



Assembly instructions

Pneumatic Vacuum Generator RECB

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.

Published by

© J. Schmalz GmbH, 09/22

This document is protected by copyright. J. Schmalz GmbH retains the rights established thereby. Reproduction of the contents, in full or in part, is only permitted within the limits of the legal provisions of copyright law. Any modifications to or abridgments of the document are prohibited without explicit written agreement from J. Schmalz GmbH.

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

Contents

1	Important Information	3
1.1	Note on Using this Document	3
1.2	The technical documentation is part of the product	3
1.3	Other applicable documents	3
1.4	Type Plate	3
1.5	Symbols	3
2	Fundamental Safety Instructions	4
2.1	Intended Use	4
2.2	Non-Intended Use	4
2.3	Personnel Qualifications	4
2.4	Personal Protective Equipment	5
2.5	Warnings in This Document	5
2.6	Residual Risks	5
2.7	Modifications to the Product	6
3	Product Design	7
4	Mechanical Data	7
4.1	General Parameters	7
4.2	Performance Data	7
4.3	Mechanical Performance Data	8
4.4	Dimensions	8
5	Transport	9
6	Checking the Delivery	9
7	Installation	9
7.1	Installation Instructions	9
7.2	Installing the RECB	9
7.2.1	Connecting the RECB to the Compressed Air and Electrical Connection	10
7.2.2	Optional Compressed Air Connection	13
7.2.3	Mechanical Attachment	16
8	Maintenance Plan and Cleaning	18
9	Warranty	18
10	Spare and Wearing Parts, Accessories	19
11	Disposing of the Device	19
12	Declarations of Conformity	20
12.1	EC Conformity	20
12.2	UKCA Conformity	20

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 Assembly 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 Other applicable documents

Important:

This manual describes the special features of the pneumatic vacuum generator RECB.

To ensure safe operation, the operating instructions for the integrated compact ejector must also be observed. These describe the installation of the electrical connection and the functions of the compact ejector.

1.4 Type Plate

The type plate (1) is permanently attached to the product in the position shown. The type plate must always be clearly legible even once the unit is installed.

The type plate contains the following information:

- Part sales designation/type
- Part number
- Permitted pressure range
- QR code
- IO-Link symbol
- Pneumatic symbol
- Manufacturing date
- Serial number



1.5 Symbols



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 RECB is designed to generate a pneumatic vacuum for gripping and transporting objects when used in conjunction with vacuum grippers. The RECB was developed especially for use on collaborative robot systems. Only specified SCPSi compact ejectors from Schmalz may be inserted into the housing of the RECB since the housing has been specially adapted to them.

The goods to be lifted should ideally be dry, airtight, rigid and have a smooth surface. Non-airtight or unstable objects must be tested for suitability before they are handled with a vacuum. Contamination of the products can impair the functionality of the RECB.

Neutral gases in accordance with EN 983 are approved as evacuation media. Neutral gases include air, nitrogen and inert gases (e.g. argon, xenon and neon).

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.

The device may only be used with robot systems that comply with the provisions of DIN ISO/TS 15066, DIN EN ISO 10218-1 and DIN EN ISO 10218-2.

Operation in a collaborative system is only permitted if the overall system meets the relevant legal requirements for collaborative robot systems. The system integrator is responsible for ensuring that these requirements are complied with.

2.2 Non-Intended Use

Schmalz does not accept any liability for any direct or indirect losses or damages that result from using the product. This applies, in particular, to any use of the product that is not in accordance with the intended purpose and to any use that is not described or mentioned in this documentation.

Non-intended use includes the following:

- Use in potentially explosive atmospheres
- Transport and through-suction of potentially explosive materials
- Use for medical applications
- Use as a clamping device for workpiece processing
- Suction of body parts
- Use with workpieces not suited for suctioning
- Exceeding the lift capacity
- Storing loads while picked up

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

These Assembly instructions are intended for fitters who are trained in handling the product and who can operate and install it.



2.4 Personal Protective Equipment

To avoid injury, always use appropriate protective equipment that is suitable for the situation. The protective equipment must meet the following standards:

- Protective work shoes in safety class S1 or higher
- Sturdy work gloves in safety category 2231 or higher
- Ear protection class L or higher
- Eye protection class F
- Hair net
- Closely fitting clothing

2.5 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
 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.

2.6 Residual Risks



WARNING

Noise pollution due to the escape of compressed air

Hearing damage!

- ▶ Wear ear protectors.
- ▶ The ejector must only be operated with a silencer.



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.



WARNING

Uncontrolled movements of system components or falling objects caused by incorrect activation and switching of the device while persons are in the plant (safety door opened and actuator circuit switched off)

Serious injury

- ▶ Ensure that the components are enabled via the actuator voltage by installing a potential separation between the sensor and actuator voltage.
- ▶ Wear the required personal protective equipment (PPE) when working in the danger zone.



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, e.g. suction cups



CAUTION

Depending on the purity of the ambient air, the exhaust air can contain particles, which escape from the exhaust air outlet at high speed.

Eye injuries!

- ▶ Do not look into the exhaust air flow.
- ▶ Wear eye protection.



WARNING

Serious injuries due to improper mounting!

- ▶ Carry out mounting and removal only when the device is in an idle, depressurized state.
- ▶ Use only the connectors, mounting holes and attachment materials that have been provided.



WARNING

Suspended load

Risk of serious injury

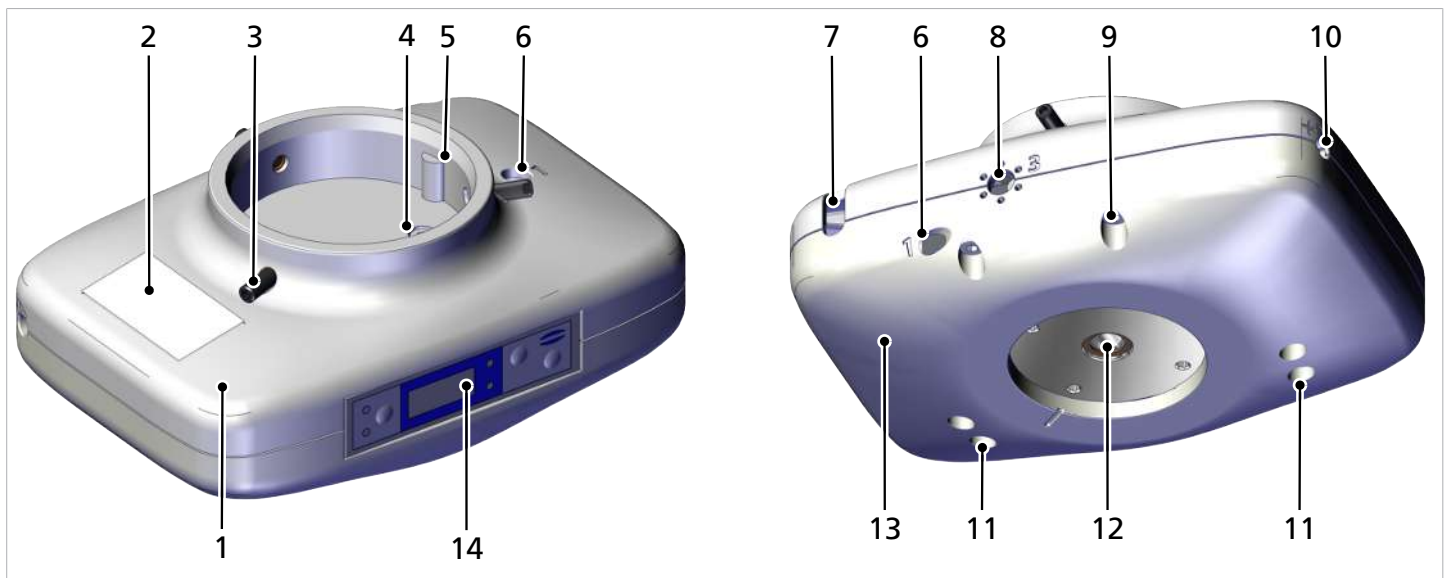
- ▶ Do not walk, stand or work under suspended loads.

2.7 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 Design



1	Top housing shell	2	Type plate
3	Set screw (3x) for attaching the flange plate	4	Screw union point, M4x30 screw (2x)
5	Flange mounting with positioning cams	6	Opening in housing for the compressed air hose (labeled with 1)
7	Opening in housing for the connection cable	8	Exhaust air outlet (labeled with 3)
9	Screw union point, M4x20 screw (2x)	10	Opening for blow-off valve screw on the compact ejector
11	Screw union point, M4x30 screw (4x)	12	Vacuum opening with screen
13	Bottom housing shell	14	Compact ejector

4 Mechanical Data

4.1 General Parameters

Parameter	Symbol	Limit values			Comment
		min.	typ.	max.	
Temperatures of working medium and environment	T_{amb}	0 °C	—	40 °C	—
Storage temperature	T_{sto}	-10 °C	—	60 °C	—
Humidity	H_{rel}	10% r.h.	—	90 % r.h.	Free from condensation
Operating pressure	bar	2	4.5	6	
Mass	m	0.67 kg			RECB 24V DC ... M12-5
		0.79 kg			ROB-SET RECB ... UR

4.2 Performance Data

Parameter	Value
Degree of evacuation ¹⁾	85 %
Suction rate (max.) ¹⁾	57.2 l/min
	3.4 m ³ /h
Suction air consumption ¹⁾	82.0 l/min
	4.9 m ³ /h
Sound pressure level, unobstructed ²⁾	77 dB(A)
Rec. diameter of compressed air hose ²⁾	4 mm
Rec. diameter of vacuum hose ²⁾	6 mm

¹⁾ At optimal operating pressure (4.5 bar)

²⁾ For max. hose length of 2 m

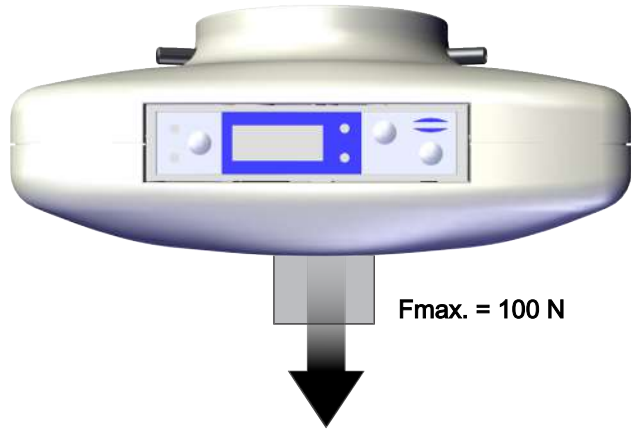
4.3 Mechanical Performance Data

Weight	Load limit Horizontal installation ¹	Load limit Vertical installation ² (l = 100 mm)
0.75 kg	Max. 100 N	Max. 25 N

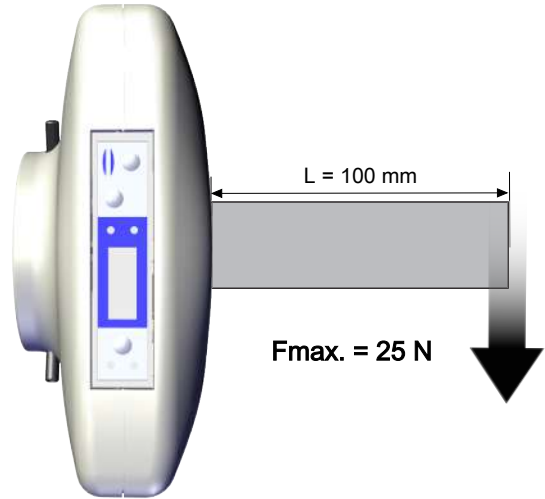
Note on the specifications for the load limits

These specifications apply for static loads. The maximum load limits given here apply to the RECB only. For use in connection with an HRC-capable robot, observe the maximum weight limits determined by the manufacturer of the robot.

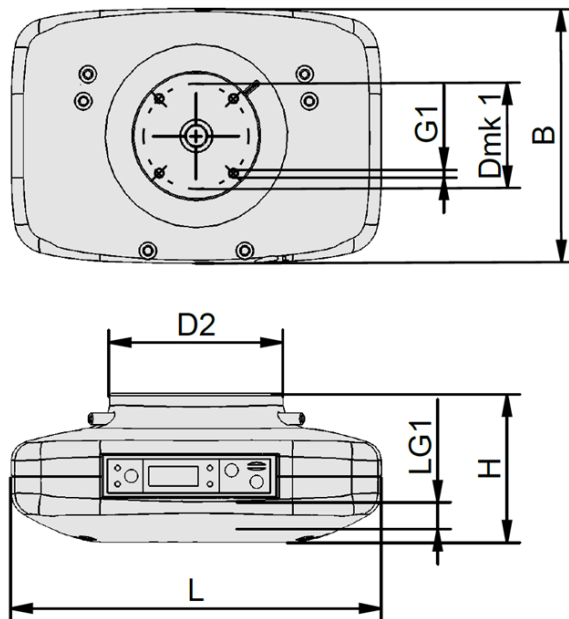
¹ horizontal installation



² vertical installation



4.4 Dimensions



G1	Dmk 1	B	D2	LG1	H	L
M4 internal thread	46	111	76	9	64.8	162

All dimensions given in millimeters [mm].

5 Transport



CAUTION

Risk of crushing due to improper securing of the load

- ▶ Properly secure the product during transport.
- ▶ Wear protective shoes and gloves.

6 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.

7 Installation

7.1 Installation Instructions



CAUTION

Improper installation or maintenance

Personal injury or damage to property

- ▶ Prior to installation and before maintenance work, the vacuum generator must be disconnected from the power supply and secured against unauthorized restart!

For safe installation, the following instructions must be observed:

Use only the connectors, mounting holes and attachment materials that have been provided.

Firmly connect and secure pneumatic and electrical line connections to the vacuum generator.

7.2 Installing the RECB



WARNING

Falling objects due to improper mounting

Serious injury!

- ▶ Using a torque wrench, tighten the screws of the flange connection on the bottom side of the housing as well as the set screws for the flange connection on the top side of the housing to the specified tightening torques.
- ▶ Wear protective work shoes.



CAUTION

Potential contact with sharp-edged components during connection work

Hand injuries!

- ▶ Wear suitable work gloves.



The RECB must not be exposed to strong vibrations.

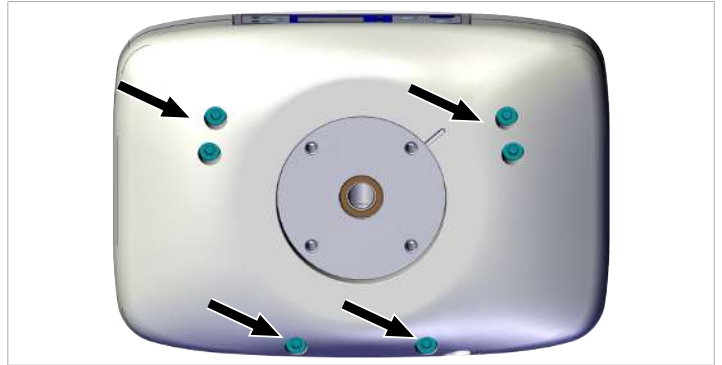
Always apply a low-strength threadlocker to the fastening screws (e.g. Loctite 221) after opening and closing the housing.

7.2.1 Connecting the RECB to the Compressed Air and Electrical Connection

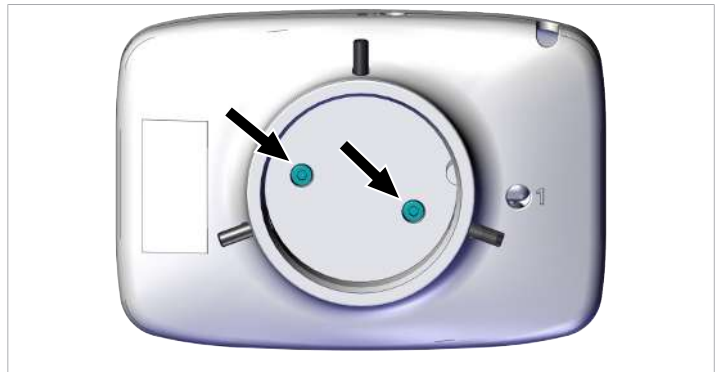
The RECB must be opened to connect it to the compressed air supply and to establish the electrical connection.

- ✓ Size 3 Allen wrench is available.
- ✓ Low-strength threadlocker (e.g. Loctite 221) is available.
- ✓ Provide a connection cable with an angle M12 5-pole socket (not included in delivery).

1. Loosen and remove the M4x30 and M4x20 screws on the underside of the device.

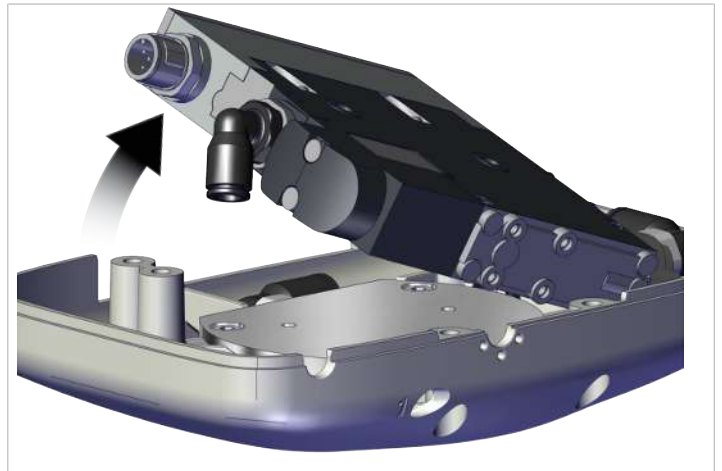


2. Rotate the RECB and loosen and remove the top M4x30 screws.

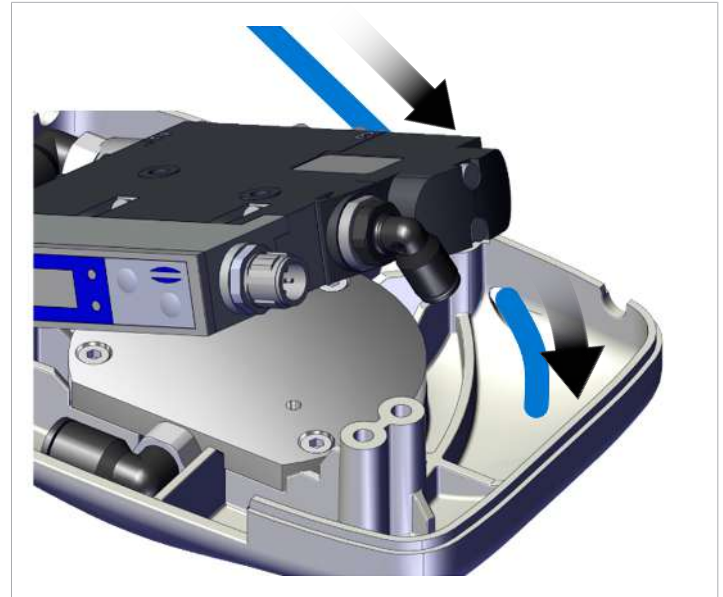


3. Remove the top housing shell.

4. To make the installation of the connection cable and the compressed air hose easier, lift the compact ejector slightly.



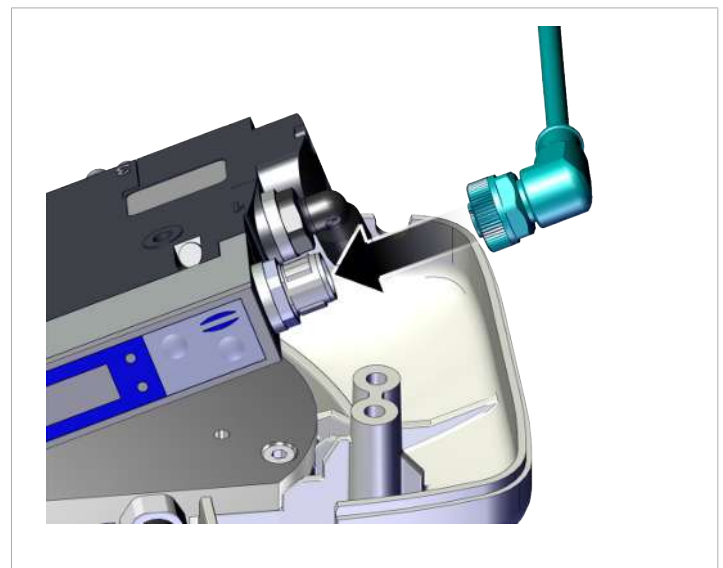
5. Guide the compressed air hose through the housing opening in the bottom housing shell, position 1.



6. Insert the compressed air hose into the plug-in screw union on the ejector side, position 1. Make sure that the plug-in screw union is pointing downwards.

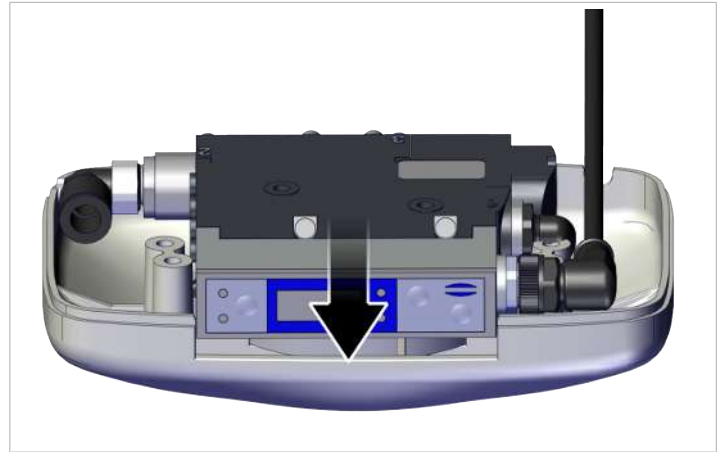


7. Attach the connection cable to the compact ejector (maximum tightening torque = hand-tight).



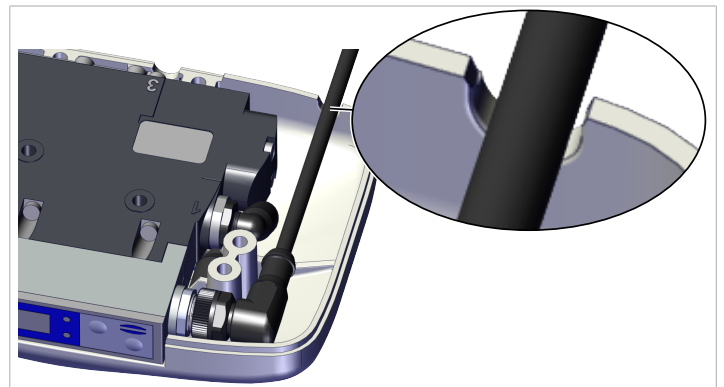
8. Check the fit of the hoses in the plug connections (vacuum and compressed air) and ensure complete insertion.

9. Hoses can push the compact ejector away slightly and generate slight resistance when the compact ejector is inserted. Press the compact ejector lightly onto the aluminum insert.

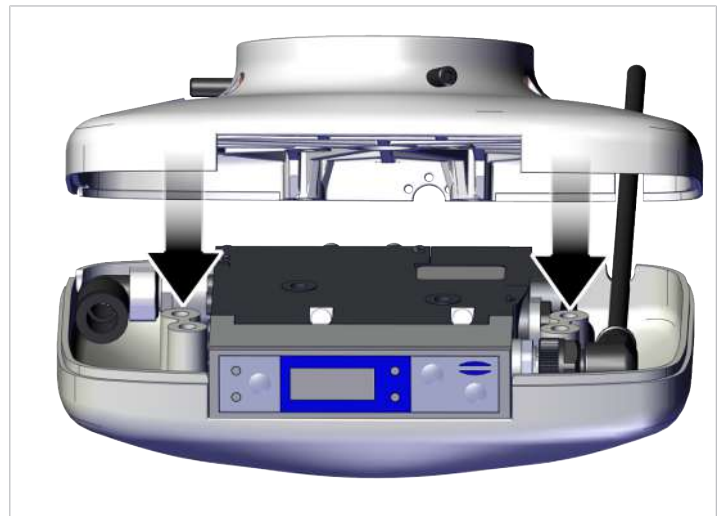


- ⇒ Ensure that the compact ejector is aligned with the front opening on the housing. This makes it easier to place and position the compact ejector.

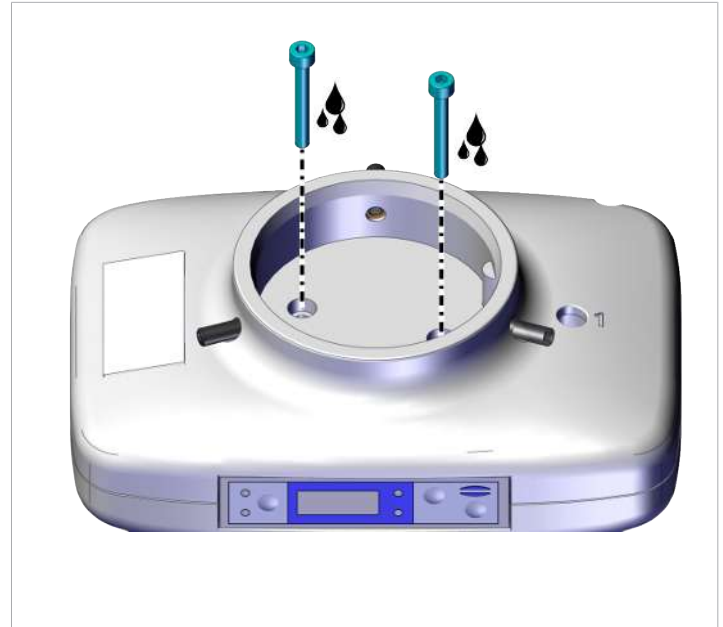
10. Place the connection cable into the cable outlet opening on the bottom housing shell.



11. Place the top housing shell on the lower housing.

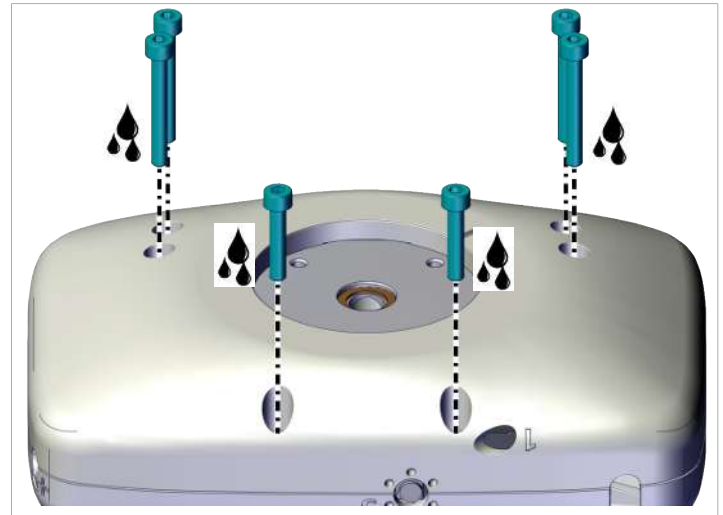


12. Wet the two M4x30 machine screws with low-strength threadlocker. Hold the housing firmly with one hand. The top housing shell is flush with the lower shell and the connection cable is exposed in the cable bushing. Screw the two housing shells tight with the prepared machine screws. 3 mm Allen wrench, 1 Nm tightening torque.



13. Turn the RECB over.

14. Wet the four M4x30 and the two M4x20 machine screws with low-strength threadlocker. Tighten the screws with a 3 mm torque wrench and tightening torque of 1 Nm.



7.2.2 Optional Compressed Air Connection

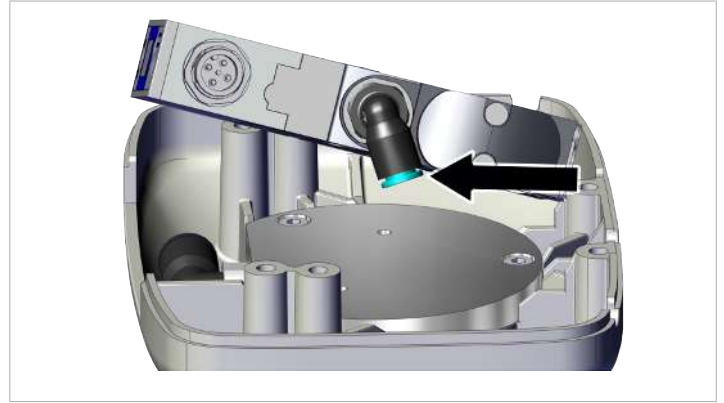


To route the compressed air connection through the top housing shell, carry out the following assembly steps:

✓ Size 3 Allen wrench is available.

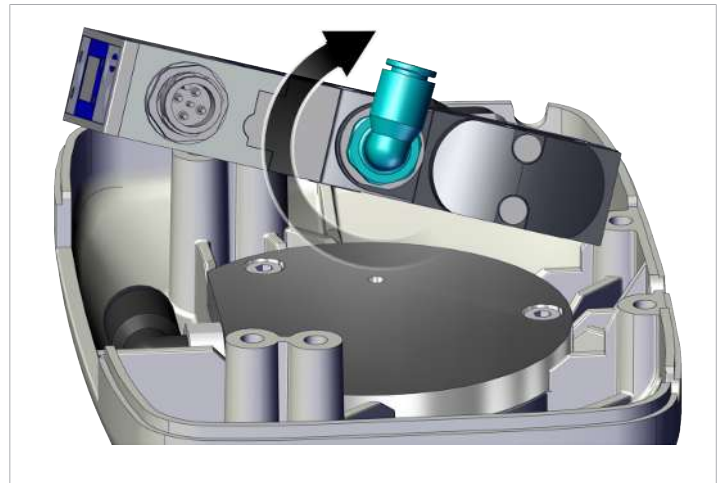
1. Loosen and remove the two M4x20 machine screws and the four M4x30 machine screws from the lower housing (see section 7.2.1, step 1.).
2. Rotate the RECB and loosen and remove the two upper M4x30 machine screws (see section 7.2.1, step 2.).
3. Remove the top housing shell.

4. Lift the compact ejector and press it onto the outer circular surface of the plug-in screw union.



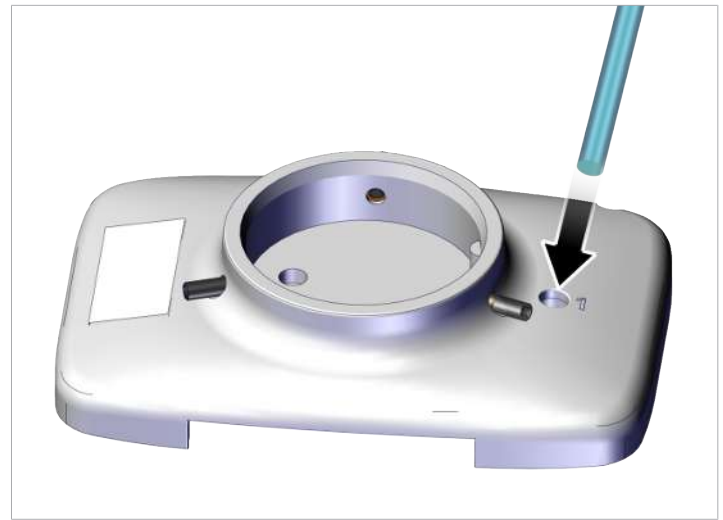
5. Press the compressed air hose into the plug-in screw union while simultaneously pressing on the circular surface of the plug-in screw union. Maintain the pressure on the circular surface of the plug-in screw union and pull the compressed air hose out of the connection.

6. Rotate the plug connection until the opening is in a vertical and upward position.

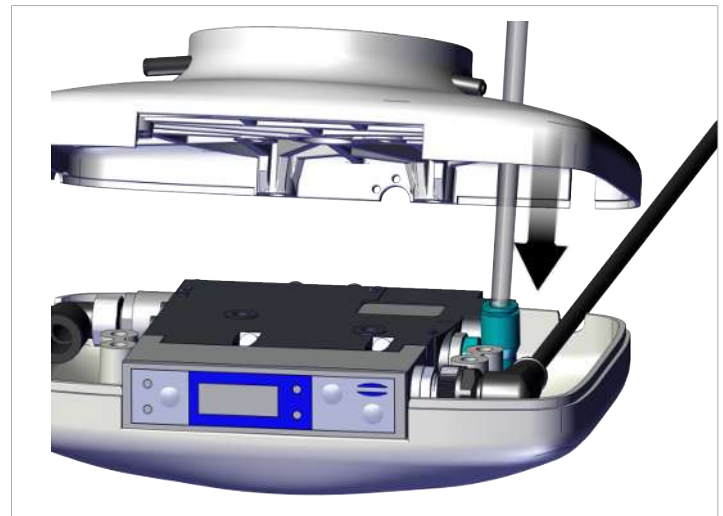


7. Attach the connection cable to the compact ejector and place the compact ejector flush on the bottom housing shell (see section 7.2.1, steps 7 to 10).

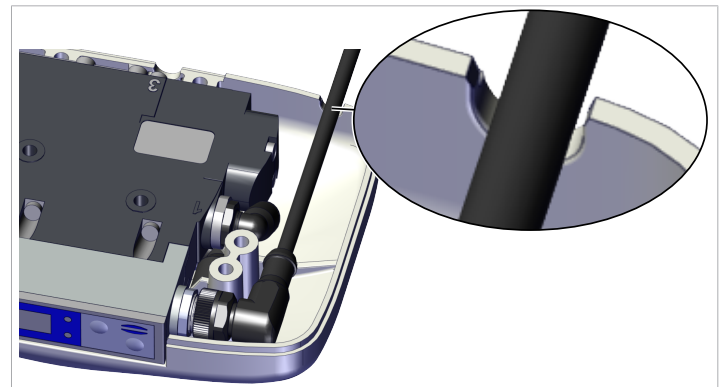
8. Insert the compressed air hose through the housing opening (labeled with 1) of the top housing shell until it protrudes by approx. 20 cm.



9. Position the top housing shell above the compact ejector and connect the compressed air hose to the plug-in screw union of the compact ejector.



10. Place the connection cable into the cable outlet opening on the bottom housing shell.



11. Check the fit of the hoses in the plug connections (vacuum and compressed air) and ensure complete insertion.
12. Close the RECB (see section 7.2.1, steps 11 to 14).

7.2.3 Mechanical Attachment



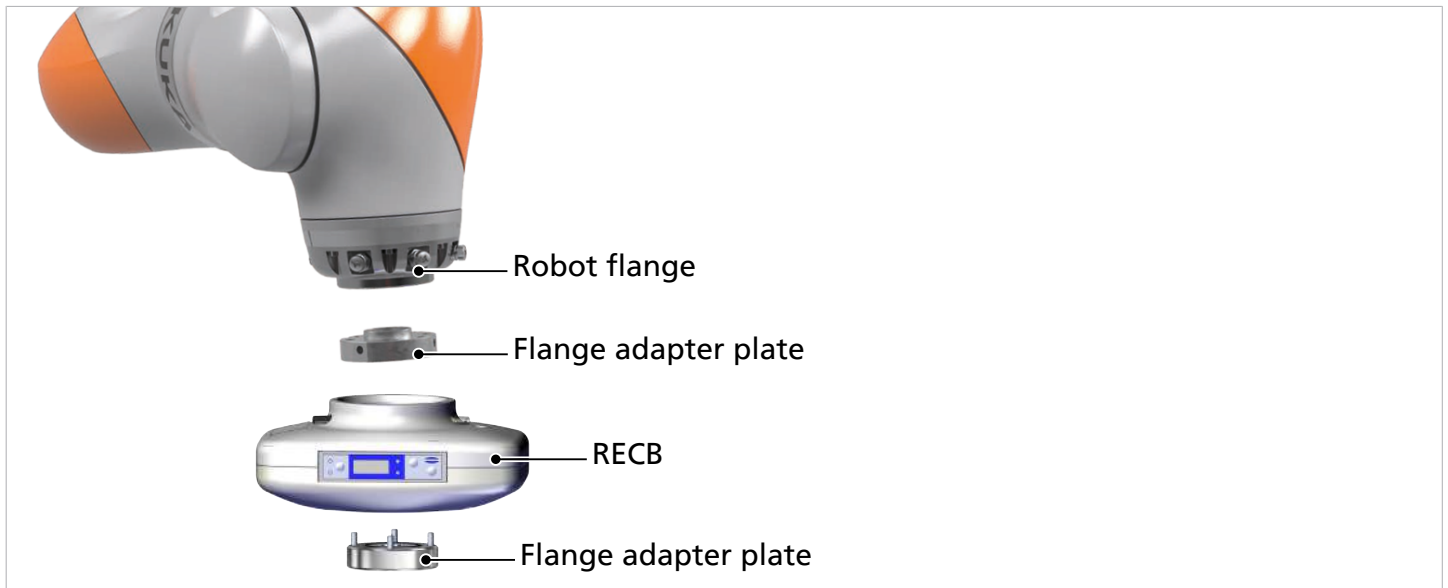
CAUTION

Risk of getting caught by the connection cable and compressed air hose, especially when the collaborative robot moves.

Injury due to limbs or hair getting caught.

- ▶ The connection cable and compressed air hose should be laid close to the contour and as close as possible to the robot arm.
- ▶ Avoid the danger zone.

The RECB may be installed in any position.

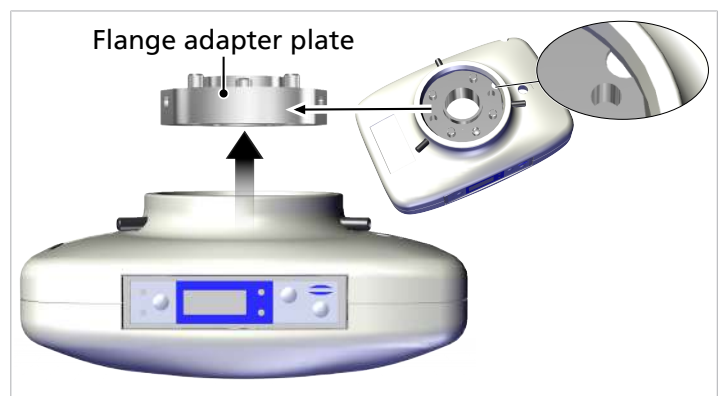


Mechanical Interface to the Robot

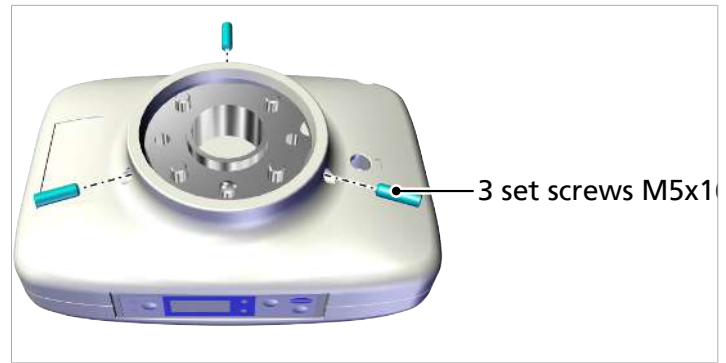
The RECB is adapted to a collaborative robot using an interchangeable flange adapter plate. The markings on the flange and on the housing of the RECB must be observed, as these determine the orientation of the display and the suction cup on the robot.

- ✓ The flange adapter plate (not included in delivery) is attached to the robot.

1. Push the RECB onto the flange adapter plate (not included in delivery), observing the Poka Yoke markings.



2. Attach the RECB radially with three set screws (M5x16). Tighten the screws with a torque wrench: Torque: 0.6 Nm.



Mechanical Interface to the Vacuum Gripper

Depending on the selected vacuum gripper, a selection of flange adapter plates is available.

- ✓ The flange adapter plate (not included in delivery) is available for use.

1. The flange adapter plate (not included in delivery) is attached to the RECB.



2. Attach the vacuum gripper that is suitable for the application to the RECB or to the adapter flange.



8 Maintenance Plan and Cleaning



Schmalz stipulates the following checks and check intervals. The operator must comply with the legal regulations and safety regulations applicable at the location of use. These intervals apply to single-shift operation. For heavier use, such as multi-shift operation, the intervals must be shortened accordingly.

Maintenance task	Daily	Weekly	Monthly	Every six months	Yearly
The operating instructions are available, legible, and can be accessed by personnel.					X
Check the screw unions and plug connections for tightness and leakage.			X		
Clean dirt from the surfaces.		X			

Specification of tightening torques in the maintenance instructions

9 Warranty



NOTE

Use of non-original spare parts

There is a risk of malfunctions or damage to the equipment.

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

A warranty claim can only be accepted by Schmalz if the product has been installed and used in accordance with its corresponding operating and assembly instructions. In the case of inappropriate handling or use of force, any warranty and liability claims shall be void.

Damage and defects resulting from inadequate maintenance and cleaning, improper use, repair or attempted repair by unauthorized persons, as well as damage and defects resulting from alterations or modifications to the product and from replaced parts or materials that do not conform to the original specification are excluded from the warranty.

Wearing parts are not covered by the warranty.

10 Spare and Wearing Parts, Accessories

Type	Part no.	Description	Part type
ERS RECB	10.02.03.00372	Spare part set: 2.5 m compressed air hose 6–4 mm), 6 M4x30 screws for the housing and 2 M4x20 screws	S
FLAN-PL UR-KUK-1	10.03.01.00313	Flange plate (round)	A
FLAN-PL RET-1	10.03.01.00358	Flange plate (round)	A
FLAN-PL RET-2	10.03.01.00373	Flange plate (round)	A
FLAN-PL YAS-2	10.03.01.00404	Flange plate (round)	A
FLAN-PL FAN-1	10.03.01.00390	Flange plate (round)	A
FLAN-PL FAN-2	10.03.01.00518	Flange plate (round)	A
FLAN-PL ECBPi	10.03.01.00379	Flange plate (round) for: CobotPump	A
MOD-FLAN 108x63x13 ECBPi	10.03.01.00436	Flange module	A
VEE-QCM 32	10.01.36.00121	VEE flange module with quick-change adapter and integrated vacuum line	A
VEE-FE 25.4x181.5	10.01.36.00128	Flange extension	A
VEE 1xSPB1/SPF 42.3x42.3	10.01.36.00267	Mounted vacuum end effector VEE	A
VEE 2xSPB1/SPF 154.3x42.3	10.01.36.00268	Mounted vacuum end effector VEE	A
VEE 4xSPB1/SPF 218.3	10.01.36.00269	Mounted vacuum end effector VEE	A
VEE SET-ECBPi	10.01.36.00266	120-piece starter set for setup of up to two vacuum end effectors VEE	A
ASK WB-M12-5 5000 K-5P	21.04.05.00830	Angle M12 5-pole socket, open end	A
ASK WB-M12-5 295 WB-M8-8	21.04.05.00823	Connection cable (use for UR)	A

Legend:	W ...	Wearing part
	S _	Spare part
	A _	Accessories

The accessories and spare parts listed here are current as of the writing of the Assembly instructions. An up-to-date overview of all accessories and spare parts for the product can be found online at www.schmalz.com

11 Disposing of the Device

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

Component	Material
Housing shells	PUR vacuum cast resin with brass threaded bushes
Flange plate	Aluminum, EN AW-6026
Press-in round screen	Brass/stainless steel
Plug-in screw unions	Technical polymer, nickel-plated brass, NBR
Screws	Galvanized steel, stainless steel
Vacuum hose	PU
Set screw with pin	Burnished steel

Materials used

12 Declarations of Conformity

12.1 EC Conformity

EU Declaration of Conformity

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

2011/65/EU	RoHS Directive
2014/30/EU	Electromagnetic Compatibility

The following harmonized standards were applied:

EN ISO 12100	Safety of machinery — General principles for design — Risk assessment and risk reduction
EN ISO 4414	Pneumatic fluid power – General rules and safety requirements for systems and their components
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 IEC 63000	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.

12.2 UKCA Conformity

Declaration of Conformity (UKCA)

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

2012	The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations
2014/30/EU	Electromagnetic Compatibility

The following designated standards were applied:

EN ISO 12100	Safety of machinery — General principles for design — Risk assessment and risk reduction
EN ISO 4414	Pneumatic fluid power – General rules and safety requirements for systems and their components
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 IEC 63000	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.