

Technical Manual

CoboShift automatic starter kit ATC18

M0124-1 ABB GoFa

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



COBOSHIFT™
BY ROBOT SYSTEM PRODUCTS

rsp robot system
products

The information in this document is subject to change without prior notice and should not be regarded as an undertaking from Robot System Products AB. Robot System Products AB assumes no responsibility for errors that may occur in this document.

Robot System Products AB bears no responsibility for damage that is incurred by the use of this document, or the software or hardware described in this document.

The document, or parts of it, may not be reproduced or copied without prior permission from Robot System Products AB. It may neither be imparted to a third party, nor otherwise be used without authorization. Infringement hereof will be subject to action in accordance with the applicable laws.

Further copies of this document can be obtained from Robot System Products AB at current prices.

© Robot System Products AB

Robot Systems Products AB
Kokillgatan 9
SE-721 33 Västerås
Sweden

CONTENTS

1 INTRODUCTION	5
1.1 RSP tool changers	5
1.2 For ABB GoFa.....	5
1.3 Coordinate system definition	6
1.4 Limitations	6
1.4 Safety	7
1.4.1 Explanation of Warnings	7
1.4.2 General.....	7
2. COBOSHIFT STARTER KIT SPECIFICATIONS.....	8
2.1 Wear parts.....	8
3 INSTALLATION AND OPERATIONS.....	9
3.1 Recommended equipment	9
3.2 Required products	9
3.3 Installation of Coboshift ATC18 tool changers on robot	10
3.4 Mounting of Axis 6 bracket for NW23 hoses on tool changer.....	11
3.5 Mounting of signal modules on tool changer.....	13
3.6 Mounting of signal modules on tool attachment.....	14
3.7 Installation of tool on tool attachment	15
3.8 Mounting of tool stand bracket on tool attachment.....	16
3.9 Pick-Up tool attachment from tool stand	17
3.10 Drop-Off of tool attachment in tool stand	18
4 TECHNICAL SPECIFICATIONS.....	19
4.1 CoboShift tool changer, ATC18-4. Article: P1181	19
4.1.1 Pneumatic diagram for CoboShift tool changer ATC18/ATA18	20
4.2 CoboShift tool attachment, ATA18-4. Article: P1182	21
4.3 CoboShift power and signal module, 7 signals, robot side. Article: P1193	22
4.3.1 Circuit diagram E0185-103 for P1193.....	23
4.4 CoboShift power and signal module, 7 signals, tool side. Article: P1194	24
4.4.1 Circuit diagram E0185-102 for P1194.....	25
4.5 Hose package CRB15000 GoFa 10kg. Article: P2613.....	26
4.6 Tool stand start kit for CoboShift ATA18-4. Article: P1196-400.....	27
4.7 Axis 6 bracket for NW23 hoses. Article: P1186.....	28
5 SPARE PARTS	29
5.1 Part list for CoboShift tool changer P1181	29
5.2 Part list for CoboShift signal module P1193.....	30

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' product lines are available for all major robot brands and come with complete documentation. 3D-models for simulation are available for download at: robotsystemproducts.com.

1.1 RSP tool changers

The Robot System Products' tool changers enable robots to handle and switch between multiple tools. They are built to ensure reliable and smooth operation, being compact with low weight and robust design and incorporating many safety features. Depending on model and options, electrical signals, weld and servo power, data, water and compressed air are transferred from the robot side to the tool.

The patented locking device TrueConnect™ has a minimum of play and gives a practically, through the lifespan, absolute positioning repeatability. The principle behind the locking mechanism is 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 For ABB GoFa

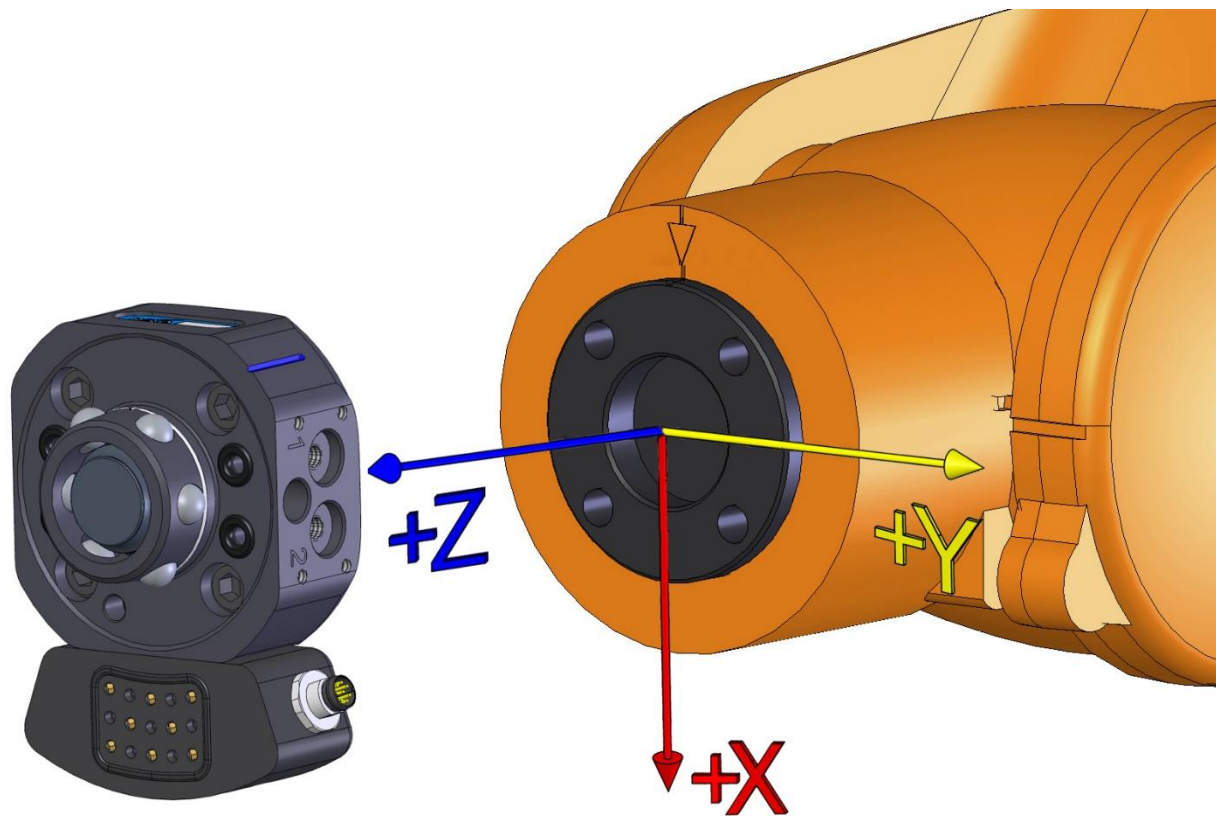
Presented in this document is the Robot System Products CoboShift tool changer ATC18-4 starter kit P1207, including tool attachments, dedicated for the collaborative robot ABB GoFa 5, 10 and 12.

The tool changer ATC18-4 transfers compressed air to the tool and cannot transport fluids. ATC18 can be equipped for transfer of electric and power signals, via spring loaded signal pins, power pins and sockets, to the tool attachment.

This *Technical Manual* contains product information and data, drawings, circuit and pneumatic diagrams and lists of spare parts on the RSP CoboShift tool changer P1207 ATC18-4, including corresponding tool attachments. In addition, this document describes procedures for mounting, installation and replacement of equipment together with descriptions.

1.3 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 CoboShift tool changers with or without tool attachment, the origin of the co-ordinate system is situated in the centre of the robot mounting flange.

1.4 Limitations

There may be some limitations on the movement of axis 5 for some robot models. Contact Robot System Products for more information.

1.4 Safety

1.4.1 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.

1.4.2 General

The integrator installing the tool changer into the system must follow the safety demands stated in standards and provisions applicable in the country where the tool changer system is to be installed. The products are all prepared for CE-certification.

The user of the Robot System Products' tool changer is responsible that law and directives applicable in respective countries, with regards to safety, are followed. 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 tools attached to the tool changer if the air pressure is safely switched off.



WARNING!

Be aware that tool changer and tool attachment may cause personal injury and equipment damage if dropped.



NOTE!

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

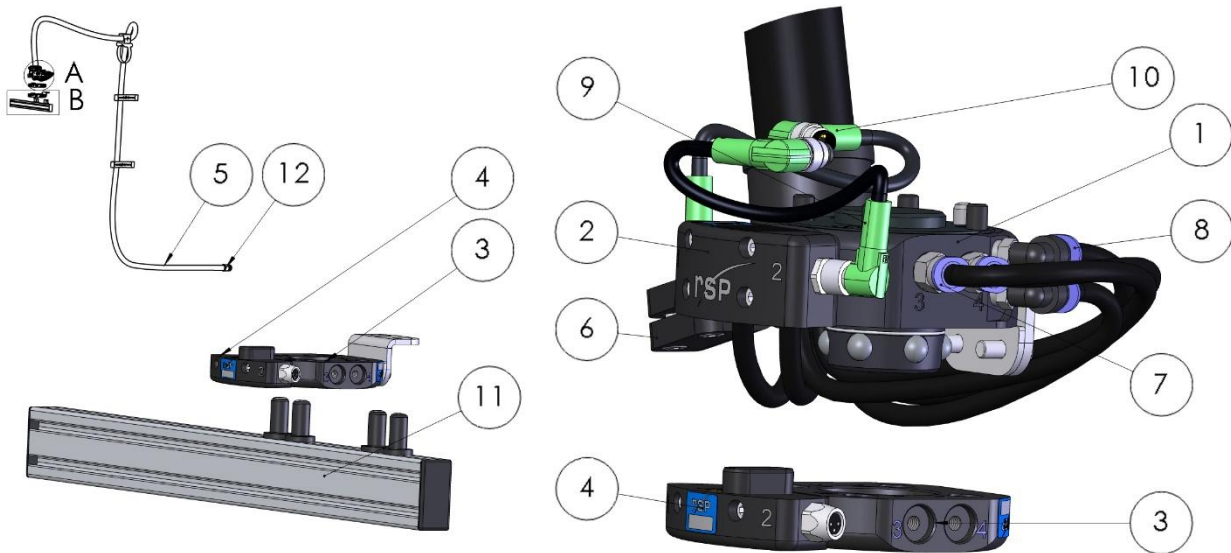


WARNING!

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

2. COBOSHIFT STARTER KIT SPECIFICATIONS

A CoboShift starter kit P1207 includes all components for implementing CoboShift tool changers on ABB GoFa cobots. Included are tool changer, tool attachments, signal modules, tool stand, brackets, cabling, hoses, fittings as well as screws and nuts needed. It is delivered ready for mounting on the cobot. A CoboShift starter kit P1207, designed for ABB GoFa consists of the following components:



Item	Description	Article	Number	Section
1	Tool Changer, ATC18-4	P1181	1	4.1
2	Power and signal module, 7 signals, robot side	P1193	1	4.3
3	Tool Attachment, ATA18-4	P1182	2	4.2
4	Power and signal module, 7 signals, tool side.	P1194	2	4.4
5	Hose package CRB15000 GoFa 10kg	P2613	1	4.5
6	Axis 6 bracket for NW23 hoses	P1186	1	4.7
7	Push-in fittings, M5, straight (TC-side)	I1757	4	4.1
8	Push-in fittings, M5, angled (TA-side)	3HXG1113-3	2	4.3
9	Signal cable, M8 3S–M8 3P	P8612	1	4.3
10	Signal cable, M8 4P–M8 4S	P8613	1	4.3
11	Tool stand start kit	P1196-400	1	4.6
12	Hose clamp NW23	P8219	1	4.5

2.1 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

3 INSTALLATION AND OPERATIONS

3.1 Recommended equipment

Equipment recommended for installation and maintenance work

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

3.2 Required products

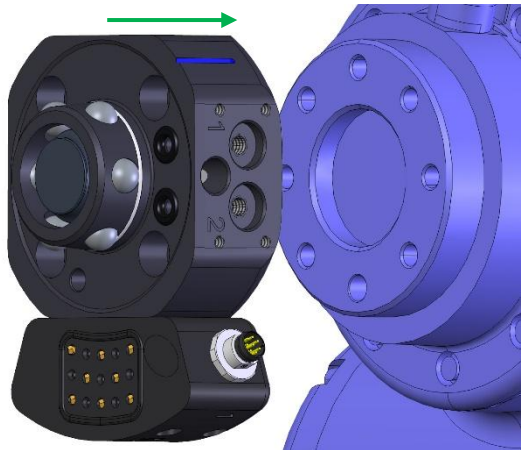
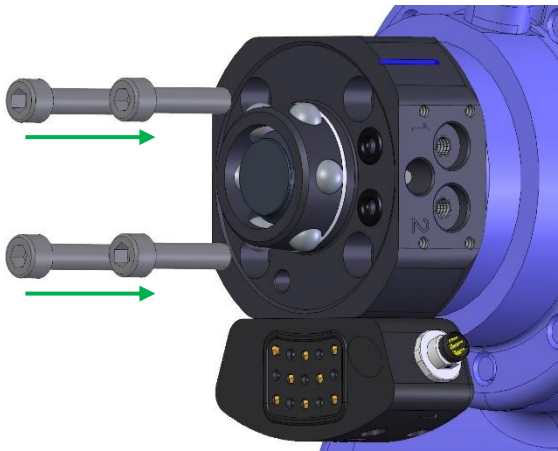
Product	Specification	Note
Grease I1934	Renolit HLT2	For air sealings and locking balls.
Cleaning agent	Industrial alcohol or similar	For cleaning of tool changer and tool attachment.
Glue	Loctite 480 (or similar)	For gluing the air sealings.
Cloth	Lint free cloth	For cleaning.



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.

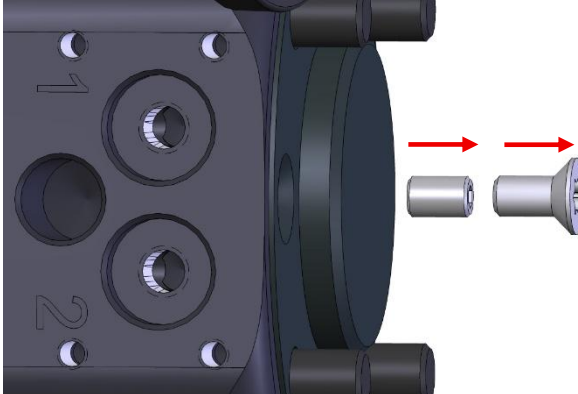
3.3 Installation of Coboshift ATC18 tool changers on robot



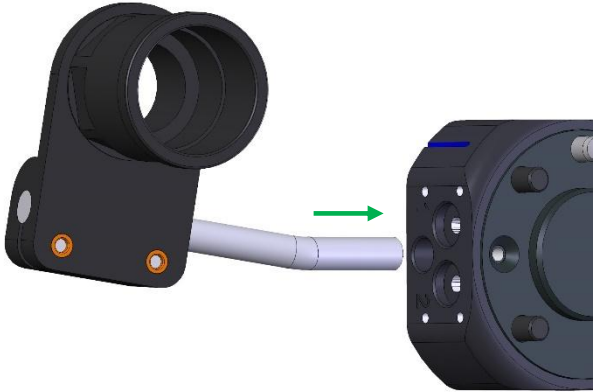
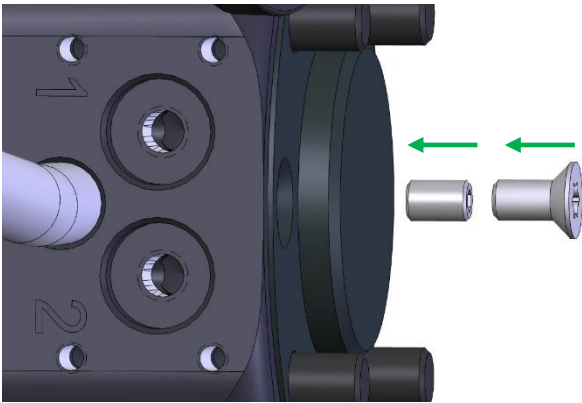
	Action	Note
1	Safety	Read the safety section 1.4.
2	Service position	Place the robot in service position.
3	Power off	Switch the power off and lock the circuit breaker NOTE! Read the safety chapter for the robot.
4	Fit tool changer 	Lift the tool changer to the robot flange. Make sure that the guide pin of the tool changer is fitted to the guide hole in the robot flange. WARNING! The tool changer may cause personal injury and equipment damage if dropped.
5	Mount tool changer 	Mount the tool changer with the four enclosed M6 screws using a torque wrench (tightening torque 10 Nm).

6	Connect air hoses 	Connect the air hoses to the tool changer according to markings. Pneumatic diagram is found in section 4.1.1.
7	Connect electrical signals 	Connect electrical contacts in accordance with circuit diagram, section 4.3.1.
8	Power on	Unlock the circuit breaker and switch the power on.

3.4 Mounting of Axis 6 bracket for NW23 hoses on tool changer

	Action	Note
1	Remove locking screws 	Unscrew and remove the MFT 4X8 locking screw, attached to the tool changer, using a Torx key. Unscrew the M4x5 stop screw using an Allen key.



2	Fit Axis 6 bracket 	Fit Axis 6 bracket, push it into the tool changer and adjust into preferred position.
3	Lock and secure Axis 6 bracket 	Lock the Axis 6 bracket with the M4x5 stop screw using an Allen key. Secure with the MFT 4X8 screw using a Torx key (tightening torque 3 Nm). NOTE! Adjust the rotation of the Axis 6 bracket to preferred position before locking with the M4x5 stop screw.
4	Mount NW23 hose 	Mount an NW23 hose by pushing it fully into the hose clamp of the Axis 6 bracket.

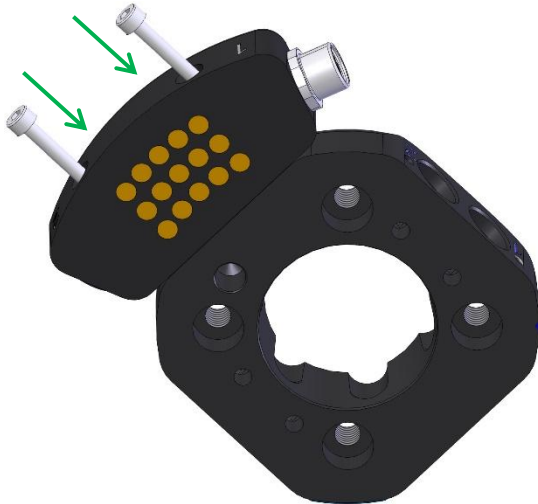
3.5 Mounting of signal modules on tool changer



NOTE! Signal modules are normally mounted on the tool changer before the tool changer is mounted on the robot.

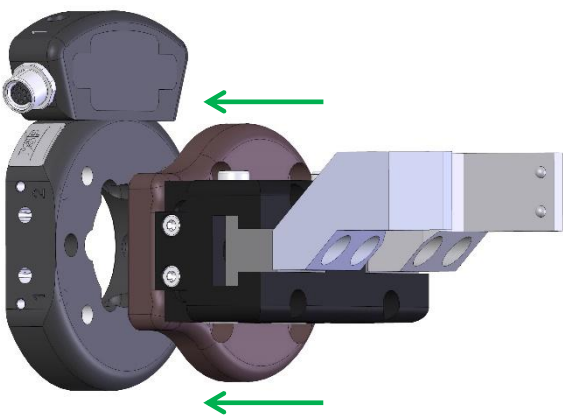
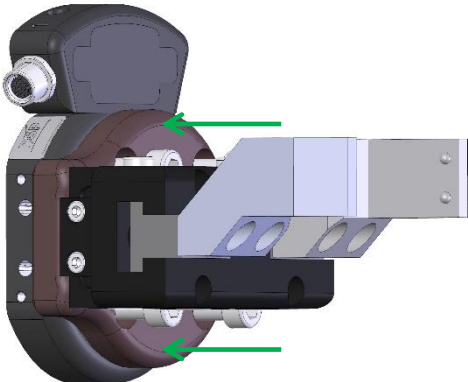
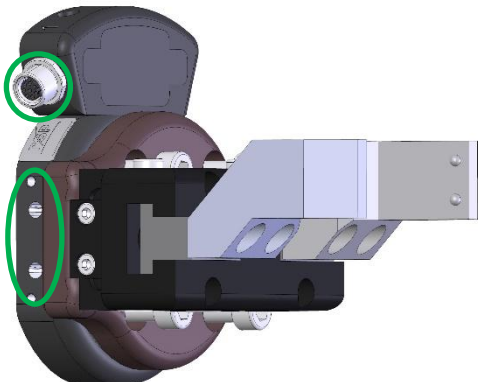
	Action	Note
1	Fit signal module 	Fit signal module to the tool changer.
2	Mount signal module 	Mount the signal module with the four enclosed M3X25 screws using a torque wrench (tightening torque 1.2 Nm).
3	Connect signals 	Connect electrical contacts in accordance with selected option. Circuit diagram is found in section 4.3.1.

3.6 Mounting of signal modules on tool attachment

	Action	Note
1	Fit signal module 	Fit signal module to the tool attachment.
2	Mount signal module 	Mount the signal module with the two enclosed M3x25 screws using a torque wrench (tightening torque 1.2 Nm).
3	Connect signals 	Connect electrical contacts in accordance with selected option. Circuit diagram is found in section 4.4.1.

3.7 Installation of tool on tool attachment

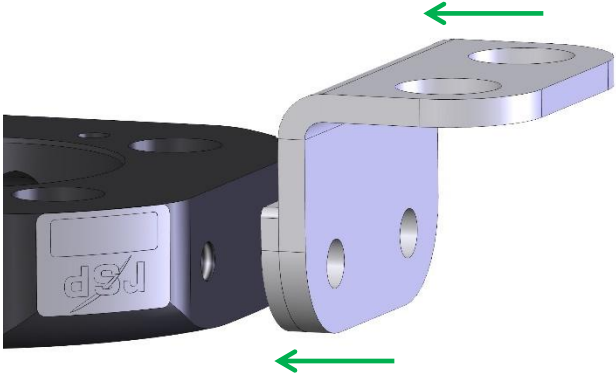
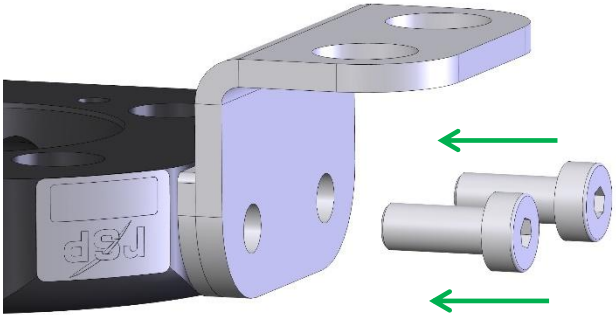
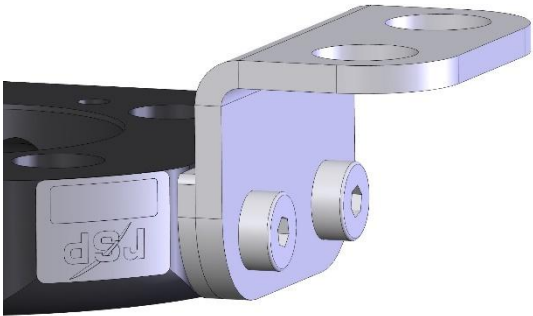


	Action	Note
1	Fit tool 	Fit tool and tool attachment to each other. WARNING! The tool attachment and tool may cause personal injury and equipment damage if dropped.
2	Mount tool 	Mount the tool to the tool attachment with M6 screws using a torque wrench (tightening torque 10 Nm), alternatively mount the tool attachment to the tool with M5 screws using a torque wrench (tightening torque 6 Nm).
3	Connect electrical contacts and air hoses 	Connect electrical contacts and air hoses to the tool attachment. NOTE! For circuit diagrams see sections 4.3.1. and 4.4.1. and for pneumatic diagrams see section 4.1.1.



3.8 Mounting of tool stand bracket on tool attachment



	Action	Note
1	Fit bracket 	Fit the tool stand bracket and tool attachment to each other. WARNING! The tool stand bracket and tool attachment may cause personal injury and equipment damage if dropped.
2	Fasten bracket 	Fasten the tool stand bracket to the tool attachment with the two low socket head M5x12 fastening screws using a torque wrench (tightening torque 6 Nm).
3	Ready mounted bracket 	The tool stand bracket is ready for vertical docking on the tool stand. NOTE! See sections 3.9 and 3.10 for pick-up and drop-off operation.

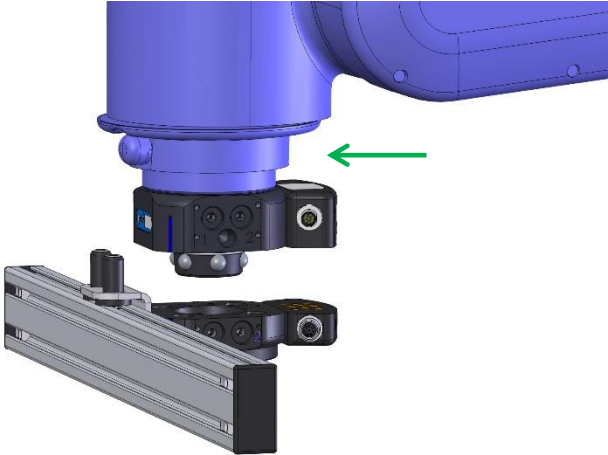
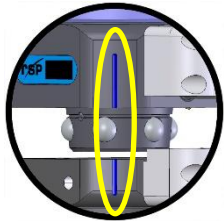
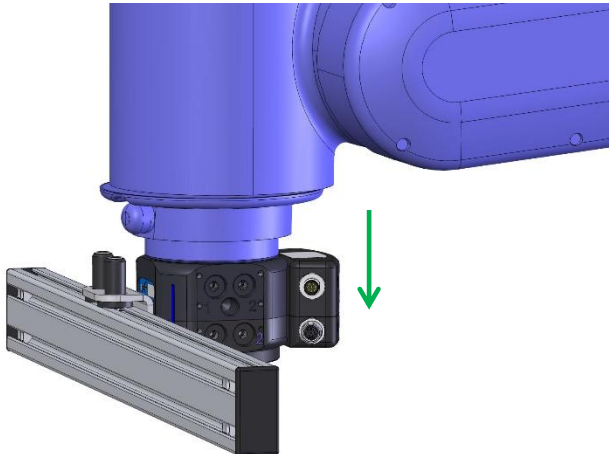
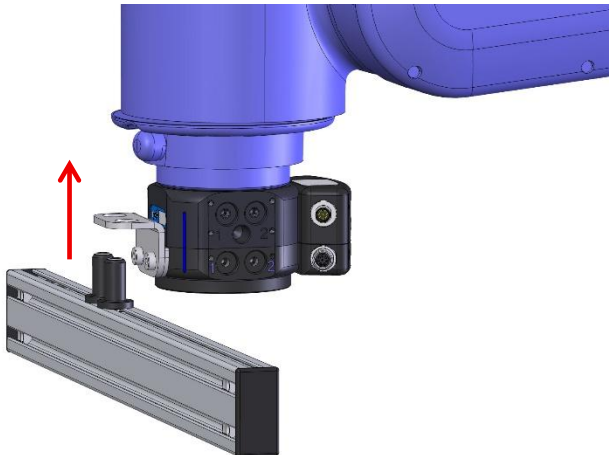


3.9 Pick-Up tool attachment from tool stand



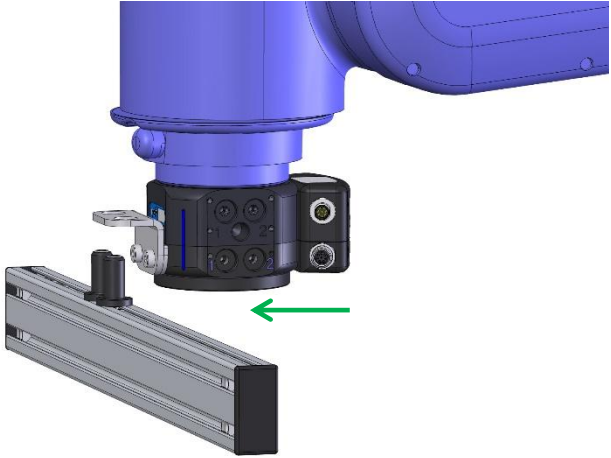
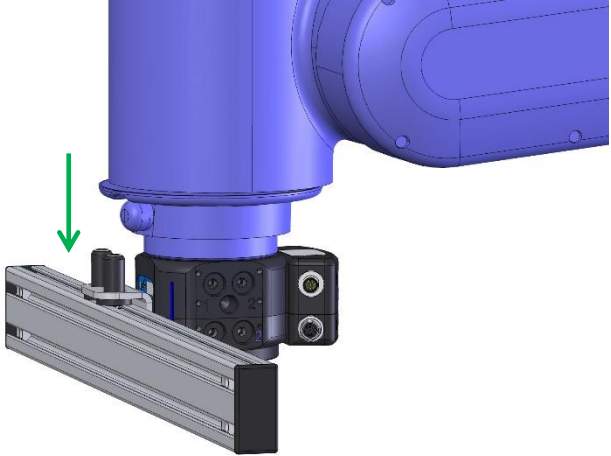
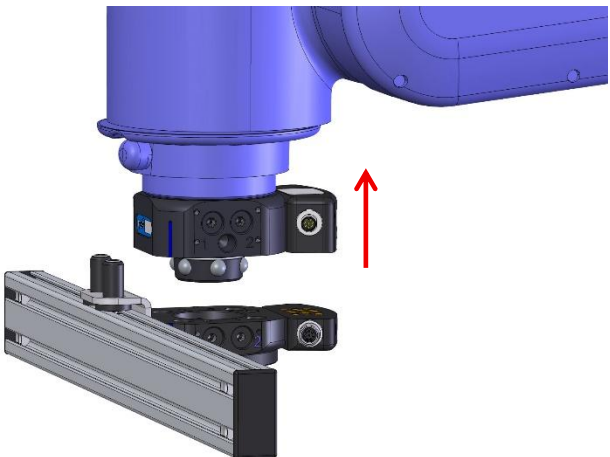
NOTE! Before any pick-up or drop-off begins the tool stand bracket and tool shall be mounted on the tool attachment (sections 2.6 and 2.5).



	Action	Note
1	Position robot above tool stand 	Position the tool changer above the tool attachment for pick-up. NOTE! It is advised to use the blue lines on the TC and TA for correct alignment. 
2	Lower robot and lock tool attachment 	Move the robot downwards into position for pick-up of the tool attachment in the tool stand. Dock the tool changer to the tool attachment (manually or automatic dependent on model).
3	Pick up tool attachment from tool stand 	Move the robot straight upwards with the tool attachment and tool locked in the tool changer. The docked tool is now ready for use.

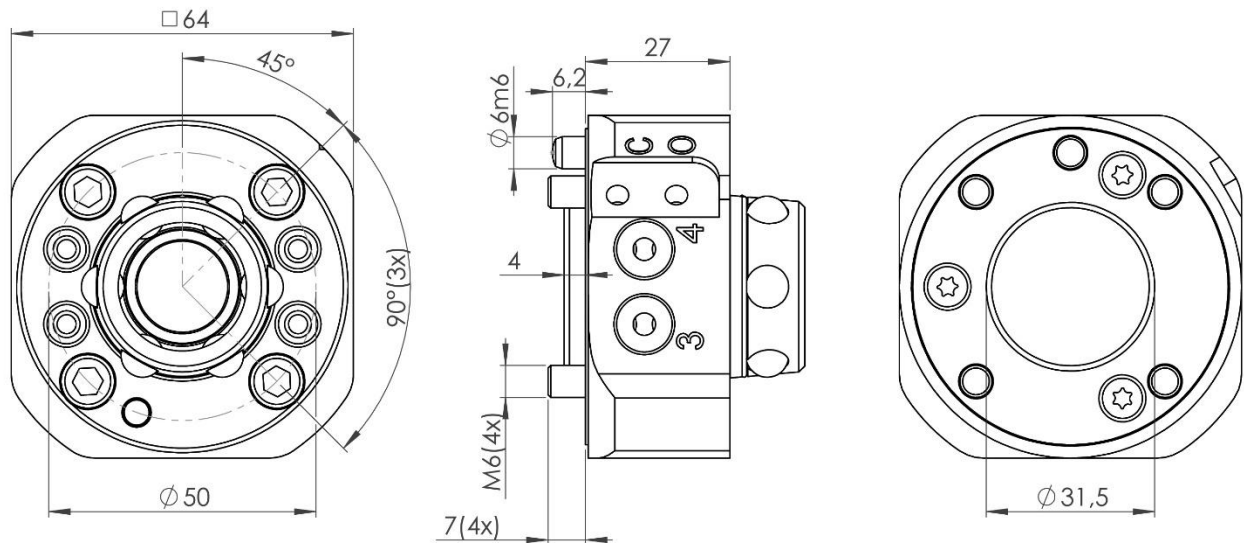
3.10 Drop-Off of tool attachment in tool stand



	Action	Note
1	Position robot above tool stand 	Position the tool changer above the tool stand in position for drop-off. NOTE! The tool changer shall be in closed position with the tool attachment (including tool) safely docked to the tool changer.
2	Lower robot and release tool attachment 	Move the robot downwards into position for drop-off of the tool attachment in the tool stand. Release the tool attachment by unlocking the tool changer.
3	Leave tool attachment in tool stand 	Leave the tool attachment in the tool stand by moving the robot upwards. The tool changer is now ready to pick-up another tool attachment/tool (section 3.9).

4 TECHNICAL SPECIFICATIONS

4.1 CoboShift tool changer, ATC18-4. Article: P1181



CoboShift tool changer P1181 transfers 4 pneumatic channels to the CoboShift tool attachment and has separate inlets for Open TC and Close TC. To be used together with tool attachment P1182.

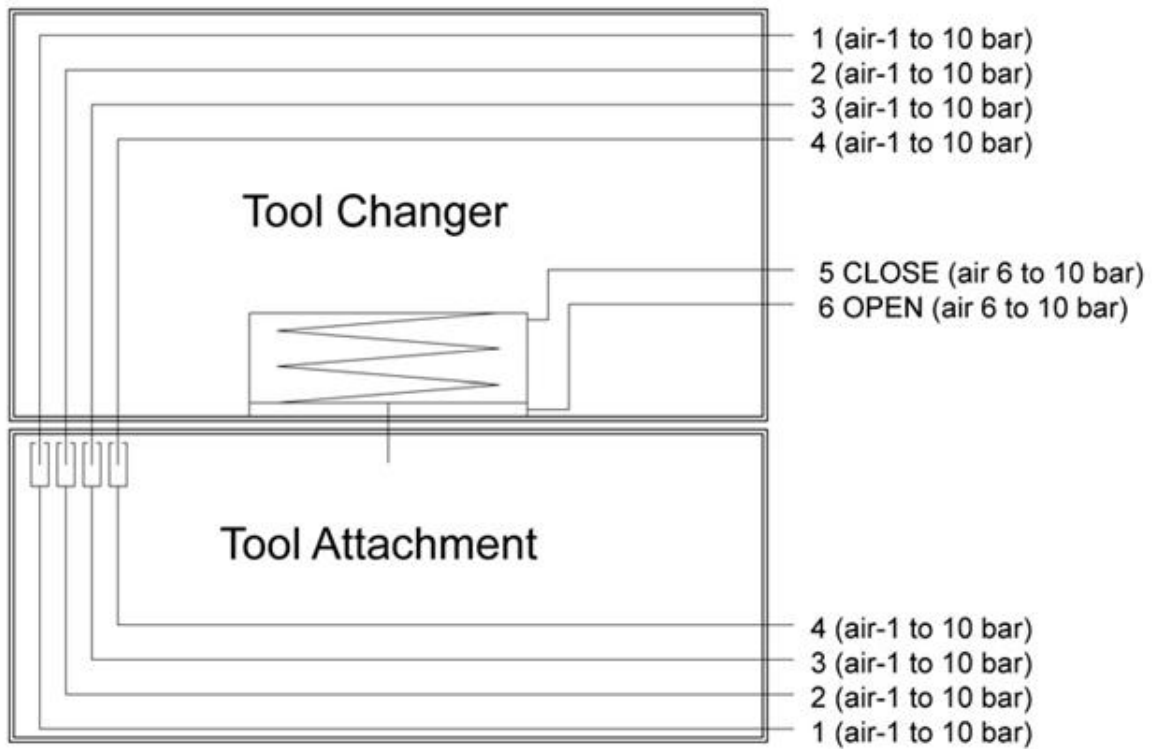
Technical data

Working temperature		+10°C – +50°C
Bolt pattern		ISO 9409-1 50-4-M6
Maximum tool load (M6-screws, 12.9)	Fz (static)	±180 N
	Mx/My (dynamic)	±130 Nm
	Mz (dynamic)	±130 Nm
Weight and centre of gravity (Z)		
P1181		0.35 kg / 16 mm
P1181+P1182		0,45 kg / 20 mm
Air channels	Pneumatic diagram	See section 4.1.1
	User channels, robot side	4 x M5 (185 l/min, max 10 bar)
	Dedicated channels (2 x M5)	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
Air connections	Push-in fittings (M5, straight)	4 x I1757

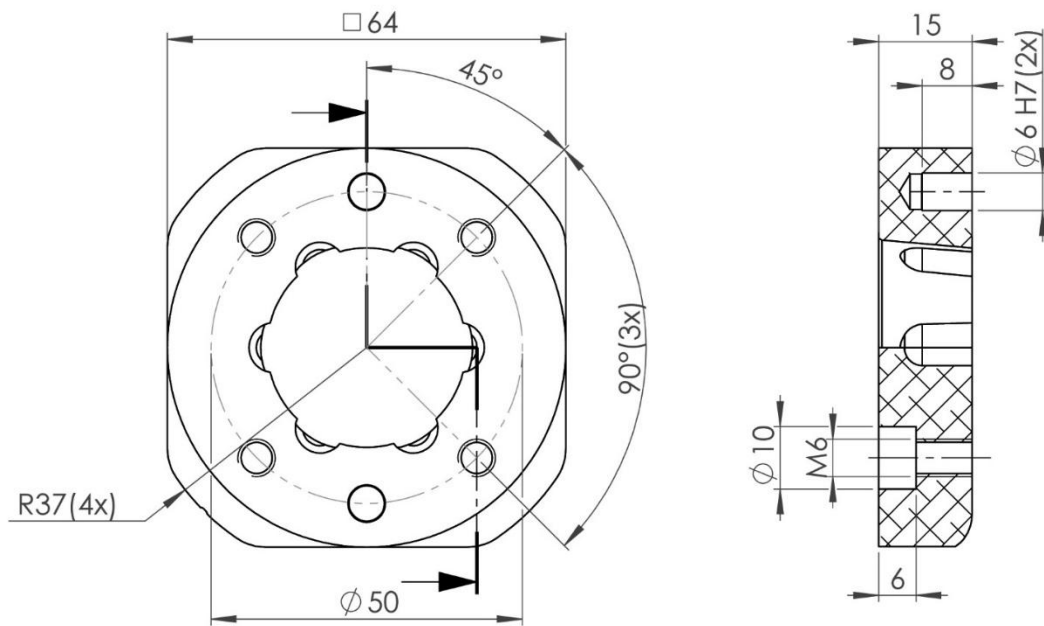


NOTE! One position pin is included in the delivery. To be mounted, if required, by the customer in the Ø 5 mm hole.

4.1.1 Pneumatic diagram for CoboShift tool changer ATC18/ATA18



4.2 CoboShift tool attachment, ATA18-4. Article: P1182



CoboShift tool attachment P1182 transfers 4 pneumatic channels to the tool. To be used together with tool changer P1181.

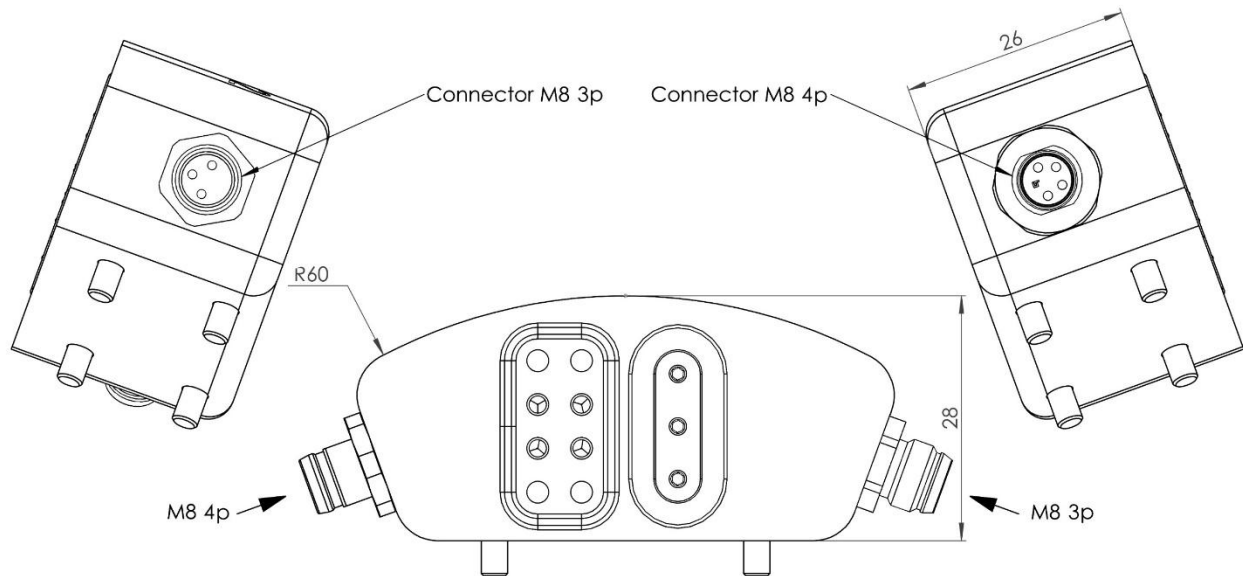
Technical data

Working temperature		+10°C – +50°C
Bolt pattern		ISO 9409-1 50-4-M6
Weight		0.10 kg
Maximum tool load (M6-screws, 12.9)	Fz (static)	±180 N
	Mx/My (dynamic)	±130 Nm
	Mz (dynamic)	±130 Nm
Maximum tool load (M6-screws, 8.8)	Fz (static)	±180 N
	Mx/My (dynamic)	±130 Nm
	Mz (dynamic)	±75 Nm
Maximum tool load (M5-screws, 12.9)	Fz (static)	±180 N
	Mx/My (dynamic)	±130 Nm
	Mz (dynamic)	±90 Nm
Maximum tool load (M5-screws, 8.8)	Fz (static)	±180 N
	Mx/My (dynamic)	±130 Nm
	Mz (dynamic)	± 55 Nm
Air channels	Pneumatic diagram	See section 4.1.1
	Connections, tool side	4 x M5
Air connections	Push-in fittings (M5, angled)	2 x 3HXG1113-3



NOTE! Tools can be mounted to the tool attachment using four M6-screws, alternatively the tool attachment can be mounted to the tool using four M5-screws.

4.3 CoboShift power and signal module, 7 signals, robot side. Article: P1193



CoboShift Power and Signal Module P1193 transfers 4 electrical signals and 3 power signals to the tool attachment. Can be mounted at two different positions on the tool changer. To be used with module P1194 mounted on the tool attachment.

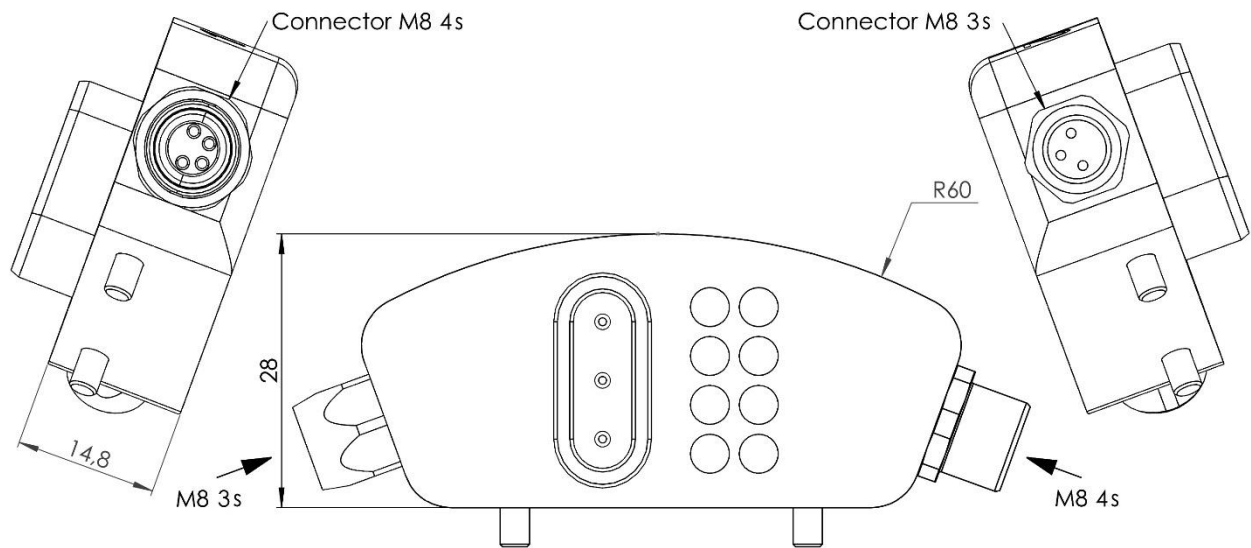
Technical data

Weight		0.07 kg
Electrical signals	Circuit diagram	E0185-103 (section 4.3.1)
	Total signals	4 x (1A, 30V), 3 x (4A, 60V)
	Connection, robot side	M8 4P (I2033), M8 3P (I1168)
Signal cables	P8612	M8 3S (female)– M8 3P (male), 0.3 m cable
	P8613	M8 4P (male)–M8 4S (female), 0.3 m cable

M0124-1 version 3.0



4.4 CoboShift power and signal module, 7 signals, tool side.
Article: P1194

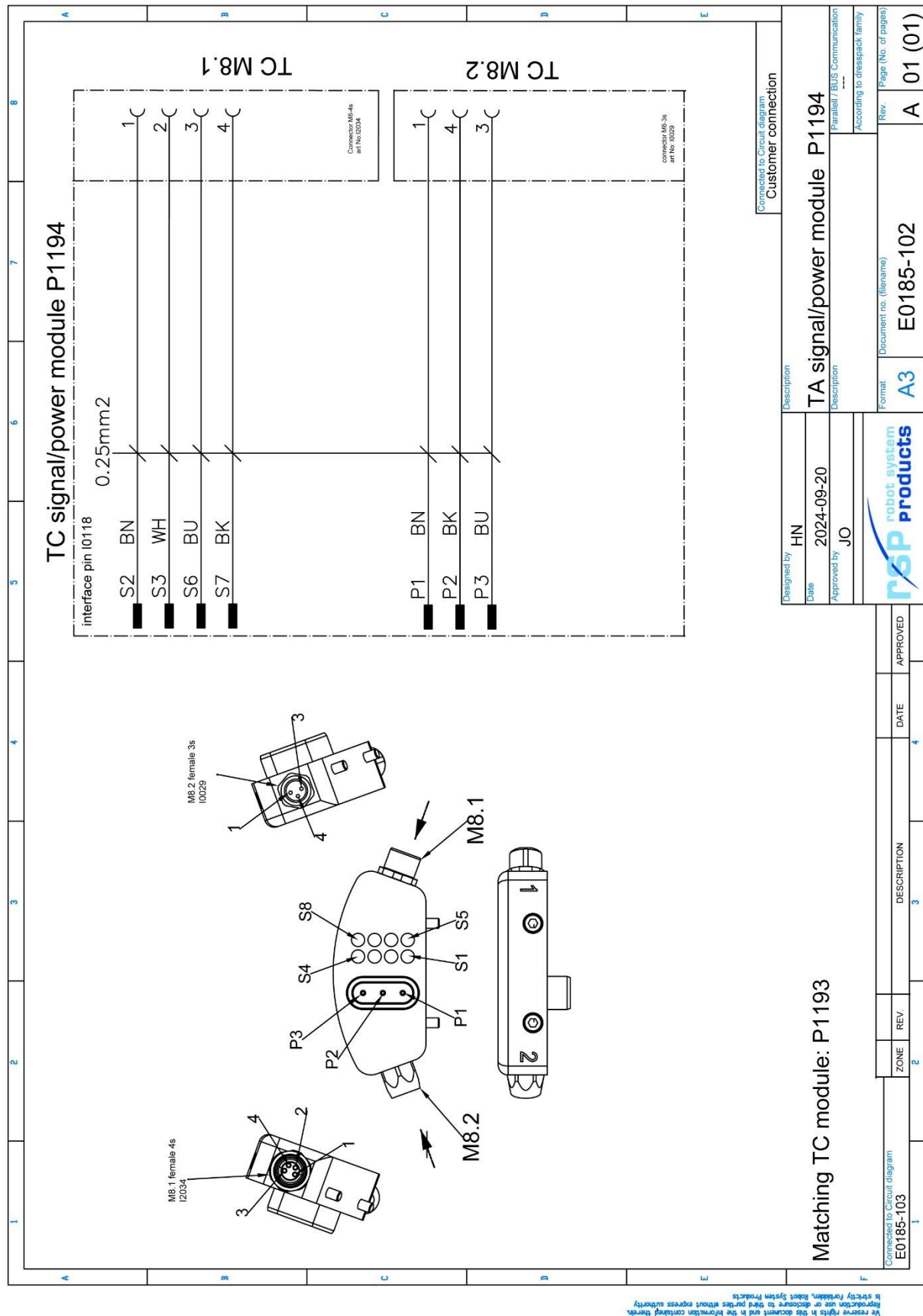


CoboShift Power and Signal Module P1194 transfers 4 electrical signals and 3 power signals to the tool. Can be mounted at two different positions on the tool attachment. To be used with module P1193 mounted on the tool changer.

Technical data

Weight		0.05 kg
Electrical signals	Circuit diagram	E0185-102 (section 4.4.1)
	Connection, tool side	M8 4S (I2034), M8 3S (I0029)

M0124-1 version 3.0



4.5 Hose package CRB15000 GoFa 10kg. Article: P2613

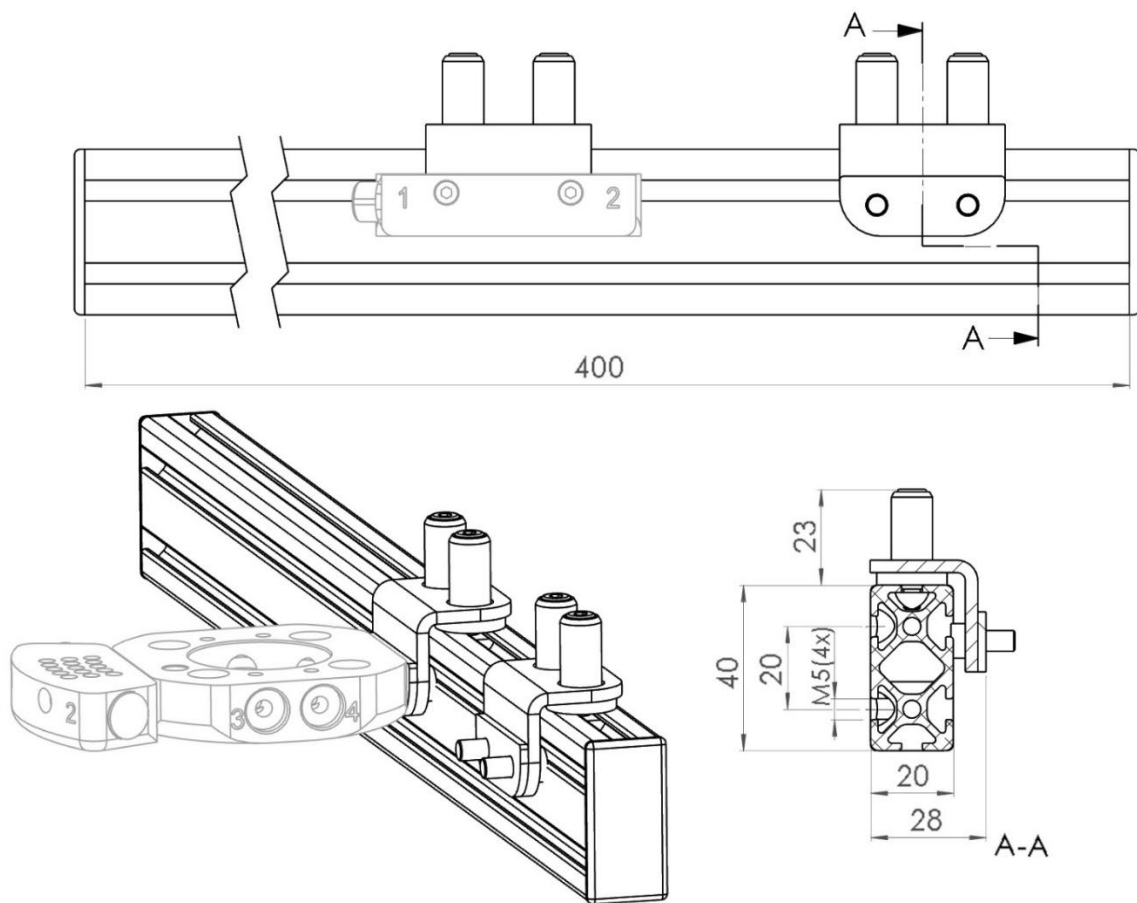


Hose packages are mounted along the robot's upper arm to protect hoses and cables and make cable slack end up where it is out of the way for transfer of air and electrical signals. The protective hose is a wear part.

Technical data

Total weight	1.1 kg
Protective hose length	3.2 m
Protective hose inner/outer diameter	27.4/34.3 mm
Protective hose clamp NW23	P8219

4.6 Tool stand start kit for CoboShift ATA18-4. Article: P1196-400



The tool stand start kit P1196-400 is divided in two parts, a tool stand with space for four tool stand brackets, and two tool stand brackets P1199 to be mounted on CoboShift tool attachment P1182. The combination gives a robust tool stand solution for easy tool changing.

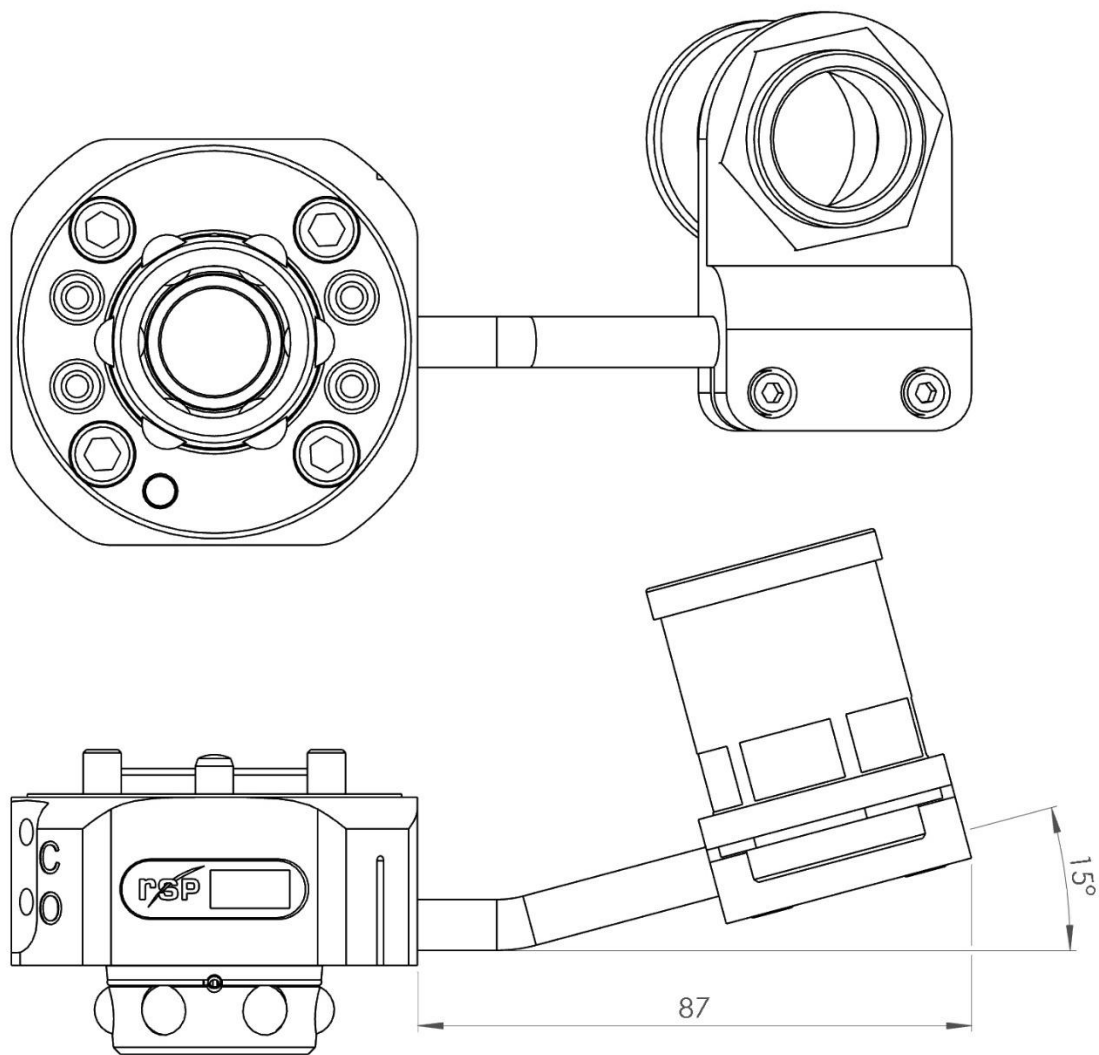
Technical data

Weight (Aluminium profile)	0,4 kg
Total weight (Aluminium profile+ 2 brackets P1199)	0,8 kg
Length (see NOTE! below)	0,4 m
Maximum load	18 kg



NOTE! Other lengths of the aluminium profile are available.

4.7 Axis 6 bracket for NW23 hoses. Article: P1186



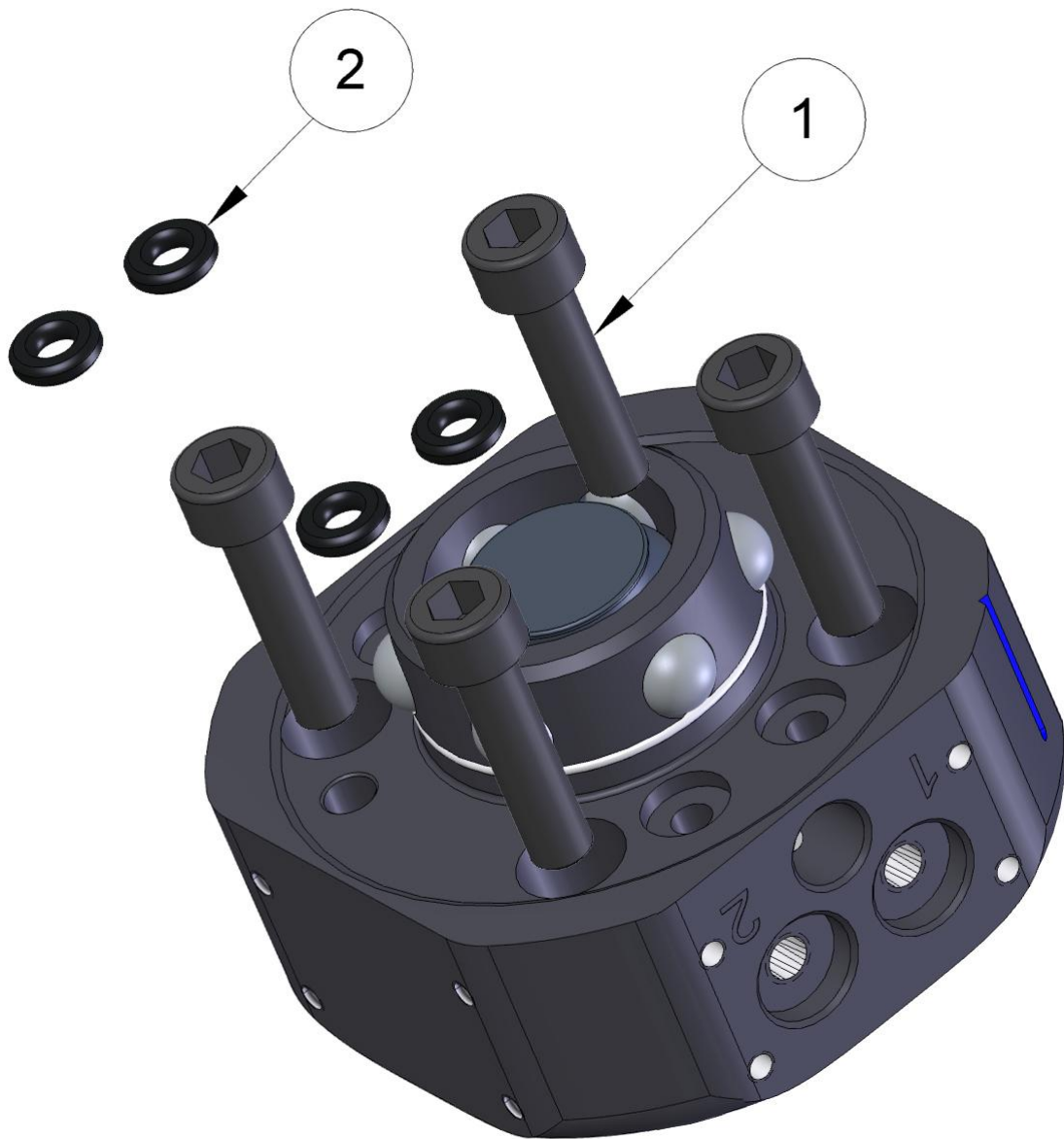
The Axis 6 bracket for NW23 hoses P1186 shall be mounted on tool attachment ATA18-4 P1182 for mounting of NW23 protection hoses.

Technical data

Weight (bracket mounted on tool attachment)	0,07 kg
--	---------

5 SPARE PARTS

5.1 Part list for CoboShift tool changer P1181



Item	Description	Part number	Wear part	Pcs
1	Fastening screw M6x25 12.9	MC6S 6x25 12.9		4
2	Air sealings	I0158	X	4

5.2 Part list for CoboShift signal module P1193



Item	Description	Part number	Wear part	Pcs
1	Spring loaded signal pin	I0154	X	4
2	O-ring	I0776	X	1

