FST GmbH
Filtrations-Separations-Technik

# Manual
# Dew point transmitter
# SP-ESH420

Version: 01/2011/EN

# 1. General Information

## 1.1 Manufacturer


FST GmbH

Head office: Weiherdamm 17 – 57250 Netphen, Germany

Sales office: Im Teelbruch 106 – 45219 Essen, Germany

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🖷 +49 (0) 2054 8735-100

✉ info@fstweb.de

***! For any questions about the product, please contact the sales office !***

In case of questions about the product, please specify the type and the manufacturing number. This information can be found on the type plate at the transmitter.

## 1.2 Warranty notes

For warranty information, please refer to our "General Terms of Sale and Delivery“.
(→ www.fstweb.de )

In the following cases the warranty shall be void:

- If the safety notes and instructions of this manual are not observed.
- If the transmitter is operated or maintained by personnel who do not have the required qualifications. (→ see „Target group“: page **Fehler! Textmarke nicht definiert.**)
- If the transmitter is used for anything other than its intended use. (→ Page **Fehler! Textmarke nicht definiert.**)
- If aggressive substances in the compressed air or ambient air cause damage to the transmitter.
- If the transmitter is operated although defects are evident.

## 1.3 About this operating manual

This operating manual contains all the technical information required for installation, operation, maintenance and disposal of the transmitter.

### Target group

This operating manual is directed to all persons working on and with the dryer. We point out that these persons have to be qualified personnel who, because auf their qualification and experience, are familiar with handling compressed air systems and electrical systems. If you are not experienced in using these systems, please ask the relevant experts for help.

### Using the operating manual

Please read the operating manual and the additional documents carefully prior to installation and follow the notes and instructions. Safe and proper operation of the transmitter can only be guaranteed if the instructions and notes are observed. The safety notes must be observed in particular.

The manufacturer accepts no liability for damages resulting from disregard of the operating manual.

All the information in this operating manual is valid at the time the manual is published.

### Signs and symbols used

- Boxes are used for bulleted lists.

→ Cross references refer to information on a different page or in a different document

**Note !**
This symbol refers to matters that should be given special attention.
Observing the notes helps to ensure safe handling of the product

**Tips and hints!**
This symbol refers to matters that should be given special attention.
Observing these advisory notes helps to ensure particular efficient operation of the product.

**CAUTION !**
This symbol indicates a possible harmful situation.
When not avoiding this situation, there is a danger of injury or damage to the product or to adjacent system components.

**DANGER !**
This symbol indicates an immediate impending danger.
Not avoiding this danger results in serious injury or death

# 2. Description of application

The dew point transmitter is a continuous 4-20-mA-Online-Transmitter for the measurement of the humidity content in compressed air or nitrogen. Most important capability characteristics are:

- - Measurement range (calibrated) -100 to +20 °C
- - Operating pressure range up to 450 bar (g)
- - Powered by any DC source from 12 to 28 V
- - Linear output signal from 4 to20 mA in 2-wire or 3-wire operation

## 2.1 Intended use

The dew point transmitter is exclusively designed for measuring of humidity in compressed air or nitrogen!
The humidity will be measured in dewpoint in °C.
A typical installation is for humidity measurement in compressor stations.
The use for other gases needs to be clarified with the manufacturer. Possible special safety guidelines are to be considered, or other transmitters are to be used.

The transmitter is designed to be set up at a site that complies with the following requirements:

- Indoors
- Protected against weather impact
- Frost-free
- Dry
- No vibration via floor or connected piping
- Compressed air must be free from aggressive and corrosive substances
  filtered acc. ISO 8573-1:2010 (1:*:3)
- Free from dangers due to explosive atmospheres inside and outside the dryer.
  (The standard transmitter version does not comply with ATEX.)

The transmitter must only be operated with compressed air within the maximum allowable operating conditions.
The voltage supply must correspond to the specified values.
The maximum allowable operating conditions and the required voltage supply are specified on the type plate of the transmitter or see (→Page **Fehler! Textmarke nicht definiert.**).

Modifications to the transmitter or use of third-party parts may cause unpredictable danger and damage. These measures must only be carried out after previous check and approval of the manufacturer. Only use genuine spare parts of the manufacturer.

Any other use is considered improper and therefore not permissible. The manufacturer accepts no liability caused by improper use.

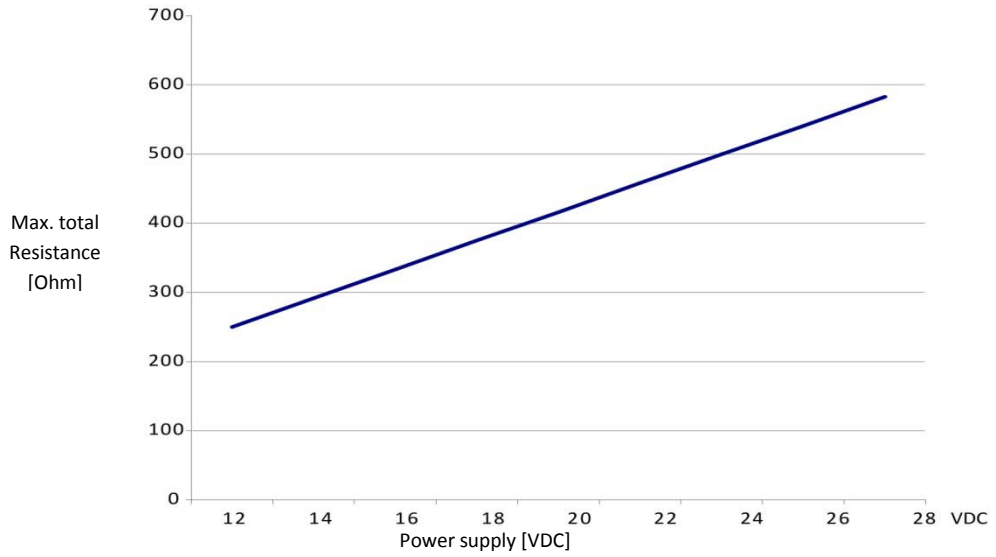
## 2.2 Technical data

| | |
|---|---|
| Type: | Ceramic-Transmitter with stainless steel housing |
| Fastening torque Transmitter: | min. 30,5 Nm |
| Measurement Range: | Calibrated: -100 to +20 °C, Extrapolated from –120 to +30 °C |
| Supply voltage: | 12 - 28 VDC |
| Output signal: | 4-20 mA, over the whole measuring range. |
| Accuracy: | ±2.0 °C, over the whole measuring range |
| Gas temperature: | -40 to + 60°C |
| Ambient temperature: | -20 to +50 °C |
| Storage temperature: | -40 to +75°C |
| Operating pressure: | up to 450 bar (g) |
| Flow rate:<br>Velocity: | 1 to 5 Nl/min mounted in standard sampling block<br>0 to 10 m/sec with direct insertion |
| Traceability of the calibration: | -90 to +82 °C dew point, traceability to NPL (National Physical Laboratory);<br>-75 to +20 °C dew point, traceability to NIST (USA) |
| Protection class: | IP66 in accordance with standard BS EN 60529:1992, and NEMA 4 in protection accordance with standard NEMA 250-2003 |
| Weight: | 0,15 kg |

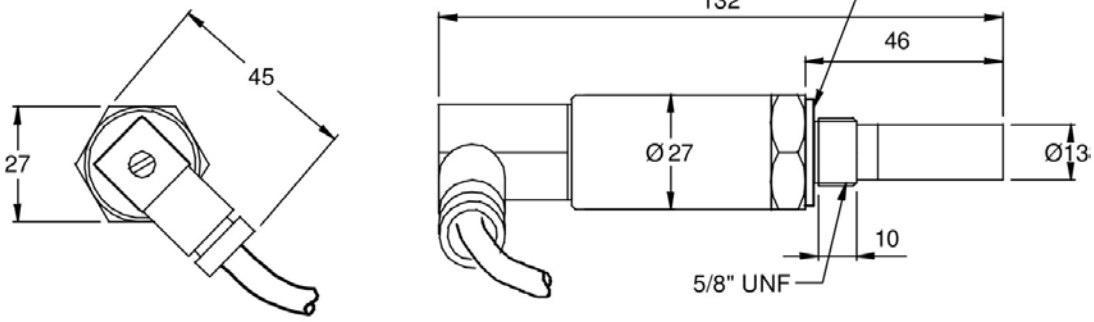
Fault signal:

| Fault | Signal |
|---|---|
| Transmitter- fault | 23 mA |
| Under-range dew point | < 4 mA |
| Over-range dew point | > 20 mA |

Max. Load resistance of transmitter, incl. cable resistance: 250Ω at 12VDC, 500Ω at 24VDC
Recommended cable see (→ page 10)



## 2.3 Dimensions




# 3. Calibration

The dew-point transmitter is fully factory-tested and calibrated prior to delivery by UKAS licensed laboratory Each transmitter is supplied with its own calibration certificate, providing direct traceability of the calibration.. The transmitter is certified at 13 dew point levels across its operating range against a certified reference hygrometer, using a mass-flow humidity generator system as a source of reference calibration gas.
The calibration laboratory is by the accreditation under the UKAS system for dew point measurement in the range -90 to +82 °C recognized (UKAS Accreditation Number 0179).
The system is also traceable directly to the National Institute for Standards & Technology (NIST) USA

As for each high-quality precision measuring instrument a regular new calibration is recommended, in order to guarantee in your application precise measurements in excellent quality also for the dew point transmitter. In most applications, annual re-calibration ensures that the stated accuracy of the dew point transmitter is maintained. For applications contaminated with high emission contents and dust a higher frequent for calibration maybe necessary.
FST offers a “replacement program” for recalibration (→ see page 11).

# 4. Installation

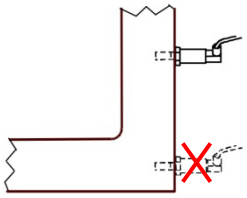
- NOTE: The transmitter is protected while in transit by a blue or red cap covering the transmitter connector and a small desiccant capsule installed inside the plastic protective cap. Neither of these items is required for the operation of the transmitter.

Remove the cap and capsule just straight before installation.

Store the protective packaging of the transmitter, cause may be useful if you need to return a transmitter to us, or by using our Replacement program (see page 11).

- The preferred method to mount the transmitter is into a stainless steel or aluminium transmitter block with 5/8 UNF-thread connection (FST-Art.-no. PP-ESH08-ESH420-WPI).
  The flow rate should be 1-5 l/min.
  Other connection could be directly into the pipe line with a suitable thread connection of 5/8 UNF
  However for direct insertion applications, gas flow can be from static to 10 m/sec.

  **Note: for direct pipeline connection**
  Be Sure the Sample is representative of the gas under test: The sample point should be as close to the critical measurement point as possible. Also, never sample from the bottom of a pipe as entrained liquids may be drawn into the sensing element.
  CAUTION: Do not mount the transmitter too close to the bottom of a bend where any condensate in the pipeline might collect and saturate the probe.



  Minimise dead space in sample lines:
  Dead space causes moisture entrapment points, increased system response times and measurement errors, as a result of the trapped moisture being released into the passing sample gas and causing an increase in partial vapour pressure.

  Remove any particulate matter or oil from the gas sample: Particulate matter at high velocity can damage the sensing element and similarly, at low velocity, they may “blind” the sensing element and reduce its response speed. If particulate, such as degraded desiccant, pipe scale or rust is present in the sample gas, use an in-line filter.

  Use high quality sample tube and fittings: We recommend that, wherever possible, tubing and fittings should be made from metallic materials. This is particularly important at low dew points since other materials have hygroscopic characteristics and adsorbs moisture on the tube walls, slowing down response and, in extreme circumstances, giving false readings. For temporary applications, or where stainless steel tubing is not practical, use high quality thick walled PTFE tubing.

- **Transmitter mounting**
  Fit the supplied seal washer over the 5/8“ UNF thread of the transmitter body. Fit the transmitter carefully by hand into the probe connection.

**WARNING: Use only the flats of the hexagonal nut and not the transmitter body.**
**WARNING: Under no circumstances should the filter guard be handled with the fingers.** .
When installed, fully tighten using a spanner until the bonded seal is fully compressed and to a minimum torque of 30,5 Nm.

## 4.1 Installing the power supply

**CAUTION ! – Qualification and experience required**
Persons working on and with the dryer have to be qualified personnel who, because of their qualification and experience, are familiar with handling compressed air systems and electrical systems. If you are not experienced in using these systems, please ask the relevant experts for help.

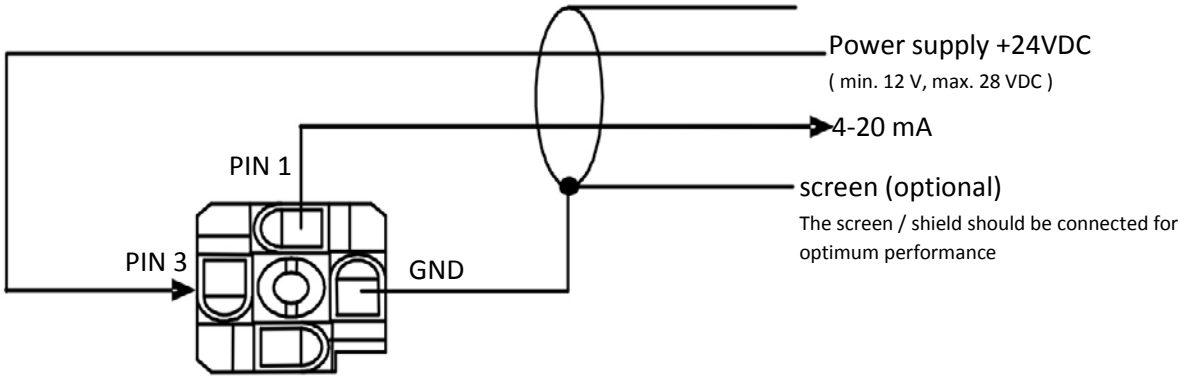
**DANGER ! – Moisture and contamination in electrical components**
Moisture and contamination in electrical components may lead to damages resulting in unpredictable dangers for the operating personnel. As a consequence, short circuits and faulty circuits may occur.
Always keep the control box and the terminal box dry and free from contamination and foreign bodies.

**Qualified electrician required**
Electrical connection of the dryer must only be carried out by a qualified electrician who is familiar with reading electro-technical documentation.

- The power supply is connected via a female power connector on the transmitter.
  Connection to the transmitter is made via the removable connector. Remove the central screw.
  This enables the terminal block to be removed by using a small screwdriver.
  **ATTENTION** When removing the central screw ensure that the small sealing O-ring is retained on the screw and is present during re-installation.
  When re-installing the connector, and to ensure that full ingress protection is achieved, the securing screw must be tightened to a minimum torque setting of 0.34 Nm. The transmitter cable used must be a minimum diameter of 4,6 mm to maintain the ingress protection. The diagram below shows the identity of the terminals.

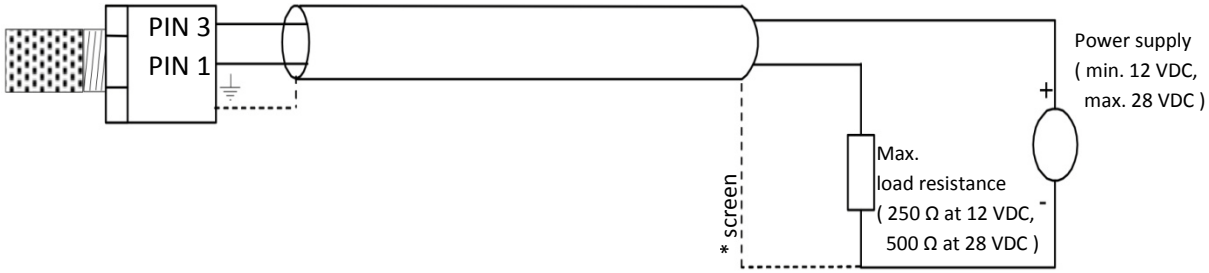
- **Cable:** Copper braid screened cable; 4 core 7 / 0.2 (0.22 mm²), stranded, tinned copper conductors, PVC, insulated, Melinex taped, AØ min. 4.6 mm. Max. length 800 m ( see max total resistance below )

- **Terminals**




When replacing a 3-wire transmitter with a 2-wire transmitter NO changes to the wiring configurations are required.

- **2 wire connection diagram**




* The screen / shield should be connected for optimum performance.

## 5. Maintenance and repair

The dew point transmitter is subject to ageing which leads to inaccurate measurements over time. Oil vapour and other contamination may render the transmitter unusable over time. To prevent operating errors from occurring the dew point transmitter must be calibrated regularly. In most applications, annual re-calibration is recommended.

**DANGER ! – Overpressure**
The transmitter is under pressure.
Suddenly escaping compressed air may result in serious injury.
Do not carry out mechanical or electrical work on the transmitter as long as the transmitter is under pressure

**CAUTION ! – Qualification and experience required**
Persons working on and with the dryer have to be qualified personnel who, because of their qualification and experience, are familiar with handling compressed air systems and electrical systems.
If you are not experienced in using these systems, please ask the relevant experts for help.

**Please observe the following requirements for maintenance:**

- Observe the notes in section "Intended use". (→ Page 6)
- Observe the "Safety notes"
- Maintenance must only be carried out if the transmitter is depressurised and disconnected from the power supply.

**Delicate dew point transmitter**

The dew point transmitter contains a very delicate electronic system. Vibrations and shocks may lead to transmitter damage. Handle the transmitter with particular care.

1) Depressurize the transmitter.
2) Loosen the screw at the transmitter cable socket and remove the cable socket.
3) Unscrew the transmitter from the measuring socket using an appropriate wrench.
   Only hold the transmitter at the hexagon of the transmitter housing!
4) Insert a new calibrated transmitter of the same type in the measuring socket.
5) Plug the cable socket onto the new transmitter and tighten the cable socket.
6) Pressurize the transmitter again
7) Check that the transmitter is proper fixed and tight.
8) Make sure the cable clamps are tightly secured.
9) Check the connecting cable for visible damages.

**Replacement program**

The manufacturer provides a replacement program for old dew point transmitters.

1) Order a new dew point transmitter.
2) Exchange the transmitters upon receipt of the new transmitter.
3) Send the old transmitter back to the manufacturer. For this purpose, use the protective packaging of the new transmitter. Only transmitters that are undamaged can be recalibrated!
4) After receipt of the old, undamaged transmitter the price difference of the new transmitter and calibration will be credited. The old transmitter remains at the manufacturer

**HDPE guard** ( 10 µm )

The HDPE Guard provides protection to the dew-point transmitter. It is designed to show any contamination and the guard should be changed if the white surface becomes discoloured. When replacing the HDPE guard, care should be taken to handle the guard by the black part only.

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## 6. Declaration of conformity

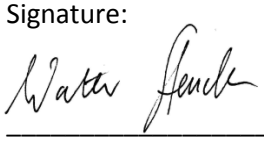
# EC – Declaration of Conformity

Herewith we declare that the below mentioned product in their conception and design in which we placed them on the market have undergone the procedure of conformity assessment acc. below mentioned directive and are in conformity with this directive.

| | |
|---|---|
| **Manufacturer/authorised representative:** | FST GmbH<br>Weiherdamm 17<br>D-57250 Netphen |
| **Description of the product:** | Dew point transmitter<br>Type SP-ESH420 |
| **Conformity assessment procedure followed:** | 2004/108/EG |
| **Harmonised standards applied :** | Electrical Equipment for measurement, control and laboratory use. EMC requirements –<br>Part1 : General requirements |
| **Other Community Directives applied:** | DIN EN 61326-1 : 2006 ( VDE0843-20-1) |

In case changes are made to the product without prior consultation and written approval by the manufacturer this declaration will become void.

Signature:



Walter Steudle,
General manager