

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, CO₂ 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")

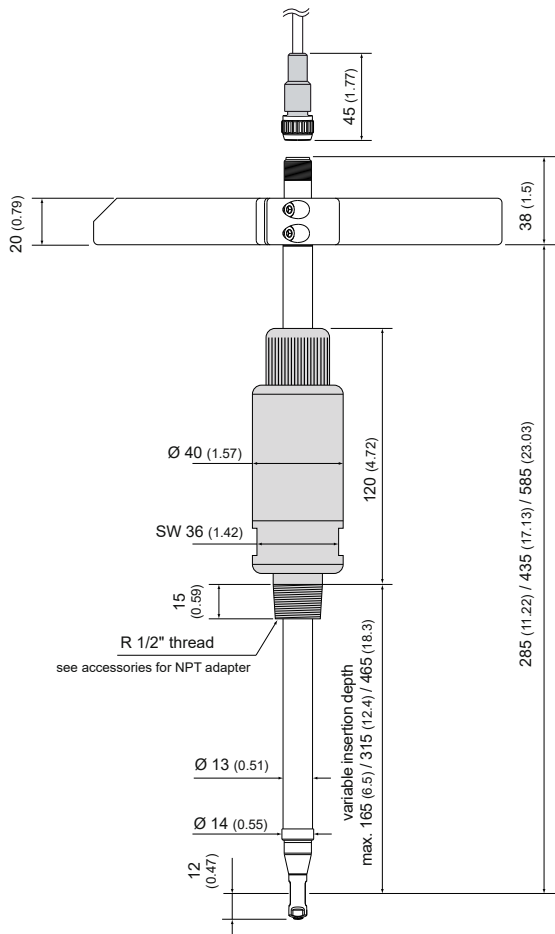
Pressure range up to 16 bar (232 PSI)

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

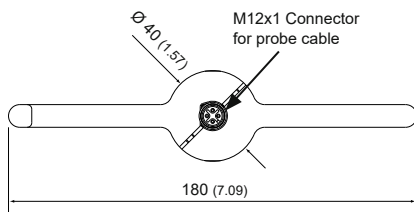
Digital interface for Modbus RTU or M-Bus

Dimensions

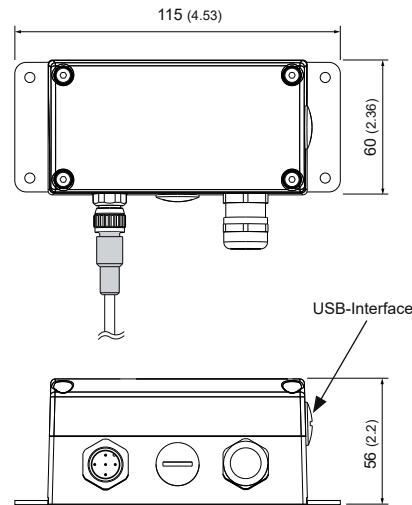
Values in mm (inch)



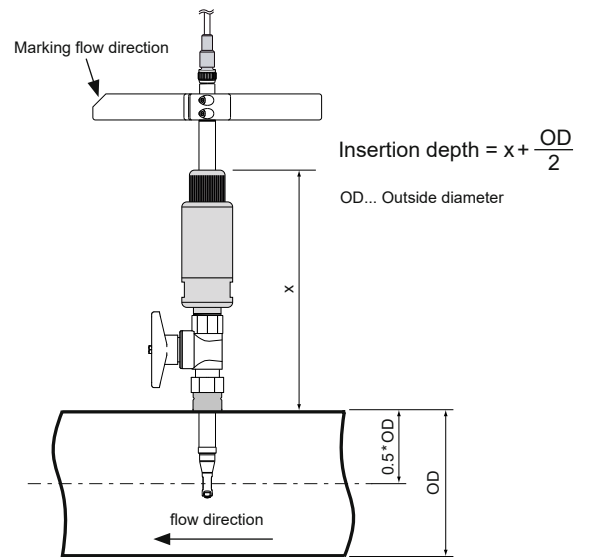
see accessories for NPT adapter



EE776
Sensor probe

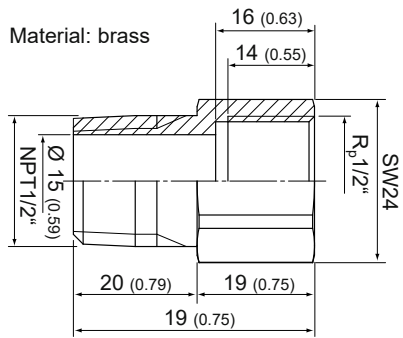


EE776
Enclosure - signal conditioning unit

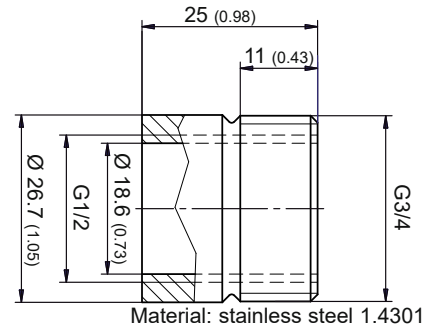


EE776
Assembly - insertion depth

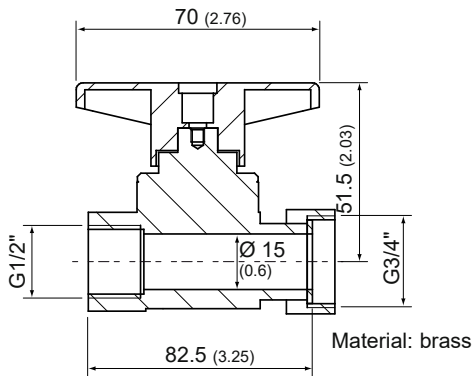
Dimensions of accessories
 Values in mm (inch)



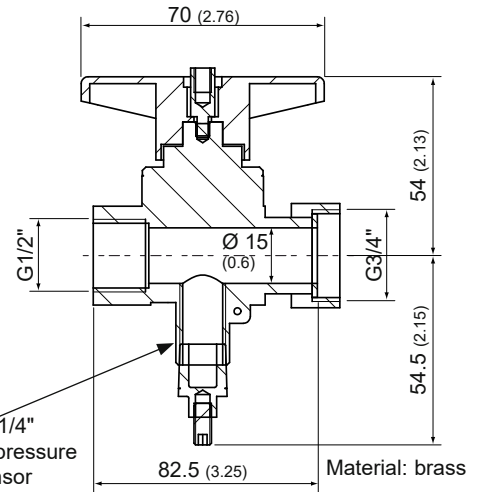
HA074004
Adapter BSP - NPT



HA074001
Welding nipple

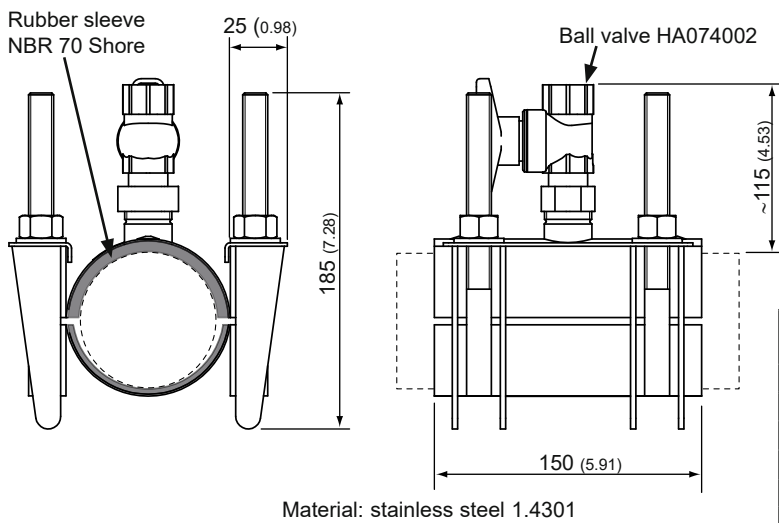


HA074002
Ball valve 1/2"



Lateral fitting $R_p 1/4"$
 for mounting of pressure
 or dew point sensor

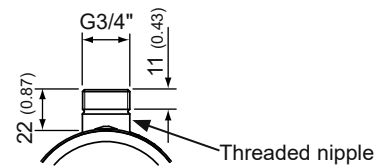
HA074003
Ball valve 1/2" for bypass measurement



Material: stainless steel 1.4301

- » 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) ¹⁾	$\pm (1.5\% \text{ of measuring value} + 0.8\% \text{ of full scale})$
Temperature dependence	$\pm (0.1\% \text{ of measuring value} / \text{°C})^2)$
Pressure dependence ³⁾	+ 0.5% of measuring value / bar
Response time t_{90}	< 1 s
Sample rate	0.5 s
Temperature	
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	
Digital interface (optional)			
RS485		(EE776 = 1 unit load)	
Modbus RTU			
Default settings		Baud rate 9600 ⁴⁾ , parity even, stop bits 1, Modbus address 1	
M-Bus			
Default settings		Baud rate 2400 ⁵⁾ , 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	-20...60 °C (-4...140 °F)
	Medium	-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	Metal (AlSi3Cu)
	Probe	Stainless steel
	Sensor head	Stainless steel/glass
	Non-return protection	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.

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 ³ /h 1.0...493.8 SCFM	1.7...1679 m ³ /h 1.0...987.6 SCFM
DN65 / 2 1/2"	70.3 (2.77)	2.8...1397 m ³ /h 1.6...821.6 SCFM	2.8...2793 m ³ /h 1.6...1643.2 SCFM
DN80 / 3"	82.5 (3.25)	3.8...1923 m ³ /h 2.3...1131.5 SCFM	3.8...3847 m ³ /h 2.3...2263.0 SCFM
DN100 / 4"	107.1 (4.22)	6.5...3242 m ³ /h 3.8...1906.9 SCFM	6.5...6483 m ³ /h 3.8...3813.8 SCFM
DN125 / 5"	131.7 (5.19)	9.8...4902 m ³ /h 5.8...2883.5 SCFM	9.8...9803 m ³ /h 5.8...5766.9 SCFM
DN150 / 6"	159.3 (6.27)	14.3...7171 m ³ /h 8.4...4218.7 SCFM	14.3...14343 m ³ /h 8.4...8437.3 SCFM
DN200 / 8"	206.5 (8.13)	24.1...12051 m ³ /h 14.2...7089.0 SCFM	24.1...24101 m ³ /h 14.2...14178.0 SCFM
DN250 / 10"	260.4 (10.25)	38.3...19163 m ³ /h 22.5...11272.6 SCFM	38.3...38325 m ³ /h 22.5...22545.3 SCFM
DN300 / 12"	309.7 (12.19)	54.2...27105 m ³ /h 31.9...15945.1 SCFM	54.2...54211 m ³ /h 31.9...31890.1 SCFM
DN350 / 14"	339.6 (13.37)	65.2...32591 m ³ /h 38.3...19172.5 SCFM	65.2...65183 m ³ /h 38.3...38345.0 SCFM
DN400 / 16"	388.8 (15.31)	85.4...42719 m ³ /h 50.3...25130.2 SCFM	85.4...85438 m ³ /h 50.3...50260.0 SCFM
DN500 / 20"	486 (19.13)	133.5...66749 m ³ /h 78.5...39266.0 SCFM	133.5...133498 m ³ /h 78.5...78531.9 SCFM
DN600 / 24"	585 (23.03)	193.4...96712 m ³ /h 113.8...56892.6 SCFM	193.4...193425 m ³ /h 113.8...113785.1 SCFM
DN700 / 28"	682.6 (26.87)	263.4...131675 m ³ /h 154.9...77459.8 SCFM	263.4...263350 m ³ /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)	HV31
		0.2...200 m/s (40...39370 SFPM)	HV33
	Maximum pipe diameter/ probe length	DN100 (4") / 165 mm (6.5")	N100
		DN300 (12") / 315 mm (12.4")	N300
		DN700 (28") / 465 mm (18.3")	N700
	Display	Without Display	no code
With Display		D2	
Electrical connection	Cable gland 1 plug for power supply and outputs	no code E4	
Digital interface	No digital output	no code	
	RS485 M-Bus (Meter-Bus)	J3 J5	
Software Configuration	Pipe diameter pre-setting ¹⁾	DN50 (2")	DN50
		DN65 (2 1/2")	DN65
		DN80 (3")	DN80
		DN100 (4")	DN100
		DN125 (5")	DN125
		DN150 (6")	DN150
		DN200 (8")	DN200
		DN250 (10")	DN250
		DN300 (12")	DN300
		DN350 (14")	DN350
		DN400 (16")	DN400
		DN500 (20")	DN500
		DN600 (24")	DN600
		DN700 (28")	DN700
	Measurand output 1	Temperature	T [°C] T [°F]
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	0 - 5 V		GA2
	0 - 10 V		GA3
	0 - 20 mA		GA5
	4 - 20 mA		GA6
	Switch output		GA9
Measurand output 2	Temperature	T [°C] T [°F]	MB1 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
	Volumetric consumption ²⁾	Q _n [m³] Q _n [ft³]	MB91 MB93
Signal output 2	Switch output		GB9
	Pulse output ²⁾		GB10
Medium	Air		no code
	Nitrogen		FU2
	CO ₂		FU3
	Argon		FU7
Position 2 - Probe cable			
Cable length	2 m	HA010816	
	5 m	HA010817	
	10 m	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")	HA074050	Welding nipple	HA074001
Tapping sleeve DN65 (2 1/2")	HA074065	Ball valve 1/2"	HA074002
Tapping sleeve DN80 (3")	HA074080	Ball valve 1/2" for bypass measurement	HA074003
Tapping sleeve DN100 (4")	HA074100	Adapter R _p 1/2" IT to NPT 1/2" ET	HA074004
Tapping sleeve DN125 (5")	HA074125		
Tapping sleeve DN150 (6")	HA074150		
Tapping sleeve DN200 (8")	HA074200	Dew point sensor	see data sheet EE371
Tapping sleeve DN250 (10")	HA074250	Sampling cell for dew point sensor	HA050102
Tapping sleeve DN300 (12")	HA074300	Quick coupling G1/4" ET	HA070203

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