CONFLOW s.p.a.

COMPANY
WITH QUALITY SYSTEM
CERTIFIED BY DNV
ISO 9001

104n	
05	1995

INSTALLATION AND MAINTENANCE INSTRUCTIONS

TRASMITTER CONTROLLER

80 SERIES

CE

Servizio Assistenza - Servicing Department

INDEX

1. INSTALLATION

2. CONNECTIONS

3. COMPRESSED AIR SUPPLY

4. PNEUMATIC CONTROL VALVE INSTALLATION

5. DIRECTION OF CONTROL ACTION

6. OPERATION OF A CONTROLLER

7. AUTOMATIC/MANUAL SELECTION PANEL

8. ROUTINE MAINTENANCE

9. CLEANING CONTROL UNIT AND AMPLIFIER RELAY

10. DIMENSIONS

11. CALIBRATION

In case of problems with the installation or operation of this equipment please contact our Local Agent or our Service Department in Cernusco.

1. INSTALLATION

The Series 80 instruments are equipped with four standard legs for immediate installation in a panel or wall mounting.

Panel installation: Insert the instrument housing into an opening made in the panel and fasten it in place by means of the four legs and the corresponding adapter plates.

Wall mounting: Wall mounting requires the installation of two metal brackets which have legs for fastening to the wall. The instrument housing is fastened by means of four 6 MA screws screwed into threaded holes in the legs. The center distances of the threaded holes in the mounting legs are indicated in the attached layout drawing.

The Series 80 instruments can also be mounted on a horizontal or vertical tubular support. On request, a clamp, complete with adapter plate, is available for mounting the unit on a 2" tube. Particular attention must be paid to the selection of the best site for the installation of the instruments, to protect the equipment from exposure to vibrations or corrosive vapors, moisture, and to keep it from ambient temperatures which are lower or higher than the minimum and maximum limits specified.

2. CONNECTIONS

The pneumatic connections are located on the rear of the instrument housing, at the bottom, and are identified by corresponding inscriptions.

"SUPP": Air input (Supply)

"OUT": Air output (Control signal)

The measurement input is located at the top rear of the instrument housing, the following elements are available:

Temperature element = stainless steel capillary outlet, bulb with threaded fitting diam. 1/2", 3/4" NPT or BSP
Pressure element = threaded fitting diam. 1/2" BSP-M
Receiving element = threaded fitting diam. 1/4" NPT-F

The fittings of the pneumatic connections are complete of self-tightening connections suitable for use on 4x6 mm copper or nylon tubing.

3. COMPRESSED AIR SUPPLY

The results which can be achieved using the pneumatic instrumentation are strictly dependent on the purity of the air supply. Our control units are designed for an air supply at a constant pressure of 20 psi (1.4 atm). A filter, generally an integrated filter, must be installed in the air pressure relief system upstream of each instrument.
It is essential to avoid potential problems caused by rust, by making pneumatic connections using non-ferrous material (copper, nylon, etc.) If possible, the supply line must run toward the instrument maintaining a slope of not less than 2% from the horizontal. The connection of the supply line to the compressed air manifold must be made in the upper part of the tube to keep condensate from reaching the instrument. If necessary, a moisture trap must be installed upstream of the filter for the preliminary removal of any water and oil in the air. For the correct operation of the filter-reducer, the air input pressure must not be less than 2.8 - 3 atm. We advise against the indiscriminate use of a single reducer for the air supply to more than one instrument, because unforeseen variations in air consumption due to the simultaneous operation of several instruments may adversely affect the operation of the individual control units.

4. PNEUMATIC CONTROL VALVE INSTALLATION

The control signal output by the controllers has a standard value of 3-15 psi (0.3-1.05 atm). The signal must be transmitted to the pneumatic control valve via a copper or nylon tube as shown in Figure 1.

It is essential that the connection line be completely airtight, since even minimal air losses would change the characteristic of the control action. We recommend checking the line for leaks by spraying all joints and connections with soapy water. Before installing the pneumatic valve, make certain that the lines which transport the process fluid are clean by blowing a strong blast of steam or compressed air through the tube, if possible. The installation of a filter upstream of the valve will prevent the potential entry of dirt and contaminants into the throttling mechanisms. For systems which are in continuous operation, to make it possible to perform periodic maintenance on the valve, we advise the installation of two cutoff valves and one bypass valve. The bypass valve can be used to manually control the process when the control valve is disconnected for any reason.

The two cutoff valves upstream and downstream of the control valve must each have a passage diameter equal to that of the line in which they are installed.

The bypass valve will preferably have a passage diameter equal to that of the control valve, which will facilitate manual control operations. When installing the pneumatic valve, make certain that the flow direction of the valve is the same as the flow direction of the fluid in the tubing.

1) Series 80 indicator control unit
2) Line filter
3) Pneumatic control valve
4) Cutoff valve
5) Bypass valve
6) Pressure reducer filter
7) Instrument air cutoff valve

A- Capillary thermometer element (integral part of instrument)
For temperature controllers

B- Pressure tap with diam 1/4" tube and valve (connection not included in instrument)
For pressure controllers

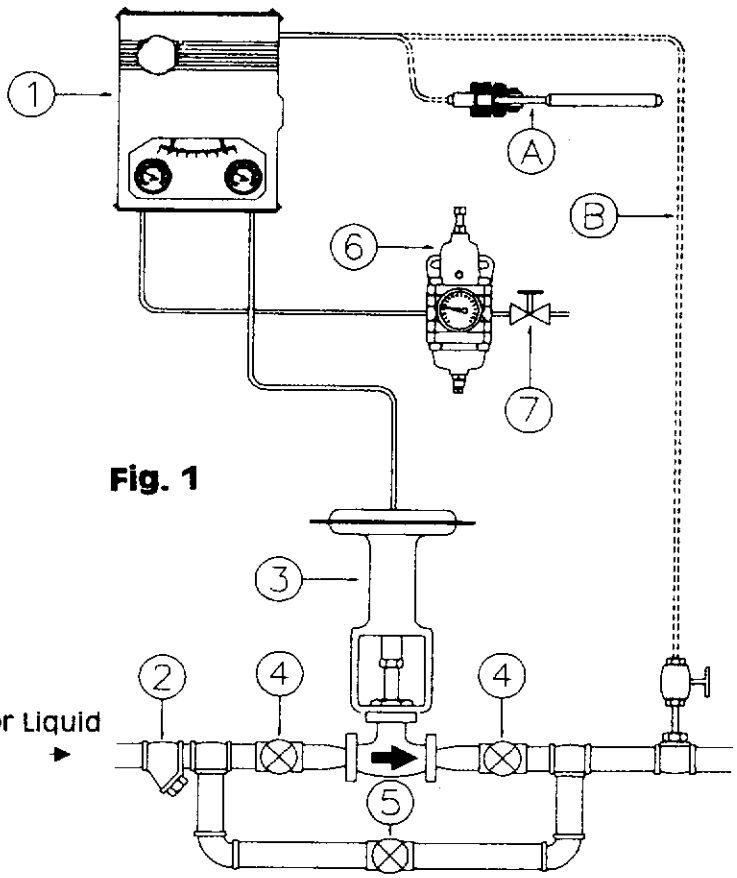


Fig. 1

5. DIRECTION OF CONTROL ACTION

The action of the pneumatic control elements can be changed from direct action (output signal increases as the variable increases) to reverse action (output signal increases as the variable decreases) or vice-versa, simply by moving the selector ring to the desired type of operation.

6. OPERATION OF A PROPORTIONAL / P + I CONTROLLER

If the control unit has an automatic/manual selector, set the selector to the "automatic" operating position.

A - Connect the unit to an air supply at 20 psi and temporarily open the bleed valve of the reducer filter until any condensate has been completely discharged.
B - Make certain that there are no air leaks in the connection to the control valve.
C - Use the knob (25) to position the red indicator (22) to the desired value.
D - Use the ring (10) to adjust the proportional band to a width of 20%, making certain that the action of the instrument (direct or reverse) is the type of operation required.
E- Turn the integral knob (49) to bring the automatic selector to the value of 0.5 repetitions a minute (for the P+I control).
F - If the pneumatic valve (3) is equipped with a bypass, make certain that the valve (5) is actually closed and the downstream cutoff valve is fully open. See Fig. 1.

Slowly open the cutoff valve (4) installed upstream of the pneumatic valve in steps, until the black measurement indicator is close to the red indicator at the desired value. Continue this operation until the cutoff valve reaches the fully open position.

FOR THE PROPORTIONAL CONTROL ONLY

G - If the control setting tends to fluctuate with continuous oscillations of the black indicator in relation to the red indicator, gradually increase the width of the band in steps as far as necessary until stability is restored.

H - To make certain that you have selected an appropriate value for the proportional band, initiate a deliberate disruption by rapidly moving the red indicator from the setpoint. If oscillation occurs, slightly widen the proportional band, repeating the operation until stability is restored. The best control is obtained with the narrowest proportional band which is compatible with the stability of the process at the various loads.

I - The black measurement indicator frequently does not coincide perfectly with the red indicator at the setpoint. To eliminate the difference, turn the manual reset knob (item 14 fig.2.1) slightly. See Figure 2.

FOR THE PROPORTIONAL + INTEGRAL CONTROL UNIT

G - If the control setting tends to fluctuate, with continuous oscillations of the black indicator with respect to the red indicator, gradually increase the width of the proportional band in steps beyond the value of 20% initially specified. If increasing the width of the proportional band does not reduce the fluctuation, turn the integral control knob (49) to reduce the number of repetitions per minute (e.g. 0.2 repetitions/minute). Do not go below values of 0.15 repetitions/minute..

H - If the fluctuations disappear, slowly and gradually reduce the width of the proportional band until there is a slight fluctuation, and then increase the width of the band as necessary until stability is restored; if necessary, turn the integral action knob (30) to gradually increase the number of repetitions/minute above 0.5 repetitions/minute to use the maximum acceptable automatic adjustment speed in the system, as long as it does not cause fluctuations.

I - To make certain that you have selected appropriate values, both for the width of the proportional band and for the automatic adjustment velocity, artificially initiate a disruption by rapidly moving the red indicator about 5 mm from the setpoint. If oscillation occurs, slightly widen the proportional band, repeating the operation until stability is restored. The best control is obtained with the narrowest proportional band which is compatible with the stability of the process at the various loads. See Figure 2.

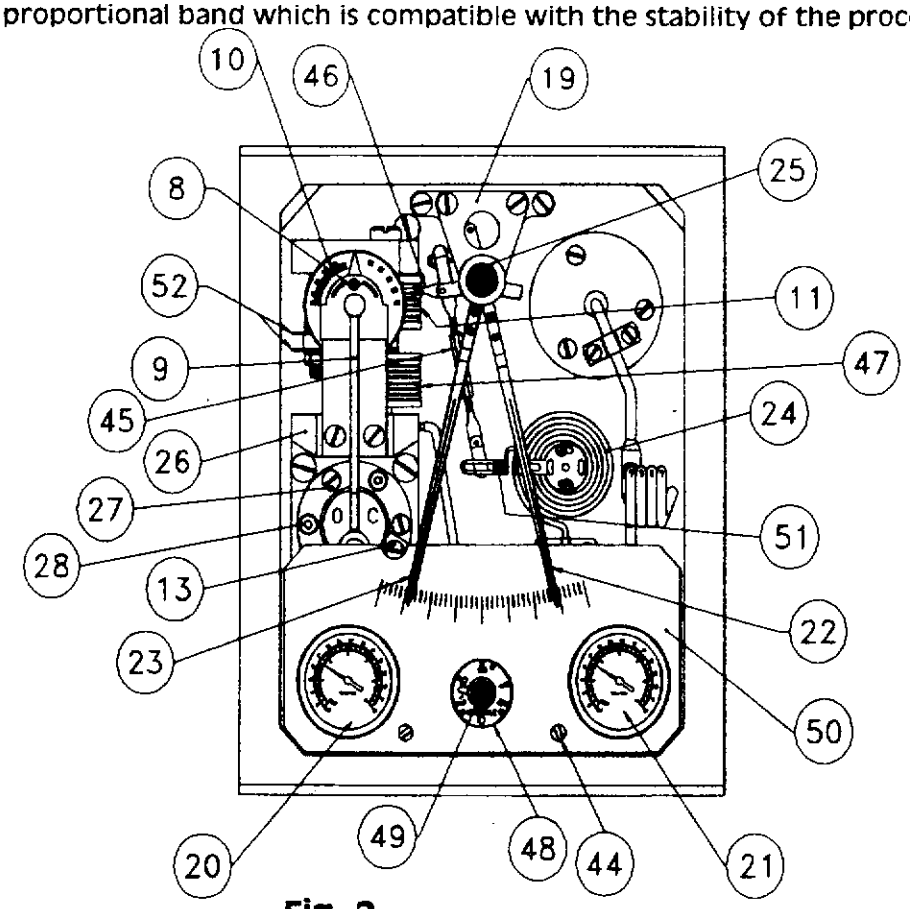
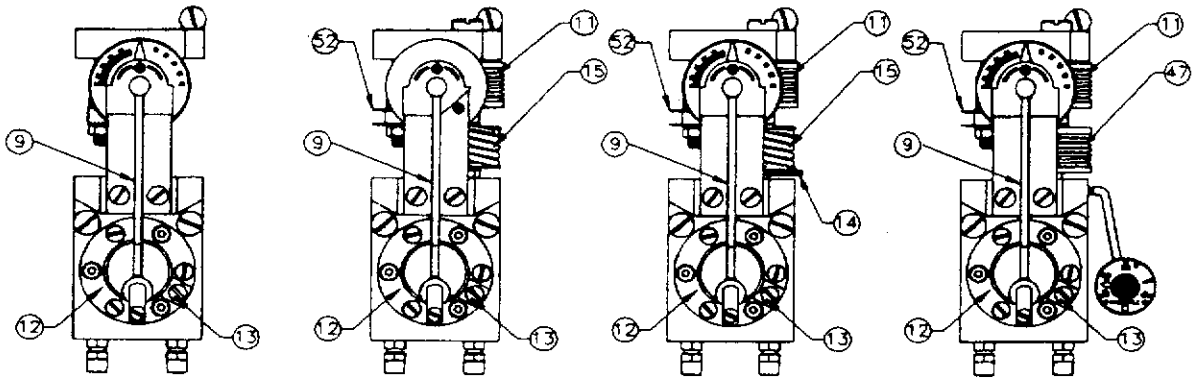


Fig. 2
P + I Controller

Transmitter/Controller
Fig.2 & 2.1

8) Nozzle support screw
9) Nozzle connection tube
10) P.band adjustment knob
11) P. Action bellows
12) Pneumatic relay
13) Orifice
14) Manual adjustment knob
15) Spring
19) Movement
20) Air input pressure gauge
21) Air output pressure gauge
22) Set point indicator
23) Measurement indicator
24) Sensitive element
25) Set point knob
26) P + I control unit
27) Relay attachment screw
28) Relay assembly screw
44) Dial fastening screw
45) Element conn. brace
46) Adjustable brace
47) Integral Action Bellows
48) Integral Action Valve
49) Integral Action Knob
50) P + I dial
51) Linkage arm
52) Plates

Fig. 2.1 Control Units



7. AUTOMATIC/MANUAL SELECTION PANEL

The automatic / manual selection panel is used when the operator wishes to override the automatic control system and to operate the system manually, when control operations are difficult or when problems are encountered. The control panel consists of a two-position switch (automatic and manual), a control knob and a pressure gauge which indicates the value of the signal output from the panel.
Before operating the control unit equipped with an automatic / manual selector switch, make certain that the proportional band and the manual adjustment have already been set as described above.

A - Set the selector to the manual operation position "M".
B - Turn the control knob on the panel to completely close the pneumatic control valve.
C - Completely open the cutoff valves upstream and downstream of the control valve; the bypass valve must be closed.
D - Use the control knob on the panel to gradually open the pneumatic valve until the black indicator coincides with the red indicator.
E - Set the selector to the automatic operation position "A".

Naturally, the automatic / manual selector panel can also be used to switch back and forth between automatic and manual operation.
To switch between automatic and manual operation, bring the pneumatic signal output from the control panel to the same pressure as the control signal (read on the output pressure gauge of the instrument) and move the selector from the position "A" to the position "M".

For Series 80 Control Units, the connection (I) of the A/M 251 panel is blocked.
The pneumatic connections must be made using copper or nylon tubes having an outside diameter of 6 mm, and "Serto" type self-tightening connections.

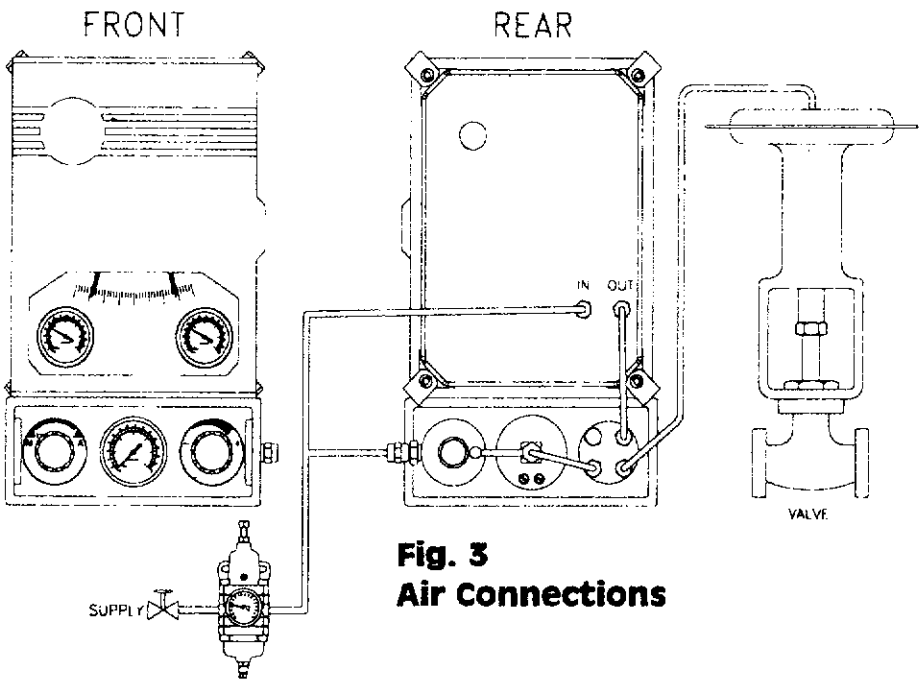


Fig. 3
Air Connections

8. REGULAR MAINTENANCE

Follow the instructions indicated below for regular maintenance of the control unit:

1) Daily, bleed the filter in the air supply line by holding open the tap located at the base of the collector tank, until the water, air and other impurities which are the principal causes of improper operation are completely expelled.
2) The capillary orifice of the control unit 13 must be absolutely clean. We recommend that this orifice be cleaned periodically, above all when the air supply contains traces of oil or moisture.
3) Keep the pneumatic control valve in good operating condition, and avoid any friction or wear which might interfere with proper control.

9.CLEANING THE CONTROL UNIT AND THE AMPLIFIER RELAY

Using an 8 mm screwdriver, remove the capillary orifice (13) shown in Fig. 2 and 5 and remove any obstructions, using the steel wire supplied with the unit. The operation may be followed by a bath in trichloroethylene and blowing the unit dry using compressed air.
Before reinstalling the capillary orifice, we recommend lubricating the O-rings by applying a coat of silicone lubricant. Replace the O-rings if necessary. Using a 4 mm screwdriver, remove the screw 8 and clean the nozzle.
Be careful not to lose or damage the O-rings. Be careful when inserting the metal wire supplied with the instrument into the nozzle orifice.
During this operation, hold the oscillating plate as far as possible away from the nozzle to avoid scratching it. This can be accomplished by reducing the proportional band to a width of zero in direct action and by positioning the setpoint indicator at the bottom of the scale.
Then replace the screw 8, lubricating the O-ring by applying a coat of silicone lubricant.
If oil and condensate are present in the air supply, it may also be necessary to clean the membranes (31 and 35) and the other internal mechanisms of the relay 41. See Fig.5.
To disassemble the relay, remove the bottom connection of the tube (9) after having loosened and turned the corresponding fastening plate. Remove the three fastening screws (27) and then the three Allen screws (28). See Fig. 2 and 5.

10. DIMENSIONS

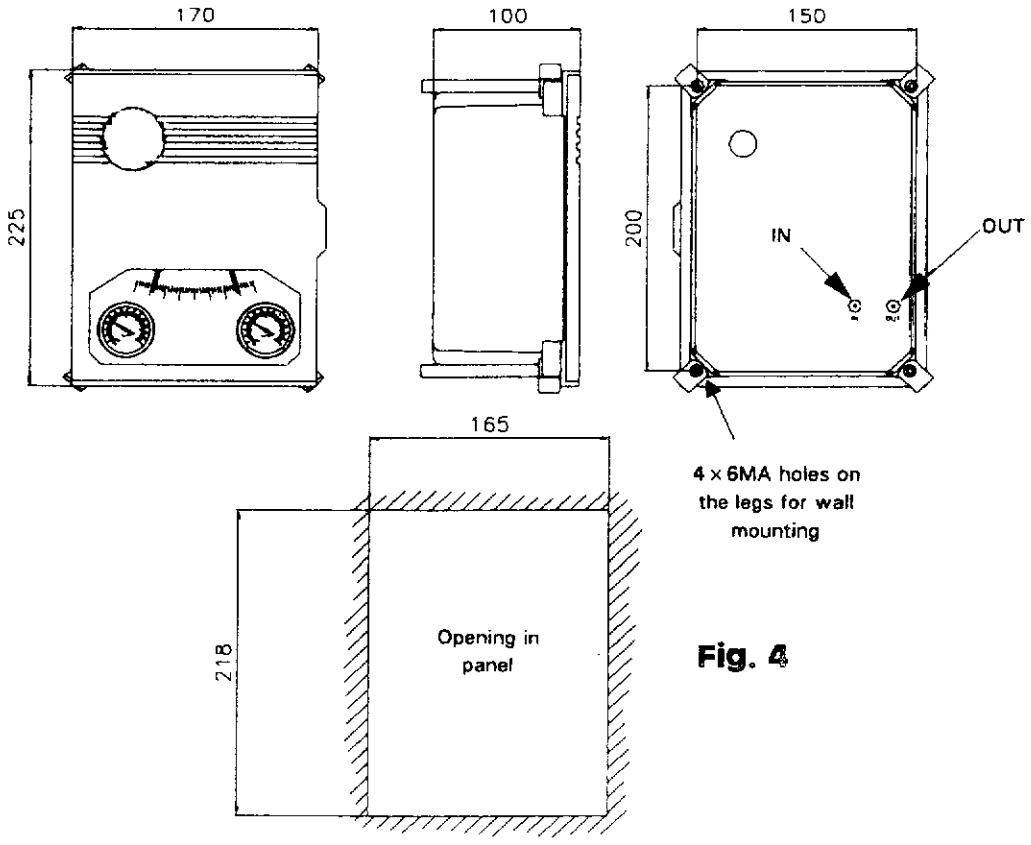
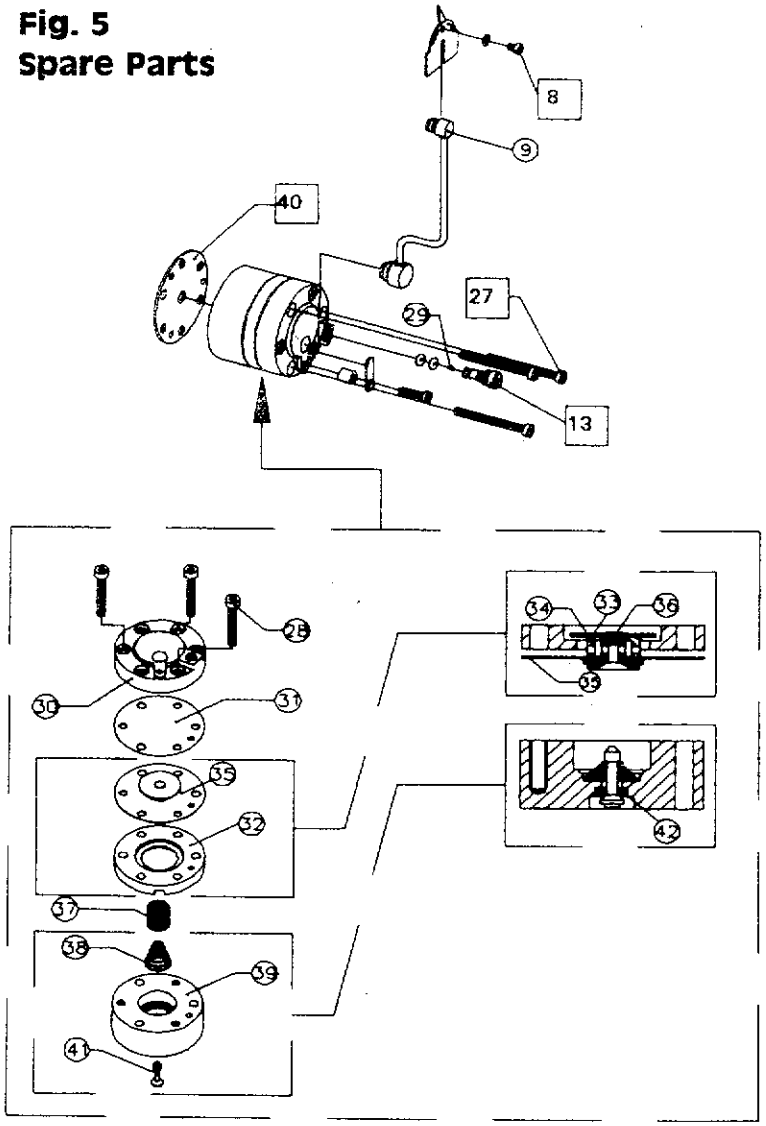


Fig. 4

Fig. 5
Spare Parts



N.	CODE
8	033-130
9	055-66
13	030-13
27	110-2
28	110-1
30	055-2
31	055-20
32	055-3
33	055-31
34	030-26
35	055-18
36	055-32
37	030-82
38	030-79
39	055-1
40	055-19
41	055-37

11. CALIBRATION

Note: Same procedure for temperature but must obviously apply varying temperatures to sensor element.

CALIBRATION OF THE BOURDON TUBE

1. Disconnect the long tie rod of the control linkage from the hole (A) and apply an air signal to simulate measured value pressure to the bourdon tube connection. Pressure should be equal to half the pressure range scale.

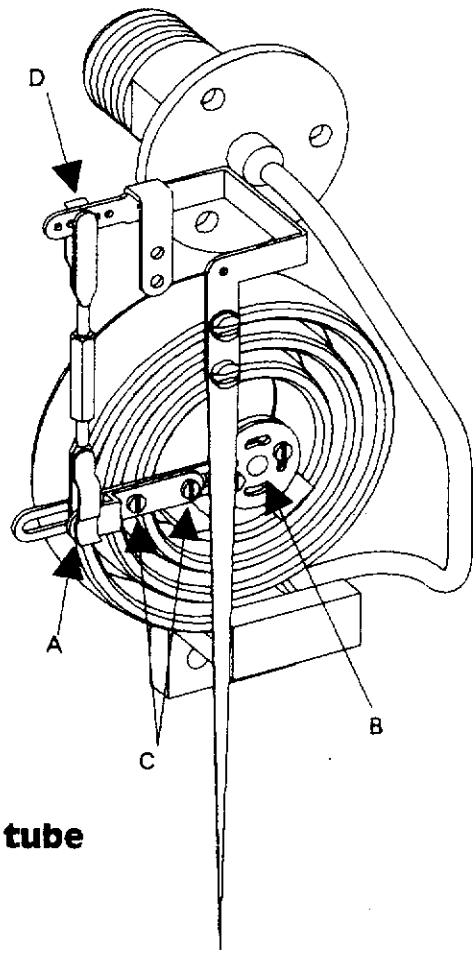


Fig. 6
Bourdon tube

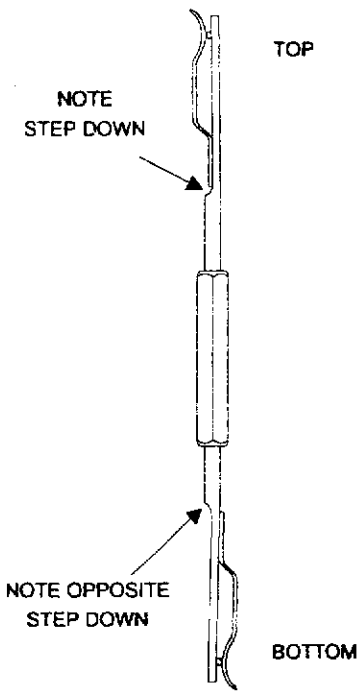


Fig. 7
Long tie-rod

2. Move bourdon tube linkage arm (B) to the horizontal position and lock setting using the two locking screws.
3. Re-connect long tie rod as shown at point A fig.6.
4. Drop measured value pressure to 0 bar.
5. Note: when connecting long tie rod to its top linkage (D) use location hole numbers 2 or 3 (5 total). This allows correct connection to bottom tube arm.
6. Adjust length of long tie rod until 0 bar is reading on controller scale (black pointer).
7. Now re-apply half scale measured value pressure to bourdon tube. If scale black pointer does not indicate half scale pressure, adjust bourdon tube arm. Undo two locking nuts adjust scale pressure indicated and set by locking screws (item C fig.8).
Note: Must adjust the scale by a negative amount equal to difference.
8. Drop measured value pressure to 0 bar and adjust long tie rod again to indicate 0 bar on scale.
9. Increase measured value pressure to half scale pressure again and repeat adjustment.
10. Also check at top of the scale reading (if possible) and intermediate readings.
This complete the procedure for calibrating the bourdon tube (same for temperature).

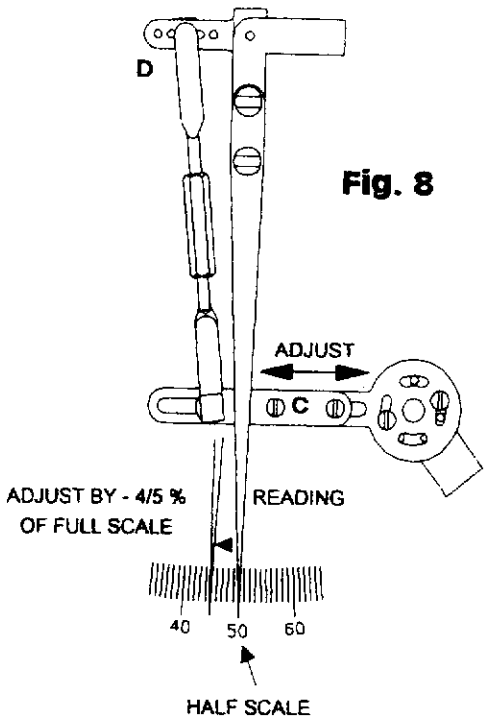


Fig. 8

CALIBRATION OF LINKAGE - OUTPUT SIGNAL

11. Fit shorter tie rod as shown.
12. Clip both red and black pointers (set and measured value) together at any point on the scale.
13. Exhaust air from controller bellows.
14. Move flapper movement arm to upright position (vertical).
15. Set Proportional band dial (F) (see fig. 9) to infinity position.
16. Fix shorter tie rod ensuring location of "pips" into holes is correct.
17. Reinstate air supply (mains air).
18. If the controller is only Proportional adjust knob (E) to give a 9 psi output signal at set point (still with both pointers connected together).
If the controller is P+I adjust slightly the shorter tie rod to give the same signal.
19. Adjust P. band dial (F) to 20% reverse (or direct).
Note: If output signal is not indicated at 9 psi ± 1 adjust slightly shorter tie rod even for Prop. controller to achieve this.
20. Turn P. band adjustment knob (F) to opposite of 19., it should read 9 psi.
21. Re-connect long tie rod ansuring pip is located in hole.

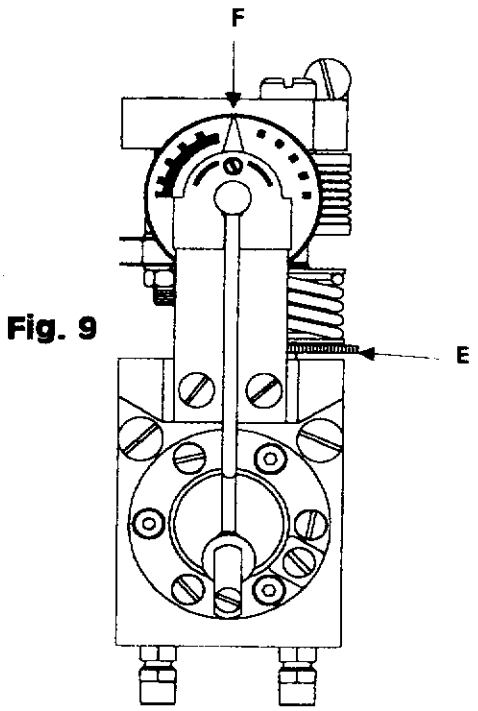
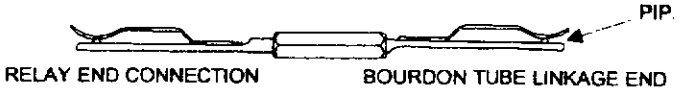


Fig. 9

Fig. 10



CALIBRATION OF LINKAGE - OUTPUT SIGNAL IS NOW COMPLETE.