Assembly and Operating Manual

PCFC

Passive Compliant Force Control Tool

Translation of Original Operating
Manual

SCHUNK

Hand in hand for tomorrow

Imprint

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Technical changes:

We reserve the right to make alterations for the purpose of technical improvement.

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Dear Customer,

Thank you for trusting our products and our family-owned company, the leading technology supplier of robots and production machines.

Our team is always available to answer any questions on this product and other solutions. Ask us questions and challenge us. We will find a solution!

Best regards,

Your SCHUNK team

Customer Management

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Please read the operating manual in full and keep it close to the product.

Table of Contents

1 General

1.1 About this manual

This manual contains important information for a safe and appropriate use of the product.

This manual is an integral part of the product and must be kept accessible for the personnel at all times.

Before starting work, the personnel must have read and understood this operating manual. Prerequisite for safe working is the observance of all safety instructions in this manual.

In addition to these instructions, the documents listed under ▶ 1.1.3 [🗋 6] are applicable.

NOTE: The illustrations in this manual are intended to provide a basic understanding and may deviate from the actual version.

1.1.1 Presentation of Warning Labels

To make risks clear, the following signal words and symbols are used for safety notes.

⚠ **DANGER**

Dangers for persons!

Non−observance will inevitably cause irreversible injury or death.

⚠ **WARNING**

Dangers for persons!

Non−observance can lead to irreversible injury and even death.

⚠ **CAUTION**

Dangers for persons!

Non−observance can cause minor injuries.

NOTICE

Material damage!

Information about avoiding material damage.

1.1.2 Definition of Terms

The term "product" replaces the product name on the title page in this manual.

1.1.3 Applicable documents

- General terms of business *
- Catalog data sheet of the purchased product *

The documents labeled with an asterisk (*) can be downloaded from **schunk.com/downloads**.

1.1.4 Variants

This operating manual applies to the following variations:

- PCFC-12-A
- PCFC-12-B
- PCFC-12-B-V750
- PCFC-12-C

1.2 Warranty

If the product is used as intended, the warranty is valid for 24 months from the ex-works delivery date under the following conditions:

- Observe the ambient conditions and operating conditions

Parts touching the workpiece and wear parts are not included in the warranty.

1.3 Scope of delivery

The scope of delivery includes

- Passive Compliant Force Control Tool PCFC in the version ordered
- Safety information (product-specific instructions available online)
- 1x wrench (1/2"), only for V750 variant
- 1x wrench (11/16"), only for V750 variant

1.4 Accessories

The following accessories are available for the product, which must be ordered separately:

- Motor kit 750 watts
- Adapter plate

For information regarding which accessory articles can be used with the corresponding product variants, see catalog data sheet.

2 Basic safety notes

2.1 Intended use

The product is intended exclusively for machining workpieces with a robot.

- The product may only be used within the scope of its technical data, ▶ 3 [🗋 13].

- The product is intended for installation in a machine/ automated system or for attachment to a robot. The applicable guidelines for the machine/automated system must be observed and complied with.

- The product is intended for industrial and industry-oriented use. Its use outside enclosed spaces is only permitted if suitable protective measures are taken against outdoor exposure. The product is not suitable for use in salty air.

- Appropriate use of the product includes compliance with all instructions in this manual.

- Any utilization that exceeds or differs from the appropriate use is regarded as misuse.

2.2 Constructional changes

Implementation of structural changes

Modifications, changes or reworking, e.g. additional threads, holes, or safety devices, can damage the product or impair its functionality or safety.

- Structural changes should only be made with the written approval of SCHUNK.

- Excluded from this is the reworking and / or removal of the cover plates on the product provided for this purpose.

2.3 Spare parts

Use of unauthorized spare parts

Using unauthorized spare parts can endanger personnel and damage the product or cause it to malfunction.

- Use only original spare parts or spares authorized by SCHUNK.

2.4 Ambient conditions and operating conditions

Required ambient conditions and operating conditions

Incorrect ambient and operating conditions can make the product unsafe, leading to the risk of serious injuries, considerable material damage and/or a significant reduction to the product's life span.

• Make sure that the product is used only in the context of its defined application parameters, ▶ 3 [🗋 13].

2.5 Personnel qualification

Inadequate qualifications of the personnel

If the personnel working with the product is not sufficiently qualified, the result may be serious injuries and significant property damage.

• All work may only be performed by qualified personnel.

• Before working with the product, the personnel must have read and understood the complete assembly and operating manual.

• Observe the national safety regulations and rules and general safety instructions.

The following personal qualifications are necessary for the various activities related to the product:

Trained electrician Due to their technical training, knowledge and experience, trained electricians are able to work on electrical systems, recognize and avoid possible dangers and know the relevant standards and regulations.

Qualified personnel Due to its technical training, knowledge and experience, qualified personnel is able to perform the delegated tasks, recognize and avoid possible dangers and knows the relevant standards and regulations.

Instructed person Instructed persons were instructed by the operator about the delegated tasks and possible dangers due to improper behaviour.

Service personnel of the manufacturer Due to its technical training, knowledge and experience, service personnel of the manufacturer is able to perform the delegated tasks and to recognize and avoid possible dangers.

2.6 Personal protective equipment

Use of personal protective equipment

Personal protective equipment serves to protect staff against danger which may interfere with their health or safety at work.

- When working on and with the product, observe the occupational health and safety regulations and wear the required personal protective equipment.
- Observe the valid safety and accident prevention regulations.
- Wear protective gloves to guard against sharp edges and corners or rough surfaces.
- Wear heat-resistant protective gloves when handling hot surfaces.
- Wear protective gloves and safety goggles when handling hazardous substances.
- Wear close-fitting protective clothing and also wear long hair in a hairnet when dealing with moving components.
- Wear ear protection and safety goggles during the machining process.

2.7 Transport

Handling during transport

Incorrect handling during transport can make the product unsafe and risk the danger of serious injuries and considerable material damage.

- During transport and handling, secure the product to prevent it from falling.
- Do not walk under suspended loads.

2.8 Malfunctions

Behavior in case of malfunctions

- Immediately remove the product from operation and report the malfunction to the responsible departments/persons.
- Order appropriately trained personnel to rectify the malfunction.
- Do not recommission the product until the malfunction has been rectified.
- Test the product after a malfunction to establish whether it still functions properly and no increased risks have arisen.

2.9 Disposal

Handling of disposal

The incorrect handling of disposal may impair the product's safety and cause serious injuries as well as considerable material and environmental harm.

- Follow local regulations on dispatching product components for recycling or proper disposal.

2.10 Fundamental dangers

General

- Observe safety distances.
- Never deactivate safety installations.
- Install the provided protective product in the danger zone before switching on the product.
- Remove the energy supplies before installation, modification, maintenance, or adjustment work. Ensure there is no residual energy in the system.
- Do not move parts by hand while the energy supply is connected.
- Do not reach into the movement area of the product during operation.

2.10.1 Protection during handling and assembly

Incorrect handling and assembly

Incorrect handling and assembly may impair the product's safety and cause serious injuries and considerable material damage.

- Have all work carried out by appropriately qualified personnel.
- For all work, secure the product against accidental operation.
- Observe the relevant accident prevention rules.
- Use suitable assembly and transport equipment and take precautions to prevent jamming and crushing.

Incorrect lifting of loads

Falling loads may cause serious injuries and even death.

- Stand clear of suspended loads and do not step into their swiveling range.
- Never move loads without supervision.
- Do not leave suspended loads unattended.

2.10.2 Protection during commissioning and operation

Falling or violently ejected components

Falling and violently ejected components can cause serious injuries and even death.

- Take appropriate protective measures to secure the danger zone.
- Never step into the danger zone during operation.

2.10.3 Protection against dangerous movements

Unexpected movements

Residual energy in the system may cause serious injuries while working with the product.

- Switch off the energy supply, ensure that no residual energy remains and secure against inadvertent reactivation.

- Never rely solely on the response of the monitoring function to avert danger. Until the installed monitors become effective, it must be assumed that the drive movement is faulty, with its action being dependent on the control unit and the current operating condition of the drive. Perform maintenance work, modifications, and attachments outside the danger zone defined by the movement range.

- To avoid accidents and/or material damage, human access to the movement range of the machine must be restricted. Limit/prevent accidental access for people in this area due through technical safety measures. The protective cover and protective fence must be rigid enough to withstand the maximum possible movement energy. EMERGENCY STOP switches must be easily and quickly accessible. Before starting up the machine or automated system, check that the EMERGENCY STOP system is working. Prevent operation of the machine if this protective equipment does not function correctly.

2.11 Notes on particular risks

⚠ DANGER

Risk of fatal injury from suspended loads!

Falling loads can cause serious injuries and even death.

- Stand clear of suspended loads and do not step within their swiveling range.
- Never move loads without supervision.
- Do not leave suspended loads unattended.
- Wear suitable protective equipment.

⚠ WARNING

Risk of injury from objects falling and being ejected!

Falling and ejected objects during operation can lead to serious injury or death.

- Take appropriate protective measures to secure the danger zone.

⚠ WARNING

Risk of injury due to unexpected movements!

If the power supply is switched on or residual energy remains in the system, components can move unexpectedly and cause serious injuries.

- Before starting any work on the product: Switch off the power supply and secure against restarting.
- Make sure, that no residual energy remains in the system.

⚠ CAUTION

Risk of injury from flying chips and dirt particles

During operation, flying chips and dirt particles can cause eye injuries.

- Always wear appropriate personal protective equipment, particularly protective goggles.
- Take suitable protective measures to secure the danger zone.

3 Technical data

3.1 Basic data

Designation	PCFC–12–A	PCFC–12–B	PCFC–12–B–V750	PCFC–12–C
Weight [kg]	3.54	3.58	4	3.63
Compensation path axial Z [mm]		12		
Compliance force [N] Min. Max.	18 85	44 170		49 240
Nominal operating pressure [bar] Compensation air connection Air purge connection		1–4.1 2		
Pressure medium Compensation air connection		Compressed air (clean, dry, filtered (≤ 5 µm), oil–free)		
Pressure medium Motor	–	Compressed air (clean, dry, filtered (≤ 5 µm), oiled)		–
Max. air consumption [l/s]	–	15		–
Oil consumption [drops/min]	–	3–5		–
Max. moment M_x / M_y [Nm]		15		
Max. moment M_z [Nm]		28		
Communication interface				
Interface		RS485		
Baud rate		115200		
Analog voltage output [V]		0–10		
Analog current output [A]		0.004–0.02		

Ambient conditions and operating conditions

| Designation	PCFC
Ambient temperature [°C] Min. Max.	+5 +35

3.2 Compliance force

NOTE

The compliance force changes linearly with the applied air pressure – as shown in the following diagram. It should be noted that the end effector mounted on the product generates a frictional force due to its own weight and thus the compliance force can be influenced. The values may also vary slightly from product to product and over the life of the product, so the values given should be treated as indicative only.

NOTE

The curves shown in the diagram apply to horizontal, rigidly mounted installations. If the product is used vertically, the unit's own weight and the payload influence the force actually applied.

- If the end effector points upwards, the weight force of the end effector acts against the force of the product and the total force is thus reduced by the weight force.
- If the end effector points downwards, the weight force of the end effector must be added to the force of the product.
- For products mounted at angles between the horizontal and vertical, the actual force must be calculated accordingly.

Compliance force
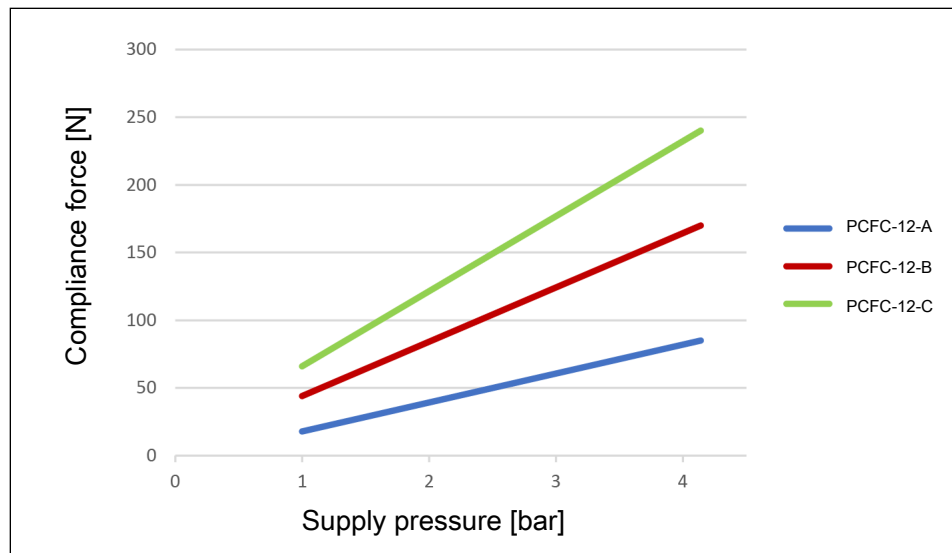
Compliance force as a function of operating pressure

4 Design and description

4.1 Design
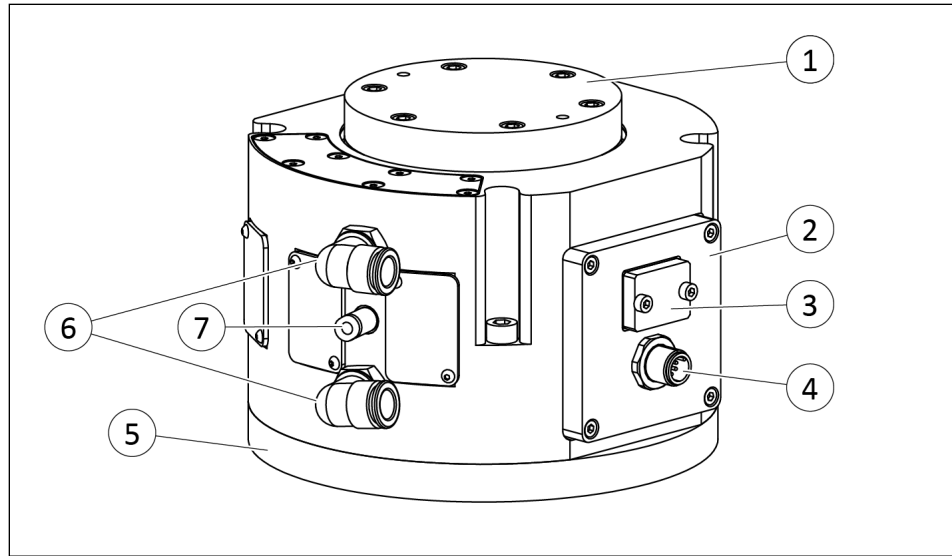
1	Inner slide cover plate for fastening the end effector
2	Sensor block
3	LEDs
4	Sensor connection
5	Rear cover plate for attachment to the robot / for stationary mounting
6	Compensation air connections
7	Air purge connection

4.2 Description

Pneumatic, axial compensation unit for flexible adjustment of compensation or pressure forces

5 Assembly and installation

5.1 Installing and connecting

⚠️ **WARNING**

Risk of injury due to unexpected movements!

If the power supply is switched on or residual energy remains in the system, components can move unexpectedly and cause serious injuries.

- Before starting any work on the product: Switch off the power supply and secure against restarting.
- Make sure, that no residual energy remains in the system.

1. Check the evenness of the mounting surface, ▶ 5.2.1 [🗋 16].
2. Connect compressed air supply, ▶ 5.2.2 [🗋 18].
3. Attach the product to the robot, ▶ 5.2.1 [🗋 16].
   ⇨ If necessary, use appropriate connection elements (adapter plates).
   ⇨ Observe the permissible depth of engagement.
4. Mount the end effector, ▶ 5.2.1 [🗋 16].
5. Adjust the sensor, if necessary, ▶ 5.3 [🗋 22].

5.2 Connections

5.2.1 Mechanical connection

Evenness of the mounting surface

The values apply to the whole mounting surface to which the product is mounted.

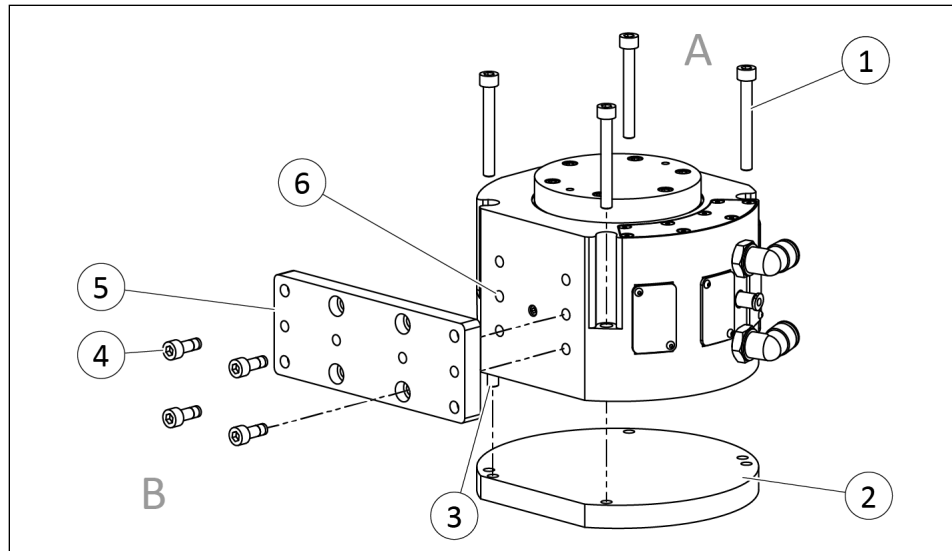| Edge length	Permissible unevenness
< 100	< 0.02
> 100	< 0.05

Tab.: Requirements for evenness of the mounting surface (Dimensions in mm)

Adapter plate requirements

The front and rear cover plates must be reworked by the customer before the product is mounted on the robot or end effector.

Robot side connection

The product can be assembled from two sides.

Item	Mounting	PCFC
Side A		
1	Mounting screw	M6
	Max. tightening torque [Nm]	10
2	Rear cover plate	Ø31.5
	DIN ISO−9409 bolt circle	Ø50
	(centering collar optionally available)	Ø100
3	Fitting bore for centering pin [mm]	6^{H6}
Side B		
4	Mounting screw *	M6
	Max. tightening torque [Nm]	10
	Max. depth of engagement [mm]	11.9
5	Adapter plate radial *	–
6	Fitting bore for centering pin [mm]	6^{H6}

*   provided by customer (available from SCHUNK on request)
     The catalog data sheet contains more information. The latest
     version is always applicable.

End effector connection
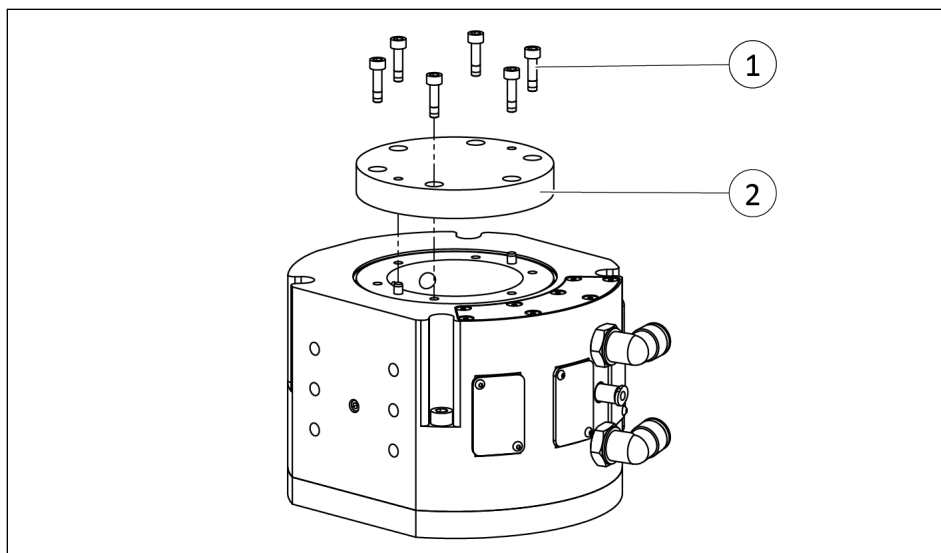
Item	Mounting	PCFC
1	Mounting screw	M4
	Max. tightening torque [Nm]	3
2	Inner slide cover plate	–

5.2.2 Pneumatic connection

NOTE

- Observe the requirements for the compressed air supply, ▸ 3 [🗋 13].
- Use a regulator with venting for better regulation of the compressed air.

PCFC–12
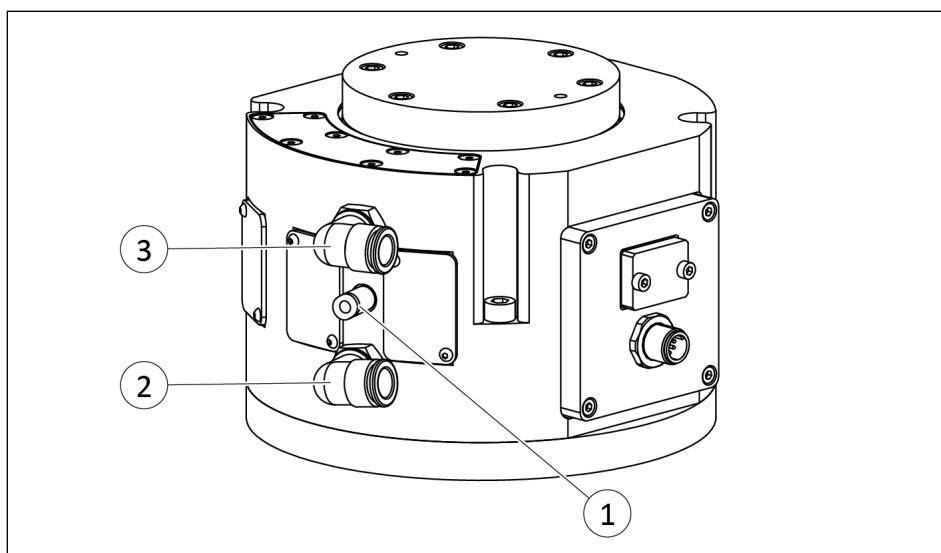
PCFC–12–B–V750
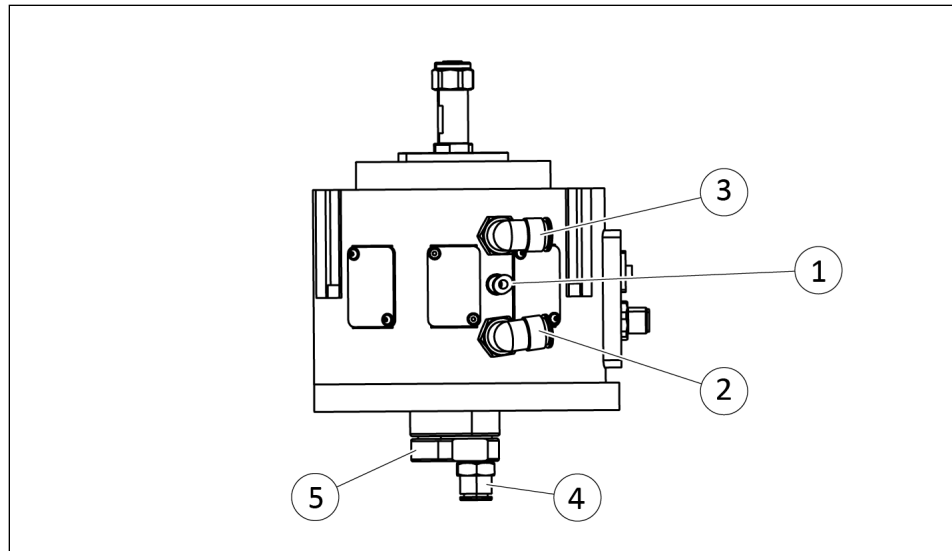
1	Air purge connection
2	Compensation air connection (extension)
3	Compensation air connection (retraction)
4	Motor air connection supply air
5	Motor air connection exhaust air

Item	Mounting	PCFC–12	PCFC–12–B–V750
1	Thread	M5	
	Hose connection [mm]	4	
2	Thread ["]	G1/4	
3	Hose connection [mm]	10	
4	Thread ["]	–	G1/4
	Hose connection [mm]	–	10
5	Thread ["]	–	G1/4
	Hose connection [mm] *	–	10

* Alternatively, a sound absorber can be connected. This is provided separately.

Pneumatics connection diagrams

NOTE
Depending on the application, only one of the retract and extend air connections may be necessary.
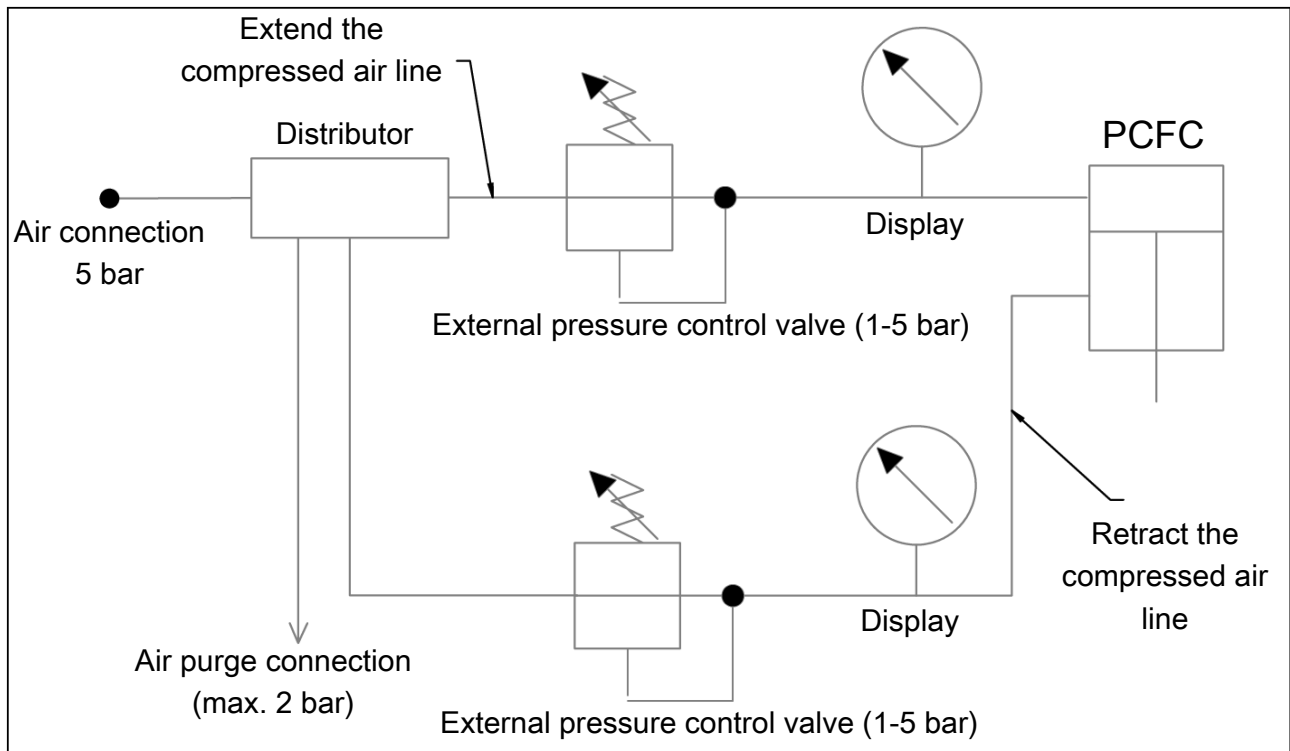
Pneumatic connection diagram for application without gyro sensor
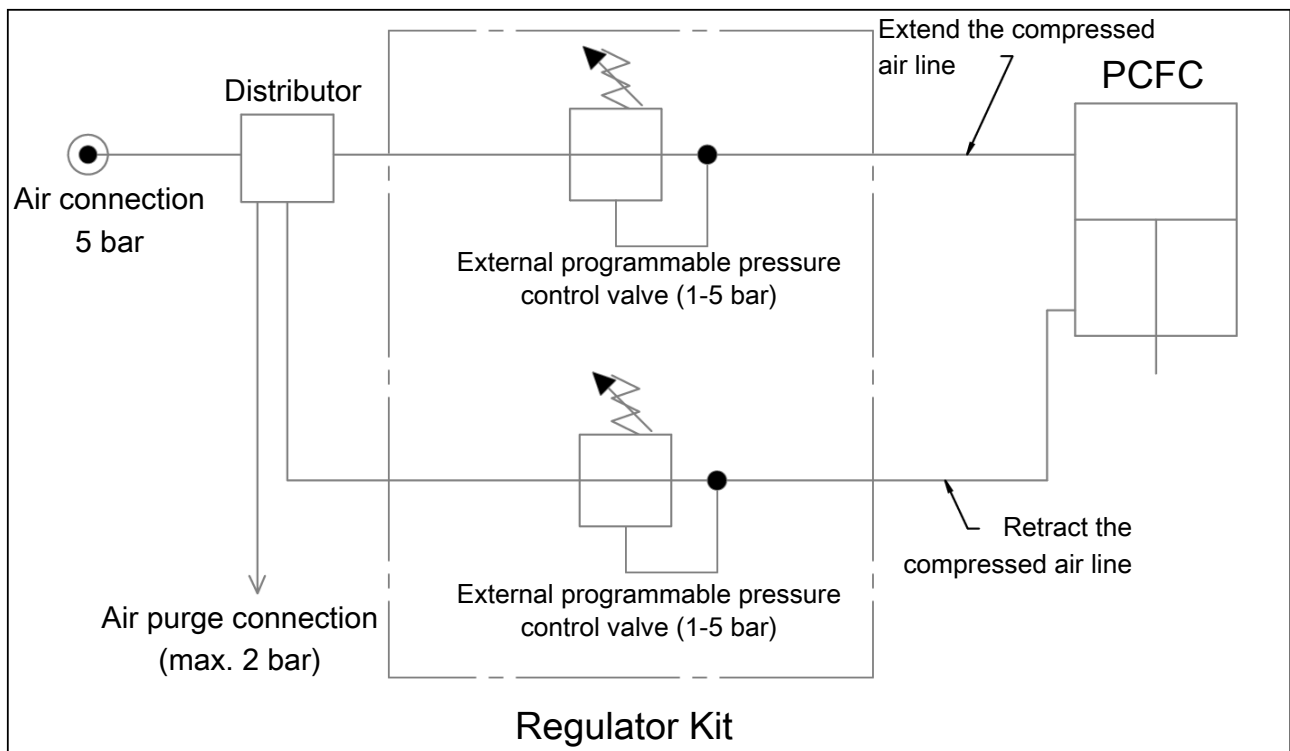
Pneumatic connection diagram for application with gyro sensor

5.2.3 Electrical connection

Connection variant: M8 connector, 8-pin (from mid 2023)
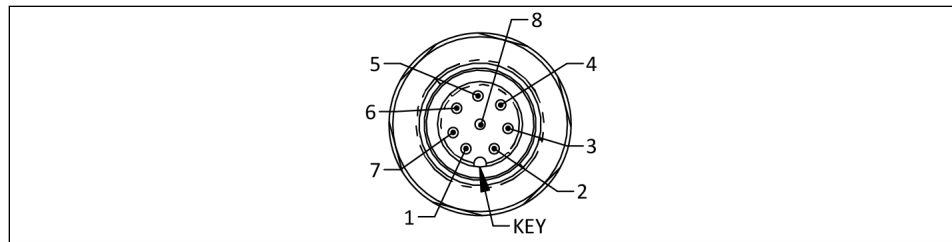
Pin	Signal	Description	Voltage [V]
1	V+	Power (positive)	24 (+/−20%)
2	V0−/I0−	Analog output reference	0V
3	V0/I0_POS+	Analog output (position sensor)	0−5V; 0−10V; 4−20mA*
4	V0/I0_REG+	Analog output (for regulator)	0−5V; 0−10V; 4−20mA*
5	RS485+	Serial interface	
6	CAL+	Trigger signal calibration	Signal 24V (+/−20%)
7	V−	Power (GND)	0V
8	RS485−	Serial interface	

* New units are delivered with the setting 0−5V

5.3 Adjusting the sensor

5.3.1 Setting the position sensor

- ■ The position sensor is preset at the factory.
- • Recalibrate the sensor if the product has been disassembled or repaired or if the LED behavior is no longer correct, ▶ 8.3 [🗋 28].

5.3.2 Adjusting the weight force compensation

- ■ Product was completely assembled.
- ■ All tools are mounted and all connections are made.
- ■ The regulator, which is controlled by the product, is connected to the compensation air connection (retract). The pressure range of the valve is set to 0 to 5 bar.

1. Move the end effector, which is mounted on the product, so that it hangs down. Do not move until the settings are completed.

2. Set the regulator on the compensation air connection (extend) to 0 bar. **NOTICE! Depending on the valve used, manually vent the "Extend" connection.**

3. Start calibration via serial interface with the command "startcal" or via the digital input line (pin 4 – trigger signal calibration).
   - ⇨ The product is calibrated.
   - ⇨ When the calibration is finished, the LEDs show the position again, ▶ 5.3.1 [🗋 22].

4. Read the pressure on the regulator, which is controlled by the product.
   - ⇨ This value is "P1".

5. Calculate air pressure for compensation air connection (extend).
   - ⇨ $P2 = 1/2 \times P1 + 1/S \times F/10$
   - ⇨ F corresponds to the desired force in Newton with which the product should work.
   - ⇨ P1 and P2 correspond to the pressure, the unit is bar.
   - ⇨ Please refer to the table for values for S in mm².

6. Set the calculated air pressure.

Variant	S [in mm²]
A	206.5
B	412.9
C	619.4

Tab.: Values for S in mm²

Command	Operand	Description		
?		Output help text.		
H				
Help				
Man				
SysVer		Output firmware version.		
Set / Cal		Read out all parameters.		
	[parameter name]	Read out all parameters that match the name entered as operand.		
	[parameter name] [value]	Set a new value for the mentioned parameter.		
Factory		Reset all parameters to default values.		
SaveAll		Save all changes to the parameters.		
StartCal		Start calibration.		
ManCal		Start manual calibration.		
Stream	[HDBXYZTP%OR]	Output data via the console interface.		
			X =	Raw value gyro sensor X–axis
			Y =	Raw value gyro sensor Y–axis
			Z =	Raw value gyro sensor Z–axis
			I =	Filtered value gyro sensor X–axis
			J =	Filtered value gyro sensor Y–axis
			K =	Filtered value gyro sensor Z–axis
			R =	Value D/A converter position sensor
			O =	Value D/A converter regulator
			% =	Position
			P =	Raw value Hall effect sensor
			F =	Filtered value Hall effect sensor
			T =	Temperature
			# =	Counter lines
			S =	Checksum
			H =	Hexadecimal
			D =	Decimal

Command	Operand	Description
		B = Binary
		> = Compressed
		< = Formatted
Flow		Output current values during each step in the main signal flow.
Status		Output status.
LED test		Start LED test.
Reset		Reset microcontroller.

Tab.: Commands of the console

Tab.: Parameters for the Set / Cal command

Name	Parameter Designation	Description	Possible content	Type	Read	Write
paramWrites	Parameter Writes	Number of times the parameters have been stored in the NVM	0	Uint16	X	
filTcAccl	Accelerometer filter time constant	Gyro sensor IIR filter setting	6	Uint16	X	X
filTc	Hall effect sensor filter time constant [Hz]	Hall effect sensor IIR filter setting [in Hz]	0 = no filter 1 = 119.7 2 = 46.6 3 = 21.7 4 = 10.4 5 = 5.1 6 = 2.6 7 = 1.2 8 = 0.7	Uint16	X	X
minPos	Minimum position	Value of the position sensor in end position (retracted)	0	Uint16	X	
maxPos	Maximum position	Value of the position sensor in end position (extended)	3300	Uint16	X	
Location	Location	shows the current (physical) position	Workstation XY	String (40)	X	X
serNum	Serial number	Serial number of the product	Serial number	String (100)	X	
hwProdCode	Hardware product code	Product code of the hardware	HW product code	String (20)	X	

Name	Parameter Designation	Description	Possible content	Type	Read	Write
hwRev	Hardware revision	Revision of the hardware	0	Uint16	X	
baud	Serial baud rate	Baud rate of the interface	115200	Uint32	X	X
Msg	Message	0 = show only requested messages 1 = show all messages	0	Uint8	X	X
productName	Product name	Product name	PCFC	String (32)	X	
posOutputtRange	Position output range	Setting the analog output of the position sensor: 5 = 0–5 V 10 = 0–10 V 20 = 4–20 mA	5	Uint16	X	X
regOutputtRange	Regulator output range	Setting the analogue output for the regulator: 5 = 0–5 V 10 = 0–10 V 20 = 4–20 mA	5	Uint16	X	X
CalWeight	Calibration weight	gravity compensation calculated from the calibration process	25		X	
DelayRamp	Calibration ramp delay [ms]	Time in ms until the delay between 1000 steps of the calibration process	10	Uint16	X	X
DelayMaxMin	Calibration max/min settling time delay	Settling time delay in ms, which must be waited for before measuring the minimum and maximum positions during the calibration process	3000	Uint16	X	X

6 Operation

■ Product was completely assembled.

1. If possible, approach the workpiece slowly and only increase the speed of movement afterwards.

2. Plan the robot path so that 50% of the compensation function of the product is used at the theoretical tool edge. This allows the product to use its flexibility to machine areas evenly despite different initial geometries without losing contact with the workpiece. If this is not possible, several machining passes may be necessary.

3. Set the main direction of load on the tool so that it coincides with or is parallel to the middle axis of the product.

LEDs

LED	Full extend (0 mm)	Start of travel (0.5 mm)	Safe travel zone (0.5–11.5 mm)	End of travel (11.5 mm)	Robot crash (12 mm)
RED_FULL_EXTND	Red	Red			
GREEN		Green	Green	Green	
RED_OUT_TRVL				Red	Red

7 Troubleshooting

7.1 Compliance slide no longer moves

Possible cause	Corrective action
Compliance slide is dirty.	Clean and lubricate compliance slide.
Sealing air connection not pressurized.	Check compressed air lines., ▸ 5.2.2 [🗋 18]
Regulator defective or not connected.	
Pressure drops below minimum.	Check air supply, ▸ 3 [🗋 13].
Loading too large.	Check permissible load, ▸ 3 [🗋 13].

7.2 Uneven deburring result

Possible cause	Corrective action
Product is leaking.	Contact the SCHUNK contact person.
The pressure valve is defective.	Change pressure valve.

8 Maintenance

NOTICE

Material damage due to incorrect assembly and disassembly!

Incorrect disassembly and reassembly may cause damage to the product and/or accessories.

- SCHUNK recommends having the product and/or accessories checked and repaired by SCHUNK if necessary.

8.1 Notes

⚠ **WARNING**

Risk of injury from electric shock due to contact with live parts!

- Before starting any work: Disconnect the power supply from the mains and secure against accidental switch-on.
- Work may only be performed by appropriately qualified personnel.

Original spare parts

Use only original spare parts of SCHUNK when replacing spare and wear parts.

8.2 Maintenance interval

Maintenance interval	Maintenance work
weekly	Clean all parts thoroughly, check for damage and wear
as required	Recalibrate the position sensor, ▶ 8.3 [🗋 28].
	Send damaged products to SCHUNK for repair.

8.3 Recalibrate position sensor

NOTE

To calibrate the position sensor, SCHUNK recommends the PuTTY software with a baud rate of 115200.
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1. Connect the product to the serial interface.
2. Enter the "ManCal" command to start the calibration.
   ⇨ The LED "RED_OUT_TRVL" flashes with 10 Hz.
   ⇨ The message "ManCal started, move to end of stroke" is output in the interface.
3. Retract or extend the piston completely.

4. Enter "ManCal" command again.
   ⇨ The LED "RED_OUT_TRVL" flashes with 4 Hz.
   ⇨ The message "CalStep:1" is output in the interface.
   ⇨ The message "Position measured: X" is output in the interface. X is the voltage [mV] which the position sensor reads.
5. Move piston by 1 mm.
6. Repeat action steps 4 and 5 a further 12 times until the piston has reached the maximum stroke of 12 mm.
   ⇨ During the last CalStep the measurements of the position sensor are validated.
   ⇨ If successful, the message "Calibration Completed" is displayed and each LED flashes once.
   ⇨ In case of failure the message "Calibration error" is displayed and each LED flashes three times at 1 Hz.
   ⇨ The following table shows the blinking frequency of the LEDs per calibration step.

LEDs

LED	Full extend (0 mm)	Start of travel (0.5 mm)	Safe travel zone (0.5–11.5 mm)	End of travel (11.5 mm)	Robot crash (12 mm)
RED_FULL_EXTND	Red	Red			
GREEN		Green	Green	Green	
RED_OUT_TRVL				Red	Red

| CalStep | Frequency [Hz] | | |
	RED_OUT_TRVL	GREEN	RED_FULL_EXTND
0	4		
1	2		
2	1.33		
3	1		
4		4	
5		2	
6		1.33	
7		1	
8			4
9			2
10			1.33

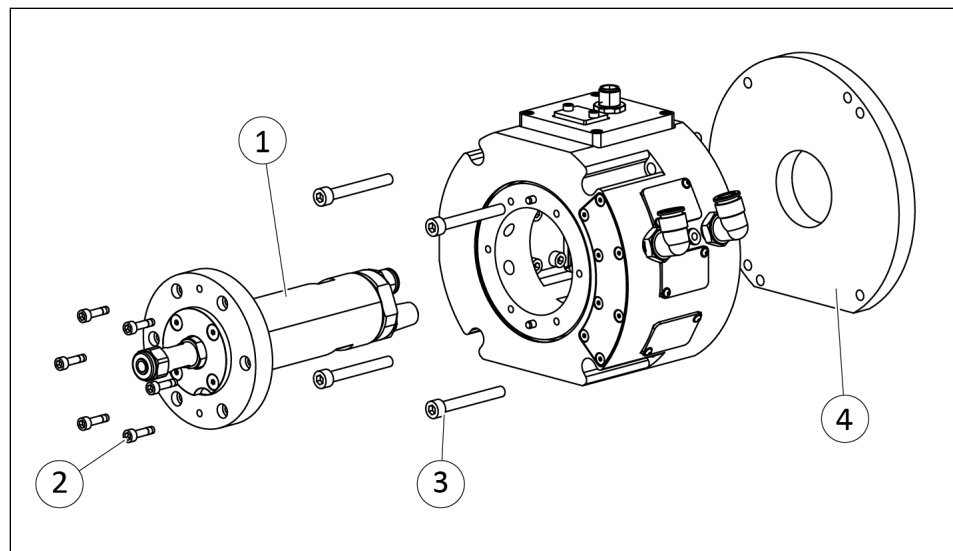| CalStep	Frequency [Hz]		
	RED_OUT_TRVL	**GREEN**	**RED_FULL_ EXTND**
11			1

Tab.: Flashing frequency of the LEDs per calibration step

8.4 Assembling the motor kit

1. Remove the compressed air hose.
2. Remove product from the system/machine.
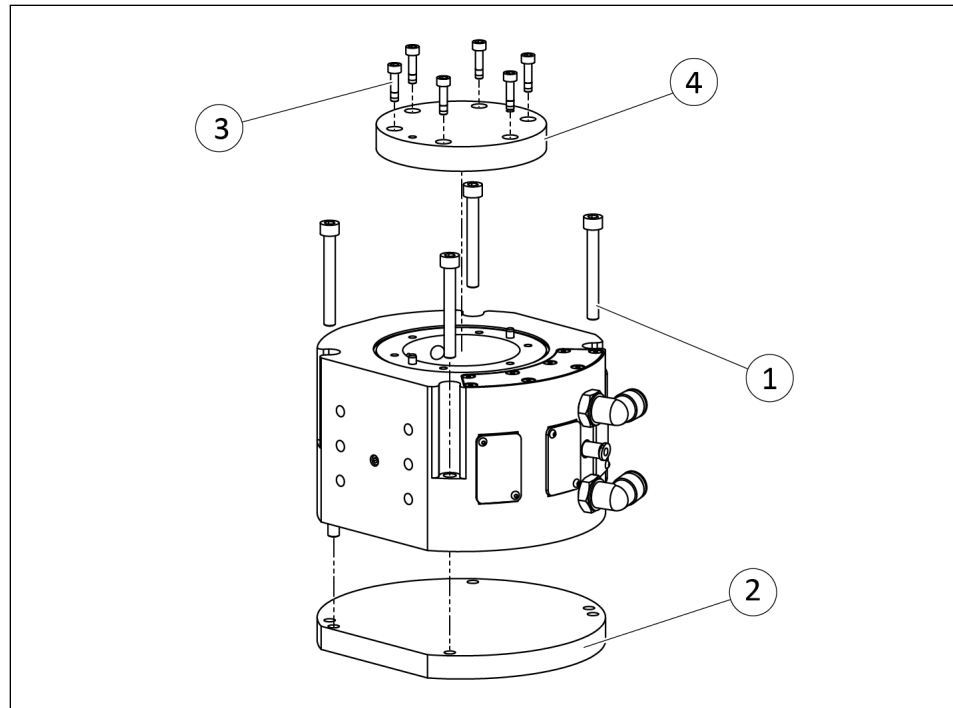
3. Loosen the mounting screws (1).
4. Remove the rear cover plate (2).
5. Loosen the mounting screws (3).
6. Remove the rear cover plate (4).

7. PCFC–Slide the motor kit (1) into the axial opening of the product as far as the stop and align it with the centering pins accordingly.

8. Apply Loctite 242 threadlocker to the mounting screws (2).

9. Fasten the motor kit in the product with the mounting screws (2).

   ⇨ Max. tightening torque: 2.8 Nm.

10. Apply Loctite 242 threadlocker to the mounting screws (3).

11. Mount the motor kit cover plate (4) from the accessory kit on the product with the mounting screws (3).

    ⇨ Max. tightening torque: 10 Nm.

12. Mount the product on the system/machine, ▶ 5.2 [⧉ 16].

8.5 Assembly drawings
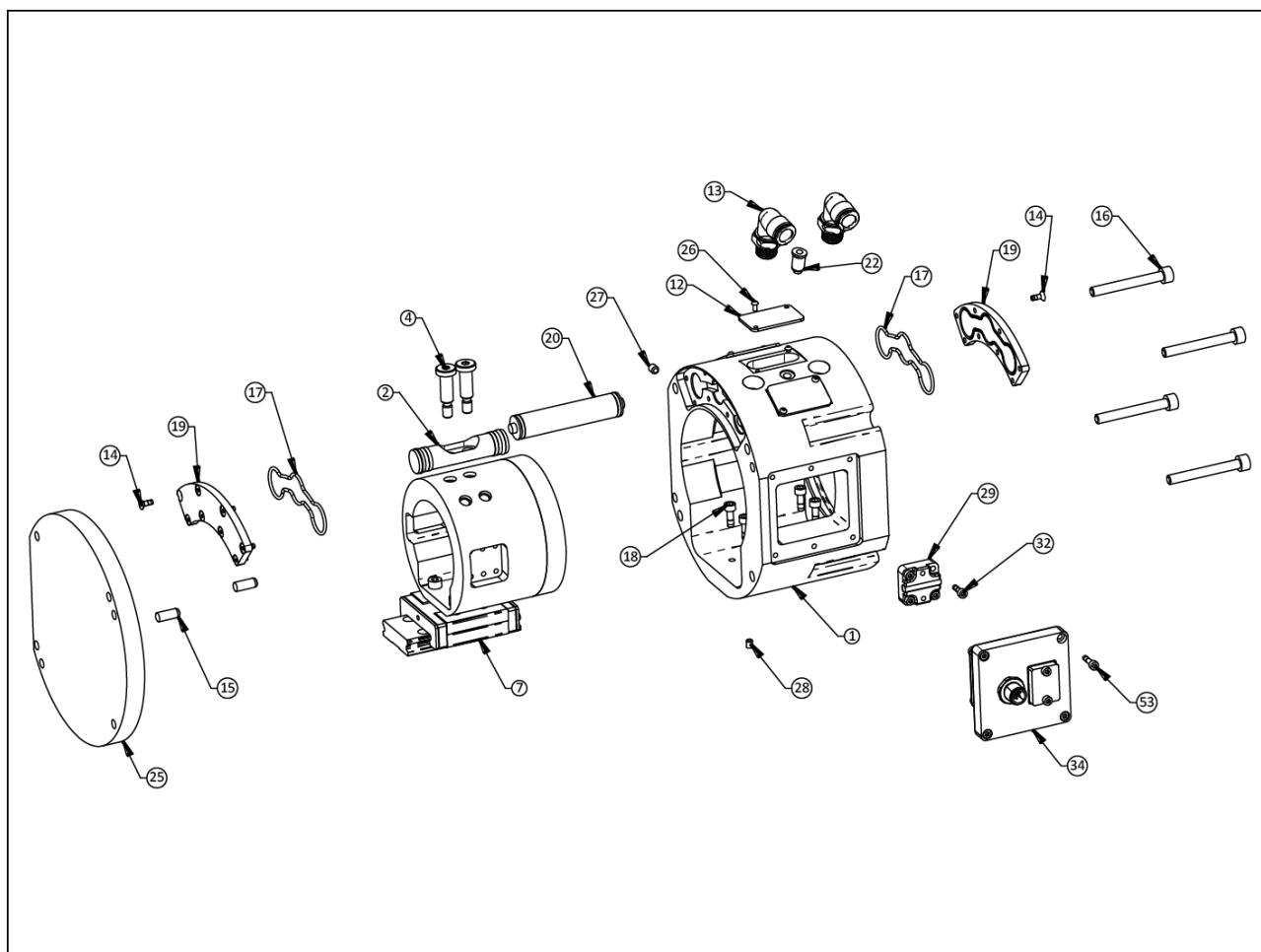
9 EC declaration of incorporation

in terms of the Directive 2006/42/EG, Annex II, Part 1 Section B.

Manufacturer/ Distributor	SCHUNK SE & Co. KG Spanntechnik | Greiftechnik | Automatisierungstechnik Bahnhofstr. 106 – 134 D-74348 Lauffen/Neckar

We hereby declare that the partly completed machine described below

Product designation:	Passive Compliant Force Control Tool / PCFC /pneumatic
ID number	1453546, 1453552, 1453555

meets the following basic occupational health and safety of the Machinery Directive 2006/42/EC:

No. 1.1.1, No. 1.1.2, No. 1.1.3, No. 1.1.5, No. 1.3.2, No. 1.5.3, No. 1.5.4, No. 1.5.6, No. 1.5.8, No. 1.5.10, No. 1.5.11, No. 1.5.13

The partly completed machinery may not be put into operation until it has been confirmed that the machine into which the partly completed machinery is to be installed complies with the provisions of the Machinery Directive (2006/42/EC). The declaration shall be rendered invalid if modifications are made to the product.

Conformity with the following directives and standards is declared for the product:

Electromagnetic compatibility (EMC directive) 2014/30/EU

EN ISO 12100:2010	Safety of machinery – General principles for design – Risk assessment and risk reduction
EN 61326-2-3:2013	Electrical equipment for measurement, control and laboratory use – EMC requirements – Part 2-3: Particular requirements – Test configuration, operational conditions and performance criteria for transducers with integrated or remote signal conditioning. (IEC 61326-2-3:2012)

The special technical documentation according to Annex VII, Part B, belonging to the partly completed machine, has been created.

Person authorized to compile the technical documentation:
Stefanie Walter, Address: see manufacturer's address

Signature: see original declaration

Lauffen/Neckar, February 2025

Dr.-Ing. Manuel Baumeister,
Head of Systems Engineering,
Technology & Innovation

10 UKCA declaration of incorporation

in accordance with the Supply of Machinery (Safety) Regulations 2008.

Manufacturer/ Distributor	SCHUNK Intec Limited Clamping and gripping technology 3 Drakes Mews, Crownhill MK8 0ER Milton Keynes

We hereby declare that on the date of the declaration the following partly completed machine complied with all basic safety and health regulations found in the "Supply of Machinery (Safety) Regulations 2008".
The declaration shall be rendered invalid if modifications are made to the product.

Product designation: Passive Compliant Force Control Tool / PCFC / pneumatic

The partly completed machine may not be put into operation until it has been confirmed that the machine into which the partly completed machine is to be installed complies with the provisions of the "Supply of Machinery (Safety) Regulations 2008".

Additionally, the product is declared to conform with the following standards and directives:

- **Electromagnetic Compatibility Regulations 2016**

EN ISO 12100:2010	Safety of machinery – General principles for design – Risk assessment and risk reduction
EN 61326-2-3:2013	Electrical equipment for measurement, control and laboratory use – EMC requirements – Part 2-3: Particular requirements – Test configuration, operational conditions and performance criteria for transducers with integrated or remote signal conditioning. (IEC 61326-2-3:2012)

The special technical documentation according to Annex VII, Part B, belonging to the partly completed machine, has been created.

Person authorized to compile the technical documentation:
Marcel Machado, address: refer to manufacturer's address

Lauffen/Neckar, February 2025

Dr.-Ing. Manuel Baumeister,
Head of Systems Engineering,
Technology & Innovation

11 Information on the RoHS Directive, REACH Regulation and Substances of Very High Concern (SVHC)

RoHS Directive

SCHUNK products are classified as "large-scale stationary installations" or as "large-scale stationary industrial tools" within the meaning of Directive 2011/65/EU and its extension 2015/863/EU "on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS)", or fulfill their intended function only as part of one. Therefore products from SCHUNK do not fall within the scope of the directive at this time.

REACH Regulation

Products from SCHUNK fully comply with the regulations of Regulation (EC) No. 1907/2006 "concerning the Registration, Evaluation, Authorization and Restriction of Chemicals (REACH)" and its amendment 2022/477. SCHUNK attaches great importance to completely avoiding chemicals of concern to humans and the environment wherever possible.

Only in rare exceptional cases do SCHUNK products contain SVHC substances on the candidate list with a mass content above 0.1%. In accordance with Article. 33 (1) of Regulation (EC) No. 1907/2006, SCHUNK complies with its duty to "communicate information on substances in articles" and lists the components concerned and the substances used in an overview that can be viewed at **schunk.com\SVHC**.

Signature: see original declaration

Lauffen/Neckar, February 2025

Dr.-Ing. Manuel Baumeister,
Head of Systems Engineering,
Technology & Innovation

SCHUNK

SCHUNK SE & Co. KG
Spanntechnik | Greiftechnik | Automatisierungstechnik

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