Vacuum change-over device 189

Installation and operating instructions

GRUNDFOS

Vacuum change-over device 189

Original installation and operating instructions

Table of contents

1. General information

Read this document before you install the product. Installation and operation must comply with local regulations and accepted codes of good practice.

2. Safety information

Non-observance of the safety instructions may have dangerous consequences for persons, environment and the product, and may result in the loss of any claims for damages.

Should you require further information, please contact Grundfos.

2.1 Target group

These installation and operating instructions are intended for authorised and trained operating and service experts.

2.1.1 Qualification and training of staff

The staff responsible for the installation, startup, operation and maintenance must be appropriately qualified for these tasks. Areas of responsibility, levels of authority and the supervision of the staff must be precisely defined by the operating company. If necessary, the staff must be trained appropriately.

2.1.2 Obligations of the operating company

- Observe the local safety regulations.
- Instruct the operating persons.
- Provide the stipulated safety equipment and personal protective equipment.
- Arrange regular maintenance.

2.1.3 Obligations of the user

- Read this manual thoroughly before operating the product.
- Observe the recognised health and safety regulations as well as the accident prevention regulations.
- Wear appropriate protective equipment in accordance with national health and safety regulations when working at the system and handling chemicals.

2.2 Symbols used in this document

Warning

If these safety instructions are not observed, it may result in personal injury.

Caution — If these safety instructions are not observed, it may result in malfunction or damage to the equipment.

Note — Notes or instructions that make the job easier and ensure safe operation.

2.3 Safety of the system in the event of product failure

If the product fails, the safety of the overall system must be ensured. Use appropriate monitoring and control functions.

WARNING
Toxic material
Death or serious personal injury

- Make sure that leaking chemicals do not cause personal injury or damage to property.
- Make sure that leak monitoring solutions and drip trays are installed.

2.4 Working with chemicals

Warning

Danger of personal injury due to contact with chemicals!

Wear the stipulated personal protective equipment (protective clothing, goggles, respirator etc.) when handling chemicals!

Observe the chemical manufacturer's safety data sheets (MSDS) and safety instructions of the used chemicals!

Make sure, that parts in contact with the chemicals are resistant to the chemicals under the specific operating conditions!

Caution

Should you have questions regarding the material resistance of the product for specific chemicals, please contact Grundfos.

3. Product description

3.1 Applications

The vacuum change-over device 189 ensures a continuous gas supply for gas dosing systems by switching over from the empty supply battery to a standby battery of gas cylinders or drums.

The vacuum change-over device is operable without auxiliary power. From which battery the gas is supplied, is indicated visually at the device. As an option, the change-over position can be remote indicated via two reed contacts.

If the vacuum rises to a value of about 2-3 m WC (78-118" WC), which can be caused by an empty or closed supply battery, the change-over function is triggered.

The change-over device can be used in connection with the VGA 113, VGA 117, VGS 141 gas dosing units and the VGA 111 and VGS 146 vacuum regulators.

3.1.1 Intended use

The vacuum change-over device 189 is used for combination of two vacuum regulators with one or more dosing regulators. The product must only be used for gaseous Cl_2 or gaseous SO_2. The allowed medium is specified on the nameplate. The installation and operation of the product must strictly comply with the instructions of this manual.

Related information

3.2.1 Nameplate

3.1.2 Improper operating methods

Warning

Improper use, misuse or misapplication can lead to personal injury and damage to the equipment!

The operational safety of the product is only guaranteed, if it is used in accordance with section Intended use.

The product must not be used for:

- operation in potentially explosive areas
- media that are not specified on the nameplate
- combustible media.

The product must not be used in case of:

- visible damage of the product
- improper repair
- unauthorized modification.

Related information

3.1.1 Intended use

3.2 Identification

3.2.1 Nameplate

TM1040050

Pos.	Description
1	Type designation
2	Product number
3	Serial number
4	Medium, capacity
5	Production code (year and week)
6	Marks of approval
7	Country of origin

4. Technical data

The values stated in the technical data must be adhered to.

4.1 General data

4.1.1 Materials, weight, temperatures

Materials	PVC
	FKM
	FEP
	Glass
	Silver
	Hastelloy® C
Approx. weight [kg]	2
Temperature for operation, transport and storage [°C]	0-40

Caution Major temperature fluctuations during operation can cause condensation in the product, which may lead to malfunction in the long term.

4.1.2 Flow rate Cl_2, SO_2

Maximum flow rate	10 kg/h
	500 PPD [1]
Minimum flow rate	≥ 50 g/h
	≥ 2.5 PPD [1]

1 Pounds per day

4.1.3 Connections

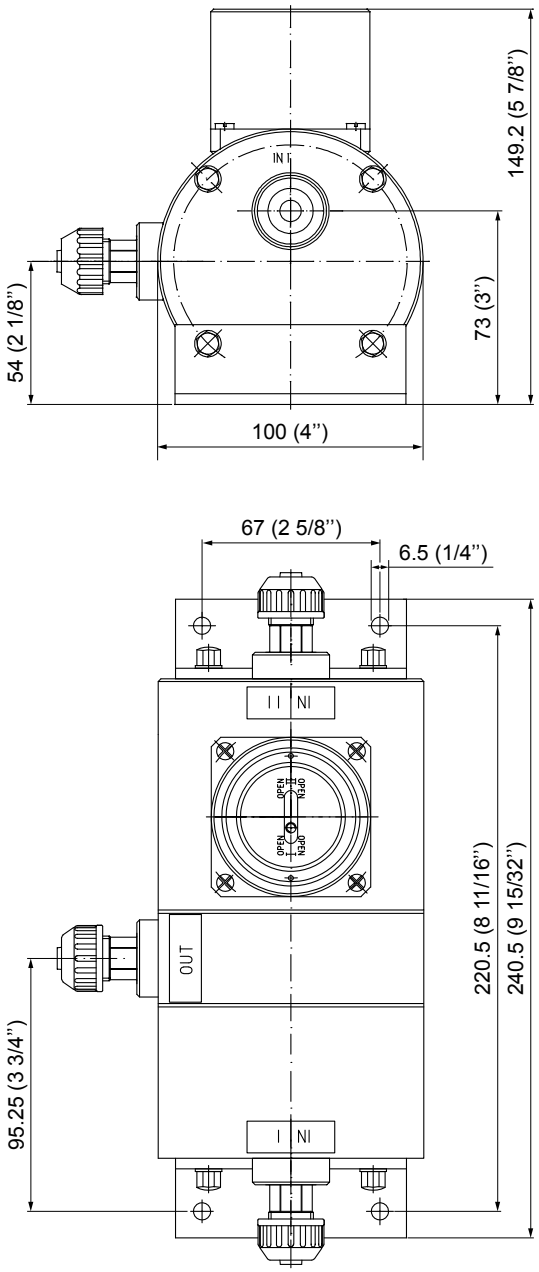
Capacity [kg/h]	Inlet / outlet connection [mm]	Gasket [1]
4	PE 8/11	O-ring
4	1/2" USA	PTFE tape
10	PE 10/14	O-ring
10	PVC 12/16 (DN 10)	O-ring
10	PE 12/16	PTFE tape
10	PVC 15/20 (DN 15)	O-ring
10	1/2" USA	PTFE tape

1 Between product enclosure and connection

4.2 Optional remote indication

Variant	Change-over device 189 with two reed contacts for remote indication
Max. supply voltage [VDC / VAC]	75 / 50
Power consumption [A]	1
Max. wattage [W]	50

4.3 Dimensions

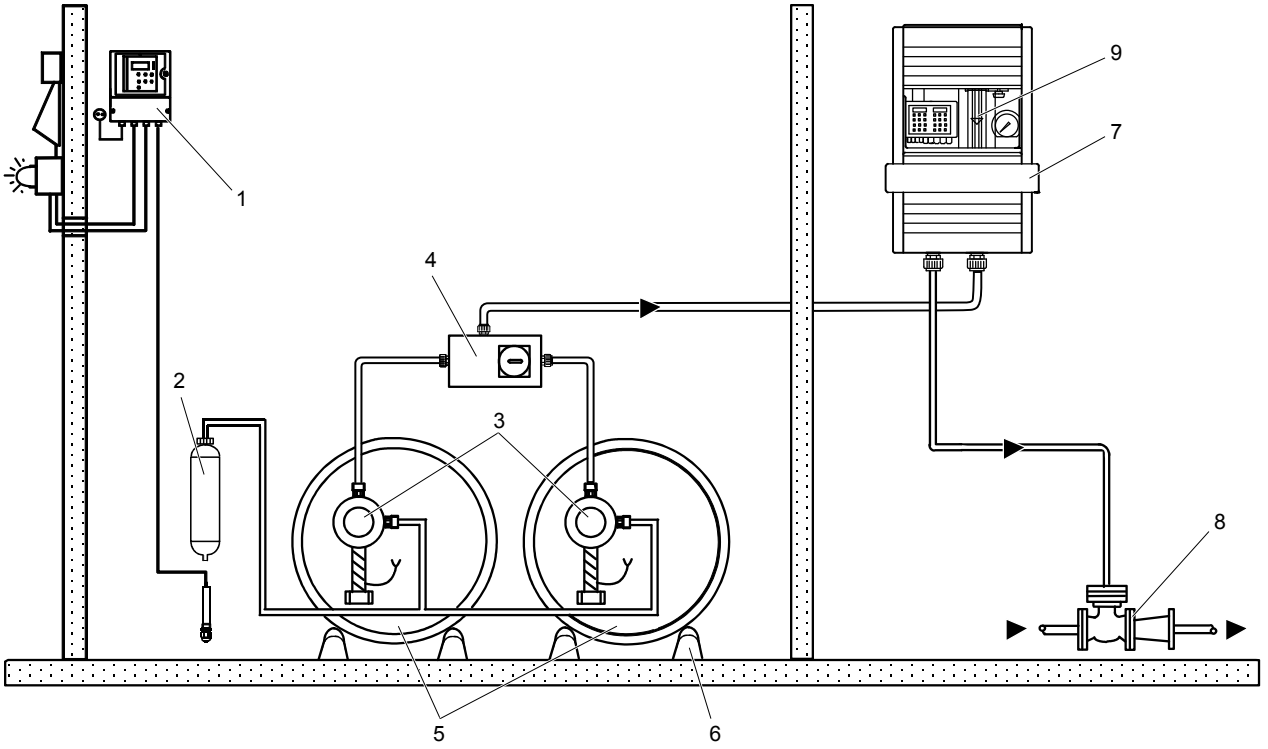


Dimensions in mm (inch)

5. Commissioning

5.1 Installation

5.1.1 Installation example



Installation example of a chlorine gas dosing system with vacuum change-over device 189

Pos.	Description	Pos.	Description
1	Gas warning system	6	Chlorine drum support
2	Adsorption filter	7	Gas dosing unit
3	Vacuum regulator with liquid trap	8	Injector
4	Vacuum change-over device	9	Variable area flowmeter
5	Chlorine drum		

5.1.2 Connections

This section refers to fig. Installation example of a chlorine gas dosing system with vacuum change-over device 189.

1. Connect the vacuum change-over device (4) at the inlet sides to two vacuum regulators (3) and at the outlet side to the gas dosing unit (7).
   - The connections for the vacuum regulators (3) are marked with "IN I" and "IN II". The connection for the dosing unit (7) is marked with "OUT".
   - The vacuum lines between the vacuum regulators (3) and the change-over device (4) should be kept as short as possible. The vacuum lines should not exceed a maximum length of 6 m, in order to minimise the pressure loss.

Note

A precondition for trouble-free functioning of the vacuum change-over device is the tightness of the whole system. Check the tightness of the system before startup.

For electrical connection of the signal transmitter for remote indication, see fig. Signal transmitter for remote indication (option).

Related information

5.1.1 Installation example
5.2 Checking the tightness
7.6.1 Spare parts set

5.2 Checking the tightness

This section refers to fig. Installation example of a chlorine gas dosing system with vacuum change-over device 189.

Check the tightness of the whole system before startup.

Warning

The device must be commissioned only by qualified staff.

Observe the material safety data sheets (MSDS) of the handled chemicals!

Wear protective clothing and a gas mask when carrying out work at the system!

Related information

5.1.1 Installation example

5.2.1 Leak test of vacuum side

Warning

For the leak test the gas dosing unit must be evacuated and free of gas. The injector must be ready for operation.

1. Close the connecting valves of all drums or cylinders.
2. Start injector (8). The vacuum lines are evacuated. In this operating state the change-over device (4) switches uncontrollably.
3. After about 10 minutes (depending on the length of the vacuum lines and the setting of the adjusting valve at the gas dosing unit (7)) the variable area flowmeter (9) must indicate no flow.
   - If no flow is indicated, proceed as described in section Leak test of pressure side.

If the variable area flowmeter (9) indicates a flow, check the complete system for leaks:

1. Disconnect the vacuum lines between vacuum regulators (3) and gas dosing unit (7) one after the other.
2. Close each disconnected line tight with the finger.
   - If the variable area flowmeter (9) stops indicating a flow, the disconnected component is leaky.
3. Repair or exchange the leaky component and check the tightness again.

Related information

5.2.2 Leak test of pressure side

5.2.2 Leak test of pressure side

For details on the leak test, see separate installation and operating instructions of the Vaccuperm system.

For this test, ammonia water in a flexible plastic bottle is required (must be purchased from local chemical supplier).

1. Stop injector (8).
2. Open the connecting valves of the drums or cylinders by about one revolution.
3. Check the connecting parts and inlet valves of the vacuum regulators for leaks:
   - Open the flexible plastic bottle filled with ammonia water.
   - Slightly press the bottle in a pumping manner, allowing the ammonia mist to rise up. Slowly pass the open ammonia bottle along gas-leading parts.
   - White mist indicates a leak.
   - Repair or exchange the leaky component and check the tightness again.

Warning

All leaks have to be removed immediately.

5.3 Startup and function test

This section refers to fig. Installation example of a chlorine gas dosing system with vacuum change-over device 189.

Note

Prior to startup, all gas-carrying parts have to be checked for leaks. See section Checking the tightness.

After the leak tests have been completed successfully, the vacuum change-over device (4) can be commissioned.

1. Entirely open the connecting valves of the drums or cylinders.
2. Start injector (8).
   - Gas is dosed.
   - The position of the indicator pin at the change-over device shows which battery supplies the gas.

To complete startup, the change-over function must be tested as described in the following section.

Related information

5.1.1 Installation example

5.2 Checking the tightness

5.3.1 Test of change-over function

1. Open the connecting valves of all drums or cylinders.
2. Start injector (8).
3. Close the connecting valves of the drums or cylinders of the supply battery.
4. The change-over device switches over to the standby battery after a short period of time.
5. Reopen the connecting valves of the supply battery and close the connecting valves of the standby battery.
6. The change-over device switches over to the supply battery after a short period of time.
7. Open the connecting valves of all drums or cylinders.
   - The vacuum change-over device is ready for operation.

6. Fault finding

Fault	Cause	Discernible from	Remedy
Changing over does not work.	The gas dosing system is leaky. The vacuum required for the change-over function cannot be generated.	The variable area flowmeter (fig. Installation example of a chlorine gas dosing system with vacuum change-over device 189, pos. 9) indicates a flow, although the supply battery (cylinder, drum) is empty or closed.	Check the dosing system for leaks.
	The diaphragm (fig. Vacuum change-over device 189, pos. 51.26) or O-ring (fig. Vacuum change-over device 189, pos. 51.14) in the change-over device are leaky.	The variable area flowmeter (fig. Installation example of a chlorine gas dosing system with vacuum change-over device 189, pos. 9) indicates a flow, although the supply battery (cylinder, drum) is empty or closed.	Replace the defective parts.
The change-over device switches to the standby battery, although the supply battery is full and the connecting valve is open.	The vacuum regulator (fig. Installation example of a chlorine gas dosing system with vacuum change-over device 189, pos. 3) lets through only an insufficient amount of gas or the vacuum line is too long (this fault occurs mainly with a high flow rate). The supply battery is frozen up.	Measure the vacuum between the change-over device and the vacuum regulators with a vacuum meter. The vacuum exceeds 2 m WC (78" WC).	Clean the vacuum regulator and restart it or lay a vacuum line with a larger cross section. If the supply battery is frozen, defrost it. Measure the vacuum. The vacuum must be less than 2 m WC (78" WC).
	The change-over device is used in connection with the VGA 111 vacuum regulator with flow restricting nozzle, which limits the flow rate to max. 600 g/h or 30 PPD. If the flow rate of the gas dosing unit exceeds this value, the vacuum increases and the change-over device switches over to the standby battery.	Measure the vacuum between the change-over device and the vacuum regulators with a vacuum meter. The vacuum exceeds 2 m WC (78" WC).	Reduce the flow rate. If the maximum flow rate is required, remove the flow restricting nozzle in the vacuum regulators or add further vacuum regulators with drums or cylinders to the system. Measure the vacuum. The vacuum must be less than 2 m WC (78" WC).

Related information

5.1.1 Installation example

5.2 Checking the tightness

7.6.1 Spare parts set

7. Maintenance

7.1 Safety instructions

Warning

Cleaning and maintenance must only be carried out by authorised and qualified staff.

Shut down the whole system before any work at the system components and lines!

The system must be pressureless!

Wear the stipulated personal protective equipment (protective clothing, goggles, respirator etc.) when handling chemicals!

Observe the chemical manufacturer's safety data sheets (MSDS) and safety instructions of the used chemicals!

Safety installations, which have been disabled during maintenance, must be enabled again immediately after maintenance.

7.2 Cleaning

If necessary, clean all product surfaces with a dry and clean cloth.

7.3 Regular maintenance

The tightness of the whole system must be checked monthly.

Related information

5.2 Checking the tightness

7.4 Maintenance interval

Maintenance should be carried out at least every two years, or in case of malfunction. During maintenance, the parts included in the spare parts set are replaced. The intervals for replacement depend on different factors, such as flow rate, operating time, pollution and ambient temperature.

Related information

7.6.1 Spare parts set

7.5 Perform maintenance

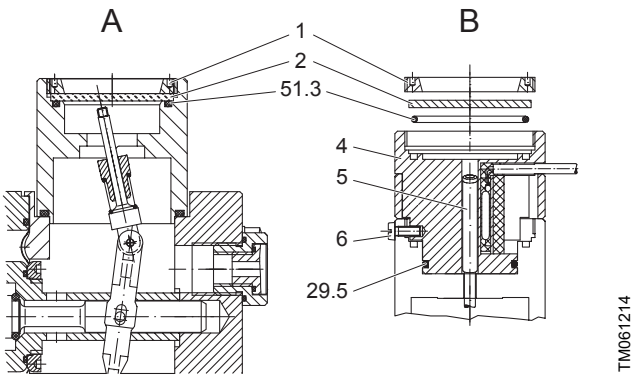
This section describes the replacement of the parts included in the spare parts set. For details on the spare parts set, see section .

7.5.1 Dismantling

Caution Clean removed parts thoroughly with warm water immediately after dismantling.

1. Shut down the whole system and make sure, that no residual gas is in the system and lines.
2. Disconnect the vacuum change-over device from the inlet and outlet lines.
3. Dismantle the inlet connections and the outlet connection.

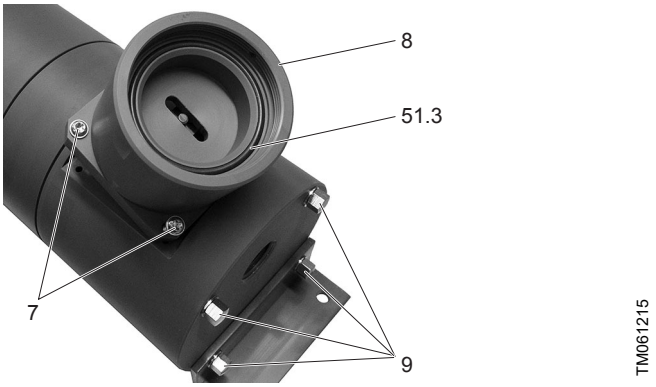
   The following steps refer to fig. Dismantling the indication body, part 1.
4. Remove thrust collar (1) using an appropriate face spanner.
5. Remove glass (2).
6. If the optional indication body with signal transmitter (B) is mounted:
   - Disconnect electrical connection at control panel.
   - Remove fixing screw (6).
   - Remove transmitter body (4). Make sure, that the cable is not damaged.
   - Unscrew and remove magnet pin (5).



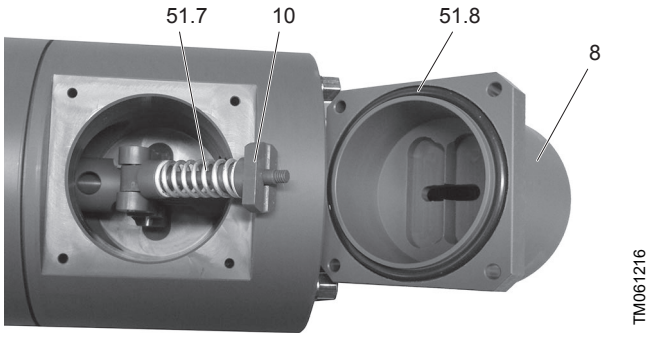
Dismantling the indication body, part 1

The following steps refer to fig. Dismantling the indication body, part 2 and Dismantling the indication body, part 3.

7. Push down the indication body (8) against the spring pressure and remove the four screws (7).
8. Remove indication body (8).
9. Remove the spring bushing (10) and the spring (51.7).
10. Remove nuts (9) and remove the foot.
    - Don't pull out the bolts.



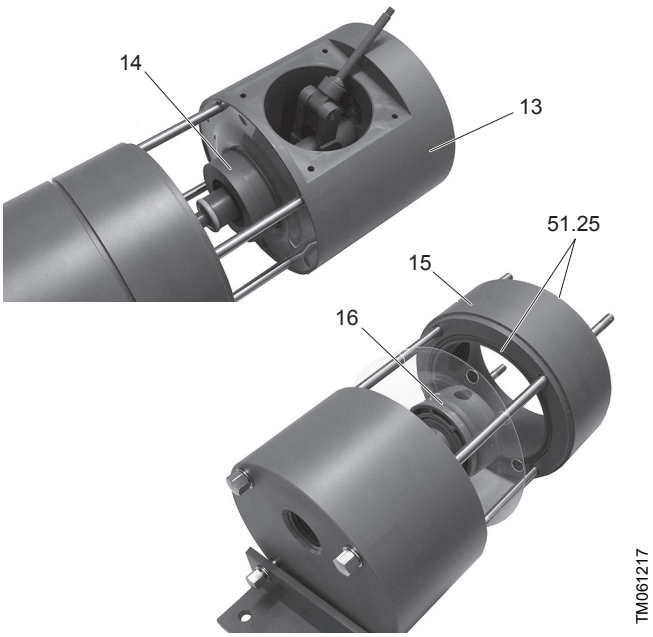
Dismantling the indication body, part 2



Dismantling the indication body, part 3

The following steps refer to fig. Dismantling the enclosure.

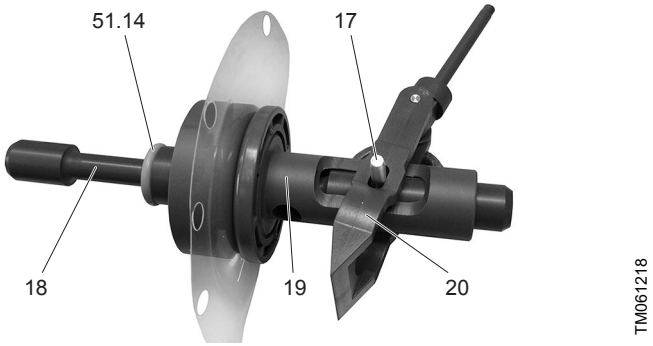
11. Remove enclosure part (13) together with inner parts (14).
12. Remove inner parts (14) from enclosure part (13).
13. Remove middle part (15) and diaphragm body (16).



Dismantling the enclosure

The following steps refer to fig. Inner parts.

14. Dismantle pin (17) and remove the lever (20).
15. Remove control piston (18) from diaphragm body (19).



Inner parts

The following steps refer to fig. Dismantling.

16. Unscrew the diaphragm rings (21) manually.
17. Remove diaphragms (51.26) from the diaphragm bodies (22).

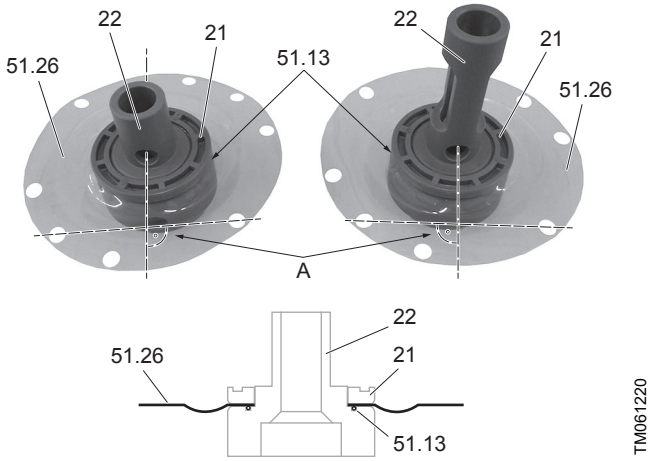
7.5.2 Reassembling

Caution Before reassembling make sure, that all parts are clean, dry and undamaged!

The following steps refer to fig. Reassembling the diaphragm bodies.

1. Replace the O-rings (51.13) at both diaphragm bodies (22).
2. Fit the diaphragms (51.26) at the diaphragm bodies (22).
   - Observe the orientation of the diaphragm. See fig. Reassembling the diaphragm bodies.
   - Make sure, that the diaphragm fits into the seat and is exactly centered on the diaphragm body (22).
3. Fit the diaphragm rings (21) and tighten them manually.
   - Make sure, that the angle (A) is exactly 90°.

Caution The correct alignment of the diaphragms (51.26) with the diaphragm bodies (22) is crucial for the faultless functioning of the change-over device!



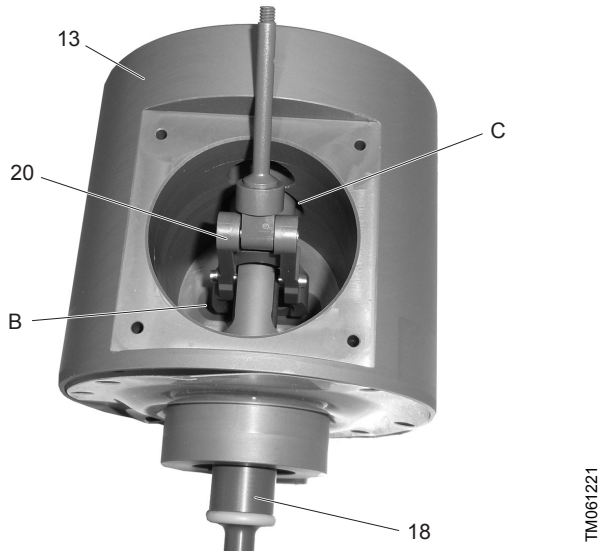
Reassembling the diaphragm bodies

The following steps refer to fig. Inner parts.

4. Replace the two O-rings (51.14) at control piston (18).
5. Insert control piston (18) into diaphragm body (19).
6. Reassemble lever (20) and fit pin (17).

   The following steps refer to fig. Dismantling the enclosure.
7. Fit diaphragm body (16).
   - Make sure, that the hole in the diaphragm body is vertically aligned. See also fig. Reassembling the diaphragm bodies.
8. Replace the two O-rings (51.25) at the middle part (15) and fit the middle part.

   The following steps refer to fig. Reassembling the inner parts.
9. Insert the inner parts into enclosure part (13).
   - Make sure, that the lever (20) is positioned correctly at connection point (B).
   - Make sure, that the control piston (18) is positioned correctly at connection point (C).

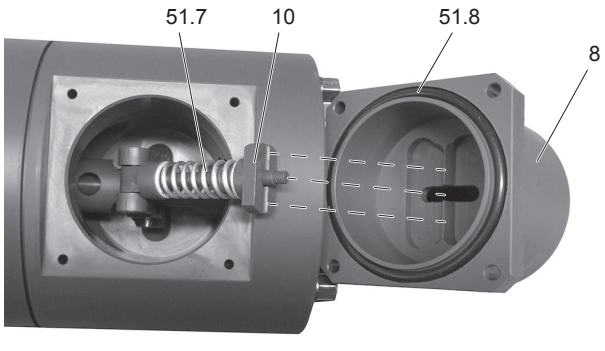


Reassembling the inner parts

10. Reassemble enclosure part (13) as shown in fig. Dismantling the enclosure.
11. Fit nuts (fig. Dismantling the indication body, part 2, pos. 9) and tighten them carefully with a torque wrench.
    - Torque: 2.5 Nm

    The following steps refer to fig. Reassembling the indication body.
12. Fit new spring (51.7) and spring bushing (10).
13. Replace O-ring (51.8) and fit indication body (8).
    - Observe the orientation of spring bushing (10) and indication body (8) as shown in fig. Reassembling the indication body.
14. Push down the indication body (8) against the spring pressure.

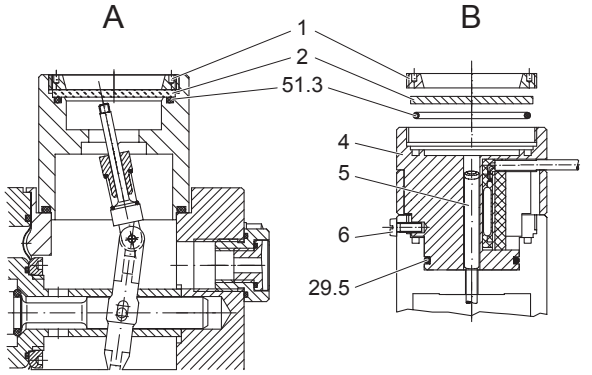
15. Fit the four screws (fig. Dismantling the indication body, part 2, pos. 7) and tighten them carefully with a torque wrench.
    - Torque: 0.76 Nm



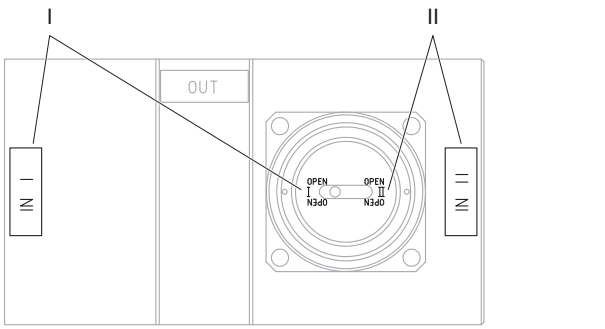
Reassembling the indication body

The following steps refer to fig. Reassembling the indication body.

16. If the optional indication body with signal transmitter (B) is mounted:
    - Replace O-ring (29.5).
    - Screw in magnet pin (5) carefully.
    - Fit transmitter body (4). Make sure, that the cable is not damaged.
    - Screw in fixing screw (6) carefully.
    - Reconnect electrical connection at control panel.
17. Replace O-ring (51.3).
18. Fit and align indication glass (2) as shown in fig. Alignment of the indication glass.
19. Fit and tighten thrust collar (1) using an appropriate face spanner.



Reassembling the indication body



Alignment of the indication glass

20. Replace the O-rings or the PTFE tape (depending on the type of connection, see section Connections) at the inlet and outlet connections.
21. Reassemble the inlet and outlet connections and tighten them carefully.

The change-over device is now ready for installation in the system. Follow the instructions given in section Commissioning.

Related information

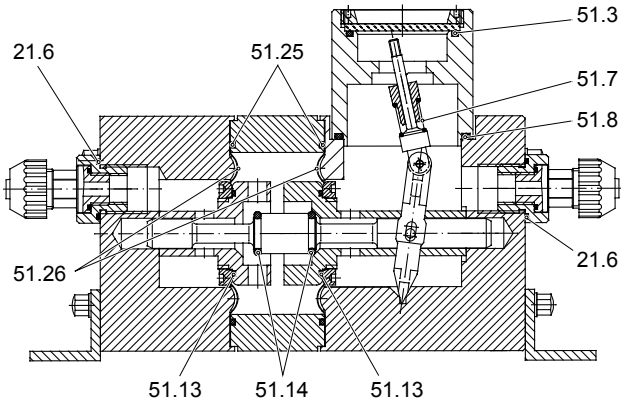
4.1.3 Connections
7.5.1 Dismantling

7.6 Spare parts

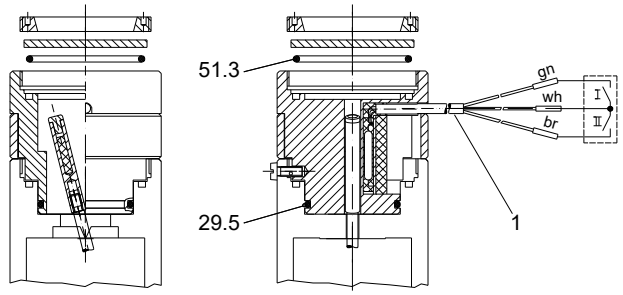
7.6.1 Spare parts set

Description	Order number
Spare parts set, comprising:	
O-rings	
(21.6, 29.5, 51.3, 51.8, 51.13, 51.14, 51.25)	91835829
Diaphragm (51.26)	
Pressure spring (51.7)	

If other parts are defective, return the change-over device to the factory for repair or replacement.



Vacuum change-over device 189



Signal transmitter for remote indication (option)

Pos.	Description
1	Length = 3 m

gn	green
wh	white
br	brown

8. Decommissioning

Caution Seal up the inlet and outlet connections of the dismantled system components to make sure, that no moisture can ingress!

For details on decommissioning, see separate installation and operating instructions of the Vaccuperm system.

9. Disposing of the product

This product or parts of it must be disposed of in an environmentally sound way:

1. Use the public or private waste collection service.
2. If this is not possible, contact the nearest Grundfos company or service workshop.

See also end-of-life information at www.grundfos.com/product-recycling.

The crossed-out wheelie bin symbol on a product means that it must be disposed of separately from household waste. When a product marked with this symbol reaches its end of life, take it to a collection point designated by the local waste disposal authorities. The separate collection and recycling of such products will help protect the environment and human health.

Declaration of conformity

GB: EU declaration of conformity

We, Grundfos, declare under our sole responsibility that the product Vacuum change-over device 189, to which the declaration below relates, is in conformity with the Council Directives listed below on the approximation of the laws of the EU member states.

CZ: Prohlášení o shodě EU

My firma Grundfos prohlašujeme na svou plnou odpovědnost, že výrobek Vacuum change-over device 189, na který se toto prohlášení vztahuje, je v souladu s níže uvedenými ustanoveními směrnice Rady pro sblížení právních předpisů členských států Evropského společenství.

DE: EU-Konformitätserklärung

Wir, Grundfos, erklären in alleiniger Verantwortung, dass das Produkt Vacuum change-over device 189, auf das sich diese Erklärung bezieht, mit den folgenden Richtlinien des Rates zur Angleichung der Rechtsvorschriften der EU-Mitgliedsstaaten übereinstimmt.

DK: EU-overensstemmelseserklæring

Vi, Grundfos, erklærer under ansvar at produktet Vacuum change-over device 189 som erklæringen nedenfor omhandler, er i overensstemmelse med Rådets direktiver der er nævnt nedenfor, om indbyrdes tilnærmelse til EU-medlemsstaternes lovgivning.

FR: Déclaration de conformité UE

Nous, Grundfos, déclarons sous notre seule responsabilité, que le produit Vacuum change-over device 189, auquel se réfère cette déclaration, est conforme aux Directives du Conseil concernant le rapprochement des législations des États membres UE relatives aux normes énoncées ci-dessous.

RO: Declaraţia de conformitate UE

Noi Grundfos declarăm pe propria răspundere că produsul Vacuum change-over device 189, la care se referă această declaraţie, este în conformitate cu Directivele de Consiliu specificate mai jos privind armonizarea legilor statelor membre UE.

- Machinery Directive (2006/42/EC)
  Standard used:
  EN ISO 12100:2011-03
- EMC Directive (2014/30/EU).
  Standards used:
  EN 61326-1:2013,
  EN 61000-3-2:2019,
  EN 61000-3-3:2013 + A1:2019.
- RoHS Directives (2011/65/EU and 2015/863/EU).
  Standard used:
  EN IEC 63000:2018

This EU declaration of conformity is only valid for products with remote indication adaptor.

This EU declaration of conformity is only valid for products with remote indication adaptor.

This EU declaration of conformity is only valid when published as part of the Grundfos installation and operating instructions (publication number 96681321).

Bjerringbro, 01.March 2022

Jimm Feldborg
Head of PD IND
Person authorised to compile technical file and empowered to sign the EU declaration of conformity.

UK declaration of conformity

We, Grundfos, declare under our sole responsibility that the products to which the declaration below relates, are in conformity with UK regulations, standards and specifications to which conformity is declared, as listed below:

Valid for Grundfos products:

Vacuum change-over device 189

- Supply of Machinery (Safety) Regulations 2008.
  Standard used: EN ISO 12100:2011-03.
- Electromagnetic Compatibility Regulations 2016.
  Standards used:
  EN 61326-1:2013
  EN 61000-3-2:2019,
  EN 61000-3-3:2013 + A1:2019.
- The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2019.
  Standard used: EN IEC 63000:2018

This UK declaration of conformity is only valid when accompanying Grundfos instructions.

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Bjerringbro, 01.March 2022

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96681321 **06.2022**
ECM: 1334581

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