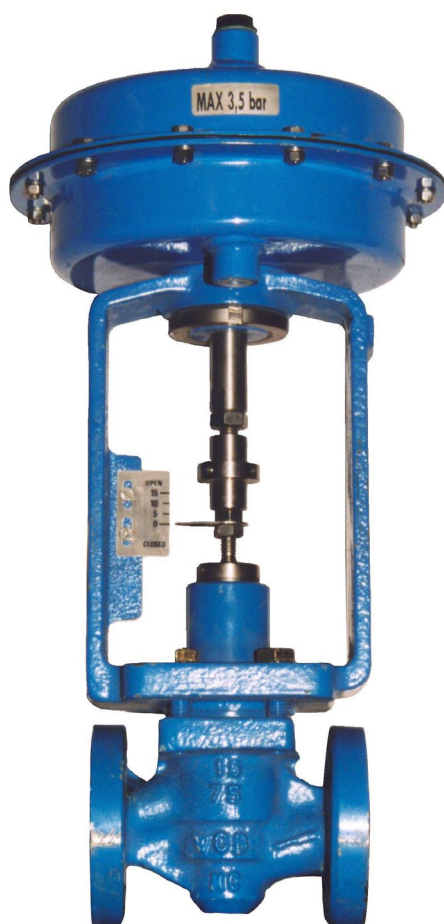


# TECHNICAL MANUAL

## PNEUMATIC CONTROL VALVE



**TYPE : L20**

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## PNEUMATIC CONTROL VALVE series L-20

### Installation

Flush or blow out carefully all flow lines before putting the control valve into operation.

### Adjust stroke and spring preloading

Valves are factory-adjusted and it is not necessary to adjust stroke and spring preloading.

However, it is possible to check these items before putting it into operation, and it is anyway necessary after substitution of certain valve elements.

To check adjusting, use a Hg column or a high accuracy pressure gauge, graduated in bar or psi, and a pressure regulator whose range will be about 0-4 bar.

Pressure regulator output must be connected to a pressure gauge and to actuator.

**General remark:** during any operations for which spring preloading device (14) must be turned, it is necessary to hold fast the plug stem (69) and the actuator stem (15) for the following reasons:

- avoid to cause phase-displacements between seat and plug with reference to their initial position, as it might be cause of leakage at closed valve.
- avoid to cause plug friction against the seat as damage on their contact area might occur.
- avoid the releasing of stem (15) and other elements employed to fix the diaphragm (8).

The operator will take care that the reference mark cut on stem plug (69) near its threaded part will always be in front of him, when looking at the front valve, will have the fluid entrance at the right connection, and the flow direction from right to left as indicated by the arrow on the body valve.

### Valve with action air to open

- a) Supply air pressure to actuator using the connection set on bottom cover (2) until plug (61) start to move
- b) Air pressure value at stroke beginning must correspond to the spring-range initial value. If they do not correspond, adjust spring tension acting on spring preloading device (14) until plug (61) starts its stroke at the above mentioned value.  
That is to carry out taking care to follow what mentioned at the general remark above and proceeding according to the following operations:
  - release the left threaded nut (36) and the right threaded nuts (70)
  - to get lower spring-range preloading values turn leftwards the preloading device (14), screwing it as much as necessary into the stems (69) and (15)
  - to get higher spring-range preload value, turn rightwards.
- c) When plug is on its starting position, (and therefore still touching the seat), check that stroke pointer (71) correspond to the close position reference mark on graduated plate (16). If they do not correspond proceed to shift the plate (16) until alignment has been reached.
- d) Proceed gradually to increase air pressure to actuator until spring-range end value has been reached.
- e) Check that stroke pointer (71) has covered the whole nominal valve stroke. If it would not be possible, proceed to adjust plug position, by screwing or unscrewing preloading device (14) into or out the stem (15), and/or the stem (69) into or out the preloading device (14)  
When stroke adjusting has been carried out, there must be no phase displacement between seat and plug with reference to their initial position as otherwise leakage at closed valve could happen.  
Seat and plug are set all right when the operator will see the reference mark on stem (69) in the same position as described at the general remark above.
- f) repeat the above mentioned operations until calibration of nominal spring-range and stroke has been carried out.

## MAINTENANCE

**General remark:** whenever the dismount operation requests the extraction of plug-stem (69) from packing rings (52), the packing must be replaced with a new one, as during the extraction damages on it could happen.

The new packing must be lubricated with proper grease suitable for the operation conditions to which the valve have to work (PTFE V-rings packing do not need lubrication).

### Substitution of actuator diaphragm (8) and/or springs (12)

All the elements mentioned below, are to find on the left side of the drawing.

- a) take note of the exact threaded length on stem (69) not screwed into the spring preloading device (14), as well as the threaded length of this latter not screwed into stem (15).
- b) release springs tension by acting on spring preloading device (14), carrying out the following operations:
  - release the left threaded nut (36) and the right threaded nuts (70)
  - to get lower spring-range preloading values, turn leftwards the preloading device (14), screwing it as much as necessary into the stems (69) and (15).

The operation is to carry out taking care what mentioned at the general remark on previous page.

- c) remove the bolts (4)
- d) remove the upper case (5) and the springs guide ring (13)
- e) remove the springs (12)
- f) remove the screw (6) from stem (15), holding fast this latter on its lowest part by means hexagonal key
- g) remove the spacer (35), the diaphragm plate (9) and the spacer (38)
- h) remove and replace the diaphragm (8)
- i) reassemble the spacer (38), the diaphragm plate (9), the spacer (35), fixing all the elements by means of the screw (6) which will be tight screwed taking care to hold fast the stem (15) on its lowest part.
- j) reassemble the springs (12) (replace if necessary), the spring guide rings (13), the upper case (5) and the bolts (4) screwing them fast.

### Packing-rings substitution

- a) and b): see paragraph above.
- c) remove the screws (59)
- d) disconnect from body valve (63) the body bonnet (64) complete with actuator
- e) unscrew the stem (69) from preloading device (14)
- f) hold tight the plug (61) and take the stem (69) out of body bonnet (64)
- g) unscrew the packing bush (51) from body bonnet
- h) take out the packing (52) and/or the elements (53) and (54) replacing them with new ones
- i) reassemble the packing bush (51) leaving it provisionally loosed.
- j) introduce with caution the stem (69) into the body bonnet, taking care that the threaded part of it do not touch the packing
- k) screw the stem (69) into the preloading device (14)
- l) reassemble the body bonnet (64) and the actuator on body valve (63) after eventual substitution of the gasket (55) screwing tight, but gradually and in cross way the screws (59)
- m) adjust spring-range and stroke at their former value by the re-establishment of the threaded length of stem (69) not screwed into the preloading device (14), as well as the threaded length of preloading device (14) not screwed into the stem (15), at the same value as mentioned in par. a)

**Remark:** at the end of the above mentioned operation, in order to avoid leakage between seat and plug at closed valve, it is necessary that the reference mark cut on plug stem (69) near its threaded part, is placed in front of the operator when this latter looking at the front valve will have the fluid entrance at the right connection and the flow direction from right to left as indicated by the arrow on body valve.

- n) at the end of the above mentioned operations, proceed to screw in a proper way the packing bush (51) into the body bonnet (64)
- o) proceed to check spring range and valve stroke as described on page 1.

## **Seat and plug substitution**

- a) - d): see paragraph above.
- e) unscrew completely the stem (69) out of preloading device (14) and this last from stem (15)
- f) unscrew the packing bush (51) from body bonnet
- g) hold tight the plug (61), and pulling it, take the stem (69) out of body bonnet (64)
- h) take out the packing (52) and the elements (53) and (54)
- i) unscrew, by means suitable key, the seat (56)
- j) screw tight the new seat after applying on its threaded part a sealing glue, which must be suitable for the operating conditions for which the valve has to work
- k) screw the packing bush (51) into the body bonnet, but don't reassemble the elements (52), (53), (54)  
Introduce the stem (69) of the new plug through the packing chamber
- l) substitute the gasket (55) and reassemble on body valve the bonnet (64) and yoke (1) complete with actuator, screwing tight but gradually and in cross way the screws (59).
- m) carry out the grinding operations on seat and plug (suggestible in case of metallic tightness)
- n) when the grinding operations are over, it is necessary, before proceeding to valve (63) with a reference mark, which will be brought on the same axis to allow the operator, during the final reassemble, to put the plug in the same position as it was at the end of the grinding operation. This is to be done to avoid phase displacement between seat and plug which might be cause of leakages through the two elements at closed valve.  
The mark on stem (69) must be cut just under the threaded part of it, as if it would be cut too much downwards, it could be cause of damages on packing during stem movements.
- o) remove the bolts (59) and disassemble from body valve the body bonnet (64) complete with actuator, Unthread stem (69) from body bush (51)
- p) unscrew and remove the packing bush (51)  
Wash seat and plug to remove the emery.  
Wash as well packing bush (51) and packing housing to remove possible residuals of it.  
Polish the stem to remove possible micro-scratches happened because of the grinding operation on seat and plug.
- q) replace the packing with a new one and reassemble the packing bush (51) leaving it provisionally loosed
- r) introduce with caution the stem (69) through the packing chamber, paying attention that the threaded part of it does not touch the packing rings.
- s) screw stem (69) into preloading device (14) and this latter into the stem (15)
- t) reassemble the body bonnet (64) and the actuator on body valve (63), screwing tight but gradually and in cross way the screws (59)
- u) adjust spring-range and stroke at their former value by the re-establishment of the threaded length of stem (69) not screwed into the preloading device (14), as well as the threaded length of preloading device (14) not screwed into the stem (15), at the same values existing before the disassemble of the old plug, as mentioned at par. a).

**Remark:** at the end of the above mentioned operation, it is necessary, as mentioned in par. a) that no phase-displacement exist between seat and plug and consequently the need to align the mentioned reference mark on stem (69) and on body valve (63)

- v) at the end of the above mentioned operation, proceed to screw tight the packing bush (51) into the body bonnet (64)
- w) proceed to check spring range and valve stroke as described on page 1.

## **PREVENTIVE MAINTENANCE**

It is recommended that a check be performed on the following parts annually or in relation to actual operating time:

- diaphragm of the pneumatic actuators
- gaskets
- trim unit components and parts which have deteriorated during operation, replacing those subject to normal wear.

It is also a good idea to check the state of the stem and if necessary have it lapped.

The instructions must be scrupulously followed throughout assembly and disassembly.

Special care should be taken in checking the seat zone.

Any scratches or taps present might be harmful and lead to improper valve functioning.

Often a simple visual inspection of the plug and seat can indicate whether they can be re-used or whether they should be replaced.

Single scratches on the sliding surfaces are generally caused by solid particles.

In such case, the scored area simply requires smoothing down with a lapping cloth so that the part can be reutilised.

Extensive circumferential scratched areas indicate:

- sticking due to improper reassembly
- incipient erosion, due to leakage from the seat surfaces
- erosion due to transport of solid particles
- deformation of the plug

In these cases the concentricity of the gliding surfaces must be re-checked by assembling the plug in a lathe.

The deformations can be corrected by refacing, making sure that the clearances obtainable upon reassembly fall within the limits set by the manufacturer.

Otherwise, the plug must be replaced.

When the parts are re-used, it is necessary either to polish them with a fine lapping cloth or else reface the scratched areas.

Scratches or erosions on the seat areas must be eliminated by lapping or lathing followed by lapping.

Rehabilitation of the seat by means of lathing is possible as long as the clearances indicated by the manufacturer are respected.

## MALFUNCTION

### Possible cause

### Remedy

#### Valve fails to complete its stroke

insufficient pressure in inlet tube

locate and eliminate cause

leak in diaphragm actuator

tighten nuts or replace cap

diaphragm broken

replace diaphragm

scales or other substances formed inside valve body

remove scales or sediment

binding of guides

smooth guides

#### Valve performs its stroke in jerky fashion

gland too tight

back-off gland

corrosion or binding of stem

smooth or replace stem

binding of guides

smooth guides

assembly not perfectly aligned

reassemble valve correctly

#### Valve seal unsatisfactory

seating surfaces not perfect

smooth and re-grind plug and seat. In certain cases teflon seal rings may be fitted

#### Leak in stuffing box packed with teflon seals

teflon seals damaged

replace teflon seals

#### Leak in stuffing box packed with teflon or graphite teflon

gland too loose

tighten gland and, if necessary, add further packing

insufficient lubrication

inject more grease

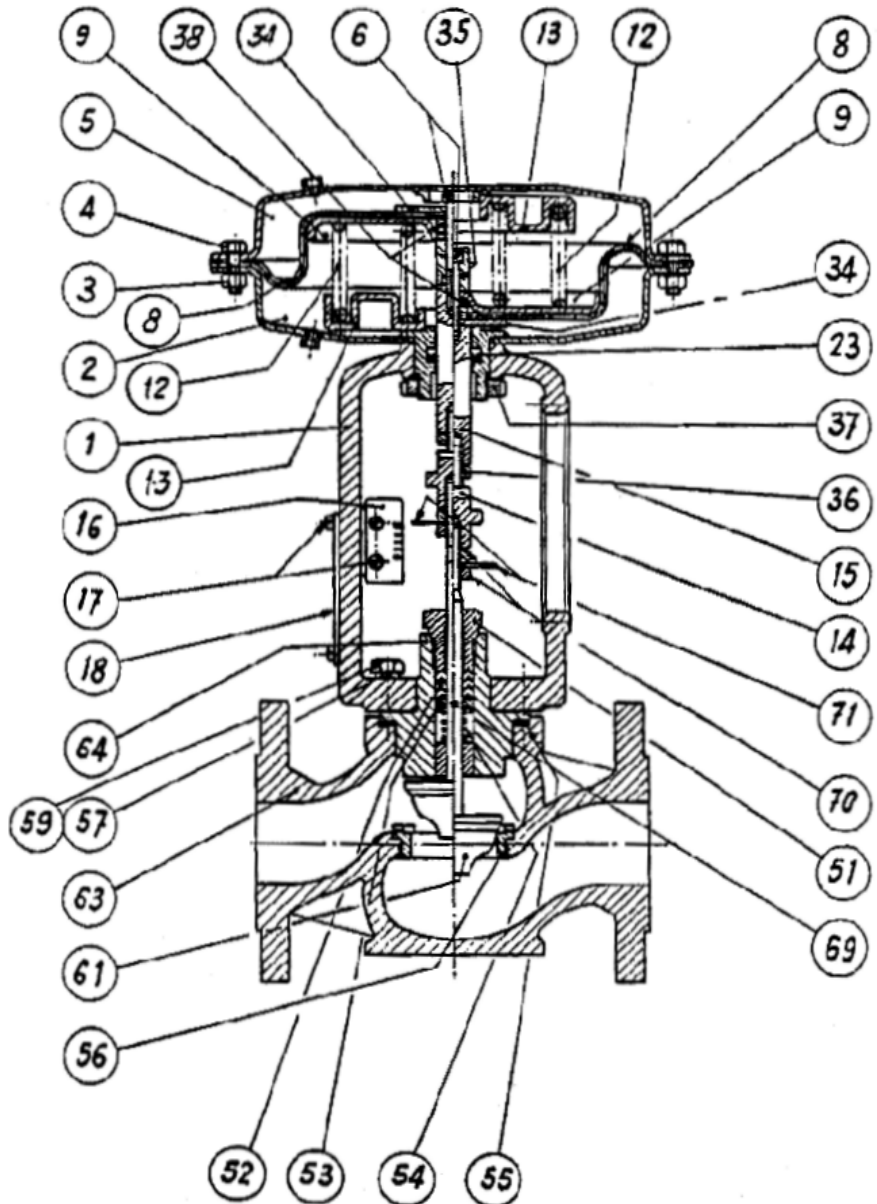
type of grease unsuitable

use type of grease suitable for the fluid

**PART'S LIST**

**Item Part**

- 1. Yoke
- 2. Bottom cover
- 3. Cover fixing nuts
- 4-4a. Cover fixing screws
- 5. Upper case
- 6. Screw
- 8. \* Diaphragm
- 9. Diaphragm plate
- 12. Springs
- 13. Springs guide ring
- 14. Springs loading screw
- 15. Stem
- 16. Range plate
- 17. Fixing screws
- 18. Serial plate
- 23. DI GACO trimming
- 34. Flat spacer
- 35. Spacer
- 36. Special nut
- 37. Threaded locking ring
- 38. Spacer
- 40. Extension ring  
(for Actuator 380 mm dia  
with stroke 22 .. 34 mm)
- 51. Packing bush
- 52. \* Packing ring
- 53. Bush
- 54. Spring
- 55. Gasket
- 56. Seat
- 57. Lock washers
- 59. Screws
- 61. Plug welded to stem
- 63. Valve body
- 64. STD. bonnet
- 69. Stem (welded to plug)
- 70. Nuts
- 71. Pointer



\* Indicates the recommended spare parts.