LFE R

Technical Datasheet



Short description

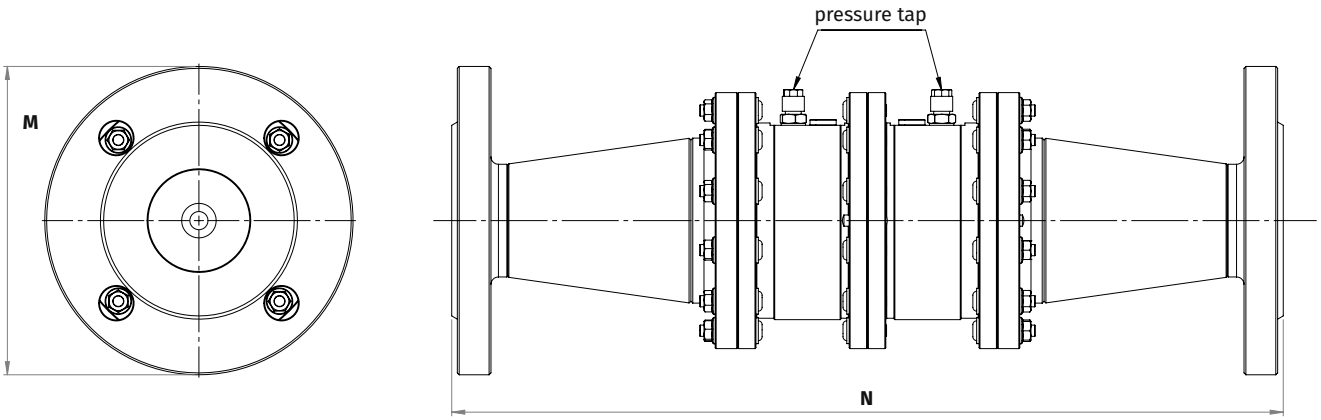
Laminar flow element with round cross-section for flow measurement of air and gases from 1000 L/min upwards. The LFE works as a differential pressure element: a laminar flow forms in its capillary matrix, and its differential pressure is proportional to the volumetric flow according to the Hagen-Poiseuille law. Compared with orifice plates, the usable measuring span is about three times as large for the same differential pressure sensor. With seven sizes the R series covers 1 to 64 m^3/min, referred to a differential pressure of 20 mbar.

Special features

- Modular and easily maintainable, O-ring-sealed and provided with ring pressure taps
- Matrix of specially wound stainless steel foils
- Connection adapter stainless steel 1.4404 as weld-on pipe or flanged, pressure rating 11 bar
- Suitable for gases other than air; reactive substances such as oxygen on request
- Accessories for every size: filter and filter housing*

* Without filter and filter housing, the user ensures protection against contamination and a swirl-free inflow: with a straight inlet section of at least ten times the inner pipe diameter.

Sizes and installation dimensions



Shown is LFE R080 with DN 50 connection flanges; flange, M and N of the other sizes in the table. Drawing not to scale; binding dimensions on request.

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

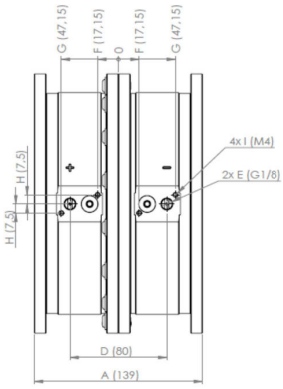
* Referred to air. Connection flanges on both sides to DIN 2633, PN 16. M is their outer diameter, N the total length from flange face to flange face.

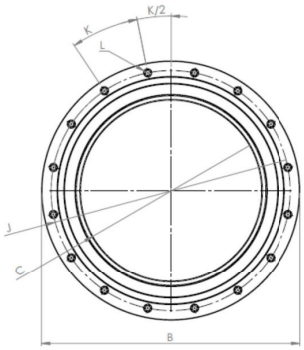
Weld-on pipe version

SIZE	PIPE OUTER Ø	TOTAL LENGTH
LFE R080	60.3 mm	485 mm
LFE R100	88.9 mm	519 mm
LFE R150	114.3 mm	633 mm
LFE R200	168.3 mm	659 mm
LFE R250	168.3 mm 219.1 mm	715 mm 724 mm
LFE R300	219.1 mm	891 mm
LFE R400	219.1 mm	1469 mm

Connection adapters on both sides as weld-on pipe of stainless steel 1.4404. Total length from pipe end to pipe end; max. flow as for the flanged version.

Housing dimensions





Housing length (A)	139 mm
Distance between sensor ports (D)	80 mm
Sensor ports (E)	G 1/8
X-distance sensor mounting inside (F)	17.15 mm
X-distance sensor mounting outside (G)	47.15 mm
Y-distance sensor mounting (H)	7.5 mm
Sensor mounting (I)	M4
Flange holes (L)	6.3 mm

Designations A to L, dimensions in millimetres. The table applies to all seven sizes; B, C, J and K are given per size below. Drawing not to scale.

LFE R080

Calibratable flow range	up to 2,800 L/min
max. turndown ratio	1:10, in special cases up to 1:30
Matrix material	wound stainless steel foil
Accuracy (linearity deviation)	< 0.5 % rdg.
Hysteresis	+/- 0.15 % rdg.
Repeatability	< 0.1 % rdg.
Long-term stability (1 year)	< 0.5 % rdg.
smallest stated measurement uncertainty (k=2) after calibration	0.40 % rdg.
Housing material	Aluminium
Seals	PTFE and FPM
Overload limits	0.4 to 11 bar(a)
Operating temperature	0 to 70 °C
Type of gas	Air, inert gases, CO_2, oxygen*, hydrogen* other gases on request
Housing diameter (B)	137 mm
Pipe inner diameter (C)	80 mm
Housing weight	0.9 kg
Flange bolt circle diameter (J)	122 mm
Angular hole spacing (K)	30°
Flange O-ring	5 x 100 mm

rdg. = of reading, FS = full scale. The flow data refer to air; other gases have different measuring ranges, which we state on request.
* on request and subject to the Pressure Equipment Directive 2014/68/EU.

LFE R100

Calibratable flow range	up to 4,500 L/min
max. turndown ratio	1:10, in special cases up to 1:30
Matrix material	wound stainless steel foil
Accuracy (linearity deviation)	< 0.5 % rdg.
Hysteresis	+/- 0.15 % rdg.
Repeatability	< 0.1 % rdg.
Long-term stability (1 year)	< 0.5 % rdg.
smallest stated measurement uncertainty (k=2) after calibration	0.40 % rdg.
Housing material	Aluminium
Seals	PTFE and FPM
Overload limits	0.4 to 11 bar(a)
Operating temperature	0 to 70 °C
Type of gas	Air, inert gases, CO_2, oxygen*, hydrogen* other gases on request
Housing diameter (B)	161.8 mm
Pipe inner diameter (C)	105 mm
Housing weight	1.0 kg
Flange bolt circle diameter (J)	145.8 mm
Angular hole spacing (K)	22.5°
Flange O-ring	5 x 125 mm

rdg. = of reading, FS = full scale. The flow data refer to air; other gases have different measuring ranges, which we state on request.
* on request and subject to the Pressure Equipment Directive 2014/68/EU.

LFE R150

Calibratable flow range	up to 10,200 L/min
max. turndown ratio	1:10, in special cases up to 1:30
Matrix material	wound stainless steel foil
Accuracy (linearity deviation)	< 0.5 % rdg.
Hysteresis	+/- 0.15 % rdg.
Repeatability	< 0.1 % rdg.
Long-term stability (1 year)	< 0.5 % rdg.
smallest stated measurement uncertainty (k=2) after calibration	0.40 % rdg.
Housing material	Aluminium
Seals	PTFE and FPM
Overload limits	0.4 to 11 bar(a)
Operating temperature	0 to 70 °C
Type of gas	Air, inert gases, CO_2, oxygen*, hydrogen* other gases on request
Housing diameter (B)	215 mm
Pipe inner diameter (C)	150 mm
Housing weight	1.8 kg
Flange bolt circle diameter (J)	199 mm
Angular hole spacing (K)	22.5°
Flange O-ring	5 x 178 mm

rdg. = of reading, FS = full scale. The flow data refer to air; other gases have different measuring ranges, which we state on request.
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LFE R200

Calibratable flow range	up to 18,100 L/min
max. turndown ratio	1:10, in special cases up to 1:30
Matrix material	wound stainless steel foil
Accuracy (linearity deviation)	< 0.5 % rdg.
Hysteresis	+/- 0.15 % rdg.
Repeatability	< 0.1 % rdg.
Long-term stability (1 year)	< 0.5 % rdg.
smallest stated measurement uncertainty (k=2) after calibration	0.40 % rdg.
Housing material	Aluminium
Seals	PTFE and FPM
Overload limits	0.4 to 11 bar(a)
Operating temperature	0 to 70 °C
Type of gas	Air, inert gases, CO_2, oxygen*, hydrogen* other gases on request
Housing diameter (B)	262.8 mm
Pipe inner diameter (C)	200 mm
Housing weight	2.2 kg
Flange bolt circle diameter (J)	247.8 mm
Angular hole spacing (K)	22.5°
Flange O-ring	5 x 228 mm

rdg. = of reading, FS = full scale. The flow data refer to air; other gases have different measuring ranges, which we state on request.
* on request and subject to the Pressure Equipment Directive 2014/68/EU.

LFE R250

Calibratable flow range	up to 28,300 L/min
max. turndown ratio	1:10, in special cases up to 1:30
Matrix material	wound stainless steel foil
Accuracy (linearity deviation)	< 0.5 % rdg.
Hysteresis	+/- 0.15 % rdg.
Repeatability	< 0.1 % rdg.
Long-term stability (1 year)	< 0.5 % rdg.
smallest stated measurement uncertainty (k=2) after calibration	0.40 % rdg.
Housing material	Aluminium
Seals	PTFE and FPM
Overload limits	0.4 to 11 bar(a)
Operating temperature	0 to 70 °C
Type of gas	Air, inert gases, CO_2, oxygen*, hydrogen* other gases on request
Housing diameter (B)	315 mm
Pipe inner diameter (C)	254 mm
Housing weight	2.6 kg
Flange bolt circle diameter (J)	300 mm
Angular hole spacing (K)	22.5°
Flange O-ring	5 x 280 mm

rdg. = of reading, FS = full scale. The flow data refer to air; other gases have different measuring ranges, which we state on request.
* on request and subject to the Pressure Equipment Directive 2014/68/EU.

LFE R300

Calibratable flow range	up to 40,800 L/min
max. turndown ratio	1:10, in special cases up to 1:30
Matrix material	wound stainless steel foil
Accuracy (linearity deviation)	< 0.5 % rdg.
Hysteresis	+/- 0.15 % rdg.
Repeatability	< 0.1 % rdg.
Long-term stability (1 year)	< 0.5 % rdg.
smallest stated measurement uncertainty (k=2) after calibration	0.40 % rdg.
Housing material	Aluminium
Seals	PTFE and FPM
Overload limits	0.4 to 11 bar(a)
Operating temperature	0 to 70 °C
Type of gas	Air, inert gases, CO_2, oxygen*, hydrogen* other gases on request
Housing diameter (B)	366 mm
Pipe inner diameter (C)	300 mm
Housing weight	3.4 kg
Flange bolt circle diameter (J)	350.5 mm
Angular hole spacing (K)	22.5°
Flange O-ring	5 x 330 mm

rdg. = of reading, FS = full scale. The flow data refer to air; other gases have different measuring ranges, which we state on request.
* on request and subject to the Pressure Equipment Directive 2014/68/EU.

LFE R400

Calibratable flow range	up to 63,700 L/min
max. turndown ratio	1:10, in special cases up to 1:30
Matrix material	wound stainless steel foil
Accuracy (linearity deviation)	< 0.5 % rdg.
Hysteresis	+/- 0.15 % rdg.
Repeatability	< 0.1 % rdg.
Long-term stability (1 year)	< 0.5 % rdg.
smallest stated measurement uncertainty (k=2) after calibration	0.40 % rdg.
Housing material	Aluminium
Seals	PTFE and FPM
Overload limits	0.4 to 11 bar(a)
Operating temperature	0 to 70 °C
Type of gas	Air, inert gases, CO_2, oxygen*, hydrogen* other gases on request
Housing diameter (B)	443 mm
Pipe inner diameter (C)	377 mm
Housing weight	4.2 kg
Flange bolt circle diameter (J)	427 mm
Angular hole spacing (K)	15°
Flange O-ring	5 x 405 mm

rdg. = of reading, FS = full scale. The flow data refer to air; other gases have different measuring ranges, which we state on request.
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Accessories: filter and filter housing

Every size has matching functional filters and filter housings. The filters protect the LFE against contamination and ensure an inflow to the matrix that is as swirl-free as possible. For free-suction applications they can be mounted without a housing; the filter housing provides a connection for the inlet and thus extends the range of applications. The housings are exchangeable and O-ring-sealed; with two filters the element can be operated bidirectionally inline, that is in the suction and in the pressure direction. With one filter, operation is unidirectional: the operating medium should then reach the matrix only through the filter, to avoid contamination.

SIZE	TOTAL LENGTH	FILTER CARRIER PLATE Ø	FILTER Ø	FILTER LENGTH
LFE R080	526 mm	228 mm	165 mm	220 mm
LFE R100	625 mm	298 mm	230 mm	310 mm
LFE R150	690 mm	351 mm	280 mm	315 mm
LFE R200	815 mm	395 mm	325 mm	430 mm
LFE R250	730 mm	505 mm	420 mm	315 mm
LFE R300	1090 mm	529 mm	450 mm	600 mm
LFE R400	1420 mm	640 mm	560 mm	630 mm

Total length with filter housing. The filter length is given excluding sensors. Holes in the filter carrier plate: 8.5 mm for R080 to R200, 10 mm for R250 to R400. Angular hole spacing of the filter carrier plate: 30° for R080, 22.5° for R100 to R300, 15° for R400.

Ordering information

The LFE is available in a wide variety of variants. The following information is required for ordering:

- Measuring range
- All gases used and the maximum operating pressure
- Process connections – weld-on pipe or flange
- Whether filter and filter housing are to be supplied, and the direction of flow

FURTHER INFORMATION

Benefits, operating principle and application examples are given in the product brochure **LFE R-Serie**. To discuss your measuring task, contact us at **+49 7157 5387-0** or **info@tetratec.de**.