# Model ADHT-Ex

Intrinsically Safe Dewpoint Transmitter

# Instruction Manual

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# Model ADHT-Ex Transmitter

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# 1 General Information

- The Alpha Moisture Systems Model ADHT-Ex is a 3 wire, 4-20mA, 24V powered dewpoint transmitter. The unit is fully self-contained in a robust stainless steel casing with weatherproof protection to IP65, making it ideal for heavy industrial environments.
- Designed with the operator in mind, the model ADHT-Ex is extremely easy to use and the digital dewSMART™ technology ensures accurate and reliable readings with little or no maintenance.
- The Model ADHT-Ex is certified (Sira 99ATEX2096X) as intrinsically safe to Ex ia IIC T6 Ga for use in hazardous areas using a PR5104BB2A/B single and dual signal isolators.
- Various ranges are available covering an overall range from –110°C to +20°C dewpoint. The Model ADHT-Ex derives its power directly from the signal isolator and it is configured to give 4-20mA signal for the chosen range.
- The 4-20mA output signal can be transmitted up to 1000 meters either DCS, SCADA system or any other suitable equipment with an input impedance of less than 600Ω
- The Model ADHT-Ex is supplied ready to use, with calibration certificate traceable to National & International Humidity standards, instruction manual and 10m of connecting cable.

## 1.1 Ranges

- PL -110 to +20ºC Dewpoint
- SR -110 to –20ºC Dewpoint
- BL -80 to +20ºC Dewpoint
- GY -80 to 0ºC Dewpoint
- RD -80 to –20ºC Dewpoint
- YW -60 to 0ºC Dewpoint
- GD -50 to +20ºC Dewpoint
- GN -30 to +20ºC Dewpoint

# 2 Safety Information

- Read the safety information below, before use.

## 2.1 Warnings

The ADHT-Ex is intrinsically safe. Therefore it can be used in hazardous areas.

**Certification:** ATEX Coding –  II 1G

Ex ia IIC T6 Ga (Ta= -40°C to+60°C)

It is the responsibility of the user to ascertain the suitability of the ADHT-Ex for use in hazardous areas. Risk assessments should be performed prior to use, taking into account the ADHT-Ex certifications, the ‘X’ rating of the ADHT-Ex and the location and the gas being monitored etc.

## 2.2 **Special Conditions of Use -** (denoted by the X after the certificate number)

The user should note that the circuit is connected to the enclosure and account of this should be taken at installation.

The following applies to all intrinsically safe equipment covered by certificate number Sira 99ATEX2096X:

- To comply with the requirements for intrinsic safety, the equipment must be supplied from a galvanic isolator. A **zener barrier** should not be used unless steps are taken to extend the barrier earth into the hazardous area as far as the instrument.
- When in the non-hazardous area, the Dewpoint Transmitter may be connected to uncertified equipment for the purpose of downloading data. However, to prevent damage to safety-critical components, the user should take steps to ensure that the stated maximum voltage, current and power are not exceeded.
- The equipment may be used in all hazardous zones with all gases with temperature classes up to T6.
- The equipment is only certified for use in ambient temperatures in the range -40°C to +60°C and should not be used outside this range.
- Surface corrosion of (or other surface damage to) the enclosure does not affect the intrinsic safety of the equipment.
- Installation shall be carried out in accordance with the applicable code of practice by suitably-trained personnel.
- The certificate number has an 'X' suffix, which indicates that special conditions of installation and use apply. Those installing or inspecting this equipment must have access to the contents of the certificate.
- Adjustments to this equipment affect operation only and have no effect on intrinsic safety .
- Repair of this equipment shall be carried out in accordance with the applicable code of practice.

**Additional requirements for the User's Guide**

**A** The User's Guide should contain the certification marking as detailed on drawing 878.
Where applicable, the address of the importer or repairer should be specified.

**B** If the equipment is sold into a European country where English is not the main language, the above instructions must be made available in the appropriate language, along with a copy in English. The translation, which must be performed by a competent agent, is the responsibility of the manufacturer or the manufacturer's representative or the person introducing the equipment into the language area in question.

# 3 Installing the Air/Gas Sampling System

The piping installation schematic diagram (see section 4) shows all components which could be used in a dry gas measurement application although all items shown will not be required for every installation.

## Installing the Air/Gas Sampling System continued.

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 affected.

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 3 Sl/min will give the right balance.

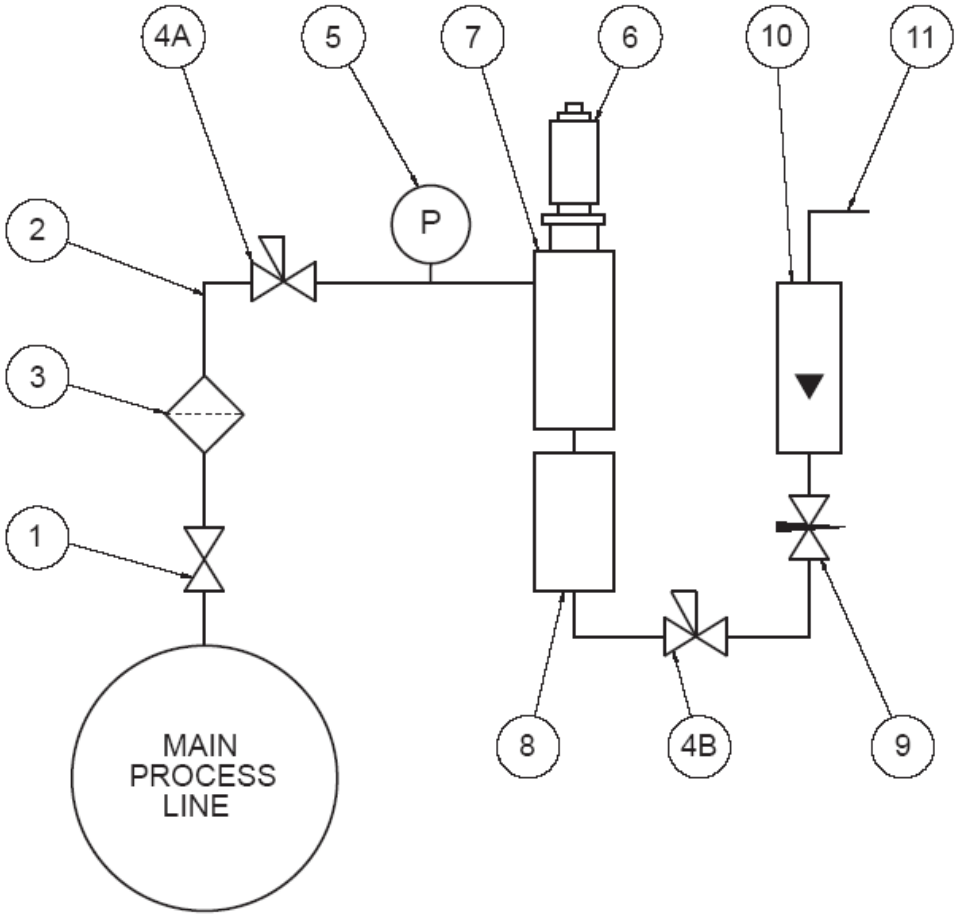
The sensor is a variable capacitor which is directly affected by changes in partial pressure of water vapour and these changes, which are proportional to the dew/frost point temperature are represented by the linear 4/20mA output.

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.

Where a sensor is calibrated to read absolute moisture content (e.g. ppm(V)) it is essential that this is done at a given operating pressure and that this pressure is maintained in the normal process operation. Failure to maintain this pressure will result in read-out errors.

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.

## 3.1 Piping Installation Schematic




NOTES

a. The sample point should be on the upper surface of a horizontal pipe or on a vertical section of pipe, where ever possible.
b. The sample tube should run, continually, upwards from the sample point. If this is not possible an inspection port or drain tap should be installed at the lowest point in the system.

### Component Index

1. Sample Isolation Valve.
This is a recommended item as it allows access to the system without interupting the main process line.

2. Sample Tube.
This should be stainless steel for dry gas applications but can be copper or carbon steel where wetter gasses are to be measured.
If any section of the pipework must be flexible, it is recommended that PTFE be used.
In most cases, 3mm(1/8") OD sample tube gives a good balance between system response and gas usage but, where lower pressure drops are needed, 6mm(1/4") OD tube should be used.

3. Filter Unit.
A filter unit is recommended when samples may contain particle or liquid contaminants. In the case of liquid contamination, the filter should be of the coalescing type, with a drain. The filter should always be positioned as close to the sample point as is practical.

4. Pressure Reducing Valve or Pressure Regulator.
If the sample is to be measured at atmospheric pressure, fit valve 4A and omit valve 4B.
If the sample is to be measured at full process line pressure and then exhausted to atmospher, fit valve 4B and omit valve 4A.
Where measurement is to be made at lower than full process line pressure ans the exhaust is at some lower pressure than the measurement, both valves 4A and 4B will be required.

5. Sample Pressure Guage.
This is not a critical component but may be useful when measuring at above atmospheric pressure.

6. Measureing Sensor.

7. Sensor Holder.

8. Desiccant Chamber.
This item, only required when sampling is intermittent, prevents ingress of water vapour, while the sample is not flowing, which helps to improve system 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 rate is 2 to 3 Sl/min.

11. Sample Exhaust.
Vented to atmospher or, where necessary, returned to the process.

## 3.2 Gases to Avoid

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.

# 4 Installation (PR5104BB2B& PR5104BB2A)

Refer to drawings 1142, 1145 and 1146 and select the system appropriate to this application and to the appropriate hazardous area certification, paying special attention to the whole of this section to ensure a SAFE installation.

# 5 Sensor Cable - Connector To Transmitter

Refer to drawing1008.

**<u>NOTE:</u> 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.**

If a new or replacement cable assembly has to be manufactured, ensure that the diagram is followed exactly and no connections are made to pins other than 1, 3 and 7.

**NOTE. The other pins of the 7 pin connector, are only used in a SAFE area and must not, on any account, be used in the HAZARDOUS are. Failure to follow this instruction will invalidate the hazardous area certification and render the transmitter UNSAFE.**

# 6 THE PR5104 Isolator/Repeater

Refer to drawing 1142.

This drawing identifies the terminal numbers and there function. Follow these instructions carefully when wiring the device into the system.

**WARNINGS**

1. Carry out all installation work in accordance with the relevant instruction given in a nationally accepted code of practice for intrinsically safe installations.

2. Do not install isolators in hazardous areas unless they are housed in an enclosure approved for the area concerned.

3. Mount isolators (and enclosures) in a clean, dry environment, shielded from direct sunlight and other sources of heat.

4. Take great care to keep hazardous area and safe area wiring segregated when wiring isolators, whether un-enclosed or within enclosures.

5. Do not use chemical cleaning solvents.

# 7 Mounting the PR5104 Isolator/Repeater

Clip the PR5104 onto type T35 DIN rail, with the blue signal plugs facing towards the hazardous area wiring.

To remove an isolator from the rail, insert a screwdriver into the sliding clip and lever the clip gently outwards. Pivot the isolator off the rail.

## 7.1 Wiring the PR5104 Isolator/Repeater

Making connections:-

a. Trim back the insulation of conductors by 12mm.

b. Check the terminal assignments shown on drawing 1142.

c. Insert the conductors according to the terminal assignments and tighten the screws.

**NOTE. If wiring is to be fitted with crimp ferrules, the trimmed conductor length should be 14mm.**

# 8 Operation/Maintenance

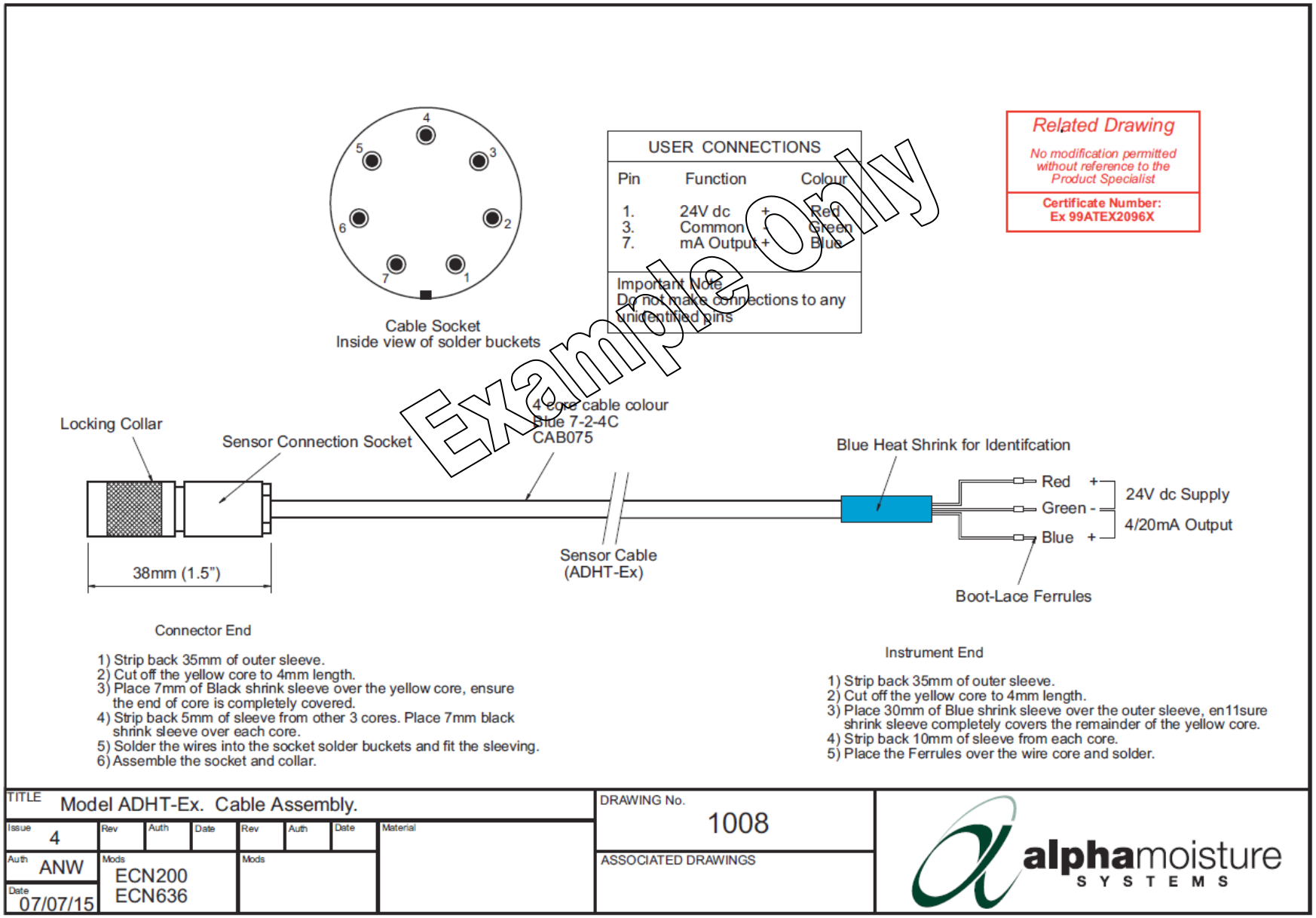
The Model ADHT-Ex is designed to operate continuously and, providing that care has been taken with the initial installation, as discussed in pages 2 & 3 of this manual, the amount of routine maintenance necessary can be kept to a minimum.

It is advisable to periodically check that the correct pressures and flows are applied to the transmitters and that any filters installed are cleaned, drained or replaced as necessary.

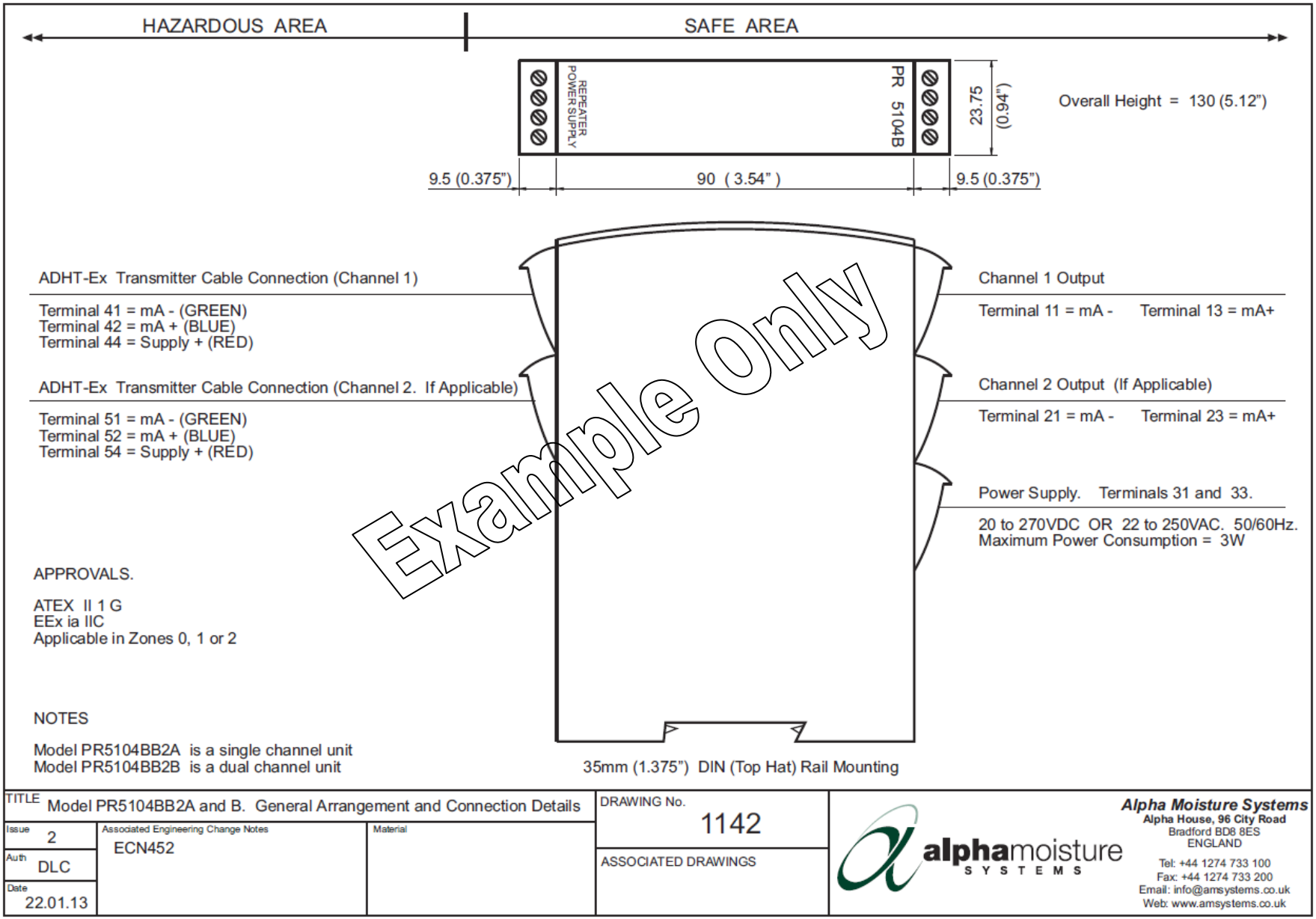
Calibration verification of the transmitter output and sensor response curve is recommended at 12 monthly intervals.

If, for any reason, it is necessary to replace a Model ADHT-Ex, any other Model ADHT-Ex of the same measuring range is fully interchangeable.

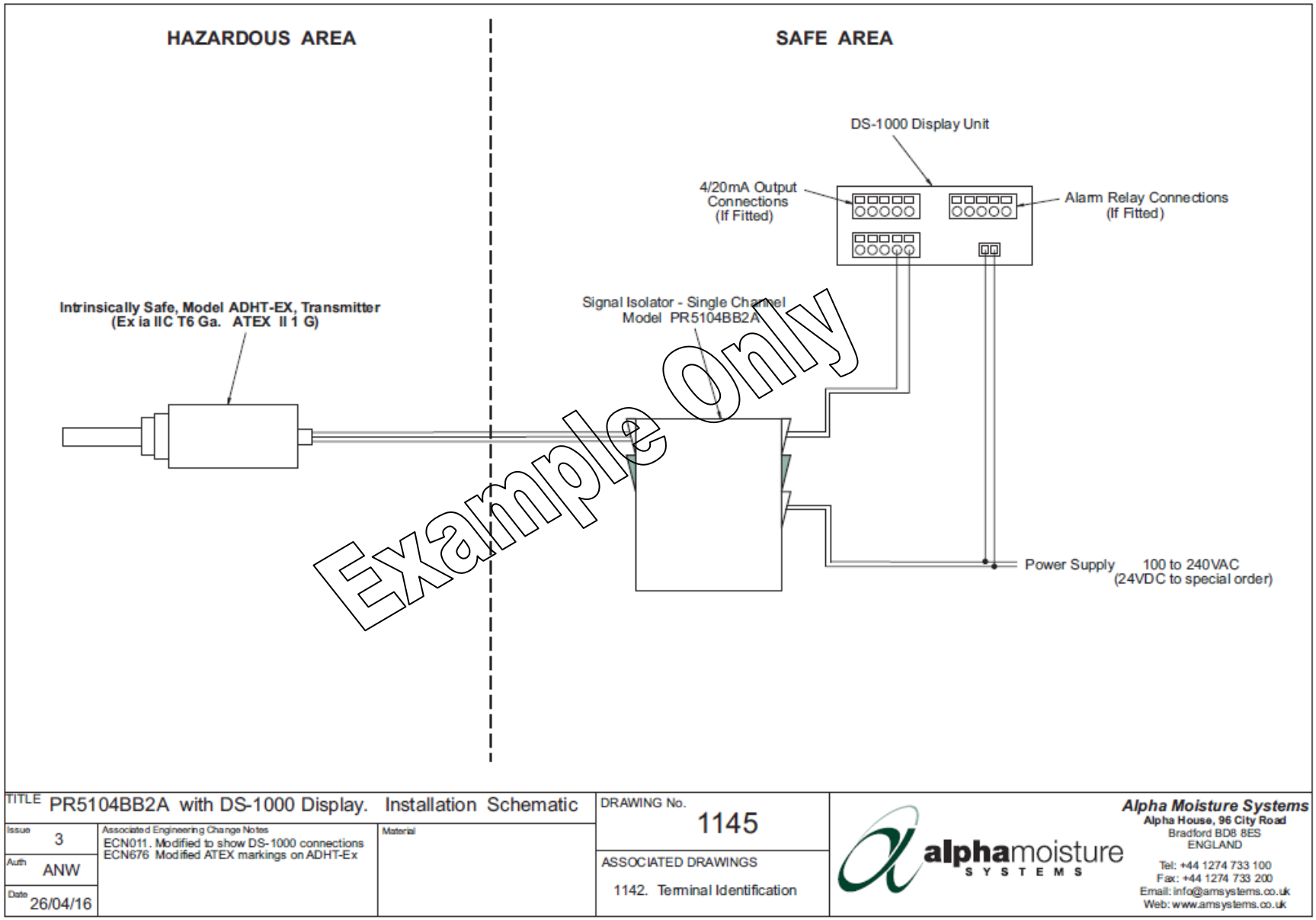
# 9 Model ADHT-Ex Cable Assembly



## 10 Model PR5104BB2A & B General Arrangement



## 11 PR5104BB2A with DS1000 Display



## PR5104BB2A with I.S. Loop Powered Dis