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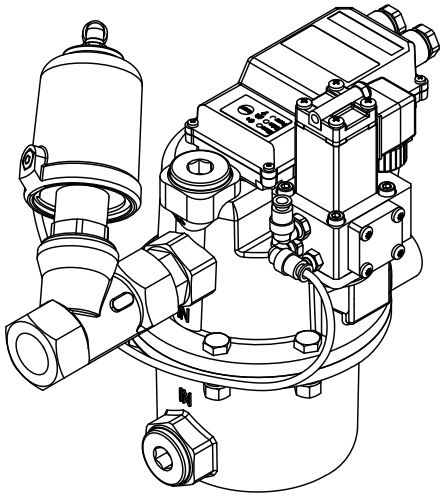

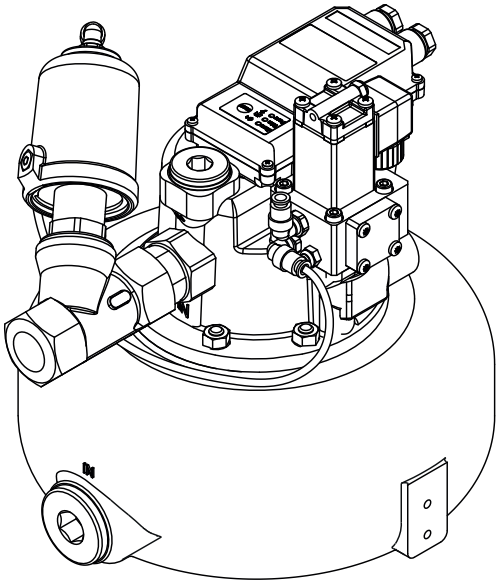

Original installation and operation manual

BEKOMAT® 15 CO VACU
BEKOMAT® 16 CO VACU

› BM15COVACU
› BM16COVACU

01-3481

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Table of contents

1. Notes about the documentation

This documentation contains all the necessary steps for the use and operation of the product and the accessories.

INFORMATION	Country-specific manufacturer representation
	You can contact the country-specific manufacturer's representative via the address listed in the address section on the rear cover or by using the contact form on the manufacturer's website.

1.1 Information about this installation and operation manual

INFORMATION	Copyright protection!
	The contents of the installation and operation manual in the form of text, figures, illustrations, photographs, technical drawings, diagrams and other representations are protected by the copyright of the manufacturer. The distribution as well as the duplication of this document, the exploitation and the communication of its contents are prohibited unless expressly authorised.

Publication date	Revision	Version	Reason for amendment	Scope of amendment
March 01, 2022	00	00	New document	New document

The installation and operation manual, hereinafter referred to as the manual, must always be kept close to the product and be in a permanently legible condition.

The manual must be handed over along with the product if it is sold or passed on.

NOTE	Follow the instructions given in the manual!
	This manual contains all the basic information required for safe operation of the product and must be read before any actions are performed. Otherwise personal and material hazards as well as malfunction and device failure are possible.

2. Safety

2.1 Use

The **BEKOMAT® 15 CO VACU / 16 CO VACU**, hereafter referred to as the "product" or **BEKOMAT®**, has been designed for draining condensate from systems with an operating pressure of 0.1 to 1.8 bar(a) (1.5 to 27 psi(a)).

2.1.1 Intended use

Any use of this system other than the use described in this manual is hereby deemed to be non-intended and can cause a hazard for the safety of people and the environment.

The following must be noted for intended use:

- Read and follow the manual.
- Only use the product and the accessories in indoor areas.
- Only use the product and accessories within the operating parameters given in the technical data.
- Only use the product and accessories within the agreed delivery conditions.
- Only use the product and accessories with media which are free of caustic, aggressive, corrosive, toxic, flammable, oxidising and inorganic components. In cases of doubt an analysis must be carried out.
- Only use the product and accessories in surroundings where splash water is the maximum possible water exposure that can occur. The splash water must be free of corrosive components.
- Only use the product and accessories in areas which are free of toxic and corrosive chemicals and gases.
- Only use the product and accessories within the piping system designed for the technical data with appropriate connections, pipe diameters and assembly clearances
- Only use the product and accessories outside potentially explosive atmospheres.
- Only use the product and accessories away from direct solar radiation and heat sources as well as areas subject to frost.
- Only combine the product and the accessories with the recommended **BEKO** TECHNOLOGIES products and components indicated in this manual.
- Adhere to the prescribed maintenance schedule.

Before using the product and the accessories, the operating company must make sure that all conditions and prerequisites for intended use are given.

The product and the accessories have been exclusively designed for stationary use in a commercial or industrial area. All of the assembly, installation, operation, maintenance, disassembly and disposal work described may only be performed by qualified skilled technical personnel.

2.1.2 Reasonably foreseeable inappropriate use

A case of reasonably foreseeable inappropriate use is deemed to have occurred if the product or the accessories are used in any other way than that described in the "Intended use" section. Reasonably foreseeable inappropriate use includes the use of the product or the accessories in a manner not intended by the manufacturer or supplier but which may result from foreseeable human behaviour.

Reasonably foreseeable inappropriate use includes:

- The execution of any kind of modification, in particular constructive and process-technology related interventions.
- The suspension, bridging or non-application of existing or recommended safety equipment.

This list is not exhaustive as not all possible inappropriate use can be foreseen in advance. If the operating company is aware of any inappropriate use of the product or accessories which are not listed here, the manufacturer must be informed immediately.

2.2 Responsibility of the operating company

The responsible operating company must ensure the following to prevent accidents, incidents and adverse effects on the environment:

- Before all actions, check to ensure that the manual available does in fact belong to the product.
- The product and the accessories are used, serviced and repaired in accordance with the intended use.
- The product and accessories are only used with the recommended and fully operable safety equipment.
- All assembly, installation and maintenance work is carried out by qualified skilled technical personnel only.
- Personnel have the necessary personal protective equipment available and also use this equipment.
- Suitable technical safety measures are taken so that the permissible operating parameters are adhered to.
- Keep all safety symbols and the type plate on the product in a legible state. Replace damaged and illegible marking immediately.

2.3 Target group and personnel

This manual addresses the personnel listed below who are involved with work on the product or the accessories.

INFORMATION	Personnel requirements!
	The personnel may not execute any actions on the product or the accessories when they are under the influence of drugs, medications, alcohol or other substances that may impair their consciousness.

Operating personnel

Operating personnel are persons who are able to operate the product and the accessories safely on the basis of knowledge of the manual and instruction at the product and accessories. Operating personnel can recognise possible malfunctions and dangerous situations independently and arrange for corresponding measures.

Skilled technical personnel - transport and storage

Skilled technical personnel - transport and storage are people who, due to their training, professional experience and qualifications, have all the necessary skills to safely execute all actions in connection with the transport and storage of the product, to instruct, to recognise possible dangerous situations independently and to execute measures to avoid danger.

The skills required include, in particular, experience operating hoists, forklifts and lifting equipment and familiarity with locally applicable laws, standards and guidelines relating to transport and storage.

Skilled technical personnel - pressure equipment and plants

Skilled technical personnel specializing in pressure equipment and plants consists of people who, as a result of their training, professional experience and qualifications, have all the necessary capabilities to safely carry out and order all activities related to pressurised fluids and systems, to independently identify potentially hazardous situations, and to implement appropriate measures to avert any danger.

The skills required include, in particular, experience using measuring equipment and control equipment, as well as familiarity with locally applicable laws, standards and regulations for pressurised systems.

Skilled technical personnel - electrical engineering

Skilled technical personnel - electrical engineering are people who, due to their training, professional experience and qualification, have all the necessary capabilities to safely execute all actions related to electricity, to instruct and to independently foresee potential hazardous situations and take appropriate measures to avoid any danger.

The capabilities include, in particular, experience in handling electric voltage plants, measurement and control technology as well as knowledge of the regionally applicable laws, standards and regulations (e.g. VDE 0100 / IEC 60364 / ATEX) applicable for handling electrical technology.

Skilled technical personnel - customer service

Skilled technical personnel - customer service are people who have the skills and qualifications of the skilled personnel definitions named above. Skilled technical personnel - customer service must have documented proof of training for all work on the product and be authorised.

2.4 Explanation of the safety symbols used

The symbols used below indicate safety-relevant and important information which must be adhered to when handling the product and to ensure safe and optimum operation.

Symbol	Description / explanation
	General warning symbol (danger, warning, caution)
	Warning: pressurised system
	Warning: electric voltage
	Observe the installation and operation manual
	General note
	Wear safety footwear
	Use protective gloves (cut-proof and liquid-resistant)
	Wear safety goggles with side shields
	General information

2.5 Safety and warning notices

This chapter provides an overview of all the important safety aspects for personal protection as well as for the safe and problem-free operation of the product and accessories.

The following chapters list the dangers posed by this product and the accessories even with intended use. To minimise the risk of personal injury and damage to property and to avoid dangerous situations, observe the safety instructions listed and adhere to the warning notices in the other chapters of this manual.

Basic warning notices and the necessary qualifications of skilled technical personnel are always listed at the beginning of the chapter in the “Warning notices” section.

Warning notices related to specific actions are printed directly before potentially hazardous procedures or sequences of actions.

2.5.1 Safe operation

Commissioning and operating the product and accessories outside the permissible limits and operating parameters may result in serious personal injuries or death. Unauthorised interference and unauthorised modifications of the product and accessories may lead to serious personal injuries or death.

To guarantee safe operation of the product and accessories, observe the following points:

- Use suitable protective equipment during all work on the product or accessories.
- Adhere to the limits and operating parameters specified on the type plate and in the manual.
- Adhere to the assembly conditions and ambient conditions.
- Check whether the permissible operating parameters have been amended or restricted by the use of accessories.
- Adhere to the maintenance intervals.

2.5.2 Pressurised systems

Contact with quickly or suddenly escaping fluids or bursting plant parts may result in serious personal injuries or death.

For the safe handling of pressurised systems, observe the following points:

- Set up a safety area around the working area during assembly, installation, maintenance and repair work.
- Before starting work, depressurise the pressurised system and secure it against unintentional pressurisation.
- Before pressurisation, check all system pipe connections for leak tightness and tighten if necessary.
- Slowly pressurise the system.
- Avoid pressure blows and high differential pressures.
- Compensate any vibrations occurring in the pipe network by using vibration dampers.

2.5.3 Electric voltage

Contact with live components may result in serious personal injuries or death.

To ensure the safe handling of live components, observe the following points:

- Set up a safety area around the working area during all installation and repair work.
- Before starting work, de-energise the product and accessories and secure them against being switched back on again unintentionally.
- Only connect the product and the accessories to the voltage supply if they are undamaged.
- Comply with all regionally applicable regulations and requirements during installation.
- Connect the protective conductor (earth connection) according to regulations.
- Only operate the product and accessories with the cover complete and closed or the housing closed.

2.5.4 Transport and storage

Inappropriate transport or storage may result in personal injury or damage to property.

For the safe transport and storage of the product and accessories, observe the following:

- Use personal protective equipment during all work with packaging material.
- Handle packaging, the product and accessories carefully.
- Transport and handle the packaged product and accessories according to the markings on the packaging (note lifting gear attachment points, the centre of gravity and alignment e.g. keep vertical, do not throw etc.).
- Only use proper means of transport and lifting equipment that is in proper working order.
- Always adhere to the permissible transport and storage parameters.
- Store the product and accessories only outside of areas exposed to direct sunlight and heat sources.

2.5.5 Installation

Inappropriate assembly or electrical installation of the product and accessories may result in personal injury and damage to property as well as impair operation.

For safe assembly and electrical installation, observe the following points:

- Install the product, the accessories, and all parts and materials used so that they are not subject to mechanical tension.
- Check all plug-type connections for a correct fit.
- Avoid a stumbling hazard by routing cables and hoses accordingly.
- Avoid mechanical strain on the cables.
- Fix and fasten hoses in such a way that they cannot flap around.
- Install the inlet lines and drain lines as fixed pipes.

2.5.6 Maintenance

Inappropriate completion of maintenance and repair work may result in serious personal injuries or death.

For safe maintenance and repair, observe the following points:

- Use suitable protective equipment during all work on the product or accessories.
- Set up a safety area around the working area during all work.
- Before starting work, depressurise the pressurised product and accessories and secure them against unintentional pressurisation.
- Before starting work, de-energise the product and accessories and secure them against being switched back on again unintentionally.
- Only use materials approved for the respective application.
- Use only suitable tools that are in proper working order.
- Only use cleaned pipes and hoses that are free of dirt and corrosion.
- Never use abrasive or aggressive cleaning agents or solvents which could damage the outer coating (e.g. markings, type plate, corrosion protection, etc.).
- Never clean the device with hard or pointed implements.
- Use an anti-static, damp cloth for cleaning the outside.
- Observe the regionally applicable hygiene regulations.
- Pay attention to cleanness and tidiness during maintenance and repair work. Prevent contamination from entering the opened product or accessories. Store the disassembled components and accessories directly in a safe place.
- After completing maintenance and repair work, remove all tools and cleaning products used, as well as all parts that are no longer needed, from the work area.
- Only dispose of the product and accessories when cleaned and freed of any media residue.
- Dispose of all components, parts, operating and auxiliary materials as well as cleaning media professionally and in accordance with all locally applicable regulations and standards.
- Dispose of electrical and electronic components through a specialized disposal company or return them to **BEKO** TECHNOLOGIES.

2.5.7 Handling hazardous substances

Contact with condensate containing substances which endanger health and the environment can pose a health hazard, causing irritation and/or damage to the eyes, skin and mucous membranes. In addition, polluted condensate must be prevented from entering the sewerage system, waters or the ground.

For the safe handling of polluted condensate the following points must be observed:

- Use suitable protective equipment when handling condensate.
- Pick up and dispose of any leaking or spilled condensate in accordance with applicable regional laws and requirements.

2.5.8 Use of spare parts, accessories or materials

The use of incorrect spare parts, accessories or materials, as well as auxiliary and operating materials, may result in death or serious injury. Malfunction and device failure as well as material damage can occur.

- Only use undamaged original parts, auxiliary and operating materials which are specified by the manufacturer to complete all work.
- Only use the materials approved for the respective application and suitable tools in proper working order.
- Only use cleaned pipes that are free of dirt and corrosion.
- Only use electric components and materials that comply with regionally applicable specifications and regulations (standards, directives etc.) for electrical safety.

2.6 Warning notices

Warning notices warn against dangers when handling the product and accessories.

In order to prevent accidents, personal injury and damage to property as well as impairments during operation, it is essential to adhere to the warning notices.

Structural set up:

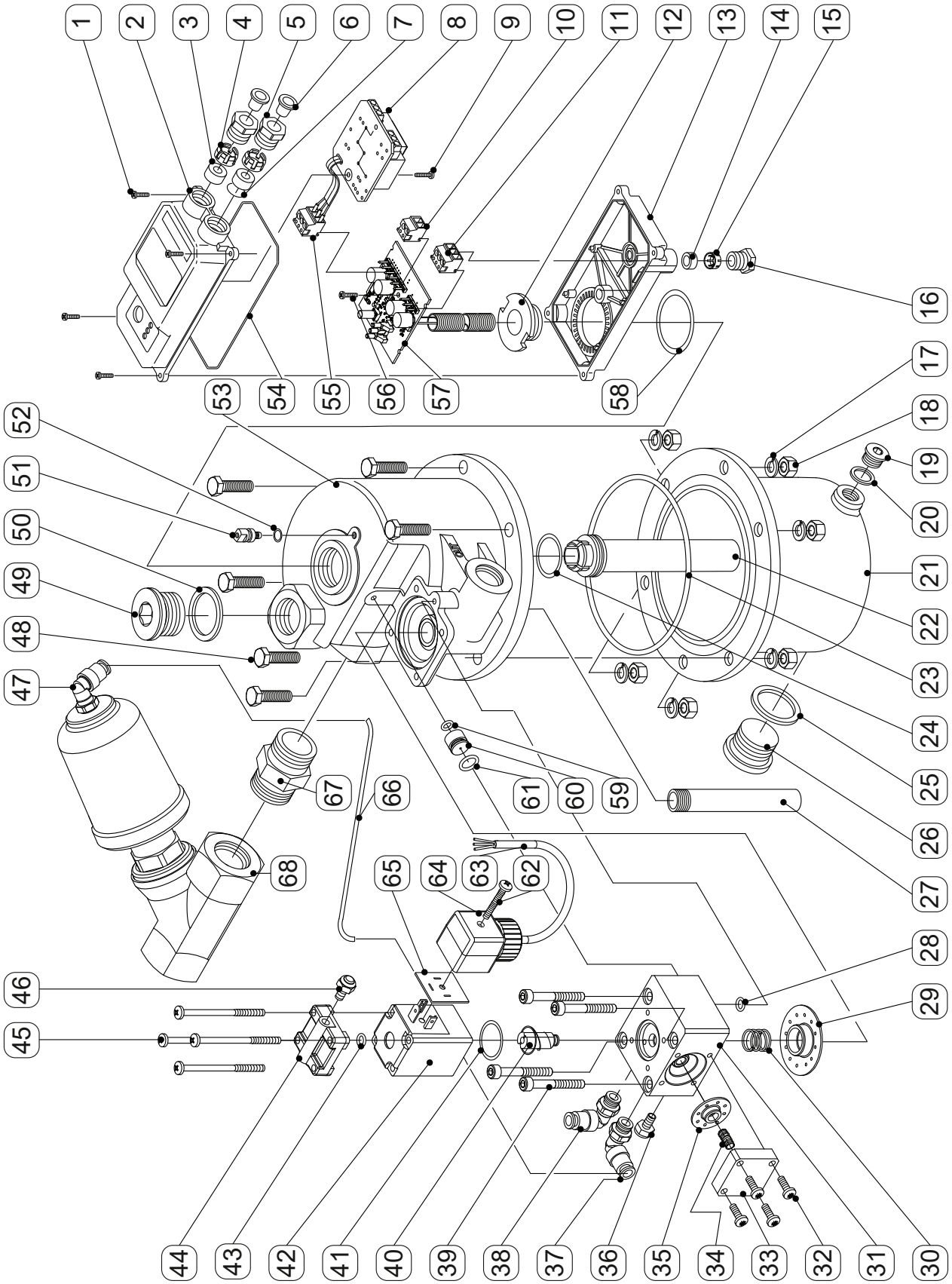
SIGNAL WORD	Type and source of danger!
 Symbol	Possible consequences if the danger is ignored • Measures to prevent the danger

Signal words:

DANGER	**Imminent hazard** Consequences of non-compliance: Death or serious personal injury
WARNING	**Imminent hazard** Consequences of non-compliance: Death or serious personal injury are possible
CAUTION	**Potential hazard** Consequences of non-compliance: Personal injury or damage to property are possible
NOTE	**Additional notes** Consequences of non-compliance: Damage to property, malfunction and device failure are possible. No hazard to people or endangerment of safe operation.

3. Product information

3.1 Exploded view of BEKOMAT® 15 CO VACU

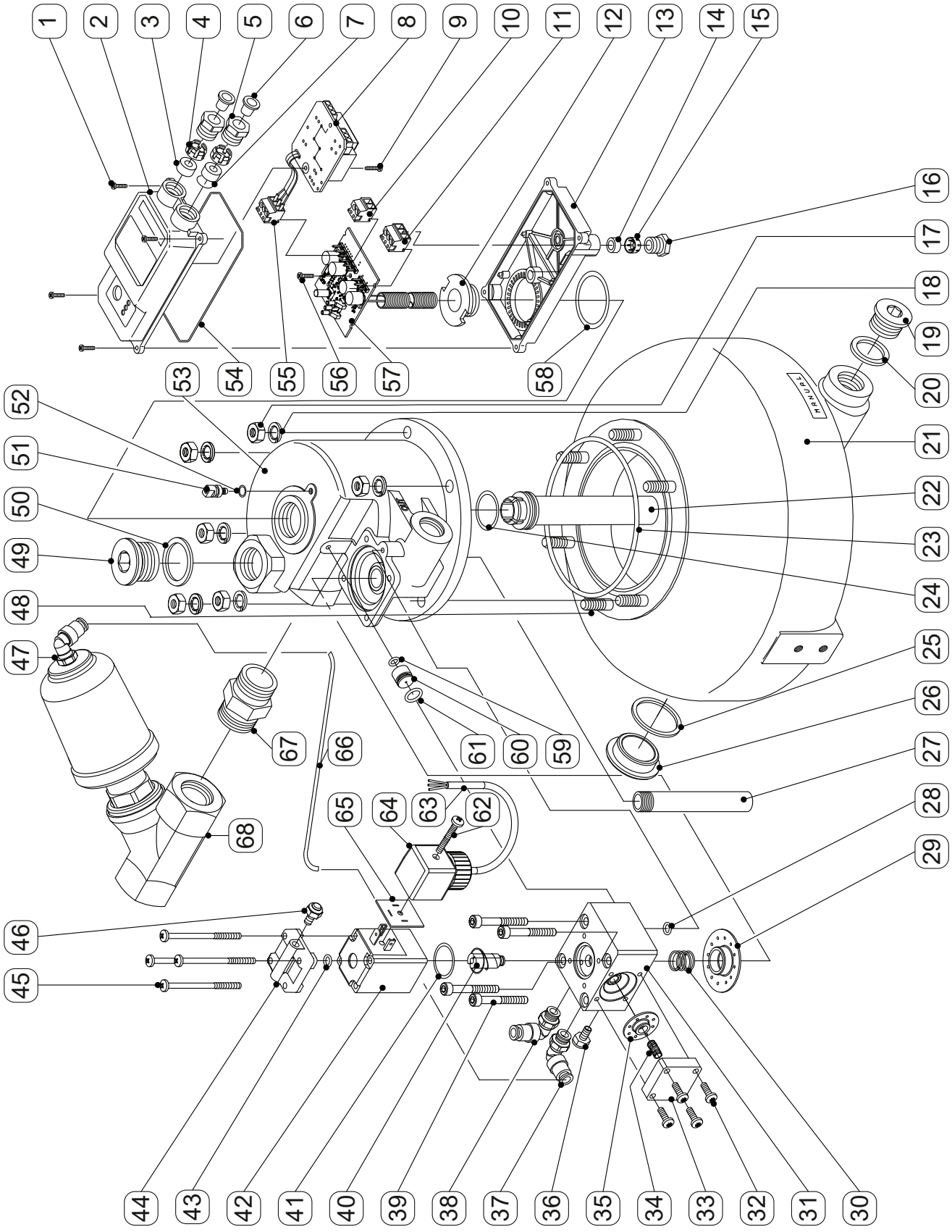


Item	Description / explanation
[1]	M3 x 10 mm screw
[2]	Top cover
[3]	Sealing ring PG9
[4]	Clamp cage PG9
[5]	PG9 cable gland
[6]	Plug
[7]	Dust protection pane
[8]	Power control board
[9]	M3 x 6 mm screw
[10]	Cable clamp
[11]	Cable clamp
[12]	Cover mounting element
[13]	Bottom cover
[14]	Sealing ring PG7
[15]	PG7 washer
[16]	PG7 cable gland
[17]	Spring washer
[18]	Nut M8
[19]	G-thread 1/4” screw plug
[20]	Flat gasket 21.5 x 26 mm
[21]	Housing
[22]	Sensor tube
[23]	O-ring 104 x 3 mm
[24]	O-ring 27 x 2 mm
[25]	Flat gasket
[26]	G-thread 3/4” screw plug
[27]	Rising pipe
[28]	O-ring 5.5 x 1.5 mm
[29]	Membrane

Item	Description / explanation
[30]	Spring
[31]	Membrane cap
[32]	M4 x 12 mm screw
[33]	Cover
[34]	Spring
[35]	Membrane
[36]	Silencer
[37]	G-thread 1/8” push-to-connect elbow fitting
[38]	G-thread 1/8” push-to-connect elbow fitting
[39]	M5 x 40 mm screw
[40]	Valve core with spring
[41]	O-ring 25 x 1.5 mm
[42]	Solenoid coil
[43]	O-ring 5.5 x 1.5 mm
[44]	Control-air cover
[45]	M4 x 62 mm screw
[46]	Silencer
[47]	G-thread 1/8” push-to-connect elbow fitting
[48]	M8 x 30 mm screw
[49]	G-thread 3/4” screw plug
[50]	Flat gasket
[51]	Earthing screw
[52]	O-ring 4 x 1.5 mm
[53]	Housing upper part
[54]	Cord packing 2 x 315 mm
[55]	Cable clamp
[56]	M3 x 6 mm screw
[57]	Control circuit board
[58]	O-ring 34.59 x 2.62 mm

Item	Description / explanation
[59]	O-ring 5 x 1.5 mm
[60]	Vent
[61]	O-ring 9.25 x 1.78 mm
[62]	M3 x 6 mm screw
[63]	Cable
[64]	Cable connector
[65]	Seal
[66]	Hose
[67]	Double nipple 3/4”
[68]	G-thread 3/4” incline seat valve

3.2 Exploded view of BEKOMAT® 16 CO VACU



Item	Description / explanation
[1]	M3 x 10 mm screw
[2]	Top cover
[3]	Sealing ring PG9
[4]	Clamp cage PG9
[5]	PG9 cable gland
[6]	Plug
[7]	Dust protection pane
[8]	Power control board
[9]	M3 x 6 mm screw
[10]	Cable clamp
[11]	Cable clamp
[12]	Cover mounting element
[13]	Bottom cover
[14]	Sealing ring PG7
[15]	PG7 washer
[16]	PG7 cable gland
[17]	Spring washer
[18]	Nut M8
[19]	G-thread 1/2” screw plug
[20]	Flat gasket 21.5 x 26 mm
[21]	Housing
[22]	Sensor tube
[23]	O-ring 104 x 3 mm
[24]	O-ring 27 x 2 mm
[25]	Flat gasket
[26]	G-thread 1” screw plug
[27]	Rising pipe
[28]	O-ring 5.5 x 1.5 mm
[29]	Membrane

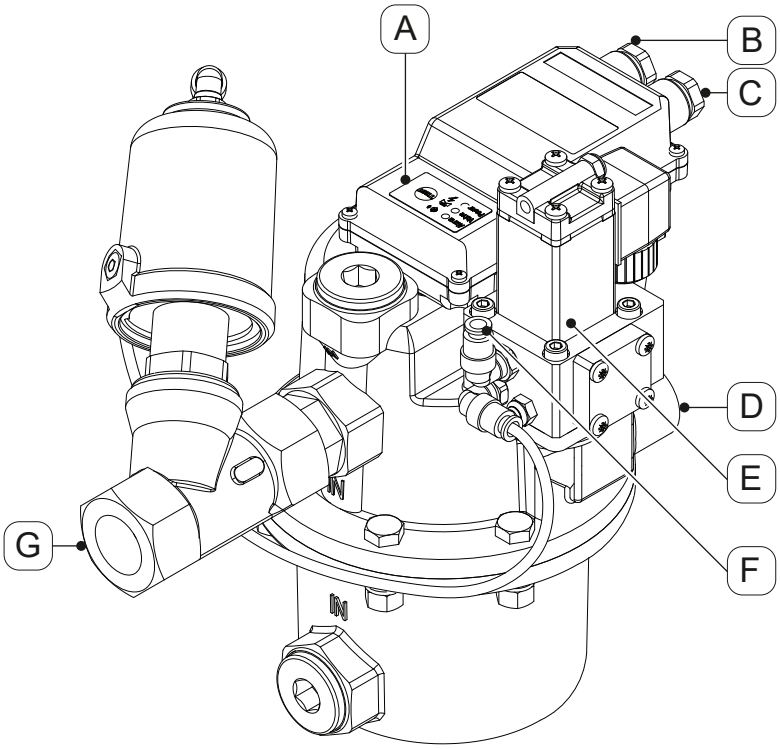
Item	Description / explanation
[30]	Spring
[31]	Membrane cap
[32]	M4 x 12 mm screw
[33]	Cover
[34]	Spring
[35]	Membrane
[36]	Silencer
[37]	G-thread 1/8” push-to-connect elbow fitting
[38]	G-thread 1/8” push-to-connect elbow fitting
[39]	M5 x 40 mm screw
[40]	Valve core with spring
[41]	O-ring 25 x 1.5 mm
[42]	Solenoid coil
[43]	O-ring 5.5 x 1.5 mm
[44]	Control-air cover
[45]	M4 x 62 mm screw
[46]	Silencer
[47]	G-thread 1/8” push-to-connect elbow fitting
[48]	M8 x 20 mm screw
[49]	G-thread 3/4” screw plug
[50]	Flat gasket
[51]	Earthing screw
[52]	O-ring 4 x 1.5 mm
[53]	Housing upper part
[54]	Cord packing 2 x 315 mm
[55]	Cable clamp
[56]	M3 x 6 mm screw
[57]	Control circuit board
[58]	O-ring 34.59 x 2.62 mm

Item	Description / explanation
[59]	O-ring 5 x 1.5 mm
[60]	Vent
[61]	O-ring 9.25 x 1.78 mm
[62]	M3 x 6 mm screw
[63]	Cable
[64]	Cable connector
[65]	Seal
[66]	Hose
[67]	Double nipple 3/4”
[68]	G-thread 3/4” incline seat valve

3.3 Product description

The **BEKOMAT®** has been designed for draining condensate from systems with an operating pressure of 0.1 to 1.8 bar(a) (1.5 to 27 psi(a)).

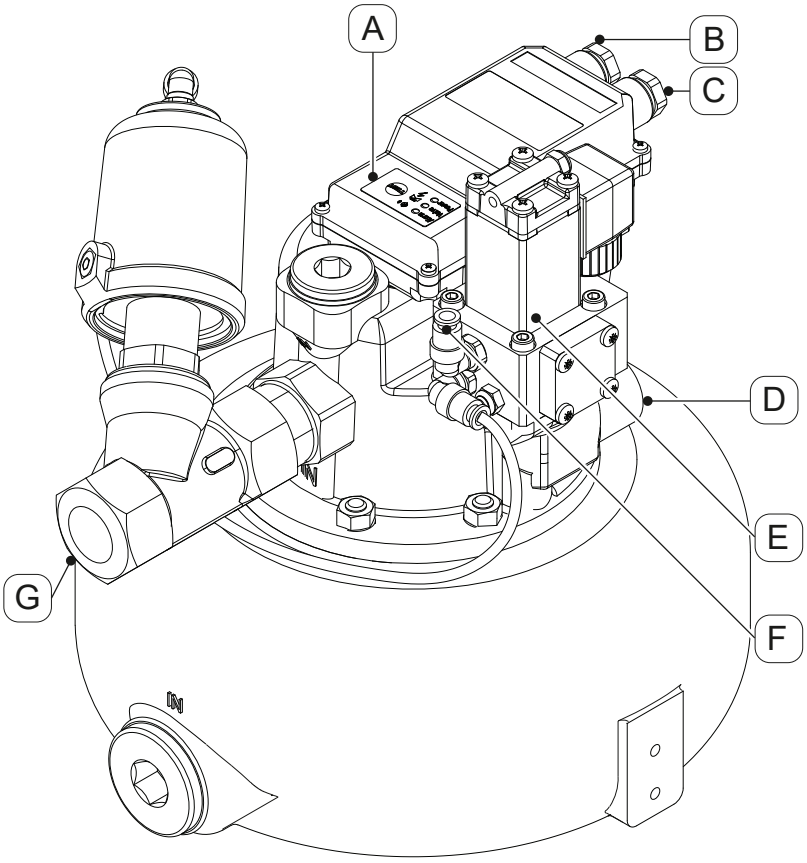
3.3.1 BEKOMAT® 15 CO VACU product diagram



Item	Description / explanation
[A]	Control panel
[B]	Right cable gland
[C]	Left cable gland
[D]	Condensate discharge

Item	Description / explanation
[E]	Pilot valve
[F]	Control medium connector
[G]	Condensate inlet

3.3.2 BEKOMAT® 16 CO VACU product diagram

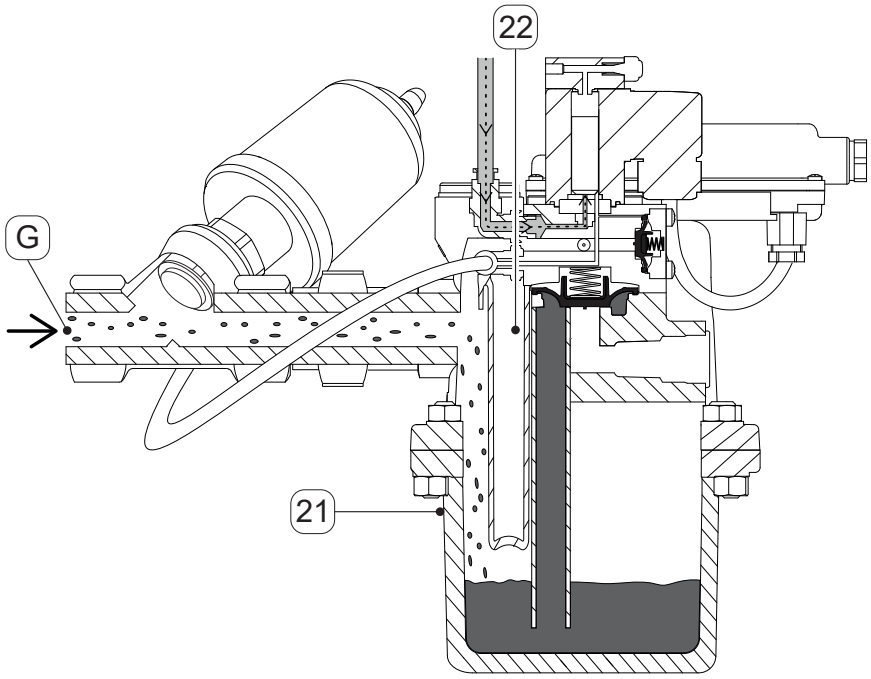


Item	Description / explanation
[A]	Control panel
[B]	Right cable gland
[C]	Left cable gland
[D]	Condensate discharge

Item	Description / explanation
[E]	Pilot valve
[F]	Control medium connector
[G]	Condensate inlet

3.4 Function description

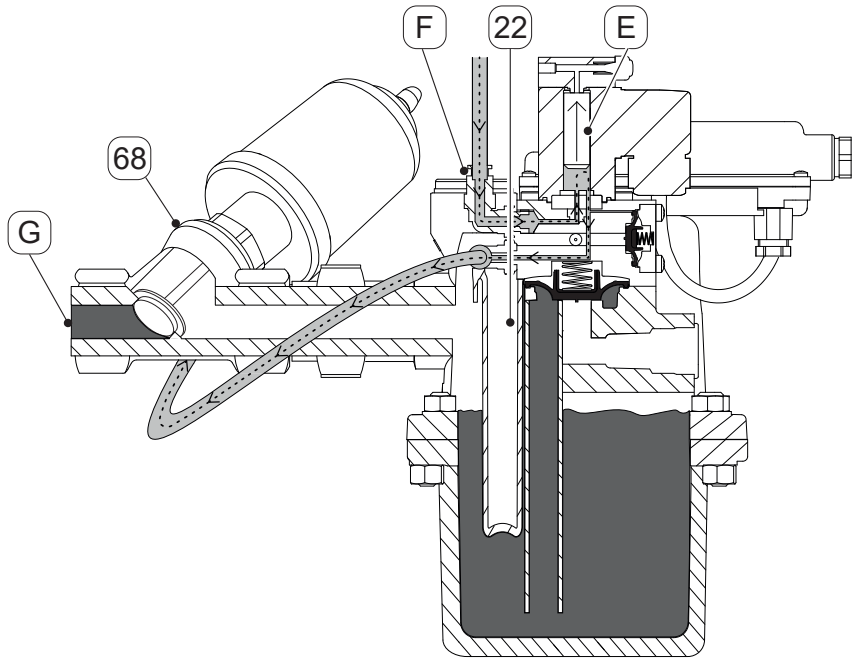
Illustration



Description / explanation

The condensate flows into the **BEKOMAT®** via the condensate inlet **[G]** and accumulates in the housing **[21]**. The filling level in the collecting tank **[21]** is continuously monitored by a capacitive sensor in the sensor tube **[22]**.

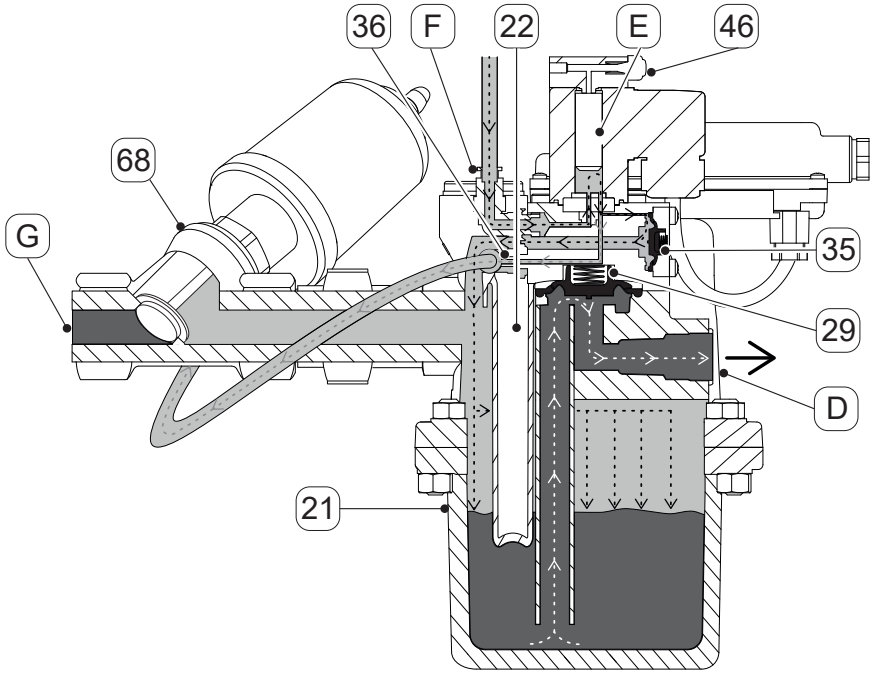
Illustration



Description / explanation

As soon as the condensate reaches the maximum fill level, the controller operates the pilot valve **[E]**. Control medium is conveyed from the connector **[F]** to the incline seat valve **[68]**. The incline seat valve **[68]** closes and the condensate inlet **[G]** is blocked.

Illustration



Description / explanation

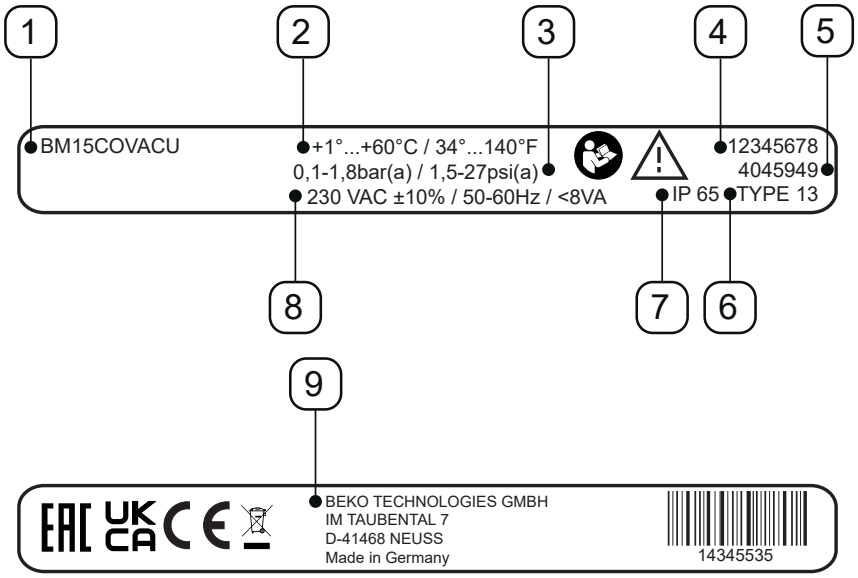
The pilot valve **[E]** conveys control medium to the membrane **[35]** and lifts the membrane **[35]** off from the valve seat. Control medium flows into the collecting tank **[21]** through the open valve, pressurizing the collecting tank **[21]** as a result. The excess pressure in the collecting tank **[21]** lifts membrane **[29]** off from the valve seat and pushes the condensate into the condensate discharge **[D]**.

Once the sensor in the sensor tube **[22]** is no longer covered by condensate, the controller operates the pilot valve **[E]** and the supply of control medium is blocked. The membranes **[29, 35]** are pushed onto their respective valve seats.

The **BEKOMAT®** and the incline seat valve **[68]** are bled through the silencers **[36, 46]**. The incline seat valve **[68]** opens the condensate inlet **[G]**.

3.5 Type plate

The type plate, which shows the identification information and operating parameters for the **BEKOMAT®**, is located on the bottom cover.



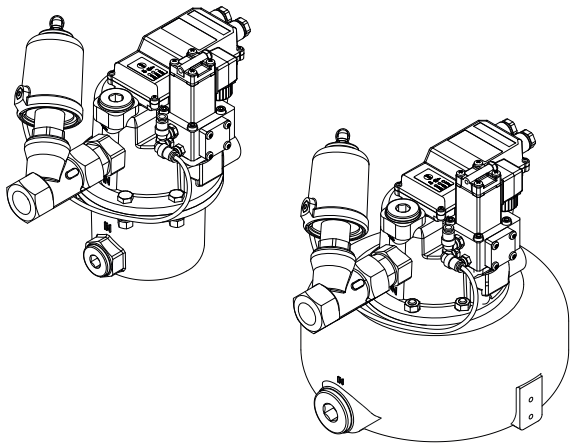
Example illustration

Item	Description / explanation
[1]	Product name
[2]	Operating temperature
[3]	Operating pressure
[4]	Serial number
[5]	Material number
[6]	Enclosure rating
[7]	IP degree of protection
[8]	Operating voltage
[9]	Manufacturer

For more information, refer to section “2.4 Explanation of the safety symbols used” on Page 9.

3.6 Scope of delivery

The table below shows the scope of delivery of the **BEKOMAT®**:

Illustration	Description / explanation
	**BEKOMAT® 15 CO VACU** or **BEKOMAT® 16 CO VACU**
	Original installation and operation manual

4. Technical data

4.1 Operating parameters

BEKOMAT®	15 CO VACU	16 CO VACU
Relative ambient humidity	10 ... 80 %, without condensation	
Maximum operating height	2000 m 2187.23 yd	
Media	Condensate, oil-contaminated or oil-free	
Minimum / maximum absolute operating pressure	0.1 to 1.8 bar(a) 1.5 to 27 psi(a)	
Minimum / maximum operating temperature	+1 to +60 °C +34 to +140 °F	
Control medium	Air or nitrogen	
Minimum / maximum absolute control pressure	4 to 8 bar(a) 58 to 116 psi(a)	
Connector, condensate inlet	G-thread 3/4" (female)	
Connection, condensate discharge	G-thread 1/2" (female)	
Control medium connector	Hose fitting Outer diameter = 6 mm Outer diameter = 0.24 in	
Empty weight	4.15 kg 9.15 lb	7.18 kg 15.83 lb
Operating voltage	24/100/115/200/230 VAC ±10%, 50 to 60 Hz / 24 VDC ±10% (see type plate)	
Power consumption	< 8,0 VA (W)	
Fuse protection	AC = 1 A (slow-blow), recommended DC = 1 A (slow-blow), required	
Degree of protection	IP65	
Enclosure rating	TYPE 13	
Overvoltage category (IEC 61010-1)	II	
Degree of pollution (IEC 61010-1)	3	
Recommended cable diameter	5.8 ... 8.5 mm 0.23 ... 0.33 in	
Recommended wire cross-sectional area	0.25 to 1 mm² AWG 18 ... 24	
Recommended shortening of the cable jacket	~ 50 mm ~ 1.97 in	
Recommended stripping length of the cable wires	~ 6 mm ~ 0.24 in	

4.2 Volume flow of drained condensate – BEKOMAT® 15 CO VACU

Control pressure Control medium	Average rate	Peak quantity
4 bar(a) 58 psi(a)	38 l/h 10.0 gal/h	45 l/h 11.9 gal/h
6 bar(a) 87 psi(a)	42 l/h 11.1 gal/h	45 l/h 11.9 gal/h
8 bar(a) 116 psi(a)	43 l/h 11.4 gal/h	45 l/h 11.9 gal/h

4.3 Volume flow of drained condensate – BEKOMAT® 16 CO VACU

Control pressure Control medium	Average rate	Peak quantity
4 bar(a) 58 psi(a)	171 l/h 45.2 gal/h	200 l/h 52.8 gal/h
6 bar(a) 87 psi(a)	194 l/h 51.2 gal/h	200 l/h 52.8 gal/h
8 bar(a) 116 psi(a)	200 l/h 52.8 gal/h	200 l/h 52.8 gal/h

4.4 Control medium ingress volume

After every discharge operation, a certain amount of control medium will enter the vacuum system.

BEKOMAT®	42L/h	194L/h
Control pressure Control medium	6 bar(a) (87.02 psi(a))	6 bar(a) (87.02 psi(a))
Volume*	Approx. 1 – 2 l (0.26 / 0.53 gal)	Approx. 5 – 6 l (1.32 / 1.59 gal)

* Depressurised to 0 bar(a) (0 psi(a))

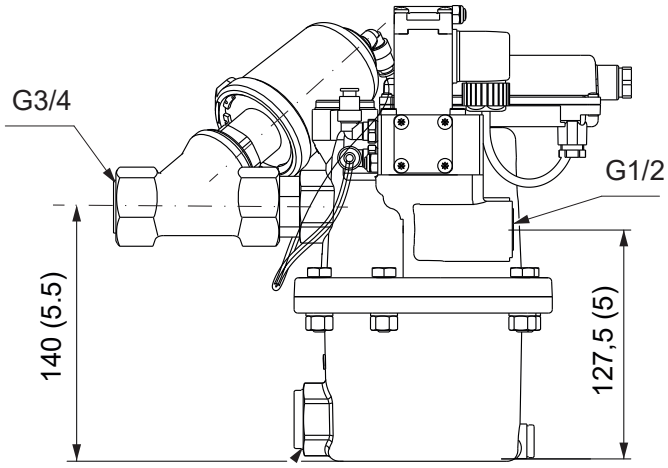
4.5 Storage and transport parameters

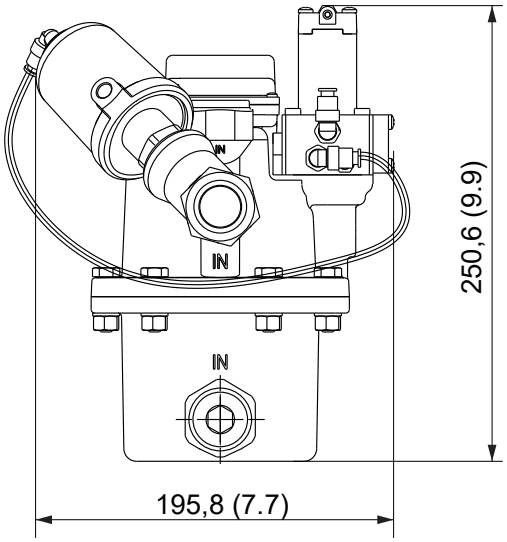
BEKOMAT®	15 CO VACU	16 CO VACU
Minimum / maximum temperature, storage and transportation	+1 to +60 °C +34 to +140 °F	

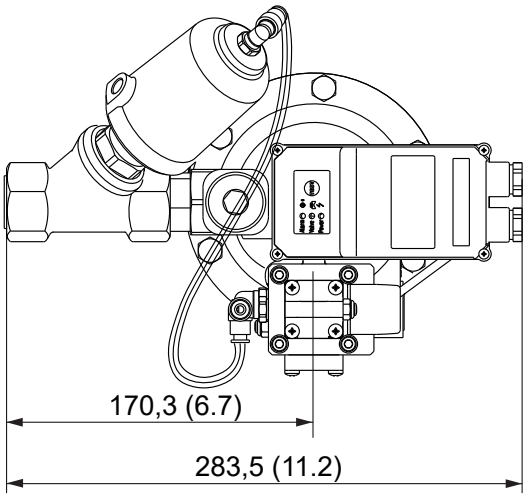
4.6 Materials

BEKOMAT®	15 CO VACU	16 CO VACU
Housing	Aluminium, hardcoated	
Membrane	FKM	

4.7 BEKOMAT® 15 CO VACU dimensions

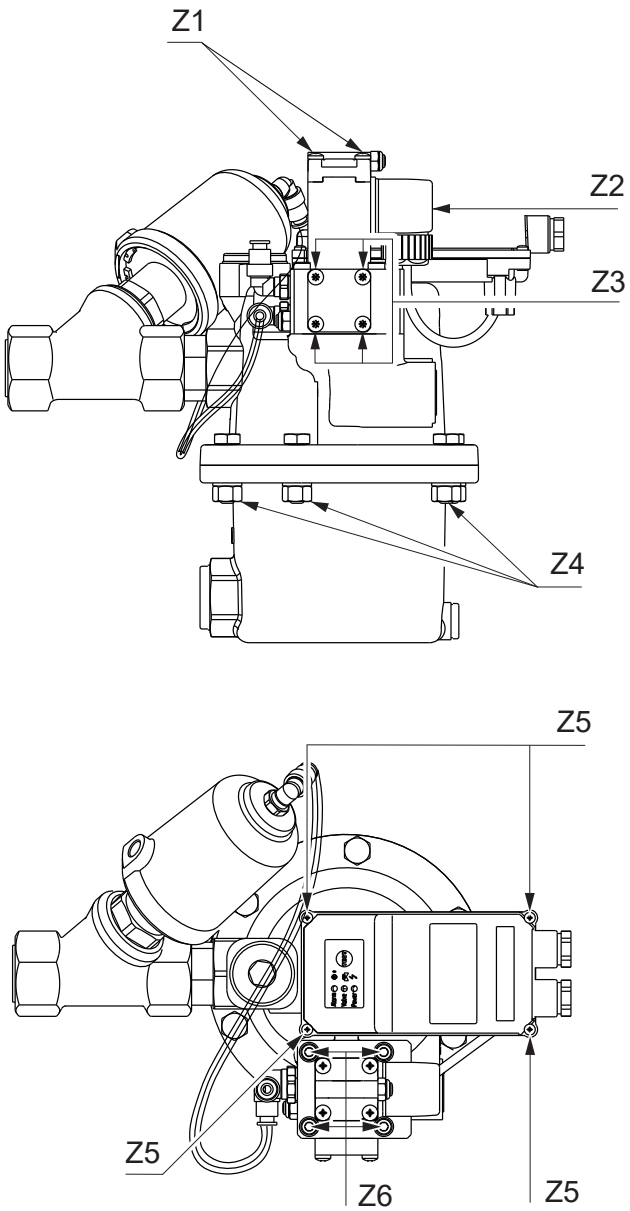






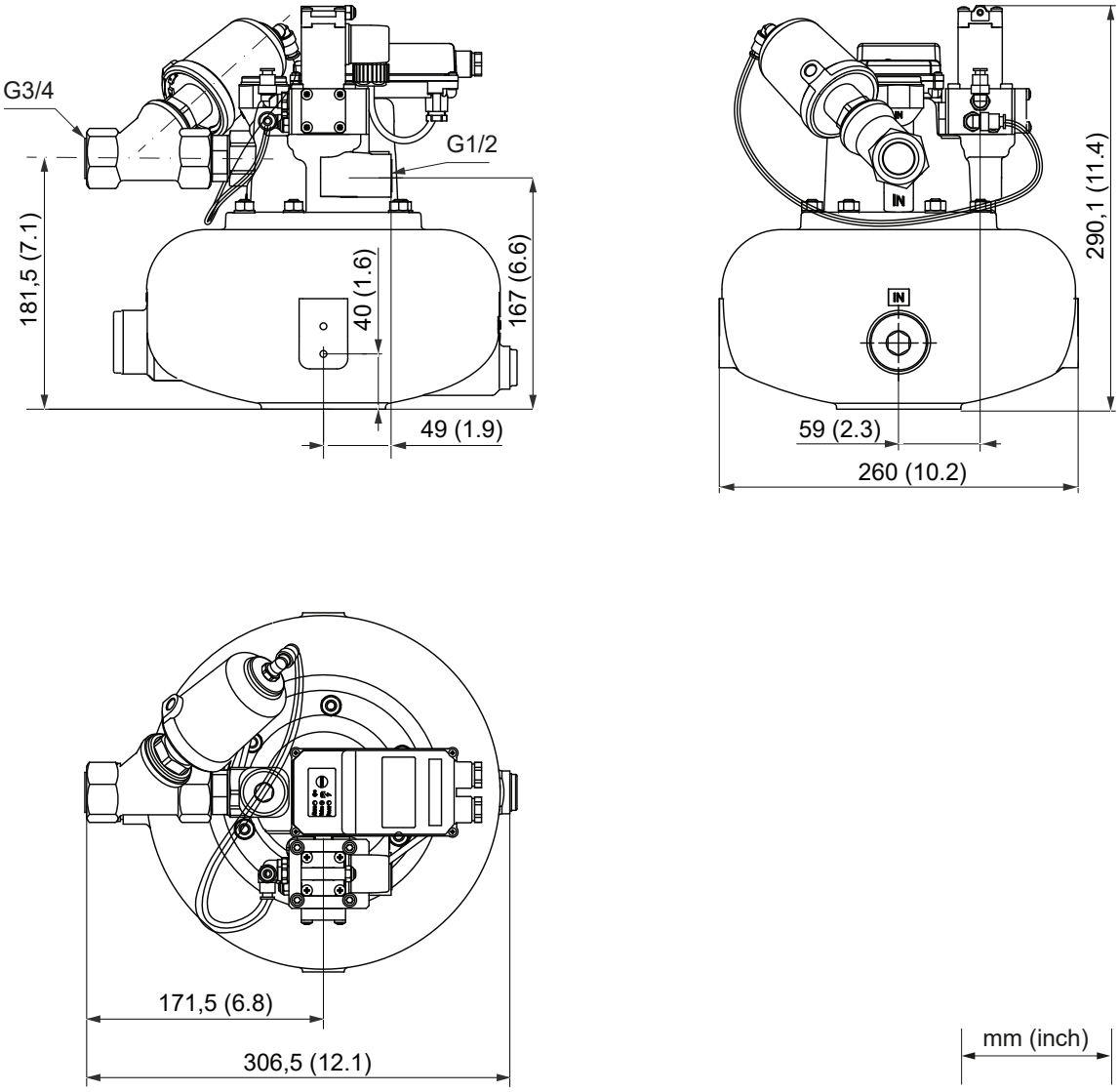
mm (inch)

4.8 BEKOMAT® 15 CO VACU screw tightening torques

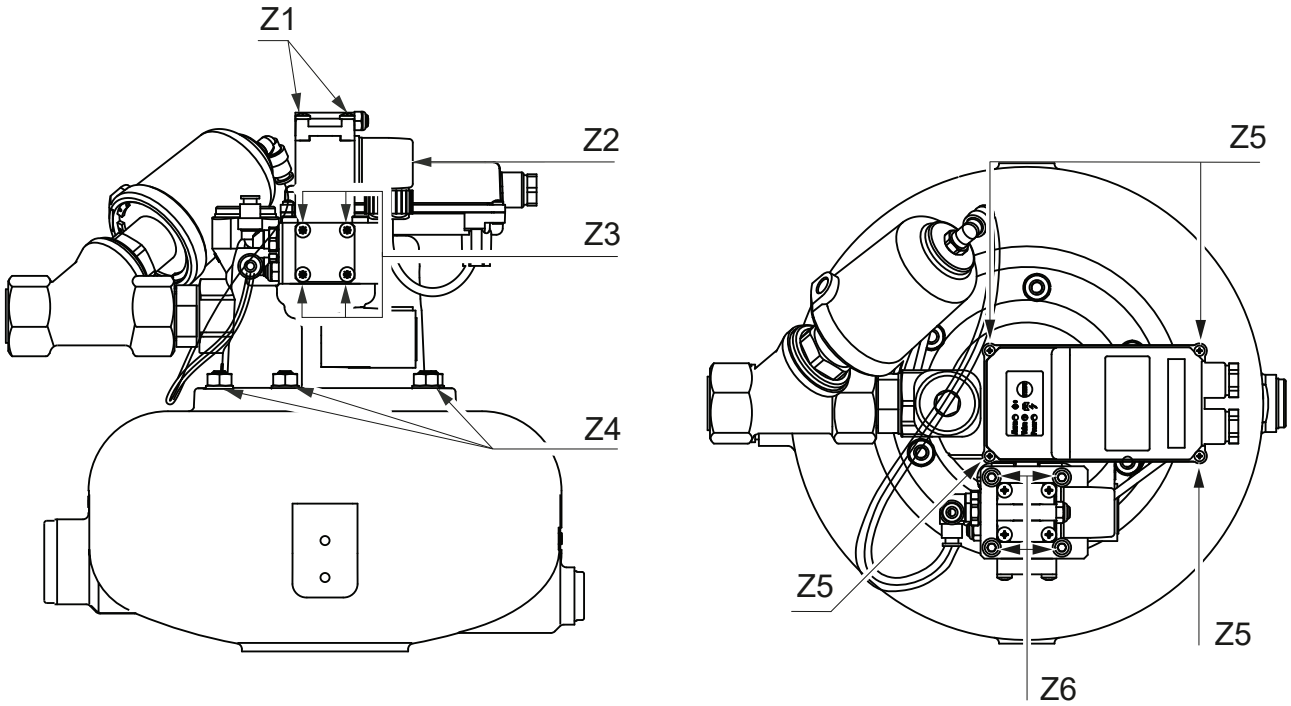


Item	Description / explanation	Tightening torques
[Z1]	Screws, control-air cover	1.5 Nm +0.5 Nm (1.11 ft-lb +0.37 ft-lb)
[Z2]	Screw, solenoid valve connector	1 Nm +0.2 Nm (0.74 ft-lb +0.15 ft-lb)
[Z3]	Screws, membrane cap valve unit	2.5 Nm ±0.5 Nm (1.84 ft-lb ±0.37 ft-lb)
[Z4]	Nuts, housing	20 Nm ±5 Nm (14.75 ft-lb ±3.69 ft-lb)
[Z5]	Screws, top cover	0.5 Nm +0.5 Nm (0.37 ft-lb +0.37 ft-lb)
[Z6]	Screws, membrane cap valve unit	1.5 Nm +0.5 Nm (1.11 ft-lb +0.37 ft-lb)

4.9 BEKOMAT® 16 CO VACU dimensions

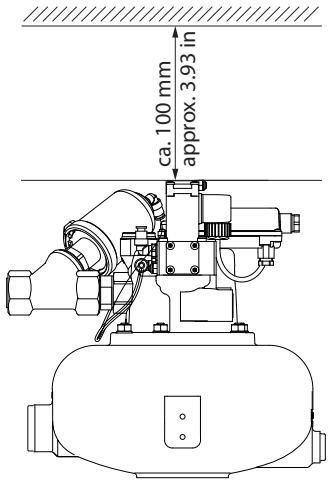


4.10 BEKOMAT® 16 CO VACU screw tightening torques



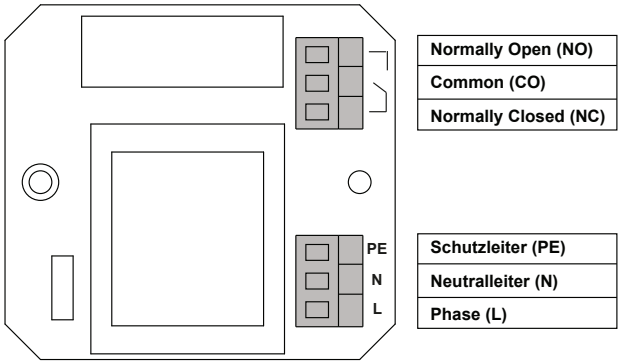
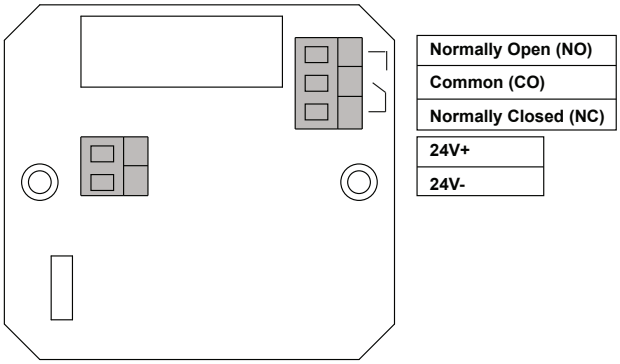
Item	Description / explanation	Tightening torques
[Z1]	Screws, control-air cover	1.5 Nm +0.5 Nm (1.11 ft-lb +0.37 ft-lb)
[Z2]	Screw, solenoid valve connector	1 Nm +0.2 Nm (0.74 ft-lb +0.15 ft-lb)
[Z3]	Screws, membrane cap valve unit	2.5 Nm ±0.5 Nm (1.84 ft-lb ±0.37 ft-lb)
[Z4]	Nuts, housing	20 Nm ±5 Nm (14.75 ft-lb ±3.69 ft-lb)
[Z5]	Screws, top cover	0.5 Nm +0.5 Nm (0.37 ft-lb +0.37 ft-lb)
[Z6]	Screws, membrane cap valve unit	1.5 Nm +0.5 Nm (1.11 ft-lb +0.37 ft-lb)

4.11 Installation dimensions

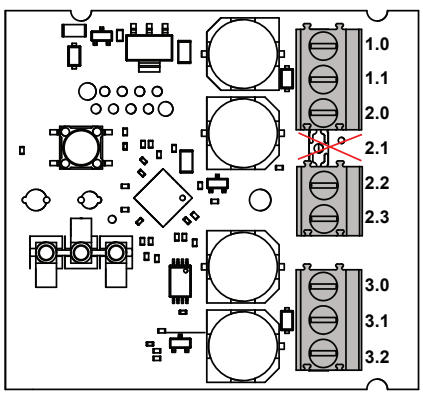
Illustration	Description / explanation
	Make sure to leave a clearance of 100 mm (3.93 in) above the top cover at the place of installation so that the LEDs are visible and the TEST button can be pressed.

4.12 Terminal diagrams

4.12.1 Power control board

Illustration 24 / ... / 115 / 230 PCB	Illustration 24 VDC circuit board
	

4.12.2 Control circuit board

Illustration	
	Voltage supply from the power control board not assigned External TEST button Solenoid valve

5. Transport and storage

WARNING	Insufficient qualification!
	Insufficient qualification of the personnel carrying out work on the product and accessories can lead to accidents, personal injury and damage to property as well as impair operation.
	• The work on the product and accessories described below may only be executed and documented by skilled personnel - transport and storage.

CAUTION	Inappropriate transport or storage!
 	Inappropriate transport or storage may result in personal injury or damage to the device.
	• Use personal protective equipment during all work with packaging material. • Handle packaging, the product and accessories carefully. • Pack all parts impact-proof using suitable material. • Transport and handle the packaging according to the markings (note lifting gear attachment points, the centre of gravity and alignment e.g. keep vertical, do not throw etc.). • Only use proper means of transport and lifting equipment that is in proper working order. • Always adhere to the permissible transport and storage parameters. • Store the product and accessories only outside of areas exposed to direct sunlight and heat sources.

NOTE	Handling packaging material!
	Inappropriate disposal of packaging materials can cause environmental damage.
	• Dispose of the packaging material in accordance with the applicable legal requirements and provisions of the country and place of use.

5.1 Transport

After transporting and removing the packaging material, inspect the product for possible transport damage. If you detect such damage, immediately notify the carrier company and **BEKO** TECHNOLOGIES or one of its agents.

Transport the product as follows:

- Only transport the product in its original packaging.
- Handle packaging and the product with care.
- Note the transport weight specification and marking on the packaging.
- Secure the packaging and the product against slipping and falling during transport.

5.2 Storage

Store the product and the accessories as follows:

- Adhere to the storage parameters in chapter “4.5 Storage and transport parameters” on Page 25.
- Store in a closed, dry as well as frost-free room.
- Store protected from external influences of the weather, direct sunlight and sources of heat.
- Secure against falling over and protect against vibrations at the storage location.

6. Assembly

6.1 Warning notices

DANGER	**Use of incorrect spare parts, accessories or materials!**
	The use of incorrect spare parts, accessories or materials, as well as auxiliary and operating materials, may result in death or serious injury. Malfunction and device failure as well as material damage can occur.
	• Only use undamaged original parts, auxiliary and operating materials which are specified by the manufacturer to complete all work. • Only use the materials approved for the respective application and suitable tools in proper working order. • Only use pipes that are free of dirt, damage and corrosion.

DANGER	**Pressurised system!**
	There is a danger of death or serious personal injury resulting from contact with fast or suddenly escaping fluids or through bursting system parts.
	• Before starting work, depressurise the pressurised system and secure it against unintentional pressurisation. • Set up a safety area around the working area during assembly, installation, maintenance and repair work. • Before pressurisation, check all system pipe connections for leak tightness and tighten if necessary. • Slowly pressurise the system. • Avoid pressure blows and high differential pressures. • Assemble all pipes free of mechanical stress. • Install the inlet lines and drain lines as fixed pipes.

WARNING	**Insufficient qualification!**
	Insufficient qualification of the personnel carrying out work on the product and accessories can lead to accidents, personal injury and damage to property as well as impair operation.
	• All work on the product and accessories may only be carried out by skilled technical personnel - pressure equipment and plants.

CAUTION	**Inappropriate assembly!**
	Inappropriate assembly of the product and the accessories can lead to personal injury and damage to property as well as impair operation.
	• Install the product, the accessories, and all parts and materials used so that they are not subject to mechanical tension. • Fix hoses in such a way that they do not flap around.

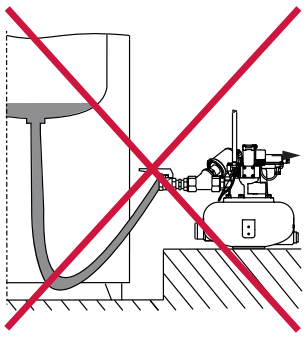
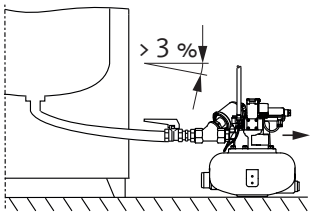
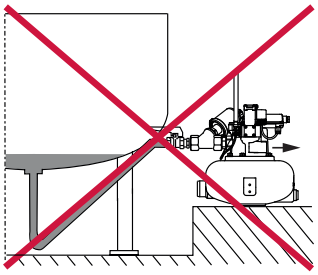
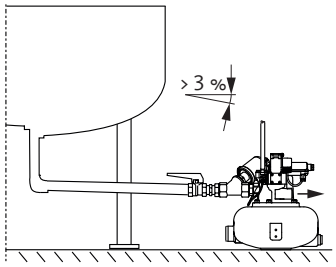
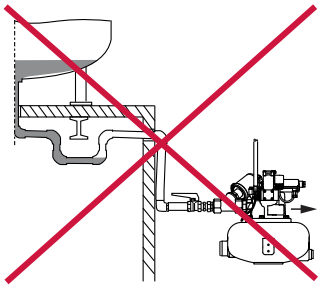
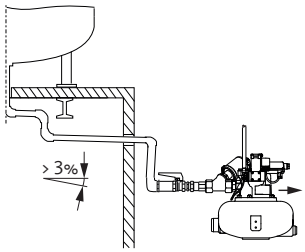
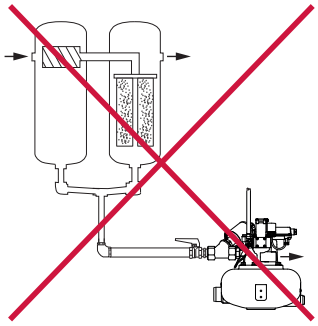
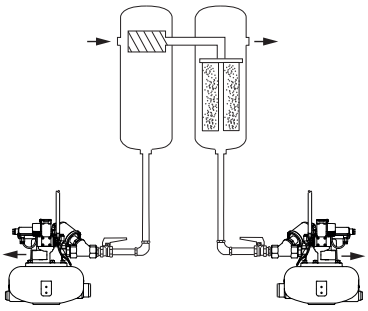
CAUTION	**Control medium penetrates the vacuum system during switching!**
	After every discharge operation, control medium will penetrate the vacuum system. This may result in problems in the process (e.g., potentially explosive gas mixtures being produced). These problems can lead to personal injury and damage to property, as well as impaired operation.
	• Make sure to use a control medium that will not affect process safety. • Use the **BEKOMAT®** for discharge only in vacuum systems in which the control medium will not cause any technical, process, or safety issues.

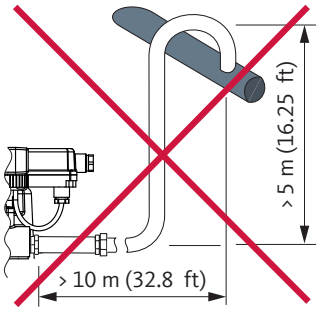
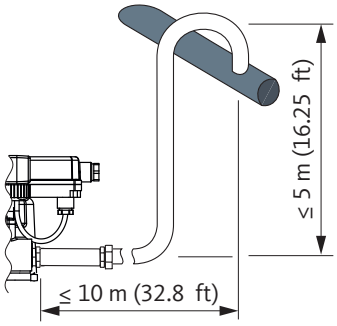
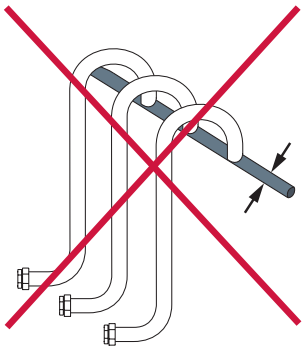
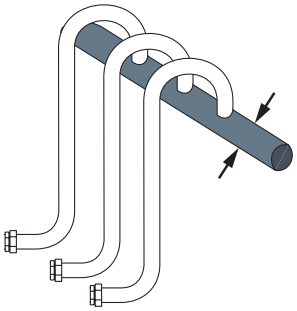
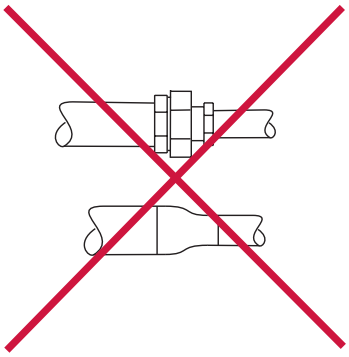
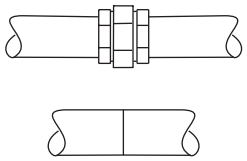
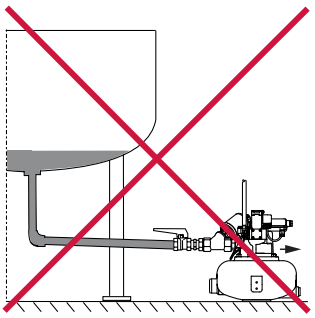
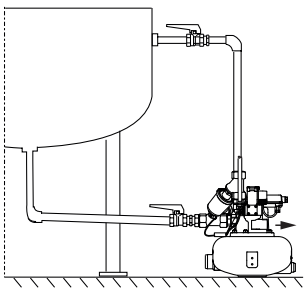
NOTE	**Excessively low control pressure!**
	Sufficient control pressure is required in order to be able to discharge condensate and operate the unit properly.
	• Set the control pressure as specified in the technical data.

NOTE	**Impaired membrane valve closing reliability!**
	If the minimum operating pressure is fallen below, the membrane valve will no longer be guaranteed to work correctly. In this case, fluids may enter the vacuum system through the condensate drain.
	• Make sure to use the **BEKOMAT®** exclusively in conformity with the specified technical data.

NOTE	**Draining malfunction!**
	Large amounts of condensate can have a negative effect on the collecting chamber vent. The resulting air pocket will prevent condensate from being discharged and negatively affect operation.
	• Install a venting line with a second externally operated incline seat valve.

6.2 Assembly conditions

Wrong	Right	Description / explanation
		**Continuous slope >3 % in hoses** • When using hoses as the inlet line, ensure a continuous slope >3 %. • Make sure that no water pockets form.
		**Continuous slope >3 % in pipes** • When installing the inlet line pipe, ensure a continuous slope >3 %. • Make sure that no water pockets form.
		**Continuous slope >3 % in pipes** • When installing the inlet line pipe, ensure a continuous slope >3 %. • Make sure that no water pockets form.
		**Bypassing filters** • Use a separate **BEKOMAT®** to drain condensate at each point where condensate originates. • Do not create filter bypasses.

Wrong	Right	Description / explanation
		**Drain line version** • Do not use shut-off valves in the drain line. • Connect the **BEKOMAT®** only with a hose to the drain line. → The hose compensates for assembly tolerances, vibrations and thermal expansion. • Do not install the drain line on storage or transportation surfaces. • The drain line may be a maximum of 10 m (32.8 ft) long and installed at a maximum of 5 m (16.25 ft) rise. → The minimum absolute operating pressure increases by 0.1 bar(a) (1.5 psi(a)) for each metre of incline.
		**Manifold design** • The cross-section of the manifold must be at least equal to the sum of the individual cross-sections of the connected inlet lines. • Route the manifold with a continuous slope >3%.
		**Maintain the minimum pipe diameter** • The minimum inside diameter of drain line is 13 mm (0.5 in). • Do not restrict or reduce the (minimum) pipe diameter with reducers (reducing nipple fittings).
		**Ensure venting** • In the event of insufficient slope in the inlet or other inlet problems, install a venting line with a second externally operated incline seat valve.

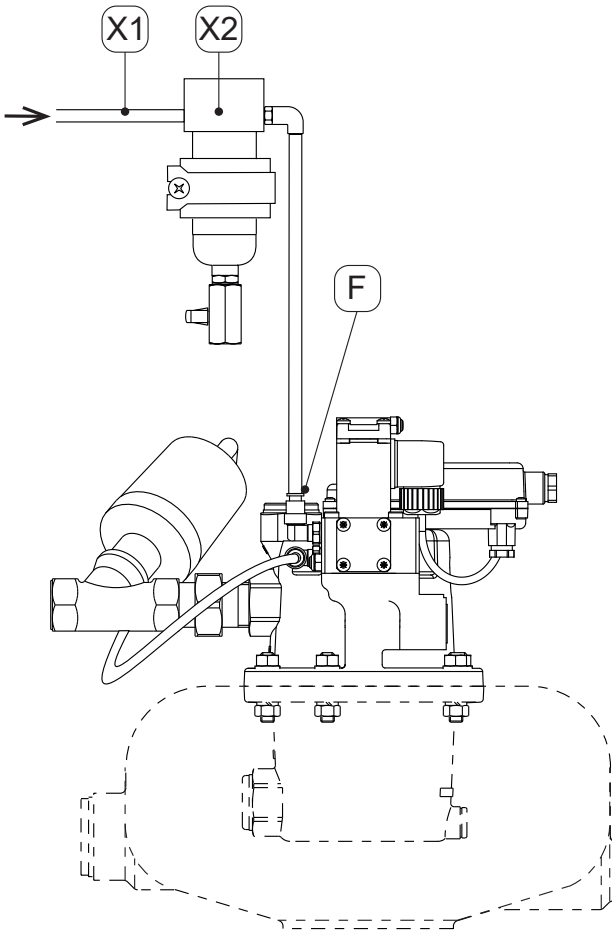
6.3 Assembly work

6.3.1 Control medium assembly

For assembly work to be carried out, the following prerequisites must be fulfilled and the preparatory tasks must have been completed.

Prerequisites		
Tools	**Material**	**Protective equipment**
• Combination wrench or adjustable wrench	• Sealants • Hose, outside diameter = 6 mm (0.24 in), approx. length of 30 cm (1 ft)	**Always to be worn:** 

Preparatory tasks	
1.	Depressurise the pressurised system or the respective system section and secure it against unintentional pressurisation.

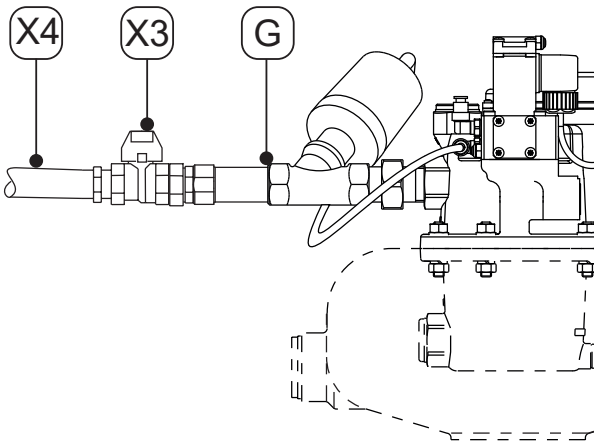
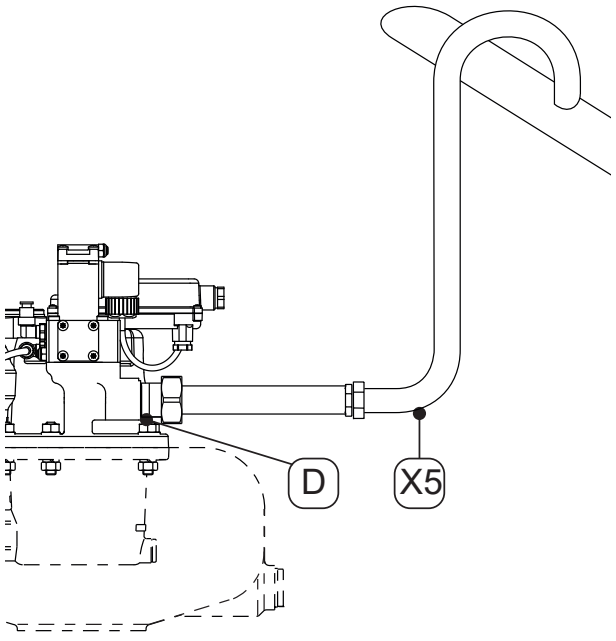
Assembly work	
Illustration	**Description / explanation**
	**Recommendation:** Install an air filter reducing station **[X2]** in the supply line for the control medium **[X1]**. 1. To do this, route an air hose to the recommended air filter reducing station **[X2]** and install it there. 2. Route the air hose from the recommended air filter reducing station **[X2]** to the control medium connector **[F]** and push it into the push-to-connect elbow fitting.

6.4 Assembly of the BEKOMAT®

For assembly work to be carried out, the following prerequisites must be fulfilled and the preparatory tasks must have been completed.

Prerequisites		
Tools	**Material**	**Protective equipment**
• Combination wrench or adjustable wrench	• Sealants e.g. PTFE • Inlet line and drain line	**Always to be worn:** 

Preparatory tasks	
1.	Depressurise the pressurised system or the respective system section and secure it against unintentional pressurisation.

Assembly work	
Illustration	**Description / explanation**
	**Recommendation:** To ensure that the product can be maintained, install a shut-off valve **[X3]** in the condensate inlet line **[X4]**. 1. For the condensate inlet line **[X4]**, apply sealant to the end of a high-pressure pipe and screw the end into the condensate inlet **[G]**.
	2. For the condensate discharge line **[X5]**, apply sealant to the end of a pressure-resistant pipe and screw it in at the condensate drain **[D]**.

7. Electrical installation

7.1 Warning notices

DANGER	**Use of incorrect spare parts, accessories or materials!**
	The use of incorrect spare parts, accessories or materials, as well as auxiliary and operating materials, may result in death or serious injury. Malfunction and device failure as well as material damage can occur.
	• Only use undamaged original parts, auxiliary and operating materials which are specified by the manufacturer to complete all work. • Only use the materials approved for the respective application and suitable tools in proper working order. • Only use electric components and materials that comply with regionally applicable specifications and regulations for electrical safety.

DANGER	**Electric voltage!**
	There is a danger of death or serious injuries as well as malfunction and device failure following contact with components which are in contact with electric voltage.
	• Only carry out installation, maintenance and repair work on the product and accessories when they have been disconnected and secured against being switched back on again unintentionally. • Set up a safety area around the working area during all installation and repair work. • Adhere to all applicable regulations (e.g. VDE 0100 / IEC 60364 / ATEX) during installation. • Connect the protective conductor (earth connection) according to regulations.

WARNING	**Insufficient qualification!**
	Insufficient qualification of the personnel carrying out work on the product and accessories can lead to accidents, personal injury and damage to property as well as impair operation.
	• All work on the product and the accessories may only be carried out by skilled technical personnel - electrical engineering.

CAUTION	**Inappropriate electrical installation!**
	Inappropriate electrical installation of the product and the accessories can lead to personal injury and damage to property as well as impair operation.
	• Check all plug-type connections for a correct fit. • Avoid stumbling hazard through appropriate cable routing. • Avoid mechanical strain on the cables.

CAUTION	**Requirement for the temperature resistance of the cables to be connected!**
	At the maximum ambient temperature, the temperature inside the electronics enclosure (cover) can reach temperatures higher than +60 °C (+140 °F) due to the heat produced by the electronics. Accordingly, make sure to only use cables which have a higher temperature resistance of at least +75° C (+167 °F) when working with ambient temperatures higher than +40 °C (+104 °F).

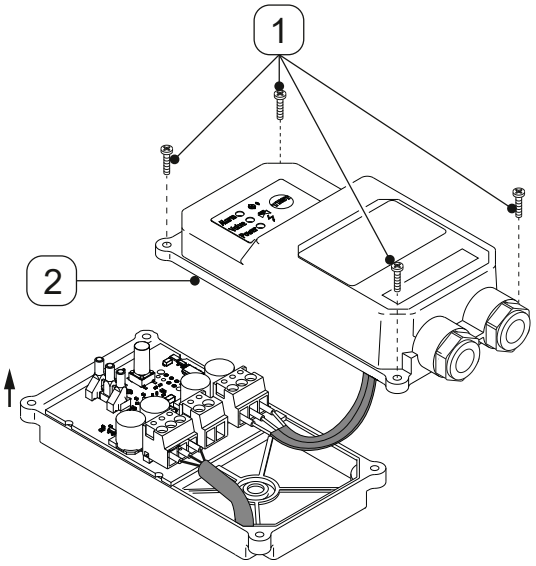
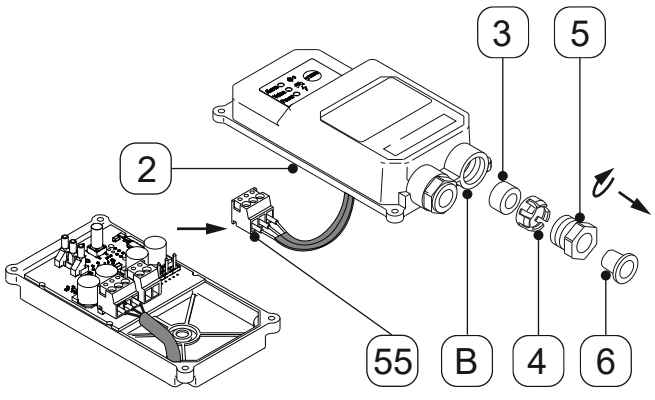
7.2 Connection work

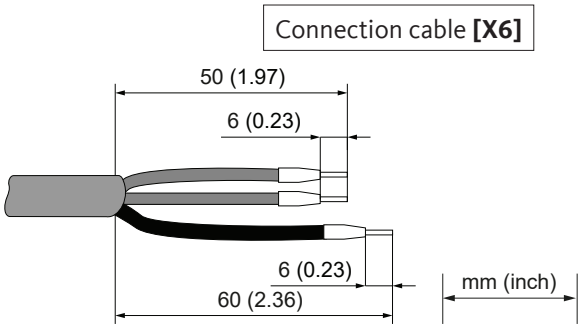
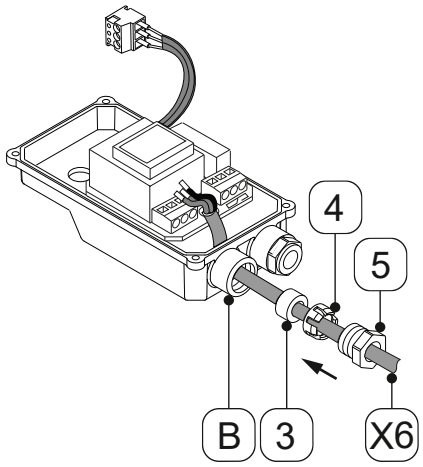
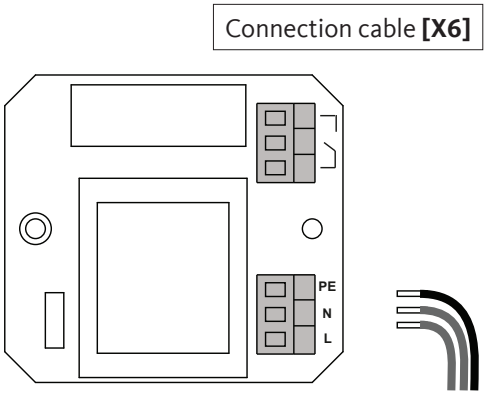
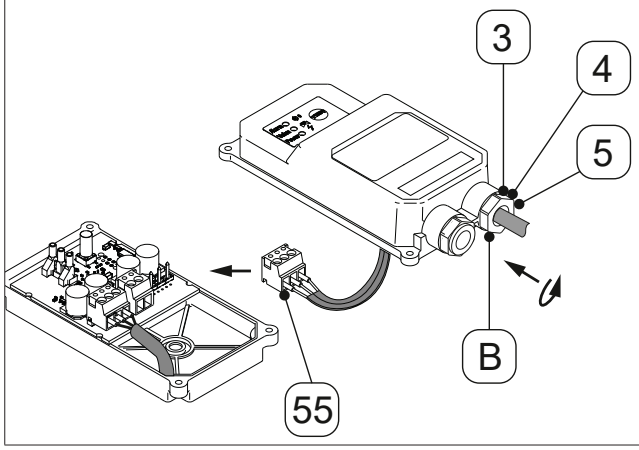
For connection work to be carried out, the following prerequisites must be fulfilled and the preparatory tasks must have been completed.

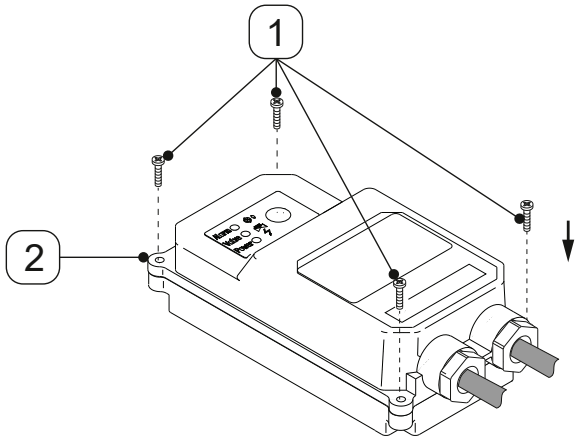
Prerequisites		
Tools	**Material**	**Protective equipment**
• Stripping tool • Crimping tool for wire-end ferrules • Screwdriver - cross-head size PZ2 • Screwdriver – flat head size 2.5 mm (0.09")	• 3-wire cable for voltage supply 230 V • 2-wire cable for voltage supply 24 V • 2-wire cable for external TEST button • 2/3-wire cable for dry contact (depending on the application) • Wire-end ferrules	**Always to be worn:** 

Preparatory tasks	
1.	Assembly is completed.

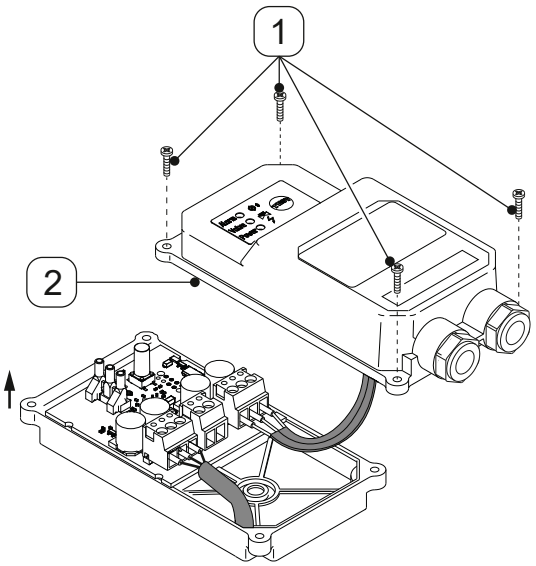
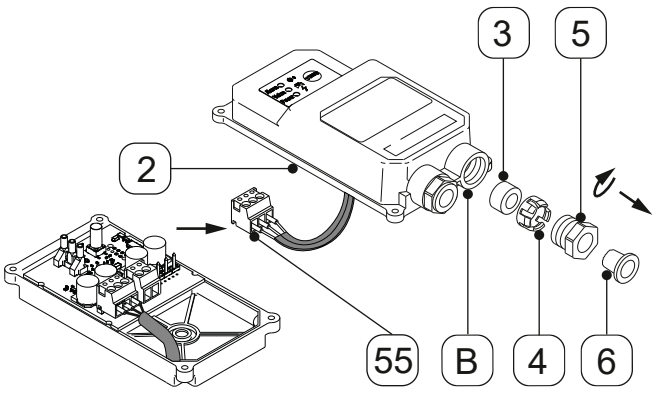
7.2.1 Connecting the 24/100/115/200/230 VAC power supply

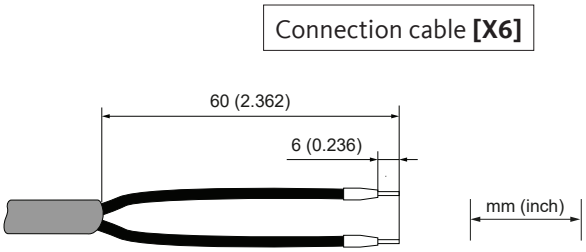
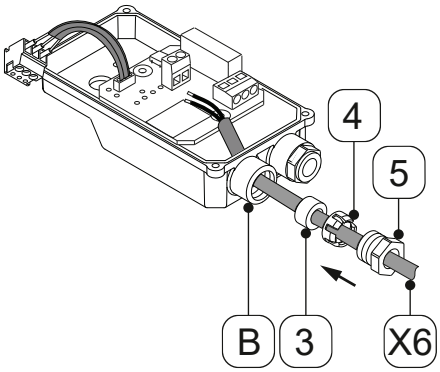
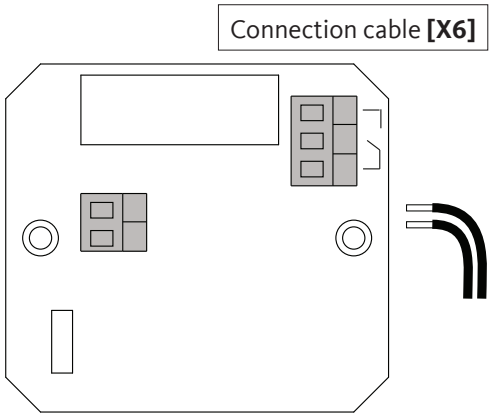
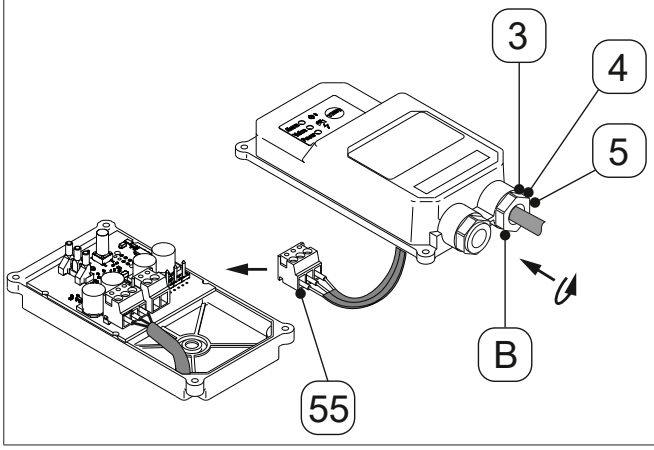
Connection work	
Illustration	**Description / explanation**
	1. Loosen the 4 screws **[1]**. 2. Lift the top cover **[2]**.
	3. Raise the top cover **[2]** slightly until the cable is mechanically tensioned and disconnect the terminal clamp **[55]**. 4. Remove the plug **[6]** and screw the cable gland components **[3, 4, 5]** off the right cable gland **[B]**.

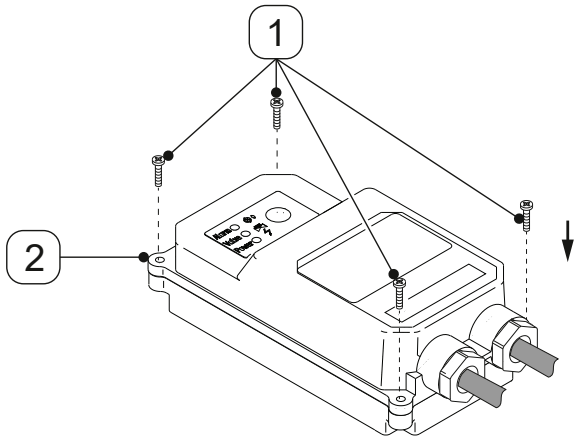
Connection work	
Illustration	**Description / explanation**
	5. Prepare the connection cable **[X6]**.
	6. Install the cable gland components **[3, 4, 5]** over the connection cable **[X6]**. 7. Insert the connection cable **[X6]** into the right cable gland **[B]**.
	8. Connect the connection cable **[X6]** as shown in the terminal diagram in section “4.12 Terminal diagrams” on Page 30.
	9. Screw the cable gland components **[3, 4, 5]** onto the right cable gland **[B]**. 10. Fit the screw terminal **[55]**.

Connection work	
Illustration	**Description / explanation**
	11. Set the top cover **[2]** in place and insert the screws **[1]**. 12. Tighten the screws **[1]** with a torque of 0.5 Nm +0.30 Nm (0.37 ft-lb +0.22 ft-lb).

7.2.2 Connecting the 24 VDC power supply

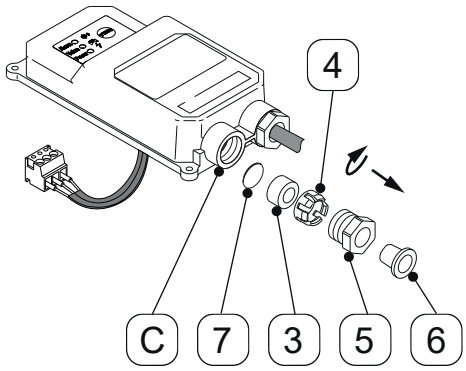
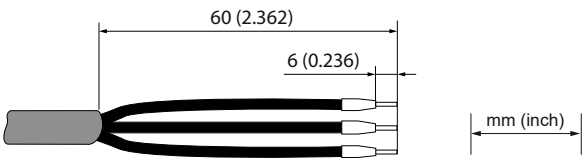
Connection work	
Illustration	**Description / explanation**
	1. Loosen the 4 screws **[1]**. 2. Lift the top cover **[2]**.
	3. Raise the top cover **[2]** slightly and pull the terminal clamp **[55]** off. 4. Remove the plug **[6]** and screw the cable gland components **[3, 4, 5]** off the right cable gland **[B]**.

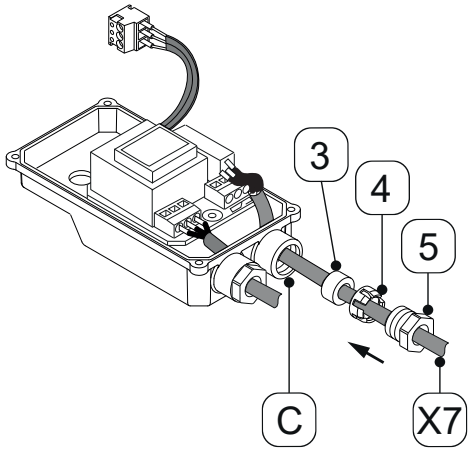
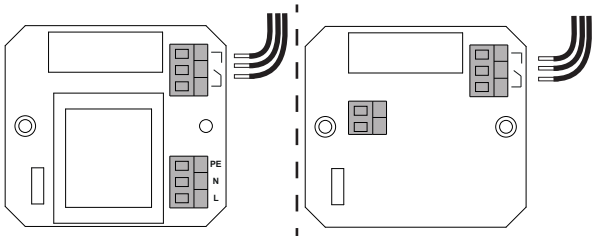
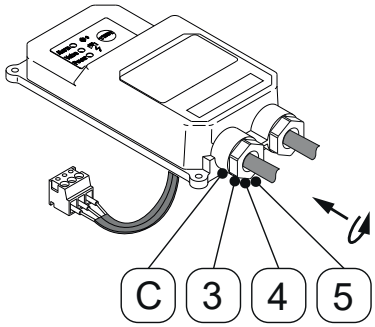
Connection work	
Illustration	**Description / explanation**
	5. Prepare the connection cable **[X6]**.
	6. Install the cable gland components **[3, 4, 5]** over the connection cable **[X6]**. 7. Insert the connection cable **[X6]** into the right cable gland **[B]**.
	8. Connect the connection cable **[X6]** as shown in the terminal diagram in section “4.12 Terminal diagrams” on Page 30.
	9. Screw the cable gland components **[3, 4, 5]** onto the right cable gland **[B]**. 10. Fit the screw terminal **[55]**.

Connection work	
Illustration	**Description / explanation**
	11. Set the top cover **[2]** in place and insert the screws **[1]**. 12. Tighten the screws **[1]** with a torque of 0.5 Nm +0.30 Nm (0.37 ft-lb +0.22 ft-lb).

7.2.3 Connecting the dry contact

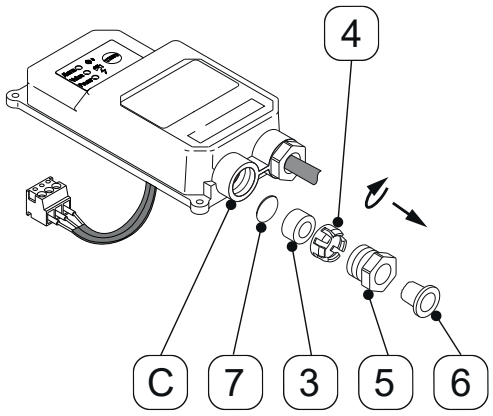
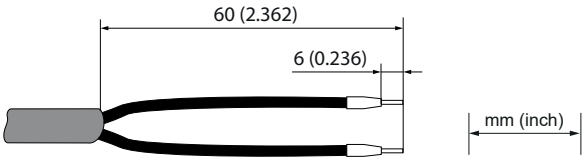
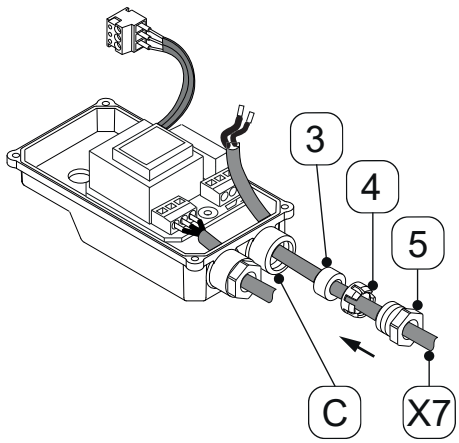
The **BEKOMAT®** has a potential-free contact on the power control board. It can be used to display a fault message at a remote maintenance centre.

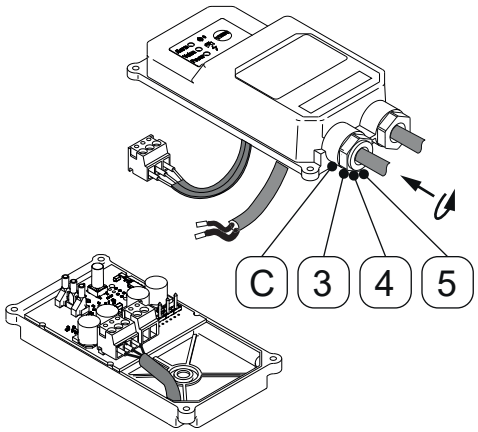
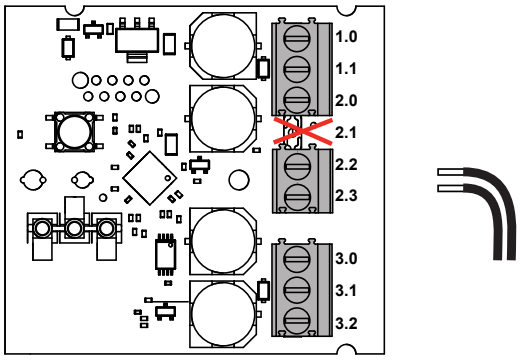
Connection work	
Illustration	**Description / explanation**
	1. Remove the plugs **[6]** and unscrew the cable gland components **[3, 4, 5]** from the left cable gland **[C]**. 2. Take the dust protection disc **[7]** out of the left cable gland **[C]**.
Connection cable **[X7]** 	**Recommendation:** 3. If the external TEST button is to be connected in addition to the dry contact, a 4/5-wire cable must be used for the connection (depending on the application). 4. Prepare the 2/3-wire cable for the dry contact **[X7]** (depending on the application).

Connection work	
Illustration	**Description / explanation**
	5. Install the components of the cable gland **[3, 4, 5]** over the cable for the dry contact **[X7]**. 6. Insert the cable for the dry contact **[X7]** into the left cable gland **[C]**.
Connection cable **[X7]** 	7. Connect the dry contact cable **[X7]** as shown in the terminal diagram in section “4.12 Terminal diagrams” on Page 30.
	8. Screw the cable gland components **[3, 4, 5]** onto the left cable gland **[C]**.

7.2.4 Connecting the external TEST button

The **BEKOMAT®** has an option for the connection of an external TEST button. This makes it possible for condensate to be discharged via remote control. If the external contact is closed, the solenoid valve opens like after pressing the TEST button on the top cover and the **BEKOMAT®** discharges condensate.

Connection work	
Illustration	**Description / explanation**
	1. Remove the plugs **[6]** and unscrew the cable gland components **[3, 4, 5]** from the left cable gland **[C]**. 2. Take the dust protection disc **[7]** out of the left cable gland **[C]**.
Connection cable **[X7]** 	**Recommendation:** 3. If the dry contact is to be connected in addition to the external TEST button, a 4/5-wire cable must be used for the connection (depending on the application). 4. Prepare the cable for the external TEST button **[X7]**.
	5. Slide the cable fitting components **[3, 4, 5]** over the external TEST button cable **[X7]**. 6. Insert the external TEST button cable **[X7]** through the left cable gland **[C]**.

Connection work	
Illustration	**Description / explanation**
	7. Screw the cable gland components **[3, 4, 5]** onto the left cable gland **[C]**.
Connection cable **[X7]** 	8. Connect the external TEST button cable **[X7]** as shown in the terminal diagram in section “4.12 Terminal diagrams” on Page 30.

8. Commissioning

8.1 Warning notices

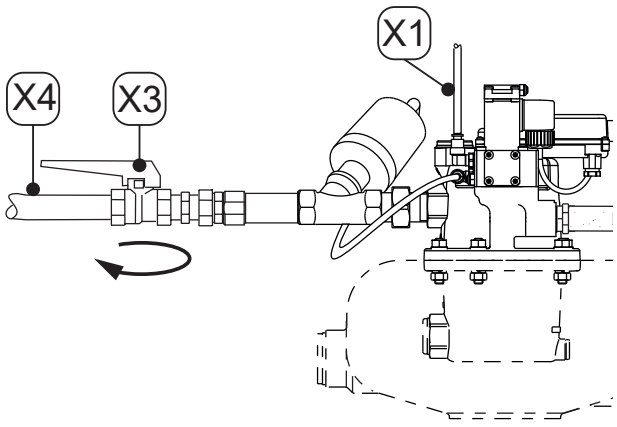
DANGER	Operation outside the permissible limit range!
	Operation of the product and accessories outside the permissible limits and operating parameters, unauthorised intervention and modifications may result in death or serious injury.
	• Adhere to the limits and operating parameters specified on the type plate and in the manual. • Check whether the operating parameters have been amended or restricted by the use of accessories.

DANGER	Pressurised system!
	There is a danger of death or serious personal injury resulting from contact with fast or suddenly escaping fluids or through bursting system parts.
	• Before pressurisation, check all system pipe connections for leak tightness and tighten if necessary. • Slowly pressurise the system. • Avoid pressure blows and high differential pressures.

DANGER	Electric voltage!
	There is a danger of death or serious injuries as well as malfunction and device failure following contact with components which are in contact with electric voltage.
	• Only operate the product with the cover complete and closed or the housing closed.

WARNING	Insufficient qualification!
	Insufficient qualification of the personnel carrying out work on the product and accessories can lead to accidents, personal injury and damage to property as well as impair operation.
	• All work on the product and accessories must be carried out exclusively by skilled technical personnel specializing in pressure equipment and plants and skilled technical personnel specializing in electrical equipment.

8.2 Commissioning work

Illustration	Description / explanation
	1. Connect the voltage supply. 2. Pressurise the control medium line **[X1]**. 3. Slowly pressurise the system (e.g., by slowly opening the recommended shut-off valve **[X3]** in the condensate inlet line **[X4]**). 4. Carry out a functional test (refer to section “10.3.2 Functional test” on Page 57).

9. Operation

9.1 Operating states

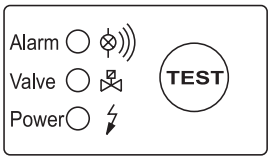
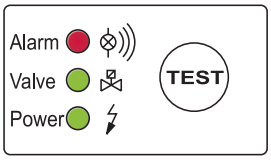
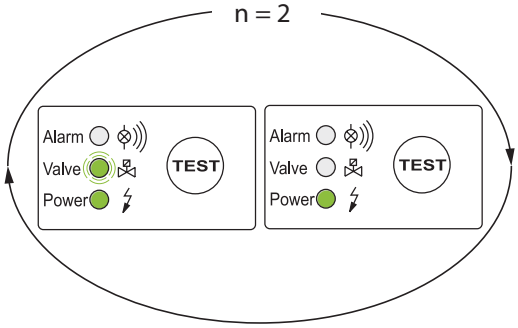
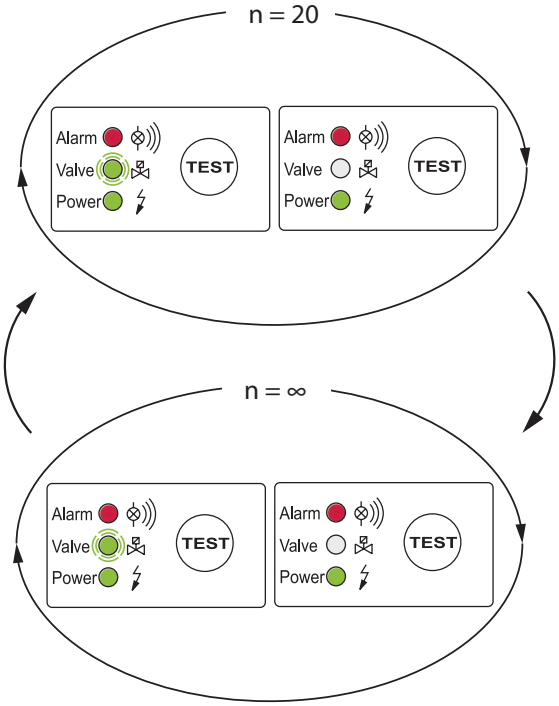
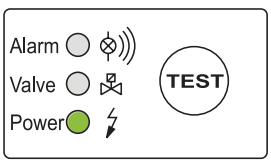
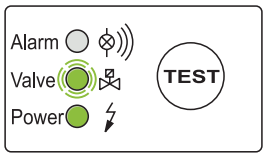
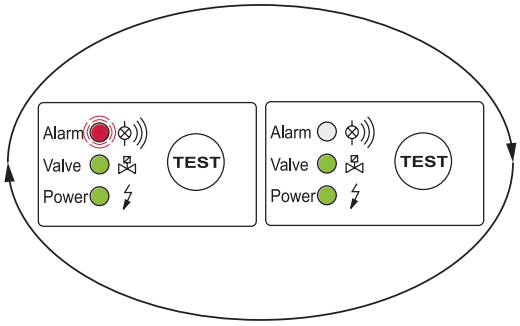
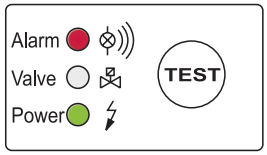
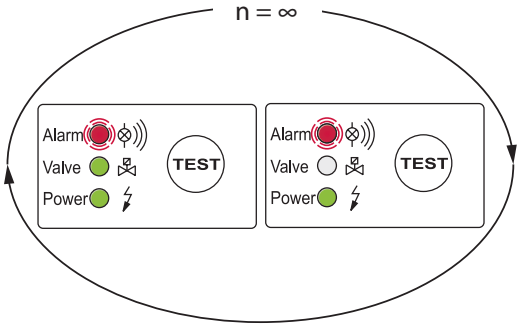
Illustration	Description / explanation
	**Disconnected** • All LEDs are off.
	**Switch on / power-on self-test** • All LEDs are on for 1 second. • The **BEKOMAT®** carries out a diagnosis of functionality.
	**Positive power-on self-test** **Number of repetitions n = 2x** • The red ALARM LED will be off. • The green VALVE LED will be on while the solenoid valve is cycling. • The green POWER LED is on. • The solenoid valve is cycling. → The **BEKOMAT®** switches to normal operation.
	**Negative power-on self-test** **Number of repetitions n = 20x** • The red ALARM LED will be on. • The green VALVE LED will be on while the solenoid valve is cycling. • The green POWER LED is on. • The solenoid valve is cycling. → The **BEKOMAT®** goes into fail-safe operation (continuously loop n = ∞). • The solenoid valve is cycling once per second.
	**Normal operation (readiness for operation)** • The red ALARM LED will be off. • The green VALVE LED is off. • The green POWER LED is on.

Illustration	Description / explanation
	**Discharge operation** **(TEST button pressed briefly)** • The red ALARM LED will be off. • The green VALVE LED will be on during the discharge operation. • The green POWER LED is on.
	**Alarm** **(TEST button pressed >1 minute and <5 minutes)** • The red ALARM LED will flash. • The green VALVE LED is on. • The green POWER LED is on.
	**Alarm** **(TEST button pressed >5 minutes)** • The red ALARM LED will be on. • The green VALVE LED is off. • The green POWER LED is on.
	**Alarm (condensate discharge is impaired)** • The red ALARM LED will flash. • The green POWER LED is on. • The green VALVE LED will be on when the solenoid valve is cycling. → The solenoid valve will cycle every 4 minutes. After the malfunction has been eliminated, the **BEKOMAT®** automatically switches to normal operation.

For more information about fault indications during operation, refer to section “15. Troubleshooting” on Page 69.

10. Maintenance

10.1 Warning notices

DANGER	**Pressurised system!**
	There is a danger of death or serious personal injury resulting from contact with fast or suddenly escaping fluids or through bursting system parts.
	• All maintenance and repair work on the system must be carried out in the depressurised state and with the system secured against unintentional pressurisation. • Set up a safety area around the working area during all maintenance and repair work. • Before pressurisation, check all system pipe connections for leak tightness and tighten if necessary. • Slowly pressurise the system. • Avoid pressure blows and high differential pressures. • Assemble all pipes free of mechanical stress. • Compensate any vibrations occurring in the pipe network by using vibration dampers. • Install the inlet lines and drain lines as fixed pipes.

DANGER	**Electric voltage!**
	There is a danger of death or serious injuries as well as malfunction and device failure following contact with components which are in contact with electric voltage.
	• Only carry out maintenance and repair work on the product when it has been disconnected and locked and tagged out. • Set up a safety area around the working area during all maintenance and repair work. • Only operate the product with the cover complete and closed or the housing closed.

DANGER	**Use of incorrect spare parts, accessories or materials!**
	The use of incorrect spare parts, accessories or materials, as well as auxiliary and operating materials, may result in death or serious injury. Malfunction and device failure as well as material damage can occur.
	• Only use undamaged original parts, auxiliary and operating materials which are specified by the manufacturer to complete all work. • Use only the approved materials and suitable tools for the respective purpose and make sure that they are in proper working order. • Only use cleaned pipes that are free of dirt and corrosion. • Only use electric components and materials that comply with regionally applicable specifications and regulations (standards, directives etc.) for electrical safety.

WARNING	**Insufficient qualification!**
	Insufficient qualification of the personnel carrying out work on the product and accessories can lead to accidents, personal injury and damage to property as well as impair operation.
	• All work on the product and the accessories may only be carried out by skilled technical personnel - customer service.

10.2 Maintenance schedule

Maintenance	Interval
Wear part replacement	Annually
Cleaning	Annually
Functional test	Monthly
Visual inspection	Weekly
Leakage test	After assembly and maintenance works on the product

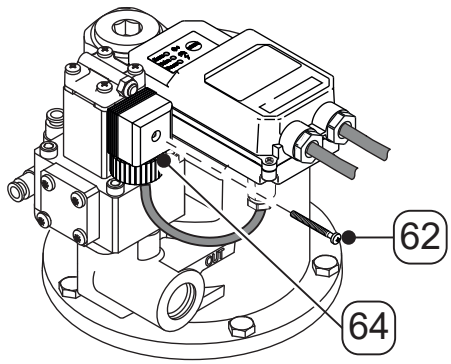
10.3 Maintenance work

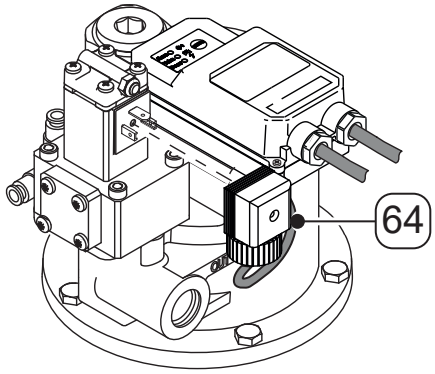
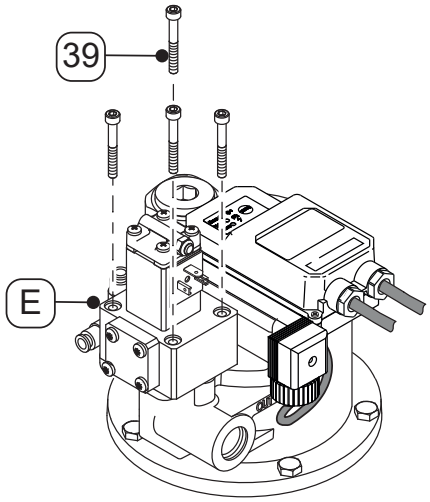
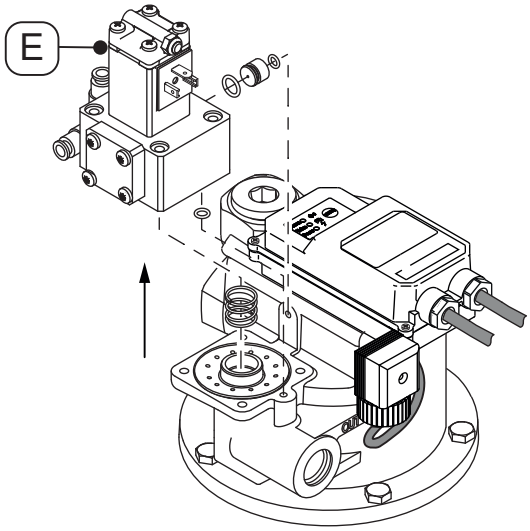
For maintenance work to be carried out, the following prerequisites must be fulfilled and the preparatory tasks must have been completed.

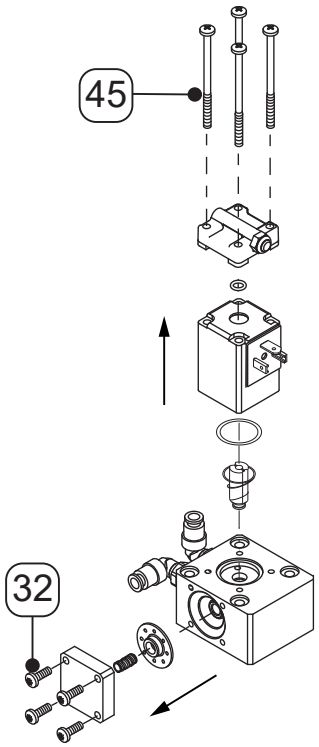
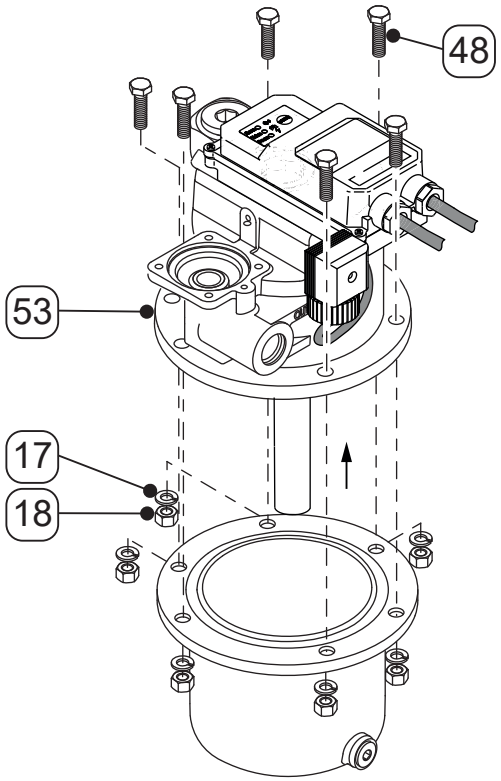
Prerequisites		
Tools	**Material**	**Protective equipment**
• Screwdriver - cross-head size PZ2 • Combination wrench or adjustable wrench	• Sealants e.g. PTFE • Suitable lubricant for greasing the O-rings • Mild cleaning agent • Cotton or disposable cloth	**Always to be worn:** 

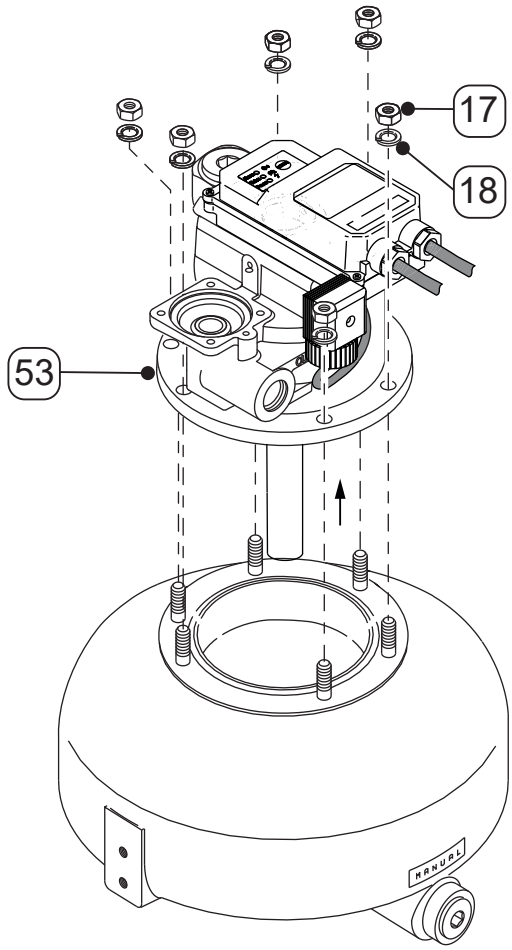
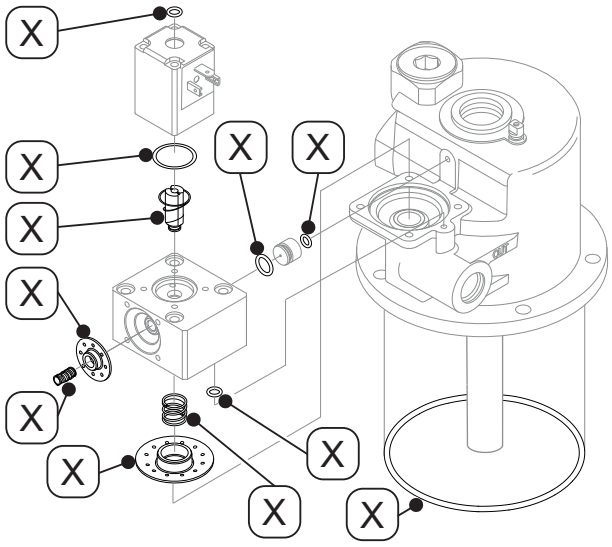
Preparatory tasks	
1.	Decommissioning and disassembly of the **BEKOMAT®** have been completed.

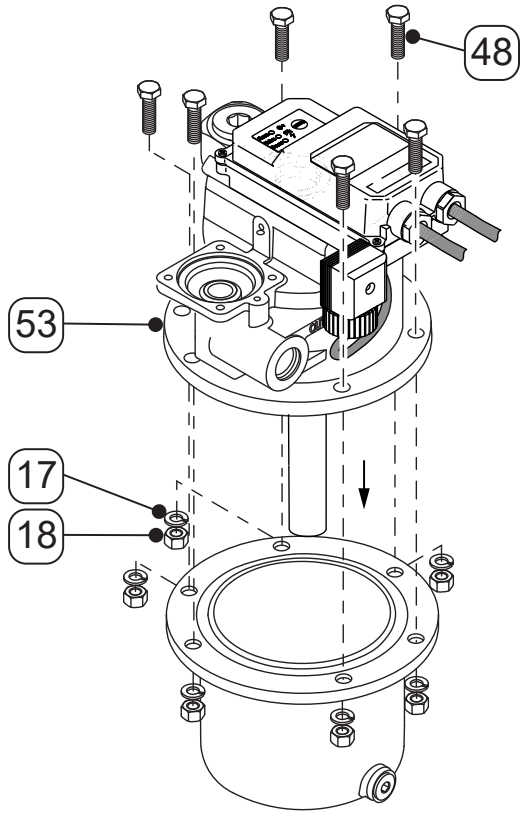
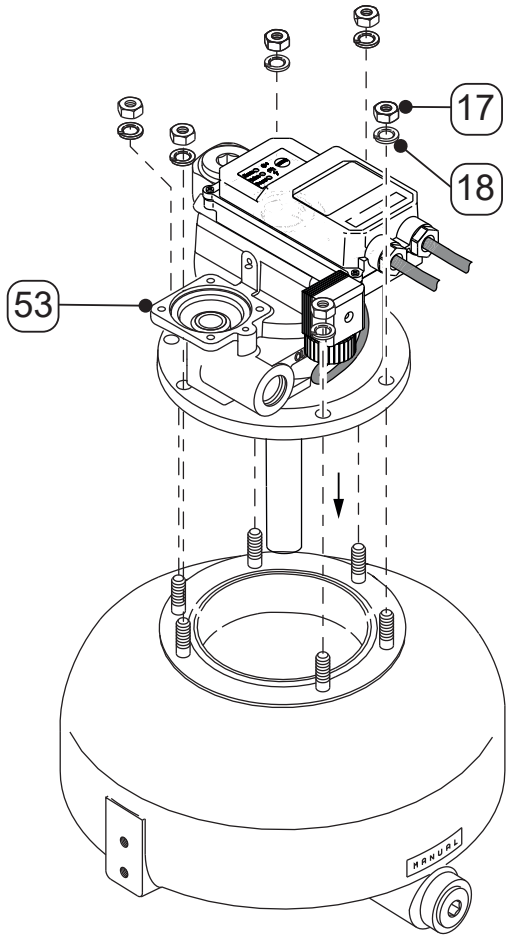
10.3.1 Wear part replacement

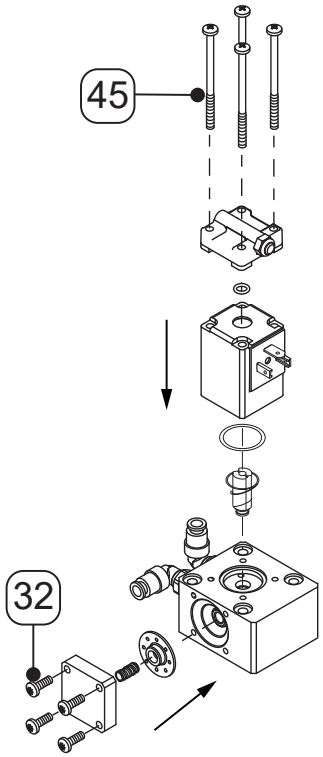
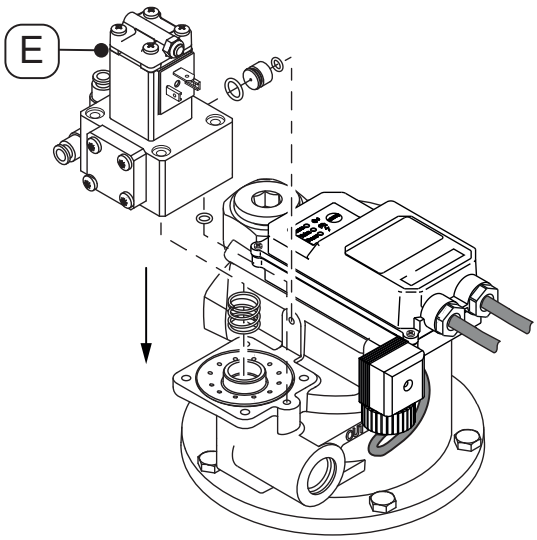
Wear part replacement	
Illustration	**Description / explanation**
	1. Loosen the screw **[62]** of the solenoid valve connector **[64]**.

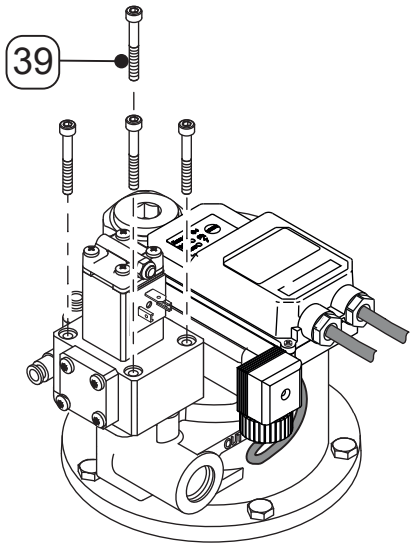
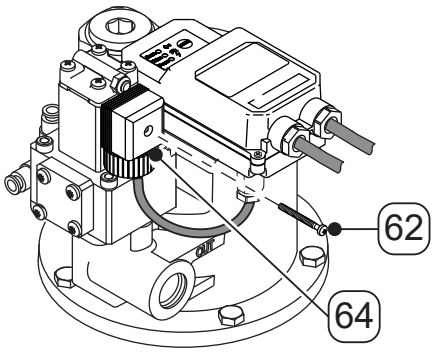
Wear part replacement	
Illustration	**Description / explanation**
	2. Pull the solenoid valve connector **[64]** off.
	3. Loosen the screws **[39]** from the valve unit **[E]**.
	4. Take the valve unit **[E]** off.

Wear part replacement	
Illustration	**Description / explanation**
	5. Unscrew the screws **[32, 45]** and take the valve unit apart.
	**BEKOMAT® 15 CO VACU** 6. Unscrew the screws **[48]** from the nuts **[18]** with the spring washers **[17]** and remove the upper section of the collecting tank **[53]**.

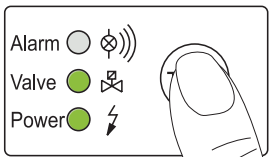
Wear part replacement	
Illustration	**Description / explanation**
	**BEKOMAT® 16 CO VACU** 7. Unscrew the nuts **[17]** with the spring washers **[18]** and remove the upper section of the collecting tank **[53]**.
	8. Replace all the components in the set of wear parts **[X]**. 9. Grease the O-rings in the set of wear parts.

Wear part replacement	
Illustration	**Description / explanation**
	10. Set the upper section of the collecting tank **[53]** back in place and use the screws **[48]** to tightly fasten it in place with the nuts **[18]** and spring washers **[17]**. 11. Tighten the screws **[48]** with a torque of 20 Nm ±5 Nm (14.75 ft-lb ±3.69 ft-lb).
	12. Set the upper section of the collecting tank **[53]** back in place and use the nuts **[17]** and spring washers **[18]** to screw it tightly in place. 13. Tighten the nuts **[17]** with a torque of 20 Nm ±5 Nm (14.75 ft-lb ±3.69 ft-lb).

Wear part replacement	
Illustration	**Description / explanation**
	14. Re-assemble the solenoid valve as shown in the illustration and tighten it in place using the screws **[32, 45]**. 15. Tighten the screws **[32]** with a torque of 2.5 Nm ±0.5 Nm (1.84 ft-lb ±0.37 ft-lb). 16. Tighten the screws **[45]** with a torque of 1.5 Nm +0.5 Nm (1.11 ft-lb +0.37 ft-lb).
	17. Place the valve unit **[E]** back on the membrane cap.

Wear part replacement	
Illustration	**Description / explanation**
	18. Screw the valve unit **[E]** using the screws **[39]**. 19. Tighten the screws **[39]** with a torque of 1.5 Nm +0.5 Nm (1.11 ft-lb +0.37 ft-lb).
	20. Fit the solenoid valve connector **[64]** and screw it tight using the screw **[62]**. 21. Tighten the screw **[62]** with a torque of 1 Nm +0.2 Nm (0.74 ft-lb +0.15 ft-lb).

10.3.2 Functional test

Illustration	Description / explanation
	1. Press the TEST button for 2 ... 5 seconds. • The red ALARM LED is off. • The green VALVE LED is on. • The green POWER LED is on. → The valve opens and condensate is drained.

10.3.3 Visual inspection

During the visual inspection of the **BEKOMAT®**, inspect all components for mechanical damage and corrosion. Replace damaged components immediately.

10.3.4 Leakage test

The leakage test is a non-destructive test method and is used to prove leak tightness in vacuum and overpressure systems. The leakage test can be carried out in different ways. **BEKO** TECHNOLOGIES does not recommend any specific method over another. The selection and determination of the test procedure is the responsibility of the company operating the pressurized system and must be carried out in conformity with the applicable standards and guidelines (e.g., DIN EN 1779).

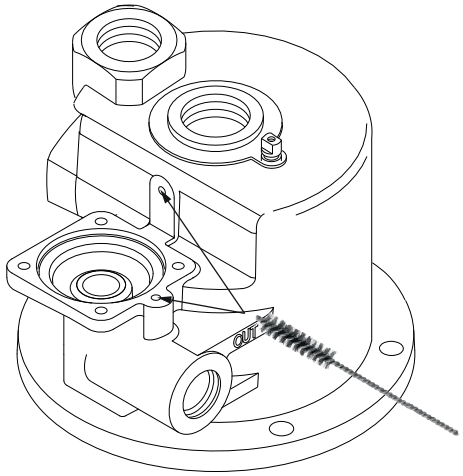
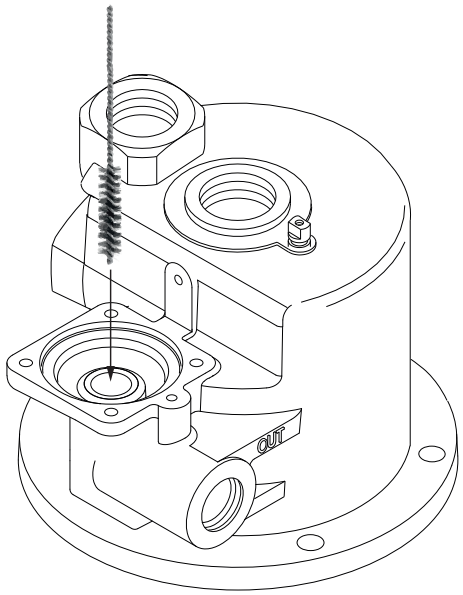
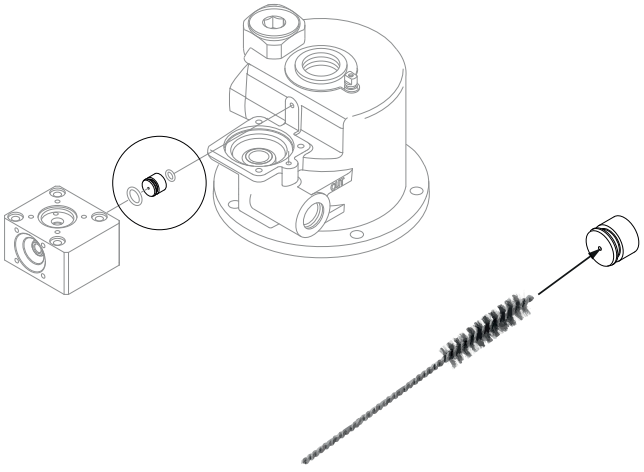
10.3.5 Cleaning

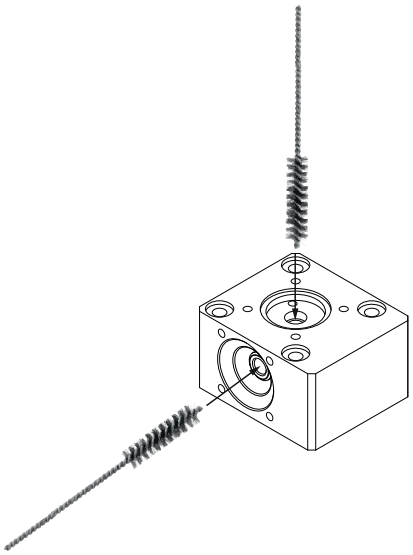
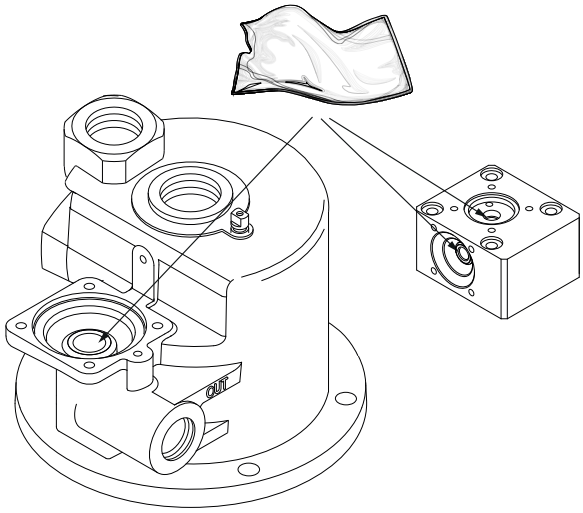
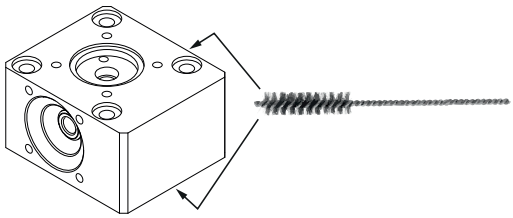
CAUTION	**Inappropriate cleaning and use of the wrong cleaning media!**
	Inappropriate cleaning and the use of the wrong cleaning media may result in minor injuries as well as damage to health and damage to property.
	• Never clean the device with a dripping wet cloth. • Never use abrasive or aggressive cleaning agent or solvents which could damage the outer coating (e.g. markings, type plate, corrosion protection, etc.). • Never clean the device with hard or pointed implements. • Use an anti-static, damp cloth for cleaning the outside. • Immediately replace any product markings (pictograms, markings) that have become illegible.

NOTE	**Local hygiene regulations!**
	In addition to the cleaning instructions listed, any regionally applicable hygiene regulations must be observed.

Prerequisites		
Tools	**Material**	**Protective equipment**
• Cleaning brush	• Mild cleaning agent • Cotton or disposable cloth	**Always to be worn:** 

Preparatory tasks	
1.	Decommissioning and disassembly of the **BEKOMAT®** have been completed.
2.	The **BEKOMAT®** is disassembled.

Cleaning work	
Illustration	**Description / explanation**
	2. Spray mild cleaning agent onto a cotton cloth or disposable tissue until it is damp (not wet). Wipe the surfaces of the **BEKOMAT®** with the damp cloth. 3. Clean the control-air bore and the condensate drain bore using a cleaning brush Ø max. = 2.5 mm (0.09").
	4. Clean the membrane seat using a cleaning brush Ø max. = 2.5 mm (0.09").
	5. Clean the vent using a cleaning brush with a max. diameter = 2.5 mm (0.09").

Cleaning work	
Illustration	**Description / explanation**
	6. Clean the membrane cap using a cleaning brush with a max. diameter = 1.5 mm (0.05").
	7. Wipe the membrane seat and the membrane cap down using a clean cloth without cleaning agent.
	8. Clean the membrane cap using a cleaning brush Ø max. = 2.5 mm (0.09").

Concluding work	
1.	Reassemble the **BEKOMAT®**.
2.	Install the **BEKOMAT®** (refer to “6. Assembly” on Page 32).
3.	Put the **BEKOMAT®** into operation (see “8. Commissioning” on Page 47).

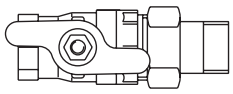
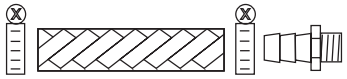
11. Consumables, accessories and spare parts

11.1 Order information

Please make sure to provide **BEKO** TECHNOLOGIES Service with the following information when submitting an inquiry or placing an order:

- Serial number (see type plate)
- Material number and designation of the accessory or spare part
- Required quantity of accessories or spare parts to be delivered

11.2 Accessories

Illustration	Description	Part number
	Connection set	
	BEKOMAT® 15 CO VACU	2000043
	BEKOMAT® 16 CO VACU	2000044
	Drain kit	2000046

11.3 Spare parts

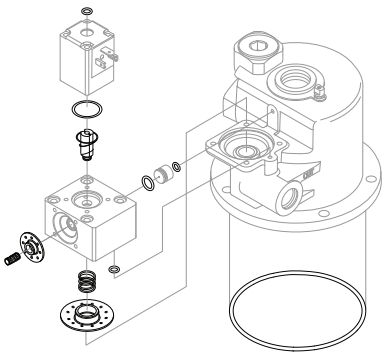
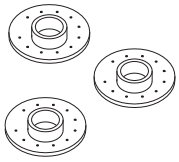
Illustration	Description	Part number
	Set of wear parts	4054440
	Membranes, 3 units	4053197

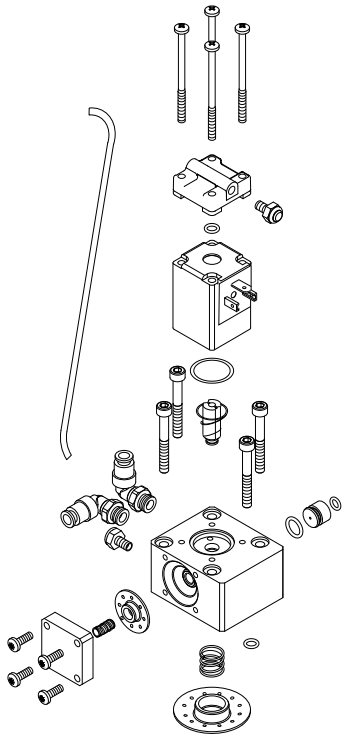
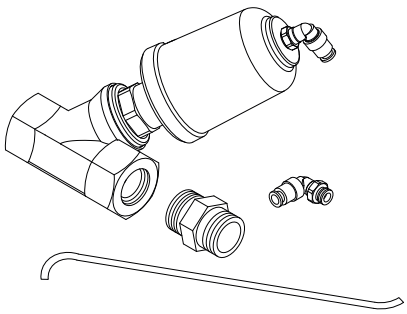
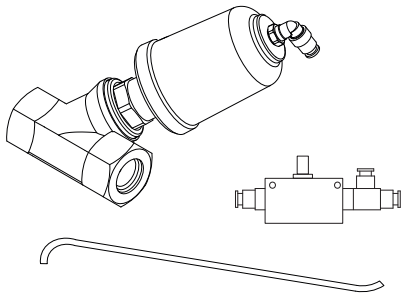
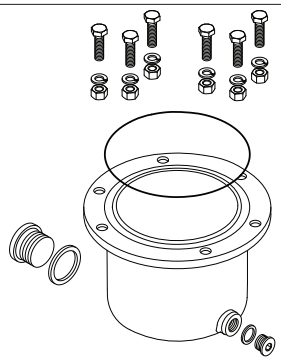
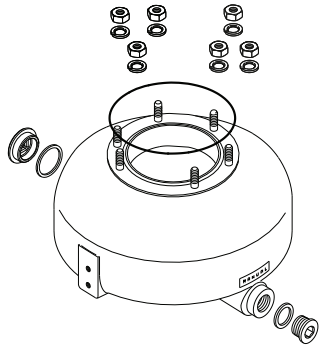
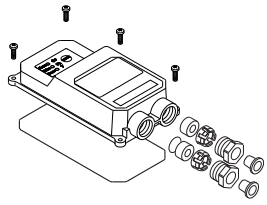
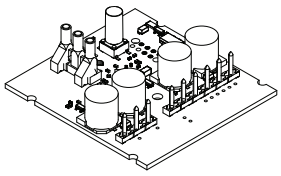
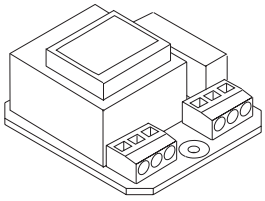
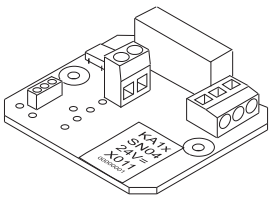
Illustration	Description	Part number
	Valve unit	4054812
	Incline seat valve	2001432
	Additional incline seat valve with special control	4005814
	Housing **BEKOMAT® 15 CO VACU**	2800675

Illustration	Description	Part number
	Housing **BEKOMAT® 16 CO VACU**	2000092
	Top cover	2000066
	Control circuit board	
	BEKOMAT® 15 CO VACU	4048019
	BEKOMAT® 16 CO VACU	4047969
	Power control board 230 VAC	2000063
	Power control board 200 VAC	2000349
	Power control board 115 VAC	2000064
	Power control board 100 VAC	2000611
	Power control board 24 VAC	2000065
	Power control board 24 VDC	2000756

12. Decommissioning

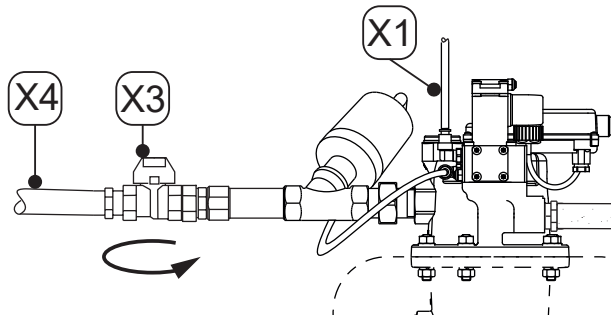
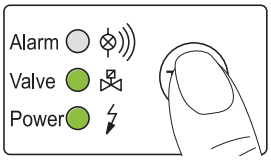
12.1 Warning notices

DANGER	Pressurised system!
	There is a danger of death or serious personal injury resulting from contact with fast or suddenly escaping fluids or through bursting system parts.
	• All work on the system must be carried out in the depressurised state and with the system secured against unintentional pressurisation. • Set up a safety area around the working area during all maintenance and repair work.

DANGER	Electric voltage!
	There is a danger of death or serious injuries, as well as malfunction and device failure, following contact with energized components.
	• Only carry out maintenance and repair work on the product when it has been disconnected and locked and tagged out. • Set up a safety area around the working area during all maintenance and repair work.

WARNING	Insufficient qualification!
	Insufficient qualification of the personnel carrying out work on the product and accessories can lead to accidents, personal injury and damage to property as well as impair operation.
	• All work on the product and the accessories may only be carried out by skilled technical personnel - customer service.

12.2 Decommissioning work

Illustration	Description / explanation
	1. Cut off the condensate feed and close the condensate inlet line **[X4]**. (e.g. close the recommended shut-off valve **[X3]**).
	2. Press the TEST button briefly multiple times. → The pressure in the **BEKOMAT®** will be relieved. → The remaining condensate in the **BEKOMAT®** will be drained. 3. Depressurise the control medium line **[X1]** (see illustration above). 4. Disconnect the **BEKOMAT®** from the voltage supply and de-energize it.

13. Disassembly

13.1 Warning notices

DANGER	Pressurised system!
	There is a danger of death or serious personal injury resulting from contact with fast or suddenly escaping fluids or through bursting system parts.
	• All work on the system must be carried out in the depressurised state and with the system secured against unintentional pressurisation. • Set up a safety area around the working area during all maintenance and repair work.

DANGER	Electric voltage!
	There is a danger of death or serious injuries, as well as malfunction and device failure, following contact with energized components.
	• Only carry out maintenance and repair work on the product when it has been disconnected and locked and tagged out. • Set up a safety area around the working area during all maintenance and repair work.

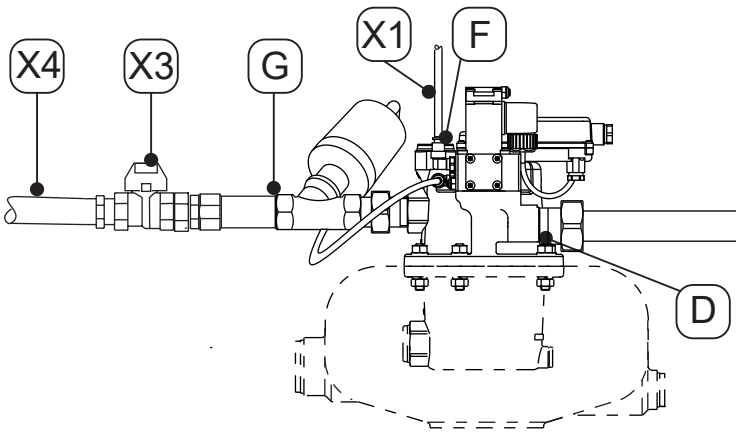
WARNING	Insufficient qualification!
	Insufficient qualification of the personnel carrying out work on the product and accessories can lead to accidents, personal injury and damage to property as well as impair operation.
	• All work on the product and the accessories may only be carried out by skilled technical personnel - customer service.

13.2 Disassembly work

For disassembly work to be carried out, the following prerequisites must be fulfilled and the preparatory tasks must have been completed.

Prerequisites		
Tools	**Material**	**Protective equipment**
• Combination wrench or adjustable wrench	• No material necessary	**Always to be worn:** 

Preparatory tasks	
1.	Decommissioning has been completed.
2.	Depressurise the pressurised system or the respective system section and secure it against unintentional pressurisation.

Disassembly work	
Illustration	**Description / explanation**
	1. Remove the pipe from the condensate drain **[D]**. 2. Remove the condensate inlet line **[X4]** and the recommended shut-off valve **[X3]** from the condensate inlet **[G]**. 3. Disconnect the control medium line **[X1]** from the control medium connector **[F]**. 4. Disassemble all power supplies.

Concluding work	
1.	Clean the components of condensate residue (refer to section “10.3.5 Cleaning” on Page 58).

14. Disposal

At the end of their useful life the product and the accessories must be sent for disposal e.g. by a specialist company. Materials such as glass, plastics and some chemical compounds are mostly recoverable, reusable or recyclable.

14.1 Warning notices

NOTE	Inappropriate disposal!
	Inappropriate disposal of parts, components, operating and auxiliary materials as well as cleaning media can cause environmental damage.
	• Dispose of all components, parts, operating and auxiliary materials as well as cleaning media professionally and in accordance with all locally applicable regulations and standards. • Dispose of electrical and electronic components through a specialized disposal company or return them to **BEKO** TECHNOLOGIES. • In case of doubt, consult a regional disposal company before disposal.

INFORMATION	Disposal of electrical and electronic equipment
	Electrical and electronic equipment (EEE) contains materials, components and substances which can be dangerous and harmful to human health and the environment if the waste from electrical and electronic equipment (WEEE) is not disposed of properly. Electrical and electronic equipment are marked by the crossed out rubbish bin. The crossed-out rubbish bin symbolises that electrical and electronic equipment must be collected separately and must not be disposed of together with unsorted household waste. For additional information regarding locally applicable laws and regulations concerning recycling electrical and electronic products, contact your local disposal companies or the responsible municipal authority.

14.2 Disposal of operating and auxiliary materials

Operating material / auxiliary material	EU waste code
Adsorption materials, filter materials, cleaning wipes and protective clothing - contaminated by oils or other hazardous substances	15 02 02
Adsorption materials, filter materials, cleaning wipes and protective clothing - with the exception of those classified by 15 02 02	15 02 03
Packaging - paper and cardboard	15 01 01
Packaging - plastic material	15 01 02
Waste oil - mineral	13 02 05
Waste oil - synthetic	13 02 06

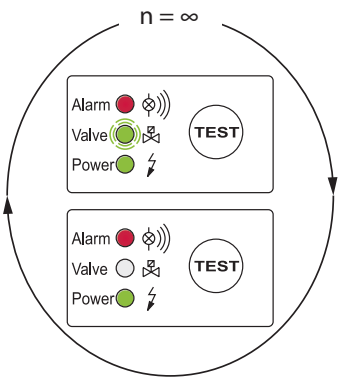
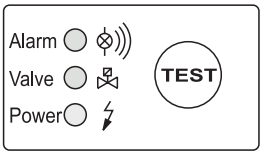
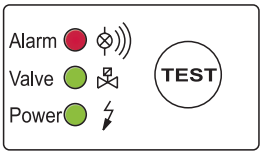
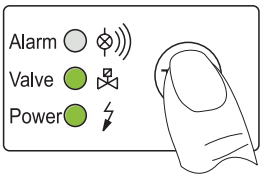
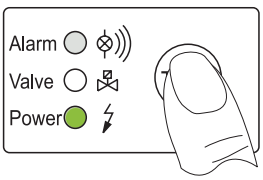
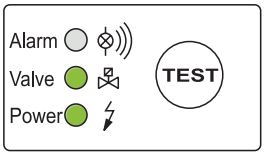
14.3 Disposal of components

Ensure the following prerequisites are met before disposal:

Prerequisites	
1.	The product and the accessories have been decommissioned and disassembled.
2.	The product and the accessories have been cleaned and any fluid residue has been removed from them.

Components	EU waste code
Electric and electronic devices with the exception of those covered by 20 01 21, 20 01 23 and 20 01 35	20 01 36
Plastic material	20 01 39
Metals	20 01 40

15. Troubleshooting

Error or fault pattern	Possible causes	Troubleshooting
	• Negative power-on self-test. ➝ The electronics unit is defective.	• Contact **BEKO** TECHNOLOGIES Service.
	• All LEDs are off.	• Read off the operating voltage on the type plate and check it. • Check whether there is voltage being applied to the power supply board terminals (PE, L, N). • Check the connection terminals on the power supply board.
	• All LEDs are on continuously.	• Disconnect the product from the voltage supply and reconnect after >5 seconds. • Inspect the circuit board for potential damage.
	• No condensate is drained after pressing the TEST button.	• Check the inlet line line and the drain line. • Check the valve function by pressing the TEST button. ➝ Valve switching can be heard clearly (clicking sound). • Replace wear parts. • Check the connection terminals on the control circuit board.
	• Condensate is only drained when the TEST button is pressed.	• Install the inlet line at a slope >3 %. • Check whether the necessary minimum pressure is reached (refer to section “4. Technical data” on Page 24). • Clean the rising pipe. • Replace wear parts. • Check whether the required minimum pressure is being reached.
	• The **BEKOMAT®** is draining continuously without stopping.	• Clean the complete valve unit. • Clean the sensor tube. • Replace wear parts.

16. Appendices

16.1 Certifications and declarations of conformity

Symbol	Description / explanation
CE	**CE marking** The CE marking indicates that a product fulfils all the EU regulations applicable to the product and that all basic safety and health requirements were met during its production. The product may be sold on the European market.
FC	**FCC marking** The FCC marking indicates that a product fulfils the requirements of the Federal Communications Commission (FCC) and that all basic safety and health requirements were met during its production. The product may be sold on the US market.
TÜVRheinland c us	**cTÜVus marking** The cTÜVus marking indicates that a product fulfils the requirements of TÜV Rhineland for the Canadian and US markets and that all basic safety and health requirements were met during its production. The product may be sold on the Canadian and US markets.
	WEEE marking The crossed out rubbish bin marks an electrical or electronic product that must not be disposed of with domestic waste at the end of its service life. Free collecting points for used electrical equipment as well as further acceptance points for reuse of the products are available for them to be returned. Addresses can be obtained from the local authorities.

16.2 Declaration of Conformity

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Im Taubental 7
41468 Neuss

GERMANY

Tel: +49 2131 988-0
www.beko-technologies.com

EU-Konformitätserklärung

Wir erklären hiermit, dass das nachfolgend bezeichnete Produkt den Anforderungen der einschlägigen Richtlinien und technischen Normen entspricht. Diese Erklärung bezieht sich nur auf das Produkt in dem Zustand, in dem das Produkt in Verkehr gebracht wurde. Nicht vom Hersteller angebrachte Teile und/oder nachträglich vorgenommene Eingriffe bleiben unberücksichtigt.

Produktbezeichnung:	Kondensatableiter
Modelle:	BEKOMAT® 15 CO VACU, 16 CO VACU
Spannungsvarianten:	24 VDC, 24 VAC, 100 VAC, 115 VAC, 200 VAC, 230 VAC
Max. Betriebsdruck:	1,8 bar(a)
Max. Steuergasdruck:	8 bar(a)
Produktbeschreibung und Funktion:	Kondensatableiter zur elektronisch niveaugeregelten Ableitung von Kondensat aus Unterdrucksystemen (Vakuumanlagen) und drucklosen Systemen.

Niederspannungs-Richtlinie 2014/35/EU
Angewandte harmonisierte Normen: EN 61010-1: 2010/A1:2019/AC:2019-04

Die Geräte mit einer Betriebsspannung von 24 ... 48 VAC und 18 ... 72 VDC fallen nicht in den Anwendungsbereich der Niederspannungs-Richtlinie.

EMV-Richtlinie 2014/30/EU
Angewandte harmonisierte Normen: EN 61326 1:2013

ROHS II-Richtlinie 2011/65/EU
Die Vorschriften der Richtlinie 2011/65/EU zur Beschränkung der Verwendung bestimmter gefährlicher Stoffe in Elektro- und Elektronikgeräten werden erfüllt.

Der Hersteller trägt die alleinige Verantwortung für die Ausstellung dieser Konformitätserklärung.

Unterzeichnet für und im Namen von:

Neuss, 10.01.2021

BEKO TECHNOLOGIES GMBH

i.V. Christian Riedel
Leiter Qualitätsmanagement International

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EU Declaration of Conformity

We hereby declare that the product named below complies with the stipulations of the relevant directives and technical standards. This declaration only refers to the product in the condition in which it has been placed into circulation. Parts which have not been installed by the manufacturer and/or modifications which have been implemented subsequently remain unconsidered.

Product designation:	Condensate drain
Types:	BEKOMAT® 15 CO VACU, 16 CO VACU
Supply voltage versions:	24 VDC, 24 VAC, 100 VAC, 115 VAC, 200 VAC, 230 VAC
Max. operating pressure:	1.8 bar(a)
Max. control gas pressure:	8 bar(a)
Product description and function:	Condensate drain for electronically level-controlled discharge of condensate out of negative pressure systems (vacuum systems) and pressureless systems.

Low Voltage Directive 2014/35/EU
Applied harmonised standards: EN 61010-1: 2010/A1:2019/AC:2019-04

The devices with a working voltage of 24 ... 48 VAC and 18 ... 72 VDC are not governed by the scope of the Low Voltage Directive.

EMC Directive 2014/30/EU
Applied harmonised standards: EN 61326 1:2013

RoHS II Directive 2011/65/EU
The products meet the requirements laid down in European Directive 2011/65/EU concerning the restriction of the use of certain hazardous substances in electrical and electronic devices.

The manufacturer shall have sole responsibility for issuing this declaration of conformity.

Signed for and on behalf of:

Neuss, 10 January 2021

BEKO TECHNOLOGIES GMBH

i.V. Christian Riedel
Head of International Quality Management

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UK Declaration of Conformity

We hereby declare that the product named below complies with the stipulations of the relevant directives and technical standards. This declaration applies only to the product in the condition in which it is marketed by us. Parts which have not been installed by the manufacturer and/or modifications which have been implemented subsequently remain unconsidered.

Product designation:	**Condensate drain**
Types:	BEKOMAT® 15 CO VACU, 16 CO VACU
Supply voltage versions:	24 VDC, 24 VAC, 100 VAC, 115 VAC, 200 VAC, 230 VAC
Max. operating pressure:	1.8 bar(a) 8 bar(a)
Product description and function: Max. control gas pressure:	Condensate drain for electronically level-controlled discharge of condensate from systems with negative pressure and pressureless systems.
Manufacturer:	**BEKO** TECHNOLOGIES GMBH Im Taubental 7, 41468 Neuss, Germany
UK Representative:	**BEKO** TECHNOLOGIES Ltd Unit 11-12 Moons Park, Burnt Meadow Road, North Moons Moat Redditch, Worcs, B98 9PA, United Kingdom

Electrical Equipment (Safety) Regulations 2016, 2016 No. 1101
Applied standards: S.I. 2016 No. 1101
(EN 61010-1: 2010/A1:2019/AC:2019-04)

The devices with a working voltage of 24 ... 48 VAC and 18 ... 72 VDC are not governed by the scope of the Low Voltage Directive.

Electromagnetic Compatibility Regulations 2016, 2016 No. 1091
Applied standards: S.I. 2016 No. 1091
(EN 61326-1:2013)

RoHS Regulations 2012 No 3032
The products meet the requirements laid down in RoHS Regulations 2012 concerning the restriction of the use of certain hazardous substances in electrical and electronic devices.

The products bear the UKCA mark:

BEKO TECHNOLOGIES GMBH shall have sole responsibility for issuing this Declaration of Conformity.

Signed for and on behalf of:

Neuss, 10.01.2021

BEKO TECHNOLOGIES GMBH

i.V. Christian Riedel
Head of Quality Management International

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17. Notes

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