

PRODUCT MANUAL

Manifold

type 964

MANUAL FOR ACCESSORIES, TYPE 981, IS ENCLOSED

APPLICATION

- To close impulse piping if it is necessary to disconnect pressure sensors or pressure difference sensors 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 special design in purity level for oxygen (code P2S)
- As special design with cleanliness of internal surfaces of grade I pursuant to TPE 10-40/1926/85 (code PC1)
- For the environment, where mechanical resistance is required pursuant to EN 60068-2-6 (class AH2 pursuant to ČSN 33 2000-5-51) and seismic capability of the electrical equipment of the safety system of the nuclear power stations pursuant to IEC 980 (MVZ level SL-2) (IEC IEEE 60980-344).
- For industrial the environment with high concentration of SO₂ and the environment with sea climate

DESCRIPTION

The basis of manifolds consists of a body, into which valve units are screwed. Their seat is a part of the basic body of the armature. In case of the armature with soft sealing, the seat has a special shape, which contributes to ensuring perfect tightness. Material of the basic body is steel 1.4541. Valve units have different designs pursuant to the type of used spindle sealing. It can be formed by elastomer o-ring or seal from graphite or from a plastic material.

TECHNICAL DATA

Technical requirements for the manifolds and dimensions of the connecting terminals are identified in ČSN 13 7501, connecting dimensions of the manometric valve are in compliance with ČSN 13 7517.

Inner bore manifolds: Ø 3 mm
Operating position: discretionary
Weight: it is specified in table 5
Type of operation: continuous

OPERATING CONDITIONS

The armatures are designed for the environment defined by the group of parameters and their severity grades IE36/3C4 for SO₂ pursuant to EN IEC 60721-3-3 and the following operation conditions, i.e. in the places with minimum protection against daily fluctuations of the outdoor climate, exposed to sun radiation, with impact of precipitations carried by rain. From time to time, the armatures may be exposed to the sea climate pursuant to EN 60068-2-52, severity grade 2.

Relative ambient humidity:

10 to 100 % with condensation, with upper limit of water content 29 g H₂O/kg of dry air

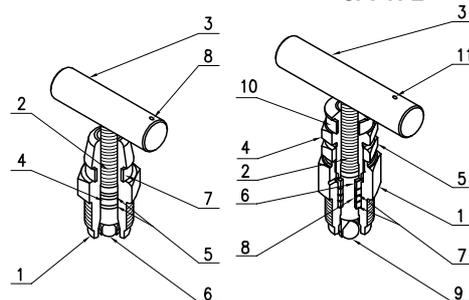
Atmospheric pressure: 70 to 106 kPa

PRESSURE AND TEMPERATURE CHARACTERISTICS

Values of pressure and temperature of operating 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.



with elastomer O-ring Valve unit with seal from graphite or PTFE



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

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) Si ₃ N ₄ (code S2) PVDF (code S3)
7	Differentiating ring	PVC
8	Sealing hole	

*) For this material, the manufacturer has certificate 3.1 pursuant to EN 10204

Valve unit with seal from graphite or PTFE

Position	Part	Material
1	Valve unit body	1.4541 **)
2	Spindle	1.4541 **)
3	Handle	1.4541 **)
4	Lid of sealing	1.4541 **)
5	Safety nut	1.4541 **)
6	Ring	1.4541 **)
7	Support ring for spindle seat sealing	(W4, W6) 1.4541 **) (W5) PVDF (W7) PEEK
8	Spindle seal sealing	GRAPHITE (code W4) PTFE (code W5) GRAPHITE (code W6) *) PTFE (code W7)
9	Seat sealing	1.4571 **) (code S1) Si ₃ N ₄ (code S2) PVDF (code S3)
10	Differentiating ring	PVC (NOT for W4, W6)
11	Sealing hole	

*) Graphite in nuclear cleanliness

***) For this material, the manufacturer has certificate 3.1 pursuant to EN 10204

DESIGNATION

(pursuant to ČSN 13 3005-1)

Data on basic body

- Trade mark of the manufacturer
- Maximum operation pressures and temperatures
- Body material
- Heat number of material of basic body
- Valve scheme
- Mark of performed pressure test
- Arrow indicating recommended direction of the medium
- Product ordering number
- Time code
(serial number for design for O₂ and for design with code PC1)

Data on valve unit

- Designation of function of the valve unit

TEXT	COLOUR	FUNCTION
BLOCK	blue	closing
EQUALIZE	green	balancing (interconnection)
VENT	red	venting / draining

- In case of designs W2, W3, W4, W5, W6, W7, S2 and S3, these codes are marked on the flat area of the hexagon of each valve unit
- 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
- Sealing rings 24 x 18 x 3 (only for design 964 2xxx and 964 3xxx)
- Holder B3 (only for design 964 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 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)
 - o Inspection report about purity of internal surfaces (only in case of armature with code PC1)

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 EN 10204 for the material of the body and other parts pursuant to the table of used materials with the heat number
- Declaration of Conformity with purchase order 2.1 pursuant to EN 10204
- Test report about the seismic and the vibration qualification
- Copy of the resistance test report of the environment
- Declaration of Conformity of the supplier pursuant to EN ISO/IEC 17050-1

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 according to EN IEC 60721-3-2, (i.e. by airplanes and trucks, semi-trailers and trailers, railway wagons with specially designed shock absorbers and ships, in premises that are neither ventilated, nor protected against atmospheric conditions).

STORAGE

The products may be stored on conditions corresponding to the set of combinations of classes IE 13/1C3 for SO₂ pursuant to EN IEC 60721-3-1, with ambient temperature from -30 to + 55 °C (i.e. in places providing minimum protection against daily fluctuations of outdoor climate, exposed to sun radiation, impact of precipitations carried by wind, with danger of growth of fungi and attacks by animals, with the exceptions of termites, in close vicinity of sources of dust and sand, with vibrations of low importance).

RELIABILITY

Reliability indicators in operation conditions and ambient conditions specified herein

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

ORDERING

The purchase order shall specify:

- Name
- Product ordering number
- Requirement for other documentation pursuant to Article DELIVERY
- Other (special) requirements for the product
- Number of pieces

PURCHASE ORDER EXAMPLE**Standard design:**

1. Manifold
964 45 21
20 pcs
2. Manifold
964 45 21 W4S2 KU1
20 pcs
3. Manifold
964 24 52 W6S1 PC1
20 pcs
4. Manifold
964 41 1515
20 pcs
5. Manifold
964 45 15 W4S2 AS21 KL1 ODP2 TZ1
20 pcs
6. Manifold
964 41 5115 FR
20 pcs

Special request:

Manifold
964 22 1212 EMA3
Internal thread 1/4-18NPT for test/venting from side
20 pcs

TABLE 3 - DESIGN OF MANIFOLDS, TYPE 964

SPECIFICATIONS			ORDERING NUMBER															
			964	x	x	xx	xx	xx	xx	xxx	xxx	xx	xxxx	xxx	xxx			
INSTALLATION OF MANIFOLD	on conventional or coplanar flange of the sensor	pitch 54mm		2														
		pitch 57mm 12)		3														
	between impulse piping	pitch 54mm		4														
DESIGN OF MANIFOLD	two-way - connection in one place				1													
	two-way - connection in two places 12)				2													
	three-way				3													
	three-way with venting valves				4													
	five-way				5													
CONNECTING TERMINALS according to manual for accessories, type 981 (with the exception of terminals code 72)		INLET 1)					xx											
		OUTLET 2)						xx										
SEALING OF THE SPINDLE 3)	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								
	seal from graphite + 1.4541	max. 500°C								W4								
	seal PTFE + PVDF	max. 200°C								W5								
	seal from graphite + 1.4541 (graphite in nuclear cleanness)	max. 500°C								W6								
	seal PTFE + PEEK	max. 260°C								W7								
SEAT SEALING 3)	corrosion ball (1.4571)	max. 300°C								S1								
	ceramic ball Si ₃ N ₄ (as a default for W4 and W6)	max. 500°C								S2								
	soft sealing PVDF (NOT for W4, W6, W7)	max.150°C								S3								
SPECIAL TREATMENT 4)	purity grade for O ₂ (NOT for W4, W6)										P2S							
	cleanness of internal surfaces equipment of grade I											PC1						
INSTALLATION ON PRESSURE SENSOR OR PRESSURE DIFFERENCE SENSOR 5)10)	only for design 964 23 xx, 964 24 xx, 964 25 xx, 964 33 xx, 964 34 xx and 964 35xx																	FR
ANOTHER SCHEME OF MANIFOLD 6)	only for design 964 25 xx and 964 45 xx	control sampling 11)	NO															AS1 AS2
			YES															AS01 AS11 AS21
CODES OF ACCESSORIES pursuant to manual for accessories, type 981 7), 8)		inlet and outlet 9)																xxx
		other accessories																

- 1) In case of the design between impulse piping (964 4x xx), the terminals at the outlet of the manifold are equal to the terminals at the inlet. (with the exception of 964 41 xx xx). In this case, specify the code of the terminal in the ordering number only once.
It is possible to select all terminals from the type 981 (with the exception of terminals with code 72), only for design 964 25 xx AS2 or 964 25 xx AS21 it is only possible to select the code 53 (not 52 and 54) for the connection internal thread 1/2-14 NPT.
- 2) Other connecting terminals at the inlet and the outlet can only be selected for a two-way design 964 41 xx xx. It is possible to select all terminals from the type 981 (with the exception of terminals with code 72), only for code 52 at the outlet it is only possible to select the code 52 at the inlet.
For the design 964 2x xx and 964 3x xx, on the outlet there is, as a default, the connection on conventional or coplanar flange of the sensor; therefore, the code for terminals of outlet is not specified.
- 3) In case none of the said codes is specified, the manifold will be delivered with the sealing W1 and S1.
- 4) If no code is specified, the armature without a special treatment will be delivered
- 5) If no code is specified, the armature will be delivered without the installation on the pressure sensor
- 6) If no code is specified, the armature will be delivered with the standard scheme of the manifold (i.e. without the code ASxx)
- 7) If no code is specified, the armature will be delivered without accessories.
- 8) Behind the ordering number, it is possible to add the codes of accessories pursuant to manual for accessories of type 981. The accessories, which can be delivered together with the armature, are specified in table 4.
- 9) In case the code KU or NA (or NAG) is specified, all cones or sleeves are delivered in the same design. If different cones or sleeves are required (e.g. for inlet carbon steel, outlet corrosion-resistant steel or for different diameters), it is necessary to order them separately pursuant to manual for accessories, type 981 (e.g. 981KU1 2 pcs and 981KU3 2 pcs).
- 10) The specification of the sensor and possible venting with the quick-coupling EMA3 shall be specified by the customer in the purchase order.
Pressure sensor + quick-couplings EMA3 can be delivered by the customer.
- 11) The terminal with code 51 is used as control sampling as a default.
- 12) Design can only be chosen on the basis of an agreement with the manufacturer as a special request.

TABLE 4 - ACCESSORIES

The table specifies accessories that are delivered with the armature as a default and also the accessories that can be delivered together with the armature after they have been ordered with the use of the code behind the ordering number.

TYPE OF ARMATURE	ACCESSORIES delivered with the armature as a default	CODES OF ACCESSORIES, which can be specified behind the ordering number	
964 2x xx ***) (on flange of the sensor - pitch 54 mm) 964 3x xx *) (on flange of the sensor - pitch 57 mm)	sealing ring PTFE 24x18x3 **) (sealing ring can be ordered separately under order number 479853)	SR2, SR3, SR4, SR5	
		B3	
		ODP2, ODP1 *)	only for 964 25 xx and 964 35 xx
		KL1	
		KU1, KU2, KU3, KU4, KU5, KU6	
		NA1, NA2, NA3, NA4, NA5, NA6	
		NAG1, NAG2, NAG3, NAG4, NAG5, NAG6	
		EMA3	NOT for 964 21 xx and 964 23 xx
964 4x xx ***) (between piping)	holder B3	TZ1	only for 964 25 xx and 964 35 xx
		ODP2, ODP1 *)	only for 964 45 xx
		KL1	
		KU1, KU2, KU3, KU4, KU5, KU6	
		NA1, NA2, NA3, NA4, NA5, NA6	
		NAG1, NAG2, NAG3, NAG4, NAG5, NAG6	
		EMA3	NOT for 964 41 xx xx and 964 43 xx
		TZ1	only for 964 45 xx

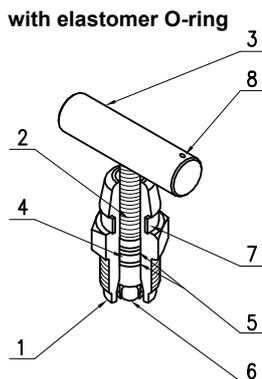
*) Design can only be chosen on the basis of an agreement with the manufacturer as a special request

**) Use max to - 10° C

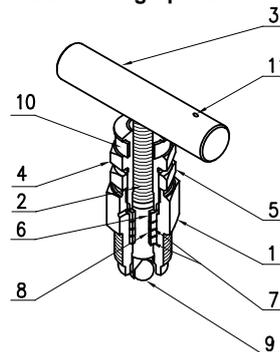
***) For installation of manifold to negative temperatures, max - 40 ° C, you can separately order the PTFE+25% glass 24x18x3 sealing ring under the order number OZN 530 247 000

DIMENSIONAL DRAWINGS, SCHEMES

Valve unit



with seal from graphite or PTFE



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

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) Si ₃ N ₄ (code S2) PVDF (code S3)
7	Differentiating ring	PVC
8	Sealing hole	

*) For this material, the manufacturer has certificate 3.1 pursuant to EN 10204

Valve unit with seal from graphite or PTFE

Position	Part	Material
1	Valve unit body	1.4541 **)
2	Spindle	1.4541 **)
3	Handle	1.4541 **)
4	Lid of sealing	1.4541 **)
5	Safety nut	1.4541 **)
6	Ring	1.4541 **)
7	Spindle seal sealing Seat sealing Differentiating ring	(W4, W6) 1.4541 **)
		(W5) PVDF
		(W7) PEEK
8	Sealing hole	GRAFIT (code W4)
		PTFE (code W5)
		GRAFIT *) (code W6)
		PTFE (code W7)
9	Seat sealing	1.4571 **)(code S1) Si ₃ N ₄ (code S2) PVDF (code S3)
10	Differentiating ring	PVC (not for W4, W6)
11	Sealing hole	

*) graphite in nuclear cleanliness

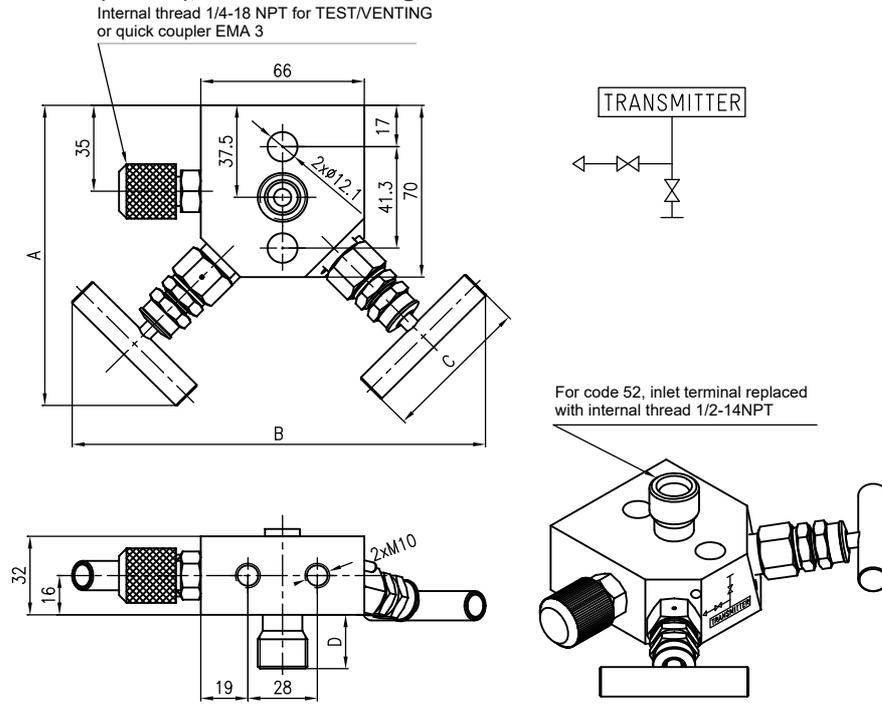
**) For this material, the manufacturer has certificate 3.1 pursuant to EN 10204

TABLE 5 - LIST OF FIGURES OF MANIFOLD DESIGNS

Number of figure	Design of manifold		Installation of manifold	Ordering number (part)	Scheme of manifold	Weight approx. [kg]
1.	Two-way	connection in one place	on conventional or coplanar flange of the sensor	964 21 xx		1.3
2.		connection in two places		964 22 xx *)		2.2
3.		between impulse piping		964 41 xx		1.3
4.	Three-way	without venting	on conventional or coplanar flange of the sensor	pitch 54 mm 964 23 xx		2.2
				pitch 57 mm 964 33 xx *)		
5.		between impulse piping - pitch 54 mm	964 43 xx		1.5	
6.		with venting valve	on conventional or coplanar flange of the sensor	pitch 54 mm 964 24 xx		2.5
				pitch 57 mm 964 34 xx *)		
7.	between impulse piping - pitch 54 mm	964 44 xx		2.3		
8.	Five-way	without control sampling	on conventional or coplanar flange of the sensor	pitch 54 mm 964 25 xx		2.3
				pitch 57 mm 964 35 xx *)		
9.				964 25 xx AS1		
10.		964 25 xx AS2		2.3		
11.		with control sampling	on conventional or coplanar flange of the sensor - pitch 54 mm	964 25 xx AS01		2.4
12.				964 25 xx AS11		2.4
13.				964 25 xx AS21		2.3
14.				964 45 xx		2.5
15.		without control sampling	between impulse piping - pitch 54 mm	964 45 xx AS1		2.5
16.				964 45 xx AS2		2.5
17.				964 45 xx AS01		2.6
18.	964 45 xx AS11				2.6	
19.	964 45 xx AS21				2.6	

*) only as a special request after an agreement with the manufacturer

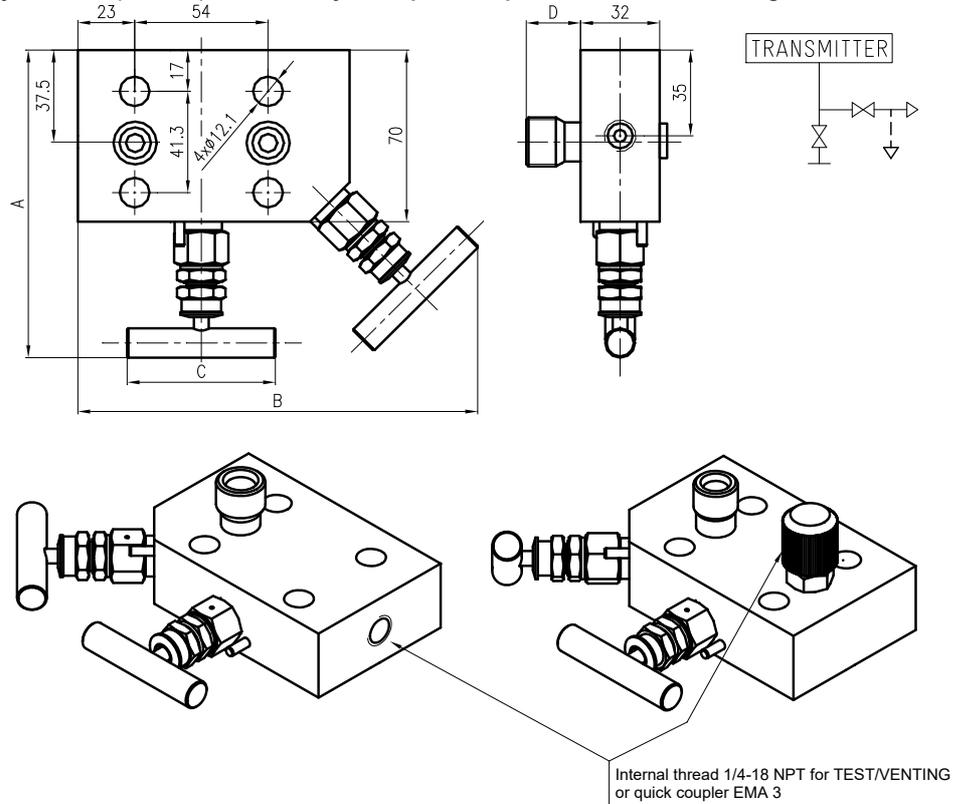
Figure 1 - Two-way manifold (964 21..), dimensional drawing, scheme



Material of spindle sealing	A	B	C
FPM, NBR, EPDM	120	160	45
GRAPHITE, PTFE	130	170	60

Size of dimension "D" is specified at the applicable codes of the connecting terminals in the manual for accessories, type 981.

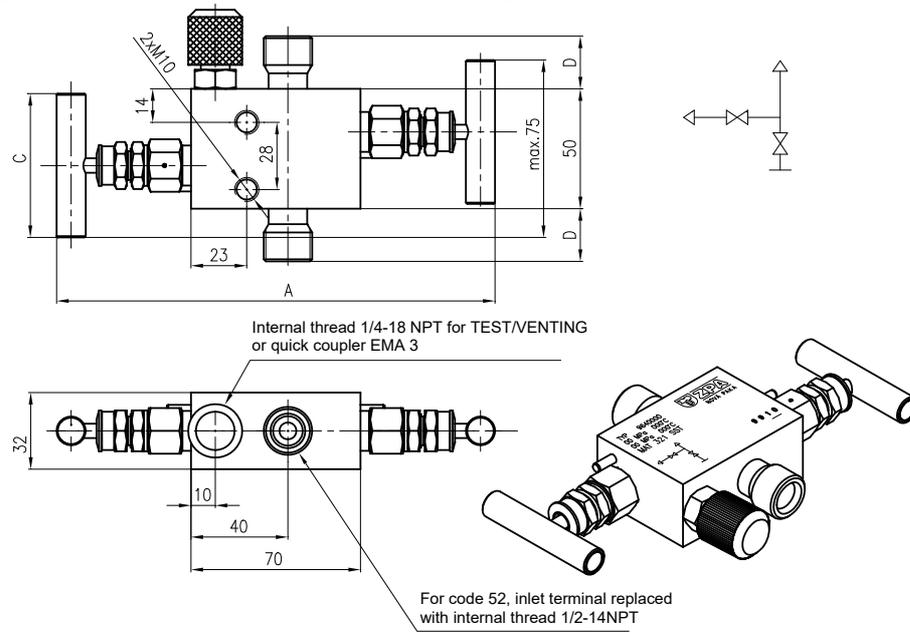
Figure 2 - Two-way manifold (964 22..) only as a special request, dimensional drawing, scheme



Material of spindle sealing	A	B	C
FPM, NBR, EPDM	120	160	45
GRAPHITE, PTFE	130	170	60

Size of dimension "D" is specified at the applicable codes of the connecting terminals in the manual for accessories, type 981.

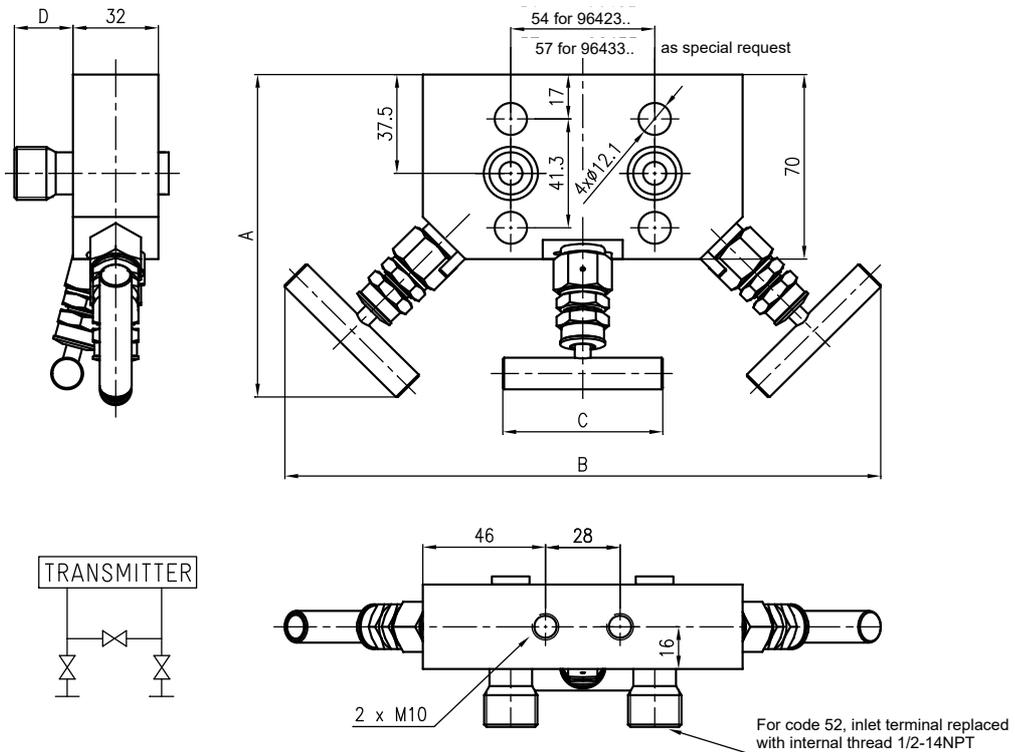
Figure 3 - Two-way manifold (964 41..), dimensional drawing, scheme



Material of spindle sealing	A	C
FPM, NBR, EPDM	165	45
GRAPHITE, PTFE	185	60

Size of dimension "D" is specified at the applicable codes of the connecting terminals in the manual for accessories, type 981.

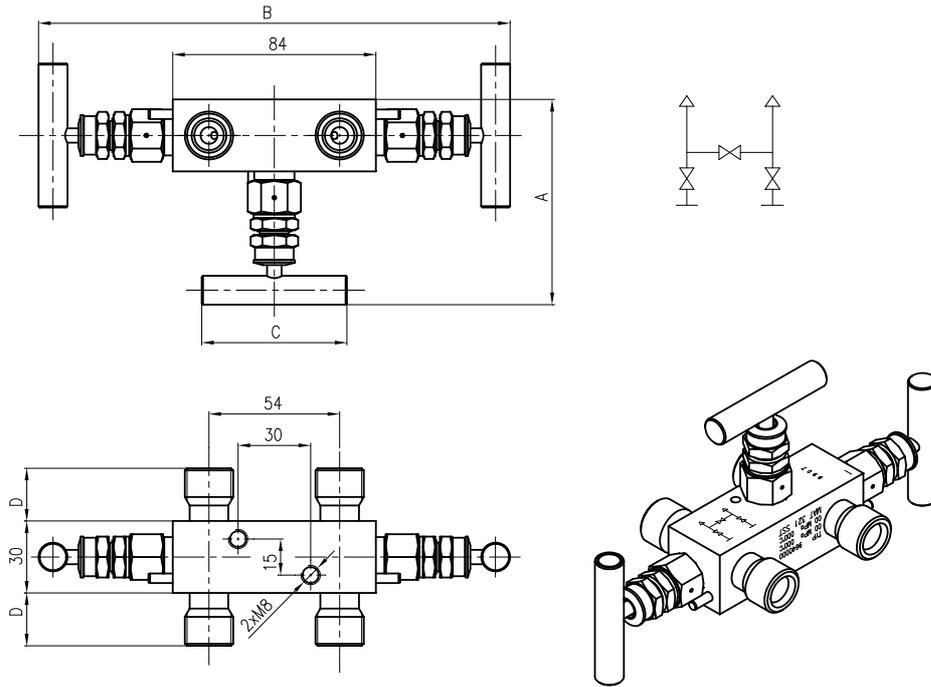
Figure 4 - Three-way manifold (964 23.. , 964 33..), dimensional drawing, scheme



Material of spindle sealing	A	B	C
FPM, NBR, EPDM	120	215	45
GRAPHITE, PTFE	130	235	60

Size of dimension "D" is specified at the applicable codes of the connecting terminals in the manual for accessories, type 981.

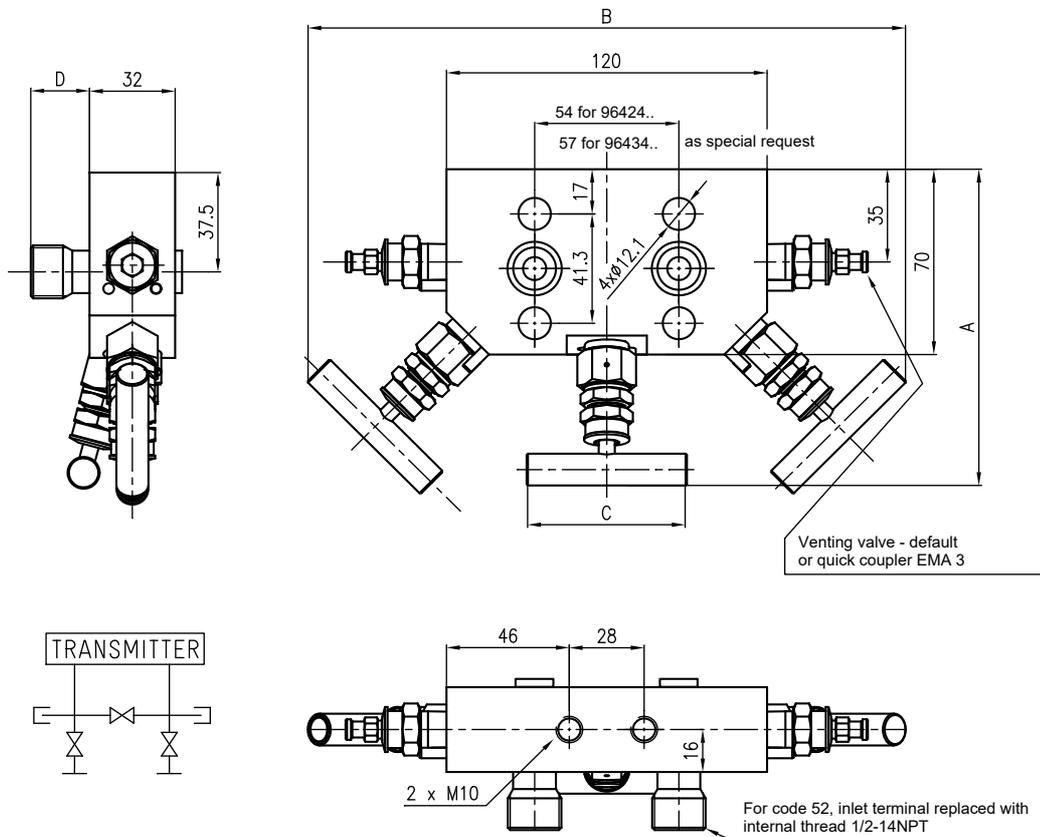
Figure 5 - Three-way manifold (964 43..), dimensional drawing, scheme



Material of spindle sealing	A	B	C
FPM, NBR, EPDM	80	180	45
GRAPHITE, PTFE	90	200	60

Size of dimension "D" is specified at the applicable codes of the connecting terminals in the manual for accessories, type 981.

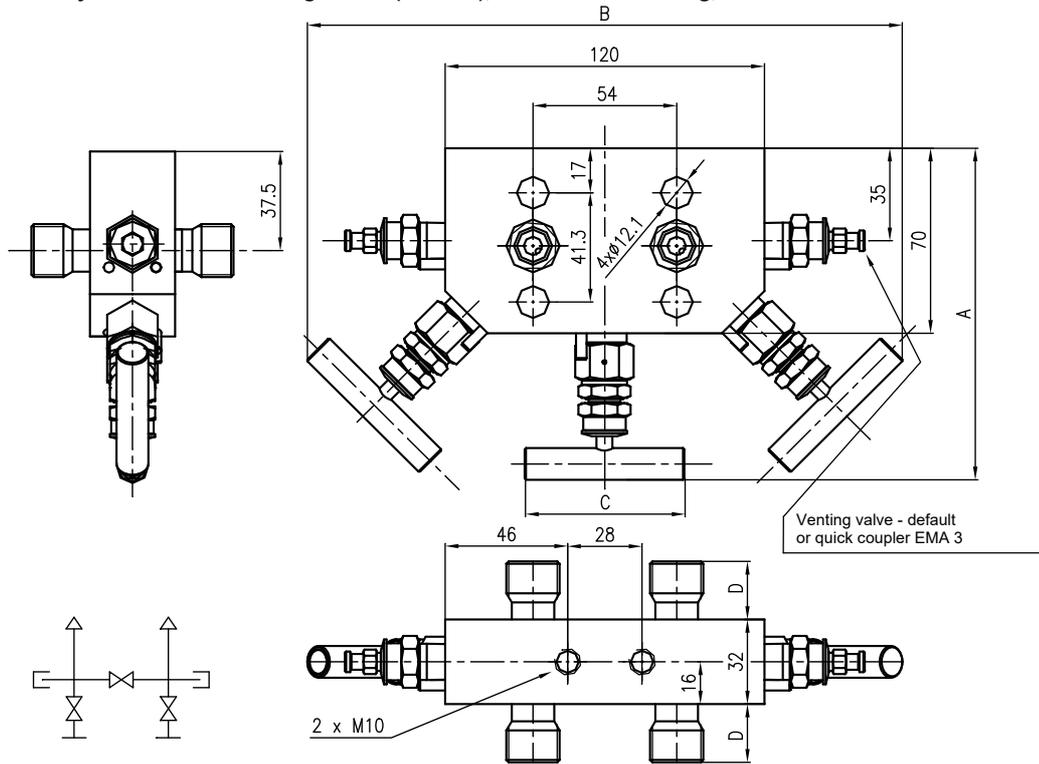
Figure 6 - Three-way manifold with venting valves (964 24.. , 964 34..), dimensional drawing, scheme



Material of spindle sealing	A	B	C
FPM, NBR, EPDM	120	215	45
GRAPHITE, PTFE	130	235	60

Size of dimension "D" is specified at the applicable codes of the connecting terminals in the manual for accessories, type 981.

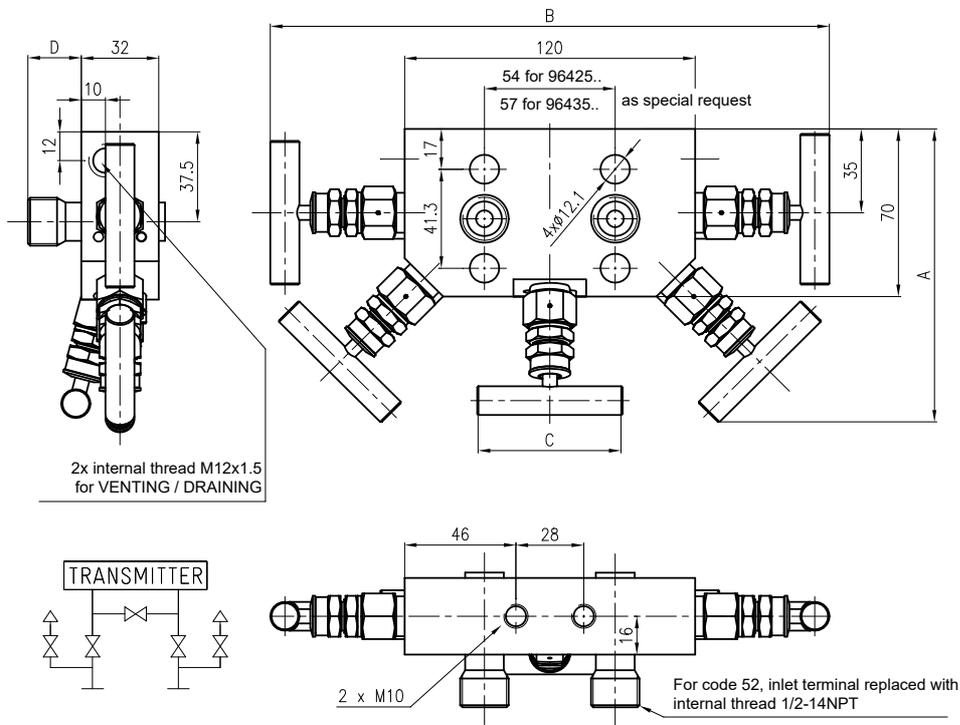
Figure 7 - Three-way manifold with venting valves (964 44..), dimensional drawing, scheme



Material of spindle sealing	A	B	C
FPM, NBR, EPDM	120	215	45
GRAPHITE, PTFE	130	235	60

Size of dimension "D" is specified at the applicable codes of the connecting terminals in the manual for accessories, type 981.

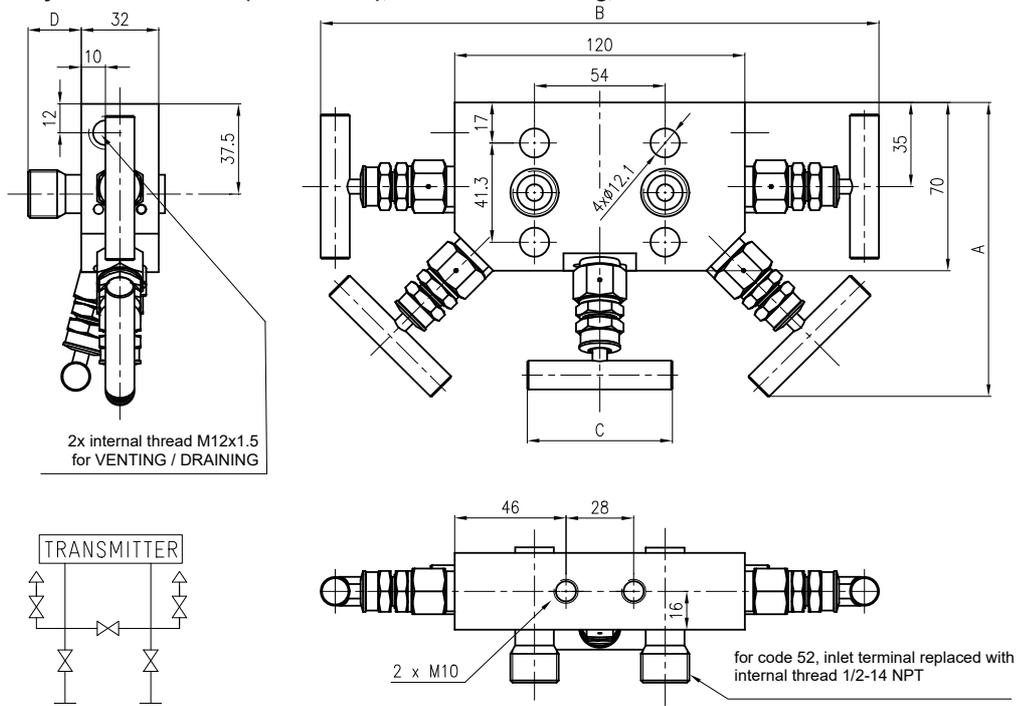
Figure 8 - Five-way manifold (964 25.. , 964 35..), dimensional drawing, scheme



Material of spindle sealing	A	B	C
FPM, NBR, EPDM	120	215	45
GRAPHITE, PTFE	130	235	60

Size of dimension "D" is specified at the applicable codes of the connecting terminals in the manual for accessories, type 981.

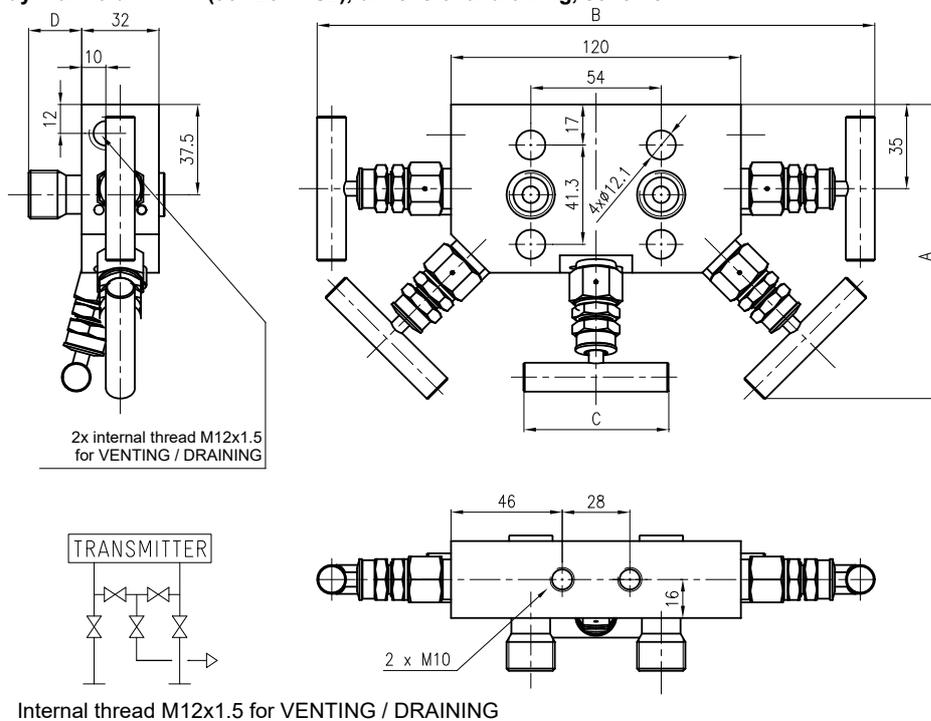
Figure 9 - Five-way manifold (964 25.. AS1), dimensional drawing, scheme



Material of spindle sealing	A	B	C
FPM, NBR, EPDM	120	215	45
GRAPHITE, PTFE	130	235	60

Size of dimension "D" is specified at the applicable codes of the connecting terminals in the manual for accessories, type 981.

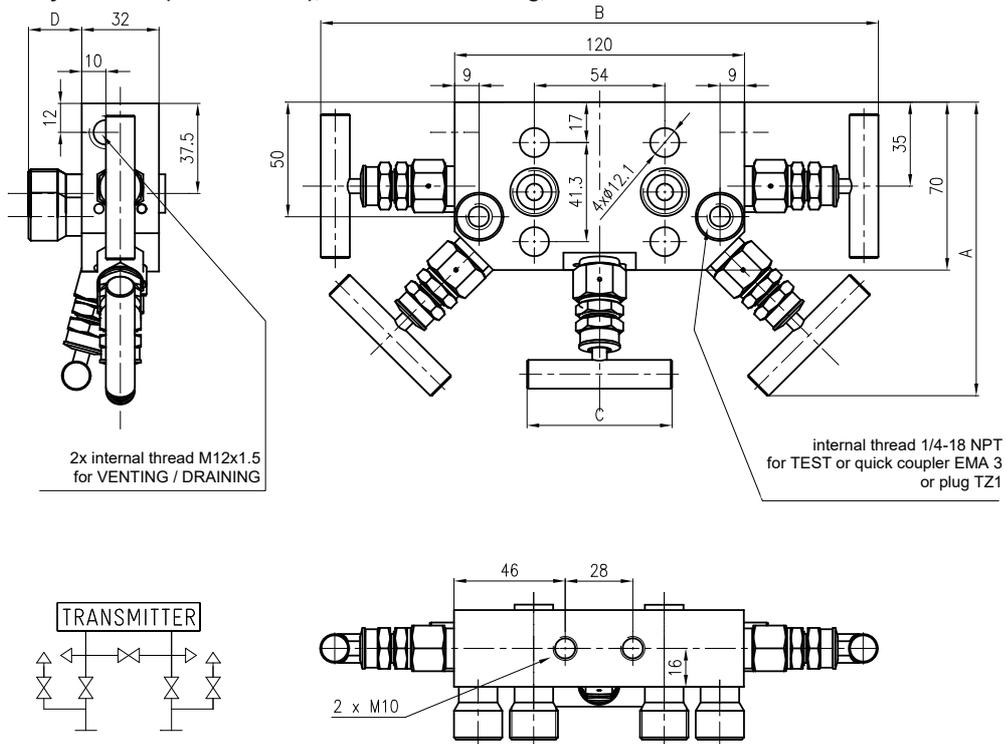
Figure 10 - Five-way manifold (964 25.. AS2), dimensional drawing, scheme



Material of spindle sealing	A	B	C
FPM, NBR, EPDM	120	215	45
GRAPHITE, PTFE	130	235	60

Size of dimension "D" is specified at the applicable codes of the connecting terminals in the manual for accessories, type 981.

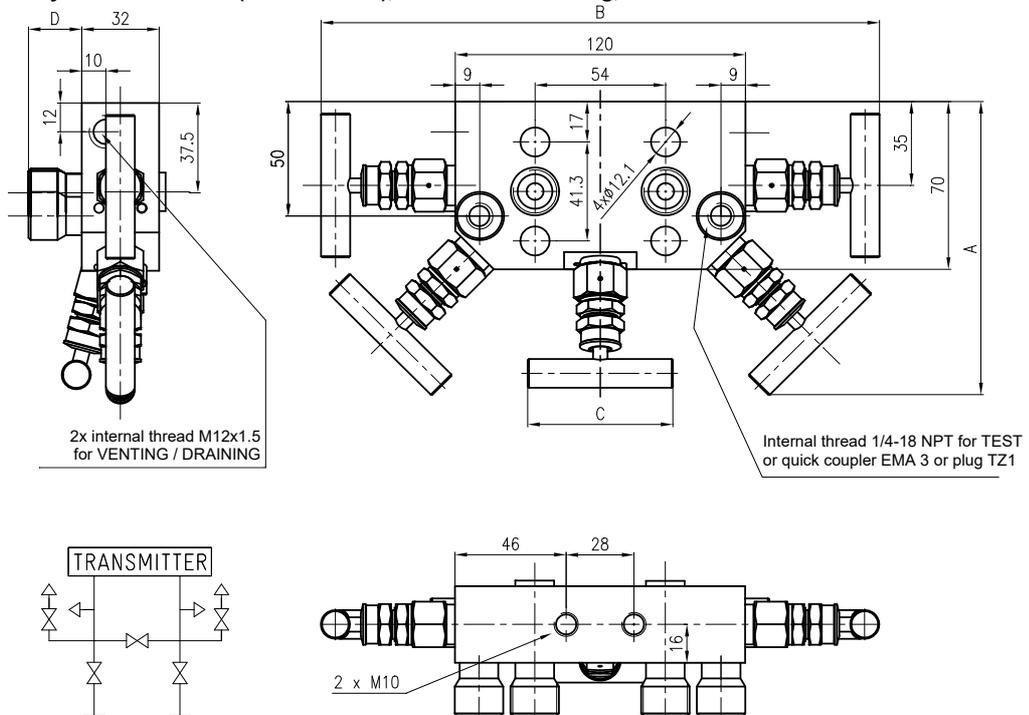
Figure 11 - Five-way manifold (964 25.. AS01), dimensional drawing, scheme



Material of spindle sealing	A	B	C
FPM, NBR, EPDM	120	215	45
GRAPHITE, PTFE	130	235	60

Size of dimension "D" is specified at the applicable codes of the connecting terminals in the manual for accessories, type 981.

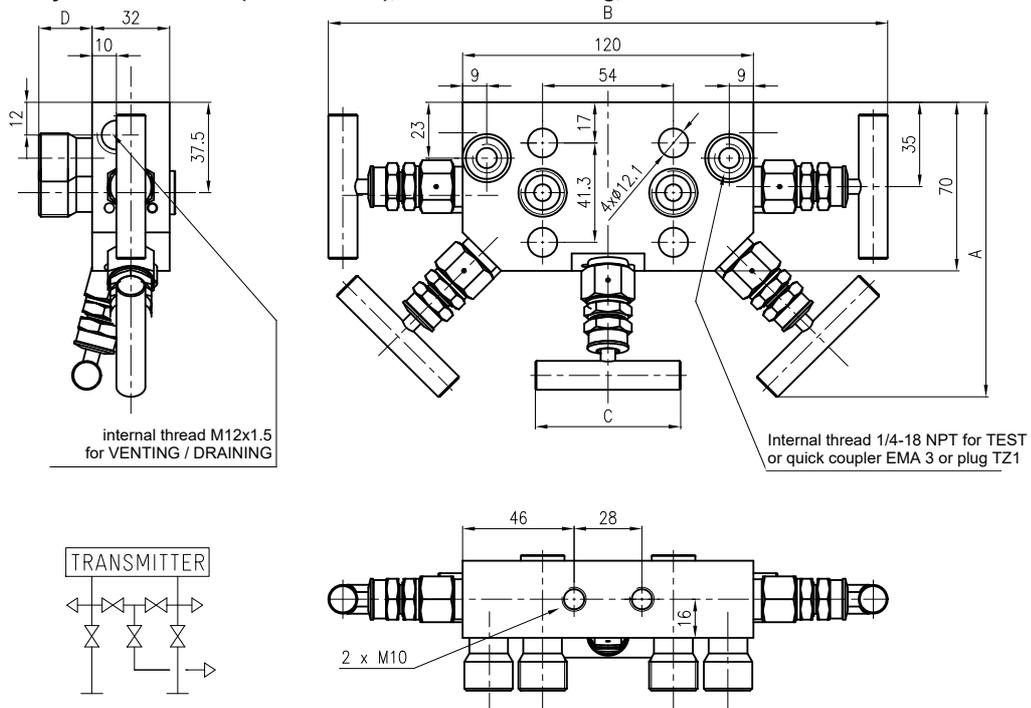
Figure 12 - Five-way manifold (964 25.. AS11), dimensional drawing, scheme



Material of spindle sealing	A	B	C
FPM, NBR, EPDM	120	215	45
GRAPHITE, PTFE	130	235	60

Size of dimension "D" is specified at the applicable codes of the connecting terminals in the manual for accessories, type 981.

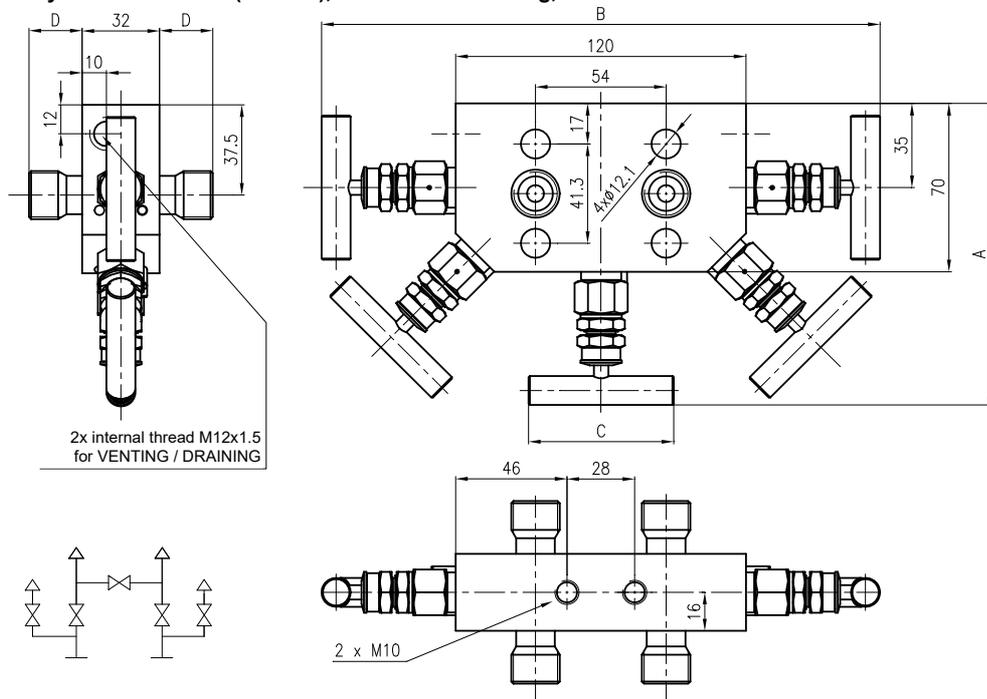
Figure 13 - Five-way manifold (964 25.. AS21), dimensional drawing, scheme



Material of spindle sealing	A	B	C
FPM, NBR, EPDM	120	215	45
GRAPHITE, PTFE	130	235	60

Size of dimension "D" is specified at the applicable codes of the connecting terminals in the manual for accessories, type 981.

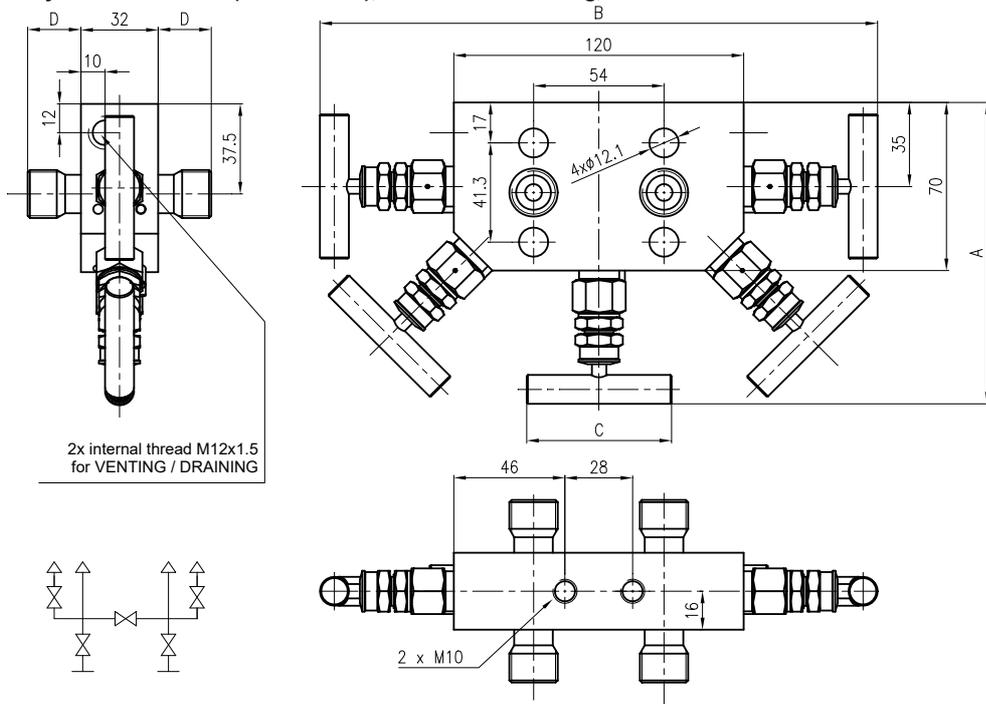
Figure 14 - Five-way manifold (964 45..), dimensional drawing, scheme



Material of spindle sealing	A	B	C
FPM, NBR, EPDM	120	215	45
GRAPHITE, PTFE	130	235	60

Size of dimension "D" is specified at the applicable codes of the connecting terminals in the manual for accessories, type 981.

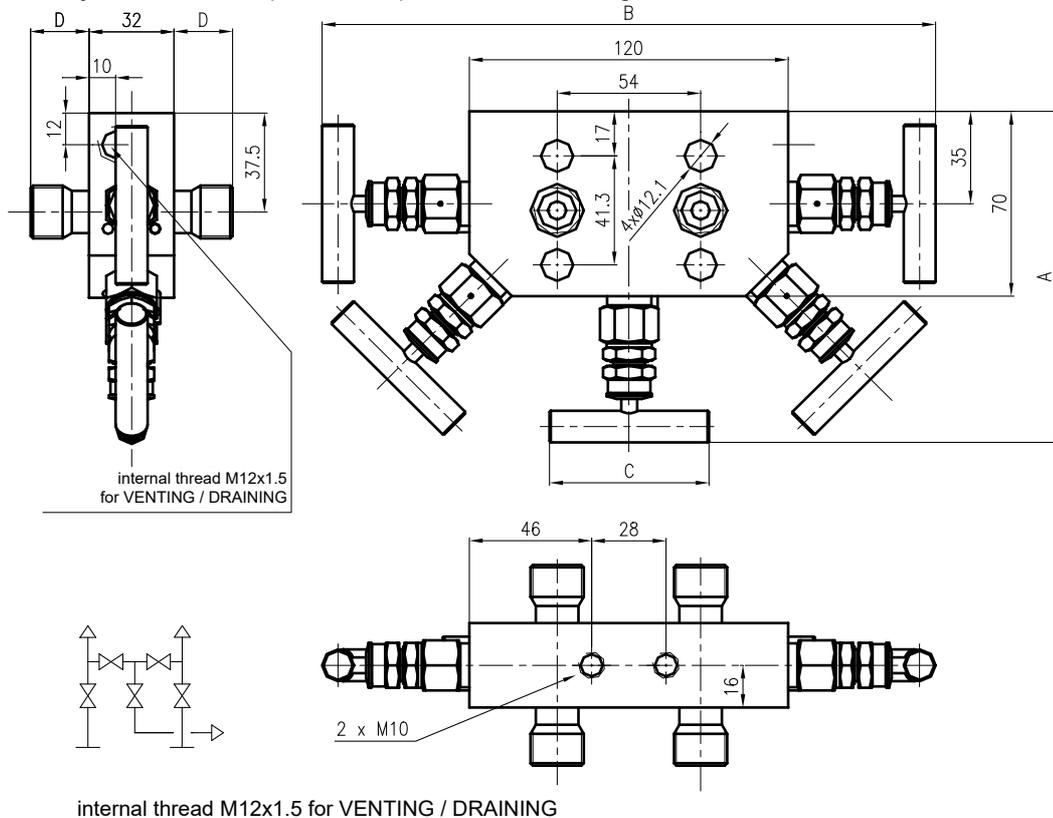
Figure 15 - Five-way manifold (964 45.. AS1), dimensional drawing, scheme



Material of spindle sealing	A	B	C
FPM, NBR, EPDM	120	215	45
GRAPHITE, PTFE	130	235	60

Size of dimension "D" is specified at the applicable codes of the connecting terminals in the manual for accessories, type 981.

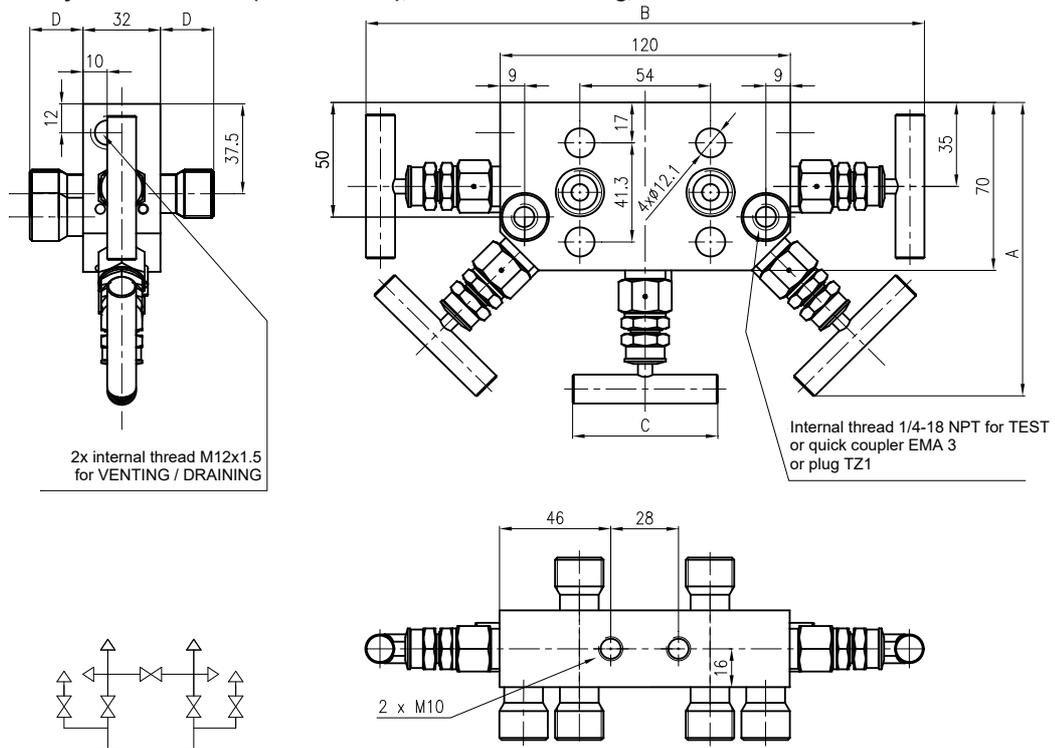
Figure 16 - Five-way manifold (964 45.. AS2), dimensional drawing, scheme



Material of spindle sealing	A	B	C
FPM, NBR, EPDM	120	215	45
GRAPHITE, PTFE	130	235	60

Size of dimension "D" is specified at the applicable codes of the connecting terminals in the manual for accessories, type 981.

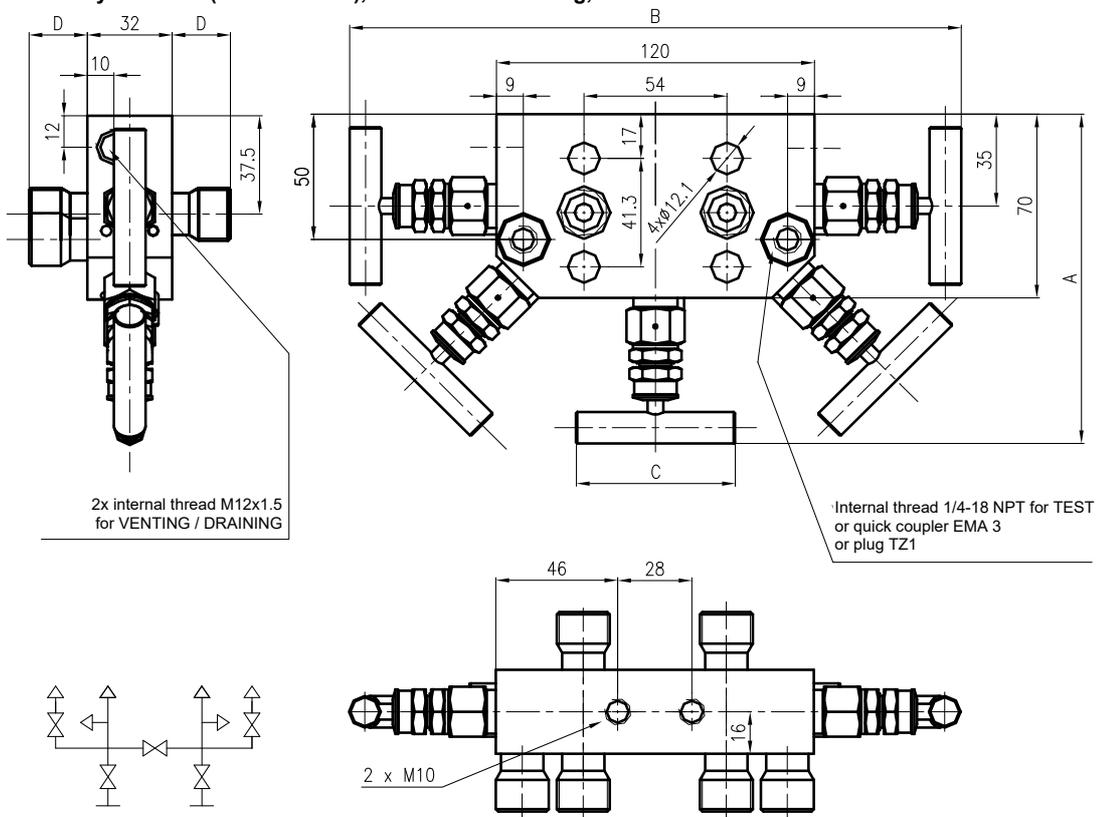
Figure 17 - Five-way manifold (964 45.. AS01), dimensional drawing, scheme



Material of spindle sealing	A	B	C
FPM, NBR, EPDM	120	215	45
GRAPHITE, PTFE	130	235	60

Size of dimension "D" is specified at the applicable codes of the connecting terminals in the manual for accessories, type 981.

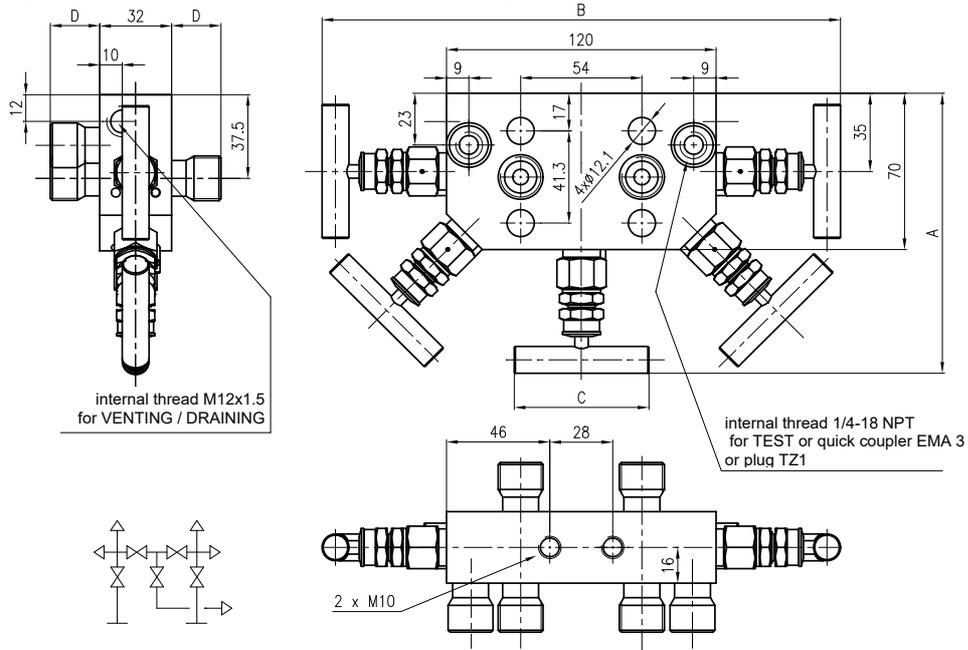
Figure 18 - Five-way manifold (964 45.. AS11), dimensional drawing, scheme



Material of spindle sealing	A	B	C
FPM, NBR, EPDM	120	215	45
GRAPHITE, PTFE	130	235	60

Size of dimension "D" is specified at the applicable codes of the connecting terminals in the manual for accessories, type 981.

Figure 19 - Five-way manifold (964 45.. AS21), dimensional drawing, scheme



Material of spindle sealing	A	B	C
FPM, NBR, EPDM	120	215	45
GRAPHITE, PTFE	130	235	60

Size of dimension "D" is specified at the applicable codes of the connecting terminals in the manual for accessories, type 981.

INSTALLATION AND CONNECTION

The installation of the manifold 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 Technická inspekce České republiky / "Technical inspection of the Czech Republic"

INSTALLATION OF CONVENTIONAL MANIFOLD ON PRESSURE DIFFERENCE SENSOR

The manifold of the design for conventional installation on the pressure difference sensor is 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 the type of installation of the pressure difference sensor: with conventional or coplanar flange with the pitch of input holes 54 mm or 57 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 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 (17 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 (34 Nm). The torque in brackets applies to stainless screws, which shall be greased before the installation. Carbon steel screws do not require any lubrication.

INSTALLATION OF MANIFOLD BETWEEN IMPULSE PIPING

Connect the armature to the impulse piping by means of either internal threads or 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.

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 is 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 manifold, 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 it, the whole condensate may never be used up; steam may not enter the five-way set.
 - Wait till the concentrate is filled up. Open the closing valves (BLOCK) (one is sufficient) of the manifold and release the inlet screw joint on the manifold with the use of a wrench so that the chambers of the pressure difference sensor and the manifold are filled up 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.
- In case of three-way manifold with venting valves, these valves can be used for venting. Venting shall be realized in the shortest possible time to avoid excessive warming of the sensor. By knocking on the impulse piping, air blisters are released, which could stick on the piping wall when it is flooded.

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 manifold. 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 set is put into operation (pressure sensor, pressure difference sensor, mathematic element).

Connect a 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 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 manifold 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 actual 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

**WARNING:**

To avoid any damage to the seat sealing of the valve unit with soft sealing (code S3), smaller closing moment (max. 4 Nm) shall be used when closing the valve.

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 equalizing valve 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 with open equalizing valve (EQUALIZE) and one open closing valve (BLOCK).

ELIMINATION OF LEAKAGE OF SPINDLE SEAL

In case of an armature with valve unit with seal from expanded graphite, PTFE or PEEK, possible leakage around the spindle can be eliminated by tightening the seal cover after previous releasing of the nut. The lid of the sealing shall be tightened with torque max. 10 – 12 Nm as required. After the seal has been tightened, the safety nut shall be tightened, too.

**WARNING**

Never tighten (release) the lid of the seal or safety nut under pressure – danger of lethal injury!!!

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**

Never tighten (release) the cap nut under pressure – danger of lethal injury!!!

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

SPARE PARTS

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

Sealing ring can be ordered separately under order number 479853.

WARRANTY

The warranty period shall be 36 months from the receiving of the product by the customer, unless established otherwise in the purchase contract or another document. The warranty of the manufacturer for the parts that are exposed to natural wear and are replaceable during normal maintenance of the product (seal sealing, sealing O-rings etc.) shall be 24 months.

The 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.

REPAIRS

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

DISABLING AND LIQUIDATION

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

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

The package of the product is fully recyclable. Metal parts of the product are recycled, non-recyclable plastic materials shall be disposed of in accordance with applicable legislation.



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 ZPA Nová Paka, a.s.