TetraTec® Instruments



LAMINAR FLOW ELEMENT

LFE R-Serie

Differential pressure element with a linear characteristic up to 64 m^3/min

TETRATEC INSTRUMENTS GMBH · STEINENBRONN · GERMANY

01 — THE COMPONENT

Linear characteristic, up to 64 m³/min.

The R series takes the measuring principle of the laminar flow element into the range of large volumetric flows. Seven sizes with a round cross-section cover 1 to 64 m³/min and are installed directly in the pipeline via connection adapters as weld-on pipe or flange.

64 m³/min
FLOW RATE
upper limit, LFE R400

1:10
TURNDOWN
in special cases up to 1:30

0.40 %
MEASUREMENT UNCERTAINTY (K=2)
smallest stated, after calibration

THE ESSENTIALS

Linear characteristic

The differential pressure follows the law of Hagen-Poiseuille and is proportional to the volumetric flow. Residual deviations at inlet and outlet are corrected by the calibrated curve.

Threefold span

Compared with an orifice plate the usable span is about three times as large for the same differential pressure sensor.

Seven sizes

From R080 to R400, round and of modular design, O-ring-sealed and with ring pressure taps.

Materials for reactive gases

Matrix of wound stainless steel foil, housing aluminium, seals PTFE and FPM. Oxygen and hydrogen on request, subject to the Pressure Equipment Directive.

Directly in the pipeline

Connection adapters as weld-on pipe or flanged, with flanges to DIN 2633, PN 16. The installation dimensions of each size are given on page 3.

Filter and filter housing

Exchangeable, O-ring-sealed filter housings for every size. With two filters the element operates bidirectionally, in the suction and in the pressure direction.

WHY NOT AN ORIFICE OR VENTURI TUBE

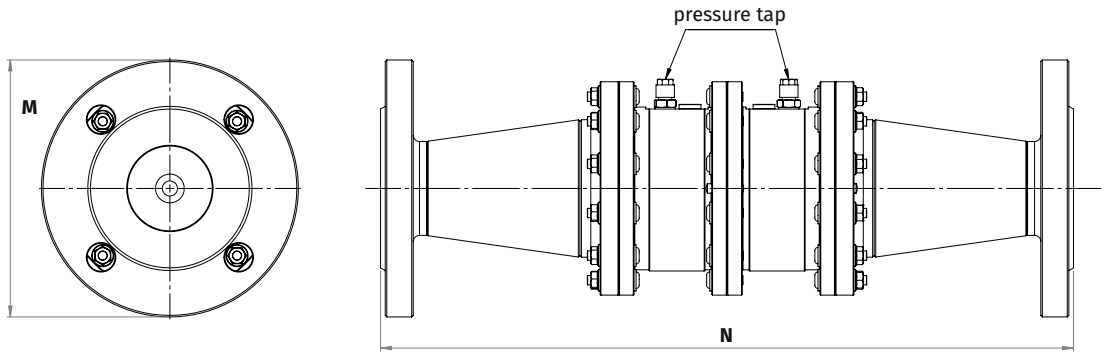
With orifice and Venturi tube the differential pressure enters the volumetric flow quadratically. Halve the flow and the signal drops to a quarter – at the lower end of the measuring range it is lost in the noise. With a laminar flow element the relationship is linear, which is why the usable span is about three times as large for the same sensor.

Operating principle

A laminar flow element consists of a capillary matrix. In its narrow, parallel channels a laminar – that is, swirl-free – flow forms. For such a flow the law of Hagen-Poiseuille applies: the pressure drop across the matrix is directly proportional to the volumetric flow.

The ideal approach yields a linear characteristic. Orifice effects at the inlet and outlet of the matrix cannot be avoided; the real relationship between volumetric flow and differential pressure is therefore corrected by a calibrated curve. How fast and how accurately the measurement runs then depends mainly on the differential pressure sensor – with a fast sensor, measurements with high temporal resolution are possible.

INSTALLATION DIMENSIONS



THE SEVEN SIZES

SIZE	MAX. FLOW*	CONNECTION FLANGE	FLANGE Ø (M)	TOTAL LENGTH (N)
LFE R080	2,800 L/min	DN 50	165 mm	445 mm
LFE R100	4,500 L/min	DN 80	200 mm	459 mm
LFE R150	10,200 L/min	DN 100 DN 125	220 mm 250 mm	573 mm 464 mm
LFE R200	18,100 L/min	DN 150	285 mm	599 mm
LFE R250	28,300 L/min	DN 150 DN 200	285 mm 340 mm	655 mm 634 mm
LFE R300	40,800 L/min	DN 200	340 mm	801 mm
LFE R400	63,700 L/min	DN 200	340 mm	1379 mm

* Referred to air. Drawing: LFE R080 with DN 50 connection flanges, not to scale. Connection flanges on both sides to DIN 2633, PN 16; M is their outer diameter, N the total length from flange face to flange face.

TYPICAL APPLICATIONS

- Differential pressure element for flow measurement systems
- Calibration of flow meters
- Flow tests with air or gases
- Dosing of gases, as actual-value sensor in control loops
- Leak tests (flow method)
- Dry functional tests of valves and other components, including components for hydraulics and fuels
- Measuring the cross-sectional areas of bores and gaps
- Measurements on air and technical gases
- Measurements with high temporal resolution
- Retrofitting of existing measuring sections

Seven sizes carry the linear characteristic up to 64 m^3/min.

02 — SELECTION

One range equals one size.

VERSIONS

- Seven sizes R080 to R400
- Standard: flange to DIN 2633, PN 16
- Optional: connection adapters

ACCESSORIES

- CoM4.Flow-Eco/Pro evaluation unit
- Filter and filter housing
- HUMTMP temperature and humidity probe
- Calibration certificate

KEY SPECIFICATIONS

Flow range	**1–64 m³/min at 20 mbar**
max. turndown ratio	**1:10, in special cases up to 1:30**
Sizes	**seven, R080 to R400**
Linearity deviation	**< 0.5 % of reading**
Repeatability	**< 0.1 % of reading**
Overload limits	**0.4–11 bar(a)**
Operating temperature	**0–70 °C**
Hysteresis	**± 0.15 % of reading**
Long-term stability	**< 0.5 % of reading in one year**
Matrix	**wound stainless steel foil**
Housing material	**Aluminium**
Seals	**PTFE and FPM**
Connection flanges	**DIN 2633, PN 16**

Complete data in the technical datasheet.

FROM ENQUIRY TO RECURRING CALIBRATION

1. **Record the measuring task**
   Measuring range, type of gas, test volume, cycle time and operating conditions – the design follows from these.
2. **Design and calibrate the instrument**
   Assembly, calibration in our own accredited laboratory, calibration certificate with stated uncertainty.
3. **Integrate and support**
   Integration into your production, training and the recurring calibration at the agreed interval.

We select the size for your range.

REQUEST A DESIGN

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