GRS/16 VALVES
FAMILY 01: GROUP 130 # 137

Description of master manual: Guide to selection, use and maintenance of GRS/16 valves. (English)

Code: 16867
Category: 1812
Group: 900
Revision no. :00
Date: 21/11/2016
Drawn up by: NM
Checked by: MB
Approved by: OS

Via Amendola 125 - 13836 Cossato (BI) ITALY
Telephone (+39) 015980641 auto reply
Fax (+39) 015926297

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

EU DECLARATION OF CONFORMITY

Mod: 704
Rev: 00
Date: 05/07/2016

EU DECLARATION OF CONFORMITY

VALVOLE PNEUMATICHE SERIE GRS

GRS SERIES PNEUMATIC VALVES

(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 (FORM A)

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

UNI EN 1092-1-2 / UNI EN 12266-1-2 / UNI EN 1561 / UNI EN 1563 / UNI EN 10213

ALTRE DIRETTIVE EUROPEE APPLICATE:
OTHER EUROPEAN STANDARDS APPLIED:

2014/34/UE

Marcatura dell'apparecchiatura:
Marking of equipments:

CE Ex II 2 GD c Tx

Certificato numero:
Certification No:

0425 ATEX 1318

ENTE NOTIFICATO – *NOTIFIED BODY*

ICIM S.p.a

Via Don Enrico Mapelli, 75 – 20099 Sesto San Giovanni (MI)

Numero Identificativo dell'Organismo Notificato
Notified Body Identification Number:

0425

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

Legale rappresentante
Legal representative

Firmato digitalmente da

OSCAR SPADON

SerialNumber = IT:SPDSCR44M19L436J
C = IT

Table of Contents

1. Introduction

Now in their fourth generation, GRS/16 valves are the result of the decade of experience gained and consolidated in *Italvalvole*®s.a.s..

The GRS series consists of on-off valves with 2 or 3 way globe body, used in installations treating overheated water, liquids, gases and steam in pipes.

Using SOLIDWORKS Flow Simulation and SOLIDWORKS Simulation analytical programmes, our technical staff have sought to improve the fluid-dynamic qualities of our new valves, re-designing bodies and shutters to improve the final valve Kv and offer better performance for our customers.

The valve is opened or closed by a pneumatic signal which reaches the servomotor (pneumatic valve head), the springs inside of which were calculated to guarantee various Δp.

While maintaining the same operating principle and main characteristics of the previous versions (the servocontrol is unaltered in the power and control forces (ΔP)), *Italvalvole*®s.a.s. has focused on the quality of materials, compact size, and the simplicity and functionality of its construction.

- **In the 2- and 3-way versions this series is supplied with guided shutter both at the top (intermediate body) and the bottom (seat). This solution guarantees longer duration of the seal parts even in heavy-duty use.**
- **The shutters have been fully renewed and calculated to improve valve flow rate performance.**

Italvalvole®s.a.s. GRS/16 series on-off valves are supplied normally closed N.C. (air opens), or normally open N.A. (air closes).

In any case, as the servomotor is reversible, it is possible to transform an N.C. valve into an N.A. valve or vice versa simply by replacing the spring and a few parts.

The valves are flanged to UNI EN 1092-1-2; PN 16 for material GJL-250 and GJS-500 or PN 40 and ANSI B16.5 class 150 for WCB and CF8M.

2. Valve technical data sheet

For any specific needs or doubts please contact our technical department, having completed the form below; you will be informed on the type of valve to use.

DATA FOR TECHNICAL ANALYSIS OF THE VALVE CHOICE:

DN _____ ☐ PN16 ☐ PN40
☐ Two-Way ☐ Three Way Deviator
Pneumatic servocontrol pressure _____ bar
Body material ☐ GJL-250 ☐ GJS-500 ☐ WCB ☐ CF8M
Valve action ☐ normally closed ☐ normally open
Operating fluid _____ Specific weight _____Kg/m^3
Maximum flow rate _____ Kg/h _____m^3/h
Pressure upstream from the valve _____bar
Pressure downstream from the valve _____bar
Fluid temperature in °C _____
Intermediate body ☐ standard ☐ with bellows
With handwheel ☐
Shutter with silencer ☐

3. Regulations for working in safety

Rules apply to all types of valve described in this manual

- All disassembly and re-assembly operations, generic handling and putting into operation on the line must be done by staff qualified to work on hydraulic and pneumatic industrial components, using all normal and safety equipment used in this industrial sector.
- **Before any operations, strictly comply with the instructions given in this manual and the laws in force concerning health and safety in the work place.**

- Staff must always be given the appropriate accident-prevention equipment, with particular attention to face, eye and hand protection. Absolutely avoid exposing the staff and any other persons to hazardous risks.

- **Read the procedures given in this manual carefully before starting work.**
- Comply with the regulations concerning storage, installation, inspection and maintenance given in this manual.

- The handling and installation on the line of valves with cast iron components GJL250 must be done with particular care due to the intrinsic fragility of the material compared to carbon steel or stainless steel. A cast iron valve that has been accidentally dropped can no longer be used, and in any case assembly on the line must include special precautions to avoid hammering and tensions on the pipe coupling flanges. It is understood that cast iron valves installed correctly are completely safe devices.

- In the conditions of maximum usage temperature depending on the system, the valve body may reach a temperature of T=300°C. The installation technician must install guards and/or signs to eliminate/signal the risk of burns by the user.
- Before any operations on the systems and valves, find out the operating temperature and pressure and any other specific conditions, taking all necessary safety precautions. The valves must be at ambient temperature to be worked on.

- For any operation on the valve, there must be no fluid in the pipes or in the valve, take care to fully empty the valve, this may be difficult due to hidden areas, particularly for valves with bellows.

- To avoid hazards due to moving parts, before working on the valve check that the power to the servomotor has been switched off or disabled.
- **N.B. Warning: springs in compression are inside the servocontrol**. Take care to avoid sudden or hazardous movements of the parts in contact with the spring using specific suitable equipment and taking the necessary precautions. Otherwise the disassembly and re-assembly operations may be hazardous for the staff working on the valve.

- **Special ATTENTION** must be paid to the risk of manual lifting of loads by the operator, in compliance with the laws in force.

- The valve must not be subjected to pressures, temperatures, or load capacities higher than those states in the technical specifications on the plate or those established at the time of order. The manufacturer shall not be liable for damage caused to equipment due to external causes.

4. Key

- **Δp allowable** (Allowable differential pressure): maximum permissible value, at a given temperature, of the static differential pressure of a valve in the closed position (UNI EN 764).
- **Allowable temperature:** limit to working temperature, required for safety reasons.
- **Allowable pressure:** limits to working pressure, normally at the top of each chamber in the pressurised equipment, prescribed for safety reasons (UNI EN 764).
- **PN** (nominal pressure)**:** Nominal permissible internal pressure value, expressed in bar, for a temperature of 20°C. The value is usually stamped on the outside of every value body.
- **DN** (Nominal diameter)**:** an alphanumeric description of the dimension of components in a piping system, used to provide a point of reference.
  It includes the letters DN followed by a whole non-dimensional number indirectly correlated to the physical dimension, expressed in millimetres, of the hole or the external diameter of the end part of the connections
- **Kv** (flow rate): expressed in m^3/h, of water (from 10 to 25 °C with volume mass equal to 1000 Kg/m^3) crossing two ways of a valve with a drop in pressure Δp of 100 KPa (1 bar) $Kv = \frac{Q}{\sqrt{\Delta p}}$ where: Q is the flow rate in m^3/h.
- **N.A.:** Indicates Normally Open valve.
- **N.C.:** Indicates Normally Closed valve.
- **V.D.:** Indicates valve fitted with Visual Device indicating the open/closed state of the shutter.
- **T.PK.**: Indicates valve fitted with Peek Seal shutter
- **T.M.:** Indicates valve fitted with Metallic Seal shutter
- **T.S.:** Indicates valve fitted with Stellited Seal shutter

5. Technical Features

General comments: ⇒ every pressure value indicated below is the relative pressure value.
⇒ **valve destined for fluids in group 2 (directive 2014/68/EU)**

DN: ⇒ 15 # 80

Connections: ⇒ flanged PN 16 to UNI EN 1092-1-2
⇒ flanged PN 40 to UNI EN 1092-1-2

Pmax* allowable*: ⇒ 16 bar (GJL-250 - GJS-500-7)
⇒ 40 bar (WCB - CF8M)
⇒ 20 bar (WCB - CF8M; valves with bellows)

Pmin* allowable*: ⇒ 0 bar

Seal: ⇒ PEEK, metallic and Stellited seals (Stellited seal recommended for Δp > 10 bar)

Seal class: ⇒ Grade A for PEEK seal, Grade B for metallic and Stellited seals

Shutter features: ⇒ linear

Body material: ⇒ UNI EN 1561-GJL-250 and UNI EN 1563-GJS-500-7
⇒ ASTM A216 WCB/1.0619 (UNI EN 10213), ASTM A351 CF8M/1.4408 (UNI EN 10213)

Tmax allowable: ⇒ +200 °C all standard version seals
+250 °C PEEK with safety bellows, with body in GJS-500-7; WCB; CF8M
+300 °C with metallic and/or Stellited, with safety bellows, with body in GJS-500-7; WCB; CF8M

Tmin* allowable*: ⇒ -10 °C (liquid phase) all standard version seals
⇒ -28 °C (liquid phase) body WCB (with safety bellows)
⇒ -40 °C (liquid phase) body CF8M (with safety bellows)

Flow direction: ⇒ 2 way globe valve, unidirectional.
⇒ 3 way DEVIATOR globe valve, with angle body, unidirectional.

Air couplings: ⇒ quick coupling for RILSAN pipes Ø 6/4

Supply fluid: ⇒ instrument air

Supply piping: ⇒ pipes internal diameter = 4 mm, external diameter min. = 6 mm

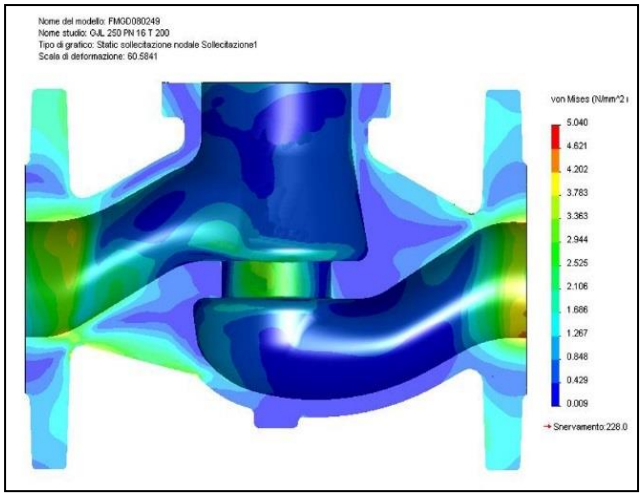
Supply P. (supply): ⇒ 6 bar (on request 2 or 4 bar with Δp reduced)

Versions / Optionals: ⇒ N.C., N.A. (for three ways, the valve is defined N.A. when the L-shaped way is open), bellows for high/low temperatures; emergency handwheel; inductive or magnetic sensors; pneumatic or electro-mechanical limit switches; stroke limiter; solenoid valves, silencer on the shutter.

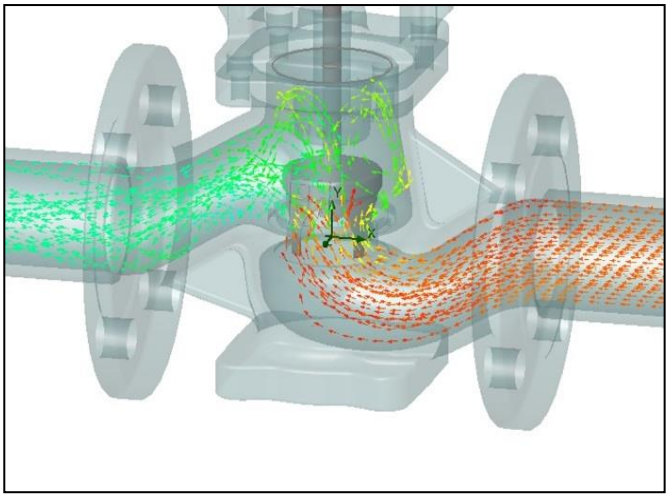
Construction materials: ⇒ See construction drawings and annexed tables

Size: ⇒ See size drawings and relative tables

5.1 Examples of design calculations

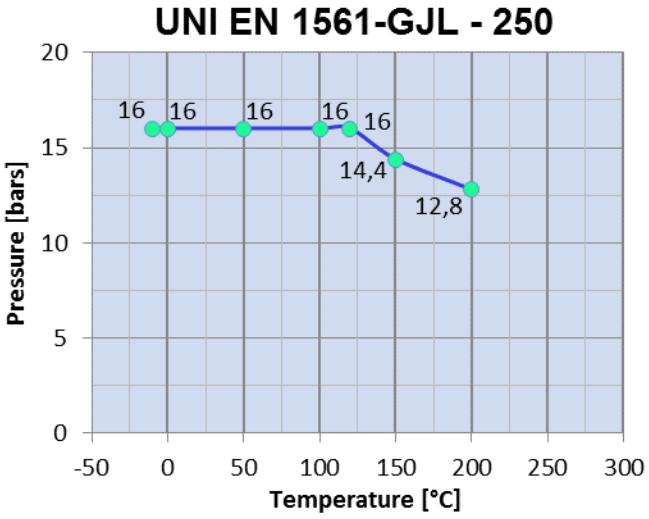


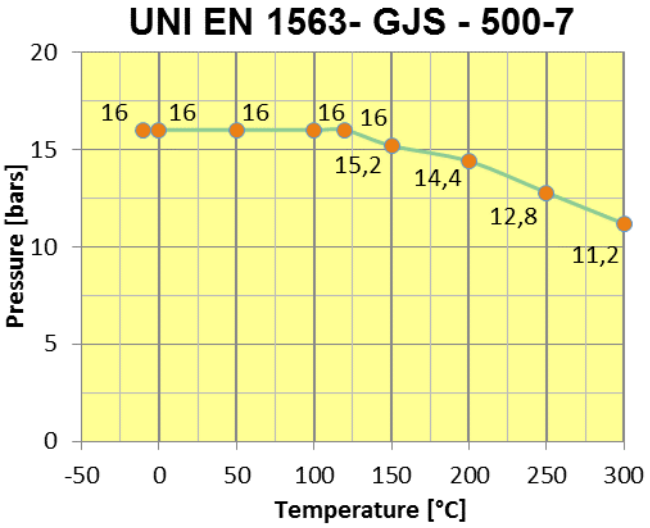
Structural calculation done with SOLIDWORKS Simulation

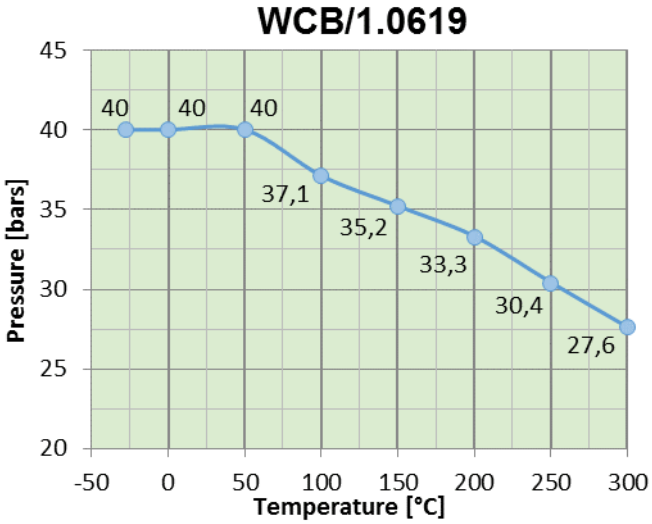


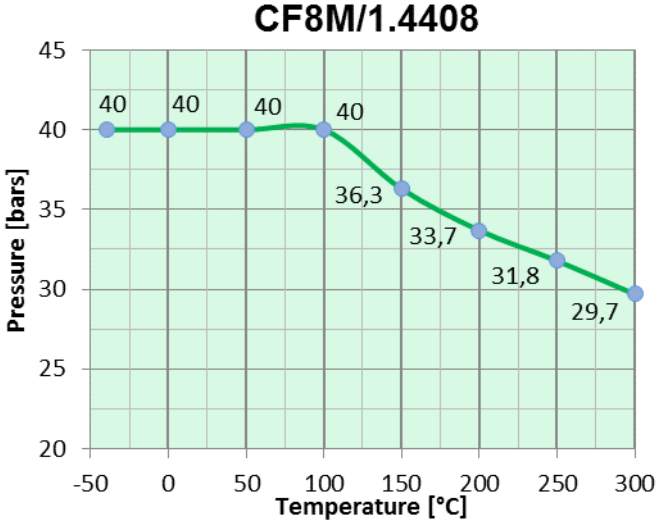
Fluid dynamic calculation done with SOLIDWORKS Flow Simulation

5.2 Pressure/Temperature graph for valve bodies in different types of material









5.3 Table 1: Compatible fluids

FLUID TYPE	***Stainless steel*** *(AISI 316) S31600/1.4401- CF8M/1.4408*	***Stainless steel*** *(AISI 316L) S31603/1.4404- CF3M/1.4409*	***Carbon steel*** *WCB/1.0619*	***Cast iron*** *GJL-250 GJS-500-7*	***Peek***	***FPM*** *- Viton*	***PTFE*** *- Teflon*	***FASIT 400***
Acetylene	**A**	**A**	**A**	**A**	**o**	**o**	**o**	**o**
Acetic Acid	**A**	**A**	**D**	**D**	**o**	**x**	**o**	**o**
Boric acid	**B**	**B**	**D**	**D**	**o**	**o**	**o**	**o**
Citric acid	**B**	**B**	**D**	**D**	**o**	**o**	**o**	**o**
Hydrochloric acid 20%	**C**	**C**	**C**	**D**	**o**	**x**	**o**	**v**
Formic acid	**B**	**B**	**D**	**D**	**o**	**x**	**o**	**o**
Phosphoric acid 10%	**B**	**B**	**D**	**D**	**o**	**o**	**o**	**o**
Nitric acid 50%	**B**	**B**	**D**	**D**	**o**	**o**	**o**	**v**
Sulphuric acid 5%	**B**	**B**	**D**	**D**	**o**	**o**	**o**	**v**
Distilled water	**A**	**A**	**C**	**D**	**o**	**o**	**o**	**o**
Ammonia solution	**A**	**A**	**B**	**B**	**o**	**o**	**o**	**o**
Air	**A**	**A**	**A**	**A**	**o**	**o**	**o**	**o**
Nitrogen N	**A**	**A**	**A**	**A**	**o**	**o**	**o**	**o**
Benzene	**B**	**B**	**B**	**B**	**o**	**o**	**o**	**o**
Petrol	**A**	**A**	**A**	**B**	**o**	**o**	**o**	**o**
Butane	**B**	**B**	**B**	**B**	**o**	**o**	**o**	**o**
Chloroform	**A**	**A**	**A**	**B**	**o**	**o**	**o**	**v**
Ethane	**B**	**B**	**B**	**B**	**o**	**o**	**o**	**o**
Ethylene glycol	**A**	**A**	**B**	**B**	**o**	**o**	**o**	**o**
Freon 22	**A**	**A**	**B**	**D**	**o**	**x**	**o**	**v**
Methane	**B**	**B**	**B**	**B**	**o**	**o**	**o**	**o**
Diesel	**B**	**B**	**B**	**B**	**o**	**o**	**o**	**o**
Fuel oil	**A**	**A**	**B**	**B**	**o**	**o**	**o**	**o**
Hydraulic oil (mineral)	**A**	**A**	**B**	**B**	**o**	**o**	**o**	**o**
Oxygen	**A**	**A**	**B**	**B**	**o**	**o**	**o**	**o**
Perchloroethylene	**A**	**A**	**B**	**B**	**o**	**o**	**o**	**v**
Propane	**B**	**B**	**B**	**B**	**o**	**o**	**o**	**o**
Caustic soda NaOH 5%	**A**	**A**	**A**	**C**	**o**	**v**	**o**	**v**
Caustic soda NaOH 20% E (1)	**A**	**A**	**A**	**C**	**o**	**v**	**o**	**v**
Caustic soda NaOH 50% E (1)	**B**	**B**	**C**	**C**	**o**	**v**	**o**	**v**
Caustic soda NaOH 75% E (1)	**B**	**B**	**C**	**C**	**o**	**v**	**o**	**v**
Toluene	**A**	**A**	**B**	**A**	**o**	**o**	**o**	**o**
Trichloroethene	**B**	**B**	**B**	**C**	**x**	**o**	**o**	**v**
Steam Tmax=130 °C-P=2,7 bar	**A**	**A**	**A**	**A**	**o**	**v**	**o**	**o**
Steam Tmax=170 °C -P=8 bar	**A**	**A**	**A**	**A**	**o**	**v**	**o**	**o**
Steam Tmax= above 170 °C (2)	**A**	**A**	**A**	**A**	**o**	**v**	**o**	**o**

Key:

A: *Excellent Resistance*
Materials which do not suffer any essential size variations

B: *Good resistance*
Materials which can be attacked but which are generally used where a certain degree of corrosion is tolerated.

C: *Poor resistance*
Materials which are normally not considered suited for use.

D: *Not Recommended*
Materials with too high corrosion speeds to be taken into consideration.

o: *Type of seal Recommended*

v: *Type of seal to assess* according to the conditions of use

x: *Type of seal Not Recommended*

(1) "E" stands for boiling

(2) In the versions in which the temperature can reach this value

The data given in the previous table, where not expressly indicated, refer to a temperature of 21 °C.
The data given is of a general nature and is not valid for all possible working conditions. This data may be considerably affected by factors such as: temperature, concentration, fluid speed.
For safer and complete information, contact our technical department.
It is expressly forbidden to use the valve with explosive, easily flammable, oxidising or toxic gases.
It is expressly forbidden to use the valve with liquids containing: chlorine, fluorine, bromine, iodine and derivative products.
Any derogations from these prescriptions may be issued for special applications, and only in writing, by our technical department.

5.4 Table 2: Δp GRS/16 cast iron 2 way valves without bellows

DN	Φ seat [mm]	Stroke [mm]	Linear shutter Kvs	Linear shutter CV	Φi Servocontrols [mm]	Δp Valve N.C. valves 2	Δp Valve N.C. valves 4	Δp Valve N.C. valves 6	Δp Valve N.A. valves 2	Δp Valve N.A. valves 4	Δp Valve N.A. valves 6	VALVE DEFINITION NO.
Min control pressure BAR						2	4	6	2	4	6	
						Letters for valve definition						
						A	B	C	M	N	O	
15	3	15	UT	UT	70	16	16	16	16	16	16	1
	6	15	UT	UT		16	16	16	16	16	16	2
	15	15	4.3	5		16	16	16	16	16	16	3
	20	15	5	5.8		11	15	15	13	16	16	30
20	8	15	UT	UT	70	16	16	16	16	16	16	4
	15	15	6	7		16	16	16	16	16	16	5
	20	15	8	9.3		11	15	16	13	16	16	6
25	15	15	5.4	6.3	70	16	16	16	16	16	16	7
	20	15	9.3	10.8		11	15	15	13	16	16	8
	26	15	11.8	13.7		7	10	16	8	16	16	9
32	20	15	9.6	11.2	80	14	16	16	16	16	16	10
	26	15	14.5	16.9		12	16	16	14	16	16	11
	31	15	20	23.3		7.5	15	16	8	16	16	12
40	26	15	16.5	19.2	80	12	16	16	14	16	16	13
	31	15	21.9	25.5		7.5	15	16	8	16	16	14
	38	15	26	30.2		5	10	14	5.5	14	16	15
50	31	15	22.1	25.7	80	7.5	15	16	8	16	16	16
	38	15	27.6	32.1		5	10	14	5.5	14	16	17
	48	15	38.4	44.7		3	6	8.1	2	7	11.5	18
65	38	15	27.9	32.4	125		14	16		14	16	19
	48	15	45.5	53.5			9	16		11	16	20
	63	20	74.8	87.1			3.8	11.5		6.7	12.8	21
80	48	15	43.2	50.3	125		9	16		11	16	22
	63	20	76.6	89.2			3.8	11.5		6.7	12.8	23
	78	20	85.8	99.9			2.2	7.3		4.1	8.1	24

Note: the Δp Max is obtained without air in the head (***NC valves only***).
UT: contact our technical department

The kv was calculated with the SOLIDWORKS Flow Simulation fluid dynamics programme in compliance with standard UNI EN 1267:2012 and refers to a 2-way valve

5.5 Table 3: Δp GRS/16 cast iron 2 way valves with bellows

DN	Φ seat [mm]	Stroke [mm]	Linear shutter Kvs	Linear shutter CV	Φi Servocontrols [mm]	Δp Valve N.C. valves 2 bar	Δp Valve N.C. valves 4 bar	Δp Valve N.C. valves 6 bar	Δp Valve N.A. valves 2 bar	Δp Valve N.A. valves 4 bar	Δp Valve N.A. valves 6 bar	VALVE DEFINITION NO.
						Letters for valve definition						
						A	B	C	M	N	O	
15	3	15	UT	UT	70	6.4	7	7	2	9.7	16	1
	6	15	UT	UT		6.4	7	7	2	9.7	16	2
	15	15	4.3	5		6.3	6.8	6.8	1.8	9.5	16	3
	20	15	5	5.8		6.1	6.8	6.8	1.7	9.5	16	30
20	8	15	UT	UT	70	6.4	7	7	2	9.7	16	4
	15	15	6	7		6.3	6.9	6.9	1.9	9.6	16	5
	20	15	8	9.3		6.1	6.8	6.8	1.7	9.5	16	6
25	15	15	5.4	6.3	70	6.3	6.9	6.9	1.9	9.6	16	7
	20	15	9.3	10.8		6.1	6.8	6.8	1.7	9.5	16	8
	26	15	11.8	13.7		5.5	6	6	1.5	8.5	16	9
32	20	15	9.6	11.2	80	14	16	16	16	16	16	10
	26	15	14.5	16.9		12	16	16	14	16	16	11
	31	15	20	23.3		7.5	15	16	8	16	16	12
40	26	15	16.5	19.2	80	12	16	16	14	16	16	13
	31	15	21.9	25.5		7.5	15	16	8	16	16	14
	38	15	26	30.2		5	10	14	5.5	14	16	15
50	31	15	22.1	25.7	80	7.5	15	16	8	16	16	16
	38	15	27.6	32.1		5	10	14	5.5	14	16	17
	48	15	38.4	44.7		3	6	9	3.5	9	14	18
65	38	15	27.9	32.4	125		14	16		14	16	19
	48	15	45.5	53.5			9	16		11	16	20
	63	15	61	71			4.6	12.3		7.5	13.6	21
80	48	15	43.2	50.3	125		9	16		11	16	22
	63	15	62.2	72.4			4.6	12.3		7.5	13.6	23
	78	15	61.9	72.1			3.5	8.1		4.9	8.9	24

Note: the Δp Max is obtained without air in the head (***NC valves only***).
UT: contact our technical department

The kv was calculated with the SOLIDWORKS Flow Simulation fluid dynamics programme in compliance with standard UNI EN 1267:2012 and refers to a 2-way valve

5.6 Table 4: Δp GRS/16 cast iron 2 way valves, extra large

						Δp Valve		VALVE DEFINITION NO.
						N.C. valves	N.A. valves	
Min control pressure BAR						6	6	
DN	**Φ seat [mm]**	**Stroke [mm]**	**Linear shutter**		**Φi** Servocontrols **[mm]**	Letters for valve definition		
			Kvs	**CV**		C	O	
15	3	15	UT	UT	80	16	16	1M
	6	15	UT	UT		16	16	2M
	15	15	4.3	5		16	16	3M
	20	15	5	5.8		16	16	30M
20	8	15	UT	UT	80	16	16	4M
	15	15	6	7		16	16	5M
	20	15	8	9.3		16	16	6M
25	15	15	5.4	6.3	80	16	16	7M
	20	15	9.3	10.8		16	16	8M
	26	15	11.8	13.7		16	16	9M
32	20	15	9.6	11.2	125	16	16	10M
	26	15	14.5	16.9		16	16	11M
	31	15	20	23.3		16	16	12M
40	26	15	16.5	19.2	125	16	16	13M
	31	15	21.9	25.5		16	16	14M
	38	15	26	30.2		16	16	15M
50	31	15	22.1	25.7	125	16	16	16M
	38	15	27.6	32.1		16	16	17M
	48	15	38.4	44.7		16	16	18M
65	38	15	27.9	32.4	160	16	16	19M
	48	15	45.5	53.5		16	16	20M
	63	20	74.8	87.1		16	16	21M
80	48	15	43.2	50.3	160	16	16	22M
	63	20	76.6	89.2		16	16	23M
	78	20	85.8	99.9		13	16	24M

Note: the Δp Max is obtained without air in the head (***NC valves only***).
UT: contact our technical department

The kv was calculated with the SOLIDWORKS Flow Simulation fluid dynamics programme in compliance with standard UNI EN 1267:2012 and refers to a 2-way valve

5.7 Table 5: Δp GRS/16 2 way valves WCB/CF8M without bellows

DN	Φ seat [mm]	Stroke [mm]	Linear shutter Kvs	Linear shutter CV	Φi Servocontrols [mm]	Δp Valve N.C. valves 2	Δp Valve N.C. valves 4	Δp Valve N.C. valves 6	Δp Valve N.A. valves 2	Δp Valve N.A. valves 4	Δp Valve N.A. valves 6	VALVE DEFINITION NO.
Min control pressure BAR						2	4	6	2	4	6	
						Letters for valve definition						
						A	B	C	M	N	O	
15	3	15	UT	UT	70	40	40	40	40	40	40	1
	6	15	UT	UT		40	40	40	40	40	40	2
	15	15	4.3	5		24	27	27	23	40	40	3
	20	15	5	5.8		11	15	15	13	26.5	40	30
20	8	15	UT	UT	70	40	40	40	40	40	40	4
	15	15	6	7		24	27	27	23	40	40	5
	20	15	8	9.3		11	15	15	13	26.5	40	6
25	15	15	5.4	6.3	70	24	27	27	30	40	40	7
	20	15	9.3	10.8		11	15	15	13	33.5	40	8
	26	15	11.8	13.7		7	10	10	8	20	30	9
32	20	15	9.6	11.2	80	14	33.5	40	30	40	40	10
	26	15	14.5	16.9		12	19.5	35.5	14	26.5	40	11
	31	15	20	23.3		7.5	15	25	8	19	28.5	12
40	26	15	16.5	19.2	80	12	19.5	35.5	14	26.5	40	13
	31	15	21.9	25.5		7.5	15	25	8	19	28.5	14
	38	15	26	30.2		5	10	14	5.5	14	19	15
50	31	15	22.1	25.7	80	7.5	15	25	8	19	28.5	16
	38	15	27.6	32.1		5	10	14	5.5	14	19	17
	48	15	38.4	44.7		3	6	8.1	2	7	11.5	18
65	38	15	27.9	32.4	125		14	40		14	40	19
	48	15	45.5	53.5			9	25.5		11	26.5	20
	63	20	74.8	87.1			3.8	11.5		6.7	12.8	21
80	48	15	43.2	50.3	125		9	25.5		11	26	22
	63	20	76.6	89.2			3.8	11.5		6.7	12.8	23
	78	20	85.8	99.9			2.2	7.3		4.1	8.1	24

Note: the Δp Max is obtained without air in the head (***NC valves only***).
UT: contact our technical department

The kv was calculated with the SOLIDWORKS Flow Simulation fluid dynamics programme in compliance with standard UNI EN 1267:2012 and refers to a 2-way valve

5.8 Table 6: Δp GRS/16 2 way valves WCB/CF8M with bellows

DN	Φ seat [mm]	Stroke [mm]	Linear shutter Kvs	Linear shutter CV	Φi Servocontrols [mm]	Δp Valve N.C. valves 2	N.C. valves 4	N.C. valves 6	N.A. valves 2	N.A. valves 4	N.A. valves 6	VALVE DEFINITION NO.
Min control pressure BAR						2	4	6	2	4	6	
						Letters for valve definition						
						A	B	C	M	N	O	
15	3	15	UT	UT	70	6.4	7	7	2	9.7	17.4	1
	6	15	UT	UT		6.4	7	7	2	9.7	17.4	2
	15	15	4.3	5		6.3	6.8	6.8	1.8	9.5	17.2	3
	20	15	5	5.8		6.1	6.8	6.8	1.7	9.5	17.1	30
20	8	15	UT	UT	70	6.4	7	7	2	9.7	17.4	4
	15	15	6	7		6.3	6.9	6.9	1.9	9.6	17.2	5
	20	15	8	9.3		6.1	6.8	6.8	1.7	9.5	17.1	6
25	15	15	5.4	6.3	70	6.3	6.9	6.9	1.9	9.6	17.2	7
	20	15	9.3	10.8		6.1	6.8	6.8	1.7	9.5	17.1	8
	26	15	11.8	13.7		5.5	6	6	1.5	8.5	17	9
32	20	15	9.6	11.2	80	14	20	20	20	20	20	10
	26	15	14.5	16.9		12	19.5	20	14	20	20	11
	31	15	20	23.3		7.5	15	20	8	19	20	12
40	26	15	16.5	19.2	80	12	19.5	20	14	20	20	13
	31	15	21.9	25.5		7.5	15	20	8	19	20	14
	38	15	26	30.2		5	10	14	5.5	14	19	15
50	31	15	22.1	25.7	80	7.5	15	20	8	19	20	16
	38	15	27.6	32.1		5	10	14	5.5	14	19	17
	48	15	38.4	44.7		3	6	9	3.5	9	14	18
65	38	15	27.9	32.4	125		14	20		14	20	19
	48	15	45.5	53.5			9	20		11	20	20
	63	15	61	71			4.6	12.3		7.5	13.6	21
80	48	15	43.2	50.3	125		9	20		11	20	22
	63	15	62.2	72.4			4.6	12.3		7.5	13.6	23
	78	15	61.9	72.1			3.5	8.1		4.9	8.9	24

Note: the Δp Max is obtained without air in the head (***NC valves only***).
UT: contact our technical department

The kv was calculated with the SOLIDWORKS Flow Simulation fluid dynamics programme in compliance with standard UNI EN 1267:2012 and refers to a 2-way valve

5.9 Table 7: Δp GRS/16 2 way valves WCB/CF8M extra large

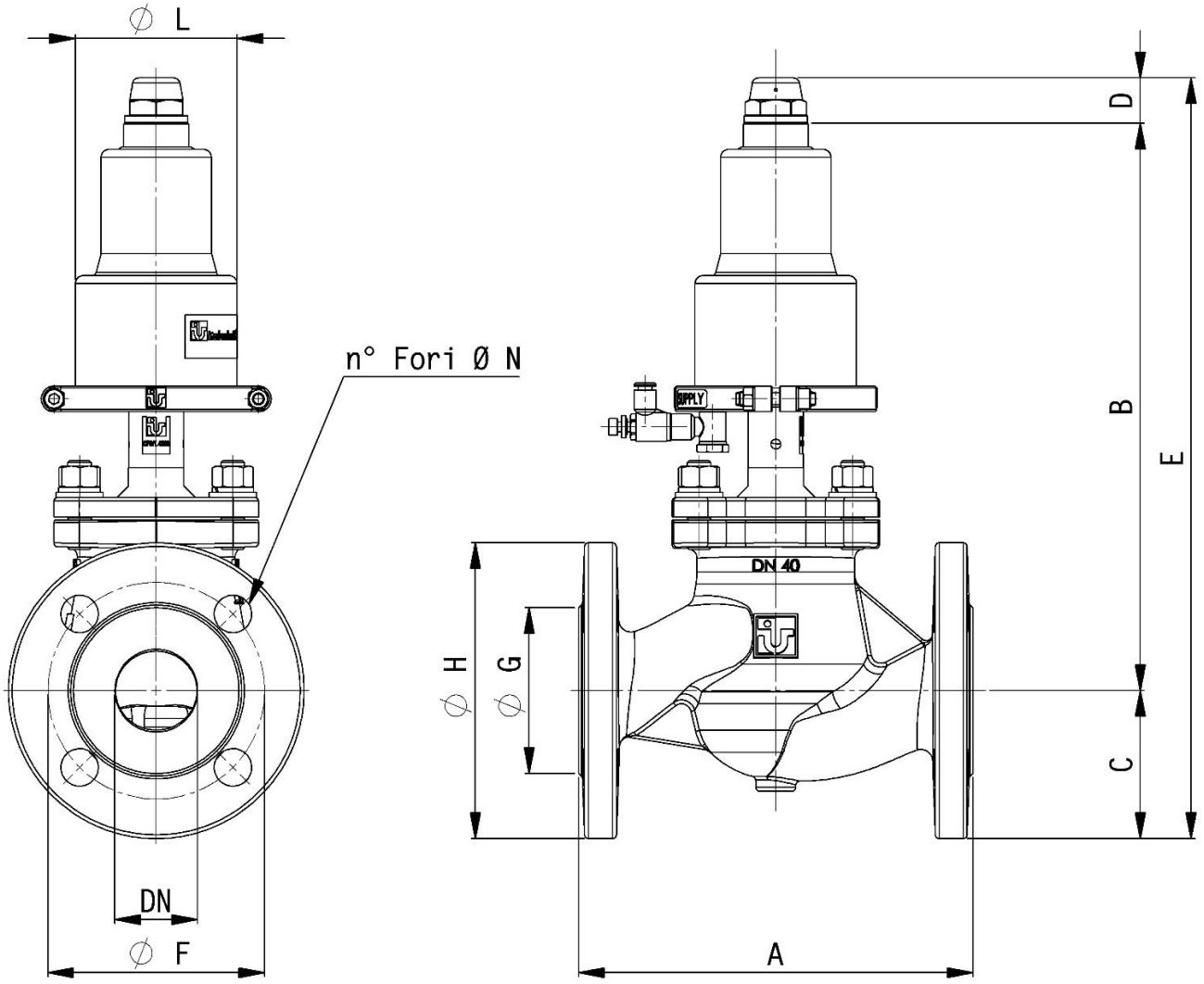
						Δp Valve		VALVE DEFINITION NO.
						N.C. valves	N.A. valves	
Min control pressure BAR						6	6	
DN	Φ seat [mm]	Stroke [mm]	Linear shutter		Φi Servocontrols [mm]	Letters for valve definition		
			Kvs	CV		C	O	
15	3	15	UT	UT	80	40	40	1M
	6	15	UT	UT		40	40	2M
	15	15	4.3	5		40	40	3M
	20	15	5	5.8		40	40	30M
20	8	15	UT	UT	80	40	40	4M
	15	15	6	7		40	40	5M
	20	15	8	9.3		40	40	6M
25	15	15	5.4	6.3	80	40	40	7M
	20	15	9.3	10.8		40	40	8M
	26	15	11.8	13.7		35.5	40	9M
32	20	15	9.6	11.2	125	40	40	10M
	26	15	14.5	16.9		40	40	11M
	31	15	20	23.3		40	40	12M
40	26	15	16.5	19.2	125	40	40	13M
	31	15	21.9	25.5		40	40	14M
	38	15	26	30.2		40	40	15M
50	31	15	22.1	25.7	125	40	40	16M
	38	15	27.6	32.1		40	40	17M
	48	15	38.4	44.7		25.5	26.5	18M
65	38	15	27.9	32.4	160	40	40	19M
	48	15	45.5	53.5		39	40	20M
	63	20	74.8	87.1		23	28.5	21M
80	48	15	43.2	50.3	160	39	40	22M
	63	20	76.6	89.2		23	28.5	23M
	78	20	85.8	99.9		13	18.5	24M

Note: the Δp Max is obtained without air in the head (***NC valves only***).
UT: contact our technical department

The kv was calculated with the SOLIDWORKS Flow Simulation fluid dynamics programme in compliance with standard UNI EN 1267:2012 and refers to a 2-way valve

5.10 Size of GRS/16 valves

5.10.1 GRS/16 2 WAY valve with V.D.

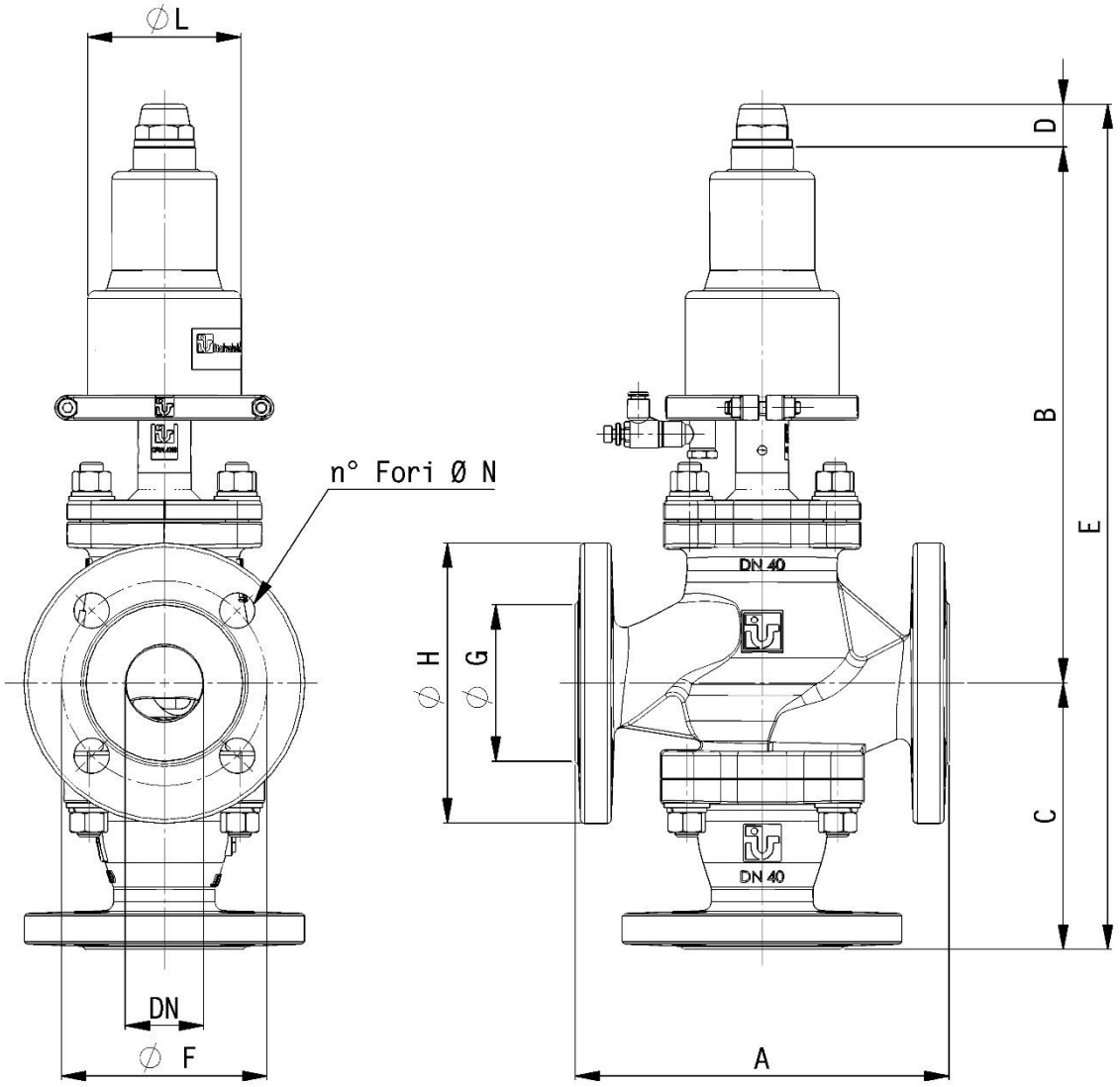


Drawing No. 160780
Rev:00

DN	A	B				C	D				E				Ø F	Ø G	Ø H	Ø N		No. of holes	
		Ø L					Ø L				Ø L							PN 16	PN 40	PN 16	PN 40
		70	80	125	160		70	80	125	160	70	80	125	160							
15	130	246	270	/	/	47.5	23	23	/	/	316.5	340.5	/	/	65	45	95	14		4	
20	150	246	270	/	/	52.5	23	23	/	/	321.5	345.5	/	/	75	58	105	14		4	
25	160	246	270	/	/	57.5	23	23	/	/	326.5	350.5	/	/	85	65	115	14		4	
32	180	/	290	344	/	70	/	23	58	/	/	383	472	/	100	76	140	19	18	4	
40	200	/	286	342	/	75	/	23	58	/	/	384	475	/	110	84	150	19	18	4	
50	230	/	286	340	/	82.5	/	23	58	/	/	391.5	480.5	/	125	99	165	19	18	4	
65	290	/	/	368	415	92.5	/	/	58	58	/	/	518.5	565.5	145	118	185	19	18	4	8
80	310	/	/	368	415	100	/	/	58	58	/	/	526	573	160	132	200	19	18	8	

Measurements expressed in mm

5.10.2 GRS/16 3 WAY valve with V.D.



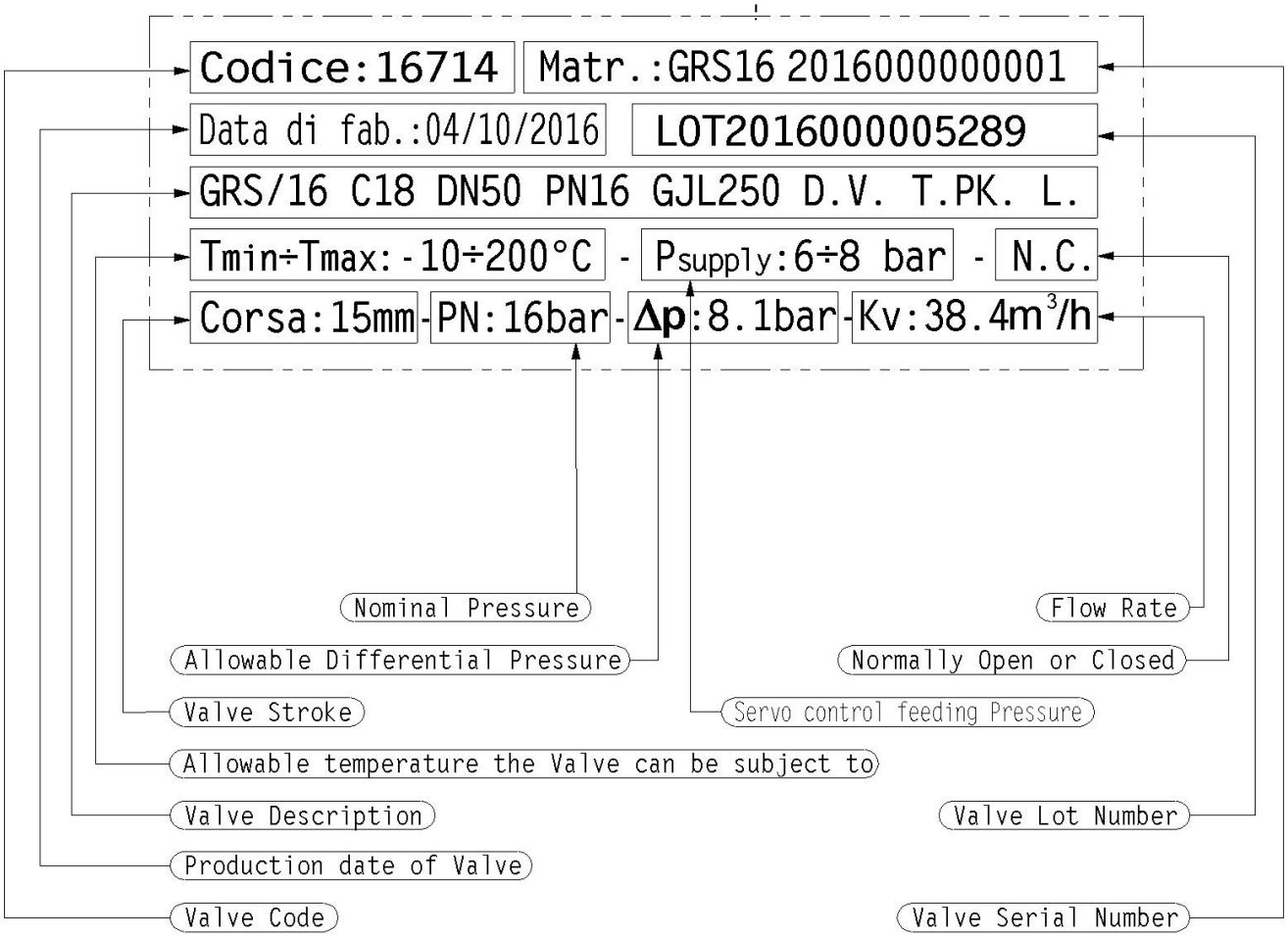
Drawing No. 160781
Rev:00

DN	A	B				C	D				E				Ø F	Ø G	Ø H	Ø N		No. of holes	
		Ø L					Ø L				Ø L										
		70	80	125	160		70	80	125	160	70	80	125	160				PN 16	PN 40	PN 16	PN 40
15	130	246	270			112	23	23			381	405			65	45	95	14		4	
20	150	246	270			112	23	23			381	405			75	58	105	14		4	
25	160	246	270			125	23	23			394	418			85	65	115	14		4	
32	180		290	344		145		23	58			458	547		100	76	140	19	18	4	
40	200		286	342		145		23	58			454	545		110	84	150	19	18	4	
50	230		286	340		161		23	58			470	559		125	99	165	19	18	4	
65	290			368	415	237			58	58			663	710	145	118	185	19	18	4	8
80	310			368	415	239			58	58			665	712	160	132	200	19	18	8	

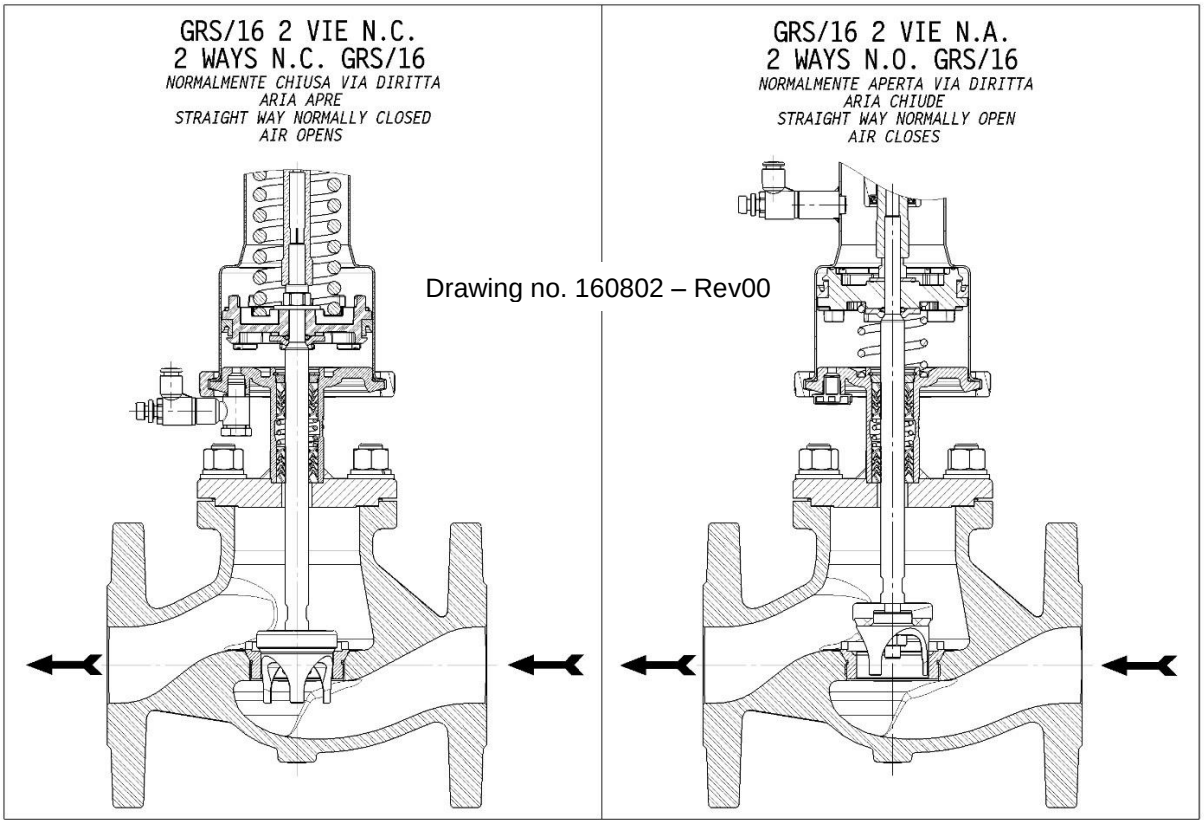
Measurements expressed in mm

6. Technical and identification data given on the marking of valves GRS/16 - Plate data.

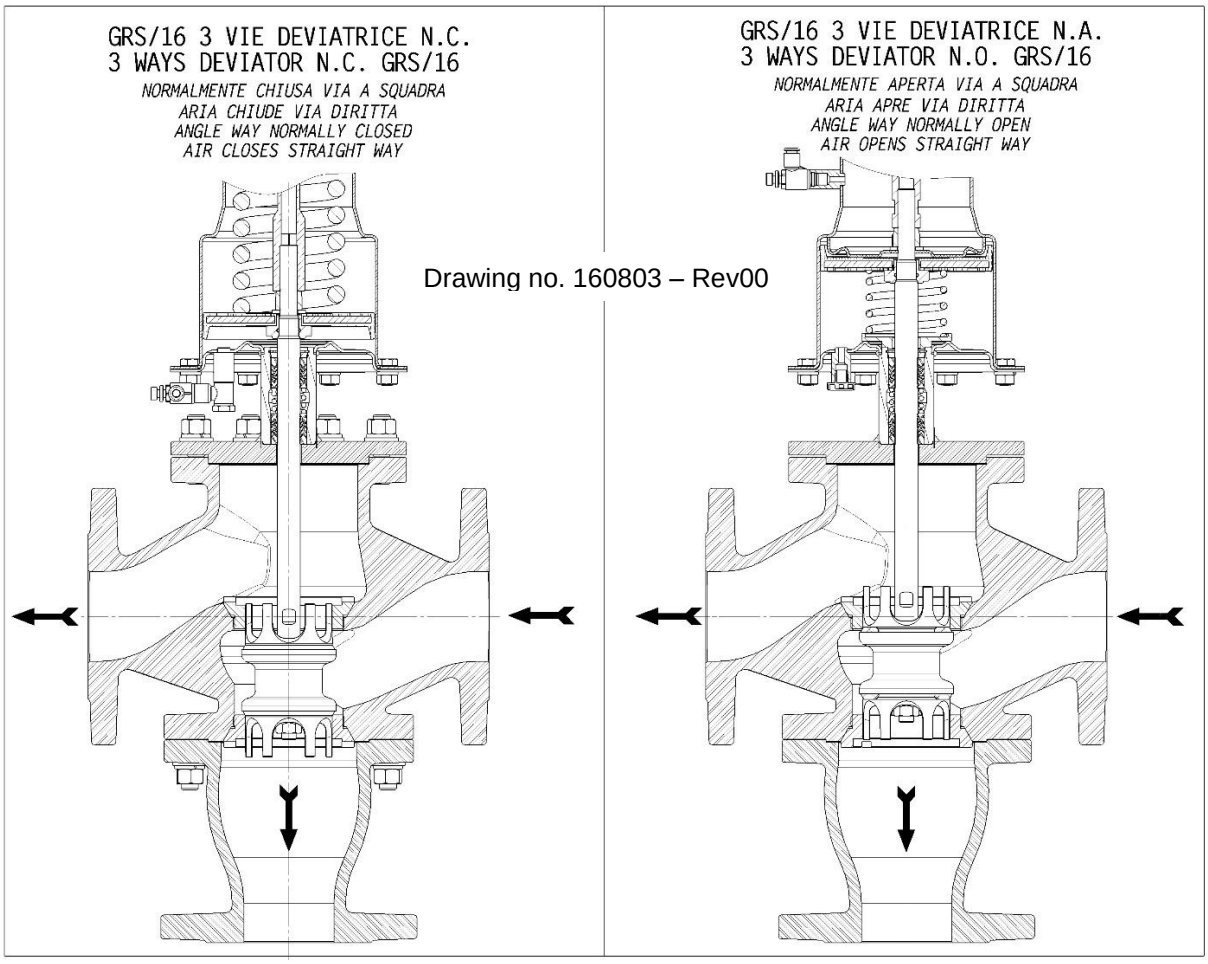
Fig.1: Laser marking with valve data



6.1 Valve operating diagram for correct installation in the system.



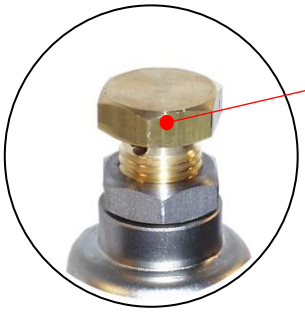
Drawing no. 160802 – Rev00



Drawing no. 160803 – Rev00

7. Accessories

GRS/16 valves may be equipped with different accessories to meet the many requirements of our customers.

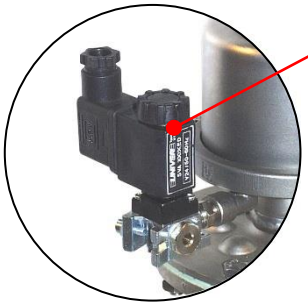


STROKE REGULATOR
The stroke regulator limits the valve stroke to the set value.

MAGNETIC SENSOR
This sensor is used to detect the opening or closing of the valve: it is activated by a magnet which moves the shutter.

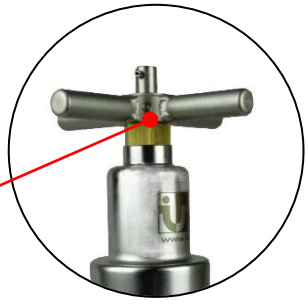
INDUCTIVE SENSOR
This sensor is used to detect the opening/closing condition of the valve.

SENSOR HOLDER BOX
The sensor holder box is applied to the top of the servocontrol: inside there is an electric or pneumatic limit switch housing.



SOLENOID VALVE
The solenoid valve is used to command the opening and closing of the valve by an electric signal.

EMERGENCY HANDWHEEL
The emergency handwheel is used to open the valve if there is no air.



8. Storage, installation, inspection and maintenance.

8.1 Transport, storage and handling.

During transport and assembly, GRS/16 valves must be handled with the utmost care. Knocks and abnormal stresses must be avoided (do not lift the valve by the servocontrol).
Do not knock or tamper with any accessories which may be fitted on the valve (handwheels, solenoid valves, electric pneumatic limit switches or proximity sensors).
The valves are delivered with protection against dust on all connections, these protections must be removed only at the time of assembly.
Special ATTENTION must be paid to the risk of manual lifting of loads by the operator, in compliance with the laws in force.
Store the valves **away from sunlight**, to prevent the seals inside from deterioration or early ageing.
Storage temperatures must be between 0°C and + 50°C.
Avoid knocking the servocontrol: this could cause misalignment and compromise the correct operation of the valve.
Comply with the information on the data plate.

8.2 Installation instructions

8.2.1 General information

Strictly comply with the instructions given in this manual for operating in safety.

Under no circumstances must the valve be disassembled or modified. This will annul any kind of warranty.
Under no circumstances remove the plate indicating the valve data and the serial number, this will annul the warranty and any assurance offered by the manufacturer.

Before any operations, strictly comply with the instructions given in this manual and the laws in force concerning health and safety in the work place.
Before installation, remove the protections from the valve body.
Warning: to put NA valves into operation do not remove the air vent on the servocontrol in the lower air hole, which is normally used to supply NC valves, to avoid dirt or foreign bodies entering the servocontrol.
Use instrument air at a pressure of between 2 and 6 bar depending on the usage values of the servocontrol and in any case never exceed 8 bar, with supply pipes in nylon $ø_{int.}$ = 4 mm.
The pneumatic supply couplings on the servocontrol must be male threaded 1/8” Gas.
During valve cleaning operations, avoid blowing compressed air inside the inspection holes on the intermediate body.

8.2.2 Installation of the valve in the system.

Comply with the information on the data plate.
Special ATTENTION must be paid to the risk of manual lifting of loads by the operator, in compliance with the laws in force.
Before assembly check that there is no dirt in the valve body; if in doubt, blow through it energetically with compressed air.
It is advised to install a protection filter on the piping upstream from the valve.
The most common installation recommended requires that the valve be assembled vertically with the servocontrol at the top. Only if for reasons of space it is necessary to assemble the valve at an angle, it may be assembled at an angle or, if necessary, horizontally.
If the continuous operation of the system is required even during valve maintenance, a suitable by pass should be installed with the relative manual on-off valves.
WARNING: when installing a valve, ensure the minimum space necessary for dismantling the pneumatic head and internal parts required for maintenance.

N.B. Warning: springs in compression are inside the servocontrol.
Take the utmost care when assembling the valve on the pipes, make sure it is mounted with the direction of the arrow stamped on the body in the same direction of the flow in the pipes, proceed to tighten the nuts on the flanges diagonally to compress the seals in a uniform manner, and avoid dangerous tensions on the valve body.
It is advisable to use joints between the pipes on the system and the valve connections, to discharge any tension which could damage the valve.
After assembling the valve on the line, before starting the system, clean all the pipes of any foreign bodies, welding burrs and dirt which could damage the valve seal surfaces. For this purpose circulate an appropriate fluid with the valve shutter in the open position at the maximum flow rate and pressure as compatible with the valve PN.
Connect the pneumatic signal output from the pilot regulator or the control panel with a specific coupling on the servocontrol.

8.3 Installation diagrams

8.3.1 Installation of GRS/16 2 way valves

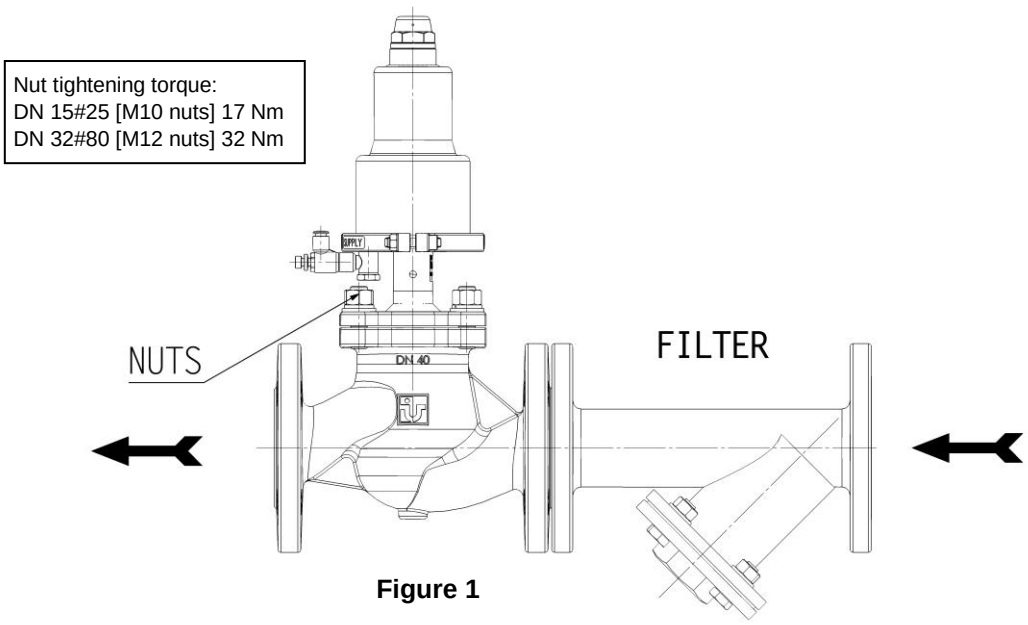


Figure 1

When installing GRS/16 2 way valves, place a filter on the valve intake to collect any impurities which could damage the seal. Mount the GRS/16 2 way valve as shown in figure 1, respecting the direction arrows on the valve. After the first hours of use when hot, check the tightening on the nuts indicated in the diagram.

8.3.2 Installation of GRS/16 3 way deviator valves

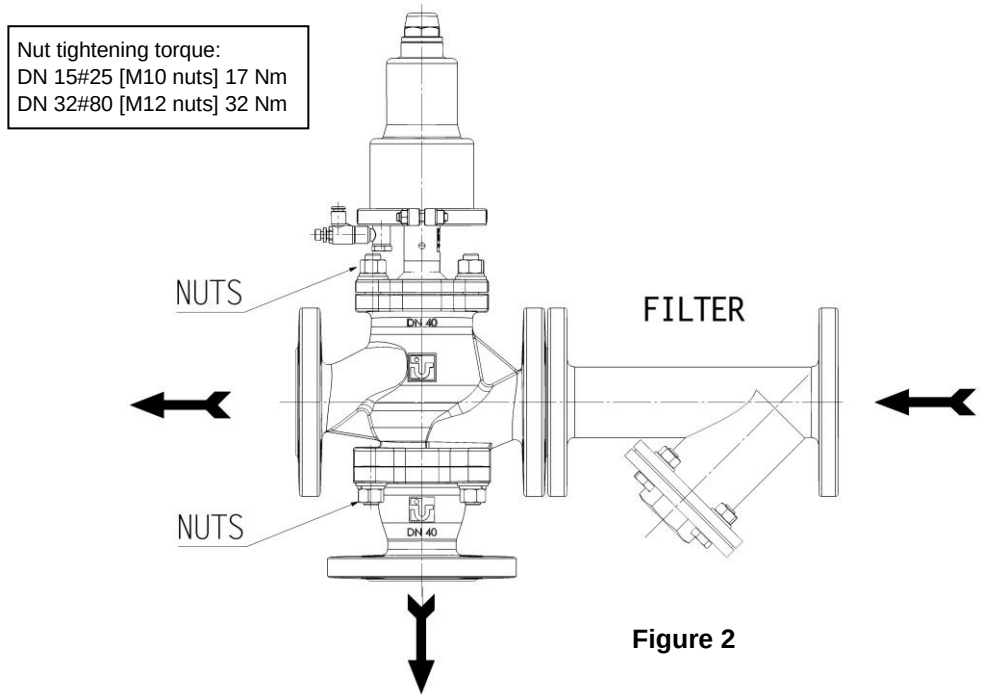


Figure 2

When installing GRS/16 3 way deviator valves, place a filter on the valve intake to collect any impurities which could damage the seal. Mount the GRS/16 3 way deviator valve as shown in figure 2, respecting the direction arrows on the valve. After the first hours of use when hot, check the tightening on the nuts indicated in the diagram.

8.4 Operating test

Before starting the system and after repairs or overhauls, run the following operating test:

For valves with N.C. normally closed servocontrol:

1) Send the fluid in the valve under the shutter at working pressure (check that it is always below the maximum allowable pressure indicated on the valve data plate).
2) Place air in the servocontrol equal to the control signal indicated on the data plate (the valve should start to open, which can be seen by the flowing fluid).
3) Remove the air from the servocontrol.
4) Repeat the operation 5 times.
5) Check with the air off that there are no leaks from the valve.
6) Check with the air on that there are no leaks from the servocontrol.

For valves with N.A. normally open servocontrol:

1) Send the fluid in the valve under the shutter at working pressure (check that it is always below the maximum allowable valve pressure).
2) Place air in the servocontrol equal to the control signal indicated on the data plate (the valve should start to close, which can be seen by the fluid stopping).
3) Repeat the operation 5 times.
4) Check with the air on that there are no leaks from the valve or the servocontrol.

8.5 Troubleshooting.

The troubleshooting operations must be performed by specialist staff, equipped for hydraulic and pneumatic operations and wearing the safety clothing envisaged for these activities. Pay particular attention to face, eye and hand protection.
Strictly comply with the instructions given in this manual for operating in safety.

Before any operations, strictly comply with the instructions given in this manual and the laws in force concerning health and safety in the work place.

8.5.1 N.C. valves

If a malfunction or leak appears in a valve, interrupt the service immediately and run the following checks:
drain the air circuit; remove the air supply pipe (with the air switched off) and make sure that there is no air in the line.
Warning: when troubleshooting, the valve must not be removed or its position changed in the system being worked on. No part of the valve must be removed or loosened.

Use a pressure gauge to check that the fluid pressure inside the valve (upstream), is no greater than the maximum allowable pressure or, if $\Delta p <$ allowable pressure does not exceed Δp.
If after these checks anomalies continue, check the internal parts of the valve, dismantling them as indicated in the “instructions for disassembly and re-assembly of N.C. valves” in this manual.
If the leaks continue, contact our technical department.

8.5.2 N.A. valves

If a malfunction or leak appears in a valve, interrupt the service immediately and run the following checks: insert air (at a pressure valve equal to that required for correct operation) in the servocontrol so that the valve closes.
Warning: when troubleshooting, the valve must not be removed or its position changed in the system being worked on. No part of the valve must be removed or loosened.

Use a pressure gauge to check that the fluid pressure inside the valve (upstream), is no greater than the maximum allowable pressure or, if $\Delta p <$ allowable pressure does not exceed Δp.
If after these checks anomalies continue, check the internal parts of the valve, dismantling them as indicated in the “instructions for disassembly and re-assembly of N.C. valves” in this manual.
If the leaks continue, contact our technical department.

8.6 Periodic routine maintenance and extraordinary maintenance

- Routine maintenance must be performed in addition to any maintenance performed in the event of a fault.
- The routine maintenance interval is 500,000 cycles or three years, whichever is the shorter; it involves the complete disassembly of the valve, replacing all the seals and fully cleaning of all the other valve components.
    - Extraordinary maintenance is performed in the event of a failure, and requires immediate intervention to prevent damage to the system, operators or valve components.

    - The seat and shutter are particularly subject to wear, and must be checked regularly to ensure correct seal; poor seal may be caused by impurities between two components or a damaged seal. Follow the troubleshooting instructions given above to work correctly.
    - Other elements subject to wear are the packing glands, the intermediate boy on GRS/16 valves has two inspection holes used to check the perfect seal, so periodically check this condition; do not blow compressed air into the holes.
- For any requests for spare parts and when corresponding with *Italvalvole*®s.a.s. please refer to the serial number stamped on the marking on the servocontrol, see the chapter on technical and machine data.

    - For dismantling and re-assembly operations, refer to the relative paragraphs of this manual.
    - Any maintenance not described in this manual must be analysed with our Technical Department in order to be certain of working correctly.
    - It is in any case a good practice to remove the valve from the system.
- When re-assembling check that all the valve components are completely clean and free of any foreign bodies, which may compromise the seal even with newly supplied parts.

<u>Before any operations, strictly comply with the instructions given in this manual and the laws in force concerning health and safety in the work place.</u>

Page left intentionally blank

8.7 Disassembly, seal replacement and re-assembly instructions for valves GRS/16 DN15#50 2 WAY V.D. - N.C.

Comply with the instructions given in this manual for operating in safety. Draw. Ref. No. 160782 annexed.

8.7.1 Disassembly

1) Let air into the servocontrol (6 bar).
2) Unscrew the nuts (23) and remove the servocontrol from the valve body with relative body gasket.
3) Remove the air from the servocontrol. **Crushing hazard due to the movement of the shutter!**
4) **Using specific suitable equipment to avoid sudden or hazardous movements of the spring housing cylinder (19) away from the intermediate body (21)**, unscrew the screws (27), separate the two joint clamps.
5) Remove the spring housing cylinder and the spring (2)
6) Remove the piston (5) and the gaskets from the rod taking care not to damage the components by tightening them unnecessarily. Slide the shutter rod (16) out of the intermediate body.
7) Remove the packing glands (14) from the intermediate body; **pay attention to the compressed spring,** see instructions at the end of the chapter.
8) To replace the seal on the shutters, see the instruction at the end of the chapter**.**
9) At this point the valve is completely disassembled, and the worn parts can be replaced.

8.7.2 Assembly

1) Assemble the seal on the shutters; see the instruction at the end of the chapter**.**
2) Mount the packing glands (14) in the interm. body: **pay attention to the compressed spring,** see instructions at the end of the chapter.
3) Insert the shutter rod (16), previously assembled and coated with silicone grease, in the intermediate body (21), rotating it to facilitate insertion, without damaging the packing glands.
4) Insert the piston support washer (8), OR (7), piston with DE gasket, flat washer (4) on the shutter rod and lock with the nut (3) to the tightening torque without forcing. Screw on the stroke indicator.
5) Fit the OR seal (9) on the intermediate body, lubricate the spring holder piston (19) with silicone grease in the part where the DE gasket slides, the OR (9) and then position the spring (2) in the seat.
6) **Take care to avoid sudden or hazardous movements of the parts in contact with the loaded spring using specific suitable equipment,** move the spring holder cylinder into the work position and lock with the two clamps (20) and relative screws and nuts
7) Let air into the servocontrol (6 bar). **Crushing hazard due to the movement of the shutter!**
8) Mount the body gasket (15) on the valve body. Position the servocontrol fully mounted in the valve body, taking care when inserting the shutter guide (16.6) in the seat (17) to avoid damaging the coupling surfaces. Lock with the relative nuts, respecting the torques indicated in the specific table in this manual
9) Remove the air from the servocontrol.

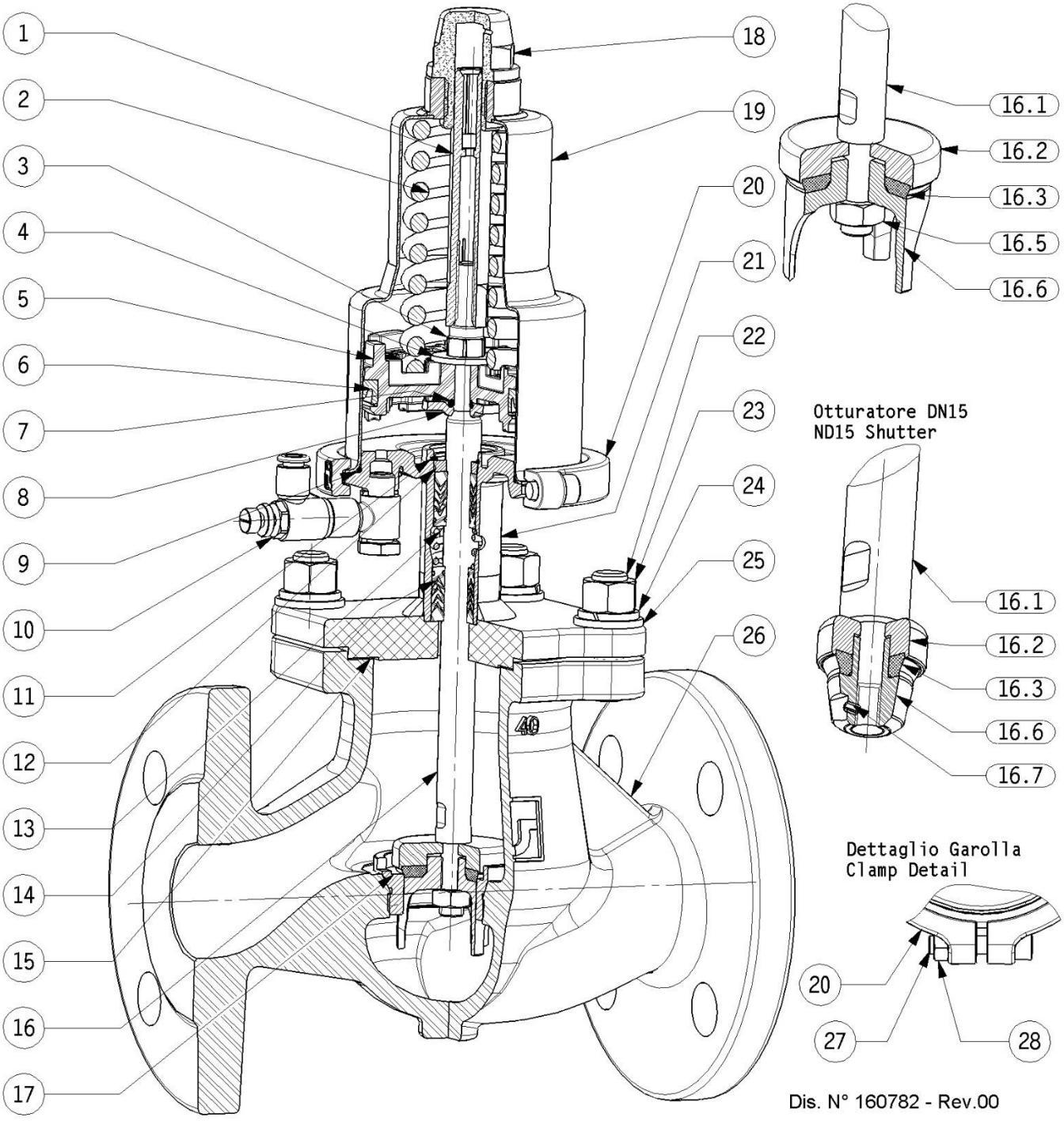
8.7.3 Construction parts and spare parts GRS/16 DN 15#50 2 WAY V.D. - N.C.

No.	DESCRIPTION	MATERIAL				No.	DESCRIPTION		MATERIAL			
		GJL-250	GJS-500	WCB	CF8M				GJL-250	GJS-500	WCB	CF8M
1	Stroke indicator	PVC red				16	Shutter	T.PK.	S30400/1.4301+PEEK			S31600/1.4401 +PEEK
2	Spring	Galvanised steel uni 3823						T.M.	S30400/1.4301			S31600/1.4401
3	Self-locking nut	Galvanised steel CL.8				17	Seat		S30400/1.4301			S31600/1.4401
4	Flat washer	Galvanised steel				18	Transparent cap		PP FV30			
5	Piston	PA 66 FV 30				19	Spring housing cylinder		S30400/1.4301			
6	DE seal	NBR				20	Joint clamp		CF8/1.4308			
7	OR seal	NBR				21	Intermediate body		CF8/1.4308+S235JR/1.0037			CF8/1.4308 S31600/1.4401
8	Piston support washer	DC04 – 1.0338 galvanised				22	Stud bolts		Galvanised steel CL.8.8			S30400/1.4301
9	OR seal	NBR				23	Hexagonal nut		Galvanised steel CL...8			S30400/1.4301
10	Flow regulator	BRASS+TECHNO-POLYMER				24	Elastic washer		Galvanised steel			S30400/1.4301
11	Seeger ring	S30400/*1.4306*				25	Flat washer		Galvanised steel			S30400/1.4301
12	Spacer washer	11SMnPb37-1.0737 galvanised				26	Valve body		GJL-250	GJS-500	WCB	CF8M//1.4408
13	Packing spring	S30100/1.4310				27	TCCE screw		S30400/1.4301			
14	Packing gland	PTFE + PTFE/GRAPHITE + FPM				28	Hexagonal nut		S30400/1.4301			
15	Body gasket	FASIT 400										

DN	SPARE PARTS CODE FOR BODY SEAL PARTS (1) (Part. No. 13;14;15;16.3;16.5;16.7;)			SPARE PARTS CODE FOR PNEUMATIC PARTS (Part. No. 4;5;6;7;9)			
	SHUTTER. T.PK.		SHUTTER. T.M.	Servocontrol Ø 70	Servocontrol Ø 80	Servocontrol Ø 125	Servocontrol Ø 160
	GJL-GJS-WCB	CF8M					
15	16748	16948	16954	16747	16937		
20	16749						
25	16750						
32	16949		16955			16938	
40	16950						
50	16951						

(1) Part **16.3** only T.PK. DN 15#50 - Part **16.5** only for T.PK. DN 20#50 - Part **16.7** only T.PK. GJL-GJS-WCB DN 15

8.7.4 Exploded diagram GRS/16 DN15#50 2 WAY V.D. - N.C.



8.8 Disassembly, seal replacement and re-assembly instructions for valves GRS/16 DN65#80 2 WAY V.D. - N.C.

Comply with the instructions given in this manual for operating in safety. Draw. Ref. No. 160783 annexed.

8.8.1 Disassembly

1) Let air into the servocontrol (6 bar).
2) Unscrew the nuts (23) and remove the servocontrol from the valve body with relative body gasket.
3) Remove the air from the servocontrol. **Crushing hazard due to the movement of the shutter!**
4) **Using specific suitable equipment to avoid sudden or hazardous movements of the spring housing cylinder (19) away from the intermediate body (21)**, screw on the screws (29) and relative nuts.
5) Remove the spring housing cylinder and the spring (2)
6) Remove the piston (5) and the gaskets from the rod taking care not to damage the components by tightening them unnecessarily. Slide the shutter rod (16) out of the intermediate body.
7) Remove the packing glands (14) from the intermediate body; **pay attention to the compressed spring,** see instructions at the end of the chapter.
8) To replace the seal on the shutters, see the instruction at the end of the chapter.
9) At this point the valve is completely disassembled, and the worn parts can be replaced.

8.8.2 Assembly

1) Assemble the seal on the shutters; see the instruction at the end of the chapter.
2) Mount the packing glands (14) in the interm. body: **pay attention to the compressed spring,** see instructions at the end of the chapter.
3) Insert the shutter rod (16), previously assembled and coated with silicone grease, in the intermediate body (21), rotating it to facilitate insertion, without damaging the packing glands.
4) Insert the piston support washer (8), OR seal (7), TDUOP piston (5), flat washer (4) on the shutter rod and lock with the nut (3) to the tightening torque without forcing. Screw on the stroke indicator.
5) Fit the OR seal (9) on the intermediate body, lubricate the spring holder piston (19) with silicone grease where the TDUOP piston slides, the OR (9) and then position the spring (2) in the seat.
6) **Take care to avoid sudden or hazardous movements of the parts in contact with the loaded spring using specific suitable equipment,** move the spring holder cylinder into the work position and lock with the screws (29) and relative nuts and washers.
7) Let air into the servocontrol (6 bar). **Crushing hazard due to the movement of the shutter!**
8) Mount the body gasket (15) on the valve body. Position the servocontrol fully mounted in the valve body, taking care when inserting the shutter guide (16.6) in the seat (17) to avoid damaging the coupling surfaces. Lock the washers and nuts (23), respecting the torques indicated in the specific table in this manual
9) Remove the air from the servocontrol.

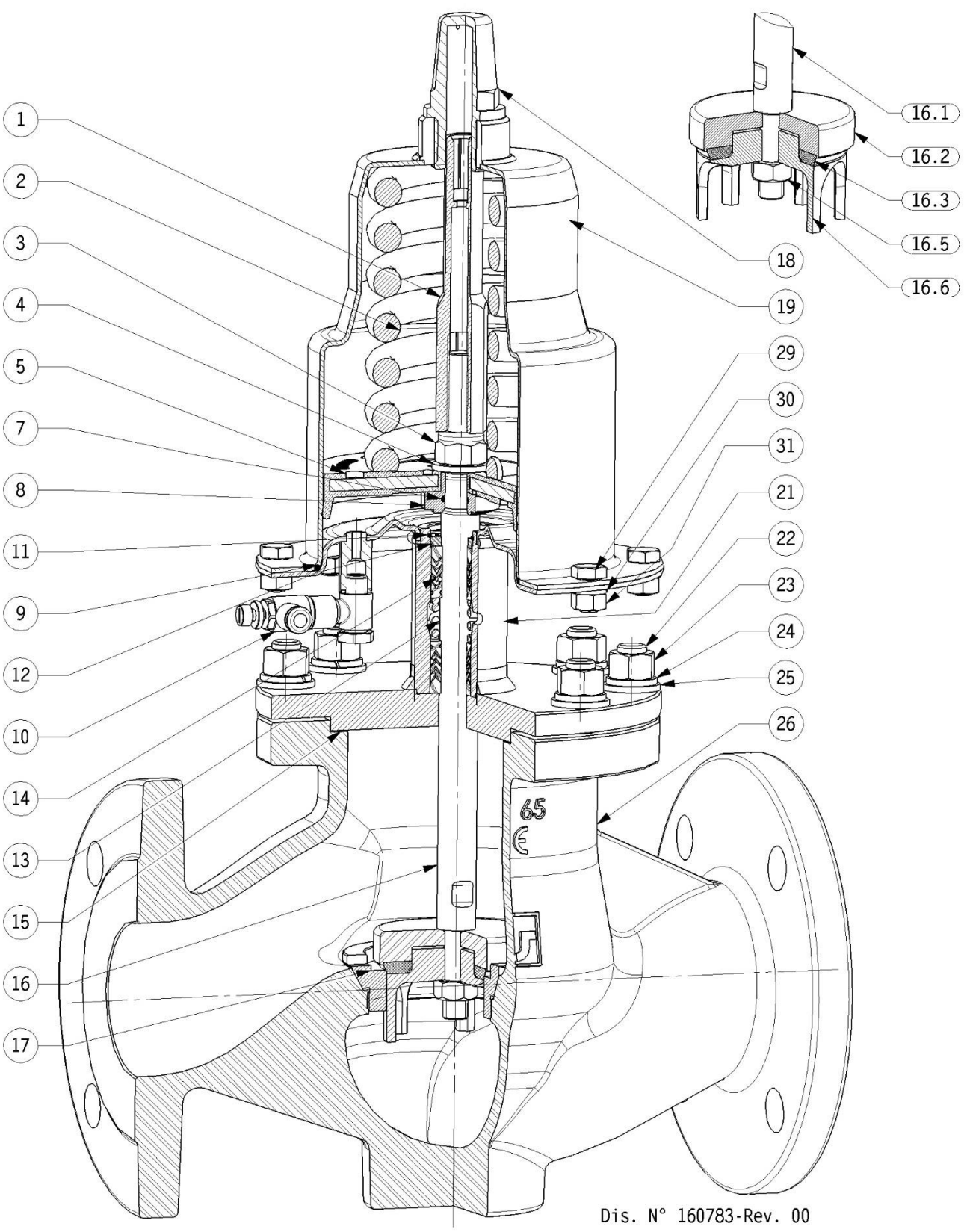
8.8.3 Construction parts and spare parts GRS/16 DN 65#80 2 WAY V.D. - N.C.

No.	DESCRIPTION	MATERIAL				No.	DESCRIPTION		MATERIAL			
		GJL-250	GJS-500	WCB	CF8M				GJL-250	GJS-500	WCB	CF8M
1	Stroke indicator	PVC red				16	Shutter	T.PK.	S30400/1.4301+PEEK			S31600/1.4401 +PEEK
2	Spring	Galvanised steel uni 3823						T.M.	S30400/1.4301			S31600/1.4401
3	Self-locking nut	Galvanised steel CL.8				17	Seat		S30400/1.4301			S31600/1.4401
4	Flat washer	Galvanised steel				18	Transparent cap		PP FV30			
5	TDUOP piston	NBR+Steel				19	Spring housing cylinder		S30400/1.4301			
7	OR seal	NBR				21	Intermediate body		CF8/1.4308+S235JR/1.0037			CF8/1.4308 S31600/1.4401
8	Piston support washer	11SMnPb37-1.0737 galvanised				22	Stud bolts		Galvanised steel CL.8.8			S30400/1.4301
9	OR seal	NBR				23	Hexagonal nut		Galvanised steel CL...8			S30400/1.4301
10	Flow regulator	BRASS+TECHNO-POLYMER				24	Elastic washer		Galvanised steel			S30400/1.4301
11	Seeger ring	S30400/*1.4306*				25	Flat washer		Galvanised steel			S30400/1.4301
12	Spacer washer	11SMnPb37-1.0737 galvanised				26	Valve body		GJL-250	GJS-500	WCB	CF8M//1.4408
13	Packing spring	S30100/1.4310				29	TE screw		S30400/1.4301			
14	Packing gland	PTFE + PTFE/GRAPHITE + FPM				30	Flat washer		S30400/1.4301			
15	Body gasket	FASIT 400				31	Hexagonal nut		S30400/1.4301			

DN	SPARE PARTS CODE FOR BODY SEAL PARTS (1) (Part. No. 13;14;15;16.3;16.5)		SPARE PARTS CODE FOR PNEUMATIC PARTS (Part. N° 4;5;7;9)	
	SHUTTER. T.PK. GJL-GJS-WCB-CF8M	SHUTTER. T.M.	Servocontrol Ø 125	Servocontrol Ø 160
65	16952	16956	16938	16939
80	16953			

(1) Part **16.3**; **16.5** only for T.PK..

8.8.4 Exploded diagram GRS/16 DN65#80 2 WAY V.D. - N.C.



8.9 Disassembly, seal replacement and re-assembly instructions for valves GRS/16 DN15#50 2 WAY V.D. - N.A.

Comply with the instructions given in this manual for operating in safety. Draw. reference No. 160784.

8.9.1 Disassembly

1) Unscrew the nuts (23) and remove the servocontrol from the valve body with relative body gasket.
2) **Using specific suitable equipment to avoid sudden or hazardous movements of the spring housing cylinder (19) away from the intermediate body (21)**, unscrew the screws (27), separate the two joint clamps.
3) Remove the spring housing cylinder and the BA gasket (33)
4) Remove the piston (5) and the gaskets from the rod taking care not to damage the components by tightening them unnecessarily. Slide the shutter rod (16) out of the intermediate body.
5) Remove the packing glands (14) from the intermediate body; **pay attention to the compressed spring,** see instructions at the end of the chapter.
6) To replace the seal on the shutters, see the instruction at the end of the chapter.
7) At this point the valve is completely disassembled, and the worn parts can be replaced.

8.9.2 Assembly

1) Assemble the seal on the shutters; see the instruction at the end of the chapter.
2) Mount the packing glands (14) in the interm. body: **pay attention to the compressed spring,** see instructions at the end of the chapter.
3) Insert the shutter rod (16), previously assembled and coated with silicone grease, in the intermediate body (21), rotating it to facilitate insertion, without damaging the packing glands.
4) Insert the spring (2), piston support washer (8), OR seal (7), piston with DE gasket, flat washer (4) on the shutter rod and lock with the nut to the tightening torque without forcing. Screw on the stroke indicator.
5) Fit the OR seal (9) on the intermediate body, mount the BA gasket (33) on the spring holder cylinder, lubricate the spring holder piston (19) with silicone grease in the part where the DE gasket slides, the OR (9) and the stroke indicator.
6) **Take care to avoid sudden or hazardous movements of the parts in contact with the loaded spring using specific suitable equipment,** move the spring holder cylinder into the work position and lock with the two clamps (20) and relative screws and nuts.
7) Mount the body gasket (15) on the valve body (26). Position the servocontrol fully mounted in the valve body, taking care when inserting the shutter guide (16.6) in the seat (17) to avoid damaging the coupling surfaces. Lock the nuts and washers respecting the torques indicated in the table in this manual

8.9.3 Construction parts GRS/16 DN 15#50 2 WAY - N.A. with and without visual device

No.	DESCRIPTION		MATERIAL				No.	DESCRIPTION	MATERIAL			
			GJL-250	GJS-500	WCB	CF8M			GJL-250	GJS-500	WCB	CF8M
(a) 1	Stroke indicator		PVC red				17	Seat	S30400/1.4301			S31600/1.4401
2	Spring		Galvanised steel uni 3823				(a)18	Transparent cap	PP FV30			
3	Self-locking nut		Galvanised steel CL.8				19	Spring housing cylinder	S30400/1.4301			
4	Flat washer		Galvanised steel				20	Joint clamp	CF8/1.4308			
5	Piston		PA 66 FV 30				21	Intermediate body	CF8/1.4308+S235JR/1.0037			CF8/1.4308 S31600/1.4401
6	DE seal		NBR				22	Stud bolts	Galvanised steel CL.8.8			S30400/1.4301
7	OR seal		NBR				23	Hexagonal nut	Galvanised steel CL...8			S30400/1.4301
8	Piston support washer		DC04 – 1.0338 galvanised				24	Elastic washer	Galvanised steel			S30400/1.4301
9	OR seal		NBR				25	Flat washer	Galvanised steel			S30400/1.4301
10	Flow regulator		BRASS+TECHNO-POLYMER				26	Valve body	GJL-250	GJS-500	WCB	CF8M//1.4408
11	Seeger ring		S30400/*1.4306*				27	TCCE screw	S30400/1.4301			
12	Spacer washer		11SMnPb37-1.0737 galvanised				28	Hexagonal nut	S30400/1.4301			
13	Packing spring		S30100/1.4310				32	Bleed cap	Polyethylene			
14	Packing gland		PTFE + PTFE/GRAPHITE + FPM				(a)33	Seal BA	NBR			
15	Body gasket		FASIT 400				(b)34	Air coupling	S30400/1.4301			
16	Shutter	T.PK.	S30400/1.4301+PEEK		S31600/1.4401 +PEEK		(b)35	OR seal	NBR			
		T.M.	S30400/1.4301		S31600/1.4401							

(a) Parts mounted only on valves with Visual Device

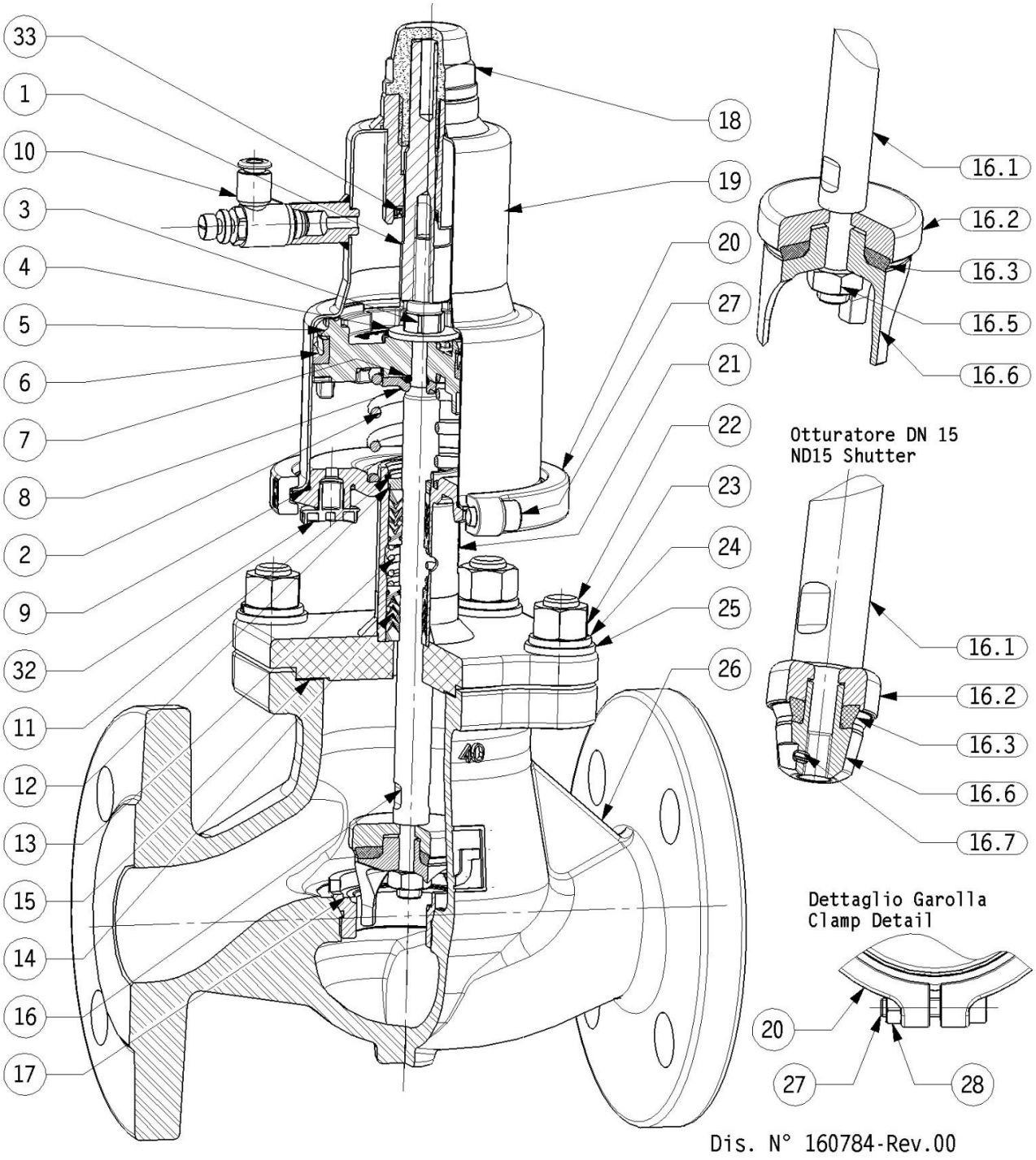
(b) Parts mounted only on valves without Visual Device (Draw. reference No. 160785 given below)

8.9.4 Spare parts GRS/16 DN15#50 2 WAY V.D. - N.A.

DN	SPARE PARTS CODE FOR BODY SEAL PARTS (1) (Part. No. 13;14;15;16.3;16.5;16.7;)			SPARE PARTS CODE FOR PNEUMATIC PARTS (Part. No. 4;5;6;7;9;33)			
	SHUTTER. T.PK.		SHUTTER. T.M.	Servocontrol Ø 70	Servocontrol Ø 80	Servocontrol Ø 125	Servocontrol Ø 160
	GJL-GJS-WCB	CF8M					
15	16748	16948	16954	16940	16941		
20	16749						
25	16750						
32	16949		16955			16942	
40	16950						
50	16951						

(1) Part **16.3** only T.PK. DN 15#50 - Part **16.5** only for T.PK. DN 20#50 - Part **16.7** only T.PK. GJL-GJS-WCB DN 15

8.9.5 Exploded diagram GRS/16 DN 15#50 2 WAY V.D. - N.A.



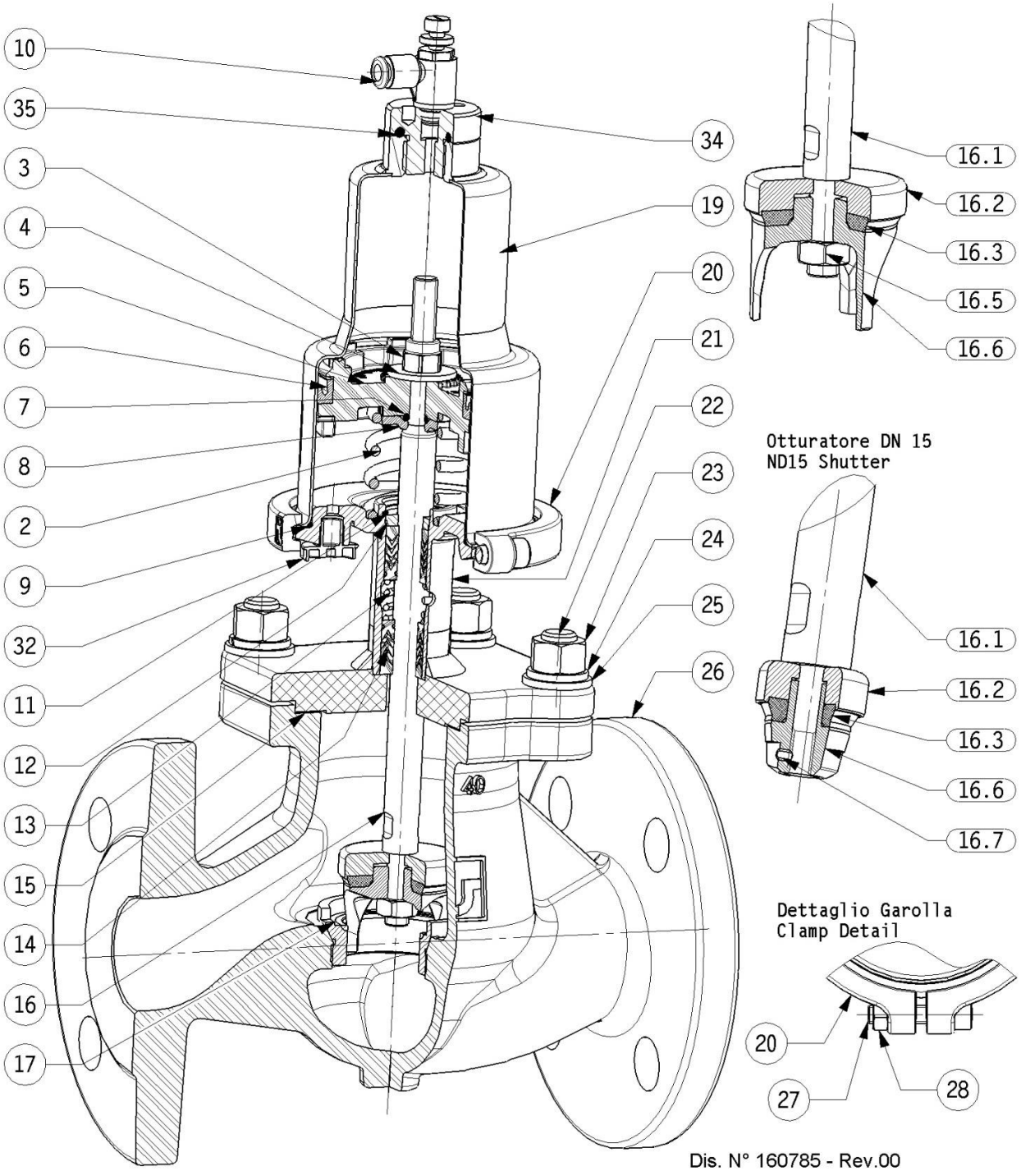
Page left intentionally blank

8.10 Spare parts GRS/16 DN15#50 2 WAY - N.A. without visual device

DN	SPARE PARTS CODE FOR BODY SEAL PARTS (1) (Part. No. 13;14;15;16.3;16.5;16.7;)			SPARE PARTS CODE FOR PNEUMATIC PARTS (Part. No. 4;5;6;7;9;35)			
	SHUTTER. T.PK.		SHUTTER. T.M.	Servocontrol Ø 70	Servocontrol Ø 80	Servocontrol Ø 125	Servocontrol Ø 160
	GJL-GJS-WCB	CF8M					
15	16748	16948	16954	16944	16945		
20	16749						
25	16750						
32	16949		16955			16946	
40	16950						
50	16951						

(1) Part **16.3** only T.PK. DN 15#50 - Part **16.5** only for T.PK. DN 20#50 - Part **16.7** only T.PK. GJL-GJS-WCB DN 15

8.10.1 Exploded diagram GRS/16 DN 15#50 2 WAY - N.A. without visual device



8.11 Disassembly, seal replacement and re-assembly instructions for valves GRS/16 DN65#80 2 WAY V.D. - N.A.

Comply with the instructions given in this manual for operating in safety. Draw. reference No. 160786

8.11.1 Disassembly

1) Unscrew the nuts (23) and remove the servocontrol from the valve body with relative body gasket.
2) **Using specific suitable equipment to avoid sudden or hazardous movements of the spring housing cylinder (19) away from the intermediate body (21)**, screw on the screws (29) and relative nuts.
3) Remove the spring housing cylinder and the BA gasket (33)
4) Remove the piston (5) and the gaskets from the rod taking care not to damage the components by tightening them unnecessarily. Slide the shutter rod (16) out of the intermediate body.
5) Remove the packing glands (14) from the intermediate body; **pay attention to the compressed spring,** see instructions at the end of the chapter.
6) To replace the seal on the shutters, see the instruction at the end of the chapter.
7) At this point the valve is completely disassembled, and the worn parts can be replaced.

8.11.2 Assembly

1) Assemble the seal on the shutters; see the instruction at the end of the chapter.
2) Mount the packing glands (14) in the interm. body: **pay attention to the compressed spring,** see instructions at the end of the chapter.
3) Insert the shutter rod (16), previously assembled and coated with silicone grease, in the intermediate body (21), rotating it to facilitate insertion, without damaging the packing glands.
4) Position the spring holder plate (37), insert the spring (2), piston support washer (8), OR seal (7), TDUOP piston (5), the piston support (36), the flat washer (4) on the shutter rod and lock with the nut to the tightening torque without forcing. Screw on the stroke indicator.
5) Mount the BA gasket (33) on the spring holder cylinder, lubricate the spring holder piston (19) with silicone grease where the TDUOP piston slides, the stroke indicator and the intermediate body where it couples to the spring holder piston.
6) **Take care to avoid sudden or hazardous movements of the parts in contact with the loaded spring using specific suitable equipment,** move the spring holder cylinder into the work position and lock with the screws (29) and relative nuts and washers.
7) Mount the body gasket (15) on the valve body (26). Position the servocontrol fully mounted in the valve body, taking care when inserting the shutter guide (16.6) with the seat (17) to avoid damaging the coupling surfaces. Lock with the relative nuts, respecting the torques indicated in the specific table in this manual.

8.11.3 Construction parts and spare parts GRS/16 DN 65#80 2 WAY - N.A. with and without visual device

No.	DESCRIPTION		MATERIAL				No.	DESCRIPTION	MATERIAL			
			GJL-250	GJS-500	WCB	CF8M			GJL-250	GJS-500	WCB	CF8M
(a) 1	Stroke indicator		PVC red				(a)18	Transparent cap	PP FV30			
2	Spring		Galvanised steel uni 3823				19	Spring housing cylinder	S30400/1.4301			
3	Self-locking nut		Galvanised steel CL.8				21	Intermediate body	CF8/1.4308+S235JR/1.0037			CF8/1.4308 S31600/1.4401
4	Flat washer		Galvanised steel				22	Stud bolts	Galvanised steel CL.8.8			S30400/1.4301
5	TDUOP piston		NBR+Steel				23	Hexagonal nut	Galvanised steel CL...8			S30400/1.4301
7	OR seal		NBR				24	Elastic washer	Galvanised steel			S30400/1.4301
8	Piston support washer		11SMnPb37-1.0737 galvanised				25	Flat washer	Galvanised steel			S30400/1.4301
10	Flow regulator		BRASS+TECHNO-POLYMER				26	Valve body	GJL-250	GJS-500	WCB	CF8M//1.4408
11	Seeger ring		S30400/*1.4306*				29	TE screw	S30400/1.4301			
12	Spacer washer		11SMnPb37-1.0737 galvanised				30	Flat washer	S30400/1.4301			
13	Packing spring		S30100/1.4310				31	Nut	S30400/1.4301			
14	Packing gland		PTFE + PTFE/GRAPHITE + FPM				32	Bleed cap	Polyethylene			
15	Body gasket		FASIT 400				(a)33	Seal BA	NBR			
16	Shutter	T.PK.	S30400/1.4301+PEEK		S31600/1.4401 +PEEK		(b)34	Air coupling	S30400/1.4301			
		T.M.	S30400/1.4301		S31600/1.4401		(b)35	OR seal	NBR			
17	Seat		S30400/1.4301		S31600/1.4401		36	Piston support	DC04 – 1.0338 galvanised			
							37	Spring holder plate	S30400/1.4301			

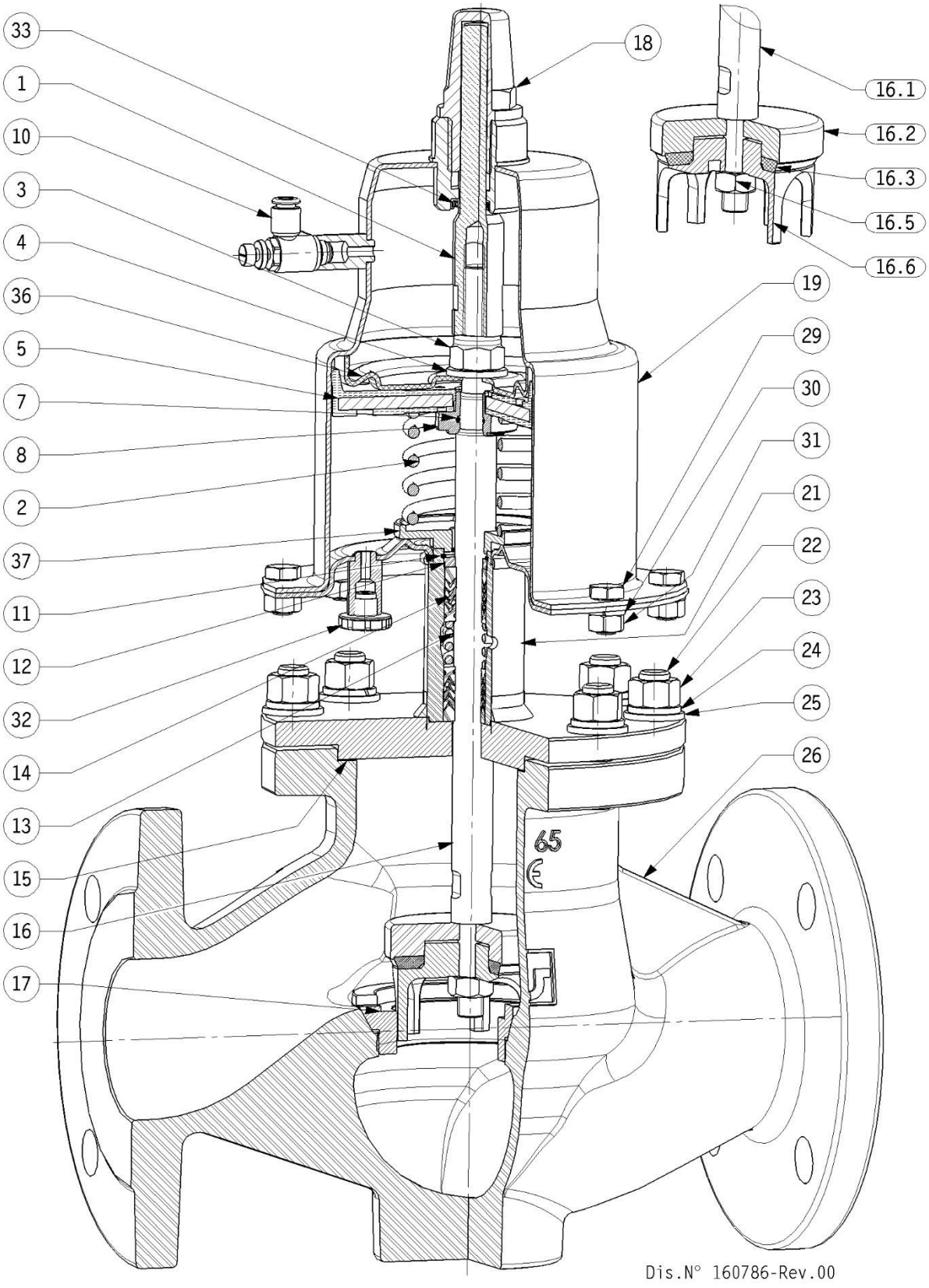
(a) Parts mounted only on valves with Visual Device

(b) Parts mounted only on valves without Visual Device (Draw. reference No. 160787 given below)

DN	SPARE PARTS CODE FOR BODY SEAL PARTS (1) (Part. No. 13;14;15;16.3;16.5)		SPARE PARTS CODE FOR PNEUMATIC PARTS (Part. N° 4;5;7;33)	
	SHUTTER. T.PK. GJL-GJS-WCB-CF8M	SHUTTER. T.M.	Servocontrol Ø 125	Servocontrol Ø 160
65	16952	16956	16942	16943
80	16953			

(1) Part **16.3**; **16.5** only for T.PK.

8.11.4 Exploded diagram GRS/16 DN65#80 2 WAY V.D. - N.A.



Page left intentionally blank

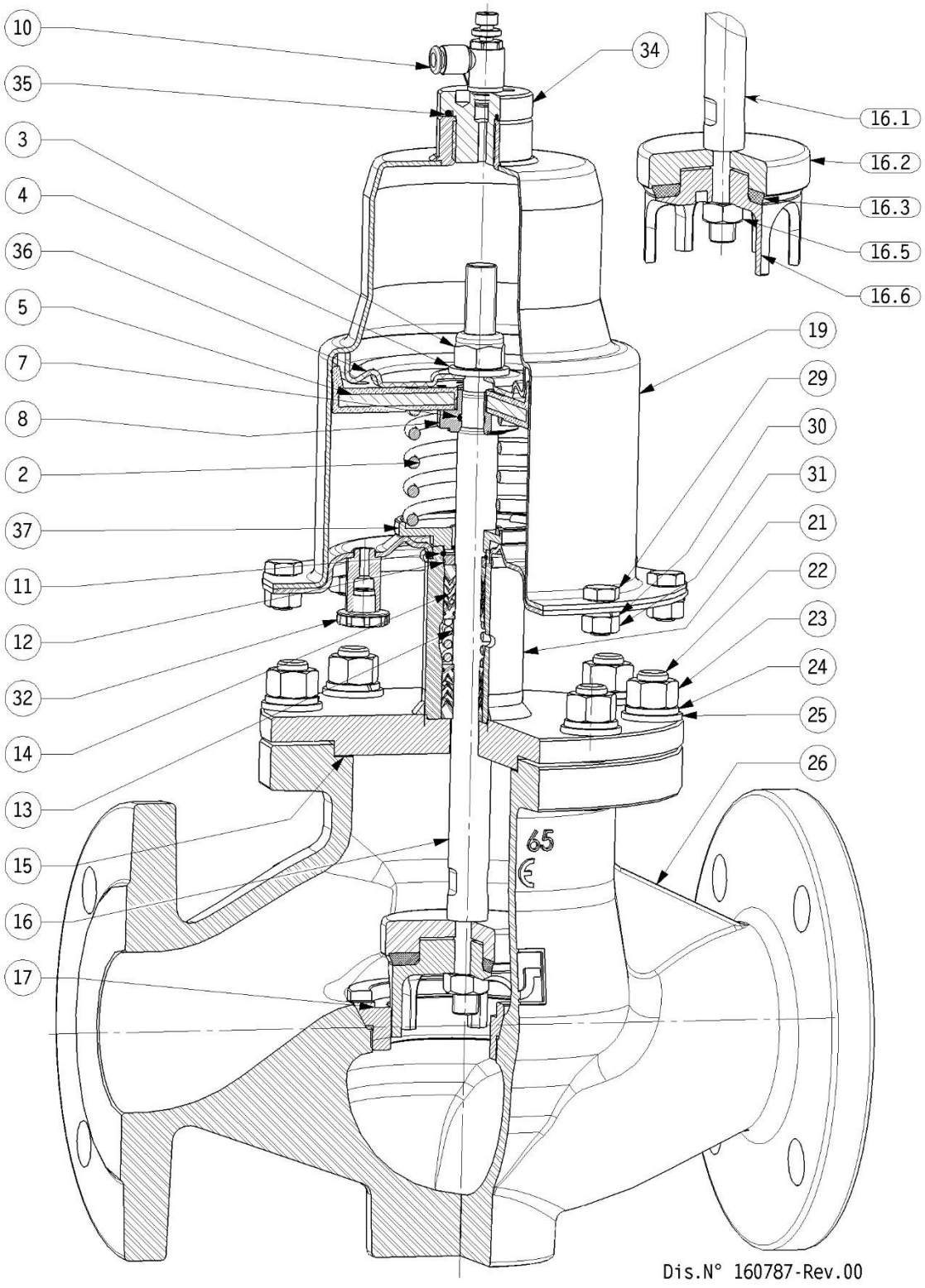
8.12 Spare parts GRS/16 DN65#80 2 WAY - N.A. without visual device

DN	SPARE PARTS CODE FOR BODY SEAL PARTS (1) (Part. No. 13;14;15;16.3;16.5)		SPARE PARTS CODE FOR PNEUMATIC PARTS (Part. N° 4;5;7;35)	
	SHUTTER. T.PK. GJL-GJS-WCB-CF8M	SHUTTER. T.M.	Servocontrol Ø 125	Servocontrol Ø 160
65	16952	16956	16946	16947
80	16953		16946	16947

(1) Part **16.3**; **16.5** only for T.PK.

8.12.1 Exploded diagram GRS/16 DN 65#80 2 WAY - N.A. without visual device

Draw. reference No. 160787



8.13 Disassembly, seal replacement and re-assembly instructions for valves GRS/16 DN15#50 3 WAY V.D. - N.C.

Comply with the instructions given in this manual for operating in safety. Draw. reference No. 160796

8.13.1 Disassembly

1) Let air into the servocontrol (6 bar).
2) Remove the third bottom unscrewing the relative nuts, unscrew the lower seat (17) using suitable spanner and hot air to dissolve the thread-lock if required to facilitate the operations.
3) Remove the air from the servocontrol. **Warning: crushing hazard due to the movement of the shutter!**
4) **Using specific suitable equipment to avoid sudden or hazardous movements of the spring housing cylinder (19) away from the intermediate body (21)**, unscrew the screws (27), separate the two joint clamps.
5) Remove the piston (5) and the gaskets from the rod taking care not to damage the components by tightening them unnecessarily. Slide the shutter rod (16) out of the intermediate body.
6) Unscrew the nuts (23) and remove the intermediate body from the valve body with relative body gasket.
7) Remove the packing glands (14) from the intermediate body; **pay attention to the compressed spring,** see instructions at the end of the chapter.
8) To replace the seal on the shutters, see the instruction at the end of the chapter.
9) At this point the valve is completely disassembled, and the worn parts can be replaced.

8.13.2 Assembly

1) Mount the packing glands (14) in the intermediate body: **pay attention to the compressed spring,** see instructions at the end of the chapter.
2) Mount the upper body gasket (15) and the intermediate body (21) complete with packing gland on the valve body with nuts and washers respecting the tightening torques recommended in this manual.
3) Assemble the seals on the shutters; see the instruction at the end of the chapter.
4) Insert the shutter rod (16), previously assembled and coated with silicone grease, in the intermediate body (21), rotating it to facilitate insertion, without damaging the packing glands.
5) Insert the piston support washer (8), OR seal (7), piston with DE gasket, flat washer (4) on the shutter rod and lock with the relative nut to the tightening torque without forcing. Screw on the stroke indicator.
6) Fit the OR seal (9) on the intermediate body, lubricate the spring holder piston (19) with silicone grease in the part where the DE gasket slides, the OR (9) and then position the spring (2) in the seat.
7) **Take care to avoid sudden or hazardous movements of the parts in contact with the loaded spring using specific suitable equipment,** move the spring holder cylinder into the work position and lock with the two clamps (20) and relative screws and nuts
8) Let air into the servocontrol (6 bar). **Crushing hazard due to the movement of the shutter!**
9) Coat the area where the seat is in contact with the valve body with thread sealant NT 907 TS (RESBOND): then screw the lower seat (17) to the torque indicated in the table in this manual.
10) Remove the air from the servocontrol, insert the lower body gasket (15) in the valve body (26), mount the bottom (38) with nuts and washers respecting the tightening torques recommended in this manual.

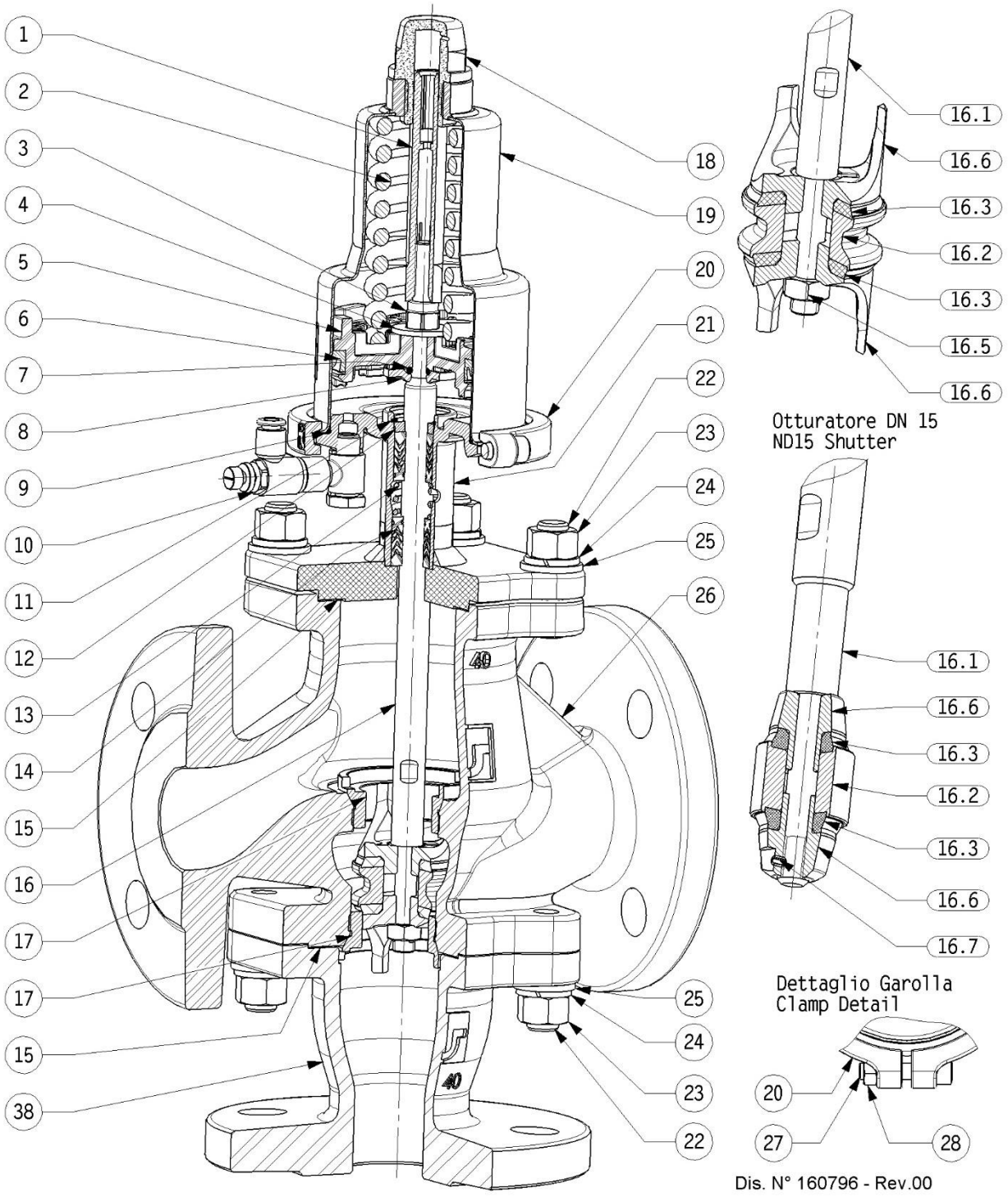
8.13.3 Construction parts and spare parts GRS/16 DN 15#50 3 WAY V.D. - N.C.

No.	DESCRIPTION	MATERIAL				No.	DESCRIPTION		MATERIAL			
		GJL-250	GJS-500	WCB	CF8M				GJL-250	GJS-500	WCB	CF8M
1	Stroke indicator	PVC red				16	Shutter	T.PK.	S30400/1.4301+PEEK			S31600/1.4401 +PEEK
2	Spring	Galvanised steel uni 3823						T.M.	S30400/1.4301			S31600/1.4401
3	Self-locking nut	Galvanised steel CL.8				17	Seat		S30400/1.4301			S31600/1.4401
4	Flat washer	Galvanised steel				18	Transparent cap		PP FV30			
5	Piston	PA 66 FV 30				19	Spring housing cylinder		S30400/1.4301			
6	DE seal	NBR				20	Joint clamp		CF8/1.4308			
7	OR seal	NBR				21	Intermediate body		CF8/1.4308+S235JR/1.0037			CF8/1.4308 S31600/1.4401
8	Piston support washer	DC04 – 1.0338 galvanised				22	Stud bolts		Galvanised steel CL.8.8			S30400/1.4301
9	OR seal	NBR				23	Hexagonal nut		Galvanised steel CL...8			S30400/1.4301
10	Flow regulator	BRASS+TECHNO-POLYMER				24	Elastic washer		Galvanised steel			S30400/1.4301
11	Seeger ring	S30400/*1.4306*				25	Flat washer		Galvanised steel			S30400/1.4301
12	Spacer washer	11SMnPb37-1.0737 galvanised				26	Valve body		GJL-250	GJS-500	WCB	CF8M//1.4408
13	Packing spring	S30100/1.4310				27	TCE screw		S30400/1.4301			
14	Packing gland	PTFE + PTFE/GRAPHITE + FPM				28	Hexagonal nut		S30400/1.4301			
15	Body/bottom gasket	FASIT 400				38	Bottom		GJL-250	GJS-500	WCB	CF8M//1.4408

DN	SPARE PARTS CODE FOR BODY SEAL PARTS (1) (Part. No. 13;14;15;16.3;16.5;16.7;)			SPARE PARTS CODE FOR PNEUMATIC PARTS (Part. No. 4;5;6;7;9)			
	SHUTTER. T.PK.		SHUTTER. T.M.	Servocontrol Ø 70	Servocontrol Ø 80	Servocontrol Ø 125	Servocontrol Ø 160
	GJL-GJS-WCB	CF8M					
15	16957	16958	16966	16747	16937		
20	16959						
25	16960						
32	16961		16967			16938	
40	16962						
50	16963						

(1) Part **16.3** only T.PK. DN 15#50 - Part **16.5** only for T.PK. DN 20#50 - Part **16.7** only T.PK. GJL-GJS-WCB DN 15

8.13.4 Exploded diagram GRS/16 DN15#50 3 WAY V.D. - N.C.



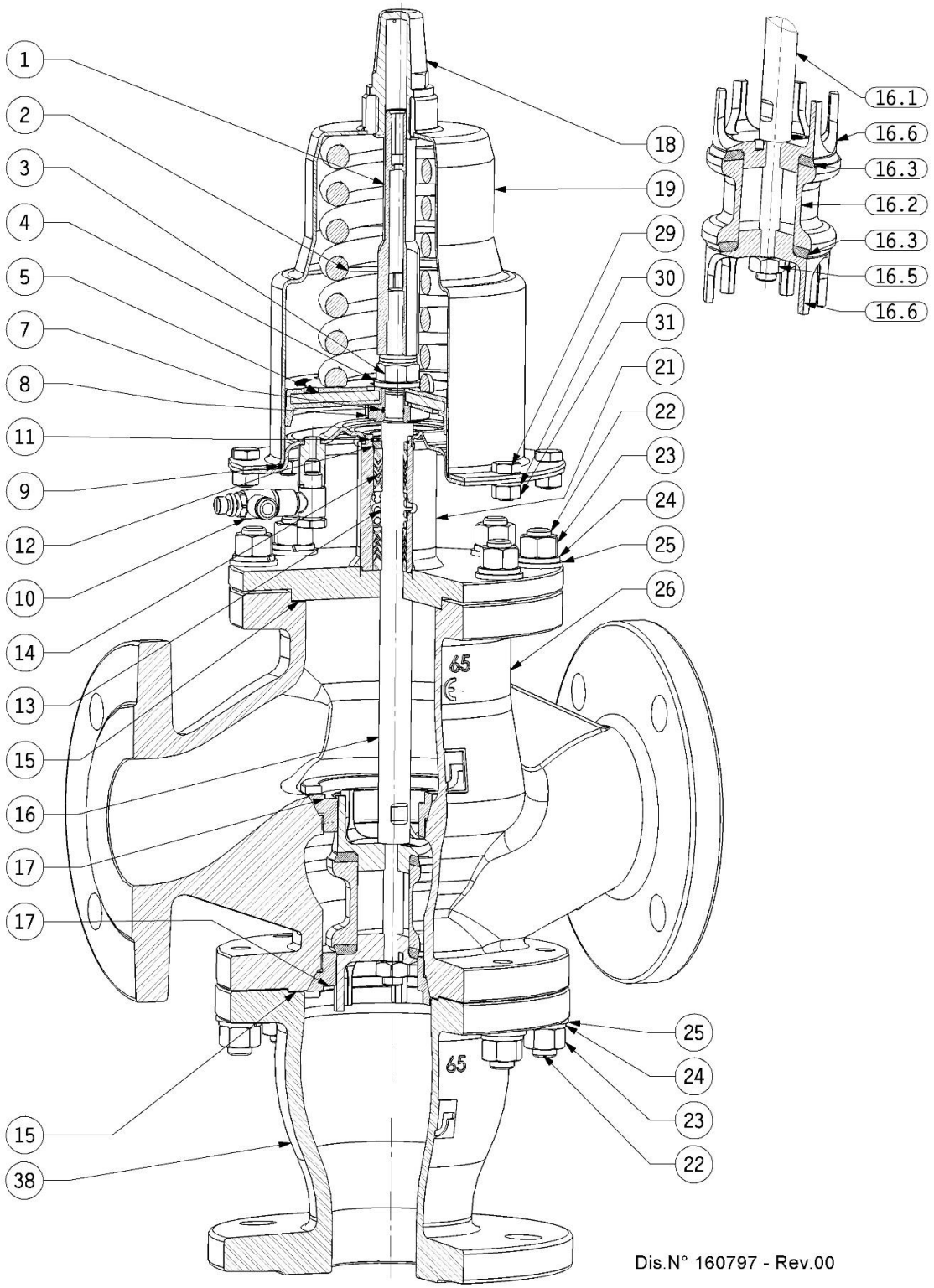
8.14 Spare parts GRS/16 DN65#80 3 WAY V.D.- N.C.

DN	SPARE PARTS CODE FOR BODY SEAL PARTS (1) (Part. No. 13;14;15;16.3;16.5)		SPARE PARTS CODE FOR PNEUMATIC PARTS (Part. N° 4;5;7;9)	
	SHUTTER. T.PK. GJL-GJS-WCB-CF8M	SHUTTER. T.M.	Servocontrol Ø 125	Servocontrol Ø 160
65	16964	16968	16938	16939
80	16965		16938	16939

(1) Part **16.3**; **16.5** only for T.PK.

8.14.1 Exploded diagram GRS/16 DN65#80 3 WAY V.D. - N.C.

Draw. reference No. 160797

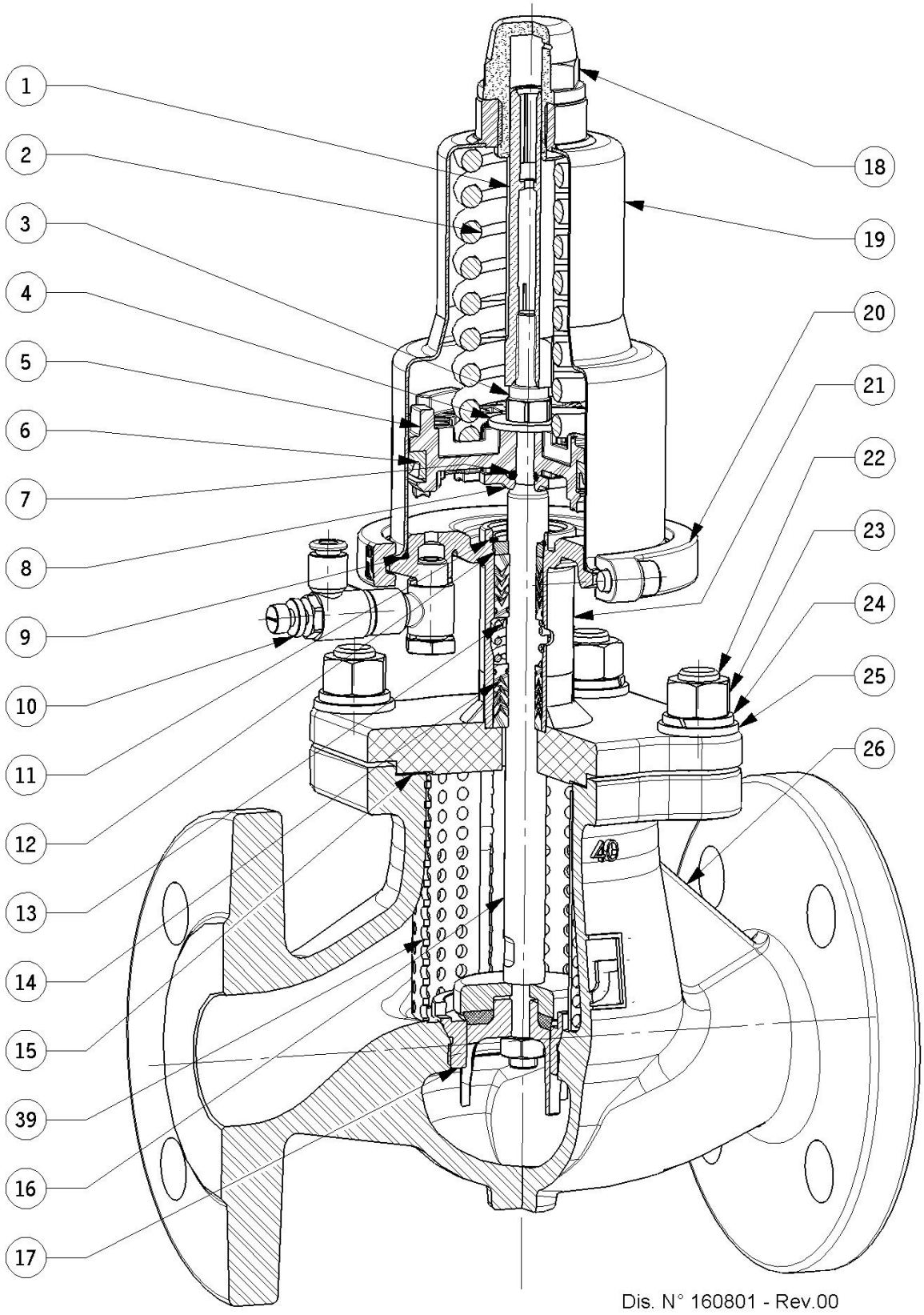


8.15 Disassembly, seal replacement and re-assembly instructions for GRS/16 – 2 WAY valves with silencer

Comply with the instructions given in this manual for operating in safety. Draw. reference No. 160801

- To dismantle and replace the seals on the valve with silenced shutter, follow the instructions for 2-way valves described in the previous paragraphs.

8.15.1 Exploded diagram GRS/16 DN15#50 2 WAY V.D. - N.C. with silencer



Dis. N° 160801 - Rev.00

8.16 Disassembly and replacement instructions for the packing glands on the intermediate bodies for GRS/16 valves

Draw. reference No. 160800

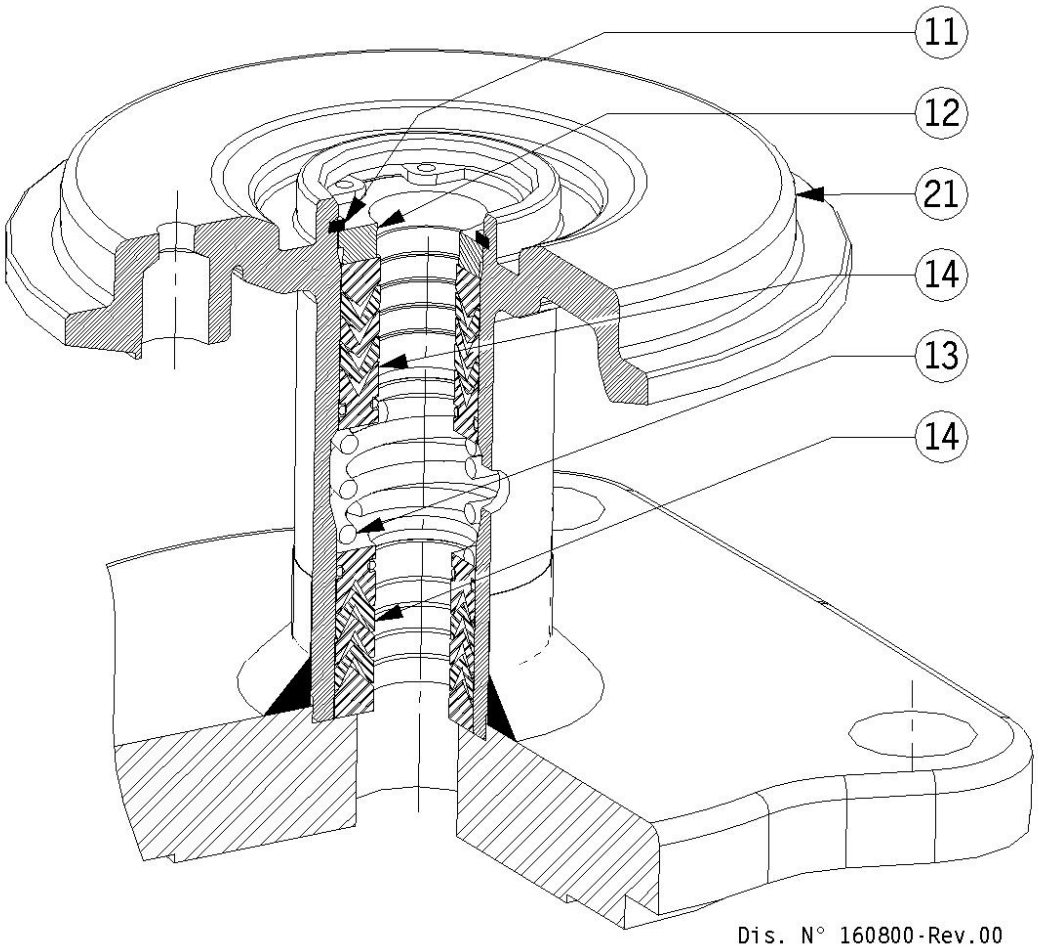
8.16.1 Disassembly

Take care to avoid sudden or hazardous movements of the parts in contact with the pre-loaded spring using specific suitable equipment, remove the seeger ring (11), packing glands, spring and spacer washer.

8.16.2 Assembly

1) Lubricate the external surface of the packing glands with silicone grease and insert the first packing gland (14), the spring (13), the second packing gland (14) and the spacer washer (12) in the intermediate body (21).
2) **Take care to avoid sudden or hazardous movements of the parts in contact with the loaded spring using specific suitable equipment,** compress the packing gland and lock with the seeger ring (11).

8.16.3 Assembly diagram for mounting the packing glands on the intermediate bodies for GRS/16 valves



8.17 Disassembly, seal replacement and re-assembly instructions for valve shutters for GRS/16 – 2 WAY – T.PK.

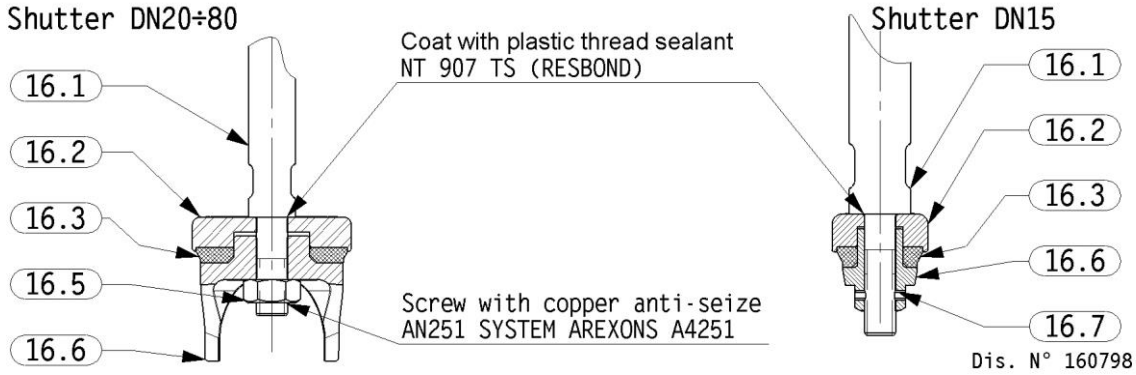
8.17.1 Disassembly

1) Keep the shutter rod (16.1) locked using the specific key print flattening device (do not damage the components by tightening too much), unscrew the nut (16.5) or extract the elastic plug (16.7).
2) Slide out the guide (16.6), the plastic insert (16.3) and the insert holder (16.2).

8.17.2 Assembly

1) Coat the rod (16.1) with plastic thread sealant NT 907 TS (RESBOND) in the area shown in the following drawing.
2) Slide the insert holder (16.2), the insert (16.3) and the guide (16.6) onto the shutter rod (16.1).
3) Coat with copper anti-seize AN251 SYSTEM AREXONS A4251, as indicated in the drawing, then screw the self-locking hexagonal nut (16.5) to the torque indicated in the table or insert the elastic plug (16.7).
4) Leave the shutter to rest for at least 24 hours before assembling on the valve in order to allow the sealants to dry.

8.17.3 Shutter diagram GRS/16 – 2 WAY T.PK.



8.18 Disassembly, seal replacement and re-assembly instructions for shutters for GRS/16 – 3 WAY – T.PK.

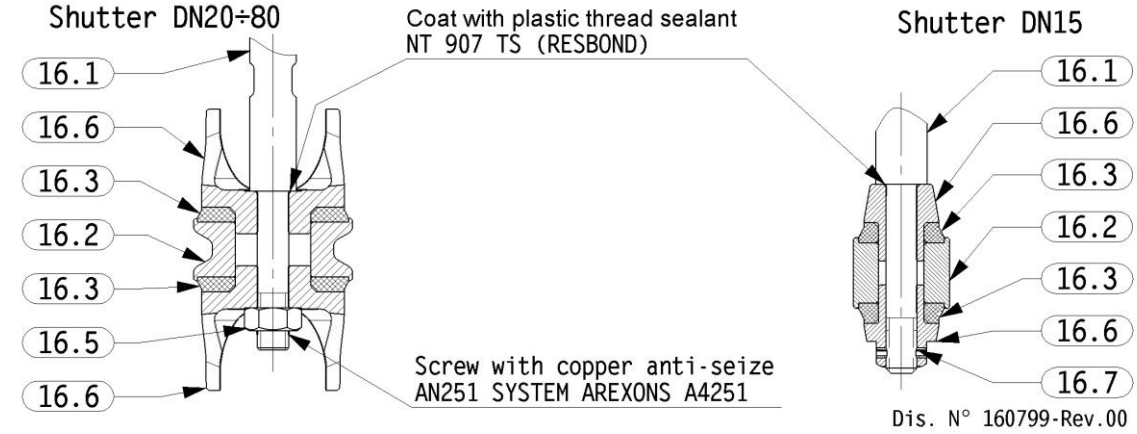
8.18.1 Disassembly

3) Keep the shutter rod (16.1) locked using the specific key print flattening device (do not damage the components by tightening too much), unscrew the nut (16.5) or extract the elastic plug (16.7).
4) Slide out the guides (16.6), the plastic inserts (16.3) and the insert holder (16.2).

8.18.2 Assembly

5) Coat the rod (16.1) with plastic thread sealant NT 907 TS (RESBOND) in the area shown in the following drawing.
6) Slide the guides (16.6), the insert holder (16.2) and the inserts (16.3) onto the shutter rod (16.1) as shown in the annexed diagram.
7) Coat with copper anti-seize AN251 SYSTEM AREXONS A4251, as indicated in the drawing, then screw the self-locking hexagonal nut (16.5) to the torque indicated in the table or insert the elastic plug (16.7).
8) Leave the shutter to rest for at least 24 hours before assembling on the valve in order to allow the sealants to dry.

8.18.3 Shutter diagram GRS/16 – 3 WAY T.PK.



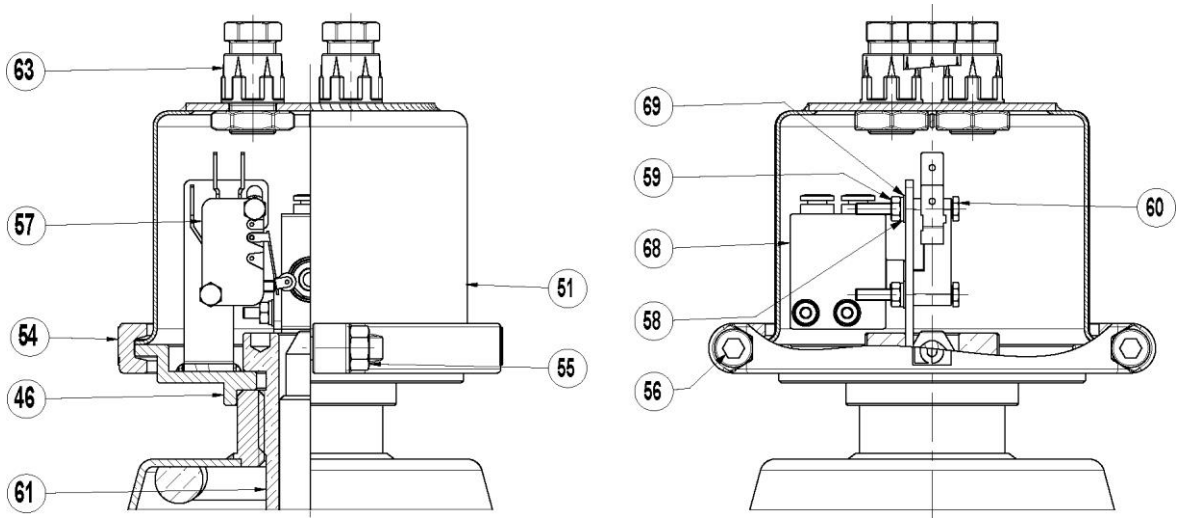
8.19 Instructions for the disassembly, wiring and re-assembly of the stainless steel micro holding box

For valve disassembly and re-assembly operations please refer to dwg. No. 090194, annexed herein.
Assembly and disassembly operations shall be carried out only by personnel qualified in hydraulics and pneumatics, 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 the fluid completely. The valve body shall be completely empty.
NOTE: Thoroughly read the procedures before proceeding with operation.

8.19.1 Disassembly and re-assembly of the stainless steel micro holding box

1) Unscrew the Hex. con. head screws (56) from the nuts (55).
2) Separate the clamps (54).
3) Remove the micro holding cover (51) and remove from it the cable holder (63).
4) Then insert the electric cables and the pneumatic hoses in the cable holders (63).
5) Fasten again the cable holders (63) in the micro holding cover (51).
6) Connect the electric cables to the electro-pneumatic limit switch (57) (see the technical specifications of the limit switch in the final section of the manual).
7) Connect the pneumatic hoses to the pneumatic limit switch (68) (see the technical specifications of the limit switch in the final section of the manual).
8) Reposition the micro holding cover (51) on the micro holding plate (46), then fasten all of them with the clamps (54).
9) Insert the hex. nuts (55) into the clamps (54) and tighten the hex. con. screws (56).

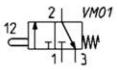
Micro holding box exploded view



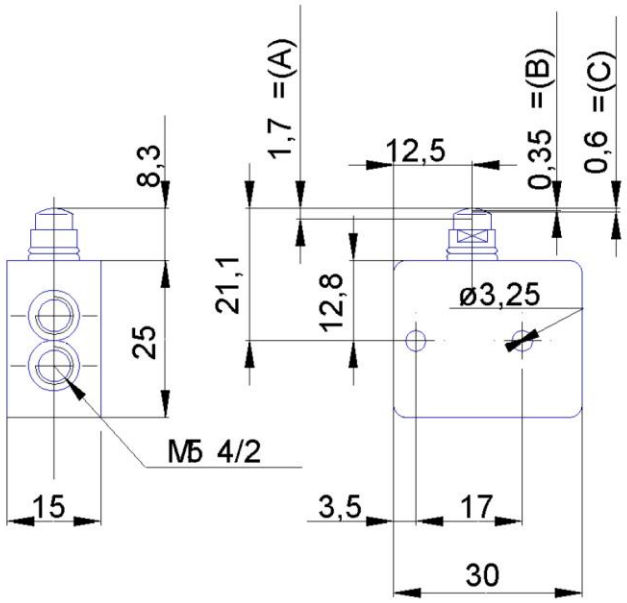
Drawing no. 090194 Rev.:00

Annex 1 – Pneumatic limit switch type FINC000234

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 2 – Pneumatic limit switch type FINCVME201

MINIVALVES, MECHANICALLY AND HAND OPERATED SERIES VME

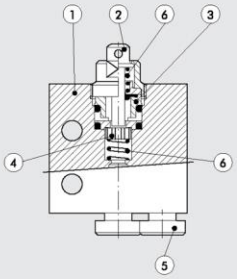
- Minivalves with 3/2 NO NC poppet,
- Installation in any position
- Push-in fittings for pipe Ø 4 mm and M5 on the valve body
- Low actuation force
- Rapid, accurate signal
- Mechanical actuation
- The 2 places adapter allows manual actuation of 1 or 2 VME valves with manual Ø 22 panel actuators. Thus 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 VME valve for mixed solenoid/pneumatic signals.

TECHNICAL DATA

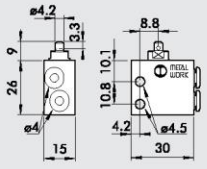
Valve fitting port		Push-in fitting for pipe diam. 4 and M5 (axial or side)
Fluid		Filtered air without lubrication; lubrication, if used, must be continuous
Type		With poppet
Versions		Mechanical and manual
Operators:		
• mechanical		With Plunger – Plunger for wall-mounting – Roller lever – Unidirectional roller lever
• manual		Depending on the type of actuation panel selected
Operating pressure	bar	0.5 to 10
Operating temperature range	°C	-10° to +60
Nominal diameter	mm	2.5
Conductance C	Nl/min · bar	16.5
Critical ratio b	bar/bar	0.03
Flow rate at 6 Bar ΔP 0.5 Bar	Nl/min	35
Flow rate at 6 Bar ΔP 1 Bar	Nl/min	60
Actuation force – Plunger at 6 Bar	N	8
Recommended lubricant		ISO and UNI FD22
Installation		In any position
Compatibility with oils		Please refer to page 6-7 of the tecnical documentation

COMPONENTS

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



Ø 4



Code	Description
W3501001101	VME2-01 NC Ø 4

Annex 3 – Electro-mechanic limit switch type FINC00161E

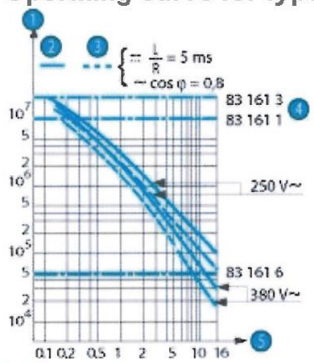
V3 - Standard83 161 3

The strengths of the family

- Nominal ratings 0.1 A to 20 A / 250 VAC
- Operating temperature up to +125°C
- Conforming to EN 61058 and UL 1054
- Choice of actuators with 4 possible fixing positions

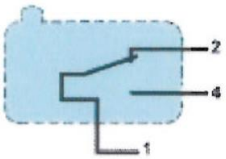
Reference characteristics	83 161 338
Function	I (changeover)
Connections	W3
Electrical characteristics	
Rating nominal / 250 VAC (A)	16
Rating thermal / 250 VAC (A)	20
Mechanical characteristics	
Maximum operating force (N)	0,8
Min. Release force (N)	0,2
Maximum total travel force (N)	2
Max. permitted overtravel force (N)	20
Maximum rest position (mm)	16,2
Operating position (mm)	$14,7^{\pm 0,3}$
Maximum differential travel (mm)	0,35
Min. overtravel CRA (mm)	1,2
Ambient operating temperature (°C)	-20 →+125
Mechanical life for 2/3 CRA (operations)	2×10^7
Contact gap (mm)	0,4
Weight (g)	5,6

Operating curve for types 831611 / 831613



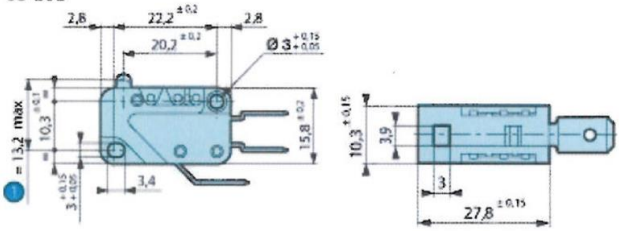
N°	Legend
1	Number of cycles
2	Resistive circuit
3	Inductive circuit
4	Mechanical life limit
5	Current in Amps

Single break changeover switch



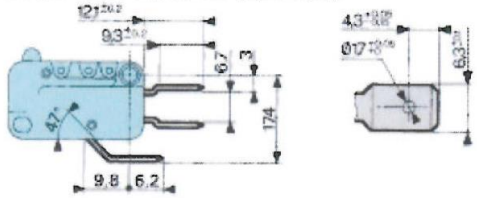
→ *Encombrements

83 161

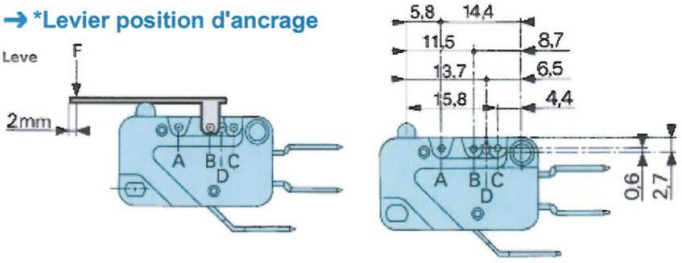


→ *Connexions

W3 per faston 6,35 mm (6,3 x 0,8)

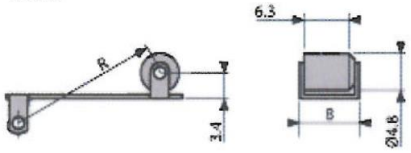


→ *Levier position d'ancrage

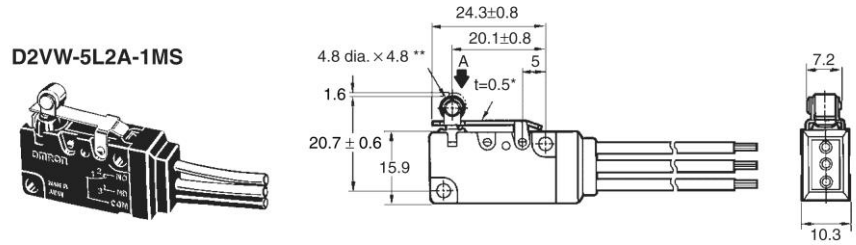


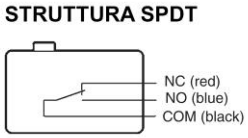
→ *Accessoires de manoeuvre

161 E



Annex 4 – Electro-mechanic micro switch type FINC100684





Electro-mechanic micro switch Omron type D2VW-5L2A-1MS with actuator lever equipped with a polyacetal resin wheel.

Operating frequency	Mechanical: 300 opt/min Electrical: 30 opt/min
Supply 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
Degree of protection	IEC IP67 (excluding the terminals)
Degree of protection against electric shock	Class I
Operating environment temperature	-40°C ÷ +85°C
Operating environment humidity	95% max (5°C to 35°C)
Mechanical life	10,000,000 cycles
Contact material	Silver
Distance between contacts	0.5 mm.
Tripping force	1.18N
Release force	0.15N

Annex 5 – 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

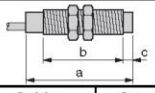
XS6 ••B1••L2

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



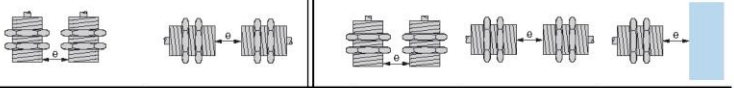
	Cable		Connector	
	a	b	a	b
∅ 8	1.9 (50)	1.6 (42)	2.4 (61)	1.6 (40)
∅ 12	1.9 (50)	1.6 (42)	2.4 (61)	1.6 (42)
∅ 18	2.3 (60)	0.09 (51)	2.8 (72.2)	2.0 (51)
∅ 30	2.3 (60)	0.09 (51)	2.8 (72.2)	2.0 (51)

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**.

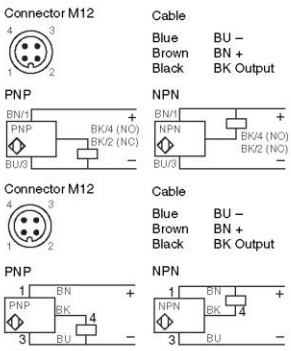
Minimum Mounting Clearances, in. (mm)



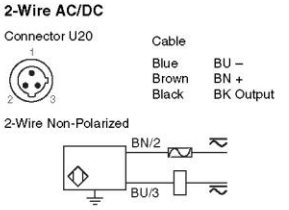
Auto-Adaptable					Extended Range			
	Side by Side		Face to Face			Side by Side	Face to Face	Face to Metal Object
—	Flush	Not Flush	Flush	Not Flush	∅ 8	e ≥ 0.1 (3)	e ≥ 0.7 (18)	e ≥ 0.17 (4.5)
∅ 12	e ≥ 0.55 (14)	1.9 (50)	e ≥ 1.9 (50)	3.9 (100)	∅ 12	e ≥ 0.2 (4)	e ≥ 0.9 (24)	e ≥ 0.2 (6)
∅ 18	e ≥ 1.1 (28)	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



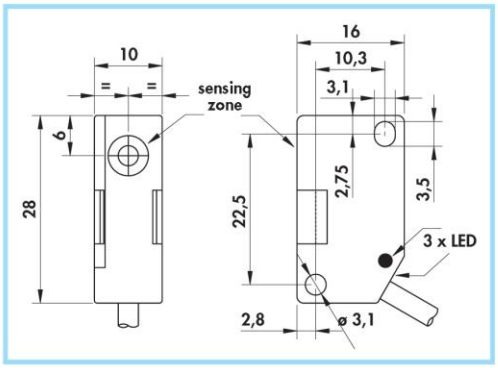
Specifications

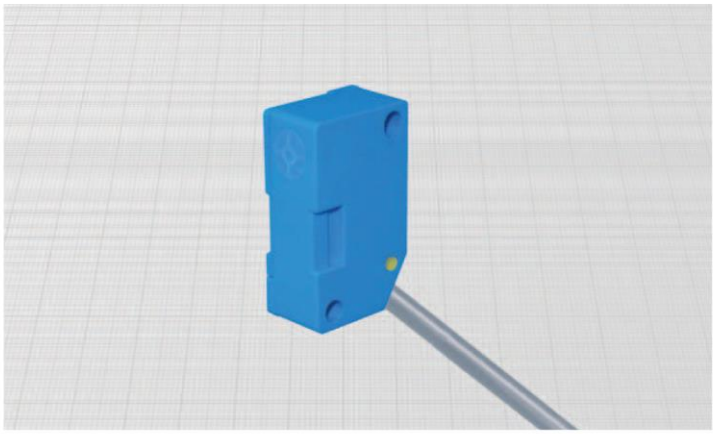
Mechanical		Extended Range	Auto-Adaptable Shielded	Auto-Adaptable Non-Shielded
Fine Detection Zone	12 mm	0–3.2 mm	1.7–3.4 mm	1.7–5 mm
Sn	12 mm	—	0–3.4 mm	0–5 mm
Temperature Rating	Storage	-40 to +185 °F (-40 to +85 °C)		
	Operation	-13 to +158 °F (-25 to +70 °C)		
Enclosure Rating	NEMA Type	3, 4X, 6P, 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 6 - 2-wire D.C. inductive sensor 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

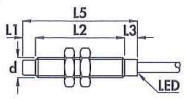
Flush mounting / Non flush mounting	Cable diameter	Sensing zone diameter	Rated operational current (I_e)	Max switching frequency (f)	Nominal sensing distance (S_n) ± 10%%	ORDERING REFERENCES	
						NO	NC
	mm	mm	mA	KHz	mm		
•	4	9	100	2	2	DCMZ/4600KS	DCMZ/4610KS

Annex 7 – 3-wire inductive proximity switch D.C. N.O.

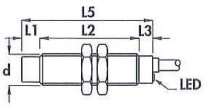
CYLINDRICAL INDUCTIVE SENSORS IN METAL HOUSING

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

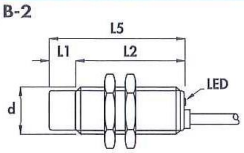
Housing B-6



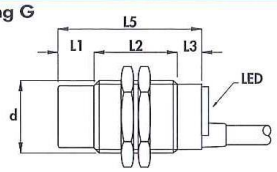
Housing B-3



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.

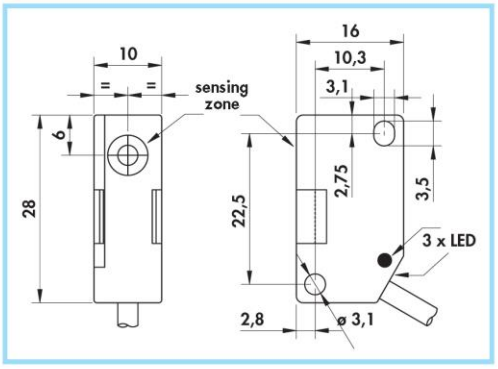
Technical data:
- Supply voltage (U_B): 20 ÷ 240 Vdc/Vac
- Electrical system frequency: 40 ÷ 60 Hz
- Off-state current (I_r) at 24 V: ≤ 1 mA
- Off-state current (I_r) at 220 V: ≤ 1,5 mA
- Minimum operational current (I_m): 5 mA
- Voltage drop (U_d): ≤ 5 V
- Temperature range: - 25° ÷ + 70°C
- Max thermal 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

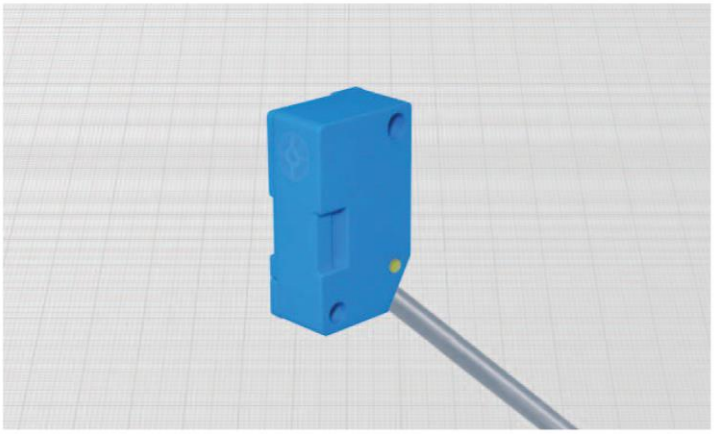
Housing	Flush mounting / Non flush mounting	L1	L2	L3	L4	L5	Cable diameter	Body diameter (d)	Max switching frequency (f) in d.c.	Max switching frequency (f) in a.c.	Rated operational current (I_e)	Nominal sensing distance (S_n) ± 10%	ORDERING REFERENCES NO	ORDERING REFERENCES NC
		mm	mm	mm	mm	mm	mm	mm	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 8 - 3-wire D.C. inductive sensor 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	NC
	mm	mm	mA	KHz	mm		
•	3	9	200	2	2	DCAZ/4609KS	DCAZ/4619KS

Annex 9 – 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
			FSM.A.7
	Change-over	-	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

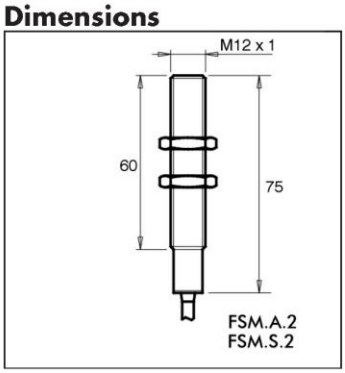
Contacts	2	7	S.2
Max switching voltage	250 Vac	-	220 Vac
Max switching current	3 A	50 mA	1 A
Max switching power	100 VA	-	60 VA

Operating distance

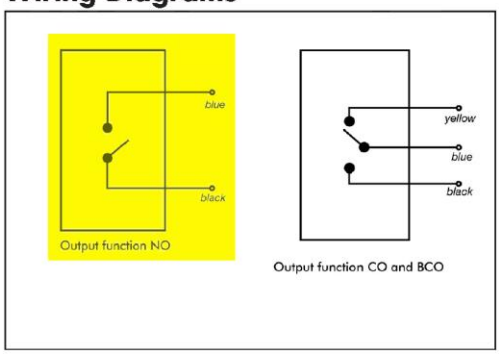
Magnetic Units	CL.10	CL.11	CL.18	CL.20/S1	CL.20/S3	CL.23	CL.31	CL.50
FSM.A.2	-	16	2	14	13	11	19	-
FSM.S.2	-	9	-	-	-	-	-	19
FSM.A.7*	-	-	-	-	-	-	-	-
FSM.S.2/S2/AT	-	-	-	-	8	-	-	-

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

Dimensions



Wiring Diagrams

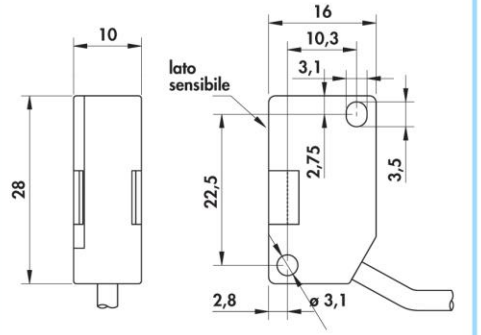


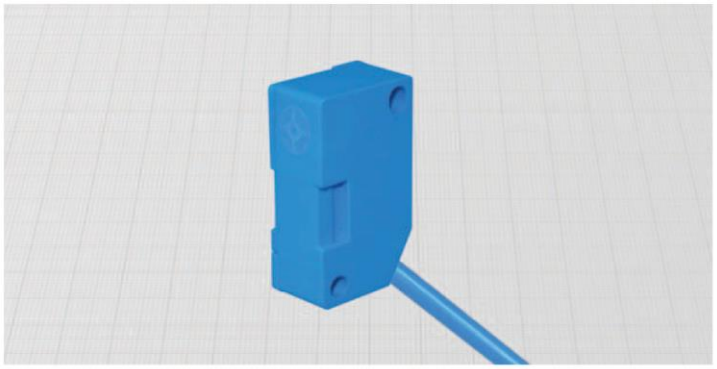
Annex 10 – Magnetic switch type FINC100681

RECTANGULAR MAGNETIC SENSORS

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

Custodia 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 (M, brown, blue)
Z - 1	3	0,5	500	**BMSZ/4600**

9. Table 8: tightening torques

Special combinations		Tightening torque for threaded couplings on GRS valves [N·m]							
		DN 15	DN 20	DN 25	DN 32	DN 40	DN 50	DN 65	DN 80
Part. 22 – Part. 23		17			32				
Part. 17 – Part. 26		170	170	212	370	503	625	900	
Part. 16.1 – Part. 16.5	TP	9			19			32	
	TM								
Part. 22 – Part. 26		45			80				

10. Valve life

The GRS/10 series valve was designed and constructed to guarantee correct operation in the conditions and within the limits laid down in the technical characteristics.

All fixed metallic parts not affected by the seal function have an expected life of 10 years. The seal parts and moving parts must be completely overhauled after either 500000 manoeuvres or three years, whichever is first.

The overhaul operations must only be performed by specialist staff.

Routine maintenance must be performed in addition to any maintenance performed in the event of a fault, which requires immediate intervention.

11. Disposal

At the end of its useful life, to dispose of the valve dismantle it and divide the parts according to construction materials, using the tables annexed to the valve construction drawings, and dispose of in compliance with the laws in force.

The dismantling operations must be done by specialist staff using all appropriate working and safety equipment. **WARNING! There are compressed springs inside the servocontrol**. Therefore, when dismantling the valve, to dispose of the components use all required safety equipment, to ensure that once the fixing screws are removed from the upper servocontrol head the upper head does not suddenly spring away from the lower head.

12. Warranty

Every valve is tested before leaving the factory. On request a test certificate may be issued. The customer may inspect and test the material at our premises if required prior to shipment. This inspection is deemed final. All costs for special tests or requests by the customer shall be borne by the customer.

When the valve is removed from its original packaging we are no longer responsible for any damage to property or injury during installation and/or maintenance.

Our responsibility is limited to the replacement or repair of parts which may show material or construction defects within a period of 12 months from shipment and used in normal operating conditions. This undertaking excludes all other obligations.

All transport and accessory charges are in any case for the customer's account. *Italvalvole*®s.a.s. reserves the right to interrupt or change or modify the characteristics and construction of any product without the obligation to replace or assemble the modified parts on products already supplied.

WARNINGS:

- The safety conditions cannot be guaranteed and any malfunctions cannot be attributed to the valves if:
  - the disassembly, re-assembly, maintenance operations are not performed in the methods described in the user and maintenance manual.
  - original spare parts are not used.
- It is prohibited to remove any pages of this document or make any corrections.
- In the event of dispute, the manual revision considered is that in the Italian language
- *Italvalvole*®s.a.s. reserves the right to modify and/or vary its products and relative documentation without notice.
- The use of the manual does not exempt the user from compliance with the laws in force.
- Please note that some components may not be of Italian origin.