

# EE772 Multifunctional Flow Sensor for Compressed Air and Gases DN40 (1 1/2") - DN80 (3") / 40 bar (580 psi)

The EE772 is ideal for flow measurement in pipelines with diameters of DN40 (1 1/2") up to DN80 (3"). 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>, argon or other non-corrosive, non-flammable gases with a pressure of up to 40 bar (580 psi).

### Precision and Reliability

The EE772 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 gauge mounting block with hot tap valve permits rapid installation and removal of the device without flow interruption. It ensures high measurement accuracy through exact and reproducible sensing head positioning in the pipe.

### Versatile Output Options

The EE772 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 configuration software and an optional configuration adapter facilitate the configuration and adjustment of the EE772.



EE772 Compact

## Features

### 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

### Display

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

### Consumption metering

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

### 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

### Hot tap valve

- » Mount and de-mount under pressure
- » Pressure rating 40 bar (580 psi)

### Gauge mounting block

- » Optional combination with p and Td sensors via quick coupling
- » Fail-safe alignment of sensing unit
- » Best accuracy due to precise and reproducible positioning of the sensing head



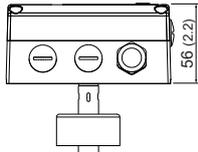
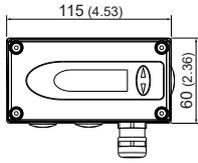
EE772 Remote with Gauge Mounting Block

Inspection certificate according to DIN EN 10204-3.1

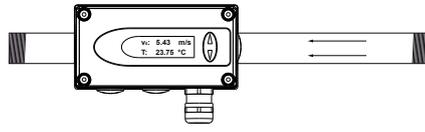
## Dimensions

Values in mm (inch)

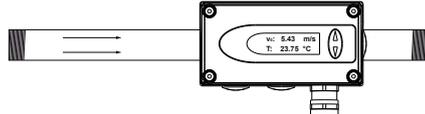
### EE772 Compact



### EE772-T19/EE772-T20

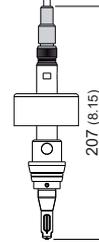
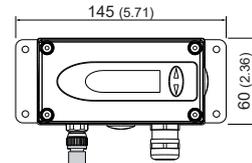


EE772-T20 direction of flow is right to left

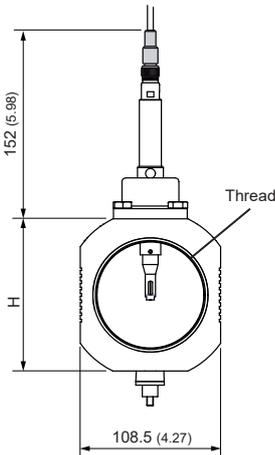


EE772-T19 direction of flow is left to right

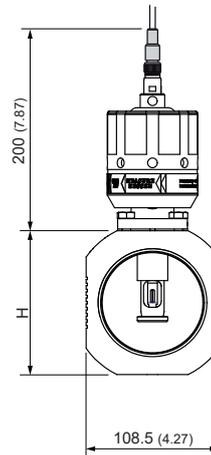
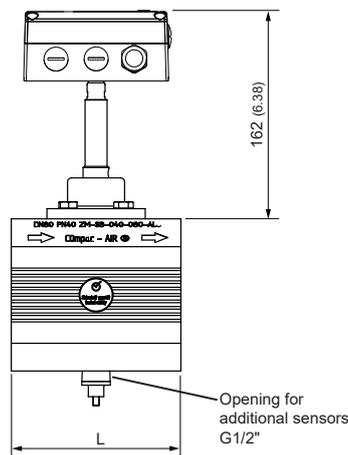
### EE772 Remote



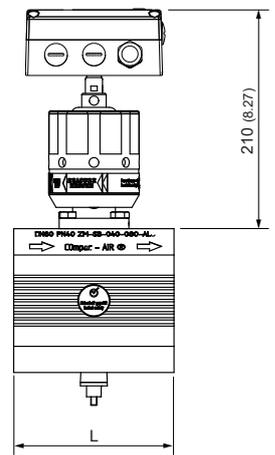
### EE772-T3



### HA071xxx Gauge Mounting Block



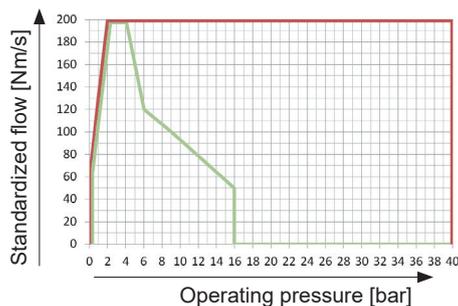
### HA072xxx Gauge Mounting Block with Hot Tap Valve



Pipe diameter	Thread	L	H
DN40	R <sub>p</sub> or NPT 1 1/2"	110 (4.3)	108.5 (4.27)
DN50	R <sub>p</sub> or NPT 2"	131 (5.2)	108.5 (4.27)
DN65	R <sub>p</sub> or NPT 2 1/2"	131 (5.2)	108.5 (4.27)
DN80	R <sub>p</sub> or NPT 3"	131 (5.2)	118.5 (4.67)

Female thread: Whitworth according to EN 10226 (old DIN 2999) or NPT

## 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

**Flow** 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		HV33 (high)	
Standardized volumetric flow in air	DN40 (1 1/2"):	2.26...904 Nm <sup>3</sup> /h	1.33...531.8 SCFM
	DN50 (2"):	3.50...1400 Nm <sup>3</sup> /h	2.06...823.6 SCFM
	DN65 (2 1/2"):	5.97...1400 Nm <sup>3</sup> /h	3.51...823.6 SCFM
	DN80 (3"):	9.04...1400 Nm <sup>3</sup> /h	5.32...823.6 SCFM
Standardized flow in air, CO <sub>2</sub> , nitrogen, argon	≤DN50 (2"):	0.5...200 Nm/s	100...39370 SFPM
	DN65 (2 1/2"):	0.5...117 Nm/s	100...23031 SFPM
	DN80 (3"):	0.5...77 Nm/s	100...15157 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	(EE772 = 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 external 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	40 bar (580 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	
Material	Enclosure	Metal (AlSi <sub>3</sub> Cu)
	Probe	Stainless steel
	Sensor head	Stainless steel / glass
	Gauge mounting block	Aluminium
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 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 <http://www.epluse.com/ee772>.

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



## Ordering Guide

The EE772 consists of the sensor (pos. 1) and the gauge mounting block (pos. 2). Both have to be ordered together! The probe cable (pos. 3) is only necessary for model T3.

Position 1 - Sensor		EE772-		
Hardware Configuration	<b>Model</b>	Compact ri-le flow direction right to left Compact le-ri flow direction left to right Remote	T19 T20 T3	
	<b>Measuring range</b>	High	HV33	
	<b>Measurement valve for pipe diameter</b>	DN40 (1 1/2") DN50 (2") DN65 (2 1/2") DN80 (3")	N40 N50 N65 N80	
	<b>Display</b>	Without display With display	no code D2	
	<b>Mounting</b>	Gauge mounting block Gauge mounting block with hot tap valve	TG2 TG3	
	<b>Electrical connection</b>	Cable gland and screw terminals 1 plug for power supply and outputs	no code E4	
	<b>Digital output</b>	No digital output Modbus RTU M-Bus	no code J3 J5	
Software Setup 1)	<b>Measurand output 1</b>	Temperature Standardized volumetric flow Mass flow Standardized flow	T [°C] T [°F] V <sub>n</sub> [Nm <sup>3</sup> /h] V <sub>n</sub> [ft <sup>3</sup> /min] m' [kg/h] v <sub>n</sub> [m/s] v <sub>n</sub> [ft <sup>3</sup> /min]	MA1 MA2 MA83 MA87 MA80 MA22 MA23
	<b>Signal output 1</b>	Analogue output Switching output	0 - 5 V 0 - 10 V 0 - 20 mA 4 - 20 mA	GA2 GA3 GA5 GA6 GA9
	<b>Measurand output 2</b>	Temperature Standardized volumetric flow Mass flow Standardized flow Consumption <sup>2)</sup>	T [°C] T [°F] V <sub>n</sub> [Nm <sup>3</sup> /h] V <sub>n</sub> [ft <sup>3</sup> /min] m' [kg/h] v <sub>n</sub> [Nm/s] v <sub>n</sub> [ft <sup>3</sup> /min] Q <sub>n</sub> [Nm <sup>3</sup> ] Q <sub>n</sub> [ft <sup>3</sup> ]	MB1 MB2 MB83 MB87 MB80 MB22 MB23 MB91 MB93
	<b>Signal output 2</b>	Switch output Pulse output		GB9 GB10
	<b>Medium</b>	Air Nitrogen CO <sub>2</sub> Argon		no code FU2 FU3 FU7
	<b>Position 2 - Gauge mounting block</b>			
		<b>BSP Thread</b>	<b>NPT Thread</b>	<b>BSP Thread</b> <b>NPT Thread</b>
	DN40 - Gauge mounting block	HA071040	HA171040	DN40 - Gauge mounting block with hot tap valve HA072040 HA172040
	DN50 - Gauge mounting block	HA071050	HA171050	DN50 - Gauge mounting block with hot tap valve HA072050 HA172050
	DN65 - Gauge mounting block	HA071065	HA171065	DN65 - Gauge mounting block with hot tap valve HA072065 HA172065
DN80 - Gauge mounting block	HA071080	HA171080	DN80 - Gauge mounting block with hot tap valve HA072080 HA172080	
<b>Position 3 - Probe cable (Model T3 only)</b>				
<b>Cable length</b>	2 m (6.56 ft) 5 m (16.4 ft) 10 m (32.8 ft)	HA010816 HA010817 HA010818		

1) Can be changed by the user.

2) Consumption measurement is only possible with pulse output (output 2 = GB10).

## Order Example

### Position 1 - Sensor

**EE772-T19HV33N080TG3MA83GA6MB91GB10**

Model: Compact ri-le  
Measuring range: High  
Measuring pipe-diameter: DN80 (3")  
Display: No display  
Mounting: Gauge mounting block with hot tap valve  
Electrical connection: Cable gland  
Measurand output 1: Standardized volumetric flow [Nm<sup>3</sup>/h]  
Signal output 1: 4 - 20mA  
Measurand output 2: Consumption [Nm<sup>3</sup>/h]  
Signal output 2: Pulse output

### Position 2 - Gauge mounting block

**HA072080**

DN80 - Gauge mounting block with hot tap valve

### Position 3 - Probe cable

Necessary for model T3 only.

## Ordering Guide Accessories

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Dew point sensor

see datasheet EE371

Sampling cell for dew point sensor

HA050102

Quick coupling G1/2" for gauge mounting block

HA070202