

# Technical Description

## Tool changer TC1000

M0722-1

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





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Robot Systems Products AB  
Isolatorvägen 4  
SE-721 37 Västerås  
Sweden

# 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 TC1000-8, Article: P0701A.....	9
2.1.3 Tool attachment, TA1000-8. Article no: P0702A.....	10
2.1.4 Tool Changer TC1000-8E, Article: P0703A .....	11
2.1.5 Tool attachment, TA1000-8E. Article no: P0704A .....	12
2.1.6 Pneumatic diagram Pne0206-001.....	13
2.1.7 Circuit diagram E0206-001 for P0703A and P0704A .....	14
2.2 Options for tool changer .....	15
2.2.1 Robot adaptation kits.....	15
2.2.2 Tool Identification .....	15
2.2.3 Limitation of Robot movements.....	15
<b>3 SPARE PARTS</b> .....	<b>16</b>
3.1 Part list for tool changer P0701A and P0703A.....	16

# 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 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, X_T and IGES-format.

## 2 TECHNICAL SPECIFICATIONS

### 2.1 Description of tool changers and tool attachments

This document presents the Robot System Products TC1000-8 and TC1000-8E 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 TC1000-8 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 TC1000-8 and TC1000-8E cannot transport fluids.

The spring-loaded signal pins of TC1000-8E 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.

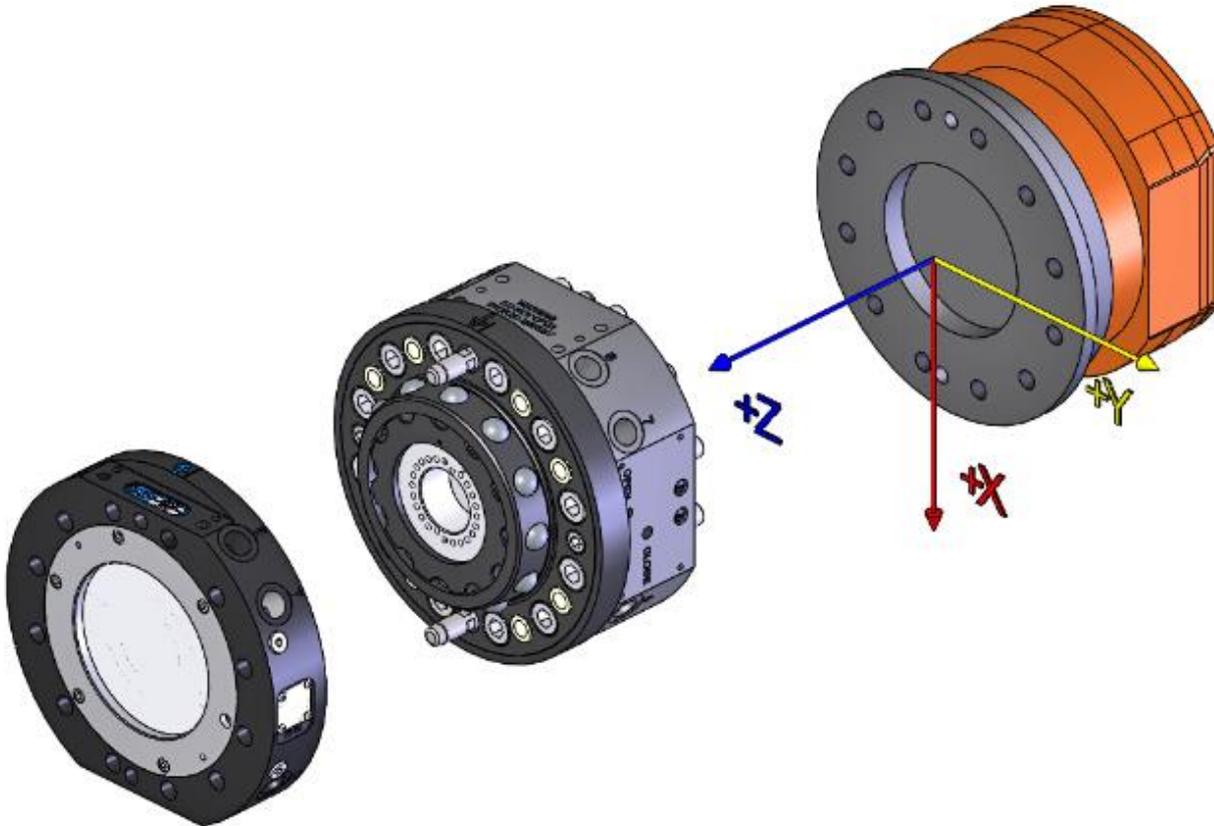
For other bolt circles adaptation plates between the tool changer and the turning disc on the robot may be needed. Such adaptation plates are available from RSP.



**TC1000-8E**

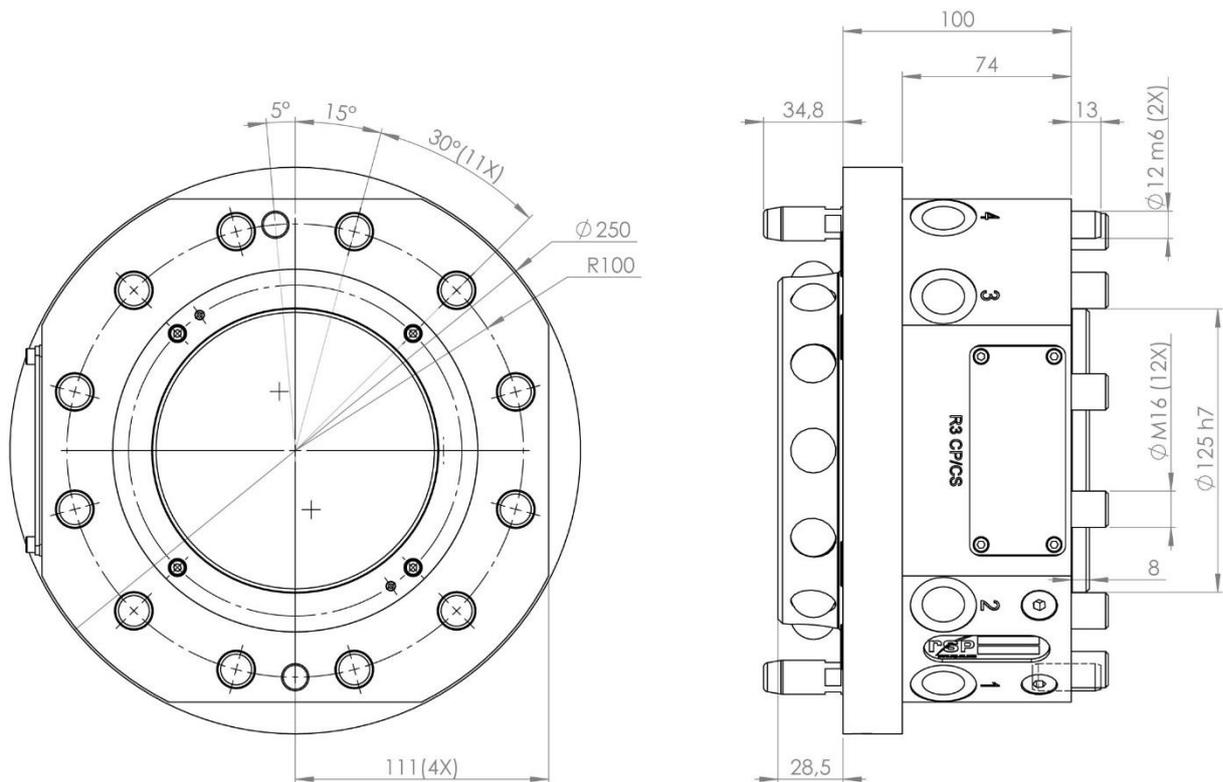
## 2.1.1 Coordinate System Definition

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 TC1000-8, Article: P0701A

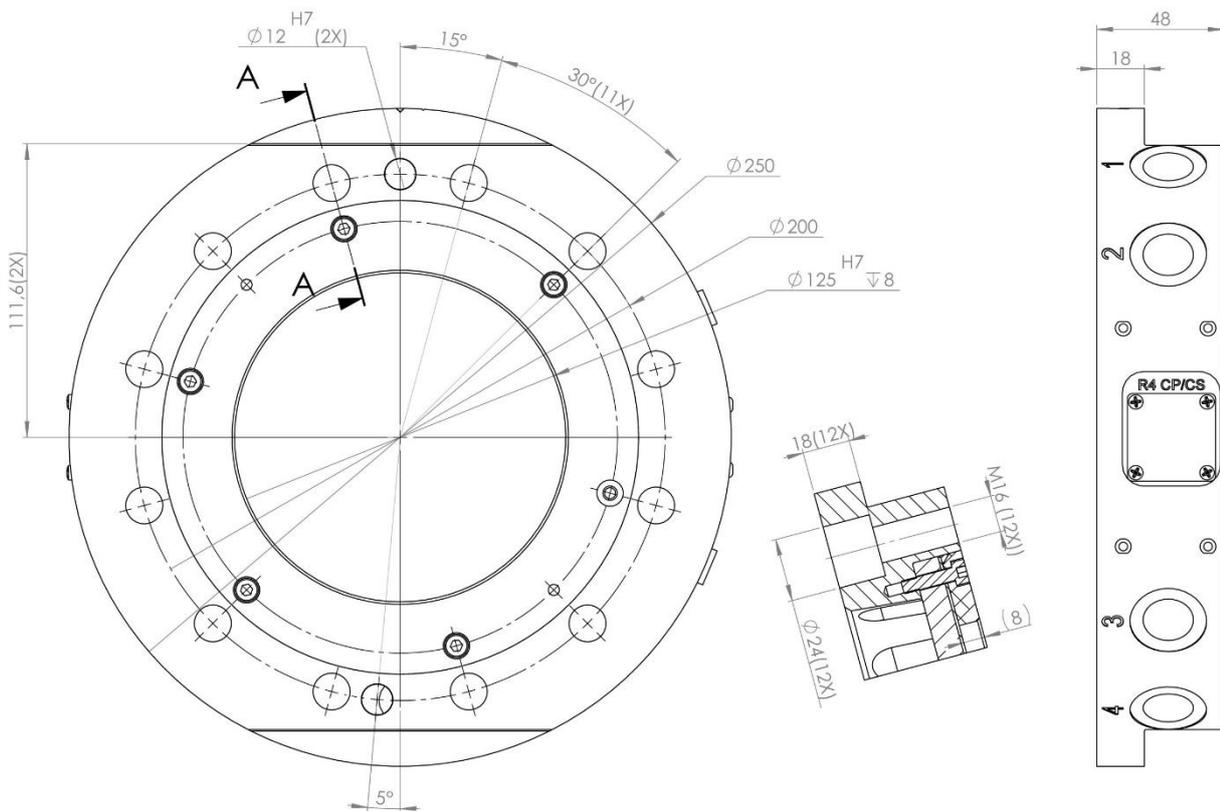


Tool changer P0701A transfers 8 pneumatic channels to the tool attachment and has separate inlets for Open TC and Close TC. To be used together with tool attachment P0702A.

### Technical data

<b>Working temperature</b>	+10°C – +50°C
<b>Bolt pattern</b>	ISO9409-1-200-12-M16
<b>IP classification</b>	IP 54
<b>Maximum tool load</b>	Fz (static) ±10 000 N Mx/My (dynamic) ±10 000 Nm Mz (dynamic) ±10 000 Nm
<b>Weight and centre of gravity (Z)</b>	
P0701A	19.7 kg / 66 mm
P0701A and P0702A	27.6 kg / 83 mm
<b>Air channels</b>	Pneumatic diagram Pne0206-001 (see <a href="#">section 2.1.6</a> ) User channels, robot side 8 x G ½" (2 400 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, TA1000-8. Article no: P0702A



Tool attachment P0702A transfers 8 pneumatic channels to the tool. To be used together with tool changer P0701A.

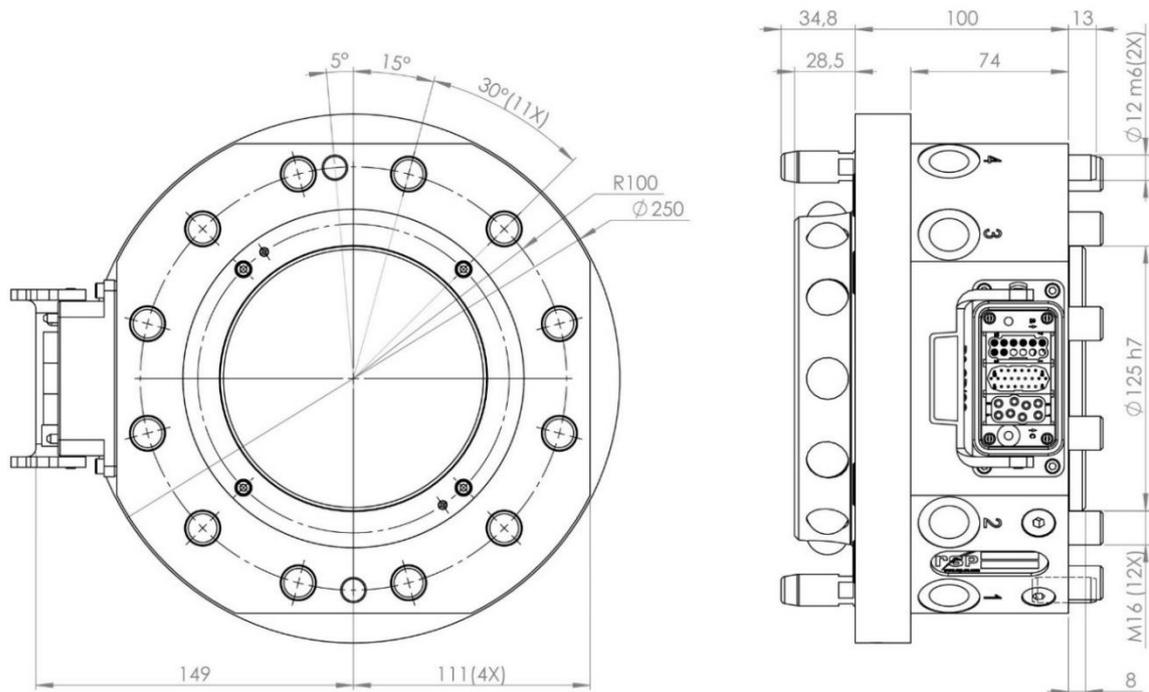
#### Technical data

<b>Working temperature</b>		+10°C – +50°C
<b>Bolt pattern</b>		ISO9409-1-200-12-M16
<b>Weight</b>		7.9 kg
<b>Maximum tool load</b> (M16-screws)	Fz (static)	±10 000 N
	Mx/My (dynamic)	±10 000 Nm
	Mz (dynamic)	±10 000 Nm
<b>Maximum tool load</b> (M14-screws)	Fz (static)	±10 000 N
	Mx/My (dynamic)	±10 000 Nm
	Mz (dynamic)	±7 500 Nm
<b>Air channels</b>	Connections, tool side	8 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.

## 2.1.4 Tool Changer TC1000-8E, Article: P0703A

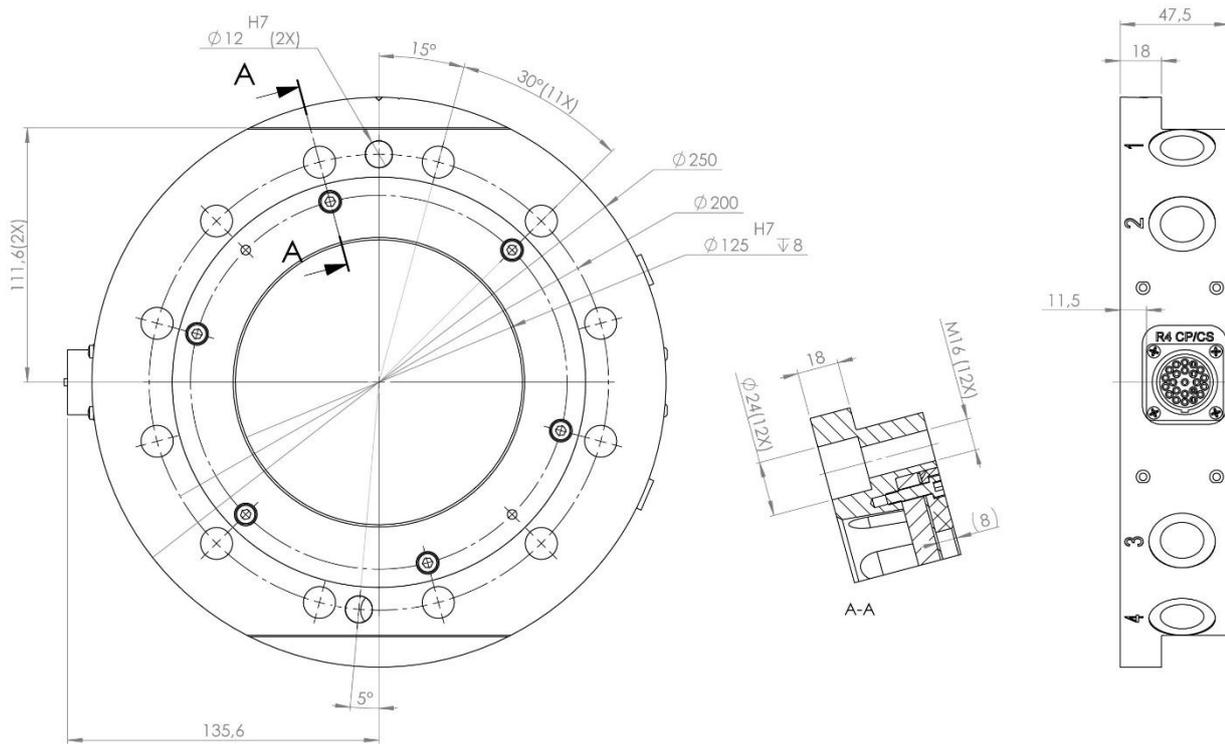


Tool changer P0703A transfers 8 pneumatic channels and 20 electrical signals to the tool attachment and has separate inlets for Open TC and Close TC. To be used together with tool attachment P0704A.

### Technical data

<b>Working temperature</b>		+10°C – +50°C
<b>Bolt pattern</b>		ISO9409-1-200-12-M16
<b>IP classification</b>		IP 54
<b>Maximum tool load</b>	Fz (static)	±10 000 N
	Mx/My (dynamic)	±10 000 Nm
	Mz (dynamic)	±10 000 Nm
<b>Weight and centre of gravity (Z)</b>		
P0703A		19.8 kg / 66 mm
P0703A and P0704A		27.7 kg / 83 mm
<b>Air channels</b>	Pneumatic diagram	Pne0206-001 (see <a href="#">section 2.1.6</a> )
	User channels, robot side Dedicated channels, G 1/8"	8 x G 1/2" (2 400 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	E0206-001 (see <a href="#">section 2.1.7</a> )
	Total signals	23 x (2A, 60V) + PE
	Dedicated signals	2 x 24V, 2 x 0V, TC Coupled TC
	Connection, robot side	Uncoupled, Open TC1, Open TC2 3-module Harting 10B
<b>Connection kits (optional)</b>	P8009 (connector)	3-module Harting, female

## 2.1.5 Tool attachment, TA1000-8E. Article no: P0704A



Tool attachment P0704A transfers 8 pneumatic channels and 19 electrical signals to the tool. To be used together with tool changer P0703A.

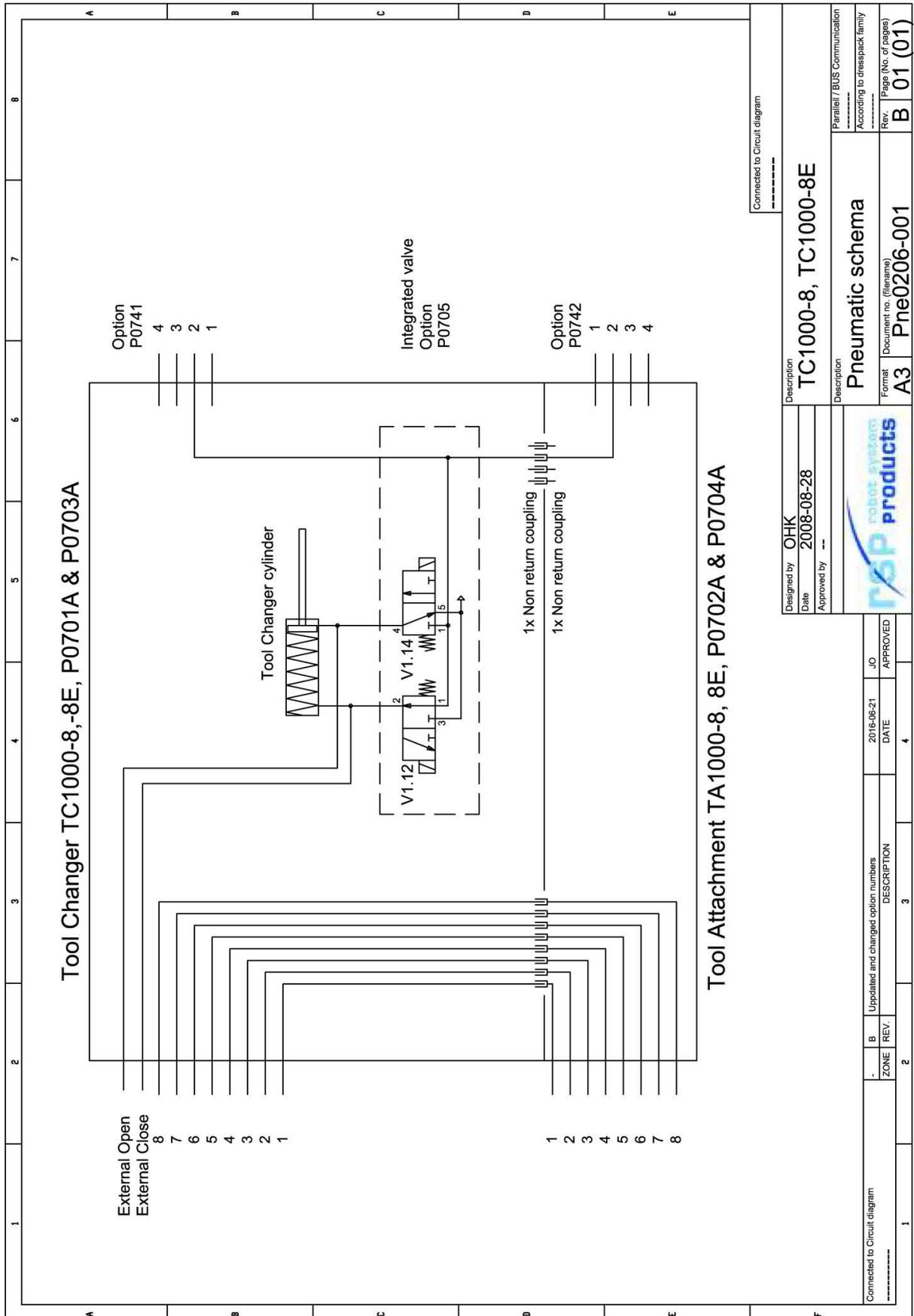
### Technical data

<b>Working temperature</b>		+10°C – +50°C
<b>Bolt pattern</b>		ISO9409-1-200-12-M16
<b>Weight</b>		7.9 kg
<b>Maximum tool load</b> (M16-screws)	Fz (static)	±10 000 N
	Mx/My (dynamic)	±10 000 Nm
	Mz (dynamic)	±10 000 Nm
<b>Maximum tool load</b> (M14-screws)	Fz (static)	±10 000 N
	Mx/My (dynamic)	±10 000 Nm
	Mz (dynamic)	±7 500 Nm
<b>Air channels</b>	Connections, tool side	8 x G 1/2"
<b>Electrical signals</b>	Circuit diagram	E0206-001 (see <a href="#">section 2.1.7</a> )
	Total number of signals	19
	Connection, tool side	Souriau 23S (UT001823SH)
<b>Connection kits</b> <b>(optional)</b>	P8001 (connector)	Souriau 23P (straight)
	P8001-1 (connector)	Souriau 23P (angled)
	P8112-20 (cable kit)	Souriau 23P, 2-meter cable, open end

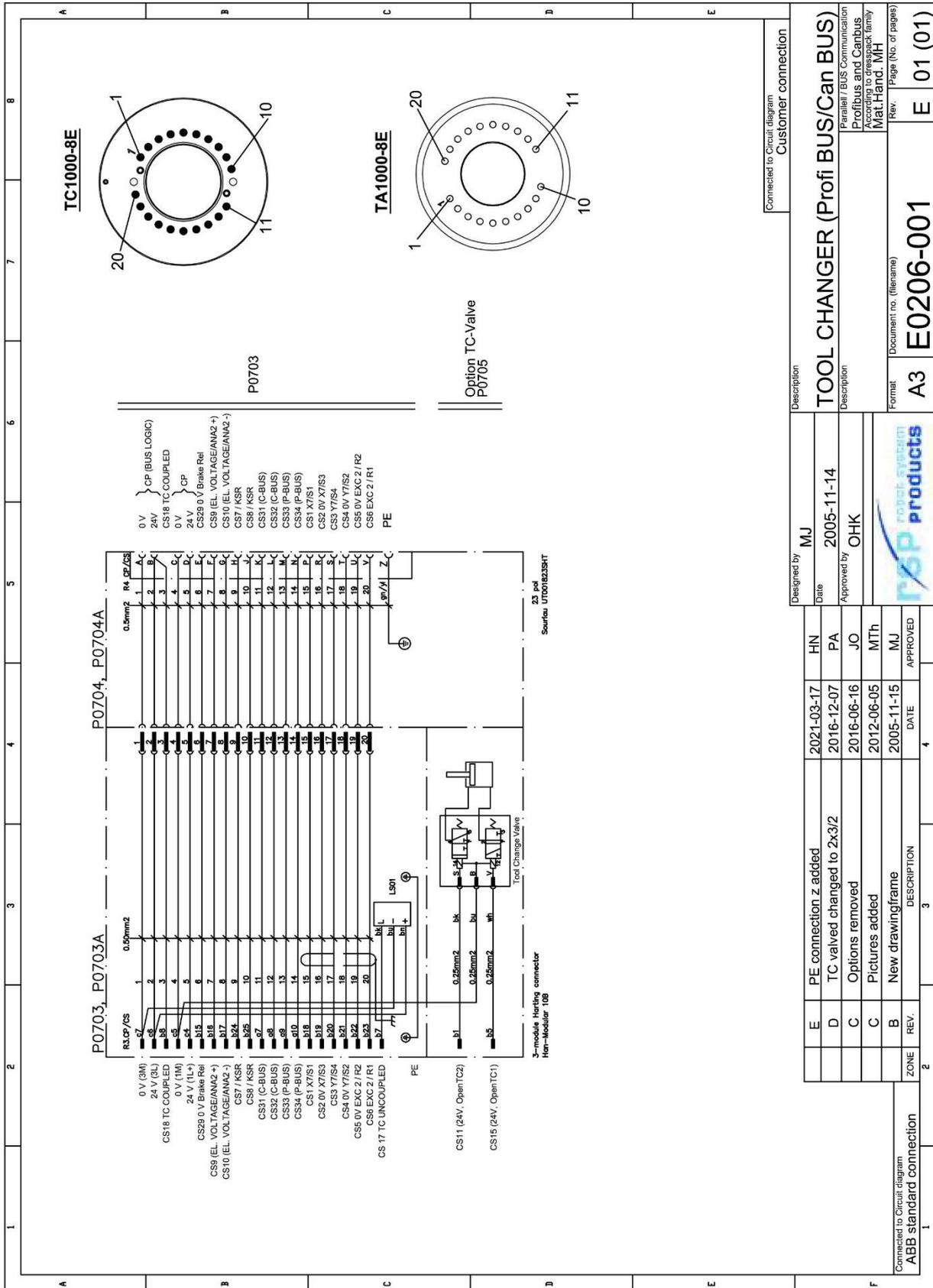


**NOTE!** Tools can be mounted to the tool attachment using twelve M16-screws, alternatively the tool attachment can be mounted to the tool using twelve M14-screws.

## 2.1.6 Pneumatic diagram Pne0206-001



## 2.1.7 Circuit diagram E0206-001 for P0703A and P0704A



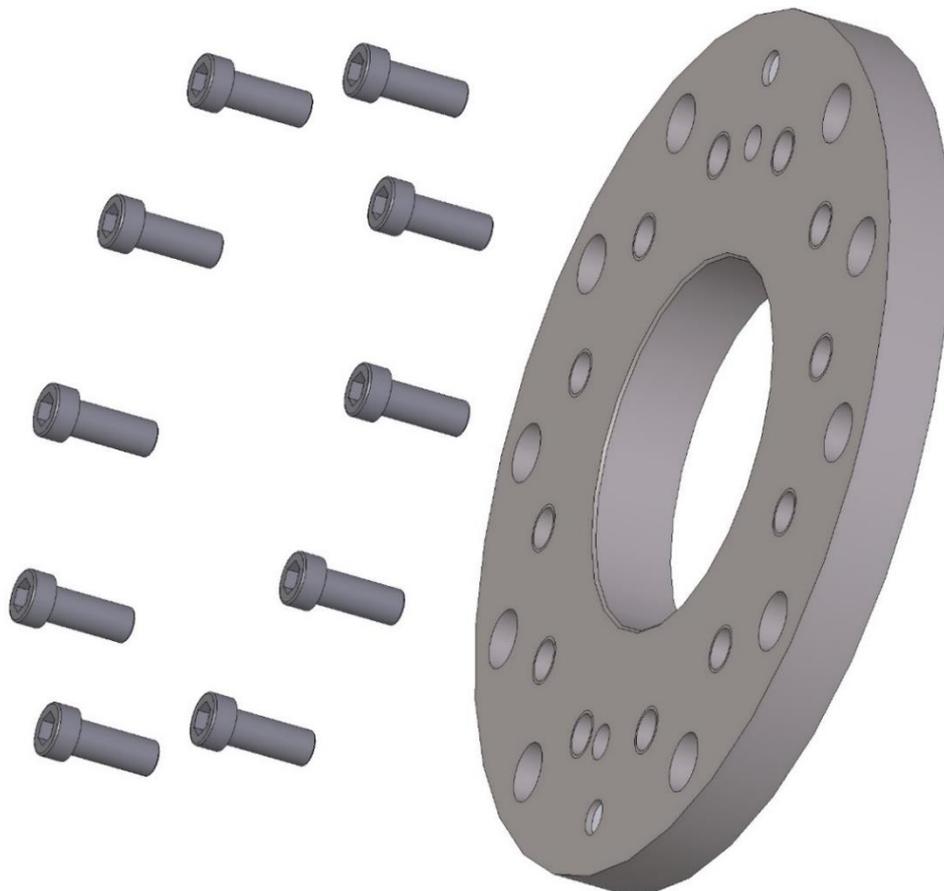
Connected to Circuit diagram		Customer connection																															
Designed by	MJ	Description	TOOL CHANGER (Profi BUS/Can BUS)																														
Date	2005-11-14	Description	Partial / BUS Communication ProfiBus and CanBus ABB product family Mat Hand MH																														
Approved by	OHK	Format	A3																														
		Document no. (filename)	E0206-001																														
<table border="1"> <thead> <tr> <th>ZONE</th> <th>REV.</th> <th>DESCRIPTION</th> <th>DATE</th> <th>APPROVED</th> </tr> </thead> <tbody> <tr> <td>E</td> <td></td> <td>PE connection z added</td> <td>2021-03-17</td> <td>HN</td> </tr> <tr> <td>D</td> <td></td> <td>TC valved changed to 2x3/2</td> <td>2016-12-07</td> <td>PA</td> </tr> <tr> <td>C</td> <td></td> <td>Options removed</td> <td>2016-06-16</td> <td>JO</td> </tr> <tr> <td>C</td> <td></td> <td>Pictures added</td> <td>2012-06-05</td> <td>MTh</td> </tr> <tr> <td>B</td> <td></td> <td>New drawing frame</td> <td>2005-11-15</td> <td>MJ</td> </tr> </tbody> </table>		ZONE	REV.	DESCRIPTION	DATE	APPROVED	E		PE connection z added	2021-03-17	HN	D		TC valved changed to 2x3/2	2016-12-07	PA	C		Options removed	2016-06-16	JO	C		Pictures added	2012-06-05	MTh	B		New drawing frame	2005-11-15	MJ	Page (No. of pages)	E 01 (01)
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Connected to Circuit diagram ABB standard connection																																	

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## **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**

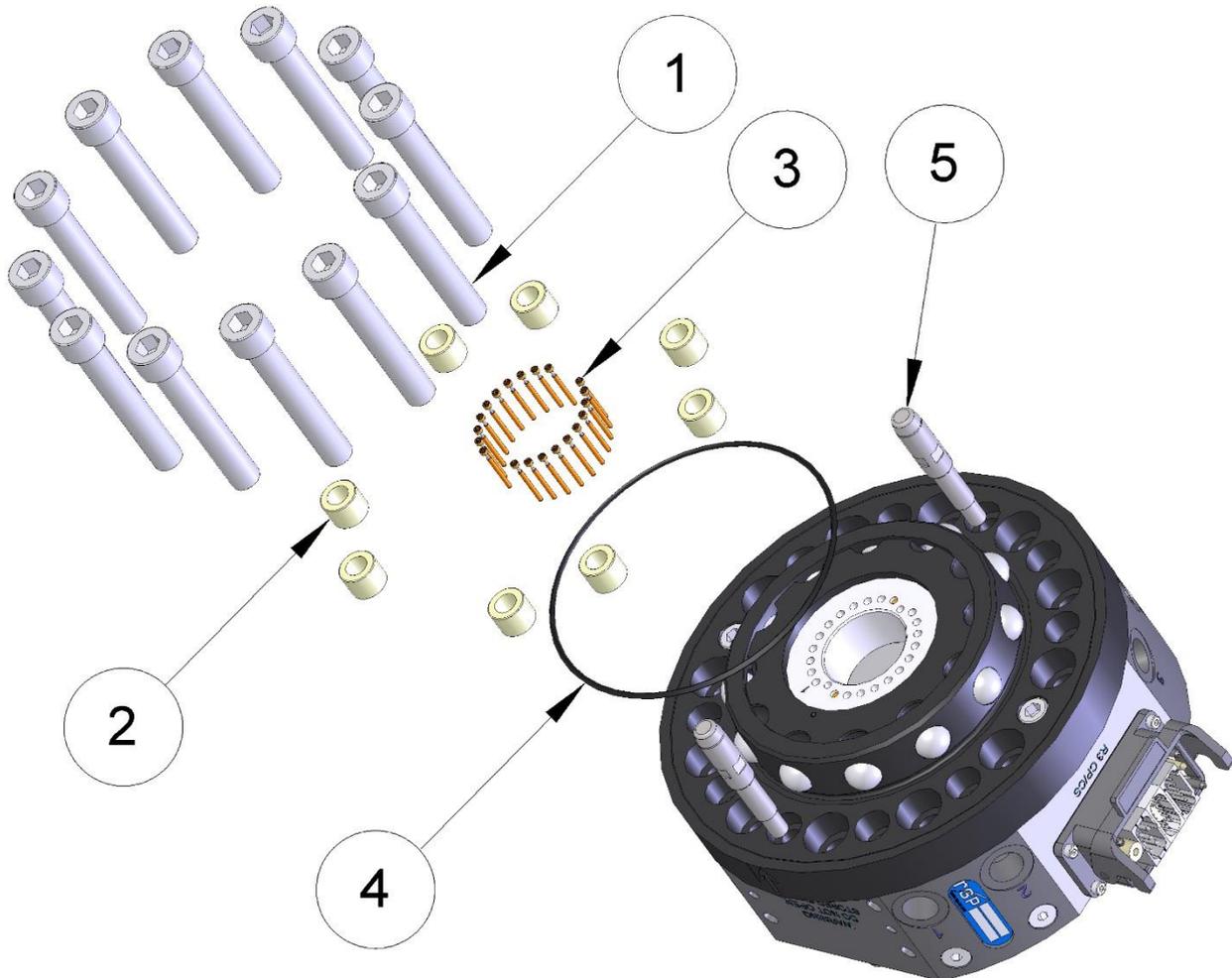
Jumpers on signals at the tool attachment can be used to give information about which tool attachment that is docked in the tool changer.

### **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.

## 3 SPARE PARTS

### 3.1 Part list for tool changer P0701A and P0703A



Item	Description	Part number	Wear part	Pcs
1	Fastening screws M16x100	MC6S M16x100		12
2	Spring loaded signal pins (P6412 only)	I0042	X	20
3	Air sealings	P0206-005	X	8
4	O-ring	I1458	X	1
5	Guide pin	P0206-069		2



