Trace moisture Transmitter for pressure or atmospheric dewpoint DewPro® MMY30

Installation and Operation Manual

GE Measurement & Sensing Technologies

GE General Eastern

General Notes

Caution! Caution!
Before installation please read all instructions.

Safety Safety
- The DewPro is designed to be mounted to pressurized systems. Take necessary precautions when mounting or removing the DewPro.

If you should have questions regarding the product described in this document, or need further assistance, please contact your local GE General Eastern Sales Centre

Contents

1.0 General System Information

1. 1 Unpacking and Inspection

Unpacking

Upon receipt of the DewPro MMY 30, 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. The carton you receive should contain:

- DewPro MMY 30
- Installation and Operation Manual
- Calibration Certificate

Check Model Number

Compare the model number (on the product label) with product structure (see below) to ensure you have received everything you ordered.

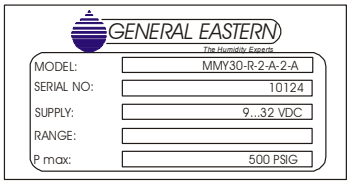

Fig. 1

Product Structure

MMY30 -
Certification/Approvals:
R Standard (not certified)
Y Other
Process Connection:
1 ½" MNPT (1/4" tube fitting if B, C or D is selected below)
2 G ½ (6 mm tube fitting if B, C or D is selected below)
9 Other
Orifice Configuration:
A Inlet: None; Outlet: Orifice, with ¼" FNPT
B Inlet: None; Outlet: Orifice, with (6 mm) ¼ " tube fitting
C Inlet: None; Outlet: None, with (6 mm) ¼ " tube fitting
D Inlet: Orifice; Outlet: None, with (6 mm) ¼ " tube fitting
Y Other
Enclosure Conduit:
1 ½ " FNPT
2 PG 16
9 Other
Output Configuration/Dewpoint Range:
A Td -90 oC to +10 oC (-130 oF to +50 oF), no display, error 22 mA
B Td -90 oC to +10 oC (-130 oF to +50 oF), no display, error Hold
C Td -90 oC to +10 oC (- 130 oF to +50 oF), no display, error 3.6 mA
D 0-100 ppmv 1 bar, no display, error 22 mA
E 0-100 ppmv 1 bar, no display, error Hold
F 0-100 ppmv 1 bar, no display, error 3.6 mA
G With integral display/user interface
Y Other

R	**2**	**A**	**2**	**A**

1.2 Introduction

Unit description

The DewPro MMY 30 trace moisture transmitter is a loop-powered dewpoint measuring device. The transmitter includes a sensor element, a flow chamber, a weather-proof enclosure, microprocessor electronics, and assorted fittings all in a compact assembly In most cases, either the inlet or outlet port includes an orifice to regulate the flow. The placement of this orifice determines whether the dewpoint measurement is done at process (line) pressure (outlet orifice), or at atmospheric pressure (inlet orifice). A 2 micron sintered inlet filter prevents particles from entering the device.

Optional Display/User Interface

The optional display/user interface feature allows the DewPro to be configured to the user's specifications. See Chapter 4.0, pages 14-20 for more information.

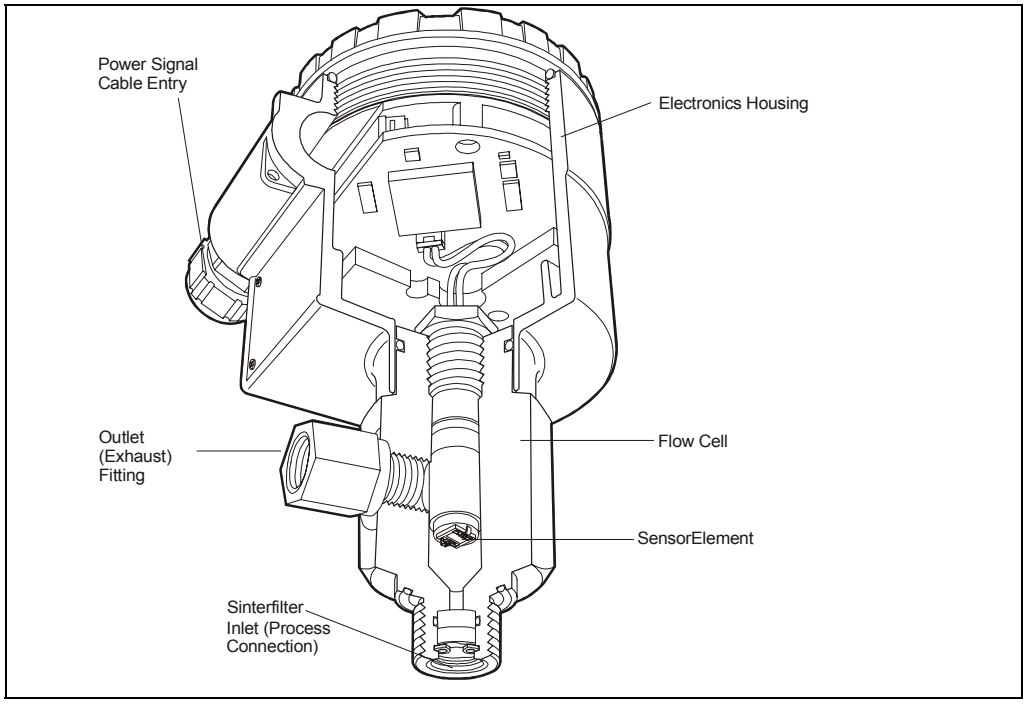

Fig. 2

1.3 Theory of Operation

4 to 20 mA Loop

The DewPro MMY 30 microprocessor controlled electronics operate with a DC voltage supply from 12 to 32 V DC. At the nominal 24 V DC supply, the maximum loop resistance is 600 Ohm. The signal is represented by the 4 to 20 mA loop current and is directly proportional to the dewpoint range in oC or oF In the standard range, 4 mA corresponds to -90 oC (-130 oF) and 20 mA to +10 oC (+50 oF) dewpoint temperature. The optional unit of measure is ppmv in the standard range 0 - 100 ppm-v.

By-pass

In dryer applications, the moisture sensor performs best when mounted in a bypass. The built-in bypass of the DewPro eliminates costly hardware associated with traditional sampling methods. The DewPro installs simply into the process with its G ½ or ½ " MNPT threaded connection.

Planar Sensor

The heart of the MMY 30 is the new planar sensor element. It incorporates a new, superior aluminum oxide sensor that provides longer calibration stability, excellent corrosion resistance, and improved speed of response. The sensor, mounted on a ceramic substrate, also has a reduced temperature coefficient.

Calibration

Each DewPro is factory calibrated against precise NIST certified moisture references and has an accuracy of ñ2 OC dewpoint. For field recalibration, GE General Eastern is offering a unique calibration device. The MMY145 field calibrator connects to the DewPro on site and corrects the calibration data automatically.

1.4 Dimensions

Choose a mounting location which allows enough clearance for the use of tools and for connection of the field calibrator.

Standard DewPro

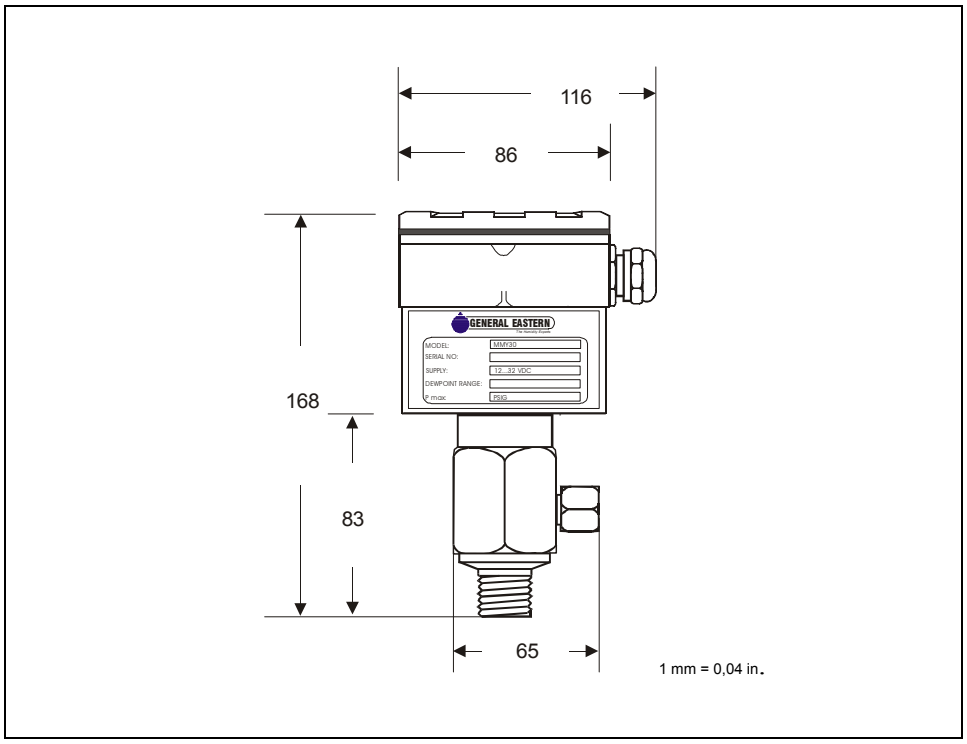

Fig. 3

DewPro with Optional Display/User Interface

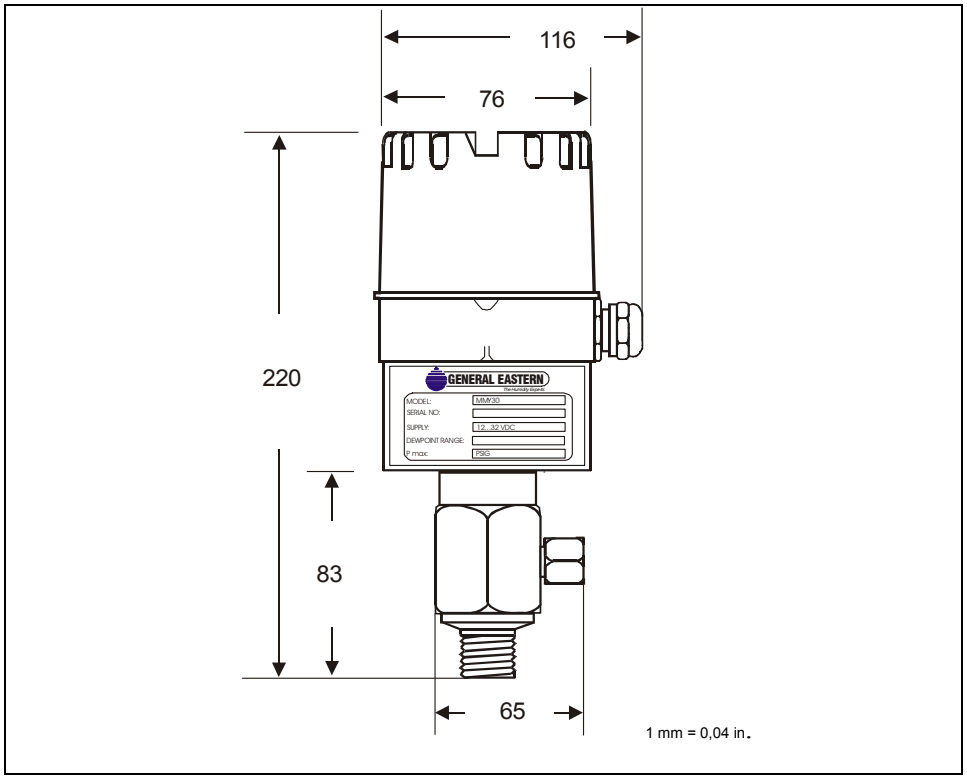

Fig. 4

2.0 Installation Guidelines

2.1 General Hints

- Mount the DewPro vertically whenever possible to prevent particles or condensation from entering the bypass.
- Mount the DewPro after a shut-off valve to depressurize the DewPro when removing it from the process pipe in case of maintenance or field calibration.

Caution! Do Not Over-Tighten

Caution!
The outlet fitting is connected to the bypass block with a G 114 straight thread (with gasket) which will seal if the fitting is simply hand-tightened. When connecting an external device, counter the fitting with a second wrench when tightening.

If the inlet is equipped with a G 112 straight thread and gasket, the seal is obtained by simply hand-tightening the DewPro.

2.2 Method I – Orifice at Outlet

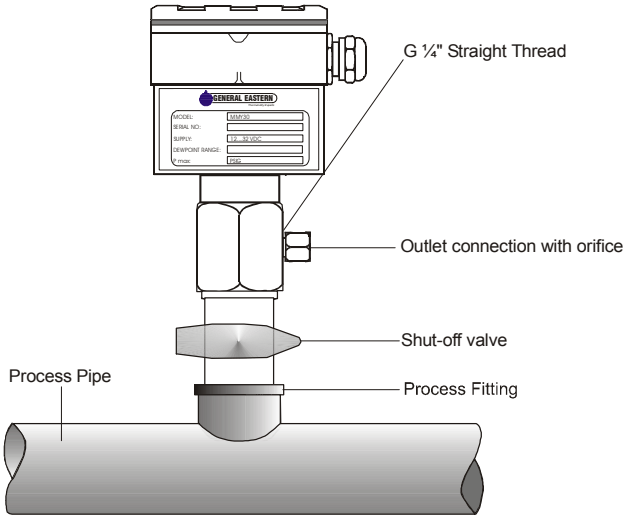

Fig. 5

Pressure Dewpoint

Air dryers producing general instrument air are typically specified with a pressure dewpoint rating. The majority of dryers operate in a dewpoint range between -40 oC to -75 oC (-40 oF to -100 oF). A pressure of 7 to 8 bar (= 100 psig) is very common.

Air Flow

The DewPro is designed to measure the pressure dewpoint. By restricting the flow at the outlet of the integral bypass with an orifice, the sensor monitors the dewpoint at process pressure. The bleed-off air to the atmosphere at 7 to 8 bar (100 psig),is approximately 70 cc/min. (=4 [/h or =0. 14 cfh). For smaller sized dryers of 3m'/min. (=100 cfm) the air loss is only 0.002% of the air production and is negligible.

Despite the very low flow rate through the bypass as shown, the air sample in the DewPro bypass chamber is refreshed every second due to the small volume design. As a result, the sensor sees changes in moisture instantaneously.

Due to the low flow rate, the flow velocity is also very low at < 0.01 m/sec. (=34m/h). The low flow velocity prevents the inlet filter from clogging since there is not enough kinetic energy to draw dust particles into the filter.

2.3 Method II – Orifice at Inlet

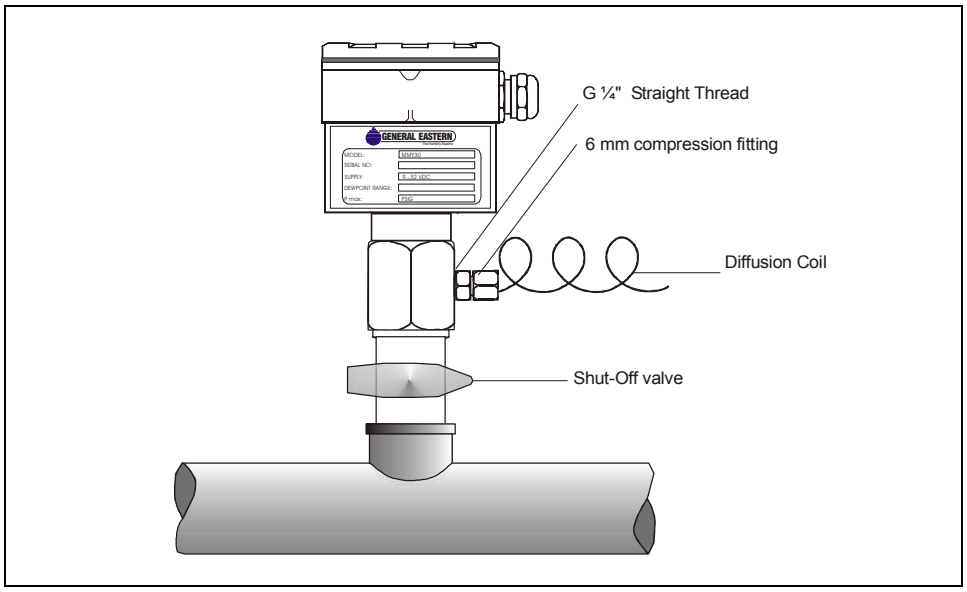

Fig. 6

2.4 Method III – No flow restriction

Low pressure closed loop

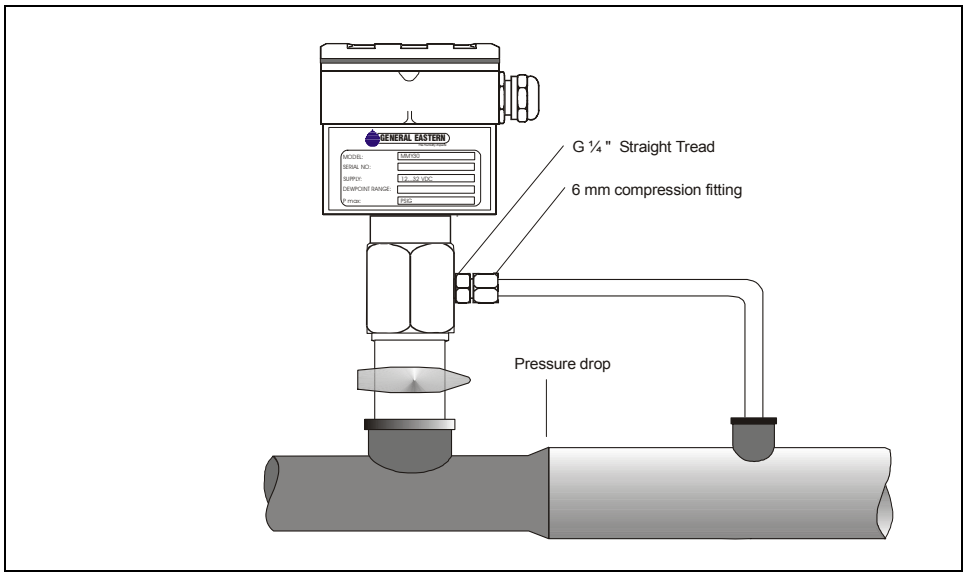

Fig. 7

Closed loop drying systems, which are very common with hopper dryers in the Low Pressure Closed Loop plastics industry, operate at very low pressures of a few inches of water. The air passing through the DewPro bypass is fed back to the main stream after a pressure drop in the main line.

In this configuration, the DewPro bypass has no flow restriction at the inlet and outlet.
The outlet is equipped with a 6 mm (l/4") tube fitting to allow simple connection of the loop tubing.

Method IV – Bypass Installation

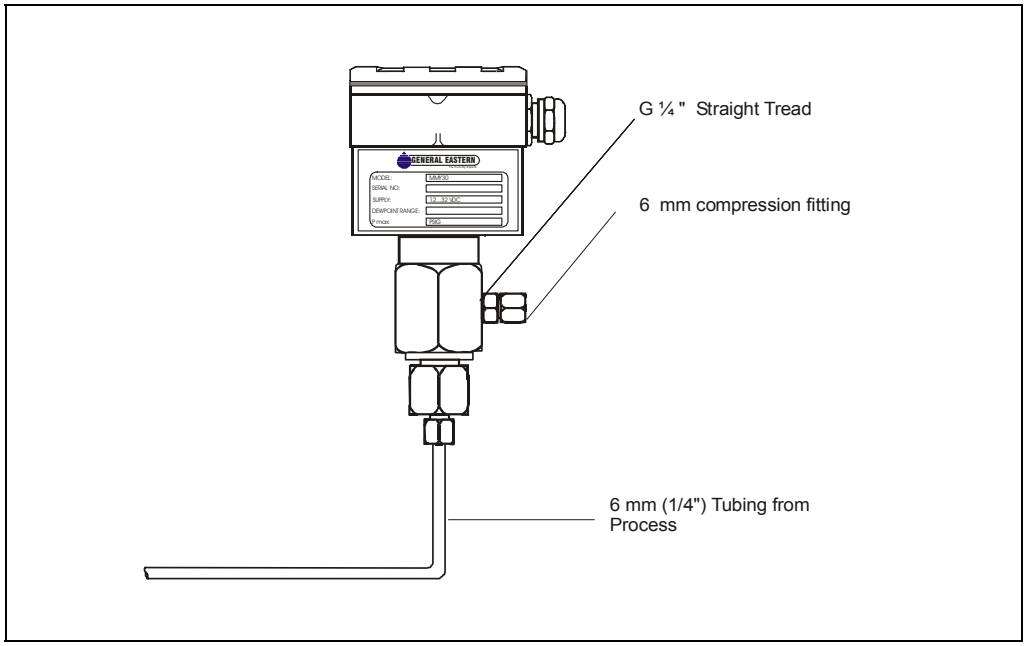

Fig. 8

Remote installation

In some cases there may not be enough room to install the DewPro directly to the process pipe. The tube connection at the inlet allows mounting the DewPro at a remote location. The functions of Methods 1-III can be selected.

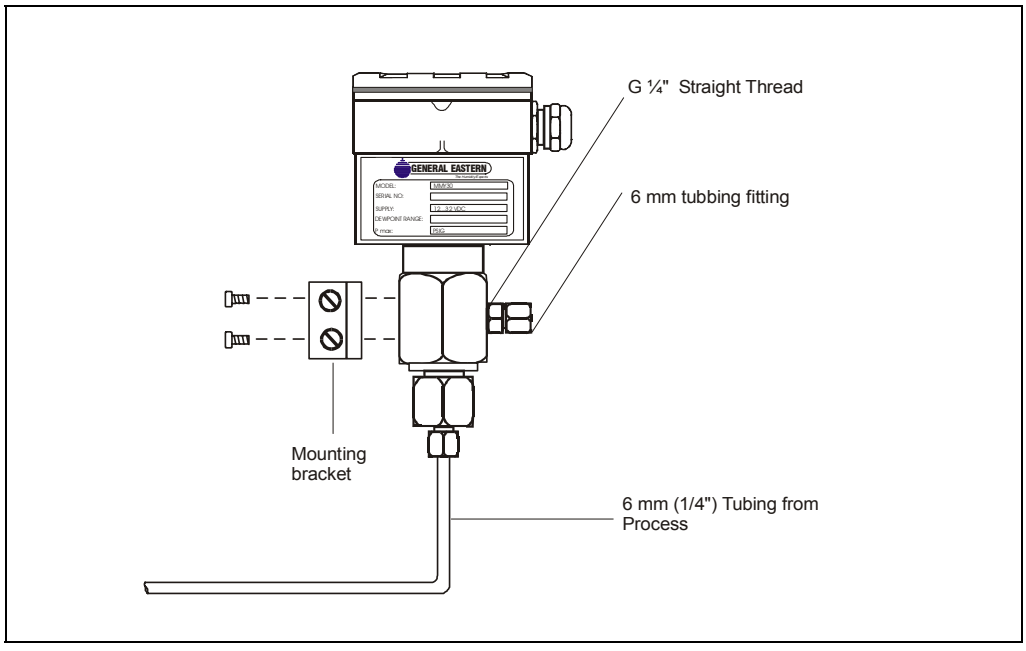

Fig. 9

Wall Mounting

The DewPro can be mounted on a wall or a plate using a bracket available from GE General Eastern.

3.0 Wiring Instructions

3.1 Wiring, General Guidelines

Note: If the DewPro is equipped with an optional display/user interface, please refer to section 4.0, page 14 prior to wiring

Caution! **Caution!**
The DewPro system contains electronic components that are susceptible to damage by electric electricity. Proper handling procedures must be observed during the removal, installation, or other handling of internal boards or devices.

3.2 System Configuration

Various Power Supplies / Displays

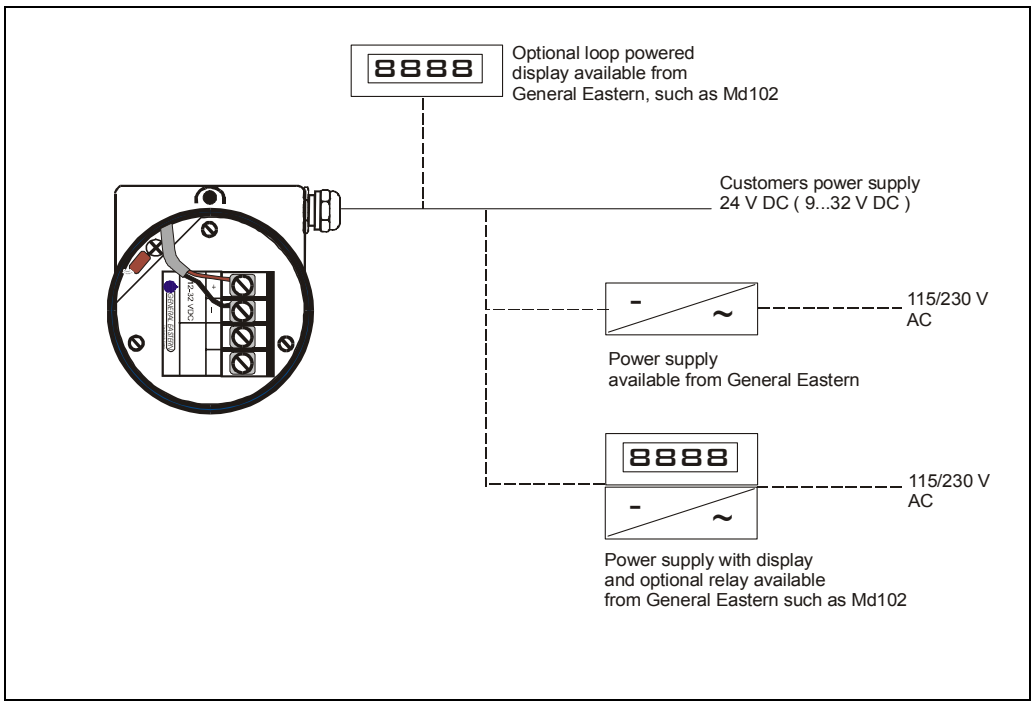

Fig.10

Designing the Loop

Note regarding customer's power supply: The voltage at the +/- terminal of the Designing the Loop DewPro should not fall below 12 V DC. 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 fl will cause a voltage drop of 1 V DC 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.

3.3 Mounting in Normal Environments

Standard

- A standard four-wire, stranded cable can be used to interconnect the DewPro with the power source.

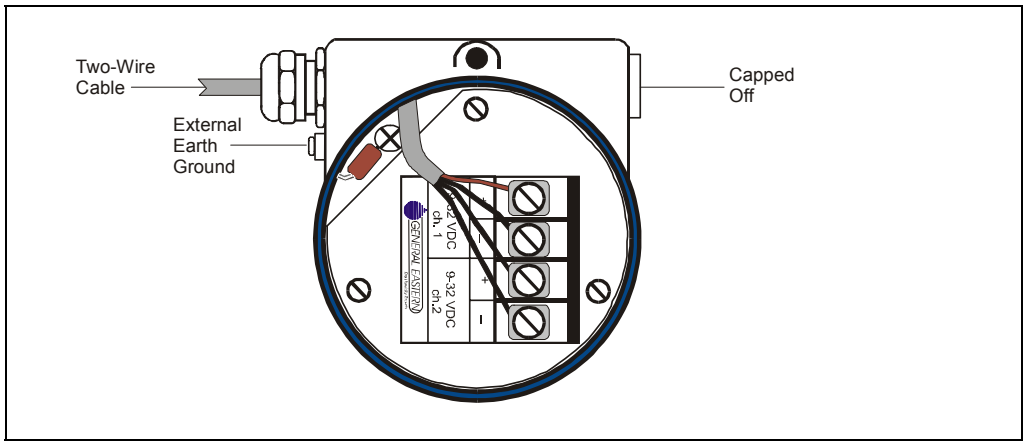

Fig.11

3.4 Mounting in Environments with Severe Electrical Noise

EMI/RFI

- In areas where EMI/RFI interference is likely a shielded signal cable is to be used for full protection. The DewPro MMR31 meets requirements of IEC 801-1 through 6 (EN 50081-1, 50082-2) when shielded cable is used.

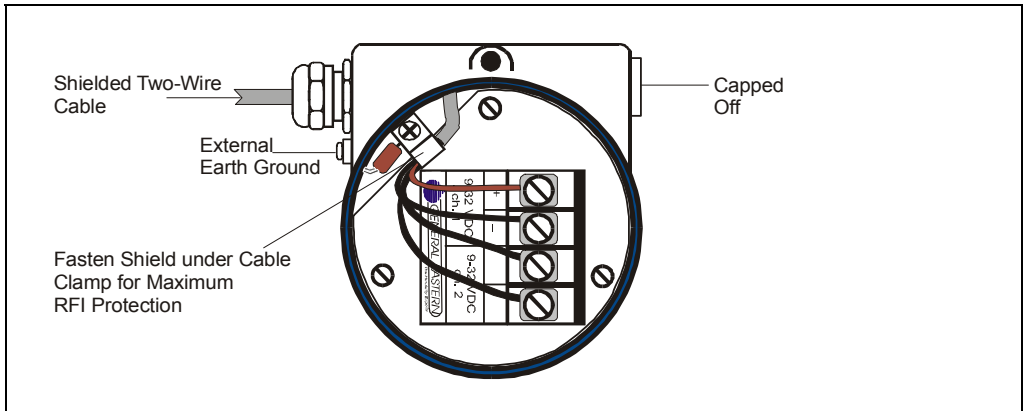

Fig.12

3.5 Electrical Connection

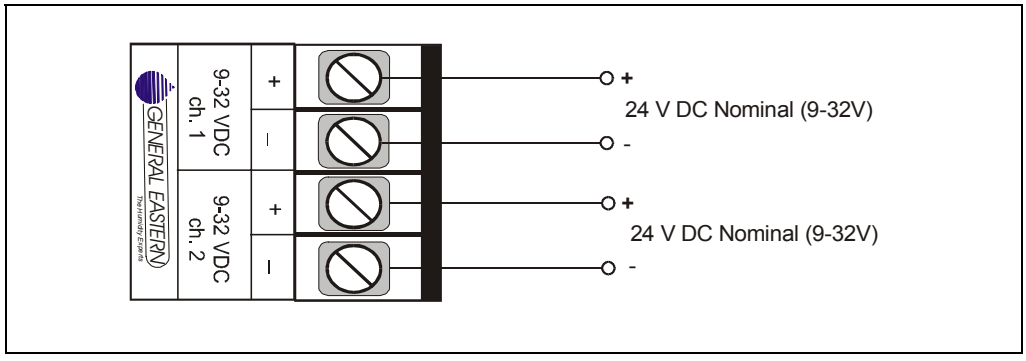

Fig. 13

3.5 General Instructions

1. Unscrew the cap on top of the unit.

2. Loosen the grey 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 grey cable gland to meet IP 67 and to relieve any stress on the wire.

5. Verify that 12 to 32 V DC 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. Connect shield to internal grounding for maximum EMI / RFI protection

4.0 Optional Display/User Interface

4.1 Installation

If the DewPro is equipped with an optional display / user interface follow the procedure below to access the terminals prior to applying power. Please use Figure 18 below as a reference when removing any parts from the DewPro.

Dewpro with Display assembly

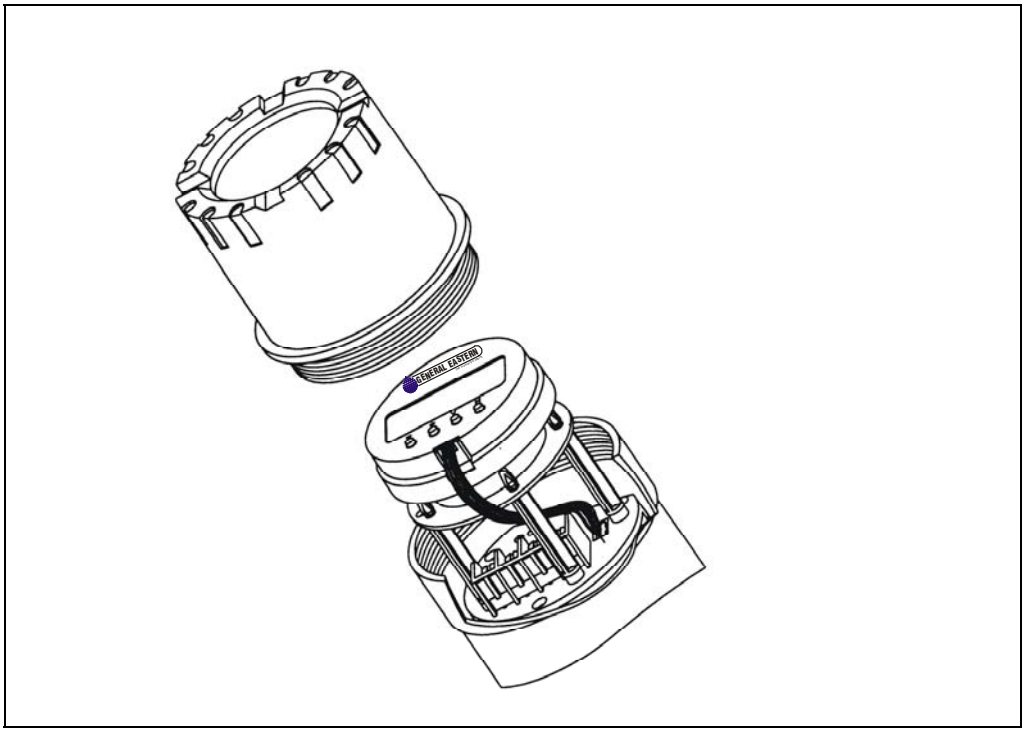

Fig. 14

1. Unscrew and remove the protective lid from the top of the DewPro, exposing the display module below
2. Unplug the display from the lower terminal board.
3. Carefully grasp the display bracket and pull straight up.
4. Follow the procedure outlined in Section 3.0, pages 8-10.
5. To replace the display module, locate the six holes on the underside of the display bracket. The MMR 31 uses the holes with the additional markings next to them.
6. Align the display bracket with the standoffs and snap the display bracket onto the three standoffs.
7. Carefully rotate the display module on the display bracket until properly aligned for readability.
8. Reconnect the display to the lower terminal board observing the key on the plug and socket.

4.2 Description of the DewPro MMY30, Programming Matrix

In the DewPro trace moisture 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. For users of other General Eastern equipment, this 'GEI matrix" format is familiar. The following describes the features and usage of the various matrix location as they apply to the MMY30.

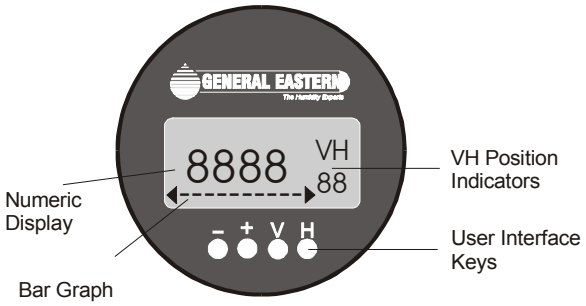

Fig. 15

The display of the DewPro MMY30 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 (refer to Figure 15). See the Appendix for an enlarged overview of the matrix.

MMY 30/31		H0	H1	H2	H3	H4	H5	H6	H7	H8	H9
Moisture Unit	V0	Display Moisture Value	Select Moisture Unit see table below						Loop 1 at Fault 0= -10%, 1=110%, 2=Hold	Loop 1 Raw Reading	
Loop Range	V1	Dewpoint °C 4 mA	Dewpoint °C 20 mA	ppm, mA							
	V2										
Constant; Loop Hardware Calibration	V3	Pressure Constant for ppmv comp. (bar)								Loop 1 D/A Calibration Low	Loop 1 D/A Calibration High
	V4										
	V5										
	V6										
	V7										
Access Key	V8										Input Locking 50 = Unlock
Misc. Setup	V9	Display Present Error	Display Previous Error	Unit ID	Software Version		Reset To Defaults 50 = Reset				System Reset 50 = Reset

Fig. 16

Movement through the matrix is accomplished by using the "V" and "H" buttons to move to another row or column. For example, beginning at VH 00 and successively pressing "V", leads the user to VH 10, VH 20, VH 30, VH 40, VH 50, VH 60, VH 70, VH 80, VH 90 and back to VH 00. At any location where a value may be changed by the user, the desired value is programmed using the "+" and "-" buttons.

4.3 Special Functions of the Push buttons

1. Reset to "Normal" Display: Pressing the 'V' and “H” buttons simultaneously returns the user to VH 00 (normal display).
2. Display Only: Note that eight (6) matrix locations me for display only and may not be changed by the user (refer to Figure 20 or Appendix). The 'display only' fields are as follows:

    - VH 00 = normal display (in dewpoint oC)
    - VH 08 = indicates digitized moisture signal
    - VH 90 = during a system alarm, displays the error code for the fault encountered
    - VH 91 = during normal operation, the previous error code is displayed 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

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).

4.4 Functions of the Matrix (Refer to Figure 16 or Appendix

This section describes the functions available to the user through the matrix. grouped by common function areas. The function is accessed by positioning to the specified location within the matrix

DISPLAY AND OUTPUT MODE

1. Dewpoint display

Location in Matrix	Description of Function
VH 00	This is the normal display of the transmitter when in operation. The dewpoint is shown in oC or oF, or ppm-v as selected under VH 01.

2. Selecting the Device Unit

Location in Matrix	Description of Function
VH 01	Selects units to be displayed. Changing from oC to oF does not change the current loop. Changing from dewpoint to ppmv does change the current loop. **NOTE:** When switching to ppmv, the display may indicate an error " 3" if the dewpoint reading is above -20 oC. (For example, the DewPro is exposed to ambient air.)

3. Loop at Fault

Location in Matrix	Description of Function
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).

4. Selecting the Analogue Output Offset (4 mA)

Location in Matrix	Description of Function
VH 10	The dewpoint value corresponding to the analogue output offset (4 mA) is entered here. **Caution!** Ensure this is always at least 20 OC below the value assigned to 20 mA. Default: -90 oC

5. Selecting the Analogue Output Span (20 mA)

Location in Matrix	Description of Function
VH 11	The dewpoint value corresponding to the analogue output span (20 mA) is entered here. Caution! Ensure this is always at least 20 oC above the value assigned to 4 mA. Default: + 10 oC

6. Setting the Span Value for the ppm-v Range

Location in Matrix	Description of Function
VH 12	Selection of this field sets the span value for the ppm-v range. NOTE: The offset is always 0 ppm-v. Do not exceed 1000 ppm-v Default: 100

SPECIAL CALIBRATION

7. Adjusting the pressure constant

Location in Matrix	Description of Function
VH 30	The process pressure constant is entered in bar (absolute), which is used to calculate ppmv. The moisture unit ppmv 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 (Daiton's Law). The gold/aluminum oxide sensor is selective to water vapour pressure monitoring a higher vapor pressure when the total pressure (process pressure) increases. The formula utilized by the analyser refers to the total pressure of 1 bar. An elevated pressure of the process has to be corrected by programming the actual process pressure 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)

8. Adjusting the Current Loop at 4 mA

Location in Matrix	Description of Function
VH 38	By connecting a mA-meter 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.

9. Adjusting the Current Loop at 20 mA

Location in Matrix	Description of Function
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 over range to a dewpoint of 22 oC. By connecting a ma-meter 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.

MODE OF OPERATION

10. Input locking

Location in Matrix	Description of Function
VH 89	Any number other than "50" will lock the instrument settings from inadvertent or unauthorized changes. (The instrument is only unlocked at "50".)

11. Displaying the present Error Code

Location in Matrix	Description of Function
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 to keep this error from occurring.
5	Sensor is shorted.
7	Sensor is open.

12. Displaying the previous Error Code

Location in Matrix	Description of Function
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.

13. Instrumentation Identification number

Location in Matrix	Description of Function
VH 92	The instrumentation identification number should always read "100".

14. Identification Field

Location in Matrix	Description of Function
VH 93	This field indicates the software version (ie. version 2.02 or higher).

15. Set to Default Values

Location in Matrix	Description of Function
VH 94	This field sets all factory defaults NOTE: Anything that has been calibrated will not be reset.

16. Resetting the Device

Location in Matrix	Description of Function
VH 94	The device is reset in this field. **Note: Reset the device only after field calibration using the DewComp MCY 40 calibrator.**

5.0 Troubleshooting

5.1 General Recommendations

5.1 General Recommendations

1. The loop current is outside the range of 4-20 mA, as shown on display or current meter

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

    - It the dewpoint is below -90 oC (-130 oF), the current will go below 4 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.

2. There is no current.

    - Check the voltage and polarity across +/- terminals with a DC voltmeter. If the voltage is within 12-32 V DC, consult the factory.

3. The response time is very slow.

    - Verify the flow with an air flow meter. If the orifice is at the outlet of a 7 to 8 bar (=100 psig) process, the air flow should indicate 20 to 30 1/h (500 cc/min., 1 cfh). If the flow is dramatically lower, the inlet filter may be clogged. Remove the 2 micron filter and clean it with a solvent or replace it.

5.2 Removing the Filter

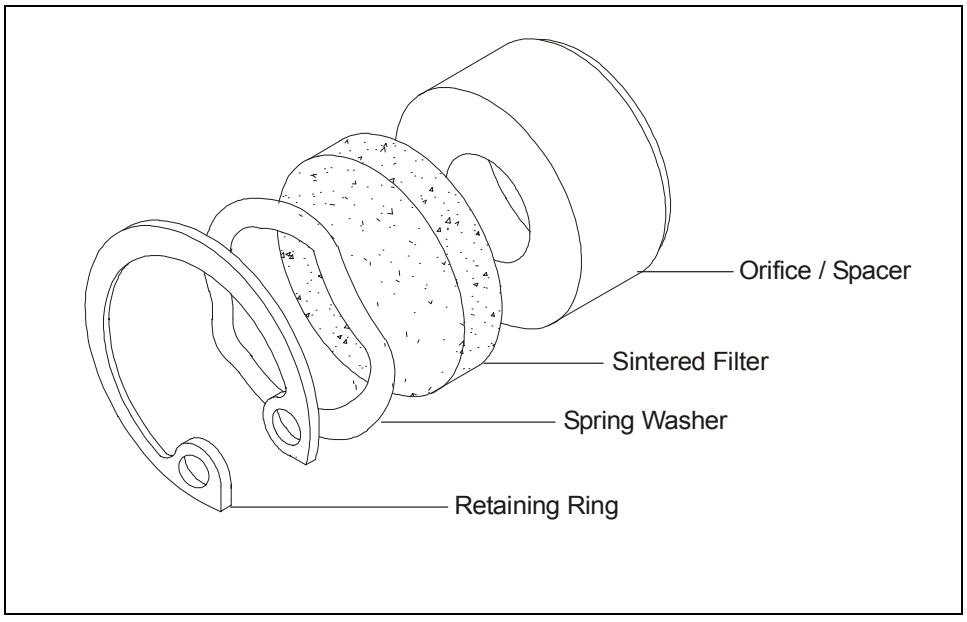

Fig. 17

6.0 Technical Specifications

Sensing element: Planar sensor, aluminum oxide capacitance principle

Measurement range: - 90 oC to + 10 oC (-130 oF to +50 oF) dewpoint temperature. Optional 0 to 100 ppm-v standard range or up to 1000 ppm-v if specified.

Recommended recalibration cycle: 6 to 12 months, depending on the application and required accuracy

Calibration accuracy: + /- 2 oC (+/- 4 oF) dewpoint

Repeatability: +/- 1 oC

Maximum relative humidity: 50% at dewpoint temperatures >0 oC (32 oF)

Temperature coefficient: $\Delta Td/\Delta T$ <0.2 oC / oC (<0.4 oF / oF)

Operating and storage temperature: -40 oC to +60 oC(-40 oF to +140oF)

Air bleed off at 7 to 8 bar (100 psig): approximately 28 l/h (1 cfh) (volume related to atmospheric pressure)

Maximum operating pressure: 30 bar (450 psig)

Helium leak-rate: $<10^{-6}$ mbar l/s

Output: 4 to 20 mA; 16 uA resolution

Flow block: 316 stainless steel 1.440/1.4436 with G ½ thread (DIN ISO 228) and VITON 0-ring seal or ½ " MNPT

Filter at inlet: 2 micron

Wrench width for flow block: 42 mm (1 5/8 “)

Electronics: Microprocessor controlled

Moisture unit.. Dewpoint temperature in oC or 0F, ppm-v

Supply power: 24 V DC nominal, tolerance 12 to 32 V DC

Protection: IP 66

Weight: 2 kg (4.4 lbs)

6.1 Optional Onboard Display with User Interface

The optional onboard display with user interface uses the General Eastem matrix configurator for:

- range changes
- unit of measure selection
- current loop adjustment
- error diagnostics
- current value selection for fault conditions,
- and entering a pressure constant for ppm-v.

7.0 Accessories

7.1 Available Accessories

Accessory Description

Single power supply

Panel mount display, power supply, no relays

Panel mount display, power supply, two alarms

Panel mount display, power supply, two alarms. 4 to 20 repeating output

Consult GE General Eastern for further information!

7.2 Example of Power Supplies and Displays

Example

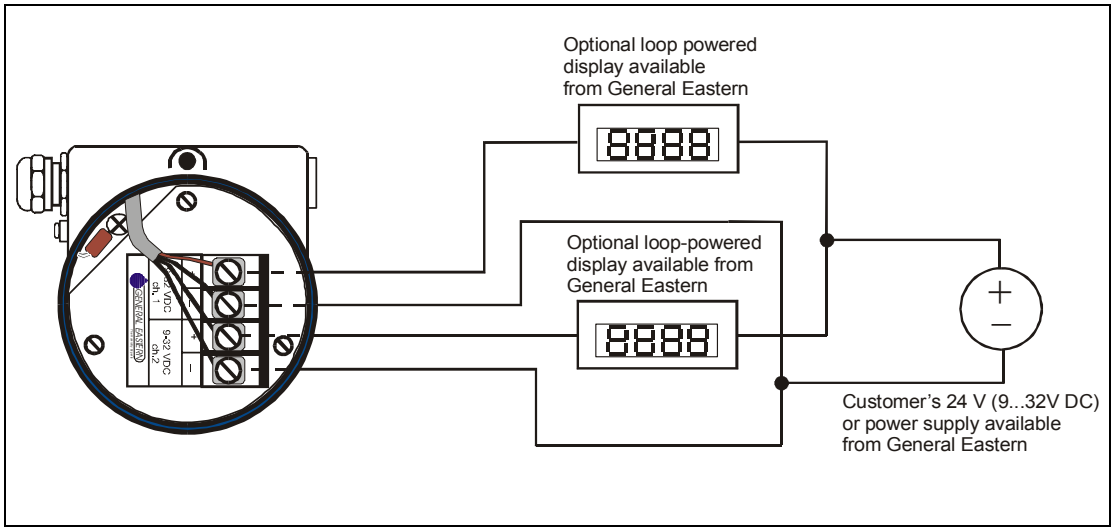

Fig. 18

APPENDIX

MMY 30/31		H0	H1	H2	H3	H4	H5	H6	H7	H8	H9
Moisture Unit	**V0**	Display Moisture Value	Select Moisture Unit see table below						Loop 1 at Fault 0= -10%, 1=110%, 2=Hold	Loop 1 Raw Reading	
Loop Range	**V1**	Dewpoint °C 4 mA	Dewpoint °C 20 mA	ppm_v mA							
	V2										
Constant; Loop Hardware Calibration	**V3**	Pressure Constant for ppmv comp. (bar)								Loop 1 D/A Calibration Low	Loop 1 D/A Calibration High
	V4										
	V5										
	V6										
	V7										
Access Key	**V8**										Input Locking 50 = Unlock
Misc. Setup	**V9**	Display Present Error	Display Previous Error	Unit ID	Software Version		Reset To Defaults 50 = Reset				System Reset 50 = Reset