

# COMBIVERT



**D** BETRIEBSANLEITUNG  
**GB** INSTRUCTION MANUAL

Steuerteil ab V2.3  
Control Circuit from V2.3



Erst Betriebsanleitung Teil 1 lesen !

Read Instruction manual part 1 first !





Seite

D - 3 ..... D - 38

Diese Betriebsanleitung beschreibt die Steuerungen der KEB COMBIVERT F5 - Serie. Sie ist nur gültig in Verbindung mit der Betriebsanleitung Teil 1 und Teil 2. Alle Anleitungen müssen jedem Anwender zugänglich gemacht werden. Vor jeglichen Arbeiten muß sich der Anwender mit dem Gerät vertraut machen. Darunter fällt insbesondere die Kenntnis und Beachtung der **Sicherheits- und Warnhinweise aus Teil 1**. Die in dieser Betriebsanleitung verwendeten Piktogramme entsprechen folgender Bedeutung:



Gefahr  
Warnung  
Vorsicht



Achtung,  
unbedingt  
beachten



Information  
Hilfe  
Tip



Page

GB - 3 .... GB - 38

This Instruction Manual describes the control circuit of the KEB COMBIVERT F5 series. It is only valid together with the Instruction Manuals Part 1 and Part 2. Both Instruction Manuals must be made available to the user. Prior to performing any work on the unit the user must familiarize himself with the unit. This includes especially the knowledge and observance of the **safety and warning directions of Part 1**. The pictographs used in this Instruction Manual have following meaning:



Danger  
Warning  
Caution



Attention,  
observe at  
all costs



Information  
Help  
Tip

<b>1.</b>	<b>General .....</b>	<b>4</b>
<b>2.</b>	<b>Installation and Connection .....</b>	<b>4</b>
<b>2.1</b>	<b>Summary .....</b>	<b>4</b>
2.1.1	Housing Size D - E .....	4
2.1.2	Housing Size >= G .....	5
<b>2.2</b>	<b>Control Circuit .....</b>	<b>6</b>
2.2.1	Assignment of Terminal Strip X2A .....	6
2.2.2	Connection of the Control .....	7
2.2.3	Digital Inputs .....	7
2.2.4	Analog Inputs .....	7
2.2.5	Voltage Input / External Power Supply .....	8
2.2.6	Digital Outputs .....	8
2.2.7	Relay Outputs .....	8
2.2.8	Analog Outputs .....	8
2.2.9	Voltage Output .....	8
<b>2.3</b>	<b>Connection .....</b>	<b>9</b>
2.3.1	Motor connection .....	9
2.3.2	X3A Resolver .....	10
2.3.3	X3B Incremental encoder simulation .....	10
2.3.4	Cables .....	11
<b>2.4</b>	<b>Operator .....</b>	<b>12</b>
<b>3.</b>	<b>Operation of the Unit .....</b>	<b>13</b>
<b>3.1</b>	<b>Keyboard .....</b>	<b>13</b>
<b>3.2</b>	<b>Parameter Summary .....</b>	<b>14</b>
<b>3.3</b>	<b>Password Input .....</b>	<b>15</b>
<b>3.4</b>	<b>Operating Display .....</b>	<b>15</b>
<b>3.5</b>	<b>Basic Adjustment of the Drive .....</b>	<b>17</b>
<b>3.6</b>	<b>Special Adjustments .....</b>	<b>20</b>
<b>3.7</b>	<b>Standard motor datas .....</b>	<b>27</b>
<b>3.8</b>	<b>The Drive Mode .....</b>	<b>28</b>
3.8.1	Start / Stop Drive .....	28
3.8.2	Changing the Direction of Rotation .....	28
3.8.3	Preseting the Set Value .....	28
3.8.4	Leaving the Drive Mode .....	28
<b>4.</b>	<b>Error Diagnosis .....</b>	<b>29</b>
<b>5.</b>	<b>Adjustment instruction speed controller ..</b>	<b>35</b>
<b>6.</b>	<b>Quick Reference .....</b>	<b>37</b>

## 1. General

The digital servo controller KEB COMBIVERT F5-SERVO serves exclusively for the control and regulation of the servo motors KEB COMBIVERT SM.

On delivery the servo amplifiers are synchronized to the servo motors supplied by KEB. So you receive a highly dynamic drive which is connected and ready for operation within the shortest time for standard applications.

The operation of other motors requires an adaption of the amplifier and is to be recommended only with special knowledge of control technology.

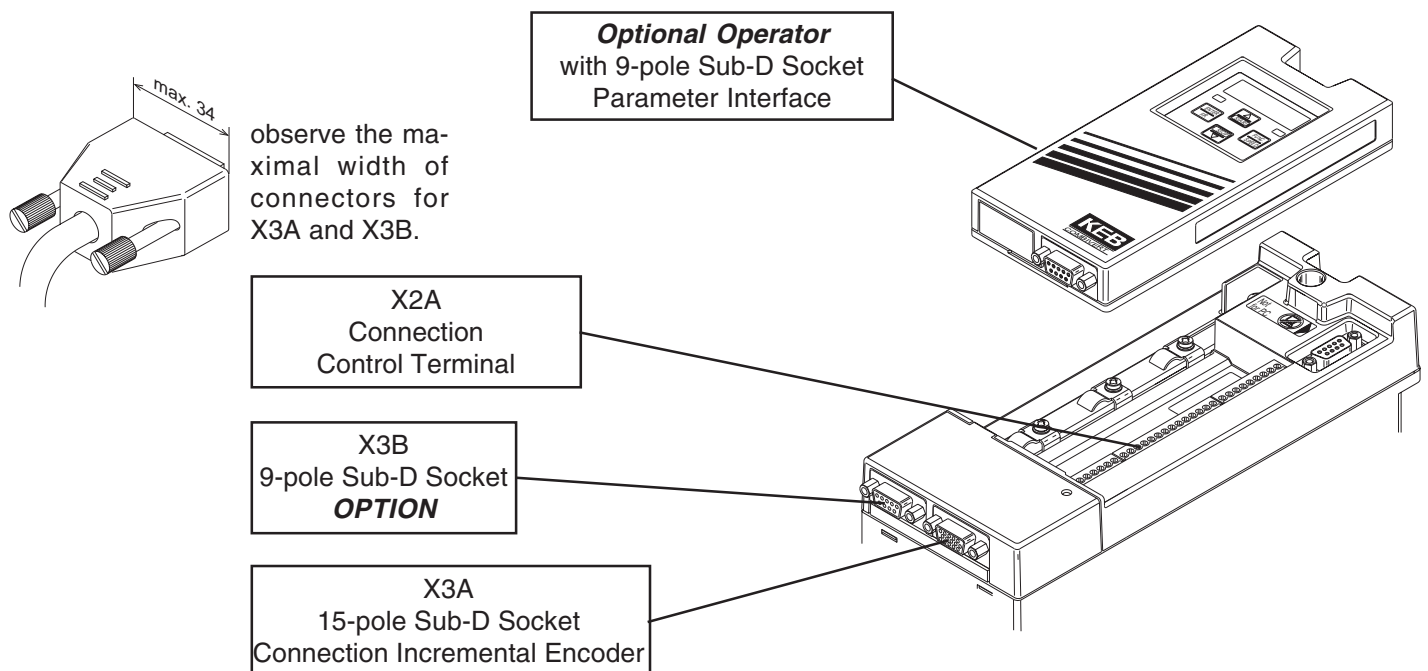
KEB COMBIVERT F5-SERVO has very extensive programming options. To make the operation and start-up simpler for the user, a special operator level was created in which the most important parameters are found. However, if the parameters pre-defined by KEB are not sufficient for your application an application manual is available.

GB

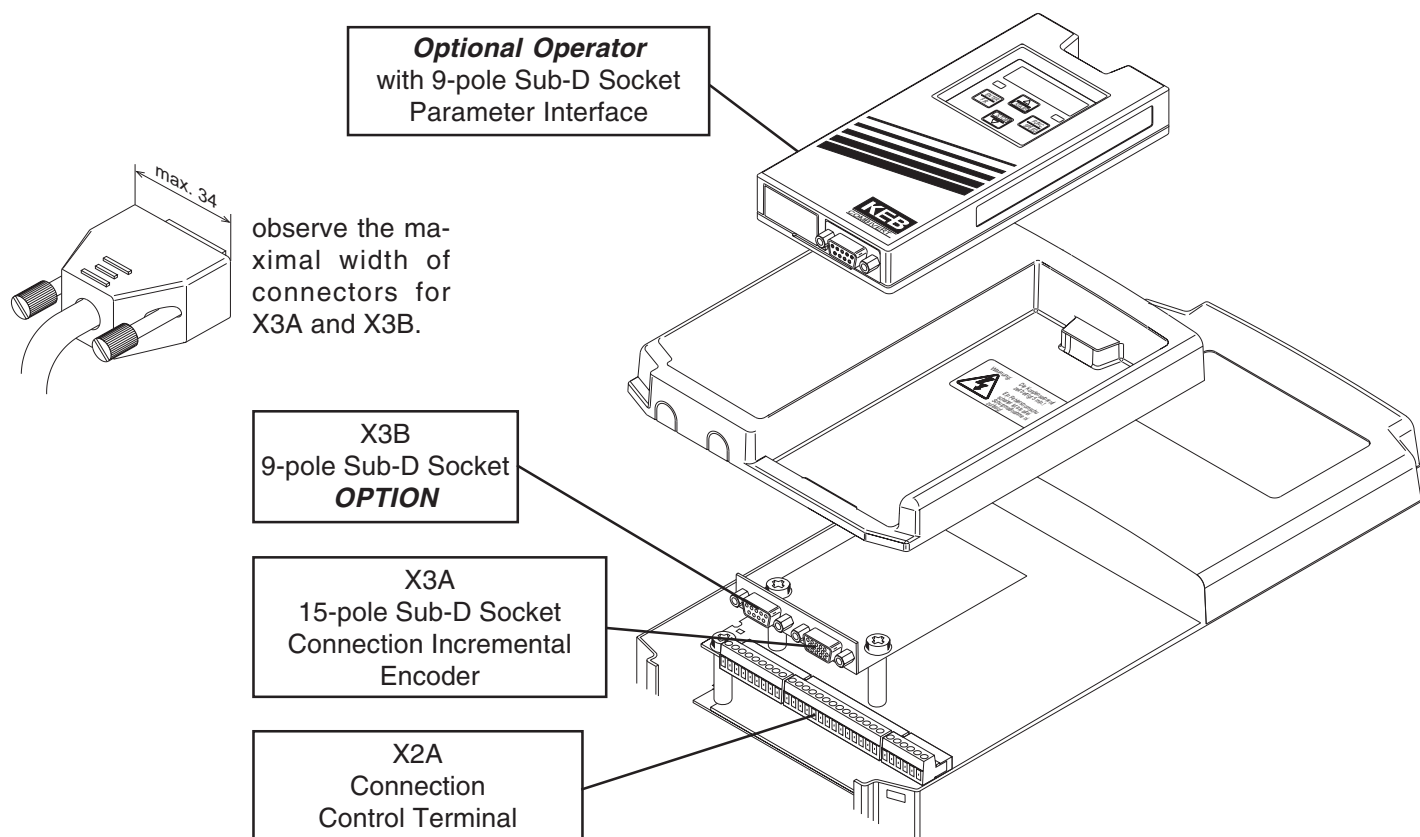
## 2. Installation and Connection

### 2.1 Summary

#### 2.1.1 Housing Size D - E



## 2.1.2 Housing Size $\geq$ G



## 2.2 Control Circuit

X2A

### 2.2.1 Assignment of Terminal Strip X2A

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29

PIN	Function	Name	Description	
1	+ Set value input 1	AN1+	Difference voltage	resolution: 12 Bit, Ri=30 k Ohm scan time: 1 ms
2	- Set value input 1	AN1-	0...±10 VDC $\hat{=}$ 0...±CP.22	
3	+ Analog input 2	AN2+	0...±10 VDC $\hat{=}$ 0...±100 %	
4	- Analog input 2	AN2-		
5	Analog output 1	ANOUT1	Analog output of the real speed 0...±10 VDC $\hat{=}$ 0...±3000 rpm	Voltage range: 0...±10V Ri=100 Ohm, resolution: 12 Bit PWM frequency: 3,4 kHz filter response 1. order: 178 Hz
6	Analog output 2	ANOUT2	Analog output of the apparent current 0 ... 10 VDC $\hat{=}$ 0 ... 2 x I <sub>N</sub>	
7	+10V Output	CRF	Reference voltage for set value poti	+10 VDC +5% / max. 4 mA
8	Analog Mass	COM	Mass for analog in- and outputs	
9	Analog Mass	COM	Mass for analog in- and outputs	
10	Fixed speed 1	I1	I1+I2 = fixed speed 3 (default: 0 rpm)	Ri = 2,1 kOhm scan time: 1 ms
11	Fixed speed 2	I2	no input = analog set value	
12	External fault	I3	Input for external fault stopping mode <sup>1)</sup>	
13	–	I4	No function deposited in the CP-Mode	
14	Forward	F	Software limit switch forward <sup>1)</sup>	
15	Reverse	R	Software limit switch reverse <sup>1)</sup>	
16	Control release / Reset	ST	Power modules are enabled; Error Reset at opening	
17	Reset	RST	Reset; only when an error occurs	
18	Speed dependent	O1	Transistor output switched at actual speed = set speed	
19	Ready signal	O2	Transistor output switched, as long as no error occurs	
20	24V-Output	U <sub>out</sub>	Approx. 24V output (max.100 mA)	
21	20...30V-Input	U <sub>in</sub>	Voltage input for external supply	
22	Digital Mass	0V	Potential for digital in-/outputs	
23	Digital Mass	0V	Potential for digital in-/outputs	
24	Relay 1/NO contact	FLA	Relay output; fault relay (default);	max. 30 V DC, 1 A;
25	Relay 1/NC contact	FLB	Function can be	
26	Relay 1/switching contact	FLC	changed with CP.33	
27	Relay 2/NO contact	RLA	Relay output;	
28	Relay 2/NC contact	RLB	Function can be	
29	Relay 2/switching contact	RLC	changed with CP.34	

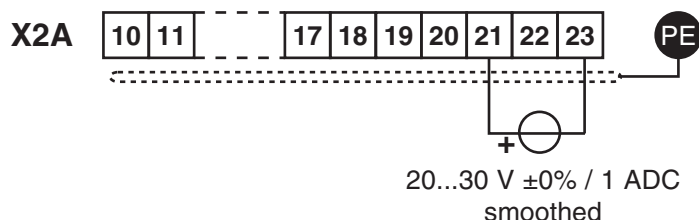


<sup>1)</sup> The reaction can be adjusted with CP.35 and CP. 36.  
If the unit is defective there is no guarantee that the software protective function will work.

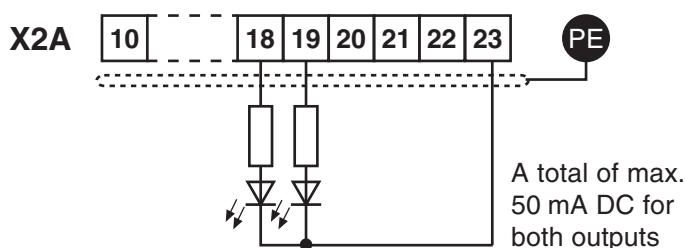


## 2.2.5 Voltage Input / External Power Supply

The supply of the control circuit through an external voltage source keeps the control in operational condition even if the power stage is switched off. To prevent undefined conditions at external power supply the basic procedure is to first switch on the power supply and after that the inverter.

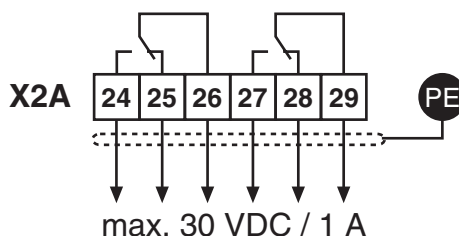


## 2.2.6 Digital Outputs

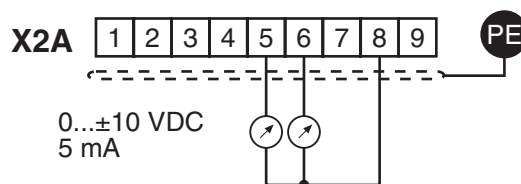


## 2.2.7 Relay Outputs

In case of inductive load on the relay outputs a protective wiring must be provided (e.g. free-wheeling diode)!

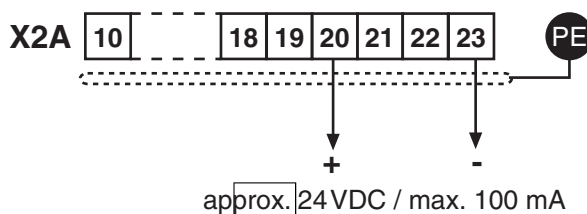


## 2.2.8 Analog Outputs



## 2.2.9 Voltage Output

The voltage output serves for the setting of the digital inputs as well as for the supply of external control elements. Do not exceed the maximum output current of 100 mA.



## 2.3 Connection

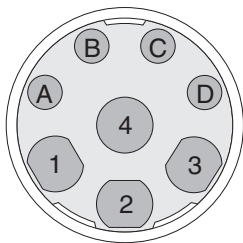
### 2.3.1 Motor connection



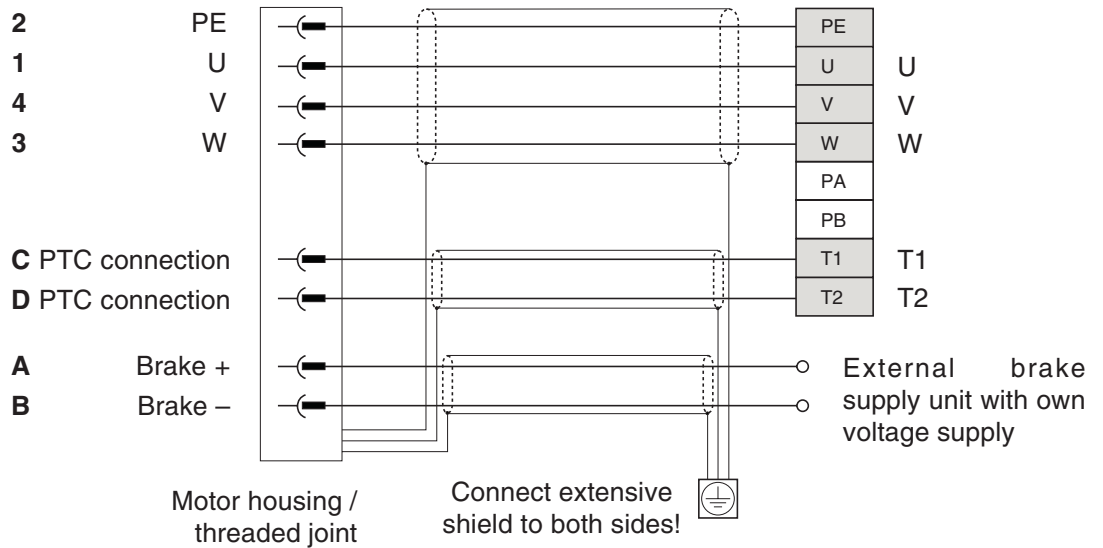
Remove or plug in the power connector only at switched off unit and disconnected power supply !



Observe the correct phase sequence for the connection of the servo motor !

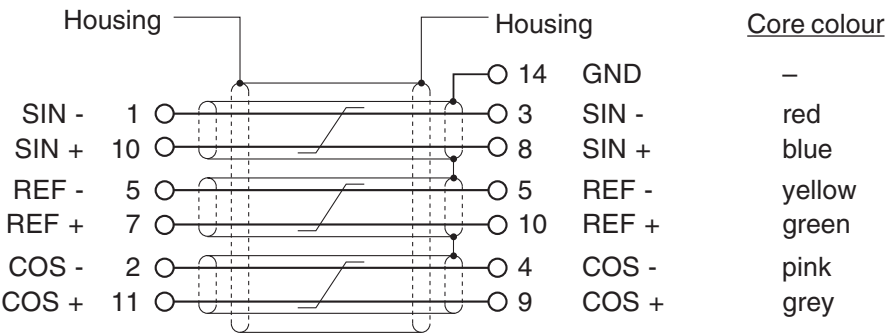
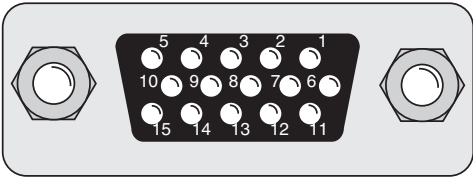
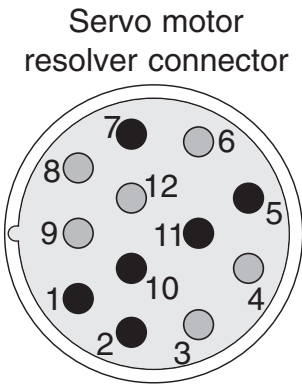


Servo motor power connector



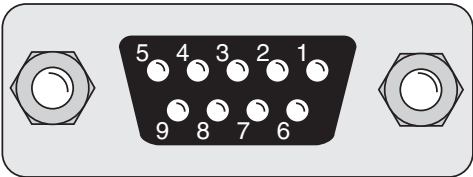
Connector Contact No.	Designation	cable Core No.
1	U	1
4	V	2
3	W	3
2	PE	green-yellow
A	Brake +	5
B	Brake -	6
C	PTC connection	7
D	PTC connection	8

2.3.2 X3A Resolver



2.3.3 X3B Incremental  
encoder  
simulation

The increments of the emulation are fixed to 1024 for units with resolver interface.



PIN No.	Signal
1	A+
2	B+
3	N+
4	+5,2 V
5	$U_{var}$ 20...30 V <sup>1)</sup>
6	A-
7	B-
8	N-
9	GND

The 20...30 V voltage supply at X3A and X3B is loadable with altogether 170 mA. If higher voltages / currents are needed for the supply of the incremental encoder, then the control must be supplied with an external voltage.

The +5,2 V voltage is a stabilized voltage, which at X3A and X3B is loadable with altogether 500 mA. Since the +5,2 V are generated from  $U_{var}$ , the current from  $U_{var}$  decreases in accordance with following formula:

$$I_{var} = 170 \text{ mA} - \frac{5,2 \text{ V} \times I_{+5V}}{U_{var}}$$

The tracks A+/A-, B+/B- and N+/N- must be fitted with a terminating resistor of approx. 150 Ohm!

<sup>1)</sup> depending on power circuit

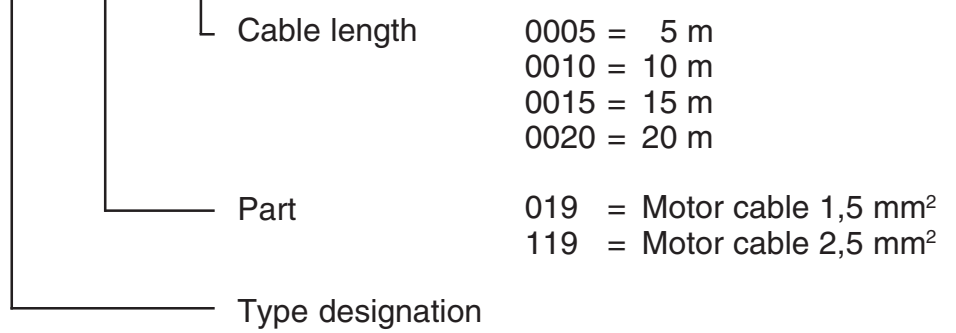


The plug may only be connected / disconnected when the inverter and supply voltage are disconnected!

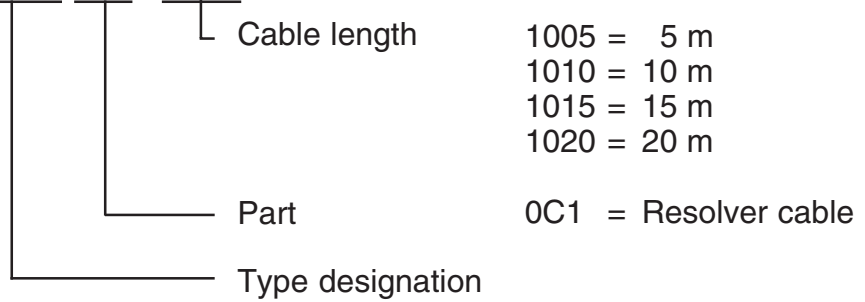
### 2.3.4 Cables

For the servo system KEB COMBIVERT F5-SERVO factory-assembled motor and resolver cables are available in the lengths 5m, 10m, 15m and 20m.

#### 00.S4.019-0005



#### 00.F5.0C1-1005



**GB**

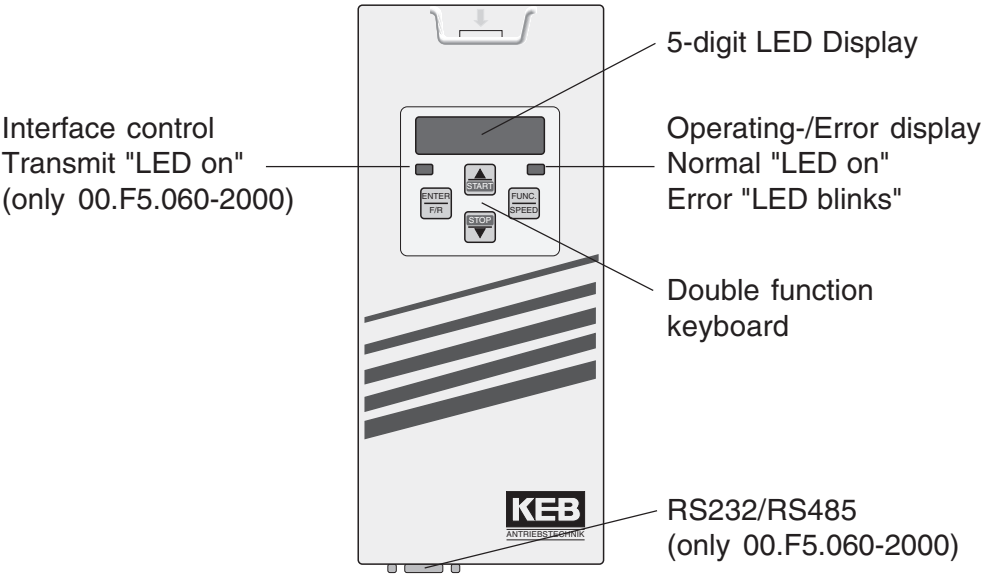


**Max. Encoder cable length 50m.  
Longer encoder cables on request.**

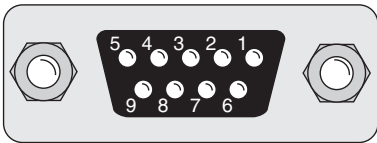
2.4 Operator

As an accessory to the local or external (option: cable 00.F5.0C0-1xxx) operation an operator is necessary. To prevent malfunctions, the inverter must be brought into **nOP** status before connecting / disconnecting the operator (open control release terminal). When starting the inverter whitout an operator, it is started with the last stored values or factory setting.

Digital Operator Standard: Part No. 00.F5.060-1000  
Interface Operator with serial Interface: Part No. 00.F5.060-2000

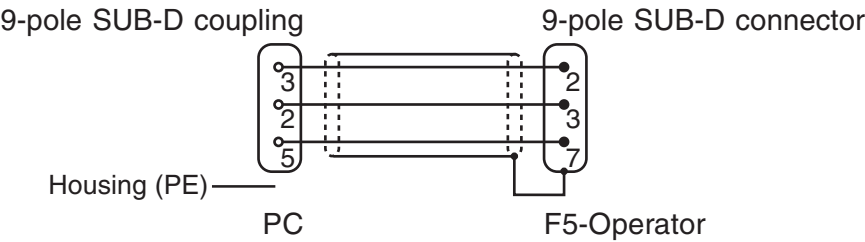


Only use the **operator interface** for the serial data transfer to RS232/485. The direct connection, PC to the inverter is only valid with a **special cable (HSP5 Part No. 00.F5.0C0-0001)**, otherwise, it would lead to the destruction of the PC-interface.



PIN	RS485	Signal	Meaning
1	—	—	reserved
2	—	TxD	Transmitter signal/RS232
3	—	RxD	Receiver signal/RS232
4	A'	RxD-A	Receiver signal A/RS485
5	B'	RxD-B	Receiver signal B/RS485
6	—	VP	Voltage supply-Plus +5V ( $I_{max} = 10\text{ mA}$ )
7	C/C'	DGND	Data reference potential
8	A	TxD-A	Transmitter signal A/RS485
9	B	TxD-B	Transmitter signal B/RS485

RS232-cable 3m  
PC / Operator  
Part. No. 00.58.025-001D



### 3. Operation of the Unit

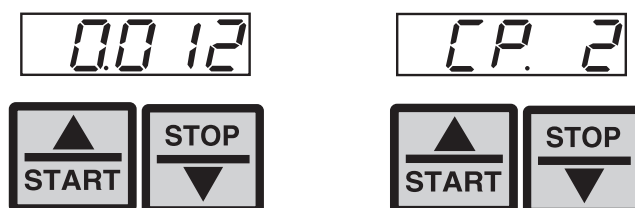
#### 3.1 Keyboard

When switching on KEB COMBIVERT F5 the value of parameter CP.1 appears (see Drive mode to switch the keyboard function.)

The **function key** (FUNC) changes between the parameter value and parameter number.



With **UP** (▲) and **DOWN** (▼) the value of the parameter number is increased/decreased with **changeable** parameters.



Principally during a change, parameter values are immediately accepted and stored non-volatile. However, with some parameters it is not useful that the adjusted value is accepted immediately. In these cases (CP.28, CP.32, CP.33, CP.34) the adjusted value is accepted and stored non-volatile by pressing **ENTER**.

If a malfunction occurs during operation, then the actual display is overwritten by the alarm message. The alarm message in the display is reset by ENTER.



With ENTER only the error message in the display is reset. In the inverter status display (CP.3) the error is still displayed. In order to reset the error itself, the cause must be removed or a power-on reset must be made.

## 3.2 Parameter Summary

Anzeige	Parameter	Einstellbereich	Auflösung	Default	Einheit	Enter	Ursprung
CP.0	password	0...9999	1	-	-	-	ud.1
CP.1	encoder 1 speed	-4000...4000	0,125	0	rpm	-	ru.9
CP.2	set value display	-4000...4000	0,125	0	rpm	-	ru.1
CP.3	inverter state	0...255	1	0	-	-	ru.0
CP.4	apparent current	0...6553,5	0,1	0	A	-	ru.15
CP.5	peak apparent current	0...6553,5	0,1	0	A	-	ru.16
CP.6	actual torque display	-10000,00...10000,00	0,01	0	Nm	-	ru.12
CP.7	actual DC voltage	0...1000	1	0	V	-	ru.18
CP.8	peak DC voltage	0...1000	1	0	V	-	ru.19
CP.9	output voltage	0...778	1	0	V	-	ru.20
CP.10	speed control config.	4...5	1	0	-	-	cs.0
CP.11	DSM rated torque	0,1...6553,5	0,1	LTK	Nm	-	dr.27
CP.12	DSM rated speed	0...32000	1	LTK	rpm	-	dr.24
CP.13	DSM rated frequency	0,0...1600,0	0,1	LTK	Hz	-	dr.25
CP.14	DSM rated current	0,0...710,0	0,1	LTK	A	-	dr.23
CP.15	DSM EMK voltage const.	0...1000	1	LTK	V	-	dr.26
CP.16	DSM winding inductance	0,01...500,00	0,01	LTK	mH	-	dr.31
CP.17	DSM winding resistance	0,000...50,000	0,001	LTK	Ohm	-	dr.30
CP.18	DSM curr. f. zero speed	0,0...700,0	0,1	LTK	A	-	dr.28
CP.19	load mot.dependent para.	1...2	1	1	-	E	fr.10
CP.20	absolute pos. enc.1	0...65535	1	57057	-	-	ec.2
CP.21	enc.1 rotation	0...19	1	0	-	-	ec.6
CP.22	max. reference forward	0...4000	0,125	0	rpm	-	op.10
CP.23	step value 1	-4000...4000	0,125	100	rpm	-	op.21
CP.24	step value 2	-4000...4000	0,125	-100	rpm	-	op.22
CP.25	acc. time forward	0,00...300,00	0,01	5,00	s	-	op.28
CP.26	dec. time forward	-0,01...300,00	0,01	5,00	s	-	op.30
CP.27	s-curve time acc. for.	0,00...5,00	0,01	0,00	s	-	op.32
CP.28	torque reference source	0...5	1	2	-	E	cs.15
CP.29	abs. torque ref	-10000,00...10000,00	0,01	LTK	Nm	-	cs.19
CP.30	KP speed	0...32767	1	300	-	-	cs.6
CP.31	KI speed	0...32767	1	100	-	-	cs.9
CP.32	carrier frequency	2/4/8/12/16	-	LTK	kHz	E	uf.11
CP.33	condition 2	0...68	1	4	-	E	do.2
CP.34	condition 3	0...68	1	2	-	E	do.3
CP.35	proh. rot. stopping mode	0...6	1	6	-	-	pn.7
CP.36	E. EF stopping mode	0...6	1	0	-	-	pn.3

LTK) depending on power circuit or on size (see 3.7 „Standard motor data“)



Due to the calculation / measuring accuracies, tolerances with the current and torque displays as well as with the switching levels and limitations, must be taken into consideration.

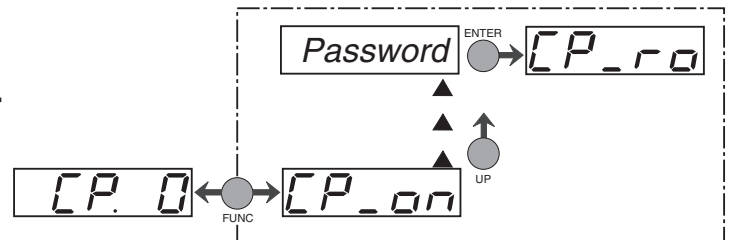
**Dependent on the data from the motor manufacturer, larger tolerances at the torque displays are possible, due to the usual variations in the machine parameters and temperature drifts.**

### 3.3 Password Input

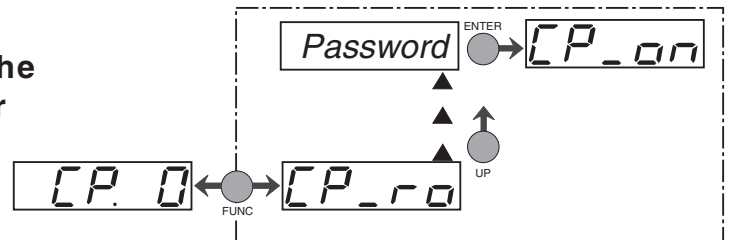
CP. 0

Ex works the frequency inverter is supplied without password protection, this means that all changeable parameters can be adjusted. After parameterizing the unit can be barred against unauthorized access (Passwords: see last but one page). The adjusted mode is stored.

#### Barring the CP-Parameter



#### Enabling the CP-Parameter



GB

### 3.4 Operating Display

The parameters below serve for the controlling of the frequency inverter during operation.

#### Actual speed

CP. 1

Display of actual motor speed (incremental encoder 1). For check reasons the setpoint speed is also displayed, if the control release or the direction of rotation are not switched. A counter-clockwise rotating field (reverse) is represented by a negative sign. Precondition for the correct display value is the in-phase connection of the motor and the correct setting of the direction of rotation (CP.21).

#### Set speed

CP. 2

Display of actually set value. The indication is done in the same manner as at CP.1. For control reasons the set speed is displayed even if control release or direction of rotation are not switched. If no direction of rotation is set, the set speed for clockwise rotation (forward) is displayed.

#### Inverter status

CP. 3

The status display shows the actual working conditions of the inverter. Possible displays and their meanings are:

noP

"no Operation" control release not bridged, modulation switched off, output voltage = 0 V, drive is not controlled.

LS

"Low Speed" no rotation preset, modulation switched off, output voltage = 0 V, drive is not controlled.

**FACC**

"Forward Acceleration" drive accelerates with direction of rotation forward.

**FdEc**

"Forward Deceleration" drive decelerates with direction of rotation forward.

**rACC**

"Reverse Acceleration" drive accelerates with direction of rotation reverse.

**rdEc**

"Reverse Deceleration" drive decelerates with direction of rotation reverse.

**Fcon**

"Forward Constant" drive runs with a constant speed and direction of rotation forward.

**rcon**

"Reverse Constant" drive runs with constant speed and direction of rotation reverse.

GB

Other status messages are described at the parameters, where they occur (see chapter 3 "Error diagnosis").

**Apparent current**

**CP. 4**

Display of the actual apparent current in ampere.

**Apparent current /  
Peak value**

**CP. 5**

CP.5 makes it possible to recognize the max. apparent current. For that the highest value of CP.4 is stored in CP.5. The peak value memory can be cleared by pressing the UP, DOWN or ENTER key or over bus by writing any value you like to the address of CP.5. The switch off of the inverter also clears the memory.

**Actual torque**

**CP. 6**

The displayed value corresponds to the actual motor torque in Nm. The value is calculated from the active current.

Requirement for the torque display is the adjustment of the motor data (CP.11...CP.18). If the real motor data deviate strongly from the data on the name plate the operating performance can be optimized by entering the real data. The adjustment of the name plate data is sufficient for a start-up.

Intermediate circuit  
voltage

CP. 7

Display of actual DC-link voltage in volt.  
Typical values:

V-class	Normal operation	Over volt. (E.OP)	Under volt. (E.UP)
230 V	300...330 V DC	approx. 400 V DC	approx. 216 V DC
400 V	530...620 V DC	approx. 800 V DC	approx. 240 V DC

Intermediate circuit  
voltage / Peak value

CP. 8

CP.8 makes it possible to recognize short-time voltage rises within an operating cycle. For that the highest value of CP.7 is stored in CP.8. The peak value memory can be cleared by pressing the UP, DOWN or ENTER key or over bus by writing any value you like to the address of CP.8. The switch off of the inverter also clears the memory.

Output voltage

CP. 9

Display of the actual output voltage in volt.

3.5 Basic Adjustment  
of the Drive

The following parameters determine the fundamental operating data of the drive and must be adjusted for the initial commissioning. They should be checked and/or adapted to the application.

Speed control /  
Configuration

CP. 10

With this parameter the basic setting of the speed controller is determined.

Value	Function
4	Speed control (regulated operation)
5	Torque control (regulated operation)

Adjustment range:	4...5
Resolution:	1
Factory setting:	4

Motor datas

CP. 11  
.  
.  
.  
CP. 18

Under these parameters the motor data can be read off and adjusted. If you have purchased the servo controller with motor from KEB, the optimal motor data are already adjusted and do not need to be changed anymore. The parameter data can be taken from the parameter survey.

### Load motor dependent parameter

CP.19

Ex factory the frequency inverter is adapted to the supplied motor. If the motor data in CP.11...18 are changed, then CP.19 must be activated once. This re-adjusts the current controller, torque curve and torque limit. With this, the torque limit is set at the value, that is maximally possible in the speed range (depending on inverter rated current), but not above the rated motor torque x 3.

CP.19 = 1 : • Pre-adjustment of the motor-dependent control-parameters.

- The voltage class of the inverter is taken as input voltage.

CP.19 = 2 : • Pre-adjustment of the motor-dependent control-parameters.

- The DC-link voltage /  $\sqrt{2}$  measured at switch on is taken as input voltage. Thus the frequency inverter can be adapted to the actually available mains voltage (e.g. USA with 460 V).

Adjustment range:	0...2
Resolution:	1
Factory setting:	0



When control release is active the adjustment was not completed. "nco" appears in the display!

### Absolute position

CP.20

The system position of the attached resolver system is adjusted at CP.20. With this parameter it is possible to adjust the controller to a not aligned motor. If the system position of the motor is unknown an automatic trimming can be done.

Before starting with the adjustment, the direction of rotation must be checked. The speed display in CP.1 must be positive when the motor runs manual in clockwise direction. If that is not the case, the direction of rotation can be exchanged as described with CP.21. If the correct direction of rotation is displayed, it can be started with the adjustment.

- the connected motor must be able to rotate freely
- open control release (terminal X2A.16)
- CP.20 = 2206 eingeben
- close control release (terminal X2A.16)

Now the motor is excited with its rated current and aligned to its zero position. The adjustment is finished when the displayed system position at CP.20 does not change for approx. 5 s. In this case open control release and switch off the unit.

If the error message E.EnC is displayed during trimming the direction of rotation must be checked (CP.21). In this case the position trimming must be repeated.

In case that motors with aligned encoder system are used, the value which has been established by the automatic trimming, can be entered under CP.20 as well. The adjustment values of known motors of the KEB COMBIVERT S4 series must be multiplied by the pole-pair number of the motor.

Example 1: A 6-pole motor (3 pole pairs) has a system position of 19.019 dec. with a S4-servo controller.

$$\begin{aligned} 19019 \text{ dec.} &= 4A4Bh \\ 4A4Bh \times 3 \text{ pole pairs} &= DEE1h \\ DEE1h &= \underline{57057} \text{ dec.} \end{aligned}$$

If the value exceeds 65535 dec., the lower 16 bit of the hexadecimal result must be entered.

Example 2: A 6-pole motor (3 pole pairs) has a system position of 23497 dec. with a S4-servo controller.

$$\begin{aligned} 23497 \text{ dec.} &= 5BC9h \\ 5BC9h \times 3 \text{ pole pairs} &= 1135Bh \\ 1135Bh &= 70491 \text{ dec.} \\ 135Bh &= \underline{4955} \text{ dec.} \end{aligned}$$

Adjustment range:	0...65535
Resolution:	1
Factory setting:	0

#### Change rotation

CP.21

The speed display at CP.1 must be positive when the engine runs manual in clockwise direction. The signals SIN+ and SIN- of the resolver have to be changed, if the sign is wrong. Please ensure that the signals are not short-circuited with the internal shield (see connection resolver). Should this involve too much effort then you can achieve a rotation reversal of encoder 1 by means of this parameter.

Value	Function
0	track <b>not</b> exchanged
1	track exchanged
2/3	reserved for initiator input

Adjustment range:	0...3
Resolution:	1
Factory setting:	0

3.6 Special Adjustments

The following parameters serve for the optimization of the drive and the adaption to certain applications. These adjustments can be ignored at the initial start-up.

GB

Maximum speed



In order to limit the setpoint value a maximum speed must be preset. This limit value is the basis for further setpoint calculations and for the determination of setpoint characteristics. The maximum speed limits the setpoint speed only. Because of speed ripples, speed overshoot or hardware defects (e.g. defective encoder) the actual speed may exceed these limits.

Adjustment range:	0...4000 rpm
Resolution:	0,125 rpm
Factory setting:	2100 rpm

Step speed 1 and 2  
Input I1



Input I2



Two fixed speeds can be adjusted. The selection is made by the inputs I1 and I2.  
If adjustments are made that are outside the fixed limit of CP.22, then the speed is internally limited. The negative values are released in application mode.

Adjustment range:	-4000...4000 rpm
Resolution:	0,125 rpm
Factory setting CP.23:	100 rpm
Factory setting CP.24:	-100 rpm



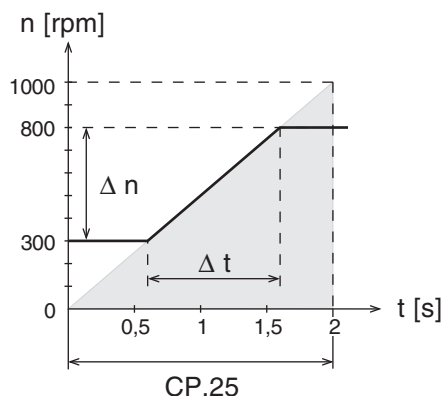
Input I1 + input I2 = Step speed 3  
(factory setting = 0 rpm)  
The Step speed 3 cannot adjusted in the CP mode.

### Acceleration time

CP.25

Defines the time needed to accelerate from 0 to 1000 rpm. The actual acceleration time is proportional to the speed change ( $\Delta n$ ).

Adjustment range: 0,00...300,00 s  
Resolution: 0,01 s  
Factory setting: 5,00 s



$\Delta n$  speed change  
 $\Delta t$  acceleration time for  $\Delta n$

#### Example:

The drive should accelerate from 300 rpm to 800 rpm in **1 s**.

$$\Delta n = 800 \text{ rpm} - 300 \text{ rpm} = 500 \text{ rpm}$$

$$\Delta t = 1 \text{ s}$$

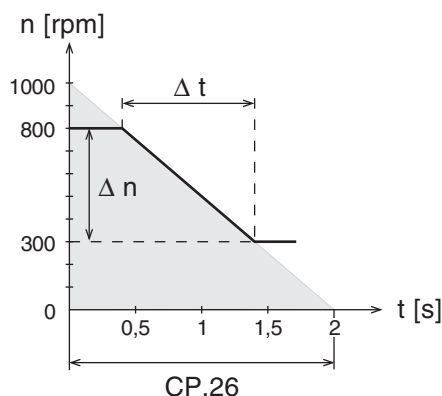
$$\text{CP.25} = \frac{\Delta t}{\Delta n} \times 1000 \text{ rpm} = \frac{1 \text{ s}}{500 \text{ rpm}} \times 1000 \text{ rpm} = 2 \text{ s}$$

### Deceleration time

CP.26

Defines the time needed to decelerate from 1000 to 0 rpm. The actual deceleration time is proportional to the speed change ( $\Delta n$ ). At a deceleration time of -1 the value from CP.25 is used (Display: „Acc“)!

Adjustment range: -1; 0,00...300,00 s  
Resolution: 0,01 s  
Factory setting: 5,00 s



$\Delta n$  speed change  
 $\Delta t$  deceleration for  $\Delta n$

Example:

The drive should decelerate from 800 rpm to 300 rpm in **1 s**.

$$\Delta n = 800 \text{ rpm} - 300 \text{ rpm} = \mathbf{500 \text{ rpm}}$$

$$\Delta t = \mathbf{1 \text{ s}}$$

$$\mathbf{CP.26} = \frac{\Delta t}{\Delta n} \times 1000 \text{ rpm} = \frac{1 \text{ s}}{500 \text{ rpm}} \times 1000 \text{ rpm} = \mathbf{2 \text{ s}}$$

## S-curve time

**CP.27**

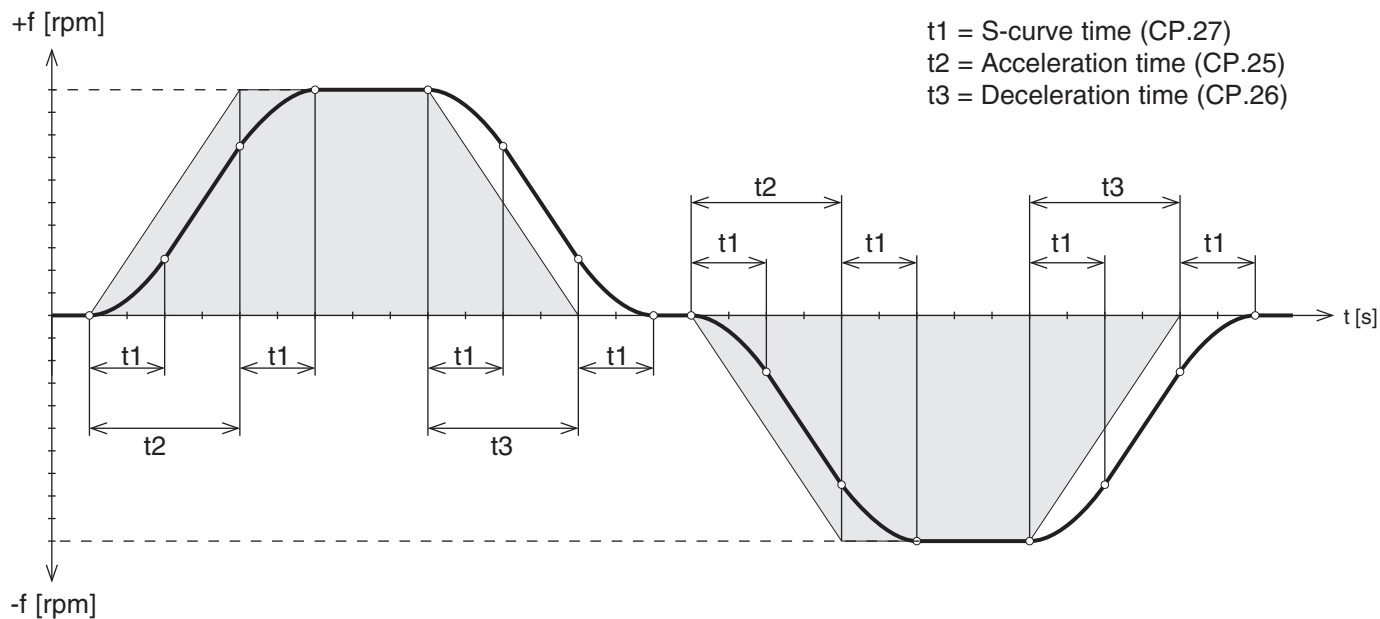
For some applications it is of advantage when the drive starts and stops jerk-free. This is achieved through a straightening of the acceleration and deceleration ramps. The straightening time, also called S-curve time, can be adjusted with CP.27.

Adjustment range: 0,00 (off)...5,00 s  
Resolution: 0,01 s  
Factory setting: 0,00 s (off)



In order to drive defined ramps with activated S-curve time, the acceleration and deceleration times (CP.25 and CP.26) must be adjusted higher than the S-curve time (CP.27).

Ramp adjustment with S-curves



## Torque reference / Source

CP.28

With this parameter the required setpoint source for torque control can be adjusted.

Value	Meaning
0	AN1+ / AN1- 0%...±100% = 0...±CP.29
1	AN2+ / AN2- 0%...±100% = 0...±CP.29
2	digital absolute CP.29
3-5	only application mode

Adjustment range: 0...5  
 Resolution: 1  
 Factory setting: 2  
 Note: Enter-Parameter

## Torque reference / Absolute

CP.29

The absolute torque reference of the drive is adjusted with parameter CP.29 in torque-controlled operation (CP.10 = 5) and with digital setpoint setting (CP.28 = 2). The sign stands for direction of rotation to be active. In speed-controlled operation (CP.10 = 4) the parameter works as torque limit in all quadrants. The sign has no effect at that. The factory setting depends on the unit size.

Adjustment range: -10000,00...10000,00 Nm  
 Resolution: 0,01 Nm  
 Factory setting: LTK

KP speed

CP.30

The proportional factor of the speed controller is adjusted in these parameters (see chapter 5 „Adjustment instruction speed controller“).

Adjustment range:	0...32767
Resolution:	1
Factory setting:	300

KI speed

CP.31

The integral factor of the speed controller is adjusted in these parameters (see chapter 5 „Adjustment instruction speed controller“).

Adjustment range:	0...32767
Resolution:	1
Factory setting:	100

GB

Carrier frequency

CP.32

The switching frequency with which the power modules are clocked can be changed depending on the application. The employed power stage determines the maximum switching frequency as well as the factory setting (see manual: part2). Refer to following list to learn about influences and effects of the switching frequency.

low switching frequency	high switching frequency
<ul style="list-style-type: none"><li>• less inverter heating</li><li>• less discharge current</li><li>• less switching losses</li><li>• less radio interferences</li></ul>	<ul style="list-style-type: none"><li>• less noise development</li><li>• improved sine-wave simulation</li><li>• less motor losses</li><li>• improved controller characteristics</li></ul>

Adjustment range (dep. on power circuit):	2/4/8/12/16 kHz
Factory setting (dep. on power circuit):	4
Note:	ENTER-Parameter



At switching frequencies above 4 kHz pay absolute attention to the max. motor line length in the technical data of the power circuit manual (Part 2).

## Relay output 1 / Function

CP.33

## Relay output 2 / Function

CP.34

CP.33 and CP.34 determine the function of the two outputs (terminal X2A.24...X2A.26 and X2A.27...X2A.29).

Value	Function
0	No function (generally off)
1	Generally on
2	Run signal; also by DC-braking
3	Ready signal (no error)
4	Fault relay
5	Fault relay (not at under voltage error)
6	Warning or error message at abnormal stopping
7	Overload alert signal
8	Overtemperature alert signal power modules
9	External Overtemperature alert signal motor
10	Only application-mode
11	Overtemperature alert signal interior OHI
12-19	Only application-mode
20	Actual value = set value (CP.3 = Fcon, rcon; not at noP, LS error, SSF)
21	Accelerate (CP.3 = FAcc, rAcc, LAS)
22	Decelerate (CP.3 = FdEc, rdEc, LdS)
23	Real direction of rotation = set direction of rotation
24	Utilization > switching level <sup>1)</sup>
25	Active current > switching level <sup>1)</sup>
26	Only application-mode
27	Real value (CP.1) > switching level <sup>1)</sup>
28	Set value (CP.2) > switching level <sup>1)</sup>
29-30	Only application-mode
31	Absolut set value on AN1 > switching level <sup>1)</sup>
32	Absolut set value on AN2 > switching level <sup>1)</sup>
33	Only application-mode
34	Set value on AN1 > switching level <sup>1)</sup>
35	Set value on AN2 > switching level <sup>1)</sup>
36-39	Only application-mode
40	Hardware current limit activated
41	Modulation on-signal
42-46	Only application-mode
47	Ramp output value > switching level <sup>1)</sup>
48	Apparent current (CP.4) > switching level <sup>1)</sup>
49	Forward running (not at nOP, LS, abnormal stopping or error)
50	Reverse running (not at nOP, LS, abnormal stopping or error)
51	Warning E.OL2
52	Current regulator limit reached
53	Speed regulator limit reached
54-62	Only application-mode
63	Absolut value ANOUT1 > switching level <sup>1)</sup>
64	Absolut value ANOUT2 > switching level <sup>1)</sup>
65	ANOUT1 > switching level <sup>1)</sup>
66	ANOUT2 > switching level <sup>1)</sup>
67-68	Only application-mode

<sup>1)</sup> Switching level of CP.33 = 100; switching level of CP.34 = 4

Factory setting CP.33: 4  
 Factory setting CP.34: 2  
 Note: Enter-Parameter

## Reaction to limit switch

CP.35

This parameter determines the reaction of the drive, to terminal X2A.14 (F) and/or X2A.15 (R). These terminals are programmed as software limit switches. The reaction of the drive is shown in the table below.

CP.35	Display	Reaction	Restart
0	E.PRx	Immediate disabling of modulation	Remove fault; Actuate reset
1	A.PRx	Quick stopping / disabling of modulation after reaching speed 0	
2	A.PRx	Quick stopping/holding torque at speed 0	
3	A.PRx	Immediate disabling of modulation	Automatic reset, if the fault is no longer present
4	A.PRx	Quick stopping / disabling of modulation after reaching speed 0	
5	A.PRx	Quick stopping/holding torque at speed 0	
6	keine	No effect on the drive; <b>! Fault is ignored !</b>	- inapplicable -

Adjustment range: 0...6  
Resolution: 1  
Factory setting: 5

## Reaction to external fault

CP.36

With the external error monitoring external units can take direct influence on the drive. This parameter determines the response of the drive to a signal at terminal X2A.12 (I3) according to following table.

CP.36	Display	Reaction	Restart
0	E.EF	Immediate disabling of modulation	Remove fault; Actuate reset
1	A.EF	Quick stopping / disabling of modulation after reaching speed 0	
2	A.EF	Quick stopping/holding torque at speed 0	
3	A.EF	Immediate disabling of modulation	Automatic reset, if the fault is no longer present
4	A.EF	Quick stopping / disabling of modulation after reaching speed 0	
5	A.EF	Quick stopping/holding torque at speed 0	
6	keine	No effect on the drive; <b>! Fault is ignored !</b>	- inapplicable -

Adjustment range: 0...6  
Resolution: 1  
Factory setting: 0

### 3.7 Standard motor data

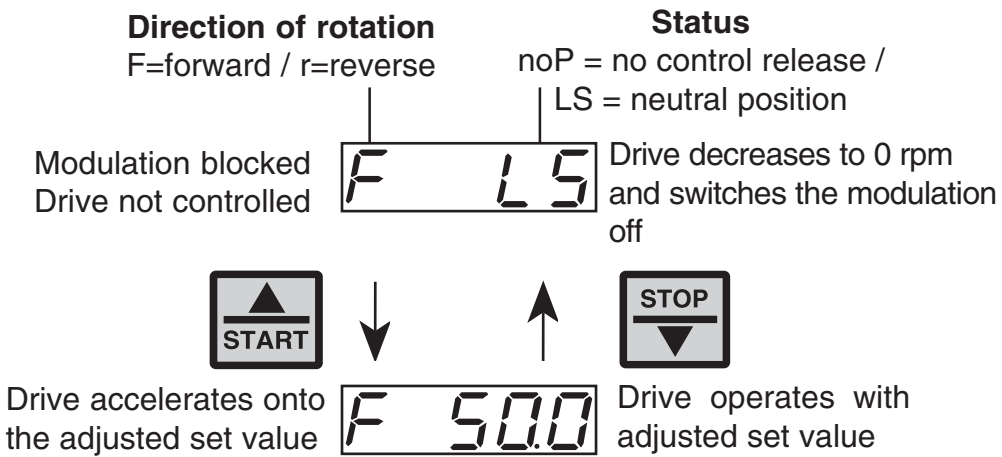
The following table contains the motor data of standard motors.

		Rated torque [Nm]	Rated speed [rpm]	Rated frequency [Hz]	Rated current [A]	Back-EMF constant [V / 1000 rpm]	Winding inductance [mH]	Winding resistance [Ohm]	Current f. zero speed [A]	Torque limit [Nm]
Housing size	Default Motor	CP.11	CP.12	CP.13	CP.14	CP.15	CP.16	CP.17	CP.18	CP.28
09/200V	C3.SM.000-3200	3,9	3000	150	4,20	69	6,90	2,00	5,10	22,09
10/200V	C4.SM.000-3200	5,0	3000	150	5,70	68	4,50	1,20	7,10	30,68
12/200V	D2.SM.000-3200	6,1	3000	150	8,10	67	4,00	1,00	8,50	53,53
13/200V	D3.SM.000-3200	8,4	3000	150	10,90	69	2,80	0,60	12,40	69,92
14/200V	E4.SM.000-3200	15,5	3000	150	16,00	89	1,30	0,29	27,80	93,40
09/400V	C3.SM.000-3400	3,9	3000	150	2,40	118	20,60	5,90	2,90	22,47
10/400V	C4.SM.000-3400	5,0	3000	150	3,40	113	13,10	3,40	4,20	30,81
12/400V	D2.SM.000-3400	6,1	3000	150	4,50	119	12,80	3,20	4,80	53,21
13/400V	D4.SM.000-3400	9,9	3000	150	7,30	121	1,50	1,40	8,50	73,26
14/400V	E2.SM.000-3400	11,0	3000	150	7,00	136	8,20	2,00	9,00	80,12
15/400V	E4.SM.000-3400	15,5	3000	150	9,90	143	3,40	0,81	17,30	118,83
16/400V	F1.SM.000-3400	20,0	3000	150	13,80	130	7,00	0,58	17,00	165,99
17/400V	F2.SM.000-3400	31,0	3000	150	20,60	135	3,60	0,23	32,20	213,37
18/400V	F3.SM.000-3400	3,3	3000	150	22,90	131	1,70	0,13	46,20	253,27

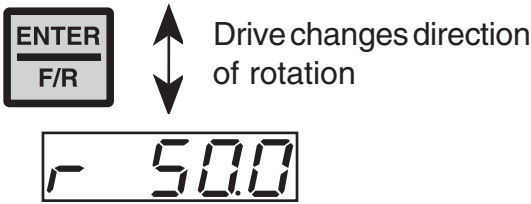
3.8 The Drive Mode

The Drive Mode is a operating mode of KEB COMBIVERT that permits the manual starting of the drive by the operator. After switching the control release the set value and rotation setting are effected exclusively over the keyboard. In order to activate the Drive Mode the corresponding **password** (see last but one page) must be entered **in CP.0**. The display switches over as follows.

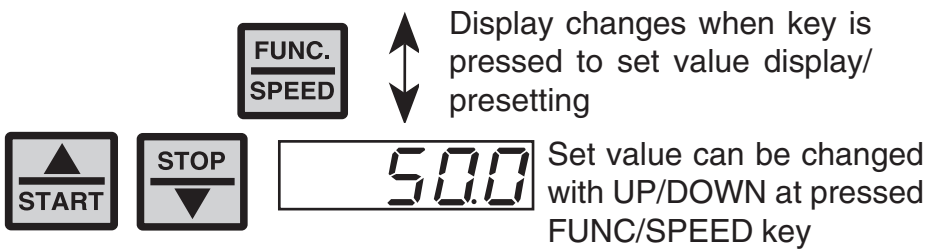
3.8.1 Start / Stop Drive



3.8.2 Changing the Direction of Rotation



3.8.3 Presetting the Set Value



3.8.4 Leaving the Drive Mode

To exit the drive mode the inverter must be in status “stop” (Display noP or LS). Press the FUNC and ENTER keys simultaneously for about 3 seconds to leave the drive mode. The CP-parameters appear in the display.



## 4. Error Diagnosis

At KEB COMBIVERT **error messages** are always represented with an „E.“ and the appropriate error in the display. Error messages cause the immediate deactivation of the modulation. Restart possible only after reset.

**Malfunction** are represented with an „A.“ and the appropriate message. Reactions to malfunctions can vary.

In the following the display and their cause are described.

Display	Plaintext COMBIVIS	Value	Meaning
	Status Messages		
bbL	base block	76	Power modules for motor de-excitation locked
bon	close brake	85	Brake control, brake engaged (see chapter 6.9)
boFF	open brake	86	Brake control, brake released (see chapter 6.9)
Cdd	calculate drive	82	Measurement of the motor stator resistance
dcb	DC brake	75	Motor is decelerated by a DC-voltage at the output.
dLS	low speed / DC brake	77	Modulation is switched off after DC-braking (see chapter 6.9 „DC-Braking“).
FAcc	forward acceleration	64	Acceleration with the adjusted ramps in clockwise direction of rotation.
Fcon	forward constant	66	Acceleration / deceleration phase is completed and it is driven with constant speed / frequency in clockwise direction of rotation.
FdEc	forward deceleration	65	It is stopped with the adjusted ramp times in clockwise direction of rotation.
HCL	hardware current limit	80	The message is output if the output current reaches the hardware current limit.
LAS	LA stop	72	This message is displayed if during acceleration the load is limited to the adjusted load level.
LdS	Ld stop	73	This message is displayed if during deceleration the load is limited to the adjusted load level or the DC-link current to the adjusted voltage level.
LS	low speed	70	No direction of rotation pre-set, modulation is off.
nO_PU	power unit not ready	13	Power circuit not ready or not identified by the control.
noP	no operation	0	Control release (terminal ST) is not switched.
PA	positioning active	122	This message is displayed during a positioning process.
PLS	low speed / power off	84	No modulation after Power-Off
PnA	position not reachable	123	The specified position cannot be reached within the pre-set ramps. The abort of the positioning can be programmed.
POFF	power off function	78	Depending on the programming of the function (see chapter 6.9 „Power-off Function“) the inverter restarts automatically upon system recovery or after a reset.
POSI	positioning	83	Positioning function active (F5-G).
rAcc	reverse acceleration	67	Acceleration with the adjusted ramp times in anti-clockwise direction of rotation.

## Error Diagnosis

Display	Plaintext COMBIVIS	Value	Meaning
rcon	reverse constant	69	The acceleration / deceleration phase is completed and it is driven with constant speed / frequency in anti-clockwise direction of rotation.
rdEc	reverse deceleration	68	It is stopped with the adjusted ramp times in anti-clockwise direction of rotation.
rFP	ready for positioning	121	The drive signals that it is ready to start the positioning process.
SLL	stall	71	This message is displayed if during constant operation the load is limited to the adjusted current limit.
SrA	search for ref. active	81	Search for reference point approach active.
SSF	speed search	74	Speed search function active, that means that the inverter attempts to synchronize onto a running down motor.
StOP	quick stop	79	The message is output if as response to a warning signal the quick-stop function becomes active.
	Error Messages		
E. br	ERROR brake	56	Error: This error can occur in the case of switched on brake control (see Chapter 6.9.5), if <ul style="list-style-type: none"> <li>the load is below the minimum load level (Pn.43) at start up or the absence of an engine phase was detected.</li> <li>the load is too high and the hardware current limit is reached</li> </ul>
E.buS	ERROR bus	18	Error: Adjusted monitoring time (Watchdog) of communication between operator and PC / operator and inverter has been exceeded.
E.Cdd	ERROR calc. drive data	60	Error: During the automatic motor stator resistance measurement.
E.co1	ERROR counter overrun 1	54	Counter overflow encoder channel 1
E.co2	ERROR counter overrun 2	55	Counter overflow encoder channel 2
E.dOH	ERROR drive overheat	9	Error: Overtemperature of motor PTC. Error can only be reset at E.ndOH, if PTC is again low-resistance. Causes: <ul style="list-style-type: none"> <li>resistance at the terminals T1/T2 &gt;1650 Ohm</li> <li>motor overloaded</li> <li>line breakage to the temperature sensor</li> </ul>
E.dri	ERROR driver relay	51	Error: Driver relay. Relay for driver voltage on power circuit has not picked up even though control release was given.
E.EEP	ERROR EEPROM defective t	21	After reset the operation is again possible (without storage in the EEPROM)
E. EF	ERROR external fault	31	Error: External error. Is triggered, if a digital input is being programmed as external error input and trips.
E.EnC	ERROR encoder	32	Error: Cable breakage resolver or incremental encoder
E.Hyb	ERROR hybrid	52	Invalid encoder interface identifier
E.HybC	ERROR hybrid changed	59	Error: Encoder interface identifier has changed, it must be confirmed over ec.0 or ec.10.
E.iEd	ERROR input error detect	53	Error at PNP/NPN switching or input failure.
E.InI	ERROR initialisation MFC	57	MFC not booted.

Display	Plaintext COMBIVIS	Value	Meaning
E.LSF	ERROR load shunt fault	15	Error: Load-shunt relay has not picked up, occurs for a short time during the switch-on phase, but must automatically be reset immediately. If the error message remains the following causes may be applicable: <ul style="list-style-type: none"> <li>• load-shunt defective</li> <li>• input voltage wrong or too low</li> <li>• high losses in the supply cable</li> <li>• braking resistor wrongly connected or damaged</li> <li>• braking module defective</li> </ul>
E.ndOH	no ERROR drive overheat	11	Motor temperature switch or PTC at the terminals T1/T2 is again in the normal operating range. The error can be reset now.
E.nOH	no E. over heat pow.mod.	36	Temperature of the heat sink is again in the permissible operating range. The error can be reset now.
E.nOHI	no ERROR overheat int.	7	No longer overheating in the interior E.OHI, interior temperature has fallen by at least 3°C
E.nOL	no ERROR overload	17	No more overload, OL-counter has reached 0%; after the error E. OL a cooling phase must elapse. This message appears upon completion of the cooling phase. The error can be reset. The inverter must remain switched on during the cooling phase.
E.nOL2	no ERROR overload 2	20	The cooling time has elapsed. The error can be reset.
E. OC	ERROR overcurrent	4	Error: Overcurrent Occurs, if the specified peak current is exceeded. Causes: <ul style="list-style-type: none"> <li>• acceleration ramps too short</li> <li>• the load is too big at turned off acceleration stop and turned off constant current limit</li> <li>• short-circuit at the output</li> <li>• ground fault</li> <li>• deceleration ramp too short</li> <li>• motor cable too long</li> <li>• EMC</li> <li>• DC brake at high ratings active (see 6.9.3)</li> </ul>
E. OH	ERROR overheat pow.mod.	8	Error: Overtemperature of power module. Error can only be reset at E.nOH. Causes: <ul style="list-style-type: none"> <li>• insufficient air flow at the heat sink (soiled)</li> <li>• ambient temperature too high</li> <li>• ventilator clogged</li> </ul>
E.OH2	ERROR motor protection	30	Electronic motor protective relay has tripped.
E.OHI	ERROR overheat internal	6	Error: Overheating in the interior: error can only be reset at E.nOHI, if the interior temperature has dropped by at least 3°C
E. OL	ERROR overload (lxt)	16	Error: Overload error can only be reset at E.nOL, if OL-counter reaches 0% again. Occurs, if an excessive load is applied longer than for the permissible time (see technical data). Causes: <ul style="list-style-type: none"> <li>• poor control adjustment (overshooting)</li> <li>• mechanical fault or overload in the application</li> <li>• inverter not correctly dimensioned</li> <li>• motor wrongly wired</li> <li>• encoder damaged</li> </ul>

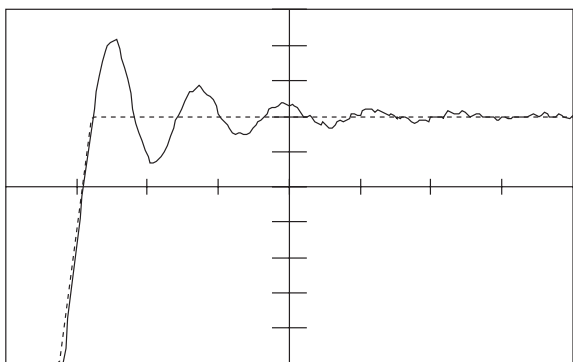
Display	Plaintext COMBIVIS	Value	Meaning
E.OL2	ERROR overload 2	19	Occurs if the standstill constant current is exceeded (see technical data and overload characteristics). The error can only be reset if the cooling time has elapsed and E.nOL2 is displayed.
E. OP	Error! Overvoltage	1	Voltage in the DC-link circuit too high. Occurs if the DC-link circuit voltage exceeds the permissible value. Causes: <ul style="list-style-type: none"> <li>• poor controller adjustment (overshooting)</li> <li>• input voltage too high</li> <li>• interference voltages at the input</li> <li>• deceleration ramp too short</li> <li>• braking resistor defective or too small</li> </ul>
E.OS	ERROR over speed	58	Real speed is bigger than the max. Output speed.
E.PFC	ERROR Power factor control	33	Error in the power factor control
E.PrF	ERROR prot. rot. for.	46	The drive has driven onto the right limit switch. Programmed response "Error, restart after reset" (see chapter 6.7 "Response to errors or warning messages").
E.Prr	ERROR prot. rot. rev.	47	The drive has driven onto the left limit switch. Programmed response "Error, restart after reset" (see chapter 6.7 "Response to errors or warning messages").
E. Pu	ERROR power unit	12	Error: General power circuit fault
E.Puci	ERROR pow. unit code inv.	49	Error: During the initialization the power circuit could not be recognized or was identified as invalid.
E.Puch	ERROR power unit changed	50	Error: Power circuit identification was changed; with a valid power circuit this error can be reset by writing to SY.3. If the value displayed in SY.2 is written, only the power-circuit dependent parameters are reinitialized. If any other value is written, then the default set is loaded. On some systems after writing Sy.3 a Power-On-Reset is necessary.
E.PUCO	ERROR power unit commun.	22	Error: Parameter value could not be written to the power circuit. Acknowledgement from PC <> OK
E.PUIN	ERROR power unit invalid	14	Error: Software version for power circuit and control card are different. Error cannot be reset (only at F5-G B-housing)
E.SbuS	ERROR bus synchron	23	Synchronization over sercos-bus not possible. Programmed response "Error, restart after reset" (see chapter 6.7 "Response to errors or warning messages").
E.SET	ERROR set	39	It has been attempted to select a locked parameter set. Programmed response "Error, restart after reset" (see chapter 6.7 "Response to errors or warning messages").
E.SLF	ERROR! Software limit switch forward	44	The right software limit switch lies outside the defined limits. Programmed response "Error, restart after reset" (see chapter 6.7 "Response to errors or warning messages").
E.SLr	ERROR software limit switch reverse	45	The left software limit switch lies outside the defined limits. Programmed response "Error, restart after reset" (see chapter 6.7 "Response to errors or warning messages").

Display	Plaintext COMBIVIS	Value	Meaning
E. UP	ERROR underpotential	2	Error: Undervoltage (DC-link circuit). Occurs, if DC-link voltage falls below the permissible value. Causes: <ul style="list-style-type: none"> <li>• input voltage too low or instable</li> <li>• inverter rating too small</li> <li>• voltage losses through wrong cabling</li> <li>• the supply voltage through generator / transformer breaks down at very short ramps</li> <li>• At F5-G housing B E.UP is also displayed if no communication takes place between power circuit and control card.</li> <li>• Jump factor (Pn.56) too small (see 6.9.20)</li> <li>• if a digital input was programmed as external error input with error message E.UP (Pn.65).</li> </ul>
E.UPh	ERROR Phase failure	3	One phase of the input voltage is missing (ripple-detection)
	Warning Messages		
A.buS	ABN.STOP bus	93	Warning: Watchdog for communication between operator/control card or operator/PC has responded. The response to this warning can be programmed (see chapter 6.7 "Response to errors and warning messages").
A.dOH	ABN.STOP drive over heat	96	The motor temperature has exceeded an adjustable warning level. The switch off time is started. The response to this warning can be programmed (see chapter 6.7 "Response to errors or warning messages"). This warning can be generated only with a special power circuit.
A. EF	ABN.STOP external fault	90	This warning is triggered via an external input. The response to this warning can be programmed (see chapter 6.7 "Response to errors or warning messages").
A.ndOH	no A. drive overheat	91	The motor temperature is again below the adjusted warning level. The switch off time is stopped.
A.nOH	no A. overheat pow.mod.	88	The heat sink temperature is again below the adjusted warning level.
A.nOHI	no A.STOP overheat int.	92	The temperature in the interior of the inverter is again below the warning threshold.
A.nOL	no ABN.STOP overload	98	Warning: no more overload, OL counter has reached 0 %.
A.nOL2	no ABN.STOP overload 2	101	The cooling time after "Warning! Overload during standstill" has elapsed. The warning message can be reset.
A. OH	A.STOP overheat pow.mod	89	A level can be defined, when it is exceeded this warning is output. A response to this warning can be programmed (see chapter 6.7 "Response to errors or warning messages").
A.OH2	ABN.STOP motor protect.	97	Warning: electronic motor protective relay has tripped. The response to this warning can be programmed (see chapter 6.7 "Response to error or warning messages").
A.OHI	ABN.STOP overheat int.	87	The temperature in the interior of the inverter lies above the permissible level. The switch off time was started. The programmed response to this warning message is executed (see chapter 6.7 "Response to errors or warning messages").

Display	Plaintext COMBIVIS	Value	Meaning
A. OL	ABN.STOP overload	99	A level between 0 and 100 % of the load counter can be adjusted, when it is exceeded this warning is output. The response to this warning can be programmed (see chapter 6.7 "Response to errors or warning messages").
A.OL2	ABN.STOP overload 2	100	The warning is output when the standstill continuous current is exceeded (see technical data and overload characteristics). The response to this warning can be programmed (see chapter 6.7 "Response to errors and warning messages"). The warning message can only be reset after the cooling time has elapsed and A.nOL2 is displayed.
A.PrF	ABN.STOP prot. rot. for.	94	The drive is driven onto the right limit switch. The response to this warning can be programmed (see chapter 6.7 "Response to errors and warning messages").
A.Prr	ABN.STOP prot. rot. rev.	95	The drive is driven onto the left limit switch. The response to this warning can be programmed (see chapter 6.7 "Response to errors and warning messages").
A.SbuS	ABN.Bus synchron	103	Synchronization over sercos-bus not possible. The response to this warning can be programmed (see chapter 6.7 "Response to errors and warning messages").
A.SET	ABN.STOP set	102	Warning: set selection: It has been attempted to select a locked parameter set. The response to this warning can be programmed (see chapter 6.7 "Response to errors or warning messages").
A.SLF	ABN.Software limit switch forward	104	The right software limit switch lies outside the defined limits. The response to this warning can be programmed (see chapter 6.7 "Response to errors or warning messages").
A.SLr	ABN.Software limit switch reverse	105	The left software limit switch lies outside the defined limits. The response to this warning can be programmed (see chapter 6.7 "Response to errors or warning messages").

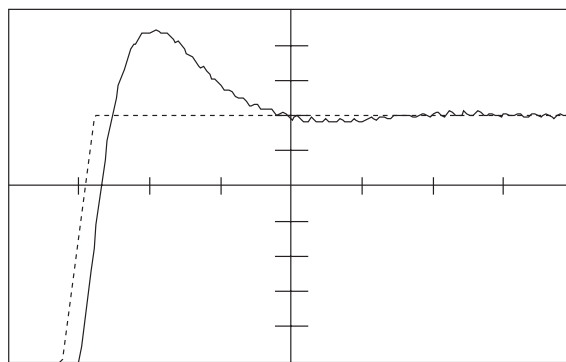
## 5. Adjustment instruction speed controller

With the PC software KEB COMBIVIS (Scope) set and real speed can be displayed. If one of the following real speed curves occurs at acceleration, the speed controller (CP.30, CP.31) should be adjusted according to the notes.



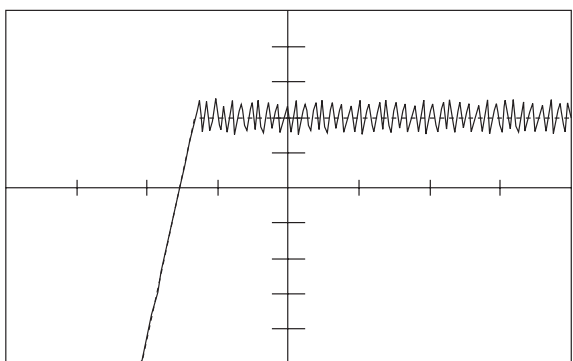
**Problem:** Very long transient process

**Solution:** Increase KP speed (CP.30); eventually reduce KI speed (CP.31)



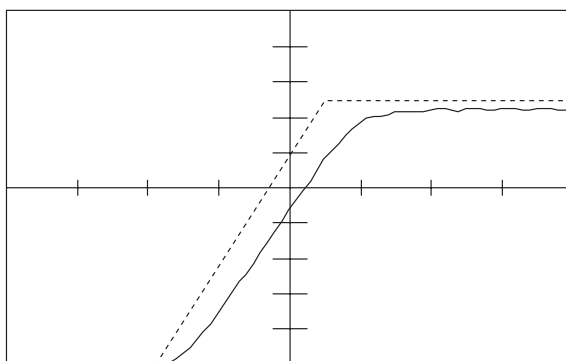
**Problem:** Speed overshoot too high

**Solution:** Increase KP speed (CP.30); eventually reduce KI speed (CP.31)



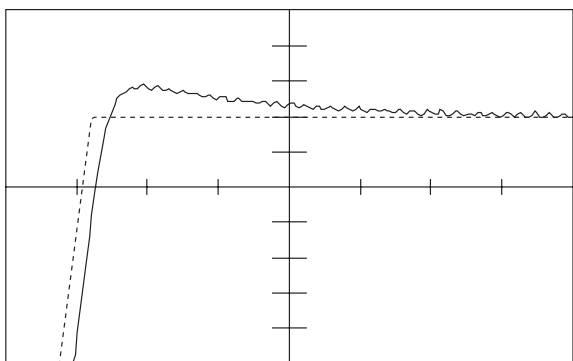
**Problem:** Sustained oscillation short billowy, noises, vibes

**Solution:** Decrease KP speed (CP.30)



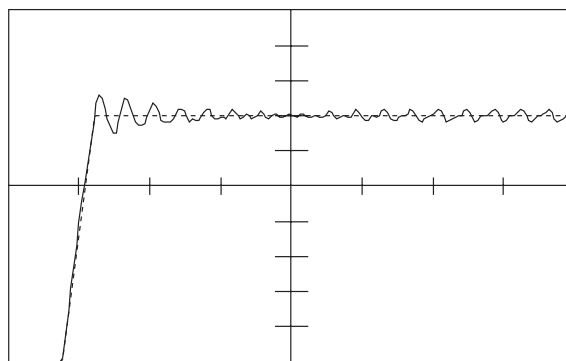
**Problem:** Transient too slow / remaining system deviation

**Solution:** Increase KI speed (CP.31)



**Problem:** Overshoot too long, strong speed decreases at load change

**Solution:** Increase KI speed (CP.31)



**Problem:** Sustained oscillation long billowy  
**Solution:** Reduce KI speed (CP.31) and / or reduce KP speed (CP.30)

GB

## 6. Quick Reference

Displ.	Parameter	Setting range	Resolution	Unit	Ent.	Customer settings
CP.0	password	0...9999	1	-	-	
CP.1	encoder 1 speed	-4000...4000	0,125	rpm	-	
CP.2	set value display	-4000...4000	0,125	rpm	-	
CP.3	inverter state	0...255	1	-	-	
CP.4	apparent current	0...6553,5	0,1	A	-	
CP.5	peak apparent current	0...6553,5	0,1	A	-	
CP.6	actual torque display	-10000,00...10000,00	0,01	Nm	-	
CP.7	actual DC voltage	0...1000	1	V	-	
CP.8	peak DC voltage	0...1000	1	V	-	
CP.9	output voltage	0...778	1	V	-	
CP.10	speed control config.	4...5	1	-	-	
CP.11	DSM rated torque	0,1...6553,5	0,1	Nm	-	
CP.12	DSM rated speed	0...32000	1	rpm	-	
CP.13	DSM rated frequency	0,0...1600,0	0,1	Hz	-	
CP.14	DSM rated current	0,0...710,0	0,1	A	-	
CP.15	DSM EMK voltage const.	0...1000	1	V	-	
CP.16	DSM winding inductance	0,01...500,00	0,01	mH	-	
CP.17	DSM winding resistance	0,000...50,000	0,001	Ohm	-	
CP.18	DSM curr. f. zero speed	0,0...700,0	0,1	A	-	
CP.19	load mot.dependent para.	1...2	1	-	E	
CP.20	absolute pos. enc.1	0...65535	1	-	-	
CP.21	enc.1 rotation	0...19	1	-	-	
CP.22	max. reference forward	0...4000	0,125	rpm	-	
CP.23	step value 1	-4000...4000	0,125	rpm	-	
CP.24	step value 2	-4000...4000	0,125	rpm	-	
CP.25	acc. time forward	0,00...300,00	0,01	s	-	
CP.26	dec. time forward	-0,01...300,00	0,01	s	-	
CP.27	s-curve time acc. for.	0,00...5,00	0,01	s	-	
CP.28	torque reference source	0...5	1	-	E	
CP.29	abs. torque ref	-10000,00...10000,00	0,01	Nm	-	
CP.30	KP speed	0...32767	1	-	-	
CP.31	KI speed	0...32767	1	-	-	
CP.32	carrier frequency	2/4/8/12/16	-	kHz	E	
CP.33	condition 2	0...68	1	-	E	
CP.34	condition 3	0...68	1	-	E	
CP.35	proh. rot. stopping mode	0...6	1	-	-	
CP.36	E. EF stopping mode	0...6	1	-	-	

GB




Vor Auslieferung durchlaufen alle Produkte mehrfach eine Qualitäts- und Funktionskontrolle, so daß Fehler auszuschließen sind. Bei Beachtung unserer Betriebsanleitung sind keine Störungen zu erwarten. Sollte sich trotzdem ein Grund zur Reklamation ergeben, so ist das Gerät mit Angabe der Rechnungsnummer, des Lieferdatums, der Fehlerursache und den Einsatzbedingungen an uns zurückzusenden. Für Fehler, die aufgrund falscher Behandlung, falscher Lagerung oder sonstigen allgemeinen Irrtümern auftreten, übernehmen wir keine Verantwortung. Prospekte, Kataloge und Angebote enthalten nur Richtwerte. Technische Änderungen jeder Art behalten wir uns vor. Alle Rechte vorbehalten. Nachdruck, Vervielfältigung und fotomechanische Wiedergabe sind ohne schriftliche Genehmigung durch KEB auch auszugsweise verboten.



Prior to delivery all products pass several quality and performance inspections so that malfunctions can be ruled out. When used in accordance with the operating instructions failure is most unlikely. However, if you have cause for complaint the unit should be returned stating invoice number, delivery date, cause of failure and field conditions. We do not accept the responsibility for failures due to misuse, wrong storage or similar causes. Leaflets, catalogues and quotations contain only standard values. We reserve the right to make technical changes without obligation. All rights reserved. Any piratic printing, mimeographing or photomechanical reproduction, even in extracts, is strictly prohibited.

## Passwords

	CP Read Only	CP Read/Write	Drive-Mode
	a) 100	b) 200	c) 500



**Karl E. Brinkmann GmbH**

Försterweg 36 - 38 • D - 32683 Barntrup  
Telefon 00 49 / 52 63 / 4 01 - 0 • Fax 00 49 / 52 63 / 4 01 - 1 16  
Internet: www.keb.de • E-mail: info@keb.de

**KEB Antriebstechnik GmbH & Co. KG**

Wildbacher Str. 5 • D - 08289 Schneeberg  
Telefon 0049 / 37 72 / 67 - 0 • Telefax 0049 / 37 72 / 67 - 2 81  
E-mail: info@keb-combidrive.de

**KEB Antriebstechnik Austria GmbH**

Ritzstraße 8 • A - 4614 Marchtrenk  
Tel.: 0043 / 7243 / 53586 - 0 • FAX: 0043 / 7243 / 53586 - 21  
Kostelni 32/1226 • CZ - 370 04 České Budejovice  
Tel.: 00420 / 38 / 731 92 23 • FAX: 00420 / 38 / 733 06 97  
E-mail: info@keb.at

**KEB Antriebstechnik**

Herenveld 2 • B - 9500 Geraadsbergen  
Tel.: 0032 / 5443 / 7860 • FAX: 0032 / 5443 / 7898  
E-mail: koen.detaeye@keb.de

**KEB China**

Xianxia Road 299 • CHN - 200051 Shanghai  
Tel.: 0086 / 21 / 62350922 • FAX: 0086 / 21 / 62350015  
Internet: www.keb-cn.com • E-mail: info@keb-cn.com

**Société Française KEB**

Z.I. de la Croix St. Nicolas • 14, rue Gustave Eiffel  
F - 94510 LA QUEUE EN BRIE  
Tél.: 0033 / 1 / 49620101 • FAX: 0033 / 1 / 45767495  
E-mail: sfkeb.4@wanadoo.fr

**KEB (UK) Ltd.**

6 Chieftain Buisness Park, Morris Close  
Park Farm, Wellingborough, GB - Northants, NN8 6 XF  
Tel.: 0044 / 1933 / 402220 • FAX: 0044 / 1933 / 400724  
Internet: www.keb-uk.co.uk • E-mail: info@keb-uk.co.uk

**KEB Italia S.r.l.**

Via Newton, 2 • I - 20019 Settimo Milanese (Milano)  
Tel.: 0039 / 02 / 33500782 • FAX: 0039 / 02 / 33500790  
Internet: www.keb.it • E-mail: kebitalia@keb.it

**KEB - YAMAKYU Ltd.**

15 - 16, 2 - Chome, Takanawa Minato-ku  
J - Tokyo 108 -0074  
Tel.: 0081 / 33 / 445-8515 • FAX: 0081 / 33 / 445-8215  
E-mail: kebjt001@d4.dion.ne.jp

**KEB Portugal**

Lugar de Salgueiros - Pavilhao A, Mouquim  
P - 4760 V. N. de Famalicao  
Tel.: 00351 / 252 / 371 318 • FAX: 00351 / 252 / 371 320  
E-mail: keb.portugal@netc.pt

**KEB Taiwan Ltd.**

1F, No.19-5, Shi Chou Rd., Tounan Town  
R.O.C. - Yin-Lin Hsian / Taiwan  
Tel.: 00886 / 5 / 5964242 • FAX: 00886 / 5 / 5964240  
E-mail: keb\_taiwan@mail.apol.com.tw

**KEBCO Inc.**

1335 Mendota Heights Road  
USA - Mendota Heights, MN 55120  
Tel.: 001 / 651 / 4546162 • FAX: 001 / 651 / 4546198  
Internet: www.kebco.com • E-mail: info@kebco.com