

# Differential Pressure and Flow Meter

## Media 4 K · Indicator 160 Ø

with inductive limit switches



### Application

Flow, differential pressure, and liquid level indicator with either one or two limit switches.

For measuring spans from 40 to 2500 mbar at static pressures up to 40 bar.

The instrument is used for measuring, indicating, and limit monitoring of differential pressures and other variables which are derivable from a differential pressure.

Depending on the respective version, the instrument can be equipped with either one and/or two inductive limit switches. Maximum switches provide a limit signal when the measured values exceed the adjusted limit value, minimum switches provide a signal when the limit value is fallen short of. These limit signals can be used to control a connected switching amplifier (transistor relay).

The Media 4 K Indicator consists of a differential pressure cell operating according to the deflection method, an indicating unit with gear mechanism, a pointer, a scale with 160 mm diameter, and a limit switch unit. The instrument is applicable for:

**Flow measurement** using the differential pressure method

**Differential pressure measurement**, e.g., between flow and return flow pipe, liquid level measurement on pressure tanks, and measurement of the pressure drop across filters and valves.

### Features

- Applicable for liquids, gases and steam
- Easily exchangeable measuring spring
- Overloadable on one side up to the perm. static pressure
- Designed for field installation (degree of protection IP 54) and panel mounting
- Zero adjustment from the front.

### Versions (Figs. 1 and 2)

**Media 4 K**, Indicator (160 Ø) with limit switch unit. Dp-cell with a brass housing PN 40 and an ECO measuring diaphragm.

With dp-cell for spans from 40 to 600 mbar **or**  
with dp-cell for spans from 250 to 1600 mbar **or**  
with dp-cell for spans from 1600 to 2500 mbar.

Can optionally be equipped with:

Limit switch versions from A to F,  
a scale of 0 to 100% linear or square, a scale acc. to DIN 19204, scales exchangeable for different media, special scales.

**Media 4 K**, special version for oxygen. Applicable for operating pressures up to 40 bar and temperatures up to 60 °C.

**Media 4 K**, special version for spans from  $\pm 40$  to  $\pm 2500$  mbar, equipped with the corresponding scale.

**Media 4 K**, special version for a dp-cell manufactured of A 351 CF8M according to ASTM.



Fig. 1 · Media 4 K, Indicator 160 Ø with two inductive limit switches (front view)



Fig. 2 · Media 4 K, Indicator 160 Ø with two inductive limit switches (side view)

- 1 Differential pressure cell
- 2 Housing of indicating unit with cover (2.2); zero adjustment (2.6)
- 3 Limit switch unit

**Media 4 K**, versions with limit switches for hazardous areas. Details referring to the special versions listed above are available on request.

### Principle of operation (Figs. 3 and 4)

The differential pressure cell (1) operates according to the deflection method. It is equipped with an ECO measuring diaphragm (1.6) designed for spans from 40 to 600 mbar, 250 to 1600 mbar or 1600 to 2500 mbar. The spring-guided (1.9) diaphragm shaft (1.8) is connected with the lever (1.11) via the connection link (1.10), with the diaphragm via the diaphragm plates (1.7), and with the measuring spring (1.5) via a spring washer. The lever (1.11) transmits the diaphragm motion through the flexible gasket (1.12) which confines the fluid within the dp-cell. The tension bands (1.13) connected to the lever and the housing ensure that the lever position is independent of the static pressure. The dp-cell is overloadable from one side, because the measuring diaphragm flexes against the wall when the measured values are out of range.

The differential pressure  $\Delta p = p_1 - p_2$  produces a force on the measuring diaphragm (1.6), which is balanced by the measuring spring (1.5). The deflection of the diaphragm (1.6) and the lever (1.11), which is proportional to the differential pressure sensed, is transmitted to the pointer via the adjustable coupling (2.3) and the gear mechanism (2.4).

The measuring spring (1.5) installed in the dp-cell (1) determines the minimum and maximum span of the instrument (see "Technical data"). Within these limits, the span can be continuously adjusted at the coupling (2.3). This adjustment alters the transmission ratio between lever (1.11) and gear mechanism (2.4).

The pointer shaft (3.1) carries the limit switch unit containing the metal tags (3.2 and 3.5) and the red limit value pointers (3.3 and 3.6) with the attached inductive pick-ups (3.4 and 3.7).

If the metal tag is contained inside the field of the associated inductive pick-up, the pick-up becomes highly resistive. If the tag is not contained in this field anymore, the pick-up becomes low resistive. This function corresponds to that of a mechanical switching contact.

During normal operation (Fig. 3), both metal tags are inside the field of the associated inductive pick-up. If a set limit value is reached, the metal tags follow the pointer. If the measured values exceed or respectively fall below the limit value, the tags go out of the pick-up field.

Switching amplifiers (transistor relays) have to be connected in the output circuit of the inductive limit switches. These amplifiers must comply with the operational requirements of subsequent control instrumentation.

### Ordering text

Differential Pressure Meter / Flow Meter Media 4 K

Dp-cell for measuring spans up to 600 / 1600 / 2500 mbar

Spring for span from ... to ... mbar, adjusted to ... mbar

Scale 0 to 100% linear / square / scale acc. to DIN 19 204 / exchangeable scale / special scale ...

With optional limit switch versions A to F

On option special version ...

On option accessories ...

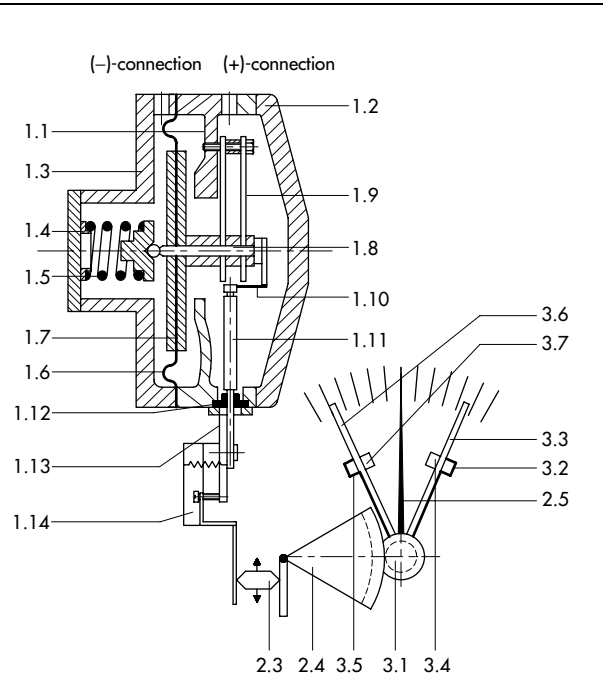


Fig. 3 · Functional diagram of the indicator 160 Ø with limit switch unit

Fig. 4 · Indicator 160 Ø with limit switch unit (3) without closing cover (2.2)

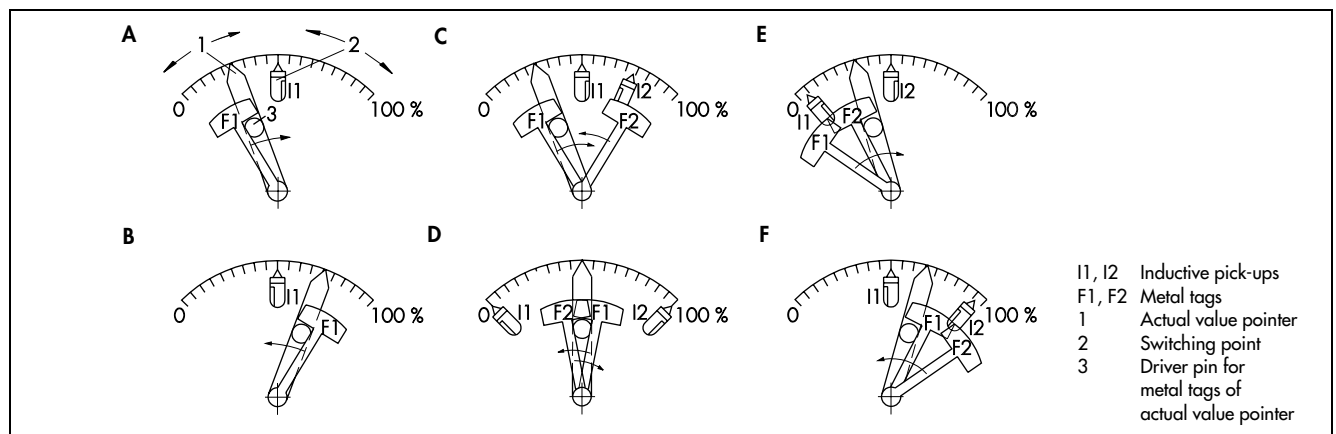
1 Differential pressure cell	2 Indicating unit
1.1 Housing	2.1 Rear cover
1.2 High pressure head	2.2 Closing cover
1.3 Low pressure head	2.3 Adjustable coupling
1.4 Spring plate	2.4 Gear mechanism
1.5 Measuring spring	2.5 Pointer
1.6 Measuring diaphragm	2.6 Zero adjustment
1.7 Diaphragm plates	3 Limit switch unit
1.8 Diaphragm shaft	3.1 Pointer shaft
1.9 Guide springs	3.2 Metal tag
1.10 Connection link	3.3 Limit value pointer
1.11 Lever	3.4 Inductive pick-up
1.12 Gasket	3.5 Metal tag
1.13 Tension bands	3.6 Limit value pointer
1.14 Coupling with overload protection	3.7 Inductive pick-up

**Technical data** - All pressures in bar (gauge)

Differential press. meter		60	100	160	250	400	600	1000	1600	2500
Meas. span	Max. mbar	60	100	160	250	400	600	1000	1600	2500
	Min. mbar	40	60	100	160	250	400	600	1000	1600
Nominal pressure		PN 40, overloadable on one side up to 40 bar								
With measuring diaphragm for spans from 40 to 600 mbar, 250 to 1600 mbar or 1600 to 2500 mbar										
Volume of dp-cell		High pressure chamber: approx. 80 cm <sup>3</sup> , low pressure chamber: approx. 25 cm <sup>3</sup>								
Displacement volume		Max. 9 cm <sup>3</sup> (with min. measuring span: 5 cm <sup>3</sup> )								
Scale		Scale 270°, scale length approx. 300 mm								
Scale version on request		0 to 100 % linear or squared For any linear measured variables, for measured variables acc. to an equation, curve or table								
Performance		Indications linear to differential pressure								
Terminal based non-conformity		< ±2.5 %	< ±1.6 % (including hysteresis)							
Sensitivity		< 0.5 %	< 0.25 %							
Effects in % of span		Static pressure: < 0.03 % / 1 bar								
Limit switch unit		Limit value pointer with inductive pick-up, min. limit value spacing: 5% of scale length								
Pick-up		Inductive pick-up SJ2-SN								
Switch. accuracy		< ±2.8%	< ±2%							
Hysteresis, approx.		< 0.8%	< 0.6%							
Environmental conditions		Perm. ambient temperature: -20 to +70 °C, perm. storage temperature: -30 to +100 °C								
D. of p. acc. to DIN 40050		IP 54								
Weight		Approx. 3.5 kg								

**Note:** All errors and deviations stated in % of. Measuring span correction by changing the transmission ratio in the limits of approx. 1:0.6. For flow measurement, see Data Sheet T 9550 E. The technical data related to the special version are the same as for the standard version.

**Limit switch versions**



Switch version	Number of switches	Preloading of the metal tag(s)	Principle of operation
A	1	F1 clockwise	F1 leaves pick-up field as the indicated actual values decrease, and enters the field as the values increase.
B	1	F1 counterclockwise	F1 leaves pick-up field as the indicated actual values increase, and enters the field as the values decrease.
C	2	F1 clockwise, F2 counterclockwise	F1 and F2 leave pick-up field when the switching points are reached. Increasing actual values from 0 to 100%: F1 enters, F2 leaves pick-up field. Decreasing actual values from 100 to 0%: F2 enters, F1 leaves pick-up field.
D	2	F1 counterclockwise, F2 clockwise	F1 and F2 enter pick-up field when the switching points are reached. Increasing actual values from 0 to 100%: F1 leaves, F2 enters pick-up field. Decreasing actual values from 100 to 0%: F2 leaves, F1 enters pick-up field.
E	2	F1 and F2 clockwise	F1 and F2 leave pick-up field as the indicated actual values decrease and enter the field as the values increase.
F	2	F1 and F2 counterclockwise	F1 and F2 leave pick-up field as the indicated actual values increase and enter the field as the values decrease.

**Inductive pick-ups** that are normally closed (NC)

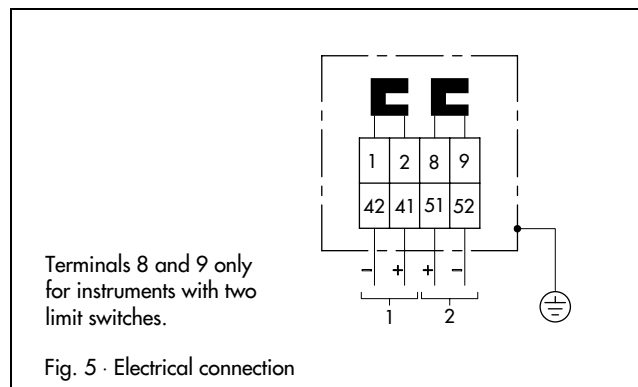
Metal tag outside pick-up field: operating signal "ON" (L-signal of inductive pick-up) - contact closed or output activated - pick-up is low resistive - undamped - power consumption ≥ 3 mA

Metal tag inside pick-up field: operating signal "OFF" (O-signal of inductive pick-up) - contact open or output blocked - pick-up is highly resistive - damped - power consumption ≤ 1mA.

### Materials (WN = Material Number)

Measuring diaphragm	ECO
Housing, heads and spring plate	Cu Zn 40 Pb
Measuring and guide springs	WN 1.4310
Diaphragm plates	WN 1.4571
Lever	WN 1.4310
Housing of indicating unit	Polycarbonate
Special version - measuring cell with stainless housing -	
Housing and heads	A 351 CF8M
Spring plate	WN 1.4301
Lever	WN 1.4571

### Electrical connection



### Installation (see Figs. below)

**Tube mounting** – with mounting device and clamps for attachment to a horizontal or vertical 2" tube.

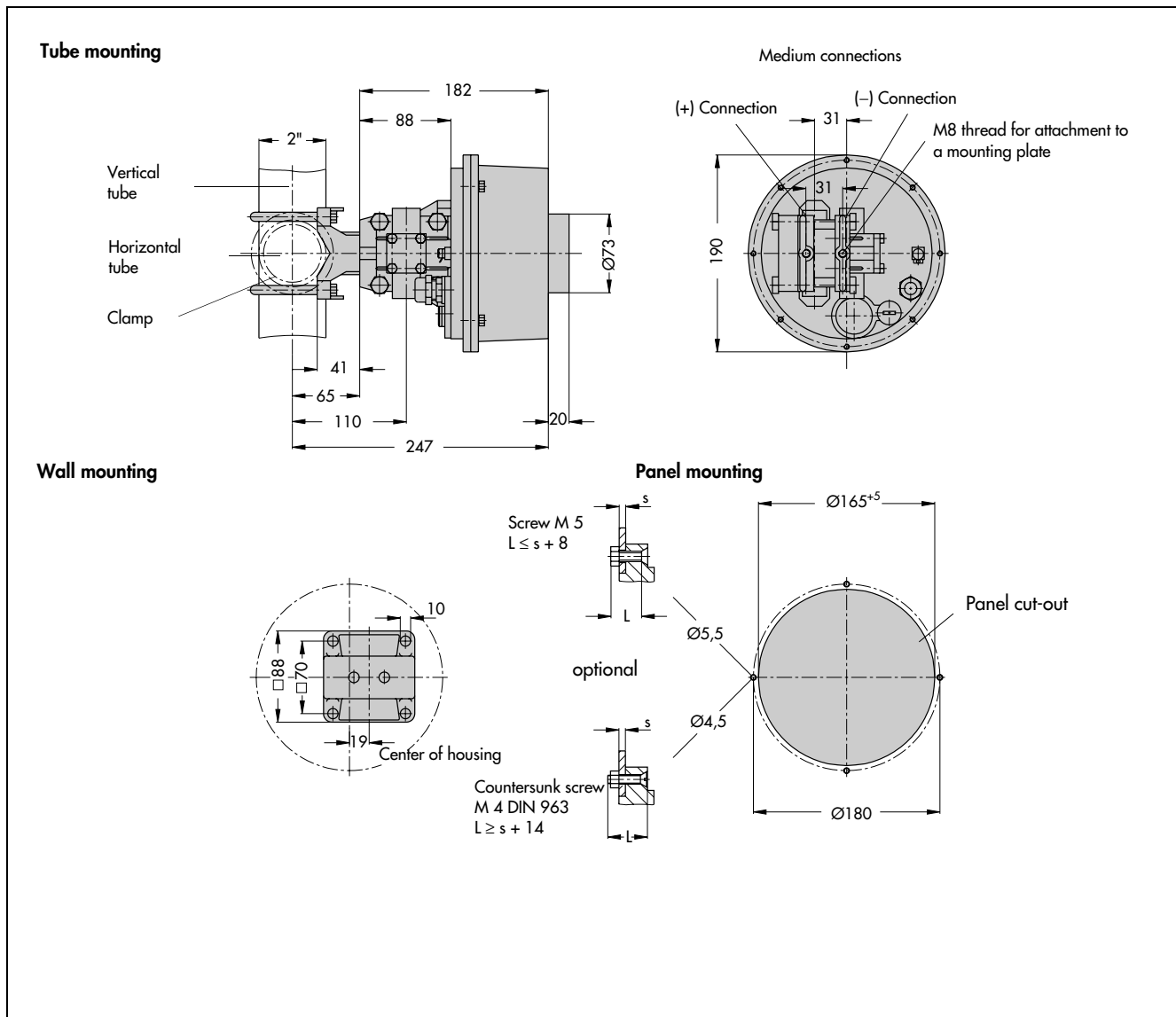
Indicating unit with burst protection in the rear cover of the housing.

**Wall mounting** – without mounting device for attachment to a metal plate or with mounting device for attachment on a wall.

**Panel mounting** – on option with four screws M5 or countersunk screws (M4 DIN 963) and hexagon nuts M4.

**Process fluid connections:** tapped holes ISO 228 G 3/8.

### Dimensions in mm



Specifications subject to change without notice.

