User Manual

Dew Point Sensor - Mini Series

Model: DEM

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Notices and Warnings

Notices

Please **read all of this manual** before you install, operate or maintain this product. Pay attention to notes, warnings and instructions. The manufacturer cannot be held liable for any damage which occurs as a result of noncompliance with this manual.

Do not tamper with device. Should the device be tampered with in any manner other than a procedure which is described and specified in this manual, the warranty is cancelled and the manufacturer is exempt from liability.

The product is designed exclusively for the described application. Use of this product in conditions not specified in this manual or, contrary to the instructions provided by the manufacturer, is considered improper handling / use of the product and will void your warranty. The manufacturer will not be held liable for any damages resulting from improper use of the product.

This manual should be read carefully by relevant personnel and the end user**.** This manual should be kept with the product and be made available as needed. **Once you install or use the product, you accept that you have read, understood and complied with this manual**.

Compressed Air Alliance endeavours to make the content of this manual correct, but is not responsible for omissions or errors and the consequences caused. In case of any doubts or questions regarding this manual or the product, please contact Compressed Air Alliance

Warnings

Ignoring the warnings can lead to serious injury and/or cause damage!

When handling, operating or carrying out maintenance on this product, personnel must employ safe working practices and observe all local health & safety requirements and regulations.

Improper operation or maintenance of this product could be dangerous and result in an accident causing damage to machinery or injury or death.

The manufacturer cannot anticipate every possible circumstance which may represent a potential hazard. The warnings in this manual cover the most common potential hazards and are therefore not all-inclusive. If the user employs an operating procedure, an item of equipment or a method of working which is not specifically recommended by the manufacturer they must ensure that the product will not be damaged or made unsafe and that there is no risk to persons or property.

NEVER CHANGE ORIGINAL COMPONENTS WITH ALTERNATIVES.

Compressed Air Safety

Any contact with quickly escaping air or bursting parts of the compressed air system can lead to serious injuries or even death.

- Do not exceed the maximum permitted pressure.
- Only use pressure rated installation materials and parts.
- Avoid getting hit by escaping air or bursting parts.
- The system must be pressure-less during maintenance work.

Electrical Safety

Any contact with energised parts of the product, may lead to an electrical shock which can lead to serious injuries or even death. The user shall take all measures necessary to protect against electrical shock.

Consider all regulations for electrical installations.

The system must be disconnected from any power supply during maintenance work.

Any electrical work on the system is only allowed by authorised qualified personal.

Storage and transportation

- Make sure that the transportation temperature of the sensor is between -10°C to 60°C (14°F to 140°F).
- Please make sure that the storage temperature of the sensor is between -10°C to 50°C (14°F to 122°F) and the humidity is <90%, no condensation. Avoid direct UV and solar radiation during storage.

Cleaning

If you need to clean the sensor it is recommended to use a clean, dry cloth. For stubborn marks, use distilled water or isopropyl alcohol only.

Please note: contamination on the sensor tip will affect calibration and accuracy of the sensor. Removal of the contamination may not fix the issue.

Disposal

Electronic devices are recyclable material and do not belong in the household waste. The product, accessories and its packing material must be disposed according to local statutory requirements.

Introduction

About Dew Point Sensors

Intended Use

Compressed Air Alliance's dew point sensors are suitable for use in manufacturing, industrial and base building environments providing the sensor's specifications are met. This includes:

- Sensor is used in inert gases, eg air, oxygen, nitrogen, carbon dioxide
- Pressure dew point is between: -60°C to +60°C (-76°F to 140°F)
- Minimum gas flow rate is > 1 Liter/min
- Gas pressure between: 0 to 50 bar (725 psi)
- Gas temperature is between: -40°C to +100°C (-40°F to +212°F)
- Power supply is between: 10 to 30 vDC
- The dew point is not used in explosive areas.

Refer to the Specifications section (next page) for full requirements.

Our dew point sensors measure pressure dew point (PDP), gas temperature (°C or °F) and relative humidity (RH).

About Dew Point Sensors

Dew Point Sensors are the simplest way to monitor dryer performance and detect moisture issues before they can cause a problem.

Moisture in the gas systems can clog pipes, break machinery, cause contamination (eg rust, mildew, bacteria) or cause freezing.

Dew point sensors are cheap, easy to install and have low maintenance requirements.

Benefits of monitoring dew point

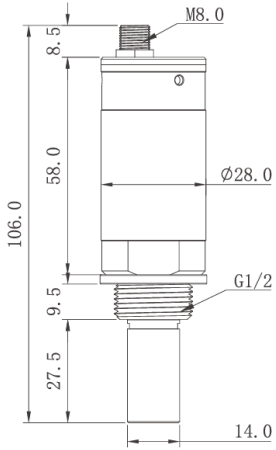
- Improve system reliability
- Reduce product contamination risks
- Reduce system maintenance
- Reduce operating and energy costs
- Reduce the risk of rust and corrosion build up
- Improve dryer reliability
- Improve filter life and performance
- Reduce the risk of bacteria, fungus and yeast build up
- Alerts you to changes in dryer performance before moisture appears in your plant
- Easy to install and low maintenance
- Suitable for temporary or permanent installation.

Specifications – Mini Series

	Mini Series
Technology	Polymer
System	Compressed air and gas systems up to 4 Mpa (600psi)
Dryer Type	Refrigerant, Desiccant, Drum or Membrane dryers
Gases	Air, Argon, Carbon Dioxide, Carbon Monoxide, Helium, Hydrogen, Nitrogen, Oxygen
Accuracy	Dew Point: ±2°C Temperature: ±0.5°C *The accuracy of the sensor is affected by on-site conditions. Contaminants such as oil, high humidity or other impurities can affect the calibration and accuracy of the sensor.*
Minimum gas flow	> 1 L/min
	Measurement Ranges
Dew Point Measurement	-60°C to +60°C | -76°F to 140°F
Gas Temperature Measurement	-40°C to +100°C | -40°F to +212°F
	Outputs
Output	Analogue: 4 to 20mA (3 wire) Digital: RS485 Modbus / RTU
Modbus Output Signals	Pressure Dew Point (PDP), Relative Humidity (RH), Temperature (°C or °F)
Analogue Output Signals	Pressure Dew Point (PDP) only
	Power
Power Supply	10 to 30V / 50 mA + 4-20mA Current output
4-20 mA Current Output • Resolution • Temperature Drift • Load	 • 0.002 mA • 0.01% of span/°C • Max 500 ohm

	Mini Series
Electrical Connection	1 x 5 pin M8, female
EMC	According to IEC 61326-1
	Working Environment
Operating Temperature	-30 to +70°C | -22 to +158°F
Working Pressure	0 to 50 bar
Gas Relative Humidity	0 to 95% RH
Storage Temperature	-30°C to +70°C | -22°F to +158°F
	Other Information
Inbuilt Display	No
Process Connection	G1/2" thread (Contact us for UNF process connection)
Measurement Chamber	1/2" Quick coupling (Nitto type) with Adjustable Bleed Screw
Dimensions	107 mm L x 28 mm W 4.2" L x 1.1" W
Casing	Stainless Steel or Aluminium
IP Rating	IP65
Installation Type	Permanent or temporary installation
Calibration Frequency	Every 2 years *provided the sensor is not exposed to relative humidity above 85%*

Dew Point Sensor Dimensions (mm)



Protective Cap / Transport Cap

The dew point sensor comes with a protective cap / transport cap. This cap is designed to protect the sensor during transport and storage. Please remove this cap before installing the sensor.

Protective cap still on sensor

Protective cap removed

Pressure Dew Point or Atmospheric Dew Point

It is important to know if you are measuring Pressure Dew Point (PDP) or Atmospheric Dew Point as they will give different results. This is because dew point is affected by pressure. For a given relative humidity, the higher the gas pressure, the higher the dew point due to the increased volume ratio of gas to moisture. Decreasing gas pressure increases the gas volume thereby reducing the dew point.

Pressure Dew Point (PDP) is the dew point inside the pipe where the gas is under pressure (ie the pressure is higher than atmospheric pressure).

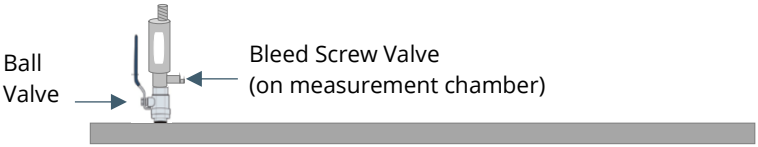
Atmospheric Dew Point is the dew point in non-pressured gases, ie the dew point of ambient conditions.

Pressure Dew Point

Sensor is measuring dew point inside the pipe

Atmospheric Dew Point

Sensor is measuring dew point in ambient conditions, ie the sensor is outside the pipe



If the dew point sensor is installed in the pipe and you want to measure:

- Pressure Dew Point – open the ball valve and open the bleed screw slightly. This will draw gas up to the sensor tip whilst maintaining the pipe pressure.
- Atmospheric Dew Point – Install a flow control valve on the inlet side of the chamber and open slightly. Open the bleed screw fully. This will bring the pressure in the measurement chamber to atmospheric pressure.

Dew Point Sensor Pack

Each dew point sensor comes with:

- ✓ Dew Point sensor – in either Aluminium **or** Stainless Steel Casing
- ✓ Measurement Chamber with mounting bracket
  - Standard option = 1/2" Quick coupling (Nitto type) with Adjustable Silencer
  - Talk to you local dealer about other options
- ✓ Connector – 5 meter cable with M8 connector
- ✓ Calibration Certificate

Installation

Installation Overview

Compressed Air Alliance recommends that our dew point sensors are installed via a measurement chamber.

Step 1 – Find a suitable section of pipe

- The sensor must be installed vertically, on dry side of system
- Do **NOT** install the sensor before a dryer or in gases with a relative humidity above 80%
- Do **NOT** install the sensor upside down, horizontally, at an angle or in wet gas

Step 2 – Install connection point in pipe, eg a ball valve, nozzle or nipple

Step 3 – Remove protective cap from sensor

Step 4 – Attach Dew Point Sensor to connection point

Step 5 – Set the gas bleed

Step 6 – Wire the sensor (see '*Installation – Electrical*')

Step 7 – Check the sensor settings

Step 8 (optional) – Connect the sensor to your SCADA or energy management system

Step 9 – Fill out the Commissioning Report (last page of this manual)

Tools and Equipment needed for installation

(not included with Dew Point Sensor Pack)

Wrench / Spanner

Thread Tape / Sealant

Ball Valve (optional)

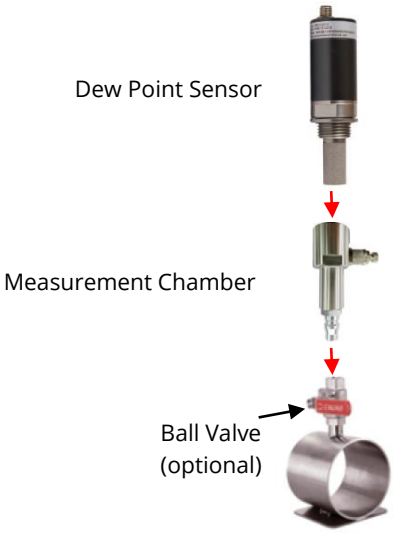
Hot Tap Kit (optional)

Installation – Mechanical

WARNING! Incorrect installation can damage the sensor or cause it to work incorrectly.

Notes

- **Before installing the sensor, make sure it is rated for your system** (refer to the "Specifications" section).
  - Use of the product outside specified ranges or operating parameters can lead to malfunctions and may damage the product or system.
- Do not use this product in explosive areas.
- Always use a spanner / wrench to install the product.
- Only use pressure rated materials and parts when installing and maintaining the product.
- Do not disassemble the product.
- Please follow local and national regulations before/during installation and operation.
- The product must be installed properly and calibrated regularly, otherwise it may lead to inaccurate measurement values.

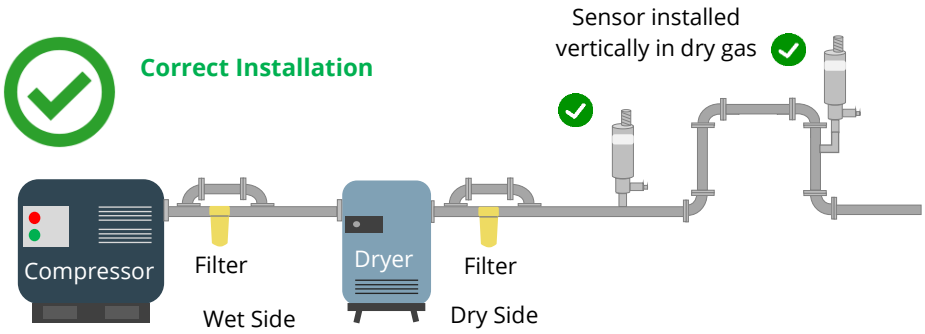


Step 1 – Find a suitable section of pipe

The sensor **must be installed vertically in dry gas** (gas humidity should be less than 80% relative humidity (RH)).

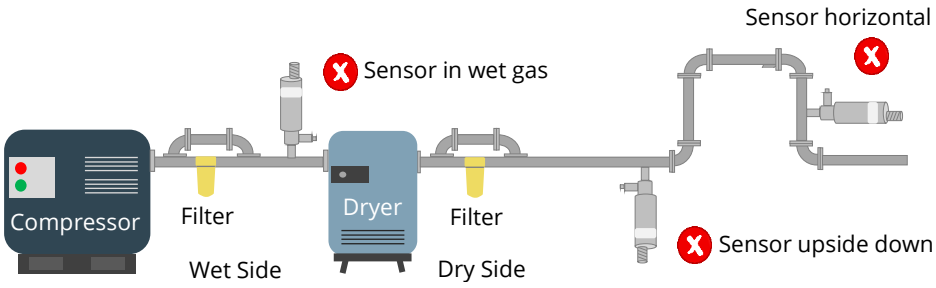
Make sure the sensor location has enough room above the pipe to install the sensor.

If installing the sensor outdoor, protection from sun and rain is necessary.



Incorrect Installation

Do **NOT** install the sensor before a dryer or in gases with a re lative humidity above 80%.
Do **NOT** install the sensor upside down, horizontally or at an angle, as shown below.
Do **NOT** let condensate reach the tip of the sensor



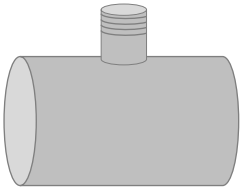
Step 2 – Install connection point in pipe

To install the sensor, you need a connection point to the pipe, eg a ball valve or a nozzle or nipple. The thread must be G 1/2".

Use of a ball valve is optional - You do not need to use a valve to install the sensor. However, using a valve will make removing the sensor easier (eg when you need to remove the sensor for calibration).

If installing a ball valve, you can use a hot tap drill and clamp to create a connection point on pressurized or unpressurised pipes. See the Compressed Air Alliance website for information on hot tap drills and clamps.

Ball Valve **OR** Welded nipple on pipe

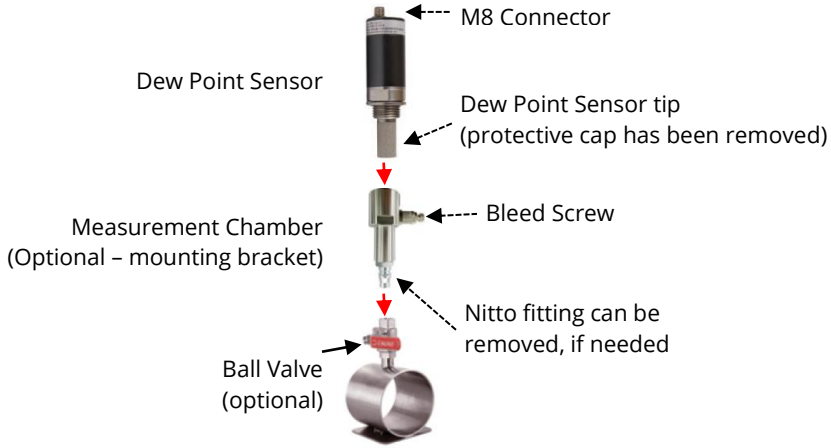


Step 3 – Remove Protective Cap

Remove (unscrew) the protective cap from the dew point sensor

Step 4 – Attach dew point sensor to connection point

- Attach the measurement chamber to the connection point.
  - You can remove the nitto fitting and replace with a 1/4" male BSP fitting, if required
- Screw the sensor into the measurement chamber
  - Make sure the protective cap is removed from the dew point sensor
- Screw the measurement chamber into the connection point (eg valve, nipple or nozzle) and tighten with a spanner
  - Compressed Air Alliance recommends that our dew point sensors are installed via a measurement chamber
  - A reducing bush may be needed if connecting the measurement chamber to a large ball valve or nipple
  - Fix measurement chamber firmly to prevent loosing or shaking
  - Use thread tap or sealant to prevent gas escaping
  - If needed, you can use the mounting bracket to secure the measurement change to a wall or block
- Open the valve



Optional - use the mounting bracket to secure the measurement chamber to a wall or block

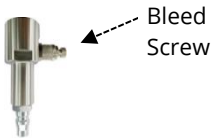
Step 5 – Set the Gas Bleed

To ensure a flow of gas past the sensor tip, either allow a small amount of gas to escape to atmosphere (option 1 below) or connect a zero loss chamber (option 2 below).

Option 1 – Bleed gas to air

On the measurement chamber:

- Close the bleed screw completely.
- Then slowly open the bleed screw to allow a small flow of gas to escape to the atmosphere.

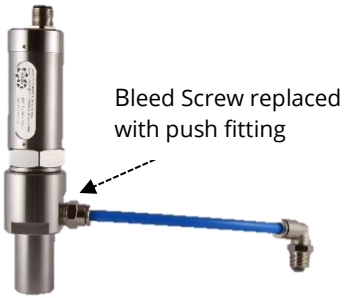


Option 2 – Zero Loss Chamber

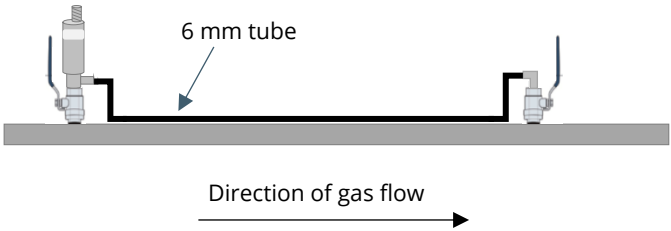
The zero loss chamber will prevent gas escaping to atmosphere and can improvie system efficiency.

- Remove the bleed screw and fitting from measurement chamber
- Install a 1/4" to 6mm push fit into measurement chamber
- Connect a 6 mm tube between the measurement chamber and a second connection point downstream of the sensor.

Tip - use cable ties to secure the 6 mm tube to the pipe.



Zero Loss Chamber set up



Installation – Electrical

WARNING! Incorrect wiring can damage the sensor or cause it to work incorrectly.

Notes:

- Do **not** screw the M8 connector using force, otherwise it may damage the connection pins.
- Always check the M8 connectors to make sure they are wired correctly.
- Follow all local and national safety requirements and regulations for electrical installations.
- **The system must be disconnected from any power supply during installation and maintenance work.**
- Only authorised and qualified personal can conduct electrical work.

4-20mA Scaling

The sensor has an analog output range of 4 to 20 mA, which is a **3-wire active** analog output. The analog output scaling is:

- 4 mA = -60°C (-76°F)
- 20 mA = +60°C (140°F)

The analog output can be set to correspond to temperature, dew point, or humidity.

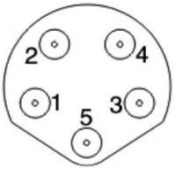
Wiring - Mini Dew Point Sensor

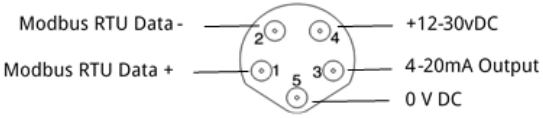
The Mini series Dew Point Sensor has an M8 connector.

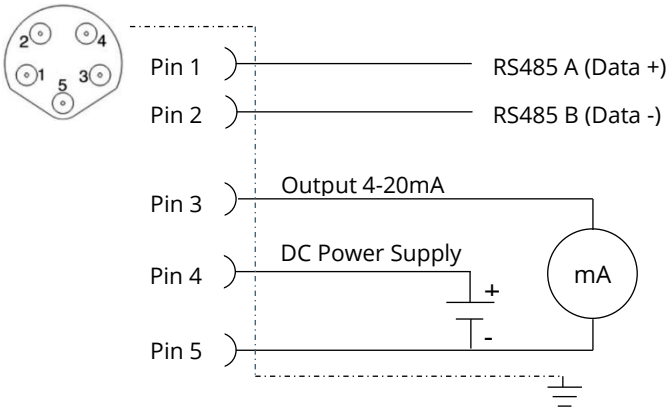
Do **not** screw the M8 connector using force. Otherwise, it may damage the connection pins.

The data cable will be coloured coded as shown in the table below. Its good practice to check the cable colours and make sure they match the chart below.

Connector		Cable Colour
Pin 1	RS845, Data + (A)	Brown
Pin 2	RS845, Data - (B)	White
Pin 3	4-20mA Output	Blue
Pin 4	+12-30 vDC	Black
Pin 5	0 vDC (Ground for Modbus)	Grey







Commuication Settings

Default Modbus Settings

All dew point sensors use the following default Modbus settings. Settings can be changed to suit system requirements using our Service Software (contact Compressed Air Alliance for more information).

Default Modbus RTU (RS485) Settings					
Address	**Baud Rate**	**Frame / Parity / Stop Bit**	**Response Time**	**Response Delay**	**Frame Spacing**
1	9600	8 / N / 1	1 Sec	0 Milliseconds	7 Characters

Modbus Registers						
Holding Register	**Address**	**Data Type**	**Byte Length**	**Description**	**Unit**	**Read / Write**
1	0	FLOAT	4	Temperature	°C or °F	Read
3	2	FLOAT	4	Relative Humidity	%RH	Read
5	4	FLOAT	4	Pressure Dew Point	°Ctd or °Ftd	Read

Trouble shooting

Trouble Shooting

Problem	Possible Causes	Suggested Action
Readings are different than expected	Only the bottom part of the protective cap has been removed	Remove (unscrew) the whole protective cap from the dew point sensor
	Sensor installed incorrectly, eg upside down, in wet air	Check installation
	Gas is not reaching the sensor tip. • Measurement Chamber not used.	Install measurement chamber and open bleed valve slightly. This will ensure that gas reaches the sensor tip
	Gas is not reaching the sensor tip. • Ball Valve is closed or • Gas system is turned off.	Open ball valve. Check gas system is turned on
	Gas is not reaching the sensor tip. • Bleed screw is closed.	Open bleed valve slightly on the measurement chamber
	Too much gas is reaching the sensor tip. (Bleed screw open too far.)	Tighten bleed valve on the measurement chamber so that only a small amount of gas is escaping
	Sensor is wired incorrectly	Check Wiring • 4-20mA wiring uses 3-wires • Modbus uses 5 wires
	Sensor communication set up incorrectly	Check 4-20mA settings and/or Modbus settings
	Dryers, filters, condensate drains are not working correctly	Service equipment
	Equipment failed (eg dryer failure) thus allowing too	Sensor may be damaged. Contact Compressed Air Alliance

Problem	Possible Causes	Suggested Action
	much water vapour, oil or particles to enter the system	
	Sensor due for calibration	Calibrate sensor. Compressed Air Alliance can help with calibration
Readings don't change or readings stuck on a certain number	Sensor damaged	Contact Compressed Air Alliance
	Incorrect sensor for your system	Check that the sensor's specifications are suitable for your system.
Air is escaping from the bleed screw on the measurement chamber	-	This is normal operation. If you don't want gas to escape from the bleed screw, use a 'Zero Loss Chamber'

Factory Settings

The default settings / factory settings are shown below. If you need to change these settings contact Compressed Air Alliance or your local Distributor.

Setting	Default Value / comments		
All Dew Point Sensors			
Gas Type	Air		
Unit Setting		USA	Rest of World
	Dew Point Units	°F	°C
	Temperature Units	°F	°C
	Pressure Units	psi	Bar
RS485 (Modbus) Settings	Baud Rate	9600	
	Parity	None	
	Stop Bits	1	
	Response Delay	0	
	Device Address	1	
Analog Settings	4-20mA Channel	Pressure Dew Point (PDP)	
	4-20mA Scaling Low (4)	-60°C	
	4-20mA Scaling High (20)	+60°C	

Warranty

Compressed Air Alliance provides a 12-month warranty for all sensors. The warranty covers materials and workmanship under the stated operating conditions from the date of delivery. Please report any findings immediately and within the warranty time.

If faults occur during the warranty period Compressed Air Alliance will repair or replace the defective unit, without charge for repair labour and material costs but there is a charge for other services such as labour to remove or reinstall the instrument, transport and packing. Warranty repairs do not extend the period of warranty.

The following damage is excluded from this warranty:

- Improper use and non-adherence to the user manual.
- Use of unsuitable accessories.
- External influences (e.g. damage caused by vibration, damage during transportation, excess heat or moisture).

The warranty is cancelled when one of the following situations occurs:

- The user opens the measurement instrument without a direct request written in this manual.
- Repairs or modifications are undertaken by third parties or unauthorised persons.
- The serial number has been changed, damaged or removed.

Other claims, especially damage occurring on the outside of the instrument (eg dents, marks), are not included unless responsibility is legally binding.

Calibration

The sensor is calibrated before delivery. The calibration date is printed on the certificate which is shipped with the sensor.

Dew Point Sensors require calibration to remain accurate. The frequency of calibration depends greatly on the level of contamination within your system.

We recommend you calibrate the sensor every 2 years (provided the sensor is not exposed to relative humidity above 85%). Calibration is excluded from the product warranty. For more information, contact Compressed Air Alliance.

Compressed Air Alliance Pty Ltd

Address: 2/7 Narabang Way, Belrose NSW 2085, Australia

Phone/What's App: +61 494 095 632

E-mail: sales@compressedairalliance.com

Website: www.compressedairalliance.com