S6
COMBIVERT S6

Compact Servo Drives
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System overview

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.*
**KEB COMBIVERT S6 - Benefits at a glance**

**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)
- High overload for excellent dynamics (250% / 3 s, 200% / 60 s)

**COMMUNICATION OPTIONS**
- Real-time Ethernet-based interfaces
- CAN
- RS232/485 for diagnostics or display

**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

**Analog & Digital I/O**
- 8 digital and 2 analog inputs
- 2 digital and 1 relay output
- 1 Analog output 0 ... 10 V
Powerful and compact

**AC mains voltage connection**

**Safety functions**
24 VDC power supply

**CAN interface**
2 analog inputs
1 analog output

**Serial diagnostic interface**

**Real-time Ethernet bus interfaces**

**Multi encoder interfaces:**
- Resolver, EnDat, Hiperface, BiSS,
- SSI, incremental HTL/TTL,
- incremental output

**Status LEDs**

**Motor connection**
DC voltage connection

**KTY/PTC motor temperature sensor inputs**

**Brake output (24 V / 2 A)**

8 digital inputs
2 digital outputs
1 relay output
The S6 with the K standard control option offers uncompromising integration, maximum performance and an optimum price/performance relationship.

Fast link to the control level using EtherCAT (or optionally VARAN) is a standard feature, as is 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
- VARAN optional
- CAN CANopen
- Diagnostics RS232 / 485
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. For example, Profinet IRT and POWERLINK are now optionally available for bus communication alongside EtherCAT. 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”
  - SS2 “Safe Stop 2”
  - SOS “Safe Operating Stop”
  - SLS “Safely-Limited Speed”
  - SLP “Safely-Limited Position”
  - SLI “Safely-Limited Increment”
  - SDI “Safe Direction”
  - SSM “Safe Speed Monitoring”

**Real-time Ethernet modules**
- EtherCAT
- Profinet IRT
- POWERLINK
- CAN
- Diagnostics RS232 / 485
### Electrical properties

<table>
<thead>
<tr>
<th>Housing</th>
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<tr>
<td>Device size</td>
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<td>Mains phases</td>
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<tr>
<td>Output rated power</td>
<td>$S_n$ [kVA]</td>
<td>1.8</td>
<td>2.8</td>
<td>4.0</td>
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<tr>
<td>Max. motor rated power</td>
<td>$P_{em}$ [kW]</td>
<td>0.75</td>
<td>1.5</td>
<td>2.2</td>
<td>4.0</td>
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<tr>
<td>Output rated current</td>
<td>$I_n$ [A]</td>
<td>2.6</td>
<td>4.1</td>
<td>5.8</td>
<td>9.5</td>
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<tr>
<td>Short maximum current (3 s / 60 s) (1)</td>
<td>$I_{max}$ [%]</td>
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<td>250 / 200</td>
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<td>Max. current 0 Hz / cutoff frequency at $f_s = 4$ kHz (1)</td>
<td>$I_n$ [%]</td>
<td>200/250</td>
<td>200/250</td>
<td>150/250</td>
<td>150/250</td>
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<td>Max. current 0 Hz / cutoff frequency at $f_s = 8$ kHz (1)</td>
<td>$I_n$ [%]</td>
<td>125/200</td>
<td>125/250</td>
<td>100/200</td>
<td>150/250</td>
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<td>Max. current 0 Hz / cutoff frequency at $f_s = 16$ kHz (1)</td>
<td>$I_n$ [%]</td>
<td>75/180</td>
<td>50/120</td>
<td>50/120</td>
<td>75/150</td>
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<td>Cutoff frequency point</td>
<td>$f_c$ [kHz]</td>
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<tr>
<td>Input rated current</td>
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<td>Rated losses</td>
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<td>Standby losses</td>
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<td>8.0</td>
<td>8.0</td>
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<td>Min. brake resistance</td>
<td>$R_{bmin}$ [Ω]</td>
<td>170</td>
<td>120</td>
<td>85</td>
<td>39</td>
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<td>Max. braking current</td>
<td>$I_{max}$ [A]</td>
<td>5.0</td>
<td>7.0</td>
<td>10.0</td>
<td>21.5</td>
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<tr>
<td>Input rated voltage (AC)</td>
<td>$U_n$ [V]</td>
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<td></td>
<td>3-phase 400 (UL: 400 ... 480)</td>
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<tr>
<td>Input voltage range (AC) (2)</td>
<td>$U_n$ [V]</td>
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<td></td>
<td></td>
<td>184 ... 550 ±0</td>
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<td>Input voltage range (DC)</td>
<td>$U_{DC}$ [V]</td>
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<td>260 ... 750 ±0</td>
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<td>Mains frequency</td>
<td>$f_N$ [Hz]</td>
<td>50 / 60 ±2</td>
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<td></td>
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<tr>
<td>Output voltage</td>
<td>$U_L$ [V]</td>
<td></td>
<td></td>
<td></td>
<td>3 x 0 ... $U_{in}$</td>
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<tr>
<td>Output frequency</td>
<td>$f_A$ [Hz]</td>
<td></td>
<td></td>
<td></td>
<td>0 ... 400 ($f_s$=4 kHz) / 0 ... 599 ($f_s$=8 kHz)</td>
</tr>
</tbody>
</table>

\(1\) 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.
**Mechanical data, operating types, standards**

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<td>H2</td>
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<td>D</td>
<td>220</td>
<td>220</td>
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<tr>
<td>W</td>
<td>50</td>
<td>90</td>
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### General

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

Dynamic Line 3

- 0.5 ... 29 Nm in five frame 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

<table>
<thead>
<tr>
<th>Motor</th>
<th>T</th>
<th>T_n</th>
<th>I_n</th>
<th>I_d</th>
<th>n_n</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>Brake option</th>
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<tr>
<td>A1</td>
<td>0.5</td>
<td>0.5</td>
<td>0.85</td>
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<tr>
<td>B1</td>
<td>1.4</td>
<td>1.3</td>
<td>1.90</td>
<td>1.95</td>
<td>6000</td>
<td>96.4</td>
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<td>75</td>
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<td>2.95</td>
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<td>B3</td>
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<td>3.60</td>
<td>4.10</td>
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<td>3.5</td>
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<td>C1</td>
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<td>6000</td>
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<td>5000</td>
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<td>4.9</td>
<td>4.75</td>
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<tr>
<td>D1</td>
<td>4.9</td>
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<td>4.75</td>
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<td>7.80</td>
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<td>183.5</td>
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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

<table>
<thead>
<tr>
<th>Gear size</th>
<th>$T_{2N}$ [Nm]</th>
<th>$T_{2\text{max}}$ [Nm]</th>
<th>$n_{\text{max}}$ [RPM]</th>
<th>i</th>
<th>Backlash $\alpha_{\text{arc}}$ [mm]</th>
<th>B [mm]</th>
<th>C [mm]</th>
<th>D [mm]</th>
<th>E [mm]</th>
<th>recommended DL3-motor</th>
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<tr>
<td>1</td>
<td>5 … 11</td>
<td>8 … 17.5</td>
<td>5000</td>
<td></td>
<td>15</td>
<td>50</td>
<td>44</td>
<td>12</td>
<td>35</td>
<td>A</td>
</tr>
<tr>
<td>2</td>
<td>15 … 28</td>
<td>24 … 45</td>
<td>4500</td>
<td></td>
<td>10</td>
<td>70</td>
<td>62</td>
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<td>52</td>
<td>A B C</td>
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<tr>
<td>3</td>
<td>38 … 85</td>
<td>61 … 136</td>
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<td>80</td>
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<td>108</td>
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<td>90</td>
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<td>210 … 460</td>
<td>336 … 736</td>
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<td>155</td>
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<td>40</td>
<td>120</td>
<td>D E</td>
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</table>
Servo gear motors

Servo Motors - TA Series

- 1.5 ... 20 Nm in three frame 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

<table>
<thead>
<tr>
<th>Motor</th>
<th>$T_0$ [Nm]</th>
<th>$T_n$ [Nm]</th>
<th>$I_{d0}$ [A]</th>
<th>$I_e$ [A]</th>
<th>$n_e$ [RPM]</th>
<th>$B$ [mm]</th>
<th>$C$ [mm]</th>
<th>$D$ [mm]</th>
<th>$E$ [mm]</th>
<th>Brake option $M_0$ [Nm]</th>
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<td>16.1</td>
<td>12.8</td>
<td>10.3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
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.
KEB COMBIVERT S6

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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