

# Instructions for Humidity Calibration with Salt Solutions of Series EE16 Transmitters

## 1. General

### 1.1. Purpose:

These instructions describe the procedure for the humidity calibration of the Series EE16 transmitters. Please note that the manufacturer originally calibrated the electronics and sensor element. Humidity calibration is only useful for the EE16 if the humidity deviation at 20 °C is more than  $\pm 3\%$ RH.

### 1.2. Limit of Usage:

The information provided is intended for skilled personnel only. Because of ongoing product development the manufacturer reserves the right to make changes in specification as deemed necessary. Please request the most recent instruction information from the manufacturer.

### 1.3. Safety:

Please note that only skilled personnel should carry out these instructions and at all times abide by the valid safety procedures and instructions.

### 1.4. Additional Documents:

- Product specifications from the manufacturer
- Manual for E+E transmitters

	Date	Name
written	18.11.2008	Hametner M.
checked	18.11.2008	Obereder
released	19.11.2008	Schwarz Roswitha

## 2. Description

### 2.1 Required Equipment

- Humidity Calibration Jar part no: HA 01 04 01 or HA 01 04 02
- Humidity Salt standards
 

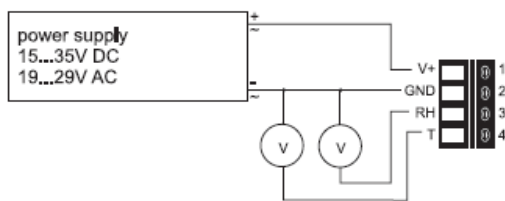
No. HA 01 04 10	<b>10</b> %RH
No. HA 01 04 35	<b>35</b> %RH
No. HA 01 04 50	<b>50</b> %RH
No. HA 01 04 80	<b>80</b> %RH
No. HA 01 04 95	<b>95</b> %RH
- Multimeter
- Power supply in accordance with transmitter specifications
- Output load in accordance with transmitter specifications

### 2.2 Setup for Calibration

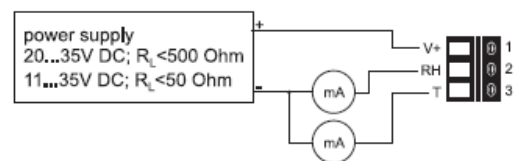
1) The electrical connections to the transmitter have to be in accordance with one of the following connection diagrams.

- a) Connection of the readout device  
 b) Connection of the power supply

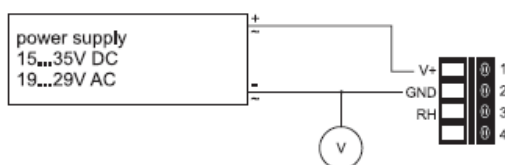
#### EE16-FT3xxx



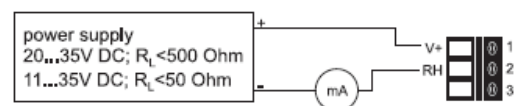
#### EE16-FT6xxx



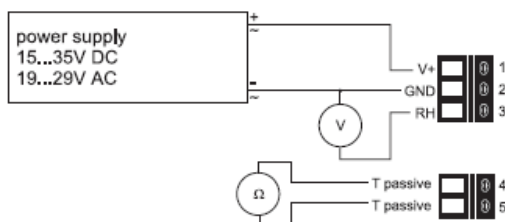
#### EE16-F3xxx



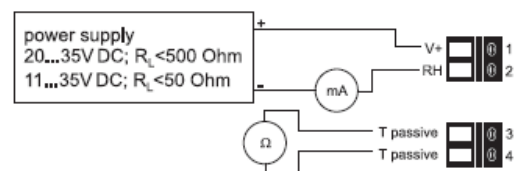
#### EE16-F6xxx



#### EE16-FP3xxx



#### EE16-FP6xxx



- 2) Insert the sensor probe in the humidity calibration jar and seal tightly
- 3) Stabilisation time: minimum 60 min

**Attention:** During the entire stabilisation time the transmitter must be connected to the power supply and readout device.

**Note:** To reach temperature equilibrium it is recommended to store the transmitter and the humidity calibration jar in the same room for a minimum of 4 hours.

**Note:** During the stabilisation time make sure to maintain a constant temperature in the room. Avoid direct sunlight, other heat sources and drafts.

**Note:** Before calibration a dirty filter cap should be replaced.

**Note:** While using the humidity calibration jar and the non-saturated lithium chloride solutions observe the following procedure:

Put the textile packet (comprising three layers) in the **dry** and **clean** cover of the humidity calibration jar. Shake the lithium chloride ampoule, and crack the tip, saturating the centre of the textile packet with the entire contents of the ampoule. Insert the humidity sensor probe into the hole on top and close tightly. The sensor probe is now in an environment with a defined humidity.

## 2.3 Calibration:

For simple and quick calibration a ONE-POINT CALIBRATION is recommended at a defined humidity reference point (value should be close to the working range of the transmitter).

A calibration should be done for every adjustment because an adjustment is only effective at a deviation larger than 3 % RH.

### 2.3.1.1 One-Point Adjustment:

#### 1) Adjustment over the whole working range:

To achieve a reliable accuracy over the whole working range, it is advisable to perform a one-point calibration at 50 %RH. Adjust the output value of the transmitter according to the attached table TAB1 with the potentiometer P3 or P2 (see appropriate PCB-drawing under paragraph 3.)

#### 2) Adjustment at a certain humidity point:

If high accuracy is required at a certain humidity value, it is necessary to adjust at this value or as close as possible.

Adjust the output value of the transmitter according to the attached table TAB1 and to the corresponding humidity reference with the potentiometer P3 or P2 (see appropriate PCB-drawing under paragraph 3.)

As a result of the one-point-calibration at a specific humidity value, a small increase of the inaccuracy at all other humidity values is to be expected.

Please note: In case the humidity value is outside the range of the potentiometer, the transmitter should be returned to the manufacturer for calibration.

## Calibration table

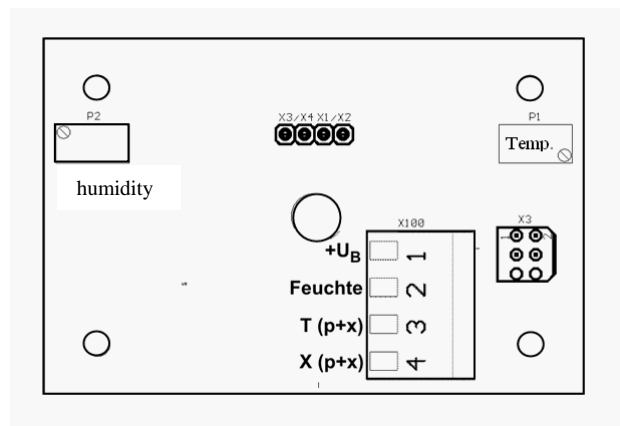
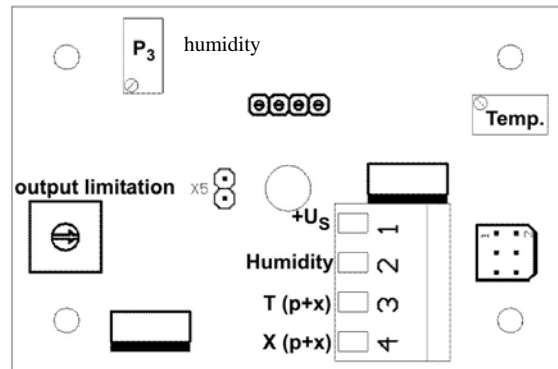
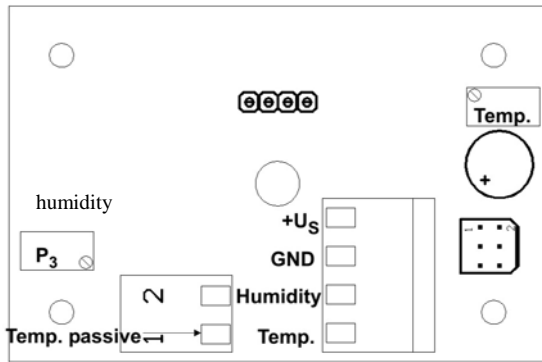
**TAB 1: output values for ONE-POINT CALIBRATION:**

temperature		degC	15	20	22	24	26	28	30	35
reference 10 % RH	humidity referenc	% RH	<b>9,4</b>	<b>9,8</b>	<b>10</b>	<b>10,2</b>	<b>10,3</b>	<b>10,5</b>	<b>10,7</b>	<b>11,1</b>
	0-10 V	V	0,94	0,98	1	1,02	1,03	1,05	1,07	1,11
	4-20 mA	mA	5,504	5,568	5,6	5,632	5,648	5,68	5,712	5,776
reference 35 % RH	humidity referenc	% RH	<b>34,1</b>	<b>34,8</b>	<b>35</b>	<b>35,2</b>	<b>35,5</b>	<b>35,7</b>	<b>36</b>	<b>36,5</b>
	0-10 V	V	3,41	3,48	3,5	3,52	3,55	3,57	3,6	3,65
	4-20 mA	mA	9,456	9,568	9,6	9,632	9,68	9,712	9,76	9,84
reference 50 % RH	humidity referenc	% RH	<b>49,4</b>	<b>49,8</b>	<b>50</b>	<b>50,2</b>	<b>50,4</b>	<b>50,5</b>	<b>50,7</b>	<b>51,1</b>
	0-10 V	V	4,94	4,98	5	5,02	5,04	5,05	5,07	5,11
	4-20 mA	mA	11,904	11,968	12	12,032	12,064	12,08	12,112	12,176
reference 80 % RH	humidity referenc	% RH	<b>79,8</b>	<b>80</b>	<b>80</b>	<b>80</b>	<b>80,1</b>	<b>80,1</b>	<b>80,2</b>	<b>80,3</b>
	0-10 V	V	7,98	8	8	8	8,01	8,01	8,02	8,03
	4-20 mA	mA	16,768	16,8	16,8	16,8	16,816	16,816	16,832	16,848
reference 95 % RH	humidity referenc	% RH	<b>94,9</b>	<b>95</b>	<b>95</b>	<b>95</b>	<b>95</b>	<b>95</b>	<b>95</b>	<b>95</b>
	0-10 V	V	9,49	9,5	9,5	9,5	9,5	9,5	9,5	9,5
	4-20 mA	mA	19,184	19,2	19,2	19,2	19,2	19,2	19,2	19,2

example: reference humidity: 10 % RH  
 ambient temperature: 20°C  
**effective humidity: 9,8 %RH**  
 corresponds for EE16-F\*6\* with and output value of 5,568mA

### 3. PCB-drawing

Depending on the transmitter model of the series EE16 the following potentiometer positions are valid.



**EE16 FT3- voltage output**  
**EE16 FP3- voltage output**

**EE16FT6 – current output 4-20mA**  
**EE16FP6 – current output 4-20mA**

**Annex:****Temperature dependance of  
humidity standards**

temperature	humidity standard							
	5% RH	10% RH	20% RH	35% RH	50% RH	65% RH	80% RH	95% RH
-20 degC	2.9%	6.5%	14.8%	29.5%	45.8%	62.7%	78.8%	*
-15 degC	3.1%	6.9%	15.4%	30.2%	46.3%	63.0%	79.0%	*
-10 degC	3.3%	7.3%	16.0%	30.9%	46.8%	63.3%	79.2%	*
- 5 degC	3.5%	7.7%	16.6%	31.5%	47.4%	63.6%	79.4%	*
0 degC	3.8%	8.1%	17.3%	32.2%	47.9%	63.9%	79.5%	94.9%
5 degC	4.1%	8.6%	17.9%	32.9%	48.4%	64.1%	79.6%	
10 degC	4.3%	9.0%	18.5%	33.5%	48.9%	64.4%	79.7%	
15 degC	4.6%	9.4%	19.1%	34.1%	49.4%	64.7%	79.8%	
18 degC	4.8%	9.7%	19.5%	34.5%	49.6%	64.8%	79.9%	
20 degC	4.9%	9.8%	19.8%	34.8%	49.8%	64.9%	80.0%	
22 degC	5.0%	10.0%	20.0%	35.0%	50.0%	65.0%	80.0%	95.0%
24 degC	5.1%	10.2%	20.2%	35.2%	50.2%	65.1%	80.0%	
26 degC	5.2%	10.3%	20.5%	35.5%	50.4%	65.2%	80.1%	
28 degC	5.3%	10.5%	20.7%	35.7%	50.5%	65.3%	80.1%	
30 degC	5.5%	10.7%	21.0%	36.0%	50.7%	65.4%	80.2%	
35 degC	5.8%	11.1%	21.6%	36.5%	51.1%	65.6%	80.3%	
40 degC	6.1%	11.6%	22.1%	37.1%	51.5%	65.8%	80.4%	
45 degC	6.4%	12.0%	22.7%	37.7%	51.9%	66.0%	80.5%	
50 degC	6.7%	12.4%	23.3%	38.2%	52.3%	66.2%	80.6%	95.1%
55 degC	7.0%	12.9%	23.9%	38.7%	52.7%	66.4%	80.7%	
60 degC	7.3%	13.3%	24.5%	39.3%	53.1%	66.6%	80.8%	
65 degC	7.6%	13.8%	25.0%	39.8%	53.4%	66.8%	80.9%	
70 degC	8.0%	14.2%	25.6%	40.3%	53.8%	66.9%	81.0%	
75 degC	8.3%	14.6%	26.1%	40.8%	54.1%	67.1%	81.0%	95.2%
80 degC	8.6%	15.1%	26.7%	41.3%	54.4%	67.3%	81.1%	
85 degC	8.9%	15.5%	27.2%	41.7%	54.8%	67.4%	81.2%	
90 degC	9.3%	16.0%	27.7%	42.2%	55.1%	67.6%	81.3%	
95 degC	9.6%	16.4%	28.2%	42.6%	55.4%	67.7%	81.3%	
100 degC	9.9%	16.8%	28.8%	43.1%	55.7%	67.9%	81.4%	

**ATTENTION:** \* calibration below 0 °C is not possible, because the 95 %RH standard will freeze up.