

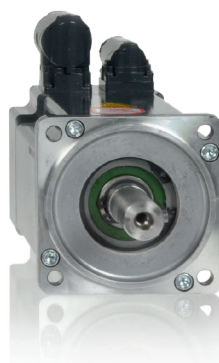
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Automatic Systems

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S6

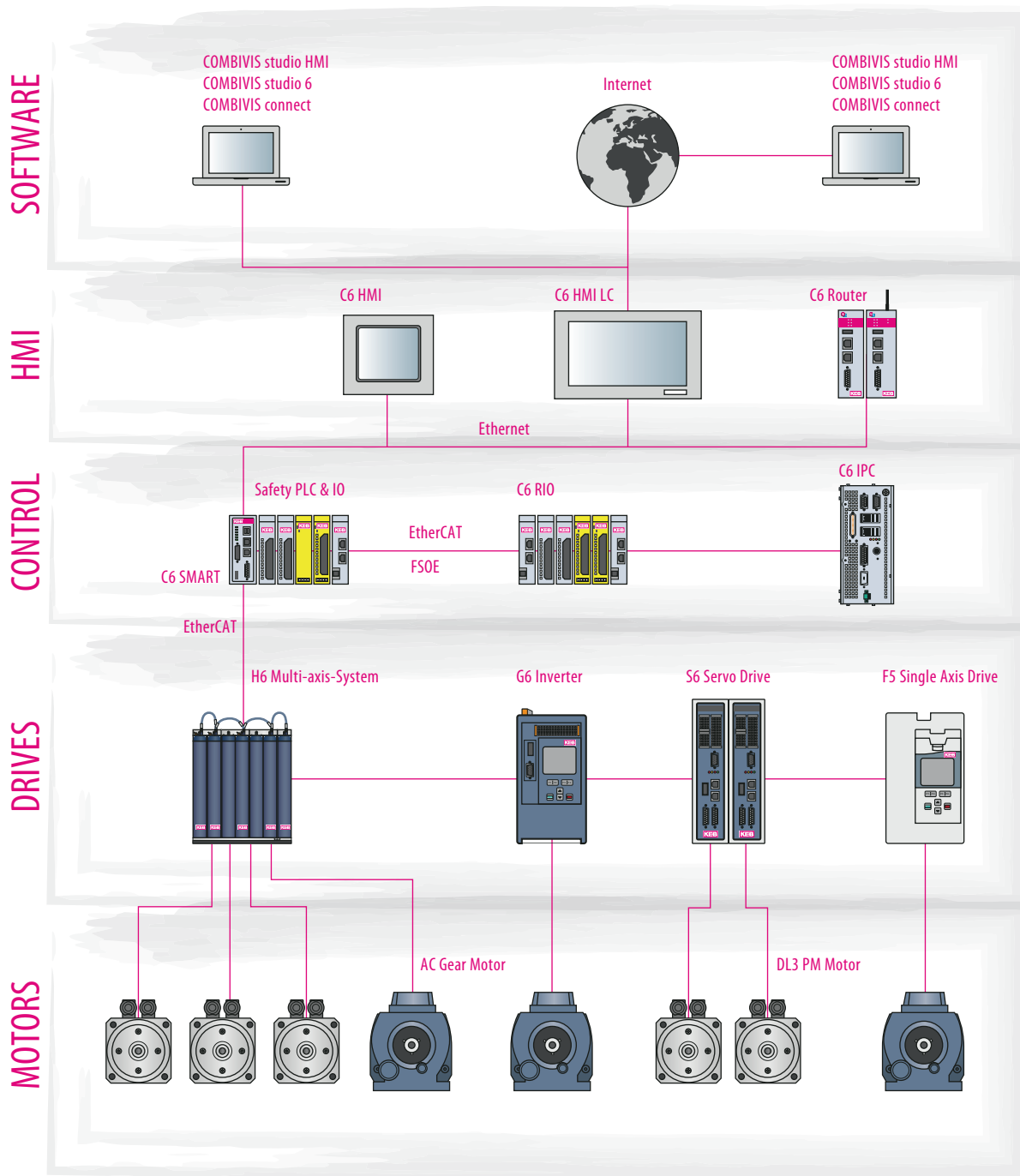
COMBIVERT S6



MADE
IN
GERMANY

Compact Servo Drives





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The COMBIVERT S6 servo system adds a compact, flexible and powerful drive module to the KEB product portfolio for highly dynamic servo applications.

The optimally selected KEB components are the key to this successful drive concept. At the heart, the innovative S6 servo drive is offered in an attractive book-style format and offers real-time performance. The S6 drives can be matched with the robust DL3 servo motors which are available in five sizes. Additionally, the DL3 servo motors may be paired with planetary gearheads with low rotational backlash. You can now design the complete servo drive system that is best suited to your application.

The package is made complete with pre-fabricated motor and encoder cables, which create the ideal conditions for easy installation, quick start-up and problem-free operation.

Let the following pages inspire you with regards to the diversity and performance of the COMBIVERT S6 servo system, and help you to find a drive solution that reliably meets your requirements.

*Optimally selected components:
The key to success.*



POWERFUL

- ✓ 0.75...5.5 kW in two enclosure sizes
- ✓ Book format for space-saving control cabinet configuration
- ✓ Direct connection to the mains for 230 V and 400-480 V grids, DC-input is also available, 260 ... 750 V
- ✓ Low leakage current mains filter (<5 mA) integrated, optional without filter
- ✓ High overload for excellent dynamics (250% / 3 s, 200% / 60 s)

MOTOR OPERATIONS

- ✓ Universal control for asynchronous, synchronous, IPM or synchronous reluctance motors
- ✓ Motor operation with encoder feedback or encoderless **ASCL/SCL** for precise speed control
- ✓ Motor temperature monitoring with PTC or KTY sensors
- ✓ Two-channel multi-encoder interface
- ✓ Integrated GTR7 brake transistor
- ✓ Integrated brake control and brake supply

REAL-TIME

or simply serially

- ✓ Real-time Ethernet-based interfaces
- ✓ CAN
- ✓ RS232/485 for diagnostics or display

Analog & Digital I/O

- ✓ 8 digital and 2 analog inputs
- ✓ 2 digital and 1 relay output
- ✓ 1 Analog output 0 ... 10 V



S6-K: Highly integrated and economical

The S6 with the K standard control option offers uncompromising integration, maximum performance and an optimum price/performance relationship.

These are the advantages of the basic version S6-K.
Fast link to the control level using EtherCAT and the CAN interface.

Also included is the integrated safety function „Safe Torque Off“ (STO).

Integrated functional SAFETY

- ✓ Safety function STO
in accordance to ISO 13849 Performance Level e / IEC 62061- SIL 3

Integrated Real-time Ethernet

- ✓ EtherCAT

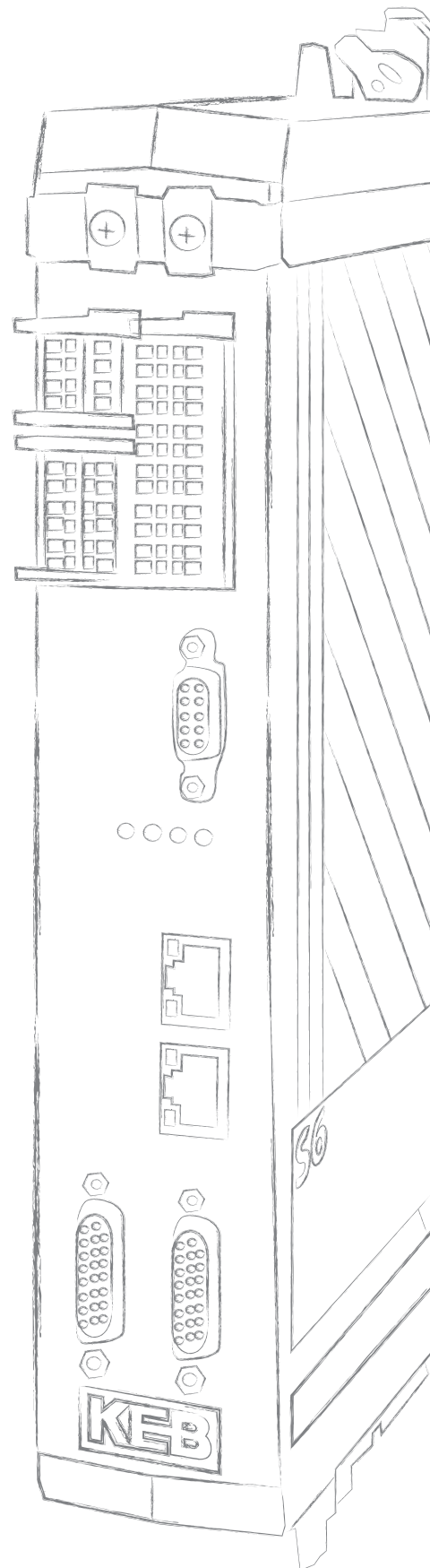
EtherCAT®

and as communication interfaces (standard feature)

- ✓ CAN

CANopen®

- ✓ Diagnostics RS232 / 485



S6-A: Modular and flexible

The characteristics of the S6-A control version can be summarised as modular, flexible and reliable.

It includes all of the advantages of the standard version and also offers users more flexibility for selecting the bus connection to the control level and a larger selection of safety functionality. To stand for the bus communication in a single device with the option - realtime Ethernet - in addition to EtherCAT optionally PROFINET IRT and POWERLINK available. STO and SBC are already integrated as standard safety features. Optionally, with safety module 2 users can also select up to three additional functions from an extensive package.

Modular functional SAFETY

Module 1

- ✓ Safety function STO according to ISO 13849 Performance Level e / IEC 62061- SIL 3 and SBC „Safe Brake Control“

Module 2

- ✓ Optionally with up to three additional functions, including:

SS1 “Safe Stop 1”	SLP “Safely-Limited Position”
SS2 “Safe Stop 2”	SLI “Safely-Limited Increment”
SOS “Safe Operating Stop”	SDI “Safe Direction”
SLS “Safely-Limited Speed”	SSM “Safe Speed Monitoring”

Real-time Ethernet module

- ✓ EtherCAT



- ✓ ProfiNET IRT



- ✓ POWERLINK



And as communication interfaces (standard feature)

- ✓ CAN

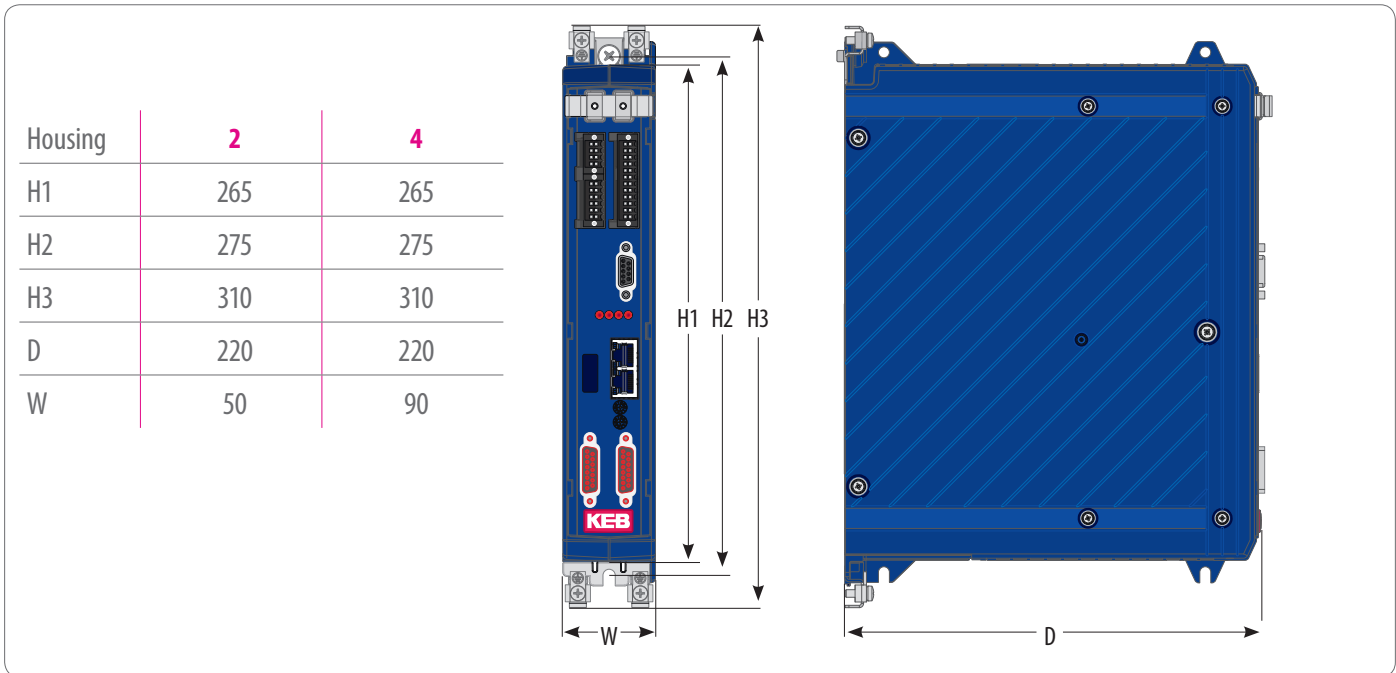


- ✓ Diagnostics RS232 / 485

Housing			2			4	
Device size			07	09	10	12	13
Mains phases			3				
Output rated power	S_A	[kVA]	1.8	2.8	4	6.6	8.3
Max. motor rated power	P_{mot}	[kW]	0.75	1.5	2.2	4.0	5.5
Output rated current	I_N	[A]	2.6	4.1	5.8	9.5	12.0
Short maximum current (3 s / 60 s) ¹⁾	I_{HSR}	[%]	250 / 200				
max. current 0 Hz / cutoff frequency at $f_s = 4$ kHz ¹⁾	I_0	[%]	200/250		150/250		200/250
max. current 0 Hz / cutoff frequency at $f_s = 8$ kHz ¹⁾	I_0	[%]	125/200		100/200	150/250	125/200
max. current 0 Hz / cutoff frequency at $f_s = 16$ kHz ¹⁾	I_0	[%]	75/180	50/120	50/120	75/150	75/125
Cutoff frequency point	f_d	[Hz]	6				
Input rated current	I_{IN}	[A]	3.6	6	8	13	17
Max. permissible mains fuse	Type gG	[A]	16			20	25
Rated switching frequency	f_{SN}	[kHz]	8				
Max. switching frequency	f_{Smax}	[kHz]	16				
Rated losses	P_D	[W]	52	60	80	145	198
Standby losses	P_{Dnop}	[W]	8				
Min. brake resistance	R_{Bmin}	[Ω]	170	120	85	39	39
Max. braking current	I_{Bmax}	[A]	5	7	10	21.5	21.5
Input rated voltage (AC)	U_N	[V]	3-phasisig 400 (UL: 400 ... 480)				
Input voltage range (AC) ²⁾	U_{in}	[V]	184 ... 550 ±0				
Input voltage range (DC)	U_{indc}	[V]	260 ... 750 ±0				
Mains frequency	f_N	[Hz]	50 / 60 ±2				
Output voltage	U_A	[V]	3 x 0 ... U_{IN}				
Output frequency	f_A	[Hz]	0 ... 400 (fs=4 kHz) / 0 ... 599 (fs=8 kHz)				

¹⁾ the figures relate to the output rated current I_N on a percentage basis.

²⁾ In the case of rated voltage $\geq 460V$, multiply rated current with a factor of 0.86



Operating modes

Motor control mode	ASM: V/Hz, SMM, field-oriented with encoder, A.S.C.L. encoderless PMSM: field-oriented with encoder, S.C.L. encoderless IPMSM: field-oriented with encoder, S.C.L. encoderless SyncRM: field-oriented with encoder, S.C.L. encoderless
Application profile	CiA Draft Standard Proposal 402
Control mode	Asynchronous speed specification (Velocity Mode) Cycl. Synchronous speed specification (Cycl. Sync. Velocity Mode) Cycl. Synchronous position specification (Cycl. Sync. Position Mode) Cycl. Synchronous torque specification (Cycl. Sync. Torque Mode) Single-axis positioning module (Profile Positioning Mode) Homing Mode Torque pilot control crank drives

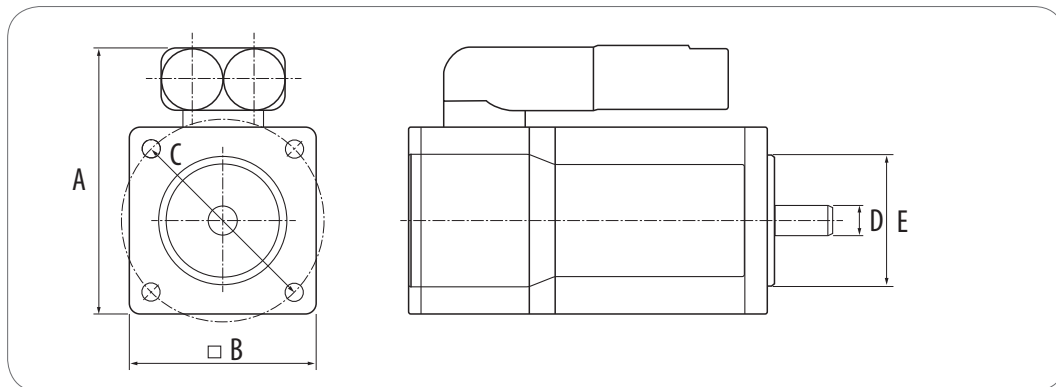
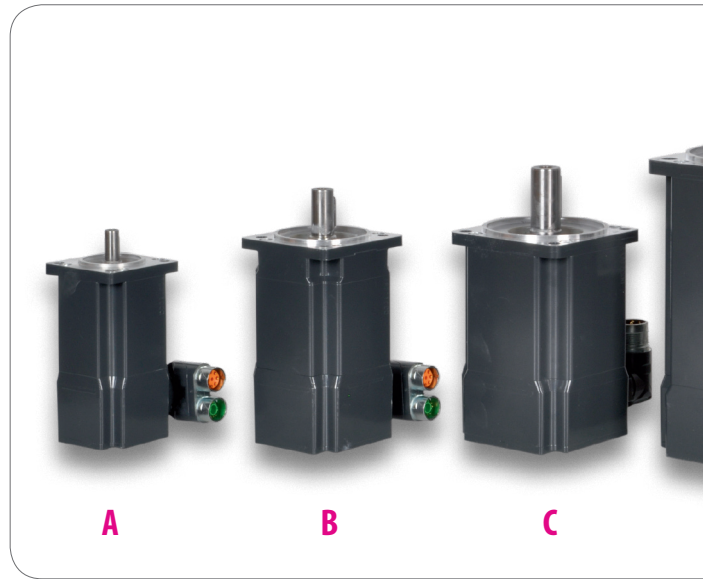
General

Product standard	EN 61800-2, -5-1
EMC transient emissions	
Grid-bound disturbance	EN 61800-3, C1 - 30 m / C2 - 50 m motor cable
Emitted disturbances	EN 61000-6-1...4, C2
Protection class	IP 20 / VBG 4
Environment	EN 60721-3-3 Operating temperature -10 ... 45 °C (up to max. 55 °C, 5% derating per 1 K) Storage temperature -25 ... 70 °C Humidity 3K3 - 5 ... 85% (no condensation)
Site altitude	Rated to 1000m (1% derate per 100m above 1000m). max. 2000m above sea level.

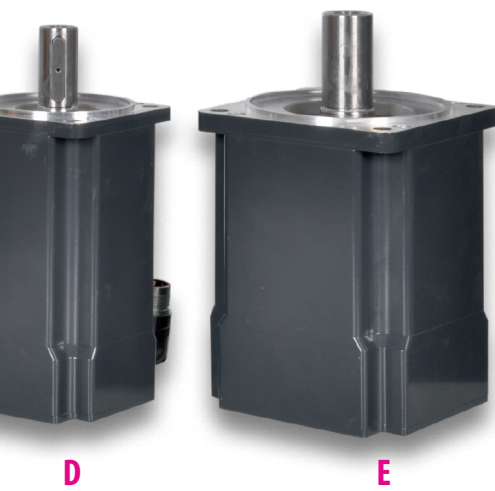
Servo motors

Dynamic Line 3

- ✓ 0.5 ... 29 Nm in five sizes
- ✓ Low inertia - high impulse torque
- ✓ Resolver or absolute rotary encoder, HIPERFACE single or multi-turn
- ✓ High degree of total efficiency
- ✓ Lifetime lubricated
- ✓ Universal installation positions
- ✓ Robust mechanics
 - ✓ Option: COMBIPERM holding brake
 - ✓ Option: Keyway with key
 - ✓ Option: IP65 shaft sealing



Motor	T [Nm]	T _n [Nm]	I _n [A]	Id ₀ [A]	n _n [rpm]	A [mm]	B □[mm]	C ∅ [mm]	D ∅ [mm]	E ∅ [mm]	Brake option [Nm]
A1	0.5	0.5	0.85	0.85							
A2SMHF_	0.8	0.7	1.30	1.50	8000	82.4	58	63	9	40	0.8
A3	1.2	1.0	1.85	2.20							
B1	1.4	1.3	1.90	1.95							
B2SMHF_	2.4	2.2	2.75	2.95	6000	96.4	72	75	14	60	2
B3	3.2	2.7	3.60	4.10							3.5
C1	2.5	2.3	2.90	3.00	6000						
C2SMHF_	4.1	3.7	3.80	4.10	5000	128.5	87	100	19	80	9
C3	5.7	4.9	4.75	5.40	5000						
D1	4.9	4.4	4.20	4.75	5000						9
D2SMHF_	8.2	6.9	5.20	6.30	4000	145.5	104	115	24	95	9
D3	11.4	8.4	6.30	8.80	4000						13
E1	12.8	11.0	6.80	7.80							20
E2SMHF_	21.1	15.2	9.40	12.4	3000	183.5	142	165	32	130	20
E3	29.0	13.2	8.10	17.2							30

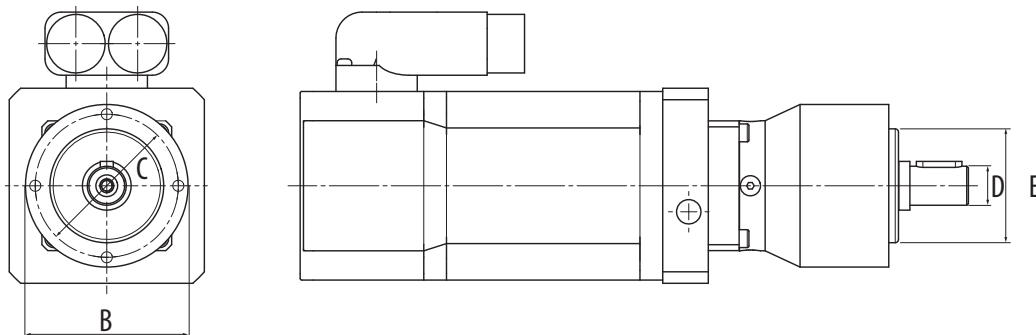
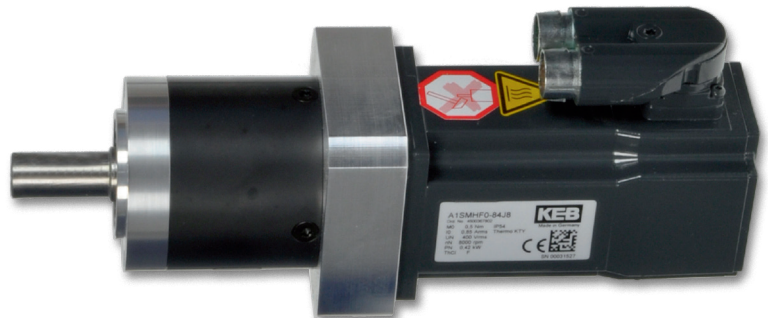


A_SMH	0.5 ... 1.2
B_SMH	1.38 ... 3.22
C_SMH	2.45 ... 5.65
D_SMH	4.9 ... 11.4
E_SMH	12.8 ... 29.0

Stall torque in Nm

Planetary gear SG paired with **Dynamic Line 3:**

- ✓ Low backlash
- ✓ High output torque
- ✓ High efficiency (97%)
- ✓ gear ratios $i = 3$ to 100
- ✓ Low audible noise
- ✓ Lifetime lubricated

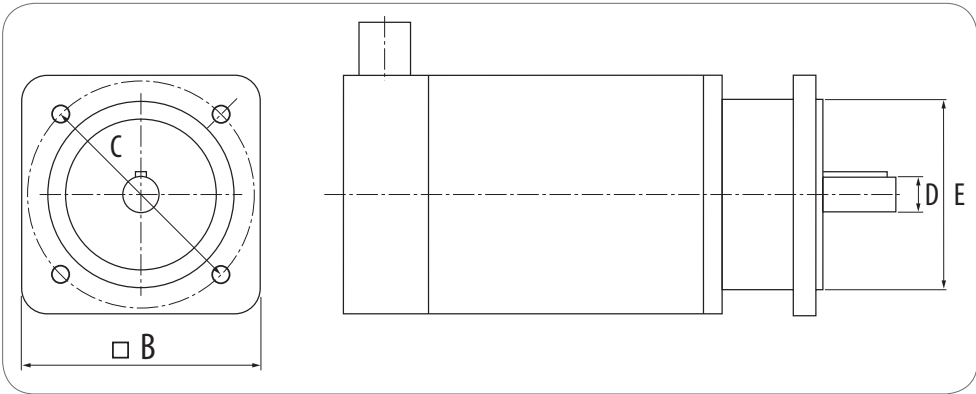


Gear size	T_{2N} [Nm]	T_{2max} [Nm]	n_{max} [RPM]	i	Backlash arc_{min}	B \varnothing [mm]	C \varnothing [mm]	D \varnothing [mm]	E \varnothing [mm]	recommended DL3-motor
1	5 ... 11	8 ... 17.5	5000	5 ... 40	15	50	44	12	35	A
2	15 ... 28	24 ... 45	4500		10	70	62	16	52	A B C
3	38 ... 85	61 ... 136	4000		7	90	80	22	68	A B C D
5	95 ... 115	152 ... 136	3000		7	120	108	32	90	B C D E
7	210 ... 460	336 ... 736	2800		8	155	140	40	120	C D E

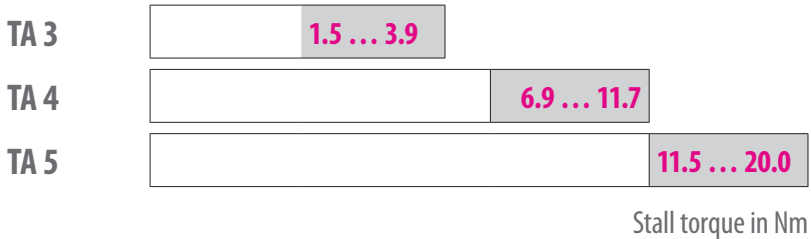
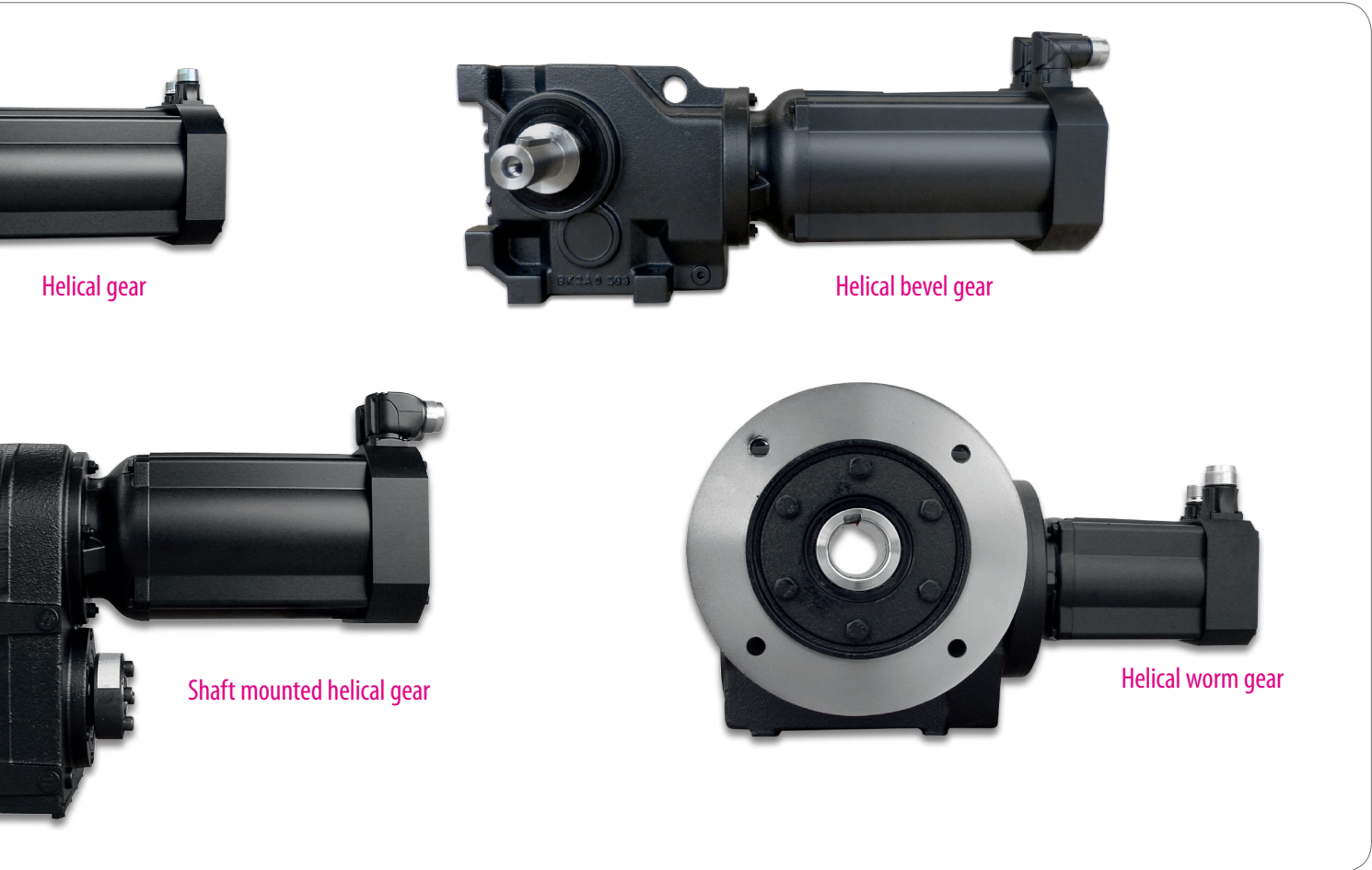
Servo gear motors

Servo Motors - TA Series

- ✓ 1.5 ... 20 Nm in three sizes
- ✓ Low inertia - high impulse torque
- ✓ Easy plug connection, straight or angled (360° rotatable)
- ✓ Compact size - directly integrated in the gear modules
- ✓ High total efficiency, lifetime lubricated, universal installation positions and robust mechanics
- ✓ Resolver or absolute rotary encoder, BiSS single and multi-turn
 - ✓ Optionally with COMBIPERM holding brake



Motor	T ₀ [Nm]	T _n [Nm]	Id ₀ [A]	I _n [A]	n _n [RPM]	B □[mm]	C ∅ [mm]	D ∅ [mm]	E ∅ [mm]	Brake option M _n [Nm]
31TA	1.5	1.4	1.1	1.1						
32TA	2.8	2.6	1.8	1.7	3000	88	100	14	80	4.5
33TA	3.9	3.6	2.5	2.4						
41TA	6.9	6.3	4.0	4.1						
42TA	9.2	8.2	5.9	5.2	3000	116	115	19	95	9
43TA	11.7	10.1	7.3	6.3						
51TA	11.5	10.4	7.4	6.6						
52TA	16.1	13.5	10.3	8.7	2000	145	165	24	130	18
53TA	20.0	16.1	12.8	10.3						



Technical info (rated torque, motor current, rated speed) can be found on KEB-DRIVE configuration software.

KEB-DRIVE can be downloaded free of charge at www.keb-drive.de.

Type	Size	Design	T_n [Nm]	i	TA3	TA4	TA5
G	0 ... 7	Helical gear	60 ... 4880	3.37 ... 250.97	■	■	■
F	2 ... 7	Shaft mounted helical gear	245 ... 4880	3.20 ... 274.23	■	■	■
K	0 ... 7	Helical bevel gear	58 ... 4880	3.38 ... 183.21	■	■	■
S	0 ... 4	Helical worm gear	55 ... 1160	5.09 ... 247.58	■	■	■

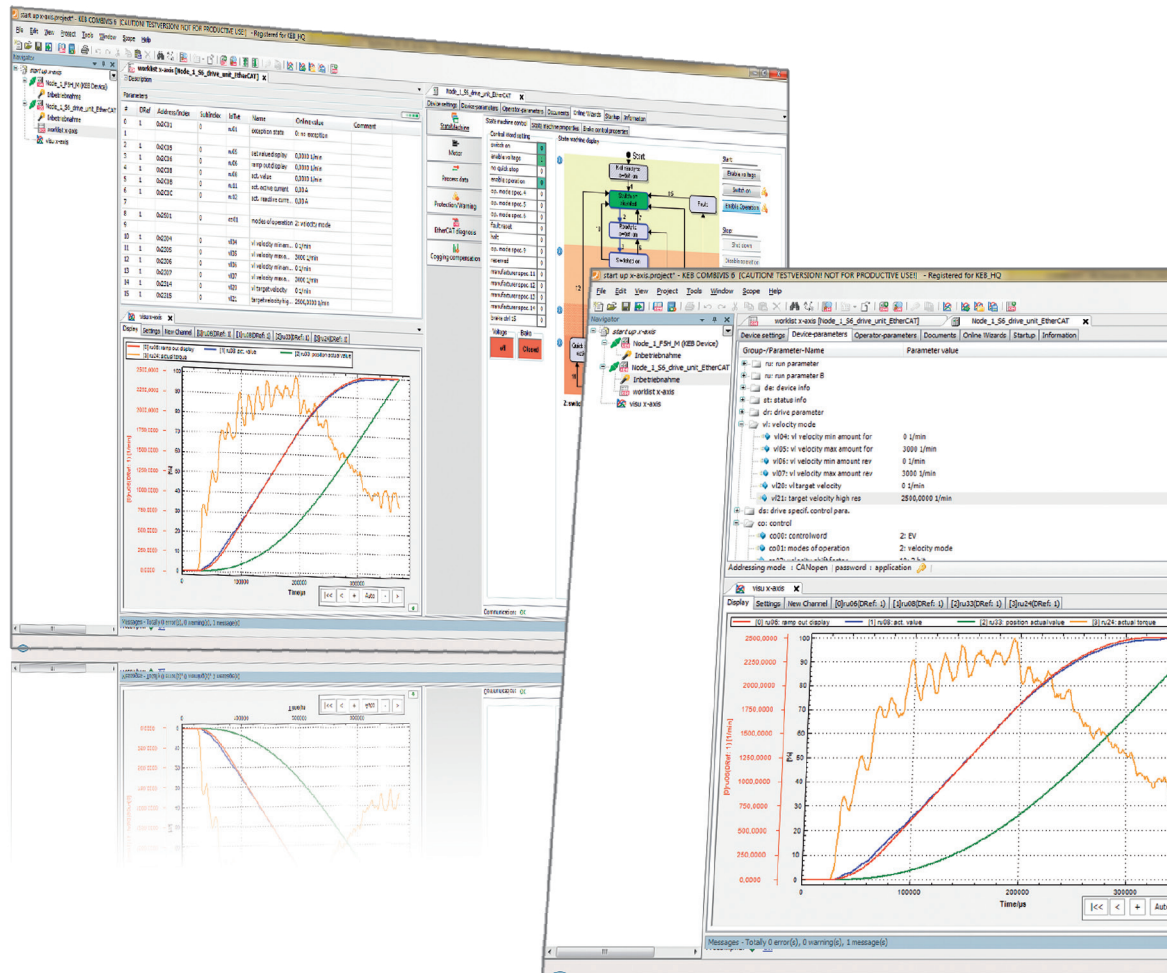


Feedback and Power Cables

- ✓ Pre-fabricated motor and encoder cables for easy installation
- ✓ High-quality and flexible design for cable drag chains
- ✓ Quick and tool-less installation with Speedtec plug connectors
- ✓ Optimally integrated shield connection
- ✓ For all supported motor and encoder types
- ✓ Available in lengths from 1 up to 50 meters

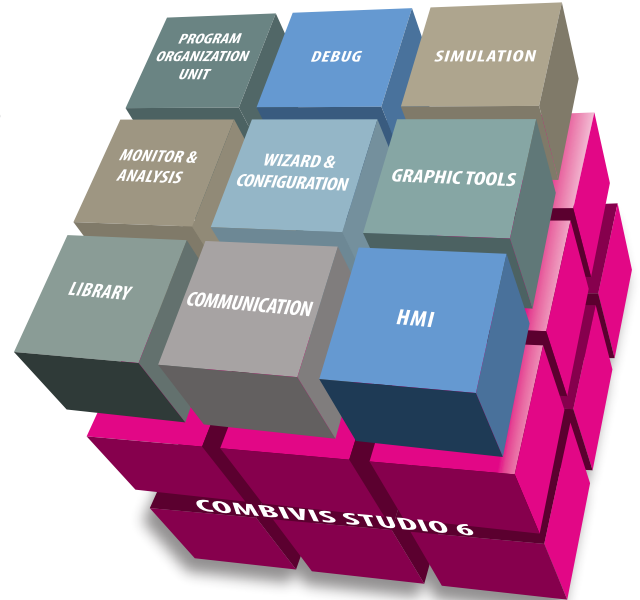
COMBIVIS 6

- ✓ Free and easy-to-use software for start-up, administration and analysis
- ✓ Integrated start-up assistants (Wizards) for quick and easy configuration
- ✓ Direct access to device documentation
- ✓ 16 channel oscilloscope for extensive analysis
- ✓ On-line parameter list comparison
- ✓ Parameterisation of key safety indicators and functions



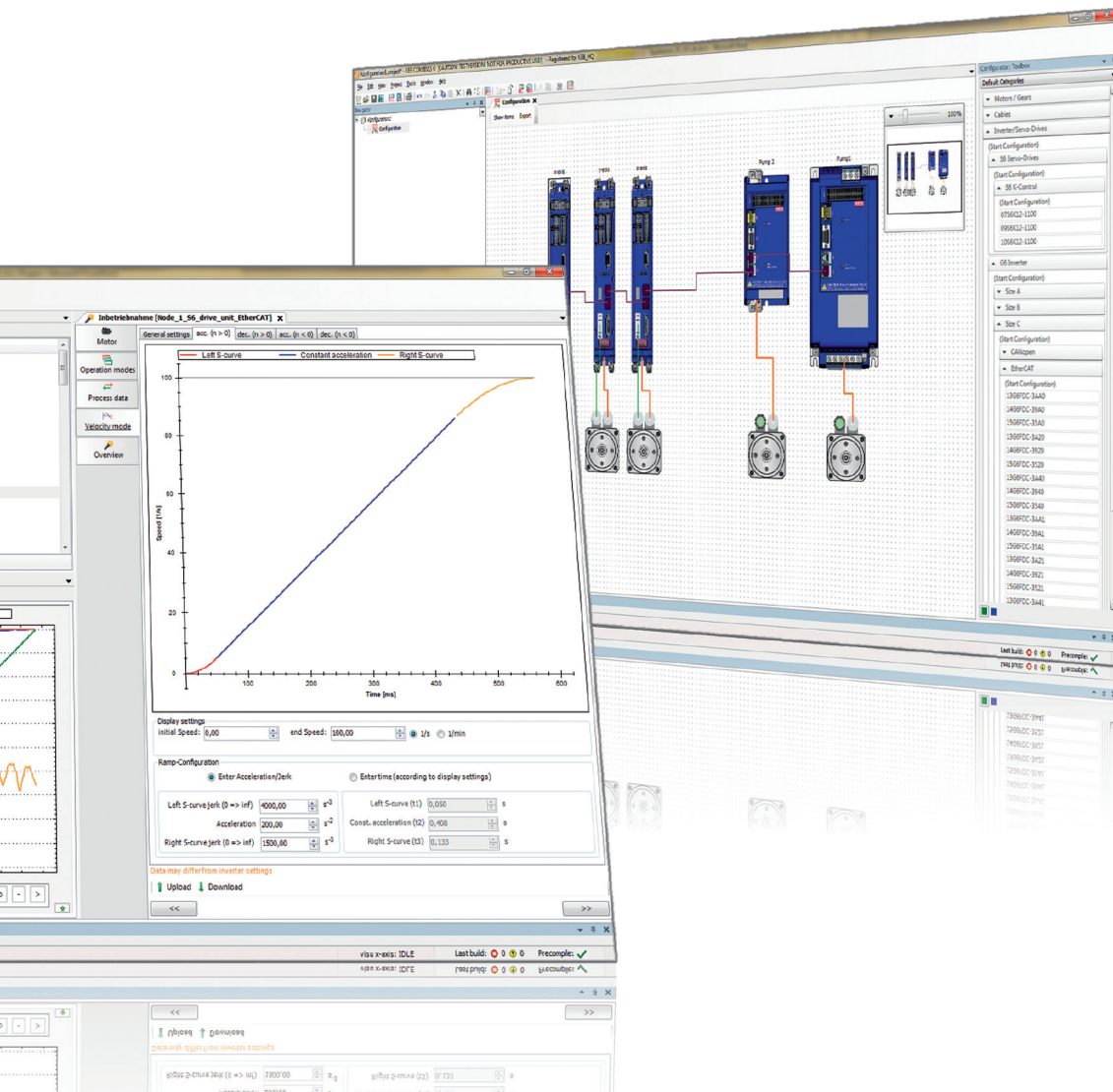
System configuration as a new component of COMBIVIS

- ✓ Access to complete KEB product database
- ✓ Intuitive gear component selection and system configuration using drag and drop
- ✓ Selection assistant with display of compatible components
- ✓ Display of all interfaces and connection components
- ✓ Extensive export function for quote list, Combivis Project, Excel ...



COMBIVIS studio 6 - the complete solution for system integration offers additionally

- ✓ PLC programming according to IEC 61131-3
- ✓ Bus master configuration (e.g.: EtherCAT, CAN, ProfiNET ...)
- ✓ Configuration of Remote I/Os
- ✓ Extensive functional module library
- ✓ Debugging tools for system optimization



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