COMBIVERT

Servo Systems

S4

0.3... 70 Nm

0… 6000 rpm

TÜV CERT
DIN ISO 9001

KEB
ANTRIEBSTECHNIK

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Introduction

„What must a drive be capable of ?”

That is a question design engineers are constantly faced with during their daily work. The selection of the most suitable power transmission equipment is of most importance for the performance of the machine or plant. **All in one** - this statement with appeal is one way to pick up the global slogan of the past years, but in operation it often results in concepts that are not cost effective.

Sensible use of material and capital is the basic principle of the **KEB COMBIVERT F4/S4** inverter series which makes fully digital drive controllers in various sizes available for the core areas of

- open loop and
- controlled loop applications
  in combination with asynchronous and synchronous motors.

The Servo System KEB COMBIVERT S4 comprises modern, industrial drive systems with high-dynamic synchronous motors of the latest generation.

The program is based on the design of KEB COMBIVERT F4 using the more than hundred thousandfold proven technical basis and in combination with the optimized DSP controller it provides an outstanding performance.

An parameter concept with two access levels with identical addresses of the parameters, the mechanical construction designed in a modular system and efficient tools for the operation ensure short planning, training and commissioning times.

Serial interfaces provide a versatile way for communication via

Profibus DP, INTERBUS, CAN, LON or **DIN66019**

UL/cUL - approval and CE - conformity show suitability for a global use.

Features

KEB COMBIVERT S4

- Combination of digital, preprogrammed **servo amplifier**, dynamically optimized **synchronous motor** with NdFeB-magnets, **resolver-, Sin/Cos-** or **multiturn SSI-encoder** and preassembled **connecting technique** for continuous standstill torque in the range of

0.3 … 70 Nm

Easy operation with the CP basic menu comprising only 24 parameters for the essential adjustments of **ramp, speed, torque, regulator setting P- and I-part and conditions for outputs** and **jog-speed**.

The display of **status**, **actual speed** and **motor current** gives clear information.

The extensive functionality of the system is fully accessable in the password protected application level with **8 parameter sets** and features to use in tasks like **synchronous control, register functions, single-axis positioning**. **Free-to-program digital and analog in- and outputs** shift the PLC-tasks into the drive .

Plugin operator modules for operating, display and serial interfaces provide maximum flexibility for the adaption to individual requirements.

Selection

- As a result of the mechanical computation the average and maximum torque form the basis for an optimal selection of the KEB COMBIVERT S4 Servo System.
  In addition to that the motor size is determined according to the tables on page 10 and 11 based on the data of the required standstill torque and rated speed.

- The available voltage class and the required peak torque of the drive axis is to be taken into account for the selection of the servo amplifier. The sizes listed in the tables on page 10 and 11 represent only a preselection based on practical experiences. The selection for different applications can be made with the aid of the current specification of the servo amplifier according to the table on page 8.

- In coordination with the overall planning of the machine the selection of
  - the radio interference suppression
  - the preassembled cables for encoder and power connection
  - as well as necessary braking resistors

  is to be made (see page 14 and 15).

For more information as well as advice in solving your application contact our engineers and technicians within the KEB distribution network at the parent company Barntrup.

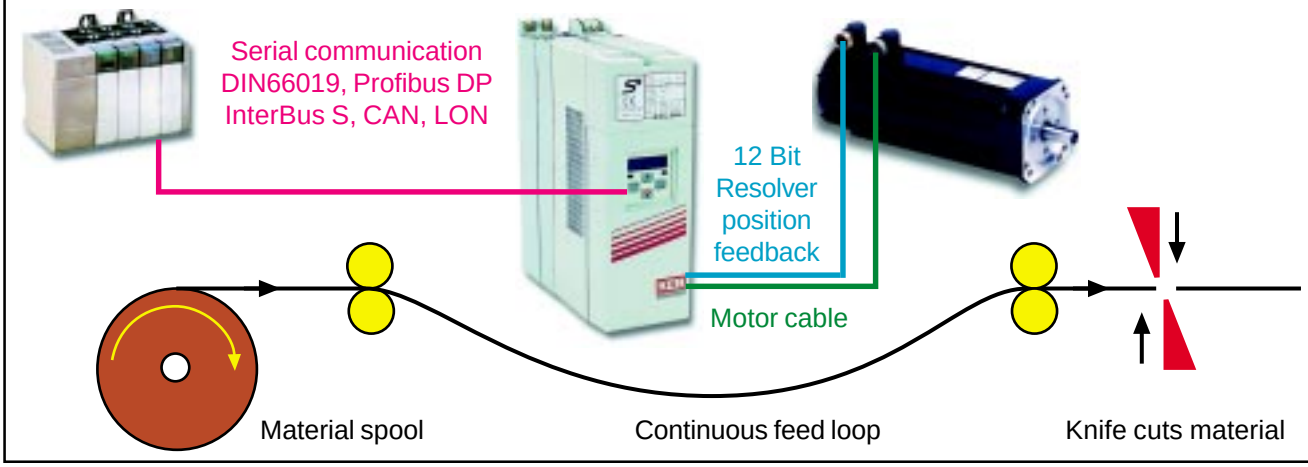
Positioning

The KEB COMBIVERT S4 servo system is capable of operating as a „stand alone“ positioning system

The universal drive unit for

- **Packaging machinery**
- **Thermalform machinery**
- **Polybag machinery**
- **Electronic cam-operated switches**
- **Pick and place systems**
- **Feed or cut to length**
- **Rotary tool changers**
- **Extruder and worm drives**
- **Automatic assembly machinery**

Example Application - Cut to length



S4 Positioning System Features

- **8 internally stored positions**
- **Absolute or incremental feedback systems**
- **Drive profile with speed, ramps, s-curves**
- **Moves changed via serial communication or keypad**
- **Teach function**
- **Built-in limit functions**
- **Auto homing sequence**
- **Adjustable „in position“ signal**
- **Secondary position loop**
- **Absolute and relative positions**

S4 Synchronizing and Conveying

KEB COMBIVERT S4 Servo Systems can also be used to synchronize one mechanical system to another

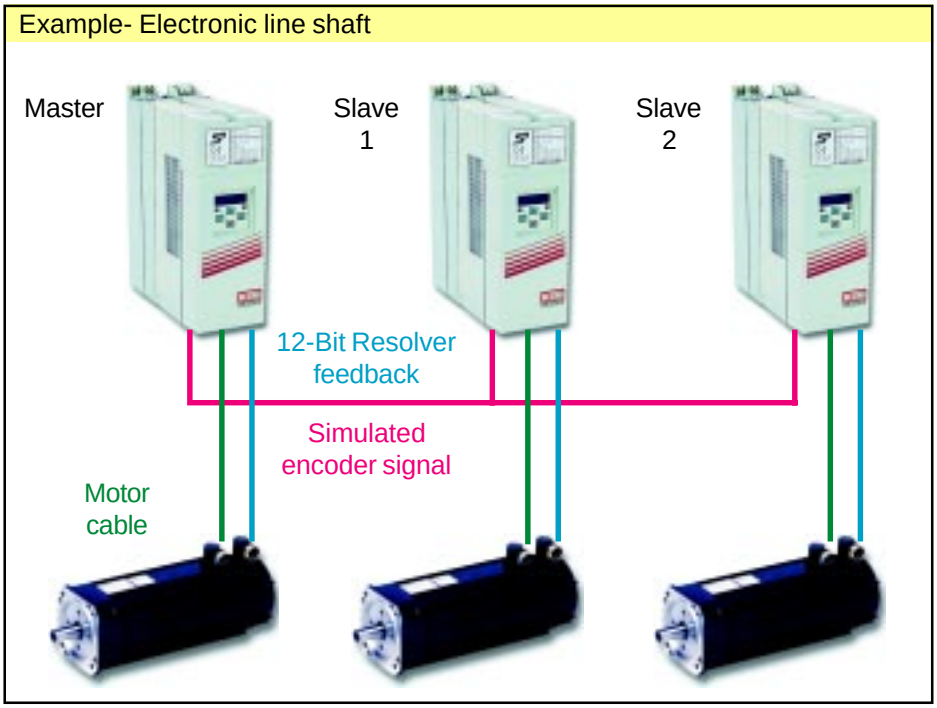
Applications

- **Electronic line shaft**
- **Electronic gearbox**
- **Flying saws**
- **Merge mechanisms / Register functions**
- **Transfer lines**

Features

- **Programmable angular offsets**
- **Adjustable gear ratio**

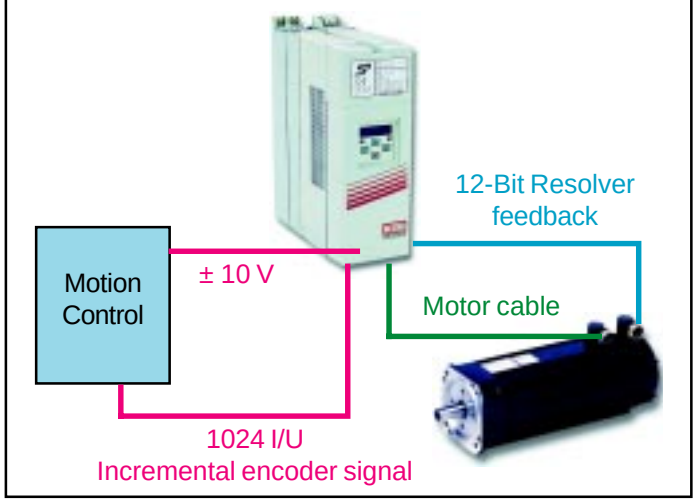
Example- Electronic line shaft



S4 Dynamic and Precise Controlling

KEB COMBIVERT S4 Servo Systems take over important parts of the plant and machine controlling

Example - Torque control



Applications

- **Motion control**
- **± 10V Speed control**
- **± 10V Torque control**
- **Replacement of DC-drives**

Features

- **High speed current control circuit (64µs)**
- **up to 5 ∗ T_N peak torque**
- **Motor protection IP65**

Technical Data - Control Circuit

Hardware

Host microprocessor	16-bit
DSP	16-bit
Analog inputs (2)	12-bit signed (11bit plus sign bit) ± 10V differential input scan time 128 µs
Analog outputs (2)	8-bit ± 10V output sample rate 2ms
Digital inputs	PNP or NPN 13-30V DC R_{in} = 2.7kΩ Scan time 2ms (special software 128 µs)
Digital outputs	PNP / Relay 2-Transistor 13-30V DC $I_{Loadmax}$ = 20mA each output Relay 30V DC 1A NO and NC Scan time 2ms
Power supply	Internal 24V DC $I_{Loadmax}$ = 60mA External 24-30V DC $I_{Loadmax}$ = 100mA
Feedback	Resolver 12-bit optional sin/cos encoder
Auxiliary feedback connection	Simulated encoder output 1024 ppr or encoder input - 500-5000 ppr; optional SSI absolute encoder input 24-bit greyscale

Controller

Speed Control	
Accuracy	± 0,5 rpm
Speed control sample rate	128 µs
Current control sample rate	64 µs
Syncronous Control	
Accuracy (1:1 gear ratio)	± 0,15°
Gear ratio	0,001 to 20,000
Offset compensation	adjustable
Master speed signal	5V RS485 A+, A- / B+, B- / C+, C-, quadrature 500 to 5000 ppr. adjustable
Position Control	
Internally stored positions	8 selectable through i/O (new positions can be downloaded via serial bus)
Velocity profile adjustments	s-curve, ACC- and DEC-ramps, maximum run speed, nominal speed, target window, distance
Accuracy	± 1 increment
Output signals	position reached, greater or less than preset position, speed limit, fault

Base Parameters CP-Mode

CP	0	Password input
CP	1	Actual speed indication
CP	2	Inverter status
CP	3	Apparent motor current
CP	4	Max. apparent motor current
CP	5	Actual torque
CP	6	Set speed
CP	7	Acceleration time
CP	8	Deceleration time
CP	9	Torque limit
CP	10	Max. run speed
CP	11	Jog speed
CP	12	Proportion gain speed regulator

CP	13	Integral gain speed regulator
CP	14	Incremental encoder pulses/revolution
CP	15	External fault condition
CP	16	Zero volt offset analog input 1
CP	17	Zero volt noise filter analog input 1
CP	18	Function analog output 1
CP	19	Amplification analog output 1
CP	20	Amplification analog output 2
CP	21	Switching condition digital output 1
CP	22	Switching condition digital output 2
CP	23	Torque level digital output 1
CP	24	Speed level digital output 2

Technical Data - Power Part

KEB COMBIVERT is designed to operate from industrial voltages ranging from 180 to 264 V AC (200 V class) and 305 to 500 V AC (400 V class).
The ready-to-connect „stand alone“ units are listed with the values for rated output current, stall current and maximum output current and can drive different makes of synchronous motors.

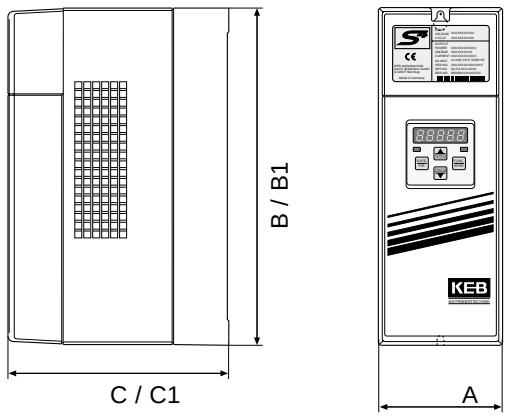
Size	**03**	**05**	**07**	**10**
Housing size	D	D	D	D
Supply voltage [V]	180 ... 264 ± 0%		305 ... 500 ± 0%	
Line frequency [Hz]	50/60 ± 2Hz		50/60 ± 2Hz	
Line phases	1/3		3	
Rated input curent (1/3-phase) [A]	4.8 / 2.6	12.8 / 7	3	7
Max. perm. line fuse [A]	16 (1ph.)	16 (1ph.)	10	10
Rated output current I_N [A]	2.4	6.4	2.7	6.4
Stall current I_{d0} [A]	2.4	6.4	2.7	6.4
Maximum output current I_{max} [A]	9.7 / 1000ms	16 / 500ms	10.6 / 200ms	22 / 200ms
Line cross section [mm²]	1.5	1.5	1.5	1.5

Size	**12**	**16**	**18**
Housing size	E	G	H
Supply voltage [V]	305 ... 500 ± 0%		
Line frequency [Hz]	50/60 ± 2Hz		
Line phases	3		
Rated input current [A]	18.2	24	57.5
Max. perm. line fuse [A]	20	25	80
Rated output current I_N [A]	16.5	21.5	50
Stall current I_{d0} [A]	16.5	21.5	50
Maximum output current I_{max} [A]	38 / 200ms	50 / 600ms	75 / 1000ms
Line cross section [mm²]	2.5	4	10

Temperature range	Operation: -10° … +45°C Storage: -25° … +70°C
Type of protection	IP 20

When ordering please specify motor size, speed and voltage and we will match the amplifier.

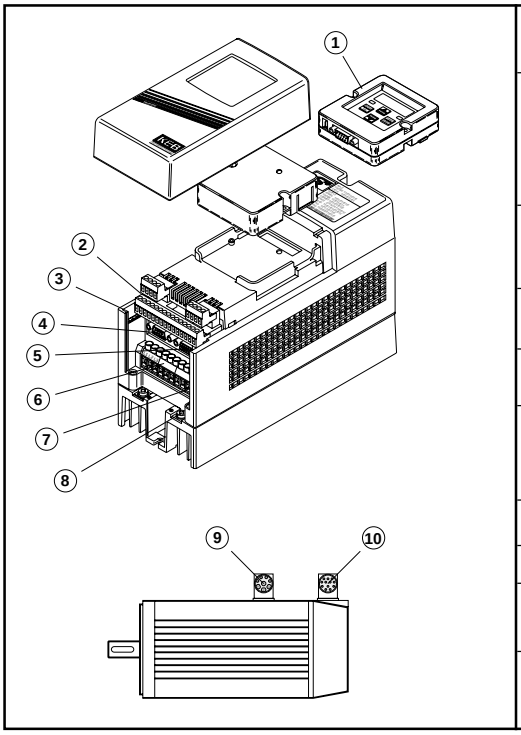
Dimensions Servo Amplifier

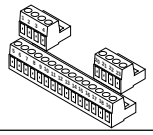
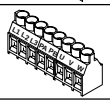
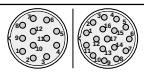


Housing	(Dimensions in mm) A	B	B1*	C	C1*	Weight [kg]
D	90	250	-	165	-	2.0
with filter	90	-	265	-	210	2.5
E	130	290	-	200	-	3.6
with filter	130	-	352	-	250	4.6
G	170	340	-	255	-	10
with filter	181	-	415	-	311	13.2
H	297	340	-	255	-	14
with filter	300	-	445	-	321	19.1

***** optional with submount filter (page14)

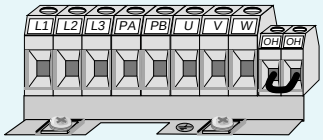
Connection



1		9-pin Sub-D-socket, parameterization interface (option)	
2		Terminal strip X1, connection of the control terminals	
3		AMP tab connector, shield connection / earth ground	
4		9-pin Sub-D-socket X3, incremental encoder simulation	
5		15-pin Sub-D-socket X4, resolver- / sin/cos-encoder input	
6		Terminal strip X2, motor connection, supply voltage connection, braking resistor connection	
7		Terminal OH / OH, PTC-connection	
8		GND connection	
9		8-pin power connector, motor power connection, PTC, brake (option)	
10		12-pin resolver connection	17-pin sin/cos encoder connection

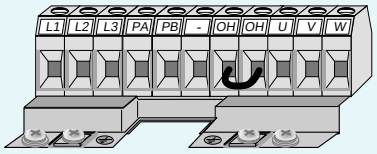
Power Part Terminals

Hosuing D



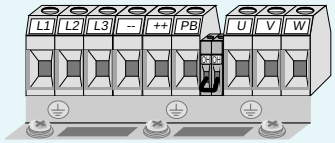
Servo amplifier
Size 03,05 ***(1/3 x 230V)***
Size 07,10 ***(3 x 400V)***

Housing E



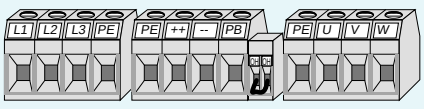
Servo amplifier
Size 12 ***(3 x 400V)***

Housing G



Servo amplifier
Size 16 ***(3 x 400V)***

Housing H



Servo ampflifier
Size 18 ***(3 x 400V)***

L1, L2, L3	-	Power supply
PA/ ++, PB	-	Connection braking resistor
U, V, W	-	Motor connection
OH, OH	-	PTC - connection
PE	-	Ground connection

Control Circuit Terminals X1

1	Drive enable
2	Reset
3	Enable forward
4	Enable reverse
5	Jog-speed forward
6	Jog-speed reverse
7	Input external fault
8	Digital output 1
9	Digital output 2
10	+24 V voltage output
11	Digital ground +24V
12	+10 V reference voltage
13	Analog Common
14	Analog set value +
15	Analog set value -
16	Analog torque +
17	Analog torque -
18	Progr. analog output 1
19	Progr. analog output 2
20	Relay: NO contact
21	Relay: NC contact
22	Relay: switching contact
23	Ext. supply +24 V

Technical Data - Servo Motors

Motor Size		A1	A2	A3	A4	B1		B2		B3	
Rated speed n_n	[min^{-1}]	6000	6000	6000	6000	4000	6000	4000	6000	4000	6000
Power rating	[kW]	0.2	0.3	0.375	0.5	0.25	0.31	0.54	0.62	0.83	0.94
Rated torque T_N	[Nm]	0.32	0.48	0.6	0.8	0.6	0.5	1.3	1.0	2.0	1.5
Stall torque T_{d0}	**[Nm]**	**0.34**	**0.5**	**0.65**	**1.0**	**0.65**		**1.5**		**2.3**	
Pulse torque Td_s	[Nm]	1.6	2.4	3	4	3	2,5	6,5	5	10	7,5
Rotor inertia torque (x10^{-4})	[kg·m^2]	0.17	0.24	0.31	0.45	0.22		0.36		0.57	
Perm. radial load F_R (at x=l_1/2)	[N]	210				300	270	300	270	300	270
Perm. axial load F_A	[N]	140				220	180	220	180	180	180
Type of protection		IP64 (IP65 with shaft seal ring)									
Holding torque brake	[Nm]	2				2,5					
Rating of brake (24 V DC)	[W]	11				12					
Brake inertia torque (x10^{-4})	[kg·m^2]	0.67				0.38					
Suggested amplifier size		**03 / 07**				**05 / 07**				**05 / 10**	
Voltage	[V]	230 / 400									

Motor Size		C1			C2			C3			C4		
Rated speed n_n	[min^{-1}]	3000	4000	6000	3000	4000	6000	3000	4000	6000	3000	4000	6000
Power rating	[kW]	0.25	0.31	0.44	0.75	0.92	1.25	1.22	1.47	1.76	1.57	1.88	1.88
Rated torque T_N	[Nm]	0.8	0.75	0.7	2.4	2.2	2	3.9	3.5	2.8	5	4.5	3
Stall torque T_{d0}	**[Nm]**		**0.95**			**2.7**			**4.5**			**6**	
Pulse torque Td_s	[Nm]	4	3.7	3.5	12	11	10	19.5	17.5	14	25	22.5	15
Rotor inertia torque (x10^{-4})	[kg·m^2]		1.2			2.7			4.2			5.4	
Perm. radial load F_R (at x=l_1/2)	[N]	400	350	320	400	356	320	400	350	320	370	330	260
perm. axial load F_A	[N]	310	260	220	310	260	220	310	260	220	280	240	200
Type of protection		IP64 (IP65 with shaft seal ring)											
Holding torque brake	[Nm]	9											
Rating of brake (24 V DC)	[W]	18											
Brake inertia torque (x10^{-4})	[kg·m^2]	0.6											
Suggested amplifier size		**05 / 07**						**05 / 10**					
Voltage	[V]	230 / 400											

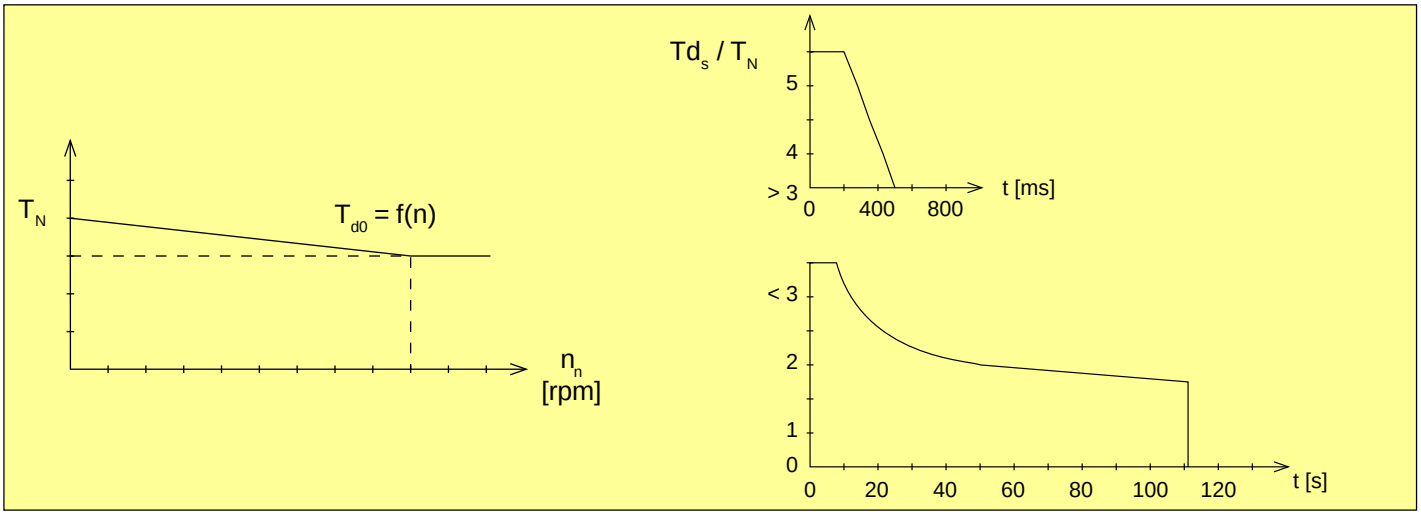
Motor Size		D1			D2			D3			D4		
Rated speed n_n	[min^{-1}]	3000	4000	6000	3000	4000	6000	3000	4000	6000	3000	4000	
Power rating	[kW]	1.2	1.5	1.9	1.9	2.4	2.4	2.6	3.2	3.1	3.1	3.6	
Rated torque T_N	[Nm]	3.7	3.5	3.0	6.1	5.8	3.8	8.4	7.6	5	9.9	8.6	
Stall torque T_{d0}	**[Nm]**		**4.2**			**7**			**10**			**12**	
Pulse torque Td_s	[Nm]	18.5	17.5	15	30.5	29	19	42	36	25	49.5	43	
Rotor inertia torque (x10^{-4})	[kg·m^2]		4.8			7.4			9.8			12.7	
Perm. radial load F_R (at x=l_1/2)	[N]	640	550	490	640	550	490	640	550	490	640	550	
Perm. axial load F_A	[N]	500	420	350	500	420	350	500	420	350	500	420	
Type of protection		IP64 (IP65 with shaft seal ring)											
Holding torque brake	[Nm]	11											
Rating of brake (24 V DC)	[W]	21											
Brake inertia torque (x10^{-4})	[kg·m^2]	2,3											
Suggested amplifier size		**10**											
Voltage	[V]	400											

Technical Data - Servo Motors

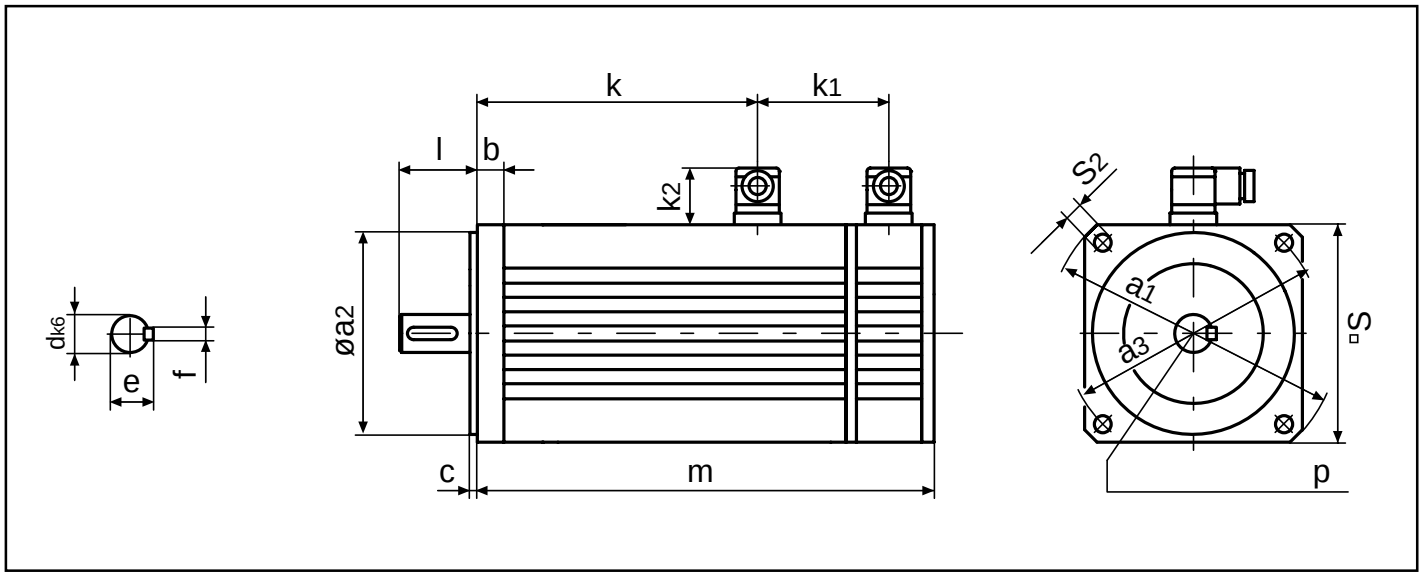
Motor Size		E1			E2			E3			E4	
Rated speed n_n	[min^{-1}]	2000	3000	4000	2000	3000	4000	2000	3000	4000	2000	3000
Power rating	[kW]	1.5	2.0	2.2	2.6	3.5	3.2	3.5	4.6	3.6	4.5	4.9
Rated torque T_N	[Nm]	7	6.5	5.2	12.2	11	7.6	16.5	14.6	8.7	21.4	15.5
Stall torque T_{d0}	**[Nm]**	**8.5**			**14**			**19**			**27**	
Pulse torque Td_s	[Nm]	35	32.5	26	61	55	38	82.5	73	43.5	107	77.5
Rotor inertia torque (x10^{-4})	[kg·m^2]	12.3			19.5			26.7			36	
Perm. radial load F_R (at x=l_1/2)	[N]	1100	1000	850	1100	1000	850	1100	1000	850	1100	1000
perm. axial load F_A	[N]	900	770	650	900	770	650	900	770	650	900	770
Type of protection		IP64 (IP65 with shaft seal ring)										
Holding torque brake	[Nm]	36										
Rating of brake (24 V DC)	[W]	26										
Brake inertia torque (x10^{-4})	[kg·m^2]	5.9										
Suggested amplifier size		**10**			**12**			**16**				
Voltage	[V]	400										

Motor Size		F1				F2			F3		
Rated speed n_n	[min^{-1}]	1500	2000	3000	4000	1500	2000	3000	1500	2000	3000
Power rating	[kW]	3.5	4.5	6.3	6.7	6.6	7.9	9.7	9.6	10.9	10.4
Rated torque T_N	[Nm]	22.5	21.5	20	16	42	38	31	61	52	33
Stall torque T_{d0}	**[Nm]**	**25**				**50**			**70**		
Pulse torque Td_s	[Nm]	112	84	82	69	147	110	112	219	166	109
Rotor inertia torque (x10^{-4})	[kg·m^2]	84				147			210		
Perm. radial load F_R (at x=l_1/2)	[N]	2500	2300	1900	1800	2500	2300	1900	2500	2300	1900
Perm. axial load F_A	[N]	2000	1800	1500	1400	2000	1800	1500	2000	1800	1500
Type of protection		IP64 (IP65 with shaft seal ring)									
Holding torque brake	[Nm]	85									
Rating of brake (24 V DC)	[W]	36									
Brake inertia torque (x10^{-4})	[kg·m^2]	17.6									
Suggested amplifier size		**12**			**16**			**18**			
Voltage	[V]	400									

Load Characteristic of Servo Motors



Dimensions Motor



Size	a_1	a_2 js6	a_3	b	c	d k6	e	f	k k_0	k k_B	k_1	k_2	l	m m_R	m m_G	m m_{RB}	m m_{GB}	p	S	S_2	Weight [kg] *
A1	74	40	63	11	2.5	9	10.2	3	72	97	33	37	20	121	149	145	173	M3	55	5.8	1.0 / 1.2
A2									85	109				133	161	157	185				1.2 / 1.4
A3									97	121				145	173	169	197				1.4 / 1.6
A4									121	146				170	193	194	222				1.8 / 2.0
B1	87	60	75	14	2.5	11	12.2	4	81	109	33	37	23	135	167	163	195	M4	70	5.3	1.5 / 1.8
B2									105	133				159	191	187	219				2.1 / 2.4
B3									141	169				195	227	227	255				2.9 / 3.2
C1	116	80	100	8	3	14	16	5	86	132	46	37	30	156	193	192	229	M4	92	7	2.7 / 3.2
C2									110	156				180	217	226	263				3.9 / 4.4
C3									144	190				214	251	260	297				5.2 / 5.7
C4									178	224				248	285	294	331				6.6 / 7.1
D1	136	95	115	10	3	19	21.5	6	138	145	52	37	40	218	248	226	256	M6	110	9	6.3 / 7.1
D2									168	175				248	278	256	286				7.9 / 8.7
D3									198	205				278	308	286	316				9.6 / 10.4
D4									228	235				308	338	316	346				11.2 / 12.0
E1	187	130	165	17	3.5	24	27	8	142	187	55	37	50	231	263	276	308	M8	140	11	10.2 / 11.8
E2									172	217				261	293	306	338				12.3 / 13.9
E3									202	247				291	323	336	368				15.5 / 17.1
E4									247	292				336	368	381	413				20.4 / 22.0
F1	237	180	215	-	4	32	35	10	254	254	60	55	58	348	386	348	386	M12	190	14	30.5 / 34.3
F2									334	334				428	466	428	466				44.0 / 47.8
F3									414	414				508	546	508	546				57.5 / 61.3

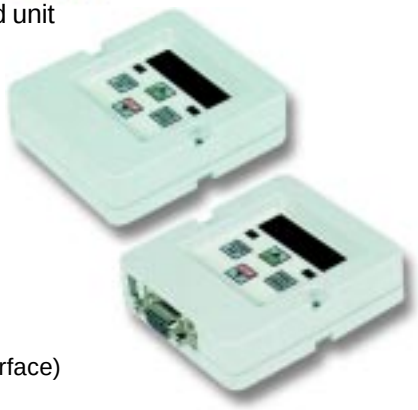
All dimensions in mm

With keyway according to DIN 6885/1
Centring according to DIN 332/2
* with brake

k_0 Without brake
k_B With brake
m_R With resolver
m_G With encoder (sin/cos)
m_{RB} With resolver and brake
m_{GB} With encoder (sin/cos) and brake

Display, Operation, Parameterization

- The servo amplifiers KEB COMBIVERT are supplied as preprogrammed standard unit with cover, status display and fault indicator



  - Plug-in modules are available for display and operation:
    DIGITAL OPERATOR
    00.F4.010-2009
    (5 character display and keypad)
    INTERFACE OPERATOR
    00.F4.010-1009
    (additionally with serial RS232/485 interface)

- **Parameterizing unit**
  MEMORY OPERATOR
  00.F4.010-3009
  (pluggable memory unit for the easy transfer of customer settings)
  - in combination with the COMBICARD-System
    00.F4.000-3009
    prepared for **data management independent from a PC**

- LCD TERMINAL **00.58.022-0201 / 0202**
  A combination of display and input station with 2x16 characters permits the representation of parameters as well as the management of unit settings. Using serial interfaces the serial communication of up to 256 KEB COMBIVERT inverters and amplifiers is possible.

Field Bus Communication

Radio Interference Suppression Filter

Optionally the servo amplifiers KEB COMBIVERT S4 are available with integrated radio interference suppression. The filters comply with EN 55011/B taken into account conducted interferences. This permits the use of the units in domestic and industrial districts. Besides the filters the radio interference suppression also incorporates effective grounding plates providing a large contact surface for the shield connection.

Technical data radio interference suppression filter KEB COMBIVERT S4				
Unit size	Voltage [V]	Filter designation	Rated current [A]	Discharge current [mA]
03*	230	09.E4.T60-0001	20	12
05*	230	09.E4.T60-0001	20	12
07*	400	10.E4.T60-1001	8	15
10*	400	10.E4.T60-1001	8	15
12*	400	14.E4.T60-1001	20	30
16*	400	16.E4.T60-1001	50	30
18	400	18.E4.T60-1001	70	30

* available with built-on filter

Preassembled Cables

Motor cable

Shielded motor cables preassembled with connector on one end for motors up to size E, which incorporate separately shielded wires two each for the temperature sensor and the brake.

Motor sizes A1-E1	5 m	00.S4.019-0005
	10 m	00.S4.019-0010
	15 m	00.S4.019-0015
	20 m	00.S4.019-0020
Motor sizes E2-E4	5 m	00.S4.119-0005
	10 m	00.S4.119-0010
	15 m	00.S4.119-0015
	20 m	00.S4.119-0020

Encoder cable resolver

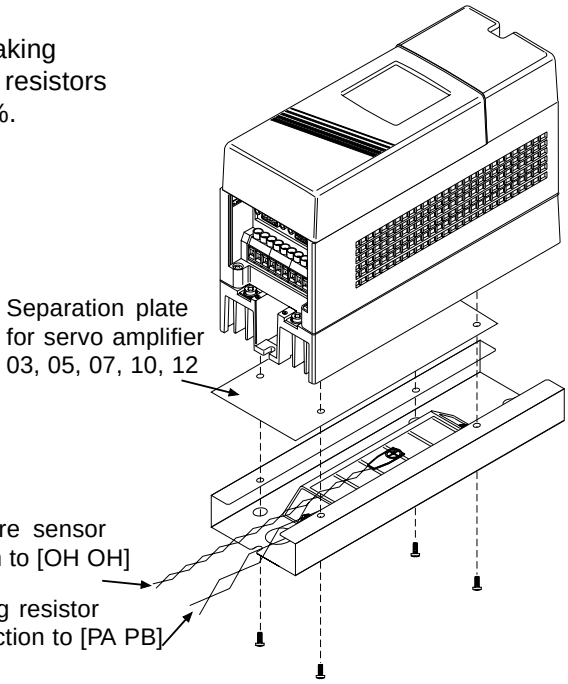
Shielded resolver cables preassemled with plug connector on one end for the motor and Submin 15-pin connector for the direct connection to the servo amplifier, encoder interface 1/ X4, on the other end.

All sizes	5 m	00.S4.109-0005
	10 m	00.S4.109-0010
	15 m	00.S4.109-0015
	20 m	00.S4.109-0020

Pulse Braking Resistor

To take up short-time generatoric load pulses compact back mounted braking resistors are available designed with space savings in mind. The braking resistors are fitted with a thermal contact and are layed out for total on time of 5 %.

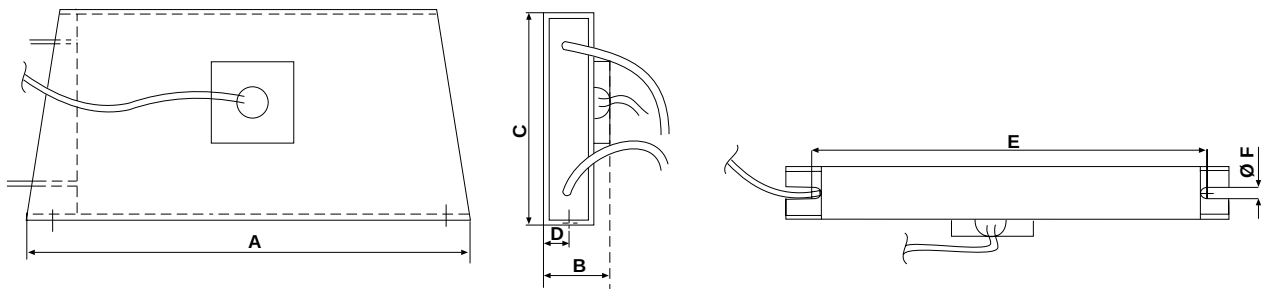
Size	Part Number	Braking Resistor [Ω]	P_N (5% ED) [W]
03,05,07,10	12.F4.D50-4200	82	700
12	14.F4.E50-4200	60	1200
16	16.F4.G50-4200	25	3200



$$ED = \frac{\text{Braking Time}}{\text{Total Cycle Time}}$$

Braking Resistor for Continuous Load

To take up larger energies use either the braking resistors designed for continuous load or the feedback module KEB COMBIVERT R4 which is available on request.



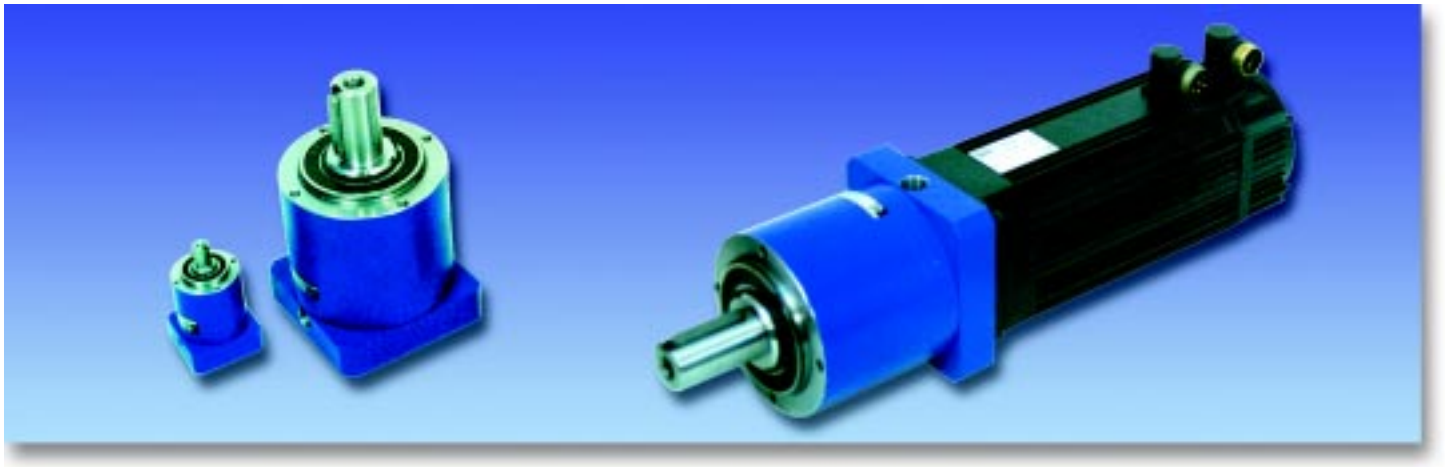
Amplifier Size	Part Number	R_B [Ohm]	P_D [W]	P_N 6 s / 120 s [kW]	A	B	C	D	E	Ø F
					[Dimensions in mm]					
03, 05	09.BR.100-1100	100	82	1.5	160	28	40	10	145	6
07, 10	10.BR.100-6270	270	130	2.1	300	28	40	10	285	6
12	12.BR.100-6150	150	230	3.7	300	28	80	10	285	6
16	16.BR.110-6423	42	820	13.1	470	63	96	32	455	16,5
18	18.BR.226-6203	20	1700	27.4	625	270	120	176/240	526	6

Panetary Gearboxes

For the adaption of speed and torque different gearbox solutions are available in the classical design of inline helical gear, spur worm gear, shaftmounted helical gear and helical bevel gear.
With the low backlash planetary gearboxes of the series Alpha, available in two performance variants

- **LP = 12/15‘**
- **SP = 6/8 ‘**, you get an optimal combination for dynamic tasks.

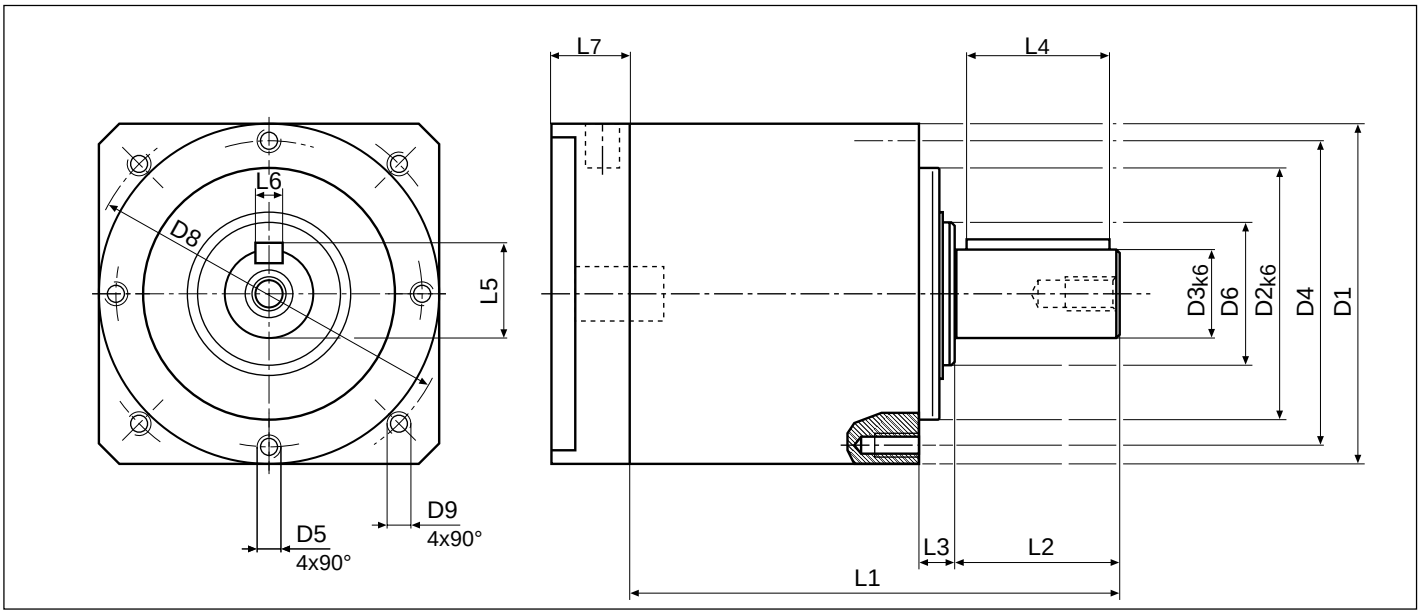
- **high reliability**
- **high efficiency > 95%**
- **maximum accuracy**
- **thermal length compensation**



Assignment Motor Size / Gear Ratio

Motor Size	n_N rpm	M_N Nm	LP 050	LP 070	LP 090	LP 120	LP 155	SP 060	SP 075	SP 100	SP 140	SP 180	SP 210
A1.SM.	6000	0.34	5…10	5…25				4…40	4…100				
A2.SM.	6000	0.5	5	5…10				4…28	4…50				
A3.SM.	6000	0.65	5	5…10				4…20	4…16				
A4.SM.	6000	1.0		5…10				4…16	4…40				
B1.SM.	6000	0.65	5	5…10	5…25			4…40	4…100				
B2.SM.	6000	1.5		5…10	5…25	5…50		4…10	4…40	4…100			
B3.SM.	6000	2.3		5	5…10	5…25		4…7	4…20	4…50			
C1.SM.	3000	1.0		5…10	5…25	5…50		4…10	4…40	4…100			
C2.SM.	3000	1.8		5	5…10	5…25		4…7	4…20	4…50			
C3.SM.	3000	2.8			5…10	5…25		4…5	4…10	4…28			
C4.SM.	3000	4.8				5…10			4…7	4…20			
D1.SM.	3000	3.4			5	5…10	5…25		4…7	4…20	28…50	70…100	
D2.SM.	3000	5.6			5	5…10	5…25		4…7	7…16	20…28	40…70	
D3.SM.	3000	7.5			5	5…10	5…,25		4…5	7…10	16…28	40…50	
D4.SM.	3000	9.6				5…10	5…10		4…5	7…10	16…20	28…50	
E1.SM.	3000	8.4				5…10	5…10			4…10	16…20	28…40	50…70
E2.SM.	3000	12.0				5	5…10			4…7	10…16	20…28	40…50
E3.SM.	3000	15.5				5	5…10			4…7	4…10	16…28	40
E4.SM.	3000	20.5				5	5…10			4…5	7…10	16…28	28…40

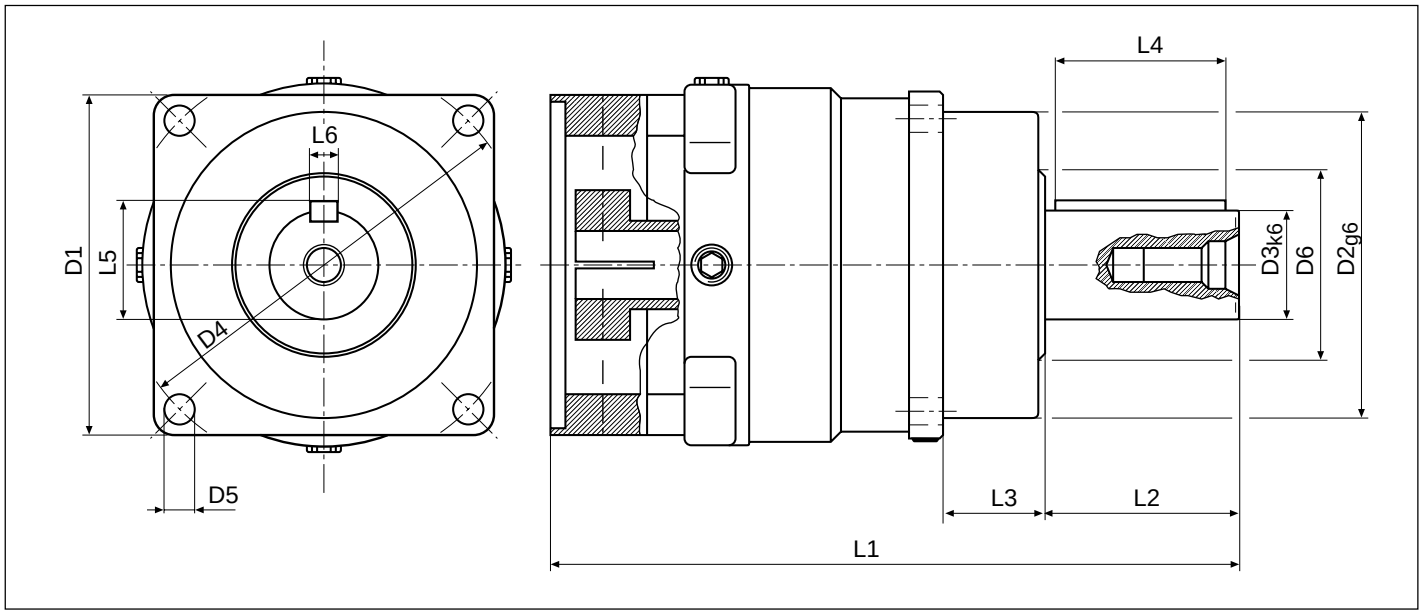
Technical Data LP Gearbox



Size [mm]	D1 Ø	$D2_{h6}$	$D3_{k6}$	D4	D5	D6	L1 1-stage	L1 2-stage	L2	L3	L4	L5	L6	L7
LP 050	50	35	12	44	M4	17	75	91	18	6,5	14	13.5	4	20
LP 070	70	52	16	62	M5	25	104	124	28	8	25	18	5	22
LP 090	90	68	22	80	M6	40	126	152.5	36	10	32	24.5	6	28
LP 120	120	90	32	108	M8	50	172	204.5	58	12	50	35	10	38
LP 155	155	120	40	140	M10	62	219.5	250	82	15	70	43	12	45

Technical Data Gearbox		**LP 050**	**LP 070**	**LP 090**	**LP 120**	**LP 155**
Max. acceleration torque	T_{2B} [Nm]	11.5	32	80	200	400
Nominal torque	T_{2N} [Nm]	5.2	15	35	90	170
Max. radial load	F_{rmax} [N]	650	1450	2400	4600	7500
Max. axial load	F_{amax} [N]	700	1550	1900	4000	6000
Torsional backlash	jt [arcmin]	12-15	12 - 15	12 - 15	12 - 15	12 - 15
Torsional rigidity	Ct.21 [Nm/arcmin]	0.9	3.3	9	24	55
Max. input speed	m_{max} [min^{-1}]	8000	6000	6000	4800	3600
Nominal input speed	m_{nom} [min^{-1}]	4000	3000	3000	2400	1800
Output shaft	$d_{shaft} * l_{shaft}$ [mm]	12 x 18	16 x 28	22 x 36	32 x 58	40 x 82

Technical Data SP Gearbox



Size [mm]	D1 Ø	D2$_{h6}$	D3$_{k6}$	D4	D5	D6	L1 1st.	L1 2st.	L2	L3	L4	L5	L6
SP 060	62	60	16	68	5.5	30	129	149	28	20	25	18	5
SP 075	76	70	22	85	6.6	38	156	182.5	36	20	32	24.5	6
SP 100	101	90	32	120	9	55	202	234.5	58	30	50	35	10
SP 140	141	130	40	165	11	70	256.5	296.5	82	30	70	43	12
SP 180	182	160	55	215	13	90	297	315.5	82	30	70	59	16
SP 210	212	180	75	250	17	120	350	397	105	38	90	79.5	20

Technical Data Gearbox		**SP 060**	**SP 075**	**SP 100**	**SP 140**	**SP 180**	**SP 210**
Max. acceleration torque	T_{2B} [Nm]	40	100	250	500	1100	1900
Nominal torque	T_{2N} [Nm]	25	70	170	360	1050	1500
Max. radial load	F_{rmax} [N]	2600	3800	6000	9000	14000	18000
Max. axial load	F_{amax} [N]	1300	1900	3000	4500	7000	9000
Torsional backlash	jt [arcmin]	< 6	< 6	< 4	< 4	< 4	< 4
Torsional rigidity	Ct.21 [Nm/arcmin]	3	8	24	45	144	400
Max. input speed	m_{max} [min^{-1}]	6000	6000	4500	4000	3500	3000
Nominal input speed	m_{nom} [min^{-1}]	4000	3000	2500	2000	2000	1500
Output shaft	$d_{shaft} * l_{shaft}$ [mm]	16 x 28	22 x 36	32 x 58	40 x 82	55 x 82	75 x 105

KEB Drive Systems

people in motion

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