EE680

Air Velocity and Temperature Sensor for Laminar Flow

The EE680 is dedicated for precise measurement of the air velocity (Av) and the temperature (T) in laminar flow. The GMP-compliant design is ideal for cleanrooms and safety cabinets in pharmaceutical, life sciences and microelectronics industries.

Modbus

Outstanding Measurement Performance
The EE680 operates on the hot film anemometer principle. It employs an E+E thin film sensing element which stands for excellent accuracy down to 0.1 m/s (20 ft/min), long term stability and low angular dependency. The multipoint air velocity factory adjustment leads to best performance over the entire working range. The E+E proprietary coating protects the sensing element against H_2O_2 and corrosive cleaning agents.

Versatility
The EE680 is available as straight and angled version with various probe lengths. The design is optimized for easy cleaning, while the mounting concept and the M12 stainless steel connector facilitate the installation and replacement. A led ring integrated in the stainless steel enclosure indicates the laminar flow conditions and the sensor status.

Analogue Outputs or RS485 Interface, User Selectable
The Av and T measured data is available as current or voltage analogue outputs or on the RS485 interface with Modbus RTU protocol.

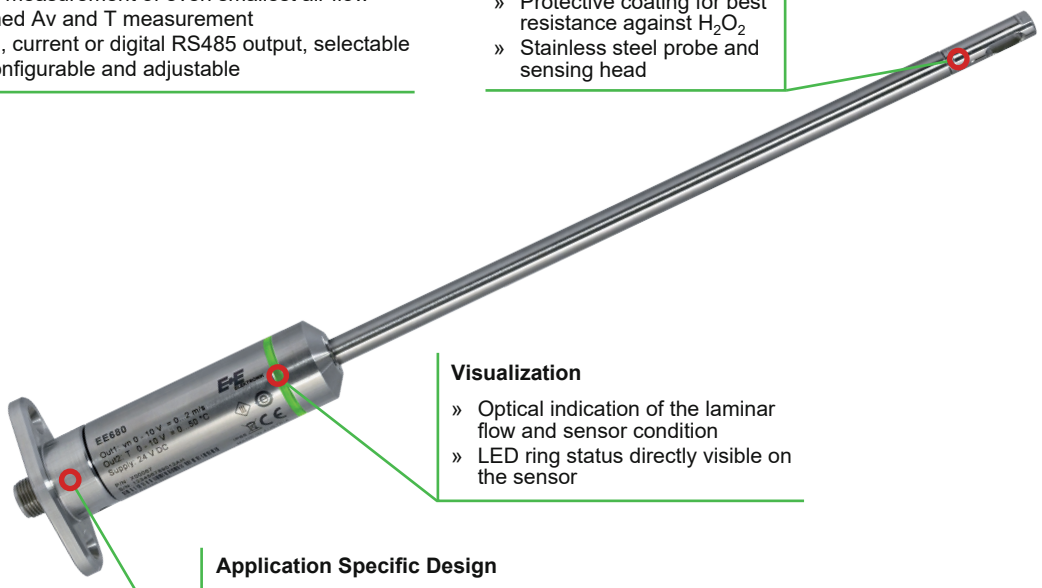
User Configurable and Adjustable
The setup and adjustment of the EE680 can be easily performed with an optional adapter and the free PCS10 Product Configuration Software.

Features

EE680 Sensor
- » Highly accurate over the entire working range
- » Precise measurement of even smallest air flow
- » Combined Av and T measurement
- » Voltage, current or digital RS485 output, selectable
- » User configurable and adjustable

Probe and Sensing Element
- » Protective coating for best resistance against H_2O_2
- » Stainless steel probe and sensing head

SIGMA PLUG-AND-PLAY



Visualization
- » Optical indication of the laminar flow and sensor condition
- » LED ring status directly visible on the sensor

Application Specific Design
- » GMP compliant design for easy cleaning
- » Straight or angled probe with various lengths
- » Stainless steel mounting flange
- » M12 stainless steel connector

Inspection Certificate
- » according to DIN EN 10204-3.1 with six Av points

Protective Sensor Coating

The E+E proprietary sensor coating is a protective layer applied to the active surface of the sensing element. The coating substantially extends the life-time and the measurement performance of the E+E sensor in applications with frequent H_2O_2 sterilization processes. Additionally, it improves the sensor's long term stability.

E+E Modular Sensor Platform

The EE680 is compatible with the Sigma 05 host device of the E+E Modular Sensor Platform. Together they become a versatile, plug-and-play Av/T modular sensor with analogue outputs and optional display. Besides EE680, Sigma 05 accommodates also other E+E intelligent sensing probes. See www.epluse.com/sigma05 for further details.

Technical Data

Measurands

Air Velocity[1)]

Measuring range		0...2 m/s (0...400 ft/min)
Accuracy[2)]		0.1...2 m/s (20...400 ft/min): ± (0.5 % of mv + 0.05 m/s)
in air at 23 °C (73 °F) and 1013 hPa (14.7 psi)		mv = measured value
Dependence	of inflow angle (α)	< 3 % for α < ±10°
	of inflow direction	< 3 %
Response time t_{90}, typ.		< 1.5...40 s (Factory setting: 1.5 s, configurable via PCS10)

Temperature

Measuring range	-20...70 °C (-4...158 °F)
Accuracy[3)], typ. *in air at 23 °C (73 °F)*	±0.5 °C (±0.9 °F)

Outputs

Analogue	0 - 5 V / 0 - 10 V	-1 mA < I_L < 1 mA
	0 - 20 mA / 4 - 20 mA (3-wire)	Load resistance ≤ 350 Ω
Digital interface	RS485 (EE680 = 1 unit load)	
Protocol	Modbus RTU	
Default settings	Baud rate 9600, parity even, 1 stop bit, Modbus address 68	

General

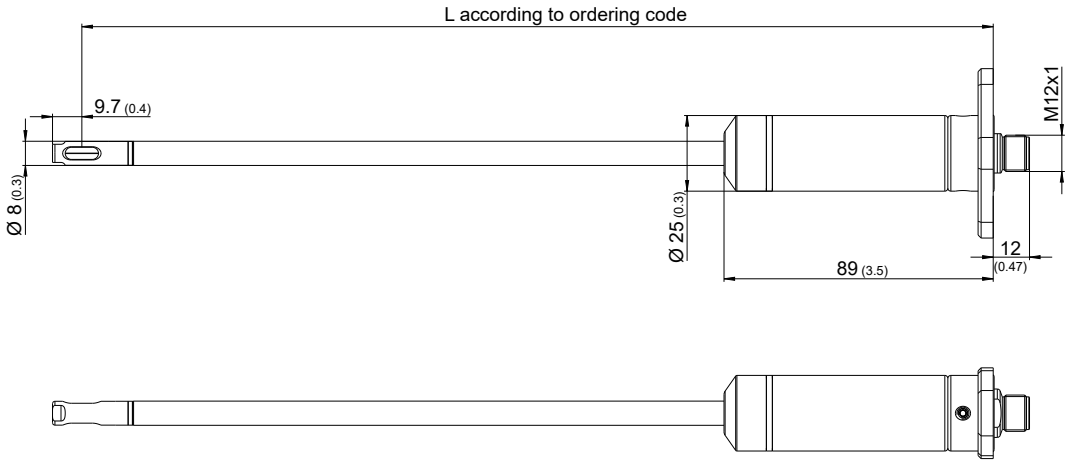
Power supply class III	24 V DC ±20 %
Current consumption, typ.	< 30 mA
Electrical connection	M12x1, 5 poles, stainless steel 1.4404
Protection rating	IP65
Enclosure material	Stainless steel 1.4404
Pressure range	700...1300 hPa (10.2...18.9 psi)
Electromagnetic compatibility	EN 61326-1 EN 61326-2-3 Industrial Enviroment FCC Part15 Class A ICES-003 Class A
Storage conditions	-20...70 °C (-40...158 °F) 0...95 % RH, non-condensing
Configuration and adjustment	PCS10 Product Configuration Software (free download) and configuration adapter

1) Standardized air velocity vn at standard conditions (factory setup): Tn = 23 °C (73 °F), pn = 1013.25 hPa (14.7 psi), settable via PCS10
2) 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)
3) At air flows ≥ 0.45 m/s

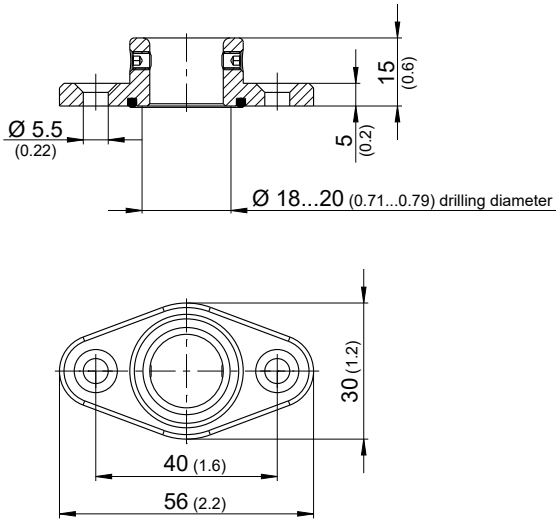
Dimensions

Values in mm (inch)

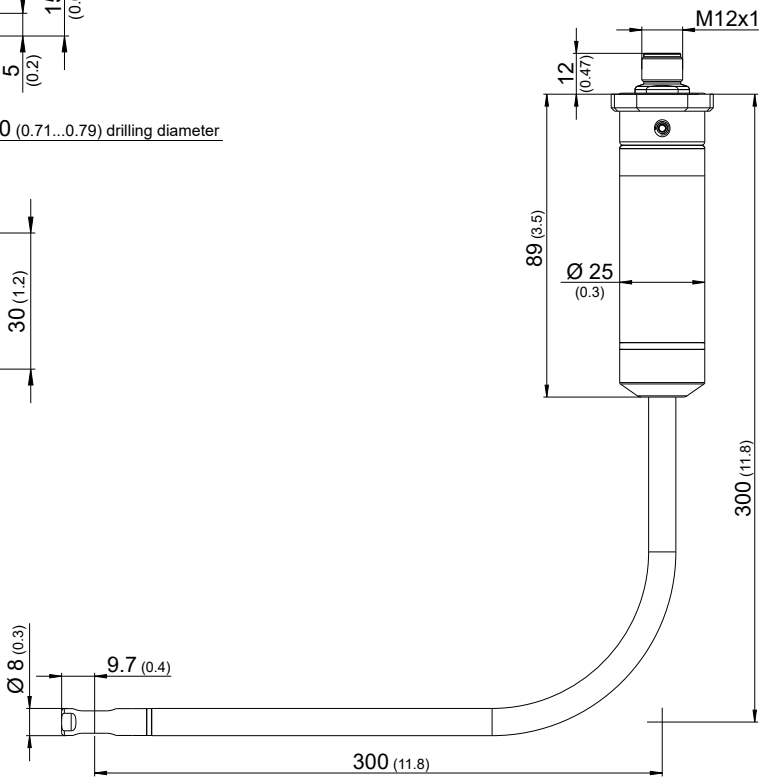
Type T15 Straight Probe



Mounting Flange



Type T29 90° Angled Probe



Ordering Guide

			EE680-			
Hardware Configuration	**Type**	Straight probe	T15		T15	
		90° angled probe		T29		T29
	Measuring range	0...2 m/s (0...400 ft/min)	no code			
	Probe length	200 mm (7.9")	L200		L200	
		300 mm (11.8")	L300	L300	L300	L300
	Mounting	With flange	TG5			
Software Setup	**Output signal**[1]	4 - 20 mA	GA6			
		0 - 20 mA	GA5			
		0 - 10 V	GA3			
		0 - 5 V	GA2			
		Digital interface RS485			no code	
	Output 1 measurand	Air velocity[2] [m/s]	no code			
		Air velocity[2] [ft/min]	MA23			
		Temperature [°C]	MA1			
		Temperature [°F]	MA2			
	Scaling 1 low	0	no code			
		Value	SAL*Value*			
	Scaling 1 high	2	no code			
		Value	SAH*Value*			
	Output 2 measurand	Temperature [°C]	no code			
		Temperature [°F]	MB2			
		Air velocity[2] [m/s]	MB22			
		Air velocity[2] [ft/min]	MB23			
	Scaling 2 low	0	no code			
		Value	SBL*Value*			
	Scaling 2 high	50	no code			
		Value	SBH*Value*			
	Protocol	Modbus RTU[3]	-		P1	

1) Applies to both outputs
2) Standardized air velocity vn at standard conditions (factory setup): Tn = 23 °C (73 °F), pn = 1013.25 hPa (14.7 psi), settable via PCS10
3) Factory settings: baud rate 9600, parity even, stop bits 1.
Modbus map and communication settings: See User Manual and Modbus Application Note at www.epluse.com/EE680

Ordering Example

EE680-T15L300TG5GA6

Type:	Straight probe
Measuring range:	0…2 m/s (0...400 ft/min)
Probe length:	300 mm (11.8")
Mounting:	With flange
Output signal:	4 - 20 mA
Output 1 measurand:	Air velocity [m/s]
Scaling 1 low:	0
Scaling 1 high:	2
Output 2: measurand	Temperature in [°C]
Scaling 2 low:	0
Scaling 2 high:	50

EE680-T29L300TG5P1

Type:	90° angled probe
Measuring Range:	0…2 m/s (0...400 ft/min)
Probe length:	300 mm (11.8")
Mounting:	With flange
Output signal:	Digital interface RS485
Protocol:	Modbus RTU

Accessories

(for further information, see data sheet "Accessories")

Modbus configuration adapter	HA011018
E+E Product Configuration Software (free download: www.epluse.com/pcs10)	PCS10
Protection cap M12 female connector	HA010781
Protection cap M12 male connector	HA010782
Connection cable M12 - flying leads (1.5 m (4.9 ft) / 5 m (16.4 ft) / 10 m (32.8 ft))	HA010819/20/21
T-coupler M12 - M12	HA030204
M12 cable connector for self assembly	HA010708
Mounting set EE680	HA011601
M12 sealing plug stainless steel	HA011602