Data sheet

# EKS36-2KF0B020A

## EKS/EKM36-S

SAFE MOTOR FEEDBACK SYSTEMS

SICK
Sensor Intelligence.

Illustration may differ

## Ordering information

| Type | part no. |
|---|---|
| EKS36-2KF0B020A | 1084232 |

Other models and accessories ➜ www.sick.com/EKS_EKM36-S

## Detailed technical data

### Features

| | |
|---|---|
| **Items supplied** | M3 mounting screws for stator coupling not included with delivery. |

### Safety-related parameters

| | |
|---|---|
| **Safety integrity level** | SIL 2 (IEC 61508), SILCL2 (EN 62061) [1] |
| **Category** | 3 (EN ISO 13849) |
| **Test rate** | 1 h |
| **Maximum demand rate** | 216 µs |
| **Performance level** | PL d (EN ISO 13849) |
| **Safety-related resolution** | Channel 1 = 18 bit or 20 bit, channel 2 = 9 bit |
| **PFH (mean probability of a dangerous failure per hour)** | $4 \times 10^{-8}$ [2] |
| **$T_M$ (mission time)** | 20 years (EN ISO 13849) |
| **$MTTF_D$ (mean time to dangerous failure)** | 500 years (EN ISO 13849) |

[1] For more detailed information on the exact configuration of your machine/unit, please consult your relevant SICK branch office.
[2] The values displayed apply to a diagnostic degree of coverage of 90%, which must be achieved by the external drive system.

### Performance

| | |
|---|---|
| **Position** | |
| Resolution per revolution | 20 bit |
| System accuracy | ± 100 ″ |
| Signal noise (σ) | ± 4 ″ (See “signal noise” and “attenuation” diagrams) |
| Number of the absolute ascertainable revolutions | 1 |
| Available memory area | 8,192 Byte |
| Measurement step per revolution | 1,048,576 |
| Measurement principle | Optical |

## Interfaces

| | |
|---|---|
| **Type of code for the absolute value** | Binary |
| **Code sequence** | Increasing, when turning the shaft For clockwise rotation, looking in direction “A” (see dimensional drawing) |
| **Communication interface** | HIPERFACE DSL® |
| **Initialization time** | Max. 500 ms [1] |
| **Measurement external temperature resistance** | 32 bit value, without prefix (1 Ω) 0 ... 209.600 Ω<br>At –40 °C ... +160 °C: NTC +-2K; PTC+-3K |

[1] From reaching a permitted operating voltage.

## Electronics

| | |
|---|---|
| **Connection type** | Male connector, 4-pin |
| **Supply voltage** | 7 V ... 12 V |
| **Warm-up time voltage ramp** | Max. 180 ms [1] |
| **Recommended supply voltage** | 8 V |
| **Current consumption** | ≤ 150 mA (See current consumption diagram) [2] |
| **Output frequency for the digital positionvalue** | 0 kHz ... 75 kHz |

[1] Duration of voltage ramp between 0 and 7.0 V.

[2] Current rating applies when using interface circuit suggestions as shown in HIPERFACE DSL ® manual (8017595).

## Mechanics

| | |
|---|---|
| **Shaft version** | Tapered shaft |
| **Flange type / stator coupling** | Stator coupling |
| **Dimensions** | See dimensional drawing |
| **Weight** | 0.1 kg |
| **Moment of inertia of the rotor** | 4.5 gcm² |
| **Operating speed** | ≤ 12,000 min⁻¹ |
| **Angular acceleration** | ≤ 500,000 rad/s² |
| **Operating torque** | 0.2 Ncm |
| **Start up torque** | 0.3 Ncm |
| **Permissible movement static** | ± 0.1 mm, radial<br>± 0.5 mm, axial |
| **Permissible movement dynamic** | ± 0.05 mm, radial<br>± 0.1 mm, axial |
| **Life of ball bearings** | 3.6 x 10^9 revolutions |

## Ambient data

| | |
|---|---|
| **Operating temperature range** | –20 °C ... +115 °C [1] |
| **Storage temperature range** | –40 °C ... +125 °C [2] |
| **Relative humidity/condensation** | 90 %, Condensation not permitted |

[1] Given typical thermal connection between motor flange and encoder stator coupling. The max. internal sensor temperature may not exceed 125 °C.

[2] Without package.

[3] The EMC according to the standards quoted is achieved when the motor feedback system is mounted in an electrically conductive housing, which is connected to the central earthing point of the motor controller via a cable screen. The GND-(0 V) connection of the supply voltage is also grounded here. If other shielding concepts are used, users must perform their own tests.

| | |
|---|---|
| **Resistance to shocks** | 100 g, 6 ms (according to EN 60068-2-27) |
| **Frequency range of resistance to vibrations** | 50 g, 10 Hz ... 2,000 Hz (EN 60068-2-6) |
| **EMC** | According to EN 61000-6-2, EN 61000-6-4 and IEC 61326-3 [3)] |
| **Enclosure rating** | IP40, with mating plugs inserted and cover closed (IEC 60529-1) |
| **Operating height (above sea level)** | 2,000 m |

[1)] Given typical thermal connection between motor flange and encoder stator coupling. The max. internal sensor temperature may not exceed 125 °C.

[2)] Without package.

[3)] The EMC according to the standards quoted is achieved when the motor feedback system is mounted in an electrically conductive housing, which is connected to the central earthing point of the motor controller via a cable screen. The GND-(0 V) connection of the supply voltage is also grounded here. If other shielding concepts are used, users must perform their own tests.

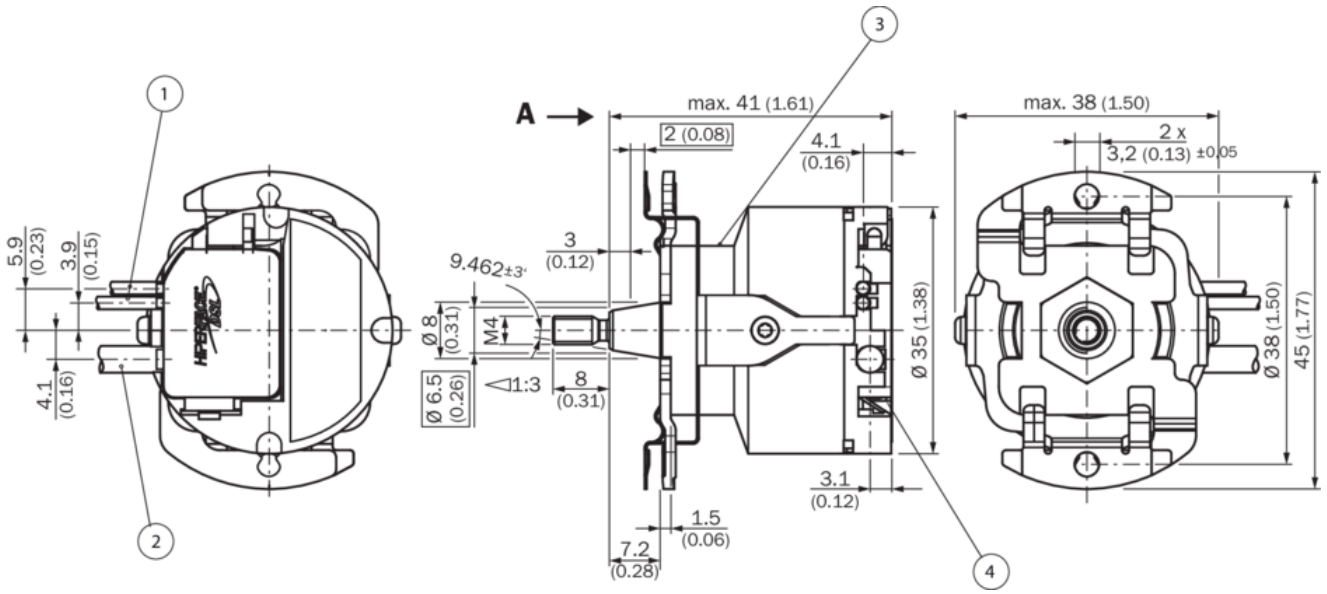
## Certificates

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

## Classifications

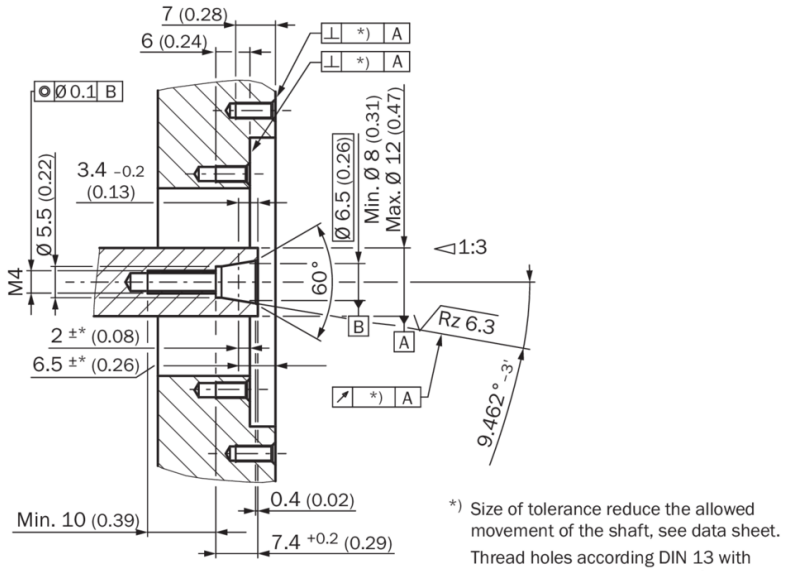
| | |
|---|---|
| **ECLASS 5.0** | 27270590 |
| **ECLASS 5.1.4** | 27270590 |
| **ECLASS 6.0** | 27270590 |
| **ECLASS 6.2** | 27270590 |
| **ECLASS 7.0** | 27270590 |
| **ECLASS 8.0** | 27270590 |
| **ECLASS 8.1** | 27270590 |
| **ECLASS 9.0** | 27270590 |
| **ECLASS 10.0** | 27273805 |
| **ECLASS 11.0** | 27273901 |
| **ECLASS 12.0** | 27273901 |
| **ETIM 5.0** | EC001486 |
| **ETIM 6.0** | EC001486 |
| **ETIM 7.0** | EC001486 |
| **ETIM 8.0** | EC001486 |
| **UNSPSC 16.0901** | 41112113 |

## Dimensional drawing EKx36-xKF0B0xxA




Dimensions in mm (inch)
① Temperature resistor cable
② Communication cable
③ Measuring point for operating temperature
④ measuring point for vibrations

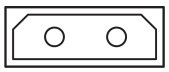
## Attachment specifications




*) Size of tolerance reduce the allowed movement of the shaft, see data sheet.
Thread holes according DIN 13 with counterbore according DIN 76 min. 1.05 x diameter of thread.

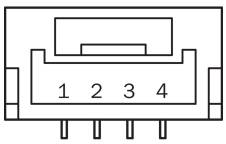
① Nominal position
② The size of the tolerance reduces the permissible wave movement, see data sheet
③ Threaded holes in accordance with DIN 13 with recesses in accordance with DIN 76 min. 1.05 x thread diameter

## Anschlussbelegung Temperature sensor pin assignment




| PIN | Signal | Explanation |
|---|---|---|
| 1 | T+ | Thermistor connection |
| 2 | T- | Thermistor connection (to ground) |
| Recommended outer diameter of set of stranded wires: 2.2 mm ± 0.1 mm | | |
| Recommended mating connector: Harwin M80-8990205 | | |

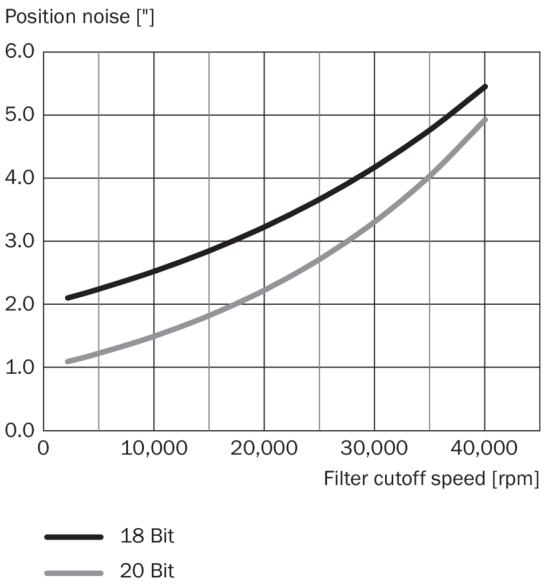
## Anschlussbelegung Supply/communication pin assignment




integrated in motor cable = J, K

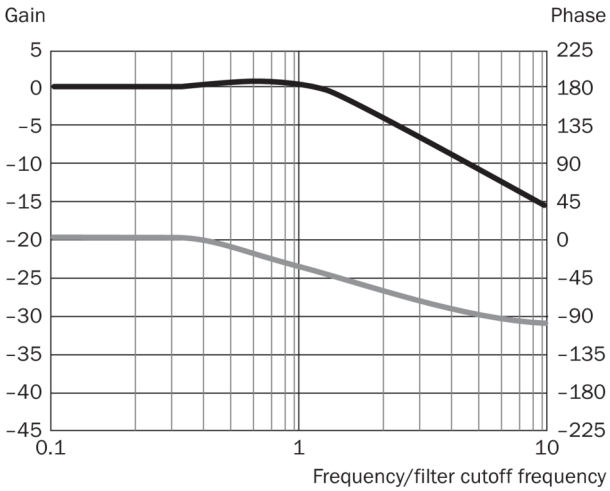
| PIN | Signal | Explanation |
|---|---|---|
| 1 | – | Not connected - no function |
| 2 | +$U_S$/DSL+ | Supply 7 V ... 12 V |
| 3 | GND/DSL- | Ground connection |
| 4 | Housing | Screen/Stranded ground wire |
| Recommended outer diameter of set of stranded wires: 4 mm +0/-0.3 mm | | |
| Recommended mating connector: JST (GHR-04V-S) | | |

## Diagrams

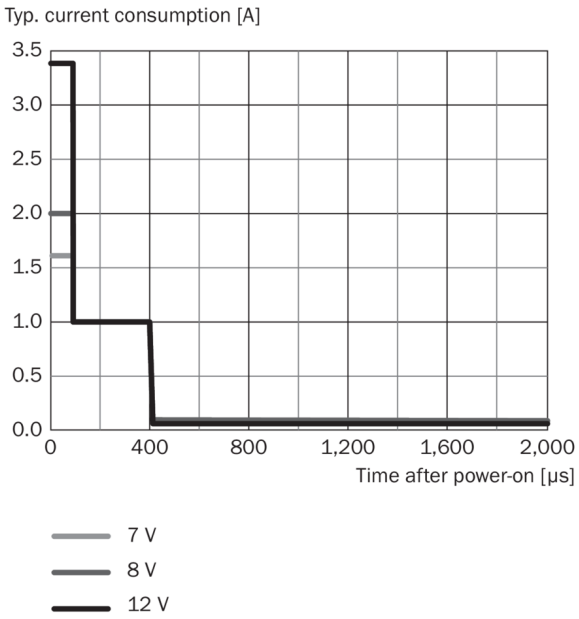


Signal noise is measured as 1 standard deviation (σ) of the value distribution. Position filter cutoff speed is set by ressource 10Ah, see page 11.

## Diagrams




## Diagrams



## Adjustments Supported resources for HIPERFACE DSL®

| RID | Name | time overrun [ms] | Description |
|---|---|---|---|
| 0x000 | ROOT | 75 | Top node of ressource tree (all nodes reachable from here) |
| 0x001 | IDENT | 75 | Node with pointers to all identification ressources |
| 0x002 | MONITOR | 75 | Node with pointers to all monitoring ressources |
| 0x003 | ADMIN | 75 | Node with pointers to all administration ressources |
| 0x004 | COUNTER | 75 | Node with pointers to all counter ressources |
| 0x005 | DATA | 75 | Node with pointers to all user file ressources |
| 0x006 | SENSHUB | 75 | Node with pointers to all SensorHub ressources |
| 0x080 | ENCTYPE | 255 | Base functionality of encoder |
| 0x081 | RESOLUTN | 255 | Number of steps per turn |
| 0x082 | RANGE | 255 | Number of encoded revolutions |
| 0x083 | TYPECODE | 255 | Type name of encoder |
| 0x084 | SERIALNO | 255 | Serial no of encoder |
| 0x085 | FWREVNO | 70 | Firmware and hardware revision of encoder |
| 0x086 | FWDATE | 70 | Firmware date of encoder |
| 0x087 | EESIZE | 255 | Total amount of memory for user files |
| 0x089 | VPOS2RES | 255 | Number of steps per turn (DSL Safe Position 2) |
| 0x0c0 | TEMPRNG | 255 | Min and max allowed ambient temperature of encoder |
| 0x0c1 | TEMPRTUR | 70 | Actual ambient temperature of encoder |
| 0x0c2 | LEDRANGE | 255 | Min and max allowed LED current of encoder |
| 0x0c3 | LEDCURR | 70 | Actual LED current of encoder |
| 0x0c4 | SUPRANGE | 255 | Min and max allowed supply voltage of encoder |
| 0x0c5 | SUPVOLT | 70 | Actual supply voltage of encoder |
| 0x0c6 | SPEEDRNG | 255 | Max allowed shaft speed of encoder |
| 0x0c7 | SPEED | 70 | Actual shaft speed of encoder |
| 0x0c8 | ACCRANGE | 255 | Max allowed shaft acceleration of encoder |
| 0x0cb | LIFETIME | 70 | Operating time and total shaft turns of encoder. For safety variants also remaining mission time is indicated. |
| 0x0cc | ERRORLOG | 195 | Stored error messages of encoder |
| 0x0cd | HISTOGRM | 70 | Usage history of encoder in histogram form |
| 0x0d5 | ERRLOGFI | 255 | Filters the error log entries |
| 0x100 | RESET | 255 | Reset or shutdown of encoder |
| 0x101 | SETPOS | 255 | Set encoder position to arbitrary preset value. Offset of position can be read back. |
| 0x104 | SETACCES | 70 | Set or read back access level |
| 0x105 | CHNGEKEY | 255 | Change password for access level |
| 0x107 | UWARNING | 255 | Set or read back user-defined warning boundaries |
| 0x108 | FACRESET | 255 | Reset user settings of encoder to factory defaults |
| 0x109 | ENCIDENT | 255 | Set or read back user-defined encoder index (for multi-axis systems) |
| 0x10a | POSFILT | 255 | Set or read back position filter settings |
| 0x112 | LOCKINTU | 255 | Possibility to lock/unlock internal access levels |
| 0x11d | FEATURES | 90 | Set or read back encoder features |
| 0x11f | BOOTLOAD | 255 | Bootloader access for end user (planned) |
| 0x120 | READCNT | 140 | Read user counter value |
| 0x121 | INCCOUNT | 140 | Increment user counter value |
| 0x122 | RESETCNT | 140 | Reset user counter value |
| 0x130 | LOADFILE | 255 | Load user file |
| 0x131 | RWFILE | 255 | Read from or write to user file |
| 0x132 | FILESTAT | 70 | Read status of user file |
| 0x133 | MAKEFILE | 255 | Create, change or delete user file |
| 0x134 | DIR | 130 | Read directory of accessible user files |
| 0x136 | FILEBACK | 255 | Set or read back status of user file backup |
| 0x200 | ACCESSIO | 70 | Access to simple I/Os connected directly to encoder |
| 0x201 | MANAGEIO | 255 | Manage simple I/Os |

## Operation note Overview of warnings and fault indications

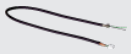
| Error type | Error register | Error bit | Description |
|---|---|---|---|
| Position (incremental) | 00h | 0 | A Protocol reset was executed |
| | 00h | 1 | Acceleration overflow, invalid position |
| | 00h | 2 | Test running |
| | 00h | 4 | Internal error in angular tracking, invalid position |
| | 00h | 5 | Internal error in vector length, invalid position |
| | 00h | 6 | Internal error in position counter, invalid position |
| | 00h | 7 | Internal error in position synchronization, invalid position |
| Position (absolute) | 01h | 0 | Error in absolute position in rotation |
| | 01h | 1 | Error 1 in absolute position in several rotations |
| | 01h | 2 | Error 2 in absolute position in several rotations |
| | 01h | 3 | Error 3 in absolute position in several rotations |
| | 01h | 4 | Position cross check error (only safety versions) |
| Initialization | 02h | 0 | Switch-on self-test undertaken (only safety versions) |
| | 02h | 1 | Warning safety parameter: error could not be rectified (only safety versions) |
| | 02h | 2 | Warning safety parameter: error could not be rectified (only safety versions) |
| | 02h | 3 | Error calibration data |
| | 02h | 4 | Internal communications error 1 |
| | 02h | 5 | Internal communications error 2 |
| | 02h | 6 | Internal general error |
| Test | 03h | 0 | Critical temperature |
| | 03h | 1 | Critical LED current |
| | 03h | 2 | Critical supply voltage |
| | 03h | 3 | Critical rotation speed |
| | 03h | 4 | Critical acceleration |
| | 03h | 5 | Critical overflow |
| | 03h | 6 | Internal monitoring error |
| Access to resources | 04h | 0 | Invalid argument given during resource access procedure |
| | 04h | 1 | Resource access refused due to incorrect access level |
| | 04h | 2 | Internal error during resoure access |
| | 04h | 3 | Error when accessing a user file |
| User defined Warnings | 07h | 0 | User-defined warning 0 |
| | 07h | 1 | User-defined warning 1 |
| | 07h | 2 | User-defined warning 2 |
| | 07h | 3 | User-defined warning 3 |

## Operation note Supported access levels

| Access level | User | Standard access key |
|---|---|---|
| 0 | Execute (default setting) | 0000 (30 30 30 30h) |
| 1 | Bediener | 1111 (31 31 31 31h) |
| 2 | Wartung | 2222 (32 32 32 32h) |
| 3 | Berechtigter Client | 3333 (33 33 33 33h) |
| 4 | Benutzerservice | 4444 (34 34 34 34h) |

## Recommended accessories

Other models and accessories ➜ www.sick.com/EKS_EKM36-S

| | Brief description | Type | part no. |
|---|---|---|---|
| Mounting systems | | | |
| | • **Description:** Mounting tools<br>• **Suitable for:** Anschlussart T,J,K | BEF-MW-EKX36 | 2060224 |
| connectors and cables | | | |
| | • **Connection type head A:** Female connector, stranded wire, 2-pin, straight<br>• **Connection type head B:** Flying leads<br>• **Signal type:** HIPERFACE DSL®<br>• **Cable:** 0.2 m, 2-wire<br>• **Description:** HIPERFACE DSL®, twisted, unshielded | DOL-0B02-G0M2XC1 | 2062083 |
|  | • **Connection type head A:** Female connector, stranded wire, 4-pin, straight<br>• **Connection type head B:** Flying leads<br>• **Signal type:** HIPERFACE DSL®<br>• **Cable:** 0.36 m, 2-wire<br>• **Description:** HIPERFACE DSL®, twisted, shielded | DOL-0B02-G0M3AC2 | 2108944 |
|  | • **Connection type head A:** Female connector, stranded wire, 2-pin, straight<br>• **Connection type head B:** Flying leads<br>• **Signal type:** HIPERFACE DSL®<br>• **Cable:** 0.3 m, 2-wire<br>• **Description:** HIPERFACE DSL®, twisted, unshielded | DOL-0B02-G0M3XC1 | 2091818 |
|  | • **Connection type head A:** Female connector, stranded wire, 2-pin, straight<br>• **Connection type head B:** Flying leads<br>• **Signal type:** HIPERFACE DSL®<br>• **Cable:** 0.4 m, 2-wire<br>• **Description:** HIPERFACE DSL®, twisted, unshielded | DOL-0B02-G0M4XC1 | 2086286 |
|  | • **Connection type head A:** Female connector, stranded wire, 4-pin, straight<br>• **Connection type head B:** Flying leads<br>• **Signal type:** HIPERFACE DSL®<br>• **Cable:** 0.43 m, 2-wire<br>• **Description:** HIPERFACE DSL®, shielded<br>• **Note:** Non-isolated drain wire | DOL-0B03-G0M4XC1 | 2087314 |

# 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