**Features**

Based on a proven solid and reliable mechanical and electrical platform, this product series was designed and built for reliability and robustness. Electrical protection is built-in to reduce “first installation” errors. Mechanically, the high precision sealed bearings were chosen for long life, even in harsh conditions. And the product is tested and rated to perform from -40° to 100°C. Standard commutation options go as high as 16 pole pairs to handle a range of commutation requirements. This is an excellent 58mm encoder for general use in heavy duty industrial environments.

**Applications**

- Industrial automation
- Automated guided vehicles
- Mills for lumber, steel & other metals
- Printing & packaging equipment
- Food processing equipment
- Forming & die presses

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**SPECIFICATIONS**

### Mechanical

<table>
<thead>
<tr>
<th></th>
<th>KH55</th>
<th>KH5</th>
<th>KO5</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Material</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Body:</td>
<td>Zinc Alloy</td>
<td>aluminium</td>
<td>Stainless Steel</td>
</tr>
<tr>
<td>Shaft:</td>
<td>Stainless Steel</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Bearings</strong></td>
<td>6000 Series</td>
<td>6803 Series</td>
<td></td>
</tr>
<tr>
<td><strong>Maximum Loads</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Axial</td>
<td>50 N</td>
<td>20 N</td>
<td></td>
</tr>
<tr>
<td>Radial</td>
<td>100 N</td>
<td>50 N</td>
<td></td>
</tr>
<tr>
<td><strong>Shaft Inertia</strong></td>
<td>$2.5 \times 10^6 \text{kg.m}^2 (10\text{mm})$</td>
<td>$2.9 \times 10^6 \text{kg.m}^2 (14\text{mm})$</td>
<td>$3.2 \times 10^6 \text{kg.m}^2 (14\text{mm})$</td>
</tr>
<tr>
<td><strong>Torque</strong></td>
<td>$4.10^{-3} \text{N.m}$</td>
<td>$16.10^{-3} \text{N.m}$</td>
<td>$20.10^{-3} \text{N.m}$</td>
</tr>
<tr>
<td><strong>Permissible Max. Speed</strong></td>
<td>$12,000 \text{min}^{-1}$</td>
<td>$6,000 \text{min}^{-1}$</td>
<td>$6,000 \text{min}^{-1}$</td>
</tr>
<tr>
<td><strong>Continuous Max. Speed</strong></td>
<td>$10,000 \text{min}^{-1}$</td>
<td>$6,000 \text{min}^{-1}$</td>
<td>$6,000 \text{min}^{-1}$</td>
</tr>
<tr>
<td><strong>Encoder Weight (Approx.)</strong></td>
<td>0.300 kg</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Theoretical Mechanical Lifetime</strong> ($F_{\text{axial}} / F_{\text{radial}}$)</td>
<td>$26 \times 10^9$ turns</td>
<td>&gt;$36 \times 10^9$ turns</td>
<td></td>
</tr>
</tbody>
</table>
### Electrical

<table>
<thead>
<tr>
<th>Ver.</th>
<th>Output Signals</th>
<th>Operating Voltage +V</th>
<th>Supply Current (no loads)</th>
<th>Current per Channel Pair</th>
<th>Short Circuit Proof</th>
<th>Reverse Polarity Tolerant</th>
<th>Frequency Capability</th>
<th>Resolutions category&lt;sup&gt;(1)&lt;/sup&gt;</th>
<th>Operating Temperature Range&lt;sup&gt;(2)(3)&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>RG5</td>
<td>HTL</td>
<td>4.75-30V</td>
<td>&lt;75mA</td>
<td>&lt;40mA</td>
<td>Yes</td>
<td>Yes</td>
<td>Up to 1MHz</td>
<td>Standard</td>
<td>-40°C ... +100°C</td>
</tr>
<tr>
<td>RP5</td>
<td>HTL</td>
<td>4.75-30V</td>
<td>&lt;75mA</td>
<td>&lt;40mA</td>
<td>Yes</td>
<td>Yes</td>
<td>Up to 1MHz</td>
<td>Programmable</td>
<td>-40°C ... +100°C</td>
</tr>
<tr>
<td>2G2</td>
<td>TTL</td>
<td>5V ± 5%</td>
<td>&lt;75mA</td>
<td>&lt;40mA</td>
<td>Yes</td>
<td>Yes</td>
<td>Up to 1MHz</td>
<td>Standard</td>
<td>-40°C ... +100°C</td>
</tr>
</tbody>
</table>

<sup>(1)</sup> See resolutions section for details.
<sup>(2)</sup> Surface encoder temperature.
<sup>(3)</sup> UL Listed: -20°C +80°C. Device must be supplied by a Class 2, LPS or SELV limited energy source 250mA.

### Environmental

- **Shocks** (EN 60068-2-27): ≤ 500 m.s<sup>-2</sup> (during 6 ms)
- **Vibrations** (EN 60068-2-6): ≤ 200 m.s<sup>-2</sup> (10…2 000Hz)
- **EMC**: EN 61000-6-2, EN 61000-6-4
- **Isolation**: 1 000V eff
- **Operating Temperature**: See Electrical table above
- **Storage Temperature**: -40° ... + 100°C
- **Protection** (EN 60529): IP 65
- **Humidity**: 98% RH non-condensing at 20 °C

### STANDARD CONNECTIONS

<table>
<thead>
<tr>
<th>KN</th>
<th>PVC cable 16 wires</th>
<th>-</th>
<th>+</th>
<th>A</th>
<th>B</th>
<th>Z</th>
<th>A/</th>
<th>B/</th>
<th>Z/</th>
<th>U</th>
<th>V</th>
<th>W</th>
<th>U/</th>
<th>V/</th>
<th>W/</th>
<th>Ground</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>16 wires</td>
<td>WH (White)</td>
<td>BN (Brown)</td>
<td>GN (Green)</td>
<td>YE (Yellow)</td>
<td>GY (Gray)</td>
<td>OR (Orange)</td>
<td>BU (Blue)</td>
<td>RD (Red)</td>
<td>WH-GN (White-Green)</td>
<td>WH-YE (White-Yellow)</td>
<td>WH-BK (White-Black)</td>
<td>WH-OR (White-Orange)</td>
<td>WH-RD (White-Red)</td>
<td>WH-BN (White-Brown)</td>
<td>General shielding</td>
</tr>
</tbody>
</table>

- KN: Knob
- PVC: Polyvinyl Chloride
- Ground: General shielding
**RESOLUTIONS**

**Standard resolutions:**
- Incremental channels (AA/ BB/ ZZ/): 1000, 1024, 2000, 2048, 2500, 4000, 4096, 5000, 10000
- Commutation tracks (UU/ VV/ WW/): 4 poles pair

**Low resolutions** (not found in the Standard resolutions range):
- Incremental channels (AA/ BB/ ZZ/): any resolution within the 1-2500ppr range.
- Commutation tracks (UU/ VV/ WW/): 1 to 16 poles pair

**Programmable resolutions** (4) (RP5 electronics):
Incremental channels (AA/ BB/):
  - from 1 to 10kppr

Index tracks ZZ/:
  - Standard index tracks configuration (EPROG in ordering key)
  - Alternate index tracks configuration (XPROG in ordering key)

Commutation tracks (UU/ VV/ WW/):
  - 1 to 16 poles pairs

Direction:
- A before B with U before V before W
- B before A with W before V before U

RP5 electronics can be configured with the programming tool P/N EAP-001 (ordered separately). Programming procedure available in Instruction Manual.

*Signal tolerances available in Instructions Manual

**DIMENSIONS**

All dimensions are in millimeters.

**KHM5_10 Connection KNR (Radial cable)**
KHM5_06 Connection KNA (Axial cable)

KHK5_14 Connection KNR (Radial cable)

KHO5_14 standard clamping, Connection KNR (Radial cable)
KH05S14/OM/ Flange side clamping, Connection KNR (Radial cable)

FLANGE AND COUPLING INTERFACES

The flange or coupling configurations can be defined in the ordering options. Selections are installed on the encoder at the factory. Flange or coupling kits can also be ordered separately (see Accessories section).

**KH5M_06 Connection KNR (Radial cable), flange 9500/003 mounted on the body**
KHM5_10 Connection KNR (Radial cable), flange 9500/005 mounted on the body

KHK5_14 Connection KNR (Radial cable), coupling 9445/016 mounted on the body
KH05_14 Standard clamping, Connection KNR (Radial Cable), coupling 9445/012 mounted on the body

KH05_14 Standard clamping, Connection KNR (Radial Cable), coupling 9445/015 mounted on the body
KO5S14/OM Flange side clamping, Connection KNR (Radial cable), coupling 9445/016 mounted on the body

KO5E4 Flange side clamping, Connection KNR (Radial cable), coupling 9445/068 mounted on the body

Note: 9445/068 coupling is available for replacing the previous HS22 model.

GENERAL NOTES

For an optimized installation meeting industrial standards, refer to the Installation Manual. The Installation Manual provides the technical information (drawings, electrical data, etc...) for a proper integration.

AGENCY APPROVALS & CERTIFICATIONS

[Certification logos]
## ORDERING OPTIONS

**Example: KHO5_14/2G2L/01024K4//KNR020//D0D9**

### Family
- **KHM5**: Solid Shaft Encoder
- **KH5K**: Blind Shaft Encoder
- **KHO5**: Hollow Shaft Encoder

### Shaft Size

<table>
<thead>
<tr>
<th>Family</th>
<th>Diameter (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>KHM5</td>
<td>06: 6 mm</td>
</tr>
<tr>
<td></td>
<td>09: 9.52 mm</td>
</tr>
<tr>
<td></td>
<td>10: 10 mm</td>
</tr>
<tr>
<td>08: 8mm (Option)</td>
<td>15: 15mm (Option)</td>
</tr>
<tr>
<td></td>
<td>12: 12 mm</td>
</tr>
<tr>
<td></td>
<td>14: 14 mm</td>
</tr>
<tr>
<td>E2: 1/4&quot;</td>
<td>8.35 mm</td>
</tr>
<tr>
<td>E3: 3/8&quot;</td>
<td>9.52 mm</td>
</tr>
<tr>
<td>E4: 1/2&quot;</td>
<td>12.7 mm</td>
</tr>
</tbody>
</table>

Contact factory for other configurations.

### Mechanical Option
- **Blank**: No option
- **OM**: Flange side clamping

### Voltage Output
- **2G2**: 5V TTL
- **RG5**: 4.75-30V HTL
- **RP5**: 4.75-30V HTL Programmable

### Signals
- For all configurations AA/ BB/ ZZ/ & UU/ WW/ signals are referenced to CW rotation when viewed from the face side of the encoder.
- G/ before A, V before U, Z gated with A&B high.
- L/ before A, U before V, W, Z gated with A&B high.
- P/ before A, U before V, W, Z gated with A&B high.
- Y/ before A, W before V, U, Z gated with B high.
- Y/US/ before A, W before V, U, Z gated with B low (for replacing the previous HS22 model).
- X/ Programmable channels (RP5 electronics).

### Cycles / Turn
- (Enter Cycles) Standard and low resolutions. See available resolutions in "Resolutions" section.
- EPROG: Full programmable 1-10kppr (standard index tracks configurations).
- XPROG: Full programmable 1-10kppr (alternate index tracks configurations).

### Commutation Tracks
- K1 to K16: 1 to 16 poles pairs (K4 = 4 pole pairs = 8 pole motor)
- Contact factory for other pole pair configurations.

### Output Termination
- **KN**: PVC cable

### Output Orientation
- **R**: Radial (All configurations)
- **A**: Axial (KHM5 and KH5K only)

### Cable Length
- xxx: Cable Length (ex.: 020 = 2 Meters)

### Accessories
- **D0******: KHO5 with aluminum reduction sleeve
- **D1******: KHO5 with insulated reduction sleeve
- **D2******: KH5 with aluminum reduction sleeve
- **DS******: 9445/012 KHO5 Stator coupling
- **DD******: 9445/015 KHO5 Stator coupling
- **D9******: 9445/088 KHO5 stator coupling (for replacing previous HS22 model)
- **DK******: 9445/016 KH5 & KHO5.../OM/ Stator coupling
- **03******: 9500/003 Synchro flange
- **05******: 9500/005 Square flange
## ACCESSORIES

### Description | Part Number
--- | ---
Synchro flange kit Hardware included | M9500/003
Square flange kit Hardware included | M9500/005
Mounting bracket Hardware included | M9202
Reduction sleeve | Insulated (PEEK) Non insulated (Aluminum) Bore size (H7)
| KH05 | KHKS | KH05 | KHKS | 6 mm | 1/4" (6.35 mm)
| 9431/06 | 9431/08 | 9431/10 | 9431/12 | 8 mm | 3/8" (9.52 mm)
| 9431/06 | 9431/08 | 9431/10 | 9431/12 | 10 mm | 1/2" (12.7 mm)
| 9431/06 | 9431/08 | 9431/10 | 9431/12 | 12 mm |
Stator coupling kit Hardware included | P/N | Recommended use/Compatibility | Fixing points
| M9445/012 | KH05 | 2
| M9445/015 | KH05 & KH05 | 4
| M9445/016 | KH05 & KH05 with /OM/ option | 2
| M9445/068 | KH05 & KH05 retrofit for HS22 | 3
Tether arm kit Hardware included | M9445/047 | (Compatible with KHK5 and KH05 models)
Bellows coupling Insulated (PEEK) | 9403/xx-yy with:
| xx = 06 to 12 (side 1 bore diameter in mm) | + Imperial sizes available: 6.35, 9.52, 12.7 (mm)
| yy = 06 to 12 (side 2 bore diameter in mm) | Installation: Refer to Instruction Manual

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