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 standardized volumetric flow (V'_n), standardized 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).

Stainless steel sensing head

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.

EE771 Compact

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.

Features

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

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

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.

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

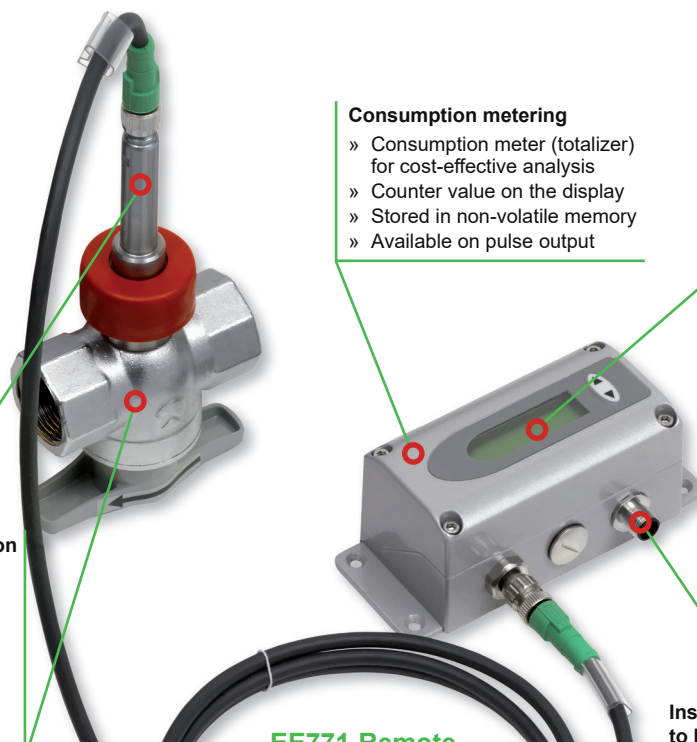**Display**
» Shows actual, min / max values and overall consumption
» Layout with 1 or 2 lines

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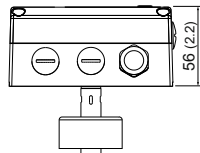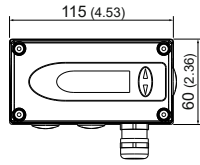» Pulse output
» Modbus RTU
» M-Bus

EE771 Remote

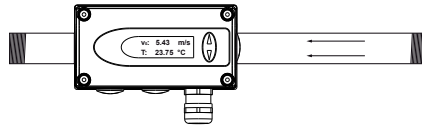**Inspection certificate according to DIN EN 10204-3.1**

Dimensions

Values in mm (inch)

EE771 Compact

115 (4.53)

60 (2.36)

EE771-T20 direction of flow is right to left

56 (2.2)
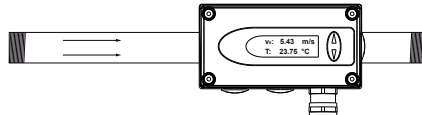
EE771-T19 / EE771-T20

EE771-T19 direction of flow is left to right

EE771 Remote

145 (5.71)

60 (2.36)

207 (8.15)
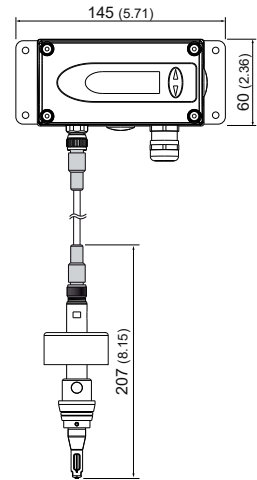
EE771-T3

Measurement valve with shut-off function

190 (7.48)

200 (7.87)

B

C
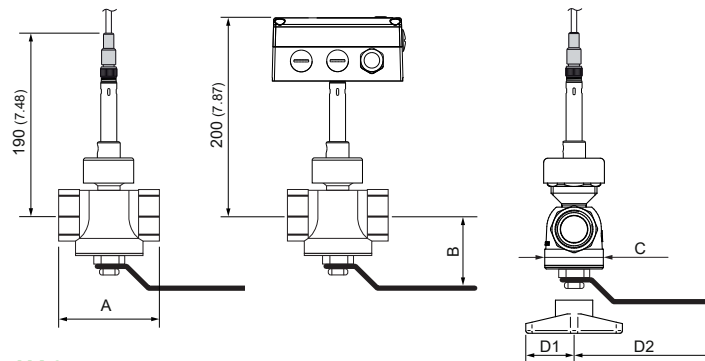
D1   D2

HA075xxx

Valve	Thread[1]	A	B	C	D1	D2	ISO	NPT
DN15	R_p 1/2"	100±8 (3.94±0.32)[2]	55 (2.28)	43 (1.69)	36 (1.46)	–	HA075015	not available
DN20	R_p or NPT 3/4"	73 (2.83)	55 (2.28)	43 (1.69)	36 (1.46)	–	HA075020	HA175020
DN25	R_p or NPT 1"	88 (3.27)	67 (2.28)	52 (2.00)	48 (1.73)	–	HA075025	HA175025
DN32	R_p 1 1/4"	100 (3.94)	77 (2.64)	62 (2.44)	–	125 (4.88)	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"

Flow measuring range as function of operating pressure

Standardized flow [m/s]
200
180
160
140
120
100
80
60
40
20
0

0 2 4 6 8 10 12 14 16

Operating pressure [bar]
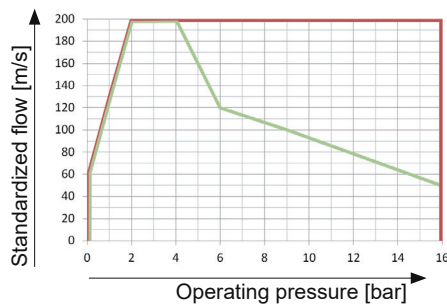
Formula for standardized volumetric flow:

$$V'_n = v_n * id^2 * \pi/4 * 3600$$

V'_n ... Standardized volumetric flow [m³/h]
v_n ... Standardized flow [m/s]
id ... Inner pipe diameter [m]
π ... 3,1415279

—— Air, nitrogen, O_2, argon

—— CO_2

Technical data

Measurands

Flow

Volumetric flow at standard conditions acc. to DIN 1343
$p_0 = 1013.25$ mbar (14.7 psi); $T_0 = 0$ °C (32 °F)

Measuring range			HV31		HV33	
Standardized volumetric flow in air	DN15 (1/2"):		0.32...63 m³/h	0.19...37.1 SCFM	0.32...126 m³/h	0.19...74.1 SCFM
	DN20 (3/4"):		0.57...113 m³/h	0.34...66.5 SCFM	0.57...226 m³/h	0.34...133 SCFM
	DN25 (1"):		0.90...176 m³/h	0.53...103.5 SCFM	0.90...352 m³/h	0.53...207.1 SCFM
	DN32 (1 1/4"):		1.45...289 m³/h	0.85...170.0 SCFM	1.45...578 m³/h	0.85...340 SCFM
	DN40 (1 1/2"):		2.26...452 m³/h	1.33...265.9 SCFM	2.26...904 m³/h	1.33...531.8 SCFM
	DN50 (2"):		3.50...700 m³/h	2.06...411.8 SCFM	3.50...1400 m³/h	2.06...823.6 SCFM
Standardized flow in air, CO_2,	≤DN50 (2"):		0.5...100 m/s	100...19685 SFPM	0.5...200 m/s	100...39370 SFPM
nitrogen, argon	DN65 (2 1/2"):				0.5...117 m/s	100...23031 SFPM
O_2	≤DN25 (1"):		0.5...100 m/s	100...19685 SFPM	0.5...200 m/s	100...39370 SFPM

Accuracy in air at 7 bar (abs) (101.5 psi) and 23°C (73°F)[1]	± (1.5 % of measuring value + 0.5 % of full scale)
Temperature dependency	± (0.1 % of measuring value/°C)
Pressure dependency[2]	0.5 % of measuring value / bar
Response time t_{90}	< 1 s
Sample rate	0.1 s

Temperature

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

Outputs

Signal range and measurands are freely configurable

Analogue output	Voltage	0 - 10 V	$0 < I_L < 1$ mA
	Current (3-wire)	0 - 20 mA and 4 - 20 mA	$R_L < 500$ Ohm
Switch output		Potential-free, max. 44 V DC, 500 mA switching capacity	
Pulse output		Totalizer, pulse length: 0.02...2 s	

Digital interface (optional)

RS485	(EE771 = 1 unit load)
Protocol	Modbus RTU
Default settings	Baud rate 9600[3], parity even, stop bits 1, slave ID 1
M-Bus	
Default settings	Baud rate 2400[4], parity even, stop bits 1, slave ID 1

Input

Dynamic pressure compensation	4 - 20 mA (2-wire; 15 V) input for pressure sensor

General

Supply voltage		18 - 30 V AC/DC
Current consumption, max		200 mA (with display)
Temperature range	Ambient, storage:	-20...60 °C (-4...140 °F)
	Medium:	-20...80 °C (-4...176 °F)
Nominal pressure		16 bar (232 psi)
Humidity		0...100 %RH, non-condensing
Electrical connection		Cable gland M16 and screw terminals max. 1.5 mm² (AWG 16), optional with connector M12x1, 8 pole
Electromagnetic compatibility		EN 61326-1 EN 61326-2-3
		Industrial Enviroment
		FCC Part15 Class A ICES-003 Class A
Material	Enclosure	Metal (AlSi₃Cu)
	Probe	Stainless steel
	Sensor head	Stainless steel / glass
	Measurement valve	Brass
Enclosure protection rating		IP65 / NEMA 4

UK CA   CE

1) The accuracy statement includes the uncertainty of the factory calibration with an enhancement 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

2) The flow meter is calibrated at 7 bar (abs) (101.5 psi). At other working pressure the error can be compensated by setting the actual pressure with the configuration software.

3) Supported baud rates: 9600, 19200, 38400 and 57600; find more details about communication setting in the User Manual and the Modbus Application Note at www.epluse.com/ee771.

4) Supported baud rates: 600, 1200, 2400, 4800 and 9600; find more details about communication setting in the User Manual.

Ordering Guide

The EE771 consists of the sensor (pos. 1) and the measurement valve with shut-off function (pos. 2). Both have to be ordered together! The probe cable (pos. 3) is only necessary for model T3.

Position 1 - Sensor			EE771-
Type	Compact ri-le	flow direction right to left	**T19**
	Compact le-ri	flow direction left to right	**T20**
	Remote		**T3**
Measuring range	0...100 m/s (328.1 ft/s)		**HV31**
	0...200 m/s (656.2 ft/s)		**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**
	With display		**D2**
Mounting	Measurement valve with shut-off function		**no code**
Electrical connection	Cable gland and screw terminals		**no code**
	1 plug for power supply and outputs		**E4**
Digital output	No digital output		**no code**
	Modbus RTU		**J3**
	M-Bus		**J5**
Measurand output 1	Temperature	T [°C]	**MA1**
		T [°F]	**MA2**
	Standardized volumetric flow	V'_n [m³/h]	**MA83**
		V'_n [ft³/min]	**MA87**
	Mass flow	m' [kg/h]	**MA80**
	Standardized flow	v_n [m/s]	**MA22**
		v_n [ft/min]	**MA23**
Signal output 1	Analogue output	0 - 5 V	**GA2**
		0 - 10 V	**GA3**
		0 - 20 mA	**GA5**
		4 - 20 mA	**GA6**
	Switching output		**GA9**
Measurand output 2	Temperature	T [°C]	**MB1**
		T [°F]	**MB2**
	Standardized volumetric flow	V'_n [m³/h]	**MB83**
		V'_n [ft³/min]	**MB87**
	Mass flow	m' [kg/h]	**MB80**
	Standardized flow	v_n [m/s]	**MB22**
		v_n [ft/min]	**MB23**
	Consumption[2]	Q_n [m³]	**MB91**
		Q_n [ft³]	**MB93**
Signal output 2	Switch output		**GB9**
	Pulse output		**GB10**
Medium	Air		**no code**
	Nitrogen		**FU2**
	CO₂		**FU3**
	O₂[3]		**FU4**
	Argon		**FU7**

Hardware Configuration
Software Setup[1]

Position 2 - Measurement valve	BSP Thread	NPT Thread		BSP Thread	NPT Thread
DN15 - measurement valve	HA075015	not available	DN15 - measurement valve for O₂[3]	HA076015	not available
DN20 - measurement valve	HA075020	HA175020	DN20 - measurement valve for O₂[3]	HA076020	HA176020
DN25 - measurement valve	HA075025	HA175025	DN25 - measurement valve for O₂[3]	HA076025	HA176025
DN32 - measurement valve	HA075032	not available			
DN40 - measurement valve	HA075040	HA175040			
DN50 - measurement valve	HA075050	HA175050			

Position 3 - Probe cable (Model T3 only)		
Cable length	2 m (6.56 ft)	HA010816
	5 m (16.4 ft)	HA010817
	10 m (32.8 ft)	HA010818

1) Can be changed by the user.
2) Consumption measurement is only possible with pulse output (output 2 = GB10).
3) Medium O₂ only for mounting valve DN15 up to DN25. Upon delivery, the mounting valve and the probe are free of oil and grease.

Order Example

Position 1 - Sensor

EE771-T19HV31N25MA83GA6MB91GB10

Model:	Compact ri-le
Measuring range:	0...100 m/s (328.1 ft/s)
Measuring pipe-diameter:	DN25 (1")
Display:	No display
Mounting:	Measurement valve with shut-off function
Electrical connection:	Cable gland
Digital output:	No digital output
Phys. parameter output 1:	Standardized vol. flow [m³/h]
Output 1:	4 - 20 mA
Phys. parameter output 2:	Consumption [m³/h]
Output 2:	Pulse output
Medium:	Air

Position 2 - Measurement valve

HA075025

DN25 - measurement valve with shut-off function

Position 3 - Probe cable

Necessary for model T3 only.

Ordering Guide Accessories

- Inlet and outlet section for measurement valve	DN15*)	HA070215
	DN20*)	HA070220
	DN25*)	HA070225
	DN32*)	HA070232
	DN40*)	HA070240
	DN50*)	HA070250

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