

INSTRUCTION MANUAL



KEB COMBIVERT S4

Size D / E

This manual

- is valid for the frequency inverter **KEBCO COMBIVERT S4 Servo Amplifier**
- Part number xx.S4.DxE-xxxx or xx.S4.ExE-xxx
- must be made available to all users

Before working with this unit you must familiarize yourself with it.



***Pay special attention to the safety and warning guides.
Make sure to read the entire instruction manual before
starting the unit!***



The KEBCO COMBIVERT S4 has very extensive programming capabilities. 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 these basic parameters are not sufficient for your application an **application and reference manual** are available for in depth programming. Consult KEBCO for more information.

The icons used in this manual are defined as follows:



**Danger
Warning
Caution**

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



Attention

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



Information

Helpful hint. Programming tip.

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1. Introduction

1.1 KEB COMBIVERT S4 The servo system KEB COMBIVERT S4 consists of the components:

- digital servo controller **KEB COMBIVERT S4** (230V- or 400V class)
- synchronous servo motor **KEB COMBIVERT SM**

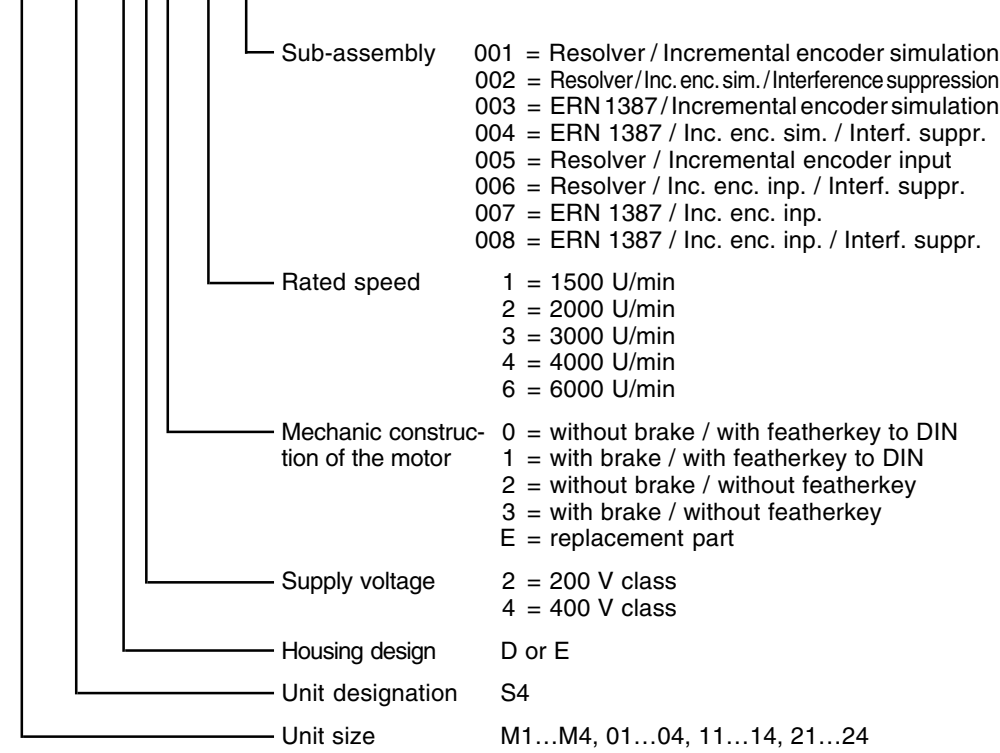


The synchronous servo motor is also available with brake.
Refer to "**Accessories Braking Motor** " (page E 41)

1.2 Part Code

Servo System

03.S4.D20-3001



Regarding prefabricated motor, resolver and encoder cables refer to "**Accessories Cable** " (page E 23).

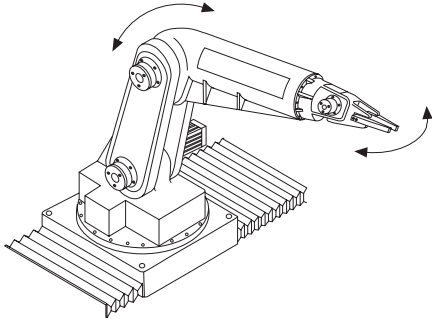
1.3 Application

The digital servo controller KEB COMBIVERT S4 serves exclusively for the control and regulation of the supplied synchronous servo motor KEB COMBIVERT SM.

The servo system KEB COMBIVERT S4 is a highly dynamic control drive it is connected and ready for operation within a short time.

2.1 Moving or Rotating Parts

- Motor shaft
- Feed axis and parts connected to it

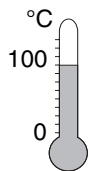


Prior to any work on the machine (e.g. exchange of tools), disconnect the machine and secure against unintended restart!



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.
- 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 separation 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 separation.

2. Operating Specifications

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.

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 beginning 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 mm² 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).

3.1 Ambient Conditions



Altitude of site max. 3000 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}

Max. permissible limit values:	Servon Controller KEB COMBIVERT S4	Servo Motor KEB COMBIVERT SM
Coolant inlet temper.- / Ambient temperature during operation	-10 °C...+45 °C	-5 °C...+40 °C
Storage temperature	-25 °C...+70°C	-25 °C...+70°C
Transport temperature	-25 °C...+70°C	-25 °C...+70°C
Relative humidity	max. 95 % no condensation (identification "F" DIN 40040)	

3.2 Type of Protection

Servo controller KEB COMBIVERT S4: IP 20
Servo motor KEB COMBIVERT SM: IP 65
Shaft gland of servo motor: IP 64



The type of protections are warranted only with correct installation and connection of the components.

3.3 Installation Instructions

- Stationary installation and earthing of the servo controller KEB COMBIVERT S4.
- At the installation of the servo controller observe minimum distance to adjoining 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 emission 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.

3. Control Cabinet Installation

3.4 Calculations

Calculation of control cabinet surface: $A = \frac{P_v}{\Delta T \cdot K} \quad [\text{m}^2]$

Rate of air flow with fan cooling: $V = \frac{3,1 \cdot P_v}{\Delta T} \quad [\text{m}^3/\text{h}]$

A = Control cabinet surface $[\text{m}^2]$

ΔT = Temperature difference $[\text{K}]$ (Standardwert = 20 K)

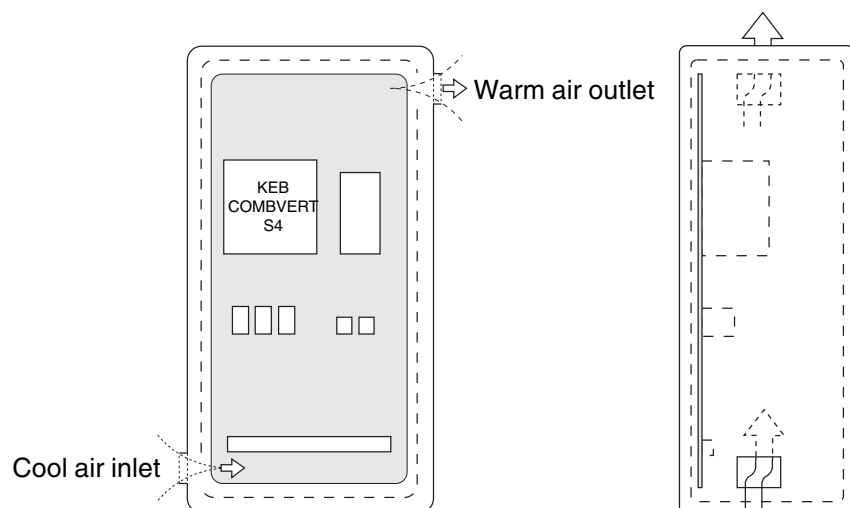
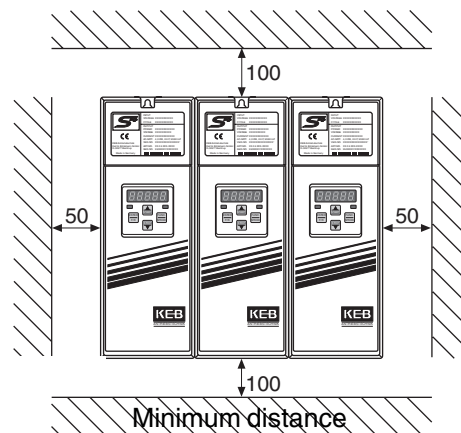
K = Heat transfer coefficient $\left[\frac{\text{W}}{\text{m}^2 \cdot \text{K}} \right]$ (Standardwert = $5 \frac{\text{W}}{\text{m}^2 \cdot \text{K}}$)

P_v = Heat dissipation $[\text{W}]$

V = Air flow rate of fan $[\text{m}^3/\text{h}]$

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

3.5 Installation Conditions



4.1 Technical Data 230 V Class

Servo Motor											
Motor size	M1	M2	01			M3	M4	02			03
Rated speed	6000	6000	3000	4000	6000	6000	6000	3000	4000	6000	3000
Nominal power	0,2	0,3	0,25	0,31	0,38	0,38	0,5	0,47	0,59	0,75	0,72
Basic torque M_N	0,32	0,48	0,8	0,75	0,6	0,6	0,8	1,5	1,4	1,2	2,3
Stall torque M_{90}	0,34	0,5	0,95			0,65	1,0	1,8			2,8
Pulse torque			max. 5 x $M_{Nominal}$			max. 5 x $M_{Nominal}$					
Rotor moment of inertia	0,17	0,24	1,1			0,31	0,45	3,2			5,3
Perm. radial force F_R (at $x=l_1/2$)	210	210	400	350	320	210	210	400	350	320	400
Perm. axial force F_A	140	140	310	260	220	140	140	310	260	220	310
FG	1	2	3			3	4	9			14
dk_6 / l_1	9/20	9/20	14/30			9/20	9/20	14/30			14/30
kx	5,3	5,9	4,9			6,6	7,8	5,7			6,8
Weight	1,0	1,2	3,1			1,4	1,8	3,9			4,2

Servo Controller										
Size	03					05				
Controller housing	D					D				
Mains voltage ¹⁾	180...264 ± 0%					180...264 ± 0%				
Line frequency	50 / 60 ± 2Hz					50 / 60 ± 2Hz				
Line phases	1 / 3					1 / 3				
Rated input current (1/3 -phase)	[A]	2,6 / 1,4	3,4 / 1,9	2,2 / 1,3	2,3 / 1,4	3,0 / 1,7	4,6 / 5,1	6,8 / 3,7	4,0 / 2,2	4,0 / 2,2
Rated output current	[A]	1,3	1,7	1,15	1,2	1,5	2,3	3,4	2,0	2,2
Stall current	[A]	1,2	1,5	1,35	1,5	2,4	2,0	3,2	2,4	2,6
Nominal power	[KW]	0,2	0,3	0,25	0,31	0,38	0,38	0,5	0,47	0,59
Max. perm. Mains fuse	[A]	16 (1-phase) / 10 (3-phase)					16 (1-phase) / 10 (3-phase)			
Line cross section ²⁾	[mm ²]	1,5					1,5			

¹⁾ in relation to 230V nominal input voltage

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

4. Technical Data

4.2 Technical Data 400 V Class

Servo Motor														
Motor size	03		04		11			12		13	14	21		22
Rated speed	4000	6000	3000	4000	3000	4000	6000	3000	4000	3000	3000	2000	3000	2000
Nominal power	0,92	1,1	1,3	1,6	1,0	1,2	1,3	1,4	1,7	1,7	2,1	1,5	2,0	2,3
Basic torque M _N	2,2	1,8	4,1	3,9	3,2	3,0	2,1	4,5	4,1	5,6	6,6	7,0	6,5	11,0
Stall torque M ₀₀	2,8		4,8		3,4			5,6		7,5	9,6	8,4		12,0
Pulse torque	max. 5 x M _{Nominal}													
Rotor moment of inertia	5,3	7,4		5,6			8,6		11,7	14,8	12,5		21,0	
Perm. radial force Fr (at x=l ₁ /2)	350	320	370	330	640	550	490	640	550	640	640	1100	1000	1100
Perm. axial force FA	260	220	280	240	500	420	350	500	420	500	500	900	770	900
FG	14		20		10			17		23	30	17		30
dk6 / l ₁	14/30		14/30		19/40			19/40		19/40	19/40	24/50		24/50
kx	6,8		8,0		4,1			4,8		5,0	6,3	4,2		4,8
Weight	4,2		5,3		6,5			8,3		10,1	11,8	10,2		12,3

Servo Controller														
Size	10													
Controller housing	D													
Mains voltage ¹⁾	305...500 ± 0%													
Line frequency	50 / 60 ± 2Hz													
Line phases	3													
Rated input current	2,5	3,2	3,6	4,5	2,7	3,3	3,4	3,5	4,1	4,2	4,9	3,4	5,0	4,8
Rated output current	2,2	2,9	3,2	4,1	2,4	3,0	3,1	3,1	3,7	3,8	4,4	3,1	4,5	4,4
Stall current	2,8	4,5	3,7	5,0	2,6	3,4	5,0	3,9	5,1	5,1	6,4	3,7	5,8	4,8
Nominal power	0,92	1,1	1,3	1,6	1,0	1,2	1,3	1,4	1,7	1,7	2,1	1,5	2,0	2,3
Max. perm. Mains fuse	10													
Line cross section ²⁾	1,5													

¹⁾ in relation to 230V nominal input voltage

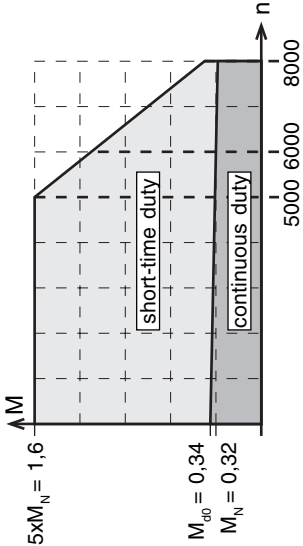
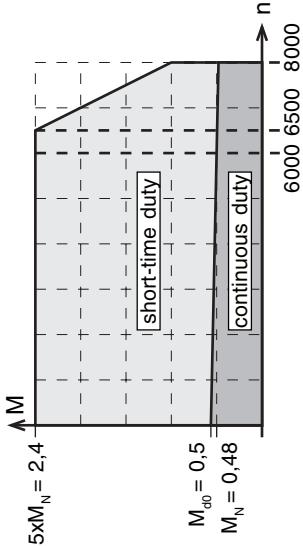
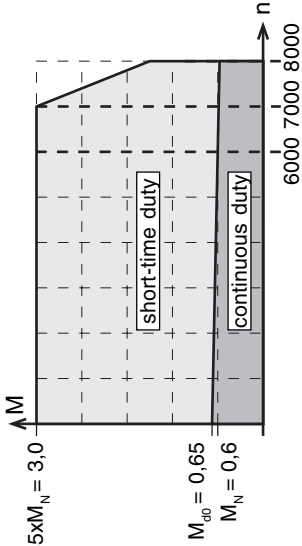
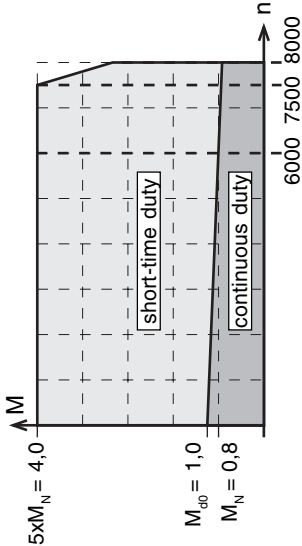
²⁾ Recommended min. cross section of mains supply at rated power and cable length up to 30 m.

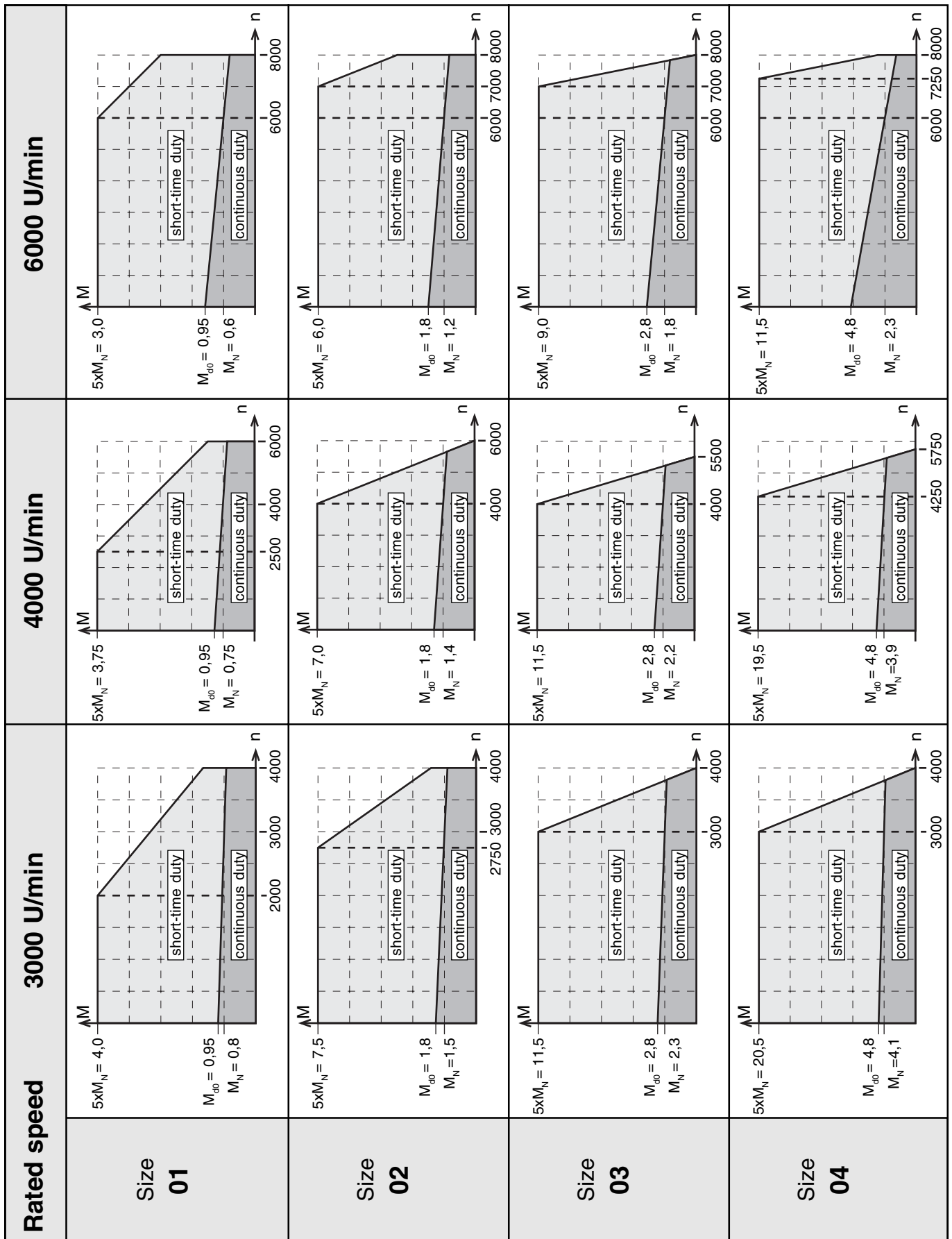
Servo Motor													
Motor size	04	12	13		14	21	22		23			24	
Rated speed [min ⁻¹]	6000	6000	4000	6000	4000	4000	3000	4000	2000	3000	4000	2000	3000
Nominal power [kW]	1,4	2,0	2,1	2,6	2,4	2,2	3,1	3,2	2,7	3,5	3,5	3,5	4,1
Basic torque M _N [Nm]	2,3	3,2	5,1	4,1	5,7	5,2	10,0	7,6	13,0	11,2	8,4	17,0	13,0
Stall torque M _{do} [Nm]	4,8	5,6	7,5		9,6	8,4	12,0		15,5			20,5	
Pulse torque [Nm]	max. 5 x M _{Nominal}												
Rotor moment of inertia [kg•cm ²]	7,4	8,6	11,7		14,8	12,5	21,0		28,0			41,0	
Perm. radial force FR (at x=l ₁ /2) [N]	260	490	550	490	550	850	1000	850	1100	1000	850	1100	1000
Perm. axial force FA [N]	200	350	420	350	420	650	770	650	900	770	650	900	770
F _G [N]	20	17	23		30	17	30		40			60	
dk ₆ / l ₁	14/30	19/40	19/40		19/40	24/50	24/50		24/50			24/50	
k _x	8,0	4,8	5,6		6,3	4,2	4,8		5,4			6,3	
Weight [kg]	5,3	8,3	10,1		11,8	10,2	12,3		15,5			20,4	

Servo Controller													
Size	12												
Controller housing	E												
Mains voltage ¹⁾ [V]	305...500 ± 0%												
Line frequency [Hz]	50 / 60 ± 2Hz												
Line phases	3												
Rated input current [A]	3,6	5,2	5,4	6,1	5,8	5,3	7,0	7,2	7,7	8,0	7,7	8,3	9,1
Rated output current [A]	3,3	4,7	4,9	5,5	5,3	4,8	6,4	6,5	6,1	7,3	7,0	7,5	8,3
Stall current [A]	6,7	8,2	7,2	10,1	8,9	7,7	7,7	10,3	7,3	10,1	12,9	9,0	13,1
Nominal power [KW]	1,4	2,0	2,1	2,6	2,4	2,2	3,1	3,2	2,7	3,5	3,5	3,5	4,1
Max. perm. Mains fuse [A]	20												
Line cross section ²⁾ [mm ²]	2,5												

¹⁾ in relation to 230V nominal input voltage

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

Rated speed: 6000 U/min	
Size M1	
Size M2	
Size M3	
Size M4	



4. Technical Data

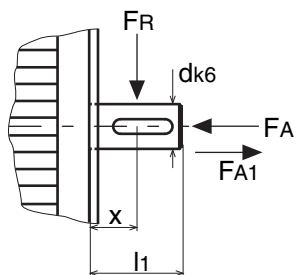
Rated speed		3000 U/min	4000 U/min	6000 U/min
Size 11				
Size 12				
Size 13				
Size 14				

Rated speed		2000 U/min	3000 U/min	4000 U/min
Size 21				

4. Technical Data

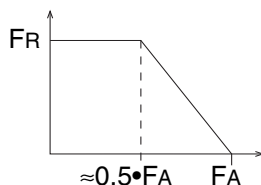
4.4 Technical Data 230 V / 400 V Class

For horizontal positioning:
 $FA1[N] = FA - (10 \cdot dk6)$

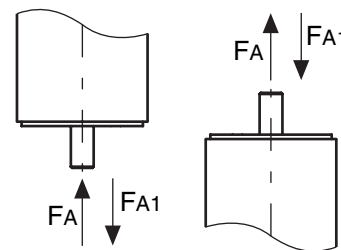


If the radial force takes no effect
 at $x = l1/2$, it applies:

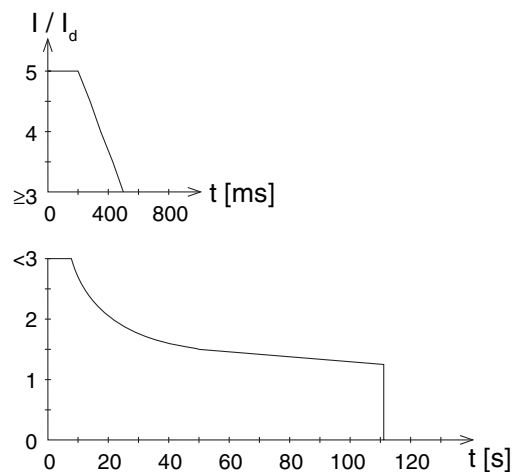
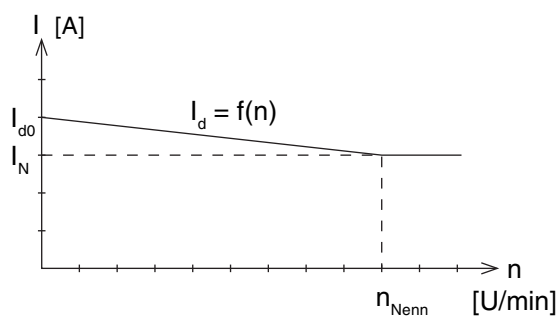
$$FR = FR(\text{at } x=l1/2) \cdot \frac{kx + 0,5}{kx + (x/l1)}$$



For vertical positioning:
 $FA1 = FA - FG$



Load capability of servo motor



PTC-connection (200 V / 400 V Class)

max. cold resistance of PTC-detector chain $[\Omega]$

Error tripping range $[\Omega]$

Error reset range $[\Omega]$

1...3 PTC-detector (series connection)

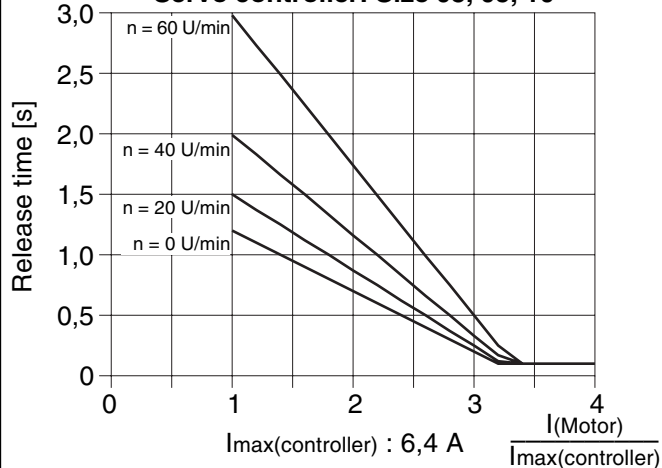
400

≥ 1650

≤ 500

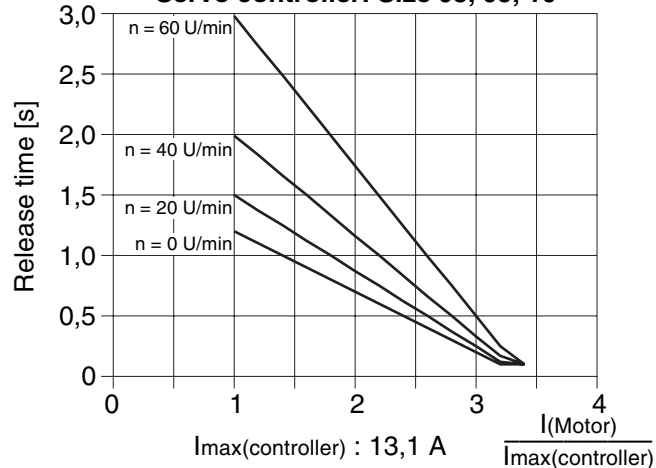
OL - Function

Servo controller: Size 03, 05, 10



OL - Funktion

Servo controller: Size 03, 05, 10



5.1 Dimensions Servo Controller

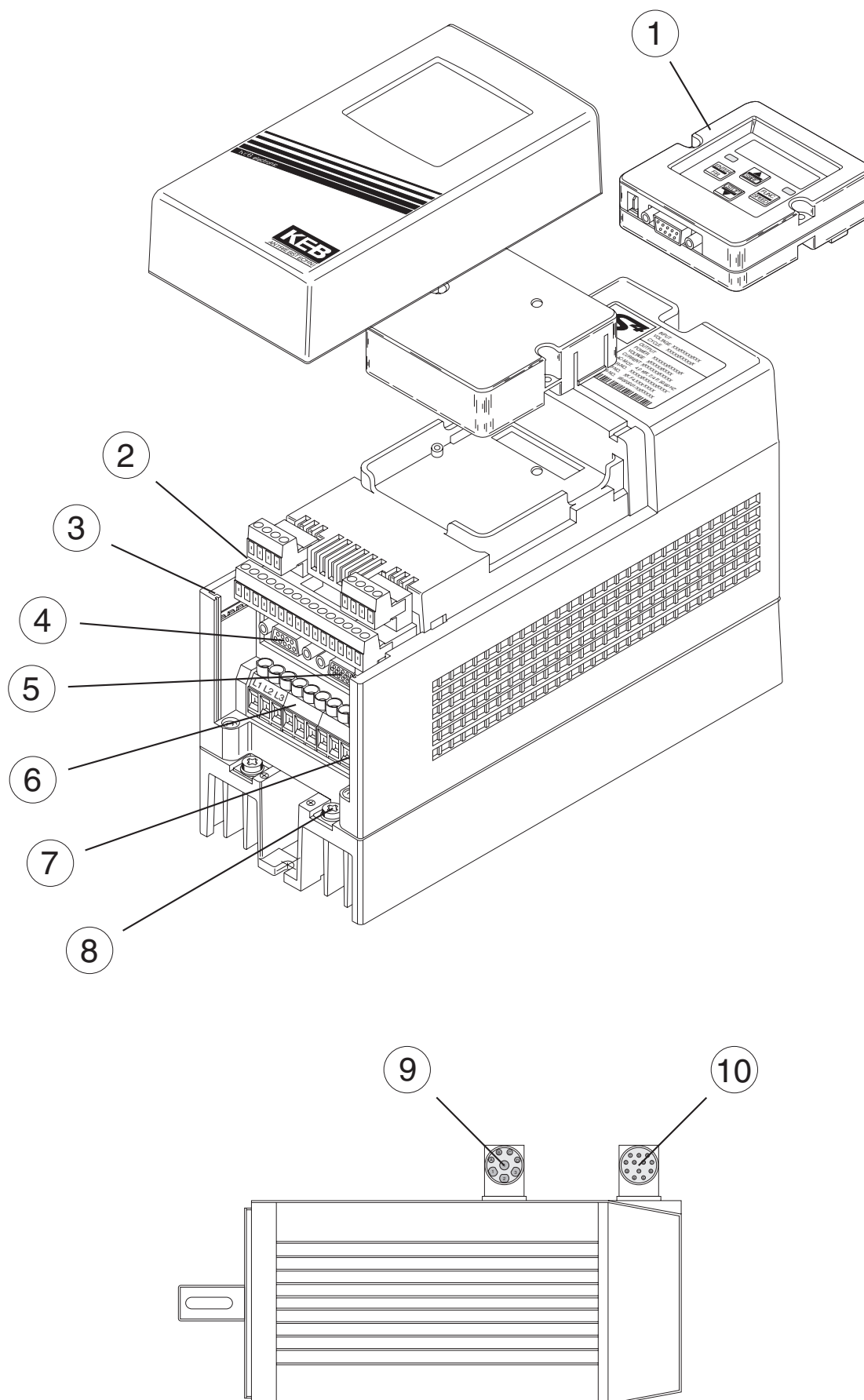
Size	A	B	B1	B2	B3	C	C1	F	G	H	Weight [kg]
D	90	250	264	287,5	301,5	160	210	5	45	240	2,0
E	130	290	-	327,5	-	200	-	7	65	275	3,6
B1/C1 Dimensions with base filter				B2 Dimensions with shield plate				B3 Dimensions with base filter and shield plate			

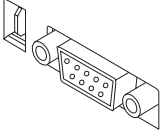
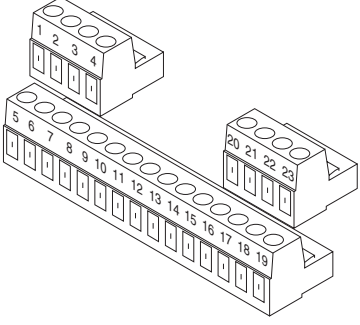
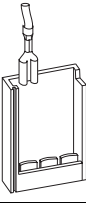
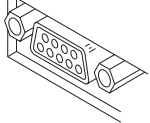
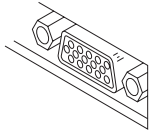
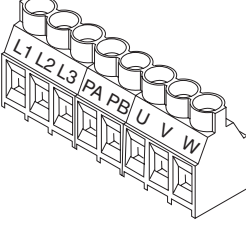
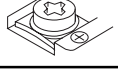
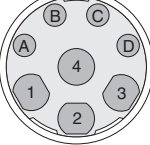
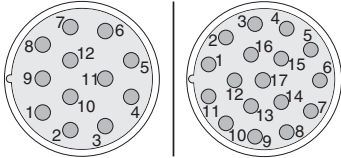
5.2 Dimensions Servo Motor

Size	a ₁	a ₂ [js6]	a ₃	b	c	d [k6]	e	f	k*		k ₁	k ₂	l	m*				p	S	S ₂	
									k ₀	k _B				m _R	m _G	m _{RB}	m _{GB}				
M1	74	40	63	11	2,5	9	10,2	3	73	98	31	37	20	121	-	145	-	M3	55	5,8	
M2	74	40	63	11	2,5	9	10,2	3	86	110	31	37	20	133	-	157	-	M3	55	5,8	
M3	74	40	63	11	2,5	9	10,2	3	98	122	31	37	20	145	-	169	-	M3	55	5,8	
M4	74	40	63	11	2,5	9	10,2	3	122	147	31	37	20	170	-	194	-	M3	55	5,8	
01	116	80	100	8	3	14	16	5	86	132	46	37	30	156	193	192	229	M4	92	7	
02	116	80	100	8	3	14	16	5	110	156	46	37	30	180	217	226	263	M4	92	7	
03	116	80	100	8	3	14	16	5	144	190	46	37	30	214	251	260	297	M4	92	7	
04	116	80	100	8	3	14	16	5	178	224	46	37	30	248	285	294	331	M4	92	7	
11	136	95	115	10	3	19	21,5	6	133	141	52	37	40	218	248	226	256	M6	110	9	
12	136	95	115	10	3	19	21,5	6	163	171	52	37	40	248	278	256	286	M6	110	9	
13	136	95	115	10	3	19	21,5	6	193	201	52	37	40	278	308	286	316	M6	110	9	
14	136	95	115	10	3	19	21,5	6	223	231	52	37	40	308	338	316	346	M6	110	9	
21	187	130	165	17	3,5	24	27	8	142	187	45	37	50	231	263	276	308	M8	140	11	
22	187	130	165	17	3,5	24	27	8	172	217	45	37	50	261	293	306	338	M8	140	11	
23	187	130	165	17	3,5	24	27	8	202	247	45	37	50	291	323	336	368	M8	140	11	
24	187	130	165	17	3,5	24	27	8	247	292	45	37	50	336	368	381	413	M8	140	11	
Featherkey to DIN 6885/1 Centring to DIN 332/2						* k ₀ k _B	Dimensions without brake Dimensions with brake				* m _R m _G m _{RB} m _{GB}	Dimensions with Resolver Dimensions with Encoder (ERN 1387) Dimensions with Resolver and brake Dimensions with Encoder (ERN 1387) and brake									

6. Connection

6.1 Survey



1		9 pole Sub-D-socket Parameterizing Interface ! Operator only optional ! see Page E 42 " Accessoires "
2		Terminal strip X1 Connection of the control terminals
3		AMP tab connector Shield connection / earthing
4		9 pole Sub-D-socket X3 Incremental encoder simulation
5		15 pole Sub-D-socket X4 resolver input / SIN/COS encoder input
6		Terminal strip X2 Connection motor, mains connection
7		Terminals OH / OH PTC-connection internal temperature sensor
8		PE connection
9		8 pole power connector Connection motor voltage, internal temperature sensor, brake (option)
10		12 pole Resolver plug Connection resolver Standard 17 pole encoder plug connection SIN/COS- encoder Option

6. Connection

6.2 1-phase Connection 230 V Class

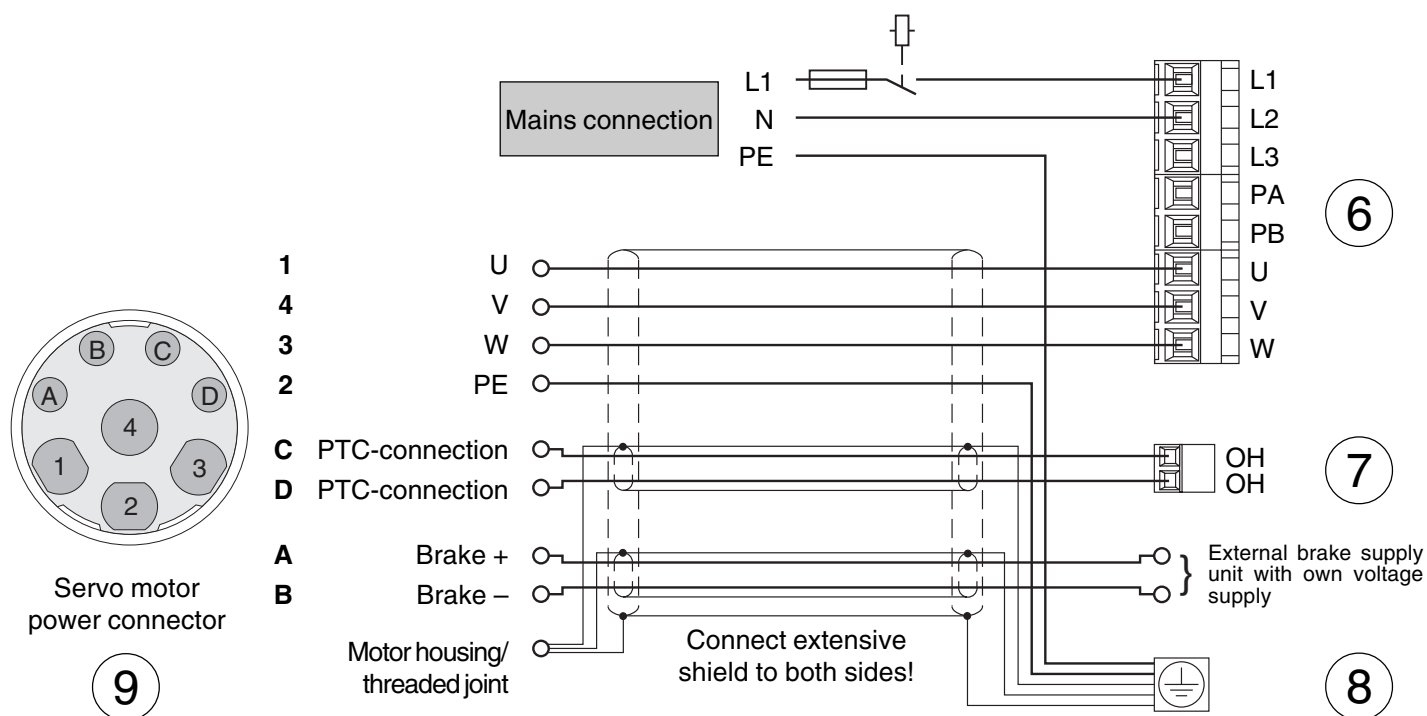


Remove or plug in the power connector only at switched off unit and disconnected power supply !



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

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



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

6.3 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) !

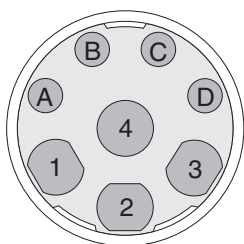


Remove or plug in the power connector only at switched off unit and disconnected power supply !



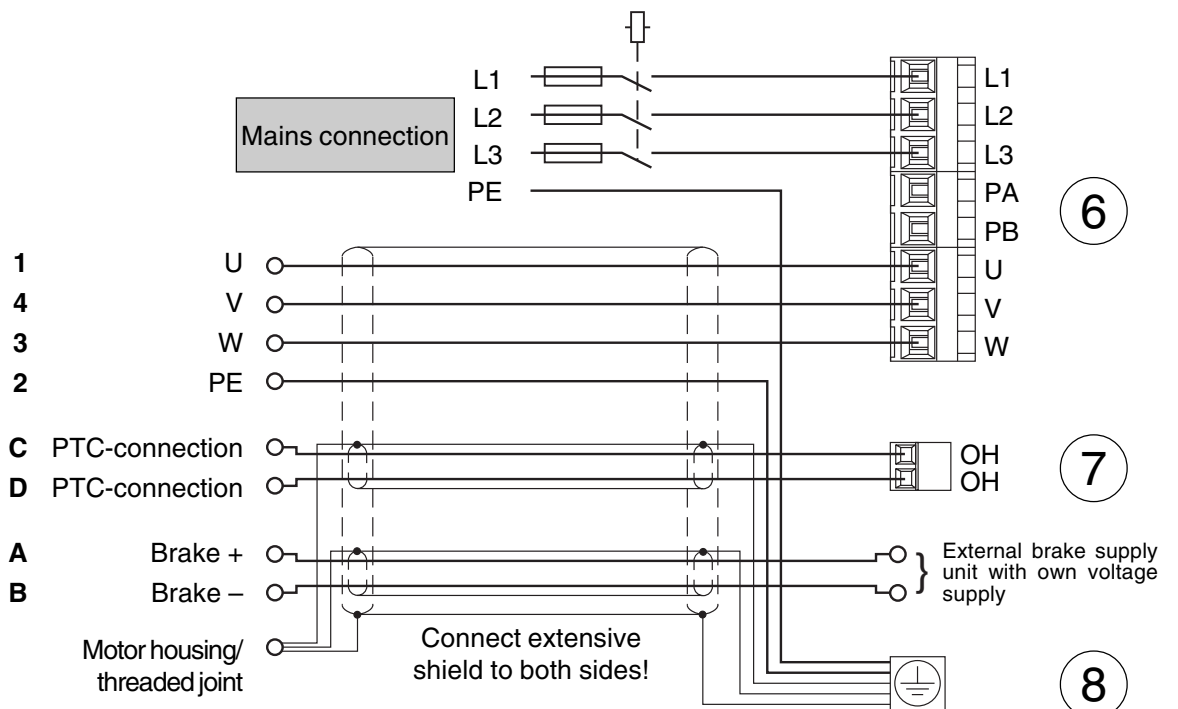
Observe the correct phase sequence for the connection of the servo motor !

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



Servo motor power connector

9



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

6. Connection

6.4 Connection Incremental Encoder Simulation

The 9-pole Sub-D connector for incremental encoder simulation serves for the connection of a paramount control (e.g. positioning control).



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

PIN Nr.	Signal	Meaning
1	U _{a1}	Signal channel A
2	U _{a2}	Signal channel B
3	U _{a0}	Signal zero
4		reserved
5		reserved
6	$\overline{U}_{a1}$	Signal channel A inverted
7	$\overline{U}_{a2}$	Signal channel B inverted
8	$\overline{U}_{a0}$	Signal zero inverted
9		reserved

Servo controller
Sub-D connector X3

8

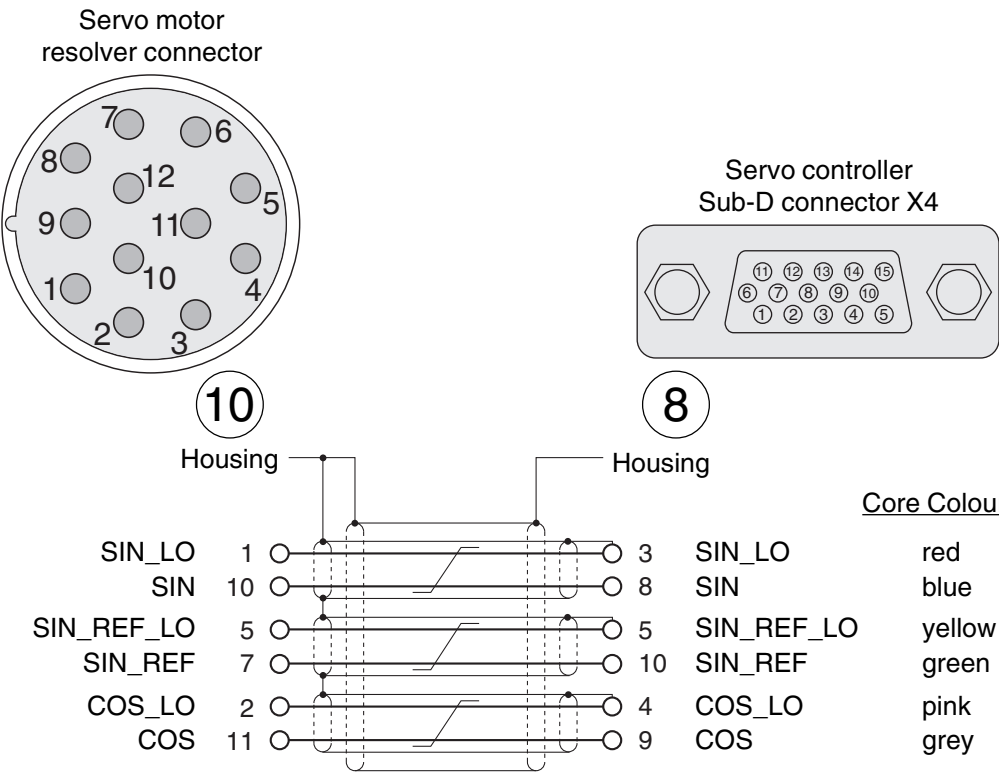


PIN 4, PIN 5 and PIN 9 are reserved for optional applications. Do not connect terminals!

6.5 Connection Resolver



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



6. Connection

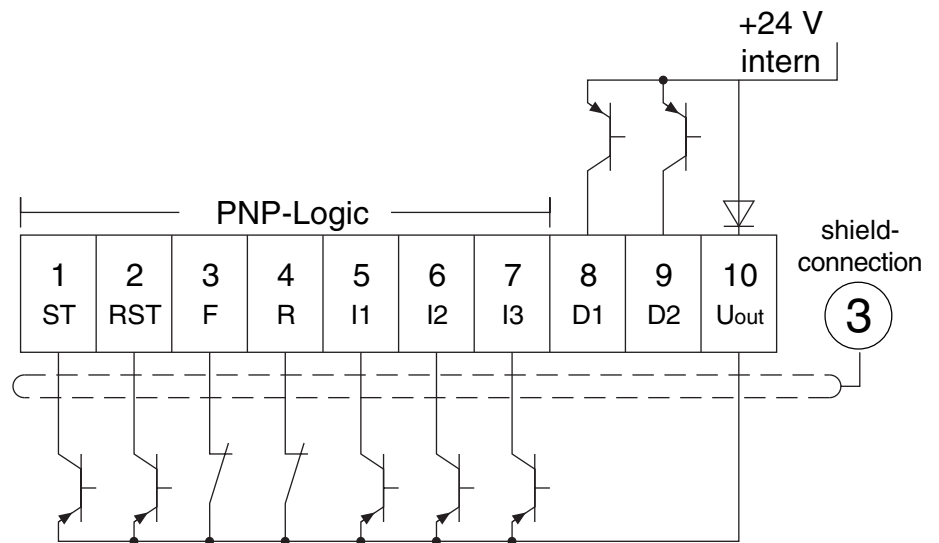
6.8 Control Terminal Strip X2

Terminal	Designation	Function	
1	ST	Control release	Digital inputs: +12...33 V / $R_i = 2\text{ k}\Omega$ 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 24 V / max. 20 mA
9	D2	Digital output signal 2	
10	Uout	+ 24 V voltage output	+24V (+/- 10%) ; max. 100 mA
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 $R_i = 40\text{ k}\Omega$
15	REF 1 -		
16	REF 2 +	Analog torque limitation refer to Parameter CP.9	Voltage difference input 0...+10V / Resolution: 12 Bit -10V...0V $\triangleq$ 0 Nm / +10V $\triangleq$ $M_{\max.}$ / $R_i = 40\text{ k}\Omega$
17	REF 2 -		
18	A1	Programmable analog output	-10V...+10V / Resolution: 8 Bit $R_i = 100\text{ }\Omega$
19	A2	Output of current speed	-10V...+10V / Resolution: 8 Bit $R_i = 100\text{ }\Omega$
20	RLA	Output relay:	max.250 V AC/0,2 A or 30 V DC/1 A
21	RLB	RLA / RLC : normal operating condition	
22	RLC	RLB / RLC : POWER OFF / malfunction	
23	Ext. Spg.	external supply of the control	+ 24 V external voltage input

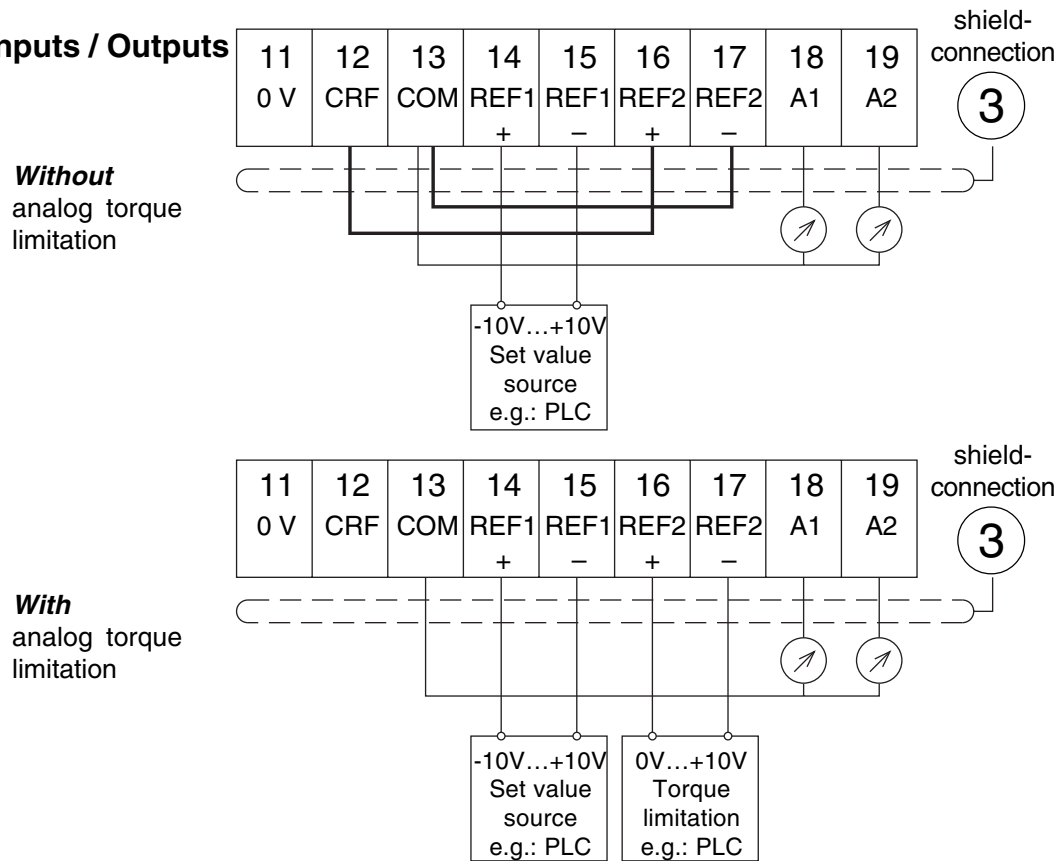


Rotation release (terminal X2.3 / X2.4) and analog torque limitation (terminal X2.16 / X2.17) have no function in the Drive Mode
See page E 37 "Drive Mode"

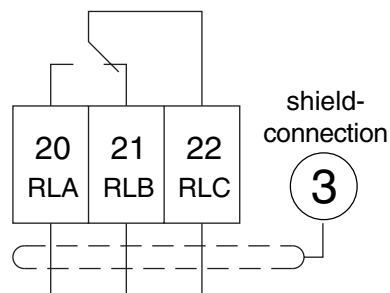
6.8.1 Digital Inputs / Outputs



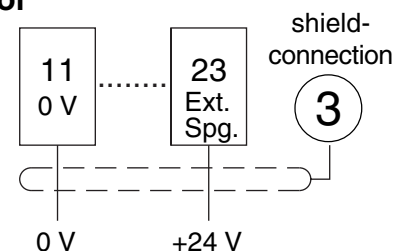
6.8.2 Analogue Inputs / Outputs



6.8.3 Output Relay

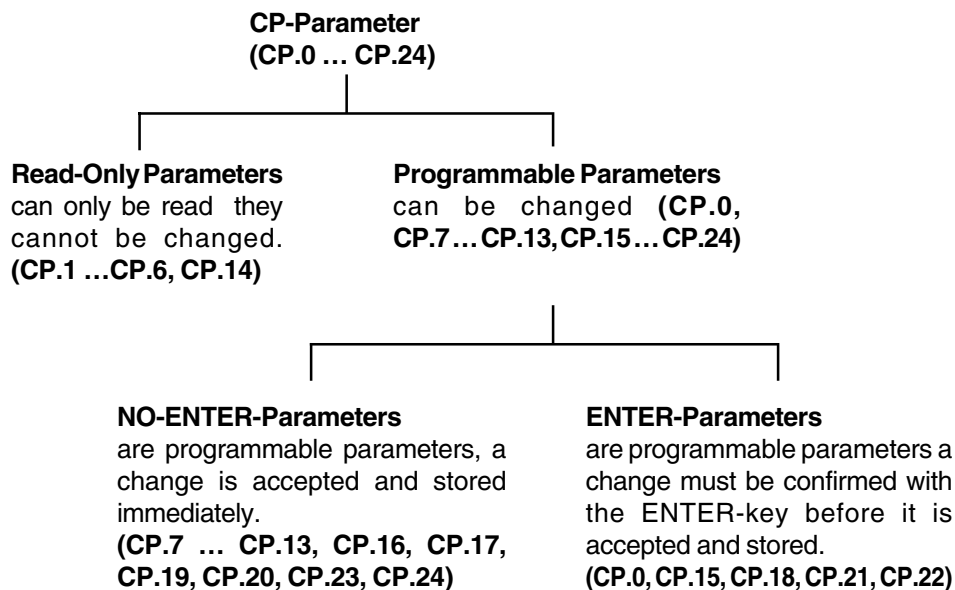


6.8.4 External voltage supply of the control



7. Operation

7.1 Parameter Structure



7.2 Parameter Survey

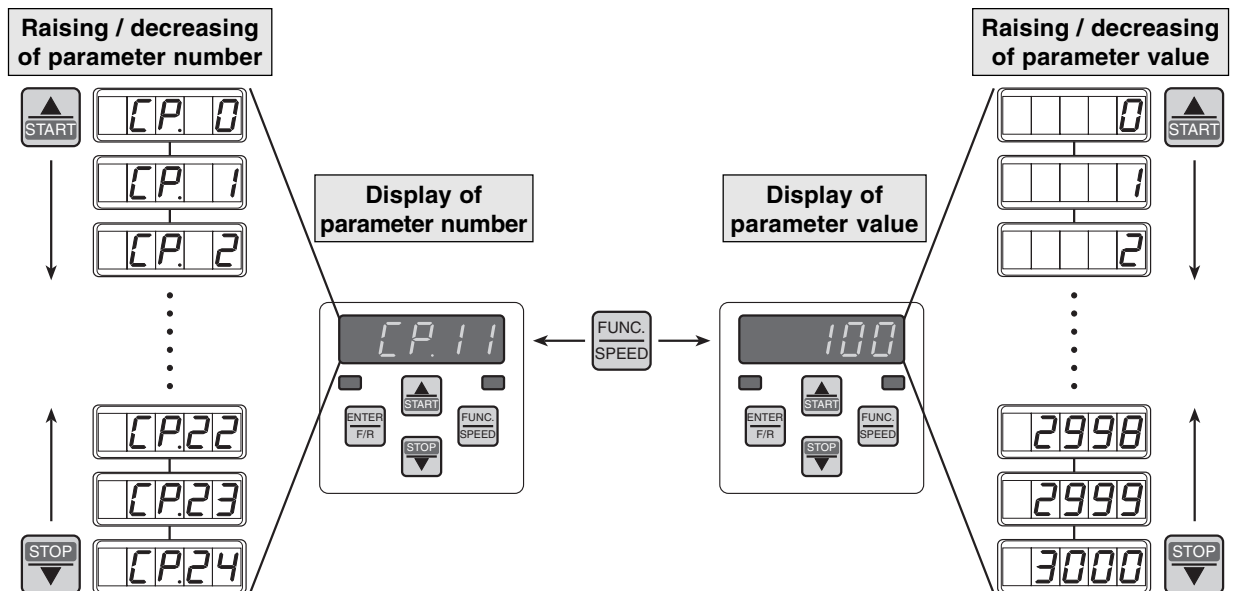
Parameter number	Parameter Name	Setting Range	Resolution	Factory Setting
CP.0	Password input	0...9999	1	—
CP.1	Actual speed display	—	0,5 U/min	—
* CP.2	Status display	—	—	—
* CP.3	Apparent motor current	—	0,1 A	—
* CP.4	Max. apparent motor current	—	0,1 A	—
CP.5	Current Torque	—	0,1 Nm	—
CP.6	Setpoint speed display	—	0,5 U/min	—
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 U/min	Rated speed
CP.11	Jogging speed	0...9999	0,5 U/min	100 U/min
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
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 _{Rated} $\triangleq$ +10 V
CP.20	Amplification output A2	-20...+20	0,01	+/-n _{Rated} $\triangleq$ +/-10 V
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 _{Rated}
CP.24	Speed level output D2	0...16000 U/min	0,5 U/min	0,5 x n _{Rated}

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

7.3 Selection and Changing of Parameters



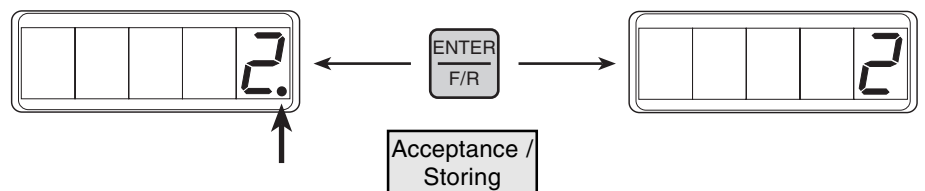
When switching on the servo controller the display always shows the value of parameter CP.1 (**Status Display**).



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 ENTER key the adjusted value is accepted and stored (point disappears).

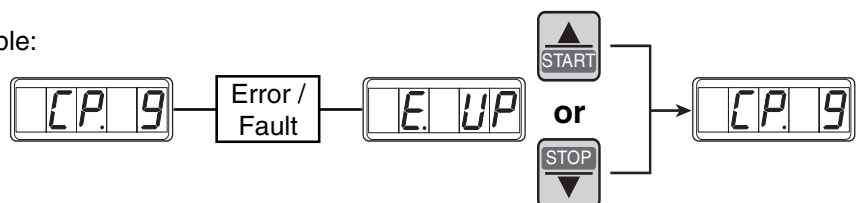
Example:



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 "UP" or "DOWN".

Example:



The keys UP / DOWN **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 Messages / Error Diagnosis see page E 44 !

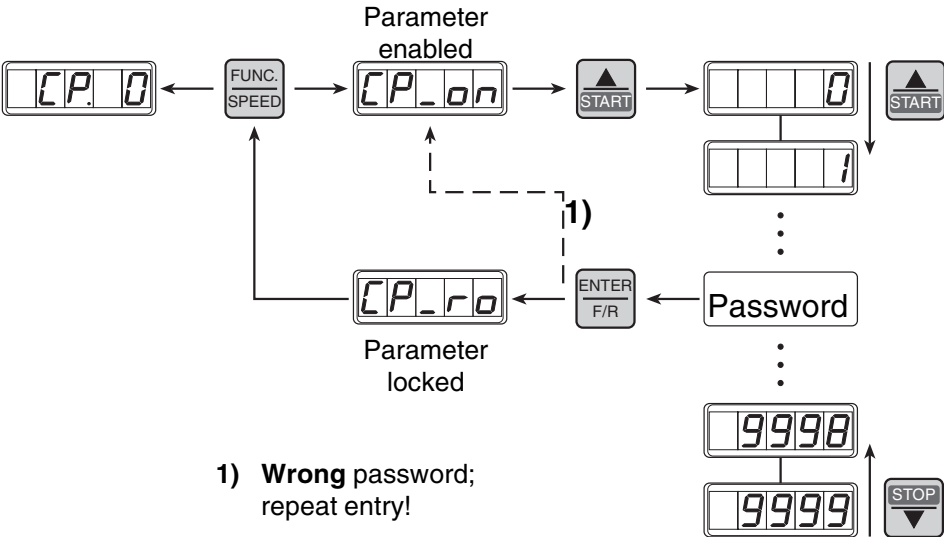
8. Parameter Description



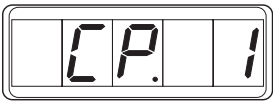
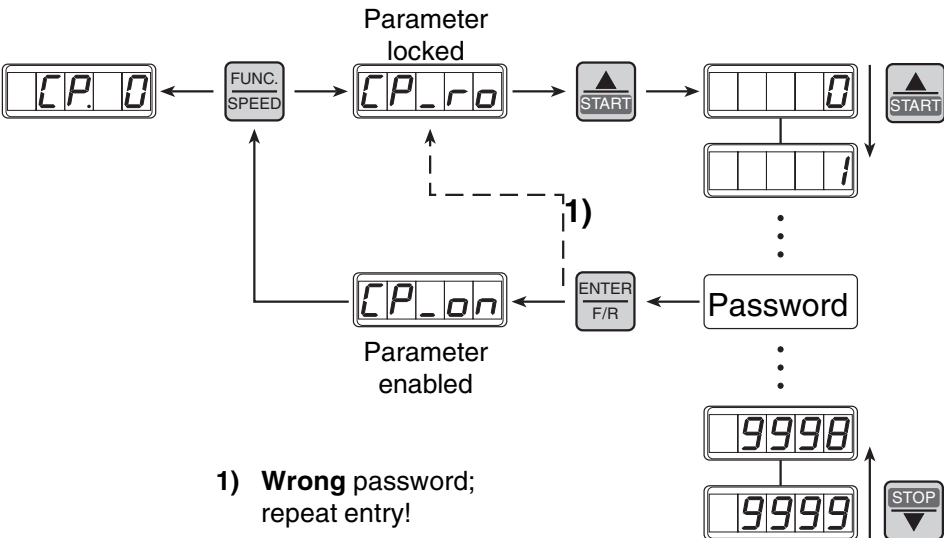
Password Input

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 E 48!

Locking of CP Parameters:



Enabling of CP Parameters:



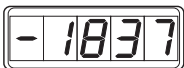
Actual Speed Display

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

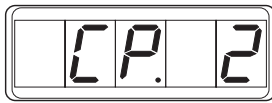
Example:



Rotation "forward"



Rotation "reverse"
Speed 1837 U/min or 1837,5 U/min



Status Display

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



no Operation

- Control release (terminal X2.1) not activated
- Modulation switched off
- Output voltage= 0V/drive uncontrolled



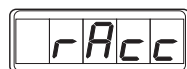
Forward acceleration

- Drive accelerates with forward direction of rotation



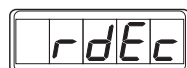
Forward deceleration

- Drive decelerates with forward direction of rotation



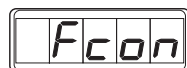
Reverse acceleration

- Drive accelerates with reverse direction of rotation



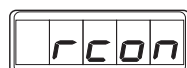
Reverse deceleration

- Drive decelerates with reverse direction of rotation



Forward constant

- Drive runs with constant speed and forward direction of rotation



Reverse constant

- Drive runs with constant speed and reverse direction of rotation

Abnormal Stopping



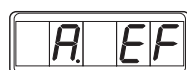
Prohibited rotation forward

- Rotation release at terminal X2.3 is missing: Drive does not start with positive reference value or decelerates to standstill (speed zero is maintained). After release of rotation the drive starts again automatically.



Prohibited rotation reverse

- Rotation release at terminal X2.4 is missing: Drive does not start with negative reference value or decelerates to standstill (speed zero is maintained). After release of rotation the drive starts again automatically.

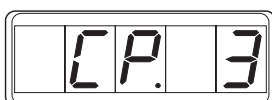


External fault

- The signal for an external fault is applied to terminal X2.7. The response of the drive to external faults is adjusted with parameter CP.15



- Error - Messages see Page E 44 "Error Diagnoses"



Apparent Motor Current

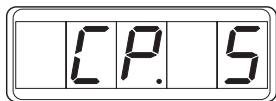
Indication of the current apparent motor current in ampere.
Resolution: 0,1 A



Apparent Motor Current Peak Value

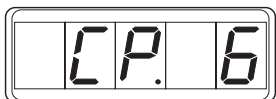
Indication of the maximum apparent motor current measured during operation, in ampere.
Resolution: 0,1 A

8. Parameter Description



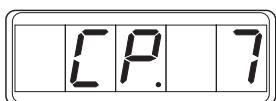
Current Torque

Indication of the current torque in newtonmeter.
Resolution: 0,1 Nm



Setpoint Speed Display

Indication of preset setpoint speed in U/min.
Resolution: 0,5 U/min
Positive speed: Rotation "forward" **or** no sense of rotation
Negative Speed: Rotation "reverse"

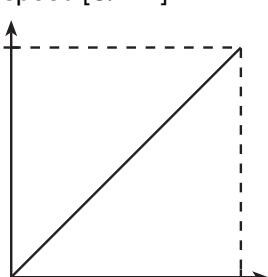


Acceleration Time

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

Rated speed [U/min]

3000/
4000/
6000



CP.7

Acceleration time [s]

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

CP.7	=	actual acceleration time
Rated speed		delta n

Calculation Example:

Calculation of acceleration time to be adjusted:

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

$$\text{delta } n = 2500 \text{ U/min} - 100 \text{ U/min} = 2400 \text{ U/min}$$

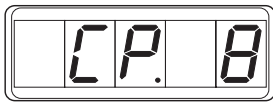
$$\text{CP.7} = \frac{\text{actual acceleration time}}{\text{delta } n} \cdot \text{Rated speed}$$

$$\text{CP.7} = \frac{0,2\text{s}}{2400 \text{ U/min}} \cdot 3000 \text{ U/min} = \underline{\underline{0,25 \text{ s}}}$$

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***

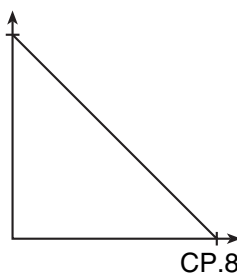


Deceleration Time

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

Rated speed [U/min]

3000/
4000/
6000



Deceleration time [s]

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 Example:

Calculation of deceleration time to be adjusted:

The drive shall decelerate from 3000 U/min to 1000 U/min in **0,05 s**!

Rated speed of the drive: 4000 U/min

$$\text{delta n} = 3000 \text{ U/min} - 1000 \text{ U/min} = 2000 \text{ U/min}$$

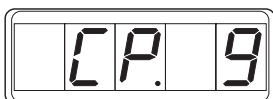
$$\text{CP.8} = \frac{\text{actual deceleration time}}{\text{delta n}} \cdot \text{Rated speed}$$

$$\text{CP.8} = \frac{0,05 \text{ s}}{2000 \text{ U/min}} \cdot 4000 \text{ U/min} = \mathbf{0,1 \text{ s}}$$

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

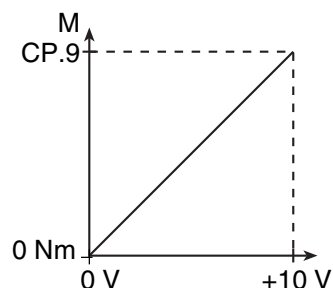


**Wenn CP.7 und CP.8 = 0.00 s
dann CP.16 und CP.17 ohne Funktion**



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



Maximum Setpoint Speed

Defines the maximum output speed of the servo controller

Setting range:	0...9999 U/min
Resolution:	0,5 U/min
Factory setting:	Rated speed
Customer setting:	_____ U/min



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

8. Parameter Description



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 rotation are preset at the same time then rotation "forward" has priority.

Setting range:	0...9999 U/min
Resolution:	0,5 U/min
Factory setting:	100 U/min
Customer setting:	_____ U/min

Condition:

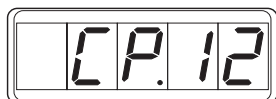
The control terminals X2.1(ST), X2.3 (F) or X2.4 (R) must be connected with terminal X2.10 (+16V).

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 limit.
- 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!

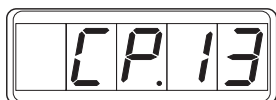


P-Factor Speed Controller

Proportional factor of speed controller.

**see page E 43
adjustment assistance
speed controller**

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

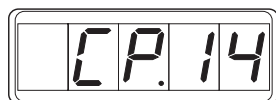


I-Factor Speed Controller

Integral factor of speed controller.

**see page E 43
adjustment assistance
speed controller**

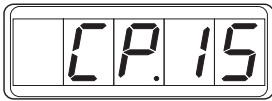
Setting range:	0...65535
Resolution:	1
Factory setting:	motor-type depend.
Customer setting:	_____



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 001, 002, 005, 006):	1024 Increments
- ERN 1387 (sub-assembly 003, 004, 007, 008):	2048 Increments

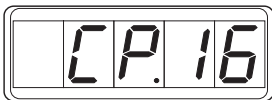


Behaviour at External Fault

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

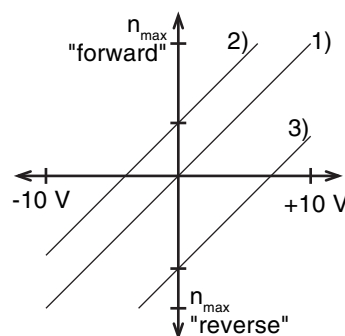
Setting range:	0...6
Resolution:	1
Factory setting:	0
Remarks:	ENTER-Parameter
Customer setting:	_____

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!



Offset REF 1

Permits the shifting of the setpoint-speed characteristic.



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 U/min

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

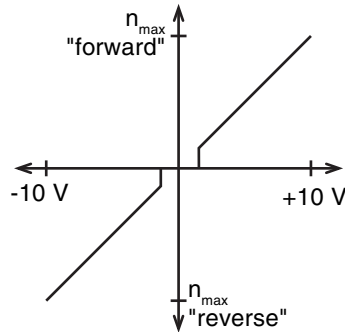
8. Parameter Description



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

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: _____

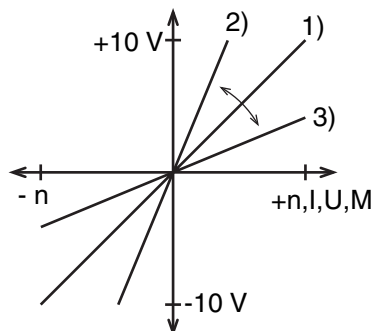
Value	Output variable	Value range at CP.19=1
0	actual speed	-6000...+6000 U/min $\hat{=}$ -10V...+10V
1	apparent motor speed	0...25 A $\hat{=}$ 0...+10V
2	actual torque	0...25 Nm $\hat{=}$ 0...+10V
3	intermediate circuit voltage	0...1000 V $\hat{=}$ 0...+10V
4	speed reference variable	-6000...+6000 U/min $\hat{=}$ -10V...+10V
5	system deviation (speed control)	-6000...+6000 U/min $\hat{=}$ -10V...+10V
6	setpoint torque	0...25 Nm $\hat{=}$ 0...+10V5



Amplification Output A1

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

Setting range: -20...+20
Resolution: 0,01
Factory setting: $3 \times M_{\text{Rated}} \hat{=}$ +10 V
Customer setting: _____

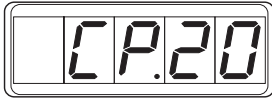


Characteristic 1: Amplification factor 1
Characteristic 2: Amplification factor 2
Characteristic 3: Amplification factor 0,5

Calculation Example:

At 2000 U/min a measurement shall be taken at analog output A1 +10 V.

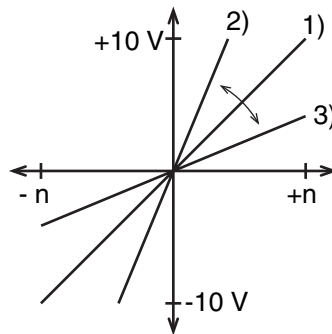
$$CP.19 = \frac{\text{value at amplification 1 (s. CP.18)}}{\text{desired value at +10V}} = \frac{6000 \text{ U/min}}{2000 \text{ U/min}} = 3$$



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:	$\pm n_{\text{Rated}} \hat{=} \pm 10 \text{ V}$
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):

$$0 \dots \pm 10 \text{ V} \quad \hat{=} \quad -6000 \dots +6000 \text{ U/min}$$

Calculation Example:

Rated speed of the servo system: 3000 U/min

At 1000 U/min a measurement shall be taken at analog output A2 +10 V .

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

$$\text{CP.20} = \frac{6000 \text{ U/min}}{1000 \text{ U/min}}$$

$$\text{CP.20} = 6$$



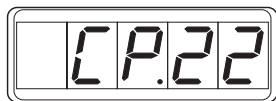
Switching Condition Output D1

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 E 36 !

8. Parameter Description



Switching Condition Output D2

Defines the switching condition of digital output D2.

! Refer to table below !

Setting range:	0...20
Resolution:	1
Factory setting:	18
Remarks:	ENTER-Parameter
Customer setting:	_____

Switching Conditions

Digital output D1 and D2

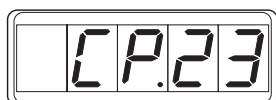
Value	Switching condition
0	always active
1	always active
2	system switched on; no abnormal operating condition
3	ready for operation and modulation enabled
4	abnormal operating condition / Fault (CP.2 = A.xxx or E.xxx)
5	inverter blocking after fault (E.xxx)
6	prewarning level electr. protective motor 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

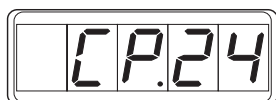
18	actual speed > speed level CP.24
19	apparent current > rated current
20	torque > rated torque



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 U/min
Resolution:	0,5 U/min
Factory setting:	0,5 x n _{Rated}
Customer setting:	_____ U/min

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 E 48!

9.1 Setting Possibilities

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

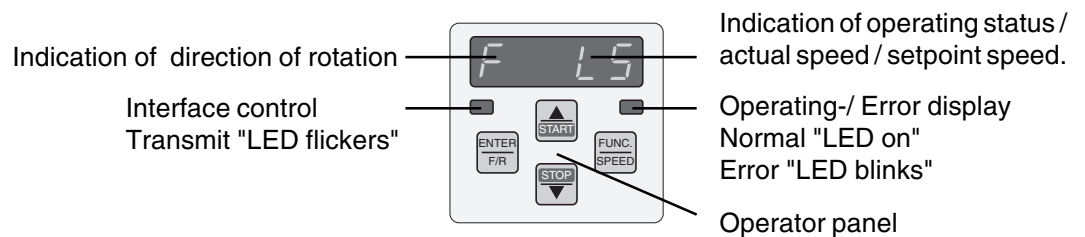
9.2 Condition

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

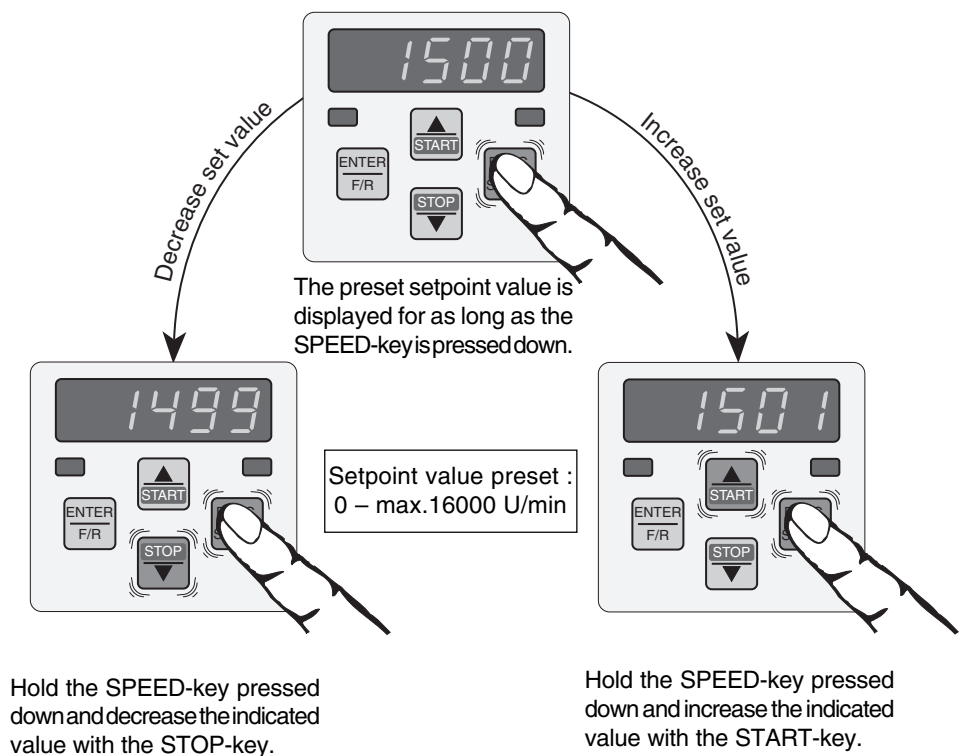


Control release (terminal X2.3 / X2.4) and analog torque limitation (terminal X2.16 / X2.17) are without function in the Drive Mode.

9.3 Display and Keyboard



9.4 Setpoint Display / Setpoint Presetting

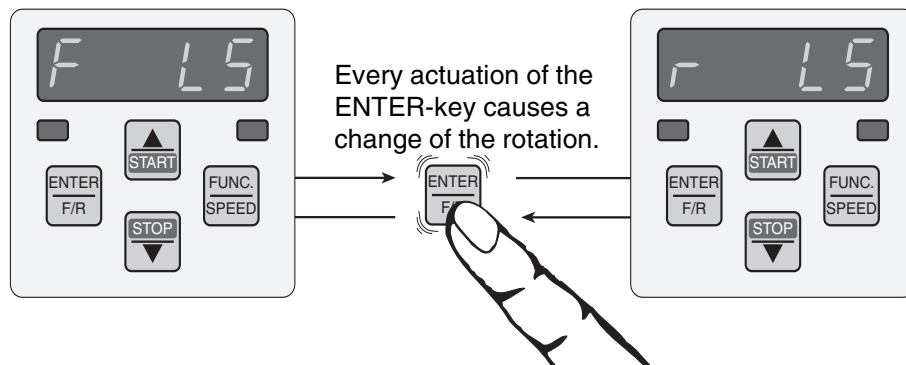


9. Drive Mode

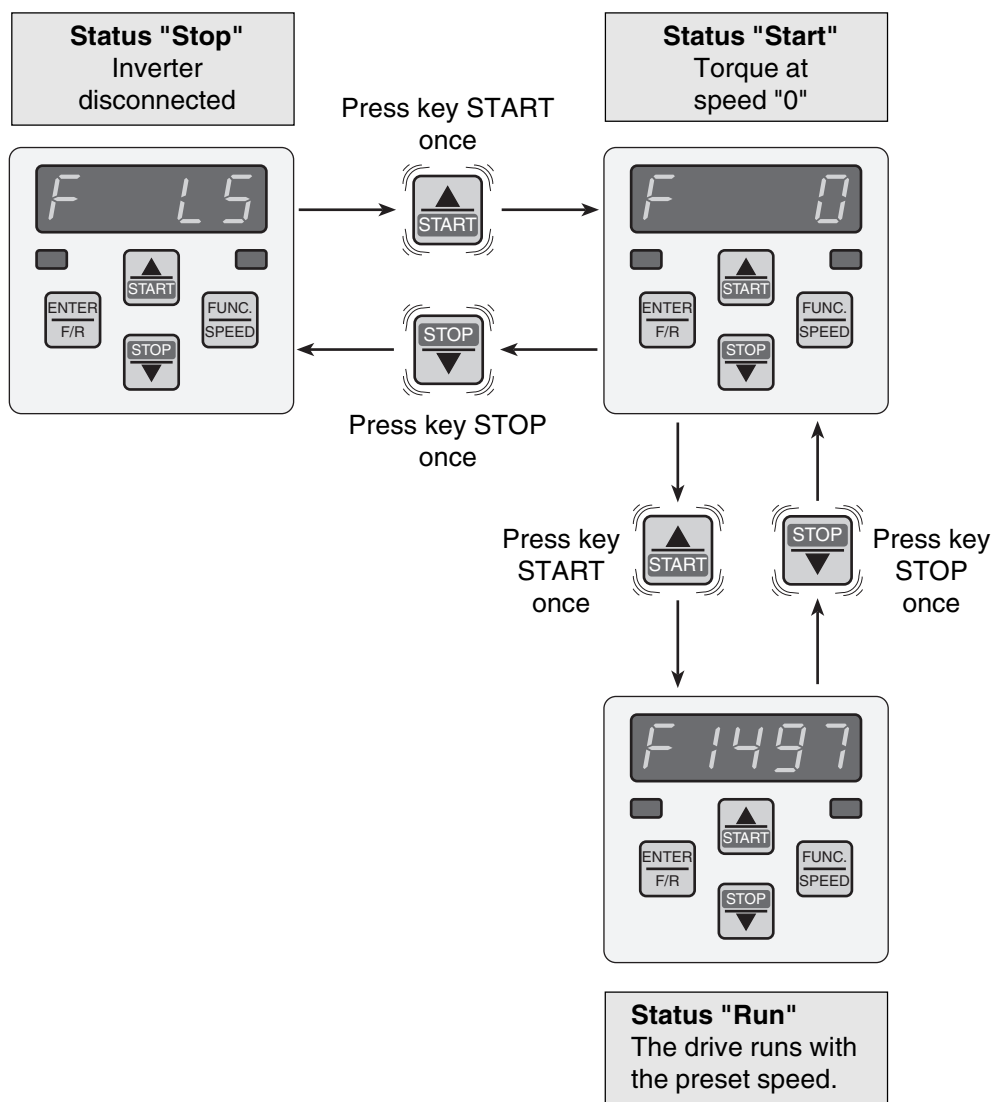
9.5 Rotation Presetting

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" !**

10.1 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 !

10.1.1 Part No.

14.56.080 – 4008	Braking resistor	6 % c.d.f.
14.56.080 – 4018	Braking resistor	25 % c.d.f.
14.56.080 – 4028	Braking resistor	40 % c.d.f.
15.56.080 – 4008	Braking resistor	6 % c.d.f.
15.56.080 – 4018	Braking resistor	25 % c.d.f.
15.56.080 – 4028	Braking resistor	40 % c.d.f.

10.1.2 Technical Data

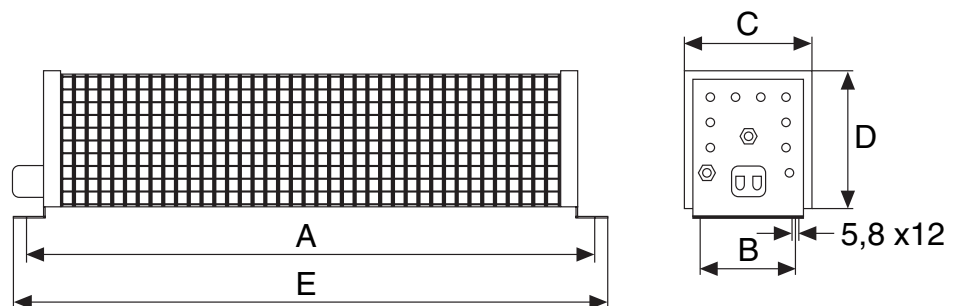
Part No.	R_B [Ohm]	$P_R^{2)}$ [kW]	Controller size	$P_N^{1)}$ [W]		
				6%	25%	40%
14.56.080 – 4xx8	82	7,0	03...10	800	2700	3700
15.56.080 – 4xx8	56	10,3	12	1200	3700	5500

¹⁾ Rated resistor value P_N depends on the peak braking power and the cyclic duration factor c.d.f. [%]

²⁾ Short-time taken up peak braking power P_R
Dimensioning servo controller : motor = 1 : 1

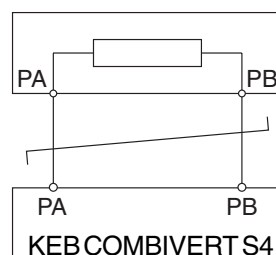
Marked value = Standard resistor (Other resistors on request!)

10.1.3 Dimensions



Part No.	A	B	C	D	E
13.56.080-4008	426	64	92	120	466
13.56.080-4018	430	190	230	145	468
13.56.080-4028	630	190	230	145	668
14.56.080-4008	526	64	92	120	550
14.56.080-4018	630	190	230	145	650
14.56.080-4028	830	190	230	145	850

10.1.4 Connection



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

10. Accessories

10.2 Radio Interference Suppression Filter

The servo controller KEB COMBIVERT S4 can be supplied ex factory with internal radio interference suppression filter. Base filters are available for the unit sizes 03, 05 and 10. **Unit size 10 can only be delivered with an external filter.**

10.2.1 Technical Data

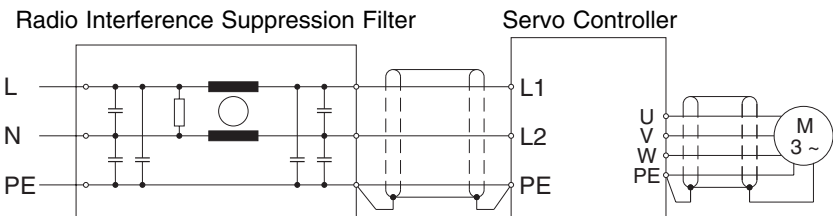
Servo controller	Part.No.: Filter-kit	I _N [A] Rated current	U _N [V] Rated voltage
03 (D-Housing) ¹⁾	07.U4.00D-B600 ²⁾	12	250
05 (D-Housing) ¹⁾	07.U4.00D-B600 ²⁾	12	250
10 (D-Housing) ¹⁾	10.U4.00D-BM00	8	500
12 (E-Housing)	12.U4.00E-CM00	22	500

¹⁾ Dimensions Servo controller with base filter see Page E 17

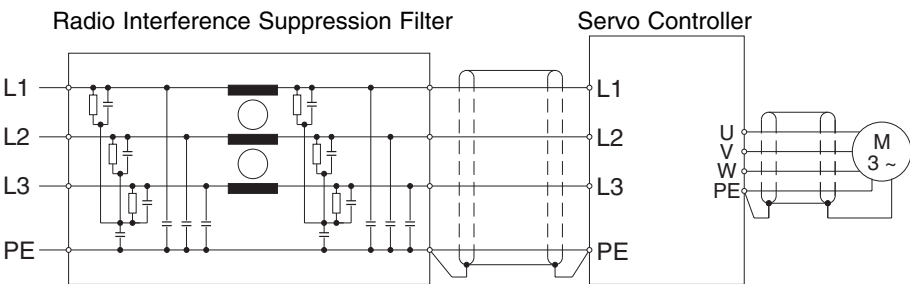
²⁾ only for 1-phase Servo controller

10.2.2 Connection

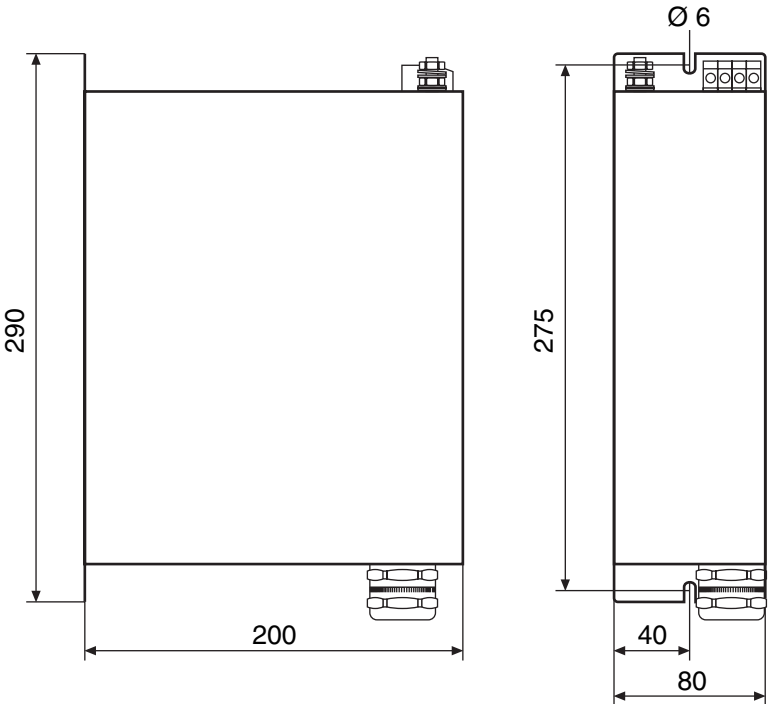
Connection 1-phase



Connection 3-phase



10.2.3 Dimensions
12.U4.00E-CM00



10.3 Braking Motor

The synchronous servo motor is alternatively available with permanent-magnet brake.

- Application:
- permanent-magnet single-disc holding brake
 - fail-safe brake to switch around standstill
 - breakdown-emergency braking (**permissible on request**)

10.3.1 Technical Data

Servo motor	Size	M1...M4	01...04
Holding brake	Type		06.15.620-0477
Voltage DC	[V]	24	24
Holding torque	[Nm]	1,2	6
Rating	[W]	8,4	13
Moment of inertia	[kg•m ²]	0,07 • 10 ⁻⁴	0,6 • 10 ⁻⁴
Ground	[kg]	0,2	0,55

Servo motor	Size	11...14	21...24
Holding brake	Type	7D.05.100-4000	
Voltage DC	[V]	24	24
Holding torque	[Nm]	11	25
Rating	[W]	20	24
Moment of inertia	[kg•m ²]	2,3 • 10 ⁻⁴	4,5 • 10 ⁻⁴
Ground	[kg]	0,85	1,2



Regarding dimensions of braking motor refer to
"Dimensions Servo Motor" (page E 17)

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 control
Transmit "LED flickers"

5-digit LED-Display

Operating-/Error display
Normal "LED on"
Error "LED blinks"

Double function keyboard

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

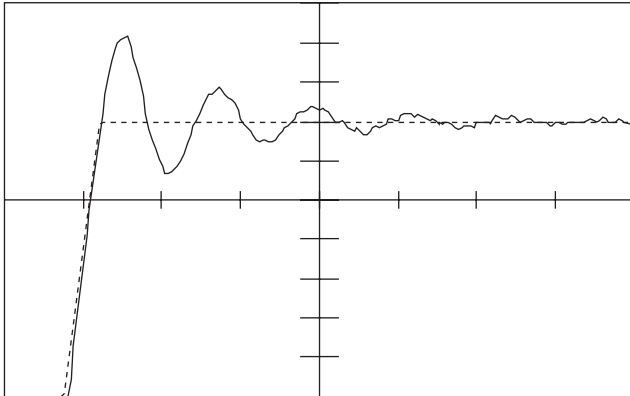
In the Interface operator there is an additionally isolated RS232/RS485-Interface integrated. The RS232/485-parameterizing interface expands the KEB COMBIVERT S4 for communication with data communications equipment. Suitable wiring permits the physically isolated data transmission.



! Connection see page E 23 !

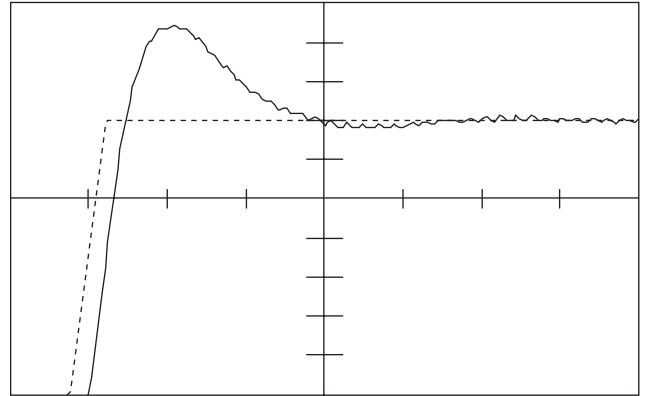
PIN No.	RS485 Norm	Signal	Meaning
1	—	—	reserved
2	—	TxD	Transmit signal / RS232
3	—	RxD	Receive signal / RS232
4	A'	RxD-A	Receive signal A / RS485
5	B'	RxD-B	Receive signal B / RS485
6	—	VP	Supply voltage +5 V, I _{max} = 10 mA
7	C/C'	COM	Data reference potential
8	A	TxD-A	Transmit signal A / RS485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

Servo controller
Parameterizing interface



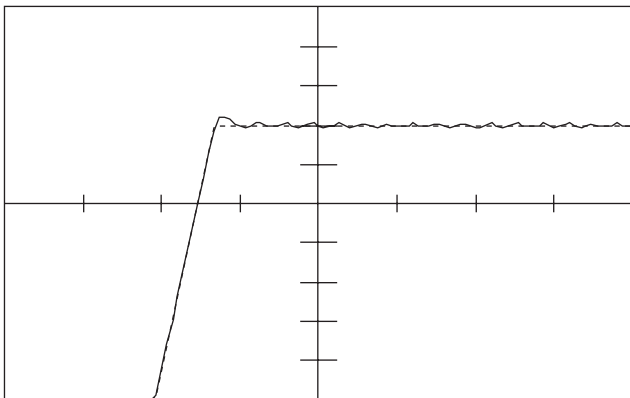
Problem: very long transient

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



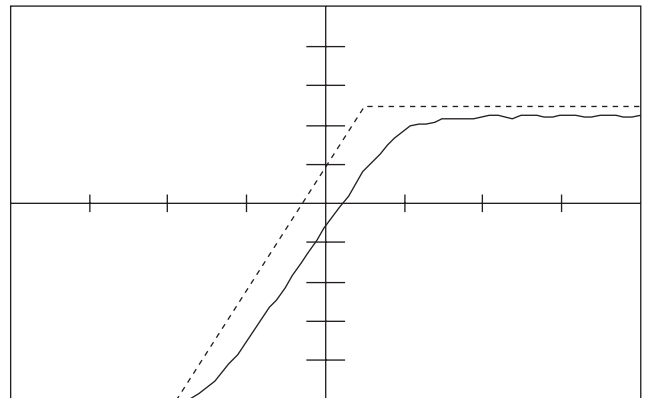
Problem: Speed overshoot too high

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



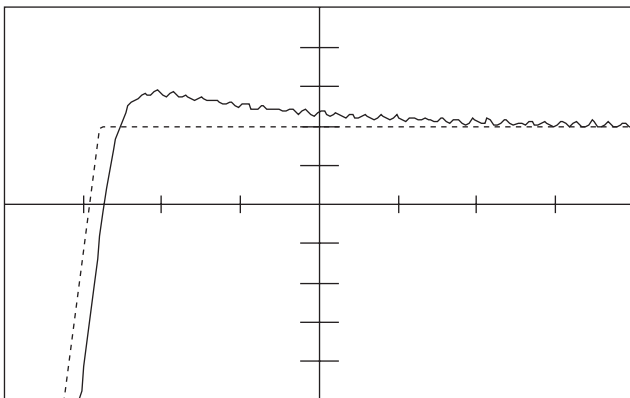
Problem: Maintained vibration

Assistance: Increase P-component (CP.12)



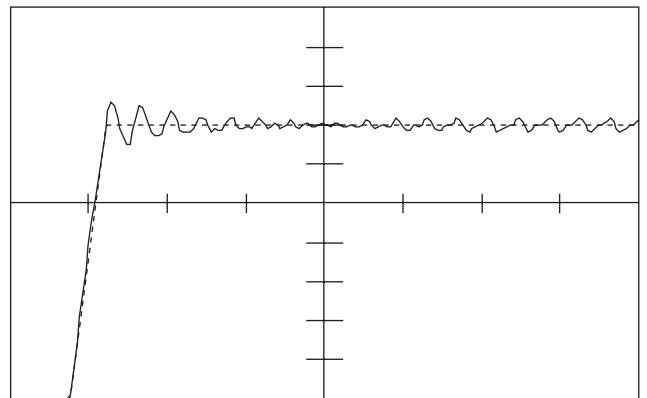
Problem: Transient too slow/ remaining control deviation

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)

12. Error Diagnosis

Display	Fault	Description
	Underpotential	Occurs when the intermediate circuit voltage drops below the permissible value.
	Overpotential	Occurs when the intermediate circuit voltage rises above the permissible value.
	Overcurrent	Occurs when the output voltage exceeds the permissible value.
	Overload	Occurs when the servo controller is overloaded.
	Drive Overheat	Occurs when the servo motor exceeds the permissible operating temperature.
	Overheat 2	Is triggered by the internal motor current surveillance. Function of an electronic protective motor relay.
	External Fault	Occurs when the digital input I3 is activated at CP.15 = 0.
	Encoder	Is indicated in case of missing supply voltage to the resolver.
	Power Unit Code	Occurs when no defined power circuit is recognized
	Hybrid	Hybrid error
	digital signal processor	Processor error

Possible Cause	Fault Remedy
- Input voltage too low or unstable - Voltage losses due to incorrect cabling	- Check voltage supply - Check input line
- Input voltage too high - Retarding torque too high	- Check voltage supply - Connect braking resistor
- Short-circuit or ground fault at the output	- Determine exact cause and remove, next re-start
- middle torque too large - wrong cabling	- Reduce torque - Control cabling from the motor to the encoder system
- PTC - triggering - PTC - line defective - Heat dissipation too low - Ambient temperature too high	- Let motor cool down - Check PTC - line - Observe correct installation - See also ambient conditions page E 7
- Motor is overloaded	- Discharge motor - Reduce torque limit (Parameter CP.9)
- External error presetting ! Only if parameter CP.15 = 0 !	- Remove external error and actuate RESET
- Short-circuit of reference voltage of the resolver	- Check resolver line
	- Fault correction only ex works!
	- Fault correction only ex works!
	- Fault correction only ex works!





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

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Denmark	REGAL-Maskin Elektro A.S. · Industrievæg 4 ·	DK - 4000 Roskilde	Tel.: (45) 46755544	FAX : (45) 46757620
Finnland	Advancetec Oy · Malminkaari 10 B · PL 149 ·	FIN 00701 Helsinki	Tel.: (358) 9/70029270	FAX : (358) 9/70029279
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