



Assembly instructions

Modular Gripper System PXT

Note

The Assembly instructions were originally written in German. Store in a safe place for future reference. Subject to technical changes without notice. No responsibility is taken for printing or other types of errors.

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1 Important Information

1.1 The technical documentation is part of the product

1. For problem-free and safe operation, follow the instructions in the documents.
 2. Keep the technical documentation in close proximity to the product. The documentation must be accessible to personnel at all times.
 3. Pass on the technical documentation to subsequent users.
- ⇒ Failure to follow the instructions in these Assembly instructions may result in injuries!
- ⇒ Schmalz is not liable for damage or malfunctions that result from failure to heed these instructions.

If you still have questions after reading the technical documentation, contact Schmalz Service at:
www.schmalz.com/services

1.2 Note on Using this Document

J. Schmalz GmbH is generally referred to as Schmalz in this document.

The document contains important notes and information about the different operating phases of the product:

- Transport, storage, start of operations and decommissioning
- Safe operation, required maintenance, rectification of any faults

The document describes the product at the time of delivery by Schmalz and is aimed at:

- Installers who are trained in handling the product and can operate and install it
- Technically trained service personnel performing the maintenance work
- Technically trained persons who work on electrical equipment

1.3 Type Plate

When the fully assembled gripper is delivered, a type plate is attached to the main beam. It is permanently attached to the product and must always be clearly legible.

It contains important information about the product:

- Order number
- Item number in the order

Please specify all the information above when ordering replacement parts, making warranty claims or for any other inquiries.

1.4 Symbols



This symbol indicates useful and important information.

- ✓ This symbol represents a prerequisite that must be met before an action is performed.
- ▶ This symbol represents an action to be performed.
- ⇒ This symbol represents the result of an action.

Actions that consist of more than one step are numbered:

1. First action to be performed.
2. Second action to be performed.

2 Fundamental Safety Instructions

2.1 Intended Use

The product described below is a modular system and is therefore not limited to a specific application. Due to its small size, light weight and energy efficiency, the gripper is suitable for applications on small robots. Depending on the design, the maximum permissible load including the configured gripper is 25 kg.

The load must only be vacuum-gripped in the position defined in advance or on initial set-up of the product.

Ensure that the load cannot slide or tip over during all phases of operation.

Use only the connections, mounting holes and attachment materials that have been provided.

The product is built in accordance with the latest standards of technology and is delivered in a safe operating condition; however, hazards may arise during use.

2.2 Non-Intended Use

Schmalz does not accept any liability for any direct or indirect losses or damages that result from using the product. This applies, in particular, to any use of the product that is not in accordance with the intended purpose and to any use that is not described or mentioned in this documentation.

Non-intended use includes the following:

- Use in potentially explosive atmospheres
- Transport and through-suction of potentially explosive materials
- Do not suck objects into the vacuum opening
- Use in medical applications
- Use as a clamping device for workpiece processing
- Suction of body parts
- Use with workpieces not suited for suctioning
- Use in environments subject to high vibration and/or impacts
- Exceeding the lift capacity
- Storing loads while picked up

2.3 Personnel Qualifications


Unqualified personnel cannot recognize dangers and are therefore exposed to higher risks!

1. Task only qualified personnel to perform the tasks described in these Assembly instructions.
2. The product must be operated only by persons who have undergone appropriate training.

These Assembly instructions are intended for fitters who are trained in handling the product and who can operate and install it.

2.4 Warnings in This Document

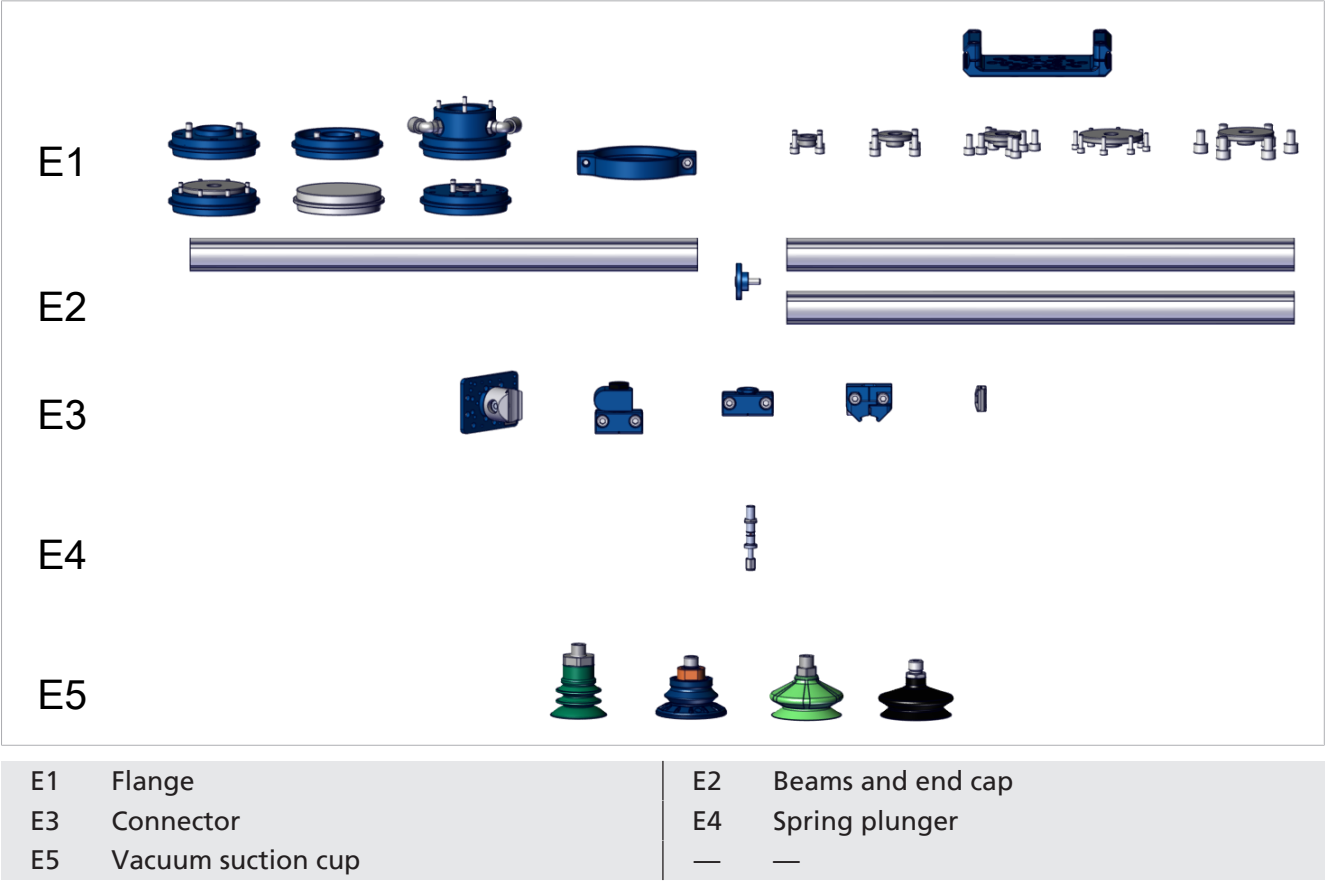
Warnings warn against hazards that may occur when handling the product. The signal word indicates the level of danger.

Signal word	Meaning
 CAUTION	Indicates a low-risk hazard that could result in minor or moderate injury if not avoided.

3 Design of Modular System PXT

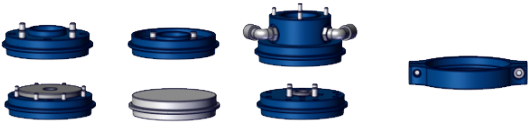
3.1 Design

3.1.1 Internal Vacuum Line




3.1.2 External Vacuum Line


E1




E2




E3




E4



E5



E6

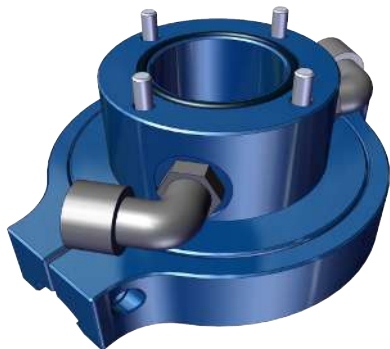


E1	Flange	E2	Beams and end cap
E3	Connector	E4	Pneumatic distributor
E5	Suction cup and spring plunger connections	E6	Vacuum suction cup



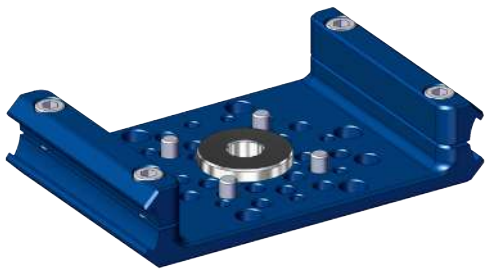
3.2 Overview of the Modular System PXT


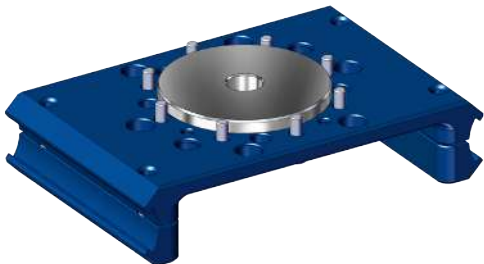
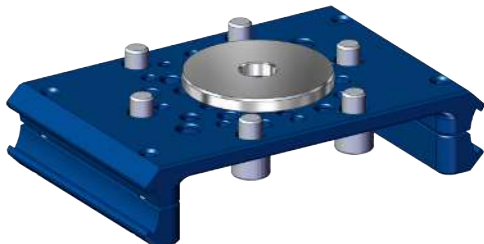
Flanges for systems with a main beam

Part number	Application	Graphic
10.01.49.00012	Fanuc cr-4 and cr-7iA robot set	
10.01.49.00013	Fanuc cr-15iA robot set	
10.01.49.00014	ISO9409-1 robot set	
10.01.49.00015	Yaskawa hc10dt robot set	
10.01.49.00016	Universal flange set (without bores)	



Part number	Application	Graphic
10.01.49.00085	ECBPi flange set	

Flanges for systems with two main beams

Part number	Application	Graphic
10.01.49.00024	DT Fanuc cr-4 and cr-7iA robot set	
10.01.49.00025	Rethink Sawyer	
10.01.49.00026	UR ISO9409-1	

Part number	Application	Graphic
10.01.49.00027	Yaskawa hc10dt	
10.01.49.00028	Fanuc cr-15iA	
10.01.49.00029	Yaskawa hc20dt	

Beam

Part number	Application	Graphic
10.01.49.00070	Section blank, max. length 850 mm Use as a main beam and cross beam	
10.01.49.00069	Section blank, max. length 850 mm Use as a main beam and cross beam Not suitable for internal vacuum line.	


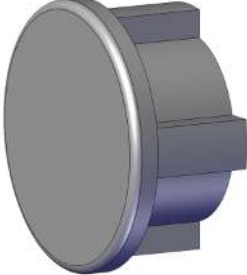
Use of the following components

Key:

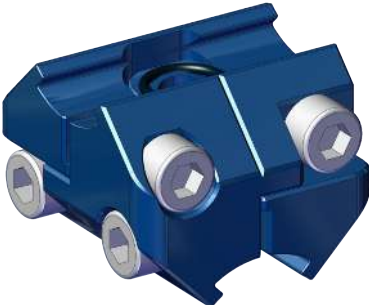

IV --> internal vacuum line

AV --> external vacuum line

Seal set, section plugs, cover cap

Part number	Application	Graphic	IV	EV
10.01.49.00031	Set of section plug seals		✓	✓
25.09.06.00119	Cover cap for section		—	✓

Connector

Part number	Application	Graphic	IV	EV
10.01.49.00034	Cross connector, 90° connection of two sections		✓	✓
25.09.06.00123	Cross connector, 90° connection of two sections		—	✓

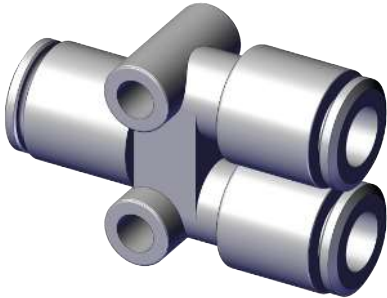

Part number	Application	Graphic	IV	EV
10.01.49.00036	Suction cup connection, movable		—	✓
10.01.49.00038	Spring plunger connection, swivel assembly		—	✓
10.01.49.00039	Suction cup connection, swivel assembly		—	✓
10.01.49.00045	Rigid connection		✓	—
10.01.49.00100	Drill bush		✓	—

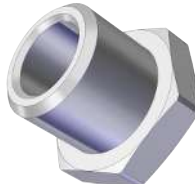
Part number	Application	Graphic	IV	EV
10.01.49.00046	Suction cup connection, swivel assembly		✓	—
10.01.49.00057	Holder + drill bush for spring plunger FSTImc		✓	—
10.01.49.00047	T-connector D30		—	✓
25.09.06.00160	T-connector		—	✓
25.09.06.00121	Parallel connector		—	✓

Part number	Application	Graphic	IV	EV
25.09.06.00122	3D connector (pipe clamp)		—	✓
25.09.06.00154	Multi-block		—	✓
10.01.49.00098	Universal connector		✓	✓
25.09.06.00120	Universal holder (cable tie)		✓	✓

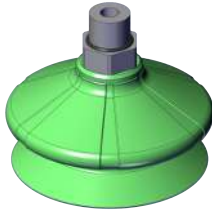


Suction cup and spring plunger connection

Part number	Application	Graphic	IV	EV
10.08.02.00500	Bulkhead connector with push-in		—	✓
10.08.02.00501	Angled connector Reducing 8–6		—	✓
10.08.02.00542	Angled connector 8–8 mm		—	✓
10.08.02.00543	Connector, straight, reducing 8–6		—	✓
10.09.02.00087	T-shaped plug connector, plastic 8		—	✓




Part number	Application	Graphic	IV	EV
10.09.02.00089	Y-shaped plug connector, plastic 8		—	✓
10.09.02.00090	Y-shaped plug connector, plastic 8-6		—	✓
10.09.02.00093	Y-shaped plug connector, plastic 10-8		—	✓
10.09.02.00091	Y-shaped plug connector, plastic 8-6x4		—	✓
10.08.02.00288	Angled plug-in screw union STV-W 1/8" to external thread 6 for spring plunger FSTE 10.01.02.00603		—	✓


Part number	Application	Graphic	IV	EV
10.01.49.00063	Accessories set FSTImc – 2x 3D sealing washers Seal set for spring plunger FSTImc 10.01.02.01685		✓	—
10.08.04.00091	Reducing fitting with hex RED-STK 1/4" external thread 1/8" internal thread MS-V for spring plunger FSTE		—	✓

Suction cup and spring plunger

Part number	Application	Graphic	Conne- ction
10.01.06.04530	Bellows suction cup (round) SPB1 30 ED-65 1/4" external thread		Suction plate holder
10.01.06.03498	Bellows suction cup (round) SPB1 40 ED-65 1/4" external thread		
10.01.06.03500	Bellows suction cup (round) SPB1 50 ED-65 1/4" external thread		
10.01.06.03502	Bellows suction cup (round) SPB1 60 ED-65 1/4" external thread		
10.01.06.03491	Bellows suction cup (round) SPB1 15 ED-65 1/8" internal thread		Spring plunger
10.01.06.03493	Bellows suction cup (round) SPB1 20 ED-65 1/8" internal thread		
10.01.06.03495	Bellows suction cup (round) SPB1 25 ED-65 1/8" internal thread		
10.01.06.03497	Bellows suction cup (round) SPB1 30 ED-65 1/8" internal thread		
10.01.06.03499	Bellows suction cup (round) for particularly uneven workpieces SPB1 40 ED-65 1/4" internal thread		Spring plunger with re- ducing fitting
10.01.06.03501	Bellows suction cup (round) for particularly uneven workpieces SPB1 50 ED-65 1/4" internal thread		
10.01.06.03503	Bellows suction cup (round) for particularly uneven workpieces SPB1 60 ED-65 1/4" internal thread		

Part number	Application	Graphic	Connection
10.01.06.03700	Bellows suction cup (round) SPB2f 30 SI-55 1/4" external thread		Suction plate holder
10.01.06.03648	Bellows suction cup (round) SPB2f 40 SI-55 1/4" external thread		
10.01.06.03654	Bellows suction cup (round) SPB2f 50 SI-55 1/4" external thread		
10.01.06.04262	Bellows suction cup (round) SPB2f 15 SI-55 1/8" internal thread		Spring plunger
10.01.06.04313	Bellows suction cup (round) SPB2f 20 SI-55 1/8" internal thread		
10.01.06.04315	Bellows suction cup (round) SPB2f 25 SI-55 1/8" internal thread		
10.01.06.03699	Bellows suction cup (round) SPB2f 30 SI-55 1/8" internal thread		
10.01.06.03647	Bellows suction cup (round) SPB2f 40 SI-55 1/8" internal thread		
10.01.06.03653	Bellows suction cup (round) SPB2f 50 SI-55 1/8" internal thread		
10.01.06.01653	Bellows suction cup (round) SAB 22 NBR-60 1/4" external thread		Suction plate holder
10.01.06.01197	Bellows suction cup (round) SAB 30 NBR-60 1/4" external thread		
10.01.06.00803	Bellows suction cup (round) SAB 40 NBR-60 1/4" external thread		
10.01.06.00804	Bellows suction cup (round) SAB 50 NBR-60 1/4" external thread		
10.01.06.00805	Bellows suction cup (round) SAB 60 NBR-60 1/4" external thread		
10.01.06.00806	Bellows suction cup (round) SAB 80 NBR-60 1/4" external thread		
10.01.06.01533	SAB 22 NBR-60 1/4" internal thread		Spring plunger with reducing fitting
10.01.06.01196	SAB 30 NBR-60 1/4" internal thread		
10.01.06.00670	SAB 40 NBR-60 1/4" internal thread		
10.01.06.00851	SAB 50 NBR-60 1/4" internal thread		
10.01.06.00852	SAB 60 NBR-60 1/4" internal thread		
10.01.06.00081	Bellows suction cup (round) FSGA 33 NBR-55 1/4" external thread		Suction plate holder
10.01.06.00941	Bellows suction cup (round) FSGA 33 HT1-60 1/4" external thread		
10.01.06.00082	Bellows suction cup (round) FSGA 43 NBR-55 1/4" external thread		
10.01.06.00942	Bellows suction cup (round) FSGA 43 HT1-60 1/4" external thread		
10.01.06.00083	Bellows suction cup (round) FSGA 53 NBR-55 1/4" external thread		
10.01.06.00943	Bellows suction cup (round) FSGA 53 HT1-60 1/4" external thread		

Part number	Application	Graphic	Connection
10.01.06.00685	Bellows suction cup (round) FSGA 63 NBR-55 1/4" external thread		Spring plunger
10.01.06.02476	Bellows suction cup (round) FSGA 63 HT1-60 1/4" external thread		
10.01.06.00061	Bellows suction cup (round) FSGA 11 NBR-55 1/8" internal thread		
10.01.06.01232	Bellows suction cup (round) FSGA 11 HT1-60 1/8" internal thread		
10.01.06.00380	Bellows suction cup (round) FSGA 14 NBR-55 1/8" internal thread		
10.01.06.00948	Bellows suction cup (round) FSGA 14 HT1-60 1/8" internal thread		
10.01.06.00062	Bellows suction cup (round) FSGA 16 NBR-55 1/8" internal thread		
10.01.06.01233	Bellows suction cup (round) FSGA 16 HT1-60 1/8" internal thread		
10.01.06.00389	Bellows suction cup (round) FSGA 20 NBR-55 1/8" internal thread		
10.01.06.00952	Bellows suction cup (round) FSGA 20 HT1-60 1/8" internal thread		
10.01.06.00063	Bellows suction cup (round) FSGA 22 NBR-55 1/8" internal thread		
10.01.06.01234	Bellows suction cup (round) FSGA 22 HT1-60 1/8" internal thread		
10.01.06.00398	Bellows suction cup (round) FSGA 25 NBR-55 1/8" internal thread		
10.01.06.00956	Bellows suction cup (round) FSGA 25 HT1-60 1/8" internal thread		
10.01.06.00064	FSGA 33 NBR-55 1/4" internal thread		Spring plunger with reducing fitting
10.01.06.00957	FSGA 33 HT1-60 1/4" internal thread		
10.01.06.00065	FSGA 43 NBR-55 1/4" internal thread		
10.01.06.00958	FSGA 43 HT1-60 1/4" internal thread		
10.01.06.00066	FSGA 53 NBR-55 1/4" internal thread		
10.01.06.00977	FSGA 53 HT1-60 1/4" internal thread		
10.01.06.00691	FSGA 63 NBR-55 1/4" internal thread		
10.01.06.02477	FSGA 63 HT1-60 1/4" internal thread		
10.01.02.01685	Spring plunger FSTImc P 30 M5 internal thread 10 CO (Accessory set required for mounting 10.01.49.00063 FSTImc – 2x 3D sealing washers)		

Part number	Application	Graphic	Connection
Example: 10.01.02.00603	Spring plunger FSTE		

3.3 Instructions for the Correct Use of the Modular System PXT

Flange type

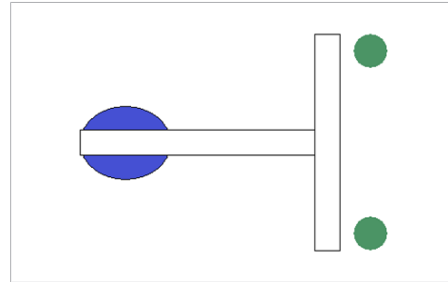
Two flange types are available:

- Different flanges for **one** main beam
- One flange for two main beams

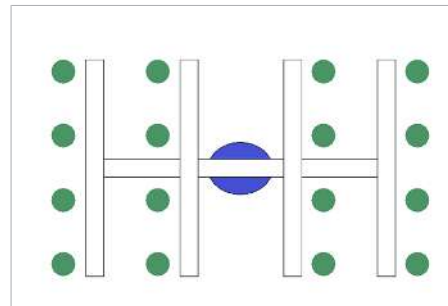
Flange position

The following options are available for the flange position:

a) "**PXT Picker**" for asymmetrical installation (at the "profile end" of the main beam or -n)



b) "**PXT Gripper**" for symmetrical installation centrally (center on the main beam or -n)



Vacuum line

When supplying the vacuum to the suction cups, you can choose from the following options:

- Internal vacuum line (IV)
- External or hose-guided vacuum line (AV)

With the "internal vacuum line," the beams are drilled with a drilling template to create the vacuum in the vicinity of the connectors and the ends of the beams are sealed vacuum-tight with end covers.

With the "external vacuum line," the vacuum is fed to the suction cups through hoses. With this variant, additional components such as pneumatic distributors, hoses and connection components are required for the vacuum line.

4 Technical Data

4.1 General Parameters

Safety distance to the end of the section (start and end):	5 mm to the components
Operating vacuum:	-850 mbar to 0 bar
Ambient temperature:	0 to 50° C

4.2 Gripper with a Main Beam

Parameter	with central flange	with external flange
Length of main beam	220 to 850 mm	Max. 500 mm
Length of cross beam	150 to 650 mm	Max. 400 mm
Number of cross beams	0, 2, 4 or 6	0, 1 or 2
Cross beam spacing	Min. 150 mm	Min. 80 mm
Number of suction cups per cross beam	Max. 6	Max. 12
Total number of suction cups	Max. 24	Max. 24

These values are regarded as guide values because the gripper design depends on other conditions, such as the suction cup positioning and suction cup size.

4.3 Gripper with Two Main Beams

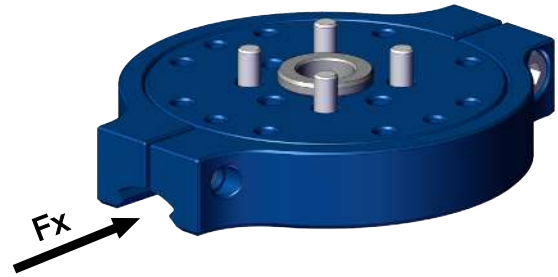
Parameter	with central flange	with external flange
Length of main beam	200 to 850 mm	Max. 500 mm
Length of cross beam	200 to 650 mm	Max. 500 mm
Number of cross beams	2, 4 or 6	1 or 2
Cross beam spacing	Min. 150 mm	Min. 80 mm
Number of suction cups per cross beam	Max. 6	Max. 12
Total number of suction cups	Max. 24	Max. 24

These values are regarded as guide values because the gripper design depends on other conditions, such as the suction cup positioning and suction cup size.

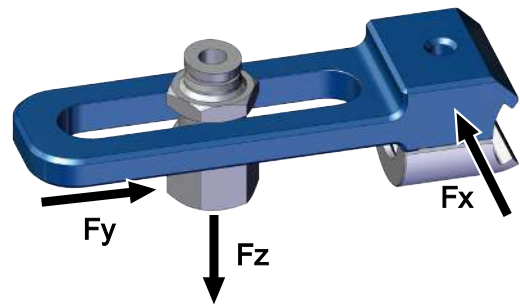
4.4 Static Load Limits

Depending on the design, the maximum permissible load including the configured gripper is 25 kg.

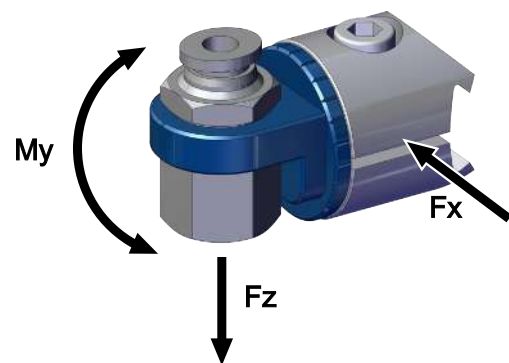
Permitted shifting force of the flange with a main beam: **$F_x = 850 \text{ N}$**



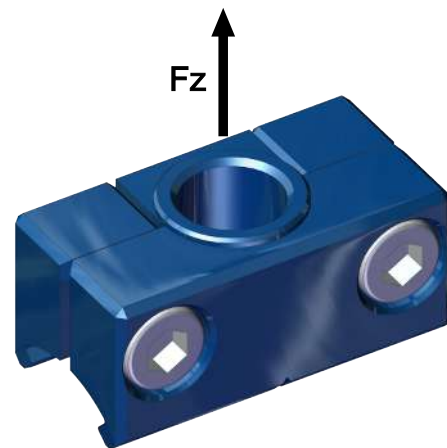
Permitted shifting force of the suction cup connection (10.01.49.00036) **$F_x = 700 \text{ N}$** , bulkhead connector **$F_y = 500 \text{ N}$** and pull-off force **$F_z = 90 \text{ N}$**



Permitted shifting force of the suction cup connection (10.01.49.00039) **$F_x = 650 \text{ N}$** , torque of the connection **$M_y = 5.5 \text{ Nm}$** and pull-off force **$F_z = 125 \text{ N}$**



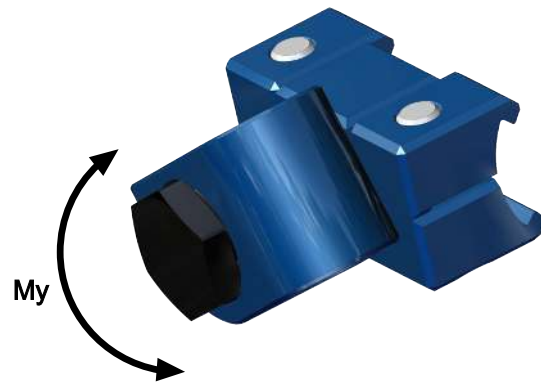
Permitted pull-off force at which the connection (10.01.49.00045) still seals **$F_z = 200 \text{ N}$**



Permitted torque of connection (10.01.49.00046)

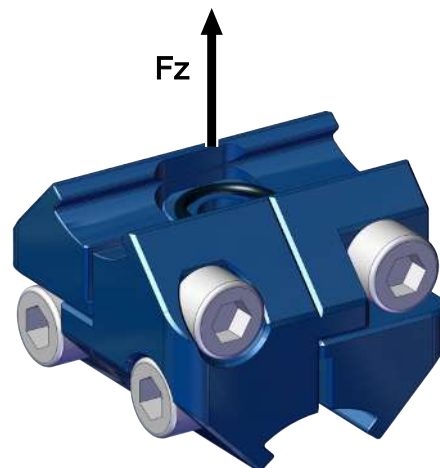
$M_y = 1 \text{ Nm}$

The torque (center of the screw to the suction cup connection, approx. 12.5 mm) at which the suction cup can load the rotating element.



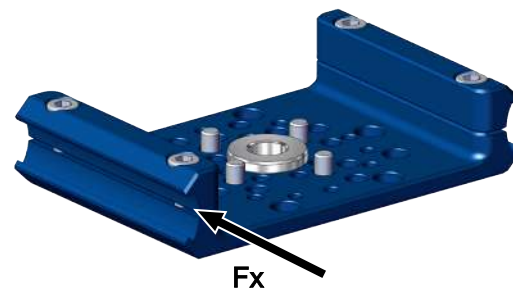
Permitted pull-off force when cross connector is leak-tight (10.01.49.00034)

$F_z = 2250 \text{ N}$



Permitted shifting force of the flange (10.01.49.00024) with two main beams

$F_x = 600 \text{ N}$

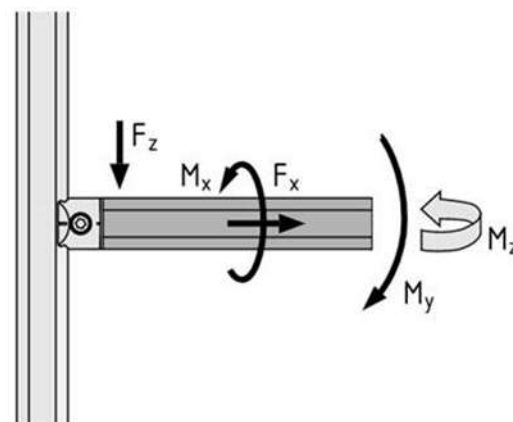


Specifications for T-connector D30 (10.01.49.00047)

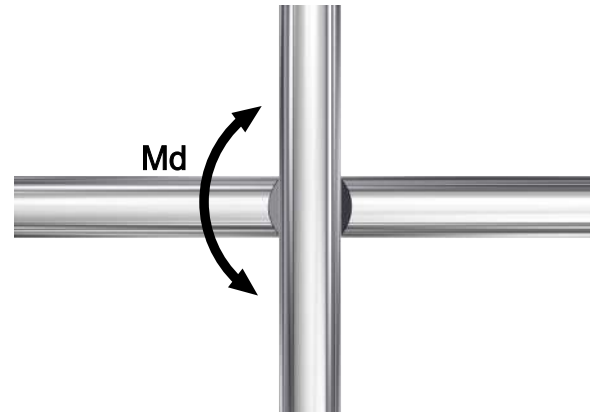
F_x and $F_z = 500 \text{ N}$

$M_x = 5 \text{ Nm}$

M_y and $M_z = 20 \text{ Nm}$



Specification for the cross connector
(25.09.06.00123)
Md max = 5 Nm



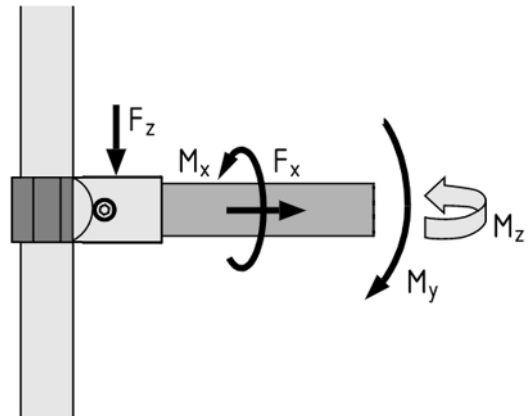
Specifications for the 3D connector (pipe clamp)
(25.09.06.00122)

F_x and F_z = 500 N

M_x = 5 Nm

M_y and M_z = 20 Nm

The force specifications refer to the connector in combination with pipe adapter D30. If another connector is used, its specific force specifications must be observed.



Specifications for the T-connector (25.09.06.00160)
including the four profile cams

F_x and F_z = 500 N

M_x = 20 Nm

M_y = 50 Nm

M_z = 20 Nm

Specifications for the T-connector (25.09.06.00160)
without profile cams

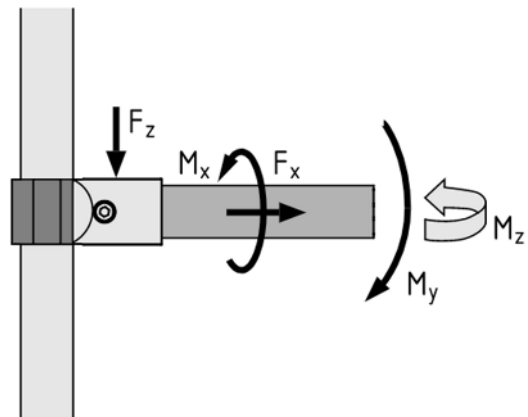
F_x and F_z = 500 N

M_x = 5 Nm

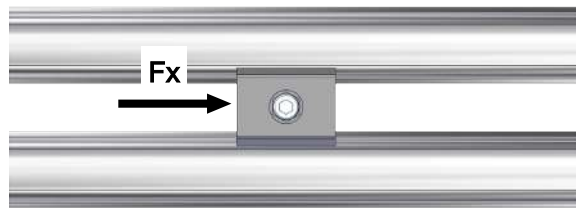
M_y = 50 Nm

M_z = 20 Nm

The force specifications refer to the connector in combination with pipe adapter D30. If another connector is used, its specific force specifications must be observed.



Specification for parallel connector (25.09.06.00121)
 $F_x = 500 \text{ N}$

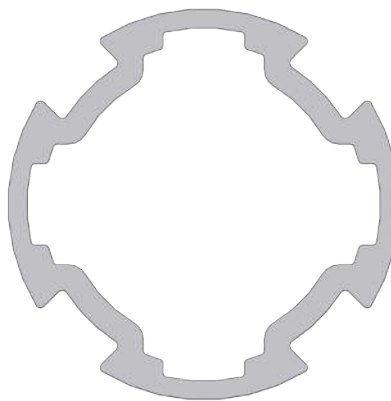


Area moment of inertia and elasticity modulus of section – 10.01.49.00070

$I_x = 1.71 \text{ cm}^4$

$I_y = 1.71 \text{ cm}^4$

$E \text{ approx. } 70,000 \text{ N/mm}^2$

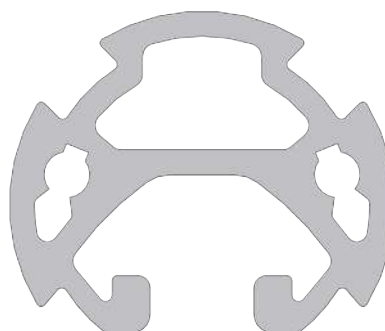


Area moment of inertia and elasticity modulus of section – 10.01.49.00069

$I_x = 1.20 \text{ cm}^4$

$I_y = 2.32 \text{ cm}^4$

$E \text{ approx. } 70,000 \text{ N/mm}^2$



5 Mounting

5.1 Cutting the Beams to Length

Saw the beam to length.



CAUTION

Sawing or cutting the beam to length

Risk of injury

- ▶ Ensure that only trained personnel cut (saw) the beams.
- ▶ Wear PPE (gloves, safety shoes, hearing protection and glasses)

- ✓ The saw used is suitable for the aluminum material and ensures a right-angle saw cut with a tolerance of $\pm 0.3^\circ$
- ✓ Wear PPE, glasses, gloves, hearing protection, safety shoes

1. Measure the specified length and mark the saw cut position on the beam.
2. Place/secure the beam in the correct position in the sawing device.
3. Cut the beam at the marked point at right angles ($\pm 0.3^\circ$) to the longitudinal axis of the beam.
4. Deburr and clean the end of the beam.
5. Visually check the cut edge.
 - ⇒ A uniform circumferential cutting surface without sharp edges is acceptable.
 - ⇒ A cutting surface with burrs, scores and chips is not acceptable.

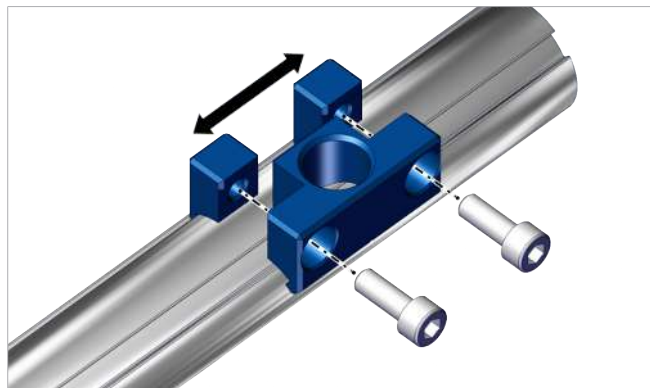


5.2 Drilling the Vacuum Feedthrough

When using the gripping system with an internal vacuum line, the holes for the vacuum feedthrough are drilled by the user in the desired positions.

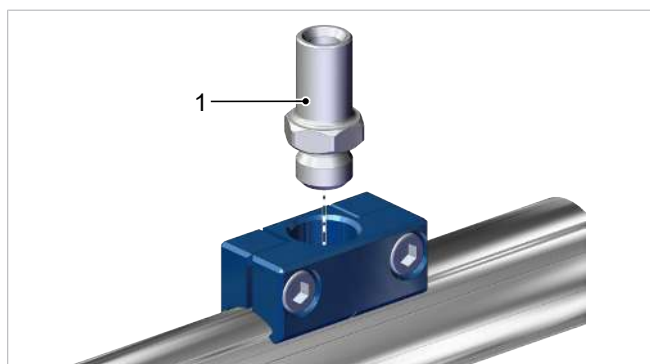
- ✓ Gripper with internal vacuum line
- ✓ Tool: HSS drill with a diameter of 8.1 mm
- ✓ Drilling template set, part no. 10.01.49.00045 and 10.01.49.00100
- ✓ A suction cup, for removing chips etc.

1. Position the drilling aid at the desired position.



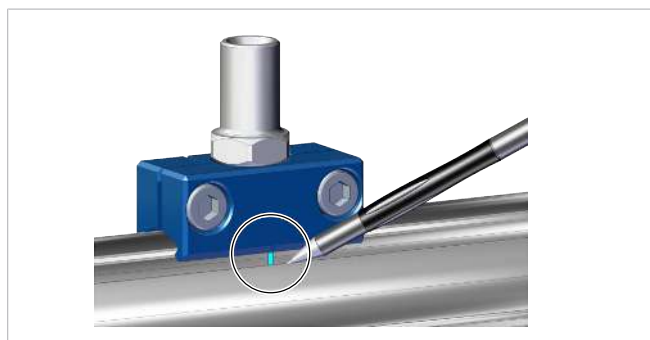
2. Tighten the screws hand-tight so that the drilling aid can no longer be moved.

3. Screw in the bore socket (1) hand-tight, width across flats 17 mm.



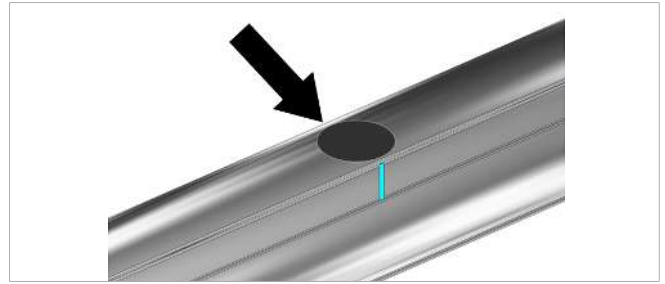
4. Drill hole.

5. Mark the position of the hole on the side of the beam.



6. Remove the drilling aid completely.
7. Remove chips and deburr the hole.

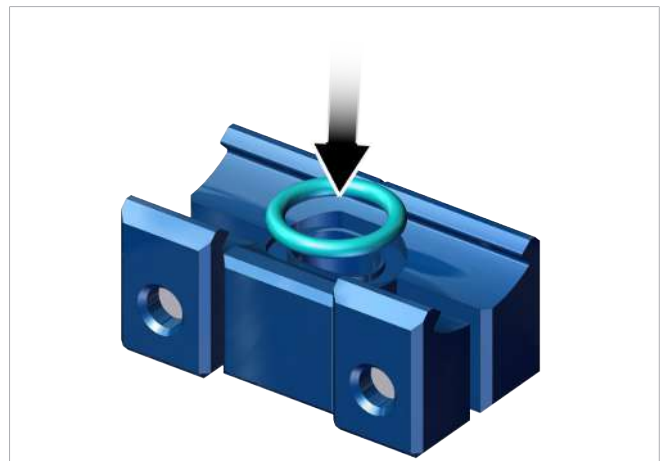
- ⇒ The hole for the vacuum feedthrough is complete.



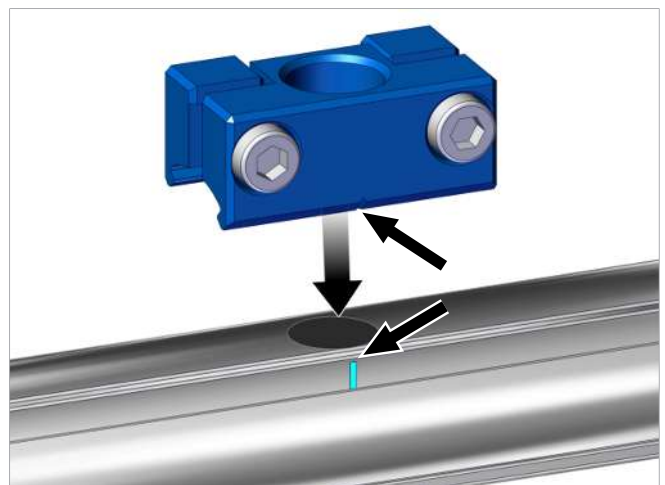
5.3 Attaching the Vacuum Supply for the Internal Vacuum Line

- ✓ The hole has been made for the vacuum feedthrough and the position of the hole has been marked on the side of the beam.
- ✓ The vacuum supply components with part number 10.01.49.00045 or 10.01.49.00046 are available.
- ✓ Hose screw connection with a minimum diameter of 8 mm

1. Insert the O-ring into the connector.



2. Position the connector loosely over the vacuum hole using the marking on the side.



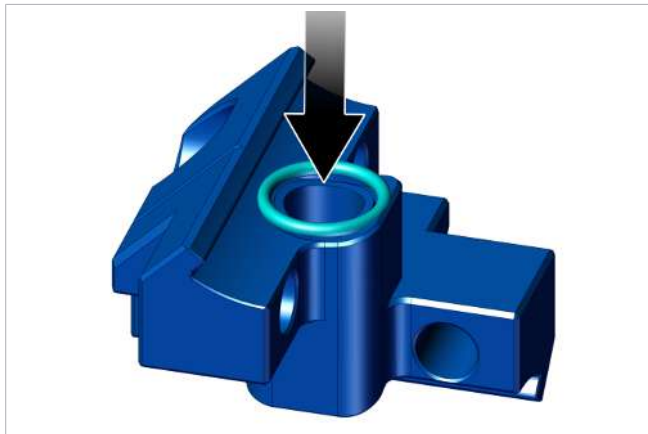
3. Fasten the clamp with the two screws with a tightening torque of 9 Nm.
4. Mount the suction cup, hose screw connection or rotatable suction plate holder (continue with Section 5.6).

5.4 Attaching the Cross Connector for the Internal Vacuum Line

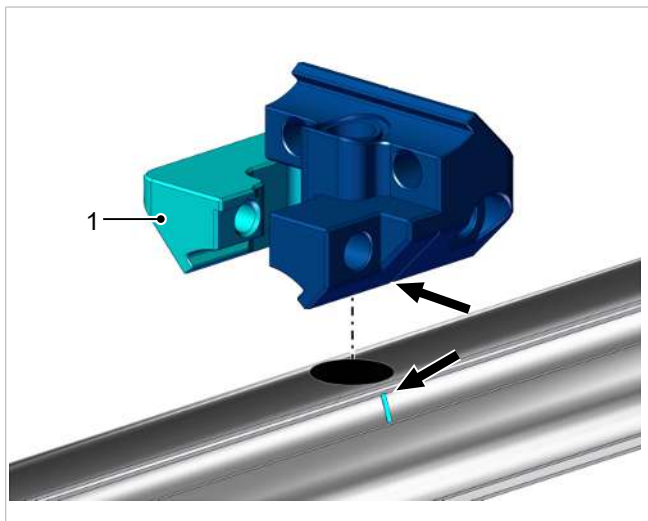
This connector is used for fixation of two beams at an angle of 90°. The cross connector guides the vacuum through the holes in the beams.

- ✓ The holes for the vacuum feedthrough have been made and the positions are marked on the beams.
- ✓ The components with part no. 10.01.49.00034 are available.

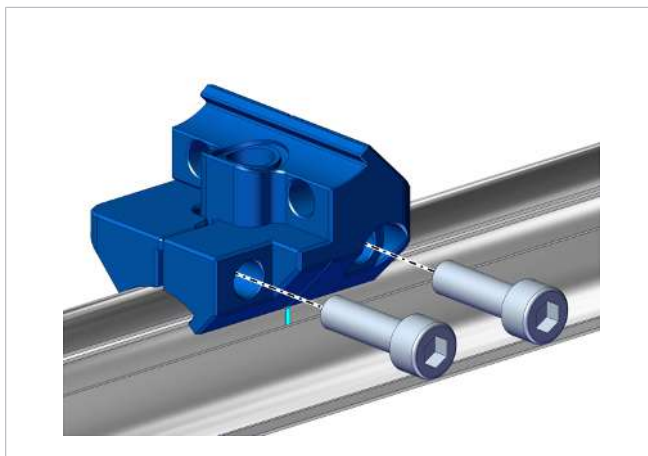
1. Insert an O-ring into the connector.



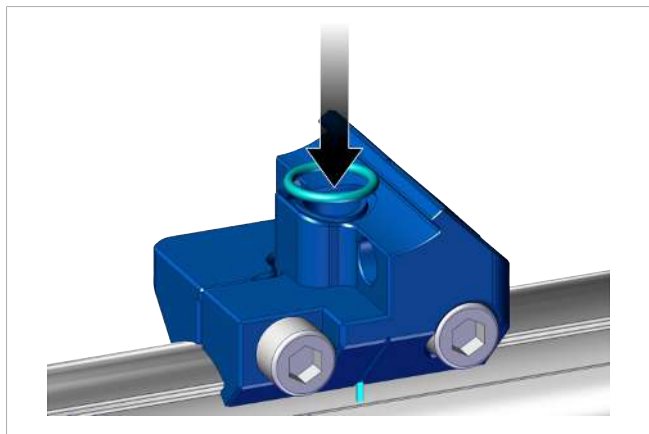
2. Position the connector with an appropriate counterpart (1) above a hole so that the notch on the connector and the marking on the beam are in line and the O-ring seals the hole.



3. Secure the mounted assembly. Tighten the screws with a torque of 9 Nm \pm 2 Nm.



4. Insert the second O-ring into the connector.



5. Position the beam with the hole on the connector and fasten it with a corresponding counterpart (1), so that the notch on the connector and the marking on the beam are in line and the O-ring seals the hole.



6. Secure the mounted assembly. Tighten the screws with a torque of $9 \text{ Nm} \pm 2 \text{ Nm}$.

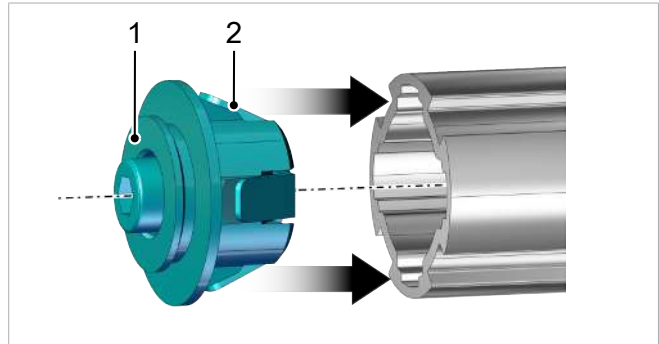


5.5 Attaching the Vacuum-Tight End Cover with an Internal Vacuum Line

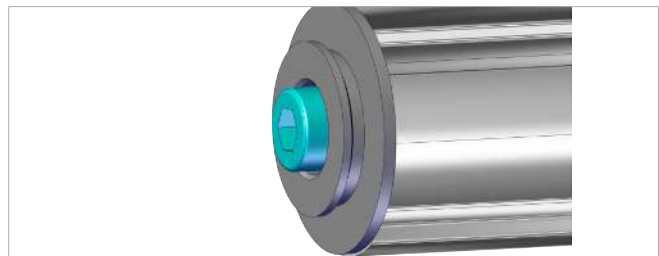
The end covers seal the end of the beam so that the vacuum can be routed inside the beam.

- ✓ The assembly with part no. 10.01.49.00031 is available.
- ✓ The beam ends are at a right angle, clean and free of burrs.

1. Insert the mounting device (1) including the clamp (2) in the correct position into the beam end so that it is flush with the beam (90° pitch).

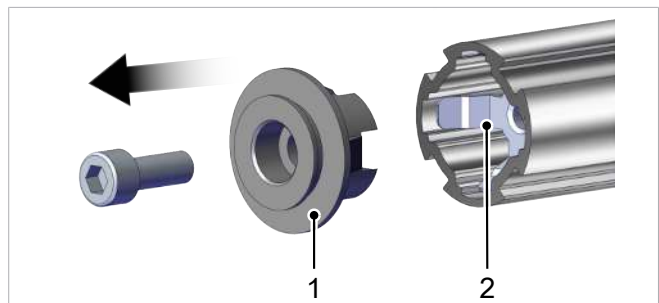


2. Tighten the screw with a torque of $> 12 \text{ Nm}$.



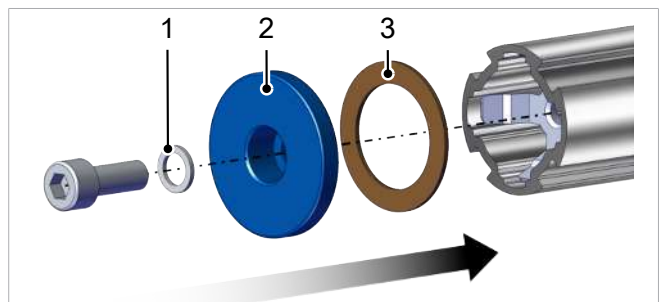
- ⇒ The internal clamp spreads and thus secures itself in the internal diameter of the beam.

3. Remove the screw and the assembly device (1).

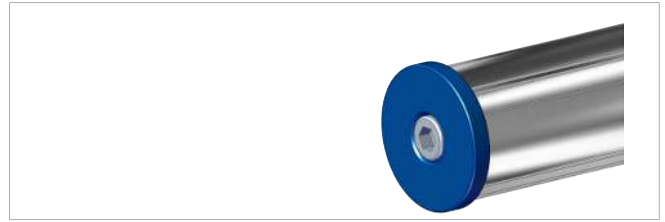


- ⇒ The internal clamp (2) remains in the beam.

4. Guide the seal (1) over the screw and secure the end cover (2) with the seal (3) with a tightening torque of 3 Nm .



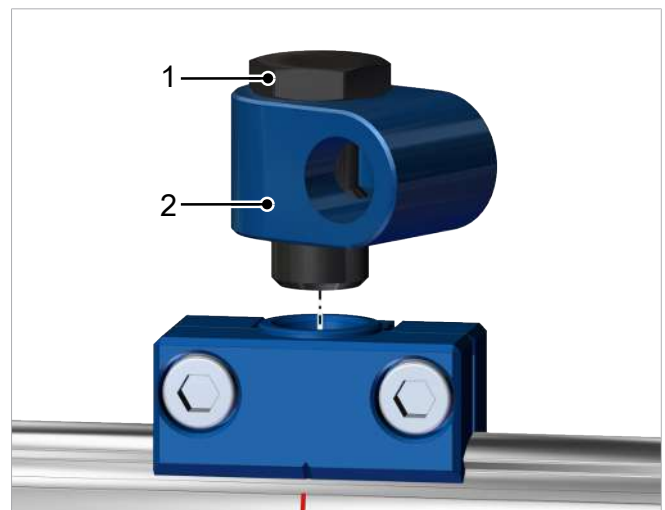
- ⇒ The end cover is attached and seals the beam end.



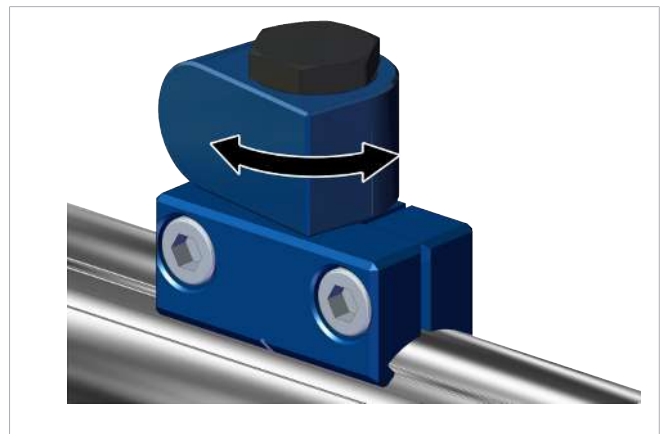
5.6 Suction Cup Connection with Internal Vacuum Line

- ✓ The connector including the threaded bush is mounted on the beam.
- ✓ The suction cup or the rotatable suction cup connection with part no. 10.01.49.00046 is available.

1. Screw the hollow screw including seals (1) and rotatable suction cup connection (2) into the connector.

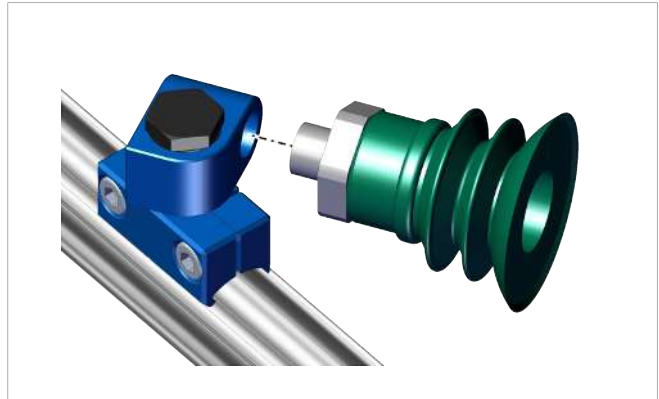


2. Before fixing the suction cup connection, align it to the workpiece by rotating it (continuously adjust by 360°).



3. Hold the suction cup connection in position and tighten the hollow screw, width across flats 17 mm.

4. Screw in the required suction cup.



5.7 Attaching the Flange

Some of the flanges have holes for locating pins on the side facing the robot. Using locating pins increases the positioning accuracy of the gripping system.

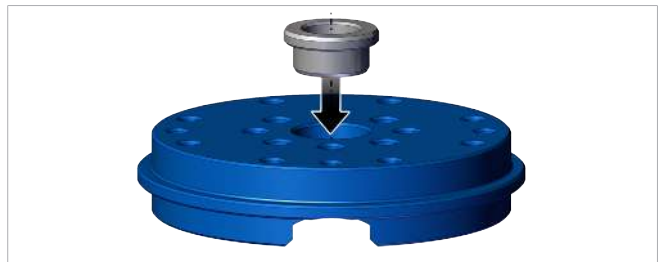


Schmalz recommends a central arrangement of the gripper on the robot in order to load the gripper and the robot as evenly as possible.

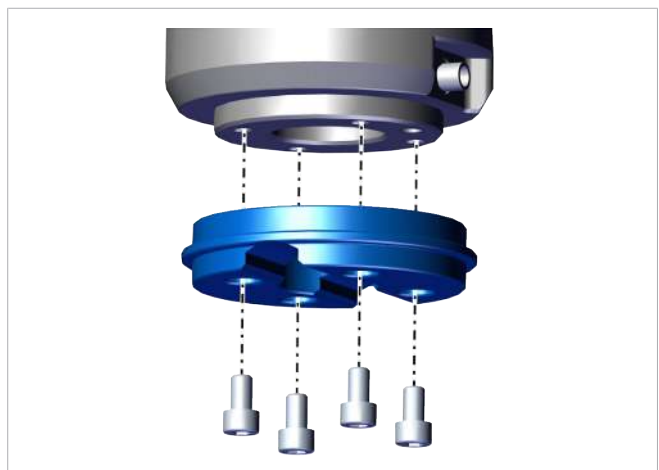
Variant with a main beam

- ✓ Flange set is available. For example, part no. 10.01.49.00012.

1. Insert the centering bush into the central hole on the flange in the correct position.



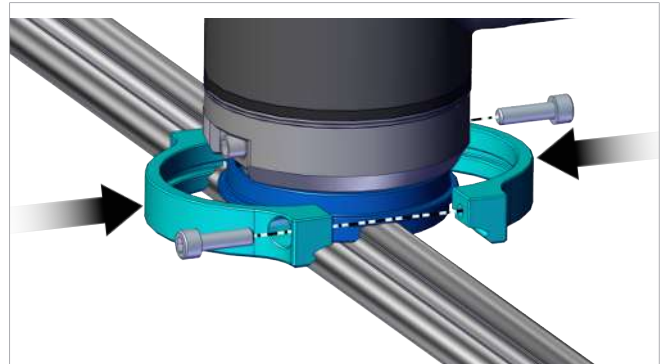
2. Attach the flange to the robot using the supplied screws.



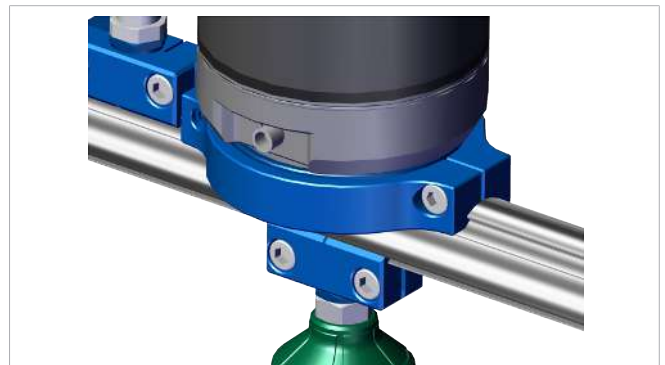
3. Place the gripping system on the flange in the correct position.



4. Secure the gripping system with the clamping ring.



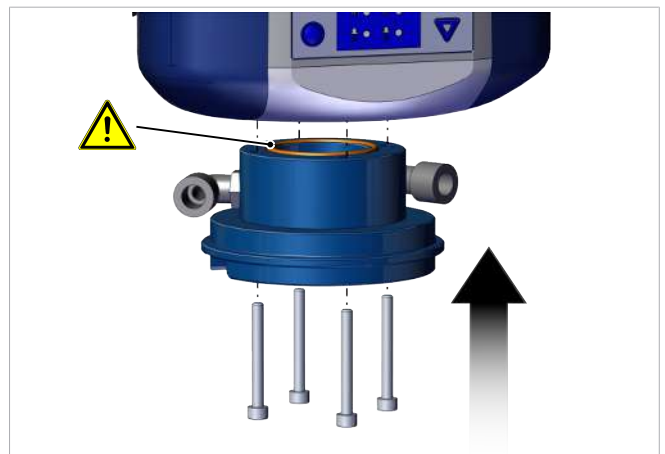
⇒ The gripping system is securely attached to the robot flange.



Variant with a main beam and ECBPi flange set

- ✓ The flange set (part no. 10.01.49.00085) is available for use.

1. Using the supplied screws and the O-ring, mount the flange on the ECBPi, which is already mounted on the robot.



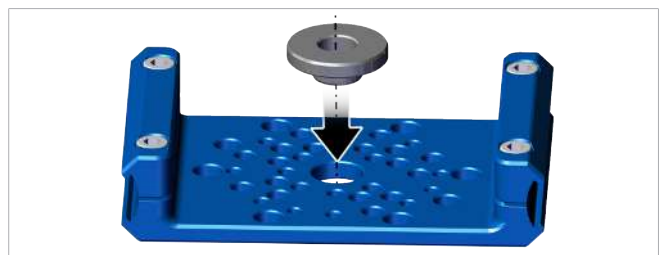
2. Place the gripping system on the flange in the correct position (see the previous section).
3. Secure the gripping system with the clamping ring (see the previous section).
 - ⇒ The gripping system is securely attached to the ECBPi.

Variant with two main beams

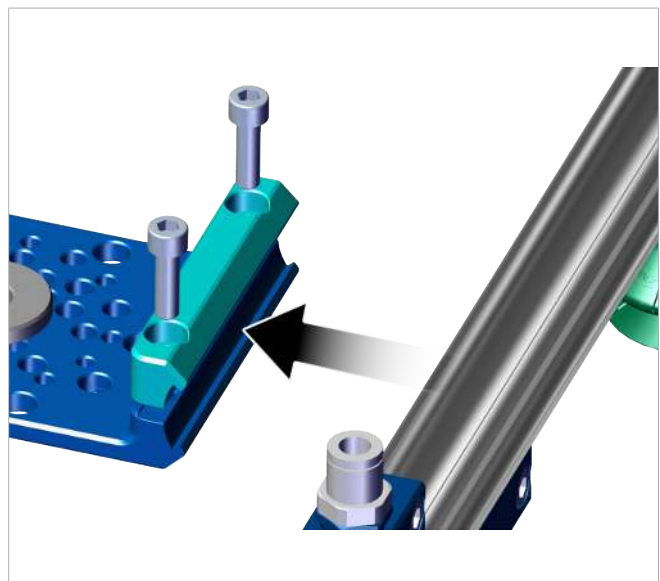
This flange can be mounted on a robot from both sides. This affects the height of the gripper structure.

- ✓ Flange set is available. For example, part no. 10.01.49.00026.

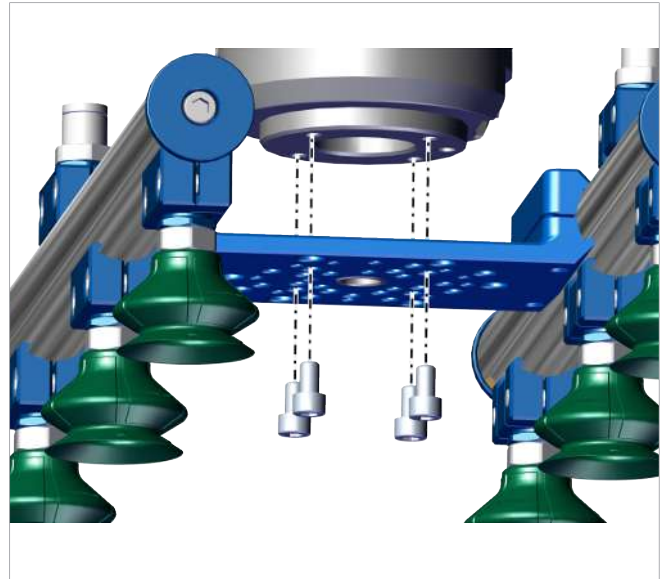
1. Insert the centering bush into the central hole on the flange in the correct position.



2. Place the preassembled main beams in the correct position on the flange and secure them.



3. Attach the gripping system to the robot by means of the flange using the supplied screws.



5.8 Attaching the Cover Cap with an External Vacuum Line



CAUTION

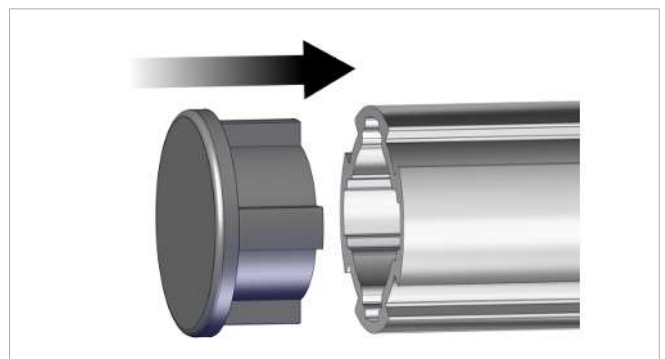
Sharp-edged section end

Cuts

- Attach a cover cap to the end of the section.

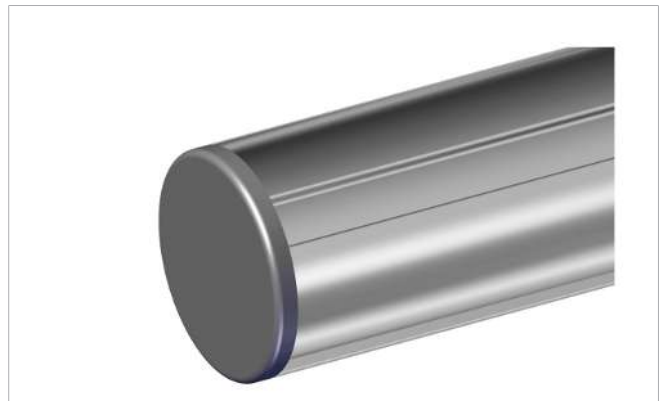
- ✓ The required number of cover caps (part no. 25.09.06.00119) is available

1. Place the cover cap on the end of the section in the correct position (90° pitch).



2. Hit the cover cap with a rubber mallet until it is flush.

⇒ The cover cap is attached flush to the end of the beam.

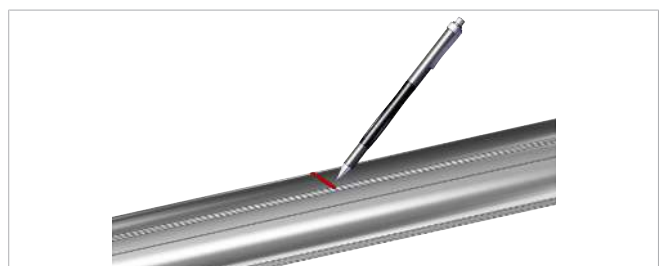


5.9 Attaching the Cross Connector for the External Vacuum Line

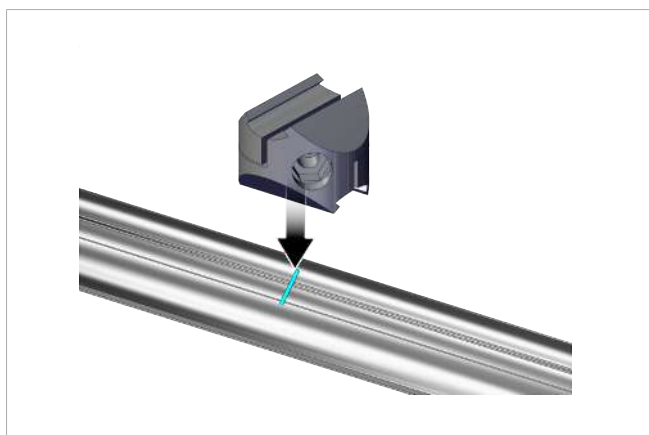
This connector is used for purely mechanical fixation of two beams at an angle of 90°.

- ✓ The components with part no. 25.09.06.00123 are available.

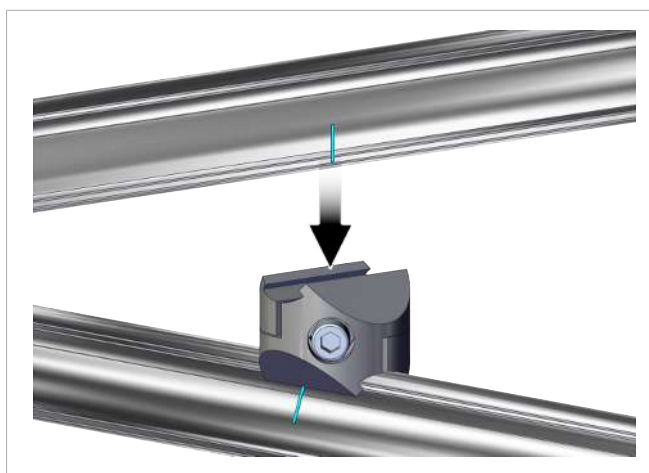
1. Mark the specified position of the cross connector on the beam.



2. Position the cross connector loosely on the beam.



3. Place the crossing beam in the correct position.



4. Position and attach the mounted assembly using the notch on the clamping element and the marking on the beam. Tighten the screw with a torque of 10 Nm \pm 2 Nm.

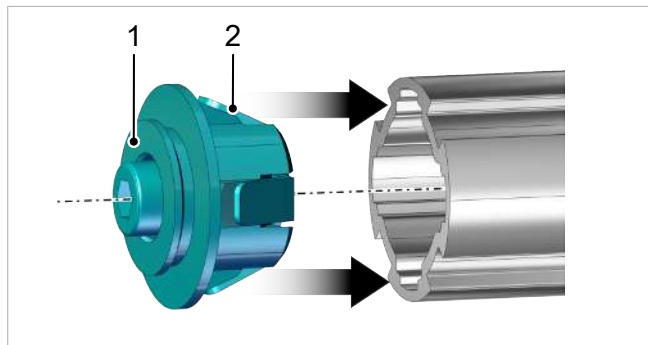


5.10 Attaching the T-Connector

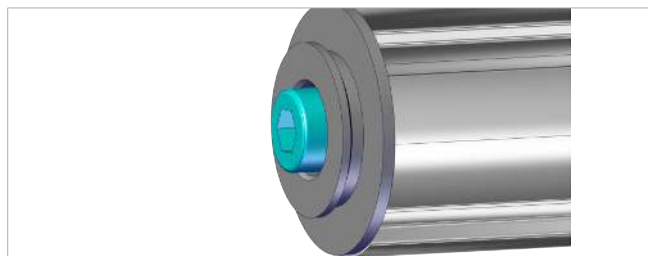
This connector is used for the butt joining of two beams. A beam can be adjusted around the longitudinal axis at an angle.

- ✓ The components with part no. 10.01.49.00047 are available.
- ✓ The beam is at a right angle, clean and free of burrs.

1. At the end of the section of the beam to be butt joined, insert the mounting device (1) including the clamp (2) in the correct position into the beam end so that it is flush with the beam (90° pitch).

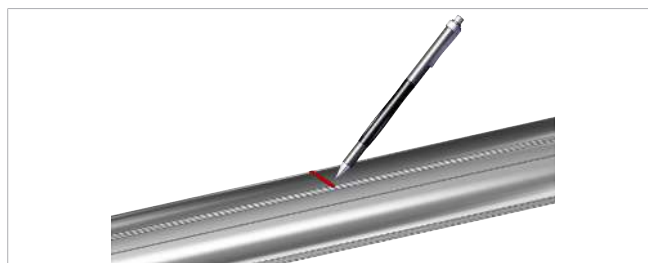


2. Tighten the screw with a torque of $> 10 \text{ Nm}$.

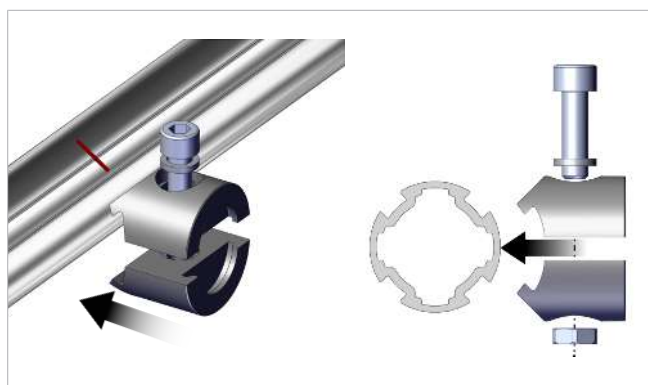


- ⇒ The internal clamp spreads and thus secures itself in the internal diameter of the beam.

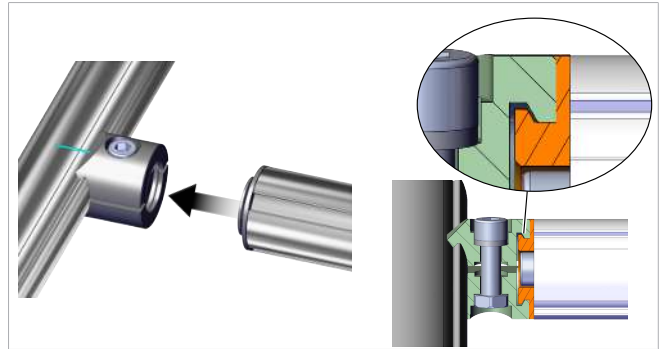
3. Mark the specified position of the T-connector on the beam.



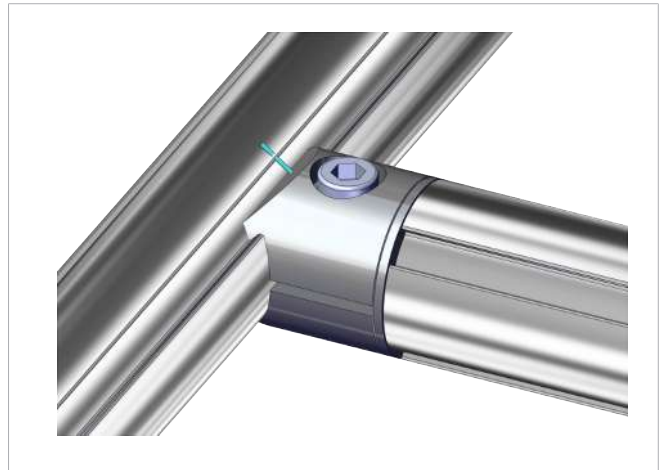
4. Position the T-connector loosely on the beam.



5. Insert the prepared end of the beam into the connector.



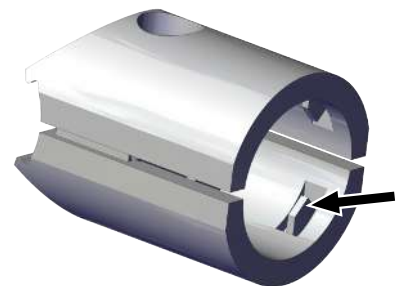
6. Move the connector to the specified position and secure/clamp all components with the screw. Tighten the screw with a torque of $10 \text{ Nm} \pm 2 \text{ Nm}$.



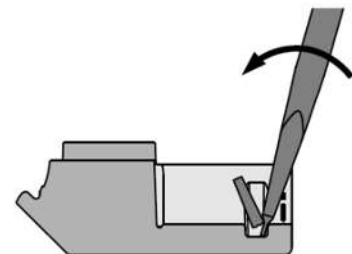
5.11 Attaching the "Long" T-Connector

This connector is used for the butt joining of two beams. A beam can be adjusted around the longitudinal axis at an angle:

- When used with profile cams = adjustment angle in **90°** increments



- When used without profile cams (i.e. the four profile cams have been removed, for example, with a flat-head screwdriver) = adjustment angle is **free**



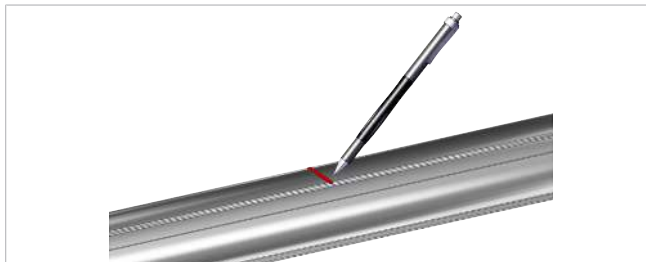
Important:

When used without profile cams, the maximum holding torque is reduced significantly. Mounting is carried out according to the following steps, except that the radial position in step 3 can be freely selected.

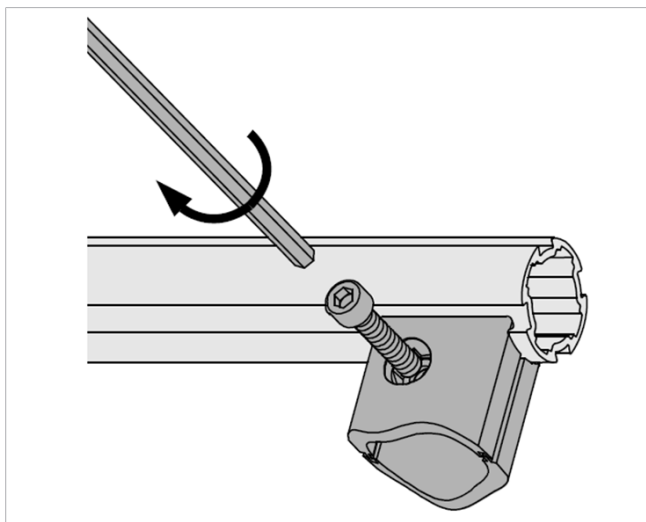
Use in original condition with profile cams

- ✓ The components with part no. 25.09.06.00160 are available.
- ✓ The beam is at a right angle, clean and free of burrs.

1. Mark the specified position of the T-connector on the beam.



2. Position the T-connector loosely on the beam.



3. Insert the prepared end of the beam into the connector in the correct position (4 profile cams) until it stops.



4. Move the connector to the specified position and secure/clamp all components with the screw.
Tighten the screw with a torque of 10 ± 2 Nm.

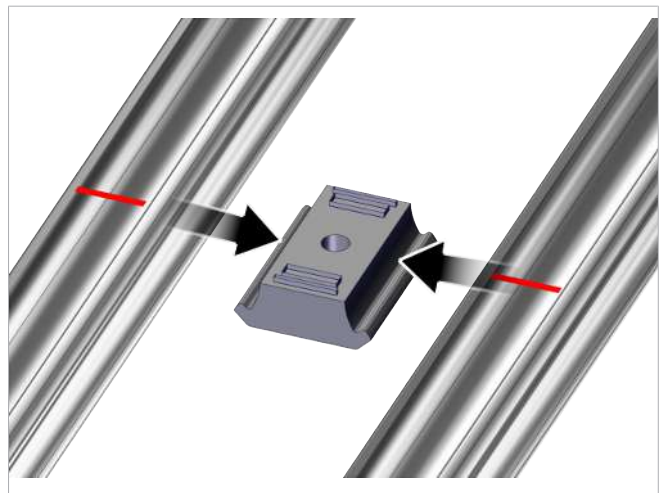


5.12 Attaching the Parallel Connector for the External Vacuum Line

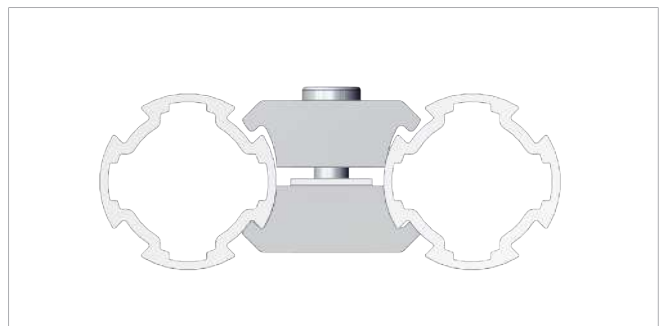
The parallel connector is used to secure two parallel beams.

- ✓ The components with part no. 25.09.06.00121 are available.
1. Mark the specified position of the parallel connector on the beam.

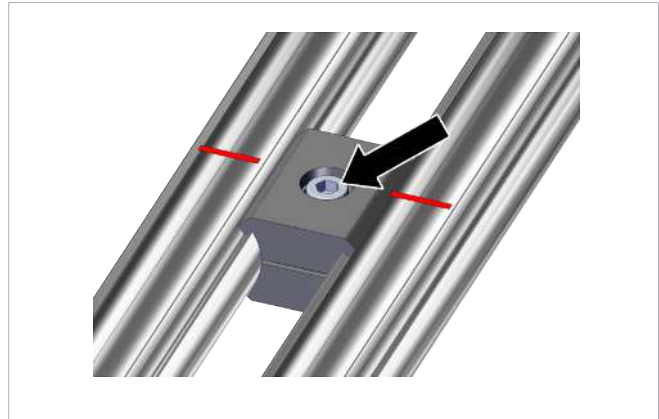
2. Position both beams in component 1 of the connector.



3. Loosely screw on component 2 of the connector with the screw.



4. Position and attach the mounted assembly using the notch on the clamping element and the marking on the beam. Tighten the screw with a torque of $10 \text{ Nm} \pm 2 \text{ Nm}$.



5.13 Attaching the 3D Connector with an Internal Vacuum Line

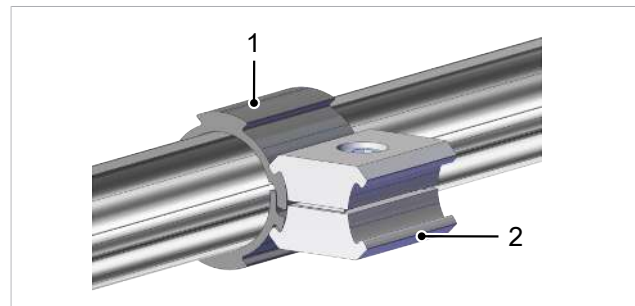
The 3D connector is used to freely connect other connectors without being restricted to the 90° arrangement of the section. Up to 4 connecting elements can be connected to a 3D connector.

Example:

A parallel connector (2) is attached to a beam with the aid of a 3D connector (1).

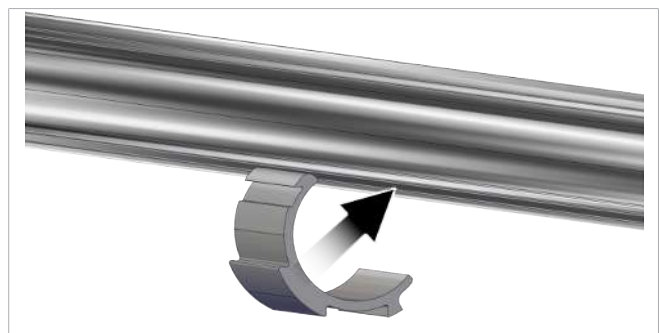
The 3D connector consists of two different half-shells.

A corresponding additional connector is required for attachment to a beam.

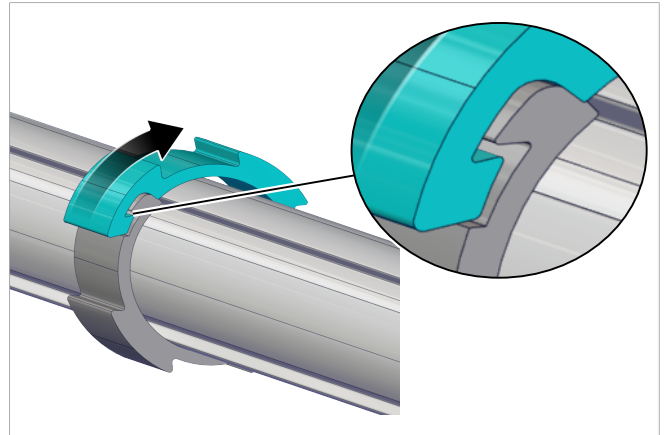


- ✓ The components with part no. 25.09.06.00122 are available.
- ✓ Two beams and another connector are available.

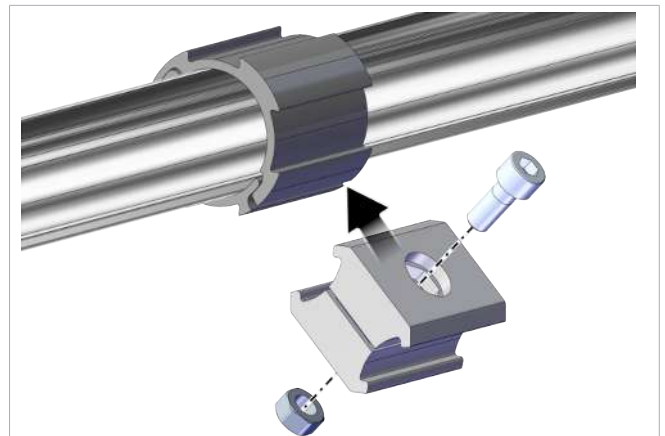
1. At the specified position on the beam, press the half-shell with the teeth facing outwards against the beam until it fits in place.



2. Insert the half-shell with the teeth facing inwards in the correct position into the teeth of the 1st half-shell and rotate it in the direction of the beam until it also fits in place.

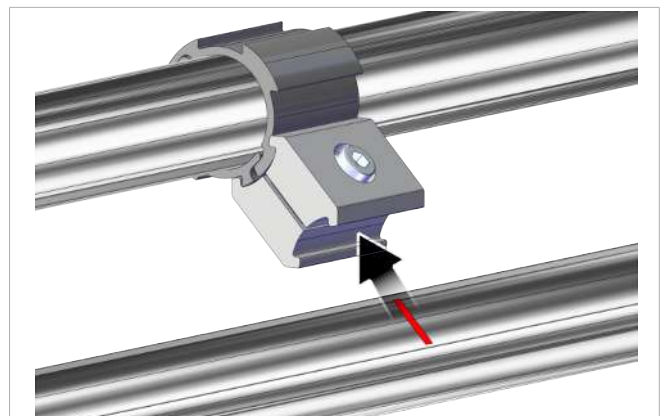


3. Loosely slide the clamping profile of the selected connector (in this example a parallel connector) over the profile of the 3D connector.

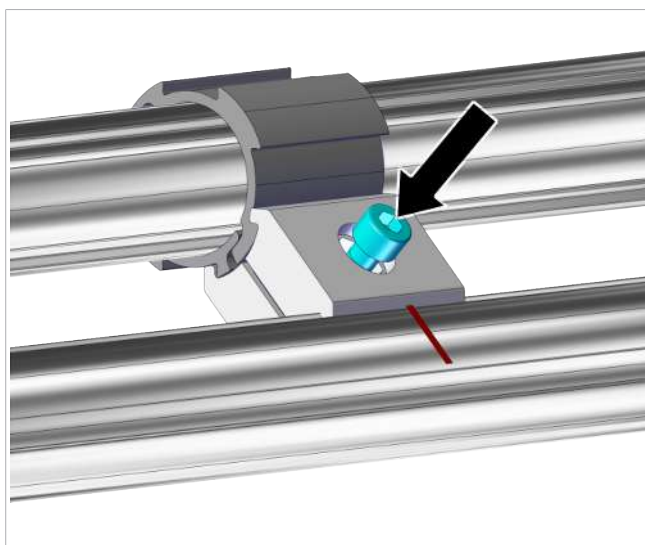


4. Slide the assembly to the specified position and rotate it.

5. Attach the 2nd beam to the connector at the specified position.

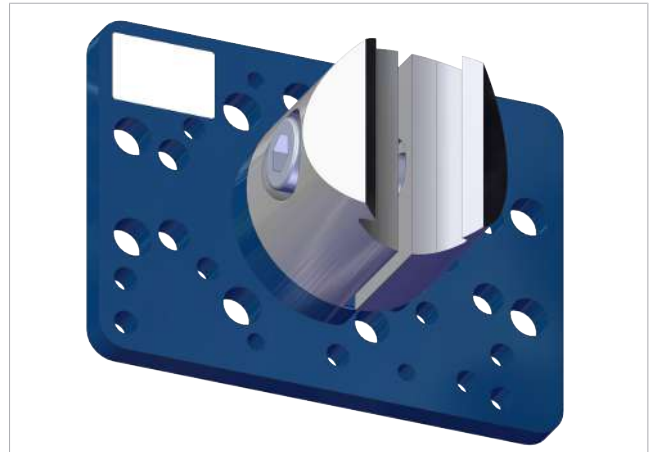


6. Fasten the connector with the screw or screws to secure or clamp the system.



5.14 Using and Attaching the Universal Connector

You can use the universal connector 10.01.49.00098 to attach a range of Schmalz components on the gripper PXT.



The following table shows all the threads and holes made in the mounting plate:

Position	Implementation	Mounting plate
2	Through-hole Ø 5.5 mm	
3	Through-hole Ø 4.5 mm	
4	Through-hole Ø 5.5 mm	
5	M4 thread	
6	M4 thread	
7	M3 thread	
8	M4 thread	
9	M6 thread	
10	M4 thread	
11	Through-hole Ø 3.4 mm	
12	M6 thread	

Use thread locking compound (e.g. Loctite 222)

Max. torque for mounting the products on the mounting plate. Check the maximum permissible tightening torque for the product in advance.

M3 = 1.4 Nm

M4 = 3 Nm

M6 = 8 Nm

The following tables show the use of the holes or threads in combination with the Schmalz products:

Type	Part number	Position	Screw
Magnetic gripper			
SGM 30 1/8" internal thread	10.01.17.00162	3	M4x10
SGM 40 1/4" internal thread	10.01.17.00163	3	M4x12
SGM 50 1/4" internal thread	10.01.17.00164	2	M5x12
SGM 70 1/4" internal thread	10.01.17.00165	2	M5x12
SGM-S 30 1/8" internal thread NPN	10.01.17.00216	3	M4x10
SGM-S 40 1/4" internal thread NPN	10.01.17.00217	3	M4x10
SGM-S 50 1/4" internal thread NPN	10.01.17.00218	2	M5x12
SGM-S 70 1/4" internal thread NPN	10.01.17.00219	2	M5x12
SGM-S 30 1/8" internal thread PNP	10.01.17.00200	3	M4x10
SGM-S 40 1/4" internal thread PNP	10.01.17.00201	3	M4x10
SGM-S 50 1/4" internal thread PNP	10.01.17.00202	2	M5x12
SGM-S 70 1/4" internal thread PNP	10.01.17.00203	2	M5x12
SGM-HD 30 1/8" internal thread	10.01.17.00184	3	M4x10
SGM-HD 40 1/4" internal thread	10.01.17.00185	3	M4x12
SGM-HD 50 1/4" internal thread	10.01.17.00273	2	M5x12
SGM-HD 70 1/4" internal thread	10.01.17.00272	2	M5x12
SGM-HP 20 G1/8-IG	10.01.17.00424	11	M3x8

Type	Part number	Position	Screw
Needle gripper			
SNGi-AE 10 0.8 V 3 IOL	10.01.29.00390	4	M5x10
SNGi-AE 10 0.8 V 10 IOL	10.01.29.00392		
SNGi-AE 10 1.2 V 3 IOL	10.01.29.00394		
SNGi-AE 10 1.2 V 10 IOL	10.01.29.00396		
SNGi-AE 10 1.2 V 20 IOL	10.01.29.00393		
SNG-AP 10 0.8 V 3	10.01.29.00340		
SNG-AP 10 0.8 V 10	10.01.29.00361		
SNG-AP 10 1.2 V 3	10.01.29.00377		
SNG-AP 10 1.2 V 10	10.01.29.00381		
SNG-AP 10 1.2 V 20	10.01.29.00362		
SNG-V 6 0.8 VS-5	10.01.29.00555	4	M5x12
SNG-V 6 1.2 VS-5	10.01.29.00539	4	M5x12

Type	Part number	Position	Screw
Ejectors			
Any SCPS / SCPSi		5.1 + 5.2	M4x25
Any SCPSb			
SCPSi-L HV 3-16 NO M12-5	10.02.02.06052	8 + 5.1	M4x40
SCPSi-L HV 3-16 NC M12-5	10.02.02.06051		
SCPSi-L HV 3-20 NO M12-5	10.02.02.06050		
SCPSi-L HV 3-20 NC M12-5	10.02.02.05827		
SCPS-L HV 3-16 NO M12-5 PNP	10.02.02.06057		
SCPS-L HV 3-16 NC M12-5 PNP	10.02.02.06058		
SCPS-L HV 3-20 NO M12-5 PNP	10.02.02.06055		
SCPS-L HV 3-20 NC M12-5 PNP	10.02.02.06056		

Type	Part number	Position	Screw
Vacuum/pressure switch			
VSi V M8-4	10.06.02.00567	7	M3x6
VSi V D M8-4	10.06.02.00577		
VSi V SA M8-4	10.06.02.00800		
VSi VP8 M8-4	10.06.02.00569		
VSi VP8 D M8-4	10.06.02.00579		
VSi P10 M8-4	10.06.02.00568		
VSi P10 D M8-4	10.06.02.00578		
VSi V M12-4	10.06.02.00570		
VSi V D M12-4	10.06.02.00580		
VSi VP8 M12-4	10.06.02.00572		
VSi VP8 D M12-4	10.06.02.00582		
VSi P10 M12-4	10.06.02.00571		
VSi P10 D M12-4	10.06.02.00581		

Type	Part number	Position	Screw
LQE			
LQEc	10.05.11.00008	6	M4x40
LQEc	10.05.11.00018		
LQ Ei	10.05.11.00014		

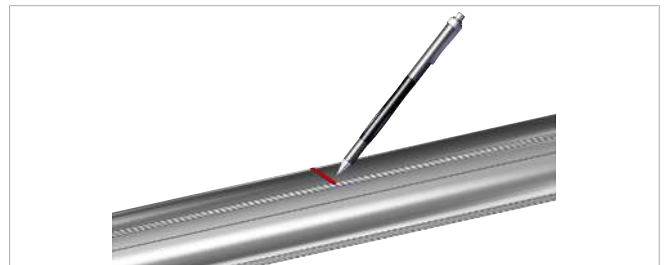
Type	Part number	Position	Screw
Basic ejectors			
SBP HF 2 03 7 KU	10.02.01.01953	10	M4x20
SBP HF 2 06 13 KU	10.02.01.01954	10	M4x20
SBP HF 2 13 22 KU	10.02.01.01956	9	M6x30
SBP HF 3 06 13 KU	10.02.01.01955	10	M4x20
SBP HF 3 13 22 KU	10.02.01.01957	9	M6x30
SBP HV 2 04 7 KU	10.02.01.01958	10	M4x20
SBP HV 2 07 13 KU	10.02.01.01959	10	M4x20
SBP HV 2 16 22 KU	10.02.01.01961	9	M6x30
SBP HV 3 07 13 KU	10.02.01.01960	10	M4x20
SBP HV 3 16 22 KU	10.02.01.01962	9	M6x30

Type	Part number	Position	Screw
Vacuum/compressed air distributor			
VTR 3/8" internal thread 9x1/4" AL	10.09.03.00054	12	M6x30
VTR 3/8" internal thread 5x1/4" AL	10.09.03.00060		M6x30
VTR 1/2" internal thread 5x3/8" POM	10.09.03.00092		M6x40
VTR 3/8" internal thread 5x1/4" POM	10.09.03.00099		M6x30
VTR 3/8" internal thread 9x1/4" POM	10.09.03.00100		M6x30

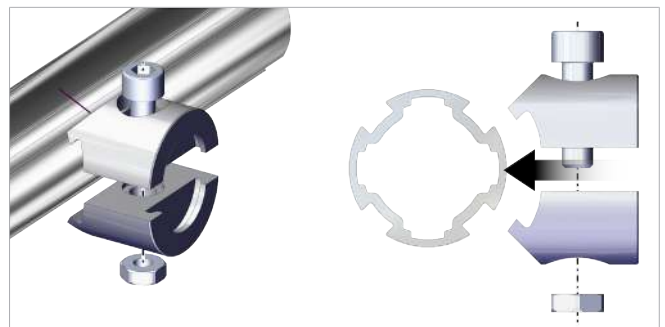
Mounting the Universal Connector to the Beam

- ✓ The universal connector set (T-connector and universal connector) with part no. 10.01.49.00098 is available.

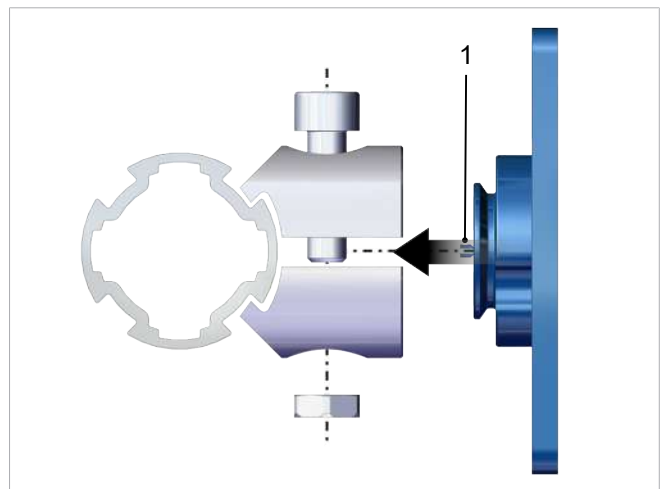
1. Mark the specified position of the T-connector on the beam.



2. Position the T-connector loosely on the beam.



3. Move the T-connector to the specified position and insert the universal connector into the T-connector in the correct position (i.e. insert the cam (1) on the universal connector into the gap between the half shells of the T-connector.).
Tighten the screw with a torque of 10 Nm \pm 2 Nm.





⇒ The universal connector is attached to the beam.



Due to the cam on the universal connector, the positioning in the T-connector is limited to two positions: 0° and rotated 180°. If a different position is required, the cam must be removed. Without the cam, the holding force with regard to radial twisting is reduced.

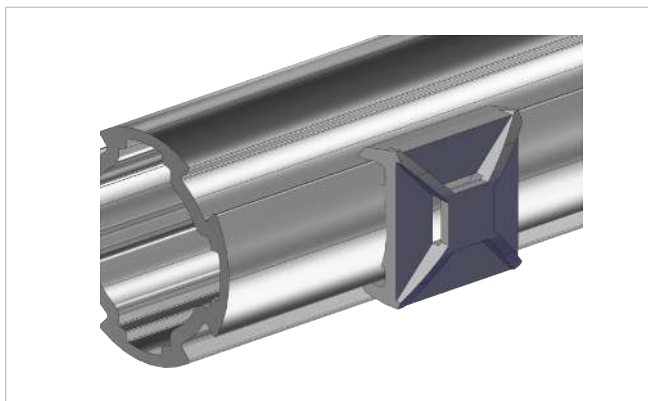
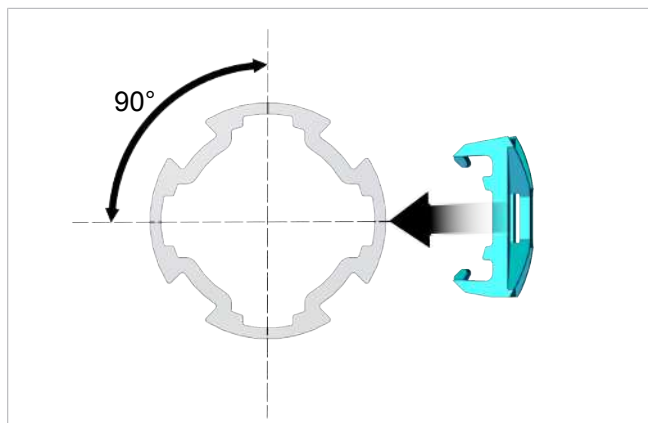
5.15 Attaching the Universal Holder

The universal holder can be used, for example, to secure hoses and cables to the beam using a cable tie.

✓ The universal holder with part no. 25.09.06.00120 is available.

► Clip the universal holder onto the beam at the specified position.

⇒ The universal holder is attached to the beam.

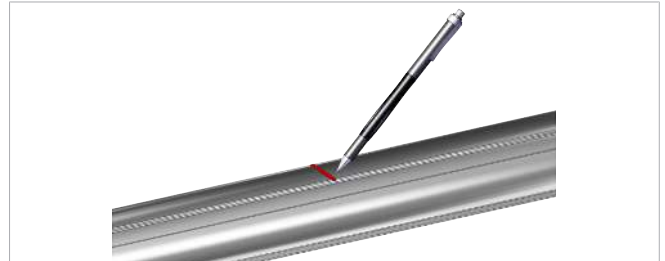


5.16 Attaching a Suction Cup Connection with Slot

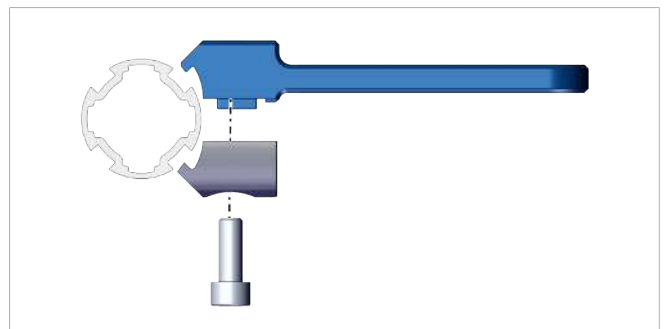
Using this assembly, suction cups are attached to the beam with an external vacuum line. By mounting this assembly on the 3D connector, the suction cup connection can be positioned freely around the longitudinal axis of the beam.

- ✓ The components with part no. 10.01.49.00036 are available.

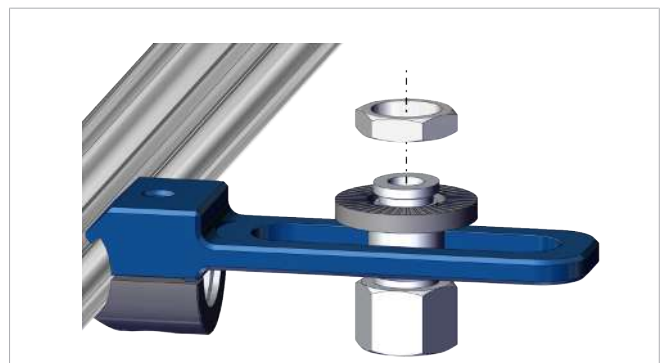
1. Mark the specified position of the connector on the beam.



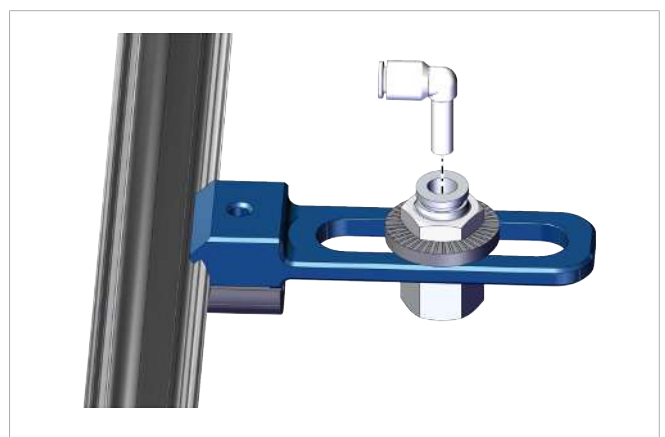
2. Position the holder on the beam (or on the 3D connector) and secure it. Tighten the screw with a torque of 9 Nm.



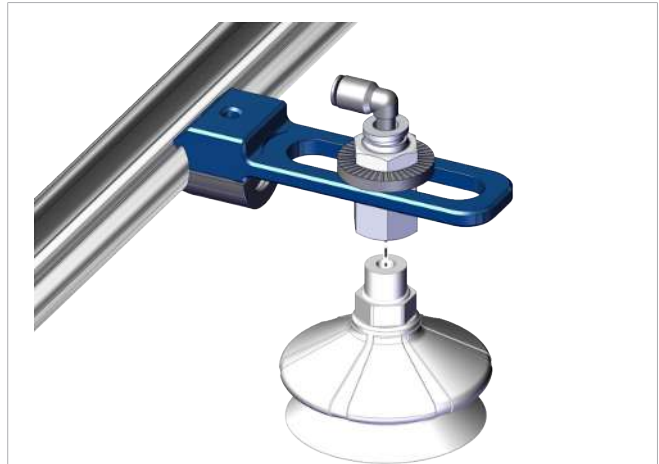
3. Attach bulkhead connector 10.08.02.00500 to the holder using a push-in head with a Ø of 8 mm. The tightening torque is 9 Nm, width across flats 19 mm.



4. If necessary, insert the right-angle connector into the push-in head of the bulkhead connector.



- ⇒ The suction cup connection is attached to the beam. Vacuum suction cups can be screwed into the bulkhead connector.



5.17 Attaching the Holder System for the Spring Plunger and Suction Cup Connection

With external vacuum lines, this holder system is used to attach spring plungers and suction cup connections to the beam, aligned exactly at a right angle to the beam or swiveled continuously by removing a positioning cam.



NOTE

The spring plunger is not aligned correctly.

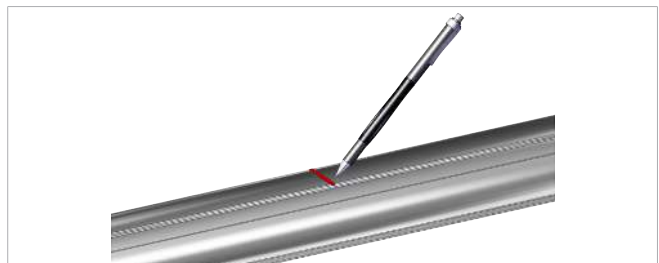
Premature spring plunger failure and leakage

- ▶ Ensure that the spring plunger and its suction cup are always **perpendicular to the area to be picked up** and the suction cup is applied over the full area when contact is made to ensure the load is spread evenly.

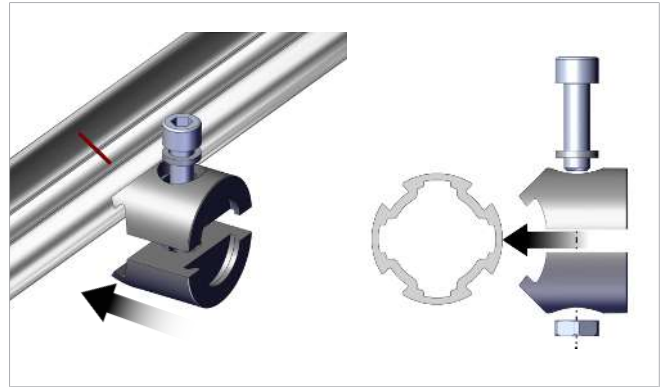
By mounting this assembly on the 3D connector, the connection can be positioned freely around the longitudinal axis of the beam.

- ✓ The components with part no. 10.01.49.00038 and .00039 including bulkhead connectors for suction cups are available.

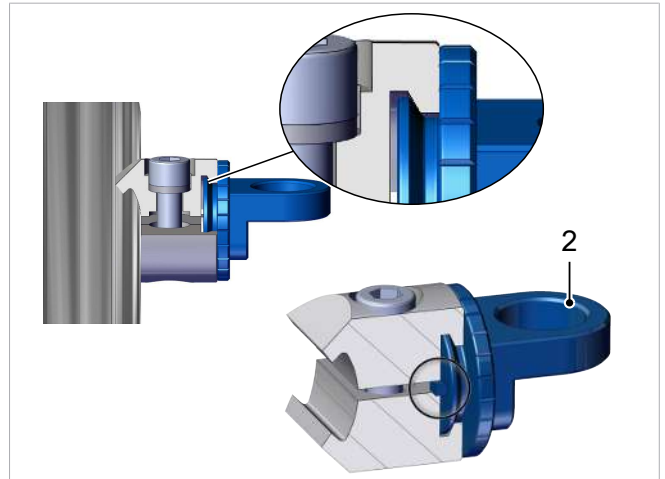
1. Mark the specified position of the connector on the beam.



2. Position the clamp of the holder system loosely on the beam.



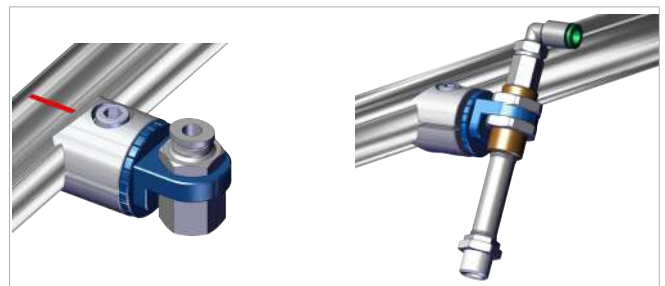
3. Position the holder system correctly (aligned exactly at a right angle to the beam) on the beam (or on the 3D connector) so that the cam on the component (2) is positioned in the gap of the clamping components and secure. Tighten the screw with a torque of 9 Nm.



4. Alternatively, the holder can be clamped to the connector at any angle.
To do so, first remove the cam from the component (2), e.g. using grippers to grip the cam and remove it with a rotational movement. To adjust the angle, loosen the screw until the component (2) can be rotated ①. Rotate the component (2) to the specified position ② and secure the system by tightening the screw with a tightening torque of 9 Nm.



5. Attach the bulkhead connector or spring plunger to the component (2).



5.18 Attaching the Multi-Block

The multi-block is used to secure attachment parts to a beam, such as a retaining plate. The various options for positioning nuts in the holder and the holes ensure a high degree of flexibility.

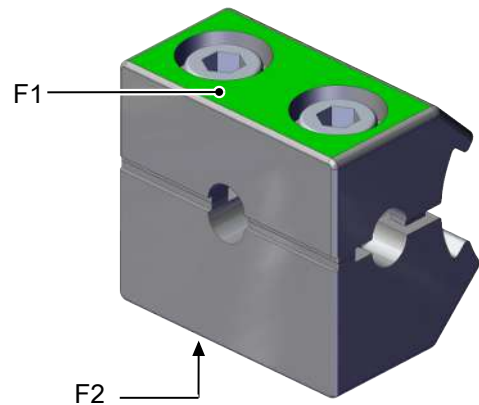
The holder assembly consists of 2 machine screws, 3 nuts with M6 thread (2x hexagon and 1x square) and two-piece holder.

The multi-block is mounted on or clamped to a beam using at least one machine screw.

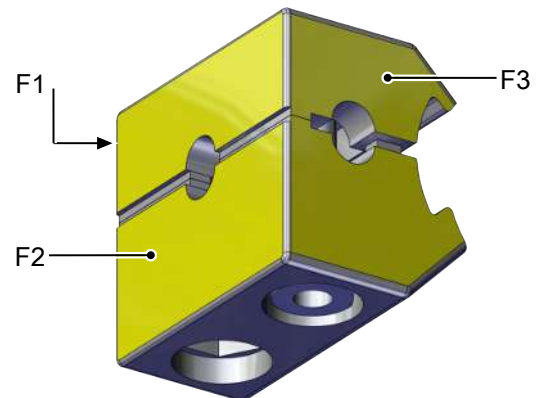
There is a choice of five possible contact surfaces for mounting attachment parts.

Depending on the position of the two remaining nuts (1 hexagon nut and the square nut mounted inside the multi-block), the following surfaces can be used as contact surfaces for add-on parts:

a) Connection with hexagon nut, 2 surfaces



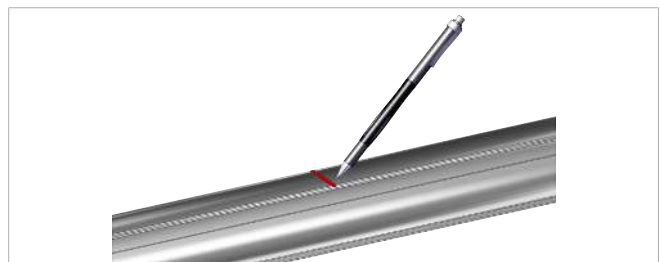
b) Connection with square nut, 3 surfaces



The following section provides an example of how to mount the multi-block. In the example, area F3 is to be used as a contact surface:

- ✓ The multi-holder assembly with part no. 25.09.06.00154 is available.
- ✓ A beam is available.

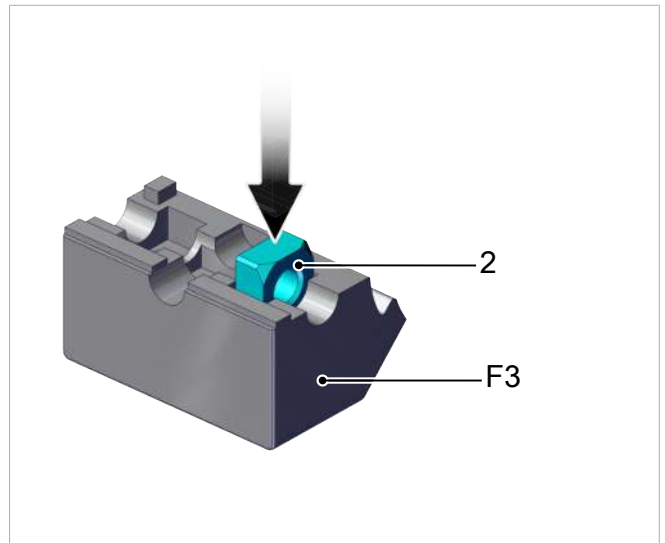
1. Mark the position specified for the multi-block on the beam.



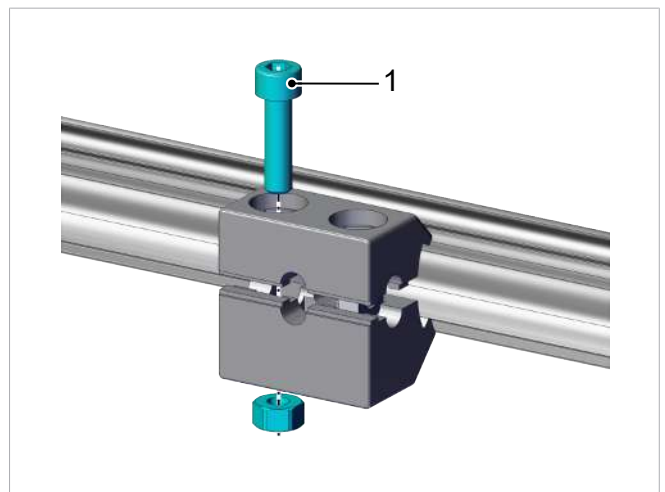
2. Remove the screws (1).



3. Remove the internal square nut (2) from the central position and insert it into the nut position on the F3 surface side.

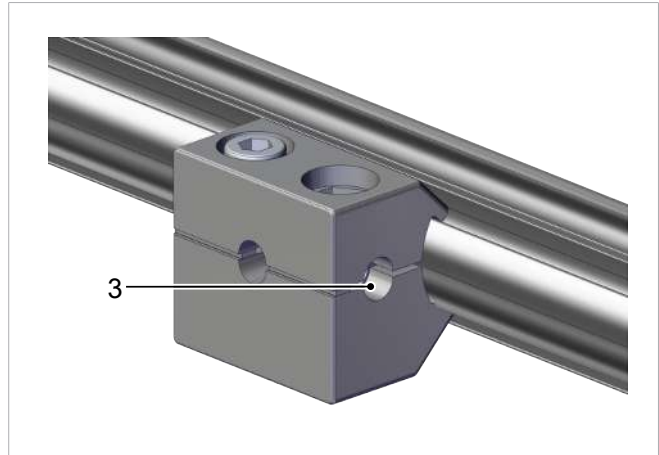


4. Place the multi-block on the beam and loosely tighten one screw (1) on the side facing F3.



5. Slide the multi-block to the specified position and tighten the screw (1) with a tightening torque of 10 Nm.

- ⇒ The attachment part can be attached using the hole (3) and the square nut positioned in the multi-holder.



5.19 Attaching Hoses with an External Vacuum Line



⚠ CAUTION

Risk of getting caught by the connection cable when the robot moves.

Injury due to limbs or hair getting caught.

- ▶ Route the connection cable as close to the robot arm as possible.
- ▶ Avoid the danger zone.

1. Cut the pneumatic hose to length.
2. Using the universal holder (> [See ch. 5.15 Attaching the Universal Holder, p. 56](#)), route the pneumatic hoses close to the robot arm and insert them into the plug-in screw unions as far as they will go.
3. Manually check that the hoses are securely fastened in the plug-in screw unions by pulling on the hose.
4. Secure the hoses on the robot arm.

6 Troubleshooting

Fault	Cause	Solution
Workpiece is not gripped	Leaks in the vacuum system	▶ Check tubing/connector/plug for leaks
Components move/shift	Screw union is not suitable or not tightened to the specified tightening torque	▶ Check/tighten the screw unions

7 Disposing of the Product

The components may only be prepared for disposal by qualified specialists.

- ✓ The product is out of operation.
- ▶ Dismantle the components of the gripping system and dispose of the materials accordingly.



For proper disposal, please contact a company specializing in the disposal of technical goods and instruct the company to observe the applicable disposal and environmental regulations. Schmalz is happy to assist you in finding a suitable company.

The table below shows the materials used:

Component	Material/material number
Main body	Anodized aluminum
Gripping finger	SI
O-ring	NBR
Screws, hose connection	Brass, nickel-plated
Machine screw	Stainless steel
Gripping finger clamping element	Aluminum
Dowel pin	1.4305
Flange	Aluminum

8 Accessories

Designation	Part no.	Note
Pipe deburrer PIPE-DEBURR	10.01.36.00043	For deburring the sections

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