

139PP Pneumatic Pressure Repeater

For table of contents see last page.

1 GENERAL

The pressure repeater is designed for pressure transmission with solidifying or crystallizing process media with temperatures up to max. 200 °C. The application limits of the special versions are given in data sheet PSS EMP0140. The pressure of the process medium is converted in a ratio of 1:1 into a pneumatic pressure. The following applies to the pressure repeater with zero suppression: Output = input + suppression

The pressure repeaters are adjusted at the factory for the ranges 0 – 1 bar, 0 – 2 bar, 0 – 4 bar, 0 – 6 bar, and 0 – 10 bar.

Pressure repeaters with zero suppression are set as a general rule to minimum input value –0.5 bar gauge pressure.

Devices with PTFE foil are unsuitable for vacuum. Adjustment, installation position and supply air pressure are recorded on labels on the pressure repeater.

2 METHOD OF OPERATION

On the measurement end, the input pressure p_E acts on the

① cell. The compensation pressure, which corresponds to the output pressure p_A , is applied to the back of the cell. The system is in equilibrium when the pressures are equal.

Thus: The amount of air supplied via the

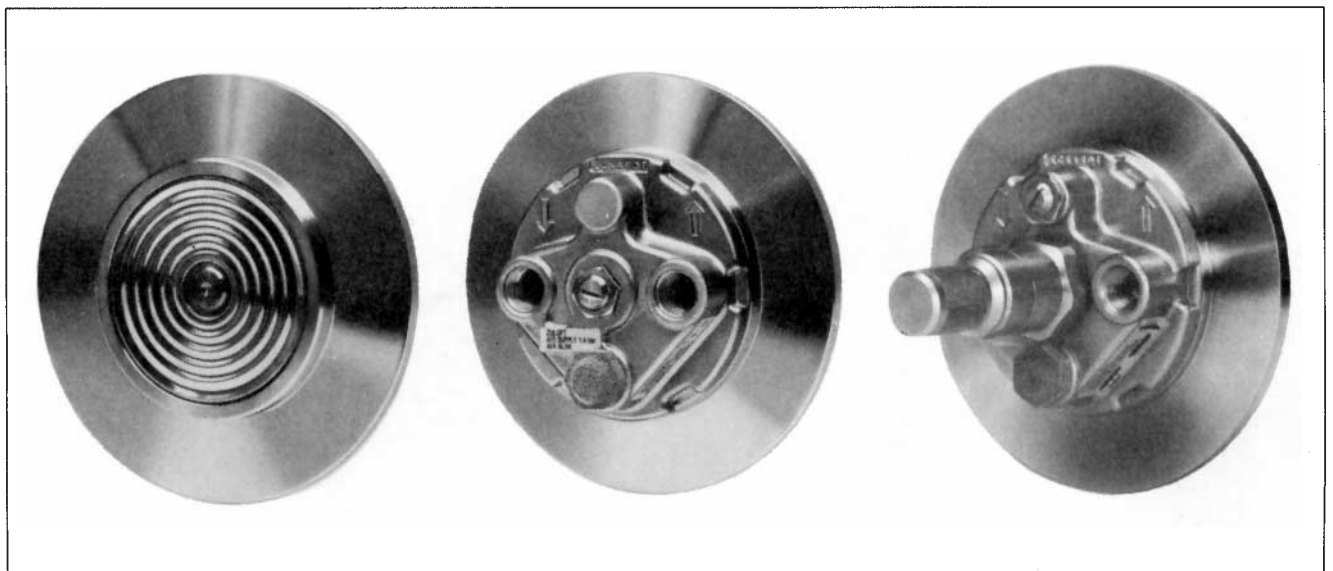
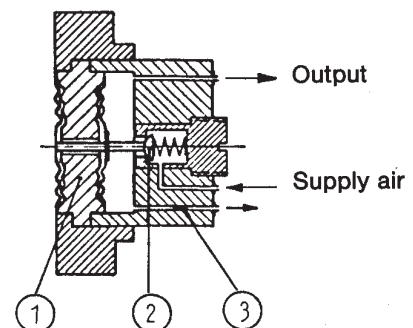
② control valve corresponds to the amount of air removed via the

③ adjustable vent throttle. If the input pressure p_E increases, the diaphragm assembly moves against the control valve (2), which increases the air supply until equilibrium is attained again with $p_A = p_E$.

If the input pressure drops, the diaphragm assembly moves away from the control valve, which reduces the air supply until p_A is reduced to p_E .

In pressure repeaters with zero suppression, the cell is pretensioned with a spring such that the repeaters can be used as of –0.5 bar.

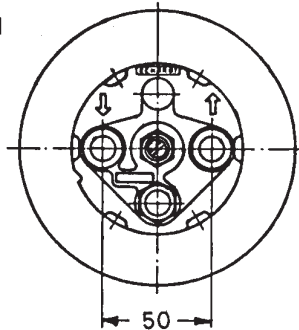
Basic diagram of 1:1 pressure repeater



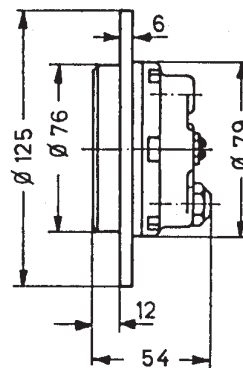
3 INSTALLATION

3.1 Dimensions

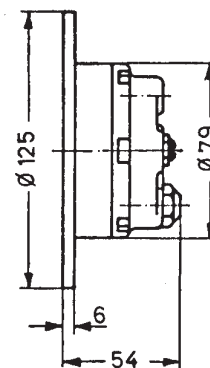
Pressure repeater 1:1



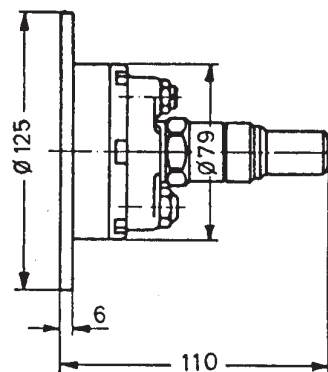
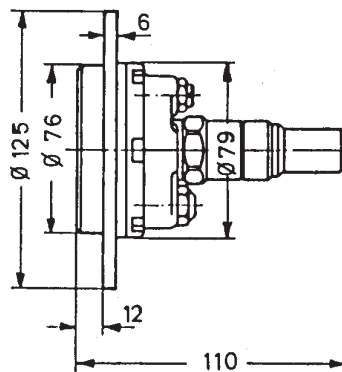
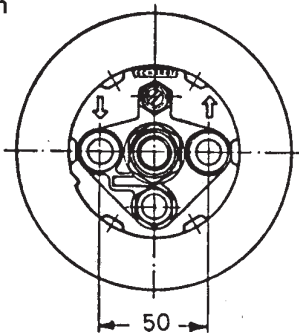
Diaphragm protruding,
cell bolted



Diaphragm flush with contact face,
cell welded-in



Pressure repeater
with zero suppression



3.2 Mounting of pressure repeater

The pressure repeater is flanged-on at the measurement location.

Use can be made of

④ flanges, DN 80 as per DIN 2501 Sheet 1 "Connection dimensions".

As unevenness at the support flange can lead to measurement inaccuracies of up to 1 mbar, only

⑤ compressible seals should be used.

As regards material selection, pay attention to resistance to process medium!

3.2.1 Pressure repeater with PTFE foil

Before mounting the pressure repeater, the PTFE foil is to be attached as follows:

Apply silicone fluid (2000 mPa · s) to medium end of pressure repeater until diaphragm is completely covered.

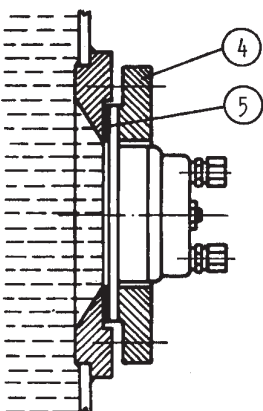
Uniformly moisten PTFE foil on raised side with silicone fluid.

Place foil on pressure repeater and eliminate air inclusions by forcing them outwards.

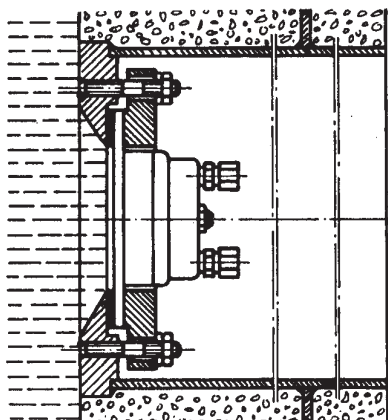
Mounting is performed in accordance with 3.2. Ensure that no air can ingress between foil and pressure repeater.

Mounting examples:

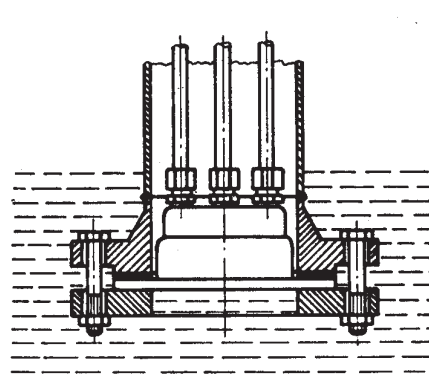
Container wall



Masonry ring



Immersion tube



3.3 Pneumatic connections

The

- ⑥ supply air connection and
⑦ output signal connection are designed as female
threads 1/4-NPT and marked by symbols (⇨).

3.4 Supply air

The magnitude of the supply air pressure depends on the maximum output pressure.

Max. ouput pressure	Supply air pressure
1 bar	1.4 bar
2 bar	2.5 bar
4 bar	4.5 bar
6 bar	6.5 bar
10 bar	11 bar

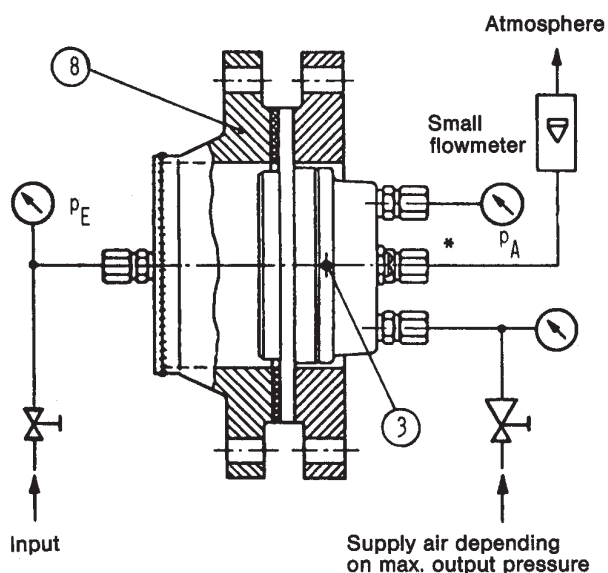
The supply air must be dry and free from oil and dust.

4 ADJUSTMENT

Adjustment can only be made in an

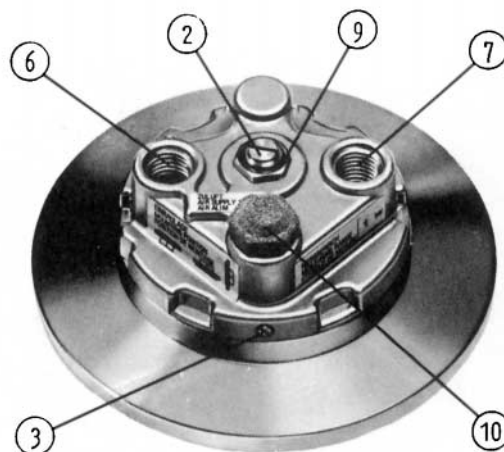
- ⑧ auxiliary device. The right-hand flange in the illustration should be provided with a groove or hole so that the vent throttle (3) is accessible from outside.

Example of measuring circuit and auxiliary device



*Sintered metal filter removed; small flowmeter attached by means of screw connection.

4.1 Adjustment of pressure repeater 1 : 1



Connect pressure repeater to measuring circuit in installation position. Set supply air pressure depending on output pressure range (see Table). Specify appropriate adjustment pressure on input end (see Table).

Loosen

- ⑨ lock nut 14 mm and, by turning control valve (2), adjust such that $p_A = p_E$.

Turning in a clockwise direction increases output pressure; turning in an anti-clockwise direction reduces output pressure.

After carrying out adjustment, secure control valve again with lock nut.

To adjust air consumption, unscrew

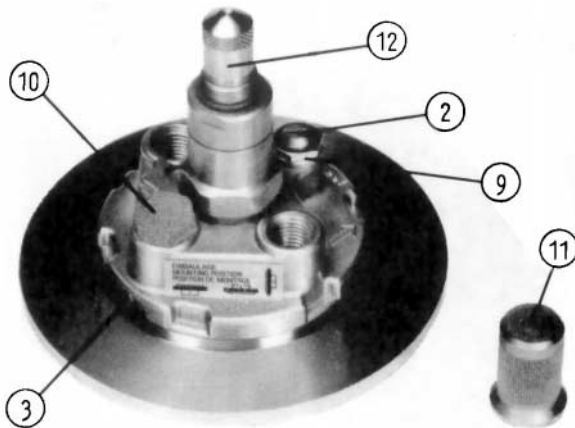
- ⑩ sintered metal filter, 17 mm and connect, via an adaptor with 1/4-NPT thread, a small flowmeter calibrated for measurement with respect to atmospheric pressure.

At maximum output pressure and by turning vent throttle (3) set corresponding air consumption (see Table).

Then specify adjustment pressure again and check output pressure; if necessary, correct setting of control valve.

Pressure range (bar)	Supply air (bar)	Air consumption at max. output pressure (l/h)	Adjustment pressure (bar)
0 – 1	1.4	120	0.4
0 – 2	2.5	160	0.7
0 – 4	4.5	210	1.3
0 – 6	6.5	260	2.0
0 – 10	11	360	3.3

4.2 Adjustment of pressure repeater with zero suppression



Unscrew

⑪ protective cap.

Completely detension suppression spring, i. e. disengage ⑫ adjusting nut by turning it in an anti-clockwise direction and remove.

Screw protective cap on again such that there are no leaks.

Connect pressure repeater to measuring circuit in installation position and perform adjustment as described under 4.1. Then allow input pressure to drop to 0 bar. Remove protective cap (11) and fit adjusting nut (12). With input pressure 0, increase output pressure by suppression value using adjusting nut. Then, as input pressure, specify adjustment pressure (see Table on page 3) minus suppression value. The output pressure must now attain the magnitude of the adjustment pressure; if necessary, perform correction by way of adjusting nut.

The following applies to pressure repeaters with zero suppression: $p_A = p_E + \text{suppression value}$

5 MAINTENANCE

5.1 Cleaning the measurement diaphragm

Should solids become deposited on the diaphragm, which impair the measurement accuracy of the pressure repeater, these are to be removed. Care is to be taken not to use any pointed or sharp-edged tools.

5.2 Cleaning the vent throttle

Unscrew vent throttle (3), clean in solvent (e. g. naphtha) and blow out.

Apply a small quantity of vaseline to O-ring and screw vent throttle in again.

It is appropriate to likewise clean or replace the sintered metal filter, 17 mm (10).

Re-adjust air consumption (see Section 4).

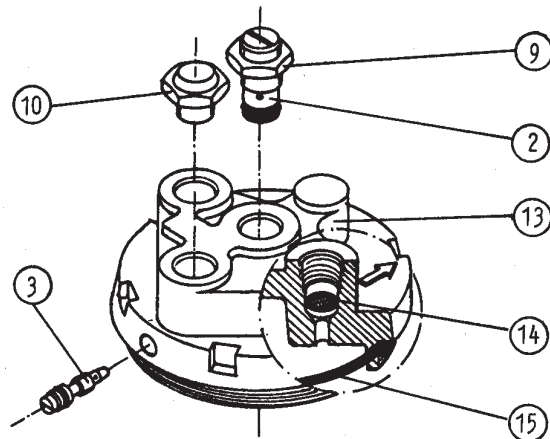
5.3 Cleaning/replacing the control valve

Loosen lock nut (9) and unscrew control valve (2). Clean the control valve in solvent (e. g. naphtha) and blow out. Do not disassemble!

If the valve seat is worn and the valve itself no longer closes properly, it is to be replaced.

Re-adjust pressure repeater (see Section 4).

5.4 Cleaning the control section



Screw

⑬ control section out of flange ring using socket wrench (see Fig. on Page 7) or pin spanner A 80 – 90 DIN 1810.

Loosen lock nut, 14 mm (9) and unscrew control valve (2). Remove vent throttle (3) and sintered metal filter, 17 mm (10).

Clean control section in solvent (e. g. naphtha) and blow compressed air through the air ducts and ⑭ sintered metal filter in the supply air and output signal connection.

Assembly is performed in reverse order.

Before screwing-in the control section, apply a small quantity of vaseline to the

⑮ sealing ring.

Re-adjust pressure repeater (see Section 4).

Caution!

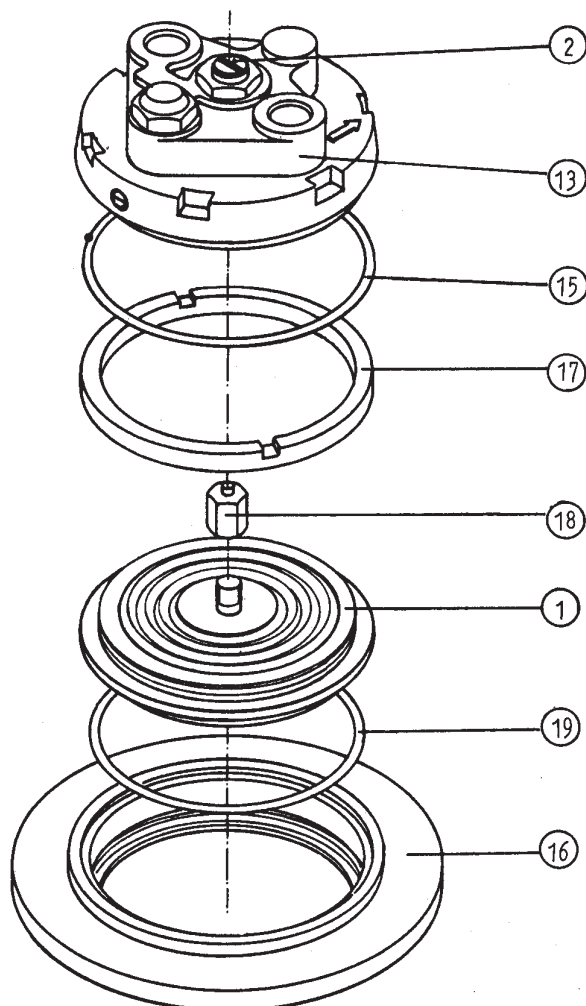
Pressure repeaters with zero suppression are to be disassembled as described under Section 5.5.2.

5.5 Replacement of cell

Note:

In the case of pressure repeaters in which the diaphragm and sealing strip are on one level, the cell can only be replaced together with the flange since both parts are welded together.

5.5.1 Pressure repeater 1 : 1



Screw control section (13) out of
⑯ flange ring using socket wrench (see Fig. on Page 7)
or pin spanner A 80 – 90 DIN 1810.

Remove

⑰ threaded ring using socket wrench (see Fig. on
Page 7).

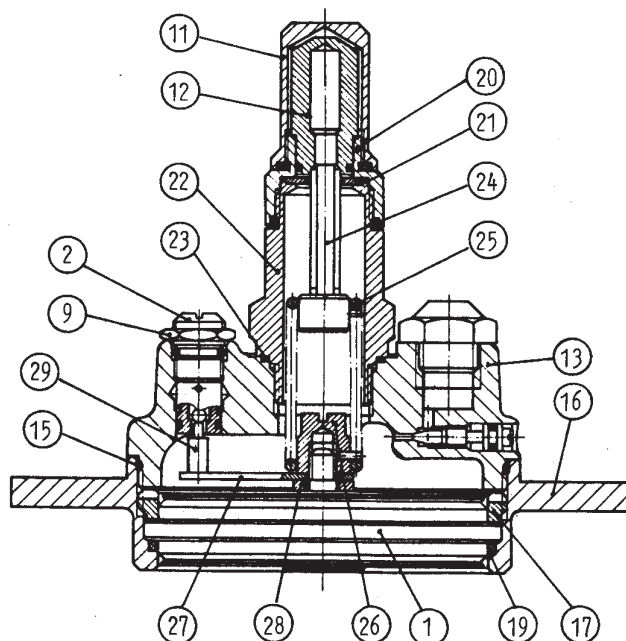
Remove cell (1) and unscrew
⑱ valve tappet.

Prior to installation of cell, replace
⑲ sealing ring.

Unscrew control valve (2) roughly 1 turn and screw
control section (13) in again.

Re-adjust pressure repeater (see Section 4).

5.5.2 Pressure repeater with zero suppression



Unscrew protective cap (11).

Disengage adjusting nut (12) by turning in an anti-
clockwise direction.

Remove

⑳ screw, 22 mm.

Remove

㉑ washer.

Unscrew

㉒ sleeve, 27 mm.

Remove

㉓ sealing ring.

Detach

㉔ threaded pin from

㉕ spring by turning in an anti-clockwise direction. To
do so, bend up end of spring slightly with screwdriver.
Loosen lock nut (9) and unscrew control valve (2).

Remove

㉖ threaded bushing together with spring.

Loosen control section (13) with socket wrench (see
Fig. on Page 7) or pin spanner A 80 – 90 DIN 1810 and
screw out of flange ring (16).

Remove

㉗ bracket and

㉘ ring.

Remove threaded ring (17) with socket wrench (see Fig.
on Page 7) and remove cell (1).

Assembly is effected in reverse order.

Before installing cell, replace sealing ring (19).

Proceed as follows when mounting bracket (27) and
control section (13):

Place ring (28) and bracket on cell. Mount control
section such that mounting hole of control valve (2) is
located centrally above the
㉙ valve tappet. Before doing so, apply a small quantity
of vaseline to sealing ring (15).

Insert centring pin (see Fig. on Page 7) through hole

onto valve tappet and screw in and tighten control section.

Secure bracket.

Remove centring pin and screw in control valve (2)

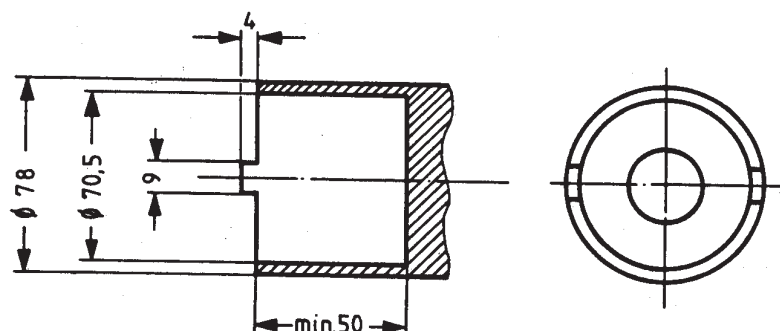
roughly 5 turns. Here again a small quantity of vaseline is to be applied to the sealing rings.

When all parts have been mounted again, adjust pressure repeater (see Section 4).

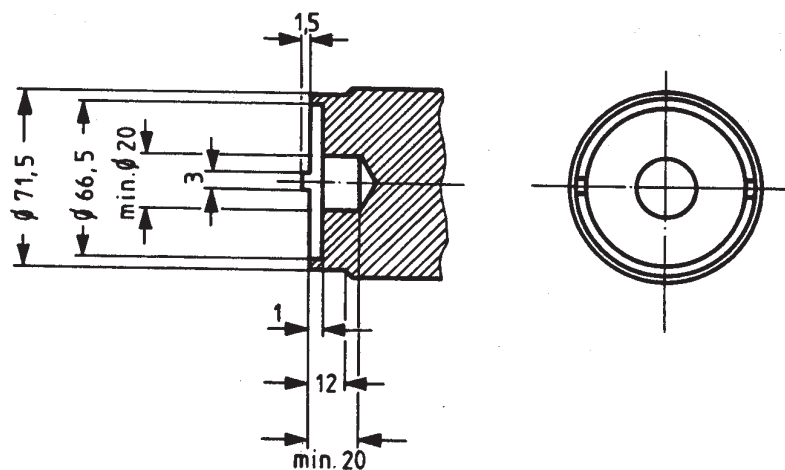
6 TROUBLESHOOTING

Fault	Possible cause	Remedy
No output signal	No supply air	Connect up supply air
Output \neq input or Output \neq input + suppression	Insufficient supply air pressure	Check supply air pressure, see Section 3.4
	Control valve dirty	Clean/replace control valve, see Section 5.3
	Vent throttle dirty	Clean throttle, see Section 5.2
	Sintered metal filter in supply air or output signal connection dirty	Clean control section, see Section 5.4
	Incorrect adjustment	Adjust device, see Section 4
Output signal only decreases slowly when pressure changes	Sintered metal filter of vent hole dirty	Unscrew and clean sintered metal filter (10)
	Vent throttle not wide enough open	Check air consumption, if necessary readjust, see Sections 4.1 and 4.2

Socket wrench for control section (13)



Socket wrench for threaded ring (17)



Centring pin

(required when assembling pressure repeaters with zero suppression, see 5.5.2)

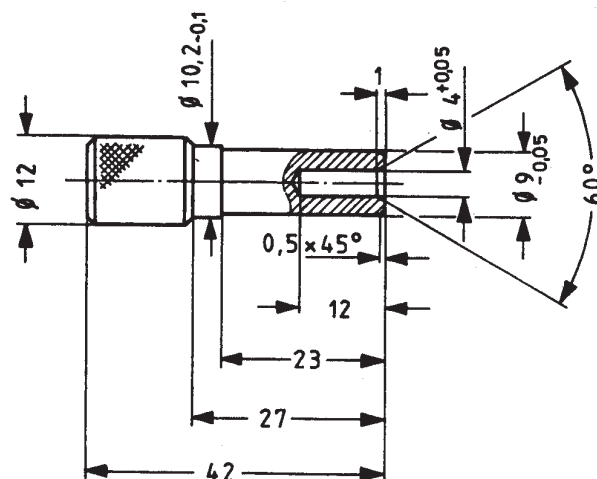


TABLE OF CONTENTS	PAGE
1 GENERAL	1
2 METHOD OF OPERATION	1
3 INSTALLATION	2
3.1 Dimensions	2
3.2 Mounting of pressure repeater	2
3.2.1 Pressure repeater with PTFE foil	2
3.3 Pneumatic connections	3
3.4 Supply air	3
4 ADJUSTMENT	3
4.1 Adjustment of pressure repeater 1:1	3
4.2 Adjustment of pressure repeater with zero suppression	4
5 MAINTENANCE	4
5.1 Cleaning the measurement diaphragm	4
5.2 Cleaning the vent throttle	4
5.3 Cleaning/replacing the control valve	4
5.4 Cleaning the control section	4
5.5 Replacement of cell	5
5.5.1 Pressure repeater 1:1	5
5.5.2 Pressure repeater with zero suppression	5
6 TROUBLESHOOTING	6
7 AUXILIARY TOOLS	7

Subject to alterations - reprinting, copying and translation prohibited. Products and publications are normally quoted here without reference to existing patents, registered utility models or trademarks. The lack of any such reference does not justify the assumption that a product or symbol is free.

FOXBORO ECKARDT GmbH

Postfach 50 03 47

D-70333 Stuttgart

Tel. # 49(0)711 502-0

Fax # 49(0)711 502-597

 **Invensys**
An Invensys company