Assembly and Operating Manual

FT

Force-torque-sensor

Translation of Original Operating Manual

Hand in hand for tomorrow

Imprint

Technical changes:
We reserve the right to make alterations for the purpose of technical improvement.

Document number: 389582

Version: 06.00 | 21/11/2024 | en

Dear Customer,

Thank you for trusting 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. Ask us questions and challenge us. We will find a solution!

Best regards,

Your SCHUNK team

Customer Management
Tel. +49-7133-103-2503
Fax +49-7133-103-2189
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 a safe and appropriate use of the product.

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

Before starting work, the personnel must have read and understood this operating manual. Prerequisite for safe working is the observance of all safety instructions in this manual.

In addition to these instructions, the documents listed under ▸ 1.1.2 [🗋 6] are applicable.

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

1.1.1 Presentation of Warning Labels

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

⚠ DANGER

Dangers for persons!

Non-observance will inevitably cause irreversible injury or death.

⚠ WARNING

Dangers for persons!

Non-observance can lead to irreversible injury and even death.

⚠ CAUTION

Dangers for persons!

Non-observance can cause minor injuries.

CAUTION

Material damage!

Information about avoiding material damage.

1.1.2 Applicable documents

- General terms of business *
- Catalog data sheet of the purchased product *
- Commissioning instructions for the force-torque-sensor system

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

1.1.3 Variants

This operating manual applies to the following variations:

- Force-torque-sensor FT with FTN-interface
- Force-torque-sensor FT with FTW-interface
- Force-torque-sensor FT with FTD-interface
- Force-torque-sensor FT with FTE-interface

NOTE

For information on the Force-torque-sensor FT with an FTS-interface, contact SCHUNK.

1.1.4 Sizes

This operating manual applies to the following sizes:

- FT Nano
- FT Mini
- FT Gamma
- FT Delta
- FT Theta
- FT Omega

NOTE

For the sake of clarity, the sizes of the force-torque sensors have been combined into two size groups in some places in this manual:

- FT Nano and FT Mini
- FT Gamma, FT Delta, FT Theta and FT Omega

1.2 Warranty

If the product is used as intended, the warranty is valid for 12 months from the ex-works delivery date under the following conditions:

- Observe the ambient conditions and operating conditions, ▸ 2.5 [🗋 8]
- Observe the specified maintenance intervals, ▸ 6 [🗋 56]

Parts touching the workpiece and wear parts are not included in the warranty.

1.3 Scope of delivery

The scope of delivery includes

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

1.4 Accessories

A wide range of accessories are 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 a machine component designed for measuring forces and torques (FT) in six directions. The product converts the mechanically acting forces into electrical measured values and can transmit these to a PC via various interfaces.

- The product may only be used within the scope of its technical data, ▸ 3 [🗋 13].
- 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 principles 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. The applicable guidelines for the machine/automated system must be observed and complied with.
- The product is intended for industrial and industry-oriented use.
- Appropriate use of the product includes compliance with all instructions in this manual.

2.2 Not intended use

- Any utilization that exceeds or differs from the appropriate use is regarded as misuse.

2.3 Constructional 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.

2.4 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 or spares authorized by SCHUNK.

2.5 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 used only in the context of its defined application parameters, ▸ 3 [🗋 13].

2.6 Personnel qualification

Inadequate qualifications of the personnel

If the personnel working with the product is not sufficiently qualified, the result may be serious injuries and significant property damage.

- All work may only be performed by qualified personnel.
- Before working with the product, the personnel must have read and understood the complete assembly and operating manual.
- Observe the national safety regulations and rules and general safety instructions.

The following personal qualifications are necessary for the various activities related to 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 were instructed by the operator about the delegated tasks and possible dangers due to improper behaviour.

Service personnel of the manufacturer
Due to its technical training, knowledge and experience, service personnel of the manufacturer is able to perform the delegated tasks and to recognize and avoid possible dangers.

2.7 Personal protective equipment

Use of personal protective equipment

Personal protective equipment serves to protect staff against danger which 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.

2.8 Notes on safe operation

Incorrect handling of the personnel

Incorrect handling and assembly may impair the product's safety and cause serious injuries and considerable material damage.

- 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. This does not apply to products that are designed for special environments.
- Eliminate any malfunction immediately.
- Observe the care and maintenance instructions.
- Observe the current safety, accident prevention and environmental protection regulations regarding the product's application field.

2.9 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.

2.10 Disposal

Handling of disposal

The incorrect handling of disposal may impair the product's safety and cause serious injuries as well as considerable material and environmental harm.

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

2.11 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.

2.11.1 Protection during handling and assembly

Incorrect handling and assembly

Incorrect handling and assembly may impair the product's safety and cause serious injuries and considerable material damage.

- Have all work carried out by appropriately qualified personnel.
- For all work, secure the product against accidental operation.
- Observe the relevant accident prevention rules.

- Use suitable assembly and transport equipment and take precautions to prevent jamming and crushing.

Incorrect lifting of loads

Falling loads may cause serious injuries and even death.

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

2.11.2 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.

3 Technical data

3.1 Basic data

Designation	FT		
	Nano17-Titan	Nano17	Nano17 (IP65/68)
Weight [kg]	0.01	0.01	0.04
Height [mm]	14.5	14.5	22.2
Diameter [mm]	17	17	20.1
Stiffness			
X-axis & Y-axis forces (Kx, Ky) [N/m]	$4.8x10^6$	$8.2x10^6$	
Z-axis forces (Kz) [N/m]	$6.6x10^6$	$1.1x10^7$	
X-axis & Y-axis torques (Ktx, Kty) [Nm/rad]	$1.4x10^2$	$2.4x10^2$	
Z-axis torques (Ktz) [Nm/rad]	$2.2x10^2$	$3.8x10^2$	
Single axis overload			
Fxy [N]	160	250	
Fz [N]	310	480	
Mxy [Nm]	1	1.6	
Mz [Nm]	1.2	1.8	
Resonant frequency			
Fx, Fy, Fz [Hz]	3000	7200	2200
Mx, My, Mz [Hz]	3000	7200	2200
Decrease in Fz due to increasing immersion depth with IP68 protection class			
Decrease in Fz [N/m]	-	-	-2.23

Designation	FT		
	Nano25	Nano25 (IP65/68)	Nano43
Weight [kg]	0.063	0.136	0.039
Height [mm]	21.6	27.5	11.5
Diameter [mm]	25	28	43
Stiffness			
X-axis & Y-axis forces (Kx, Ky) [N/m]	$5.3x10^7$		$5.2x10^6$
Z-axis forces (Kz) [N/m]	$1.1x10^8$		$5.2x10^6$
X-axis & Y-axis torques (Ktx, Kty) [Nm/rad]	$6.5x10^3$		$7.7x10^2$
Z-axis torques (Ktz) [Nm/rad]	$9.2x10^3$		$1.1x10^3$
Single axis overload			
Fxy [N]	2300		300
Fz [N]	7300		280
Mxy [Nm]	43		3.2
Mz [Nm]	63		4.6
Resonant frequency			
Fx, Fy, Fz [Hz]	3600	3400	2800
Mx, My, Mz [Hz]	3800	3500	2300
Decrease in Fz due to increasing immersion depth with IP68 protection class			
Decrease in Fz [N/m]	-	-4.81	-

Designation	FT			
	Mini27-Titan	Mini40	Mini40 (IP65/68)	Mini43LP
Weight [kg]	0.033	0.05	0.272	0.05
Height [mm]	18.2	12.2	21.1	7.99
Diameter [mm]	27	40	53.3	43
Stiffness				
X-axis & Y-axis forces (Kx, Ky) [N/m]	$3.1x10^7$	$1.1x10^7$		$3.3x10^7$
Z-axis forces (Kz) [N/m]	$6.4x10^7$	$2.0x10^7$		$2.1x10^7$
X-axis & Y-axis torques (Ktx, Kty) [Nm/rad]	$4.5x10^3$	$2.8x10^3$		$3.4x10^3$
Z-axis torques (Ktz) [Nm/rad]	$6.5x10^3$	$4.0x10^3$		$1.1x10^4$
Single axis overload				
Fxy [N]	1500	810		1200
Fz [N]	4600	2400		1200
Mxy [Nm]	30	19		15
Mz [Nm]	40	20		25
Resonant frequency				
Fx, Fy, Fz [Hz]	N/A	3200	1400	5200
Mx, My, Mz [Hz]	N/A	4900	1300	7300
Decrease in Fz due to increasing immersion depth with IP68 protection class				
Decrease in Fz [N/m]	-	-	-18.9	-

Designation	FT		
	Mini45-Titan	Mini45	Mini45 (IP65/68)
Weight [kg]	0.1	0.092	0.391
Height [mm]	17.5	15.7	25.1
Diameter [mm]	45	45	57.9
Stiffness			
X-axis & Y-axis forces (Kx, Ky) [N/m]	$4.3x10^7$	$7.4x10^7$	
Z-axis forces (Kz) [N/m]	$5.7x10^7$	$9.8x10^7$	
X-axis & Y-axis torques (Ktx, Kty) [Nm/rad]	$9.7x10^3$	$1.7x10^4$	
Z-axis torques (Ktz) [Nm/rad]	$2.0x10^4$	$3.5x10^4$	
Single axis overload			
Fxy [N]	3000	5100	
Fz [N]	6400	10000	
Mxy [Nm]	67	110	
Mz [Nm]	81	140	
Resonant frequency			
Fx, Fy, Fz [Hz]	5800	5600	5200
Mx, My, Mz [Hz]	4600	5400	4200
Decrease in Fz due to increasing immersion depth with IP68 protection class			
Decrease in Fz [N/m]	-	-	-18.9

Designation	FT			
	Mini58	Mini58 (IP60)	Mini58 (IP65/68)	Mini85
Weight [kg]	0.345	0.522	0.804	0.635
Height [mm]	30	36.2	37.6	29.8
Diameter [mm]	58	82	65.4	85.1
Stiffness				
X-axis & Y-axis forces (Kx, Ky) [N/m]		$2.5x10^8$		$7.7x10^7$
Z-axis forces (Kz) [N/m]		$3.7x10^8$		$1.2x10^8$
X-axis & Y-axis torques (Ktx, Kty) [Nm/rad]		$1.1x10^5$		$8.1x10^4$
Z-axis torques (Ktz) [Nm/rad]		$2.0x10^5$		$1.3x10^5$
Single axis overload				
Fxy [N]		21000		13000
Fz [N]		48000		27000
Mxy [Nm]		590		500
Mz [Nm]		800		610
Resonant frequency				
Fx, Fy, Fz [Hz]	3000	N/A		2400
Mx, My, Mz [Hz]	5700	N/A		3100
Decrease in Fz due to increasing immersion depth with IP68 protection class				
Decrease in Fz [N/m]	–	–	-27.1	–

Designation	FT			
	Gamma	Gamma (IP60)	Gamma (IP65)	Gamma (IP68)
Weight [kg]	0.255	0.467	1.09	1.98
Height [mm]	33.3	39.6	52.3	52.3
Diameter [mm]	75.4	99.1	111	111
Stiffness				
X-axis & Y-axis forces (Kx, Ky) [N/m]	$9.1x10^6$			
Z-axis forces (Kz) [N/m]	$1.8x10^7$			
X-axis & Y-axis torques (Ktx, Kty) [Nm/rad]	$1.1x10^4$			
Z-axis torques (Ktz) [Nm/rad]	$1.6x10^4$			
Single axis overload				
Fxy [N]	1200			
Fz [N]	4100			
Mxy [Nm]	79			
Mz [Nm]	82			
Resonant frequency				
Fx, Fy, Fz [Hz]	1400	1200	1000	1250
Mx, My, Mz [Hz]	2000	1200	970	940
Decrease in Fz due to increasing immersion depth with IP68 protection class				
Decrease in Fz [N/m]	-	-	-	-47.4

Designation	FT			
	Delta	Delta (IP60)	Delta (IP65)	Delta (IP68)
Weight [kg]	0.913	1.81	1.77	2.63
Height [mm]	33.3	47.1	52.2	52.2
Diameter [mm]	94.5	117	126	102
Stiffness				
X-axis & Y-axis forces (Kx, Ky) [N/m]	$3.6x10^7$			
Z-axis forces (Kz) [N/m]	$5.9x10^7$			
X-axis & Y-axis torques (Ktx, Kty) [Nm/rad]	$5.2x10^4$			
Z-axis torques (Ktz) [Nm/rad]	$9.1x10^4$			
Single axis overload				
Fxy [N]	3700			
Fz [N]	10000			
Mxy [Nm]	280			
Mz [Nm]	400			
Resonant frequency				
Fx, Fy, Fz [Hz]	1500	1100	880	950
Mx, My, Mz [Hz]	1700	1100	920	960
Decrease in Fz due to increasing immersion depth with IP68 protection class				
Decrease in Fz [N/m]	–	–	–	-72

Designation	FT		
	Theta	Theta (IP60)	Theta (IP65/68)
Weight [kg]	4.99	8.62	9
Height [mm]	61.1	74	74.8
Diameter [mm]	155	194	163
Stiffness			
X-axis & Y-axis forces (Kx, Ky) [N/m]	$7.1x10^7$		
Z-axis forces (Kz) [N/m]	$1.2x10^8$		
X-axis & Y-axis torques (Ktx, Kty) [Nm/rad]	$3.4x10^5$		
Z-axis torques (Ktz) [Nm/rad]	$5.3x10^5$		
Single axis overload			
Fxy [N]	20000		
Fz [N]	51000		
Mxy [Nm]	2000		
Mz [Nm]	2000		
Resonant frequency			
Fx, Fy, Fz [Hz]	680	N/A	
Mx, My, Mz [Hz]	820	N/A	
Decrease in Fz due to increasing immersion depth with IP68 protection class			
Decrease in Fz [N/m]	-	-	-191

Designation	FT	
	Omega85	Omega85 (IP65/68)
Weight [kg]	0.658	1.91
Height [mm]	33.4	38.7
Diameter [mm]	85.1	92.7
Stiffness		
X-axis & Y-axis forces (Kx, Ky) [N/m]	$7.7x10^7$	
Z-axis forces (Kz) [N/m]	$1.2x10^8$	
X-axis & Y-axis torques (Ktx, Kty) [Nm/rad]	$8.1x10^4$	
Z-axis torques (Ktz) [Nm/rad]	$1.3x10^5$	
Single axis overload		
Fxy [N]	13000	
Fz [N]	27000	
Mxy [Nm]	500	
Mz [Nm]	610	
Resonant frequency		
Fx, Fy, Fz [Hz]	2100	N/A
Mx, My, Mz [Hz]	3000	N/A
Decrease in Fz due to increasing immersion depth with IP68 protection class		
Decrease in Fz [N/m]	-	-57

Designation	FT		
	Omega160	Omega160 (IP60)	Omega160 (IP65/68)
Weight [kg]	2.72	7.67	7.26
Height [mm]	55.9	57.7	65.9
Diameter [mm]	157	194	165
Stiffness			
X-axis & Y-axis forces (Kx, Ky) [N/m]		$7.0x10^7$	
Z-axis forces (Kz) [N/m]		$1.2x10^8$	
X-axis & Y-axis torques (Ktx, Kty) [Nm/rad]		$3.3x10^5$	
Z-axis torques (Ktz) [Nm/rad]		$5.2x10^5$	
Single axis overload			
Fxy [N]		18000	
Fz [N]		48000	
Mxy [Nm]		1700	
Mz [Nm]		1900	
Resonant frequency			
Fx, Fy, Fz [Hz]	1300	1100	1200
Mx, My, Mz [Hz]	1000	1000	900
Decrease in Fz due to increasing immersion depth with IP68 protection class			
Decrease in Fz [N/m]	-	-	-191

Designation	FT		
	Omega191	Omega191 (IP60)	Omega191 (IP65/68)
Weight [kg]	9.41	14.1	13.2
Height [mm]	64	73.7	74.8
Diameter [mm]	190	238	204
Stiffness			
X-axis & Y-axis forces (Kx, Ky) [N/m]		$2.4x10^8$	
Z-axis forces (Kz) [N/m]		$3.6x10^8$	
X-axis & Y-axis torques (Ktx, Kty) [Nm/rad]		$1.5x10^6$	
Z-axis torques (Ktz) [Nm/rad]		$3.2x10^6$	
Single axis overload			
Fxy [N]		36000	
Fz [N]		110000	
Mxy [Nm]		6800	
Mz [Nm]		6800	
Resonant frequency			
Fx, Fy, Fz [Hz]	N/A	1200	1400
Mx, My, Mz [Hz]	N/A	1200	980
Decrease in Fz due to increasing immersion depth with IP68 protection class			
Decrease in Fz [N/m]	-	-	-294

Designation	FT	
	Omega250 (IP60/65/68)	Omega331 (without IP/IP65)
Weight [kg]	31.8	47
Height [mm]	94.9	107
Diameter [mm]	295	330
Stiffness		
X-axis & Y-axis forces (Kx, Ky) [N/m]	$4.2x10^8$	$1.2x10^9$
Z-axis forces (Kz) [N/m]	$5.6x10^8$	$1.3x10^9$
X-axis & Y-axis torques (Ktx, Kty) [Nm/rad]	$3.0x10^6$	$9.2x10^6$
Z-axis torques (Ktz) [Nm/rad]	$6.2x10^6$	$2.4x10^7$
Single axis overload		
Fxy [N]	160000	240000
Fz [N]	330000	520000
Mxy [Nm]	21000	320000
Mz [Nm]	25000	360000
Resonant frequency		
Fx, Fy, Fz [Hz]	780	N/A
Mx, My, Mz [Hz]	770	N/A
Decrease in Fz due to increasing immersion depth with IP68 protection class		
Decrease in Fz [N/m]	-506	-

3.2 Ambient conditions and operating conditions

SCHUNK force-torque-sensors are optionally available in versions with IP60, 65 or 68 protection.

Force-torque-sensors in versions not with IP65 or 68 protection must be operated in an environment with max. 95% relative air humidity.

The catalog data sheet contains more information.

Designation	Ambient temperature [°C]	
FTD / FTN / FTE Nano and Mini	Min. Max.	0 +80
FTD from Gamma and larger	Min. Max.	0 +60
FTD from Gamma and larger without on-board electronics	Min. Max.	0 +85
FTN from Gamma and larger	Min. Max.	0 +85
FTE from Gamma and larger	Min. Max.	0 +70

3.3 Measurement error

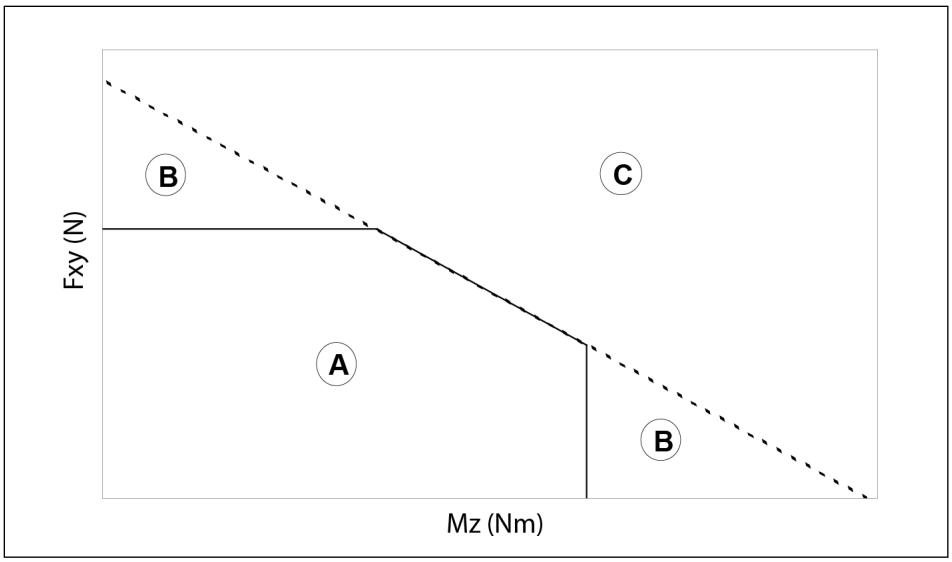
NOTE

The force-torque-sensors are calibrated at a temperature of 22°C. If the force-torque-sensors are used at a different ambient temperature, the accuracy of the measured values changes.

Measurement error from 22°C	Nano / Mini	from Gamma and larger
±5°C	0.1%	0.1%
±15°C	0.5%	0.5%
±25°C	1%	1.5%
±50°C	5%	7%

3.4 Maximum permissible load

The following diagrams show the maximum permissible load in which the force-torque-sensor may be used and when it can lead to damage. Each page covers one size. The upper diagram shows the interplay of forces in the X or Y direction in combination with torques in the Z direction. The lower diagram shows the interplay of forces in the Z direction in combination with torques in the X or Y direction. Each diagram includes several SI calibrations.

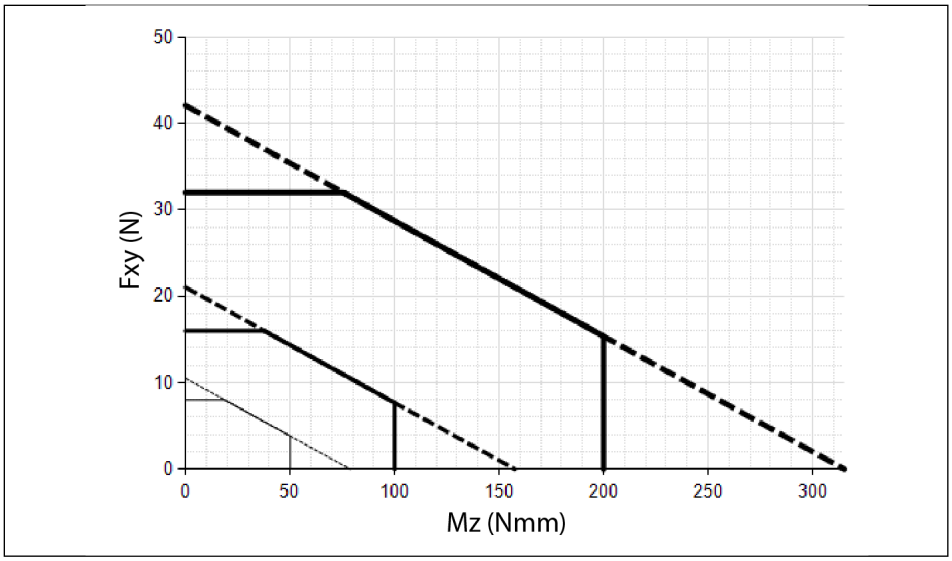


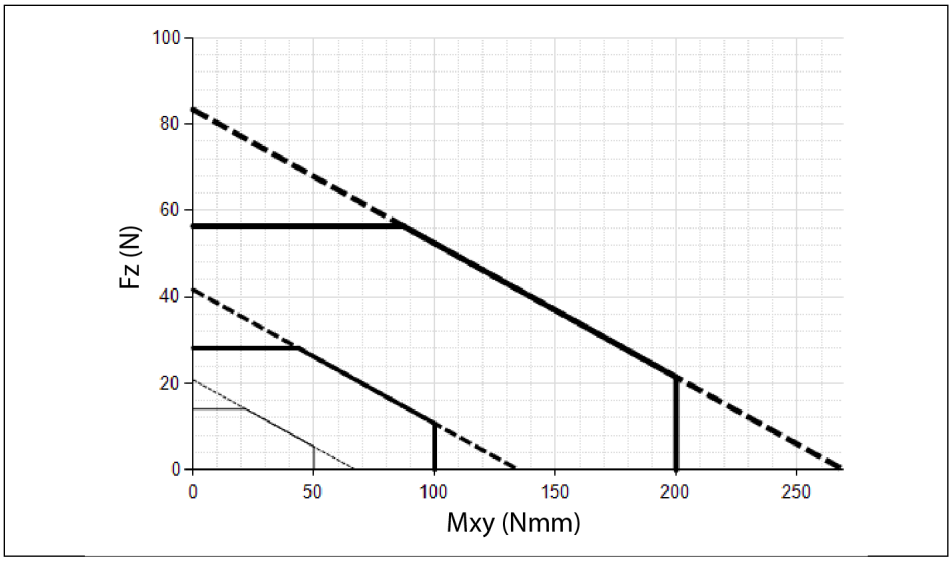
Example diagram with maximum permissible load of a force-torque-sensor

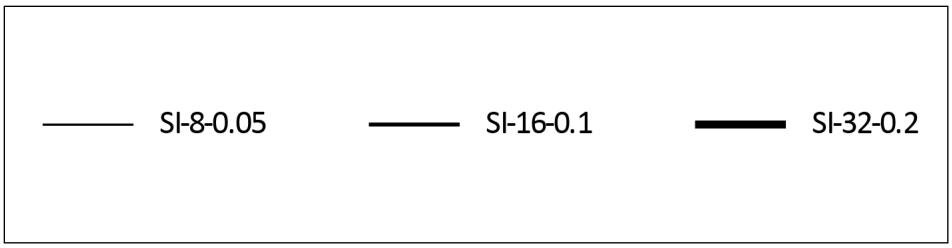
A	In this range, the force-torque-sensor functions perfectly.
B	In this range, the force-torque-sensor still functions perfectly, but the measured values may deviate.
C	In this range, the strain gages are in saturation, and the force-torque-sensor may get damaged.

Tab.: Nano17-Titan

Calibration	F_x / F_y [N]	F_z [N]	M_x / M_y [Nmm]	M_z [Nmm]	F_x / F_y [N]	F_z [N]	M_x / M_y [Nmm]	M_z [Nmm]
SI-8-0.05	8	14.1	50	50	1/682	1/682	3/364	5/728
SI-16-0.1	16	28.2	100	100	1/341	1/341	3/182	5/364
SI-32-0.2	32	56.4	200	200	1/171	1/171	3/92	5/184
	Ranges of measurement				FTD, FTN, FTW, FTE resolution			

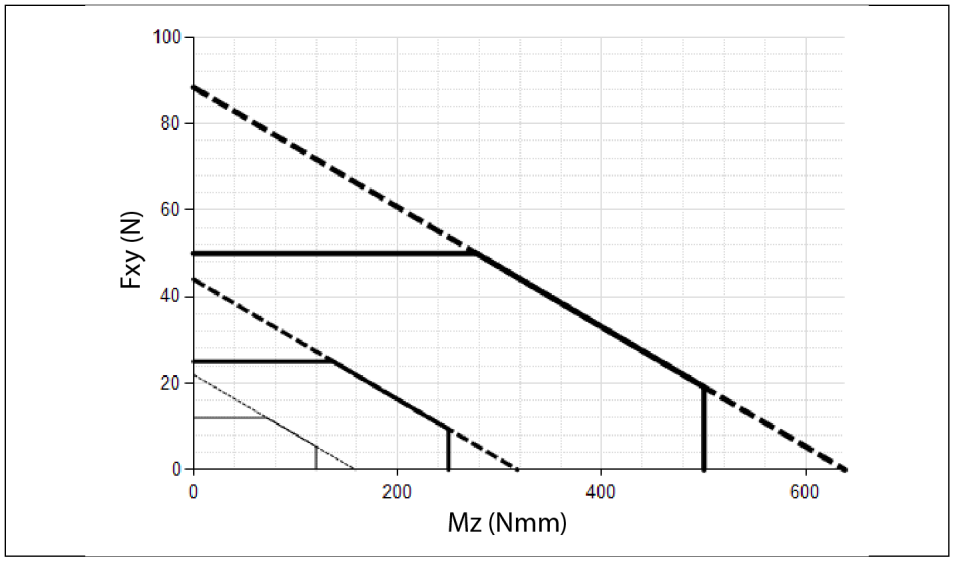


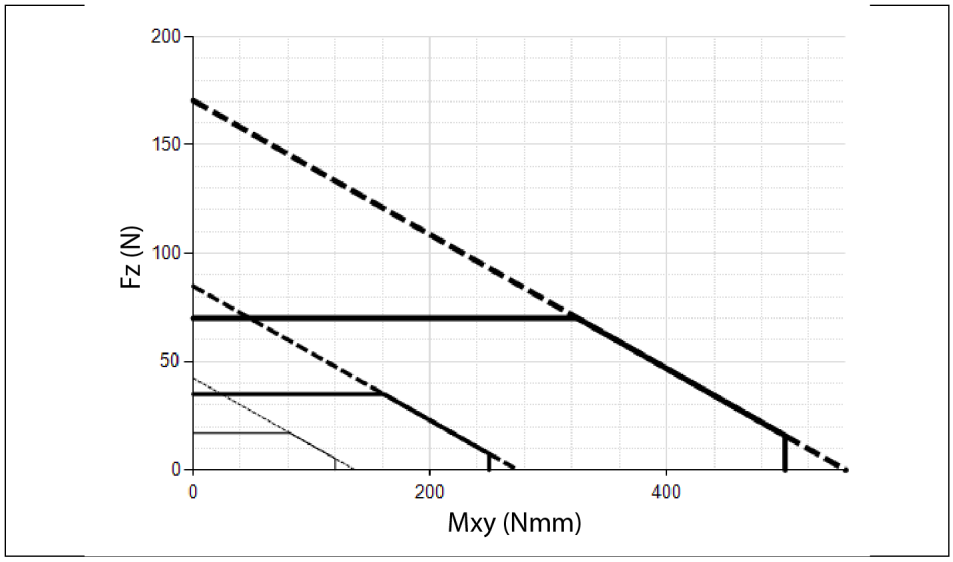


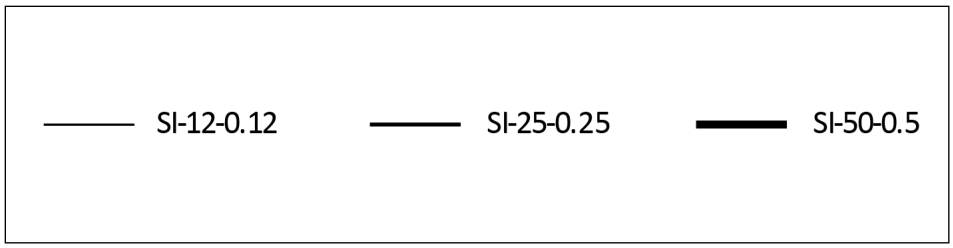


Tab.: Nano17 (including IP 65 and IP 68)

Calibration	F_x / F_y [N]	F_z [N]	M_x / M_y [Nmm]	M_z [Nmm]	F_x / F_y [N]	F_z [N]	M_x / M_y [Nmm]	M_z [Nmm]
SI-12-0.12	12	17	120	120	1/320	1/320	1/64	1/64
SI-25-0.25	25	35	250	250	1/160	1/160	1/32	1/32
SI-50-0.5	50	70	500	500	1/80	1/80	1/16	1/16
	Ranges of measurement				FTD, FTN, FTW, FTE resolution			

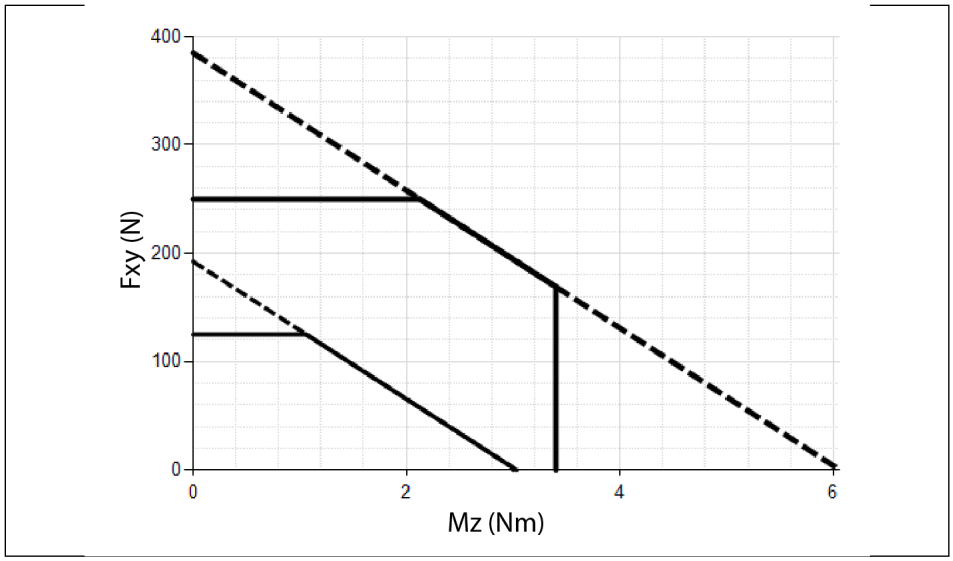


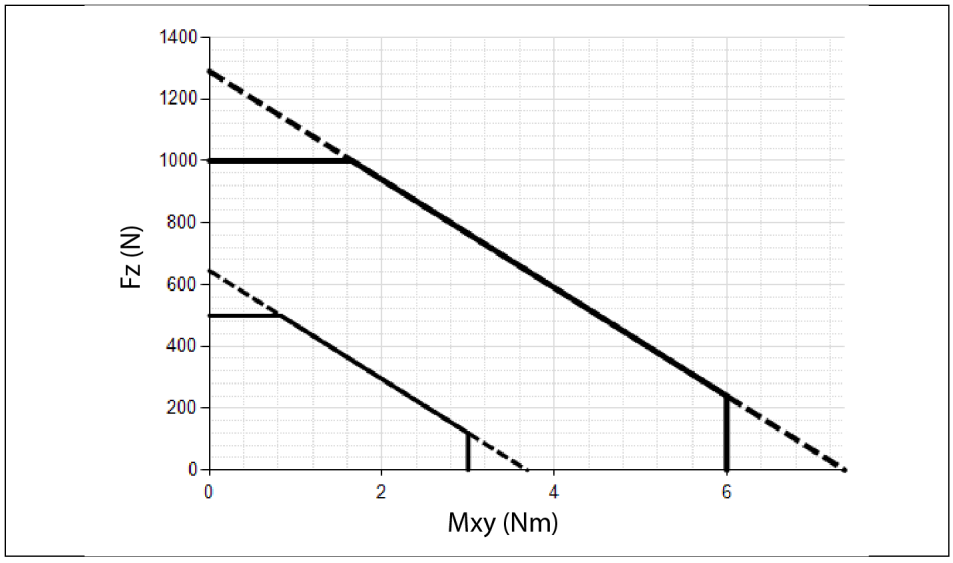


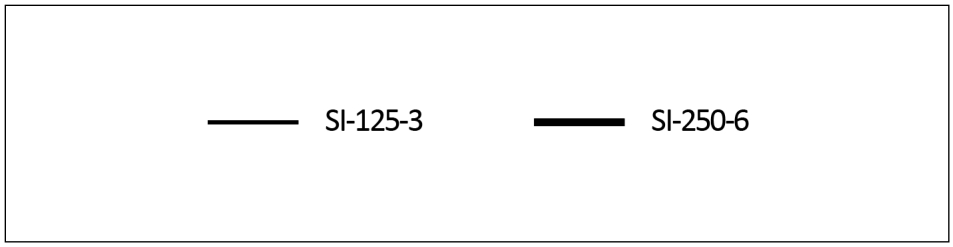


Tab.: Nano25 (including IP 65 and IP 68)

Calibration	F_x / F_y [N]	F_z [N]	M_x / M_y [Nm]	M_z [Nm]	F_x / F_y [N]	F_z [N]	M_x / M_y [Nm]	M_z [Nm]
SI-125-3	125	500	3	3	1/48	1/16	1/1320	1/2640
SI-250-6	250	1000	6	3.4	1/24	1/8	1/660	1/1320
	Ranges of measurement				FTD, FTN, FTW, FTE resolution			

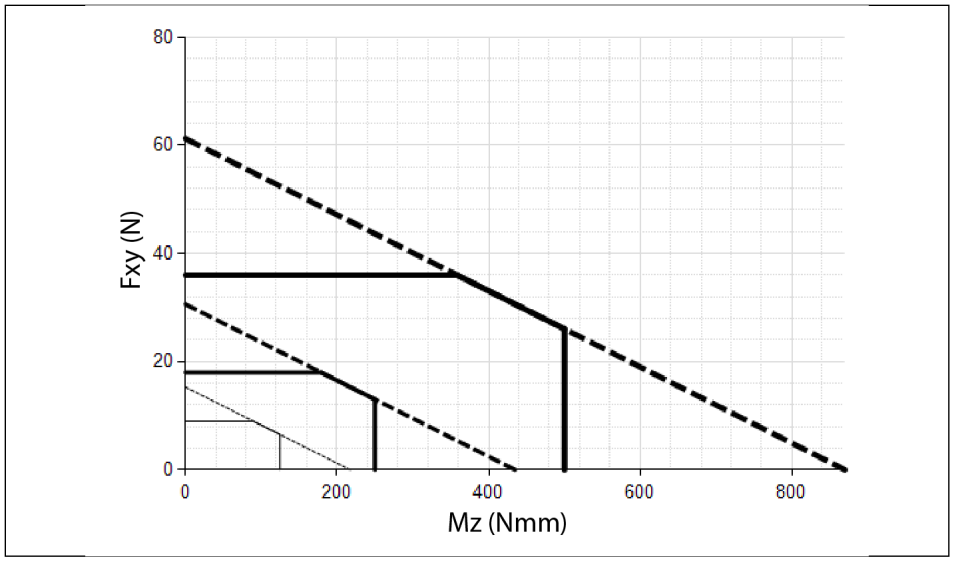


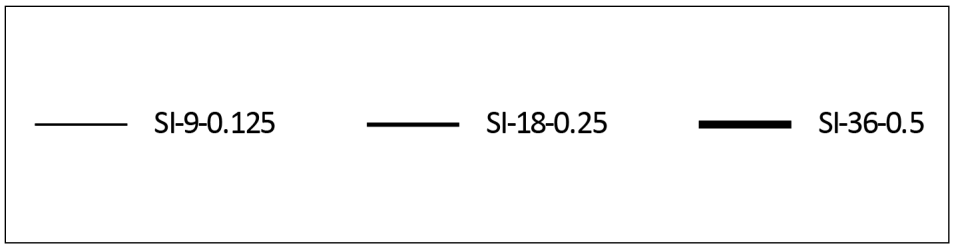




Tab.: Nano43

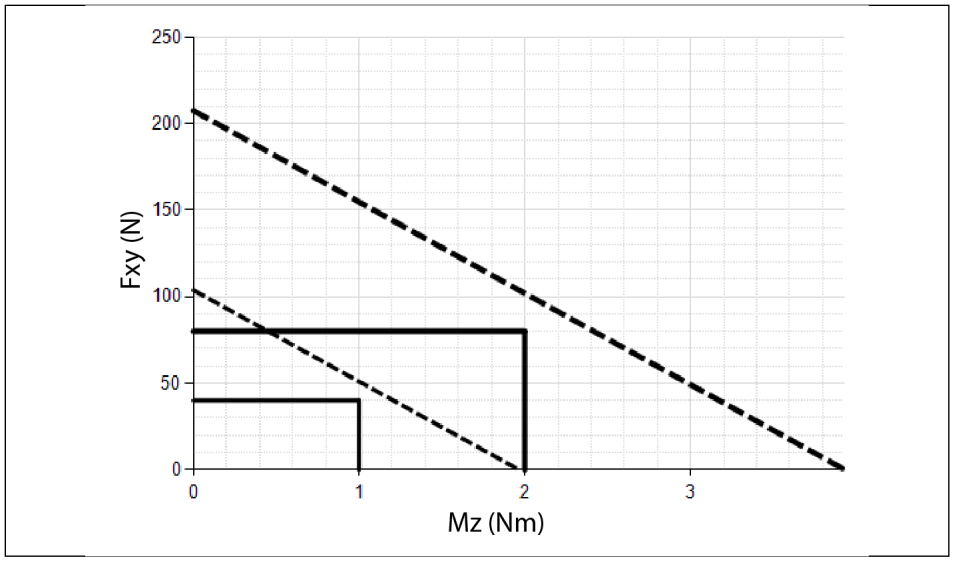
Calibration	F_x / F_y [N]	F_z [N]	M_x / M_y [Nmm]	M_z [Nmm]	F_x / F_y [N]	F_z [N]	M_x / M_y [Nmm]	M_z [Nmm]
SI-9-0.125	9	9	125	125	1/512	1/512	1/40	1/40
SI-18-0.25	18	18	250	250	1/256	1/256	1/20	1/20
SI-36-0.5	36	36	500	500	1/128	1/128	1/10	1/10
	Ranges of measurement				FTD, FTN, FTW, FTE resolution			

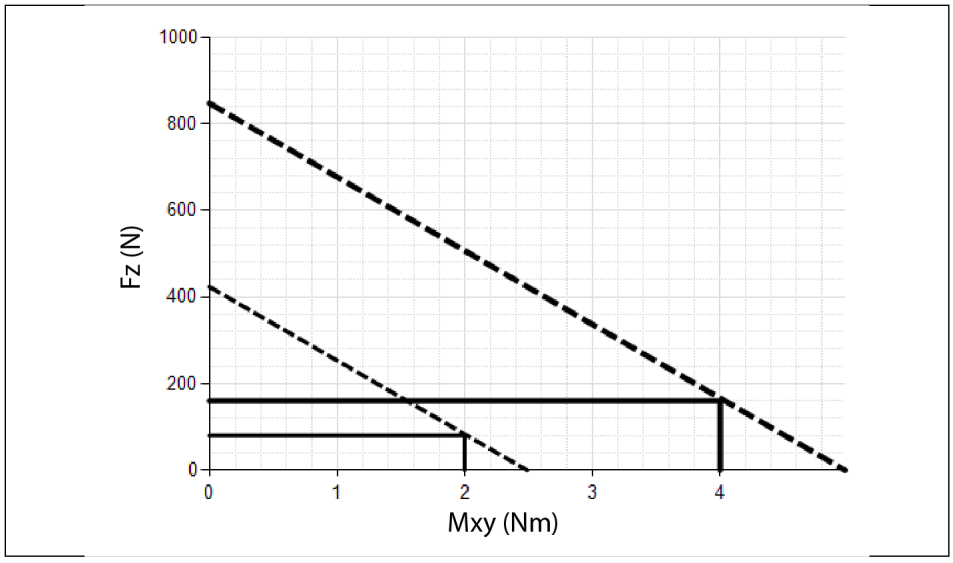


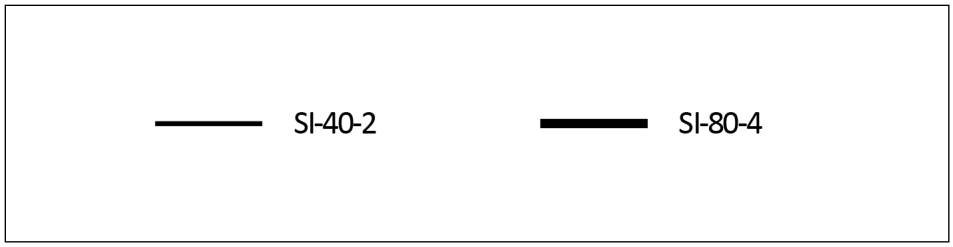


Tab.: Mini27-Titan

Calibration	F_x / F_y [N]	F_z [N]	M_x / M_y [Nm]	M_z [Nm]	F_x / F_y [N]	F_z [N]	M_x / M_y [Nm]	M_z [Nm]
SI-40-2	40	80	2	1	3/200	3/100	3/8000	1/4000
SI-80-4	80	160	4	2	3/100	3/50	3/4000	1/2000
	Ranges of measurement				FTD, FTN, FTW, FTE resolution			

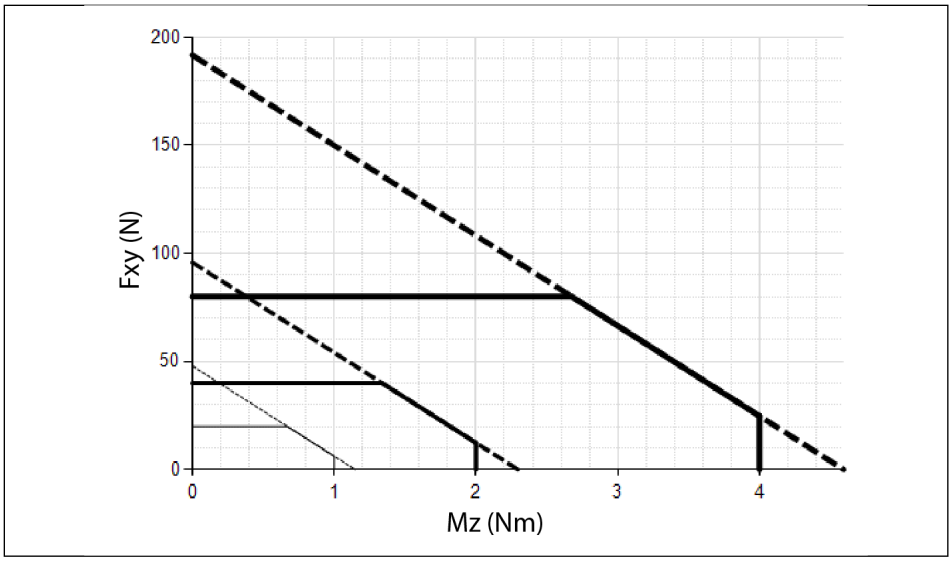


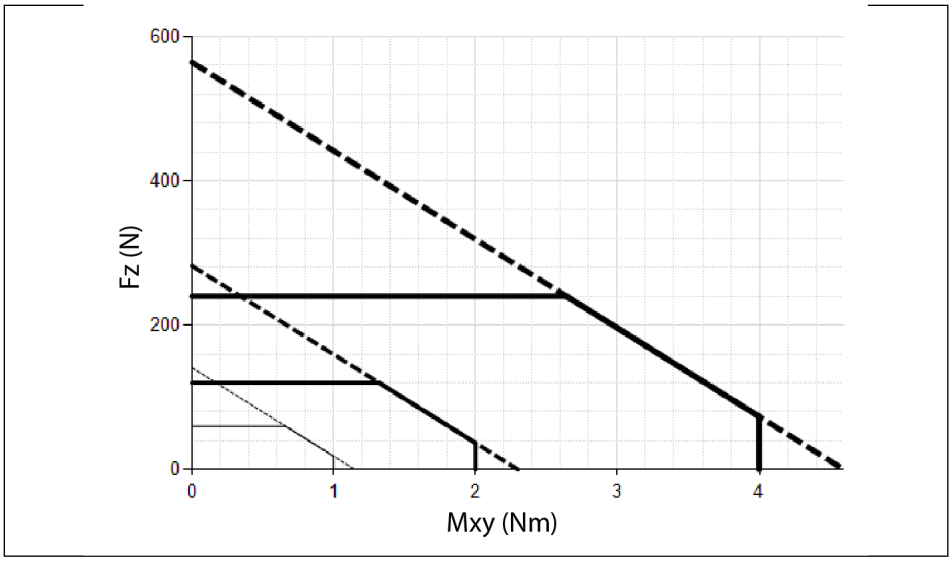


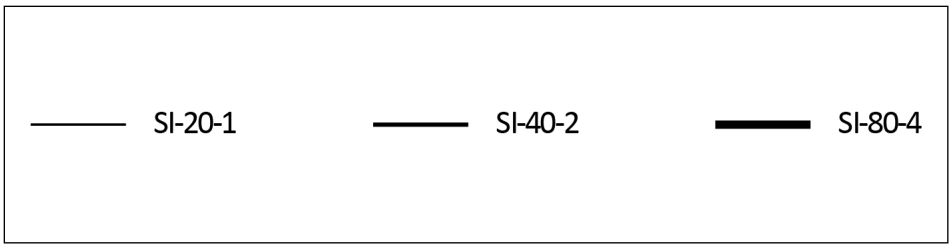


Tab.: Mini40 (including IP 65 and IP 68)

Calibration	F_x / F_y [N]	F_z [N]	M_x / M_y [Nm]	M_z [Nm]	F_x / F_y [N]	F_z [N]	M_x / M_y [Nm]	M_z [Nm]
SI-20-1	20	60	1	1	1/200	1/100	1/8000	1/8000
SI-40-2	40	120	2	2	1/100	1/50	1/4000	1/4000
SI-80-4	80	240	4	4	1/50	1/25	1/2000	1/2000
	Ranges of measurement				FTD, FTN, FTW, FTE resolution			

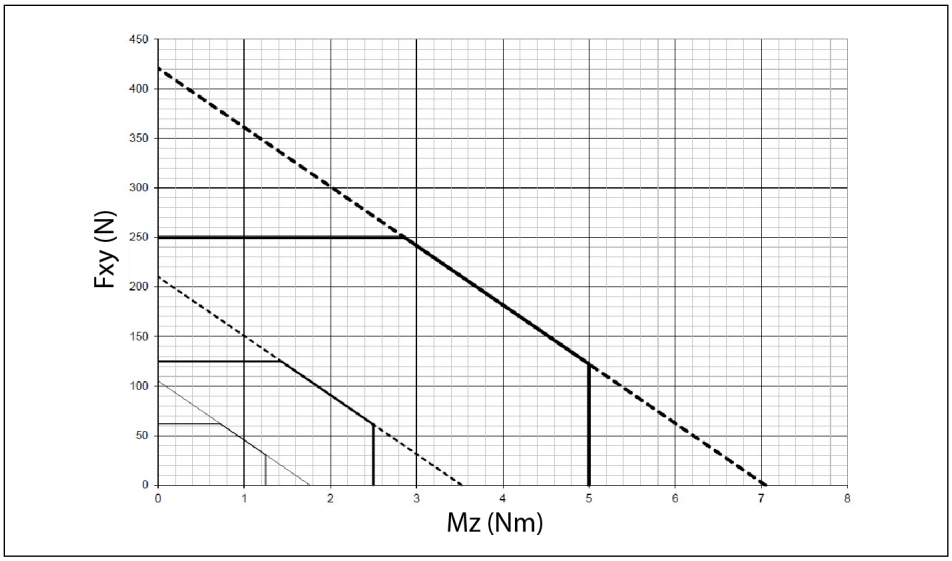


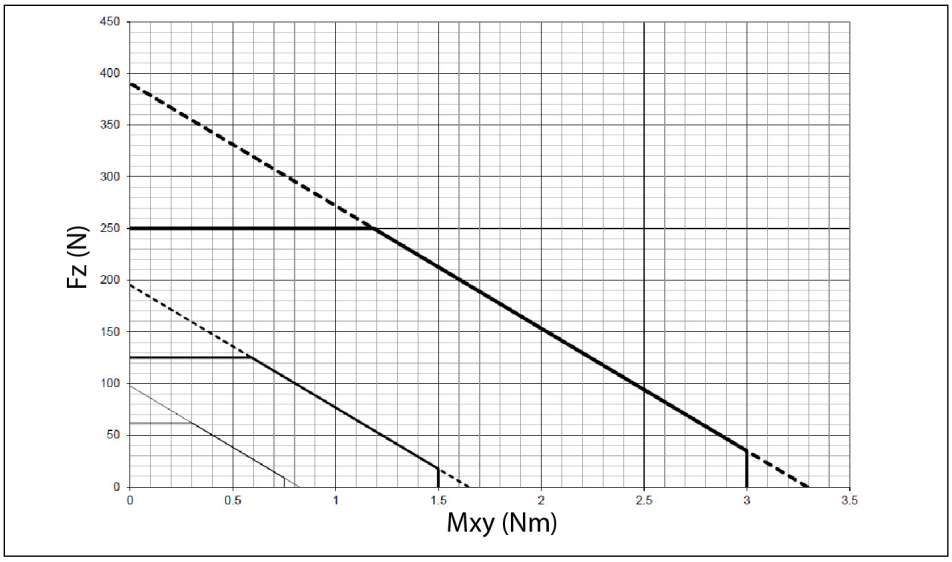


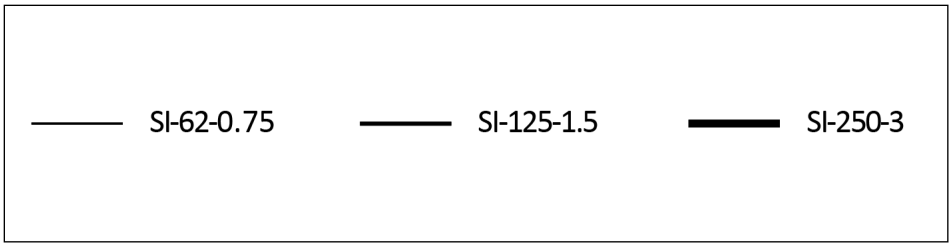


Tab.: Mini43LP

Calibration	F_x/F_y [N]	F_z [N]	M_x/M_y [Nm]	M_z [Nm]	F_x/F_y [N]	F_z [N]	M_x/M_y [Nm]	M_z [Nm]
SI-62-0.75	62	62	0.75	1.25	0.0313	0.0313	0.00037	0.0006
SI-125-1.5	125	125	1.5	2.5	0.0625	0.0625	0.00074	0.0012
SI-250-3	125	250	3	5	0.125	0.125	0.00147	0.0024
	Ranges of measurement				FTD, FTN, FTW, FTE resolution			

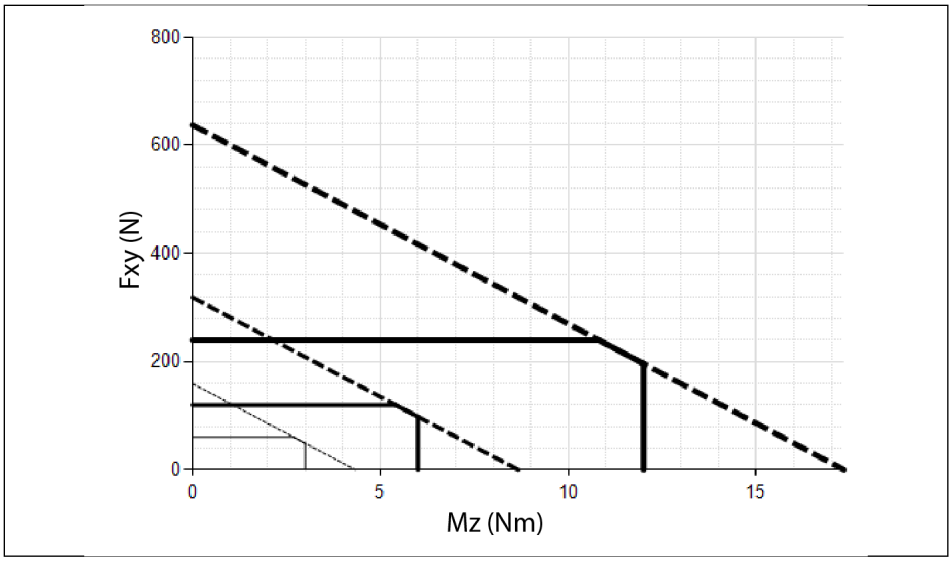


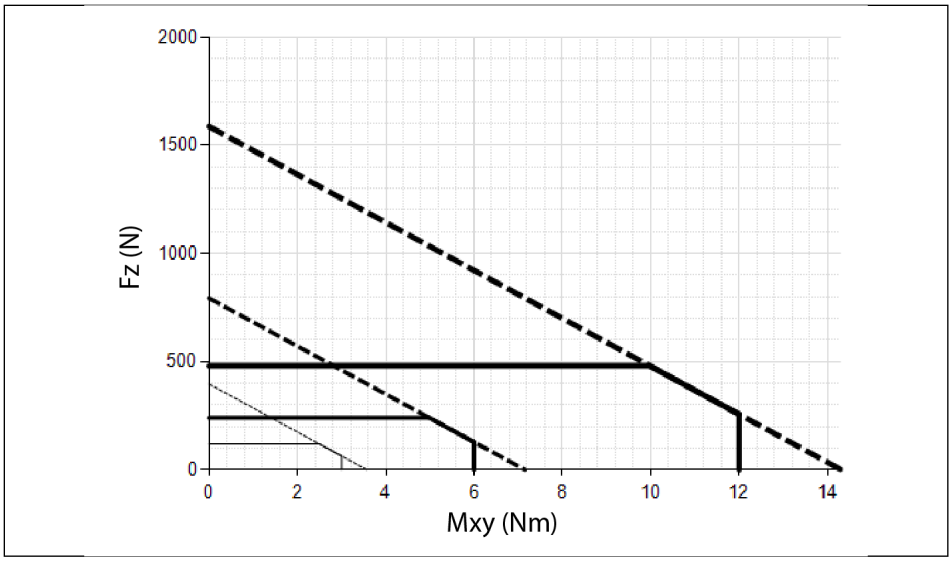


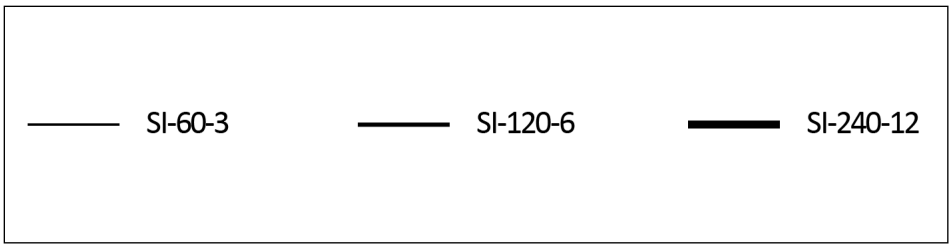


Tab.: Mini45-Titan

Calibration	F_x / F_y [N]	F_z [N]	M_x / M_y [Nm]	M_z [Nm]	F_x / F_y [N]	F_z [N]	M_x / M_y [Nm]	M_z [Nm]
SI-60-3	60	120	3	3	1/60	7/240	3/8000	1/3200
SI-120-6	120	240	6	6	1/30	7/120	3/4000	1/1600
SI-240-12	240	480	12	12	1/15	7/60	3/2000	1/800
	Ranges of measurement				FTD, FTN, FTW, FTE resolution			

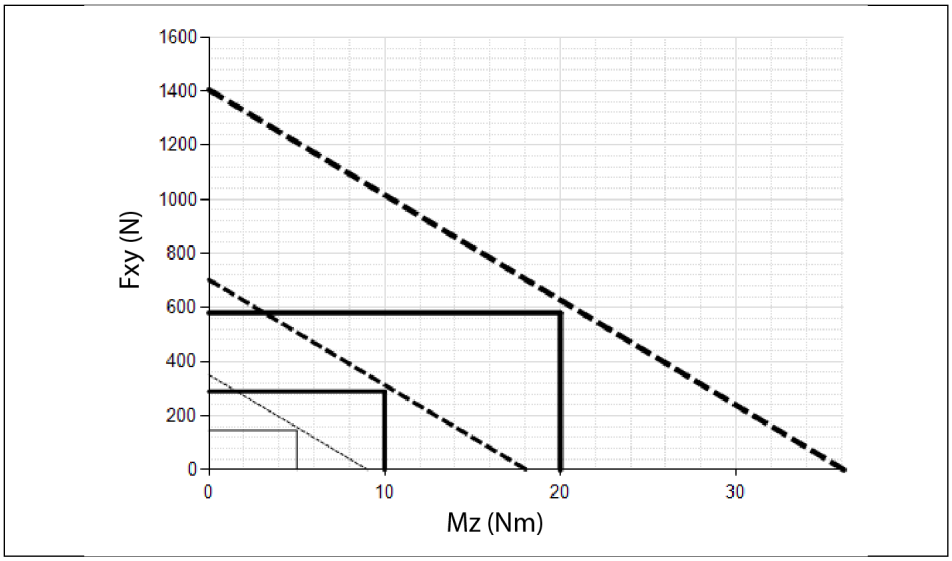


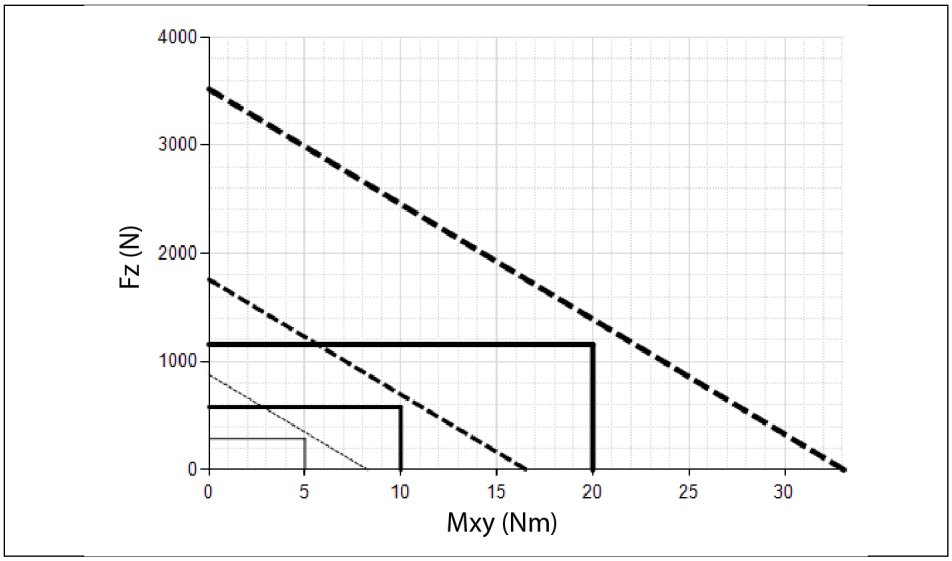


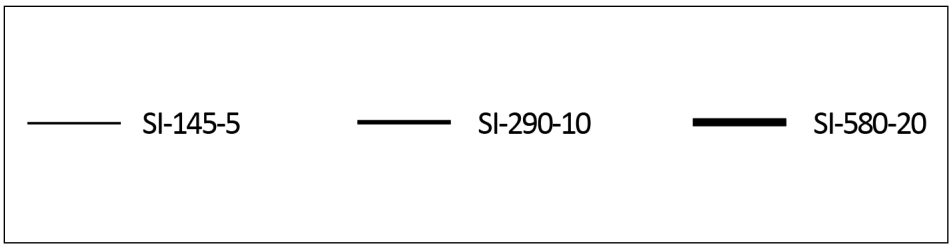


Tab.: Mini45 (including IP 65 and IP 68)

Calibration	F_x / F_y [N]	F_z [N]	M_x / M_y [Nm]	M_z [Nm]	F_x / F_y [N]	F_z [N]	M_x / M_y [Nm]	M_z [Nm]
SI-145-5	145	290	5	5	1/16	1/16	1/752	1/1504
SI-290-10	290	580	10	10	1/8	1/8	1/376	1/752
SI-580-20	580	1160	20	20	1/4	1/4	1/188	1/376
	Ranges of measurement				FTD, FTN, FTW, FTE resolution			

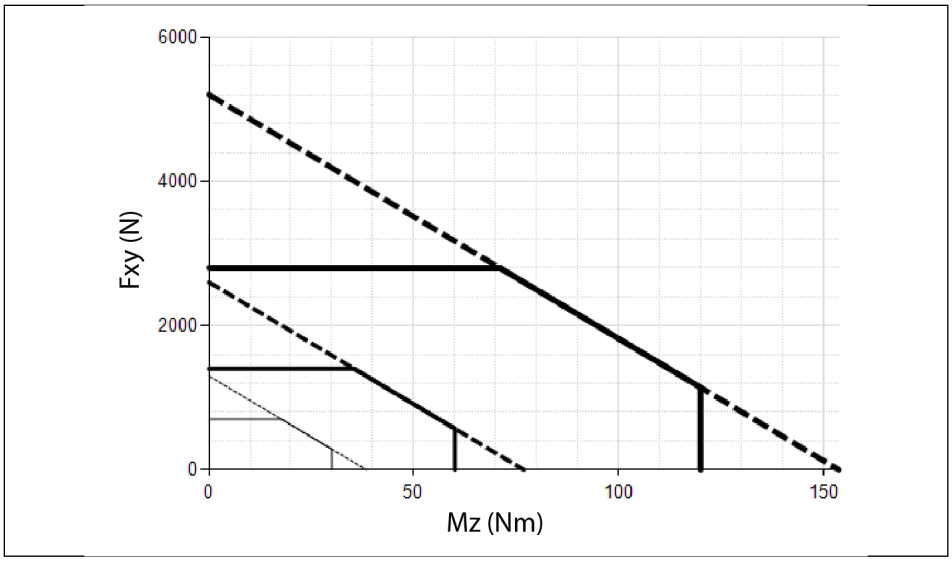


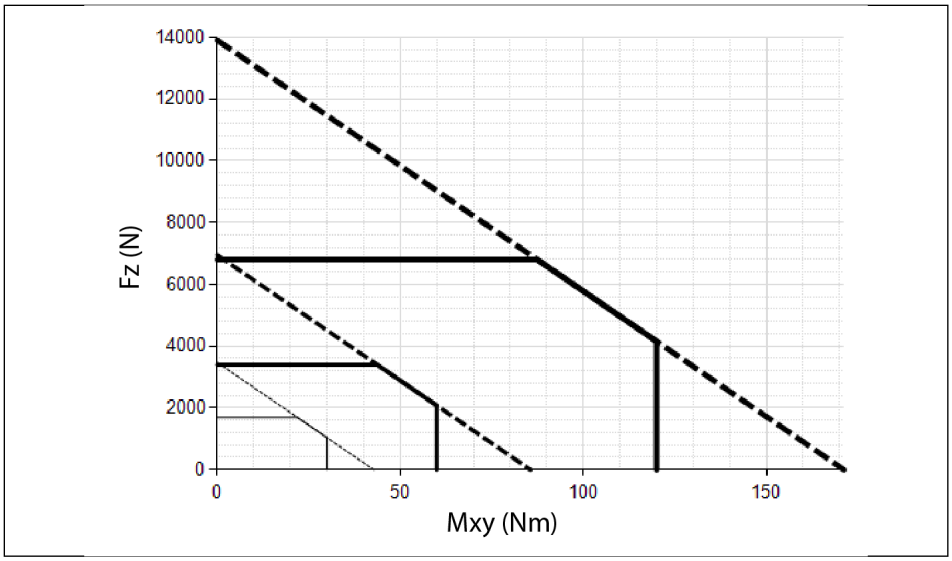


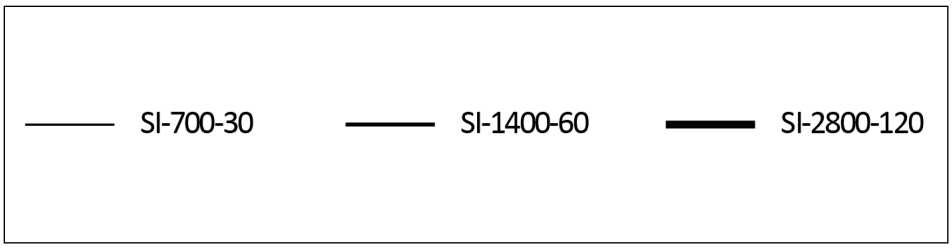


Tab.: Mini58 (including IP 60, IP 65 and IP 68)

Calibration	F_x / F_y [N]	F_z [N]	M_x / M_y [Nm]	M_z [Nm]	F_x / F_y [N]	F_z [N]	M_x / M_y [Nm]	M_z [Nm]
SI-700-30	700	1700	30	30	1/6	7/24	9/1600	1/320
SI-1400-60	1400	3400	60	60	1/3	7/12	9/800	1/160
SI-2800-120	2800	6800	120	120	3/4	1 1/4	9/400	1/80
	Ranges of measurement				FTD, FTN, FTW, FTE resolution			

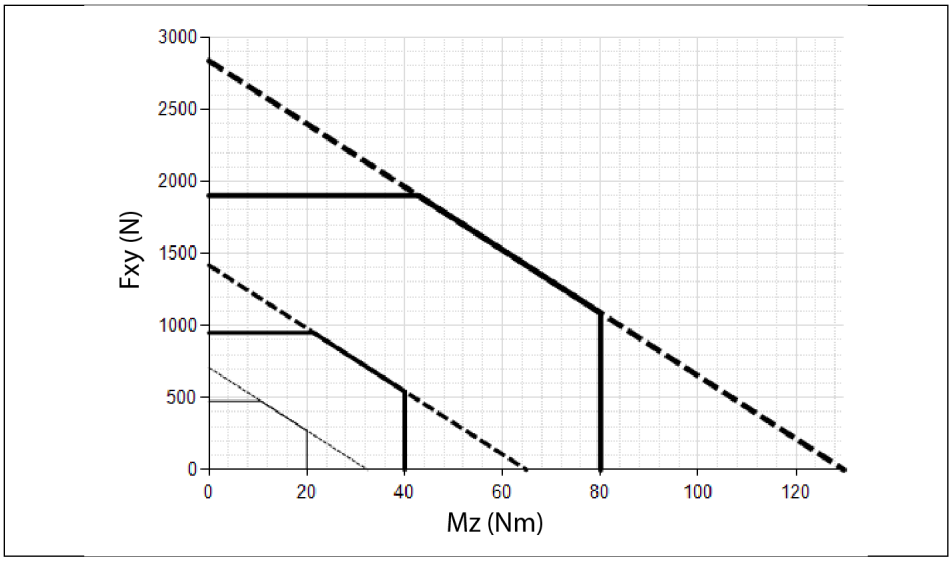


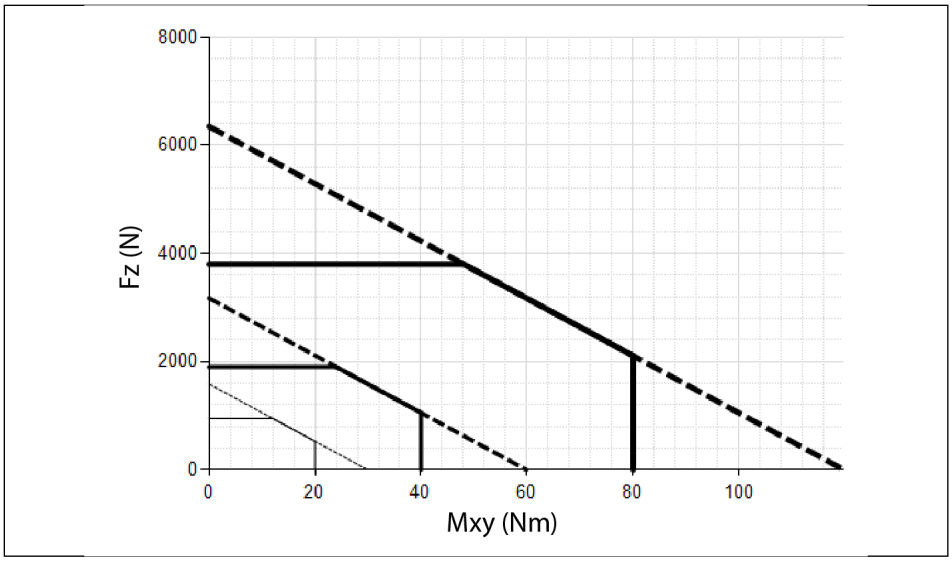


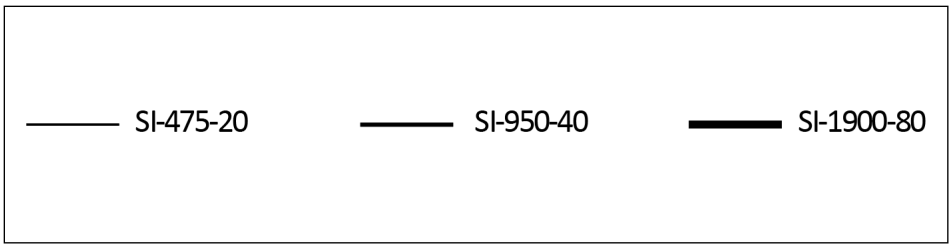


Tab.: Mini85

Calibration	F_x / F_y [N]	F_z [N]	M_x / M_y [Nm]	M_z [Nm]	F_x / F_y [N]	F_z [N]	M_x / M_y [Nm]	M_z [Nm]
SI-475-20	475	950	20	20	9/112	3/28	5/1496	7/2992
SI-950-40	950	1900	40	40	9/56	3/14	5/748	7/1496
SI-1900-80	1900	3800	80	80	9/28	3/7	5/374	7/748
	Ranges of measurement				FTD, FTN, FTW, FTE resolution			

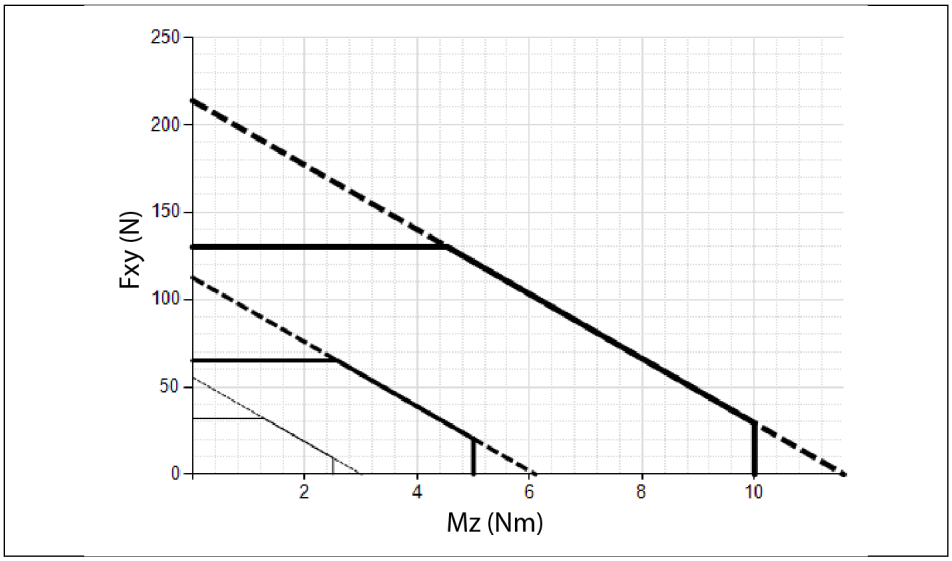


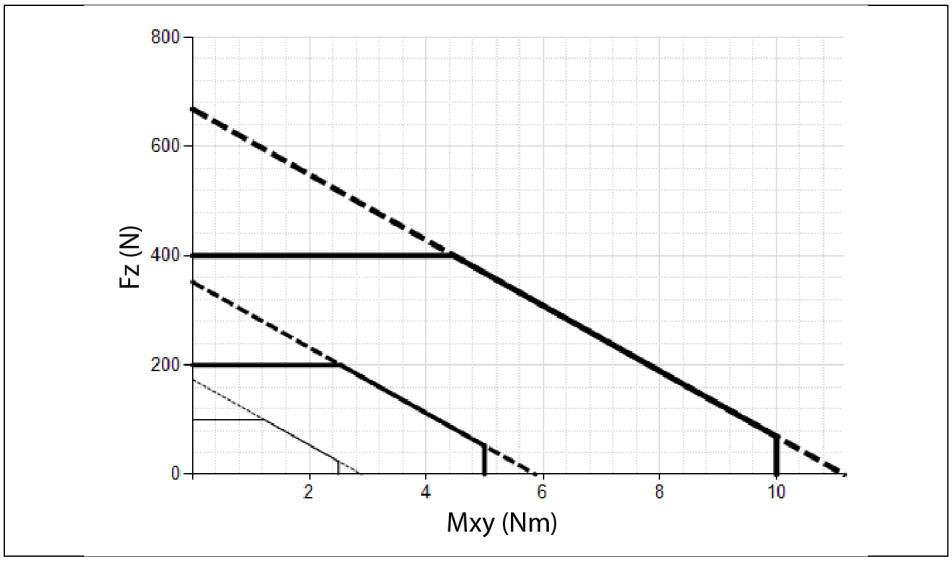


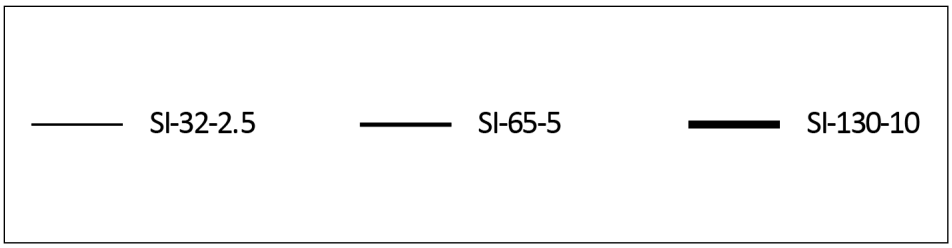


Tab.: Gamma (including IP 60, IP 65 and IP 68)

Calibration	F_x / F_y [N]	F_z [N]	M_x / M_y [Nm]	M_z [Nm]	F_x / F_y [N]	F_z [N]	M_x / M_y [Nm]	M_z [Nm]
SI-32-2.5	32	100	2.5	2.5	1/160	1/80	1/2000	1/2000
SI-65-5	65	200	5	5	1/80	1/40	10/13333	10/13333
SI-130-10	130	400	10	10	1/40	1/20	1/800	1/800
	Ranges of measurement				FTD, FTN, FTW, FTE resolution			

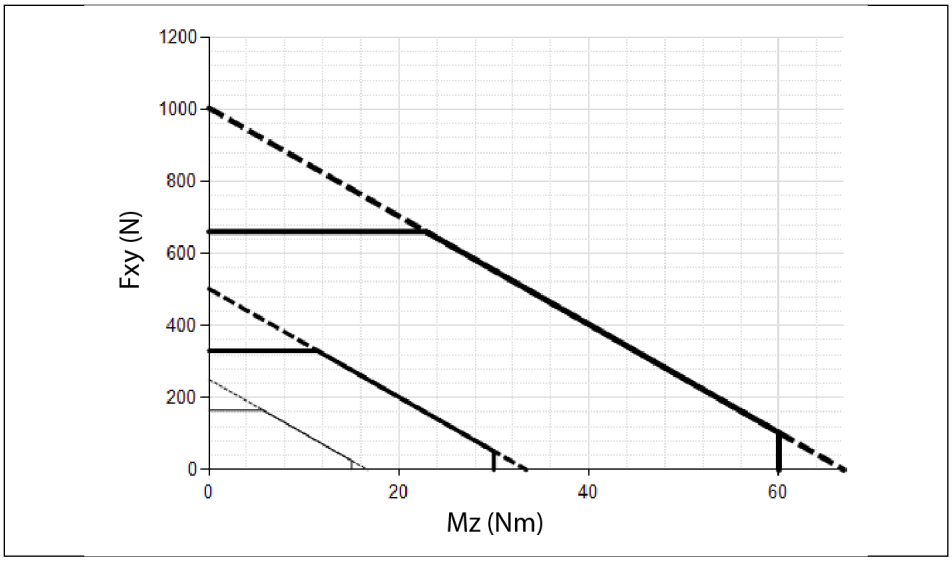


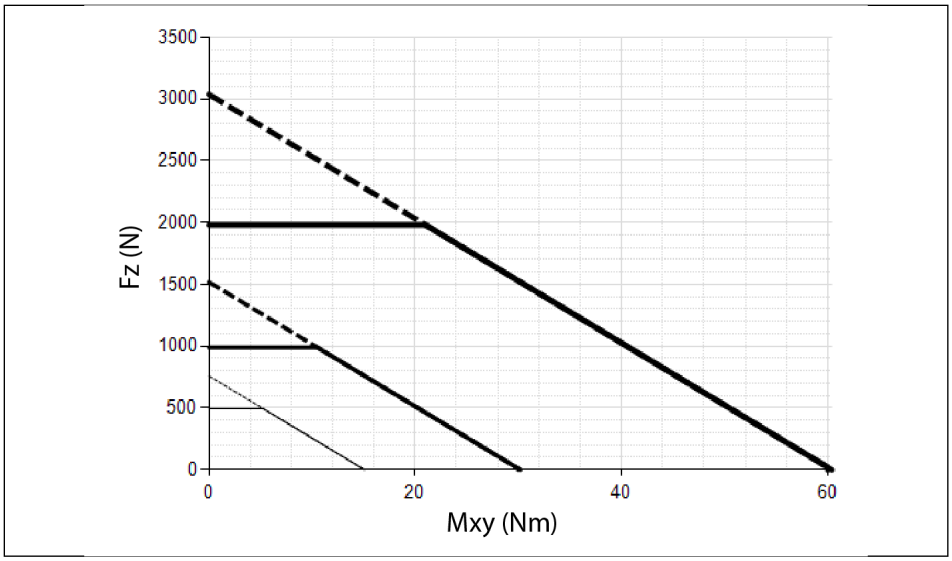


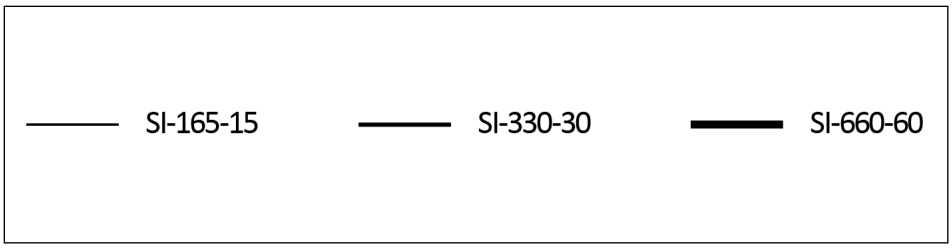


Tab.: Delta (including IP 60, IP 65 and IP 68)

Calibration	F_x / F_y [N]	F_z [N]	M_x / M_y [Nm]	M_z [Nm]	F_x / F_y [N]	F_z [N]	M_x / M_y [Nm]	M_z [Nm]
SI-165-15	165	495	15	15	1/32	1/16	1/528	1/528
SI-330-30	330	990	30	30	1/16	1/8	5/1333	5/1333
SI-660-60	660	1980	60	60	1/8	1/4	10/1333	10/1333
	Ranges of measurement				FTD, FTN, FTW, FTE resolution			

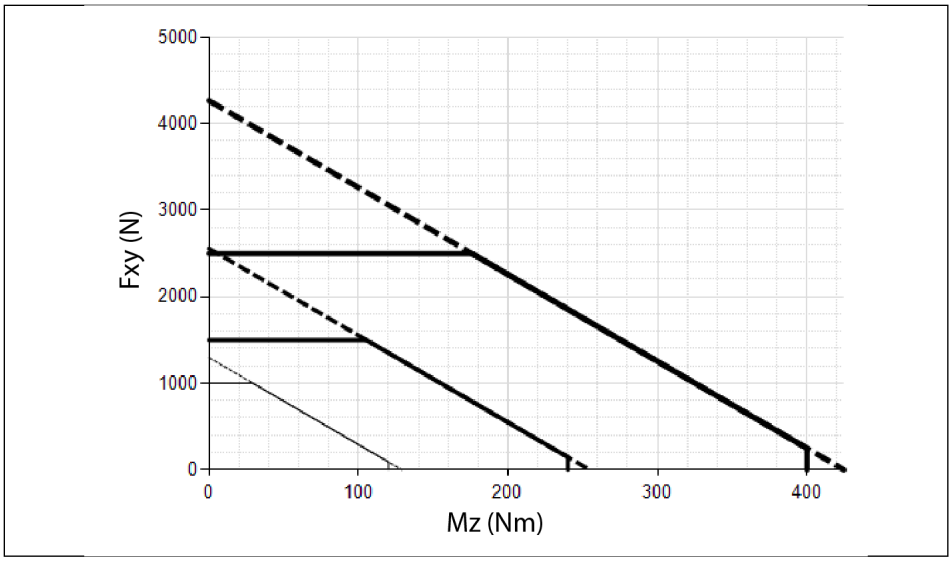


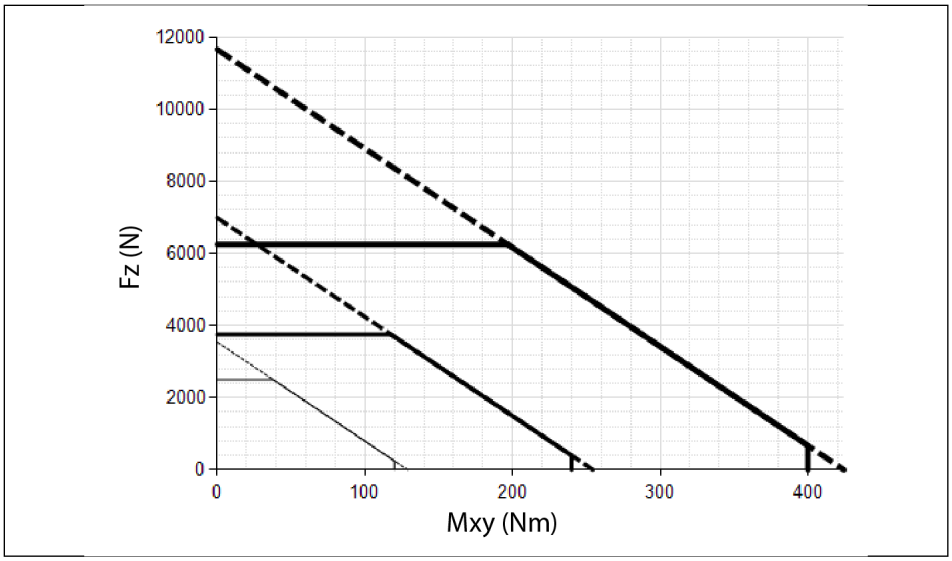


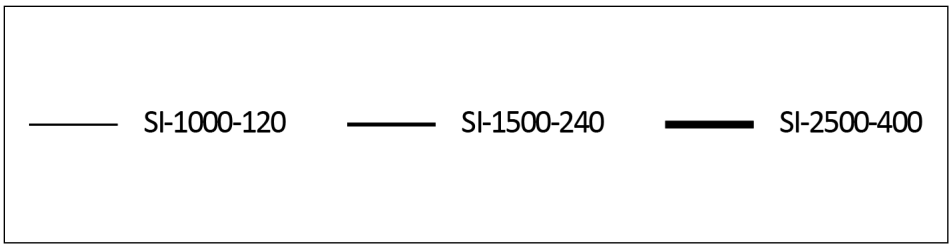


Tab.: Theta (including IP 60, IP 65 and IP 68)

Calibration	F_x / F_y [N]	F_z [N]	M_x / M_y [Nm]	M_z [Nm]	F_x / F_y [N]	F_z [N]	M_x / M_y [Nm]	M_z [Nm]
SI-1000-120	1000	2500	120	120	1/4	1/4	1/40	1/80
SI-1500-240	1500	3750	240	240	1/2	1/2	1/20	1/40
SI-2500-400	2500	6250	400	400	1/2	1	1/20	1/20
	Ranges of measurement				FTD, FTN, FTW, FTE resolution			

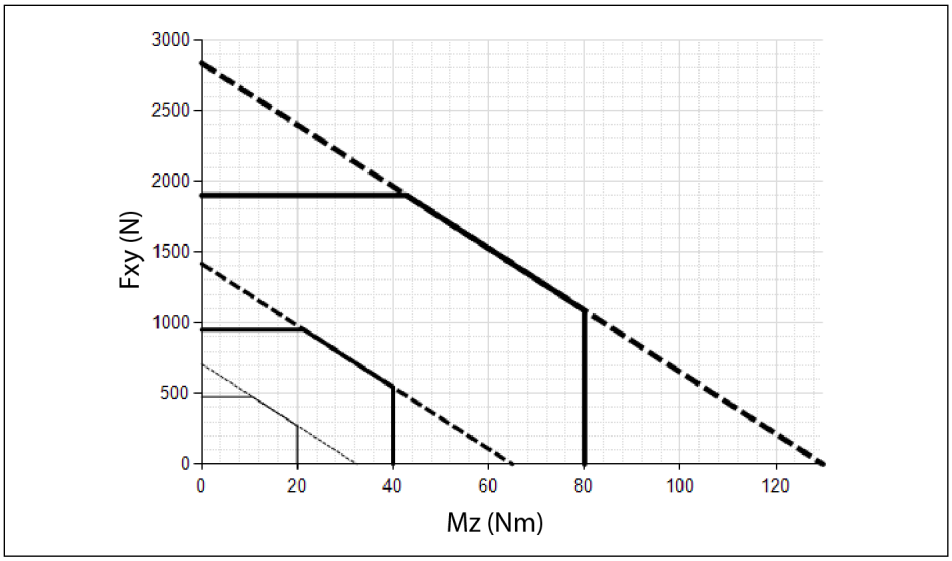


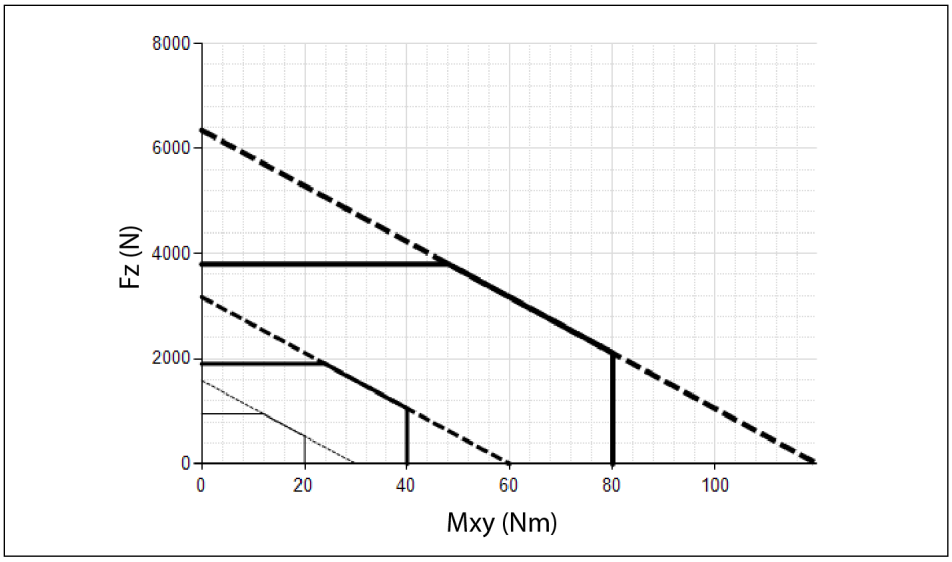


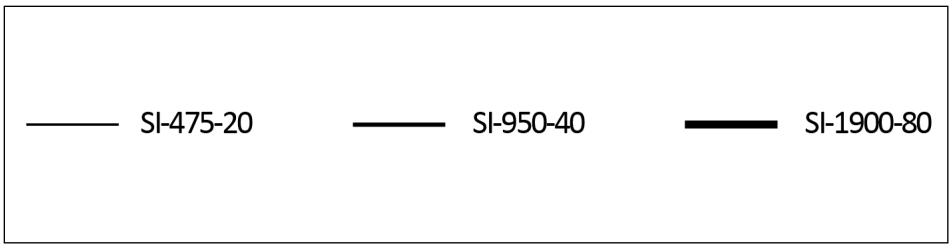


Tab.: Omega85 (including IP 65 and IP 68)

Calibration	F_x / F_y [N]	F_z [N]	M_x / M_y [Nm]	M_z [Nm]	F_x / F_y [N]	F_z [N]	M_x / M_y [Nm]	M_z [Nm]
SI-475-20	475	950	20	20	1/14	3/28	5/1496	7/2992
SI-950-40	950	1900	40	40	1/7	3/14	5/748	7/1496
SI-1900-80	1900	3800	80	80	2/7	3/7	5/374	7/748
	Ranges of measurement				FTD, FTN, FTW, FTE resolution			

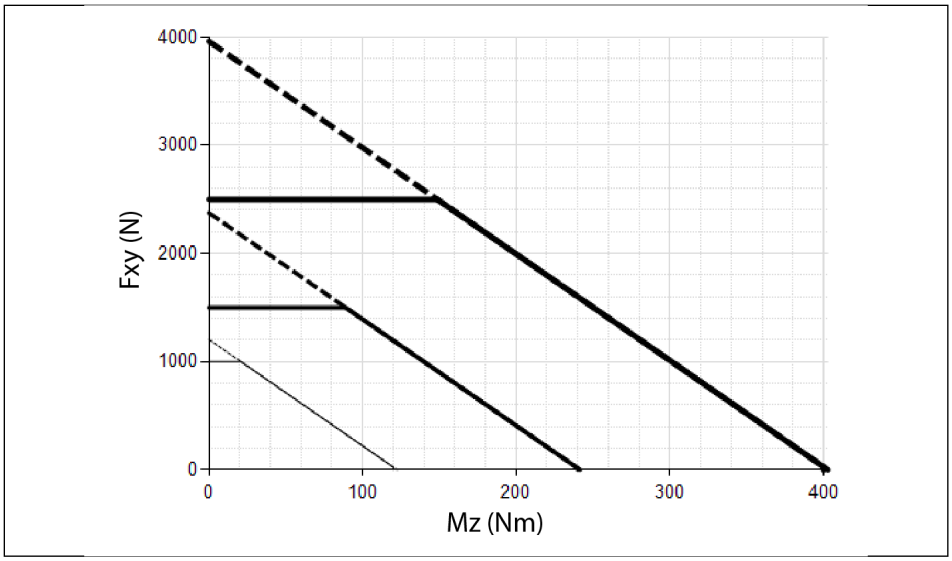


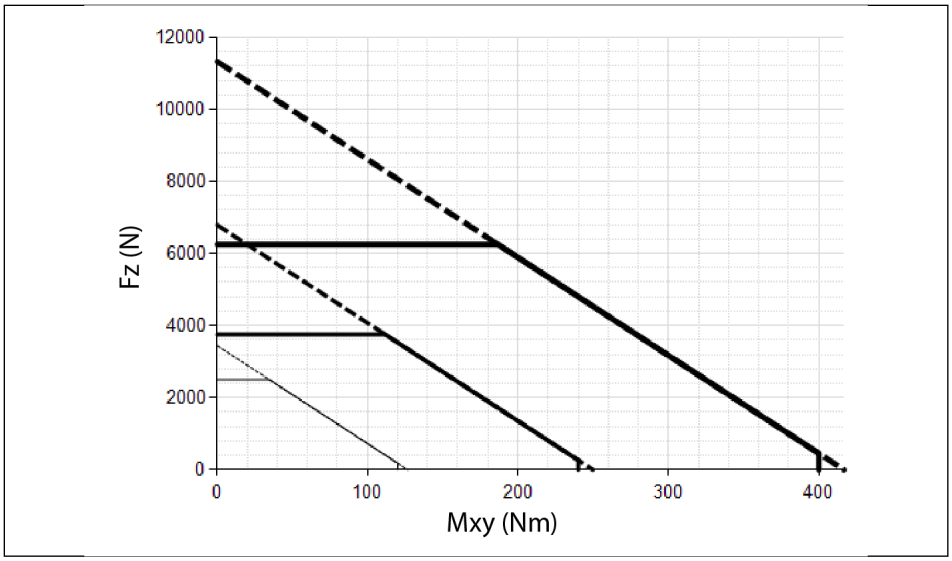


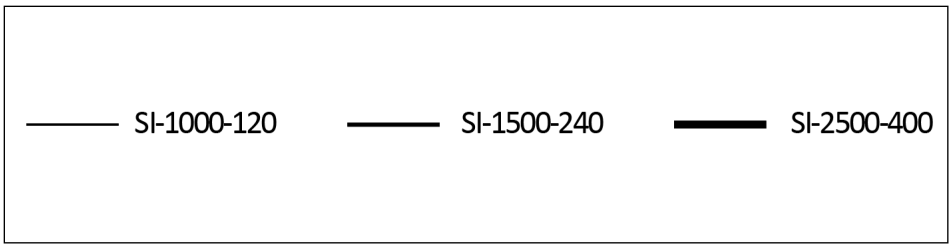


Tab.: Omega160 (including IP60, IP 65 and IP 68)

Calibration	F_x / F_y [N]	F_z [N]	M_x / M_y [Nm]	M_z [Nm]	F_x / F_y [N]	F_z [N]	M_x / M_y [Nm]	M_z [Nm]
SI-1000-120	1000	2500	120	120	1/4	1/4	1/40	1/80
SI-1500-240	1500	3750	240	240	1/4	1/2	1/20	1/40
SI-2500-400	2500	6250	400	400	1/2	3/4	1/20	1/20
	Ranges of measurement				FTD, FTN, FTW, FTE resolution			

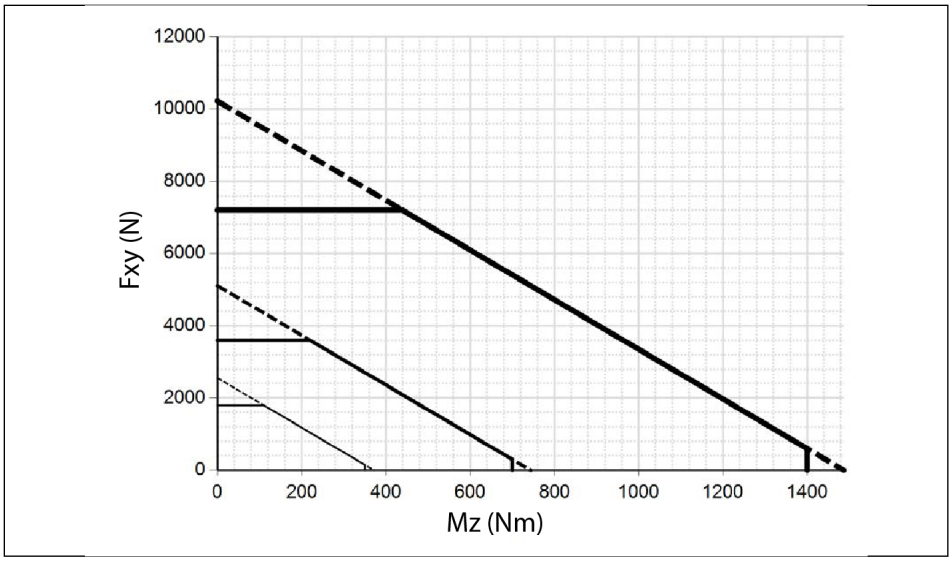


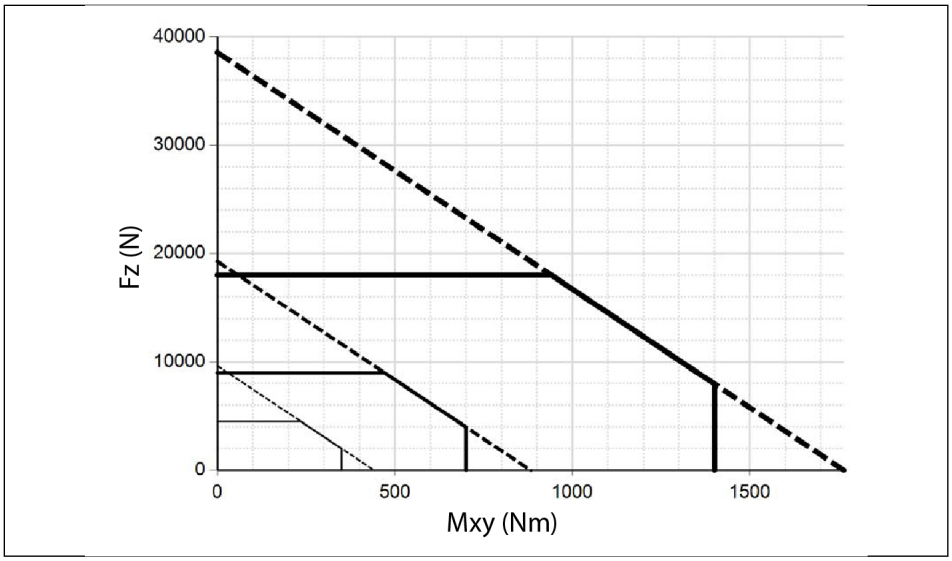


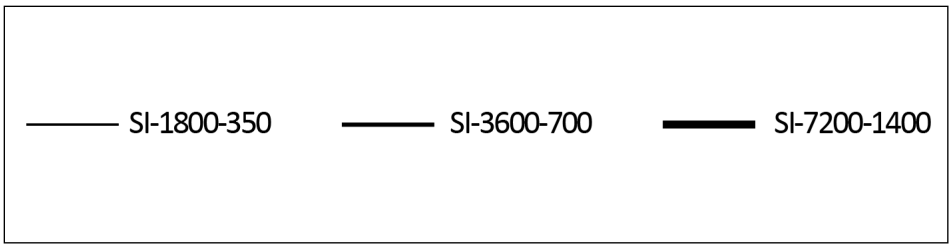


Tab.: Omega191 (including IP 60, IP 65 and IP 68)

Calibration	F_x / F_y [N]	F_z [N]	M_x / M_y [Nm]	M_z [Nm]	F_x / F_y [N]	F_z [N]	M_x / M_y [Nm]	M_z [Nm]
SI-1800-350	1800	4500	350	350	3/8	3/4	5/96	5/144
SI-3600-700	3600	9000	700	700	3/4	11/2	5/48	5/72
SI-7200-1400	7200	18000	1400	1400	11/2	3	5/24	5/36
	Ranges of measurement				FTD, FTN, FTW, FTE resolution			

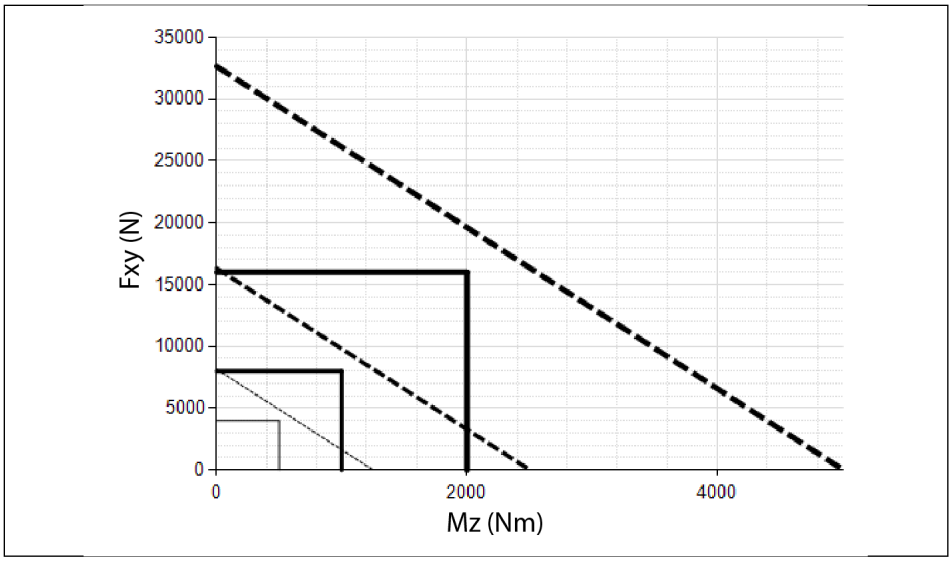


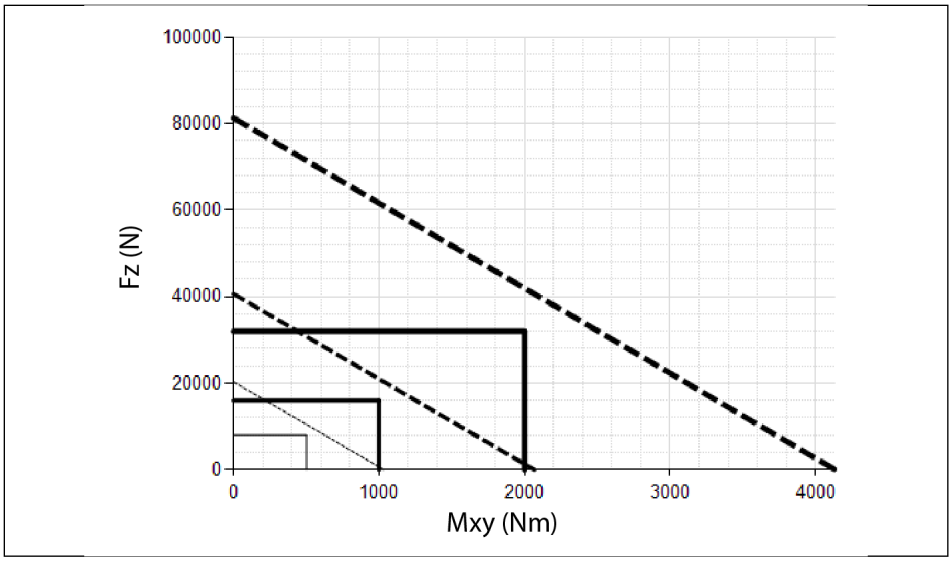


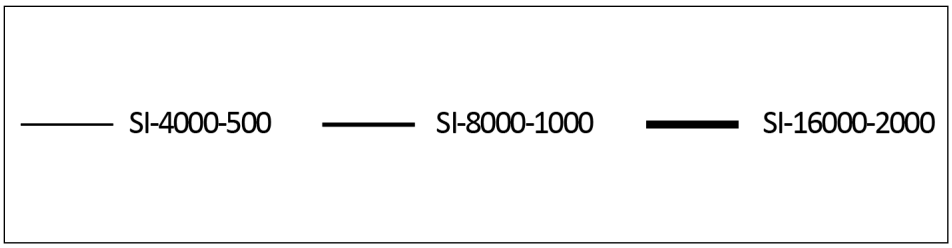


Tab.: Omega250

Calibration	F_x / F_y [N]	F_z [N]	M_x / M_y [Nm]	M_z [Nm]	F_x / F_y [N]	F_z [N]	M_x / M_y [Nm]	M_z [Nm]
SI-4000-500	4000	8000	500	500	1	2	1/8	1/8
SI-8000-1000	8000	16000	1000	1000	2	4	1/4	1/4
SI-16000-2000	16000	32000	2000	2000	4	8	1/2	1/2
	Ranges of measurement				FTD, FTN, FTW, FTE resolution			

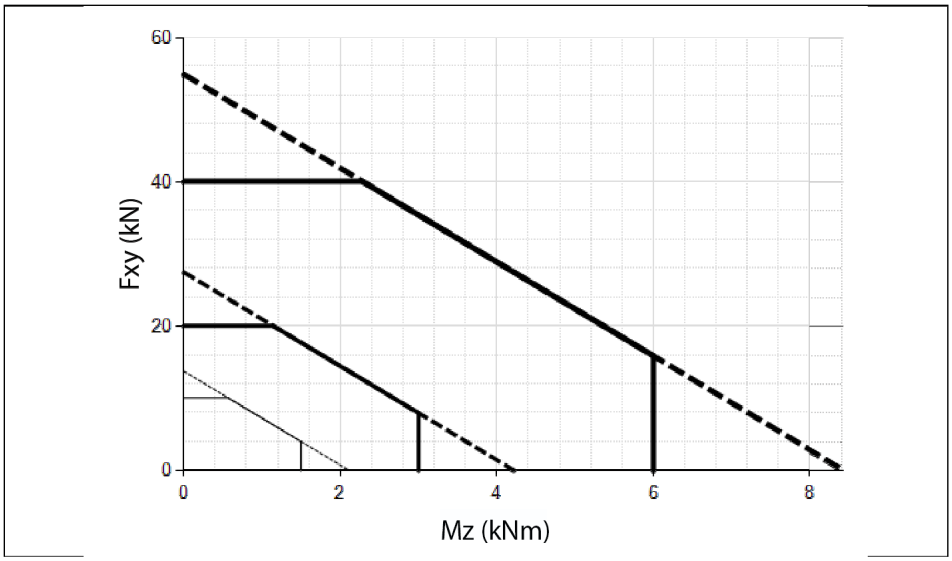


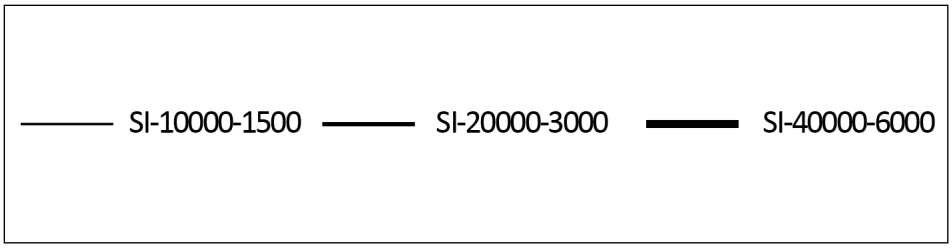




Tab.: Omega331

Calibration	F_x / F_y [kN]	F_z [kN]	M_x / M_y [kNm]	M_z [kNm]	F_x / F_y [kN]	F_z [kN]	M_x / M_y [kNm]	M_z [kNm]
SI-10000-1500	10	22	1.5	1.5	1/640	1/240	3/8000	3/16000
SI-20000-3000	20	44	3	3	1/320	1/120	3/4000	3/8000
SI-40000-6000	40	88	6	6	1/160	1/60	3/2000	3/4000
	Ranges of measurement				FTD, FTN, FTW, FTE resolution			

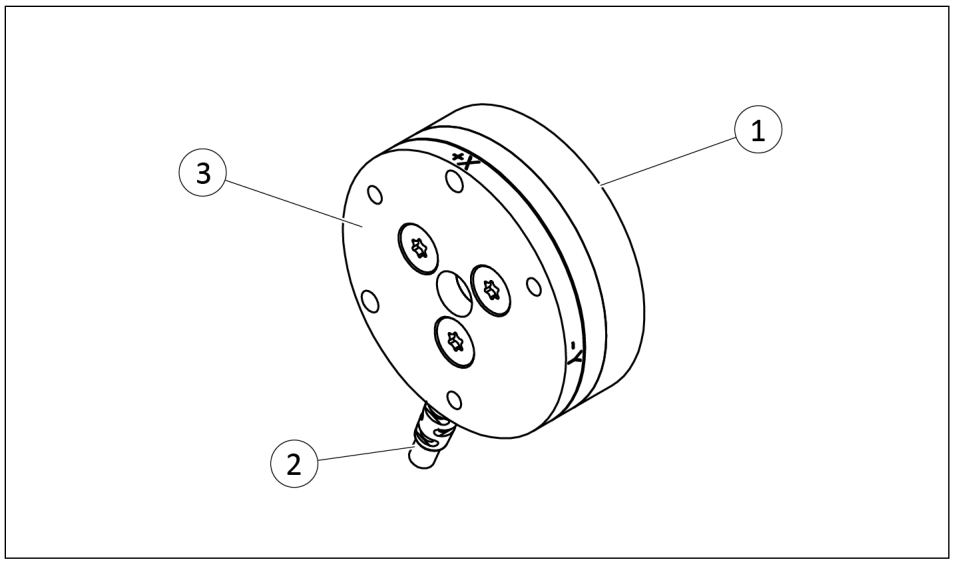




4 Design and description

4.1 Design

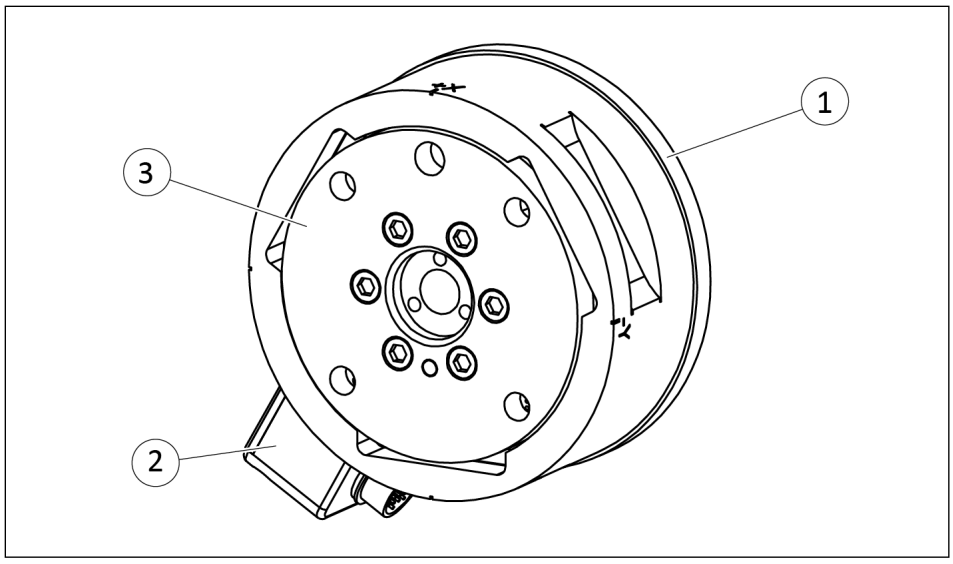
Nano / Mini / IP-protected



Exemplary design shown on FT Mini40

1	Robot side
2	Sensor cable connection
3	Tool side

from Gamma and larger



Exemplary design shown on FT Gamma

1	Removable interface plate, robot side
2	Sensor cable connection
3	Tool side

4.2 Description

Rigid 6-axis force-torque-sensor for precise measuring in all six degrees of freedom

5 Assembly

5.1 Assembly and connection

⚠ WARNING

Risk of injury due to unexpected movements!

If the power supply is switched on or residual energy remains in the system, components can move unexpectedly and cause serious injuries.

- Before starting any work on the product: Switch off the power supply and secure against restarting.
- Make sure, that no residual energy remains in the system.

1. Commission the associated interface, ▸ 1.1.2 [🗋 6].
2. Check the evenness of the mounting surface, ▸ 5.2.1 [🗋 49].
3. Screw the product to the machine/system, ▸ 5.2.1 [🗋 49].
   ⇨ If necessary, use appropriate connection elements (adapter plates).
4. Connect and lay the sensor cable, ▸ 5.2.2 [🗋 54].

5.2 Connections

5.2.1 Mechanical connection

Evenness of the mounting surface

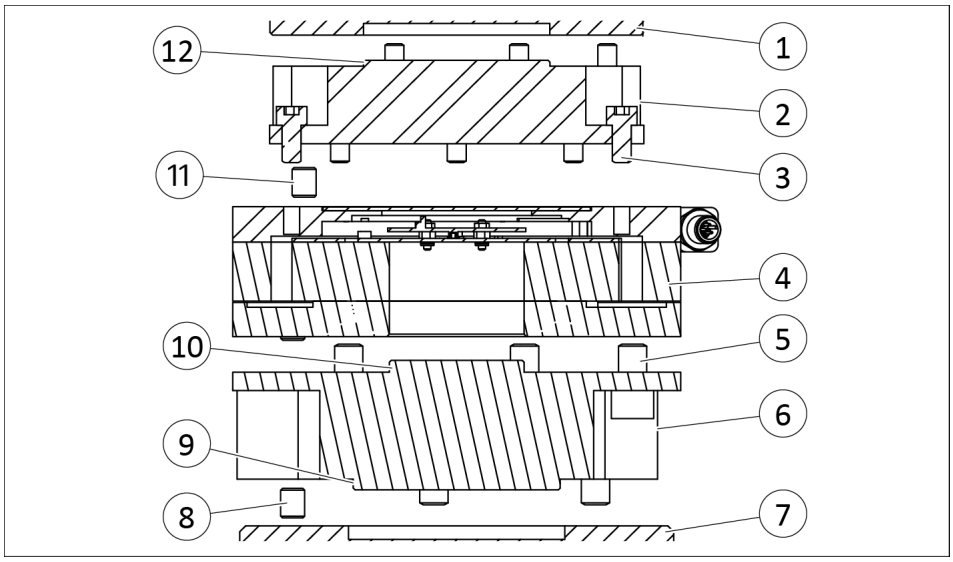
The values apply to the whole mounting surface to which the product is mounted.

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

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

Adapter plate requirements

Adapter plates can be inserted between the robot and the force-torque-sensor or between the force-torque-sensor and the tool. An adapter plate is necessary if the screw connection diagram of the force-torque-sensor has to be adapted to the customer's equipment (robot flange, end effector). **IMPORTANT! Only use adapter plates if they have bore holes and recesses that match the product exactly. Precise assembly is a prerequisite for proper functioning.**



Adapter plate for robot flange and adapter plate for tool side

1	Robot
2	Adapter plate for robot flange
3/5	Mounting screws
4	Force-torque-sensor
6	Adapter plate for tool side
7	End effector
8/11	Alignment pin
9/10/12	Centering collar

The adapter plate must meet the following requirements:

- For precise assembly, the adapter plate requires precisely measured bore holes for the mounting screws, the alignment pins and the centering collar
- The bore holes in the adapter plate should not all be aligned centrally. A larger bolt pitch circle ensures more accurate measured values because less bending occurs in the plate.
- To guarantee the necessary tightening torque, the adapter plate must have a sufficient height.
- The mounting screws must not be too long in order to prevent damage to the internal electronics of the force-torque-sensor.

  The adapter plate must have an even and stable surface running parallel to the force-torque-sensor to prevent distortion during operation.

The catalog data sheet contains detailed information and precise manufacturing instructions for possible adapter plate design, ▶ 1.1.2 [🗋 6].

CAUTION

Risk of damage to the sensor!

The internal electronics can get damaged if the interface plate is removed.

- Do not touch the internal electronics.
- Protect internal electronics from contamination.

CAUTION

Risk of damage to the sensor!

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

- Only mount the sensor if the corresponding interface has been put into operation to check the saturation.
- If an error occurs during assembly, wait until the error disappears.

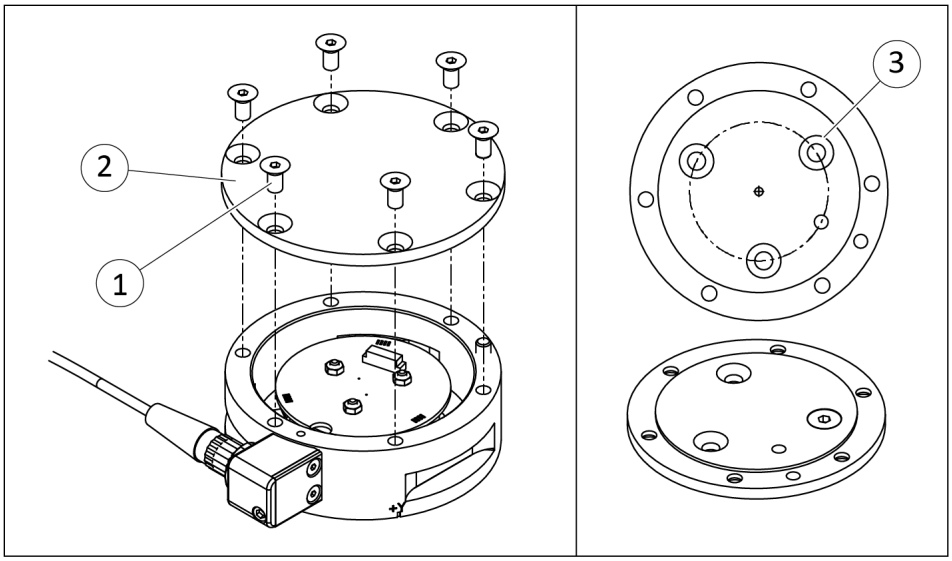
from Gamma and larger (without IP protection class)

Force-torque-sensors from Gamma and larger without IP protection class have a removable interface plate.

Assembly with interface plate as adapter plate

NOTE

The interface plate can only be used as an adapter plate if the screw connection diagram of the robot is smaller than the interface plate itself.

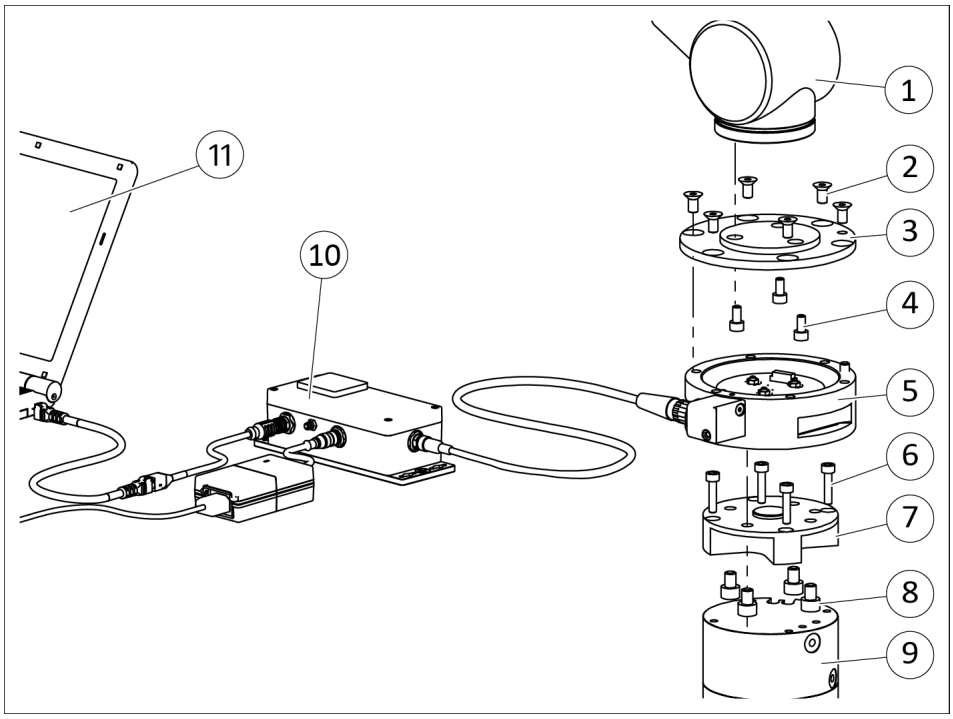


Force-torque-sensor with removable interface plate

1. Loosen the mounting screws (1) and remove the interface plate (2).
2. Incorporate the screw connection diagram (3) of the robot into the interface plate.

   ⇨ Observe requirements for adapter plate, ▸ 5.2.1 [🗋 49].

- The corresponding interface (10) has been put into operation.
- Use the demo program (11) to observe gage saturation errors during assembly. If an error occurs, stop assembly until the error disappears

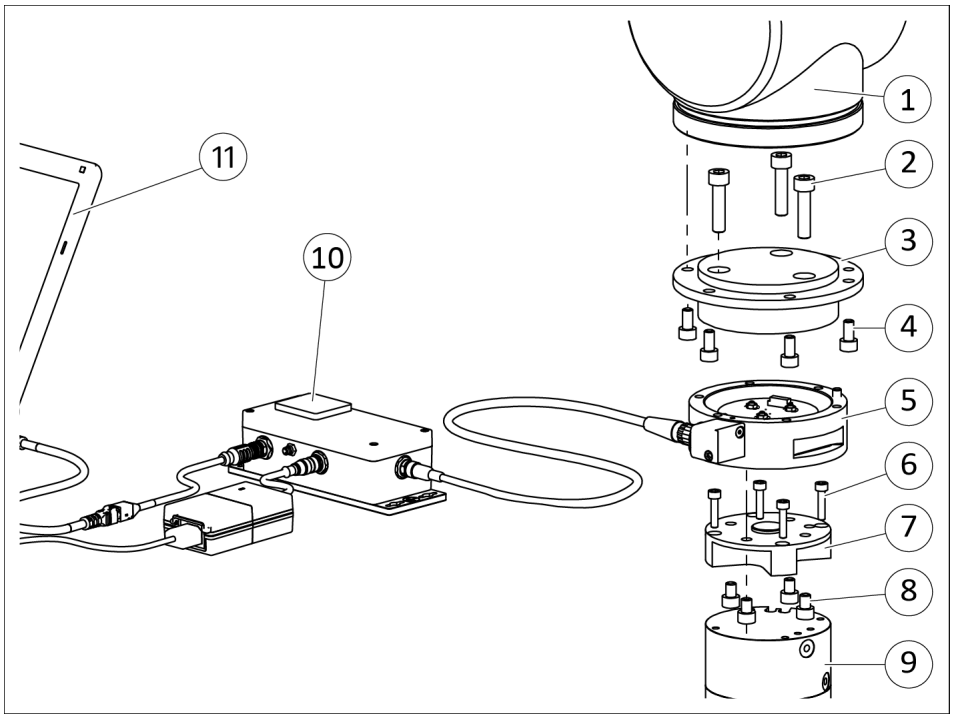


Assembly with interface plate as adapter plate

1. Apply Loctite 222 threadlocker to the mounting screws (2) and (4).
2. Fasten the pre-machined interface plate (3) to the robot (1) with mounting screws (4).
3. Fasten the interface plate (3) to the force-torque-sensor with mounting screws (2).
4. Apply Loctite 222 threadlocker to the mounting screws (6) and (8).
5. Fasten the adapter plate (7) to the end effector (9) with mounting screws (6).
6. Fasten the end effector (9) to the force-torque-sensor (5) with mounting screws (8).

Assembly with adapter plate provided by the customer

- The corresponding interface (10) has been put into operation.
- Use the demo program (11) to observe gage saturation errors during assembly. If an error occurs, stop assembly until the error disappears



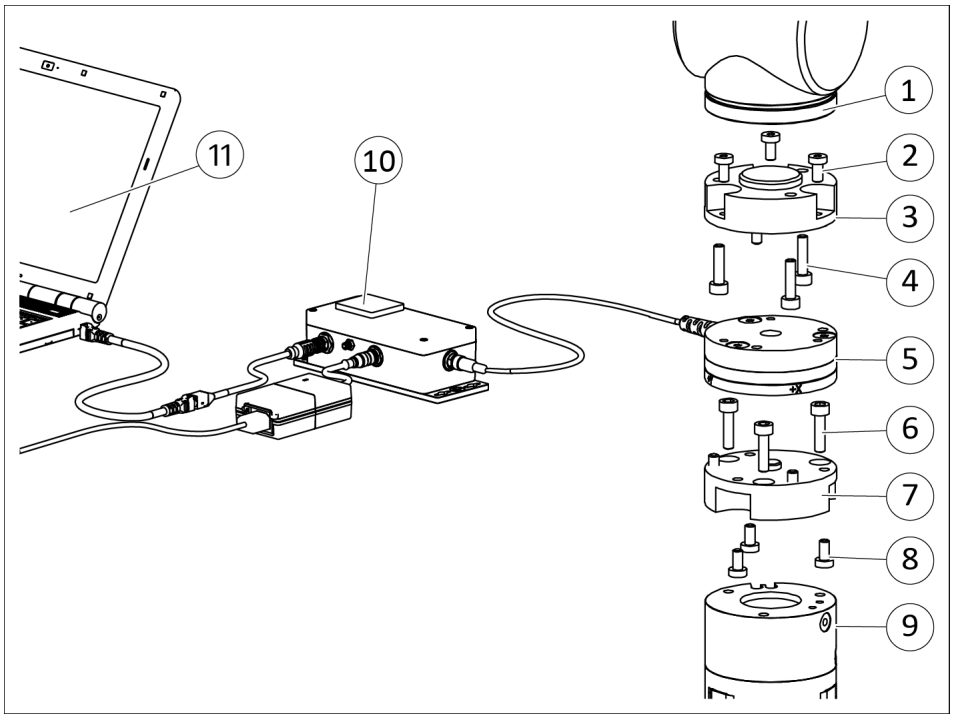
Assembly with adapter plate provided by the customer

1. The adapter plate for assembling on the robot is provided by the customer.
   ⇨ Observe requirements for adapter plate, ▸ 5.2.1 [🗋 49].
2. Apply Loctite 222 threadlocker to the mounting screws (2) and (4).
3. Fasten the adapter plate (3) to the robot (1) with mounting screws (4).
4. Fasten the force-torque-sensor (5) to the adapter plate (3) with mounting screws (2). **IMPORTANT! Risk of damage to the internal electronics! The mounting screws (2) must not be too long.**
5. Apply Loctite 222 threadlocker to the mounting screws (6) and (8).
6. Fasten the adapter plate (7) to the end effector (9) with mounting screws (6).
7. Fasten the end effector (9) to the force-torque-sensor (5) with mounting screws (8).

Mini / Nano / IP protection class

The Nano, Mini, IP-protected and some Omega force-torque-sensors do not have a removable interface plate and are mounted directly on the robot using an adapter plate.

- The corresponding interface (10) has been put into operation.
- Use the demo program (11) to observe gage saturation errors during assembly. If an error occurs, stop assembly until the error disappears



1. Apply Loctite 222 threadlocker to the mounting screws (2) and (4).
2. Mount the adapter plate (3) on the robot (1) with mounting screws (4).
3. Mount the force-torque-sensor (5) on the adapter plate (3) with mounting screws (2).
4. Apply Loctite 222 threadlocker to the mounting screws (6) and (8).
5. Mount the adapter plate (7) on the force-torque-sensor (5) with mounting screws (8).
6. Mount the end effector (9) on the adapter plate (7) with mounting screws (6).

5.2.2 Electrical connection

CAUTION

Risk of distorted calibration!

If the sensor cable is removed from Nano or Mini force-torque-sensors, this will influence the calibration and can damage the force-torque-sensor.

- Never remove the sensor cable.
- If the cable is damaged, send the force-torque-sensor to SCHUNK with a repair order.

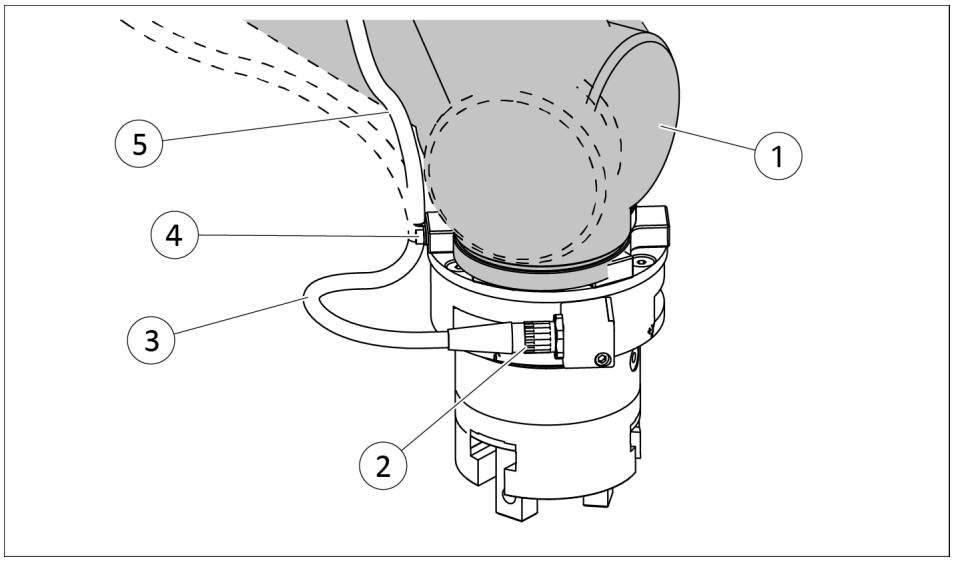
CAUTION

Risk of damage to the sensor cable!

The sensor cable can get damaged in moving applications.

- Observe the bending radius of the cable.
- Secure the cable close to the connector.
- Leave enough clearance to allow the robot to move.

Designation	Diameter [mm]	Bending radius [mm]	
		static	dynamic
FT-TW	3.2	16	32
FT-C3	4.4	22	44
FT-CM	4.4	22	44
FT-CW	4.4	22	44
FT-CT	6.1	30.5	61
FT-C	3.2	16	32
	4.4	22	44
	6.1	30.5	61
	10.0	50	100
FT-C-MTR	8.4	42	84
FT-C-MTS	8.4	42	84
FT-CF-MTR FT-CF-MTS	8.5	42.5	85



1. **For sensors from Gamma and larger:** Connect the connector (1) to the cable outlet.
2. Observe the static bending radius (3) and fasten the sensor cable close to the connector (4).
3. Observe the dynamic bending radius (5) so that the robot (1) can move.

6 Maintenance

CAUTION

Material damage due to improper disassembly!

Incorrect works can cause damage to the mechanics and internal electronics.

- Disassembly or opening of the product is not permitted.
- Only allow SCHUNK to repair the product.

This product must not be disassembled for maintenance. Have all repair work on the product carried out only by SCHUNK.

6.1 Maintenance intervals

Maintenance interval	Maintenance work
weekly	Inspect the product for damage
annual	Send the product to SCHUNK for calibration.
as required	Check functionality, ▶ 6.2 [🗋 56].
	Send damaged products to SCHUNK for repair.

6.2 Checking the measured data

To check the functionality of a force-torque-sensor, known loads can be applied to the force-torque-sensor. If the outputted values correspond to the known loads, the force-torque-sensor is working.

1. Position the robot arm so that the force-torque-sensor is loaded in as many axes as possible.
2. Record the measured output value.
3. Position the robot arm so that an additional load is applied.
4. Record the measured output value again.
5. Determine the differences between the two measured output values and use them as the accuracy deviation.

7 EU Declaration of Conformity

Manufacturer/ Distributor	SCHUNK SE & Co. KG Spanntechnik | Greiftechnik | Automatisierungstechnik Bahnhofstr. 106 – 134 D–74348 Lauffen/Neckar

We hereby declare on our sole authority that the product meets the requirements of the following directives at the time of the declaration.
The declaration is rendered invalid if modifications are made to the product.

Product designation:	Force–torque–sensor FT This declaration of conformity is valid for all variants mentioned in the appendix.

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

Applied harmonized standards, especially:

IEC 61326–2:2022	Electrical equipment for measurement, control and laboratory use – EMC requirements – Part 2–3: Particular requirements – Test configuration, operational conditions and performance criteria for transducers with integrated or remote signal conditioning (IEC 61326–2–3:2020)

All related technical documentation has been prepared in electronic form according to Directive 2014/30/EU and will be made available to national authorities on demand. The signatory is resident at the manufacturer's address and is authorized to compile this documentation.

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

Lauffen/Neckar, November 2024

Signature: see original declaration

Dr.–Ing. Manuel Baumeister, Technology & Innovation

8 UKCA Declaration of Conformity

Manufacturer/ Distributor	SCHUNK Intec Limited Clamping and gripping technology 3 Drakes Mews, Crownhill MK8 0ER Milton Keynes

We hereby declare on our sole authority that the product meets the requirements of the following directives at the time of the declaration.
The declaration is rendered invalid if modifications are made to the product.

Product designation: Force-torque-sensor FT

ID number

- **Electromagnetic Compatibility Regulations 2016**

Applied harmonized standards, especially:

IEC 61326-2:2022	Electrical equipment for measurement, control and laboratory use – EMC requirements – Part 2-3: Particular requirements – Test configuration, operational conditions and performance criteria for transducers with integrated or remote signal conditioning (IEC 61326-2-3:2020)

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, November 2024

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

9 Appendix to the declaration of conformity

This declaration of conformity is valid for all variants of the force/torque sensor mentioned in this appendix.

FTD-interface

FTD-Nano-17 SI-12-0.12
FTD-Nano-17 SI-25-0.25
FTD-Nano-17 SI-50-0.5
FTD-Nano-17-T SI-8-0.05
FTD-Nano-17-T SI-16-0.1
FTD-Nano-17-T SI-32-0.2
FTD-Nano-25 SI-125-3
FTD-Nano-25 SI-250-6
FTD-Nano-43 SI-9-0.125
FTD-Nano-43 SI-18-0.25
FTD-Nano-43 SI-36-0.5
FTD-Mini-40 SI-20-1
FTD-Mini-40 SI-40-2
FTD-Mini-40 SI-80-4
FTD-Mini 43 SI-62-0.75
FTD-Mini 43 SI-125-1.5
FTD-Mini 43 SI-250-3
FTD-Mini-45 SI-145-5
FTD-Mini-45 SI-290-10
FTD-Mini-45 SI-580-20
FTD-Mini-58 SI-700-30
FTD-Mini-58 SI-1400-60
FTD-Mini-58 SI-2800-120
FTD-Mini-85 SI-475-20
FTD-Mini-85 SI-950-40
FTD-Mini-85 SI-1900-80
FTD-Gamma SI-32-2.5
FTD-Gamma SI-65-5
FTD-Gamma SI-130-10
FTD-Delta SI-165-15
FTD-Delta SI-330-30
FTD-Delta SI-660-60
FTD-Theta SI-1000-120
FTD-Theta SI-1500-240
FTD-Theta SI-2500-400

FTD-Omega85 SI-475-20
FTD-Omega85 SI-950-40
FTD-Omega85 SI-1900-80
FTD-Omega-160 SI-1000-120
FTD-Omega-160 SI-1500-240
FTD-Omega-160 SI-2500-400
FTD-Omega-191 SI-1800-350
FTD-Omega-191 SI-3600-700
FTD-Omega-191 SI-7200-1400
FTD-Omega-250 SI 4000 500
FTD-Omega-250 SI 8000 1000
FTD-Omega-250 SI-16000-2000
FTD-Omega-331 SI-10000-1500
FTD-Omega-331 SI-20000-3000
FTD-Omega-331 SI-40000-6000

FTN-interface

FTN-Nano-17 SI-12-0.12
FTN-Nano-17 SI-25-0.25
FTN-Nano-17 SI-50-0.5
FTN-Nano-17-T SI-8-0.05
FTN-Nano-17-T SI-16-0.1
FTN-Nano-17-T SI-32-0.2
FTN-Nano-25 SI-125-3
FTN-Nano-25 SI-250-6
FTN-Nano-43 SI-9-0.125
FTN-Nano-43 SI-18-0.25
FTN-Nano-43 SI-36-0.5
FTN-Mini-40 SI-20-1
FTN-Mini-40 SI-40-2
FTN-Mini-40 SI-80-4
FTN-Mini 43 SI-62-0.75
FTN-Mini 43 SI-125-1.5
FTN-Mini 43 SI-250-3
FTN-Mini-45 SI-145-5
FTN-Mini-45 SI-290-10
FTN-Mini-45 SI-580-20
FTN-Mini-58 SI-700-30
FTN-Mini-58 SI-1400-60
FTN-Mini-58 SI-2800-120

FTN-Mini-85 SI-475-20
FTN-Mini-85 SI-950-40
FTN-Mini-85 SI-1900-80
FTN-Gamma SI-32-2.5
FTN-Gamma SI-65-5
FTN-Gamma SI-130-10
FTN-Delta SI-165-15
FTN-Delta SI-330-30
FTN-Delta SI-660-60
FTN-Theta SI-1000-120
FTN-Theta SI-1500-240
FTN-Theta SI-2500-400
FTN-Omega85 SI-475-20
FTN-Omega85 SI-950-40
FTN-Omega85 SI-1900-80
FTN-Omega 160 SI 1000 120
FTN-Omega-160 SI-1500-240
FTN-Omega 160 SI 2500 400
FTN-Omega-191 SI-1800-350
FTN-Omega-191 SI-3600-700
FTN-Omega-191 SI-7200-1400
FTN-Omega-250 SI-4000-500
FTN-Omega 250 SI-8000-1000
FTN-Omega 250 SI 16000 2000
FTN-Omega-331 SI-10000-1500
FTN-Omega-331 SI-20000-3000
FTN-Omega 331 SI-40000-6000

FTE-interface

FTE-Nano-17 SI-12-0.12
FTE-Nano-17 SI-25-0.25
FTE-Nano-17 SI-50-0.5
FTE-Nano-17-T SI-8-0.05
FTE-Nano-17-T SI-16-0.1
FTE-Nano-17-T SI-32-0.2
FTE-Nano-25 SI-125-3
FTE-Nano-25 SI-250-6
FTE-Nano-43 SI-9-0.125
FTE-Nano-43 SI-18-0.25
FTE-Nano-43 SI-36-0.5

FTE-Mini-40 SI-20-1
FTE-Mini-40 SI-40-2
FTE-Mini-40 SI-80-4
FTE-Mini 43 SI-62-0.75
FTE-Mini 43 SI-125-1.5
FTE-Mini 43 SI-250-3
FTE-Mini-45 SI-145-5
FTE-Mini-45 SI-290-10
FTE-Mini-45 SI-580-20
FTE-Mini-58 SI-700-30
FTE-Mini-58 SI-1400-60
FTE-Mini-58 SI-2800-120
FTE-Mini-85 SI-475-20
FTE-Mini-85 SI-950-40
FTE-Mini-85 SI-1900-80
FTE-Gamma IP65 SI-32-2.5
FTE-Gamma IP65 SI-65-5
FTE-Gamma-IP65 SI-130-10
FTE-Delta-IP60 SI-165-15
FTE-Delta-IP65 SI-165-15
FTE-Delta-IP60 SI-330-30
FTE-Delta-IP65 SI-330-30
FTE-Delta-IP60 SI-660-60
FTE-Delta IP65 SI-660-60
FTE-Omega 160-IP60 SI 1000-120
FTE-Omega 160-IP65 SI 1000-120
FTE-Omega 160-IP60 SI 1500-240
FTE-Omega 160-IP65 SI 1500-240
FTE-Omega 160-IP60 SI 2500-400
FTE-Omega 160-IP65 SI 2500-400
FTE-Omega 250 IP60 SI 4000 500
FTE-Omega 250-IP60 SI-8000-1000
FTE-Omega 250-IP60 SI-16000-2000

10 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, November 2024

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

SCHUNK SE & Co. KG
Spanntechnik | Greiftechnik | Automatisierungstechnik

Bahnhofstr. 106 – 134
D-74348 Lauffen/Neckar
Tel. +49-7133-103-0
info@de.schunk.com
schunk.com

Folgen Sie uns | *Follow us*

Wir drucken nachhaltig | *We print sustainable*

11-2024 06.00 | FT | Assembly and Operating Manual | en | 389582