

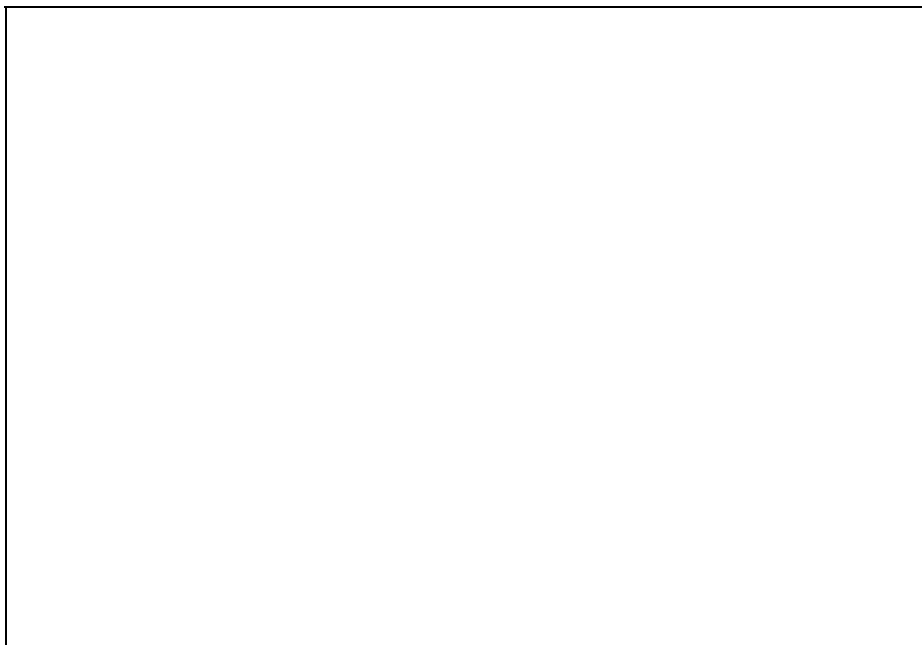
## **Diaphragm Pump Model 2**

Standard Design

Explosion-protected and  
Corrosion-proof Design

## **Operator's Manual**

42/23-20-2 EN



**ABB**

# Contents

<b>1</b>	<b>Application</b>	<b>3</b>
<b>2</b>	<b>Technical data</b>	<b>3</b>
<b>3</b>	<b>Construction</b>	<b>5</b>
<b>4</b>	<b>Mounting and connecting instructions</b>	<b>8</b>
<b>5</b>	<b>Putting the instrument into operation</b>	<b>8</b>
<b>6</b>	<b>Maintenance</b>	<b>9</b>
<b>7</b>	<b>Explosion-protected and corrosion-proof design</b>	<b>9</b>
<b>8</b>	<b>Accessories</b>	<b>10</b>
<b>9</b>	<b>Packing instructions</b>	<b>10</b>
<b>10</b>	<b>List of spare parts</b>	<b>10</b>

This Operator's Manual is protected by copyright. The translation, duplication and distribution in any form, even in a revised edition or in extracts, in particular as a reprint, by photomechanical or electronic reproduction or in the form of storage in data processing systems or data networks are prohibited without the consent of the copyright holder and will be prosecuted under civil and criminal law.

# TECHNICAL DESCRIPTION

## 1 Application

The diaphragm pump 2 is used for passing the sample gas through the gas analyzers if the gas pressure at the sampling point is too low.

## 2 Technical data

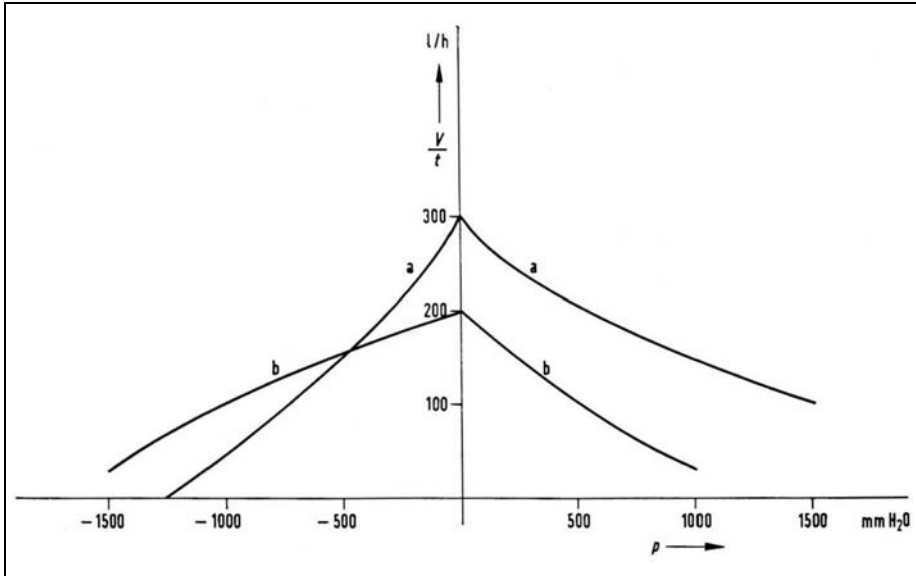
Model	Instrument design	Power supply	Catalog No.
Diaphragm pump 2	Standard design	220 V, 50...60 Hz approx. 11 VA (for voltage ranges 200...240 V)	23121-5-5861212
Diaphragm pump 2-Ex	Explosion- protected and corrosion-proof design	220 V, 50...60 Hz approx. 13 VA (for voltage ranges 200...240 V)	23121-5-5861219.3
		24 V, 50...60 Hz approx. 6 VA (for voltage ranges 22...26 V)	23121-5-5861217

Permissible ambient temperature	+5...45 °C +5...40 °C for explosion-protected and corrosion-proof design
Gas connections	G 1/4 internal thread (DIN ISO 228/1) for screw- in screw connections (PTFE hose nipples for tubing of 4 mm I.D. and 6 mm O.D. are included in the delivery)
Electrical connection	1 cable screw connection Pg 11
Case	Cast iron; degree of protection IP 54
Dimensions of case	width 192 mm      according to dimension height 170 mm     sheet 5861-000 Ma 3-4 depth 90 mm        (see Fig. 4)
Type of mounting	wall mounting (If mounted on sheet metal walls, e. g. in panels or in cabinets together with other instruments (analyzers, controllers), anti-vibration mounts should be installed.)
Weight	approx. 3 kg

## Explosion protection

Manufacturer's identification code  
Approval identification  
Type of protection of case  
Mounting of diaphragm pump  
Permissible ambient temperature

49/23-01 Ex  
PTB-No. III B/E-9767  
increased safety Ex e G 5  
inside the hazardous area  
max. 40 °C if used with ignition group G 5



**Fig 1** Minimum delivery  $V/t$  as a function of the back pressure  $p+$  or the vacuum  $p-$  at 220 VAC and open shunt

Curve a Standard design

Curve b Explosion-protected and corrosion-proof design

### 3 Construction

In respect of their construction there is not much difference between the standard design and the explosion-protected design (see figs. 2 and 3). The diaphragm pump 2 in its cast case is extremely robust and due to its simple mode operation is very reliable, requiring only little maintenance.

Materials of gas carrying parts:

#### Standard design

Diaphragm	EPDM
Valve leaves	Viton
Pump block	PVC
Hoses	PVC
Hose nipples	PTFE

#### Explosion-protected and corrosion-proof design

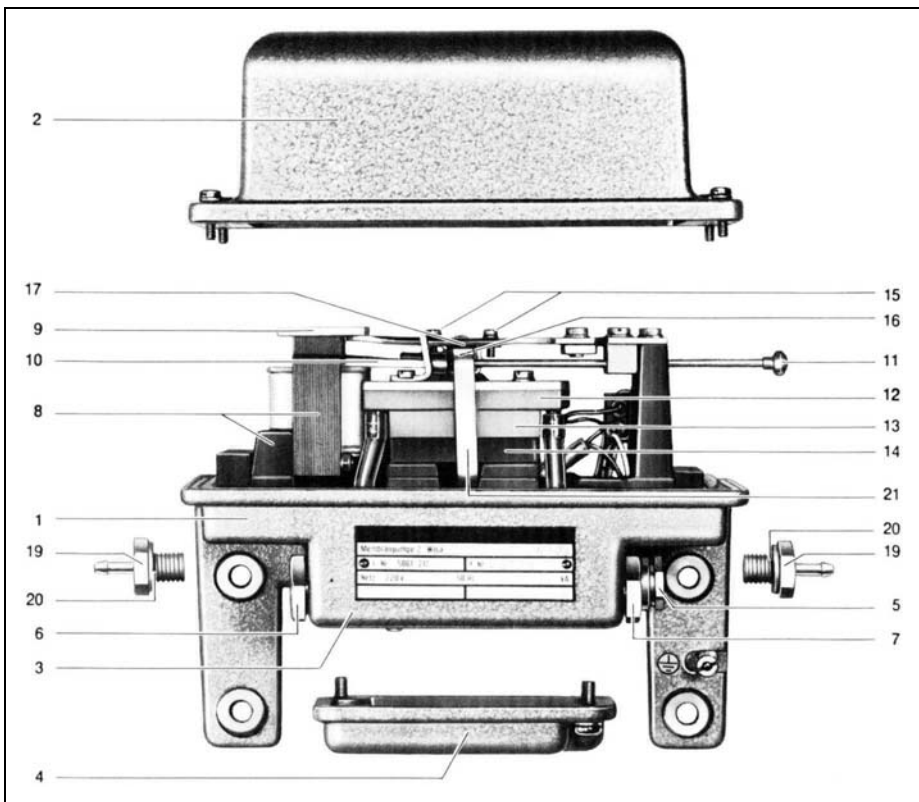
Diaphragm	Viton
Valve leaves	Viton
Pump block	PVC
Hoses	Viton
Hose nipples	PTFE

Outside on the case are:

- the connections (G 1/4 internal thread) for the sample gas inlet (6) and the sample gas outlet (7) (arranged horizontally relative to the axis of the instrument),
- a slider (11) for regulating the gas delivery (actuation of the magnetic shunt (10)),
- the cable screw connection (5) for the power cord,
- the terminal box (3) for the power supply.

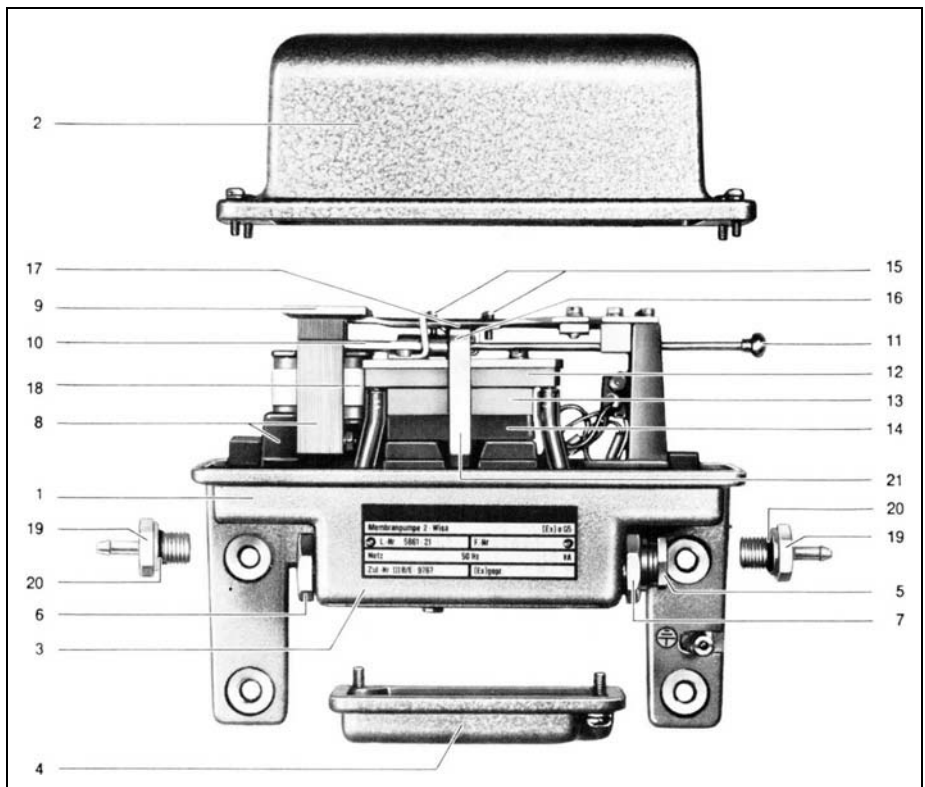
Under the case lid (2) are:

- a casting with the solenoid (8) and the keeper (9),
- the magnetic shunt (10) actuated by the above mentioned slider (regulation of gas delivery),
- the pump block, consisting of plate with hose connection (12), plate with valves (13), plate with diaphragm (14).



**Fig. 2** Diaphragm pump 2, case lid removed (standard design)

- |    |                                       |    |  |
|----|---------------------------------------|----|--|
| 1  | bottom section of case                | 11 | slider for actuation of magnetic shunt |
| 2  | lid                                   | 12 | plate with hose connection             |
| 3  | terminal box                          | 13 | plate with valves                      |
| 4  | cover of terminal box                 | 14 | plate for diaphragm                    |
| 5  | cable screw connection for power cord | 15 | holding screws                         |
| 6  | sample gas inlet                      | 16 | screw spring (not visible)             |
| 7  | Sample gas outlet                     | 17 | pivoted spring retaining bar           |
| 8  | casting with solenoid                 | 19 | PTFE hose nipple                       |
| 9  | keeper                                | 20 | O-ring                                 |
| 10 | magnetic shunt                        | 21 | connection bar                         |



**Fig. 3** Diaphragm pump 2-Ex, case lid removed (explosion-protected and corrosion-proof design)

- |    |                                       |    |   |
|----|---------------------------------------|----|---|
| 1  | bottom section of case                | 11 | slider for actuation of magnetic shunt                            |
| 2  | lid                                   | 12 | plate with hose connection  |
| 3  | terminal box                          | 13 | plate with valves   |
| 4  | cover of terminal box                 | 14 | plate for diaphragm   |
| 5  | cable screw connection for power cord | 15 | holding screws  |
| 6  | sample gas inlet                      | 16 | screw spring (not visible)  |
| 7  | Sample gas outlet                     | 17 | pivoted spring retaining bar                                      |
| 8  | casting with solenoid                 | 18 | automatic thermal switch (on exciter coil, blocked by insulation) |
| 9  | keeper                                | 19 | PTFE hose nipple  |
| 10 | magnetic shunt                        | 20 | O-ring  |
|    |                                       | 21 | connection bar  |

# OPERATING INSTRUCTIONS

## 4 Mounting and connecting instructions

The instrument is screwed to the control panel or a similar support by means of four mounting screws, if necessary by using anti-vibration mounts. A three-core cable should be used for the power supply. The power supply is connected to the terminal strip and the non-fused earth lead to the earth terminal in the connection box (3). In addition the external earth screw of the diaphragm pump should be connected to the panel earth. The lid (4) of the connection box (3) can be removed downward by unscrewing the two slotted screws.

**Before any other connection is made the protective earth terminal shall be connected to a protective conductor.**

**Gas connections:** sample gas inlet (6) – left  
sample gas outlet (7) – right

The instrument can be connected to the sampling point and the analyzer either by means of pipe lines via Ermeto screw connections G ¼ O.D. for tubing of 6 mm O.D., or after screwing in the supplied PTFE hose nipples with connecting hoses of 4 mm I.D.

## 5 Putting the instrument into operation

After switching on the voltage the instrument starts to operate.

**Before switching the apparatus on, make sure that it is set to the voltage of the power supply.**

### Adjusting the gas delivery

The magnetic shunt (10) for regulating the gas delivery is actuated by means of the slider (11) which protrudes on the right side of the case lid.

Slider pulled out    magnetic shunt open    high delivery  
Slider pushed in    magnetic shunt closed    low delivery

The slider permits continuous adjustment of the desired delivery between approx. 30 % and 100 %.



## 6 Maintenance

Maintenance is limited to an occasional cleaning of the valves, exchanging the retaining bar and the diaphragm.

For this purpose first disconnect the voltage from the instrument, then unscrew the slider (11) counter-clockwise and pull it out completely. Thereupon unscrew the lid (2), loosen the holding screws (5) up to the end of the thread, remove the screw spring (16), take out the retaining bar (17) – bolt with ball (4 mm dia.) and felt ring – by pressing from the top, and dismantle the pump block after unscrewing the 4 screws. This makes all components to be cleaned or exchanged accessible.

When reassembling, attention should be paid that the upper valve is located in the square cut-out of the gasket plate. The felt ring of the retaining bar should be impregnated with oil. Care should be taken that no oil reaches the diaphragm and the valves.

When reassembling proceed analogously in reverse order.

**Any adjustment, maintenance and repair of the opened apparatus under voltage shall be avoided as far as possible and, if inevitable, shall be carried out only by a skilled person who is aware of the hazard involved.**

## 7 Explosion-protected and corrosion-proof design

The diaphragm pump 2-Ex is licensed for the type of protection increased safety Ex e G 5. It can be used at working places exposed to explosion hazards by flammable substances of all explosion classes covered by the ignition groups G 1...G 5.

When mounting the diaphragm pump 2-Ex the regulations on electrical apparatus in hazardous areas, requirements for the installation of electrical systems in hazardous areas and the type approval certificate should be observed.

The diaphragm pump 2-Ex is protected by a thermostatic cut-out which switches off the current for the solenoid as soon as the of the coil exceeds 80 °C.

Work on an explosion-protected instrument may be carried out by any person and in any workshop **after the danger of an explosion has been eliminated. However, before putting the diaphragm pump back into operation it is necessary to have it checked and certified by an expert.** This can be omitted if the work is carried out by authorized personnel of the manufacturer. In this case the repair man should identify himself. After repair, the date and the code number of the repair man should be marked on the repaired instrument.

## 8 Accessories

The initial consignment also includes a bag with spares which contains the following:

Spare parts bag  
(Catalog No. 23105-5-5861271)  
for standard design

1 diaphragm (EPDM)  
1 gasket  
1 ball with felt ring  
1 compression screw spring  
1 movable part  
6 valve leaves (Viton)  
2 anti-vibration mounts

Spare parts bag  
(Catalog No. 23105-5-5861272)  
for explosion-protected and corrosion-  
proof design

1 diaphragm (Viton)  
1 gasket (Viton)  
1 ball with felt ring  
1 compression screw spring  
1 movable part  
6 valve leaves (Viton)  
2 anti-vibration mounts  
1 O-ring 4 mm x 1 mm (Viton)

## 9 Packing instructions

If the original packaging is no longer available, the diaphragm pump is to be wrapped in paper and packed in a sufficiently large carton lined with shock-absorbing material (excelsior, rubberized hair or the like) so as to be protected against impacts for transporting purposes. If excelsior is used, the unit is to be surrounded on all sides by a layer at least 20 cm thick.

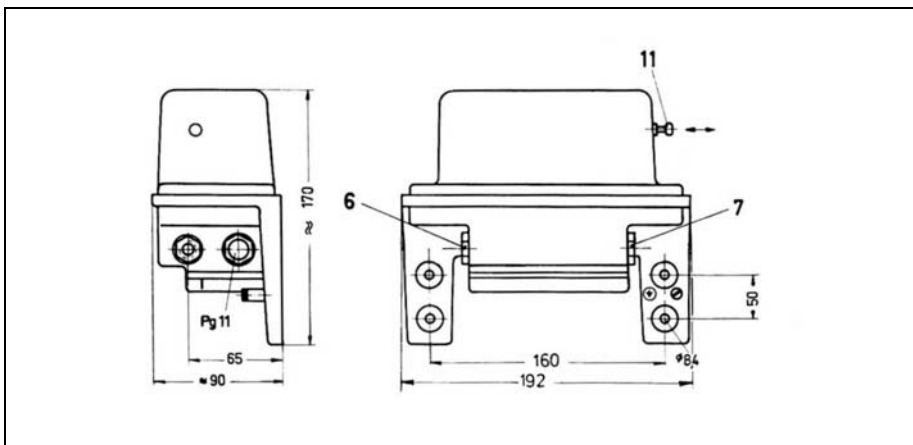
In the case of overseas shipment, the diaphragm pump must additionally be welded so as to be air-tight in polyethylene foil which is 0.2 mm thick. A drying agent (e.g. silica gel) is to be provided. Furthermore, in the case of this type of shipment, the interior of the transportation container is to be lined with a layer of double tar paper.

These packing instructions also apply to shipment back to the unit manufacturer (e.g. for repairs).

## 10 List of spare parts

The following components can be obtained as spare parts from the spare parts service of the unit manufacturer upon stating the designation and the Catalog No. Whenever ordering spare parts or making any complaints, the serial number entered on the rating plate is to be stated.

<b>No. in figs. 2 and 3</b>	<b>Designation</b>	<b>Catalog No.</b>
	Spare parts bag, complete (for contents, see para. 8)	
	for standard design	23105-5-5861271
	for explosion-protected and corrosion-proof design	23105-5-5861272
	Pump block (8 pcs.)	23105-5-0993011
	Diaphragm 45 mm dia.	
	EPDM, for standard design	23105-4-0993001
	Viton, for explosion-protected and corrosion-proof design	23105-5-0651333
	Valve leaves, 16 mm x 6 mm, of Viton	23105-5-0993143
	Metal spring, approx. 24 mm x 25 mm	23105-4-0993003
	Coil 220 V	
	for standard design	23105-4-0993005
	for explosion-protected and corrosion-proof design	23105-4-0848302
	Rectifier for 220 VAC	23105-4-0993007
	Foam rubber plate, 170 mm x 63 mm	23105-4-0993012
	Gasket for pump, 50 mm x 50 mm, for standard design	23105-4-0993008
	Valve clamp	23105-4-0993009
	Felt ring, white, 10 mm x 4 mm	23105-4-0993014
	Steel ball 4 mm dia.	23105-4-0993015
9	Keeper with arm	23105-4-0993019
10	Magnetic shunt	23105-4-0993233
11	Slider for actuation of magnetic shunt	23105-4-0993168
12	Plate with hose connection	23105-4-0993134
13	Plate with valves	23105-4-0993135
14	Plate for diaphragm	23105-4-0993136
16	Screw spring	23105-4-0993016
17	Pivoted spring retaining bar	23105-4-0993017
	Movable element (ball-and-socket joint)	23105-4-0993018
18	Automatic thermal switch (explosion-protected design only)	94082-4-0835977
19	PTFE hose nipple	20005-4-0402180
20	O-ring, 10 mm x 2 mm	94081-4-0673183
21	Connecting bar	23105-4-0993217



**Fig. 4** Dimensional drawing of the diaphragm pump 2 (dimensions in mm)

- 6 sample gas inlet
- 7 sample gas outlet
- 11 slider for actuation of magnetic shunt

**ABB**

**ABB Automation Products GmbH**  
**Geschäftsgebiet Analysetechnik**

Stierstädter Straße 5, D-60488 Frankfurt am Main  
 Telefon (0 69) 79 30-40, Telefax (0 69) 79 30-45 66

E-Mail analytical-mkt.deapr@de.abb.com, <http://www.abb.de/analysetechnik>

Technische Änderungen vorbehalten  
 Printed in the Fed. Rep. of Germany  
 42/23-20-2 EN 02.89