

COMBICONTROL



GB Instruction Manual

C5 Compact

Mat.No.	Rev.
00C5CEB-K140	1D



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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Inspection of our units in view of their suitability for the intended use must be done generally by the user. Inspections are particularly 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.

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1. Description of the unit

1.1 Application

KEB COMBICONTROL C5 is a programmable control with direct connection upto four 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 describes the release of the firmware V1.4 and higher.

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 following modules:

- CPU and memory
- internal flash file system
- Switching power supply
- Real-time clock
- HSP5/485-interfaces to the inverter/servo axes
- Ethernet interfaces
- serial interface
- Control and error LED's
- RUN/Reset switch
- Voltage supply connection
- four digital inputs
- four digital outputs
- Field bus interface (optional)

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

C5	Material number	Description
Compact	14C5B00-1000	4DI/4DO

1.5 Technical data

General	
Dimensions (HxBxT)	125 x 44 x 144 mm
Weight	approx. 260 g
Installation method	35 mm Mounting rail
Grounding	via terminal strip or plug-in contact
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 VDC $\pm 0\%$
Power input control	3 W max.

Digital inputs/outputs	
Wiring system	cage-clamp terminals
Operating voltage inputs/outputs (UM)	18...30 VDC $\pm 0\%$
Output current	max. 0,7A per channel, short-circuit proof, free-wheeling diode integrated
Input voltage/current	according to IEC 61131-2 Type 1

Axis interface	
Type	HSP5/485
Connector	RJ-45, 8-pole, screened
Cable	Cat5, max. 100 m
Speed	38,4...250 kBaud
Use	Connection to KEB F5 inverter/servo, process data transmission, communication channel

Ethernet interfaces	
Type	IEEE802.3 10/100BaseTx 2-Port Switch
Connector	RJ-45, 8-pole, screened
Speed	10/100 MBaud autocrossover

Use	Connection to CoDeSys (programming system, debugging, visualization). Connection to COMBIVIS (control and axis adjustment, Scope) Connection to any devices (Socket-API)
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Serial interface	
Type	DIN66019II, RS232, RS485 full/half duplex
Connector	D-Sub 9 female
Speed	9,6...115,2kBaud
Use	Connection to COMBIVIS (control and axis adjustment, Scope) Connection to any devices (Socket-API)

Memory of the programming system	
Code	8 MB, double for online change
Data	12 MB
Retain	31 KB
Flag area	32 KB
Input	2 KB
Output	2 KB

1.6 Accessories

Operators	Material number
F5 HSP5/485, screw terminal	00F5060-9001
F5 HSP5/485, RJ45	00F5060-9002

Supply cable	Material number
Cable RS232 for COMBIVIS	0058025-001D
Cable RJ45 open end (for operator -9001), 2,5m	00F50C3-2025
Patch cable RJ45 (for operator -9002), 5m	00F50C3-1050

2. Functional Description

The C5 compact is mounted on a 35mm mounting rail. The earthing occurs with a plug-in contact or terminal connection X2.19/20.

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.

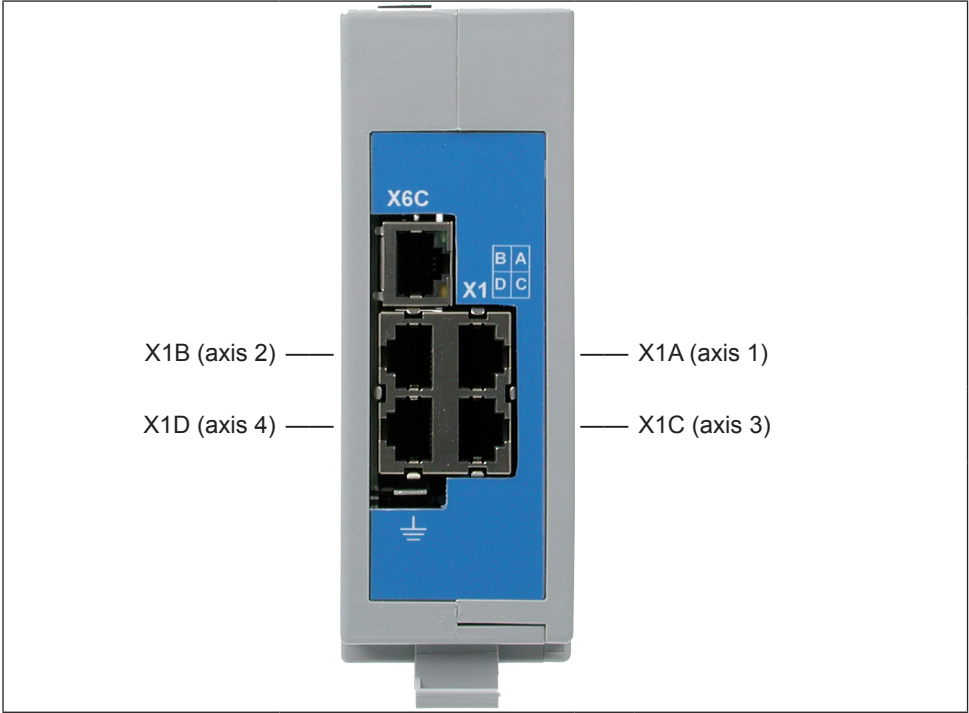
2.2 HSP5/485 interfaces to the inverter/servo axes

Up to four KEB COMBIVERT F5 can be connected via the terminals X1A to X1D. The connection occurs via reliability RS485 cables, which can be up to 100m 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).

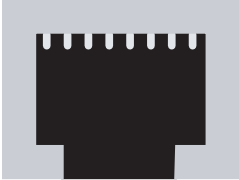
The process data are mapped-in as follows in the image of the control:

%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

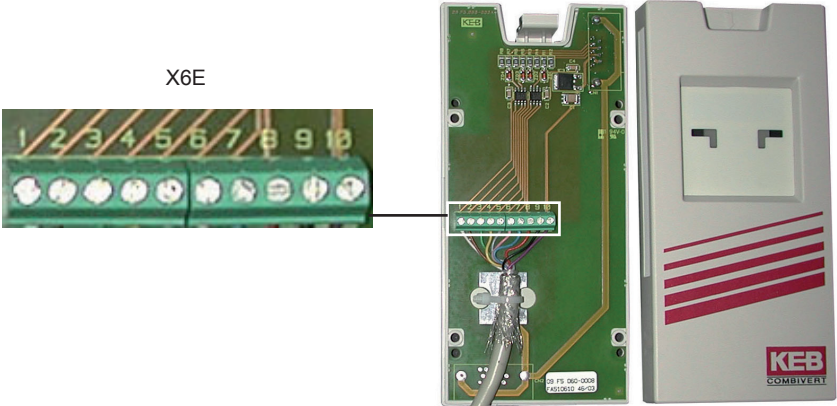
2.2.1 View of the inverter interfaces X1A...X1D for the axes 1..4




2.2.2 Assignment of the HSP5/485 interfaces

X1A...D	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 (00F5060-9001)



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 (00F5060-9002)

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+	EnTXD-	
PIN	1	2	3	4	5	6	7	8	
									Operator X6E
PIN	4	3	9	2	1	9	8	7	
Signal	RXD+	RXD-	GND	TXD+	TXD-	GND	EnRxD+	EnRxD-	
Color	see below								

RJ45 connection:

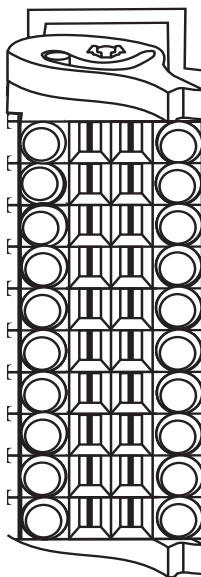
Color	see below								C5 PCC X1A...H
Signal	TXD+	TXD-	GND	RXD+	RXD-	GND	EnTXD+	EnTXD-	
PIN	1	2	3	4	5	6	7	8	
									Operator RJ45
PIN	1	2	3	4	5	6	7	8	
Signal	RXD+	RXD-	GND	TXD+	TXD-	GND	EnRxD+	EnRxD-	
Color	see below								

 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.

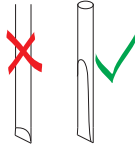
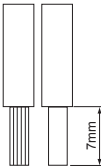
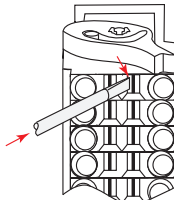
2.2.6 Comparison of the standards

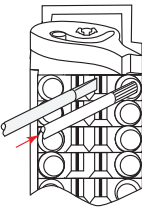
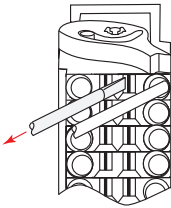
Pair	PIN	EIA/TIA568B	EIA/TIA568A	DIN 47100	IEC 189.2	USOC
3	1	orange/white	green/white	green	red	black
3	2	orange	green	yellow	orange	yellow
2	3	green/white	orange/white	grey	black	orange
1	4	blue	blue	brown	blue	red
1	5	blue/white	blue/white	white	white	green
2	6	green	orange	pink	green	brown
4	7	brown/white	brown/white	blue	yellow	grey
4	8	brown	brown	red	brown	blue

2.3 Voltage supply and digital inputs and outputs

Figure 2.3 Socket X2					
Voltage supply			Digital inputs and outputs		
+ Voltage input (UM) (internally interconnected)	1		11	Digital input 0	
	2		12	Digital input 1	
	3		13	Digital input 2	
	4		14	Digital input 3	
- Voltage input (UM) (internally interconnected)	5		15	Digital output 0	
	6		16	Digital output 1	
	7		17	Digital output 2	
	8		18	Digital output 3	
+ Voltage input (US)	9		19	PE	
- Voltage input (US)	10		20		

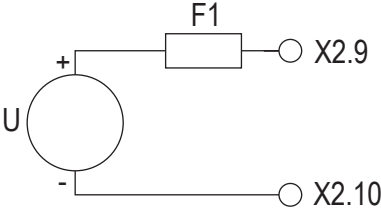
2.3.1 Assembly of the wires

	Required tools: Screw driver SD 0,4x2,5 (DIN 5264)							
1.	Strip cable <table border="1" data-bbox="168 1112 794 1230"><tr><td>Cable</td><td>permissible cross-section</td></tr><tr><td>flexible</td><td>0,2...1 mm²</td></tr><tr><td>Wire-end ferrule</td><td>0,13...0,34 mm²</td></tr></table>	Cable	permissible cross-section	flexible	0,2...1 mm ²	Wire-end ferrule	0,13...0,34 mm ²	
Cable	permissible cross-section							
flexible	0,2...1 mm ²							
Wire-end ferrule	0,13...0,34 mm ²							
2.	Plug screw driver into the square slot to the midside							

3.	Plug cable into the round slot, that no wires can be seen from the outside.	
4.	Remove screw driver and check if cables are fixed.	

2.3.2 Voltage supply of the control

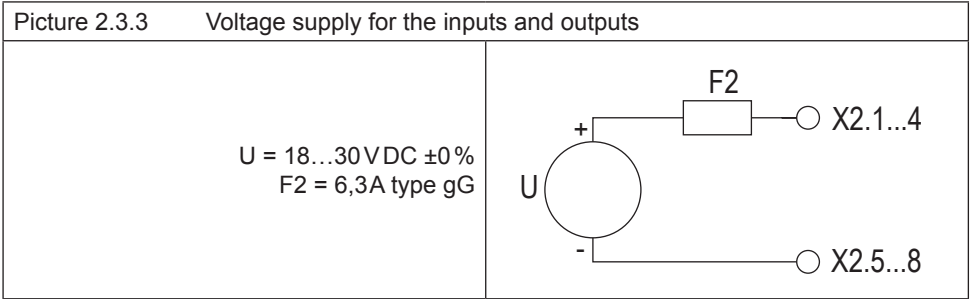
The voltage for supply of the control (US) occurs via terminals X2.9 and X2.10 in accordance with picture 2.3.2 and is electrically insulated from UM. If the control is supplied with voltage, the VCC-LED flashes (green).

Picture 2.3.2 Voltage supply of the control	
$U = 18 \dots 30 \text{ VDC} \pm 0 \%$ $F1 = 2 \text{ A type gG}$	

2.3.3 Voltage supply for the inputs and outputs

The voltage for supply of the digital inputs and outputs (UM) occurs via the terminals X2.1 to X2.8 in accordance with picture 2.3.3 and is electrically insulated from US.

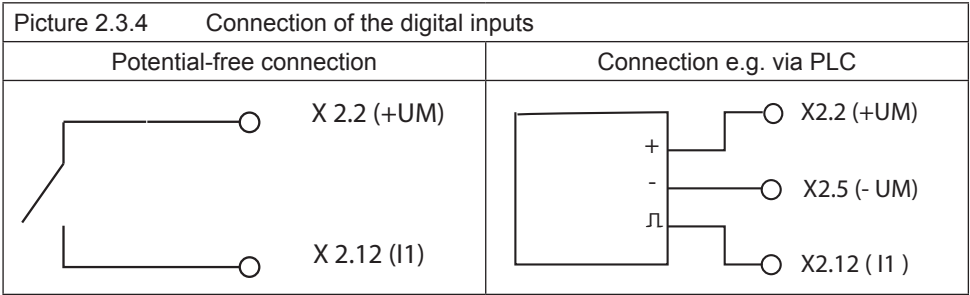
%IW1	%IX1.0	Condition of the supply voltage in/outputs (UM)
	%IX1.1	Is set in case of overload at one or several outputs. Additionally the OL-LED (red) is set.
	%IX1.2...%IX1.15	not assigned



2.3.4 Digital inputs (X2.11...14)

The digital inputs are potential-free to the control voltage US.

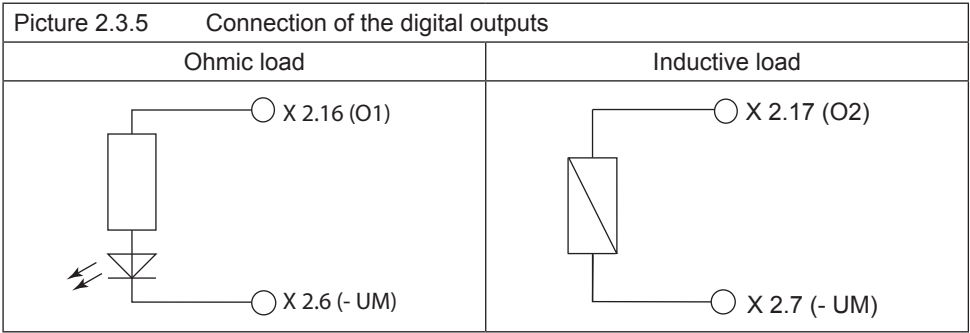
4 digital inputs 0...3		
%IW0	%IX0.0...%IX0.3 %IX0.4...%IX0.15	Condition of the digital inputs 0...3 not assigned





2.3.5 Digital outputs (X2.15...18)

The digital outputs are potential-free to the control voltage US. A free-wheeling diode is integrated in the unit, so that no external wiring is necessary at inductive load.

4 digital outputs 0...3		
%QW0	%QX0.0...%QX0.3 %QX0.4...%QX0.15	Condition of the digital outputs 0...3 not assigned

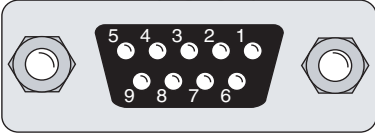


2.4 The operating unit

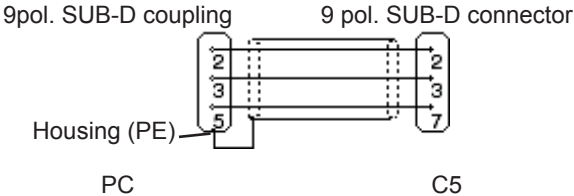
View Front	Name	Function	Addition	View from the bottom
	S1	Multi function switch/button		
	RUN	Run-LED	green	
	ERROR	ERROR-LED	red	
	OL	Overload	red	
	VCC	Voltage supply (US)	green	
	X6A	Serial interface	COMBIVIS	
	X6B	Ethernet interface	COMBIVIS/	
	X6C	Ethernet interface	CoDeSys	
	X1A...D	Axis interfaces		

2.5 Serial interface (X6A)

The socket X6A is a serial RS232/485 interface. It serves for the connection of the control with a PC or other operating units via the protocol DIN66019II. Alternatively access to this interface can occur by the control program.

X6A	Name	Description	
1	PGM	No wiring!	
2	TxD	Transmission signal RS232	
3	RxD	Receive signal RS232	
4	RxD-A	Receive signal RS485 A	
5	RxD-B	Receive signal RS485 B	
6	PGM+	No wiring!	
7	DGND	Data reference potential	
8	TxD-A	Transmission signal RS485 A	
9	TxD-B	Transmission signal RS485 B	

Part.No.: 0058025-001D
RS 232 cable
2,8m



2.6 Ethernet interface (X6B/X6C)

The standardized 10/100base-T interface supports the protocols TCP/IP and UDP/IP. The two interfaces are internally connected as switch.

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.

2.7 Description of the LED's

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

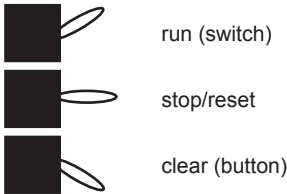
ERROR-LED	red
off	O.K.
on	Program error, exact error cause can be determined via CoDeSys.
fast blinking	Hardware error, control must be restarted

OL-LED	red
off	no error at the outputs
on	Overload or short circuit at the outputs

VCC-LED	green
off	no voltage supply
on	Voltage supply available

2.8 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 ERROR LED lights	After releasing the switch all retain variables are resetted (reset cold)
Stop --> Clear and hold (> 10 s) until ERROR and RUN LED light	All variables and the boot project are cleared (re-set origin) after releasing the button.

2.9 File system

The file system consists of an internal flash memory (drive C:). 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.
- The deleted memory space can be make available again with the command "filecleanup" without reformatting.

3. Software

3.1 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 or X6C 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

3.2 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 4. Connection with COMBIVIS occurs via Ethernet interface X6B or X6C 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

3.3 Parameter description

3.3.1 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.

3.3.2 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 „FAXxxxx“. 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
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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
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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
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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.

et.12	data port response delay	Address 030Ch
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This parameter adjusts the response delay for the Combivis-data port in ms. The network utilization can be reduced by setting of higher values. A value of 0 enables the fastest communication with the control, but a high network utilization is also generated.

et.14	Link state	Address 030Eh
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Displays state informations for the Ethernet link.

et.15	Link mode	Address 030Fh
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Determines the adjustments of the Ethernet interface. Fixed values or automatic recognition can be adjusted here. The additional clearlock value 32 activates a special behavior, which corrects link problems automatically with automatic detection on both sides (control and switch).

3.3.3 Real-time clock

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

rc.00	time	Address 0400h
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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.		

3.3.4 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.		

3.3.5 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.		

3.3.6 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.03	target-Id	Address 0003h
Displays the CoDeSys identification number of the control.		

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

COMBICONTROL

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

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

sy.07	baud rate 66019II	Address	0007h
The baud rate for the KEB DIN 66019II 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

3.3.7 Debugging

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

3.4 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 $n \cdot 44 \text{ ms}$. 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.

SYSAXISTOUT

Determines the response time of the axes. The default value of 20 ms means a maximum response time of 20 ms per axis. If necessary, this value must be increased in order to prevent a time-out error at slow units.



Karl E. Brinkmann GmbH

Försterweg 36-38 • D-32683 Bartrup

fon: +49 5263 401-0 • fax: +49 5263 401-116

net: www.keb.de • mail: info@keb.de

KEB worldwide...

KEB Antriebstechnik Austria GmbH

Ritzstraße 8 • A-4614 Marchtrenk

fon: +43 7243 53586-0 • fax: +43 7243 53586-21

net: www.keb.at • mail: info@keb.at

KEB Antriebstechnik

Herenveld 2 • B-9500 Geraardsbergen

fon: +32 5443 7860 • fax: +32 5443 7898

mail: yb.belgien@keb.de

KEB Power Transmission Technology (Shanghai) Co.,Ltd.

No. 435 QianPu Road, Songjiang East Industrial Zone,

CHN-201611 Shanghai, P.R. China

fon: +86 21 37746688 • fax: +86 21 37746600

net: www.keb.cn • mail: info@keb.cn

KEB Antriebstechnik Austria GmbH

Organizační složka

K. Weise 1675/5 • CZ-370 04 Česká Budějovice

fon: +420 387 699 111 • fax: +420 387 699 119

net: www.keb.cz • mail: info.keb@seznam.cz

KEB Antriebstechnik GmbH

Wildbacher Str. 5 • D-08289 Schneeberg

fon: +49 3772 67-0 • fax: +49 3772 67-281

mail: info@keb-combidrive.de

KEB España

C/ Mitjer, Nave 8 - Pol. Ind. LA MASIA

E-08798 Sant Cugat Sesgarrigues (Barcelona)

fon: +34 93 897 0268 • fax: +34 93 899 2035

mail: yb.espana@keb.de

Société Française KEB

Z.I. de la Croix St. Nicolas • 14, rue Gustave Eiffel

F-94510 LA QUEUE EN BRIE

fon: +33 1 49620101 • fax: +33 1 45767495

net: www.keb.fr • mail: info@keb.fr

KEB (UK) Ltd.

6 Chieftain Business Park, Morris Close

Park Farm, Wellingborough GB-Northants, NN8 6 XF

fon: +44 1933 402220 • fax: +44 1933 400724

net: www.keb-uk.co.uk • mail: info@keb-uk.co.uk

KEB Italia S.r.l.

Via Newton, 2 • I-20019 Settimo Milanese (Milano)

fon: +39 02 33535311 • fax: +39 02 33500790

net: www.keb.it • mail: kebitalia@keb.it

KEB Japan Ltd.

15-16, 2-Chome, Takanawa Minato-ku

J-Tokyo 108-0074

fon: +81 33 445-8515 • fax: +81 33 445-8215

mail: info@keb.jp

KEB Korea Seoul

Room 1709, 415 Missy 2000

725 Su Seo Dong, Gang Nam Gu

ROK-135-757 Seoul/South Korea

fon: +82 2 6253 6771 • fax: +82 2 6253 6770

mail: yb.korea@keb.de

KEB RUS Ltd.

Lesnaya Str. House 30, Dzerzhinsky (MO)

RUS-140091 Moscow region

fon: +7 495 550 8367 • fax: +7 495 632 0217

net: www.keb.ru • mail: info@keb.ru

KEB Sverige

Box 265 (Bergavägen 19)

S-43093 Hälsö

fon: +46 31 961520 • fax: +46 31 961124

mail: yb.schweden@keb.de

KEB America, Inc.

5100 Valley Industrial Blvd. South

USA-Shakopee, MN 55379

fon: +1 952 224-1400 • fax: +1 952 224-1499

net: www.kebamerica.com • mail: info@kebamerica.com

More and newest addresses at <http://www.keb.de>

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