COMBICONTROL

Instruction Manual **PCC C5**

00.C5.0EB-K201

KEB

09/2005

Preface

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The safety and warning reference specified in this manual is not exhaustive. The manual and the information contained in it is made with care. KEB don´t accept a guarantee for misprint or other errors or resulting damages.
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Contents

1. Description of the unit

1.1 Application

KEB COMBICONTROL C5 is a programmable control with direct connection upto 8 KEB frequency inverters/servo axes of the series F5. The connection to the axes is created as HSP5/485. All axes can be operated directly and synchronously with an inexpensive operator with this fast, reliable connection. Cycle times down to one millisecond are realizable. This manual describe the release of the firmware V1.2 from september 2005.
The axis control is programmed with the uniform IEC 61131-3 programming system CoDeSys of the 3S-Software Company, Kempten (Germany) (www.3s-software.com).

1.2 Construction

The control consists of four modules:

- **Basic module with**
  - CPU and memory
  - internal flash file system
  - Switched-mode power supply
  - Real-time clock
  - HSP5/485 interfaces to the inverter/servo axes
- **Operating element** with
  - Ethernet interface
  - serial interface
  - Control and error LED's
  - RUN/Reset switch
  - external memory card file system
- **Input/output interface** contains
  - Voltage supply connection
  - 8DI/8DO input module with
    - eight digital inputs
    - eight digital outputs
- **Field bus interface**
  - ProfiBus-DP interface

1.3 CE-certifications

This unit was tested in accordance with the generic standard EN 61000-6-2 in the range of noise immunity and corresponds to the EMC directive 89/336/EWG with changes/extensions.

1.4 Unit identification

Part Number	09.C5.B30-1000 (Profibus-DP and 8DI/8DO)

1.5 Technical data

General	
Dimensions (HxBxT)	144 x 182 x 76 mm
Weight	approx. 600 g
Installation method	35 mm Mounting rail
Grounding	via mounting rail
Protective system (EN 60529)	IP20
Operation temperature	-10…45 °C (14…113 °F)
Storage temperature	-25…70 °C (-13…158 °F)
Climatic category (EN 60721-3-3)	3K3
Environment (IEC 664-1)	Pollution degree 2
Control	
Operating voltage control (US)	18…30 V DC ±0 %
Power input control	4 W max.
Digital inputs/outputs	
Wiring system	cage-clamp terminals
Operating voltage inputs/outputs (UM)	18…30 V DC ±0 %
Output current	max. 0,7 A per channel, short-circuit proof, free-wheeling diode integrated
Input voltage/current	according to IEC 61131-2 Type 1
Fieldbus interface	
Type	ProfiBus DP slave
Connector	D-Sub 9 female, DIN 41652 part 1
Speed	9,6…12000 kBaud
Use	Connection to a ProfiBus Master, process data transmission, communication channel to the control and axes
Axis interface	
Type	HSP5/485
Connector	RJ-45, 8-pole, screened
Speed	38,4…250 kBaud
Use	Connection to KEB F5 inverter/servo, process data transmission, communication channel

Ethernet interface

Type	IEEE 802.3, 10Base-T
Connector	RJ-45, 8-pole, screened
Speed	10 MBaud
Use	connection to CoDeSys (programming system, debugging, visualization) connection to COMBIVIS (control and axis adjustment, Scope)

Serial interface

Type	DIN66019II, RS232
Connector	D-Sub 9 female
Speed	9,6…115,2 kBaud
Use	connection to COMBIVIS (control and axis adjustment, Scope)

Memory of the programming system

Code	256 KByte, double for online change
Data	392 KByte
Retain	31 KByte
Flag area	512 Byte
Input	256 Byte
Output	256 Byte

1.6 Accessories

Operators

F5 HSP5/485, screw terminal	00.F5.060-9001
F5 HSP5/485, RJ45	00.F5.060-9002

Supply cable

Cable RS232 for COMBIVIS	00.58.025-001D
Cable RJ45 open end (for operator -9001), 2,5 m	00.F5.0C3-2025
Patch cable RJ45 (for operator -9002), 5 m	00.F5.0C3-1050

2. Basic module with drive interfaces

The basic module is mounted on a 35 mm mounting rail. The grounding occurs by the mounting rail via spring contacts on the back of the basic module. The basic module serves as carrier for the operation unit and the field bus interface as well as the input/output terminal blocks. Furthermore it contains the

- CPU
- Switched-mode power supply
- Flash file system
- Real-time clock
- HSP5/485 interfaces to the inverter/servo axes

2.1 Real-time clock

The integrated real-time clock is maintenance-free (no battery) and operates without power supply for approx.30 days. After this time it must be adjusted again. A read out parameter indicates the validity of the date and time. The control shall remain switched on min. 30 minutes for complete loading. Leap years are recognized automatically up to the year 2099. Date and time can be read and set via COMBIVIS or the control program.

2.2 HSP5/485 interfaces to the inverter/servo axes

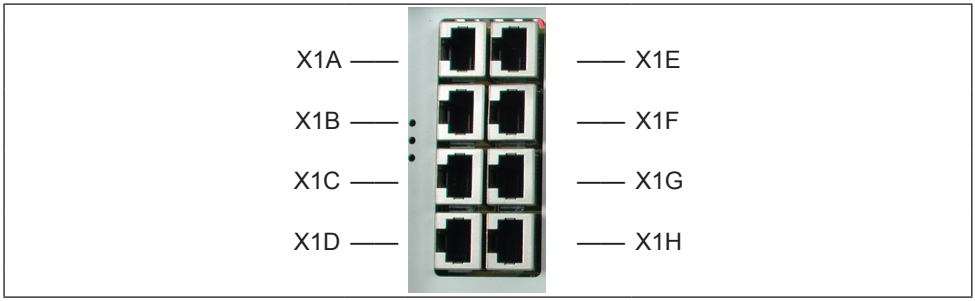
Up to eight KEB COMBIVERT F5 can be connected via the terminals X1A to X1H. The connection occurs via reliability RS485 cables, which can be up to 100 m long. A shielded standard cable with RJ-45 connector is used on the control side and appropriate operator on the frequency inverter/servo. The process data of the required axes are exchanged by the control in the cyclic or synchronous mode. Service 50 (1*32 + 2*16 Bit process data) is used thereby. The parameter channel is free for the PLC program and COMBIVIS access to the axes. Depending on the used axes the cycle time can be between 1 and 65 ms. The process data assignment in the axes must be adjusted before starting the cyclic/synchronous operation in parameters SY.16…31 (if not stored in the axes).
The process data are mapped-in as follows in the image of the control:

%IW8+9	%ID4	1. Word (32 Bit) of axis 1	%QD4	1. Word (32 Bit) to axis 1
%IW10		2. Word (16 Bit) of axis 1	%QW10	2. Word (16 Bit) to axis 1
%IW11		3. Word (16 Bit) of axis 1	%QW11	3. Word (16 Bit) to axis 1
%IW16+17	%ID8	1. Word (32 Bit) of axis 2	%QD8	1. Word (32 Bit) to axis 2
%IW18		2. Word (16 Bit) of axis 2	%QW18	2. Word (16 Bit) to axis 2
%IW19		3. Word (16 Bit) of axis 2	%QW19	3. Word (16 Bit) to axis 2
%IW24+25	%ID12	1. Word (32 Bit) of axis 3	%QD12	1. Word (32 Bit) to axis3
%IW26		2. Word (16 Bit) of axis 3	%QW26	2. Word (16 Bit) to axis3
%IW27		3. Word (16 Bit) of axis 3	%QW27	3. Word (16 Bit) to axis3
%IW32+33	%ID16	1. Word (32 Bit) of axis 4	%QD16	1. Word (32 Bit) to axis 4
%IW34		2. Word (16 Bit) of axis 4	%QW34	2. Word (16 Bit) to axis 4
%IW35		3. Word (16 Bit) of axis 4	%QW35	3. Word (16 Bit) to axis 4

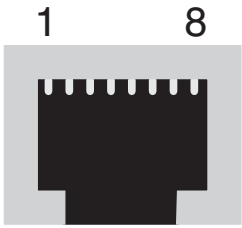
further on next side

%IW40+41	%ID20	1. Word (32 Bit) of axis5	%QD20 1. Word (32 Bit) to axis 5
%IW42		2. Word (16 Bit) of axis5	%QW42 2. Word (16 Bit) to axis 5
%IW43		3. Word (16 Bit) of axis5	%QW43 3. Word (16 Bit) to axis 5
%IW48+49	%ID24	1. Word (32 Bit) of axis 6	%QD24 1. Word (32 Bit) to axis 6
%IW50		2. Word (16 Bit) of axis 6	%QW50 2. Word (16 Bit) to axis 6
%IW51		3. Word (16 Bit) of axis 6	%QW51 3. Word (16 Bit) to axis 6
%IW56+57	%ID28	1. Word (32 Bit) of axis 7	%QD28 1. Word (32 Bit) to axis 7
%IW58		2. Word (16 Bit) of axis 7	%QW58 2. Word (16 Bit) to axis 7
%IW59		3. Word (16 Bit) of axis 7	%QW59 3. Word (16 Bit) to axis 7
%IW64+65	%ID32	1. Word (32 Bit) of axis 8	%QD32 1. Word (32 Bit) to axis 8
%IW66		2. Word (16 Bit) of axis 8	%QW66 2. Word (16 Bit) to axis 8
%IW67		3. Word (16 Bit) of axis 8	%QW67 3. Word (16 Bit) to axis 8

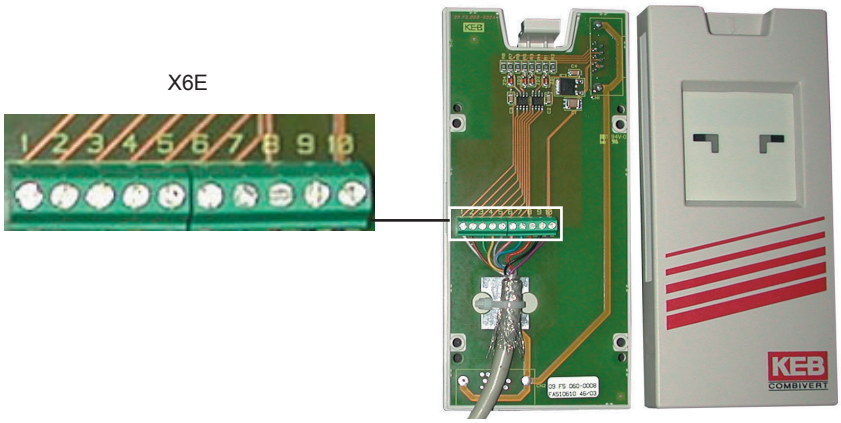
2.2.1 View of the inverter interfaces X1A...X1H for the axes 1..8



2.2.2 Assignment of the HSP5/485 interface

X1A…H	Name	Description	Socket (top view)
1	TXD+	Transmission signal+	
2	TXD-	Transmission signal-	
3	GND	Reference potential	
4	RXD+	Receive signal+	
5	RXD-	Receive signal-	
6	GND	Reference potential	
7	EnTXD+	Handshake transmission signal+	
8	EnTXD-	Handshake transmission signal-	
-	Shielding	Shielding	

2.2.3 HSP5 Operator with screw terminal (00.F5.060-9001)



X6E	Name	Description
1	TXD-	Transmission signal-
2	TXD+	Transmission signal+
3	RXD-	Receive signal-
4	RXD+	Receive signal+
5	EnTXD-	Handshake transmission signal-
6	EnTXD+	Handshake transmission signal+
7	EnRxD-	Handshake receive signal-
8	EnRxD+	Handshake receive signal+
9	GND	Reference potential
10	VCC	+24 V voltage output
-	Shielding	Shielding (see figure)

No cables may be connected to terminal VCC. High voltage can destroy the interface in the control.

2.2.4 HSP5 Operator with RJ45 socket (00.F5.060-9002)

RJ45	Name	Description
1	RXD+	Receive signal+
2	RXD-	Receive signal-
3	GND	Reference potential
4	TXD+	Transmission signal+
5	TXD-	Transmission signal-
6	GND	Reference potential
7	EnRxD+	Handshake receive signal+
8	EnRxD-	Handshake receive signal-
-	Shielding	Shielding

The connection to the control is realized with a commercial CAT5 Patch cable for this operator.

2.2.5 Adapter cable HSP5 interface operator

Screw terminal:

Color	see below							**C5 PCC X1A…H**
Signal	TXD+	TXD-	GND	RXD+	RXD-	GND		EnTXD-
PIN	1	2	3	4	5	6	7	8
	|	|	|	|	|	|	|	|	
PIN	4	3	9	2	1	9	8	7	**Operator X6E**
Signal	RXD+	RXD-	GND	TXD+	TXD-	GND		EnRxD-
Color	see below							

RJ45 connection:

Color	see below							**C5 PCC X1A...H**
Signal	TXD+	TXD-	GND	RXD+	RXD-	GND	EnTXD+	EnTXD-
PIN	1	2	3	4	5	6	7	8
	|	|	|	|	|	|	|	|	
PIN	1	2	3	4	5	6	7	8	**Operator RJ45**
Signal	RXD+	RXD-	GND	TXD+	TXD-	GND	EnRxD+	EnRxD-
Color	see below							

In case of production of own connecting cables please pay attention that the signal pairs (e.g. TxD+ and TxD -) are assigned to the corresponding twisted cables (e.g. green and green/white). Connect un-used scores always to GND.

2.2.6 Comparison of the standards

Pair	PIN	EIA/TIA568B	EIA/TIA568A	DIN47100	IEC189.2	USOC
3	1	orange/white	green/white	green	red	black
3	2	orange	green	yellow	orange	yellow
2	3	green/white	orange/white	grey	black	orange
1	4	blue	blue	brown	blue	red
1	5	blue/white	blue/white	white	white	green
2	6	green	orange	pink	green	brown
4	7	brown/white	brown/white	blue	yellow	grey
4	8	brown	brown	red	brown	blue

3. In-/output module

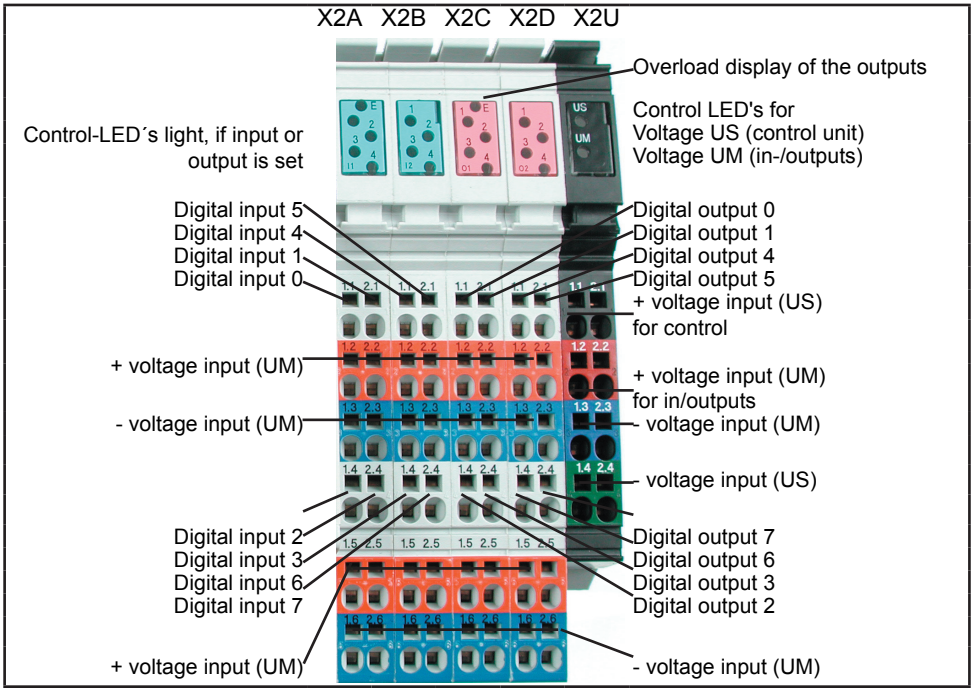


Figure 3: Connectors of the in-/output module

The input/output module offers place for five terminal blocks. One is individually assigned for the voltage supply of the control. The digital inputs/outputs are potential-free from supply voltage.

3.1 Voltage supply (X2U)

Voltage supply for the control (US)

Voltage supply for the inputs and outputs (UM)

%IW1	%IX1.0	Condition of the supply voltage in/outputs (UM)
	%IX1.1	Is set in case of overload at one or several outputs
	%IX1.2…%IX1.15	not assigned

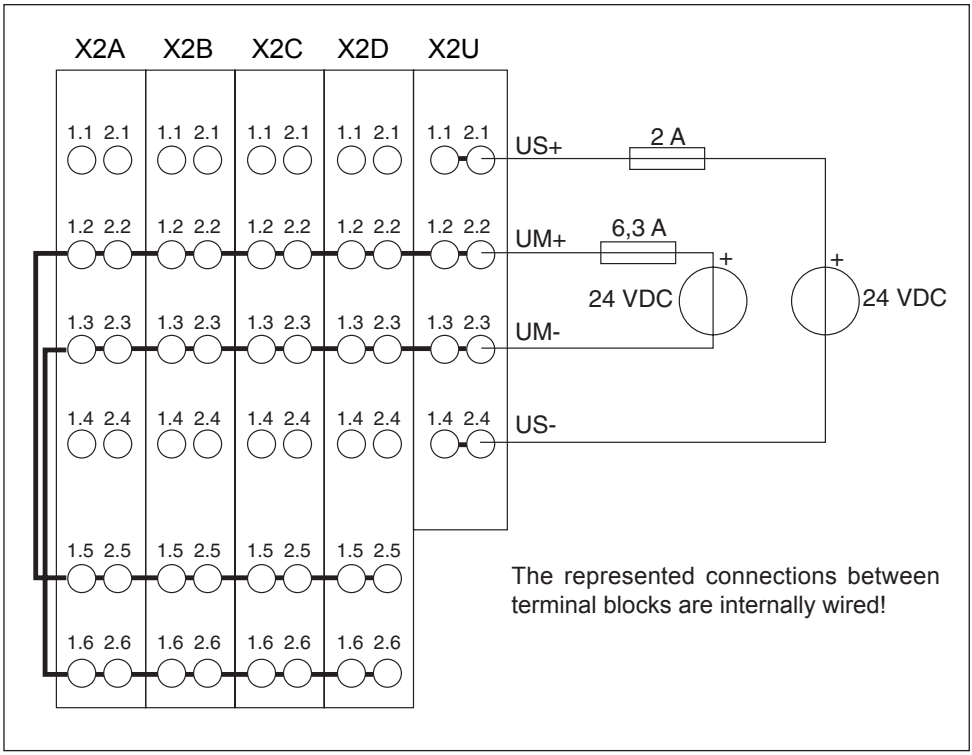
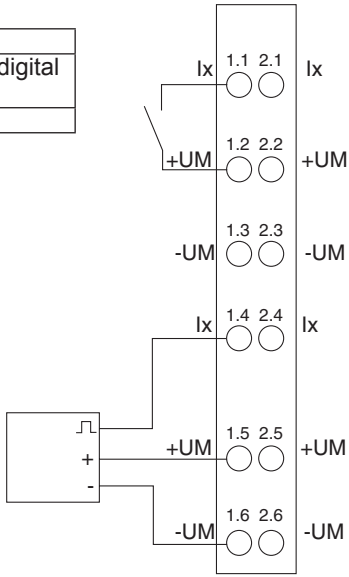


Figure 3.1: *Connection of the supply voltages*

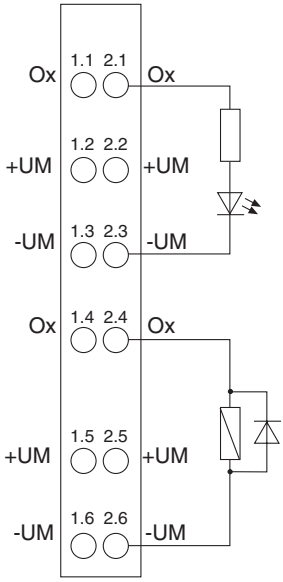
3.2 Digital inputs (X2A and X2B)

8 digital inputs 0...7 (2 blocks)			
%IW0	%IX0.0…%IX0.7	(%IB1)	Condition of the digital inputs 0…7
	%IX0.8…%IX0.15	(%IB0)	not assigned



3.3 Digital outputs (X2C and X2D)

8 digital outputs 0...7 (2 blocks)			
%QW0	%QX0.0…%QX0.7	(%QB1)	Condition of the digital outputs 0…7
	%QX0.8…%QX0.15	(%QB0)	not assigned



4 The operating unit

Name	Function	Addition
S1	Multi function switch/ button	
LD1	Run-LED	green
LD2	Error LED	red
LD3	Ethernet LAN	yellow
LD4	Ethernet Link	green
LD5	Fieldbus Data	green
LD6	Fieldbus Ready	green
X6A	Serial interface	COMBIVIS
X6B	Ethernet interface	COMBIVIS/ CoDeSys
X6C	Fieldbus interface	
-	Slide-in unit for SD or MMC memory card	

View

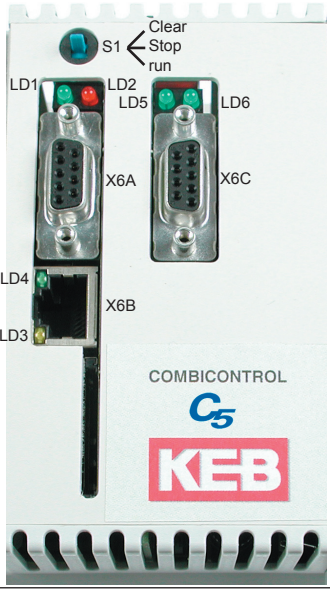


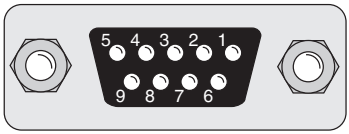
Figure 4: Interfaces of *COMBICONTROL*

4.1 Serial interface (X6A)

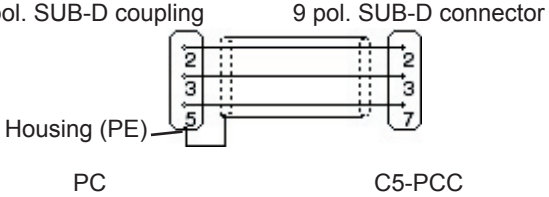
The socket X6A is a serial RS232 interface. It serves for the connection of the control with a PC or other operating units via the protocol DIN66019II.

X6A	Name	Description
1	PGM	No wiring!
2	TxD	Transmission signal RS232
3	RxD	Receive signal RS232
4	-	-
5	-	-
6	PGM+	No wiring!
7	DGND	Data reference potential
8	-	-
9	-	-

SubD-9 socket (top view)



Part.No.: 00.58.025-001D
RS 232 cable
3 m



4.2 Ethernet interface (X6B)

The standardized 10 base-T interface supports the protocols TCP/IP and UDP/IP.
The following ports have these functions:
The CoDeSys port is adjusted to 1200 (as standard). The port can be changed with parameter Et.03. The control program is processed here by means of CoDeSys (only TCP/IP possible).
The COMBIVIS port is adjusted to 8000 (as standard). It can be changed with parameter Et.02. The access of COMBIVIS or other control/visualizations to parameters of the control, the axes as well as if necessary by the control program defined parameter occurs here. TCP or UDP is possible as protocol, at which encapsulated DIN66019II data telegrams will be transferred.
The used IP address can be adjusted with parameter Et.01. In case that a cross-over cable is used for the connection, make sure that the upper part of the IP address (network number) is the same and the lower part of the IP address (Node number) is different from the PC IP address. The IP address may not have been used in the entire connected Ethernet.

Protect C5 against unauthorized access

Each user within a network can take access to the control with knowledge of the IP address. The C5 should be absolutely protected against unauthorized access. For the protection
- the write access on the COMBIVIS port can be limited with parameter et.09.
- CoDeSys can be protected with a login-password.

4.3 Description of the LED's

Run-LED	LD1 (green)
off	PLC program stopped or not available
on	PLC program in run mode

Error LED	LD2 (red)
off	O.K.
on	Program error, exact error cause can be determined via CoDeSys.
fast blinking	Hardware error, control must be restarted

LAN-LED	LD3 (yellow)
blinking	Reception active via Ethernet

Link-LED	LD4 (green)
on	Connection to Ethernet active

4.4 Multi-function switch/button S1

The multi function switch/button is constructed as follows:

The button S1 is assigned with the following functions

Activity	**Function**
Stop --> Run	Program is started
Run --> Stop	Programm is stopped, all variables are resetted (reset warm)
Stop --> Clear and hold (> 3 s) until LD 2 lights	After releasing the switch all retain variables are resetted (reset cold)
Stop --> Clear and hold (> 10 s) until LD 1+2 light	All variables and the boot project are cleared (reset origin) after releasing the button. If a memory card is plugged-in, all files are copied from the card into the internal flash memory. Existing files (e.g. the boot project) are overwritten.
Stop --> Clear 3 x within 2 s	All files of the internal flash are copied onto a plugged-in memory card. Existing files are overwritten. LD2 lights up briefly.

4.5 File system

The file system consists of an internal built-in flash memory (drive C:) and an optionally external plugged-in memory card (drive A:). Access can occur via CoDeSys or directly from the program of the control.

Internal flash memory

This memory is accessed as drive C: and the boot project can be stored, which is automatically loaded and started when switching on.Any other files (documentation, download lists, prescriptions, etc.) can be stored and read here. The following particularities must be observed:

- Access is possible only to files in the root directory.
- Only short file names (8.3 format) are possible.
- Reading takes place with high speed and can occur also at any time in the time-critical cyclic operating modes of the control.
- Writing occurs at a slow rate, because the flash must be programmed here. Any data can be written if the control is in stop condition, but only one file can be opened for writing. If the control is in run condition, only blocks of max. 32KByte can be written into the opened file. As soon as this block was completely stored in the background the next data can be written.
- Data is not physically deleted. First they are internal marked as deleted. Thus the free available memory space decreases. The command "fileformat" can be used via the CoDeSys PLC browser. Thus the complete memory is formatted again. All data is irrevocable deleted.

External memory card

A SD or MMC memory card of any capacity can be plugged-in into the slit-in unit of the operating unit. This memory is accessed as drive A:Any files can be stored and read here, too. The following particularities must be observed:

- The file system is FAT16 and thereby compatible to external memory card readers and Windows operating systems.
- Access is possible only to files in the root directory.
- Only short file names (8.3 format) are possible.
- Reading and writing is not possible in cyclic operating modes. The card is completely ignored.
- The write protection switch (at SD cards) is not considered, writing on the card is always possible.

Note:
The standard drive of C: can be changed to A: via CoDeSys PLC browser. Thus files can be written and read via CoDeSys to the internal memory or the external memory card.

5. Field bus interface ProfiBus DP

5.1 Basic data of the C5-PROFIBUS interface

The PROFIBUS interface of the C5 control is corresponding to the PROFIBUS-DP standard (DIN 19245 Part3). Now the PROFIBUS DP standard is also specified in the international standard, IEC 61158 as type 3. The present quick guide shall only describe the basic properties.

The control can be integrated into a ProfiBus network as slave via the ProfiBus-DP interface. Thereby up to 32 bytes (16 words) of process data (in and Out) as well as parameterizing data can be exchanged. Depending on the adjustment of object 5FFFh (field bus COMM Axis) the parameterizing data have access to the control (0) or to parameters of the required axis (1…8).

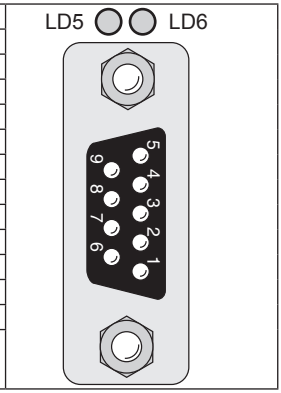
The ProfiBus process data are faded-in in the image of the control:

%IW72	1.	Prozess data word from ProfiBus master
%IW73	2.	
:	:	
%IW88	16.	

%QW72	1.	process data word to ProfiBus master
%QW73	2.	
:	:	
%QW88	16.	

Depending on the number and data type (byte/word/Dword) this range can be adapted in the control configuration with CoDeSys.

LD5	Data	Ready for operation
LD6	Ready	Data is transmitted by the ProfiBus master
X6C	Name	Description
1	-	reserved
2	-	reserved
3	RxD/TxD-P	transmission/receive signal P
4	-	reserved
5	DGND	Data reference potential
6	VP	supply voltage for terminating resistor
7	-	reserved
8	RxD/TxD-N	transmission/receive signal N
9	-	reserved



Node address	adjustable via parameter SY.06
Ident-Number	0944h
GSD file	KEB40944.gsd
PBS transmission speed	9,6 / 19,2 / 45,45 / 93,75 / 187,5 / 500 Kbit/s and 1,5 / 3 / 6 / 12 Mbit/s are automatically detected
PBS diagnosis	6 byte occupied according to standard
PBS parameterizing	7 byte occupied according to standard
PBS configuration generally	Max. three modules can be activated (also see GSD file): Parameterizing channel (8 byte for 8 bit raw data) Process output data (1…16 words for 16 bit raw data) Process input data (1…16 words for 16 bit raw data)
Configuration of the modules	Parameterizing channel B7h (coding the config-bytes) process output data with n=number of words E0h + (n-1) (coding the config-bytes) process input data with n=number of words D0h + (n-1) (coding the config-bytes)
Process data mapping	The process data are directly copied into the process image of the control: Input data of the slave begins with QW72 Output data of the master begins with IW72

5.2 The raw data of the KEB-PROFIBUS-DP interface

The C5 PBS interface realizes max. three modules. All modules change the raw data in the cyclic telegrams between PROFIBUS master and slave:

- Parameterizing channel: This module occupied always 8 byte raw data and serves for writing/ reading of a parameter value with max.data length of 32 bit. The parameter is addressed via 16 bit index and 8 bit subindex.
- Process output data: Data, which are transmitted non-addressed from master to slave.
- Process input data: Data, which are transmitted non-addressed from slave to master.

The KEB C5 PROFIBUS-interface adjusts itself flexible to the configuration preset by the master. For example it is possible

- to work exclusively with the parameter channel (8 byte raw data). For this the master specifies only one configuration byte with the value B7h.
- work only with process data. The master specifies two configuration bytes with values according to the process data length (see above).

If the parameter channel in the slave shall be activated, value B7h must be entered as first configuration byte. The further sequence of the configuration bytes for the process data is not predefined.

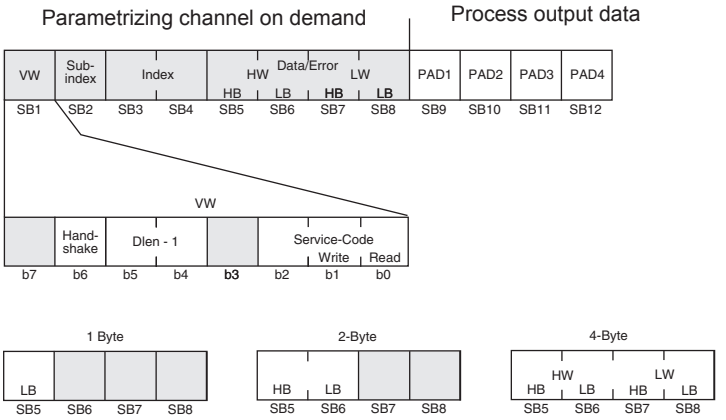
The following figures represent the raw data assignment in case the parameter channel is active and configured for process output data as well as process input data 4 byte(=2 words). Thus it results a net data length of 12 byte both for the telegram of the DP master to the slave as well as in direction from the slave to the master.

Coding of the raw data from DP master to KEB-DP interface

Legend	
LB	Low-Byte
HB	High-Byte
HW	High-Word
LW	Low-Word

B5	B4	Data length
0	0	1 Byte
0	1	2 Byte
1	0	3 Byte
1	1	4 Byte

B1	B0	Service requirement
0	0	No service
0	1	Reading
1	0	Writing
1	1	No service



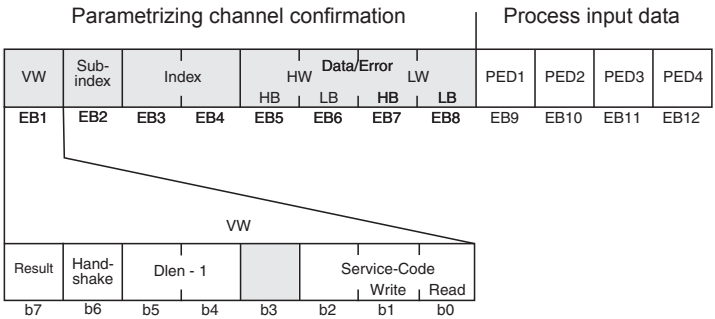
Coding of the raw data from the KEB-DP interface to DP master

Legend	
LB	Low-Byte
HB	High-Byte
HW	High-Word
LW	Low-Word

B5	B4	Data length
0	0	1 Byte
0	1	2 Byte
1	0	3 Byte
1	1	4 Byte

B1	B0	Service requirement
0	0	No service
0	1	Reading
1	0	Writing
1	1	No service

b7=0 --> No error
b7=1 --> Error



5.3 Parameters of the PROFIBUS interface

The parameters serve for the configuration of the PROFIBUS interface. The parameters are addressed via PROFIBUS by means of index (16 bit) and subindex (8 bit).

Name	**Fieldbus Comm Axis**	
Meaning	Serves for change-over of the PROFIBUS communication between each devices, which can be addressed by the control.	
Index	**5FFFh**	
Subindex	0	
Data length	1 Byte	
Coding	0	The control itself is addressed.
	1…8	Axis 1…8 is addressed
Default	0	
Note	A changed value is immediately active. After switching on the parameter value is always = 0.	

Name	**Parameter of the respective ax**is	
Meaning	set-addressing	
Index	**2000…5FFEh**	
Subindex	0	
Data length	1 Byte	
Coding	0	indirect set-addressing
	1…255	binary coded set-addressing set 0...7

6. Software

6.1 Programming system CoDeSys

The axis control is programmed with the programming system CoDeSys of the company 3S-Software (www.3s-software.com). This programming software is free-available in the Internet. A KEB target information file (TNF) for the control is available as accessories, which contains all required hardware specifications. A library with firmware functional modules is further contained for access to the periphery (axes, real-time clock, switch, LED, file system). The use of these functional modules is explained in the provided example projects.

The connection to CoDeSys occurs via the Ethernet interface X6B via IP protocol. For this the control is connected with a 1:1 cable to the distribution system of an existing firm net or by means of a cross cable directly to the network interface of a PC. IP-address and port number can be adjusted at first via COMBIVIS. TCP/IP (Level2) is selected with the following adjustments in the CoDeSys communication parameter:

Address	(as adjusted)
Port	1200 (or as changed)
Block size	512
Motorola Byteorder	Yes

6.2 Parameterizing system COMBIVIS

The axis control can be parameterized and monitored with COMBIVIS. COMBIVIS is free-available in the Internet (www.keb.de). Access to all axes is possible via the control with COMBIVIS. The control has the node address 0, the axes have the node addresses 1 to 8. Connection with COMBIVIS occurs via Ethernet interface X6B via IP protocol or the serial interface X6A. IP-address and port number can be adjusted first via the serial interface and COMBIVIS. Afterwards the protocol TCP or UDP as well as the correct IP-address of the control is selected in the COMBIVIS IP protocol driver. The data port number is 8000, if necessary it can be changed.

The following must be observed on access to axis:

- First the axes must be switched on, then the control, or the function block 'tSetModes' must call-up in order to make the connection between control and axis. Thus the baud rate between axis and control is adjusted to the highest possible value and the axis can be accessed via COMBIVIS. (After power-on reset the inverter /servo starts always with 38,4 KBaud)
- If an axis is operated cyclically or synchronously, only the indirect set addressing can be used in COMBIVIS. This applies also to download and scope

6.3 Parameter description

6.3.1 Runtime and error monitoring

The ru-parameters serve for monitoring of the program flow.

ru.00	**status**	**Address 0200h**
Program status	no prog	no program loaded
	prog OK	program loaded
	prog corrupt	program checksum error
Control status	run	Program runs
	Stop	Program stopped
	breakpoint	Program is on break point
Error status	err_cyctime	The adjusted cycle time was exceeded
	err_watchdog	The length of the last PLC cycle exceeded the maximum value, the PLC program was stopped.

ru.01	**cycle time**	**Address 0201h**
This parameter indicates the cycle time adjusted by the PLC program in milliseconds. This value is also used for the cycle time monitoring, a value of 0 ms means a free-running PLC program without cycle time monitoring.		

ru.02	**axis mode**	**Address 0202h**
The parameter indicates the axis configuration adjusted by the PLC program. There is a differentiation between normal- and synchronous/cyclic operation.		

ru.03	**axis errors**	**Address 0203h**
The parameter indicates the axes which did not respond. This can have been released by interruption of the cable to the axis or by switching off the axis. The value 0 means that all monitored axes are connected correctly.		

ru.04	**min. process time**	**Address 0204h**
ru.05	**max. process time**	**Address 0205h**
ru.06	**response time**	**Address 0206h**
ru.07	**process time**	**Address 0207h**
ru.08	**idle time**	**Address 0208h**
The cycle time of a PLC program flow is composed of:		
response time	Time of recognizing the new program cycle up to the call of the PLC program	
process time	Time, when the PLC program as well as all accesses by CoDeSys and COMBIVIS are processed.	
idle time	Remaining time up to the next program cycle.	
Parameter ru.04 / ru.05 displays the minimum/maximum process time and can be reset by writing of any value.		

6.3.2 Ethernet parameter

The following parameters contain the values, which are needed for the communication via the Ethernet interface.

et.00	MAC address	Address 0300h
The MAC address (Media Access Control) is formed of 6 byte. The first three bytes contain the manufacturer's code (00-08-FA). Only the lowest 4 bytes are displayed here „FAxxxxxx“. This address is assigned by the manufacturer and cannot be changed.		

et.01	IP address	Address 0301h
The IP address consists of 4 bytes and is the clear identification of one Internet participant (called node by such a way). In case of doubt the network administrator gives the address to be adjusted. When using a direct connection of control and PC with a cross cable, this IP address should be adjusted in such a way that the difference is only in the lowest byte to the address of the PC's (same network but different node).		

et.02	COMBIVIS port number	Address 0302h
The port number for the access via COMBIVIS is adjusted with this parameter. The standard value is 8000 and normally it is not changed.		

et.03	CoDeSys port number	Address 0303h
This parameter adjusts the port number, under which CoDeSys establishes the connection. The standard value is 1200 and normally it is not changed.		

et.04	IP error count	Address 0304h
Serves for the diagnosis of the IP protocol stack.		

et.05	TCP connections	Address 0305h
This parameter displays the number of active TCP/IP connections.		

et.06	UDP connections	Address 0306h
This parameter displays the number of active UDP connections.		

et.07	PGM logged in	Address 0307h
This parameter displays that there is an online connection to CoDeSys. A further login via CoDeSys is not possible then.		

et.08	TCP multicount	Address 0308h
This parameter serves only for diagnostic purposes.		

et.09	Data port password	Address 0309h
This parameter defines the write protection password for the COMBIVIS data port. The programming of the password occurs only via the serial interface. Then this password must be entered here again for write access via the data port. Error message "operation not possible" is displayed in case of locked data port write access. Value 0 switches off the write protection password.		

et.10	Gateway address	Address 030Ah
This parameter determines the IP address of the appropriate gateway. As soon as a connection to IP slave address outside the own network shall be made by the control program, this address is used. In case of doubt the gateway address to be adjusted can be ask for by the network administrator.		

et.11	Subnet mask	Address 030Bh
The decision whether an IP slave address is outside of the own network is determined with this mask. If this mask is 0.0.0.0 the standard masks are used depending on network class A, B or C. In case of doubt the subnet mask to be adjusted can be ask for by the network administrator.		

6.3.3 Real-time clock

The internal real-time clock is adjusted and/or read-out with the following parameters.

rc.00	time	Address 0400h
This parameter displays the time in hours and minutes in a 24-hours format. Writing on this parameter adjusts the time.		

rc.01	seconds	Address 0401h
This parameter displays the seconds in a range of 0...59. Writing on this parameter adjusts the seconds.		

rc.02	date	Address 0402h
This parameter displays the date in a DD-MM format. Writing on this parameter adjusts the date.		

rc.03	year	Address 0403h
This parameter displays the year in four digits. Writing on this parameter adjusts the year.		

rc.04	data valid	Address 0404h
The real-time clock is running for approx. 30 days after switching off the supply. After this it must be adjusted again. If this parameter has the value „false“, the date and/or time is not correct. The clock must be adjusted.		

6.3.4 Process Image

pi.00	inputs	Address 0500h
Displays the condition of the local inputs.See section in-/output module. Set 0 displays the first word, set 1 displays the second.word, etc.		

pi.01	outputs	Address 0501h
Displays the condition of the local outputs.See section in-/output module. Set 0 displays the first word, set 1 displays the second.word, etc.		

pi.02	axis indata 1	Address 0502h
Displays the value of the first process-input data (32 Bit) of the axes. Set 0 is for the data of axis 1, set 1 for the axis 2, etc.		

pi.03	axis outdata 1	Address 0503h
Displays the value of the first process-output data (32 Bit) of the axes. Set 0 is for the data of axis 1, set 1 for the axis 2, etc.		

pi.04	axis indata 2	Address 0504h
Displays the value of the second process input data (16 Bit) of the axes. Set 0 is for the data of axis 1, set 1 for the axis 2, etc.		

pi.05	axis outdata 2	Address 0505h
Displays the value of the second process-output data (16 Bit) of the axes. Set 0 is for the data of axis 1, set 1 for the axis 2, etc.		

pi.06	axis indata 3	Address 0506h
Displays the value of the third process-input data (16 Bit) of the axes. Set 0 is for the data of axis 1, set 1 for the axis 2, etc.		

pi.07	axis outdata 3	Address 0507h
Displays the value of the third process-output data (16 Bit) of the axes. Set 0 is for the data of axis 1, set 1 for the axis 2, etc.		

pi.08	fieldbus indata	Address 0508h
Displays the value of the Fieldbus-input data. Set 0 displays the first word, set 1 displays the second word, etc.		

pi.09	fieldbus outdata	Address 0509h
Displays the value of the Fieldbus-output data. Set 0 displays the first word, set 1 displays the second word, etc.		

6.3.5 Userdefinition parameter

ud.00	Program operation	Address 0800h
The current program operation mode (run/stop) is displayed or adjusted here. Furthermore a reset or reset cold can be executed with this parameter.		

ud.01	password	Address 0801h
Password input for the corresponding user level. The following values for the password step are possible:		
200	User write protection (operating parameter cannot be changed)	
440	User reading/writing	
Note: The value for the reading/writing password can be changed with parameter ud.08.		

ud.02	Features	Address 0802h
Display of the actual disconnected special functions (e.g. SoftMotion)		

ud.03	IO module	Address 0803h
This parameter displays the installed I/O module.		

ud.04	fieldbus module	Address 0804h
This parameter displays the installed Fieldbus module.		

ud.05	error counters rx	Address 0805h
This parameter counts the receive errors during the communication with the axes. Set 0 displays the errors of axis 1, set 1 of axis 2 etc.		

ud.06	error counters tx	Address 0806h
This parameter counts the errors during the transmission to each individual axis. Set 0 displays the errors of axis 1, set 1 of axis 2 etc.		

ud.07	fieldbus comm axis	Address 0807h
This parameter displays the axis, on which the field bus accesses to by parameter communication.		

ud.08	user r/w password	Address 0808h
Parameters with write/read password level can be changed with the password input of this parameter. The standard value is 440. This parameter can only be read/changed with a special password.		

ud.09	indirect set indicator	Address 0809h
Display and adjustment of the set indicator for indirect parameter access.		

ud.10	active set	Address 080Ah
Display and adjustment of the active set.		

ud.11	Serial number (date)	Address 080Bh
Displays the date of the unit serial No.		

ud.12	Serial number (counter)	Address 080Ch
Display of the unit serial No.		

ud.13	QS number	Address 080Dh
Only for the internal use during the production of the unit.		

6.3.6 System parameter

sy.01	software date	Address 0001h
This parameter displays the date of the installed firmware.		

sy.02	device identifier	Address 0002h
This parameter displays the software-identification number (CFG-ID) for COMBIVIS.		

sy.04	configuration selection	Address 0004h
Selection of internal device data.		

sy.05	configuration data	Address 0005h
Output of internal device data.		

sy.06	configuration selection	Address 0006h
This parameter determines the Fieldbus address.		

sy.07	baud rate 66019II	Address 0007h
The baud rate for the KEB DIN66019II protocol is adjusted with this parameter.		

sy.10	C5	Address 000Ah
Display of the unit type.		

The following parameters serve for the operation of the inverter scope part of COMBIVIS.

sy.32	**scope timer**	**Address**	**0020h**
sy.33	**scope data 1 defin.**	**Address**	**0021h**
sy.34	**scope data 1 set**	**Address**	**0022h**
sy.35	**scope data 2** defin.	**Address**	**0023h**
sy.36	**scope data 2 set**	**Address**	**0024h**
sy.37	**scope data 3** defin.	**Address**	**0025h**
sy.38	**scope data 3 set**	**Address**	**0026h**
sy.39	**scope data 4** defin.	**Address**	**0027h**
sy.40	**scope data 4 set**	**Address**	**0028h**

6.3.7 Debugging

Parameters 06xxh are only used for the diagnosis during the production process.

6.4 System variables

The following system variables are available in the PLC program:

SYSAXISMODE

Displays the axes control mode adjusted via the function block 'tSetModes'.

SYSERRORAXIS

Displays the failed monitored or cyclic/synchronous operated axes. In case of failure of an axis the red error LED at the operating unit is switched on and the event "excpt_axis_error" is released (if this event is activated). Then the control program can evaluate the defective axes in SYSERRORAXIS. Additionally this condition is displayed in parameter ru.03.

SYSCYCLETIME

Displays the axes control mode adjusted via the function block 'tSetModes'. Value 0 means that NO cycle time monitoring takes place and the PLC program is running free with a minimum of 1 ms. The cycle time determines the fixed time interval the PLC program needs for one cycle and into which the process data are exchanged with the axes during cyclic/synchronous operation.

SYSERRORCYCLETIME

The red error LED at the operating unit is switched on, when exceeding the adjusted cycle time. Event "excpt_cycle time_overflow" is released (if this Event is activated) and the system variable SYSERRORCYCLETIME is set on TRUE. Additionally this condition is displayed in parameter ru.00.

SYSWATCHDOGMAX
Determines the max. watchdog time in n*44ms. Standard value is 3, that means the program watchdog is adjusted to 132ms.

SYSERRORWATCHDOG
If a cycle of the PLC program needs longer than the maximum watchdog time (e.g. by a endless loop), then the system variable SYSERRORWATCHDOG is set to TRUE and the program is interrupted (PLC is on stop then). Additionally this condition is displayed in parameter ru.00.

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