

VeriDri™

Moisture Transmitter User's Manual



VeriDri™

Moisture Transmitter

User's Manual

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panametrics.com

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Information Paragraphs



Panametrics provides customers with an experienced staff of customer support personnel ready to respond to technical inquiries, as well as other remote and on-site support needs. To complement our broad portfolio of industry-leading solutions, we offer several types of flexible and scalable support services including: Training, Product Repairs, Service Agreements and more.

Please visit <https://www.bakerhughes.com/panametrics/panametrics-services> for more details.

Typographical Conventions

Note: *These paragraphs provide additional information about the topic which is helpful but is not essential to proper completion of the task.*

IMPORTANT: These paragraphs provide emphasis to instructions that are essential to proper setup of the equipment. Failure to follow these instructions carefully may cause unreliable performance.



WARNING! This symbol indicates a risk of potential serious personal injury, unless these instructions are followed carefully.



CAUTION! This symbol indicates a risk of potential serious personal injury, unless these instructions are followed carefully.

Safety Issues



WARNING! It is the responsibility of the user to make sure all local, county, state and national codes, regulations, rules and laws related to safety and safe operating conditions are met for each installation.



Attention European Customers! To meet CE Mark requirements for all units intended for use in the EU, all electrical cables must be installed as described in this manual.

Auxiliary Equipment

Local Safety Standards

The user must make sure that he operates all auxiliary equipment in accordance with local codes, standards, regulations, or laws applicable to safety.

Working Area



WARNING! Auxiliary equipment may have both manual and automatic modes of operation. As equipment can move suddenly and without warning, do not enter the work cell of this equipment during automatic operation, and do not enter the work envelope of this equipment during manual operation. If you do, serious injury can result



WARNING! Make sure that power to the auxiliary equipment is turned OFF and locked out before you perform maintenance procedures on the equipment.

Qualification of Personnel

Make sure that all personnel have manufacturer-approved training applicable to the auxiliary equipment.

Personal Safety Equipment

Make sure that operators and maintenance personnel have all safety equipment applicable to the auxiliary equipment. Examples include safety glasses, protective headgear, safety shoes, etc.

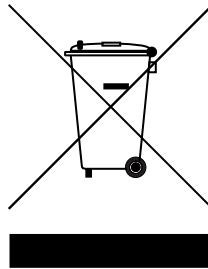
Unauthorized Operation

Make sure that unauthorized personnel cannot gain access to the operation of the equipment.

Environmental Compliance

Waste Electrical and Electronic Equipment (WEEE) Directive

Panametrics is an active participant in Europe's *Waste Electrical and Electronic Equipment (WEEE)* take-back initiative, directive 2012/19/EU.



The equipment that you bought has required the extraction and use of natural resources for its production. It may contain hazardous substances that could impact health and the environment.

In order to avoid the dissemination of those substances in our environment and to diminish the pressure on the natural resources, we encourage you to use the appropriate take-back systems. Those systems will reuse or recycle most of the materials of your end of life equipment in a sound way.

The crossed-out wheeled bin symbol invites you to use those systems.

If you need more information on the collection, reuse and recycling systems, please contact your local or regional waste administration.

EU Declaration of Conformity

The EU Declaration of Conformity (EU DoC) and other compliant documents can be downloaded from the Product Support Portal.

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Visit www.bakerhughesds.com/health-safety-and-environment-hse for take-back instructions and more information about this initiative.

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1. Introduction

The Panametrics VeriDri™ is a low-cost, loop-powered transmitter that provides accurate dew/frost point measurements covering an overall range of -110° to 40°C (-166° to 104°F). It can also be provided to cover a number of moisture ranges from 0 to 10,000 PPMv.

The VeriDri is supplied with one 4 to 20 mA analog output that is factory-configured for a specified range.

The VeriDri is easy to install, operate and maintain. This manual includes the following sections:

- “Sample System Guidelines” on page 1
- “Inserting the Transmitter into the System” on page 2
- “Making the Wiring Connections” on page 3
- “Operating the Transmitter” on page 4
- “Cleaning the Transmitter Probe” on page 5
- “Specifications” on page 7

2. Sample System Guidelines

You can install the VeriDri transmitter either into a sample system or directly into the process. Panametrics recommends that the unit be installed in a sample system to protect the probe from coming into contact with damaging elements in the process.

Before constructing a sample system, you should consult a Panametrics Applications Engineer and adhere to the guidelines below. See *Figure 1 on page 2* for an example of a suitable sample system.

- See “Specifications” on page 7 for The VeriDri dimensions and other requirements.
- Sample systems should be kept very simple.
- The transmitter should be installed so it is perpendicular to the sample inlet.
- The sample system should contain as few components as possible, and all or most of those components should be located downstream from the measurement location.
- If possible, you should use stainless steel components for all wetted parts.
- Sample system components should not be made of any material that will affect measurement. Most common filters and pressure regulators are not suitable for sample systems because they have wetted parts which may absorb or release components (such as moisture) into the sample system. They may also allow ambient contamination to enter the sample system.

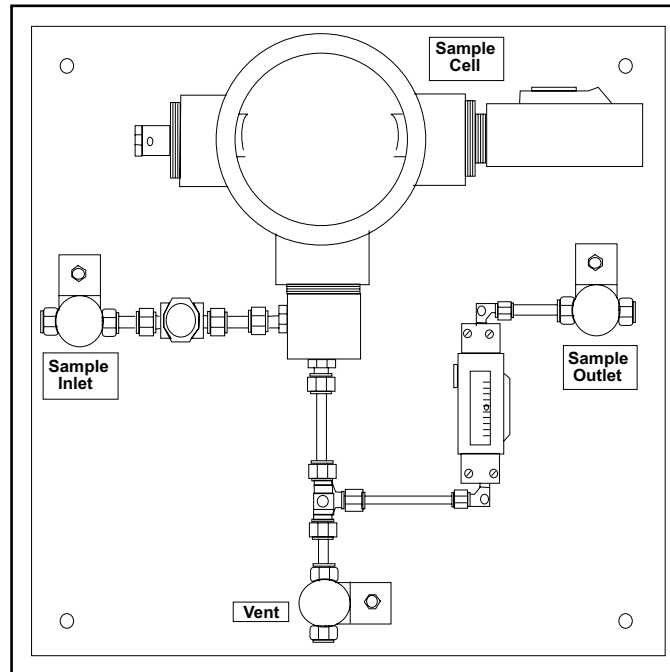


Figure 1: Sample System Example

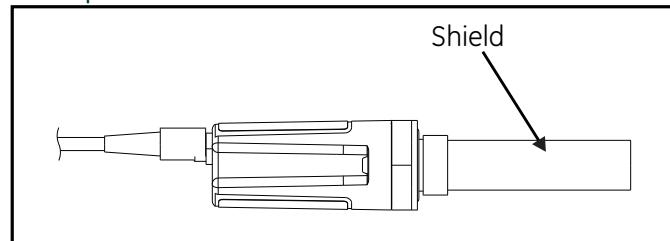
3. Inserting the Transmitter into the System



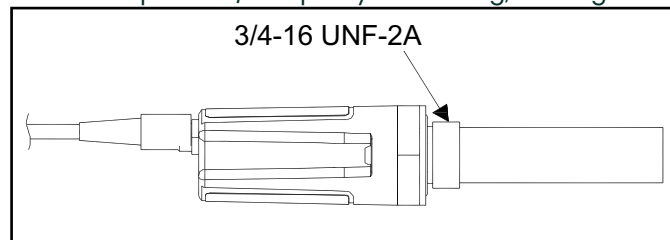
CAUTION! If you are mounting the VeriDri directly into the process line, you must consult Panametrics for proper installation instructions and precautions before beginning the following procedure.

Complete the steps below to install the VeriDri:

1. Make sure the sintered or sheet stainless-steel shield is in place. The shield protects the aluminum oxide sensor from damaging elements in the process.



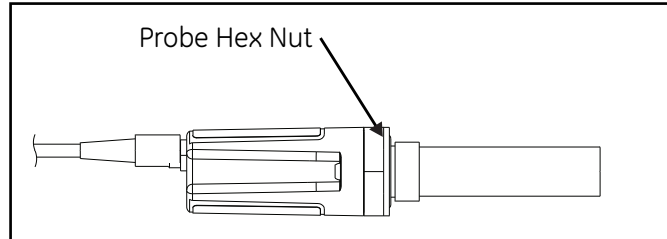
2. The probe is mounted into the process via the 3/4-16 straight male thread located on the probe. Thread the probe end of the transmitter into the process/sample system fitting, making sure not to cross thread it.



- Using a 1-1/8 in. wrench, tighten the probe securely into the system using the probe hex nut.



CAUTION! Do not apply force on the transmitter module to tighten the unit into its fitting.



4. Making the Wiring Connections

You must wire the transmitter using the factory-supplied cable, which is available in a variety of lengths.

Note: If you need to lengthen cables, refer to Table 1 below to splice an extension onto the existing cable. Be sure to connect positive to positive and negative to negative.

Use the following steps to wire the transmitter to your system:

- Push the female connector end on the transmitter cable into the mating male connector on the transmitter module. Make sure the pins are properly aligned. Then, secure the connectors together by sliding the metal sleeve on the cable over the connectors and turning it clockwise until it is tight.
- Using the flying leads at the other end of the transmitter cable, connect the transmitter to your power supply and data acquisition system (DAS), as shown in *Figure 2 on page 4*. Refer to *Table 1* below for a description of the leads on the factory-supplied cable.

Table 1: Cable Lead Descriptions

Lead Color*	Connection Description
Blue	(+) 7 to 28 VDC
Brown	(-) 7 to 28 VDC
Shield	Connect to ground, if desired
<i>*The blue and brown leads also produce a current output equivalent to 4 to 20 mA.</i>	

- Trim any unused leads back to the outer cable jacket, to remove the bare tinned wire and prevent accidental short circuits.

The VeriDri is now ready for operation.

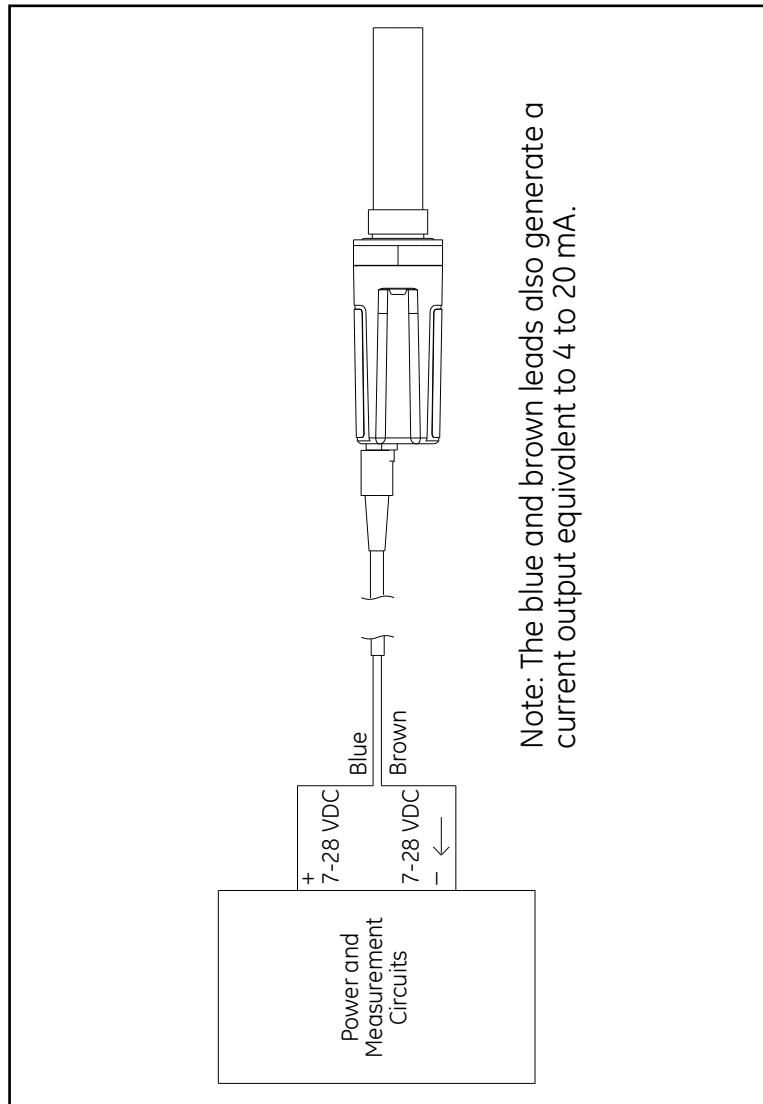


Figure 2: Wiring Connections

5. Operating the Transmitter

After proper installation, the VeriDri transmitter is very easy to use. Simply power the unit up and you are ready to begin taking measurements. As the VeriDri stores moisture calibration data in non-volatile FLASH memory, you do not have to enter data manually or worry about losing data during a power loss.

Probes may need to be cleaned occasionally, depending on the application. Consult a Panametrics Applications Engineer for recommended cleaning intervals.

If a problem should arise with the probe, see “*Error Handling*” below for the transmitter reactions to various error conditions.



CAUTION! Any attempt to open the module or remove the sensor probe will void your warranty.

5.1 Powering Up

After the VeriDri is wired as described in the previous section, you may apply power to the unit. The transmitter takes approximately 20 seconds to initialize and begin normal operation. The unit will meet specified accuracy in about 3 minutes.

5.2 Error Handling

In the event of an error condition, the analog output reading is forced to the following values:

- ≥ 22 mA to indicate a short circuit in the probe
- ≤ 3.5 mA to indicate an open circuit in the probe

6. Cleaning the Transmitter Probe



CAUTION! Be sure to perform the probe cleaning procedure in a well ventilated area. Observe all necessary safety precautions when handling cleaning solvents.

To clean the moisture probe, you will need the following items:

- Three glass (**NOT** metal) containers with the following solvents:
 - 2 containers, each with approximately 300 ml of reagent-grade hexane or toluene
 - 1 container, with approximately 300 ml of distilled (**NOT** deionized) water.



CAUTION! Make sure the containers are deep enough to submerge the probe. Do not place the transmitter module into the solvents. You should only insert the sensor portion of the transmitter into the solvents.

- Rubber or latex gloves.
- An oven set at $50^{\circ}\text{C} \pm 2^{\circ}\text{C}$ ($122^{\circ}\text{F} \pm 3.6^{\circ}\text{F}$), for drying the probe
- A 1-1/8 in. wrench

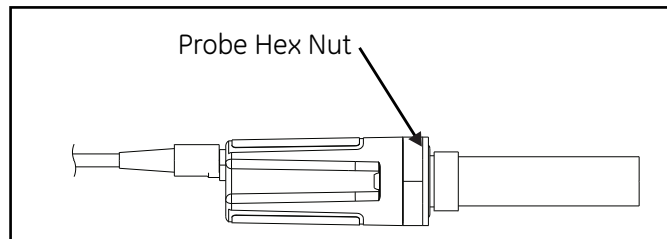
Refer to the following sections to properly clean the probe.

6.1 Removing the Transmitter

Complete the following steps to remove the transmitter from the system:

Note: After the probe is cleaned, it must dried in the oven for 24 hours.

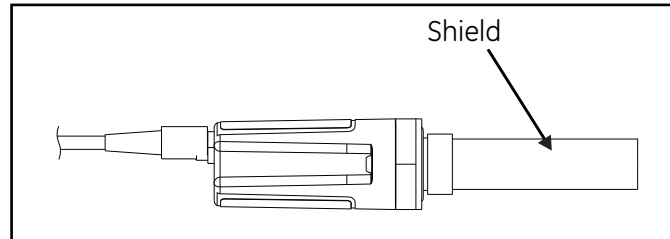
1. Using a 1-1/8 in. wrench, unthread the transmitter from the fitting on the sample system/process using the probe hex nut as indicated below.



2. Record the dew point of the ambient air.
3. Disconnect the cable from the transmitter module.
4. Unscrew the stainless-steel shield from the probe mount, and carefully remove it without touching the sensor.



CAUTION! Any attempt to open the module or remove the probe from the module will void your warranty.



6.2 Soaking the Sensor and Shield



CAUTION! Do not place the transmitter module into the solvents. You should only insert the sensor portion of the transmitter into the solvents. Also, do not allow the sensor to come into contact with the surfaces of the cleaning containers or any other hard surface.

While wearing protective gloves, complete the following steps:

1. Place the sensor in the first container of hexane or toluene and allow it to soak for 10 minutes.
2. Remove the sensor from the hexane or toluene and soak it in the container of distilled water for 10 minutes.
3. Remove the sensor from the distilled water and soak it in the second (clean) container of hexane or toluene for 10 minutes.
4. Remove the sensor from the hexane or toluene and set it aside until the shield has completed its cleaning cycle.
5. Clean the shield by repeating steps 1 to 3 above. To ensure the removal of any contaminants that may have become embedded in the porous walls of the shield, swirl the shield in the solvents during the soaking procedures.
6. Remove the shield from the hexane or toluene.
7. Carefully replace the shield over the exposed sensor, **without touching the sensor**.
8. Place the sensor with the installed shield in an oven set at $50^{\circ}\text{C} \pm 2^{\circ}\text{C}$ ($122^{\circ}\text{F} \pm 3.6^{\circ}\text{F}$) for 24 hours.

6.3 Evaluating the Probe

To evaluate the probe, complete the following steps:

1. Re-connect the cable to the transmitter module and measure the ambient dew point. Make sure you measure the same ambient air as measured in step 2 on page 5.
2. Compare the two ambient air readings. If the new ambient air reading is within $\pm 2^{\circ}\text{C}$ ($\pm 3.6^{\circ}\text{F}$) of the first reading, the cleaned probe is properly calibrated and may be reinstalled. If the two readings not within that tolerance, proceed to step 3 below.
3. If the probe is still not reading the ambient air accurately, repeat the cleaning procedure using soaking times that are 5 times the previous cleaning sequence, until two consecutive ambient air readings are within $\pm 2^{\circ}\text{C}$ ($\pm 3.6^{\circ}\text{F}$).

If the above cleaning procedure does not result in accurate readings, contact Panametrics for assistance.

7. Specifications

7.1 General Specifications

Moisture Ranges

- -110° to 20°C
- -110° to -50°C
- -80° to 20°C
- -80° to -30°C
- -30° to 20°C
- -60° to 40°C
- -150° to 70°F
- -150° to -40°F
- -40° to 70°F
- -100° to 0°F
- -50° to 50°F
- 0° to 100°F
- 0 to 10 PPMv
- 0 to 100 PPMv
- 0 to 1000 PPMv
- 0 to 10,000 PPMv

Note: PPMv ranges are based on a constant pressure, which was provided at the time of the order.

Operating Temperature

-40° to 60°C (-40° to 140°F)

Storage Temperature

70°C (158°F) maximum

Note: The probe should be stored with the plastic cover and desiccant packet threaded onto the probe. Store it in a cool, dry environment.

Warm-up Time

Meets specified accuracy in 3 minutes

Calibrated Accuracy at 25°C (77°F)

- $\pm 2^{\circ}\text{C}$ (3.6°F) from -65° to 10°C (-85° to 50°F)
- $\pm 3^{\circ}\text{C}$ (5.4°F) from -80° to 66°C (-112° to 87°F)

Repeatability

- $\pm 0.5^{\circ}\text{C}$ (0.9°F) from -65° to 10°C (-85° to 50°F)
- $\pm 1.0^{\circ}\text{C}$ (1.8°F) from -80° to -66°C (-112° to -87°F)

7.2 Electronics

Power

- *Supply Voltage:* 7 to 28 VDC (loop-powered, customer supplied)
- *Output:* 4 to 20 mA
- *Output Resolution:* 0.01 mA

- *Max. Loop Resistance:* $R = 50 \Omega \times (\text{PSV} - 7)$, where PSV = Power Supply Voltage
Example: For a PSV = 24 VDC, $R = 50 \Omega \times (24 - 7) = 850 \Omega$
- *Cable:* 2 m, standard (consult factory for custom lengths)

7.3 Mechanical Specifications

Sample Connection

3/4-16 straight, male thread with o-ring

Operating Pressure

5 μm Hg to 5,000 psig (345 bar)

Enclosure

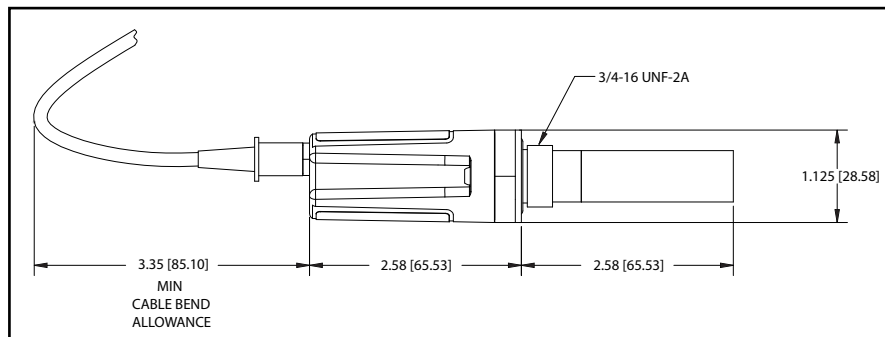
Type 4X/IP67

European Compliance

See the *EC Declaration of Conformity* at the end of this manual

Dimensions

- *Overall:* 8.51 \times 1.125 in. (21.62 \times 2.86 cm)
- *Electronics Module w/cable:* 5.93 \times 1.125 in. (15.06 \times 2.86 cm)
- *Weight:* 5 oz (140 g)



7.4 Moisture Sensor Specifications

Sensor Type

Thin-film aluminum oxide moisture sensor probe

Calibration

Each sensor is individually computer-calibrated against known moisture concentrations, traceable to NIST

Calibration Interval

Factory sensor recalibration by Panametrics is recommended every 6-12 months, depending on the application

Calibration Data

Factory-calibrated, stored in **FLASH** memory

Flow Rate

- *Gases:* Static to 10,000 cm/s linear velocity, at a pressure of 1 atm
- *Liquids:* Static to 10 cm/s linear velocity, at a density of 1 g/cc

Warranty

Each instrument manufactured by Panametrics is warranted to be free from defects in material and workmanship. Liability under this warranty is limited to restoring the instrument to normal operation or replacing the instrument, at the sole discretion of Panametrics. Fuses and batteries are specifically excluded from any liability. This warranty is effective from the date of delivery to the original purchaser. If Panametrics determines that the equipment was defective, the warranty period is:

- one year from delivery for electronic or mechanical failures
- one year from delivery for sensor shelf life

If Panametrics determines that the equipment was damaged by misuse, improper installation, the use of unauthorized replacement parts, or operating conditions outside the guidelines specified by Panametrics, the repairs are not covered under this warranty.

The warranties set forth herein are exclusive and are in lieu of all other warranties whether statutory, express or implied (including warranties or merchantability and fitness for a particular purpose, and warranties arising from course of dealing or usage or trade).

Return Policy

If a Panametrics instrument malfunctions within the warranty period, the following procedure must be completed:

1. Notify Panametrics, giving full details of the problem, and provide the model number and serial number of the instrument. If the nature of the problem indicates the need for factory service, Panametrics will issue a RETURN MATERIAL AUTHORIZATION (RMA), and shipping instructions for the return of the instrument to a service center will be provided.
2. If Panametrics instructs you to send your instrument to a service center, it must be shipped prepaid to the authorized repair station indicated in the shipping instructions.
3. Upon receipt, Panametrics will evaluate the instrument to determine the cause of the malfunction.

Then, one of the following courses of action will then be taken:

- If the damage is covered under the terms of the warranty, the instrument will be repaired at no cost to the owner and returned.
- If Panametrics determines that the damage is not covered under the terms of the warranty, or if the warranty has expired, an estimate for the cost of the repairs at standard rates will be provided. Upon receipt of the owner's approval to proceed, the instrument will be repaired and returned.

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