

## Operating Instructions

# Mini Compact Terminal SCTMi

**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.

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# 1 Important Information

## 1.1 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

## 1.2 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](http://www.schmalz.com/services)

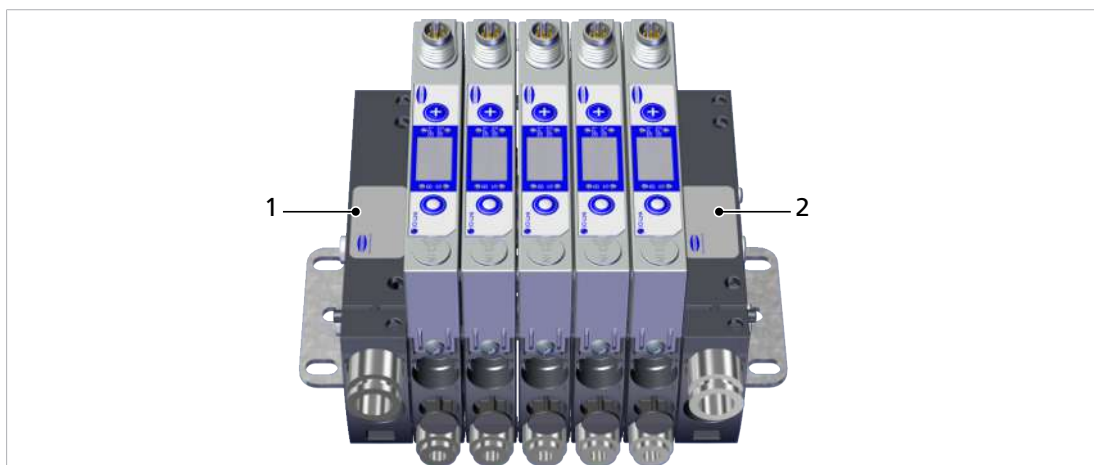
## 1.3 Other applicable documents

**Important:**

These instructions explain how to mount the mini compact terminal as well as the important points that must be taken into account when using such a terminal.

For safe operation, the operating instructions 30.30.01.01961 for the mini compact ejector SCPMi must be observed, in particular the explanation of operation and all functions of the SCPMi.

## 1.4 Type Plate



The type plates (1) and (2) are permanently attached to the Terminal and must always be clearly legible.

The type plate (1) contains the following data:

- Designation, incl. individual configuration code (terminal "XY", ejector "AAA")

The type plate (2) contains the following data:

- Part number
- Permitted pressure range
- Manufacturing date
- Serial number
- QR code

Identical individual discs are installed in groups in the terminal as blocks. The following counting method is defined for identification of the ejector blocks:

The ejector block to the right of the type plate (1) is the first ejector block. The second ejector block is assembled next to that one, and so on, up to a maximum of four blocks.

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

## 1.5 Symbols



This symbol indicates useful and important information.

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

Actions that consist of more than one step are numbered:

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

## 2 Fundamental Safety Instructions

### 2.1 Intended Use

The mini compact terminal (SCTM) is designed to generate a vacuum for gripping and transporting objects when used in conjunction with suction cups. Depending on the design, the electrical control signals are transmitted directly or via appropriate communication lines.

Neutral gases are approved as evacuation media. Neutral gases include air, nitrogen and inert gases (e.g. argon, xenon and neon). For further information, see (> See ch. Technical Data).

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

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 non-intended usage of the .

In particular, the following are considered non-intended use:

- Use in potentially explosive atmospheres
- Use in medical applications
- Lifting people or animals
- Evacuation of objects that are in danger of imploding

### 2.3 Personnel Qualification

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 operating staff have been instructed in the operation of the product and have read and understood the operating instructions.
- Installation, maintenance, and repairs must be carried out only by specialists or by persons who can prove that they have undergone appropriate training.

Applicable 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 employees must observe the relevant industry-specific rules and regulations.

## 2.4 Warnings in This Document

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

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

## 2.5 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.

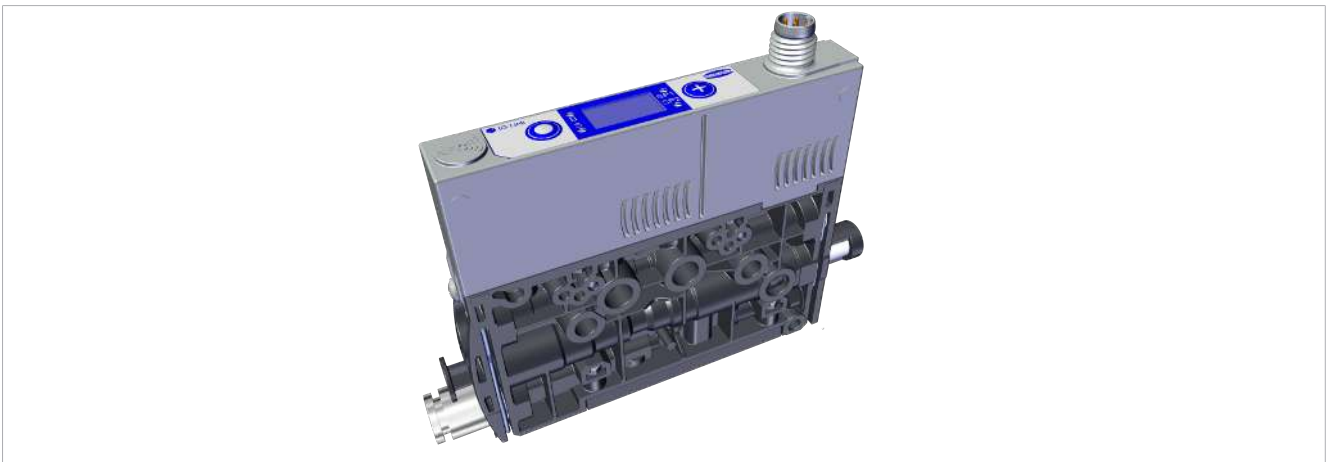
## 3 Product Description

### 3.1 Mini compact terminal description



The Schmalz mini compact terminal SCTMi, or SCTMi for short, is a compact unit of multiple vacuum generators known as ejectors. Thanks to its modular design, up to 16 individual ejectors can be controlled and configured independently. It can be used to handle different parts simultaneously and independently using just one vacuum system.

### 3.2 Description of the Ejector



Every SCTMi mini compact ejector has an electrical connection to the voltage supply and to communication with the control for the superordinate machine.

The compressed air supply can be connected centrally for all ejectors. As an alternative, there can also be a compressed air supply for each ejector.

#### 3.2.1 Applying Suction to the Workpiece/Part (Vacuum Generation)

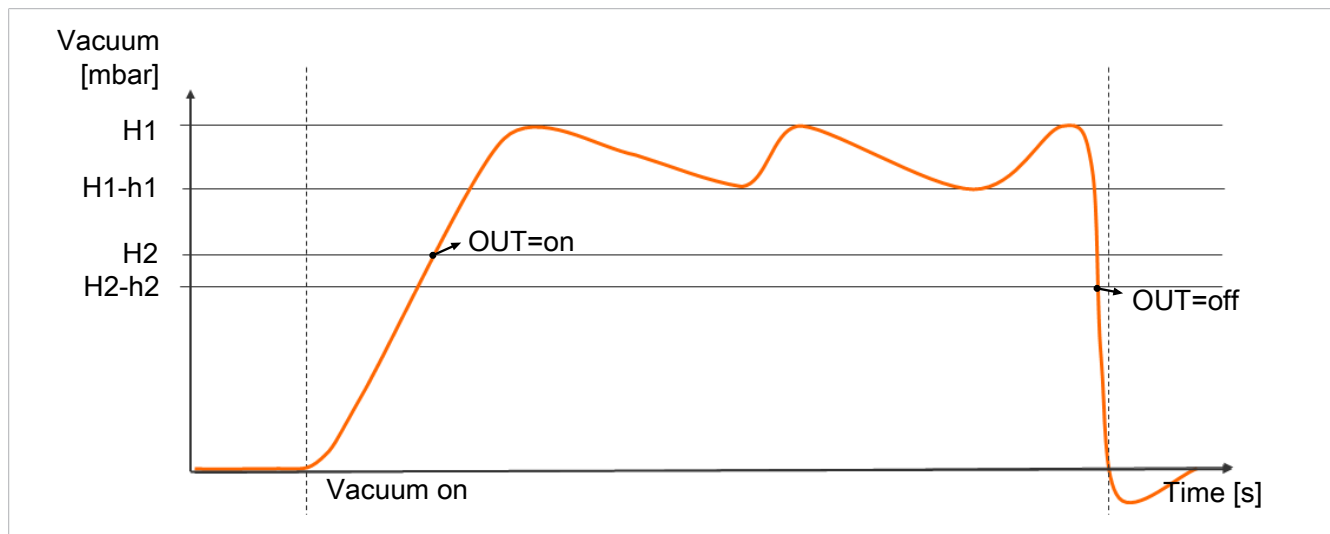
The ejector is designed for handling and holding workpieces by means of a vacuum in combination with suction systems. The vacuum is generated in a nozzle according to the venturi principle, using suction generated by the flow of accelerated compressed air. Compressed air is channeled into the ejector and flows through the nozzle. A vacuum is generated immediately downstream of the motive nozzle; this causes the air to be sucked through the vacuum connection. The air and compressed air that have been removed by the suction exit together via the silencer.

The venturi nozzle on the ejector is activated and deactivated using the suction command:

- In the NO (normally open) version, vacuum generation is deactivated when the suction signal is received.  
(This means that if the power fails or if no control signal is present, vacuum is constantly generated (continuous suction).)
- In the NC (normally closed) version, vacuum generation is activated when the suction signal is received.  
(This means that if the power fails or if no control signal is present, no vacuum is generated.)

An integrated sensor records the vacuum generated by the venturi nozzle. The exact vacuum level is shown on the display and can be read from the IO-Link process data.

The diagram below shows the vacuum curve for when the air saving function is activated:



The ejector has an integrated control function and automatically regulates the vacuum in suction mode:

- The electronics switch vacuum generation off as soon as the vacuum limit value set for switching point SP1 is reached.
- When objects with airtight surfaces are picked up, the integrated non-return valve prevents the vacuum from dropping quickly.
- If the system vacuum drops below the limit value switching point H1-h1 due to leaks, the venturi nozzle is switched back on.
- Depending on the vacuum, the H2 process data bit is set once a workpiece is picked up safely. This enables the further handling process.

### 3.2.2 Depositing the Workpiece/Part (Blowing Off)

In blow off mode, the vacuum circuit of the ejector is supplied with compressed air. This ensures that the vacuum drops quickly, allowing the workpiece/part to be deposited quickly.

During blow off,  $[-FF]$  is shown on the display.

The ejector provides three blow-off modes for selection:

- Externally controlled blow off
- Internally time-controlled blow-off
- Externally time-controlled blow off
- Optional: External blow-off (EB function)

### 3.3 Variants and product keys

The item designation of the SCTM is composed of a product key, which indicates the number of ejectors installed and their exact properties.

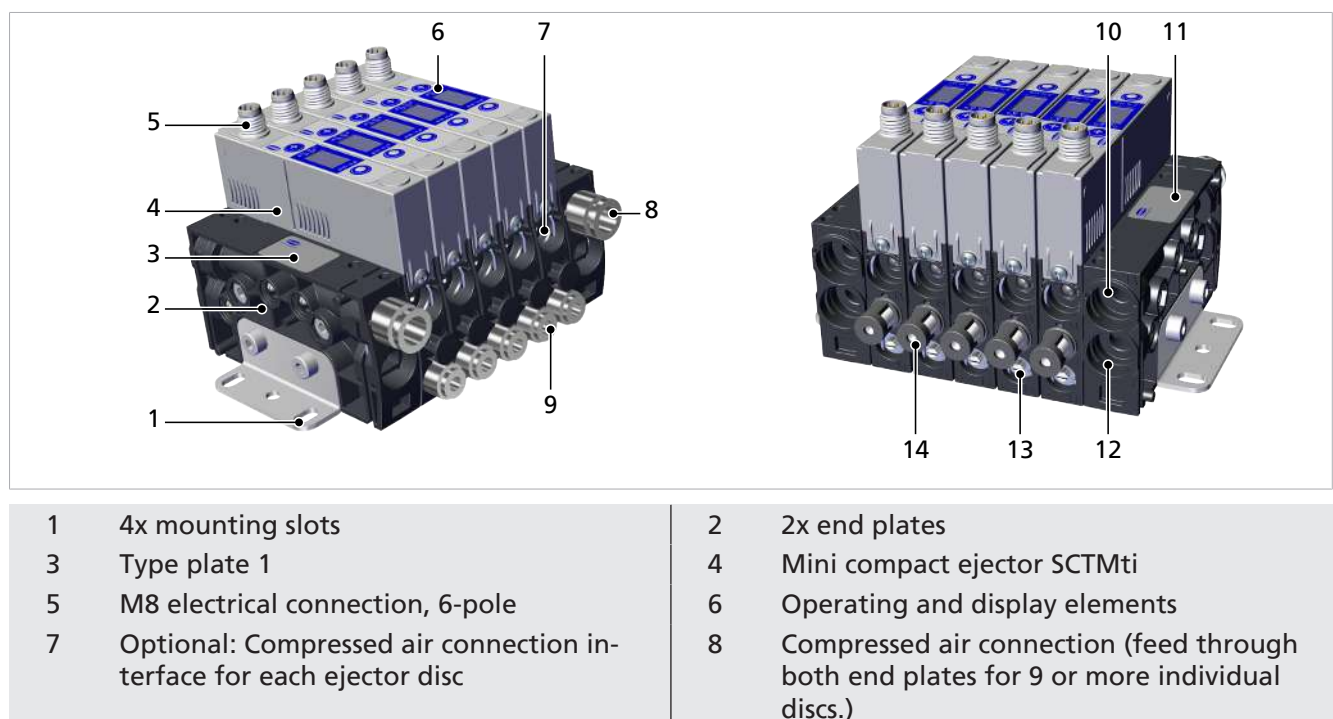
The SCTM product key (so-called system configuration), e.g. SCTMc-MP-6-XY-2AAF-2AB0-2AAH, is composed as follows:

Feature	Variants	Comment
Product class	SCTM terminal with c-ejectors Basic: b Controlled: c Intelligent: i	—
Terminal type	MP (multipole), [IOL, ECT, EIP, PNT]	MP is only available in the SCTMc variant
Number of ejectors	6	Max. of 16; for SCTMc MP the max. is only 7
Code terminal	XY	Contains all basic functions/properties in coded form
Ejector block 1	2 <b>AAF</b> individual discs	Contains the complete "type information" of the blocked individual discs
Ejector block 2	2 <b>AB0</b> individual discs	
Ejector block 3	2 <b>AAH</b> individual discs	

#### Important notes:

- Only unmixed terminals may be constructed (b, c, or i ejectors)
- A maximum of 4 individual discs can be used
- Identical individual discs must be installed grouped together as blocks.
- The combination of the optional functions "External blow-off (EB)" and "External vacuum (EV)" cannot be selected.

### 3.4 Components of the Mini Compact Terminal



9	Vacuum connection	10	Optional: Compressed air connector for external blow-off EB (marking 1A)
11	Type plate 2	12	Optional: Collective exhaust air connector (marking 3)
13	Blow-off valve screw	14	Silencer (marking 3)

## 4 Technical Data

### 4.1 General parameters

Parameter	Version	Symbol	Limit value			Comment
			min.	optimal	max.	
Working temperature		T <sub>amb</sub>	0° C	—	+50° C	—
Storage temperature		T <sub>sto</sub>	-10° C	—	60° C	—
Humidity		H <sub>rel</sub>	10% r.h.	—	85% r.h.	Free from condensation
Degree of protection		—	—	—	IP40	—
Operating pressure (flow pressure)	03	P	2 bar	4 bar	6 bar	—
	05	P	4 bar	4 bar	6 bar	—
	07	P	4 bar	4 bar	6 bar	—
	10	P	4 bar	4.5 bar	6 bar	—
	12	P	4 bar	4.5 bar	6 bar	—
Operating medium	Air or neutral gas, filtered to 5 µm, without oil, class 3-3-3 compressed air quality in acc. with ISO 8573-1					

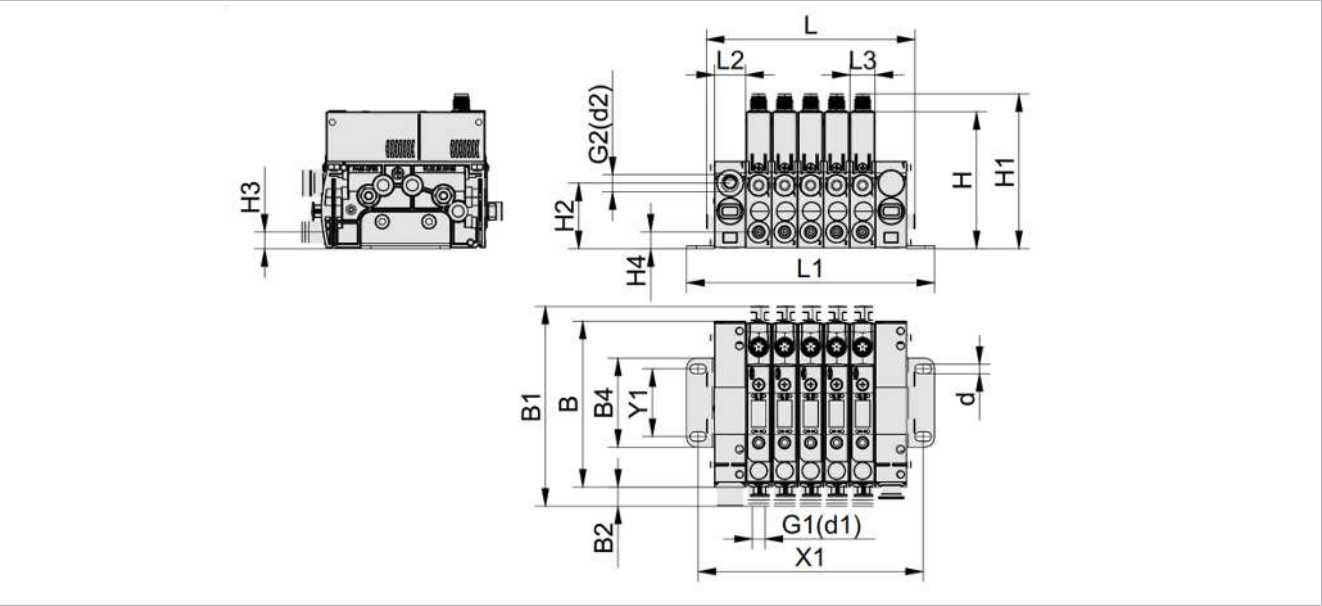
### 4.2 Mechanical Data

#### 4.2.1 Performance Data

Type	Nozzle 03	Nozzle 05	Nozzle 07	Nozzle 10	Nozzle 12
Nozzle size [mm]	0.3	0.5	0.7	1.0	1.2
Degree of evacuation [%]	87				92
Max. suction rate [l/min] <sup>1)</sup>	2.2	7.5	15	28	30
Air consumption for suction [l/min]	3.5	9	22	45	51
Air consumption for blow off [l/min]	10				
Sound pressure level, unobstructed suction [dB(A)] <sup>1)</sup>	51	66	70	71	76
Sound pressure level, suction [dB(A)]	42	55	70	72	75
Pressure range [bar]	2 to 6	4 to 6			
Rec. diameter of compressed air hose [mm] <sup>2)</sup>	2			4	
Rec. diameter of vacuum hose [mm] <sup>2)</sup>	2			4	
Weight [g]	80				

<sup>1)</sup> At optimum operating pressure (SCPM...03/05/07: 4 bar; SCPM...10/12: 4,5 bar) <sup>2)</sup> For max. length of 2 m  
The values specified apply to each ejector. The values for terminals vary according to the number of ejectors installed.

4.2.2 SCTMi dimensions



B	B1	B2	B4	d	G1(d1)	G2(d2)	H	H1
79.9	96.1	9.2	42.9	4.5	6	8	65.8	74.4
H2	H3	H4	L	L1	L2	L3	X1	Y1
31.5	8	8	37.8+(n*12.5)	56.8+(n*12.5)	15	12.5	45.8+(n*12.5)	32.5

All dimensions given in millimeters [mm].

The letter “n” stands for the number of ejector discs installed in the terminal.

The weight of one terminal amounts to:

- approx. 175 g+(n\*80) g if it has up to and including 9 ejectors
- approx. 205 g+(n\*80) g if it has 10 to 16 ejectors

## 5 Transportation and Storage

### 5.1 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.

### 5.2 Reusing the Packaging

The product is delivered in cardboard packaging. The packaging should be reused to safely transport the product at a later stage.



Keep the packaging for future transport or storage.

## 6 Installation

### 6.1 Installation Instructions



#### 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 and secured against unauthorized restart.

For safe installation, the following instructions must be observed:

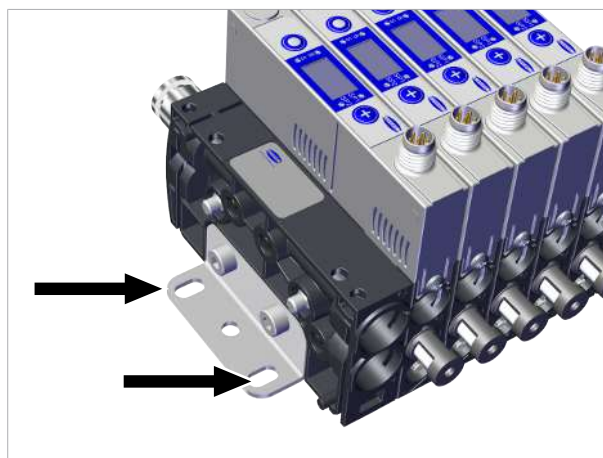
1. Use only the connectors, mounting holes and attachment materials that have been provided.
2. Firmly connect and secure pneumatic and electrical line connections to the compact terminal.
3. Ensure that there is adequate installation space in the area where the product will be installed.

### 6.2 Installation

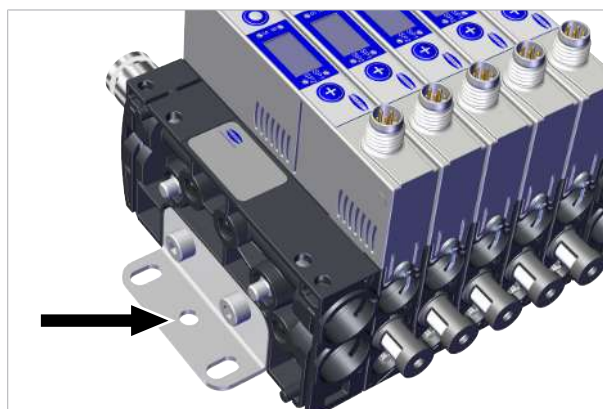
The Terminal may be installed in any position.

The terminal is attached using the mounting slots (4 pieces). There is also the option of mounting DIN rails.

- ▶ The four slots are used to attach them. The terminal must be secured in place using at least 4 M4 screws. The maximum tightening torque is 2 Nm.



- ▶ As an option, the holes can be used to attach DIN rails for mounting.



### 6.3 Pneumatic Connection



#### ⚠ 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 the silencer air stream
- ▶ Do not look into vacuum openings such as suction cups, suction lines and hoses.



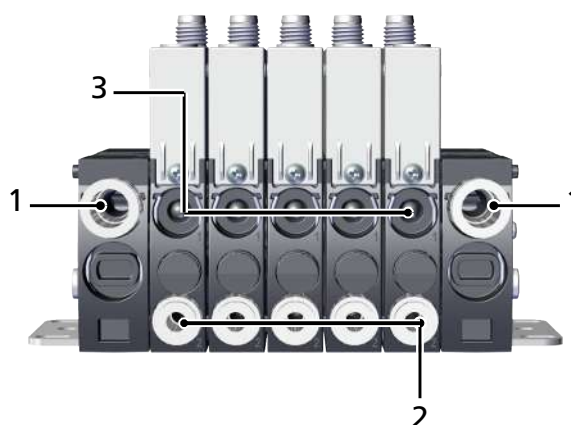
#### ⚠ CAUTION

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

Hearing damage

- ▶ Correct installation.
- ▶ Wear ear protectors.

### 6.4 Connecting the Compressed Air and Vacuum



- |   |   |
|---|---|
| 1 | 1x compressed air connection per 9 ejector discs (marking 1)        |
| 3 | Optional: 1x compressed air connection per ejector disc (marking 1) |

- |   |   |
|---|---|
| 2 | 1x vacuum air connection per ejector disc (marking 2) |
|---|---|

The compressed air connector with the plug connector 8/6 or 1/8" thread is marked with the number 1 on the ejector disc.

- ▶ Connect compressed air hose. For threaded connectors, the maximum tightening torque is 1 Nm.

The vacuum connector with the plug connector 8/2 or 6/4 or M5 or M7 thread is marked with the number 2 on the ejector disc.

- ▶ Connect the vacuum hose. For threaded connectors, the maximum tightening torque is 1 Nm.

## 6.5 Optional: External blow-off connection (EB)

The terminal is also available with an additional compressed air connector for the blow-off function.

With the external blow-off function (EB), the blow-off pulse is controlled separately and independently of the compressed air supply for vacuum generation, allowing you to use a different medium (e.g. nitrogen) for the blow-off function.

It also allows you to precisely set the blow-off pressure using an external pressure regulator (between 2 and 6 bar).

The blow-off flow rate can also be set between 0% and 100% directly on the respective ejector disc. This can be used, for example, to set down small and lightweight workpieces with high positioning precision.

The hose size and the thread on the connector depend on the particular ejector disc and can have the following dimensions:

- Push-in: 8/6
- Thread: 1/8" thread, female



- ▶ Connect the compressed air hose for external blow-off (connector marked with 1A) and adjust the blow-off flow rate using the adjusting screw (2).

## 6.6 Electrical Connection



### NOTE

**Change of output signals when product is switched on or plug is connected**

Personal injury or damage to property

- ▶ Electrical connection may be performed only by specialists who can evaluate the effects of signal changes on the overall system.



## NOTE

### Incorrect power supply

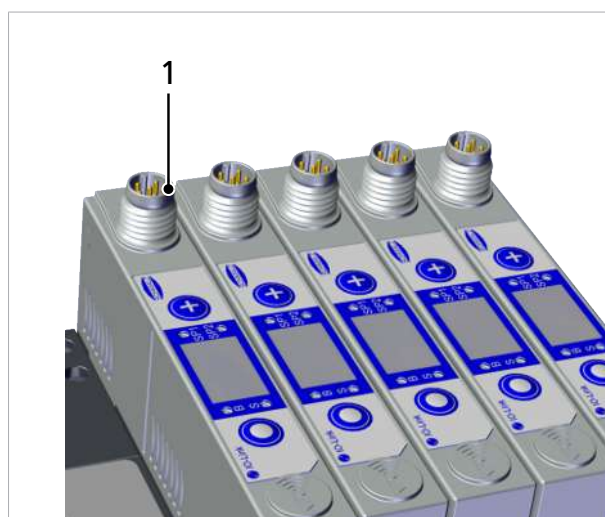
Destruction of the integrated electronics

- ▶ Operate the product using a power supply unit with protected extra-low voltage (PELV).
- ▶ The system must incorporate safe electrical cut-off of the power supply in compliance with EN60204.
- ▶ Do not connect or disconnect the connector under tension and/or when voltage is applied.

#### 6.6.1 Variant with plug connector M8

The electrical connection supplies the ejector with power and communicates with the control system of the higher-level machine using defined outputs.

- ✓ Provide a connection cable with an M8 plug (customer's responsibility).



- ▶ Attach the connection cable to the electrical connection point (1) on each ejector, max. tightening torque = hand-tight.

Ensure that the electrical cable does not exceed the maximum length of 20 meters.

#### Pin assignments

M8 plug	PIN	Symbol	Wire color <sup>1)</sup>	Function
	1	US	Brown	24 V power supply
	2	IN1	White	"Suction" signal input
	3	GND	Blue	Ground
	4	OUT1 / CQ	Black	"Parts control" output (SP2) or IO-Link
	5	IN2	Gray	"Blow off" signal input
	6	— / OUT2	Pink	Not used / analog output

<sup>1)</sup> When using a Schmalz connection cable, part no. 21.04.05.00488 (see accessories)

## 7 Operation

### 7.1 General Preparations



#### **WARNING**

##### **Extraction of hazardous media, liquids or bulk material**

Personal injury or damage to property!

- ▶ Do not extract harmful media such as dust, oil mists, vapors, aerosols etc.
- ▶ Do not extract aggressive gases or media such as acids, acid fumes, bases, biocides, disinfectants or detergents.
- ▶ Do not extract liquids or bulk materials, e.g. granulates.

Always carry out the following tasks before activating the system:

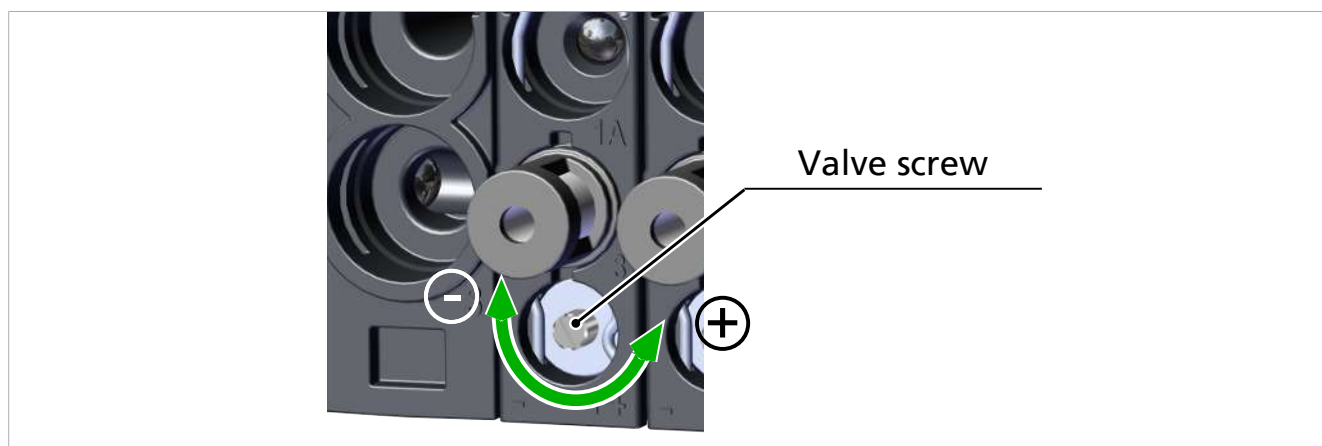
1. Before each start of operations, ensure that the safety features are in perfect condition and fully functional.
2. Check the device for visible damage and deal with any problems immediately (or notify the supervisor).
3. Ensure that only authorized persons are present in the working area of the machine or system in order to prevent any hazard from switching on the machine.

### 7.2 Changing the Blow-Off Flow Rate on the Ejector



Do not overwind past the stop on the valve screw. The blow off flow rate can be adjusted within the range between 0% and 100%.

There is a valve screw below the vacuum connection that can be used to adjust the blow-off flow rate. The valve screw is equipped with a stop on both sides.



1. Turn the valve screw clockwise to reduce the flow rate.
2. Turn the valve screw counterclockwise to increase the flow rate.

## 8 Warranty

This system is guaranteed in accordance with our general terms of trade and delivery. The same applies to spare parts, provided that these are original parts supplied by us.

We are not liable for any damage resulting from the use of non-original spare parts or accessories.

The exclusive use of original spare parts is a prerequisite for the proper functioning of the system and for the validity of the warranty.

Wearing parts are not covered by the warranty.

## 9 Spare and Wearing Parts, Accessories

### 9.1 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 most important spare and wearing parts.

Designation	Part no.	Type
Silencer insert	10.02.02.05403	Wearing part
NO ejector suction valve for nozzle size 03	10.05.01.00394	Spare part
NO ejector suction valve for nozzle size 05/07/10/12	10.05.01.00382	Spare part
NC ejector suction valve for nozzle size 03	10.05.01.00382	Spare part
NC ejector suction valve for nozzle size 05/07/10/12	10.05.01.00394	Spare part
Blow off valve (NC valve)	10.05.01.00382	Spare part
Ejector wearing part, VST SCPMi/c/b	10.02.02.06536	Wearing part
Ejector wearing part, VST SCPMi/c/b-EV	10.02.02.06537	Wearing part

When tightening the fastening screws on the valves, observe the maximum tightening torque of 0.1 Nm.

### 9.2 Accessories

Designation	Part no.	Note
Connection cable ASK WB-M8-6 2000 K-6P	21.04.05.00488	M8 socket, 6-pole; length: 2000 mm; open cable end, 6-pole; 90° angle
Connection cable, ASK B-M8-6 5000 K-6P	21.04.05.00255	M8 socket, 6-pole; length: 5000 mm; open cable end, 6-pole
Connection cable, ASK WB-M8-6 2000 S-M12-5	21.04.05.00489	M8 socket, 6-pole; cable length: 2000 mm; M12 plug, 5-pole; 90° angle
Plug-in screw union M5	10.08.02.00468	—
Plug-in screw union M7	10.08.02.00469	—
DIN rail mounting kit	10.02.02.05804	—

## 10 Decommissioning and Recycling

### 10.1 Disposing of the mini compact terminal

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

### 10.2 Materials Used

Component	Material
Housing	PA6-GF
Inner components	Aluminum alloy, anodized aluminum alloy, stainless steel, POM
Silencer insert	Porous PE
Screws and brackets	Galvanized steel
Sealing	Nitrile rubber (NBR)
Lubrication	Silicone-free

## 11 Declarations of Conformity

### 11.1 EU Declaration of Conformity

The manufacturer Schmalz confirms that the product Terminal described in these operating instructions fulfills the following applicable EU directives:

2006/42/EC	Machinery Directive
2014/30/EU	Electromagnetic Compatibility
2011/65/EU	Directive on the restriction of the use of certain hazardous substances in electrical and electronic equipment

The following harmonized standards were applied:

EN ISO 12100	Safety of machinery — General principles for design — Risk assessment and risk reduction
EN 61000-6-2+AC	Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity for industrial environments
EN 61000-6-3+A1+AC	Electromagnetic compatibility (EMC) - Part 6-3: Generic standards - Emission standard for residential, commercial and light-industrial environments
EN 50581	Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances



The EU Declaration of Conformity valid at the time of product delivery is delivered with product or made available online. The standards and directives cited here reflect the status at the time of publication of the operating and assembly instructions.

### 11.2 UKCA Conformity

The manufacturer Schmalz confirms that the product described in these operating instructions fulfills the following applicable UK regulations:

2008	Supply of Machinery (Safety) Regulations
2016	Electromagnetic Compatibility Regulations
2012	The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations

The following designated standards were applied:

EN ISO 12100	Safety of machinery — General principles for design — Risk assessment and risk reduction
EN 61000-6-2+AC	Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity for industrial environments
EN 61000-6-3+A1+AC	Electromagnetic compatibility (EMC) - Part 6-3: Generic standards - Emission standard for residential, commercial and light-industrial environments
EN 50581	Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances



The Declaration of Conformity (UKCA) valid at the time of product delivery is delivered with the product or made available online. The standards and directives cited here reflect the status at the time of publication of the operating and assembly instructions.



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