



SF72

Dew-Point Transmitter

User's Manual



Please fill out the form(s) below for each instrument that has been purchased.

Use this information when contacting Michell Instruments for service purposes.

Transmitter	
Code	
Serial Number	
Invoice Date	
Location of Instrument	
Tag No	

Transmitter	
Code	
Serial Number	
Invoice Date	
Location of Instrument	
Tag No	

Transmitter	
Code	
Serial Number	
Invoice Date	
Location of Instrument	
Tag No	



SF72 Transmitter

For Michell Instruments' contact information please go to
www.michell.com

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Safety

The manufacturer has designed this equipment to be safe when operated using the procedures detailed in this manual. The user must not use this equipment for any other purpose than that stated. Do not apply values greater than the maximum value stated.

This manual contains operating and safety instructions, which must be followed to ensure the safe operation and to maintain the equipment in a safe condition. The safety instructions are either warnings or cautions issued to protect the user and the equipment from injury or damage. Use competent personnel using good engineering practice for all procedures in this manual.

Electrical Safety

The instrument is designed to be completely safe when used with options and accessories supplied by the manufacturer for use with the instrument.

UL Approval

This product is UL approved within the operating temperature range of -20°C to +60°C. The IP66 rating of this product is outside the scope of UL Approval, but this product has been verified as being IP66 by independent, UKAS accredited, 3rd party listing.

Pressure Safety

DO NOT permit pressures greater than the safe working pressure to be applied to the instrument. The specified safe working pressure is 45 MPa (450 barg / 6500 psig). Refer to the Technical Specifications in Appendix A.

Toxic Materials

The use of hazardous materials in the construction of this instrument has been minimized. During normal operation it is not possible for the user to come into contact with any hazardous substance which might be employed in the construction of the instrument. Care should, however, be exercised during maintenance and the disposal of certain parts.

Repair and Maintenance

The instrument must be maintained either by the manufacturer or an accredited service agent. For Michell Instruments' contact information please go to www.michell.com.

Calibration

The recommended calibration interval for this instrument is 12 months unless it is to be used in a mission-critical application or in a dirty or contaminated environment in which case the calibration interval should be reduced accordingly. The instrument should be returned to the manufacturer, Michell Instruments Ltd., or one of their accredited service agents for re-calibration.

Safety Conformity

This product meets the essential protection requirements of the relevant EU and US standards and directives. Further details of applied standards may be found in the Technical Specifications in Appendix A.

Abbreviations

The following abbreviations are used in this manual:

barg	pressure unit (=100 kP or 0.987 atm) (bar gauge)
°C	degrees Celsius
°F	degrees Fahrenheit
DC	direct current
g	grams
in	inch(es)
µm	micrometer
m/sec	meters per second
mA	milliampere
max	maximum
mm	millimetres
MPa	megapascal
NI/min	normal liters per minute
Nm	Newton meter
oz	ounces
psig	pounds per square inch
RH	relative humidity
scfh	standard cubic feet per hour
fps	feet per second
T	temperature
V	Volts
Ω	Ohms
∅	diameter

Warnings

The following general warning listed below is applicable to this instrument. It is repeated in the text in the appropriate locations.



Where this hazard warning symbol appears in the following sections it is used to indicate areas where potentially hazardous operations need to be carried out.

1 INTRODUCTION

The SF72 dew-point transmitter has been manufactured, tested and calibrated to the highest available standards and should be in perfect working order, ready for installation into a gas measurement application. If there are any questions about the instrument or how to install and operate it, please contact a Michell representative (for Michell Instruments' contact information go to www.michell.com).

1.1 Features

The SF72 dew-point transmitter is a continuous on line 4-20mA transmitter for the measurement of moisture content in air and other non-corrosive gases.

The key features are:

- Compatible with Compressed Air Quality ISO8573.1 class 2 to 6 requirements
- Dew-point measurement range -60 to +60°Cdp (-76 to +140°Fdp)
- Fast response
- Rugged all stainless steel IP66 construction
- 8-point traceable calibration certificate
- Accuracy $\pm 2^{\circ}\text{C}$ dew point
- Available in G $\frac{1}{2}$ " BSP, $\frac{3}{4}$ " - 16 UNF and $\frac{5}{8}$ " - 18 UNF process connections

2 INSTALLATION

2.1 Unpacking the Instrument

On delivery, please check that all the following standard components are in the packing box:

- SF72 Transmitter
- Bonded Seal
- Certificate of Calibration
- Connector (for sensor/cable)

Unpack the dew-point transmitter box as follows:

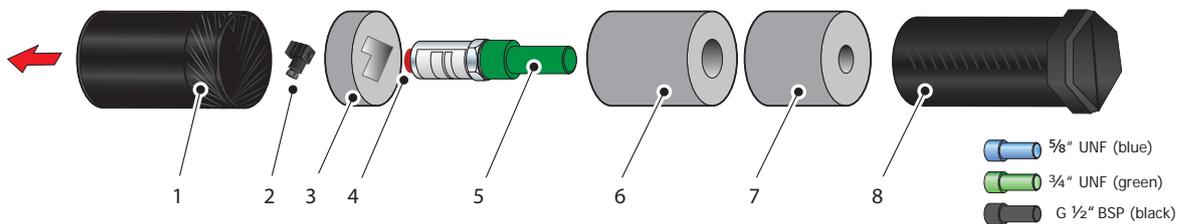


Figure 1 Transmitter Unpacking Method

1. Unscrew the cap (1) from the packing tube (8).
2. Remove the foam block (3) containing the connector (2).
3. Pull out the transmitter (5) from the tube, complete with the two foam covers (6) and (7) and the red protective cap (4).
4. Remove the foam covers from the transmitter but leave the plastic protective cover (5) and the red cap (4) in place until ready for installation.

NOTE: The transmitter sensing element is protected while in transit by a blue, green or black cover containing a small desiccant capsule. The connection pins are protected by a red plastic cap. None of these plastic items are required for the operation of the transmitter.

NOTE: Keep the connector in a safe place until the transmitter is ready for wiring.

2.2 Preparation of the Sensor Cable

The sensor cable is NOT supplied as standard. A cable can be obtained by contacting your local distributor or Michell Instruments (see www.michell.com for details).

Cable connection to the SF72 transmitter is made via the removable connector. Removing the central screw enables the connector terminal block to be removed from the outer housing by using a small screwdriver to prise it clear.

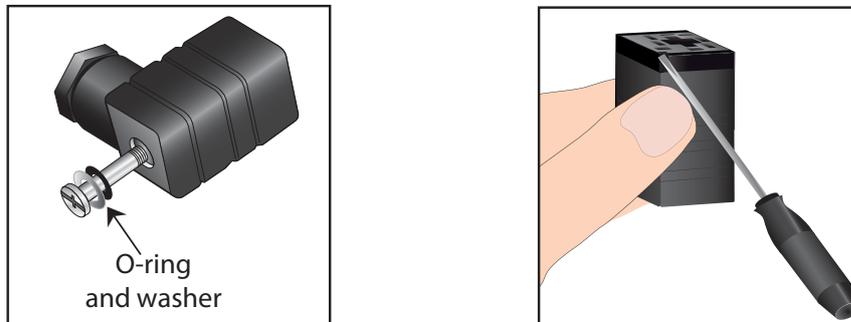


Figure 2 Connector Terminal Block Removal



Caution: When removing the central screw ensure that the small sealing O-ring and the washer are retained on the screw and are present during re-installation.

For the transmitter to work properly, and to achieve maximum performance, the sensor cable must be connected to the sensor connector as shown in the drawing below.

NOTE: The drawing below shows the identity of the connector terminals and wiring connections of the cable manufactured by Michell Instruments.

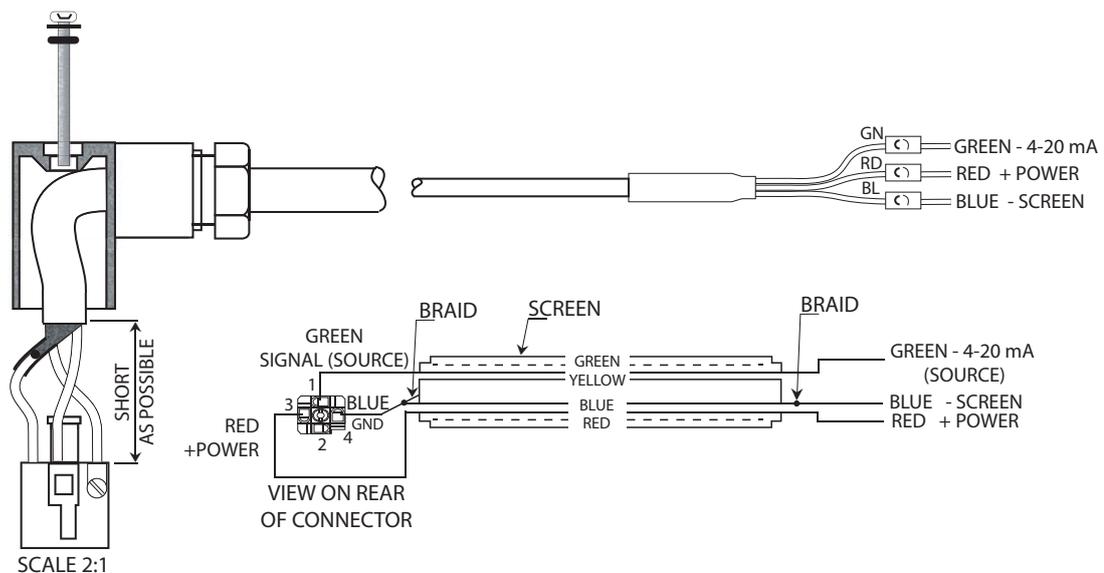


Figure 3 Wiring Connections



Always connect the 4-20 mA return signal to a suitable load (see Figure 3) before the power is applied. Without this connection, the transmitter may be damaged if allowed to operate for prolonged periods.

2.3 Cable Connection

When installing the connector, and to ensure that full ingress protection is achieved, the securing screw (with the O-ring and washer) must be tightened to a minimum torque setting of 3.4 Nm (2.5 ft-lbs). The sensor cable used must be a minimum diameter of 4.6mm (0.2”).



In applications where the ambient temperature is +60°C, ensure that any connection cable used is also suitably rated.

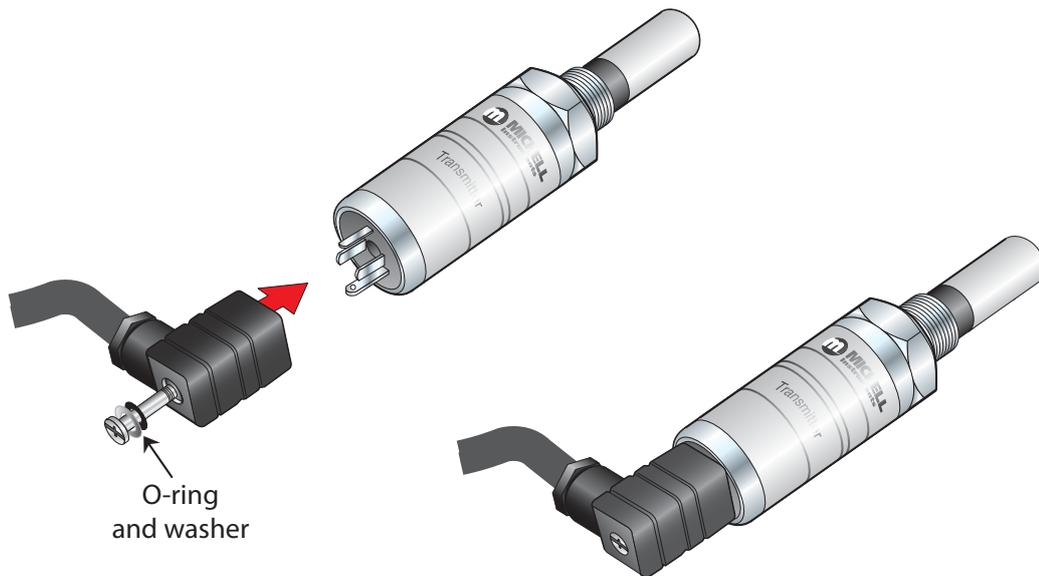


Figure 4 Connector Installation

2.4 Electrical Schematic

NOTE: The screen/shield should be connected for maximum performance and to avoid interference.

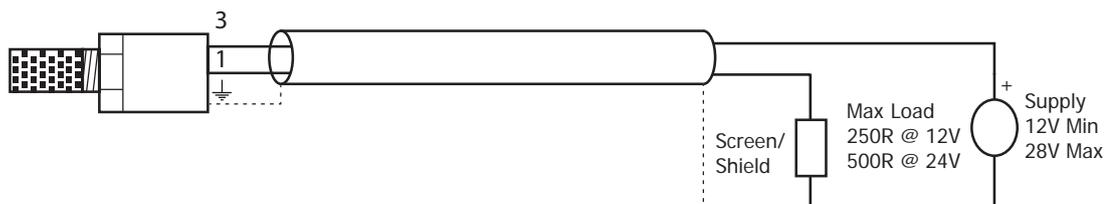


Figure 5 2-Wire Connection Diagram

2.4.1 Electrical Boundaries

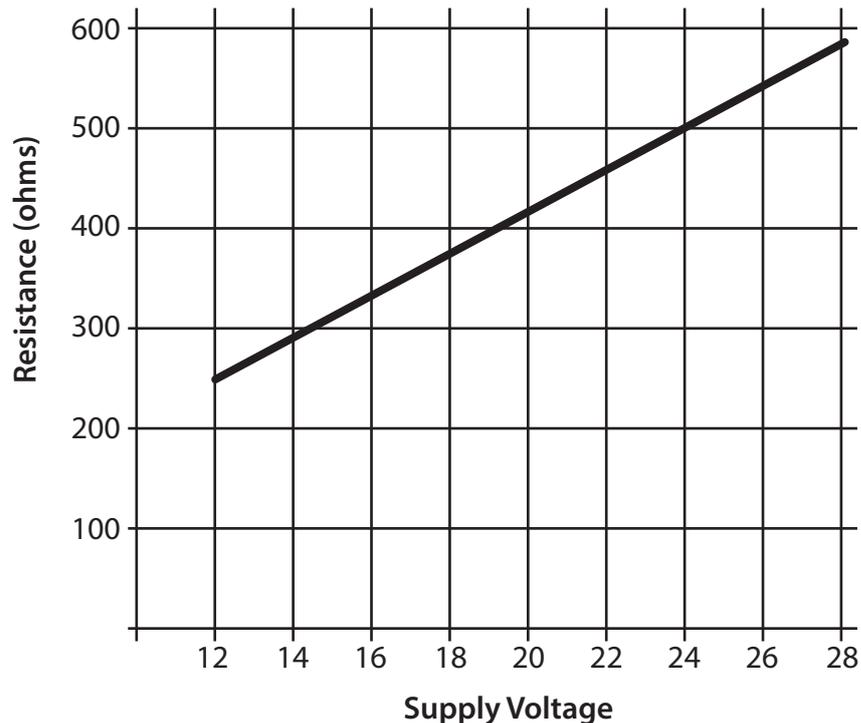


Figure 6 *Maximum Load of SF72 - Including Cable Resistance*

2.5 Transmitter Mounting

Prior to installation of the transmitter, unscrew and remove the black, green or blue plastic cover and retain for future use. Take care to prevent any contamination of the sensor before installation (**handle the transmitter by the main body only, avoiding contact with the sensor guard**).

The SF72 can be mounted either into a flow-through sensor sampling block (optional) or directly into a pipe or duct. It can be operated at pressures of up to 45 MPa (450 barg / 6500 psig) when fitted with the bonded seal or O-ring provided.

The recommended gas flow rate, when mounted in the optional sampling block, is 1 to 5 NI/min (2.1 to 10.6 scfh). However, for direct insertion applications, gas flow can be from static to 10 m/sec (32.8 fps).

NOTE: Pass the seal over the mounting thread and assemble into the sampling location, by hand, using the wrench flats only. DO NOT grip and twist the sensor cover when installing the sensor.

When installed, fully tighten using a wrench until the seal is fully compressed and to the following torque settings:

- G 1/2" BSP 56 Nm (41.3 ft-lbs)
- 3/4" - 16 UNF 40 Nm (29.5 ft-lbs)
- 5/8" - 18 UNF 30.5 Nm (22.5 ft-lbs)

2.5.1 Transmitter Mounting - Sample Block (Optional)

(Applicable to the SF72 5/8" -18 UNF and G1/2 BSP versions ONLY)



The following procedure must be carried out by a qualified installation engineer.

To mount the transmitter into the sensor block (preferred method), proceed as follows, refer to *Figure 7*.

1. Remove the protective cover (2) and the desiccant capsule (2a) from the tip of the transmitter (1).
2. Fit the seal (4) over the threaded part of the transmitter body.



WARNING: Under no circumstances should the sensor guard be handled with the fingers.

3. Screw the transmitter (1) into the sample block (3) and tighten to the recommended torque setting (see Section 2.2). **NOTE: Use the flats of the hexagonal nut and not the sensor body.**
4. Fit the transmitter cable/connector assembly to the plug located on the base of the transmitter and tighten the fixing screw (see Section 2.2).

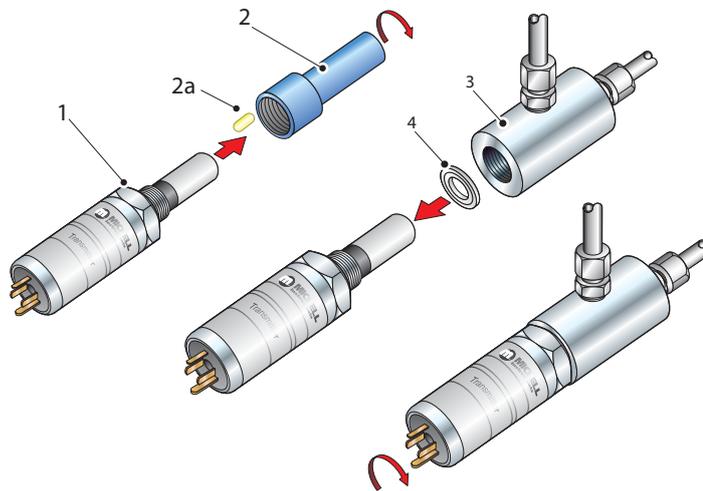


Figure 7 Transmitter Mounting - Sensor Block

2.5.2 Transmitter Mounting - Direct Pipeline Connection

The transmitter may be directly mounted into a pipe or duct as shown in *Figure 8*.



CAUTION: Do not mount the transmitter too close to the bottom of a bend where any condensate in the pipeline might collect and saturate the probe.

The pipe or duct will require a thread to match the transmitter body thread. Fixing dimensions are shown in *Figure 8*. For circular pipework, to ensure the integrity of a gas tight seal, a mounting flange will be required on the pipework in order to provide a flat surface to seal against.



The following procedure must be carried out by competent personnel.

1. Ensure that the protective cover and the desiccant capsule have been removed from the tip of the transmitter (3).



WARNING: Under no circumstances should the sensor guard be handled with the fingers.

2. Fit a seal (2) over the threaded part of the transmitter body.
3. Screw the transmitter (3) into the pipe. Tighten enough to obtain a gas tight seal. (Torque will depend upon the pipeline material.) **NOTE: Do not overtighten or the thread on the pipework may be stripped.**

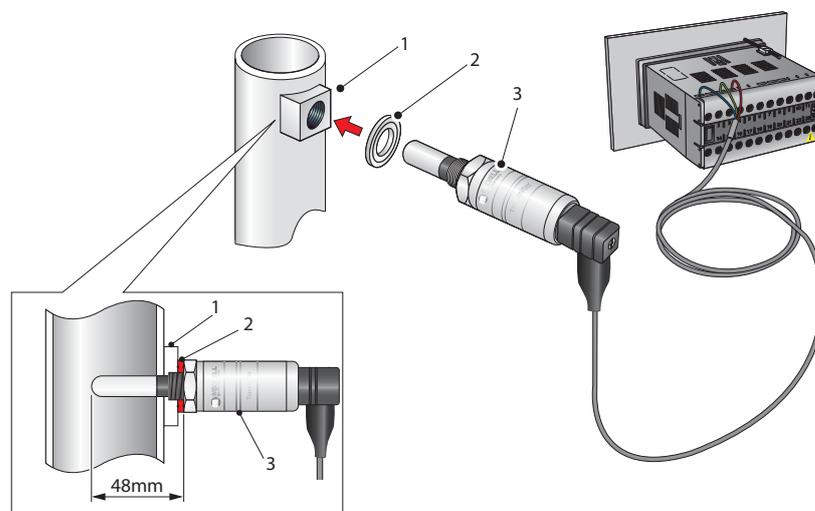


Figure 8 Transmitter Mounting - Pipe or Duct

3 OPERATION

Operation is very simple assuming the following installation techniques are adhered to:

Sampling Hints

Be Sure the Sample is Representative of the Gas Under Test:

The sample point should be as close to the critical measurement point as possible. Also, never sample from the bottom of a pipe as entrained liquids may be drawn into the sensing element.

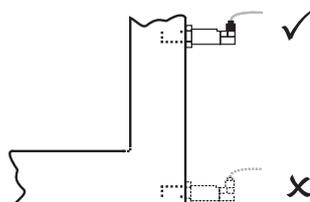


Figure 9 *Installation Location*

Minimize Dead Space in Sample Lines:

Dead space causes moisture entrapment points, increased system response times and measurement errors, as a result of the trapped moisture being released into the passing sample gas and causing an increase in partial vapor pressure.

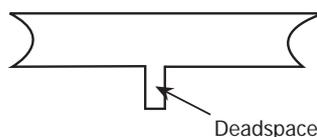


Figure 10 *Indication of Dead Space*

Remove Any Particulate Matter or Oil from the Gas Sample:

Particulate matter at high velocity can damage the sensing element and similarly, at low velocity, they may 'blind' the sensing element and reduce its response speed. If particulate, such as degraded desiccant, pipe scale or rust is present in the sample gas, use an in-line filter, as a minimum level of protection. For more demanding applications Michell Instruments offers a range of sampling systems (for more information contact www.michell.com).

Use High Quality Sample Tube and Fittings:

Michell Instruments recommends that, wherever possible, stainless steel tubing and fittings should be used. This is particularly important at low dew points since other materials have hygroscopic characteristics and adsorb moisture on the tube walls, slowing down response and, in extreme circumstances, giving false readings. For temporary applications, or where stainless steel tubing is not practical, use high quality thick walled PTFE tubing.

Position Transmitter away from Heat Source:

It is recommended, as good instrumentation practice, that the transmitter is placed away from any heat source to avoid adsorption/desorption.

4 MAINTENANCE

Calibration

Routine maintenance of the SF72 is confined to regular re-calibration by exposure of the SF72 to sample gases of known moisture content to ensure that the stated accuracy of the SF72 is maintained. Calibration services traceable to the UK *National Physical Laboratory* (NPL) and the US *National Institute of Standards and Technology* (NIST) are provided by Michell Instruments.

Michell Instruments offers a re-calibration service to suit specific needs. A Michell representative can provide detailed, custom advice (for Michell Instruments' contact information go to www.michell.com).

Sensor Guard Replacement

The sensor is supplied with a white HDPE guard (standard) or a stainless steel guard (if specified at time of order). The method of replacement is the same for both types.

HDPE Guard

The HDPE guard provides $<10\mu\text{m}$ protection to the dew-point sensor. It is designed to show any contamination and the guard should be changed if the surface becomes discolored.

When replacing the guard, care should be taken to handle the guard by the bottom part only. Replacement guards (EA2-HDPE) - pack of 10 - can be obtained by contacting Michell Instruments (www.michell.com) or your local distributor.

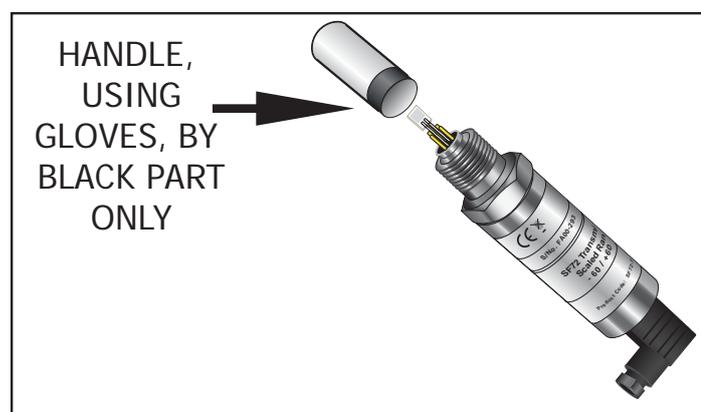


Figure 11 Replacement of HDPE Guard

Stainless Steel Guard

The stainless steel guard provides $<80\mu\text{m}$ protection to the dew-point sensor. It is designed to show any contamination and the guard should be changed if the surface becomes discolored.

When replacing the guard, care should be taken to handle the guard by the bottom part only. A replacement guard (SSG) can be obtained by contacting Michell Instruments (www.michell.com) or your local distributor.

Bonded Seal

If the installed bonded seal gets damaged or lost, a pack of 5 replacement bonded seals can be obtained by contacting Michell Instruments, or your local distributor, and quoting part number 5/8-BS.

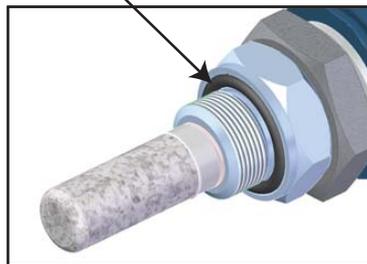
4.1 O-Ring Replacement



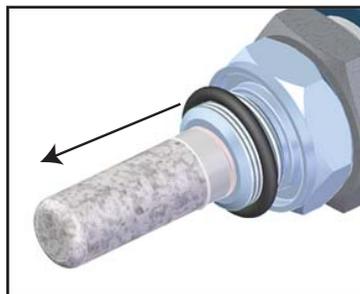
Do not touch the filter with bare hands

1. Identify the O-ring to be removed, as shown below.

BS116 (3/4" x 3/32") viton,
75 shore



2. Carefully slide tweezers, thin bladed screwdriver or a blunt needle under the outer edge of the O-ring. **NOTE: Take care not to scratch any of the surfaces of the surrounding metal component.**
3. Move the tool around the circumference to assist the extraction process. Slide the O-ring clear of the thread and filter.



4. Make sure the groove has no scratches and is free from grease, dirt or debris. Slide the new O-ring over the filter and thread and into the groove. **NOTE: Do not touch the filter with bare hands.**

Appendix A

Technical Specifications

Appendix A Technical Specifications

Performance	
Measurement Range (Dew Point)	-60 to +60°Cdp (-76 to +140°Fdp)
Accuracy (Dew Point)	±2°Cdp (±3.6°Fdp)
Repeatability	±0.2°Cdp (±0.36°Fdp)
Long Term Stability	<1% per annum
Calibration	Traceable 8-point calibration certificate
Electrical Specifications	
Output Signal	4-20mA (2-wire) current source
Output	Dew point
Analog Output Scaled Range	Standard -60 to +60°C (-76 to +140°F) -50 to +50°C (-58 to +122°F) -50 to +30°C (-58 to +86°F) Non-standard available upon request
Supply Voltage	12 to 28 V DC
Load Resistance	Max 250 Ω @ 12 V (500 Ω @ 24 V)
CE conformity	Approved
UL61010-1 & CAN/CSA C22.2 No. 61010-1	
Operating Specifications	
Operating Temperature	-40 to +60°C (-40 to +140°F)
Operating Pressure	45 MPa (450 barg / 6500 psig) max
Overpressure Rating	x 2 operating pressure 90 MPa (900 barg / 13,000 psig)
Flow Rate	1 to 5 NI/min (2.1 to 10.6 scfh) mounted in standard sampling block; 0 to 10 m/sec (0 to 32.8 fps) direct insertion
Thermal Compensation	Characterized over operating range
Mechanical Specifications	
Ingress Protection	IP66 in accordance with standard BS EN60529:1992 NEMA 4 in protection accordance with standard NEMA 250-2003
Housing Material	316 stainless steel
Dimensions	Transmitter plus connector L=132mm x ø45mm (5.19" x ø1.77")
Sensor Guard	Standard: HDPE Guard < 10µm Optional: 316 stainless steel sintered guard < 80µm
Process Connection	G½" BSP ¾" - 16 UNF ⅝" - 18 UNF
Weight	150g (5.29oz)
Interchangeability	Fully interchangeable transmitter
Electrical Connections	Hirshmann GDS Series (DIN 43650-C)
Digital Diagnostic Communications	RS485, 2-wire Modbus RTU

A.1 Dimensions

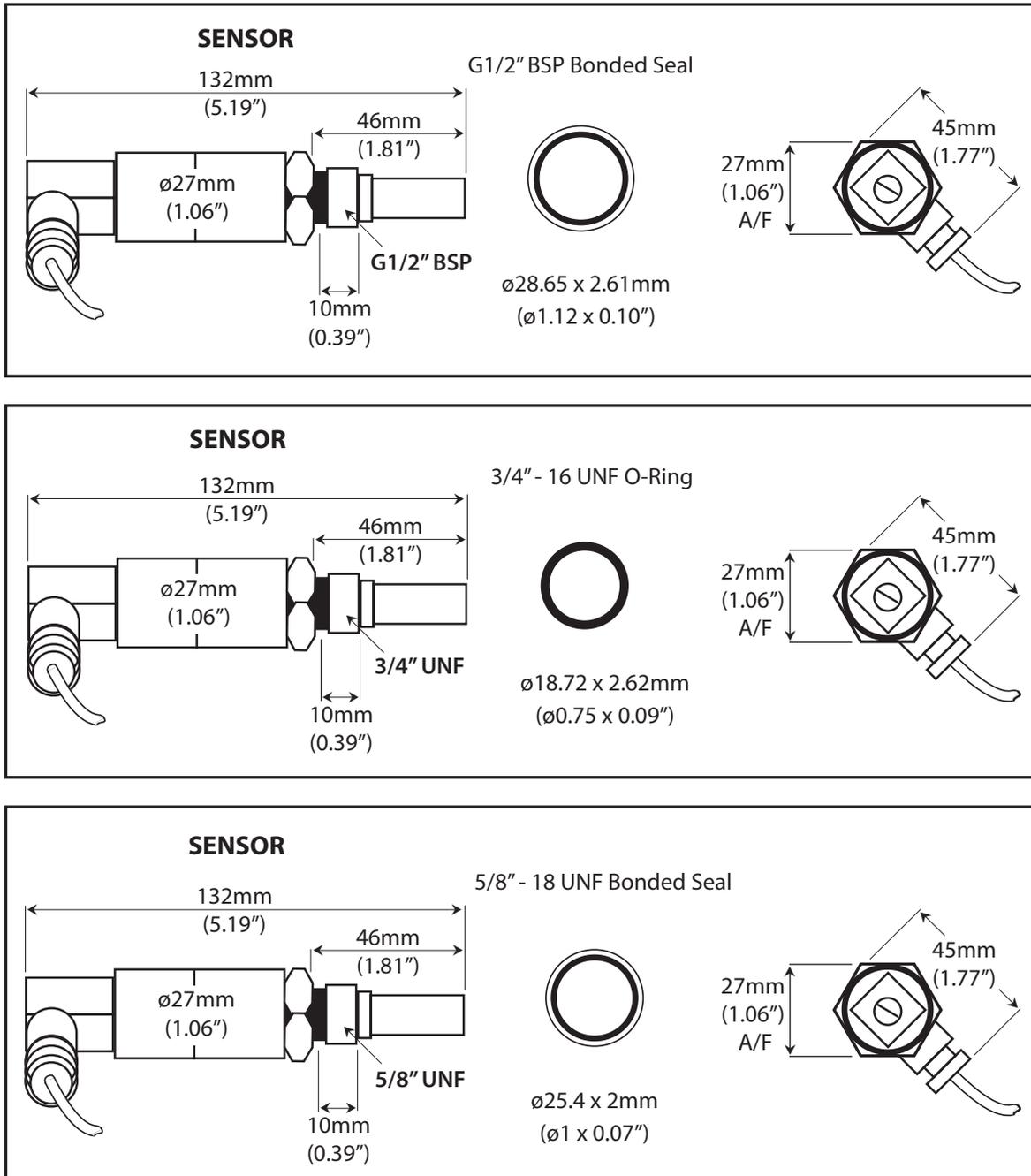


Figure 12 Dimensions - SF72 2-Wire

Electrical connections

4-20 mA connections 2-wire	
Pin 1	4-20 mA
Pin 3	POWER

Appendix B

Quality, Recycling & Warranty Information

Appendix B Quality, Recycling & Warranty Information

Michell Instruments is dedicated to complying to all relevant legislation and directives. Full information can be found on our website at:

www.michell.com/compliance

This page contains information on the following directives:

- ATEX Directive
- Calibration Facilities
- Conflict Minerals
- FCC Statement
- Manufacturing Quality
- Modern Slavery Statement
- Pressure Equipment Directive
- REACH
- RoHS2
- WEEE2
- Recycling Policy
- Warranty and Returns

This information is also available in PDF format.

Appendix C

Return Document & Decontamination Declaration

Appendix C Return Document & Decontamination Declaration

Decontamination Certificate

IMPORTANT NOTE: Please complete this form prior to this instrument, or any components, leaving your site and being returned to us, or, where applicable, prior to any work being carried out by a Michell engineer at your site.

Instrument			Serial Number	
Warranty Repair?	YES	NO	Original PO #	
Company Name			Contact Name	
Address				
Telephone #			E-mail address	
Reason for Return /Description of Fault:				
Has this equipment been exposed (internally or externally) to any of the following? Please circle (YES/NO) as applicable and provide details below				
Biohazards			YES	NO
Biological agents			YES	NO
Hazardous chemicals			YES	NO
Radioactive substances			YES	NO
Other hazards			YES	NO
Please provide details of any hazardous materials used with this equipment as indicated above (use continuation sheet if necessary)				
Your method of cleaning/decontamination				
Has the equipment been cleaned and decontaminated?			YES	NOT NECESSARY
Michell Instruments will not accept instruments that have been exposed to toxins, radio-activity or bio-hazardous materials. For most applications involving solvents, acidic, basic, flammable or toxic gases a simple purge with dry gas (dew point <-30°C) over 24 hours should be sufficient to decontaminate the unit prior to return. Work will not be carried out on any unit that does not have a completed decontamination declaration.				
Decontamination Declaration				
I declare that the information above is true and complete to the best of my knowledge, and it is safe for Michell personnel to service or repair the returned instrument.				
Name (Print)			Position	
Signature			Date	



NOTES:



<http://www.michell.com>