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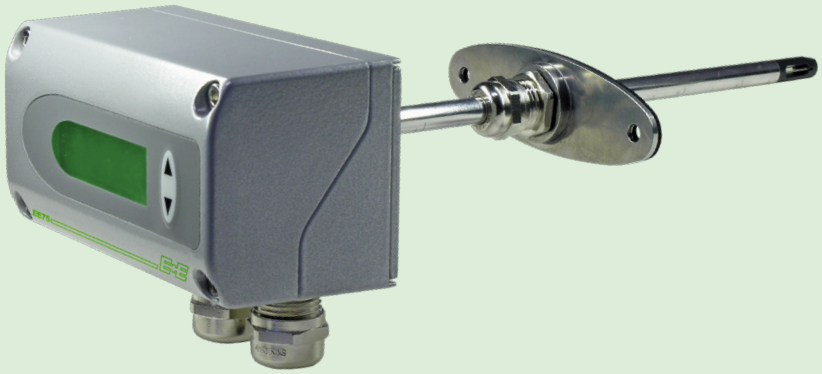
User Manual EE75

Highly Accurate Air / Gas Velocity Sensor for Industrial Applications



www.epluse.com

Content

1 General Information

This user manual is intended to ensure proper handling and optimal functioning of the device. The user manual shall be read before commissioning the equipment and it shall be provided to all staff involved in transport, installation, operation, maintenance and repair. E+E Elektronik Ges.m.b.H. accepts no liability for any warranty or liability claims arising from this publication or improper handling of the product(s) described.

All information, technical data and diagrams included in this document are based on the information available at the time of writing. The document may contain technical inaccuracies and typographical errors. The contents will be revised on a regular basis and changes will be implemented in subsequent versions. The product(s) described and the contents of this document may be changed or improved at any time without prior notice.

PLEASE NOTE

Find this document and further product information on our website at www.epluse.com/ee75.

1.1 Explanation of Warning Notices and Symbols

Safety precautions

Precautionary statements warn of hazards in handling the device and provide information on their prevention. The safety instruction labeling is classified by hazard severity and is divided into the following groups:

DANGER

Danger indicates hazards for persons. If the safety instruction marked in this way is not followed, the hazard will verly likely result in severe injury or death.

WARNING

Warning indicates hazards for persons. If the safety instruction marked in this way is not followed, there is a risk of injury or death.

CAUTION

Caution indicates hazards for persons. If the safety instruction marked in this way is not followed, minor or moderate injuries may occur.

NOTICE

Notice signals danger to objects or data. If the notice is not observed, damage to property or data may occur.

Informative notes

Informative notes provide important information that is characterised by its relevance.

INFO

The information symbol indicates tips on handling the device or provides additional information on it. This information is useful to achieve optimum performance of the device.

The title field may deviate from “INFO” depending on the context. For instance, it may also read “PLEASE NOTE”.

1.2 Safety Instructions

1.2.1 General Safety Instructions

NOTICE

Improper handling of the device may result in its damage.

- The EE75 enclosure, the sensing probe and the sensing module shall not be exposed to unnecessary mechanical stress.
- The EE75 electronics is sensitive to electrostatic discharge (ESD), appropriate protective measures shall be taken when touching it.
- Use the EE75 only as intended and observe all technical specifications.

1.2.2 Intended Use

The EE75 air / gas velocity (v) and temperature (T) sensor is optimised for best measurement results in challenging air flow applications in most various industries.

Various models are available that allow wide velocity and temperature ranges of 0.06 m/s (12 ft/min) to 40 m/s (8000 ft/min) and -40 °C (-40 °F) up to 120 °C (248 °F).

⚠ WARNING

Non-compliance with the product documentation may cause safety risks for people and the entire measurement installation.

The manufacturer is not liable for any damage caused by improper handling, installation and maintenance of the device.

- Do not use the EE75 in explosive atmosphere or for measurement in aggressive gases.
- This device is not appropriate for safety, emergency stop or other critical applications where device malfunction or failure could cause injury to human beings.
- The device may not be manipulated with tools other than specifically described in this manual.

NOTICE

Failure to follow the instructions in this user manual may lead to measurement inaccuracy and device failures.

- The EE75 may only be operated under the conditions described in this user manual and within the specification included in chapter 9 Technical Data.
- Any unauthorised product modifications will invalidate all warranty claims. Modifications may only be carried out with express authorisation of E+E Elektronik Ges.m.b.H.!

1.2.3 Mounting, Start-up and Operation

The EE75 has been produced under state of the art manufacturing conditions, has been thoroughly tested and has left the factory after fulfilling all safety criteria. The manufacturer has taken all precautions to ensure safe operation of the device. The device shall be set up and installed in a way that does not impair its safe use. All applicable local and international safety guidelines for safe installation and operation of the device have to be observed. This user manual contains information and warnings that must be observed in order to ensure safe operation.

PLEASE NOTE

The manufacturer or his authorised agent can only be held liable in case of willful or gross negligence. In any case, the scope of liability is limited to the corresponding amount of the order issued to the manufacturer. The manufacturer assumes no liability for damage caused by non-compliance with the applicable regulations, operating instructions or the specified operating conditions. Any consequential damage is excluded from liability.

⚠ WARNING

Non-compliance with the product documentation may cause accidents, personal injury or property damage.

- Mounting, installation, commissioning, start-up, operation and maintenance of the device may only be carried out by qualified staff. Such staff must be authorised by the operator of the facility to carry out the mentioned activities.
- The qualified staff must have read and understood this user manual and must follow the instructions contained within. The manufacturer accepts no responsibility for non-compliance with instructions, recommendations and warnings.
- All process and electrical connections shall be thoroughly checked by authorized staff before commissioning the device.
- Do not install or start-up a device suspected to be faulty. Mark it clearly as faulty and remove it from the process.
- Service operations other than described in this user manual may only be performed by the manufacturer. A faulty device may only be investigated and possibly repaired by qualified, trained and authorised staff. If the fault cannot be fixed, the device shall be removed from the process.

1.3 Environmental Aspects

PLEASE NOTE

Products from E+E Elektronik Ges.m.b.H. are developed and manufactured in compliance with relevant environmental protection requirements. Please observe local regulations for the disposal of the device.

For disposal, the individual components of the device must be separated according to local recycling regulations. The electronics shall be disposed of correctly as electronics waste.

1.4 ESD Protection

The sensing elements and the electronics board are ESD (electrostatic discharge) sensitive components of the device and must be handled as such. Failure to do so may damage the device by electrostatic discharge when touching exposed sensitive components.

2 Scope of Supply

- EE75 Highly Accurate Air / Gas Velocity Sensor for Industrial Applications according to the ordering guide
- Mounting flange for Types T2 and T3
- EE75 Configuration software and a USB interface cable
- Inspection certificate according to DIN EN 10204-3.1 with three v points

3 Product Description

3.1 General

The EE75 air / gas velocity (v) and temperature (T) sensor is optimised for best measurement results in challenging air/gas flow applications in most various industries.

With its multi-point v factory adjustment the EE75 meets the highest accuracy requirements. The E+E thin-film sensing element operates according to the hot-film anemometer principle, which ensures excellent accuracy from 0.06 m/s (12 ft/min) to 40 m/s (8000 ft/min) and low angular dependency.

The integrated temperature compensation combined with the robust mechanical design, makes the EE75 suitable for process temperatures from -40 °C (-40 °F) up to 120 °C (248 °F).

The EE75 is available both for duct mounting and with remote probes in various probe lengths.
The remote probe types feature different cable lengths and pressure-tight versions up to 10 bar (145 psi).

Three different types provide a comprehensive range of mounting options:
- Type T2 for duct mounting
- Type T3 with remote probe
- Type T26 with remote probe, pressure-tight to 10 bar (145 psi)

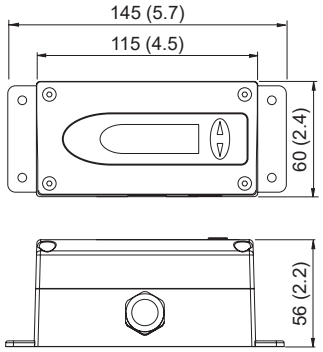
The IP65 / NEMA 4 rated metal enclosure facilitates easy installation and maintenance. The v and T measured data is available on two current or voltage analogue outputs. In addition to measuring v and T, the EE75 calculates the volume flow V' in m^3/min or ft^3/min.

For a setup deviating from default, the EE75 can be configured manually by means of the free EE75 Configuration Software and the USB interface cable (included in the scope of supply). Refer to chapter 10 Configuration Software for details.

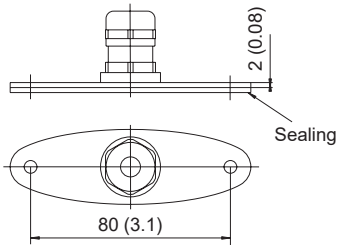
3.2 Dimensions

Values in mm (inch)

Enclosure

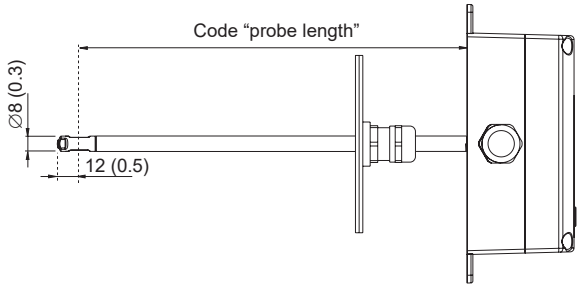


Mounting flange
in the scope of supply for Types T2 and T3



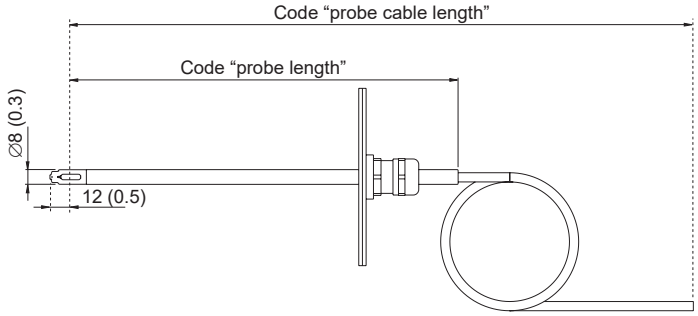
Type T2

Duct mount



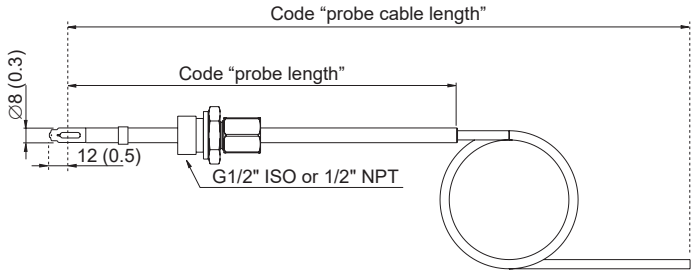
Type T3

Remote probe



Type T26

Remote probe, pressure-tight up to 10 bar (145 psi)



4 Mounting and Installation

PLEASE NOTE

Before installation, please ensure that the upper and lower modules of the enclosure are not interchanged! Only with identical serial numbers the function of the sensor can be guaranteed within the specifications (refer to chapter 9 Technical Data).

4.1 Installing the Enclosure

Procedure

1. On delivery, the two mounting brackets (on the left and right of the enclosure base plate) are attached to the lower part of the enclosure with two screws each, facing inwards. For installation, the brackets can be swung out and screwed down (see drawing).
2. The dimensions of the mounting holes are as shown in the adjacent drawing.
3. The bottom part of the enclosure is fitted using 4 screws (not included).
   Max. screw diameter 4.5 mm (0.18"), for example 4.2 x 38 mm (0.17 x 1.5") - DIN 7983H screws.
4. Connecting the sensor (refer to chapter 4.5 Electrical Connection)
5. Lift the upper part of the enclosure into position and screw it into place using the four Allen screws included (Allen key provided).

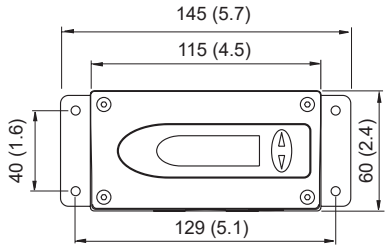


Fig. 1 Enclosure dimensions in mm (inch)

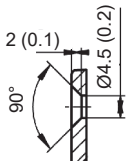


Fig. 2 Cross-section of bore in mm (inch)

4.2 Mounting Type T2 (Duct Mounting)

There are two types of duct mounting:

4.2.1 Mounting with Brackets

Refer to chapter 4.1 Installing the Enclosure.

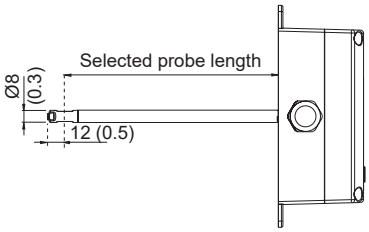


Fig. 3 Duct mount with brackets

4.2.2 Mounting with a Flange

The stainless steel mounting flange allows for the sensor to be mounted on the outside wall of the duct in which the measurement takes place and adjusted to any insertion depth.

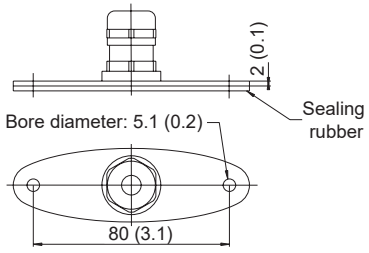


Fig. 4 Mounting flange

4.3 Mounting Type T3 (Remote Probe)

4.3.1 Installing the enclosure

Refer to chapter 4.1 Installing the Enclosure.

4.3.2 Installing the probe

Refer to chapter 4.2.2 Mounting with a Flange.

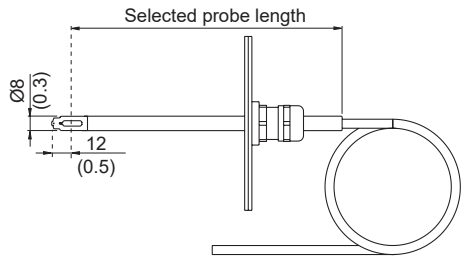


Fig. 5 Mounting flange

4.4 Mounting Type T26 (Remote Probe, Pressure-tight up to 10 bar / 145 psi)

4.4.1 Installing the enclosure

Refer to chapter 4.1 Installing the Enclosure.

4.4.2 Installing the Probe

⚠ WARNING

As the sensing probe can be exposed to very high pressures in the measuring environment, there is a risk of sudden, unintentional expulsion of the probe during or after improper installation. Special care must therefore be taken when working on or near the sensing probe. Never bend directly over the probe under any circumstances.

NOTICE

- When installing the sensor probe, be careful not to damage the surface of the sensing probe.
- This could damage the seals (resulting in leakage and pressure loss) or cause problems when removing the probe (may get stuck).
- Before installing the sensing probe, make sure it is free from any impurities such as grease or dirt.

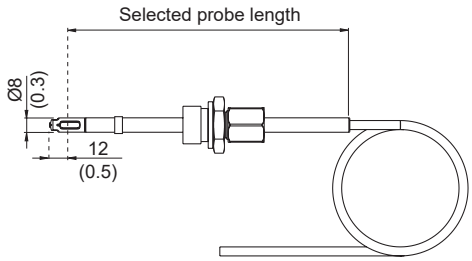


Fig. 6 Mounting flange

Installing the probe

There should be a shut-off valve on both sides of the probe insert when installing the probe. This makes it easy to remove the sensor for maintenance and calibration.

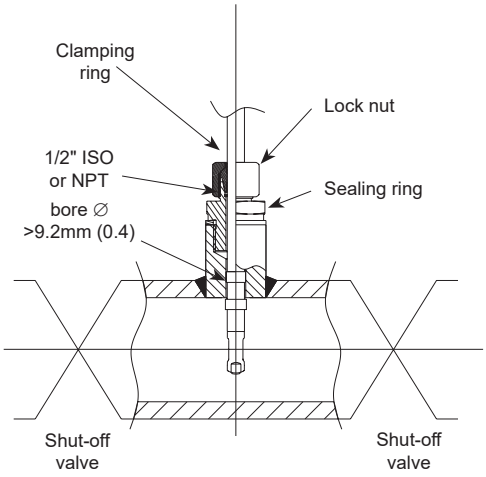


Fig. 7 Partial description of the probe

Procedure

1. Install the probe with the shut-off valves closed.
2. Insert the sensor probe into the process.
3. To ensure the probe is installed securely, the lock nut must be tightened to a specified torque of 10 Nm.
4. If no torque spanner is available, tighten the lock nut by hand as far as possible and then turn it a further ~ 90° with an appropriate open-ended spanner.

⚠ WARNING

An inadequate torque results in a low tension force (fixing force) on the clamping sleeve. This brings with it a risk of injury due to sudden expulsion of the sensing probe. An excessive torque can lead to permanent deformation of the clamping sleeve and sensing probe, making removal and re-installation more difficult or even impossible.

Removing the probe

⚠ WARNING

If the sensor probe is installed in a pressure chamber, make sure that the pressure in the chamber and the ambient pressure are in equilibrium before removing the probe.

Procedure

1. Hold the sensing probe/enclosure firmly. (Attention: Do not bend the connection cable)
2. Slowly loosen the lock nut using a spanner (spanner width 24).
3. The entire probe can now be removed.

General installation instructions

Scaling the insertion depth on the probe

The insertion depth can be read off directly on the probe. The depth ismeasured from the centre of the velocity measuring slot (= middle of the sensor). The scaling on the probe has an offset of 30mm (1.2”). This allows for the insertion depth “X” (= distance between middle of sensor and mounting plate) to be read off directly above the screwed cable gland (refer to).

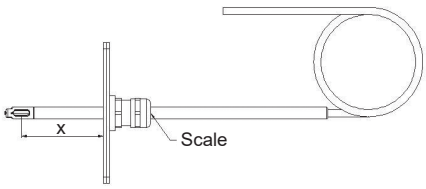


Fig. 8 Location of the scaling indicator

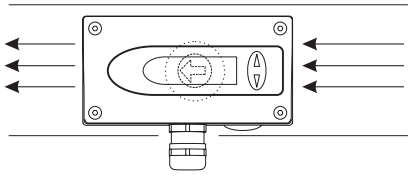
Flow direction

The arrow on the sensor probe should be pointing exactly in the direction of flow!

⊙ indicates the orientation of the tip of the arrow.

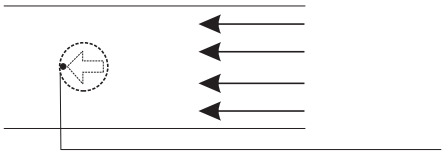
⊗ indicates the orientation of the tail of the arrow.

Flow direction type T2 (duct mounting)



Flow direction type T3 and T26 (remote probe)

To be able to read off the orientation of the remote sensor head beyond the measuring line, a mark has been punched at the end of the sensing probe. This corresponds with:



- flow
- corresponds to the tip of the arrow

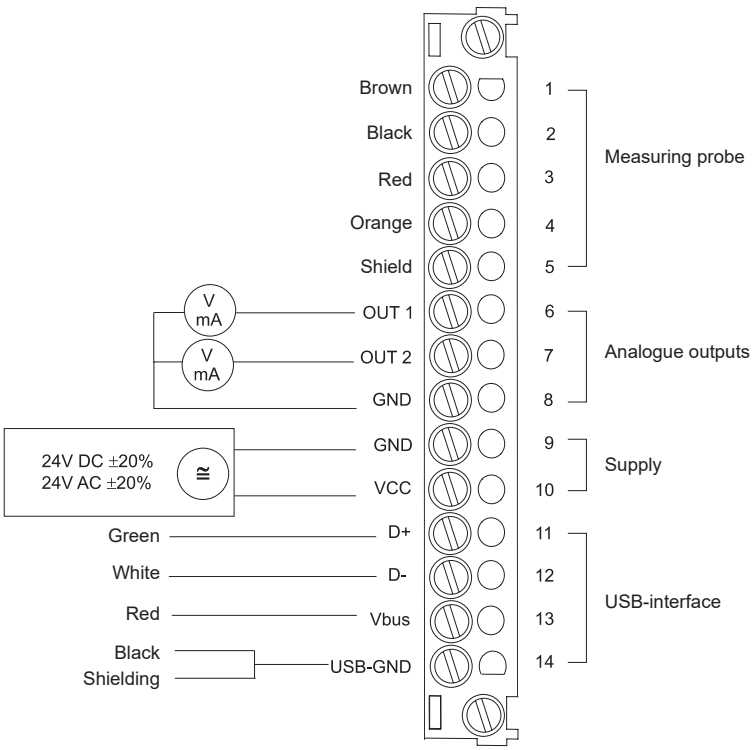
4.5 Electrical Connection

⚠ WARNING

Incorrect installation, wiring or power supply may cause overheating and therefore personal injuries or damage to property.

For correct cabling of the device, always observe the presented wiring diagram for the product version used.

The manufacturer cannot be held responsible for personal injuries or damage to property as a result of incorrect handling, installation, wiring, power supply and maintenance of the device.



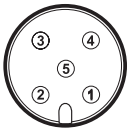
4.6 Connection Diagram with Optional Connections

M12 Plug for supply and analogue outputs

Front view on device

Pin	Assignment
1	OUT1
2	OUT2
3	GND (Supply)
4	GND (OUT)
5	Vcc

M12 Socket for USB interface



Front view on device

Pin	Assignment
3	D+
1	D-
2	Vbus
4	GND
5	Not assigned

PLEASE NOTE

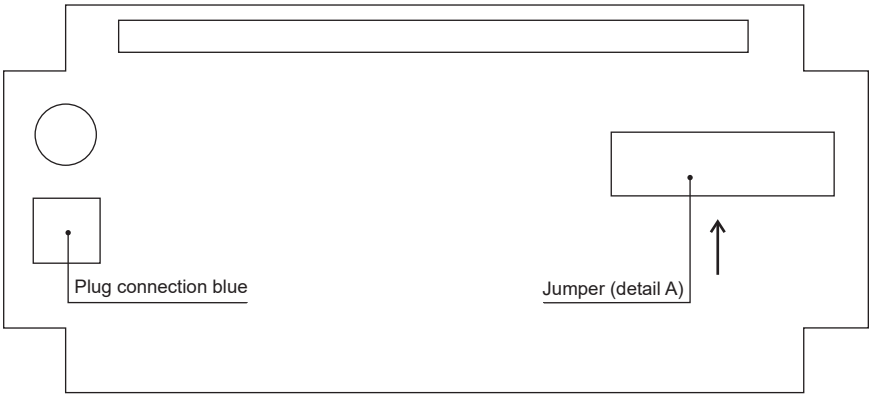
Cable connection to the plugs should be as indicated by the numbers above.

4.7 Assignment USB - Interface Cable

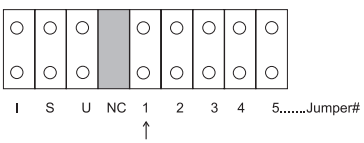
Color of wire	Assignement	Signal	Terminal no.
Green	3	D+	11
White	1	D-	12
Red	2	Vbus	13
Black Shielding	4	USB-GND	14

5 Operating Components

5.1 Electronics Board



Jumper (detail A)

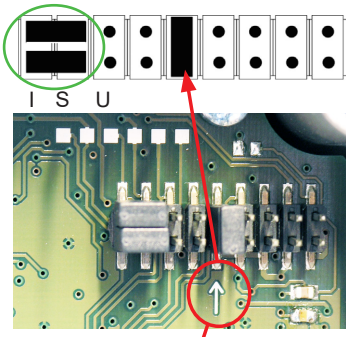


Jumper#	Function
I	Current output signal
S	Signal
U	Voltage output signal
1 (arrow)	$\tau_{90\text{-}1}$ velocity (2 s)
2	$\tau_{90\text{-}2}$ velocity (4 s)
3	$\tau_{90\text{-}3}$ velocity (10 s)
4	Free
5	Free

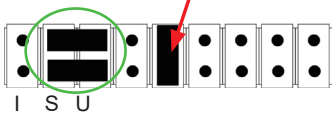
5.2 Jumpers for Setting the Output Signal

If the sensor output signal is set from current to voltage by use of the configuration software, additionally 2 jumpers must be set on the circuit board as follows:

EE75-TxA6 (for current output, e.g. 4 - 20 mA)



EE75-TxA3 (for voltage output, e.g. 0 - 10 V)



5.3 Jumpers for Setting the Velocity Response Time

The EE75 allows users to set the velocity response time:

1. Setting the velocity response time using jumpers

Jumper position (refer to chapter 5.1 Electronics Board)	**Response time**
No jumper	1.5 s
Jumper at pos. 1	2 s (factory setting)
Jumper at pos. 2	4 s (factory setting)
Jumper at pos. 3	10 s (factory setting)

2. Setting the velocity response time using configuration software
   The response time (τ90) can also be set to any value between 1.5 and 40 s using the configuration software, without changing the jumpers on the circuit board. Refer to Configuration Software, chapter 10.4.4 Response Time.

5.4 Display Module with Buttons (Optional)

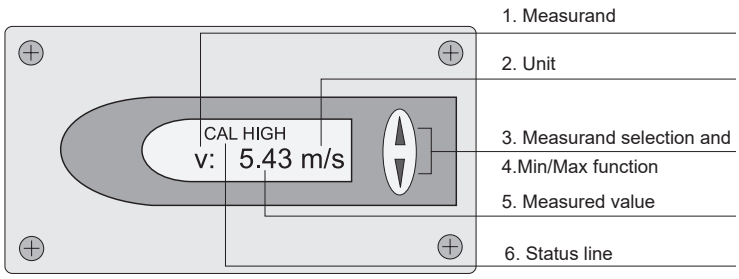


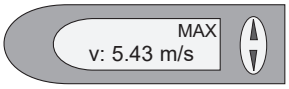
Fig. 9 Display module components

1. Measurand SI		**2. Units** SI	US	**3. Measurand Selection**
v	Velocity	m/s	ft/min	Pressing the Δ or ∇ button switches between the various physical quantities (measurands).
T	Temperature	°C	°F	
$\bar{v}$	Volume	m^3/min	ft^3/min	

4. MIN/MAX Function

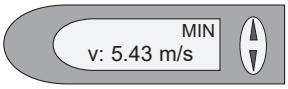
The MIN / MAX function can be used to record the lowest and highest values measured for each measurand since the last reset or the last interruption of the power supply.

Highest measured value: MAX



1. Select the required measurand (UP / DOWN button)
2. To display the maximum value, press the UP button and hold it down for approx. 5 s.
3. To return to the normal operating mode, press the UP button again and hold it down for approx. 5 s.

Lowest measured value: MIN



1. Select the required measurand (UP / DOWN button)
2. To display the minimum value, press the DOWN button and hold it down for approx. 5 s.
3. To return to the normal operating mode, press the DOWN button again and hold it down for approx. 5 s.

By pressing the UP and DOWN buttons simultaneously in normal operating mode, the stored MIN/MAX values for all measurands can be reset by selecting “CLEAR MIN/MAX BUFFER”; the recording can then be restarted (for details refer to chapter 5.4 Display Module with Buttons (Optional), point 7 - Menu navigation).

5. Measured Value

The measured value of the respective measurand is indicated.

6. Status Line

The status line indicates the sensor’s current operating status.

Status	Description
No indication	Normal operating mode / measurement in progress
MIN or MAX	Refer to point 4 - MIN/MAX function
CAL LOW	V or T calibration routine for the low adjustment point selected.
CAL HIGH	V or T calibration routine for the high adjustment point selected.

7. Menu Navigation

Pressing the UP and DOWN buttons simultaneously for approx. 5 s during a measurement (in normal operating mode) a 4-line menu is displayed with the following options:

Options	Description
CALIBRATION	Calibration
FACTORY SETTINGS	Factory settings
CLEAR MIN/MAX BUFFER	Clear Min/Max buffer
EXIT	Returns to normal operating mode without executing any of the menu items

Pressing the UP and DOWN buttons moves the cursor “>” on the left-hand side of the display up and down to select one of the neighbouring menu items.

Pressing the UP and DOWN buttons simultaneously for approx. 5 s confirms the selection and executes the selected menu item.

6 Velocity and Temperature Calibration

The EE75 can be calibrated / adjusted using either the buttons on the optional display module or the USB interface and configuration software provided.

PLEASE NOTE

To achieve comparable results to the E+E factory setting, please note the following

- The adjustment should be carried out in a wind tunnel with homogeneous, low-turbulence flow profile.
- Insert the probe 10 cm (3.94") deep into the flow channel.
- The fixtures should be installed outside the flow channel and not protrude into the air stream (refer to the drawings below).

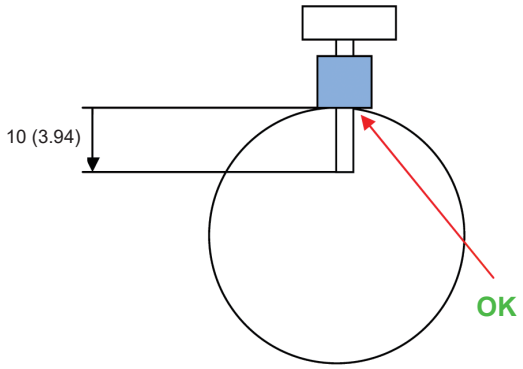


Fig. 10 Correct installation

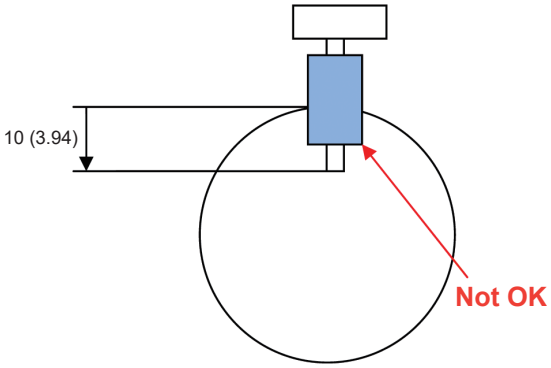


Fig. 11 Incorrect installation

6.1 1-point or 2-point Calibration

The EE75 sensor can be calibrated in 2 different ways

1-point v/T calibration
Quick and easy option for obtaining accurate measuring results at a specific working point. 1-point calibration should only be used for very limited working ranges.

2-point v/T calibration
With 2-point calibration, accurate measuring results can be obtained over the entire v/T measuring range. The more complicated 2-point calibration procedure is preferable to 1-point calibration, if higher precision or a wider working range is required.

6.1.1 General Information on 1-point v/T Calibration

If possible the selected calibration point should be similair to the working point (of the limited working range) of the sensor.

Example
Working range v 8...12 m/s (1 600...2 400 ft/min) > calibration point at 10 m/s (2 000 ft/min); working range T 18...22 °C (64.4...71.6 °F) - > calibration point at 20 °C (68 °F).

- If the selected calibration point is <50 % of the max. measuring range, V/T-CAL LOW should be selected for calibration / adjustment.
- If the selected calibration point is >50 % of the max. measuring range, V/T-CAL HIGH should be selected for calibration / adjustment.

Example
v measuring range 0...10 m/s (0...2 000 ft/min); actual working range 6...8 m/s (1200...1600 ft/min); selected calibration point 7 m/s (1400 ft/min); perform 1-point calibration, selecting V-CAL HIGH.

6.1.2 General Information on 2-point v/T Calibration

With a 2-point calibration, v/T calibration / adjustment is performed at 2 different calibration points.

To ensure the smallest possible deviation in measuring results over the entire measuring range, the two calibration points should be selected as follows:

- The low calibration point should be in the lower third of the measuring range. Calibration / adjustment must be performed using the V/T-CAL LOW function.
- The high calibration point should be in the upper third of the measuring range. Calibration / adjustment must be performed using the V/T-CAL HIGH function.

Example

EE75 T3***HV23 - measuring range = 0 ... 2 m/s (0...400 ft/min).

Low calibration point (V-CAL LOW) should be around 0.4 m/s (0...0.7).

High calibration point (V-CAL HIGH) should be around 1.8 m/s (1.4...2).

6.2 Velocity Calibration

6.2.1 Calibration Procedure Using Configuration Software

Refer to Configuration Software, chapter 10.4.9 Calibration (Point 3 v Calibration Process Using a Configurator).

6.2.2 Calibration Procedure Using Buttons on the Display Module (Optional)

1. Position the sensor head in the middle of the reference system (wind tunnel).
2. Stabilise the probe at the reference velocity (for at least 1 minute). The temperature of the measuring probe and the reference system must be approximately the same.
3. Press both buttons for approx. 5 s to display the menu window.
4. Use the buttons and cursor so select the menu item “CALIBRATION” and confirm the selection.
5. Select “V-Cal” and confirm the selection.
6. 1. “1-point calibration”
   - Select the calibration point as described in chapter 6.1.1 General Information on 1-point v/T Calibration.
   - If calibration point >50% of measuring range, select “V-CAL HIGH” and confirm the selection.
   - If calibration point <50% of measuring range, select “V-CAL LOW” and confirm the selection.

   2. “2-point calibration”
   - Select the low (high) calibration point as described in chapter 6.2.2 Calibration Procedure Using Buttons on the Display Module (Optional).
   - Approach the low (high) calibration point in the reference system, select “V-CAL LOW” (“V-CAL HIGH”) on the sensor and confirm the selection.
7. The status line should display either CAL LOW (CAL HIGH).
8. The measuring value can now be adjusted with the reference value in 0.1m/s (20ft/min) increments by pressing the UP or DOWN button. The updated value is displayed immediately and present at the analogue output.
9. To save the adjusted measuring value in the instrument, press both buttons simultaneously for approx. 5 s, then select “YES” in the “SAVE” menu and confirm the selection. This exits the calibration routine and the sensor returns to normal operating mode.
   Selecting “NO” in the “SAVE” menu exits the calibration routine without saving the adjusted measuring value.
10. In the case of 1-point v calibration, the procedure is now complete.
11. For 2-point v calibration, repeat steps 6.2-9 with the (high) calibration point.

6.3 Temperature Calibration

Refer to Configuration Software, chapter 10.4.9 Calibration (Point 4 T Calibration Procedure Using a Configurator)

6.3.1 Calibration Procedure Using Buttons on the Display Module (Optional)

1. Insert the sensor head in the temperature reference system.
2. Allow it to stabilise (min. 15 minutes). The greater the difference in temperature between the measuring probe and the reference system, the longer the required stabilisation time.
3. Press both buttons for approx. 5 s to display the menu window.
4. Use the buttons and cursor to select the menu item “CALIBRATION” and confirm the selection.
5. Select “T-Cal” and confirm the selection.
6. 1. “1-point calibration”
   - Select the calibration point as described in chapter 6.1.1 General Information on 1-point v/T Calibration.
   - If calibration point >50% of measuring range, select “T-CAL HIGH” and confirm the selection.
   - If calibration point <50% of measuring range, select “T-CAL LOW” and confirm the selection.

   2. “2-point calibration”
   - Select the low (high) calibration point as described in chapter 6.1.2 General Information on 2-point v/T Calibration.
   - Approach the low (high) calibration point in the reference system, select “T-CAL LOW” (“T-CAL HIGH”) on the sensor and confirm the selection.
7. The status line should display either CAL LOW (CAL HIGH).
8. The measuring value can now be adjusted with the reference value in 0.1°C (32.18°F) increments by pressing the UP or DOWN button. The updated value is displayed immediately and present at the analogue output.
9. To save the adjusted measuring value in the instrument, press both buttons simultaneously for approx. 5 s, then select “YES” in the “SAVE” menu and confirm the selection. This exits the calibration routine and the sensor returns to normal operating mode. Selecting “NO” in the “SAVE” menu exits the calibration routine without saving the adjusted measuring value.
10. In the case of 1-point T calibration, the procedure is now complete.
11. For 2-point T calibration, repeat steps 6.2-9 with the (high) calibration point.

6.4 Resetting to Factory Calibration

If necessary the sensor can be reset to the factory settings (factory calibration data), after a v or T customer calibration has been performed.

6.4.1 Resetting v / T to Factory Calibration

1. Press both buttons for approx. 5 s to display the menu window.
2. Select “Factory settings” and confirm the selection.
3. Select “Restore Settings” and confirm the selection.
4. The customer calibration data (v, T) has now been reset to the factory calibration data.

6.4.2 Resetting v to Factory Calibration

1. Press both buttons for approx. 5 s to display the menu window.
2. Select “Calibration” and confirm the selection.
3. Select “V-CAL” and confirm the selection.
4. Select “V-FACTORY SETTINGS” and confirm the selection.
5. Select “Restore Settings” and confirm the selection.
6. The customer calibration data (v) has now been reset to the factory calibration data.

6.4.3 Resetting T to Factory Calibration

1. Press both buttons for approx. 5 s to display the menu window.
2. Select “Calibration” and confirm the selection.
3. Select “T-CAL” and confirm the selection.
4. Select “T-FACTORY SETTINGS” and confirm the selection.
5. Select “Restore Settings” and confirm the selection.
6. The customer calibration data (T) has now been reset to the factory calibration data.

7 Maintenance

If the measuring values are unrealistic, the first thing to check is the angle of inflow.

NOTICE

- Check the sensor element for soiling. If dust has collected on the element, blow it off carefully with oil-free compressed air. If there is anything else on the sensor, clean it carefully using isopropyl alcohol and allow it to dry. Do not touch the velocity sensor with your fingers!

If there is no output and indication, check the power supply.

7.1 Repairs

PLEASE NOTE

Repairs may only be carried out by the manufacturer. The attempt of unauthorised repair excludes any warranty claims.

8 Spare Parts / Accessories

For further information please refer to the Accessories datasheet.

Description	Code
Stainless steel mounting plate	**HA010207**
USB interface cable	**HA010310**

9 Technical Data

Measurands

Air Velocity (v)

Measuring range	0...2 m/s (0...400 ft/min) 0...10 m/s (0...2 000 ft/min) 0...40 m/s (0...8 000 ft/min)	
Accuracy in air at 25 °C (77 °F) and 1 013 hPa (14.7 psi), including non-linearity, hysteresis and repeatability **0.06...2 m/s (12...400 ft/min)** **0.15…10 m/s (30…2000 ft/min)** **0.20…40 m/s (40…8000 ft/min)**	 ±0.03 m/s (6 ft/min) ±(0.10 m/s (20 ft/min) + 1 % of mv) ±(0.20 m/s (40 ft/min) + 1 % of mv)	 mv = measured value
Uncertainty of factory calibration	±1 % of mv, min. 0.015 m/s (3 ft/min)	mv = measured value
Dependency **of inflow angle (α)** **of inflow direction**	<3 % for α <20° <3 %	
Response time t_{90}, typ.	<1.5...40 s (Factory setting: 2 s, configurable via EE75 Configuration Software)	

Temperature (T)

Measuring range	-40...+120 °C	
Accuracy in air at 25 °C (77 °F) at air flows ≥0.45 m/s (886 ft/min)	±0.5 °C (±0.9 °F)	
Temperature dependency of electronics, typ.	±0.005 % of mv/K deviating from 25 °C (77 °F)	mv = measured value
Temperature dependency of probe, typ.	±0.1 % of mv/K deviating from 25 °C (77 °F)	mv = measured value
Response time t_{90}, typ.	≤10 s	

Outputs

Analogue

Two freely selectable and scalable outputs for v, T, V'	0 - 10 V 0 - 20 mA / 4 - 20 mA (3-wire)	-1 mA < I_L < 1 mA R_L ≤ 350 Ω	I_L = load current $R_{L=}$ load resistance

General

Power supply class III ⧫ USA & Canada: Class 2 supply necessary	24 V DC ±20 %
Current consumption, typ. **With Display**	<100 mA <160 mA
Electrical connection	Screw terminals max. 2.5 mm^2 (AWG 16)
Protection rating	IP65 / NEMA 4
Temperature working range **Probe cable** **Enclosure** **Enclosure with display**	 -40…+105 °C (-40…+221 °F) -40…+60 °C (-40…+140 °F) -30…+60 °C (-22…+140°F)
Pressure working range **T2, T3:** **T26:**	 700...1 300 hPa (10.2...18.9 psi) Pressure tight 0.05...10 bar (0.73...145 psi)
Humidity working range	0…95 %RH, non-condensing
Storage conditions	-20...+70 °C 0...95 %rF, non-condensing
Material **Enclosure** **Probe** **Probe head**	 Die-cast aluminium (AlSi9Cu3) Stainless steel 1.4404 Polybutylenterephtalat (PBT)
Electromagnetic compatibility	EN 61326-1 EN 61326-2-3 Industrial Environment FCC Part15 Class B ICES-003 Class B
Configuration und adjustment	EE75 Configuration Software and USB interface cable included in the scope of supply
Conformity	CE UKCA

Accuracy of E+E Humidity and Temperature Sensors

The measurement accuracy depends both on the performance of the measuring instrument and on the correct installation in the application.

For best accuracy, every E+E v sensor is multi-point factory adjusted and calibrated in a highly stable reactor.

The total measurement uncertainty U_{total} for E+E sensors is calculated in accordance with EA-4/02 (European Accreditation, Evaluation of the Measurement Uncertainty in Calibration) and with GUM (Guide to the Expression of Uncertainty in Measurement) as follows:

$$U_{total} = k \bullet \sqrt{\left(\frac{U_{cal}}{2}\right)^2 + \left(\frac{u_{accuracy}}{\sqrt{3}}\right)^2}$$

U_{total} .....total accuracy incl. factory calibration
U_{cal}.....uncertainty of the factory calibration
$u_{accuracy}$...accuracy of the measurement device
k.....coverage factor k=2, corresponding to a confidence level of 95 %.

For external calibrations, U_{total} is to be used as the evaluation criterion. The calculation does not include effects due to long-term drift or chemical exposure.

As designated laboratory (NMI) responsible for maintaining National Standards in Austria, E+E Elektronik represents the highest level in calibration. For further details, please refer to www.epluse cal.com.

10 Configuration Software

PLEASE NOTE

E+E Elektronik shall not be held liable for any damages or consequential damages (for example, but not restricted to, loss of earnings, interruption of business, loss of information and data or any other financial losses) resulting from the installation, use or impossibility of use of an E+E Elektronik software product and any associated support services or non-performance of support services.

10.1 General Information

The configuration software can be downloaded free of charge at www.epluse.com/ee75. The configuration software provides a user-friendly alternative to the use of the buttons on the optional display module for adjusting the sensor to suit the relevant application or to calibrate / adjust the velocity and temperature settings.

System requirements: Windows XP or higher, interface USB 1.1 or higher.

PLEASE NOTE

Any use beyond these purposes is not permitted. The permanent connection between EE75 and PC via the USB interface in normal operation may cause a malfunction and does not meet the CE-criteria.

10.2 Installation

PLEASE NOTE

Administrator authorisations may be required for problem-free installation of the EE75 configuration software.

1. **During installation do NOT connect the EE75 to the PC using the USB Port.**
2. Run “Setup.exe” to install the EE75 configuration software.
3. The InstallShield Wizard for the EE75 configurator is launched.
4. Follow the instructions to install the software.
5. Clicking the “Finish” button completes configuration software installation.

10.2.1 Installing the USB-Interface

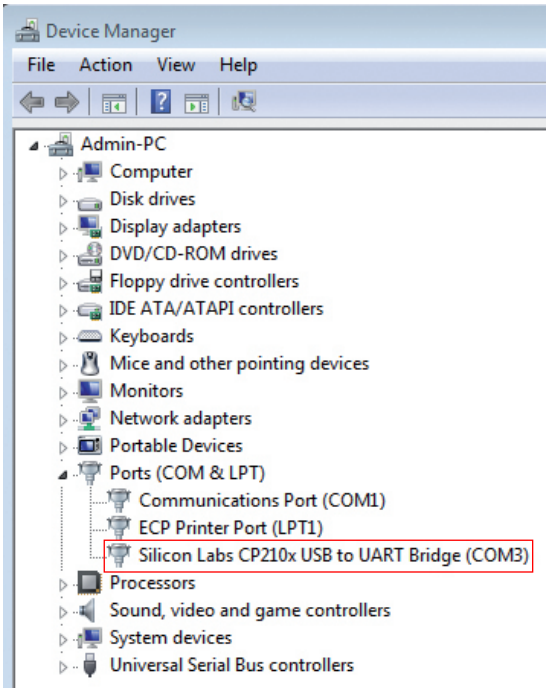
PLEASE NOTE

The USB interface software must also be installled to allow your PC and the EE75 velocity sensor to communicate properly.

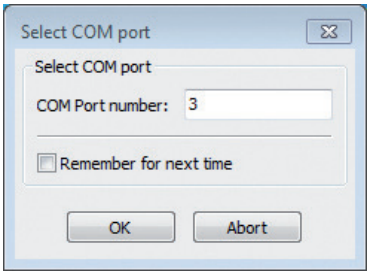
1. Connect terminals and USB-interface located in the back module of the EE75 enclosure under zero-potential conditions.
2. Replace and secure the upper module of the enclosure.
3. Connect EE75 to the supply voltage (V_{CC}).
4. You can now **connect the EE75** to your chosen **USB Port** on your PC (max. transmission distance 3 m).
5. The driver software will be installed automatically.

If the EE75 configuration software and the associated USB interface have been set up correctly, a connection has been assigned to the EE75 USB to UART Bridge Controller on your PC’s Control Panel.

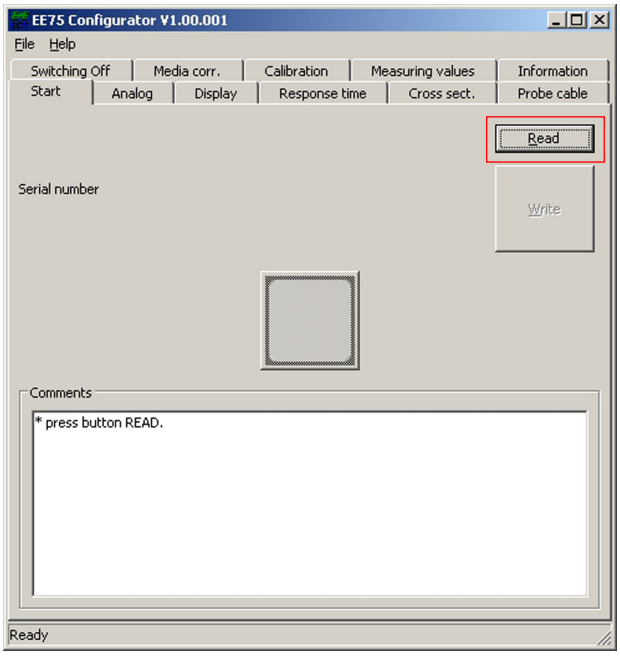
See Start / Settings / Control Panel / System / Hardware / Device Manager



6. The configuration software can now be opened by double-clicking the EE75 icon on your desktop.
7. Specify the selected USB Port (for details, see Configuration Software, chapter 10.3.1 File)

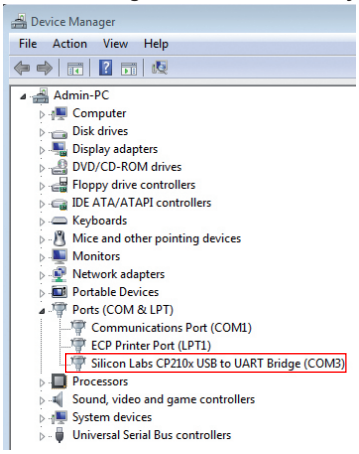


8. Pressing the “Read” button will start the communication with the EE75 and downloads its configuration.



10.3 Menu Items

10.3.1 File

Sub-Item	Description
Load Settings	Opens the saved sensor configuration settings from an archive file on the PC.
Save Settings	Saves the displayed configuration settings in an archive file on the PC.
Select COM Port	Selects the USB interface used on your PC. If the “Remember next time” box is checked, the selected interface will always be used in future.The number of the USB Port can be found under **Start -> Settings -> Control Panel -> System -> Hardware -> Device Manager** 
Exit	Closes the configuration software.

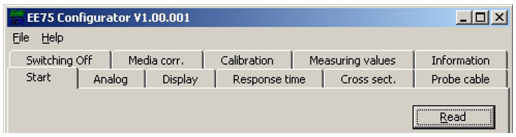
10.3.2 Help

The Configurator provides general information about the configuration software.

10.4 EE75 Configurator

10.4.1 Start

The “Start” tab is used to initiate communication with the connected sensor.



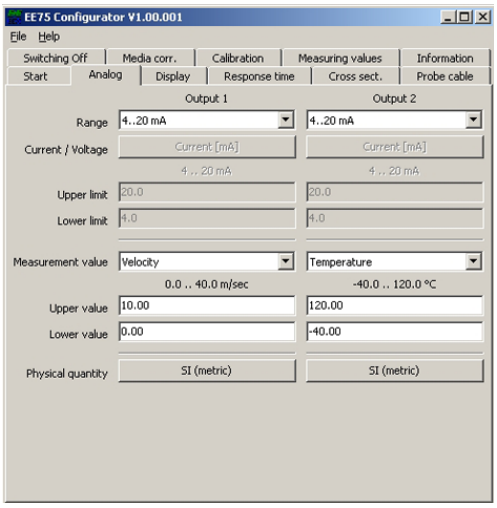
Function	Description
Read	This function downloads the current sensor configuration and serial number.
Write	The configuration changes made on the other tabs can be uploaded to the sensor using the “Write” command.

PLEASE NOTE

Execute the “Read” function before making any new configuration change!

10.4.2 Analogue

The “Analog” tab allows free configuration and scaling of the two analogue outputs.



Selection Fields	Description
Range	The drop-down input field is used either to select a ▪ standardised output signal (0-5 V, 0-10 V, 0-20 mA, 4-20 mA) or to ▪ specify a user-defined current / voltage output range (e.g. 1-9 V).
Measurement value	Specifies the physical quantities the outputs will represent. **PLEASE NOTE** If the measurement value “volumetric flow rate” is selected, the cross section has to be defined (refer to the chapter 10.4.5 Cross Section).
Upper / Lower limit	Specifies the required display range. The limits must lie within the maximum span as indicated.
Physical Quantity	Allows a user to choose whether measuring results are displayed and output in the following ▪ SI units (m/s; °C; m³/min) or ▪ US units (ft/min.; °F; ft³/min.).

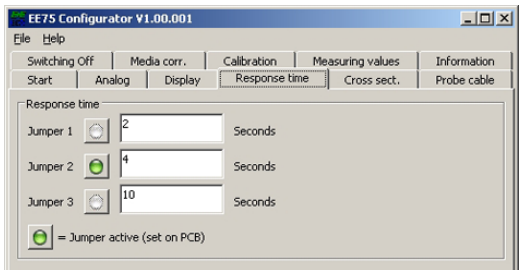
10.4.3 Display

With an optional display, the following can be set on the Display tab:

Function	Description
Display Mode	The drop-down input field is used either to select the ▪ Single-line display or the ▪ Two-line display (factory setting)
Backlight on	The check box is used to ▪ activate the backlight = ON or to ▪ inactivate the backlight = OFF.

10.4.4 Response Time

As described in chapter 5.3 Jumpers for Setting the Velocity Response Time, three different response times can be set.



In the factory settings, the following response times are assigned to the 3 jumper positions:

Jumper position	Response time
1	τ_{90} = 2 s
2	τ_{90} = 4 s
3	τ_{90} = 10 s

A response time of between 1.5 and 40 s can be assigned to each jumper position via the configuration software.

Example

Jumper at position 1: changes from 2 s (factory setting) to 35 s.

The green pilot lamp next to the jumper position indicates which jumper position is currently set and consequently active.

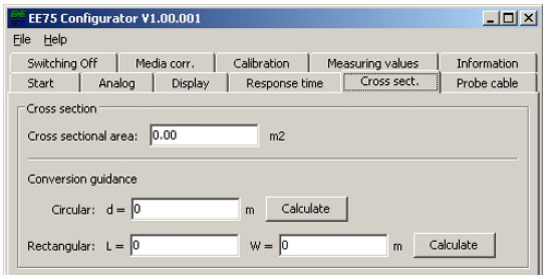
PLEASE NOTE

If the response time of the currently active jumper is changed and uploaded with the “Write” function, the speed behaviour of the sensor is switched without changing the hardware (jumper position).

10.4.5 Cross Section

The EE75 allows volumetric flow to be displayed in [m³/min] or [ft³/min.] (refer to chapter 5.4 Display Module with Buttons (Optional) - Measurands).

The volume is calculated based on the flow velocity measured and the cross section. Consequently, the cross sectional area of the duct must be entered in [m²] or [ft²].



To make it easier to calculate the cross sectional area, the “Cross sect.” tab provides input assistance:

Conversion guidance	Description
Circular	Measure and enter the duct diameter in [m] or [ft] ▪ Press “calculate” ▪ The cross section is calculated and entered in the “Cross sectional area” field
Rectangular	Measure and enter the duct length and width in [m] or [ft] ▪ Press “calculate” ▪ The cross section is calculated and entered in the “Cross sectional area” field

If the duct has a different shape or the cross-sectional area is already known, the value can, of course, also be entered directly in the “Cross sectional area” field, in [m^2] or [ft^2].

10.4.6 Probe Cable

The length of the probe cable (sensor with remote probe) should not normally be changed.

However, if it is necessary to do so, the new (modified) probe cable length must be entered on the “Probe Cable” tab. This virtually rules out additional measuring errors due to the modified cable length.

Example

You order an EE75 T3***K5 (5 m / 16.4 ft cable length) and then cut the cable with 3 m (9.8 ft). The new cable length of 2 m (6.6 ft) should be entered and uploaded using the “Write” function.

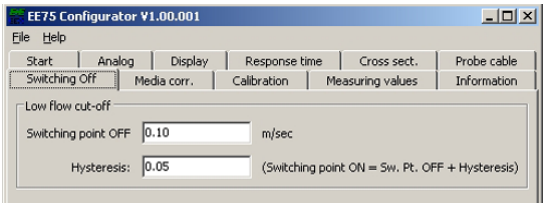
PLEASE NOTE

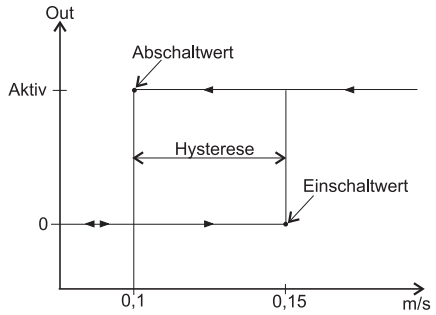
- The cable length is measured from the centre of the sensor element in the sensor head to the point where it enters the enclosure (PG / screw connection).
- To increase the length of the probe cable, the instrument must be returned to E+E Elektronik.

10.4.7 Switching Off

The low flow cut-off is intended to prevent the display or output signal fluctuating if the flow is cut off.

Small differences in temperature in the duct can produce small flow fluctuations, which would be recorded by the sensor without the low flow cut-off.



	Description
Switching point OFF and Hysteresis	(Switching point OFF + hysteresis = switching point ON) can be defined in the input fields of the “Switching Off” tab. 

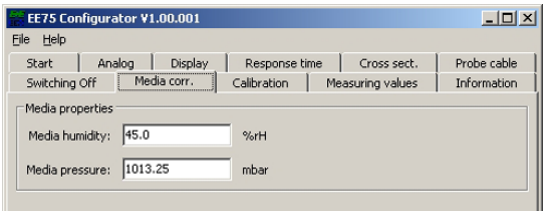
PLEASE NOTE

- The EE75 comes with the low flow cut-off function activated, with a switching point OFF of 0.1 m/s (20 ft/min) and a hysteresis of 0.05 m/s (10 ft/min).
- Should you require smaller flow velocities to be displayed, deactivate the low flow cut-off (switching point OFF + hysteresis = 0 m/s or ft/min.).

10.4.8 Media Correction

The EE75 measures air velocity [m/s] temperature-independent, but pressure-dependent and is standardised to 45 % relative humidity and air pressure of 1 013 mbar at the factory.

If e.g. the media pressure is significantly different, the actual values can be defined in the input field on the “Mediacorr.” tab to obtain the best possible measuring results.



10.4.9 Calibration

Velocity and temperature calibration is not only possible using the buttons on the integrated display, the EE75 can also easily be calibrated / adjusted using the configuration software.

PLEASE NOTE

The configuration software automatically distinguishes between the low and high calibration points.

- If the selected calibration point is BELOW the centre of the measuring range, it is automatically recognised as the “low calibration point” (CAL LOW).
- If the selected calibration point is ABOVE the centre of the measuring range, it is automatically recognised as the “high calibration point” (CAL HIGH).

Example

EE75 T3***HV23: Measuring range = 0...2 m/s (0...400 ft/min) -> centre of measuring range = 1 m/s (200 ft/min)

- 0.5 m/s (100 ft/min) -> calibration point lies below 1 m/s (200 ft/min) -> CAL LOW
- 1.6 m/s (300 ft/min) -> calibration point lies above 1 m/s (200 ft/min) -> CAL HIGH

1. Information on 1-point v/T Calibration

If possible the selected calibration point should be similair to the working point (of the limited working range) of the sensor.

Example

Working range v 8...12 m/s (1 600...2 400 ft/min) > calibration point at 10 m/s (2 000 ft/min);
working range T 18...22 °C (64.4...71.6 °F) > calibration point at 20 °C (68 °F).

2. Information on 2-point v/T Calibration

v/T calibration / adjustment is performed at 2 different calibration points. To ensure the smallest possible deviation in measuring results over the entire measuring range, the two calibration points should be selected as follows:

- The low calibration point should be in the lower third of the measuring range.
- The high calibration point should be in the upper third of the measuring range.

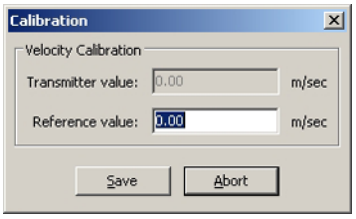
Example

EE75 T3***HV23 - measuring range = 0...2 m/s (0...400 ft/min)

- Low calibration point (V-CAL LOW) should be around 0.4 m/s (0...0.7).
- High calibration point (V-CAL HIGH) should be around 1.8 m/s (1.4...2).

3. v Calibration Procedure Using the Configuration Software

1. Position the sensor head in the middle of the reference system (wind tunnel).
2. Set the required calibration point in the reference system (wind tunnel).
3. Stabilise the probe at the reference velocity (for at least 1 minute).
4. Clicking on the “Velocity calibration” button opens the menu window shown below.
5. Enter the velocity displayed by the reference system in the “Reference value” input field.



6. Clicking “Save” adjusts the EE75 measuring value with the reference value.
7. In the case of 1-point calibration, the process is now complete.
8. For 2-point calibration, repeat steps 2-7.

4. T Calibration Procedure Using the Configuration Software

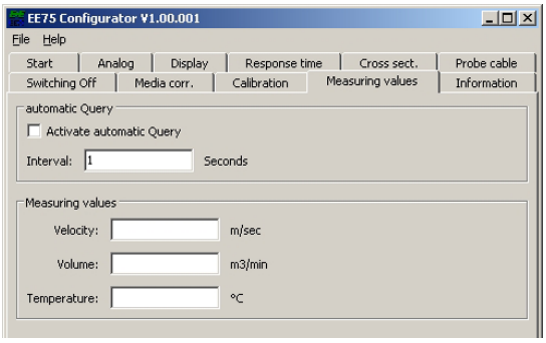
Click on the “Temperature calibration” button. The 1 or 2-point temperature calibration procedure is similar to the velocity calibration (refer to chapter 10.4.9 Calibration - 3. v Calibration Procedure Using the Configuration Software).

5. Activating Factory Calibration

Clicking the “Activate factory calibration” button deletes the customer calibration data set for velocity and temperature and restores the factory settings.

10.4.10 Measuring Values

The configuration software allows the EE75 measuring values to be queried periodically on the “Measuring Values” index card.



If the “Activate automatic Query” function is activated, all measuring values are downloaded according to the specified interval and displayed in the desingated fields. This function is particularly useful for checking sensors, which do not have the (optional) display module.

10.4.11 Information

The “Information” tab contains general information on the sensor. It also saves the date of the last customer calibration done with the configuration software.

Sensor information	Description
Model	Type of sensor.
Serial number	Reference to the serial number of the connected sensor.
Software version	Version of the firmware used.
Production date	Date of production.
Last customer V adjustment	Date of last velocity adjustment.
Last customer T adjustment	Date of last temperature adjustment.

11 Conformity

11.1 Declarations of Conformity

E+E Elektronik Ges.m.b.H. hereby declares that the product complies with the respective regulations listed below:

CE European directives and standards.

and

UK CA UK statutory instruments and designated standards.

Please refer to the product page at www.epluse.com/ee75 for the Declarations of Conformity.

11.2 Electromagnetic Compatibility

EMC for industrial environment.
The sensor is a group 1 device and corresponds and correspond to class B.

11.3 FCC Part 15 Compliance Statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the installation manual, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

11.4 ICES-003 Compliance Statement

This Class B digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.

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