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User Manual EE600

Differential Pressure Sensor



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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.

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PLEASE NOTE

Find this document and further product information on our website at www.epluse.com/ee600.

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 very 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 EE600 enclosure and electronics shall not be exposed to unnecessary mechanical stress.
- Use the EE600 only as intended and observe all technical specifications.
- Installation, electrical connection, maintenance and commissioning shall be performed by qualified staff only.
- Do not blow into the pressure connections.
- The device may be permanently damaged if a pressure is connected to the EE600 that is outside the measuring range according to the product specification.
- Do not apply the supply voltage to the output terminals.

1.2.2 Intended Use

The EE600 is dedicated to high accuracy differential pressure measurement. The multi-range device is suitable for air and all non-flammable and non-aggressive gases. The sensor can be used between -20 °C and +60 °C (-4 °F and +140 °F) and max. 95 %RH (non-condensing).

Please observe the mounting and installation instructions in chapter 4 Mounting and Installation. Check the measuring range for the appropriate use and be aware of the maximum overload limit.

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 EE600 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 EE600 may only be operated under the conditions described in this user manual and within the specification included in chapter 7 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 EE600 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.

i 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 must be thoroughly checked by authorised 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

i 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.

2 Scope of Supply

- EE600 Differential Pressure Sensor
- Quick Guide
- Test report according to DIN EN 10204-2.2
- Mounting material
- For the digital version (ordering code J3): M16x1.5 cable gland for daisy chain wiring

3 Product Description

3.1 General

The measurement performance of the EE600 sensor covers bidirectional measuring ranges of $\pm 1\,000$ Pa and $\pm 10\,000$ Pa for the analogue versions (2-wire and 3-wire). The digital versions have unidirectional measuring ranges from 1 000 Pa (4 inch WC) up to 10 000 Pa (40 inch WC).

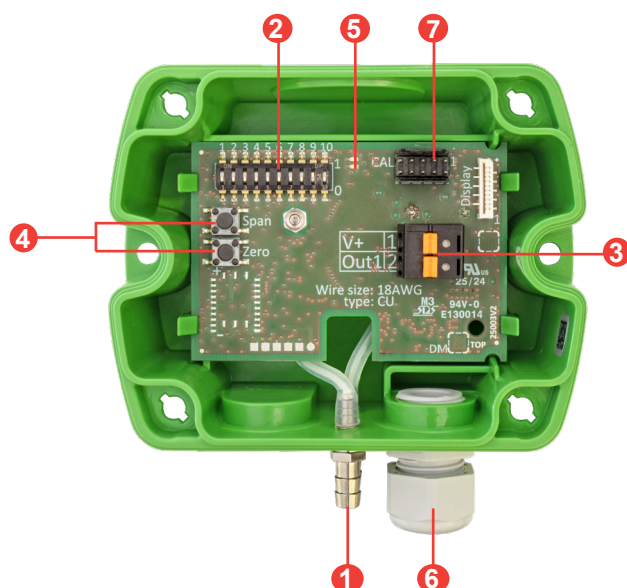
The pressure sensing element is piezoresistive and non-flow-through, and makes the sensor a long-term stable device.

The measured data is available on the analogue voltage and current output or on the RS485 interface with Modbus RTU protocol.

The setup can be performed with DIP switches on the electronics board (EE600 with analogue output) or with an optional adapter and the free PCS10 Product Configuration Software. The setup includes measuring range, output signal, response time, displayed units and backlight. The auto-zero interval can be set with the PCS10. The EE600 can be set up for volume flow or air velocity measurement, as well as for filter monitoring or level indication. A zero point and span point adjustment can be performed with push buttons on the electronics board.

3.1.1 Analogue Version

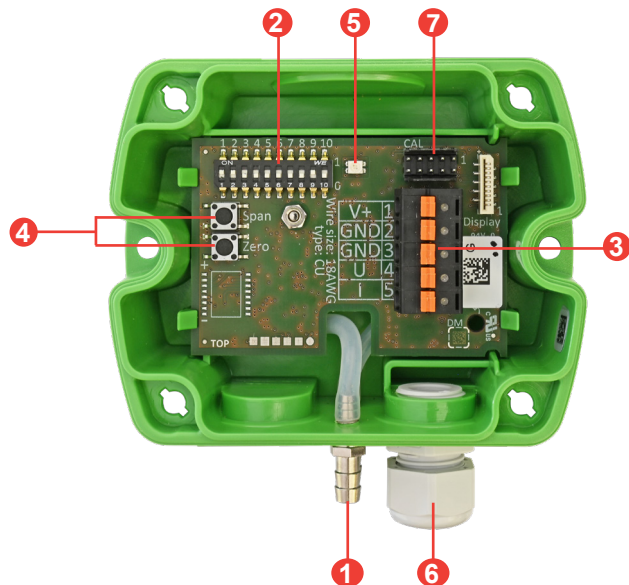
Output (A6)



No.	Function
①	Pressure connection nipples
②	DIP switches for configuration (Measuring ranges, response time, ...)
③	Spring-loaded terminals
④	Push buttons for zero point and span point adjustment
⑤	Status LED
⑥	Cable gland for wiring
⑦	Service interface connector

Tab. 1 Design and components of the EE600 sensor with analogue output A6

Output (A7)

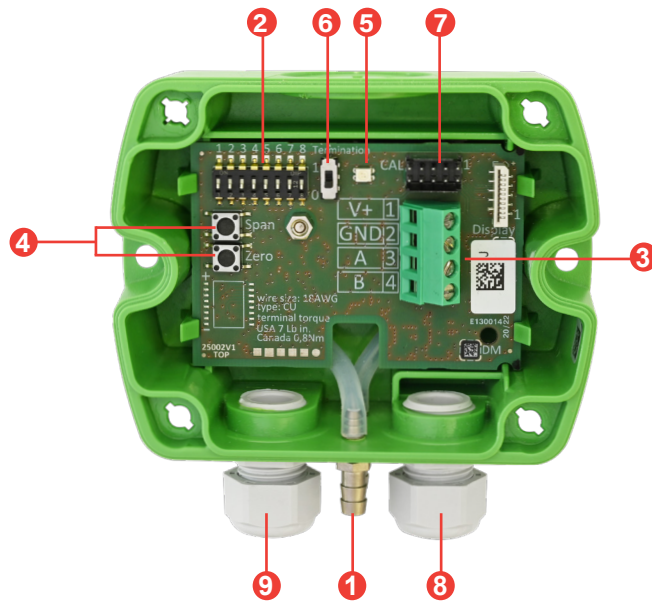


No.	Function
1	Pressure connection nipples
2	DIP switches for configuration (Measuring ranges, response time, ...)
3	Spring-loaded terminals
4	Push buttons for zero point and span point adjustment
5	Status LED
6	Cable gland for wiring
7	Service interface connector

Tab. 2 Design and components of the EE600 sensor with analogue output A7

3.1.2 Digital Version

Output (J3)

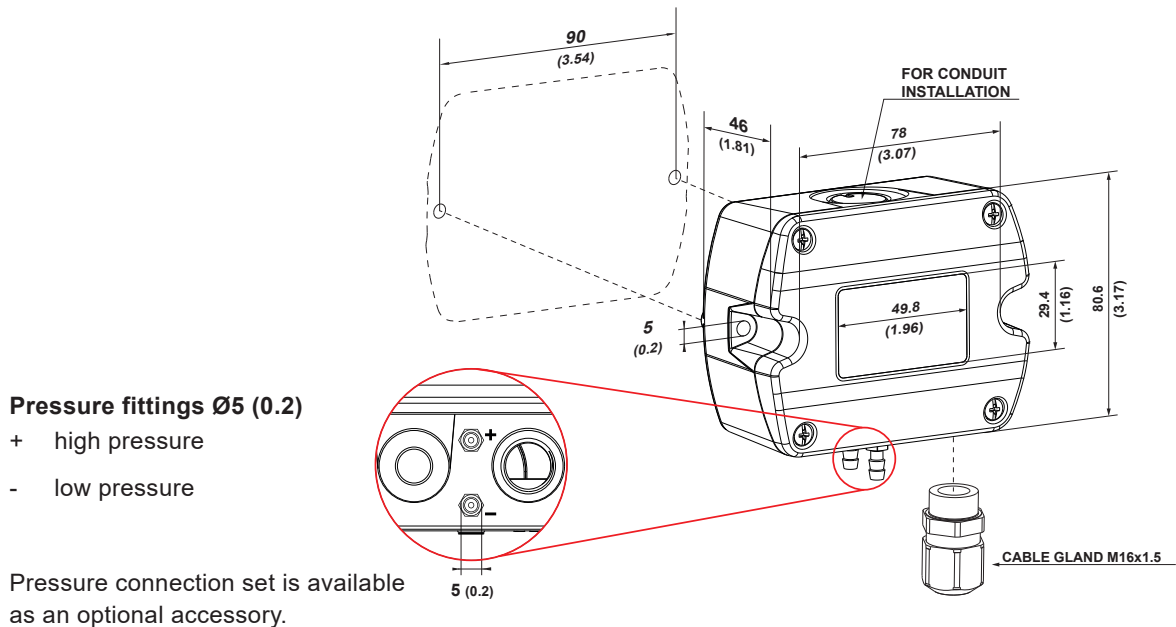


No.	Function
①	Pressure connection nipples
②	DIP switches for RS485 addressing
③	Screw terminals
④	Push buttons for zero point and span point adjustment
⑤	Status LED
⑥	Slide switch termination resistor
⑦	Service interface connector
⑧	Cable gland for wiring
⑨	Cable gland for daisy chain wiring

Tab. 3 Design and components of the EE600 sensor with digital interface

3.2 Dimensions

Values in mm (inch)



3.3 Electrical Connection

⚠ WARNING

Incorrect installation, wiring or power supply may cause overheating and result in personal injury or property damage.

Cables must not be under voltage during electrical installation and connection or disconnection, especially at terminal connections on circuit boards. For correct cabling, always observe the presented wiring diagram for the product version used.

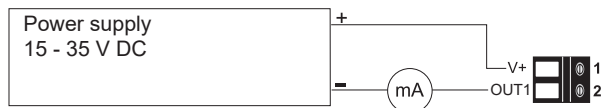
The manufacturer cannot be held responsible for personal injury or damage to property caused by incorrect handling, installation, wiring, power supply or maintenance of the device.

The EE600 features screw terminals for connecting the power supply and the outputs. The cables are fed into the enclosure through the M16 cable gland.

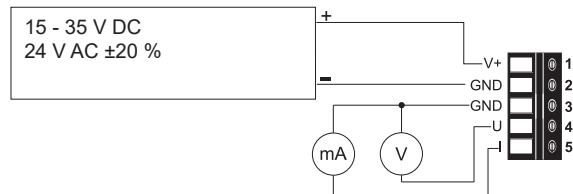
NOTICE

It is important to ensure that the cable glands are closed tightly for the power supply and outputs cable. This is necessary to assure the IP rating of the enclosure according to EE600 specification, as well as for stress relief at the screw terminals on the EE600 board.

Analogue Version (A6)



Analogue Version (A7)



Digital Version (J3)

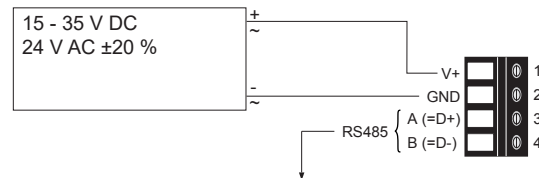


Fig. 1 Connection Diagram

3.4 User Interface

3.4.1 LED Indication

Green LED	Description
Flashing (1 s interval)	The EE600 operates normally, the measured data is within the selected measuring range
One flash (2 s)	Confirms adjustment or return to the factory settings
Off	No power supply or electronics failure
Fast flashing (0.2 s interval)	Auto-zero is executed, first time 10 s after start / reset

Red LED	Description
Flashing (1 s interval)	The measured data is out of the selected range (overload or reversed pressure connection)
One flash (2 s)	Indicates the failure of the attempt to adjust zero point or span point, or to return to factory adjustment

3.4.2 Display

The optional display shows the measured value(s) together with a linear gauge or in two lines and has a configurable backlight. It also indicates when the measured value is out of range.

In the factory setting, the display shows the measured differential pressure in Pascal [Pa]. Refer to chapter 5.4 Display Settings and Output Signals for changing the display settings.



Fig. 2 Examples for display indications

In case of differential pressure out of the measuring range or negative pressure due to inverse pressure connection the display indicates:

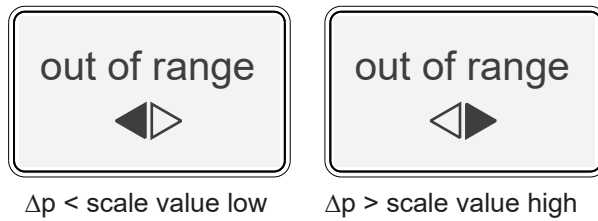


Fig. 3 Out of range indications

4 Mounting and Installation

4.1 General

Use a matching wrench to fit the cable gland (in the scope of supply) onto the EE600 enclosure.

When using the EE600 with conduit connection, use a flat screwdriver to carefully knock open the blind at the top of the enclosure. Be careful not to damage the electronics inside the enclosure. The conduit adapter is not included in the scope of supply. The M16x1.5 cable gland opening shall be tightly closed using the blind plug supplied (refer to chapter 3.2 Dimensions).

For best measurement results, please note the following:

- Mount the EE600 onto a vertical, smooth surface.
- The pressure connection nipples must point downwards.
- Avoid installation close to heaters and sources of strong electromagnetic interference.
- Insert the cable for supply voltage and output signal through the cable gland and connect it to the spring-loaded or screw terminals according to the wiring diagram (Fig. 1 Connection Diagram).
- Ensure that the connecting cable or wires do not interfere with the push buttons in order to prevent unintentional trigger of the span or zero point adjustment.
- Tightly close the cable gland. This is essential for the compliance with the IP65 / NEMA 4X protection rating of the EE600 enclosure.

4.2 Sensor Positioning and Pressure Connection

To ensure a valid measurement, the sensor and hose position must be selected correctly.

1. Mount the sensor in the correct position. Pay attention to the alignment (refer to Fig. 4 Mounting orientation).

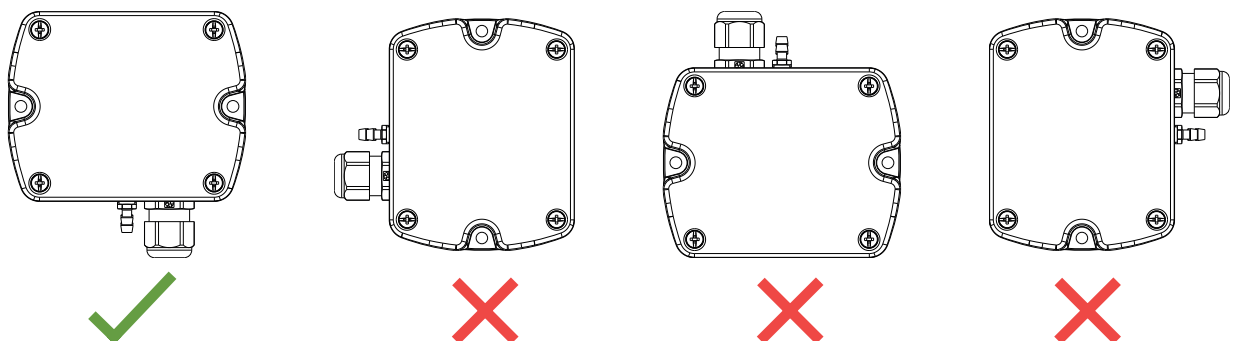


Fig. 4 Mounting orientation

- To connect the hoses to a duct, use the pressure connection nipples (available as an optional accessory). Use a $\varnothing 7.5$ mm (0.30") drill bit for the holes according to the dimensions in Fig. 5.

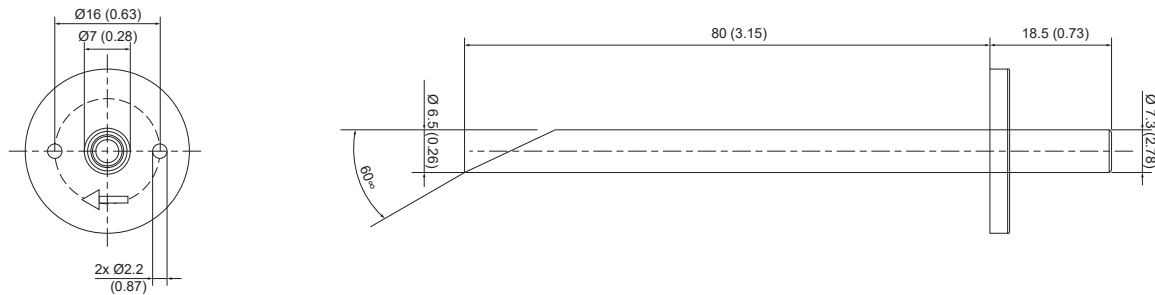


Fig. 5 Dimensions of pressure connection nipples

- Connect the pressure hose (available as an optional accessory) first to the EE600 and then to the duct. Route the pressure hose to avoid sharp bends which might lead to hose obstructions (Fig. 6 and Fig. 7).

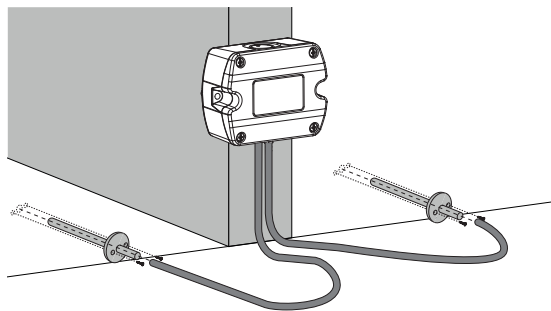


Fig. 6 Pressure connection

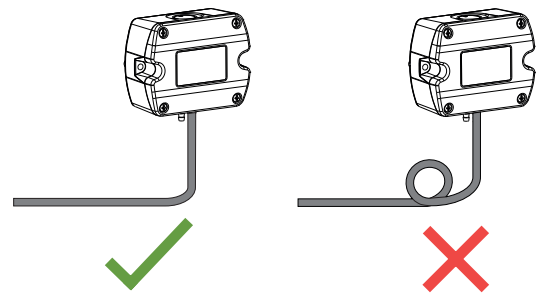


Fig. 7 Pressure hose route

Depending on the application, the following connections are possible:

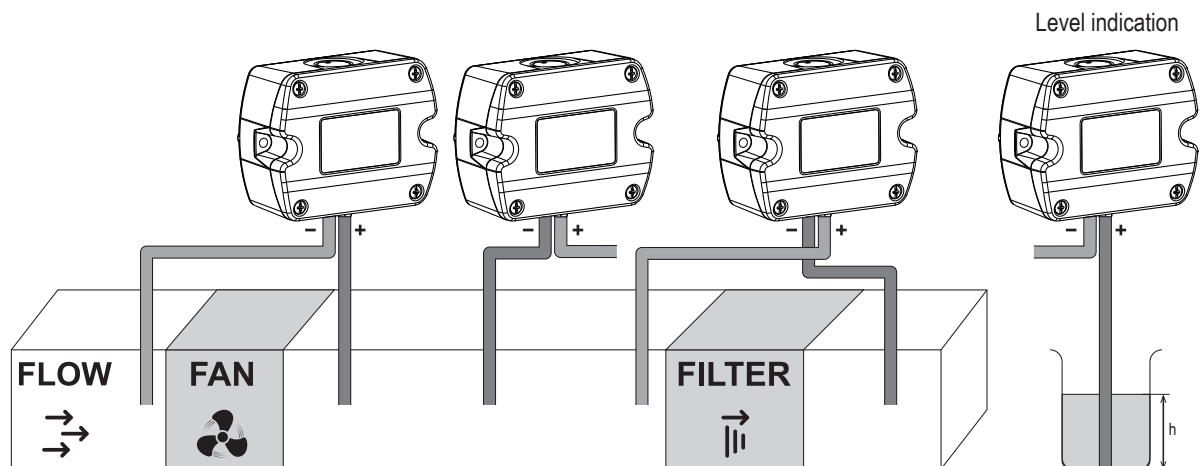


Fig. 8 Mounting examples

i PLEASE NOTE

Make sure to connect the higher pressure at the “+” pressure connector and the lower pressure at the “-” pressure connector. Inverted connection leads to “out of range” information on the optional display and at the analogue outputs of unidirectional sensors, refer to chapter 5.2.8 Outputs and 3.4.2 Display.

5 Setup and Configuration

The EE600 is ready to use and does not require any further configuration. The factory setup of the EE600 corresponds to the specified order code. Please refer to the datasheet at www.epluse.com/ee600. If needed, the factory setup can be changed with the on-board DIP switches (analogue versions) or the PCS10 Product Configuration Software and the USB-C configuration stick (HA011070), please refer to the chapters below.

5.1 Analogue Version 2-Wire

Each EE600 sensor is delivered with the following factory settings (all switches on "0"):

Factory settings

Measuring range	100 % of the full scale ($\pm 1\,000$ Pa or $\pm 10\,000$ Pa)
Response time	50 ms
Displayed unit	Pa
Output signals	4 - 20 mA
Source of settings	DIP switch settings (if available)

The analogue version is intended to be configured using the on-board DIP switches. Any changes to the factory setup can also be done using the PCS10.

Settings that can be changed via PCS10:

- Application settings (refer to chapter 5.6.3 Application Settings)
- Display visualisation (refer to chapter 5.4.2 Analogue Version with PCS10 Settings or Digital Version)
- Measurands and their measuring range
- Auto-zero on/off and interval (refer to chapter 6.1.4 Auto-zero (Optional))
- Response time

i INFO

The EE600 is fully configurable. Before commissioning, set the individual configuration of the EE600 according to the application requirements using the DIP switches S1 to S10 as described below. The function of the DIP switches is also indicated inside the EE600 front cover.

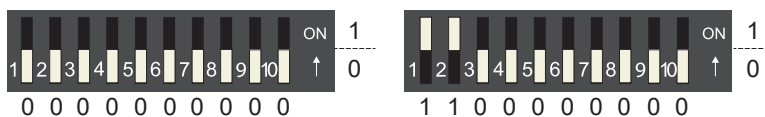


Fig. 9 DIP switch examples

i PLEASE NOTE

If settings were changed via PCS10 and DIP switch settings shall apply again, be sure to restore the factory settings before applying the DIP switches.

- Outputs scale: $\pm 1\,000$ / $\pm 10\,000$ Pa
- Analogue bar limits: $\pm 1\,000$ / $\pm 10\,000$ Pa
- Number of lines: 1
- Unit: Pa

5.1.1 Select the Measuring Range with S1 and S2

EE600-HV54A6

S1	S2	Pa	mbar	inch WC	kPa
0	0	1 000	10	4	1
1	0	750	7.5	3	0.75
0	1	500	5	2	0.5
1	1	250	2.5	1	0.25

EE600-HV55A6

S1	S2	Pa	mbar	inch WC	kPa
0	0	10 000	100	40	10
1	0	7 500	75	30	7.5
0	1	5 000	50	20	5
1	1	2 500	25	10	2.5

Tab. 4 DIP switch settings - Measuring range

5.1.2 Select the Response Time with S3 and S4

S3	S4	Response Time
0	0	50 ms
1	0	500 ms
0	1	2 s
1	1	4 s

Tab. 5 DIP switch settings - Response time

5.1.3 Select the Displayed Unit with S5 and S6

S5	S6	Displayed unit
0	0	Pa
1	0	mbar
0	1	inch WC
1	1	kPa

Tab. 6 DIP switch settings - Displayed unit

5.1.4 S7

No function is assigned to the S7 DIP switch.

5.1.5 Select Auto-Zero On/Off with S8

S8	Auto-Zero
0	On
1	Off

Tab. 7 DIP switch settings - Auto-Zero

5.1.6 Select the Source of Settings with S9

(Versions with 10 DIP-Switches on the Electronics Board)

S9	Source of settings
0	DIP switches
1	PCS10

Tab. 8 DIP switch settings - Source for the settings

5.1.7 Select the Measuring Direction with S10

S10	Measuring Direction
0	Bidirectional (\pm)
1	Unidirectional (up to the full scale value)

Tab. 9 DIP switch settings - Measuring Direction

i PLEASE NOTE

Example of measuring ranges:

S1 = 0, S2 = 0, S9 = 0, S10 = 0 $\pm 1\,000$ Pa or $\pm 10\,000$ Pa or customised measuring range.
 S1 = 1, S2 = 0, S9 = 0, S10 = 1 0...750 Pa or 0...7 500 Pa

5.1.8 Outputs

The measured data is available at the 4 - 20 mA spring terminals.

Additionally, the analogue outputs indicate out-of-range measurements as follows and can be set via the PCS10.

Indication of $\Delta p > 5\%$ of the measuring range below the lower limit:

Output signal	Indication of value below lower limit
4 - 20 mA	3.2 mA

Tab. 10 Indication of $\Delta p <$ scale value low, -5 % of span

Indication of $\Delta p > 105\%$ of the measuring range:

Output signal	Indication of overload
4 - 20 mA	20.8 mA

Tab. 11 Indication of $\Delta p >$ scale value high, +5 % of span

5.2 Analogue Version 3-Wire

Each EE600 sensor is delivered with the following factory settings (all switches on "0"):

Factory settings

Measuring range	100 % of the full scale (1 000 Pa or 10 000 Pa)
Response time	50 ms
Displayed unit	Pa
Display backlight	On
Output signals	0 - 10 V and 4 - 20 mA
Source of settings	DIP switch settings (if available)

The analogue version is intended to be configured with the on-board DIP switches. All changes to the factory setup can also be done using the PCS10.

i PLEASE NOTE

EE600 sensor versions with 8 DIP switches are not supported by the PCS10 Product Configuration Software.

Settings that can be changed via PCS10:

- Application settings (refer to chapter 5.6.3 Application Settings)
- Display visualisation (refer to chapter 5.4.2 Analogue Version with PCS10 Settings or Digital Version)
- Measurands and their measuring range
- Auto-zero on/off and interval (refer to chapter 6.1.4 Auto-zero (Optional))
- Response time

i INFO

The EE600 is fully configurable. Before commissioning, set the individual configuration of the EE600 according to the application requirements using the DIP switches S1 to S9 as described below. The function of the DIP switches is also indicated on the inside of the EE600 front cover.



Fig. 10 DIP switch examples

i PLEASE NOTE

If the settings have been changed via PCS10 and the DIP switch settings are to apply again, restore the factory settings before applying the DIP switches.

- Outputs scale: 0...1 000/10 000 Pa
- Analogue linear gauge: -10...1 000/10 000 Pa
- Number of lines: 1
- Unit: Pa

5.2.1 Select the Measuring Range with S1 and S2

EE600-HV52A7, -HV54A7

S1	S2	Pa	mbar	inch WC	kPa
0	0	1 000	10	4	1
1	0	750	7.5	3	0.75
0	1	500	5	2	0.5
1	1	250	2.5	1	0.25

EE600-HV53A7, -HV55A7

S1	S2	Pa	mbar	inch WC	kPa
0	0	10 000	100	40	10
1	0	7 500	75	30	7.5
0	1	5 000	50	20	5
1	1	2 500	25	10	2.5

Tab. 12 DIP switch settings - Measuring range

5.2.2 Select the Response Time with S3 and S4

S3	S4	Response Time
0	0	50 ms
1	0	500 ms
0	1	2 s
1	1	4 s

Tab. 13 DIP switch settings - Response time

5.2.3 Select the Displayed Unit with S5 and S6

S5	S6	Displayed unit
0	0	Pa
1	0	mbar
0	1	inch WC
1	1	kPa

Tab. 14 DIP switch settings - Displayed unit

5.2.4 Select the Display Backlight with S7

S7	Backlight
0	on
1	off

Tab. 15 DIP switch settings - Backlight

5.2.5 Select the Output Signal with S8

S8	Output signal
0	0 - 10 V and 4 - 20 mA
1	0 - 5 V and 0 - 20 mA

Tab. 16 DIP switch settings - Output signals

5.2.6 Select the Source of Settings with S9

(Refer to the label on the inside of the cover for the functions)

S9	Source of settings
0	DIP switches
1	PCS10

Tab. 17 Source for the settings

5.2.7 Select the Measuring Direction with S10

(Refer to the label on the inside of the cover for the functions)

S10	Measuring Direction
0	Bidirectional (\pm)
1	Unidirectional (up to the full scale value)

Tab. 18 DIP switch settings - Measuring Direction

i PLEASE NOTE

Example of measuring ranges:

S1 = 0, S2 = 0, S9 = 0, S10 = 0 $\pm 1\,000$ Pa or $\pm 10\,000$ Pa or customised measuring range.
 S1 = 1, S2 = 0, S9 = 0, S10 = 1 0...750 Pa or 0...7 500 Pa

5.2.8 Outputs

The measured data is available at the spring terminals as 0 - 10 V and 4 - 20 mA or as 0 - 5 V and 0 - 20 mA signals (refer to chapter 5.2.5 Select the Output Signal with S8). The EE600 provides a voltage and a current output signal at the spring terminals simultaneously.

A serious error is indicated by the analogue output jumping to the “Error indication” value set in the PCS10.

i PLEASE NOTE

The factory default values for error indication are 10.5 V and 21 mA, respectively. The NAMUR indication is active ex works and can be changed via PCS10.

On a device equipped with a display, a serious error will also be indicated according to the error codes in Tab. 28 Displayed errors in chapter 6.2.

5.3 Digital Version

The RS485 digital interface version is intended to be configured with PCS10 Product Configuration Software and the USB-C configuration stick (HA011070). The device address can be overruled by setting the DIP switches. The factory setup of the EE600 corresponds to the specified order code.

Settings that can be changed with the PCS10

- Digital communication parameters
- Application settings (refer to chapter 5.6.3 Application Settings)
- Display visualisation (refer to chapter 5.4.2 Analogue Version with PCS10 Settings or Digital Version)
- Auto-zero on/off and interval (refer to chapter 6.1.4 Auto-zero (Optional))
- Response time

Hardware Bus Termination

For bus termination the EE600 features an internal 120 Ω resistor which can be activated using the slide switch on the electronics board (refer to Tab. 3 Design and components of the EE600 sensor with digital interface).

Device Address

Address Switch	Option
	<p>Address setting via PCS10 Product Configuration Software (= factory setting)</p> <p>All DIP switches at position 0 → factory-set default address (43_{DEC}, 0x28) applicable, can be changed via software (PCS10 or Modbus protocol, permitted values: 1...247).</p> <p>Example: Address is set via configuration software.</p>
	<p>Address setting via DIP switches</p> <p>DIP switches in any other position than 0 indicate the effective Modbus address which overrules the factory setting and any Modbus address set via PCS10 or Modbus command (permitted values: 1...247).</p> <p>Example: Address set to 11_{DEC} (0000 1011_{BIN}).</p>

5.3.1 Modbus RTU Protocol Settings

	Factory settings	Selectable values (via PCS10)
Baud rate	As ordered via order code	9 600, 19 200, 38 400, 57 600, 76 800, 115 200
Data bits	8	8
Parity	Even	None, odd, even
Stop bits	1	1, 2
Modbus address	43	1...247

Tab. 19 Modbus RTU protocol settings

i PLEASE NOTE

- The recommended settings for multiple devices in a Modbus RTU network are 9600, 8, even, 1.
- The EE600 represents 1/2 unit load on an RS485 network.

Device address, baud rate, parity and stop bits can be set via:

- PCS10 Product Configuration Software and the USB-C configuration stick HA011070.
The PCS10 can be downloaded free of charge from www.epluse.com/pcs10.
- Modbus protocol in the register 1 (0x00) and 2 (0x01).
Refer to Application Note Modbus AN0103 (available at www.epluse.com/ee600).

The measured values are saved as a 32 bit floating point value and as 16 bit signed integer, refer to chapter 5.3.2 Modbus Register Map.

The serial number as ASCII-code is located in read-only registers 1 - 8 (0x00 - 0x07).

The firmware version is located in read-only register 9 (0x08) (bit 15...8 = major release; bit 7...0 = minor release).

The sensor name as ASCII-code is located in read-only registers 10 - 17 (0x09 - 0x11).

NOTICE

When reading information that spans multiple registers, it is always necessary to read all registers, even if the desired information requires less.

NOTICE

To obtain the correct floating point values, both registers have to be read within the same read cycle. The measured value may change between two Modbus requests. This can cause inconsistencies in the exponent and mantissa.

i INFO

The Modbus function codes mentioned throughout this document shall be used as described in chapter 6 of the [MODBUS APPLICATION PROTOCOL SPECIFICATION V1.1b3](#), available at the Modbus Organisation's Technical Resources site <https://www.modbus.org/modbus-specifications>.

Communication settings (INT16)

Parameter	Register number ¹⁾ [Dec]	Register address ²⁾ [Hex]	Size ³⁾
Write register: function code 0x06			
Modbus address ⁴⁾	1	00	1
Modbus protocol settings ⁴⁾	2	01	1
Initiate manual zeroing	508	1FB	1

Device information (INT16)

Parameter	Register number ¹⁾ [Dec]	Register address ²⁾ [Hex]	Size ³⁾
Read register: function code 0x03 / 0x04			
Serial number (as ASCII)	1	00	8
Firmware version	9	08	1
Sensor name (as ASCII)	10	09	8
Device status (bit decoded) ⁵⁾	602	259	1

1) Register number (decimal) starts from 1.

2) Register address (hexadecimal) starts from 0.

3) Number of registers

4) For Modbus address and protocol settings see Application Note Modbus AN0103 (available at www.epluse.com/ee600).

5) Refer to chapter 5.3.4 Device Status Indication.

Tab. 20 EE600 registers for device setup

5.3.2 Modbus Register Map

The measurement data is saved as 32 bit floating point values (data type FLOAT32) and as 16 bit signed integer values (data type INT16).

FLOAT32

Parameter	Unit	Register number ¹⁾ [DEC]	Register address ²⁾ [HEX]
Read register: function code 0x03 / 0x04			
Differential pressure	mm H ₂ O	1211	4BA
Differential pressure	mbar	1213	4BC
Differential pressure	Pa	1215	4BE
Differential pressure	kPa	1217	4C0
Differential pressure	inch WC	1219	4C2
Air velocity	m/s	1041	410
Air velocity	ft/min	1043	412
Volume flow	m ³ /h	1055	41E
Volume flow	l/s	1057	420
Volume flow	m ³ /s	1059	422
Volume flow	ft ³ /min	1181	49C
Filter monitoring	%	1075	432
Level indicator	cm	1077	434
Level indicator	inch	1079	436

INT16

Parameter	Unit	Scale ³⁾	Register number ¹⁾ [DEC]	Register address ²⁾ [HEX]
Read register: function code 0x03 / 0x04				
Differential pressure	mm H ₂ O	10	4106	1009
Differential pressure	mbar	100	4107	100A
Differential pressure	Pa	1	4108	100B
Differential pressure	kPa	1000	4109	100C
Differential pressure	inch WC	100	4110	100D
Air velocity	m/s	100	4021	FB4
Air velocity	ft/min	1	4022	FB5
Volume flow	m ³ /h	1	4028	FBB
Volume flow	l/s	1	4029	FBC
Volume flow	m ³ /s	1000	4030	FBD
Volume flow	ft ³ /min	1	4091	FFA
Filter monitoring	%	10	4038	FC5
Level indicator	cm	10	4039	FC6
Level indicator	inch	10	4040	FC7

1) Register number (decimal) starts from 1.

2) Register address (hexadecimal) starts from 0.

3) Examples: For scale 100, the reading of 2550 means a value of 25.5. For scale 50, the reading of 2550 means a value of 51.

Tab. 21 EE600 FLOAT32 and INT16 measured data registers

5.3.3 Configurable Custom Modbus Map

It is possible to map measured value/status registers arbitrarily in a block with up to 20 registers provided for this purpose. This means that registers of interest may be mapped in an area with consecutive registers, so that important values can be queried with a single command in one block.

The custom map can be configured via:

- PCS10 Product Configuration Software and the USB-C configuration stick HA011070.
The PCS10 can be downloaded free of charge from www.epluse.com/pcs10.
- Modbus protocol commands, refer to the example in chapter 5.3.5 Modbus RTU Example.

The register block for the configuration of the customisable Modbus map consists of the registers 6001 (0x1770) to 6010 (0x1779). For the blockwise query of the measured values behind Modbus registers 3001 (0xBB8) to 3020 (0xBCB), the firmware accesses this configuration area and thus gets the information which measured value/status registers are to be output. A maximum of 10 user-defined registers can be mapped. The table below shows an example:

Registers with these assigned measurands map to registers mirrored from source registers	
Dec	Hex	Meas.	Unit	Type	Dec	Hex	Dec	Hex
<i>Function code 0x10</i>					<i>Function code 0x03/0x04</i>			
6001	1770	Δp	Pa	INT16	3001	BB8	4108	100B
6002	1771	V'	m ³ /h	FLOAT32	3002	BB9	1055	41E
				FLOAT32	3003	BBA	1056	41F
6003	1772	v	m/s	FLOAT32	3004	BBB	1041	410
				FLOAT32	3005	BBC	1042	411

- 1) Register number starts from 1.
- 2) Protocol address starts from 0.

Tab. 22 Custom Modbus map example

5.3.4 Device Status Indication

If a critical error occurs, all Modbus values are set to NaN (according to IEEE754 for data type FLOAT32) or to 0x8000 (INT16). It is possible to read out all status and error information via Modbus register 609 (0x260). Errors are displayed in bit-coded form. If an event is present, the corresponding bit is set to 1.

Measured values outside the measuring range are limited with the corresponding limit value.

Error Bits	Description	Recommended action
Bit 0	Error: Sensor not adjusted	Carry out zero point adjustment
		Return to factory adjustment
		Return the unit to the E+E Customer Service
Bit 1	Error: Pressure measurement faulty	Check the installation and clean the device
		Carry out the zero point adjustment
		Return the unit to the E+E Customer Service
Bit 2	Error: Faulty display communication	Check the display connection
Bit 3	Error: Auto-zero did not work	Carry out zero point adjustment
		Return the unit to the E+E Customer Service

Tab. 23 Device status indication

5.3.5 Modbus RTU Example

The EE600's Modbus address is 43 [0x2B].

Please refer to

- Chapter 6 of the [MODBUS APPLICATION PROTOCOL SPECIFICATION V1.1b3](#), available at the Modbus Organisation's Technical Resources site <https://www.modbus.org/modbus-specifications>
- E+E Application Note Modbus AN0103 (available at www.epluse.com/ee600)

Read the differential pressure (FLOAT32) $\Delta p = 497,965972$ Pa from the register address 0x4BE:

Master (e.g. PLC)

EE600

Request [Hex]:									
Modbus address	Function code	Starting address Hi	Starting address Lo	Qty. of registers Hi	Qty. of registers Lo	CRC			
2B	04	04	BE	00	02	17	15		

Response [Hex]:									
Modbus address	Function code	Byte count	Register 1 value Hi	Register 1 value Lo	Register 2 value Hi	Register 2 value Lo	CRC		
2B	04	04	FB	A5	43	F8	61	F3	

Tab. 24 Example of a differential pressure query

NOTICE

To obtain the correct floating point values, both registers have to be read within the same read cycle. The measured value may change between two Modbus requests. This can cause inconsistencies in the exponent and mantissa.

Decoding of floating point values:

Floating point values are stored according to IEEE754. The byte pairs 1, 2 and 3, 4 are transformed as follows (numbers taken from Δp reading Modbus request/response example above):

Modbus response [Hex]			
Byte 3	Byte 4	Byte 1	Byte 2
FB	A5	43	F8
MMMMMMMM	MMMMMMMM	SEEEEEEE	EMMMMMMM

Tab. 25 Modbus response

IEEE754			
Byte 1	Byte 2	Byte 3	Byte 4
43	F8	FB	A5
0100 0011	1111 1000	1111 1011	1010 0101
SEEE EEEE	EMMM MMMM	MMMM MMMM	MMMM MMMM
Decimal value: 497.965972			

Tab. 26 Data representation according to IEEE754

5.4 Display Settings and Output Signals

5.4.1 Analogue Version with DIP Switch Settings

Refer to chapter 5.1 Analogue Version 2-Wire and chapter 5.2 Analogue Version 3-Wire for the configuration options.

5.4.2 Analogue Version with PCS10 Settings or Digital Version

The factory setting of the display (if present) shows the measured differential pressure in Pascal [Pa]. All measurands can also be selected as output signal. With the PCS10 Product Configuration Software and the optional USB-C configuration stick HA011070, the display layout, the visualised parameter according to the selected application and the output signal can be changed:

Measurands	Units	Possible display visualisations
Differential pressure measurement	Pa, kPa, mbar, mm H ₂ O, inch WC	<ul style="list-style-type: none"> One line with linear gauge. One line without linear gauge.
Volume flow measurement	Pa, kPa, mbar, mm H ₂ O, inch WC m ³ /h, m ³ /s, ft ³ /min, l/s	<ul style="list-style-type: none"> One line with linear gauge. One line without linear gauge. Two lines without linear gauge.
Air velocity measurement	Pa, kPa, mbar, mm H ₂ O, inch WC m/s, ft/min	<ul style="list-style-type: none"> One line with linear gauge. One line without linear gauge. Two lines without linear gauge.
Filter monitoring	Pa, kPa, mbar, mm H ₂ O, inch WC %	<ul style="list-style-type: none"> One line with linear gauge. One line without linear gauge. Two lines without linear gauge.
Level indicator	Pa, kPa, mbar, mm H ₂ O, inch WC cm, inch	<ul style="list-style-type: none"> One line with linear gauge. One line without linear gauge. Two lines without linear gauge.

Examples of Display Visualisation

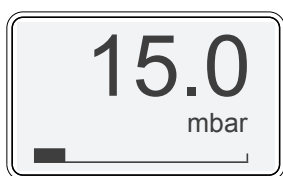


Fig. 11 One line with linear gauge

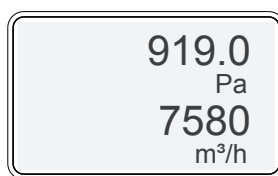


Fig. 12 Two lines without linear gauge.

i PLEASE NOTE

If the settings have been changed via PCS10 and the DIP switch settings are to apply again, restore the factory settings before applying the DIP switches.

- Outputs scale: 0...1 000/10 000 Pa or ±1 000/ ±10 000 Pa
- Analogue linear gauge limits: -10...1 000/10 000 Pa or -1 000...+1 000/-10 000...+10 000 Pa
- Number of lines: 1
- Unit: Pa

5.4.3 Customised Output Scaling

If the customised output scaling (SAL/SAH) was ordered ex works, the DIP switches S1/S2/S9/S10 may no longer be changed. In case of applied changes to the DIP switches the preset measuring ranges can no longer be ensured when resetting to S1/S2/S10 = 0.

Any changes will invalidate the measuring ranges indicated on the label.

i PLEASE NOTE

If the settings have been changed via PCS10 or the DIP switches, restore the non-customised factory settings via PCS10 to the following:

- Outputs scale: ±1 000/±10 000 Pa
- Analogue linear gauge limits: ±1 000/±10 000 Pa
- Number of lines: 1
- Unit: Pa

5.5 PCS10 Product Configuration Software

i PLEASE NOTE

EE600 versions with 10 DIP switches and digital versions of the EE600 are supported by the PCS10 Product Configuration Software.

The EE600 is ready to use and does not require any configuration by the user. The factory setup of the EE600 corresponds to the specified order code. Please refer to the datasheet at www.epluse.com/ee600. If needed, the user can change the factory setup with the help of the free PCS10 Product Configuration Software and the USB-C configuration stick (HA011070).

5.6 Product Configuration

5.6.1 EE600 Configuration using HA011070

For all types (analogue, digital)

NOTICE

The USB-C configuration stick HA011070 galvanically isolates the USB interface of the PC from the supply voltage of the EE600. When using the USB-C configuration stick the EE600 needs external supply.

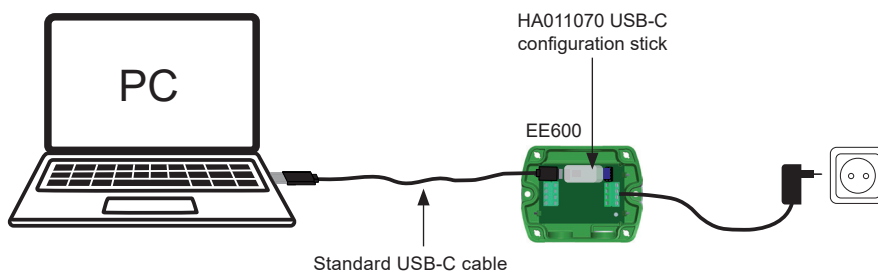


Fig. 13 EE600 configuration using the HA011070 USB-C configuration stick

5.6.2 EE600 Configuration using legacy USB configuration adapter HA011066

(Not intended for new designs)

EE600-HV54A6 or EE600-HV55A6 type (2-wire)

NOTICE

The EE600 must be directly supplied on the electronics board (do not use the power supply from the adapter) when using the configuration adapter HA011066.

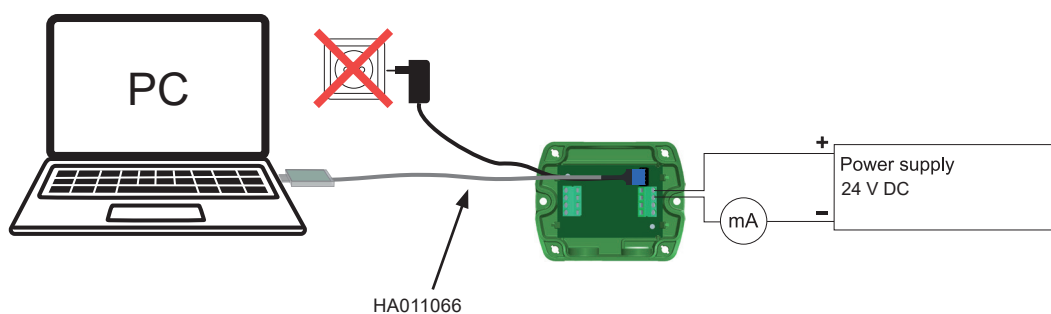


Fig. 14 EE600 - HV54A6 or EE600-HV55A6 connected to a PC running PCS10

EE600-HV52A7/J3 or EE600-HV53A7/J3 type (3-wire)

NOTICE

The EE600 must not be connected to any additional power supply when using the USB configuration adapter HA011066.

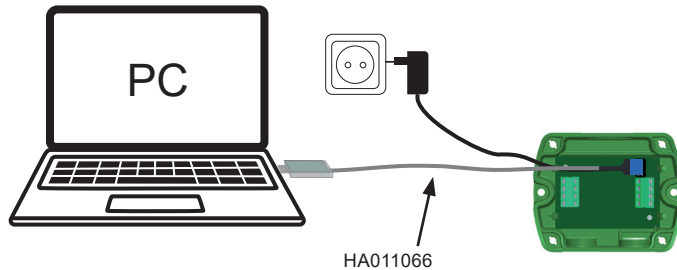


Fig. 15 EE600 - HV52A7/J3 or HV53A7/J3 connected to a PC running PCS10

To use the software for changes in settings, please proceed as follows:

1. Download the PCS10 Product Configuration Software from www.epluse.com/pcs10 and install it on a PC.
2. Connect the EE600 to the PC using the Modbus configuration adapter.
3. Start the PCS10 software.
4. Follow the instructions on the PCS10 opening page to scan the ports and to identify the connected device.
5. Click on the desired setup or adjustment mode from the main PCS10 menu on the left. Follow the PCS10 online instructions that are displayed when clicking on the “Tutorial” button.
6. Upload changes to the sensor by pressing the “Sync” button.

5.6.3 Application Settings

This chapter provides some details on the possible applications and their inputs.

In addition to differential pressure measurement (Pa, kPa, mbar, mm H₂O, inch WC), the EE600 can be set up for the following applications:

- Volume flow rate measurement (k-factor input)
- Air velocity measurement (k-factor input)
- Filter monitoring
- Level indication

Volume flow measurement

By entering a k-factor in the application settings, the EE600 is able to calculate the volume flow (q) according to the following formula:

$$q = k * \sqrt{\Delta p}$$

Formula sign	Description	Unit
q	Volume flow	m ³ /h
k	k-factor	-
Δp	Differential pressure	Pa

The k-factor is a characteristic theoretical parameter for each fan model, specified by the manufacturer in the datasheet of the fan.

i PLEASE NOTE

If the fan manufacturer’s datasheet specifies a different method or unit for calculating the volume flow, the k-factor must be converted accordingly so that it fits into the formula above.

The calculated volume flow (q) is available in four different units: m³/h, m³/s, ft³/min, l/s

The default air density (ρ₂₀) value at standard conditions is defined as follows:

Air density (ρ₂₀) = 1.204 kg/m³ @ T = 20 °C (68 °F) and p = 1 013 mbar (14.7 psi)

If the air density deviates from standard conditions, a compensation for the calculated volume flow is necessary.

By entering the specific air density (ρ') [kg/m³] at the operating point, the EE600 applies a compensation to the calculated volume flow (q') according to the formula:

$$q' = k * \sqrt{\Delta p} * \sqrt{\frac{\rho_{20}}{\rho'}}$$

Formula sign	Description	Unit
q'	Volume flow	m ³ /h
k	k-factor	
Δp	Differential pressure	Pa
ρ ₂₀	Air density at 20 °C (68 °F)	kg/m ³
ρ'	Specific air density	kg/m ³

Air velocity measurement

By entering a k-factor and the dimensions of the duct (round or square), the EE600 is able to calculate the air velocity (v) out of the volume flow (q) and the area of the duct.

$$v = \frac{q / 3600}{A}$$

Formula sign	Description	Unit
v	Air velocity	m/s
q	Volume flow	m ³ /h
A	Area (cross section)	m ²

Details for k-factor refer to application settings for volume flow measurement.

The calculated air velocity (v) is available in two different units: m/s and ft/min.

Details for setting air density (when deviating from default air density at standard conditions) refer to application settings for volume flow measurement.

Filter monitoring

By entering filter limit values for the differential pressure, the EE600 is able to calculate a level of contamination for the monitored filter in order to plan maintenance activities.

$$\text{Contamination level [\%]} = \frac{\text{measured } \Delta p - \Delta p \text{ new filter}}{\Delta p \text{ change filter} - \Delta p \text{ new filter}}$$

For example:

With the application settings of Δp change filter = 800 Pa and Δp new filter = 100 Pa, a measured differential pressure at the filter of Δp = 450 Pa would mean a level of contamination of 50 %

Level indicator

By entering the density of a fluid the EE600 can act as a level indicator. The differential pressure level measurement uses the pressure values and the specific weight of the fluid to represent the level in a tank (refer to Fig. 8 Mounting examples).

$$h = \frac{\Delta p}{\rho * g} * 100$$

Formula sign	Description	Unit
h	level	cm
Δp	Differential pressure	Pa
ρ	Density of fluid	kg/m ³
g	Gravitation acceleration, 9.81	m/s ²

By applying the positive pressure connection into the tank, the user can measure the height of the fluid column. The level measurement is available in two different units: cm and inch. The maximum measurable level is limited by the highest differential pressure range 0...10 000 Pa. For water with a density of 998 kg/m³, for example, the maximum height at 10 000 Pa is 102 cm (40 inch).

6 Maintenance and Service

The EE600 does not require any special maintenance, nevertheless it is recommended to perform a zero point adjustment every 12 month. If needed, the enclosure may be cleaned and the device may be re-adjusted as described below.

6.1 Re-adjustment of the EE600

A periodical re-adjustment of EE600 might be required by the regulations of certain industries or by the need of best long-term measurement accuracy. The zero point and the span point can be adjusted with push buttons on the EE600 electronics board.

For adjustment the device must be powered and the enclosure cover removed. Consequently, the adjustment may be performed by authorised staff only, observing the handling of electrical sensitive devices (ESD).

6.1.1 Zero Point Adjustment

The zero point adjustment is used to correct an eventual zero point deviation.

1. Remove the tubes from both pressure connections of the EE600. This ensures that the pressure is the same at both connections. If the sensor has an auto-zero setting, the tubes do not need to be removed.
2. Press the "zero point" button for 1-2 seconds (refer to chapter 3 Product Description).
3. Successful zero point adjustment is confirmed by the green LED lighting up for 2 seconds.
4. If the red LED lights up for 2 seconds, this indicates that the zero point adjustment was not successful. In this case, please repeat step 2.

i PLEASE NOTE

The zero point adjustment (step 2) for the unidirectional setting may not be successful because the deviation is more than 5 % of the original full scale value of the device. This is 50 Pa for the 0...1 000 Pa range, 500 Pa for the 0...10 000 Pa range, ± 100 Pa for the $\pm 1 000$ Pa range and $\pm 1 000$ Pa for the $\pm 10 000$ Pa range. If the zero point adjustment is not successful even after pressing the button for at least 10 seconds, the deviation is too high for zeroing. Please check the sensor, the tubes and the environment and make sure that the pressure connection nipples are free.

i PLEASE NOTE

With the 2-wire version, manual zero point calibration is only possible every 90 minutes if an auto-zero valve is present, as a capacitor with the switching energy for the auto-zero valve takes a correspondingly long time to charge. Failure of the calibration due to insufficient charging time is also signalled by the red LED lighting up for 2 seconds, as mentioned above.

6.1.2 Span Point Adjustment

The span point adjustment is used to correct and eventual deviation of the span value.

1. Connect the differential pressure reference device / calibrator to the EE600 nipple properly and set it according to the EE600 span value to be adjusted.

i PLEASE NOTE

The span value has to be set according to the selected measuring range. In case of a bidirectional measuring range, only the positive upper limit is to be adjusted. The according lower limit is the same value but with a negative sign (e.g., +10 000 Pa → -10 000 Pa). Therefore, it is important to carry out a zero point adjustment prior to a span point adjustment.

Example:

Analogue version: (refer to chapter 5.2, Tab. 12, Tab. 18)

EE600-HV55A7, S1 = 0, S2 = 1, S10=1, span point = 5 000 Pa

(refer to chapter 5.1, Tab. 4 and Tab. 9)

EE600-HV54A6, S1 = 0, S2 = 1, S10 = 1, span point = 500 Pa

EE600-HV55A6, S1 = 0, S2 = 1, S10 = 1, span point = 5 000 Pa

Digital version: EE600-HV52J3, max. span point = 1 000 Pa

EE600-HV53J3, max. span point = 10 000 Pa

i PLEASE NOTE

Observe the User Manual of the reference device.

2. Press the span point adjustment button (refer to chapter 3 Product Description).
3. Successful span point adjustment is confirmed by the green LED lighting up for 2 seconds.
4. If the red LED lights up for 2 seconds, this indicates that the span point adjustment was not successful. In this case, repeat step 2.

i PLEASE NOTE

The span point adjustment (step 2) for the unidirectional setting may not be successful because the deviation is more than 5 % of the original full scale value of the device.

This is 50 Pa for the 0...1 000 Pa range, 500 Pa for the 0...10 000 Pa range, 100 Pa for the ±1 000 Pa range and 1 000 Pa for the ±10 000 Pa range. In this case, the span point adjustment can be forced by pressing and holding the span point button for 10 seconds. If the span point adjustment is not successful even after pressing the key for at least 10 seconds, then the deviation is too high for setting the span point. Please check the sensor, the span point settings, the hoses and the environment and make sure that the pressure connection nipples are free.

5. Successful span point adjustment is confirmed by the green LED lighting up for 2 seconds.

6.1.3 Return to Factory Adjustment

1. Press and hold simultaneously both “zero” and “span” buttons for 5 seconds.
2. The successful return to the factory setting is confirmed by the green LED lighting up for 2 seconds.
3. If the red LED lights up for 2 seconds, this indicates that the factory reset was not successful. In this case, repeat step 2.

i PLEASE NOTE

Return to factory adjustment affects both zero and span.

6.1.4 Auto-zero (Optional)

With auto-zero, no maintenance of the sensor is required. Auto-zero is carried out every 24 hours (factory setting). The interval can be changed using PCS10 and the USB configuration adapter (refer to chapter 5.5 PCS10 Product Configuration Software). For this purpose DIP switch 9 (refer to chapter 5.2.6 Select the Source of Settings with S9) has to be in position 1 (ON).

The Auto-zero interval can be set in these ranges according to the models:

EE600 Version	Auto-zero interval
Analogue 2-wire (A6)	From 90 minutes to 7 days
Analogue 3-wire (A7)	From 10 minutes to 7 days
Digital (J3)	From 10 minutes to 7 days

Tab. 27 Time periods of the auto-zero interval

During the auto-zero procedure (takes approx. 4 s), the green LED flashes quickly (see chapter 3.4.1 LED Indication) and the output signal value is frozen.

i PLEASE NOTE

If the auto-zero interval was changed via PCS10 and DIP switch settings are applied again, the auto-zero interval value will be adopted.

6.2 Error Messages

Following error messages can be read on the display.

Code	Description	Recommended action
13	Sensor not adjusted	Carry out zero point adjustment
		Return to factory adjustment
		Return the unit to the E+E Customer Service
14	Pressure measurement faulty	Check the installation and clean the device
		Carry out the zero point adjustment
		Return the unit to the E+E Customer Service
18	Auto-zero did not work	Carry out zero point adjustment
		Return the unit to the E+E Customer Service
21	Faulty display communication	Check the display connection

Tab. 28 Displayed errors

6.3 Cleaning

Use a damp soft cloth to remove deposits of dust or dirt from the exterior of the device and from the display. Do not attempt to clean the interior of the device. Do not use any solvents, alcohol or abrasive cleaning agents.

6.4 Repairs

i PLEASE NOTE

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

7 Accessories

For further information please refer to the [Accessories](#) datasheet.

Description	Code
Pressure connection set, 2 m (6.6 ft) PVC hose with two ABS pressure connection nipples	HA011304
USB-C configuration stick	HA011070
E+E Product Configuration Software (Free download: www.epluse.com/pcs10)	PCS10

8 Technical Data

Measurands

Differential Pressure (Δp)

Measurement principle	Piezoresistive, no flow-through	
Measuring range	Analogue output RS485	$\pm 1\,000$ Pa (± 4 inch WC) $\pm 10\,000$ Pa (± 40 inch WC) 0...1 000 Pa (0...4 inch WC) 0...10 000 Pa (0...40 inch WC)
Analogue scaling	Analogue output ¹⁾ with PCS10	$\pm 250 / \pm 500 / \pm 750 / \pm 1\,000$ Pa field selectable with DIP switches $\pm 2\,500 / \pm 5\,000 / \pm 7\,500 / \pm 10\,000$ Pa .field selectable with DIP switches 0...250 / 500 / 750 / 1 000 Pa field selectable with DIP switches 0...2 500 / 5 000 / 7 500 / 10 000 Pa field selectable with DIP switches Configurable within max. measuring range
Accuracy @ 20 °C (68 °F), incl. hysteresis, non-linearity and repeatability	± 0.5 % fs fs = full scale (1 000 Pa or 10 000 Pa)	
Temperature dependency, typ.	<0.03 % from fs/K	
Response time t_{90}	Analogue output ¹⁾ Digital interface ²⁾	50 ms / 500 ms / 2 s / 4 s field selectable with DIP switches Configurable from 0.05 to 30 s with PCS10 Configurable from 0.5 to 30 s with PCS10
Auto-zero interval	Factory setting 4 - 20 mA (2-wire) output Voltage and current output / RS485	24 h Configurable from 90 min to 7 days with PCS10. Can be disabled. Configurable from 10 min to 7 days with PCS10. Can be disabled.
Long-term stability	<0.5 % fs/year fs = full scale (1 000 Pa or 10 000 Pa)	
Overload limits	1 000 Pa fs 10 000 Pa fs	$\pm 10\,000$ Pa $\pm 80\,000$ Pa

1) Factory setup A6: measuring range ± 100 % fs; response time t_{90} : 50 ms; displayed unit: Pa; other ranges selectable via order code.
Factory setup A7: measuring range ± 100 % fs; response time t_{90} : 50 ms; displayed unit: Pa; display backlight: on; other ranges selectable via order code.

2) Factory setup RS485: response time t_{90} : 500 ms; displayed unit: Pa; display backlight: on.

Calculated measurands

		unit
Level indicator	LI	cm
		inch
Volume flow	V'	m ³ /h
		l/s
		m ³ /s
		ft ³ /min
Air velocity	v	m/s
		ft/min
Filter contamination level		%

Outputs**Analogue**




4 - 20 mA (2-wire) output	$R_L \leq 500 \Omega$	$R_L = \text{load resistance}$
Voltage and current output¹⁾	0 - 5 V or 0 - 10 V	-1 mA < I_L < 1 mA
	and 0 - 20 mA or 4 - 20 mA (3-wire)	$R_L \leq 500 \Omega$
		$I_L = \text{load current}$ $R_L = \text{load resistance}$

1) Voltage and current output signals available simultaneously at the spring loaded terminals (factory setup: 0 - 10 V / 4 - 20 mA). Settings selectable with DIP switches.

Digital

Digital interface	RS485 (EE600 = 1/2 unit load)
Protocol Factory settings Supported Baud rates Data types for measured values	Modbus RTU Baud rate according to ordering guide, parity even, 1 stop bit, Modbus address 43 9 600, 19 200 and 38 400 FLOAT32 and INT16
Protocol Factory settings Supported Baud rates	BACnet MS/TP Baud rate according to ordering guide, BACnet address 43 9 600, 19 200, 38 400, 57 600, and 76 800

General

Power supply class III  USA & Canada: Class 2 supply necessary, max. voltage 30 V DC 4 - 20 mA (2-wire) output Voltage and current output / RS485		15 - 35 V DC 15 - 35 V DC or 24 V AC $\pm 20\%$	
Current consumption, typ. @ 0 Pa (0 psi) / 24 V DC		Analogue output	Digital interface
	Without display	23 mA	8 mA
	Display with backlight	49 mA	29 mA
	Display without backlight and 4 - 20 mA (2-wire)	According to output current, max. 20 mA	
Electrical connection	Analogue output Digital interface	Spring-loaded terminals, max. 1.5 mm ² (AWG16) Screw terminals, max. 2.5 mm ² (AWG14)	
Cable gland	M16x1.5		
Display	Graphic, with backlight		
Selectable units on display with analogue output via DIP switch analogue output and digital interface via PCS10	Pa, kPa, mbar, kPa Pa, kPa, mbar, kPa, inch WC, m ³ /h, m ³ /s, ft ³ /min, l/s m/s, ft/min, %		
Humidity range	0...95 %RH, non-condensing		
Temperature range	Operation Storage	-20...+60 °C (-4...+140 °F) / -20...+50 °C (-4...+122 °F) with display -40...+70 °C (-40...+158 °F) / -20...+60 °C (-4...+140 °F) with display	
Enclosure	Material Protection rating	Polycarbonate, UL94 V-0 (with display UL94 HB) approved IP65 / NEMA 4X	
Electromagnetic compatibility	EN 61326-1 Industrial environment FCC Part15 Class A ICES-003 Class A		
Shock and vibration	Tested according to EN 60068-2-64 and EN 60068-2-27		
Conformity	 		

Configurability

All devices, analogue and digital, with or without auto-zero, can be configured via DIP switch or via PCS10. Configuration options see above.

9 Conformity

9.1 Declarations of Conformity

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



European directives and standards.

and



UK statutory instruments and designated standards.

Please refer to the product page at www.epluse.com/ee600 for the Declarations of Conformity.

9.2 Electromagnetic Compatibility

EMC for industrial environment.

The sensor is a group 1 device and corresponds to class A.

WARNING

This device is not intended for use in residential areas and cannot ensure adequate protection of radio reception in such environments.

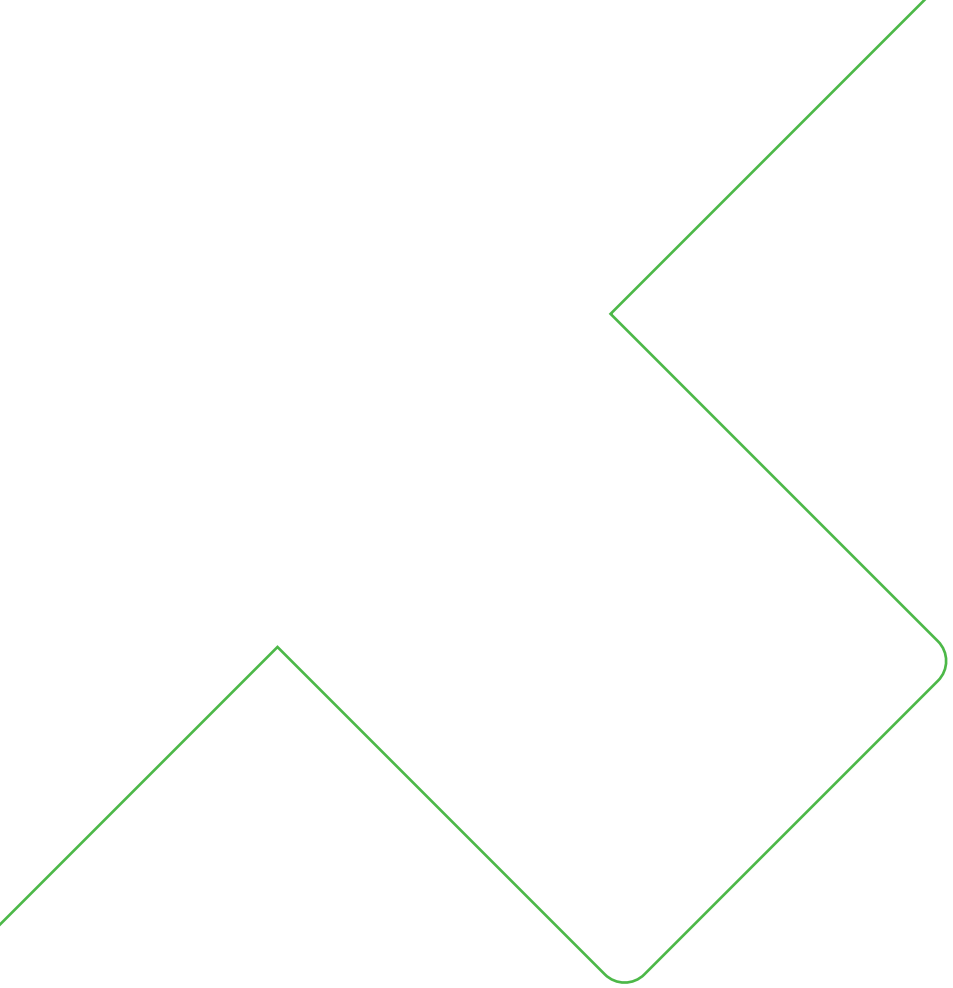
9.3 FCC Part 15 Compliance Statement

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

9.4 ICES-003 Compliance Statement

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

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



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