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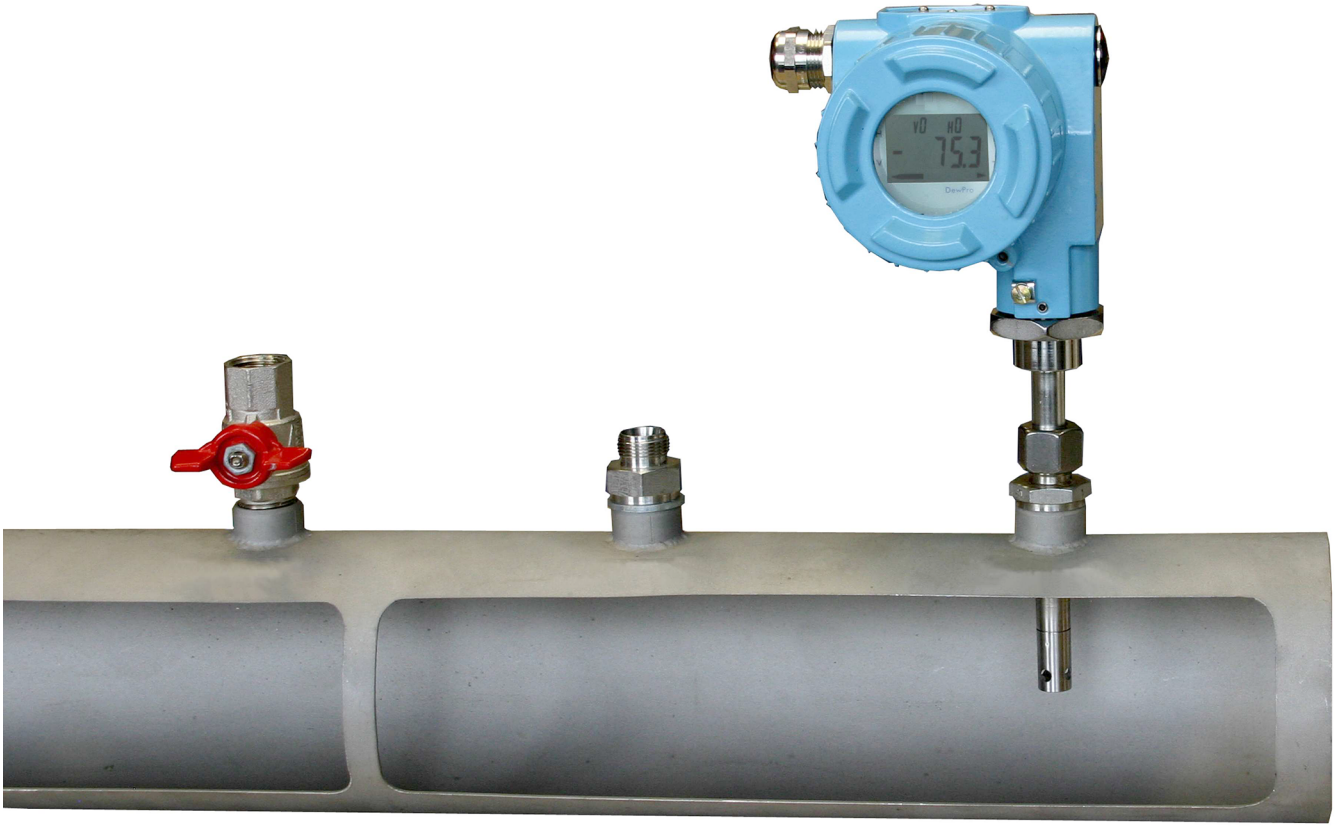
DewPro™ MMY31

Installation & Operation Manual



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Panametrics
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DewPro™ MMY31

Dew Point Transmitter

Installation & Operation Manual

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[no content intended for this page]

Chapter 1. General System Information

1.1 Unpacking and Inspection

Upon receipt of the DewPro MMY31, examine the shipping carton for broken or open packing, distortion, or any other evidence of mishandling. If inspection indicates damage to the unit or any of its components, notify the carrier (within 15 days of delivery) and request an inspection.

Move the carton to a clean work area and unpack it. The carton you receive should contain:

- DewPro MMY31
- Installation and Operation Manual
- Calibration Certificate

Compare the last five characters of the model number with the product model number (see below) to ensure you have received everything you ordered.

Figure 1: DewPro MMY31 Product Label

1.2 Model Number Configuration

Table 1: Model Number Configuration

Certification/Approvals:

R	MMY31 Safe Area Config
A	IS Config
B	XP Config
C	CI.I, Div.2 Config
F	Zone 2 Config (self declared)
S	Other

Process Connection:

2	¾" NPT-M compression fitting
3	½" NPT-M compression fitting
4	¾" x 16 Oring fitting UNF thread
6	No mounting hardware
8	G½ male compression fitting
S	Other

Protective Cap:

A	100 micron sintered filter
B	No filter, clean applications
S	Other

Enclosure Conduit:

1	M20 x 1.5-F cable gland + plug
2	M20 x 1.5-F ½" FNPT adapter
S	Other

Range, Display, Error Status

A	−90°C to +10°C blind, error 22 mA
B	−90°C to +10°C blind, error Hold
C	−90°C to +10°C blind, error 3.6 mA
D	0-100 ppm_v blind, error 22 mA
E	0-100 ppm_v blind, error Hold
F	0-100 ppm_v blind, error 3.6 mA
G	integral display, ppmv
S	Other

R	**8**	**A**	**2**	**A**	**Model Number example**

1.3 Introduction

1.3.1 Unit Description

The DewPro MMY31 transmitter is a loop-powered dewpoint measuring device. The transmitter includes a sensor element, a stainless steel probe, a weather-proof enclosure, microprocessor electronics, and assorted fittings, all in a compact assembly. It is designed to be installed "in-line." Various types of mounting hardware, such as flange and compression fittings, are available for mounting into a process chamber or pipe.

An optional display with user interface feature allows the DewPro to be configured by the user. See *Chapter 4* for more information.

1.4 Theory of Operation

1.4.1 4–20mA Loop

The DewPro MMY31 Transmitter is powered by a voltage supply of 12 to 28 VDC. At the nominal 24 VDC supply, the maximum loop resistance is 600 ohms. The signal is represented by the 4–20 mA loop current and is directly proportional to the dewpoint temperature range in °C or °F. In the standard range, 4 mA corresponds to −90°C (−130°F) and 20 mA to +10°C (+50°F) dewpoint temperature. The optional unit of measure is ppm_V in the standard range 0-100 ppm_V, unless ordered differently

1.4.2 Planar Sensor

The heart of the MMY31 is the planar aluminum oxide sensor that provides longer calibration stability, excellent corrosion resistance, and improved speed of response. The sensor is mounted on a ceramic substrate giving a reduced temperature coefficient.

1.4.3 Calibration

Each DewPro is factory calibrated against precise NIST certified moisture references and has an accuracy of ±2°C dewpoint at 25°C temperature.

[no content intended for this page]

Chapter 2. Installation

2.1 Mounting the MMY31

CAUTION! **Before installing the unit, please read all the instructions. The MMY31 is designed to be mounted onto pressurized systems. Take all the necessary precautions when mounting or removing the unit.**

Choose a mounting location which allows enough clearance for the use of tools and for connection of the field validator. *Figure 2* below shows the dimensions of the standard MMY31.

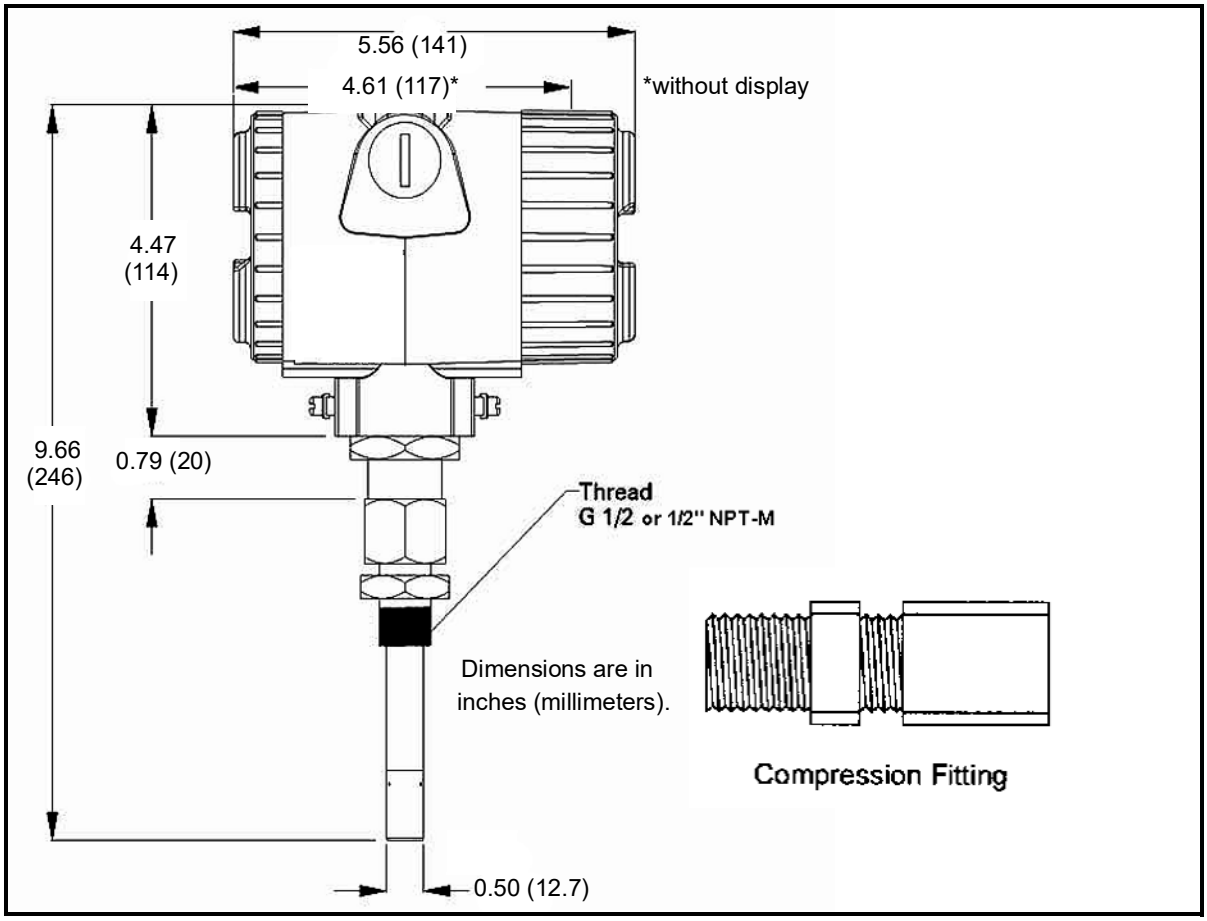

Figure 2: DewPro MMY31 Outline and Compression Fitting

Mount the MMY31 using a compression fitting connection. Be certain that the tip of the probe does not touch the inside wall of the pipe.

IMPORTANT: Ensure that your probe has a stainless steel ferrule, which is required for use in pressurized systems.

Adjust the ferrule for a probe insertion length of 1" (minimum) and tighten the compression fitting as follows (see *Figure 2* below):

1. Hand-tighten the nut.
2. Then, use a wrench to tighten the nut 1½ turns. Now the fitting is tight and can withstand pressures to 1750 psig (120 barg).

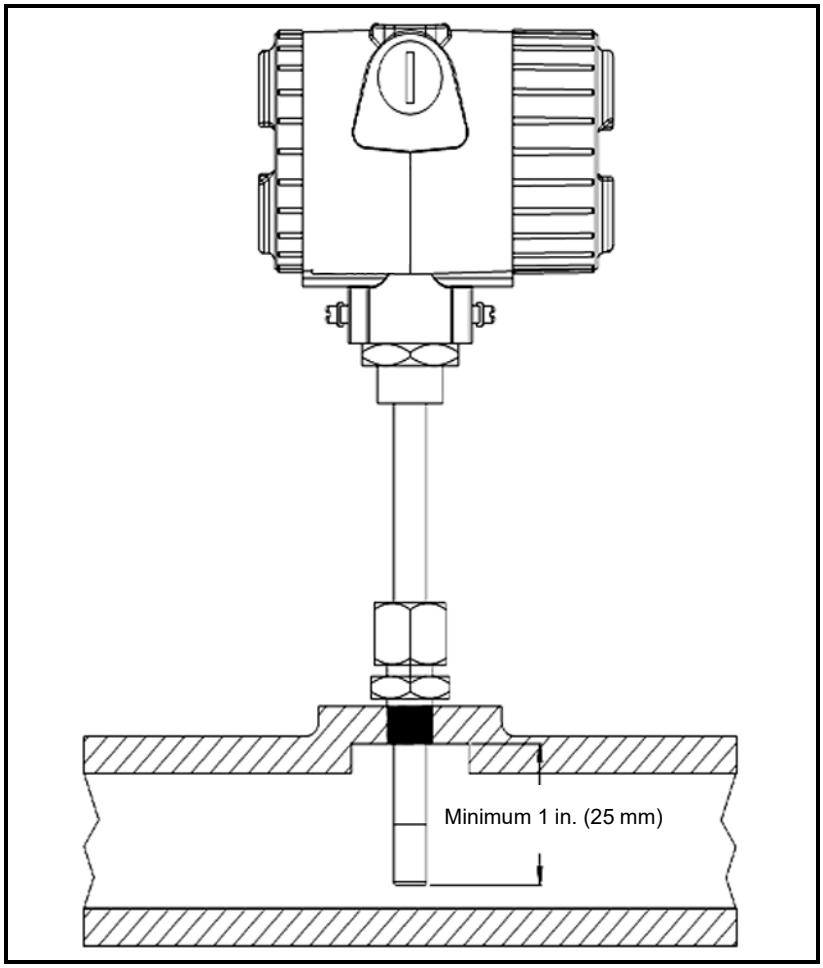

Figure 3: Mounting the MMY31

2.2 Wiring Configurations

CAUTION! **The DewPro system includes electronic components that are susceptible to damage by static electricity. Use proper handling procedures during the removal, installation, or other handling of internal boards or devices.**

Note: *If the DewPro is equipped with an optional display/user interface, please refer to* Chapter 4.

Figure 4 below illustrates various power supplies and displays for use with the DewPro MMY31.

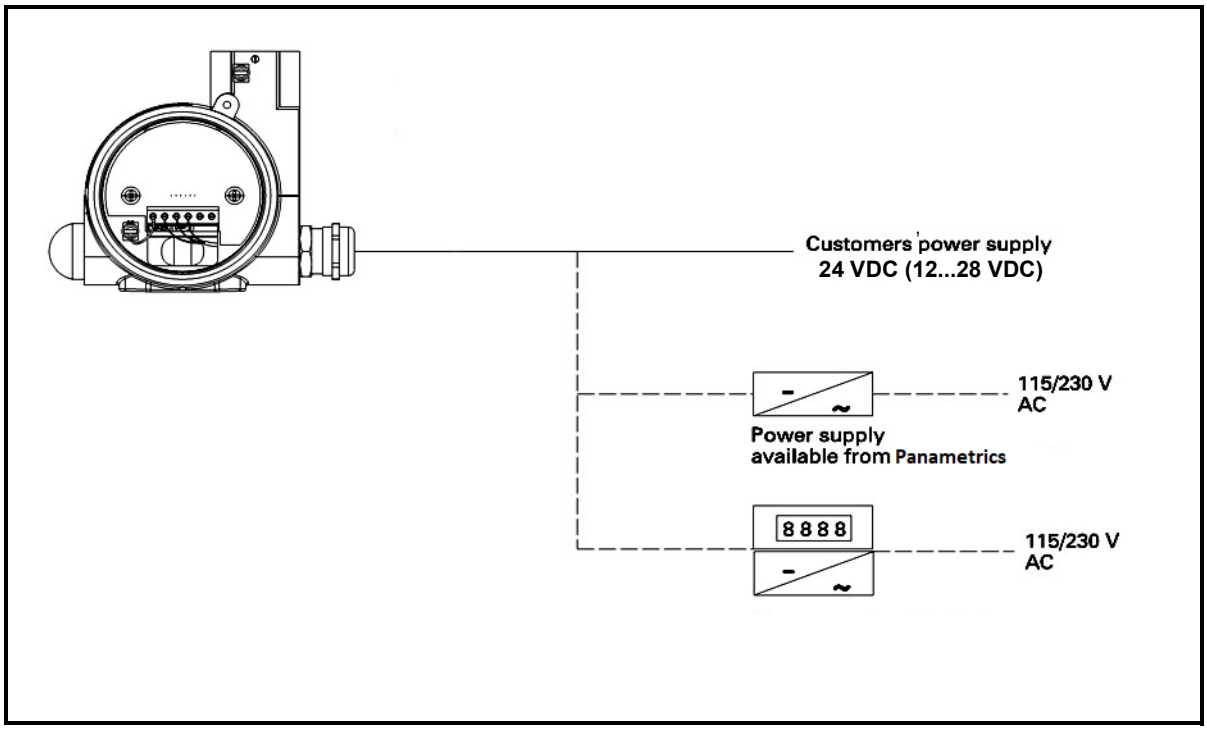

Figure 4: Various System Configurations

2.2.1 Designing the Loop

When selecting a power supply, please note that the voltage at the ± terminal of the DewPro should not fall below 12 VDC. The maximum loop resistance is an important measure for selection of the supply voltage. Each device connected to the loop causes a voltage drop. For instance, using a loop-powered display with an input impedance of 50 Ω will cause a voltage drop of 1 VDC at 20 mA, using Ohm's law. Connecting the loop to a PLC will cause a voltage drop across the input.

When designing your loop, add up all voltage losses across the devices connected to the loop and add 12 V. The sum will be the minimum supply voltage required from the power supply. Calculate with a 20% safety factor.

2.2.2 In a Normal Environment

A standard two-wire, stranded cable can be used in a normal environment to interconnect the DewPro with the power source.

2.2.3 In Environments with Severe Electrical Noise

The DewPro MMY31 meets the EMC requirements of IEC 61326 for equipment used in industrial locations. The MMY31 passed all tests to the standards IEC 61000-4- to the performance criterion A. Test details can be found in Chapter 5 Specifications.

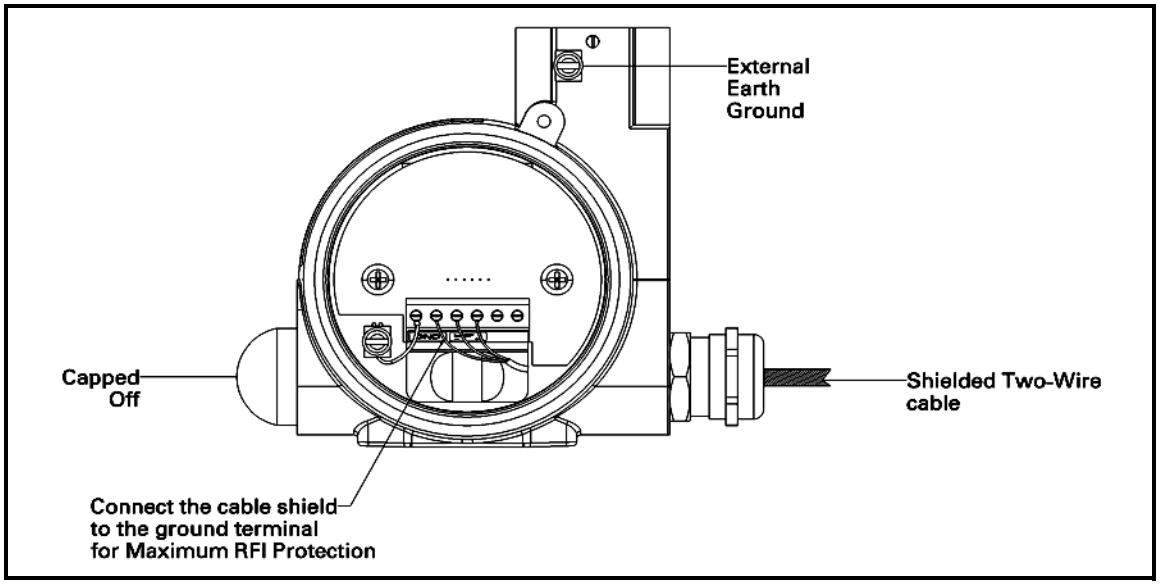

Figure 5: Shielded Cable Wiring Diagram

2.2.4 General Wiring Instructions

To wire the DewPro MMY31:

1. Unscrew the cap on the terminal side of the unit.
2. Loosen the cable gland located on the side of the unit.
3. Feed the cable through the conduit opening.

Note: *Use a standard signal cable size.*

4. Retighten the metal cable gland to meet IP 67 and to relieve any stress on the wire.
5. Verify that a value between 12 and 28 VDC is across the terminals marked + and –.

Note: *This is the voltage that appears across the DewPro terminals, not necessarily the power supply voltage due to voltage loss in wire length, displays, indicators, etc.*

6. In order to meet EMI/RFI immunity, a two-wire shielded cable with a common foil shield layer is being used to power the MMY31. Removing the insulation by 3 inches allows users to pull back the foil, clamping it between the metal cable gland. The ground wire must be connected to the internal grounding screw.

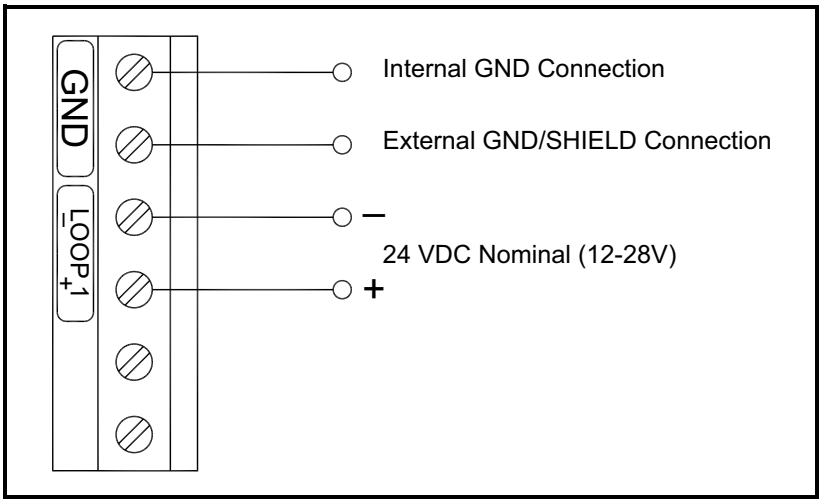

Figure 6: Electrical Connections

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Chapter 3. Troubleshooting

3.1 The Loop Current is Out of Range

The loop current is outside the range of 4-20 mA, as shown on the display or the current meter. For an example of error current at 22mA, see below.

SOLUTION: The process dewpoint is out of range. If the dewpoint is above +10°C (+50°F), the current will go to 22 mA. Apply dry air for 20 minutes. If the dewpoint doesn't decrease, consult the factory.

If the dewpoint is below –90°C (–130°F), the current will go below 4 mA and then go to the error current, e.g. 22 mA. Expose the DewPro to ambient air for several minutes. If the error remains, the cause may be a defective sensor assembly or an electronics malfunction. Consult the factory.

3.2 There Is No Current

SOLUTION: Check the voltage and polarity across +/- terminals with a DC voltmeter. If the voltage is within 12-28 VDC, consult the factory.

[no content intended for this page]

Chapter 4. Optional Display/User Interface

4.1 Installation

If the DewPro MMY31 is equipped with an optional display/user interface, follow the procedure below to access the buttons.

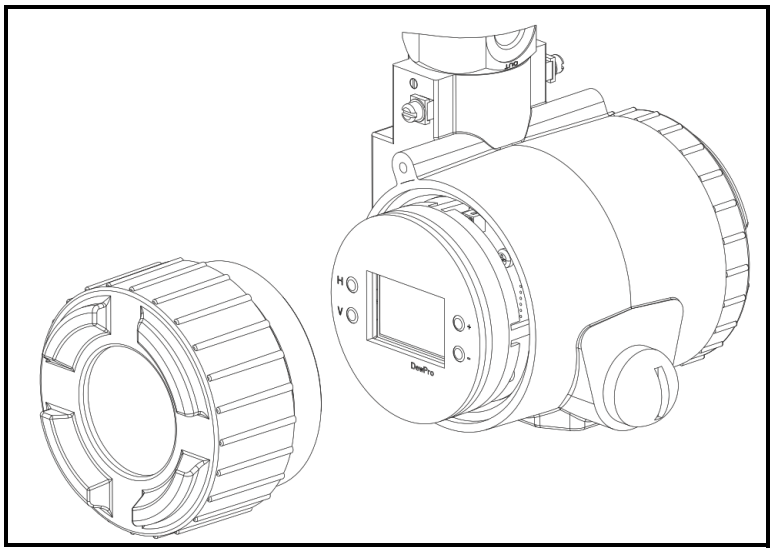

Figure 7: DewPro MMY31 with Display

4.1.1 Removing the Display

1. Unscrew and remove the protective windowed lid from the DewPro (as shown in *Figure 7* above), exposing the display module below. The buttons **V**, **H**, **+** and **–** are now accessible.
2. The display unit snaps onto the printed circuit board, resting on four posts. When removing the display, push one post to the outside, using a small screwdriver, and pull the display out.
3. Then unplug the display cable.

4.2 Programming Matrix

In the DewPro MMY31 transmitter with display option, a matrix-style input is used for programming the unit of measure, measuring range, error status of output, and output adjustment. The following describes the features and usage of the various matrix locations as they apply to the MMY31.

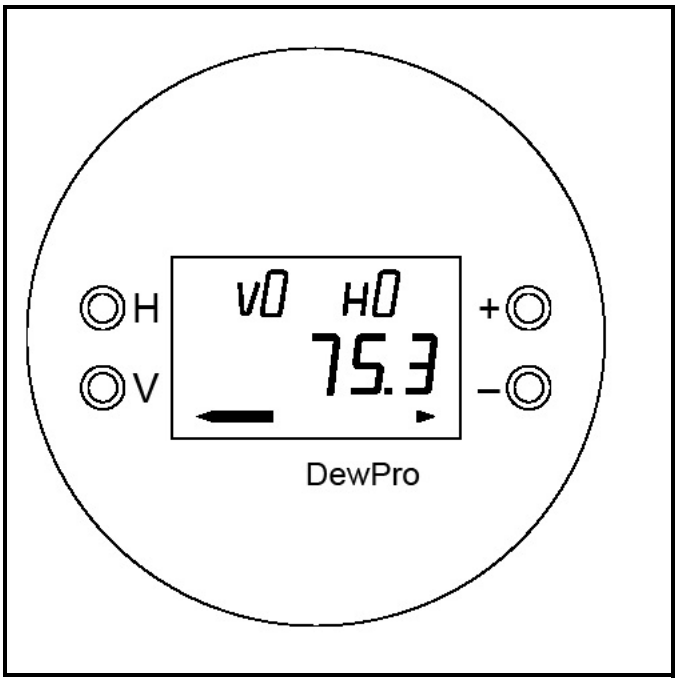

Figure 8: DewPro MMY31 Display

The DewPro MMY31 display (see *Figure 8* above) continuously shows the current matrix location using the vertical (**V**) and horizontal (**H**) coordinates to designate the row and column, respectively. The bar graph represents the output current in an analogue fashion.

Movement through the matrix is accomplished by using the **V** and **H** buttons to move to another row or column as shown in *Table 2 on page 15*. For example, to select location VH 38 (beginning at VH 00), successively press **V** (V1, V2, V3) and then successively press **H** (H1, H2, H3, H4, H5, H6, H7, H8); thus arriving at VH 38.

At any location where a value may be changed by the user, the desired value is programmed using the **+** and **–** buttons. The digit to be changed is flashing.

Table 2: Matrix Options

MMY31	H0	H1	H2	H3	H4	H5	H6	H7	H8	H9
V0	Display Moisture Value	Select Units 0 = °C 1 = °F 35 = ppm_v						Loop #1 at Fault 0 = –10% 1 = 110% 2 = Hold		
V1	Dew Point °C 4 mA	Dew Point °C 20 mA	ppm_v 20 mA							
V2										
V3	Pressure ppm_v Constant (bar)								Output D/A Cal 4 mA	Output D/A Cal 20mA
V4										
V5										
V6										
V7										
V8										Input Locking 50 = Unlock
V9	Current Error Code	Previous Error Code	Device ID	Software Version		Set to Default Values 50 = Set Default				Reset Device 50 = Reset After Calibration

4.3 Push Buttons - Special Functions

4.3.1 Reset to "Normal" Display

Pressing the **V** and **H** buttons simultaneously returns the user to VH 00 (normal display).

4.3.2 Display Only

Five (5) matrix locations are for display only and may not be changed by the user (see *Table 2 on page 15*). The "display only" fields are as follows:

VH 00	Normal display (in dewpoint or ppm_v).
VH 90	During a system alarm, displays the error code for the fault encountered.
VH 91	During normal operation, displays the previous error code for reference.
VH 92	Displays the factory issued identification number.
VH 93	Displays the factory-issued reference number designating the device type and software version.

4.3.3 Default Values

A default value is assigned to each programmable matrix field. The values are present after a reset to factory programmed data has been executed (see VH 95).

4.3.4 Changing Values

When unlocked (VH89 = 50), values in certain matrix locations can be changed using the **+** and **–** buttons. The changeable digit flashes.

4.4 Matrix Functions

This section describes the functions available to the user through the matrix, grouped by common function areas (refer to *Table 2 on page 15*). Each function is accessed by moving to its specified location within the matrix.

4.4.1 Display and Output Mode

Table 3: Display and Output Mode Functions

Function	Location	Description
Dew Point Display	VH 00	This is the normal display of the transmitter when in operation. The dewpoint is shown in °C or °F, or ppm_V as selected under VH 01.
Selecting the Device Unit	VH 01	Selects units to be displayed. Changing from °C to °F does not change the current loop. Changing from dewpoint to ppm_V does change the current loop. **Note:** *When switching to ppm_V, the display may indicate an error "3" if the dewpoint reading is above -20°C. (For example, the DewPro is exposed to ambient air.)*
Loop at Fault	VH 07	If any fault malfunction occurs, the loop can be set to either "-10%" (=3.6 mA), to "110%" (=22 mA) or "Hold" (stays at last valid value).
Selecting the Analog Output Offset (4 mA)	VH10	The dewpoint value corresponding to the analog output offset (4 mA) is entered here. Default: –90°C **Caution: E**nsure the dewpoint value in VH10 is always at least 20°C below the value assigned to 20 mA.
Selecting the Analog Output Span (20 mA)	VH11	The dewpoint value corresponding to the analog output span (20 mA) is entered here. Default: +10°C. **Caution: E**nsure the value in VH11 is always at least 20 °C above the value assigned to 4 mA.
Setting the Span Value for the ppm_V Range	VH 12	Selection of this field sets the span value for the ppm-v range. Default: 100. **Note:** *The offset is always 0 ppm_V. Do not exceed 1000 ppm_V.*

4.4.2 Special Calibration

Table 4: Special Calibration Functions

Function	Location	Description
Adjusting the Pressure Constant	VH 30	The process pressure constant is entered in bar (absolute), and is used to calculate ppm_V. The moisture unit ppm_V is the ratio of water vapor pressure to the total process pressure and is, therefore, independent of the process pressure. The reason is that when compressing a gas (process pressure) all partial pressures increase by the same factor (Dalton's Law). The gold/aluminum oxide sensor is selective to water vapor pressure monitoring a higher vapor pressure when the total pressure (process pressure) increases. The formula utilized by the analyzer refers to the total pressure of 1 bar. An elevated pressure of the process has to be corrected by programming the actual process pressure in bars to the matrix field VH 30. The system should be designed to maintain a constant pressure, for instance, by using a pressure regulator in a bypass system. Default: 1 bar (absolute)
Hardware Adjustment of the Current Loop at 4 mA	VH 38	By connecting an ammeter in the loop, the correct current (4 mA) can be adjusted by increasing or decreasing the displayed digits. **Note:** *If the matrix input is locked (VH89), the calibration values are displayed but the current output is unaffected. To enable adjustments, VH89 has to be unlocked by entering "50" into this field.*
Hardware Adjustment of the Current Loop at 20 mA	VH 39	Selection of this field assists during calibration, generating a nominal 20 mA signal, but the actual value must be 21.92 mA, an overrange to a dewpoint of 22°C. By connecting an ammeter in the loop, the correct current (21.92 mA) can be adjusted by increasing or decreasing the displayed digits. **Note:** *If the matrix input is locked (VH89), the calibration values are displayed but the current output is unaffected. To enable adjustments, VH89 has to be unlocked by entering "50" into this field.*

4.4.3 Mode of Operation

Table 5: Mode of Operation Functions

Function	Location	Description	
Input Locking	VH 89	Any number other than "50" will lock the instrument settings from inadvertent or unauthorized changes. (The instrument is unlocked only at "50.")	
Displaying the Present Error Code	VH 90	In the event of a system fault, this field displays the diagnostic error code for the fault encountered.	
		Error Code	Description
		0	No error.
		1	Dewpoint underrange. The current output has fallen below the 4.00 mA point.
		2	Dewpoint overrange. The current output has exceeded the 21.92 mA level.
		3	The instrument is no longer reading between –90° and –20°C dewpoint while in ppm_V mode and has fallen off of the internal vapor pressure table.
		4	ppm_V overrange. The current output has exceeded the 20 mA level. Re-range the ppm_V upper scaling limit in V1H2 to keep this error from occurring.
		5	Sensor is shorted.
		6	Sensor is open.
Displaying the Previous Error Code	VH 91	When a system fault condition is cleared, the value of the error code is stored in this location. That is, during normal operation, the most recent error code is displayed for reference.	
Instrumentation Identification Number	VH 92	The instrumentation identification number should always read "100."	
Identification Field	VH 93	This field indicates the software version (i.e., version 3.0 or higher).	
Set to Default Values	VH 94	This field sets all factory defaults. **Note:** *Anything that has been calibrated will not be reset.*	
Resetting the Device	VH 99	The device is reset in this field by entering 50. **Note:** *Reset the device only after field calibration.*	

[no content intended for this page]

Chapter 5. Specifications

5.1 Technical Specifications

Sensing Element:

Capacitive measurement, planar aluminium oxide sensor

Measurement Range:

–130° to +50°F (–90° to +10°C) dew point temperature.

0 to 10, 0 to 100, 0 to 1000 ppm_v (fully adjustable with integral display)

Recommended Recalibration Cycle:

12 months, depending on the application

Calibration Accuracy:

±3.6°F (±2°C) dew point at 77°F (25°C)

Maximum Sensor Relative Humidity:

50% at dewpoint temperatures >32 °F (0°C)

Operating and Storage Temperature:

–40° to +122°F (–40° to +50°C)

Electronics Operating Temperature Range:

–40° to +185°F (–40° to +85°C)

Maximum Operating Pressure:

1750 psig, (120 bar, 12 MPa)

Helium Leak-Rate:

$<10^{-6}$ mbar l/s

Output:

4 to 20 mA loop-powered; 16 µA resolution

Filter Element:

100 micron, sintered stainless steel

Probe Tube:

316 stainless steel, 1/2" (12.7 mm) diameter,

insertion length 2" (50 mm) to 3.5" (90 mm)

Typical Probe Mounting:

1/2" NPT-M, 3/4" NPT-M, 3/4"-16, or

G 1/2 stainless steel compression fitting on 1/2" (12.7 mm) tube

Electronics:

Microcontroller operated.

Moisture Unit:

Dew point temperature in °C or °F, ppm_v

Power Supply:
24 VDC nominal, 12 to 28 VDC range

Protection:
Type 4X (IP 67)

Weight:
3.3 lb (1.5 kg)

Hazardous Area Approvals (Optional):

- MMY31-Axxxx:

Intrinsically safe, Class I, II & III, Division 1, Groups A, B, C, D, E, F & G,

Type 4X, T5 Ta = 60°C, Entity, per drawing FM-IS-Dewpro

(FM Approvals)

- MMY31-Bxxxx:

Explosionproof with intrinsically safe sensor, Class I, Division 1, Groups A, B, C & D, Type 4X, T5 Ta = 60°C, per drawing FM-XP-Dewpro

(FM Approvals)

- MMY30-Cxxxx:

Non-incendive, Class I, Division 2, Groups A, B, C & D, Type 4X, T4A Ta = 60°C;

Dust-ignitionproof, Class II and III, Division 1,Groups E, F and G, Type 4X, T5 Ta = 60°C

(FM Approvals)

- MMY30-Fxxxx:

Non-Sparking apparatus for ATEX Zone 2, II 3 G Ex nA IIC T4

(ATEX declaration by the manufacturer (Panametrics)

5.2 Optional Onboard Display with User Interface

The optional onboard display with user interface uses a matrix configurator for:

- Range changes
- Unit of measure selection
- Current loop adjustment
- Error diagnostics
- Current value selection for fault conditions
- Entering a pressure constant for ppm_v.

5.3 EMC

Performance Criterion A:

1. Conducted Emission Test as per CISPR 11 Class A, 2004
2. Radiated Emission Test as per CISPR 11 Class A, 2004
3. Radiated Susceptibility Test as per IEC 61000-4-3, 2002
4. Electrostatic Discharge Test as per IEC 61000-4-2, 2001
5. Electrical Fast Transient Test as per IEC 61000-4-4, 2004
6. High Energy Surge Immunity Test as per IEC 61000-4-5, 2001
7. Power Frequency Magnetic Field Test as per IEC 61000-4-8, 2001
8. IEC 61326, Industrial Locations

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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 Authorisation (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.

[no content intended for this page]

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