for this. After that the C5 control sends a telegram with 1 byte length:

Identifier = 700h + Node_Id(SY.06):

B7	B6	B5	B4	B3	B2	B1	B0
Toggle	Node status						

Toggle: This bit changes the state with each telegram.
Node status: Note status according to [1]:
4:       Stopped
5:       OPERATIONAL
127:       PRE_OPERATIONAL

Software

3.4 Network management (NMT)

The CAN master sends network management commands, in order to execute certain functions in the slave(s). All NMT commands are sent by the identifier = 0 and are not confirmed by the slave. The following NMT commands are realized:

Identifier = 0:

Byte0	Byte1	Command
01h	Node_Id	Start_Remote_Node
02h	Node_Id	Stop_Remote_Node
80h	Node_Id	Enter_Preoperational_State
82h	Node_Id	Reset_Communication

Node_Id = 0 addresses all nodes

3.5 Parameter description

Name:	**Device address (Node_Id)**
Index:	**2006h**
Meaning:	Specifies the node address for the CAN communication. All CAN identifiers are calculated from the node address.
Subindex:	0
Data length:	1 byte
Coding:	1
Default value:	A changed value is immediately stored non-volatile, but becomes active after the next Power_ON or Reset_Communication command.

Name:	**Baud rate Fieldbus**									
Index:	**2008h**									
Meaning:	Indicates the CAN transmission speed.									
Subindex:	0									
Data length:	1 byte									
Coding:	0	1	2	3	4	5	6	7	8	9
	10 Kbit/s	20 Kbit/s	50 Kbit/s	100 Kbit/s	125 Kbit/s	250 Kbit/s	500 Kbit/s	1000 Kbit/s	800 Kbit/s	25 Kbit/s
	255: automatically bit rate identification									
Access:	READ_WRITE									
Notice:	A changed value is immediately stored non-volatile, but becomes only active after the next Power_ON or Reset_Communication command.									

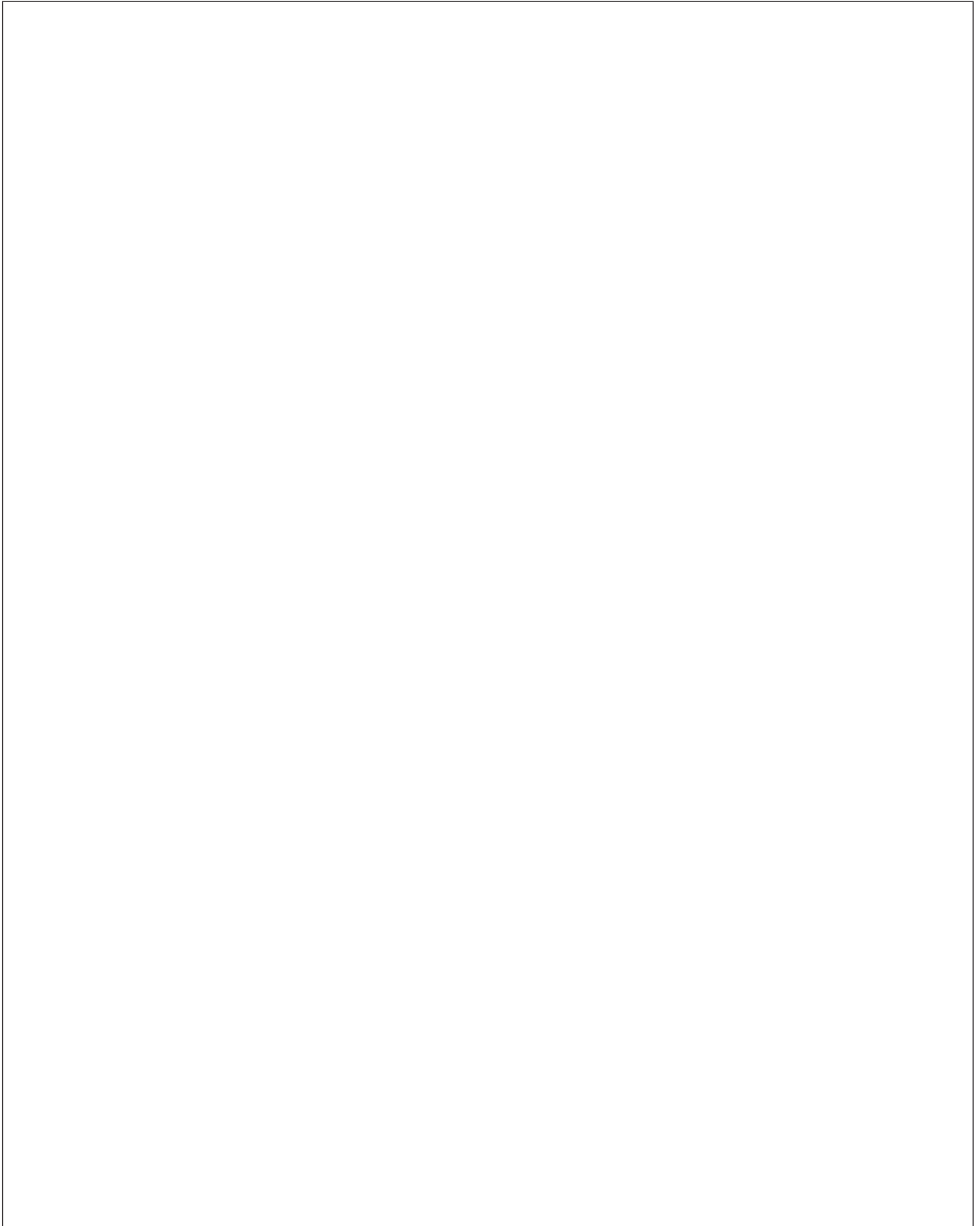| Name:	**Fieldbus Comm Axis**	
Index:	**5FFFh or 2807h**	
Meaning:	Serves as indicator for parameter communication, in order to address the control or the connected axes.	
Subindex:	0	
Data length:	1 byte	
Coding:	0	1-n
	The control is addressed.	Axis1 - axis n is addressed
Access:	READ_WRITE	
Notice:	A changed value becomes active immediately, but it is not stored non-volatile.	

Software

4 Annex

4.1 Parameter table

Index	Subindex	Parameter name	Object type	Data Length in Byte	Access
1000h	0	Device type, s. [1]	VAR	4	ro
1001h	0	Error register, s. [1]	VAR	1	ro
1018h		Identity Object , s. [1]	RECORD		ro
1018h	0	Nr entries , s. [1]	VAR	1	ro
1018h	1	Vendor Id , s. [1]	VAR	4	ro
1018h	2	Product Code , s. [1]	VAR	4	ro
1400h		PDO1-Rx Communication Parameter , s. [1]	RECORD		
1400h	0	Nr entries	VAR	1	ro
1400h	1	COB-ID	VAR	4	ro
1400h	2	Tx type	VAR	1	rw
1401h		PDO2-Rx Communication Parameter , s. [1]	RECORD		
1402h		PDO3-Rx Communication Parameter , s. [1]	RECORD		
1403h		PDO4-Rx Communication Parameter , s. [1]	RECORD		
1800h		PDO1-Rx Communication Parameter , s. [1]	RECORD		
1800h	0	Nr entries , s. [1]	VAR	1	ro
1800h	1	COB-Id , s. [1]	VAR	4	ro
1800h	2	Tx type , s. [1]	VAR	1	rw
1800h	3	Inhibit time , s. [1]	VAR	2	ro
1801h		PDO2-Rx Communication Parameter , s. [1]	RECORD		
1802h		PDO3-Rx Communication Parameter , s. [1]	RECORD		
1803h		PDO4-Rx Communication Parameter , s. [1]	RECORD		
1600h		PDO1-Rx-Mapping , s. [1]	RECORD		
1600h	0	Nr entries , s. [1]	VAR	1	ro
1600h	1	1. Mapping , s. [1]	VAR	4	ro
1600h	2	2. Mapping , s. [1]	VAR	4	ro
1600h	3	3. Mapping , s. [1]	VAR	4	ro
1600h	4	4. Mapping , s. [1]	VAR	4	ro
1601h		PDO2-Rx-Mapping , s. [1]	RECORD		
1602h		PDO3-Rx-Mapping , s. [1]	RECORD		
1603h		PDO4-Rx-Mapping , s. [1]	RECORD		
1A00h		PDO1-Tx-Mapping , s. [1]	RECORD		
1A01h		PDO2-Tx-Mapping , s. [1]	RECORD		
1A02h		PDO3-Tx-Mapping , s. [1]	RECORD		
1A03h		PDO4-Tx-Mapping , s. [1]	RECORD		
2006h	0	Device address (Node_Id)	VAR	1	rw
2008h	0	Baud rate Fieldbus	VAR	1	rw
2807h	0	Fieldbus Comm Axis	VAR		
2580h	0	PDO1-Tx.word1	VAR	2	ro
:	:	:	:	:	:
258Fh	0	PDO1-Tx.word4	VAR	2	ro
2590h	0	PDO1-Rx.word1	VAR	2	ro
:	:	:	:	:	:
259Fh	0	PDO1-Rx.word4	VAR	2	ro

ro: Parameter can be read only.
rw: Parameter can be read and written.

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