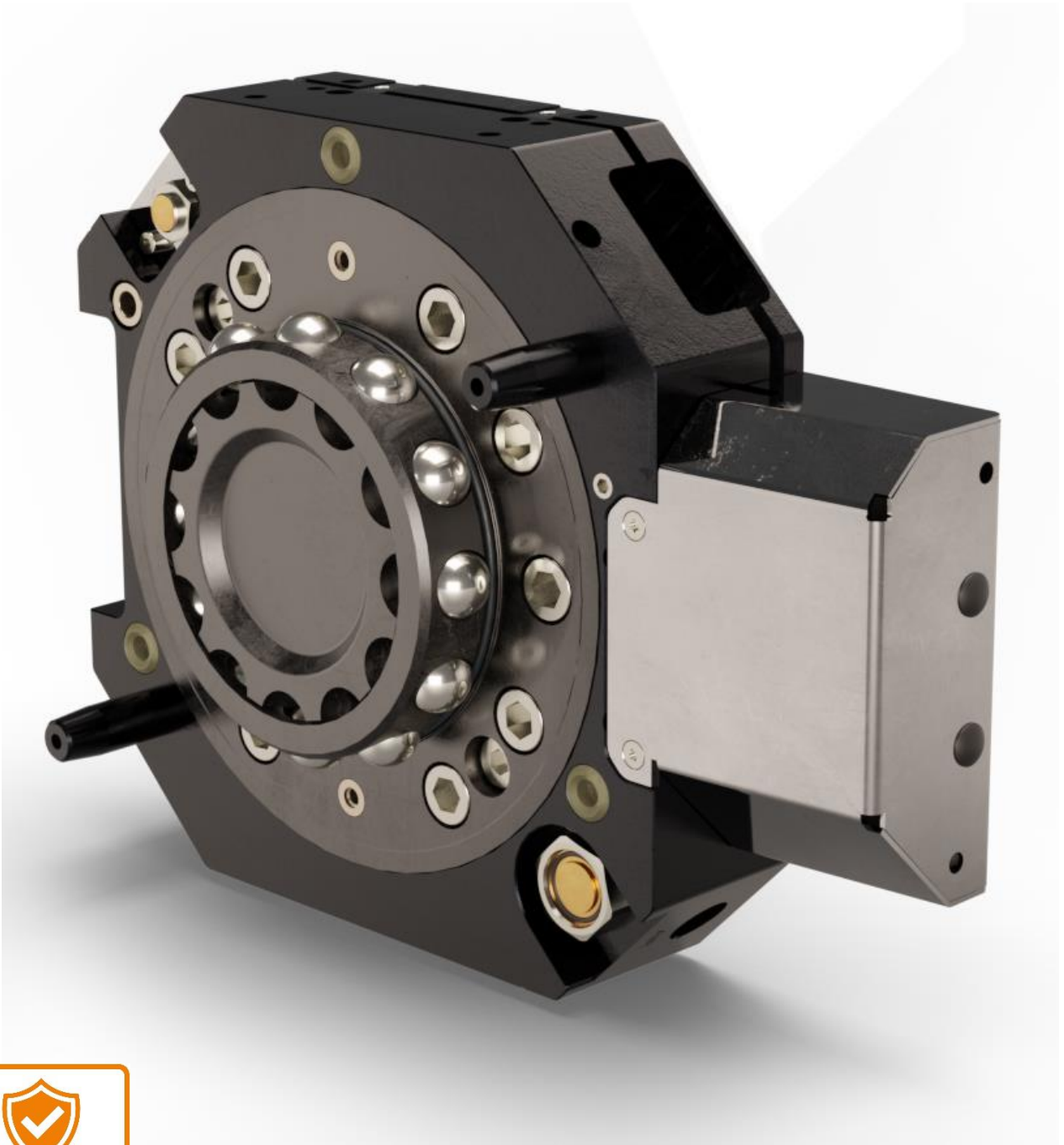


Product Description

Tool changers Prepared for Safety

M0740-1

Tool changers | Swivels | Swivels with Tool changers | Grippers | Hose packages | Valve Units | Tool systems



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1 INTRODUCTION

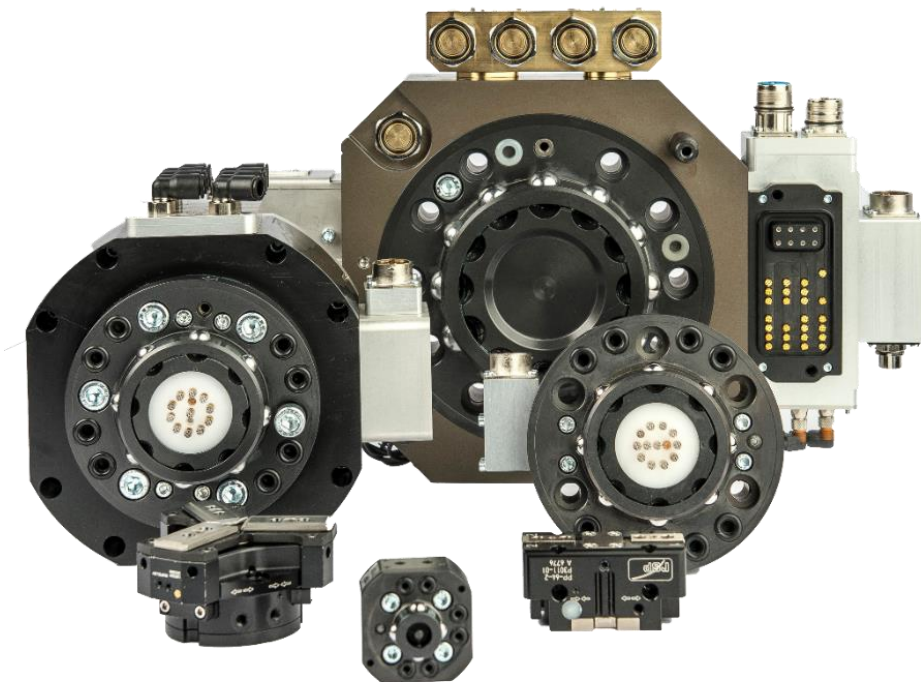
Robot System Products is a front-rank provider of peripheral products for high performance robot applications. We provide complete system solutions for your robot installations, aiming to improve your productivity with the most reliable and cost-effective tooling on the market. Continuously we explore emerging technologies, working with leading edge design.

Robot System Products has a wide range of standard robot peripheral products:

- Tool changers
- Swivels
- Swivel tool changers
- CiRo
- Grippers
- Hose Packages
- Valve units
- Tool systems
- Tool parking systems

Robot System Products' tool changers are constructed to maximize the flexibility and reliability of your robot fleet. Through our patented locking device TrueConnect™ robustness and high safety are combined with low weight and compactness. With our swivels compressed air, water, electrical and data signals as well as weld and servo power are transferred to your tools with robot motion capabilities fully maintained. Our swivel tool changers unite the TrueConnect™ mechanism with our swivel technology, combining the best out of the two technologies. With RSP's cost-effective CiRo, cables and hoses can be freely selected with high robot flexibility maintained, and space requirements reduced. Our integrated tool systems are delivered as complete plug-and-play solutions designed for quick and simple installation.

Robot System Products' product lines are available for all major robot brands and come with complete documentation. 3D-models for simulation are available for download at: robotssystemproducts.com.



1.1 RSP tool changers

The Robot System Products' tool changers enable robots to handle and switch between multiple tools. They are built to ensure reliable and smooth operation, being compact with low weight and robust design and incorporating many safety features. Depending on model and options, electrical signals, weld and servo power, data, water and compressed air are transferred from the robot side to the tool.

The patented locking device TrueConnect™ has a minimum of play and gives a practically, through the lifespan, absolute positioning repeatability. The principle behind the locking mechanism is the uniform distribution of load obtained by pressing locking balls into spherical cavities. In consequence, substantially larger positional tolerances are accepted during docking. A built-in spring ensures that the tool remains in the tool changer even if the air pressure drops.

1.2 Documents

This document, *Product Description*, contains product information, drawings, data, electrical and pneumatic diagrams, required safety software functions and lists of spare parts. In the document *Installation and Maintenance* (M0720-1) procedures for mounting, installation, replacement of equipment is described together with instructions related to maintenance activities and intervals. Options and tools to be mounted and connected to the tool changers and tool attachments are described in *Options for Moduflex* (M0741-1). The RSP Safety signal module, P7501-xxx is described in the manual M8353-1.

1.3 Wear parts

Wear parts should be replaced before considerable damage occurs. The interval depends on the number of tool changes and its working environment. Generally, the more contaminated environment, the closer maintenance intervals.

The following parts are considered as wear parts:

- Water/air couplings
- Signal pins
- Servo power pins and sockets
- Weld power pins and sockets
- Guide pins and bushings
- Air sealings
- O-rings

1.4 Complementary equipment from RSP

Complementary equipment is described in separate documents.

Article	Note
External valve units	Mounted at the rear of the upper arm. Shuts off air automatically during tool change.
Cable and hose packages	Complete packages for most robots on the market ready to be mounted without any modifications.
Tool parking systems	RSP tool parking systems give rigid installations for easy tool changing.
Connection kits	Connection kits for tool changers and tool attachments simplifying electrical installations.
3D-models	Available in Solid Works®, STEP and Parasolid-format.

2 TECHNICAL SPECIFICATIONS

2.1 Prepared for Safety tool changers and tool attachments

This document presents the Robot System Products' Prepared for Safety tool changers and tool attachments, based on the RSP Moduflex product family. The RSP Prepared for Safety are designed to be used exclusively together with the RSP Safety signal module P7501-xxx. The tool changers can be utilized for various applications by combining a large number of options for electrical signals, weld and servo power, data, water and compressed air, which are transferred from the robot side to the tool.

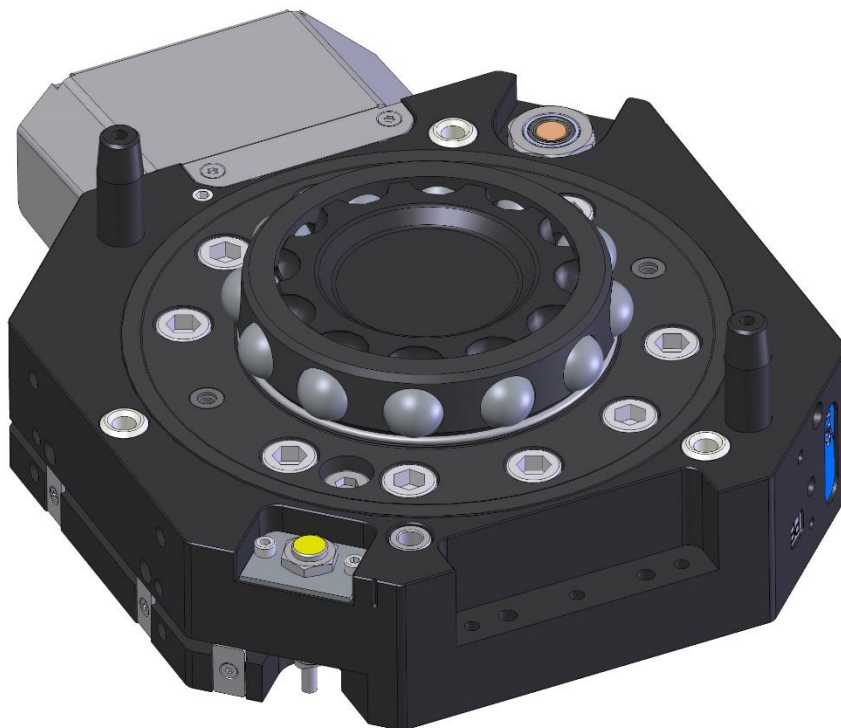
For RSP's tool changers equipped with the Safety signal module, all internal control signals are safely interlocked internally. The Safety signal module is designed for material handling, spot-welding and other industrial applications with high safety demands.

Two guide pins are mounted in order to precisely align the tool attachment with the tool changer before the electrical connectors are connected at a tool change operation, this extends the lifetime for not spring-mounted signal pins.

This document presents:

- The Robot System Products' Prepared for Safety TC240, TC480, TC720 and TC960 tool changers, including corresponding tool attachments.
- Description of components which are parts of the Prepared for Safety tool changers and tool attachments.
- Lists of spare parts.

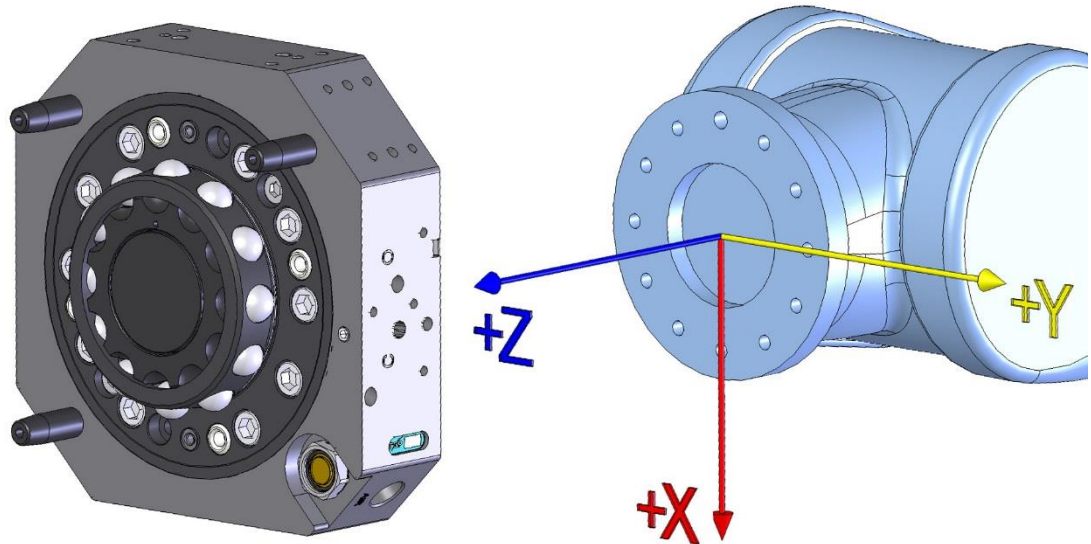
An adaptation plate between the tool changer and the turning disc on the robot may be needed, depending on the robot model. Such adaptation plates are available from RSP.



Tool changer TC480 Prepared for Safety 160-10-M12

2.1.1 Coordinate System Definition

A tool changer adds load to the robot. If the arm and tool loads are not stated correctly during programming the behaviour of the robot and the wear of the equipment will be affected. Information about weight and maximum tool load can, in accordance with the co-ordinate systems shown below, be found in the technical specification tables of the tool changers.



NOTE! For the tool changer, and tool changer with tool attachment, the origin of the co-ordinate system is situated in the centre of the robot mounting flange.

2.1.2 Screw class

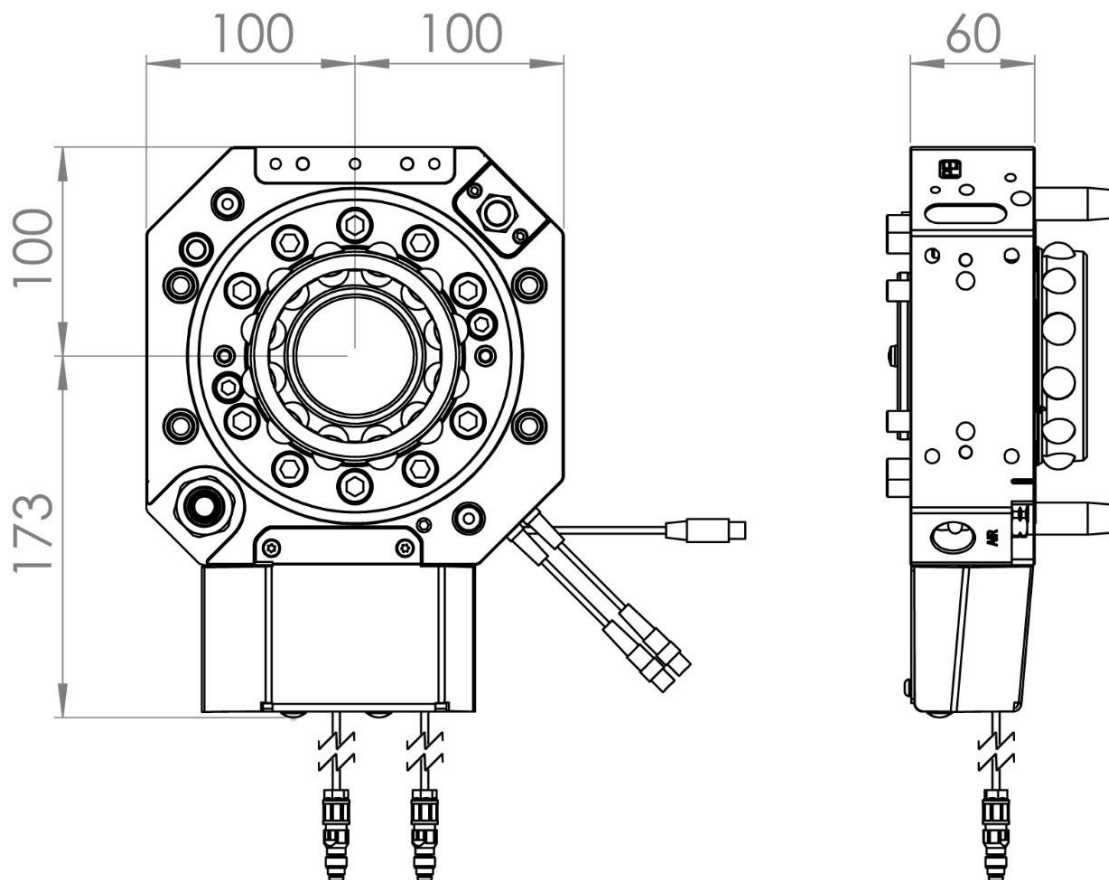


NOTE! RSP standard for screws used for mounting of tool changers and tool attachments is screw class 8.8.

Tool changers are normally delivered with screw class 8.8 mounting screws (if otherwise not specifically stated). Maximum tool loads for mounting with screw class 12.9 screws may, in addition, be stated in the technical tables of tool changers and tool attachments.

2.2 Tool changer TC240 Prepared for Safety 125-10-M10. Article: P7720

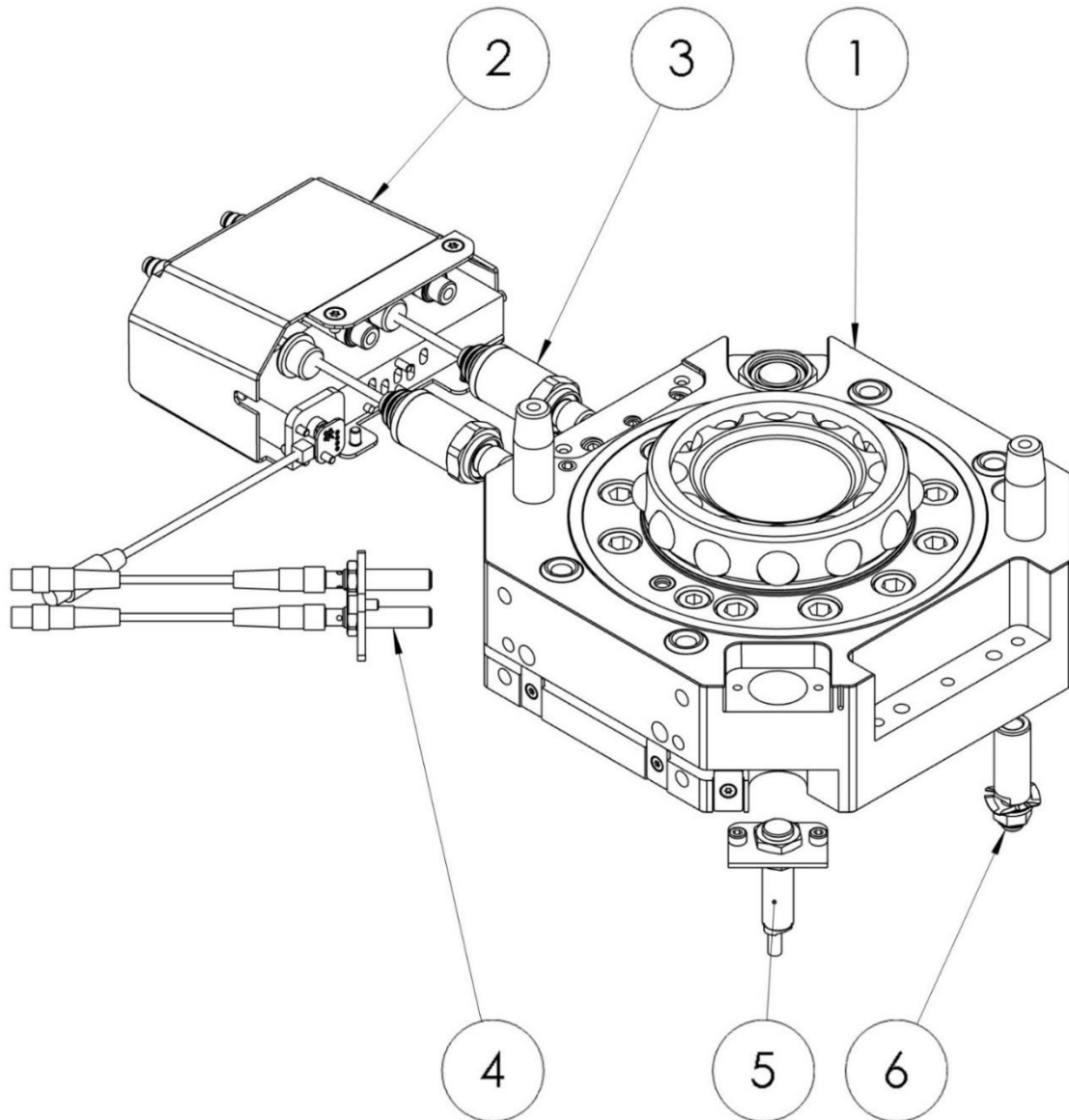
Tool changer P7720 is prepared for mounting of Safety signal modules P7501-XXX. To be used together with P7721 (TA240 Prepared for Safety 125-10-M10).



2.2.1 Technical summary

Working temperature		+10°C—+50°C
Bolt pattern		ISO 9409-1 125-10-M10
Maximum tool load	Fz (static)	±2 400 N
	Mx/My (dynamic)	±2 400 Nm
	Mz (dynamic)	±2 000 Nm
Weight and centre of gravity (Z)		
TC (P7720)		8.9 kg / 38 mm
TC + TA (P7721)		14.3 kg / 55 mm

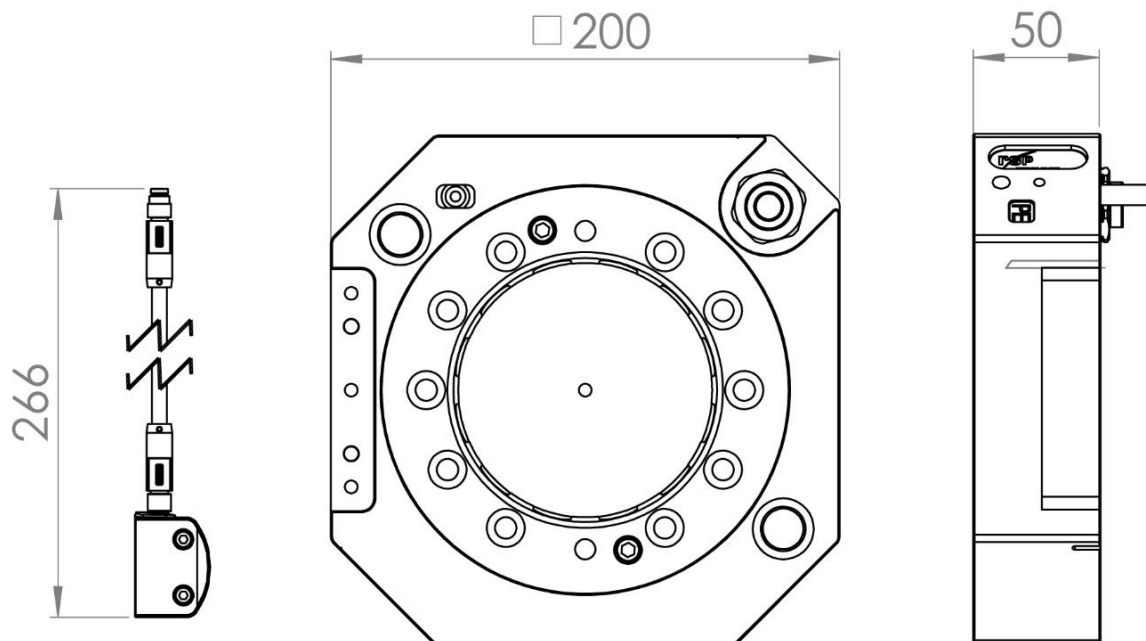
2.2.2 Components



Item	Article number	Description	Quantity	Section
1	P7722	TC240-1	1	3.1
2	P7710-4	Integrated valve open/close	1	3.14
3	P7257A	Analog pressure sensor	1	3.15
4	P6789	TC240 Magnetic sensors open/close	1	3.16
5	P7145-1	TC-empty sensor (inductive)	1	3.17
6	P7239	TC ground socket	1	3.18

2.3 Tool attachment TA240 Prepared for Safety 125-10-M10. P7721

Tool attachment P7721 is prepared for mounting of Safety signal modules P7501-XXX. To be used together with tool changer P7720 (TC240 Prepared for Safety 125-10-M10).



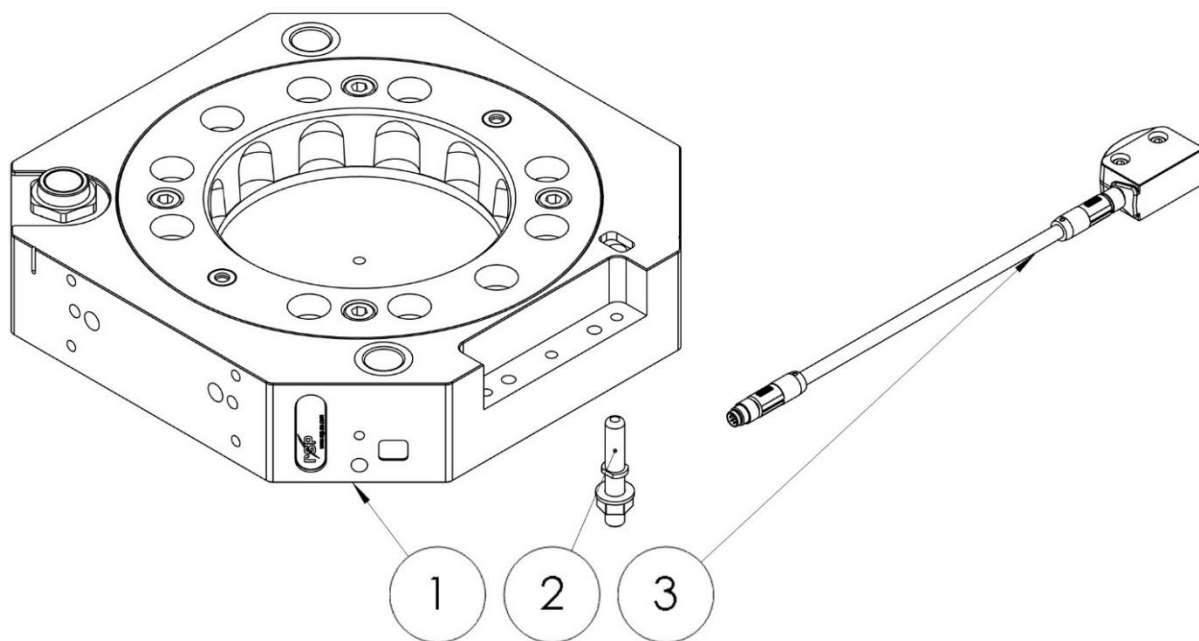
2.3.1 Technical summary

Working temperature		+10°C–+50°C
Bolt pattern		ISO 9409-1 125-10-M10
Weight		5.3 kg
Maximum tool load (M10 screws)	Fz (static)	±2 400 N
	Mx/My (dynamic)	±2 400 Nm
	Mz (dynamic)	±2 000 Nm
Maximum tool load (M8 screws)	Fz (static)	±2 400 N
	Mx/My (dynamic)	±2 400 Nm
	Mz (dynamic)	±1 200 Nm



NOTE! Tools can be mounted to the tool attachment using ten M10 screws, alternatively the tool attachment can be mounted to the tool using ten M8 screws.

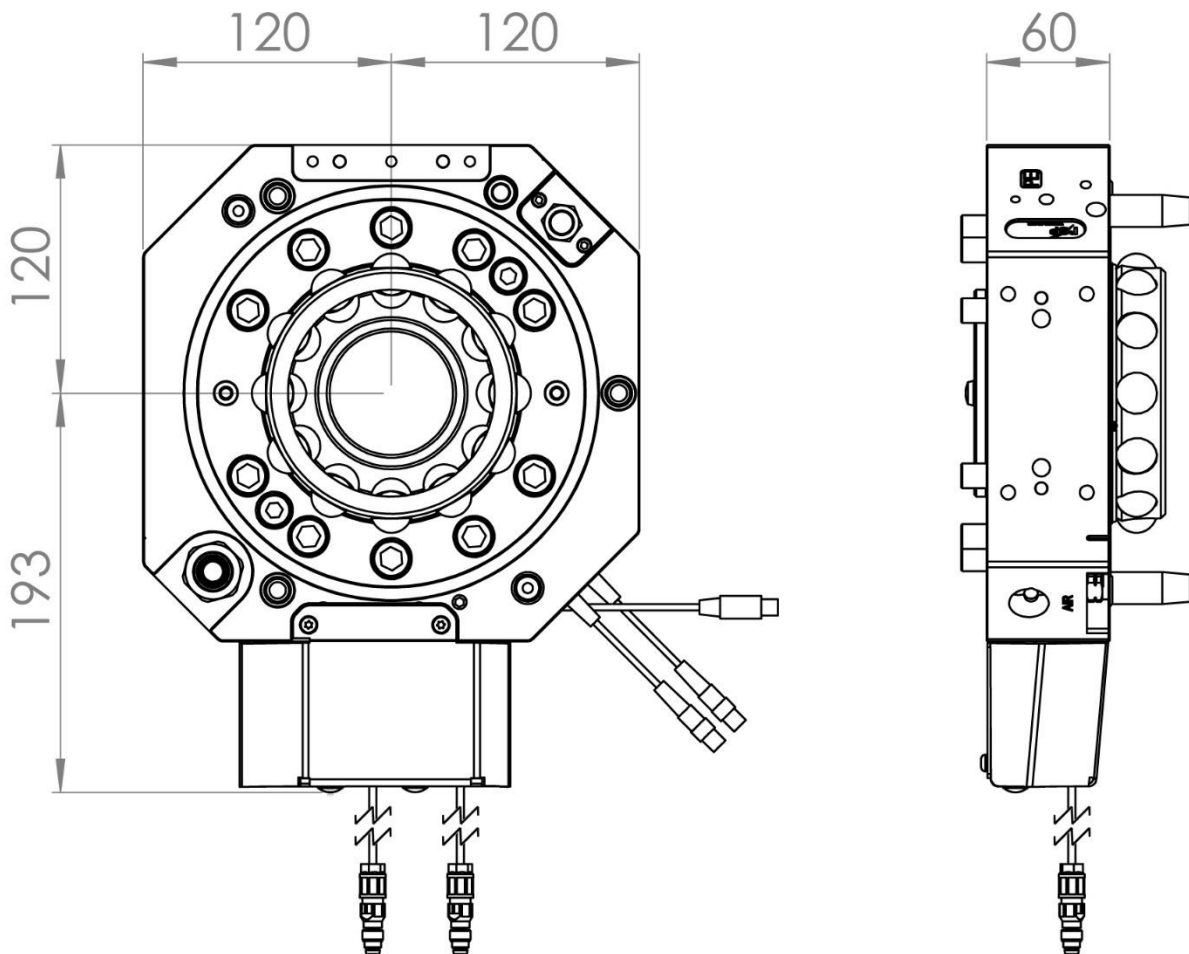
2.3.2 Components



Item	Article number	Description	Quantity	Section
1	P7723	TA240-1	1	3.2
2	P7147	TA ground pin	1	3.19
3	P8528	Tool in stand sensor, active	1	3.20

2.4 Tool changer TC480 Prepared for Safety 160-10-M12. Article: P7830

Tool changer P7830 is prepared for mounting of Safety signal modules P7501-XXX. To be used together with P7831 (TA480 Prepared for Safety 160-10-M12).



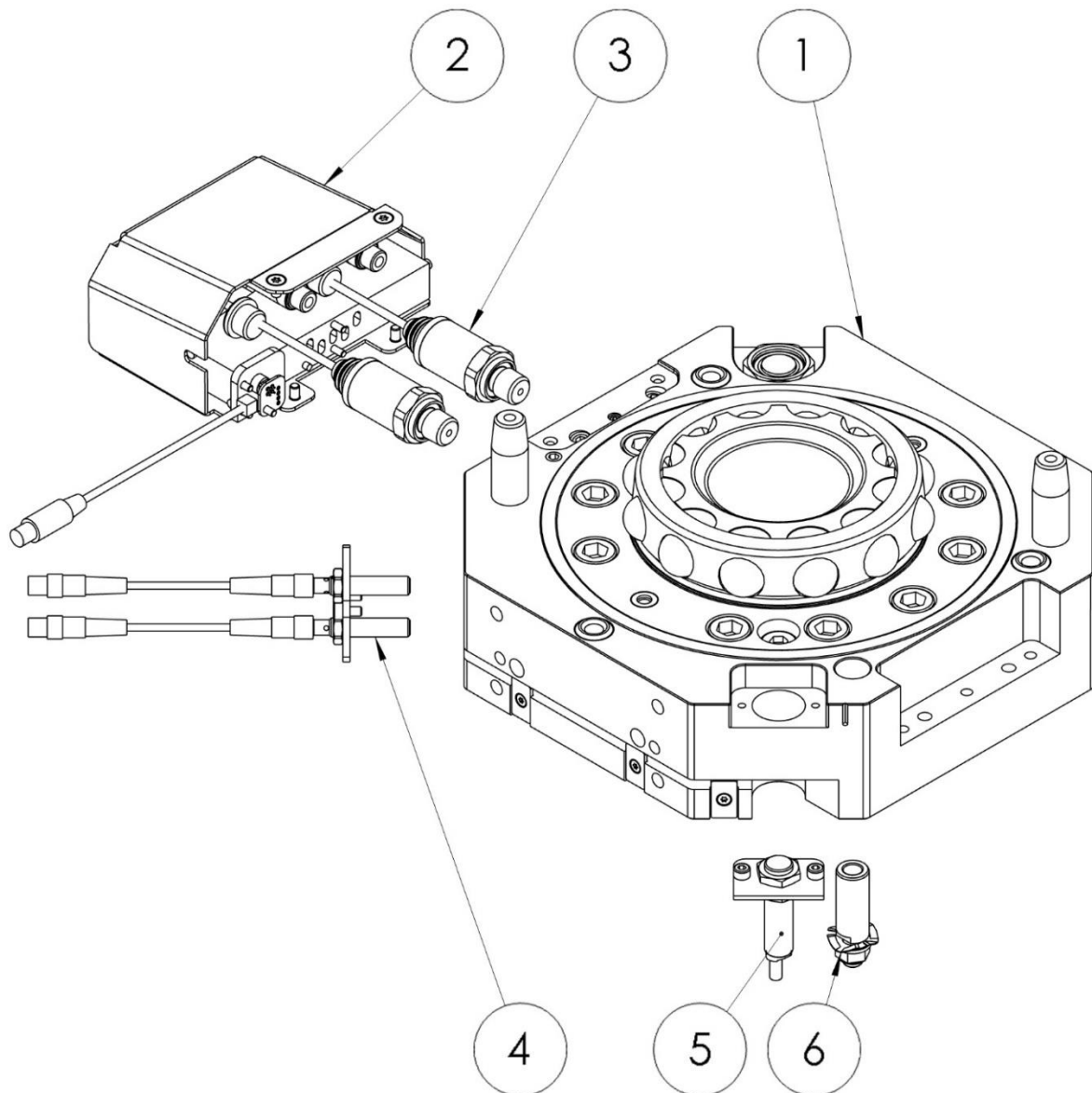
2.4.1 Technical summary

Working temperature		+10°C—+50°C
Bolt pattern		ISO 9409-1 160-10-M12
Maximum tool load	Fz (static)	±5 000 N
	Mx/My (dynamic)	±5 000 Nm
	Mz (dynamic)	±3 500 Nm
Maximum tool load (Screw class 12.9)	Fz (static)	±5 000 N
	Mx/My (dynamic)	±5 000 Nm
	Mz (dynamic)	±5 000 Nm
Weight and centre of gravity (Z)		
TC (P7830)		13.2 kg / 38 mm
TC + TA (P7831)		21.2 kg / 55 mm



NOTE! Tool changer P7830 may also be used together with tool attachment P7833 having 160-10-M10 bolt pattern.

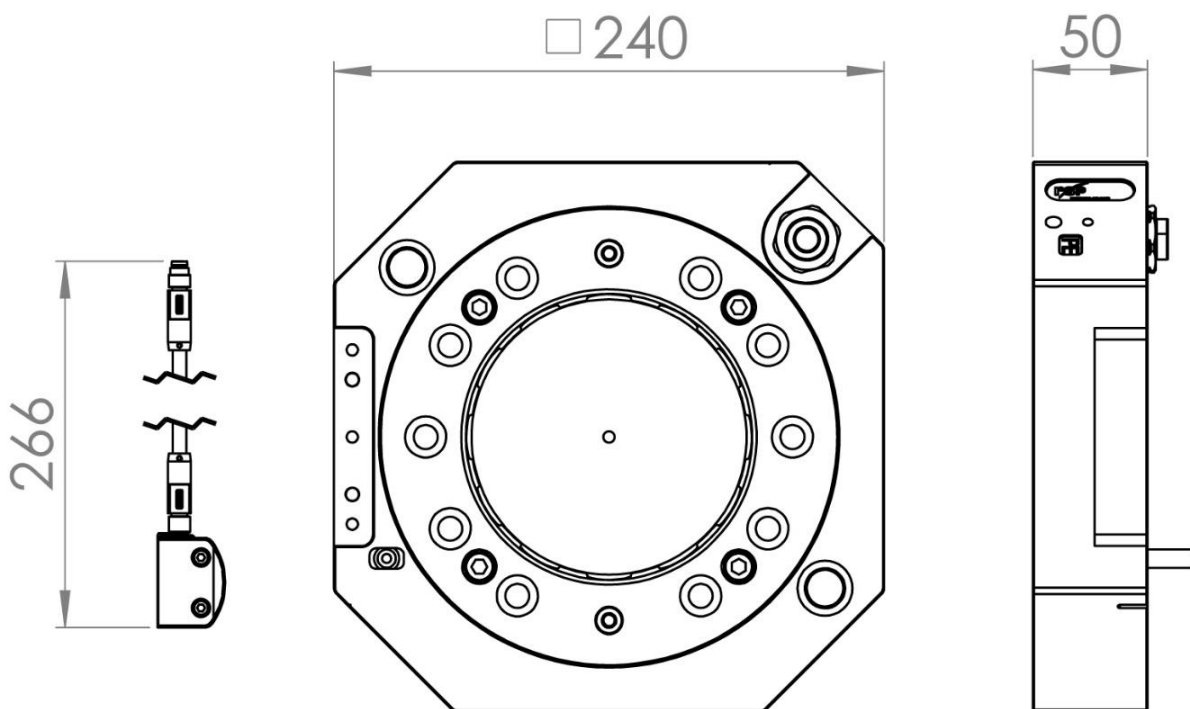
2.4.2 Components



Item	Article number	Description	Quantity	Section
1	P7834	TC480-1	1	3.3
2	P7710-4	Integrated valve open/close	1	3.14
3	P7257A	Analog pressure sensor	1	3.15
4	P7173	TC480 Magnetic sensors open/close	1	3.16
5	P7145-1	TC-empty sensor (inductive)	1	3.17
6	P7239	TC ground socket	1	3.18

2.5 Tool attachment TA480 Prepared for Safety 160-10-M12. P7831

Tool attachment P7831 is prepared for mounting of Safety signal modules P7501-XXX. To be connected on the tool side and used together with tool changer P7830 (TC480 Prepared for Safety 160-10-M12).



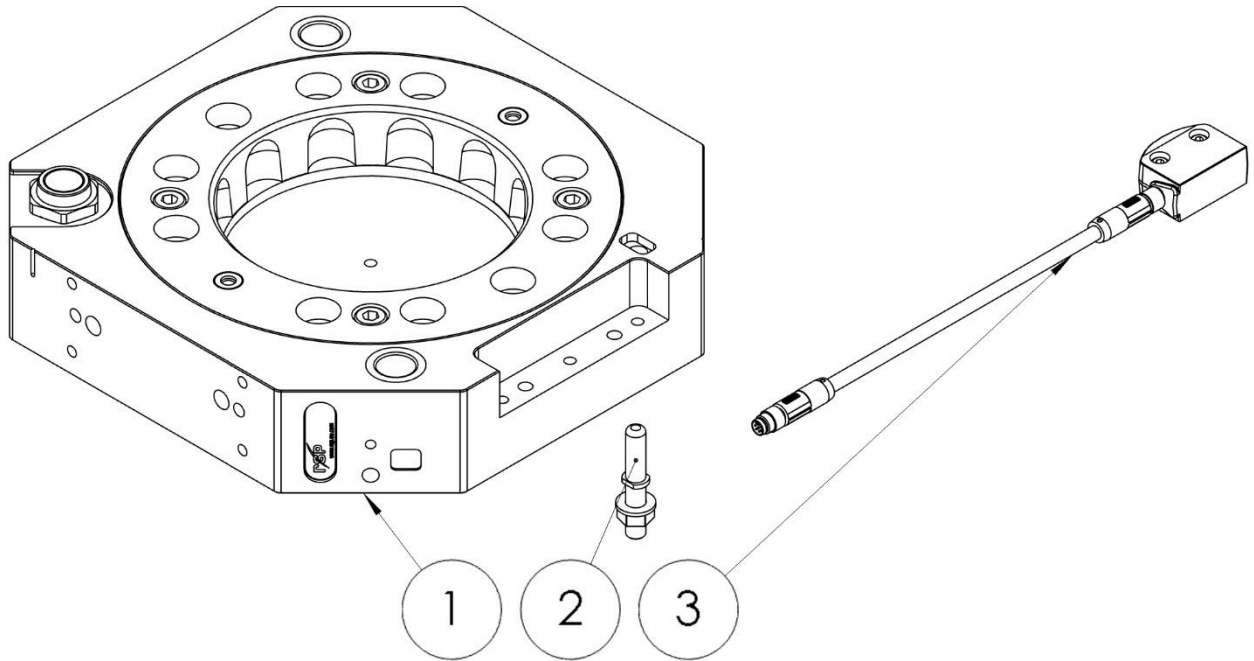
2.5.1 Technical summary

Working temperature		+10°C–+50°C
Bolt pattern		ISO 9409-1 160-10-M12
Weight		8.0 kg
Maximum tool load (M12 screws)	Fz (static)	±5 000 N
	Mx/My (dynamic)	±5 000 Nm
	Mz (dynamic)	±3 500 Nm
Maximum tool load (M12 screws, screw class 12.9)	Fz (static)	±5 000 N
	Mx/My (dynamic)	±5 000 Nm
	Mz (dynamic)	±5 000 Nm
Maximum tool load (M10 screws)	Fz (static)	±5 000 N
	Mx/My (dynamic)	±5 000 Nm
	Mz (dynamic)	±2 500 Nm
Maximum tool load (M10 screws, screw class 12.9)	Fz (static)	±5 000 N
	Mx/My (dynamic)	±5 000 Nm
	Mz (dynamic)	±4 000 Nm



NOTE! Tools can be mounted to the tool attachment using ten M12 screws, alternatively the tool attachment can be mounted to the tool using ten M10 screws.

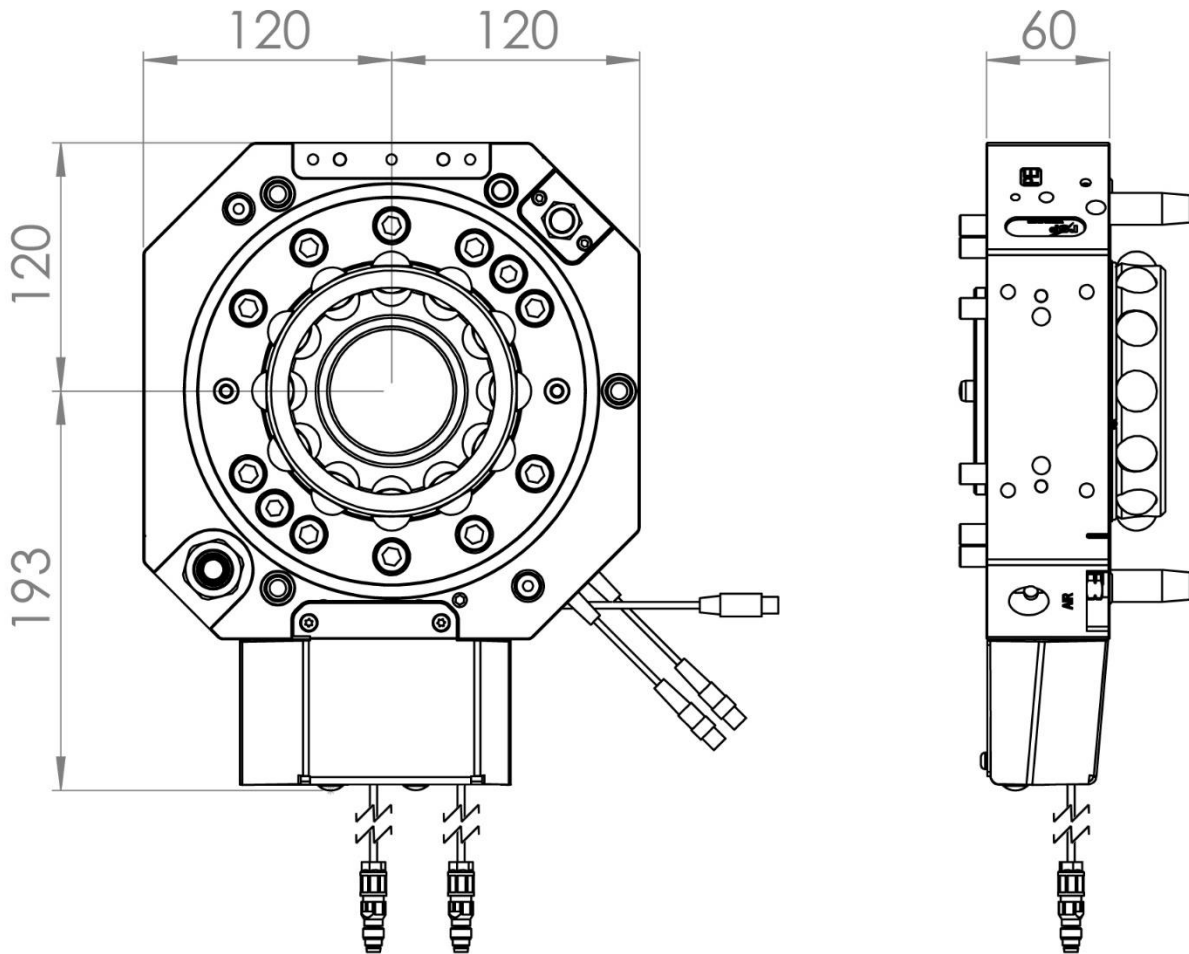
2.5.2 Components



Item	Article number	Description	Quantity	Section
1	P7835	TA480-1	1	3.4
2	P7147	TA ground pin	1	3.19
3	P8528	Tool in stand sensor, active	1	3.20

2.6 Tool changer TC480 Prepared for Safety 160-10-M10. Article: P7832

Tool changer P7832 is prepared for mounting of Safety signal modules P7501-XXX. To be used together with P7833 (TA480 Prepared for Safety 160-10-M10).



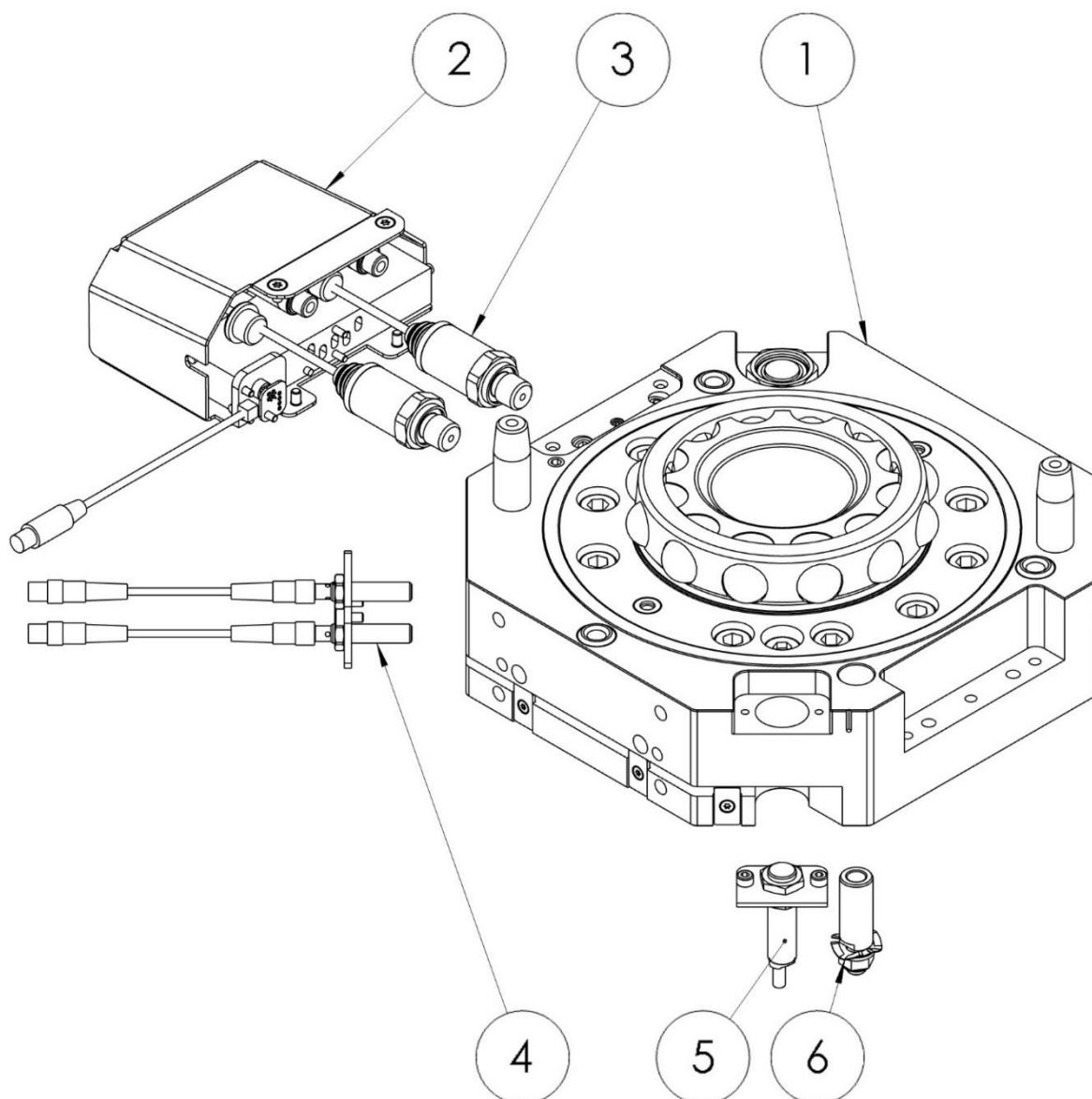
2.6.1 Technical summary

Working temperature		+10°C—+50°C
Bolt pattern		ISO 9409-1 160-10-M10
Maximum tool load	Fz (static)	±5 000 N
	Mx/My (dynamic)	±5 000 Nm
	Mz (dynamic)	±2 500 Nm
Maximum tool load (Screw class 12.9)	Fz (static)	±5 000 N
	Mx/My (dynamic)	±5 000 Nm
	Mz (dynamic)	±4 000 Nm
Weight and centre of gravity (Z)		
TC (P7832)		13.1 kg / 38 mm
TC + TA (P7833)		21.1 kg / 55 mm



NOTE! Tool changer P7832 may also be used together with tool attachment P7831 having 160-10-M12 bolt pattern.

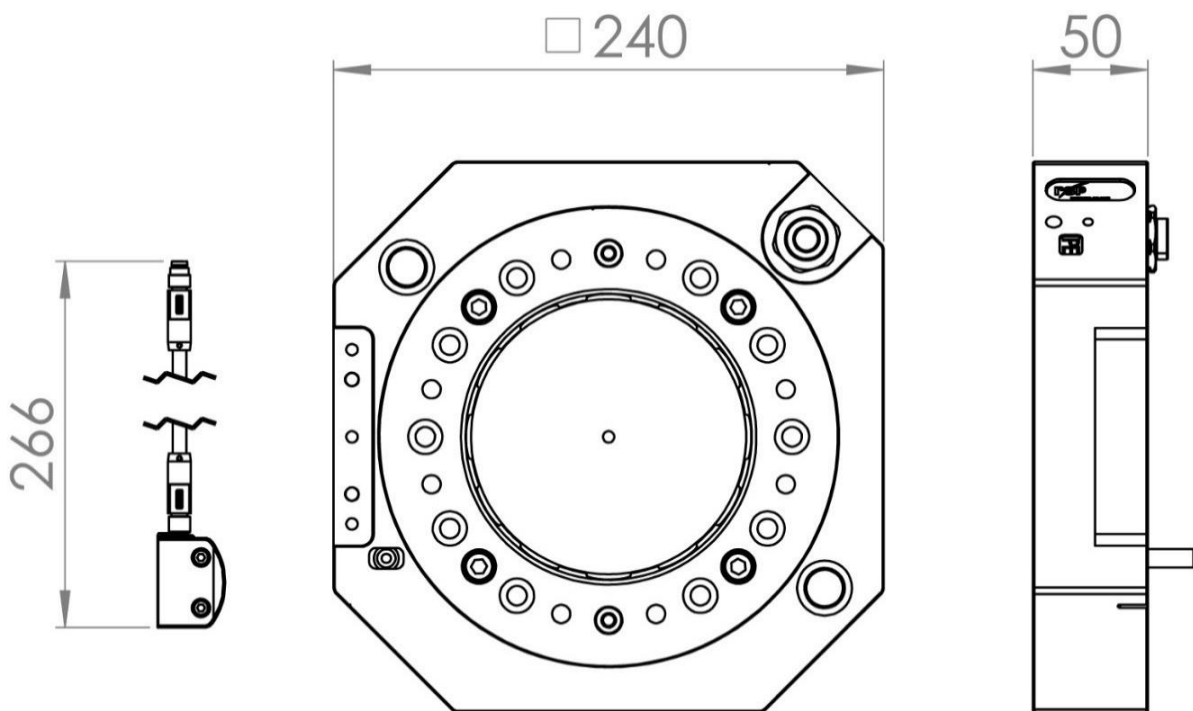
2.6.2 Components



Item	Article number	Description	Quantity	Section
1	P7836	TC480-1	1	3.5
2	P7710-4	Integrated valve open/close	1	3.14
3	P7257A	Analog pressure sensor	1	3.15
4	P7173	TC480 Magnetic sensors open/close	1	3.16
5	P7145-1	TC-empty sensor (inductive)	1	3.17
6	P7239	TC ground socket	1	3.18

2.7 Tool attachment TA480 Prepared for Safety 160-10-M10. P7833

Tool attachment P7833 is prepared for mounting of Safety signal modules P7501-XXX. To be connected on the tool side and used together with tool changer P7832 (TC480 Prepared for Safety 160-10-M10).



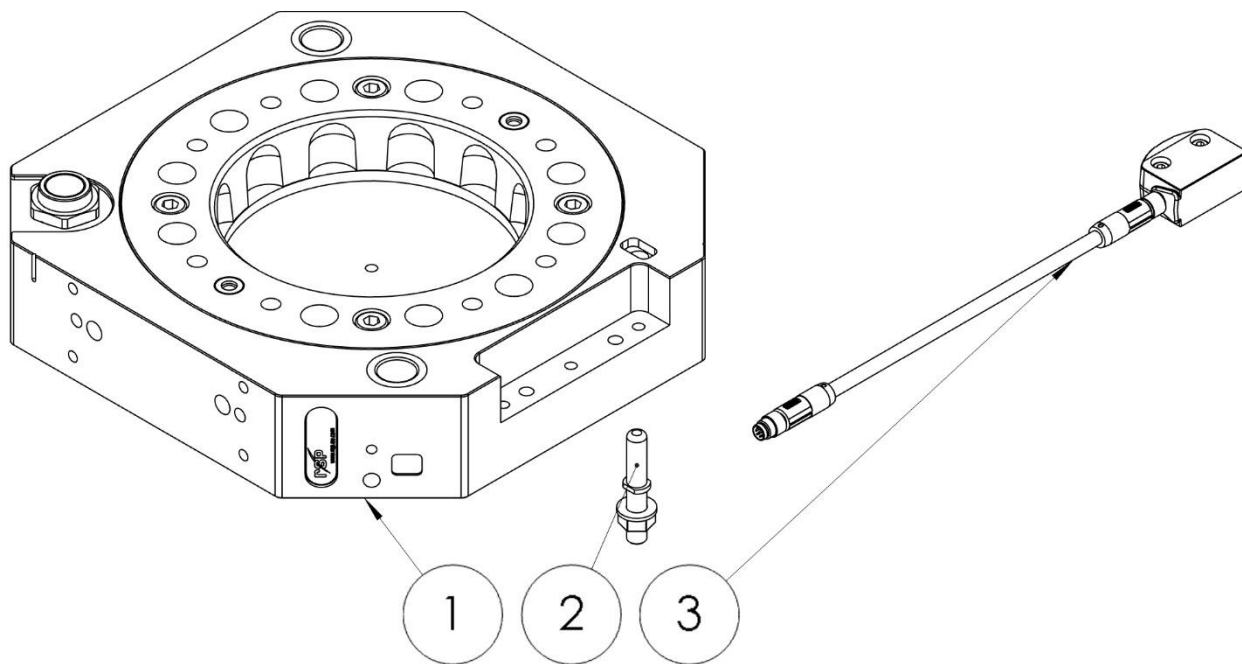
2.7.1 Technical summary

Working temperature		+10°C–+50°C
Bolt pattern		ISO 9409-1 160-10-M10
Weight		8.0 kg
Maximum tool load (M10 screws)	Fz (static)	±5 000 N
	Mx/My (dynamic)	±5 000 Nm
	Mz (dynamic)	±2 500 Nm
Maximum tool load (M10 screws, screw class 12.9)	Fz (static)	±5 000 N
	Mx/My (dynamic)	±5 000 Nm
	Mz (dynamic)	±4 000 Nm
Maximum tool load (M8 screws)	Fz (static)	±1 500 N
	Mx/My (dynamic)	±5 000 Nm
	Mz (dynamic)	±1 500 Nm
Maximum tool load (M8 screws, screw class 12.9)	Fz (static)	±5 000 N
	Mx/My (dynamic)	±5 000 Nm
	Mz (dynamic)	±2 500 Nm



NOTE! Tools can be mounted to the tool attachment using ten M10 screws, alternatively the tool attachment can be mounted to the tool using ten M8 screws.

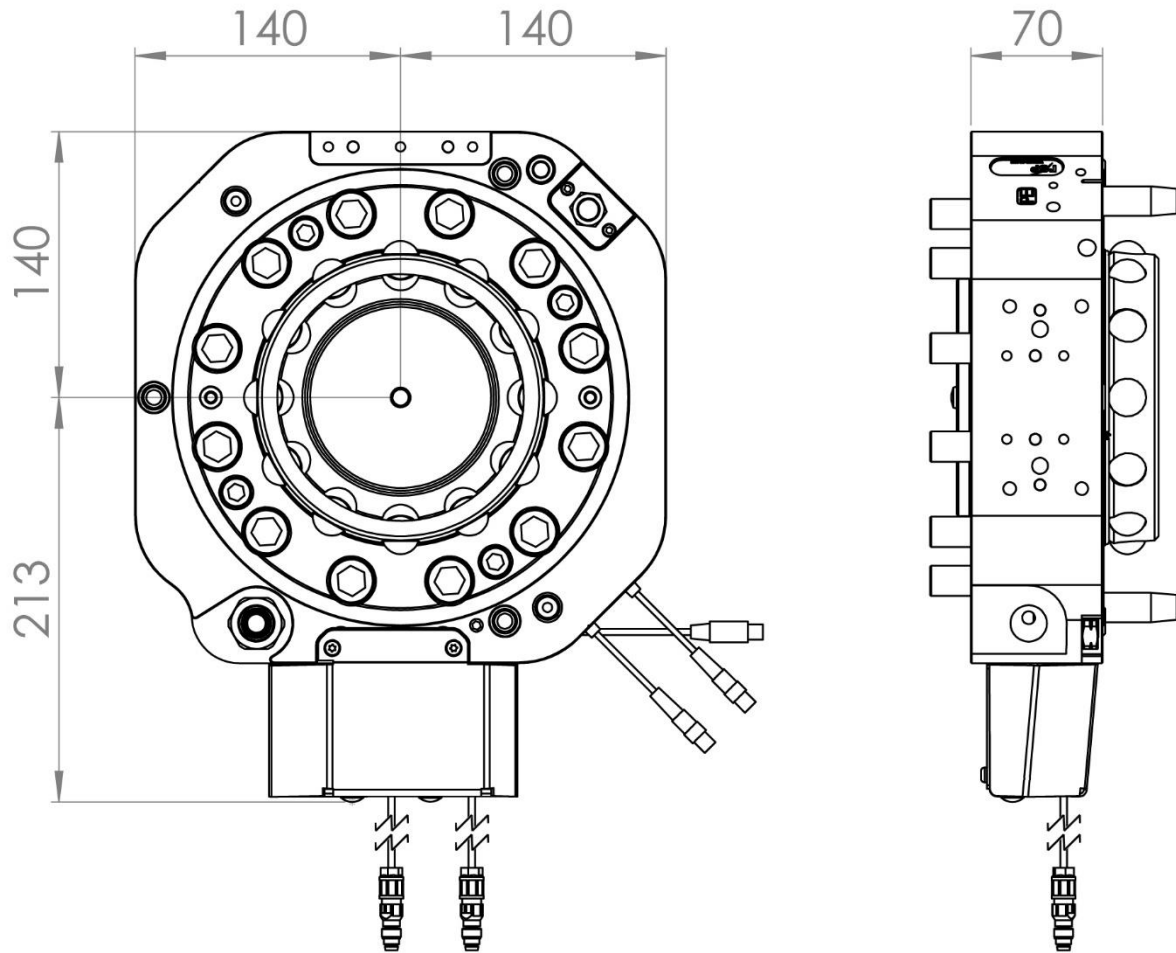
2.7.2 Components



Item	Article number	Description	Quantity	Section
1	P7837	TA480-1	1	3.6
2	P7147	TA ground pin	1	3.19
3	P8528	Tool in stand sensor, active	1	3.20

2.8 Tool changer TC720 Prepared for Safety 200-12-M16. Article: P6962

Tool changer P6962 is prepared for mounting of Safety signal modules P7501-XXX. To be used together with P6963 (TA720 Prepared for Safety 200-12-M16).



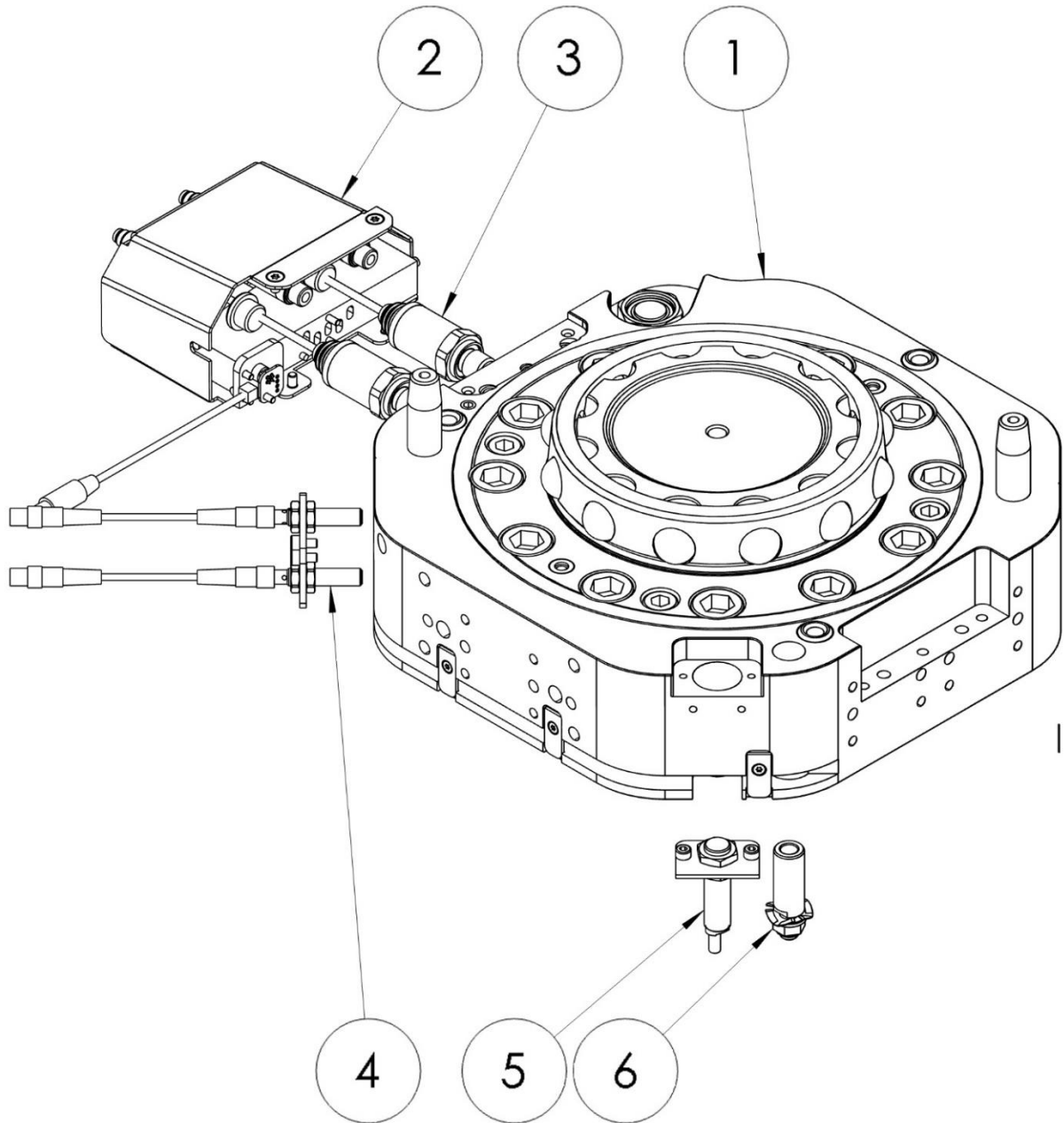
2.8.1 Technical summary

Working temperature		+10°C—+50°C
Bolt pattern		ISO 9409-1 200-12-M16
Maximum tool load	Fz (static)	±10 000 N
	Mx/My (dynamic)	±10 000 Nm
	Mz (dynamic)	±10 000 Nm
Weight and centre of gravity (Z)		
TC (P6962)		21.3 kg / 44 mm
TC + TA (P6963)		32.3 kg / 61 mm



NOTE! Tool changer P6962 may also be used together with tool attachment P6957 having 200-16-M16 bolt pattern.

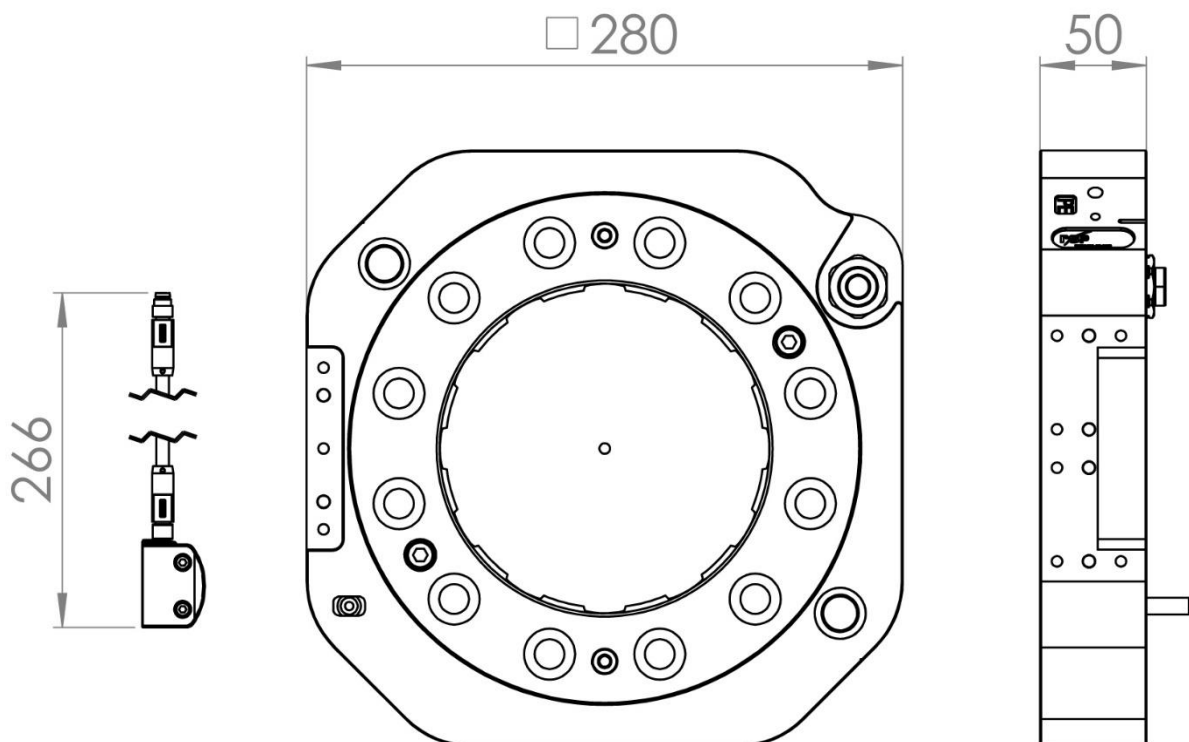
2.8.2 Components



Item	Article number	Description	Quantity	Section
1	P6958	TC720-1	1	3.7
2	P7710-4	Integrated valve open/close	1	3.14
3	P7257A	Analog pressure sensor	1	3.15
4	P7174	TC720 Magnetic sensors open/close	1	3.16
5	P7145-1	TC-empty sensor (inductive)	1	3.17
6	P7239	TC ground socket	1	3.18

2.9 Tool attachment TA720 Prepared for Safety 200-12-M16. P6963

Tool attachment P6963 is prepared for mounting of Safety signal modules P7501-XXX. To be connected on the tool side and used together with tool changer P6962 (TC720 Prepared for Safety 200-12-M16.).



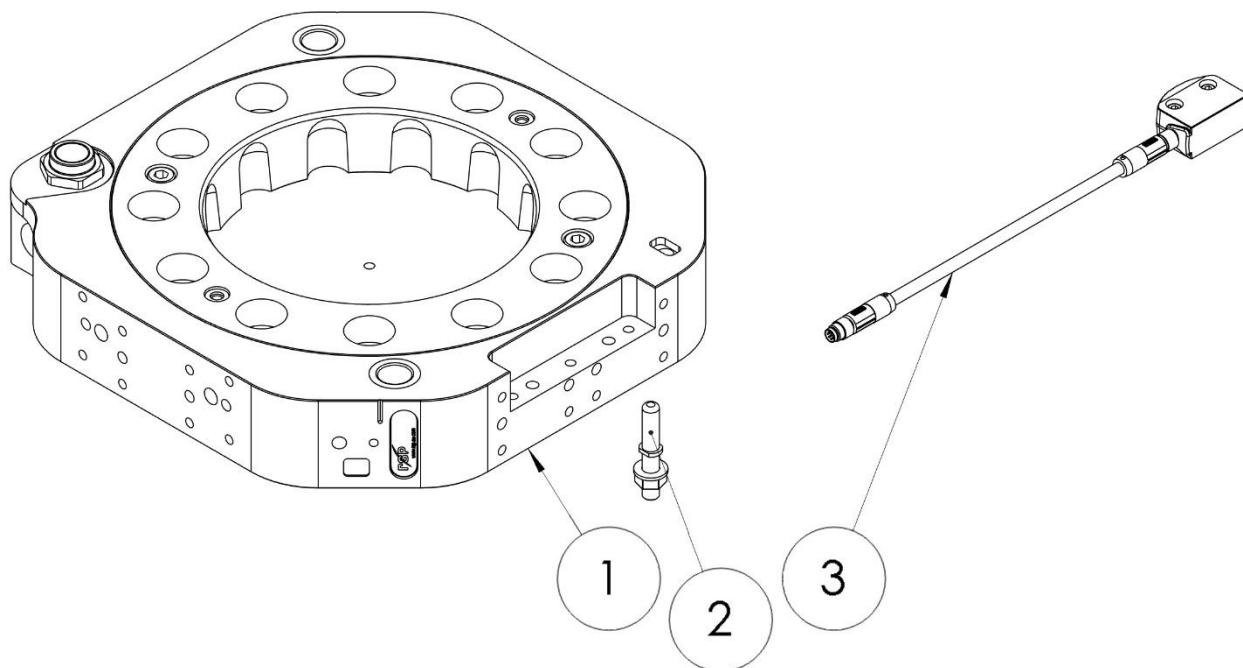
2.9.1 Technical summary

Working temperature		+10°C—+50°C
Bolt pattern		ISO 9409-1 200-12-M16
Weight		11.0 kg
Maximum tool load (M16 screws)	Fz (static)	±10 000 N
	Mx/My (dynamic)	±10 000 Nm
	Mz (dynamic)	±10 000 Nm
Maximum tool load (M14 screws)	Fz (static)	±10 000 N
	Mx/My (dynamic)	±10 000 Nm
	Mz (dynamic)	±7 500 Nm



NOTE! Tools can be mounted to the tool attachment using twelve M16 screws, alternatively the tool attachment can be mounted to the tool using twelve M14 screws.

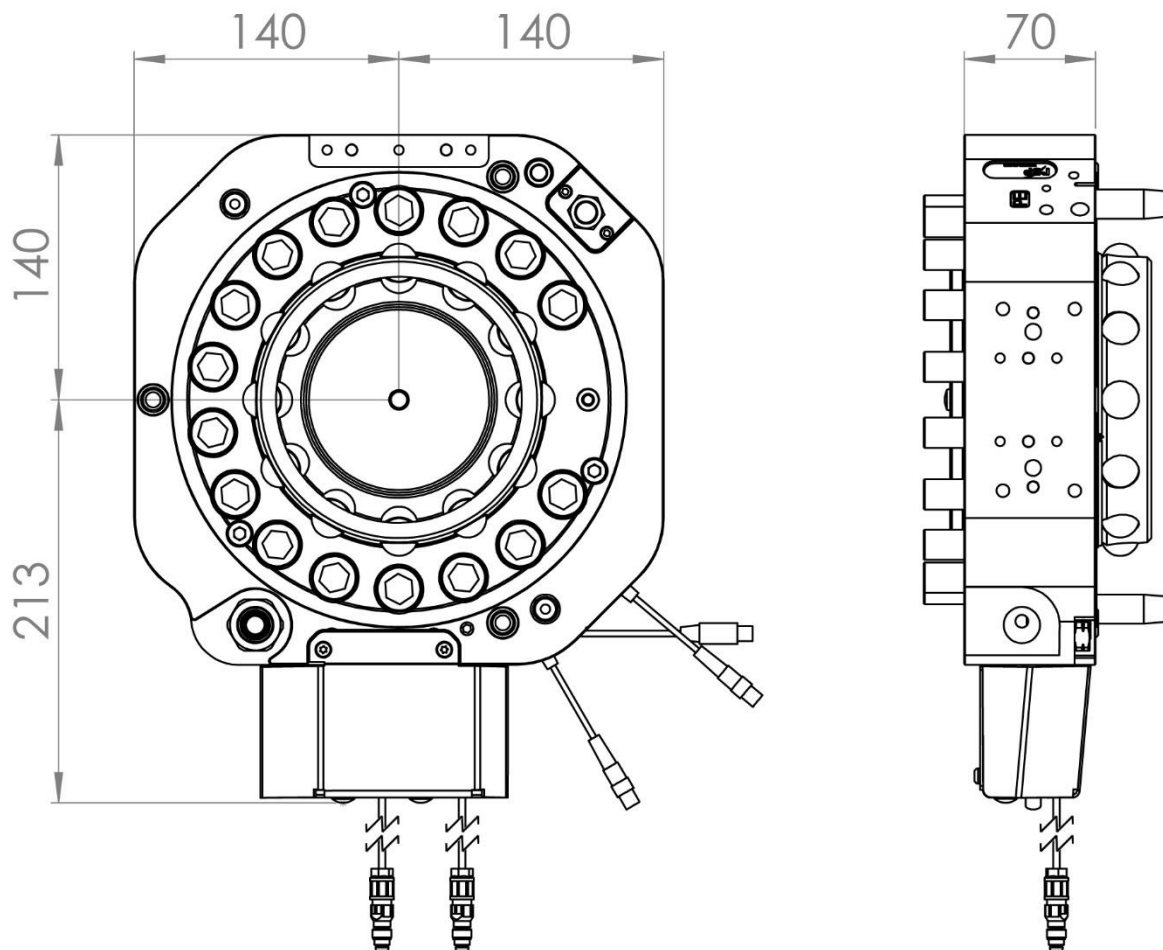
2.9.2 Components



Item	Article number	Description	Quantity	Section
1	P6959	TA720-1	1	3.8
2	P7147	TA ground pin	1	3.19
3	P8528	Tool in stand sensor, active	1	3.20

2.10 Tool changer TC720 Prepared for Safety 200-16-M16. P6956

Tool changer P6956 is prepared for mounting of Safety signal modules P7501-XXX. To be used together with P6957 (TA720 Prepared for Safety 200-16-M16).



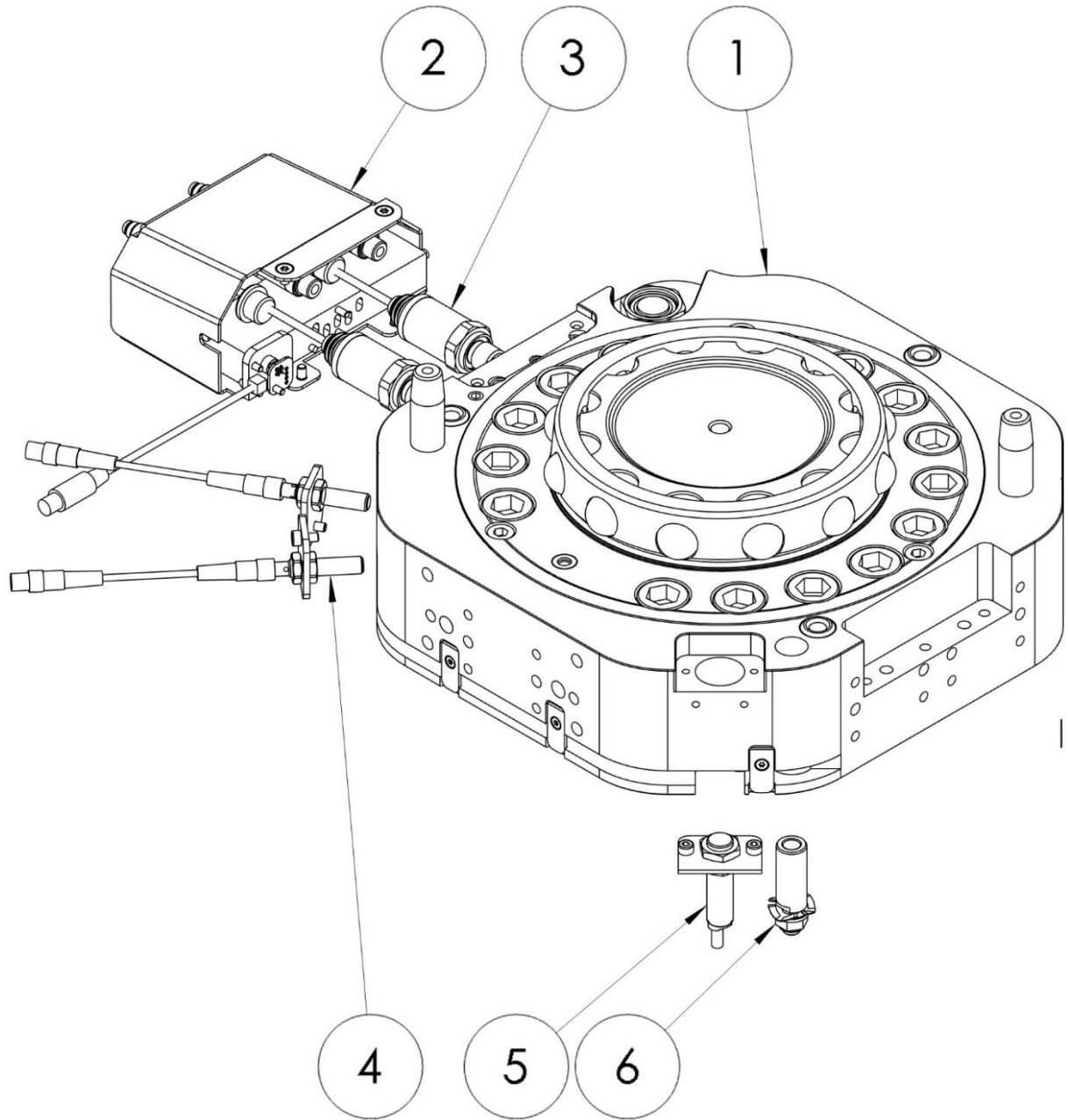
2.10.1 Technical summary

Working temperature		+10°C—+50°C
Bolt pattern		ISO 9409-1 200-16-M16
Maximum tool load	Fz (static)	±10 000 N
	Mx/My (dynamic)	±10 000 Nm
	Mz (dynamic)	±10 000 Nm
Weight and centre of gravity (Z)		
	TC (P6956)	21.6 kg / 44 mm
	TC + TA (P6957)	31.9 kg / 61 mm



NOTE! Tool changer P6956 may also be used together with tool attachment P6963 having 200-12-M16 bolt pattern.

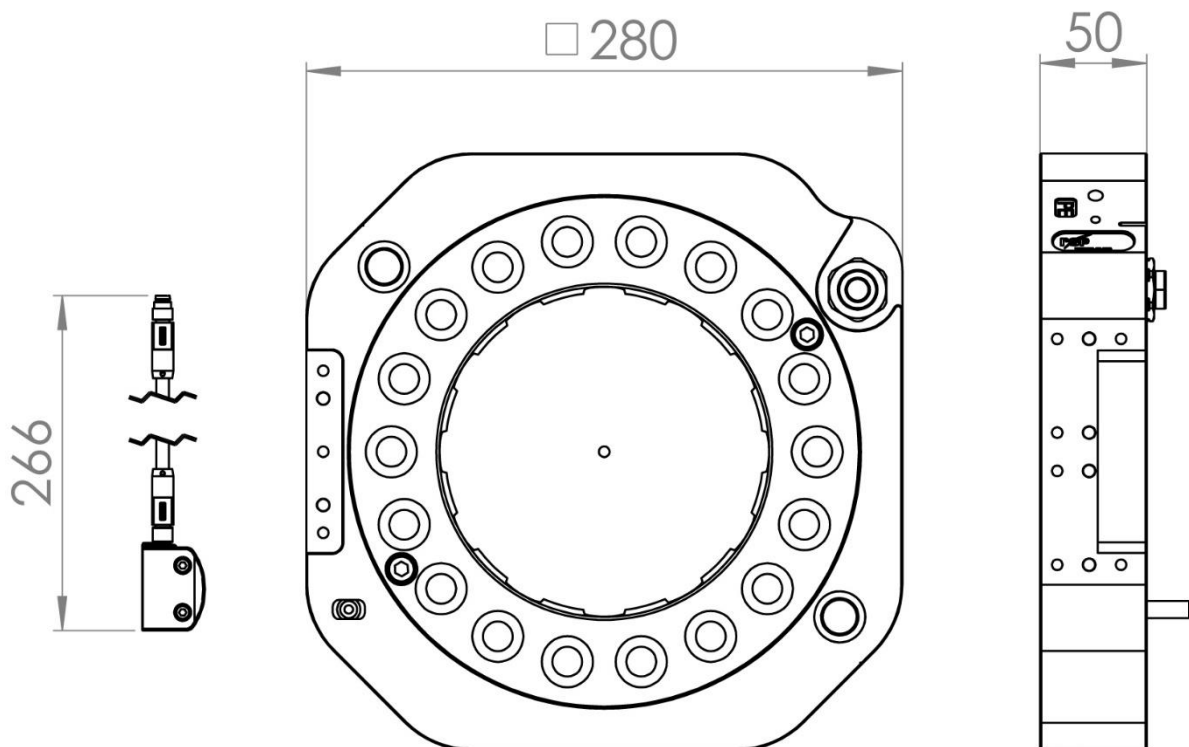
2.10.2 Components



Item	Article number	Description	Quantity	Section
1	P6960	TC720-1	1	3.9
2	P7710-4	Integrated valve open/close	1	3.14
3	P7257A	Analog pressure sensor	1	3.15
4	P7293	TC720 Magnetic sensors open/close	1	3.16
5	P7145-1	TC-empty sensor (inductive)	1	3.17
6	P7239	TC ground socket	1	3.18

2.11 Tool attachment TA720 Prepared for Safety 200-16-M16. P6957

Tool attachment P6957 is prepared for mounting of Safety signal modules P7501-XXX. To be connected on the tool side and used together with tool changer P6956 (TC720 Prepared for Safety 200-16-M16.).



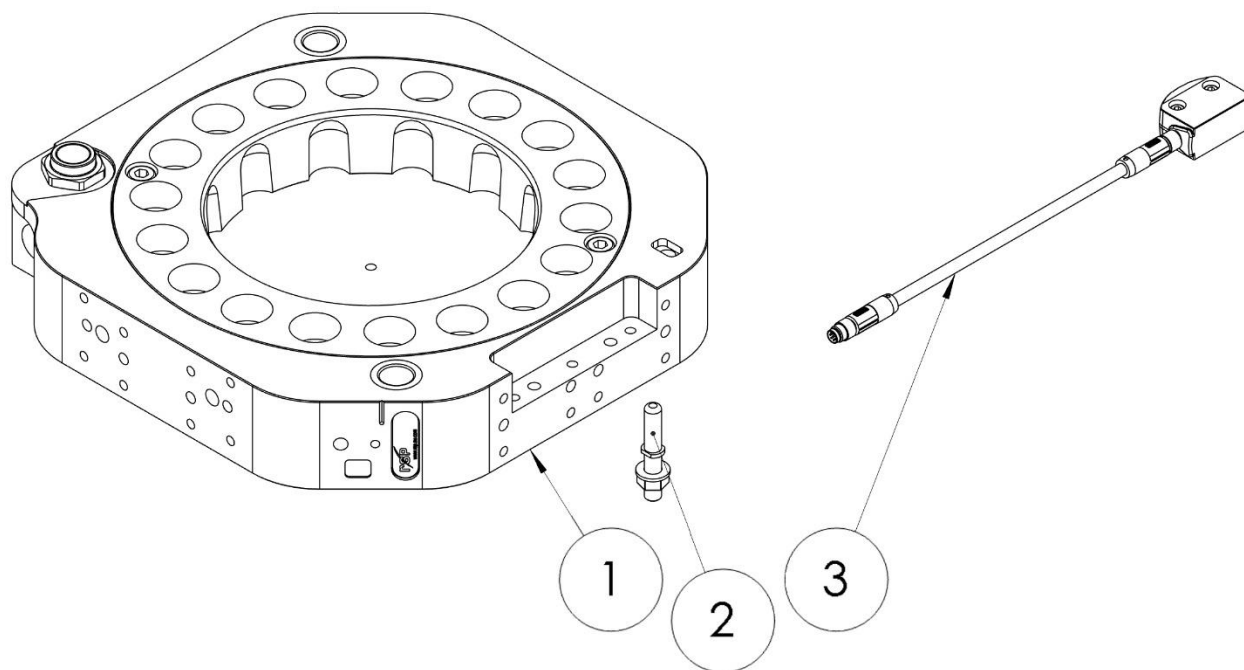
2.11.1 Technical summary

Working temperature		+10°C—+50°C
Bolt pattern		ISO 9409-1 200-16-M16
Weight		10.3 kg
Maximum tool load	Fz (static)	±10 000 N
	Mx/My (dynamic)	±10 000 Nm
	Mz (dynamic)	±10 000 Nm



NOTE! Tools can be mounted to the tool attachment using sixteen M16 screws, alternatively the tool attachment can be mounted to the tool using sixteen M14 screws.

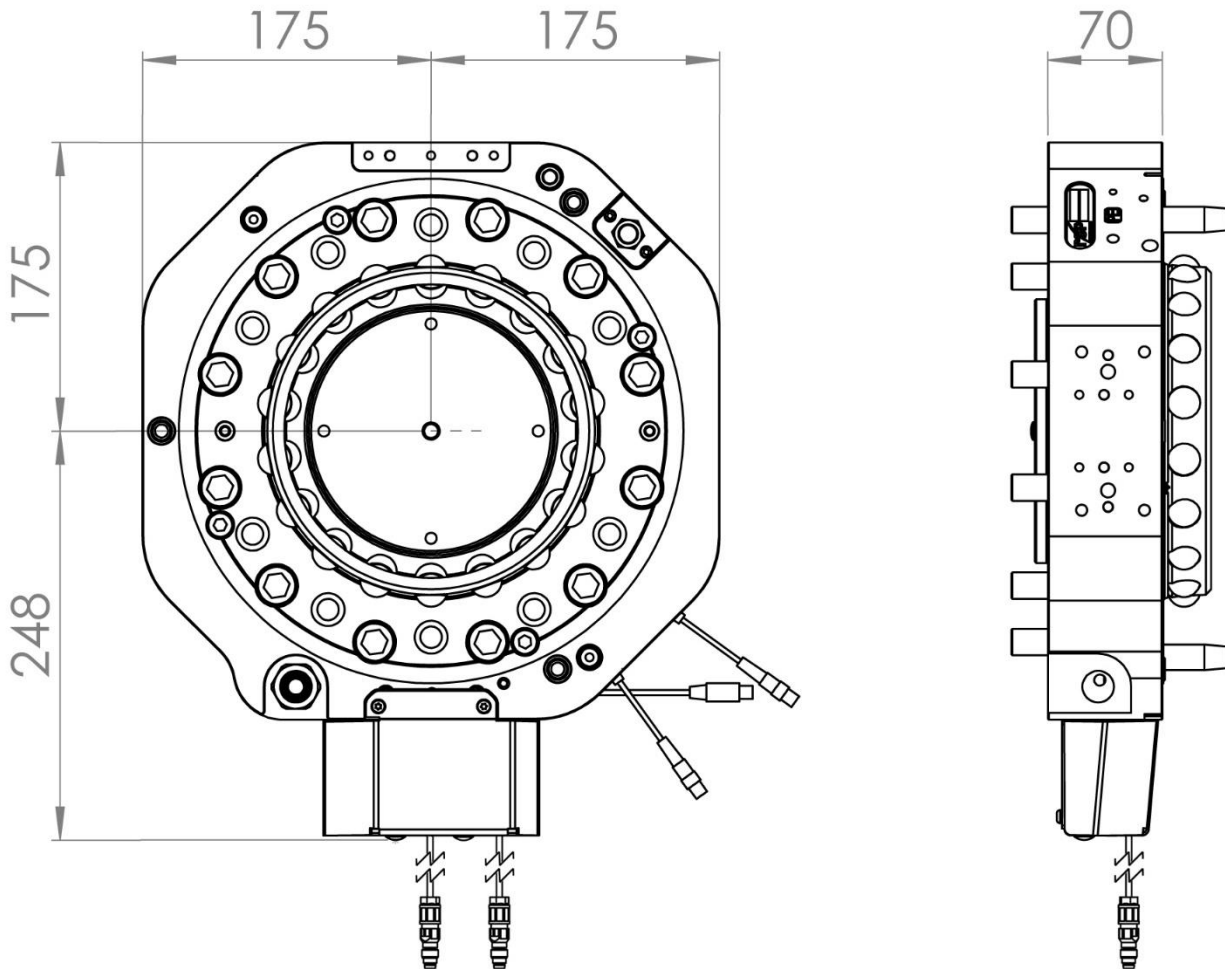
2.11.2 Components



Item	Article number	Description	Quantity	Section
1	P6961	TA720-1	1	3.10
2	P7147	TA ground pin	1	3.19
3	P8528	Tool in stand sensor, active	1	3.20

2.12 Tool changer TC960 Prepared for Safety 265-12-M16. P7921

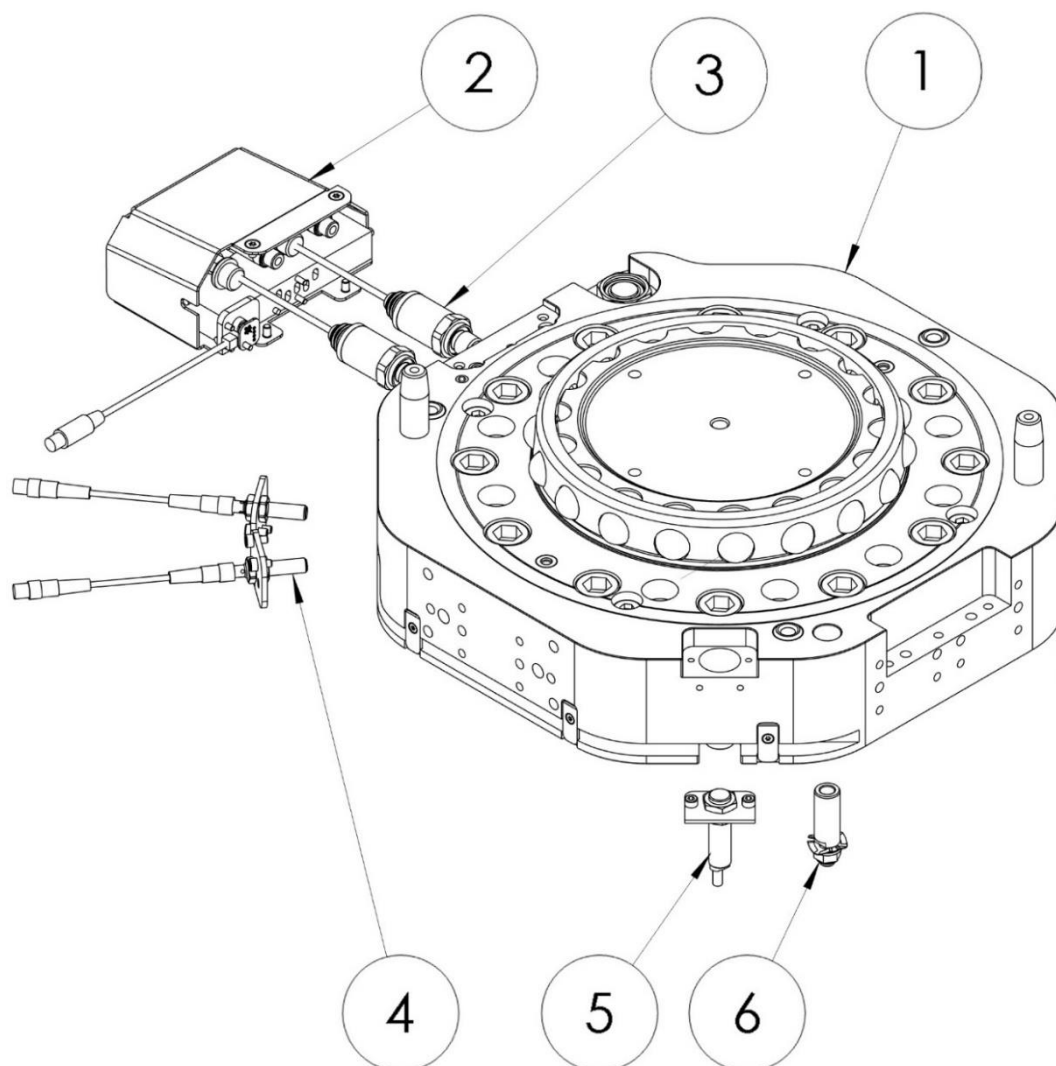
Tool changer P7921 is prepared for mounting of Safety signal modules P7501-XXX. To be used together with P7922 (TA960 Prepared for Safety 265-12-M16/250-10-M12).



2.12.1 Technical summary

Working temperature		+10°C—+50°C
Bolt pattern		ISO 9409-1 265-12-M16
Maximum tool load	Fz (static)	±15 000 N
	Mx/My (dynamic)	±15 000 Nm
	Mz (dynamic)	±12 500 Nm
Weight and centre of gravity (Z)		
TC (P7921)		31.9 kg / 46 mm
TC + TA (P7922)		48.4 kg / 61 mm

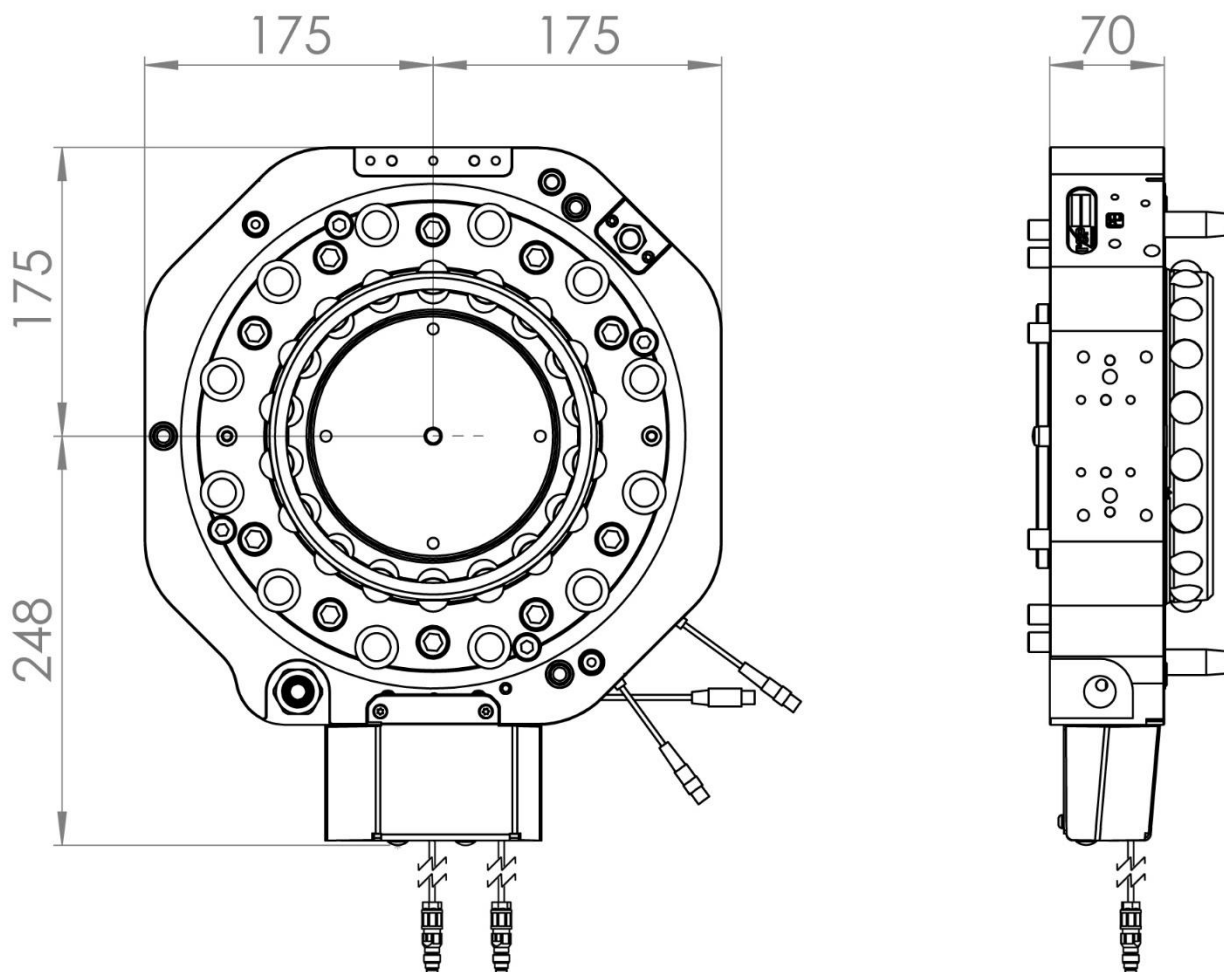
2.12.2 Components



Item	Article number	Description	Quantity	Section
1	P7924	TC960-1 (265-12-M16)	1	3.11
2	P7710-4	Integrated valve open/close	1	3.14
3	P7257A	Analog pressure sensor	1	3.15
4	P7175	TC960 Magnetic sensors open/close	1	3.16
5	P7145-1	TC-empty sensor (inductive)	1	3.17
6	P7239	TC ground socket	1	3.18

2.13 Tool changer TC960 Prepared for Safety 250-10-M12. P7923

Tool changer P7923 is prepared for mounting of Safety signal modules P7501-XXX. To be used together with P7922 (TA960 Prepared for Safety 265-12-M16/250-10-M12).



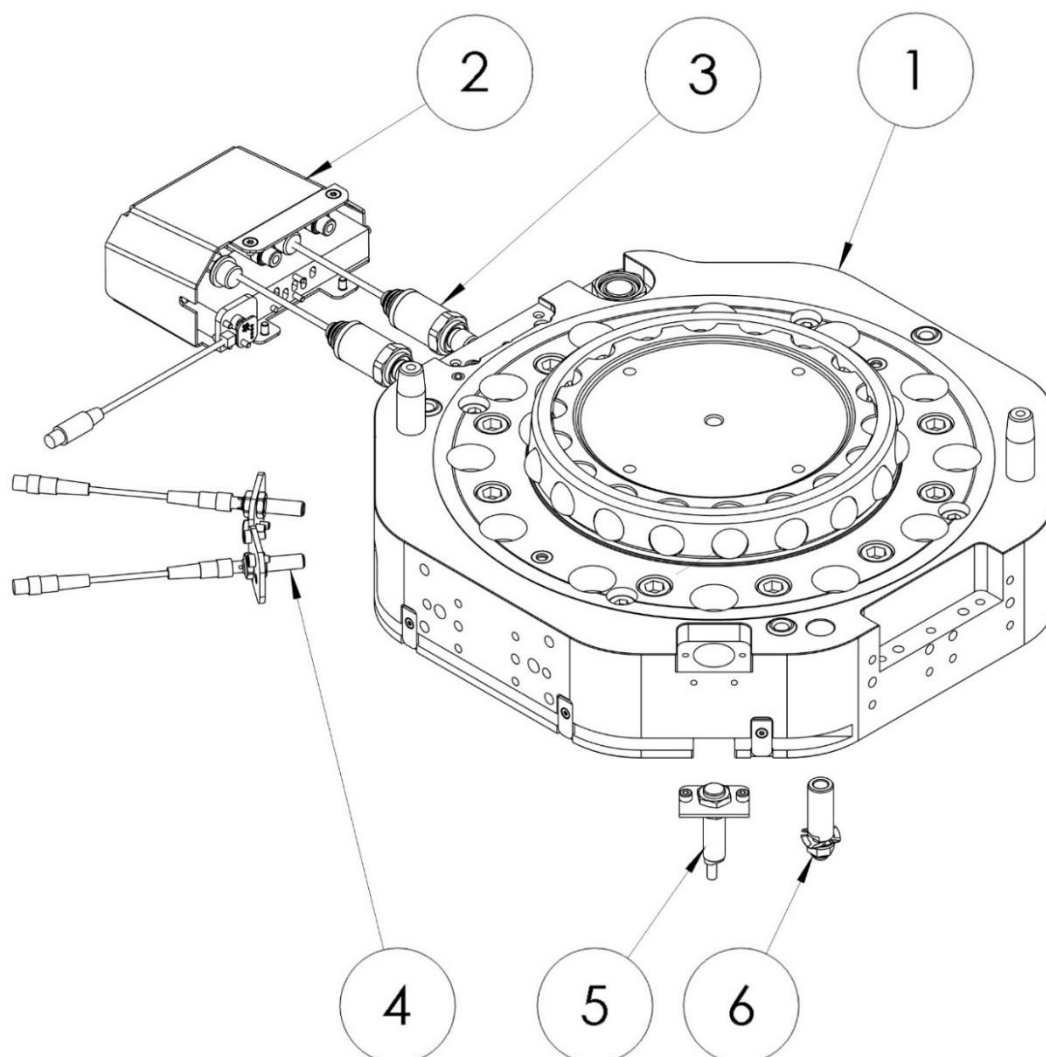
2.13.1 Technical summary

Working temperature		+10°C—+50°C
Bolt pattern		ISO 9409-1 250-10-M12
Maximum tool load (Screw class 12.9)	Fz (static)	±15 000 N
	Mx/My (dynamic)	±10 000 Nm
	Mz (dynamic)	±9 000 Nm
Weight and centre of gravity (Z)		
TC (P7923)		30.1 kg / 46 mm
TC + TA (P7922)		46.6 kg / 61 mm



NOTE! Tool changer P7923 is delivered with screw class 12.9 mounting screws as standard.

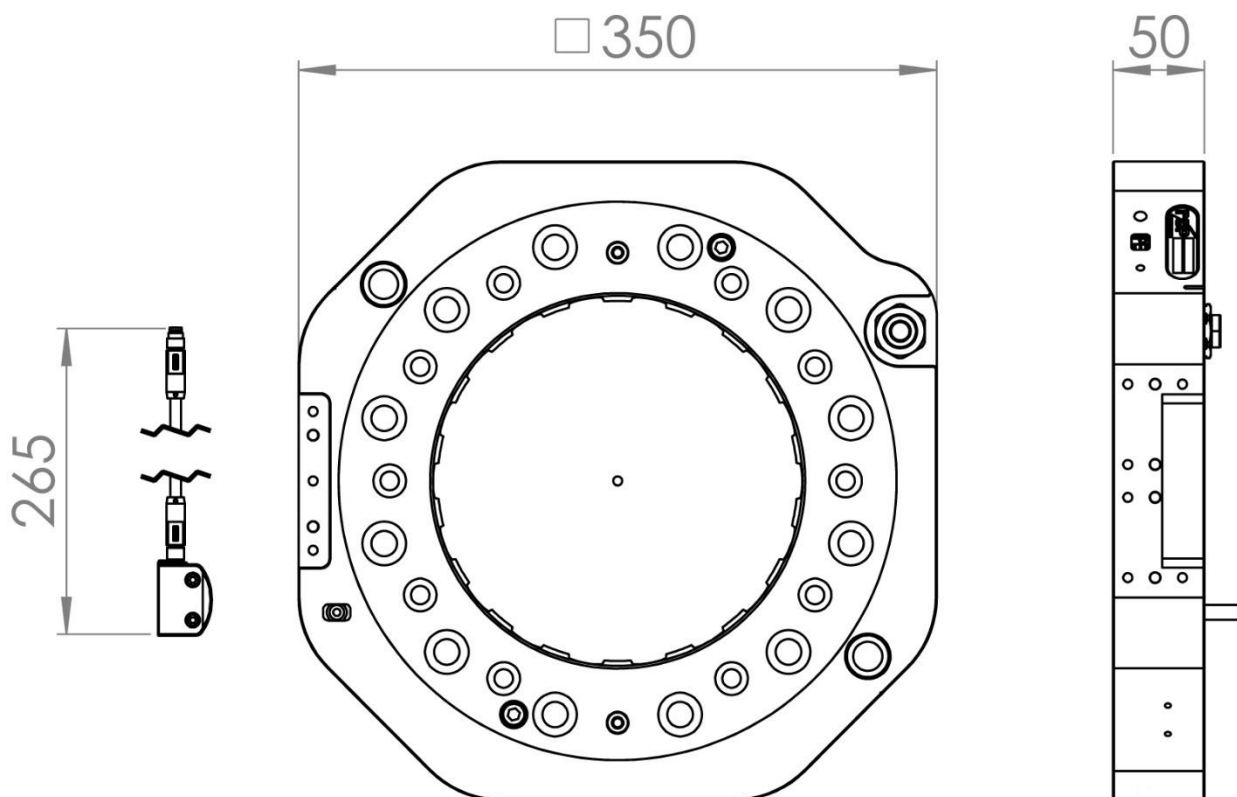
2.13.2 Components



Item	Article number	Description	Quantity	Section
1	P7924-1	TC960-1 (250-10-M12)	1	3.11
2	P7710-4	Integrated valve open/close	1	3.14
3	P7257A	Analog pressure sensor	1	3.15
4	P7175	TC960 Magnetic sensors open/close	1	3.16
5	P7145-1	TC-empty sensor (inductive)	1	3.17
6	P7239	TC ground socket	1	3.18

2.14 Tool attachment TA960 Prepared for Safety 265-12-M16/250-10-M12. Article: P7922

Tool attachment P7922 is prepared for mounting of Safety signal modules P7501-XXX. To be connected on the tool side and used together with tool changer P7921 (TC960 Prepared for Safety 265-12-M16) and P7923 (TC960 Prepared for Safety 250-10-M12).



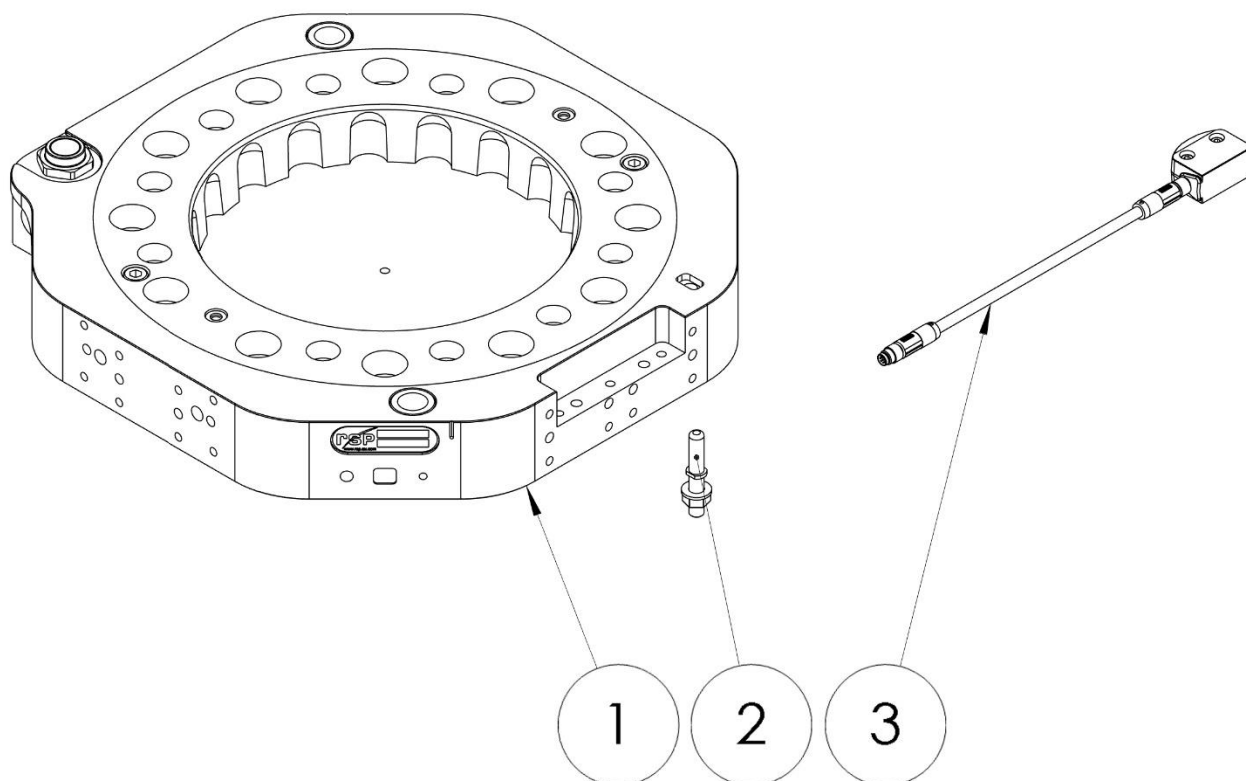
2.14.1 Technical summary

Working temperature		+10°C–+50°C
Bolt patterns		ISO 9409-1 265-12-M16 / 250-10-M12
Weight		16.5 kg
Maximum tool load (265-12-M16 with M16 screw class 8.8)	Fz (static)	±15 000 N
	Mx/My (dynamic)	±15 000 Nm
	Mz (dynamic)	±12 500 Nm
Maximum tool load (265-12-M16 with M14, screw class 8.8)	Fz (static)	±15 000 N
	Mx/My (dynamic)	±15 000 Nm
	Mz (dynamic)	±10 000 Nm
Maximum tool load (250-10-M12 with M12, screw class 12.9)	Fz (static)	±15 000 N
	Mx/My (dynamic)	±10 000 Nm
	Mz (dynamic)	±9 000 Nm
Maximum tool load (250-10-M12 with M10, screw class 12.9)	Fz (static)	±15 000 N
	Mx/My (dynamic)	±7 000 Nm
	Mz (dynamic)	±6 000 Nm



NOTE! Tools can be mounted to the tool attachment using twelve M16 screws or ten M12 screws, alternatively the tool attachment can be mounted to the tool using twelve M14 screws or ten M10 screws.

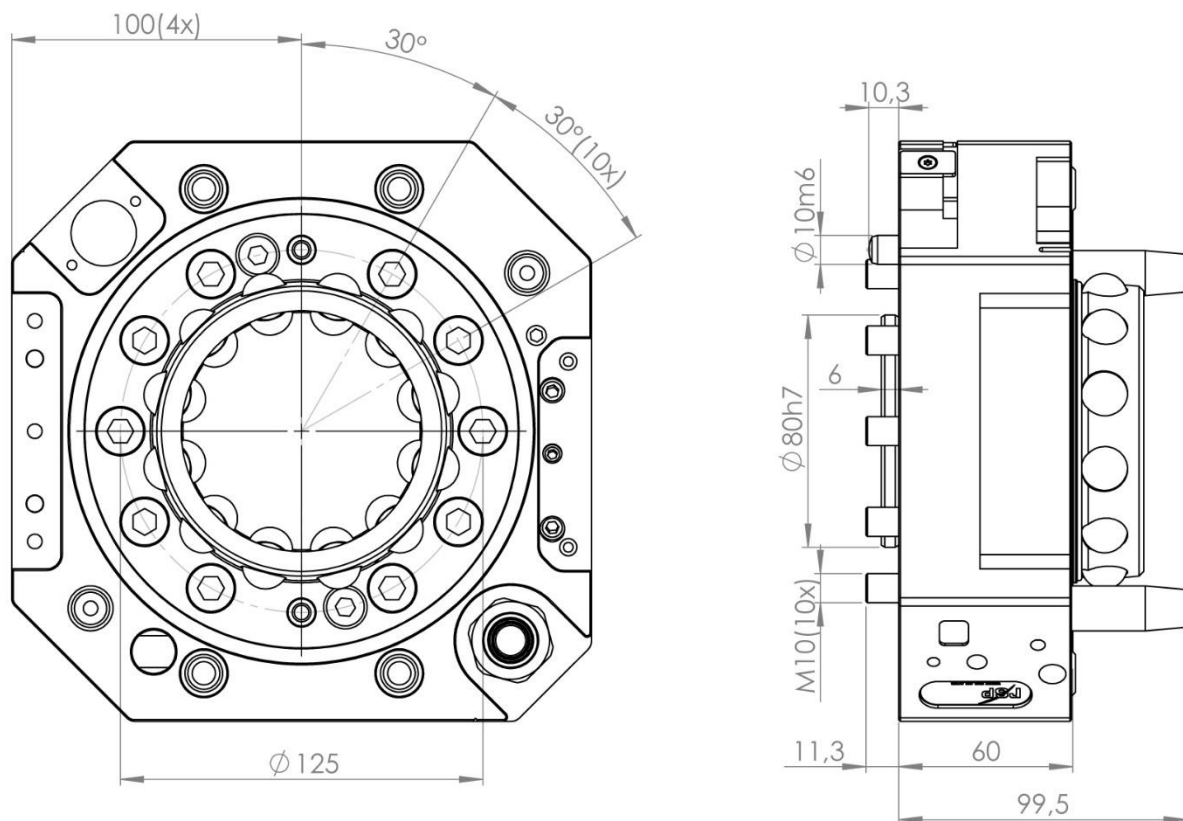
2.14.2 Components



Item	Article number	Description	Quantity	Section
1	P7925	TA960-1	1	3.13
2	P7147	TA ground pin	1	3.19
3	P8528	Tool in stand sensor, active	1	3.20

3 DESCRIPTIONS OF COMPONENTS

3.1 Tool changer TC240-1, basic unit. Article: P7722

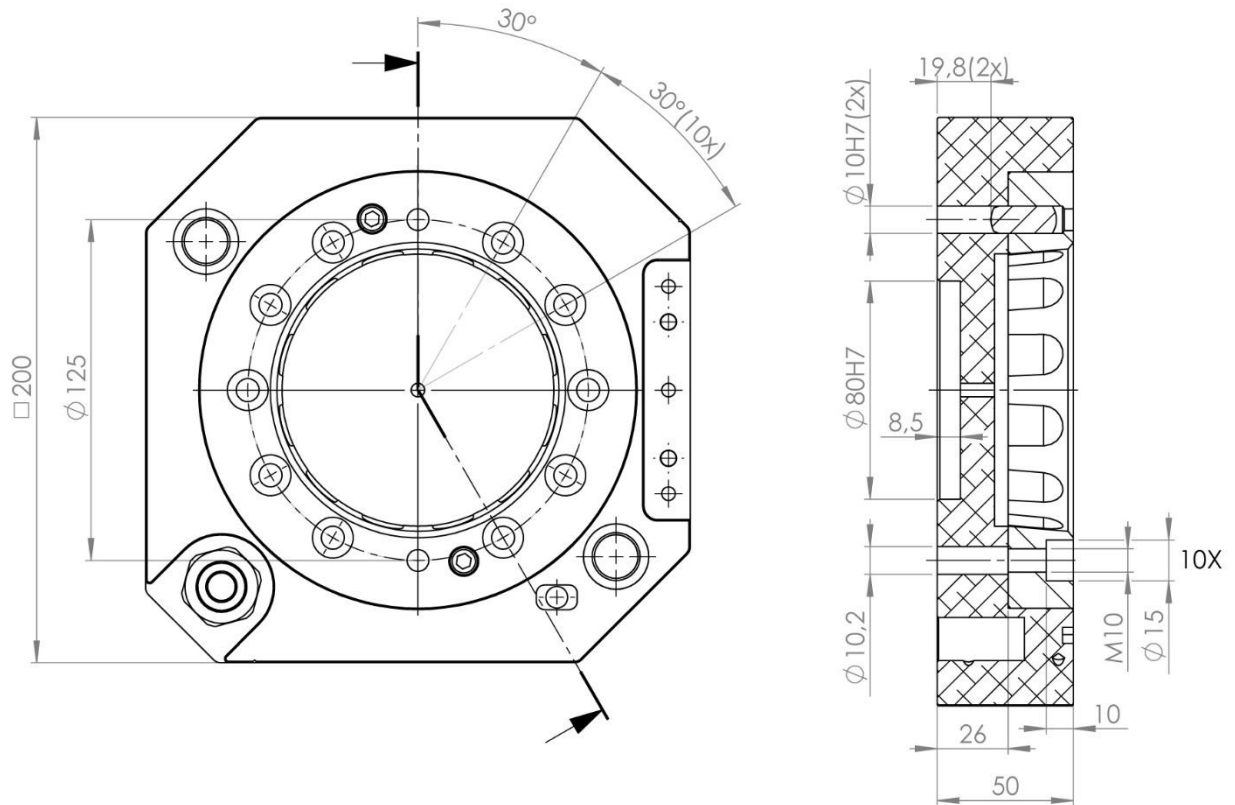


The tool changer P7722 transfers 1 pneumatic channel to the tool attachment. To be used together with tool attachment P7723.

Technical data

Working temperature		+10°C—+50°C
Bolt pattern		ISO 9409-1 125-10-M10
Maximum tool load	Fz (static)	±2 400 N
	Mx/My (dynamic)	±2 400 Nm
	Mz (dynamic)	±2 000 Nm
Weight and centre of gravity (Z)		
TC (P7722)		8.1 kg / 38 mm
TC + TA (P7723)		13.3 kg / 55 mm
Air channels	Pneumatic diagram	Pne0230-011 (section 3.14.2)
	User channels, robot side	1 x G ½" (2 000 l/min, max 10 bar)
	Air quality	Oil-clean and waterless filtered air, with max 25µm particle content,

3.2 Tool attachment TA240-1, basic unit. Article: P7723



The tool attachment P7723 transfers 1 pneumatic channel to the tool. To be used together with tool changer P7722.

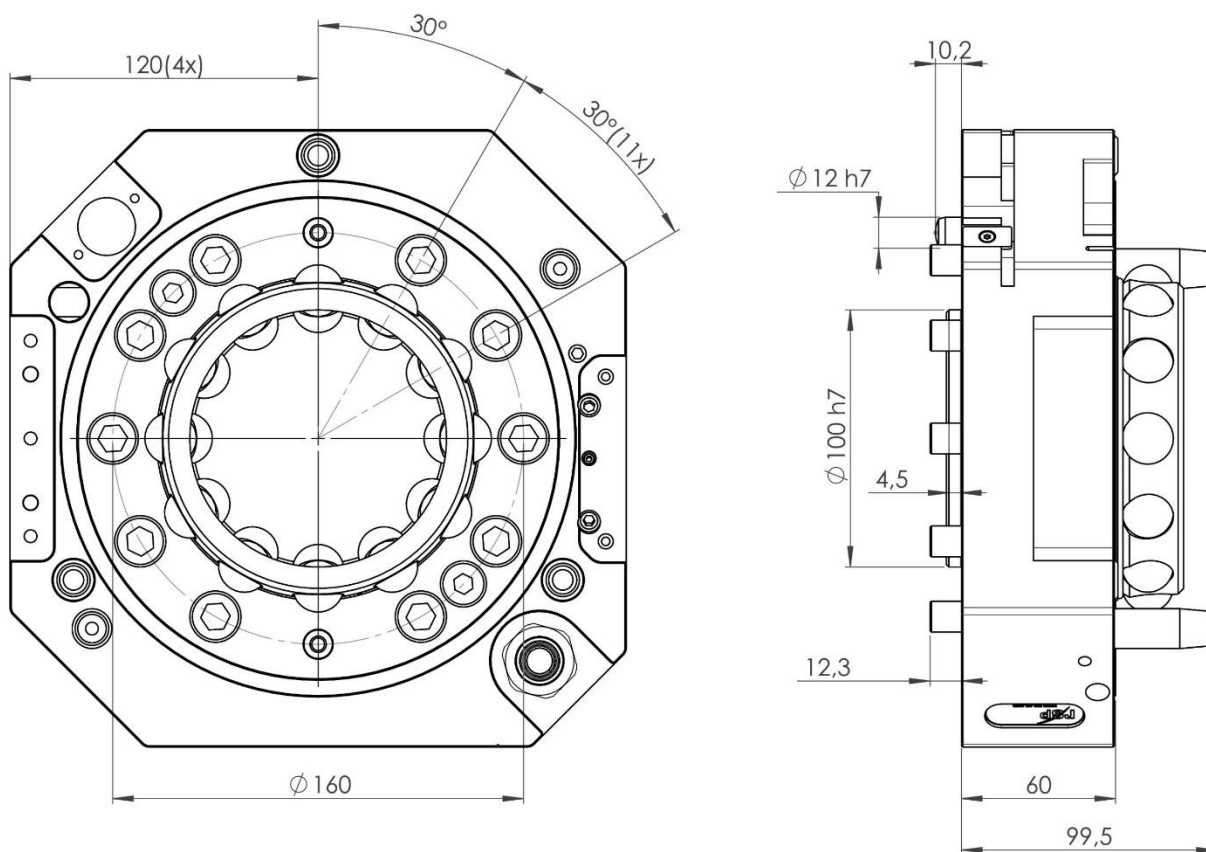
Technical data

Working temperature		++10°C—+50°C
Bolt pattern		ISO 9409-1 125-10-M10
Weight		5.2 kg
Maximum tool load (M10 screws)	Fz (static) Mx/My (dynamic) Mz (dynamic)	±2 400 N ±2 400 Nm ±2 000 Nm
Maximum tool load (M8 screws)	Fz (static) Mx/My (dynamic) Mz (dynamic)	±2 400 N ±2 400 Nm ±1 200 Nm
Air channels	Connection, tool side	1 x G 1/2"



NOTE! Tools can be mounted to the tool attachment using ten M10 screws, alternatively the tool attachment can be mounted to the tool using ten M8 screws.

3.3 Tool changer TC480-1, basic units. Article: P7834



The tool changer P7834 transfers 1 pneumatic channel to the tool attachment. To be used together with tool attachment P7835.

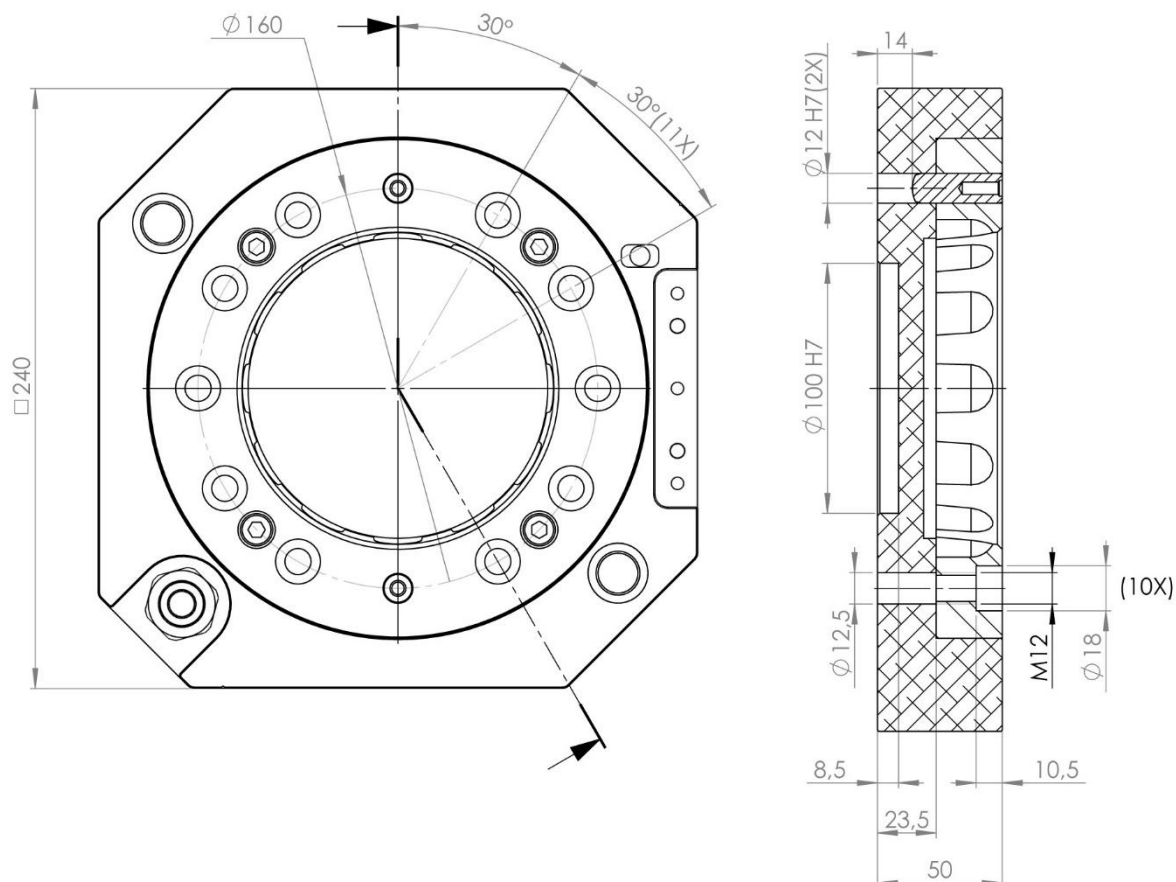
Technical data

Working temperature		+10°C—+50°C
Bolt pattern		ISO 9409-1-160-10-M12
Maximum tool load	Fz (static)	±5 000 N
	Mx/My (dynamic)	±5 000 Nm
	Mz (dynamic)	±3 500 Nm
Weight and centre of gravity (Z)		
TC (P7834)		12.4 kg / 39 mm
TC+TA (P7835)		20.2 kg / 55 mm
Air channels	Pneumatic diagram	Pne0230-011 (section 3.14.2)
	User channels, robot side	1 x G 1/2" (2 000 l/min, max 10 bar)
	Air quality	Oil-clean and waterless filtered air, with max 25µm particle content



NOTE! Tool changer P7834 may also be used together with tool attachment P7837 having 160-10-M10 bolt pattern.

3.4 Tool attachment TA480-1, basic unit. Article: P7835



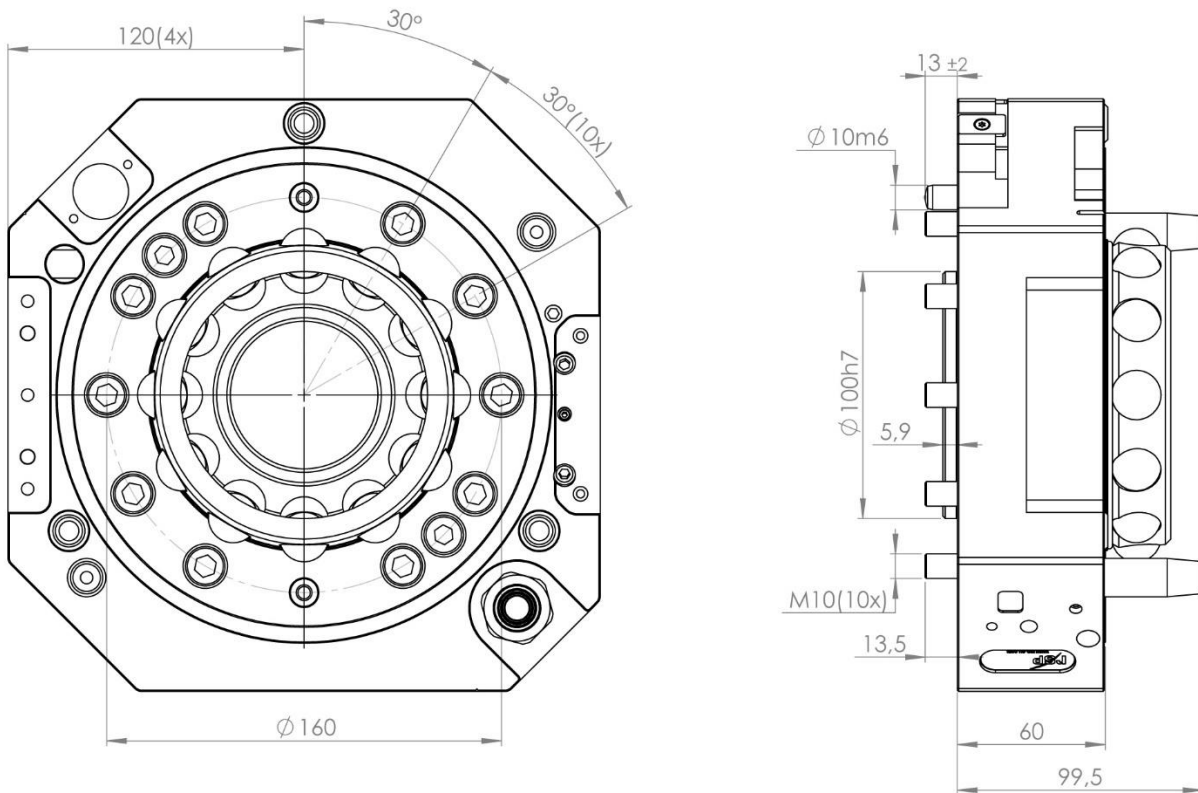
The tool attachment P7835 transfers 1 pneumatic channel to the tool. To be used together with tool changer P7834.

Working temperature		+10°C—+50°C
Bolt pattern		ISO 9409-1 160-10-M12
Weight		7.8 kg
Maximum tool load (M12-screws)	Fz (static)	±5 000 N
	Mx/My (dynamic)	±5 000 Nm
	Mz (dynamic)	±3 500 Nm
Maximum tool load (M10-screws)	Fz (static)	±5 000 N
	Mx/My (dynamic)	±5 000 Nm
	Mz (dynamic)	±2 500 Nm
Air channels	Connection, tool side	1 x G 1/2"



NOTE! Tools can be mounted to the tool attachment using ten M12 screws, alternatively the tool attachment can be mounted to the tool using ten M10 screws.

3.5 Tool changer TC480-1, basic units. Article: P7836



The tool changer P7836 transfers 1 pneumatic channel to the tool attachment. To be used together with tool attachment P7837.

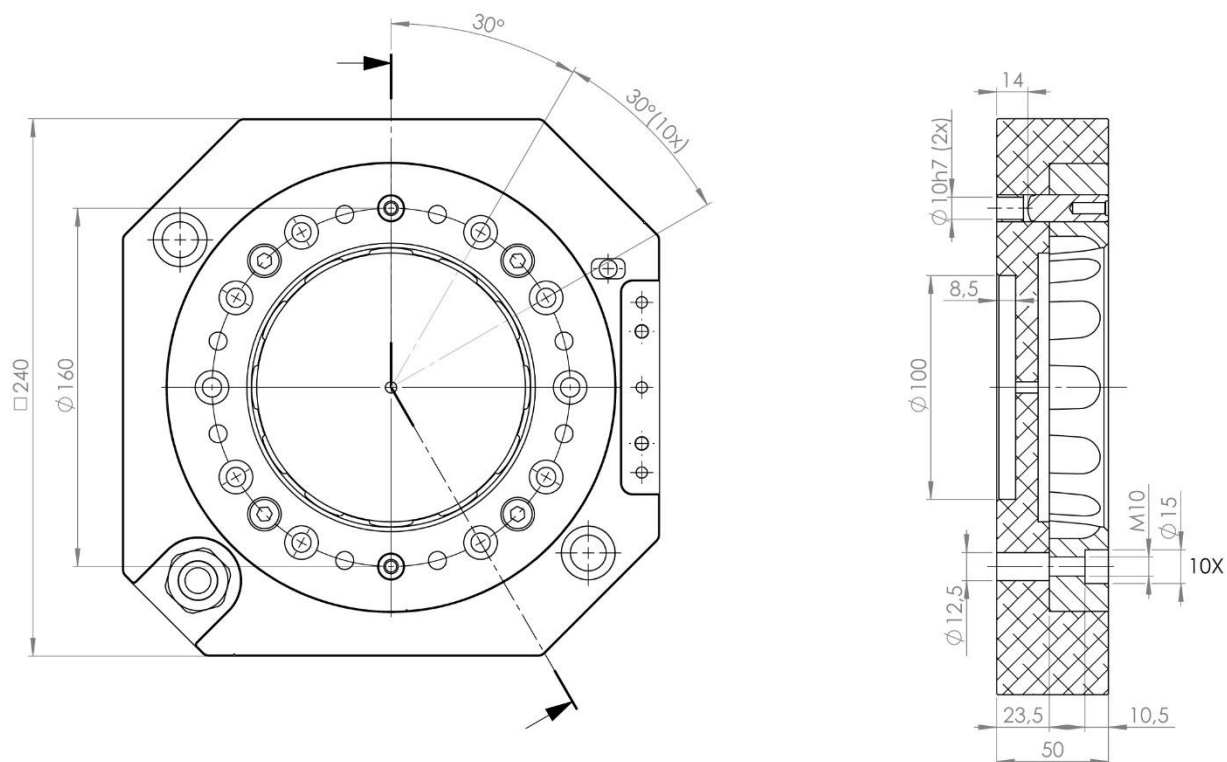
Technical data

Working temperature		+10°C—+50°C
Bolt pattern		ISO 9409-1-160-10-M10
Maximum tool load	Fz (static)	±5 000 N
	Mx/My (dynamic)	±5 000 Nm
	Mz (dynamic)	±2 500 Nm
Weight and centre of gravity (Z)		
TC (P7823)		12.6 kg / 40 mm
TC+TA (P7837)		20.4 kg / 56 mm
Air channels	Pneumatic diagram	Pne0230-011 (section 3.14.2)
	User channels, robot side	1 x G 1/2" (2 000 l/min, max 10 bar)
	Air quality	Oil-clean and waterless filtered air, with max 25µm particle content



NOTE! Tool changer P7836 may also be used together with tool attachment P7835 having 160-10-M12 bolt pattern.

3.6 Tool attachment TA480-1, basic unit. Article: P7837



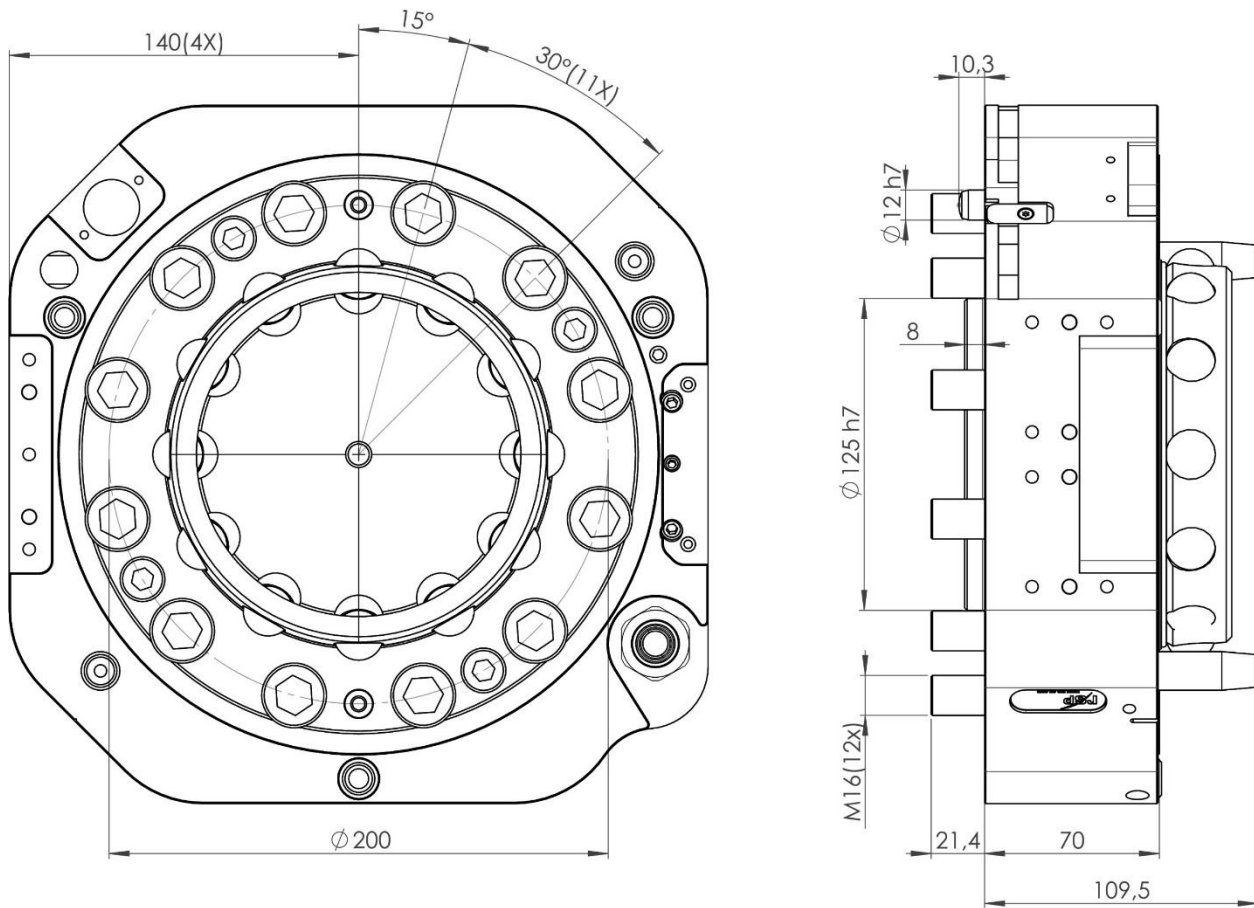
The tool attachment P7837 transfers 1 pneumatic channel to the tool. To be used together with tool changer P7836.

Working temperature		+10°C – +50°C
Bolt pattern		ISO 9409-1 160-10-M10
Weight		7.8 kg
Maximum tool load	Fz (static)	±5 000 N
(M10-screws, screw class 8.8)	Mx/My (dynamic)	±5 000 Nm
	Mz (dynamic)	±2 500 Nm
Maximum tool load	Fz (static)	±5 000 N
(M8-screws, screw class 12.9)	Mx/My (dynamic)	±5 000 Nm
	Mz (dynamic)	±2 500 Nm
Air channels	Connection, tool side	1 x G 1/2"



NOTE! Tools can be mounted to the tool attachment using ten M10 screws, alternatively the tool attachment can be mounted to the tool using ten M8 screws.

3.7 Tool changer TC720-1, basic unit. Article: P6958



The tool changer P6958 transfers 1 pneumatic channel to the tool attachment. To be used together with tool attachment P6959.

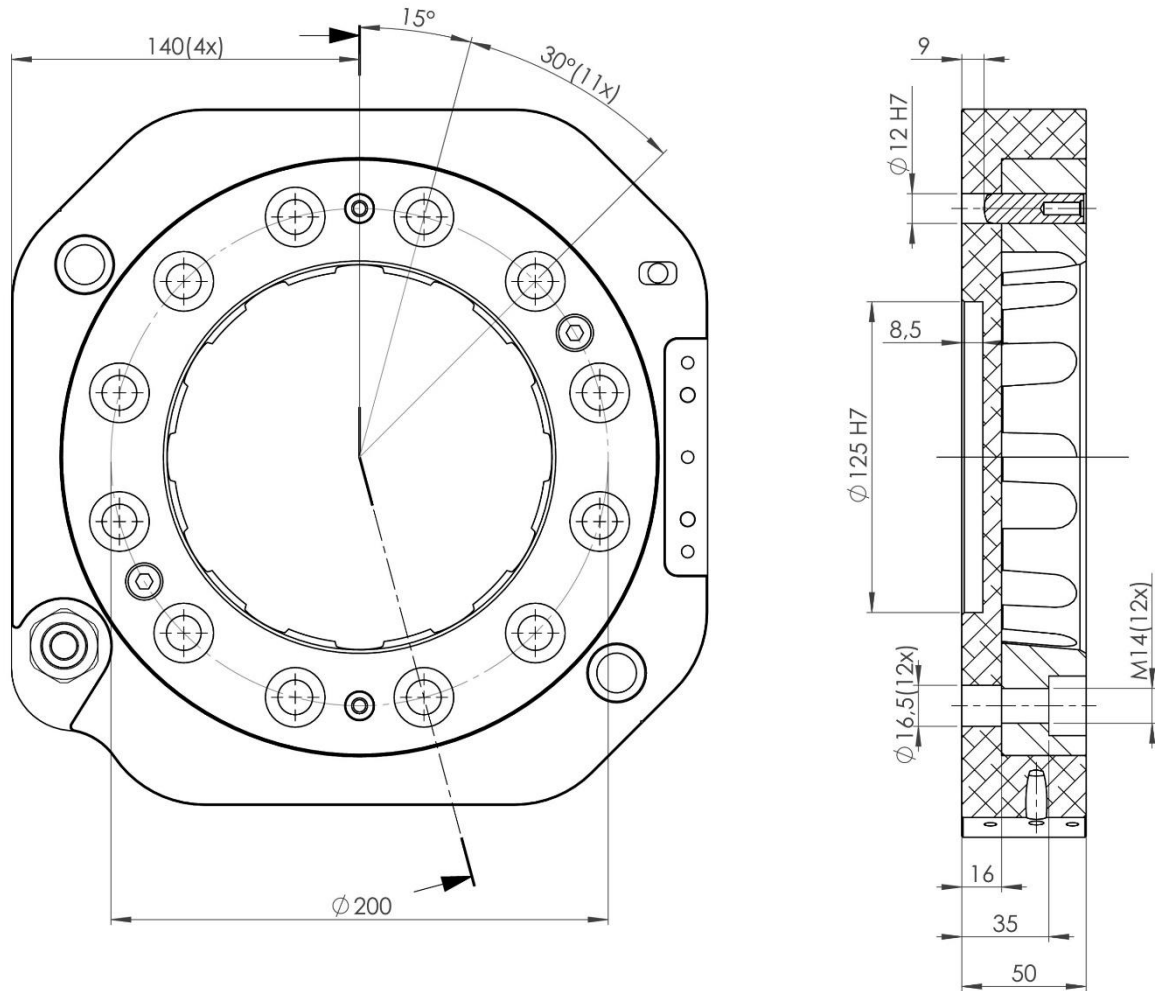
Technical data

Working temperature		+10°C–+50°C
Bolt pattern		ISO 9409-1 200-12-M16
Maximum tool load	Fz (static) Mx/My (dynamic) Mz (dynamic)	±10 000 N ±10 000 Nm ±10 000 Nm
Weight and centre of gravity (Z)	TC (P6958) TC + TA (P6959)	20,4 kg / 45 mm 30.6 kg / 61 mm
Air channels	Pneumatic diagram User channels, robot side Air quality	Pne0230-011 (section 3.14.2) 1 x G 1/2" (2 000 l/min, max 10 bar) Oil-clean and waterless filtered air, with max 25µm particle content



NOTE! Tool changer P6958 may also be used together with tool attachment P6961 having 200-18-M16 bolt pattern.

3.8 Tool attachment TA720-1, basic unit. Article: P6959



The tool attachment P6959 transfers 1 pneumatic channel to the tool. To be used together with tool changer P6958.

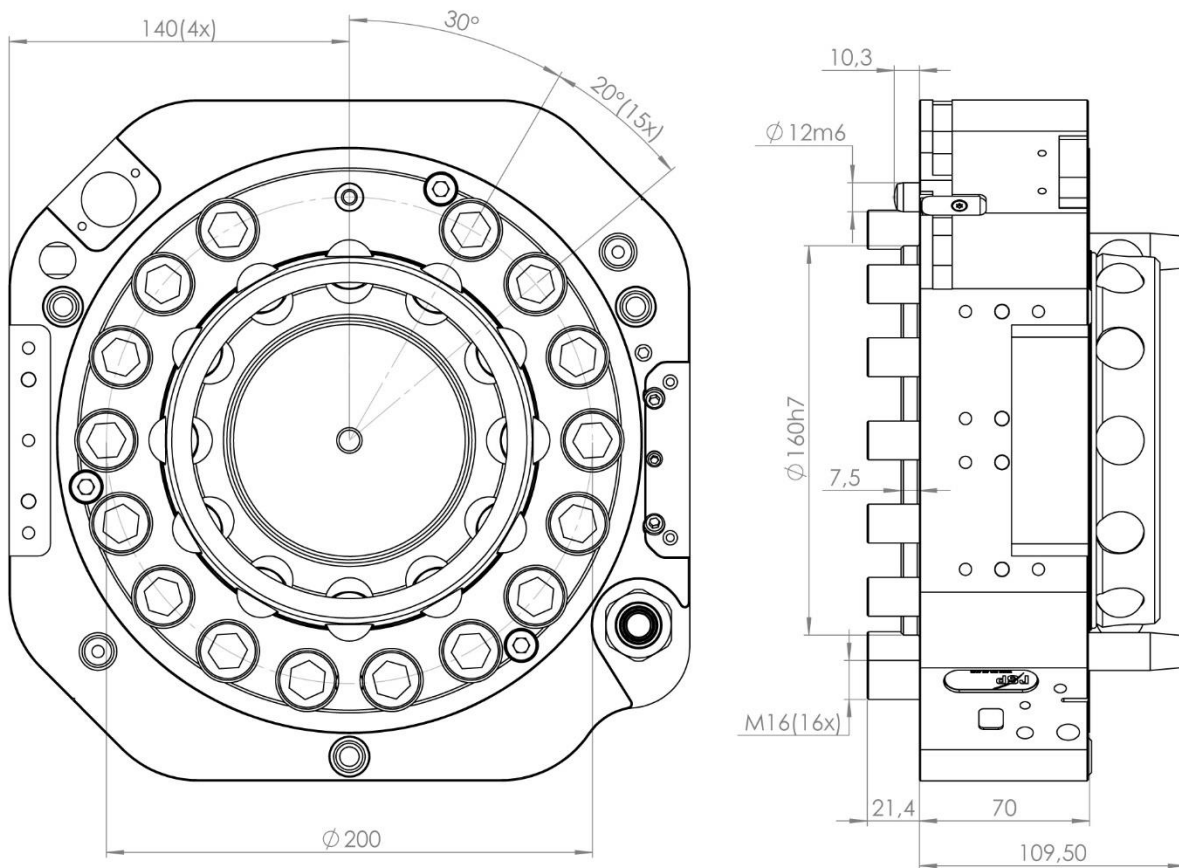
Technical data

Working temperature		+10°C–+50°C
Bolt pattern		ISO 9409-1 200-12-M16
Weight		10.2 kg
Maximum tool load (M16 screws)	Fz (static)	±10 000 N
	Mx/My (dynamic)	±10 000 Nm
	Mz (dynamic)	±10 000 Nm
Maximum tool load (M14 screws)	Fz (static)	±10 000 N
	Mx/My (dynamic)	±10 000 Nm
	Mz (dynamic)	±7 500 Nm
Air channels	Connection, tool side	1 x G ½"



NOTE! Tools can be mounted to the tool attachment using twelve M16 screws, alternatively the tool attachment can be mounted to the tool using twelve M14 screws.

3.9 Tool changer TC720-1, basic unit. Article: P6960



The tool changer P6960 transfers 1 pneumatic channel to the tool attachment. To be used together with tool attachment P6961.

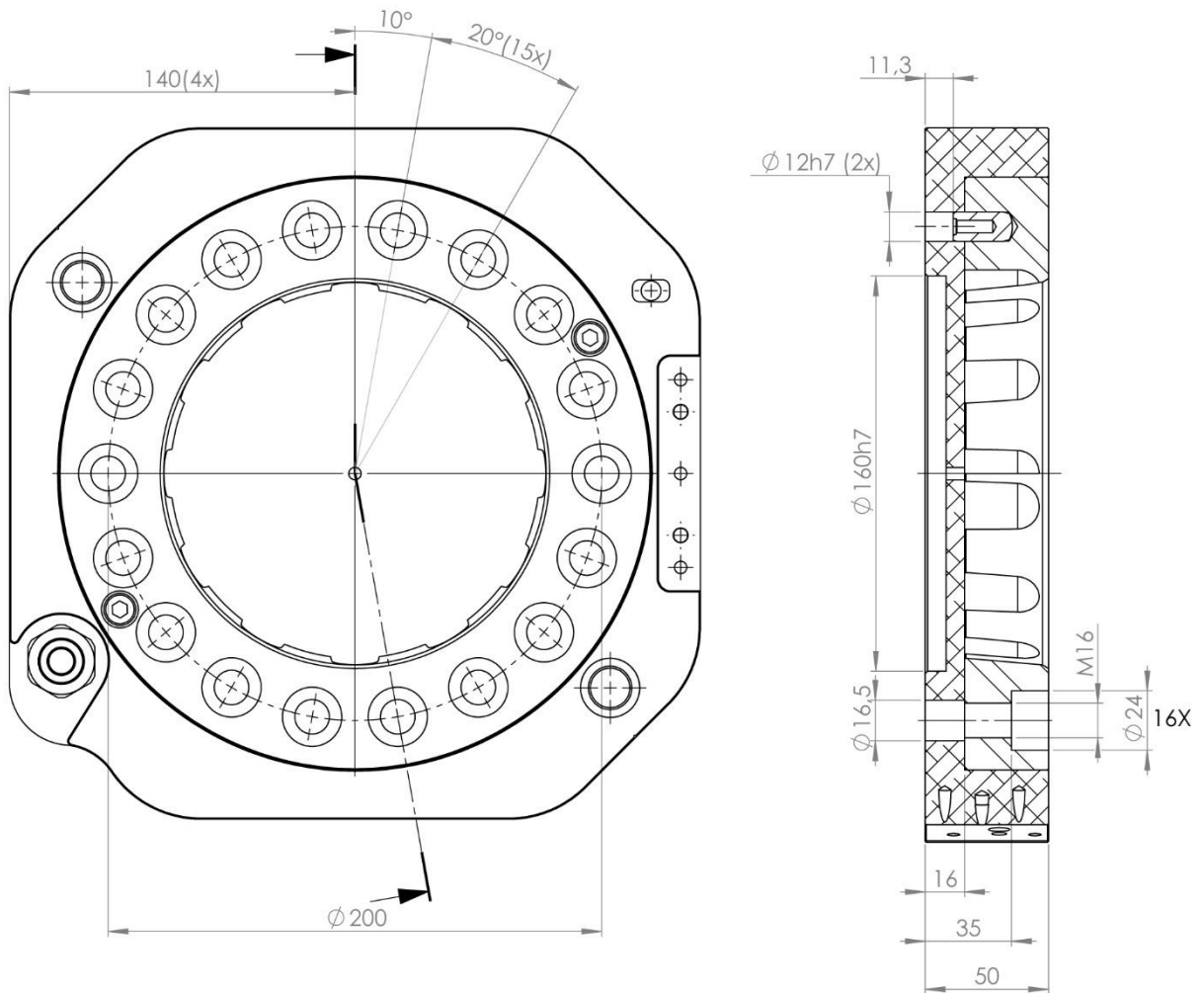
Technical data

Working temperature		+10°C–+50°C
Bolt pattern		ISO 9409-1 200-16-M16
Maximum tool load	Fz (static) Mx/My (dynamic) Mz (dynamic)	±10 000 N ±10 000 Nm ±10 000 Nm
Weight and centre of gravity (Z)		
TC (P6960)		20,4 kg / 45 mm
TC + TA (P6961)		30.6 kg / 61 mm
Air channels	Pneumatic diagram User channels, robot side Air quality	Pne0230-011 (section 3.14.2) 1 x G ½" (2 000 l/min, max 10 bar) Oil-clean and waterless filtered air, with max 25µm particle content



NOTE! Tool changer P6960 may also be used together with tool attachment P6959 having 200-12-M16 bolt pattern.

3.10 Tool attachment TA720-1, basic unit. Article: P6961



The tool attachment P6961 transfers 1 pneumatic channel to the tool. To be used together with tool changer P6960.

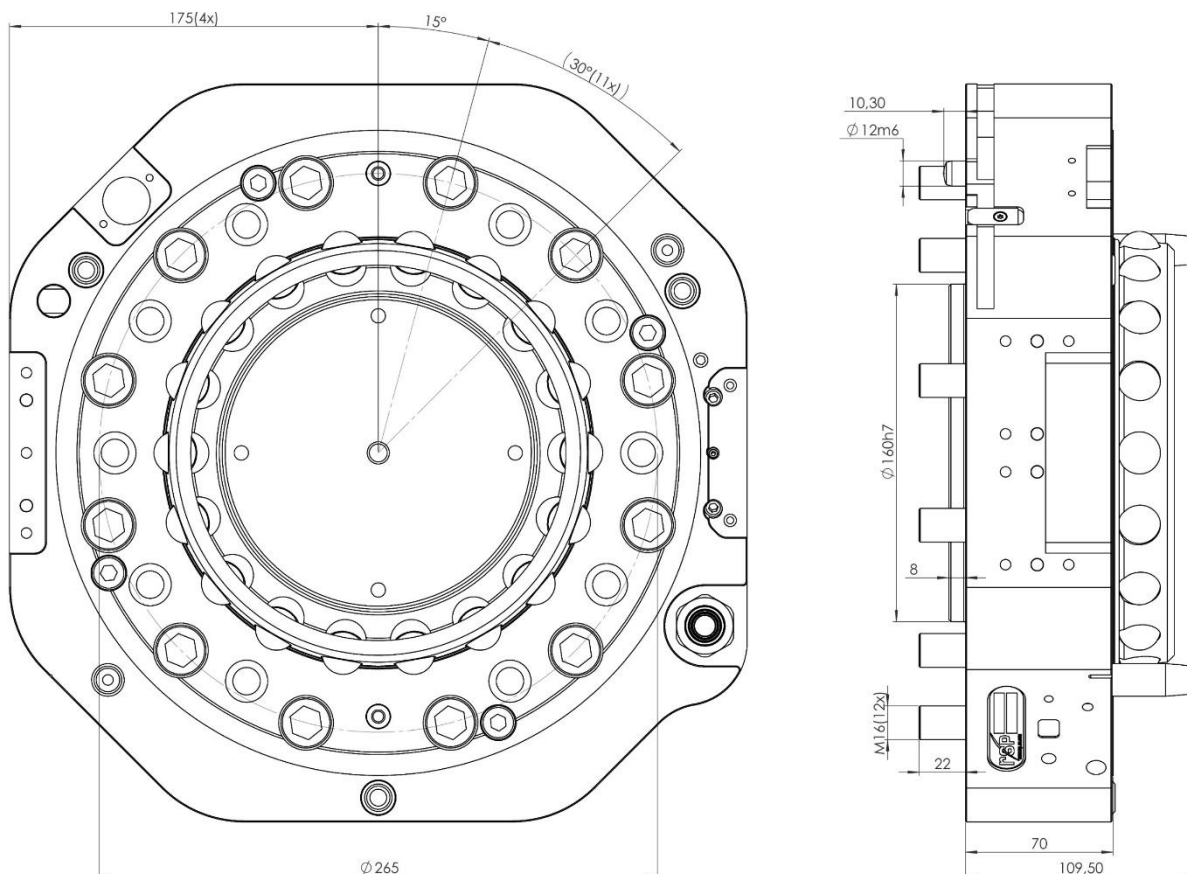
Technical data

Working temperature		+10°C–+50°C
Bolt pattern		ISO 9409-1 200-16-M16
Weight		10.2 kg
Maximum tool load	Fz (static)	±10 000 N
	Mx/My (dynamic)	±10 000 Nm
	Mz (dynamic)	±10 000 Nm
Air channels	Connection, tool side	1 x G ½"



NOTE! Tools can be mounted to the tool attachment using sixteen M16 screws, alternatively the tool attachment can be mounted to the tool using sixteen M14 screws.

3.11 Tool changer TC960-1, basic unit. Article: P7924

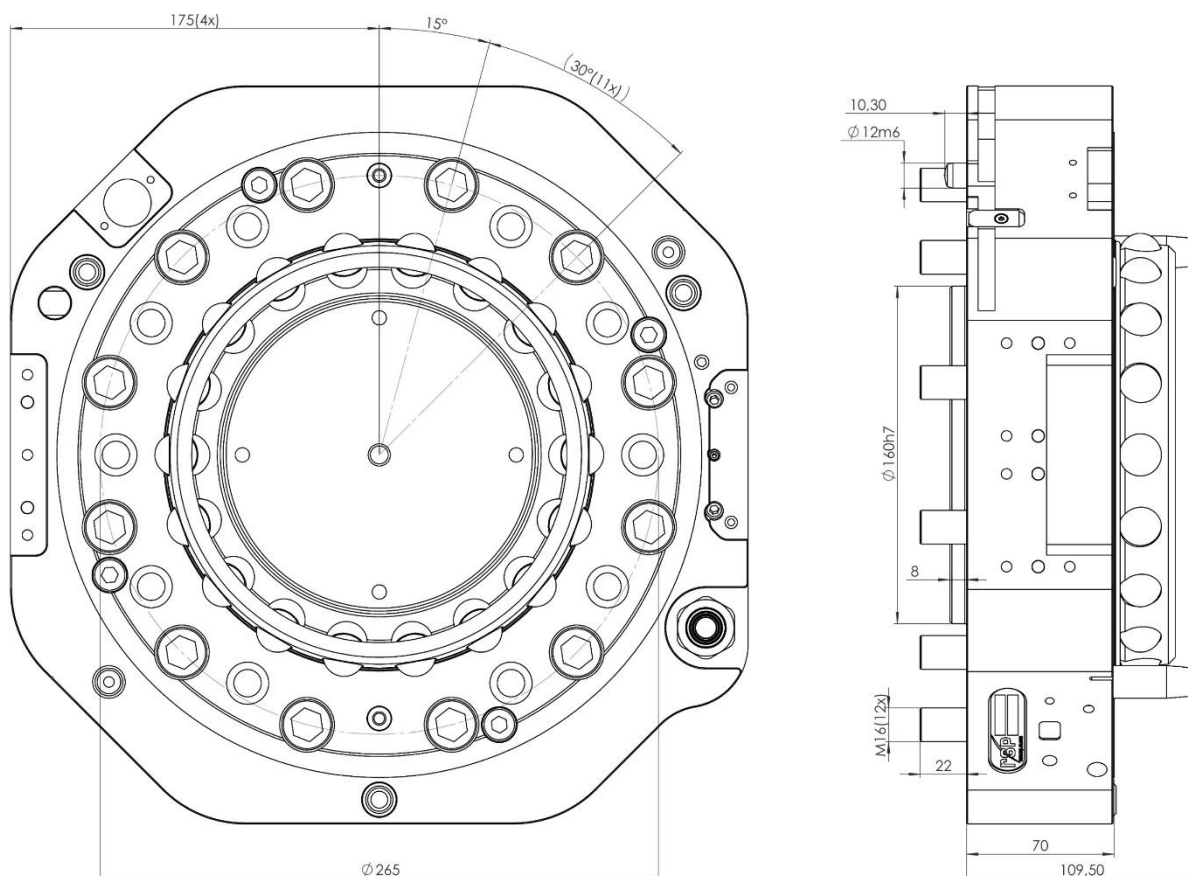


The tool changer P7924 transfers 1 pneumatic channel to the tool attachment. To be used together with tool attachment P7925.

Technical data

Working temperature		+10°C–+50°C
Bolt patterns		ISO 9409-1 265-12-M16, alternatively 250-10-M12 with screws not included
Maximum tool load	Fz (static) Mx/My (dynamic) Mz (dynamic)	±15 000 N ±15 000 Nm ±12 500 Nm
Weight and centre of gravity (Z)	TC (P7924) TC + TA (P7925)	27,7 kg / 46 mm 43.6 kg / 61 mm
Air channels	Pneumatic diagram User channels, robot side Air quality	Pne0230-011 (section 3.14.2) 1 x G 1/2" (2 000 l/min, max 10 bar) Oil-clean and waterless filtered air, with max 25µm particle content

3.12 Tool changer TC960-1, basic unit. Articles: P7924-1

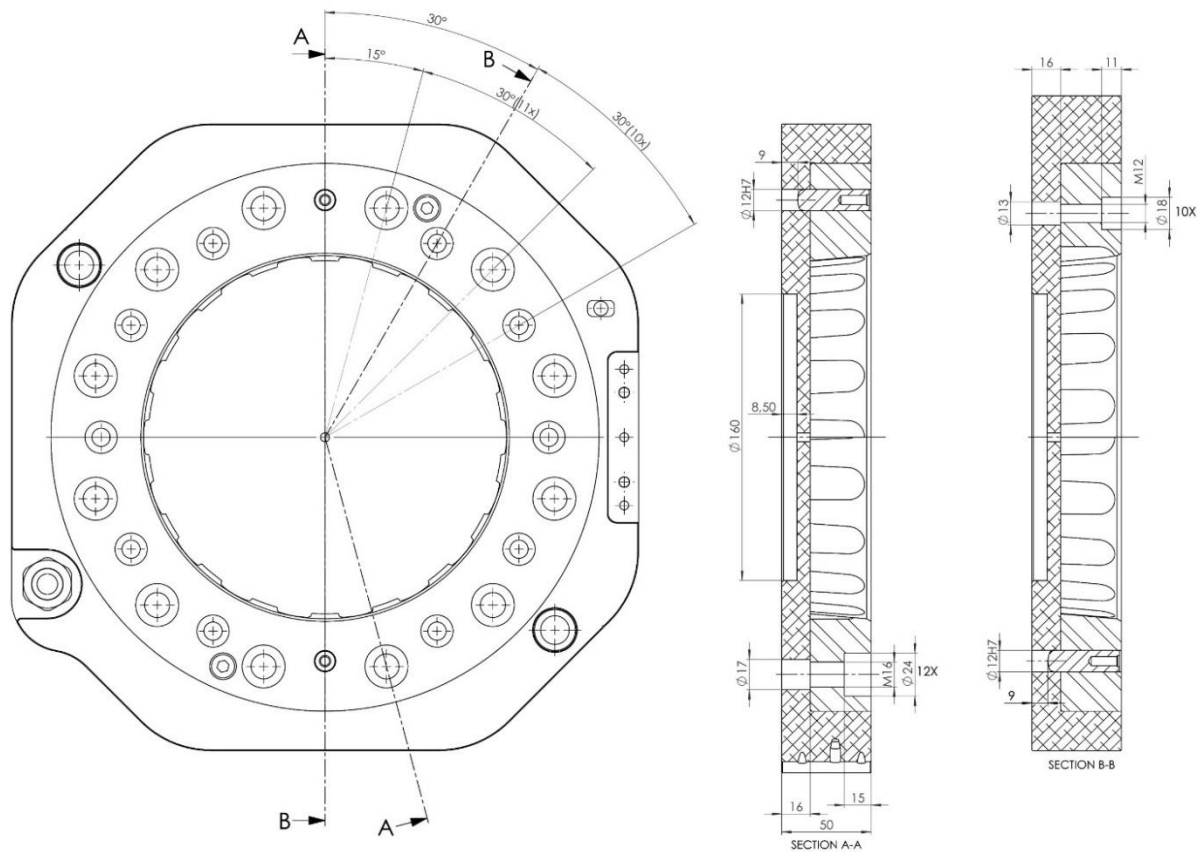


The tool changer P7924-1 transfers 1 pneumatic channel to the tool attachment. To be used together with tool attachment P7925.

Technical data

Working temperature		+10°C–+50°C
Bolt patterns		ISO 9409-1 250-10-M12, alternatively 265-12-M16 with screws not included
Maximum tool load (P7924)	Fz (static)	±15 000 N
	Mx/My (dynamic)	±15 000 Nm
	Mz (dynamic)	±12 500 Nm
Maximum tool load (P7924-1, screw class 12.9)	Fz (static)	±15 000 N
	Mx/My (dynamic)	±10 000 Nm
	Mz (dynamic)	±9 000 Nm
Weight and centre of gravity (Z)		
TC (P7924/P7924-1)		27,7 kg / 46 mm
TC + TA (P7925)		43.6 kg / 61 mm
Air channels	Pneumatic diagram	Pne0230-011 (section 3.14.2)
	User channels, robot side	1 x G ½" (2 000 l/min, max 10 bar)
	Air quality	Oil-clean and waterless filtered air, with max 25µm particle content

3.13 Tool attachment TA960-1, basic unit. Article: P7925



The tool attachment TA960-1 transfers 1 pneumatic channel to the. To be used together with tool changer P7924 or P7924-1.

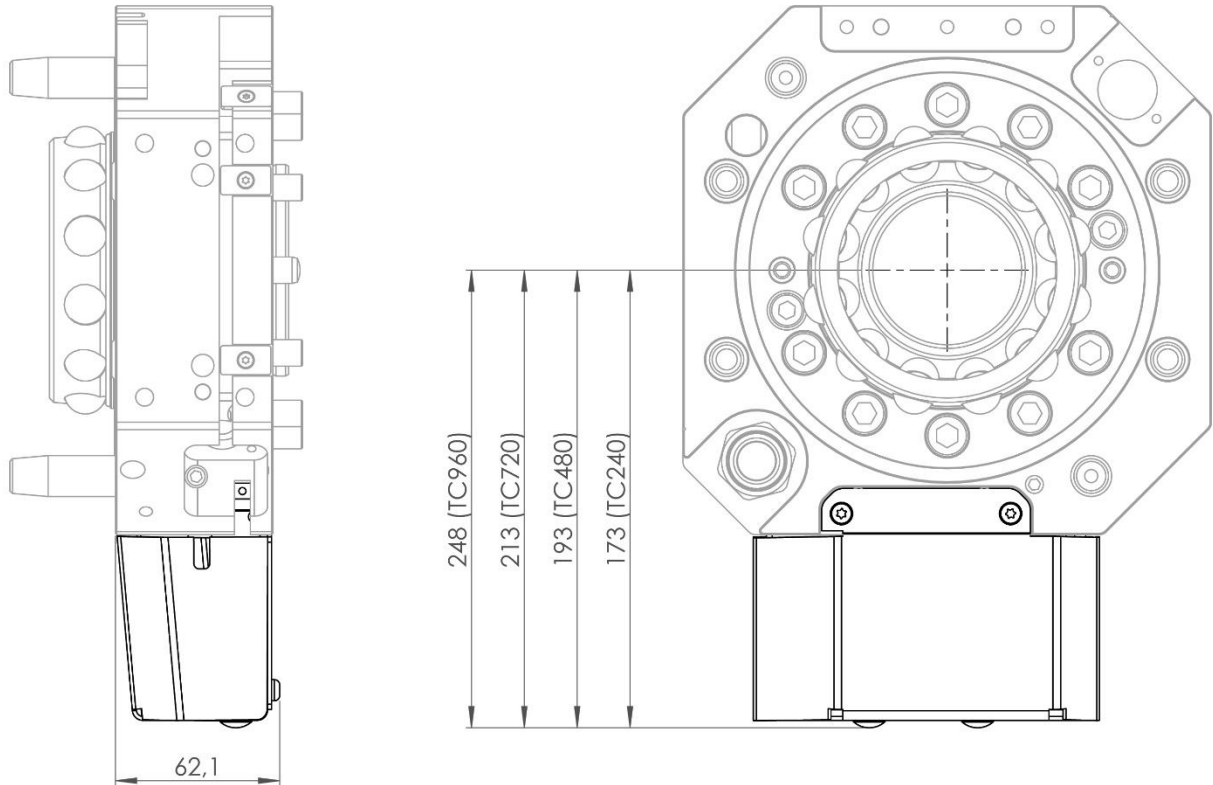
Technical data

Working temperature		+10°C–+50°C
Bolt patterns		ISO 9409-1 265-12-M16 / 250-10-M12
Weight		15.9 kg
Maximum tool load (265-12-M16 with M16, screw class 8.8)	Fz (static) Mx/My (dynamic) Mz (dynamic)	±15 000 N ±15 000 Nm ±12 500 Nm
Maximum tool load (265-12-M16 with M14, screw class 8.8)	Fz (static) Mx/My (dynamic) Mz (dynamic)	±15 000 N ±15 000 Nm ±10 000 Nm
Maximum tool load (250-10-M12 with M12, screw class 12.9)	Fz (static) Mx/My (dynamic) Mz (dynamic)	±15 000 N ±10 000 Nm ±9 000 Nm
Maximum tool load (250-10-M12 with M10, screw class 12.9)	Fz (static) Mx/My (dynamic) Mz (dynamic)	±15 000 N ±7 000 Nm ±6 000 Nm
Air channels	Connection, tool side	1 x G ½"



NOTE! Tools can be mounted to the tool attachment using twelve M16 screws or ten M12 screws, alternatively the tool attachment can be mounted to the tool using twelve M14 screws or ten M10 screws.

3.14 Integrated valve for TC Open/TC Close. Article: P7710-4



Includes two integrated valves. The TC Close valve is in passive position open, which is locking the tool changer. The TC Open valve is in passive position evacuating the air from the unlocking side of the piston inside the tool changer, which is allowing the tool to be locked.

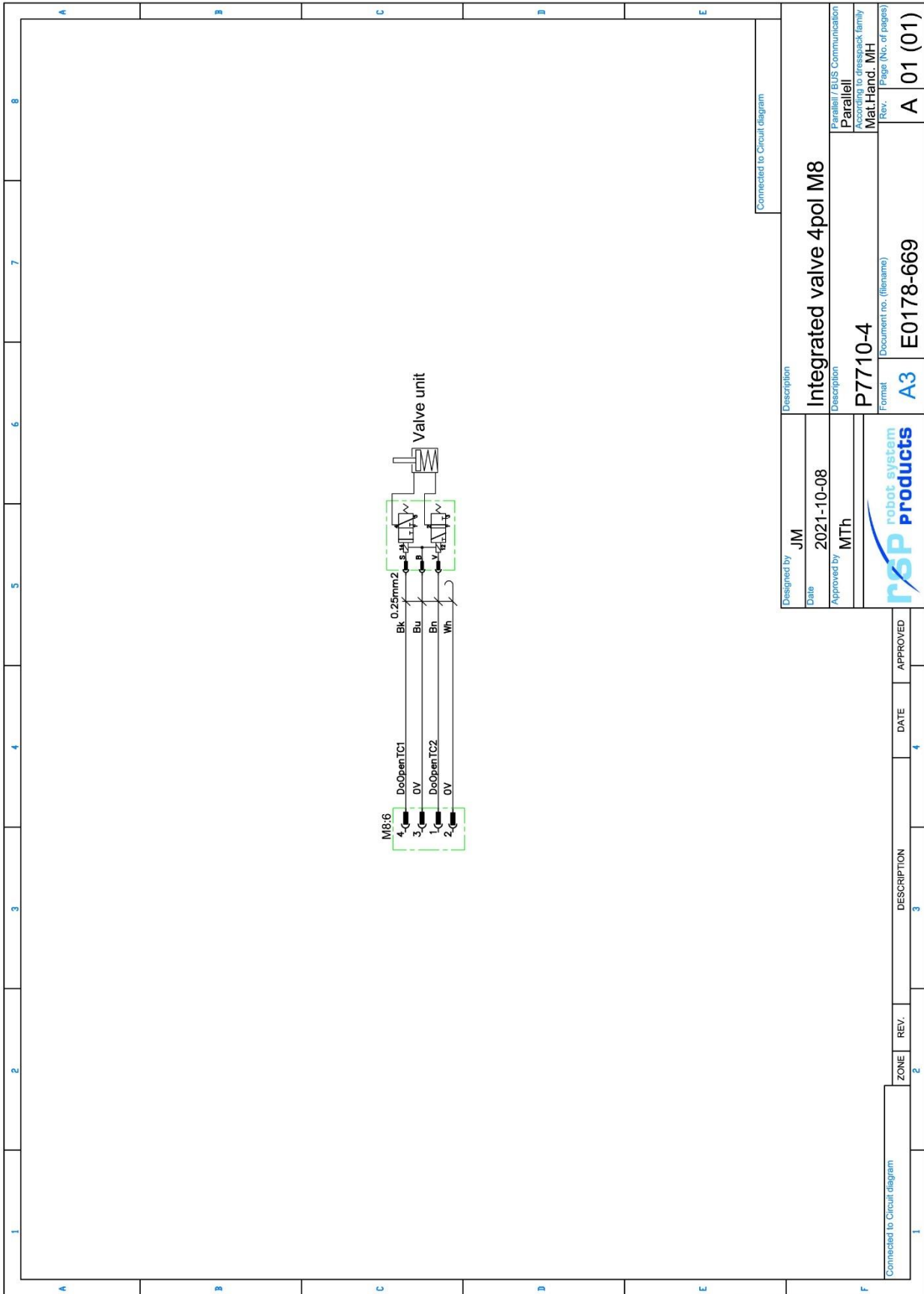
In order to Open (unlock) the tool changer, the signals “doOpen TC 1” and “doOpen TC 2” shall both be set to +24V DC. If one or both of the electrical signals disappear the tool changer will go to closed (locked) position. Air is supplied via Air in on the tool changer.

To be mounted at one dedicated position on the tool changer.

Technical data

Weight		0.3 kg
Electrical signals	Circuit diagram M8 4p	E0178-669 (section 3.14.1) doOpen TC 1. doOpen TC 2, 0V
Air channels	Pneumatic diagram Air supply Air quality	Pne0230-011 (section 3.14.2) Air in (marked “AIR” on TC), 6-10 bar Oil-clean and waterless filtered air, with max 25µm particle content

3.14.1 Circuit diagram, E0178-669 for integrated valve

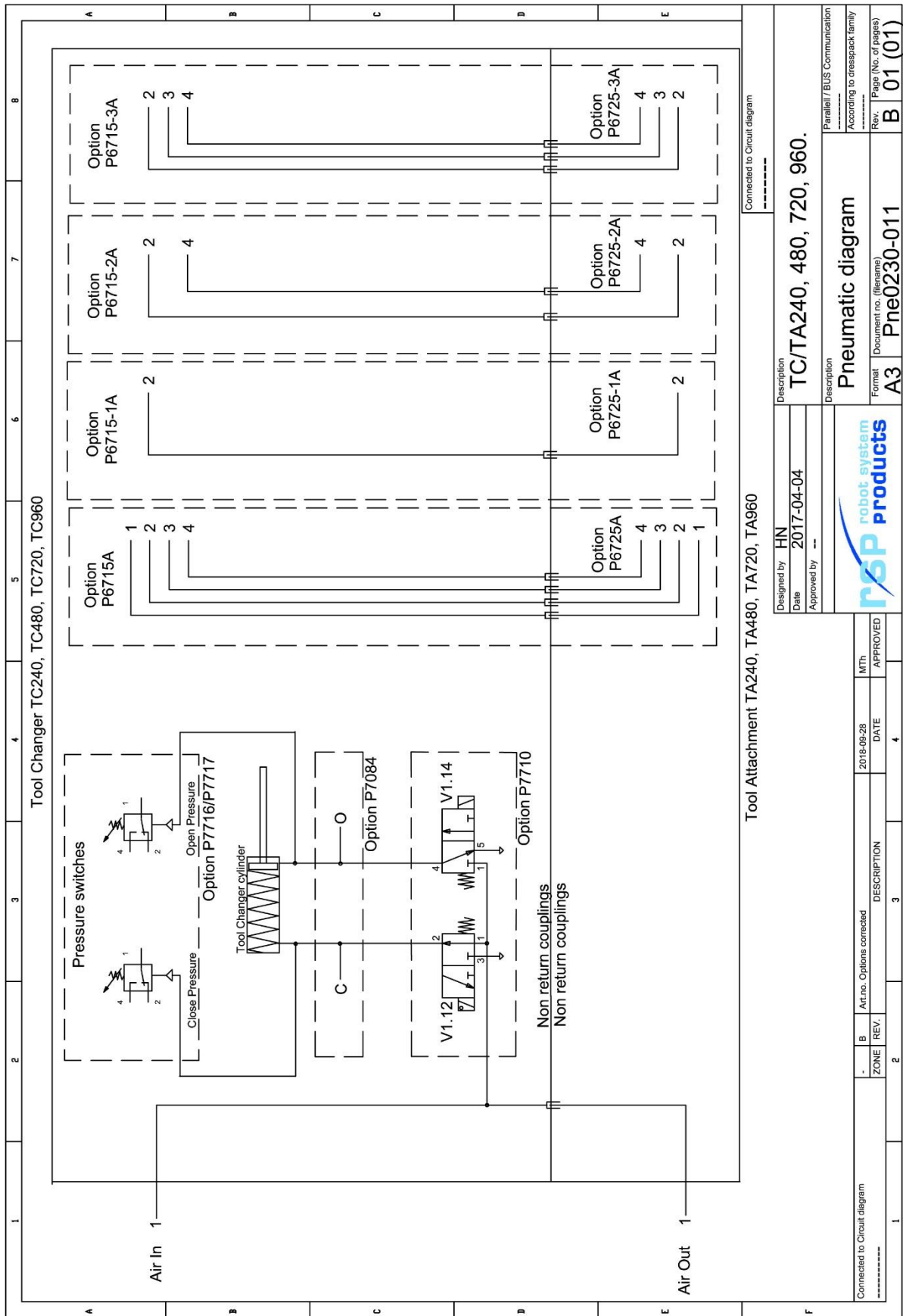


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Designed by	JM	Description	Integrated valve 4pol M8
Date	2021-10-08	Description	P7710-4
Approved by	MTh	Format	A3
		Document no. (filename)	E0178-669
		Parallel / BUS Communication	Parallel
		According to dresspack family	Mat.Hand. MH
		Rev.	Page (No. of pages)
			A 01 (01)

robot system		APPROVED
RSP Products		DATE
ZONE	DESCRIPTION	DATE
2	3	4
1		

3.14.2 Pneumatic diagram Pne0230-011



3.15 Analog pressure sensor. Article: P7257A

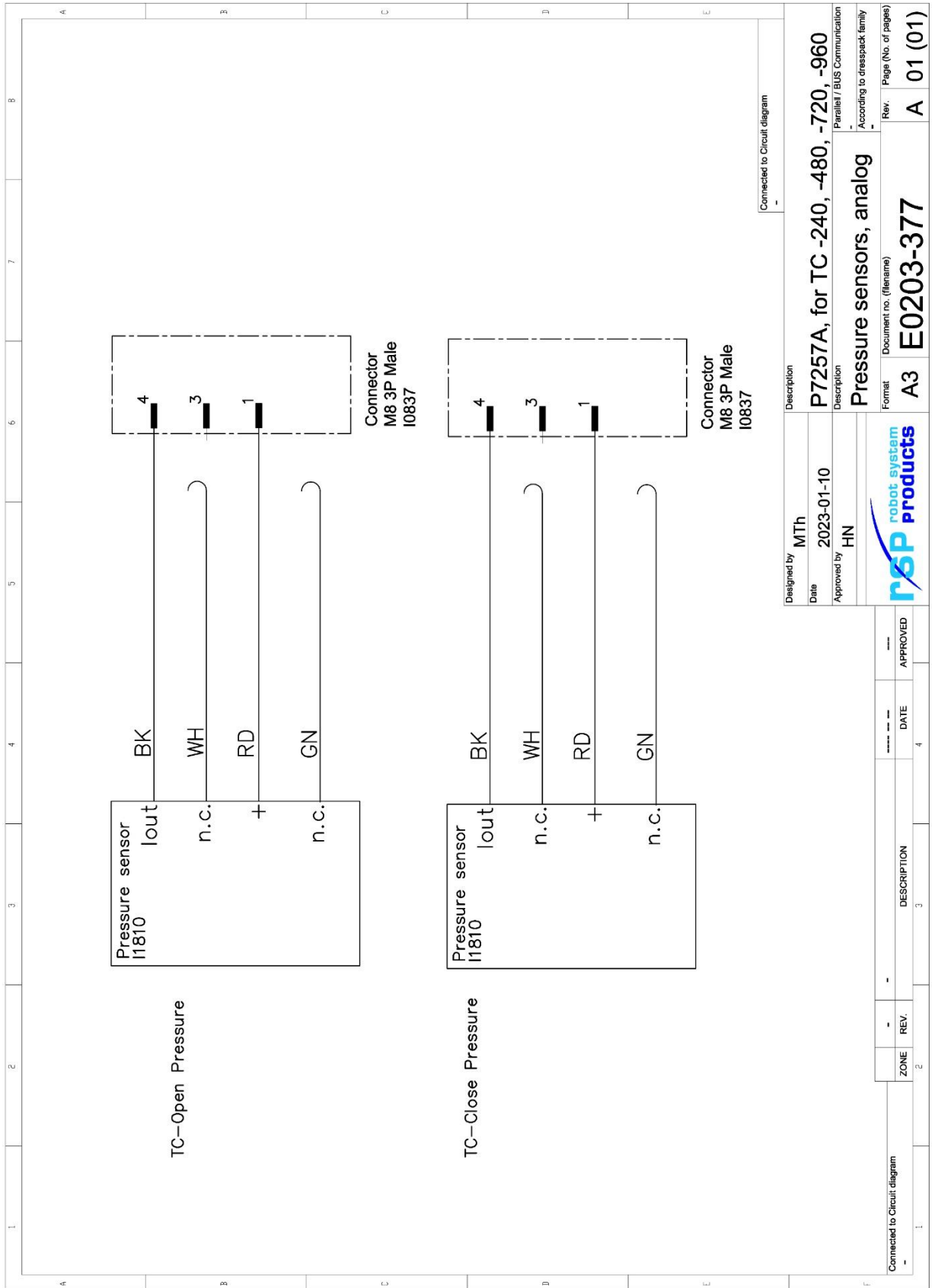


One pressure sensor which gives an analogue signal dependent on the pressure on the unlocking side of the locking piston and another pressure sensor which gives an analogue signal dependent on the pressure on the locking side of the locking piston.

Technical data

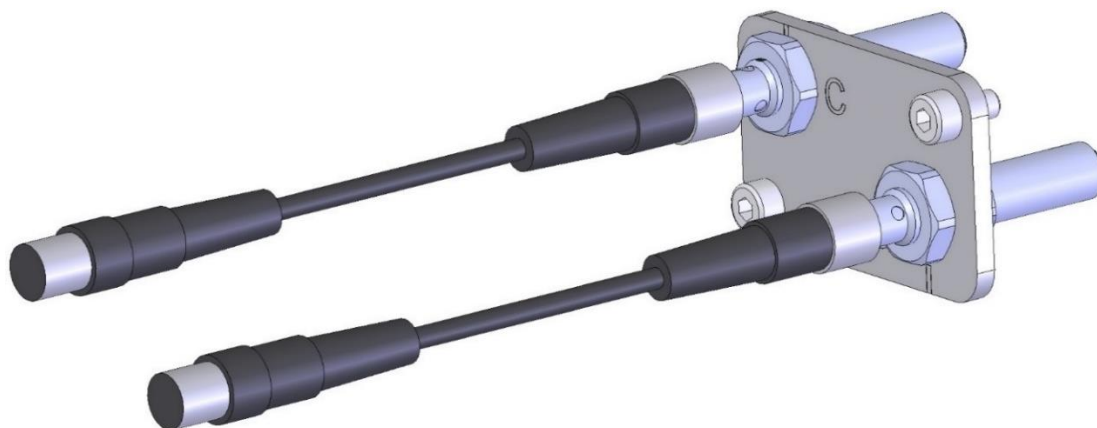
Weight		0.2 kg
Electrical signals	Circuit diagram	E0203-377 (section 3.15.1)
	M8 3P	TC_Close_Pressure, 24 V
	M8 3P	TC_Open_Pressure, 24 V

3.15.1 Circuit diagram, E0203-377 for P7145-1



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3.16 Magnetic sensors TC Opened/TC Closed. Articles: P6789, P7173, P7174, P7293 and P7175

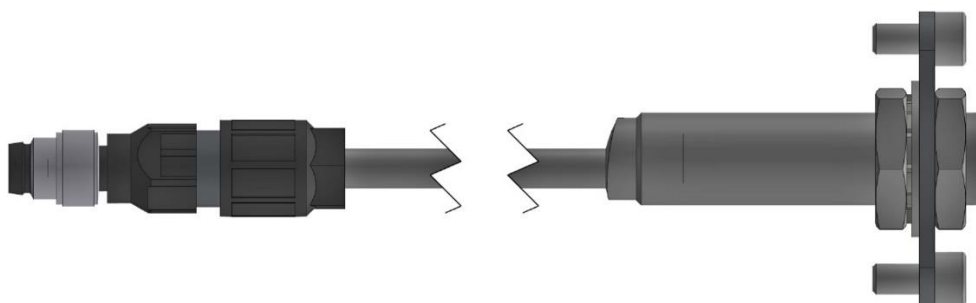


One magnetic sensor which gives signal “TC_Opened” when tool changer is unlocked and one which gives signal “TC_Closed” when tool changer is locked. To be mounted at one dedicated position on the tool changer. Each magnetic sensor is dedicated for specific tool changers.

Technical data

Weight		0.05 kg
Electrical signals	M8 3P	TC_Opened, 0V, 24 V
	M8 3P	TC_Closed, 0V, 24 V
Magnetic sensor		Tool changers
P6789		P7720 (TC240-1)
P7173		P7830 and P7832 (TC480-1)
P7174		P6962 (TC720-1)
P7293		P6956 (TC720-1)
P7175		P7921 and P7923 (TC960-1)

3.17 TC Empty sensor. Article: P7145-1

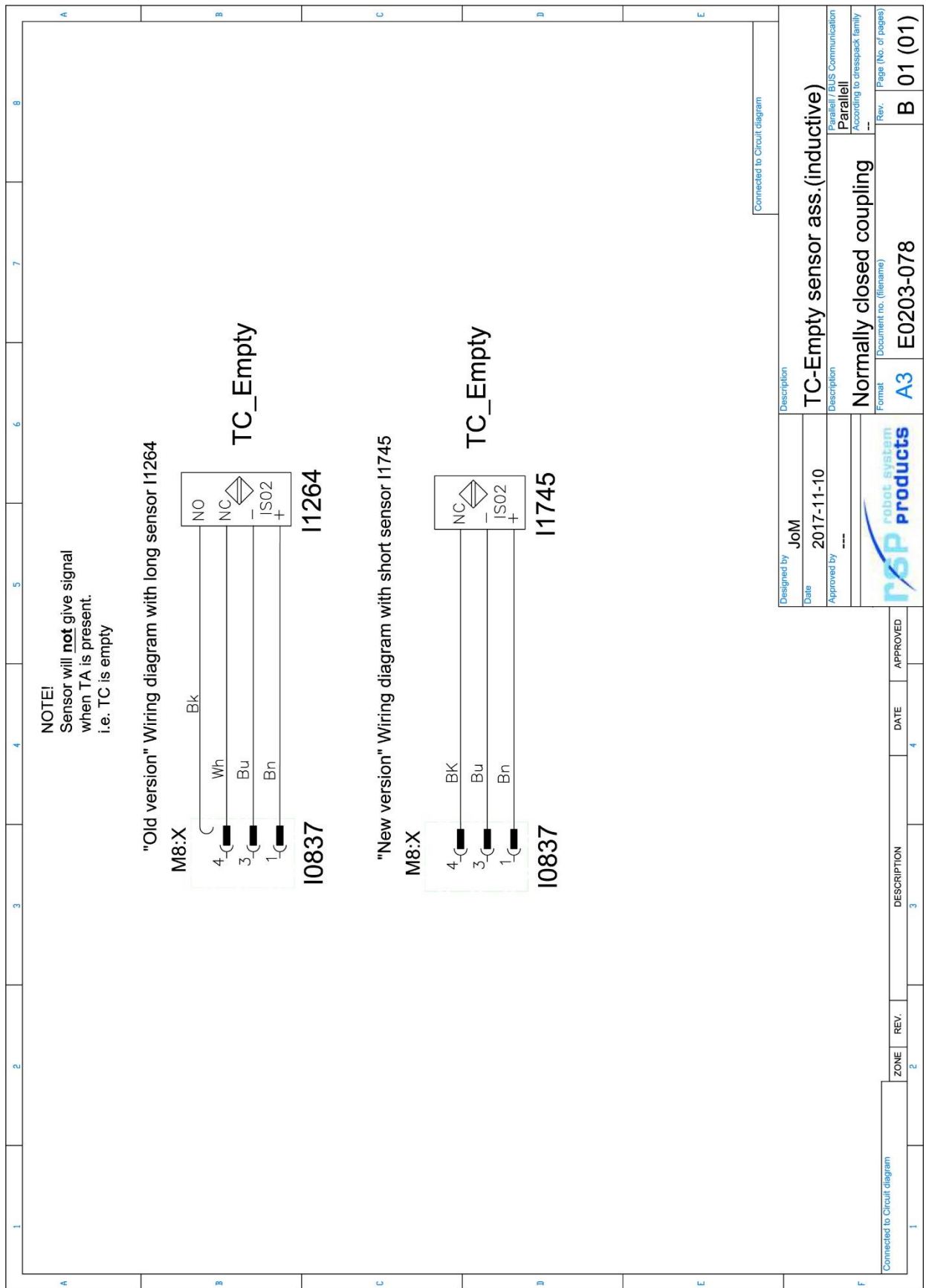


One inductive sensor which gives +24V signal “TC_Empty” when tool attachment is not present at tool changer. To be mounted at one dedicated position on the tool changer.

Technical data

Weight		0.05 kg
Electrical signals	Circuit diagram	E0203-078 (section 3.17.1)
	M8 8P	TC_Empty, 0V, 24 V

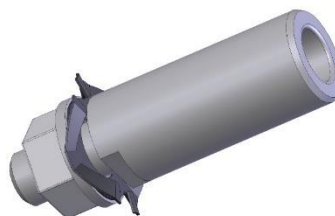
3.17.1 Circuit diagram, E0203-078 for P7145-1



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3.18 TC ground socket. Article: P7239

To be mounted at one dedicated position on the tool changers and used for ground connection between the tool changer, tool attachment and ground cable.

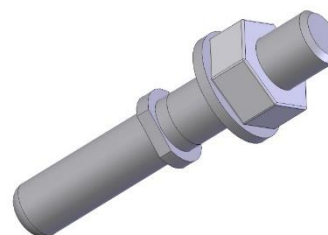


Technical data

Weight	0.01 kg
Connection, ground	M5/M8 (screw holes on tool changer)
Max current	140A

3.19 TA ground pin. Article: P7147

To be mounted at one dedicated position on the tool attachments and used for ground connection between tool attachment, tool changer and tool.



Technical data

Weight	0.01 kg
Connection, ground	M5/M8 (screw holes on tool attachment)
Max current	140A

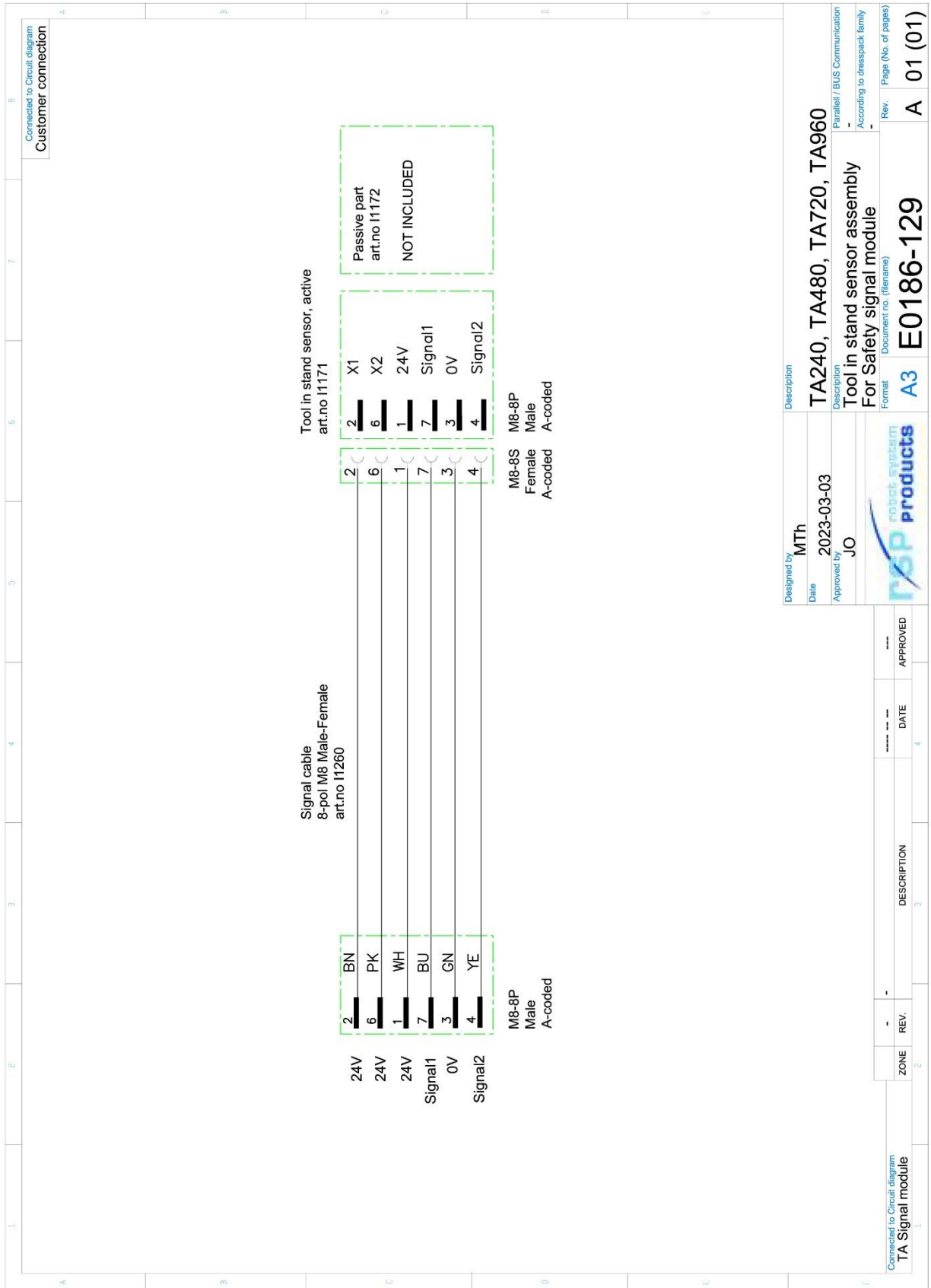
3.20 Tool in stand sensor, active. Articles: P8528



RFID sensor which gives +24V signal "Tool_In_Stand1" and "Tool_In_Stand2" when tool is positioned in tool stand. To be mounted on the tool attachment and combined with passive sensor I1172 mounted on a dedicated position on the tool stand.

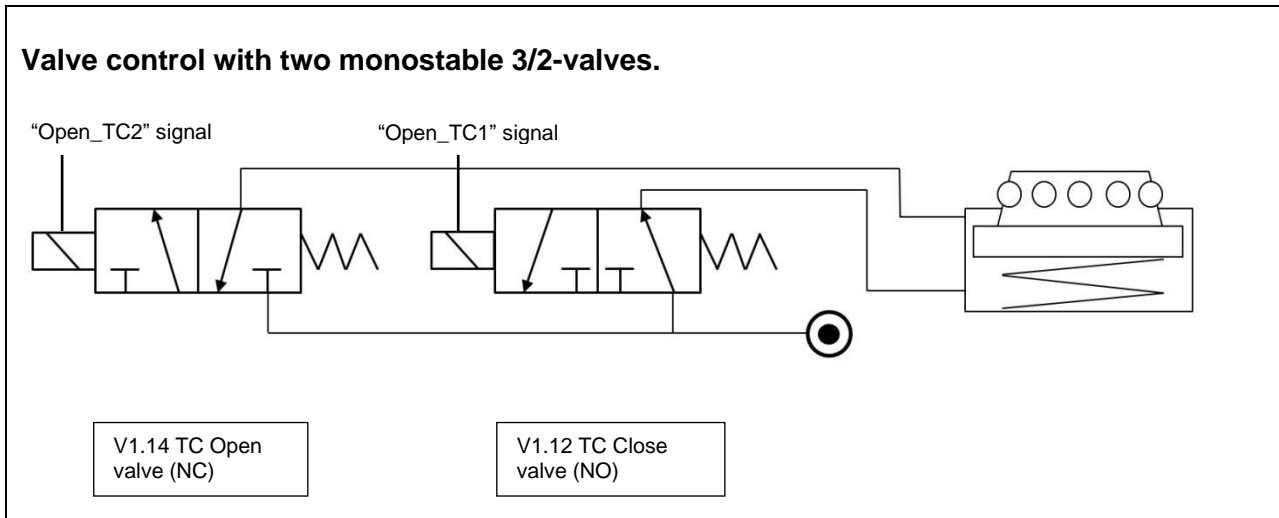
Weight	0.05 kg
Electrical signals	Circuit diagram M8 8P
	E0203-384 (section 3.20.1) Tool_In_Stand1, Tool_In_Stand2, 0V, 24V

3.20.1 Circuit diagram, E0203-384 for P8528



4 TC OPERATION AND INTERFACE

4.1 Software function



- The right valve, called TC Close, will in passive position allow the air pressure to move the piston in the direction locking the tool. In active position the air will be allowed to be evacuated from the cylinder without impacting the piston.
- The left valve, called TC Open, will in active position let the air pressure move the piston in the direction unlocking the tool. In passive position the air will be evacuated from this side of the cylinder, allowing the tool to be locked.
- As a consequence, both valves must be activated to open the tool changer.
- For opening of the tool changer, one of the following conditions must be met:
 - * When there is no tool attachment mounted, the tool changer can be opened.
 - * When there is a tool attachment mounted, it is only possible to open the tool changer when it is positioned in the tool stand.

For more information see *Product Manual for Safety signal module P7501-xxx (M8353-1)*.

4.2 Programming

The following will ensure a correct docking position.

	Action
1	Attach a spare tool attachment to the tool changer.
2	Position the spare tool attachment above the tool attachment that is mounted at the tool.
3	The correct position is found when the tool attachments are parallel, centered and the engraved arrows are on the same line.
4	Save the position. The robot can move to this position with high speed.
5	Dismount the spare tool attachment.
6	Go back to the saved position and move the tool changer (in axis 6 direction) the remaining distance to the tool attachment (mounted at the tool).
7	Save the position. The robot should move the final distance to this position with low speed.

4.3 Sparking



WARNING! Electrical and power signals (see NOTE! below) must be switched off and disconnected when docking the tool attachment. This is to prevent sparking between signal pins and tool attachment.



NOTE!

Supply of +24V will be shut off automatically by the internal logic of the Safety signal module P7501-xxx.

4.4 Tool Stand



NOTE!

To guarantee reliability and a long service-life for the tool changer, the tool stand must be stable, both in terms of its design and attachment.



NOTE!

The tool stand must not be spring-loaded!

4.5 Tool Identification

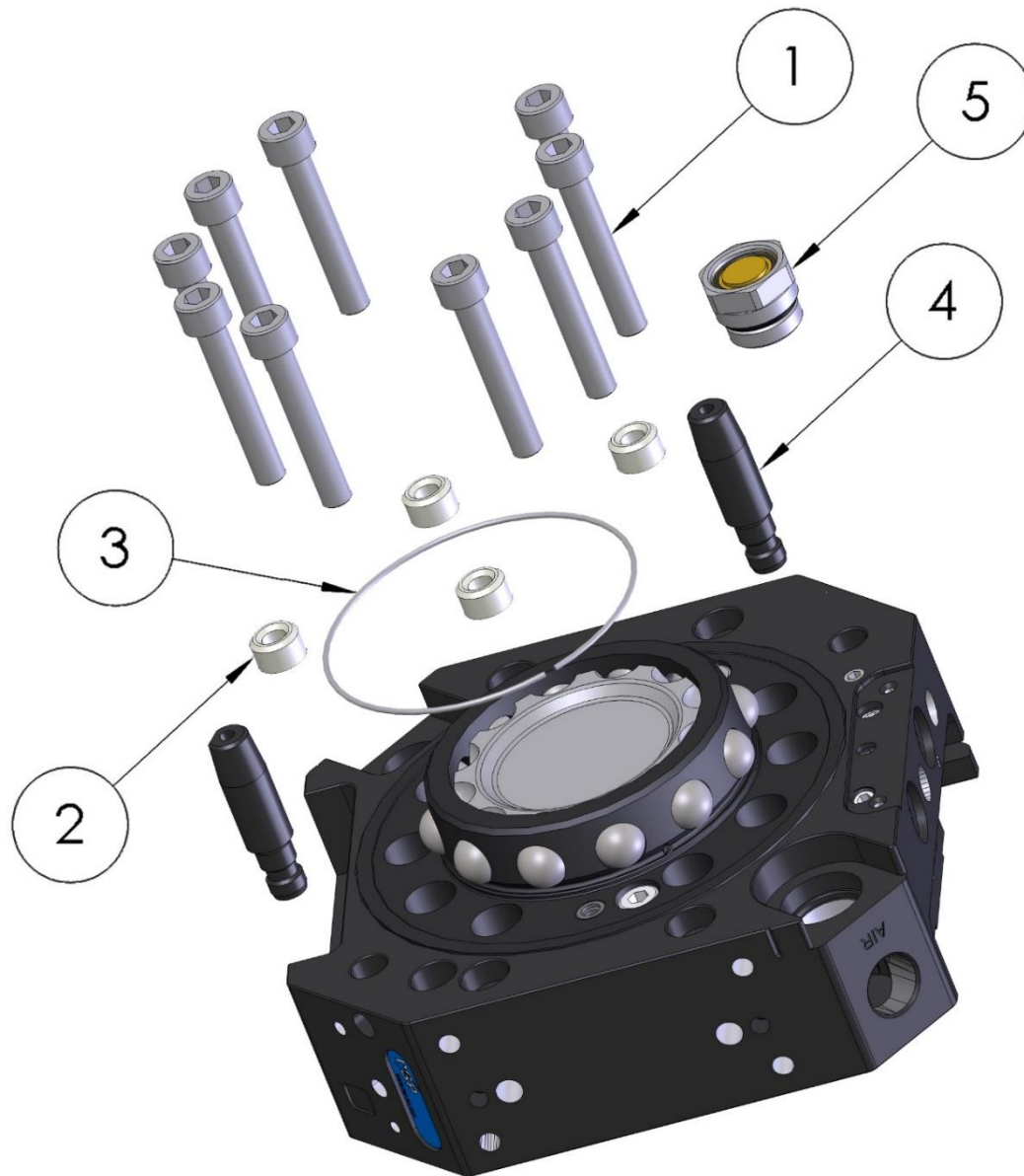
The safety signal module P7501-xxx at the tool attachment side can be equipped with a Tool_ID option. See *Product Manual for Safety signal module P7501-xxx (M8353-1)*.

4.6 Limitation of Robot movements

There can be some limitations on the movement of axis 5 for some robot models. Contact Robot System Products for more information.

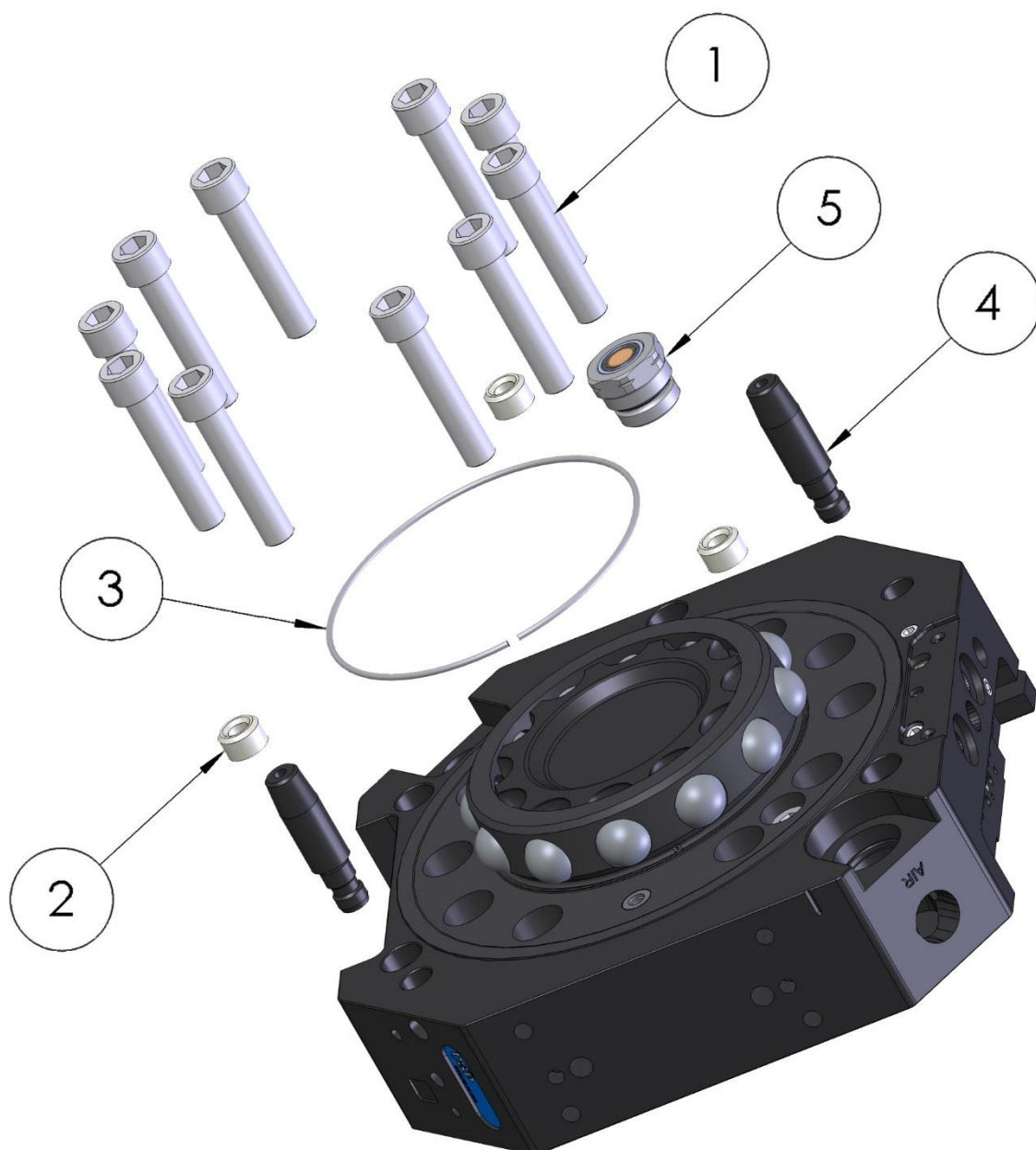
5 SPARE PARTS

5.1 Part list for TC240-1, P7722



Item	Description	Part number	Wear part	Pcs
1	Mounting screw, M10x60	21212519-503		10
2	Damper	63550006-462	X	4
3	Circlip	I1127		1
4	Guide pin	P0230-175	X	2
5	Water/air coupling	I1846	X	1

5.2 Part list for TC480-1, P7834 and P7836



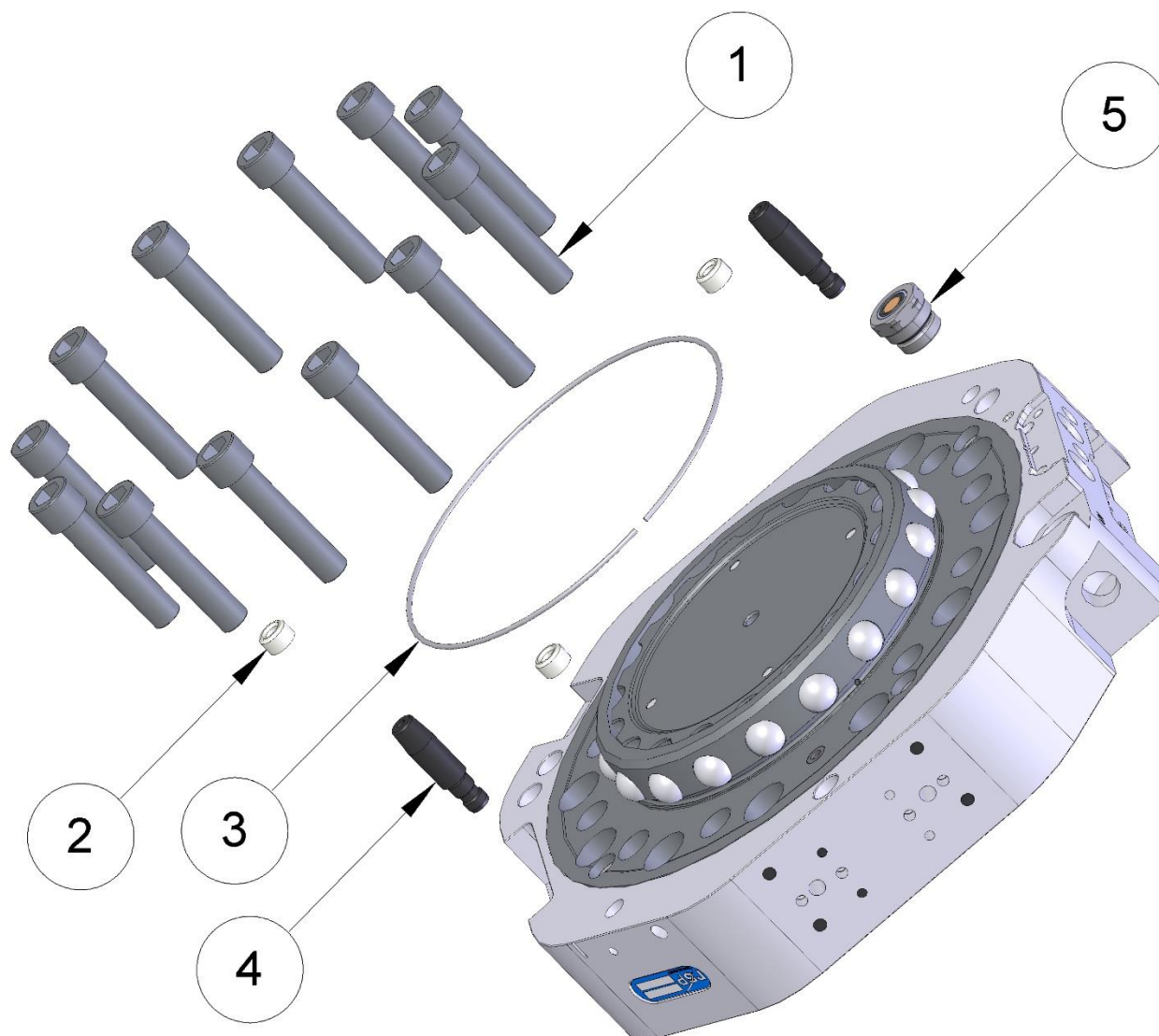
Item	Description	Part number	Wear part	Pcs
1	Mounting screw, M12x60 (P7834 only)	21212519-544		10
1	Mounting screw, M10x60 (P7836 only)	21212519-503		10
2	Damper	63550006-462	X	3
3	Circlip	I0818		1
4	Guide pin	P0230-175	X	2
5	Water/air coupling	I1846	X	1

5.3 Part list for TC720-1, P6958 and P6960



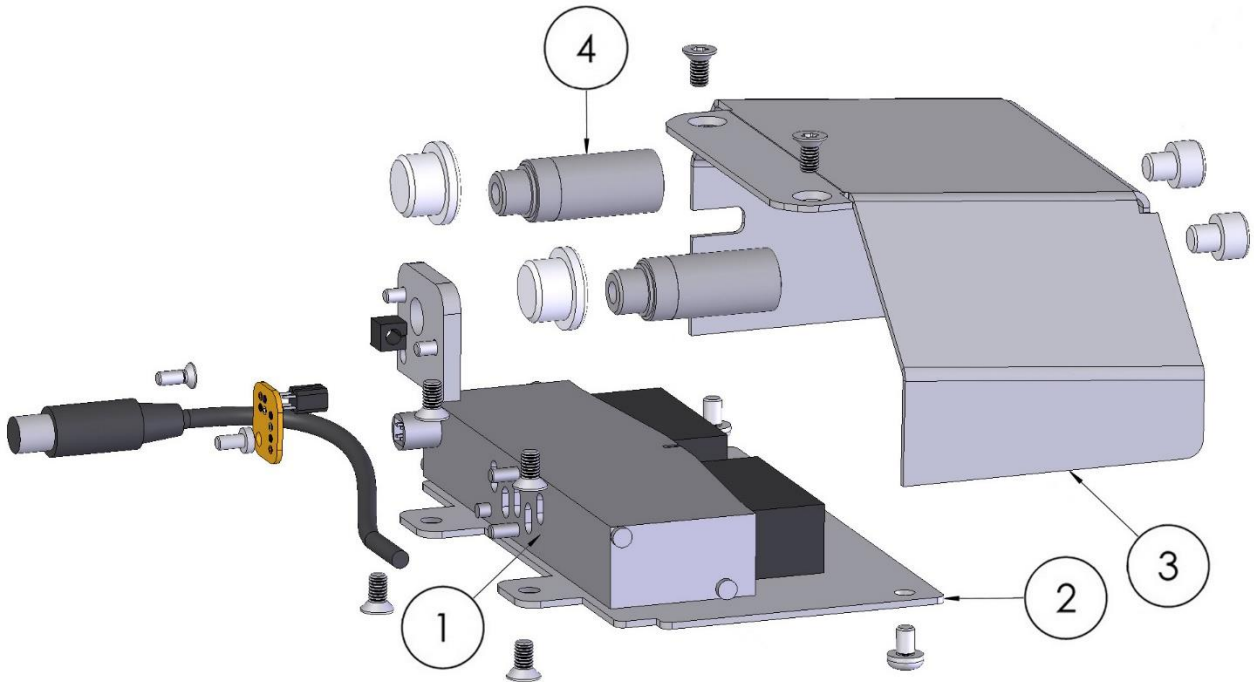
Item	Description	Part number	Wear part	Pcs
1	Mounting screw, M16x75 (P6958 only)	MC6S 16x75		12
1	Mounting screw, M16x75 (P6960 only)	MC6S 16x75		16
2	Damper	63550006-462	X	3
3	Circlip	I1253		1
4	Guide pin	P0230-175	X	2
5	Water/air coupling	I1846	X	1

5.4 Part list for TC960-1, P7924 and P7924-1



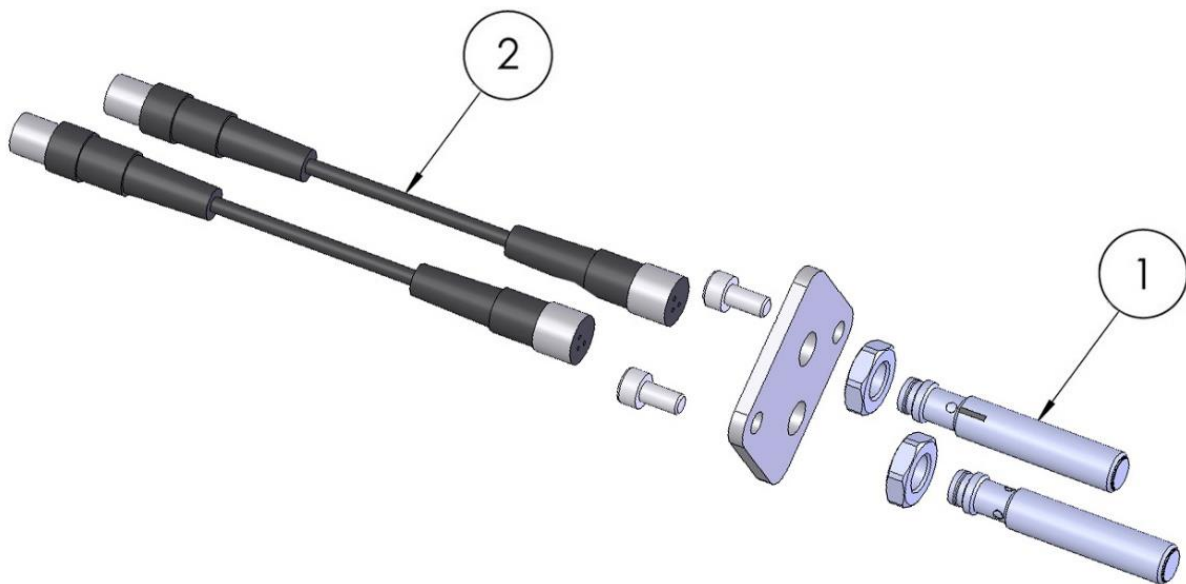
Item	Description	Part number	Wear part	Pcs
1	Mounting screws M16x75 (screw class 8.8) for P7924 only	P7914 (includes 12X MSC6S 16x75)		1
1	Mounting screws M12x70 (screw class 12.9) for P7924-1 only	P7915 (includes 10X MSC6S 12x70)		1
2	Damper	63550006-462	X	3
3	Circlip	I1320		1
4	Guide pin	P0230-175	X	2
5	Water/air coupling	I1846	X	1

5.5 Part list for integrated valve, P7710-4



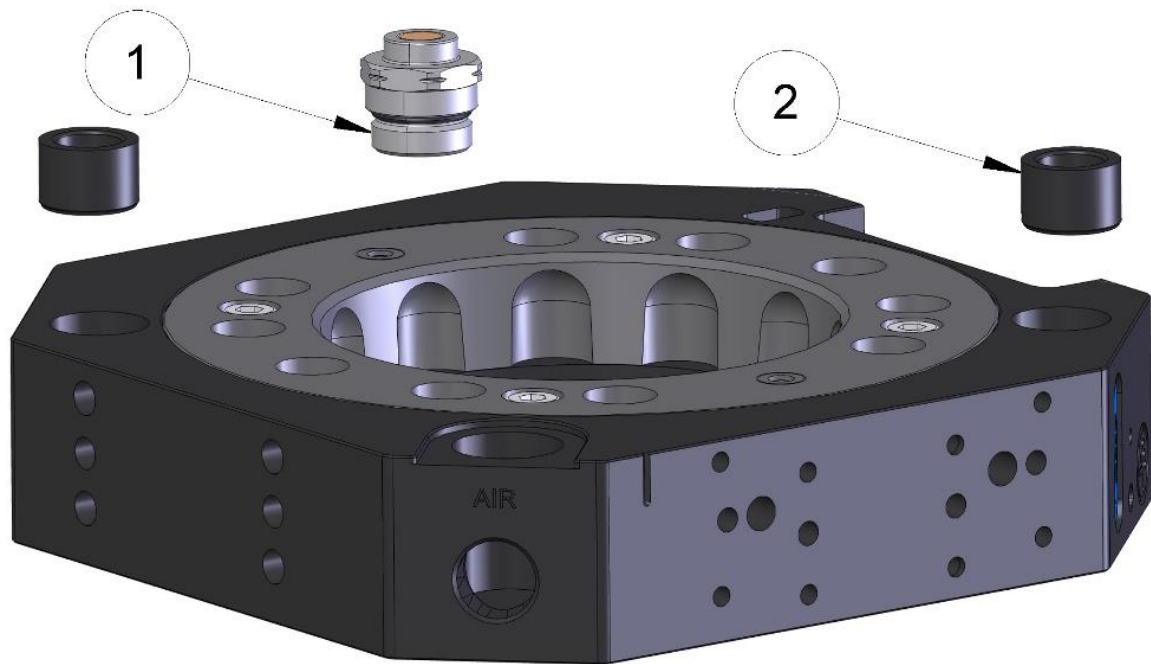
Item	Description	Part number	Wear part	Pcs
1	Valve	I0449		1
2	Rear valve cover	P0178-324		1
3	Valve cover	P0178-323		1
4	Silencer	I0903		2

5.6 Part list for magnetic sensors, P6789, P7173, P7174, P7293 and P7175



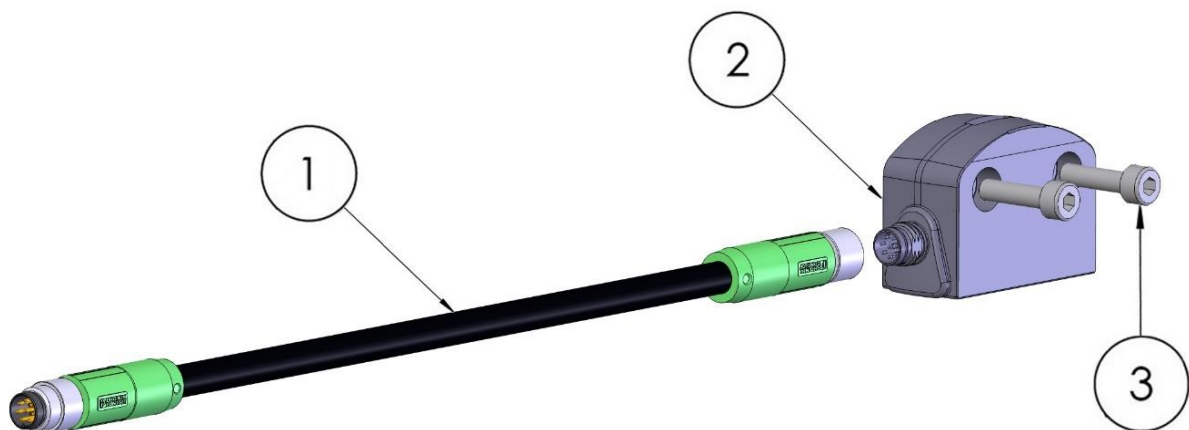
Item	Description	Part number	Wear part	Pcs
1	Magnetic sensor	I1015		2
2	Sensor cable M8	I1288		2

**5.7 Part list for tool attachments,
P7723, P7835, P7837, P6959, P6961 and P7925**



Item	Description	Part number	Wear part	Pcs
1	Water/air coupling	I1847	X	1
2	Guide bushing	P0178-064	X	2

5.8 Part list for Tool in stand sensor, active. P8528



Item	Description	Part number	Wear part	Pcs
1	Cable, M8 8P–M8 8S	I1260		1
2	Position switch, active	I1171		1
3	Screw, MC6S 4x16	21212519-293		2

