P34 Instruction Manual Differential Pressure Transmitter

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Table of Contents:

1 Purpose of instruction manual

This instruction manual describes the features of the P34 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 device is state of the art. It complies with the legal requirements of EC directives. This is shown by the CE mark. CE

2 Safety precautions

2.1 Appropriate use

The P34 is used to measure pressure, volume flow, mass flow and flow rate.

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.

2.2 Shipping, assembly, electrical connections and start-up

Do not close the pressure inlets during shipping. Changes in barometric pressure may damage devices with low measuring ranges.

Assembly and the electrical connections should only be handled by professionals. They should be given proper training and be authorised by the operator of the facility.

Although the P34 pressure transducer is highly robust, it is nevertheless a precision instrument and should be handled with care. Avoid mounting the P34 in the direct vicinity of any sources of heat or radiation. Ideally, the instrument should be mounted vertically on a wall or in a control cabinet not subject to vibration.

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

Do not carry out a function test with compressed or breathable air. This would damage instruments with low measuring ranges.

The pressure ports may only be connected and disconnected when the device is switched off.

Measurement errors may occur if the instrument is not kept protected from sunlight.
Specific safety precautions are given in individual sections of this manual.

2.3 Troubleshooting, maintenance, repairs, disposal

The individual responsible for the electrical connections must be notified if the instrument is damaged or if errors occur that cannot be corrected as indicated in Section 5 .

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. The instrument must therefore be sent to a recycling plant when you no longer wish to use it. The environment codes of your particular country must be complied with.

2.4 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.

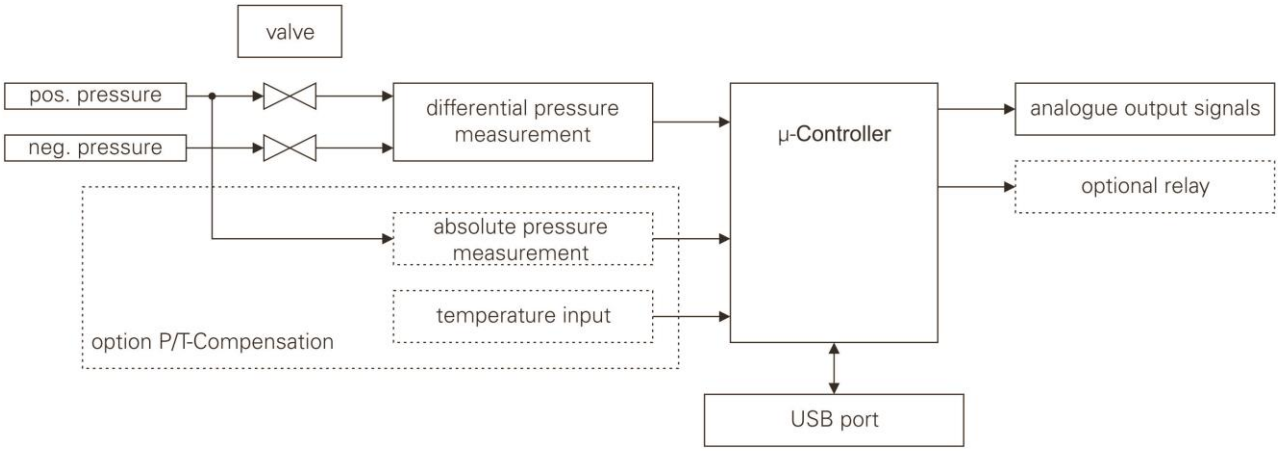
INFORMATION: This indicates that the corresponding information is important for operating the instrument properly.

3 Instrument description

3.1 Functions

The P34 is controlled by a microprocessor and can

- measure pressure and vacuum
- measure differential pressure
- measure volume flow, mass flow and flow rate
- monitor a variety of threshold parameters



Basic circuit diagram

3.2 Output of volume flow, mass flow and flow rate

Differential pressure ←→ volume flow, mass flow and flow rate are assigned using the PC software. Two options are available here:

- Root-extracted output using a k-factor: Output value = K * √ (Delta-P)
- 20-point calibration: up to 20 value pairs can be stored differential pressure ←→ volume flow / mass flow / flow rate

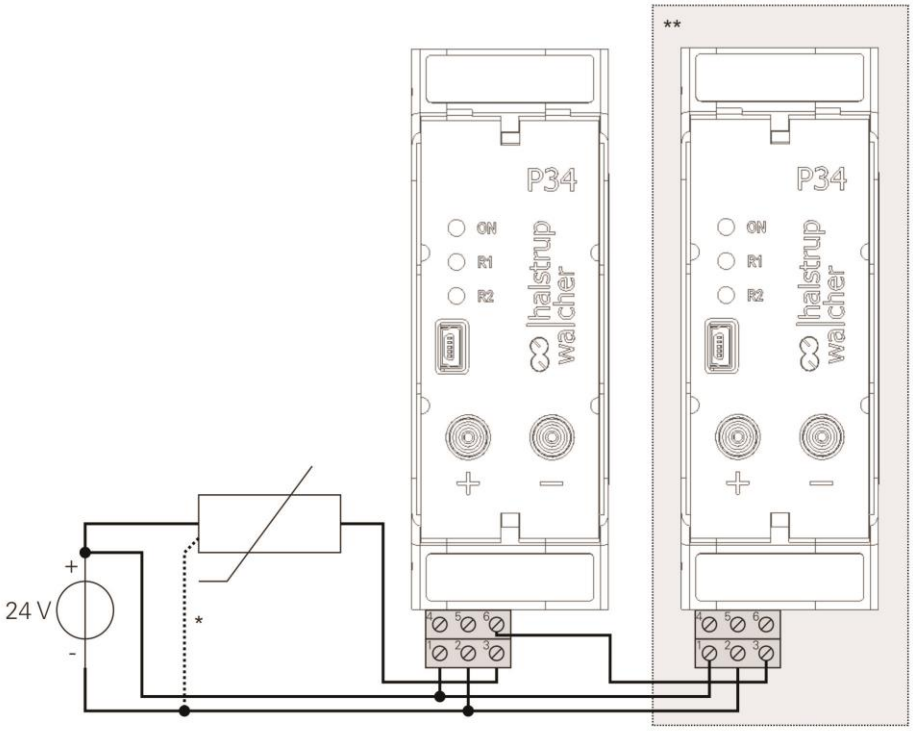
It is also possible to set a value for creep suppression (CS). This parameter specifies the value for creep suppression as a percentage. If this value falls short of the measured pressure value, the display is set to zero.

3.3 P/T Compensation (optional)

P/T compensation is used for correcting the density when calculating the volume flow, mass flow or flow rate. To do this, the absolute pressure is measured in the P34 in addition to the differential pressure. Temperature compensation is via an external 0/4 .. 20 mA temperature input. The temperature range is freely scalable using the PC software.
The output can be adjusted using the PC software to standard/operating volume flow, mass flow and standard/operating flow rate.
The k-factor of the measurement section must correspond to the specified standard conditions.
If "20-point calibration" is selected, it will be assumed that a root-extracted function should be used in the compensation calculation.

3.3.1 Temperature input 0/4 .. 20 mA

The P34 can be connected to both a 2-wire and a 3-wire temperature sensor (0/4 .. 20 mA, Ri = 130 Ω). The temperature range is freely scalable using the PC software.
The signal cannot be looped. However, it is possible to activate a signal multiplying function using the PC software. The P34 will output the measured value again at the current output (see diagram below).



* Temperature sensor, 3-wire
** Signal multiplication, temperature signal

3.4 Analogue outputs

The output of the analogue outputs can be adjusted using the PC software.
The two outputs (current and voltage output) can be adjusted independently of each other. For example, the voltage output can output the differential pressure and the current output the volume flow.

In the case of a fault occurring, the outputs can assume the following states:

- For an overpressure error in the differential pressure (see also section 3.10), the output will be set to the maximum value for the output range.
- For a negative pressure error in the differential pressure (see also section 3.10), the output will be set to the minimum value for the output range.
- If the supply voltage is too low (< approx. 18 V), the outputs will be switched off (0V or 0 mA).
- For other errors, the outputs will be set to the following values:
  - if the voltage output is set to 0 .. 10 V → 0 V
  - if the voltage output is set to 2.. 10 V → < 1.8 V
  - if the current output is set to 0 .. 20 mA → 0 mA
  - if the current output is set to 4.. 20 mA → < 3.6 mA

3.4.1 Voltage output

The voltage output can be set to 0 .. 10 V or 2 .. 10 V using the PC software.
For a root-extracted output, the maximum value for the output is calculated as "k * √Upper scale value".

3.4.2 Current output

The current output can be set to 0 .. 20 mA or 4 .. 20 mA using the PC software.
In addition, the current output can be set to "Ext. temperature sensor" in order to permit signal multiplication of the temperature input (optional P/T compensation, see section 3.3).
For a root-extracted output, the maximum value for the output is calculated as "k * √Upper scale value".

3.5 Relays (optional)

The P34 can also be fitted with 2 relays (changeover contact max. 6 A / 230 VAC) (optional).
The status of the relays is displayed via the LEDs "R1" and "R2".

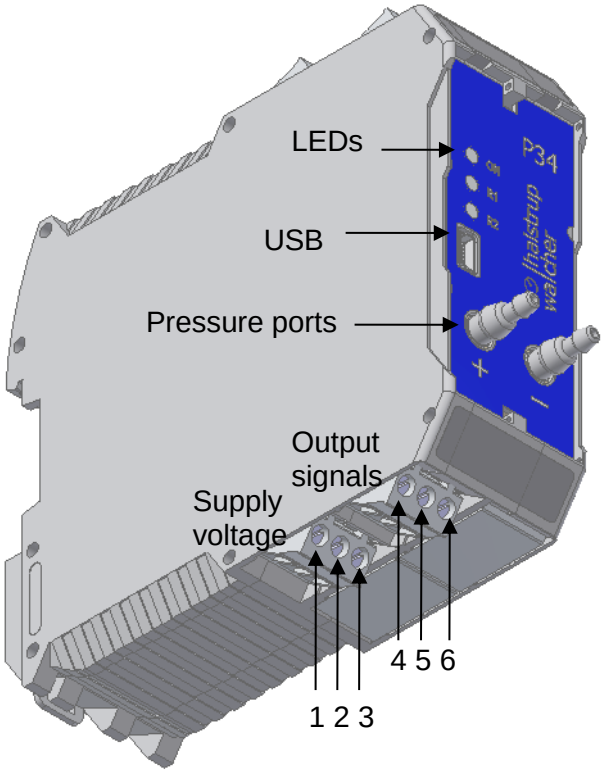
The following settings can be adjusted for each relay using the PC software:

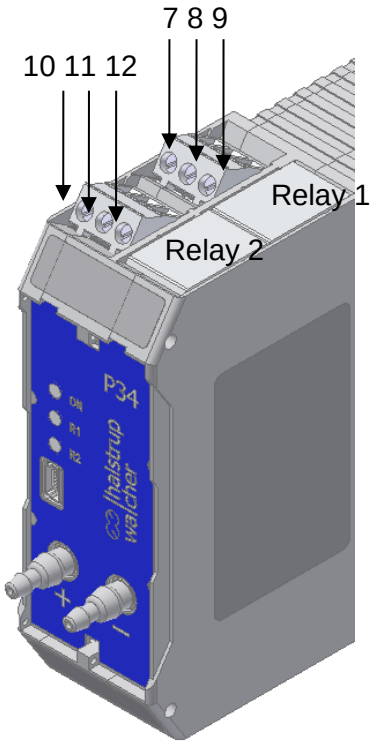
- Switch value
- Hysteresis
- Start-up delay
- Deactivation delay
- Switch direction (rising or falling)
- Filtered value: the set filter time is taken into account

If the supply voltage is too low (< approx. 18 V), the relays will be switched off.

3.6 Connections

The screw terminals can be unplugged and have a connection capacity of 0.25 .. 2.5 mm².





1. Supply voltage 24 V AC/DC
2. Supply voltage ground
3. Temperature input 0/4 .. 20 mA (optional)

4. Voltage output (0/2 .. 10 V)
5. Ground for output signals
6. Current output (0/4 .. 20 mA)

7. Relay 1 Closing contact (active position) (optional)
8. Relay 1 Centre contact (optional)
9. Relay 1 Opening contact (rest position) (optional)

10. Relay 2 Closing contact (active position) (optional)
11. Relay 2 Centre contact (optional)
12. Relay 2 Opening contact (rest position) (optional)

3.7 LEDs

3.7.1 „ON“

The green LED "ON" provides information about the operating status of the P34.

LED remains lit	Device operating normally
LED flashes slowly (0.5 Hz)	Device not operating correctly: - overpressure or negative pressure (± 120% of measurement range) - supply voltage too low - short circuit at the voltage output (error detection active at output voltages > 1 V) - cable breakage at the current output (fault detection active at output currents > 0 mA) - EEPROM error
LED flashes rapidly (2 Hz)	Zeroing active

3.7.2 „R1“

The LED signals the switch state of relay 1 (optional). Parameterisation is via the PC software. If no relays are present, the LED can be used to signal when a value is out of range.

3.7.3 „R2“

The LED signals the switch state of relay 2 (optional). Parameterisation is via the PC software. If no relays are present, the LED can be used to signal when a value is out of range.

3.8 USB port

The Mini USB interface can be used to set the parameters for the P34 and display the actual values. The PC software can be found in the download section at www.hwg.eu. The software requires .NET Framework 4.5.
The P34 is detected automatically as soon as it is connected to the PC (Windows 7, 8, 8.1). No installation of drivers is required.

3.9 Zero-point calibration

External influences such as temperature, position or ambient pressure can shift the instrument's zero point, i.e., the value displayed when the pressure ports are open. Calibration is the process by which the instrument automatically registers this shift and figures it into the currently displayed pressure value.
Pressure measurement is inactive during zeroing. The outputs remain steady at the last measured value.
After being switched on, the P34 runs a warm-up routine. Depending on the ambient conditions, this may take 30 .. 90 minutes.

INFORMATION:

The greatest possible accuracy is achieved at room temperature (20°C).

3.9.1 Cyclical zero-point calibration

The interval between two zero-point calibrations can be adjusted via PC software. Cyclical zeroing can also be deactivated although this is not recommended.

3.9.2 External zero-point calibration

An unused analogue output can be used to trigger zeroing of the P34. To do this, the output must be set to the ground potential (e.g. using an external relay). As long as the output is set to ground, the P34 will zero and the capsule will be short circuited. This function can also be used to protect the capsule against overpressure.

Mechanism: The unused output is set to a fixed value in the P34 (voltage output approx. 1V, current output approx. 1 mA). For a short circuit (> 100 ms), the voltage at the voltage output is interrupted, the current flows at the current output. These states are detected and trigger the zeroing procedure.

The current or voltage output can be activated/deactivated using the PC software.

3.10 Overpressure protection

The P34 has an internal overpressure safeguard that protects the precision pressure measurement capsule from damage. (Overload range: 200 x [max. 400 kPa]) If the pressure is out of range (± 120% of the measurement range), this results in zeroing of the pressure measurement capsule.
For an overpressure, the instrument will output the maximum value for the output hub. For a negative pressure, the instrument will output the corresponding minimum value.

4 Technical data

Measured data differential pressure	
Measurement range (also ± measurement ranges)	10 / 50 / 100 / 250 / 500 Pa 1 / 2.5 / 5 / 10 / 20 / 50 / 100 kPa (freely scalable from 10 to 100% within a measurement range)
Margin of error (0.3 Pa margin of error for the reference)	± 0.2 % FS for meas. ranges ≤ 50 kPa or ± 0.5 % FS of the measurement range at 20 °C (±2 °C)
Deflection drift / temperature	0,03 % of FS/K (10 .. 50 ° C)
Zero-point drift / temperature	± 0 % (cyclical zero-point correction)
Sensor response time	25 ms
Time constants	25 ms.. 60 s (adjustable)

Measured data of absolute pressure for P /T compensated volume flow (optional)	
Measurement range	0 .. 200 kPa
Accuracy	±2.0 % FS

Electrical data	
Rated input	approx. 6 VA
Supply voltage	24 V AC / DC ±10 %
Output signal	0/2 .. +10 V (RL ≥ 2 k Ω) and 0/4 .. 20 mA (RL ≤ 500 Ω)
Connections	Screw terminals (connection capacity 0.25 .. 2.5 mm²)
USB port	USB 2.0 Full-Speed Slave (Mini USB)
Relays (optional)	2 x changeover contact (max. 6 A / 230 VAC)
Temperature input for P /T compensated volume flow (optional)	0/4 .. 20 mA Ri = 130 Ω Temperature range freely scalable

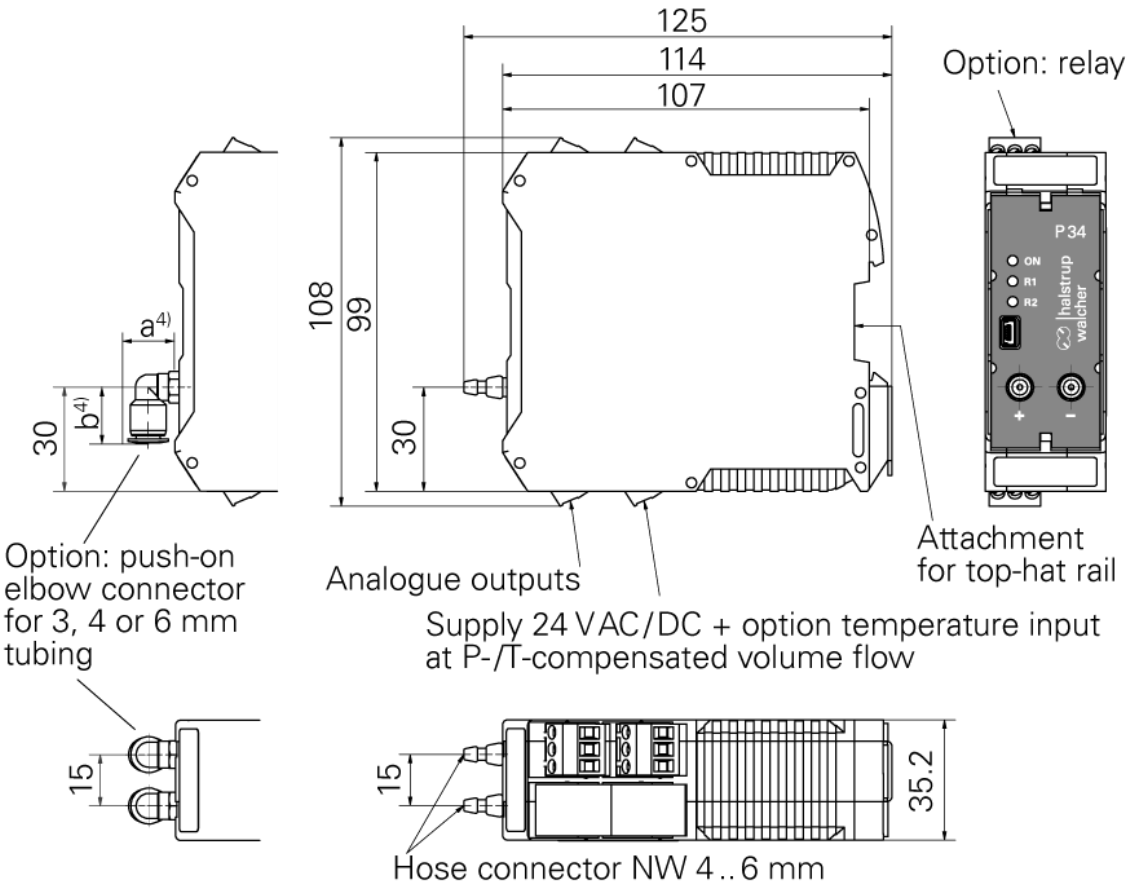
Ambient conditions	
Medium	Air, all non-aggressive gases
Max. system pressure/overload capacity	400 kPa for measurement ranges ≥ 2.5 kPa 200x for measurement ranges < 2.5 kPa
Operating temperature	+10 °C .. +50 °C
Storage temperature	-10 °C .. +70 °C
Protection class	IP20
Certification	CE

Physical data	
Housing	Plastic housing for mounting on top-hat rail TH35
Weight	max. 500 g (dependent upon measurement range and selected options)
Pressure ports	Hose connector for 4-6 mm tubing Push-on elbow connector for 3, 4 or 6mm tubing
Dimensions	approx. 35 mm x 100 mm x 125 mm (W x H x D)

5 Troubleshooting

Problem	Cause	Corrective Action
Instrument does not work (green LED is off)	No power	Check the terminal connections and supply voltage
Pressure drops continuously	Leak	Firmly slide tubing completely onto ports; adjust diameter
The instrument will not be detected by the PC (USB)	No cable connection	Check the connection and plug in again if necessary
Green LED flashes slowly	Operating problems or errors (e.g. signal out of range, voltage too low, short circuit at output)	- Check system for overpressure/ negative pressure - Check supply voltage - Check analogue outputs for broken cables or short circuit

6 Dimension drawing



4) Elbow connector	a	b
3 mm	10,5	11
4 mm	11,5	15,7
6 mm	14,0	16,3

For additional specifications and dimension drawings, please visit our website at

https://www.halstrup-walcher.de/en/products/measurement-technology.php

7 Certificate of Conformity

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Die Lösung liegt im Detail

EG-Konformitätserklärung im Sinne der
EG- Richtlinie 2014/30/EU, EMV Richtlinie und
2006/95/EG, Niederspannungsrichtlinie

Certificate of Conformity based on the
European Standard 2014/30/EU, and 2006/95/EG

Der Hersteller
The manufacturer

halstrup-walcher GmbH
Stegener Straße 10
79199 Kirchzarten
Deutschland

erklärt, dass die Bauart des Produktes
declares, that the construction of instrument type

Differenzdruck-Messumformer Typ P34
Differential Pressure Transformer Type P34

entwickelt, konstruiert und gefertigt ist in Übereinstimmung mit den EG – Richtlinien
is developed, designed and manufactured in accordance with the EC Directives.

EN 61000-6-2 : 2005
EN 61000-6-4 : 2011
EN 61010-1 : 2011

abgegeben durch / stated by:

Sura, Christian
(Nachname, Vorname / Surname, first name)

Geschäftsführer, Managing Director
(Stellung im Betrieb des Herstellers / Position)

Kirchzarten, 12.10. 2016
(Ort, Datum / City, Date)

(Rechtsgültige Unterschrift/ Signature)