

Assembly Instructions

Steel-Plate ISST / FlexMat SFM

Note

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

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Contact

J. Schmalz GmbH
Johannes-Schmalz-Str. 1
72293 Glatten, Germany
T: +49 7443 2403-0
schmalz@schmalz.de
www.schmalz.com

Contact information for Schmalz companies and trade partners worldwide can be found at:
www.schmalz.com/salesnetwork

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1 Important Information

1.1 The technical documentation is part of the product

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

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

1.2 Note on Using this Document

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

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




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

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

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

1.3 Warnings in This Document

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

Signal word	Meaning
 DANGER	Indicates a high-risk hazard that will result in death or serious injury if not avoided.
 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.

1.5 Other Applicable Documents

The following instructions must also be referred to when setting up the clamping system:

- Assembly instructions 30.30.01.03058 of the Matrix-Plate

2 Fundamental Safety Instructions

2.1 Intended Use

The Matrix-Plate (MPL) forms a system with its accessories Innospann steel-plate (ISST), FlexMat (SFM) and vacuum block (ISBL) and is intended exclusively for clamping workpieces on a CNC machining center. A workpiece is secured to the clamping system by applying a vacuum and can then be machined from five sides.

The clamping system must be used with an operating vacuum of -750 mbar (guide value) (> See ch. Pneumatic Connection).

The product is intended for industrial use.

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

2.2 Non-Intended Use

Schmalz accepts no liability for damages caused by the use of the clamping system for purposes other than those described under "Intended Use".

Non-intended use includes the following:

- In potentially explosive atmospheres
- Unauthorized refits

2.3 Danger Zone

Hazards arise when the clamping system is clamped to a machine table and a workpiece is being processed.

Due to the function of the clamping system in connection with the machine table and the tool in use, constant vibrations occur. As a result, mechanical and fluid connections may loosen or even become disconnected.

Measures for avoiding accidents:

- Ensure that no persons are present in the danger zone.
- Ensure that no persons enter the danger zone during operation.



CAUTION

Vacuum close to the eye

Severe eye injury!

- ▶ Wear eye protection.
- ▶ Do not look into vacuum openings such as suction lines and hoses.



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.

2.4 Environmental and Operating Conditions

The clamping system must **not** be operated under the following conditions:

- In potentially explosive atmospheres
- Use in an environment with highly acidic or alkaline media

The clamping system is installed with a separate vacuum supply on a machine tool or machining center.



To ensure that the workpiece is securely held on the clamping plate, you must check the vacuum level directly on the clamping device.



DANGER

Flying workpiece due to insufficient clamping force during machining, resulting from insufficient vacuum or excessive machining forces.

Risk of injury or death due to flying workpiece

- ▶ Monitor the vacuum value as close to the clamping location as possible.
- ▶ Wear personal protective clothing.

-
- ▶ If in doubt, consult Schmalz before the start of operations.

2.5 Personnel Qualifications

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

The operating company must ensure the following points:

- The personnel must be commissioned for the activities described in these operating instructions.
- The staff must be at least 18 years of age and physically and mentally capable.
- The product must be operated only by persons who have undergone appropriate training.
- Personnel must receive regular safety briefings (frequency as per country-specific regulations).
- Installation, maintenance, and repairs must be carried out only by specialists from J. Schmalz GmbH or by persons who can prove that they have undergone appropriate training at Schmalz.

The following target groups are addressed in these operating instructions:

- Persons trained in operating and cleaning the product.
- Specialists in mechanics who are responsible for troubleshooting and maintaining the product.

The operator of the system must comply with country-specific regulations regarding the age, ability and training of the personnel.

Valid for Germany:

A qualified employee is defined as an employee who has received technical training and has the knowledge and experience – including knowledge of applicable regulations – necessary to enable him or her to recognize possible dangers and implement the appropriate safety measures while performing tasks. Qualified personnel must observe the pertinent industry-specific rules and regulations.

2.6 Personal Protective Equipment

To avoid injury, always use appropriate protective equipment that is suitable for the situation.

Observe the notes on protective equipment in the corresponding chapters and any country-specific regulations.

2.7 Technical Condition

If the product is operated while in a defective state, safety and function will be impaired.

- The product must only be operated when in perfect technical working order – i.e., in its original condition.
- Follow the maintenance plan (> See ch. Maintenance).
- Use only original spare parts from Schmalz.
- If the operating behavior should change, check the product for faults. Rectify faults immediately.
- Unauthorized conversion or modification of the product is prohibited.
- Safety features must not be disabled under any circumstances.

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

2.8 Responsibility of the Operating Company

The operating company is obligated to perform a risk assessment for the environmental conditions at the installation location.

The operating company is responsible for mounting the clamping system on the machine table. It is therefore responsible for ensuring that the clamping system is correctly mechanically attached, that the pneumatic connections are in good condition and that the pneumatic monitoring (gauge) is working.

The operating company is also responsible for third parties in the working area of the machining center and the clamping system. The operating company must ensure that they have the appropriate qualifications and skills.

- Ensure that the clamping system cannot be started up by unauthorized persons.
- Ensure that the machining center cannot be operated during maintenance or repair work on the clamping system.
- Clearly define the responsibilities for the various activities performed with the gripper.
- Ensure that these responsibilities are observed.

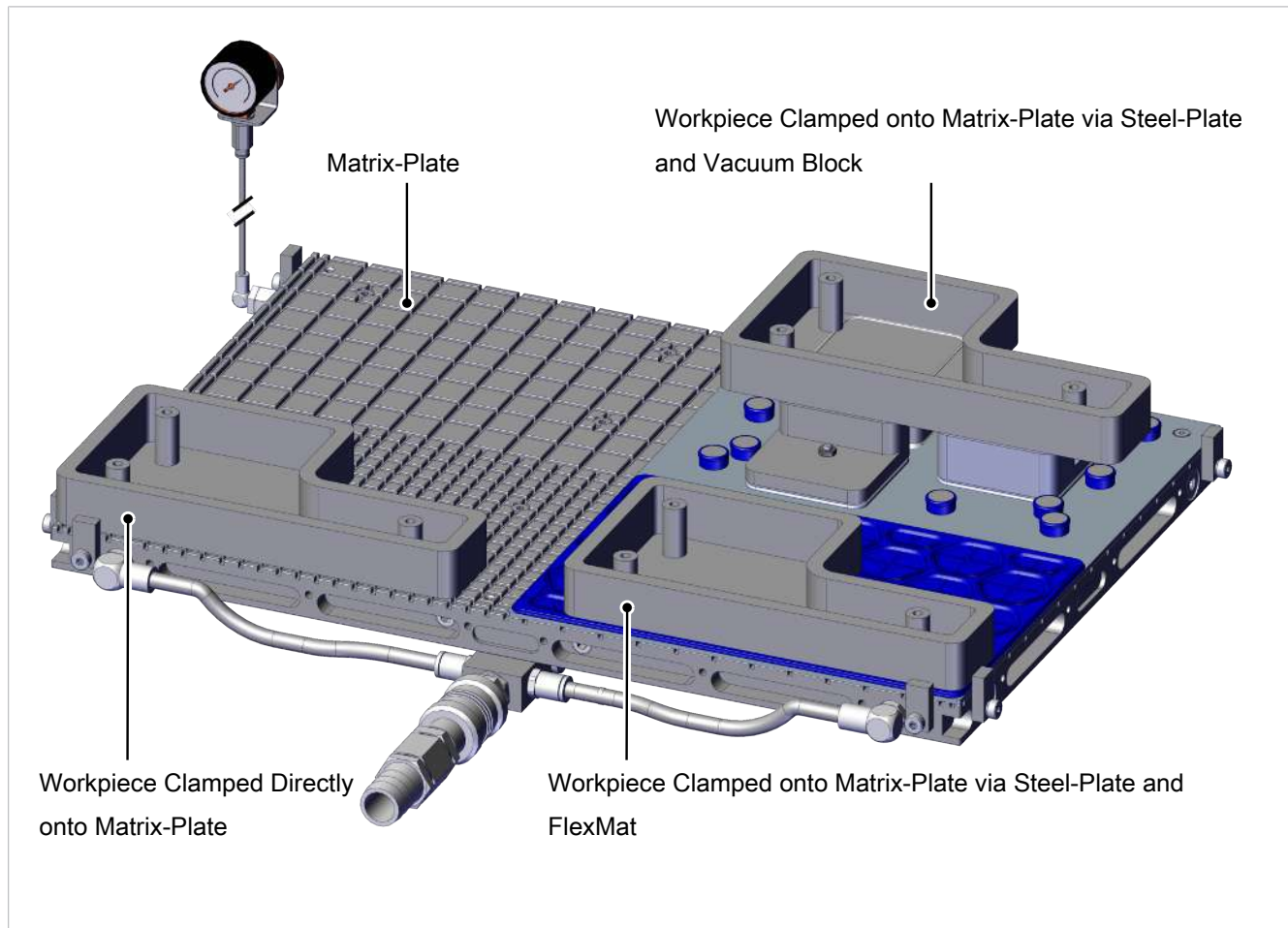
2.9 Country-Specific Regulations for the Operating Company

1. Observe the country-specific regulations regarding accident prevention, safety testing and environmental protection.
2. The product is used in combination with a machine tool/machining center.
Ensure that the appropriate country-specific regulations and safety regulations are adhered to.

3 Product Description

3.1 Description of the Innospann Steel-Plate Clamping System with Vacuum Block and FlexMat

The products Steel-Plate ISST, FlexMat SFM and Innospann vacuum block ISBL are designed as accessories for the Schmalz Matrix-Plate MPL and expand its range of applications.



Workpiece Clamped Directly onto Matrix-Plate

This option is described in the assembly instructions for the Matrix-Plate.

Steel-Plate ISST

The **Steel-Plate ISST** is a flat, 3 mm magnetic steel plate featuring vacuum holes with a diameter of 7 mm distributed evenly across the plate as well as countersunk mounting holes. It serves as a base plate for the use of Innospann vacuum blocks ISBL or the FlexMat SFM and is primarily screwed onto a Matrix-Plate of the corresponding size.

The Steel-Plate is not suitable for direct clamping of workpieces, which requires either Innospann vacuum blocks ISBL or a FlexMat SFM.

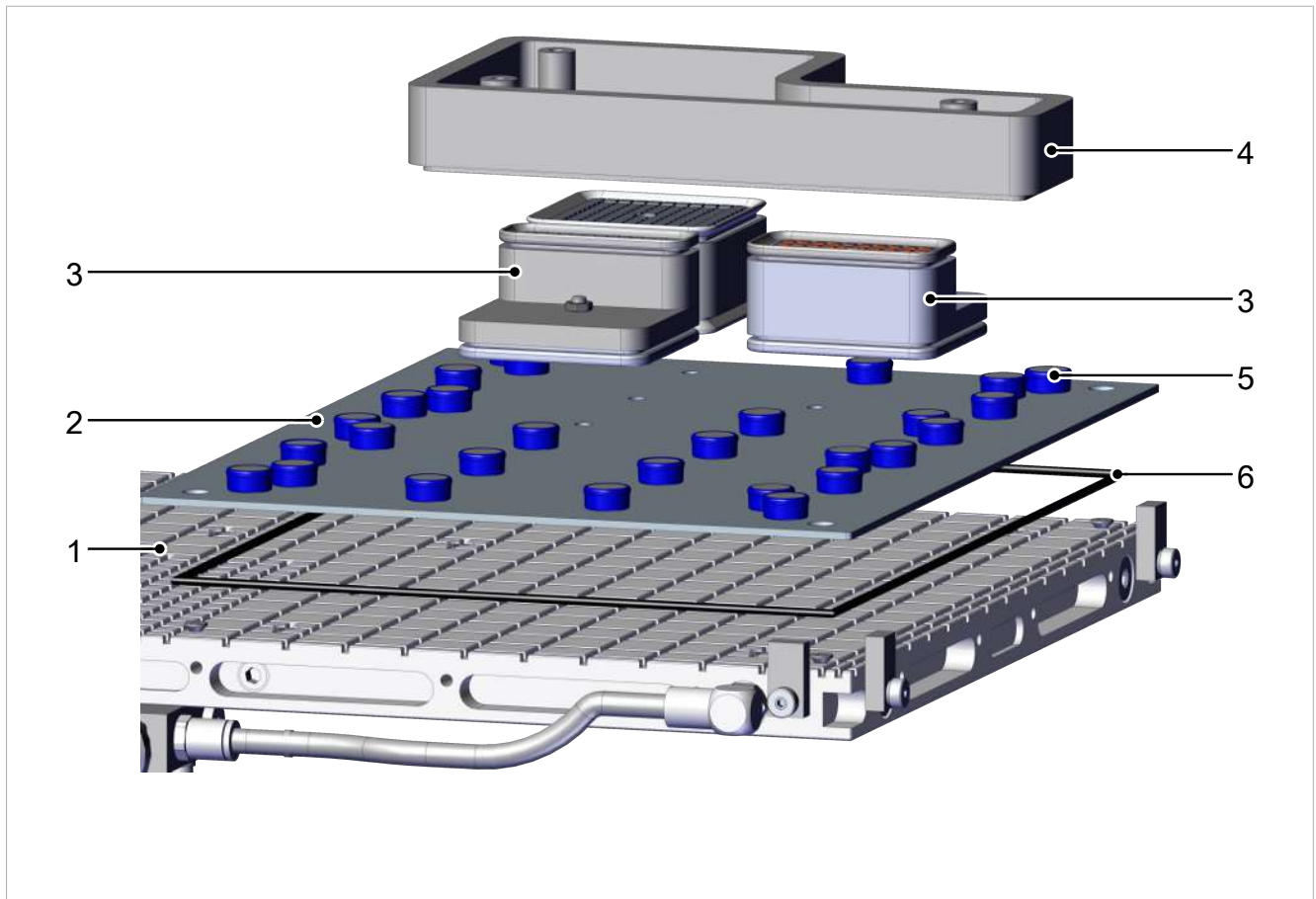
Workpiece Clamped onto Matrix-Plate via Steel-Plate and Vacuum Block

The vacuum is supplied to the system via the grid system of the Matrix-Plate (1) (> See ch. Other Applicable Documents). The attached clamping equipment is supplied with a vacuum through the vacuum holes on the Steel-Plate. The tightness of the system is ensured by the sealing gasket, which is inserted into the

grid of the Matrix-Plate before attaching the Steel-Plate. Since the vacuum chamber limited by the sealing gasket can also enclose vacuum holes in the Steel-Plate that are not required, they must be sealed vacuum-tight with sealing magnets ISMST where necessary.

The **Innospann vacuum blocks ISBL (3)** are equipped with a permanent magnet on the underside as well as separate suction areas facing down to the Steel-Plate and upward to the workpiece. Individual vacuum blocks can be positioned over a vacuum hole of the Steel-Plate (2) at any position and in any number. **The vacuum hole must be completely enclosed by the sealing lip of the vacuum block.** The vacuum is supplied through these holes. The permanent magnet pre-fastens the suction cups to the Steel-Plate. Once the workpiece has been applied and the vacuum is activated, the suction cups are fixed to the Steel-Plate and the workpiece to the suction cups.

Any uncovered holes of the Steel-Plate must be sealed with the supplied sealing magnets.

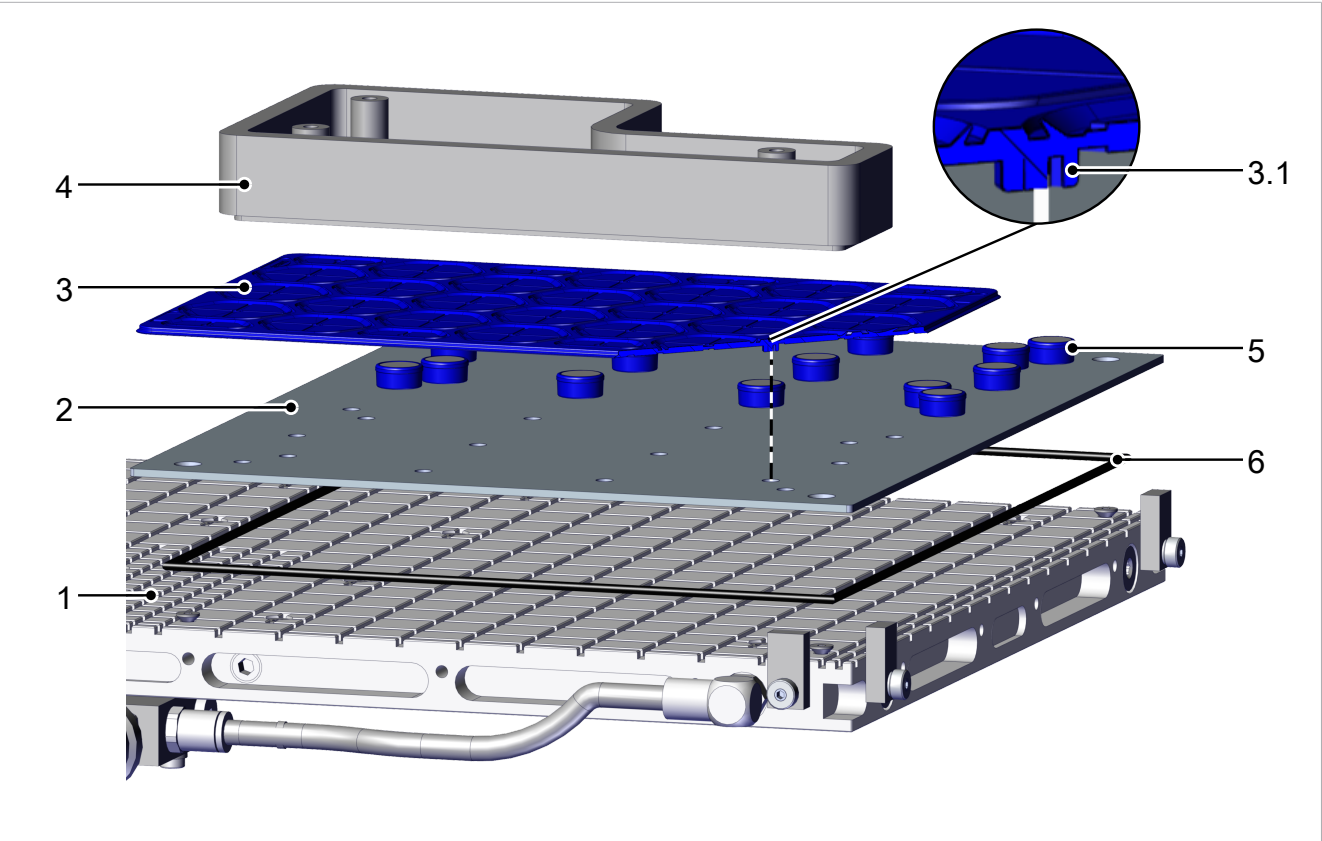


1	Matrix-Plate	2	Steel-Plate
3	Vacuum block	4	Workpiece
5	Sealing magnets	6	Sealing gasket

Workpiece Clamped onto Matrix-Plate via Steel-Plate and FlexMat

Alternatively, the elastomer mat **FlexMat SFM (3)** can be used on the Steel-Plate (2). It is placed on a free Steel-Plate without sealing magnets. Nubs (3.1) are attached to the underside which engage with the corresponding holes of the Steel-Plate (see dimensions L2 and B2 of the parameter drawing). The vacuum is routed upward into the 32 separate suction cells via the grid that is also located on the underside. This allows workpieces (4) with different geometries to be secured. The FlexMat is designed as a wearing part and can be cut to create recesses or outer contours. Alternatively, it can also be reused multiple times, provided that it remains undamaged.

Uncovered holes on the Steel-Plate must be sealed with sealing magnets (5) (> See ch. Accessories).



1	Matrix-Plate	2	Steel-Plate
3	FlexMat	3.1	FlexMat, positioning nubs
4	Workpiece	5	Sealing magnets
6	Sealing gasket		

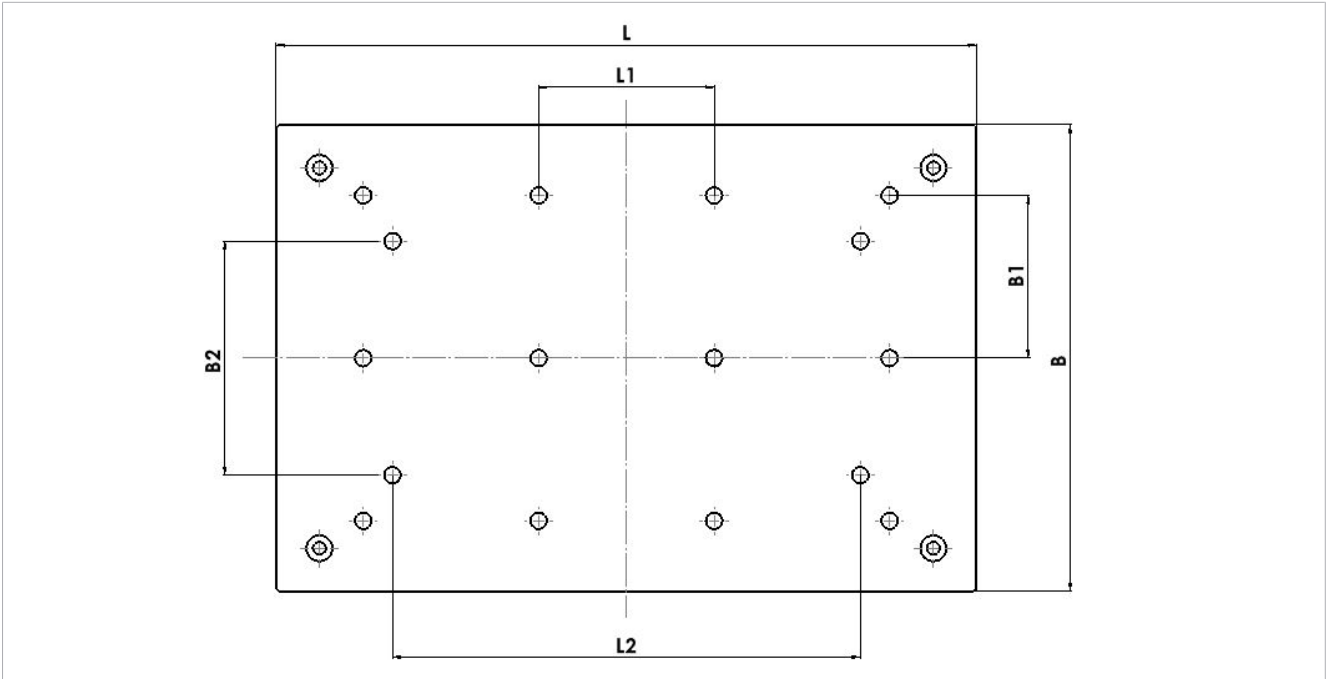
3.2 Variants and Type Keys / Technical Data

Steel-Plate ISST

The Steel-Plate ISST is available in six versions, three for use with vacuum blocks (ISST-MPL) and three for use with the FlexMat (ISST-MPL SFM). As well as the plate itself, the scope of delivery also includes countersunk screws, the sealing gasket, adhesive and sealing magnets (ISST-MPL only). The version is indicated in the item designation. The item designation is composed as follows:

Part number	Abbreviated designation	L	L1	L2	B	B1	B2	Sealing magnets included
10.01.28.00018	ISST-MPL 300x200x3	300	75	200	200	69.5	100	X
10.01.28.00019	ISST-MPL 400x300x3	400	69.5	100	300	75	200	X
10.01.28.00020	ISST-MPL 600x400x3	600	75	200	400	69.5	100	X
10.01.28.00021	ISST-MPL SFM 300x200x3	300	75	200	200	69.5	100	---
10.01.28.00022	ISST-MPL SFM 400x300x3	400	69.5	100	300	75	200	---
10.01.28.00023	ISST-MPL SFM 600x400x3	600	75	200	400	69.5	100	---

All specifications are in mm.

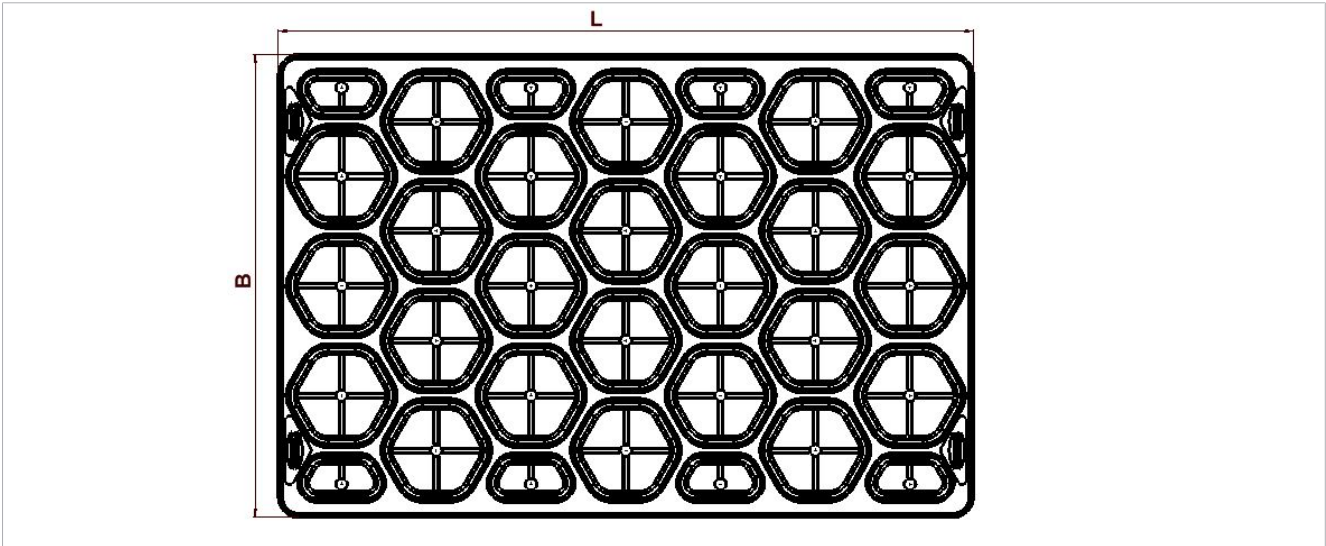


FlexMat SFM

The FlexMat SFM is available in one version.

Part number	Abbreviated designation	L	B
10.01.28.00005	SFM-298.5x198.5	298.5	198.5

All specifications are in mm.



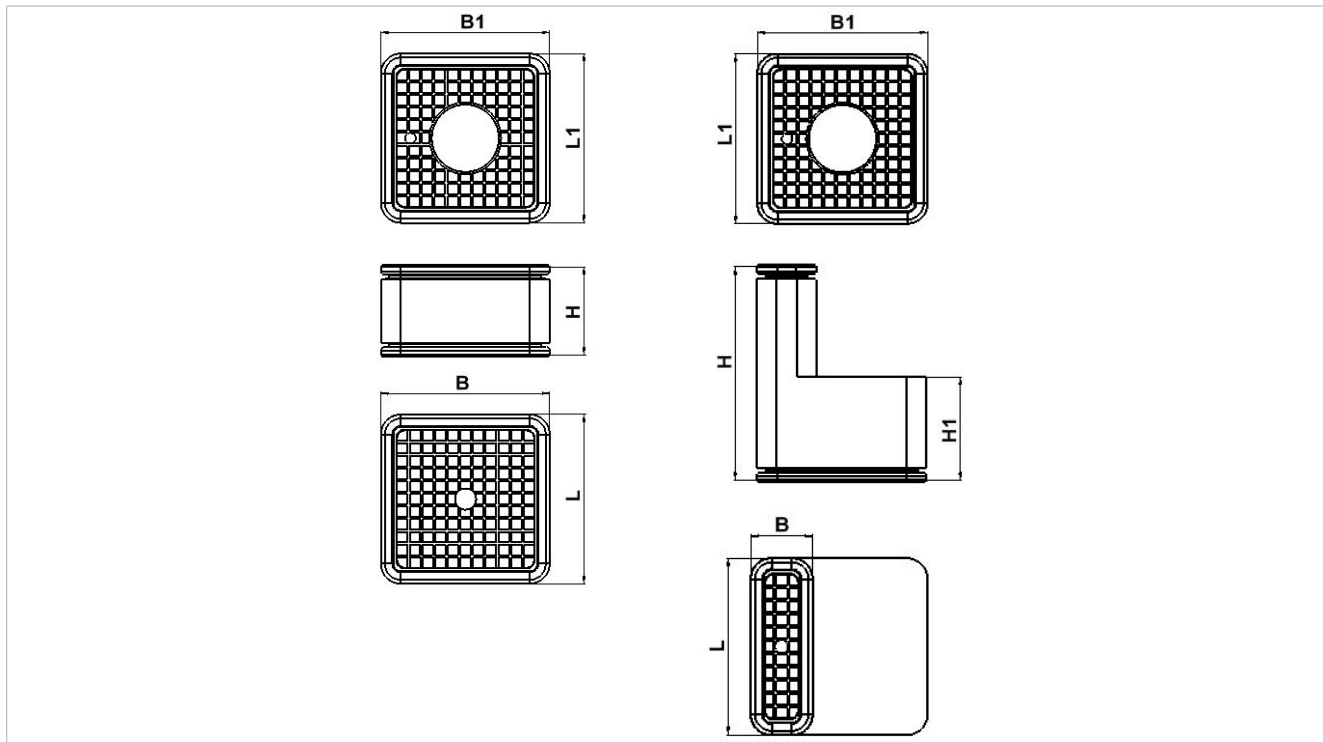
Innospann Vacuum Block ISBL

The Innospann vacuum block ISBL is available in six versions.
The version is indicated in the item designation. The item designation is composed as follows:

Part number	Abbreviated designation	L	L1	B	B1	H	H1
10.01.15.00654	ISBL 80x80x38	80	80	80	80	38	---
10.01.15.00655	ISBL 80x40x38	80	80	40	80	38	13

Part number	Abbreviated designation	L	L1	B	B1	H	H1
10.01.15.00656	ISBL 80x28x38	80	80	28	80	38	13
10.01.15.00657	ISBL 80x80x97	80	80	80	80	97	---
10.01.15.00658	ISBL 80x40x97	80	80	40	80	97	47
10.01.15.00659	ISBL 80x28x97	80	80	28	80	97	47

All specifications are in mm.



3.3 Properties of the Clamping System

Basic Considerations, Processing Strategy

Note that not all processing can be carried out with vacuum clamping systems.

However, vacuum clamping systems offer additional possibilities for the user and expand the processing range of the respective machines. The clamping systems are particularly suited for processing flat and thin-walled workpieces with corresponding clamping surfaces.

Other advantages include gentle and warp-free clamping, suitability for non-ferromagnetic materials as well as the possibility of five-side processing, formatting of the outer contour and creation of recesses. However, the clamping forces with vacuum are usually lower than, for example, the clamping forces of mechanical clamping equipment (> See ch. Calculating the Clamping Force).

Therefore, selecting the correct clamping equipment is crucial for ensuring efficient and reliable processing.

Direct Clamping on the Matrix-Plate

This variant offers the highest precision, robustness and stiffness. In addition, the clamping surface can be optimally adapted to the workpiece by inserting the sealing gasket, thereby increasing the clamping force.

If recesses have to be created, the edges of the workpiece need to be processed or spacing is required between the workpiece and Matrix-Plate, the FlexMat SFM or the vacuum blocks ISBL-A can be used.

Clamping with the FlexMat

The FlexMat allows for the creation of recesses and edge processing of the workpiece since it is possible to cut up to 0,3 mm into the FlexMat. The FlexMat is made from an elastomer material and therefore generally offers higher shear force absorption than when clamping directly onto the Matrix-Plate. The individual suction cells also make it possible to clamp workpieces with different contours without the need for any adjustments. If a suction cell is completely covered by the workpiece, it is evacuated and thus creates a clamping force matching the area of a suction cell. As a result, the effective suction area tends to be lower than with direct clamping onto the Matrix-Plate.

The following points must be taken into account:

- Suction cells are only evacuated when they are completely covered.
- If the workpiece is drilled in the area of the suction cell or if its sealing lip is damaged, the vacuum collapses suddenly, thereby eliminating the clamping force of this cell.
- Even with a large workpiece area, it is possible that only a few suction cells are completely covered, meaning that the actual clamping force is significantly lower than expected.
- During processing, temperatures can develop on the workpiece and on the tool, which can exceed the melting point of the elastomer of the FlexMat. **Therefore, the FlexMat should only be used with an appropriate coolant supply.**

Clamping with Innospann Vacuum Blocks

The Innospann vacuum blocks also allow lateral processing, e.g. with a swiveled unit. As the workpiece is raised off the Matrix-Plate, this creates space for the unit or tool. As a result, the friction pad of the vacuum block ISBL tends to produce higher frictional forces than directly on the Matrix-Plate.

Note that a single vacuum block ISBL has only a relatively small clamping surface. This results in low clamping forces, which can be compensated by a large number of vacuum blocks.

The vacuum blocks 80x80 have the same clamping surface for the workpiece and the Steel-Plate. The additional holding force produced by the permanent magnet facing the Steel-Plate is negligible.

The machining force acts on the workpiece. The height of the vacuum block results in a lever effect that is strongest at the connection point between the vacuum block and the Steel-Plate. This lever effect must be given particular consideration in the case of high suction cups (97 mm) and when suction cups are only used in a line.

Processing on only one suction cup is not permitted. At least two suction cups must always be used, but ideally as many suction cups as possible.

3.4 Calculating the Clamping Force

To establish the specific machining process, it is essential that:

- The workpiece is securely clamped at all times.
- The clamping forces exceed the arising machining forces (including a safety buffer).

For this purpose, the theoretical machining forces must be determined. The calculation of the clamping forces is explained in detail in the assembly instructions of the MPL.(> See ch. Other Applicable Documents: Assembly Instructions for Matrix-Plate). Note also the following regarding the Innospann vacuum blocks ISBL and the FlexMat SFM.

Due to the elastomer contact surface, both the FlexMat and the vacuum blocks offer a higher theoretical friction coefficient on most workpieces and therefore tend to have higher clamping forces. However, the friction coefficient should be checked based on the practical application.

The aforementioned clamping equipment offers the following clamping surface:

- ISBL 80x80: 6400 mm²
- ISBL 80x40: 3200 mm²
- ISBL 80x28: 2240 mm²
- FlexMat, whole suction cell: 1430 mm²
- FlexMat, half suction cell on the outer edge: 530 mm²

This can be used to calculate the theoretical clamping force (according to the MPL assembly instructions).

When using vacuum clamping systems such as the Matrix-Plate, Innospann vacuum blocks and FlexMat, no generally applicable clamping forces can be specified. Actual values can deviate from theoretical values, and vary greatly from application to application.

As a rule, the process parameters must always be selected such that the machining forces are kept as low as possible and safe processing with a sufficient buffer is always possible. This should always be carefully observed and monitored, particularly during retraction, but also during processing.

4 Transport and Storage

4.1 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.

The ISST-MPL scope of delivery includes the following:

- Steel-Plate
- Sealing magnets (one per vacuum hole)
- Sealing gasket and screws

The ISST-MPL SFM scope of delivery includes the following:

- Steel-Plate
- Sealing gasket and screws

4.2 Storage

If the products are not used immediately, we recommend storing them horizontally in the transport packaging.

The following is generally recommended:

- Always store the Steel-Plate flat or horizontally, otherwise it may deform.
- Store the FlexMat flat/horizontally. Do not bend or stress, otherwise it may deform and become unusable.

The FlexMat, the seals and friction pads of the vacuum blocks and the sealing gaskets are made from elastomers.

Elastomer parts must be stored in a cool place (0° C to +15° C, max. 25° C) that is dark, dry, low in dust and offers protection from the weather, ozone and drafts. They must also be free of tension. The effects of ozone, light (particularly UV), heat, oxygen and humidity as well as mechanical influences can reduce the service life of suction cups.

We therefore recommend storage in closed containers. Under ideal storage conditions, the maximum storage period is 2 to 4 years (storage of elastomer parts in accordance with DIN 7716).

5 Installation

5.1 Installation Instructions

The Steel-Plate is designed for use on a Matrix-Plate.

The Matrix-Plate must first be prepared for mounting. For this purpose, it must be free of dirt, and the sealing gasket must be inserted in accordance with the outer contour of the Steel-Plate (> See ch. Other Applicable Documents, MPL Assembly Instructions).

Ensure that all plugs within the area enclosed by the sealing gasket are removed and that the screens are screwed in here.

Apply the Steel-Plate flat and secure it to the Matrix-Plate using the countersunk screws.

The Innospann vacuum blocks or FlexMat clamping equipment can now be applied to the Steel-Plate.

- The Innospann vacuum blocks can be positioned freely over the vacuum openings. The vacuum vent must be fully inside the sealing edge of the vacuum block.
Uncovered vacuum openings should be sealed with ISMST magnetic plugs
Note: Always use ISBL of the same overall height.
- The FlexMat is placed flat on the Steel-Plate. The four pins on the underside must engage with the designated grid (L2xB2, see parameter image).
The outer sealing edge of the FlexMat must rest completely on the Steel-Plate.
Exactly one FlexMat can be used on a Steel-Plate 300x200 while two and up to four FlexMats can be used simultaneously on a Steel-Plate 400x300 and Steel-Plate 600x400 respectively.
Uncovered vacuum vents on the Steel-Plate must be sealed vacuum-tight with sealing magnets (see accessories: magnetic plugs or rubber mat).
The cover of the open vacuum vents / suction cells also prevents cooling lubricants from being sucked in.

6 Start of Operations

6.1 Personnel Qualification

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

1. Only instruct qualified personnel to perform the tasks described in these operating instructions.
2. The product may only be operated by persons who have undergone appropriate training.
3. Electrical work and installations may only be carried out by qualified electrical specialists.
4. Assembly and maintenance work must only be carried out by qualified personnel.

6.2 Before Initial Start of Operations

Before the initial start of operations following installation, repair, servicing or maintenance work, you must check the following:

- All mechanical connectors are properly attached and secured.
- All screws and nuts are tightened to specified torques.
- All components are installed.
- The safety distances have been maintained.
- The supply hoses are properly routed.
- The EMERGENCY STOP switch for the overall system is working.



CAUTION

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

Hearing damage

- ▶ Correct installation.
- ▶ Wear ear protectors.



CAUTION

Vacuum close to the eye

Severe eye injury!

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



CAUTION

Risk of crushing if the suction cup is abruptly attached to a workpiece

- ▶ Do not place any body parts between the suction cup and the workpiece

The Matrix-Plate is mounted as described in the assembly instructions for the Matrix-Plate (> See ch. Other Applicable Documents, Assembly Instructions for Matrix-Plate), and the Steel-Plate is securely fastened to the Matrix-Plate (> See ch. Installation Instructions). The following additional checks must be performed:

- When using the FlexMat, check whether it forms a tight seal.
To do so, place the workpiece or an airtight, level plate on the FlexMat so that all suction cells are completely covered. Activate the vacuum and measure the vacuum level on the MPL. The vacuum level should be close to the maximum achievable vacuum of the vacuum generator.
If the vacuum value is not reached, check that the FlexMat is correctly positioned and that a tight seal exists between the Steel-Plate and MPL (sealing gasket, correctly closed vacuum supply holes).(> See ch. Faults, Causes, Solutions)
- When using the vacuum blocks, check whether they are correctly applied to the Steel-Plate.
To do so, place the workpiece or an airtight, level plate on the vacuum blocks so that all suction cups are completely covered. Activate the vacuum and measure the vacuum level on the MPL. The vacuum level should be close to the maximum achievable vacuum of the vacuum generator.
If the vacuum value is not reached, check the sealing lips of the vacuum blocks for damage. The sealing lips must be cleanly applied to the Steel-Plate and the workpiece.
All vacuum holes not covered by vacuum blocks must be sealed vacuum-tight with sealing magnets. (> See ch. Faults, Causes, Solutions)

7 Operation

7.1 Preparations

- ▶ The product must only be operated by persons who have undergone appropriate training (see Product Description).

Operators must have sufficient understanding of the following points before commencing processing:

1. How the clamping elements work
2. How the vacuum generator works
3. How the machine works
4. The safety features on the machine
5. Measures to be taken in the event of an emergency

Carry out the following tasks before each machine start:

1. Check that the clamping elements are in perfect technical condition.
2. Check that the clamping elements are securely attached to the machine table.
3. Check the sealing gasket for damage or wear.
4. Check that the vacuum openings on the Matrix-Plate are clean and the screw-in filters are screwed in.
5. Check whether any existing damage to the FlexMat is still permissible with regard to the planned processing.
6. Ensure that all safety and monitoring equipment is present and fully functional.
7. Check that the gauge is working properly.
8. Check whether the required operating vacuum of -750 mbar is achieved.
9. Check whether the stops (see Side Stops) on the Matrix-Plate are in the collision area of the machining tools.
The stops may need to be lowered if this is the case.
10. Ensure that only authorized personnel are present in the working area of the machine or system and that no other personnel are put in danger by switching on the machine.

7.2 Processing



⚠ DANGER

Flying workpiece due to insufficient clamping force during machining, resulting from insufficient vacuum or excessive machining forces.

Risk of injury or death due to flying workpiece

- ▶ Monitor the vacuum value as close to the clamping location as possible.
- ▶ Wear personal protective clothing.

Processing steps in chronological order:

1. Place the workpiece on the clamping elements (FlexMat or vacuum blocks)
2. Activate the vacuum using the manual slide valve. Support the suctioning of the workpiece, if necessary, by pressing it onto the clamping elements.
3. Check that the workpiece is securely held.
4. Start processing according to the machine specifications.
5. Once processing is complete, deactivate the vacuum using the manual slide valve. The clamping system is vented automatically and the workpiece can be removed.

To process workpieces on the complete machine, an operating vacuum of at least -750 mbar is recommended (monitored by the gauge). This does not mean that processing cannot also be carried out at a lower vacuum level. To measure the vacuum, the gauge must be connected directly to the Matrix-Plate (> See ch. Other Applicable Documents).

Note:

A vacuum drop may cause the processed workpiece on the clamping elements to move or even be released.

Possible causes for a vacuum drop include:

- Power failure
- Sudden leakage
- Line break
- Malfunction
- Perforation in the workpiece due to machining
- Contaminated screen in the vacuum vent of the Matrix-Plate



⚠ CAUTION

Injury to persons and/or damage to property due to unexpected malfunctions

- ▶ Following a vacuum supply system failure or malfunction, carry out the process of clamping the workpiece again from the very start.
- ▶ Restore the vacuum supply.
- ▶ Check the system for software errors (machine controller switching functions).

Note:

If a VAGG from Schmalz is used to generate the vacuum, note that the warning devices are set to -600 mbar.

Nevertheless, we recommend an operating vacuum of at least -750 mbar. This may need to be taken into account during monitoring.

8 Troubleshooting

8.1 Safety

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.



⚠ CAUTION

Improper installation or maintenance

Personal injury or damage to property

- ▶ Prior to installation and before maintenance work, the product must be disconnected from the power supply, depressurized (vented to the atmosphere) and secured against unauthorized restart.

8.2 Faults, Causes, Solutions when Working with Steel-Plate and Vacuum Blocks

The components ISST and ISBL-A are used on the Matrix-Plate. Therefore, please observe the information provided in chapter 10.2 of the Matrix-Plate assembly instructions. The following table merely represents a specific supplement to this.

Fault	Possible cause	Solution
The workpiece is not picked up or the vacuum does not build up.	The Steel-Plate is not correctly attached to the Matrix-Plate. There may be leakage and/or the existing flow rate is insufficient.	Check the correct mounting and vacuum supply of the Matrix-Plate according to the MPL instructions. Check whether the sealing gasket is inserted correctly. Attach the Steel-Plate and screw it on. There must not be a gap between the Steel-Plate and Matrix-Plate.
	There are no or too few open vacuum vents within the vacuum area enclosed by the sealing gasket under the Steel-Plate.	Open at least one vacuum vent within the vacuum area enclosed by the sealing gasket. We recommend that you always open all vacuum vents inside the sealing gasket.
	The screw-in screens in the vacuum vents are dirty.	Clean the screens or replace them if necessary.
	The workpiece is curved and does not make contact with all vacuum blocks.	Press on the workpiece so that the vacuum blocks form a tight seal. Once the vacuum has been established, the workpiece should remain attached in this forced position.
	The clamping system with the suctioned workpiece is not tight or there is too much leakage.	Check whether all vacuum blocks are completely covered by the workpiece and that the sealing lip is correctly applied to the workpiece.

Fault	Possible cause	Solution
		Check whether all unused vacuum vents in the Steel-Plate are correctly covered with sealing magnets ISMST.
	Individual suction cups do not apply suction.	Check whether the individual vacuum vent over which the suction cup is positioned is supplied with a vacuum by the Matrix-Plate.
	Individual suction cups apply suction to the Steel-Plate, but the workpiece is not gripped.	Check whether the screen in the relevant suction cup is clogged. Remove any coarse dirt. If the screen is damaged or dirt has accumulated in the suction cup, it must be replaced.
	Workpiece has perforations.	Position the vacuum block such that the entire suction area is completely covered by the workpiece and no leakage occurs due to perforations.
	Workpiece is not vacuum-tight.	If possible, select a more powerful vacuum generator and uses hoses with larger cross sections. In the case of excessive porousness, vacuum clamping is not possible.
	Cause lies with vacuum generator, hoses or Matrix-Plate.	See Matrix-Plate assembly instructions.
The workpiece moves or tears off when the tool is engaged or during machining.	Clamping force too low. This depends on the vacuum level, the clamping area and the friction coefficient.	See the following errors: "vacuum level is too low," "clamping surface is too small" and "friction coefficient between the workpiece and the Matrix-Plate is too low."
	Machining forces too high.	Change the machining parameters to reduce the machining forces (infeed, speed, feed, tool, etc.).
	Workpiece or machining is not suitable for vacuum clamping because the machining forces are too high and the vacuum clamping force is subject to physical restrictions (> See ch. Calculating the Clamping Force).	Support with mechanical clamping force if possible or change the machining process. Not every workpiece can be clamped and machined using solely a vacuum.
	Vacuum drops during machining due to leakage caused by material removal or damage to the sealing edge of the vacuum blocks (workpiece perforation, machining of the outer contour, etc.).	Compare the position of the vacuum blocks to the machining program. Adjust the position if necessary. If necessary, use an adapted milling program to prevent perforations.
	Vacuum blocks must be removed in pairs from the processing point (i.e. the point of force application). The lever effect increases the machining forces relative to the clamping forces.	Always place the vacuum block as close to the outside of the workpiece or to the processing point as possible in order to reduce the generated torque. If possible, increase the clamping force with additional/larger vacuum blocks, a higher vacuum level or higher friction force.

Fault	Possible cause	Solution
Vacuum blocks detach from or move on the Steel-Plate during processing.	This problem applies particularly to ISBL-A with a suction area of 80x80 mm. The vacuum suction force applied to the workpiece is almost identical to that applied to the Steel-Plate. The torque generated on the lower suction area can be significantly higher due to the lever effect of the machining forces that are applied to the workpiece (especially with the high suction cups). This is therefore the weak point in the system.	If possible, increase the number of vacuum blocks or use lower vacuum blocks, if available. Reduce the machining forces or increase the clamping forces.
	Only one vacuum block was used.	Processing on only one suction cup is not permitted. The generated torques can easily displace it. Use additional suction cups.
The vacuum level is too low	The leakage between the Matrix-Plate and Steel-Plate is too great.	Check the correct mounting of the Steel-Plate and the condition of the sealing gasket.
	The leakage between the vacuum blocks and Steel-Plate is too great.	Check that the vacuum blocks are positioned correctly over the vacuum vents (they must be fully covered). Check the lower seals of the vacuum block for damage.
	The leakage between the vacuum blocks and the workpiece is too great.	Check the seals and replace in the case of visible damage. They are available as spare parts and can be replaced without tools.
	The leakage at the unused vacuum vents is too great.	Check that the sealing magnets ISMST are positioned correctly in the vacuum vents on the Steel-Plate. If the rubber surface of the ISMST is damaged, replace the relevant ISMST.
	Cause lies with vacuum generator, hoses or Matrix-Plate.	See Matrix-Plate assembly instructions.
The clamping surface is too small	The number of suction cups is too low.	If possible, use additional or larger suction cups.
The friction coefficient between the workpiece and the vacuum blocks is too low.	The friction coefficient is reduced by cooling lubricant or other contaminants.	Clean the friction surface of the vacuum blocks and the workpiece, e.g. with a cloth, to remove any cooling lubricant or other contaminants.

8.3 Faults, Causes, Solutions when Working with Steel-Plate and FlexMat

The components ISST and SFM are used on the Matrix-Plate. Therefore, please observe the information provided in chapter 10.2 of the Matrix-Plate assembly instructions. The following table merely represents a specific supplement to this.

Fault	Possible cause	Solution
The workpiece is not picked up or the vacuum does not build up.	The Steel-Plate is not correctly attached to the Matrix-Plate. There may be leakage and/or the existing flow rate is insufficient.	Check the correct mounting and vacuum supply of the Matrix-Plate according to the MPL instructions. Check whether the sealing gasket is inserted correctly. Attach the Steel-Plate and screw it on. There must not be a gap between the Steel-Plate and Matrix-Plate.
	There are no or too few open vacuum vents within the vacuum area enclosed by the sealing gasket under the Steel-Plate.	Open at least one vacuum vent within the vacuum area enclosed by the sealing gasket. We recommend that you always open all vacuum vents inside the sealing gasket.
	The screw-in screens in the vacuum vents are dirty.	Clean the screens or replace them if necessary.
	The workpiece is curved and is not positioned correctly on the FlexMat.	Press on the workpiece so that the seals of the suction cells form a tight seal. Once the vacuum has been established, the workpiece should remain attached in this forced position.
	FlexMat is not positioned correctly on the Steel-Plate.	Ensure that the four pins on the underside are positioned in the designated openings in the Steel-Plate. The FlexMat must be evenly applied, especially at the outer edges with the underside seal toward the Steel-Plate.
	Workpiece does not fully cover at least one FlexMat suction cell.	Position the workpiece such that as many suction cells as possible are completely covered. Note: If a suction cell is not fully covered, no vacuum builds up in this cell and no clamping force is generated.
	The seals or suction cells of the FlexMat are damaged, for example, due to the previous processing.	Replace the damaged FlexMat with a new one.
	The cell's suction openings are clogged with dirt.	The cell's suction openings have a very small diameter and can clog up with minimal dirt. Check whether they are clear and, if necessary, unclog them with a sharp object. Caution: If the suction opening is damaged or enlarged during this process, the FlexMat must no longer be used and must be replaced. Tip: This is best checked by means of a visual inspection by holding the FlexMat against the light.

Fault	Possible cause	Solution
	Workpiece is not vacuum-tight.	If possible, select a more powerful vacuum generator and uses hoses with larger cross sections. In the case of excessive porousness, vacuum clamping is not possible.
	Cause lies with vacuum generator, hoses or Matrix-Plate.	See Matrix-Plate assembly instructions.
The workpiece moves or tears off when the tool is engaged or during machining.	Clamping force too low. This depends on the vacuum level, the clamping area and the friction coefficient.	See the following errors: "vacuum level is too low," "clamping surface is too small" and "friction coefficient between the workpiece and the Matrix-Plate is too low."
	Machining forces too high.	Change the machining parameters to reduce the machining forces (infeed, speed, feed, tool, etc.).
	Workpiece or machining is not suitable for vacuum clamping because the machining forces are too high and the vacuum clamping force is subject to physical restrictions (> See ch. Calculating the Clamping Force).	Support with mechanical clamping force if possible or change the machining process. Not every workpiece can be clamped and machined using solely a vacuum.
	Vacuum drops during machining due to leakage caused by material removal or due to damage to the FlexMat or to individual suction cells of the FlexMat (workpiece perforation, machining of the outer contour, etc.).	The FlexMat is designed such that perforations can be created or cuts made into the FlexMat. However, the vacuum drops completely in drilled or milled suction cells, and the clamping force is reduced accordingly. If too many suction cells fail, there is no longer sufficient clamping force. In this case, refer to the points "Machining forces too high" and/or "Workpiece not suitable".
Vacuum in the FlexMat breaks down or the FlexMat detaches from the Steel-Plate (this will cause the workpiece to move or break off).	Excessive amounts of cooling lubricant and/or dirt can clog the vacuum ducts or holes in the system, thus causing the vacuum level to drop.	Cover unused suction cells to prevent heavy ingress of cooling lubricant and dirt.
	Due to the high pressure of the cooling lubricant stream or other influences (e.g. collision with attachment parts on the unit), the FlexMat is raised off the Steel-Plate and the vacuum collapses abruptly.	Cover the outer edges of the FlexMat. Change the direction or pressure of the cooling lubricant stream and avoid collisions.
The FlexMat melts during processing.	The workpiece and the tool can heat up significantly when processing metal in particular. This can cause the elastomer FlexMat to melt.	Cool the workpiece and FlexMat accordingly. Adapt the processing if necessary.
The vacuum level is too low	Leakages that must be compensated by the vacuum generator can be caused particularly by uncovered suction cells or dirt between the FlexMat seal and the Steel-Plate.	Reduce leakage by covering uncovered suction cells and cleaning the Steel-Plate, FlexMat and workpiece. If possible, use a more powerful vacuum generator or hoses with larger cross sections. Tip: When processing with the FlexMat, a vacuum generator with double the

Fault	Possible cause	Solution
		suction capacity should be used than required for a similar clamping area without the FlexMat.
	Cause lies with vacuum generator, hoses or Matrix-Plate.	See Matrix-Plate assembly instructions.
The clamping surface is too small	Too few suction cells are fully covered by the workpiece.	Position the workpiece such that as many suction cells as possible are fully covered.
The friction coefficient between the workpiece and the FlexMat is too low.	The friction coefficient is reduced by cooling lubricant or other contaminants.	Clean the surface of the FlexMat and the workpiece, e.g. with a cloth, to remove any cooling lubricant or other contaminants.

9 Maintenance

9.1 Safety

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.



⚠ CAUTION

Improper installation or maintenance

Personal injury or damage to property

- ▶ Prior to installation and before maintenance work, the product must be disconnected from the power supply, depressurized (vented to the atmosphere) and secured against unauthorized restart.

9.2 Maintenance and Cleaning of the Steel-Plate ISST-MPL

The sealing gasket between the Matrix-Plate and the Steel-Plate must be replaced in the case of visible wear or damage. A faulty sealing gasket creates leakage between the Steel-Plate and the Matrix-Plate. Before applying or positioning the clamping equipment (setup), the Matrix-Plate and the Steel-Plate must be cleaned thoroughly (e.g. with a cloth) to remove any dirt and contamination.

9.3 Maintenance and Cleaning of the Vacuum Blocks ISBL-A

The seals of the vacuum blocks ISBL-A must be replaced in the case of visible damage, e.g. due to wear. To do so, simply pull the damaged seal out of the slot and thoroughly clean the slot. Wet the new seal slightly, e.g. with soapy water or some cooling lubricant, and press it in by hand. The friction pad cannot be replaced. Before each machining process, clean the vacuum blocks to remove any coarse dirt and cooling lubricant.

9.4 Maintenance and Cleaning of the FlexMat SFM

The FlexMat should be replaced in the event of damage. Before each machining process, clean the FlexMat to remove any coarse dirt and cooling lubricant.

Note regarding cleaning of elastomer parts:

The FlexMat as well as the seals and friction pads of the vacuum blocks and the sealing gaskets are made from elastomers. These can be cleaned with soap and warm water along with a cloth or a soft brush. Afterwards, they should be dried at room temperature.

9.5 Accessories, Spare Parts and Wearing Parts

Spare and wearing parts can be requested from the Schmalz service team using the order number, product key or product service number.

Accessories

Part no.	Designation	Note
10.01.27.00120	Vacuum unit VAGG 6 AC3 10; VAGG-6-L Basic-SCHMALZ	Recommended for 1x MPL 300x200
10.01.27.00121	Vacuum unit VAGG 18 AC3 30 VAGG-18-L Basic-SCHMALZ	Recommended for 1x MPL 400x300 (> See ch. Pneumatic Connection)
10.01.27.00122	Vacuum unit VAGG 40 AC3 80; VAGG-40-L Basic-SCHMALZ	Recommended for 1x MPL 600x400 (> See ch. Pneumatic Connection)
10.01.27.00123	Vacuum unit VAGG 63 AC3 80; VAGG-63-L Basic-SCHMALZ	Recommended for 2x MPL 600x400 (> See ch. Pneumatic Connection)

Spare and wearing parts

Part no.	Designation	Part type	Note
20.01.04.00754	Countersunk screw - ISKT SCHR 10642 M5x12 ST-8.8 VZ	S	For ISST-MPL
10.07.04.00091	Sealing gasket DI-SCHN 3.5 MOS CR-20	W	For ISST-MPL
10.01.14.00847	Sealing magnet ISMST 19-7 4ISMST	S	For ISST-MPL
10.01.15.00158	Sealing frame ISDR 81x81x12 cup 1 NBR-50	W	For all ISBL-A lower seal For ISBL-A 80x80 upper seal
10.01.15.00418	Sealing frame ISDR 81x43x12 cup 2 NBR-50	W	For ISBL-A 80x40 upper seal
10.01.15.00419	Sealing frame ISDR 81x31x12 cup 3 NBR-50	W	For ISBL-A 80x28 upper seal

S = spare part, W = wearing part

10 Disposing of the Product

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.

