

Measuring



MEASURING

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Size
050

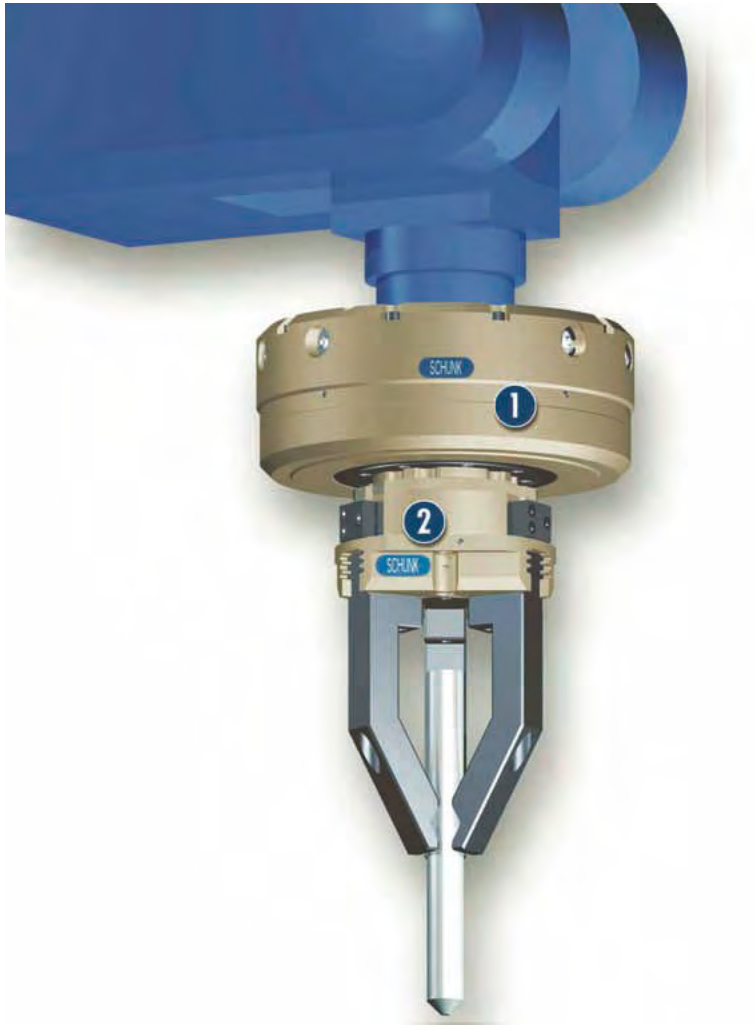


**Range of measurement,
force**
 $\pm 300 \text{ N}$



**Range of measurement,
moments**
 $\pm 15 \text{ Nm}$

Application example



**Robot-supported insertion of a metal pin into
a bore**

- 1** FTC-050-80 Force-torque Sensor
- 2** PZN-plus 100
3-Finger Centric Gripper with
workpiece-specific gripper fingers

Force Sensor

Flexible force-torque sensor for compensating for the workpiece's or tool's component tolerances and positioning inaccuracy

Area of application

For insertion operations or for other assembly operations (pressing-in, adhesion or buffing tasks etc.). In the case of handling tasks in particular, the sensitive collision monitoring system helps to protect the tool as well as the workpiece.

Your advantages and benefits

Measuring the forces and moments [N and Nm]

in all six degrees of freedom

Deflection measurement [mm and degrees]

in all six degrees of freedom

Easy connection to a control system

for the lowest possible assembly and start-up costs

Flexibility up to 1.4 mm and 1.4°

for increased operational safety

Symmetrical measurement cell alignment

for efficient calculation of the tool center point displacement with optimum calculating time

Status display via LED

for checking the operating status directly at the sensor

Mechanical overload protection

to protect the sensor



General information on the series

Material

High-strength, hard-coated aluminum alloy

Scope of delivery

Sensor, software for PC connection, installation connector, operating manual, maintenance instructions, manufacturer's declaration

Accessories

Adapter cable, extension cable for CAN and RS-232 on request

Warranty

24 months

Data interface

CAN from 10 Kbaud to 1 Mbaud (DeviceNET on request)
RS-232 1200 Baud to 115200 Baud, RS-485 (on request)

Data update rates

Updating the measurement data: 1 ms
Shortest response time < 200 µs at 1 Mbaud (CAN)

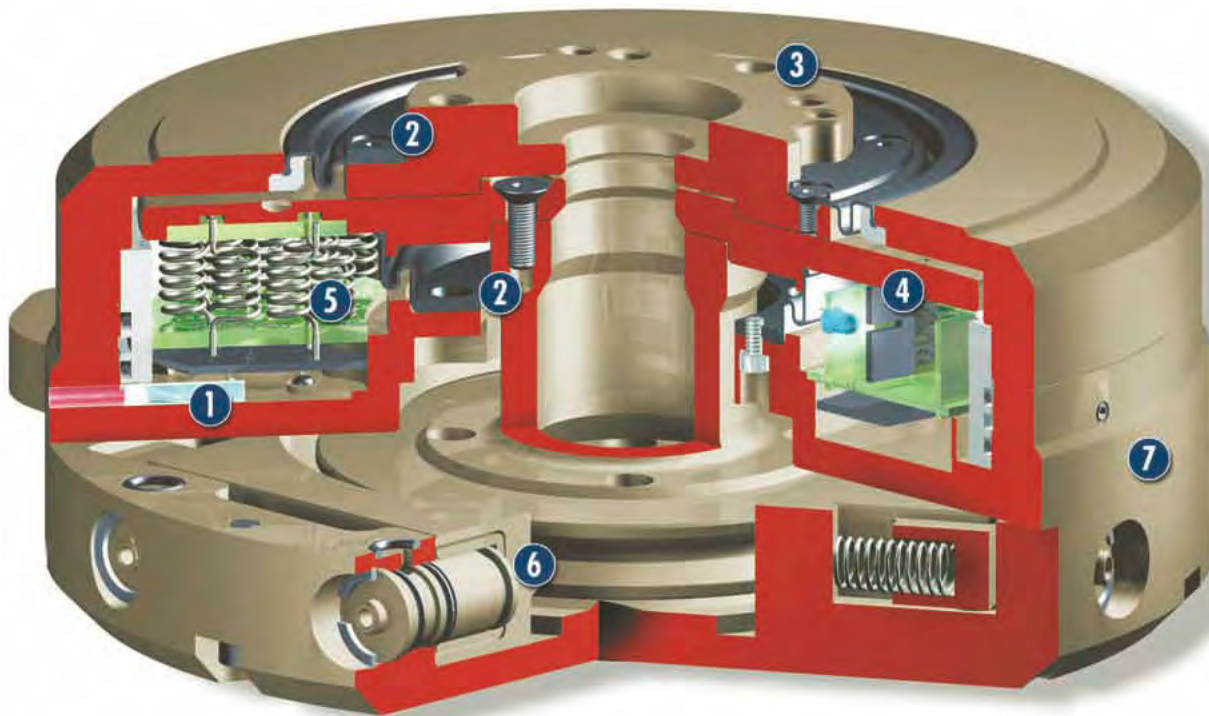
Software

Test software for monitoring all functionalities and for commissioning, based on Agilent Vee. Compatible with Win 9x, Win NT, Win 2000 and Win XP.

Power connection

8-pin circular connector, cable length 300 mm

Sectional diagram



- | | | |
|---|--|---|
| <p>1 Optical Fibers
for displaying the operating status</p> <p>2 Bellows Seal
for protecting against coarse dirt</p> <p>3 Direct Mounting
by means of standardized ISO 9409 interface for robots</p> | <p>4 Optical Force/Torque Sensor System Controller
to determine the loads applied</p> <p>5 Spring Elements
to achieve a defined degree of rigidity</p> | <p>6 Locking Mechanism
centric locking with defined flexibility; pneumatic drive</p> <p>7 Housing
weight-reduced through the use of a hard-anodized, high-strength aluminum alloy</p> |
|---|--|---|

Function description

The FTC force-torque sensor is a combination of mechanical flexibility and an opto-electronic position measuring system for all six degrees of freedom. The flexibility prevents an erratic increase in the measurement values in the event of contact and therefore facilitates force-controlled assembly operations with the least possible lag. By means of four, high-speed DSP measurement cells, the sensor measures the displacement of two plates positioned one above the other. Spring elements connect the plates, and forces and moments are calculated from the displacements using a rigidity matrix.

The symmetrical alignment of the measurement cells ensures that the stresses in all six degrees of freedom and the displacement of the tool center point can be calculated efficiently, with optimum calculating time. The robot can be steered and controlled quickly and in real time, thanks to measurement value output at intervals of 1kHz.

Accessories

Accessories from SCHUNK – the suitable supplement for maximum functionality, reliability and performance of all automation modules.

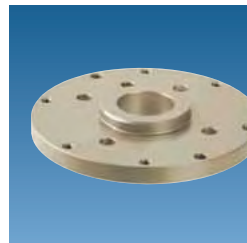
Fittings



Extension cables



Adapter plates



① For the exact size of the accessories, the availability for this size and the designation and ID, please refer to the additional views at the end of the size in question. You can find more detailed information on our accessory range in the "Accessories" catalog section.

General information on the series

Programming

Set commands, Get commands, Info commands
All the functions can be triggered by means of simple character transfer.
Therefore a driver is not needed. Integration into any software is possible.

Remote maintenance

PC with sensor (client) and remote maintenance PC (master) must be connected to the internet, and the software (supplied as standard) must be activated on each PC.
Web server solution on request.

Connection

Connection by means of inputs and outputs on request. Monitoring and teaching of all limit values by means of digital input (DI) and digital output (DO) on the customer's control system. A separate module is needed for this.

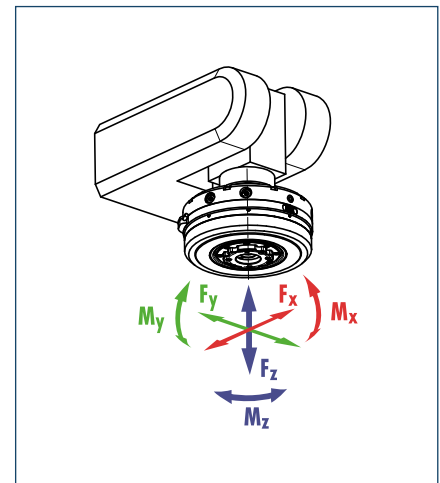
Measuring accuracy

5 % along the main axes for deflection up to ± 1 mm and ± 1 degree.

Forces and moments



	FTC-050-80	FTC-050-40
F_x max. 300 N	max. 150 N	max. 150 N
F_y max. 300 N	max. 150 N	max. 150 N
F_z max. 300 N	max. 150 N	max. 150 N
M_x max. 7 Nm	max. 4 Nm	max. 8 Nm
M_y max. 7 Nm	max. 4 Nm	max. 8 Nm
M_z max. 15 Nm	max. 4 Nm	max. 8 Nm



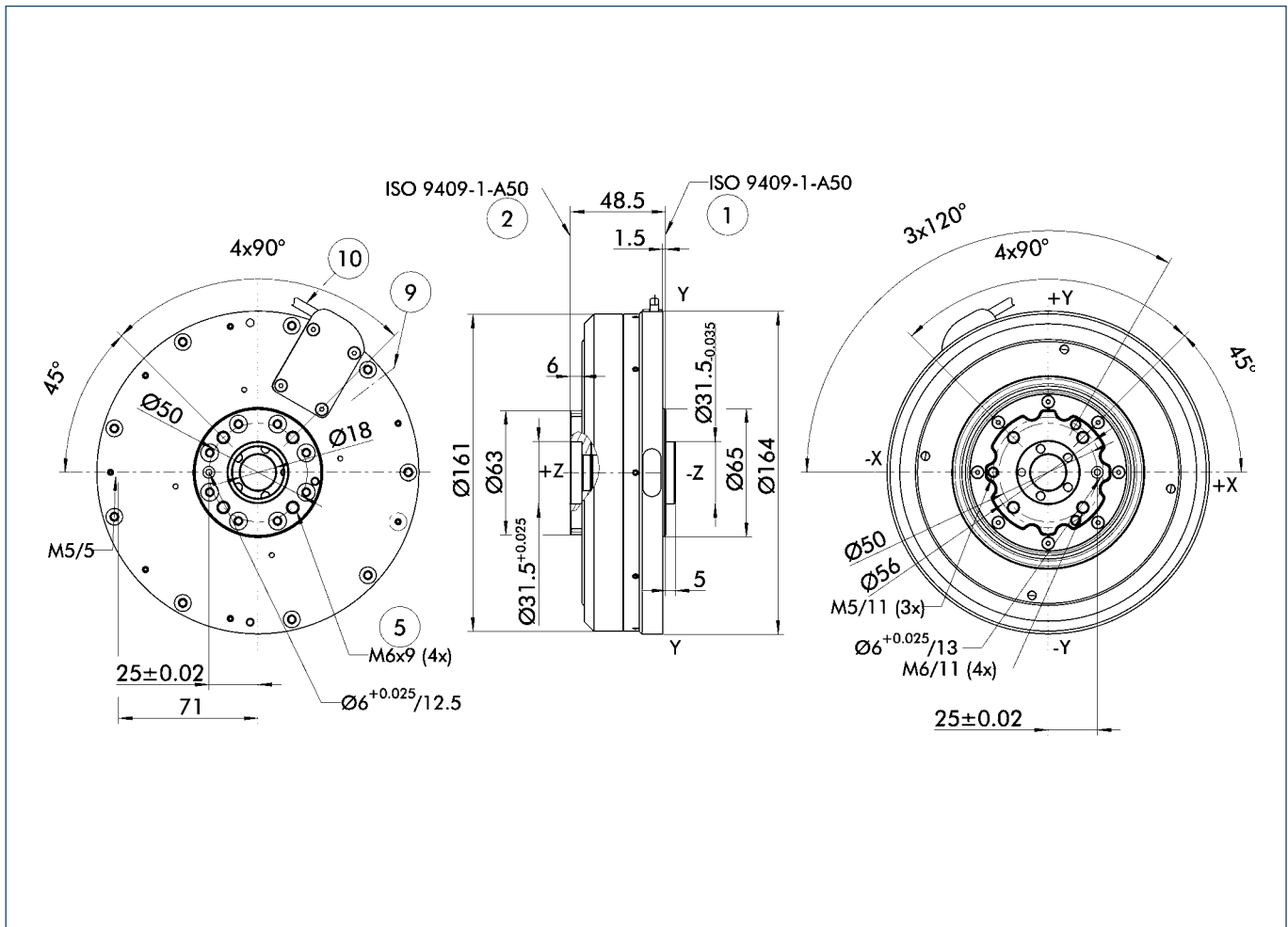
① In all six degrees of freedom overloads to the specified values are permitted without the sensor being damaged. Permissible external forces and moments in the event that the max. possible motion range of the tool-side flange is exceeded. System butts up to internal stops. If the specified external forces/moments are exceeded, the locking mechanism will be released in the opposite direction to the actuating pressure.

Technical data

Designation		FTC-050-80	FTC-050-80-V	FTC-050-40	FTC-050-40-V
	ID	0322300	0322301	0322302	0322303
Range of measurement, deflection					
Translatory X, Y, Z	[mm]	± 1.0	± 1.0	± 1.0	± 1.0
Rotational α , β , γ	[°]	± 1.0	± 1.0	± 1.0	± 1.0
Area of motion					
Translatory X, Y, Z	[mm]	± 1.4	± 1.4	± 1.4	± 1.4
Rotational α , β , γ	[°]	± 1.4	± 1.4	± 1.4	± 1.4
Overload					
F_x, F_y	[N]	400	400	200	200
F_z	[N]	350	350	180	180
M_x, M_y	[Nm]	14	14	8	8
M_z	[Nm]	25	25	13	13
Locking at 6 bar					
F_x, F_y	[N]	450	450	200	200
F_z	[N]	400	450	230	230
M_x, M_y	[Nm]	20	20	12	12
M_z	[Nm]	35	35	20	20
Robot-side interfaces		ISO 9409-1-A50			
Tool-side interfaces		ISO 9409-1-A50 as well as for gripper model PZN 64			
Mass moment of inertia I_{xx}, I_{yy}	[kg cm ²]	39.5	85.6	39.5	85.6
Mass moment of inertia I_{zz}	[kg cm ²]	58.0	93.7	58.0	93.7
Weight	[kg]	1.56	2.56	1.56	2.56
Min. ambient temperature	[°C]	5	5	5	5
Max. ambient temperature	[°C]	55	55	55	55
Power supply	[VDC]	10 - 26	10 - 26	10 - 26	10 - 26
Power consumption	[W]	1.8	1.8	1.8	1.8
IP rating		65	65	65	65

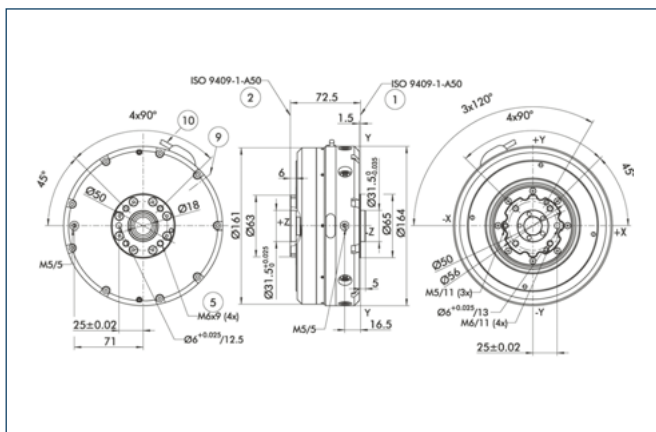
① Sensor FTC-050 with variable rigidity (80) and (40) springs, sensor FTC-050-XX with pneumatic, single-acting locking system (V), sensor FTC-L-050 light-weight version with variable rigidity (80) and (40) springs.

Main views FTC-050



- ① Robot-side connection
- ② Tool-side connection
- ⑤ Through-bore for screw connection with screw (enclosed)
- ⑨ Status display
- ⑩ Connection cable

Dimensions for FTC-050 with lock

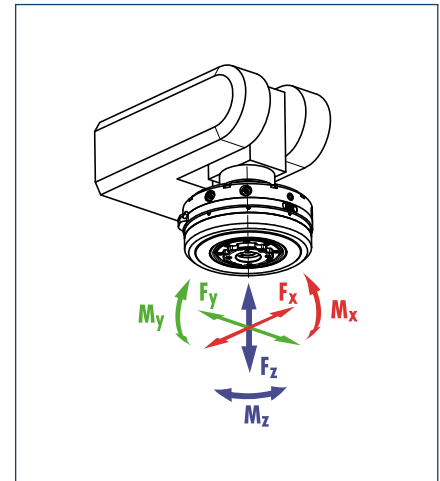


- ① Robot-side connection
- ② Tool-side connection
- ⑤ Through-bore for screw connection with screw (enclosed)
- ⑨ Status display
- ⑩ Connection cable

Forces and moments



	FTCL-050-80	FTCL-050-40
■ F_x	max. 300 N	max. 150 N
■ F_y	max. 300 N	max. 150 N
■ F_z	max. 300 N	max. 150 N
■ M_x	max. 7 Nm	max. 4 Nm
■ M_y	max. 7 Nm	max. 4 Nm
■ M_z	max. 15 Nm	max. 8 Nm



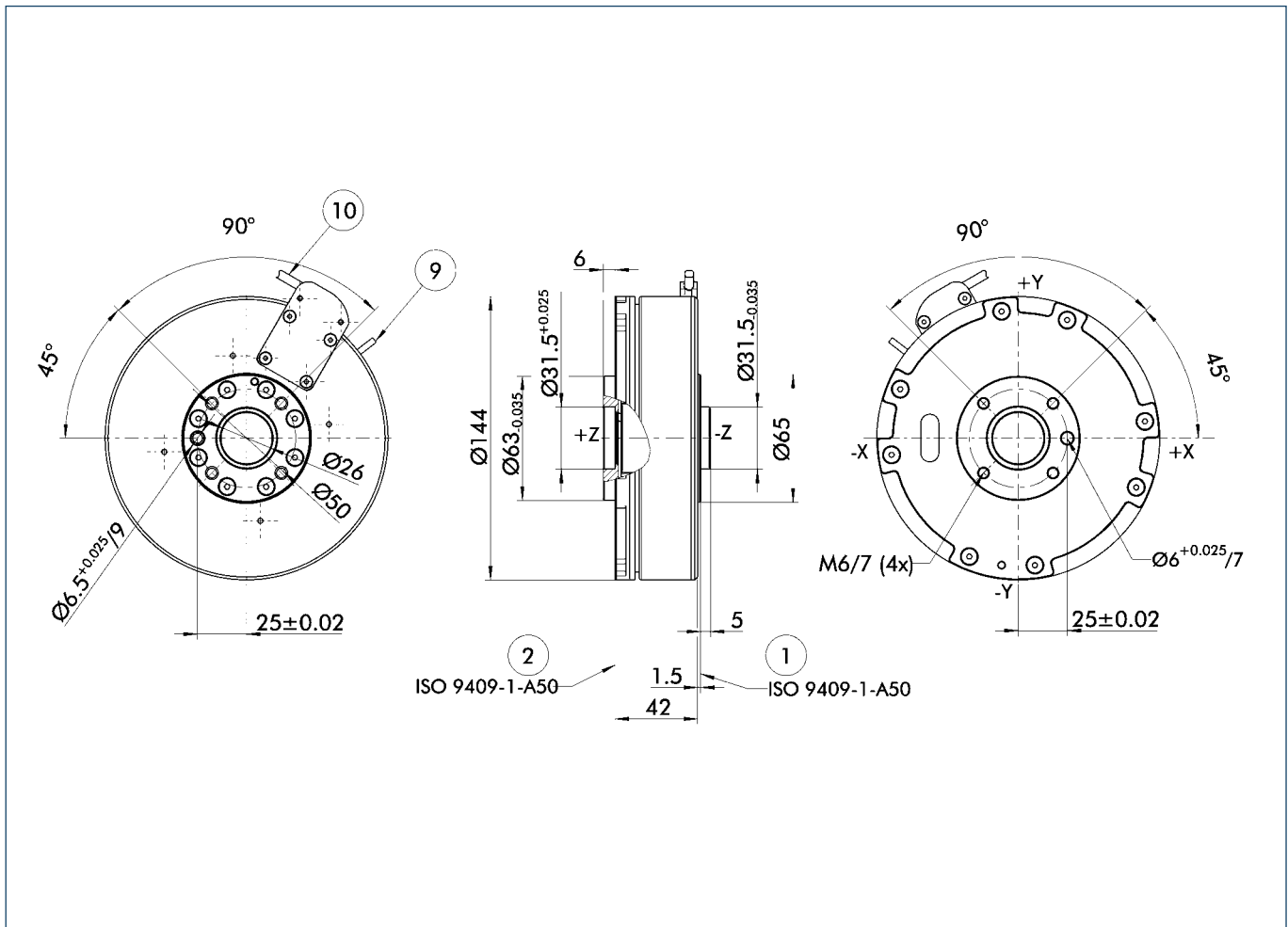
① In all six degrees of freedom overloads to the specified values are permitted without the sensor being damaged. Permissible external forces and moments in the event that the max. possible motion range of the tool-side flange is exceeded. System butts up to internal stops. If the specified external forces/moments are exceeded, the locking mechanism will be released in the opposite direction to the actuating pressure.

Technical data

Designation		FTCL-050-80	FTCL 50-40
	ID	0322351	0322350
Range of measurement, deflection			
Translatory X, Y, Z	[mm]	± 1.0	± 1.0
Rotational α , β , γ	[°]	± 1.0	± 1.0
Area of motion			
Translatory X, Y, Z	[mm]	± 1.4	± 1.4
Rotational α , β , γ	[°]	± 1.4	± 1.4
Overload			
F_x , F_y	[N]	-	-
F_z	[N]	-	-
M_x , M_y	[Nm]	-	-
M_z	[Nm]	-	-
Locking at 6 bar			
F_x , F_y	[N]	-	-
F_z	[N]	-	-
M_x , M_y	[Nm]	-	-
M_z	[Nm]	-	-
Robot-side interfaces	ISO 9409-1-A50		
Tool-side interfaces	ISO 9409-1-A50 as well as for gripper model PZN 64		
Mass moment of inertia I_{xx} , I_{yy}	[kg cm ²]	15.1	15.1
Mass moment of inertia I_{zz}	[kg cm ²]	24.3	24.3
Weight	[kg]	0.96	0.96
Min. ambient temperature	[°C]	5	5
Max. ambient temperature	[°C]	55	55
Power supply	[VDC]	10 - 26	10 - 26
Power consumption	[W]	1.8	1.8
IP rating		65	65

① Sensor FTC-050 with variable rigidity (80) and (40) springs, sensor FTC-050-XX with pneumatic, single-acting locking system (V), sensor FTC-L-050 light-weight version with variable rigidity (80) and (40) springs.

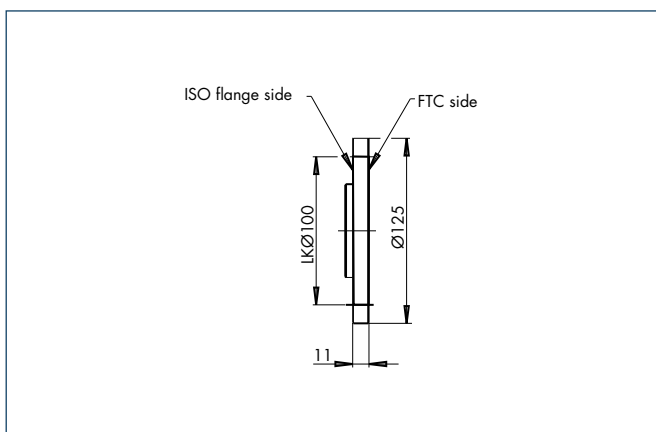
Main views FTCL-050



- ① Robot-side connection
- ② Tool-side connection

- ⑨ Status display
- ⑩ Connection cable

Adapter plate



Adapter plate

Designation	ID
A-FTC-050-ISO A100	0322320

Adapter cable

Designation	Interface	Length	ID
FTC-K-RS 232-5	RS-232	5 m	0322340
FTC-K-CAN-5	CAN	5 m	0322341
FTC-K-RS 232-10	RS-232	10 m	0322342
FTC-K-CAN-10	CAN	10 m	0322343