

## EE776

### Insertion Flow Sensor for Compressed Air and Gases DN50 - DN700 (2" - 28")

The EE776 employs the thermal mass flow measurement principle and is suitable for pipe diameter DN50 (2") to DN700 (28"). It is ideal for monitoring and metering compressed air, nitrogen, CO<sub>2</sub> and other non-corrosive and non-flammable gases with a pressure up to 16 bar (232 PSI).

#### Versatility

The EE776 is available for two measuring ranges 0.2...100 m/s (40...19685 SFPM) and 0.2...200 m/s (40...39370 SFPM) and features various probes for maximum immersion depth 165 mm (6.5"), 315 mm (12.4") and 465 mm (18.3").

#### Wide choice of outputs

The measured data is available on two outputs, which can be configured as analogue current or voltage, switch or pulse signal for consumption metering. Optionally, the EE776 features also Modbus RTU or M-Bus (Meter-Bus) interface.

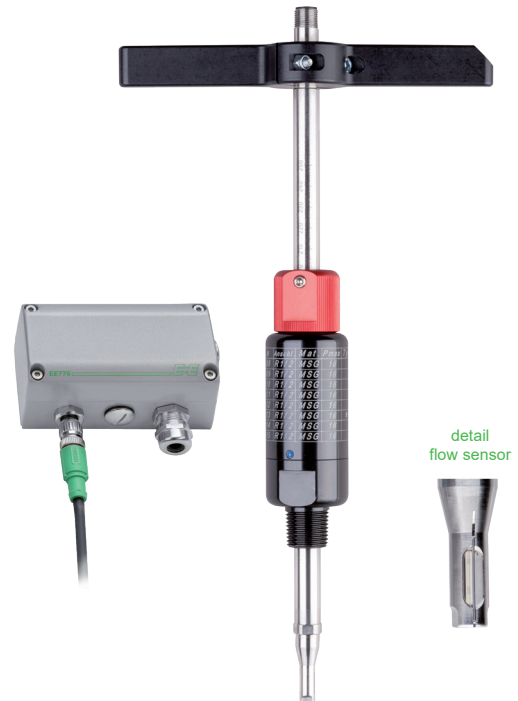
#### Easy and safe mounting

The patented non-return protection combines three functions:

- » Non-return protection: The sensing probe can only slide in one direction during installation. It cannot return (blow out), even if released.
- » Sealing: An encapsulated O-ring avoids leakage when mounting the device under pressure.
- » Precise positioning: The design facilitates the precise positioning of the sensing probe (immersion depth and orientation), which is paramount for high accuracy measurement.

#### User configurable and adjustable

The USB interface and the free software facilitate the EE776 configuration which includes selecting the measurands and the output signals, uploading the working pressure and the pipe diameter and adjusting the device.



### Typical Applications

Measurement of consumption of compressed air

Compressed air counter

Mass flow measurement of industrial gases

### Features

Non-return protection for secure mounting

Assembly/disassembly under pressure without flow interruption

Easy and accurate positioning

High accuracy  $\pm 1.5\%$  of reading

Factory adjustment under pressure

Pipe diameters DN50 (2") to DN700 (28")

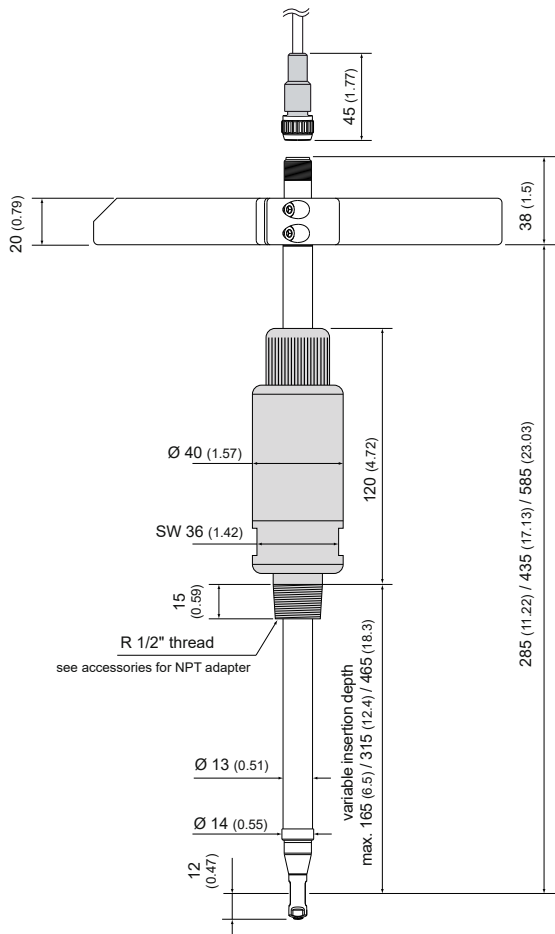
Pressure range up to 16 bar (232 PSI)

Wide measuring range up to 200 m/s (39370 SFPM)

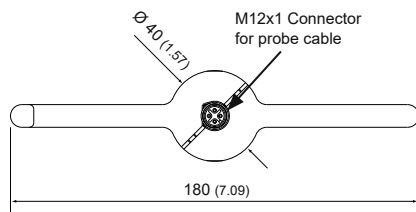
Digital interface for Modbus RTU or M-Bus

## Dimensions

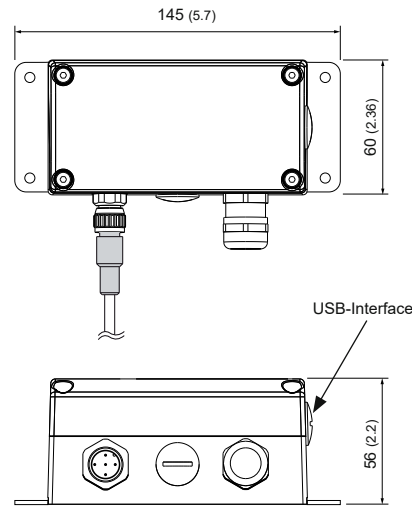
Values in mm (inch)



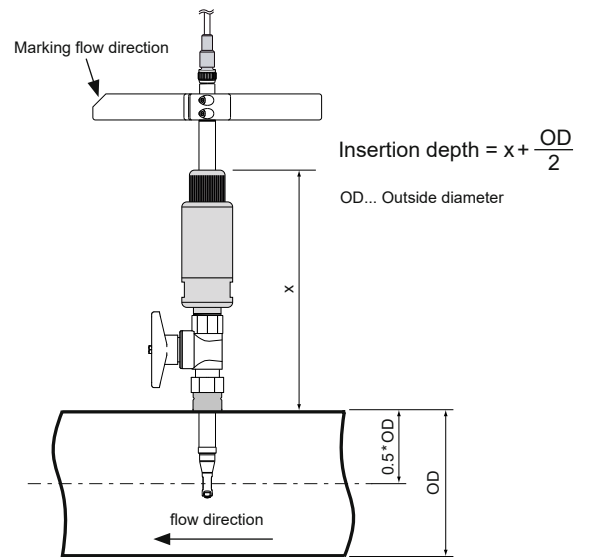
see accessories for NPT adapter



**EE776**  
Sensor probe



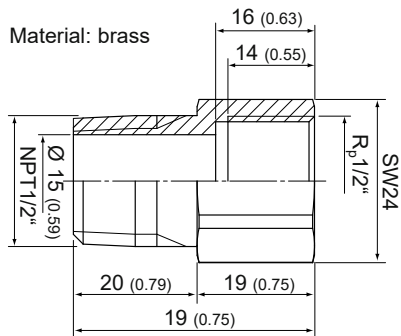
**EE776**  
Enclosure - signal conditioning unit



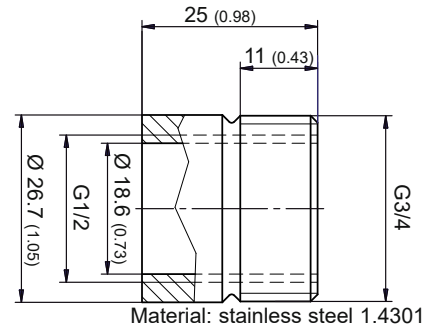
**EE776**  
Assembly - insertion depth

## Dimensions of accessories

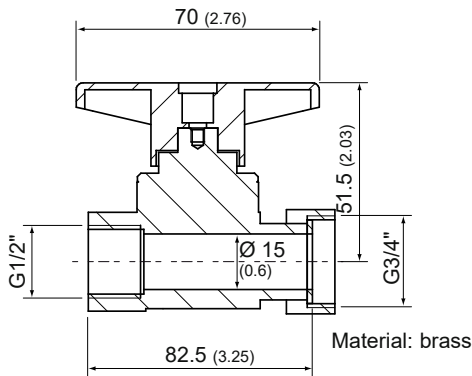
Values in mm (inch)



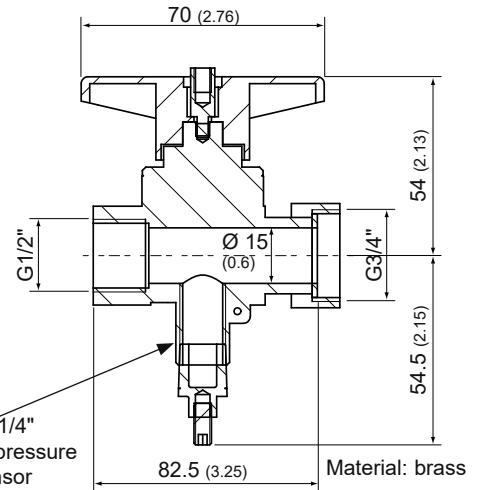
**HA074004**  
**Adapter BSP - NPT**



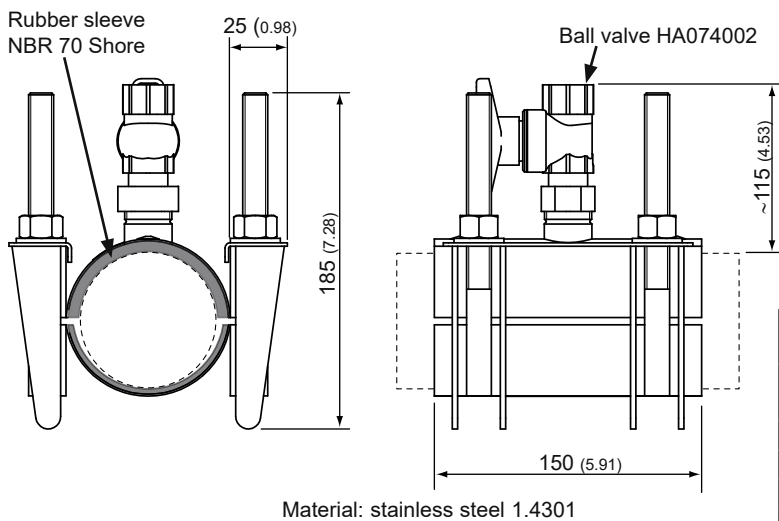
**HA074001**  
**Welding nipple**



**HA074002**  
**Ball valve 1/2"**

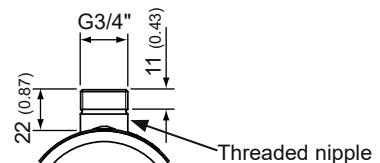


**HA074003**  
**Ball valve 1/2" for bypass measurement**



- » Slip-proof and oil-resistant rubber sleeve
- » Half shell construction for easy assembly
- » For installations without flow interruption and welding

**HA074xxx**  
**Tapping sleeve** (delivery without ball valve)



Pipe	Clamping range [mm (inch)]	TÜV certified for working pressure
DN50 (2")	47 - 67 (1.85 - 2.64)	16 bar (232 psi)
DN65 (2 1/2")	73 - 93 (2.87 - 3.66)	16 bar (232 psi)
DN80 (3")	86 - 106 (3.39 - 4.17)	16 bar (232 psi)
DN100 (4")	107 - 127 (4.21 - 5.00)	16 bar (232 psi)
DN125 (5")	128 - 148 (5.04 - 5.83)	16 bar (232 psi)
DN150 (6")	149 - 171 (5.87 - 6.73)	16 bar (232 psi)
DN200 (8")	216 - 236 (8.50 - 9.29)	16 bar (232 psi)
DN250 (10")	260 - 280 (10.24 - 11.02)	10 bar (145 psi)
DN300 (12")	315 - 335 (12.40 - 13.19)	10 bar (145 psi)

## Technical Data

### Measurands

#### Flow

Standardized conditions	According to DIN 1343 (configurable) $P_0 = 1013.25 \text{ mbar}$ (14.7 psi); $t_0 = 0 \text{ °C}$ (32 °F)
Measuring range	0.2...100 m/s (40...19685 SFPM) or 0.2...200 m/s (40...39370 SFPM)
Accuracy in air at 9 bar (130.5 psi) (abs) and 23 °C (73 °F) <sup>1)</sup>	$\pm (1.5\% \text{ of measuring value} + 0.8\% \text{ of full scale})$
Temperature dependence	$\pm (0.1\% \text{ of measuring value} / \text{°C})^2)$
Pressure dependence <sup>3)</sup>	+ 0.5% of measuring value / bar
Response time $t_{90}$	< 1 s
Sample rate	0.5 s
<b>Temperature</b>	
Measuring range	-20...80 °C (-4...176 °F)
Accuracy at 20 °C (68 °F)	$\pm 0.7 \text{ °C}$ (1.26 °F)

### Outputs


#### Signal range and measurands are freely configurable

Analogue output	Voltage	0 - 10 V	0 < IL < 1 mA
	Current (3-wire)	0 - 20 mA and 4 - 20 mA	RL < 500 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		(EE776 = 1 unit load)	
Modbus RTU			
Default settings		Baud rate 9600 <sup>4)</sup> , parity even, stop bits 1, Modbus address 1	
M-Bus			
Default settings		Baud rate 2400 <sup>5)</sup> , parity even, stop bits 1, M-Bus address 1	

### Input

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

Supply voltage class III  (EU)/class 2 (NA)	18 - 30 V AC/DC
Current consumption, max.	200 mA
Temperature range	Ambient/Storage Medium -20...60 °C (-4...140 °F) -20...80 °C (-4...176 °F)
Humidity working range	0...99 %RH non-condensing
Max. working pressure	16 bar (232 psi)
Medium	Compressed air or non-corrosive gases
Electrical connection	Cable gland M16x1.5 (optional 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 Probe Sensor head Non-return protection
	Metal (AlSi3Cu) Stainless steel Stainless steel/glass Brass
Protection rating enclosure	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).

2) Deviating from 20 °C (68 °F)

3) The flow meter is calibrated at 9 bar (130.5 psi) abs. If the working pressure is different from 9 bar (130.5 psi) you can compensate the error by setting the actual pressure with the configuration software.

4) 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/EE776](http://www.epluse.com/EE776).

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

### Flow measuring range in dependence on pipe diameter

Pipe	Inner Ø	Measuring range	
		mm (inch)	
		0.2...100 m/s (40...19685 SFPM)	0.2...200 m/s (40...39370 SFPM)
DN50 / 2"	54.5 (2.15)	1.7...839 m <sup>3</sup> /h 1.0...493.8 SCFM	1.7...1679 m <sup>3</sup> /h 1.0...987.6 SCFM
DN65 / 2 1/2"	70.3 (2.77)	2.8...1397 m <sup>3</sup> /h 1.6...821.6 SCFM	2.8...2793 m <sup>3</sup> /h 1.6...1643.2 SCFM
DN80 / 3"	82.5 (3.25)	3.8...1923 m <sup>3</sup> /h 2.3...1131.5 SCFM	3.8...3847 m <sup>3</sup> /h 2.3...2263.0 SCFM
DN100 / 4"	107.1 (4.22)	6.5...3242 m <sup>3</sup> /h 3.8...1906.9 SCFM	6.5...6483 m <sup>3</sup> /h 3.8...3813.8 SCFM
DN125 / 5"	131.7 (5.19)	9.8...4902 m <sup>3</sup> /h 5.8...2883.5 SCFM	9.8...9803 m <sup>3</sup> /h 5.8...5766.9 SCFM
DN150 / 6"	159.3 (6.27)	14.3...7171 m <sup>3</sup> /h 8.4...4218.7 SCFM	14.3...14343 m <sup>3</sup> /h 8.4...8437.3 SCFM
DN200 / 8"	206.5 (8.13)	24.1...12051 m <sup>3</sup> /h 14.2...7089.0 SCFM	24.1...24101 m <sup>3</sup> /h 14.2...14178.0 SCFM
DN250 / 10"	260.4 (10.25)	38.3...19163 m <sup>3</sup> /h 22.5...11272.6 SCFM	38.3...38325 m <sup>3</sup> /h 22.5...22545.3 SCFM
DN300 / 12"	309.7 (12.19)	54.2...27105 m <sup>3</sup> /h 31.9...15945.1 SCFM	54.2...54211 m <sup>3</sup> /h 31.9...31890.1 SCFM
DN350 / 14"	339.6 (13.37)	65.2...32591 m <sup>3</sup> /h 38.3...19172.5 SCFM	65.2...65183 m <sup>3</sup> /h 38.3...38345.0 SCFM
DN400 / 16"	388.8 (15.31)	85.4...42719 m <sup>3</sup> /h 50.3...25130.2 SCFM	85.4...85438 m <sup>3</sup> /h 50.3...50260.0 SCFM
DN500 / 20"	486 (19.13)	133.5...66749 m <sup>3</sup> /h 78.5...39266.0 SCFM	133.5...133498 m <sup>3</sup> /h 78.5...78531.9 SCFM
DN600 / 24"	585 (23.03)	193.4...96712 m <sup>3</sup> /h 113.8...56892.6 SCFM	193.4...193425 m <sup>3</sup> /h 113.8...113785.1 SCFM
DN700 / 28"	682.6 (26.87)	263.4...131675 m <sup>3</sup> /h 154.9...77459.8 SCFM	263.4...263350 m <sup>3</sup> /h 154.9...154919.6 SCFM

## Ordering Guide

Position 1 - Flow sensor		EE776-		
Hardware Configuration	Type	Remote Probe	T3	
	Measuring range	0.2...100 m/s (40...19685 SFPM) 0.2...200 m/s (40...39370 SFPM)	HV31 HV33	
	Maximum pipe diameter/ probe length	DN100 (4") / 165 mm (6.5") DN300 (12") / 315 mm (12.4") DN700 (28") / 465 mm (18.3")	N100 N300 N700	
	Display	Without Display With Display	no code D2	
	Electrical connection	Cable gland 1 plug for power supply and outputs	no code E4	
	Digital interface	No digital output RS485 M-Bus (Meter-Bus)	no code J3 J5	
	Software Configuration	Pipe diameter pre-setting <sup>1)</sup>	DN50 (2") DN65 (2 1/2") DN80 (3") DN100 (4") DN125 (5") DN150 (6") DN200 (8") DN250 (10") DN300 (12") DN350 (14") DN400 (16") DN500 (20") DN600 (24") DN700 (28")	DN50 DN65 DN80 DN100 DN125 DN150 DN200 DN250 DN300 DN350 DN400 DN500 DN600 DN700
Measurand output 1		Temperature	T [°C] T [°F]	MA1 MA2
		Standardized volumetric flow	V <sub>n</sub> [m³/h] V <sub>n</sub> [ft³/min]	MA83 MA87
		Mass flow	m' [kg/h]	MA80
		Standardized flow	v <sub>n</sub> [m/s] v <sub>n</sub> [ft/min]	MA22 MA23
		Signal output 1	0 - 5 V 0 - 10 V 0 - 20 mA 4 - 20 mA Switch output	GA2 GA3 GA5 GA6 GA9
Measurand output 2		Temperature	T [°C] T [°F]	MB1 MB2
		Standardized volumetric flow	V <sub>n</sub> [m³/h] V <sub>n</sub> [ft³/min]	MB83 MB87
		Mass flow	m' [kg/h]	MB80
		Standardized flow	v <sub>n</sub> [m/s] v <sub>n</sub> [ft/min]	MB22 MB23
		Volumetric consumption <sup>2)</sup>	Q <sub>n</sub> [m³] Q <sub>n</sub> [ft³]	MB91 MB93
Signal output 2		Switch output Pulse output <sup>2)</sup>	GB9 GB10	
Medium		Air Nitrogen CO <sub>2</sub> Argon	no code FU2 FU3 FU7	
Position 2 - Probe cable				
Cable length		2 m 5 m 10 m	HA010816 HA010817 HA010818	

1) Value of pipe diameter pre-setting must be equal or smaller than the maximum pipe diameter / probe length selection.  
2) Consumption measuring is possible only with pulse output (output 2 = GB10).

## Accessories

Tapping sleeve DN50 (2")	<b>HA074050</b>	Welding nipple	<b>HA074001</b>
Tapping sleeve DN65 (2 1/2")	<b>HA074065</b>	Ball valve 1/2"	<b>HA074002</b>
Tapping sleeve DN80 (3")	<b>HA074080</b>	Ball valve 1/2" for bypass measurement	<b>HA074003</b>
Tapping sleeve DN100 (4")	<b>HA074100</b>	Adapter R <sub>p</sub> 1/2" IT to NPT 1/2" ET	<b>HA074004</b>
Tapping sleeve DN125 (5")	<b>HA074125</b>		
Tapping sleeve DN150 (6")	<b>HA074150</b>		
Tapping sleeve DN200 (8")	<b>HA074200</b>	Dew point sensor	see data sheet EE371
Tapping sleeve DN250 (10")	<b>HA074250</b>	Sampling cell for dew point sensor	<b>HA050102</b>
Tapping sleeve DN300 (12")	<b>HA074300</b>	Quick coupling G1/4" ET	<b>HA070203</b>

## Order Example

### Position 1 - Flow sensor

#### **EE776-T3HV31N100DN50MA83GA6MP91GB10**

Type:	Remote probe
Measuring range:	0.2...100 m/s
Maximum pipe diameter/probe length:	DN100/165 mm
Display:	Without display
Electrical connection:	Cable gland
Digital interface:	Without bus interface
Pipe diameter pre-setting:	DN50 (2")
Phys. parameter output 1:	Standardized volumetric flow
Output 1:	4 - 20 mA
Phys. parameter output 2:	Consumption
Output 2:	Pulse output
Medium:	Air

### Position 2 - Probe cable

#### **HA010816**

Probe cable 2 m