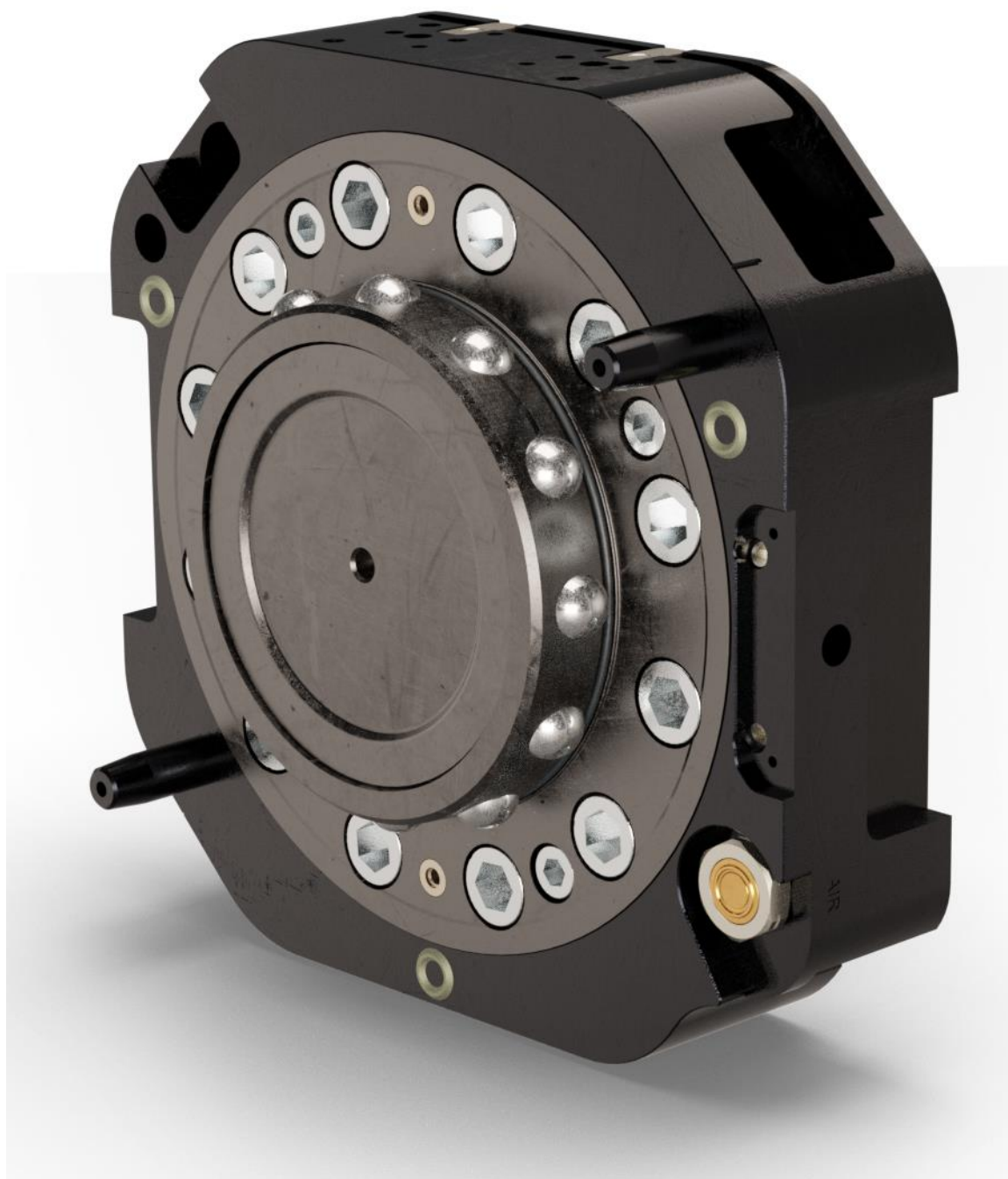


Product Description

Tool changers Moduflex-series

M0742-1

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



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1 INTRODUCTION

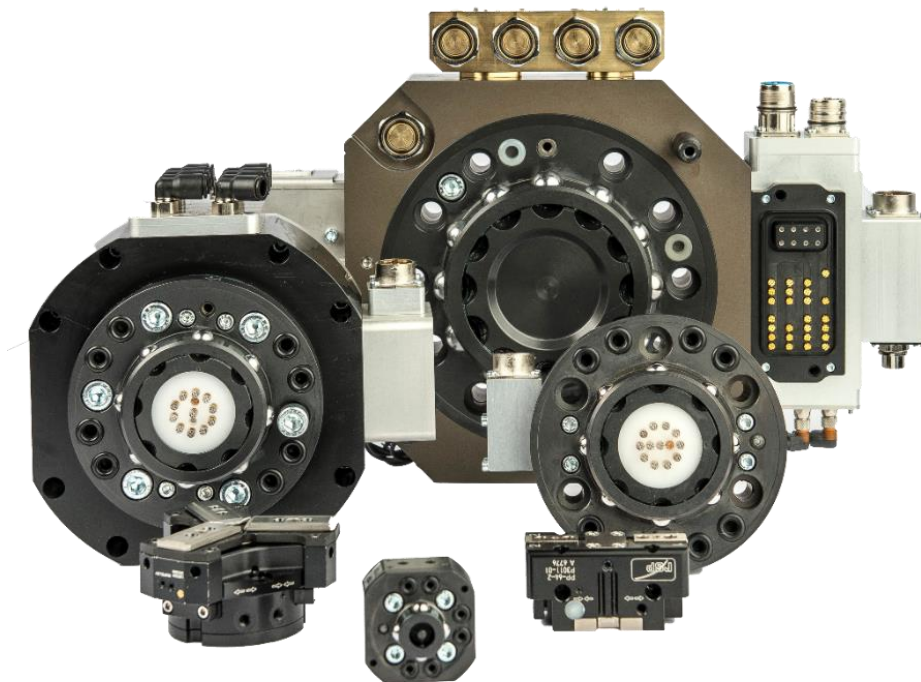
Robot System Products is a front-rank provider of peripheral products for high performance robot applications. We provide complete system solutions for your robot installations, aiming to improve your productivity with the most reliable and cost-effective tooling on the market. Continuously we explore 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: robotsystemproducts.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 that load is uniformly distributed 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 place in the tool changer even if the air pressure drops.

1.2 Documents

This *Product Description* (M0742-1) contains product information, drawings, data, pneumatic diagrams, required safety software functions and lists of spare parts for the Moduflex-series tool changers and tool attachments. The corresponding information for Moduflex tool changers prepared for direct mounting of Safety signal modules are found in *Product Description Prepared for Safety* (M0740-1). The functionality of RSP Safety signal module, P7501-xxx is described in the manual M8353-1.

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 to be mounted and connected to the tool changers and tool attachments are described in *Product Description Options for Moduflex* (M0741-1). In the *Product Manual Tool parking system TPS 400* (M8311-1) complete systems for parking of tool attachment and tools are described.

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
- Guide pins and bushings
- Dampers

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.
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

This document presents the basic tool changers of the RSP product family Moduflex. The Moduflex series is designed for heavy weights and maximum flexibility and can be configured with a large number of options for transfer of electrical signals, data, air and water (see M0741-1) and be used in a broad spectra of applications.

This document presents:

- The Robot System Products TC240, TC480, TC720 and TC960 tool changers including tool attachments.

If not otherwise indicated maximum tool loads are stated for screw class 8.8.

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.

Dependent on model, two or three 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.

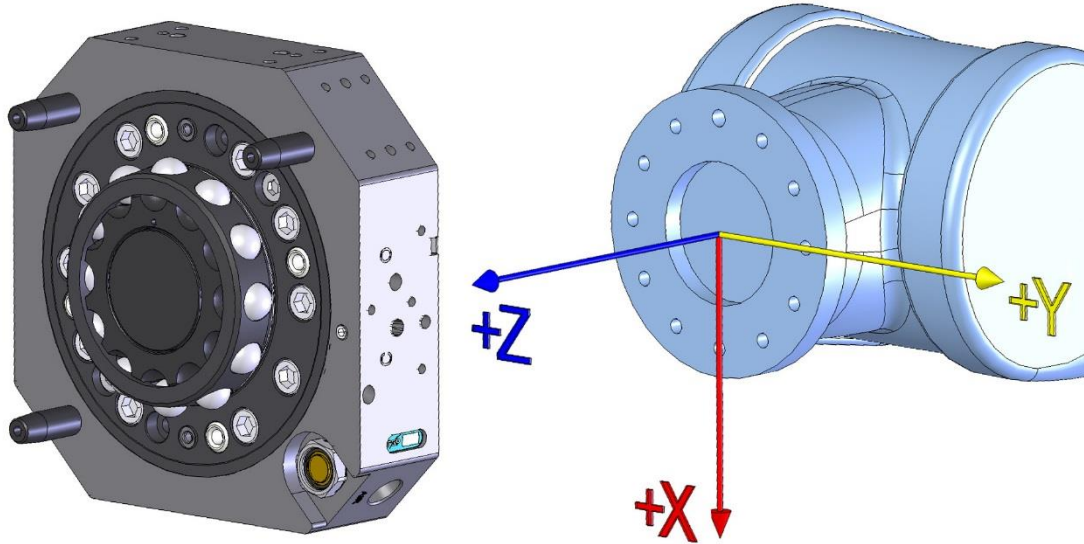
The figure below is an example that shows a configuration for spot welding.



TC480-SWS

2.1 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.

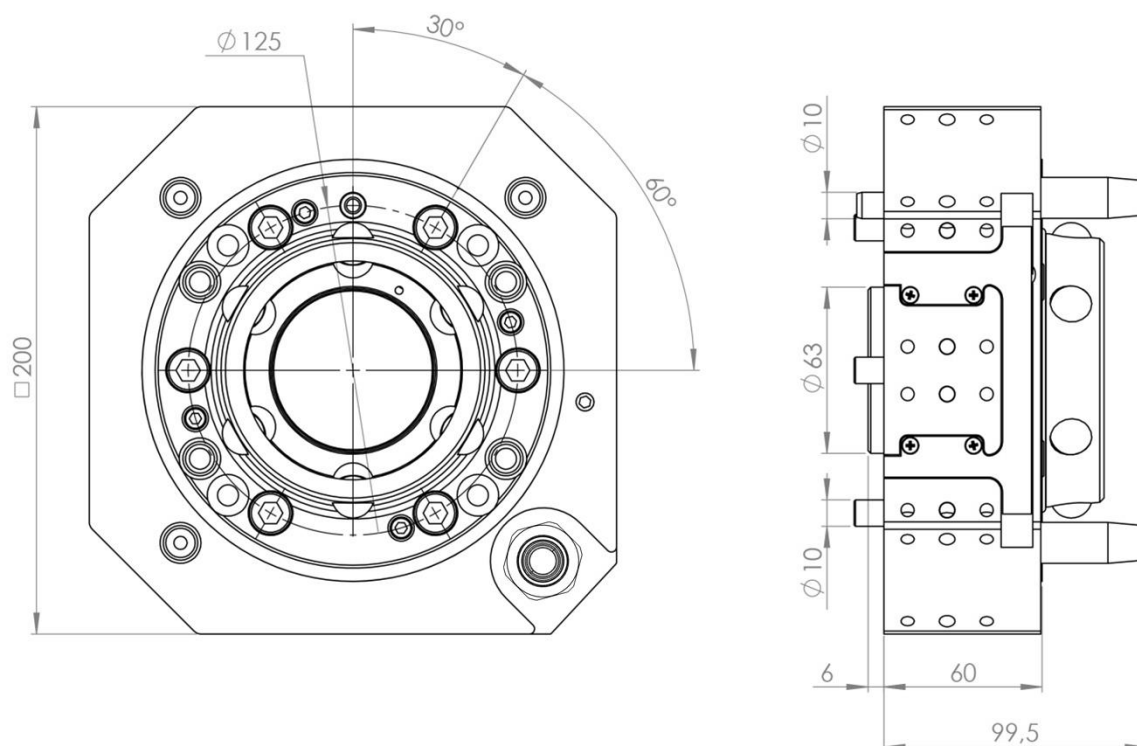


NOTE! For the tool changer, and tool changer with tool attachment, the origo of the co-ordinate system is situated in the centre of the robot mounting flange.

2.2 Robot adaptation kits

The flange of the tool changers has fastening holes in accordance with ISO 9409. For other bolt circles adaptation plates, to be mounted between the tool changer and the robot flange, are available. The product numbers of the adaptation kits are depending on actual combination of robot and tool changer.

2.3 Tool changer TC240-1, basic unit. Article: P7330

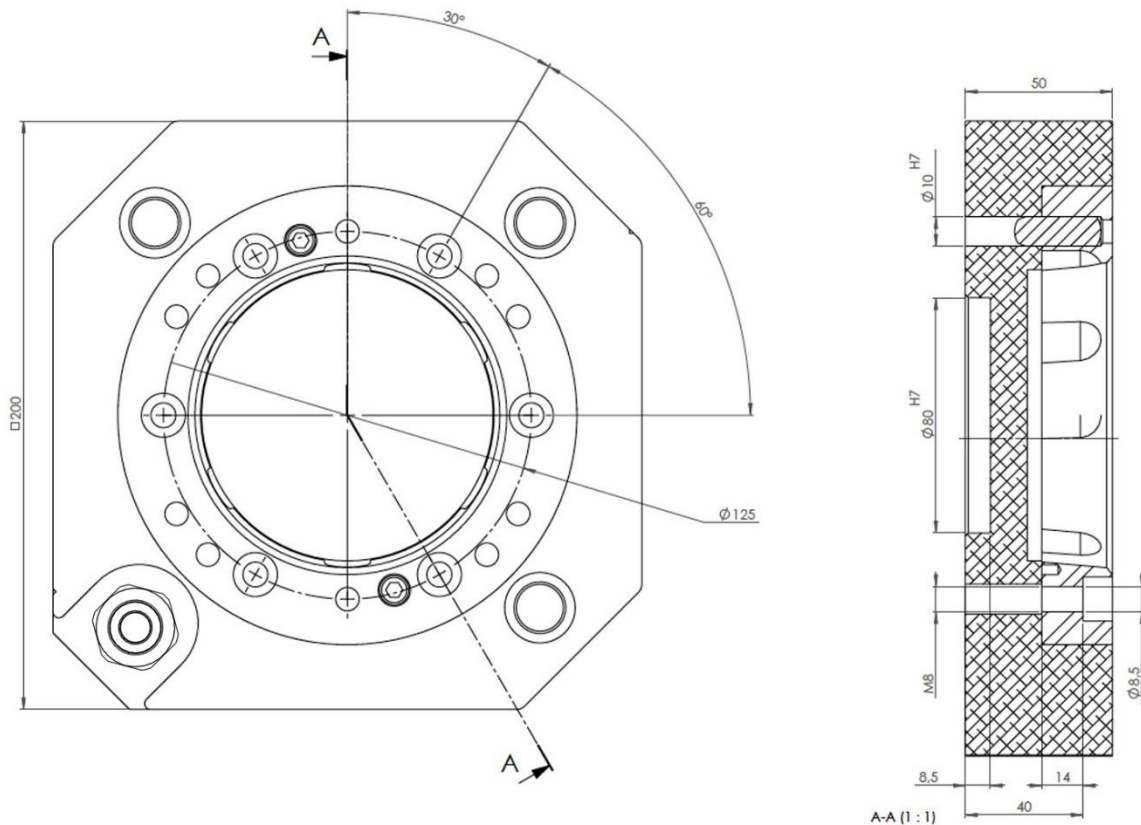


The tool changer P7330 transfers 1 pneumatic channel to the tool attachment, has separate inlets for Open TC and Close TC, 5 positions for options and 1 for magnetic sensors. To be used together with tool attachment P7331.

Technical data

Working temperature		+10°C–+50°C
Bolt pattern		ISO 9409-1 125-6-M10
Maximum tool load	Fz (static)	±2 400 N
	Mx/My (dynamic)	±2 000 Nm
	Mz (dynamic)	±1 250 Nm
Weight and centre of gravity (Z)		
P7330		8.2 kg / 38 mm
P7330 with P7331		13.5 kg / 55 mm
Air channels	Pneumatic diagram	Pne0230-008 (section 2.16)
	User channels, robot side	1 x G 1/2" (2 000 l/min, max 10 bar)
	Dedicated channels, G 1/8"	Open TC marked O (6–10 bar) Close TC marked C (6–10 bar)
Air quality		Oil-clean and waterless filtered air, with max 25µm particle content

2.4 Tool attachment TA240-1, basic unit. Article: P7331



The tool attachment TA240-1 transfers 1 pneumatic channel to the tool and has 5 positions for options. To be used together with tool changer P7330.

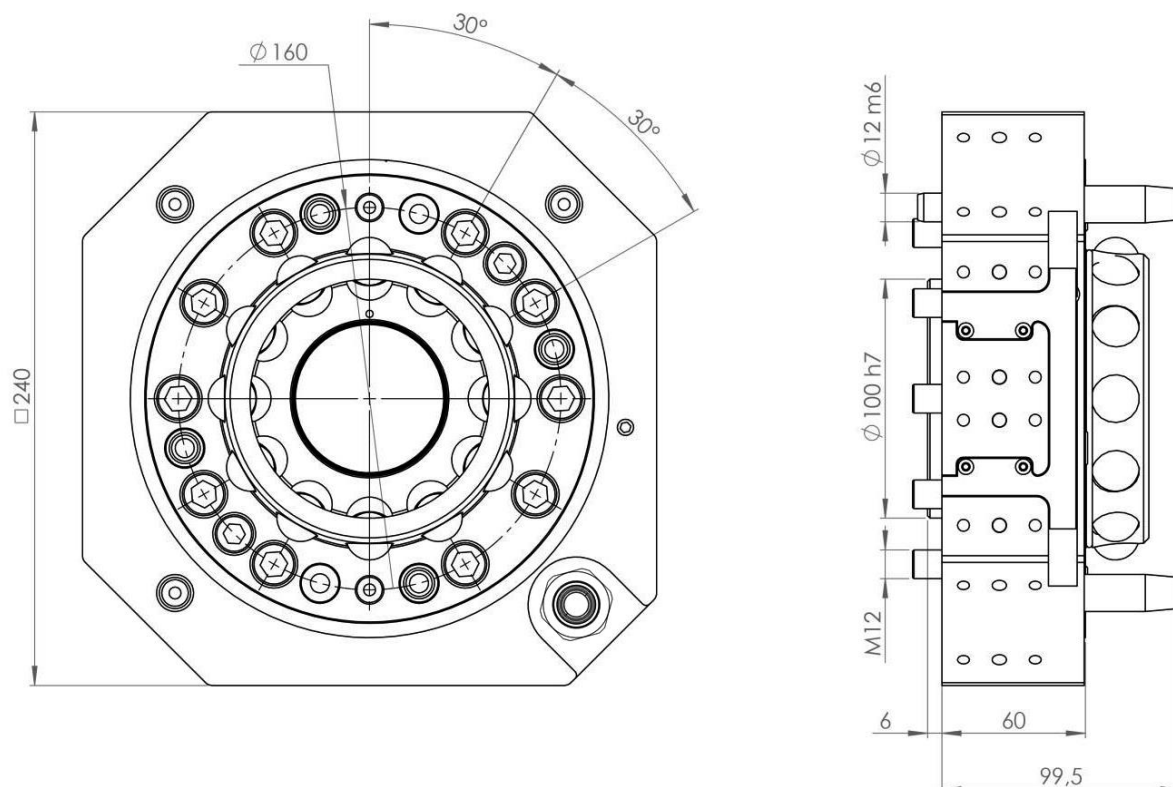
Technical data

Working temperature		+10°C–+50°C
Bolt pattern		ISO 9409-1 125-6-M10
Weight		5.1 kg
Maximum tool load (M10 screws)	Fz (static)	±2 400 N
	Mx/My (dynamic)	±2 000 Nm
	Mz (dynamic)	±1 250 Nm
Maximum tool load (M8 screws)	Fz (static)	±2 400 N
	Mx/My (dynamic)	±2 000 Nm
	Mz (dynamic)	±750 Nm
Air channels	Connection, tool side	1 x G 1/2"



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

2.5 Tool changer TC480-1, basic units. Article: P7332

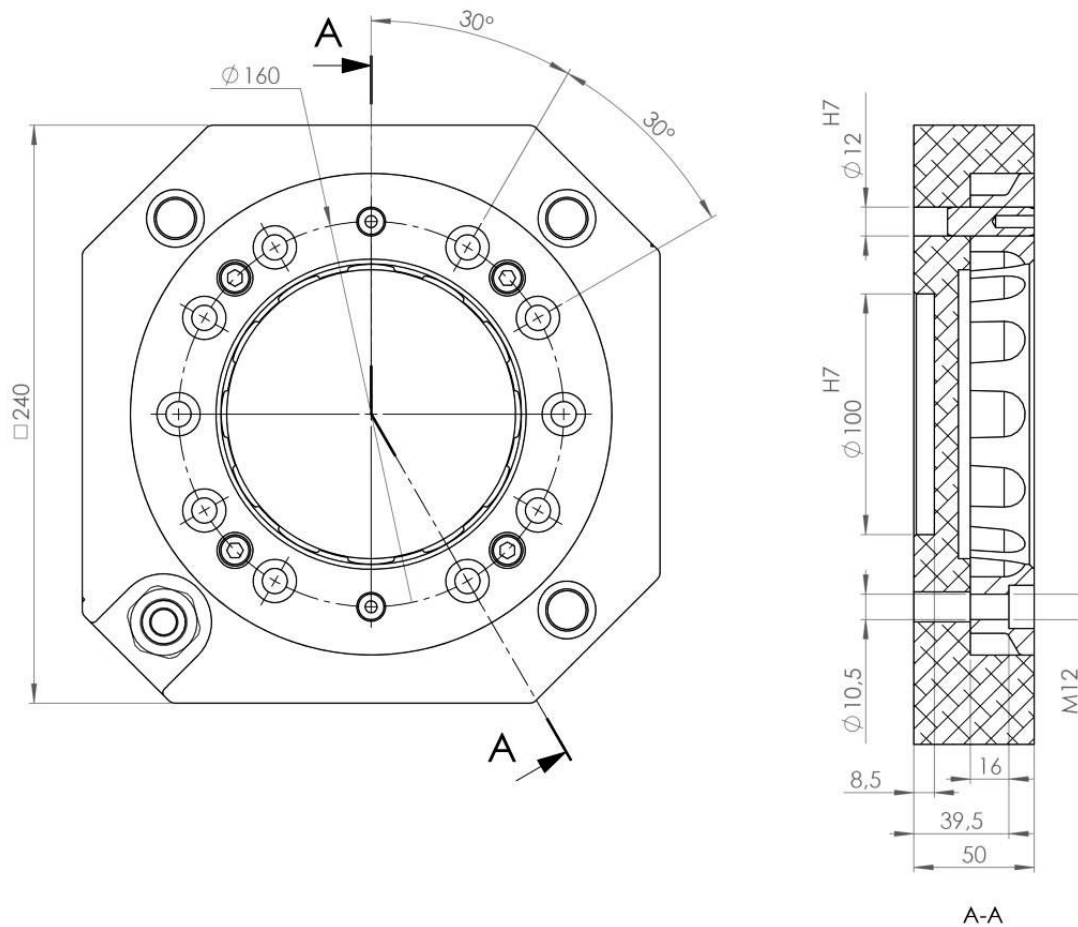


The tool changer transfers 1 pneumatic channel to the tool attachment, has separate inlets for Open TC and Close TC, 5 positions for options and 1 for magnetic sensors. To be used together with tool attachment P7333 or P7335.

Technical data

Working temperature		+10°C–+50°C
Bolt pattern		ISO 9409-1 160-10-M12
Maximum tool load	Fz (static)	±5000 N
	Mx/My (dynamic)	±5000 Nm
	Mz (dynamic)	±3500 Nm
Weight and centre of gravity (Z)		
P7332		13.1 kg / 39 mm
P7332 with P7333/P7335		20.8 kg / 55 mm
Air channels	Pneumatic diagram	Pne0230-008 (section 2.16)
	User channels, robot side	1 x G ½" (2 000 l/min, max 10 bar)
	Dedicated channels, G 1/8"	Open TC marked O (6–10 bar) Close TC marked C (6–10 bar)
	Air quality	Oil-clean and waterless filtered air, with max 25µm particle content

2.6 Tool attachment TA480-1, basic unit. Article: P7333



The tool attachment P7333 transfers 1 pneumatic channel to the tool and has 5 positions for options. To be used together with tool changer P7332 or P7334.

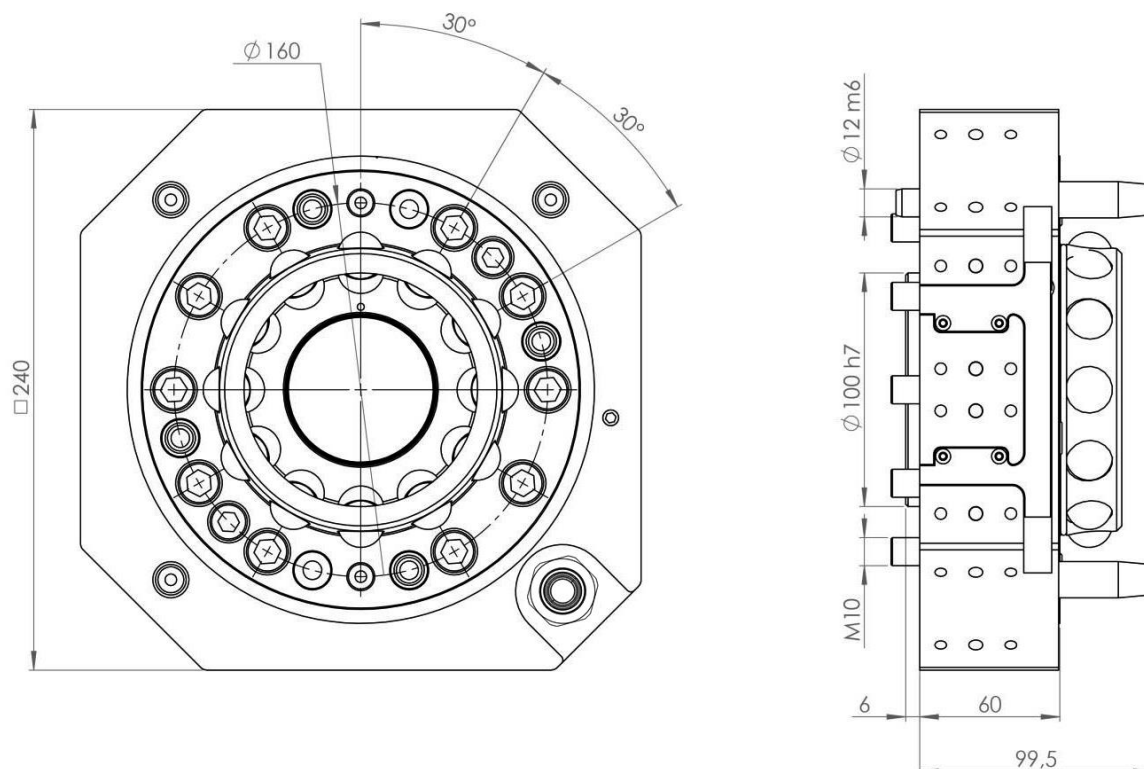
Technical data

Working temperature		+10°C–+50°C
Bolt pattern		ISO 9409-1 160-10-M12
Weight		7.7 kg
Maximum tool load (M12-screws)	Fz (static)	±5000 N
	Mx/My (dynamic)	±5000 Nm
	Mz (dynamic)	±3500 Nm
Maximum tool load (M10-screws)	Fz (static)	±5000 N
	Mx/My (dynamic)	±5000 Nm
	Mz (dynamic)	±2500 Nm
Air channels	Connection, tool side	1 x G ½"



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.

2.7 Tool changer TC480-1, basic units. Article: P7334

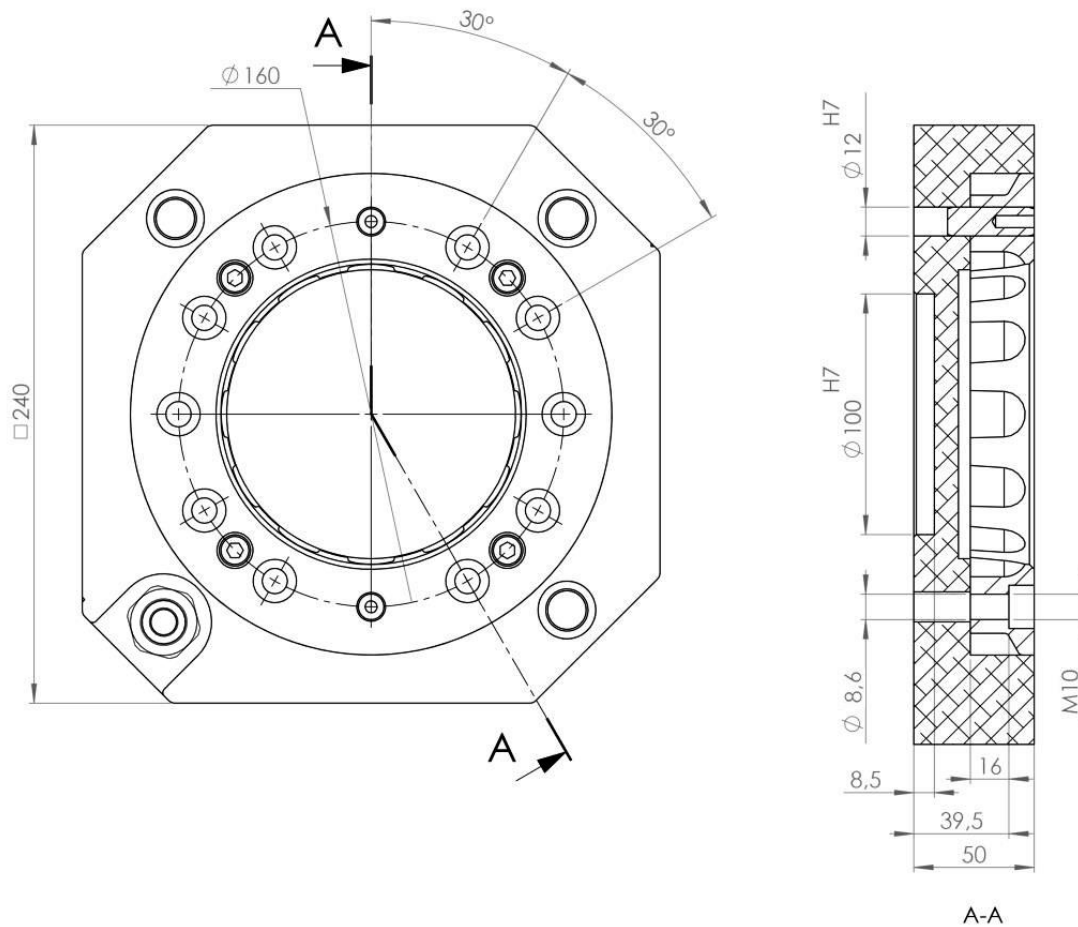


The tool changer P7334 transfers 1 pneumatic channel to the tool attachment, has separate inlets for Open TC and Close TC, 5 positions for options and 1 for magnetic sensors. To be used together with tool attachment P7333 or P7335.

Technical data

Working temperature		+10°C–+50°C
Bolt pattern		ISO 9409-1 160-10-M10
Maximum tool load	Fz (static)	±5000 N
	Mx/My (dynamic)	±5000 Nm
	Mz (dynamic)	±2500 Nm
Weight and centre of gravity (Z)		
P7334		13.1 kg / 39 mm
P7334 with P7333/P7335		20.8 kg / 55 mm
Air channels	Pneumatic diagram	Pne0230-008 (section 2.16)
	User channels, robot side	1 x G 1/2" (2 000 l/min, max 10 bar)
	Dedicated channels, G 1/8"	Open TC marked O (6–10 bar) Close TC marked C (6–10 bar)
Air quality		Oil-clean and waterless filtered air, with max 25µm particle content

2.8 Tool attachment TA480-1, basic unit. Article: P7335



The tool attachment P7335 transfers 1 pneumatic channel to the tool and has 5 positions for options. To be used together with tool changer P7332 or P7334.

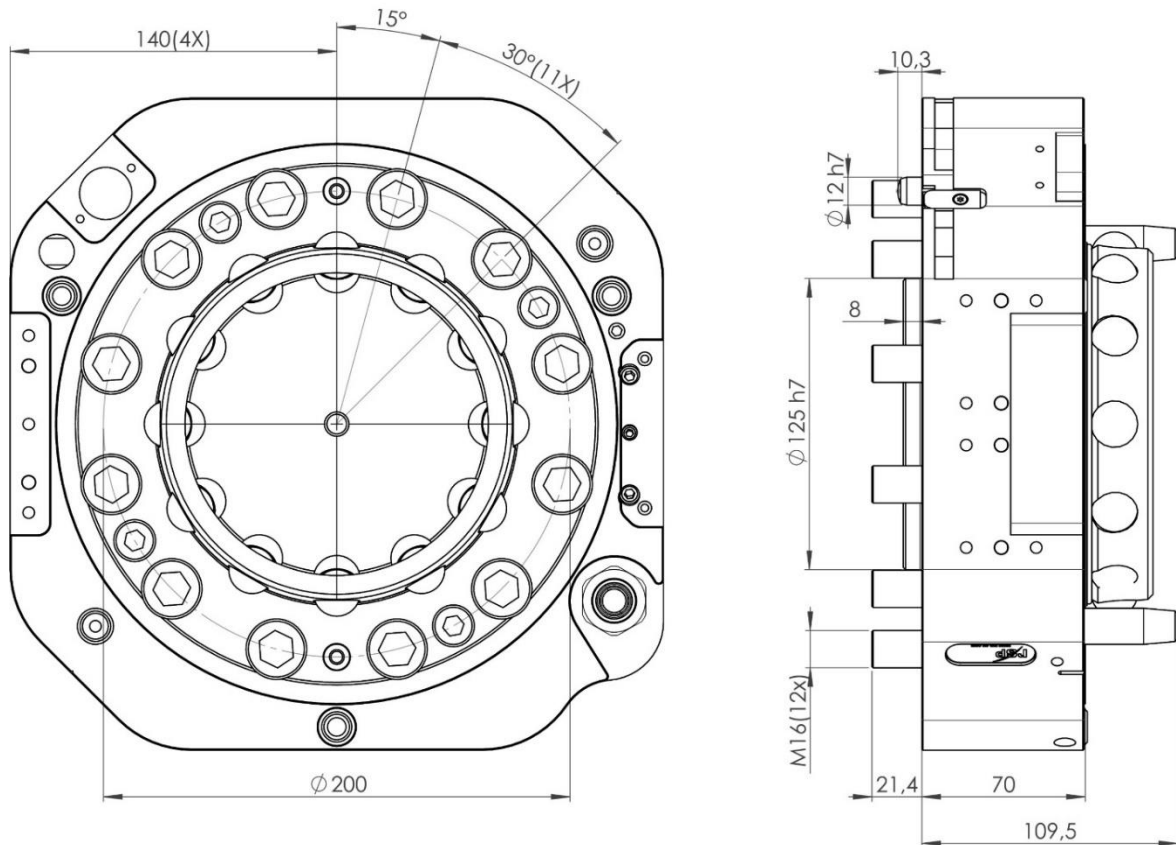
Technical data

Working temperature		+10°C–+50°C
Bolt pattern		ISO 9409-1 160-10-M10
Weight		7.7 kg
Maximum tool load (M10-screws, screw class 8.8)	Fz (static)	±5000 N
	Mx/My (dynamic)	±5000 Nm
	Mz (dynamic)	±2500 Nm
Maximum tool load (M8-screws, screw class 12.9)	Fz (static)	±5000 N
	Mx/My (dynamic)	±5000 Nm
	Mz (dynamic)	±2500 Nm
Air channels	Connection, tool side	1 x G ½"



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.

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

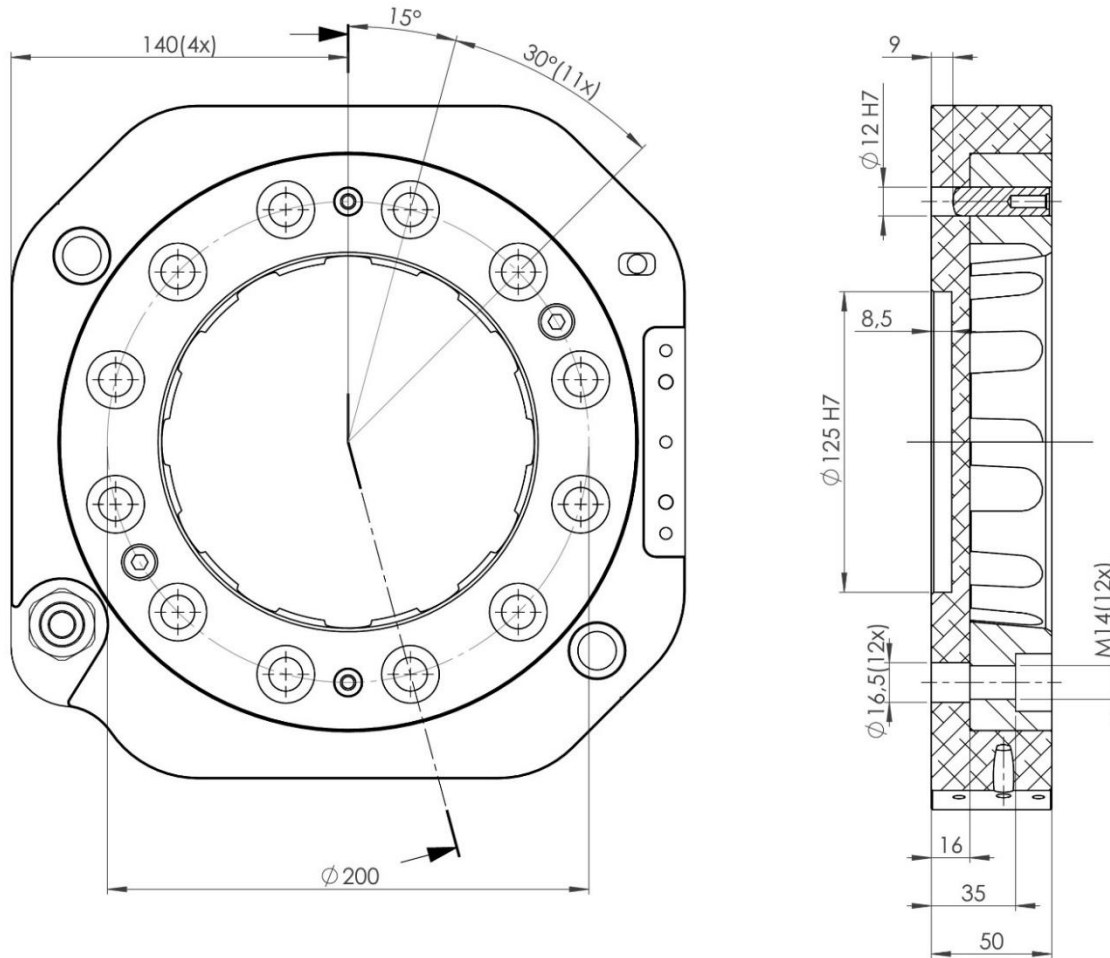


The tool changer P6958 transfers 1 pneumatic channel to the tool attachment, has separate inlets for Open TC and Close TC, 5 positions for options and 1 for magnetic sensors. To be used together with tool attachment P6959 or P6961.

Technical data

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 (P6958)		20,4 kg / 45 mm
TC + TA (P6959)		30.6 kg / 61 mm
Air channels	Pneumatic diagram	Pne0230-011 (section 2.17)
	User channels, robot side	1 x G ½" (2 000 l/min, max 10 bar)
	Dedicated channels, G 1/8"	Open TC (6–10 bar) Close TC (6–10 bar)
Air quality		Oil-clean and waterless filtered air, with max 25µm particle content

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



The tool attachment P6959 transfers 1 pneumatic channel to the tool and has 5 positions for options. To be used together with tool changer P6958 or P6960.

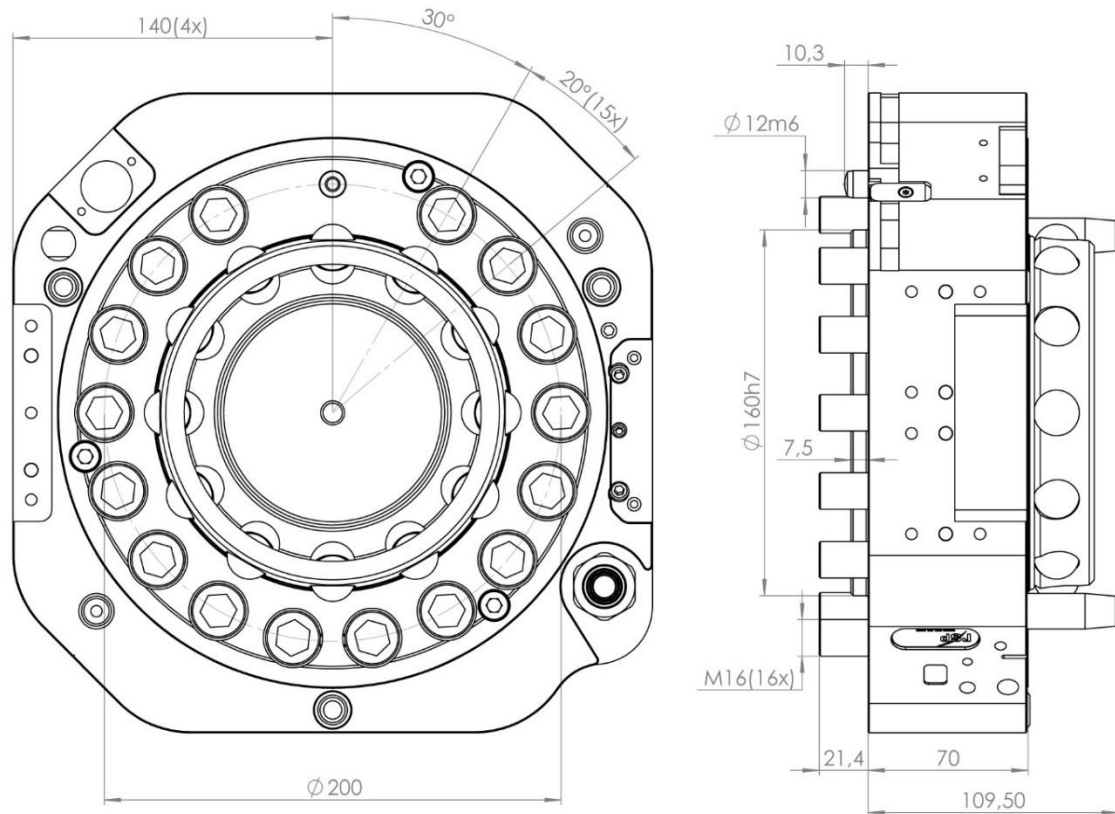
Technical data

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.

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

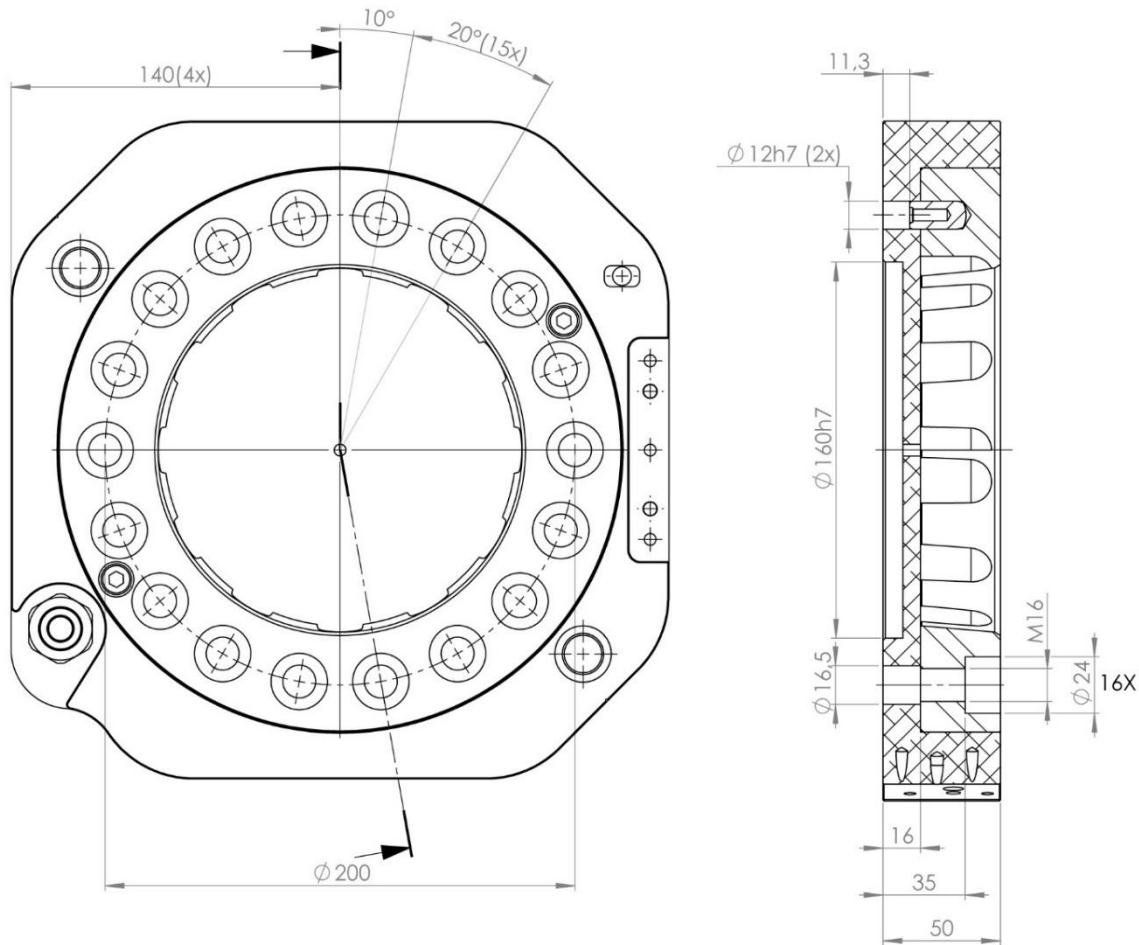


The tool changer P6960 transfers 1 pneumatic channel to the tool attachment, has separate inlets for Open TC and Close TC, 5 positions for options and 1 for magnetic sensors. To be used together with tool attachment P6961 or P6959.

Technical data

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 (P6960)		20,4 kg / 45 mm
TC + TA (P6961)		30.6 kg / 61 mm
Air channels	Pneumatic diagram	Pne0230-011 (section 2.17)
	User channels, robot side	1 x G 1/2" (2 000 l/min, max 10 bar)
	Dedicated channels, G 1/8"	Open TC (6–10 bar) Close TC (6–10 bar)
Air quality		Oil-clean and waterless filtered air, with max 25µm particle content

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



The tool attachment P6961 transfers 1 pneumatic channel to the tool and has 5 positions for options. To be used together with tool changer P6960 or P6958.

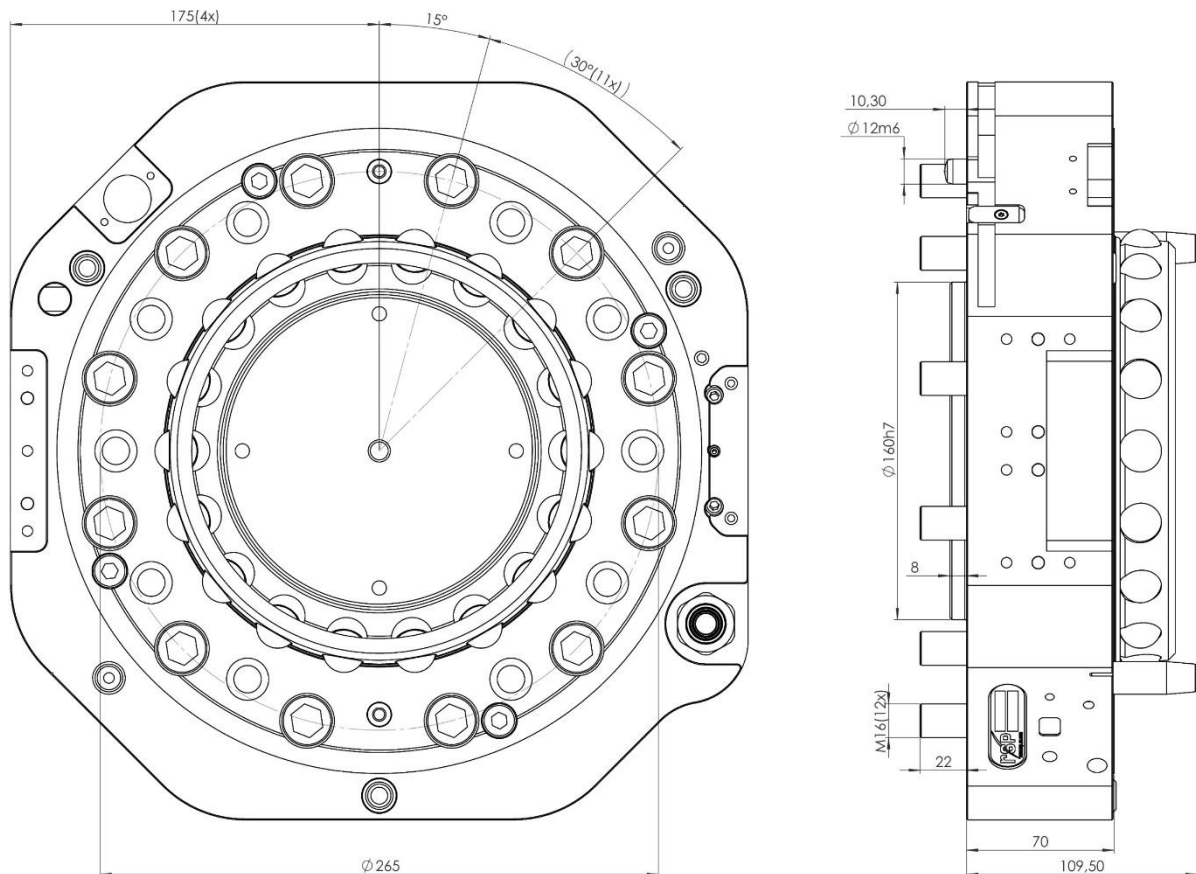
Technical data

Working temperature		+10°C--+50°C
Bolt pattern		ISO 9409-1 200-18-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 eighteen M16 screws, alternatively the tool attachment can be mounted to the tool using eighteen M14 screws.

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

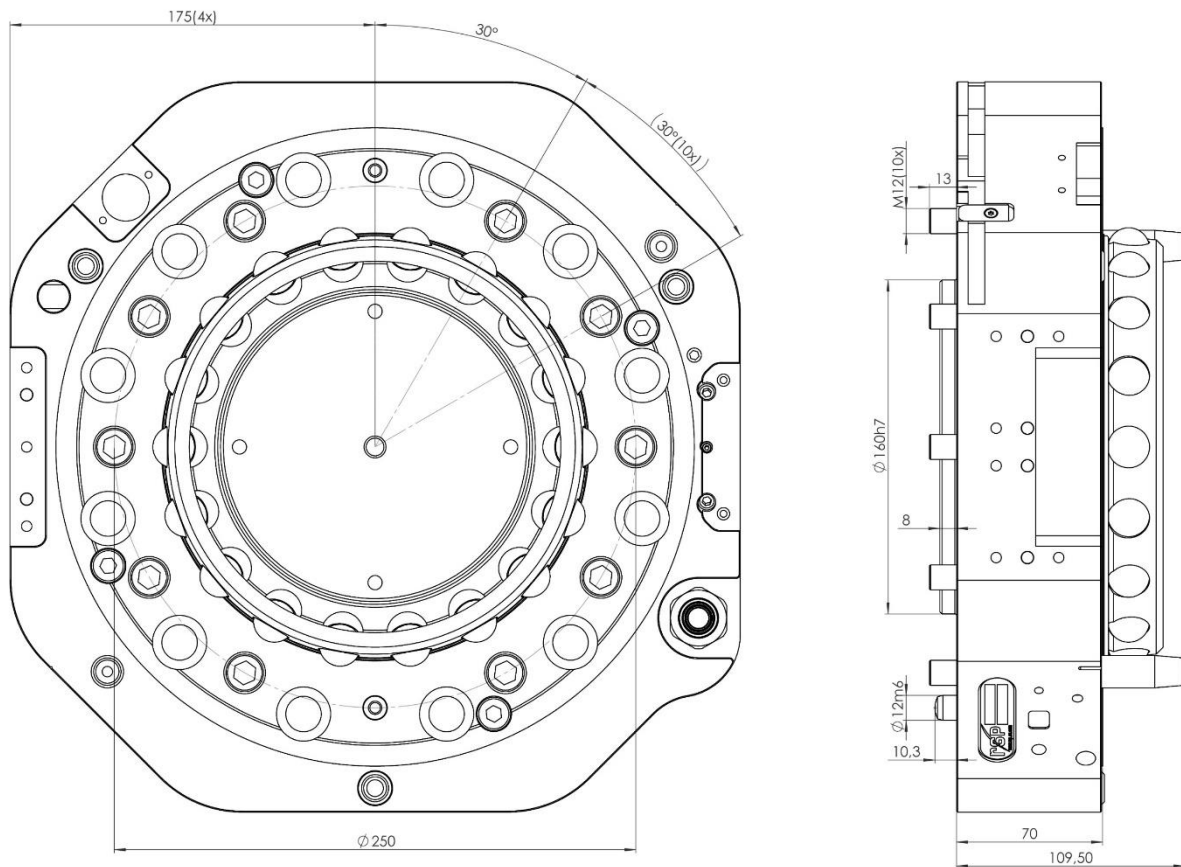


The tool changer P7924 transfers 1 pneumatic channel to the tool attachment, has separate inlets for Open TC and Close TC, 5 positions for options and 1 for magnetic sensors. To be used together with tool attachment P7925.

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)	±15 000 N
	Mx/My (dynamic)	±15 000 Nm
	Mz (dynamic)	±12 500 Nm
Weight and centre of gravity (Z)		
TC (P7924)		27,7 kg / 46 mm
TC + TA (P7925)		43.6 kg / 61 mm
Air channels	Pneumatic diagram	Pne0230-011 (section 2.17)
	User channels, robot side	1 x G ½" (2 000 l/min, max 10 bar)
	Dedicated channels, G 1/8"	Open TC (6–10 bar) Close TC (6–10 bar)
Air quality		Oil-clean and waterless filtered air, with max 25µm particle content

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

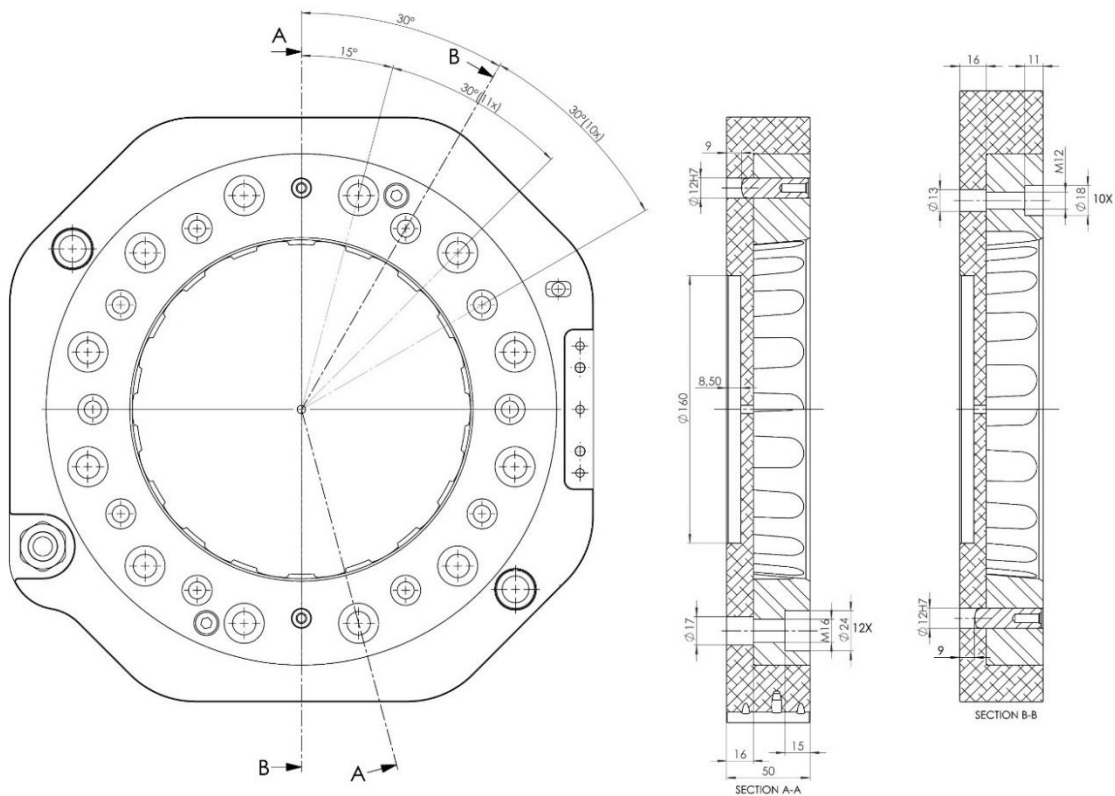


The tool changer P7924-1 transfers 1 pneumatic channel to the tool attachment, has separate inlets for Open TC and Close TC, 5 positions for options and 1 for magnetic sensors. To be used together with tool attachment P7925.

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 (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 (P7924-1)		27,7 kg / 46 mm
TC + TA (P7925)		43.6 kg / 61 mm
Air channels	Pneumatic diagram	Pne0230-011 (section 2.17)
	User channels, robot side	1 x G 1/2" (2 000 l/min, max 10 bar)
	Dedicated channels, G 1/8"	Open TC (6–10 bar) Close TC (6–10 bar)
Air quality		Oil-clean and waterless filtered air, with max 25µm particle content

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



The tool attachment P7925 transfers 1 pneumatic channel and to the tool and has 5 positions for options. To be used together with tool changer P7924 and P7924-1.

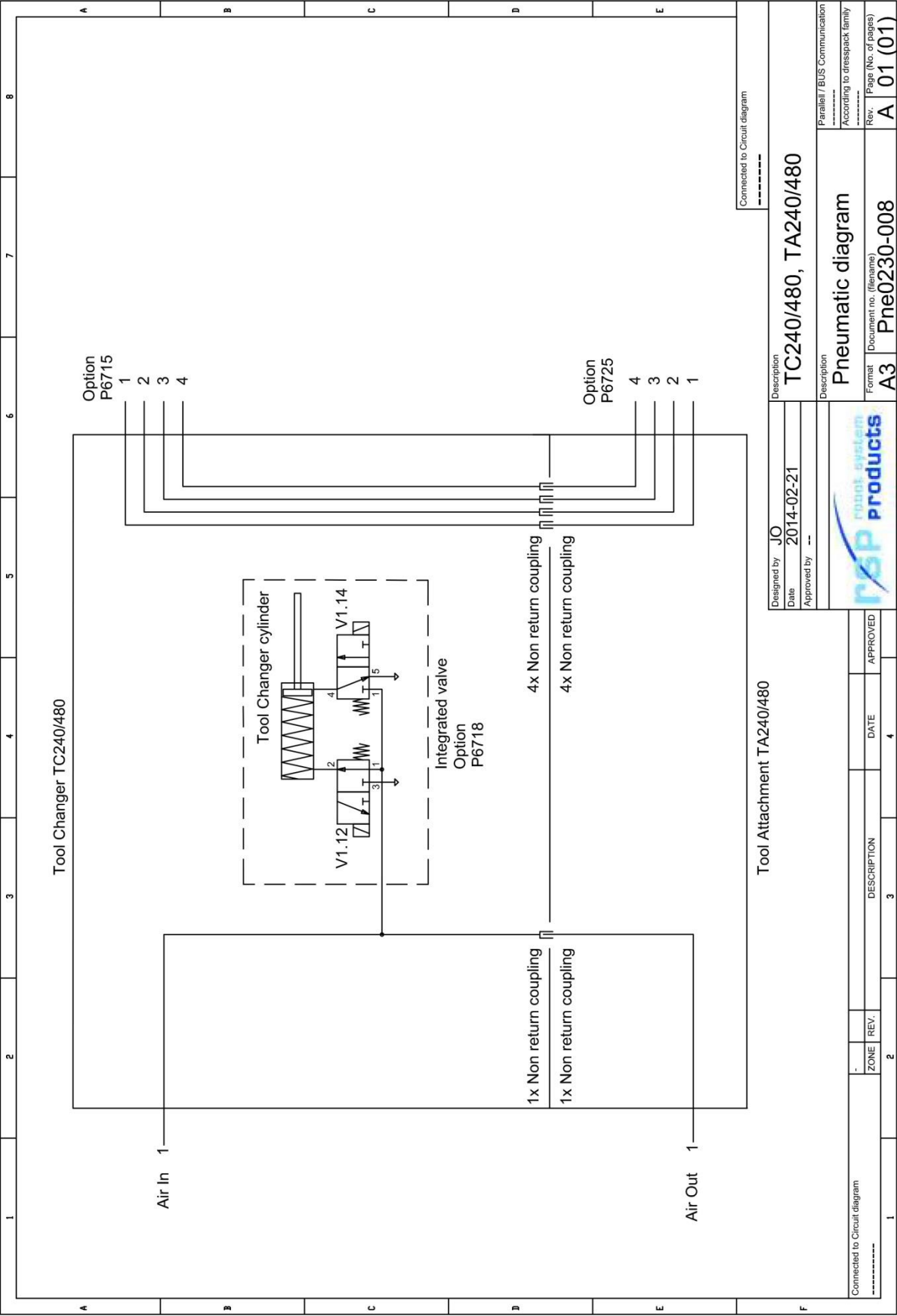
Technical data

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

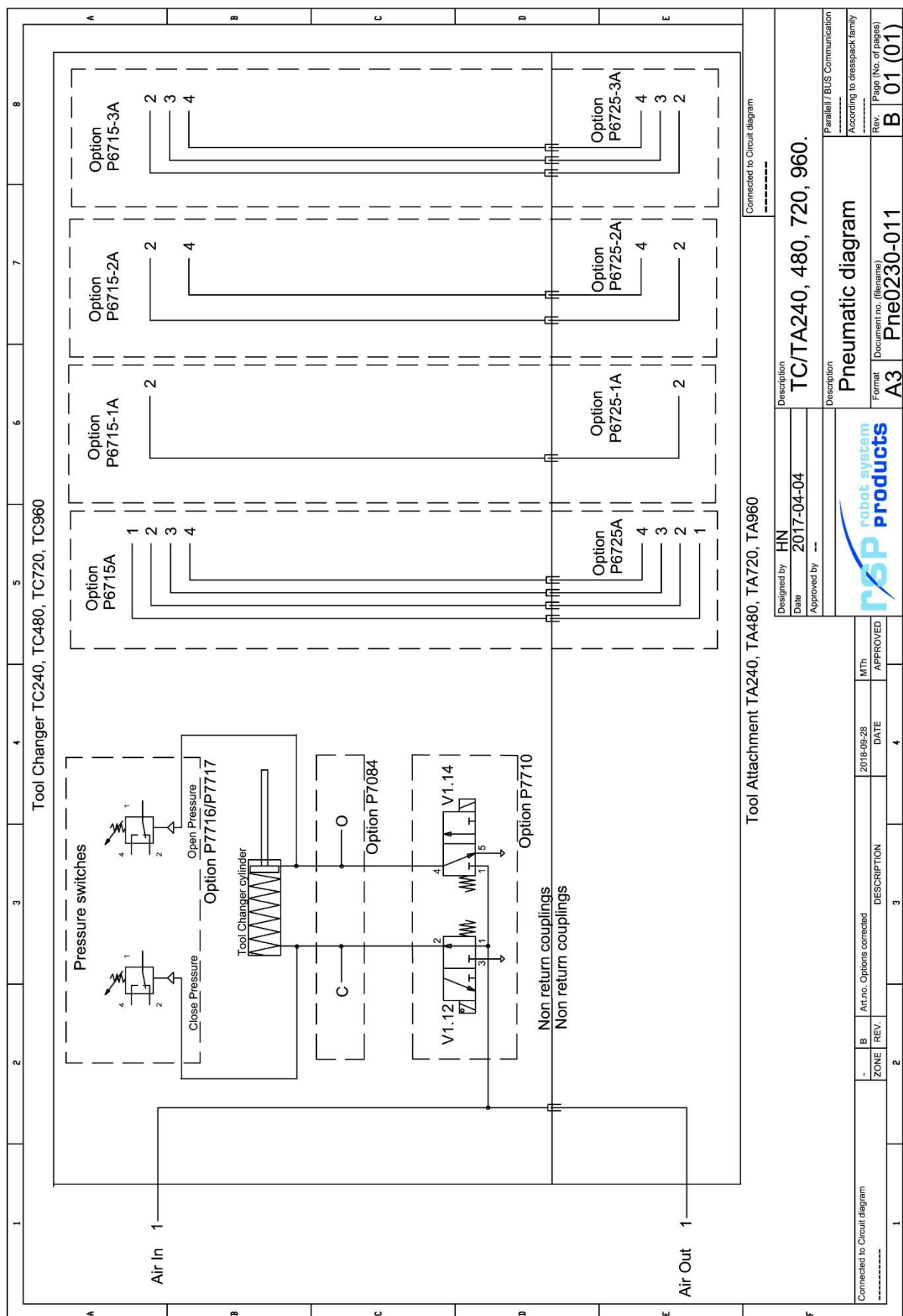


NOTE! Tools can be mounted to the tool attachment using twelve M16 screws or ten M12 screws, alternatively the tool attachment can be mounted to the tool using twelve M14 screws or ten M10 screws.

2.16 Pneumatic diagram Pne0230-008 for TC240-1 and TC480-1



2.17 Pneumatic diagram Pne0230-011 for TC720-1 and TC960-1

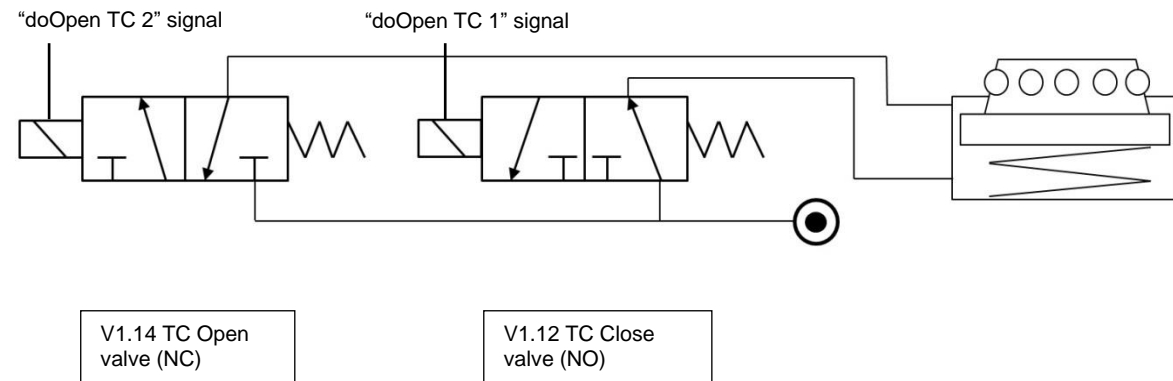


3 TC OPERATION AND INTERFACE

3.1 Required software function

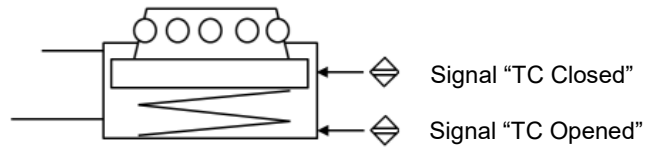
The risk assessment for this tool changer (locking control function and monitoring) requires that the software logic described below is adhered to by the system integrator installing the tool changer.

Valve control with two monostable 3/2-valves.



- 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.
- The "doOpen TC 2" signal shall be interlocked with both a tool attachment (TA) present jumper and a tool stand switch indicating the following safe conditions for opening the tool changer:
 - * 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.

Piston status monitoring sensors



There are two sensors built in into the main body supervising the location of the piston.

- Signal “TC Opened” is high when the piston is in open position.
- Signal “TC Closed” is high when the piston is in locked position.

Signal logic for picking up a tool

- Open the tool changer by setting signals “doOpen TC 1” and “doOpen TC 2” to high.
- When signal “TC Opened” becomes high the tool changer has been opened and is allowed to move to the tool attachment.
- When the tool changer is in position for picking up the tool attachment, the tool changer should be closed (set signals “doOpen TC 1” and “doOpen TC 2” low).
- When signal “TC Closed” is high, the tool changer has been closed and can start to move.
- When the closed tool changer has been lifted 10mm, the signal from the switch or sensor mounted at the tool stand should be checked to confirm that the tool remains in the tool changer.

Set “doOpen TC 1” and “doOpen TC 2” to high

Is “TC Opened” high and “TC Closed” low?

Move robot to tool stand

Is robot in position in tool stand?

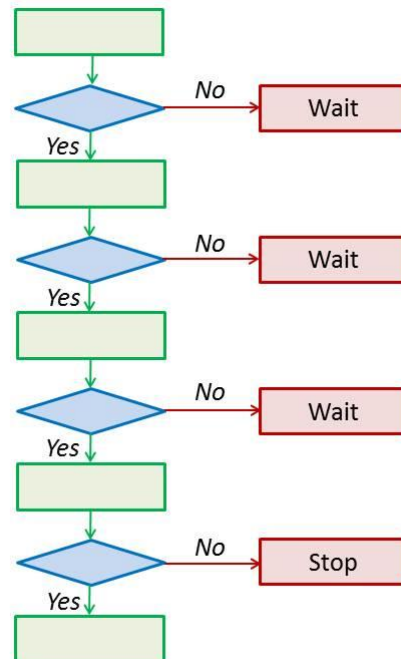
Reset “doOpen TC 1” and “doOpen TC 2”

Is “TC Closed” high and “TC Opened” low?

Move robot up 10 mm

Are tool stand switch signals correct?

Continue work cycle



Signal logic for leaving a tool in the tool stand

- Opening of tool changer should only be possible when tool is positioned in tool stand. A switch or sensor mounted at the tool stand should give a signal that allows the tool changer to open.
- Set signals “doOpen TC 1” and “doOpen TC 2” high, when the tool attachment is positioned in the tool stand.
- When signal “TC Opened” is high, the tool changer is opened and can start to move.
- When the opened tool changer has been lifted 10mm, the signal from the switch or sensor mounted at the tool stand should be checked to confirm that the tool remains in the tool stand.

Move the robot to the tool stand position

Is robot in position in tool stand?

Is “tool in stand” signal high?

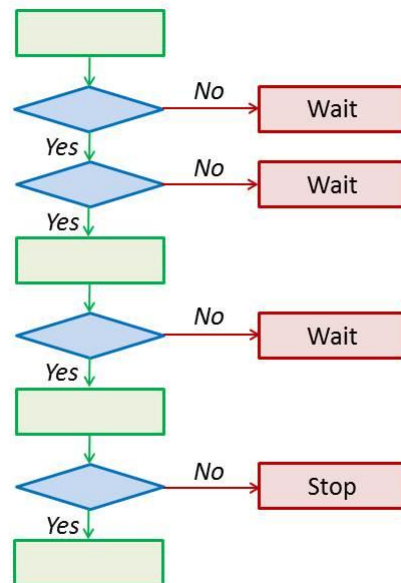
Set “doOpen TC 1” and “doOpen TC 2” to high

Is “TC Opened” high and “TC Closed” low”?

Move robot up 10 mm

Is tool stand switch signals correct?

Continue work cycle



Functional test

For controlling that the tool change valves and the integrated locking spring are functioning following tests should be made regularly:

- With the tool changer in opened position:
Set “doOpen TC 2” to low and let “doOpen TC 1” remain high.
The signal “TC Closed” will become high.
- With the tool changer in opened position:
Let “doOpen TC 2” remain high and set “doOpen TC 1” to low.
The signal “TC Closed” will become high.

Breaking conditions

- If signal “TC Closed” disappears when tool attachment is in tool changer, the robot should be stopped.
- If signal “TC Opened” disappears, when tool changer is going to pick up the tool attachment, the robot should be stopped.
- If signal “TC Opened” is high at the same time as “TC Closed” is high, the robot should be stopped.

3.2 Sparking



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

3.3 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.

3.4 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.

3.5 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!

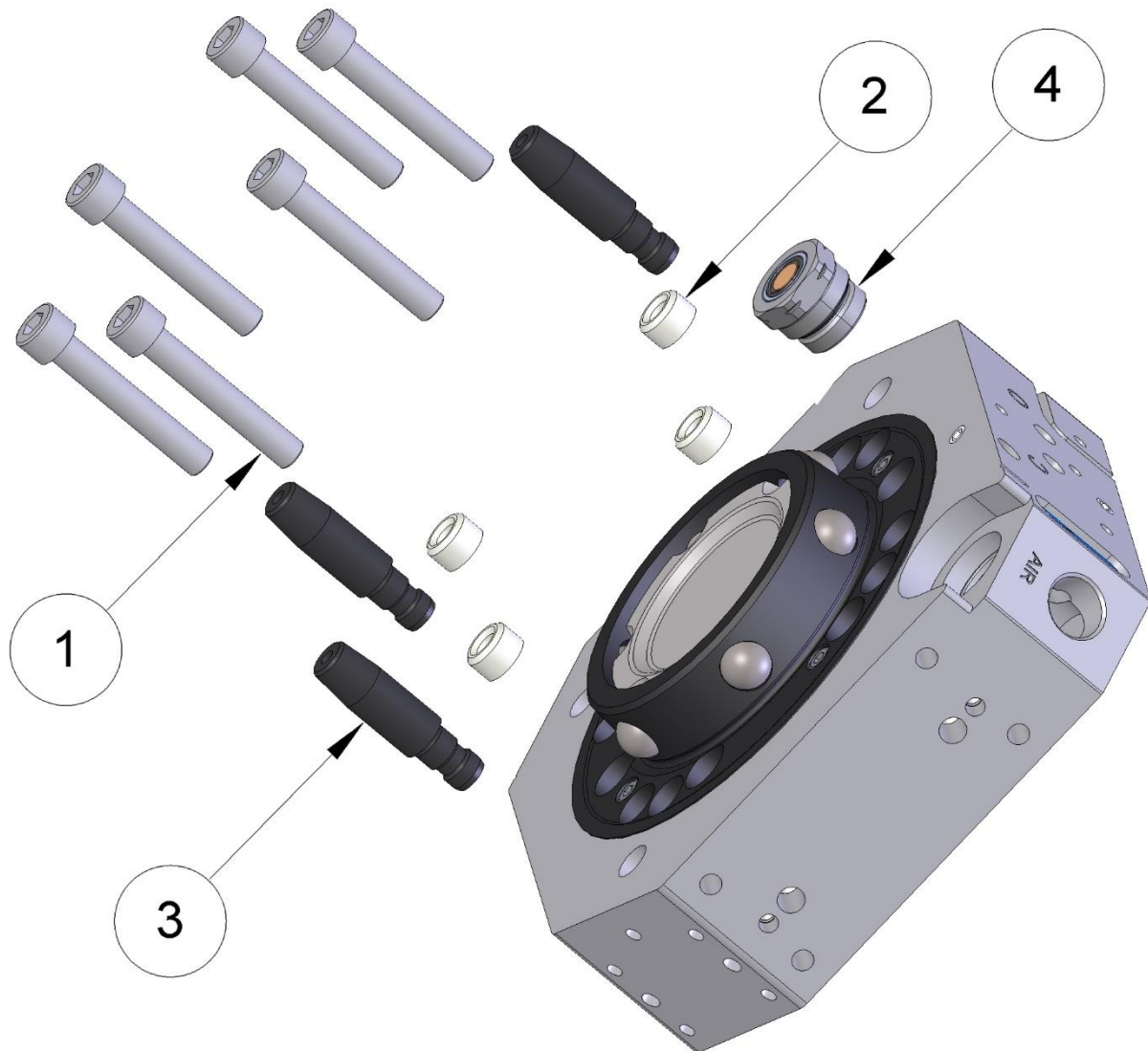
The tool stand must not be spring-loaded!

3.6 Tool Identification

Jumpers on signals at the tool attachment can be used to give information about which tool attachment that is docked in the tool changer.

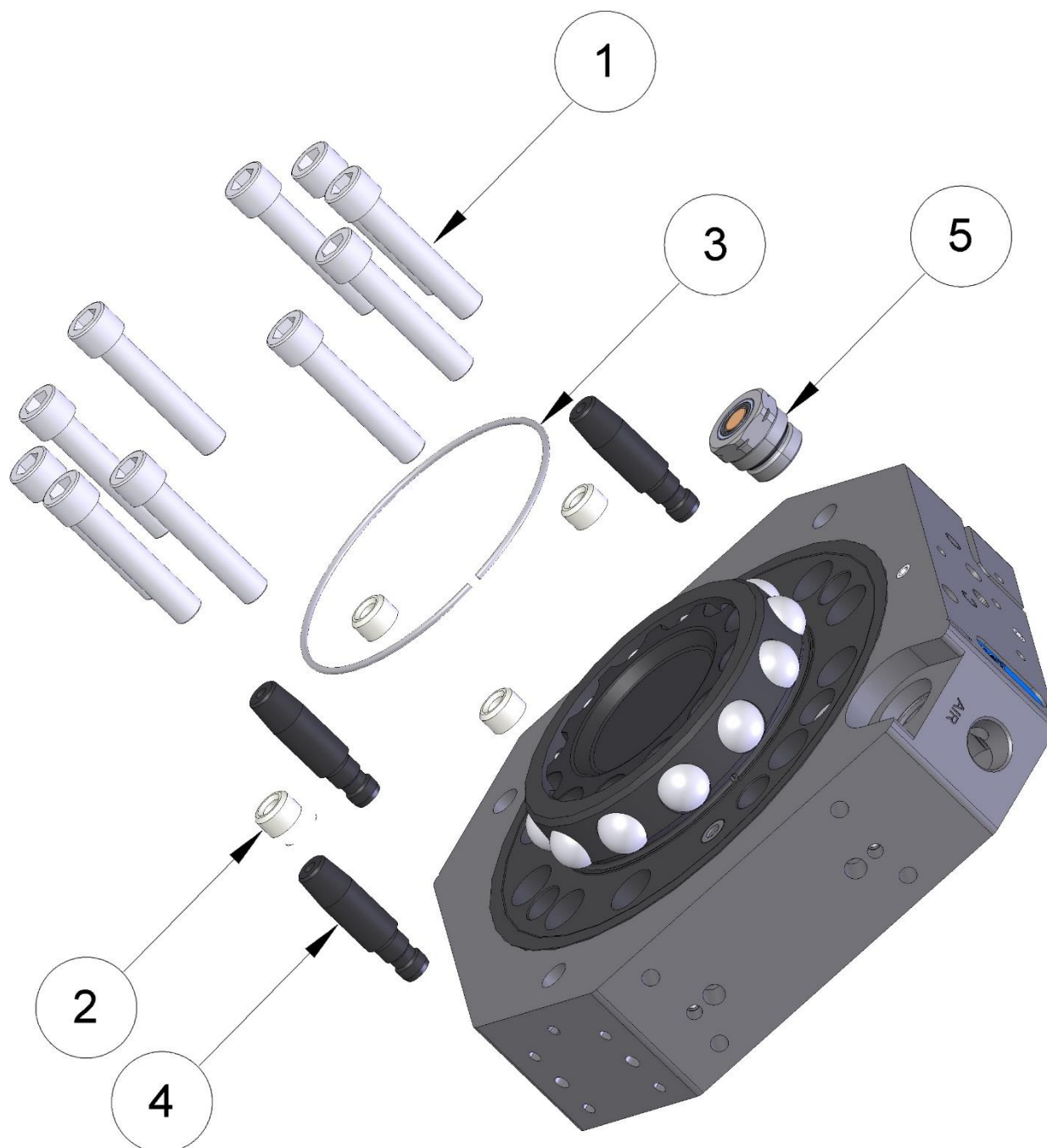
4 SPARE PARTS

4.1 Part list for TC240-1: P7330



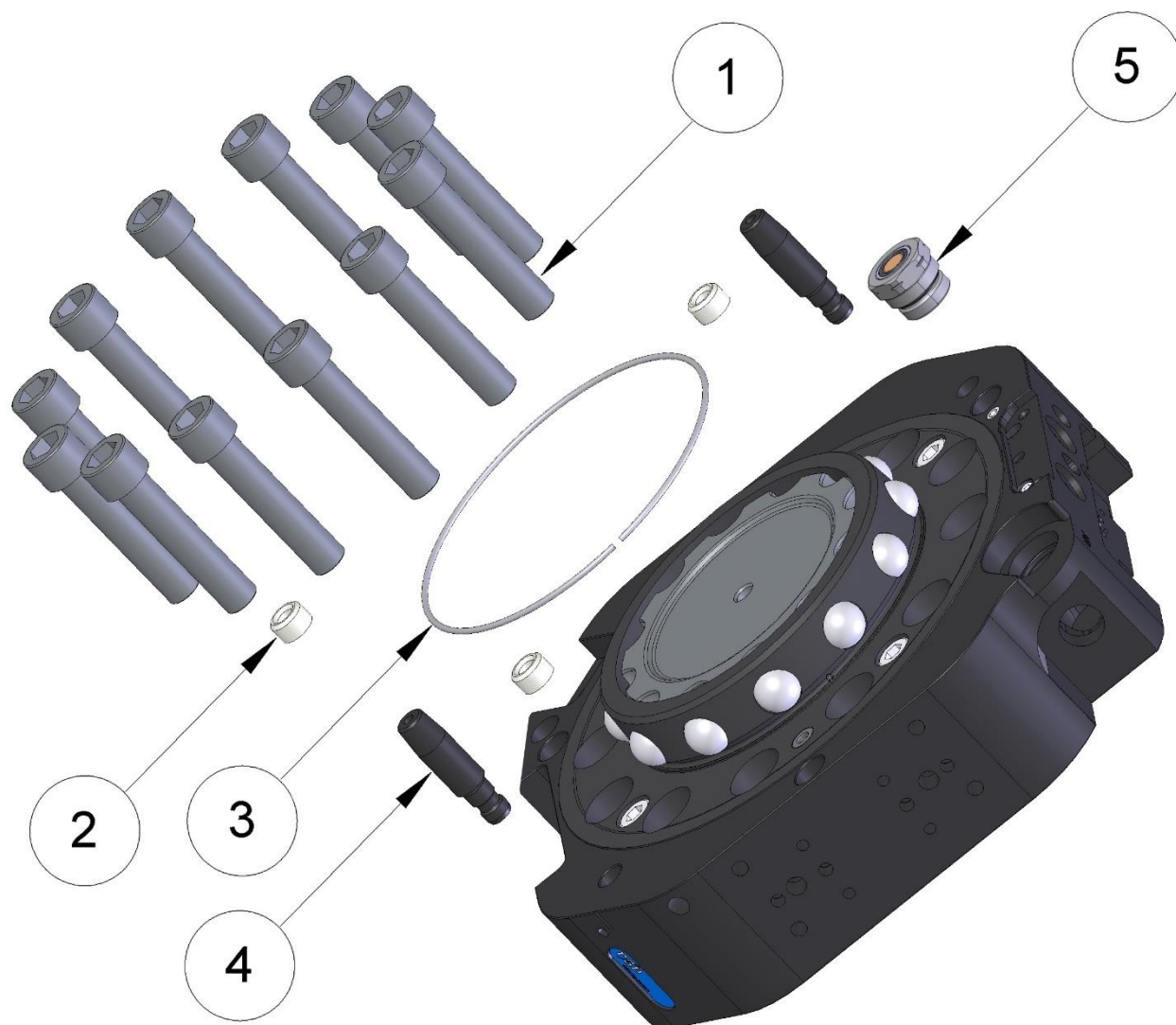
Item	Description	Part number	Wear part	Pcs
1	Mounting screw, M10x60	21212519-503		6
2	Damper	63550006-462	X	4
3	Guide pin	P0230-175	X	3
4	Water/air coupling	I1846	X	1

4.2 Part list for TC480-1: P7332 and P7334



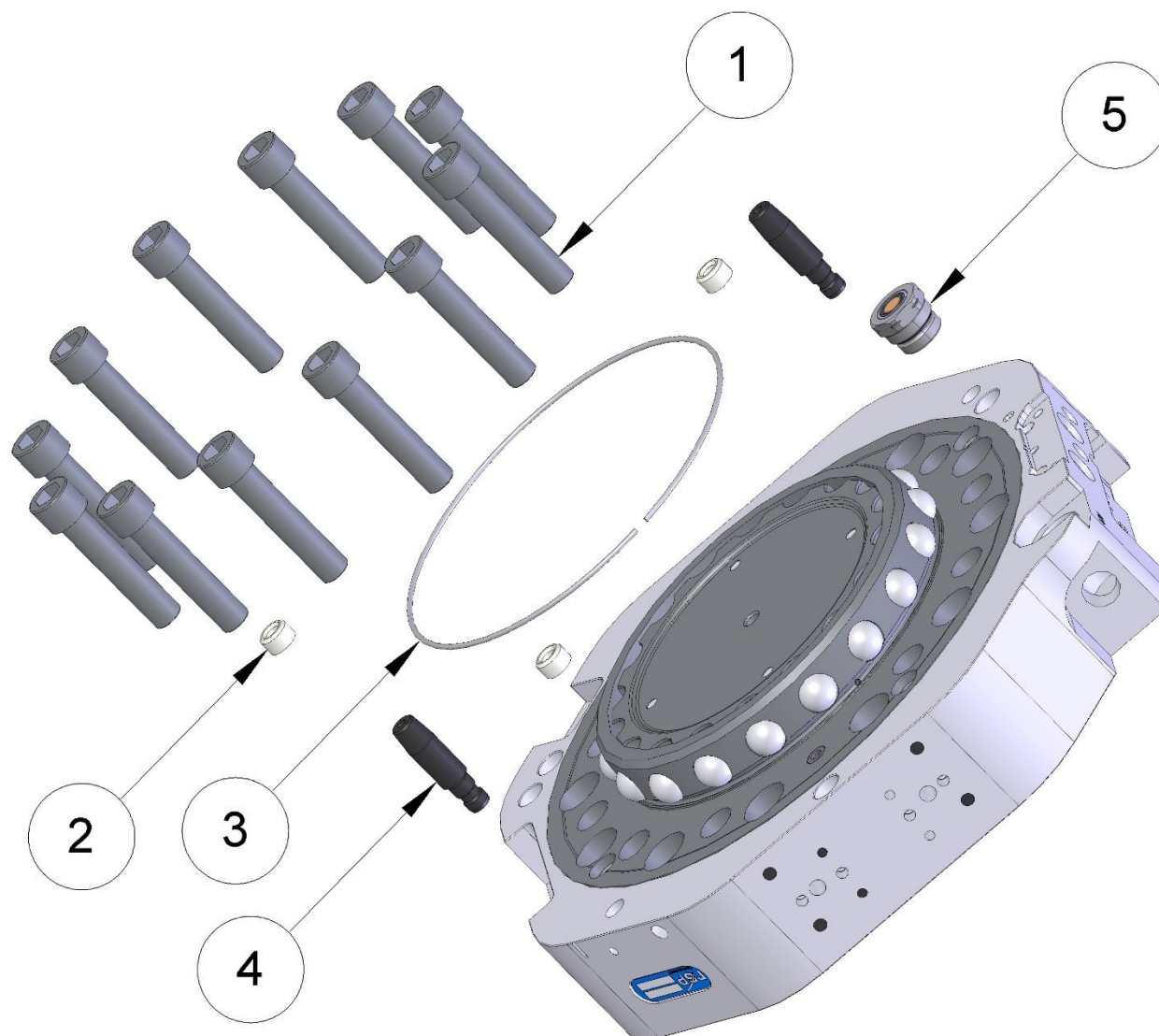
Item	Description	Part number	Wear part	Pcs
1	Mounting screw, M12x60 (P7332 only)	21212519-544		10
1	Mounting screw, M10x60 (P7334 only)	21212519-503		10
2	Damper	63550006-462	X	4
3	Circlip	I0818		1
4	Guide pin	P0230-175	X	3
5	Water/air coupling	I1846	X	1

4.3 Parts list for TC720-1: P6958 and P6960



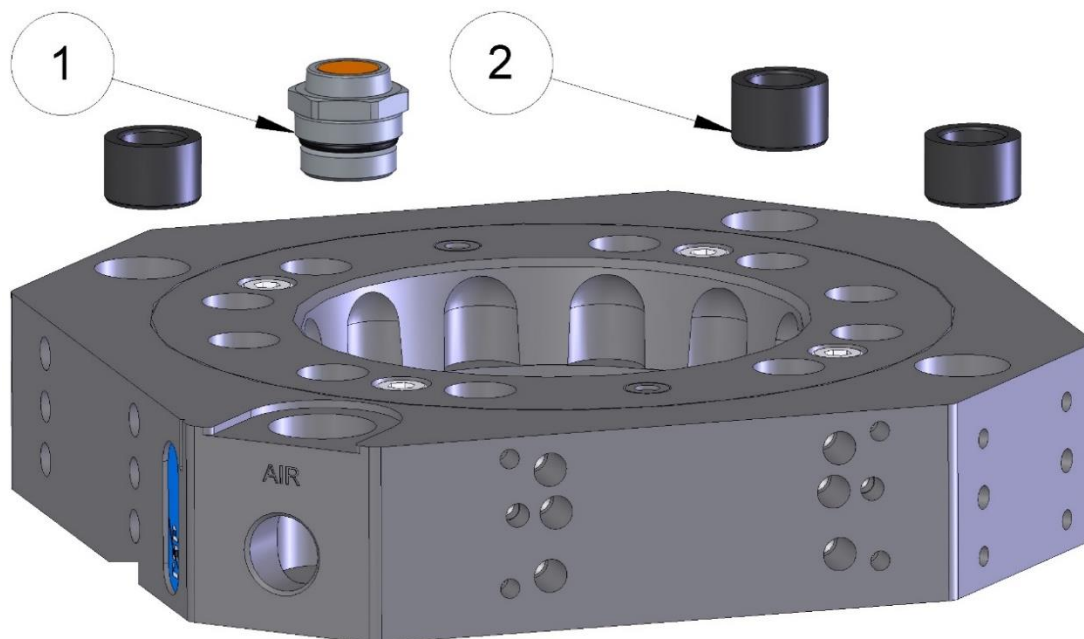
Item	Description	Part number	Wear part	Pcs
1	Mounting screw, M16x75 (P6958 only)	MC6S 16x75		12
1	Mounting screw, M16x75 (P6960 only)	MC6S 16x75		16
2	Damper	63550006-462	X	3
3	Circlip	I1253		1
4	Guide pin	P0230-175	X	2
5	Water/air coupling	I1846	X	1

4.4 Parts list for TC960-1: P7924 and P7924-1



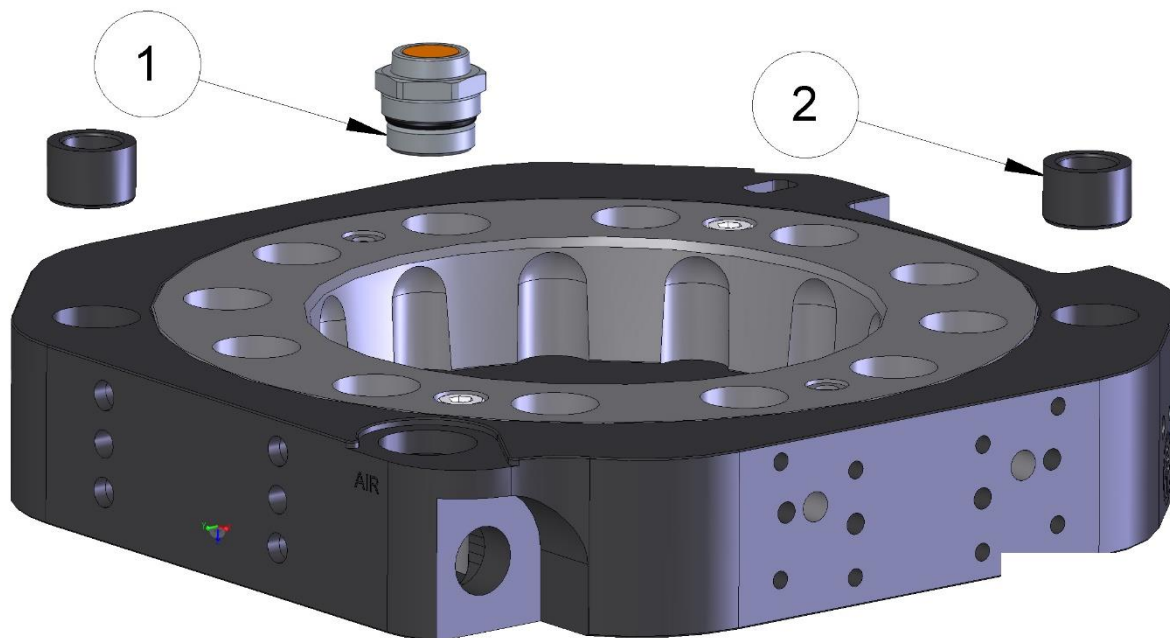
Item	Description	Part number	Wear part	Pcs
1	Mounting screws M16x75 (12X) for P7924 (screw class 8.8)	P7914		1
1	Mounting screws M12x70 (10X) for P7924-1 (screw class 12.9)	P7915		1
2	Damper	63550006-462	X	3
3	Circlip	I1320		1
4	Guide pin	P0230-175	X	2
5	Water/air coupling	I1846	X	1

4.5 Parts list for TA240 and TA480: P7331, P7333 and P7335



Item	Description	Part number	Wear part	Pcs
1	Water/air coupling	I1847	X	1
2	Guide bushing	P0178-064	X	3

4.6 Parts list for TA720 and TA960: 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

