Assembly and operating manual FTS

Force/torque sensor

Translation of original operating manual

Hand in hand for tomorrow

Imprint

Technical changes:
We reserve the right to make technical improvements.

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Dear Customer

Dear Customer,

Thank you for putting your trust in our products and our family-owned company, the leading technology supplier of robots and production machines.

Our team is always available to answer any questions on this product and other solutions. We look forward to your challenging questions. We will find a solution!

Best regards,

Your SCHUNK team

Customer Management
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cmg@de.schunk.com

Please read the operating manual in full and keep it close to the product.

Table of contents

1 General

1.1 About this Manual

This manual contains important information for the safe, correct use of the product.

The manual is an integral part of the product and must be kept accessible by personnel at all times.

Personnel must have read and understood this manual before beginning any work. The observance of all safety notes in this manual is the precondition for all safe working.

Besides this manual, other documents which apply are those listed under ▸ 1.1.4 [🗋 6].

NOTE: The illustrations in this manual are intended to provide a basic understanding and may deviate from the actual version.

1.1.1 Illustration of safety notes

To make risks clear,the following signal words and symbols are used for safety notes.

⚠ DANGER

Danger to individuals!

Ignoring a safety note such as this will certainly lead to irreversible injury and even death.

⚠ WARNING

Danger to individuals!

Ignoring a safety note such as this can lead to irreversible injury and even death.

⚠ CAUTION

Danger to individuals!

Non-observance can cause minor injuries.

NOTICE

Material damage!

Information about avoiding material damage.

1.1.2 Definition of Terms

The term "product" replaces the product name on the title page in this manual.

1.1.3 Symbol definition

The following symbols are used in this manual:

■ Prerequisite for an action

1. Action 1
2. Action 2
   ⇨ Intermediate results

⇨ Final results

▸ 1.1.3 [🗋 6]: chapter number and [page number] in hyperlinks

1.1.4 Applicable documents

- General terms and conditions *
- Catalog data sheet for the purchased product *
- Commissioning instructions for the force/torque sensor system *

The documents labeled with an asterisk (*) can be downloaded from **schunk.com/downloads**.

1.1.5 Sizes

This manual applies to the following sizes:

- FTS 047
- FTS 056
- FTS 070
- FTS 085
- FTS 105
- FTS 125
- FTS 160

1.2 Warranty

If the product is used as intended, the warranty is valid for 24 months from the date of delivery from the production facility under the following conditions:

- Observe the maximum permissible loads, ▸ 3.7 [🗋 33]
- Observe the maximum permissible load cycles (2 million threshold loads within the measuring range or permissible combined load), ▸ 3.7 [🗋 33]
- Observe the ambient conditions and operating conditions, ▸ 2.4 [🗋 9]
- Observe the specified maintenance intervals, ▸ 6 [🗋 53]
- The metrological properties can only be guaranteed with annual recalibration and compliance with all other warranty conditions as well as under the environmental conditions shown in the calibration certificate, ▸ 3.5 [🗋 24]

Parts touching the workpiece and wearing parts are not part of the warranty.

1.3 Scope of delivery

The scope of delivery includes:

- Force/torque sensor FTS in the version ordered
- Assembly and Operating Manual
- Accessory pack

1.4 Accessories

A wide range of accessories is available for this product.

For information regarding which accessory articles can be used with the corresponding product variants, see catalog data sheet.

2 Basic safety notes

2.1 Intended use

The product is intended as a component of a machine for the measurement of forces and torque in six directions. The mechanically acting forces are converted into digital measured values and these are transmitted to a PC or a machine control system via various interfaces.

- When implementing and operating components in safety-related parts of the control systems, the basic safety principles in accordance with DIN EN ISO 13849-2 apply. The proven safety principals in accordance with DIN EN ISO 13849-2 also apply to categories 1, 2, 3 and 4.
- The product is intended for installation in a machine/automated system or for attachment to a robot. The applicable guidelines for the machine/automated system must be observed and complied with.
- Use of the product in the direct vicinity of a welding process is only permitted with additional protective measures.
- The product is intended for industrial and industry-oriented use. Its use outside enclosed spaces is only permitted if suitable protective measures are taken against outdoor exposure. The product is not suitable for use in salty air.
- The product may only be used within the scope of its technical data, ▶ 3 [🗋 14].
- Appropriate use of the product includes compliance with all instructions in this manual.
- Any use that exceeds or differs from the appropriate use is regarded as misuse.

2.2 Structural changes

Implementation of structural changes

Modifications, changes or reworking, e.g. additional threads, holes, or safety devices, can damage the product or impair its functionality or safety.

- Structural changes should only be made with the written approval of SCHUNK.

2.3 Spare parts

Use of unauthorized spare parts

Using unauthorized spare parts can endanger personnel and damage the product or cause it to malfunction.

- Use only original spare parts and spares authorized by SCHUNK.

2.4 Ambient conditions and operating conditions

Required ambient conditions and operating conditions

Incorrect ambient and operating conditions can make the product unsafe, leading to the risk of serious injuries, considerable material damage and/or a significant reduction to the product's life span.

- Make sure that the product is only used within its defined application parameters, ▶ 3 [🗋 14].

2.4.1 Insulation resistance and voltage resistance in accordance with EN 60204-1

When measuring the insulation resistance and inspecting the voltage resistance of the machine/automated system, observe the following information in order to protect the product from damage:

- The electronics are connected to the housing ground, in order to protect against overvoltage.
- For measurements of the insulation resistance in accordance with EN 60204-1, no voltage levels above the permitted operating voltage range may be used. In addition, the maximum measuring current must be safely limited to values below 10mA.
- Before testing the voltage resistance of the machine/ automated system in accordance with EN 60204-1, disconnect the product from the electric circuits to be tested. This applies to all connections on the product:
  - positive and negative connections of the power and logic supply
  - Fieldbus connections

2.5 Personnel qualification

Inadequate qualification of personnel

Work on the product by inadequately qualified personnel can lead to serious injuries and considerable material damage.

- Order all work to be performed only by appropriately qualified personnel.
- Personnel must have read and understood the complete manual before beginning any work on the product.
- Observe national accident prevention regulations and the general safety notes.

The following personnel qualifications are required for the various types of work on the product:

Trained electrician Due to their technical training, knowledge and experience, trained electricians are able to work on electrical systems, recognize and avoid possible dangers and know the relevant standards and regulations.

Qualified personnel Due to its technical training, knowledge and experience, qualified personnel is able to perform the delegated tasks, recognize and avoid possible dangers and knows the relevant standards and regulations.

Instructed person Instructed persons have been instructed by the user regarding the tasks entrusted to them and the potential dangers of inappropriate behavior.

Manufacturer's service personnel The manufacturer's service personnel have the specialized training, knowledge, and experience to perform the work entrusted to them and to recognize and avoid potential dangers.

2.6 Personal protective equipment

Use of personal protective equipment

Personal protective equipment serves to protect staff in the event of a danger that may interfere with their health or safety at work.

- When working on and with the product, observe the occupational health and safety regulations and wear the required personal protective equipment.
- Observe the valid safety and accident prevention regulations.
- Wear protective gloves to guard against sharp edges and corners or rough surfaces.
- Wear heat-resistant protective gloves when handling hot surfaces.
- Wear protective gloves and safety goggles when handling hazardous substances.
- Wear close-fitting protective clothing and also wear long hair in a hairnet when dealing with moving components.

2.7 Notes on safe operation

Incorrect manner of working by personnel

An incorrect manner of working can make the product unsafe and risk the danger of serious injuries and considerable material damages.

- Avoid any manner of working that may interfere with the function and operational safety of the product.
- Use the product as intended.
- Observe the safety notes and assembly instructions.
- Do not expose the product to any corrosive media. Products for special ambient conditions are excluded.
- Rectify malfunctions as soon as they occur.
- Observe the care and maintenance instructions.
- Observe the current safety, accident prevention, and environmental protection regulations for the application field of the product.

2.8 Malfunctions

Behavior in case of malfunctions

- Immediately remove the product from operation and report the malfunction to the responsible departments/persons.
- Order appropriately trained personnel to rectify the malfunction.
- Do not recommission the product until the malfunction has been rectified.
- Test the product after a malfunction to establish whether it still functions properly and no increased risks have arisen.

2.9 Disposal

Handling of disposal

Incorrect handling during disposal can make the product unsafe and risks serious injuries and considerable material and environmental harm.

- Follow local regulations on dispatching product components for recycling or orderly disposal.

2.10 Fundamental dangers

General

- Observe safety distances.
- Never deactivate safety devices.
- Before commissioning the product, take appropriate protective measures to secure the danger zone.
- Disconnect power sources before installation, modification, maintenance, or calibration. Ensure that no residual energy remains in the system.
- If the energy supply is connected, do not move any parts by hand.
- Do not reach into the open mechanism or movement area of the product during operation.

2.10.1 Protection during handling and assembly

Incorrect handling and assembly

Incorrect handling and assembly can make the product unsafe and pose a risk of serious injuries and considerable material damage.

- Order all work to be performed only by appropriately qualified personnel.
- For all work, secure the product against accidental operation.
- Observe the relevant accident prevention regulations.
- Use suitable assembly and transport equipment and take precautions to prevent jamming and crushing.

Incorrect lifting of loads

Falling loads can cause serious injuries and even death.

- Stand clear of suspended loads and do not step within their swiveling range.
- Never move loads without supervision.
- Do not leave suspended loads unattended.

2.10.2 Protection during commissioning and operation

Falling or violently ejected components

Falling and violently ejected components can cause serious injuries and even death.

- Take appropriate protective measures to secure the danger zone.
- Never step into the danger zone during operation.

Non-immediate injuries due to the assumption of incorrect measured values, e.g. due to electromagnetic processes, moisture penetration or temperature effects.

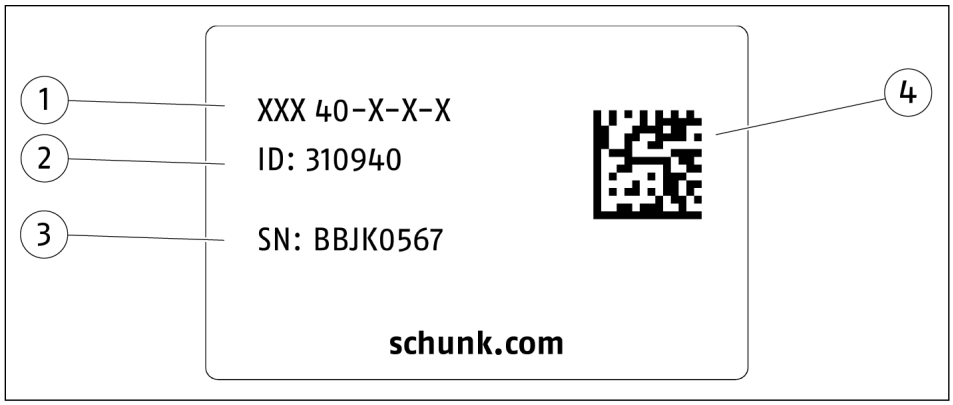
- A regular check of the measurement data and the process must be carried out to prevent malfunctions due to incorrect measurement data ▸ 6.2 [🗋 53].
- Observe measurement deviations due to temperature deviations.
- If the product is used in environments with high temperatures (with maximum utilization of the permissible ambient conditions up to +85 °C), it is essential to monitor the sensor temperature and check the sensor for correct function if it is exceeded.

Injury to skin surfaces due to contact with hot product surfaces

- If the product is used in environments with high temperatures (with maximum utilization of the permissible ambient conditions up to +85 °C), wear appropriate PPE! ▸ 2.4 [🗋 9]

3 Technical data

3.1 Name plate



1	Product designation
2	ID
3	Serial number
4	Data matrix code

Scan code or enter serial number on the web and get all the product information: operating manuals, spare parts packages, software updates and much more.

For further information, visit **schunk.com/serialisierung**

A separate app may be required for scanning with a mobile phone.

3.2 Basic sensor data

FTS 047

Dimensions (ØD x Z) [mm]	47,0 x 31,5
Weight [kg]	0.13
Range of measurement Fx, Fy [N]	±125
Range of measurement Fz [N]	±300
Range of measurement Mx, My, Mz [Nm]	±4,5
Resolution Fx, Fy [N]	0.0063
Resolution Fz [N]	0.0120
Resolution Mx, My [Nm]	0.00018
Resolution Mz [Nm]	0.00014
max. rel. deviation relative to measuring range [%-fs]	<1,0
max. display deviation Fx, Fy [N]	1,25
max. display deviation Fz [N]	3
max. display deviation Mx, My, Mz [Nm]	0,045
max. sampling rate [Hz]	1000
Overload Fx, Fy [N]	1000
Overload Fz [N]	2400
Overload Mx, My, Mz [Nm]	22.5
Resonance frequency Fx, Fy, Mx, My [Hz]	1760
Resonance frequency Fz, Mz [Hz]	3010

FTS 056

Dimensions (ØD x Z) [mm]	56,0 x 35,0
Weight [kg]	0.18
Range of measurement Fx, Fy [N]	±250
Range of measurement Fz [N]	±600
Range of measurement Mx, My, Mz [Nm]	±11
Resolution Fx, Fy [N]	0.0125
Resolution Fz [N]	0.0240
Resolution Mx, My [Nm]	0.00044
Resolution Mz [Nm]	0.00033
max. rel. deviation relative to measuring range [%-fs]	<1,0
max. display deviation Fx, Fy [N]	2,5
max. display deviation Fz [N]	6
max. display deviation Mx, My, Mz [Nm]	0,11
max. sampling rate [Hz]	1000
Overload Fx, Fy [N]	1500
Overload Fz [N]	4200
Overload Mx, My, Mz [Nm]	44
Resonance frequency Fx, Fy, Mx, My [Hz]	1870
Resonance frequency Fz, Mz [Hz]	2980

FTS 070

Dimensions (ØD x Z) [mm]	70,0 x 42,0
Weight [kg]	0.36
Range of measurement Fx, Fy [N]	±500
Range of measurement Fz [N]	±1200
Range of measurement Mx, My, Mz [Nm]	±28
Resolution Fx, Fy [N]	0.0250
Resolution Fz [N]	0.0480
Resolution Mx, My [Nm]	0.0011
Resolution Mz [Nm]	0.0008
max. rel. deviation relative to measuring range [%-fs]	<1,0
max. display deviation Fx, Fy [N]	5
max. display deviation Fz [N]	12
max. display deviation Mx, My, Mz [Nm]	0,28
max. sampling rate [Hz]	1000
Overload Fx, Fy [N]	2500
Overload Fz [N]	7200
Overload Mx, My, Mz [Nm]	84
Resonance frequency Fx, Fy, Mx, My [Hz]	1770
Resonance frequency Fz, Mz [Hz]	2870

FTS 085

Dimensions (ØD x Z) [mm]	85,0 x 51,0
Weight [kg]	0,65
Range of measurement Fx, Fy [N]	±1000
Range of measurement Fz [N]	±2400
Range of measurement Mx, My, Mz [Nm]	±70
Resolution Fx, Fy [N]	0.05
Resolution Fz [N]	0.096
Resolution Mx, My [Nm]	0.0028
Resolution Mz [Nm]	0.0021
max. rel. deviation relative to measuring range [%-fs]	<1,0
max. display deviation Fx, Fy [N]	10
max. display deviation Fz [N]	24
max. display deviation Mx, My, Mz [Nm]	0,7
max. sampling rate [Hz]	1000
Overload Fx, Fy [N]	4500
Overload Fz [N]	12000
Overload Mx, My, Mz [Nm]	175
Resonance frequency Fx, Fy, Mx, My [Hz]	1670
Resonance frequency Fz, Mz [Hz]	2620

FTS 105

Dimensions (ØD x Z) [mm]	105,0 x 56,0
Weight [kg]	1,5
Range of measurement Fx, Fy [N]	±2000
Range of measurement Fz [N]	±4800
Range of measurement Mx, My, Mz [Nm]	±175
Resolution Fx, Fy [N]	0.1
Resolution Fz [N]	0.192
Resolution Mx, My [Nm]	0.007
Resolution Mz [Nm]	0.0053
max. rel. deviation relative to measuring range [%-fs]	<1,0
max. display deviation Fx, Fy [N]	20
max. display deviation Fz [N]	48
max. display deviation Mx, My, Mz [Nm]	1,75
max. sampling rate [Hz]	1000
Overload Fx, Fy [N]	9000
Overload Fz [N]	24000
Overload Mx, My, Mz [Nm]	350
Resonance frequency Fx, Fy, Mx, My [Hz]	1370
Resonance frequency Fz, Mz [Hz]	2030

FTS 125

Dimensions (ØD x Z) [mm]	125,0 x 66,0
Weight [kg]	2.6
Range of measurement Fx, Fy [N]	±3200
Range of measurement Fz [N]	±7800
Range of measurement Mx, My, Mz [Nm]	±350
Resolution Fx, Fy [N]	0.16
Resolution Fz [N]	0.312
Resolution Mx, My [Nm]	0.014
Resolution Mz [Nm]	0.0105
max. rel. deviation relative to measuring range [%-fs]	<1,0
max. display deviation Fx, Fy [N]	32
max. display deviation Fz [N]	78
max. display deviation Mx, My, Mz [Nm]	3,5
max. sampling rate [Hz]	1000
Overload Fx, Fy [N]	14400
Overload Fz [N]	39000
Overload Mx, My, Mz [Nm]	700
Resonance frequency Fx, Fy, Mx, My [Hz]	1300
Resonance frequency Fz, Mz [Hz]	1860

FTS 160

Dimensions (ØD x Z) [mm]	160,0 x 70,0
Weight [kg]	5.1
Range of measurement Fx, Fy [N]	±5000
Range of measurement Fz [N]	±12500
Range of measurement Mx, My, Mz [Nm]	±700
Resolution Fx, Fy [N]	0.25
Resolution Fz [N]	0.5
Resolution Mx, My [Nm]	0.028
Resolution Mz [Nm]	0.021
max. rel. deviation relative to measuring range [%-fs]	<1,0
max. display deviation Fx, Fy [N]	50
max. display deviation Fz [N]	125
max. display deviation Mx, My, Mz [Nm]	7
max. sampling rate [Hz]	1000
Overload Fx, Fy [N]	30000
Overload Fz [N]	75000
Overload Mx, My, Mz [Nm]	1750
Resonance frequency Fx, Fy, Mx, My [Hz]	1050
Resonance frequency Fz, Mz [Hz]	1360

3.3 Basic sensor cable data

Designation	Identification number	Length [m]	Size of socket (sensor)	Rated current / Rated voltage / Rated impulse voltage
FTS C-M8-M12-5	1608054	5	M8	According to IEC 61076-2-104
FTS C-M12-M12 -5	1608055	5	M12	According to IEC 61076-2-101

Diameter [mm]	6,0 ± 0,2
Coding (sensor)	A coded
Outlet Plug connector (sensor)	Angled 90°
Size Connector (interface box)	M12
Coding (interface box)	A coded
Outlet Connector (Interface Box)	Straight
Color	Black
Protection class IP	67
Shielding	shielded
Energy chain compatible / drag chain compatible	yes
Bending radius static / fixed installation [mm]	60
Bending radius dynamic / free laid [mm]	75
Max. permissible bending cycles	>2.0 million
Chemical resistance	Chemical, UV, oil resistance

3.4 Basic interface box data

Standard

Designation	FTS IFB-PN	FTS IFB-EI	FTS IFB-EC
Identification number	1603600	1603602	1603604
Communication interface	Profinet	Ethernet	Ethercat
Weight [kg]	0.22		
Dimensions (L x W x H) [mm]	105.5 x 107.5 x 32.5		
Max. sampling rate [Hz]	1000		
Rated voltage [V]	12/24/48		
Rated/max. current consumption [A]	0,4/0,2/0,1		
Type Socket 1 Bus (IN)	RJ 45		
Coding (IN)	-		
Type socket 2 Bus (Out)	RJ 45		
Coding (Out)	-		
Power supply connection	Wire		
Cable cross-section power supply max. [mm²]	2 mm²		
Type Socket Sensor	M12		
Bluetooth antenna (optional)	external		

3.5 Ambient conditions and operating conditions

Sensor

Transport and storage	
Ambient temperature [°C] min.	-40
Ambient temperature [°C] max.	70
Air humidity [%] max.	95
Operation	
Ambient temperature [°C] min.	0
Ambient temperature [°C] max.	55 * 85 **
Air humidity [%] max.	95
IP protection class	67 ***

* This can be negatively influenced by insufficient heat dissipation in the tool or actuator as well as heat supply through the tool or actuator!

** The maximum internal sensor temperature of 85°C must never be exceeded. This must be ensured by sufficient heat dissipation and/or by limiting the time of use at temperatures above 55°C.

*** The IP protection of the electronics is only given if all the plug connectors have been mounted properly.

The product must not be used in potentially explosive areas.

The product may only be used in the following locations if additional measures are taken:

- In places with a high level of ionizing radiation.
- In places with difficult operating conditions, e.g. as a result of corrosive dusts, gases or chemicals.
- in plants that require special monitoring, e.g. in particularly hazardous rooms.
- In applications during which the product is exposed to unacceptably severe knocking or vibrations Suitable measures must be taken to reduce the amplitude or acceleration of such disturbances. Vibration-damping or vibration-absorbing systems are to be used in such cases.

Sensor cable

Static/fixed installation	
Ambient temperature [°C] min.	-40
Ambient temperature [°C] max.	80
dynamic/freely laid	
Ambient temperature [°C] min.	-20
Ambient temperature [°C] max.	80

Interface box

Ambient temperature [°C] min.	0
Ambient temperature [°C] max.	55
IP protection class Variant PN / EI / EC Variant: PN-67/ EI-67 /EC-IP67	 - 67 *

* The IP protection of the electronics is only guaranteed if all plug connectors have been properly installed. If connectors are left free, the supplied cover must be used

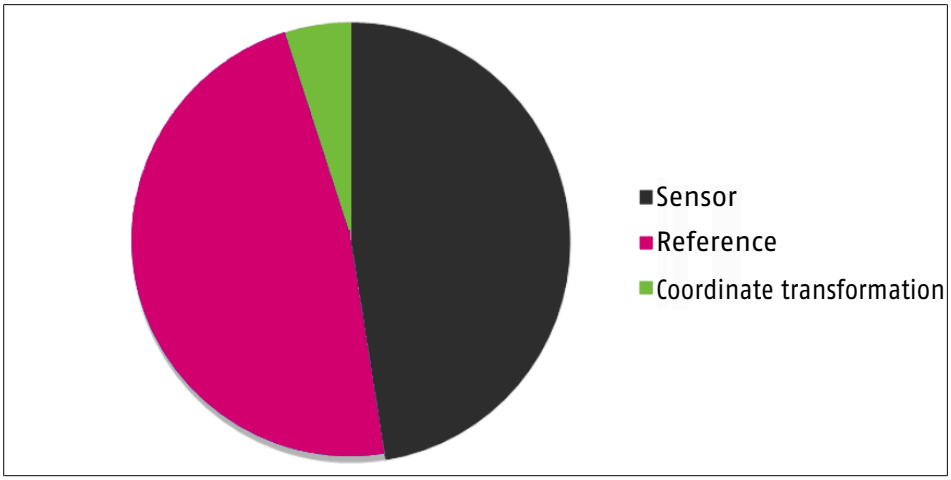
3.6 Technical measurement characteristics

SCHUNK FTS 6-axis Force/Torque sensors have been developed for high levels of precision. The measuring accuracy for these sensors cannot be described with a single characteristic value. A precise distinction must be made between the terms used and attention must be paid to what is being considered. The measurement uncertainty and components of the measurement uncertainty are considered below.

3.6.1 Measurement uncertainty

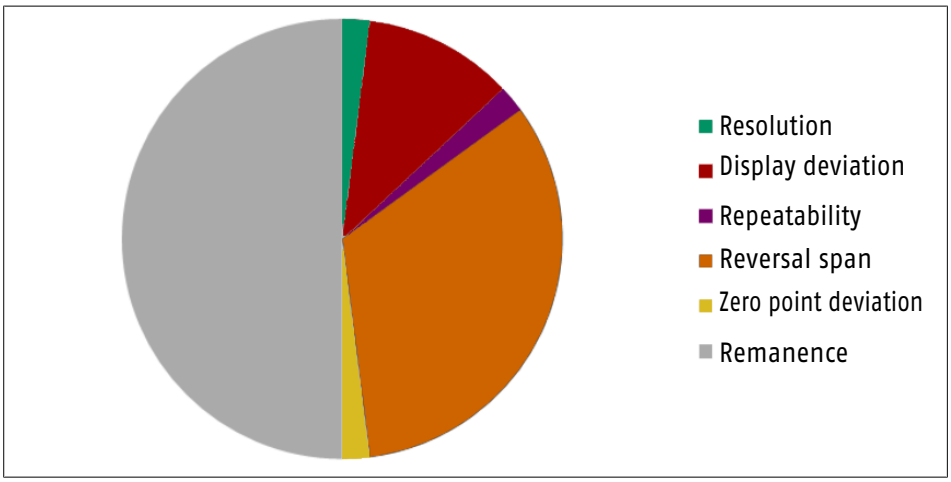
When calibrating a sensor, not only is the sensor considered, but all relevant components. This includes the reference against which the calibration is performed and the errors due to coordinate transformations (e.g. lever arms and adaptations).

- The measurement uncertainty of the calibration device consists, among other things, of the individual measurement uncertainties of the references used as well as measurement uncertainties of components required for force application.
- The measurement uncertainty of the calibration item is an individual characteristic of each sensor and consists of the zero point deviation, the repeatability, the maximum remanence or reversal span, the display deviation and the display resolution.
- Measurement uncertainties of the coordinate transformation arise, for example, as a result of geometric tolerances of the setup and its components and ensure an error contribution during the coordinate transformation from the reference to the calibration object.



Example of the distribution of measurement uncertainty Calibration (qualitative)

The measurement uncertainty of the sensor consists of all components that are relevant in the application. This includes:



Example Distribution of measurement uncertainty Sensor

If, for example, no alternating loads occur in the axis under consideration in the application of the sensor, then the consideration of remanence can be dispensed with. This allows the measurement uncertainty to be reduced depending on the application.

All measurement uncertainties are specified in the calibration certificate, thus covering the worst case for the above-mentioned components (not for temperature and other environmental influences).

3.6.2 Display resolution & saturation

The resolution of the sensor depends on the ambient conditions during the measurement, and in particular on the selected sampling rate and filtering.

The resolution is defined as the smallest signal that can be displayed without noise. The lower the chosen sampling rate, the lower the noise and the resolution.

Size	FX/Fy [N]	Fz [N]	MX/My [Nm]	Mz [Nm]
047	0.0063	0.0120	0.00018	0.00014
056	0.0125	0.0240	0.00044	0.00033
070	0.0250	0.0480	0.00112	0.00084
085	0.0500	0.0960	0.003	0.002
105	0.1	0.1920	0.007	0.005
125	0.16	0.312	0.014	0.011
160	0.25	0.5	0.028	0.021
200	0.5	0.8	0.056	0.042
250	0.8	1.28	0.112	0.084

Tab.: Resolution (at a sampling rate of 1000 Hz, 4σ [95.4% confidence interval], sensor not installed in normal position)

The resolution stated in the calibration certificate is measured prior to calibration in the installed state, under different ambient conditions, and may therefore deviate.

Saturation of the integrated measuring amplifier cannot occur within the measuring range limits or beyond the measuring range. Despite its high resolution, the sensor can detect high overloads.

NOTICE

Do not use the sensor above the maximum permissible loads!

The sensor documents the maximum loads that have occurred!

3.6.3 Display deviation & crosstalk

The display deviation or the max. relative deviation of the displayed measured value describes the deviation of the displayed force or the displayed moment from the true load applied. It mainly consists of linearity errors and cross-talk between the individual channels.

The SCHUNK FTS sensors achieve a maximum relative deviation of ≤ 1.0% in relation to the upper range value (Full-Scale, f.s.).

Size	FX/Fy [N]	Fz [N]	MX/My/Mz [Nm]
047	≤ 1.25	≤ 3.00	≤ 0.045
056	≤ 2.50	≤ 6.00	≤ 0.110
070	≤ 5.00	≤ 12.0	≤ 0.280
085	≤ 10.0	≤ 24.0	≤ 0.700
105	≤ 20.0	≤ 48.0	≤ 1.750
125	≤ 32.0	≤ 78.0	≤ 3.500
160	≤ 50.0	≤ 125	≤ 7.000

The specified values apply to single axis and mixed loads. Information on this can be found in the explanations on the binary statement of conformity in the calibration certificate and in the chapter ▶ 3.6.6 [🗋 32].

3.6.4 Drift & Temperature

The drift and temperature behavior of the sensors is highly dependent on the boundary conditions of the attachments. It can be positively and negatively influenced by heat input and output via the actuator and the tool. The mass, material and heat transfer properties of the attachment must be taken into account! Measurement accuracy is at its best when the system is in a stable state. To achieve this, a sufficient warm-up time must be observed after switching on the sensor. A minimum warm-up time of 30 minutes is recommended.

The residual drift decreases further after a longer warm-up time under stable ambient conditions and even better measurement results can be achieved. Drift effects can be easily eliminated by taring the sensor.

NOTE

The force/torque sensors are calibrated at a temperature of 21.5 °C. If the force/torque sensors are used at a different ambient temperature, the accuracy of the measured values changes.

3.6.5 Calibration

The calibration of multi-component transducers is complex and must always be tailored to the existing sensor system. The accuracy and functionality of SCHUNK FTS sensors can only be guaranteed if they are calibrated according to SCHUNK guidelines.

SCHUNK sensors are supplied with a factory calibration. This factory calibration can be carried out both in the SCHUNK calibration laboratory and in a partner calibration laboratory in accordance with SCHUNK guidelines.

The calibration certificate can be downloaded from SCHUNK.com by entering the serial number. Alternatively, contact SCHUNK After Sales Service Gripping Technology (service.greifsysteme@de.schunk.com).

The regular recalibration of the sensor ensures that it will function properly and that the measurement result will achieve the specified precision. SCHUNK recommends an annual recalibration. Depending on the use of the sensor, earlier recalibration may be worthwhile.

3.6.6 Calibration procedure, measurement uncertainty & calibration certificate

Calibration is required to define the scaling of the force axes and to correctly align the coordinate system of the sensor.

For this purpose, a conversion matrix (or correction matrix C) is determined, which translates the signals of the six DMS channels into forces and torques. The display deviations and the cross-talk behavior are then evaluated and assessed by means of a binary conformity statement (maximum relative deviation ≤ 1.0 % f.s., see ▸ 3.6.2 [🗋 28]).

In addition, the expanded measurement uncertainty of the calibration is determined and the test uncertainty ratio is specified.

Calibration certificate

The calibration certificate includes:

- Description of the calibration item
- Description of the display unit
- Description of the calibration procedure
- Documentation of the measuring condition (measuring device, technical details)
- Documentation of the ambient conditions
- Conformity statement*
- Indication of the measurement uncertainty
- Information for the user (e.g. change history of the calibration certificate)
- Measurement results for resolution
- Determined conversion matrix / correction matrix
- Determined measurement values

* The binary conformity statement refers to the ambient conditions present during calibration, to all measured values under uniaxial load and/or mixed load using simple acceptance (without taking a safety band into account). An indication is given as to whether the transducer has "passed" or "failed".

The test uncertainty ratio indicates the ratio of the acceptance limit divided by the expanded measurement uncertainty of the calibration.

3.7 Maximum permissible load

The maximum permissible load of the sensor is dependent on the type of load. A differentiation is made between single axis and combined load, static and dynamic, and pulsating and alternating and changing loads. The respective limits must be observed.

	static	dynamic	
Load profile	Single load	Pulsating	Alternating
Single axis load	Overload value	Range of measurement final value	On request after detailed examination!
Combined load	On request after detailed examination!	See combined load diagrams	

Tab.: Overview of permissible loads:

In reality, single axis loads – both forces and torque – on the sensor due to attachments are rare. Torques are usually applied in combination with forces. Frequent pulsating loads are also normal in applications with FT sensors. If the sensor is used under alternating loads, it must be checked in each individual case whether the sensor can withstand the load permanently. The sensors are designed for a lifespan of ≥ 2.0 million alternating load cycles with a singel axis load, up to the range of measurement final value, and in case of combined load within the permitted range (see combined load charts). If the permissible loads are exceeded, the service life is reduced and the sensor may suffer fatigue fractures! The service life may be shortened by external vibrations, even if these are not in the resonance range of the sensor.

If the sensor is overloaded beyond the overload value, plastic deformation and/or slippage of the screw connections of the sensor components occurs. This can irreparably damage the sensor. Depending on the damage, the sensor can possibly be saved by recalibrating it.

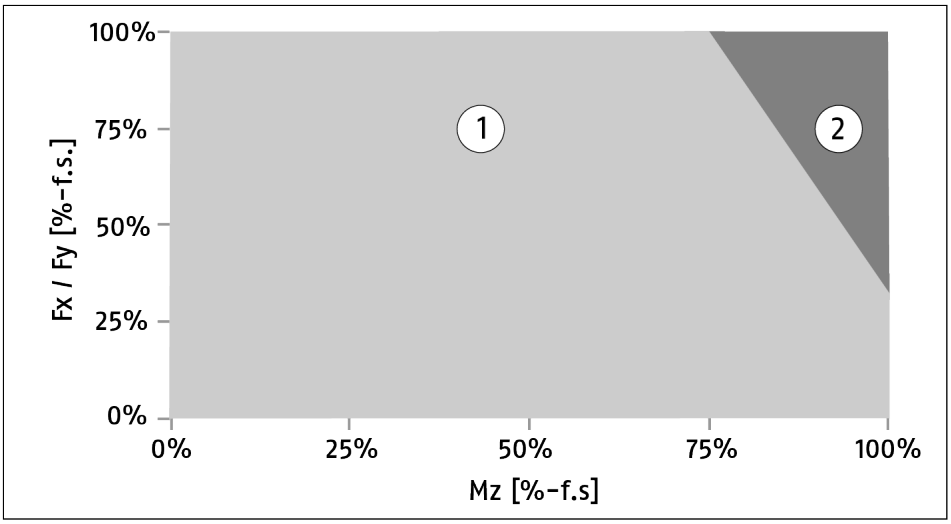
3.7.1 Combined load

The following double combinations of forces and torques are possible:

- Fx & Mz
- Fy & Mz
- Fx & My
- Fy & Mx
- Fz & Mx
- Fz & My

A combined load diagram is shown for these combinations. Two combinations can be displayed in one chart. Should multiple combined loads simultaneously act on the sensor, a detailed case-by-case test of the strength is required!

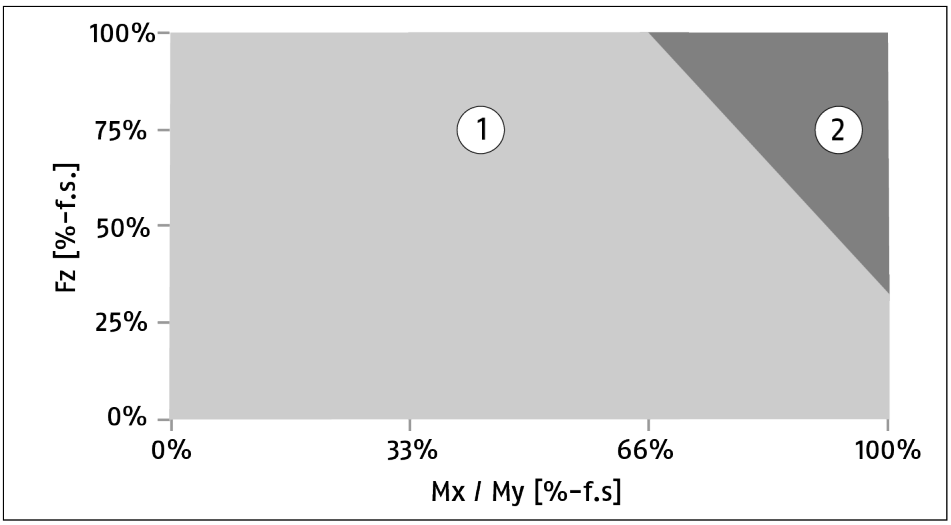
Fx/Fy & Mz



Combined load Fx/Fy & Mz

1	Permissible load	2	Impermissible load

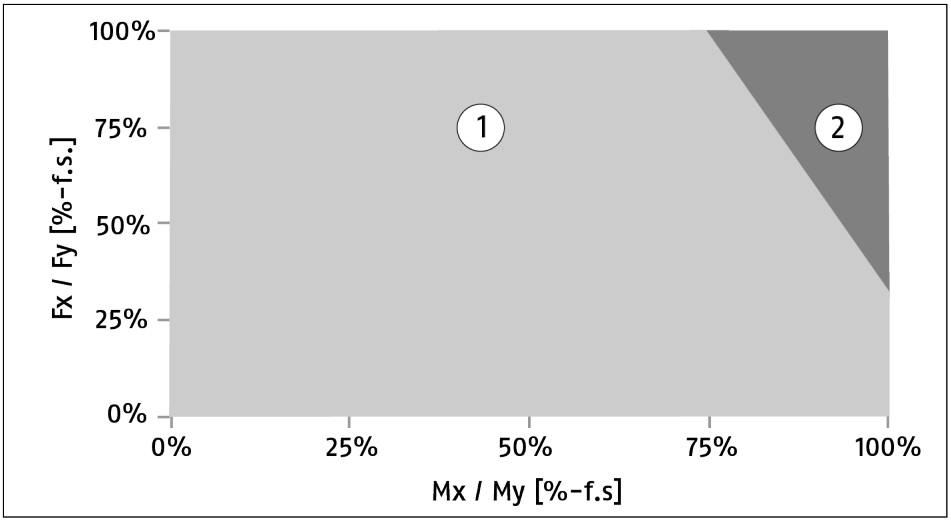
Fz & Mx/My



Combined load Fz/Mx & My

1	Permissible load	2	Impermissible load

Fx/Fy & Mx/My



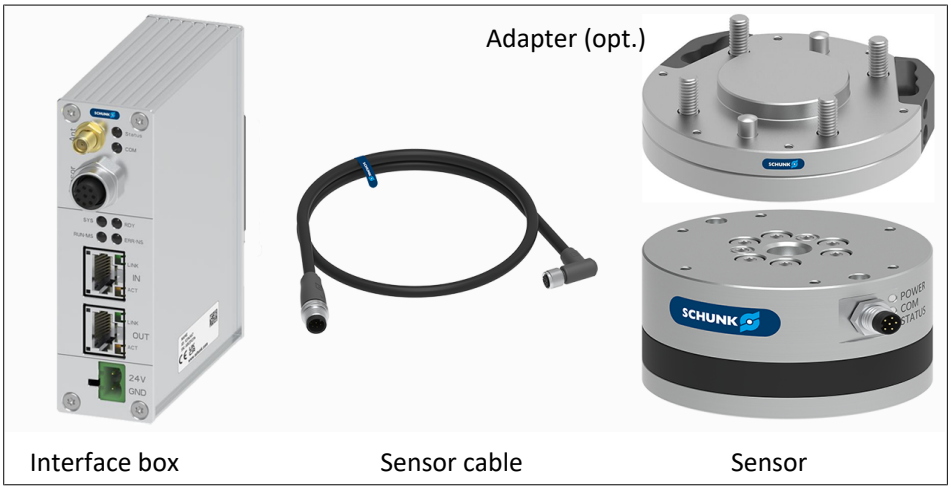
Combined load Fx/Fy & Mx/My

1 Permissible load 2 Impermissible load

Size	Fx/Fy		MZ		Fz		Mx/My		Fx/Fy		Mx/My	
		[N]	[Nm]			[N]	[Nm]			[N]	[Nm]	
047-300-4.5	33.3%	41.7	4.5	100%	33%	99	4.5	100%	33%	41.3	4.5	100%
	100%	125	3.4	75%	100%	300	3.0	66%	100%	125	3.4	75%
056-500-11	33.3%	83.3	11	100%	33%	198	11	100%	33%	82.5	11	100%
	100%	250	8.3	75%	100%	600	7.3	66%	100%	250	8.3	75%
070-1200-28	33.3%	166.7	28	100%	33%	396	28	100%	33%	165	28	100%
	100%	500	21	75%	100%	1200	18.5	66%	100%	500	21	75%
085-2400-70	33.3%	333	70	100%	33%	792	70	100%	33%	330	70	100%
	100%	1000	52.5	75%	100%	2400	46.2	66%	100%	1000	52.5	75%
105-4800-175	33.3%	666.6	175	100%	33%	1584	175	100%	33%	660	175	100%
	100%	2000	131.3	75%	100%	4800	115.5	66%	100%	2000	131.3	75%
125-7800-350	33.3%	1066.6	350	100%	33%	2574	3502	100%	33%	1056	350	100%
	100%	3200	262.5	75%	100%	7800	231	66%	100%	3200	262.5	75%
160-12500-700	33.3%	1666.5	700	100%	33%	4125	700	100%	33%	1650	700	100%
	100%	5000	525	75%	100%	12500	462	66%	100%	5000	525	75%

4 Design and description

4.1 Structure of the overall system



4.2 Sensor structure

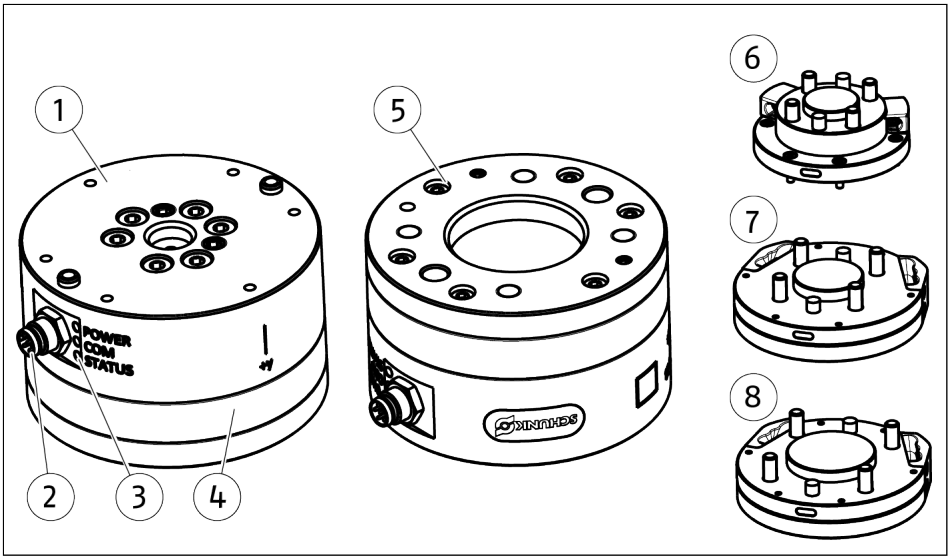
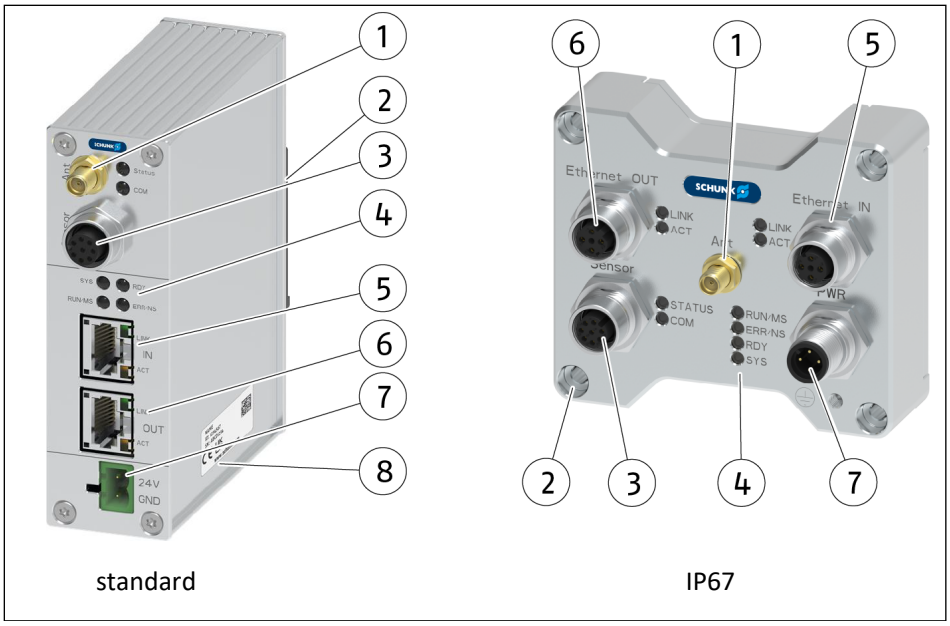


Illustration shows size 070

1	Housing actuator side / robot side
2	Sensor cable connection
3	Sensor LED status display
4	Sealing collar
5	Tool-side housing
6	Attachment kit S
7	Attachment kit M
8	Attachment kit L

Flange pattern on tool-side housing and attachment kit in accordance with DIN EN ISO 9409-1

4.3 Interface box structure



standard IP67

1	Antenna connection
2	Mounting rail bracket / mounting holes
3	Sensor connection (M12 sensor-specific)
4	System LED status display
5	Communication 1 connection (IN) with LEDs (RJ 45 or M12)
6	Communication 2 connection (OUT) with LEDs (RJ 45 or M12)
7	PWR voltage supply connection
8	Name plate

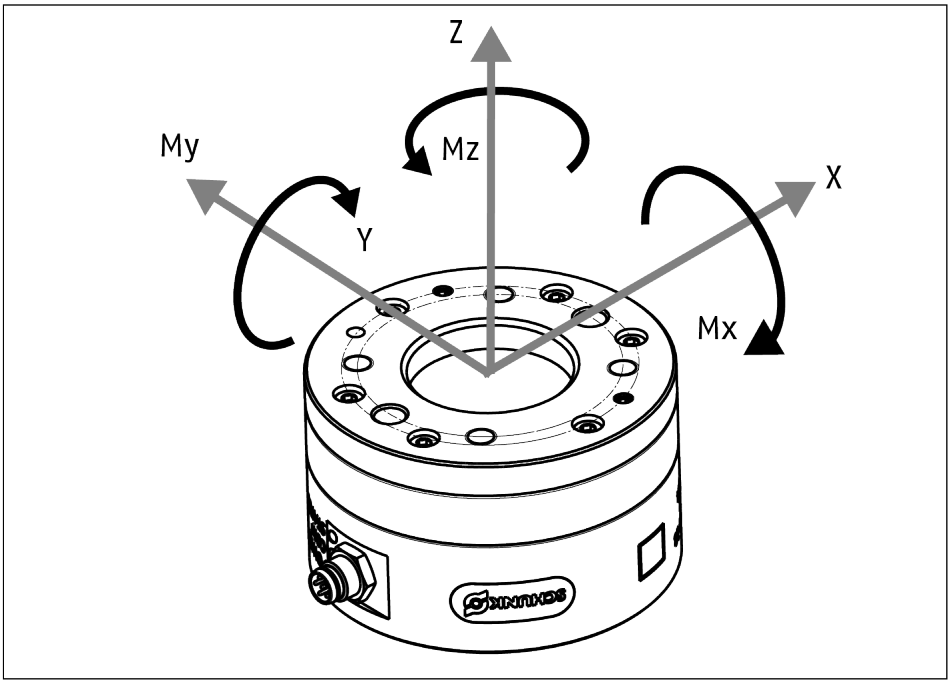
4.4 Description

Rigid, high-precision 6-axis force/torque sensor for measuring forces and torques.

- The sensor has a large usable measuring range and has IP protection class 67.
- The interface box is optionally available in IP 67. Depending on the firmware version, the interface box can communicate via one of the following interfaces: PROFINET, EtherCAT, EtherNet/IP™.
- The SCHUNK FTS-specific communication cable between the sensor and interface box is available in various lengths (2 m; 5 m; 10 m; 15 m; 30 m).
  The cable is shielded and suitable for energy chains.
- The sensor can be operated with any Interface Box variant (interface & IP protection). The cables are flexibly interchangeable. The length can be extended by plugging several cables together. The maximum total length is 30 m.
- The sensor is parameterized and commissioned via the SCHUNK Control Center.

4.5 Coordinate system

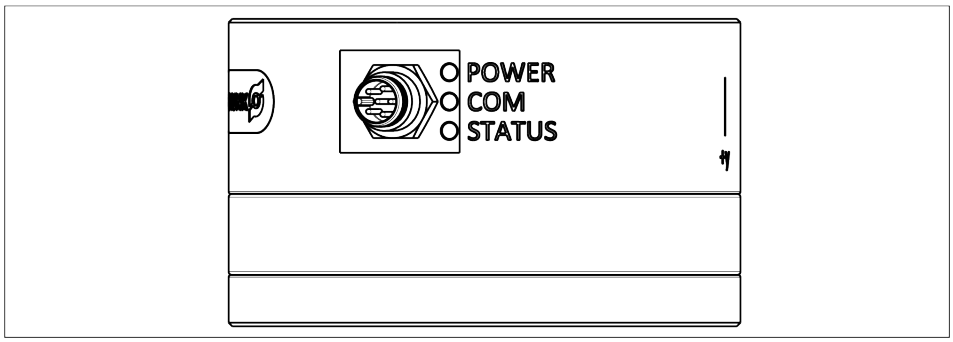
The Cartesian coordinate system of the pick-up is defined by the contact surface on the tool side (X-Y plane), the two centering holes on the tool side (X-axis), the centering on the tool side (Z-axis) and the direction of the Z-axis towards the tool. The connection socket always points in the negative x-direction.



- The "right-hand rule" of mechanics applies. The torques are also defined according to the "right-hand rule".
- The coordinate system of the signal output can be transformed and shifted as required via the SCHUNK Control Center.
- The calibration and the specified deviations only apply in the sensor's original coordinate system. A transformation of the coordinate system will result in further error contributions.

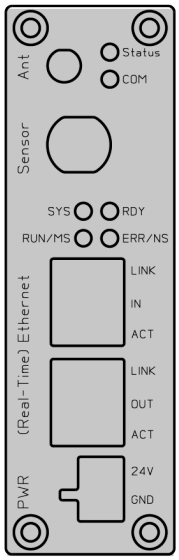
4.6 Displays and control elements

4.6.1 Sensor LED status display



LED	Designation	Color	Description
POWER	Power supply	Green	off: No supply voltage present at the sensor.
			lights up: Supply voltage present at the sensor.
COM	Communication status	Green	off: There is no connection to the sensor.
			lights up: Connection between sensor and interface box established and active.
STATUS	Module status	Red/Green	off: No supply voltage present at the sensor.
			lights up green: The product is in normal operating mode.
			flashes alternately green and red: The product is currently processing diagnostic processes or a firmware update.
			lights up red: Serious error The product is not ready for operation.

4.6.2 Interface Box LED status display



PORFINET

LED	Designation	Color	Description
SYS	System	Green	off: No supply voltage present at the sensor.
			lights up green: System ready for operation (boot process completed)
RDY	Ready	Yellow	off: No supply voltage present at the sensor.
			flashes yellow: Maintenance mode active (contact service!)
COM	Communication status	Green	off: There is no connection to the sensor.
			lights up green: Connection between sensor and interface box established and active.
STATUS	Module status	Red/Green	off: No supply voltage present at the sensor.
			lights up green: The product is in normal operating mode.
			flashes alternately green and red: The product is currently processing diagnostic processes or a firmware update.
			lights up red: Serious error The product is not ready for operation.
			off: No supply voltage present at the sensor.
RUN/MS	Module status	Red/Green	off: The product is in Setup or NW_Init status (NW_Init status = initialization status).
			lights up green: The product is in normal operating mode.
			flashes green once: The product is currently carrying out diagnostic processes.
			lights up red: Serious error The product is not ready for operation.

LED	Designation	Color	Description
ERR/NS	Network status	Red/Green	off: No connection to the control system.
			lights up green: Connection to the control system present and control system in "Run" mode.
			flashes green once: Connection to the control system present and control system in "Stop" mode. The IRT synchronization is not yet finished.
			continually flashes green: The network participant is in Identification mode.
			lights up red: Serious network error present.
			lights up red once: The station name is unknown.
			lights up red twice: The IP address is unknown.
			lights up red three times: A configuration error is present.
LINK	Link	Green	off: Connection inactive
			lights up green: Connection active
ACT	Link/Activity	Green	off: Communication inactive
			flashes quickly: Communication active

Ethernet/IP

LED	Designation	Color	Description
SYS	System	Green	off: No supply voltage present at the sensor.
			lights up green: System ready for operation (boot process completed)
RDY	Ready	Yellow	off: No supply voltage present at the sensor.
			flashes yellow: Maintenance mode active (contact service!)
COM	Communication status	Green	off: There is no connection to the sensor.
			lights up green: Connection between sensor and interface box established and active.
STATUS	Module status	Red/ Green	off: No supply voltage present at the sensor.
			lights up green: The product is in normal operating mode.
			flashes alternately green and red: The product is currently processing diagnostic processes or a firmware update.
			lights up red: Serious error The product is not ready for operation.
			off: No supply voltage present at the sensor.
RUN/MS	Module status	Red/ Green	off: No supply voltage present.
			lights up green: Is controlled by a scanner in the operating status
			flashes green: The product is not configured, scanner in idle phase.
			lights up red: Serious error The product is not ready for operation.
			flashes red: Correctable error/errors. The product is configured, but the stored parameters differ from the parameters currently in use.
ERR/NS	Network status	Red/ Green	off: No supply voltage present and/or no IP address.
			lights up greenL Product is online. One or more connections are/have been established (CIP™ Class 1 or 3)
			flashes green: Product is online, but has not established a connection
			lights up red: Duplicate network address present. Serious network error present.
			flashes red: Timeout for one or more connections.
LINK	Link	Green	off: Connection inactive
			lights up green: Connection active
ACT	Activity	Green	off: Communication inactive
			flashes quickly: Communication active

EtherCat

LED	Designation	Color	Description
SYS	System	Green	off: No supply voltage present at the sensor.
			lights up green: System ready for operation (boot process completed)
RDY	Ready	Yellow	off: No supply voltage present at the sensor.
			flashes yellow: Maintenance mode active (contact service!)
COM	Communication status	Green	off: There is no connection to the sensor.
			lights up green: Connection between sensor and interface box established and active.
STATUS	Module status	Red/Green	off: No supply voltage present at the sensor.
			lights up green: The product is in normal operating mode.
			flashes alternately green and red: The product is currently processing diagnostic processes or a firmware update.
			lights up red: Serious error The product is not ready for operation.
			off: No supply voltage present at the sensor.
RUN/MS	Module status	Red/Green	off: No supply voltage present and/or Ethernet device in 'INIT' status.
			lights up green: EtherCAT device is in 'OPERATIONAL' status.
			flashes green: EtherCAT device is in 'SAFE-OPERATIONAL' status.
			flashes green once: EtherCAt device is in 'SAFE-OPERATIONAL' status.
			flickers: EtherCAT device is in 'BOOT' status.
			lights up red: A serious error is present The bus interface has been put into a physically passive state. Contact SCHUNK Service.
ERR/NS	Network status	Red/Green	off: No supply voltage present and/or no error.
			flashes red: Invalid configuration. The status change requested by the master is not possible due to invalid register or object settings.
			flashes red once: Unrequested status change. Device has independently changed the EtherCAT status.
			flashes red twice: Timeout of the Sync Manager Watchdog
			lights up red: A serious error is present The bus interface has been put into a physically passive state. Contact SCHUNK Service.
			flickers: Boot error, e.g. due to a failed firmware download
LINK	Link	Green	off: Connection inactive
			lights up green: Connection active
ACT	Activity	Green	off: Communication inactive
			flashes quickly: Communication active

5 Assembly

⚠ WARNING

Risk of injury due to sudden movements!

If the energy supply is switched on or if residual energy is still present in the system, this can cause components to move unexpectedly, which may result in serious injuries.

- Before starting any work on the product: Switch off the energy supply and secure against re-connection.
- Ensure that no residual energy remains in the system.

5.1 Installing and connecting

1. Commission the associated interface, ▸ 1.1.4 [🗋 6].
2. Check the flatness of the mounting surface, ▸ 5.2.1 [🗋 45].
3. Screw the product to the machine/system,▸ 5.2.1 [🗋 45]
   OR: Secure product to the robot, ▸ 5.2.1.3 [🗋 47].
   ⇨ Use suitable connecting elements (adapter plates) if necessary. If required, adapter plates can be requested from SCHUNK.
   ⇨ Observe maximum tightening torque, screw-in depth and, if applicable, strength class.
4. Connect and lay the sensor cable, ▸ 5.2.2 [🗋 49].
   ⇨ Make sure that the connections are not stressed due to tensile and pressure forces. Apply appropriate strain relief devices if required.

5.2 Connections

5.2.1 Mechanical connection

5.2.1.1 Mechanical connection of the sensor

Evenness of the mounting surface

The values apply to the whole mounting surface to which the product is mounted.

Edge length	Permissible unevenness
< 100	< 0.02
> 100	< 0.05

Tab.: Requirements for evenness of the mounting surface (Dimensions in mm)

The evenness and rigidity of the screw-on surfaces on both the actuator and tool sides influence the measurement result. The sensor may be pre-loaded due to insufficient evenness.

Adapter plate requirements

Flexible adaptations can lead to incorrect measurement! The residual stresses caused by deflection, for example, can cause the display of non-existent forces and torques.

Precise coordinate transformation from the sensor coordinate system to the TCP is required for high measurement accuracy in the tool center point (TCP). This requires either highly accurate adaptations and tools or precise measurement of the structure.

To ensure reliable power transmission, we recommend using the existing centering devices (3 on each side). The available screw-in depths should be utilized as far as possible when using grade 12.9 screws, otherwise the thread in the sensor may be damaged during tightening.

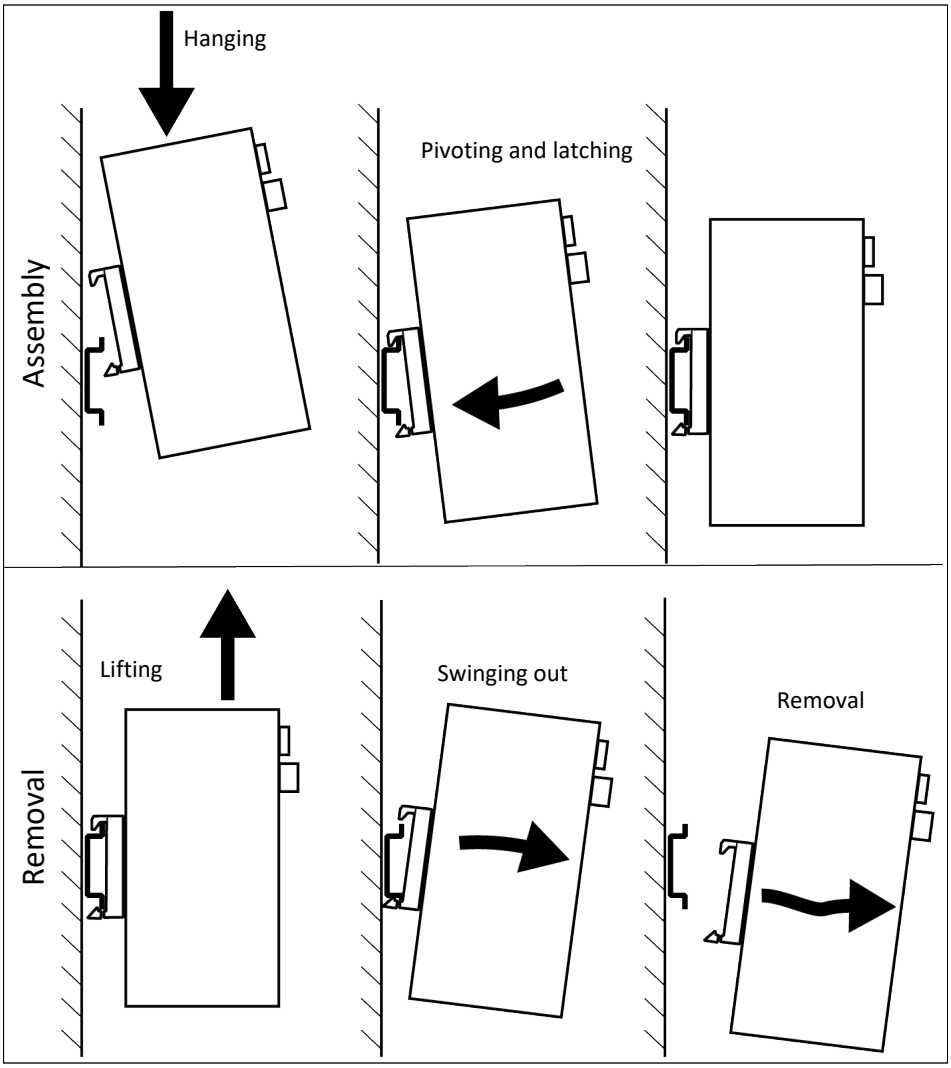
NOTICE

Risk of damage to the sensor!

The sensor can get damaged if the specified range of measurement is exceeded.

- When mounting tools in particular, ensure that the permissible torque of the sensor is not exceeded when tightening the fastening screws. Adjust the assembly sequence if necessary!
- Only mount the sensor if the associated interface has been commissioned. This makes it possible to monitor whether the sensor is overloaded.

5.2.1.2 Mechanical connection of the Interface Box

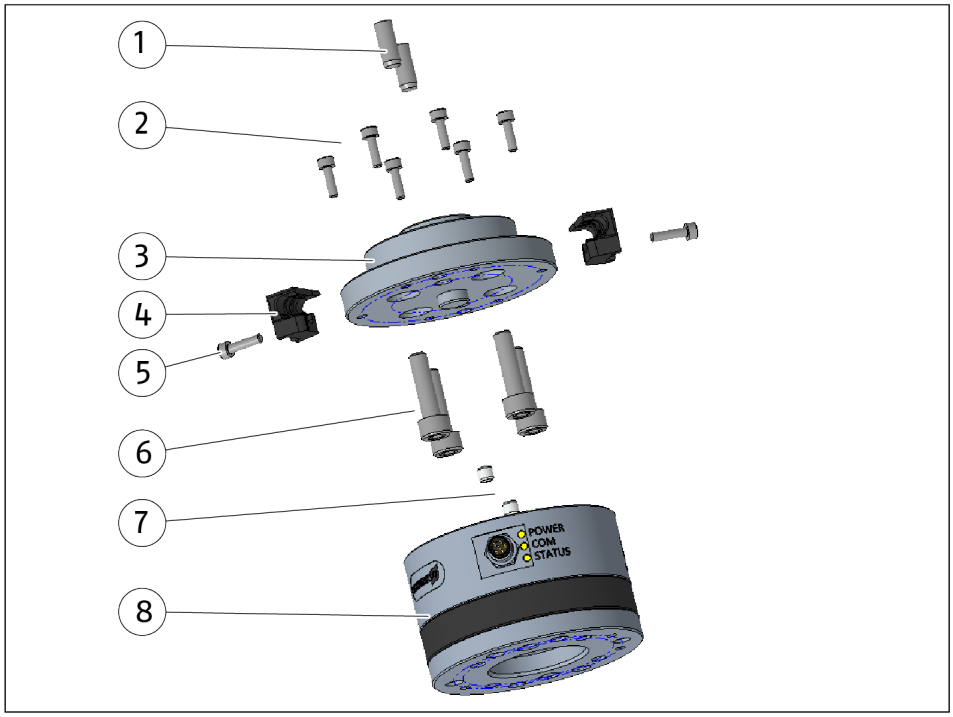


Interface Box: Mounting and removing from the top-hat rail

5.2.1.3 Attaching the sensor to the robot

SCHUNK provides robot adaptation packages as accessories for mounting the sensor on robots. These packages contain suitable screws, centering pins and centering collars for fastening to the desired robot flange. For further information see catalog data sheet at schunk.com.

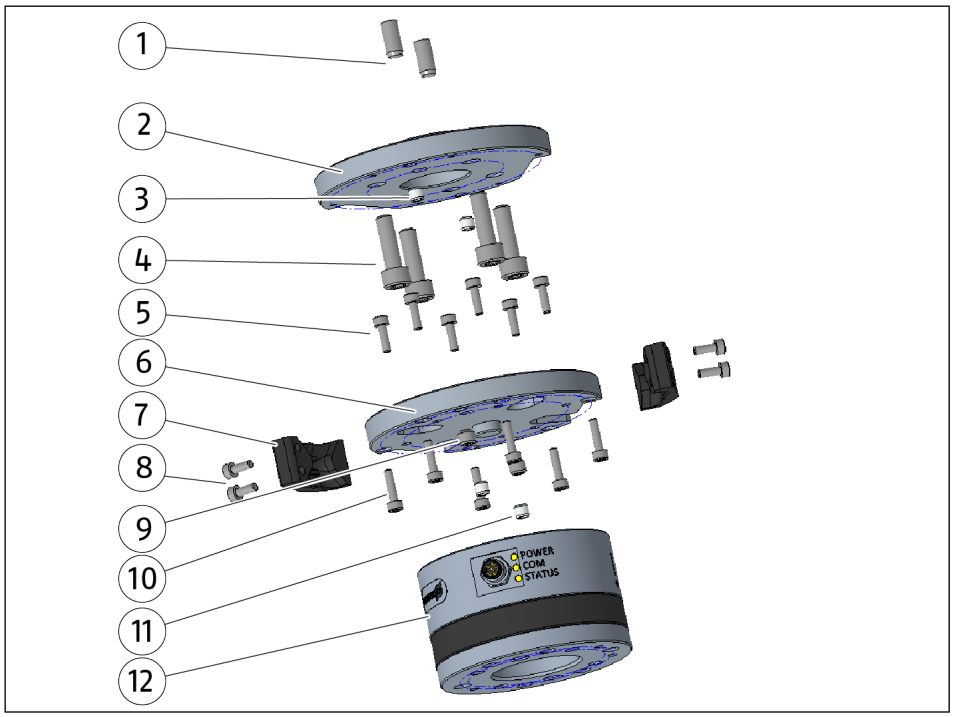
One-piece adapter plate (XS & S)



FTS 070: Mounting on the robot with one-piece adapter plate

1. Insert centering pin (1) into robot flange (not shown).
2. Fasten adapter plate (3) to the robot flange with screws (6).
3. Insert centering sleeves (7) into adapter plate (3).
4. Fasten the sensor (8) to the adapter plate (3) with screws (2).
   Note: Two different orientations are possible!
5. Connect sensor cable (not shown) to sensor (8). Guide the cable to the strain relief (4) and fasten it to the adapter plate (3) with screw(s) (5) and thus clamp the cable.
   Note: Two different orientations are possible!

Two-part adapter plate (M & L)



FTS 070: Mounting on the robot with two-part adapter plate

1. Insert centering pin (1) into robot flange (not shown).
2. Fasten head plate (2) to the robot flange with screws (4).
3. Insert centering sleeves (3) into the head plate (2).
4. Insert centering sleeves (11) into adapter plate (6).
5. Screw the grub screws (9) into the adapter plate (6) so that the centering sleeves (3) cannot fall out.
6. Fasten the sensor (12) to the adapter plate (6) with screws (5).
   Note: Two different orientations are possible!
7. Screw the sensor with adapter plate (12+6) to the head plate (2) using screws (10).
8. Connect sensor cable (not shown) to sensor (12). Lead the cable to the strain relief (7) and fasten it to the adapter plates (2+6) with screw(s) (8) and thus clamp the cable.
   Note: Two different orientations are possible!

5.2.2 Electrical connection

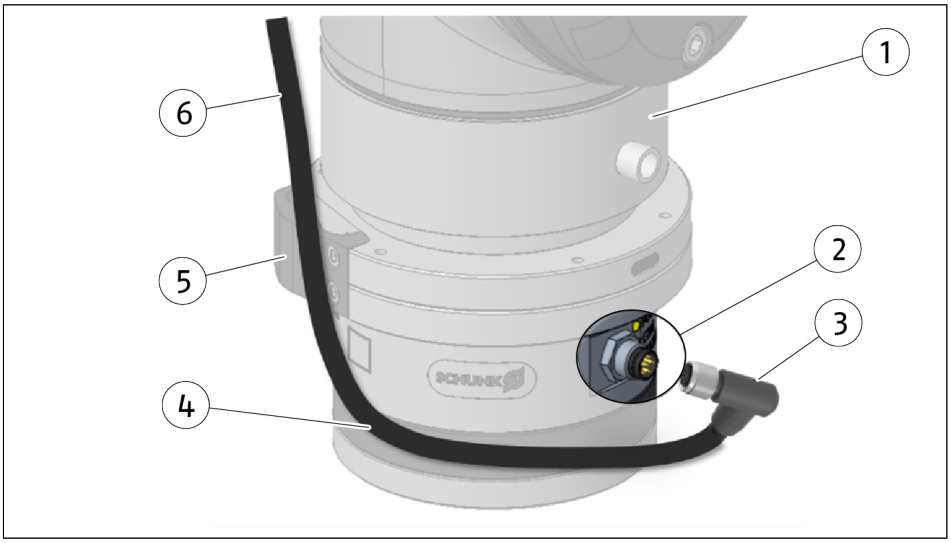
5.2.2.1 Electrical connection of sensor

NOTICE

Damage to the sensor cable due to incorrect installation!

The sensor cable can be damaged in moving applications.

- Observe the bending radius of the cable, ▶ 3.3 [🗋 22].
- Ensure that the cable connection is not subjected to tensile or compressive forces or vibrations. Use the strain relief provided (optional).
- When connecting the cable, observe the maximum tightening torque of 0.8 Nm and do not exceed it. SCHUNK recommends the use of a suitable tool to generate the required tightening torque and thus ensure a permanently functioning communication and power connection.
- Leave enough clearance to allow the robot to move.



1. Connect plug (3) to socket (2) (cable outlet always to the left).
2. Observe the static bending radius (4) and attach the sensor cable close to the plug or use the strain relief provided (optional) (5).
3. Observe the dynamic bending radius (6) so that the robot (1) can move.

5.2.2.1.1 Insulation resistance and voltage resistance in accordance with EN 60204-1

When measuring the insulation resistance and testing the withstand voltage of the machine/automated system, observe the following information in order to protect the product from damage:

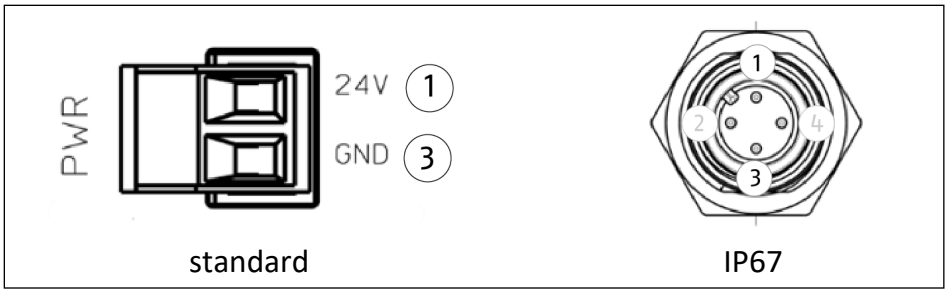
- The electronics are connected to the housing ground, in order to protect against overvoltage.
- For measurements of the insulation resistance in accordance with EN 60204-1, no voltage levels above the permitted operating voltage range may be used. In addition, the maximum measuring current must be safely limited to values below 10 mA.
- Before testing the withstand voltage of the machine/ automated system in accordance with EN 60204-1, completely disconnect the product from the electric circuits to be tested. This applies to all connections on the product:
  - positive and negative connections of the power and logic supply
  - Fieldbus connections

5.2.2.2 Electrical connection Interface Box

Power supply

The power supply is realized via a connection block.

In the IP67 version, the power supply is provided via an A-coded M12 plug.

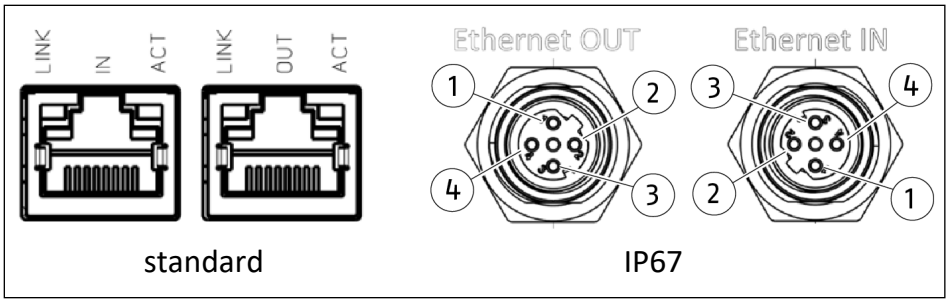


1	+ 12/24/48 V
2	–
3	GND
4	–

Communication

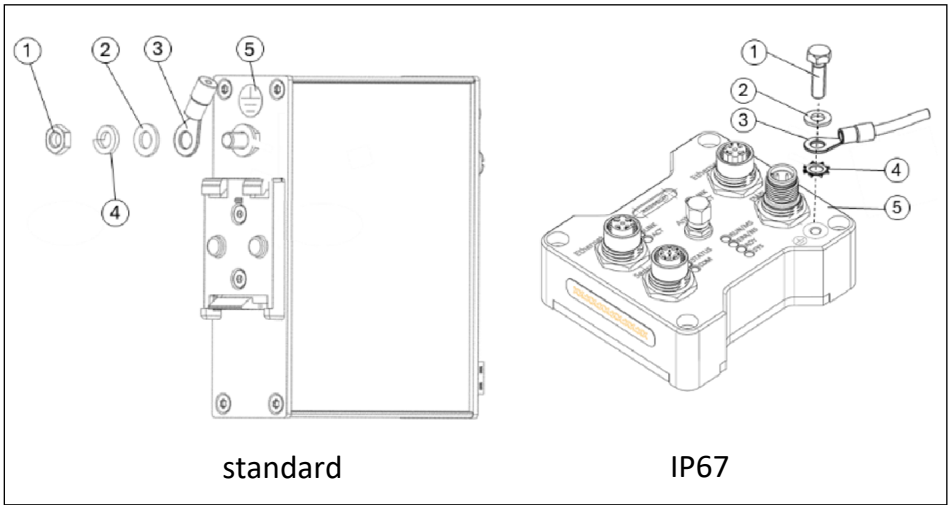
The communication interface is implemented via a standard RJ 45 Ethernet socket.

In the IP67 variant, communication takes place via a D-coded M12 Ethernet socket (4-pin).



1	Tx+
2	Rx+
3	Tx–
4	Rx–

5.2.2.3 Connecting the earthing cable (functional earth)



1	Screw *	4	Toothed lock washer
2	Washer	5	Earthing mark
3	Cable lug		

* Tightening torque1 Nm

A minimum screw-in depth of 6 mm is recommended (for maximum screw-in depth, see catalog data sheet).

A ground connection with a sufficient cross-section must be established between the product and the machine on the customer's premises.
Mount the ground cable (functional ground) on the threaded hole marked with the ground marking.

NOTE

Only connect the ground cable (functional ground) at the location intended for this purpose.

Always mount the ground cable individually. A green-yellow wire strand color is not permitted.

Always use all components to fasten the ground cable (functional ground) and install them in this order: toothed lock washer, cable lug, washer and screw. See "Ground connection" diagram. Observe the tightening torque.

6 Maintenance

NOTICE

Material damage due to unauthorized disassembly!

Incorrectly performed work can cause damage to the mechanics and internal electronics.

- Dismantling or opening the product is not permitted.
- Only have the product repaired by SCHUNK.

The product does not have to be dismantled for maintenance work. All repair work on the product may only be carried out by SCHUNK.

6.1 Maintenance intervals

Maintenance interval	Maintenance work
weekly	Inspect the product for damage
annual (recommended)	Send the product to SCHUNK for calibration.
as required	Check the functionality, ▶ 6.2 [🗋 53]
	Send damaged products to SCHUNK for repair.

6.2 Checking the measured data

Absolute verification of the functionality and accuracy of the sensor is difficult without special setups or test processes. It is recommended that you perform a reference measurement immediately after the initial commissioning of the sensor, against which a comparison can be made in the future, e.g:

- Comparison of non-tared measurement data in a defined position without additional load.
- Comparison of tared measurement data with defined position and load.

This means that a change in the measurement result over time or damage to the sensor can be reliably detected

7 EU-Declaration of Conformity

Manufacturer/ Distributor	SCHUNK SE & Co. KG Spanntechnik | Greiftechnik | Automatisierungstechnik Bahnhofstr. 106 – 134 D-74348 Lauffen/Neckar
Product designation:	Force/torque sensor / FTS
ID no.	1598242, 1598246, 1598247, 1598248, 1598249, 1598250, 1598251, 1598252, 1598253, 1603600, 1603601, 1606302, 1603603, 1603604, 1603606, 1651726, 1651748

We hereby declare that the product complies with all relevant harmonization legislation of the following directives at the time of declaration.
The declaration is rendered invalid if modifications are made to the product.

- **Electromagnetic compatibility (EMC Directive) 2014/30/EU**

Applied harmonized standards, especially:

EN IEC 61000-6-2:2019	Electromagnetic compatibility (EMC) – Part 6-2: Generic standards – Immunity standard for industrial environments
EN 55011:2016 + A1:2017 + A11:2020	Industrial, scientific and medical equipment – Radio-frequency disturbance characteristics – Limits and methods of measurement

Signed for and on behalf of: SCHUNK SE & Co. KG

Signature: see original declaration

Lauffen/Neckar, October 2025

Dr.-Ing. Manuel Baumeister,
Head of Systems Engineering,
Technology & Innovation

8 UKCA Declaration of Conformity

Manufacturer/ Distributor	SCHUNK Intec Limited Clamping and gripping technology 3 Drakes Mews, Crownhill MK8 0ER Milton Keynes
Product designation:	Force/torque sensor / FTS
ID no.	1598242, 1598246, 1598247, 1598248, 1598249, 1598250, 1598251, 1598252, 1598253, 1603600, 1603601, 1606302, 1603603, 1603604, 1603606, 1651726, 1651748

We hereby declare that the product complies with all relevant harmonization legislation of the following directives at the time of declaration.
The declaration is rendered invalid if modifications are made to the product.

- **Electrical Equipment (Safety) Regulations 2016**

Applied harmonized standards, especially:

EN IEC 61000-6-2:2019	Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity standard for industrial environments
EN 55011:2016 + A1:2017 + A11:2020	Industrial, scientific and medical equipment - Radio-frequency disturbance characteristics - Limits and methods of measurement

Person authorized to compile the technical documentation:
Marcel Machado, address: refer to manufacturer's address

Signed for and on behalf of: SCHUNK SE & Co. KG

Lauffen/Neckar, October 2025

Dr.-Ing. Manuel Baumeister,
Head of Systems Engineering,
Technology & Innovation

9 Information on the RoHS Directive, REACH Regulation and Substances of Very High Concern (SVHC)

RoHS Directive

SCHUNK products are classified as "large-scale stationary installations" or as "large-scale stationary industrial tools" within the meaning of Directive 2011/65/EU and its extension 2015/863/EU "on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS)", or fulfill their intended function only as part of one. Therefore products from SCHUNK do not fall within the scope of the directive at this time.

REACH Regulation

Products from SCHUNK fully comply with the regulations of Regulation (EC) No. 1907/2006 "concerning the Registration, Evaluation, Authorization and Restriction of Chemicals (REACH)" and its amendment 2022/477. SCHUNK attaches great importance to completely avoiding chemicals of concern to humans and the environment wherever possible.

Only in rare exceptional cases do SCHUNK products contain SVHC substances on the candidate list with a mass content above 0.1%. In accordance with Article. 33 (1) of Regulation (EC) No. 1907/2006, SCHUNK complies with its duty to "communicate information on substances in articles" and lists the components concerned and the substances used in an overview that can be viewed at **schunk.com\SVHC**.

Signature: see original declaration

Lauffen/Neckar, October 2025

Dr.-Ing. Manuel Baumeister,
Head of Systems Engineering,
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SCHUNK SE & Co. KG
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