ND 5 MICROFLOW VALVES
FAMILY 01 - GROUP 30

Master handbook description: Guide to selection, operation and maintenance ND 5 Microflow Valves (English)

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1 Foreword

Microflow valves have been designed to be used on sampling and/or laboratory machines for which low capacity values, necessary for applications, are extremely important.
Classification about 2014/68/UE directive : Art. 4. Par 3.
The materials used to manufacture this type of valves allow their application mainly in the textile-dyeing sector and in the plant engineering field. They can also be used in the chemical and pharmaceutical sector, upon agreement with our technical department about each application.
Table 1 includes a list of fluids which are perfectly compatible with valves.
For any other fluid or use, which has not been expressly indicated in this manual, contact directly our service department.

2 Legend

- $\Delta p_{allowable}$ (allowable differential pressure): maximum allowable value, at a given temperature, of the static differential pressure of a valve in closed position (EN 7363).

- **Allowable temperature**: maximum operating temperature prescribed for safety reasons.

- **Allowable pressure**: maximum operating pressure, normally at the top of each department of the pressure equipment, prescribed for safety reasons (UNI EN 764).

- **ND**: is an alphanumeric designation of size for components of a pipework system, which is used for reference purposes.
  It comprises the ND letters followed by a dimensionless whole number which is indirectly related to the physical dimension, expressed in millimetres, of the hole or of the outer diameter of the ends of connection pipes (ISO 6708: 1995)

- **Kv**: capacity, expressed in m3/h, of water (10 to 25 °C with volumic mass equal to 1000 Kg/m3) passing through two ways of a valve with a Δp pressure drop of 100 KPa (1 bar).

$$Kv = \frac{Q}{\sqrt{\Delta p}}$$

  where: Q is the capacity in m3/h
  Uni 9753: 1990).

- **P2**: pressure measured on the valve outlet connection (value equal to 0 bar).

3 Requests

In case of requests, indicate the following data:
- Serial number (printed on the rating plate)
- Type, nominal diameter and version (they are also specified on the rating plate)
- Fluid pressure and temperature
- Capacity in m3/h
- Installation drawing

4 Technical Characteristics

General notice:: ⇒ all the pressure values indicated hereinafter are gauge pressure values
⇒ valve destined to fluids of group 2 (directive 2014/68/UE

ND: ⇒ 5

Connections: ⇒ 1/4" GAS internal threaded

Pmax allowable ⇒ 40 bar

Pmin allowable: ⇒ 0 bar

Tmax allowable: ⇒ 140° C

Tmin allowable: ⇒ -10 °C (liquid phase)

Flow direction: ⇒ 2-way globe valve, with straight pattern body, unidirectional.

Air fitting (NC): ⇒ 1/8" GAS

Air fitting (NO): ⇒ M 5

Supply fluid*:* ⇒ instrument air

Supply pipes: ⇒ pipe inner diameter = 4 mm, min. outer diameter = 6 mm, able to bear the supply Pmax under the environmental conditions of the plant where the valve has to be assembled.

Supply Pmin: ⇒ 6 bar

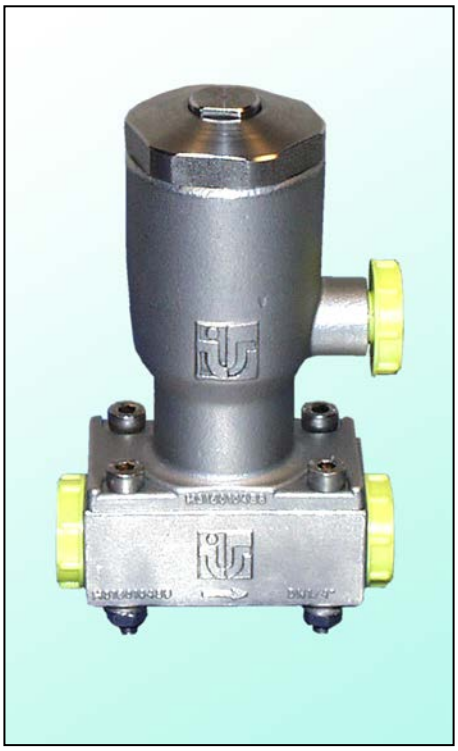
Supply Pmax: ⇒ 10 bar

Air consumption (NC): ⇒ 0.016 Nl/cycle at a pressure of 6 bar

Air Consumption (NO): ⇒ 0.013 Nl/cycle at a pressure of 6 bar

Working materials: ⇒ See Dwg. No. 010985 – Dwg. No. 010984 and relevant tables

Overall dimensions: ⇒ *See* overall dimensions *drawings* and relevant tables



ND 5 Microflow Valve

4.1 Table: Kv And Operating Δp Of ND 5 Microflow Valves

	NC	NO
ND	5	5
$Kv_{theor.}$ [m^3/h]	0,48	0,48
Δp allowable with P_2=0 bar [bar]	40	40

4.2 Fluids Compatible With Microflow Valves

Table 1	
Vinyl acetate	Potassium chlorate 30% max
Phenol acetylene	Sodium chloride 20% max
Glycerol fatty acids	Potassium chloride 5% max
Phenol	Butyl ether
Phosphoric acid 20% max..	Petroleum ether
Phthalic acid	Dibenzile ether
Gallic acid	Dibutyl ether
Nitric acid 5% - 65% max	Ethylene glycol
Oleic acid	Ammonium nitrate
Stearic acid	Copper nitrate
Tannic acid	Sodium nitrate
Butanol	Ethylene perchlorate
Ethanol	Potassium sulphate 20% max at T=100 °C
Methanol	Sodium sulphate
Propanol	Zinc sulphate 40% max at T=100 °C
Aniline	Potassium sulphite 10% max
Sodium carbonate 20% max	Sodium sulphide
Borax (sodium tetraborate)	Toluene
Sodium carbonate	Steam (T_{max}= 150 °C)

All data are general and are not valid for all possible working conditions. These data may considerably vary depending upon various conditions, such as: temperature, concentration, fluid speed.
For reliable and exhaustive information, please get in touch with the technical department.
Any use of the valve on explosive, easily inflammable, comburent and toxic gases is strictly forbidden.
use of the valve on liquids based on: chlorine, fluorine, bromine, iodine and derivative elements is strictly forbidden.
Any deviation from such prohibitions may be issued for special applications, by our technical department, upon written request.

4.3 Safety Notes

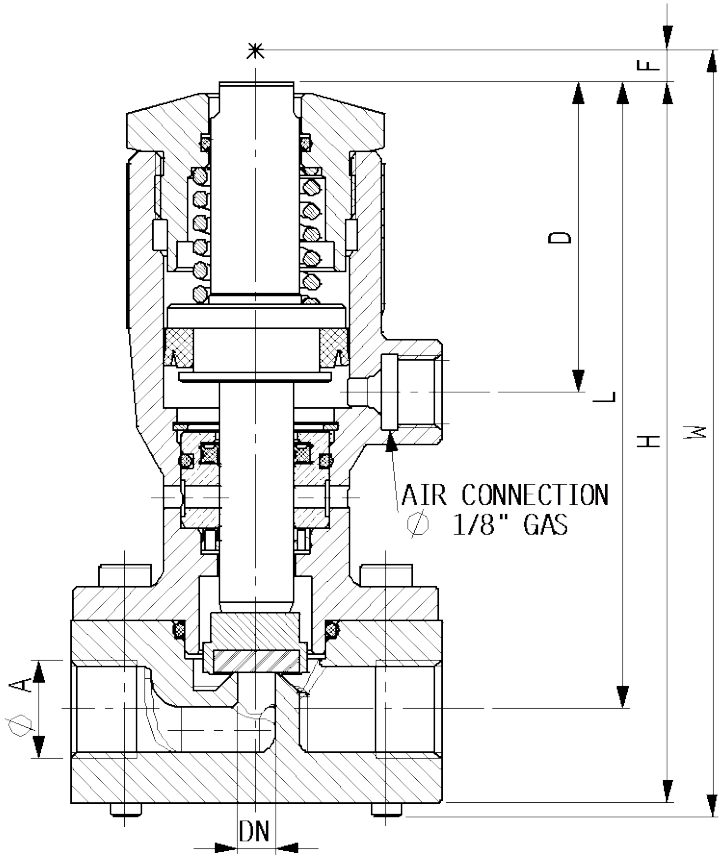
- The valve body, under the maximum operating temperature conditions, depending upon the system, may reach a temperature T equal to 140 °C. It is up to the engineer to provide the system with the necessary safety guards and/or warning signals aiming at removing/indicating the risk of possible burns by the user.
- On each valve 2 inspection holes have been made (located on the intermediate body). Their scope is to signal any loss from the stem seal. They are extremely important as they limit the passage of fluid into the air circuit and warn about the loss, preventing the instrument air from being contaminated. It is up to the engineer to provide the system with the necessary safety guards and/or warning signals aiming at removing/indicating the risk of contact with the fluids (that might be dangerous) by the user.
- Whatever operation may be performed on the valve, the fluid must be present neither in pipes, nor inside the valve itself.

4.4 Overall Dimensions Of ND 5 Microflow Valves

4.4.1 N. C. D. ¼'' GAS ND 5 Microflow Valves

Globe valve with straight pattern body.
Female threaded connections.
Normally closed servo control.
Shaft indicating the valve on/off condition.

N.C. Valve



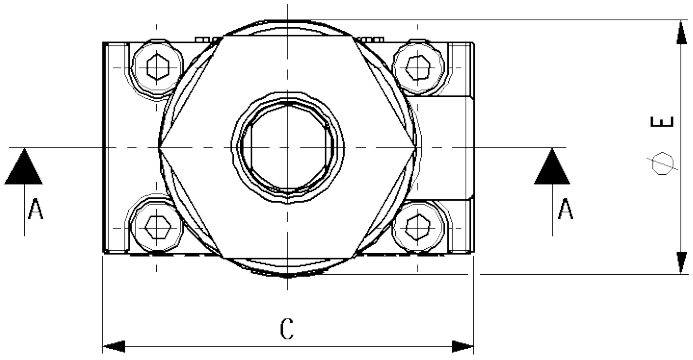
SEC. A-A

ND	5
CODE	6988
Weight [Kg]	0.608
A	1/4" GAS
C	50
D	42
E	34,1
F	4,5
L	84,5
H	97
W	103.5

Main dimensioning parameters

Δp [bar]	40
Kv	0,48

F: technical overall dimensions depending on the stem handling



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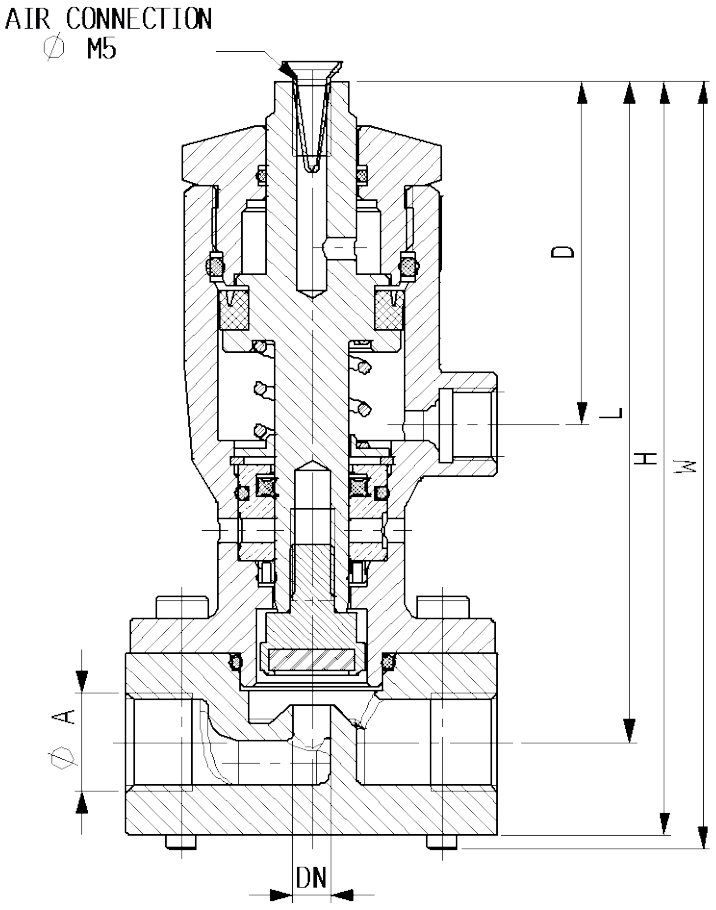
4.4.2 N. O. D. ¼'' GAS ND 5 Microflow Valves

Globe valve with straight pattern body.
Female threaded connections.
Normally open servo control.
Shaft indicating the valve on/off condition.

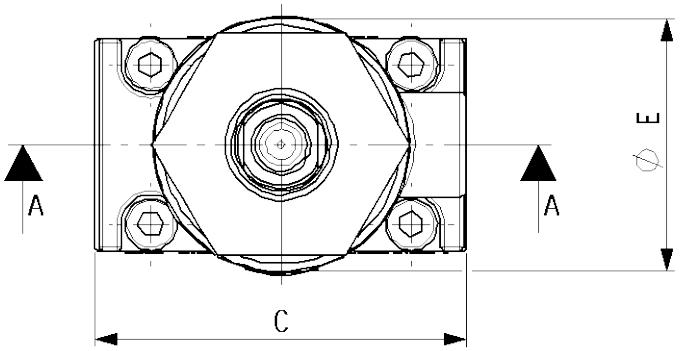
N.O. Valve



ND	5
CODE	**7145**
Weight [Kg]	0,607
A	1/4" GAS
C	50
D	46,5
E	34,1
L	89
H	101.5
W	103,5

Main dimensioning parameters

Δp [bar]	40
Kv	0,48



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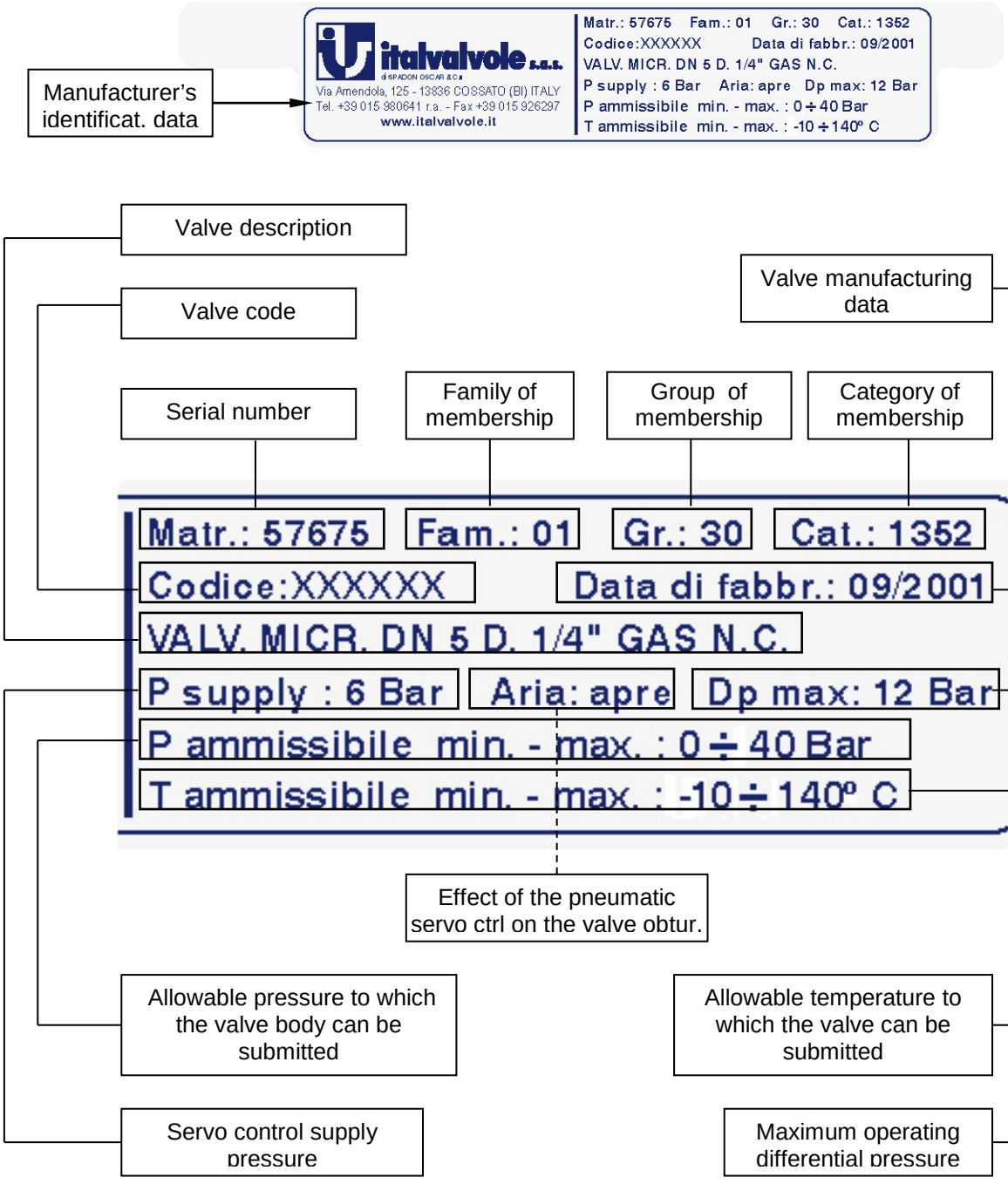
4.5 Description Of The Microflow Valve Rating Plate



5 Storage, Assembly, Check and Maintance

5.1 Trasport, Storage and Handling

Microflow valves, during transport and assembly, must be handled very carefully. Shocks as well as anomalous stresses must be avoided, (do not handle, in case of normally closed servo control, the valve by the transparent cap).

Valves are delivered with dust-proof protections on all connections and these protections must not be removed until they are installed.

Valves shall be stored in areas which are not exposed to the sunshine to prevent inner gaskets from getting dry and old before time.

Storage temperatures shall range between 0 °C and + 50 °C.

5.2 Assembly Instructions

5.2.1 General

The valve installation on the system shall be carried out by qualified personnel only, within the mechanical and pneumatic fields, provided with all the equipment normally used in the industrial hydraulic and pneumatic plant engineering. The personnel shall always wear proper accident prevention garments, taking particular care to the protection of face, eyes and hands.
In no case the valve must be disassembled or modified, under pain of revocation of each type of guarantee.
NOTE: A compression spring is included inside the valve.
Before assembly, all protections shall be removed from the valve body. In case of servo control normally closed, remove the threaded cap located sideways. In case of servo control normally open, remove the threaded cap located on the upper side.
In case of normally closed servo control, the supply shall be carried out from the side connection.
In case of normally open servo control, the supply shall be carried out from the connection located on the shaft; the side threaded cap must not be removed to prevent dust or foreign matters from entering the cylinder.
The compressed air shall be instrument air, with a pressure ranging between 6 bar and 10 bar, with ø inner = 4 mm. supply pipes (See also chap. 4).
The air connection on the valve shall be made of 1/8” Gas male threaded couplings (for N. C. valves) and of M5 male threaded coupling (for N. O. valves).
During the valve cleaning operations, do not blow compressed air into the inspection holes.

5.2.2 Assembly Of Valves With Female Threaded Connections

To install this valve the ends of connections pipes are to be sealed with PTFE seal, so as to guarantee a perfect seal; besides, it is necessary to tighten to the prescribed torque the connections as specified hereinafter, in table 2. Caution: the installer shall verify that all the parts connected to the valve can support the required tightening torque.

In order to prevent foreign matters (welding slags, chips and others), present in the pipes, from damaging the valve seat, before operating the valve, open it completely and make the fluid pass through at the maximum operating pressure of the system, so as to clean the pipe.

5.3 Operation Test

Before starting up the system and after any repair or overhaul, the following operation test shall be carried out:

On valves with normally closed N.C. servo control:

1) Send the fluid under obturator into the valve at the operating pressure, (check that the operating pressure is always lower than the maximum allowable pressure, specified on the rating plate, present on the cylinder).
2) Blow air inside the servo control and check the occurred opening from the fluid passage.
3) Blow air out of the servo control.
4) Repeat this operation 5 times.
5) Check, with air off, that there are no valve leakages.
6) Check, with air on, that there are no air leakages from the servo control.

On valves with normally open N.O. servo control:

1) Send the fluid under obturator into the valve at the operating pressure, (check that the operating pressure is always lower than the maximum allowable pressure, specified on the rating plate, present on the cylinder).
2) Blow air inside the servo control and check the occured opening from the failed fluid passage.
3) Blow air out of the servo control.
4) Repeat this operation 5 times.
5) Check, with air off, that there are no valve leakages.
6) Check, with air on, that there are no air leakages from the servo control

5.4 Troubleshooting

Troubleshooting operations shall be always carried out by qualified personnel only, adequately equipped for the hydraulic and pneumatic operations and provided with the proper safety clothing, paying particular attention to the protection of face, eyes and hands.

5.4.1 N.C. Valves

In case of anomalous operation or valve leakage, the operation shall be immediately stopped and the following checks shall be carried out:
disconnect the air circuit; disconnect the air supplying pipe (with air off), to make sure that no air is present inside the piping.
Caution: during troubleshooting, the valve must not be removed, nor placed elsewhere. No components of the valve shall be disassembled or unloosened.
Check , by means of a pressure gauge, that the pressure of the valve inlet fluid (before the valve) is not higher than the maximum allowable pressure specified on the rating plate, present on the cylinder.
Should anomalies still be present after this check, valve inner parts are to be verified, disassembling the valve as indicated under the “Instructions for disassembly, gasket replacement and re-assembly of N. C. valves” of this manual.
Should leakages still persist, please contact our technical department.

5.4.2 N.O. Valves

In case of anomalous operation or valve leakage, the operation shall be immediately stopped and the following checks shall be carried out:
blow air (at a pressure value equal to that specified for a proper operation) into the servo control so as to make the valve close.
Caution: during troubleshooting, the valve must not be removed, nor placed elsewhere. No components of the valve shall be disassembled or unloosened.
Check, by means of a pressure gauge, that the pressure of the valve inlet fluid (before the valve) is not higher than the maximum allowable pressure, specified on the rating plate, present on the cylinder.
Should anomalies still be present after this check, valve inner parts are to be verified, disassembling the valve as indicated under the “Instructions for disassembly, gasket replacement and re-assembly of N. O. valves” of this manual.
Should leakages still persist, please contact our technical department.

5.5 Scheduled Maintenance

Scheduled maintenance operations shall be carried out apart from the ones due to possible failures, which always need an immediate intervention.
The time interval between one maintenance operation and the following shall be included in the lower time interval between the one corresponding to 60.000 cycles and three years; it consists of a complete disassembly of the valve, replacement of all the gaskets and a complete cleaning of all other components. For disassembly and re-assembly operations, make reference to the relevant paragraphs of this manual.

5.6 Instructions For Disassembly, Gasket Replacement And Reassembly Of N. C. Valves

For the disassembly and assembly operations of the N.C. valve, refer to the annexed Dwg. no. 010985.
All the disassembly and assembly operations shall be carried out by qualified personnel, adequately equipped for the hydraulic and pneumatic and provided with the proper safety equipment. Before carrying out any operation on systems and valves, get acquainted with operating temperatures and pressures and any other particular conditions.
Whenever operations are to be carried out on valves, remove the fluid completely.
NOTE: Read the procedures thoroughly before starting any operation.

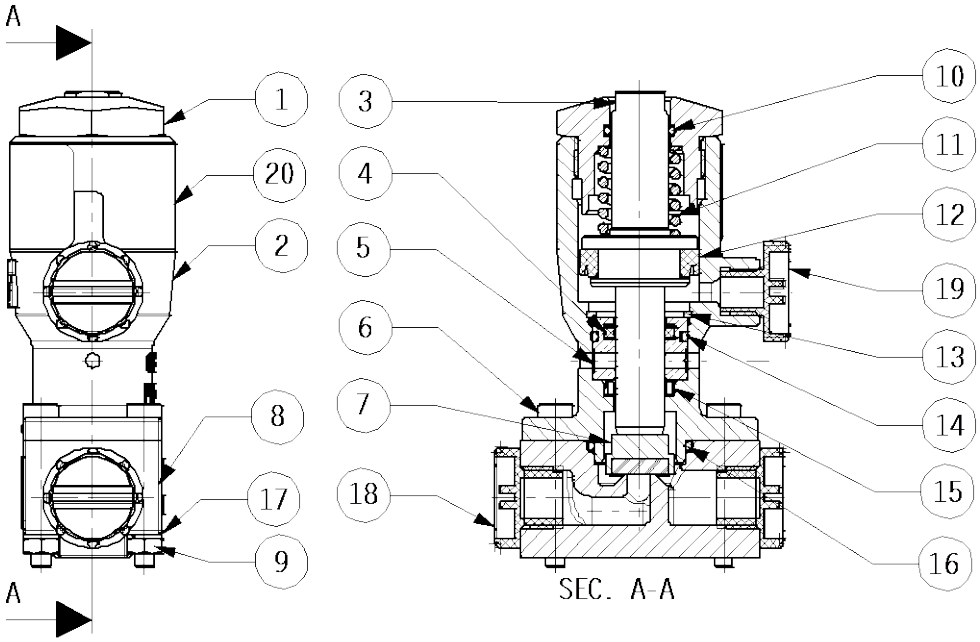
5.6.1 Disassembly Of N. C. Valves

1) Blow air inside the servo control (6 bar).
2) Unscrew nuts (9), extract the spring washers (17) and remove screws (6).
3) Remove the servo control from the body.
4) Extract the O-ring gasket (16) from the body.
5) Blow air out of the servo control. **Caution! During this operation the stem will jump out of its stroke**.
6) Keeping locked the spring housing cylinder (2), unscrew the fastening screw (1), using a 30 Allen wrench. **Caution! Inside the intermediate body there is a compressed spring**. Therefore, it is recommended to provide yourself with suitable equipment not allowing the sudden expulsion of the fastening screw (1) from the spring housing cylinder, when the thread joining them together is no more tightened.
7) Extract the O-ring gasket (10) from the fastening screw.
8) Remove the spring (11) from the cylinder.
9) Lock the shaft (3), by gripping it between soft cheeks at the height of the upper millings and unscrew the obturator (7) using a 17 wrench.
10) Remove the shaft from the spring housing piston.
11) Extract the DE gasket (12) from the shaft.
12) Extract the snap ring (13) from the spring housing cylinder.
13) Remove the guide bush (5), together with all its gaskets, from the spring housing cylinder.
14) Remove the O-ring gasket (14) and the gasket (4) from the guide bush.
15) Extract the gasket (15) from the spring housing cylinder.
16) Now the valve has been completely disassembled, so that the required components can be replaced.

5.6.2 Assembly Of N. C. Valves

1) Clean carefully all components.
2) Fit the gasket (15) into the spring housing cylinder (2).
3) Provide the guide bush (5) with the O-ring gasket (14) and the gasket (4).
4) Fit the so assembled guide bush into the spring housing cylinder.
5) Fit the snap ring (13).
6) Fit, on the shaft (3), the DE gasket (12), orienting it to the right direction.
7) Fit the shaft, equipped with gasket, into the spring housing cylinder.
8) Locking the shaft between soft cheeks, at the height of the upper millings, tighten to the prescribed torque (as specified in table 2), the obturator (7) using a 17 wrench.
9) Lay the spring (11) on the shaft.
10) Provide the fastening screw (1) with the O-ring gasket (10).
11) Keeping locked the spring housing cylinder, tighten to the prescribed torque (as specified in table 2), the fastening screw using a 30 wrench.
12) Provide the valve body (8) with the O-ring gasket (16).
13) Blow air into the servo control (6 bar). **Caution! During this operation the stem will come back to its stroke**.
14) Position the servo control on the valve body.
15) Fit screws (6) into the relevant holes.
16) Fit spring washers (17) on screws and tighten to the prescribed torque (as specified in table 2) nuts (9).
17) Blow air out of the servo control.

5.7 Exploded View, Components And Spare Parts For N. C. Valves



PART	Q.TY	DESCRIPTION	MATERIAL	GR.	CODE
1	1	N.C. D.25 Cylind. fastening screw	AISI 316	706	VCHI010463
2	1	D.25 Sring housing cylinder	AISI 316	813	CLCI010453
3	1	N.C. Shaft complete with piston	AISI 316	564	ALSC01046
4	1	X Ring gasket	FPM	511	GUAR01048
5	1	Guide bush (dwg. 010464)	BR.ANTIAC	581	BSGD01046
6	4	4x30 TCCE Screw	AISI 304	551	TCCE04304
7	1	ND 1/4" Micr. valv. obtur. with cap	AISI 316 PTFE	595	OTTR010469
8	1	ND 1/4" G. Microflow valve body	AISI 316	813	CLMC01046
9	4	Hexagon nut (UNI 5588 D.4)	AISI 304	501	DES045588
10	1	ORM 0120-15	GACO	548	OR012015G
11	1	Spring (dwg. 010467	AISI 302	552	MOLL01046
12	1	150/25-17-5.5 Viton N.O. Gasket	FPM	511	GUAR01048
13	1	D. 21 Snap ring	AISI 304	695	SEEF21304
14	1	O-ring 2062	VITON	548	OR002062VI
15	1	G.energ. T.rad. D.10/14.5 H 3.1	PTFE	511	GUAR01048
16	1	O-ring 2075	FPM	548	OR002075VI
17	4	U 1751-B D.4 Spring washer	AISI 304	503	REL0417514
18	2	EP400G-1/4" Threaded cap	POLYETHY.	505	TEP400G01
19	1	EP400G-1/8" Threaded cap	POLYETHY.	505	TEP400G01
20	1	Microflow valve self-sticking rating plate	POLYEST.	506	ETAU010347

Group 94

Complete set of spare parts for N. C. ND 5 microflow valves

Servo control spare parts

Spare p. code		7152
PART.	Q ty.	CODE
4	1	GUAR010486
10	1	OR012015GA
12	1	GUAR010485
14	1	OR002062VI

Body spare parts

Spare p. code		**7151**
PART	Qty.	ND 5
7	1	OTTR010469
15	1	GUAR010487
16	1	OR002075VI

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5.8 Instructions For Disassembly, Gasket Replacement And Reassembly Of N. O. Valves

For the disassembly and assembly operations of the N.O. valve, refer to the annexed Dwg. no. 010984.
All the disassembly and assembly operations shall be carried out by qualified personnel, adequately equipped for the hydraulic and pneumatic and provided with the proper safety equipment. Before carrying out any operation on systems and valves, get acquainted with operating temperatures and pressures and any other particular conditions.
Whenever operations are to be carried out on valves, remove the fluid completely.
NOTE: Read the procedures thoroughly before starting any operation.
NOTE: Disconnect the air circuit from the valve before starting any disassembly operation.

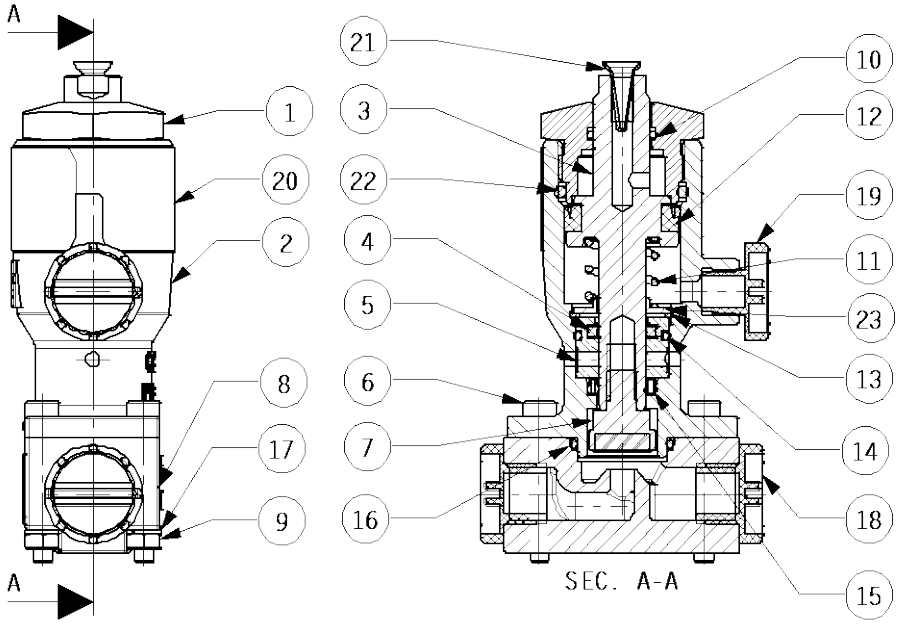
5.8.1 Disassembly Of N. O. Valves

1) Unscrew nuts (9), extract spring washers (16) and remove screws (6).
2) Remove the servo control from the body (8).
3) Extract the O-ring gasket (15) from the body.
4) Keeping locked the spring housing cylinder (2), unscrew the fastening screw (1), using a 30 Allen wrench.
5) Extract the O-ring gasket (10) from the fastening screw.
6) Extract the O-ring gasket (17) from the cylinder.
7) Lock the shaft (3), by gripping it between soft cheeks at the height of the upper millings and unscrew the obturator (7) using a 17 wrench. **Caution! Inside the intermediate body there is a compressed ring.** Therefore, it is recommended to provide yourself with suitable equipment not allowing the sudden expulsion of the shaft (3) from the obturator (7), when the thread joining them together is no more tightened.
8) Remove the shaft from the spring housing piston.
9) Extract the DE gasket (11) from the shaft.
10) Remove the spring (18) from the cylinder.
11) Extract the washer (19) from the cylinder.
12) Extract the snap ring (12) from the spring housing cylinder.
13) Remove the guide bush (5), together with its gaskets, from the spring housing cylinder.
14) Remove the O-ring gasket (13) and the gasket (4) from the guide bush.
15) Extract the gasket (14) from the spring housing cylinder.
16) Now the valve has been completely disassembled, so that the required components can be replaced.

5.8.2 Assembly Of N. O. Valves

1) Clean carefully all components.
2) Fit the gasket (14) into the spring housing cylinder (2).
3) Provide the guide bush (5) with the O-ring gasket (13) and the gasket (4).
4) Fit the so assembled guide bush into the spring housing cylinder.
5) Fit the snap ring (12) into the cylinder.
6) Fit the washer (18).
7) Lay the spring (18) on the washer.
8) Fit, on the shaft (3), the DE gasket (11) orienting it to the right direction.
9) Fit the shaft, provided with the relevant gasket, into the spring housing cylinder.
10) Locking the shaft between soft cheeks, at the height of the upper millings, tighten to the prescribed torque (as specified in table 2), the obturator (7) using a 17 wrench. **Caution! Screwing progressively the obturator, the spring (18) will be compressed.** In case it is necessary to unscrew this last, see the item 7) of the previous paragraph.
11) Fit the O-ring gasket (17) into the spring housing cylinder.
12) Provide the fastening screw (1) with the O-ring gasket (10).
13) Keeping locked the spring housing cylinder, tighten to the prescribed torque (as specified in table 2) the fastening screw using a 30 wrench.
14) Provide the valve body (8) with the O-ring gasket (15).
15) Position the servo control on the valve body.
16) Fit screws (6) into the relevant holes.
17) Fit spring washers (16) on them and tighten to the prescribed torque (as specified in table 2) nuts (9).

5.9 Exploded View, Components And Spare Parts Of N. O. Valves



PART	Q.TY	DESCRIPTION	MATERIAL	GR.	CODE
1	1	N.O. D.25 Cylind. fastening screw	AISI 316	706	VCHI010981
2	1	D.25 Sring housing cylinder	AISI 316	813	CLCI010453
3	1	N.O. Shaft complete with piston	AISI 316	564	ALSC01097
4	1	X Ring gasket	FPM	511	GUAR01048
5	1	Guide bush (dwg. 010464)	BR.ANTIAC	581	BSGD01046
6	4	Cl. A2-70 4x30 TCCE Screw	AISI 304	551	TCCE04304
7	1	ND 1/4" Micr. valv. obtur. with cap	AISI 316 PTFE	595	OTTR010469
8	1	ND 1/4" G. Microflow valve body	AISI 316	813	CLMC01046
9	4	Hexagon nut (UNI 5588 D.4)	AISI 304	501	DES045588
10	1	ORM 0120-15	GACO	548	OR012015G
11	1	Spring (dwg. 010982)	AISI 302	552	MOLL01098
12	1	150/25-17-5.5 Viton N.O. Gasket	VITON	511	GUAR01048
13	1	D. 21 Snap ring	AISI 304	695	SEEF21304
14	1	O-ring 2062	FPM	548	OR002062VI
15	1	G.energ. T.rad. D.10/14.5 H 3.1	PTFE	511	GUAR01048
16	1	O-ring 2075	FPM	548	OR002075VI
17	4	U 1751-B D.4 Spring washer	AISI 304	503	REL0417514
18	2	EP400G-1/4" Threaded cap	POLYETH.	505	TEP400G01
19	1	EP400G-1/8" Threaded cap	POLYETH.	505	TEP400G01
20	1	Microflow valve self-sticking rating plate	POLYEST.	506	ETAU010347
21	1	Tapered cap for hole protection	POLYETH.	505	TCONPBU0
22	1	3093 VITON O-Ring	VITON	548	OR03093VI
23	1	N. O. ND 5 spring housing piston	AISI 316	591	PPMD01098

Group 94

Complete set of spare parts for N. O. ND 5 microflow valves

Servo control spare parts

Spare p. code		7153
PART	Q.TY	CODE
4	1	GUAR010486
10	1	OR012015GA
12	1	GUAR010485
14	1	OR002062VI
17	1	OR03093VI

Body spare parts

Spare p. code		**7151**
PART	Q.TY	ND 5
7	1	OTTR010469
15	1	GUAR010487
16	1	OR002075VI

Dwg. no. 010984 Rev.: 00

5.10 Table: Tightening Torques

Table 2 – Tightening torques for ND 5 microflow valve threaded couplings	
M 4 (AISI 304 Cl. A2-70) (part 6 and part 9)	C4 = 0.17 [Kgf · m]
M 6 (AISI 316) (part 3 and part 7)	C6 = 0.59 [Kgf · m]

6 Diposal

After use, for the valve disposal, it is necessary to disassemble the valve and separate the different materials the valve is composed of, according to the tables annexed to the valve working drawings, then dispose of the different materials in compliance with the laws in force.

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