Product Manual

Tool parking system TPS400

M8307-1

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

rsp robot system products

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1 INTRODUCTION

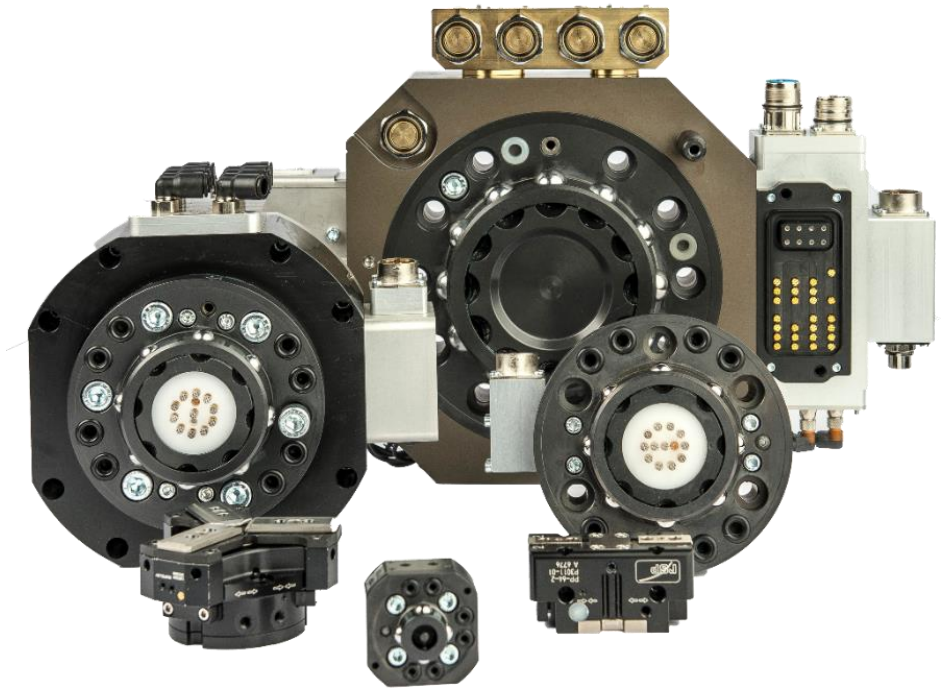
Robot System Products is a front-rank provider of peripheral products for high performance robot applications. We provide complete tool systems solutions for your robot installations, aiming to improve your productivity with the most reliable and cost-effective tooling on the market. Continuously we 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 RSPs unique CiRo-technology cables and hoses can be freely selected with high robot flexibility maintained, and the space requirements reduced. RSP's 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



1.1 Safety

1.1.1 General

The integrator installing the tool parking system must follow the safety demands stated in standards and provisions applicable in the country where the tool parking system is installed.

The user of the Robot System Products tool parking system is responsible that law and directives applicable in respective countries, with regards to safety, are adhered to. The user is also responsible to guarantee that all safety devices are installed correctly.

WARNING!
Never carry out service work on a robot that has not been taken out of operation. See safety information for the robot.

WARNING!
Only perform work on grippers or tools docked to the tool parking system if the air pressure is safely switched off.

WARNING!
Be aware that tool hangers, tool plates and tool stands are heavy and may cause personal injury and equipment damage if dropped.

WARNING! The electrical control of the moveable dust cover must be interlocked by the normal safety system of the robot cell,

NOTE!
The tool changer shall always be in locked position, also when empty, to avoid unexpected locking if air pressure is lost.

1.1.2 Explanation of warnings

The warnings in this document are specific to the products in this manual. It is expected that the user also pay attention to certain notifications from the robot manufacturer and/or the manufacturers of other components used in the installation.

WARNING!
The warning sign will make you aware that a situation could result in potential serious injury or damage to equipment.

NOTE!
The note sign will alert you about something important to consider.

2 TECHNICAL SPECIFICATIONS

This document describes RSP tool parking systems and its components. The tool parking systems are designed both for material handling and spot-welding applications.

The RSP tool parking system is a modular unit, easy to install with a reliable design and several options, which also can be ordered as accessories for retrofitting. RSP offers a variety of tool parking system components that can be combined to create a storage solution that fits each individual robot system requirements. This helps the line builder to save time through the ability to easily combine these modules into storage solutions tailored for each robot system.

2.1 Tool parking system overview

Single hangers

Product (standard)	Product (safety)	Column height	Weight	Description	Circuit diagram
P8385-100	P8365-100	1.0 m	64 kg	Section 2.2	E0186-056 (section 3.3.1)
P8385-125	P8365-125	1.25 m	69 kg	Section 2.2	E0186-056 (section 3.3.1)
P8385-150	P8365-150	1.5 m	78 kg	Section 2.2	E0186-056 (section 3.3.1)
P8383-100		1.0 m	64 kg	Section 2.4	E0186-056 (section 3.3.1)
P8383-125		1.25 m	69 kg	Section 2.4	E0186-056 (section 3.3.1)
P8383-150		1.5 m	78 kg	Section 2.4	E0186-056 (section 3.3.1)

NOTE! P8365 is prepared for the use of safety signal modules P7501-xxx.

Double hangers

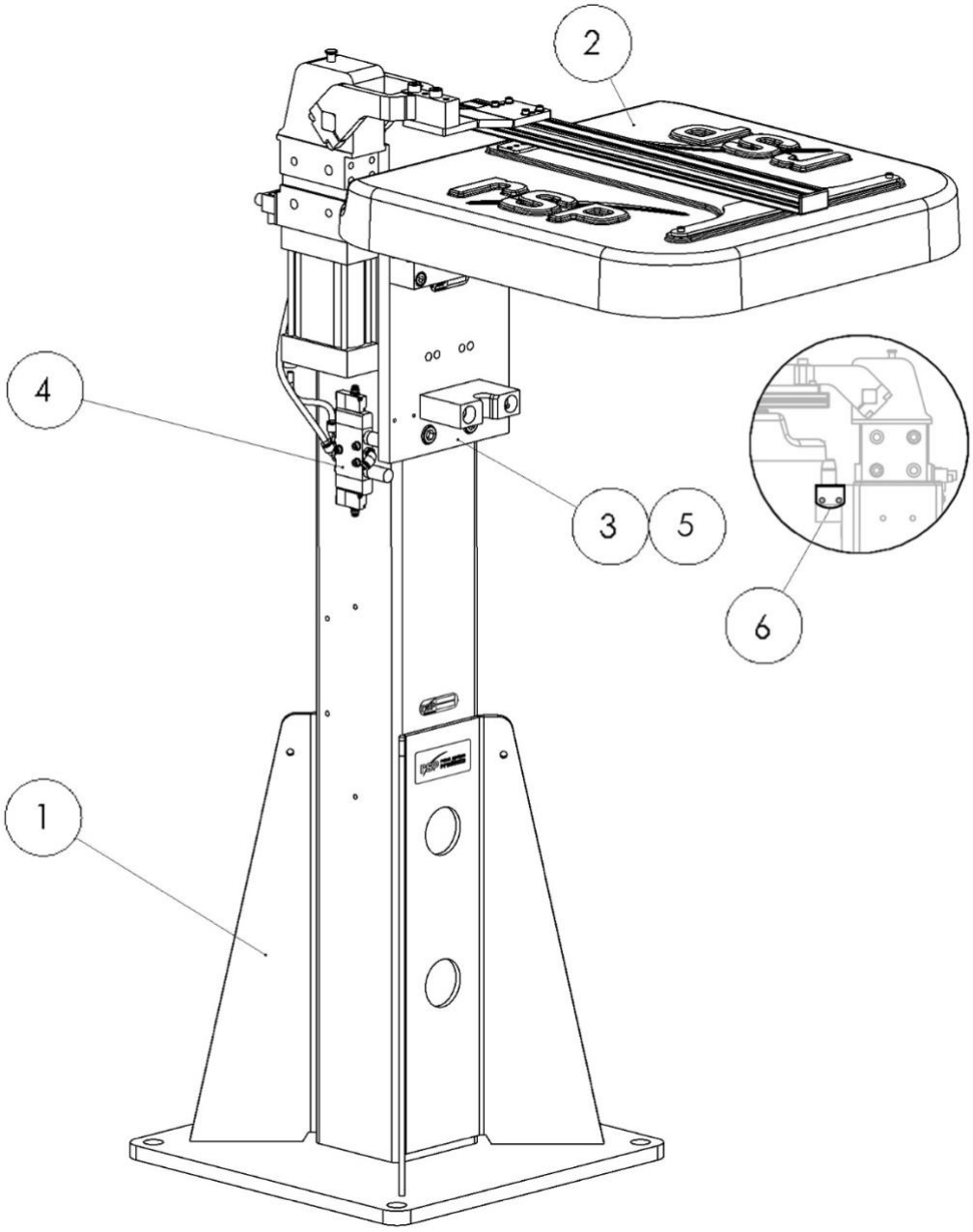
Product (standard)	Product (safety)	Column height	Weight	Description	Circuit diagram
P8386-100	P8366-100	1.0 m	77 kg	Section 2.3	2 x E0186-056 (section 3.3.1)
P8386-125	P8366-125	1.25 m	82 kg	Section 2.3	2 x E0186-056 (section 3.3.1)
P8386-150	P8366-150	1.5 m	91 kg	Section 2.3	2 x E0186-056 (section 3.3.1)
P8384-100		1.0 m	77 kg	Section 2.5	2 x E0186-056 (section 3.3.1)
P8384-125		1.25 m	82 kg	Section 2.5	2 x E0186-056 (section 3.3.1)
P8384-150		1.5 m	91 kg	Section 2.5	2 x E0186-056 (section 3.3.1)

NOTE! P8366 is prepared for the use of safety signal modules P7501-xxx.

2.1.1 Complementary products

Article	Note
3D-models	Available in STEP and Parasolid-format.

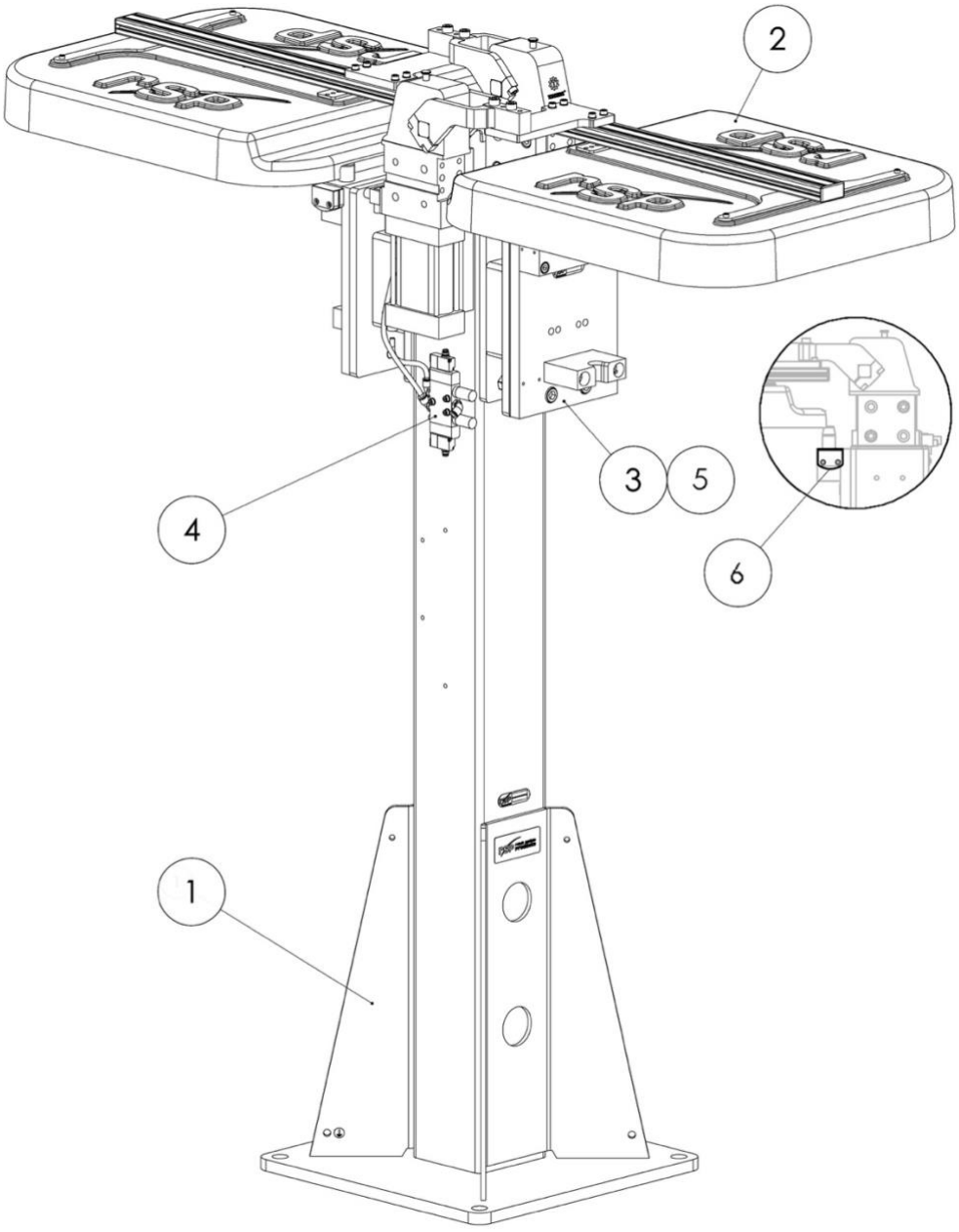
2.2 Tool parking system single, TPS400-1. Articles: P8365 and P8385



Tool parking system single P8365 and P8385 shall be used together with the tool changers TC240, TC480, TC720 and corresponding tool attachments. P8365 should be used together with safety signal modules P7501-xxx. P8385 can be used together with tool in stand sensor assembly, P8364, and tool present sensor, P8312.

Item	Product number	Description	Pcs
1	P8380-100/125/150	Tool stand column, H=1000/1250/1500 mm	1
2	P8327	Dust cover with pneumatic tilting clamp large	1
3	P8302	Tool hanger	1
4	P8308A	Valve unit for dust cover	1
5	P8370	Mounting kit, tool hanger	1
6	P8369 (P8365 only)	Tool in stand sensor, passive	1
7	P8303A	Tool plate (included but delivered separately)	1

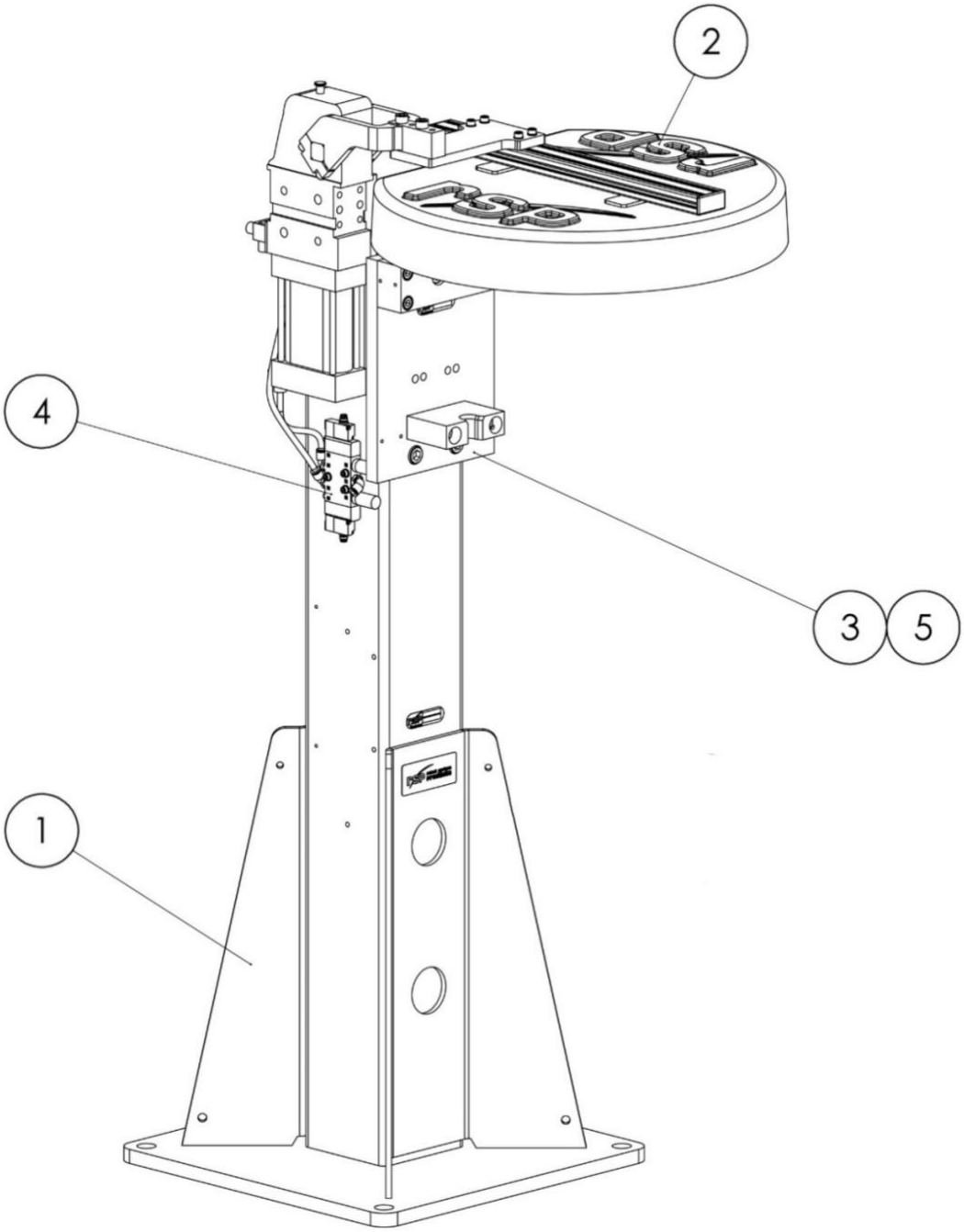
2.3 Tool parking system double, TPS400-2. Articles: P8366 och P8386



Tool parking system double P8366 and P8386 shall be used together with the tool changers TC240, TC480, TC720 and corresponding tool attachments. P8366 should be used together with safety signal modules P7501-xxx. P8386 can be used together with tool in stand sensors assembly, P8364, and tool present sensors, P8312.

Item	Product number	Description	Pcs
1	P8380-100/125/150	Tool stand column, H=1000/1250/1500 mm	1
2	P8327	Dust cover with pneumatic tilting clamp large	2
3	P8302	Tool hanger	2
4	P8308A	Valve unit for dust cover	2
5	P8371-08	Extension kit, 80 mm	2
6	P8369 (P8366 only)	Tool in stand sensor, passive	2
7	P8303A	Tool plate (included but delivered separately)	2

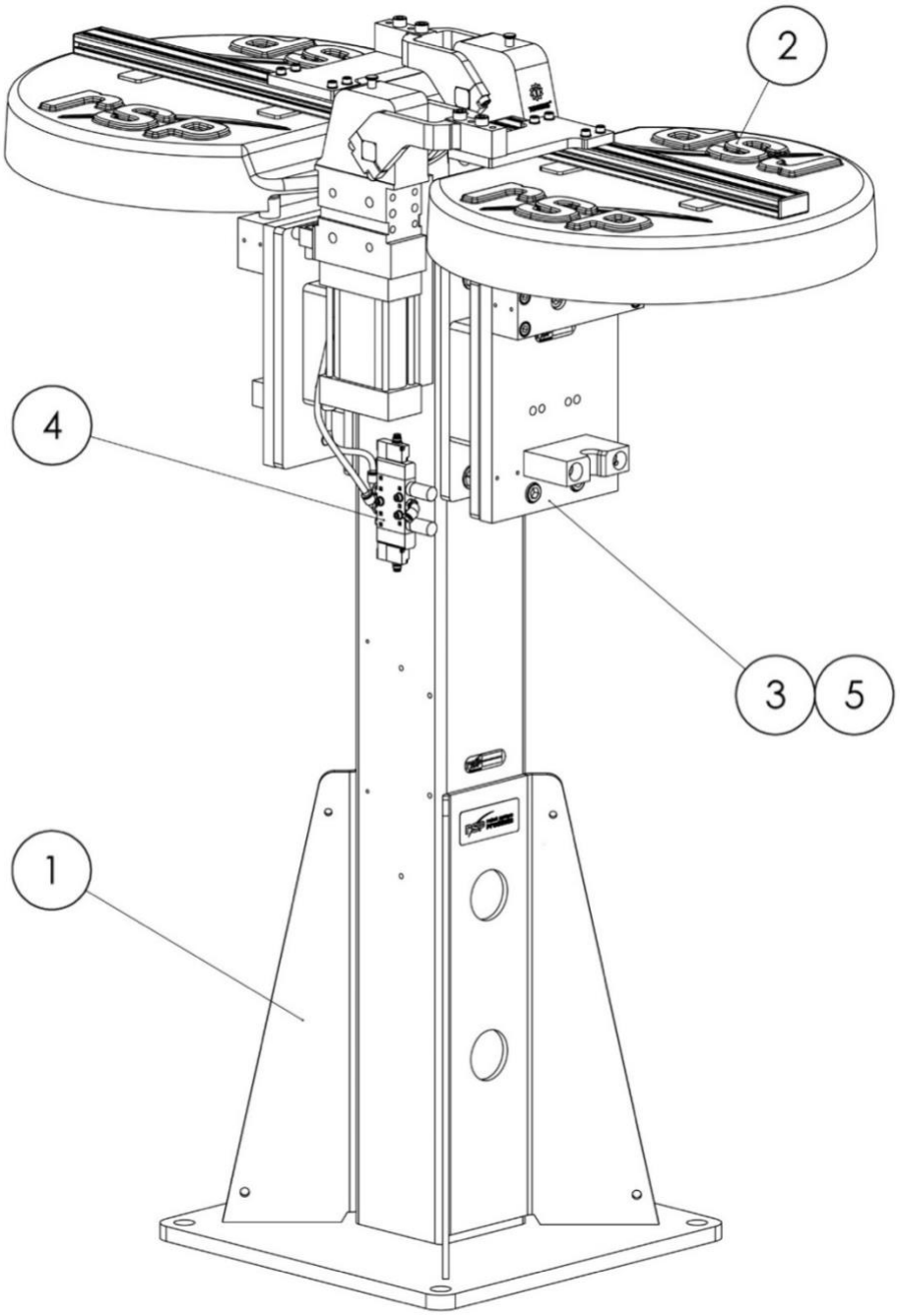
2.4 Tool parking system single, TPS400-1. Article: P8383



Tool parking system single P8383 shall be used together with the tool changer TC500 and tool attachment TA500. P8383 can be used together with tool in stand sensor assembly, P8364, and tool present sensor, P8312.

Item	Product number	Description	Pcs
1	P8380-100/125/150	Tool stand column, H=1000/1250/1500 mm	1
2	P8379	Dust cover with pneumatic tilting clamp small	1
3	P8302	Tool hanger	1
4	P8308A	Valve unit for dust cover	1
5	P8370	Mounting kit, tool hanger	1
6	P8303A	Tool plate (included but delivered separately)	1

2.5 Tool parking system single, TPS400-2. Article: P8384

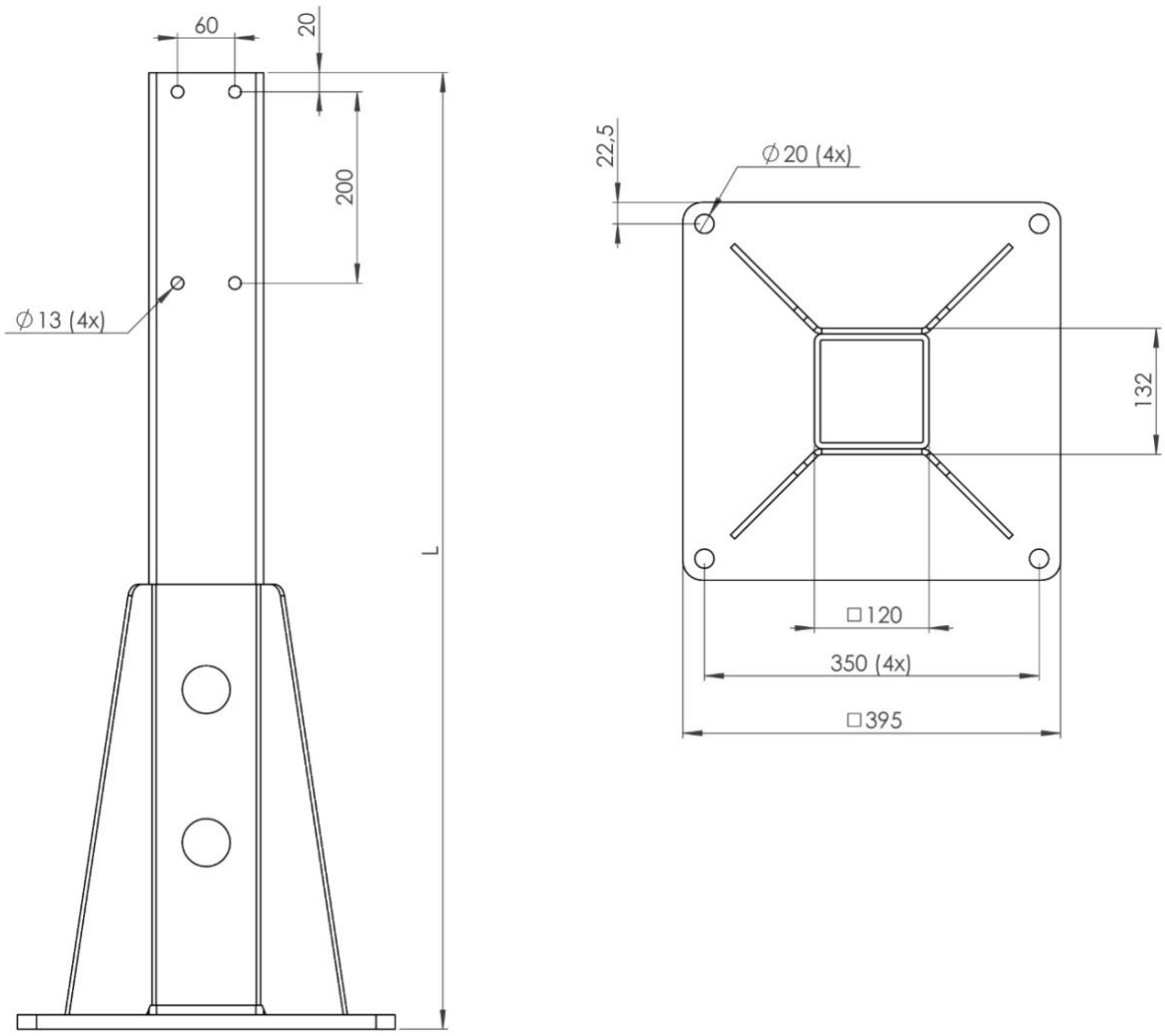


Tool parking system single P8384 shall be used together with the tool changers TC500 and tool attachments TA500. P8384 can be used together with tool in stand sensors assembly, P8364, and tool present sensors, P8312.

Item	Product number	Description	Pcs
1	P8380-100/125/150	Tool stand column, H=1000/1250/1500 mm	1
2	P8379	Dust cover with pneumatic tilting clamp small	2
3	P8302	Tool hanger	2
4	P8308A	Valve unit for dust cover	2
5	P8370	Mounting kit, tool hanger	2
6	P8303A	Tool plate (included but delivered separately)	2

3 TOOL PARKING SYSTEM COMPONENTS

3.1 Tool stand columns. Article: P8380

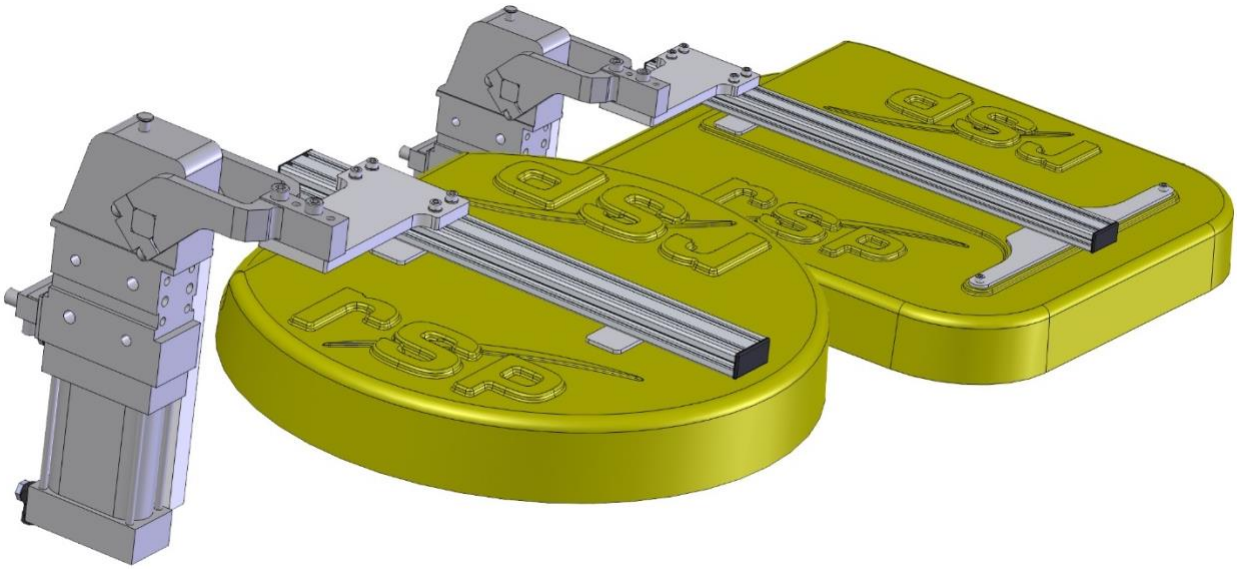


The tool stand column P8380 gives together with the tool hanger P8302 and tool plate P8303A a robust tool parking system for easy tool changing. The tool stand column comes in different heights and is prepared for mounting of a single or double hanger, dust cover, connection modules and valve units.

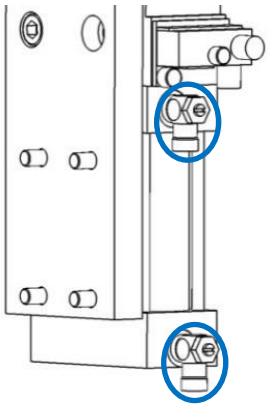
Technical data

Article number	Height (L)	Weight
P8380-100	1000 mm	51 kg
P8380-125	1250 mm	56 kg
P8380-150	1500 mm	65 kg

3.2 Dust covers with pneumatic tilting clamp



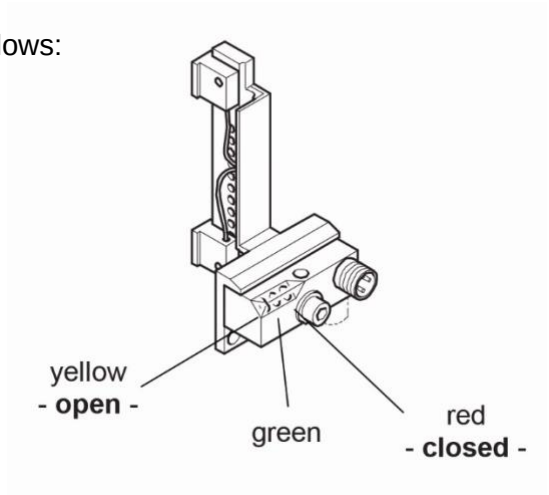
The options P8327, P8377 and P8379 (dust covers with pneumatic tilting clamp) shall be mounted on the tool stand column P8380. The dust covers are used for effectively protecting the tool and tool attachment when docked on the tool stand. The tilting angle is adjustable within the range of 10°–135°. The default tilting angle for tool parking system single is fully open, 135° and the default tilting angle for tool parking system double is 90°.



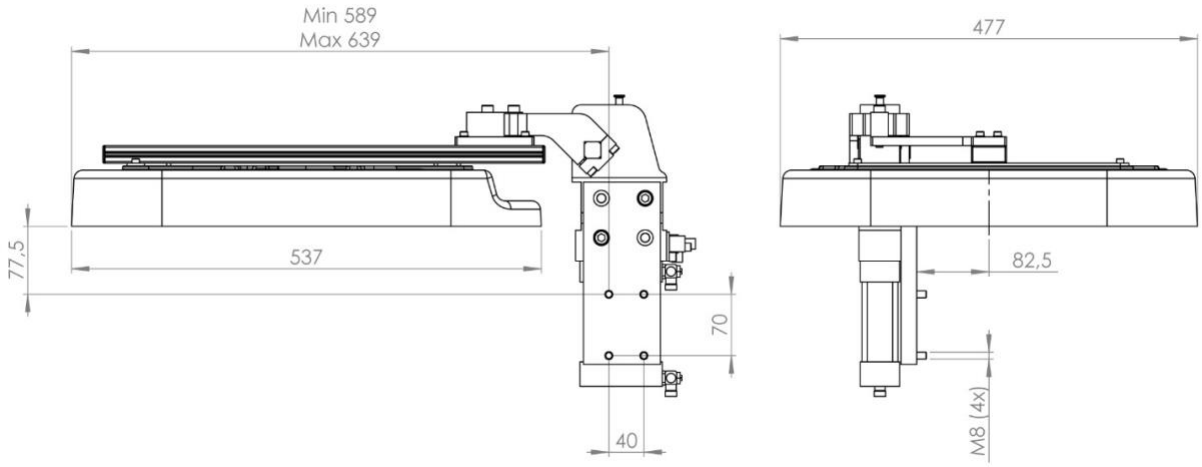
Flow control valves, I1315, are installed on both ports to reduce the tilting clamps opening and closing speed, adjust the proper system/line speed to ensure a smooth dust cover operation, see sketch to the right.

The function of the integrated LEDs are as follows:

- Green system current
- Red clamp closed
- Yellow clamp open



3.2.1 Dust cover with pneumatic tilting clamp, large. Articles: P8327/P8377



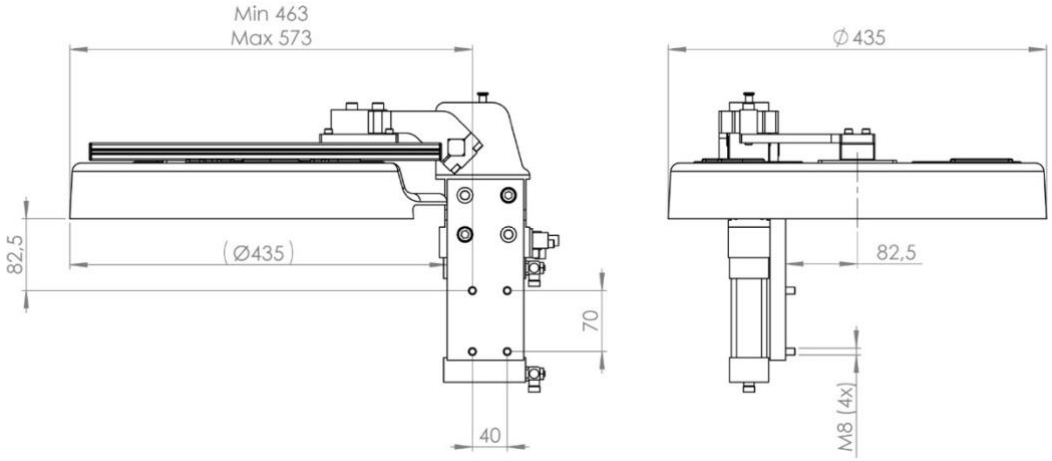
Dust cover with pneumatic tilting clamp large P8327 (drawing above) and P8377 should be used together with tool changers TC240, TC480, TC720 with corresponding tool attachments.

NOTE The dust cover P8377 has a vertical offset of 50 mm and shall be used when an extended free space under the dust cover is required.

Technical data

Weight		5.1 kg
Electrical signals	Circuit diagram M12 4-pole A-code male	E0186-056 (section 3.3.1) 24V, 0V, Cover_Closed, Cover_Opened

3.2.2 Dust cover with pneumatic tilting clamp, small. Article: P8379

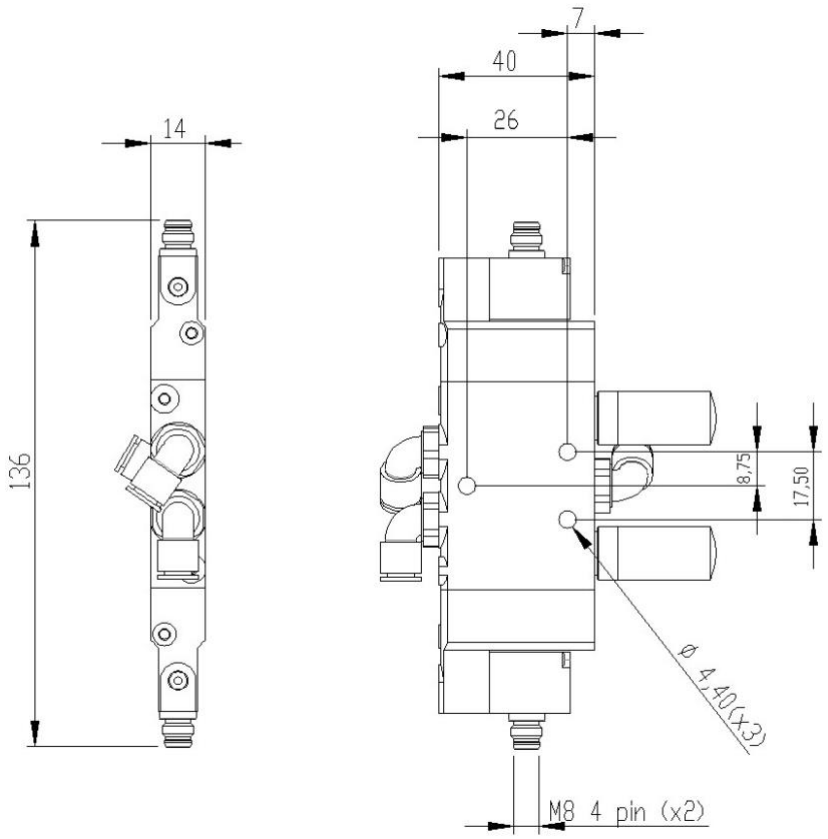


Dust cover with pneumatic tilting clamp small P8379 should be used together with tool changer TC500 with tool attachment TA500.

Technical data

Weight		5.1 kg
Electrical signals	Circuit diagram M12 4-pole A-code male	E0186-056 (section 3.3.1) 24V, 0V, Cover_Closed, Cover_Opened

3.3 Valve unit for dust cover. Article: P8308A

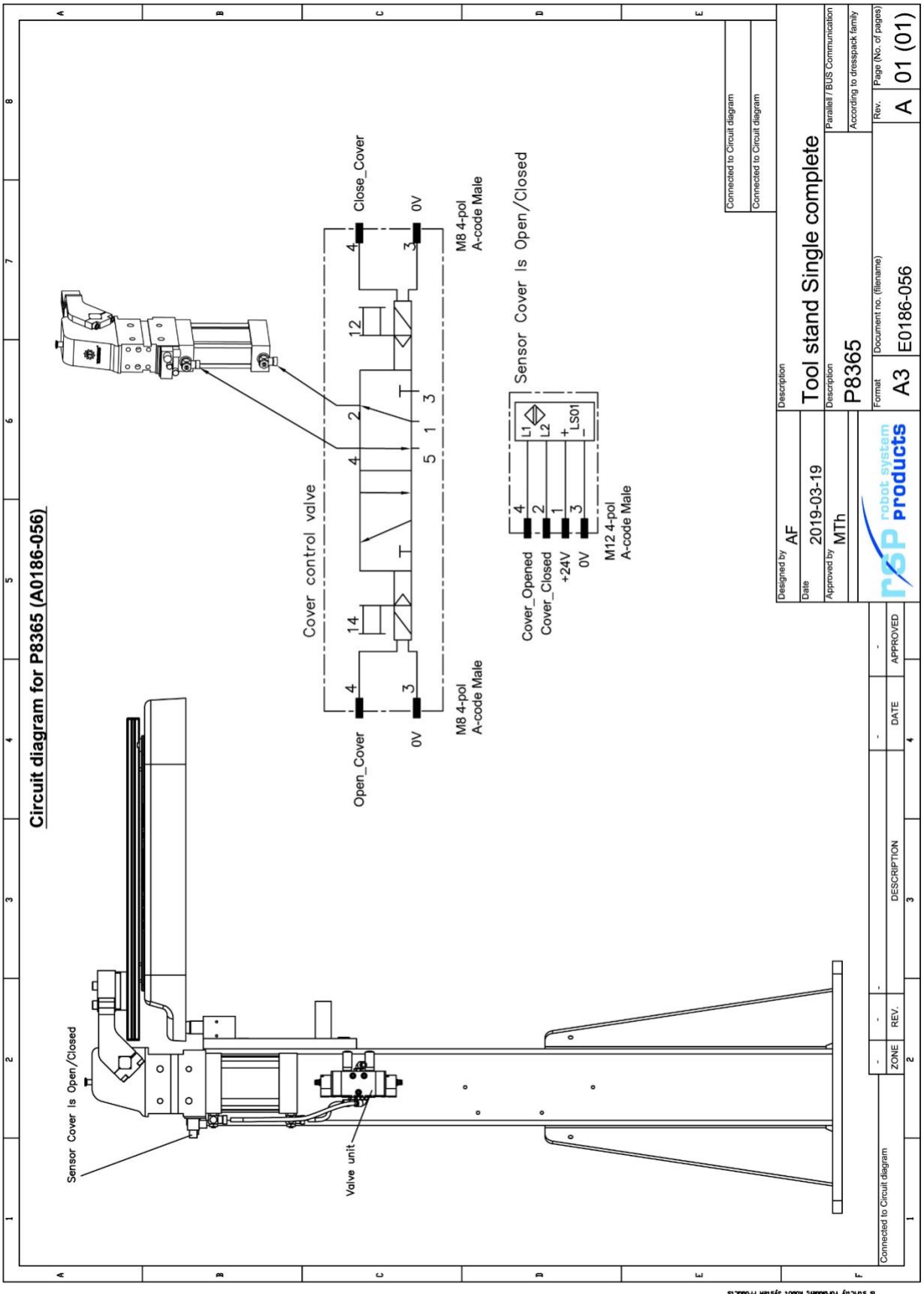


A bi-stable 5/2-valve to be mounted on the tool stand column P8380 and used together with P8327, P8377 or P8379 (dust covers with pneumatic tilting clamps).

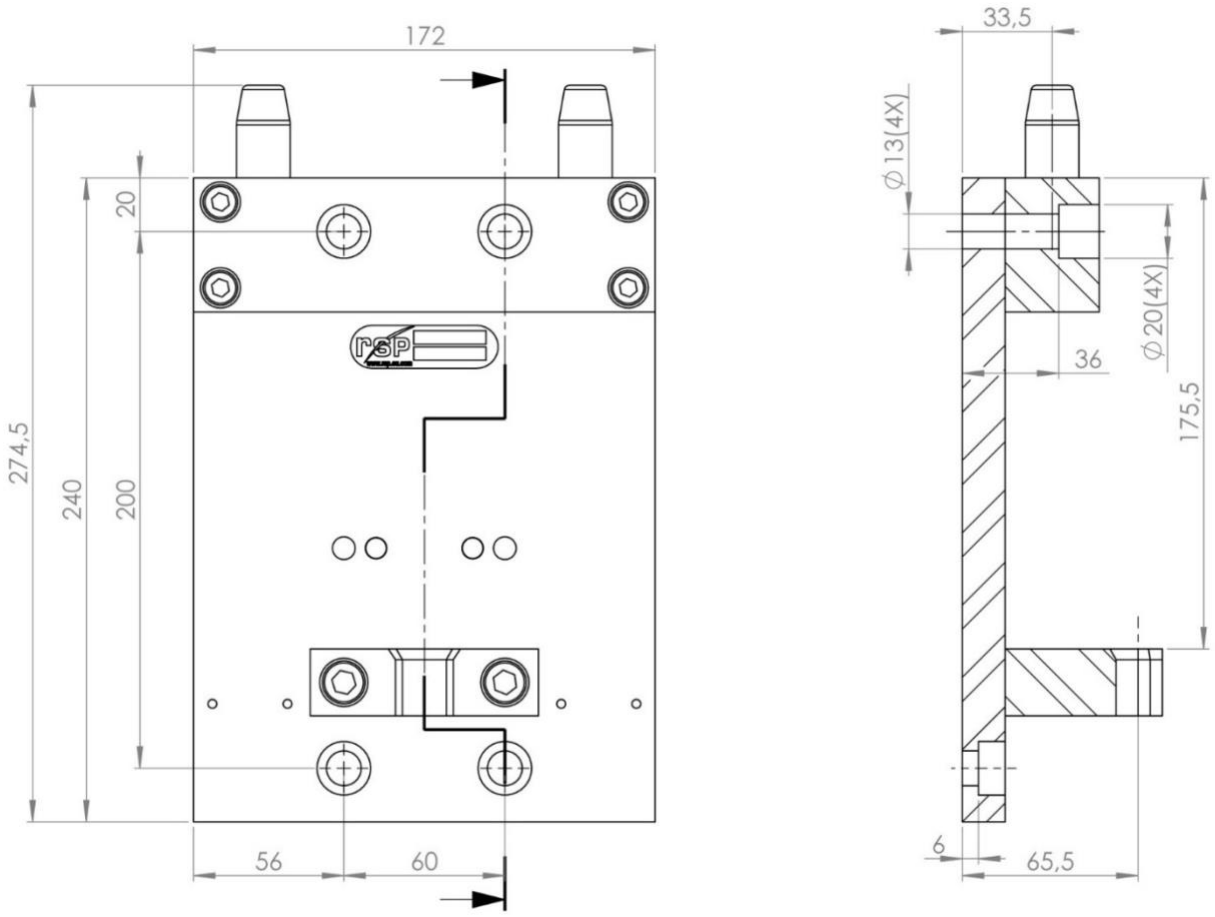
Technical data

Weight		0,1 kg
Electrical signals	Circuit diagram	E0186-056 (section 3.3.1)
	M8 4-pole A-code male	0V, OpenCover,
	M8 4-pole A-code male	0V, CloseCover

3.3.1 Circuit diagram E0186-056



3.4 Tool hanger. Article: P8302

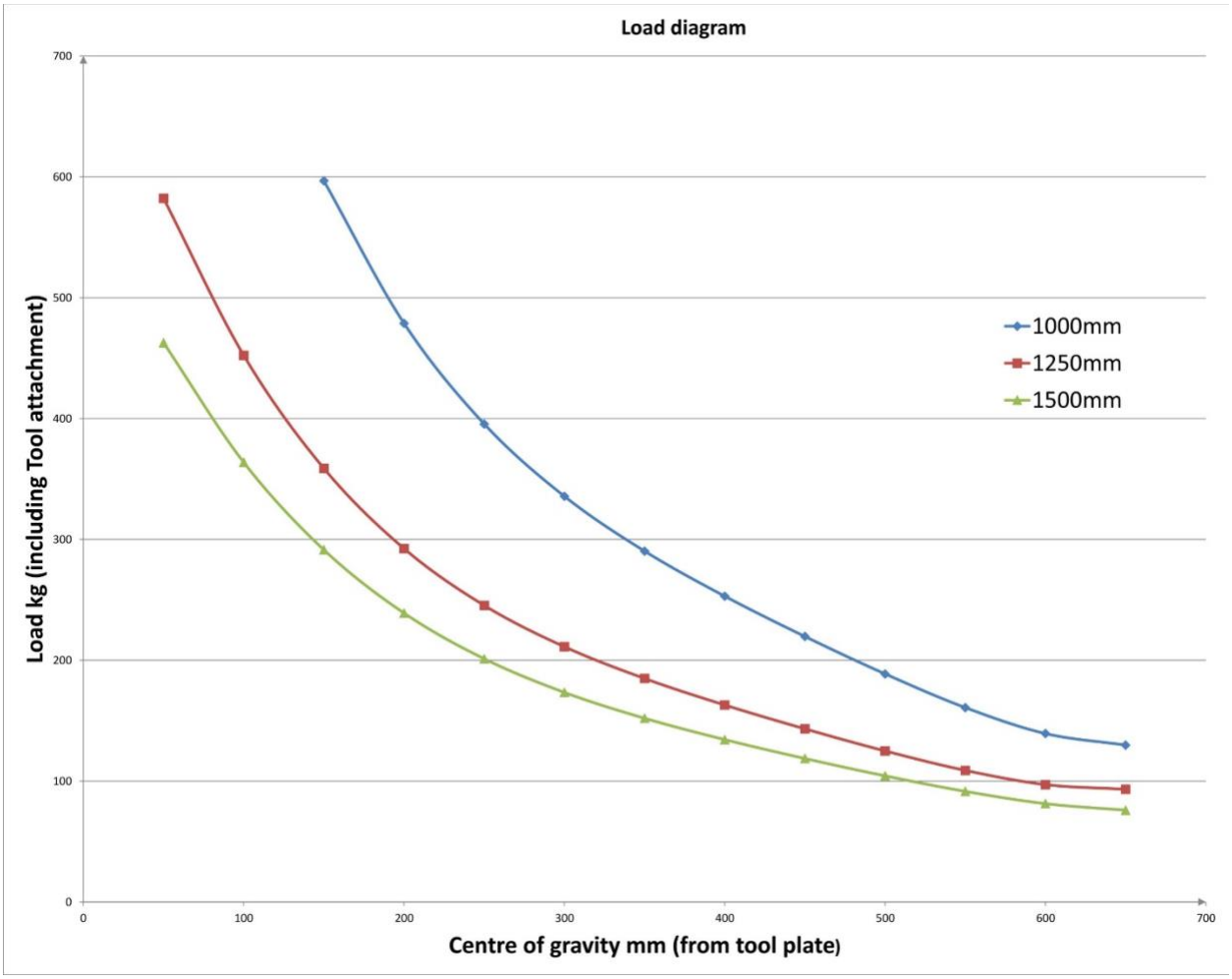


The tool hanger P8302, mounted on the tool stand column P8380, gives together with tool plate P8303A a robust tool parking system for easy tool changing. To be mounted using mounting kit for tool hanger, P8370.

Technical data

Weight	8.3 kg

3.5 Load diagram for tool parking system

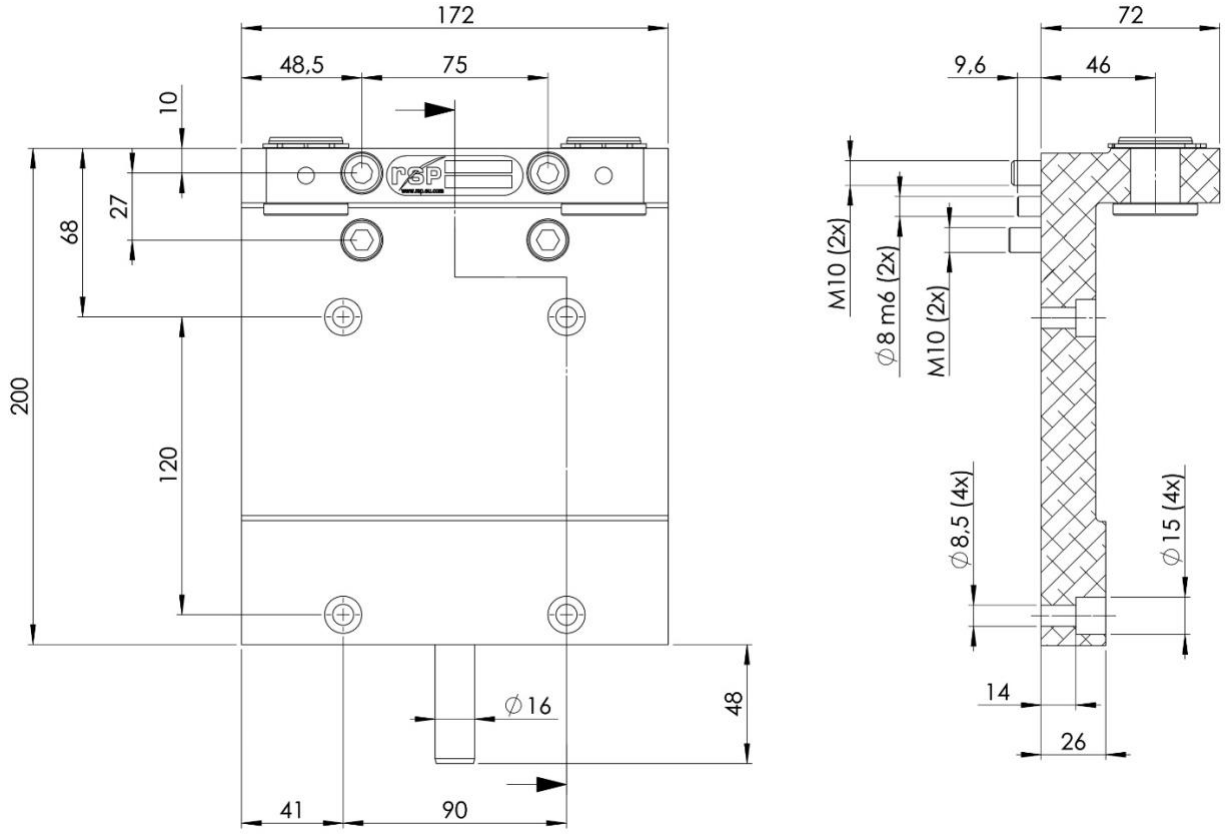


The diagram shows the load corresponding to a maximum displacement of 0.5 mm of the tool (including tool attachment) at its point of gravity.

NOTE! The displacement of the docking position for drop off/pick up depends on the distance from the tool plate to the tool attachment. To minimize the wear of the tool changer we recommend a docking position tolerance of maximum 1 mm.

4 OPTIONS

4.1 Tool plate. Article: P8303A



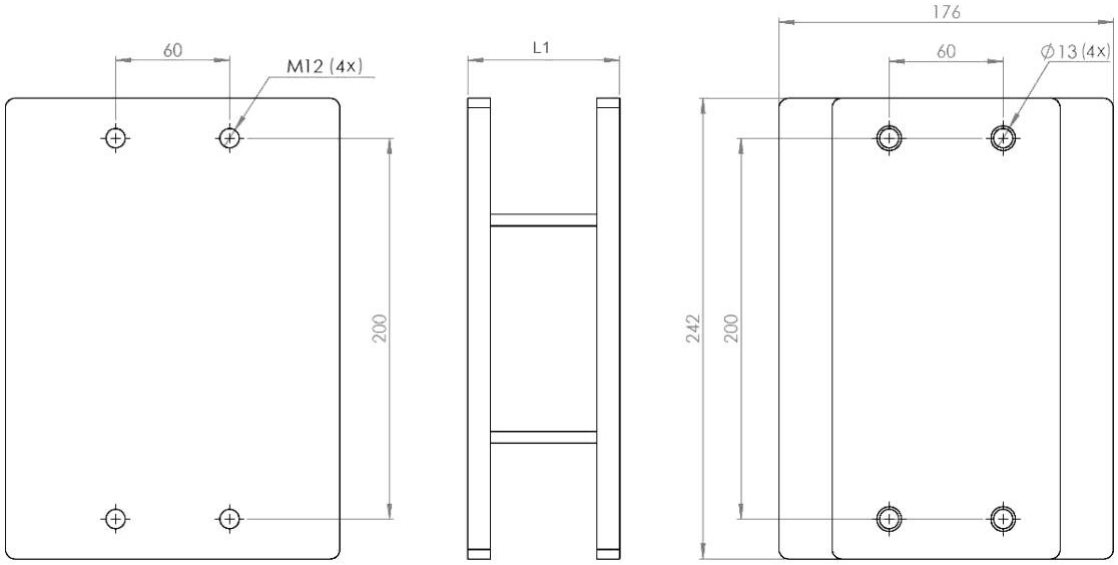
The tool plate P8303A, mounted on the tool attachment, gives together with tool hanger P8302 and tool stand column P8380 a robust tool parking system for easy tool changing.

NOTE! When used in combination with the safety signal modules P7501-xxx the tool plate P8303A can be used together with tool-in-stand sensor, P8369, to get a presence signal for the safety logic.

Technical data

Weight	2.6 kg

4.2 Extension for tool hanger kit. Article: P8371 / P8381

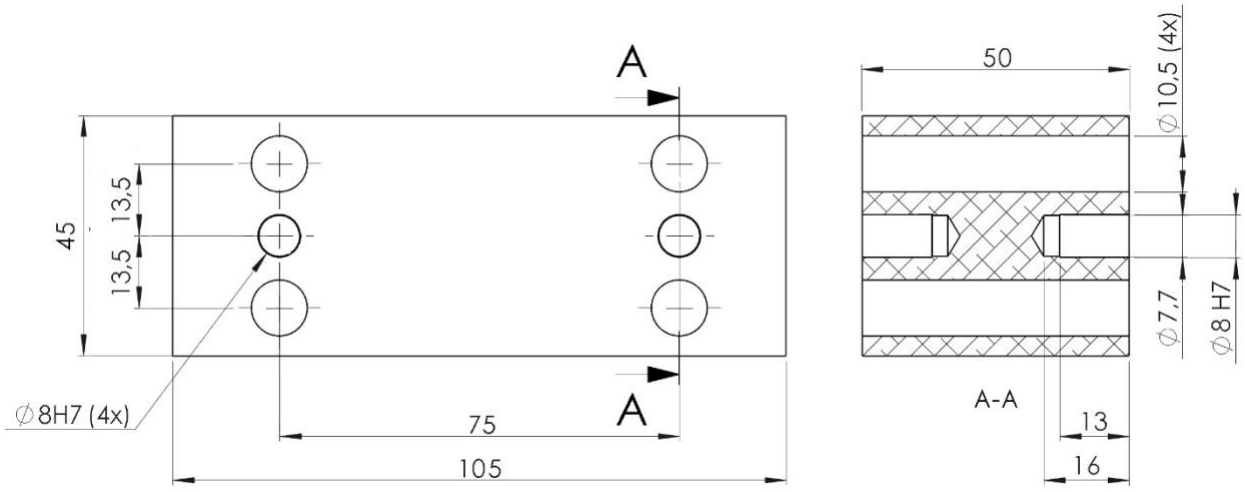


The tool hanger extension P8371 shall be mounted between the tool stand column, P8380, and the tool hanger, P8302 in combination with dust cover with pneumatic tilting clamp large, P8327/P8377. The tool hanger extension P8381 shall be used in combination with dust cover with pneumatic tilting clamp small, P8379. When required an extra-long aluminium profile for the dust cover is included.

Technical data

Article number	With dust cover	Width (L1)	Extra aluminium profile (length)	Weight
P8371-08	P8327/P8377	80 mm	-	8.1 kg
P8371-13	P8327/P8377	130 mm	650 mm	9.6 kg
P8371-18	P8327/P8377	180 mm	650 mm	10.5 kg
P8381-08	P8379	80 mm	-	8.1 kg
P8381-13	P8379	130 mm	-	9.0 kg
P8381-18	P8379	180 mm	500 mm	10.3 kg

4.3 Spacer between tool attachment and tool plate. Article: P0186-049

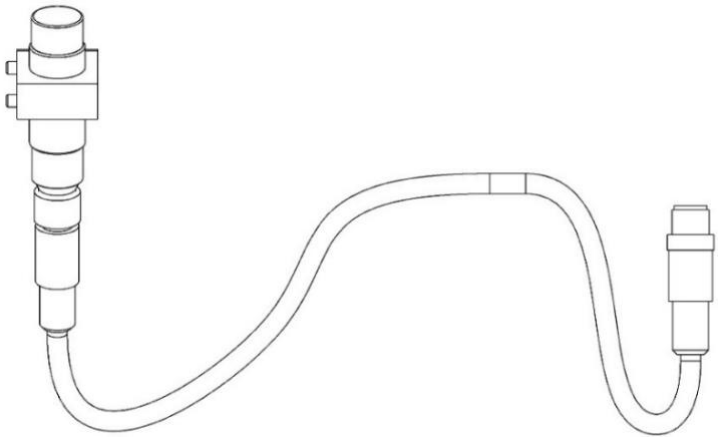


The spacer P0186-049 shall be mounted between the tool attachment and tool plate.

Technical data

Article number	Width	Weight
P0186-049	50 mm	0.7 kg

4.4 Tool present sensor, inductive. Article: P8312

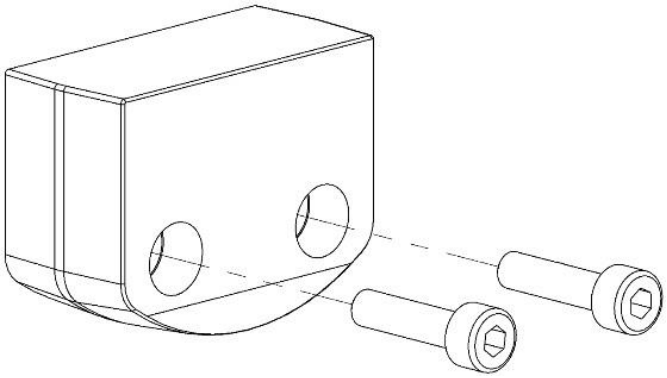


To be mounted on the tool hanger, a 0.8 meter cable is included. Transmits a double channel signal to detect presence of tool in the tool parking system.

Technical data

Weight		0.2 kg
Electrical signals	Circuit diagram M12 4-pole female	E0186-040 (section 2.6.10) 24V, Tool present 1, 0V, Tool present 2
Safety classification (ISO13849-1)		Category 2, PL d

4.5 Tool in stand sensor, passive side. Article: P8369

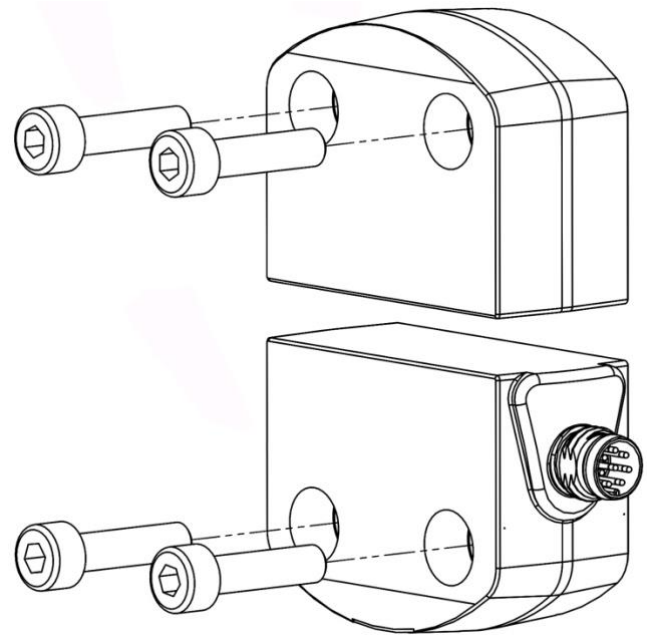


For the tool changers TC240, TC480 and TC720, equipped with safety signal module P7501-xxx, the tool in stand sensor P8369 shall be mounted on tool stand hanger and used together with I1171 mounted on the tool plate.

Technical data

Weight	0.02 kg

4.6 Tool in stand sensor, assembly. Article: P8364

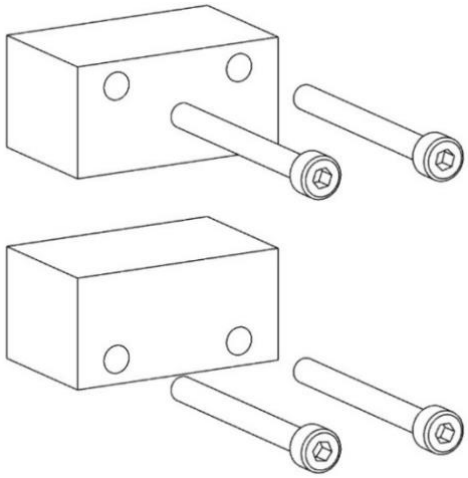


For the tool changers TC240, TC480 and TC720 without safety signal module and the tool changer TC500. The active tool in stand sensor P8382 can be mounted on tool stand hanger and the passive part mounted on the tool plate.

Technical data

Weight		0.05 kg
Electrical signals	Circuit diagram M8 8-pole, male	E0186-075 (section 4.13) 3 x 24V, 0V, Tool_in_Stand_1, Tool_in_Stand_2

4.7 Spacer for tool in stand sensor. Article: P8373



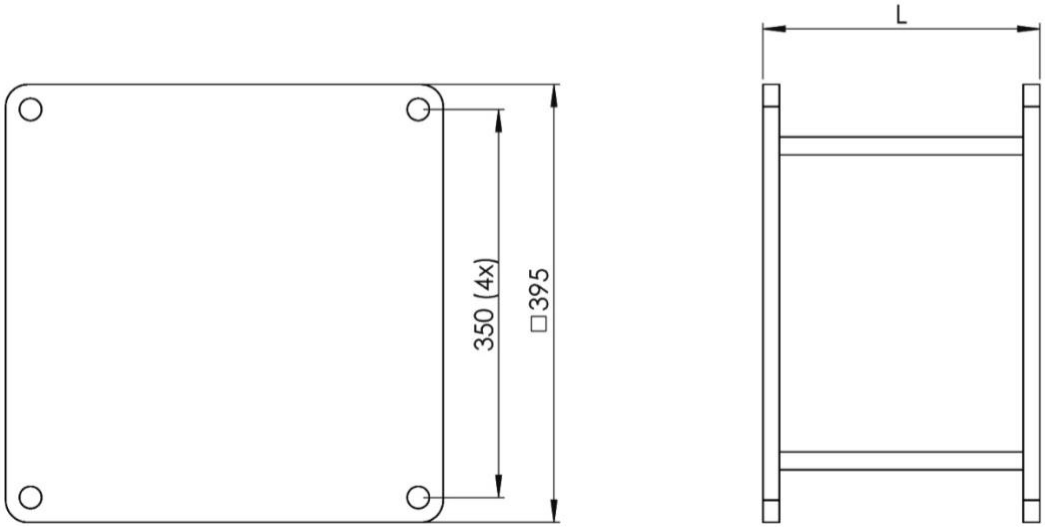
Spacers for mounting of passive tool in stand sensor P8369 on the tool hanger and the tool in stand sensor I1171 on the tool plate.

Technical data

Weight	0.1 kg
Thickness	22 mm

NOTE! To be used together with TA720 in order to avoid collision between sensor cable and tool attachment.

4.8 Pedestal for tool stand column. Article: P8376

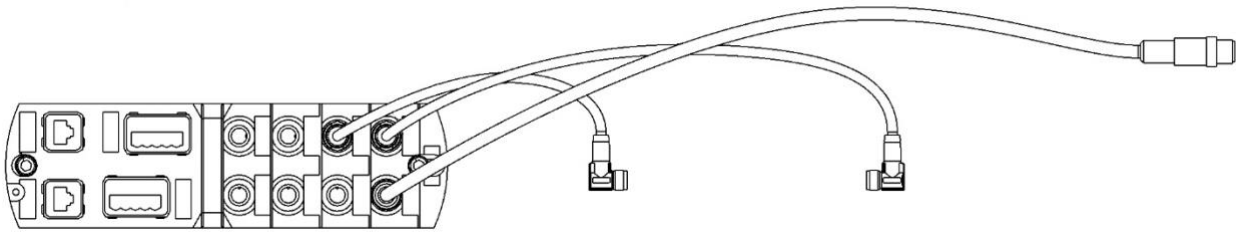


To be used to elevate the tool stand by mounting under a tool stand column P8380.

Technical data

Article	Height (L)	Weight
P8376-025	250 mm	56 kg
P8376-035	350 mm	65 kg

4.9 Connection module. Article: P8372

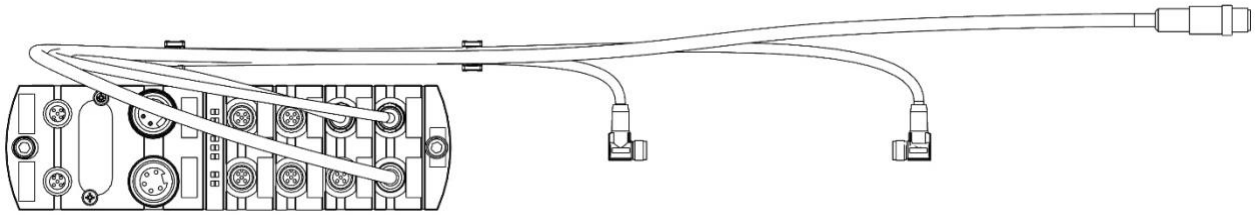


Option for tool parking system single P8365, P8385 and P8383.

Technical data

Electrical signals	Circuit diagram	E0186-062-1 (section 4.15)
Input	Push Pull RJ45 Push Pull power M12 4-pin, female (tilting clamp) M12 4-pin, female (tool present sensor)	Profinet Power supply 24V 24V, Cover_Closed, 0V, Cover_Opened 24V, Tool present 1, 0V, Tool present 2
Output	M8 4-pin, female (valve unit) M8 4-pin, female (valve unit)	0V, Close_Cover 0V, Open_Cover

4.10 Connection module. Article: P8378

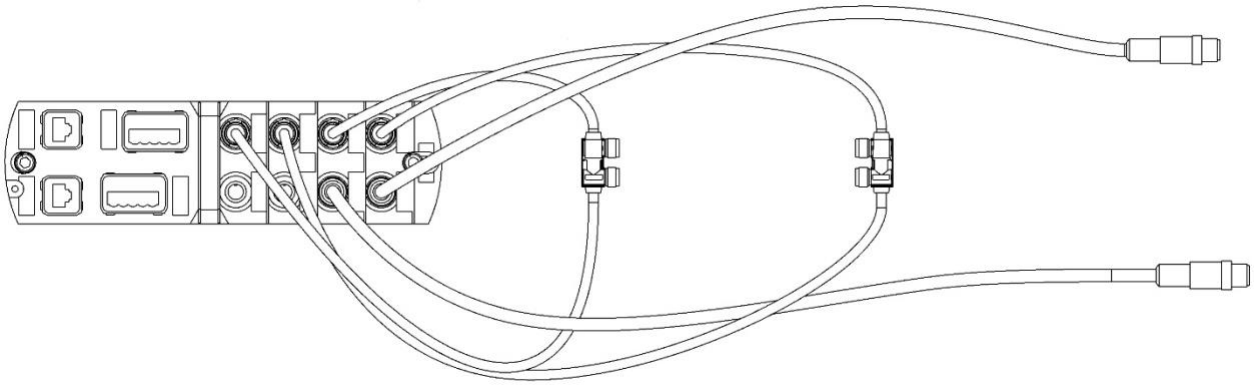


Option for tool parking system single P8365, P8385 and P8383.

Technical data

Electrical signals	Circuit diagram	E0186-072-1 (section 4.17)
Input	7/8" 5-pole M12 4S, D-coded M12 4-pin, female (tilting clamp) M12 4-pin, female (tool present sensor)	Power supply 24V Profinet 24V, Cover_Closed, 0V, Cover_Opened 24V, Tool present 1, 0V, Tool present 2
Output	M8 4-pin, female (valve unit) M8 4-pin, female (valve unit)	0V, Close_Cover 0V, Open_Cover

4.11 Connection module. Article: P8372-2

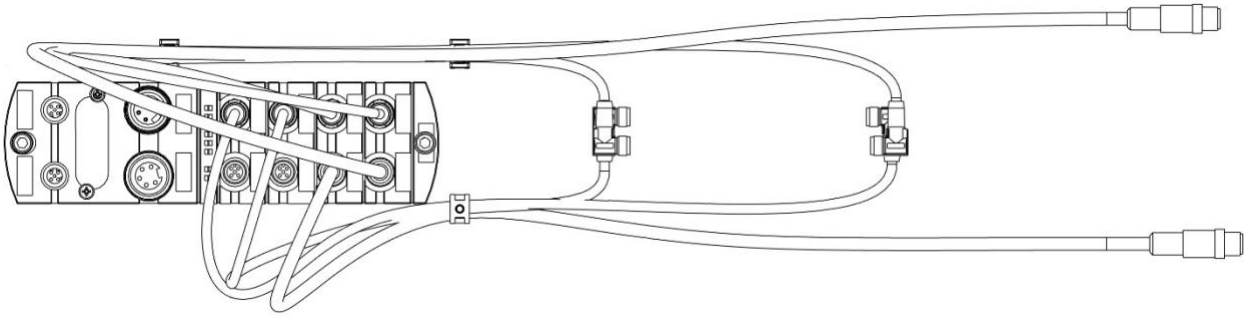


Option for Tool parking system double P8366, P8386 and P8384.

Technical data

Electrical signals	Circuit diagram	E0186-062-2 (section 4.16)
Input	Push Pull RJ45 Push Pull power M12 4-pin, female (tilting clamp #1) M12 4-pin, female (tilting clamp #2) M12 4-pin, female (tool present sensor #1) M12 4-pin, female (tool present sensor #2)	Profinet Power supply 24V 24V, Cover_Closed, 0V, Cover_Opened 24V, Cover_Closed, 0V, Cover_Opened 24V, Tool present 1, 0V, Tool present 2 24V, Tool present 1, 0V, Tool present 2
Output	M8 4-pin, female (valve unit #1) M8 4-pin, female (valve unit #1) M8 4-pin, female (valve unit #2) M8 4-pin, female (valve unit #2)	0V, Close_Cover 0V, Open_Cover 0V, Close_Cover 0V, Open_Cover

4.12 Connection module. Article: P8378-2

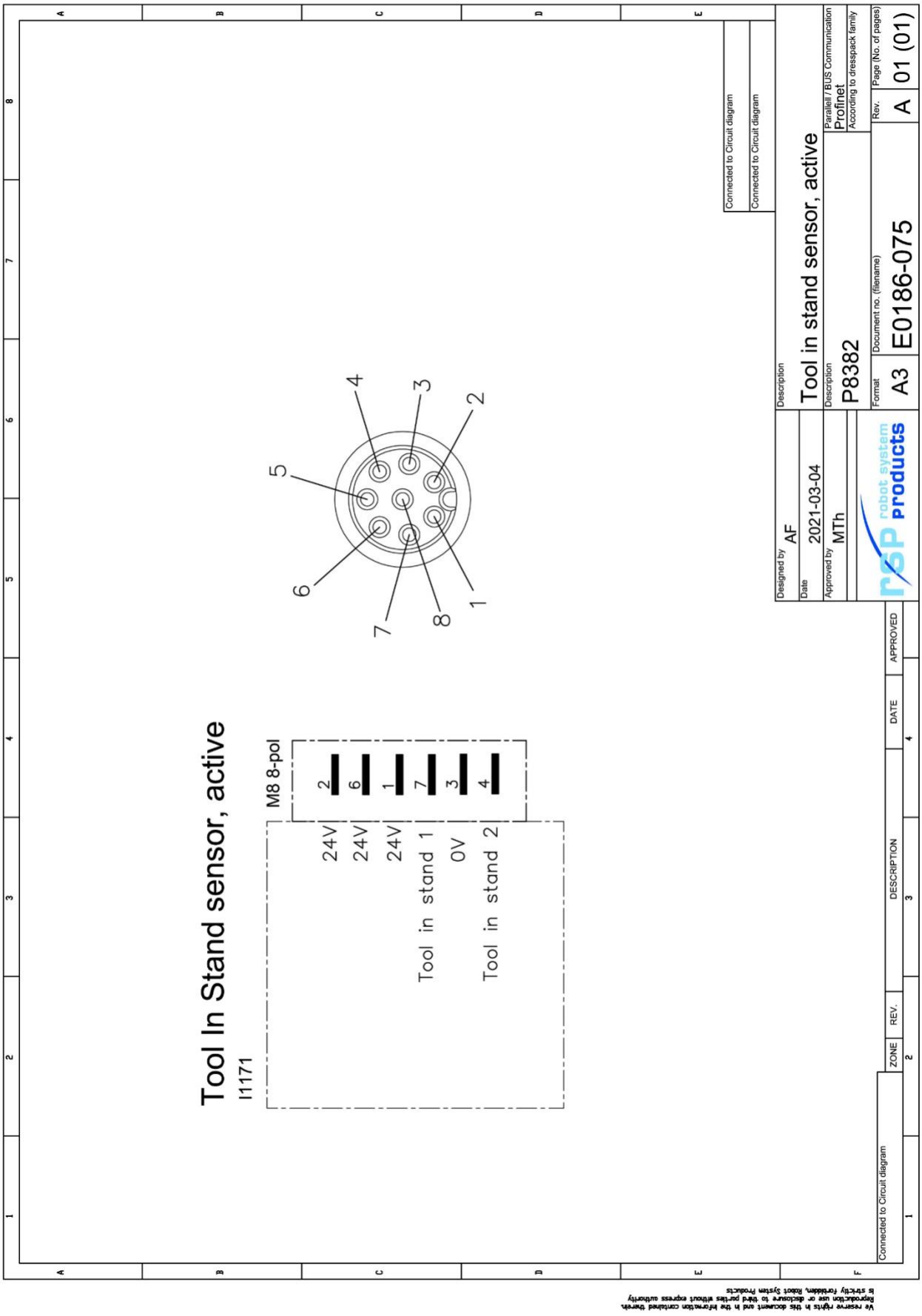


Option for Tool parking system double P8366, P8386 and P8384.

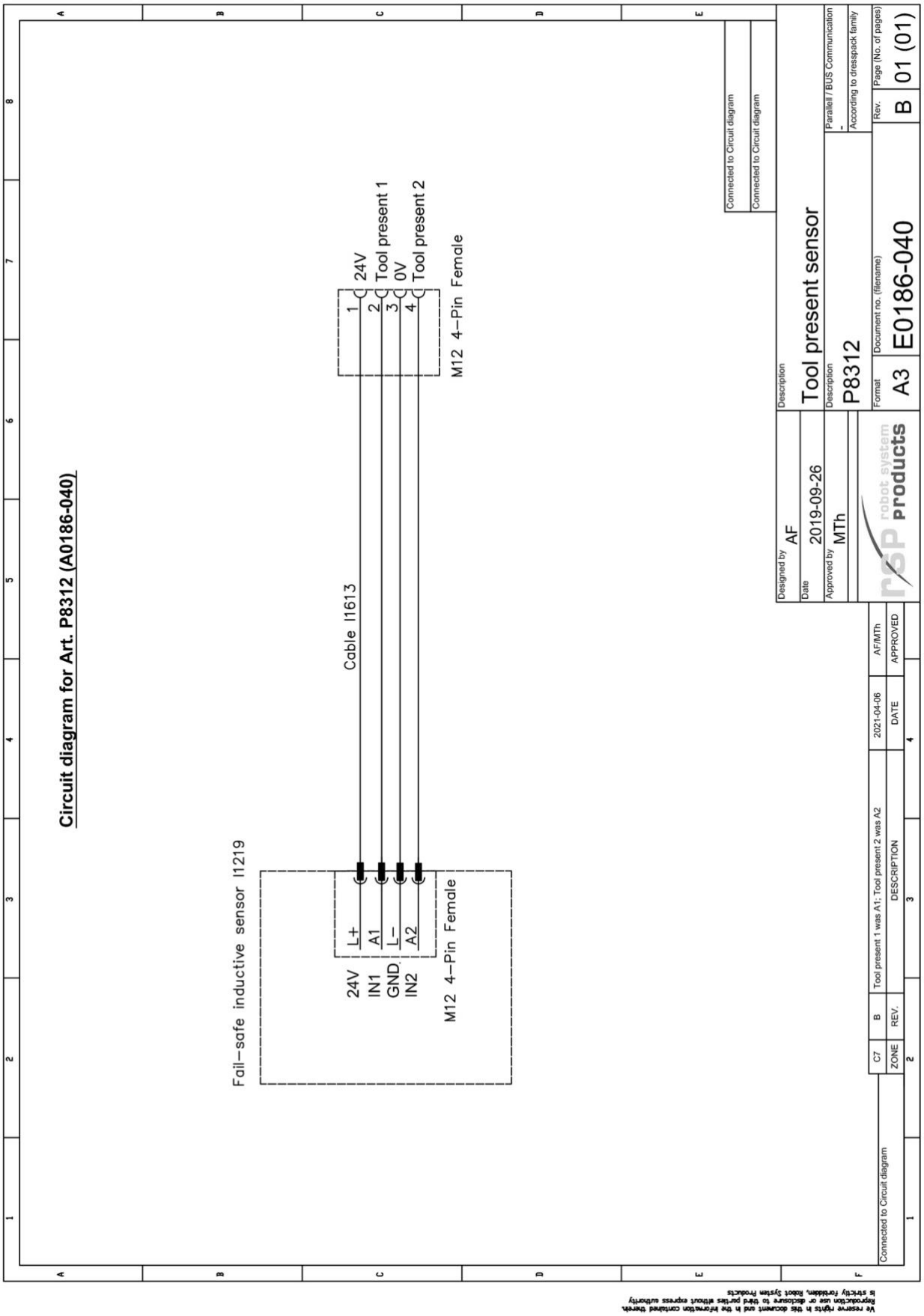
Technical data

Electrical signals	Circuit diagram	E0186-072-1 (section 4.17)
Input	7/8" 5-pole	Power supply 24V
	M12 4S, D-coded	Profinet
	M12 4-pin, female (tilting clamp #1)	24V, Cover_Closed, 0V, Cover_Opened
	M12 4-pin, female (tilting clamp #2)	24V, Cover_Closed, 0V, Cover_Opened
	M12 4-pin, female (tool present sensor #1)	24V, Tool present 1, 0V, Tool present 2
	M12 4-pin, female (tool present sensor #2)	24V, Tool present 1, 0V, Tool present 2
Output	M8 4-pin, female (valve unit #1) M8 4-pin, female (valve unit #1)	0V, Close_Cover 0V, Open_Cover
	M8 4-pin, female (valve unit #2) M8 4-pin, female (valve unit #2)	0V, Close_Cover 0V, Open_Cover

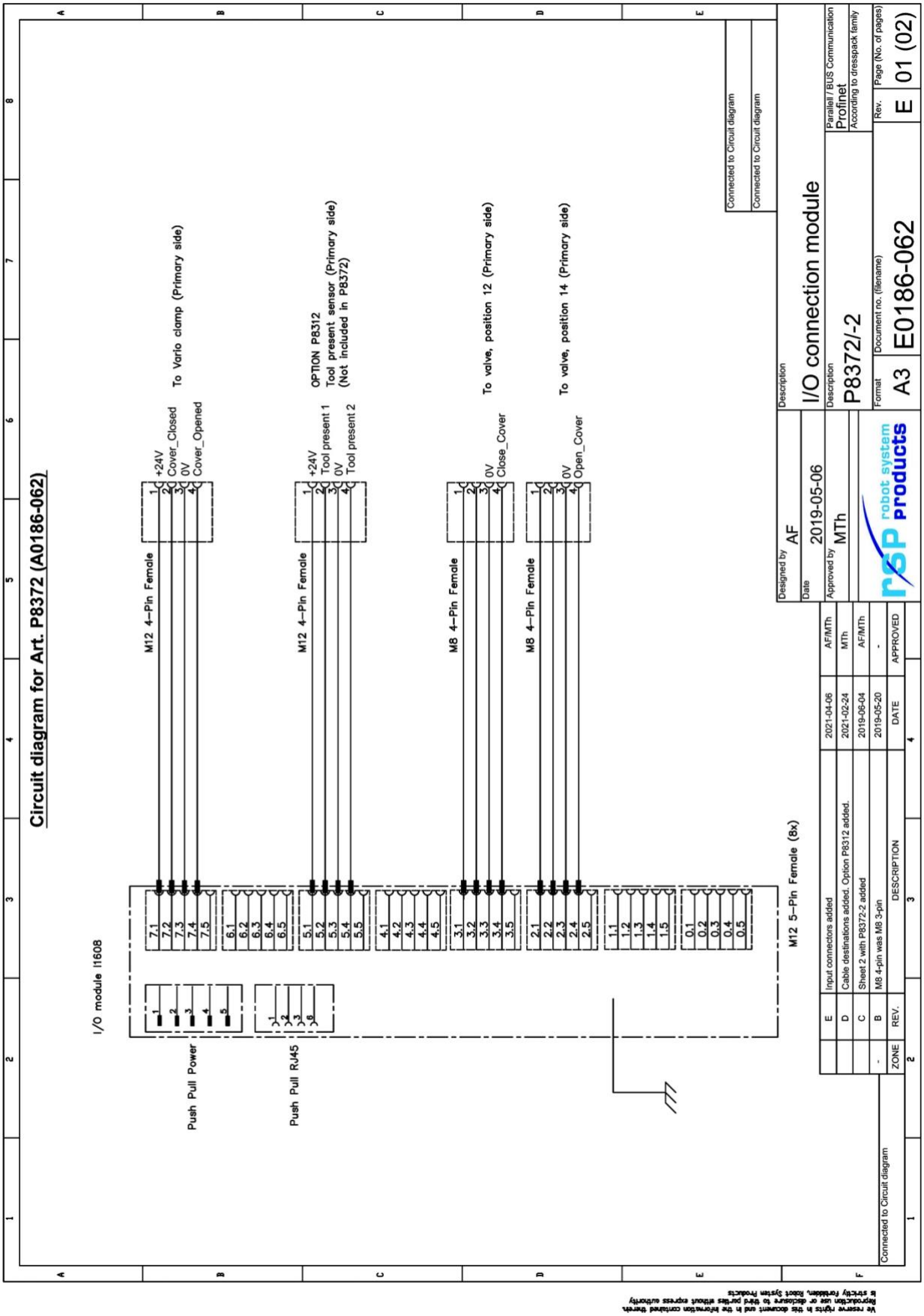
4.13 Circuit diagram E0186-075 for P8382



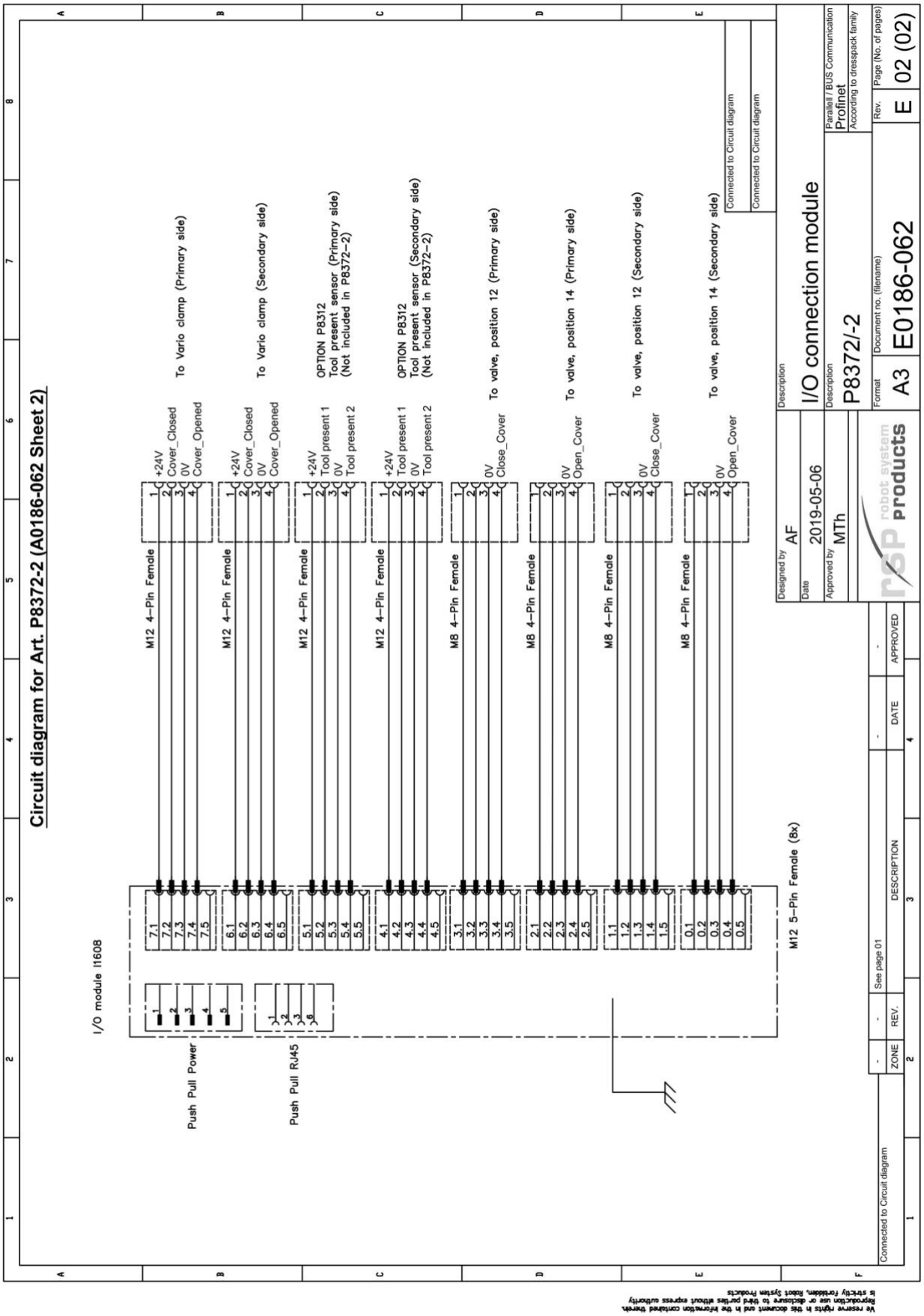
4.14 Circuit diagram E0186-040 for P8312



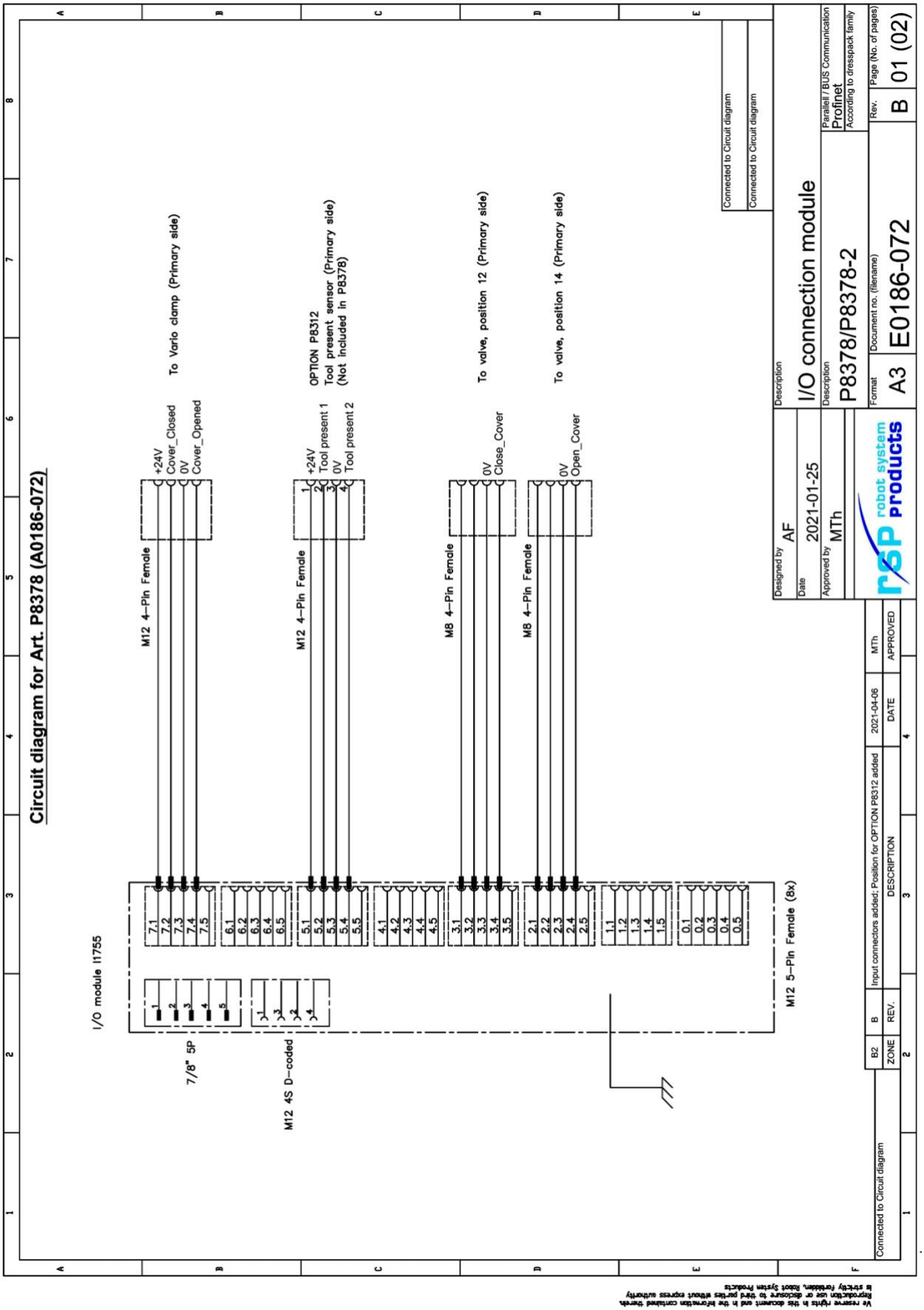
4.15 Circuit diagram E0186-062-1 for P8372



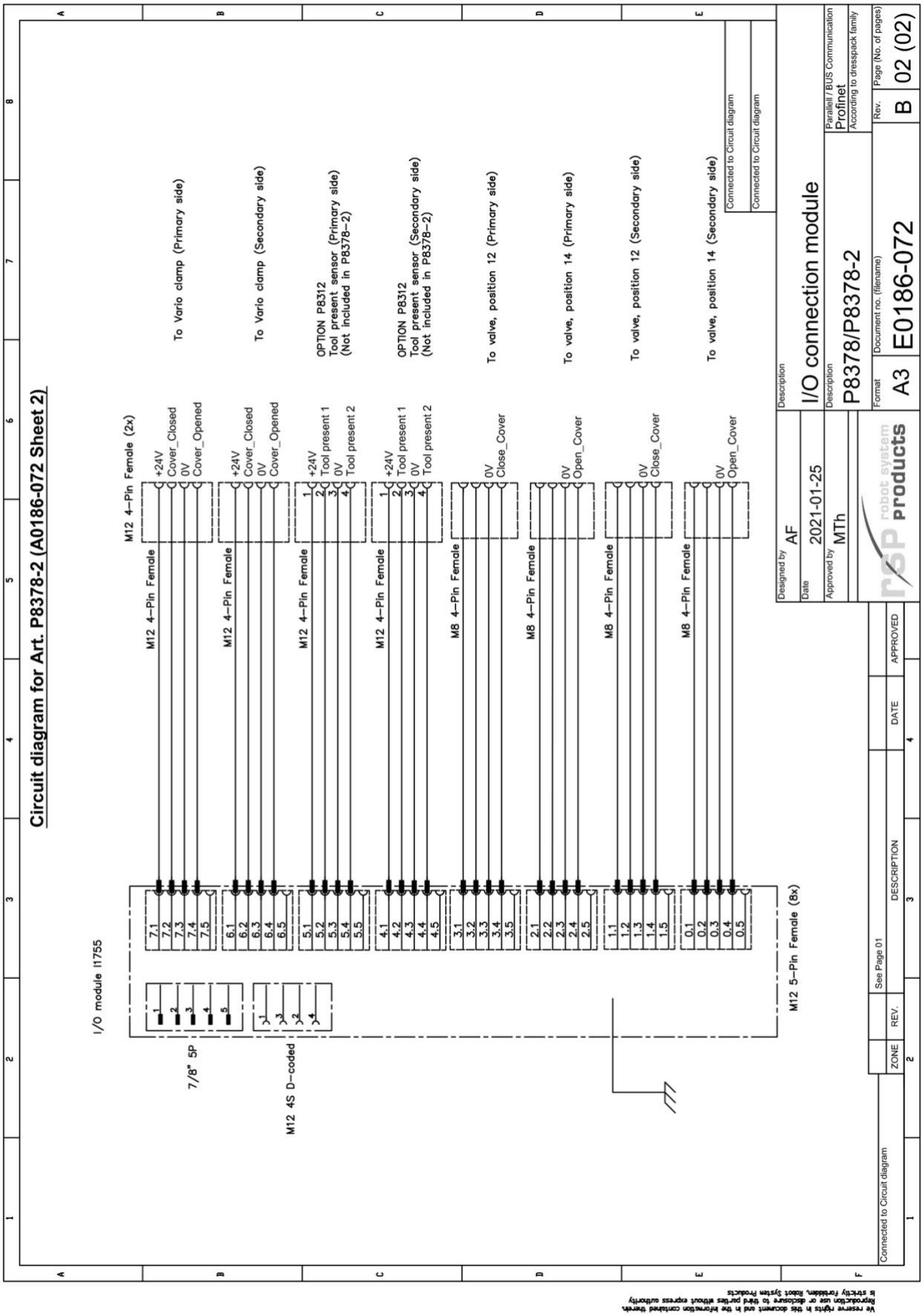
4.16 Circuit diagram E0186-062-2 for P8372-2



4.17 Circuit diagram E0186-072-1 for P8378



4.18 Circuit diagram E0186-072-2 for P8378-2



5 INSTALLATION

5.1 Tightening torques

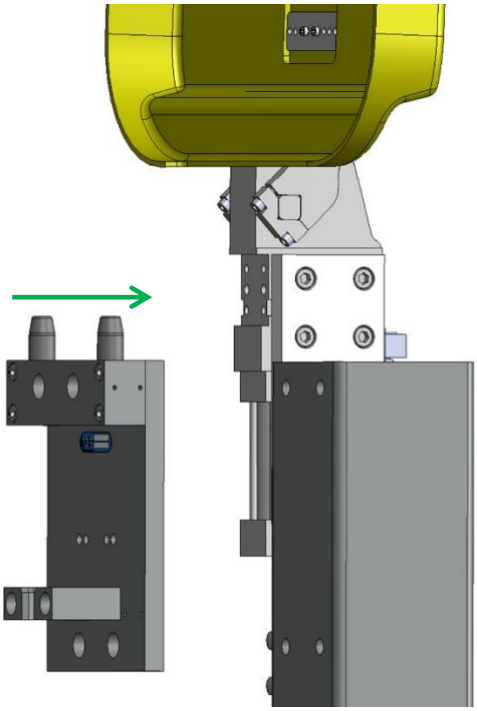
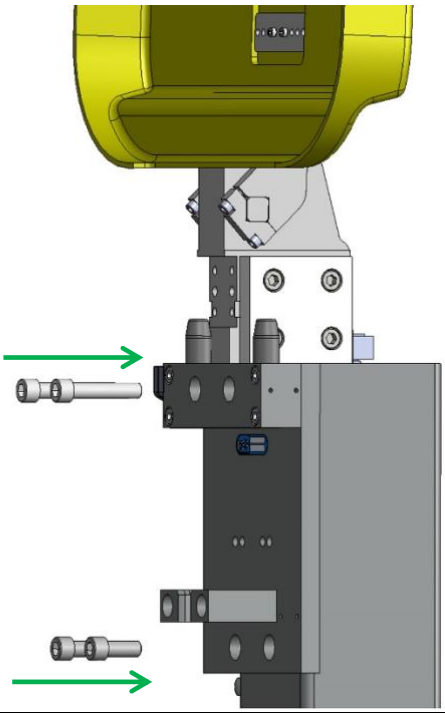
Tightening torques for mounting (screw class 8.8)

Dimension	Torque
M4	3 Nm
M5	6 Nm
M6	10 Nm
M8	24 Nm
M10	47 Nm
M12	82 Nm
M16	200 Nm

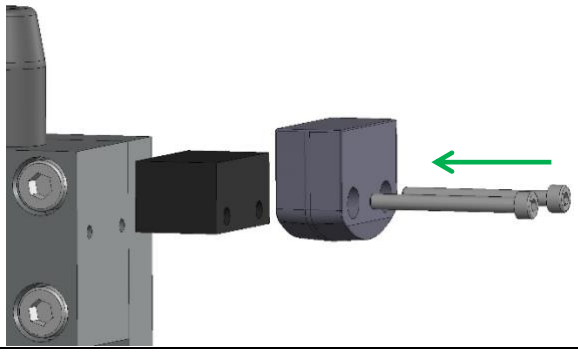
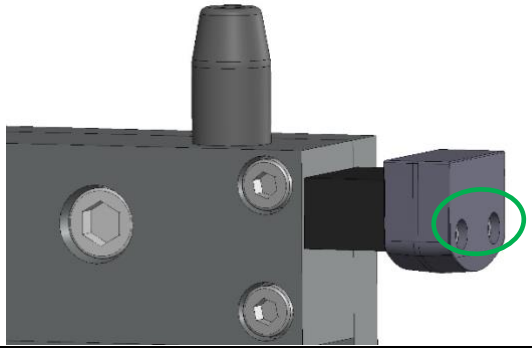
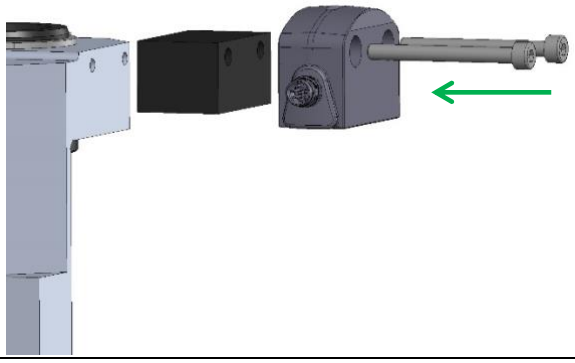
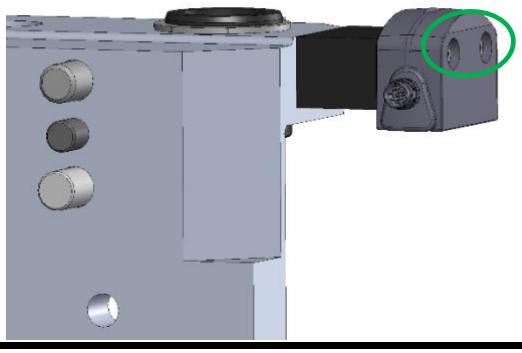
5.2 Recommended tools for installation

Tools	Applications
Complete set of Allen keys	For dismounting and mounting.
Torque wrench	For all socket head cap screws

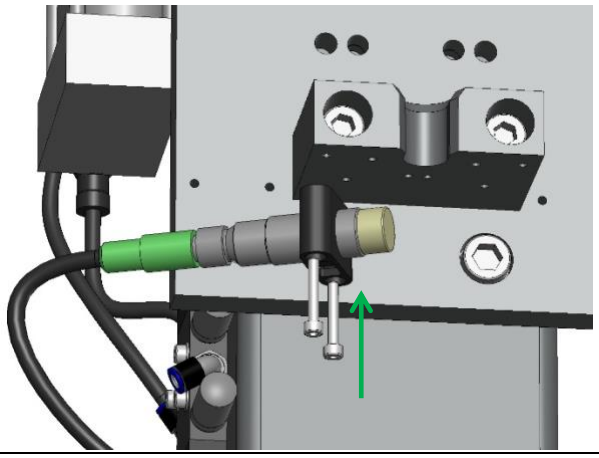
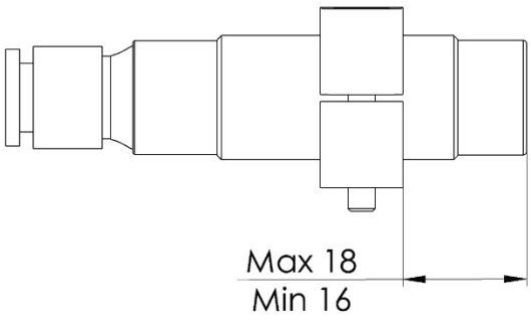
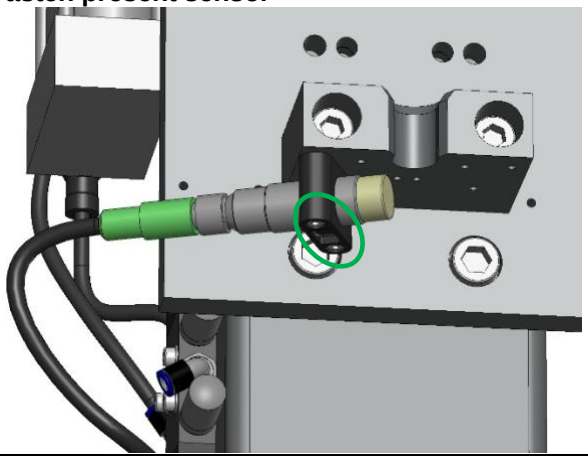
5.3 Installation of tool hanger on the tool stand column

	Action	Note
1	**Safety**	Read the safety section (1.1).
2	**Fit tool hanger** 	Lift and fit the tool hanger to the tool stand column. **WARNING!** The tool hanger is heavy and might cause personal injury and equipment damage if dropped.
3	**Mount tool hanger** 	Mount the tool hanger to the tool stand column using a torque wrench with two M12x60, two M12x30 screws and the corresponding washers and locking nuts. See tightening torques above.

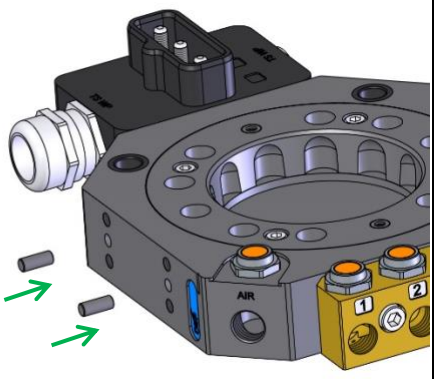
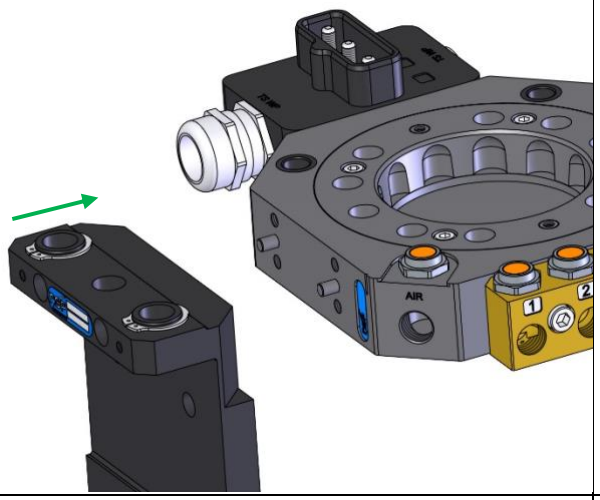
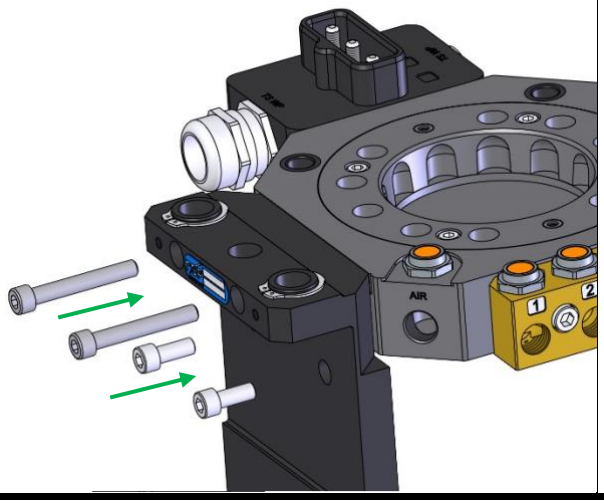
5.4 Mounting of tool in stand sensor with spacer

	Action	Note
1	**Safety**	Read the safety section (1.1).
2	**Fit spacer and sensor on tool hanger** 	Fit the spacer, the tool in stand sensor and the two M4X40 screws to the tool hanger. **WARNING!** The tool hanger is heavy and might cause personal injury and equipment damage if dropped.
3	**Mount spacer and sensor on tool hanger** 	Mount the spacer and the tool in stand sensor to the to the tool hanger with the two M4X40 screws using a torque wrench. See tightening torques above.
4	**Fit spacer and sensor on tool plate** 	Fit the spacer, the tool in stand sensor and the two M4X40 screws to the tool plate. **WARNING!** The tool plate is heavy and might cause personal injury and equipment damage if dropped.
5	**Mount spacer and sensor on tool plate** 	Mount the spacer and the tool in stand sensor to the to the tool plate with the two M4X40 screws using a torque wrench. See tightening torques above.

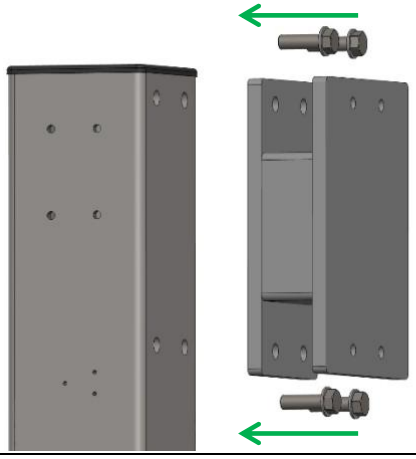
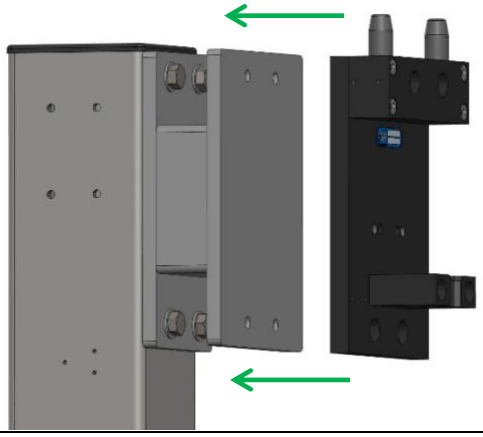
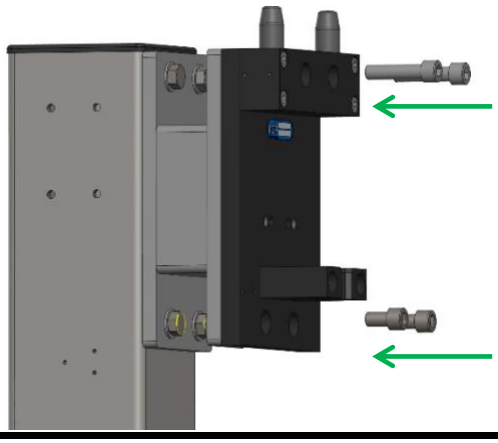
5.5 Mounting of tool present sensor

	Action	Note
1	**Safety**	Read the safety section (1.1).
2	**Fit tool present sensor** 	Fit the tool present sensor to the tool hanger and fasten the two enclosed M4x25 screws lightly.
3	**Adjust tool present sensor** 	Adjust the tool present sensor. It shall protrude between 16 and 18 mm from the sensor holder. **NOTE!** IF present sensor protrudes more than 18 mm from the sensor holder It might be damaged during docking.
4	**Fasten present sensor** 	Fasten the tool present sensor with the M4x25 screws.
5	**Connect present sensor**	Connect the tool present sensor according to circuit diagram E0186-040 (section 2.6.10).

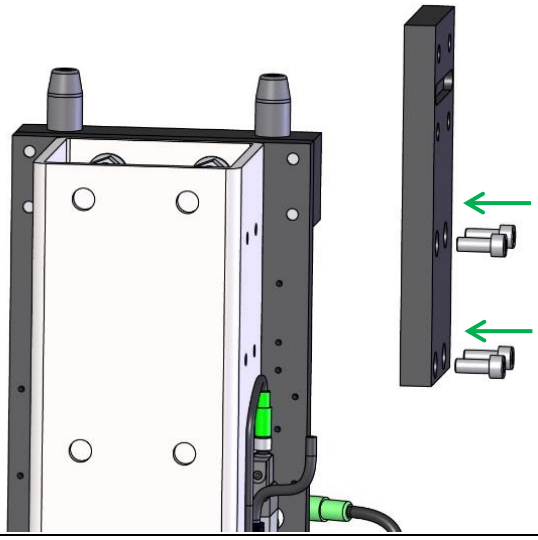
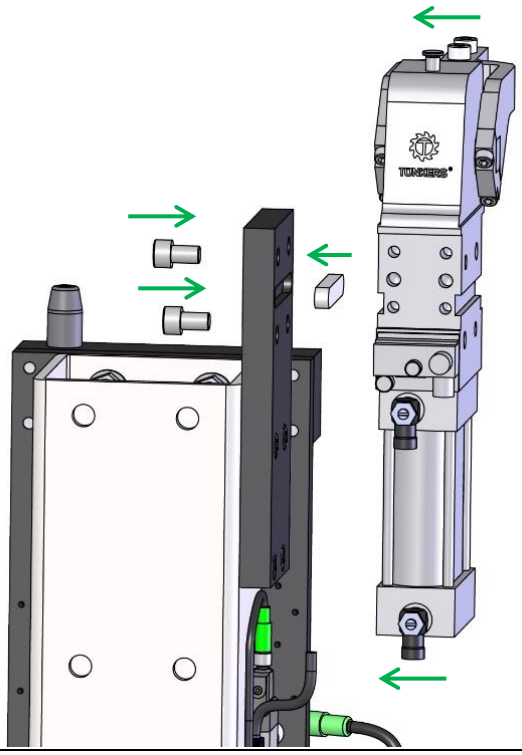
5.6 Mounting of tool plate on tool attachment

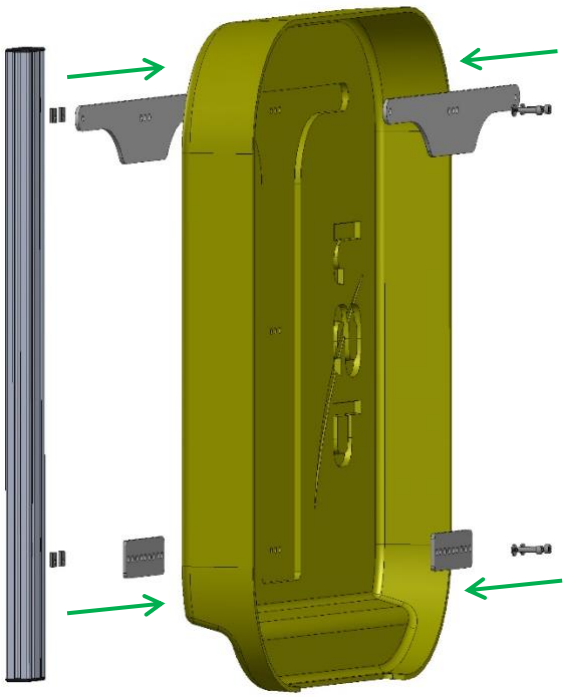
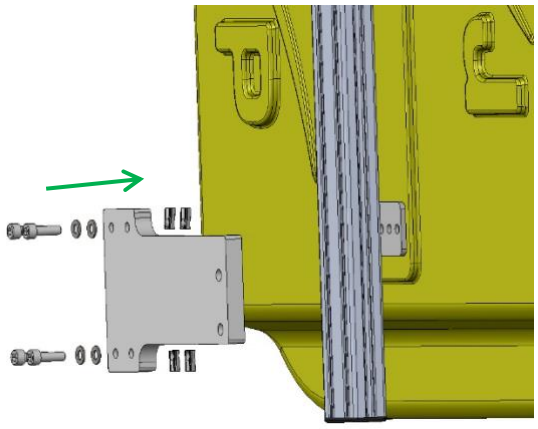
	Action	Note
1	**Safety**	Read the safety section (1.1).
2	**Mount guide pins** 	Press the enclosed guide pins into the tool attachment.
3	**Fit tool plate** 	Lift and fit the tool plate to tool attachment. **WARNING!** The tool plate is heavy and might cause personal injury and equipment damage if dropped.
4	**Mount tool plate** 	Mount the tool plate to the tool attachment with two M10x70 and two M10x25 screws using a torque wrench. See tightening torques above.

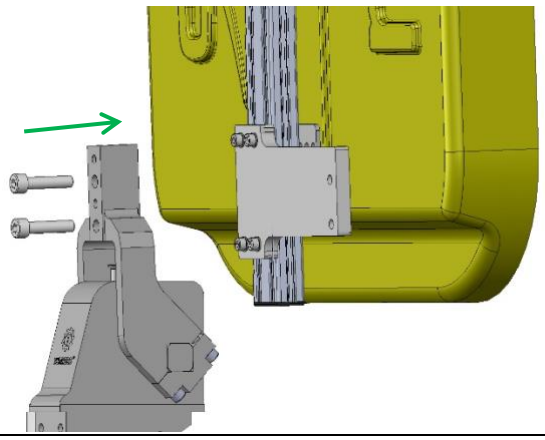
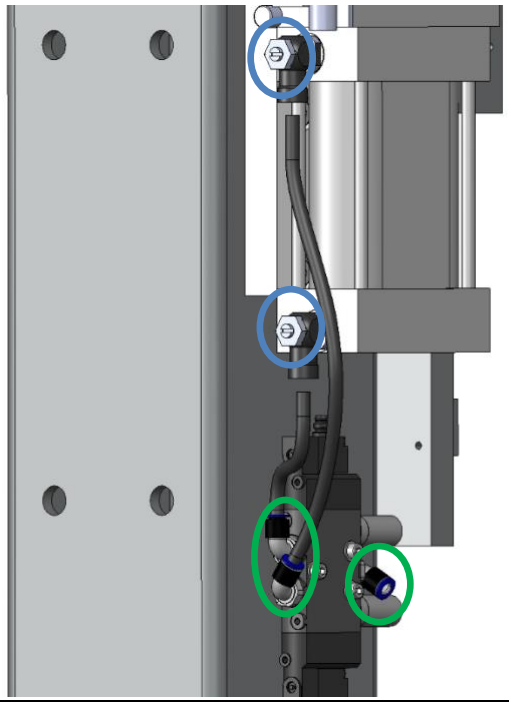
5.7 Mounting of tool hanger extension

	Action	Note
1	**Safety**	Read the safety section (1.1).
2	**Mount extension** 	Mount the tool hanger extension (P8371) with the enclosed four M12x40 screws and corresponding washers on the tool stand column. See tightening torques above. **WARNING!** The tool hanger extension is heavy and might cause personal injury and equipment damage if dropped.
3	**Fit tool hanger** 	Lift and fit the tool hanger to the tool hanger extension. **WARNING!** The tool hanger is heavy and might cause personal injury and equipment damage if dropped.
4	**Mount tool hanger** 	Mount the tool hanger on the tool hanger extension with the enclosed two M12x50 and two M12x20 screws using a torque wrench. See tightening torques above. **NOTE!** When tool hanger extensions P8371-13 and P8371-18 are used the aluminum profile P8313-05 should be exchanged for P8313-06.

5.8 Installation of dust cover with pneumatic tilting clamp

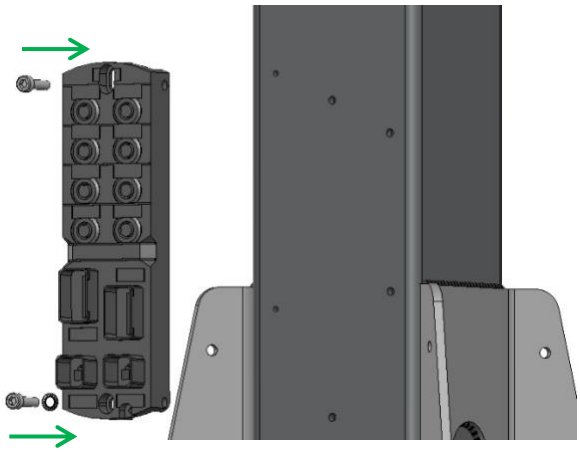
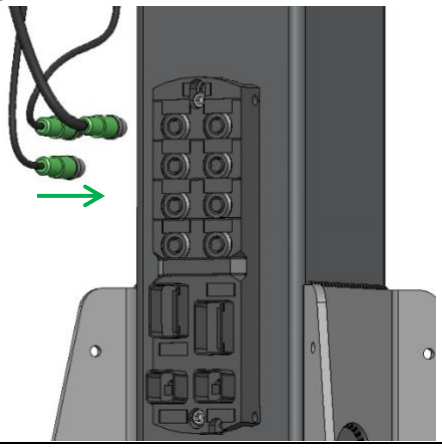
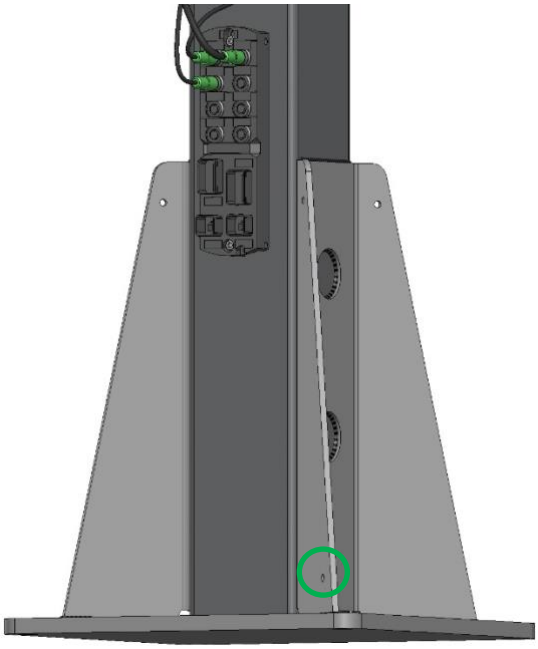
	Action	Note
1	**Safety**	Read the safety section (1.1).
2	**Mount tilting clamp bracket** 	Mount the tilting clamp bracket on the tool stand column with four M8-screws. See tightening torques above.
3	**Mount tilting clamp** 	Position the flat key in the slot and the tilting clamp on the bracket. Fasten with two M6-screws. See tightening torques above. **NOTE!** The flat key must be kept in correct position during mounting.

4	**Mount profile** 	Mount the four M4 screws, the dust cover, the two supports, the eight spacers and the four T-nuts. Remove the caps from the profile and enter the four T-nuts in respective grooves. Tighten with a torque wrench. Apply a small amount of threadlocker (Loctite 2400) in the screw holes before mounting. See tightening torques above. **NOTE!** The four T-nuts (M4) must be entered into the aluminum profile before fastening the screws.
5	**Mount profile** 	Fasten the dust cover supports with the dust cover using two M4 screws and the corresponding locking screws with a torque wrench. See tightening torques above.
6	**Mount dust cover bracket** 	Place the dust cover bracket in position and mount it to the aluminium profile using four M5-screws and the corresponding spacers and T-nuts with a torque wrench. Apply a small amount of threadlocker (Loctite 2400) in the screw holes before mounting. See tightening torques above.

7	**Mount dust cover** 	Place the dust cover in position and mount it to the tool hanger using two M8-screws. See tightening torques above.
8	**Connect air** 	Connect air to the pneumatic tilting clamp. **NOTE!** Adjust the opening and closing speed with the two flow control valves to ensure a smooth dust cover operation.
9	**Adjust tilting angle** **Tool parking system** / **Recommended tilting angle** Single (P8365) — 135° Double (P8366) — 90°	Adjust the tilting angles of the dust cover, see 3.9.1. The recommended tilting angle are stated in the table to the left. **WARNING!** The tilting angle of the dust cover for TPS double P8366 must not exceed 90° in order to avoid damage on the dust covers!
10	**Connect signals and sensors**	Connect signals and sensors according to selected connection module.

WARNING! Operation with incorrect or too high voltage can lead to short circuiting and danger to personnel.

5.9 Installation of connection module

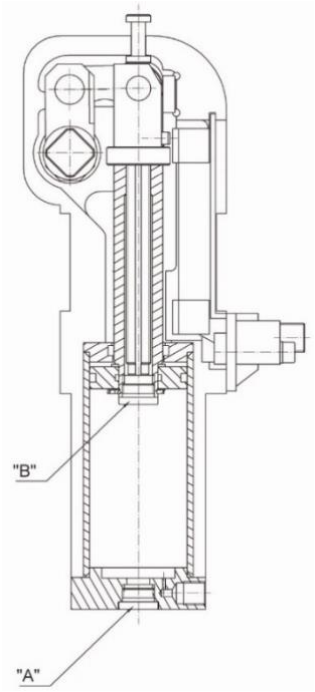
	Action	Note
1	**Safety**	Read the safety section (1.1).
2	**Mount connection module** 	Mount the connection module on the tool stand column with two M6 screws and the serrated washer. See tightening torques above. **NOTE!** The serrated washer must be in place in order to ensure that the connection module is in full contact with ground via the tool stand column.
3	**Connect signals** 	Connect the signal cables from the valve unit for the dust cover to respective contact according to respective circuit diagram (depending on option).
3	**Connect ground** 	**NOTE!** Two 9 mm holes are available, in the wings supporting the tool stand column, for ground connection. **NOTE!** The ground connection shall be mounted with a serrated washer, directly against the tool stand column, in order to ensure full contact with ground.

5.10 Hints

5.10.1 Changing tilting angle

The tilting angle of the dust cover mounted on the pneumatic tilting clamp is seamlessly adjustable within 10°–135° using the adjustment screw. The default tilting angle is 135°. Set up of maximum tilting angle is performed in the following way:

	Action	Note
1	**Air off!**	**WARNING!** Only perform work on the pneumatic tilting clamp when the air pressure is safely switched off.
2	**Open position**	Bring arm of the pneumatic tilting clamp to open position. Circuit diagram is found in section 2.4.6.
3	**Read angle**	Read the pre-adjusted angle at the scale.
4	**Release tilting clamp for adjustment**	Remove securing screw “A” in the cylinder bottom.
5	**Set new tilting angle**	Turn adjustment screw “B” with until desired angle has been reached, adjusting range 10°-135° (APH2 max 105), see scale at the housing.
6	**Lock tilting clamp for adjustment**	Remount securing screw “A” in the cylinder bottom.



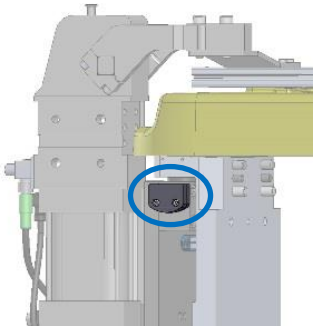
5.10.2 Safety

WARNING! The pneumatic tilting clamp is not designed as a complete tool ready for independent applications and has not been supplied with safety features. Only when correctly installed, as a part of a production system and with a corresponding safety control system added, all safety requirements will be met.

Should any faults occur that place personnel at risk, the pneumatic tilting clamp shall be switched off immediately. Maintenance measures shall only be undertaken when the machine is at a complete standstill and by qualified specialists. After maintenance has been carried out, protection devices shall be refitted in the correct way.

5.10.3 Use of tool-in-stand sensor

The passive tool-in-stand sensor (P8369) mounted on the tool parking system can, in combination with the active sensor (I1171) on the tool side, be used to check that the tool/tool attachment is present in the parking position before the tool changer is permitted to open.



NOTE! Tool-in-stand sensor P8369 should be used together with safety signal modules P7501-xxx.

6 MAINTENANCE AND SERVICE

The tool changer, tool attachment and tool stand must be maintained regularly to ensure proper function. The specified intervals are approximate and valid under normal conditions. Under extreme conditions, such as dirty environments or extreme robot movements, the intervals should be shortened.

Consider the table as a guide and update as your production experience of each system increases.

NOTE!
Only perform work on grippers or tools attached to the tool changer if the air pressure is safely switched off.

NOTE!
Equipment delivered by Robot System Products must only be dismantled and repaired by Robot System Products during the warranty period. Otherwise the warranty will not be valid.

6.1 Tools and required products

6.1.1 Recommended tools for maintenance

Tools	Applications
Complete set of Allen keys	For dismounting and mounting.
Torque wrench	For all socket head cap screws
Slide hammer	For dismounting guide pins
Plastic hammer	For mounting guide pins
Circlip plier	For dismounting and mounting circlips
Punch	For dismounting bushings

6.1.2 Required products

Product	Specification	Note
Grease	MolykoteBR2Plus	For guide pins and tool plate bushings
Glue	Loctite 638	For guide pins at tool plate
Threadlocker	Loctite 2400	For securing screws
Cleaning agent	Denatured alcohol or similar	For tool hanger and tool plate
Cloth	Lint free cloth	For cleaning.

NOTE! Chemical resistance protective gloves are recommended when using grease or cleaning agents such as industrial alcohol. Safety goggles are recommended when working with cleaning agents such as industrial alcohol. Adequate ventilation should be provided when chemical substances are used.

6.2 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:

- Tool hanger and tool plate guide pins
- Guide block
- Tool plate bushings

6.3 Inspection and cleaning

6.3.1 Visual inspection (monthly)

Visually check the following

Equipment	Description	Action
Guide pins on tool hanger and tool plate	Not worn, damaged or dirty.	Replace if worn or damaged. Clean when dirty.
Bushings on tool plate	Not worn, damaged or dirty.	Replace if worn or damaged. Clean when dirty.
Cables and connector	Not worn, damaged.	Replace if worn or damaged.
Tool stand column	Not damaged or dirty	Replace if damaged. Clean when dirty.
Tool hanger in general	Not damaged or dirty.	Replace if damaged, Clean when dirty.

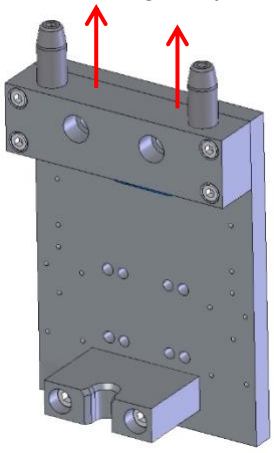
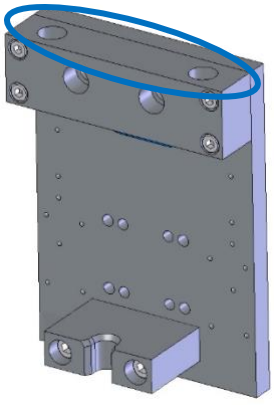
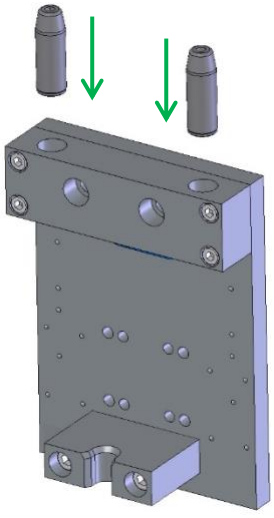
6.3.2 Cleaning (every third month)

Clean the following

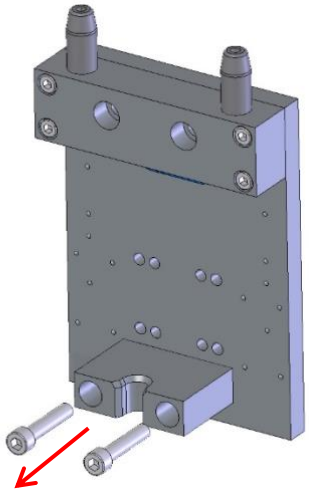
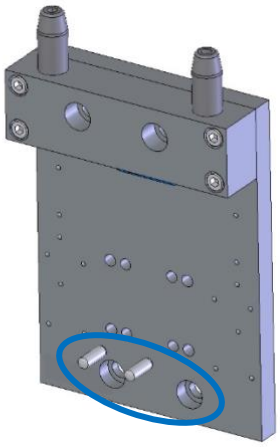
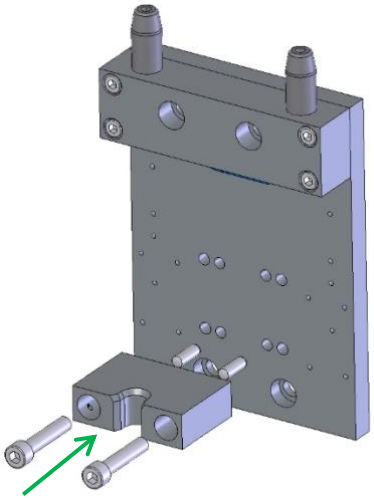
Equipment	Action
Guide pins on tool hanger and tool plate	Wipe clean with lint free cloth. Apply a small amount of grease (Molykote BR2Plus).
Bushings on tool plate	Wipe clean with lint free cloth. Apply a small amount of grease (Molykote BR2Plus).
Tool stand column	Wipe clean with lint free cloth.
Tool hanger in general	Wipe clean with lint free cloth.

6.4 Replacement of wear parts

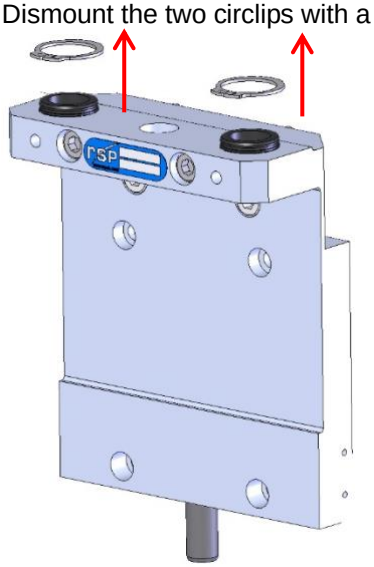
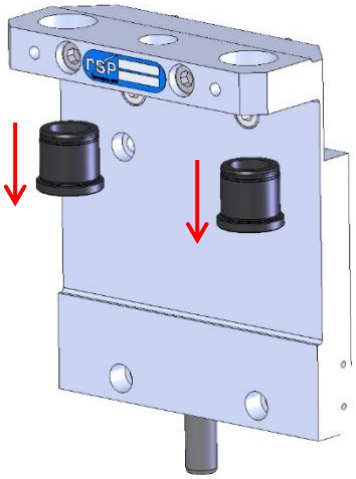
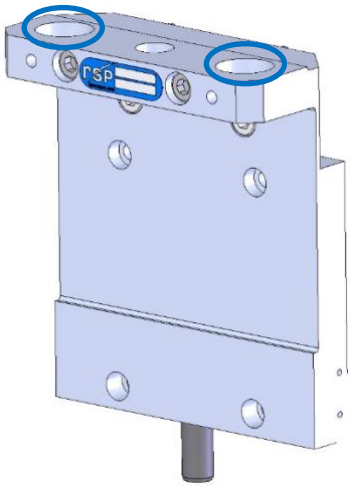
6.4.1 Replacement of tool hanger guide pins

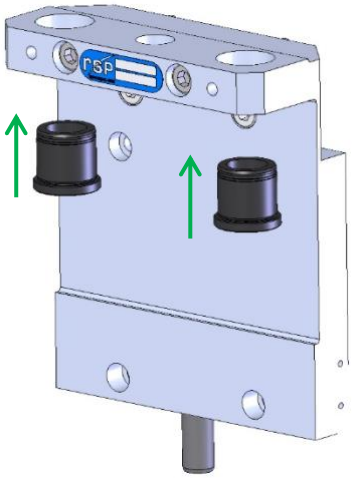
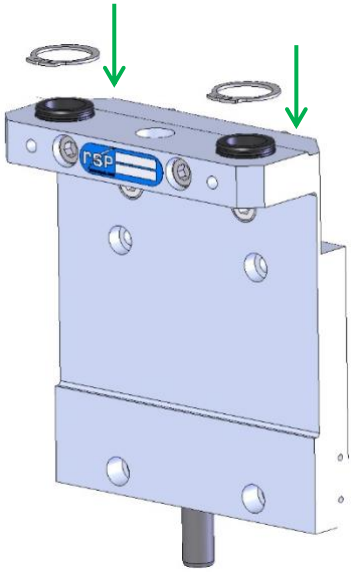
	Action	Note
1	Dismount guide pins	Remove the guide pins with a slide hammer. 
2	Cleaning	Wipe clean guide pin holes seat with a cloth. 
3	Lubricate	Apply a small amount of grease (Molykote BR2Plus) on guide pins and guide pin holes.
4	Mount guide pins	Fit the new guide pins in the holes and use a plastic hammer to mount the guide pins. 

6.4.2 Replacement of tool hanger guide block

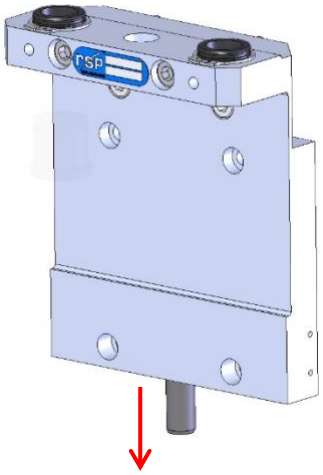
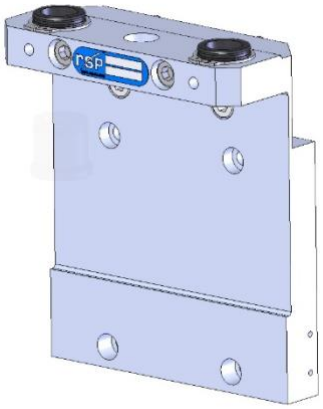
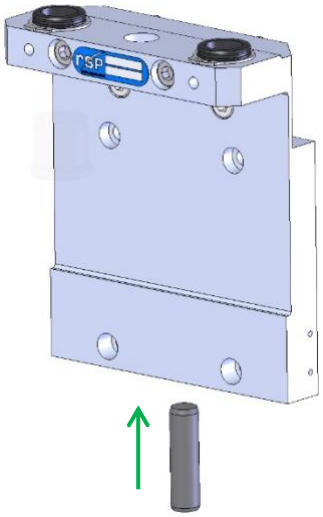
	Action	Note
1	Remove guide block	Remove the guide block by loosening the M10 screws. 
2	Cleaning	Wipe clean the guide block seat with a cloth. 
3	Attach new guide block	Attach a new guide block using M10-screws. See tightening torques above. 

6.4.3 Replacement of tool plate bushings

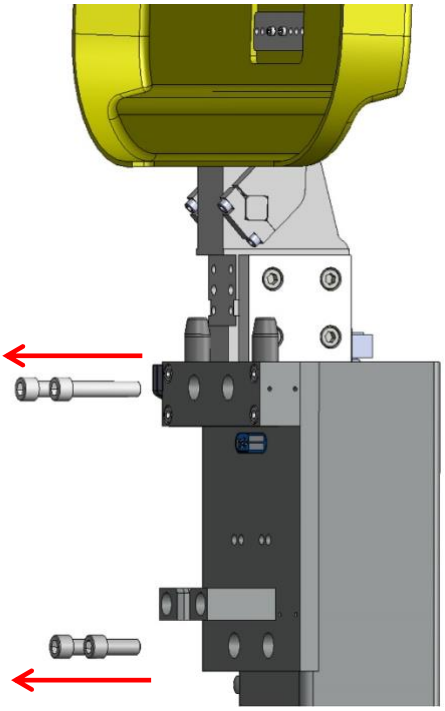
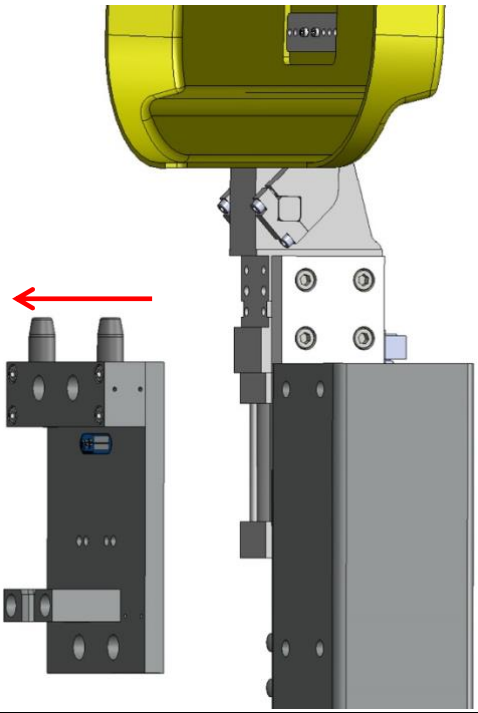
	Action	Note
1	Dismount circlips	Dismount the two circlips with a circlip plier. 
2	Dismount bushings	Dismount the bushings with a punch. 
3	Cleaning	Wipe clean the bushing holes with a cloth. 

4	Mount new bushings	Apply a small amount of grease (Molykote BR2Plus) in the bushing holes. Fit the new bushings in the holes. Insert the bushings. 
5	Mount locking rings	Mount the two circlips with a circlip plier. 

6.4.4 Replacement of tool plate guide pin

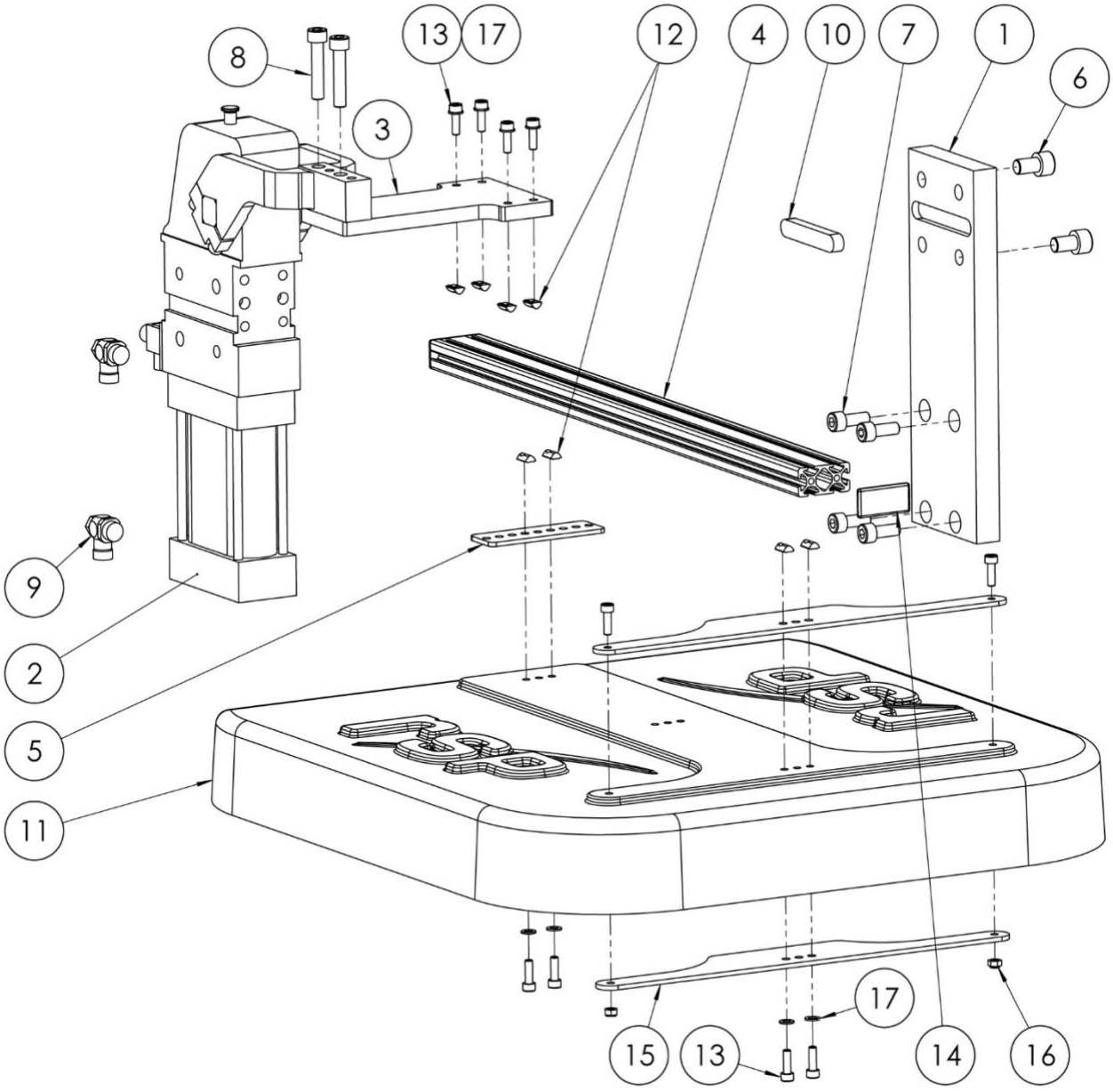
	Action	Note
1	**Dismount guide pin**	Dismount the guide pin with a slide hammer. 
2	**Cleaning**	Wipe clean the guide pin holes with a cloth. 
3	**Mount new guide pin**	Apply a small amount of glue (Loctite 638) in the guide pin hole. Fit the new guide pin in the hole and use a plastic hammer to mount the guide pin. 

6.4.5 Replacement of tool hanger

	Action	Note
1	**Safety**	Read the safety section (1.1).
2	**Dismount tool hanger** 	Dismount the tool hanger from the tool stand column using torque wrench for the two M12x60 and the two M12x30 screws. Disconnect sensor connector.
3	**Release tool hanger** 	Remove the tool hanger from the tool stand column. **WARNING!** The tool hanger is heavy and might cause personal injury and equipment damage if dropped.
4	**Mount new tool hanger**	See section 3.3 Installation of tool hanger on the tool stand column.

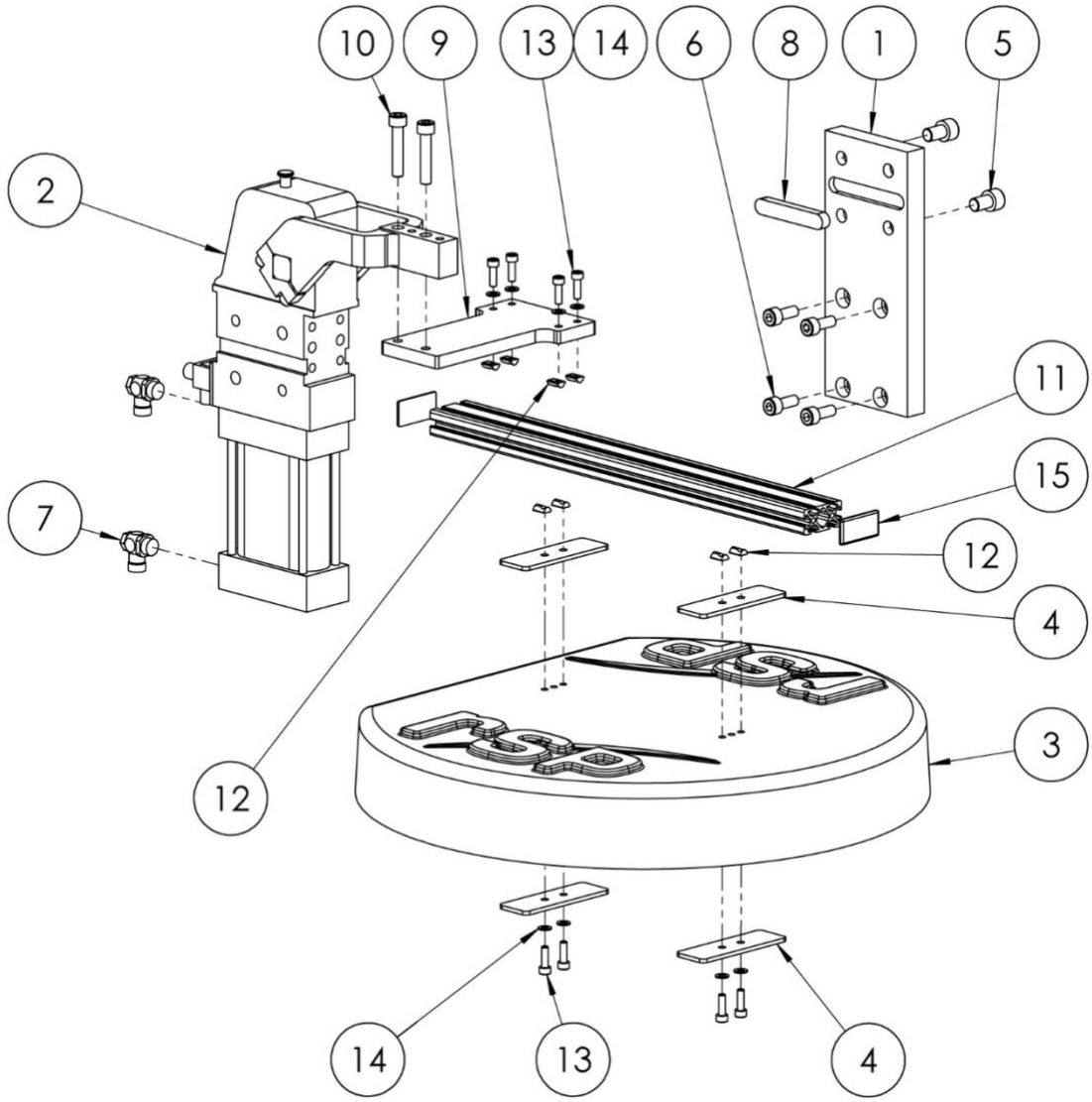
7 SPARE PARTS

7.1 Dust cover with pneumatic tilting clamp, P8327 and P8377



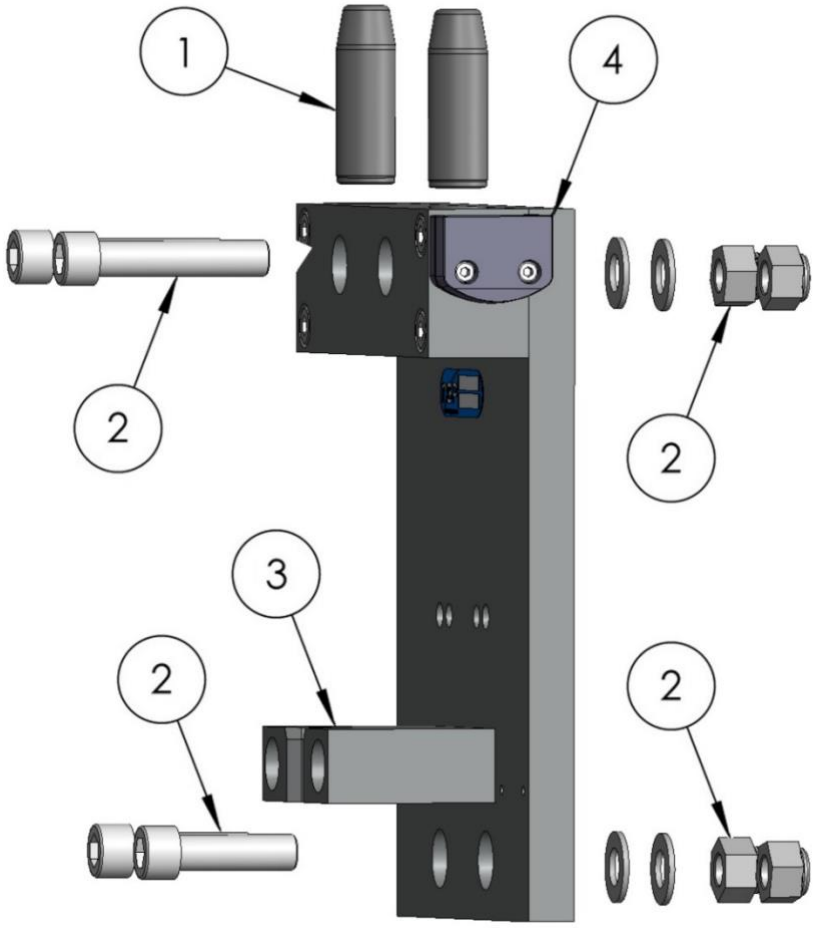
Item	Description	Part number	Wear parts	Pcs
1	Vario clamp bracket (P8327 only)	P0186-046		1
1	Vario clamp bracket (P8377 only)	P0186-075		1
2	Tilting clamp	I1085		1
3	Dust cover bracket	P0186-062		1
4	Aluminium Profile 20x40	P8313-05		1
5	Support washer	P0186-051		2
6	Screws, M10x16	21212519-489		2
7	Screws, M8x20	21212519-451		4
8	Screws M8x40	21212519-459		2
9	Tube fitting	I1315		2
10	Flat key	I1098		1
11	Dust cover, rectangular	P0186-050		1
12	T-slot nut M5	I1602		8
13	Screws, M5x16	21212519-329		10
14	Profile cap	I1593		2
15	Dust cover support	P0186-063		2
16	Locking nut	M6M M5		2
17	Spacer, 5.3x10x1	21512062-146		8

7.2 Dust cover with pneumatic tilting clamp, P8379



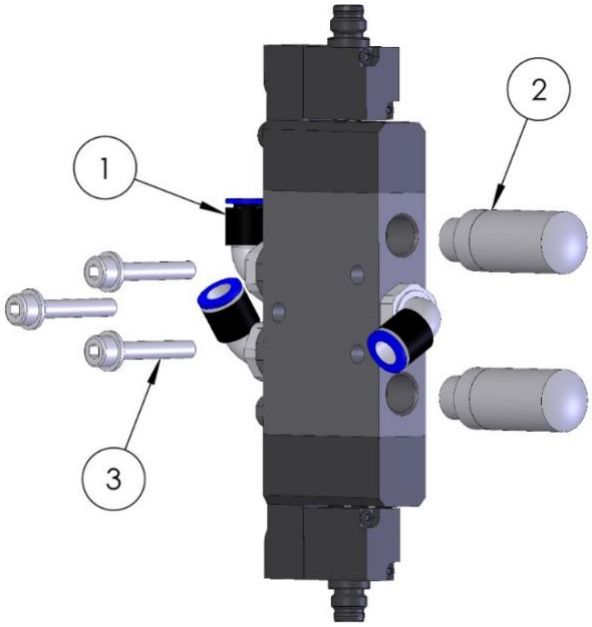
Item	Description	Part number	Wear parts	Pcs
1	Vario clamp bracket	P0186-046		1
2	Tilting clamp	I1085		1
3	Dust cover	P0186-032		1
4	Support washer	P0186-051		4
5	Screws, M10x16	21212519-489		2
6	Screws, M8x20	21212519-451		4
7	Tube fitting	I1315		2
8	Flat key	I1098		1
9	Dust cover bracket	P0186-062		1
10	Screws M8x40	21212519-459		2
11	Aluminium Profile 20x40	P8313-04		1
12	T-slot nut M5	I1602		8
13	Screws, M5x16	21212519-329		8
14	Spacer, 5.3x10x1	21512062-146		8
15	Profile cap	I1593		2

7.3 Tool hangers P8302, including mounting kit and sensor



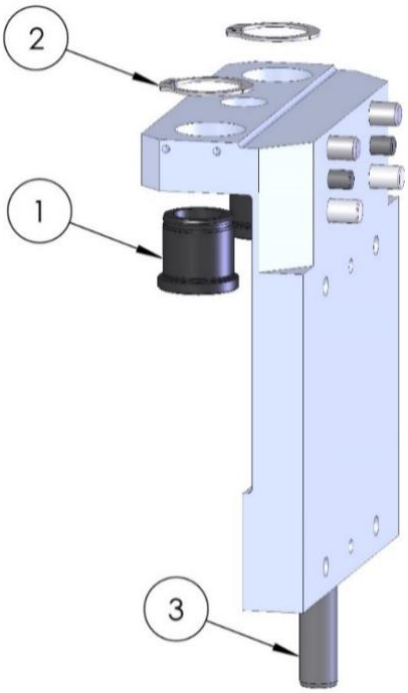
Item	Description	Part number	Wear parts	Pcs
1	Guide pin	P0186-027	X	2
2	Mounting kit	P8370		1
3	Guide block	P0186-003		1
3	Guide block screw, M10x50	MC6S 10x50		2
4	Tool-in-stand sensor, passive	P8369		1

7.4 Valve unit for dust cover P8308A



Item	Description	Part number	Wear parts	Pcs
1	Tube fitting	I0904		3
2	Silencer	I0903		2
3	Screw and washer	MC6S 4x20, washer 4,3x9x0,8		3

7.5 Tool plates P8303A and P8303-1



Item	Description	Part number	Wear parts	Pcs
1	Bushings	P0186-045	X	2
2	Retaining clip	I1002		2
3	Guide pin	CPIG 16x80 m6	X	1

8 DISPOSAL AND RECYCLING

Taking care of spent equipment

Used equipment must be taken care of in an environmentally friendly way.

When disposed of, a major share of the material, or its energy content, can be recycled. The quantities possible to recycle vary depending on technical resources and practises in respective country. Non-recyclable components shall be handed over to an authorized environmental waste treatment facility for destruction or disposal.

Electronics

Electronic equipment shall be sent to an authorized recycling company or sorted into different component materials and treated as such.

Metals

Metals can, in general, be melted down, recycled and used in new products. They shall be sorted according to type and surface coating and handed over to an authorized recycling facility.

Metal components of steel and aluminium are substantial in size and easy to identify. Copper is primarily used in transmission of power for spot welding. Silver or gold plating of contact surfaces may occur.

Plastics

Thermoplastics can, in general, be re-heated an recycled without any major loss of quality. They shall be handed over to an authorized recycling facility. POM occurs in swivel housings, etc. PTFE in some sealings.

Rubber

Rubber shall be handed over to an authorized environmental waste treatment facility either for recycling, disposal or destruction. Rubber occurs in O-rings.

Other material

All other material shall be sorted and handed to an authorized environmental waste treatment facility in accordance with national legislation.