



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 EWG-machine guidelines.

PED 97/23/EG

In acc. with Article 3 Paragraph (3), "Sound Engineering Practice", of the PED 97/23/EC no CE mark.

Model	P max/bar	Pipe	
		Diagram 7 Group 2 no dangerous fluids	Diagram 6 Group 1 dangerous fluids
MAN	< 200	Art. 3, § 3	Art. 3, § 3
MAN	< 500	Art. 3, § 3	Cat. I
MAN	< 1000	Art. 3, § 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 of 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 may be removed immediately before connecting measurement conductors, so that no foreign particles may find a chance to enter the pressure chamber. The storage of measurement unit should be arranged in a dry and dust-free area.

5. Operating Principle

Depending on the measuring range as well as method of measurement (capsule, diaphragm, bourdon), the pressure to be measured is brought to display via a mechanical pointer attachment. 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 necessary force may not be applied via the housing, instead only via key areas designated for such a purpose.

The installation place of the pressure-gauges should be well 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 is to be kept small.

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

The piping up to the measuring unit should allow a vibration-free and stable attachment; in other case a wall holding or an additional fortification via an attachment brim on housing should be provided. Alternatively, mounting in a 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 manometers and stop valve should be protected through sufficiently long measurement piping or water-bag pipes. The temperature influence can influence the display accuracy.

With gauges for gas measurements, accumulation of condensation is to be avoided by suitable laying of piping. 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 higher than expected measuring pressure, on **-** marked pressure connection, connect lower than expected pressure. In order to protect the unit, a pressure compensation valve is to be provided.

Through this valve, during commissioning or out of operation state of pressure-difference manometer, the measuring chambers on both sides of the measuring members are coupled among each other, and foremost if both pressure lines are open or closed, separated from each other. By means of this, a single-sided stress and thereby a possible overloading of measuring members is avoided.

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 the measuring-point is not sufficiently stable, a transmission line with one of the measuring unit's mounting, separated from the measuring-point should be provided.

The units should be protected against coarse contamination strong variations of ambient temperature.

6.4. Disassembly

Before disassembling the pressure-measuring unit, the machine/equipment should be rendered in a pressure-less state. If possible, the measuring pipe should be emptied. In case of flat-spring manometers, step-in screws between upper and lower flange should not be loosened. Material remains inside disassembled measuring unit can be dangerous for the environment, in which case corresponding safety precautions should be adapted. Pressure-measuring units, whose measuring elements are filled with water or water-based chemicals, may not be allowed to develop frost within.

7. Sliding or Magnet-Spring Contacts

7.1. General

The built-in limit signal generators (Sliding or magnet-spring contacts) are auxiliary current switches, which open or close connected wired electric circuits via the contact arm with the adjusted limit-value, moved by the actual value pointer.

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 with the power supply.

- The electrical connections may only be carried out by qualified personnel.
- Make sure that the electrical connection lines are not supplied with power.
- 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 earthing terminals are tagged accordingly. The supplied mains wires must be measured for the maximum current intake of the unit 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: Limit-value for the contact loading

Limit-value for contact loading with ohmic load	Sliding Contact	Magnet-spring contact	
	unfilled units	Unfilled units	Filled units
Nominal op. Voltage U_{eff}	250 V	250 V	250 V
Nominal op. Current			
Switch-in current	0.7 A	1.0 A	1.0 A
Switch-off current	0.7 A	1.0 A	1.0 A
Continuous current	0.6 A	0.6 A	0.6 A
Switching power	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 overstepped!

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

Voltage AC / DC V	Sliding contact			Magnet-spring contact					
	Unfilled housing			Unfilled housing			Filled housing		
	Ohmic Load		Inductive load $\cos \varphi > 0.7$ mA	Ohmic load		inductive load $\cos \varphi > 0.7$ mA	Ohmic load		inductive load $\cos \varphi > 0.7$ mA
	AC	DC		AC	DC		AC	DC	
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 process safety, as well as for the units with liquid -filled housings, in order to protect against oil turbidity, we recommend the use of an additional pulse-controlled 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 (direct evaluation in SPS).

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 connection may only be rendered by qualified personnel.
- Make sure, that the electrical connection wires are not active.
- 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 mains connection must be appropriate for the largest current intake by the unit 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 employed proximity switches, due to their slit-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 current value pointer moves Aluminium control-wings in the air-gap between both the coils (slit), which is immersed in the field. Thereby signal output is achieved without delay and changing in step with the movement of current value pointer.

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

By immersing the control-wings in the air-gap, the coil system is damped, the oscillations in the oscillator are set up and the system becomes relatively more resistive (approx. 7k Ω).

8.3. Electrical Data - Inductive 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 (Ub)
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

The measuring unit may only be subjected to pressure 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 in no case.

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. The leakage must be searched for and eliminated by means of suitable measures. Next, repeat system-check as a whole. For the null-point check on running system, the shut-off equipment must be closed and the measuring element to be released.

The pointer must then remain within the null-point tolerance bars, printed on the scale. If the pointer is outside the crossbar, then generally, damage to the measuring unit may result. Thus manometer should be subjected to an exact check, in order to avoid measuring errors, and subsequent accidents.

For display examination during operation, the pressure-measuring unit is locked off by means of shutoff device with test-connection disconnected and with the test-pressure applied. Manometers (display type) operate perfectly requiring no maintenance.



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 from the window-panel. The desired value pointers of limit-value switches are adjustable freely in the complete scale range. The switching point should be checked at operating pressure due to different hysteresis behaviours, particularly with magnet spring contact.

For reasons of 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

In case 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. For the cleaning of the interior of cable box or plug connector, the mains supply lines must be disconnected. 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:

DIN EN 31010-1	1994-03
DIN EN 60947-1	1992-07
DIN EN 60947-1 A11	1994-11
DIN EN 60947-5-1	1992-07

Also the following EWG guidelines are fulfilled:

97/23/EWG **Low voltage directive**

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

97/23/EG PED
Category I, Table 6, pipe,
Group 1 dangerous fluids

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

97/23/EG PED
Category I, Table 7, pipe,
Group 2 non dangerous fluids

Hofheim, 06. Dec. 2002



H. Peters



M. Wenzel