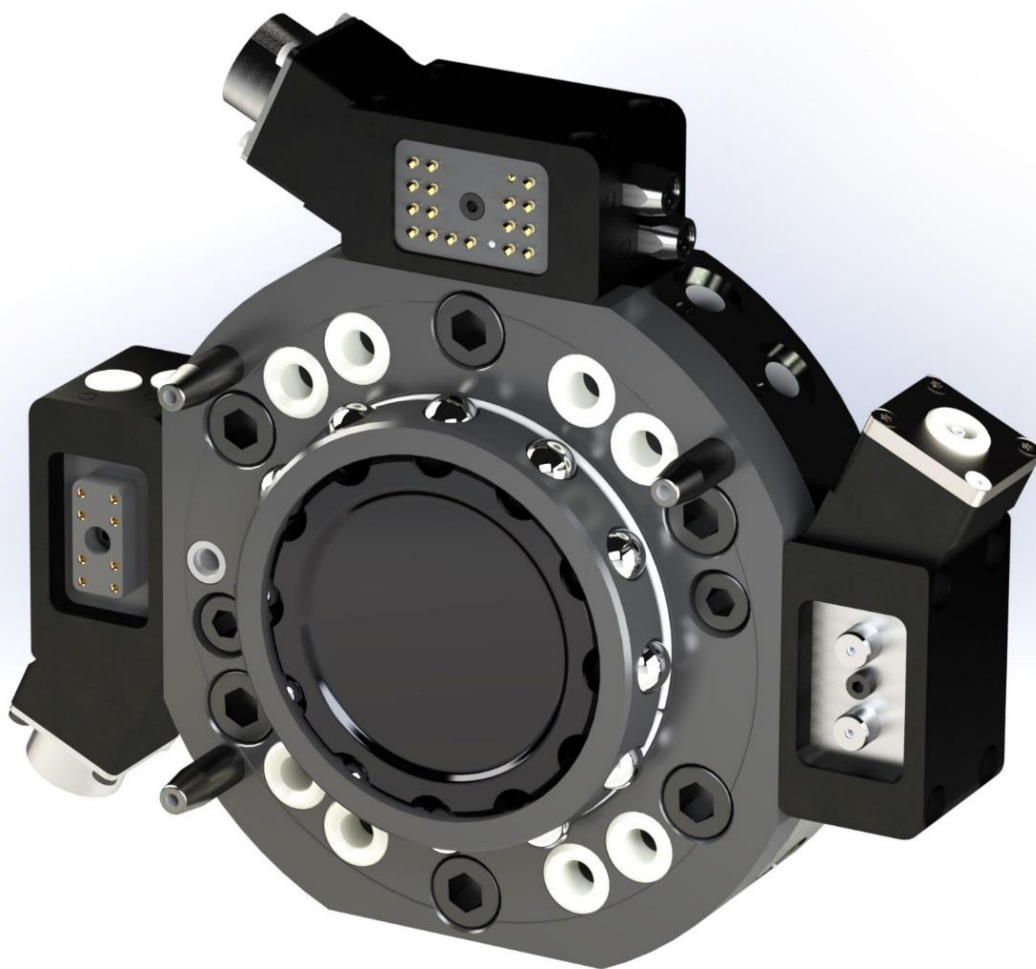


Technical Description

Tool changers TC60, TC120, TC180

M0640-1

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



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1 INTRODUCTION

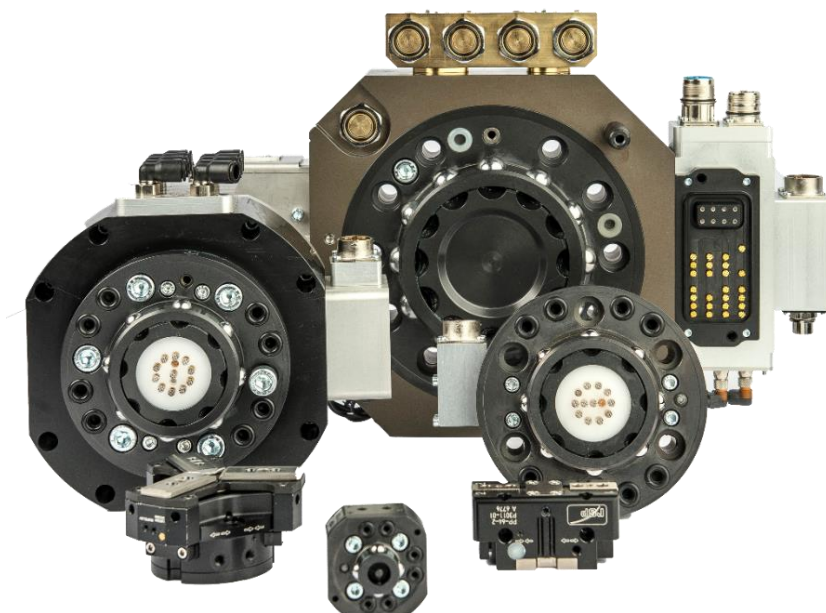
Robot System Products is a front-rank provider of peripheral products for high performance robot applications. We provide complete system solutions for your robot installations, aiming to improve your productivity with the most reliable and cost-effective tooling on the market. Continuously we explore 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
- CoboShift
- 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. The automatic and manual CoboShift tool changers are dedicated for collaborative robots. 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, power, data 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 grooves. 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 *Technical description M0640-1* contains product information, drawings, technical data, electrical and pneumatic diagrams and lists of spare parts for TC60, TC120 and TC180 in the RSP Modular product family of tool changers. In the *Technical description M0641-1* options to be mounted on the tool changers and tool attachments are presented for transfer of electric signals, power, data and compressed air. The document *Installation and Maintenance M0627-1* contains procedures for mounting, installation, replacement of equipment, together with procedures for inspection, cleaning and lubrication including maintenance intervals.

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:

- Signal pins
- Guide pins and bushings
- Air sealings

1.4 Complementary Equipment

Complementary equipment is described in separate documents.

Article	Note
External valve units	Mounted at the rear of the upper arm. Shuts off the air automatically during tool changing.
Cable and Hose Package	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 and cables for tool changers and tool attachments simplifying electrical installations.
3D-models	Available in Solid Works®, STEP and Parasolid-format.

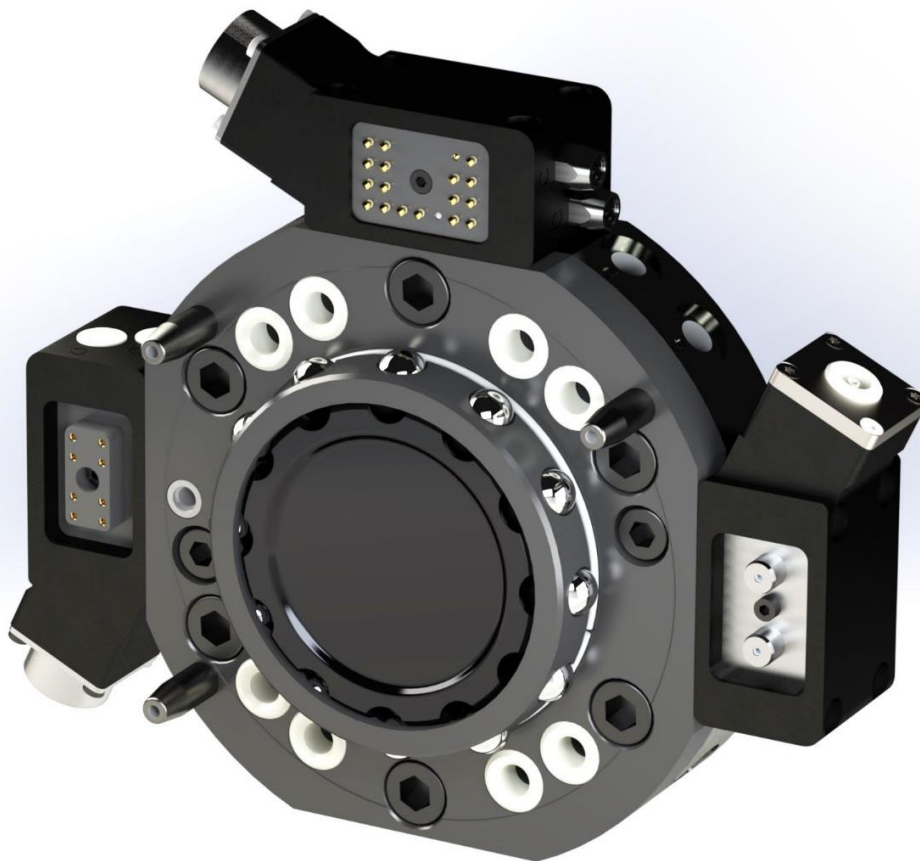
2 TECHNICAL SPECIFICATIONS

The Robot System Products TC240, TC480, TC720 and TC960 tool changers are designed for maximum flexibility and use within various applications for which a large number of options can be combined in different configurations. This document presents tool changers including tool attachments as well as connection kits to facilitate electrical installation.

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.

Three guide pins can be mounted, as an option, in order to align the tool attachment with the tool changer before electrical interfaces connects to each other during docking, which significantly extends the lifetime for not spring-mounted signal pins.

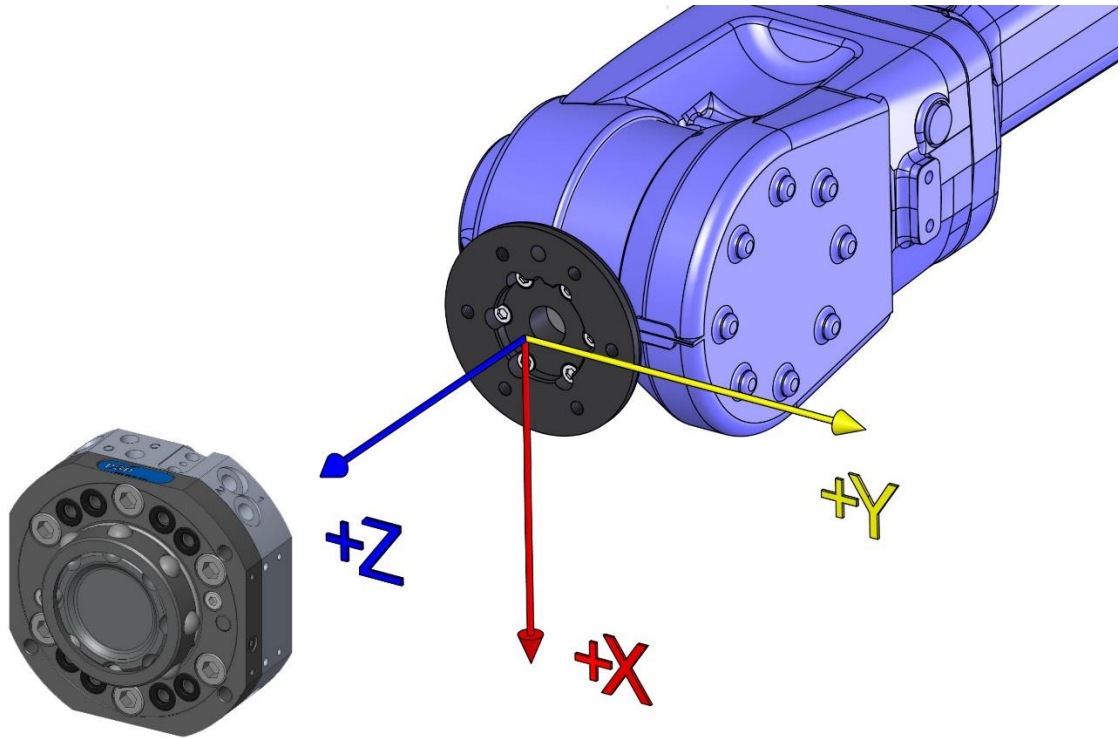
The figure below is an example of a configuration with different options:



TC60-8 with some different options mounted.

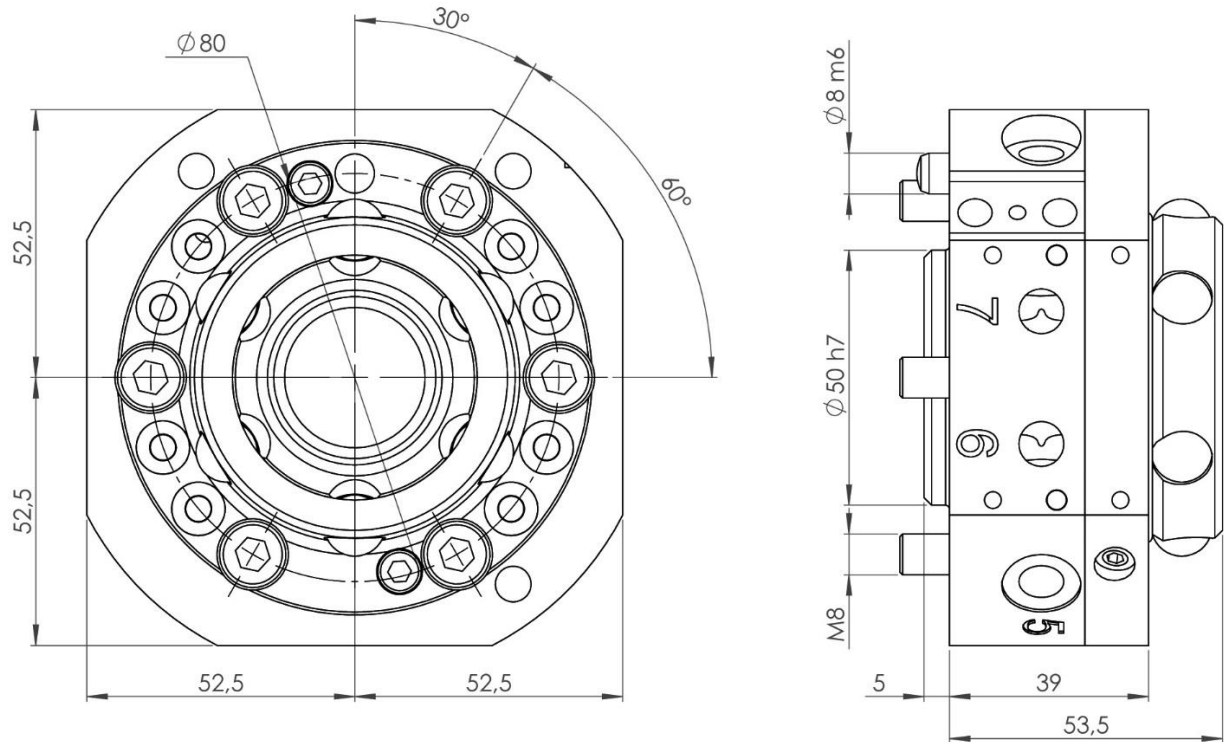
2.1 Coordinate System Definition

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 docked, the origo of the co-ordinate system is situated in the centre of the robot mounting flange.

2.2 Tool changer TC60-8. Article: P1301A

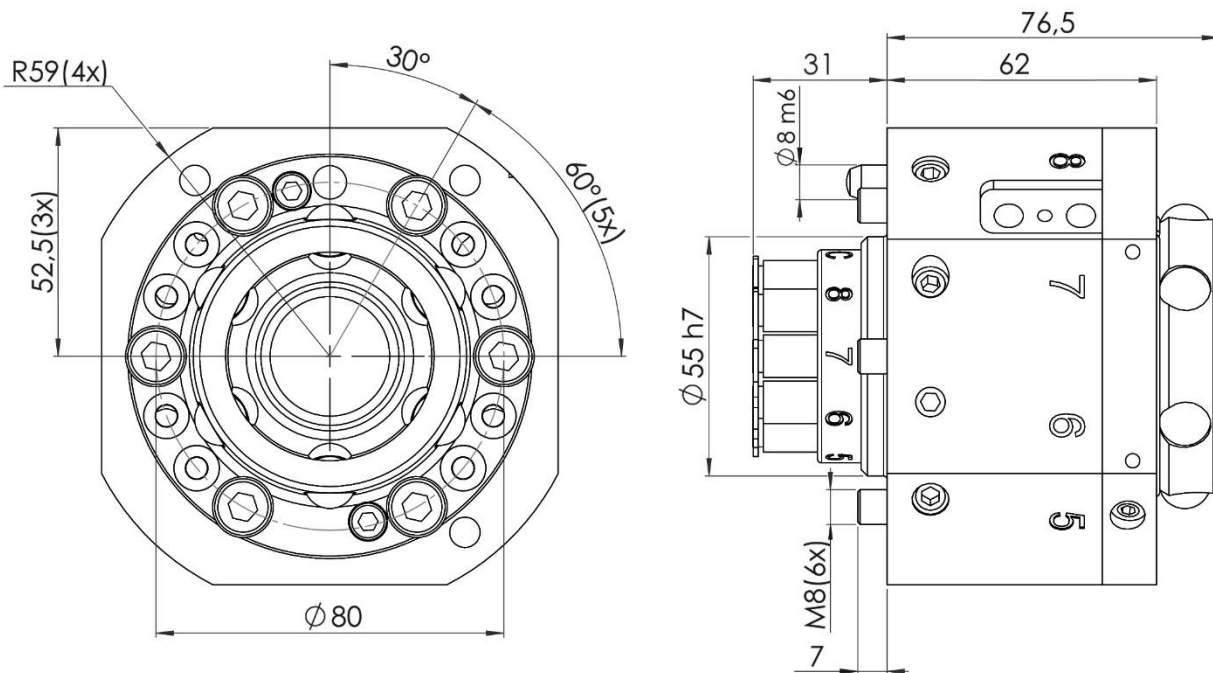


The tool changer TC60-8 transfers 8 pneumatic channels to the tool attachment, has inlets for Open TC and Close TC, 3 positions for options and 1 for TC Opened/Closed sensors. To be used together with tool attachment P1302.

Technical data

Working temperature		+10°C–+50°C
Bolt pattern		ISO 9409-1 80-6-M8
Weight and centre of gravity (Z)		
P1301A		1.8 kg / 26 mm
P1301A with P1302		2.8 kg / 35 mm
Maximum tool load	Fz (static)	±600 N
	Mx/My (dynamic)	±600 Nm
	Mz (dynamic)	±500 Nm
Air channels	Pneumatic diagram	See section 2.10
	User channels, robot side	8 X G 1/8" (400 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

2.3 Tool changer TC60-8 ID. Article: P1336

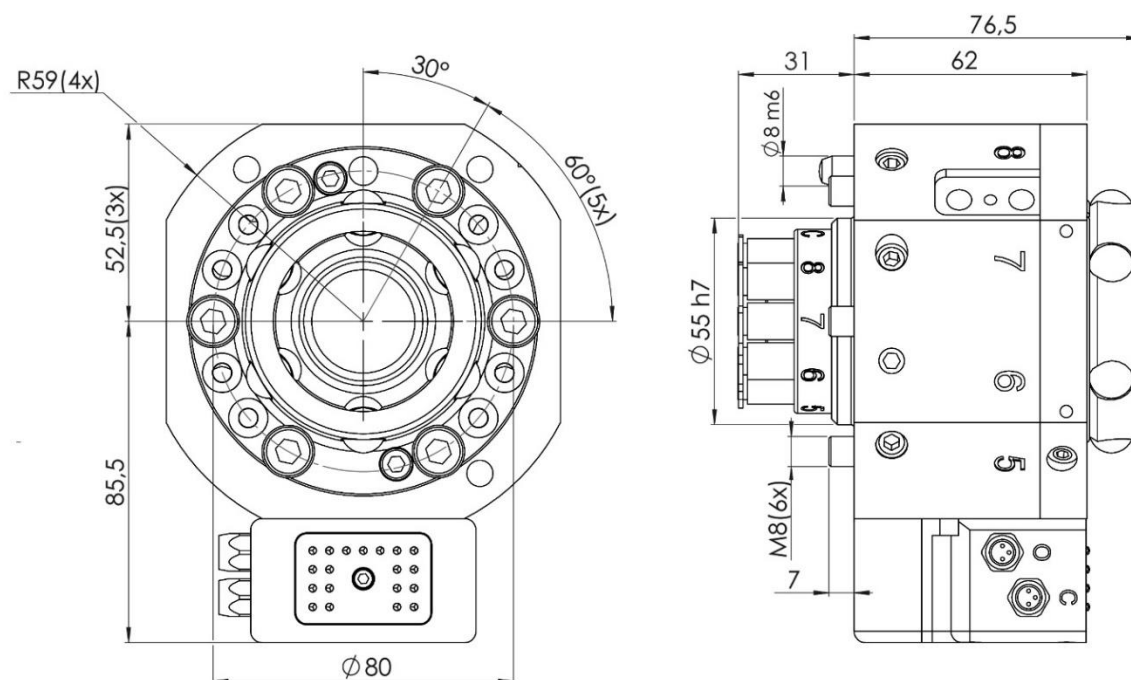


The tool changer TC60-8 ID transfers 8 pneumatic channels to the tool attachment, has inlets for Open TC and Close TC, 1 position for options and 1 for TC Opened/Closed sensors. To be used together with tool attachment P1302.

Technical data

Working temperature		+10°C--+50°C
Bolt pattern		ISO 9409-1 80-6-M8
Weight and centre of gravity (Z)		
P1336		2.4 kg / 35 mm
P1336 with P1302		3.4 kg / 49 mm
Maximum tool load	Fz (static)	±600 N
	Mx/My (dynamic)	±600 Nm
	Mz (dynamic)	±500 Nm
Air channels	Pneumatic diagram	See section 2.10
	User channels, robot side	8 x Ø6 mm (Push-in fitting, Festo QSM-M7-6-I), 150 l/min, max 10 bar
	Dedicated channels, Ø6 mm	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 changer TC60-8E ID. Article: P1337

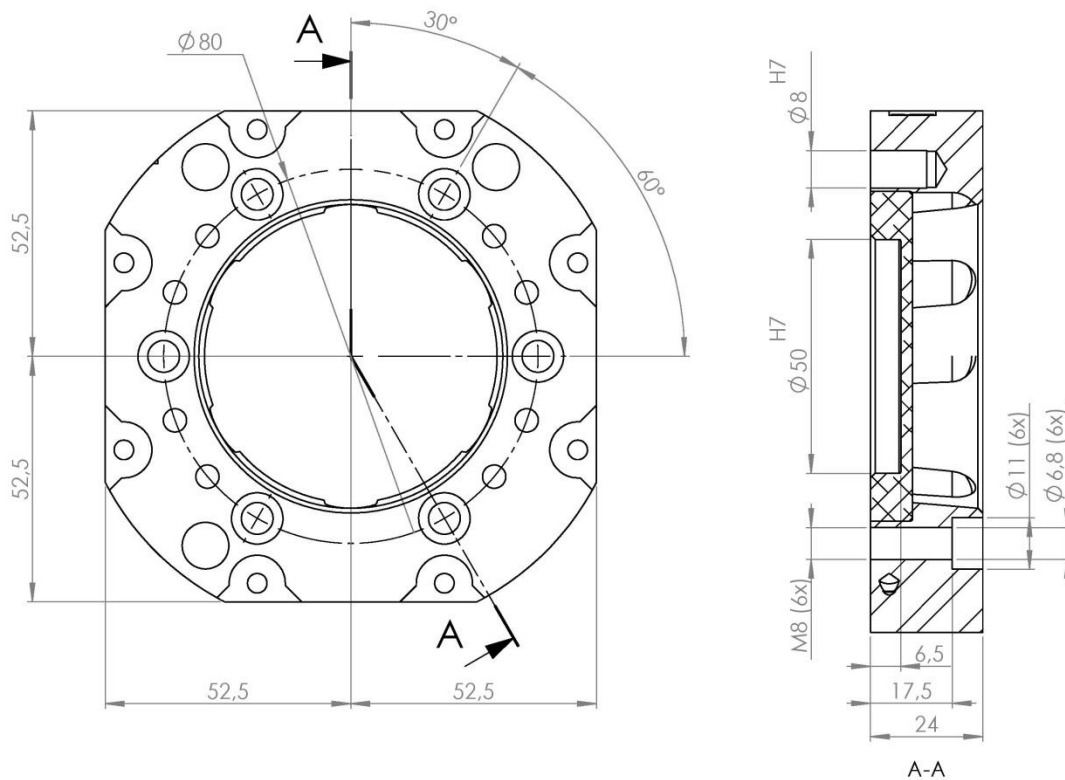


The tool changer TC60-8 transfers 8 pneumatic channels and 17 electrical signals to the tool attachment, has inlets for Open TC and Close TC and 1 for TC Opened/Closed sensors. To be used together with tool attachment P1302 with signal module P1312 (17 x signals) mounted at the corresponding position.

Technical data

Working temperature		+10°C–+50°C
Bolt pattern		ISO 9409-1 80-6-M8
Weight and centre of gravity (Z)		
P1337		2.6 kg / 37 mm
P1337 with P1302+1312		3.6 kg / 50 mm
Maximum tool load	Fz (static) Mx/My (dynamic) Mz (dynamic)	±600 N ±600 Nm ±500 Nm
Air channels	Pneumatic diagram User channels, robot side Dedicated channels, Ø6 mm Air quality	See section 2.10 8 x Ø6 mm (Push-in fitting, Festo QSM-M7-6-I), 150 l/min, max 10 bar Open TC marked O (6-10 bar) Close TC marked C (6-10 bar) Oil-clean and waterless filtered air, with max 25µm particle content
Electrical Interface	Circuit diagram Connection, robot side Total signals Dedicated signals	E0182-047 (section 2.11) I1154 (Mini-snap 19 pole) 17 x (1A, 30V) TC Opened, TC Closed
Connection kit (optional)	P8176-16	I1155 (Mini-snap 19 pole female)–Souriau 19P (UT061823PH04), total length 1.6 m.

2.5 Tool attachment, TA60-8. Article: P1302



The tool attachment TA60-8 transfers 8 pneumatic channels to the tool and has 4 positions for options. To be used together with tool changer P1301A, P1336 and P1337.

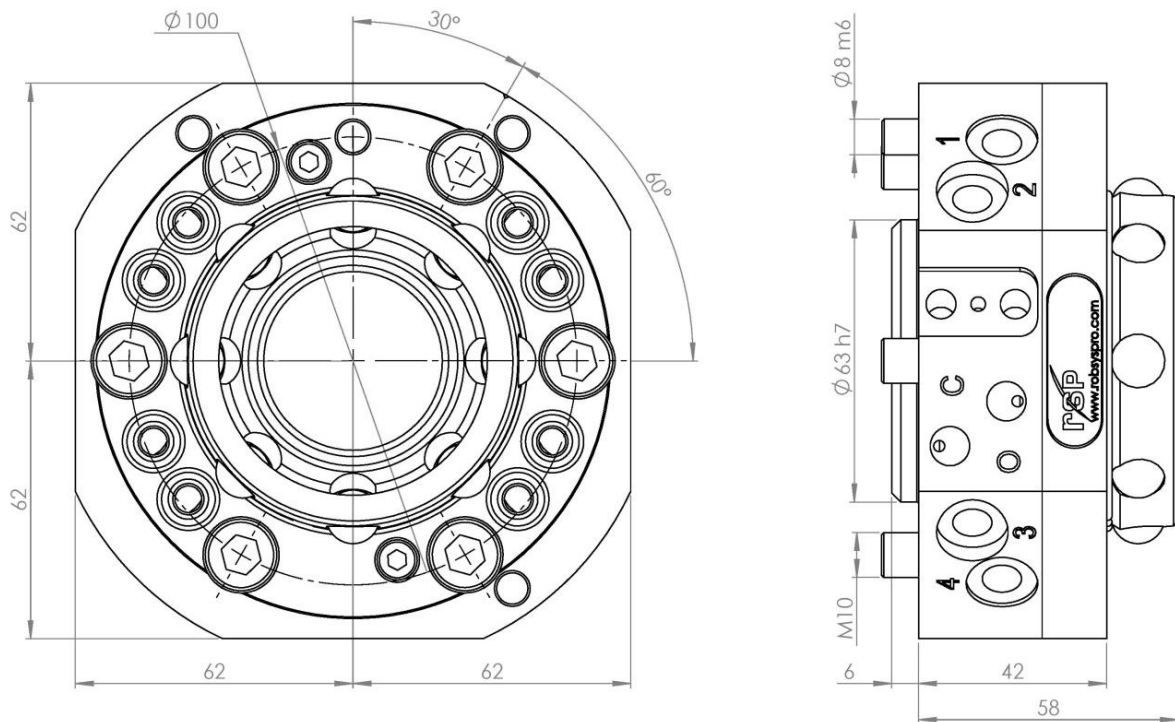
Technical data

Working temperature		+10°C–+50°C
Bolt pattern		ISO 9409-1 80-6-M8
Weight		1.0 kg
Maximum tool load (M8-screws)	Fz (static) Mx/My (dynamic) Mz (dynamic)	±600 N ±600 Nm ±500 Nm
Maximum tool load (M6-screws)	Fz (static) Mx/My (dynamic) Mz (dynamic)	±600 N ±600 Nm ±250 Nm
Air channels	Pneumatic diagram Connections, tool side	See section 2.10 8 X G 1/8"



NOTE! Tools can be mounted to the tool attachment using six M8-screws, alternatively the tool attachment can be mounted to the tool using six M6-screws.

2.6 Tool changer TC120-8. Article: P1401

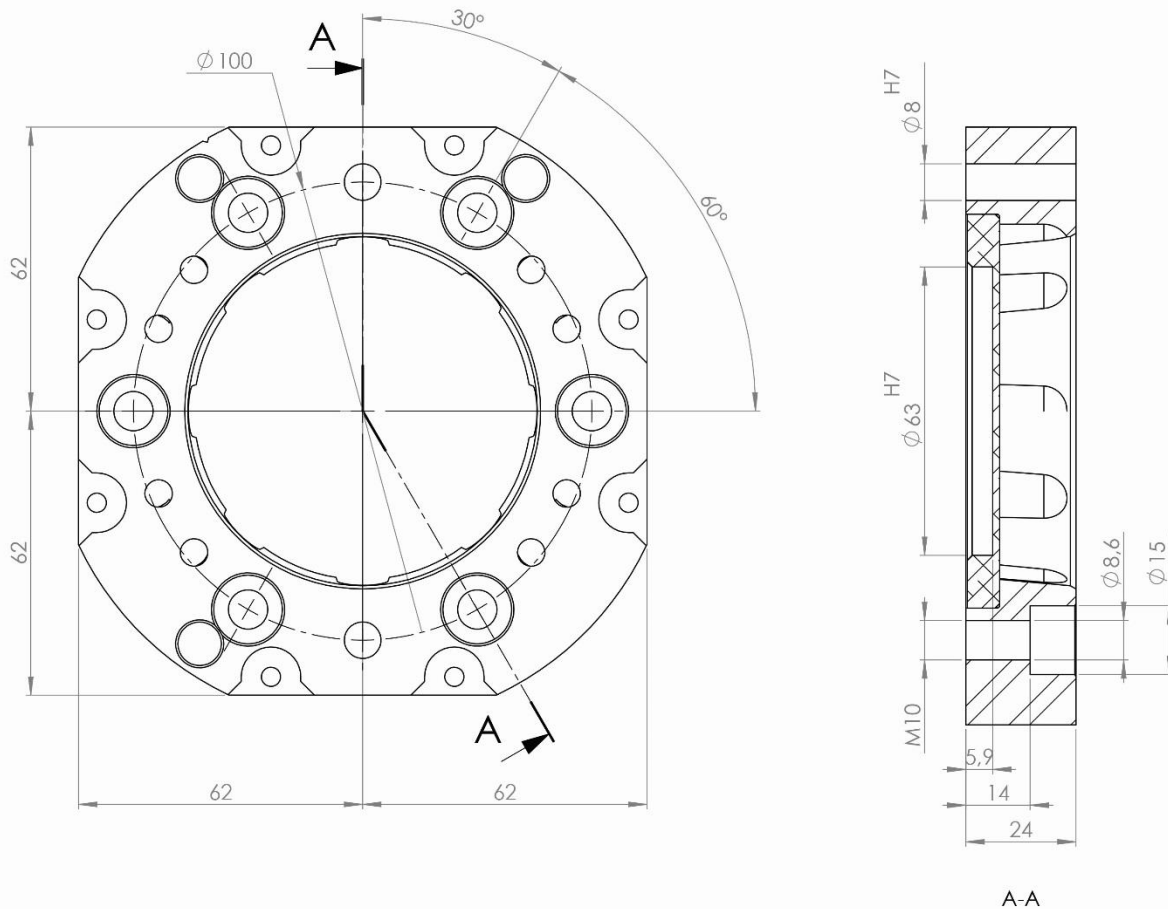


The tool changer TC120-8 transfers 8 pneumatic channels to the tool attachment, has inlets for Open TC and Close TC, 3 positions for options and 1 for TC Opened/Closed sensors. To be used together with tool attachment P1402.

Technical data

Working temperature		+10°C–+50°C
Bolt pattern		ISO 9409-1 100-6-M10
Weight and centre of gravity (Z)		
P1401		2.7 kg / 28 mm
P1401 with P1402		4.0 kg / 37 mm
Maximum tool load	Fz (static) Mx/My (dynamic) Mz (dynamic)	±1000 N ±1000 Nm ±1000 Nm
Air channels	Pneumatic diagram User channels, robot side Dedicated channels, G 1/8" Air quality	See section 2.10 8 X G 1/8" (400 l/min, max 10 bar) Open TC marked O (6-10 bar) Close TC marked C (6-10 bar) Oil-clean and waterless filtered air, with max 25µm particle content

2.7 Tool attachment, TA120-8. Article: P1402



The tool attachment TA120-8 transfers 8 pneumatic channels to the tool and has 4 positions for options. To be used together with tool changer P1401.

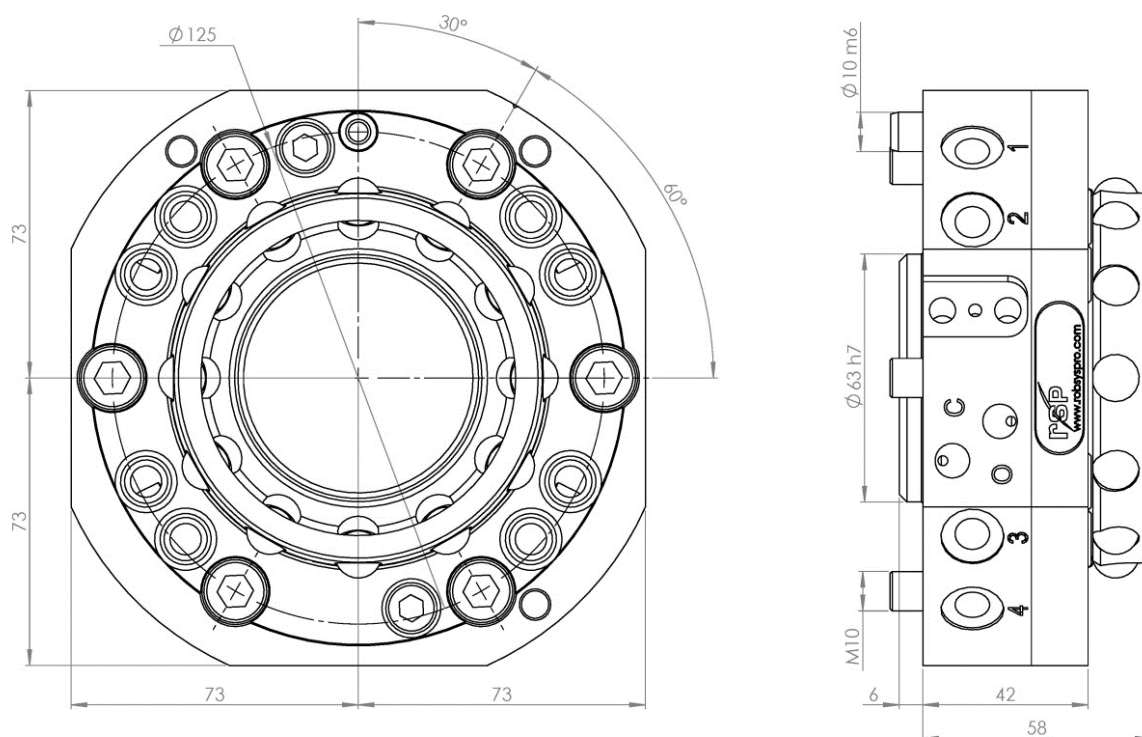
Technical data

Working temperature		+10°C--+50°C
Bolt pattern		ISO 9409-1 100-6-M10
Weight		1.3 kg
Maximum tool load (M10-screws)	Fz (static)	±1000 N
	Mx/My (dynamic)	±1000 Nm
	Mz (dynamic)	±1000 Nm
Maximum tool load (M8-screws)	Fz (static)	±1000 N
	Mx/My (dynamic)	±1000 Nm
	Mz (dynamic)	±600 Nm
Air channels	Pneumatic diagram	See section 2.10
	Connections, tool side	8 X G 1/8"



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.

2.8 Tool changer TC180-8. Article: P1801

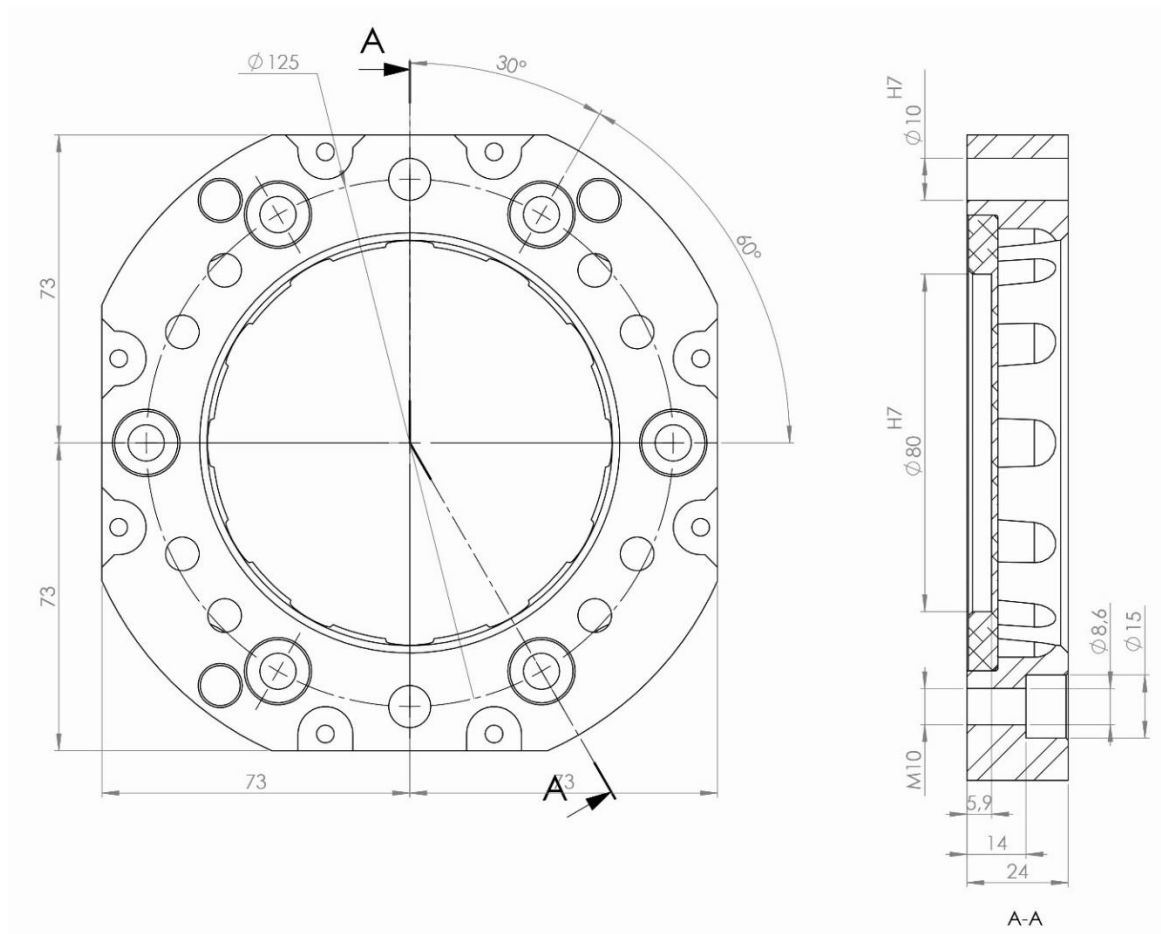


The tool changer TC180-8 transfers 8 pneumatic channels to the tool attachment, has inlets for Open TC and Close TC, 3 positions for options and 1 for TC Opened/Closed sensors. To be used together with tool attachment P1802.

Technical data

Working temperature		+10°C–+50°C
Bolt pattern		ISO 9409-1 125-6-M10
Weight and centre of gravity (Z)		
P1801		3.6 kg / 28 mm
P1801 with P1802		5.4 kg / 37 mm
Maximum tool load	Fz (static)	±1800 N
	Mx/My (dynamic)	±1800 Nm
	Mz (dynamic)	±1250 Nm
Air channels	Pneumatic diagram	See section 2.10
	User channels, robot side	8 X G 1/8" (400 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

2.9 Tool attachment, TA180-8. Article: P1802



The tool attachment TA180-8 transfers 8 pneumatic channels to the tool and has 4 positions for options. To be used together with tool changer P1801.

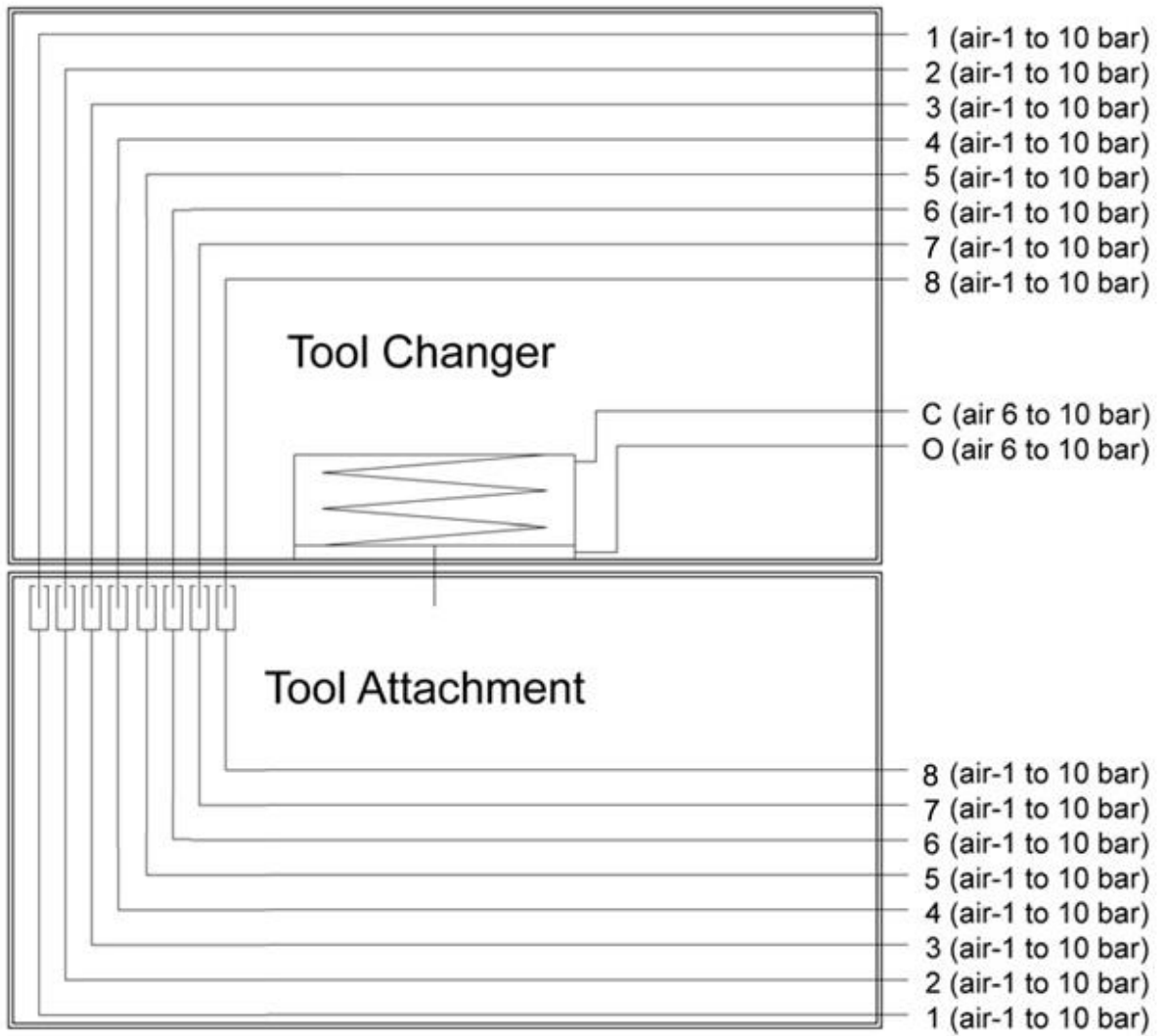
Technical data

Working temperature		+10°C--+50°C
Bolt pattern		ISO 9409-1 125-6-M10
Weight		1.8 kg
Maximum tool load (M10-screws)	Fz (static)	±1800 N
	Mx/My (dynamic)	±1800 Nm
	Mz (dynamic)	±1250 Nm
Maximum tool load (M8-screws)	Fz (static)	±1800 N
	Mx/My (dynamic)	±1800 Nm
	Mz (dynamic)	±750 Nm
Air channels	Pneumatic diagram	See section 2.10
	Connections, tool side	8 X G 1/8"

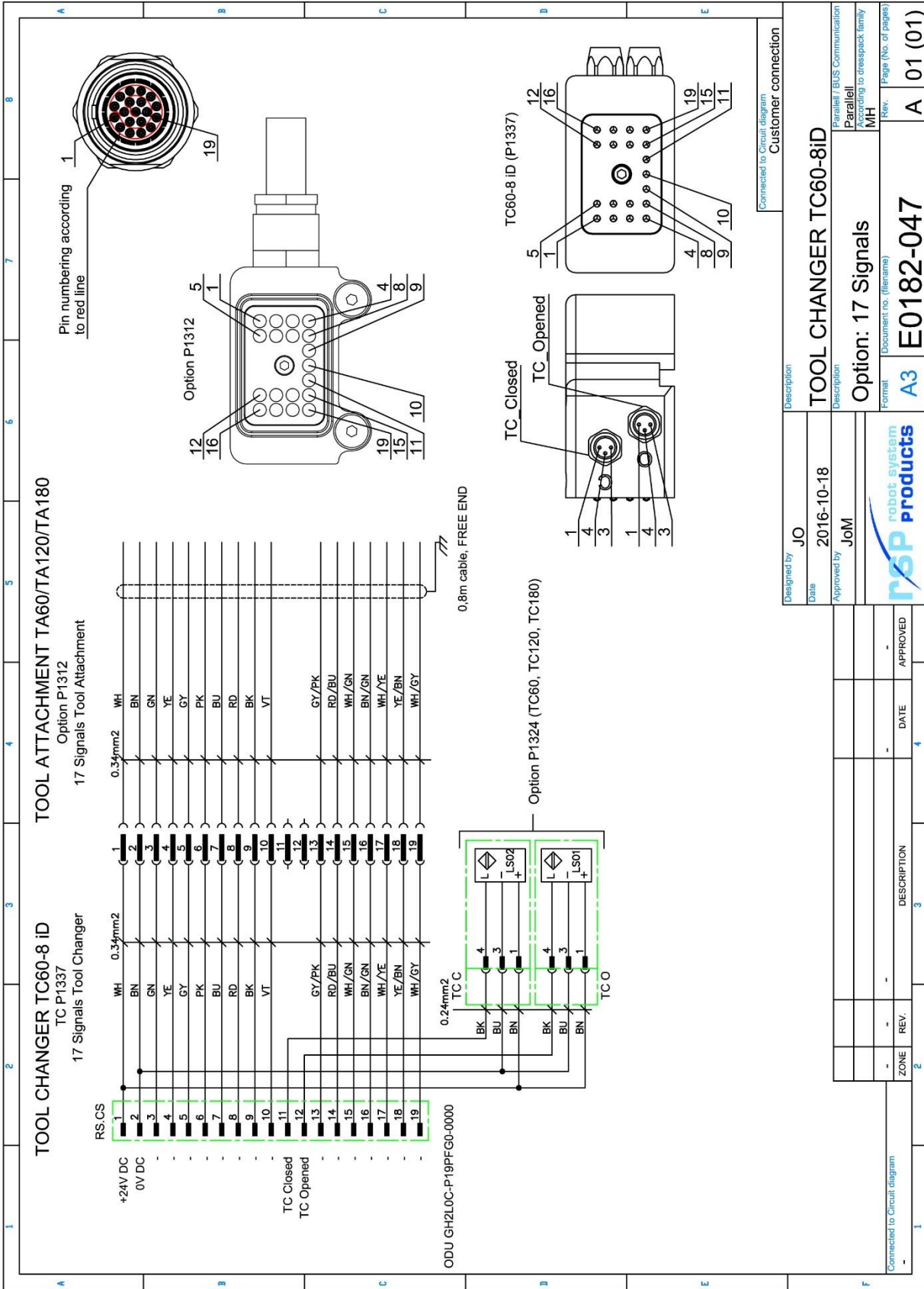


NOTE! Tools can be mounted to the tool attachment using six M10-screws, alternatively the tool attachment can be mounted to the tool using six M8-screws.

2.10 Pneumatic diagram for TC60, TC120 and TC180



2.11 Circuit diagram E0182-047 for P1337



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2.12 Technical notes

2.12.1 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.

2.12.2 Sparking



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

2.12.3 Robot Adaptation Kits

The flange of the tool changers has fastening holes in accordance with ISO 9409. Adaptation plates, to be mounted between the tool changer and the robot flange, are available for other bolt circles. The order numbers are customer specific, depending on robot.

2.12.4 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!

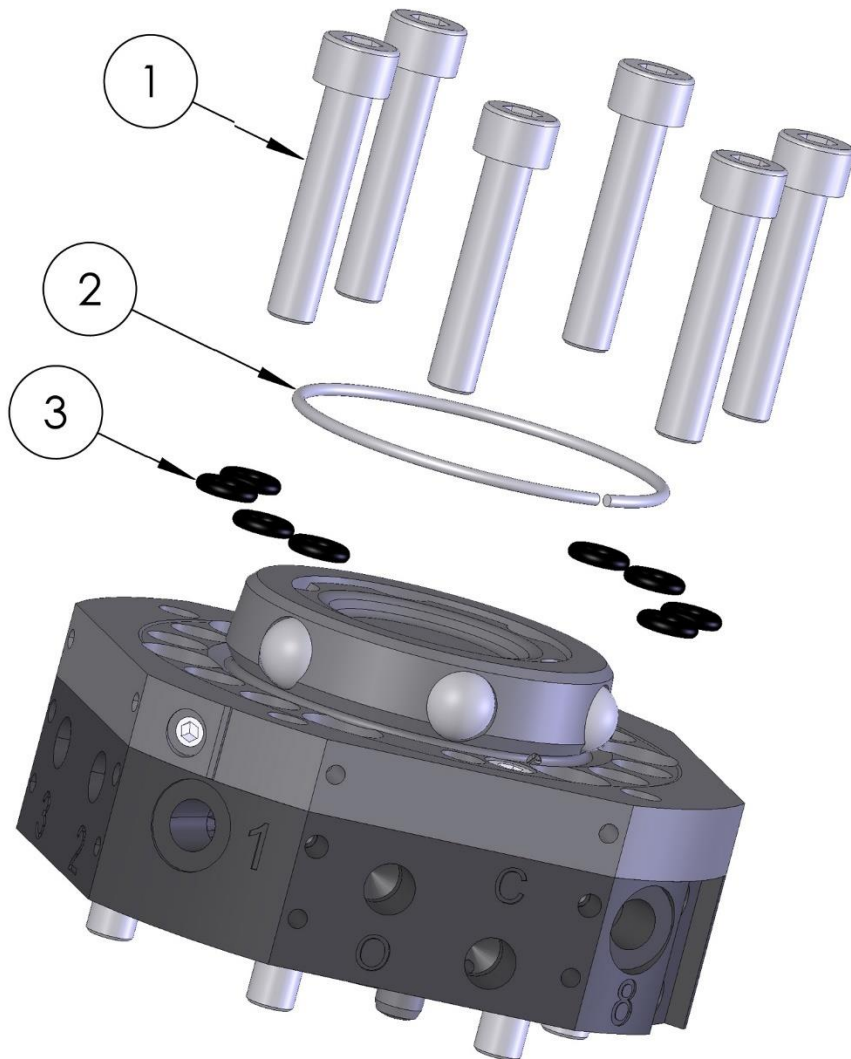
See *Technical description M0641-1* for suitable tool stand equipment.

2.12.5 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.

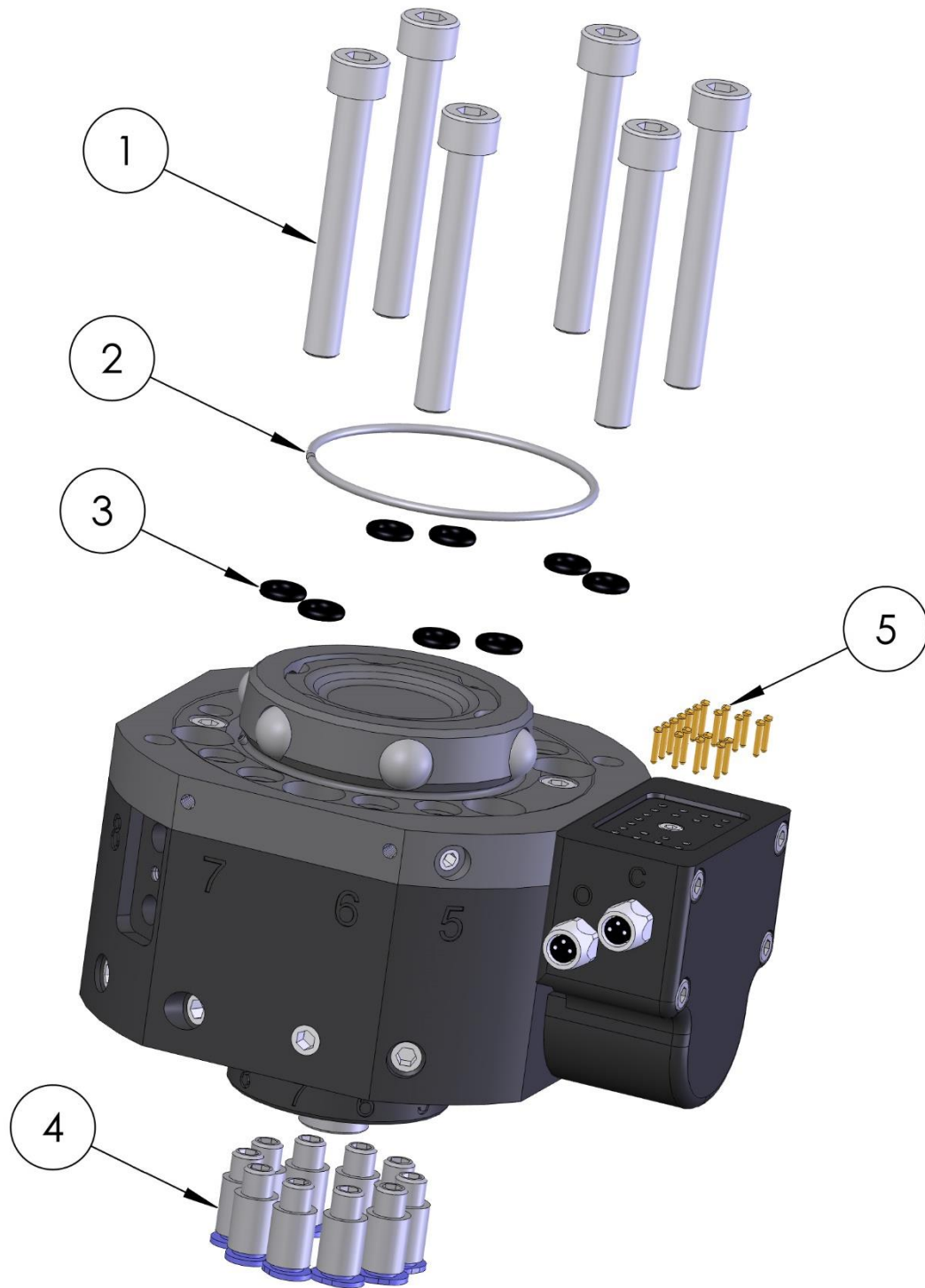
3 SPARE PARTS

3.1 Part list for tool changer TC60, P1301A



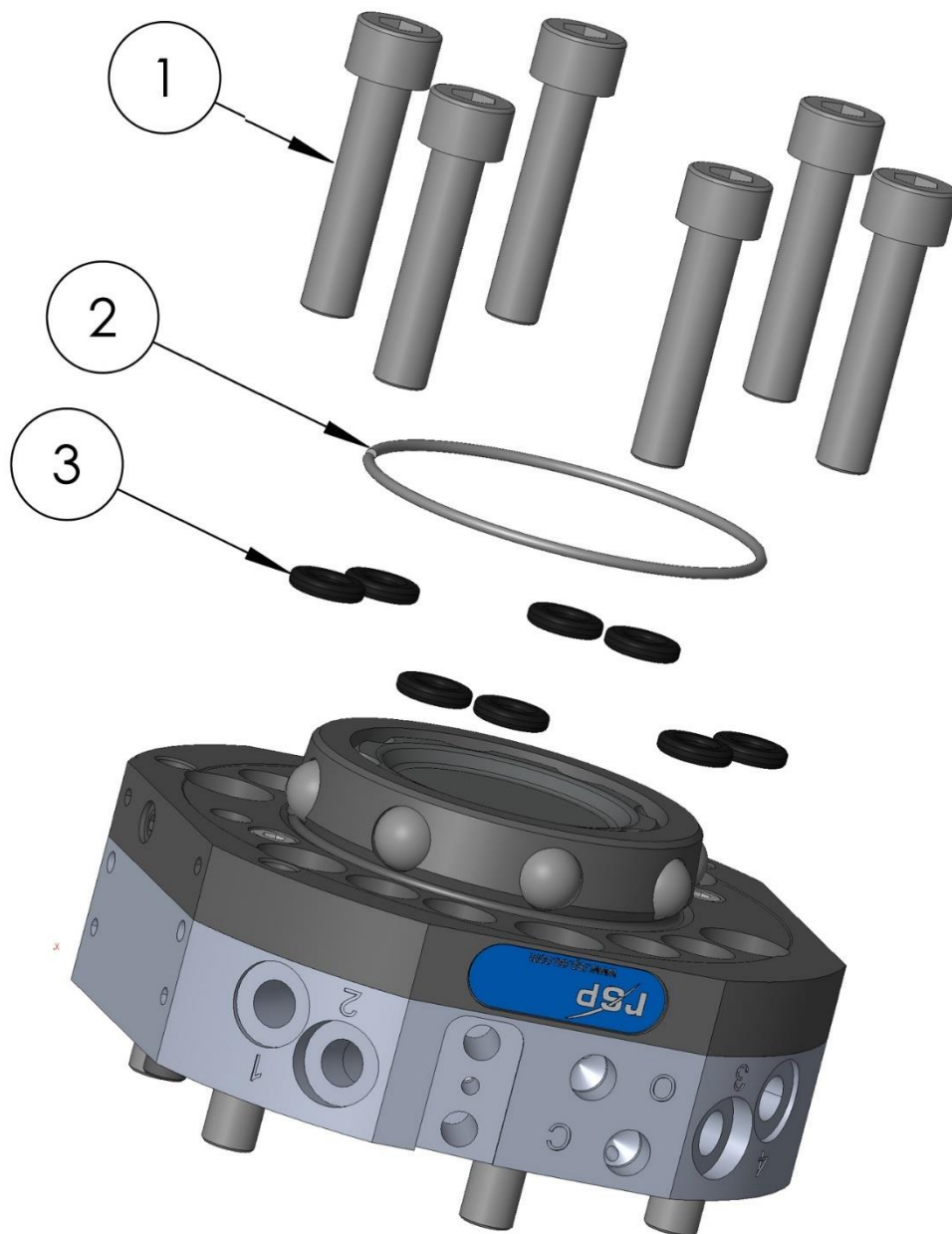
Item	Description	Part number	Wear part	Pcs
1	Screw, M8x40	21212519-459		6
2	Locking ring	I0758		1
3	Air sealing	I0760	X	8

3.2 Part list for tool changer TC60 ID, P1336 and P1337



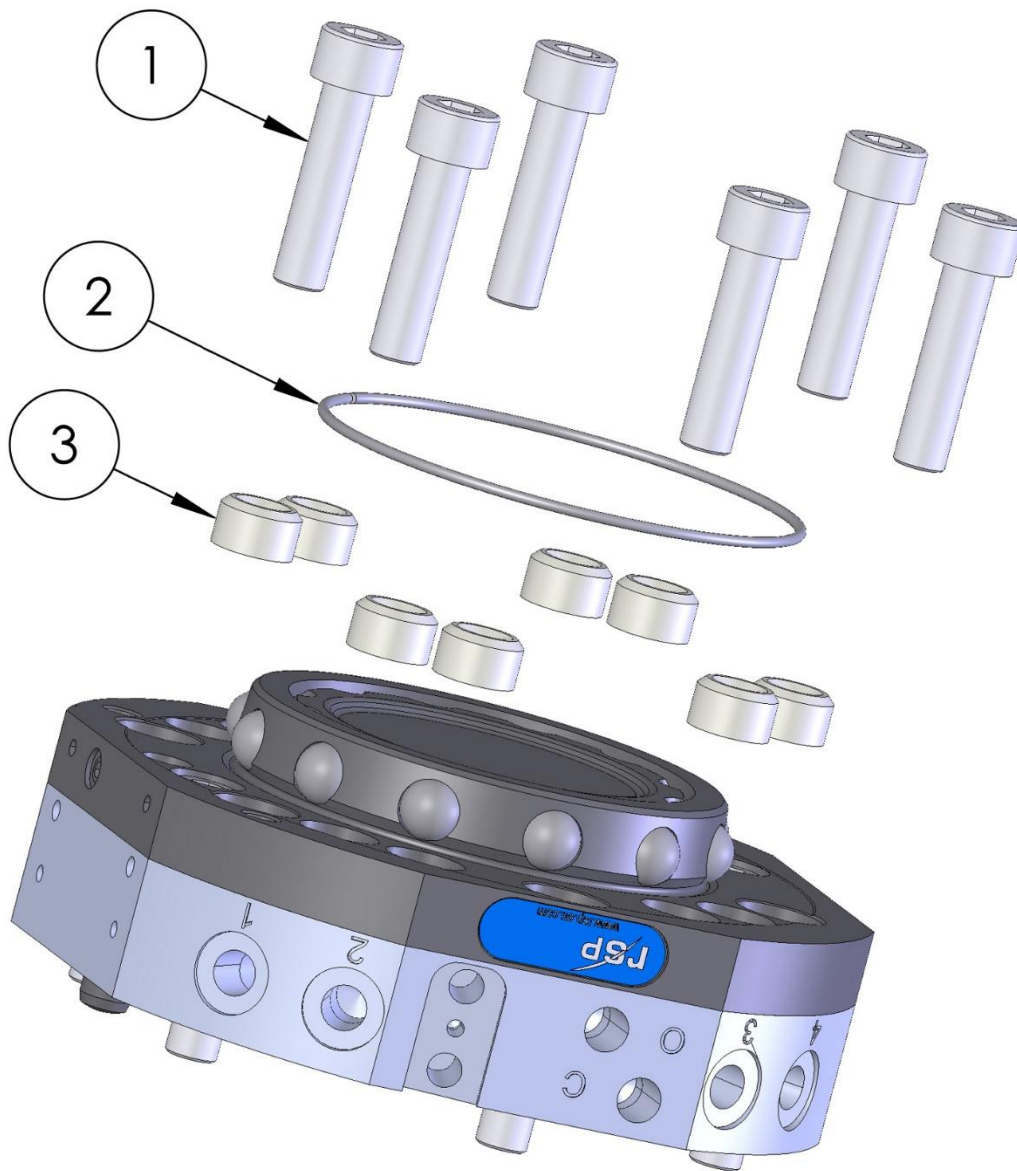
Item	Description	Part number	Wear part	Pcs
1	Screw, MC6S 8x60	21212519-463		6
2	Locking ring	I0758		1
3	Air sealing	I0760	X	8
4	Tube fittings	I0178		10
5	Spring loaded signal pin (P1337)	I0154	X	19

3.3 Part list for tool changer TC 120, P1401



Item	Description	Part number	Wear part	Pcs
1	Screw, M10x45	9ADA183-54		6
2	Locking ring	I1037		1
3	Air sealing	I0230	X	8

3.4 Part list for tool changer TC180, P1801



Item	Description	Part number	Wear part	Pcs
1	Screw, M10x40	21212519-499		6
2	Locking ring	11093		1
3	Air sealing	63550006-462	X	8

