

# Operating Instructions for Differential Pressure Gauges

**Model: MAN-U**



We don't accept warranty and liability claims neither upon this publication nor in case of improper treatment of the described products.

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## 2. Note

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

The instruction manuals on our website [www.kobold.com](http://www.kobold.com) are always for currently manufactured version of our products. Due to technical changes, the instruction manuals available online may not always correspond to the product version you have purchased. If you need an instruction manual that corresponds to the purchased product version, you can request it from us free of charge by email ([info.de@kobold.com](mailto:info.de@kobold.com)) in PDF format, specifying the relevant invoice number and serial number. If you wish, the operating instructions can also be sent to you by post in paper form against an applicable postage fee.

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.

### **as per PED 2014/68/EU**

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

## 3. Instrument Inspection

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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.

### **Scope of delivery:**

The standard delivery includes:

- Differential Pressure Gauges     model: MAN-U...

## 4. Regulation Use

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Any use of the device which exceeds the manufacturer's specification, may invalidate its warranty. Therefore, any resulting damage is not the responsibility of the manufacturer. The user assumes all risk for such usage.

## 5. Operating Principle

These instruments model MAN-U are used to check filter obstructions, pressure drops, flow rate differences, level, measurements and generally the difference between two pressures of equal or different circuits. The measuring element is formed by two diaphragms, acting on the same movement. In this way the pointer senses only the difference between the two pressures corresponding respectively to up-stream and downstream pressure of the circuit.

## 6. Installation and commissioning

Before installation and commissioning verify the connection distance of the instrument process connection and the possible valve where it will be installed.

<u>Instrument:</u>	<u>Connection Distance:</u>
MAN-U...	50 mm

Tighten the instrument thread forcing on the process connection area by a special wrench without forcing with the hands.

As for cylindric threading process connections (GAS- metric), a head gasket compatible with the gas or fluid medium should be used.

If the connection thread is conic simply screw on the connection. In order to improve the thread tightness it is recommended to wrap the male thread with PTFE tape. **Not suitable for cylindric threading.**



In both cases twist through two hexagon wrenches the first applied on the plane faces of the connection and the other the pressure connection.

We recommend fixing the instrument through a pipe or panel mounting bracket. After mounting the instrument dial should be in vertical position except otherwise indicated on the instrument.

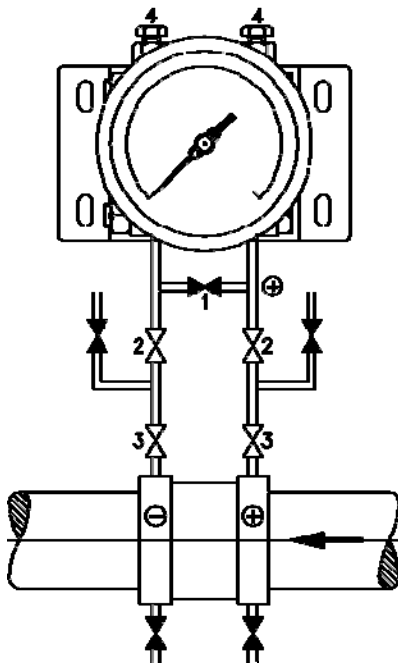
In order to remove the instrument for maintenance much easier it is recommended to use a manifold valve between the instrument and the system.

## 7. Installation

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Installation should be always carried out carefully in order to prevent any pressure spike or sudden temperature fluctuations.

Therefore, the shut-off valves should be opened slowly in order to check if there are restrictions, sediments or condensate which could affect the real values.



Please follow these instructions:

1. Open the by-pass valve "1"
2. Open the root valve "3"
3. Open the shut-off valve "2" of the plus side (+)
4. Verify that the chambers are completely filled up through the blow out vents placed on the top of the instrument.
5. Close the by-pass valve "1", open the shut-off valve "2" of the minus side (-)

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## 8. Operation limits

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### 8.1 Process and ambient temperature

This instrument is designed to be used in safety conditions that is in an ambient temperature between  $-40$  and  $+65$  °C. As for the filled model please see the paragraph "DAMPENING LIQUID FILLING"

### 8.2 Working pressure

This instrument is designed to work with a differential pressure of 100% of the full scale range.

<u>Instrument</u>	<u>Static pressure one-side</u>
MAN-U	25÷200 bar

<u>Instrument</u>	<u>Static pressure both-side</u>
MAN-U	200 bar

### 8.3 Dynamic and cyclic pressure

Not accepted.

### 8.4 Overpressure

The instrument is protected against overpressure only in case of short period overpressure disturbances. In case of longer unilateral overpressure the O-ring can adhere so strongly to the clamps that they do not detach regularly not even when the differential pressure decreases.

### 8.5 Vibrations

When the instrument support is subjected to vibrations, we can consider different solutions such as: a) the use of liquid filled instruments; b) remote mounted instruments connected through hoses (suitable for strong or irregular vibrations). Vibrations can be noticed if the index keeps on oscillating.

### 8.6 Dampening liquid filling

The dampening liquid is generally used to reduce vibrations of the moving parts due to vibrations and/or pulsations. The dampening liquid must be chosen very carefully in case the instrument operates with oxidant media such as oxygen, chlorine, nitric acid, hydrogen peroxide, etc. In presence of oxidant agents there is a potential risk of chemical reaction, inflammability and explosion of the instrument. In this case proper filling liquids must be used.

The type of the filling liquid as well as its ambient temperature use limits should be taken into consideration.

Dampening liquids	Working temperature
Glycerine 98%	+15...+65 °C (+60...+150 °F)
Silicon oil	-40...+65 °C (-40...+150 °F)

## 9. Wrong uses

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### 9.1 Breakage for corrosion

It occurs when the sensing element material is subjected to chemical attack by the substances contained in the medium to be measured or in the ambient surrounding the pressure system. The damage consists in a punctiform leakage or in a stress crack due to the material weakening.

The sensing element is normally characterised by a reduced thickness, so it works in condition of strong mechanical stress. Therefore, the chemical compatibility with the fluid to be measured has to be taken into consideration. No common material can be saved from a chemical attack which can be characterised by different factors: concentration, temperature and mixture of the different chemical substances.

### 9.2 Breakage for explosion

It occurs after a violent release of thermal energy due to some chemical reactions such as the adiabatic compression of oxygen in presence of hydrocarbons/combustibles. It is commonly accepted that it is impossible to prevent the effects of this kind of damage.

### 9.3 Pressure gauges suitable for use with oxygen are marked:



**“Oxygen – No lubrication” and/or  
They are marked with a crossed out oil can symbol on the dial**

Also, the models with double diaphragm seal are filled up between the two diaphragms with a special neutral fluorolube liquid. Instruments are supplied properly cleaned and degreased with special products and packed in polyethylene bags. The user must take the necessary precautions to ensure that the connection and the elastic element are kept clean after the pressure gauge has been unpacked.

### 9.4 Breakage for vibrations

Vibrations most commonly cause an abnormal deterioration of the parts in the movement bringing to a gradual loss of accuracy and then to a total block of the pointer.



### **9.5 Dangerous process fluids**

When the instrument does not work correctly the sensing element can break or crack; if the medium measured is inflammable and the measurement activity is continuous an explosive atmosphere could generate inside and outside the instrument case. In this case it is fundamental an appropriate maintenance program through which the damaged instruments are replaced before the leakage occurs.

### **9.6 Mechanical stress**

If the installation points are subjected to stress the instruments should be remote mounted and connected through hoses. Instruments should be chosen among those suitable for surface or panel mounting.

## **10. Maintenance**

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The instrument's characteristics should be maintained during time through a special maintenance program on which skilled personnel should work on.

The instrument features must be maintained in order to prevent damages due to high temperatures, risk of fire and explosion due to abnormal instrument working.

As for heavy work instruments operating in severe conditions plants (vibrations, pulsating pressures, corrosive or sedimentous fluids, combustible or inflammable media) we recommend to schedule their replacement according to the maintenance program schedule. It is recommended to verify the sensing element condition, the indication pressure, the sensing element corrosion level (as far as the diaphragm seals are concerned), the gaskets tightness and the condensate presence inside the housing. In case the instrument does not work properly it is necessary to proceed to an unschedule examination procedure.

### **10.1 Routine check**

In order to verify the sensing element condition, install the instrument on the pressure generator introducing an interception valve between them. Apply the maximum pressure value to the gauge and exclude it from the pressure source through the valve. Any possible leakage of the sensing element can be noticed from the slow return of the pointer to zero. In order to verify the accuracy of indication create in laboratory a stable pressure value and apply it to the instrument to be examined and to a pressure test/primary testing instrument.

# MAN-U

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## 10.2 Recalibration

If after recalibration results are different from the nominal values declared on the data sheet the recalibration procedure should be repeated. It is recommended to return the instrument to Kobold for this procedure.

**Kobold will not be responsible for any non authorized intervention on the instrument.**

**Moreover, the contract warranty will be no longer valid.**

## 11. Disposal

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It is recommended to remove the window and blow out vent before disposal as aluminium and stainless steel. The fluid remaining inside the instrument can be dangerous or toxic.

## 12. Order Codes

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Example: **MAN-U FC R F2 000**

Model	Housing size (DS)/ connection type	Connection	Range	Options
MAN-U...	<p>...FC... = ø 100, VA, back flange</p> <p>...HC... = ø 150, VA, back flange</p> <p>...FE... = ø 100, VA, front flange</p> <p>...HE... = ø 150, VA, front flange</p>	<p>...R... = 1/4" NPT female, bottom</p> <p>...S... = 1/2" NPT male, bottom</p> <p>...6... = 1/2" BSP male, bottom</p>	<p>...F2... = 0...100 mbar</p> <p>...F3... = 0...160 mbar</p> <p>...F4... = 0...250 mbar</p> <p>...F5... = 0...400 mbar</p> <p>...F6... = 0...600 mbar</p> <p>...FA... = 0...1000 mbar</p> <p>...FB... = 0...1600 mbar</p> <p>...B4... = 0...2.5 bar</p> <p>...B5... = 0...4 bar</p> <p>...B6... = 0...6 bar</p> <p>...B7... = 0...10 bar</p> <p>...B8... = 0...16 bar</p> <p>...B9... = 0...25 bar</p> <p>...EY... = single scale as per data sheet without add-on price</p> <p>...DY... = dual scale as per data sheet against add-on price</p>	<p>...000 = no options</p> <p>...other options = see options table</p>

## Options

Description	Code	Housing size [mm]	Notes
Inductive and mechanical electronic contacts	-	150	Codes, descriptions and wiring in separate data sheet
AISI 316 stainless steel case and ring	<b>C40</b>	100/150	
MONEL 400 diaphragm and process connections	<b>D10</b>	100/150	Accuracy 2.5 as per EN837, for pressure ranges <400 mbar
NACE MR0103/MR0175 (ISO15156)	<b>E30</b>	100/150	To be ordered with MONEL 400 diaphragm (code M23)
protection IP65	<b>E65</b>	100/150	
Maximum pointer IP65	<b>L22</b>	100/150	To be ordered with Plexiglas window (code T31)
MONEL 400 diaphragms	<b>M23</b>	100/150	Accuracy 2.5 as per EN 837, for pressure ranges <400 mbar
Oil-free and degreased, oxygen service	<b>P02</b>	100/150	Filling of internal chamber with Fluorolube
Case glycerine filling, IP67 (ambient temperature +15...+65 °C)	<b>R10</b>	100/150	
Silicone filling, IP67 (ambient temperature -40...+65 °C)	<b>R11</b>	100/150	Window gasket and blow out vent: FPM
2" pipe mounting bracket	<b>S31</b>	100/150	For connection type C only
Tropicalisation	<b>T01</b>	100/150	
Stainless steel label	<b>T25</b>	100/150	
Plexiglas window	<b>T31</b>	100/150	
Safety glass window	<b>T32</b>	100/150	

## Options for Remote Mounting, with Diaphragm Seal

Description	Code	Housing size [mm]	Notes
2 diaphragm seals mounting*	ADD	100/150	With diaphragms >ø 63 mm only
Stainless steel capillary, covered with st. st. armour 1 m	CP1	100/150	
Stainless steel capillary, covered with st. st. armour 2 m	CP2	100/150	
Stainless steel capillary, covered with st. st. armour 3 m	CP3	100/150	
Stainless steel capillary, covered with st. st. armour 4 m	CP4	100/150	For pressure ranges ≥ 0...250 mbar
Stainless steel capillary, covered with st. st. armour 5 m	CP5	100/150	For pressure ranges ≥ 0...250 mbar
Stainless steel capillary, covered with st. st. armour 6 m	CP6	100/150	For pressure ranges ≥ 0...400 mbar

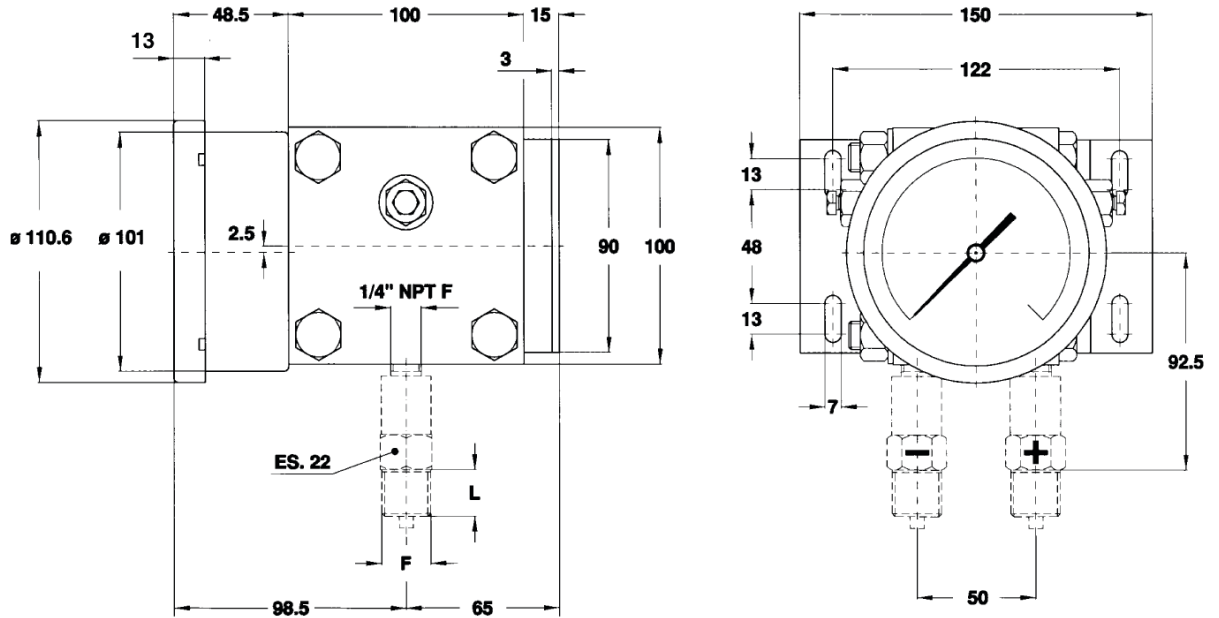
\* for pressure ranges <250 mbar call our sales team

# MAN-U

## 13. Dimensions

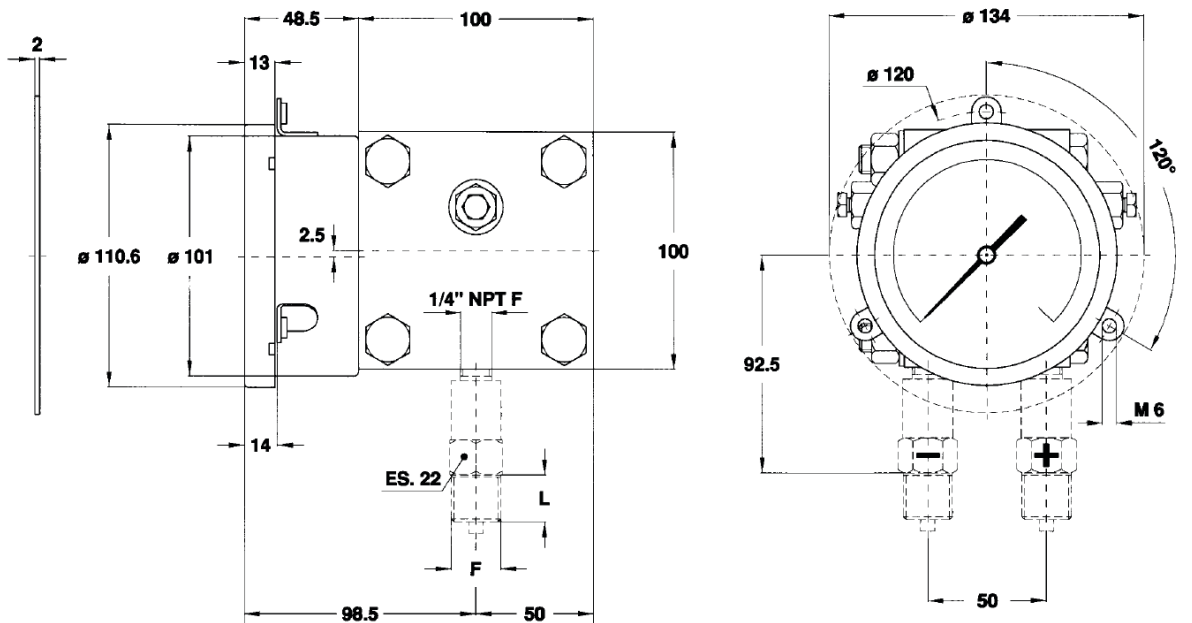
### Model MAN-UFC

Surface mounting, back flange, lower connections



### Model MAN-UFE

Panel mounting, front flange, lower connections





## 14. EU Declaration of Conformance

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

**Differential Pressure Gauge**

**Model: MAN-U...**

to which this declaration relates fulfils the following EC guidelines:


**2011/65/EU**

**RoHS**

Hofheim, 31. January 2017



H. Peters  
General Manager



M. Wenzel  
Proxy Holder