



Operating Instructions for Manometer

Model: MAN



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2. Note

Please read these operating instructions before unpacking and putting the unit into operation. Follow the instructions precisely as described herein.

The devices are only to be used, maintained and serviced by persons familiar with these operating instructions and in accordance with local regulations applying to Health & Safety and prevention of accidents.

When used in machines, the measuring unit should be used only when the machines fulfil the EC-machine guidelines.

PED 2014/68/EU

In acc. with Article 4 Paragraph (3), "Sound Engineering Practice", of the PED 2014/68/EU no CE mark.

		Pipe	
Model	P max/bar	Diagram 7 Group 2 no dangerous fluids	Diagram 6 Group 1 dangerous fluids
MAN	< 200	Art. 4, § 3	Art. 4, § 3
MAN	< 500	Art. 4, § 3	Cat. I
MAN	< 1000	Art. 4, § 3	Cat. I
MAN	> 1000	Cat. I	Cat. I

3. Instrument Inspection

Instruments are inspected before shipping and sent out in perfect condition.

Should damage to a device be visible, we recommend a thorough inspection of the delivery packaging. In case of damage, please inform your parcel service / forwarding agent immediately, since they are responsible for damages during transit.

The packing material must be thoroughly searched, so that no accompanying accessories are thrown away.

4. Regulation Use

The units of the model MAN serve to measure and monitor pressure-dependent processes in machines systems.

If applicable, the existing cap-holder on the connection body should only be removed immediately before connecting measurement conductors, so that no foreign particles may enter the pressure chamber. The storage of any measurement unit should be in a dry and dust-free area.

5. Operating Principle

Depending on the measuring range as well as the method of measurement (capsule, diaphragm, bourdon), the pressure to be measured is displayed via a mechanical pointer apparatus. The measuring element deforms in flexible range.

6. Mounting

6.1. General

The assembly has to be carried out following the corresponding general technical regulations for pressure measuring devices (e.g. DIN 16255 or EN 837-2).



While screwing in at the connection point, the required force must not be applied using the housing, instead only use the key areas designated for this purpose.

The installation location of the pressure-gauges should be easily accessible and close to the gas pressure measurements; if possible, above the measuring point. To avoid display deceleration time the distance between pressure withdrawal and pressure connection should be kept small.

Between the pressure withdrawal point and the measuring unit, a shut-off device should be introduced which allows a renewal and null-point check of the running system. Up to the final commissioning, the shut-off equipment should remain closed in the measurement piping. If pressure peaks are expected, suitable protective equipment may be considered, such as a pressure peak suppressor or a similar device. Alternatively, pressure measuring units with damping-liquid filling such as a glycerine manometer may be provided.

The piping up to the measuring unit should provide a vibration-free, stable attachment; otherwise, a wall bracket or some additional fortification via an attachment rim on the housing should be provided. Alternatively, mounting in an instrument panel may be considered.

The attachment of the manometer is to be executed in such a way that the admissible operating temperature does not violate min. and max. limits. In addition, measurement and stop valve should be protected through sufficiently long dimensional piping or water-bag pipes. The temperature conditions can influence the display accuracy.

With gauges for gas measurements, accumulation of condensation is to be avoided by a suitable piping design. If the device for operational reasons cannot be attached above the measuring point, a drainage possibility is to be provided. An additional liquid column may affect the gauge only if this pressure is noted on the scale. In the unfavourable case, the result of measurement is falsified.

For sealing of measuring unit's connections, sealing disks or sealing-edge-rings are utilised. The connection is recommended with stress-sockets or union-nuts; with that the manometer can be placed in the best reading position. During screw-in or screw-out, the force must not be exerted on the manometer housing, rather applied only over the four hexagonal connection-clips.

Before attaching the gauges, the measuring piping should be cleaned with the Medium to be measured or with clean compressed air. While squeezing off or blowing through the piping or containers, the gauge may not be over-pressed. If the expected pressure is higher, the manometer must be removed or locked off.

6.2. Assembly for Differential Pressure Manometer

Pressure-difference manometers have two pressure connections.

On **+** marked pressure connection, connect high pressure side, on **-** marked pressure connection, connect low pressure side. In order to protect the unit, a pressure equalization valve manifold **MUST** be used. Equalization valve manifolds are available from Kobold Instruments.

6.3. Assembly for Contact Manometer

In order to avoid bouncing of closed switch and thus resulting increase in wear, care should be taken during installation such that the units remain vibration-free. If excessive vibration exists, the manometer should be isolated from the vibration via a tubing line of flexible capillary. The units should be protected against coarse contamination strong variations of ambient temperature.

6.4. Disassembly

Before disassembling the gauge unit, ensure the machine/equipment is depressurized or that the gauge is thoroughly isolated from the system. If possible, the measuring pipe should be emptied. In case of diaphragm type manometers, upper and lower flanges should not be loosened. Hydraulic liquid inside disassembled measuring unit can be dangerous for the environment, in which case corresponding safety precautions should be used. Pressure-measuring units, whose measuring elements are filled with water or water-based chemicals, must be protected from freezing.

7. Sliding or Magnet-Spring Contacts

7.1. General

The built-in limit switches (Sliding or magnet-spring contacts) are field adjustable via a rotator on the gauge face. The contacts are actuated by the pointer indicator as it moves up and down scale.



Pay attention during assembly, commissioning and operation of these units that the applicable national safety regulations (such as VDE 0100) are complied with. All work must be carried out while the system is disconnected from the power supply.

- The electrical connections may only be completed by qualified personnel.
- Make sure that the electrical supply lines are de-energized.
- The connection assignments and the switching functions are given on the type-label of the unit and the connection terminals (1...6) as well as the ground terminals are tagged accordingly. The power supply leads must be sized to accommodate the maximum current carrying rating of the switch and should follow IEC 227 or IEC 245.



Not observing the relevant regulations can result in serious life and/or material damage.

7.2. Contact Ratings

Table 1: Sliding or magnetic spring contact ratings

Limit-value for contact loading with resistive load	Sliding Contact	Magnet-spring contact	
	unfilled units	Unfilled units	Filled units
Max. op. Voltage U_{eff}	250 V	250 V	250 V
Max. op. Current			
Connecting current	0.7 A	1.0 A	1.0 A
Interrupting current	0.7 A	1.0 A	1.0 A
Continuous current	0.6 A	0.6 A	0.6 A
Power dissipation	10 W / 18 VA	30 W / 50 VA	20 W/20 VA

Note: Under no circumstances, the limiting values of voltage, current or power may be exceeded!

Table 2: Recommended contact rating with different supply voltages and device versions

Voltage AC / DC V	Sliding contact			Magnet-spring contact					
	Unfilled housing			Unfilled housing			Filled housing		
	Resistive Load		Inductive load	Resistive load		Inductive load	Resistive load		Inductive load
	AC	DC	$\cos \varphi > 0.7$	AC	DC	$\cos \varphi > 0.7$	AC	DC	$\cos \varphi > 0.7$
	mA	mA	mA	mA	mA	mA	mA	mA	mA
230	40	45	25	100	120	65	65	90	40
110	80	90	45	200	240	130	130	180	85
48	120	170	70	300	450	200	190	330	130
24	200	350	100	400	600	250	250	450	150

At low voltages, on grounds of switching safety, the switching current may not be less than 20 mA.

For higher loads and, as well as for the units with liquid -filled housings, in order to protect against oil turbidity, we recommend the use of an additional protective contact relay.

7.3. Over-Current Protection Equipment

These devices do not contain built-in over-current protection. In case, over-current protection is required, we suggest the following values to be considered in accordance with EN 60 947-5-1.

Table 3: Over-current protection device

Voltage	Sliding contact	Magnet spring contact
24 V	1 A	2 A
250 V	0.315 A	1 A

8. Inductive and Electronic Contacts

8.1. General

Inductive contacts (Electronic limit-signal generators, DIN 19234 or NAMUR) are simply DC voltage switches in two-wire form that only contain transistor oscillators.

For the operation of inductive contacts, the use of switching amplifier, such as REL-6000 is recommended.

Electronic contact (electronic limit-signal generator in three-wire form) are simple inductive DC voltage switches for switching of DC loads up to 100 mA.



Pay special attention during assembly, commissioning and operation of these units such that applicable national safety regulations are followed, for example, VDE 0100 etc. All work must be performed while the power is disconnected from the system.

- The electrical connections may only be conducted by qualified personnel.
- Make sure, that the electrical connection wires are de-energized.
- The connection terminals and switching functions are given on the type-label and the connection terminals (1...6) as well as the grounding terminals are accordingly marked. The wires provided for supply connection must be appropriate for the largest current handling capability by the switch and should follow IEC 227 or IEC 245.



Not complying with the applicable regulations, serious damage to life and materials may result.

8.2. Mode of Operation

The proximity switches, due to their slit-groove construction are also known as slit-initiators. The electromagnetic field is concentrated between two coils, which face each other axially. The switch responds if the measuring pointer moves an aluminium target into the air-gap between both the coils (slit). This results in switch activation.

With inductive contacts, if there is no damping material present within the slit-range, oscillator swings. In this state, system has a very low resistance (approx. 1k Ω).

When the target enters the air-gap, the coil system is damped, the oscillations in the oscillator are set up and the system becomes more resistive (approx. 7k Ω).

8.3. Electrical Data – Inductive (NAMUR) Contact

Nominal voltage	8 V _{DC} (Ri approx. 1 kΩ)
Self-inductivity	29 μH
Self-capacitance	20 nF
Current-intake (active surfaces free)	≥ 3 mA
Current-intake (active surfaces covered)	≤ 1 mA

8.4. Electrical Data - Electronic Contact

Operational voltage	10...30 V _{DC}
Residual ripple	10 %
No load current	≤ 10 mA
Polarity protection	Restricted (U _b)
Inductive protection	1 kV; 0.1 ms ; 1k
Oscillator frequency	1000 kHz
EMV DIN 60947-5-2 supplement ZA	Yes
Switching frequency	1000 Hz
Output	PNP
Switching element function	N.O.
Switching current	≤ 100 mA
Residual current	≤ 100 μA
Voltage drop (at I _{max} .)	≤ 0.7 V

9. Commissioning

9.1. General

Pressure should be applied to the gauge slowly, in order to avoid damage to the measuring unit. Thereby the unit must be monitored continuously. The maximum permitted pressure must not be exceeded.

After commissioning of the unit, all piping connected to the measurement unit must be checked for proper sealing. Moreover, if present, the shut-off valve for the system pressure at the pressure-intake point must be closed.

The pointer moves in the null-point direction (possible temperature changes, condensation, to be considered), check also if the leakage exists.



Attention! With dangerous materials, such as Oxygen, Acetylene, flammable or poisonous materials, as well as chillers, compressors etc. all the general regulations, along with the existing relevant regulatory directions must be observed.

9.2. Adjustment of Set-Point Value with Contact Manometers

The adjustment of desired value (set-point value) is carried out via the supplied adjustment key which is inserted into the back of the contact electrical plug. The adjustment is made by inserting into the centre of the gauge face and rotating the contact pointer to the setpoint value. The switching point should be tested at operating pressure due to different hysteresis behaviours, particularly with magnet spring contact.

For reasons of hysteresis, switching accuracy, switching safety and the working-life of mechanical measuring systems, the switching points however should not be set in the range 0 to 10% and 90 to 100% of respective measurement span.

10. Maintenance

If the medium to be measured is not contaminated, the unit is maintenance-free. An examination of the display and the switching function should take place about 1 to 2 times per year. In order to check the display and switching function, the device is to be separated from the process and be subjected with a test pressure with appropriate inspection temperature.

10.1. Cleaning

Clean the devices with a dry or soap-water solution dampened cloth. If the electrical connections require cleaning make sure the power is disconnected first. Before restarting, it must be guaranteed that all parts are dried.

11. Technical Information

See "order confirmation" and data sheet.

12. Declaration of Conformance

We, Kobold Messring GmbH, Hofheim-Ts, Germany, declare under our sole responsibility that the product:

Manometer with Inductive and Electronic Contacts Model: MAN

to which this declaration relates is in conformity with the standards noted below:

EN 50581:2012 Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances

Also the following EU guidelines are fulfilled:

2011/65/EU **RoHS II** (category 9)

Additional for **MAN** **p_{max} > 200 bar**

2014/68/EU PED
Category I, Table 6, pipe, gases
Group 1 dangerous fluids

- Module D, marking CE0575
- Notified body: DNV GL
- Certificate No. PEDD000000R

Additional for **MAN** **p_{max} > 1000 bar**

2014/68/EU PED
Category I, Table 7, pipe,
Group 2 non dangerous fluids

- Module D, marking CE0575
- Notified body: DNV GL
- Certificate No. PEDD000000R

Additional for **MAN-..S/M/I/P**:

is in conformity with the standards noted below:

EN 60947-1:2015 Low-voltage switchgear and controlgear - Part 1: General rules

Also the following EC guidelines are fulfilled:

2014/35/EU
2014/30/EU

Low Voltage Directive
EMC Directive



H. Peters
General Manager



M. Wenzel
Proxy Holder

Hofheim, 21 Nov. 2019