E+E

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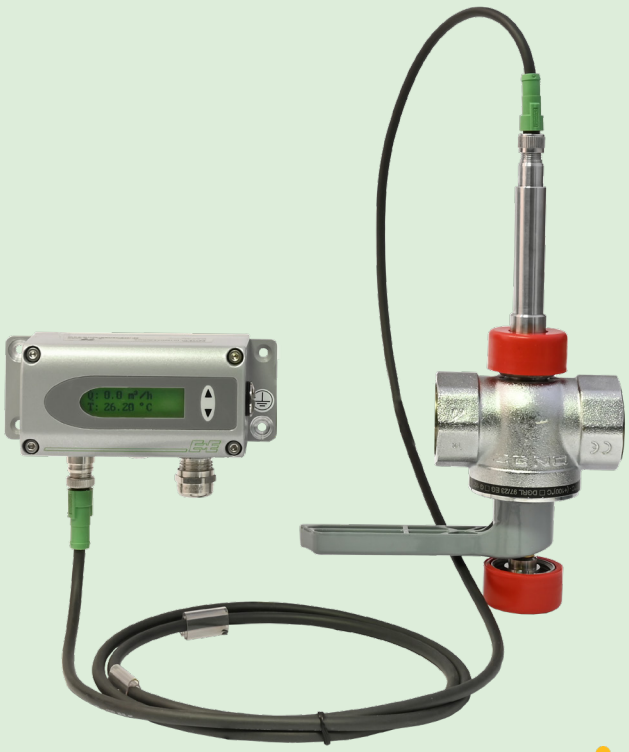
technology.

Datasheet EE771

Flow Sensor for Compressed Air and Gases DN15 (1/2") - DN50 (2")



Modbus

M-Bus

www.epluse.com

EE771

Flow Sensor for Compressed Air and Gases DN15 (1/2") - DN50 (2")

The EE771 is ideal for flow measurement in pipelines with diameters of DN15 (1/2") up to DN50 (2"). Besides the temperature (T) the sensor provides the values for standardised volume flow (V'_n), standardised flow (v_n) and mass flow (m'). The integrated totalizer records the consumption (Q_n). The sensor is suitable for air, nitrogen, CO_2, O_2, argon or other non-corrosive, non-flammable gases with a pressure of up to 16 bar (232 psi).

Precision and Reliability

The EE771 sets new standards in terms of measurement accuracy and reproducibility thanks to its application-specific factory adjustment at 7 bar. A dynamic pressure compensation via a 2-wire 4 - 20 mA input is available. The E+E hot-film sensing element deploying the latest thin film technology features excellent long-term stability, fast response time and an outstanding reliability.

Easy Mounting

The unique mounting concept including a measurement valve with shut-off function permits rapid installation and removal of the device with only short flow interruption. It ensures high measurement accuracy through exact and reproducible sensing head positioning in the pipe.

Versatile Output Options

The EE771 features two freely scalable outputs configurable as analogue current or voltage output, switch output or as pulse output for consumption measurement. Optionally, the measured data is available at the Modbus RTU or M-BUS (Meter-Bus) interface.

User Configurable and Adjustable

The free EE-PCS Product Configuration Software and an optional configuration adapter facilitate the configuration and adjustment of the EE771.

EE771 Compact

EE771 Remote

Features

Consumption metering

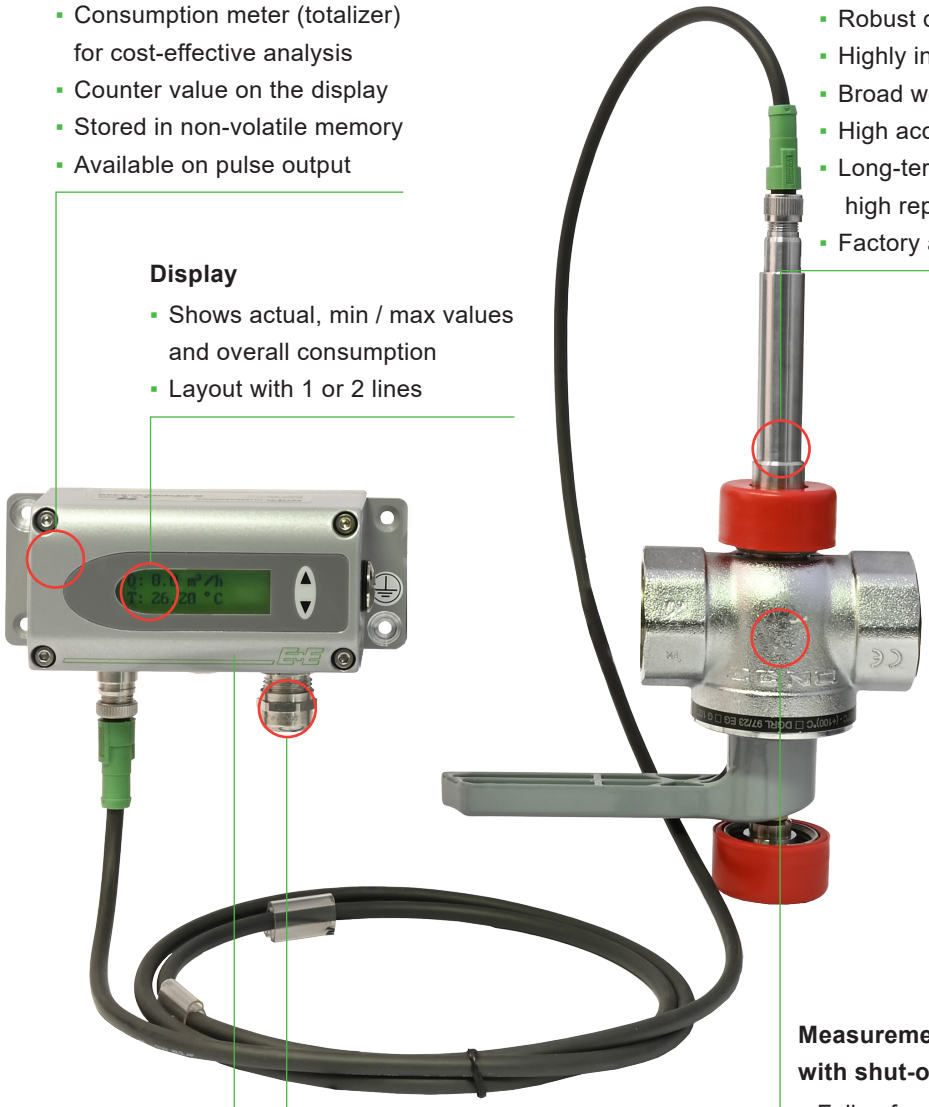
- Consumption meter (totalizer) for cost-effective analysis
- Counter value on the display
- Stored in non-volatile memory
- Available on pulse output

Display

- Shows actual, min / max values and overall consumption
- Layout with 1 or 2 lines

Probe with hot-film sensing element

- Robust design in stainless steel
- Highly insensitive to contamination
- Broad working range of 1:400
- High accuracy ±1.5 % of reading
- Long-term stablility and high reproducibility
- Factory adjustment under pressure



Measurands

- Standard volume flow (V'_n)
- Mass flow (m')
- Standard flow (v_n)
- Temperature (T)
- Consumption (Q_n)

Output

- User configurable via PC
- 0 - 10 V / 4 - 20 mA output
- Two switch outputs
- Pulse output
- Modbus RTU
- M-Bus

Measurement valve with shut-off function

- Fail-safe alignment of sensing unit
- Service friendly due to <15 s flow interruption for sensor unit installation
- Best accuracy due to precise and repro-ducible positioning of the sensing head
- Pressure rating 16 bar (232 psi)
- Sealing plug allows for running the process also without sensor

Inspection certificate

According to DIN EN 10204-3.1

Features

Accredited Traceable Calibration Certificate

Internationally recognised certificates for the calibration of measuring instruments from accredited laboratories document the traceability of the measurements to the International System of Units (SI). The E+E Elektronik calibration laboratory offers traceable calibrations.

The E+E calibration laboratory is accredited by Akkreditierung Austria in accordance with DIN EN ISO/IEC 17025 with the identification number 0608. This allows the laboratory to issue ISO 17025 certificates for the measurands humidity, temperature, dew point temperature, air velocity, flow, pressure and CO_2.

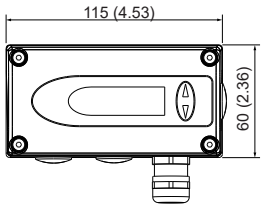
Visit www.eplusecal.com for detailed information on calibration and to enquire a certificate of accredited traceable calibration for the EE771 from the E+E Elektronik calibration laboratory.

Dimensions

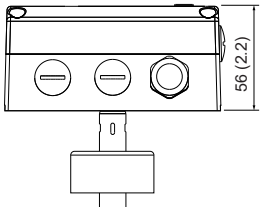
Values in mm (inch)

EE771 compact

Type T19, T20

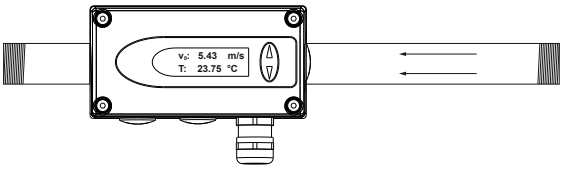


Type T19, T20

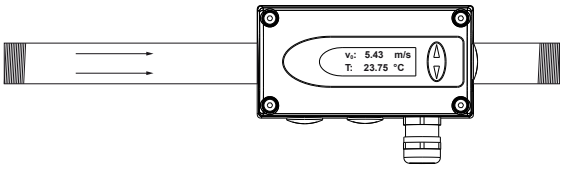


EE771 compact

Type T19: flow direction right to left

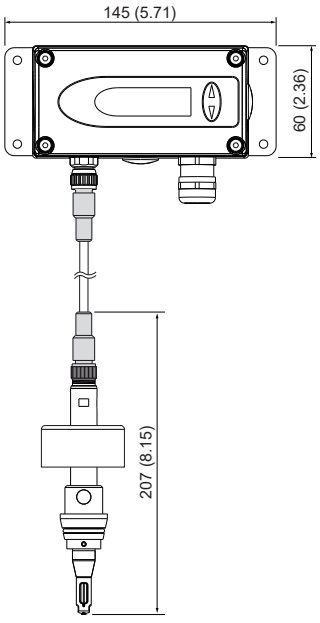


Type T20: flow direction left to right



EE771 remote

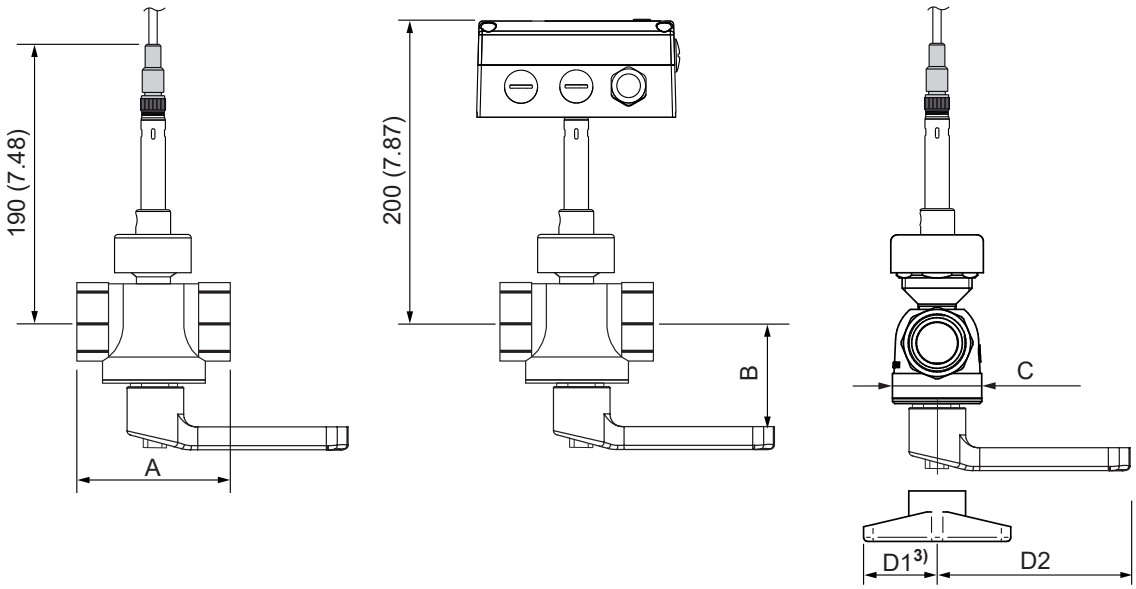
Type T3:



Dimensions

Values in mm (inch)

Measurement valve with shut-off function
HA075xxx:



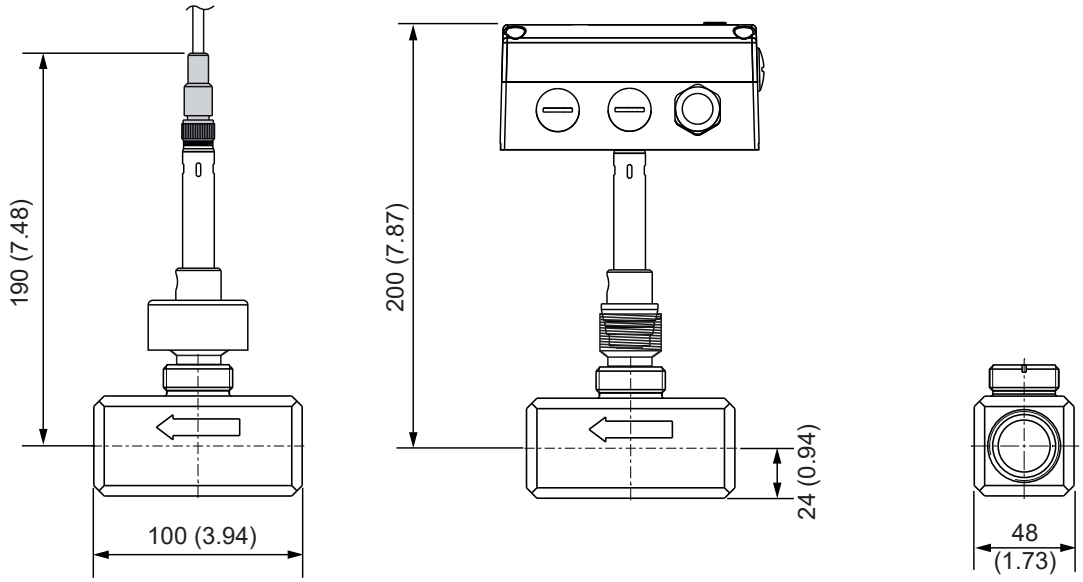
Valve	Thread[1)]	A	B	C	D1[3)]	D2	ISO	NPT
DN15	R_p1/2"	100±8 (3.94±0.32)[2)]	55 (2.28)	43 (1.69)	36 (1.46)	92 (3.62)	**HA075015**	**Not available**
DN20	R_p or NPT 3/4"	73 (2.83)	55 (2.28)	43 (1.69)	36 (1.46)	92 (3.62)	**HA075020**	**HA175020**
DN25	R_p or NPT 1"	88 (3.27)	67 (2.28)	52 (2.00)	48 (1.73)	125 (4.92)	**Not available**	**HA175025**
DN32	R_p 1 1/4"	100 (3.94)	77 (2.64)	62 (2.44)	–	125 (4.92)	**HA075032**	**Not available**
DN40	R_p or NPT 1 1/2"	110 (4.33)	83 (3.27)	74 (2.91)	–	147 (5.79)	**HA075040**	**HA175040**
DN50	R_p or NPT 2"	131 (5.16)	88 (3.46)	90 (3.54)	–	147 (5.79)	**HA075050**	**HA175050**

1) Female thread: BSP thread acc. to EN 10226 (old DIN 2999) or NPT.
2) Including reduction 3/4" - 1/2"
3) Phasing out, mixed deliveries are possible in the transition phase.

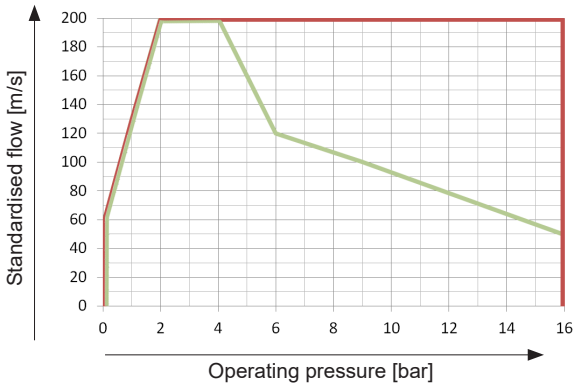
Dimensions

Values in mm (inch)

Gauge mounting block DN25 and O_2 DN25 (ISO)
HA077107 and HA077109:



Flow Measuring Range as Function of Operating Pressure



Graph for standardised volume flow

$V'_n = v_n * id^2 * \pi/4 * 3\,600$

V'_n ... Standardised volume flow [m^3/h]

v_n ... Standardised flow [m/s]

id ... Inner pipe diameter [m]

π ... 3.1415927

— Air, nitrogen, O_2, argon

— CO_2

Formula for standardised volume flow

Technical Data

Measurands

Volume Flow (V'n)

Standard conditions		Factory setting according to DIN 1343 pn = 1013.25 mbar (14.7 psi); Tn = 0 °C (32 °F), configurable		
Measuring range Standardised volume flow in				
	Medium	**Pipe-diameter**	**HV31**	**HV33**
	Air	**DN15 (1/2")**	0.32...63 m^3/h (0.19...37.1 SCFM)	0.32...126 m^3/h (0.19...74.1 SCFM)
		DN20 (3/4")	0.57...113 m^3/h (0.34...66.5 SCFM)	0.57...226 m^3/h (0.34...133 SCFM)
		DN25 (1")	0.90...176 m^3/h (0.53...103.5 SCFM)	0.90...352 m^3/h (0.53...207.1 SCFM)
		DN32 (1 1/4")	1.45...289 m^3/h (0.85...170.0 SCFM)	1.45...578 m^3/h (0.85...340 SCFM)
		DN40 (1 1/2")	2.26...452 m^3/h (1.33...265.9 SCFM)	2.26...904 m^3/h (1.33...531.8 SCFM)
		DN50 (2")	3.50...700 m^3/h (2.06...411.8 SCFM)	3.50...1 400 m^3/h (2.06...823.6 SCFM)
Measuring range Standardised flow in				
	Medium	**Pipe-diameter**	**HV31**	**HV33**
	Air, CO_2, Nitrogen , Argon	**≤DN50 (2")**	0.5...100 m/s (100...19 685 SFPM)	0.5...200 m/s (100...39 370 SFPM)
	O_2	**≤DN25 (1")**	0.5...77 m/s (100...15 157 SFPM)	0.5...200 m/s (100...39 370 SFPM)
Accuracy [1] in air @ 7 bar (101.5 psi) (abs) and 23 °C (73 °F)		±(1.5 % of measured value + 0.5 % of full scale)		
Temperature dependency		±(0.1 % of measured value/°C)		
Response time t_{90}, typ.		<1 s		
Sampling interval		0.1 s		

1) The accuracy statement includes the uncertainty of the factory calibration with an coverage factor k=2 (2-times standard deviation).
The accuracy was calculated in accordance with EA-4/02 and with regard to GUM (Guide to the Expression of Uncertainty in Measurement).
The accuracy specifications apply when using inlet and outlet sections of suitable length, see accessories and User Manual.

Temperature (T)

Measuring range	-20...+80 °C (-4...+176 °F)
Accuracy @ 20 °C (68 °F)	±0.7 °C (±1.26 °F)

Technical Data

Outputs

Analogue

Signal range and measurands are freely configurable	0 - 10 V 4 - 20 mA 3-wire 0 - 20 mA 3-wire	0 mA < I_L < 1 mA R_L < 500 Ω R_L < 500 Ω	I_L = load current R_L = load resistance

Switch output	Potential free, max. 44 V DC, 500 mA switching capacity
Pulse output	Totalizer, pulse length: 0.02...2 s

Digital (optional)

Digital interface	RS485 (EE771 = 1 unit load)
Protocol[1)] **Factory settings** **Supported Baud rates** **Measured data types**	Modbus RTU 9 600 Baud, parity even, 1 stop bit, Modbus address 1 9 600, 19 200, 38 400 and 57 600 FLOAT32
Protocol[2)] **Factory settings** **Supported Baud rates**	M-Bus 2 400 Baud, parity even, 1 stop bit, M-Bus address 1 600, 1 200, 2 400, 4 800 and 9 600

1) Find more details about communication setting in the User Manual and the Modbus Application Note at www.epluse.com/ee771.
2) Find more details about communication setting in the User Manual.

Input

External Dynamic Pressure Compensation

Requirements to the pressure sensor	4 - 20 mA (2-wire, 15 V) (relevant for gases other than air and nitrogen)

General

Power supply class III ⧫III⧫ USA & Canada: Class 2 supply necessary, max. voltage 30 V DC		18 - 30 V AC/DC
Current consumption, max.		<200 mA (with display)
Electrical connection		Cable gland M16 and screw terminals max. 1.5 mm2 (AWG 16), optional with connector M12x1, 8 poles
Nominal pressure		16 bar (232 psi)
Humidity range		0…100 %RH, non-condensing
Temperature range	**Ambient, Storage** **Medium**	-20...+60 °C (-4...+140 °F) -20...+80 °C (-4...+176 °F)
Material	**Enclosure** **Probe** **Probe head** **Measurement valve**	AlSi9Cu3 (Die-cast aluminium) Stainless steel Stainless steel / glass Brass
Protection rating	**Enclosure**	IP65 / NEMA 4X
Electromagnetic compatibility		EN 61326-1 EN 61326-2-3 Industrial environment FCC Part15 Class A ICES-003 Class A
Conformity		CE UKCA

Ordering Guide

The EE771 consists of the sensor (pos. 1) and the measurement valve with shut-off function / gauge mounting block (pos. 2). These must be ordered together! The probe cable (pos. 3) is only necessary for model T3.

Position 1 - Sensor

	Feature	Description	Code
			EE771-
Hardware Configuration	Type	Compact ri-le (flow direction right to left)	T19
		Compact le-ri (flow direction left to right)	T20
		Remote	T3
	Measuring range	0.5...100 m/s (100...19685 SFPM)	HV31
		0.5...200 m/s (100...39370 SFPM)	HV33
	Measurement valve for pipe diameter	DN15 (1/2")	N15
		DN20 (3/4")	N20
		DN25 (1")	N25
		DN32 (1 1/4")	N32
		DN40 (1 1/2")	N40
		DN50 (2")	N50
	Display	Without display	No code
		Display with backlight	D2
	Mounting	Measurement valve with shut-off function	No code
	Electrical connection	Cable gland and screw terminals	No code
		1x plug for power supply and outputs	E4
	Digital interface	Without digital output	No code
		RS485 (with Modbus RTU)	J3
		M-Bus (Meter-Bus)	J5
	Cleaning	Without	No code
		Degreased for oxygen measurement	AF2
Software Setup[1] Analogue Outputs	Output 1 measurand	Temperature T [°C]	MA1
		Temperature T [°F]	MA2
		Standardised volume flow V'_n [m^3/h]	MA83
		Standardised volume flow V'_n [ft^3/min]	MA87
		Mass flow m' [kg/h]	MA80
		Standardised flow v_n [m/s]	MA22
		Standardised flow v_n [ft/min]	MA23
	Output 1 signal	Analogue output 0 - 5 V	GA2
		0 - 10 V	GA3
		0 - 20 mA	GA5
		4 - 20 mA	GA6
		Switch output	GA9
	Output 2 measurand	Temperature T [°C]	MB1
		Temperature T [°F]	MB2
		Standardised volume flow V'_n [m^3/h]	MB83
		Standardised volume flow V'_n [ft^3/min]	MB87
		Mass flow m' [kg/h]	MB80
		Standardised flow v_n [m/s]	MB22
		Standardised flow v_n [ft/min]	MB23
		Consumption Q_n [m^3][2)]	MB91
		Consumption Q_n [ft^3]	MB93
	Output 2 signal	Switch output	GB9
		Pulse output	GB10
	Medium	Air	No code
		Nitrogen	FU2
		CO_2	FU3
		O_2[3)]	FU4
		Argon	FU7
	Accredited Traceable Calibration Certificate in accordance with DIN EN ISO/IEC 17025		see www.eplusecal.com

1) Can be changed by the user.
2) Consumption measurement is only possible with pulse output (output 2 = GB10).
3) Medium O_2 only for mounting valve DN15 up to DN25. Upon delivery, the mounting valve and the probe are free of oil and grease.

Ordering Guide

Position 2 - Measurement Valve with Shut-Off Function / Gauge Mounting Block

	Feature	Description	Code	Code
			BSP Thread	NPT Thread
Hardware	Measurement valve	DN15	HA075015	Not available
		DN20	HA075020	HA175020
		DN25	Not available	HA175025
		DN32	HA075032	Not available
		DN40	HA075040	HA175040
		DN50	HA075050	HA175050
	Gauge mounting block	DN25	HA077107	Not available
	Measurement valve O_2	DN15	HA076015	Not available
		DN20	HA076020	HA176020
		DN25	Not available	HA176025
	Gauge mounting block O_2	DN25	HA077109	Not available

Position 3 - Probe cable (Model T3 only)

	Feature	Description	Code
Hard.	Cable length	2 m (6.56 ft)	HA010816
		5 m (16.4 ft)	HA010817
		10 m (32.8 ft)	HA010818

Order Examples

Position 1 - Sensor

EE771-T19HV31N25MA83GA6MB91GB10

Feature	Code	Description
Type	T19	Compact ri-le (flow direction right to left)
Measuring range	HV31	0.5...100 m/s (100...19685 SFPM)
Measurement valve for pipe diameter	N25	DN25 (1")
Display	No code	Without display
Mounting	No code	Measurement valve with shut-off function
Electrical connection	No code	Cable gland and screw terminals
Digital interface	No code	Without digital output
Output 1 measurand	MA83	Standardised volume flow V'_n [m^3/h]
Output 1 signal	GA6	4 - 20 mA
Output 2 measurand	MB91	Consumption Q_n [m^3]
Output 2 signal	GB10	Pulse output
Medium	No code	Air

Order Examples

Position 1 - Sensor

EE771-T3HV31N15D2J3AF2MA1GA2MB1GB9

Feature	Code	Description
Type	**T3**	Remote
Measuring range	**HV31**	0.5...100 m/s (100...19685 SFPM)
Measurement valve for pipe diameter	**N15**	DN15 (1/2")
Display	**D2**	Display with backlight
Mounting	**No code**	Measurement valve with shut-off function
Electrical connection	**E1**	1x M16x1.5 cable gland
Digital interface	**J3**	RS485 (with Modbus RTU)
Cleaning	**AF2**	Degreased for oxygen measurement
Output 1 measurand	**MA1**	Temperature T [°C]
Output 1 signal	**GA2**	0 - 5 V
Output 2 measurand	**MB1**	Temperature T [°C]
Output 2 signal	**GB9**	Switch output
Medium	**No code**	Air

Position 2 - Measurement Valve

HA075015

DN15 - Measurement valve with shut-off function

Position 3 - Probe Cable

Necessary for model T3 only.

Accessories

For further information see datasheet Accessories.

Description		Code
Inlet and outlet pipe section, BSP 1/2"	**DN15*)**	**HA070215**
	DN20*)	**HA070220**
	DN25*)	**HA070225**
	DN32*)	**HA070232**
	DN40*)	**HA070240**
	DN50*)	**HA070250**

*) Inlet and outlet pipe section is available for measurement valve with shut-off function with BSP thread only.

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