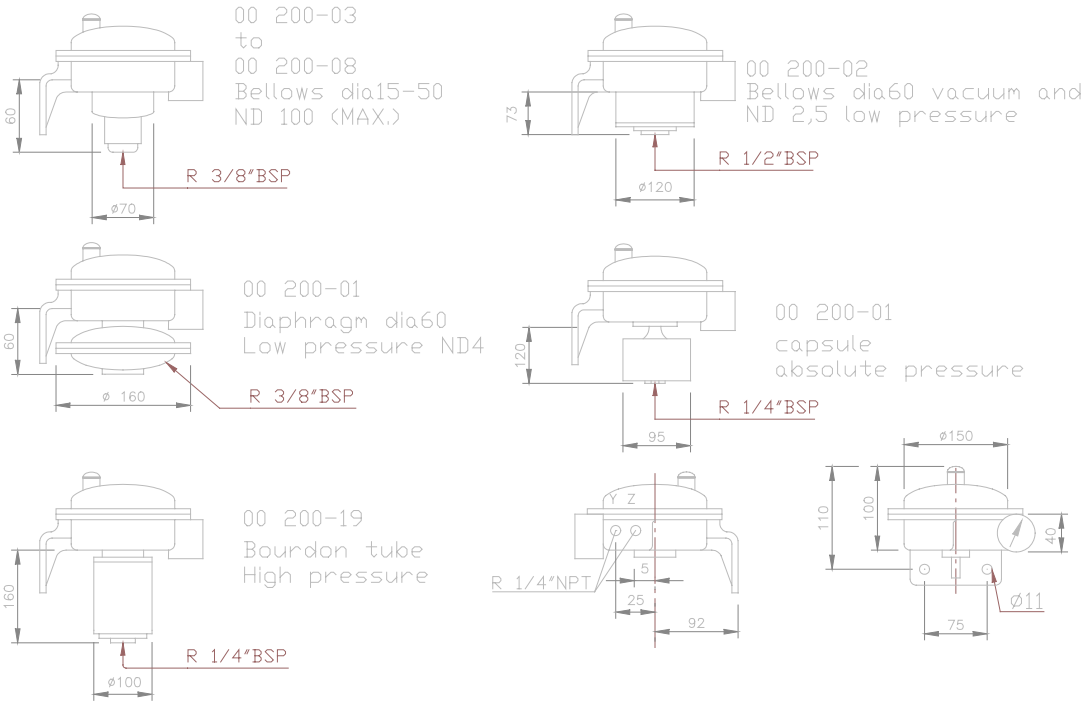
1. ABOUT THE PRODUCT:

a General Description:

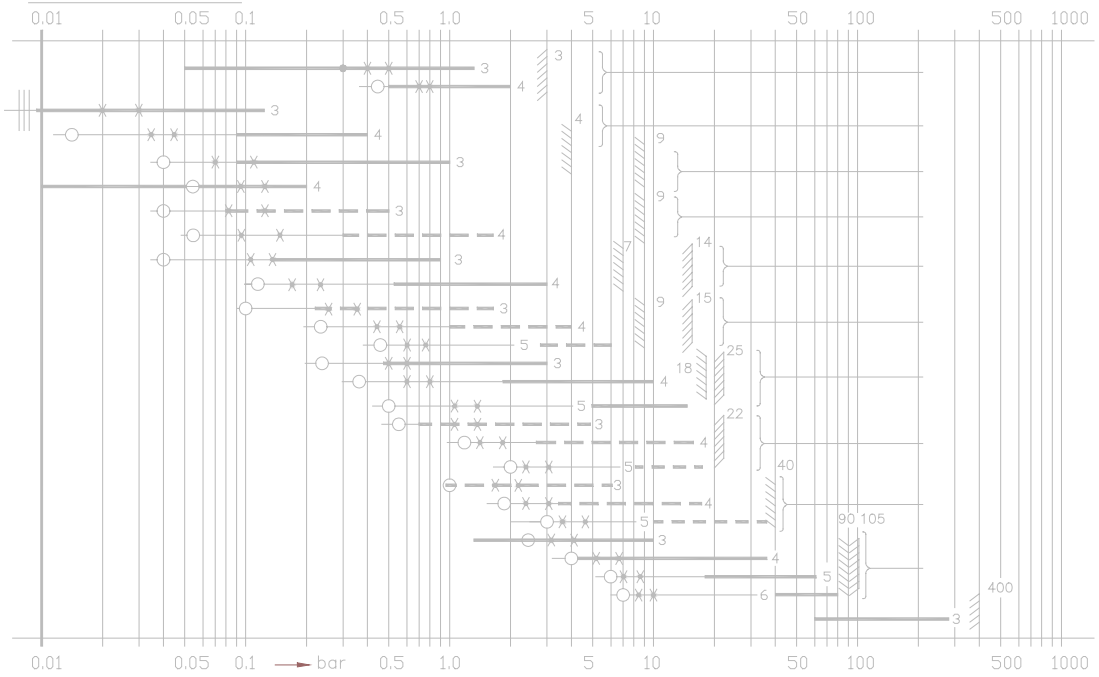
This Valve Mounted pressure controller is a yet solid one for direct mounting to the control valve and direct impulse connection for various pressures including vacuum and absolute pressures.

It has the following outstanding characteristics:

1. **Separate interchangeable measuring units.**
2. **In-built supply air restrictor and output damping throttle.**
3. **Reversal of action without additional parts.**



Set point range:



The tabuler notes the range of set point according the numbered spring-diameter
0 = Propartional band 1) w/o feed back
* = proportional band 1) adjusttable on feed-back spring
1) measured on nozzle dia. 3mm (nozzle dia. 2mm approx. 60%)
Max. allow. pressure : tombac/bronce ⧵ SS316 bellows ⧵

FIG.B

b Specifications:

Measuring Range	:	0.02 To 400 Bar
Absolute Pressure	:	0.05 To 3 Bar
Vacuum	:	0-1 Bar Low Pressure
Supply Air Pressure	:	1.4 Bar
Control Pressure	:	0.2-1 Bar
Set Point/Actual Value	:	See Fig. No. B
Speed Of Response Range	:	<0.02% Of Medium Set Point
Reversal Range Point	:	<0.033% Of Medium. Set
Hysterisis Range	:	<1.1% Of Medium Set Point
Dependence On Supply Pressure	:	<0.4% Per 0.1 Bar
Air Consumption	:	300 NL/hr On Y=0.6, Z=1.4, Nozzle=Dia. 0.2
Valve Speed	:	40 Sec. Up/ 5 Sec Down Nozzle 2, Actuator UI-30 140 Sec Up/20 Sec Down Nozzle 2, Actuator UIII-60.

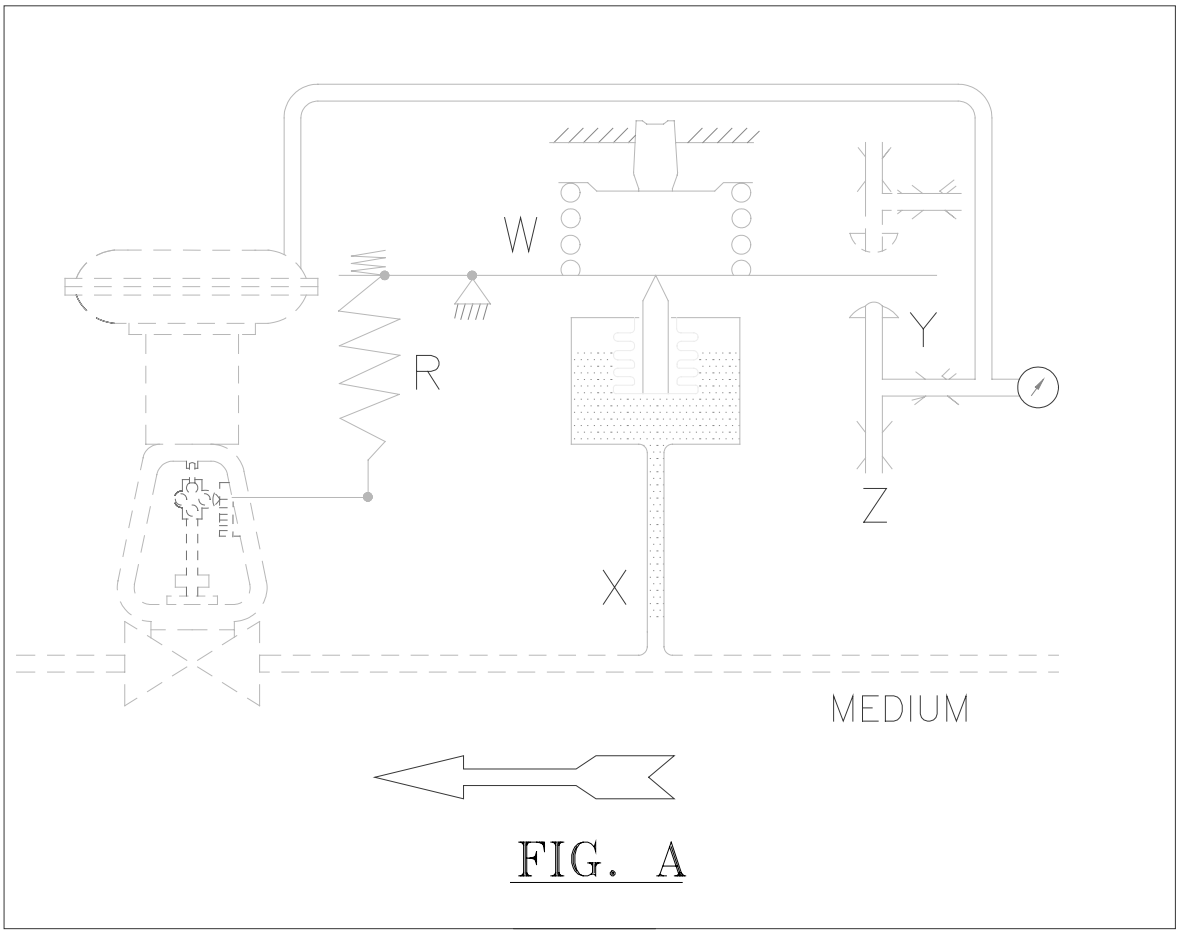


FIG. A

c Operation:

Ref. Fig.

The pressure to be controlled, ‘x’, which is acting on the measuring unit (bellows, diaphragm, etc.) is compared to a set point spring, ‘w’. Any deviation in ‘x’ alters the valve diaphragm pressure ‘y’ at the nozzle, altering the flow to the actuator and thereby the lift. This alteration in lift is fed back to the controller via the adjustable spring ‘R’.

2. GETTING STARTED:

a. Installation:

The pressure control valve should be stored in its original packing until it is mounted. The storage area must be dry and clean. After mounting the valve should be supplied with control air, this is best protection against fouling and corrosion.

The protection caps of the valve openings, of the filter and regulating valve and of the pressure controller have to be taken off. If there are conservatives in the spindle area of the valve, they have to be removed carefully.

The diaphragm control valve is mounted vertically standing up with actuator on top. The mounting place has to be easily accessible. Maximum allowable temperature is 80 degrees centigrade.

The impulse connection is taken at about 1-2 m after the control valve. The point of pressure taking has to be provided with a stop valve, so that in case of troubles you can get the measuring system free of pressure. Pressure tapping from a vertical line where the point of tapping is above the measuring chamber is ideal. In this case the measuring line can remain filled, and the possibility of air inclusion cam be eliminated. With viscous media the tapping point has to be provided with a separating vessel as to avoid delays in pressure transmission.

The separating vessel should be mounted as near as possible to the tapping point.

b. Mounting Instruction For Pressure Controller

Before connecting the air supply to the air filter and regulator, the newly laid airline should be carefully blown out to line and it should be examined for any possible leakages.

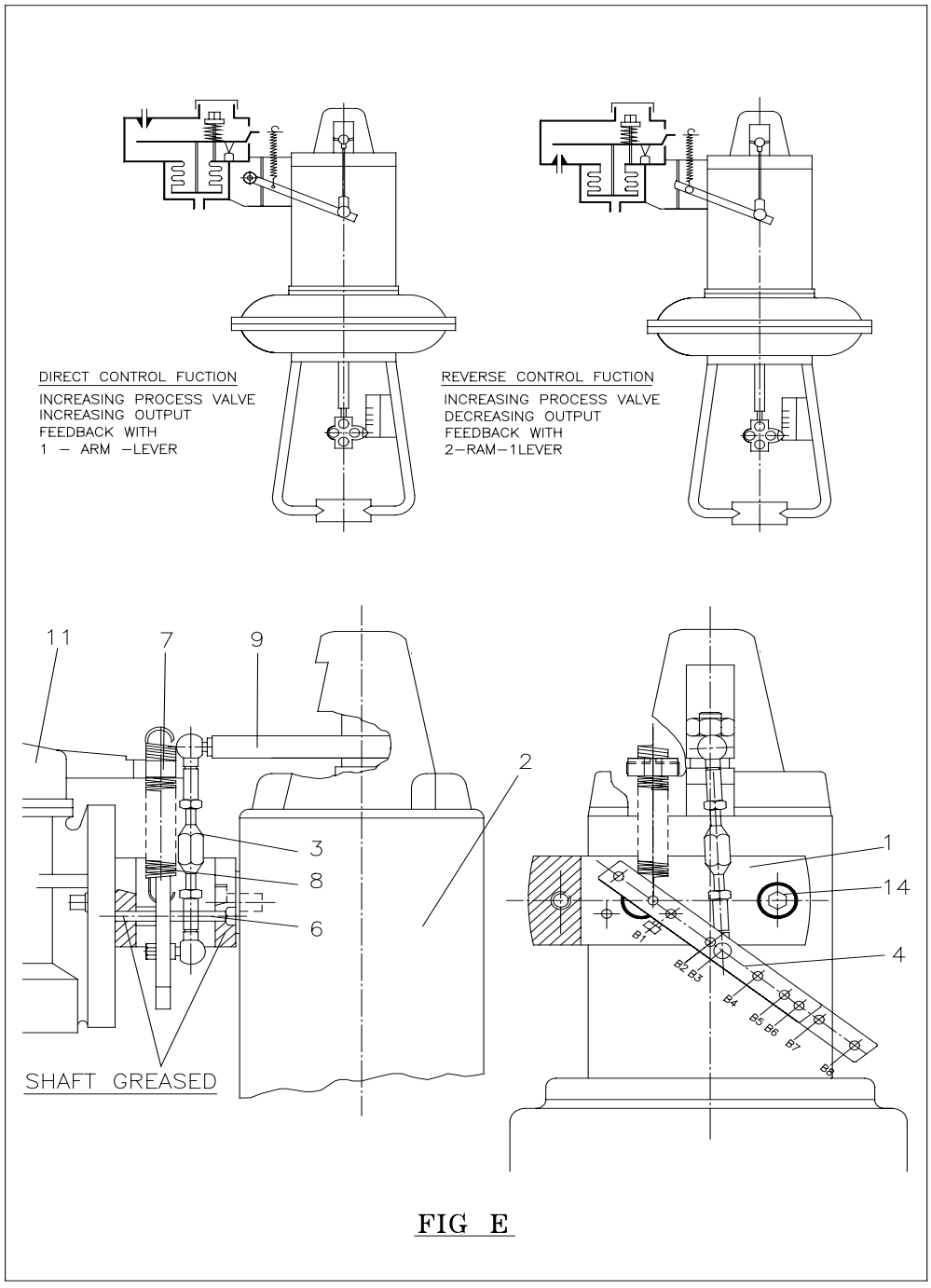
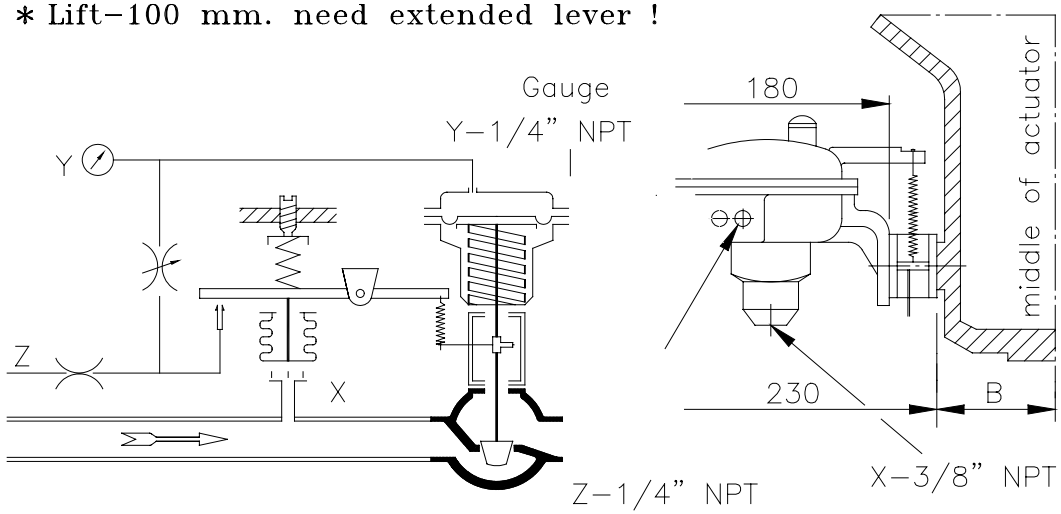
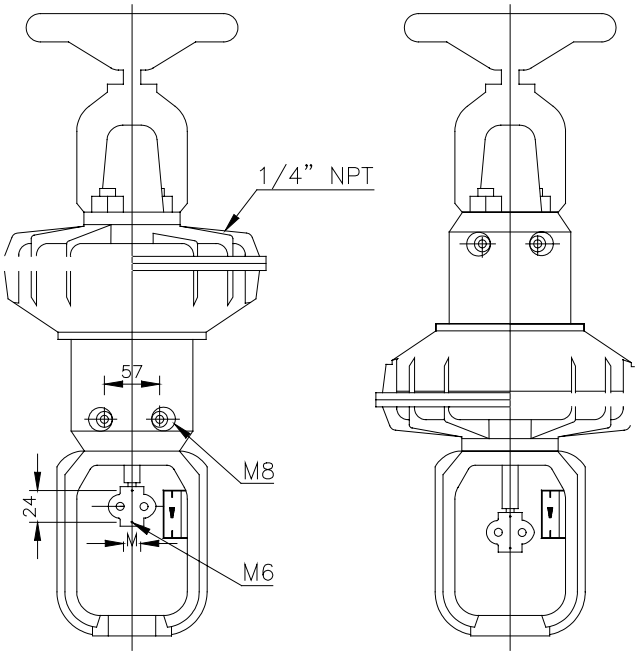


FIG E

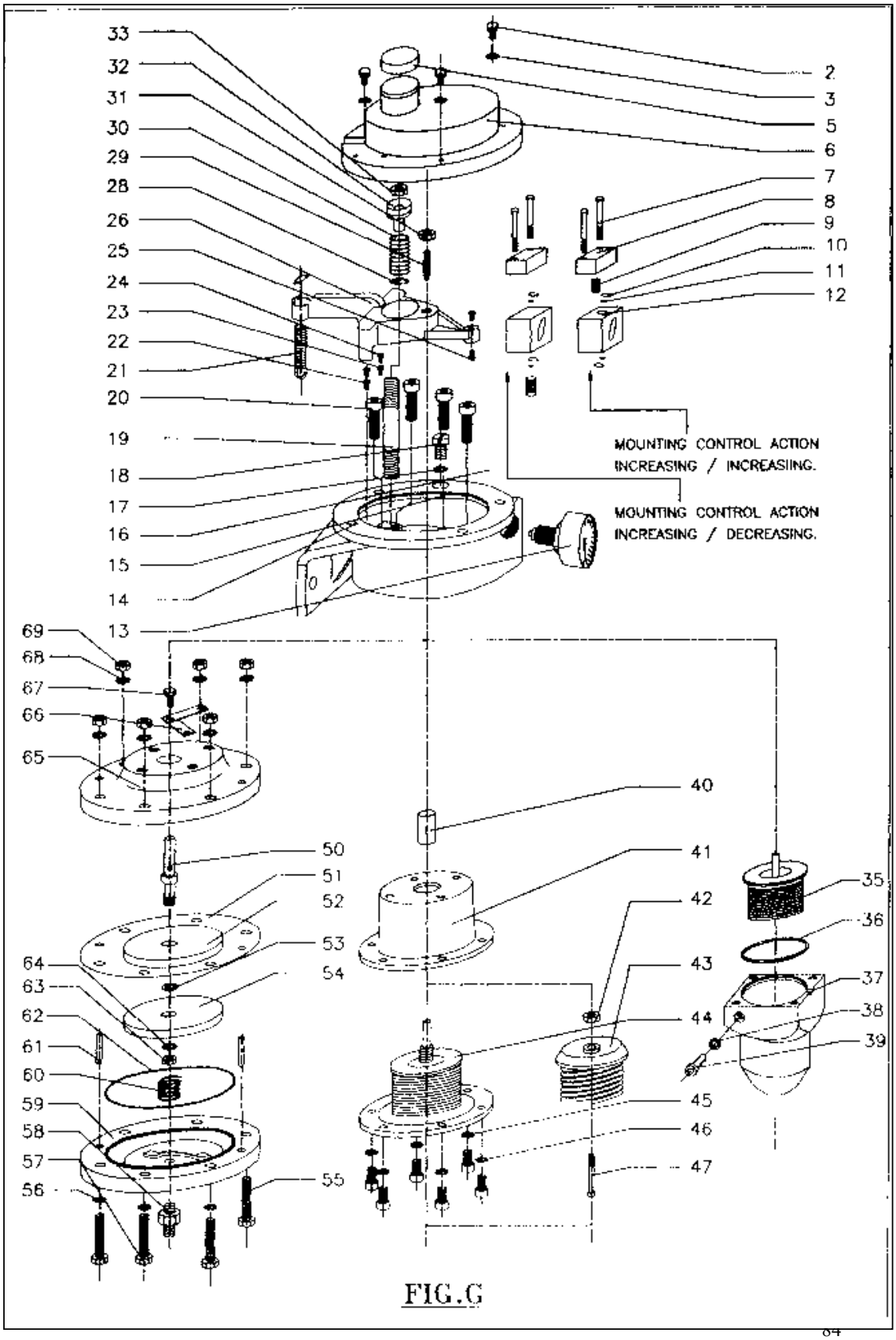
ACTUATOR/VALVE LIFT (stroke)	Hole – No. 1–arm–lever	Hole – No. 2–arm–lever
20 mm.	B 1	B 2
30 mm.	B 2	B 3
60 mm.	B 6	B 5
100 mm.*	B 8	B 8

* Lift–100 mm. need extended lever !





Dimension 'B'
for small actuatros
50 – 65 mm.
AND
for large actuators
90 – 120 mm.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MOUNTING CONTROL ACTION
INCREASING / INCREASING.
MOUNTING CONTROL ACTION
INCREASING / DECREASING.
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FIG.G

c. Pressure Controller Part List :

d. Commissioning The Product:

Ref. Fig. G:

On start up the required air-supply is adjusted, at the AFR. The supply pressure should be about 0.5 bar higher than the maximum operating pressure of the connected control actuator. (See nameplate: CONTROL RANGE). The air is checked for moisture, dirt, etc. by operating the drain valve.

The set-point spring (30) is relieved (-) by turning the nut anti-clockwise direction. The operating pressure Y now increases up to maximum value and control valve closes. The Control Valve can, now be started as follows.

Open the impulse valve slowly de-aerating the measuring chamber.

Tighten slowly the Set-point spring (+) until the valve begins to open. Set the spring tension to the desired set pressure.

If controller oscillates, the measuring chamber must be de-aerated again. If this does not improve the situation, the proportional range has to be enlarged by feedback-spring (21).

If the controller remains unsteady, screwing in the damping throttle can damp the control pressure Y to the Diaphragm chamber. (16)

After start up the following service has to be done. Examine if hand-wheel is in end position and secured by lock pin. Slightly tighten stuffing box nut to avoid leakage of media. Tighten all nuts on valve.

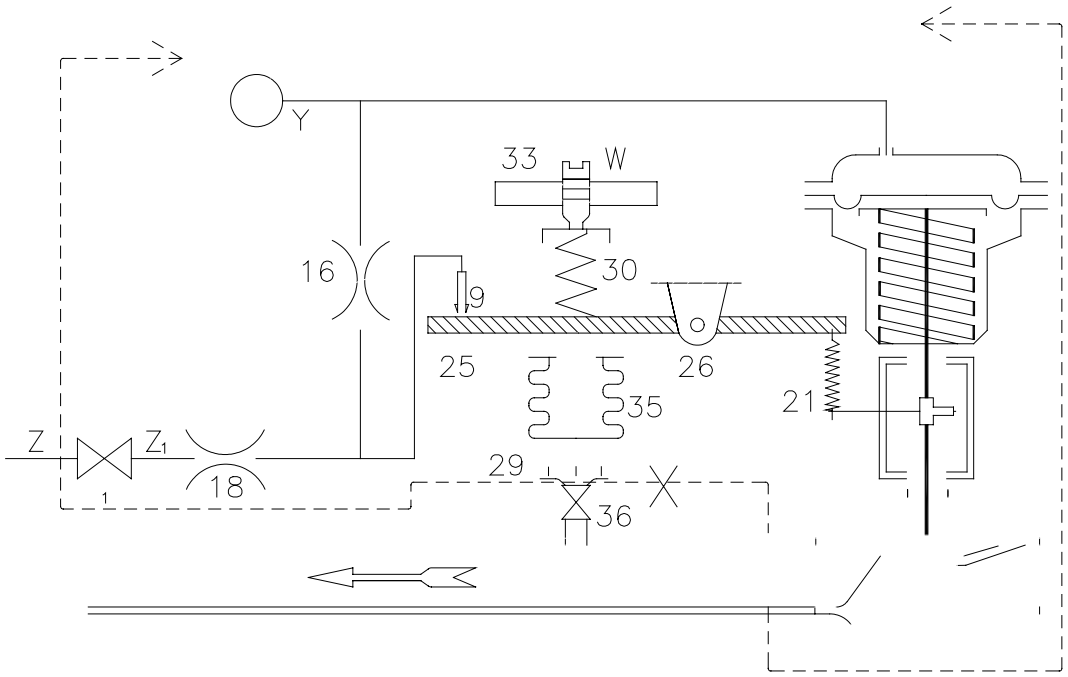

FIG.H

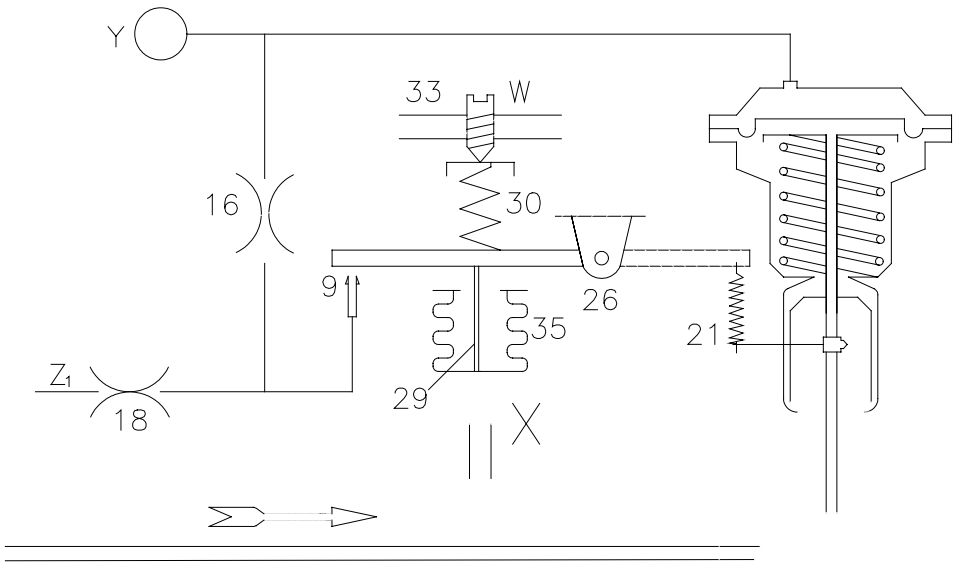

FIG.I

3. OPERATION AND MAINTENANCE:

a. Basic Functions:

PRESSURE REDUCING CONTROLLER:

The FM valve pressure reducing controller works as a pressure-reducing valve. If the set pressure value is surpassed, the control valve closes and reduces the pressure. Air is supplied at pressure Z which is to be free from dust, oil and water of at-least 4 Bar. The supply pr. to Roboter. Z1 is adjusted on the Air Filter Regulator (1). The supply air reaches the nozzle flapper system through the constant restrictor (18). The flapper (25) at the nozzle lever (26) covers the nozzle (9) more or less depending upon the pressure deviation at the bellows (35). This in turn changes the control pressure y supplied to the actuator. The air supply is limited to a fixed value by the fixed throttle (18) so that with open nozzle, the pressure goes towards zero and the actuator can assume the fail-safe position as determined by the spring. (In the given fig. Actuator is mounted in air to close position) At the outer end of the lever (26), an adjustable feedback spring (21) is connected. By blocking some spring threads, the feedback force can be changed depending on the lift position of the control valve. If the feedback spring is tightened, the proportional range is widened and the control loop is attenuated. If the feedback spring is loosened, the proportional range is shortened and the control loop reacts more sensitively and may even tend to vibrate. The output signal y can be dampened by a damping throttle (16). The set-point spring (30) secures the lever (26) in its bearing and counteracts the force on the impulse pressure, X, at the measuring system. The bellows assembly consists of the below (35) and the thrust bolt (29). Depending on the impulse pressure X at the bellow (35), the distance between nozzle and flapper is changed and thereby the control pressure Y.

Referring to **Fig** H, when impulse pressure increases the lever moves upwards, nozzle closes, control pressure increases and valve closes. On decreasing impulse pressure X, the lever moves down, nozzle opens, control pressure decreases and valve opens. The set value of the spring W can be adjusted by a nut (33) by tightening & releasing the spring tension (30) .On the cover this tightening or loosening is marked as "+" or "-" respectively. If set-

point spring is tightened (+) control pressure Y decreases, set value W increases. If set point spring is loosened (-), control pressure increases, set value W decreases. The air supply is limited to a fixed value by the constant fixed throttle (18) so that; it opens nozzle *the* pressure goes towards zero and the actuator can assume the fail-safe position as determined by the spring. (In the given fig. The Actuator is mounted in air to close position). At the outer end of the lever (26) an adjustable feedback spring (21) is connected. By blocking some spring threads, the feedback force can be changed depending on the lift position of the control valve. If the feedback spring is tightened, the proportional range is widened and the control loop
Is attenuated. If the feedback spring is loosened, the proportional range is shortened and the control loop reacts more sensitively and may even tend to vibrate. The output signal V can be dampened by a damping throttle. (16).
2.2 The set-point spring (30) secures the lever (26) in its bearing and counteracts the force on the impulse pressure, X, at the measuring system. The bellow assembly consists of the bellow (35) and the thrust bolt (29). Depending on the impulse pressure X at the bellow (35), the distance between nozzle and flapper is changed and thereby the control pressure V.

Referring to Fig. No. 1, when impulse pressure increases the lever upward, nozzle opens, control pressure decreases and valve opens.

The set value of the spring W can be adjusted by a nut (33) by tightening or releasing the spring tension (3.0) On the cover this tightening & loosening is marked as "+" respectively. If set-point spring is tightened (+) control pressure y decreases, set value W increases. If set-point spring is loosened
(-), control pressure increases, set value W decreases.

4. TROUBLE SHOOTING:

In case there is trouble in starting, the valve can be operated in any position by means of the hand-wheel It is to be noted that after manual operation, the hand-wheel should always be set back into end position and locked by means of a lock pin. In case of Viscous media the application of a separating vessel is necessary, the installation should be arranged as showing Fig numbers' (a) & (b).
The lines have to be, arranged with a slope of 1: 10 so that the enclosed air bubbles can go up to the de-aeration points. Before start-up the impulse lines, controller and separating vessel should be carefully filled with a separating, liquid (e.g. Barium Chloride or Glycerin) .It has to be observed that the least possible air enters into the system. Then the valve is to be carefully opened. The media exerts pressure on the separating liquid in the separating vessel and the system is once more de-aerated. This is very important as the air bubbles rise in the measuring system and cause oscillation.

Q1] How to change springs and bellows?

Remove the cover [6] by unscrewing the M5x10L screws [2](4 noose).
Unscrew the hex-nut [33].
Take-out the bearing [32].
Take-out the spring [30] and spring-plate attached to it [28]. Turn the notches using Plyer; ensure that the notches are not damaged. Now take out the spring and replace with new.

For bellow: 3.5] remove the cover [6] by unscrewing the M5x10L screws [2](4 nos.).
Unscrew the Allen-bolt (M8x35) [20] 4nos. Remove the bellow chamber assembly [37].
Replace bellow with new one.
Fix the new bellow by tightening Allen-bolt
(M8x35) [20].

Q2] How to adjust Roboter settings for given valve lift?

Check what is the set pressure of valve – check the action of Roboter. Suppose the valve is 80#150. Observe on the VDS. The set pressure and the action of Roboter are given on it. Suppose the action is reverse acting down stream control and set pressure is 4.5 bar. Also check spring and bellow size as per the VDS.

Remove the cover [6] by unscrewing the M5x10L screws [2](4 nos.). Take out the ball bearing [32], hex nut [31], set point spring [30].

Polish the flapper [25] with smooth polish paper and needle file and hit the contact screw [29] by soft headed mallet/hammer to make the nozzle [9] impression on flapper [25]. Check for impression. If not there, on the flapper r then repeat above steps.

Give air supply to AFR. Adjust the pressure of the air between (3-3.5 bar). Rotate the hex nut [31] in clockwise direction so that the valve opens fully [i.e. 30 mm for given valve. Check the pipeline for air leakage by spraying soap solution near all the joints. There must not be any leakage. Rotate the hex nut [31] in anti-clockwise direction until the valve is 50% open i.e. 15mm. Check the double arm lever [ ] to be horizontal. If not then by rotating the adjustment lever [ ] make the double arm lever horizontal. Rotate the contact screw [29] making it touch the bellow [44]. Again, rotate it 1 ½ [1.5 mm] rotation of contact screw. Now the valve should be completely close. [If not the Roboter is to be replaced completely.] Apply set pressure 4.5 bar through siphon. If siphon is not used then bellow might get burst. To check the bellow chamber is completely filled observe the flowing medium coming out at the air vent port. Now tight the air vent screw [39].

Rotate the hex nut [33] up to 50 % opening of the valve. Increase the set pressure 4.5 bar till the valve is fully closed. Ensure output pressure [p1] on the gauge [13] to

be zero or less than operating control range of valve. Note that pressure. Then decrease the pressure [p2] bellow 4.5 bar. Do it until the valve gets open fully. Apply set pressure 4.5 bar and ensure the valve is 50% open.

To check smooth operation of the valve we should check the proportionate band. {= (P1-p2)/(set pr. X 100)} this formula should give result between 10 % to 40 %.

Q3] How to change the nozzle?

Remove the cover [6] by unscrewing the M5x10L screws [2](4 nos.).
Unscrew the hex-nut [33].
Take-out the bearing [32].
Take-out the spring [30] and spring-plate
attached to it [28].

Remove the flapper lever [26]. Unscrew the (m4x40) screw 2nos. [7]. Take out the traverse [12] and traverse head assembly [8]. Unscrew the nozzle [9] and replace with news.
Assemble in reverse as above steps.
Recalibrate.