

Humidity and Temperature Transmitter HTT-V



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1 COMPONENTS

1.1 Humidity and temperature transmitter



AN 28896

Humidity / temperature transmitter type DigiControl **HTT-V S room**, with 24 VAC/VDC power supply, with LCD display, with standard polyformaldehyde (POM) probe length 90 mm.



AN 28897







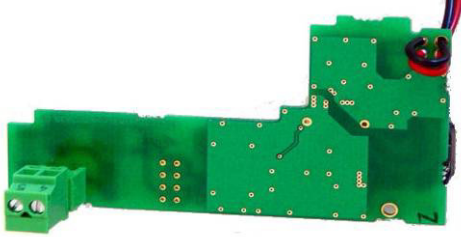


Humidity / temperature transmitter type DigiControl **HTT-V M1**, with 24 VAC/VDC power supply, with LCD display, with remote stainless steel probe length 250 mm, on **3m** wire.



AN 29164

Humidity / temperature transmitter type DigiControl **HTT-V M2**, with 24 VAC/VDC power supply, with LCD display, with remote stainless steel probe length 250 mm, on **10m** wire.

1.2 Accessories and spare parts

		
<p>AN 28928</p>	<p>AN 28929</p>	
<p>Sal_SC humidity set 58% 75%</p>	<p>Sal_SC humidity 90%</p>	
		
<p>AN 29025</p>	<p>AN 28904</p>	
<p>Sal_SC humidity 33%</p>	<p>Probe assembly bracket for duct 13mm</p>	
		
<p>AN 28905</p>	<p>AN 28916</p>	
<p>Probe-wall-mounting bracket 13mm (2 pieces)</p>	<p>Connector set for HTT-V "S" and "M" 3 pieces</p>	
		
<p>AN 28914</p>	<p>AN 28920</p>	<p>AN 28920</p>
<p>Power supply module 24 VAC/DC</p>	<p>Special screw set for cover</p>	<p>Screw set bottom</p>

	
<p>AN 28902</p>	<p>AN 29121</p>
<p>Stainless steel probe duct HTT-V M1, length of cable 3 m To use with high humidity (> 85%)</p>	<p>Stainless steel probe duct HTT-V M2, length of cable 10 m To use with high humidity (> 85%)</p>
	
<p>AN 28901</p>	<p>AN 28907</p>
<p>Probe room HTT-V "S"</p>	<p>Electronics Module Transmitter HTT-V "S" room</p>
	
<p>AN 28926</p>	<p>AN 28909</p>
<p>Electronics Module Transmitter HTT-V "M" ext.</p>	<p>Housing bottom complete</p>
	
<p>AN 28911</p>	<p>AN 28910</p>
<p>Housing cover HTT-V "M" without electronics</p>	<p>Housing cover HTT-V "S" without electronics</p>

2 PRODUCT DESCRIPTION

The Luwa **HTT-V, S** transmitter is a rugged precision measuring instrument for the use in HVAC control and regulating systems. It continuously measures up to three times per second, the relative humidity and the actual air temperature and shows the measured value on a large LCD display and simultaneously on two high-precision analogue outputs.

Special features:

- Large **LCD** for a simultaneous display of %RH and temperature
- Easy and intuitive **menu navigation** (3 keys)
- **2 analogue outputs** for measured value %RH und temperature (U or I), freely scalable
- Possibility of **adjustment** von %HR and temperature (3 points %HR / 1 point temperature)
- Average value display (1/4: 1 : 3 h display for 3 seconds)
- **Password** protection for all settings
- Changeover of Aout **U / I** and the display **°C/°F**
- Permanent online monitoring of all functions



Luwa HTT-V-M



Luwa HTT-V-S

2.1 Scope of delivery

The HTT-V S/M contains:

- RH/T measuring instrument including probe in room – duct version
- Stain relief plate including screw set and 4 spacers
- Instruction manual
- Assembly instructions

Check the completeness of the box contents.

Incomplete deliveries can be completed immediately by the Luwa Air Engineering AG representation.

2.2 Transmitter Features

Type	<i>HTT-V room</i>	<i>HTT-V duct</i>
Item number	28896	28897
Supply voltage	24 VDC +/-25% (no galvanic isolation of input and output)	
Power consumption	min 20mA	typical 50 mA max. 80 mA (current outputs)
Measuring range	-20...+80 °C	0...100.0% RH
Application range	0...50 °C (Electronic)	-20...80 °C (Sensor)
	Breathing air measurement (MAC value respected)	
Humidity / Temperature probe	Digital capacitive humidity and temperature measuring system	
Standard measurement accuracy	+/- 0.4 °C (at 25 °C) +/- 2.5 - 3.0% RH (20...80-90% RH)	+/- 1.2 °C (0...50 °C) +/- 5.0% RH (0...100% RH)
Option measurement accuracy (with 3 points RH / 1 point T factory adjustment)	+/- 0.2 °C (at 25 °C) +/- 1.5% RH (10...90% RH)	+/- 1.0 °C (0...50 °C) +/- 4.0% RH (0...100% RH)
Measurement hysteresis temperature / humidity	+/- 0.1 °C	+/- 1.0% RH
Measurement interval	330...500 ms	
Temperature effect on measurement	typical 0.06% RH / °C	
Resolution of analog outputs	typical 5 mV : 5µA	
Accuracy of analog outputs	typical 0.05% FS (of the entire measuring range)	
Housing protection class	IP 54	
Housing material	POM	
Probe protecting class	IP 54 (with polymer membrane filter as option for type S, stand for type R and M)	
Probe material	Stainless steel / POM	
Storage temperature range	5...+ 55 °C noncondensing!	
EMV-CE tests	EN 61326-1 / EN 61326/A1 / EN 61010-1	

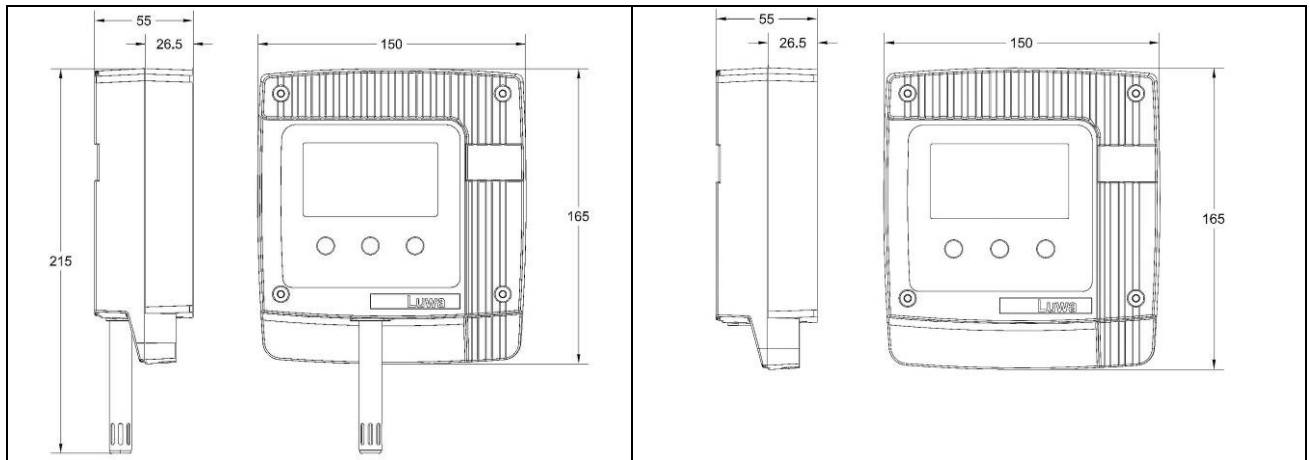
2.3 Factory Settings

Display: Temp. : -20...+80 °C
 Humidity : 0...100.0% RH
 AOOUT 1: Humidity : 0...10V, 0...20, 4...20mA / 0...100% RH
 AOOUT 2: Temp. : 0...10V, 0...20, 4...20mA / -20...+80 °C
 Password : "0000" -> deactivated
 Factory adjustment : precalibrated (standard)
 Opt. calibration : "CAL RH" L/M/H (3 PKT)
 "CAL T" (1 PKT)

2.4 Technical specifications

Power supply24 VAC / VDC ±25%
Output2 x 4-20 mA
 Max. Load: 500 Ohm (4-20 mA)
Galvanic separation.....Output
Power consumption5 VA
CE-conformity (EMV).....EN 61 326
Electrical connection.....Screw terminals up to max. 1.5 mm²
Operating temperature
housing0 to +50 °C
Probe-20 to +80 °C
Storage temperature.....5 to +55 °C
Mediumair and neutral gases

2.5 Dimensions



3 SAFETY

- This equipment has left the factory perfectly safety-related way.
- Inappropriate manipulations or modifications are strictly forbidden. Follow all warnings and warning labels on the instrument and in the manual.
- The HTT-V is exclusively developed for the measurement in fresh air environments within the specifications. Use and run this instrument only for this purpose. A different or additional use is considered as not intended. The manufacture / supplier is not liable for possible damage caused. The risk is entirely assumed by the user.
- The assembly and installation work shall only be done by certified personal (electrician or workman with equivalent training).
- The HTT-V may be operated only under the specified operating conditions.
- Wherever malfunctions or errors can cause large material damage or personal injury, additional precautions and external safety measures must be taken, so that in case of an error defined operating conditions are guaranteed (for example limit switch).
- The HTT-V is not suitable for the use in hazardous rooms.
- The professional installation should comply with local electrical codes and with this manual.
- The HTT-V contains ESD-sensitive components. Please refer to the appropriate safety measures.
- Use only original accessories and spare parts from Luwa Air Engineering AG.
- Without written permission from Luwa Air Engineering AG it is not allowed to carry out extensions or remodeling at the HTT-V.

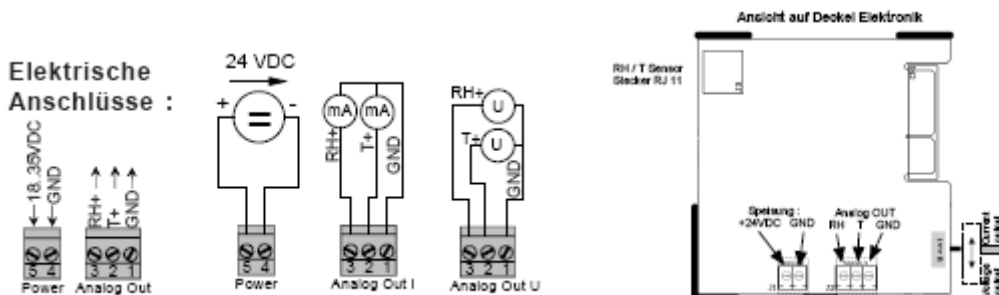
4 INSTALLATION

General:

1. Read carefully the manual before the installation of the HTT-V instrument.
2. Verify the performance data on the label fixed on the instrument and check whether or not it is suitable for your application.
3. Choose the appropriate mounting place according to the application and specification (possibly in cooperation with the planners)
4. Observe strictly that the device specifications and the MAC values (maximum allowable concentration for the chemical load for craftsmen) match.
5. Avoid that the instrument and the probe are exposed to a corrosive ambient air.

5 MOUNTING

1. First remove the bottom of the instrument. If necessary, 4 holes can be broken through for the mounting on the wall or at the ventilation duct. The breakthroughs should remain closed when assembling it at a ventilation duct through cable flanges. This is the only way to guarantee the housing tightness
2. In case of unevenness of the mounting wall, 4 spacers can be assembled.
3. Insert the appropriate cables into the membrane which is at the bottom of the instrument by piercing small holes into the membrane with a pointed scribe and then push the cables (only simple isolation) through the holes.
4. Please use the stain relief plate for a cable stain relief.
5. After having set the dowels or drilled the appropriate holes in the wall, the bottom can be screwed.
6. Now you can screw the cables on the connector with the ferrule. Please consider for this the electric diagram of the designer, respectively of the instrument.
7. Check the wiring carefully, before connecting the plugs to the cover plate with integrated electronics.
8. Introduce the cover plate into the upper bracket and click it laterally on the bottom. Check the correct fitting.
9. After switching on the supply voltage the **HTT-V** registers on the display.



EMC note:

1. Disturbing circuits of measurement or analysis units have to be separated by open ground.
2. Avoid, wherever possible, the parallel motion of measurement connections and power electric cables.
3. Shield the measurement connections, if necessary, and connect the screen only on one side with a defined mass potential.
4. Twist the unshielded cables in pairs and keep them as short as possible.

Recommended cabling:

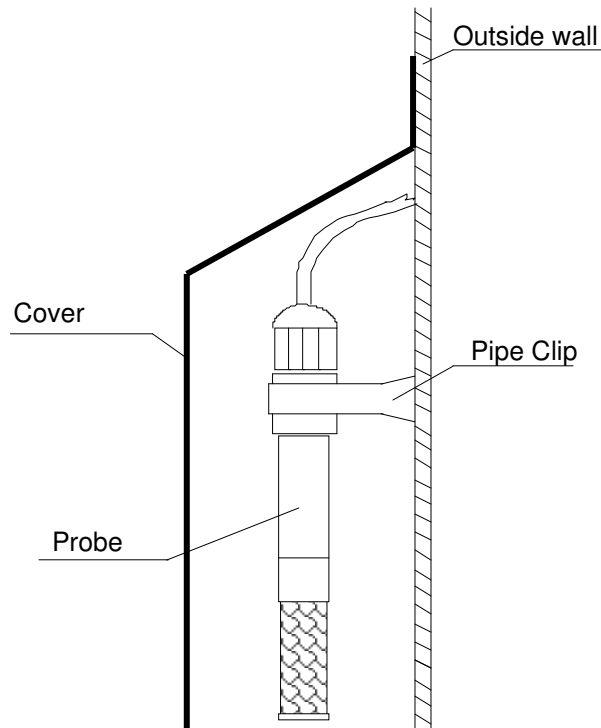
Supply: 24 VDC +/- 10% single-strands from 0.5...0.75 mm² (22 ... 18 AWG) with PVC insulation or equivalent 2-fold strand.

AOUT: 0...10 VDC / 0... 20 mA

Single-strand from 0.25...0.5 mm² (24 ... 20 AWG) twisted and possibly shielded with PVC insulation or corresponding 2/3/4-fold strand.

5.1 Outside measurement

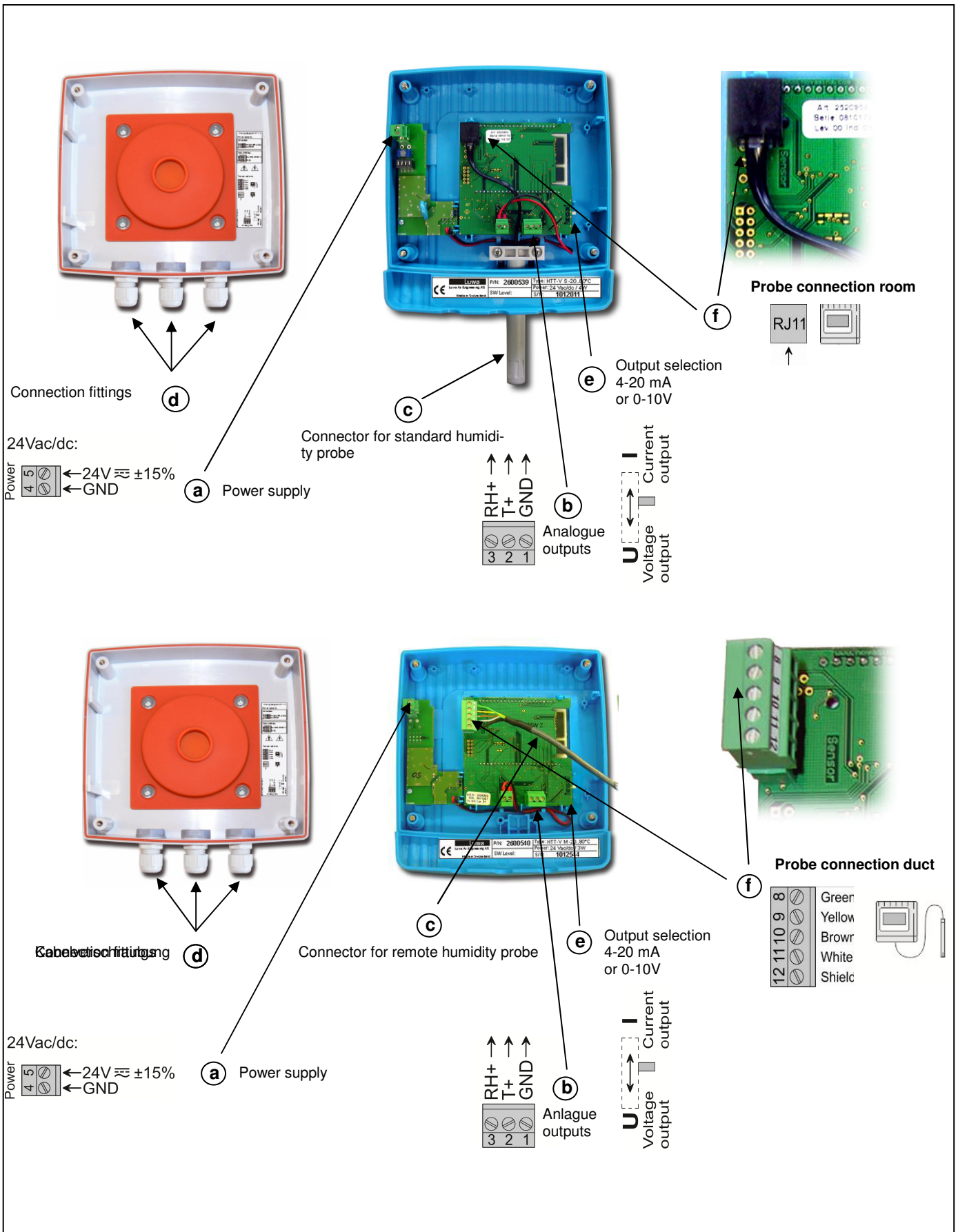
For the outside measurements, use the same cables as for the duct measurements. The probe does not necessarily have to be installed inside the duct, but can also be secured by means of a pipe clip to the outside wall of the building. This application is used to detect the outside conditions, for example for the enthalpy. So that the probe is not exposed to all weathers, a cover should be fitted over it.



6 STARTUP

Before you start the system, check the correct supply wiring and the configuration of the analogue outputs (U/I switch). Close the cover of the HTT-V before the power supply is switched on. Check the fuse protection on the power supply in accordance with the current local regulations. Voltages above +35VDC lead to destruction of the measuring instrument! The HTT-V is calibrated to a basic accuracy of +/- 2.5 - 3.0 % HR. (option +/- 1.5 % HR with factory certificate). After switching-on the power supply, an automatic start-up occurs *S TST*. On the top line of the display the current software version is shown for 2 seconds. After that the measurement starts immediately and the current relative humidity and temperature is displayed. In case of faults of the hard- or software, the system alerts „ERROR” and shows an error-code. The device has an online monitoring, which reports error immediately. The analogue outputs are protected against short circuit, but not protected against external supply.

6.1 Connections

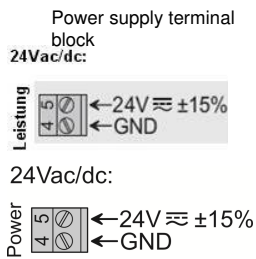


Electrical connections

This connection must be made by a qualified technician.
To make the connection, the transmitter must not be energized.

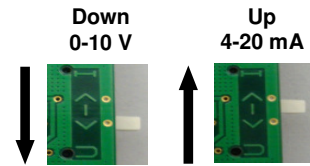
➤ **Power supply connection**

Before making the connection, you must first check the power supply which is indicated on the transmitter board



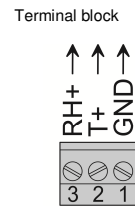
➤ **Output signal selection**
Voltage (0-10 V) or current (4-20 mA)

Select on the miniatur switch the desired output signal.



➤ **Connection analogue output**

- 4-20 mA:
- 0 – 10 V:



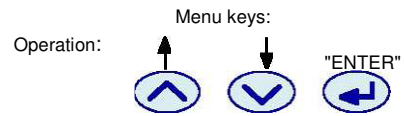
7 CONFIGURATION

7.1 Working principle

The configuration of the transmitter is done via the keypad which is front mounted under the display.



The **HTT-V** is delivered ready for operation. At the most the analogue outputs and the display options for the application have to be configured. For this, the instrument has an intuitive menu guidance, which is started by the key „Enter“.



ENTER : -> Menu and submenus
 Press 2 seconds for the change [↑]* : -> Menu upwards increases the flashing digit [↓]* : -> Menu downwards reduces the flashing digit
 * Average function in the measuring mode

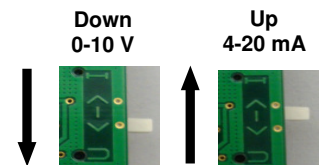
- Following menu items can be used:
- **Measuring mode** (Standard & average value display)
 - **Calibration** (adjustment) of **rel. humidity**
 - **Calibration** (adjustment) of **temperature**
 - **Adjustment of the analogue outputs** (U: 0,2...10V -I: 0,4...20 mA) and free **scaling** of the ranges
 - **Switchover** unit °C or °F
 - Key lock-code (**Password protection**)
- Each menu item can be selected by [↑], [↓]

7.2 Output signal selection

Voltage or current?



The selection of the analogue output is made on the on-off slide switch on the board of the transmitter.



7.3 Measurement mode:

Measurement mode

To get directly from any menu item to the measurement mode, press for minimum 2 seconds the "Enter" key. The measurement mode is automatically activated 2 minutes after the last key press. The relative air humidity and temperature (°C or °F) are simultaneously displayed. In case of an error an error-code is displayed instead of the temperature. If the arithmetic average of the relative air humidity respectively of the temperature should be displayed, then press in the measure mode the button [↓]. It appears then the average of the last 1/4 h (1 arrow on the top right of the LCD). Press twice to show the average of 1 hour and three times for the average of the last 3 hours. After about three seconds all arrows disappear and the system returns to the current measurement mode.

7.4 Calibration HR:

Calibration humidity
*CAL RH

- You reach this menu by pressing ENTER -> „*CAL RH“ -> ENTER -> "CAL 1" -> ENTER. There is the possibility to adjust 3 humidity points separately (1: Low / 2: Medium / 3: High) without any restriction.
- As an example, we show the adjustment by SAL-SC 33%:
- Drop the SAL-SC 33% HR together with the adapter „CH“ over the probe, after having inspected visually and shaken the SAL-SC. Make sure that the cylinder is close to the probe.
- Wait at least 30 minutes (necessary for the balancing of the moisture inside the cylinder). The ambient temperature should not vary during this time (SAL-SC 90%RH > wait 3h!).
- By pressing the ENTER key go to the change mode.
- Read the generated humidity level with the corresponding room temperature from the table of the SAL-SC. Perhaps it is necessary to interpolate the value accordingly.
- Set up the desired value of humidity with the keys [↑], [↓] (press ENTER for the next digit!)
- After the last digit appears on the display "no SAVE?" By pressing the keys [↑] or [↓] you get to „YES SAVE?“ and close off the function with the ENTER button (it appears briefly "*DONE*" on the display).
- The adjustment point "CAL 1" is now terminated.

Calibration temp.
*CAL T

7.5 Calibration temperature:

The adjustment of the temperature measurement can be done at one point (offset shift of the temperature curve). The procedure is the same as for the adjustment of the relative humidity. Here too, an entered value can easily be deleted by the menu function "CAL CLR". (Range +/- 4.0 °C) Press „Exit“ to leave this menu item.

7.6 Analogue Outputs:

Analogue outputs
*AN OUT

You can set the scaling of the analogue outputs and the ranges 0...10V/0...20mA or 2...10V/4...20mA

"Range L": Lower % HR humidity value -> normally = 0.0 % RH
 "Range H": Higher % HR humidity value -> normally = 100.0 % RH
 "Range L": Lower temperature value -> normally = -20.0 °C
 "Range H": Higher temperature value -> normally = +80.0 °C

Example: (ANA OUT: 4 - 20 / switch I)

0.0 % RH -> 4 mA
 100.0 % RH -> 20 mA AOUT 1
 - 20.0 °C -> 4 mA
 +80.0 °C -> 20 mA AOUT 2

„ANA OUT“: Outputs can be changed depending on the switch setting „Aout“

[↓] U: 0 - 10V <-> 2 - 10V
 I: 0 - 20mA <-> 4 - 20mA

7.7 Offset adjustment for analogue output:

With this function, the analogue output and the value for manual output can be adjusted from -5%RH to 105%RH. This allows an adaption to inaccurate analogue inputs.

7.7.1 Settings before correction

Adjust the desired values for Range L and Range H at the Transmitter HTT-V, for example 0%RH (RLs) and 100%RH (RHs).

Set the desired output range (0/2..10V, 0/4..20mA).

Set the control system in the same way.

7.7.2 Measurement

Enter a manual value for example 10%RH (S1). Note the range on the control system, e.g. 11%RH (M1).

Enter a manual value e.g. 90%RH (S2). Note the range on the control system e.g. 92%RH (M2)

7.7.3 Calculation Gain and Offset

$$Gain = \frac{M_2 - M_1}{S_2 - S_1} = \frac{(92 - 11)[\%RH]}{(90 - 10)[\%RH]} = 1.0125$$

$$Offset = M_1 - Gain \times S_1 = 11[\%RH] - 1.0125 \times 10[\%RH] = 0.875[\%RH]$$

7.7.4 Calculation corrected settings Range L and Range H

$$Range L = RLs \times Gain + Offset = 0[\%RH] \times 1.0125 + 0.875[\%RH] = 0.875[\%RH]$$

To adjust 0.9[%RH]

$$Range H = RHs \times Gain + Offset = 100[\%RH] \times 1.0125 + 0.875[\%RH] = 102.125 [\%RH]$$

To adjust 102.1[%RH]

The display on the control system should now concur with the one on the transmitter. The linearity of both systems is assumed.

Should the deviation at the nominal value of the measurement of the system be too big due to a nonlinearity, chose for S₂ a value around the nominal measuring value and for S₁ the RLs value.

7.8 Temperature Unit:

Temperature Unit
*UNIT T

In this menu item you can change the unit temperature from °C (ISO unit) to the US format °F. The changeover is done by pressing the keys [↑], [↓].

7.9 Low-passfilter setting:

Filter settings RH
F. RH

- Press [ENTER]. ⇒ The display starts flashing. Use [↑] or [↓] to set the low-pass filter between 0 and 20.
- Press [ENTER] again for confirmation.
- Remark:
- The low-pass filter damps the measurement value display as well as the analogue output signal. This function can be used in case of big pressure oscillations.
- Basically it is recommended to set a low filter with high oscillations (high frequency) and a high filter with low oscillations (low frequency).

7.10 Manual override:

Manual override
*MANUAL

In this menu item the actual value of the temperature and humidity can be overridden. This override is active for 10 minutes, then the system displays the current actual value of the temperature and humidity.

7.11 Password protection:

Password protection
*KEYLO

At shipping from factory the password is deactivated. You can activate the password (4 digits) on your own.

Attention: The activation of the password is set by the code >< „0000“ and activating the menu “Lock“, but latest after 2 minutes (without operation). Note your password. Password reset can only be done via the factory-reset function. Thereby all configuration data will be deleted and the factory settings are taken over.

Menu: *KEYLO -> ENTER -> CODE -> ENTER -> Setting of the password -> [↑] LOCK & ENTER -> Password activated *DONE*

Reset to factory settings:

All parameters including the password code are reset to the factory settings. This function is activated as follows:

- Switch off the supply voltage
- Press and keep pushed the key [↑] when the power supply is turned off and switch the power supply on again
- Following text appears on the display: “FA SET?”
- Select with the keys [↑], [↓] “YES“
- “DONE“ is displayed and the instrument is restarted. The device is thus reset to factory settings.

7.12 Exit the set-up

Exit Menu
EXIT

- In the Exit Menu press the key, to change in the measurement mode.
- press the [Enter] key for more than 2sec., at any menu level, for changing to the measurement mode.

8 SYSTEM MESSAGES

- *S TST“: Power ON reset
- *DONE“: Action completed successfully
- *CODE? “: Password needed
- *---,“ : Defective probe element
- *SPACE“ : CAL points are too close (2.0%RH)
- *RANGE“ : Range exceeded
- *Power“ : Operating voltage outside the limits
- *FATAL“ : Fatal error
- *DATA“ : Not enough data for Moving Average

Error messages:

A serious error is displayed with an error code. This is important for error analysis. Please send us in such cases always the fault code.

9 TECHNICAL SUPPORT

Luwa Air Engineering AG has an extensive worldwide network of representatives, which offers a service at any time with their experienced technicians. Report any disturbance to your local representative of Luwa Air Engineering

www.luwa.com

HTT-V software menu structure "E"

