# Easidew Online
## Dew-Point Hygrometer
# User's Manual
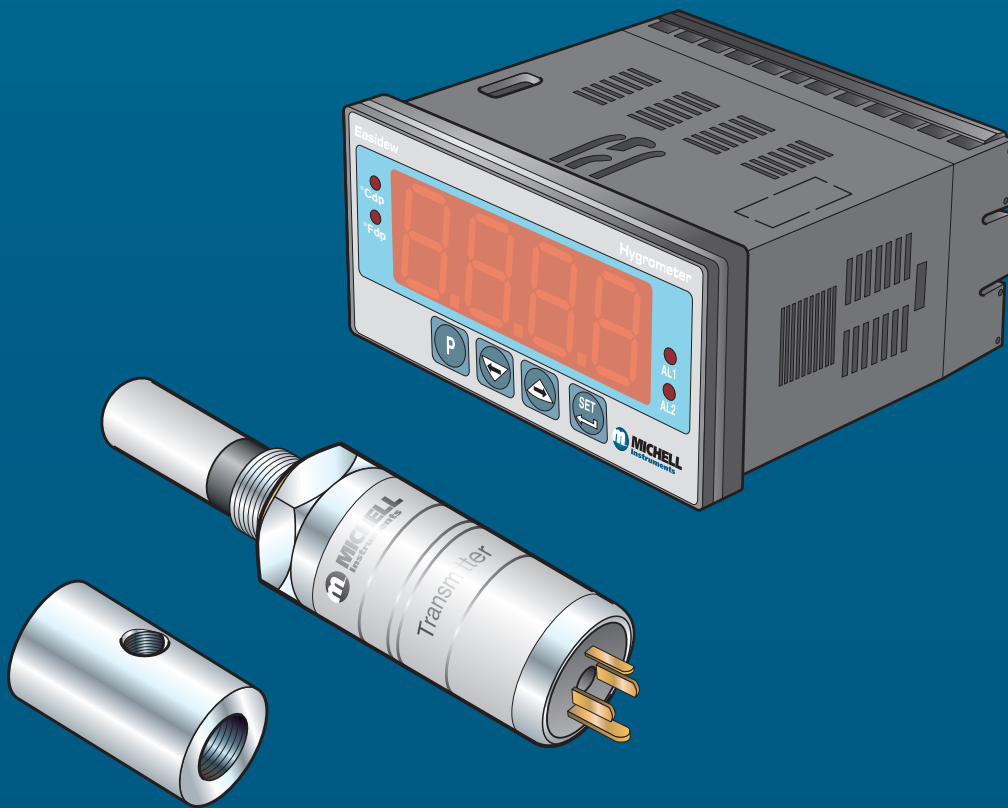
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**Easidew Online**

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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. The input power supply voltage limits are 100 V AC to 240 V AC, 47Hz to 63Hz. Refer to Appendix A - Technical Specifications.

### Pressure Safety

DO NOT permit pressures greater than the safe working pressure to be applied to the instrument. The specified safe working pressure (SWP), for this instrument is 45 MPa (450 barg / 6500 PSI) Refer to Appendix A - Technical Specifications.

### 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. Refer to Appendix D for details of Michell Instruments' worldwide offices' contact information.

### 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 directives. Further details of applied standards may be found in Appendix A - Technical Specifications.

## EC Declaration of Conformity

We,     Michell Instruments Limited
        48 Lancaster Way Business Park
        Ely, Cambridgeshire
        CB6 3NW.   UK.

declare under our sole responsibility that the product

**Easidew On-Line Hygrometer**

**to which this declaration relates is in conformity with the following standards
or other normative document(s)**

EN61326-1:2006          **Electrical equipment for measurement, control and
                        laboratory use – EMC requirements – Part 1:
                        General requirements.**

following the provisions of

2004/108/EC                         **EMC Directive**

Andrew M.V. Stokes, Technical Director

Date of Issue:  20 July 2009

## Abbreviations

The following abbreviations are used in this Manual:

| | |
|---|---|
| AC | alternating current |
| atm | pressure unit (atmosphere) |
| bar | pressure unit (=100 kP or 0.987 atm) |
| bara | bar absolute |
| ºC | degrees Celsius |
| ºF | degrees Fahrenheit |
| DC | direct current |
| ft | foot (feet) |
| g | gram(s) |
| Hz | Hertz |
| " | inch(es) |
| $in^2$ | square inch(es) |
| kg | kilogram(s) |
| lb | pound |
| lbf-ft | pound force per foot |
| l/min | liters per minute |
| m | meter(s) |
| mA | milli Ampere |
| max | maximum |
| min | minute(s) |
| mm | millimeter(s) |
| MPa | megapascal (Pascals x106) |
| m/sec | meters per second |
| Nm | newton meter |
| $ppm_v$ | parts per million (by volume) |
| RS232 | serial data transmission standard |
| Rx | receive |
| SCFH | standard cubic feet per hour |
| SCFS | standard cubic feet per second |
| SWP | safe working pressure |
| sec | second(s) |
| temp | temperature |
| Tx | transmit |
| V | Volts |
| Ω | Ohms |

## Warnings

The following general warnings listed below are applicable to this instrument. They are 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.



Where this symbol appears in the following sections it is used to indicate areas of potential risk of electric shock.

## Recycling Policy

Michell Instruments is concerned with the protection of the environment. It is our commitment to reduce and eliminate from our operations, wherever possible, the use of substances which may be harmful to the environment. Similarly, we are increasingly using recyclable and/or recycled material in our business and products wherever it is practical to do so.

The product that you have purchased may contain recyclable and/or recycled parts and we will be happy to provide you with information on these components if required.

## WEEE and RoHS Compliance

The Waste Electronic and Electrical Equipment (WEEE) Directive, and the Restriction of Hazardous Substances (RoHS) Directive place rules upon European manufacturers of electrical and electronic equipment. The directives' aim is to reduce the impact that electronic devices have on the environment.

Michell products are currently exempt from the RoHS directive, however all future products will be developed entirely using compliant materials. Furthermore, Michell is taking active steps to remove non-compliant materials and components from existing products wherever possible.

Michell is in full compliance with the WEEE Directive (Registration No. WEE/JB0235YW).  Customers may be required to return certain instruments for treatment at the end of their working life.

June 2010

## Warranty

Unless otherwise agreed, the Supplier warrants that as from the date of delivery for a period of 12 months the goods and all their component parts, where applicable, are free from any defects in design, workmanship, construction or materials.

The Supplier warrants that the services undertaken shall be performed using reasonable skill and care, and of a quality conforming to generally accepted industry standards and practices.

Except as expressly stated all warranties whether express or implied, by operation of law or otherwise, are hereby excluded in relation to the goods and services to be provided by the Supplier.

All warranty services are provided on a return to base basis. Any transportation costs for the return of a warranty claim shall reside with the Customer.

## Return Policy

If a Michell Instruments' product malfunctions within the warranty period, the following procedure must be completed:

1.  Notify a Michell Instruments' distributor, giving full details of the problem, the model variant and the serial number of the product.

2.  If the nature of the problem indicates the need for factory service then the instrument should be returned to Michell Instruments, carriage prepaid, preferably in the original packaging, **with a full description of the fault and the customer contact information.**

3.  Upon receipt, Michell Instruments will evaluate the product to determine the cause of the malfunction.   Then, one of the following courses of action will be taken:

    *   If the fault is covered under the terms of the warranty, the instrument will be repaired at no cost to the owner and returned.

    *   If Michell Instruments determines that the fault 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 product will be repaired and returned.

# 1 INTRODUCTION

The Easidew Online dew-point hygrometer is an instrument designed for the continuous online measurement of moisture content in non-corrosive gases, over an operational range of -100 to +20ºCdp (-148 to +68ºFdp).

The system comprises a programmable process indicator configured to accept a 4-20 mA current loop signal from an impedance-type dew-point temperature measurement transmitter.  The span of the process indicator is set to cover the dew-point range -100 to +20ºCdp (-148 to +68ºFdp) at operating pressures up to 45 MPa (450 barg / 6500 PSI).

The process indicator also has a re-transmission facility which buffers the transmitter output for onward transmission to other systems.  The transmitter input to the process indicator is configured as a 0-20 mA current loop signal and the re-transmitted output can be configured as either a 4-20 mA or a 0-20 mA current loop signal.

Two alarm outputs (high and low) are provided for connection to external systems.  Alarm 1 provides a set of single pole make contacts and Alarm 2 provides a set of changeover contacts.  Both sets are potential free and Alarm 1 contacts (single pole make) are rated at 250 V, 3 A and the Alarm 2 contacts (changeover) are rated at 250 V, 5 A.

*Figure 1.1* shows the process indicator and the transmitter.
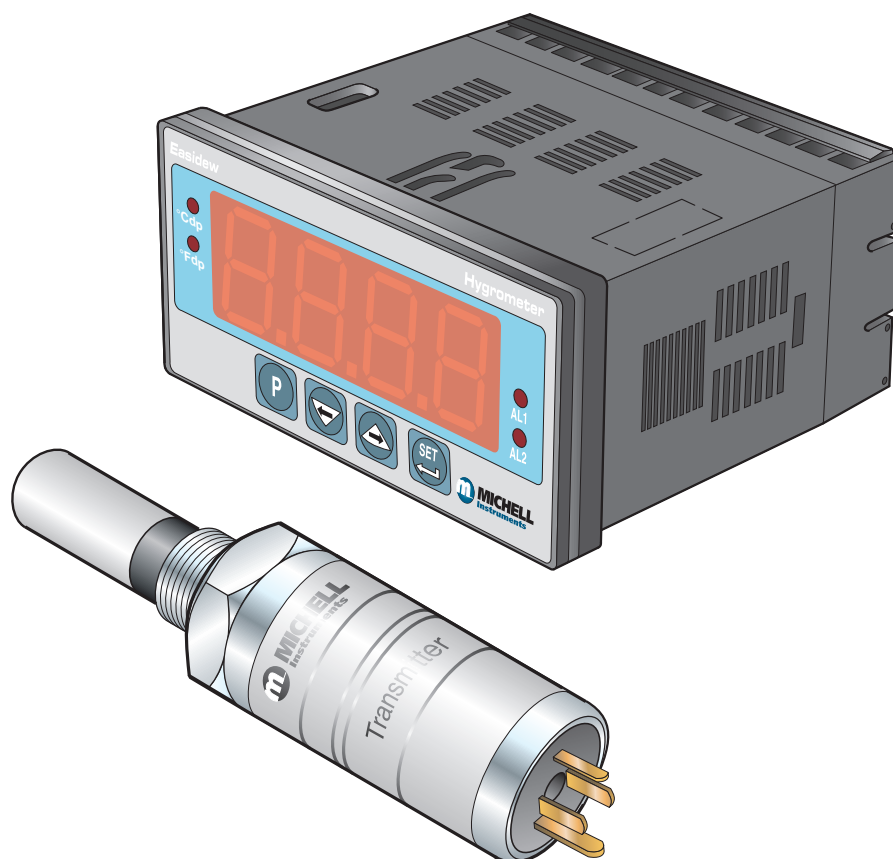


**Figure 1.1**     *Easidew Online process indicator and transmitter*

## 2      DESCRIPTION

The controls and indicators associated with the Easidew Online are located on the front panel of the process indicator.

Connections to the Easidew dew-point transmitter, the RS232 communications port and the external power supply are all made to the rear panel of the process indicator (refer to Section 3).

*Figure 2.1* shows the layout of these controls and Tables 2.1 and 2.2 describe their respective operational functions.
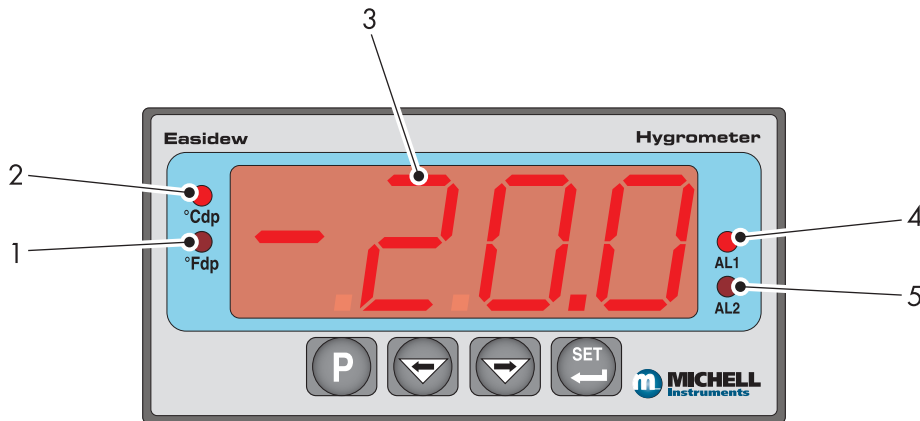


**Figure 2.1**      *Process indicator panel layout*

## 2.1      Display

The instrument has a 4-digit display, set-up on delivery to display a dew-point temperature range of +20ºCdp (+68ºFdp) (corresponding to a transmitter input of 20 mA), to -100ºCdp (-148ºFdp) (corresponding to a transmitter input of 4 mA). Negative temperature readings are signed and positive temperature readings are unsigned.

Temperature units are displayed by one of the two LED's located to the left of the display. On delivery, ºCdp is set-up. If required, the units can be changed to ºF. The method of configuring the unit for ºF is described in Section 4.4.

Optionally, the instrument can be set-up to read dew point in parts per million (ppm$_V$), range 0 to 3000 ppm$_V$. This option requires the transmitter to be set-up for ppm$_V$ either at the time of ordering or subsequently via Michell application software. **Note:  No specific ppm$_V$ LED indicator is provided on the process indicator; ppm$_V$ is selected if neither the ºCdp nor the ºFdp temperature indicators are illuminated.**

Two temperature alarm indications are provided by two LEDs located on the right hand side of the display, AL1 (low) and AL2 (high). Access to the alarm relay contacts is provided on the rear panel. The connection for these alarm relay contacts is shown in Section 3.7.

The operating temperature at which these alarm outputs operate is set-up as shown in Sections 4.3.2 and 4.4.2.

| Item | Description |
|---|---|
| 1 | **ºFdp**<br><br>When illuminated, this LED indicates that the displayed dew-point reading is in degrees Fahrenheit.<br><br>**Note: If neither the ºFdp or ºCdp LED is lit,** $ppm_V$ **is selected.** |
| 2 | **ºCdp**<br><br>When illuminated, this LED indicates that the displayed dew-point reading is in degrees Celsius.<br><br>**Note: if neither the ºCdp nor ºFdp LED is lit,** $ppm_V$ **is selected.** |
| 3 | **Main dew-point temperature display.**<br><br>Flashes to alternately indicate 'ErrL' (error low) and temperature reading for low temperatures over-range (lower than -100ºCdp (-148ºFdp) or -129.9ºCdp (199.9ºFdp) for an open loop condition).<br><br>Flashes to alternately indicate 'ErrH' (error high) and temperature reading for high temperature over-range. |
| 4 | **AL1**<br><br>When illuminated, this LED indicates that the dew-point temperature programmed for Alarm 1 has exceeded the programmed threshold. Under these conditions the alarm relay contacts associated with this alarm (normally open) will change state (close) and will remain closed until the dew-point temperature moves back within the programmed operational limit.<br><br>Alarm 1 is usually allocated to the Low alarm setting.<br><br>These relay contacts are rated at 250 V, 3 A and are connected as shown in Section 3.7.<br><br>Section 4.3.2 describes the setting up of AL1 trip points. |
| 5 | **AL2**<br><br>When illuminated this LED indicates that the dew-point temperature programmed for Alarm 2 has exceeded the programmed threshold. Under these conditions the alarm relay changeover contacts associated with this alarm will change state and will remain in this state until the temperature moves back to within the programmed operational limit.<br><br>Alarm 2 is usually allocated to the High alarm setting.<br><br>These changeover relay contacts are rated at 250 V, 5 A and are connected as shown in Section 3.7.<br><br>Section 4.3.2 details the setting up of AL2 trip points. |

**Table 2.1**     Process indicator front panel controls and indicators

## 2.2 Function Keys

The four function keys, located below the display, are used for setting up the process indicator.

The following set-up functions are covered in Section 4 of this Manual:

- Reversal of alarm level switching logic

- Set-up alarm level trip points for AL1 and AL2

- Selection of temperature units

- Selection of re-transmission output current loop range, either 4-20 mA or 0-20 mA

- Set-up/change operating temperature range or $ppm_V$ range

The function key panel is shown in *Figure 2.1*. Table 2.2 describes the operation of the keys.
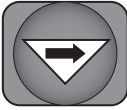
| Item | Description |
|---|---|
| **P** | **'P' (Program) key**<br><br>This key is used to access the programming menus and to select sub-menus within the list. |
| ⬅ | **'⇐' Left arrow (decrement) key**<br><br>This key is used to access sub-menus and, within individual sub-menus, to decrease the numeric value of the selected parameter. |
| ➡ | **'⇒' Right arrow (increment) key**<br><br>This key is used to access sub-menus and, within individual sub-menus, to increase the numeric value of the selected parameter. |
| **SET** | **'SET' key**<br><br>Depending upon the context, this key is used to access the set value of the selected process field and as an 'Accept' key for new parameter values. |

**Table 2.2**   Function keys

## 2.3    Process Indicator Menu Structure

Once the Easidew Online is set-up it should not require much adjustment.  The dew-point transmitter is supplied calibrated over the range -100 to +20ºCdp (-148 to +68ºFdp) and has a linear output in the range of 4-20 mA (corresponding to -100ºCdp (-148ºFdp) and +20ºCdp (+68ºFdp) respectively).

As supplied, the process indicator is configured to accept this 4-20 mA input, to indicate the measured dew-point temperature in ºC and to give over-range indications with a flashing display if the operational limits are exceeded.

Alarm level set-points are pre-set.  The default settings are -20ºCdp for Alarm 1 and -40ºCdp for Alarm 2.

For most applications the default parameters are usually sufficient but programming facilities within the process indicator permit the changing of some parameters.

These parameters, such as alarm levels, alarm switching logic, temperature units and analog re-transmission current loop output range are set-up under a menu structure and are accessed by pressing the programming key '**P'** on the process indicator's control panel.

> **This Manual describes the functions relating to the operational requirements of the Easidew Online equipment and it is not recommended that menu structures other than those described be entered.**

**NOTE:  If a sub-menu is entered by mistake, quit by pressing the 'P' key until the main display is restored.  Never try to quit with the 'SET' key.**

Section 4 describes the set-up procedures. The flowcharts shown in Section 4 use the symbols from Table 2.3.

| Symbol | Description |
|---|---|
| ALt2 | Display reading / Indication<br><br>Outline is shown as solid green if the display is static |
| 020.0 | Display reading / Indication<br><br>Outline is shown as solid red if the display is flashing |
| ConF  P inP | Display<br><br>Outline is shown as red, hatched to indicate that the display is alternately flashing between the two indicated values |
| (P) x6 | Indicates the requirement to press the 'P' program key. Any number next to the key indicates the number of times to press the key, e.g. 6 |
| (SET) x6 | Indicates the requirement to press the 'SET' key. Any number next to the key indicates the number of times to press the key, e.g. 6 |
| (△) | Indicates the requirement to press the increment '⇨' key. |
| (▽) | Indicates the requirement to press the decrement '⇦' key. |

**Table 2.3**    Flowchart symbols

### 2.3.1   Flowchart Reading Method

*Figure 2.2* shows a typical flowchart for setting up the alarm switching levels and shows how to change the default settings for AL1 from -20ºCdp to -25.5ºCdp and for AL2 from -40ºCdp to -50ºCdp.

This, and all subsequent flowcharts in other sections, should be read from top to bottom, left to right.

Further details on alarm settings are given in Section 4.

## 2.3.2   Flowchart Example

The following is a flowchart example showing the set-up of alarm levels.  For actual set-up instructions see Section 4.3.2.

The alarm set-point levels are set-up from the program menu as follows: (To exit to the main display without saving any new settings, press the '**P**' key.)

**To set-up both alarm set-points**

1.  Press the '**SET**' key once.  '**ALr1**' will be displayed shown with a green outline to indicate that the display is static. (To set Alarm 2, press the '**SET**' key two times and follow the Alarm 2 branch instead).

2.  Press the '⇨' key to display the current Alarm 1 set-point (-20ºC in this example). This is shown with a red outline and is flashing.

3.  Use the '⇨' and '⇦' keys  to set the required value (-25.5ºC in this example).   This is shown with a red outline and is flashing.

    **To exit to the main display without saving any new setting, press the 'P' key.**

4.  Press the '**SET**' key once to store the new (or existing) value for Alarm 1 and to enter the set-up menu for Alarm 2.  '**ALr2**' will now be displayed.  This is shown with a green outline and is static.

5.  Press the '⇨' key to display the current Alarm 2 set-point (-40ºC in this example).  This is shown with a red outline and is flashing.

6.  Use the '⇨' and  '⇦' keys to set the required value (-50ºC in this example) This is shown with a red outline and is flashing.

7.  Press the '**SET**' key once to store the new value for Alarm 2. The display will then return to the main dew-point temperature display.
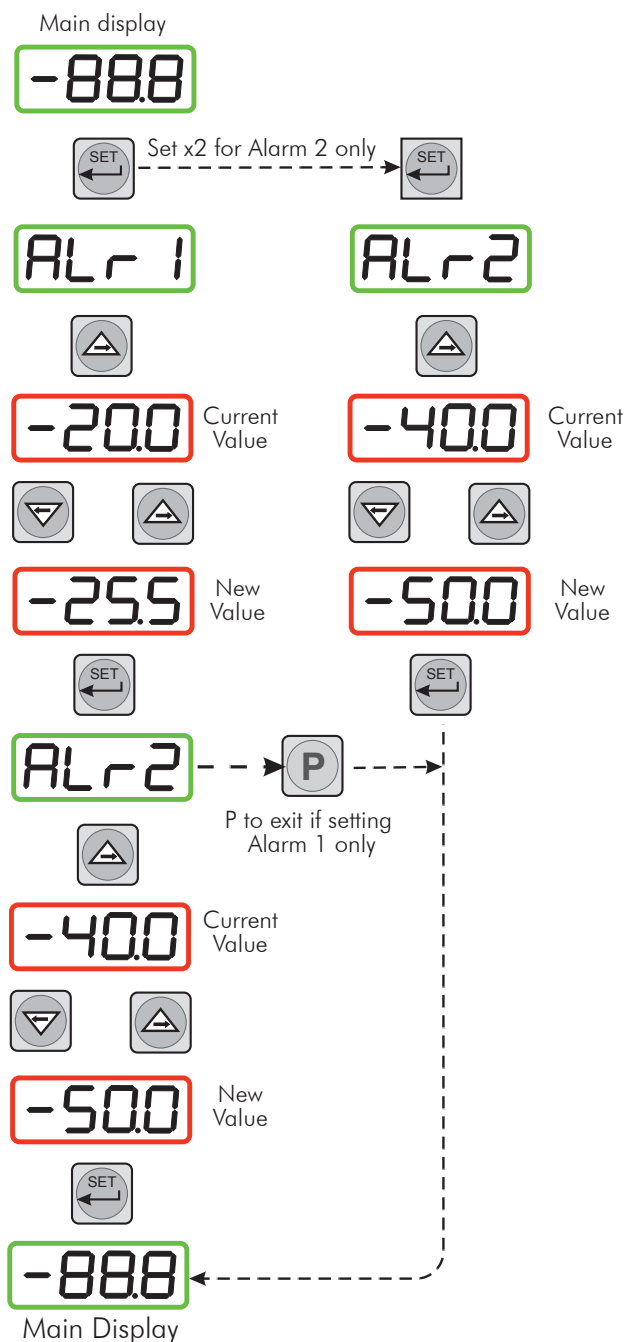


*Figure 2.2*      *Flowchart Example*

## 3       INSTALLATION

## 3.1     Safety

| ⚠ | **It is essential that the connection of electrical and gas supplies to this instrument be undertaken by competent personnel** |
|:---:|:---|

## 3.2     Unpacking the Instrument

The Easidew instruments and accessories are packed into a box and the method of unpacking is shown as follows in *Figure 3.1:*
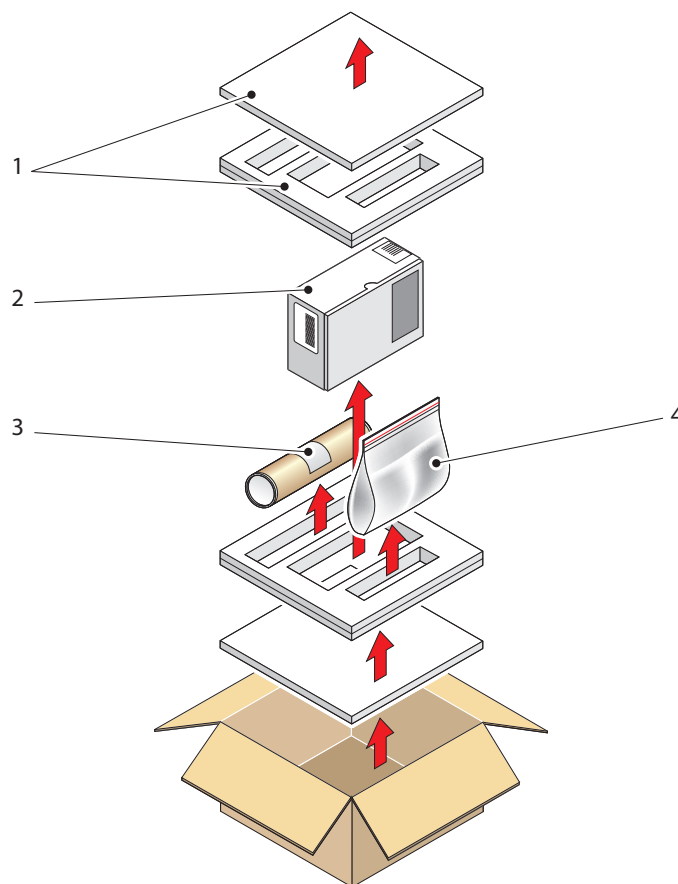


***Figure 3.1***       *Unpacking method*

Open the box and unpack carefully as follows.  Save all the packing materials for the purpose of returning the instrument for re-calibration or any warranty claims.  Note that the packing method may vary slightly in the U.S.

1. Remove the top packing (1)

2. Remove the dew-point transmitter box (3)

3. Remove the accessories pack (4)

4. Remove the process indicator box (2)

Unpack the dew-point transmitter box as follows (see *Figure 3.2).*



       1       2       3       4       5       6
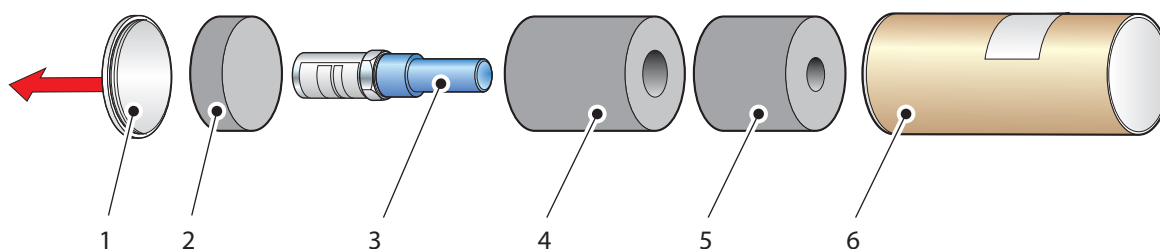
***Figure 3.2***       *Transmitter unpacking method*

1.  Remove the cap (1) from the packing tube (6).  Remove the cover (2).  Remove the transmitter from the tube, complete with the body cover (4) and tip cover (5).

2.  Remove the body cover (4) and the tip cover (5) but leave the plastic protective cover (3) over the probe tip in place.

The accessories pack is shown in *Figure 3.3.*
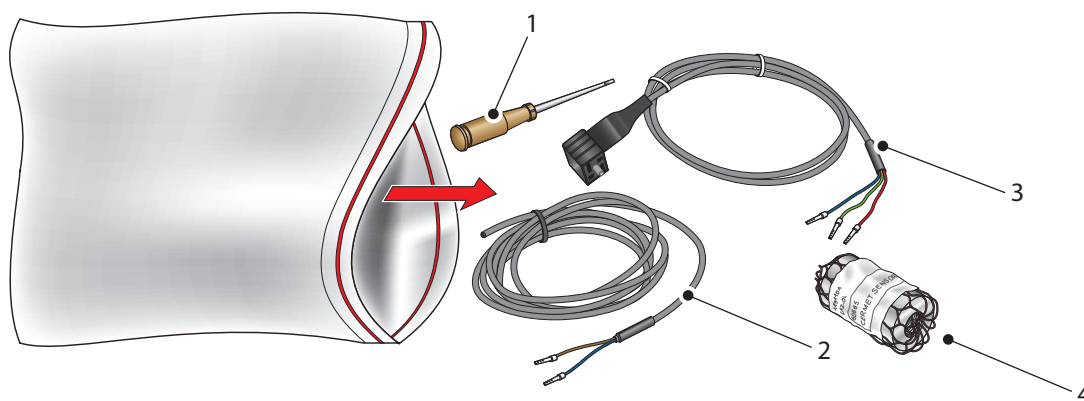


***Figure 3.3***       *Accessories pack*

Remove the screwdriver (1), the two leads (2) and (3) and the sample block (4) from the bag.

The process indicator (3) is packed, together with its fixing clamps (1) as shown in *Figure 3.4.*
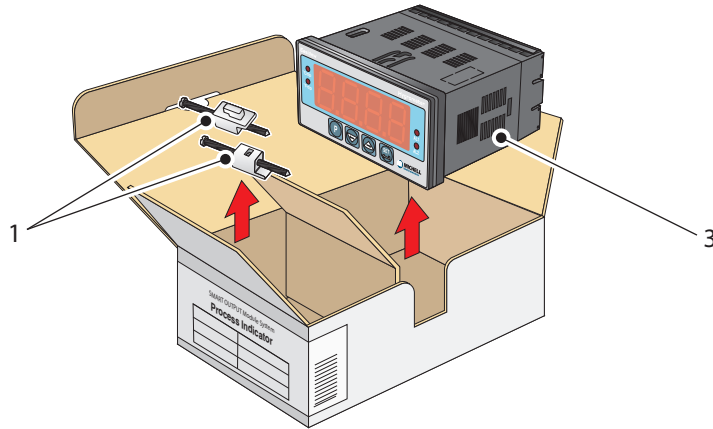


**Figure 3.4**        *Process indicator*

Remove the items from the box but retain the packing for future use.

## 3.3    Easidew Components

The Easidew Online dew-point hygrometer and its accessories are shown in *Figure 3.5*.
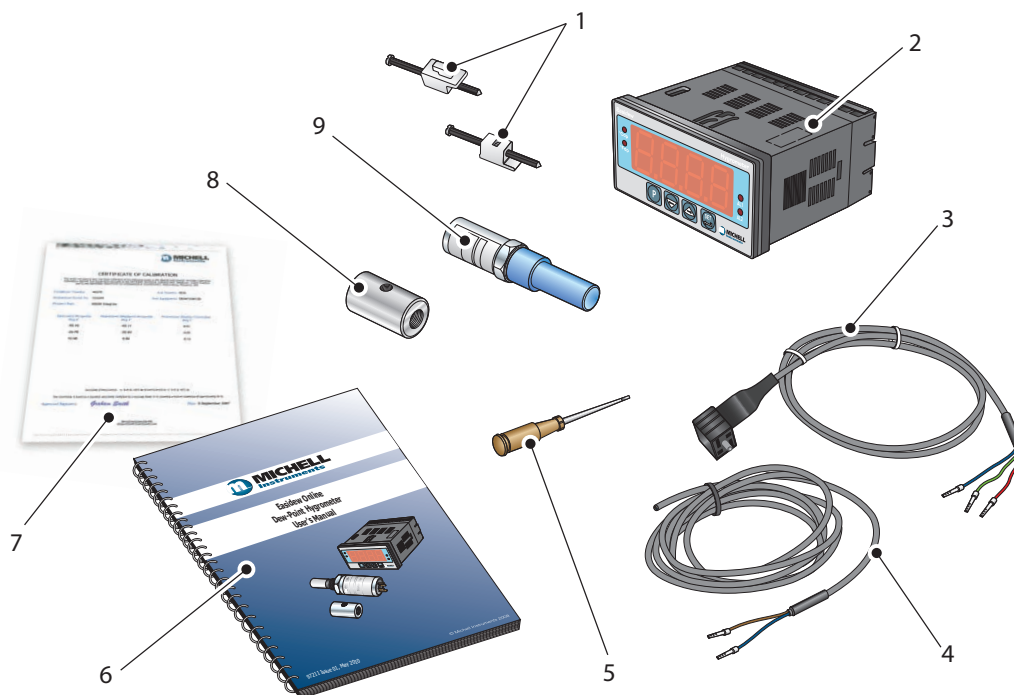


**Figure 3.5**    *Easidew Online components*

Please check that all these components are present after unpacking. Report any shortages immediately.

1.  Process indicator clamps (2 off)

2.  Process indicator

3.  Transmitter lead

4.  Power lead

5.  Screwdriver

6.  User's Manual

7.  Calibration certificate

8.  Sample block

9.  Dew-point transmitter

## 3.4    Operational Requirements

The following operational requirements are required:

### 3.4.1    Environmental Requirements – Process Indicator

| | |
|---|---|
| Operating temperature range: | 0ºC to +50ºC (+32ºF to +122ºF) |
| Humidity: | 90% RH (non-condensing) |
| Altitude: | Up to 2000 m |

### 3.4.2    Electrical Requirements

| | |
|---|---|
| Supply voltage: | 100 V to 240 V AC (+10%, -15%), 50/60 Hz, 6 VA |
| Transmitter supply: | 12 V to 28 V DC (25 mA max)* |

*Current loop excitation supply, 24 V DC (supplied by the process indicator)

## 3.5    Mounting the Process Indicator

The process indicator is designed for panel mounting and requires a panel cut-out of 46 x 92mm (1.8 x 3.6"). The recommended panel thickness is 2 to 5mm (0.08 to 0.2").

To mount the unit, proceed as follows (refer to *Figure 3.6):*

1.  Pass the process indicator (1) through the front of the panel (2).

2.  Support the process indicator and insert the hook on the underside of the clamp (3) into the slot (4) located on top of the process indicator casing.

3.  Tighten the fixing screw (5) finger tight, against the back of the panel.

4.  Insert the hook on the second clamp (6) into the slot located on the underside of the instrument casing and tighten the fixing screw, finger tight, against the back of the panel.

5.  Ensure that the process indicator is sitting flush to the front of the panel (2) and tighten the fixing screws evenly against the back of the panel.

| ⚠ | **Caution: Do not overtighten the screws as this could cause the case to crack.** |
|---|---|

.
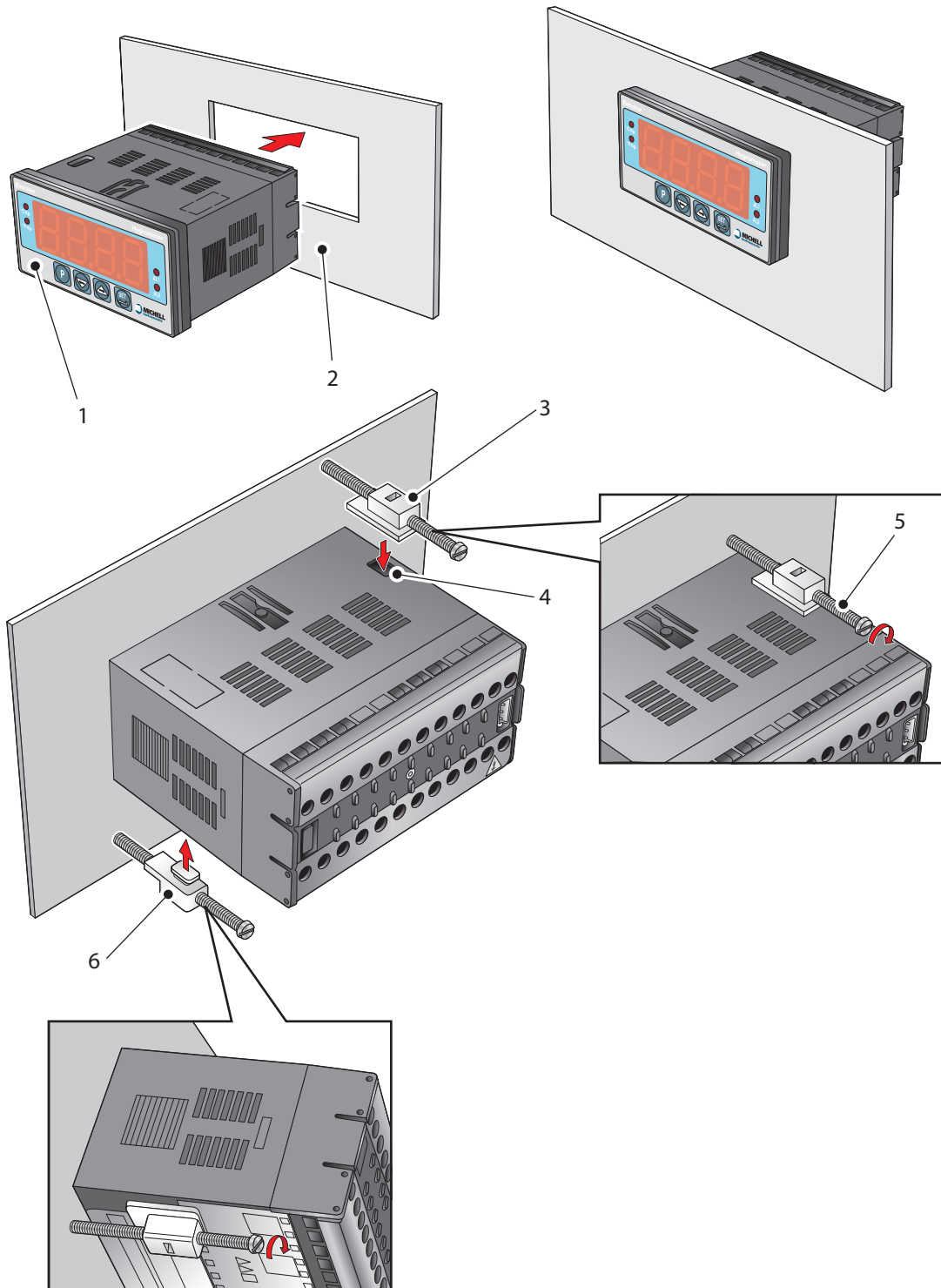
***Figure 3.6***      *Mounting the process indicator*

## 3.6    Electrical Connections

Electrical connections to the Easidew Online system are as follows:

- AC power supply, 100 V to 240 V AC  (+10%, -15%), 50/60 Hz, 6 VA.  A low voltage (24 V DC) option is also available.

- Transmitter current loop input, 4-20 mA (24 V DC loop power provided by process indicator).

- Alarm 1 (Low), potential free contacts, single pole make.  Contacts rated at 250 V, 5 A.

- Alarm 2 (High), potential free contacts, single pole changeover.  Contacts rated at 250 V, 5 A.

- Re-transmitted dew-point input signal 4-20 mA or 0-20 mA.

### 3.6.1   AC Power Supply Input

> **It is essential that the connection of electrical supplies to this instrument be undertaken by competent personnel**

Connect the AC power supply to the process indicator (1) as shown in *Figure 3.7*.  Refer also to Table 3.1 which gives a summary of all the connections to the rear panel of the process indicator.

Process Indicator
viewed from underneath
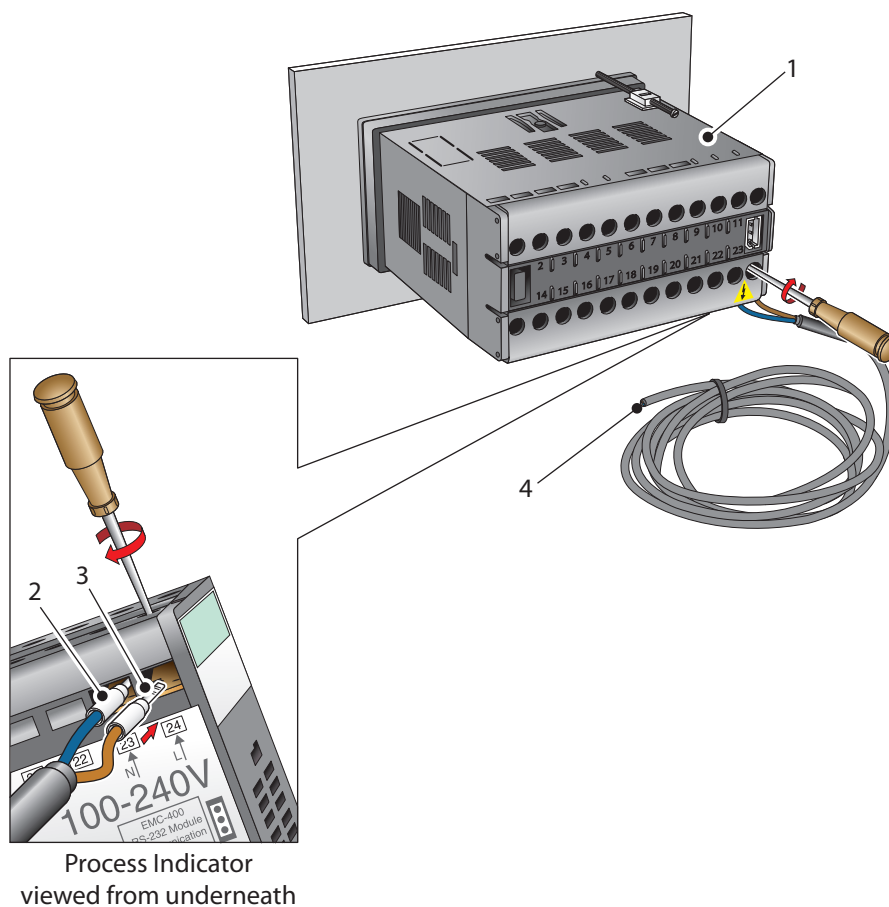
***Figure 3.7***     *AC power supply connections*

1.  Ensure that no power is connected to the mains lead.

2.  Connect the blue (white - US standard) (neutral) lead (2) to terminal 23 on the rear panel of the process indicator.

3.  Connect the brown (black - US standard) (live) lead (3) to terminal 24 on the rear panel of the process indicator.

4.  Strip back the insulation on the free end of the power cable and wire to an appropriate power supply plug (brown lead to live supply terminal, blue lead to neutral supply terminal).

5.  Check that the wiring has been completed correctly before connecting to a mains power supply.

## 3.6.2   Preliminary System Test

Before wiring the external signal outputs and the transmitter, perform a system check as follows:

1.  Switch off and disconnect the power supply.

2.  Connect to an AC supply and switch the supply ON.  The process indicator display should come on. The display digits are sequentially tested, each in turn displaying the figure '**8**'.  With no transmitter connected (current loop open), the display will be alternately flashing '**ErrL**' and '**-129.9**'. The  ºCdp LED will, by default, also be illuminated and it is possible, that even though no alarms are currently set-up, one of the alarm LED's may be illuminated.  **NOTE:  If the instrument is configured to read ppm$_V$ neither of the temperature LED indicators will be lit.**

3.  If a loop calibrator is available, set it to Ext loop and connect to terminal 4 (positive) and terminal 3 (negative) of the process indicator.

4.  Set the output current of the loop calibrator to 4 mA, the display should now be reading -100.0.

5.  Set the output current of the loop calibrator to 20 mA, the display should now be reading 020.0.

6.  Switch off and disconnect the loop calibrator.

7.  Connect the transmitter as described in Section 3.6.4.

### 3.6.3   DC Power Supply Input (Optional)

Connect the DC power supply to the process indicator (1) as shown in *Figure 3.8*. Refer also to Table 3.1 which gives a summary of all the connections to the rear panel of the process indicator.



Process Indicator
viewed from underneath
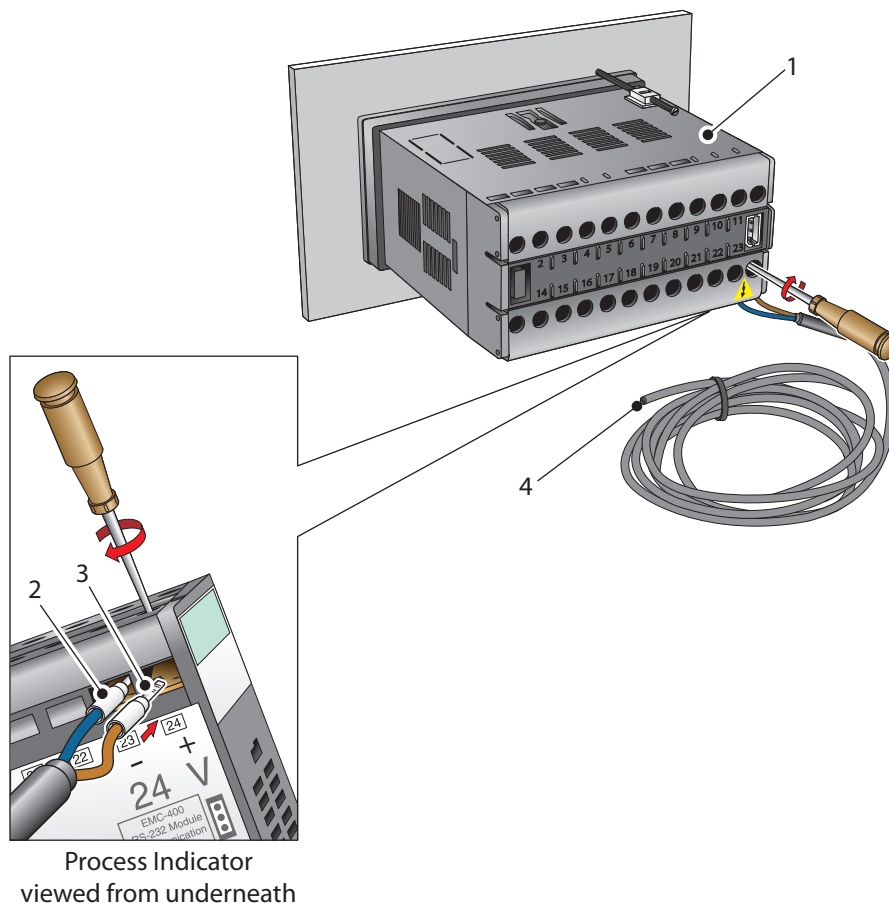
***Figure 3.8***      *DC power supply connections*

1.  Ensure that no power is connected to the mains lead.

2.  Connect the blue (white - US standard) lead (2) to terminal 23 on the rear panel of the process indicator.

3.  Connect the brown (black - US standard) lead (3) to terminal 24 on the rear panel of the process indicator.

4.  Strip back the insulation on the free end of the power cable and wire to an appropriate power supply plug (brown lead to positive (+) supply terminal, blue lead to negative (-) supply terminal).

5.  Check that the wiring has been completed correctly before connecting to a mains power supply.

### 3.6.4   Transmitter Connections

Connect the transmitter cable to the process indicator (1) as shown in *Figure 3.9.*



Process Indicator
viewed from above
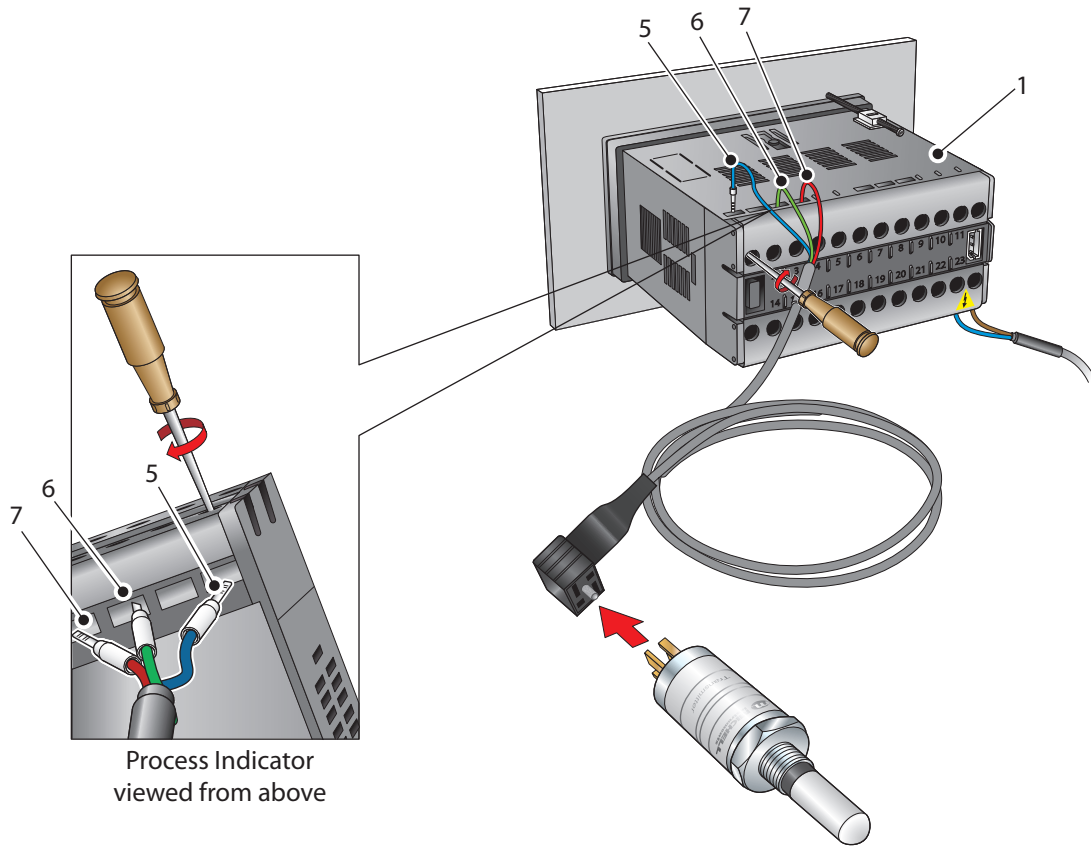
***Figure 3.9***        *Transmitter connections*

1.  Connect the blue wire (5) of the transmitter cable to terminal 1 on the process indicator.

2.  Connect the green wire (6) of the transmitter cable to terminal 3 on the process indicator.

3.  Connect the red wire (7) of the transmitter cable to terminal 4 on the process indicator.

4.  Check that the transmitter cable wiring has been completed correctly.

## 3.7    Signal Output Connections

The Easidew Online system has three signal outputs, Alarm 1 (ALr1), Alarm 2 (ALr2) and the re-transmitted input signal (4-20 mA or 0-20 mA current loop signal depending upon instrument configuration).

*Figure 3.10* shows the relevant rear panel connections.  Table 3.1 shows a summary of all the electrical connections to the process indicator.

> **The signal outputs will be connected to external systems that can potentially influence the operation of the process.**
>
> **Alarm level signals could be at mains potential so it is essential that, before connecting these signal lines, checks are made to ensure that these inputs are not live and that it is safe to handle them.**

**Re-transmission Output**

The re-transmission output is current sourcing.  Connect the positive output to terminal 14 and the negative output to terminal 13.  Use appropriately colored wires e.g., red (positive), black (negative).

**Alarm Outputs**

Alarm 1 is a single pole make contact.  Connect incoming signal lines to terminal 16 (common) and terminal 17 (normally open).

Alarm 2 comprises a set of changeover contacts.  Connect incoming signal lines to terminal 9 (common), terminal 8 (normally open) and terminal 7 (normally closed).
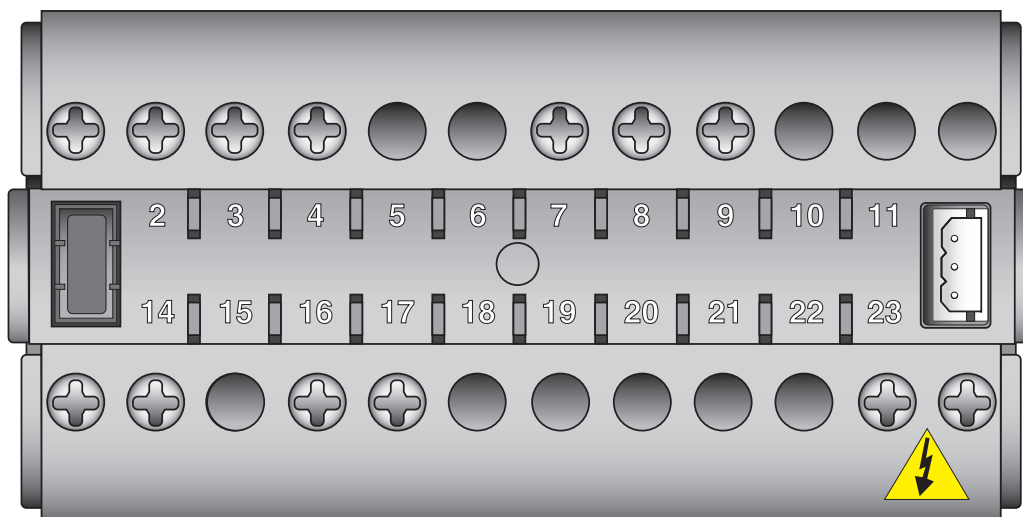


**Figure 3.10**    *Process indicator rear panel connections*

| Terminal | Wire Color | Signal | Supply Information |
|---|---|---|---|
| 1 | Blue | 0 V (GND) | |
| 3 | Green | 4-20 mA loop current | Default 4-20 mA |
| 4 | Red | Transmitter loop supply (+ve) | +24 V DC w.r.t. terminal 1 |
| 7 | User defined | ALR2 (normally closed) | |
| 8 | User defined | ALR2 (normally open) | |
| 9 | User defined | ALR 2 (common) | |
| 13 | User defined | Current loop out (-ve) | Default 4-20 mA |
| 14 | User defined | Current loop out (+ve) | Default 4-20 mA |
| 16 | User defined | ALR1 (common) | |
| 17 | User defined | ALR2 (normally open) | |
| 23 (AC Version) | Blue | Power in (neutral) | 100 – 240 V, 50/60 Hz |
| 24 (AC Version) | Brown | Power in (live) | 100 – 240 V, 50/60 Hz |
| 23 (DC Version) | Blue | Negative (-) | 0 V |
| 24 (DC Version) | Brown | Positive (+) | 24 V |
| **NOTE:  There are no terminals in positions 5, 6, 10, 11, 12, 15, 18, 19, 20, 21 and 22** | | | |

**Table 3.1**      Summary of electrical connections

## 3.8     Mounting the Sample Block and Transmitter

### 3.8.1   Sample Block Gas Connections

Sample gas connections are made to the Gas In and Gas Out ports on the sample block see *Figure 3.11.* Either port on the sample block may be used as the Gas Input port (i.e. for connection purposes the ports are interchangeable).

Normally, connections are made via stainless steel pipework, in which case the sensor block/transmitter assembly will be self supporting.  If Teflon tubing is used it may be necessary to support the assembly with a body clip.
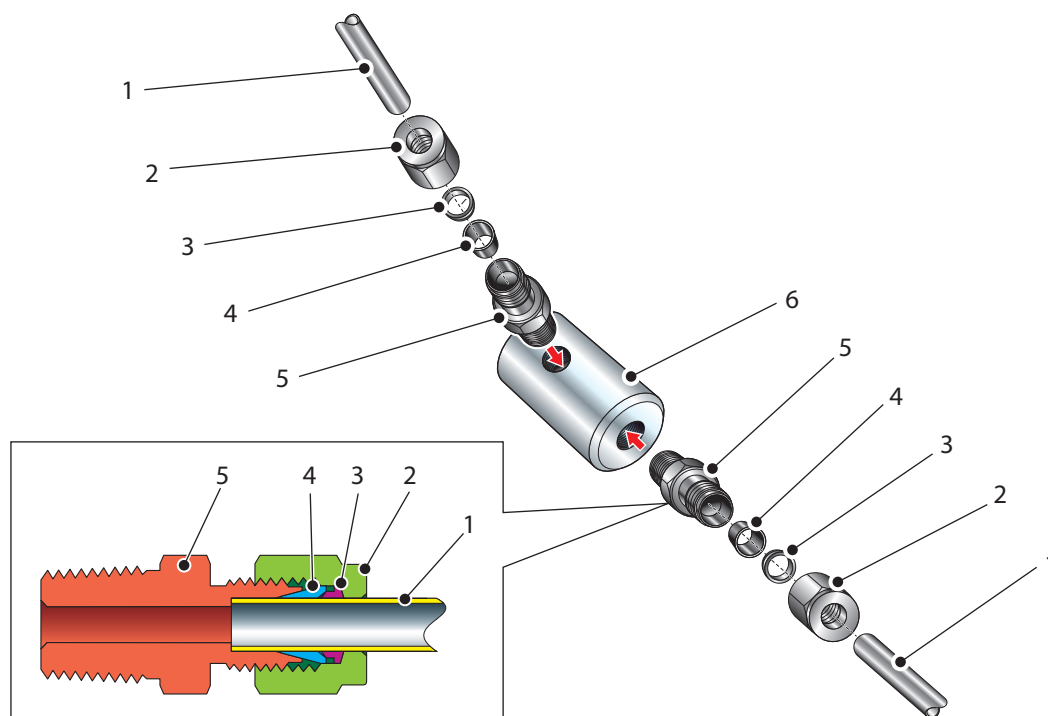


**Figure 3.11**     *Sample block gas connections*

Both the Input and Output gas connections are 6mm (¼" U.S.) NPT Swagelok® couplings.  It is recommended that both the Gas Input and Output connections are made via 1/8" stainless steel piping.  The method of connection to the sensor block (6) is as follows:

**NOTE:   The following description relates to 6mm tube fixings.  The sensor block ports are both 6mm (¼" U.S.) NPT female fittings.  Tube fixings are not supplied with the equipment.**

**Procedure (see *Figure 3.11)***

1.   Cut a suitable length of 6mm (¼" U.S.) stainless steel tubing (1) to the correct length and, if necessary, bend to shape to suit the location of the sensor block assembly.  **NOTE: To facilitate ease of connection to the port, at least 75mm (3") of the tubing coming out of the Gas In port must be straight.**

2.   Clean off any burrs or metal shavings adhering to the tubing.

3.   Screw the 6mm (¼" U.S.) NPT Swagelok adaptor (5) into the 6mm (¼" U.S.) NPT inlet port in the sensor block (6) and tighten to a torque setting of 35 Nm (25 lbf-ft).

4. Pass the stainless steel tubing (1) through the locking nut (2). **NOTE: Threads towards the gas port**.

5. Fit the back ferrule (3) over the stainless steel tubing (1) with the bevelled end facing the back of the front ferrule (4).

6. Place the front ferrule (4) over the stainless steel tubing (2), bevelled end towards the adaptor (5).

7. Push the stainless steel tubing (2) as far as it will go into the adaptor (5) and tighten up the locking nut (2) finger tight.

8. Hold the adaptor (5) flats with a spanner and tighten up the locking nut (2) to a torque setting of 35 Nm (25 lbf-ft). This action compresses the front ferrule (4) and back ferrule (3) onto the tubing to form a gas tight seal.

9. Connect up the other gas port as described in steps 1 to 8 above.

### 3.8.2 Transmitter Mounting - Sample Block

![warning triangle] 
> 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 3.12.*

1.  Remove the blue protective cover (2) from the tip of the transmitter (1).

2.  Fit the Dowty washer (4) over the threaded part of the transmitter body.

![warning triangle]
> WARNING: Under no circumstances should the
> filter guard be handled with the fingers.

3.  Screw the transmitter (1) into the sample block (3) and tighten to a minimum torque setting of 30 Nm (22.1 lbf-ft). **NOTE**: **Use the flats of the hexagonal nut and not the sensor body.**

4.  Fit the transmitter cable/connector assembly (6) to the plug located on the base of the transmitter and tighten the fixing screw (7). Section 3.6.4 details the wiring of the transmitter cable (5) to the process indicator.
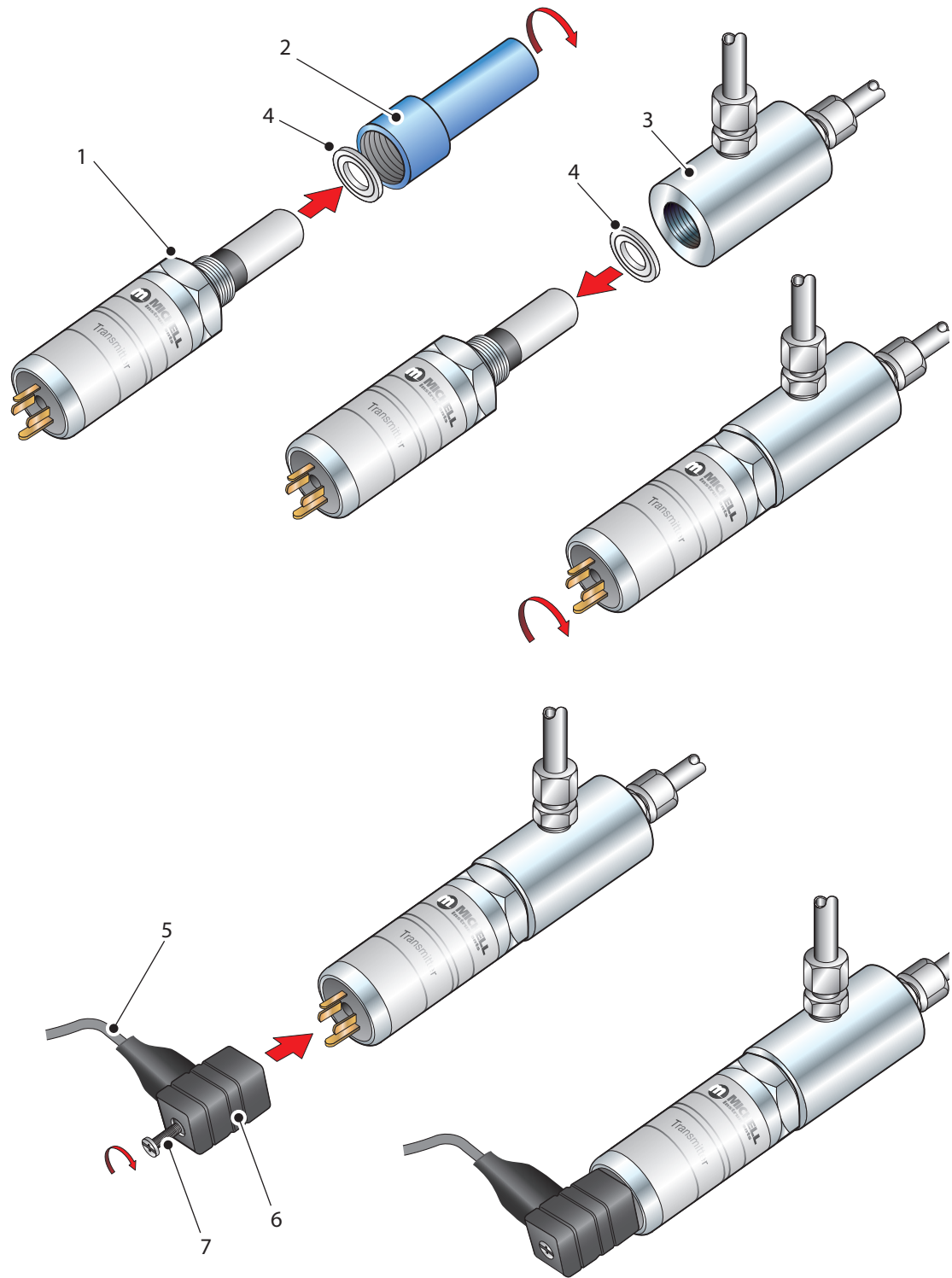
***Figure 3.12***    *Transmitter mounting - sensor block*

### 3.8.3   Transmitter Mounting - Direct Pipeline Connection

The transmitter may be directly mounted into a pipe or duct as shown in *Figure 3.13.*

> ⚠️ **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 5/8" -18 UNF thread to match the transmitter body thread. Fixing dimensions are shown in *Figure 3.13.*  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.

**Procedure**

> ⚠️ **The following procedure must be carried out by competent personnel.**

1.  Ensure that the blue protective cover has been removed from the tip of the transmitter (3) *(Figure 3.13).*

> ⚠️ **WARNING: Under no circumstances should the filter guard be handled with the fingers.**

2.  Fit a Dowty washer (2) over the threaded part of the transmitter body.

3.  Cut a 5/8" -18 UNF thread into the pipe to match the transmitter body thread. Clean out any burrs or metal shavings adhering to the inside of the pipeline.

4.  After first checking that the pipeline has a wide enough bore to accept the transmitter's probe tips 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.**

5.  Fit the transmitter cable/connector assembly to the process indicator as detailed in Section 3.6.4 (see also *Figure 3.9).*
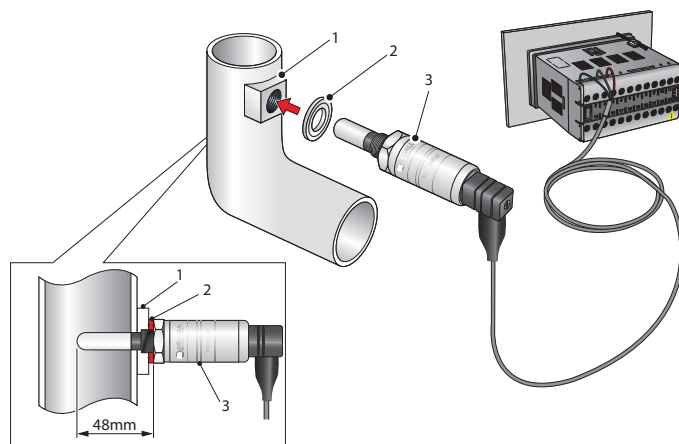


**Figure 3.13**     *Transmitter mounting - pipe or duct*

# 4    OPERATION

As supplied, the instrument is ready for operation and has been set-up with a set of default parameters. This section describes both the general operation of the instrument and the method of setting it up and changing the default parameters should this become necessary.

The default parameters are as follows:

- Span -100 to +20ºCdp (-148 to +68ºFdp) or 0 to 3000 ppm$_V$

- Temperature units ºCdp

- Current loop input, 4-20 mA (7.5ºC/mA or 13.5ºF/mA)

- Re-transmission current loop output, 4-20 mA (7.5ºC/mA or 13.5ºF/mA)

- Alarm 1 set-point -20ºCdp (-4ºFdp)

- Alarm 2 set-point -40ºCdp (-40ºFdp)

- Data communications, Unit address 1, Baud rate 9600, Parity None, Stop bits 1

For the supplied dew-point transmitter, the span and current loop input setting should not be changed. The span will require changing if the instrument is to be ranged in ºF, if a different transmitter is employed, if the user chooses to re-range the Easidew transmitter or if ppm$_V$ is selected.

Before operating the instrument, read Section 2, which explains the display functions and the method of reading the menu flowcharts in detail.

The instrument must also have been installed as detailed in Section 3 and connected to a sample gas supply that is representative of the process being monitored.

## 4.1    General Operational Information

Operation of the Easidew Online hygrometer is completely automatic and once set-up requires little or no operator intervention.

The dew-point transmitter is designed to operate in a flowing gas stream of between 1 and 5 l/min (2.1 and 10.6 SCFH) at operating pressures up to a maximum of 45 MPa (450 barg / 6500 PSI).

The sample gas is taken into the sample block via the Gas In port and, in flowing through the sample block, comes into contact with the dew-point transmitter which, in turn, produces a current loop output signal proportional to the measured dew-point temperature.

This output signal is converted to a real time analog dew-point temperature reading by the process indicator. If data logging is required, the process indicator will need to be connected to a suitable host and temperature readings extracted via the RS232 interface.

The gas flow through the sample block must be controlled outside the instrument, typically by means of a needle valve located in the sample gas input line.

## 4.2     Preparation For Operation

Prior to operation, the instrument must be connected to the correct electrical power supply and the relevant analog and alarm outputs connected to external systems as required and as described in Section 3.

### 4.2.1   First Time Operation

To commence operation, proceed as follows:

1.  Switch on the power supply to the instrument. The instrument display will now come on, typically showing the default parameters and units as detailed in *Figure 4.1.*

2.  Check that the gas sample flow rate through the sample block or the pipeline in which the transmitter is located is within the operational limits:

    1 to 10 l/min (2.1 to 21.2 SCFH)  (5 l/min (10.6 SCFH) optimum).

3.  Adjust any external flow control valves, located in the gas sample input line to the instrument, to achieve the required flow rate.

The instrument is now operational and after a few seconds, in which all the segments of the display are tested, the process indicator will display the measured dew-point temperature as a steady reading within the range -100 to +20ºCdp, (-148 to 68ºFdp) or 0 to 3000 ppm$_v$, depending upon how the instrument has been set-up. The default setting is degrees Celsius.

In the absence of any error indications the instrument will now be operational using the default parameters, typically as shown in *Figure 4.1*.



**Figure 4.1**      *Typical display*

If the display is flashing, a fault condition exists.

The following operational error conditions may be encountered:

'**ErrL**'  If the display is alternately flashing (e.g.) '**ErrL**' and '**-103.3**', this indicates that the measured dew point is outside the lower operational limit (-100ºCdp ) and the numeric section of the display gives an indication of the actual measured reading.

If the display is alternately flashing '**ErrL**' and '**-129.9**', (or '**-199.9**' if set-up to read temperature in ºF), this could be an indication that the input current loop to the process indicator is open or that there may be a transmitter fault.  Check that the transmitter is wired correctly as detailed in Section 3.6.4.

'**ErrH**'  If the display is alternately flashing (e.g.) '**ErrH**' and '**021.4**', this indicates that the measured dew point is outside the upper operational limit (+20ºCdp) and the numeric section of the display gives an indication of the actual measured reading.

## 4.3.    System Alarms

The Easidew Online system has two alarm outputs. As supplied, the default alarm set-points and the alarm switching logic are as follows (the default temperature units are degrees Celsius):

- Low Alarm - Alarm 1 (**AL1**) set to -20ºCdp

- High Alarm - Alarm 2 (**AL2**) set to -40ºCdp

**Alarm 1** (Low Alarm) is set-up to switch ON when the temperature reading is lower (gas drier) than the alarm set-point value.  For the default set-points therefore, the default switching logic for these alarms is as follows:

> Alarm 1        Temp < -20 Alarm 1 = ON
>
> Temp > -20 Alarm 1 = OFF

**Alarm 2** (High Alarm) is set to switch ON when the temperature reading is higher (gas wetter) than its set-point value.  For the default set-points therefore, the operation of this alarm would be as follows:

> Alarm 2        Temp < -40 Alarm 2 = OFF
>
> Temp > -40 Alarm 2 = ON

Depending upon the application, if required, it is possible to reverse the switching logic for either or both of the alarm channel outputs to provide the following alarm output configurations.

> Alarm 1        Temp < -20 Alarm 1 = OFF
>
> Temp > -20 Alarm 1 = ON

> Alarm 2        Temp < -40 Alarm 2 = ON
>
> Temp > -40 Alarm 2 = OFF

Section 4.3.1 describes the method for reversing the default switching logic and Section 4.3.2 describes the method for setting up individual alarm set-points.

## 4.3.1   Reversal of Default Alarm Switching Logic

As described in Section 4.3, the switching logic for the alarm channels may, if required, be individually reversed. Starting at the default state, the method of reversing the switching logic for both alarms is as follows:

*Figure 4.2* shows the operational key sequence.

**For Alarm 1:**

1.  Press the 'P' key once and the display will read '**tECH**'.

2.  Press the '**SET**' key and the display will flash between '**ConF**' and '**PinP**'.

3.  Press the '⇨' key twice and the display will flash between '**ConF**' and '**Alr1**'.

4.  Press the '**SET**' key twice to display '**Alt1**'.

5.  Press the '⇨' key once to display a flashing 4 digit number. For the Alarm 1 default setting this will be 0001.

6.  Press the '⇦' key once to change the display to 0000.

7.  Press the '**SET**' key to accept the new value. The default setting for Alarm 1 is now reversed.

8.  Either press the 'P' key twice to return to the main display or press the 'P' key once followed by the '⇨' key to move to the '**Alr2**' setting sequence from step 4 above.

**To reverse the switching logic for Alarm 2 ONLY, proceed as follows:**

1.  Press the 'P' key once and the display will read '**tECH**'.

2.  Press the '**SET**' key and the display will flash between '**ConF**' and '**PinP**'.

3.  Press the '⇨' key three times and the display will flash between '**ConF**' and '**Alr2**'.

4.  Press the '**SET**' key twice to display '**Alt2**'.

5.  Press the '⇨' key once to display a flashing 4 digit number. For the Alarm 2 default setting this will be 0000.

6.  Press the '⇨' key once to change the display to 0001.

7.  Press the '**SET**' key to store the new value.

8.  Press the 'P' key twice to return to the main display. The default setting for Alarm 2 is now reversed.
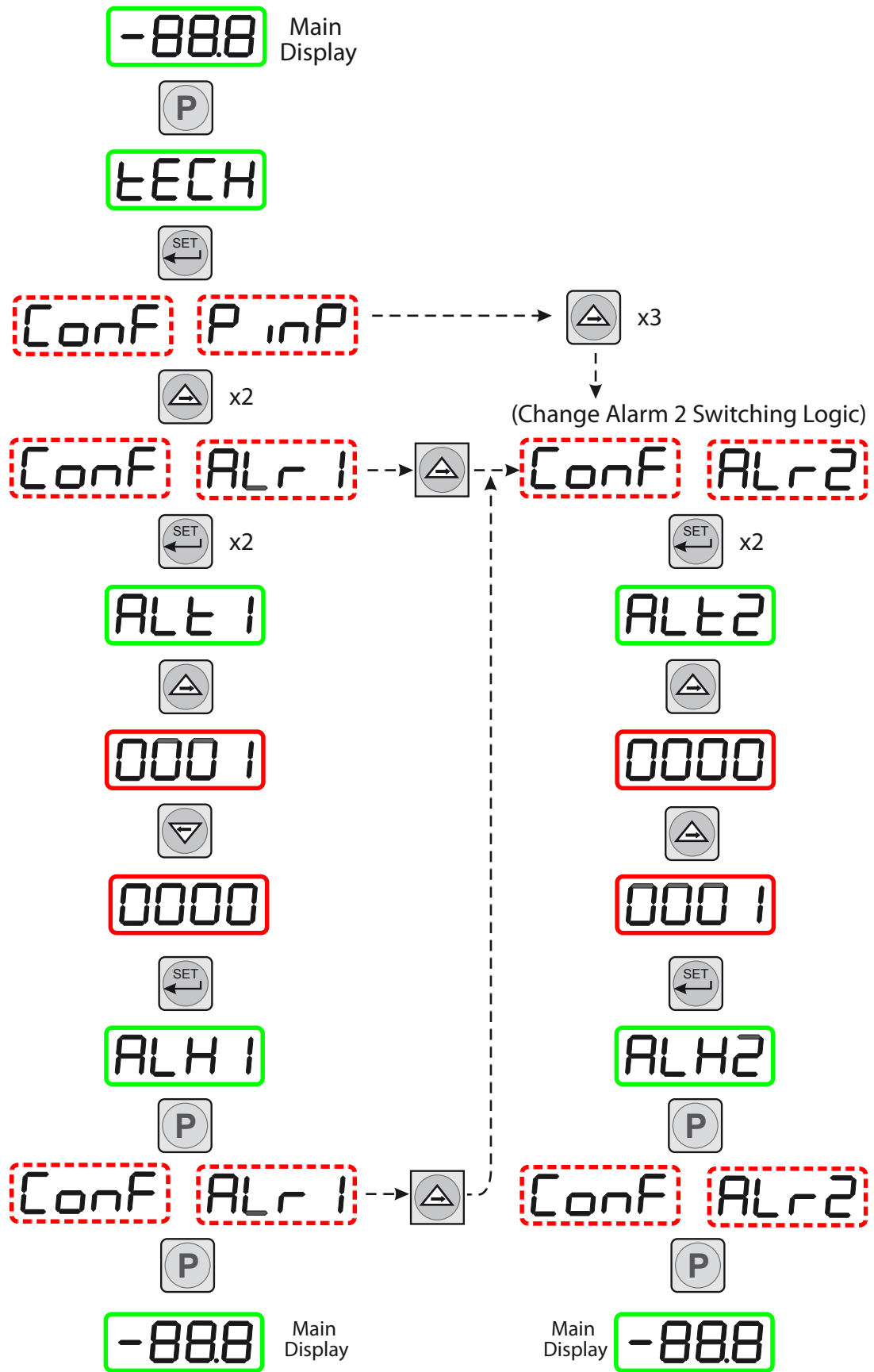
***Figure 4.2*** *Change alarm switching logic*

### 4.3.2   Set-up Alarm Levels

The alarm set-point levels are set-up from the program menu as follows  (to exit to the main display without saving any new settings press the '**P**' key):

*Figure 4.3* shows the operational key sequence.

**To set-up both alarm set-points**:

1.  Press the '**SET**' key once, '**ALr1**' will be displayed. (To set Alarm 2 only, press the '**SET**' key twice and follow the Alarm 2 branch instead).

2.  Press the '⇨' key to display the flashing current Alarm 1 set-point (-20ºC in this example).

3.  Use the '⇨' and '⇦' keys to set the required value (-25.5ºC in this example).

4.  Press the '**SET**' key once to store the new (or existing) value for Alarm 1 and to enter the set-up menu for Alarm 2, '**ALr2**'.  (To exit to the main display without changing Alarm 2 set-point levels, press the '**P**' key.)

5.  Press the '⇨' key to display the flashing current Alarm 2 set-point (-40ºC in this example).

6.  Use the '⇨' and '⇦' keys to set the required value (-50ºC in this example).

7.  Press the '**SET**' key once to store the new value for Alarm 2.  The display then returns to the main dew-point temperature display.
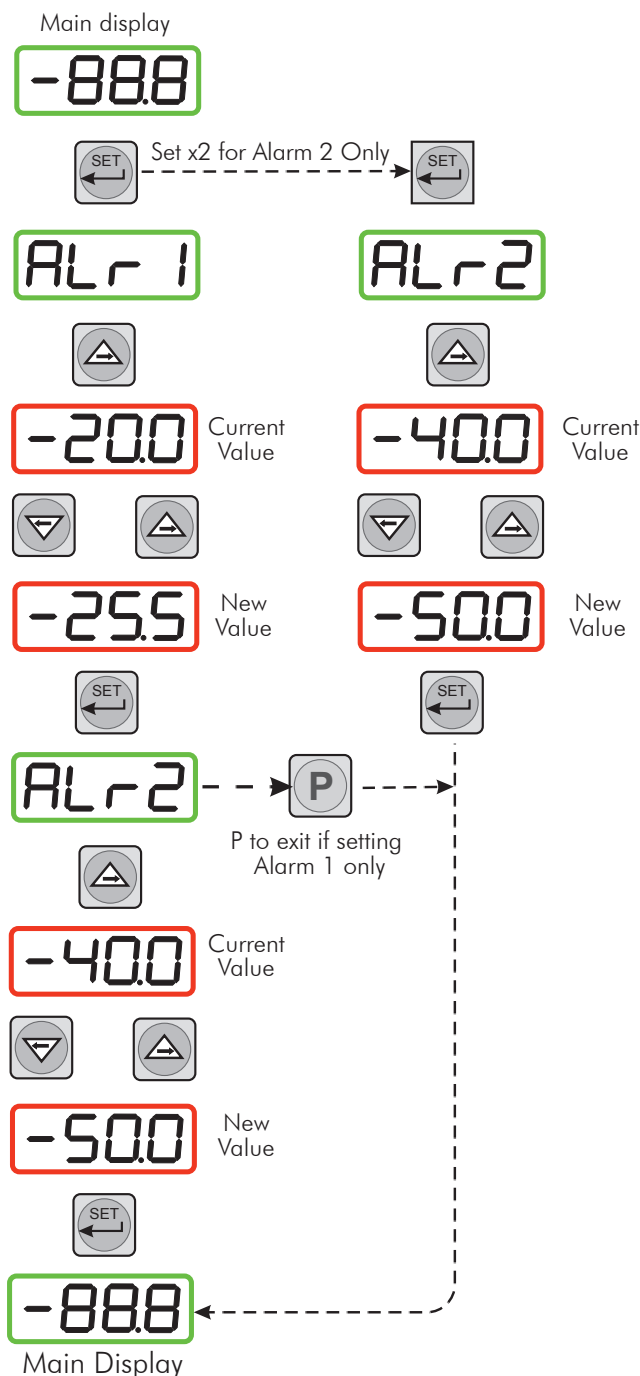


**Figure 4.3**    *Set-up alarm levels*

### 4.3.3   Configure Analog Output Current Loop

The Easidew Online is provided with an analog current loop output module which buffers and re-transmits the current loop input signal from the dew-point transmitter.

By default, the re-transmission output is set as a 4-20 mA current loop (to exactly follow the input signal, i.e. 4 mA in, 4 mA out).

For certain system processes, a 0-20 mA current loop output may be required.  The set-up method is as follows:

*Figure 4.4* shows the operational key sequence.

**Change output from 4-20 mA to 0-20 mA**

1. Press the '**P**' key once, the display will read '**tECH**'.

2. Press the '**SET**' key and the display will flash between '**ConF**' and '**PinP**'.

3. Press the '⇨' key and the display will flash between '**out1**' and '**ConF**'.

4. Press the '**SET**' key to display '**oAt1**'.

5. Press the '⇨' key once to display a flashing 4 digit number.  For the default setting (4-20 mA) this will be 0001.

6. Press the '⇦' key once to change the display to  0000.  This selects the re-transmission output to be 0-20 mA.

7. Press the '**SET**' key to accept the new value. The output current loop is now 0-20 mA.  The display will flash between '**out1**' and '**ConF**'.

8. Press the '**P**' key once to return to the main dew-point temperature display,

**Note: The transmitter current loop output signal is now scaled at 6 mA per ºC input, while the transmitter input remains scaled at 7.5ºC per mA.**
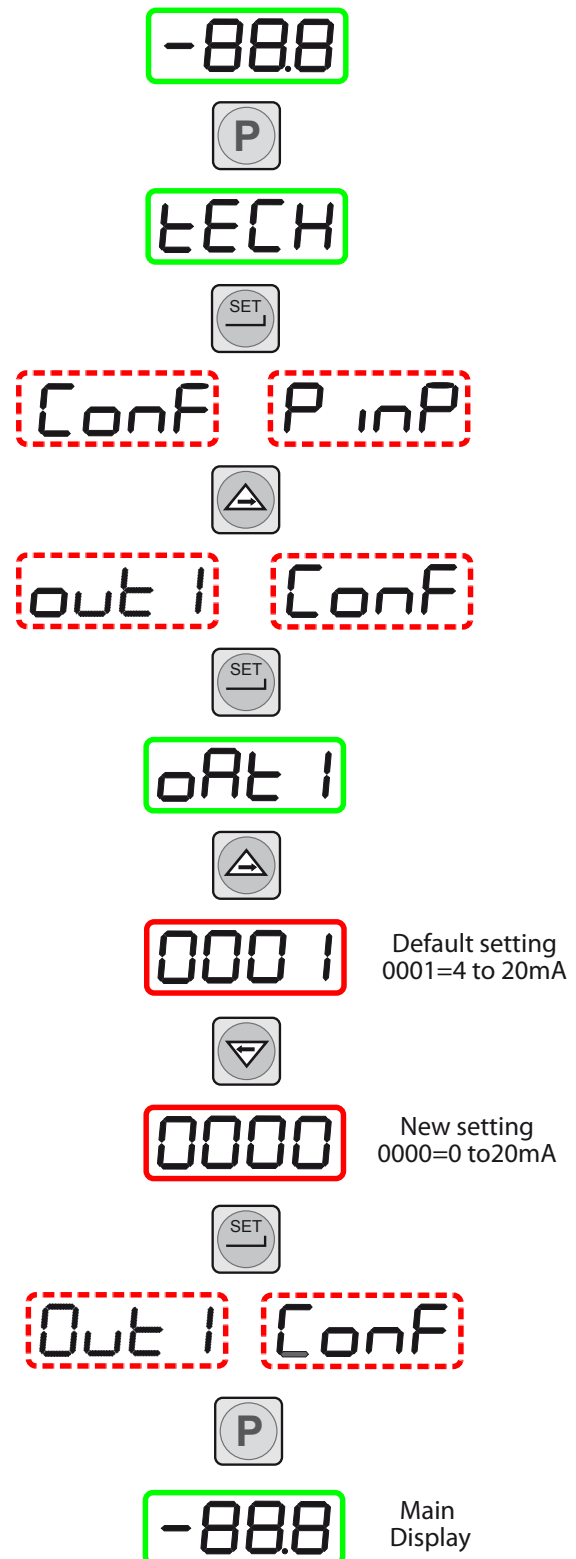


**Figure 4.4**      *Configure analog output*

## 4.4.   Change Dew-Point Temperature Range

The default temperature unit for the Easidew Online instrument is degrees Celsius.  This is indicated by the **ºCdp** LED indicator.  The default settings associated with this temperature scale are as follows:

- Span                                    +20 to -100ºCdp

- Upper and lower span limits    +20 and -100 (display flashes outside this range)

- Minimum alarm set-point        -100ºCdp

- Maximum alarm set-point        +20ºCdp

> ⚠️ **To range the instrument for ºF, all the above parameters need to be changed to their Fahrenheit equivalent values (+68 and -148ºF).  It is not sufficient just to change the units.**

After these parameters have been changed, the alarm level set-points will remain set at their previous levels -40 and -20 but will now represent ºF.  These will therefore probably require changing, refer to Section 4.3.2 for details.

### 4.4.1   Span and Unit Settings

To change the span and unit settings, proceed as follows. *Figure 4.5* shows the operational key sequence.

1. Press the '**P**' key once, the display will read '**tECH**'.

2. Press the '**SET**' key six times and the display will read '**tPoL**'.

3. Press the '⇨' key and the display will flash with the current minimum span limit (-100.0).

4. Use the '⇨' and '⇦' keys to set the required equivalent Fahrenheit value (-148.0) and press the '**SET**' key. '**tPoH**' is then displayed.

5. Press the '⇨' key, the display will flash the current maximum span limit (020.0).

6. Use the '⇨' and '⇦' keys to set the required equivalent Fahrenheit value (068.0) and press the '**SET**' key twice. '**unit**' is then displayed.

7. Press the '⇨' key, the display will flash the current unit (ºC).

8. Use the '⇨' and '⇦' keys to set the required scale units (ºF in this example) and press the '**SET**' key. '**LoL**' is then displayed.

9. Press the '⇨' key and the display will flash with the current alarm lower range limit (-100.0).

10. Use the '⇨' and '⇦' keys to set the required equivalent Fahrenheit value (-148) and press the '**SET**' key. '**uPL**' is then displayed.

11. Press the '⇨' key, the display will flash the current alarm upper range limit (020.0).

12. Use the '⇨' and '⇦' keys to set the required equivalent Fahrenheit value (068.0) and press the '**SET**' key. '**PUoF**' is then displayed. Press the '**P**' key twice to return to the main menu.

The maximum and minimum alarm level limits should now be changed to suit the new (Fahrenheit) unit values (refer to Section 4.3.2).
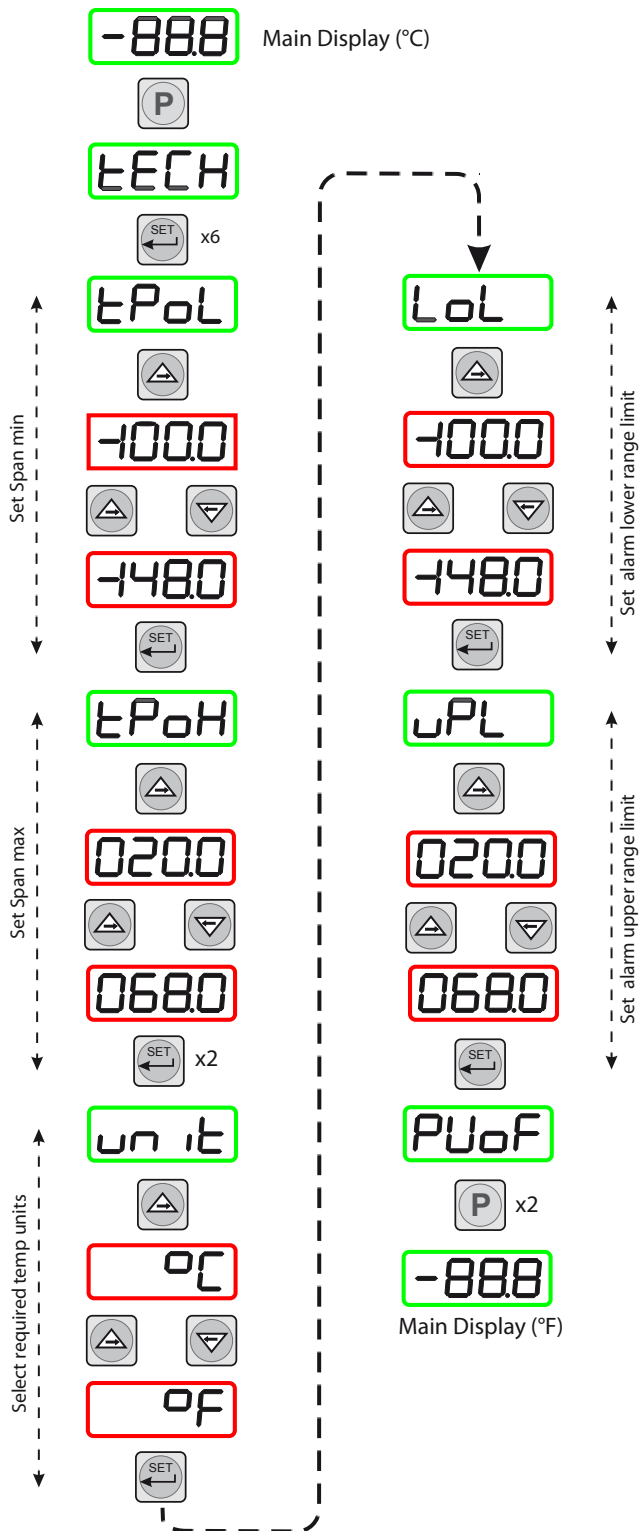


**Figure 4.5**    *Span and unit settings*

## 4.4.2 Configure Alarm Set-Point Limits

The following procedure is used to set limits to which the alarm levels can be set (usually after re-configuring the instrument's range for Fahrenheit readings).

*Figure 4.6* shows the operational key sequence.

1. Press the '**P**' key once, the display will read '**tECH**'.

2. Press the '**SET**' key once and the display will flash between '**ConF**' and '**PinP**'.

3. Press the '⇨' key four times and the display will flash between '**ConF**' and '**GEnn**'.

4. Press the '**SET**' key once, the display will read '**SU-L**'.

5. Press the '⇨' key once to display a flashing 4 digit number representing the current minimum alarm level setting. (The default setting for the ºC range is -100.0).

6. Use the '⇨' and '⇦' keys to set the required new value (e.g. -148.0).

7. Press the '**SET**' key to accept the new value. The display will read '**SU-u**'.

8. Press the '⇨' key once to display a flashing 4 digit number representing the current maximum alarm level setting. (The default setting for the ºC range is 020.0)

9. Use the '⇨' and '⇦' keys to set the required new value (e.g. 068.0).

10. Press the '**SET**' key to accept the new value, followed by the '**P**' key to return to the main display.
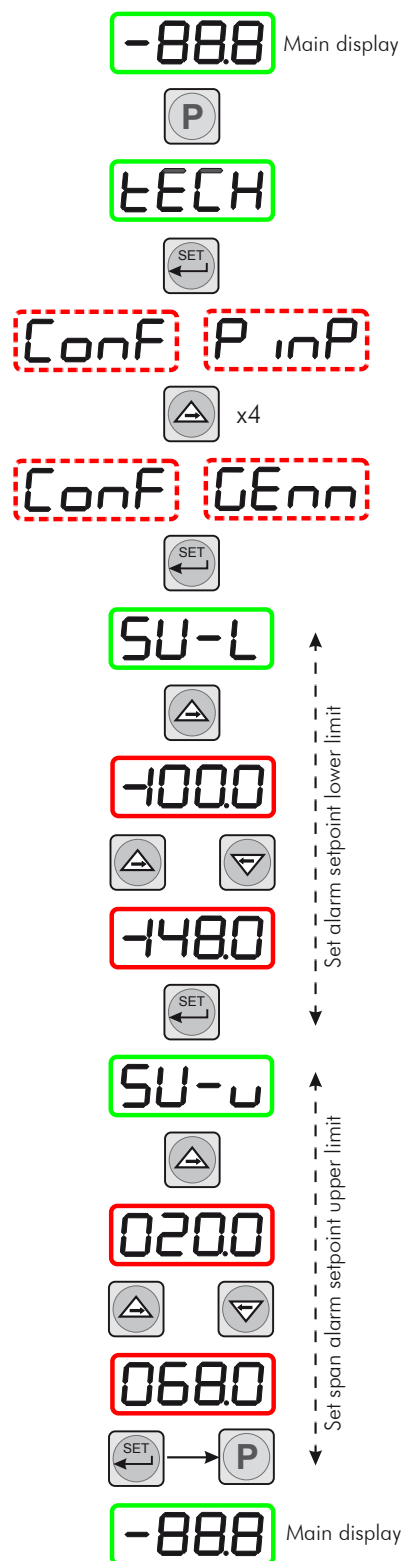


**Figure 4.6** *Set-up alarm set-point limits*

### 4.4.3   Change Scale Units (to ppm$_V$)

To change the process indicator to read parts per million by volume (ppm$_V$) proceed as follows:

*Figure 4.7* shows the operational key sequence.

**Note: The dew-point transmitter must first be programmed to provide an output proportional to ppm$_V$ by using the Michell application software.  Contact Michell Instruments for information (for contact details see Appendix D).**

1.  Press the '**P**' key once, the display will read '**tECH**'.

2.  Press the '**SET**' key four times and the display will read '**dPnt**'.

3.  Press the '⇨' key, the display will flash the current decimal point position (0001).

4.  Press the '⇦' key to set 0000 on the display (no decimal point), and press the '**SET**' key twice.  '**tPoL**' is then displayed.

5.  Press the '⇨' key, the display will flash the current minimum span limit (-1000)

6.  Use the '⇨' and '⇦' keys to set the required ppm$_V$ minimum reading (0000) and press the '**SET**' key.  '**tPoH**' is then displayed.

7.  Press the '⇨' key, the display will flash the current maximum span limit (0200).

8.  Use the '⇨' and '⇦' keys to set the required ppm$_V$ maximum reading (3000) and press the '**SET**' key twice.  '**unit**' is then displayed.

9.  Press the '⇨' key, the display will flash the current unit (ºC).

10. Press the '⇨' key three times to set the display reading to '_' (ppm$_V$) and press the '**SET**' key.   '**LoL**' is then displayed.

11. Press the '⇨' key, the display will flash the current alarm lower range limit (-1000) (formerly -100.0 with no sign or decimal point showing).

12. Use the '⇨' and '⇦' keys to set the required alarm lower range limit (point where display starts to flash) (0 or different value), and press the '**SET**' key. '**uPL**' is then displayed.

13. Press the '⇨' key, the display will flash the current alarm upper range limit (0200) (formerly 020.0 with no decimal point showing).

14. Use the '⇨' and '⇦' keys to set the required alarm upper range limit (point where display starts to flash) (3000 or different value), and press the '**SET**' key. '**PUoF**' is now displayed.

15. Press the '**P**' key twice and the main display, now reading ppm$_V$ will show. **NOTE:  Neither the ºC nor the ºF LED indicators on the front panel of the process indicator are now lit.**

On completion of the above procedure appropriate alarm levels, relevant to the new ppm$_V$ scale, will need to be set-up (refer to Section 4.3.2).
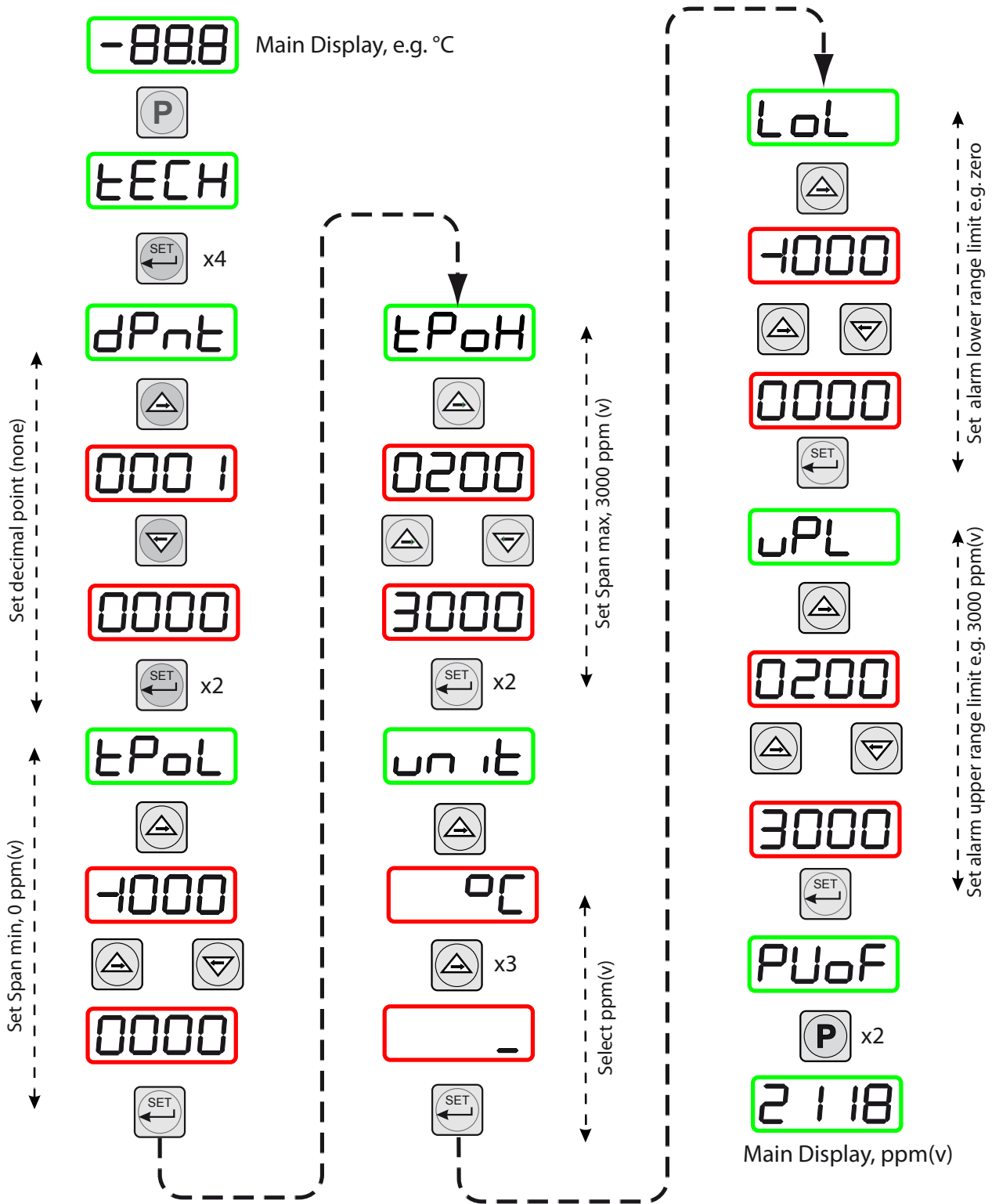
*Figure 4.7*    *Set-up process indicator (to read ppm_v)*

## 4.5     Set-Up Communications Parameters

The default parameters for the Easidew Online instrument are as follows:

Default Address = 1, Baud rate = 9600, Parity = None, Stop bits = 1

To change these parameters, proceed as follows:

*Figure 4.8* shows the operational key sequence.

1.  Press the 'P' key once, the display will read '**tECH**'.

2.  Press the '**SET**' key and the display will flash between '**ConF**' and '**PinP**'.

3.  Press the '⇨' key five times, the display will flash between '**ConF**' and '**Corn**'.

    **Set-up instrument address**

4.  Press the '**SET**' key once to display '**SAdr**'.

5.  Press the '⇨' key once to display a flashing 4 digit number. The default setting is 0001.

6.  Use the '⇨' and '⇦' keys to give the required new value (e.g. 0002). Note: The range of possible addresses is between 1 and 247. Press the '**SET**' key to accept the new value.

    **Set baud rate**

7.  '**bAud**' will now be displayed. Press the '⇨' key once to display a flashing 4 digit number. The default setting is 0003, representing 9600 baud.

8.  Use the '⇨' and '⇦' keys to give the required new value (the range is 0 to 4). 0 = 1200 baud, 1 = 2400 baud, 2 = 4800 baud, 3 = 9600 baud, 4 = 19200 baud. Press the '**SET**' key to accept the selected value.

    **Set parity**

9.  '**Prty**' will now be displayed. Press the '⇨' key once to display a flashing 4 digit number. The default setting is 0000, representing no parity (none).

10. Use the '⇨' and '⇦' keys to give the required new value  (the range is 0 to 2).  0 = none, 1 = Odd, 2 = Even.  Press the '**SET**' key to accept the selected value.

    **Set number of stop bits**

11. '**StPb**' will now be displayed.  Press the '⇨' key once to display a flashing 4 digit number. The default setting is 0000, representing 1 stop bit.

12. Use the '⇨' and '⇦' keys to give the required new value (the range is 0 - 1)  0 = 1 stop bit, 1= 2 stop bits.

13. Press the '**SET**' key to accept the selected value, followed by the 'P' key to return to the main display.
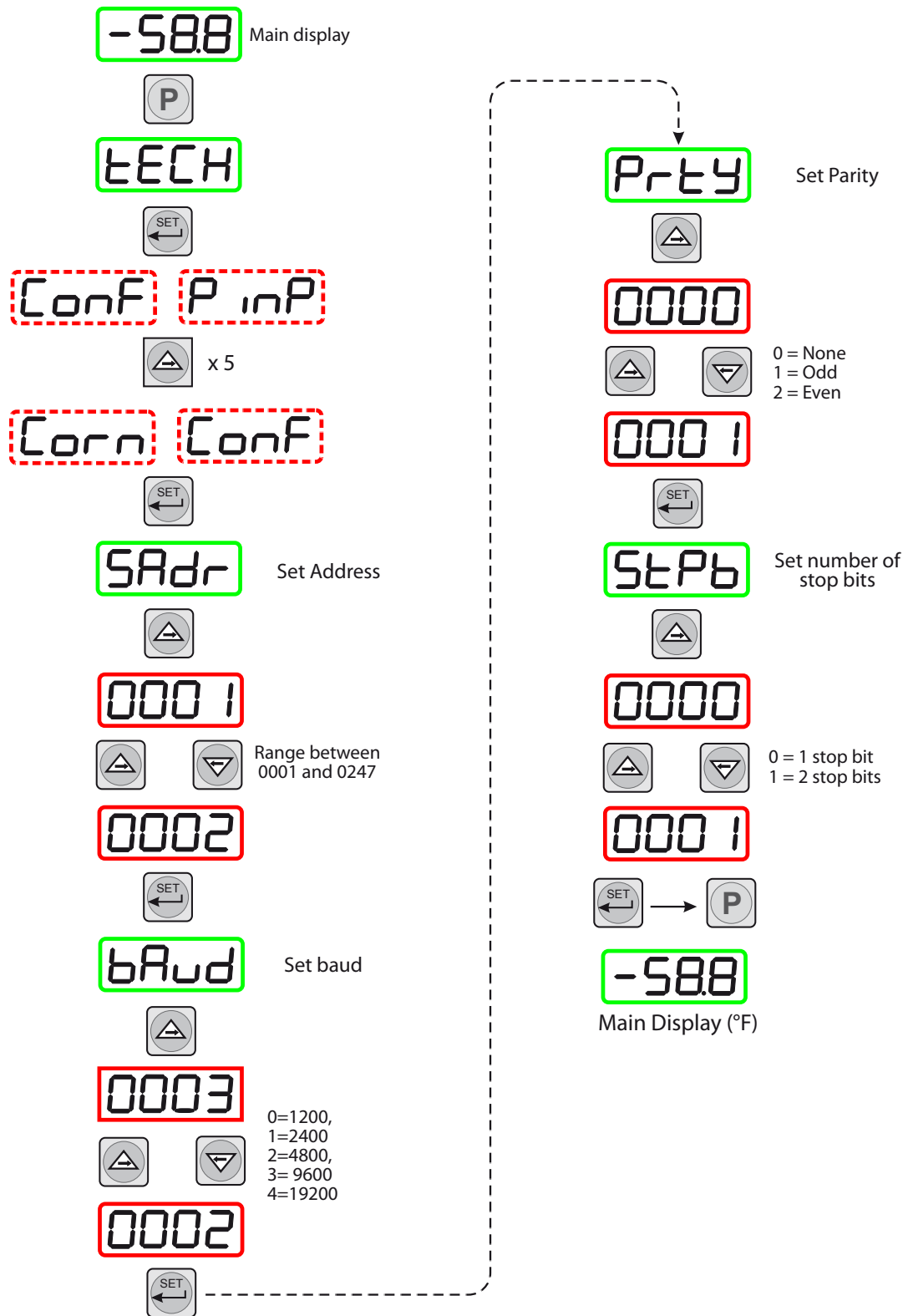
**Figure 4.8**    *Set-up data communications parameters*

# 5    GOOD MEASUREMENT PRACTICE

The Easidew Online Hygrometer is designed to operate in a flowing gas stream and is suitable for the measurement of the moisture content of a wide variety of gases. In general, if the gas (in conjunction with water vapor) is not corrosive to ceramics or base metals then it will be suitable for measurement by the Easidew Online Hygrometer.

The transmitter is designed for operation with sample gas flow rates of 1 to 10 l/min (2.1 to 22.2 SCFH). Ideally, the flow rate should be set-up between 4 and 6 l/min (8.5 and 12.7 SCFH), (5 l/min (10.6 SCFH) is the recommended optimum.  Flow regulation is not provided within the Easidew Online system. Sample gas flow must therefore be regulated outside the instrument, on the input side of the sample block by means of a precision needle valve. Always use high quality valve gear, coupling connections and pipework.

The transmitter will operate successfully at flow rates within its operational range and it is important to ensure that the flow rate through the sample block is high enough to avoid long time lags in response to humidity changes at the sample source.

Avoid pressure gradients in the system by placing excessive flow restriction on the output side of the sample block. In applications where the test gas has a very high flow rate, an instrument by-pass arrangement is preferable to flow restriction after the transmitter.

## 5.1    General Operational Guidelines

General guidelines to be followed when setting-up a sampling system are as follows:

- **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.
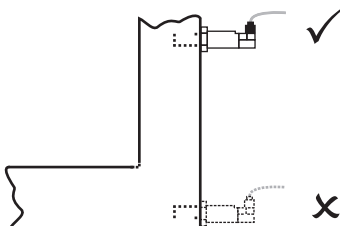


**_Figure 5.1_**        _Installation location_

- **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.
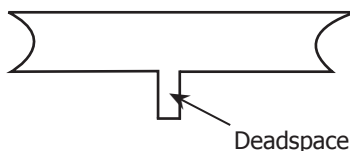


Deadspace

**_Figure 5.2_**        _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.

- **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.

- **Avoid the use of too many Tee pieces, in-line couplings or other unnecessary pipework**

Sample pipework should, ideally, be specially designed for each application rather than adapted from that previously installed for another application. Dead space in sample lines increases response time by holding water molecules which are more slowly released to the passing gas sample.

- **Gas samples**

Generally, if the sample gas (in conjunction with water vapor) is not corrosive to base metals, it will be suitable for measurement by the Easidew Online system. Gases containing entrained solids should be filtered before application to the sample block.

Care should be taken with gas mixtures containing potentially condensable components in addition to water vapor e.g. oil, to ensure that only water vapor is present in the sample.

## 5.2    Maintenance and Calibration

Routine maintenance of the Easidew Online Hygrometer is confined to regular re-calibration. For most applications, annual re-calibration ensures that the stated accuracy of the Easidew Online Hygrometer is maintained.

Specialist calibration instrumentation is required to calibrate the transmitter and a true calibration can only be performed by exposure of the moisture sensor to a reference gas of known dew point.

Calibration services are offered by Michell Instruments at their accredited calibration laboratories. All calibrations are traceable to national standards either via the National Physical Laboratory (UK) or the National Institute of Standards and Technology (USA).

The Easidew transmitter can be returned to Michell Instruments either directly or via the authorized distributor, for calibration at 13 points across the range -100 to +20ºCdp (-148 to +68°Fdp).

Alternatively, Michell Instruments can provide an exchange transmitter. Prior to re-calibration, an exchange transmitter can be ordered from Michell Instruments or an authorized distributor.

Once the replacement transmitter and calibration certificate have been received, the original transmitter can be disconnected from the process indicator and the replacement transmitter fitted in its place. Refer to Section 3.8. The original transmitter should be packed in its original packing (see *Figure 3.2)* and returned to Michell Instruments, either directly, or via their authorized agent.

Easidew transmitters are fully interchangeable and can be used with any Easidew Online process indicator. Transmitter interchangeability is not affected by cable length.

### 5.2.1    Clean Process Indicator

The front panel of the process indicator should be cleaned with a moist lint free cloth. Mild detergent may be used to remove any stubborn marks or stains but DO NOT use any type of solvent e.g. Acetone, which could damage the instrument.

# Appendix A

# Technical Specifications

## Appendix A    Technical Specifications

| Monitor | |
|---|---|
| Equipment Use | Process indicator – dew-point measurement |
| Housing & Mounting | 48 x 96 x 86mm (1.9 x 3.8 x 3.4") Horizontal, DIN 43700 Plastic housing for panel mounting. Panel cut out is 46 x 92mm (1.8 x 3.6") |
| Protection | NEMA 12 (IP65 at front, IP20 at rear) |
| Weight | Approximately 260g (0.5lb) |
| Environmental Rating | Standard, indoor at an altitude of less than 2000m with non-condensing humidity |
| Operating / Storage Temperature | 0 to +50°C / -40 to +85°C (+32 to +122°F / -40 to +185°F) |
| Operating / Storage Humidity | 90% max (non condensing) |
| Installation Over Voltage Category | III, distribution level, fixed installation category |
| Mode of Operation | Continuous |
| Supply Voltage | 100 to 240 V AC (+10%, -15%), 50/60 Hz (Optional 24 V DC) |
| Alr 1 Relay | Single pole make contact, rating 3 A @ 250 V AC |
| Alr 2 Relay | Changeover contacts, rating 5 A @ 250 V AC |
| Analog Output (if installed) | 4-20 mA (or 0-20 mA) over range  -100 to +20°C (-148 to +68°F) |
| Process Display | 20mm (0.8"), Red, 4 digit LED display |
| LED Indicators | AL1, AL2,  °C,  °F |
| Power Connection | 2 wire, length 2m (6.6ft) |
| Transmitter Cable | Copper braid screened cable; 4 core 7 / 0.2 (0.22mm²), stranded, tinned copper conductors, PVC, insulated, Melinex taped, Black PVC outer.  Max length 800m (2,624 ft) |
| Transmitter | |
| Type | Michell Easidew |
| Transmitter Torque Loading | Minimum 30.5 Nm (22.5 lbf-ft) |
| Calibration Range | -100 to +20°C (-148 to +68°F) dew point |
| Output | 4-20 mA current source configurable over the entire dew-point range |
| Interchangeability | Fully interchangeable |
| Dew-Point Accuracy | ± 2°C (± 3.6°F) |
| Operating Temperature | -40 to +60°C (-40 to +140°F) |
| Storage Temperature | -40 to +75°C (-40 to +167°F) |
| Temperature Coefficients | Temperature compensated across operating temperature range |
| Operating Pressure | 10-6 bara vacuum to 45 MPa (450 barg / 6500 PSI) |
| Flow Rate | 1 to 5 l/min (2.1 to 10.6 SCFH) mounted in standard sampling block 0 to 10 m/sec (0 to 353 SCFS) direct insertion (80 μm sintered guard) |
| Traceable Certification |  -90 to +20°C (-130 to +68°F) dew point traceable to the National Physical Laboratory; -75 to +20°C (-103 to +68°F) dew point traceable to NIST (USA) *[For dew points < -90°C (< -130°F): Direct reference to a fundamental cooled mirror dew-point meter]* |
| Environmental Protection | IP66 and NEMA 4 |
| Weight | 150g (5.29oz) |

# Appendix B

# Fahrenheit or Celsius

## Appendix B    Fahrenheit or Celsius

Ranging of the monitor is achieved by using the following procedure. (The figures in brackets are the °F equivalents of the °C values).
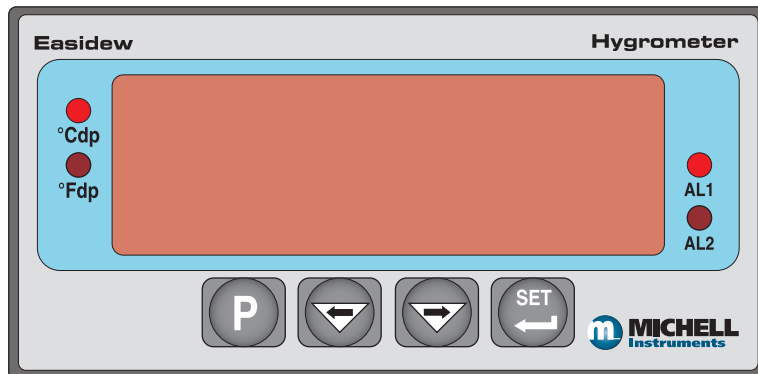


1.  Press the '**P**' key and the display will show '**tECH**'.

2.  Press the '**SET**' key until the display shows '**tPoL**'. Press the '⇨' or '⇦' key. The display will now show the current "minimum calibration value". Use the '⇨' and '⇦' keys to adjust the value to the minimum range value eg -100.0 for deg C (−148.0 for deg F)

3.  Press the '**SET**' key until the display shows '**tPoH**'. Press the '⇨' or '⇦' key. The display will now show the current "maximum calibration value". Use the '⇨' and '⇦' keys to adjust the value to the maximum range value eg +20.0 (+68.0)

4.  Press the '**SET**' key until the display shows '**unit**'. Press the '⇨' or '⇦' key. The display will now show the current engineering unit, probably °C. Use the '⇨' and '⇦' keys to adjust the value to °F.

5.  Press the '**SET**' key until the display shows '**LoL**'. Press the '⇨' or '⇦' key. The display will now show the current "minimum display value". Use the '⇨' and '⇦' keys to adjust the value to the minimum range value.

6.  Press the '**SET**' key until the display shows '**uPL**'. Press the '⇨' or '⇦' key. The display will now show the current "maximum display value". Use the '⇨' and '⇦' keys to adjust the value to the maximum range value.

7.  Press the '**SET**' key.

8.  Press the '**P**' key twice to return to the dew point display.

The alarm set points need to be set to −100 and +20°C to be the equivalent of the −148 and +68°F.

To do this, follow the instructions below:

1.  Press and hold the '**P**' key and the display should read '**tECH**'.

2.  Press the '**SET**' key and the display should flash between '**PinP**' and '**ConF**'.

3.  Press the '⇨' key four times until the display should flash between '**Genn**' and '**ConF**'.

4.  Press the '**SET**' key and the display should read '**SU-L**'. Press the '⇨' key to reveal a flashing value on the display. Using the '⇨' and '⇦' keys adjust the flashing value to "-148.0" (-100.0). This is the minimum value for alarm set points.

5.  Press the '**SET**' key and the display should read '**SU-u**'. Press the '⇨' key to reveal a flashing value on the display. Using the '⇨' and '⇦' keys, adjust the flashing value to "068.0" (020.0). This is the maximum value for alarm set points.

6.  Press the '**SET**' key followed by the '**P**' key to get back to the normal display.

# Appendix C

# RS232 Data Communications Port Connections (Optional)

# Appendix C    RS232 Data Communications Port Connections (Optional)

The Easidew Online instrument has an RS232 port, situated on the rear panel of the process indicator. This port enables remote access to the instrument's configuration and the indicated dew-point temperature.

The method of connection is shown in *Figure A.1* and the following items will be required (these are not supplied with the Easidew system):

- Matching connector for process indicator output port

- Screened RS232 communications cable (max length permitted 12 m (39.4 ft))
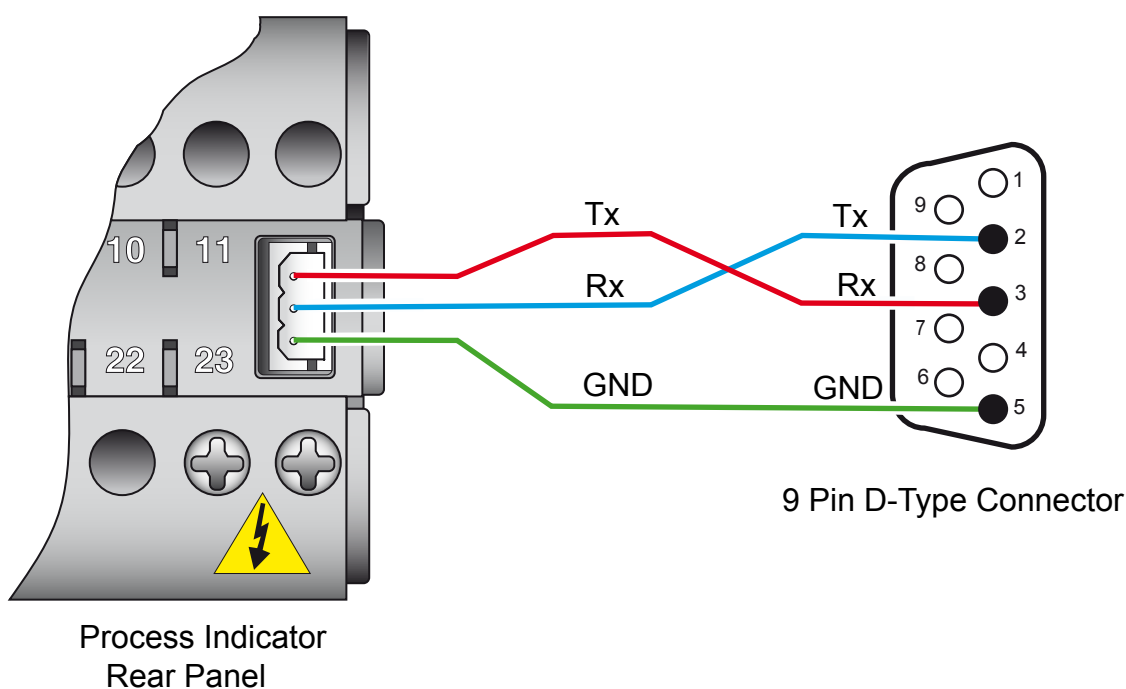
- 9-pin, D-Type RS232 connector



*Figure A.1*    *RS232 Connections*

1. Strip both ends of the communications cable to expose the individual cable cores and the cable screen.

2. Trim off the cable screening at the process indicator end.

3. Connect the Tx, Rx and ground (GND) cable cores to the process indicator connector as shown.

4. On the 9-pin D-type PC connector, connect the Tx line to pin 3, the Rx line to Pin 2 and the GND connection to Pin 5.  Connect the Screen to Pin 5 and/or the frame of the connector.

5. Check that the cable wiring has been completed correctly.

# Appendix D

# List of Worldwide Michell Instruments' Offices

## Appendix D    List of Worldwide Michell Instruments' Offices

| | |
|---|---|
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| **China**<br>Michell Instruments (Shanghai) Ltd<br>Room 505, Qilai Building,<br>889 Yishan Road,<br>Shanghai, 200233,<br>P R China<br>Tel:      +86 21 5401 2255<br>Fax:      +86 21 5401 2085<br>E-mail: cn.info@michell.com<br>Web:    www.michell.com/cn | **France**<br>Michell Instruments SAS<br>2, rue Jean Desparmet,<br>69008 Lyon,<br>France<br>Tel:      +33 437 53 88 20<br>Fax:      +33 437 53 88 21<br>E-mail: fr.info@michell.com<br>Web:    www.michell.com/fr |
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