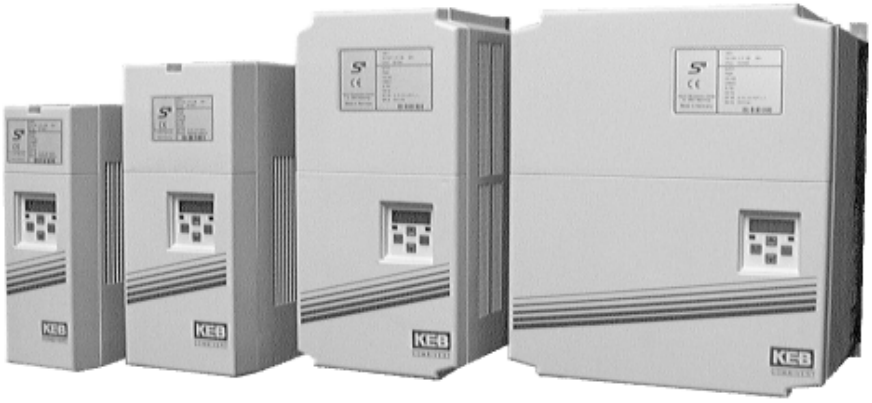
BETRIEBSANLEITUNG

INSTRUCTION MANUAL



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KEB COMBIVERT S4 **Größe D / E / G / H / R / U**

Size D / E / G / H / R / U

00.S4.01B-K141

STOP

Erst Betriebsanleitung Teil 1 lesen!

Read Instruction manual part 1 first!

KEB

1/2004

Diese Betriebsanleitung
– ist gültig für das Servosystem **KEB COMBIVERT S4**
– muß 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. Lesen Sie deshalb unbedingt die "Technische Dokumentation Teil 1".

Damit beim KEB COMBIVERT S4 trotz umfangreicher Program-miermöglichkeiten eine einfache Bedienung und Inbetriebnahme möglich ist, wurde eine spezielle Bedienerebene geschaffen, in der die wichtigsten Parameter zusammengefaßt sind. Sollten jedoch die von KEB vordefinierten Parameter nicht ausreichen um Ihren Einsatzfall zu lösen, können Sie gegen eine geringe Schutzgebühr ein **Applikationshandbuch** erwerben.
Es umfaßt: - Erstellen einer individuellen Bedienerebene
- Aufstellung und Beschreibung weiterer Parameter

Die in dieser Betriebsanleitung verwendeten Pictogramme entsprechen folgender Bedeutung:

Gefahr
Warnung
Vorsicht

Wird verwendet, wenn Leben oder Gesundheit des Benutzers gefährdet sind oder erheblicher Sachschaden auftreten kann.

Achtung

Unbedingt beachten! Besondere Hinweise für den sicheren und störungsfreien Betrieb.

Information

Hilfestellung, Tip

This manual
– is valid for the frequency inverter **KEB COMBIVERT F4-F**
– must be made available to every user

Before working with this unit you must familiarize yourself with it. Pay special attention to the safety and warning guides. Make sure to read 'Technical Documentation Part 1'!

KEB COMBIVERT S4 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 for a small fee.
It includes: - Creating an individual operator level
- Listing and description of other parameters

The pictograms used in this manual mean:

Danger
Warning
Caution

Used when the life or health of the user is exposed to danger or when considerable damage to property can occur.

Attention

Must be observed! Special instructions for a safe and trouble-free operation.

Information

Assistance, Tip

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1. Introduction

1.1 Application

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The digital servo controller KEB COMBIVERT S4 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.

1.2 Part Code Servo Controller

Size Type Design Sub-assembly

A B . S 4 . C D E - F G H I

AB Size / Dimension wide
see Part 3

C Housing design: D, E, G or H

D Supply voltage.
0 ... 200V class DC sub-assembly
1 ... 400V class DC sub-assembly
2 ... 200V class
3 ... 200V class with 3-phase Interference suppression
4 ... 400V class

E Mechanic construction of the motor.
Motor unit marking see part B

F Motor nominal speed.
1 ... 1500 UPM 3 ... 3000 UPM 5 ... ------- UPM
2 ... 2000 UPM 4 ... 4000 UPM 6 ... 6000 UPM

G 0 ... with self ventilated
1 ... with forced ventilated

HI 09 ... Resolver / SSI
10 ... Resolver / SSI / Interference suppression
11 ... Resolver / IG-IO / Interference suppression
12 ... Resolver / IG-IO
13 ... ERN1387 / IG-IO
14 ... ERN1387 / IG-IO / Interference suppression
15 ... ERN1188 / IG-IO
16 ... ERN1188 / IG-IO / Interference suppression

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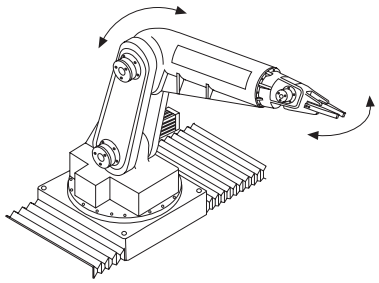
2. Operation Specifications

2.1 Moving or Rotating Parts

– Motor shaft
– Feed axis and parts connected to it

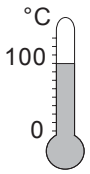


Prior to any work on the machine (e.g. exchange of tools), disconnect the machine and secure against unintended restart!

Safely secure movement range of machine during operation! Danger of injury!

2.2 High Operating Temperatures

– Housing of servo motor
– Braking resistors



Motor housing and braking resistor can attain very high operating temperatures! Danger of injury!

2.3 Connection Directions

A trouble-free and safe operation of the servo system is only warranted when the following connection instructions are observed.
When deviated from, malfunctions and damages may occur in isolated cases.

– The servo controller KEB COMBIVERT S4 is only designed for a fixed connection.
– Do not interchange power cable and motor line.
– Lay control and power lines separately (min. 10 cm distance).
– Connect control lines only to switching elements and setting devices (relay, switch, potentiometer), that are suitable for extra-low voltages.
– Use shielded/twisted control lines. Connect the shield only single-sided to PE of the servo controller.

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– Use shielded motor cables. Connect shield to the Servo controller to PE and extensively connect to motor housing.
– Earth servo controller very well: star-shaped earthing, avoid earth loops, shortest connection to main earthing terminal.

The connections on the control terminal strip and the encoder inputs show a safe seperation in accordance with VDE 0100. The person who sets up the systems or machines must ensure that the existing or newly wired circuit meets the VDE requirements for safe seperation.

2.4 Interference Protection of Servo Controller

The control and power inputs of the servo controller are protected against interferences.
An increased operational reliability and additional protection against malfunctions is achieved through following measures:

– Use of mains filter when the mains voltage is affected by the connection of large consumers (reactive-power compensation equipment, HF-furnaces etc.)
– Protective wiring of inductive consumers (solenoid valves, relays, electromagnets) with RC elements or similar devices to absorb the energy released at switch-off.
– Separate laying of power lines as described in the connection directions to avoid inductive and capacitive coupling of interference pulses.
Paired-twisted cables protect against inductive parasitic voltages, shielding provides protection against capacitive parasitic voltages. Optimal protection is achieved with twisted and shielded cables when signal and power lines are layed separately.

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2.5 Interference Protection of Electric Plants

The servo controller KEB COMBIVERT S4 transmits waves of high frequency. Following measures can reduce the arising interference pulses that may effect electric plants in the vicinity of the servo controller:

- Installation of the servo controller in a metal housing.
- Shielded motor cables.
  The shield must be connected to PE of the servo controller and to the housing of the motor (connect extensive shield). The shielding shall not be used as protective earthing. Only an uninterrupted shield begining as close as possible at the servo controller or servo motor ensures a safe function of the shielding.
- Good earthing (metal-powder tape or 10 mm^2 earth lead)
- Use of radio interference suppression filters.

2.6 Operating Directions

To avoid premature ageing or destruction of the servo system KEB COMBIVERT S4 observe the following directions!

- Install a circuit interrupter between voltage supply and servo controller to permit the independent switch-off of KEB COMBIVERT S4.
- Frequent switching between mains and servo controller is not permitted!
- The switching between motor and servo controller during operation is prohibited!
- The servo system KEB COMBIVERT S4 is to be operated under suitable conditions (see Ambient Condition).

3. Control Cabinet Installation

***Altitude of site max. 2000 m* — A power reduction of 1 % per 100 m must be taken into account for site altitudes of 1000 m and more above sea level, i.e. 1500mNN = 95% $P_{Nominal}$**

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3.1 Ambient Conditions

Max. permissible limit values:	Servo controller KEB COMBIVERT S4
Coolant inlet temper.- / Ambient temperature during operation	-10 °C…+45 °C
Storage temperature	-25 °C…+70°C
Transport temperature	-25 °C…+70°C
Relative humidity max.	max. 95 %, no condensationg (identification "F" DIN 40040) Climatic category 3K3

3.2 Installation Instructions

– Stationary installation and earthing of the servo controller KEB COMBIVERT S4.
– At the installation of the servo controller observe minimum distance to adjacing elements (see Installation Instructions).
– No moisture or water shall penetrate into the servo controller.
– Avoid penetration of dust into the servo controller. For installation in a dust-proof housing sufficient heat dissipation must be provided.
– Do ***not*** operate the servo system KEB COMBIVERT S4 in explosion-protected rooms.
– Ensure sufficient heat emmission of the servo motor.
– Protect servo controller and servo motor against aggressive gases and liquids.
– Avoid any impacts or shocks on the servo motor.
– Use suitable devices for fitting or taking off drive elements on the motor shaft (toothed wheels, belt-pulleys, clutches etc.)

If other consumers which produce electric or magnetic fields or which effect the power supply are located in the vicinity of the servo controller, they must be positioned as far away as possible from the servo controller and steps must be taken to suppress interferences.

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3.3 Calculations

Calculation of control cabinet surface $A = \frac{P_V}{\Delta T \cdot K}$ [m²]

Rate of air flow with fan cooling: $V = \frac{3{,}1 \cdot P_V}{\Delta T}$ [m³/h]

A = Control cabinet surface [m²]

ΔT = Temperature difference [K] (Default value = 20 K)

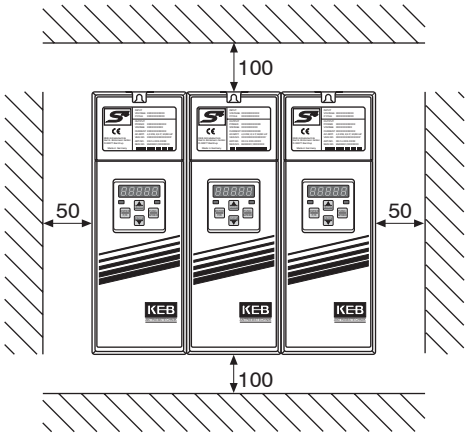
K = Heat transfer coefficient $\left[\frac{W}{m^2 \cdot K}\right]$ (Default value = 5 $\frac{W}{m^2 \cdot K}$)

P_V = Heat dissipation [W]

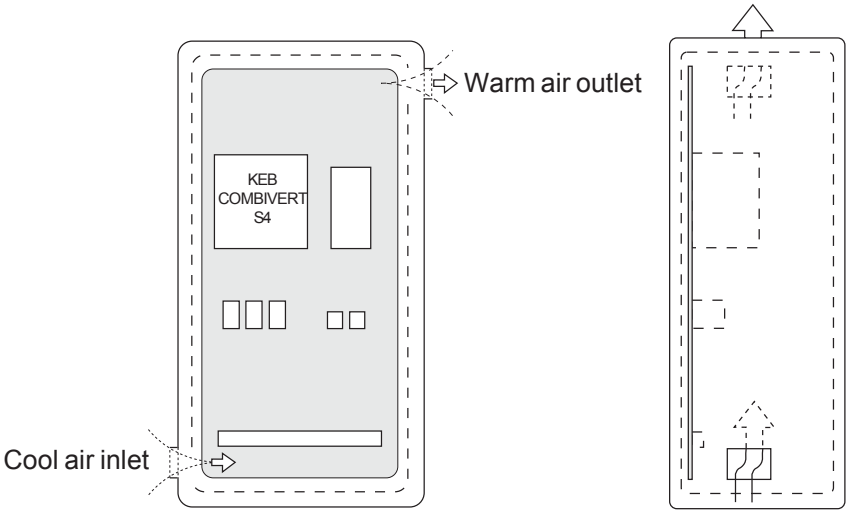
V = Air flow rate of fan [m³/h]

For detailed informaton please refer to the catalogs of the control cabinet manufacturers.

3.4 Installation Conditions



Minimum distance



4. Technical Data

Operating temperature -10°	... +45°C; Storage: -25° ... +70°C
Type of Protection	IP20

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The Type of protection is warranted only with correct installation and connection of the components.

4.1 230V Class

Size		03		05		14
Housing		D		D		G
Mains voltage[1]	[V]	180 . . . 260 ± 0%				
Line frequency	[Hz]	50 / 60 Hz ± 2 Hz				
Line phases		1	3	1	3	3
Input current	[A]	4,8	2,6	12,8	7	36
max. perm. Mains fuse [3]	[A]	16	10	16	10	50
Rated output current	[A]	2,4		6,4		33
Stillstandsdauerstrom I_{do}	[A]	6,4		6,4		33
Stall current I_{max} [4]	[A]	8,5 for 1200 ms		14,8 for 600 ms		49,5 for 1000 ms
Line cross section [2]	[mm²]	1,5		1,5		280
Heat dissipation P_V [5]	[W]	65		75		100

[1] In relation to 230V nominal input voltage

4.2 400V Class

Size		07	10
Housing		D	D
Mains voltage [1]	[V]	305 . . . 500 ± 0%	
Line frequency	[Hz]	50 / 60 Hz ± 2 Hz	
Line phases		3	3
Input current	[A]	3	7
max. perm. Mains fuse [3]	[A]	10	10
Rated output current	[A]	2,7	6,4
Stall current I_{do}	[A]	2,7	6,4
Peak current I_{max} [4]	[A]	8,5 for 200 ms	22 for 200 ms
Line cross section [2]	[mm²]	1,5	1,5
Heat dissipation [5]	[W]	50	110

[1] In relation to 400 V nominal input voltage

[2] Recommended min. cross section of mains supply at rated power and cable length up to 30 m.

[3] Mains fuse and line cross section can also be dimensioned on the basis of the rated current of the servo motor.

[4] The peak current I_{max} is a theoretical value, that leads to the operation of the current limiting. The maximum torque llimit should be adjusted 10...15% below I_{max}.

[5] Heat dissipation related to the static continuous current (heat dissipation control circuit ca. 20 W).

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Size		12	16
Housing		E	G
Mains voltage [1]	[V]	305 . . . 500 ± 0%	
Line frequency	[Hz]	50 / 60 Hz ± 2 Hz	
Line phases		3	3
Input current	[A]	18,2	36
max. perm. Mains fuse [3]	[A]	20	50
Rated output current	[A]	16,5	33
Stall current I_{do}	[A]	16,5	21,5
Peak current I_{max} [4]	[A]	38 for 600 ms	49,5 for 600 ms
Line cross section [2] [3]	[mm²]	2,5	10
Heat dissipation [5]	[W]	240	310

Size		18	22	24
Housing		H	R	U
Mains voltage [1]	[V]	305 . . . 500 ± 0%		
Line frequency	[Hz]	50 / 60 Hz ± 2 Hz		
Line phases		3		
Input current	[A]	55	127	198
max. perm. Mains fuse [3]	[A]	80	160	315
Rated output current	[A]	50	115	180
Stall current I_{do}	[A]	45	115	180
Peak current I_{max} [4]	[A]	75 for 800 ms	172,5 for 1000 ms	270 for 1000 ms
Line cross section [2] [3]	[mm²]	25	50	95
Heat dissipation P_V [5]	[W]	610	1500	2400

[1] In relation to 400 V nominal input voltage

[2] Recommended min. cross section of mains supply at rated power and cable length up to 30 m.

[3] Mains fuse and line cross section can also be dimensioned on the basis of the rated current of the servo motor.

[4] The peak current I_{max} is a theoretical value, that leads to the operation of the current limiting. The maximum torque llimit should be adjusted 10...15% below I_{max}.

[5] Heat dissipation related to the static continuous current (heat dissipation control circuit ca. 20 W).

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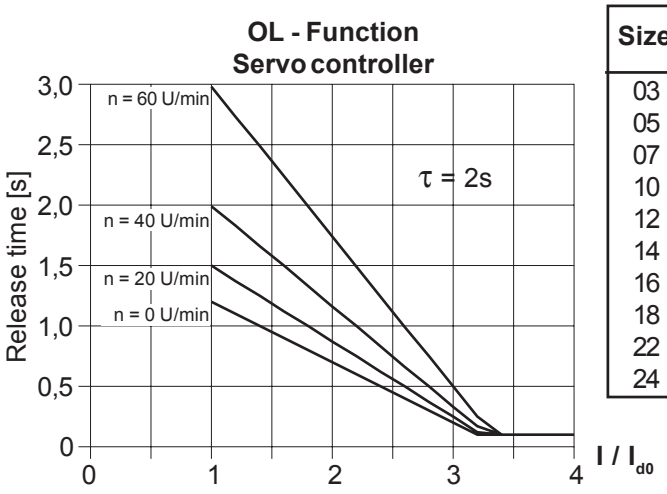
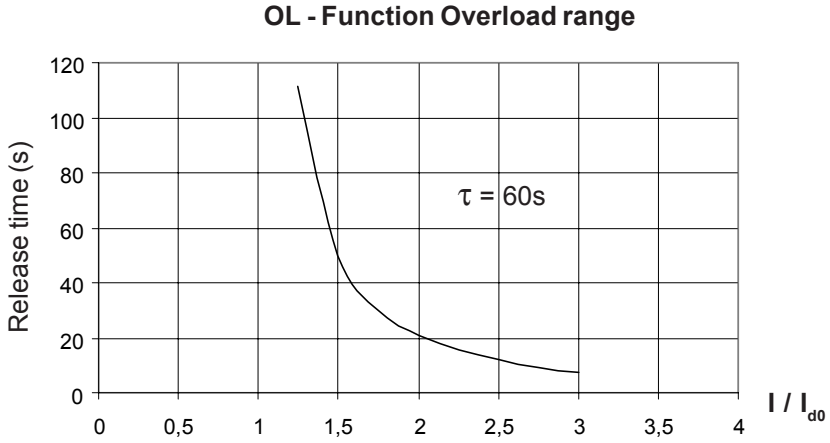
4.3 Overload characteristics



Size	I_{d0}	$\frac{I}{I_{d0}}$ max.
03	2,4	1,3
05	6,4	2,3
07	2,7	3,1
10	6,4	3,4
12	16,5	3,0
14	33,0	1,5
16	21,5	2,3
18	45	1,7
22	115	1,5
24	180	1,5



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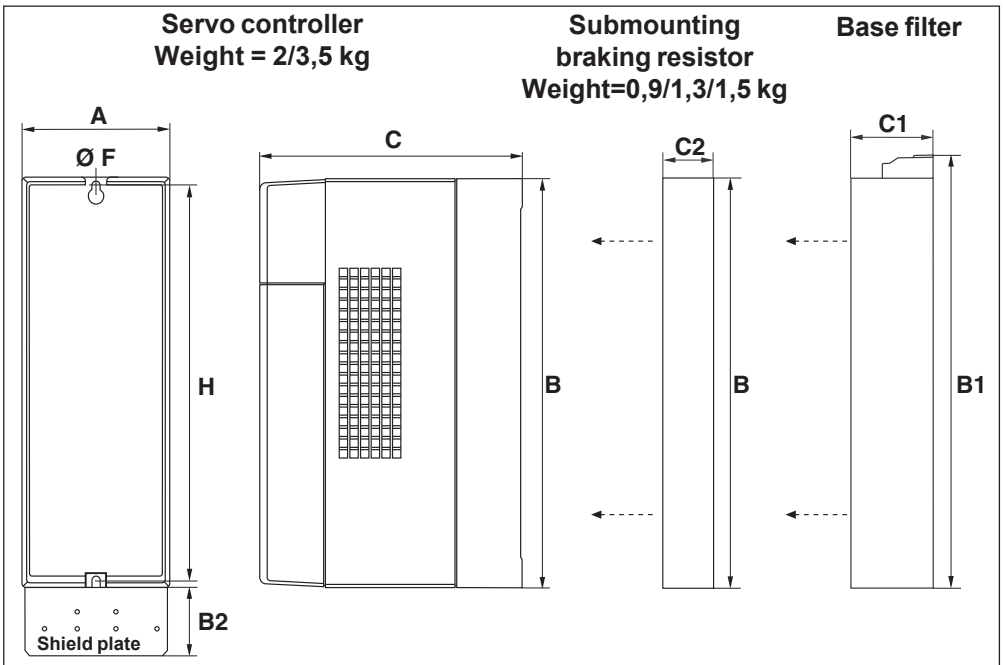
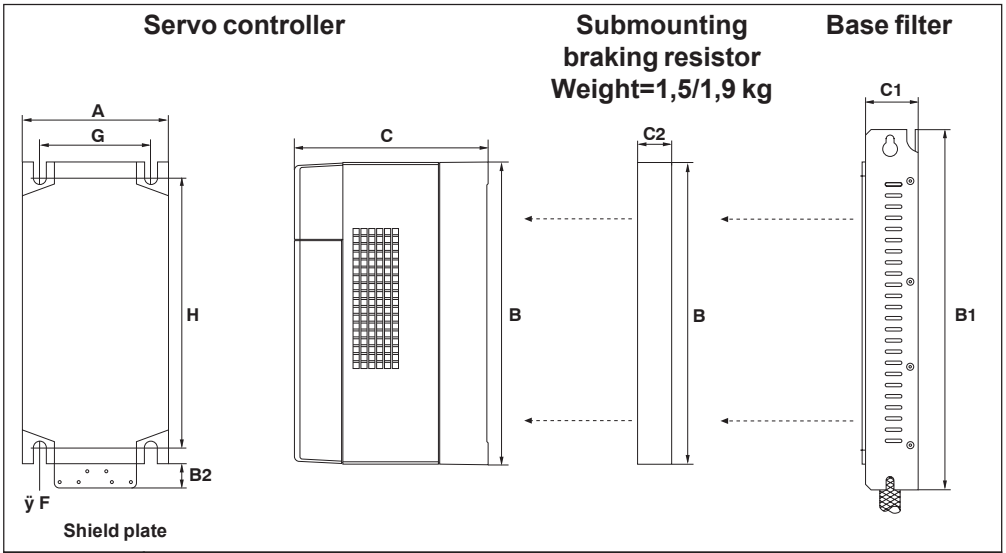
5. Dimensions



Size	A	B	B1	B2	C	C1	C2	F	H
D	90	250	264	37,5	160	50	30	5	240
E	130	290	352	37,5	200	50	30	7	275



Size	A	B	B1	B2	C	C1	C2	F	G	H	Wight
G	170	340	415	32	255	56	30	7	150	330	10
H	297	340	445	51	255	66	-	7	250	330	14
R*	340	520	-	68	355	-	-	10	300	495	25-29
U	340	800	-	-	355	-	-	11	300	775	75

Dimensions and wights of the HF-filter: see Instruction Manual 00.F4.00B-K000 (KEB-COMBIVERT F4).

*) The R-Housing installation filter have no influence to the dimensions of the housing. (Weight = 7 kg)

6. Connection

6.1 Survey Housing sizes

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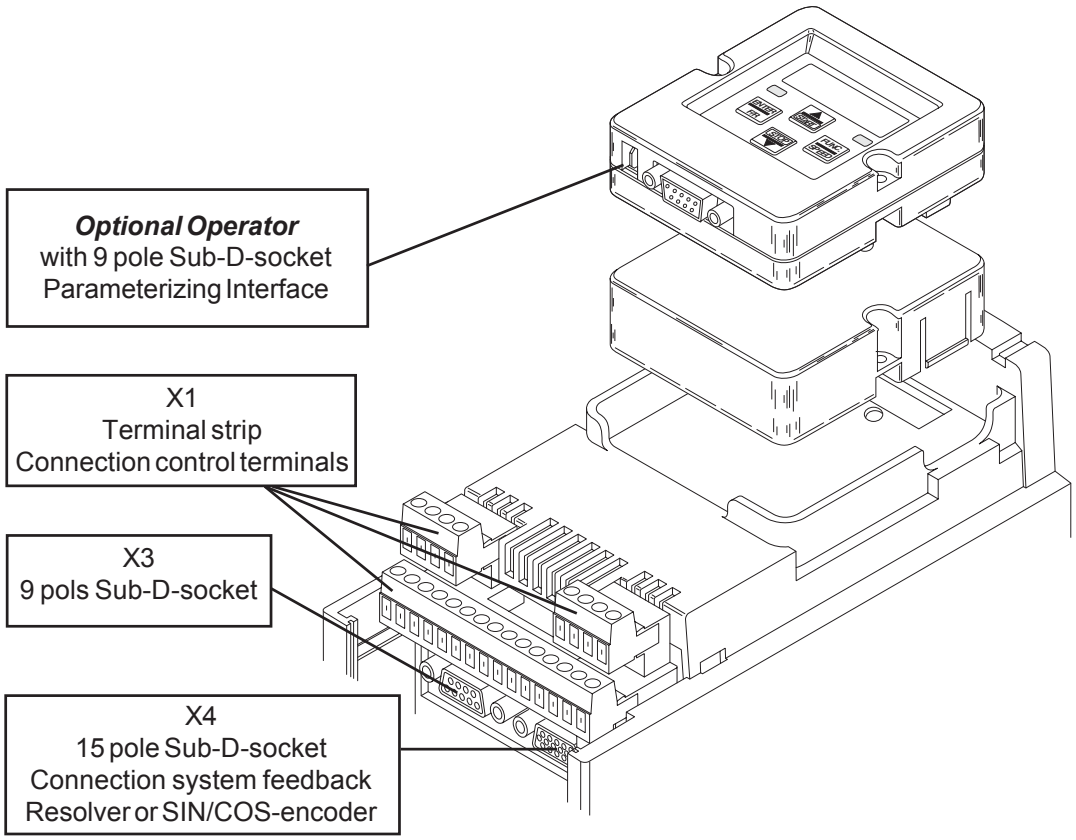
Size D - E



Size G / H / R / U

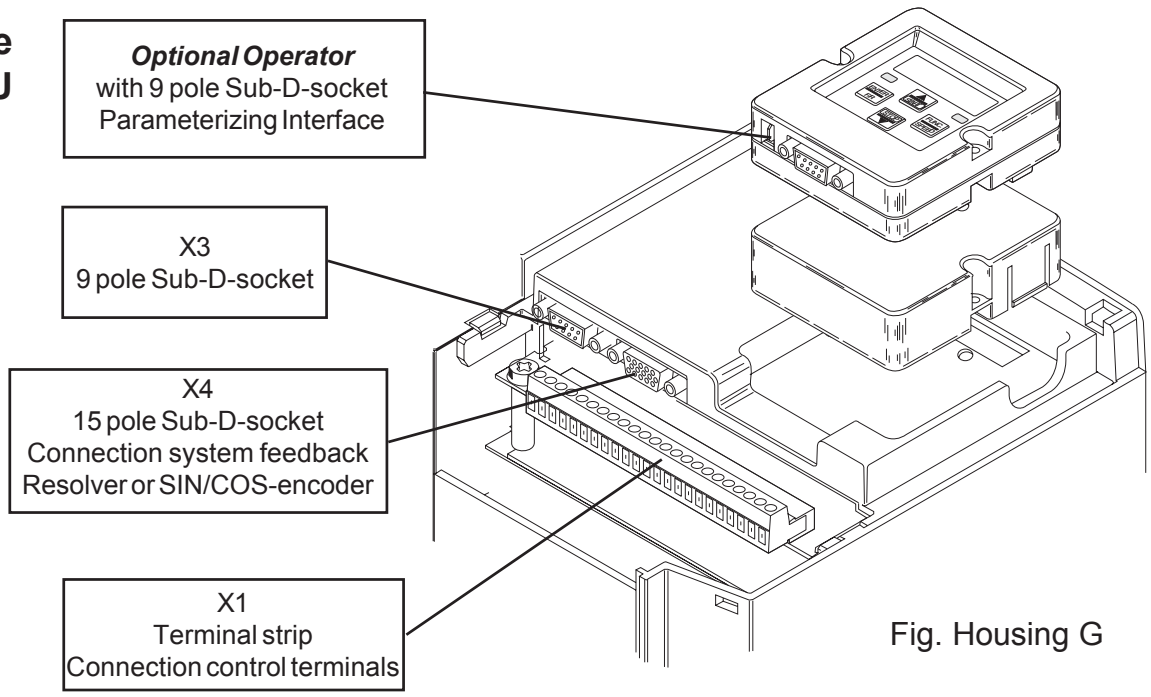


Fig. Housing G

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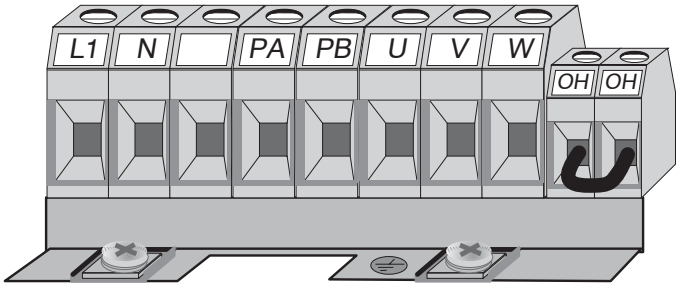
6.2 Power Circuit Terminals

Size D

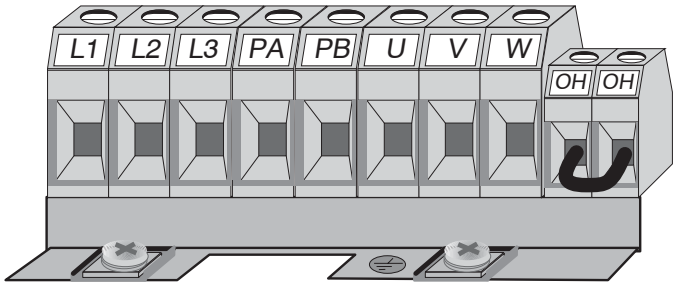
⚠ **Note input voltage, since 230V and 400V class (3 phase) is possible.**

1-phase



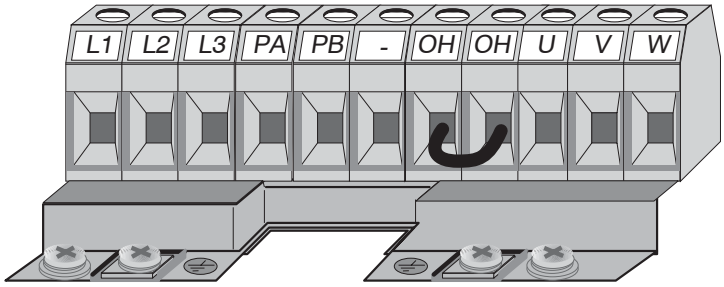
L1, N	1 phase mains connection
L1, L2, L3	3 phase mains connection
PA, PB	Connection braking resistor

3-phase



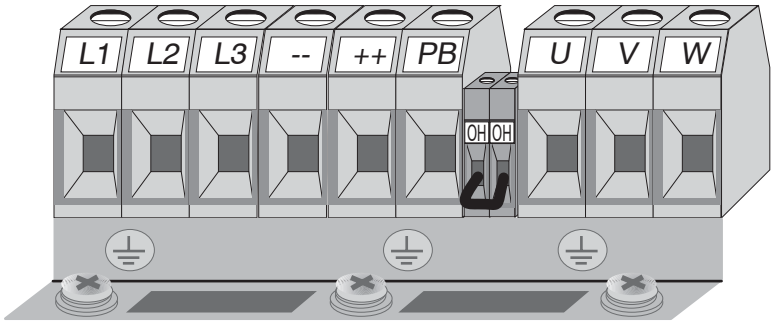
U, V, W	Motor connection
OH, OH	Connection for temperature sensor
⏚	Connection for screening/earthing

Size E



L1, L2, L3	3 phase mains connection
PA, PB	Connection braking resistor
PA, -	Connection for braking module and feedback unit
OH, OH	Connection for temperature sensor
U, V, W	Motor connection
⏚	Connection for screening/earthing

Size G

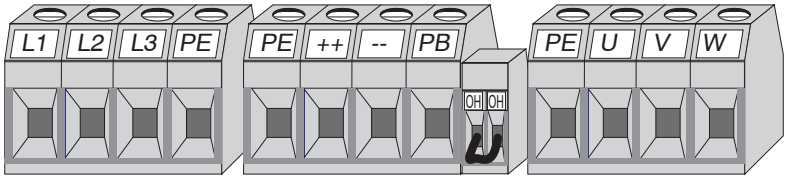


L1, L2, L3	3 phase mains connection
++, PB	Connection braking resistor
++, --	Connection for braking module, feedback and supply unit DC input 420...720VDC
OH, OH	Connection for temperature sensor
U, V, W	Motor connection
⏚	Connection for screening/earthing

Unit without DC input

+PA, PB	Connection braking resistor
+PA, -	Connection for braking module and feedback unit

Size H



L1, L2, L3	3 phase mains connection
++, PB	Connection braking resistor
++, --	Connection for braking module, feedback and supply unit DC input 420...720VDC
OH, OH	Connection for temperature sensor
U, V, W	Motor connection
PE	Connection for screening/earthing

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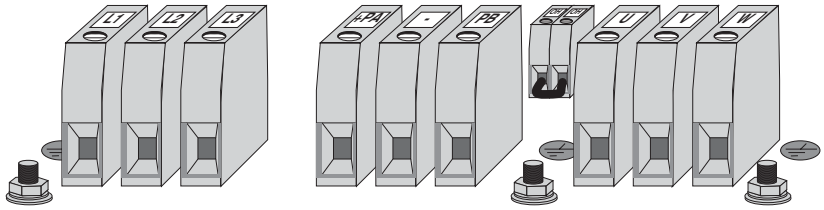
Size R and U

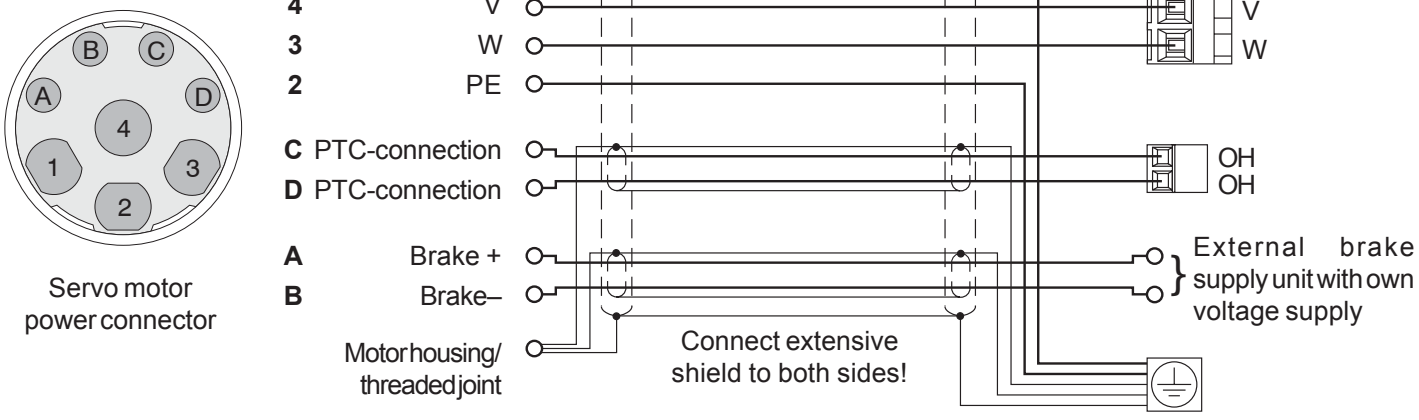


L1, L2, L3	3 phase mains connection
+PA, PB	Connection for braking resistor
+PA, -	Connection for braking module and feedback unit
OH, OH	Connection for temperature sensor
U, V, W	Motor connection
⏚	Connection for screening/earthing

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!

6.3 1-phase Connection 230 V Class

PE	Protective earth conductor
U, V, W	Motor
L1, L2	Mains connection 1-phase
PA, PB	Connection braking resistor



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-Contact	7
D	PTC-Contact	8

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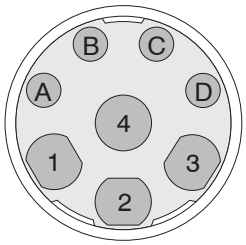
6.4 3-phase Connection 230 V/400 V Class

Absolutely ensure the observance of the supply voltage of the servo controller (3 x 230 V / 3 x 400 V!

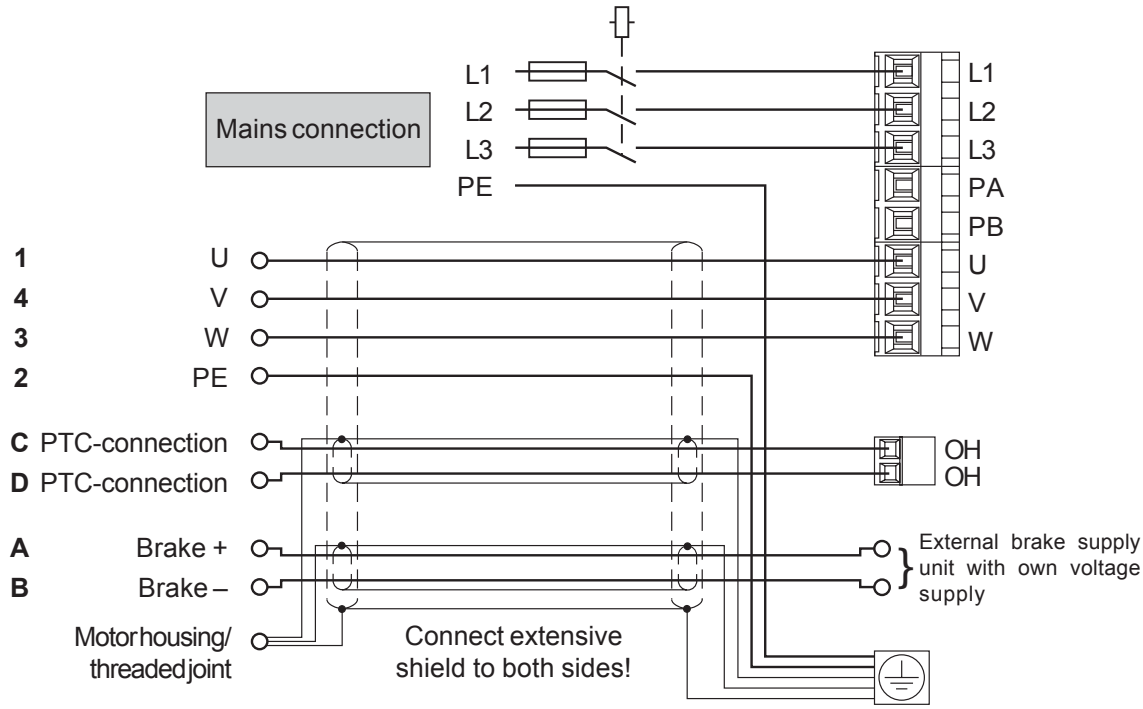
Remove or plug in the power connector only at switched off unit and disconnected power supply !

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

PE	Protective earth conductor
U, V, W	Motor
L1, L2, L3	Mains connection 3-phase
PA, PB	Connection braking resistor



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-Contact	7
D	PTC-Contact	8

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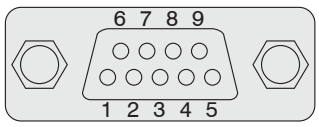
6.5 Connection Incremental-EncodeR Simulation

The encoder interface X3 is reversible from an incremental encoder emulation to an incremental encoder input. The increments of the emulation are fixed to 1024 for units with resolver interface. For units with SIN/COS interface, the increments of the SIN/COS - encoder are used.

Max. input frequency: < 300 kHz
Signals: RS 422 / 2 trace signals and zero signal
Max. transmission link: 50 m
Released encoder types: Kübler 5800 / 5820
Heidenhain RON 425 / ROD 426
or compatible

Servo controller
Sub-D-connector X3



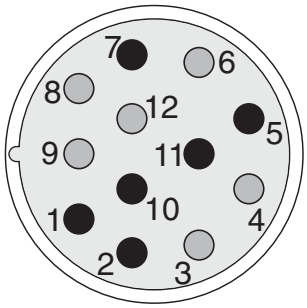
PIN No.	Signal	Meaning
1	U_{a1}	Signal channel A
2	U_{a2}	Signal channel B
3	U_{a0}	Signal Zero
4	+5V	max. 150 mA (1)
5	+18V	max. 100 mA (1)
6	$\overline{U}_{a1}$	Signal channel A inverted
7	$\overline{U}_{a2}$	Signal channel B inverted
8	$\overline{U}_{a0}$	Signal zero inverted
9	GND	

(1) Voltage supply at X3 and X4 can be loaded at the +18V with max. 100mA. Alternatively the +5V can be loaded with 300mA.

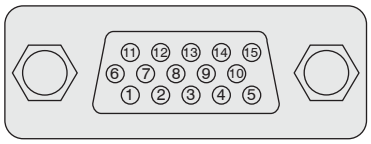
Remove or plug in the power connector when the unit is switched off and the power supply is disconnected!

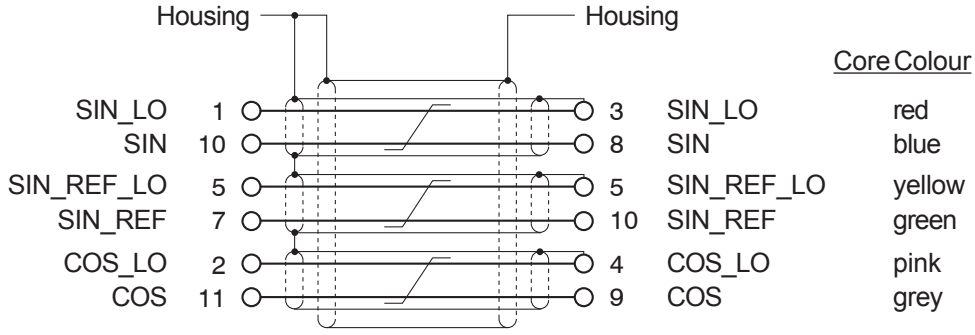
6.6 Connection Resolver

Servo motor
resolver connector



Servo controller
Sub-D connector X4



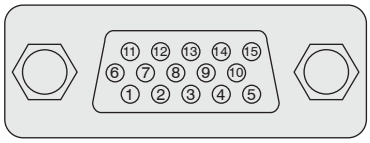


GB

6.7 Connection SIN/COS-Encoder*Option*

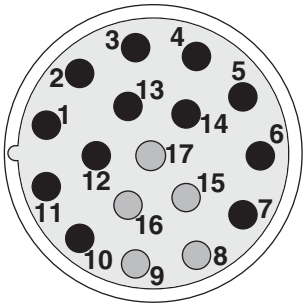
Remove or plug in the connector only at switched off unit and disconnected power supply !

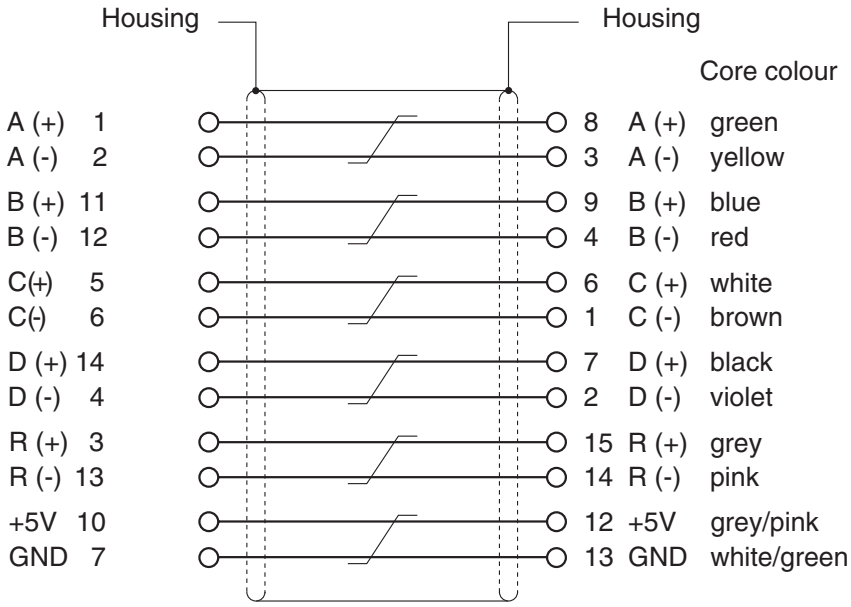
Servo Controller
Sub-D socket X4



Servo Motor

Servo motor
Encoder connector





6.8 Cables

For the servo system KEB COMBIVERT S4 factory-assembled motor, resolver and encoder cables are available in the lengths 5m, 10m, 15m und 20m.

00.S4.109–0005

Cable length
- 05 = 5 m
- 10 = 10 m
- 15 = 15 m
- 20 = 20 m

Part
- 109 = Resolver cable
- 019 = Motor cable 1,5 mm²
- 119 = Motor cable 2,5 mm²
- 209 = Encoder cable ERN1387

Type designation 00.S4

Other cable lengths on request.

6.9 Control Terminal Strip X1

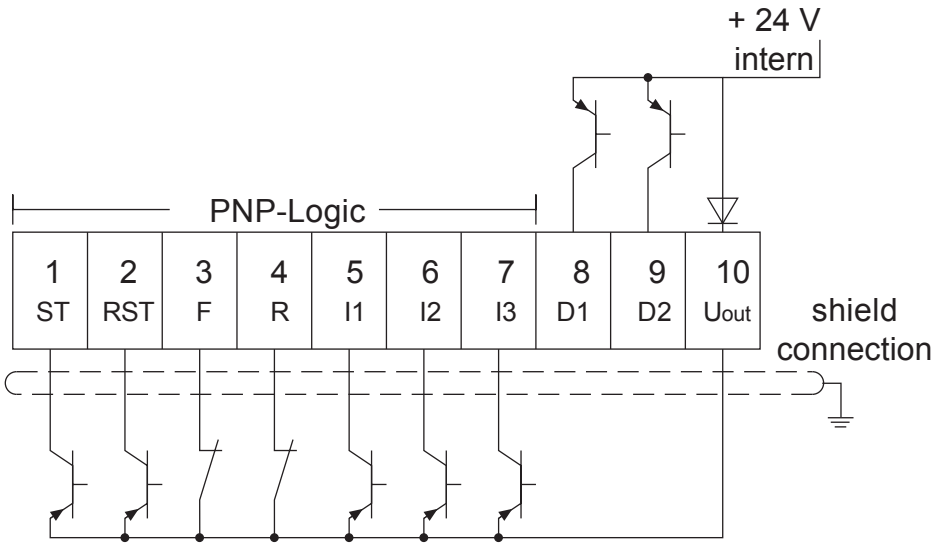
Rotation release (terminal X2.3 / X2.4) and analog torque limitation (terminal X2.16 / X2.17) have no function in the Drive Mode. See page GB 35 "Drive Mode".

GB

Terminal	Designation	Function	
1	ST	Control release (output off circuit, if opened, no torque)	digital inputs: +12…33 V / Ri = 2,7 kΩ PNP potential separated * When the unit is defective there is no guarantee that the software protective function will start.
2	RST	Reset	
3	F	Release of rotation direction (limit switch*) forward	
4	R	Release of rotation direction (limit switch*) reverse	
5	I1	Input for jogging speed forward	
6	I2	Input for jogging speed reverse	
7	I3	Input for external error setting	
8	D1	Digital output signal 1	programmable PNP - transistor outputs 16V - 30V / max. 20 mA
9	D2	Digital output signal 2	
10	Uout	+ 24 V voltage input	16V - 30V / max. 60 mA at ext. supply of the control approx $U_{ext.}$
11	0 V	Ground reference for +24 V and digital in/outputs	
12	CRF	+10 V reference voltage	+10V (+/- 3%) ; max. 4 mA
13	COM	Ground for analog inputs/outputs	
14	REF 1 +	Analog setpoint value setting	Voltage difference input - 10V… + 10V / Resolution: 12 Bit Ri = 40 kΩ
15	REF 1 –		
16	REF 2 +	Analog torque limitation ***refer to Parameter CP.9***	Voltage difference input 0…+10V Resolution: 12 Bit; -10V…0V ≙ 0 Nm/ +10V ≙ $M_{max.}$ / Ri = 40 kΩ
17	REF 2 –		
18	A1	Programmable analog output 1	-10V…+10V / Resolution: 10 Bit Ri=100 Ω
19	A2	Programmable analog output 2	
20	RLA	Output relay:	30 V DC/1 A
21	RLB	RLA / RLC: normal operating condition	
22	RLC	RLB / RLC: POWER OFF / malfunction	
23	Ex. Voltage	external supply of the control	+ 24 V external voltage input

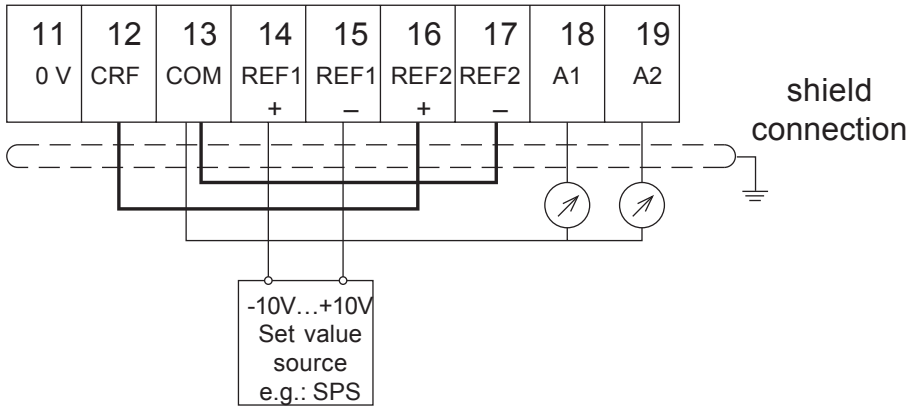
GB

6.9.1 Digital Inputs / Outputs

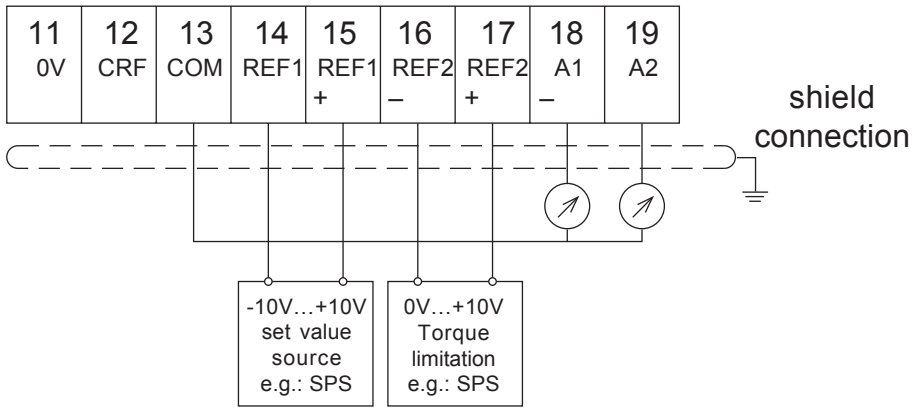


6.9.2 Analog Inputs / Outputs

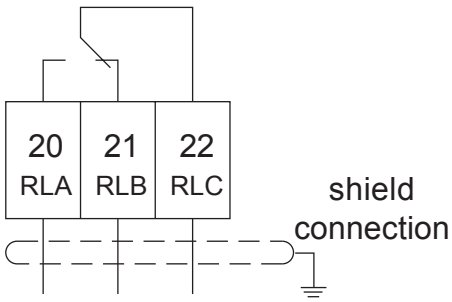
without analog torque limitation



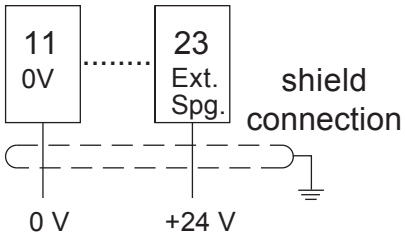
with analog torque limitation



6.9.3 Output Relay



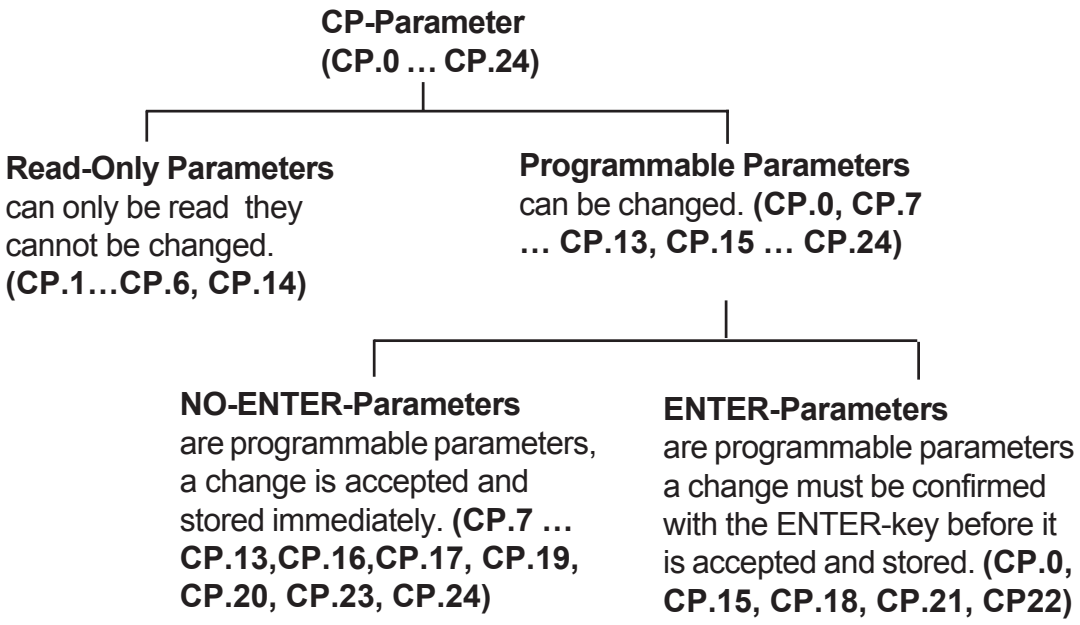
6.8.4 External voltage supply of the control



7. Operation

7.1 Parameter Structure

GB



7.2 Parameter Survey

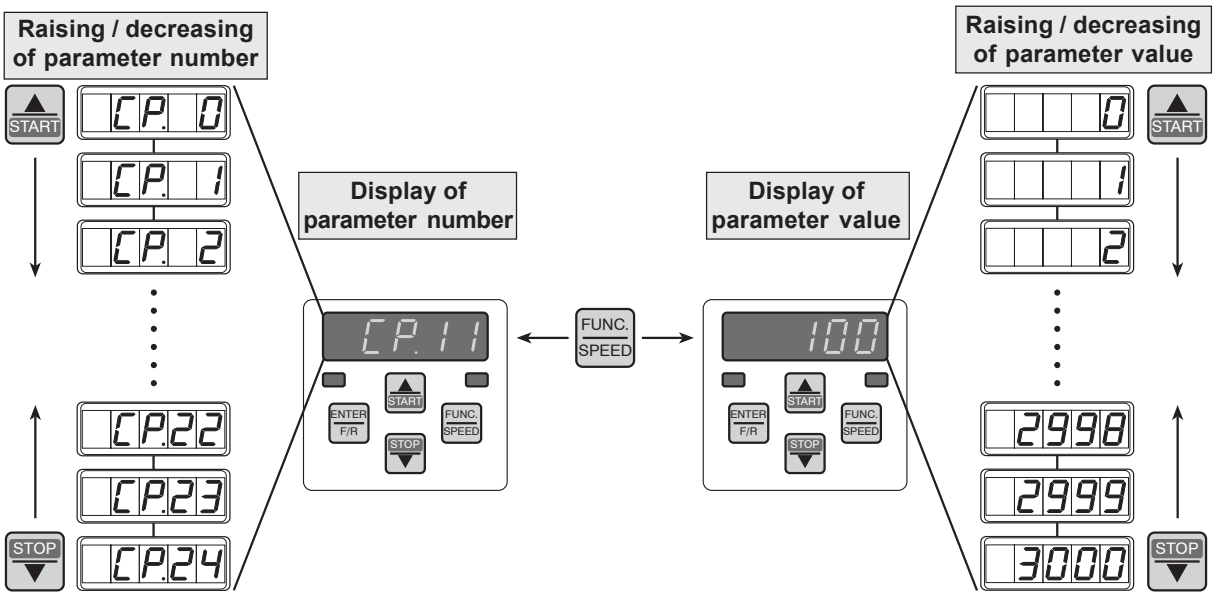
Par.-No.	Parameter name	Setting range	Resolution	Factory setting
CP.0	Password input	0…9999	1	–
CP.1	Actual speed display	–	0,5 rpm	–
CP.2	Status display	–	–	–
* CP.3	Apparent motor current	–	0,1 A	–
* CP.4	Max. apparent motor current	–	0,1 A	–
* CP.5	Current Torque	–	0,1 Nm	–
CP.6	Setpoint speed display	–	0,5 rpm	–
CP.7	Acceleration time	0…320 s	0,01 s	0,05 s
CP.8	Deceleration time	0…320 s	0,01 s	0,05 s
CP.9	Torque limit	0…5 x M_N	0,1 Nm	3 x M_N
CP.10	Max. setpoint speed	0…9999	0,5 rpm	Rated speed
CP.11	Jogging speed	0…9999	0,5 rpm	100 rpm
CP.12	P-factor speed controller	0…65535	1	Motor-type dependent
CP.13	I-factor speed controller	0…65535	1	Motor-type dependent
CP.14	Line number incremental encoder simulation	–	–	1024/2048 (for sin/cos)
CP.15	Behaviour at external fault	0…6	1	0
CP.16	Offset REF 1	-100%…+100%	0,1 %	0 %
CP.17	Zero point hysteresis REF 1	0…10 %	0,1 %	0 %
CP.18	Function output A1	0…6	1	2
CP.19	Amplification output A1	-20…+20	0,01	3 x M_{Nenn} ^ +10V
CP.20	Amplification output A2	-20…+20	0,01	+/–n_{Nenn} ^ +/–10V
CP.21	Switching condition output D1	0…20	1	20
CP.22	Switching condition output D2	0…20	1	18
CP.23	Torque level output D1	0…50 Nm	0,1 Nm	0,5 x M_{Nenn}
CP.24	Speed level output D2	0…16000 rpm	0,5 rpm	0,5 x n_{Nenn}

*With the actual values displayed, from the normal machine dispersion and temperature drifts, tolerances must be taken into account. (about ± 10% in relation to the nominal value)

GB

7.3 Selection and Changing of Parameters

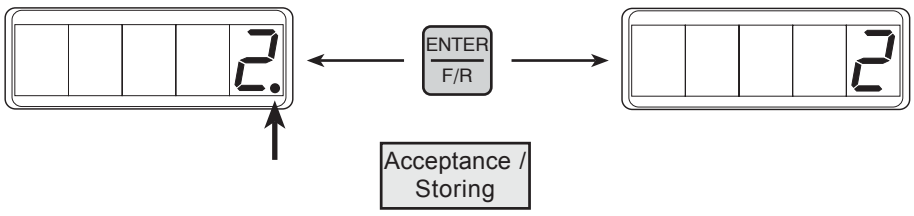
When switching on the servo controller the display always shows the value of parameter CP.1 (Status Display).



7.4 Storing Parameter Value

When changing the value of an **ENTER-Parameter** a point appears behind the last digit in the display. By pressing the ENTERkey the adjusted value is accepted and stored (point disappears).

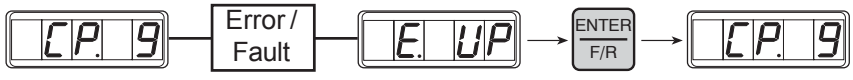
Example:



7.5 Error Message

If an error occurs during operation the current display is overwritten by the error message. To reset the error message press the key "ENTER".

Example:



The key ENTER only reset the error message. To reset the error itself the error cause must be eliminated first and a reset at terminal X2.2 or a cold start must be carried out.

! Error Massages / Error Diagnosis see page GB 43!

8. Parameter Description

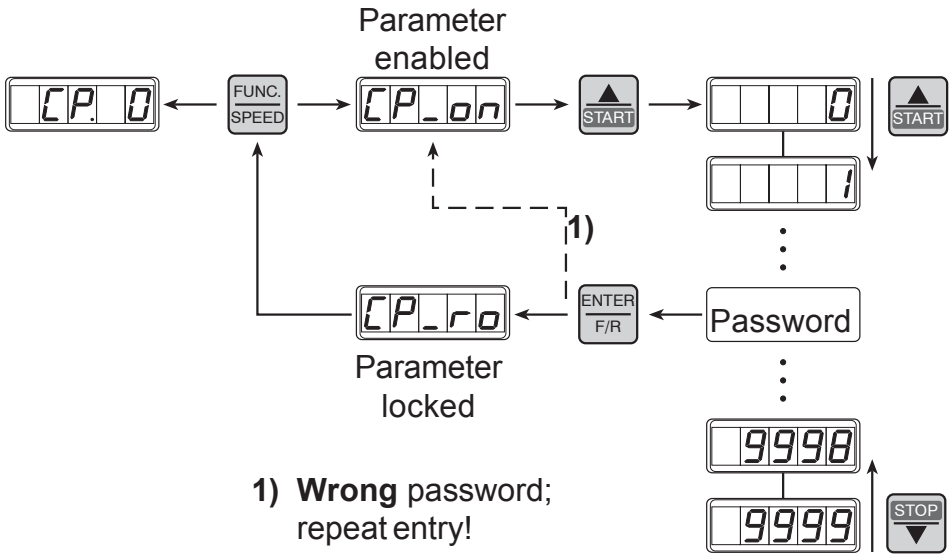
GB

The servo controller is supplied ex factory without password protection, i.e. all programmable parameters can be changed. After the parameterizing the unit can be locked against unauthorized access. The adjusted mode is stored.

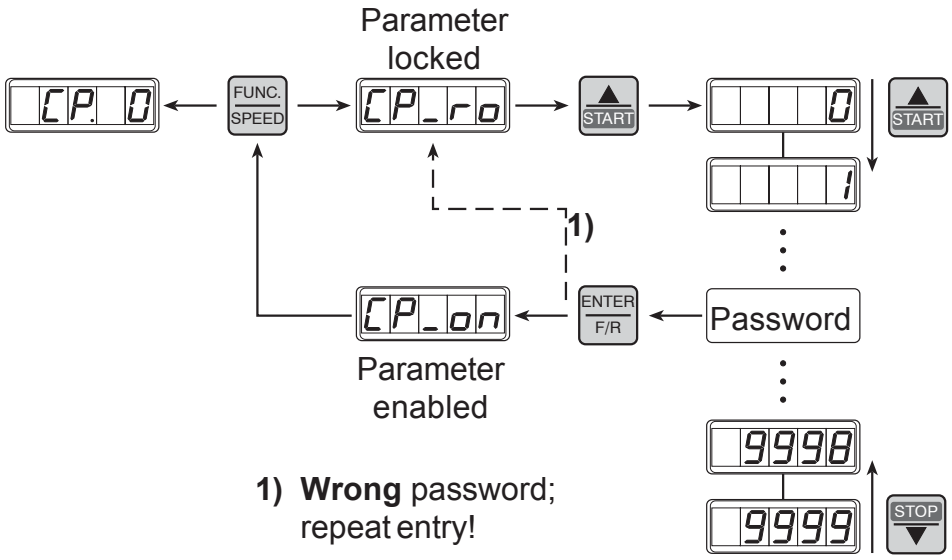
The passwords are listed in page GB 45!

Passwort input

Locking of CP-Parameters:



Enabling of CP-Parameters:



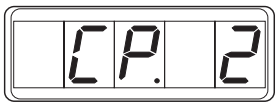
Actual Speed Display

Display of current motor speed.
Rotation "forward": Resolution 0,5 rpm.
Rotation "reverse": Represented by negative speed with a resolution of 1 rpm.

Example:

Rotation "forward"

Rotation "reverse"
Speed1837 rpm or 1837,5 rpm



Status Display

The status display indicates the current operating condition of the servo controller. Possible indications and their meaning are listed in the following:

Operating State ready:

noP	0	No Operation	Control release not briged, modulation switched off, output voltage = 0, drive uncontrolled
LS	70	Low Speed	Control release briged, no rotational direction command, modulation switched off, output voltage = 0 drive uncontrolled

Operating State run :

Facc	64	Forward Acceleration	Drive accelerates forward
Fcon	66	Forward Constant	Drive runs with constant speed forward
FdEc	65	Forward Deceleration	Drive decelerates forward
rAcc	67	Reverse Acceleration	Drive accelerates in reverse
rCon	69	Reverse Constant	Drive runs with constant speed in reverse
rdEc	68	Reverse Deceleration	Drive decelerates in reverse
rFP	79	ready for positioning	Drive waits for the positioning to start
P A	80	positioning active	Drive executes a positioning command
SrA	82	search for reference active	Drive in reference point search

Operating State Abnormal Condition:

A.OH2	97	abnormal stopping OH	Quick stop after OH-prewarning
A.dOH	96	abnormal stopping drive OH	Quick stop after motor overheating
A.EF	90	abnormal stopping EF	Quick stop after external error
A.PrF/	94	abnormal stopping prohibited	Quick stop caused by one of the
A.Prr	95	rotation forward / reverse	software limit switches
A.bus	93	abnormal stopping bus	Quick stop after the time monitoring starts for serial communication (Watchdog)

Operating State Fatal Error:

E.OC	4	error overcurrent	Overcurrent
E.OP	1	error overpotential	Overvoltage
E.UP	2	error underpotential	Undervoltage
E.OH	8	error overheat	Overheat in the inverter
E.dOH	9	error drive overheat	Motor overheated
E.OH2	30	error motor protection	Motor overloaded
E.OL	16	error overload inverter	Overload KEB COMBIVERT S4
E.EF	31	error extern fault	External Fault
E.PrF/	46	error prohibited rotation	Quick stop caused by one of the
E.Prr	47	forward/reverse	software limit switches
E.OS	105	error overspeed	Error overspeed
E.LSF	15	current limit resistor error	Loading shunt error
E.SEt	39	error at set selection	Set selection error set x
E.bus	18	error bus	Time monitoring for serial communication
E.EnC	32	error encoder	Error in the resolver interfacing
E.PuC	49	error power unit	Error in the power part detection
E.dSP	51	error DSP	Internal processor error
E.hyb	52	error hybrid	Internal hardware error in the hybrid detection
E.SLF	110	error software limit forward	Software limit switch F
E.SLr	111	error software limit reverse	Software limit switch R

A detailed error description is shown at page GB 43.

Apparent Motor Current

Indication of the current apparent motor current in ampere.

Resolution: 0,1 A

Apparent Motor Current Peak Value

Indication of the maximum apparent motor current measured during operation, in ampere.

Resolution: 0,1 A

Current Torque

Indication of the current torque in newtonmeter.

Resolution: 0,1 Nm

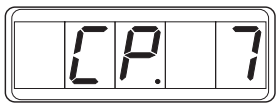
Setpoint Speed Display

Indication of preset setpoint speed in rpm.

Resolution: 0,5 rpm

Positive speed: Rotation "forward" **or** no sense of rotation

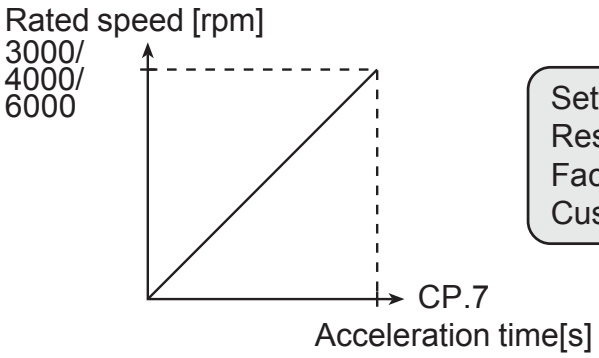
Negative Speed: Rotation "reverse"



Acceleration Time

The parameter defines the time required to accelerate form 0 rpm to rated speed of the servo system (3000/4000/6000 rpm). The behaviour of the actual acceleration time is proportional to the speed change (delta n).

GB



Setting range:	0…320 s
Resolution:	0,01 s
Factory setting:	0,05
Customer setting:	____ s

$$\frac{\textbf{CP.7}}{\textbf{Rated speed}} = \frac{\textbf{actual acceleration time}}{\textbf{delta n}}$$

Calculation Example:

Calculation of acceleration time to be adjusted:

The drive shall accelerate from 100 rpm to 2500 rpm in **0,2 s** !
Rated speed of the drive: 3000 rpm

delta n = 2500 rpm – 100 rpm = 2400 rpm

$$CP.7 = \frac{\text{actual acceleration time}}{\text{delta n}} \cdot \text{Rated speed}$$

$$CP.7 = \frac{0{,}2\text{s}}{2400\text{ rpm}} \cdot 3000\text{ rpm} = \mathbf{0{,}25\text{ s}}$$

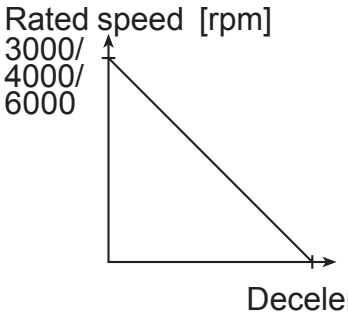
In this example the parameter CP.7 must be adjusted to 0,25 s !

If CP.7 and CP.8 = 0.00 s
then CP.16 and CP.17 without function

Deceleration Time

GB

The parameter defines the time required to decelerate from rated speed of the servo system (3000/4000/6000 rpm) to 0 rpm. The behaviour of the actual deceleration time is proportional to the speed change.



Setting range:	0…320 s
Resolution:	0,01 s
Factory setting:	0,05 s
Customer setting:	_____ s

$$\frac{\text{CP.8}}{\text{Rated speed}} = \frac{\text{actual deceleration time}}{\text{delta n}}$$

Calculation of deceleration time to be adjusted:

The drive shall decelerate from 3000 rpm to 1000 rpm in **0,05 s**!
Rated speed of the drive: 4000 rpm

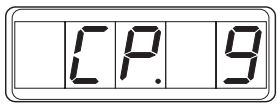
delta n = 3000 rpm – 1000 rpm = 2000 rpm

$$\text{CP.8} = \frac{\text{actual deceleration time}}{\text{delta n}} \bullet \text{Rated speed}$$

$$\text{CP.8} = \frac{0{,}05\text{s}}{2000\ \text{rpm}} \bullet 4000\ \text{rpm} = \mathbf{0{,}1\ s}$$

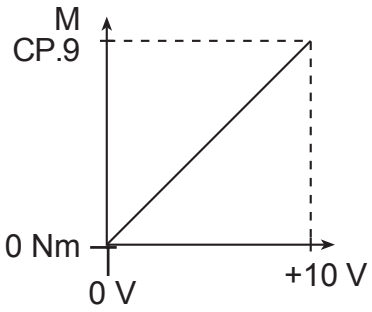
In this example parameter CP.8 must be adjusted to 0,1 s !

When CP.7 and CP.8 = 0.00 s
then CP.16 and CP.17 without function



Torque Limit

The maximum permissible torque of the drive is defined with parameter CP.9.



Analog limitation:
Terminals X2.16 / X2.17

Setting range:	0…5 x M_N
Resolution:	0,1 Nm
Factory setting:	3 x M_N
Customer setting:	____ Nm

GB

Maximum Setpoint Speed

Defines the maximum output speed of the servo controller.

Setting range:	0…9999 rpm
Resolution:	0,5 rpm
Factory setting:	Rated speed
Customer setting:	____ rpm

In case the preset speed is too high the value is limited internally to the maximum permissible value!

Jog-Drehzahl
Jogging Speed

Presetting of speed that can be activated via digital inputs I1 or I2.
Depending on the assignment of the inputs the jogging speed can be activated by direction of rotation "forward" or alternatively direction of rotation "reverse" . If both directions of roation are preset at the same time then rotation "forward" has priority.

Setting range:	0…9999 rpm
Resolution:	0,5 rpm
Factory setting:	100 rpm
Customer setting:	_____rpm

Condition:
The control terminals X2.1(ST), X2.3 (F) or X2.4 (R) must be connected with terminal X2.10 (+16V) .

Function:
- I1 or I2 active ⇨ Drive runs with adjusted jogging speed.
- I1 and I2 not active ⇨ Drive runs with original speed.

- In jogging operation the drive accelerates and decelerates at the torque limt.
- Original direction of rotation, speed, acceleration time and deceleration time are without function.
- In case the preset speed is too high the value is limited internally to the maximum permissible motor speed!

GB

P-Factor Speed Controller

Proportional factor of speed_controller.

see page 42 adjustment assistance speed controller

Setting range:	0...65535
Resolution:	1
Factory setting:	motor-type depend
Customer setting:	_____

I-Factor Speed Controller

Integral factor of speed controller.

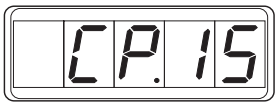
see page 42 adjustment assistance speed controller

Setting range:	0...65535
Resolution:	1
Factory setting:	motor-type depend
Customer setting:	_____

Line Number Incremental Encoder Simulation

This Parameter shows the adjusted encoder (inc/r) of the incremental encoder simulation. It is dependent on the system sub-assembly.

Increments of servo system with
- Resolver (sub-assembly 009 - 012): 1024 Increments
- ERN 1387 (sub-assembly 012 - 014): 2048 Increments
- ERN 1188 (sub-assembly 015, 016): 512 Increments



Behaviour at External Fault

This parameter determines the response of the drive to an external fault.

Setting range:	0…6
Resolution:	1
Factory setting:	0
Remarks:	ENTER-Parameter
Customer setting:	_____

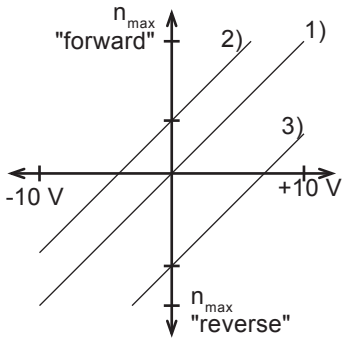
Value	Response of Drive
0	Error message: **E.EF** → Immediate disconnection of inverter! ***!*** To restart eliminate the fault and make a ***Reset !***
1	Status message: **A.EF** → Fast stop → Disconnection of inverter after attaining speed 0. ***!*** To restart eliminate the fault and make a ***Reset !***
2	Status message: **A.EF** → Fast stop → Holding torque at speed 0. ***!*** To restart eliminate the fault and make a ***Reset !***
3	Status message: **A.EF** → Immediate disconnection of inverter. ***!*** **Automatic** restart when fault condition no longer exists***!***
4	Status message: **A.EF** → Fast stop → Disconnection of inverter after attaining speed 0. ***!*** **Automatic** restart when fault condition no longer exists***!***
5	Status message: **A.EF** → Fast stop → Holding torque at speed 0. ***!*** **Automatic** restart when fault condition no longer exists ***!***
6	Status message: **none** → No effect on the drive. ***!*** Fault is ignored***!***

GB

CP.16

Offset REF 1

Permits the shifting of the setpoint-speed characteristic.
! Only at CP.7 > 0,00 s!



Adjustment of parameter CP.7 and CP.8 must be observed!

Setting range:	-100…+100 %
Resolution:	0,1 %
Factory setting:	0 %
Customer setting:	____ %

Examples:

Characteristic 1: CP.16 = **0%** (standard setting)
0V = 0 rpm
Rotation "forward": n_{max} is attained at +10V
Rotation "reverse": n_{max} is attained at -10 V

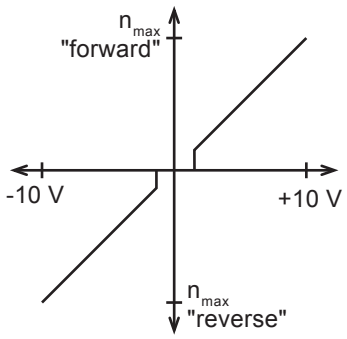
Characteristic 2: CP.16 = **+40%**
0V = 40 % of n_{max} "forward"
Rotation "forward": n_{max} is attained at 60% of +10V
Rotation "reverse": maximal 60% of n_{max} possible

Characteristic 3: CP.16 = **–70%**
0V = 70 % of n_{max} "reverse"
Rotation "forward": maximal 30% of n_{max} possible
Rotation "reverse": n_{max} is attained at 30% of -10V

CP.17

Zero Point Hysteresis REF 1

A zero point hysteresis of the analog reference input REF1 is adjusted with this parameter. Voltage fluctuations and ripple voltages around the zero point of the setpoint value do not cause any drifting of the motor.
! Only when CP.7 or CP.8 > 0,00 s !



Adjustment of parameter CP.7 and CP.8 must be observed!

Setting range:	0…10 %
Resolution:	0,1 %
Factory setting:	0 %
Customer setting:	____ %

0…10 % = 0…+/- 1 V

Example: If CP.17 is adjusted to 5 % then the drive starts only at a setpoint value of +/- 0,5 V.

Function Output A1

GB

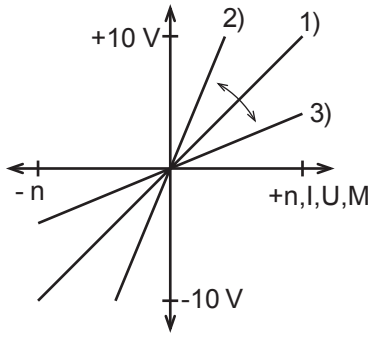
This parameter defines which variable is given out at analog output 1 (terminal X2.18).

Setting range:	0…6
Resolution:	1
Factory setting:	2
Remarks:	ENTER-Parameter
Customer setting:	_____

Value	Output variable	Value range at CP.19=1
0	actual speed	-6000…+6000 rpm ^= -10V…+10V
1	apparent motor speed	0…25 A ^= 0…+10V
2	actual torque	0…25 Nm ^= 0…+10V
3	intermediate circuit voltage	0…1000 V ^= 0…+10V
4	speed reference variable	-6000…+6000 rpm ^= -10V…+10V
5	system deviation (speed control)	-6000…+6000 rpm ^= -10V…+10V
6	setpoint torque	0…25 Nm ^= 0…+10V

Amplification Output A1

Parameter CP.19 defines the amplifcation of the analog output signal at output A1 (terminal X2.18).



Setting range:	-20…+20
Resolution:	0,01
Factory setting:	3 x M_{Rated} ^= +10 V
Customer setting:	_____

Characteristic 1: Amplification factor 1
Characteristic 2: Amplification factor 2
Characteristic 3: Amplification factor 0,5

Calculation Example:

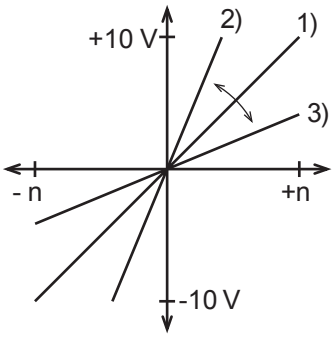
At 2000 rpm a measurement shall be taken at analog output A1 +10 V.

$$\textbf{CP.19} = \frac{\textbf{value at amplification 1 (s. CP.18)}}{\textbf{desired value at + 10 V}} = \frac{\textbf{6000 rpm}}{\textbf{2000 rpm}} = \textbf{3}$$

GB

Amplification Output A2

The analog output A2 (terminal X2.19) outputs the current speed of the servo systems.
Parameter CP.20 defines the amplification of the analog output signal.



Setting range:	-20…+20
Resolution:	0,01
Factory setting:	+/– n_{Rated} ^ +/–10 V
Customer setting:	_____

Characteristic 1: Amplification factor 1
Characteristic 2: Amplification factor 2
Characteristic 3: Amplification factor 0,5

Standardization at amplification 1 (CP.20=1):
0…+/– 10 V ^ -6000…+6000 rpm

Calculation Example:

Rated speed of the servo system: 3000 rpm
At 1000 rpm a measurement shall be taken at analog output A2 +10 V.

$$CP.20 = \frac{\text{value at amplification 1}}{\text{desired value at +10V}}$$

$$CP.20 = \frac{6000\ \text{rpm}}{1000\ \text{rpm}}$$

$$CP.20 = 6$$

Switching Condition Output D1

Defines the switching condition of digital output D1.

Setting range:	0…20
Resolution:	1
Factory setting:	20
Remarks:	ENTER–Parameter
Customer setting:	_____

! Refer to table Switching Conditions page GB 34 !

Switching Condition Output D2

GB

Defines the switching condition of digital output D2.

! Refer to table below !

Setting range:	0…34
Resolution:	1
Factory setting:	18
Remarks:	ENTER–Parameter
Customer setting:	_____

Switching Conditions

Digital output D1 and D2

Value	Switching condition
0	always active
1	always active
2	system switched on; no abnormal operating condition
3	ready for operation and modulation enabled
4	abnormal operating condition / Fault (CP.2 = A.xxx or E.xxx)
5	inverter blocking after fault (E.xxx)
6	prewarning level electr. protective motor relay (OH.2) exceeded
7	after triggering of motor PTC-contact
8	prewarning level OH.2 or dOH exceeded
9	current controller in limitation
10	speed controller in limitation
11	any controller in limitation
12	drive in acceleration phase
13	drive in deceleration phase
14	drive runs with constant speed
15	drive runs with constant speed except speed 0
16	clockwise rotation – not at noP, LS, abnormal stopping or fault
17	anti-clockwise rotation-not at noP,LS,abnormal stopping or fault

only Digital output D1

18	actual speed > 0,1 x rated speed
19	apparent current > rated current
20	torque > torque level CP.23

only Digital output D2

18	actual speed > speed level CP.24
19	apparent current > rated current
20	torque > rated torque
21	Angle deviation > angle level
22	Reference mode completed
23	Target position reached only available in the posi mode
24	actual position > position level
25	Break control

Torque Level Output D1

Defines the torque level of digital output D1.

Setting range:	0…50 Nm
Resolution:	0,1 Nm
Factory setting:	0,5 x M_{Rated}
Customer setting:	_____ Nm

Speed Level Output D2

Defines the speed level of digital output D2.

Setting range:	0…16000 rpm
Resolution:	0,5 rpm
Factory setting:	0,5 x n_{Rated}
Customer setting:	_____ rpm

9. Drive-Mode

The Drive Mode is a special operating mode of the KEB COMBIVERT. It allows an easy manual startup. To activate the Drive Mode enter the corresponding password in **CP.0**.
The passwords are listed on page GB 45!

9.1 Setting Possibilities

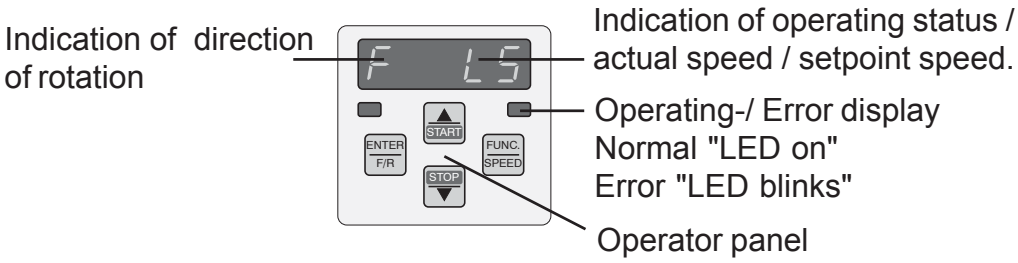
– Stop / Start / Run
– Setpoint value
– Direction of rotation

9.2 Condition

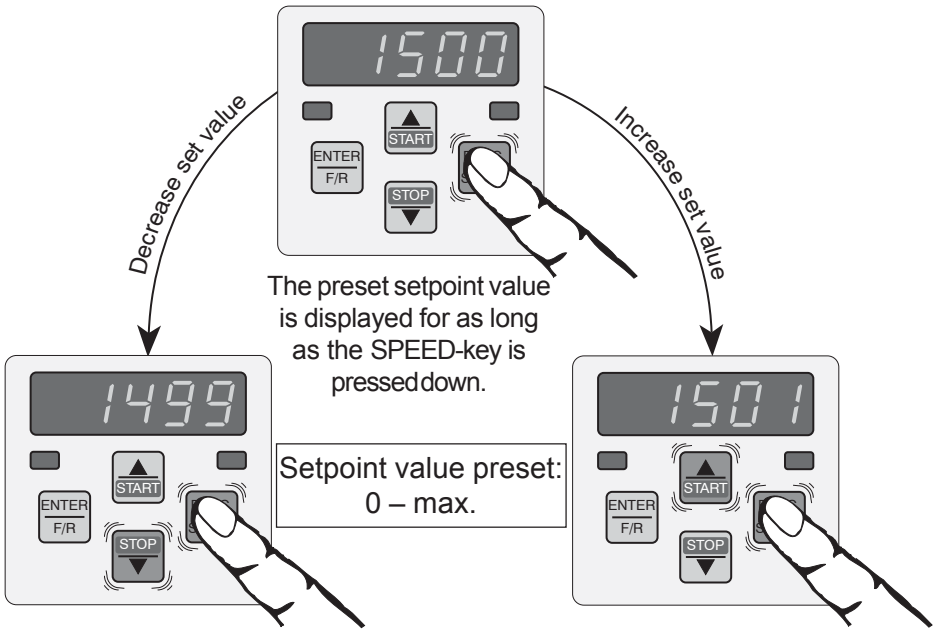
The control release must be activated (terminal stip X2).

> ⚠ Control release (terminal X2.3 / X2.4) and analog torque limitation (terminal X2.16 / X2.17) are without function in the Drive Mode.

9.3 Display and Keyboard



9.4 Setpoint Display / Setpoint Presetting



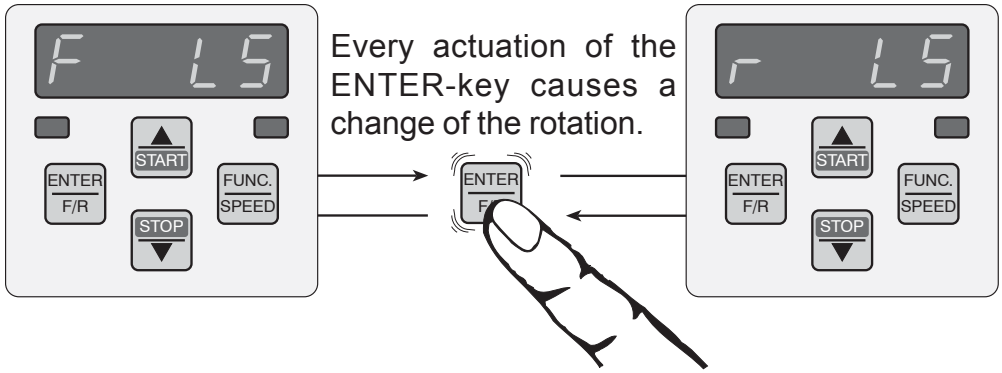
Hold the SPEED-key pressed down and decrease the indicated value with the STOP-key.

Hold the SPEED-key pressed down and increase the indicated value with the START-key.

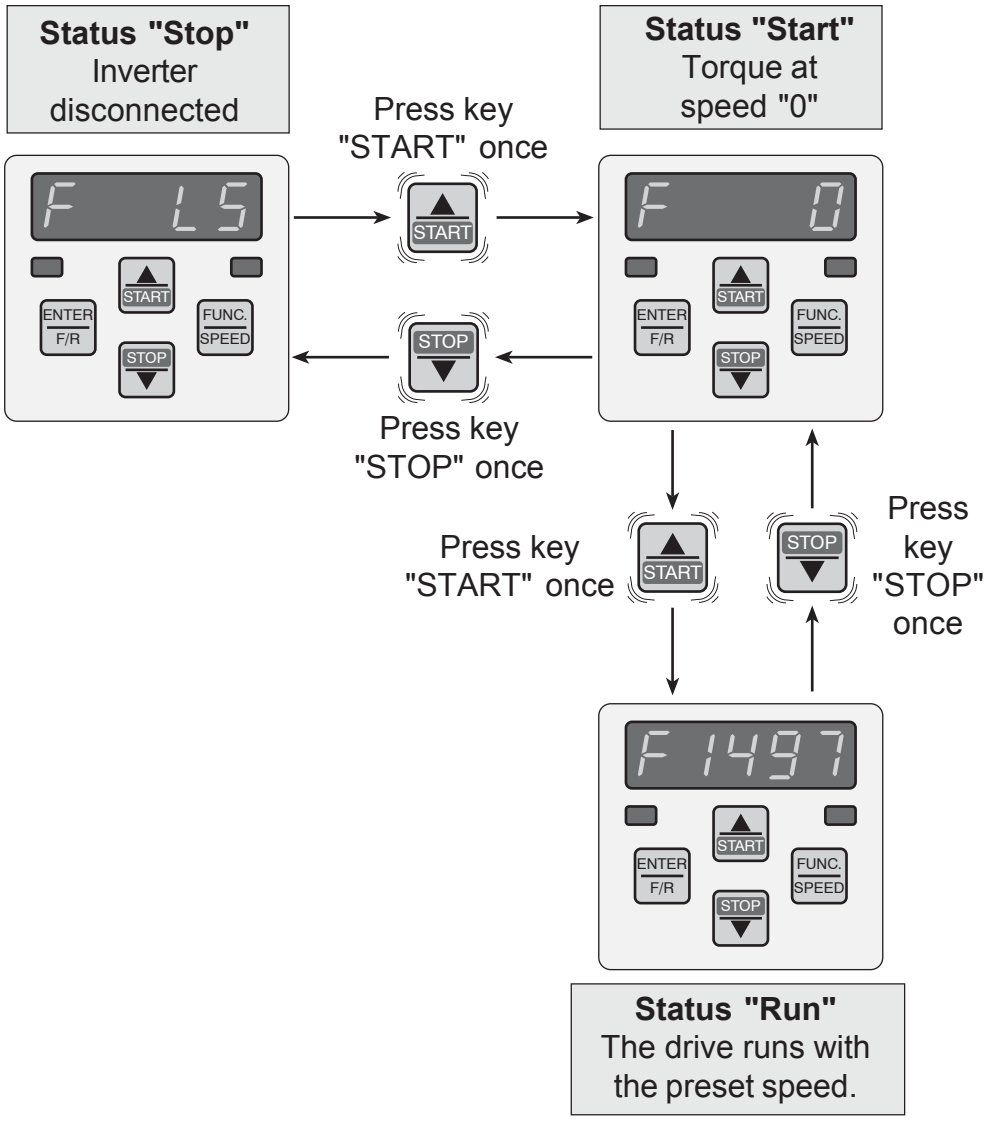
GB

9.5 Rotation Presetting

Presetting Possibilities: **F** = forward (clockwise rotation)
r = reverse (anti-clockwise rotation)



9.6 Start / Stop / RUN



To change from Drive Mode to CP Mode press the keys "FUNC" and "ENTER" simultaneously and hold them for min. 3 s!
! Only possible in the status "Stop" !

10. Accessories

10.1 External Braking Resistor

The braking resistor heats up during the braking operation. If the braking resistor is installed in the control cabinet sufficient cooling of the cabinet interior must be provided and a sufficient distance to the KEB COMBIVERT S4 must be kept.

Do not mount the external braking resistor below the servo controller !

GB

10.1.1 Part No.

x x . 5 6 . 0 8 0 - x x x 8

- 00 = 6 % ED 01 = 25 % ED 02 = 40 % ED — Voltage class
- 2 = 230 V 4 = 400V — Braking resistor
- Size

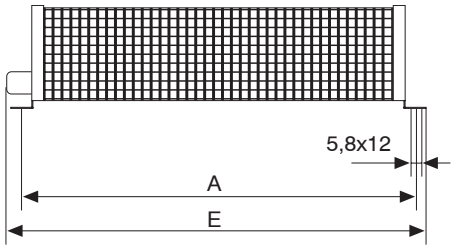
10.1.2 Technical Data

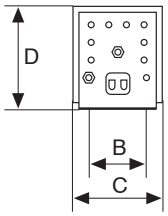
Size	Part number	P_R [2] [kW]	R_B [Ohm]	P_N Nominal power [1] [W] 6 %	25 %	40 %
03, 05, 07, 10	14.56.080-4008	7,0	82	800	2700	3700
	14.56.080-4018					
	14.56.080-4028					
12	15.56.080-4008	10,3	56	1200	3700	5500
	15.56.080-4018					
	15.56.080-4028					
16	16.56.080-4008	14,8/14,4	39	1700	5000	7500
	16.56.080-4018		39			
	16.56.080-4028		40			
18	18.56.080-4008	26,3	22	4000	9000	13500
	18.56.080-4018					
	18.56.080-4028					

[1] The resistor nominal power to be selected P_N dependent on the peak power and the cycle duration factor c.d.f [%].

[2] Peak power recorded for a short period P_R Dimensioning inverter: Motor = 1 : 1

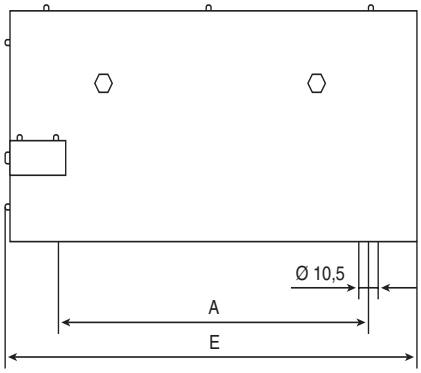
10.1.3 Dimensions

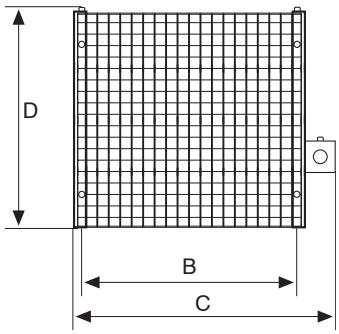




GB

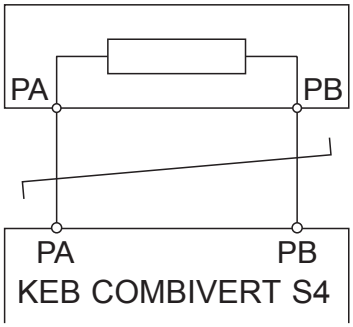
Part number	R_B [Ohm]	P_N [W]	A	B	C	D	E
14.56.080-4008	82	800	526	64	92	120	550
14.56.080-4018	82	2700	630	190	230	145	650
14.56.080-4028	82	3700	830	190	230	145	850
15.56.080-4008	56	1200	426	150	185	120	450
15.56.080-4018	56	3700	830	190	230	145	850
15.56.080-4028	56	5500	830	300	340	145	850
16.56.080-4008	39	1700	430	190	230	145	450





Part number	R_B [Ohm]	P_N [W]	A	B	C	D	E
16.58.080-4018	39	5000	380	370	430	260	490
16.56.080-4028	40	7500	380	570	630	260	490
18.56.080-4008	22	4000	380	370	430	260	490
18.56.080-4018	22	9000	380	570	630	260	490
18.56.080-4028	22	13500	380	770	830	260	490

10.1.4 Connection



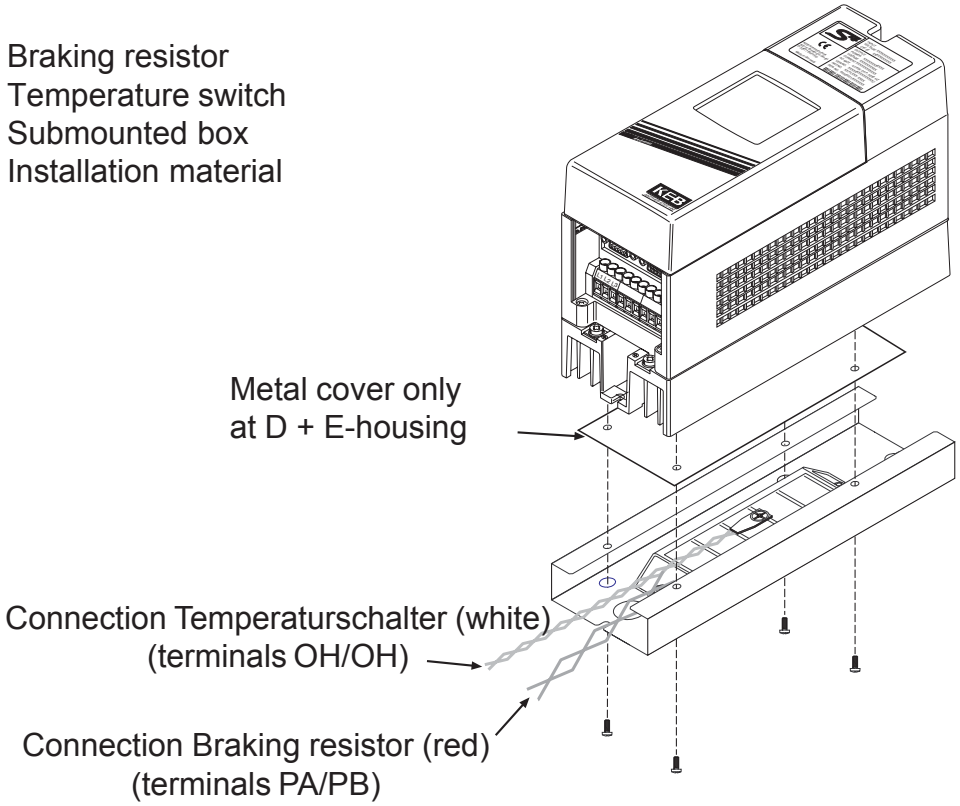
The external braking resistor is connected with the shortest possible line (twisted) to the terminals PA and PB.

GB

10.2 Submounted braking resistor

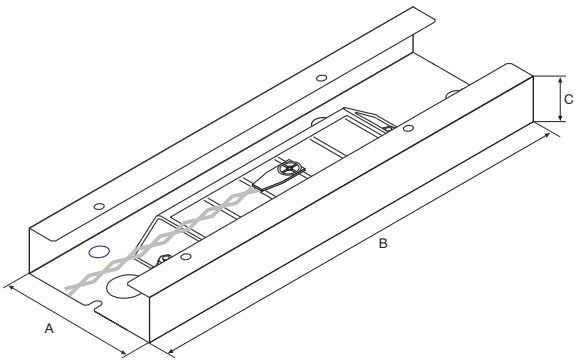
The submounting braking resistors are planned for a small volume installation directly under the frequency inverter. Mostly they are suitable for short braking cycles and clock system. The assemblies are made of:

- Braking resistor
- Temperature switch
- Submounted box
- Installation material



Size		03 / 05 / 07 / 10	12	16
Housing		D	E	G
Braking resistor	(Ω)	82	60	25
Permanent load	[W]	35	60	2 x 80
Non-recurring load (max. 3s)	[W]	7800	9600	23000
Permissible load at 5 % ED	[W]	700	1200	3200
Permissible load at 10 % ED	[W]	350	600	1600
Permissible load at 20 % ED	[W]	175	300	800
Permissible load at 40 % ED	[W]	90	150	400
Weight	[kg]	0,9	1,3	1,9
Partnumber of the kit		12.F4.D50-4200	14.F4.E50-4200	16.F4.G50-4200

10.2.1 Dimensions



Housing [mm]	D	E	G
A	90	130	170
B	250	290	340
C	30	30	25

10.3 Radio Interference Suppression Filter

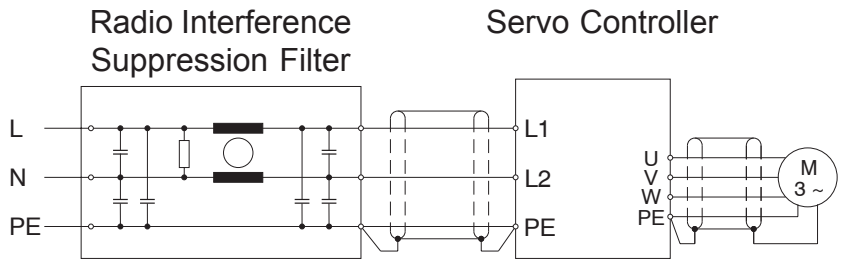
Optional the servo amplifier KEB COMBIVERT S4 is available with integrated radio interference suppression. Submounted filters are available for all unit sizes. The dimensions of the submounted filters are listed in Chapter „5 „Dimensions“.

10.3.1 Technical Data

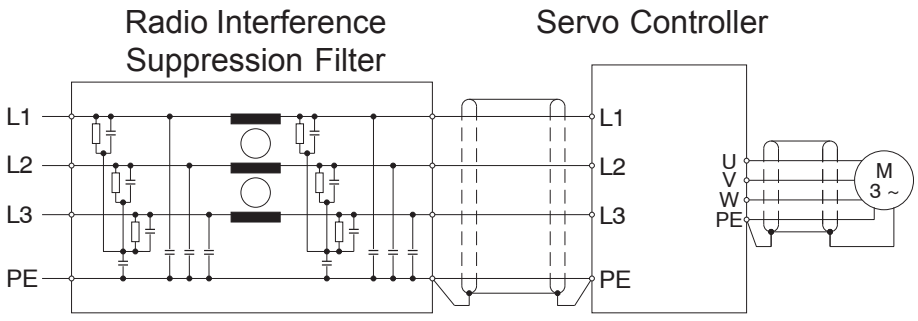
Servo controller	**Part No.:** Filter-kit	**[A]** Rated current	**[mA]** Leakage current	**[V]** Rated voltage
03 (D-Housing)	09.E4.T60-0001	20	12	230
05 (D-Housing)	09.E4.T60-0001	20	12	230
07 (D-Housing)	10.E4.T60-1001	8	15	400
10 (D-Housing)	10.E4.T60-1001	8	15	400
12 (E-Housing)	14.E4.T60-1001	20	50	400
16 (G-Housing)	16.E4.T60-1001	50	50	400
18 (H-Housing)	18.E4.T60-1001	70	30	400

10.3.2 Connection

Connection 1-phase



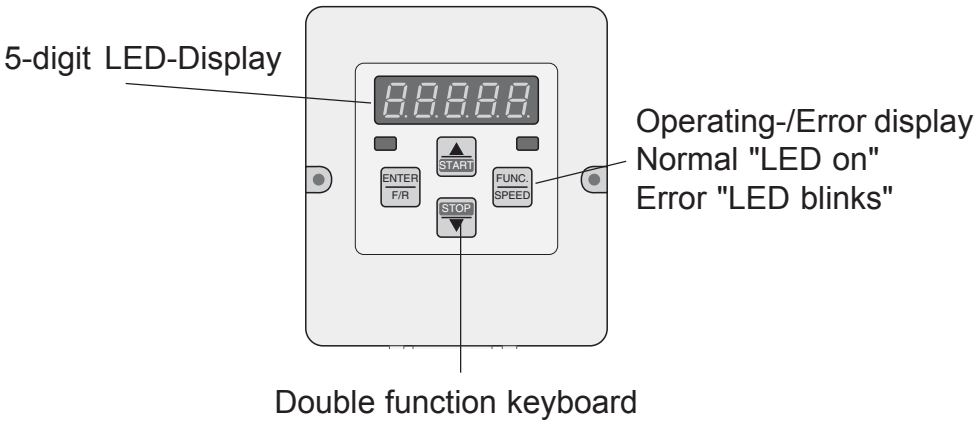
Connection 3-phase



10.4 Operator

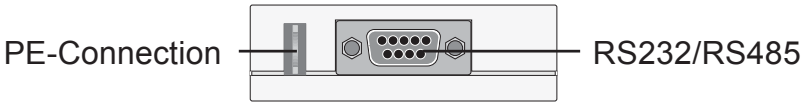
As an accessory to the local operation an operator is necessary. To prevent malfunctions, the Servo Controller must be brought into ***nOP*** status before connecting/disconnecting the operator (open control release terminal X2.1). When starting the Servo controller whitout an operator, it is started with the last stored values or factory setting. The operator is obtainable in different versions:

Digital-Operator
Part. No. 00.F4.010-2009

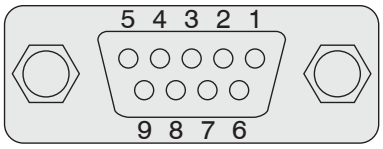


Interface-Operator
Part.-No. 00.F4.010-1009

In the Interface operator there is an additionally isolated RS232/RS485-Interface integrated. The RS232/485-parameterizing interface expands the KEB COMBIVERT S4 for communication with data communications equipment. Suitable wiring permits the physically isolated data transmission.



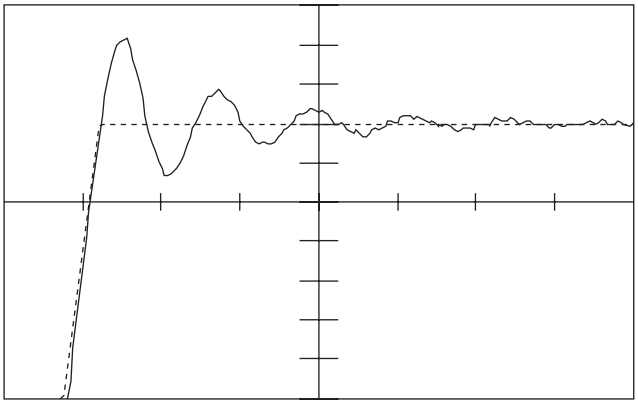
Servo controller
Parameterizing interface



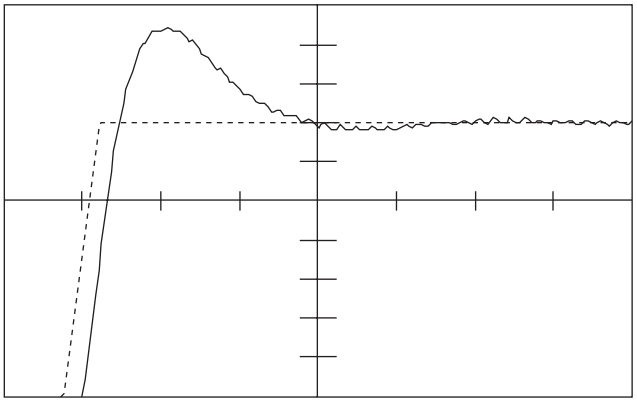
PIN No.	RS485 / Norm	Signal	Meaning
1	–	–	reserved
2	–	TxD	Transmit signal / RS232
3	–	RxD	Receive signal / RS232
4	A'	RxD-A	Receive signal A / RS485
5	B'	RxD-B	Receive signal B / RS485
6	–	VP	Supply voltage +5 V, I_{max} = 10 mA
7	C/C'	COM	Data reference potential
8	A	TxD-A	Transmit signal A / RS485
9	B	TxD-B	Transmit signal B / RS485

GB

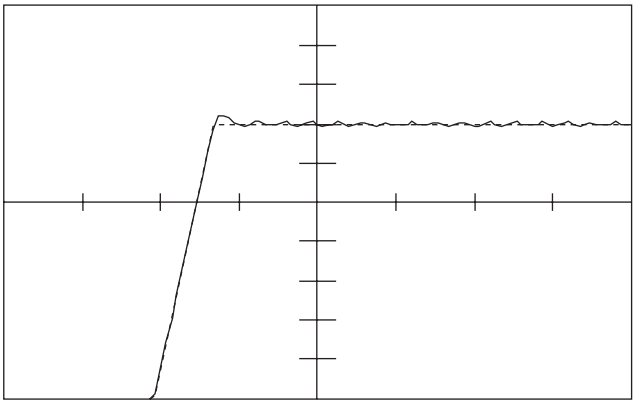
11. Adjustment Assistance Speed Controller



Problem: very long transient
Assistance: Increase P-component (CP.12); eventually reduce I-component (CP.13)

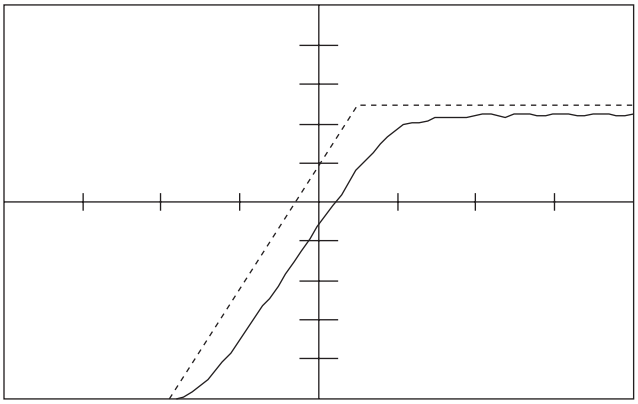


Problem: Speed overshoot too high
Assistance: Increase P-component (CP.12); eventually reduce I-component (CP.13)

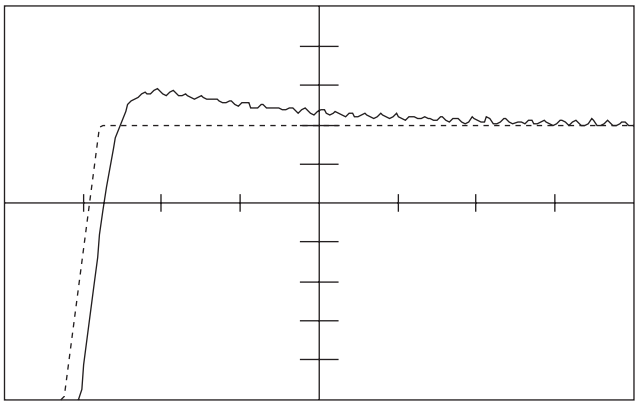


Problem: Maintained vibration

Assistance: Reduce P-component (CP.12)

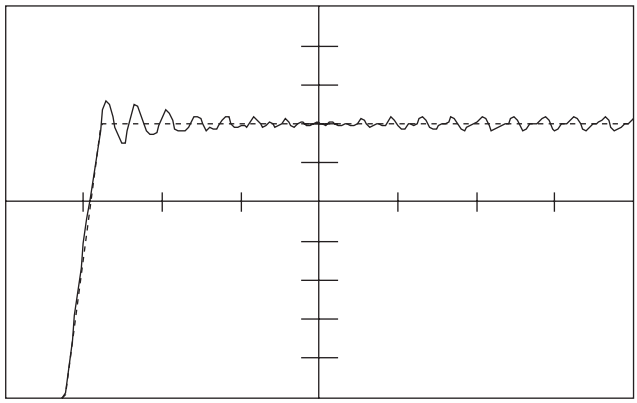


Problem: Transient too slow/ remaining control deviation
Assistance: Increase I-component (CP.13)



Problem: Overshoot too long

Assistance: Increase I-component (CP.13)



Problem: Maintained vibration with high amplitude
Assistance: Reduce I-component (CP.13)

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12. Error Diagnosis

Error messages are always represented by an „E“ and the corresponding error in the display of KEB COMBIVERT S4. In the following the displayed indications and their causes are described.

Undervoltage

Occurs when the DC-link voltage drops below the permissible value.
Causes:
- input voltage too low or instable
- inverter rating too low
- voltage losses through wrong wiring
- supply voltage from generator/transformer breaks down at very short ramps
- one phase of input voltage missing (ripple detection)

Overvoltage

Occurs when the DC-link voltage rises above the permissible value.
Causes:
- input voltage too high
- interference voltages at the input
- deceleration ramp too short
- braking resistor incorrectly connected
- braking module defective

Overcurrent

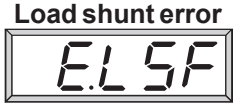
Occurs when the specified peak current is exceeded.
Causes:
- short circuit at the output
- ground fault
- motor cable too long
- EMC

Overload

Occurs when a too large load is applied longer than the permissible time allows (see Technical Data).
Causes:
- mechanical fault or overload in the application
- wrong dimensioned inverter
- wrong wired motor

Overheat

Occurs when the heat sink temperature rises above the permissible limit (see Technical Data).
Causes:
- insufficient cooling
- surrounding temperature too high
- ventilator clogged

ext. Overheat 	Occurs, when external temperature monitoring is triggered. Causes: - resistance at terminals OH/OH >1650 Ohm - motor overloaded - open circuit to temperature sensor
Load shunt error 	Load shunt not bridged, occurs for a short time during the switch on phase, but must be automatically reset immediately. If the error message remains, it may have following causes. - load shunt defect - input voltage wrong or too low - high losses in the supply line - wrong connected braking resistor - braking module defect
Set selection error 	**E**rror **SEt** occurs, when trying to select a locked parameter set.
Bus error 	**E**rror **buS**; for bus operation a monitoring time (Watchdog time ud.8) can be adjusted. The error is triggered when no telegrams are received within the the adjusted time.
External fault 	**E**rror **E**xternal **F**ault is triggered, when a digital input is being programmed as external error input (di. 3...di.10 = 6) and trips.
Power unit code 	**E**rror **P**ower **u**nit **C**ode invalid; during the initialization phase the power unit was not identified or detected as non-permissible.
Error brake 	Occurs when terminal F was not active at set direction clockwise or counter-clockwise (refer to di- and Pn-Parameter for terminal handling).
Error brake 	Occurs when terminal R was not active at set direction clockwise or counter-clockwise (refer to di- and Pn-Parameter for terminal handling).

GB

CPU-error 	Hardware error
Control card defect 	Hardware error
Software limit forward 	Occurs when a setpoint position outside the permissible range has been selected for the positioning (refer to Pc-Parameter).
Software limit reverse 	Occurs when a setpoint position outside the permissible range has been selected for the positioning (refer to Pc-Parameter).
Error incremental encoder 	Encoder not or wrong connected.
Overtemperature 2 	Occurs when the motor is overloaded and is triggered by the internal motor current monitoring. Function of an electrical motor protective relay. Help: – reduce the motor – reduce torque limit (Parameter CP.9)
Over speed 	**E**rror **O**ver **S**peed occurs when the actual speed is higher than the max.speed. Causes: – resolver not connected – wrong adjustment of the speed controller

13. Passwords

Customer "read only" Password	**100**
Customer "on" Password	**200**
Drive Password	**500**

Karl E. Brinkmann GmbH
Försterweg 36-38 • **D**-32683 Barntrup
fon: +49 5263 401-0 • fax: +49 5263 401-116
net: www.keb.de • mail: info@keb.de

KEB Antriebstechnik GmbH & Co. KG
Wildbacher Str. 5 • **D**–08289 Schneeberg
fon: +49 3772 67-0 • fax: +49 3772 67-281
mail: info@keb-combidrive.de

KEB Antriebstechnik Austria GmbH
Ritzstraße 8 • **A**-4614 Marchtrenk
fon: +43 7243 53586-0 • fax: +43 7243 53586-21
Kostelni 32/1226 • **CZ**-370 04 Ceské Budejovice
fon: +420 38 7319223 • fax: +420 38 7330697
mail: info@keb.at

KEB Antriebstechnik
Herenveld 2 • **B**-9500 Geraadsbergen
fon: +32 5443 7860 • fax: +32 5443 7898
mail: koen.detaeye@keb.de

KEB China
Xianxia Road 299 • **CHN**-200051 Shanghai
fon: +86 21 62350922 • fax: +86 21 62350015
net: www.keb-cn.com • 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
fon: +33 1 49620101 • fax: +33 1 45767495
mail: sfkeb.4@wanadoo.fr

KEB (UK) Ltd.
6 Chieftain Buisiness 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 33500782 • fax: +39 02 33500790
net: www.keb.it • mail: kebitalia@keb.it

KEB - YAMAKYU Ltd.
15–16, 2–Chome, Takanawa Minato-ku
J–Tokyo 108-0074
fon: +81 33 445-8515 • fax: +81 33 445-8215
mail: kebjt001@d4.dion.ne.jp

KEB Antriebstechnik
Leidsevaart 126 • **NL**–2013 HD Haarlem
fon: +31 23 5320049 • fax: +31 23 5322260
mobil: +31 653964667
mail: vb.nederland@keb.de

KEB Portugal
Lugar de Salgueiros – Pavilhao A, Mouquim
P-4760 V. N. de Famalicao
fon: +351 252 371318 • fax: +351 252 371320
mail: keb.portugal@netc.pt

KEB Taiwan Ltd.
No.8, Lane 89, Sec.3; Taichung Kang Rd.
R.O.C.-Taichung City / Taiwan
fon: +886 4 23506488 • fax: +886 4 23501403
mail: keb_taiwan@mail.apol.com.tw

KEB Sverige
Box 265, Bergavägen 19
S-430 93 Hälsö
fon: +46 31 961520 • fax: +46 31 961124
mail: thomas.crona@keb.de

KEBCO Inc.
1335 Mendota Heights Road
USA-Mendota Heights, MN 55120
fon: +1 651 4546162 • fax: +1 651 4546198
net: www.kebco.com • mail: info@kebco.com