

# Technical Description

## Tool changer TC250

M0634-1

Tool changers | Swivels | Swivel tool changers | Grippers | Hose packages | Valve units | Tool systems





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# CONTENTS

<b>1 INTRODUCTION</b> .....	<b>5</b>
1.1 RSP tool changer .....	6
1.2 Documents .....	6
1.3 Wear parts.....	6
1.4 Complementary Equipment .....	6
<b>2 TECHNICAL SPECIFICATIONS</b> .....	<b>7</b>
2.1 Description of tool changers and tool attachments .....	7
2.1.1 Coordinate System Definition.....	8
2.1.2 Tool changer TC250-8. Article no: P6411 .....	9
2.1.3 Tool Attachment TA250-8. Article no: P6417 .....	10
2.1.4 Square tool attachment TA250-8. Article no: P6474.....	11
2.1.5 Tool changer TC250-8E. Article: P6412 .....	12
2.1.6 Tool Attachment TA250-8E. Article no: P6418 .....	13
2.1.7 Tool Attachment TA250-8E. Article no: P6431 .....	14
2.1.8 Square tool attachment TA250-8E. Article no: P6473 .....	15
2.1.9 Pneumatic diagram for TC250 .....	16
2.1.10 Circuit diagram E0196-001 for P6412.....	17
2.1.11 Circuit diagram E0196-002 for P6418.....	18
2.1.12 Circuit diagram E0196-009 for P6431 and P6473 .....	19
2.2 Options for tool changer .....	20
2.2.1 Robot adaptation kits.....	20
2.2.2 Tool Identification .....	20
2.2.3 Limitation of Robot movements.....	20
2.2.4 Tool stand kit. Article no: P6472.....	21
<b>3 SPARE PARTS</b> .....	<b>22</b>
3.1 Part list for tool changer P6411 and P6412 .....	22

# 1 INTRODUCTION

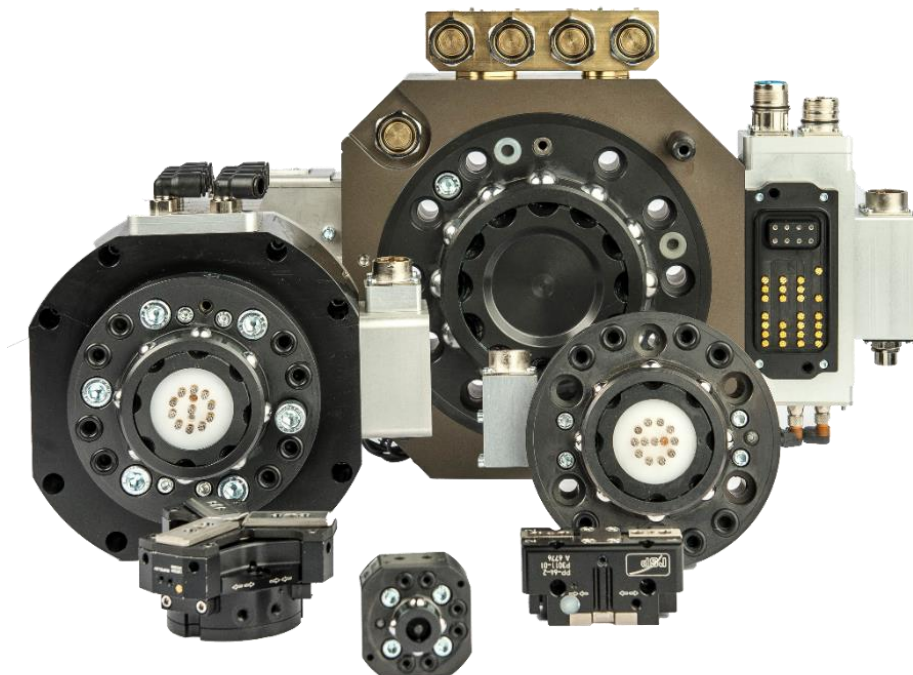
**Robot System Products** is a front-rank provider of peripheral products for high performance robot applications. We provide complete system solutions for your robot installations, aiming to improve your productivity with the most reliable and cost-effective tooling on the market. Continuously we explore 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: [www.rsp.eu.com](http://www.rsp.eu.com).



## 1.1 RSP tool changer

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 grooves. In consequence, substantially larger positional tolerances are accepted during docking.

## 1.2 Documents

This *Technical Description* contains product information and data, drawings, circuit and pneumatic diagrams and lists of spare parts. In the document *Installation and Maintenance* (M0416-1) procedures for mounting, installation and replacement of equipment are described together with descriptions of inspection, cleaning and lubrication activities including recommended 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
- Air sealings
- O-rings

## 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 for tool changers and tool attachments simplifying electrical installations.
3D-models	Available in Solid Works®, STEP, X_T and IGES-format.

## 2 TECHNICAL SPECIFICATIONS

### 2.1 Description of tool changers and tool attachments

This document presents the Robot System Products TC250-8 and TC250-8E tool changers including tool attachments dedicated for material handling. Likewise presented are adaptation kits, connection kits to facilitate electrical installation and a tool stand kit.

The tool changer TC250-8 transfers compressed air to the tool. It can be equipped with transfer of electrical signals, via spring loaded signal pins, to the tool attachment. The electrical version is designated 'E'. The tool changers TC250-8 and TC250-8E cannot transport fluids.

The spring-loaded signal pins of TC250-8E are placed and protected at the centre of the tool changer. The contact surface of the tool attachment and the signal pins are not in connection until at the very end of the docking cycle when the tool attachment is already properly aligned. This guarantees a minimum of wear of the contact surfaces.

The electrical unit is primarily intended for transfer of sensor signals from grippers. In addition, it can be used for checking the presence and identifying tools by using signal jumpers and binary coding of signals on the tool attachment.

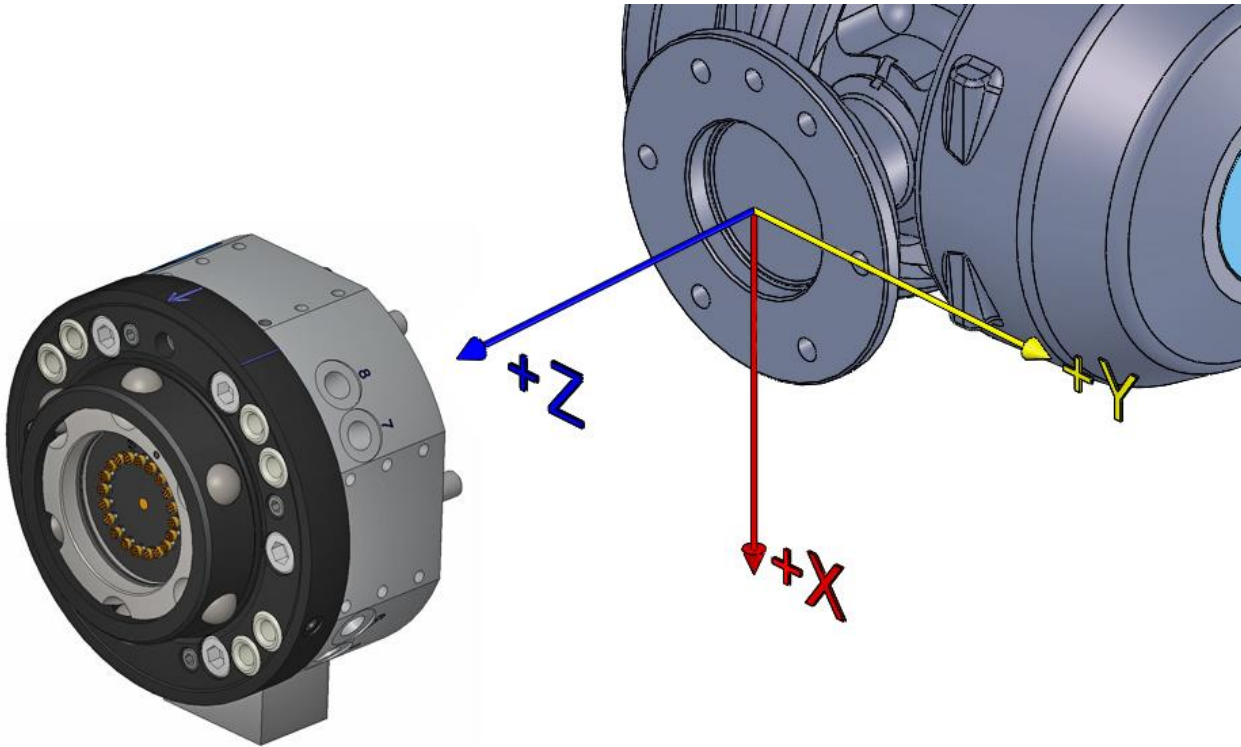
For other bolt circles adaptation plates between the tool changer and the turning disc on the robot may be needed. Such adaptation plates are available from RSP.



**TC250-8E**

## 2.1.1 Coordinate System Definition

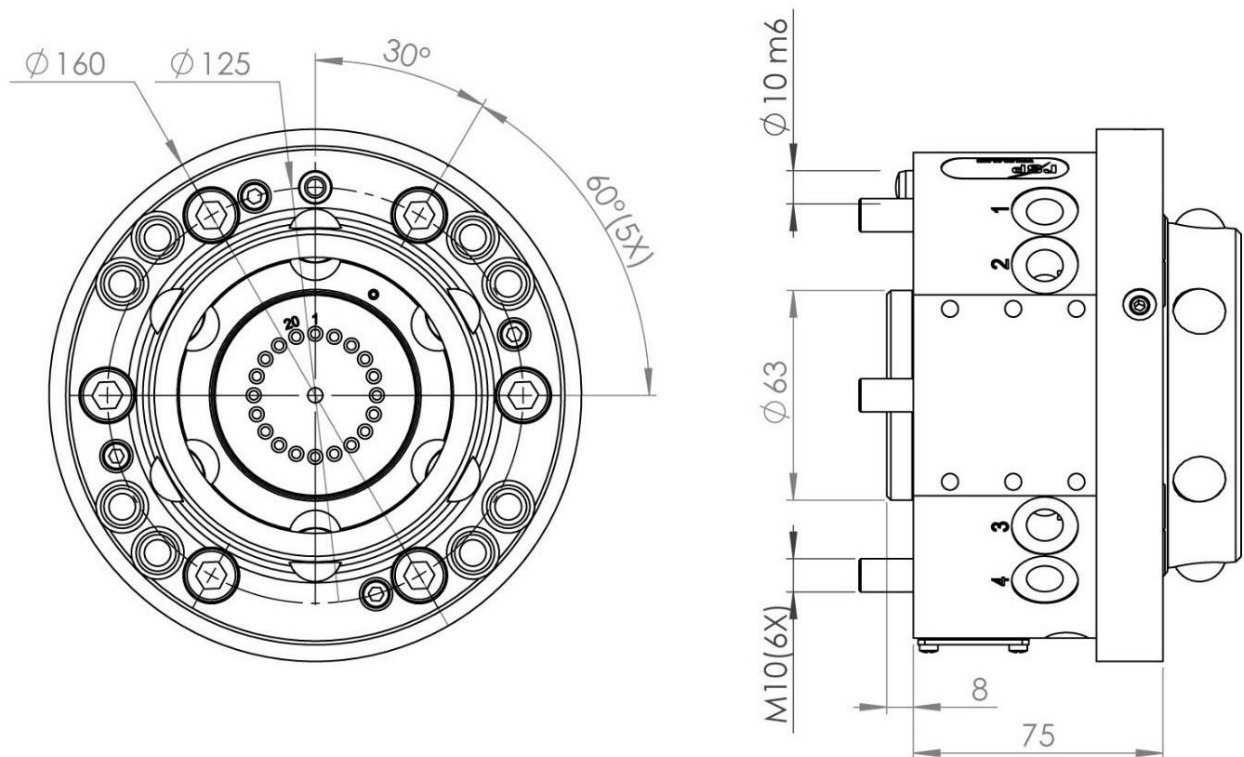
A tool changer adds load to the robot. If the arm and tool loads are not stated correctly during programming the behaviour of the robot and the wear of the equipment will be affected. Information about weight and centre of gravity can, in accordance with the co-ordinate system stated below, be found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



**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 Tool changer TC250-8. Article no: P6411

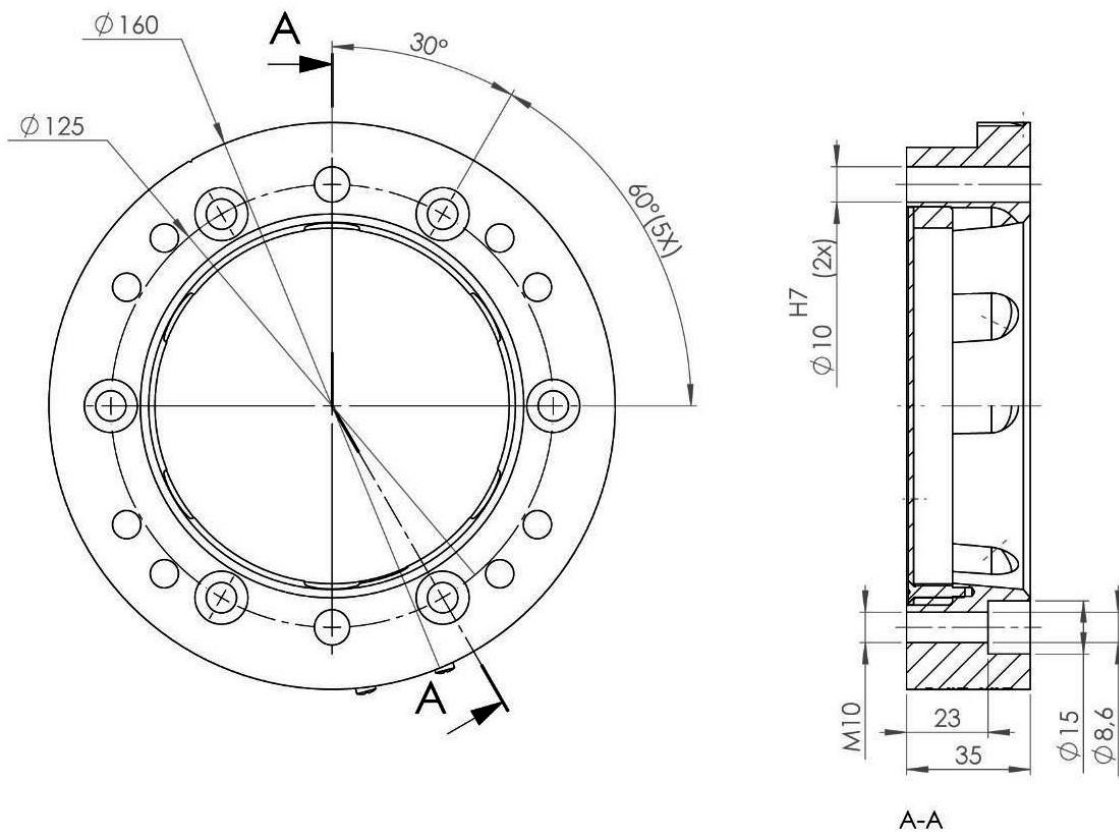


Tool changer P6411 transfers 8 pneumatic channels to the tool attachment and has separate inlets for Open TC and Close TC. To be used together with tool attachment P6417 or P6474.

### Technical data

<b>Working temperature</b>		+10°C – +50°C
<b>Bolt pattern</b>		ISO9409-1-125-6-M10
<b>IP classification</b>		IP 54
<b>Maximum tool load</b>	Fz (static)	±2 500 N
	Mx/My (dynamic)	±2 000 Nm
	Mz (dynamic)	±1 250 Nm
<b>Weight and centre of gravity (Z)</b>		
P6411		6.0 kg / 50 mm
P6411 and P6417		8.6 kg / 63 mm
P6411 and P6474		9.5 kg / 68 mm
<b>Air channels</b>	Pneumatic diagram	See <a href="#">section 2.1.9</a>
	User channels, robot side	8 x G 1/4" (1 600 l/min, max 10 bar)
	Dedicated channels, G 1/8"	Open TC marked Open, 6-10 bar
		Close TC marked Close, 6-10 bar
	Air quality	Oil-clean and waterless filtered air, with max 25µm particle content

### 2.1.3 Tool Attachment TA250-8. Article no: P6417



Tool attachment P6417 transfers 8 pneumatic channels to the tool. To be used together with tool changer P6411.

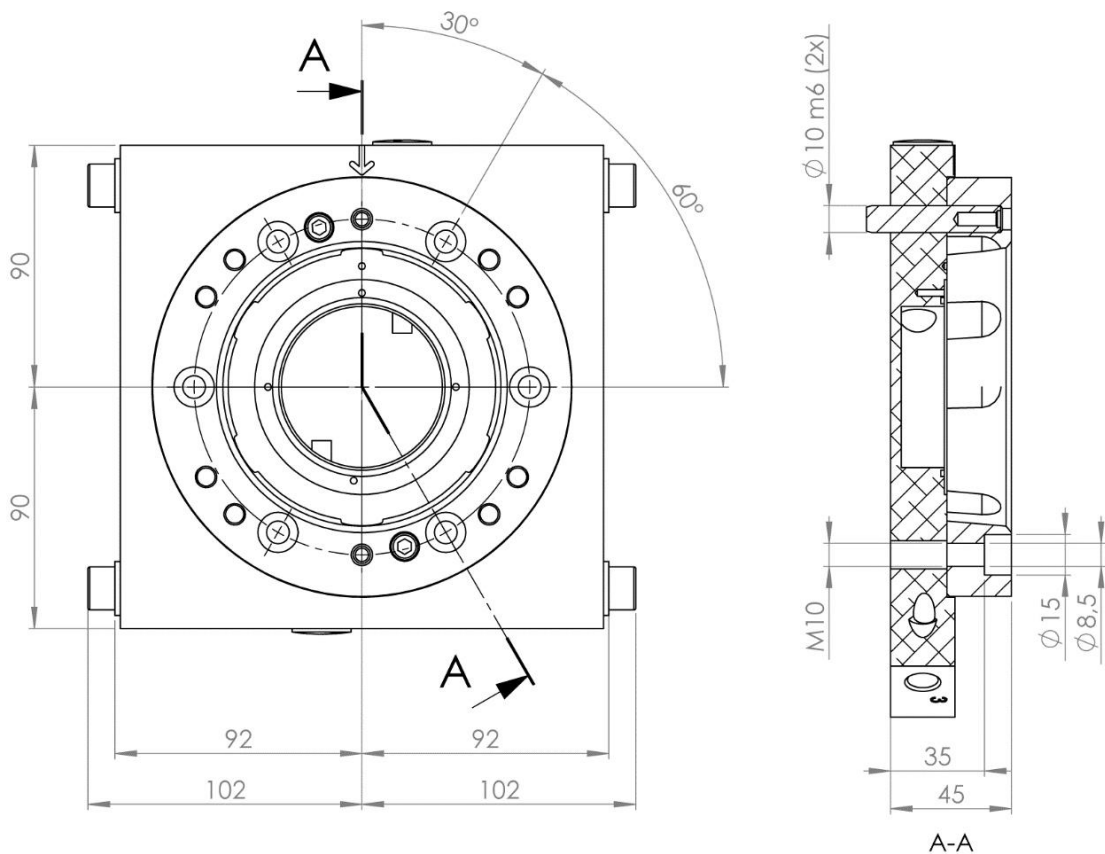
#### Technical data

<b>Working temperature</b>		+10°C – +50°C
<b>Bolt pattern</b>		ISO9409-1-125-6-M10
<b>Weight</b>		2.7 kg
<b>Maximum tool load</b> (M10-screws)	Fz (static) Mx/My (dynamic) Mz (dynamic)	±2 500 N ±2 000 Nm ±1 250 Nm
<b>Maximum tool load</b> (M8-screws)	Fz (static) Mx/My (dynamic) Mz (dynamic)	±2 500 N ±2 000 Nm ±750 Nm
<b>Air channels</b>	Connection, tool side	8 x G ¼"



**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.

## 2.1.4 Square tool attachment TA250-8. Article no: P6474



Square attachment P6474 transfers 8 pneumatic channels to the tool and gives together with option P6472 a stable tool stand for easy tool changing. To be used together with P6411.

### Technical data

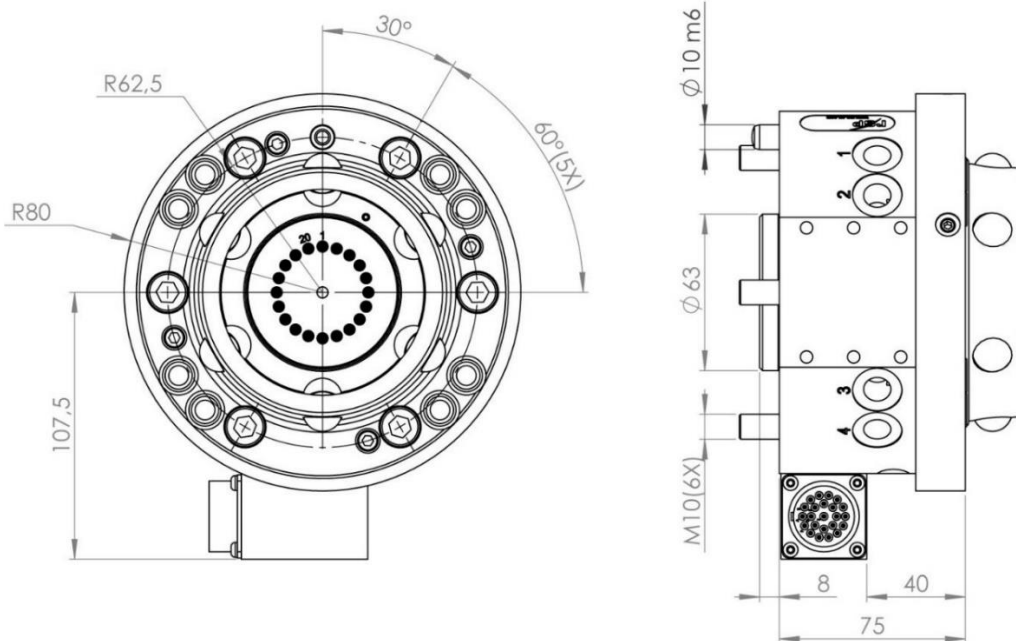
<b>Working temperature</b>		+10°C – +50°C
<b>Bolt pattern</b>		ISO9409-1-125-6-M10
<b>Weight</b>		3.6 kg
<b>Maximum tool load</b> (M10-screws)	Fz (static)	±2 500 N
	Mx/My (dynamic)	±2 000 Nm
	Mz (dynamic)	±1 250 Nm
<b>Maximum tool load</b> (M8-screws)	Fz (static)	±2 500 N
	Mx/My (dynamic)	±2 000 Nm
	Mz (dynamic)	±750 Nm
<b>Air channels</b>	Connection, tool side	8 x G ¼"



#### 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.

## 2.1.5 Tool changer TC250-8E. Article: P6412

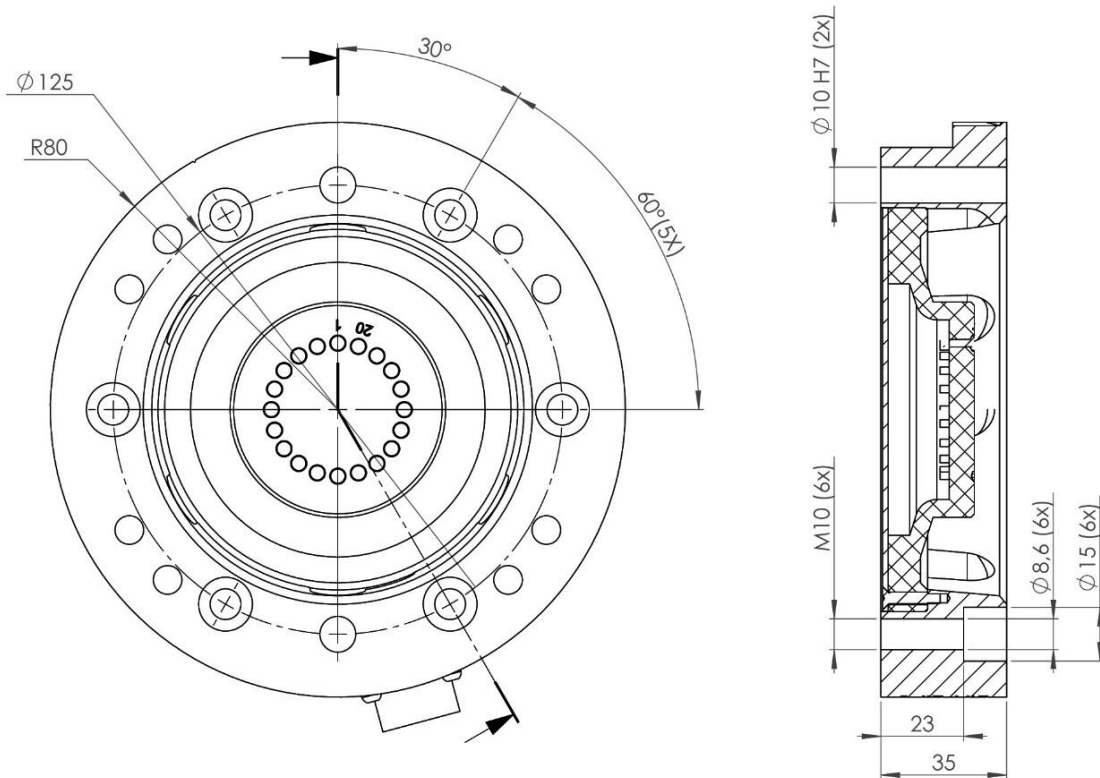


Tool changer P6412 transfers 8 pneumatic channels and 19 electrical signals to the tool attachment and has separate inlets for Open TC and Close TC. To be used together with tool attachment P6418, P6473 or P6431.

### Technical data

<b>Working temperature</b>		+10°C – +50°C
<b>Bolt pattern</b>		ISO9409-1-125-6-M10
<b>IP classification</b>		IP 54
<b>Maximum tool load</b>	Fz (static)	±2 500 N
	Mx/My (dynamic)	±2 000 Nm
	Mz (dynamic)	±1 250 Nm
<b>Weight and centre of gravity (Z)</b>		
P6412		6.1 kg / 50 mm
P6412 with P6418		8.8 kg / 63 mm
P6412 with P6431		8.8 kg / 63 mm
P6414 with P6473		9.7 kg / 69 mm
<b>Air channels</b>	Pneumatic diagram User channels, robot side Dedicated channels, G 1/8"	See <a href="#">section 2.1.9</a> 8 x G 1/4" (1 600 l/min, max 10 bar) Open TC marked Open, 6-10 bar Close TC marked Close, 6-10 bar
	Air quality	Oil-clean and waterless filtered air, with max 25µm particle content
<b>Electrical signals</b>	Circuit diagram	E0196-001 ( <a href="#">section 2.1.10</a> )
	Total signals	20 x (2A, 60V) + PE
	Dedicated signals	24V, 0V, TC Coupled, TC Uncoupled
	Connection, robot side	Souriau 23P (UT001823PH)
<b>Connection kits (optional)</b>	P8002 (connector)	Souriau 23S (straight)
	P8129-50 (cable kit)	Souriau 23S, 5-meter cable, open end

## 2.1.6 Tool Attachment TA250-8E. Article no: P6418



Tool attachment P6418 transfers 8 pneumatic channels and 18 electrical signals to the tool. To be used together with tool changer P6412.

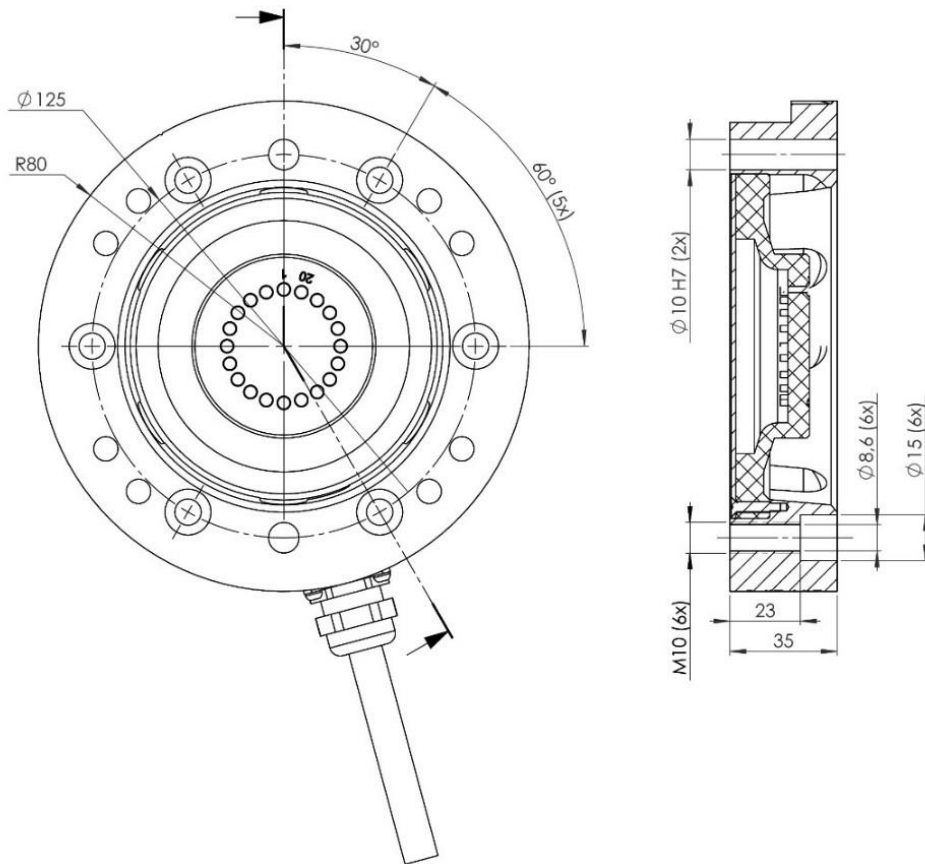
### Technical data

<b>Working temperature</b>		+10°C – +50°C
<b>Bolt pattern</b>		ISO9409-1-125-6-M10
<b>Weight</b>		2.7 kg
<b>Maximum tool load</b> (M10-screws)	Fz (static)	±2 500 N
	Mx/My (dynamic)	±2 000 Nm
	Mz (dynamic)	±1 250 Nm
<b>Maximum tool load</b> (M8-screws)	Fz (static)	±2 500 N
	Mx/My (dynamic)	±2 000 Nm
	Mz (dynamic)	±750 Nm
<b>Air channels</b>	Connection, tool side	8 x G ¼"
<b>Electrical signals</b>	Circuit diagram	E0196-002 ( <a href="#">section 2.1.11</a> )
	Total number of signals	18 x (2A, 30V) + PE
	Dedicated signals	24 V, 0V, TC Coupled
	Connection, tool side	Compact Souriau 19S (UT0W01419SH)
<b>Connection kits</b> (optional)	P8007 (connector)	Souriau 19P (straight)
	P8105-20 (cable kit)	Souriau 19P, 2-meter cable, open end



**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.

## 2.1.7 Tool Attachment TA250-8E. Article no: P6431



Tool attachment P6431 transfers 8 pneumatic channels and 18 electrical signals to the tool. To be used together with tool changer P6412.

### Technical data

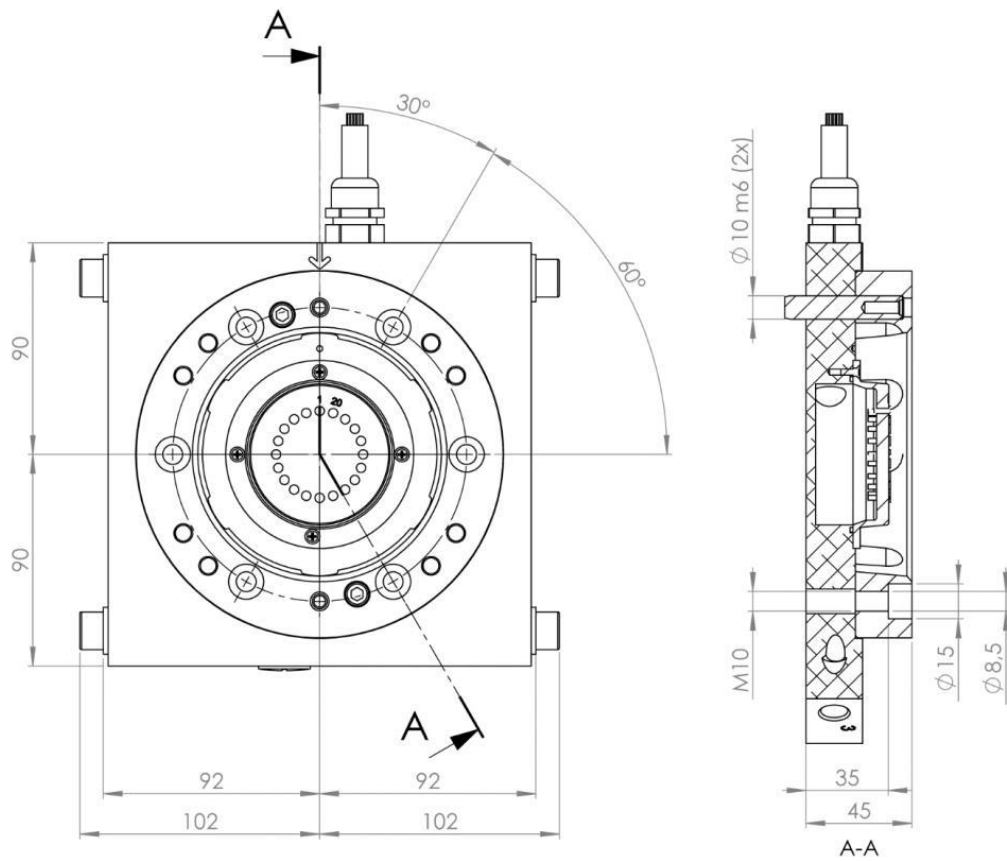
<b>Working temperature</b>		+10°C – +50°C
<b>Bolt pattern</b>		ISO9409-1-125-6-M10
<b>Weight</b>		2.8 kg
<b>Maximum tool load</b> (M10-screws)	Fz (static)	±2 500 N
	Mx/My (dynamic)	±2 000 Nm
	Mz (dynamic)	±1 250 Nm
<b>Maximum tool load</b> (M8-screws)	Fz (static)	±2 500 N
	Mx/My (dynamic)	±2 000 Nm
	Mz (dynamic)	±750 Nm
<b>Air channels</b>	Connection, tool side	8 x G ¼"
<b>Electrical signals</b>	Circuit diagram	E0196-009 ( <a href="#">section 2.1.12</a> )
	Total number of signals	18 + PE
	Dedicated signals	24 V, 0V, TC Coupled
	Connection, tool side	1-meter cable (0.5 mm²), open end



**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.



## 2.1.8 Square tool attachment TA250-8E. Article no: P6473



Square Tool Attachment P6473 transfers 8 pneumatic channels and 18 electrical signals to the tool and gives together with option P0423 a stable tool stand for easy tool changing. To be used together with tool changer P6412.

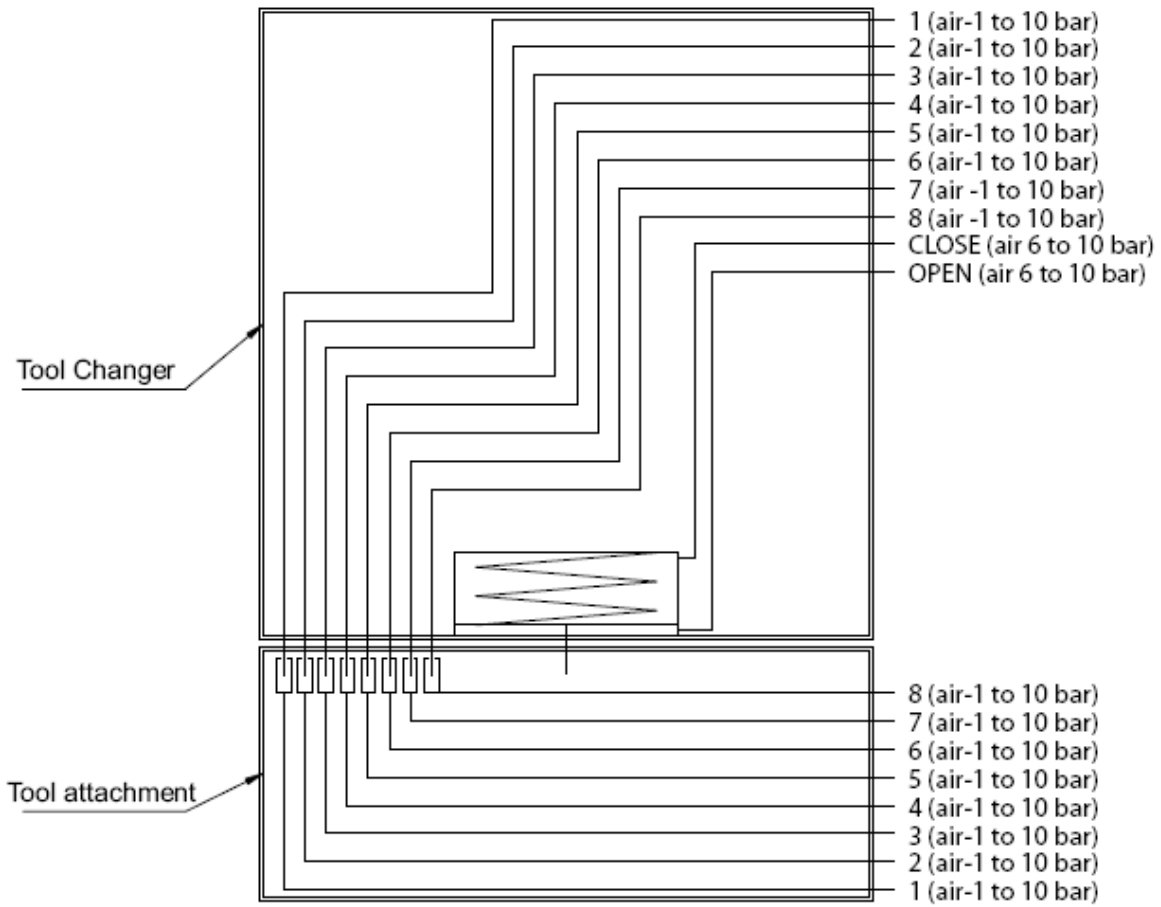
### Technical data

<b>Working temperature</b>		+10°C – +50°C
<b>Bolt pattern</b>		ISO9409-1-125-6-M10
<b>Weight</b>		3.7 kg
<b>Maximum tool load</b> (M10-screws)	Fz (static)	±2 500 N
	Mx/My (dynamic)	±2 000 Nm
	Mz (dynamic)	±1 250 Nm
<b>Maximum tool load</b> (M8-screws)	Fz (static)	±2 500 N
	Mx/My (dynamic)	±2 000 Nm
	Mz (dynamic)	±750 Nm
<b>Air channels</b>	Connection, tool side	8 x G ¼"
<b>Electrical signals</b>	Circuit diagram	E0196-009 ( <a href="#">section 2.1.12</a> )
	Total number of signals	18 + PE
	Dedicated signals	24 V, 0V, TC Coupled
	Connection, tool side	1-meter cable (0.5 mm <sup>2</sup> ), open end



**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.

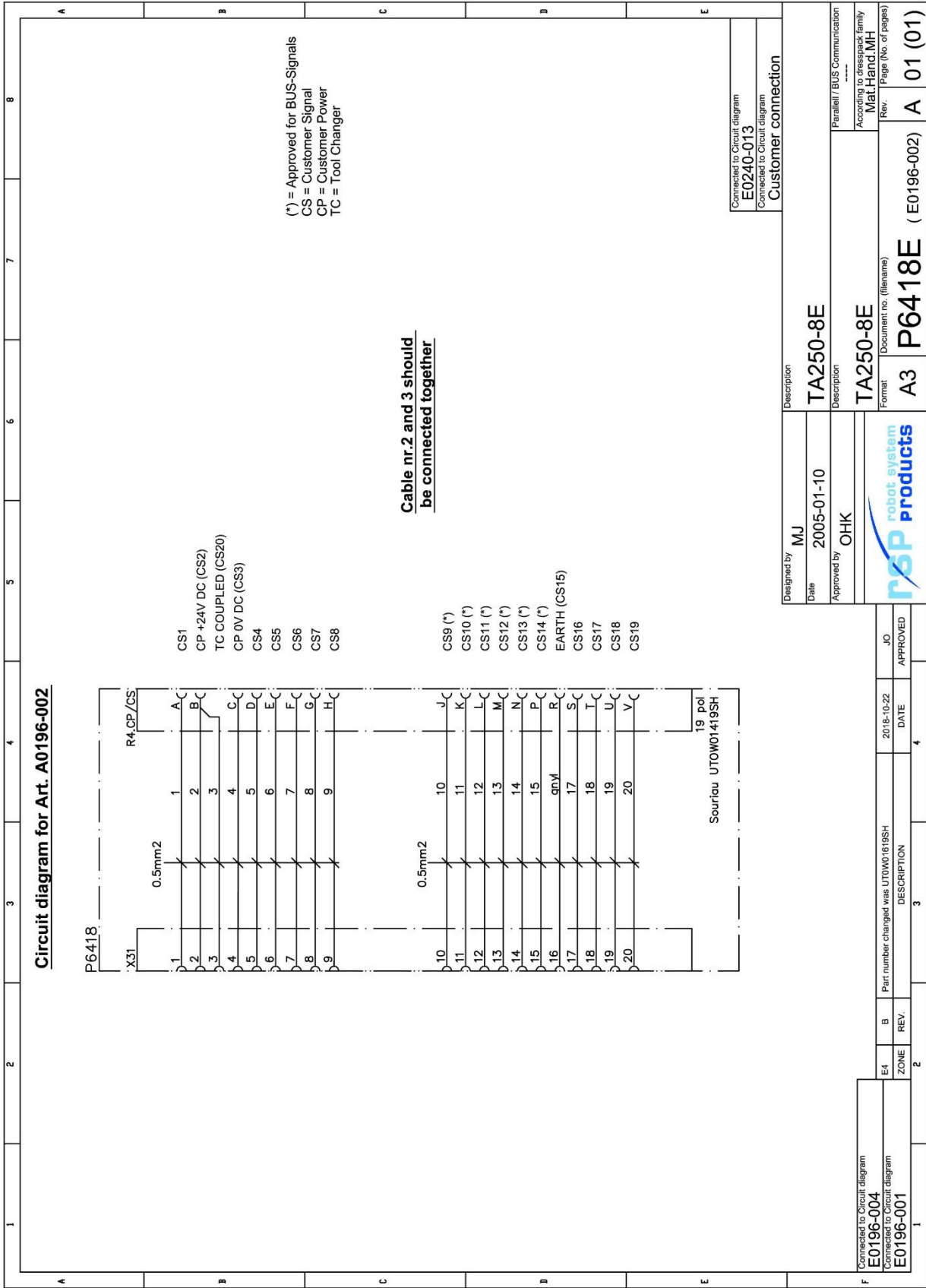
## 2.1.9 Pneumatic diagram for TC250





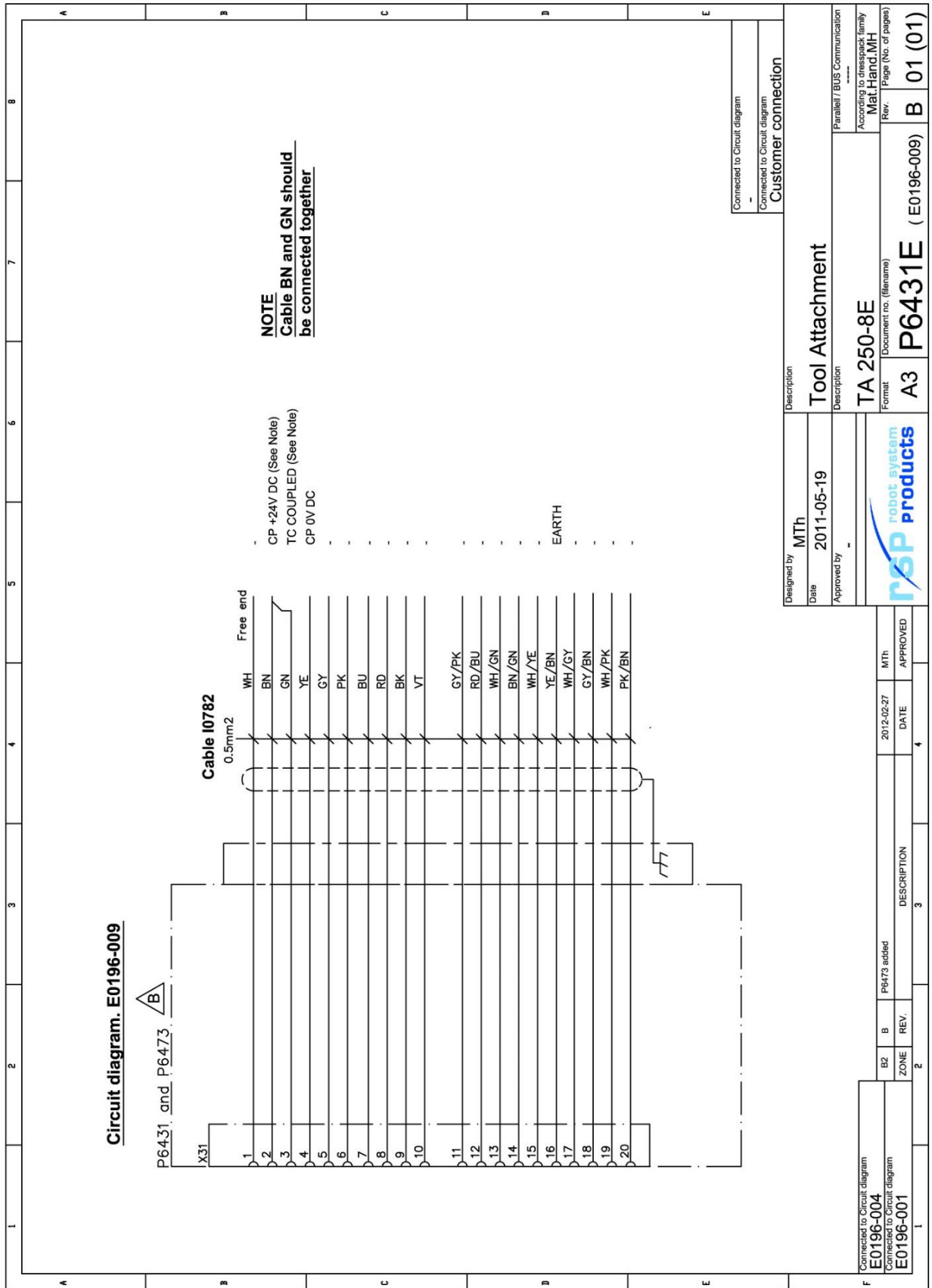


## 2.1.11 Circuit diagram E0196-002 for P6418



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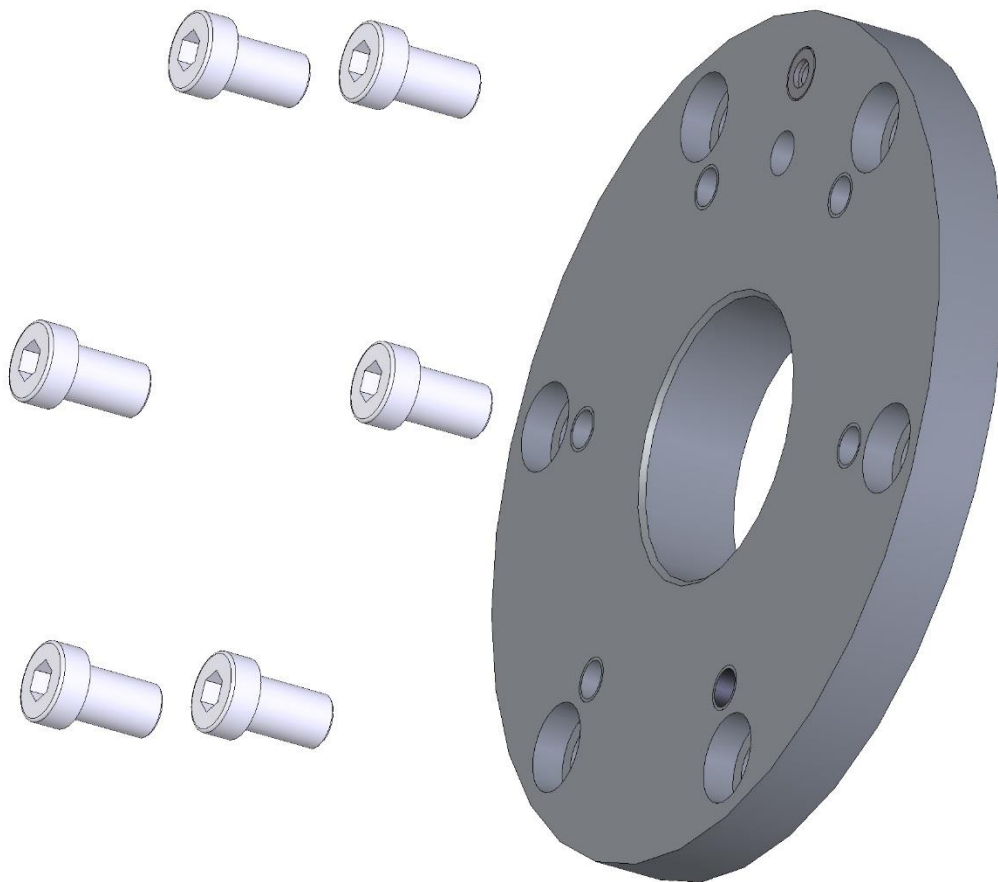
## 2.1.12 Circuit diagram E0196-009 for P6431 and P6473



## **2.2 Options for tool changer**

### **2.2.1 Robot adaptation kits**

Robot adaptation kits are required for mounting on robot flanges using alternative bolt patterns and consist of an adaptation plate including mounting screws. Robot adaptation kits for various robot models are available from RSP.



***Example of adaptation plate with mounting screws***

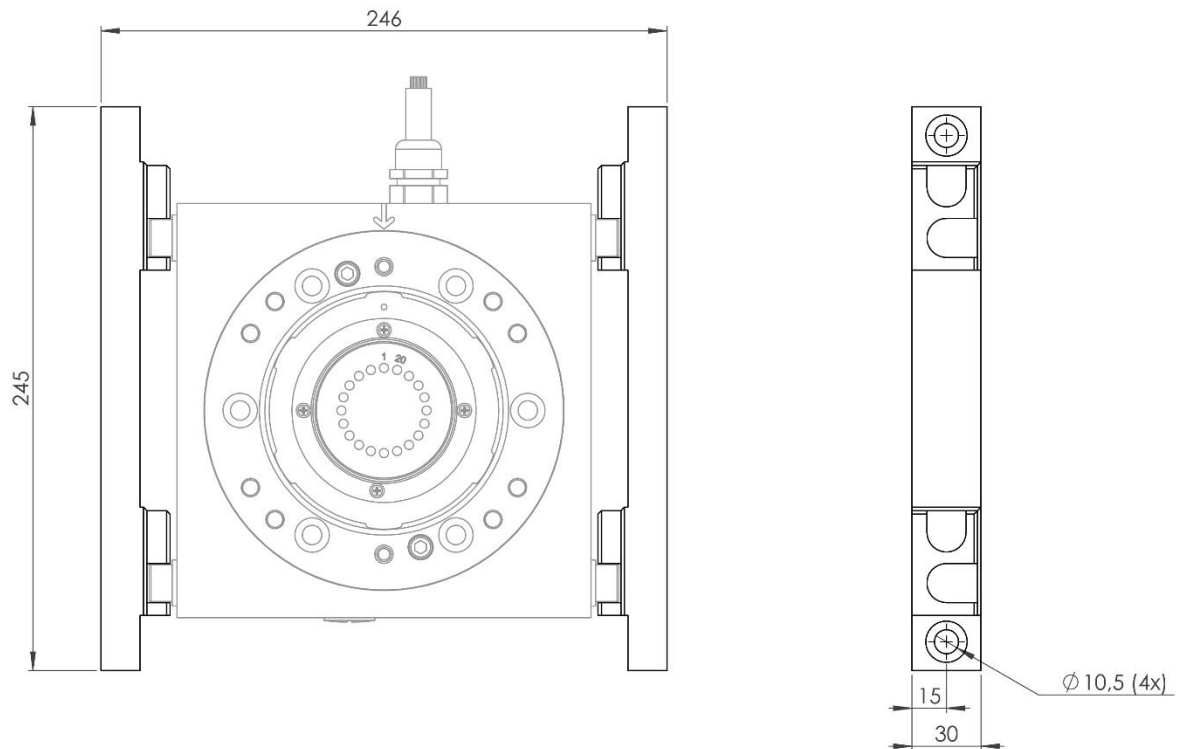
### **2.2.2 Tool Identification**

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

### **2.2.3 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.

## 2.2.4 Tool stand kit. Article no: P6472



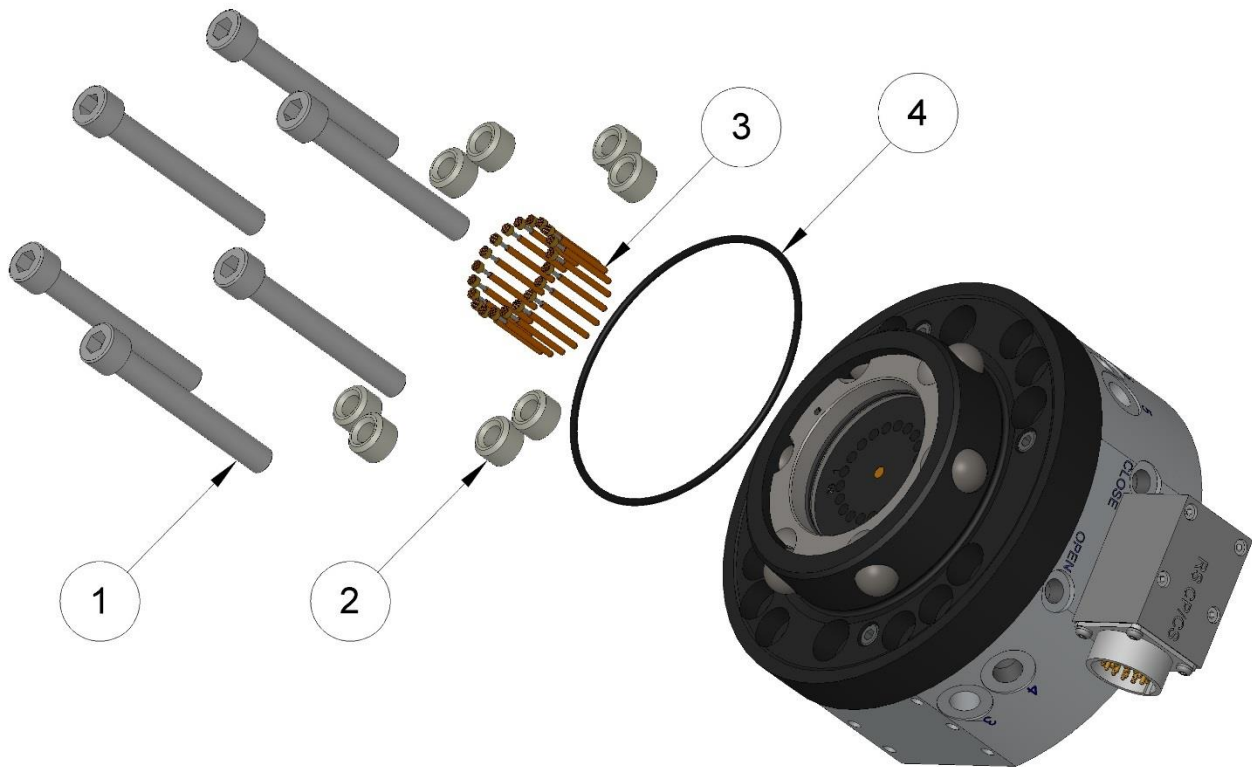
This tool stand kit gives, mounted on a stand, in combination with square tool attachments P6474 or P6473 a robust tool stand for easy tool changing.

### Technical data

<b>Weight</b>	1.2 kg
<b>Maximum load</b>	250 kg

## 3 SPARE PARTS

### 3.1 Part list for tool changer P6411 and P6412



Item	Description	Part number	Wear part	Pcs
1	Fastening screws M10x80	21212519-507		6
2	Air sealings	63550006-462	X	8
3	Spring loaded signal pins (P6412 only)	I0042	X	20
4	O-ring	I1464	X	1



