

**Condensation-protected on-wall humidity and temperature sensor for "high humidity", relative/absolute humidity, mixture ratio, dew point, wet bulb temperature and temperature, calibratable, with multi-range switching, with active and switching output**

Condensation-protected on-wall sensor **HYGRASREG® AFTF-35** with active and switching output, housing made of impact-resistant plastic with quick-locking screws, cable gland, plastic sinter filter (replaceable), optionally with/without display, for detecting relative humidity (0...100 % RH) and temperature (4 switchable measuring ranges, max. 0...+100 °C) as well as for determining various parameters of humidity measurement technology. The measuring transducer converts the measured variables into a standard signal of 0-10 V or 4...20 mA.

The unit is specially designed for use in the **high humidity range** (95...99 % RH). A long-term stable, **digital humidity and temperature sensor** is used. Overtemperature prevents or hinders dew formation on the humidity sensor. A second, separate temperature measuring element is used to determine the actual relative humidity of the ambient air. The following measured variables are calculated internally from these parameters and are retrievable via output **OUT3**: absolute humidity, mixing ratio, dew point and wet bulb temperature (can be changed via DIP switch).

The sensor is used in medical technology, refrigeration technology, control technology, air conditioning and clean room technology. The sensor is factory-calibrated; an environmental precision adjustment by an expert is possible.

#### TECHNICAL DATA

|                     |   |
|---------------------|---|
| Power supply:       | 24 V AC/DC (± 10 %)   |
| Working resistance: | > 100 kOhm for U variant; 100...500 Ohm for I variant   |
| Power consumption:  | typically < 6 W at 24 V DC, peak current 200 mA   |
| Measured variables: | relative humidity [%RH], temperature [°C]   |
| Parameters:         | absolute humidity [g/m³], mixture ratio [g/kg], dew point [°C], wet bulb temperature [°C]   |
| Outputs:            | 3 active outputs (0-10 V or 4...20 mA)<br>1 changeover contact  |
| Sensor:             | <b>digital humidity sensor with integrated temperature sensor</b> , low hysteresis, high long-term stability, with condensation protection through heating function (plus a second, separate temperature measuring element) |
| Sensor protection:  | <b>plastic</b> sinter filter, Ø 16 mm, L = 35 mm, exchangeable (optional <b>metal</b> sinter filter, Ø 16 mm, L = 32 mm)  |

#### HUMIDITY

|                            |  |
|----------------------------|--|
| Measuring range, humidity: | 0...100 % RH   |
| Accuracy in humidity:      | typically ± 3.0 % (30...70 % RH) at +25 °C, otherwise ± 3.5 % (deviations of alternative parameters result from deviations from humidity and temperature.) |
| Output humidity:           | 0-10 V for U variant; 4...20 mA for I variant  |

#### TEMPERATURE

|                              |   |
|------------------------------|---|
| Temperature measuring range: | <b>Multi-range switching with 4 switchable measuring ranges</b> (see table)<br>0...+50 °C (default); -20...+50 °C; -20...+80 °C; 0...+100 °C  |
| Accuracy in temperature:     | typically ± 0.5 K at +25 °C   |
| Temperature output:          | 0-10 V for U variant; 4...20 mA for I variant   |
| Long-term stability:         | ± 1 % per year  |
| Response time (t90):         | < 60 s  |
| Warm-up time:                | < 10 min  |
| Electrical connection:       | 0.14 - 1.5 mm², via terminal screws   |
| Cable connection:            | <b>Cable gland</b> , plastic (M 16 x 1.5; with strain relief, exchangeable, max. inner diameter 10.4 mm)  |
| Housing:                     | Plastic, UV-resistant, material polyamide, 30 % glass-globe reinforced, with quick-locking screws (slotted/Phillips head combination), colour traffic white (similar to RAL 9016), housing cover for display is transparent!                  |
| Housing dimensions:          | 126 x 90 x 50 mm (Tyr 2)  |
| Protective tube:             | made of stainless steel <b>V2A</b> (1.4301), Ø 16 mm, NL = 55 mm (combined humidity and temperature measuring element) <b>and</b> of stainless steel <b>V4A</b> (1.4571), Ø 6 mm, NL = 65 mm (second, separate temperature measuring element) |
| Process connection:          | via screws  |
| Ambient temperature:         | storage -20...+50 °C; operation -20...+50 °C  |
| Permitted humidity:          | < 99 % RH, non-precipitating air free of harmful substances   |
| Protection class:            | III (according to EN 60 730)  |
| Protection type:             | <b>IP 65</b> (according to EN 60 529) housing, IP 20 sensor technology  |
| Standards:                   | CE-conformity according to EMC Directive 2014/30/EU   |
| Optional:                    | <b>Display with illumination</b> , three-line, cutout approx. 70 x 40 mm (W x H), to display the ACTUAL humidity and ACTUAL temperature and/or selectable parameters  |

#### FUNCTION

A constant overtemperature of the humidity sensor makes its dewing considerably more difficult or prevents its formation within the limits of the system. A faster reaction speed is achieved in the case of humidity fluctuations, even in the range above 95 % RH. The sensor (combined humidity and temperature measuring element) is heated approx. 3 K above the ambient temperature. The actual relative humidity is determined from the measured relative humidity at overtemperature, the chip temperature of the sensor and the ambient temperature (via a second, separate temperature measuring element).



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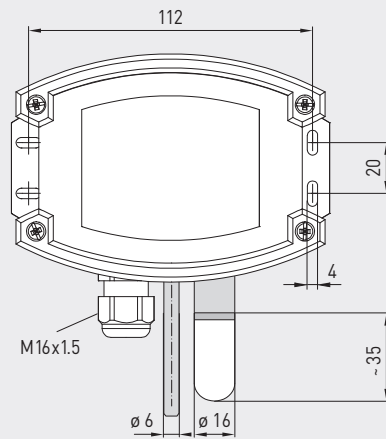
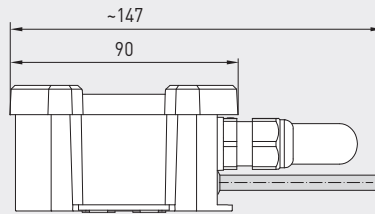
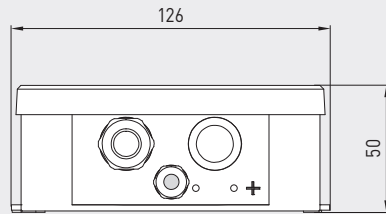
HYGRASREG® AFTF-35

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Dimensional drawing  
[mm]

AFTF-35



SF-K  
Plastic sinter filter  
(standard)



SF-M  
Metal sinter filter  
(optional)

AFTF-35

with plastic sinter filter  
(standard)



AFTF-45

with display



Temperature table  
MR: -20...+80 °C

| °C  | U <sub>A</sub><br>[V] | I <sub>A</sub><br>[mA] |
|-----|-----------------------|------------------------|
| -20 | 0.0                   | 4.0                    |
| -15 | 0.5                   | 4.8                    |
| -10 | 1.0                   | 5.6                    |
| -5  | 1.5                   | 6.4                    |
| 0   | 2.0                   | 7.2                    |
| 5   | 2.5                   | 8.0                    |
| 10  | 3.0                   | 8.8                    |
| 15  | 3.5                   | 9.6                    |
| 20  | 4.0                   | 10.4                   |
| 25  | 4.5                   | 11.2                   |
| 30  | 5.0                   | 12.0                   |
| 35  | 5.5                   | 12.8                   |
| 40  | 6.0                   | 13.6                   |
| 45  | 6.5                   | 14.4                   |
| 50  | 7.0                   | 15.2                   |
| 55  | 7.5                   | 16.0                   |
| 60  | 8.0                   | 16.8                   |
| 65  | 8.5                   | 17.6                   |
| 70  | 9.0                   | 18.4                   |
| 75  | 9.5                   | 19.2                   |
| 80  | 10.0                  | 20.0                   |

Temperature table  
MR: -20...+50 °C

| °C  | U <sub>A</sub><br>[V] | I <sub>A</sub><br>[mA] |
|-----|-----------------------|------------------------|
| -20 | 0.0                   | 4.0                    |
| -15 | 0.7                   | 5.1                    |
| -10 | 1.4                   | 6.3                    |
| -5  | 2.1                   | 7.4                    |
| 0   | 2.9                   | 8.6                    |
| 5   | 3.6                   | 9.7                    |
| 10  | 4.3                   | 10.9                   |
| 15  | 5.0                   | 12.0                   |
| 20  | 5.7                   | 13.1                   |
| 25  | 6.4                   | 14.3                   |
| 30  | 7.1                   | 15.4                   |
| 35  | 7.9                   | 16.6                   |
| 40  | 8.6                   | 17.7                   |
| 45  | 9.3                   | 18.9                   |
| 50  | 10.0                  | 20.0                   |

Temperature table  
MR: 0...+50 °C

| °C | U <sub>A</sub><br>[V] | I <sub>A</sub><br>[mA] |
|----|-----------------------|------------------------|
| 0  | 0.0                   | 4.0                    |
| 5  | 1.0                   | 5.6                    |
| 10 | 2.0                   | 7.2                    |
| 15 | 3.0                   | 8.8                    |
| 20 | 4.0                   | 10.4                   |
| 25 | 5.0                   | 12.0                   |
| 30 | 6.0                   | 13.6                   |
| 35 | 7.0                   | 15.2                   |
| 40 | 8.0                   | 16.8                   |
| 45 | 9.0                   | 18.4                   |
| 50 | 10.0                  | 20.0                   |

Temperature table  
MR: 0...+100 °C

| °C  | U <sub>A</sub><br>[V] | I <sub>A</sub><br>[mA] |
|-----|-----------------------|------------------------|
| 0   | 0.0                   | 4.0                    |
| 5   | 0.5                   | 4.8                    |
| 10  | 1.0                   | 5.6                    |
| 15  | 1.5                   | 6.4                    |
| 20  | 2.0                   | 7.2                    |
| 25  | 2.5                   | 8.0                    |
| 30  | 3.0                   | 8.8                    |
| 35  | 3.5                   | 9.6                    |
| 40  | 4.0                   | 10.4                   |
| 45  | 4.5                   | 11.2                   |
| 50  | 5.0                   | 12.0                   |
| 55  | 5.5                   | 12.8                   |
| 60  | 6.0                   | 13.6                   |
| 65  | 6.5                   | 14.4                   |
| 70  | 7.0                   | 15.2                   |
| 75  | 7.5                   | 16.0                   |
| 80  | 8.0                   | 16.8                   |
| 85  | 8.5                   | 17.6                   |
| 90  | 9.0                   | 18.4                   |
| 95  | 9.5                   | 19.2                   |
| 100 | 10.0                  | 20.0                   |

Humidity table  
MR: 0...100 % RH

| % RH | U <sub>A</sub><br>[V] | I <sub>A</sub><br>[mA] |
|------|-----------------------|------------------------|
| 0    | 0.0                   | 4.0                    |
| 5    | 0.5                   | 4.8                    |
| 10   | 1.0                   | 5.6                    |
| 15   | 1.5                   | 6.4                    |
| 20   | 2.0                   | 7.2                    |
| 25   | 2.5                   | 8.0                    |
| 30   | 3.0                   | 8.8                    |
| 35   | 3.5                   | 9.6                    |
| 40   | 4.0                   | 10.4                   |
| 45   | 4.5                   | 11.2                   |
| 50   | 5.0                   | 12.0                   |
| 55   | 5.5                   | 12.8                   |
| 60   | 6.0                   | 13.6                   |
| 65   | 6.5                   | 14.4                   |
| 70   | 7.0                   | 15.2                   |
| 75   | 7.5                   | 16.0                   |
| 80   | 8.0                   | 16.8                   |
| 85   | 8.5                   | 17.6                   |
| 90   | 9.0                   | 18.4                   |
| 95   | 9.5                   | 19.2                   |
| 100  | 10.0                  | 20.0                   |

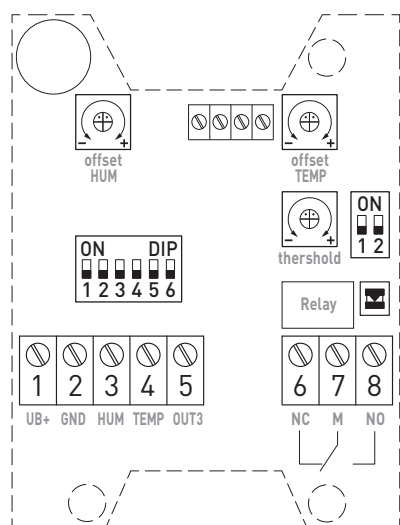


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Schematic diagram

AFTF-35-xx



Connecting diagram

AFTF-35-I

- ① +UB 24V AC/DC
- ② -UB GND
- ③ Output Humidity 4...20mA
- ④ Output Temperature 4...20mA
- ⑤ Output altern. parameters 4...20mA
- ⑥ NC Normally Closed
- ⑦ M Common
- ⑧ NO Normally Open

Connecting diagram

AFTF-35-U

- ① +UB 24V AC/DC
- ② -UB GND
- ③ Output Humidity 0-10V
- ④ Output Temperature 0-10V
- ⑤ Output altern. parameters 0-10V
- ⑥ NC Normally Closed
- ⑦ M Common
- ⑧ NO Normally Open



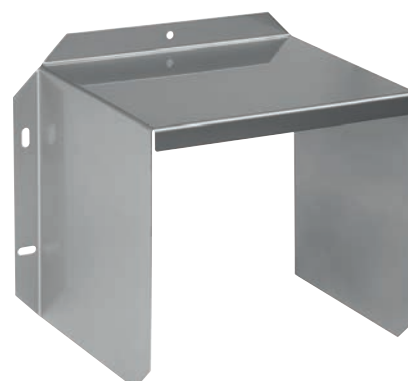
| Measuring ranges temperature | DIP 1 | DIP 2 |
|------------------------------|-------|-------|
| 0...+50 °C (default)         | OFF   | OFF   |
| -20...+50 °C                 | ON    | OFF   |
| -20...+80 °C                 | OFF   | ON    |
| 0...+100 °C                  | ON    | ON    |



| Relay function assignment | DIP 1 | DIP 2 |
|---------------------------|-------|-------|
| inactive (default)        | OFF   | OFF   |
| Humidity                  | ON    | OFF   |
| Temperature               | OFF   | ON    |
| alternative parameters    | ON    | ON    |

| Measuring ranges alternative parameters   | DIP 3 | DIP 4 | DIP 5 |
|---|-------|-------|-------|
| (A) 0...20 g/m³ (default)   | OFF   | OFF   | OFF   |
| (A) 0...25 g/m³   | ON    | OFF   | OFF   |
| (R) 0...20 g/kg   | OFF   | ON    | OFF   |
| (R) 0...25 g/kg   | ON    | ON    | OFF   |
| (D) 0...+50 °C  | OFF   | OFF   | ON    |
| (D) -20...+50 °C  | ON    | OFF   | ON    |
| (W) -30...+30 °C  | OFF   | ON    | ON    |
| (W) -20...+50 °C  | ON    | ON    | ON    |
| (A) = absolute humidity [g/m³]<br>(R) = mixture ratio [g/kg]<br>(D) = dew point [°C]<br>(W) = wet bulb temperature [°C] |       |       |       |

|  |              |
|--|--------------|
| <b>Note:</b> For factory service only, it must be set to "OFF" during operation! | <b>DIP 6</b> |
| <b>Operation</b> (default)   | <b>OFF</b>   |



WS-03

Weather and sun protection hood





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| HYGRASREG®<br>AFTF-35                                |      |  |   |                  |                          |   |                    | Condensation-protected on-wallsensor<br>for high humidity |  |
|--|------|--|---|------------------|--------------------------|---|--------------------|---|--|
| Type/  | WG02 | Measuring Range<br>Humidity  | Temperature   | Output<br>active | Output<br>switching      | Display   | Item No.           | Price   |  |
| AFTF-35-I  |      |  |   |                  |                          |   | I variant          |   |  |
| AFTF-35-I/W  |      | 0...100%RH<br>0...20 g/m³ (A)<br>0...25 g/m³ (A)<br>0...20 g/kg (R)<br>0...25 g/kg (R)<br>0...+50 °C (D)<br>-20...+50 °C (D)<br>-30...+30 °C (W)<br>-20...+50 °C (W)   | 0...+50 °C<br>-20...+50 °C<br>-20...+80 °C<br>0...+100 °C | 3x 4...20 mA     | 1x Changeover<br>contact |   | 1201-714B-1000-000 | 767,66 €  |  |
| AFTF-35-I/W  | LCD  | (as above)   | (as above)  | 3x 4...20 mA     | 1x Changeover<br>contact |  | 1201-714B-1200-000 | 877,31 €  |  |
| AFTF-35-U  |      |  |   |                  |                          |   | U variant          |   |  |
| AFTF-35-U/W  |      | (as above)   | (as above)  | 3x 0-10V         | 1x Changeover<br>contact |   | 1201-714A-1000-000 | 767,66 €  |  |
| AFTF-35-U/W  | LCD  | (as above)   | (as above)  | 3x 0-10V         | 1x Changeover<br>contact |  | 1201-714A-1200-000 | 877,31 €  |  |
| Note   |      | Alternative parameters are calculated internally from the measured variables,<br>which are retrievable via the active output OUT3:<br>absolute humidity, mixing ratio, dew point and wet bulb temperature<br>(can be changed via DIP switch) |   |                  |                          |   |                    |   |  |
| ACCESSORIES  |      |  |   |                  |                          |   |                    |   |  |
| SF-M   |      | Metal sinter filter, Ø 16 mm, L = 32 mm, exchangeable<br>stainless steel V4A (1.4404)  |   |                  |                          |   | 7000-0050-2200-100 | 45,34 €   |  |
| WS-03  |      | Weather and sun protection hood, 200 x 180 x 150 mm,<br>stainless steel V2A (1.4301)   |   |                  |                          |   | 7100-0040-6000-000 | 47,92 €   |  |
| for further information see see chapter Accessories! |      |  |   |                  |                          |   |                    |   |  |