



Read these instructions carefully before use.

The instrument must be installed by qualified personnel, only.

Observe the stated power supply voltage.

Do not use with combustible gas.

Do not blow into the pressure ports.

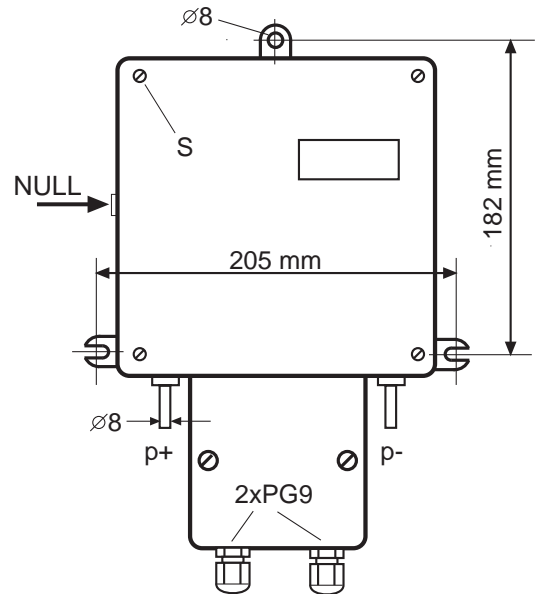
This instrument contains filling fluid: do not remove from the wall with opened valves!

Please notice that the 4-20mA output must not (!) be connected to loop-powered (2-wire) instruments.

While housing is removed, avoid any contact to the electronic board!

Description

The MU DIGITAL measuring instrument converts pressure, draft or differential pressure of non combustible gases, mainly air, into standard electronic signals of 0-20mA, 4-20mA and 0-10V.



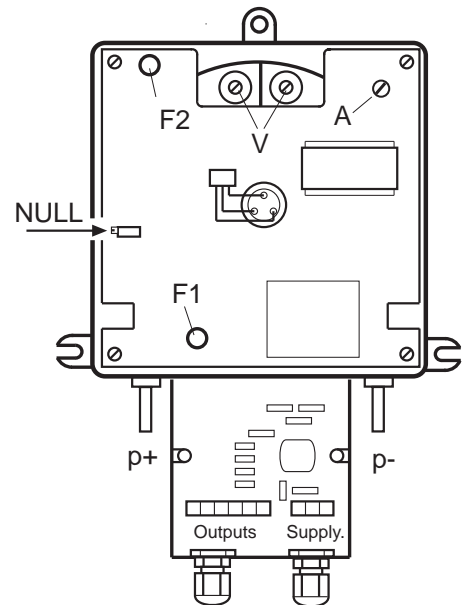
Installation Instructions

1. Mount the instrument vertically on the wall.
2. Remove the 4 front screws (S) and take off the cover.
3. Open both valves (V) by turning both screws fully counter-clockwise.

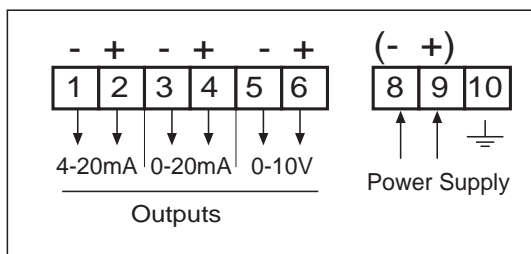


Incompletely opened valves will cause measuring errors !

4. Turn locking screw (A) **fully** counter-clockwise.
5. Replace the cover and fasten with screws (S).
6. Open the terminal box.
Verify if the voltage specified on the label is correct. Connect the power supply and the electrical output according to the terminal diagram.
The "+" and "-" at terminals 8/9 is for DC supply, only.



Terminal Diagram:



- A** Locking Screw
- V** Valves
- F1** Fuse (0-10V output)
- F2** Fuse (spare fuse)
- NULL** Zero Adjustment

7. Zero adjustment: The potentiometer **NULL** for zero setting is behind the plug on the left side of the housing.

For zero setting, both of the external pressure connections (p+/p-) and both of the valves (V) must be fully opened.

8. Make process connection(s):

- pressure left fitting (p+)
- negative pressure. . . right fitting (p-)
- draft / pressure
- (e.g. -20/0/+20 Pa). . . left fitting
- differential pressure . . higher pressure on the left,
lower pressure on the right
pressure port

 **Before Transporting:**

1. Disconnect the power supply !
2. Remove the cover
3. Close both valves (V)
4. Locking device: position the ringbody so that the pin on the rear side of the ringbody is aligned with the slot in the white locking bar. Lock down the ringbody by turning the **screw A** clockwise until the locking bar engages the pin (turn up to stop).

Technical Data

Measuring Principle

Ringbalance measuring system; factory filled ringbody, supported by two ball-bearings

Process Connections

2 fittings for flexible tubes, 8mm outside diameter

Electrical Connections

Screw terminals in the terminal box, 2 cable fittings PG9 with strain relief

Housing

Cover made out of polycarbonate; base plate out of glass reinforced polycarbonate. Protection class IP42.

Digital Display

LCD 12.5 mm (0.5" in.) high

Accuracy

max. error +/-1.5% of span or +/-1.5 Pa

Electrical Outputs

0-20mA, 4-20mA, 0-10V

Output Loads

mA range max. 680 Ohms

Voltage range min. 2k Ohms

Power Supply

Specified on the label inside the terminal box.
Power consumption: 3.5VA; no internal fuse

Operational Temp.

0...+50C° (32 - 122°F)

Measuring Pickup

Magnetic field sensor, non-contact, with infinite resolution

Electromagnetic Compatibility

According to EN 50082-2 (Immunity) and EN 50081-2 (Emission)

Specified on the label of each instrument:

- 1.* Instrument SN°
2. Measuring range
3. Power supply
4. Type of filling fluid

***Service**

When inquiring about your Ringbalance, please include the serial number.

This information will assist us in determining all technical specifications of your instrument.

The Ringbalance Measuring Principle

E_MUdigital

-3-

Principle

A hollow ring, free to rotate on bearings and half filled with fluid, is divided by partition wall (T) into two chambers. Positive, and negative or differential pressure are applied to the ringbody chambers via flexible tubes. The pressure differential across the dividing wall causes the ringbody to rotate until an equilibrium is reached with counterweight (G).

Filling Fluid

Since the differential pressure is ultimately balanced by the counterweight, it follows that neither the quantity nor the density of the filling fluid play a role in the actual measurement. However, these two factors are subject to the following criteria:

Maximum Quantity: the ringbody should be filled up to the filling opening (see fig.4).

Minimum Quantity: if oil spills out because of improper operation or handling (overpressure; tipping over, etc.), the instrument **must be checked** to confirm that the maximum measuring range value can still be reached:

Quantity Check:

Carefully (!) pressurize the instrument (beware of excessive pressure!). If the maximum of the measuring range can be reached, no oil should be added. However, if the applied pressure comes out of the other pressure connection, and results in "bubbling-through" (figure 3) **before** the maximum range is reached, oil of the same type must be added.

Stop pressurizing when the maximum range is reached ! Watch the LCD reading !

Density (specific gravity)

Although the density of the filling fluid has no direct influence on the actual measurement, it must meet certain criteria. A light oil is suitable for low ranges. For higher ranges, the specific gravity is more critical, since an oil which is too light would experience a large level change and overflow into the flexible tubes before the pointer reaches the maximum value.

Mineral Oil

density 0.8kg/l, overload point at 1 kPa (4" W.C.)
max. range 700 Pa

Synthetic Oil

density 1.9 kg/l, overload point at 2 kPa (8" W.C.)
max. range 1.8 kPa (7" W.C.)

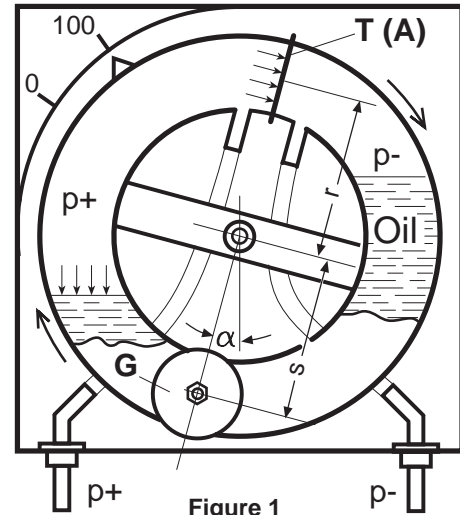


Figure 1

$$\Delta p = \frac{G \times s}{A \times r} \sin \alpha$$

Δp . . Differential Pressure [Pa]

G Counterweight [N]

A Area of partition wall T [m²]

r Average Ringbody Radius [m]

s Counterweight Moment Arm [m]

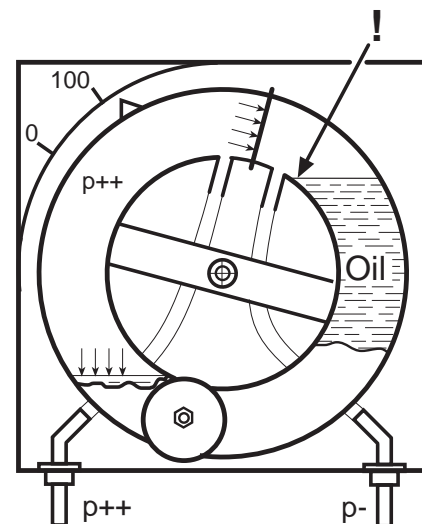


Figure 2

(near the overflow point)

Refilling (figure 4)

In the event that the filling fluid has to be replenished, remove the filling plug (F) and add fluid, using a funnel and tube, until the fluid comes out of the filling opening.

The Ringbalance must be in its normal upright position during this process, and the ringbody valves (V) and pneumatic lines must be **open**.

Overload

The calibration of a Ringbalance instrument is determined by the mass of the counterweight, which is accurately adjusted at the factory.

A counterweight cannot "age" or become "overloaded" Therefore, Ringbalances can occasionally be loaded to the maximum and even overloaded without affecting their mechanical calibration.

The critical point is reached when the oil rises so high that it overflows into the flexible tube.

This **overflow point** (fig. 2) is actually determined by the density of the fluid used, not by the measuring range.

For example, a Ringbalance filled with mineral oil (density 0.8kg/l) is protected to 1 kPa (4" W.C.), even if it has a range of only 0-50 Pa (0.2" W.C.).

With synthetic oil (1.9 kg/l), the Ringbalance is protected to 2 kPa (8" W.C.).

If higher pressures are expected, a special protective device must be installed (type "DZ1").

Functional Check

If, through any circumstances, a part of the filling fluid spills out, the following functional check is recommended:

First, determine if the maximum measuring range is reached or if some oil must be added (see section above: "**Quantity Check**"). Refill, if necessary.

Next, determine if the Ringbalance is **correctly zeroed** (see above: "**Zero Adjustment**").

The Ringbalance is most likely to be functioning correctly when:

1. **the maximum value can be reached**
2. **when the instrument can be exactly "zeroed"**

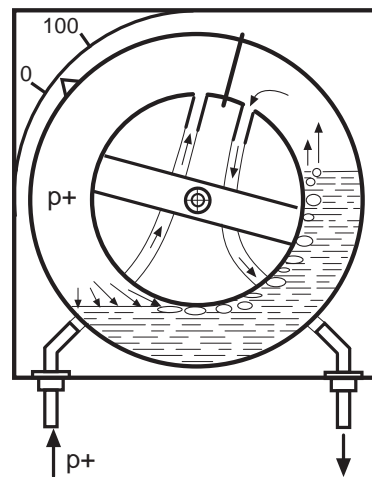


Figure 3
("Bubbling through")

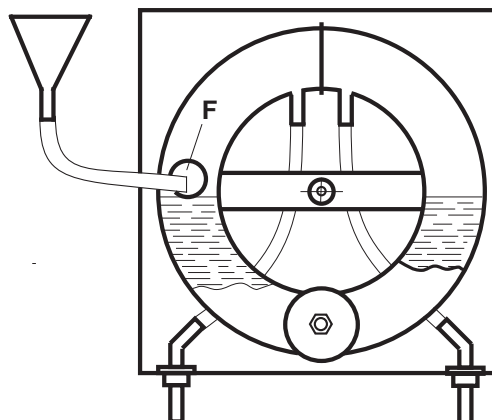


Figure 4:
(Replenishing the filling fluid)

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