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# **Instruction Manual**

## **EMA 84**

### **Digital Pressure Gauge**

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## Purpose of instruction manual

This instruction manual describes the features of the EMA 84 digital pressure gauge and provides guidelines for its use.

Improper use of this instrument or failure to follow these instructions may cause injury or equipment damage. Every person who uses this device must therefore read the manual and understand the possible risks. The instruction manual, and in particular the safety precautions contained therein, must be followed carefully. **Contact the manufacturer if you do not understand any part of this instruction manual.**

Handle this manual with care:

- It must be readily available throughout the lifecycle of the instrument.
- It must be provided to any individuals who assume responsibility for operating the instrument at a later date.
- It must include any supplementary materials provided by the manufacturer.

The manufacturer reserves the right to continue developing this instrument model without documenting such development in each individual case. The manufacturer will be happy to determine whether this manual is up-to-date.

## Conformity

This instrument corresponds to the state of the art and meets all legal requirements set forth in EC directives as evidenced by the CE label.



## Translation of the original instructions

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The manufacturer owns the copyright to this instruction manual. This manual contains data, instructions and drawings pertaining to the features and usage of this instrument; copying this manual in part or in full or distributing it to third parties is prohibited.

## **1 Safety precautions**

### **1.1 Appropriate use**

The EMA 84 is a portable, battery-powered digital pressure gauge for measuring positive and negative differential pressures. At the heart of this precision instrument is a pressure measurement capsule containing a membrane spring; the deflection of this spring is then ascertained via an inductive measurement principle. Because it is durable and easy-to-use, the EMA 84 lends itself well to maintenance work and customer service applications for heating, air-conditioning and ventilation units, where it can be used for monitoring filters, measuring fireplace drafts and wind pressure, etc. Its precision and reproducibility also make the EMA 84 highly suitable for use in laboratory applications.

Always observe the operating requirements—particularly the permissible supply voltage—indicated on the rating plate and in the “Technical data” section of this manual.

The instrument may only be handled as indicated in this manual. Modifications to the instrument are prohibited. The manufacturer is not liable for damages caused by improper use or failure to follow these instructions. Violations of this type render all warranty claims null and void.

### **1.2 Shipping, assembly, electrical connections and start-up**

Only technical personnel who are appropriately trained and authorized by the operator of the facility may assemble the instrument and set up its electrical connections.

The instrument may only be operated by appropriately trained individuals who have been authorized by the operator of the facility.

Specific safety precautions are given in individual sections of this manual.

### **1.3 Troubleshooting, maintenance, repairs, disposal**

The individual responsible for the electrical connections must be notified immediately if the instrument is damaged or if errors occur.

This individual must take the instrument out of service until the error has been corrected and ensure that it cannot be used unintentionally.

This instrument requires no maintenance.

Only the manufacturer may perform repairs that require the housing to be opened.

The electronic components of the instrument contain environmentally hazardous materials and materials that can be reused. For this reason the instrument must be recycled in accordance with the environmental guidelines of the jurisdiction in question once it has been taken permanently out of service.

## 1.4 Symbols

The symbols given below are used throughout this manual to indicate instances when improper operation could result in the following hazards:



**WARNING!**

This warns you of a potential hazard that could lead to bodily injury up to and including death if the corresponding instructions are not followed.



**WARNING:**

This warns you of a potential hazard that could lead to significant property damage if corresponding instructions are not followed.



**INFORMATION:**

This indicates that the corresponding information is important for operating the instrument properly.

## 1.5 Important notes on batteries and rechargeable batteries

According to current international regulations, batteries, rechargeable batteries, and electrical and electronic devices must not be disposed of via household waste.

Optional built-in lithium-ion batteries must be returned together with the device.

Proper Disposal:

Please use the return systems provided by retailers or commercial take-back schemes or your local municipal collection points. Check for a suitable collection point in your area.

**Depending on the device's features, different instructions apply to the use and disposal of batteries/rechargeable batteries.**

The device is equipped with a NiMH battery:

Nominal voltage: 9V

Replacement batteries: 9V block 6LR61 MN1604



### **DANGER – Fire and explosion hazard!**

- Never throw the battery/accumulators into a fire, open, damage, or short-circuit them.
- Do not expose the battery/ accumulators to temperatures below  $-10\text{ }^{\circ}\text{C}$  or above  $+50\text{ }^{\circ}\text{C}$ .
- Non-rechargeable batteries must never be recharged.

Lithium-ion batteries can cause serious injuries in case of short-circuit, overheating, or mechanical damage.



### **WARNING - Risk of injury!**

Improper handling of lithium-ion batteries may cause injuries

- If the device has a built-in battery, only charge it with the supplied or manufacturer-approved charger.
- In case of leakage or deformation, do not touch the battery/accumulator. Rinse immediately with plenty of water if contact with skin or eyes occurs, and seek medical attention.



### **CAUTION Avoid damage to property!**

- Protect against moisture and direct sunlight.
- Unauthorized opening of the device may lead to injury and void the warranty.
- Observe polarity when connecting.



### **NOTICE**

1. This product does not contain batteries with lead (Pb), cadmium (Cd), or mercury (Hg), in accordance with current EU regulations.

## 2 Instrument description

### 2.1 Features

The EMA 84 is a battery-operated, digital precision pressure gauge for measuring overpressure, vacuum and differential pressure of non-aggressive gases. Operating range is 100 Pa to 100 kPa.

Because it is robust, easy-to-use and includes an analog output, this instrument is especially suitable for maintenance, customer service and record-keeping for heating, ventilation and air-conditioning units.

At its heart is a pressure measurement capsule with a beryllium bronze membrane spring, which is displaced by the pressure difference between the two chambers of the measurement capsule. A distance measurement system converts this displacement into an electrical signal.

### 2.2 Operating elements



### 3 Start-up

#### 3.1 Electrical connections



**Use only IEC 6 LR 51 batteries.**

Open the battery compartment on the rear of the instrument by sliding down the silver locking button. Clip the battery to the battery connector, making sure that the battery terminals match those of the connector. Place the battery in the compartment and replace the cover.

#### 3.2 Pneumatic connections

Connect the EMA 84 to the pressure source at the overpressure port (+) when measuring overpressure, at the vacuum port (-) when measuring vacuum pressure, or at both ports (making certain to connect the + and - ports appropriately) when measuring differential pressure.

The two valves next to the pressure ports should always be kept open (by turning all the way to the left) when transporting the instrument or when beginning a measurement. Turning the valves to the right will close them.

The valve of the overpressure port (+) must be closed when measuring overpressure, and the valve of the vacuum port (-) must be closed when measuring vacuum pressure. Both valves should be closed when measuring differential pressure.

#### 3.3 Operating the instrument

The battery voltage must be greater than 7 V for proper operation. The battery must be replaced if this is not the case. "LO BAT" will be displayed when the battery charge reaches a critical level.

Turn the instrument on by flipping switch D to the up position.

Use switch C to set the desired units (kPa – mbar).

Use switch A to set the desired response time. The lowest possible response time ("FAST" or 20 ms) is generally the best option. If, however, the pressure being measured fluctuates to the point where a precise reading cannot be taken, the response time can be lengthened by flipping switch A up to "MED" (0.1s) or "SLOW" (1 s).

Proceed as outlined in section 4 ("Zero-point calibration") if the display does not read 000 when the valves are open and/or when the pressure ports are disconnected. The instrument will then be ready for use.



## 4 Zero-point calibration

The instrument has a built-in potentiometer for calibrating the zero-point, a procedure that must be carried out with the **pressure ports and/or valves open** before every measurement. This is accomplished by turning potentiometer dial B until the display reads 000. Zero-point calibration allows the instrument to compensate for positional errors, temperature-induced errors and long-term instrument drift. The zero point must be calibrated with the instrument in the same position as it will be in when operated.

The potentiometer may not be used to compensate for errors caused by overloading the pressure measurement capsule; in other words, the zero-point can no longer be calibrated in this case and the instrument must be returned to the manufacturer.

## 5 Troubleshooting

Error description	Potential cause	Corrective action
display does not appear	dead battery	install new battery use a 9V IEC 6 LR 51 battery
instrument returns false values	zero point has shifted	adjust zero point (see section 4)
	battery is low	display reads 'LOW BAT,' i.e., replace the battery
zero-point calibration cannot be performed	defective pressure measurement capsule	send the instrument to the manufacturer for repair

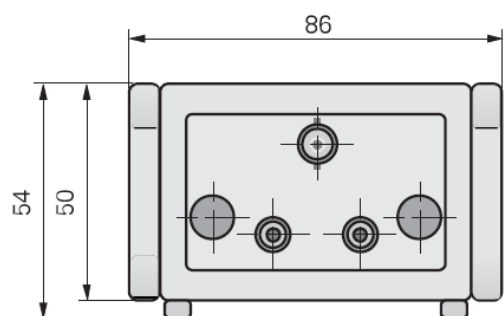
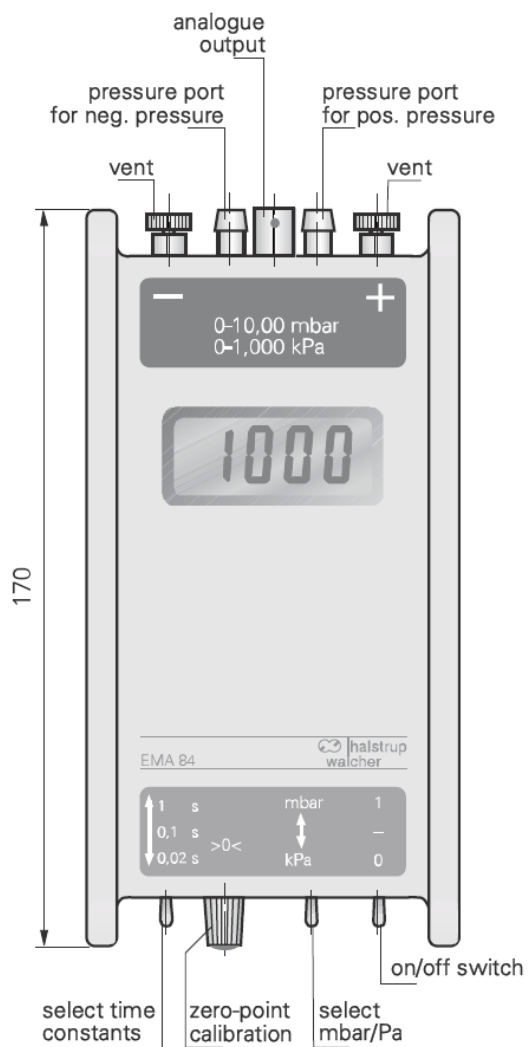
## 6 Technical data

<b>Measurement data</b>	
measurement ranges	0...100 Pa 0...1 kPa 0...10 kPa 0...100 kPa
overload capacity	10 x the final value of the measurement range (for measurement ranges $\leq 20$ kPa) 2 x the final value of the measurement range (for measurement ranges $> 20$ kPa)
hysteresis	0.1 %
time required for adjustment	may toggle between 0.02 s, 0.2 s and 1 s
deviation from characteristic curve	1 %
setting limiting value	0.5 % option (only for measurement ranges $\geq 100$ Pa)
deviation of reference: 0,3 Pa	0.2 % option (only for measurement ranges $\geq 1$ kPa)
<b>Ambient conditions</b>	
medium	air, all non-aggressive gases
operating temperature	0° C to +60° C
storage temperature	-10° C to +70° C
relative humidity	0...80 %
EMC standards	CE
conformity	declaration of conformity available upon request
<b>Electrical data</b>	
supply voltage	9 V battery
output signal	0 to 1 V (BNC connector)
load resistance $R_L$	$R_L \geq 2$ k $\Omega$ for an output voltage of 0.. 1 V
display	3½-place LCD, character height = 13 mm
battery life	approx. 120 hours under constant operation
<b>Physical data</b>	
pressure port	Ø 6.5 mm for NW5 tubing (interior tubing diameter = 5 mm)
operating position	preferably horizontal
dimensions (w x h x d)	86 x 54 x 170 mm
protection class	IP54
weight	approx. 0.75 kg, including battery

### Appendix A: Parts in contact with measurement medium

- Beryllium bronze CuBe2
- Mu metal (nickel alloy)
- Brass CuZn39Pb3
- Aluminium AlCuMgPb / AlMg3
- Silicon (tubing), optional: Viton
- Crastin (PTBP)
- Araldite CY236 / HY988
- Loctite 242e
- Carbonyl iron
- KEL (FPM: fluorinated rubber)
- Vepuran Vu 4457/51
- UHU-Plus endfest 300 binder

## 7 Dimension drawings



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[illegible]

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