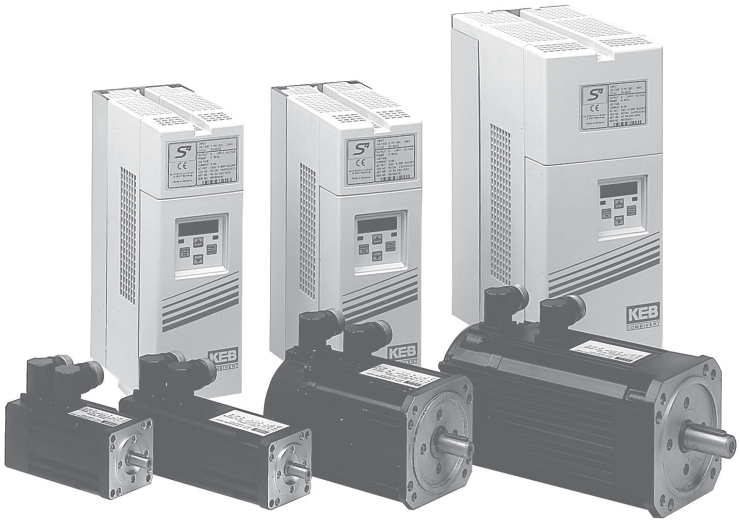
BEDIENUNGSANLEITUNG
INSTRUCTION MANUAL

MOTORADAPTION



KEB COMBIVERT S4 Größe D / E / G **Version 1.4**
KEB COMBIVERT S4 Size D / E / G Version 1.4

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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".

Technische Daten siehe auch Betriebsanleitung Teil 2
KEB COMBIVERT S4 Größe D/E

Before any application the user must familarize himself with the unit. Especially of importance is the knowledge and paying attention to the safety and warning remarks. Therefore it is mandatory for you to read "Technical Documentation part 1".

For technical data also refor to instruction manual part 2
KEB COMBIVERT S4 size D/E

Table of Contents

1. Adaption of motor to KEB COMBIVERT S4

The KEB COMBIVERT S4 is factory set to KEB- servo motor. If other motors are used, the adjustments described in this chapter have to be made. If these are not taken into consideration, the motor can be destroyed.

1.1 Requirements of the servo motor

Based on the table **technical data** in the application manual the KEB COMBIVERT S4 suitable for the motor can be selected. KEB dimensions the servo systems, that the standstill continuous current of the motor is smaller than the standstill continuous current of the KEB COMBIVERT S4. If dimensioned differently, the total torque of the motor might not be effective.

Applicable as an encoder system for the motor is a resolver or a SIN/COS - encoder.

1.2 Specifications of the resolver

Pol number	2
Exitation voltage	7 V at 10 kHz
Current input	10 mA - 30 mA
Transformation factor	0,5

Released by KEB are:
- Litton SSBH-15
- Siemens V23401-D1001-B1001

1.3 Specification of the SIN/COS-encoder

For high-resolution servo systems the following 2 encoder systems are released by KEB:
- Heidenhain ERN 1387 / ERN1188

1.4 Taking a servo system into operation

The servo system is wired and supplied with mains voltage as described in the application manual **Installation and Connection.** The control terminal strip remains unused.

1.5 Checking of the speed feeback

The speed display in ru.1 has to be positiv during manual right turn of the motor. If the signs are not correct the signals SIN and SIN_LO for units with resolver have to be changed. The signals A(+) and A(-) have to be changed for units with SIN/COS encoder.

1.6 Checking of the absolute position

This test is only necessary for units with SIN/COS- encoder.
By writing 2206 in EC.7 the position adpation is started. The motor is now turned manually. If turning the motor to the right the value shown in EC.7 must become smaller. If this is not the case the signals C(+) and C(-) at the encoder must be switched.

1.7 Entry of the motor data

dr. 0	motor rated power
dr. 1	motor rated speed
dr. 2	motor rated current
dr. 3	motor rated frequency
dr. 7	stillstand continuous current
dr. 9	motor rated moment
dr. 17	EMF - voltage constant
dr. 41	winding resistance R_{UV}
dr. 42	winding inductivity L_{UV}

The parameters of the drive parameter group mark the technical data of the motor. Only with the **complete motor data** the servo can be taken into operation. The supervisor password is required to change these parameters.

Motor rated power (dr.0)

The motor rated power only serves as an information and the value is not required for calculation.

Motor rated current (dr.2)
Standstill continuous current (dr.7)
Motor rated moment (dr.9)

By entering the rated current the standstill continuous current is replaced with the 1.1 times the rated current. The standstill continuous current is also used to calculate the OH2 function of the motor. **The rated moment and the rated current influence all torque data of the KEB COMBIVERT type S4.**
$M = I \bullet M_N / I_N$
With entering the rated moment all moment limit values are changed to 1.5 times the value.

Motor rated speed (dr.1)
Motor rated frequency (dr.3)

The pole pair number of the motor is calculated with the rated speed and the rated frequency. $p = f_N / n_N$

EMF-voltage constant (dr.17)

With the EMF - voltage constant the pre-control of the current control is parameterized. The peak value of the phase voltage per 1000 min^{-1} has to be set.

Winding resistance (dr.41)
Winding inductivity (dr.42)

With the entry of the winding inductivity L_{uv} and the winding resistance R_{uv} the setting of the current controller is calculated. (ds.0, ds.1) These values can be taken out the data sheet of the servo motor or can be meassured between terminal U and V at the motor.

Based on the motor data the **dr-parameter** must be set **completely**.

1.8 Adjustment of the speed detection

The time for the speed detection can be set with EC.8. For high-resolution systems 1 ms and for resolver systems 4 ms have been approved. With this setting the speed resolution is set at the same time.

EC.8	ERN1387	Resolver
0.5 ms	1.8 min^{-1}	29.3 min^{-1}
1 ms	**0.9 min^{-1}**	14.6 min^{-1}
2 ms	0.5 min^{-1}	7.3 min^{-1}
4 ms	0.2 min^{-1}	**3.7 min^{-1}**
8 ms	0.1 min^{-1}	1.8 min^{-1}

1.9 Detection of the system position of the encoder system

- Starting of the position adjustment EC.7 = 2206
- close control release

Now the motor is exited with it's own rated current and aligned to the zero position. If the value in EC.7 does not change after approximately 5s the adjustment is finalized. If this is the case the release control can be opened and the unit can be turned off. If during the adjustment E.EnC is triggered, the terminals U and V of the motor connection must the switched. Afterwards the position adjustment has to be made again.

1.10 Parameterization of the current controller

With the motor data R_{UV} and L_{UV} both current controllers are set optimally. Should this setting be optimized or checked the following action is suggested. For evaluation an oszilloscope with current probe is required. The current probe is connected to the motor wire U. With the following download the speed control is turned off and the reaction of the current controller can be reviewed separately.

ud01 bus password input	=	440	pre-set password
CS0 KP speed	=	0	speed control off
CS1 KI speed	=	0	
CS3 KP speed gain	=	1000	speed jump setting
CS4 KP speed limit	=	10000	
ud1 bus password input	=	2206	pre-set password
AA36 dsp test address 1	=	388ah	speed detection off
AA37 dsp test date 1	=	0	
AA36 dsp test address 1	=	388bh	
AA37 dsp test date 1	=	0	
AA36 dsp test address 1	=	388ch	
AA37 dsp test date 1	=	0	
AA36 dsp test address 1	=	14477	
AA37 dsp test date 1	=	0	
AA36 dsp test address 1	=	38cbh	Vector setting to phase U
AA37 dsp test date 1	=	c000h	
AA36 dsp test address 1	=	3823h	

Setting of moment limit CS.6 to rated moment of the motor and enter set value of speed. With each turning on of the release control the current controller jumps to rated current which is documented with an oszilloscope. First ds.0 and than ds.1 is increased until a transient condition without overshoot occurs. This adjustment modus is interrupted with Fr.01 = -2.

1.11 Parametrization of the speed control

When the drive is installed in the respective application only than the speed control can be adjusted exactly. First the P-part is increased until the drive starts swinging and than reduced by 30 %. The I-part is adjusted the same way.

1.12 KEB Basic settings

With the system download the following adjustments are made that the drive acts conform to the instruction manual. These setting can be made with the function fr.0, fr.1 = -2 always set again. In the following please find a system download for a motor 01.SM.000-3200. Downloads for other motors can be made according to this example without problems.

ud1 bus password input	=	2206	supervisor password
Fr9 bus parameter set	=	0 : set 0	
Fr1 copy bus para set	=	- 2 : initialize all sets	unit back to original setting
ud1 bus password input	=	2206	
EC8 Drehzahlabtastzeit	=	3 : 4 ms	speed detection
EC7 Systemlage	=	19017	system pos. according to motor
dr0 rated motor power	=	0.53 KW	motor rated power
dr1 rated motor speed	=	3000 rpm	motor rated speed
dr2 rated motor current	=	1.2 A	motor rated current
dr3 rated motor freq	=	150 Hz	motor rated frequency
dr7 m.curr.for zero speed	=	1.4 A	standstill continuous current
dr9 rated torque	=	0.8 Nm	rated moment
dr17 emf voltage constant	=	37 Vpk min / 1000	EMF voltage constant
dr41 motor resistance R_{UV}	=	21.6 ohm	winding resistance
dr42 motor inductance L_{UV}	=	25.4 mH	winding inductivity
CS0 KP speed	=	200	speed controller basic setting
CS1 KI speed	=	200	
CS3 KP speed gain	=	20	
CS4 KP speed limit	=	940	
CS6 torque limit forward	=	2.4 Nm	3 * M_N
CS7 torque limit reverse	=	off	
CS14 standstill po. ctrl.	=	0	
SP5 max speed reference	=	3000 rpm	max. set value setting = n_N
SP8 abs. max. speed	=	3500 rpm	= n_N + 500
SP10 delta speed acc/dec	=	3000 rpm	=n_N
SP11 acceleration time	=	0.01 s	KEB basic setting
SP12 deceleration time	=	0.01 s	
LE4 speed level 1	=	300.0 rpm	n_N / 10
LE5 speed level 2	=	1500.0 rpm	n_N / 2
LE6 speed level 3	=	3000.0 rpm	n_N
LE7 speed level 4	=	3500.0 rpm	n_N + 500
LE12 appar. curr. level 1	=	1.2 A	I_N
LE13 appar. curr. level 2	=	0.6 A	I_N / 2
LE14 appar. curr. level 3	=	2.4 A	I_N * 2
LE15 appar. curr. level 4	=	3.6 A	I_N * 3
LE20 torque level 1	=	0.4 Nm	M_N / 2
LE21 torque level 2	=	1.2 Nm	M_N
LE22 torque level 3	=	1.6 Nm	M_N * 2
LE23 torque level 4	=	2.4 Nm	M_N * 3

In40 last error	=	nOP	reset error counter
In41 error counter OC	=	0	
In42 error counter OL	=	0	
In43 error counter OP	=	0	
In44 error counter OH	=	0	
In45 error counter watchd	=	0	
An19 analog out2 gain	=	2.00	6000 min^{-1} / n_N
An15 analog out1 gain	=	10.42	25 Nm / 3 M_N
Fr9 bus parameter set	=	1 : set 1	
Fr1 copy bus para set	=	0 : copy set 0 (stand.)	
Fr9 bus parameter set	=	2 : set 2	
Fr1 copy bus para set	=	0 : copy set 0 (stand.)	
Fr9 bus parameter set	=	3 : set 3	
Fr1 copy bus para set	=	0 : copy set 0 (stand.)	
Fr9 bus parameter set	=	4 : set 4	
Fr1 copy bus para set	=	0 : copy set 0 (stand.)	
Fr9 bus parameter set	=	5 : set 5	
Fr1 copy bus para set	=	0 : copy set 0 (stand.)	
Fr9 bus parameter set	=	6 : set 6	
Fr1 copy bus para set	=	0 : copy set 0 (stand.)	
Fr9 bus parameter set	=	7 : set 7	
Fr1 copy bus para set	=	0 : copy set 0 (stand.)	
Fr9 bus parameter set	=	0 : set 0	
ud0 key password input	=	200	
ud1 bus password input	=	200	

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