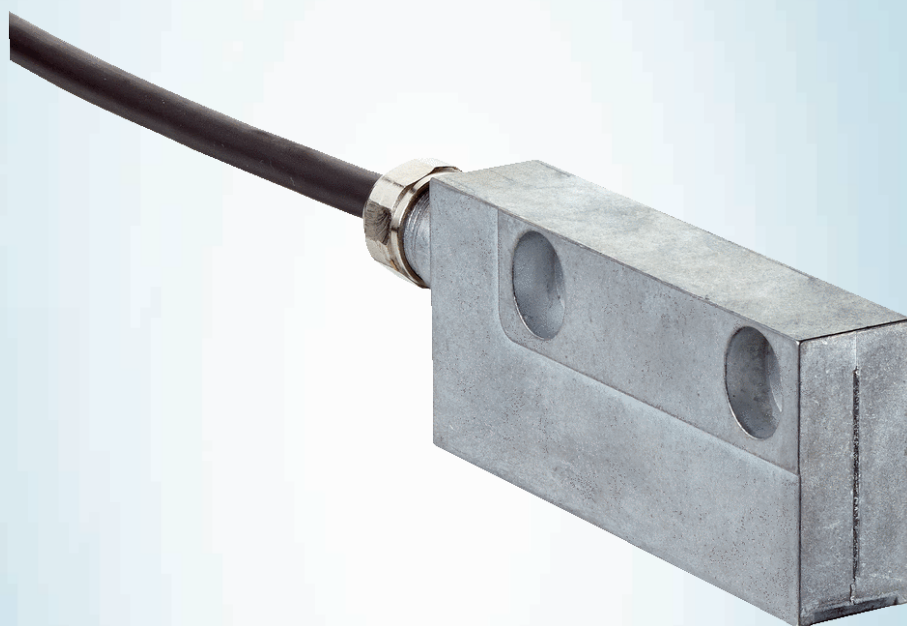




# TTK70S-HXIO-K02

TTK70-S

SAFE MOTOR FEEDBACK SYSTEMS

**SICK**  
Sensor Intelligence.

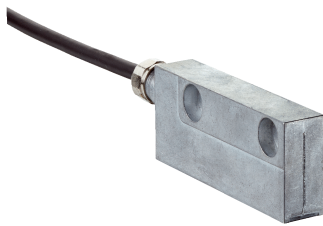


Illustration may differ



## Ordering information

| Type            | part no. |
|-----------------|----------|
| TTK70S-HX10-K02 | 1099702  |

Other models and accessories → [www.sick.com/TTK70-S](http://www.sick.com/TTK70-S)

## Detailed technical data

### Features

|                       |                                          |
|-----------------------|------------------------------------------|
| <b>Items supplied</b> | Magnetic tape not included with delivery |
|-----------------------|------------------------------------------|

### Safety-related parameters

|                                                               |                                                    |
|---------------------------------------------------------------|----------------------------------------------------|
| <b>Safety integrity level</b>                                 | SIL 2 (IEC 61508), SILCL2 (EN 62061) <sup>1)</sup> |
| <b>Category</b>                                               | 3 (EN ISO 13849)                                   |
| <b>Maximum demand rate</b>                                    | Continuous (analog signals)                        |
| <b>Performance level</b>                                      | PL d (EN ISO 13849)                                |
| <b>PFH (mean probability of a dangerous failure per hour)</b> | $2.02 \times 10^{-8}$ <sup>2)</sup>                |
| <b>T<sub>M</sub> (mission time)</b>                           | 20 years (EN ISO 13849)                            |
| <b>MTTF<sub>D</sub> (mean time to dangerous failure)</b>      | 73 years (EN ISO 13849)                            |
| <b>Safety-related accuracy</b>                                | ± 25 mm, = ± 1/4 pin length                        |
| <b>Safety-related measuring step</b>                          | 0.25 mm                                            |

<sup>1)</sup> For more detailed information on the exact configuration of your machine/unit, please consult your relevant SICK branch office.

<sup>2)</sup> The specified values apply to a diagnostic coverage rate of 90%, which must be achieved by the external drive system.

### Performance

|                                |                                                                              |
|--------------------------------|------------------------------------------------------------------------------|
| <b>Measuring step</b>          | 0.244 µm For interpolation of the sine/cosine signals with, e. g., 12 bits   |
| <b>Measuring range</b>         | 0 mm ... 3,920 mm                                                            |
| <b>Length of period</b>        | 1 mm                                                                         |
| <b>Traversing speed</b>        | ≤ 10 m/s, 1.3 m/s up to which the absolute position can be reliably produced |
| <b>Repeatability</b>           | < 5 µm                                                                       |
| <b>System accuracy</b>         | ± 10 µm (+20 °C)                                                             |
| <b>Measured value backlash</b> | < 10 µm                                                                      |

### Interfaces

|                                |                                       |
|--------------------------------|---------------------------------------|
| <b>Communication interface</b> | HIPERFACE® <sup>1)</sup>              |
| <b>Code type</b>               | Binary                                |
| <b>Available memory area</b>   | 1,792 Byte (E <sup>2</sup> PROM 2048) |

<sup>1)</sup> SSInterface described in publication 8013375.

## Electronics

|                                   |                                                    |
|-----------------------------------|----------------------------------------------------|
| <b>Supply voltage</b>             | 7 V DC ... 12 V DC                                 |
| <b>Recommended supply voltage</b> | 8 V DC                                             |
| <b>Operating current</b>          | ≤ 65 mA (without load) <sup>1)</sup>               |
| <b>Connection type</b>            | Cable, 8-wire (4 x 2 x 0.15 mm <sup>2</sup> ), 1 m |

<sup>1)</sup> 100 mA approx. during adjustment.

## Mechanics

|                           |                                          |
|---------------------------|------------------------------------------|
| <b>Dimensions</b>         | See dimensional drawing                  |
| <b>Scope of delivery</b>  | Magnetic tape not included with delivery |
| <b>Weight</b>             | 0.08 kg                                  |
| <b>Read head material</b> | Zinc diecast                             |

## Ambient data

|                                                 |                                                                                                              |
|-------------------------------------------------|--------------------------------------------------------------------------------------------------------------|
| <b>EMC</b>                                      | According to EN 61000-6-2 and EN 61000-6-3 <sup>1)</sup>                                                     |
| <b>Enclosure rating</b>                         | IP67, with mating plug inserted (IEC 60529)                                                                  |
| <b>Operating temperature range</b>              | –30 °C ... +80 °C                                                                                            |
| <b>Storage temperature range</b>                | –40 °C ... +85 °C, without package                                                                           |
| <b>Permissible relative humidity</b>            | 100 %, condensation permitted                                                                                |
| <b>Resistance to shocks</b>                     | 30 g, 6 ms (EN 60068-2-27)                                                                                   |
| <b>Resistance to vibration</b>                  | 20 g, 10 Hz ... 2,000 Hz (EN 60068-2-6)                                                                      |
| <b>Maximum permitted ambient field strength</b> | < 3 kA/m ... 4 kA/m (3.8 mT ... 5 mT), to guarantee compliance with the quoted accuracy values <sup>2)</sup> |
| <b>Maximum permitted field strength</b>         | < 150 kA/m (< 190 mT), to ensure that the magnetic tape is not permanently damaged                           |

<sup>1)</sup> According to the listed standards, EMC is guaranteed if the motor feedback system is connected to the central grounding point of the motor controller via a cable shield and the encoder housing lays over a large area of the motor potential. If other shielding concepts are used, users must perform their own test.

<sup>2)</sup> The maximum permitted external field influence is reached when the position value deviates from the original value (without external field influence) by more than 5 µm. This value is reached when, at the sensor location, a field strength of 3 kA/m to 4 kA/m (3.8 mT to 5 mT) occurs in addition to the field strength of the magnetic tape.

## Certificates

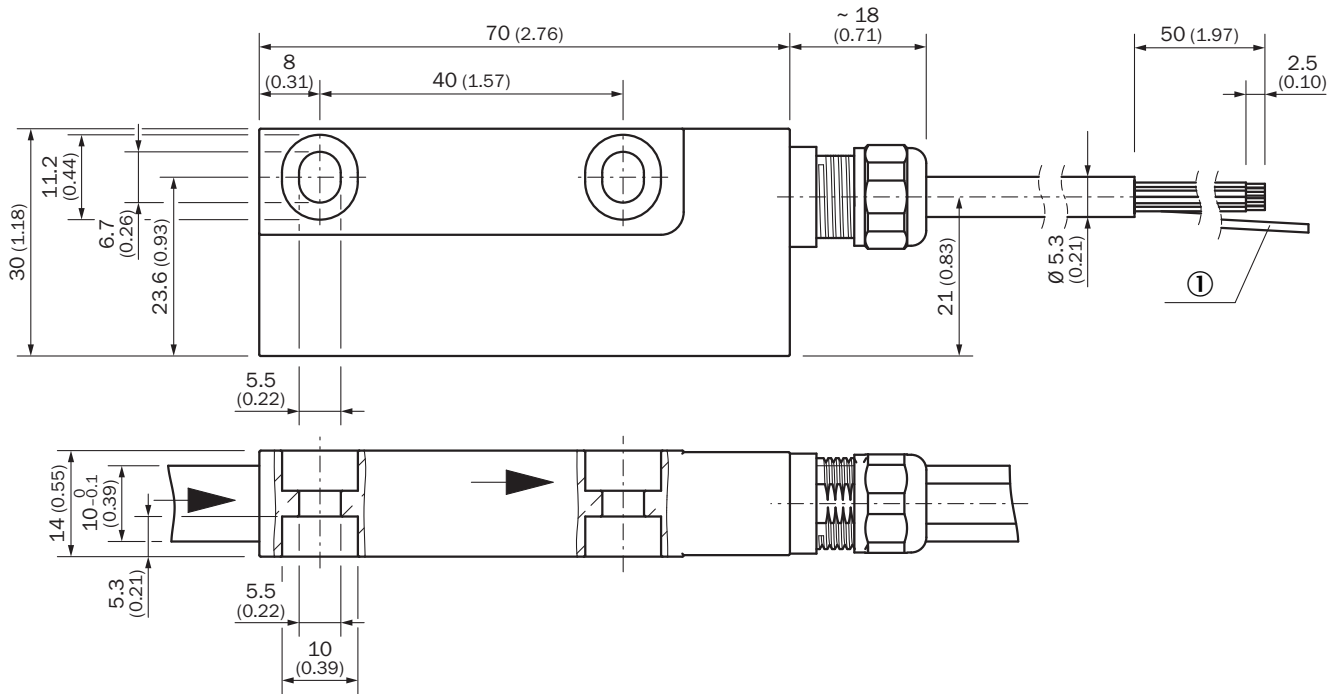
|                                                                              |   |
|------------------------------------------------------------------------------|---|
| <b>EU declaration of conformity</b>                                          | ✓ |
| <b>UK declaration of conformity</b>                                          | ✓ |
| <b>ACMA declaration of conformity</b>                                        | ✓ |
| <b>China RoHS</b>                                                            | ✓ |
| <b>EC-Type-Examination approval</b>                                          | ✓ |
| <b>Information according to Art. 3 of Data Act (Regulation EU 2023/2854)</b> | ✓ |

## Classifications

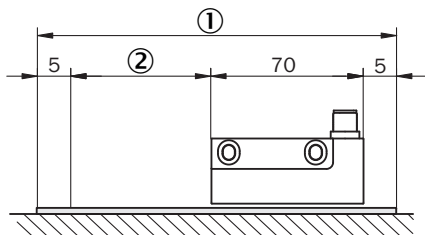
|                     |          |
|---------------------|----------|
| <b>ECLASS 5.0</b>   | 27270705 |
| <b>ECLASS 5.1.4</b> | 27270705 |
| <b>ECLASS 6.0</b>   | 27270705 |
| <b>ECLASS 6.2</b>   | 27270705 |
| <b>ECLASS 7.0</b>   | 27270705 |
| <b>ECLASS 8.0</b>   | 27270705 |

|                       |          |
|-----------------------|----------|
| <b>ECLASS 8.1</b>     | 27270705 |
| <b>ECLASS 9.0</b>     | 27270705 |
| <b>ECLASS 10.0</b>    | 27270705 |
| <b>ECLASS 11.0</b>    | 27270705 |
| <b>ECLASS 12.0</b>    | 27274304 |
| <b>ETIM 5.0</b>       | EC002544 |
| <b>ETIM 6.0</b>       | EC002544 |
| <b>ETIM 7.0</b>       | EC002544 |
| <b>ETIM 8.0</b>       | EC002544 |
| <b>UNSPSC 16.0901</b> | 41111613 |

### Dimensional drawing Read head, cable

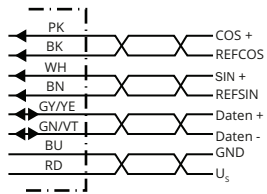


### Order note for magnetic tape length



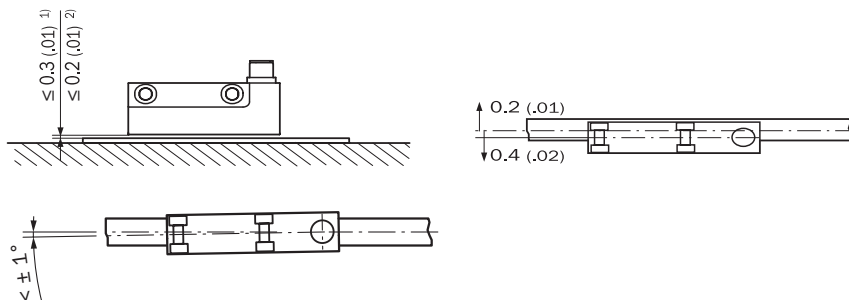
## ② Measurement path

### PIN assignment



| Wire colors (cable connection) | Signal         | Explanation              |
|--------------------------------|----------------|--------------------------|
| Brown                          | REFSIN         | Process data channel     |
| White                          | + SIN          | Process data channel     |
| Black                          | REFCOS         | Process data channel     |
| Pink                           | + COS          | Process data channel     |
| Gray or yellow                 | Data +         | Parameter channel RS 485 |
| Green or purple                | Data -         | Parameter channel RS 485 |
| Blue                           | GND            | Ground connection        |
| Red                            | U <sub>s</sub> | Supply voltage           |
| Screen                         | -              | Housing                  |

### Position tolerance



General tolerances according to DIN ISO 2768-mk

- ① Without cover strip
- ② With cover strip

Operation note Overview of supported commands for HIPERFACE<sup>®</sup>

| Overview of supported commands |                                               |                      | TTK50/TTK70                    |
|--------------------------------|-----------------------------------------------|----------------------|--------------------------------|
| Command byte                   | Function                                      | Code 0 <sup>1)</sup> | Comments                       |
| 42h                            | Read position (5 bits per sine/cosine period) |                      | 31,25 µm                       |
| 43h                            | Set position                                  | ■                    |                                |
| 44h                            | Read analog value                             |                      | Channel number 48h             |
|                                |                                               |                      | Temperature [°C] <sup>2)</sup> |
| 46h                            | Read counter                                  |                      |                                |
| 47h                            | Increase counter                              |                      |                                |
| 49h                            | Reset counter                                 | ■                    |                                |
| 4Ah                            | Read data                                     |                      |                                |
| 4Bh                            | Save data                                     |                      |                                |
| 4Ch                            | Determine status of a data field              |                      |                                |
| 4Dh                            | Create data field                             |                      |                                |
| 4Eh                            | Determine available memory area               |                      |                                |
| 4Fh                            | Change access code                            |                      |                                |
| 50h                            | Read encoder status                           |                      |                                |
| 52h                            | Read out name plate                           |                      | Encoder type = FFh             |
| 53h                            | Encoder reset                                 |                      |                                |
| 55h                            | Allocate encoder address                      | ■                    |                                |
| 56h                            | Read serial number and program version        |                      |                                |
| 57h                            | Configure serial interface                    | ■                    |                                |
| 67h                            | Change serial interface temporary             |                      |                                |
| 6Ah                            | Set position with interanal synchronization   | ■                    |                                |
| 6Bh                            | Sensor adjustment (during commissioning)      | ■                    |                                |

<sup>1)</sup> The commands thus marked include the parameter 'Code 0'. Code 0 is a byte inserted into the protocol to provide additional protection of vital system parameters against accidental overwriting. When the device is supplied, 'Code 0' = 55h.

<sup>2)</sup> The temperature value will be reliably formed approx. 2 s after power on/reset or at command.

## Operation note Overview of status messages for HIPERFACE<sup>®</sup>

| Error type     | Status code | Description                                           | TTK50/TTK70 |
|----------------|-------------|-------------------------------------------------------|-------------|
| Initialization | 00h         | The encoder has recognized no error                   | ■           |
|                | 01h         | Adjustment data faulty                                | ■           |
|                | 02h         | Faulty internal angular offset                        | ■           |
|                | 03h         | Data field partitioning table destroyed               | ■           |
|                | 04h         | Analog limit values not available                     | ■           |
|                | 05h         | Internal I <sup>2</sup> C bus not operational         | ■           |
|                | 06h         | Internal checksum error                               | ■           |
| Protocol       | 09h         | Parity error                                          | ■           |
|                | 0Ah         | Checksum of the data transmitted data is incorrect    | ■           |
|                | 0Bh         | Unknown command code                                  | ■           |
|                | 0Ch         | Number of data transmitted is incorrect               | ■           |
|                | 0Dh         | Command argument transmitted is not allowed           | ■           |
| Data           | 0Eh         | The selected data field may not be written to         | ■           |
|                | 0Fh         | Incorrect access code                                 | ■           |
|                | 10h         | Size of data field stated cannot be changed           | ■           |
|                | 11h         | Word address states, is outside data field            | ■           |
|                | 12h         | Access to non-existent data field                     | ■           |
| Position       | 20h         | Sensor is not adjusted or is in adjustment mode       | ■           |
|                | 21h         | Distance magnetic tape/sensor too high                | ■           |
|                | 23h         | Positional error                                      | ■           |
| Other          | 1Ch         | Monitoring the value of analog signals (process data) | ■           |
|                | 1Eh         | Encoder temperature critical                          | ■           |
|                | 08h         | Counter overflow                                      | ■           |

For more information on the interface see HIPERFACE<sup>®</sup> - description, part no. 8010701

## Operation note Model-specific settings

| Type-specific settings           | TTK50/TTK70 |
|----------------------------------|-------------|
| Model ID (command 52h)           | FFh         |
| Free E <sup>2</sup> PROM [bytes] | 1.792       |
| Address                          | 40h         |
| Mode_485 <sup>1)</sup>           | E4h         |
| Codes 0 to 3                     | 55h         |
| Counter                          | 0           |

1) The linear length measuring system supports the following baud rates: 9600, 19200 and 38400.

## Operation note Charactersitics applicable to all permissible environmental conditions

| Signal                                        | Values/unit     |
|-----------------------------------------------|-----------------|
| Signal peak, peak V <sub>SS</sub> of SIN, COS | 0.9 V ... 1.1 V |
| Signal offset REFSIN, REFCOS                  | 2.2 V ... 2.8 V |

### Recommended accessories

Other models and accessories → [www.sick.com/TTK70-S](http://www.sick.com/TTK70-S)

|                                                                                     | Brief description                                                                                                                                                                                                                                                                                                                                                                                                           | Type          | part no. |
|-------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|----------|
| programming devices                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                             |               |          |
|    | <ul style="list-style-type: none"> <li>• <b>Product segment:</b> Programming devices</li> <li>• <b>Product family:</b> PGT-11-S</li> <li>• <b>Description:</b> SVip® LAN programming tool for all motor feedback systems</li> <li>• <b>Items supplied:</b> 1x programming tool PGT-11-S LAN, 1x power supply unit 100-240 V AC / 12 V DC, primary adapter (Europe, UK, USA/Japan, Australia), Ethernet cable 3 m</li> </ul> | PGT-11-S LAN  | 1057324  |
| connectors and cables                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                             |               |          |
|    | <ul style="list-style-type: none"> <li>• <b>Connection type head A:</b> Female connector, M12, 8-pin, straight, A-coded</li> <li>• <b>Description:</b> Shielded</li> <li>• <b>Connection systems:</b> Screw-type terminals</li> <li>• <b>Permitted cross-section:</b> 0.25 mm² ... 0.5 mm²</li> </ul>                                                                                                                       | DOS-1208-GA   | 6028369  |
|    | <ul style="list-style-type: none"> <li>• <b>Connection type head A:</b> Male connector, M12, 8-pin, straight, A-coded</li> <li>• <b>Description:</b> Shielded</li> <li>• <b>Connection systems:</b> Screw-type terminals</li> <li>• <b>Permitted cross-section:</b> ≤ 0.5 mm²</li> </ul>                                                                                                                                    | STE-1208-GA   | 6028370  |
|    | <ul style="list-style-type: none"> <li>• <b>Connection type head A:</b> Female connector, M12, 8-pin, straight, A-coded</li> <li>• <b>Signal type:</b> Incremental, SSI</li> <li>• <b>Cable:</b> CAT5, CAT5e</li> <li>• <b>Description:</b> Incremental, shielded SSI</li> <li>• <b>Connection systems:</b> IDC quick connection</li> <li>• <b>Permitted cross-section:</b> 0.14 mm² ... 0.34 mm²</li> </ul>                | DOS-1208-GA01 | 6045001  |
|    | <ul style="list-style-type: none"> <li>• <b>Connection type head A:</b> Female connector, M12, 8-pin, angled, A-coded</li> <li>• <b>Signal type:</b> Ethernet</li> <li>• <b>Cable:</b> CAT5, CAT5e</li> <li>• <b>Description:</b> Ethernet, shielded</li> <li>• <b>Connection systems:</b> QUICKON connection</li> <li>• <b>Permitted cross-section:</b> 0.14 mm² ... 0.34 mm²</li> </ul>                                   | DOS-1208-WA   | 6043358  |
|  | <ul style="list-style-type: none"> <li>• <b>Connection type head A:</b> Male connector, M12, 8-pin, straight, A-coded</li> <li>• <b>Signal type:</b> Incremental</li> <li>• <b>Cable:</b> CAT5, CAT5e</li> <li>• <b>Description:</b> Incremental, shielded</li> <li>• <b>Connection systems:</b> IDC quick connection</li> <li>• <b>Permitted cross-section:</b> 0.14 mm² ... 0.34 mm²</li> </ul>                           | STE-1208-GA01 | 6044892  |
|                                                                                     | <ul style="list-style-type: none"> <li>• <b>Connection type head A:</b> Flying leads</li> <li>• <b>Connection type head B:</b> Flying leads</li> <li>• <b>Signal type:</b> HIPERFACE®, HIPERFACE®</li> <li>• <b>Items supplied:</b> By the meter</li> <li>• <b>Cable:</b> 8-wire, PUR, halogen-free</li> <li>• <b>Description:</b> HIPERFACE®, shielded, HIPERFACE®</li> </ul>                                              | LTG-2708-MW   | 6028361  |

## SICK AT A GLANCE

SICK is one of the leading manufacturers of intelligent sensors and sensor solutions for industrial applications. A unique range of products and services creates the perfect basis for controlling processes securely and efficiently, protecting individuals from accidents and preventing damage to the environment.

We have extensive experience in a wide range of industries and understand their processes and requirements. With intelligent sensors, we can deliver exactly what our customers need. In application centers in Europe, Asia and North America, system solutions are tested and optimized in accordance with customer specifications. All this makes us a reliable supplier and development partner.

Comprehensive services complete our offering: SICK LifeTime Services provide support throughout the machine life cycle and ensure safety and productivity.

**For us, that is “Sensor Intelligence.”**

## WORLDWIDE PRESENCE:

Contacts and other locations –[www.sick.com](http://www.sick.com)