

Perfection in fluids.

The right *flow*
by German engineering.



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EP LMF® LaminarMasterFlow®

Product presentation



Content

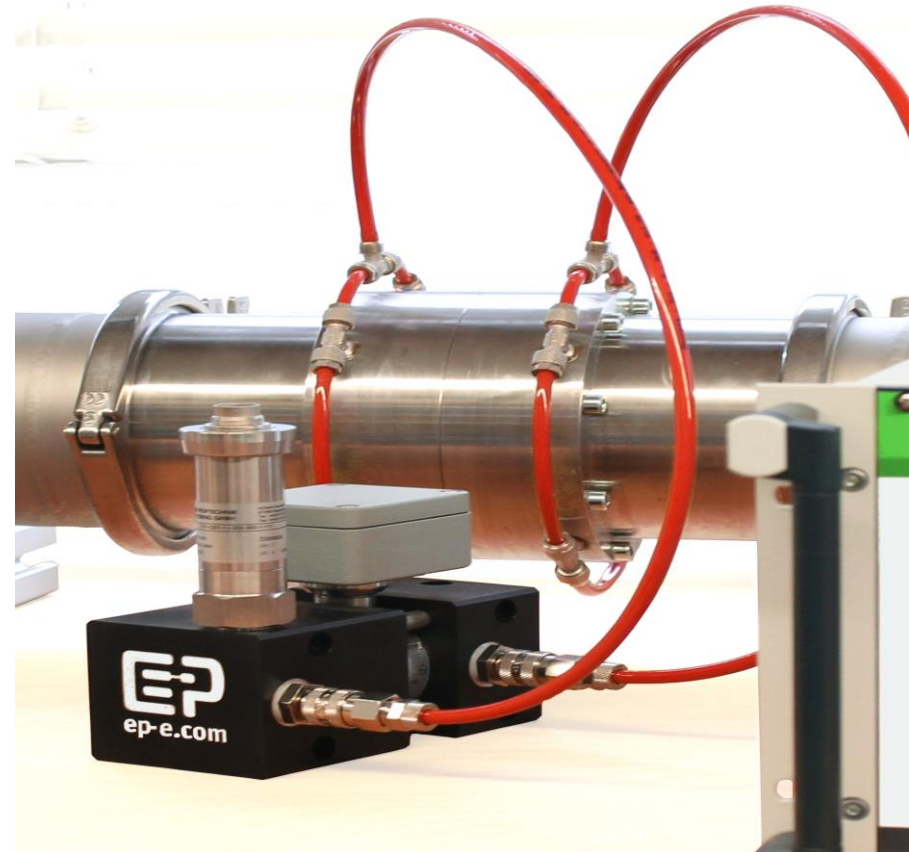
EP LMF® - LaminarMasterFlow® systems

- Features & benefits
- System components and options
- System operation
- Application examples
- Marketing material (incl. LMF configurator website)
- Summary



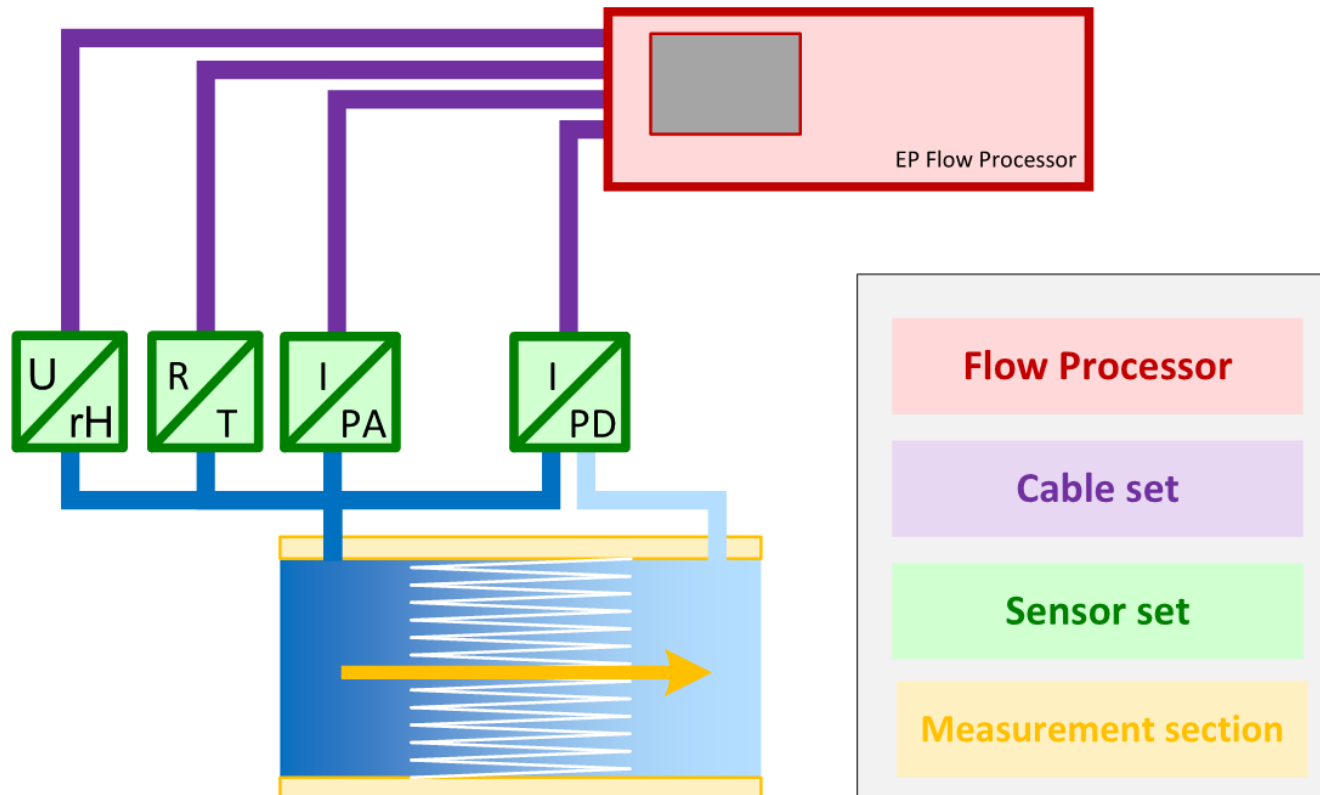
EP LMF® – LaminarMasterFlow®

- High-precision flow measurement of gas and air
- Flow rates up to 700 m³/h (opt. 4000 m³/h)
- Variable system configuration
- Rapid and precise measurement





EP LMF® – Technical diagram

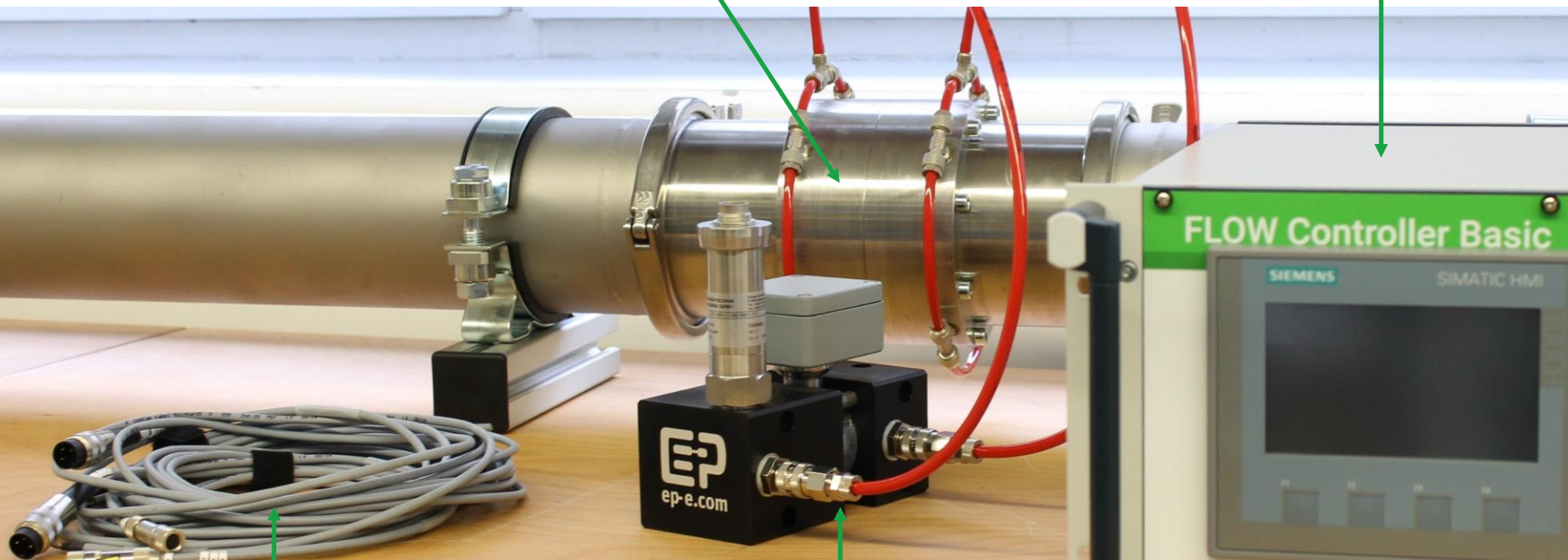




EP LMF® – System overview

Measuring section LFE

Flow Processor



Cable set

Sensor set



EP LMF[®] – Features & benefits



Laminar Flow Elements (LFEs) as flow sensors

- Highest measurement accuracy – up to 0,5 % MW for the complete system
- Wide measurement range – up to 1:100 (with appropriate calibration)
- Different flow ranges – from 0.01 to 700 m³/h (opt. 4000 m³/h)
- Low pressure loss



Modular design

- Individual system configuration – meeting your application needs
- Clever options – also for later system upgrade



Easy use

- Intuitive user interface – leads the user through the test procedures
- User management – to create different accounts
- Sensor calibration – via processor



EP LMF[®] – System components

Flow Processor

controls the test procedure and the data logging and analysis.

- Convenient 19" rack
- Intuitive use interface
- Three types of processors



BASIC / STANDARD



CLASSIC

BASIC

For SPS based applications

Siemens control system

Measurement accuracy depending on sensor set up to

- 0.8 % MV + 0.05 % EV or

- 1.0 % MV + 0.1 % EV

Display of measurement values

STANDARD

For SPS based applications

Siemens control system

Measurement accuracy depending on sensor set up to

- 0.8 % MV + 0.05 % EV or

- 1.0 % MV + 0.1 % EV

Display of measurement values, export and saving via USB, webserver for remote control

CLASSIC

Stand-alone applications in the lab or industry

PC control system

Measurement accuracy up to 0.5 % MV + 0.025 % EV

Display of measurement values, export and saving via USB, several measurement sections selectable



EP LMF[®] – System components

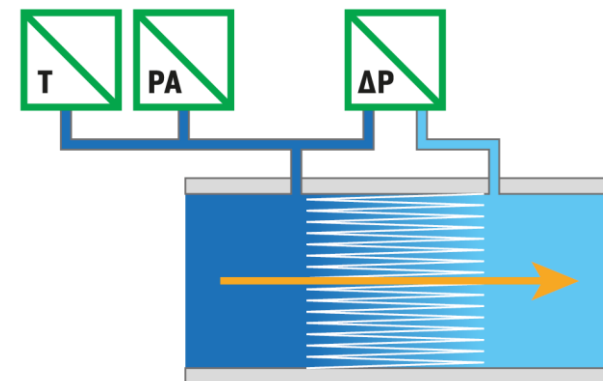
Laminar Flow Elements (LFEs)

Laminar Flow Elements (LFE) are flow sensors that work according to the differential pressure principle. Due to the laminar flow in the capillaries of the LFE there is (according to Hagen-Poiseuille) a nearly linear correlation between flow and resulting differential pressure.

- Highest measurement accuracy
 - up to 0,5 % MW for the complete system
- Wide measurement range
 - up to 1:100 (with appropriate calibration)
- Low pressure loss
 - of 20 mbar



Measurement principle





EP LMF[®] – System components

Laminar Flow Elements (LFE)

are used as flow sensors.

- Available in different sizes –
from 0.01 to 700 m³/h
(optional up to 4000 m³/h)



Overview available LFEs

LFE	Flow [m ³ /h]
LFE EPM TC10-1	0.012...0.12
LFE EPM TC10-2	0.03...0.3
LFE EPM TC10-3	0.06...0.6
LFE EPM TC10-4	0.12...1.2
LFE EPM TC10-5	0.27...2.7
LFE EPM TC20	0.69...6.9
LFE EPM TC25	1.14...11.4
LFE EPM TC40	4.2...42
LFE EPM TC50	7.11...71.1
LFE EPM TC80	16.8...168
LFE EPM TC100	28.0...280
LFE EPM TC150	67.8...678



EP LMF[®] – System components

Cable set

The cable set contains connection cables with mating plugs for each of the four sensors. It is available in four different lengths:

- 2.5 m
- 5 m
- 10 m
- 15 m





EP LMF[®] – System options (1/2)

- Extended calibration
- Pressure supply and / or regulation
 - Manometer, pressure regulating valve and ball valve for manual pressure regulation between pressure supply on-site and measuring section
 - Flow control unit and radial blower in sucking mode
 - Volume flow regulation ± 50 mbar with proportional pressure valve, compressed air supply on-site available
- Additional input / output channels
 - 16 free, scalable and analogue inputs for pressure, temperature, relative humidity, etc.; channels for measuring signals 0...10 V or 4...20 mA
 - 1 output signal
- ...



EP LMF[®] – System options (2/2)

- Base plate / frame for measuring section
- Resistance
 - H2 resistance / Atex Zone 2G
 - T resistance up to 180 °C
- Software adjustments
 - Customer specific protocol function in the software
- Rack for pressure sensors
- Filter
- Which additional options might be interesting?



Contact us for your individual quotation!



EP LMF[®] – System operation



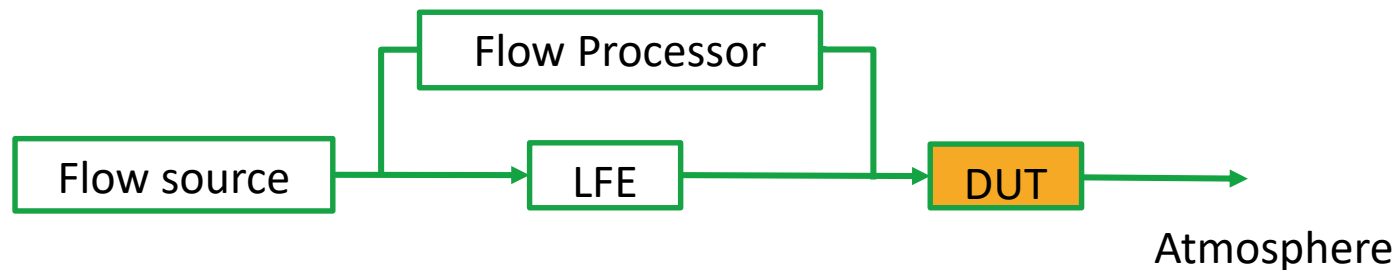
User interface BASIC/CLASSIC Flow Processor

- Set measurement time
- Start measurement
- Median values of Q_m , p_A , p_D , T , H are displayed

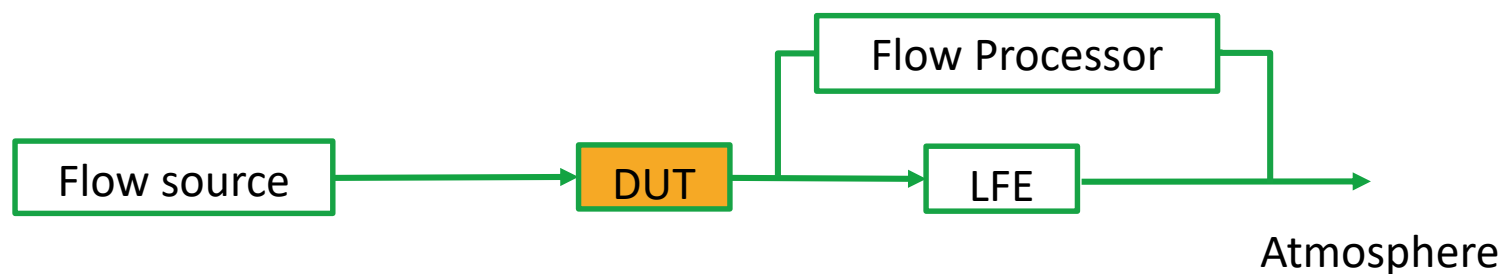


EP LMF[®] – System setup examples

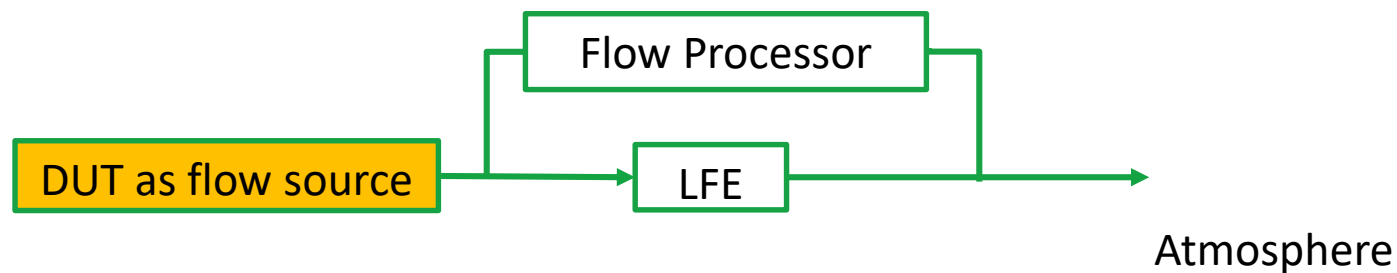
1



2



3



DUT = device under test



EP LMF[®] – Sample applications

- Calibration of Mass Flow Meters (MFM) and Mass Flow Controller (MFC) with digital display
- Calibration of nozzle parts
- Leak test of valves, other parts
- Flow measurement in engine test benches
-



Marketing material

• Brochure EP LMF[®] system

Perfection in fluids.
The right flow
by German engineering.

EP LMF[®] - LaminarMasterFlow[®]
High-precision flow measurement of gas and air

Brochure EPE-160797

EP LMF[®] - LaminarMasterFlow[®]
High-precision flow measurement of gas and air

The EP LMF[®] - LaminarMasterFlow[®] is a complete system for high-precision flow measurement of gas and air (volume and mass flow). The LMF[®] system consists of a flow processor, a Laminar Flow Element (LFE) as measuring section, a cable set and a sensor set.

Variable system configuration

Different types of flow processor, diverse measurement accuracies, a big range of Laminar Flow Elements in different sizes and some options can be selected application-specific and allow a variable system configuration.

Technical diagram
EP LMF[®] - LaminarMasterFlow[®] System

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EP LMF[®] - LaminarMasterFlow[®]
High-precision flow measurement of gas and air

Flow measurement system for gas and air

Flow rates up to 700 m³/h (up to 400 m³/h)
Variable system configuration
Rapid and precise measurement

Description

The EP LMF[®] - LaminarMasterFlow[®] is a complete system for high-precision flow measurement of gas and air (volume and mass flow). The LMF[®] system consists of a flow processor, a Laminar Flow Element (LFE) as measuring section, a cable set and a sensor set.

Variable system configuration

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Flow Processor

- ✓ Convenient 19" rack
- ✓ Intuitive user interface
- ✓ Three types of processors

The Flow Processor controls the test procedure and the data logging and analysis. For different application requirements three processor types are available (BASIC, STANDARD and CLASSIC).

BASIC	STANDARD	CLASSIC
For GDS based applications	For GDS based applications	For GDS based applications
Measurement accuracy depending on sensor set up: - 0.5 % M ± 0.1 % EV - 1.0 % M ± 0.1 % EV - 1.5 % M ± 0.1 % EV	Measurement accuracy depending on sensor set up: - 0.5 % M ± 0.1 % EV - 1.0 % M ± 0.1 % EV - 1.5 % M ± 0.1 % EV	Measurement accuracy depending on sensor set up: - 0.5 % M ± 0.1 % EV - 1.0 % M ± 0.1 % EV - 1.5 % M ± 0.1 % EV
Display of measurement values	Display of measurement values	Display of measurement values

Laminar Flow Elements (LFE)

- ✓ High measurement accuracy
- ✓ Wide measurement range
- ✓ Low pressure loss

Flow is measured via Laminar Flow Elements (LFE), which are available in different sizes covering a total measurement range from 0.01 to 700 m³/h (normal up to 400 m³/h).

Overview available LFEs

LFE	Flow [m ³ /h]
LFE-DM7101	0.01 - 0.12
LFE-DM7102	0.01 - 0.12
LFE-DM7103	0.01 - 0.12
LFE-DM7104	0.01 - 0.12
LFE-DM7105	0.01 - 0.12
LFE-DM7106	0.01 - 0.12
LFE-DM7107	0.01 - 0.12
LFE-DM7108	0.01 - 0.12
LFE-DM7109	0.01 - 0.12
LFE-DM7110	0.01 - 0.12
LFE-DM7111	0.01 - 0.12
LFE-DM7112	0.01 - 0.12
LFE-DM7113	0.01 - 0.12
LFE-DM7114	0.01 - 0.12
LFE-DM7115	0.01 - 0.12
LFE-DM7116	0.01 - 0.12
LFE-DM7117	0.01 - 0.12
LFE-DM7118	0.01 - 0.12
LFE-DM7119	0.01 - 0.12
LFE-DM7120	0.01 - 0.12
LFE-DM7121	0.01 - 0.12
LFE-DM7122	0.01 - 0.12
LFE-DM7123	0.01 - 0.12
LFE-DM7124	0.01 - 0.12
LFE-DM7125	0.01 - 0.12
LFE-DM7126	0.01 - 0.12
LFE-DM7127	0.01 - 0.12
LFE-DM7128	0.01 - 0.12
LFE-DM7129	0.01 - 0.12
LFE-DM7130	0.01 - 0.12
LFE-DM7131	0.01 - 0.12
LFE-DM7132	0.01 - 0.12
LFE-DM7133	0.01 - 0.12
LFE-DM7134	0.01 - 0.12
LFE-DM7135	0.01 - 0.12
LFE-DM7136	0.01 - 0.12
LFE-DM7137	0.01 - 0.12
LFE-DM7138	0.01 - 0.12
LFE-DM7139	0.01 - 0.12
LFE-DM7140	0.01 - 0.12
LFE-DM7141	0.01 - 0.12
LFE-DM7142	0.01 - 0.12
LFE-DM7143	0.01 - 0.12
LFE-DM7144	0.01 - 0.12
LFE-DM7145	0.01 - 0.12
LFE-DM7146	0.01 - 0.12
LFE-DM7147	0.01 - 0.12
LFE-DM7148	0.01 - 0.12
LFE-DM7149	0.01 - 0.12
LFE-DM7150	0.01 - 0.12
LFE-DM7151	0.01 - 0.12
LFE-DM7152	0.01 - 0.12
LFE-DM7153	0.01 - 0.12
LFE-DM7154	0.01 - 0.12
LFE-DM7155	0.01 - 0.12
LFE-DM7156	0.01 - 0.12
LFE-DM7157	0.01 - 0.12
LFE-DM7158	0.01 - 0.12
LFE-DM7159	0.01 - 0.12
LFE-DM7160	0.01 - 0.12
LFE-DM7161	0.01 - 0.12
LFE-DM7162	0.01 - 0.12
LFE-DM7163	0.01 - 0.12
LFE-DM7164	0.01 - 0.12
LFE-DM7165	0.01 - 0.12
LFE-DM7166	0.01 - 0.12
LFE-DM7167	0.01 - 0.12
LFE-DM7168	0.01 - 0.12
LFE-DM7169	0.01 - 0.12
LFE-DM7170	0.01 - 0.12
LFE-DM7171	0.01 - 0.12
LFE-DM7172	0.01 - 0.12
LFE-DM7173	0.01 - 0.12
LFE-DM7174	0.01 - 0.12
LFE-DM7175	0.01 - 0.12
LFE-DM7176	0.01 - 0.12
LFE-DM7177	0.01 - 0.12
LFE-DM7178	0.01 - 0.12
LFE-DM7179	0.01 - 0.12
LFE-DM7180	0.01 - 0.12
LFE-DM7181	0.01 - 0.12
LFE-DM7182	0.01 - 0.12
LFE-DM7183	0.01 - 0.12
LFE-DM7184	0.01 - 0.12
LFE-DM7185	0.01 - 0.12
LFE-DM7186	0.01 - 0.12
LFE-DM7187	0.01 - 0.12
LFE-DM7188	0.01 - 0.12
LFE-DM7189	0.01 - 0.12
LFE-DM7190	0.01 - 0.12
LFE-DM7191	0.01 - 0.12
LFE-DM7192	0.01 - 0.12
LFE-DM7193	0.01 - 0.12
LFE-DM7194	0.01 - 0.12
LFE-DM7195	0.01 - 0.12
LFE-DM7196	0.01 - 0.12
LFE-DM7197	0.01 - 0.12
LFE-DM7198	0.01 - 0.12
LFE-DM7199	0.01 - 0.12
LFE-DM7200	0.01 - 0.12

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EP LMF[®] - LaminarMasterFlow[®]
High-precision flow measurement of gas and air

Ordering Code

EP LMF[®] - LaminarMasterFlow[®] Ordering Code: 160797, X, X, X, X

Flow Processor

Flow Processor	Ordering Code
BASIC measurement accuracy: 0.5 % M ± 0.1 % EV	1
STANDARD measurement accuracy: 0.5 % M ± 0.1 % EV	2
CLASSIC measurement accuracy: 0.5 % M ± 0.1 % EV	3
CLASSIC measurement accuracy: 0.5 % M ± 0.1 % EV	4
CLASSIC measurement accuracy: 0.5 % M ± 0.1 % EV	5

Measuring section - Laminar Flow Element (LFE)

LFE	Ordering Code
LFE-DM7101	A
LFE-DM7102	B
LFE-DM7103	C
LFE-DM7104	D
LFE-DM7105	E
LFE-DM7106	F
LFE-DM7107	G
LFE-DM7108	H
LFE-DM7109	I
LFE-DM7110	J
LFE-DM7111	K
LFE-DM7112	L

Calculation of the measuring section

Calculation of the measuring section	Ordering Code
Factory calibration	1
Calibration	2
Cable set	M
5 m	N
10 m	P
15 m	Q

Operating conditions

Operating temperature: 0 °C - 50 °C
Operating pressure (max.): atmospheric (up to 10 bar)
Operating medium: air
Medium: supply optional

Measurement instruments for test unit options

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Marketing material

- Brochure EP LMF[®] system
- **Datasheet EP LFEs**

LFE - Laminar Flow Elements
Small flow

EP-146242

Laminar Flow Element TC10-1 to TC10-5

Flow measuring elements of 2.45 mm at differential pressures of 20 mbar. Measuring accuracy up to 0.5% v.M. with reproducibility to 0.1% v.M.

Technical Data

Art. No.	Art. Desc.	QV	QV ₁	QV ₂	QV ₃	QV ₄
		l/min	m³/h	l/min	m³/h	l/min
187 787	LFE DPM TC10-1	2	0.12	0.11	0.14	
187 788	LFE DPM TC10-2	5	0.3	0.28	0.36	
187 789	LFE DPM TC10-3	10	0.6	0.55	0.71	
187 790	LFE DPM TC10-4	20	1.2	1.10	1.43	
187 791	LFE DPM TC10-5	45	2.7	2.48	3.21	

Size remains the same
See sketch above

Measurement principle

Calibration & Service
Application examples:

- Heat and flow measurement
- Automation and automation
- Power station technology
- Hydroinformatics and medicine
- HVAC and energy engineering
- Food and water technology
- Filtration technology
- Chemistry
- Services

For special requirements we are happy to advise you. Subject to change. / EP-146242 / Last update: 05/2017 / 107
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Laminar Flow Element TC20 to TC150

Flow measuring elements from 7...480 m³/h for differential pressures of 20 mbar. Measuring accuracy up to 0.5% v.M. with reproducibility up to 0.1% v.M.

EP-146243

Technical Data

Art. No.	Art. Desc.	QV	QV ₁	QV ₂	QV ₃	QV ₄
		l/min	m³/h	l/min	m³/h	l/min
188 276	LFE DPM TC20	115	6.9	6.34	8.20	
188 228	LFE DPM TC25	160	11.4	10.47	13.54	
188 230	LFE DPM TC30	200	12	10.90	14.00	
188 231	LFE DPM TC35	250	15.0	13.63	17.50	
188 232	LFE DPM TC40	300	18.0	16.36	21.00	
188 233	LFE DPM TC45	350	21.0	19.09	24.50	
188 234	LFE DPM TC50	400	24.0	21.82	28.00	
188 235	LFE DPM TC60	480	28.8	26.18	33.60	
188 236	LFE DPM TC70	560	33.6	30.55	39.20	
188 237	LFE DPM TC80	640	38.4	34.91	44.80	
188 238	LFE DPM TC90	720	43.2	39.27	50.40	
188 239	LFE DPM TC100	800	48.0	43.64	56.00	
188 240	LFE DPM TC120	960	57.6	52.37	67.20	
188 241	LFE DPM TC150	1200	72.0	65.45	84.00	

Size remains the same
See sketch above

Measurement principle

Calibration & Service
Application examples:

- Heat and flow measurement
- Automation and automation
- Power station technology
- Hydroinformatics and medicine
- HVAC and energy engineering
- Food and water technology
- Filtration technology
- Chemistry
- Services

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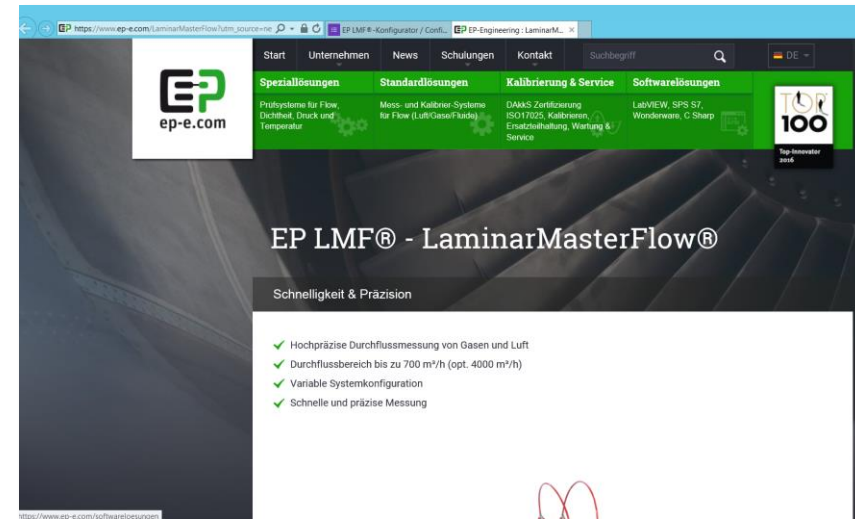
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Marketing material

- Brochure EP LMF® system
- Datasheet EP LFEs
- **Landing page website**



https://www.ep-e.com/LaminarMasterFlow?utm_source=newsletter&utm_medium=email&utm_campaign=epe



Marketing material

- Brochure EP LMF® system
- Datasheet EP LFEs
- Landing page website
- **LMF® configuration tool website**

EP LMF®-Konfigurator / Configuration tool

* Erforderlich

E-Mail-Adresse *

Ihre E-Mail-Adresse

Konfigurieren Sie Ihr individuelles EP LMF® Messsystem/
Configure your individual EP LMF® measurement system

EP LMF® - LaminarMasterFlow® EP LMF® - LaminarMasterFlow®

Hochpräzise Durchflussmessung von Luft & Gas
High-precision flow measurement of gas & air

- ✓ Schnelle und präzise Messung
Rapid and precise measurement
- ✓ Einfache Bedienung
Easy use
- ✓ Variable Systemkonfiguration
Variable system configuration



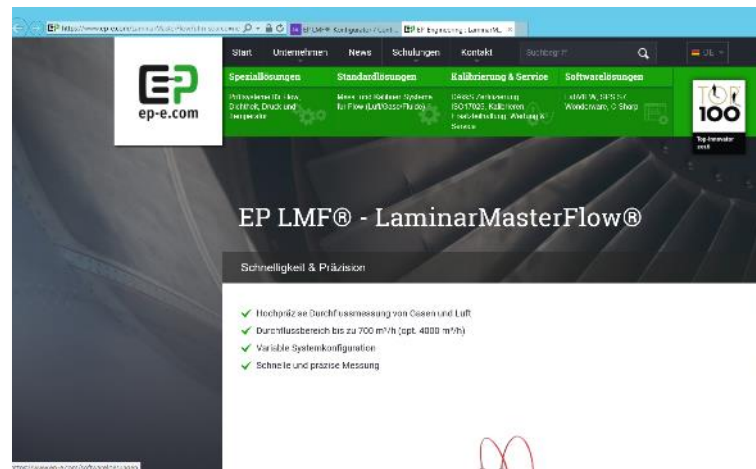
Messbereich / Measurement range: *

- ☐ (1) 0,2...2 l/min // 0,012...0,12 m³/h // 0,014...0,14 kg/h
- ☐ (2) 0,5...5 l/min // 0,03...0,3 m³/h // 0,036...0,36 kg/h
- ☐ (3) 1...10 l/min // 0,06...0,6 m³/h // 0,071...0,71 kg/h
- ☐ (4) 2...20 l/min // 0,12...1,2 m³/h // 0,143...1,43 kg/h
- ☐ (5) 4,5...45 l/min // 0,27...2,7 m³/h // 0,321...3,21 kg/h
- ☐ (6) 11,5...115 l/min // 0,69...6,9 m³/h // 0,82...8,2 kg/h
- ☐ (7) 19...190 l/min // 1,1...11,4 m³/h // 1,354...13,54 kg/h
- ☐ (8) 70...700 l/min // 4,2...42 m³/h // 4,99...49,9 kg/h
- ☐ (9) 118,5...1185 l/min // 7,1...71,1 m³/h // 8,447...84,47 kg/h
- ☐ (10) 280...2800 l/min // 16,8...168 m³/h // 19,958...199,58 kg/h



Marketing material

- Brochure EP LMF® system
- Datasheet EP LFEs
- Landing page website
- LMF® configuration tool website





Ordering information

EP LMF®-LaminarMasterFlow® Ordering Code:		159733_	X	X	X	X
Flow Processor						
BASIC measurement accuracy 1.0 % MV + 0.1 % EV		1				
BASIC measurement accuracy 0.8 % MV + 0.05 % EV		2				
STANDARD measurement accuracy 1.0 % MV + 0.1 % EV		3				
STANDARD measurement accuracy 0.8 % MV + 0.05 % EV		4				
CLASSIC measurement accuracy 0.5 % MV + 0.025 % EV		5				
Measuring section - Laminar Flow Element (LFE)*						
LFE EPM TC10-1			A			
LFE EPM TC10-2			B			
LFE EPM TC10-3			C			
LFE EPM TC10-4			D			
LFE EPM TC10-5			E			
LFE EPM TC20			F			
LFE EPM TC25			G			
LFE EPM TC40			H			
LFE EPM TC50			I			
LFE EPM TC80			J			
LFE EPM TC100			K			
LFE EPM TC150			L			
Calibration of the measuring section						
Factory calibration				1		
DAkkS calibration				2		
Cable set						
2.5 m						M
5 m						N
10 m						P
15 m						Q



Summary / Key points

- Gas flow measurement system from 0.01 to 4000 m³/h
- Highest accuracy (up to 0.5 % MV)
 - Reliable and well approved with many customers
 - Individual system configuration
 - Clever options
 - Easy use



Thanks for your kind attention.





Automotive & Automation



Aviation



HVAC & Energy Engineering



Pharmaceuticals & Medicine



Gas & Flow Measurement



Fluid & Valve Technology



Chemistry



Power Station Techn.



EP Instruments



Services



Filter Technology



EP Ehrler Prüftechnik Engineering GmbH &
EP Instruments Messtechnik + Kalibrierung GmbH

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