dewSMART™

Model ADHT Transmitter

Instruction Manual

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Model ADHT Transmitter

Installation, Commissioning and Operation Manual

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1 General Specification

1.1 Sensor

Model	:	ADHT Transmitter	
Range	:	see sensor label	
Resolution	:	Better than 0.1ºC or 0.1ppm$_v$	
Output Signal	:	4 wire Linear 4 -20mA signal suitable for external equipment with a maximum input impedence of 600W (@24V)	
Accuracy	:	Dewpoint	±2°C (±3.6°F)
		ppm$_v$	±2°C dewpoint equivalent (See calibration certificate for further information).
Environment	:	Non-Corrosive Gases	
Operating Humidity	:	10 to 90% RH (non-condensing)	
Operating Temperature	:	-10 to +50°C (+14 to +122°F)	
Storage Temperature	:	-50 to +70°C (-58 to +158°F)	
Pressure	:	50 barg maximum (standard version)	
Response Time	:	Wet to Dry : -20ºC to –60ºC less than 60 seconds Dry to Wet : -110ºC to –20ºC less than 20 seconds	
Sample Flow Range	:	Flow independent but ideally 2 to 5 l/min	
Calibration	:	Supplied calibrated & traceable to National & International Calibration Standards	
Calibration Period	:	1 Year	
Enclosure	:	Stainless Steel with IP65 weatherproof seals	
Connector	:	8 pin connector (IP65 when mated)	
Cable	:	4 wire (shielded) maximum cable length 1000m.	
EMC: Immunity	:	BS EN 61326-1	
Emissions	:	BS EN 61326-1 :	
Warranty	:	2 Years for faulty workmanship and defective parts	

1.2 Sensor Holder

Model	:	ADHS
Material	:	Stainless Steel
Connections	:	Stainless Steel Swagelok tube fittings
Mounting	:	2 x M5 tapped holes in base OR 4 holes 5mm dia. @ 42 x 35 centres, in mounting bracket.

2 Installation the Air/Gas Sampling System

The piping installation schematic diagram on page 3 of this manual, shows all components which could be used in a dry gas measurement application although all the items shown will not be required for every installation.

Care should be taken to ensure that the sample presented to the measuring sensor is not contaminated with any component that will damage, contaminate or affect the sensor in a way that will impair the system accuracy.

It is strongly recommended that the sample should not contain particulate matter, oil or other heavy hydrocarbon condensate. If these components contaminate the sample system and/or the measuring sensor the system response time will be lengthened, although the sensor calibration will not be effected.

Corrosive Gases: The Sensor should not be exposed to corrosive gases (or corrosive contaminants in the gas sample) as these can chemically attack the sensor, impairing calibration accuracy and/or damaging it beyond economic repair. Examples of such gases are mercury (Hg), ammonia (NH_3), chlorine (Cl_2) etc. Strong oxidising agents such as ozone (O_3) should also be prevented from coming into contact with the sensor..

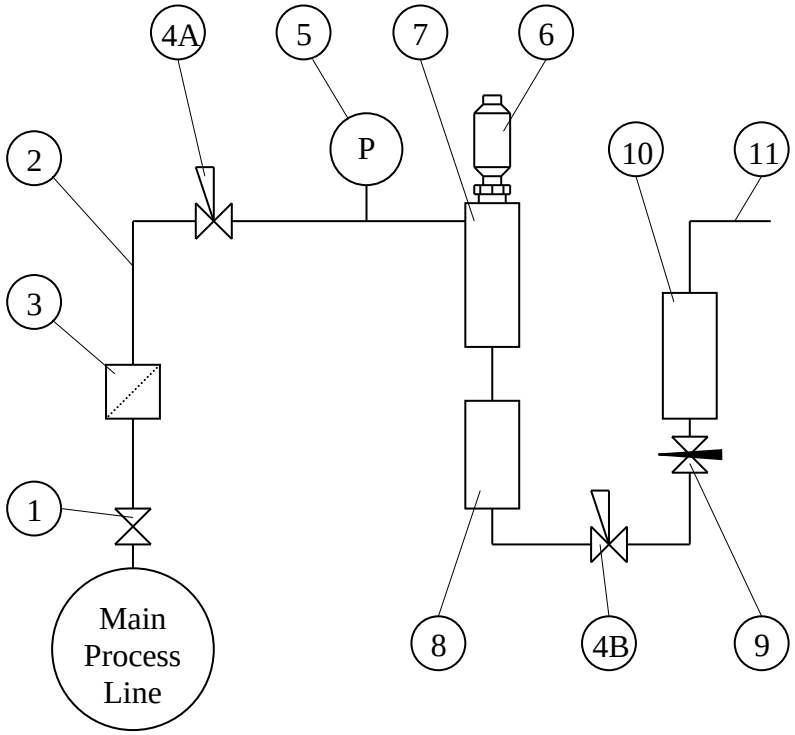
The flow rate, although not critical to the sensor measurement, should be low enough to avoid abrasion to the sensor surface without being so low as to extend the system response time to an unacceptable level. In general, a flow rate of between 2 and 5 Slitres/min at NTP will give the right balance.

The sensor is a variable capacitor which is directly affected by changes in partial pressure of water vapour and these changes, which are proportional to the dew/frost point temperature, are represented ny the linear 4-20mA output.

Partial pressure of water vapour is directly affected by total pressure and, this being the case, the 4-20mA output will be proportional to the dew/frost point temperature at whatever total pressure the sensor is exposed, therefore care should be taken to ensure that the sample pressure, at the sensor is that at which the dew/frost point readings are required.

The measuring sensor can be installed directly into the process line but this does create problems with access for maintenance and calibration. It is for these reasons that we recommend that the sensor be installed in a bypass, fast loop or total loss sample system where the sensor is accessible without interrupting the main process flow line.

2.1 Piping Installation



Notes

a. The sample point should be on the upper surface of the horizontal pipe, or from a vertical section of pipe, wherever possible.

b. The sample tube should run upwards from the sample point. If this is not possible, then an inspection port or drain tap should be installed at the lowest point in the sample system.

2.2 Component index

1. Sample Isolation Valve - This is a recommended item as it allows access to the sample system without interrupting the main process line.
2. Sample Tube – This should be stainless steel for dry air or gas applications but copper or carbon steel can be used where wetter gases are to be measured. If any section of the sample tube must be flexible then PTFE should be used. In most cases, 3mm OD (1/8”) is sufficient as it provides good system response time within minimum flow. 6mm OD (1/4”) tube can be used where pressure drops across the 3mm tube are too high
3. Filter Unit – A filter unit is recommended when the samples are likely to contain particulate matter. If the air/gas sample contains heavy hydrocarbon condensate, the filter must be of the coalescing type with a drain. The filter unit should be positioned as close to the sample point as practical.
4. Pressure Reduction Valve or Pressure Regulator – If the sample is to be measured at atmospheric pressure then the valve 4A should be fitted and 4B omitted from the system. If the sample is to be measured, at full line pressure and the exhaust vented to atmosphere, then

valve 4B should be fitted and 4A omitted from the system. If measurements are to be taken at full line pressure and the sample is to be returned to a part of the main line or a vent, which is at a pressure higher than atmospheric, and the input to that line needs a controlled pressure then both 4A and 4B will be required.

5. Sample Pressure Gauge – This is not a critical part of the moisture measurement but may be required if Dew/Frost point measurements are to be made at higher than atmospheric pressure.
6. Measuring Sensor.
7. Sensor Holder.
8. Desiccant Chamber – This item is required when the sampling is to be intermittent. When installed it prevents the ingress of wet air to the sample system, while the sample is not flowing, improving the response time.
9. Flow Control Valve – This can be a separate item or combined with the flow indicator.
10. Flow Indicator – The recommended sample flow is 2 to 3 SL/M.
11. Sample Exhaust – The exhaust can be vented to atmosphere or returned to the process line as discussed above.

3 Installing and Commissioning Sensor

It is advisable to carry out an initial purge routine of the sample loop, before installing the sensor, in order to remove the possibility of sensor damage on start-up.

Refer to the sample system schematic on page 3 of this manual and open the inlet isolation valve slowly, until a small flow of air/gas at atmospheric pressure flows through the inlet pipework to the sensor holder and exhausts through the sensor entry port of the sensor holder.

Allow this purge to continue for about 15 to 20 minutes to remove any residual moisture from the sample pipework and components.

Close the inlet isolation valve, install the sensor into the sensor holder and ensure that the 8 pin sensor cable connector is correctly positioned and the locking ring screwed down securely to effect a weatherproof seal.

> **NOTE: The Plug and socket of the connector have location keys to ensure correct positioning. Care should be taken to ensure that correct alignment is made before attempting to mate the plug and socket or damage to the connector pins will occur, resulting in malfunction of the instrument.**

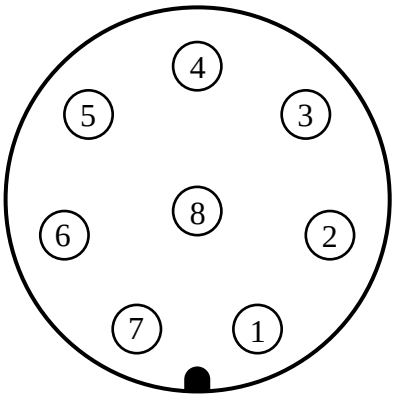
Open the inlet valve slowly, again and, by opening all valves after the sensor holder, allow a low pressure purge through the whole sample system. (Note. If a closed by-pass loop is installed, this section of the procedure is not possible).

Set the required pressures and flows within the sample loop.

This completes the installation and commissioning but, on initial start-up, it could take several hours for the system to reach equilibrium.

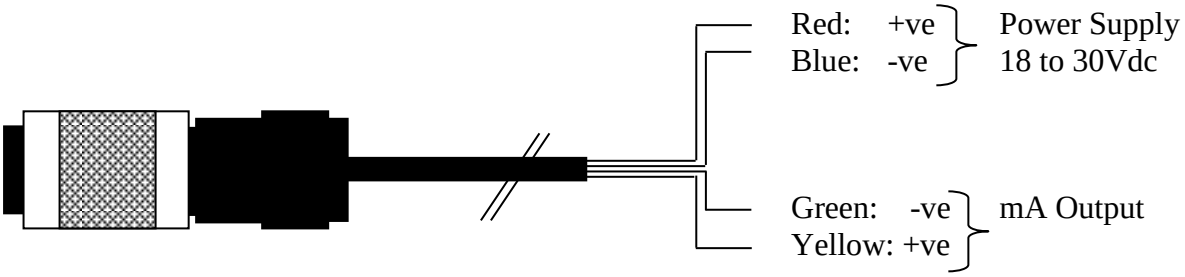
4 Model ADHT –Connections

Panel Plug (viewed into the probe)



Pin	Description
1	Vin+
2	N/A
3	Vin-
4	N/A
5	mA – Output
6	N/A
7	mA + Output
8	N/A

(Note: Factory connections 2,4,6,8 do not use)



5 Operation/Maintenance

The system is designed to operate continuously, with a minimum amount of operator input.

It is, however, advisable to inspect the sample loop periodically to ensure that the required pressures and flows are being maintained.

While the sensor should give several years operation, it is advisable to have the calibration verified, from time to time, to ensure accurate operation of the system. Please refer to your local dealer for recalibration information.

The number and type of items employed in the sample loop will determine what, if any, other routine checks should be made. If, for instance, a filter is used, the filter element should be inspected periodically and changed when necessary.

The instrument should not require any routine maintenance but if any malfunction is suspected it is advisable to contact your local dealer.

6 Hygrometric Equivalents

DEWPOINT ºC	DEWPOINT ºF	VAPOUR PRESSURE mmHg	PARTS PER MILLION by VOLUME	DEWPOINT ºC	DEWPOINT ºF	VAPOUR PRESSURE mmHg	PARTS PER MILLION by VOLUME
-150	-238	7x10(-15)	9.2x10(-12)	-52	-62	0.02305	30.329
-140	-220	3x10(-10)	3.9x10(-7)	-50	-58	0.02961	38.961
-130	-202	7x10(-9)	9.2x10(-6)	-48	-54	0.03786	49.816
-120	-184	9x10(-8)	1.2x10(-4)	-46	-51	0.04819	63.408
-118	-180	0.00000015	0.00020	-44	-47	0.06108	80.368
-116	-177	0.00000025	0.00033	-42	-44	0.07709	101.43
-114	-173	0.00000041	0.00054	-40	-40	0.09691	127.51
-112	-170	0.00000066	0.00087	-38	-36	0.12133	159.64
-110	-166	0.00000107	0.00141	-36	-33	0.15133	199.12
-108	-162	0.00000169	0.00222	-34	-29	0.1880	247.37
-106	-159	0.00000266	0.00350	-32	-26	0.2328	306.32
-104	-155	0.00000413	0.00543	-30	-22	0.2871	377.76
-102	-152	0.00000636	0.00837	-28	-18	0.3529	464.34
-100	-148	0.00000968	0.0127	-26	-15	0.4323	568.82
-98	-144	0.00001459	0.0192	-24	-11	0.5277	694.34
-96	-141	0.00002178	0.0287	-22	-8	0.6422	845.00
-94	-137	0.00003224	0.0424	-20	-4	0.7790	1025.00
-92	-134	0.00004729	0.0622	-18	0	0.9421	1239.61
-90	-130	0.00006879	0.0905	-16	3	1.136	1494.74
-88	-126	0.00009924	0.1305	-14	7	1.365	1796.05
-86	-123	0.00014205	0.1869	-12	10	1.636	2152.63
-84	-119	0.0002018	0.2655	-10	14	1.956	2573.68
-82	-116	0.0002844	0.3742	-8	18	2.331	3067.11
-80	-112	0.0003981	0.5238	-6	21	2.771	3646.05
-78	-108	0.0005533	0.728	-4	25	3.285	4322.37
-76	-105	0.0007638	1.005	-2	28	3.884	5110.53
-74	-101	0.0010476	1.378	0	32	4.581	6027.63
-72	-98	0.0014275	1.878	2	36	5.292	6963.16
-70	-94	0.001933	2.543	4	39	6.099	8025.00
-68	-90	0.002603	3.425	6	43	7.012	9226.32
-66	-87	0.003483	4.583	8	46	8.045	10585.53
-64	-83	0.004635	6.099	10	50	9.209	12117.10
-62	-80	0.006135	8.072	12	54	10.518	13839.47
-60	-76	0.008076	10.626	14	57	11.988	15733.68
-58	-72	0.010576	13.916	16	61	13.635	17940.79
-56	-69	0.01378	18.132	18	64	15.478	20365.79
-54	-65	0.01787	23.513	20	68	17.535	23072.37