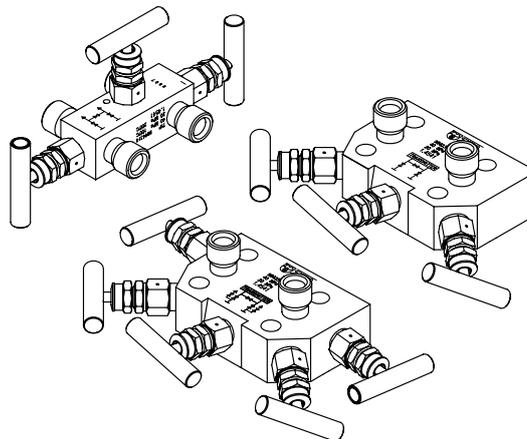


MANUAL FOR ACCESSORIES, TYPE 981, IS ENCLOSED

APPLICATION

- In common measuring and regulation circuits of systems of industrial automation, especially for heat plants.
- To close impulse piping if it is necessary to disconnect pressure difference sensor or pressure difference sensor and interconnect both inlet pressures when adjusting zero of the pressure difference sensor at operation pressure;
- For venting (draining) and inspection (test) of the sensor;
- As pressure equipment of category I pursuant to the Decree of the Government 26/2003 Coll. (compliance assessment module B+D);
- As special design in the purity grade for oxygen (code P2S);

The valves are rated products pursuant to the Act No. 22/1997 Coll. and the Declaration of Conformity **EC-984000** is issued for them.



DESCRIPTION

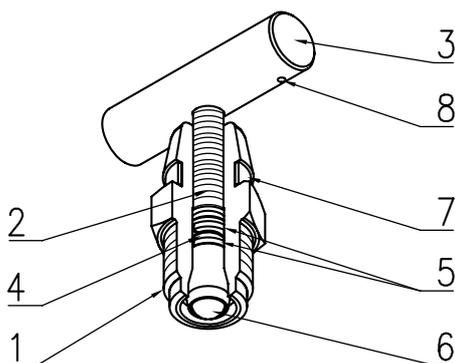
The basis of valves consists of a body, into which a valve unit is screwed. Its seat is a part of the basic body of the armature. Material of the basic body is steel 1.4541.

The spindle sealing of the valve unit is made of elastomer o-ring from various materials.

Valve unit with elastomer o-ring

Position	Part	Material
1	Valve unit body	1.4541 *)
2	Spindle	1.4541 *)
3	Handle	1.4541 *)
4	O-ring	FPM (code W1) NBR (code W2) EPDM (code W3)
5	Support ring	PTFE
6	Seat sealing	1.4571 (code S1) *)
7	Differentiating ring	PVC
8	Sealing hole	

*) with respect to this material, the manufacturer has certificate 3.1 pursuant to ČSN EN 10204



By turning the control handle to the right (left) up to the stop, the flow of the operation liquid through the armature body is closed (opened).

TECHNICAL DATA

Technical requirements for valves and dimensions of connecting terminals are specified in ČSN 13 7501, connecting dimensions of manometric valve comply with ČSN 13 7517.

Operation position: discretionary
Weight: refer to figures 1 to 4
Type of operation: continuous

OPERATION CONDITIONS

The armatures are designed for the environment defined by the group of parameters and their severity grades IE36 pursuant to standard ČSN EN 60 721-3-3 and the following operation conditions.

PRESSURE AND TEMPERATURE CHARACTERISTICS

Values of pressure and temperature of operation medium, for which the armature may be used, are determined, in particular, by the selected material of spindle sealing and sealing elements of valve unit seats. The charts provide dependency of pressure on temperature for various materials of such sealing elements. When selecting the material, it is necessary to consider both the chart for the spindle sealing material and the chart for seat sealing material. Operation characteristics of the armature are determined by the material with worse parameters.

Chart 1

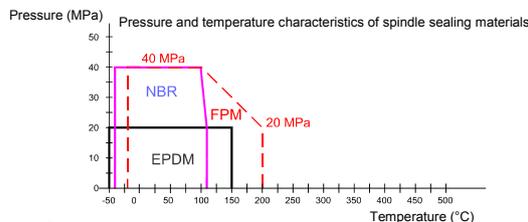


Chart 2

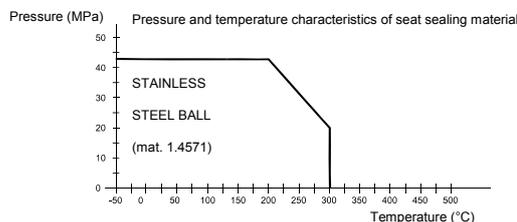


Chart 3

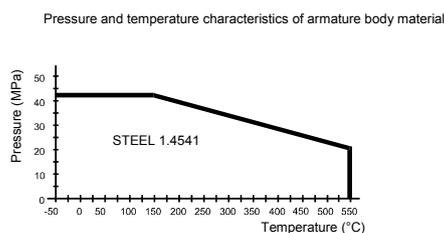


TABLE 1 - RESULTING MAXIMUM VALUES OF OPERATION PRESSURES AND TEMPERATURES
(they are marked on the armature body)

CODE	W1 (FPM)	W2 (NBR)	W3 (EPDM)
S1 (STEEL)	40 MPa 100°C 20 MPa 200°C	40 MPa 100°C 20 MPa 110°C	20 MPa 150°C

TABLE 2 CHEMICAL RESISTANCE OF SEALING MATERIALS

Chemical resistance of materials of sealing elements represents an important parameter, which determines reliability of the valve. The following table includes informative data of the most frequently used substances together with chemical resistance of sealing element materials. If other substances are used, chemical resistance tests shall be performed directly at the customer in the expected operation conditions (temperature, pressure, concentration ...)

Medium		Elastomer O-ring			
		FPM	NBR	EPDM	
Acetone		-	-	-	
Acetylene		+	+	+	
Petrol		+	*	-	
Ammonia	aqueous solution	-	-	+	
	liquid	-	*	+	
	gaseous	*	*	-	
Ethylene		+	+	+	
Hydraulic fluids	not flammable	*	-	+	
Hydroxides		*	*	+	
ACIDS	Boric	+	+	+	
	Citric	+	*	+	
	Nitric	-	-	-	
	Hydrofluoric	< 65%	*	-	*
		> 65%	*	-	*
	Phosphoric	10%	+	+	+
		concentrate boiling conc.	+	-	+
	Hydrochloric	10%, 80°C	*	-	+
		36%, 20°C	*	*	+
	Chromic		+	-	*
	Malic		+	+	+
	Carbolic		-	-	-
	Hydrocyanic		+	*	*
	Butyric		*	*	
	Lactic		+	*	+
	Formic	10%	-	-	*
		10%	-	-	*
	Acetic	10%	-	-	*
		concentrate	-	-	-
Salicylic		+	+	+	
Sulphuric	25%	*	*	+	
	80%	-	-	*	
Oxalic	10%	+	+	+	
Carbonic		+	+	+	
Tartaric		+	+	+	
Oxygen		+	-	+	
Oils		+	*	-	
Steam	< 200°C	*	-	*	
	> 200°C	-	-	-	
Perchloroethylene		+	*	-	
Kerosene		+	*	-	
Radioactive radiation		*	*	*	
Compressed air		+	+	+	
Toluene, trichloroethylene		*	-	-	
Hydrocarbons	natural gas	+	+	-	
Water	< 80°C	+	+	+	
	> 80°C	+	*	+	
Hydrogen	cold	+	+	+	
	hot	+	*	+	

+ Great resistance
* Good or conditional resistance
- Not resistant

Vacant

No information is available

DESIGNATION (pursuant to ČSN 13 3005-1)

Data on basic body

- Trade mark of the manufacturer
- Maximum operation pressures and temperatures
- Body material
- Casting number of material of basic body
- Scheme of the set
- Mark of performed pressure test
- Arrow indicating recommended direction of flow of medium
- Product ordering number
- Manufacturing number
- CE mark

Data on valve unit

- Designation of function of valve unit

TEXT	COLOUR	FUNCTION
BLOCK	blue	close
EQUALIZE	green	equalize (interconnect)
VENT	red	vent / drain

- The codes of spindle and seat sealing (W1S1, W2S1, W3S1) are marked on the surface of the hexagon of each valve unit;
- The armature in purity level for O₂ is marked with a suspended blue tag

DELIVERY

Unless agreed otherwise with the customer, each delivery includes

- Delivery note
- Products pursuant to the purchase order
- 2 pcs of sealing rings 24 x 18 x 3 (only for design 984 2xxx)
- Holder B3 (only for design 984 4xxx)
- Optional accessories pursuant to manual for accessories, type 981
- Accompanying technical documentation in Czech:
 - o Product quality and completeness certificate, which also serves as the warranty certificate
 - o EC Declaration of Conformity
 - o Test report and list of used materials
 - o Product manual
 - o Manual for accessories, type 981
 - o Inspection report for design for O₂ (only in case of armature with code P2S)

If it is established in the purchase contract or agreed otherwise, the following documentation can be also delivered with the product:

- Copy of inspection certificate 3.1 pursuant to ČSN EN 10204 for body material with casting number
- Declaration of Conformity with purchase order 2.1 pursuant to ČSN EN 10204

PACKING

Both products and accessories are delivered in a packing ensuring resistance to the impact of thermal effects and mechanical effects pursuant to controlled packing regulations. When removing the product from the packing, no special measures are necessary with the exception of design for O₂, when perfect degreasing of the product shall be maintained.

TRANSPORT

The products may be transported on conditions corresponding to the set of combinations of classes IE 23 pursuant to ČSN EN 60721-3-2 but they may not be exposed to direct rain (i.e. by airplanes and trucks, drop-side trucks and trailers, railway wagons with specially designed shock absorbers and ships, in premises that are not ventilated and protected against atmospheric conditions).

STORAGE

The products may be stored on conditions corresponding to the set of combinations of classes IE 12 pursuant to ČSN EN

60721-3-1, but with ambient temperature from -30 to 45 °C (i.e. in places without temperature and humidity control, with a threat of occurrence of condensation, dripping water and formation of ice, without a special threat of an attack with biological agents, with vibrations of small significance and not situated close to sources of dust and sand).

PLACING AN ORDER

The purchase order shall specify:

- Name
- Product ordering number
- Other (special) requirements
- Number of pieces

PURCHASE ORDER EXAMPLE

Standard design:

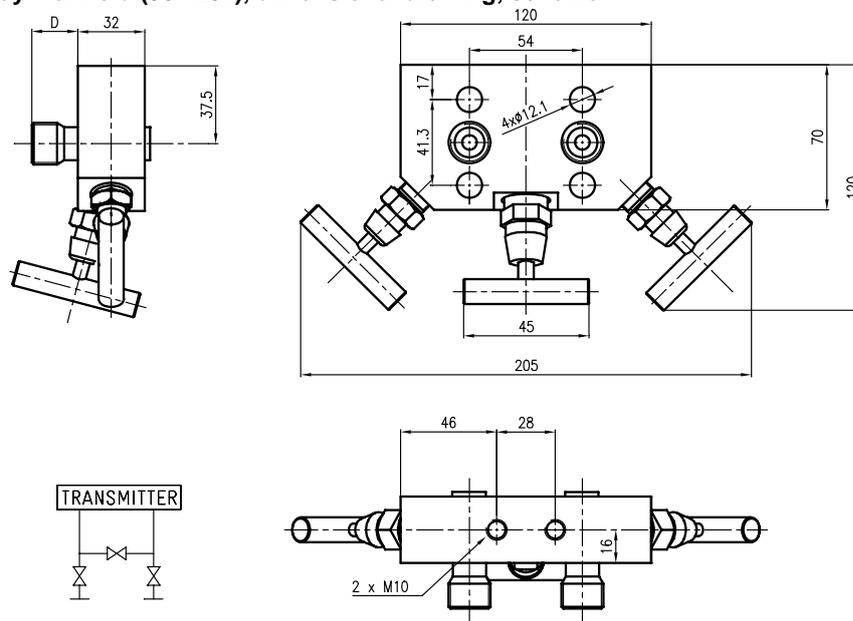
1. Manifold
9844521 - 20 pcs
2. Manifold
9844521W3S1 - 20 pcs
3. Manifold
9842514W2S1P2S - 20 pcs
4. Manifold
9844514ODP2 - 20 pcs

TABLE 3 - DESIGN OF MANIFOLDS, TYPE 984

SPECIFICATIONS		ORDERING NUMBER					
		984	x	x	xx	vol. ²⁾	acces. ³⁾
INSTALLATION OF MANIFOLD	Conventional for sensor flange - pitch 54 mm		2				
	Between impulse piping - pitch 54 mm		4				
DESIGN OF MANIFOLD	Three-way			3			
	Five-way			5			
CONNECTING TERMINALS pursuant to the manual of accessories, type 981					xx		
SPINDLE SEALING	O-ring from elastomer FPM (max. 200°C)					W1	
	O-ring from elastomer NBR (max. 110°C)					W2	
	O-ring from elastomer EPDM (max. 150°C)					W3	
SEAT SEALING	Stainless ball from mat. 1.4571(max. 300°C)					S1	
SPECIAL TREATMENT	Purity level for O ₂					P2S	

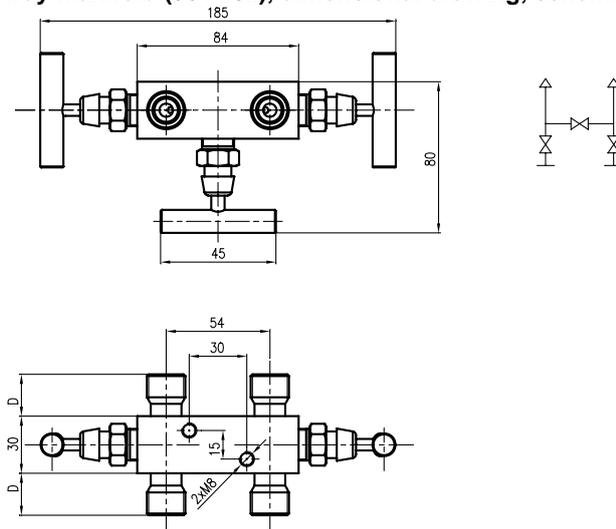
- 1) With respect to the design between impulse piping, the terminals at outlet of the manifold are equal with terminals at the inlet. As a default, terminals with the following codes can be selected: 14, 21, 31.
- 2) Codes behind numerical designation (position vol.) identify either other than standard design or special treatment. In case none of such codes is specified, the manifold will be delivered with standard design, i.e. with sealing W1 and S1.
- 3) Behind the ordering number, it is possible to add codes of accessories pursuant to manual for accessories, type 981: ODP2, KU1, KU2, KU4, KU6, NA1, NA2, NA4, NA5.
In case the code KU or NA is specified, all delivered cones or sleeves are equal. If different terminals are required (e.g. carbon steel for inlet, stainless steel for outlet, or different diameters), they shall be ordered separately pursuant to manual for accessories, type 981
Codes of accessories, which may be specified behind the ordering number only for design 984 2xxx: SR2, SR3, SR4, SR5, B3

Figure 1 - Three-way manifold (984 23..), dimensional drawing, scheme



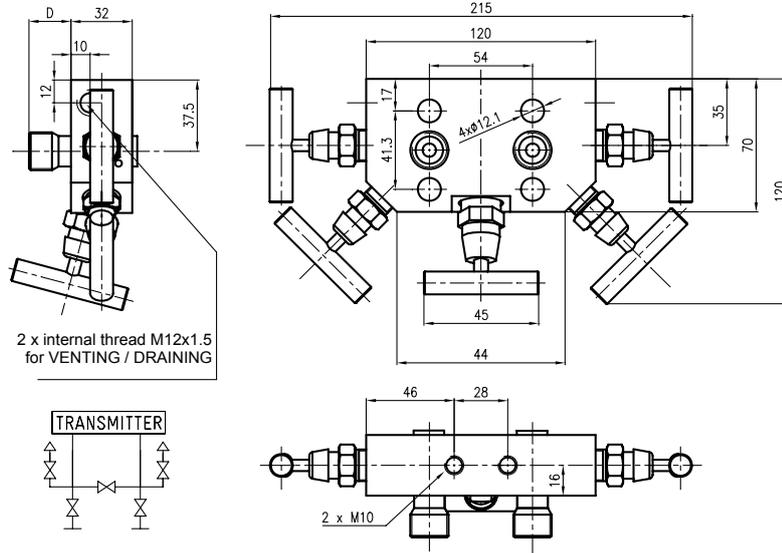
Size of dimension "D" is specified at the applicable codes of connecting terminals in the manual of accessories, type 981.
Weight: approx. 2.2 kg

Figure 2 - Three-way manifold (984 43..), dimensional drawing, scheme



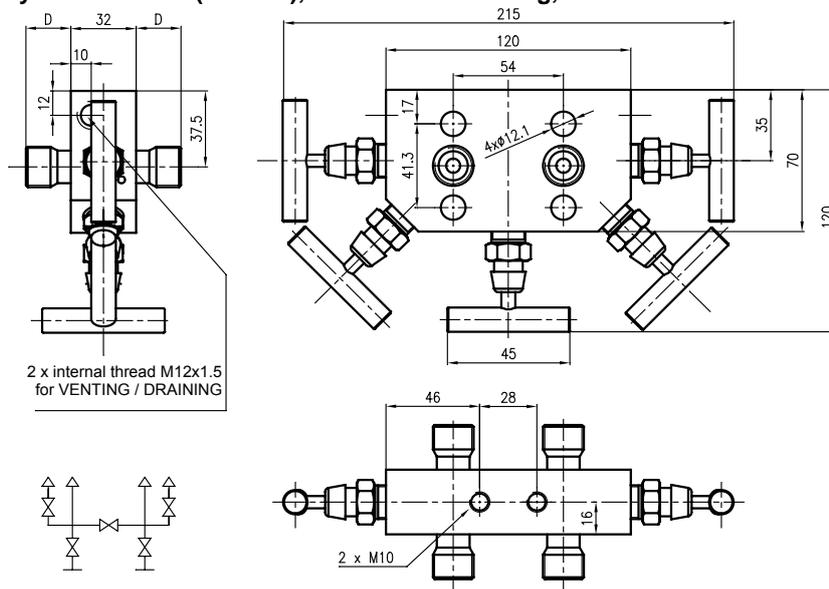
Size of dimension "D" is specified at the applicable codes of connecting terminals in the manual of accessories, type 981.
Weight: approx. 1.5 kg

Figure 3 - Five-way manifold (984 25..), dimensional drawing, scheme



Size of dimension "D" is specified at the applicable codes of connecting terminals in the manual of accessories, type 981.
Weight: approx. 2.3 kg

Figure 4 - Five-way manifold (984 45..), dimensional drawing, scheme



Size of dimension "D" is specified at the applicable codes of connecting terminals in the manual of accessories, type 981.
Weight: approx. 2.5 kg

INSTALLATION AND CONNECTION

The valve installation may be realized by a worker of the installation or service organization.

The installation and commissioning for design for O₂ may only be performed by the organization, which has the authorization for installation and repair of gas equipment, issued by the organization of state professional supervision ITI Prague.

INSTALLATION OF CONVENTIONAL SET ON PRESSURE DIFFERENCE SENSOR

The set of the design for conventional installation on the pressure difference sensor shall be attached to the sensor flange with the use of four screws. These screws shall be ordered as accessories because they have various lengths depending on whether it concerns an installation on the pressure difference sensor with conventional or coplanar flange with the pitch of input holes 54 mm.

The sealing elements between the manifold and the sensor consist of two sealing rings PTFE, 24 x 18 x 3, which are included in the delivery of the manifold. The shape of the groove complies with standard ČSN EN 61518 – type A and also enables to use the sealing O-ring 20x2.65.

Installation process:

Sealing rings from the accessories of the manifold shall be pressed into the grooves at the outlet of the manifold.

Attach the manifold to the flange of the pressure difference sensor with four screws of carbon (stainless) steel. With the use of a wrench, tighten the screws crosswise with initial torque of 34 Nm so that the gap between the flange and the manifold is the same along the whole periphery.

Then tighten the screws in the same order crosswise with the use of the final torque of 73 Nm.

INSTALLATION OF MANIFOLD BETWEEN IMPULSE PIPING

Connect the armature to the impulse piping by means of weld-on terminals.

All types of connection are specified in the manual for accessories, type 981, together with dimensional drawings and the described type of installation.

PIPING CLEANNESS

Before the armature is connected, the piping shall be perfectly cleaned. To prevent any deposit of impurities in the manifold, cleanness of medium in the piping shall be ensured in a suitable way (drain tanks, etc.).

OPERATION POSITION

The operation position of the armature is discretionary. If possible, use a suitable holder from the manual for accessories, type 981 (e.g. holder with code B3).

COMMISSIONING

After the installation of the armature and venting the piping, the equipment is prepared for operation.

To vent, you should use either condensate (cold, if possible) or fill the whole system, including the sensor, with clean service water. In this case, the static pressure in the piping shall be zero. Equalizing the levels in both condensation tanks shall be made by turning the whole set of the orifice; at the same time, it is recommended to check the levels with a hose level. Equalizing the levels is facilitated if a double condensation tank is used.

Filling the system with condensate shall be realized when the thermal circuit is cut off:

- Check if all valves, including the set, are closed. Open the equalizing valve (EQUALIZE).
- Open both drain valves (VENT). By partial opening of closing valves of the orifice measurement, the impulse piping is filled with condensate. Let water flow till all air is pressed out of the impulse piping and only water is coming out from the drain holes. Then close the drain valves (VENT). While doing so, the whole condensate may never be used up; steam may not enter the five-way manifold.
- Wait till the concentrate is filled. Open the closing valves (BLOCK) (one is sufficient) of the set and release the input screw joint on the set with the use of a wrench so that the chambers of the pressure difference sensor and the manifold are filled with water and, at the same time, air could escape. If venting is realized with the use of hot condensate, it is

recommended to wait till condensate in the connecting piping is cooled down (approx. 15 to 60 minutes, depending on the length of piping and temperature of condensate). As soon as all air is pressed out of the sensor, the screw joint shall be tightened again.

Therewith the venting is completed. Fully open closing valves of measurement.



WARNING

Steam may not enter the pressure difference sensor and the manifold.

RESETTING THE PRESSURE DIFFERENCE SENSOR

Close the equalizing valve (EQUALIZE) of the set. Both closing valves (BLOCK) are open. Wait till condensate is filled in the condensation tanks.

By switching on the mains switch, the electronic part of the manifold shall be put into operation (pressure sensor, pressure difference sensor, mathematic element).

Connect milliammeter into the output from the pressure difference sensor serially with the mathematic element. After switching on the mains switch, the whole device shall be let at least 30 minutes till the temperature is stabilized. If venting has been realized with hot condensate, which has entered the sensor, this time shall be prolonged till temperature of water in the impulse piping and in the pressure difference sensor is equalized with the ambient temperature. When the steam flow is zero (steam flow shall be cut off so that the level of condensate in the condensation tanks is not changed) and there is full operation static pressure, press the zero reset button (for sensors with SMART electronics) or use the relevant adjusting element for resetting zero to adjust the output current of the pressure difference sensor to -0.01 mA (3.99 mA). It will equalize the deviation of zero caused by a possible difference of level heights in both condensation tanks and the impact of the static pressure on the pressure difference sensor. Thereby the whole set is prepared for operation.

If required, an appointed worker of the installation and service organization may provide the manifold with seals with the mark of the installation and service organization.

OPERATION AND MAINTENANCE

CONTROL MOMENT OF SPINDLE

The following table provides informative values of control moments of spindle and moments required to close the valve for various types of sealing subjected to different medium pressures. The values are only for information purposes because real values may differ depending on the tightening of the seal cover.

Medium pressure (MPa)	Control moment (Nm)	Closing moment (Nm)
0	0.1 to 1.0	2.5 to 4.0
40	2.0 to 3.0	4.0 to 6.0

VENTING AND DRAINING

During the operation, air can leak from the main piping to the impulse piping. Therefore, it is necessary to vent the impulse piping by means of drain valves of the five-way manifold or the venting valves of the manifold with venting. The interval of venting and draining shall be chosen according to the local conditions.

Venting process shall be realized at zero flow. First open the equalizing valve (EQUALIZE). Close the closing valves (BLOCK). Slowly open the drain valves (VENT). As soon as water occurs at the outlet from the drain holes, close the drain valves (VENT). Open the closing valves (BLOCK). Finally close the equalizing valve (EQUALIZE).

During such venting, impurities from the impulse piping are removed, too.

If it is not possible to realize the venting at zero flow and if opening the valve EQUALIZE can result in a loss of condensate, venting may be performed with closed equalizing valve (EQUALIZE). However, in that case the pressure difference sensor is subjected to overload with full static pressure.

RESETTING PRESSURE DIFFERENCE SENSOR

If the levels of condensate in the condensation tanks were equalized correctly during commissioning, it is possible to inspect and adjust the zero of the pressure difference sensor during periodic inspections; in that process, the equalizing valve (EQUALIZE) and one closing valve (BLOCK) shall be open.

ARMATURE CLEANING

This activity may only be performed by service workers of the valve manufacturer.

PROCEDURE WHEN FINDING LEAKAGE OF CONNECTION WITH THREADED RINGS

Possible leakage of the connection can be caused by unprofessional installation, e.g. by failure to comply with specified torque (i.e. insufficient or excessive tightening of the cap nut), with minimum straight part of the tube from its end or by using this connection in the conditions with increased level of vibrations without any fixation of armature and connecting tubes, in particular longer ones.

**WARNING**

The cap nut may never be tightened (released) under pressure – it could cause lethal injury!!!

Uninstallation and repeated installation of the connection shall be realized pursuant to manual for accessories, type 981 – Connecting terminals.

RELIABILITY

Indicators of reliability in operation conditions and ambient conditions specified herein

REPAIRS

The manifolds shall be repaired by the manufacturer. They shall be sent for repair in the original or equal package without accessories.

DISABLING AND LIQUIDATION

They shall be realized in compliance with the Waste Act No. 106/2005 Coll.

The product and its package do not include any parts that could impact the environment.

Products that are withdrawn from operation, including their packages, may be disposed of to sorted or unsorted waste pursuant to the type of waste.

- Medium time of operation between failures 96 000 hours (inf. value)
- Expected service life 10 years

SPARE PARTS

The armature design does not require any delivery of spare parts.

WARRANTY

Pursuant to § 429 of the Commercial Code and the provisions of § 620 (2) of the Civil Code, the manufacturer warrants for technical and operation parameters of the product specified in the manual. The warranty period is 36 months from the receiving of the product by the customer, unless established otherwise in the contract. The manufacturer warrants for the parts, which are subjected to natural wear and are replaceable as a part of common maintenance of the product (plug sealing, sealing O-rings, etc.), for the period of 24 months.

Rejection of defects shall be enforced in writing at the manufacturer within the warranty period. The rejecting side shall identify the product name, ordering and manufacturing numbers, date of issue and number of the delivery note, clear description of the occurring defect and the subject of the claim. If the rejecting side is invited to send the device for repair, it shall do so in the original package of the manufacturer and/or in another package ensuring safe transport.

The warranty shall not apply to defects caused by unauthorized intervention into the device, its forced mechanical damage or failure to comply with operation conditions of the product and the product manual.

The package of the product can be recycled completely. Metal parts of the product are recycled, non-recyclable plastic materials shall be disposed of in compliance with the aforesaid Act.

**MMG Műszerszerviz Kft.**

1036 Budapest, Dereglye u. 1.,

Tel/fax: 204-2252, Tel:203-7443

Web: www.mmg.hu, E-mail: info@mmg.hu