INTERCEPTION ON-OFF VALVES SERIES IVS/P-IVFL/P-FFF/P

FAMILY 01 - GROUP 4, 5, 6

Master Handbook Description: Guide to choice, use and maintenance of ON - OFF valves series IVS/P-IVFL/P-FFF/P (English)

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Approved by: OS

Via Amendola 125 - 13836 Cossato (BI) ITALY
Phone (+39) 015980641 a.s.
Telefax (+39) 015926297

Home page: http://www.italvalvole.it
P.E.C.: italvalvole@cert.italvalvole.it
E-mail: itv@italvalvole.it

DICHIARAZIONE DI CONFORMITA' UE

DECLARATION OF UE CONFORMITY

Mod: 703
Rev: 00
Data: 05/07/2016

VALVOLE ON-OFF D'INTERCETTAZIONE SERIE FFF/P

ON-OFF VALVES SERIES FFF/P

(in tutte le sue configurazioni / *in all their configurations*)

ITALVALVOLE® s.a.s. di Spadon Oscar & C. dichiara che l'intera gamma dei prodotti è stata progettata e costruita in accordo a quanto indicato nell'ALLEGATO I della direttiva UE:

ITALVALVOLE® *s.a.s. of Spadon Oscar & C. declare that all products it was engineered and built in according as indicated on Annex 1 of the directive UE:*

2014/68/UE

CLASSIFICAZIONE DELLE VALVOLE / *CLASSIFICATION OF THE VALVES*

CATEGORIA I per fluidi del gruppo **II** - ***CATEGORY I*** *for fluids group* ***II***

Secondo valutazione di conformità descritte dall' allegato III (MODULO A)
With respect to the conformity described in annex III (MODULE A)

NORME TECHICHE ARMONIZZATE e SPECIFICHE UTILIZZATE:
HARMONISED TECHNICAL STANDARDS and SPECIFICATIONS USED:

UNI EN 12266-1-2 / UNI EN 10213

LUOGO e DATA - *Place and Date*
Cossato, 19/07/2016

Legale rappresentante
Legal representative

Firmato da:
SPADON OSCAR
Motivo:
CF: SPDSCR44M19L436J

Luogo:
Cossato, 13836 (BI)
Data: 02/05/2018 16:56:46

Table of Contents

1 Foreward

Interception on-off valves have been developed to satisfy present and future necessities in industry. Thanks to their technical characteristics they find application in dyeing, leather, chemical, food industry and in every sector where stainless steel is required and indispensible.

The particular ease of maintenance, the teflon seal on the stem, the use of pressed and microfused components make these valves be one of the most industrialised products of the sector.

Interception ON-OFF series IVS/P-IVFL/P-FFF/P are all available with micro-casting body except for IVFL/P DN150 body.

Tag IVS/P indicates valve with square body, IVFL/P indicates valve with 45°-angle body and FFF/P indicates valve with 45°-angle body with both threaded and socket-weld connections.

Classification following directive 97/23/CE (PED): Art. 3.3.

Table 4 includes a list of fluid which are perfectly compatible with valves.

For any other fluid or use, which has not been expressly indicated in this manual, contact directly our technical department.

2 Legend

- $\Delta p_{allowablee}$ (allowable differential pressure): maximum allowable value, at a given temperature, of the static differential pressure of a valve in closed position.
- **Allowable temperature:** maximum operating temperature, prescribed for safety reasons.
- **Allowable pressure:** maximum operating pressure, normally at the top of each compartment of the pressure equipment, prescribed for safety reasons.
- **DN:** 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
- **Kv**: flow rate, expressed in m^3/h, of water (10 to 25 °C with volumic mass equal to 1000 Kg/m^3) 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 flow in m^3/h.

3 Technical Characteristics

General Notice: ⇒ any pressure value indicated hereinafter corresponds to gauge pressure values. Normal working with pressure below plug;
⇒ **valve destined to fluids of group 2 (directive 2014/68/UE);**

DN: ⇒ 8 ÷ 150;

Connections: ⇒ butt weld;
⇒ Socket weld;
⇒ flanged in accordance with UNI PN 6, PN 10, PN 16, (flanges may be flat, pressed or binded-pressed);
⇒ GAS threaded both male and female;

Pmax allowable (PS): ⇒ 40 bar (DN 8÷11); 16 bar (DN 15÷50); 10 bar (DN 65÷100); 6 bar (DN 125÷150);

Pmin allowable.: ⇒ 0 bar;

Seal: ⇒ EPDM, PTFE-coated EPDM, PTFE;

Tmax allowable: ⇒ 150 °C with seal in EPDM; 155° with seal in PTFE-coated EPDM; 170 °C with seal in PTFE;

Tmin allowable: ⇒ 0 °C (in liquid phase);

Flow Direction: ⇒ 2-way globe valve, with 45°- or 90°-angle body, unidirectional;

Valves Series P with actuator in reinforced polyammide

Air Connections: ⇒ quick fitting for RILSAN tube Ø 6-4 mm;
Supply Fluid: ⇒ instrument air;
Supply pipe: ⇒ pipe inner diameter = 4 mm, min. outer diameter min. = 6 mm, able to bear the supply Pmax under the environmental conditions of the plant where the valve has to be placed;
P min. (supply): ⇒ 6 bar;
Air Consumption (NC): ⇒ see table 2;
Versions: ⇒ with visual device, with inductive sensors, with magnetic sensor; with pneumatic limit switches, with electromechanical limit switches, with stroke limiter; with solenoid valve in line;
Constructive Materials: ⇒ see drawings and relative relevant tables;
Overall Dimensions: ⇒ see dimensional drawings and relative relevant tables.

3.1 Table 1: Kv [m³/h]

	ND 8	ND 11	ND 15	ND 20	ND 25		ND 32	ND40	
	SERV. Ø 32	SERV. Ø 32	SERV. Ø 63	SERV. Ø 63	SERV. Ø 63	SERV. Ø 80	SERV. Ø 80	SERV. Ø 80	SERV. Ø 125
Stroke (mm)	7	7	7	7	7	11	11	11	20
IVS Body	1,8	3,2	5,8	9	13,8	18	25	39	53,9
IVFL Body	1,4	3,3	5	8,5	12,7	16	23	35	41,4
FFF Body	1,4	3,3	5	9,5	13,7	16	23	33	43,8

	ND 50		ND 65	ND 80	ND 100	ND 125	ND 150
	SERV. Ø 80	SERV. Ø 125	SERV. Ø 125	SERV. Ø 125	SERV. Ø 125	SERV. Ø 125	SERV. Ø 125
Stroke (mm)	11	20	20	20	25	37	37
IVS Body	53	69,7	65	121,5	185,2	355	411
IVFL Body	50,6	51,1	90	130,5	206,5	372,5	417
FFF Body	40	58,1	77,8				

3.2 Table 2: Air Consumption [Nl / cycle]

PILOT PRESSURE	Serv. ∅ 32	Serv. ∅ 63	Serv. ∅ 80	Serv. ∅ 125
6 bar	0,21	0,80	1,3	4,61

Note: cycle= complete maneuver consisting in opening and closure.

3.3 Table 3: Δp [bar]

∅ Servo Control	ND 8	ND 11	ND 15	ND 20	ND 25	ND 32	ND 40	ND 50	ND 65	ND 80	ND 100	ND 125	ND 150
32	20	12											
63			16	10,5	10								
80					16	16	11	6,5					
125							16	14	9,5	7	4	1,8	1,2

3.4 Table 4: Compatible FLuids

Fluid	Seal		
	EPDM	PTFE-coat. EPDM	PTFE
Vinyl Acetate	YES	YES	YES
Glycerol fatty acids	NO	YES	YES
Phenol	NO	YES	YES
Phosphoric acids (20% max.)	YES	YES	YES
Phtalic Acid	YES	YES	YES
Gallic Acid	NO	YES	YES
Nitric Acid (5% - 65% max)	NO	YES	YES
Tannic Acid	YES	YES	YES
Ethyl Alcohol	YES	YES	YES
Methyl Alcohol	YES	YES	YES
Propyl Alcohol	YES	YES	YES
Aniline	NO	YES	YES
Sodium Bicarbonate (20% max)	YES	YES	YES
Borax (sodium tetraborate)	YES	YES	YES
Sodium Carbonate	YES	YES	YES
Potassium Chlorate (30% max)	YES	YES	YES
Sodium Chloride (20% max)	YES	YES	YES
Potassium Chloride (5% max)	YES	YES	YES
Ethylene glycol	YES	YES	YES
Ammonium Nitrate	YES	YES	YES
Copper Nitrate Nitrato	YES	YES	YES
Sodium Nitrate Nitrato	YES	YES	YES
Potassium Sulphate (20% max a T=+100°C)	YES	YES	YES
Sodium Sulphate	YES	YES	YES
Zinc Sulphate (40% max a T=+100°C)	YES	YES	YES
Potassium Sulphite (10% max)	YES	YES	YES
Sodium Sulphide	YES	YES	YES
Toluene	NO	YES	YES
Steam T_{max}=130 °C P = 2,7 bar	YES	YES	YES
Steam T_{max}=150 °C P = 4,8 bar	YES	YES	YES

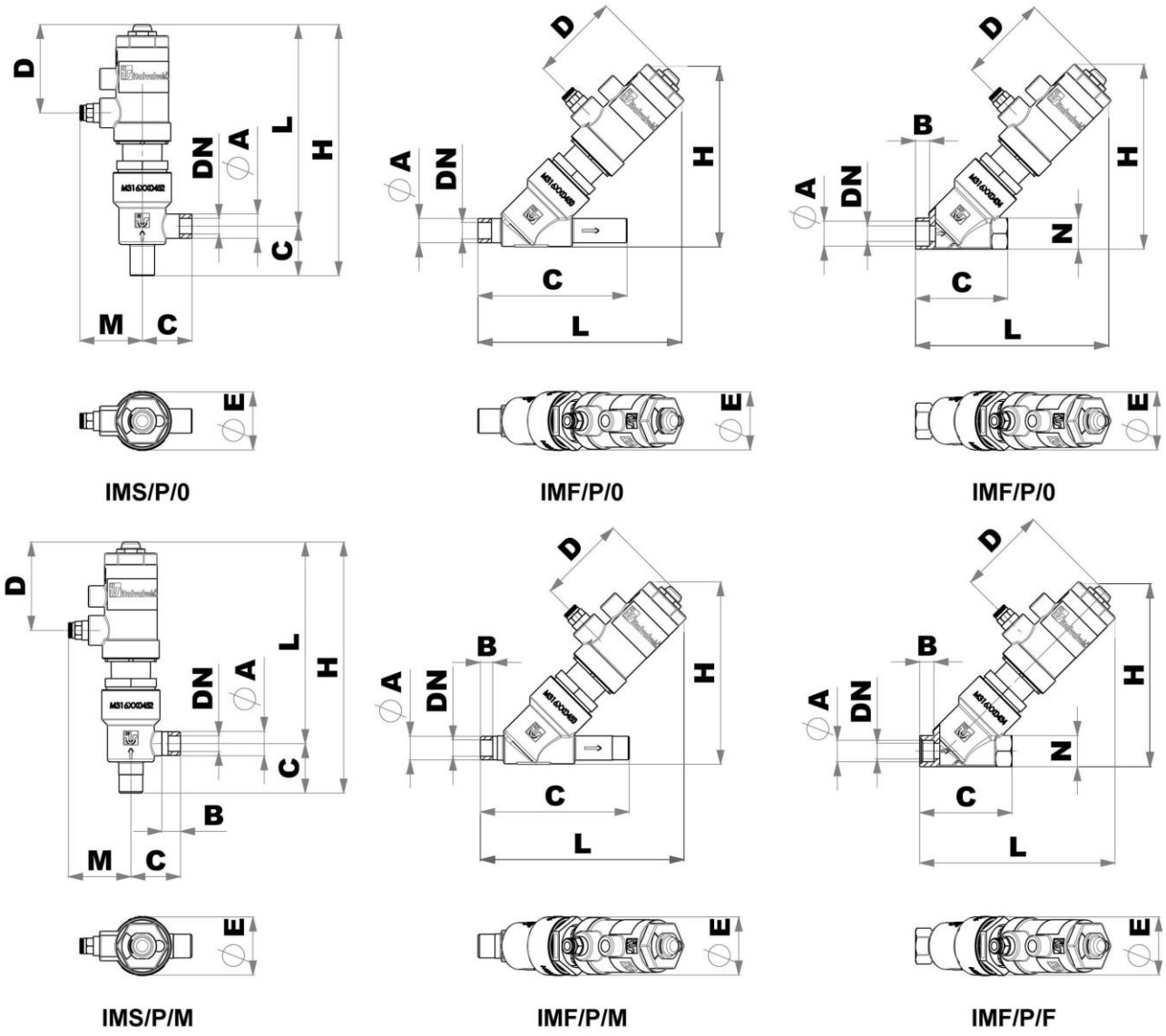
All data indicated under table 4, if not otherwise indicated, are relevant to a temperature of 21°C.
All data are general and are not valid for all possible working conditions. These data may considerably vary depending upon various conditions, such as: temperature, concentration, fluid speed.
For reliable 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.
Any 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.

3.5 Safety Notes

- valve body, under the maximum operating temperature conditions, depending upon the system, may reach T=200° C. It is up to the engineer 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 equip system with necessary safety guards and/or warning signals aiming at removing/indicating the risk of contact with the fluids that might be dangerous for the user
  NOTE: do not blow air or liquids into inspection holes. If they should be logged, disassemble valve for complete maintenance.
- Whatever operation may be performed on the valve, the fluid must be present neither in pipes, nor inside the valve itself.

3.6 Overall Dimensions Valve IVS/P-IVFL/P-FFF/P

3.6.1 IMS/P-IMF/P D.32 with visual indicator; group: 4-5-6

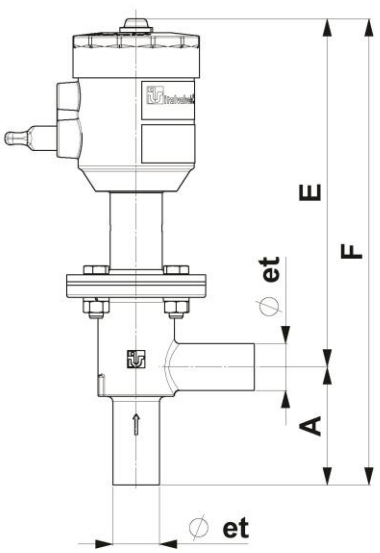


Drawing N° 100695 Rev.: 00

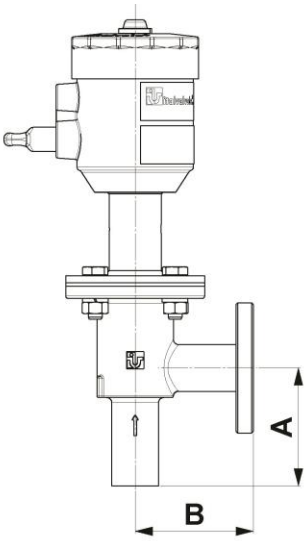
	IMS/P/0		IMS/P/M		IMF/P/0		IMF/P/M		IMF/P/0		IMF/P/F	
DN	8	11	8	11	8	11	8	11	8	11	8	11
∅A	13,7	17,2	¼"	⅜"	13,7	17,2	¼"	⅜"	14,2	17,6	¼"	⅜"
B			12	12			12	12	10	10	10	10
C	35	35	35	35	105	105	105	105	65	65	65	65
D	62,5	62,5	62,5	62,5	62,5	62,5	62,5	62,5	62,5	62,5	62,5	62,5
∅E	41	41	41	41	41	41	41	41	41	41	41	41
H	179	177,5	179	177,5	128	129	128	129	129	131	129	131
L	144	142,5	144	142,5	145	145	145	145	138	138	138	138
M	44	44	44	44								
N									19	22	19	22

Dimensions are expressed in mm.

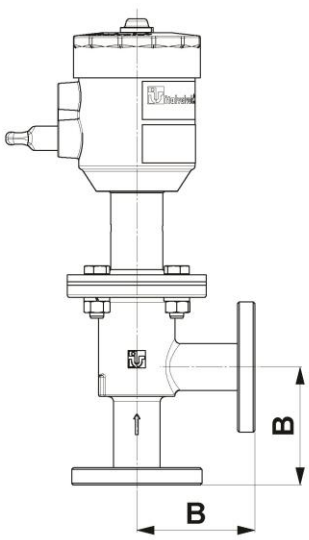
3.6.2 IVS/P-IVFL/P-FFF/P D.63 with visual indicator; group: 4-5-6



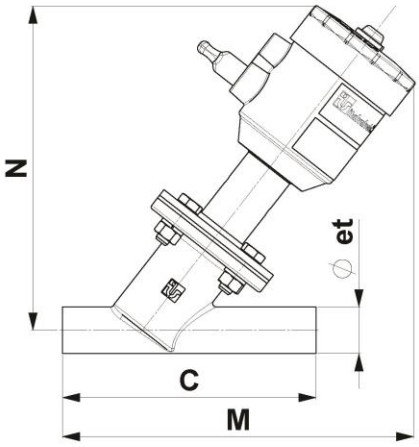
IVS/P/0



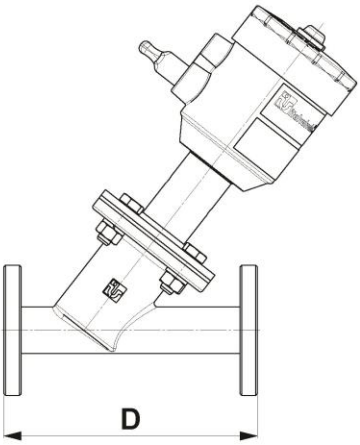
IVS/P/1



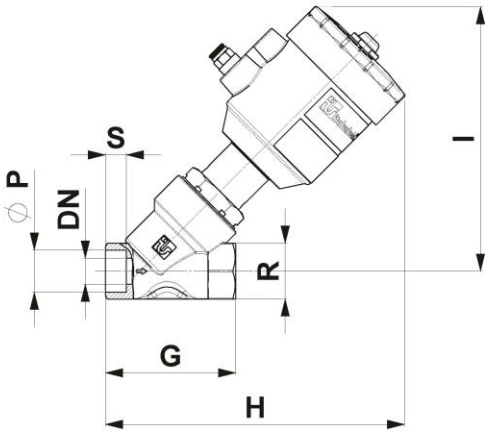
IVS/P/2



IVFL/P/0



IVFL/P



FFF/P

Drawing N° 100696 Rev.: 01

DN	15	20	25
Øe tubo	21,3	26,9	33,7
A	68	68	78
B	70	70	80
C	146	146	156
D	150	150	160
E	197,5	197,5	200,5

DN	15	20	25
F	265,5	265,5	278,5
G	65	75	90
H	169	172.5	186
I	151	152	160
M	207	202	193
N	182	185	184

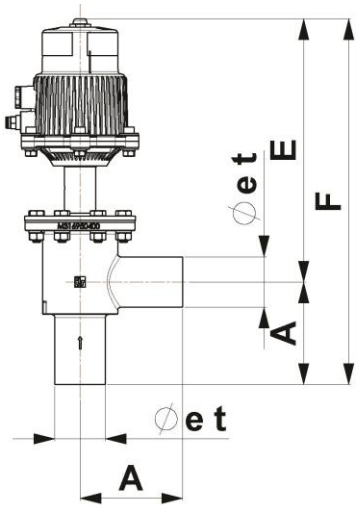
DN		15	20	25
Ø P	F(1)	½"GAS	¾"GAS	1"GAS
	ST(2)	22	27,5	34
R		27	32	39
S	F(1)	8	9	12
	ST(2	11	12	15

Dimension are in mm

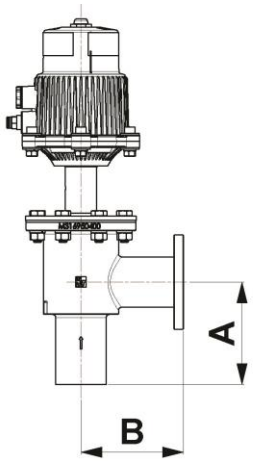
(1) "F" threaded connection

(2) "ST" socket weld connection

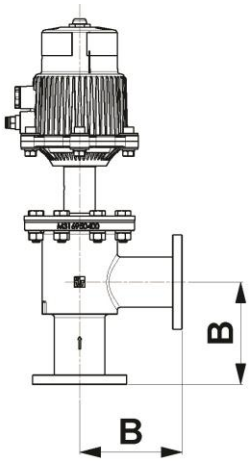
3.6.3 IVS/P-IVFL/P-FFF/P D.80 with visual indicator; group: 4-5-6



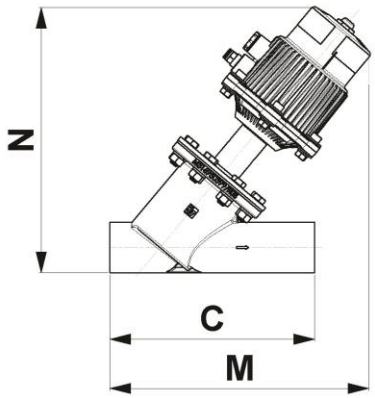
IVS/P/0



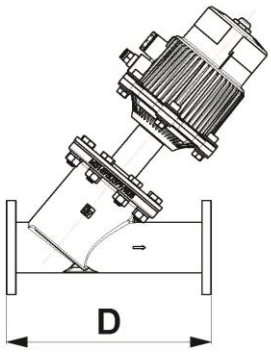
IVS/P/1



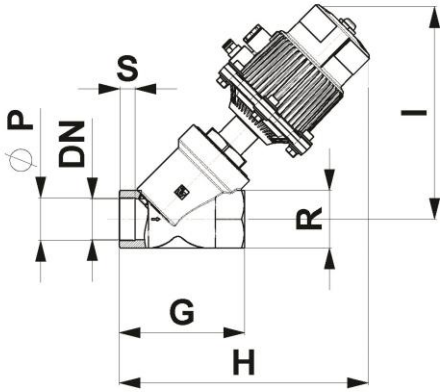
IVS/P/2



IVFL/P/0



IVFL/P



FFF/P

Drawing N° 100697 Rev.: 01

DN	25	32	40	50
Øe tubo	33,7	42,4	48,3	60,3
A	78	88	98	113
B	80	90	100	115
C	156	176	196	226
D	160	180	200	230
E	238,8	249	250	271
F	316,8	337	348	384
G	90	110	120	150
H	213,5	234	239	253,5

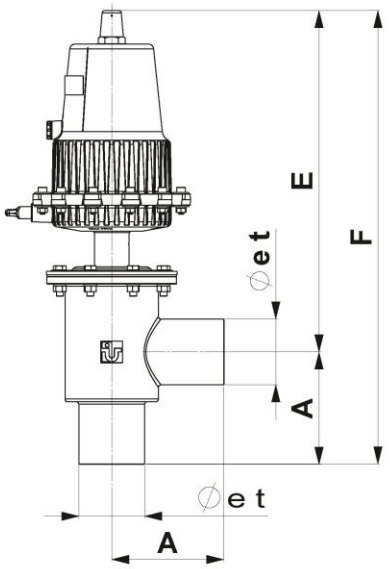
DN		25	32	40	50
I		187	199,3	204,5	215,5
M		215	233	248	279
N		211	222,8	228,8	251,8
Ø P	F(1)	1”GAS	1”1/4 GAS	1”1/2 GAS	2”GAS
	ST(2)	34	43	49	61
R		39	49	55	68
S	F(1)	12	14	14	16
	ST(2)	15	17	17	19

Dimension are in mm

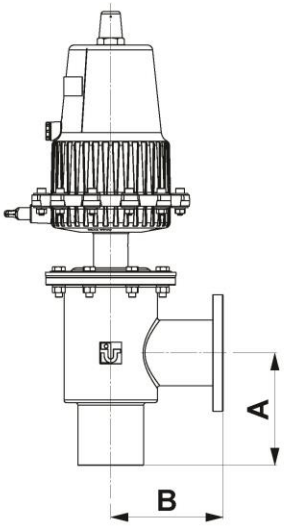
(1) “F” threaded connection

(2) “ST” socket weld connection

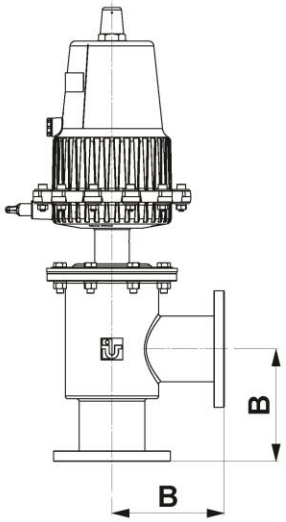
3.6.4 IVS/P-IVFL/P-FFF/P D.125 with visual indicator; group: 4-5-6



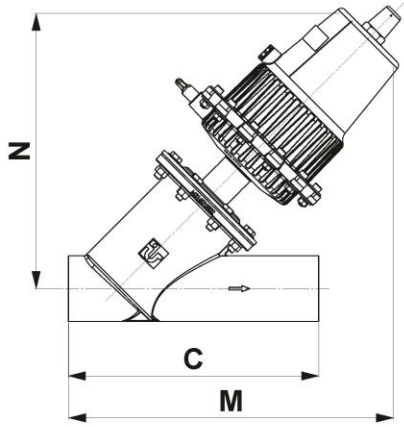
IVS/P/0



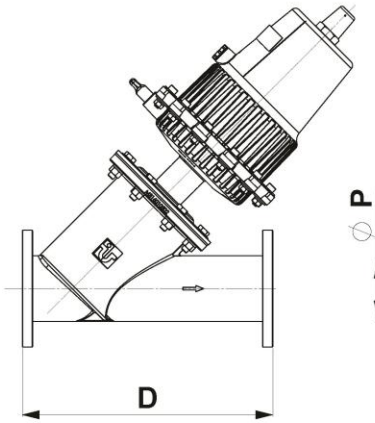
IVS/P/1



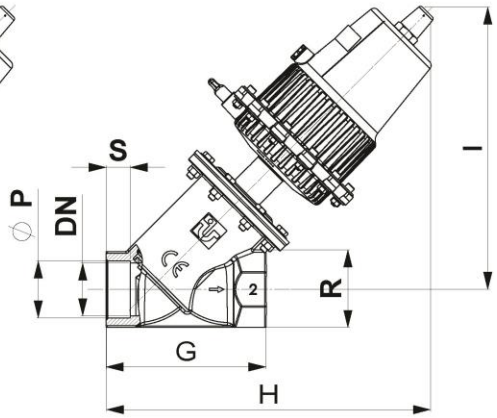
IVS/P/2



IVFL/P/0



IVFL/P



FFF/P

Drawing N° 100698 Rev.: 01

DN	40	50	65	80	100	125	150
Øe tubo	48,3	60,3	76,1	89	114,3	139,7	168,3
A	98	113	130	135	148	135	148
B	100	115	130	135	150	137	150
C	196	226	290	310	345	394	476
D	200	230	290	310	350	400	480
E	378,5	387	395	403,5	430,5	413	425
F	476,5	500	525	538,5	578,5	548	573
G	120	150	185				
H	310	324,5	378,5				

DN		40	50	65	80	100	125	150
I		275,5	286,5	327,5				
M		321	344	384,5	399	445	454,5	573
N		319,5	333	326,5	350,5	365	399	392
Ø P	F(1)	1”1/2 GAS	2”GAS	2”1/2 GAS				
	ST(2)	49	61	77				
R		55	68	88				
S	F(1)	14	16	26				
	ST(2)	17	19	28				

Dimension are in mm

(1) “F” threaded connection

(2) “ST” socket weld connection

4 Tags description

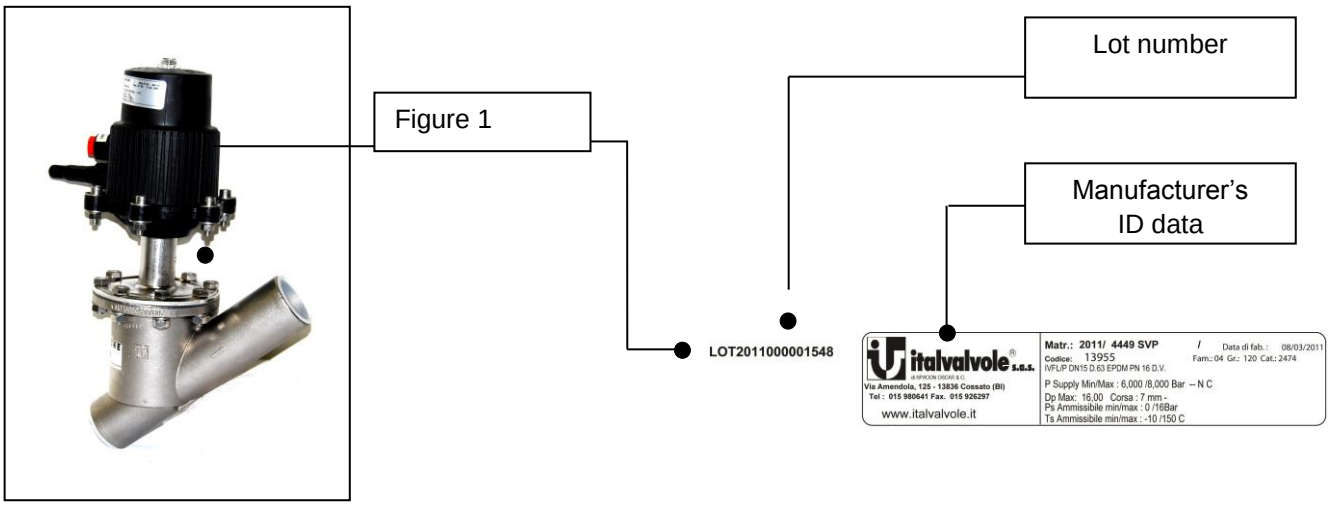
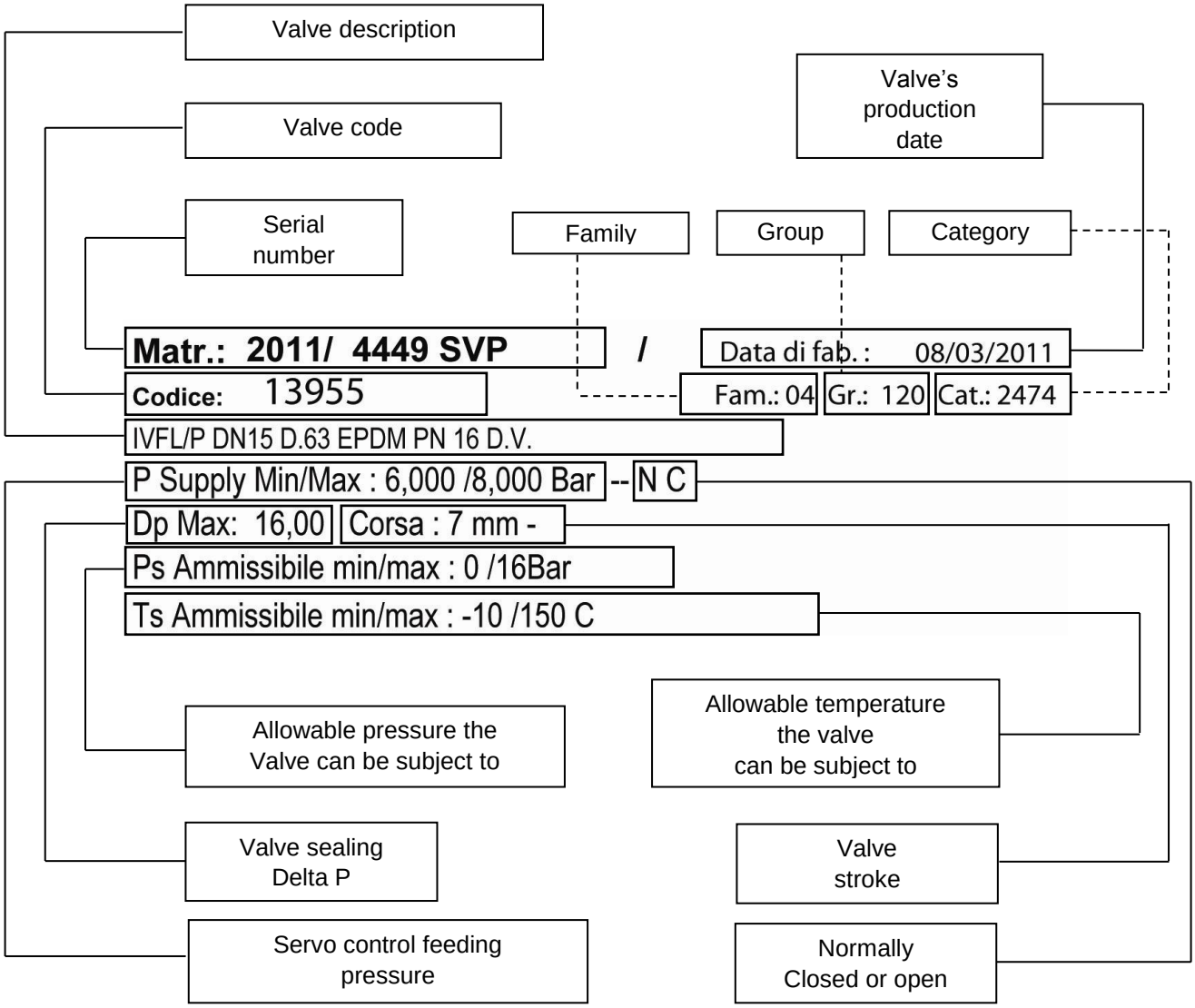
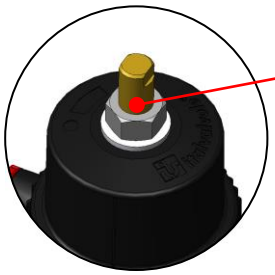


Fig.1 : Technical data of the valves

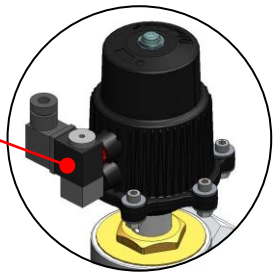


5 Accessories



STROKE LIMITER
It allows to limit stroke of the valve at desired value

SOLENOID VALVE
Solenoid valve allows to control the valve opening and closure thanks to an electric



MAGNETIC SENSOR
This sensor enables to detect valve opening or closing: it is activated by a magnet moving with the shutter.

INDUCTIVE SENSOR
This sensor enables to detect the valve on/off condition.

6 Storage, Assembly, Check And Maintenance

6.1 Transport, Storage and Handling

IVS/P-IVFL/P-FFF/P valves, during transport and assembly, must be handled very carefully. Shocks as well as anomalous stresses must be avoided, (do not handle the valve by 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.

6.2 Assembly instructions

6.2.1 General

The valve installation on the system shall be carried out by qualified personnel only, within the hydraulic 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. On the servo control remove the cap from the pneumatic supply connection.
In case of normally closed servo control, the supply shall be carried out from the lower side connection.
In case of normally open servo control, the supply shall be carried out from the upper side connection.
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 7 bar, with ø inner = 4mm supply pipes.
During the valve cleaning operations, do not blow compressed air or liquid into the inspection holes.

6.2.2 Installation of flanged valves

In case the body has flanges connections, it is necessary to put a seal between the valve flanges and the pipes flanges, in order to ensure a perfect seal; moreover, it is necessary to torque tighten the flange closing screws, according to the equipment features, in compliance with mechanic constraints due to the valve PS.

6.2.3 Assembly of valves with socket- and butt-weld ends

In case of bodies having butt and socket weld ends, before starting welding, the whole servo control complete with its gasket shall be removed, not to damage it during welding. In order to properly perform intermediate body disassembly and assembly operations, operate as follows:
for N.C. valves
1) Blow air inside the servo control (6 bar).
for all valves
2) Unscrew the screws which fasten the servo control to the valve body.
3) Remove the servo control from the body.
4) Extract the gasket from the body.
Welding must be carried out considering the material of the valve body and the required thickness, according to the provisions in force for the whole system.
Reassemble gasket and intermediate proceeding in reverse sense.

6.2.4 Assembly of valves with female threaded connections

In case the body has female threaded connections, it is necessary to coat connection terminals with PTFE seal tape to ensure a perfect seal; moreover, it is necessary to tighten connections to the prescribed torque, as specified later on, in table 5.

CAUTION: the installer must verify that all parts connected to the valve bear the required tightening torque.

6.2.5 Assembly of valves with male threaded connections

In case the body has male threaded connections, it is necessary to coat connection terminals with PTFE seal tape to ensure a perfect seal; moreover, it is necessary to tighten connections to the prescribed torque, as specified later on, in table 5.

CAUTION: the installer must verify that all parts connected to the valve bear the required tightening torque.

In order to prevent foreign matters (welding slags, chips and others), located in the pipes, from damaging 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.

6.3 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 NC servo control:

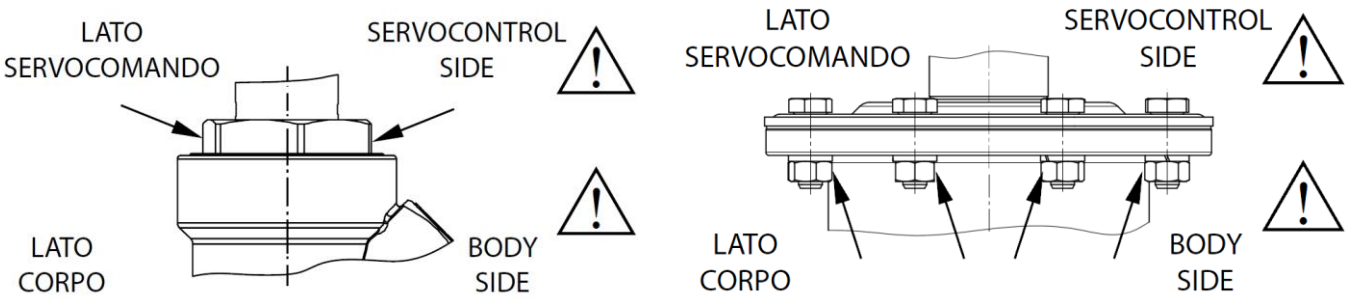
1) Send fluid inside the valve under shutter at the operating pressure (check that it is always lower than the maximum allowable pressure of the valve).
2) Blow air inside the servo control and check for opening, observing fluid passage.
3) Switch off air from the servo control.
4) Repeat this operation 5 times.
5) Check, with air off, that there is no leak from the valve.
6) Check, with air on, that there is no air leak from the servo control.

On valves with normally open NO servo control:

1) Send the fluid inside the valve under shutter at the operating pressure (check that it is always lower than the maximum allowable pressure of the valve).
2) Blow air inside the servo control and check for closure, observing absence fluid passage.
3) Switch off air from the servo control.
4) Repeat this operation 5 times.
5) Check, with air on, that there is no leak from the valve.
6) Check, with air on, that there is no air leak from the servo control.

6.3.1 First check of the valve seal

FOR PTFE VALVES SEAL



THE FIRST HOURS OF USE MUST BE AT HOT TEMPERATURE (Tmin.: 130 °C).
After a few hours of hot use, depending on the type of closure:

1. YOU HAVE TO BLOW AIR IN IF THE VALVE HAVE A CENTRAL CLAMP SCREW
2. SCREW DOWN THE NUTS INDICATED BY THE ARROWS OR THE CENTRAL CLAMP SCREW INDICATED BY THE ARROWS

6.4 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.

6.4.1 N.C. Valves

In case of anomalous operation or valve leakages, valve operation shall be immediately stopped and the following checks shall be carried out:
disconnect the air circuit;
disconnect the air supply pipe (with air off);
make sure that no air is inside the line.
Caution: during troubleshooting, the valve shall not be removed, nor placed elsewhere. No component of the valve shall be disassembled or loosened.
Check, by means of a manometer, that inlet pressure of fluid (upstream) is not higher than maximum allowable pressure or, if $\Delta p < PS$, Δp. is not exceeded.
Should anomalies still be present after this check, valve inner parts are to be verified, disassembling valve as indicated under the “Instructions for disassembly and re-assembly of N.C. valves” of this manual.
In case of doubts, or before performing operations which have not been expressly indicated in this manual, contact our technical department.

6.4.2 N.O. Valves

In case of anomalous operation or valve leakages, valve 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 to make the valve close.
Caution: during troubleshooting, the valve shall not be removed, nor placed elsewhere. No component of the valve shall be disassembled or loosened.
Check, by means of a manometer, that inlet pressure of fluid (upstream) is not higher than the maximum allowable pressure or, if $\Delta p < PS$, Δp. is not exceeded.
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 and re-assembly of N. O. valves” of this manual.
In case of doubts, or before performing operations which have not been expressly indicated in this manual, contact our technical department.

6.5 Scheduled Maintenance

Scheduled maintenance operations shall be carried out independently of the ones due to possible failures, which always require 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 300,000 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.

6.6 Disassembly and assembly instructions for valves IMS/P-IMF/P DN 8 ÷ 11 servo control D.32 N.C. with visual indicator

Make reference to annexed Dwg. N° 100719.
Assembly and disassembly operations shall be carried out only personnel qualified in hydraulics and pneumatics operations, provided with all the necessary work and safety equipment. Before carrying out any operation on systems and valves, get acquainted with operating temperatures and pressures and any other particular conditions, and take the relevant safety measures.
Whenever operations are to be carried out on valves, remove fluid completely. Valve body shall be completely empty.
NOTE: Read the procedures thoroughly before starting any operation.

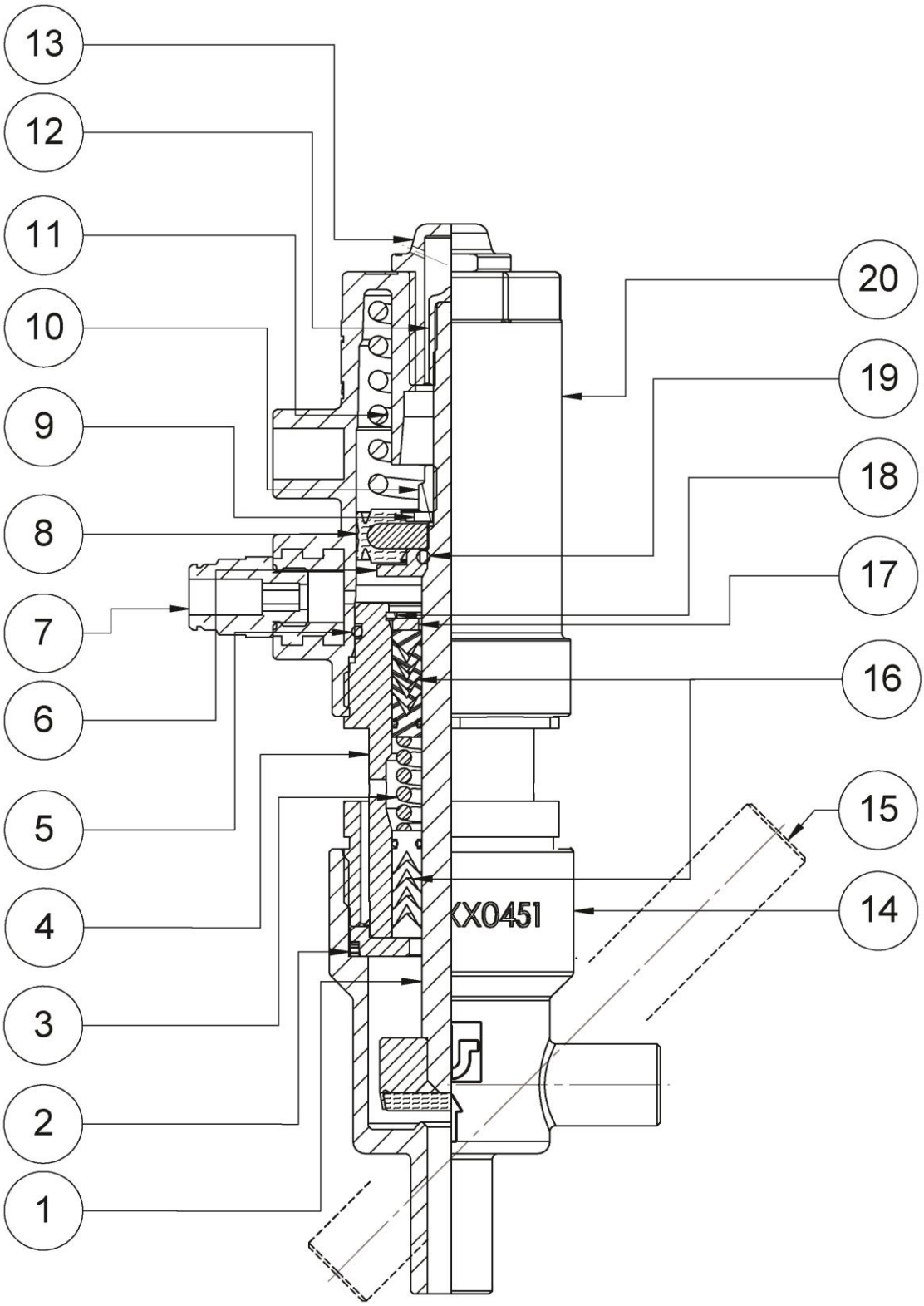
6.6.1 Disassembly

1) Blow air in the servo control (6 bar).
2) Unscrew intermediate body (4) to separate servo control form valve body (14-15).
3) Remove body gasket (2).
4) Blow air out from servo control. **Pay attention to stem-plug movement (1) due to air output!**
5) Unscrew spring-housing cylinder (20) from intermediate body (4).
   ATTENTION! A compression spring is inside the cylinder. Adequate fixture and cares shall then be used preventing the spring housing cylinder to separate explosively (20) from intermediate body (4).
6) Remove spring-housing cylinder (20).
7) Remove spring (11).
8) Unscrew transparent cap (13).
9) Lock the shutter stem between the soft jaws (1).
10) Unscrew stroke indicator (12) and self-locking nut (10). Extract piston-bearing washer (9).
11) Remove piston with NADUOP seal (8), extract O-ring (19).
12) Extract second piston-bearing washer (6).
13) Extract plug-stem (1) from intermediate body (4).
14) Extract seeger ring from intermediate body (18). **ATTENTION! Seeger ring (18) keeps compressed packing gland spring (3)**; Use any precaution to prevent the spring from coming out suddenly during disassembly operations.
15) Remove plane washer (17), first packing gland (16), spring (3), second packing gland(16).
16) Remove O-ring (5) from intermediate body.
17) Valve now is completely disassembled; make necessary replacements.

6.6.2 Assembly

1) Insert first packing gland (16) in intermediate body (4), then spring (3), second packing gland (16) and plane washer (17).
2) Compress assembly and lock it with seeger (18). **ATTENTION! Seeger ring (18) keeps compressed packing gland spring (3);** Use any precaution to prevent the spring from coming out suddenly during assembly operations.
3) Insert plug-stem (1) in intermediate body (4).
4) Insert on plug-stem first piston-bearing washer (6) and O-ring (19).
5) Insert on plug-stem piston with NADUOP gasket (8) and second piston-bearing washer (9).
6) Close and fix assembly with self-locking nut (10) closing packing of components (torque moments on Table 5).
7) Screw stroke indicator (12).
8) Insert O-ring (5) on intermediate body.
9) Insert spring (11) into its seat in spring-housing cylinder (20).
10) Screw spring-housing cylinder (20) on intermediate body (4).
11) Screw transparent cap (13) on spring-housing cylinder (20) without forcing closing.
12) Blow air in the servo control (6 bar). **ATTENTION! When the air actuates the servo control, the shutter will move for its entire stroke.**
13) Put body gasket (2) on valve body (14-15).
14) Screw servo control in valve body.
15) Remove air from servo control.

6.6.3 Exploded view IMS/P-IMF/P DN 8 ÷ 11 servo control D.32 N.C. with visual indicator



Drawing N° 100719 Rev.: 01

6.7 Disassembly and assembly instructions for valves IVS/P-IVFL/P-FFF/P DN 15 ÷ 25 servo control D.63 N.C. with visual indicator

Make reference to annexed Dwg. N° 100720.
Assembly and disassembly operations shall be carried out only personnel qualified in hydraulics and pneumatics operations, provided with all the necessary work and safety equipment. Before carrying out any operation on systems and valves, get acquainted with operating temperatures and pressures and any other particular conditions, and take the relevant safety measures.
Whenever operations are to be carried out on valves, remove fluid completely. Valve body shall be completely empty.
NOTE: Read the procedures thoroughly before starting any operation.

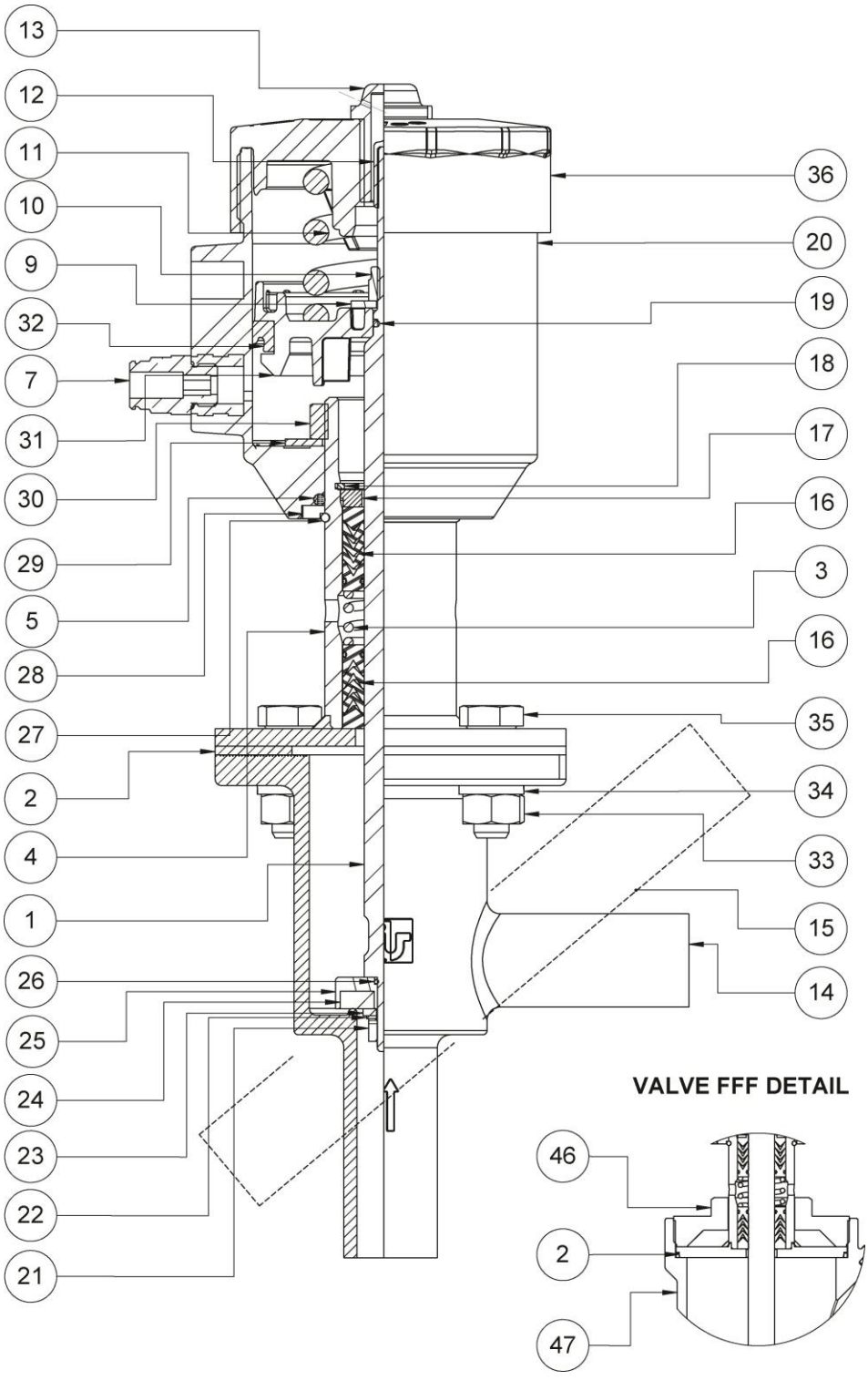
6.7.1 Disassembly

1) Blow air into servo control (6 bar).
2) Unscrew nuts (33), remove washers (34) remove screws (35). For FFF valve unscrew locking nut (46) of intermediate body
3) Separate servo control from valve body (14-15-47).
4) Remove body gasket (2).
5) Blow air out of servo control. **ATTENTION to stem-plug movement (1) due to air output!**
6) Unscrew and remove cap of the cylinder (36). **ATTENTION! A compression spring is inside the cylinder.** Adequate fixture and cares shall then be used preventing the spring housing cylinder to separate explosively (36) from intermediate body (20).
7) Remove spring (11).
8) Unscrew transparent cap (13).
9) Lock plug-stem between soft jaws (1).
10) Unscrew stroke indicator (12) and self-locking nut (10).Remove plan washer (9).
11) Remove piston with DE seal (31).
12) Detouch DE seal (32) from piston (31).
13) Extract plug-stem (1) from intermediate body (4).
14) Extract O-ring (19) from stem (1).
15) Unscrew nut (21) which locks cap.
16) Extract elastic washer (22), cap-locking plane washer (23) and cap bearing (25).
17) Extract from cap bearing (25) gasket (24) (for ND25 only gasket EPDM coated PTFE) and O-ring (26).
18) Unscrew nut (30) with tubular spanner.
19) Extract elastic washer (29) and spring-housing cylinder (20) from intermediate body (4).
20) Extract O-ring (5), washer (28) and shoulder ring (27) from intermediate body (4).
21) Extract seeger (18). **ATTENTION! Seeger ring (18) keeps compressed packing gland spring (3)**; Use any precaution to prevent the spring from coming out suddenly during disassembly operations.
22) Remove washer (17), first packing gland (16), spring (3) and second packing gland (16).
23) Valve now is completely disassembled; make necessary replacements.

6.7.2 Assembly

1) Put gasket (24)(for ND25 only gasket EPDM coated PTFE) on cap bearing (25).
2) Insert O-ring (26) and cap bearing (25) on plug-stem (1)
3) Insert on stem (1) cap-locker plane washer (23), elastic washer (22) and screw nut (21), adding some thread-locker glue on stem thread (tightening torque on Table 5).
4) Put O-ring (19) on stem (1).
5) Insert in intermediate body (4) first packing gland (16), spring (3), second packing gland (16).and washer (17).
6) Compress assembly and lock it with seeger (18). **ATTENTION! Seeger ring (18) keeps compressed packing gland spring (3);** Use any precaution to prevent the spring from coming out suddenly during assembly operations.
7) Insert shoulder ring (27), washer (28) and O-ring (5) on intermediate body (4).
8) Insert spring-housing cylinder (20) on intermediate body (4). Position elastic washer (29) and close nut (30) with tubular spanner.
9) Insert plug stem (1) previously assembled to intermediate body (4).
10) Insert DE gasket (32) on piston (31) paying attention to fix it as indicated in drawing.
11) Insert on plug-stem (1) piston with DE gasket (31), paying attention to position it with lip downward. Position plan washer (9) and close assembly with self-locking nut (10) (tightening torque on Table 5).
12) Screw stroke indicator (12).
13) Insert spring (11) in servo control
14) Screw cap (36) on spring-housing cylinder (20). **ATTENTION! A compression spring is inside the cylinder.**
15) Screw transparent cap (13) on top of cylinder (36).
16) Blow air into servo control (6 bar). **ATTENTION! When the air actuates the servo control, the shutter will move for its entire stroke.**
17) Put body gasket (2) on valve body (14-15-47).
18) Insert servo control in valve body.
19) Put screws (35) in intermediate body in correspondence of holes of valve body.
20) Insert washers on screws (34) and screw nuts (33) (tightening torque on Table 5). For FFF valve screw locking nut (46) of intermediate body.
21) Remove air from servo control.

6.7.3 Exploded view IVS/P-IVFL/P-FFF/P DN 15 ÷ 25 servo control D.63 N.C. with visual indicator



Drawing N° 100720 Rev.: 02

6.8 Disassembly and assembly instructions for valves IVS/P-IVFL/P-FFF/P DN 25 ÷ 50 servo control D.80 N.C. with visual indicator

Make reference to annexed Dwg. N° 100721.
Assembly and disassembly operations shall be carried out only personnel qualified in hydraulics and pneumatics operations, provided with all the necessary work and safety equipment. Before carrying out any operation on systems and valves, get acquainted with operating temperatures and pressures and any other particular conditions, and take the relevant safety measures.
Whenever operations are to be carried out on valves, remove fluid completely. Valve body shall be completely empty.
NOTE: Read the procedures thoroughly before starting any operation.

6.8.1 Disassembly

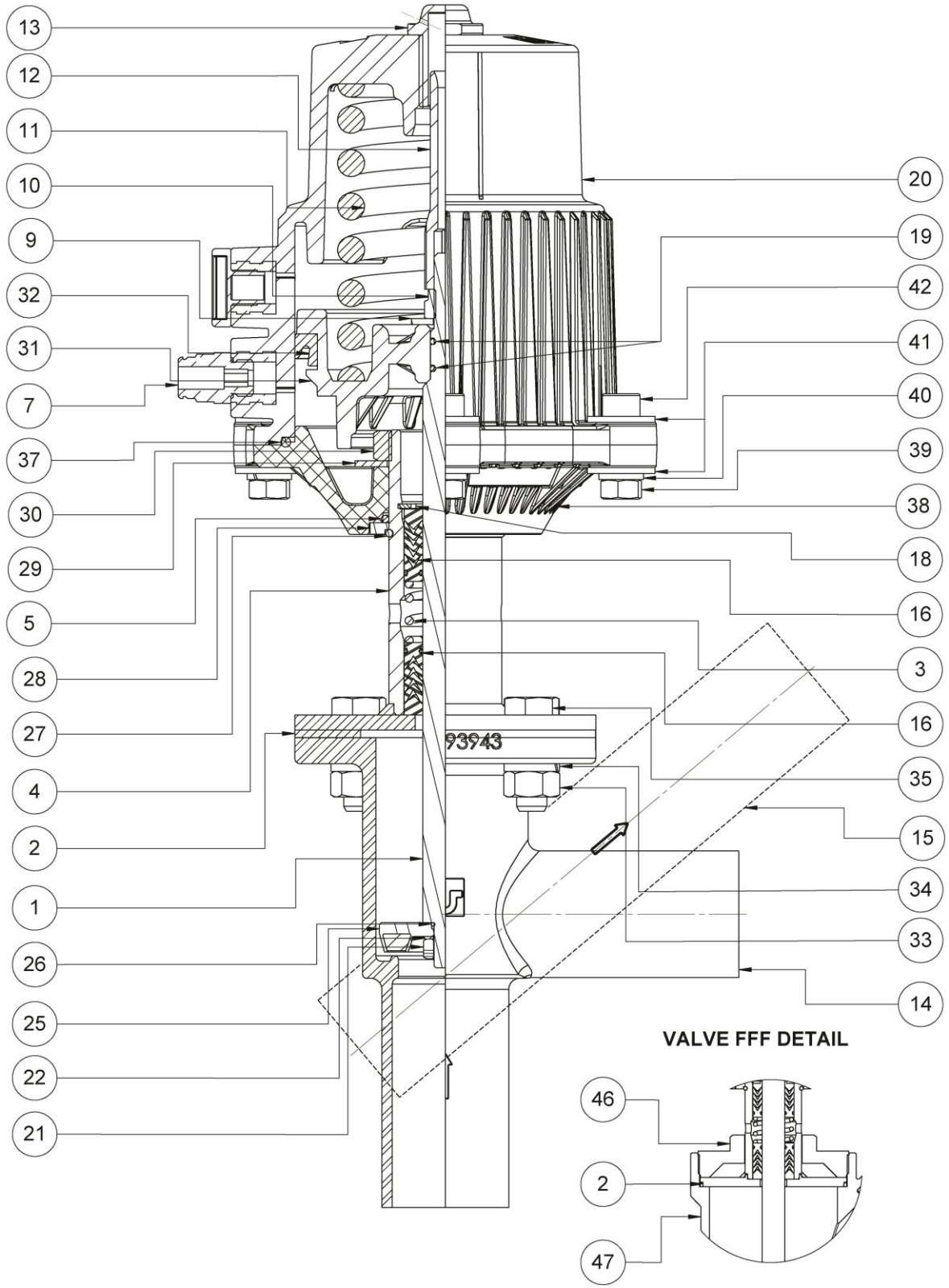
1) Blow air into servo control (6 bar).
2) Unscrew nuts (33), remove washers (34) remove screws (35). For FFF valve unscrew locking nut (46) of intermediate body
3) Separate servo control from valve body (14-15-47).
4) Remove body gasket (2).
5) Blow air out of servo control. **ATTENTION to stem-plug movement (1) due to air!**
6) Unscrew nuts (39) remove washers (40-41) and screws (42). **ATTENTION! A compression spring is inside the cylinder.** Adequate fixture and cares shall then be used preventing the spring housing cylinder to separate explosively (20) from intermediate body.
7) Remove spring-housing cylinder (20).
8) Remove spring (11).
9) Unscrew transparent cap (13) from spring-housing cylinder.
10) Remove O-ring (37).
11) Lock plug-stem between soft jaws (1).
12) Unscrew stroke indicator (12) and self-locking nut (10). Remove plane washer (9).
13) Remove piston with DE gasket (31).
14) Disassemble DE gasket (32) from piston (31).
15) Extract plug-stem (1) from intermediate body (4).
16) Extract O-rings (19) from stem (1).
17) Unscrew nut (21) which locks tap.
18) Extract elastic washer (22), cap bearing (25) and O-ring (26).
19) Unscrew nut (30).
20) Extract elastic washer (29) and upper intermediate body (38) from lower intermediate body (4).
21) Extract O-ring (5), washer (28) and shoulder ring (27) from lower intermediate body (4).
22) Extract seeger (18). **ATTENTION! Seeger ring (18) keeps compressed packing gland spring (3)** Use any precaution to prevent the spring from coming out suddenly during disassembly operations.
23) Remove washer (17), first packing gland (16), spring (3) and second packing gland (16).
24) Valve now is completely disassembled; make necessary replacements.

6.8.2 Assembly

1) Insert O-ring (26) and cap bearing (25) on plug-stem (1)
2) Insert on stem (1) elastic washer (22) and screw nut (21), adding some thread-locker glue on stem thread (tightening torque on Table 5).
3) Put O-rings (19) on stem (1).
4) Insert in intermediate body (4) first packing gland (16), spring (3), second packing gland (16) and washer (17).
5) Press and fix assembly with seeger (18). **ATTENTION! Seeger ring (18) keeps compressed packing gland spring (3);** Use any precaution to prevent the spring from coming out suddenly during assembly operations.
6) Insert shoulder ring (27), washer (28) and O-ring (5) on lower intermediate body (4).
7) Put upper intermediate body (38) on lower intermediate body (4).
8) Put elastic washer (29) and close nut (30).
9) Insert plug-stem (1) previously assembled in intermediate body (4).
10) Put DE gasket (32) on piston (31) paying attention to fix it as indicated in drawing.
11) Insert on plug-stem (1) piston with DE gasket (31), paying attention to position it with lip downward.
12) Put plane washer (9) and close assembly with self-locking nut (10) (tightening torque on Table 5).
13) Screw stroke indicator (12).
14) Insert O-ring (37) on intermediate body.
15) Insert spring (11).
16) Insert spring-housing cylinder on intermediate body (20).
17) Using adapt instruments approach spring-housing cylinder to intermediate body.
ATTENTION! A compression spring is inside the cylinder.
18) Insert screws (42) and washers (41) in spring-housing cylinder body in correspondence of holes of intermediate body.
19) Insert washers (40-41) and screw nuts (39) (tightening torque on Table 5).
20) Screw transparent cap (13) on spring-housing cylinder (20).
21) Blow air in servo control (6 bar). **ATTENTION! When the air actuates the servo control, the shutter will move for its entire stroke.**

22) Put body gasket (2) on valve body (14-15-47). Insert servo control in valve body.
23) Insert screws (35) in intermediate body of servo control in correspondence of holes of valve body.
24) Insert washers on screws (34) and screw nuts (33) (tightening torque on Table 5). For FFF valve screw locking nut (46) of intermediate body.
25) Remove air from servo control.

6.8.3 Exploded view IVS/P-IVFL/P-FFF/P DN 25 ÷ 50 servo control D.80 N.C. with visual indicator



Drawing N° 100721 Rev.: 02

6.9 Disassembly and assembly instructions valves IVS/P-IVFL/P-FFF/P DN 40÷150 servo control D.125 N.C. with visual indicator

Make reference to annexed Dwg. N° 100722.
Assembly and disassembly operations shall be carried out only personnel qualified in hydraulics and pneumatics operations, provided with all the necessary work and safety equipment. Before carrying out any operation on systems and valves, get acquainted with operating temperatures and pressures and any other particular conditions, and take the relevant safety measures.
Whenever operations are to be carried out on valves, remove fluid completely. Valve body shall be completely empty.
NOTE: Read the procedures thoroughly before starting any operation.

6.9.1 Disassembly

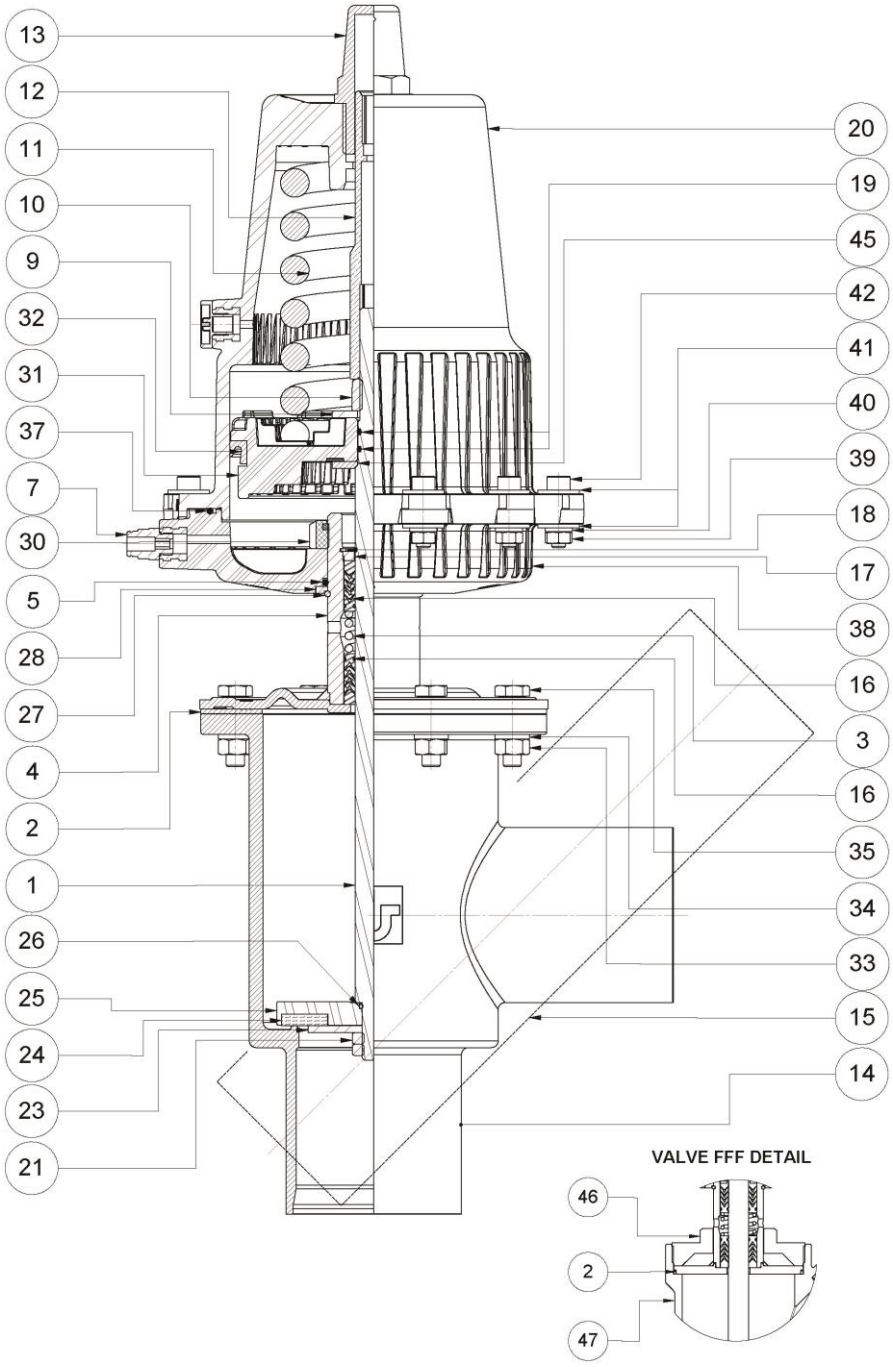
1) Blow air into servo control (6 bar).
2) Unscrew nuts (33), remove washers (34) remove screws (35). For FFF (DN 40#50) valve unscrew locking nut (46) of intermediate body
3) Detouch servo control from valve body (14-15-47).
4) Remove body gasket (2).
5) Blow air out of servo control. **ATTENTION to stem-plug movement (1) due to air!**
6) Unscrew nuts (39) then remove washers (40-41) and screws (42). **ATTENTION! A compression spring is inside the cylinder.** Adequate fixture and cares shall then be used preventing the spring housing cylinder to separate explosively (20) from intermediate body.
7) Remove spring-housing cylinder (20).
8) Remove spring (11).
9) Unscrew transparent cap (13) from spring-housing cylinder.
10) Remove O-ring (37).
11) Lock plug-stem between soft jaws (1).
12) Unscrew stroke indicator (12) and self-locking nut (10). Remove plane washer (9).
13) Remove piston with DE gasket (31) and the lower washer (45).
14) Disassemble DE gasket (32) from piston (31).
15) Extract plug-stem (1) from intermediate body (4).
16) Extract O-rings (19) from stem (1).
17) Unscrew nuts (21) which locks tap.
18) Extract plane washer (23) and cap bearing (25).
19) Extract from cap bearing (25) gasket (24) and OR (26).
20) Unscrew nut (30).
21) Extract upper intermediate body (38) from lower intermediate body (4).
22) Extract O-ring (5), washer (28) and shoulder ring (27) from lower intermediate body (4).
23) Extract seeger (18). **ATTENTION! Seeger ring (18) keeps compressed packing gland spring (3)** Use any precaution to prevent the spring from coming out suddenly during disassembly operations.
24) Remove washer (17), first packing gland (16), spring (3) and second packing gland (16).
25) Valve now is completely disassembled; make necessary replacements.

6.9.2 Assembly

1) Put gasket (24) on cap bearing (25).
2) Insert O-ring (26) and cap bearing (25) on plug stem (1)
3) Insert cap-holder plane washer (23) on stem (1) and screw nuts (21), adding some thread-locker glue on stem thread (tightening torque on Table 5).
4) Put O-rings (19) on stem (1).
5) Insert first packing gland (16), spring (3), second packing gland (16) and washer (17) into intermediate body (4).
6) Press and fix assembly with seeger (18). **ATTENTION! Seeger ring (18) keeps compressed packing gland spring (3);** Use any precaution to prevent the spring from coming out suddenly during disassembly operations.
7) Insert shoulder ring (27), washer (28) and O-ring (5) on intermediate body (4).
8) Insert upper intermediate body (38) on lower intermediate body (4).
9) Screw nut (30).
10) Insert plug stem (1) previously assembled into intermediate body (4).
11) Put DE gasket (32) on piston (31) paying attention to fix it as indicated in drawing.
12) Insert on plug-stem (1) the lower washer (45) and the piston with DE gasket (31), paying attention to position it with lip downward.
13) Put plane washer (9) and close assembly with self-locking nut (10) (tightening torque on Table 5).
14) Screw stroke indicator (12).
15) Insert O-ring (37) on intermediate body.
16) Insert spring (11).
17) Insert spring-housing cylinder on intermediate body (20).
18) Using adapt instruments approach spring-housing cylinder to intermediate body.
ATTENTION! A compression spring is inside the cylinder.
19) Insert screws (42) and washers (41) in spring-housing cylinder body in correspondence of holes of intermediate body.
20) Insert washers (40-41) and screw nuts (39) (tightening torque on Table 5).

21) Screw transparent cap (13) on spring-housing cylinder (20).
22) Blow air in servo control (6 bar). **ATTENTION! When the air actuates the servo control, the shutter will move for its entire stroke.**
23) Put body gasket (2) on valve body (14-15-47). Insert servo control in valve body.
24) Insert screws (35) in intermediate body of servo control in correspondence of holes of valve body.
25) Insert washers on screws (34) and screw nuts (33) (tightening torque on Table 5). For FFF (DN 40#50) valve screw locking nut (46) of intermediate body.
26) Remove air from servo control.

6.9.3 Exploded view IVS/P-IVFL/P-FFF/P DN 40 ÷ 150 servo control D.125 N.C. with visual indicator



Drawing N° 100722 Rev.: 02

6.10 Disassembly and assembly instructions valves IVS/P-IVFL/P-FFF/P DN 15 ÷ 25 servo control D.63 N.O. with visual indicator

Make reference to annexed Dwg. N° 100787.
Assembly and disassembly operations shall be carried out only personnel qualified in hydraulics and pneumatics operations, provided with all the necessary work and safety equipment. Before carrying out any operation on systems and valves, get acquainted with operating temperatures and pressures and any other particular conditions, and take the relevant safety measures.
Whenever operations are to be carried out on valves, remove fluid completely. Valve body shall be completely empty.
NOTE: Read the procedures thoroughly before starting any operation.

6.10.1 Disassembly

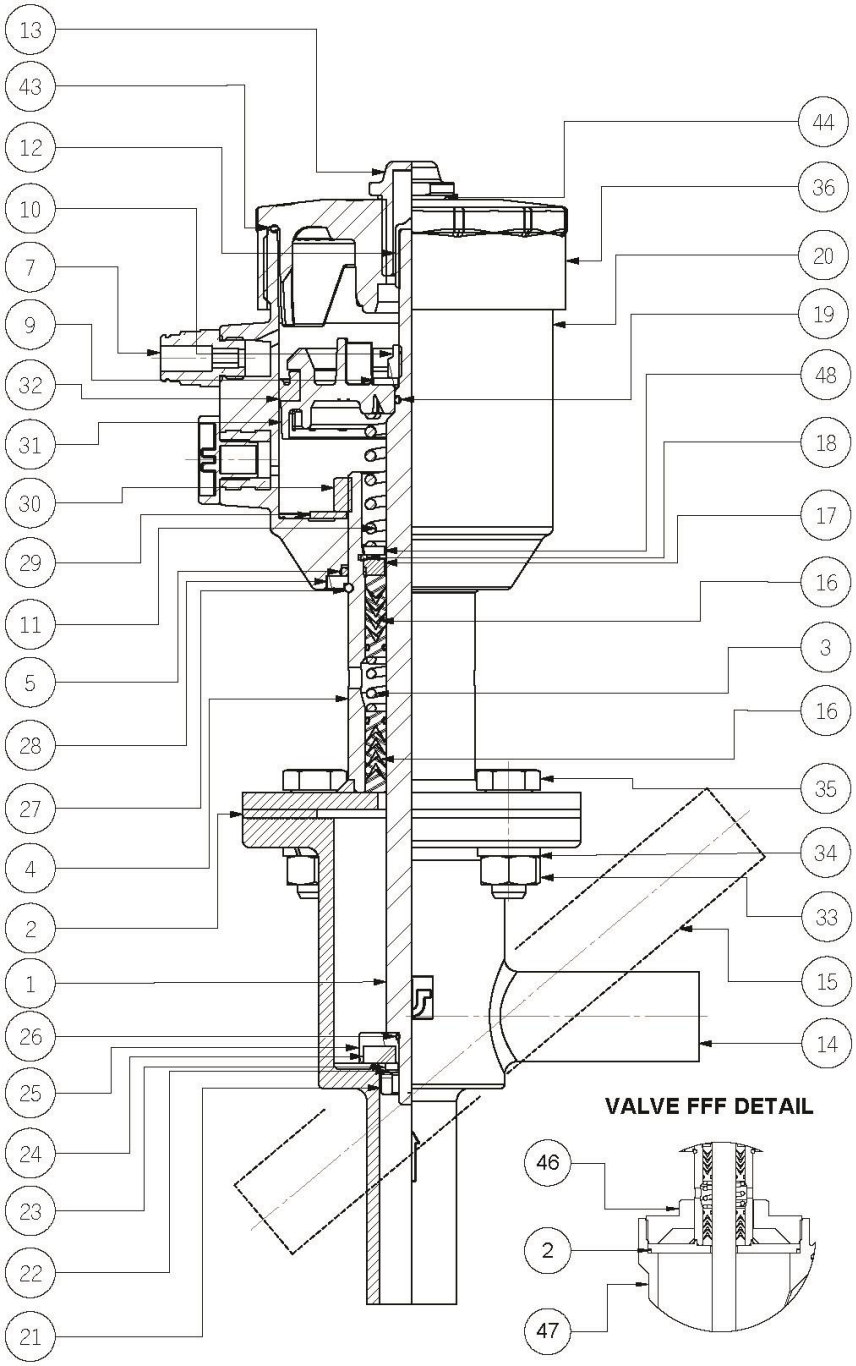
1) Unscrew nuts (33), remove washers (34) remove screws (35). For FFF valve unscrew locking nut (46) of intermediate body
2) Separate servo control from valve body (14-15-47).
3) Remove body gasket (2).
4) Unscrew cylinder cap (36). **ATTENTION! A compression spring is inside the cylinder.** Adequate fixture and cares shall then be used preventing the spring housing cylinder to separate explosively (36) from intermediate body (20).
5) Remove cap cylinder (36) and O-ring (43).
6) Unscrew transparent cap (13) and O-ring (44).
7) Unscrew pneumatic fitting (7).
8) Lock plug-stem between soft jaws (1).
9) Unscrew stroke indicator (12) and self-lockign nut (10). Extract plane washer (9).
10) Remove piston with DE gasket (31).
11) Disassemble DE gasket (32) from piston (31).
12) Remove spring (11) and washer(17).
13) Extract plug-stem (1) from intermediate body (4).
14) Extract O-rings (19) from stem (1).
15) Unscrew nut (21) which locks tap.
16) Extract elastic washer (22), cap-holder plane washer (23) and cap bearing (25).
17) Extract from cap bearing (25) gasket (24) and O-ring (26).
18) Unscrew nut (30) with tubular spanner.
19) Extract elastic washer (29) and spring-housing cylinder (20) from intermediate body (4).
20) Extract O-ring (5), washer (28) and shoulder ring (27) from intermediate body (4).
21) Extract seeger (18). **ATTENTION! Seeger ring (18) keeps compressed packing gland spring (3).** Use any precaution to prevent the spring from coming out suddenly during disassembly operations.
22) Extract washer (17), first packing gland (16), spring (3) and second packing gland (16).
23) Valve now is completely disassembled; make necessary replacements.

6.10.2 Assembly

1) Put gasket (24) on cap bearing (25).
2) Insert O-ring (26) and cap bearing (25) on plug-stem (1).
3) Insert on stem (1) cap-holder plane washer (23), elastic washer (22) and screw nut (21), adding some thread-locker glue on stem thread (tightening torque on Table 5).
4) Put O-rings (19) on the stem (1).
5) Insert into intermediate body (4) first packing gland (16), spring (3), second packing gland (16) and washer (17).
6) Press and fix assembly with seeger (18). **ATTENTION! Seeger ring (18) keeps compressed packing gland spring (3);** Use any precaution to prevent the spring from coming out suddenly during disassembly operations.
7) Put shoulder ring (27), washer (28) and O-ring (5) on intermediate body (4).
8) Insert spring-housing cylinder (20) on intermediate body (4). Put elastic washer (29) and close nut (30) with a tubular spanner.
9) Insert plug-stem (1) previously assembled to intermediate body (4).
10) Insert washer (17) and spring (11).
11) Insert DE gasket (32) on piston (31) paying attention to fix it as indicated in drawing.
12) Insert on plug-stem (1) piston with DE gasket (31), paying attention to position it with lip downward. Position plan washer (9) and close assembly with self-locking nut (10) (tightening torque on Table 5).
13) Screw stroke indicator (12).
14) Put O-ring (43) on cap (36).
15) Screw cap (36) on spring-housing cylinder (20).
    ATTENTION! A compression spring is inside the cylinder
16) Put O-ring (44) on transparent cap (13) and screw it on cap of cylinder (36).

17) Screw air fitting (7) on spring-housing cylinder (20).
18) Put body gasket (2) on valve body (14-15-47).
19) Insert servo control in valve body.
22) Put screws (35) in intermediate body in correspondence of holes of valve body.
20) Insert washers on screws (34) and screw nuts (33) (tightening torque on Table 5). For FFF valve screw locking nut (46) of intermediate body .

6.10.3 Exploded view IVS/P-IVFL/P-FFF/P DN 15 ÷ 25 servo control D.63 N.O. with visual indicator



Drawing N° 100787 Rev.:01

6.11 Disassembly and assembly instructions valves IVS/P-IVFL/P-FFF/P DN 25 ÷ 50 servo control D.80 N.O. with visual indicator

Make reference to annexed Dwg. N° 100788.
Assembly and disassembly operations shall be carried out only personnel qualified in hydraulics and pneumatics operations, provided with all the necessary work and safety equipment. Before carrying out any operation on systems and valves, get acquainted with operating temperatures and pressures and any other particular conditions, and take the relevant safety measures.
Whenever operations are to be carried out on valves, remove fluid completely. Valve body shall be completely empty.
NOTE: Read the procedures thoroughly before starting any operation.

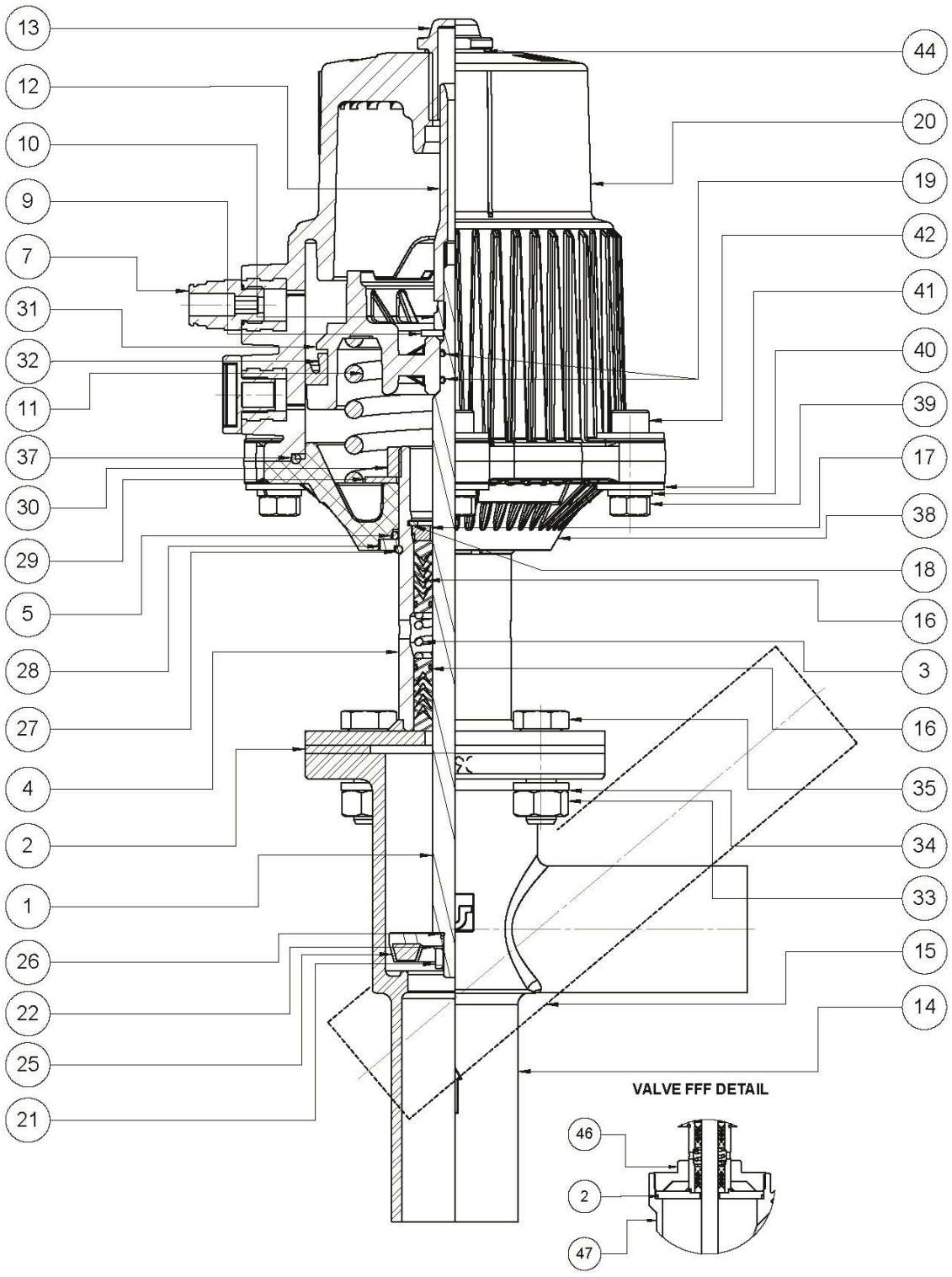
6.11.1 Disassembly

1) Unscrew nuts (33), remove washers (34) and screws (35). For FFF valve unscrew locking nut (46) of intermediate body
2) Detouch servo control from valve body (14-15-47).
3) Remove body gasket (2).
4) Unscrew nuts (39) then washers (40-41) and screws (42). **ATTENTION! A compression spring is inside the cylinder.** Adequate fixture and cares shall then be used preventing the spring housing cylinder to separate explosively (20) from intermediate body.
5) Remove spring-housing cylinder (20).
6) Unscrew transparent cap (13) from spring-housing cylinder and remove O-ring (44).
7) Remove pneumatic fitting (7) from spring-housing cylinder (20).
8) Extract O-ring (37).
9) Lock plug-stem between soft jaws (1).
10) Unscrew stroke indicator (12) and self-locking nut (10). Extract plane washer (9).
11) Remove piston with DE gasket (31).
12) Remove DE gasket (32) from piston (31).
13) Remove spring (11).
14) Extract plug-stem (1) from intermediate body (4).
15) Extract O-rings (19) from stem (1).
16) Unscrew nut (21) which locks tap.
17) Extract elastic washer (22), cap bearing (25) and O-ring (26).
18) Unscrew nut (30).
19) Extract elastic washer (29) and upper intermediate body (38) from lower intermediate body (4).
20) Extract O-ring (5), washer (28) and shoulder ring (27) from lower intermediate body (4).
21) Extract seeger (18). **ATTENTION! Seeger ring (18) keeps compressed packing gland spring (3).** Use any precaution to prevent the spring from coming out suddenly during disassembly operations.
22) Extract washer (17), first packing gland (16), spring (3) and second packing gland (16).
23) Valve now is completely disassembled; make necessary replacements.

6.11.2 Assembly

1) Insert O-ring (26) and cap bearing (25) on plug-stem (1)
2) Insert on stem (1) elastic washer (22) and screw nut (21), adding some thread-locker glue on stem thread (tightening torque on Table 5).
3) Put O-rings (19) on stem (1).
4) Insert in intermediate body (4) il first packing gland (16), spring (3), second packing gland (16) and washer (17).
5) Press and fix assembly with seeger (18). **ATTENTION! Seeger ring (18) keeps compressed packing gland spring (3);** Use any precaution to prevent the spring from coming out suddenly during disassembly operations.
6) Put shoulder ring (27), washer (28) and O-ring (5) on lower intermediate body (4).
7) Fix upper intermediate body (38) on lower intermediate body (4).
8) Put elastic washer (29) and close nut (30).
9) Insert plug-stem (1) previously assembled into intermediate body (4).
10) Put DE gasket (32) on piston (31) paying attention to fix it as indicated in drawing.
11) Insert on plug-stem (1) spring (11) and piston with DE gasket (31), paying attention to position it with lip downward.
12) Put plane washer (9) and close the assembly with self-locking nut (10) (tightening torque in Table 5).
13) Screw stroke indicator (12).
14) Screw pneumatic fitting (7) on spring-housing cylinder molla (20).
15) Insert O-ring (37) on intermediate body.
16) Insert spring-housing cylinder on intermediate body (20).
17) Using adapt instruments approach spring-housing cylinder to intermediate body.
ATTENTION! A compression spring is inside the cylinder.
18) Insert screws (42) and washers (41) in spring-housing cylinder in correspondence of holes of intermediate body.
19) Insert washers (40-41) and screw nuts (39) (tightening torque on Table 5).
20) Put O-ring (44) on transparent cap (13) and screw it in spring-housing cylinder (20).
21) Put body gasket (2) on valve body (14-15-47).
22) Insert servo control in valve body.
23) Insert screws (35) in intermediate body of the servo control in correspondence of holes in valve body.
24) Insert washers (34) and screw nuts (33) (tightening torque on Table 5). For FFF valve screw locking nut (46) of intermediate body.

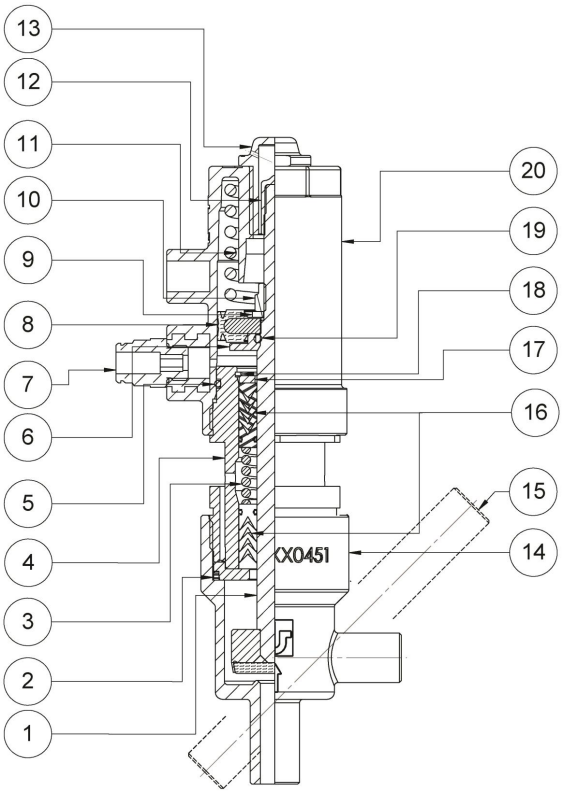
6.11.3 Exploded view IVS/P-IVFL/P-FFF/P DN 25 ÷ 50 servo control D.80 N.O. with visual indicator



Drawing N° 100788 Rev.:01

6.12 Components and spare parts IMS/P-IMF/P DN 8 ÷ 11 D.32 N.C. with visual indicator

PART N°	Q.ty	DESCRIPTION	MATERIAL
1	1	Stem	1.4401-PTFE
2	1	Gasket	PTFE
3	1	Packing gland Spring	1.4401
4	1	Intermediate Body	1.4301-1.4308-1.4401
5	1	O-ring	Viton
6	1	Piston-Bearing Washer	Fe 430 B
7	1	Pneumatic Fitting	PA
8	1	Piston NADUOP 32	NBR
9	1	Plane Washer	Fe 360
10	1	Self-Locking Nut	Fe 360
11	1	Spring	1.4310
12	1	Stroke Indicator	PVC Red
13	1	Transparent Cap	Metacrilate
14	1	IVS Body	1.4408
15	1	IVFL Body	1.4408
16	2	Packing Gland	PTFE/Graphite
17	1	Packing Washer	1.4301
18	1	Seeger	1.4301
19	1	O-ring	GACO
20	1	Cylinder	PA66 + FV30



Spare parts – Fluid Side

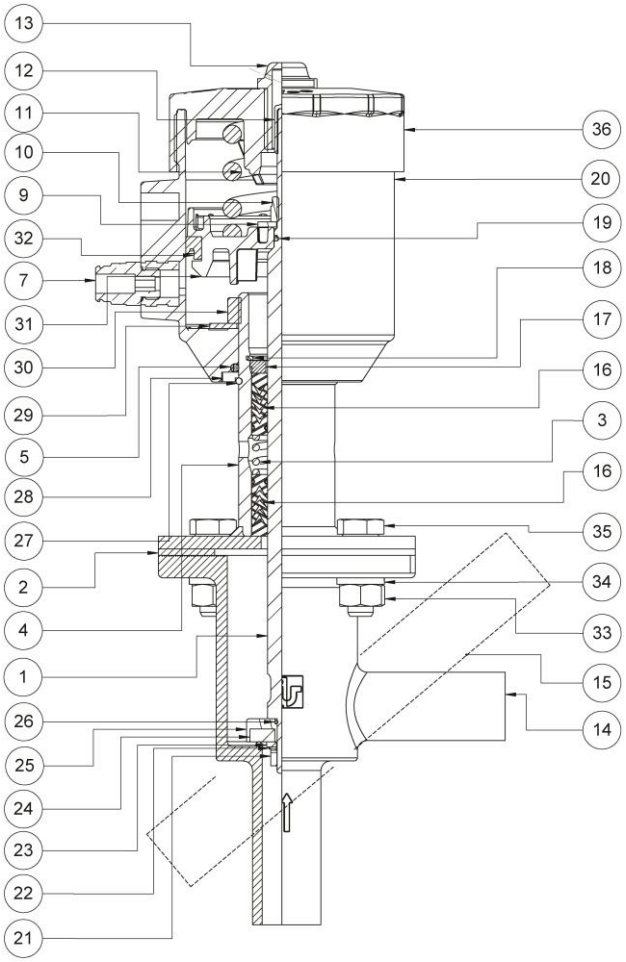
ND	CODE (Part. N° 1-2-16)
	PTFE
1/4”	12880
3/8”	12880
8	12880
11	12880

Spare parts – Air Side

Ø SERV.	CODE (Part. N° 5-8-19)
Ø 32	12879

6.13 Components and spare parts IVS/P-IVFL/P DN 15 ÷ 25 D.63 N.C. with visual indicator

PART N°	Q.ty	DESCRIPTION	MATERIAL
1	1	Stem	1.4401
2	1	Body Gasket	FASIT 400
3	1	Packing gland Spring	1.4401
4	1	Intermediate Body	1.4301-1.4401+2B
5	1	O-ring	GACO
7	1	Pneumatic Fitting	PA
9	1	Plane Washer	Fe 360
10	1	Self-Locking Nut	Fe 360
11	1	Spring	Acciaio C72
12	1	Stroke Indicator	PVC rosso
13	1	Transparent Cap	Metacrilato
14	1	IVS Body	1.4408
15	1	IVFL Body	1.4408
16	2	Packing Gland	PTFE/GRAFITE
17	1	Packing Washer	Fe 510 B
18	1	Seeger	1.4301
19	1	O-ring	GACO
20	1	Cylinder	PA66 + FV30
21	1	Hexagonal Nut	1.4401
22	1	Fan Washer	1.4401
23	1	Plane Washer	1.4401
24	1	Plug Seal	EPDM EPDM coated PTFE PTFE
25	1	Tap Holder	1.4401
26	1	O-ring	Viton
27	1	Shoulder Ring	Acc. Armonico
28	1	External Washer	1.4301
29	1	Elastic Washer	Acc. Armonico
30	1	Hexagonal Nut	Fe 510 B
31	1	Piston D.63	PA66 + FV30
32	1	DE Gasket	NBR
33	4	Hexagonal Nut	1.4301
34	4	Elastic Washer	1.4301
35	4	Hexagonal Head Nut	1.4301
36	1	Cap	PA66 + FV30



Spare parts – Fluid Side

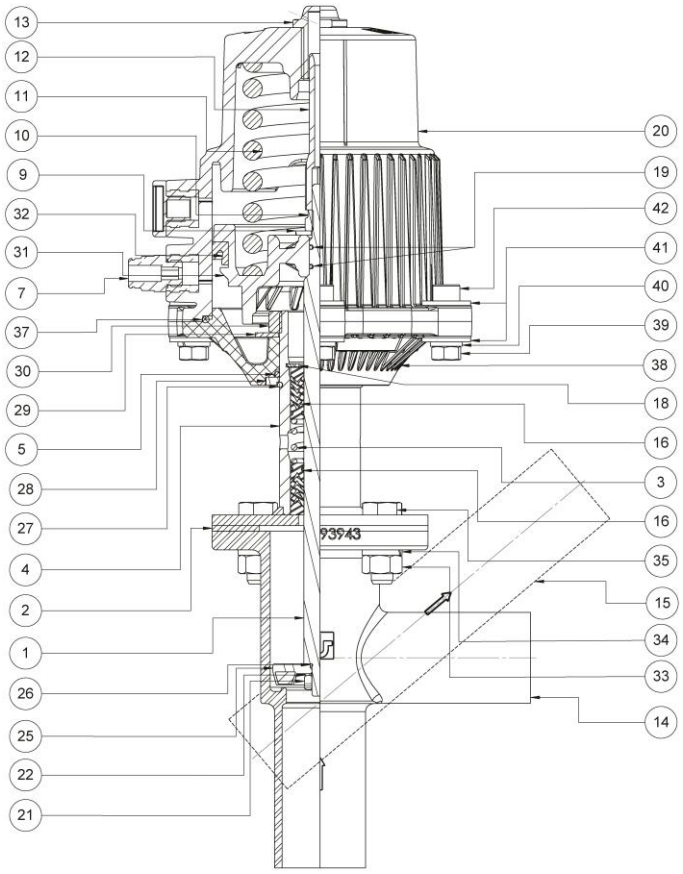
ND	CODE (Part. N° 2-3-16-21-22-24-26)		
	PTFE	EPDM coa. PTFE	EPDM
15	12684	14019	12683
20	12510	10679	12508
25	12511	10680	12509

Spare parts – Air Side

Ø SERV.	CODE (Part. N° 5-19-32)
Ø 63	12833

6.14 Components and spare parts IVS/P-IVFL/P DN 25 ÷ 50 D.80 N.C. with visual indicator

PART N°	Q.tà	DESCRIZIONE	MATERIALE
1	1	Stem	1.4401
2	1	Body Gasket	FASIT 400
3	1	Packing gland Spring	1.4401
4	1	Intermediate Body	1.4301-1.4401+2B
5	1	O-ring	GACO
7	1	Pneumatic Fitting	PA
9	1	Plane Washer	Fe 360
10	1	Self-Locking Nut	Fe 360
11	1	Spring	Acciaio 55SiCr6
12	1	Stroke Indicator	PP + FV20
13	1	Transparent Cap	Metacrilato
14	1	IVS Body	1.4408
15	1	IVFL Body	1.4408
16	2	Packing Gland	PTFE/GRAFITE
17	1	Packing washer	1.4301
18	1	Seeger	1.4301
19	2	O-ring	GACO
20	1	Cylinder	PA66 + FV30
21	1	Hexagonal Nut	1.4401
22	1	Fan Washer	1.4401
25	1	Cap Holder	1.4401 + EPDM or EPDM coated PTFE or PTFE
26	1	O-ring	Viton
27	1	Shoulder Ring	Acc. Armonico
28	1	External Washer	1.4301
29	1	Elastic Washer	Acc. Armonico
30	1	Hexagonal Nut	Fe 510 B
31	1	Piston D.80	PA66 + FV30
32	1	DE Gasket	NBR
33	4	Hexagonal Nut	1.4301
34	4	Elastic Washer	1.4301
35	4	Hexagonal-Head Screw	1.4301
37	1	O-ring	GACO
38	1	Upper Intermediate	PA66 + FV30
39	6	Hexagonal Nut	1.4301
40	6	Elastic Washer	1.4301
41	12	Large Washer	1.4301
42	6	TCEI Screw	1.4301



Spare parts – Fluid Side

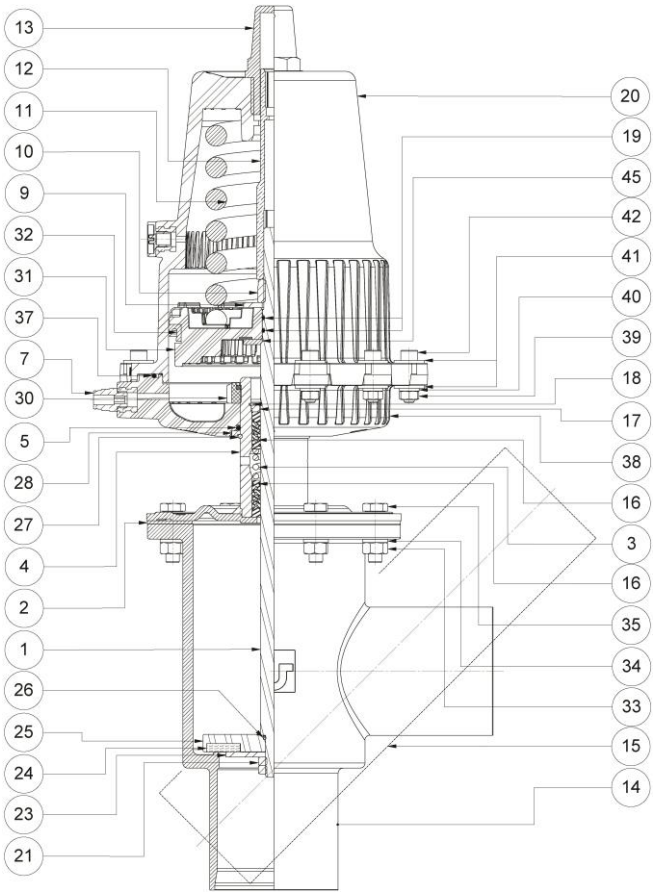
ND	CODE (Part. N° 2-3-16-21-22-26)		
	PTFE	EPDM coa. PTFE	EPDM
25	12511	10680	12509
32	12876	10558	12831
40	12877	10681	12863
50	12878	10559	12864

Spare parts – Air Side

Ø SERV.	CODE (Part. N° 5-19-32-37)
Ø 80	12834

6.15 Components and spare parts IVS/P-IVFL/P DN 40 ÷ 150 D.125 N.C. with visual indicator

PART N°	Q.ty	DESCRIPTION	MATERIAL
1	1	Stem	1.4401
2	1	Body Gasket	FASIT 400
3	1	Packing gland Spring	1.4401
4	1	Intermediate Body	1.4301-1.4401+2B
5	1	O-ring	GACO
7	1	Pneumatic Fitting	PA
9	1	Plane Washer	Fe 360
10	1	Self-Locking Nut	Fe 360
11	1	Spring	Acciaio 55SiCr6
12	1	Stroke Indicator	PVC rosso
13	1	Transparent Cap	Metacrilato
14	1	IVS Body	1.4408
15	1	IVFL Body	1.4408
16	2	Packing Gland	PTFE/GRAFITE
17	1	Packing Washer	Fe 510 B
18	1	Seeger	1.4301
19	2	O-ring	GACO
20	1	Cylinder	PA66 + FV30
21	2	Hexagonal Nut	1.4401
23	1	Tap-Holding Washer	1.4401
24	1	Tap	EPDM Coated PTFE PTFE
25	1	Tap Holder	1.4401
26	1	O-ring	Viton
27	1	Shoulder Ring	Acc. Armonico
28	1	External Washer	1.4301
30	1	Self-Locking Nut	Fe 510 B
31	1	Piston D.125	PA66 + FV30
32	1	DE Gasket	NBR
33	4	Hexagonal Nut	1.4301
34	4	Elastic Washer	1.4301
35	4	Hexagonal-Head Screw	1.4301
37	1	O-ring	GACO
38	1	Upper Intermediate	PA66 + FV30
39	12	Hexagonal Nut	1.4301
40	12	Elastic Washer	1.4301
41	24	Large Washer	1.4301
42	12	TCEI Screw	1.4301
45	1	Lower washer	Fe 360



Spare parts – Fluid Side

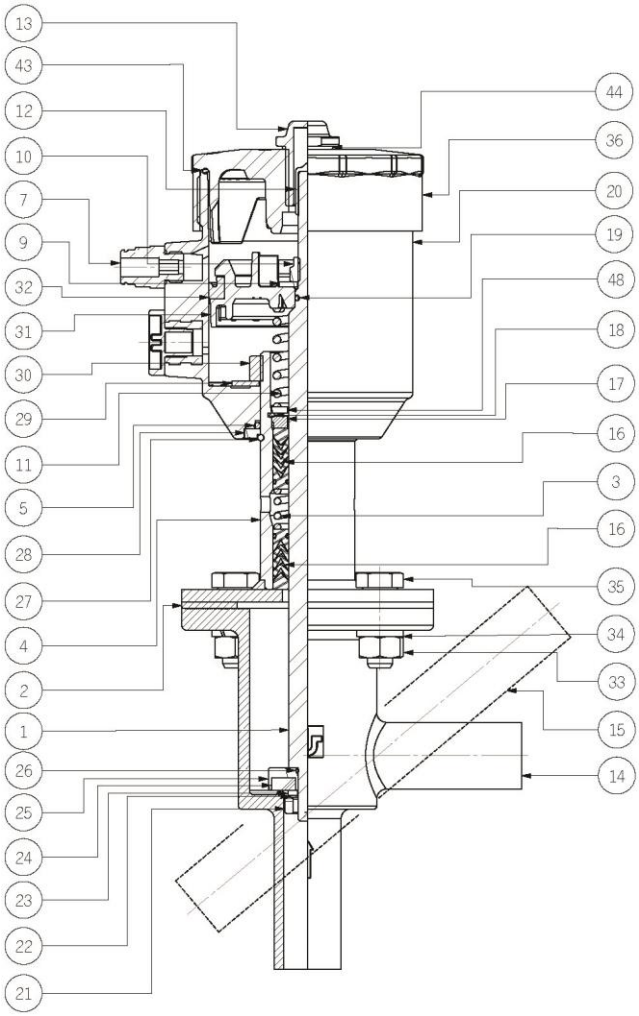
ND	CODE (Part. N° 2-3-16-24-26)			
	PTFE	EPDM coa. PTFE	EPDM	EPDM FULL D.
40	12962			
50	12963		13414	
65	10333	10332	10331	
80			9727	9730
100				10691
125				12866
150				13799

Spare parts – Air Side

Ø SERV.	CODE (Part. N° 5-19-32-37)
Ø 80	12846

6.16 Components and spare parts IVS/P-IVFL/P DN 15 ÷ 25 D.63 N.O. with visual indicator

PART N°	Q.ty	DESCRIPTION	MATERIAL
1	1	Stem	1.4401
2	1	Body Gasket	FASIT 400
3	1	Packing Spring	1.4401
4	1	Intermediate Body	1.4301-1.4401+2B
5	1	O-ring	GACO
7	1	Pneumatic Fitting	PA
9	1	Plane Washer	Fe 360
10	1	Self-Locking Nut	Fe 360
11	1	Spring	Acciaio C72
12	1	Stroke Indicator	PVC rosso
13	1	Transparent Cap	Metacrilate
14	1	IVS Body	1.4408
15	1	IVFL Body	1.4408
16	2	Packing Gland	PTFE/GRAPHITE
17	1	Washer	1.4301
18	1	Seeger	1.4301
19	1	O-ring	GACO
20	1	Cylinder	PA66 + FV30
21	1	Hexagonal Nut	1.4401
22	1	Fan Washer	1.4401
23	1	Plane Washer	1.4401
24	1	Plug Seal	EPDM EPDM coa. PTFE PTFE
25	1	Tap Holder	1.4401
26	1	O-ring	Viton
27	1	Shoulder Ring	Armonic Steel
28	1	External Washer	1.4301
29	1	Elastic Washer	Armonic Steel
30	1	Hexagonal Nut	Fe 510 B
31	1	Piston D.63	PA66 + FV30
32	1	DE Gasket	NBR
33	4	Hexagonal Nut	1.4301
34	4	Elastic Washer	1.4301
35	4	Hexagonal-Head Screw	1.4301
36	1	Cap	PA66 + FV30
43	1	O-ring	GACO
44	1	O-ring	GACO
48	1	Washer spring support	1.4301



Spare parts – Fluid Side

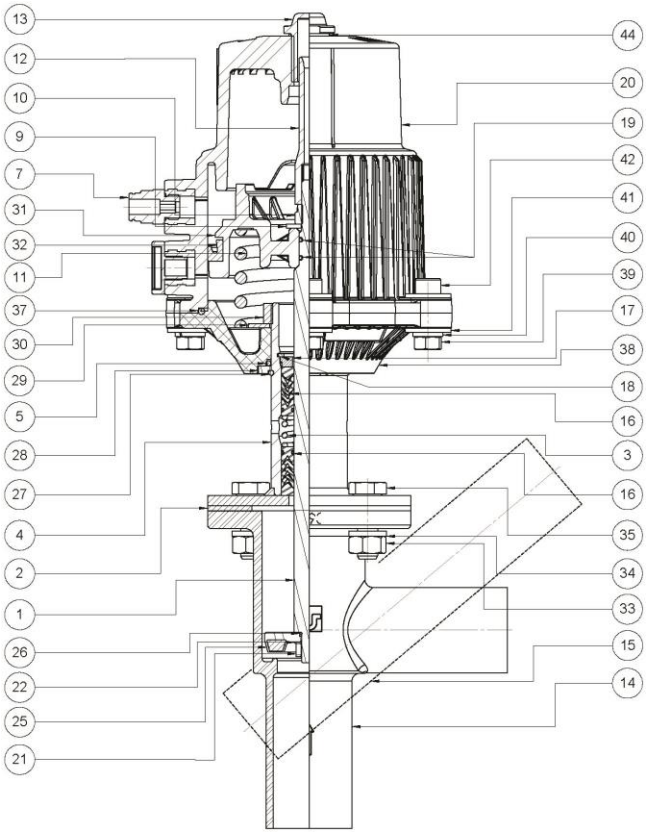
ND	CODE (Part. N° 2-3-16-21-22-24-26)		
	PTFE	EPDM coa. PTFE	EPDM
15	12684	14019	12683
20	12510	10679	12508
25	12511	10680	12509

Spare parts – Air Side

Ø SERV.	CODE (Part. N° 5-19-32-43-44)
Ø 63	12881

6.17 Components and spare parts IVS/P-IVFL/P DN 25 ÷ 50 D.80 N.O. with visual indicator

PART N°	Q.ty	DESCRIPTION	MATERIAL
1	1	Stem	1.4401
2	1	Body Gasket	FASIT 400
3	1	Packing gland Spring	1.4401
4	1	Intermediate Body	1.4301-1.4401+2B
5	1	O-ring	GACO
7	1	Pneumatic Fitting	PA
9	1	Plane Washer	Fe 360
10	1	Self-Locking Nut	Fe 360
11	1	Spring	Steel C85
12	1	Stroke Indicator	PP + FV20
13	1	Transparent Cap	Metacrilate
14	1	IVS Body	1.4408
15	1	IVFL Body	1.4408
16	2	Packing Gland	PTFE/GRAPHITE
17	1	Packing washer	1.4301
18	1	Seeger	1.4301
19	2	O-ring	GACO
20	1	Cylinder	PA66 + FV30
21	1	Hexagonal Nut	1.4401
22	1	Fan Washer	1.4401
25	1	Tap Holder	1.4401 + EPDM or EPDM coated PTFE or PTFE
26	1	O-ring	Viton
27	1	Shoulder RIng	Armonic Steel
28	1	External Washer	1.4301
29	1	Elastic Washer	Armonic Steel
30	1	Hexagonal Nut	Fe 510 B
31	1	Piston D.80	PA66 + FV30
32	1	DE Gasket	NBR
33	4	Hexagonal Nut	1.4301
34	4	Elastic Washer	1.4301
35	4	Hexagonal-Head Screw	1.4301
37	1	O-ring	GACO
38	1	Upper Intermediate	PA66 + FV30
39	6	Hexagonal Nut	1.4301
40	6	Elastic Washer	1.4301
41	12	Large Washer	1.4301
42	6	TCEI Screw	1.4301
44	1	O-ring	GACO



Spare parts – Fluid Side

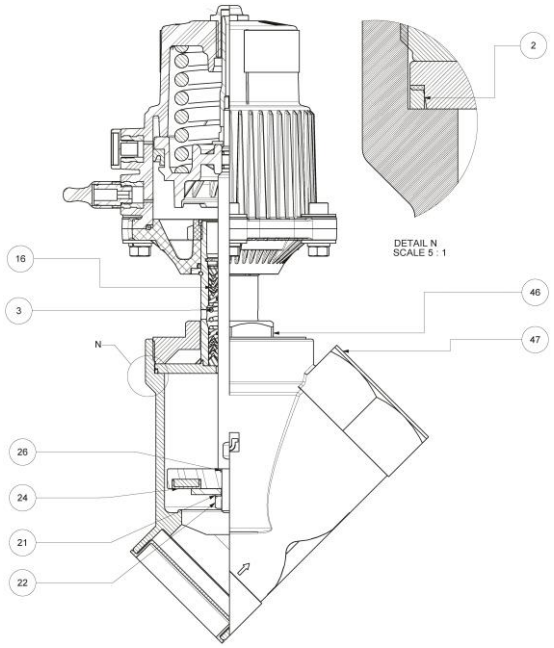
ND	CODE (Part. N° 2-3-16-21-22-25-26)		
	PTFE	EPDM coa. PTFE	EPDM
25	12511	10680	12509
32	12876	10558	12831
40	12877	10681	12863
50	12878	10559	12864

Spare parts – Air Side

Ø SERV.	CODE (Part. N° 5-19-32-37-44)
Ø 80	12882

6.18 Spare parts FFF/P with visual indicator

PART N°	Q.tà	DESCRIZIONE	MATERIALE
2	1	Body gasket	PTFE
3	1	Packing gland Spring	1.4401
16	2	Packing Gland	PTFE/GRAFITE
21	1	Hexagonal Nut	1.4401
22	1	Fan Washer	1.4401
24	1	Plug Seal	EPDM EPDM rivestito PTFE
26	1	O-Ring	Viton
46	1	Locking nut	CF8 / 1.4308
47	1	FFF Valve body	1.4401



Drawing. 130159 Rev. 01

Spare parts – Fluid Side N.C. / N.O. D.63 – D.80

ND	CODE (Part. N° 2-3-16-24-26)		
	PTFE	EPDM coa. PTFE	EPDM
15	12716	10173	
20	12433	10174	12432
25	12697	10175	12698
32	12883	10176	12915
40	12754	10177	12755
50	12148	10178	12147

Spare parts – Air Side N.C.

Ø SERV.	CODE (Part. N° 5-19-32)
Ø 63	12833
Ø SERV.	**CODE (Part. N° 5-19-32-37)**
Ø 80	12834
Ø SERV.	**CODE (Part. N° 5-19-32-37)**
Ø 125	12846

Spare parts – Fluid Side N.C. / N.O. D.125

ND	CODE (Part. N° 2-3-16-24-26)		
	PTFE	EPDM coa. PTFE	EPDM
40			
50	12884		
65	10333	10332	10331

Spare parts – Air Side N.O.

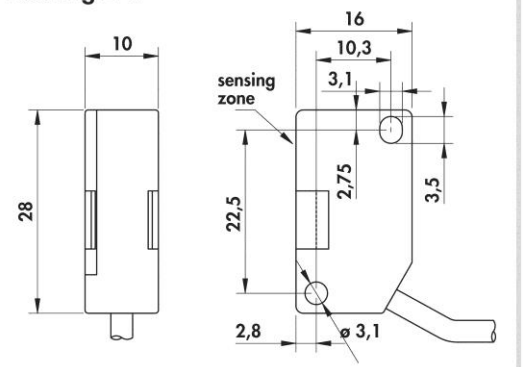
Ø SERV.	CODE (Part. N° 5-19-32-43-44)
Ø 63	12881
Ø SERV.	**CODE (Part. N° 5-19-32-37-44)**
Ø 80	12882

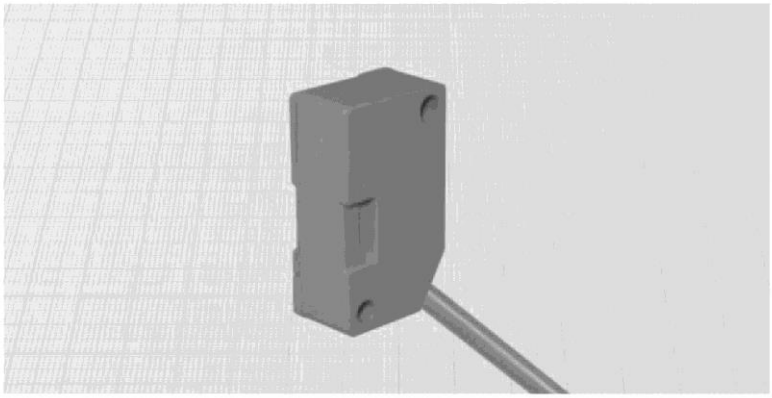
Annex 1 – Magnetic sensor type FINC100681

RECTANGULAR MAGNETIC SENSORS

- **REED CONTACT 2 wires**
- **Type Z and W**
- Cable output

Housing Z-1



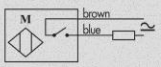


Materials:
- Cable: 2m PVC CEI 20 - 22 II; 90°C; 300 V; O.R.
- Housing: plastic

General Features:
These sensors give on the output a contact activated by an external magnetic field, not depending by the polarity of the field. The activation distance depends by the power of the magnet (see on page C-12), which must be ordered separately.
Reed contacts allows to drive directly dc loads (PNP/NPN) or ac loads.

Technical data:

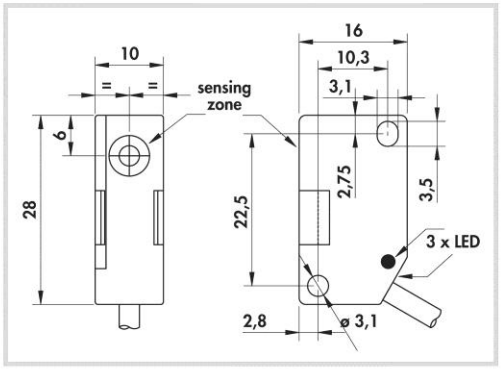
• Working voltage	max 50 Vac/75 Vdc
• Output function	normally open
• Contact resistance max	0,1 Ω
• Operate time max	1 ms
• Release time max	0,4 ms
• Temperature range	- 25 ÷ + 85°C
• Degree of protection	IP67
• Cable conductor cross section	0,15 mm² Type Z 0,50 mm² Type W

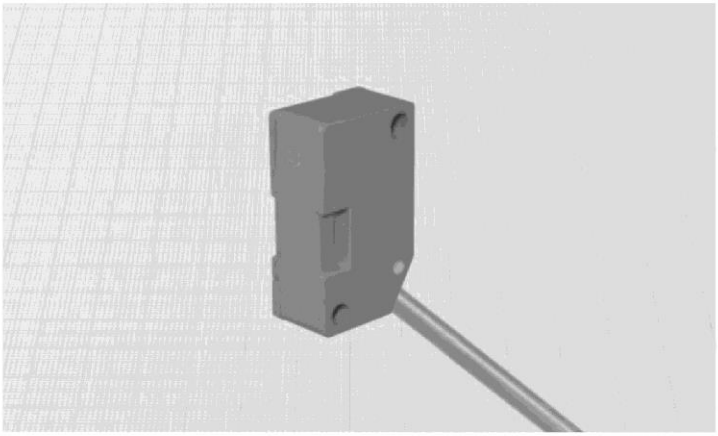
Housing	Cable diameter	Max switching frequency (f)	Rated operational current (I_e)	ORDERING REFERENCES
	mm	KHz	mA	NO 
Z - 1	3	0,5	500	BMSZ/4600

Annex 2 – Inductive sensor DC with 3 wires type FINC100682

RECTANGULAR INDUCTIVE SENSORS

- **Type Z**
- **Amplified in d.c. 3 wires**
- Cable output





Materials:
- Cable: 2 m PVC CEI 20 - 22 II; 90°C; 300 V; O.R.
- Housing: plastic

General Features:
This sensor has the same shape and fixing holes as V3 standard microswitches. The particular cable position allows the mounting on every side of the housing. The output status is indicated by LED visible from 3 sides.

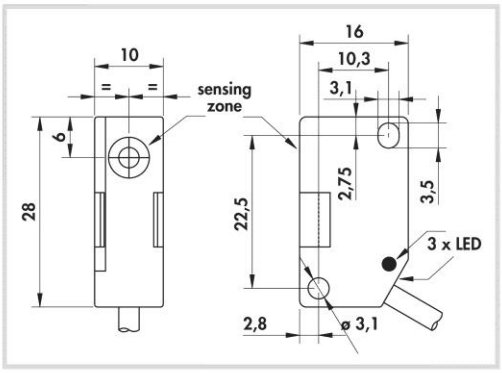
Technical data:
- Supply voltage (U_B): 7 ÷ 30 Vdc
- Max ripple: 10%
- No-load supply current (I_o): ≤ 10 mA
- Voltage drop (U_d): ≤ 1,5 V
- Temperature range: - 25° ÷ + 75°C
- Max thermal drift of sensing distance S_r: ± 10%
- Repeat accuracy (R): 2%
- Switching hysteresis (H): 10%
- Degree of protection: IP67
- Switch status indicator: yellow LED
- Cable conductor cross section: 0,15 mm²
- Protected against short-circuit and overload
- Protected against any wrong connection
- Suppression of initial false impulse
- Electromagnetic compatibility (EMC) according to EN60947-5-2 CE
- Shock and vibration resistance according to EN60068-2-27 EN60068-2-6

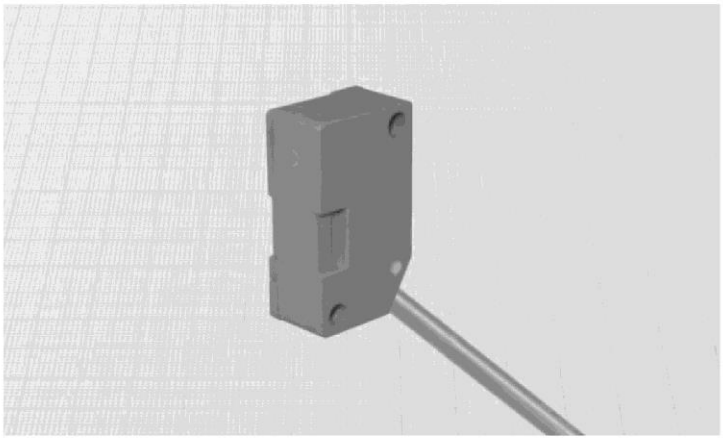
Flush mounting / Non flush mounting	Cable diameter	Sensing zone diameter	Rated operational current (I_e)	Max switching frequency (f)	Nominal sensing distance (S_n) ± 10%	ORDERING REFERENCES PNP (positive switching) NO	ORDERING REFERENCES PNP (positive switching) NC
	mm	mm	mA	KHz	mm		
•	3	9	200	2	2	DCAZ/4609KS	DCAZ/4619KS

Annex 3 - Inductive sensor DC with 2 wires type FINC100683

RECTANGULAR INDUCTIVE SENSORS

Type Z •
Amplified in d.c. 2 wires non polarized •
Cable output •





Materials:
- Cable: 2 m PVC CEI 20 - 22 II; 90°C; 300 V; O.R.
- Housing: plastic

General Features:
These sensors are not polarized and the load can be connected on both positive and negative lead (function PNP or NPN).
So they can replace traditional mechanical microswitches in many applications. They have shape and fixing holes as V3 standard microswitches. The particular cable position allows the mounting on every side of the housing. The output status is indicated by LED visible from 3 sides.

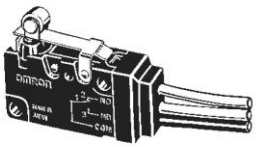
Technical data:
- Supply voltage (U_B): 10 ÷ 48 Vdc
- Max ripple: 10%
- Off-state current (I_r): ≤ 1 mA
- Minimum operational current (I_m): 5 mA
- Voltage drop (U_d) con I_e = 10 mA: ≤ 5 V
- Voltage drop (U_d) con I_e = 100 mA: ≤ 6 V
- Temperature range: - 25° ÷ + 70°C
- Max thermal drift of sensing distance S_r: ± 10%
- Repeat accuracy (R): 2%
- Switching hysteresis (H): 10%
- Degree of protection: IP67
- Switch status indicator: yellow LED
- Cable conductor cross section: 0,35 mm²
- Protected against short-circuit and overload
- Suppression of initial false impulse
- Electromagnetic compatibility (EMC) according to EN60947-5-2 CE
- Shock and vibration resistance according to EN60068-2-27 EN60068-2-6

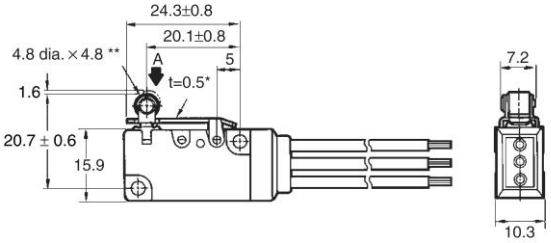
Flush mounting / Non flush mounting	Cable diameter	Sensing zone diameter	Rated operational current (I_e)	Max switching frequency (f)	Nominal sensing distance (S_n) ± 10%%	ORDERING REFERENCES	
						NO	NC
	mm	mm	mA	KHz	mm		
•	4	9	100	2	2	DCMZ/4600KS	DCMZ/4610KS

Annex 4 – Electromechanical Micro Switch Type FINC100684

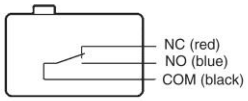
Electromechanical micro switch Omron model D2VW-5L2A-1MS with actuator handle with ball in polyacetalic resin.

D2VW-5L2A-1MS





STRUTTURA SPDT



Operative Frequency	Mechanic: 300 opz/min Electric: 30 opz/min
Voltage	30 VDC (5 A) 125 VDC (0,4 A) 125 VAC (5 A) 250 VAC (5 A)
Insulation	100 MΩ min at 500 VDC
Contact Resistance	50 mΩ max
Protection Grade	IEC IP67 (ends excluded)
Electro-Shock Protection Grade	Class I
Environment Temperature Range	-40°C ÷ +85°C
Maximum Environment Humidity	95% max (da 5°C a 35°C)
Mechanical Life	10.000.000 cycles
Contact Material	Silver
Distance between Contacts	0,5 mm
Acting Force	1,18N
Release Force	0,15N

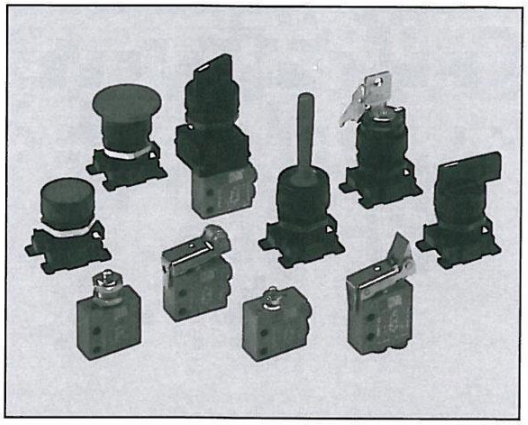
Annex 5 – Pneumatic limit switch type FINCVME201

METAL WORK PNEUMATIC

MINIVALVES, MECHANICALLY AND HAND OPERATED SERIES VME

- Minivalves with 3/2 NO NC poppet,
- Installation in any position
- Push-in fittings for pipe Ø 4 mm and M5 on the valve body
- Low actuation force
- Rapid, accurate signal
- Mechanical actuation
- The 2 places adapter allows manual actuation of 1 or 2 VME valves with manual Ø 22 panel actuators. Thus it is possible to obtain 3/2, 5/2, 5/3 open centre and 5/3 pressure centre pneumatic functions.

On request, it is possible to place a NC-NO electric switch next to a VME valve for mixed solenoid/pneumatic signals.

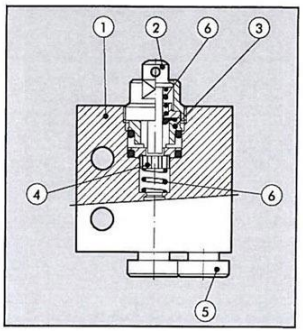


TECHNICAL DATA

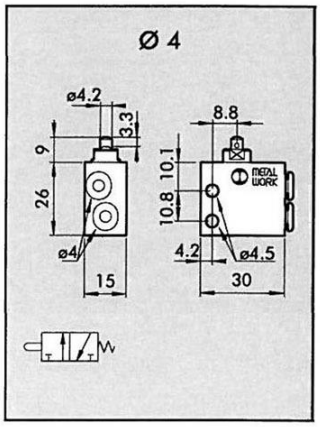
Valve fitting port	Push-in fitting for pipe diam. 4 and M5 (axial or side)
Fluid	Filtered air without lubrication; lubrication, if used, must be continuous
Type	with poppet
Versions	Mechanical and manual
Operators:	
• mechanical	With Plunger – Plunger for wall-mounting – Roller lever – Unidirectional roller lever
• manual	Depending on the type of actuation panel selected
Operating pressure	0.5-10 bar
Operating temperature range	-10°÷+60°C
Nominal diameter	2.5 mm
Conductance C	16.5 Nl/min · bar
Critical ratio b	0.03 bar/bar
Flow rate at 6 Bar P 0.5 Bar	35 Nl/min
Flow rate at 6 Bar P 1 Bar	60 Nl/min
Actuation force – Plunger at 6 Bar	8 N
Recommended lubricant	ISO and UNI FD 22
Installation	In any position
Compatibility with oils:	please refer to page 6.1/08

COMPONENTS

① VALVE BODY: Aluminium
② BUTTON: chemically nickel-plated brass
③ DISTANCE PLATES: Brass
④ GASKETS: NBR nitrile rubber
⑤ PUSH-IN FITTING CARTRIDGES: stainless steel, brass and plastic
⑥ SPRINGS: stainless steel



PLUNGER 3/2 NC – SIDE FITTINGS



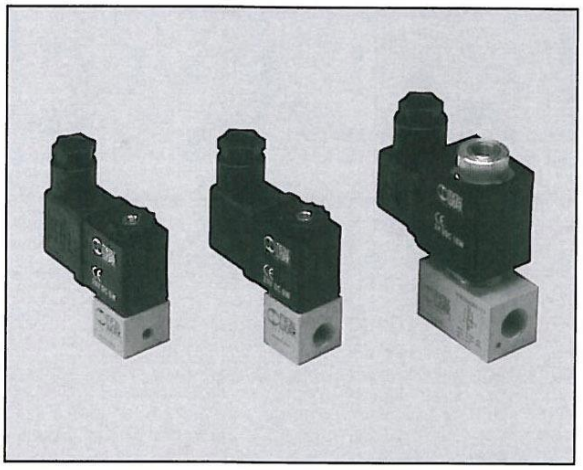
Code	Description	Weight [g]
W3501001101	VME2-01 NC Ø4	34

Annex 6 –PIV solenoid valve in line

METAL WORK® PNEUMATIC

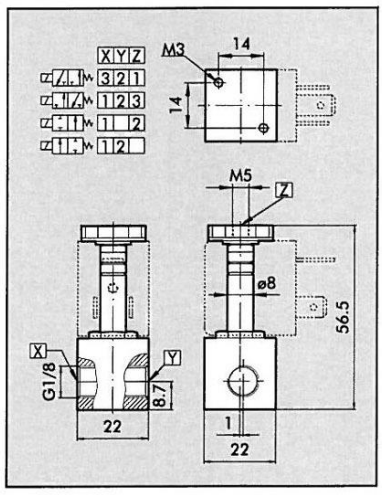
PIV VALVES IN LINE

- PIV.I – PIV.B in-line solenoid valves
- Threaded ports: M5 G1/8" G1/4"
- 2/2 – 3/2 solenoid valves - normally closed/normally open
- Installation in any position
- Particularly suitable for high operating frequencies and low response times.



TECHNICAL DATA		PIV.I IN LINEA	PIV.B IN LINE
Absorption	W	5.5W - 5.5VA	10W - 13VA
Voltage available	V	24Vdc - 24-110-220 Vac - 50/60 Hz	24Vdc - 24-110-220 Vac - 50/60 Hz
Voltage tolerance	ΔV	–10 to +15%	–10 to +15%
Maximum operating frequency	f	30 Hz	15 Hz
Solenoid rating	ED	100%	100%
Response time	t	8÷15 msec	10÷15 msec
Type of protection		IP 65	IP 65
Type of coil		coil side 22 Ø 8 DIN 43650	coil side 30 DIN 43650
Insulation class	F	155	155
Ambient temperature	Te	–15÷50°C	–15÷50°C
Fluid temperature	Tg	–15÷50°C	–15÷50°C
Fluid		filtered lubricated or unlubricated air	filtered lubricated or unlubricated air
Working life		25 million cycles	–
Weight	[g]	35 to 140 g (depending on version)	130 g
Maximum coil/nut torque		1 Nm	1 Nm
Note on use		**The 2/2 NC and 2/2 NO valves work only with inlet pressure ≥ outlet pressure**	

PIV.I VALVES, OPERATOR Ø 8 mm, IN LINE – M5 – 1/8"



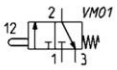
Symbol	Ordesing code	Description	Input thread	Diameter of air hole mm	kv factor	Maximum operating pressure (bar) DC = 5W	Maximum operating pressure (bar) AC 5VA
	W4017000100	PIV42I5S NC	M5	1.2	0.65	30	30
	W4017001300	PIV92I8S NC	G1/8"	2.4	2	6	7
	W4017001100	PIV42I8S NC	G1/8"	1.2	0.65	30	30
	W4017001200	PIV72I8S NC	G1/8"	1.6	1.2	15	14
	W4017000101	PIV72I5S NO	M5	1.4	0.8	10	10
	W4017001201	PIV72I8S NO	G1/8"	1.4	0.8	10	10
	W4017003100	PIV43I5S NC	M5	1.2	0.65	10	10
	W4017004100	PIV43I8S NC	G1/8"	1.2	0.65	10	10
	W4017004200	PIV73I8S NC	G1/8"	1.6	1	6.5	6.5
	W4017004201	PIV73I8S NO	G1/8"	1.4	0.7	6	7

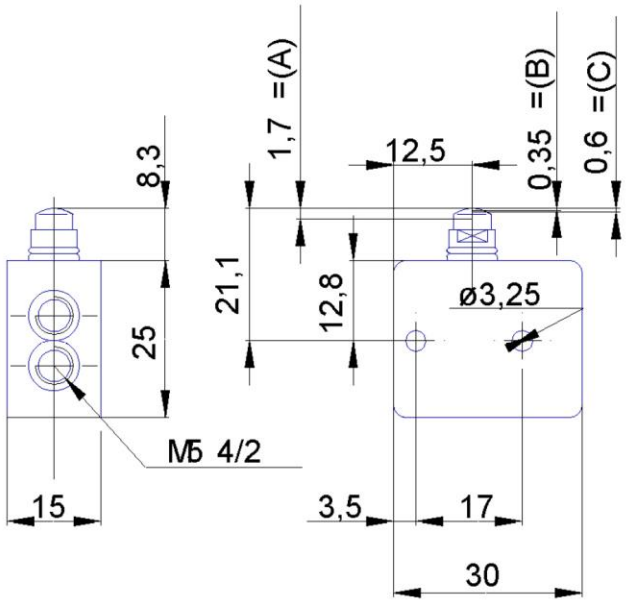
Annex 7 – Pneumatic limit switch type FINC000234

CAMOZZI

234-945

The mechanically operated miniature valves Series 2 with 3/2 normally closed function are available with M5 threaded ports or with an integrated super-rapid fitting for tubes ø 4.
The devices are actuated by a plunger, roller/lever or a unidirectional lever.





GENERAL DATA	
Construction	poppet - type (closed centre)
Valve group	3/2 way/pos., normally closed
Materials	aluminium body, OT58 (brass) plunger, NBR seals
Mounting	by through - holes in valve body
Ports	M5, cartridge dia. 4
Ambient temperature	0°C ÷ 60°C
Medium temperature	0°C ÷ 50°C
Operating pressure	see models
Fluid	Filtered air, without lubrication. If lubricated air is used, it is recommended to use ISO VG32 oil. Once applied the lubrication should never be interrupted.

Minivalves

Operating pressure = 2 ÷ 8 bar
Flow rate = 60 Nl/min.
Actuating force at 6 bar = 6 N
A = Complete stroke
B = Centres closed position
C = Effective stroke

Annex 8 – 2-wire inductive proximity switch A.C. N.O.

Proximity Sensors

XS6 Extended Range and Auto-Adaptable Inductive Sensor

Metal Tubular, DC and AC/DC

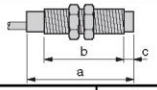
XS6 ••B1••L2

Features

Entire range of fully shielded metal body tubular inductive proximity sensors

- Increased sensing range, fully shielded
- 2-wire AC/DC and 3-wire DC
- Normally open or normally closed outputs available
- Cable and connector versions
- PNP or NPN, DC
- Self-Teach available on 12–30 mm versions

Dimensions



	Cable		Connector	
	a	b	a	b
∅ 8	1.9 (50)	1.6 (42)	2.4 (61)	1.6 (40)
∅ 12	1.9 (50)	1.6 (42)	2.4 (61)	1.6 (42)
∅ 18	2.3 (60)	0.09 (51)	2.8 (72.2)	2.0 (51)
∅ 30	2.3 (60)	0.09 (51)	2.8 (72.2)	2.0 (51)

in. (mm)

Nominal Sensing Distance	Circuit Type	Output Mode	Voltage Range	Load Current Maximum	Operating Frequency DC	Operating Frequency AC	Catalog Number
12 mm Diameter, 2 m (6.6 ft) cable ▲							
4 mm	2-wire	N.O.★	12–48 Vdc	1.5–100 mA	4,000 Hz	25 Hz	**XS612B1MAL2**

★ To order a normally closed (N.C.) version, change the A to B. Example: XS518B1PAL2 to XS518B1PBL2.
◆ Self-teach version only
▲ For a 5 m (16.4 ft) cable length, add suffix **L5**. For a 10 m (32.8 ft) cable length, add suffix **L10**.

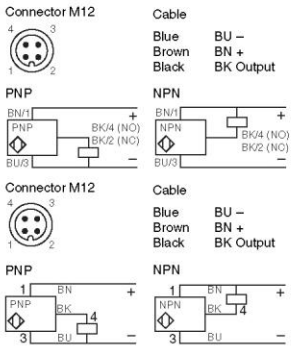
Minimum Mounting Clearances, in. (mm)

Auto-Adaptable | **Extended Range**

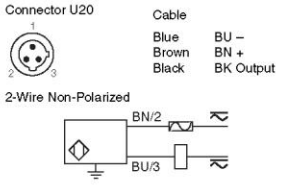
	Side by Side		Face to Face			Side by Side	Face to Face	Face to Metal Object
—	Flush	Not Flush	Flush	Not Flush	∅ 8	e ≥ 0.1 (3)	e ≥ 0.7 (18)	e ≥ 0.17 (4.5)
∅ 12	e ≥ 0.55 (14)	1.9 (50)	e ≥ 1.9 (50)	3.9 (100)	∅ 12	e ≥ 0.2 (4)	e ≥ 0.9 (24)	e ≥ 0.2 (6)
∅ 18	e ≥ 1.1 (28)	3.9 (100)	e ≥ 3.9 (100)	7.9 (200)	∅ 18	e ≥ 0.4 (10)	e ≥ 2.4 (60)	e ≥ 0.6 (15)
∅ 30	e ≥ 1.9 (48)	7.1 (180)	e ≥ 7.1 (180)	14.1 (360)	∅ 30	e ≥ 0.8 (20)	e ≥ 4.7 (120)	e ≥ 1.2 (30)

Wiring

3-Wire Selectable



2-Wire AC/DC



Specifications

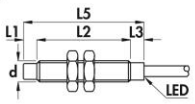
Mechanical		Extended Range	Auto-Adaptable Shielded	Auto-Adaptable Non-Shielded
Fine Detection Zone	12 mm	0–3.2 mm	1.7–3.4 mm	1.7–5 mm
Sn	12 mm	—	0–3.4 mm	0–5 mm
Temperature Rating	Storage	-40 to +185 °F (-40 to +85 °C)		
	Operation	-13 to +158 °F (-25 to +70 °C)		
Enclosure Rating	NEMA Type	3, 4X, 6P, 12, 13		
	IEC	IP68 cable versions (IP67 connector versions)		
Enclosure Material	Case	Nickel-plated brass		
	Face	PBT		
Maximum Tightening Torque	12 mm	15 N•m (11 lb-ft)		
Vibration		25 g, ±2 mm amplitude (10–55 Hz)		
Shock Resistance		50 g, 11 ms duration		
Differential (%of Sr)		15%		
Repeatability (% of Sr)		3%		
LED Indicator	Power and Teach	—	Green	
	Output	Yellow		
Cable		PVR 3 x 0.34 mm² / PVR2 x 0.5 mm²	PVR – 4.2 mm (0.17 in.) O.D.	
Connector		M12 4-pin / U20 3-pin micro-style	M12 micro-style 4-pin	
Electrical		**2-wire AC/DC**	**3-wire DC**	**Auto-adaptable DC**
Voltage Range		24–240 Vac; 24–210 Vdc	12–48 Vdc	12–24 Vdc
Voltage Limit (Including Ripple)		20–264 Vac/Vdc	10–58 Vdc	10–36 Vdc
Voltage Drop		5.5 V	2 V	2 V
Maximum Leakage (Residual) Current—Open State		0.8 mA	—	—
Current Consumption		—	10 mA	10 mA
Maximum Current Limit		AC: 5–300 mA; DC: 5–200 mA	200 mA	100 mA
Power-up Delay (Maximum)		20 ms—12 mm; 25 ms—18/30 mm	5 ms	5 ms
On Delay (Maximum)	12 mm	0.5 ms	0.2 ms	0.3 ms
Off Delay (Maximum)	12 mm	0.2 ms	0.2 ms	0.7 ms
Operating Frequency, Maximum	12 mm	AC: 25 Hz / DC: 1,000 Hz	2,500 Hz	1,000 Hz
Protective Circuitry	Short Circuit Protection	No	Yes	Yes
	Overload Protection	Yes	Yes	Yes
	Reverse Polarity Protection	Yes	Yes	Yes
Agency Listings				

Annex 9 – 3-wire inductive proximity switch D.C. N.O.

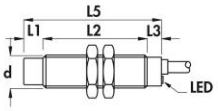
CYLINDRICAL INDUCTIVE SENSORS IN METAL HOUSING

Voltage 20 ÷ 240 V≂ •
Amplified in d.c. + a.c. 2 wires •
Cable output •

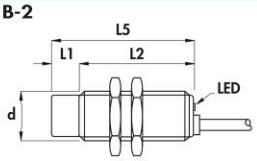
Housing B-6



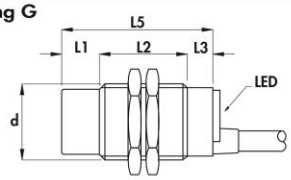
Housing B-3



Housing B-2

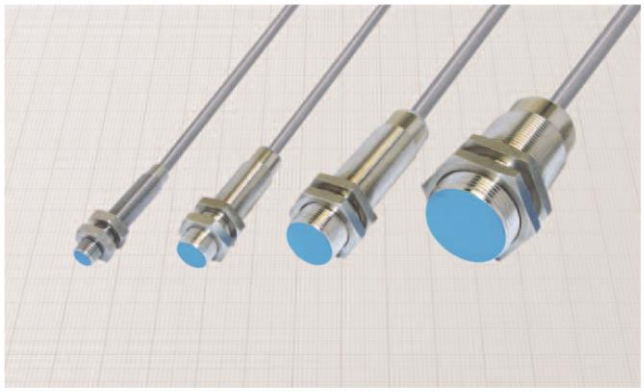


Housing G



Diameter		M8 x 1	M12 x 1	M18 x 1	M30 x 1,5
Nut	Size	SW13	SW17	SW24	SW36
	Thickness mm	4	4	4	5
Max tightening torque Nm		10	15	35	80

Materials:
- Cable: 2 m PVC CEI 20 - 22 II; 90°C; 300 V; O.R.
- Housing 8 mm: stainless steel
- Housing 12 -18 - 30 mm: nickel plated brass
- Sensing face: plastic



General Features:
These sensors are able to work with either direct or alternate current. Voltage drop and residual current are very low. They are not polarized and the load can be connected on both the leads. In many applications they can used to replace mechanical microswitches.

Technical data:
- Supply voltage (U_B): 20 ÷ 240 Vdc/Vac
- Electrical system frequency: 40 ÷ 60 Hz
- Off-state current (I_r) at 24 V: ≤ 1 mA
- Off-state current (I_r) at 220 V: ≤ 1,5 mA
- Minimum operational current (I_m): 5 mA
- Voltage drop (U_d): ≤ 5 V
- Temperature range: - 25° ÷ + 70°C
- Max thermal drift of sensing distance S_r: ± 10%
- Repeat accuracy (R): 2%
- Switching hysteresis (H): 10%
- Degree of protection: IP67
- Switch status indicator: yellow LED
- Cable conductor cross section: 0,35 mm² on 8 and 12 mm; 0,50 mm² on 18 mm; 0,75 mm² on 30 mm
- Protected against short-circuit and overload (versions with letter K)
- Suppression of initial false impulse
- Class 2 equipment according to IEC 536
- Shock and vibration according to EN60068-2-27 EN60068-2-6
- Electromagnetic compatibility (EMC) according to EN60947-5-2 CE

Housing	Flush mounting / Non flush mounting	L1	L2	L3	L4	L5	Cable diameter	Body diameter (d)	Max switching frequency (f) in d.c.	Max switching frequency (f) in a.c.	Rated operational current (I_e)	Nominal sensing distance (S_n) ± 10%	ORDERING REFERENCES NO	ORDERING REFERENCES NC
		mm	mm	mm	mm	mm	mm	mm	Hz	Hz	mA	mm		
B-6	•	-	40	5	-	45	3,5	M8 x 1	1000	25	100	1,5	**AX8/4609S**	**AX8/4619S**
B-6	•	5	35	5	-	45	3,5	M8 x 1	800	25	100	2,5	**AX8/5609S**	**AX8/5619S**
B-3	•	-	43	7	-	50	4	M12 x 1	800	25	100	2	**AX12/4609KS**	**AX12/4619KS**
B-3	•	7	36	7	-	50	4	M12 x 1	600	25	100	4	**AX12/5609KS**	**AX12/5619KS**
B-2	•	-	50	-	-	50	5	M18 x 1	800	25	200	5	**AX18/4A09KS**	**AX18/4A19KS**
B-2	•	10	40	-	-	50	5	M18 x 1	400	25	200	8	**AX18/5A09KS**	**AX18/5A19KS**
G	•	-	50	10	-	60	6	M30 x 1,5	400	25	200	10	**AX30/4609KS**	**AX30/4619KS**
G	•	15	35	10	-	60	6	M30 x 1,5	200	25	200	15	**AX30/5609KS**	**AX30/5619KS**

Annex 10 – 2-wire magnetic sensor A.C. N.O.

Proximity Magnetic Sensors Cylindrical Body, FSM Series

- Cylindrical case
- Brass or nickel plated brass body
- M12 or M16 diameter
- NO or CO output functions
- Front side switching

Product Description

The cylindrical proximity magnetic sensors of the FSM series are available in different versions with brass or nickel-plated brass body, different dimensions and output contacts and can be mounted directly on ferromagnetic supports. FSM.A.7 model is provided with output function status LED, while FSM.S.2/S2/AT can resist to temperatures up to 180 °C.

Ordering Key

FSM.S.2/S2/AT

- Type
- Output Function
- Reed Contact Type
- Special Versions
- Special Applications

Type Selection

Dimensions	Output function	High temperature applications	Reference
M12 x 1	NO	-	FSM.A.2
	Change-over	-	FSM.A.7 FSM.S.2
M16 x 1		-	FSM.S.2/S2
		Yes	FSM.S.2/S2/AT

General specification

Case		**Output connection**	
FSM.A.2 FSM.A.7 FSM.S.2	Nickel-plated brass	**FSM.A.2 FSM.S.2 FSM.S.2/S2**	PVC Cable
FSM.S.2/S2 FSM.S.2/S2/AT	Brass	**FSM.A.7 FSM.S.2/S2/AT**	Silicone Cable
Protection degree	IP67		
Operating temperature	-25 to +75°C		
FSM.S.2/S2/AT	-25 to +180°C		

Electrical specifications

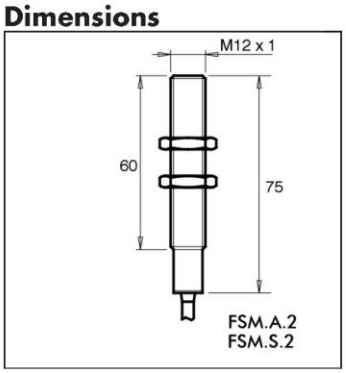
Contacts	2	7	S.2
Max switching voltage	250 Vac	-	220 Vac
Max switching current	3 A	50 mA	1 A
Max switching power	100 VA	-	60 VA

Operating distance

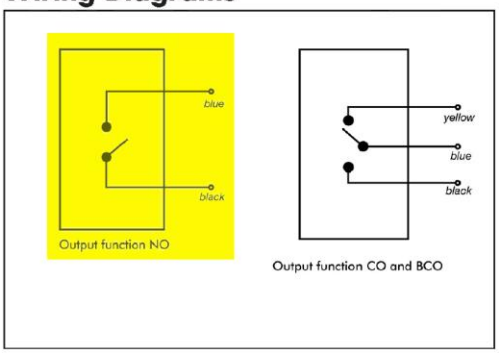
Magnetic Units	CL.10	CL.11	CL.18	CL.20/S1	CL.20/S3	CL.23	CL.31	CL.50
FSM.A.2	-	16	2	14	13	11	19	-
FSM.S.2	-	9	-	-	-	-	-	19
FSM.A.7*	-	-	-	-	-	-	-	-
FSM.S.2/S2/AT	-	-	-	-	8	-	-	-

** ≥ 7 mm with Neodimium REN 35, 5x5x1,5 magnetic unit mounted on iron*

Dimensions



Wiring Diagrams



7 Table 5: Tightening torques

Components Assembly		Tightening torques for threaded couplings in stainless-steel valves [Nm]														
		Serv. D.32		Serv. D.63		Serv. D.80				Serv. D.125						
		ND 8	ND 11	ND 15	ND 20	ND 25	ND 32	ND 40	ND 50	ND 40	ND 50	ND 65	ND 80	ND 100	ND 125	ND 150
P. 10		2		2		2				9						
P. 21	TP			9		9	18			18						
	TM			12		12	19			19						
P. 33-35				20		20				20						
P. 39-42						6				6						
Connection to plant		1,6	2,6	4,2	7	12	20	25	50	25	50	70				

8 Disposal

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.

9 Warranty

Every valve is checked before leaving the factory. On request of customer a certificate of control can be issued. The customer himself can inspect and check the material at our factory before shipment. Such inspection is considered definitive.
All expenses relative to special checks or requirements by the customer are at the customers expense.
Our responsability (for damage to person or/and properties during installation and/or maintenance) lapses when the valve is removed from its original packaging.
Our responsibility is limited to the replacement or repair of parts which develop material or manufacturing defects within 12 months from shipment and which have been used in normal working conditions. This use excludes every and any other obligation. All transport and additional costs are at the customer expense.
ITALVALVOLE® reserved the right to stop, change or modify the characteristics of any of its products without being obliged to replace or mount the modified parts on products already supplied.

WARNINGS:

- The safety conditions shall not be guaranteed and malfunctions shall not be subjected to valves in case:
  - disassembly, re-assembly, maintenance operations are not carried out in compliance with the use and maintenance manual.
  - original spare parts are not used.
- It is forbidden to remove pages from this document or to make any correction.
- In case of doubt, make reference to Italian version of the manual.
- ITALVALVOLE® S.A.S. reserves the right to change its products and the relevant documentation without prior notice.
- The use of the handbook does not exempt from the observance of the laws in force.
- It should be noted that same components can be not Italian source.