Assembly and Operating Manual
FDB-AC
Axially flexible pneumatic deburring tool

Original Manual

Hand in hand for tomorrow

Imprint

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

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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 ▸ 1.1.2 [🗋 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 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**.

1.2 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, ▶ 2.4 [🗋 8]
- Observe the specified maintenance intervals, ▶ 7 [🗋 27]

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

1.3 Scope of delivery

The scope of delivery includes

- Axially flexible pneumatic deburring tool FDB-AC in the version ordered
- Safety information (product-specific instructions available online)
- 1x C-wrench
- 1x pliers (for changing the miller)
- 1x holder for miller
- 8x M4x16 screw

2 Basic safety notes

2.1 Intended use

The product is to be used only for the deburring of workpieces.

The product is intended for installation on a robot. The requirements of the applicable guidelines must be observed and complied with.

- The product may only be used within the scope of its technical data, ▶ 4 [🗋 14].
- The product is intended for industrial and industry-oriented use.
- Appropriate use of the product includes compliance with all instructions in this manual.

Use which is not specified as an intended use is for instance when

- the product is used with machines/systems or workpieces that are not designed to be used with the unit.
- the product is operated without protective equipment in accordance to the EC Machinery Directive.
- the statutory safety and accident-prevention regulations and the standards and guidelines valid at the usage site are not observed.

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.

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, ▸ 4 [🗋 14].

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.

2.7 Notes on safe operation

Incorrect handling of the personnel

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

- Avoid any manner of working that may interfere with the function and operational safety of the product.
- Use the product as intended.
- Observe the safety notes and assembly instructions.
- Do not expose the product to any corrosive media. This does not apply to products that are designed for special environments.
- Eliminate any malfunction immediately.
- Observe the care and maintenance instructions.
- Observe the current safety, accident prevention and environmental protection regulations regarding the product's application field.

2.8 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.

2.9 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.

2.10 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.

2.11 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.

2.11.1 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.

2.11.2 Protection during commissioning and operation

Falling or violently ejected components

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

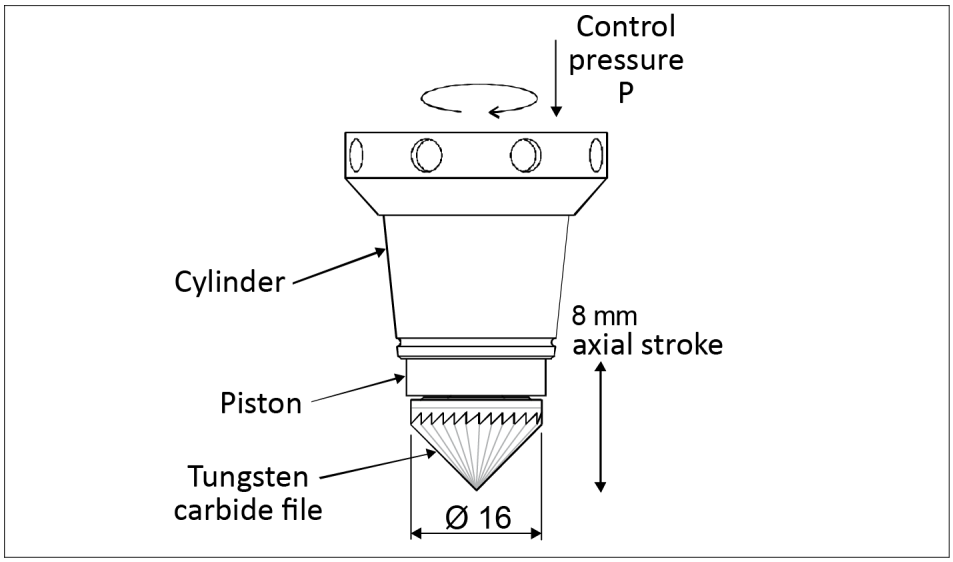
- Take appropriate protective measures to secure the danger zone.
- Never step into the danger zone during operation.

2.12 Notice regarding specific hazards

- Familiarize yourself thoroughly with the installation and operating manual before using or starting the tool.
- Make sure that the tool has been mounted as described in the "Mounting" section ▶ 5.3.2 [🗋 19].
- Never use the tool for purposes other than those expressly described in the installation and operating manual.
- Make sure that the pneumatic control equipment has been mounted as described in the "FDB-AC Pneumatics" section ▶ 5.3.1 [🗋 17].
- Only original spare parts and original files/deburrers supplied by the tool manufacturer may be used ▶ 7.7 [🗋 32].
- Never stand near the tool when it is being started or is in operation. If you do need to approach the rotating tool, stand behind a suitable Plexiglas® protective screen.
- Beware of rotating parts!

- The tool must be secured using appropriate structural measures so that no one can approach it when it is in operation.
- A very high sound pressure level is achieved. Always wear earplugs when near the tool.
- Provide a guard to prevent objects such as machined workpieces, tools, chips, fragments or waste from falling or being ejected.
- The hazardous area must be surrounded by a safety fence during operation.

3 Product overview



The Compensation piston is an important part of the Straight FDB-AC. The Compensation piston is pushed forward into contact with the burr edge by use of a remotely controlled air pressure.

The air vane motor is decoupled from the linear movement of the Compensation piston, to reduce inertia and increase the stability of the contact force when deburring. The spline coupling transmits torque to the rotary file.

Ball bearings ensure an even running of the tungsten carbide file. A very little friction torque is transmitted through the ball bearings to the Compensation piston cylinder, which rotates slowly inside the stationary outer cylinder. Thus stick- slip or static friction of the Compensation piston is avoided. The Compensation piston cylinder is in addition precision ground to ensure very little friction in the axial direction.

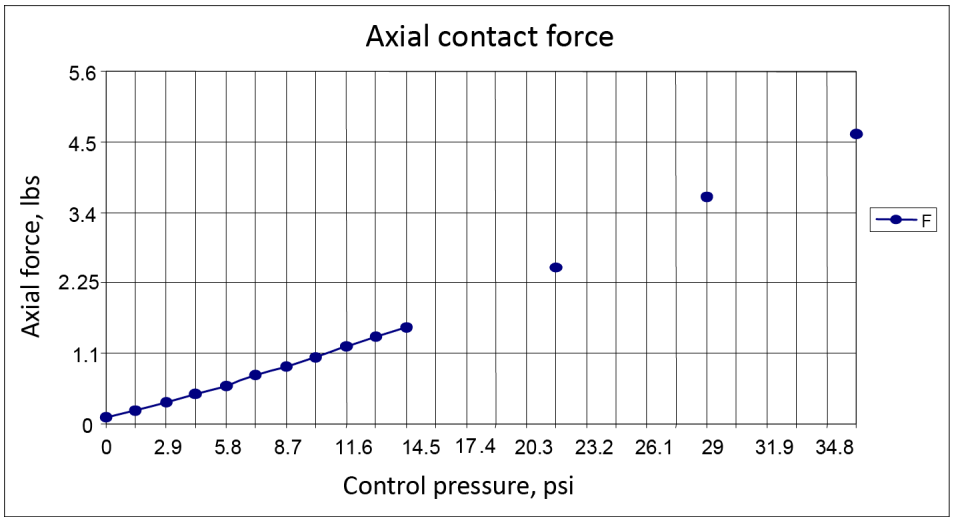
4 Technical data

4.1 Technical Specifications

Motor	Air motor, vane motor type
Speed of rotation	Idle 30,000 rpm
Torque	0.35 Nm at lower speeds
Power	250 W at 20,000 rpm
Net weight, total	0.51 kg
Dead weight, balance piston with milling cutter	0.05 kg
Compensation area (free-standing burr)	Max. ± 4.1 mm axial and lateral, ± 2 mm recommended
Axial force	8.45–32.9 N at an operating pressure of 0–4.1 bar
Deburring speed	7.7–11 m/s, measured at Ø 8 mm (midway point between center point and outer milling cutter diameter)
Air consumption	approx. 9.4 l/s
Noise emission	80 dB
Milling cutters	Tapered 90° milling cutter for ferrous materials included in scope of delivery. Other milling cutters available on request, or see catalog chapter.
Special tools	Tool for replacing the milling cutter

Notes on the sound pressure level

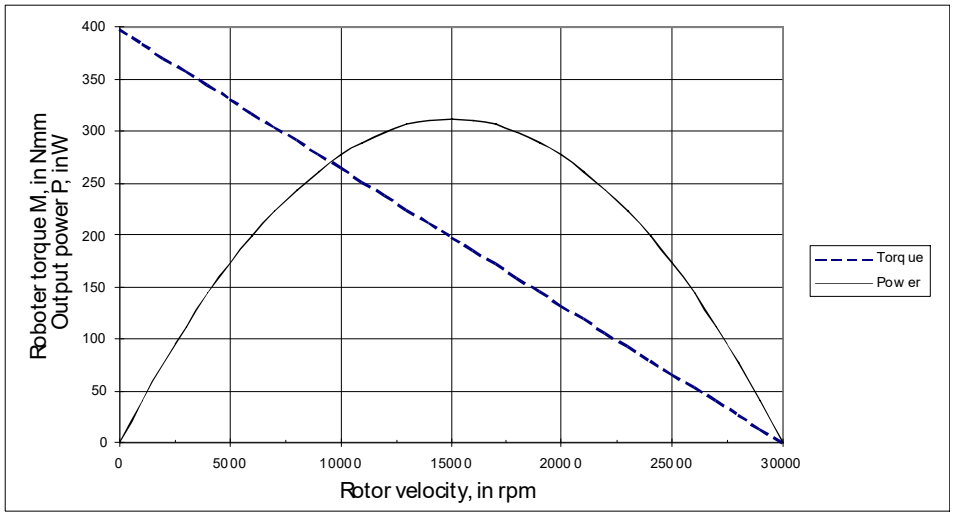
All noise emission measurements were performed at a distance of 0.9 m from the FDB-AC and at a height of 1.5 m above the ground. The FDB-AC was mounted on a laboratory test stand. No noise barriers or other noise reduction devices were used, except for exhaust gas recirculation to an oil recovery unit beneath the test stand. No axial force pressure was applied. The FDB-AC ran at full idle speed. Since the working environment is not known, this method was considered the best measurement method.



Axial contact force, measured with milling cutter pointing downwards

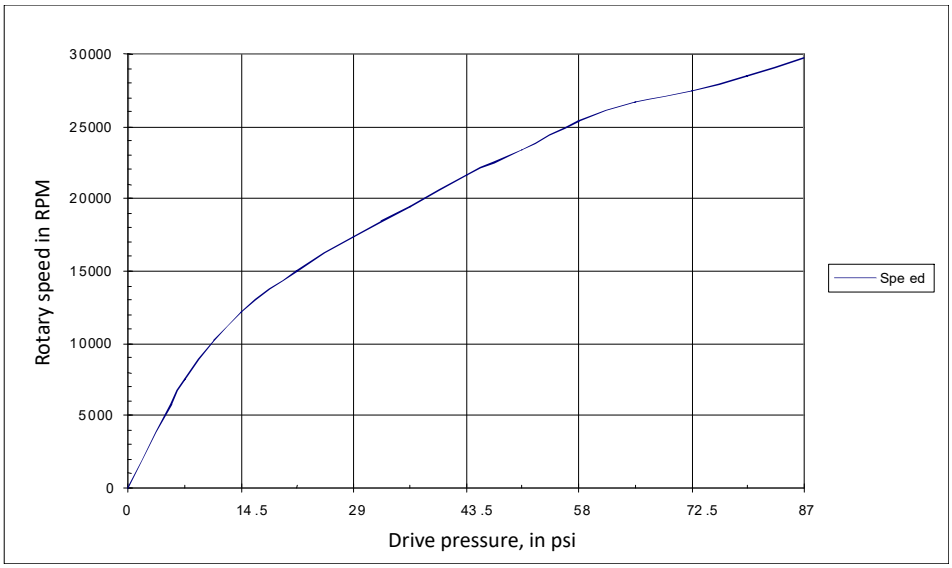
Each FDB-AC is carefully tested prior to delivery. The figure shows the theoretical and measured forces corresponding to the axial air pressure used. It should be noted that theoretical calculations do not necessarily correspond to actual data.

Measurements vary by product and should only be considered as nominal values.



Theoretical calculations, output torque of the FDB-AC and performance

Due to pressure losses between the pressure regulator and the balance piston, the axial force is lower than the results of theoretical calculations. In the case that different types of pneumatic components are used, the actual force characteristics vary depending on the mounting method.



Idling speed as a function of applied drive pressure

SCHUNK recommends an operating speed of 15,000 to 25,000 rpm for maximum performance. A speed lower than 15,000 rpm is not recommended because it increases the risk of stalling the motor due to the higher torque at lower speeds.

4.2 Environmental Limitations

General

Area classification:	None
Gas group/ignition group:	None

Operation

Installation position:	• Mounted to robot by means of the Speedeburr adapter and flange. The flange is specific to each type of robot. This flange not supplied by SCHUNK . • Mounted to a table or stand by means of the Speedeburr adapter (the robot is carrying the workpiece).
Temperature range:	5°C–35°C 41°F–95°F

Storage

Temperature range:	0°C–45°C 32°F–113°F

Conditions

The tool should be stored in its crate and in a dry place. The tool should be kept dry and full of pneumatic oil when stored. Keep unit in crate if possible. ▸ 5.4 [🗋 20]

5 Handling, Installation, Storage and Transportation

5.1 Inspection of Condition when Delivered

Upon receipt, the following must be checked:

- Delivery in accordance with freight documents
- Damage to packaging

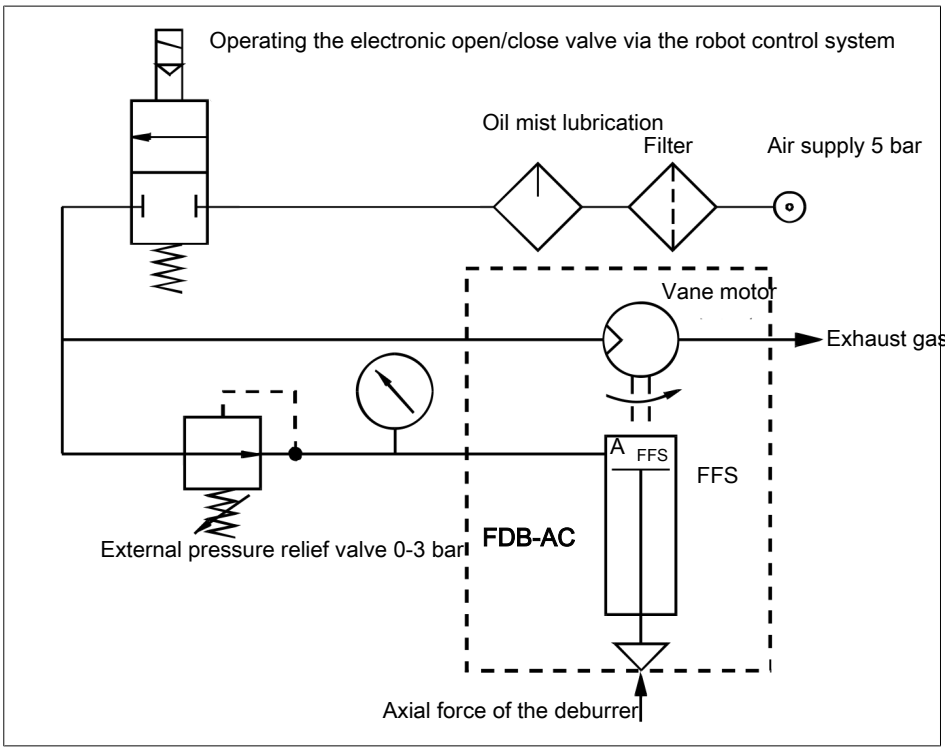
If there is damage to any of the packaging, or if any of the goods have been exposed to abnormal handling, unpack those parts that may have been damaged for a closer inspection. If necessary, notify SCHUNK for assistance in evaluation of the product condition.

5.2 Unpacking and Handling

The FDB-AC tool, during transportation, storing and handling, should always be placed inside the accompanying box (crate).

5.3 Installation

5.3.1 Pneumatics FDB-AC 180



Pneumatic connection

Connect the FDB-AC 180 as shown in the figure.

A special adapter is available as an optional extra to allow standard air nipples to be coupled to the straight FDB-AC. Air silencers can be coupled to the outlet ports of the adapter to attenuate the noise when the exhaust air enters the atmosphere.

The drive compressed air for the air vane motor must be lubricated using conventional pneumatic equipment with oil mist.

An external pressure regulator mounted, for example on the upper arm of the industrial robot, controls the axial force of the rotating tungsten carbide file.

The axial force is adjusted until a chamfer of the correct width is produced at a given path velocity.

NOTE

When using unsuitable components, the performance level drops.

The pneumatic components used for the motor control circuit must meet the air consumption requirements ▶ 4.1 [🗋 14].

The FDB-AC is supplied with compressed air via conventional pneumatic components (not supplied with the FDB-AC tool). SCHUNK recommends the installation of a pneumatic pressure regulator to achieve a uniform air supply and to reduce the air supply to a maximum of 6.2 bar.

Magnetic valves are actuated by a digital output signal from the robot controller.

The external pressure regulator is used to control the air supply to compensate for the axial force, enabling control of the axial force acting on the milling cutter. If the complete workpiece can be deburred with the same axial force, a conventional manual pressure regulator can be used. If the burrs to be removed vary according to the workpiece area, and this variation is similar for all workpieces of the same type, the axial force may have to be adjusted by means of an analog pressure regulator controlled by the robotic control unit. This requires an analog output connection in the robotic control unit.

Function	Thread type	Pressure
Motor inlet	1/8"	6.2 bar
Inlet for compensation	M5	1 – 4.1 bar
Control functions	M5	Optional
Exhaust air	1/4"	N/A

The use of a 3/8" plastic hose is recommended for the motor air supply, and a 5/32" hose is recommended for the compensating air connection. It should be noted that an M5 connection is used

for the compensation air supply and a 1/8" connection is used for the motor air supply. Use two silencers mounted directly on the two 1/4" exhaust outlets ▸ 4.1 [🗋 14].

If further noise reduction is desired, mount silencers on the exhaust line at a greater distance from the standard adapter.

An oil recovery unit can be mounted on the exhaust air line to prevent droplets from the oil mist lubrication from entering the atmosphere around the robot system. To reduce noise in adjacent work areas, additional noise barriers ▸ 6.2 [🗋 23] (preferably made of perspex or Lexan) can be placed around the unit.

The supply pressure regulator for equalization should be set within the range from 1 to 4.1 bar. To determine the correct pressure, start with a very low pressure and slowly increase it until the desired chamfer is achieved (the higher the compensation pressure, the greater the material removal).

Before starting, make sure that the oil-air lubrication system is filled with oil.▸ 7.3 [🗋 30]

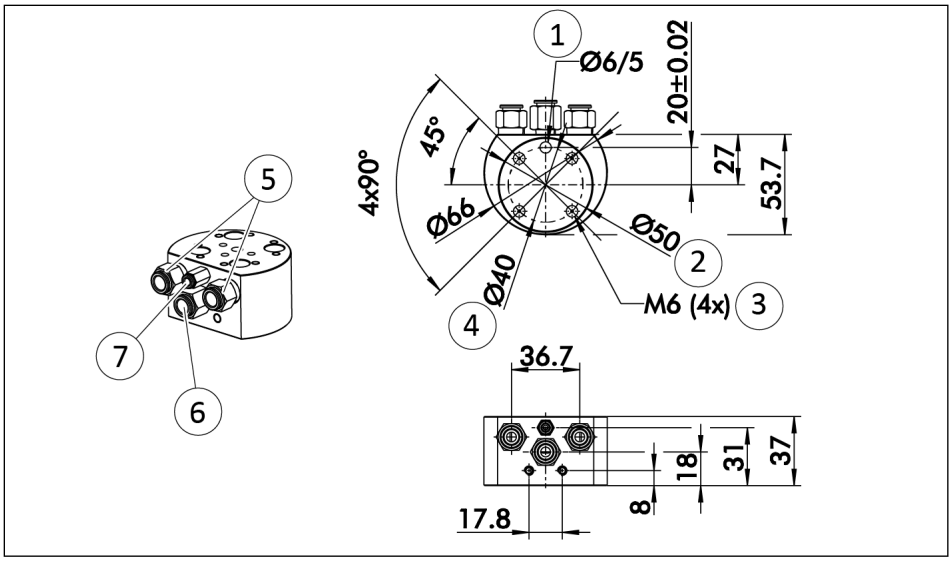
NOTICE

A lack of lubrication leads to the destruction of the engine within a relatively short time.

If the lubrication is not working properly, the engine will run slower than usual and the speed may fluctuate.

- To ensure proper operation, install lubrication equipment near the robot base (no further than 4.87 m from the FDB-AC), ▸ 7.3 [🗋 30].

5.3.2 Mounting, Adapter and Interface Plate



Speedburr (FDB-AC) Adapter

Item	Designation
1	Fit for centering pins
2	Fit for centering
3	Through hole for connection with screws
4	Bolt circle
5	Pneumatic connection motor exhaust air, (Thread 1/4 " NPT) for 8 mm hose
6	Pneumatic connection motor, (Thread 1/8 " NPT) for 8 mm hose
7	Pneumatic connection compensation (Thread 10-32 UNF) for 4 mm hose

The Figure shows the Speedeburr pneumatic adapter (Id.-No. 9951358). This adapter, or equivalent, should be used for mounting the FDB-AC to the robot or to other equipment. The adapter facilitates the connection of the pneumatics to the FDB-AC.

The FDB-AC can be mounted on the robot or on a stand in which case the robot carries the part to be deburred to the FDB-AC. The FDB-AC is mounted to the Speedeburr adapter by means of 8 screws M4. Be sure the O- rings are positioned correctly into the grooves on the FDB-AC bracket before mounting the FDB-AC to the pneumatic adapter. Removable thread locker should be used for all mounting bolts.

The Speedeburr adapter is mounted to the wrist of the robot, usually by means of a robot-specific interface plate. In some cases, the Speedeburr adapter will mount directly to the robot without an interface plate. The interface plate is manufactured either by the robot supplier, the FDB-AC supplier, the system integrator, or by the owner/user of the FDB-AC.

The FDB-AC, with the Speedeburr adapter, may be mounted to a table or stand using an interface plate or directly using the Speedeburr pneumatic adapter.

5.4 Transportation and Protection during Transportation

The FDB-AC is packaged in a wooden crate designed to secure and protect it during transportation. Always use the crate when transporting the FDB-AC in order to minimize the risk of damage.

When taking the FDB-AC out of the crate and carrying, or performing maintenance, try to always grab and hold it around the motor housing Drawings.

5.5 Storage and Preventive Maintenance during Storage

The FDB-AC should be stored in the wooden crate when it is not in use. The FDB-AC should also be stored in a dry place.

For short-term storage (limited to a few weeks), no preventive maintenance is needed, except for cleaning.

For long-term storage, the FDB-AC should be thoroughly cleaned of any burrs or debris. It should not be disassembled. After cleaning, the FDB-AC should be "filled" with oil of the same type used as lubrication during operation. The oil should be poured into the FDB-AC through the adapter or through the FDB-AC bracket. Place the FDB-AC inside a sealed plastic bag and place the FDB-AC inside the crate. This is necessary in order to keep the blades in the air-vane motor from drying out and for preventing the risk of corrosion.

6 Operating Instructions

These operating instructions are intended to help system integrators program, start up and complete a robotic deburring cell containing a FDB-AC deburring tool. The system integrator should be familiar with the task of deburring in general and should have extensive knowledge relating to robots and automation incorporating robots.

The system integrator is responsible for providing user documentation for the complete deburring installation. This document is not intended to cover all aspects of such an installation, although it contains some information vital for the system user, such as maintenance instructions for the FDB-AC and instructions related to safety.

6.1 General Precautions

⚠ WARNING

Neglecting safety precautions can create hazardous situations,

In the worst case, personnel can be injured or the deburring installation and the FDB-AC can be damaged.

- It is important that all personnel involved in operation of the FDB-AC have a thorough understanding of the operating procedures.
- The FDB-AC must only be used for robotic deburring applications. The FDB-AC is a deburring tool only.
- Never use the FDB-AC for purposes other than robotic deburring.

Grinding, countersinking or other metal-forming processes should not be performed by the FDB-AC. It may be dangerous to operate the FDB-AC for these purposes. If a failure occurs due to forces caused by improper use, hazardous situations for both personnel and equipment could be created. The FDB-AC is intended to perform deburring only.

The FDB-AC should not be used to deburr materials that are prone to fracture. A fracturing workpiece may result in pieces of material damaging surrounding working environment and personnel. Material removed correctly should be in the form of chips.

Reduce the robot velocity when the workpiece and the FDB-AC are making initial contact. Making the contact movement between the FDB-AC and the workpiece too fast may in some situations result in a collision. Collisions may create hazardous situations for both personnel and equipment.

When performing maintenance, always remember to tighten nuts and bolts thoroughly and **use a removable thread lock adhesive.** When replacing burrs, always attach the burr correctly. ▸ 7.4 [🗋 31]

⚠ WARNING

Never use the FDB-AC as a hand-held machine.

In order to increase the life of the FDB-AC motor and bearings, always use proper lubrication. ▸ 7.3 [🗋 30]

6.2 FDB-AC Working Environment

As described in previous sections, the FDB-AC should only be used in conjunction with a robot in a secured work cell/chamber.

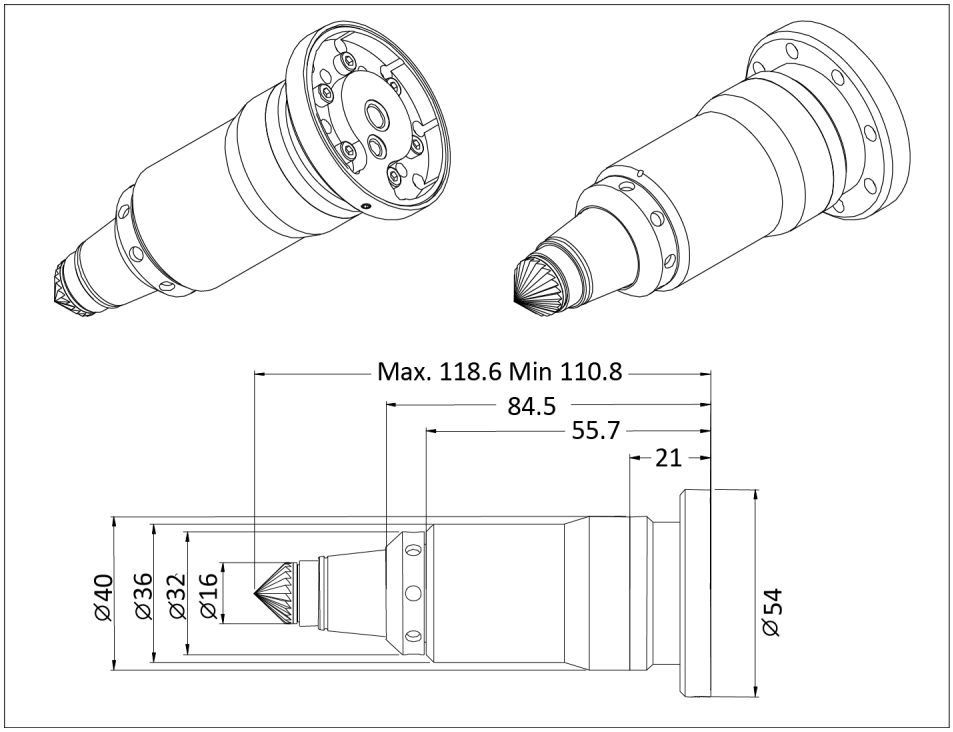
The work cell must be secured by means of barriers to prohibit personnel from entering the cell. A lockable door should be included as a part of the barrier in order to facilitate access to the cell for authorized personnel only. The barrier could consist partly or fully of Plexiglas to facilitate observation of the deburring operations.

During system or FDB-AC maintenance, make sure the FDB-AC and robot are stopped before entering the robot cell. When installing and testing, never be present in the cell when the FDB-AC is running.

Be aware of rotating parts. Use eye-protection while working around the FDB-AC.

Be aware of high sound levels. Always use hearing protection while working in the neighborhood of the deburring cell.

6.3 Tool Center Point (TCP) Position



Dimensions of the tool center point (TCP) of the FDB-AC

The illustration shows the position of the TCP and the dimensions of the FDB-AC. When setting the TCP position on the robot controller, use the center of the 7.9 mm axial stroke of the compensation piston. Take into account the depth of the standard adapter ▸ 5.3.2 [🗋 19]. If an additional interface plate is used to secure the adapter to the robot, its depth must also be taken into account.

Without standard adapter:	Dz = –115 mm
With standard adapter:	Dz = –150 mm

6.4 Operational Considerations

To obtain best results, it is important for the Compensation piston to be running with low friction in the cylinder. ▸ 6.1 [🗋 22]

The FDB-AC should not be statically mounted with the cutting tip up. This will increase the amount of debris entering the cylinder and cause premature wear of the cylinder and piston, possibly preventing the piston from floating altogether. If the FDB-AC must be mounted in this orientation then a continuous or regular burst of high velocity air should be used to blow debris away from the piston and cylinder to insure low friction between the Compensation piston and the cylinder.

For instructions on how to replace the burr, please consult section "Replacement of Burrs" ▸ 7.4 [🗋 31]

NOTICE

The FDB-AC should not be statically mounted with the cutting tip up.

This will increase the amount of debris entering the cylinder and cause premature wear of the cylinder and piston, possibly preventing the piston from floating altogether.

Under normal conditions, no cooling or lubrication of the rotary burr is necessary. The FDB-AC is used in most robot deburring installations with aluminum and steel workpieces without any coolants.

6.5 Programming

The FDB-AC must never be running while programming the robot.

There are various techniques that may be used to program the robot path. In any case, the burr should be nominally at the mid- point of its stroke while deburring the part. It will move up and down with part and path variation.

One programming method is to teach the path using the point of the burr as a guide, following the edge of the part, then manually or automatically adding offsets to the path points to achieve the final correct burr path. Another method is to program the actual points making sure that at each point the burr is at its nominal mid-point when in contact with the part, and that there are no radial forces. The method used will depend on the robot's capabilities and programmer preferences.

If you are deburring sharp inner corners, it may be required to use the area of the burr closer to its tip. Note that, in this case, some of the compensation ability of the FDB-AC as well as the cutting surface speed is reduced. When running the robot program the first time, observe the path with the axial supply turned off. When increasing the path speed it is important to notice that path deviation may increase with speed. Verify that at operational robot path speed the FDB-AC burr remains near the mid-point of its axial travel.

NOTICE

The brass Cylinder (5)--- FEHLENDER LINK ---▸ 7.1.1 [🗋 27] that encloses the Compensation piston must be protected from collisions. If struck it may be damaged and need replacement

The axial force of the burr should be adjusted in order to achieve a correct sized and even chamfer.▸ 5.3.1 [🗋 17]

Addition FDB-AC 90:

To change the drive speed, adjust the main supply pressure. The greater the pressure, the greater the speed and vice versa. It is also possible to adjust the speed by using a small flat-blade screwdriver to turn the adjustment screw on the side of the 90-degree bracket --- FEHLENDER LINK --- and --- FEHLENDER LINK ---. This adjustment varies the flow rate, clockwise to decrease, counterclockwise to increase the flow rate (and speed). In most applications, it is best to adjust the regulator to a maximum pressure (75–90 psi) with the adjustment screw in the full out position, approximately flush with the surface

NOTICE

The FDB-AC must never run without proper lubrication. Damage to the unit will occur. ▸ 7.3 [🗋 30]

7 Maintenance

7.1 Regular Operational Maintenance

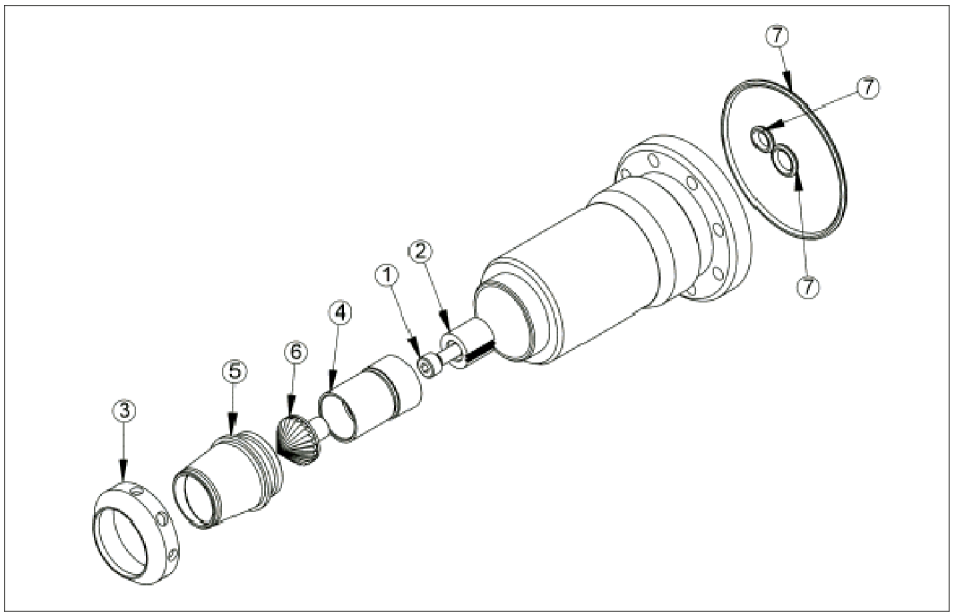
To obtain best results, it is important for the piston to be running with low friction in the cylinder.

This should be checked at regular intervals. Some debris will always enter the cylinder and regular cleaning is recommended.

The FDB-AC should not be operated for extensive periods of time with the cutting tip pointing up. This orientation will increase the amount of debris entering the cylinder and cause premature wear of the cylinder and piston, possibly preventing the piston from floating altogether. If the FDB-AC must be operated in this orientation then a continuous or regular burst of high velocity air should be used to blow debris away from the piston and cylinder to insure low friction between the Compensation piston and the cylinder.

Additionally, the outside of the FDB-AC should be kept clean to ensure proper cooling.

7.1.1 User Serviceable parts FDB-AC 180



User-Serviceable Parts

Item	Quantity	Description
1	1	Spine Lock Screw
2	1	Male Spline
3	1	Lock Ring
4	1	Compensation piston
5	1	Cylinder
6	1	Rotary File (Burr)
7	1	O-ring Set

7.2 Recommended Inspection and Cleaning Procedure

Position of the position numbers ▸ 7.1.1 [🗋 27]

1. Remove the Lock Ring (3) from the FDB-AC Motor Housing (7) using the hook spanner wrench (not shown).
2. Gently pull the Cylinder (5) and Compensation piston (4) assembly from the FDB-AC Motor Housing.
3. Thoroughly clean the Male Spline, the interior of the Motor Housing, and the Lock Ring with a mild solvent.
4. Spin the burr by holding the Compensation piston and assure it spins freely. If it does not spin freely, replace the Compensation piston.
5. Separate the Compensation piston from the Cylinder and clean thoroughly.
6. Inspect the Compensation piston and Cylinder for scratches. Deep scratches may require replacement of the part(s).
7. Check the Burr (I6) condition and replace as necessary.
8. Lightly lubricate the outside diameter of the Compensation pistonn and the inside diameter of the Cylinder with the same oil used for operational air lubrication.
9. Assemble the Compensation piston in the Cylinder and assure the Piston moves freely without excessive play. The fit between the Compensation piston and the Cylinder provides the seal for the axial down force air pressure, therefore the fit must be consistent and without excessive play. If the play is excessive, replace the Cylinder.
10. Install the Cylinder and the Compensation piston assembly on the Motor Housing.
11. Replace the Lock Ring. **NOTICE! Do not over tighten the Lock Ring.**
12. Assure the axial down force and the drive are working properly

NOTICE

The FDB-AC should not be operated for extensive periods of time with the cutting tip pointing up. This orientation will increase the amount of debris entering the cylinder and cause premature wear of the cylinder and piston, possibly preventing the piston from floating altogether.

The burr must be replaced at regular intervals. During initial production, the burr and the workpiece should be examined often in order to determine at what interval the burr should be replaced ▶ 7.4 [🗋 31].

At regular intervals (normally once every two years, or more often depending on the application), an overhaul of the FDB-AC should be performed in order to fully comply with the technical specifications. Parts inside the FDB-AC, such as the blades in the air-vane motor and bearings should be replaced as part of the overhaul ▶ 7.6 [🗋 32].

At regular intervals, the pneumatics used to control the FDB-AC should also be checked, especially the air-filter and lubricator. Remember to fill the lubricator with oil.

7.3 Lubrication

The vane motors for the AC deburring tool must be supplied with oil in the motor air supply. Otherwise, the vane material on the housing will wear out quickly. Premature failure occurs if the deburring tool is used without lubrication.

- Use oil specifically suitable for air motors with viscosity in the range from ISO VG 32 to ISO VG 46, e.g. *Interflon Lube PN32 or PN46*
- Use a mist lubricator for lubrication.
- Lubricate the air supply with 3–4 drops of oil per minute.
- The length of the lubricant supply hose between the lubricator and the air motor should not exceed 5 m.

NOTICE

- When first installing the system, use a higher oil setting than that recommended (approx. twice as high) until oiled air is always supplied to the unit.
- Before start-up: run oil through the entire compressed air hose between the lubricator and the unit.

⚠ WARNING

Risk of injury on account of inhalation of air containing oil!

Prolonged contact with air containing oil may cause damage to health.

- SCHUNK recommends filtering lubricant-containing exhaust air through an oil recovery system before it is released into the atmosphere.

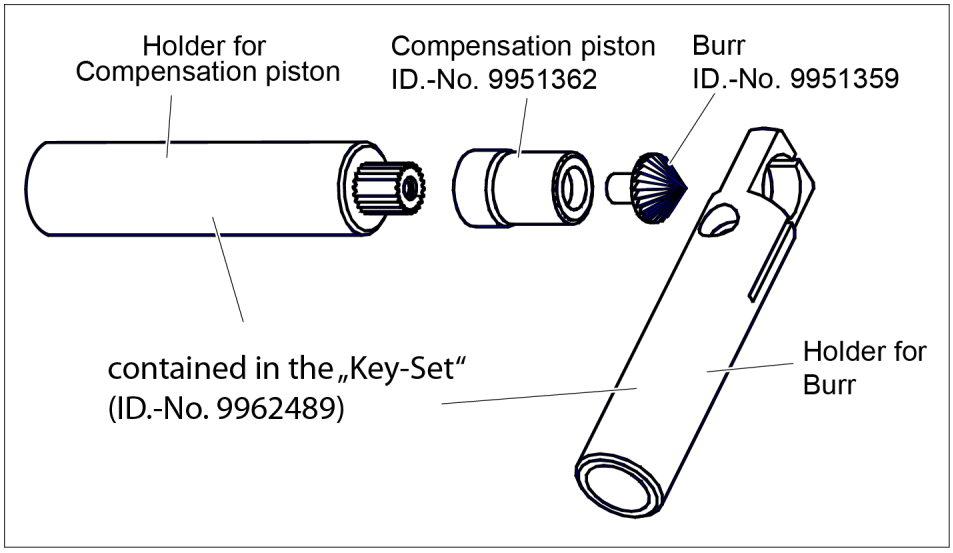
NOTICE

Material damage on account of lacking lubrication!

A lack of lubrication results in the premature wear of the motor and product malfunction within a relatively short time. If the lubrication is not working properly, the motor will run more slowly than it otherwise would, and the speed can fluctuate.

- For optimal results, install lubrication equipment close to the robot (no more than 4.87 m from the FDB-AC).

7.4 Replacement of Burrs



Burr Replacement

The Figure shows the burr-changing tools, the Compensation piston and burr (rotary file). The Compensation piston and the Cylinder should be inspected whenever a burr is replaced. The Compensation piston should rotate freely (by hand) in the Cylinder with no binding. If binding is detected, the Compensation piston and/or Cylinder should be replaced ▶ 7.1 [🗋 27].

To change the burr, unscrew it with the burr-changing tools and replace it with a new one. Re-assemble the parts ▶ 7.1 [🗋 27].

After the burr is changed and the unit re-assembled, check that the Compensation piston is rotating with the burr. If the Compensation piston is not rotating, static friction may be interfering so that the axial force cannot remain constant. In that case, clean the Compensation piston and inspect for any visible scratches. If a burr with an imbalance is used, the Compensation piston may also stop rotating. All burrs are checked for imbalance before they are shipped.

Only original SCHUNK burrs should be used.

7.5 Replacement of Other FDB-AC Parts

In addition to burrs, FDB-AC parts such as the blades in the air-vane motor and bearings should be replaced at regular intervals (nominally every 2 years) as part of a general overhaul ▶ 7.6 [🗋 32].

Experience has shown that during installation, programming, and sometimes during operation, the FDB-AC and the workpiece collide, or the radial forces acting are too high. This sometimes results in damage to the Cylinder and/or the Compensation piston. In this case these parts may also need to be replaced ▶ 7.1 [🗋 27].

Only original spare parts supplied by SCHUNK should be used.

7.6 Overhaul

As described in previous sections of this User Manual, the motor unit and Compensation piston should be inspected and overhauled at regular intervals. In addition to the above, the FDB-AC should be thoroughly cleaned, inspected and tested. This overhaul must be performed by SCHUNK in order to maintain the technical specifications and tool life of the FDB-AC.

7.7 Repairs and Spare Parts

For repair and spare parts please contact SCHUNK.

User- serviceable parts are shown in Figure "Burr -Replacement" ▶ 7.4 [🗋 31]. For the replacement of the burr, a "Keyset" (ID number 9962489) is available.

All other repairs must be performed by SCHUNK.

SCHUNK recommends stocking the following spare parts in addition to burrs:

- Compensation piston – ID number 9951362
- Cylinder – ID number 9951361

Use only original spare parts and burrs from SCHUNK.

8 Translation of the original 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:	Axially flexible pneumatic deburring tool / FDB–AC /pneumatic
ID number	0322206, 0322207

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.

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

9 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:	Axially flexible pneumatic deburring tool / FDB-AC / pneumatic
ID number	0322206, 0322207

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".

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

10 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

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