

# 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<sub>2</sub>, O<sub>2</sub>, 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.



## 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  $\pm 1.5\%$  of reading
- » Long-term stability 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 reproducible 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

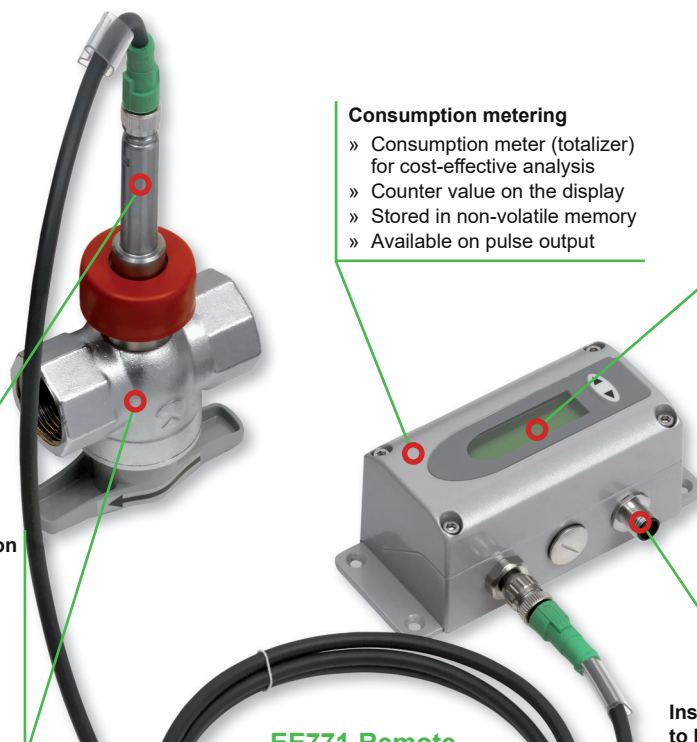
### Display

- » 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

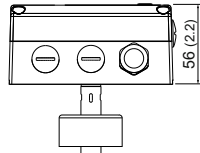
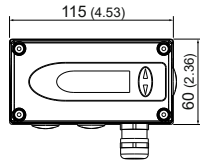
Inspection certificate according to DIN EN 10204-3.1



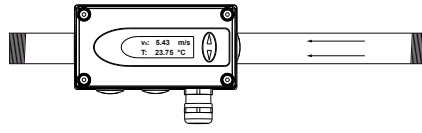
## Dimensions

Values in mm (inch)

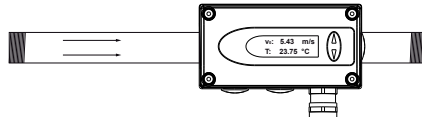
### EE771 Compact



### EE771-T19/EE771-T20

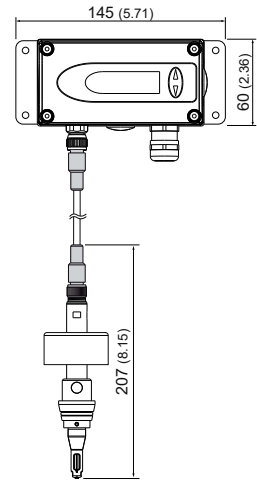


**EE771-T20** direction of flow is right to left



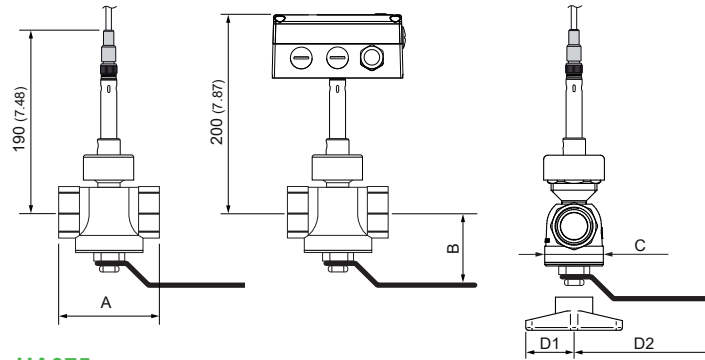
**EE771-T19** direction of flow is left to right

### EE771 Remote



### EE771-T3

### Measurement valve with shut-off function

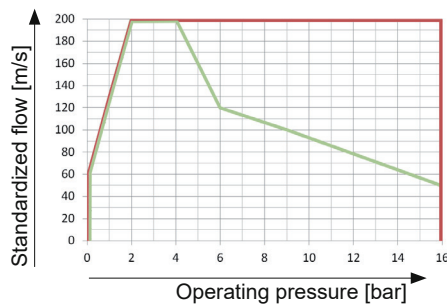


### HA075xxx

Valve	Thread <sup>1)</sup>	A	B	C	D1	D2	ISO	NPT
DN15	R <sub>p</sub> 1/2"	100±8 (3.94±0.32) <sup>2)</sup>	55 (2.28)	43 (1.69)	36 (1.46)	–	HA075015	not available
DN20	R <sub>p</sub> or NPT 3/4"	73 (2.83)	55 (2.28)	43 (1.69)	36 (1.46)	–	HA075020	HA175020
DN25	R <sub>p</sub> or NPT 1"	88 (3.27)	67 (2.28)	52 (2.00)	48 (1.73)	–	HA075025	HA175025
DN32	R <sub>p</sub> 1 1/4"	100 (3.94)	77 (2.64)	62 (2.44)	–	125 (4.88)	HA075032	not available
DN40	R <sub>p</sub> or NPT 1 1/2"	110 (4.33)	83 (3.27)	74 (2.91)	–	147 (5.79)	HA075040	HA175040
DN50	R <sub>p</sub> 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



### Formula for standardized volumetric flow:

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

$V'_n$  ... Standardized volumetric flow [m<sup>3</sup>/h]

$v_n$  ... Standardized flow [m/s]

$id$  ... Inner pipe diameter [m]

$\pi$  ... 3,1415279

— Air, nitrogen, O<sub>2</sub>, argon

— CO<sub>2</sub>

## Technical data

### Measurands

<b>Flow</b>		Volumetric flow at standard conditions acc. to DIN 1343 $p_0 = 1013.25 \text{ mbar (14.7 psi)}$ ; $T_0 = 0 \text{ °C (32 °F)}$			
Measuring range		<b>HV31</b>		<b>HV33</b>	
Standardized volumetric flow in air	DN15 (1/2"):	0.32...63 m <sup>3</sup> /h	0.19...37.1 SCFM	0.32...126 m <sup>3</sup> /h	0.19...74.1 SCFM
	DN20 (3/4"):	0.57...113 m <sup>3</sup> /h	0.34...66.5 SCFM	0.57...226 m <sup>3</sup> /h	0.34...133 SCFM
	DN25 (1"):	0.90...176 m <sup>3</sup> /h	0.53...103.5 SCFM	0.90...352 m <sup>3</sup> /h	0.53...207.1 SCFM
	DN32 (1 1/4"):	1.45...289 m <sup>3</sup> /h	0.85...170.0 SCFM	1.45...578 m <sup>3</sup> /h	0.85...340 SCFM
	DN40 (1 1/2"):	2.26...452 m <sup>3</sup> /h	1.33...265.9 SCFM	2.26...904 m <sup>3</sup> /h	1.33...531.8 SCFM
Standardized flow in air, CO <sub>2</sub> , nitrogen, argon O <sub>2</sub>	≤DN50 (2"):	0.5...100 m/s	100...19685 SFPM	0.5...200 m/s	100...39370 SFPM
	DN65 (2 1/2"):			0.5...117 m/s	100...23031 SFPM
	≤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) <sup>1)</sup>		± (1.5 % of measuring value + 0.5 % of full scale)			
Temperature dependency		± (0.1 % of measuring value/°C)			
Pressure dependency <sup>2)</sup>		0.5 % of measuring value / bar			
Response time $t_{90}$		< 1 s			
Sample rate		0.1 s			
<b>Temperature</b>					
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	$0 < I_L < 1 \text{ mA}$
	Current (3-wire)	0 - 20 mA and 4 - 20 mA	$R_L < 500 \text{ Ohm}$
Switch output	Potential-free, max. 44 V DC, 500 mA switching capacity		
Pulse output	Totalizer, pulse length: 0.02...2 s		
<b>Digital interface (optional)</b>			
RS485	(EE771 = 1 unit load)		
Protocol	Modbus RTU		
Default settings	Baud rate 9600 <sup>3)</sup> , parity even, stop bits 1, slave ID 1		
M-Bus			
Default settings	Baud rate 2400 <sup>4)</sup> , parity even, stop bits 1, slave ID 1		

### Input

Dynamic pressure compensation	4 - 20 mA (2-wire; 15 V) input for pressure sensor
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### 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 mm <sup>2</sup> (AWG 16), optional with connector M12x1, 8 pole	
Electromagnetic compatibility	EN 61326-1	EN 61326-2-3
	Industrial Environment	
	FCC Part15 Class A	ICES-003 Class A
Material	Enclosure	Metal (AlSi <sub>3</sub> Cu)
	Probe	Stainless steel
	Sensor head	Stainless steel / glass
	Measurement valve	Brass
Enclosure protection rating	IP65 / NEMA 4	



- 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](http://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-			
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...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			
Software Setup <sup>1)</sup>	Measurand output 1	Temperature	T [°C]	MA1	
			T [°F]	MA2	
		Standardized volumetric flow	V <sub>n</sub> [m <sup>3</sup> /h]	MA83	
			V <sub>n</sub> [ft <sup>3</sup> /min]	MA87	
		Mass flow	m' [kg/h]	MA80	
	Signal output 1	Analogue output	v <sub>n</sub> [m/s]	MA22	
			v <sub>n</sub> [ft/min]	MA23	
			0 - 5 V	GA2	
			0 - 10 V	GA3	
			0 - 20 mA	GA5	
	Switching output	4 - 20 mA	GA6		
			GA9		
	Measurand output 2	Temperature	T [°C]	MB1	
			T [°F]	MB2	
		Standardized volumetric flow	V <sub>n</sub> [m <sup>3</sup> /h]	MB83	
			V <sub>n</sub> [ft <sup>3</sup> /min]	MB87	
		Mass flow	m' [kg/h]	MB80	
		Standardized flow	v <sub>n</sub> [m/s]	MB22	
Signal output 2		v <sub>n</sub> [ft/min]	MB23		
	Consumption <sup>2)</sup>	Q <sub>n</sub> [m <sup>3</sup> ]	MB91		
		Q <sub>n</sub> [ft <sup>3</sup> ]	MB93		
	Switch output		GB9		
	Pulse output		GB10		
Medium	Air		no code		
	Nitrogen		FU2		
	CO <sub>2</sub>		FU3		
	O <sub>2</sub> <sup>3)</sup>		FU4		
	Argon		FU7		
<b>Position 2 - Measurement valve</b>		<b>BSP Thread</b>	<b>NPT Thread</b>	<b>BSP Thread</b>	<b>NPT Thread</b>
DN15 - measurement valve	HA075015	not available	DN15 - measurement valve for O <sub>2</sub> <sup>3)</sup>	HA076015	not available
DN20 - measurement valve	HA075020	HA175020	DN20 - measurement valve for O <sub>2</sub> <sup>3)</sup>	HA076020	HA176020
DN25 - measurement valve	HA075025	HA175025	DN25 - measurement valve for O <sub>2</sub> <sup>3)</sup>	HA076025	HA176025
DN32 - measurement valve	HA075032	not available			
DN40 - measurement valve	HA075040	HA175040			
DN50 - measurement valve	HA075050	HA175050			
<b>Position 3 - Probe cable (Model T3 only)</b>					
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 O<sub>2</sub> 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 [m<sup>3</sup>/h]  
 Output 1: 4 - 20 mA  
 Phys. parameter output 2: Consumption [m<sup>3</sup>/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

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

<sup>\*)</sup> Inlet and outlet pipe section is available for measurement valve with BSP thread only.