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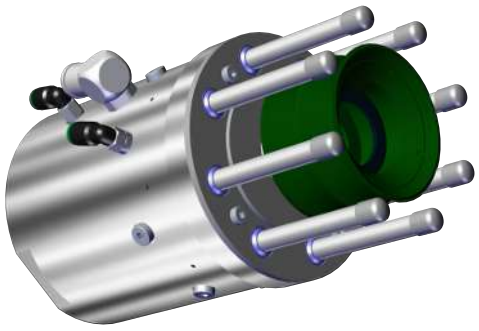

Suction Cup Balance SSCB

Operating Instructions

WWW.SCHMALZ.COM

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Note

The Operating 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.

Published by

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www.schmalz.com/salesnetwork

Contents

1 Important Information

1.1 Note on Using this Document

J. Schmalz GmbH is generally referred to as Schmalz in these Operating instructions.

These Operating instructions contain 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 Operating instructions describe the product at the time of delivery by Schmalz.

1.2 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 Operating 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

1.3 Warnings in This Document

Warnings warn against hazards that may occur when handling the product. This document contains three levels of danger that you can recognize by the signal word.

Signal word	Meaning
WARNING	Indicates a medium-risk hazard that could result in death or serious injury if not avoided.
CAUTION	Indicates a low-risk hazard that could result in minor or moderate injury if not avoided.
NOTE	Indicates a danger that leads to property damage.

1.4 Symbol

This symbol indicates useful and important information.

✓ This symbol represents a prerequisite that must be met prior to an operational step.

‣ 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 suction cup Balance (SSCB) is built in accordance with the latest standards of technology and is safe to operate upon delivery; however, hazards can still arise during use.

The SSCB is intended solely to pick up and simultaneously support workpieces using vacuum power. It may be used on a robot, a measuring machine or any other machine or device. While clamped, the workpiece is subjected to a work operation or moved within a space. To clamp the workpiece with vacuum power using the SSCB, it must be close enough to the suction cup to generate sufficient vacuum force.

The procedure for use is the responsibility of the user and must be adapted to the application and the intended use. The product is intended for industrial use.

The basic functions of the SSCB are listed below:

- Positioning and locking the positioning pins for supporting the workpiece
- Picking up the workpiece using the vacuum

The mechanism for fixing the positioning pins of the SSCB-30 ZP - SAB (part number: 10.01.41.00017) is designed for a maximum of 40 cycles per working day. One cycle consists of releasing and locking the positioning pins. A locking cycle before each work step should be avoided.

Intended use includes observing the technical data and the installation and operating instructions in this manual.

2.2 Non-Intended Use

Schmalz assumes no liability for damage caused by non-intended use. In particular, the following are considered non-intended use:

- Use in potentially explosive atmospheres
- Use in medical applications

Workpieces that are not sufficiently vacuum-tight in the area of the suction cup are not suitable to be clamped/handled using the SSCB.

The mechanism for fixing the positioning pins of the SSCB-30 ZP - SAB (part number: 10.01.41.00017) should not be actuated with every work step.

When handling or clamping thin-walled components, the workpiece may become deformed.

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 this Operating instructions.
2. The product must be operated only by persons who have undergone appropriate training.

This Operating instructions is intended for fitters who are trained in handling the product and who can operate and install it.

2.4 Requirements for the Location of Use and Workpieces

To safely use the SSCB, the following requirements must be met:

- The SSCB must not be used outdoors.
- The type plate and warning signs must be legible.
- The surroundings of the SSCB must be dry.
- The guides for the positioning pins and suction cups must be kept clean.
- The pneumatic lines must be clean.
- Protect the SSCB from direct and constant exposure to sunlight (negative effect on rubber and plastic components).

- The SSCB is not suitable for use in combination with aggressive substances.
- The workpiece must be sufficiently vacuum-tight in the suction area on the SSCB.
- The workpiece must be sufficiently rigid to prevent deformation.

2.5 Emissions

The device emits noise due to operation with compressed air and a vacuum.

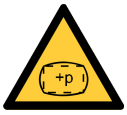
⚠ CAUTION

Noise pollution caused by exhaust air or leakage during operation

Hearing damage

- In the event of leakage, check connections and lines and remedy leakages
- Wear ear protectors.

2.6 Overpressure

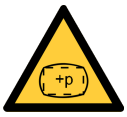


⚠ CAUTION

The compressed air required to open the clamps for the positioning pins may cause parts to be ejected.

Risk of eye injury

- Be careful while connecting the pneumatic lines.
- Check that the connections are installed correctly on a regular basis.
- Wear eye protection.



⚠ CAUTION

The positioning pin can be moved by compressed air. If the clamps fail, the positioning pins move out suddenly.

Risk of injury

- Perform any work in the movement range of the positioning pins cautiously and carefully.
- Wear eye protection.

2.7 Vacuum

⚠ CAUTION

A strong vacuum is produced on the suction cup and suction lines.

Hair, skin, body parts and items of clothing can be sucked in.

- Wear protective glasses and tight-fitting clothing.
- Use a hairnet if necessary.
- Do not look or reach into the suction cup openings.

2.8 Falling product

⚠ CAUTION

Falling product

Risk of injury

- Fasten or store the product securely at the location of use.
- Wear protective work shoes (S1).

2.9 Modifications to the Product

Schmalz assumes no liability for consequences of modifications over which it has no control:

1. The product must be operated only in its original condition as delivered.
2. Use only original spare parts from Schmalz.
3. The product must be operated only in perfect condition.

3 Product Description

3.1 Product Name

The breakdown of the item designation (e.g. SSCB-78 141-171 ZP M6-IG FSG-VU1) is as follows:

Feature	Variants	Explanation
Abbreviated designation	SSCB	Suction cup balance
Pitch diameter of positioning pins	30 78	Ø30 mm Ø78 mm
Working height	60.7–66.5 93.5-107.5 141-171 88.5-102.5	In a range of 60.7 to 66.5 mm In a range of 93.5 to 107.5 mm In a range of 141 to 171 mm In a range of 88.5 to 102.5 mm
Positioning pin locking	EP ZP	Positioning pins locked individually Positioning pins locked centrally
Connection	M6 internal thread 60	Thread: M6 internal thread Ø60 mm Innospann interface
Suction pad	FSG SAB	2.5 folds, round 1.5 folds, round
Suction pad material	VU1 NBR	VU1 Nitrile rubber

3.2 Type Plate

The type plate must always be clearly legible.

The type plate contains the following information:

- Part sales designation/type
- Article/part number
- Manufacturing date

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

3.3 Description of the Suction Cup Balance (SSCB)

3.3.1 Use

The SSCB is intended solely to pick up and simultaneously support arbitrary workpieces using vacuum power. It may be used on a robot, a measuring machine or any other machine or device. While clamped, the workpiece is subjected to a work operation or moved within a space. To clamp the workpiece with vacuum power using the SSCB, it must be close enough to the suction pad for sufficient vacuum force to be generated.

The basic functions of the SSCB are listed below:

- Positioning and locking the positioning pins for supporting the workpiece
- Picking up the workpiece using vacuum

The integrated clamping function in the SSCB requires a compressed air supply (P1), which offsets the clamping forces during attachment. The system is clamped/locked without pressure.

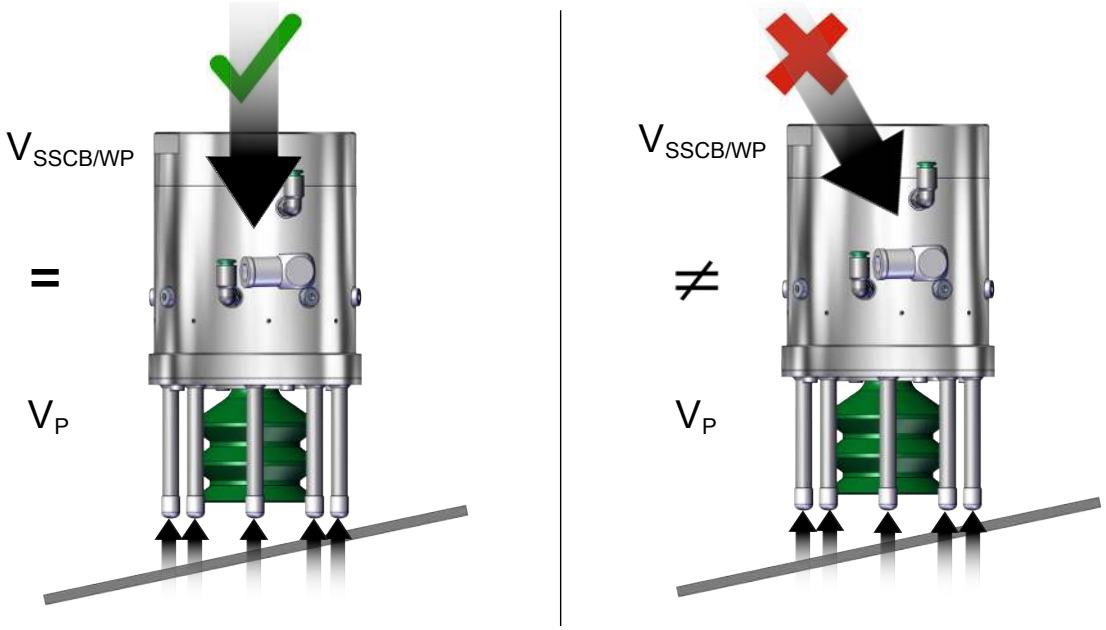
3.3.2 Attaching the SSCB

The clamping system must be adapted to the specific planned application.

The user must plan the work process in detail taking the machine, workpiece, clamping equipment, other equipment and requirements into account.

The machine must be attached appropriately before starting the work process.

Ensuring the Same Direction of Movement



During the setup process, it is important that the direction of movement of the SSCB or the workpiece corresponds to the direction of movement of the positioning pins.
Direction of movement of SSCB or of the workpiece = $V_{SSCB/WP}$
Direction of movement of the positioning pins = V_P

NOTE

Different direction of movement

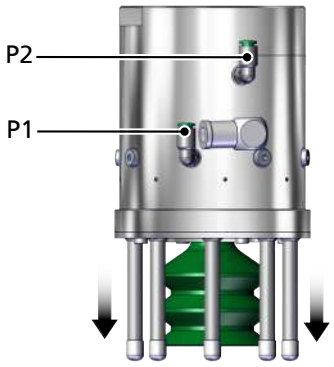
A different direction of movement leads to increased friction when setting up the positioning pins and thus to malfunctions. The workpiece can be moved by the relative movement.

- Make sure that the positioning pins of the SSCB are aligned parallel to the direction of movement with which the SSCB and the workpiece are moving towards each other.

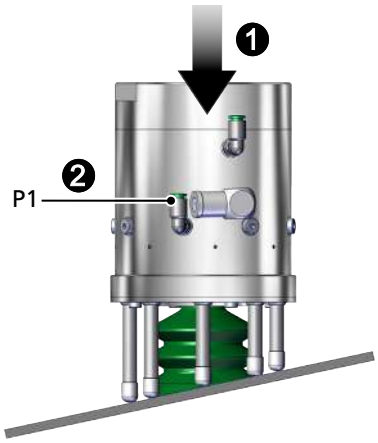
Setup Process

Setting up the SSCB means locking or clamping the positioning pins in the desired position.

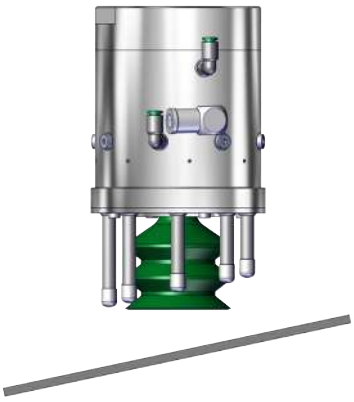
1. Variants SSCB-78 141-171 EP and ZP: By activating the compressed air connections P1 and P2, fully extend the positioning pins.
   Since the variants SSCB-30 60.7-66.5 ZP, SSCB-78 88.5-102.5 and SSCB-78 93.5-107.5 use compression springs for extension, activating the compressed air connection of the positioning pin clamps is sufficient to achieve full extension.



2. Transfer the contour from the workpiece to the positioning pins. I.e. the positioning pins are pushed in to the required position ❶ (e.g. by moving the SSCB against the workpiece or by moving the workpiece against the SSCB).



3. Clamp the positioning pins by deactivating the compressed air at connection P1 ❷ or the compressed air connection of the positioning pin clamps.
   ⇨ The positioning pins are clamped and form the contour of the workpiece.



When the workpiece is set up, it must be dimensionally stable or so well supported that it does not become deformed during setup. If the workpiece becomes deformed during setup, the positioning pins will be incorrectly positioned!

Alternatively, the positioning pins can be equipped with a template specially tailored to the workpiece to be handled.

In the SSCB variant with individually clampable positioning pins (EP), the positioning pins can be individually positioned, e.g. with a robot.

3.3.3 Clamping the Workpiece

To determine the number of suction cups required, an operating vacuum of -600 mbar is assumed. For peace of mind, the

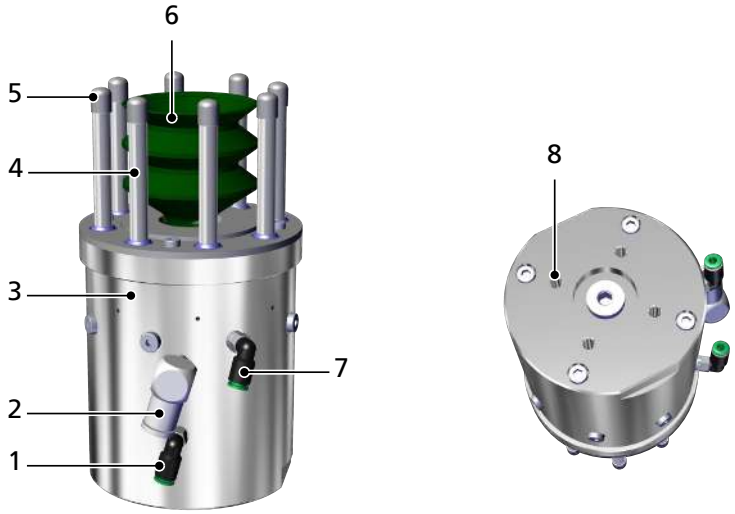
- number of suction cups
- or the operating vacuum

can be increased.

You must check that the required operating vacuum of at least -600 mbar is reached using appropriate safety equipment (e.g. vacuum gauge or vacuum switch). Once an operating vacuum of at least -600 mbar is reached, the workpieces are clamped and ready for processing.

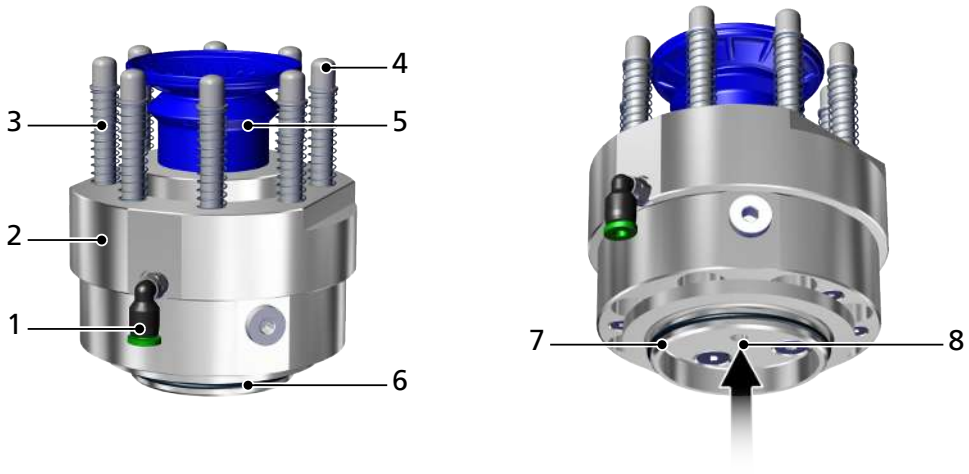
3.4 Design of the Suction Cup Balance (SSCB)

3.4.1 Variants SSCB-78 141-171 EP and ZP



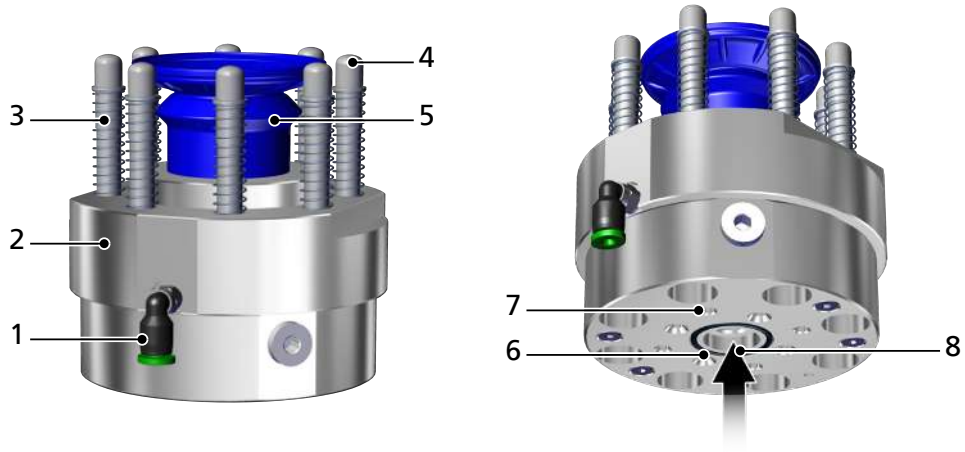
1	Compressed air connection for the spring force (P2)	2	Vacuum connection for the suction cup (V)
3	Main body	4	Positioning pin
5	Cover cap	6	Bellows suction cups
7	Compressed air connection for opening the positioning pin clamps (P1)	8	Mounting thread

3.4.2 Variant SSCB-78 93.5-107.5 ZP



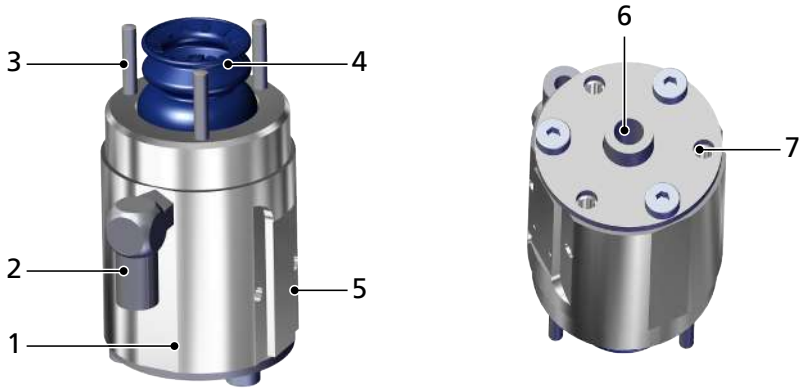
1	Compressed air connection for opening the positioning pin clamps	2	Main body
3	Positioning pin with compression spring	4	Cover cap
5	Bellows suction cups	6	O-ring on the Innospann interface
7	Innospann fastening interface	8	Vacuum feedthrough for the suction cup

3.4.3 Variant SSCB-78 88.5-102.5 ZP



1	Compressed air connection for opening the positioning pin clamps	2	Main body
3	Positioning pin with compression spring	4	Cover cap
5	Bellows suction cups	6	O-ring
7	Mounting thread	8	Vacuum connection for suction cups

3.4.4 Variant SSCB-30 60.7-66.5 ZP



1	Main body	2	Compressed air connection for opening the positioning pin clamps
3	Positioning pin	4	Bellows suction cups
5	Fastening interface; 2 through holes, 2 screws M3x40 with hexagon socket are included in the delivery.	6	Vacuum connection for the suction cup
7	Mounting thread		

4 Technical Data

4.1 General Parameters

Parameter	Unit	Part no. 10.01.41.00017	Part no. 10.01.15.00572	Part no. 10.01.41.00025	Part no. 10.01.15.00850 10.01.15.00922
Mass	kg	0.2	1.3		2.6
Stroke length (Z)	mm	8	22		46
Support force per positioning pin	N	20 [2)]	100		100
Max. working height (WH)	mm	67	102	108	171
Min. working height (WH)	mm	61	88	94	141
Suction cup stroke (Zs)	mm	6	14		30
Suction force at 0.6 bar [1)]	N	16	82		61
Pull-off force at 0.6 bar [1)]	N	24	130		100
Compressed air P1 for releasing the positioning pins	bar	6			
Compressed air P2 for spring force	bar	—			0 to 2
Suction cup type	—	SAB			FSG
Suction cup material	—	NBR			VU1
Suction cup size	mm	22	60		
Workpiece support material	—	A2	NBR		

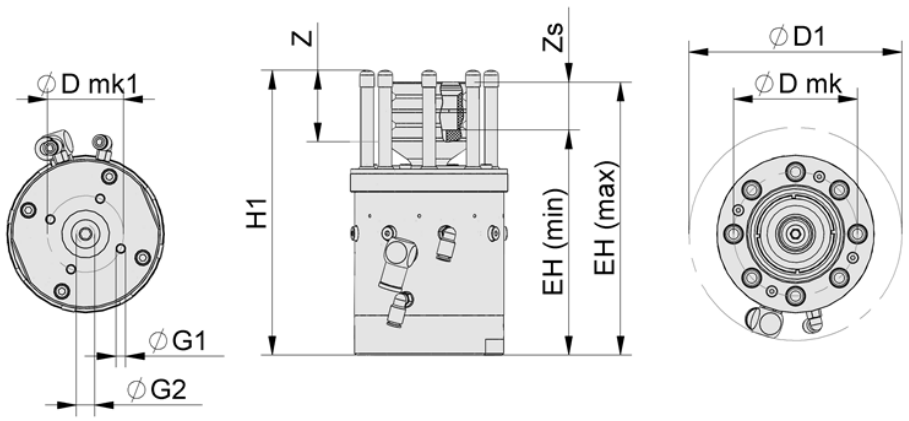
1) Theoretical values calculated with a dry, smooth and even workpiece surface and that do not include safety factors.

2) Up to a max. of 30,000 cycles

The suction and pull-off forces are maximum values calculated under specified test conditions. To ensure safe operation, the values that may be achieved in the customer-specific applications must be determined beforehand through testing.

4.2 Dimensions

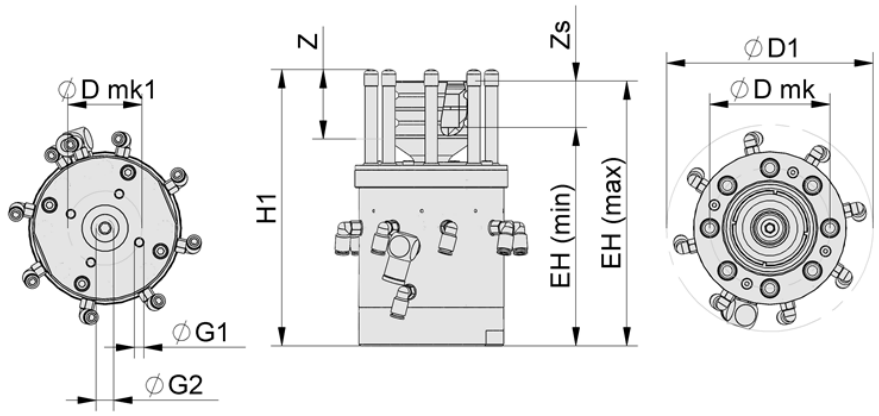
4.2.1 SSCB-78 ZP - FSG



ØD1	ØDmk	ØDmk1	WH (max)	WH (min)	G1	G2	H1	Zs	Z
134	78	48	171	141	M6 internal thread	G1/4" internal thread	179	30	46

All dimensions given in millimeters [mm].

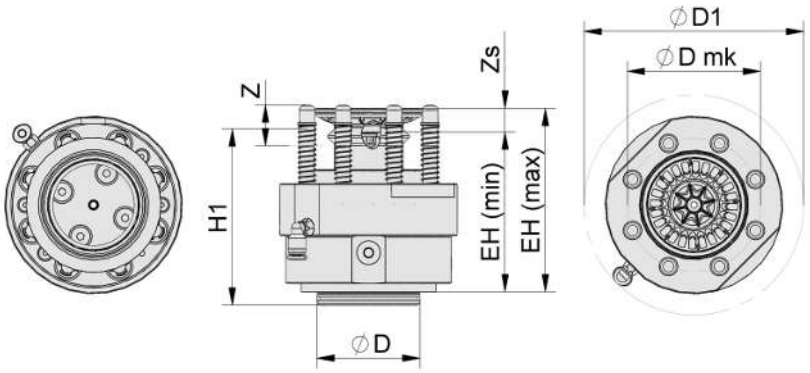
4.2.2 SSCB-78 EP - FSG



ØD1	ØDmk	ØDmk1	WH (max)	WH (min)	G1	G2	H1	Zs	Z
134	78	48	171	141	M6 internal thread	G1/4" internal thread	179	30	46

All dimensions given in millimeters [mm].

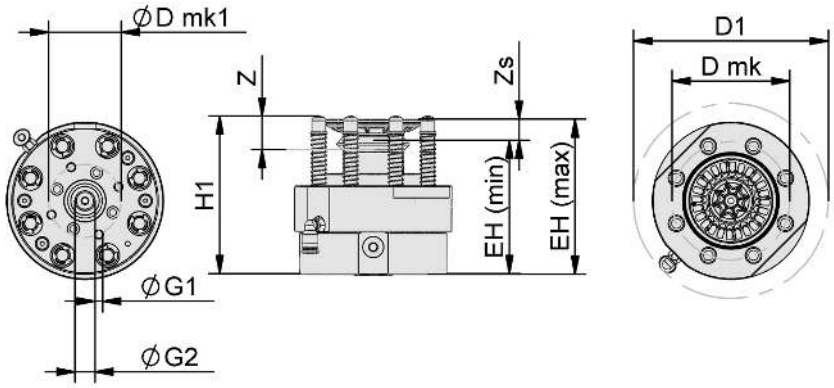
4.2.3 SSCB-78 ZP - SAB



ØD	ØD1	ØDmk	WH (max)	WH (min)	H1	Zs	Z
60	117	78	108	94	118	14	22

All dimensions given in millimeters [mm].

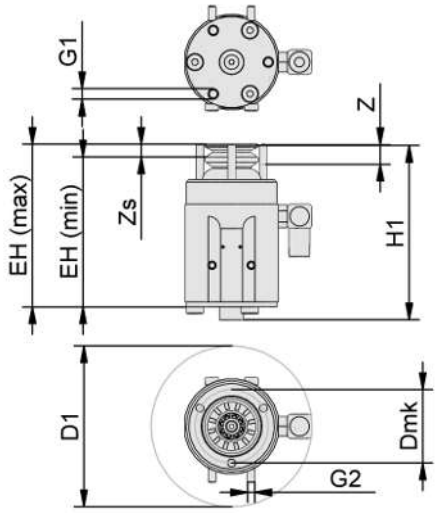
4.2.4 SSCB-78 ZP - SAB (without Innospann interface)



ØD1	ØDmk	ØDmk1	WH (max)	WH (min)	ØG1	ØG2	H1	Zs	Z
117	78	48	102.5	88.5	M6 internal thread	G1/4" internal thread	104.5	14	20

All dimensions given in millimeters [mm].

4.2.5 SSCB-30 ZP - SAB



D1	Dmk	WH (max)	WH (min)	G1	G2	H1	Zs	Z
66	30	67	61	M4 internal thread	M3 external thread	72	6	8

All dimensions given in millimeters [mm].

5 Checking the Delivery

The scope of delivery can be found in the order confirmation. The weights and dimensions are listed in the delivery notes.

1. Compare the entire delivery with the supplied delivery notes to make sure nothing is missing.
2. Damage caused by defective packaging or occurring in transit must be reported immediately to the carrier and J. Schmalz GmbH.

6 Installation

6.1 Installation Instructions

⚠ CAUTION

Compressed air or vacuum in direct contact with the eye

Severe eye injury

- Wear eye protection
- Do not look into compressed air openings
- Do not look into vacuum openings, e.g. suction cups

⚠ CAUTION

Noise pollution due to incorrect installation of the pressure and vacuum connections

Hearing damage

- Correct installation.
- Wear ear protectors.

6.2 Mechanical Attachment

With the exception of the SSCB variant with Innospann interface, the SSCB can be installed in any position.

6.2.1 Planning the Clamping Conditions

The SSCB is adapted to a handling system, robot or device using mounting threads or the Innospann interface.

Detailed planning of the clamping conditions in relation to the workpiece and the options for picking it up in the workspace is vital for the work process.

Note the following issues especially in this regard:

- The surfaces on the workpiece where the suction cups can be positioned and their position in the room
- Where applicable, the interference contour during machining processes (damage to suction cups if the holding force drops)
- Calculation of the forces to be absorbed while deriving the required numbers of suction cups
- Planning the exact positioning including the integration of stops and/or specified pickup surfaces

6.2.2 Attachment Using the Thread

✓ The screws are available in the required number, size and length.

✓ A suitable thread locking compound is available.

▸ Connect the SSCB to the higher-level system using the thread on the housing. Maintain a minimum screw depth of 1.6 × d while doing so. Use a suitable thread locking compound.

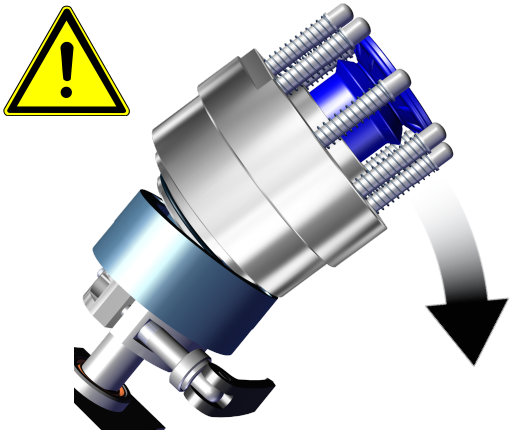
6.2.3 Attachment Using the Innospann Interface

The Innospann interface is a plug connector. The SSCB holder must be designed accordingly.

1. Wet the O-ring on the SSCB with soapy water.

2. Insert the SSCB into the holder up to the stop.

For products with the Innospann interface, the holding force in the bracket when no vacuum is applied is provided purely through the static friction in the Innospann holder. The vacuum must be switched on for the generated vacuum to increase the holding force between the holder and the product.
Using blow off to release the workpiece is not permitted as the SSCB will be forced out of the Innospann holder!



⚠ CAUTION

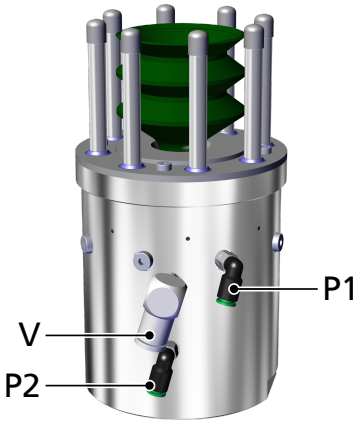
The SSCB tilts or becomes disconnected from the Innospann attachment when it is in an inclined mounting position and the vacuum is not activated.

Risk of injury from falling objects

- Only install the SSCB with the Innospann attachment in the correct position so that gravity retains the SSCB in the Innospann holder.
- Wear protective work shoes (S1).

6.3 Connecting the Compressed Air and Vacuum

6.3.1 SSCB-78 ZP and EP FSG



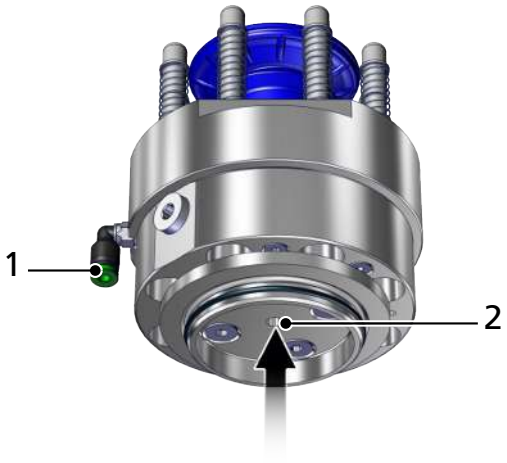
1. Connect the compressed air hose for releasing the positioning pin clamps to the compressed air connection (P1) using the plug connector.

2. Connect the compressed air hose for the spring force of the positioning pins to the compressed air connection (P2).
3. Connect the vacuum hose for clamping the workpiece to the vacuum connection (V).

6.3.2 SSCB-78 ZP - SAB with and without Innospann Interface

Variant with Innospann Interface

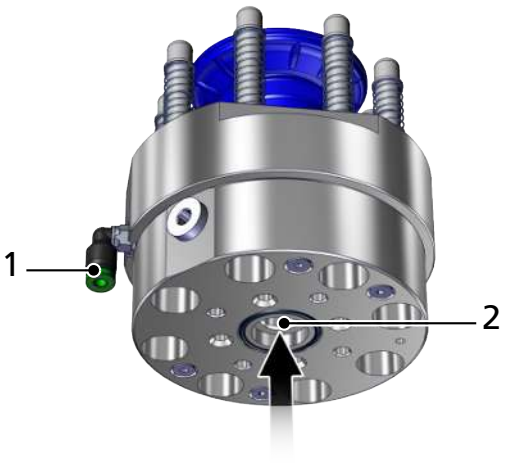
1. Connect the compressed air hose to the connection (1).



2. Attaching the SSCB to the appropriate Innospann holder ensures that the vacuum is transmitted to the hole (2).

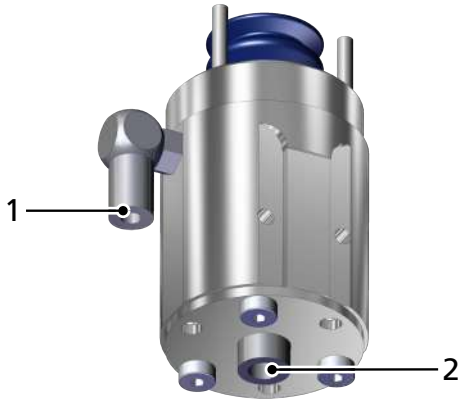
Variant with Mounting Thread

1. Connect the compressed air hose to the connection (1).



2. Connect the vacuum hose for clamping the workpiece to the vacuum connection (2).

6.3.3 SSCB-30 ZP - SAB



1. Connect the compressed air hose to the connection (1) (VSL 4/2).
2. Connect the vacuum hose to the connection (2) (VSL 6/4).

7 Warranty

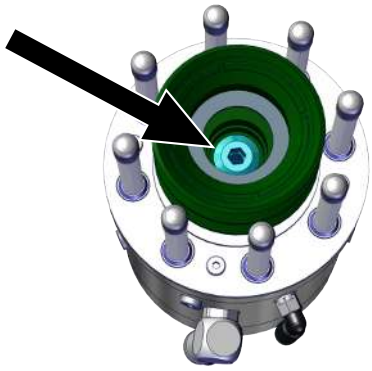
Schmalz guarantees this system pursuant to our General Terms and Conditions of Sale and Delivery. The same applies to spare parts, provided that these are original parts supplied by us.

Wearing parts are not covered by the warranty.

8 Maintenance

8.1 Replacing Suction Pads

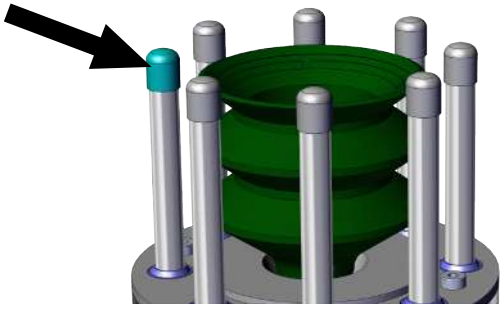
The replacement procedure is explained here using the SSCB -78 ZP - SAB as an example:



1. Screw off the suction pad (hexagon socket).

2. Screw on the new suction pad and sealing ring.

8.2 Replacing the Cover Cap



- ✓ The worn cover cap is removed.
- ✓ A suitable cleaner is provided by the customer.
- ✓ Loctite 480 adhesive is available for attaching the cover cap.
- ✓ The new cover caps are ready for use.
- ✓ A tool (thin rod) for venting when joining the cover cap to the positioning pin is provided by the customer.

1. Clean the positioning pin in the cover cap area thoroughly using a suitable cleaning agent (for example, with Loctite SF 7063).

2. Wet the cover cap with adhesive around the lower inner edge.

3. Use the tool to slide the cover cap onto the positioning pin. This ensures that there are no remaining air cushions between the positioning pin and the cover cap.

4. Hold down the cover cap on the positioning pin and remove the tool.

5. To ensure that the adhesive is distributed evenly inside, apply light pressure and turn the cover cap on the positioning pin by 90°.
6. Leave the adhesive to cure for approximately 10 minutes.
7. Remove the excess adhesive on the positioning pin using Acetone.

9 Spare and Wearing Parts

Maintenance work may only be carried out by qualified personnel.

⚠ WARNING

Risk of injury due to incorrect maintenance or troubleshooting

- Check the proper functioning of the product, especially the safety features, after every maintenance or troubleshooting operation.

The following list contains the primary spare and wearing parts.

Designation	Part no.	Type
Spare parts set, ERS-SET SSCB-FG60-VU1	10.01.15.00953	S
Cover cap, KAPP 7x10.5 SSCB	10.01.15.00918	W
Plug-in screw union bracket, STV-W M5-AG	10.08.02.00293	S

Legend:	S …	Spare part
	W …	Wearing part

10 Disposing of the Product

⚠ CAUTION

Flying parts resulting from opening the product and releasing the spring

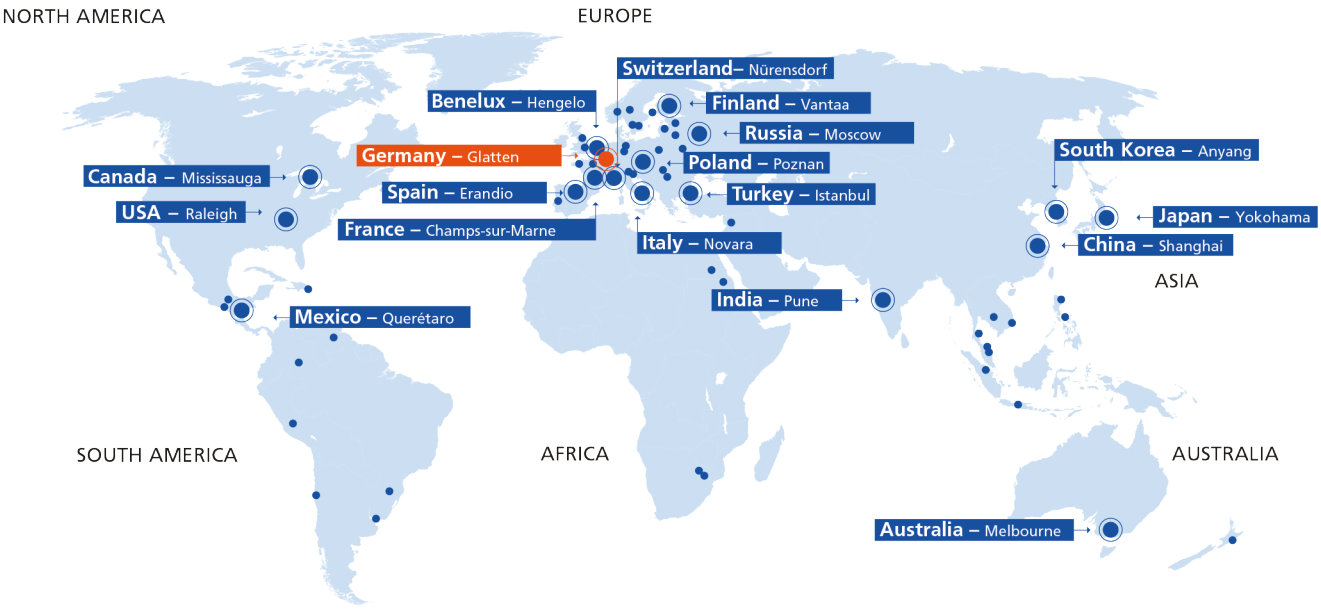
Serious injury!

- Carefully open the product and carefully release the tension on the integrated spring(s).
- Wear eye protection.

Recover the disassembled parts for recycling or reuse (provided no agreement on return or disposal has been made).

1. Dispose of the product properly after replacement or decommissioning.
2. Observe the country-specific guidelines and legal obligations for waste prevention and disposal.

At your side worldwide



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