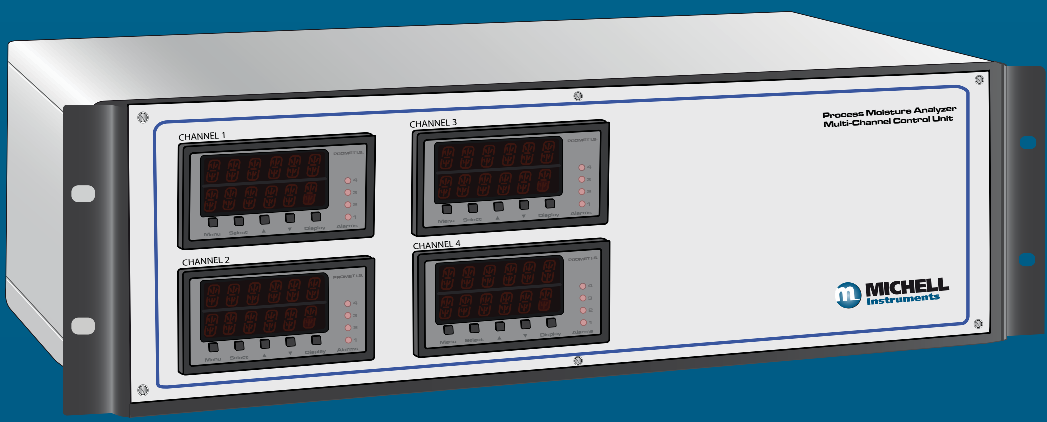
Promet I.S.

Process Moisture Analyzer

User’s Manual



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

Use this information when contacting Michell Instruments for service purposes.

Analyzer	
Code	
Serial Number	
Invoice Date	
Location of Instrument	
Tag No	

Analyzer	
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Serial Number	
Invoice Date	
Location of Instrument	
Tag No	

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Serial Number	
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Promet I.S.
Process Moisture Analyzer

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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 is 85 to 265 V AC or 10 to 72 V DC. Refer to labels on instrument or calibration certificate.

Pressure Safety

DO NOT permit pressures greater than the safe working pressure, as defined in the published specifications. to be applied to the instrument.

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.

Long exposure to, or breathing of, the calibration gases may be dangerous.

Repair and Maintenance

The instrument must be maintained either by the manufacturer or an accredited service agent. Refer to www.michell.com for details of Michell Instruments' worldwide offices contact information.

Calibration

The recommended calibration interval for the analyzer is 12 months (6 months or less for agressive gases) depending on the application in which the instrument is used. Please consult Michell Instruments for the specific calibration interval (refer to www.michell.com for details of Michell Instruments' worldwide offices contact information).

Safety Conformity

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

Abbreviations

The following abbreviations are used in this manual:

A	Ampere
AC	alternating current
barg	pressure in bar (gauge)
°C	degrees Celsius
°F	degrees Fahrenheit
DC	direct current
dp	dew point
Hz	Hertz
lb/MMscf	pounds per million standard cubic feet
lbf-ft	pound force per foot
mA	milliampere
mg/m^3	milligrams per cubic meter
mm	millimeters
Nl/min	normal liters per minute
ppm$_V$	parts per million by volume
psig	pressure in pound(s) per square inch (gauge)
scfh	standard cubic feet per hour
T	temperature
V	Volts
W	Watts
”	inch(es)

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.

1 INTRODUCTION

The Promet I.S. Process Moisture Analyzer is a continuous, on-line instrument for the measurement of absolute moisture content in gas. It is designed to fulfil a wide range of applications and provide for the monitoring and/or control of moisture in gas. The instrument consists of two component parts: the control unit and the sensors’ assembly (moisture transmitters and optional pressure transmitter). They are individually calibrated to a single standard allowing for total interchangeability between combinations of sensors and control units.

The instrument covers the ranges –100 to +20°Cdp (-148 to +68°Fdp), 0 to 9999 ppm_V as well as 0 to 1000 lb/MMscf and g/m^3 for natural gas. Selection of the displayed moisture unit of measure is factory-set but may be easily changed by the user. Four alarm relay contacts are provided which are user-configurable both in terms of set-point and operating mode. Current output is factory set at 4-20 mA.

The Promet I.S. performs moisture content calculations based on the measured dew point and the analysis pressure. The default setting of the monitor assumes atmospheric pressure but the customer can set a fixed value of elevated pressure - for this to be a valid method, the sensor must be installed at a constant, known analysis pressure. Alternatively, there is an active pressure compensation option providing a loop-powered intrinsically-safe pressure transmitter connecting to the second input channel on the control unit, for dynamic pressure compensation.

The Promet I.S. Control Unit must be placed in a non-hazardous area suitable for electronic analytical equipment. The moisture transmitter and optional pressure transmitter can be positioned close to the process sample take-off point in Zone 0, Zone 1 or Zone 2 (Class I, Division 1, Groups A,B,C and D) hazardous area. The control unit and transmitters are connected via a standard 2-wire instrumentation cable protected by safety isolation interface units.

Figure 1 *Promet I.S. Control Unit*

1.1 Performance Features

- State-of-the-art ceramic moisture sensor with chemically inert materials coupled with physical resilience provides long-term reliability in the most arduous applications. Robust construction also enables measurement directly at process / pipeline pressure up to 45 MPa (450 barg/5801 psig).
- High integrity moisture measurement from ambient to ppb level with an exhaustive list of hygrometric units, including key parameters of natural gas.
- Two 4-20 mA output with configurable units / ranges. RS485 Modbus RTU communication. Four built-in user-adjustable alarm contacts.
- Assured measurement accuracy with each sensor calibrated across the entire measurement range and certified traceable to NPL (UK) and NIST (USA).
- User-programmable or real-time active pressure compensation for moisture content calculation.
- Certified intrinsically safe.
- Replaceable sensor element with Michell Calibration Exchange Service for professional, scheduled and low cost recalibration to minimize downtime and cost.
- Up to four independent measurement channels with any combination of moisture in gas and moisture in liquid measurement at low per-channel cost.
- Customized sampling systems to meet even the most demanding applications.

1.2 Applications

- Natural gas production and processing
- Pipeline drying
- Offshore export pipeline natural gas
- Transmission pipeline monitoring
- Fiscal metering/custody transfer of gas
- Gas storage facilities
- Refinery recycle gas – reformer and platformer
- LNG production processing and receiving terminals

1.3 Theory of Operation

The reliable and robust sensor design is fundamental to achieving accurate measurement of moisture in process over a long period of time. Proprietary thick- and thin-film techniques are applied in the Michell Ceramic Moisture Sensor. The inert materials of the sensor have a high resistance to aggressive media while the inherent strength of the sensor and the thermal bonded connections to the active device ensures reliable operation.

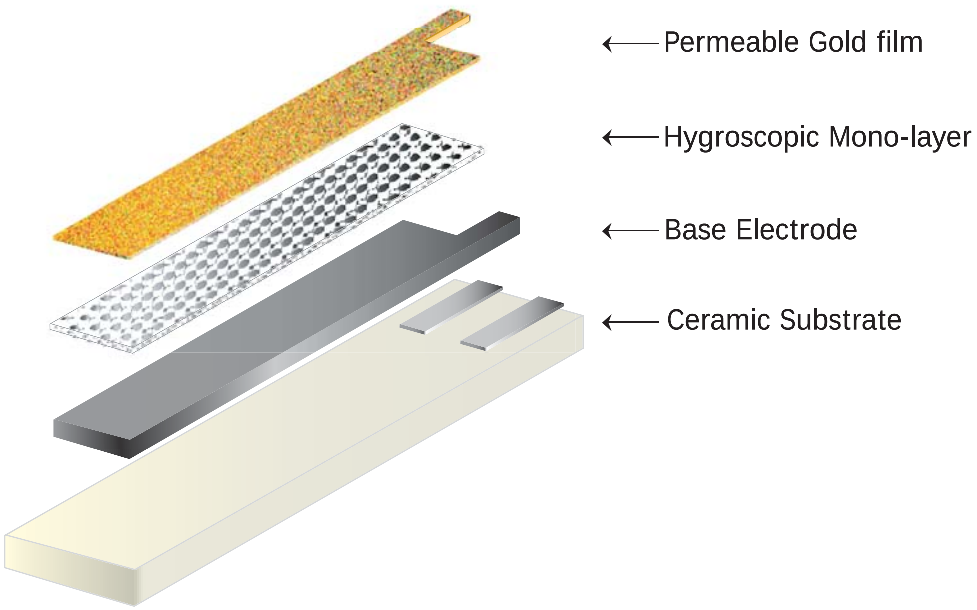


Figure 2 *Structure of the Michell Ceramic Moisture Sensor*

The ceramic sensor responds to the partial pressure of water vapor in the gas being measured, which is directly related to the dew-point temperature.

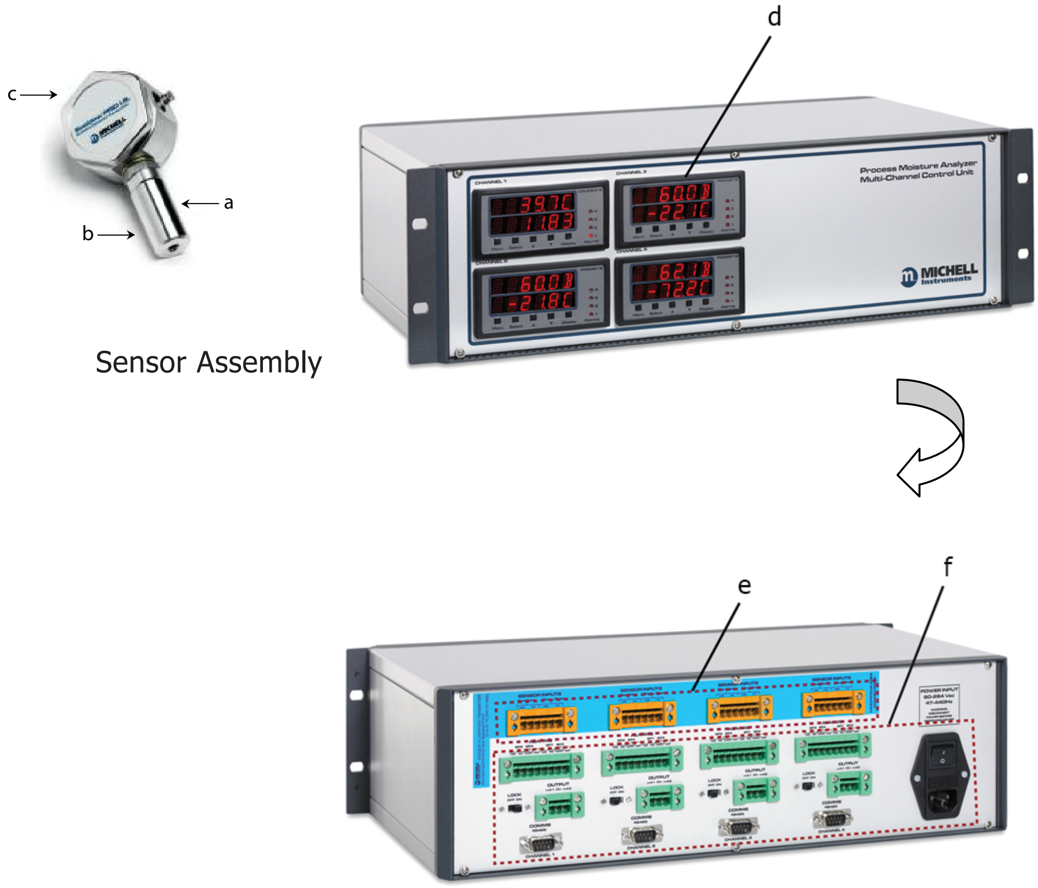
Calibration is certified traceable to NPL (UK) and NIST (USA) through the use of dew-point transfer standards.

The firmware of the Promet I.S. incorporates dew point/pressure to moisture content conversion data for ideal gas and natural gas. The calculation for natural gas uses either the long established IGT research Bulletin No.8 or the more recently published ISO 18453, depending on the customer's preference.

1.4 System Components

The Promet I.S. Process Moisture Analyzer consists of:

- the sensor assembly
- the control unit



Control Unit

(Up to four channels can have any combination of Promet I.S. and Liquidew I.S.*)

a	Port for optional pressure transmitter
b	Sensor block
c	Dew-point transmitter
d	User interface
e	Electrical connections - to hazardous area
f	Electrical connections - to non-hazardous area

Figure 3 *Major Components of the Promet I.S.*

* Liquidew I.S. is a sister product of the Promet I.S. used for moisture in liquid measurement

1.4.1 User Interface

The Promet I.S. user interface is located on the control unit. There is a two-line, six digit (15 segment), LED display and four alarm indicators. Five push-button function keys facilitate data display, parameter setting and system adjustment.

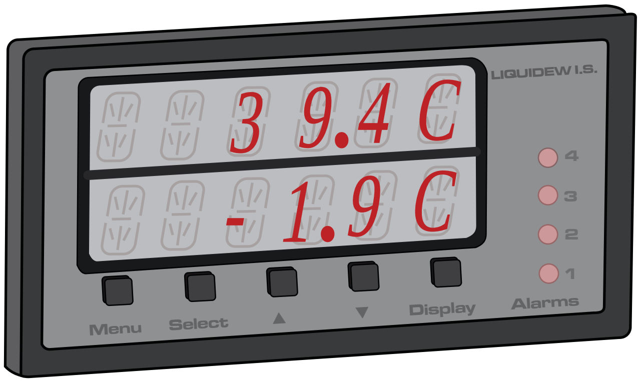
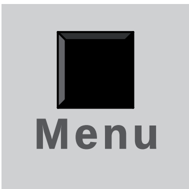


Figure 4 *User Interface*

The operation of the function keys are shown below and more information can be found in Section 3:

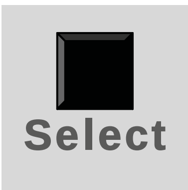
- **Menu** key:



The **Menu** key is used to enter and exit the set-up menu.

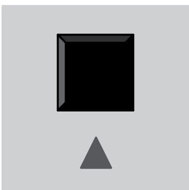
At any level within the set-up menu, press and hold the **Menu** key to return to the default screen.

- **Select** key:



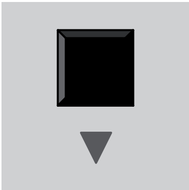
The **Select** key is used to enter the sub-menu and to confirm the selection.

- ▲ key:



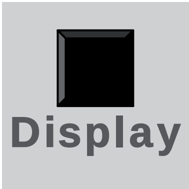
The ▲ key is used to scroll up through pages in the top and sub-level menus and to increase values in sub-level menus.

- ▼ key:



The ▼ key is used to scroll down through pages in the top and sub-level menus and to decrease values in sub-level menus.

- **Display** key



The **Display** key is used to change the display unit (see Section 3.2.2).

The four LED alarm indicators will light up when the specific alarm relay is activated. Settings for the alarm relays are explained in Section 3.8.

1.4.2 Power Supply and Input/Output Signal

The terminal blocks for the power supply, signal input, signal output and alarm output are located on the back panel of the control unit (as shown in *Figure 9)*.

- **Power Supply**

  The Promet I.S. requires either 85 to 265 V AC or 10 to 72 V DC power input, depending on the model ordered.

- **Signal Input**

  There are two 4-20 mA signal input channels from the dew-point and optional pressure sensors to the control unit. Both input channels are isolated by built-in galvanic type I.S. barriers.

- **Signal Output**

  There are two 4-20 mA linear signal output channels. The output channel 1 is used for the dew point, moisture or pressure signal, with configurable ranges. Output channel 2 has a fixed pressure signal and cannot be configured.

  There is one RS485 Modbus RTU digital communication port. Refer to Appendix B.

- **Alarm Output**

  There are four alarm relays. Alarms 1 and 2 are Form C contacts rated 10A / 240 V AC or 8A / 24 V DC, non-inductive load. Alarms 3 and 4 are Form A contacts rated 5A / 240 V AC or 4A / 24 V DC, non-inductive load. The control actions and set points of these four alarms are user-programmable. A fault alarm with adjustable set points is also included.

1.5 Sampling System

The Promet I.S. requires a clean sample of the gas mixture that meets the pressure and flow requirements of the transmitter. The design of the sampling system will depend on the specific application.

The requirements for the sample gas going into the sensor block are as follows:

- Temperature: -40 to +60°C (-40 to +140°F)

  (-20 to +40°C (-4 to +104°F) recommended for optimum performance)

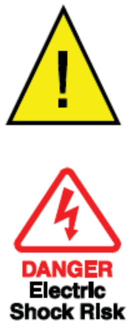
- Maximum pressure: 45 MPa (450 barg / 5801 psig)

- Flow rate: 1 to 5 Nl/min (2.1 to 10.6 scfh)

NOTE: Contact Michell Instruments if you wish to order a specific sampling system.

Please refer to the Promet I.S. Premium Sampling System Instructions if a Michell sampling system has been ordered with the Promet I.S.

2 INSTALLATION



It is essential that the installation of the electrical and gas supplies to this analyzer be undertaken by suitably qualified personnel.

2.1 Unpacking the Analyzer

Unpack carefully as follows:

a. Remove the accessories (if ordered).

b. If no accessories have been ordered the delivery should contain following items:

- Promet I.S. control unit
- Promet I.S. sensor assembly (if a sampling system has been ordered the sensor assembly should already be mounted in the sampling system)
- User manual
- Certificates of calibration and conformity
- Power lead (only for 85 to 265 V AC version)

c. Remove the Promet I.S. sensor assembly from the box.

d. Lift out the control unit together with its end packing pieces.

e. Remove the end packing pieces and set the control unit down at the site of installation. Save all the packing materials for the purpose of returning the instrument to the manufacturer for service.

If ordered, the Promet I.S. Premium Sampling System will be shipped in a separate box.

2.2 Operating Requirements

2.2.1 Environmental Requirements

The Promet I.S. sensor assembly is intrinsically safe and designed to be installed on-site, indoors or outdoors, directly at the point of measurement within a Hazardous Area. The sensor assembly is ATEX and IECEx or CSA and FM certified (to be specified at time of order). To operate correctly, the sensor assembly must be installed within a suitable sampling system (Michell Instruments can supply standard and custom designed sampling systems).

The Promet I.S. control unit is NOT designed for use in a Hazardous Area and should only be installed in a safe area. The control unit is intended for indoor installation only and operates within environmental limits of 0 to +50°C (+32 to +122°F) and <90%RH. The control unit contains built-in isolation barriers permitting connection, direct from the Hazardous Area, of the Promet I.S. sensor assembly.

2.2.2 Power Requirement

The Promet I.S. control unit can be ordered for either of the following electrical supplies:

- 85 TO 265 V AC, 47/63 Hz @ 4W max 10W

OR

- 10 to 72 V DC @ 4W max 10W

The Promet I.S. sensor assembly is powered through the 2-wire signal cable directly from the control unit.

Please refer to the Promet I.S. Premium Sampling System Instructions for the power requirement of the sampling system.

2.3 Mounting

2.3.1 Control Unit Installation

The Promet I.S. control unit is contained in a 19" sub-rack case (size 3U). It should be installed in a 19" rack using the mounting holes provided. It should be placed in a position free from any appreciable vibration and shaded from direct sunlight.

NOTE: The materials and construction of the control unit allow for operation in an indoor, clean, non-hazardous only, control room environment.

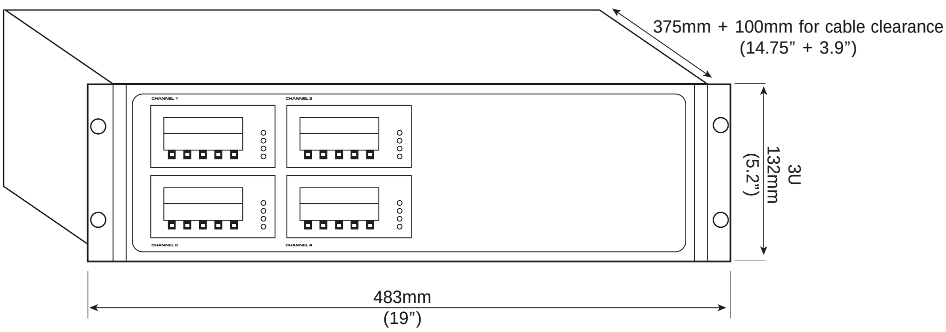


Figure 5 *Dimensions of the Control Unit*

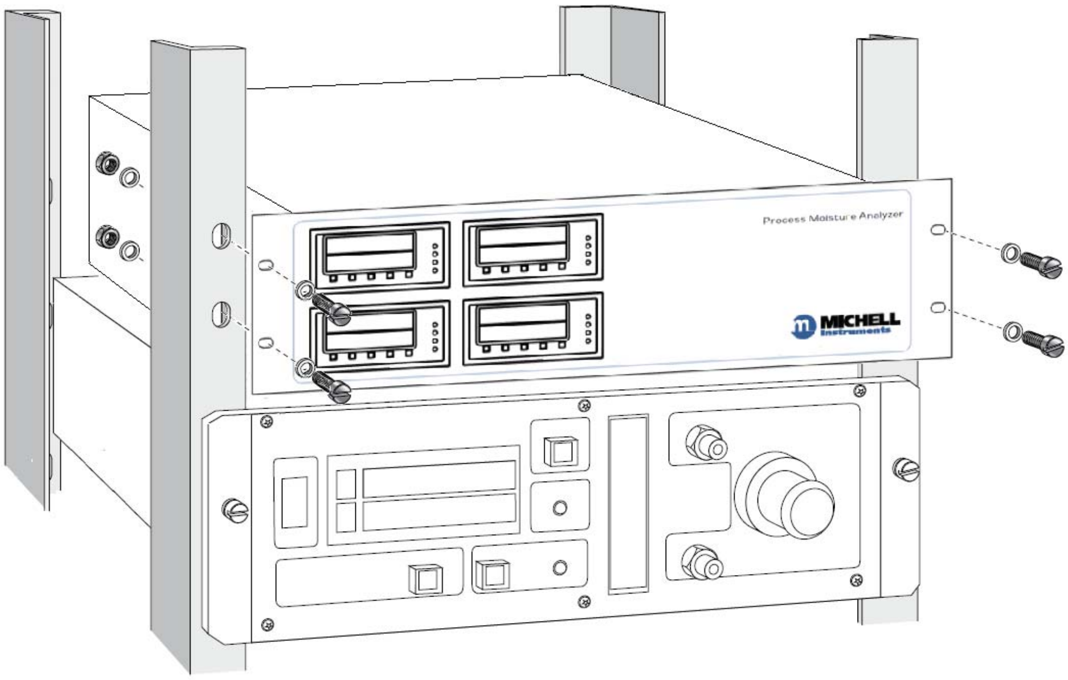


Figure 6 *Rack Mounting Method*

Figure 6 illustrates the general method for fitting a rack mount instrument into a standard 19” rack. To fit the unit proceed as follows:

a. Remove all terminal blocks for the electrical connections.

b. If necessary, remove any covers from the rack cabinet to gain access to the rear and side.

c. Connect up the sensor input, analog and alarm output terminal blocks to the internal rack wiring, ensuring that there is sufficient free cable to permit withdrawal of the instrument from the rack.

d. Slide the instrument into the rack and support its weight while the four fixing screws are inserted.

e. Ensure that the front panel of the instrument is flush and square with the front of the rack and tighten the fixing screws.

f. Insert the terminal blocks into their respective sockets on the rear of the instrument.

g. Connect the power supply cable and switch the **ON/OFF** switch to **ON**.

h. Re-fit any covers to the rack as necessary.

NOTE: Allow a minimum clearance depth of 100mm (4”) behind the instrument housing for cables and vents.

2.3.2 Mounting the Promet I.S. Sensor Assembly into the Sampling System

HIGH PRESSURE! High pressure gases are potentially hazardous. Energy stored in these gases can be released suddenly and with extreme force. High pressure systems should be assembled and operated only by people who have been trained in proper safety practices.

NOTE: If the analyzer has been ordered with a sampling system, the Promet I.S. sensor assembly will have been installed and tested in the factory. In that case disregard the following section and go to Section 2.3.3.

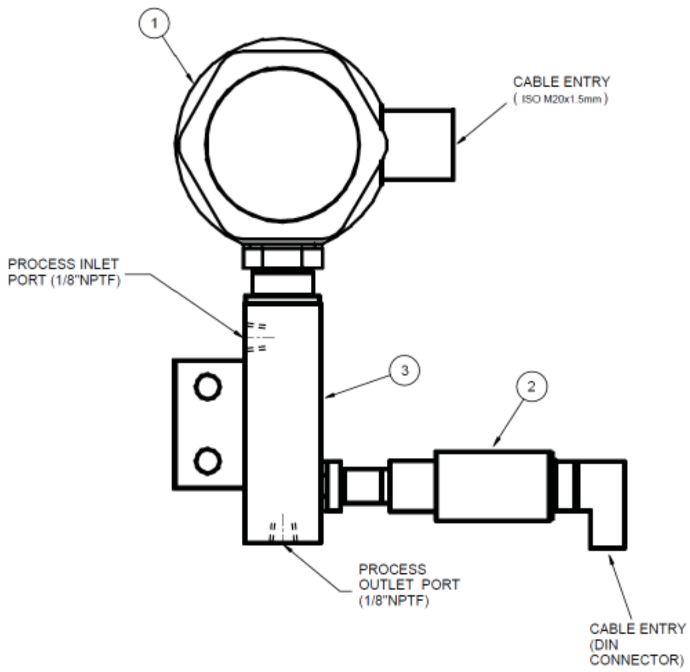


Figure 7 *Promet I.S. Sensor Assembly*

The Promet I.S. sensor assembly consists of:

1 Dew-point transmitter - Easidew PRO I.S.

2 Pressure transmitter (optional)

3 Sensor block

To assemble, proceed as follows:

a. Remove the protective cap on the dew-point transmitter (Easidew PRO I.S.) before installation and retain for future use. Take care to prevent any contamination of the sensor before installation (**do not touch or handle the sintered guard - located on the tip of the Easidew PRO I.S.**).

b. The dew-point transmitter has a 5/8” UNF parallel mounting thread which should be installed directly into the sampling block with the bonded seal provided. **The bonded seal provided should be placed over the transmitter mounting thread before it is screwed into the sampling block.**

c. Finger tighten the dew-point transmitter by gripping the spanner/wrench flats on the body - **NOT** the transmitter body cover. Completely tighten using a spanner/wrench until the bonded seal is fully compressed to a minimum torque of 30.5 Nm (22.5 lbf-ft).

d. The pressure transmitter has a 1/8” NPT thread. It can be installed into the 1/8” NPTF port on the sensor block. Follow the standard Swagelok® installation instructions to make the connection.

To install the complete Promet I.S. sensor assembly into the sampling system, follow these steps:

a. Select a location to mount the sensor assembly which has sufficient clearance for connecting and disconnecting the inlet/outlet tubing and cable. The surface should be strong enough to hold the analyzer.

b. Mount the Promet I.S. sensor assembly into the sampling system via its two mounting holes.

c. Sample gas connections are made via the gas inlet and gas outlet ports as shown in *Figure 7*. Both the gas inlet and outlet port are 1/8” NPT female ports. Michell recommends using Swagelok® 6mm to 1/8” NPT (ordering code SS-6M0-1-2) or 1/4” to 1/8” NPT (ordering code SS-400-1-2) male connectors to connect these two ports to the 6mm or 1/4” sampling system tubing. Follow standard Swagelok® installation instructions to make the connections.

d. The sensor assembly will then be supported by the tubings connecting to it.

Although the operation of the Easidew PRO I.S. dew-point transmitter is not sample flow-rate dependant, it is important to ensure that the flow velocity through the sample line to the sampling block is high enough to avoid long time lags in response to changes in moisture at the sample source. Michell recommends that a flow-rate of 1 to 5 Nl/min (2.1 to 10.6 scfh) (or equivalent at pressure) be set and that the dew-point transmitter is mounted as close as practicably possible to the sample source.

2.3.3 Sampling System Installation

HIGH PRESSURE! High pressure gases are potentially hazardous. Energy stored in these gases can be released suddenly and with extreme force. High pressure systems should be assembled and operated only by people who have been trained in proper safety practices.

To install the sampling system follow the steps below:

a. Select a location close to the measurement point. The ambient temperature should be within the range of -20 to 60°C (-4 to +140°F) (preferably 0 to +40°C (+32 to +104°F) for optimum performance). Consult Michell for special heating or cooling options if the temperature is outside of this range.

b. Fasten the sampling system to a vertical surface or instrument stand using the four M8 size mounting holes at each corner.

c. Connect the sample inlet and outlet tubing to the fittings of the inlet/outlet ports on the sampling system. If the sampling system has been ordered from Michell, the fitting is a 6mm or 1/4" Swagelok® bulkhead union. Follow standard Swagelok® installation instructions for the connection procedure.

NOTE: The sampling line between the process point and the sampling system should be as short as possible to minimize the lag time.

2.4 Wiring

These tasks are to be undertaken only by suitably qualified personnel. All the connections to the rear panel are electrical connections. Exercise due caution, particularly when connecting to external alarm circuits which could be at high potential.

2.4.1 Overall Wiring Arrangement

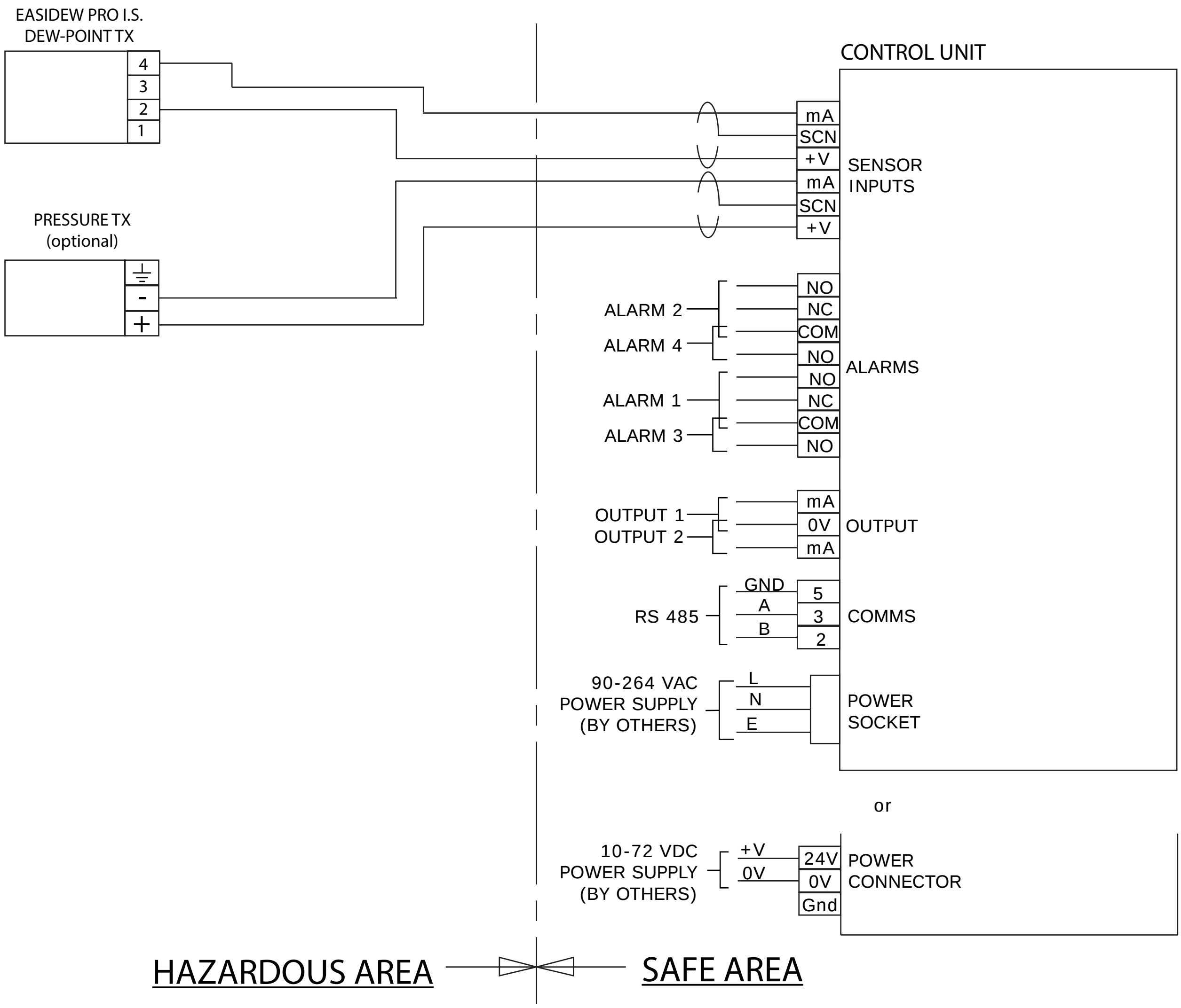


Figure 8 *Overall Wiring Arrangement*

2.4.2 Control Unit Wiring

The electrical connections are located at the rear panel of the control unit. There are spaces for four individual channels.

HAZARDOUS AREA INFORMATION:

The only connections on the control unit which can take cables from hazardous area are the connectors labelled
SENSOR INPUTS**.**

ALL OTHER CONNECTORS MUST NOT BE CONNECTED TO CABLES FROM HAZARDOUS AREA

NOTE: Make sure channels are connected correctly.

Connections for each channel are identical.

The following text will only refer to one channel.

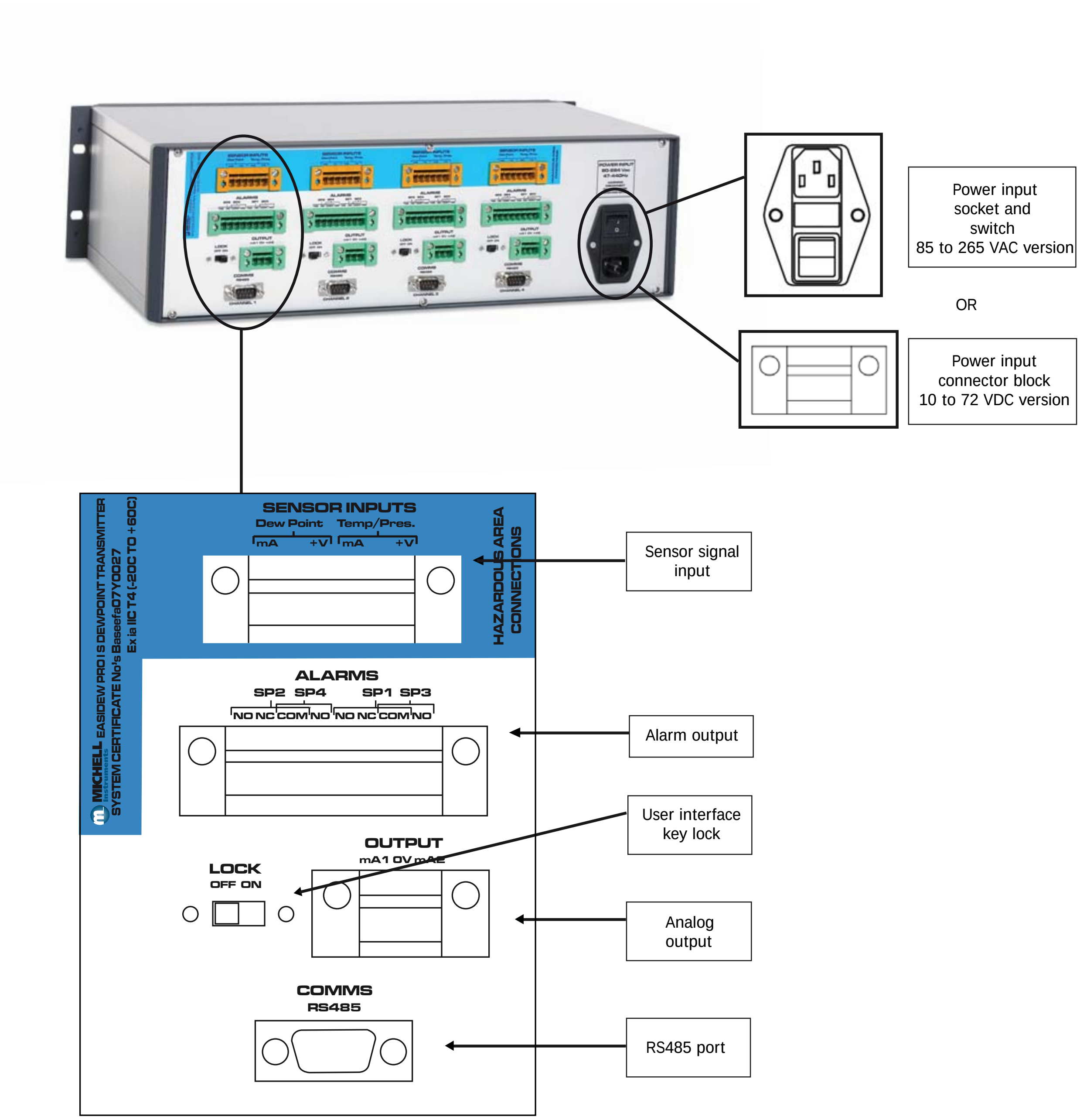


Figure 9 *Control Unit Electrical Connections*

2.4.2.1 Power Supply Input Connection

85 to 265 V AC

The AC power supply connection is a push fit socket labelled **POWER INPUT** as shown below.

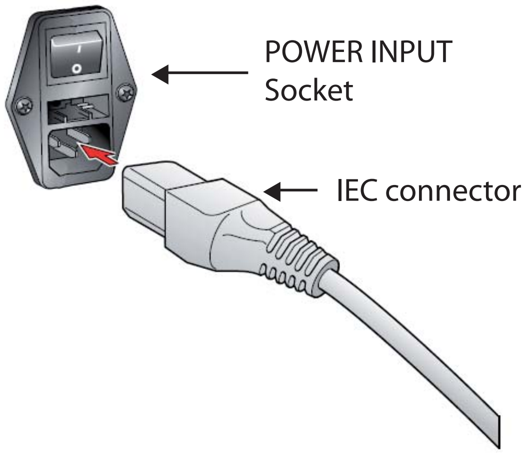


Figure 10 *POWER INPUT Socket*

The method of connection is as follows:

a. Turn off the AC power. Ensure that both ends of the power cable are potential free, i.e. not connected to an AC power supply.

b. Check that the **ON/OFF** switch is switched to **OFF**.

c. Push the IEC connector firmly into the **POWER INPUT** socket.

d. Connect the free end of the power cable to a suitable AC power supply source (voltage range 85 to 265 V AC, 47/63 Hz) and switch on the AC supply. The instrument may then be switched on, as required, by pressing the **ON** switch.

10 to 72 V DC

If a DC power supply version is ordered it will come with a 3-way push fit connector block labelled **POWER INPUT** as shown below.

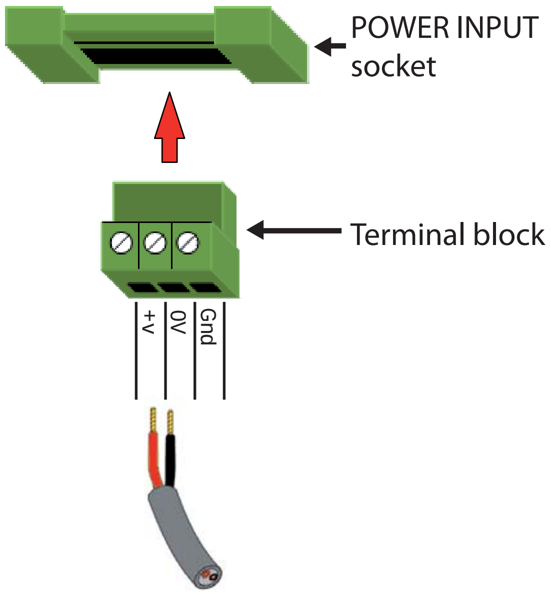


Figure 11 *POWER INPUT Connector Block*

The method of connection is as follows:

a. Turn off the power. Ensure that both ends of the power cable are potential free i.e., not connected to a power supply.

b. Remove the terminal block from the **POWER INPUT** socket.

c. Strip back the wires of the power cable, exposing approximately 6mm (0.2") - the use of crimps/wire ferrules is recommended.

d. Insert the +24 V DC lead into the **+V** terminal way on the terminal block and tighten the screw.

e. Insert the 0V lead into the **0V** terminal way on the terminal block and tighten the screw.

f. Check that the wiring has been completed correctly.

g. Push the terminal block firmly back into the **POWER INPUT** socket.

NOTE: There is no power switch for the DC power supply version; the analyzer will be turned on automatically as soon as power is supplied. Connect the free end of the power cable to a suitable DC power supply source (voltage range 10 to 72 V DC). The instrument may then be switched on, as required, by the power switch at the source.

2.4.2.2 Sensor Signal Input Connection

HAZARDOUS AREA INFORMATION

Cables from transmitters mounted in hazardous areas can be connected directly to the SENSOR INPUTS connector block. There are built-in Galvanic I.S. barriers for all connections made to this connector block.

Refer to ATEX/CSA/FM/IECEx certificates for the dew-point and optional pressure transmitters' connection cable requirements which stipulate maximum permissible mutual capacitance and inductance to resistance ratio.

All wiring procedures should be in accordance with local electrical codes.

Two input ports are provided for signals from the dew-point transmitter and the optional pressure transmitter respectively. They are connected via a single 6-way push fit connector block labelled **SENSOR INPUTS** as shown below.

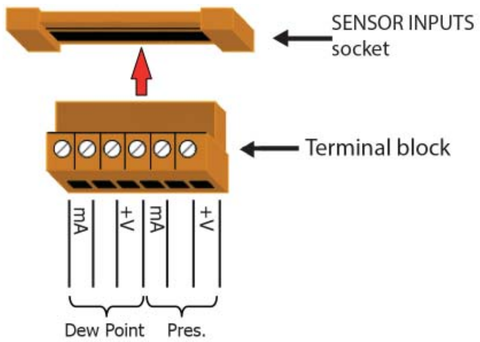


Figure 12 *SENSOR INPUTS Connector Block*

The method of connection is as follows:

a. Remove the terminal block from the **SENSOR INPUTS** socket.

b. Strip back the wires of the dew-point transmitter signal cable, exposing approximately 6mm (0.2") - the use of crimps/wire ferrules is recommended.

c. Insert the + 4-20 mA lead into the **Dew Point** → **+V** terminal way on the terminal block and tighten the screw.

d. Insert the – 4-20 mA lead into **Dew Point** → **mA** terminal way on the terminal block and tighten the screw.

e. Strip back the wires of the pressure transmitter signal cable, exposing approximately 6mm (0.2") - the use of crimps/wire ferrules is recommended.

f. Insert the + 4-20 mA lead into the **Temp./Press.** → **+V** terminal way on the terminal block and tighten the screw.

g. Insert the – 4-20 mA lead into the **Temp./Press.** → **mA** terminal way on the terminal block and tighten the screw.

h. Check that the wiring has been completed correctly.

i. Push the terminal block firmly back into the **SENSOR INPUTS** socket.

2.4.2.3 Analog Output Connection

Two analog output ports are provided for moisture content signal and pressure signal respectively. They are connected via a single 3-way push fit connector block labelled **OUTPUT** as shown below.

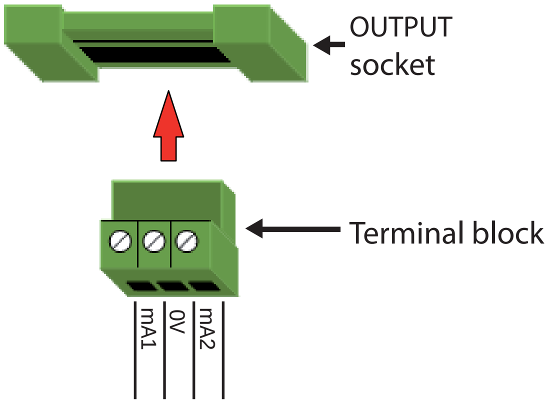


Figure 13 *OUTPUT Connector Block*

The method of connection is as follows:

a. Remove the terminal block from the **OUTPUT** socket.

b. Strip back the wires of the moisture content signal cable, exposing approximately 6mm (0.2") - the use of crimps/wire ferrules is recommended.

c. Insert the + 4-20 mA lead into the **mA1** terminal way on the terminal block and tighten the screw.

d. Insert the – 4-20 mA lead into the **0V** terminal way on the terminal block and tighten the screw.

e. Strip back the wires of the pressure signal cable, exposing approximately 6mm (0.2") - the use of crimps/wire ferrules is recommended.

f. Insert the + 4-20 mA lead into the **mA2** terminal way on the terminal block and tighten the screw.

g. Insert the – 4-20 mA lead into the **0V** terminal way on the terminal block and tighten the screw.

h. Check that the wiring has been completed correctly.

i. Push the terminal block firmly back into the **OUTPUT** socket.

2.4.2.4 Alarm Output Connection

Four alarm output ports are provided and are connected to the instrument via a single 8-way push fit connector block labelled **ALARMS** as shown below.

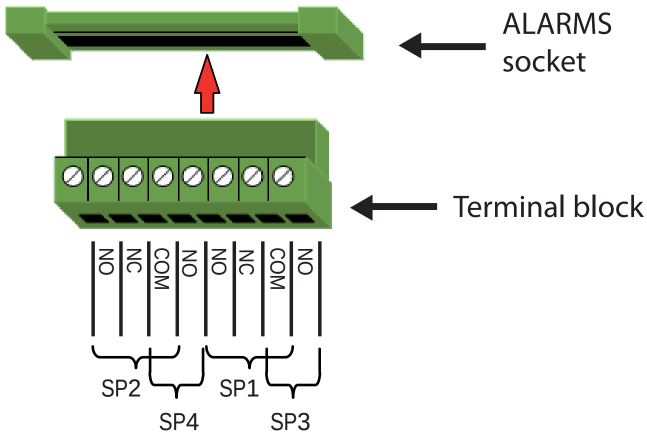
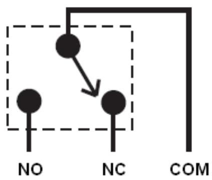


Figure 14 *ALARM Connector Block*

Alarm 1 (connection labelled as SP1) and Alarm 2 (connection labelled as SP2) are Form C (single pole, double throw) relays.

The method of connection is as follows:



a. Remove the terminal block from the **ALARMS** socket.

b. Strip back the wires of the Alarm 1 cable, exposing approximately 6mm (0.2") - the use of crimps/wire ferrules is recommended.

c. Insert the **N/O** connection lead into the **SP1** → **NO** terminal way on the terminal block and tighten the screw.

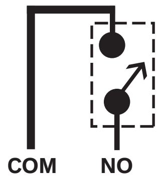
d. Insert the **N/C** connection lead into the **SP1** → **NC** terminal way on the terminal block and tighten the screw.

e. Insert the common lead into the **SP1** → **COM** terminal way on the terminal block and tighten the screw.

f. Repeat operations b. to e. for connecting the Alarm 2 cable to the SP2 terminals.

Alarm 3 (connection labelled as SP3) and Alarm 4 (connection labelled as SP4) are Form A (single pole, single throw, normally open) relays.

The method of connection is as follows:



a. Strip back the wires of the Alarm 3 cable, exposing approximately 6mm (0.2") - the use of crimps/wire ferrules is recommended.

b. Insert the **N/O** connection lead into the **SP3** → **NO** terminal way on the terminal block and tighten the screw.

c. Insert the common lead into the **SP3** → **COM** terminal way on the terminal block and tighten the screw.

d. Repeat operations a. to c. for connecting the Alarm 4 cable to the SP4 terminals.

e. Check that the wiring has been completed correctly.

f. Push the terminal block firmly back into the **ALARMS** socket.

2.4.2.5 RS485 Port Connection

The RS485 connection is a push-fit socket labelled **COMMS** as shown in *Figure 9*.

The method of connection is as follows:

Pin Number	Function
2	B
3	A
5	0V

a. Check the orientation of the RS485 connector and gently push it into the socket.

b. Tighten the two screws on the connector.

2.4.3 Sensor Assembly Wiring

NOTE: If the analyzer has been ordered with a sampling system, the Promet I.S. sensor assembly will be wired-up in the factory to the junction box. In that case disregard the following instructions and go to Section 3.

2.4.3.1 Dew-point Transmitter Wiring

HAZARDOUS AREA INFORMATION

The dew-point transmitter (Easidew PRO I.S.) is certified intrinsically safe for use in hazardous areas.

Before using the Easidew PRO I.S. in any hazardous environment ensure that personnel are completely familiar with the above standards relating to the certification of this instrument and also with the further information relating to intrinsically safe apparatus to be found in standard EN60079-14:1997 or equivalent, and up-to-date codes of practice in the country of installation.

Installation of the Easidew PRO I.S. MUST be as per system drawing in order to comply with the intrinsic safety regulations.

Refer to ATEX/CSA/FM/IECEx certificates for the dew-point and optional pressure transmitters' connection cable requirements which stipulate maximum permissible mutual capacitance and inductance to resistance ratio.

Preparation of the Sensor Cable

In order to comply with hazardous area certification of the product it is essential that the crimps/wire ferrules supplied must be attached on to any cable installed into the connector.

a. As shown in *Figure 15* below, the crimps/wire ferrules should be applied so that there is no possibility of a conductor strand of a core becoming free.

When the crimp/wire ferrules are applied they should have a minimum of two positions of crimping. After the crimp/wire ferrules are applied they should be trimmed to a length of 5mm (0.2") (see *Figure 16)*.

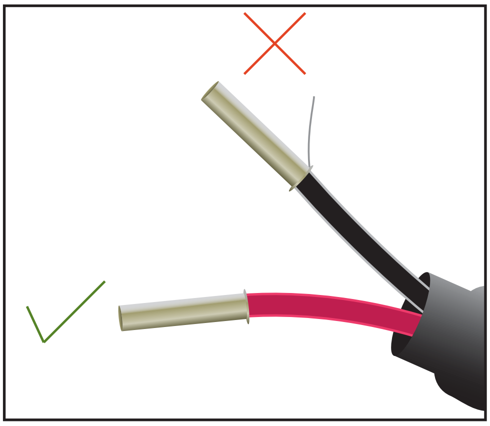


Figure 15 *Crimped Wires*

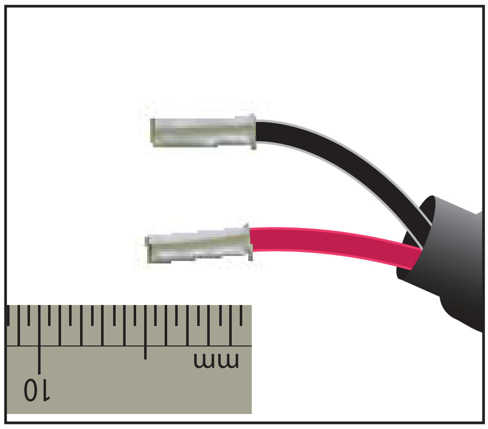


Figure 16 *Cut to 5mm*

b. Cable connection to the dew-point transmitter is made via the terminal block (4) (see *Figure 17)*. Remove the terminal housing lid (2) to access.

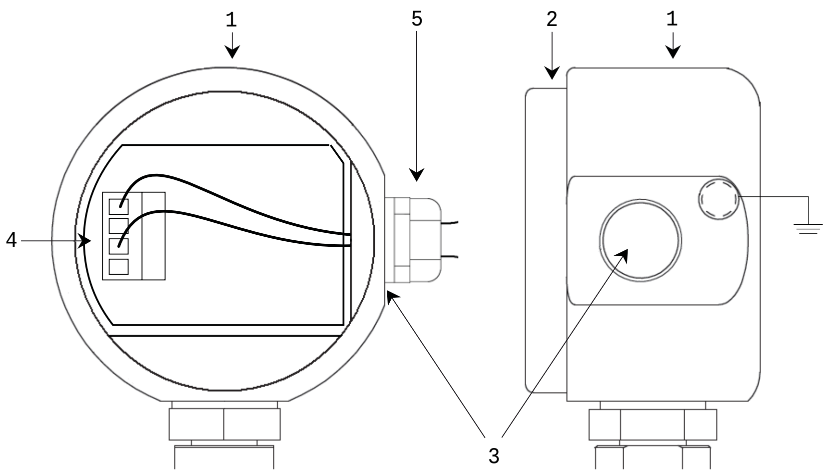


Figure 17 *Dew-point Transmitter Housing*

c. Ensure that the outer diameter of the selected cable is matched to an EExe M20 cable gland (5). Unscrew the cable gland (5) and slide the cable through the cable gland (5) and into the terminal housing (1) through the cable entry (3).

d. Remove the terminal block (4) from the PCB for easier operation. Connect the signal cable leads with the crimps/wire ferrules to the screw terminals on the terminal block (4) in accordance with the following pin-assignment drawing.

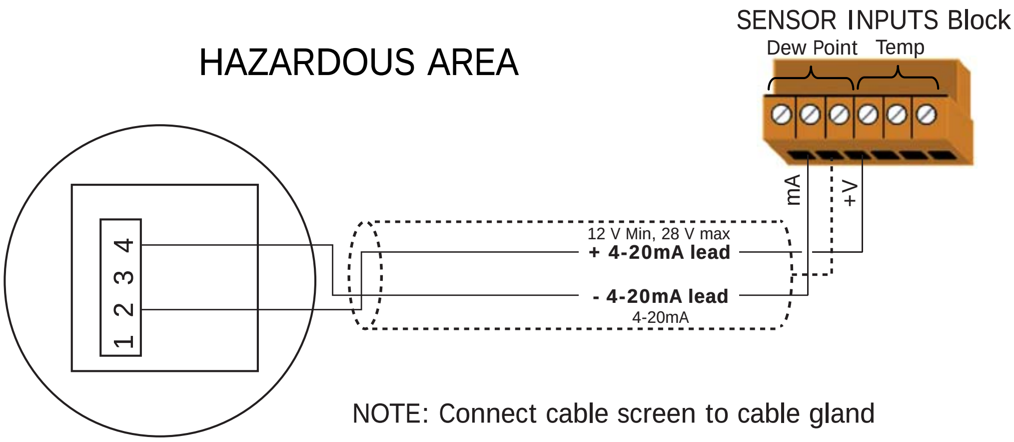


Figure 18 *Pin Assignment Drawing*

Always connect the 4-20mA return signal to a suitable load (in this case, back into the control unit) before the power is applied. Without this connection the transmitter may be damaged if allowed to operate for prolonged periods. The maximum load is 500 Ω at 24 V or 250 Ω at 12 V.

When the crimps/wire ferrules are installed into the connector terminal block ensure that they are inserted completely. When all wire connections are made, ensure that there is a minimum clearance distance of 2mm (0.008") between each terminal.

e. Press the terminal block (4) back into its socket firmly.

f. Tighten the cable gland (5) around the cable. Ensure that the sealing is not damaged and that the cable gland and seals are assembled correctly in order to ensure ingress protection.

g. Install and tighten the terminal housing lid (2).

2.4.3.2 Optional Pressure Transmitter Wiring

HAZARDOUS AREA INFORMATION

The pressure transmitter is certified intrinsically safe for use in hazardous areas by Baseefa and is covered by EC-type examination certificate BAS01ATEX1125X. The instrument conforms to the standards specified in EN 50014:1997 + Amds 1 & 2, EN 50020:1994 and EN 50284:1999 with certification code Ex ia IIB T4 (-20°C≤Ta≤75°C).

Before using the pressure transmitter in any hazardous environment ensure that personnel are completely familiar with the above standards relating to the certification of this instrument and also with the intrinsically safe system information in the BAS01ATEX1125X certificate or equivalent codes of practice in the country of installation.

If the pressure transmitter is not ordered together with the analyzer, it is the user's responsibility to make sure that the pressure transmitter is compatible with the I.S. barrier in the control unit.

Refer to ATEX/CSA/IECEx certificates for the dew-point and optional pressure transmitters' connection cable requirements which stipulate maximum permissible mutual capacitance and inductance to resistance ratio.

NOTE: A pressure transmitter will only be provided if the model with active pressure compensation (order code: P1/P2) is ordered. For the model without active pressure compensation (order code: G), skip this section.

a. The cable connection to the pressure transmitter is made via the removable connector. Loosen the central screw (1) to remove the connector from the transmitter.

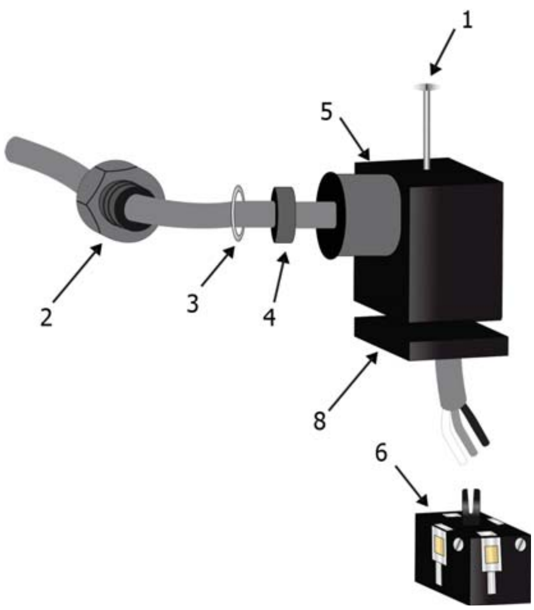


Figure 19 *Pressure Transmitter Connector*

b. When the connector is unplugged from the transmitter, remove the central screw (1) *(Figure 19)* completely.

c. Remove the gasket (8) *(Figure 19)* from the connector.

d. Using a small screwdriver in the mounting hole (7), lever the terminal block (6) out of the outer housing (5) *(Figure 20)*.

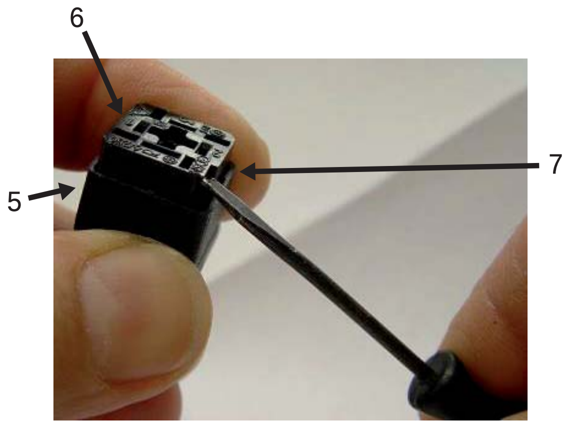


Figure 20 *Removal of Terminal Block*

e. Ensure that the outer diameter of the cable selected matches the outer housing's cable gland. To ensure that full ingress protection is achieved, the sensor cable used must have a minimum diameter of 4.6mm (0.18"). Slide the cable through the cable gland nut (2), washer (3), gland seal (4) and outer housing (5) *(Figure 19)*.

f. Apply crimps/wire ferrules to the flying leads of the cable. Connect these leads to the screw terminals on the terminal block (6) in accordance with the following pin-assignment drawing. Pin designations are marked adjacent to each pin.

CAUTION: In order to comply with Hazardous Area Certification of the product it is essential that the crimps/wire ferrules supplied must be attached on to any cable installed into the connector.

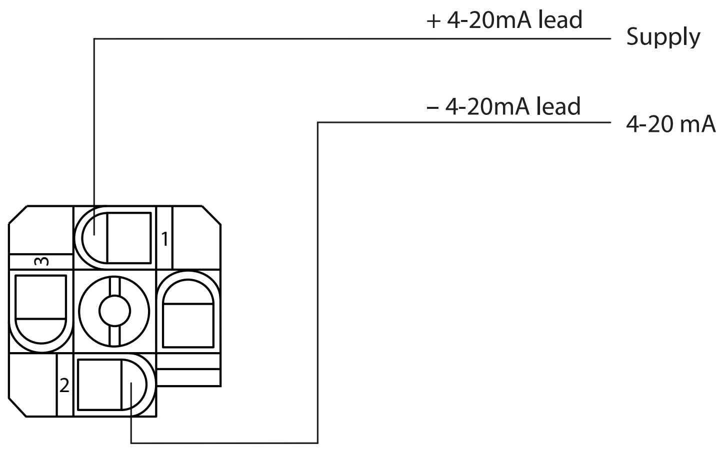


Figure 21 *Pressure Transmitter Wiring Diagram*

CAUTION: Always connect the 4-20 mA return signal to a suitable load (in this case, back into the control unit) before the power is applied. Without this connection, the transmitter may be damaged if allowed to operate for prolonged periods.

CAUTION: When the crimps/wire ferrules are installed into the connector terminal block ensure they are completely inserted. When all wire connections are made, ensure that there is a minimum clearance distance of 2mm between each terminal.

g. Press the terminal block (6) back into the outer housing (5) firmly *(Figure 20)*, until a 'click' sound is heard.

h. Tighten the cable gland (2) *(Figure 19)* around the cable. Ensure that the sealing is not damaged and that the cable gland and seals are assembled correctly in order to ensure ingress protection.

i. Slide the terminal block (6) onto the connection pins on the transmitter. **NOTE: There is only one orientation by which the terminal block can be plugged onto the transmitter.**

3 OPERATION

3.1 Preparation

Before applying power and beginning sample flow ensure that the system has been properly installed following the instructions in Section 2 and that all sample connections are tight and leak free. Check that the wiring has been correctly completed.

Ensure that personnel are familiar with Sections 1, 2 and 3 of this manual in which the equipment controls, indicators, elements of the display and overall menu structure are described before starting operation.

Prior to operation, the instrument must be connected to the correct electrical power supply, sensor signal input, relevant analog and alarm outputs as described in Section 2.

On delivery, the instrument will have been set-up with a standard set of default parameters defining the operation of the analyzer. These parameters can be changed as required by means of the Set-up menus.

3.2 Start-Up

3.2.1 Function Keys Activation

There are five push-button function keys on the user interface of the control unit. They can be locked to prevent unauthorized operation or accidental pressing. The lock switch is located on the back panel of the control unit (see *Figure 9)*. It must be switched to the **OFF** position to activate the function keys.

NOTE: Remember to lock the function keys after each operation.

3.2.2 Powering-up the Analyzer

For the AC power supply version of the Promet I.S., turning on the power switch on the back panel of the control unit will power-up the control unit and the two transmitters for each channel connected. There is no power switch for the DC power supply version. It is turned on automatically once 24 V DC power source is applied.

After turning on the analyzer the display will be illuminated. The default Main Reading Page displays sample dew point (°C) and sample pressure (barg).

NOTE. Depending on your order, the pressure value can be real-time readings from the pressure transmitter if the model with active pressure compensation (order code: P1/P2) is ordered, or manual set value if the model without active pressure compensation (order code: G) is ordered (see Section 3.2.2.2).

3.2.2.1 Change Units

From the Main Reading Page, press the **Display** key to change the units of measurement readings in sequence as shown below:

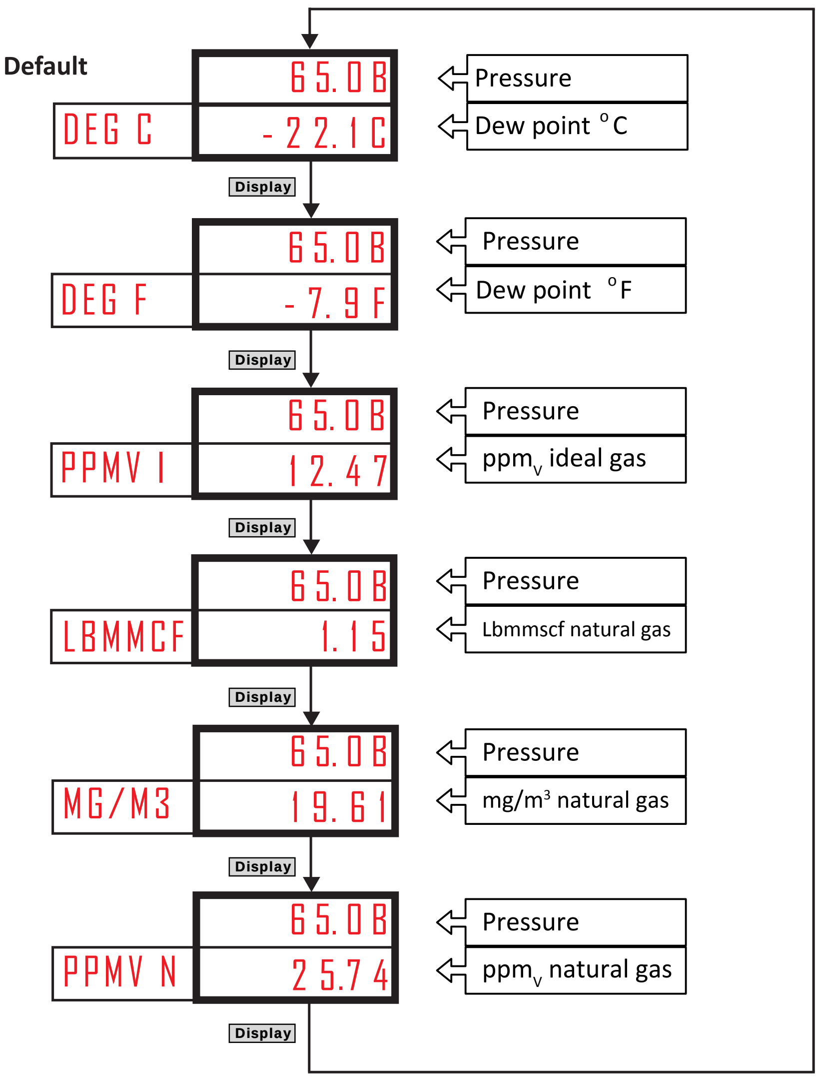


Figure 22 *Units of Measurement Readings in Sequence*

At the Main Reading Page, the full description of the currently selected unit for the moisture measurement will scroll across the display on the bottom line at set intervals (set in the **DISP** – display settings sub-menu).

NOTE: Unit for the sample pressure reading / set value can be set in the DISP **– display settings sub-menu.**

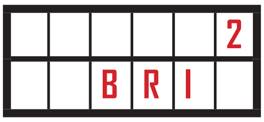
NOTE: After the display units are set, they will remain the same even after the analyzer power is turned off and on again.

3.2.2.2 Manual Set Pressure Value

If the model without active pressure compensation (order code: G) is ordered, press the ▲ and ▼ keys from the Main Reading Page to manually set the required pressure.

3.2.2.3 Display Brightness Adjustment

The brightness of the display can be adjusted. From the Main Reading Page, press and hold the **Select** key then press the ▲ key to enter the brightness adjustment page.



a. Use the ▲ and ▼ keys to adjust the display brightness.

b. Press the **Select** key to confirm the adjustment. The display will then return to the Main Reading Page.

3.2.3 Sample Flow Start-Up

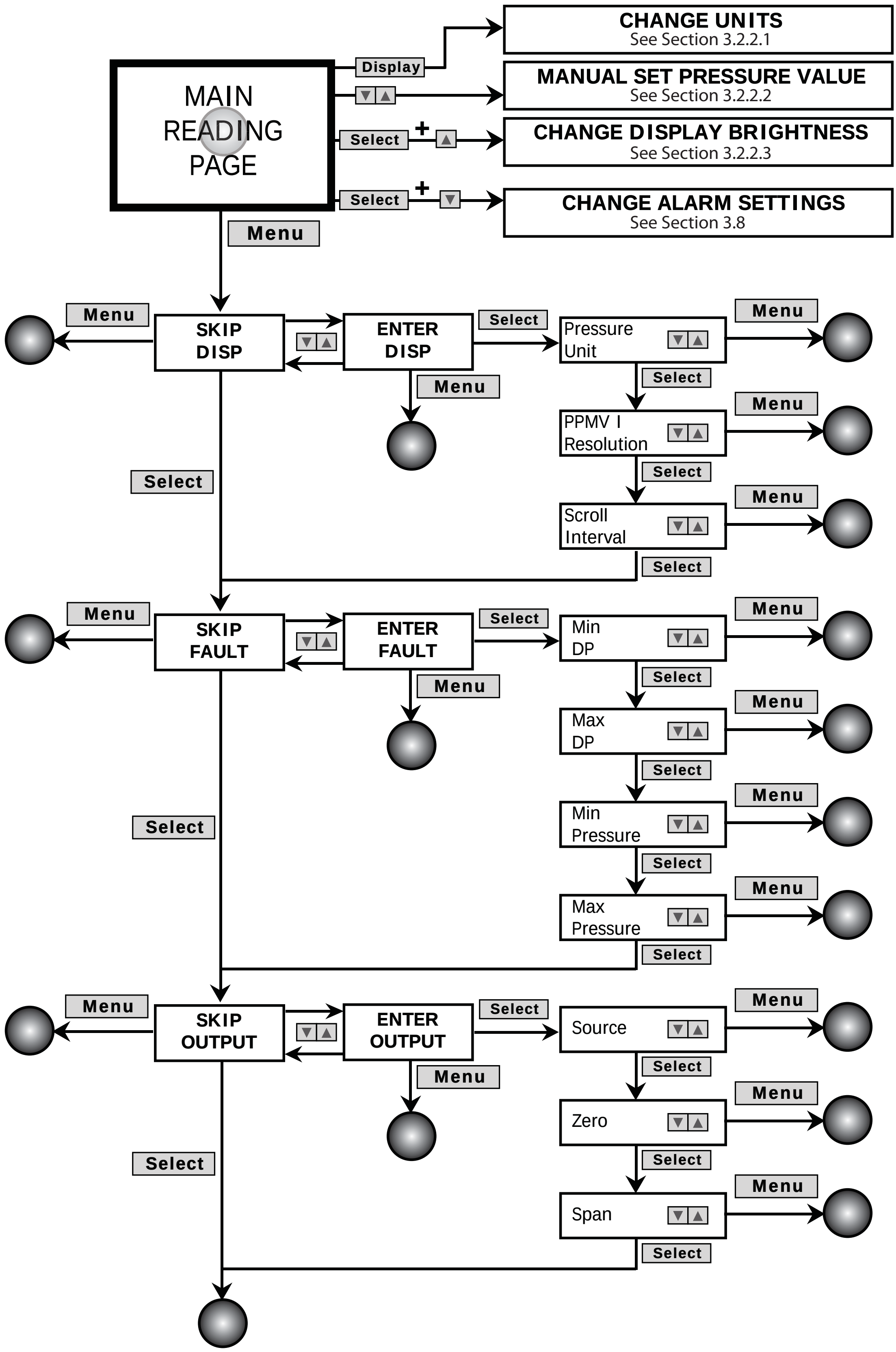
Follow the Promet I.S. Premium Sampling System Instructions to establish the sample flow of:

1 to 5 Nl/min (2.1 to 10.6 scfh).

3.3 Menu Structure

The Promet I.S. main menu has a two level menu structure. There are three sub-menus **DISP**, **FAULT** and **OUTPUT**. The **ALARM SETTINGS** are not in the main menu and are accessed separately. These are described in detail in following sections. Below is the complete menu structure:

NOTE: **represents the Main Reading Page**



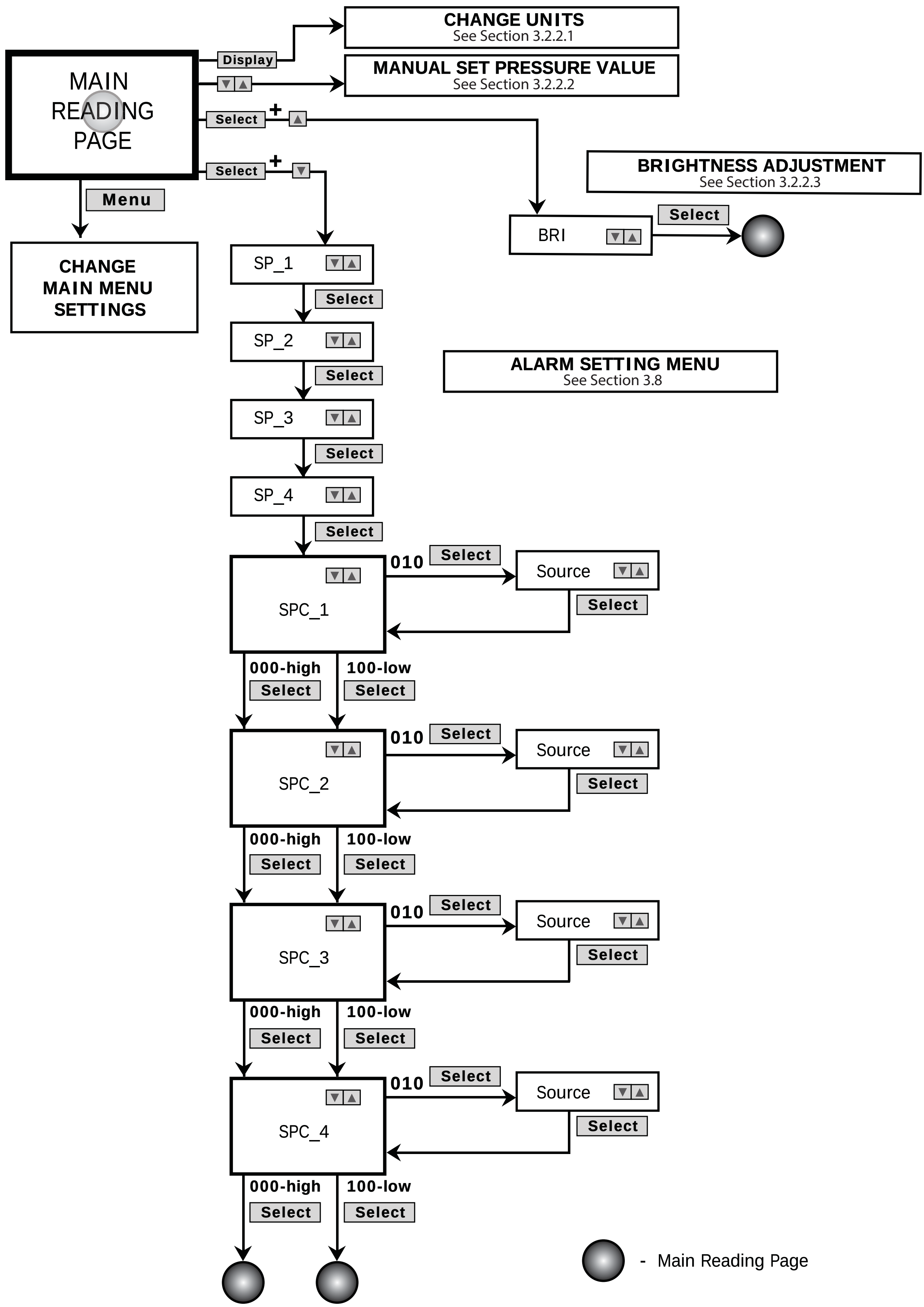


Figure 23 *Menu Maps*

3.4 Main Reading Page

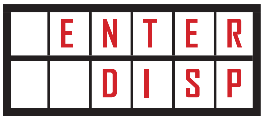
The Main Reading Page is the default screen shown after turning the instrument on. It will display the units of measurement selected by the user (see Section 3.2.2.1).

3.5 Display Set-Up

The display preference of the Main Reading Page can be configured under **DISP** – display settings sub-menu.

From the Main Reading Page, press the **Menu** key to enter the main menu. The first setting option is:

The top line shows the navigation command. Press the ▲ key to change the navigation command from **SKIP** to **ENTER.**



Press the **Select** key to confirm the navigation command and either skip to the next sub-menu or enter this display setting sub-menu. The first setting parameter under the display settings sub-menu is the unit for pressure reading / set value.

3.5.1 Pressure Unit Selection

Either **BARG** or **psiG** can be selected as the unit for the pressure reading / set value.

a. Change the selection by scrolling through these two options using the ▲ and ▼ keys.

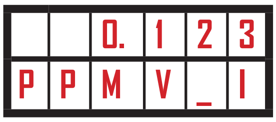
b. When the desired unit is shown on the display, press the **Select** key to confirm. The display will then change to the next setting parameter which is for **PPMV I** readings.

NOTE: The pressure reading / set value at the Main Reading Page will then change to the selected unit.

- **For the model with active pressure compensation (P1/P2), the pressure reading value will be automatically converted based on the new unit selected.**
- **For the model without active pressure compensation (G), the manually set pressure value will NOT be automatically converted based on the new unit selected. The value must be manually changed.** For example - if the pressure is set at 60 barg - when the pressure unit is changed to **psiG**, the value of the pressure setting will be 60 psig. This must be manually changed to 870 psig.

NOTE: The pressure fault alarm set point under FAULT – fault alarm settings sub-menu - will also switch to the selected unit. The value will be automatically converted based on the new unit selected.

3.5.2 Settings for the PPMV I (Ideal Gas) Reading



The resolution of **PPMV I** (ideal gas) readings can be adjusted between one decimal point to three decimal points, based on the user's preference. It will not change the resolutions of readings with other units.

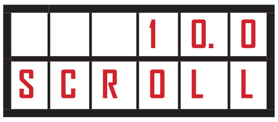
a. Increase or decrease the resolution by pressing the ▲ and ▼ keys.

b. When the desired resolution is on the display, press the **Select** key. The display will change to the next setting parameter which is for setting the scrolling intervals of the unit's full name on the Main Reading Page.

The **PPMV I** (ideal gas) readings at the Main Reading Page, if selected, will then change to the set resolution.

3.5.3 Setting the Scrolling Interval for a Unit's Full Name

At the Main Reading Page, the full description of the currently selected unit will scroll across the display on the bottom line at set intervals. This interval can be set to the user's preference.



a. Increase or decrease the scrolling interval (in seconds) by pressing the ▲ and ▼ keys.

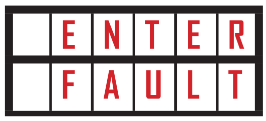
b. When the desired value is on the display, press the **Select** key. The display will then change to the next sub-menu **FAULT** – fault alarm settings.

3.6 Fault Alarm Set-Up

There are four conditions for the system’s fault alarm which can be configured in the **FAULT** – fault alarm settings sub-menu.

From the Main Reading Page, press **Menu** to enter the main menu. Use the **Select** key to scroll to the **FAULT** option.

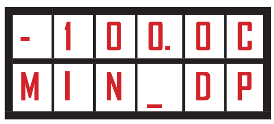
The top line shows the navigation command. Press the ▲ key to change the navigation command from **SKIP** to **ENTER**.



Press the **Select** key to confirm the navigation command and to either skip to the next sub-menu or enter the **FAULT** – fault alarm settings sub-menu.

The first setting parameter under this sub-menu is for the minimum dew-point fault alarm set-point.

3.6.1 Minimum Dew-point Value for the Fault Alarm



This is the minimum dew point below which the fault alarm will be activated.

a. Increase or decrease the value by pressing the ▲ and ▼ keys.

b. When the desired set-point is on the display press the **Select** key to confirm. The display will then change to the next setting parameter - the maximum dew-point fault alarm set-point.

NOTE: This fault alarm set-point can only be set in °Cdp, no matter what unit has been selected for the Main Reading Page.

3.6.2 Maximum Dew-point Value for the Fault Alarm

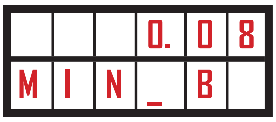
This is the maximum dew-point above which the fault alarm will be activated.

a. Increase or decrease the value by pressing the ▲ and ▼ keys.

b. When the desired set-point is on the display press the **Select** key to confirm. The display will then change to the next setting parameter - the minimum pressure fault alarm set-point.

NOTE: This fault alarm set-point can only be set in °Cdp, no matter what unit has been selected for the Main Reading Page.

3.6.3 Minimum Pressure Value for the Fault Alarm



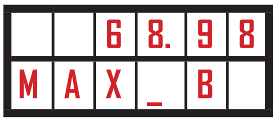
This is the minimum pressure below which the fault alarm will be activated.

a. Increase or decrease the value by pressing the ▲ and ▼ keys.

b. When the desired set-point is on the display press the **Select** key to confirm the choice. The display will then change to the next setting parameter - the maximum pressure fault alarm set-point.

NOTE: The unit could be either barg (B) or psig (P), depending on the choice of pressure unit in DISP **– display settings sub-menu (refer to Section 3.5.1). The value will be automatically converted if a new unit is selected.**

3.6.4 Maximum Pressure Value for the Fault Alarm



This is the maximum pressure above which the fault alarm will be activated.

a. Increase or decrease the value by pressing the ▲ and ▼ keys.

b. When the desired set-point is on the display press the **Select** key to confirm. The display will then change to the next sub-menu **OUTPUT** – output settings.

NOTE: The unit could be either barg (B) or psig (P), depending on the choice of pressure unit in DISP **– display settings sub-menu (refer to Section 3.5.1). The value will be automatically converted if a new unit is selected.**

3.7 Output Set-Up

The source and scale of the 4-20 mA output can be configured in **OUTPUT** – output settings sub menu.

From the Main Reading Page, press **Menu** to enter the main menu. Use the **Select** key to scroll to the **OUTPUT** option.

		S	K	I	P
O	U	T	P	U	T

The top line shows the navigation command. Press the ▲ key to change the navigation command from **SKIP** to **ENTER.**

	E	N	T	E	R
O	U	T	P	U	T

Press the **Select** key to confirm the navigation command and either skip to the Main Reading Page or enter the output settings sub-menu. The first setting parameter under this sub-menu is the output source selection.

3.7.1 Output Source Selection

	M	O	I	S	T
S	O	U	R	C	E

The following list shows the options for the output source:

PPMV_N – moisture content in ppm_V natural gas

MG/M3 – moisture content in mg/m^3 natural gas

LBMMCF – moisture content in lb/MMscf natural gas

PPMV_I – moisture content in ppm_V ideal gas

DP_F – °F dew point

psiG – pressure in psig

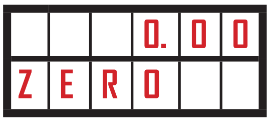
DP_C – °C dew point

BARG – pressure in barg

a. Change the selection by scrolling through these options using the ▲ and ▼ keys.

b. When the desired source is on the display, press the **Select** key to confirm. The 4-20 mA output will then switch to the selected source. The display will change to the **ZERO** value for the output range set-point.

3.7.2 Output Range ZERO Value Settings



a. Use the ▲ and ▼ keys to adjust the **ZERO** value.

b. Press the **Select** key to confirm the input. The display will change to the **SPAN** value of the output range set-point.

NOTE: The output range ZERO **value could be in different units, depending on the specific source selected in Section 3.7.1. The** ZERO **value of the output range will not change accordingly when a new output source is selected. The range should be checked and manually adjusted after changing the output source.**

3.7.3 Output Range SPAN Value Settings

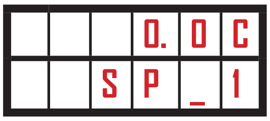
a. Use the ▲ and ▼ keys to adjust the **SPAN** value.

b. Press the **Select** key to confirm the input. The display will leave the output settings sub-menu and return to the Main Reading Page.

NOTE: The output range SPAN **value could be in different units, depending on the specific source selected in Section 3.7.1. The** SPAN **value of the output range will not change accordingly when a new output source selected. The range should be checked and manually adjusted after changing the output source.**

3.8 Alarm Set-Up

There are 4 built-in alarm relays. They can be configured independently in the menu. From the Main Reading Page, press and hold the **Select** key then press the ▼ key to enter the **ALARM** page.



3.8.1 Alarm Set-Point Adjustment

The first page in **ALARM** is for adjusting the set-point of the Alarm Relay 1.

a. Use the ▲ and ▼ keys to adjust the set-point.

b. Press the **Select** key to confirm the input. The display will then change to the alarm set-point for Alarm Relay 2.

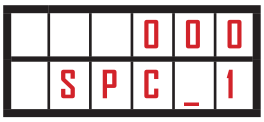
c. Repeat the same operation to adjust the set-point for Alarm Relay 2, and then Alarm Relay 3 and Alarm Relay 4 accordingly.

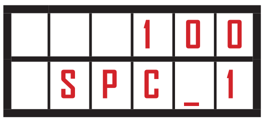
d. After Alarm Set Point SP_4 for Alarm Relay 4 has been set, press the **Select** key to confirm the input. The display will then change to the alarm control setting page SPC_1 for Alarm Relay 1.

NOTE: The alarm set-point could be in different units depending on the source selection for the specific alarm (set in the SPC function). How to change the source of the alarm will be explained in Section 3.8.3. It will not be affected by the unit selection at the Main Reading Page or at the source selection of the 4-20 mA output under OUTPUT **– output settings sub-menu.**

3.8.2 Alarm Type Selection

The alarm type can be selected in the **ALARM** page.





a. Use the ▲ and ▼ keys to adjust the control code.

- Code **000** : Alarm type high. Activates the alarm when the measurement value is above the alarm set-point SP_1.
- Code **100** : Alarm type low. Activates the alarm when the measurement value is below the alarm set-point SP_1.

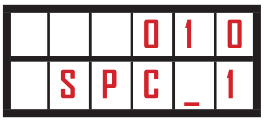
b. Press the **Select** key to confirm the input. The display will then change to the alarm control setting for Alarm Relay 2.

c. Repeat the same operation to adjust the type (high/low) for Alarm Relay 2, Alarm Relay 3 and Alarm Relay 4 accordingly.

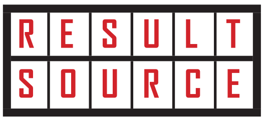
3.8.3 Alarm Source Selection

The alarm source can be selected in the **ALARM** page.

a. Use the ▲ and ▼ keys to adjust the control code to **010.**



b. Press the **Select** key to confirm this control code. The display will then change to the Alarm source selection sub menu.



c. Change the selection by scrolling through these options using the ▲ and ▼ keys.

The following list shows the available alarm sources:

DISP – not in use

RESULT – pressure in barg

DP_C – °C dew point

psiG – pressure in psig

DP_F – °F dew point

PPMV_I – moisture content in ppm_V ideal gas

TOT_1 – not in use

. . .

TARE – not in use

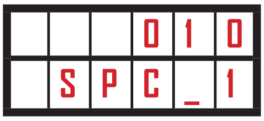
AUX_1 – moisture content in lb/MMscf natural gas

AUX_2 – moisture content in mg/m^3 natural gas

AUX_3 – moisture content in ppm_V natural gas

AUX_4 – not in use

d. When the desired source is on the display, press the **Select** key to confirm. The alarm will then switch to the selected source. The display will return to the **ALARM** page.



e. Use the ▲ and ▼ keys to change the control code back to **000** or **100** depending on the alarm type (high/low).

f. Press the **Select** key to confirm the input. The display will then change to the **ALARM** page for Alarm Relay 2.

g. Repeat the same operation to adjust the set-point for Alarm Relay 2, Alarm Relay 3 and Alarm Relay 4 accordingly.

h. After Alarm Relay 4 is configured press the **Select** key to return to the Main Reading Page.

CAUTION: The alarm set-point value will NOT be automatically converted based on the new alarm source selected. In some cases the operation of changing the alarm source may activate the alarm. For example - if the SP_1 is set at 10°C dew point - when the alarm source is changed from DP_C (°C dp) to DP_F (°F dp) under SPC_1, the value of SP_1 will be 10°F.

Appendix A

Technical Specifications

Appendix A Technical Specifications

Sensors	
Sensor Technology	Michell Ceramic Moisture Sensor
Sensor Version	Easidew PRO I.S.
Measurement Range	-100 to +20°Cdp (-148 to +68°Fdp)
Calibration Range	-100 to +20°Cdp (-148 to +68°Fdp)
Calibration	Traceable to British (NPL) and American (NIST) National Humidity Standards
Accuracy	Dew point: ±1°C between –60 and +20°Cdp (-76 and +68°Fdp) Moisture content: ±10% of reading Dew point: ±2°C between –60.1 and -100°Cdp (-76.18 and -148°Fdp)
Resolution	0.1°C between +20 and -100°Cdp (+68 and-148°Fdp)
Analysis Pressure	Up to 45 MPa (450 barg / 5801 psig)
Operating Temperature	-40 to +60°C (-40 to +140°F)
Sample Flow Rate	1 to 5 Nl/min (2.1 to 10.6 scfh)
Optional Pressure Sensor	0–138 barg (other ranges available) Accuracy: ±0.25% FS
Control Unit	
Display	Two line 6-digits LED, displaying moisture content / dew point (user toggle) and analysis pressure
Analog Output	Two 4-20 mA (max load 500 Ω) User configured for parameter, unit and range
Digital Output	RS485 Modbus RTU
Display Mode	Moisture content (ppm_V) Moisture content in natural gas (ppm_V, lb/MMscf, mg/m³) Dew point (°C or °F) Pressure (psig, barg)
Pressure Compensation	Fixed value (user programmed) or dynamic input from optional pressure sensor
Display Resolution	0.1°Cdp, 0.1°Fdp, 0.1-0.001 ppm_V ideal gas (adjustable), 0.01 ppm_V natural gas, 0.01 mg/m³, 0.01 lb/MMscf, 1 psig, 0.1 barg
Alarms	Four alarm relays Control action and set-point are user-programmable Two Form C contacts rated 10 A, 240 V AC or 8 A, 24 V DC Non-inductive load Two Form A contacts rated 5 A, 240 V AC or 4 A 24 V DC Non-inductive load
I.S. Barriers	Galvanic isolation type, integrated to Control Unit
Power Supply	85 to 265 V AC, 47/63 Hz or 10 to 72 V DC 10 W max power consumption
Operating Environment	Indoor, safe area, 0 to +50°C (+32 to +122°F) < 90% RH
Interconnection Cable	General instrument type, twisted pair, screened, single pair (two pairs with pressure sensor)
Enclosure	19" sub rack unit Dimensions 132 x 483 x 375mm (5 x 19 x 14.75") (h x w x d) (100mm (4") minimum rear clearance depth for cables and vents)

Premium Sampling Systems	
Enclosure	304 stainless steel (EN1.4301) enclosure Option for complete enclosure in 316 stainless steel (EN1.4401) All fixtures stainless steel Galvanized steel internal mounting plate Open panel version available for indoor installation Dimensions 800 x 600 x 300mm (31.5 x 23.6 x 11.8”) (h x w x d)
Enclosure Mounting	Stainless steel wall mounting brackets
Enclosure Ingress Protection	IP66
Enclosure Temperature Control	Heater/thermostat options for fixed set-point +20°C (+68°F) or adjustable set-point range 0 to control 50°C (+32 to +122°F)
Heater Power Supply	110/120 or 220/240/255 V AC, 47/63 Hz Power consumption 100 W max
Operating Environment	Shaded position, on or off shore, -20 to +50°C (-4 to +122°F) (-40 to +60°C (-40 to +140°F) max transient) Enclosure cooling option recommended for climatic ambient > +45°C (+113°F)
Hazardous Area Certification	
Certification Codes	**ATEX** II 1 G Ex ia IIC T4 Ga (-20°C to +70°C) **IECEx** Ex ia IIC T4 Ga (-20°C to +70°C) **TC TR Ex** 0Ex ia IIC T4 Ga (-20°C to +70°C) **FM** Class I, Division 1, Groups A B C D, T4 **CSA** Class I, Division 1, Groups A B C D, T4
Pattern Approval	GOST-R, GOST-K

A.1 Dimensional Drawings

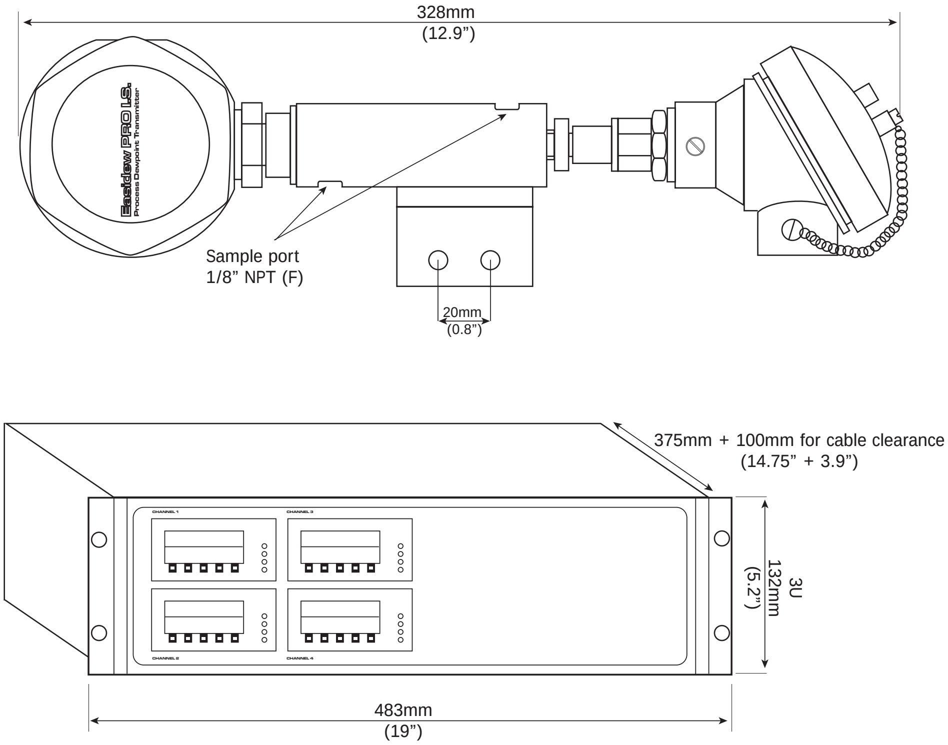


Figure 24 *Dimensional Drawings*

Appendix B

Serial Communications

Appendix B Serial Communications

To communicate with the monitor:

- Connect to the serial port using the wiring defined below.
- Set the address of the monitor using the front panel.
- Set the desired communication protocol (ASCII or Modbus RTU) via the front panel or over the serial interface.
- Determine the register number of the parameter to be read.
- Send the correct command to the monitor and decode the response.

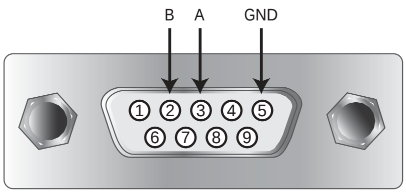
RS485 Wiring

The Promet I.S. monitor uses a 2-wire RS485 connection.

Pin Name	Promet DB9 Pin
A	3
B	2
GND	5

Pin numbers in the manual refer to standard pins on the DB9 D-Sub connector on the rear panel of the MCU:

Male DB9 Pinout (Promet I.S. Monitor on MCU Panel)



It will be necessary to match up the A/B (Differential data pair) and GND (0 V) pins with the wiring of your own third party adaptor.

E.g. For the K3-ADE RS232->RS485 adaptor use the following wiring:

Pin Name	Promet DB9 Pin	K3-ADE DB9 Pin
A	3	8
B	2	3
GND	5	5

This wiring is the generally accepted standard for most 2-wire RS485 equipment.

Setting the Address of the Monitor

This procedure needs to be done for either ASCII or MODBUS RTU protocols.

a. Press the **Select** and ▲ keys simultaneously to display the BRI (brightness) menu.

b. Press the **Select** key again to display the CAL (calibration) menu.

c. Use the ▲ and ▼ keys to set the code in the CAL menu to **200**.

d. Press the **Select** key 3 times to display the address.

e. Use the ▲ and ▼ keys to set the address.

f. Press the **Select** key again and use the ▲ and ▼ keys to set the code in the CAL menu to **000**.

Setting the Communications Protocol

- If the instrument is set to ASCII send **sw132,1$** to set to Modbus.
- If the instrument is set to Modbus send **0** to register 40132(132) to set to ASCII.

Using the Front Panel

Firstly, follow the instructions in Appendix C to unlock the CODE settings on the monitor front panel.

a. Press the **Select** and ▲ keys simultaneously to display the BRI (brightness) menu.

b. Press the **Select** key until the CODE3 menu is displayed and set it to **001** using the ▲ and ▼ keys. Setting CODE3 to **000** sets the communications back to ASCII.

c. Press the **Select** key to exit the menu.

NOTE: It is now recommended that the CODE settings are locked again using the instructions in Appendix C, as accidental modification of the CODEs can cause damage to the monitor.

Register Map:

Function	Register Name	Texmate ASCII	Modbus RTU
BARG	RESULT	254	40515/40516
Dew point_C	CH1	253	40517/40518
psiG	CH2	252	40519/40520
Dew point_F	CH3	251	40521/40522
PPMV_IDEAL	CH4	250	40523/40524
LBMMSCF	AUX1	244	40244
MG_M3	AUX2	243	40243
PPMV_NATURAL	AUX3	242	40242
WVP (floating point)	VARIABLE11	107	40619/40620
PRESSURE_IN_BARG	USER_MEMORY_1	5121	45121
PRESSURE_INPUT	USER_MEMORY_2	5122	45122
SCROLL_TIME	USER_MEMORY_6	5126	45126
MIN_TEMP	USER_MEMORY_10	5130	45130
MAX_TEMP	USER_MEMORY_11	5131	45131
MIN_PRESSURE	USER_MEMORY_12	5132	45132
MAX_PRESSURE	USER_MEMORY_13	5133	45133
FAULT_OUTPUT	USER_MEMORY_14	5134	45134
AOP1_SOURCE	USER_MEMORY_15	5135	45135

ASCII Communications

Start Character	Address	Read/ Write	Register Address	Separator	Data Value	Message Terminator
s	0 to 255	**r** or **w**	1 to 65535	**,**	-9999999 to 9999999	**$**

- Reading the dew-point value from a meter that has an address of 2:
  Send: s2r253$
- Reading the LBMMSCF from a meter that has an address of 5:
  Send: s5r244$

MODBUS RTU

Once the protocol has been set the monitor will communicate in accordance with the standard Modbus RTU protocol.

The **Read Holding Registers** command should be used to read the registers listed in the register map. When two registers are listed in the table both registers must be read using a single command.

Note that the least significant word is sent first, for example - for dew point - register 40517 is the least significant word and 40518 is the most significant word.

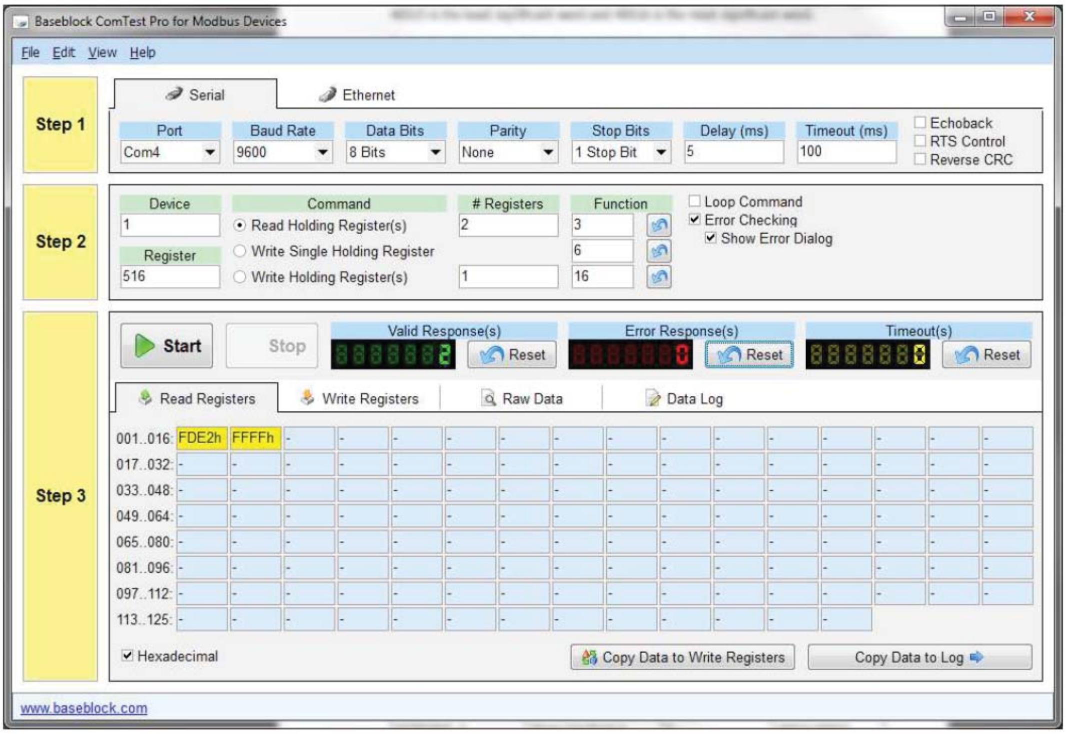
It should also be noted that the actual address is that stated, minus 40000, i.e. 40517 is physically 517.

Example: Getting the dew-point value using Modbus RTU

Register Numbers:

Function	Register Name	Texmate ASCII	Modbus RTU
BARG	RESULT	254	40515/40516
Dew Point_C	CH1	253	40517/40518
psig	CH2	252	40519/40520

There is often an offset of -1 for the register address, depending on your software/PLC system. To read the dew-point value software, read holding registers 516-517:



The highlighted value **0xFFFFFDE2** is a 32 bit signed integer .. so **-542**

There is a scaling multiplier of 0.1, so -542 x 0.1 = **-54.2°C** which is the value shown on the monitor.

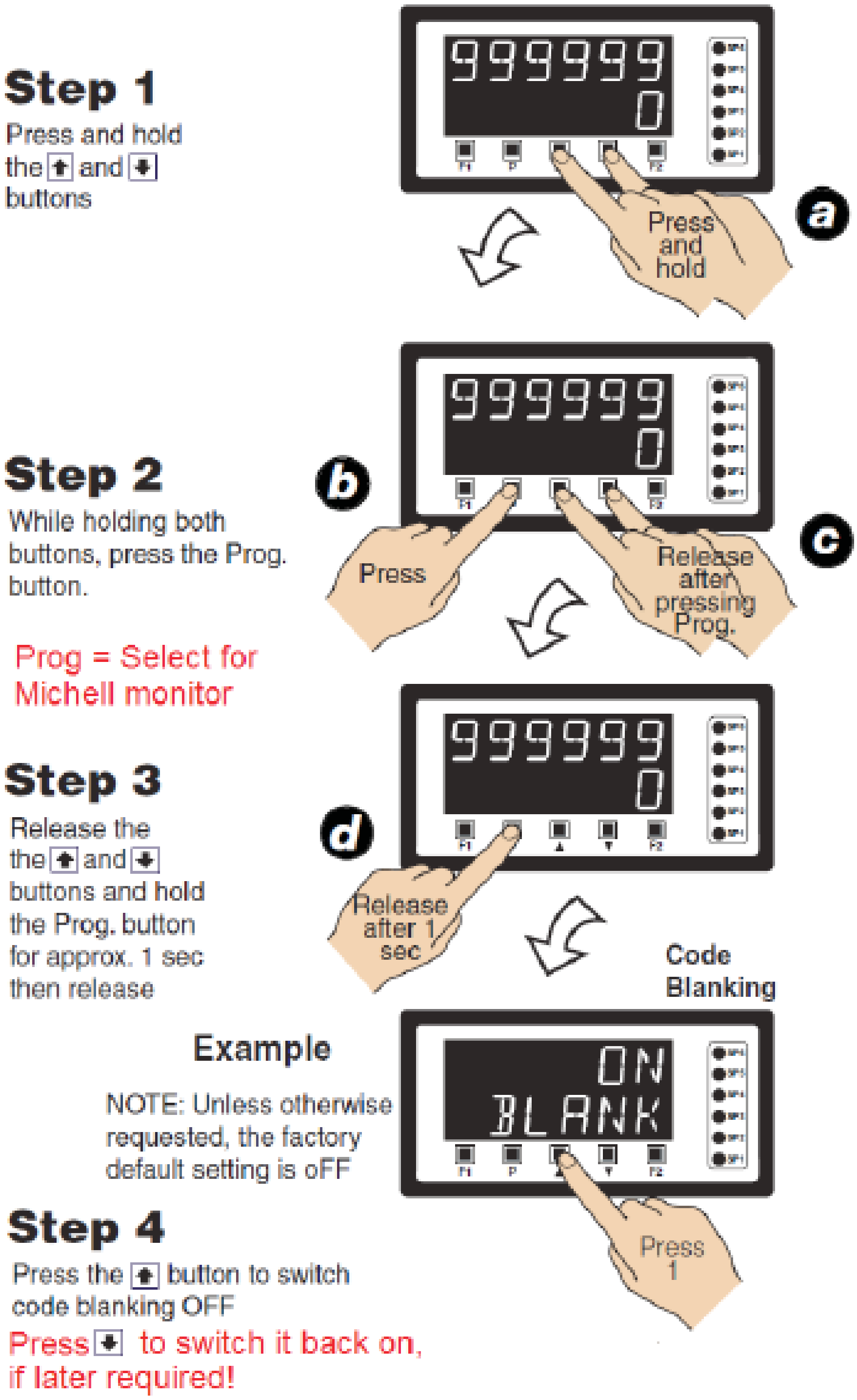
Appendix C

Modbus RTU Comms

Appendix C Modbus RTU Comms

Accessing locked codes on Promet I.S. monitor (turning off "code blanking")

WARNING: It is recommended that "code blanking" is switched back ON after making any required changes to the configuration codes. Adjusting configuration codes without the express written instruction of Michell Instruments may result in damage to the monitor that is NOT covered under warranty.



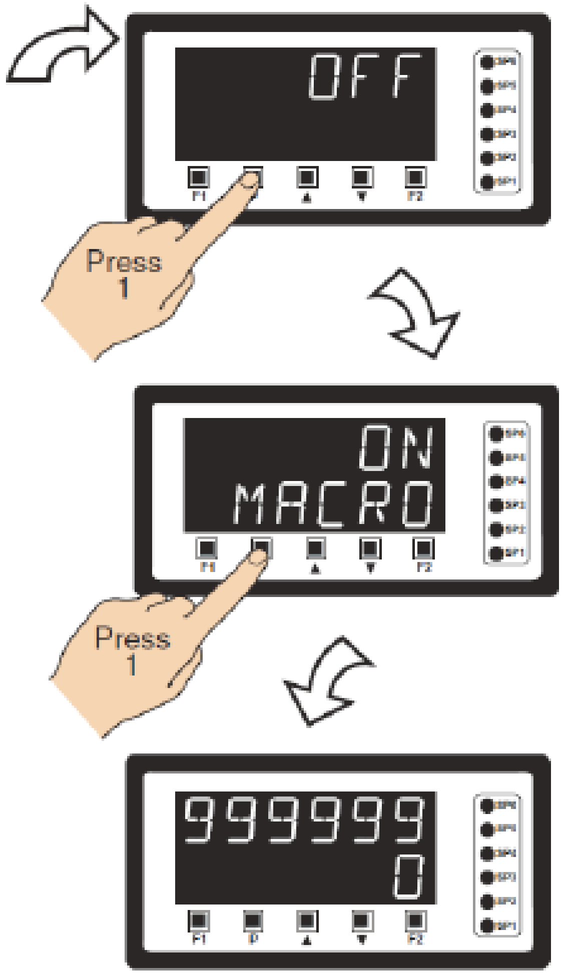
continued from Step 4

Step 5

Press the Prog. button.

Step 6

Press the Prog. button.



Operational Display

Appendix D

Hazardous Area Certification

Appendix D Hazardous Area Certification

The Promet I.S. Process Moisture Analyzer utilizes the Easidew PRO I.S. dew-point transmitter

The Easidew PRO I.S is certified compliant to the ATEX Directive (94/9/EC), and IECEx for use within Zone 0, 1 and 2 hazardous areas and has been assessed so by Baseefa Ltd (Notified Body 1180).

The Easidew PRO I.S is certified compliant to the North American Standards (USA and Canada) for use within Class I, Division 1, Groups A, B, C & D hazardous locations and has been assessed so by CSA and FM.

D.1 Product Standards

This product conforms to the Standards:

EN60079-0:2012	IEC60079-0:2011
EN60079-11:2012	IEC60079-11:2011
FM Class 3600:1998	CAN/CSA-C22.2 No. 0-10
FM Class 3610:2007	CAN/CSA-C22.2 No. 157-92
FM Class 3810:2005	C22.2 No 142-M1987

D.2 Product Certification

This product is attributed with the product certification codes:

ATEX & IECEx
II 1G Ex ia IIC T4 Ga (-20°C to +70°C)

North American
IS, Class I, Division 1, Groups A, B, C & D, T4

D.3 Global Certificates/Approvals

ATEX	Baseefa 06ATEX0330X
ATEX System	Baseefa 07Y0027
IECEx	IECEx BAS 06.0090X
CSA	2013218
FM	3030238
TC TR Ex	RU C-GB. ГБ05.В.00229

These certificates can be viewed or downloaded from our website at:
http://www.michell.com

D.4 Terminal Parameters

Ui	= 28 V
Ii	= 93 mA
Pi	= 651 mW
Ci	= 37 nF
Li	= 0

D.5 Special Conditions

1. The wiring connections to the free socket must be made via crimped connectors in such a way that all the strands of the wire used are held securely by the crimp.
2. The plastic plug and socket create a potential for electrostatic discharge so must not be rubbed with a dry cloth or cleaned with solvents.
3. The Easidew PRO I.S Dew-Point Transmitter does not withstand the 500 V AC insulation test to frame. This must be taken into account when installing the equipment.

D.6 Maintenance and Installation

The Easidew PRO I.S. must only be installed by suitably qualified personnel and in accordance with the instructions provided and the terms of the applicable product certificates.

Maintenance and servicing of the product must only be carried out by suitably trained personnel or returned to an approved Michell Instruments’ Service Ce

Appendix E

System Drawings

Appendix E System Drawings

E.1 Baseefa Approved System Drawing

THE CAPACITANCE AND EITHER THE INDUCTANCE OR THE INDUCTANCE TO RESISTANCE RATIO (L/R) OF THE CABLE MUST NOT EXCEED THE FOLLOWING VALUES:

GROUP	CAPACITANCE (µF)	INDUCTANCE (mH)	OR	L/R RATIO (µH/ohm)
IIC	SEE NOTE 1 * 40 nF	4.2mH		54 µH/ Ω
IIB	613 nF	12.6mH		217 µH/ Ω
IIA	2.11 µF	33mH		435 µH/ Ω

THE ISOLATION OF THE SIGNAL WIRES WITH THE EASIDEW DISCONNECTED, MUST BE ABLE TO WITHSTAND A 500V AC INSULATION TEST.

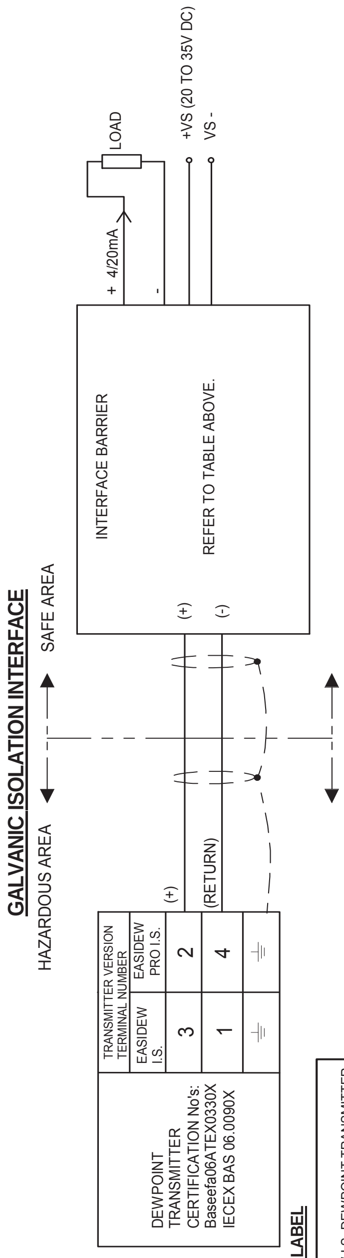
AT INSTALLATION OF SYSTEM PERFORM A RISK ASSESSMENT IN ACCORDANCE WITH EN60079-25:2004 cl.10 AND INSTALL LIGHTENING PROTECTION AS NECESSARY.

THE SYSTEM MUST BE MARKED WITH A DURABLE LABEL. THE LABEL SHOULD APPEAR ON OR ADJACENT TO THE PRINCIPAL ITEM OF ELECTRICAL APPARATUS IN THE SYSTEM OR AT THE INTERFACE BETWEEN THE INTRINSICALLY SAFE AND NON-INTRINSICALLY SAFE CIRCUITS. THIS MARKING SHALL INCLUDE THE FOLLOWING INFORMATION:
Baseefa 07Y0027 AND THE WORD SYST OR SYSTEM.

NOTE 1. 46nF MAXIMUM CABLE CAPACITANCE IS ACCEPTABLE IN *IIC* INSTALLATIONS FOR THE INTRINSIC SAFETY ISOLATORS SHOWN IN THE LIST BELOW.
FOR ISOLATORS NOT LISTED BELOW, BUT APPEARING IN TABLE A, ONLY 40nf MAXIMUM CABLE CAPACITANCE IS ACCEPTABLE.
KFD0-CS-Ex1.50P
KFD0-CS-Ex2.50P
KFD0-CR-Ex1.20200
KFD0-CR-Ex1.30200
MTL5041
MTL5040
MTL5541

TABLE A

Type	Certificate Number	Interface	Connection to Easidew I.S.
Isolated Repeater	BAS98ATEX7343	KFD0-CS-Ex1.50P	Pin 1 (+) Pin 2 (-)
Dual Isolated Repeater	BAS98ATEX7343	KFD0-CS-Ex2.50P	Channel 1 - Pin 1 (+) Channel 1 - Pin 2 (-) Channel 2 - Pin 4 (+) Channel 2 - Pin 5 (-)
Transmitter Supply Isolator	BAS00ATEX7164	KFD2-CR-Ex1.20200	Pin 1 (+) Pin 3 (-)
Transmitter Supply Isolator	BAS00ATEX7164	KFD2-CR-Ex1.30200	Pin 1 (+) Pin 3 (-)
Smart Transmitter Power Supply	BAS99ATEX7060	KFD2-STC4-Ex1.H	Pin 1 (+) Pin 3 (-)
Repeater Power Supply	BAS01ATEX7155	MTL5041	Pin 2 (+) Pin 1 (-)
Dual Loop Isolator	BAS98ATEX2227	MTL5040	Pin 2 (+) Pin 1 (-) Pin 5 (+) Pin 4 (-)
Repeater Power Supply	BaseefaATEX0213	MTL5541	Pin 2 (+) Pin 1 (-)



SYSTEM LABEL

MICHELL Instruments EASIDEW I.S. DEWPOINT TRANSMITTER
SYSTEM CERTIFICATE No's: Baseefa07Y0027
Ex ia IIC T4 (-20C TO + 70C)

THIS DOCUMENT IS THE PROPERTY OF MICHELL INSTRUMENTS LTD. AND MUST NOT BE COPIED NOR DISCLOSED TO A THIRD PARTY WITHOUT THE CONSENT OF MICHELL INSTRUMENTS.

MICHELL Instruments

DRAWN: MSB	DATE: 10/03/06	CHECKED / DATE	APPROVED / DATE

3rd ANGLE PROJECTION

TOLERANCES: UNLESS OTHERWISE STATED
DIMENSIONS: 0 DEC. PLACE: ± 0.5; 1 DEC. PLACE: ± 0.2; 2 DEC. PLACE: ± 0.1; HOLE Ø: +0.1 -0.0; ANGLES: ±0.5°

DRAWING UNITS: mm
SCALE: NTS

MATERIAL
FINISH

ISSUE	MOD. No.	DATE	SIGN
05	13395	16/12/13	IMA
04	11165	10/08/11	IMA
03	PRO Variation	16/02/09	IMA
02	08057	27/05/08	IMA
01	CERT ISS	26/01/07	MSB

TITLE: EASIDEW I.S. and EASIDEW PRO I.S. DEWPOINT TRANSMITTER SYSTEM DRAWING

DRAWING NUMBER: Ex90352

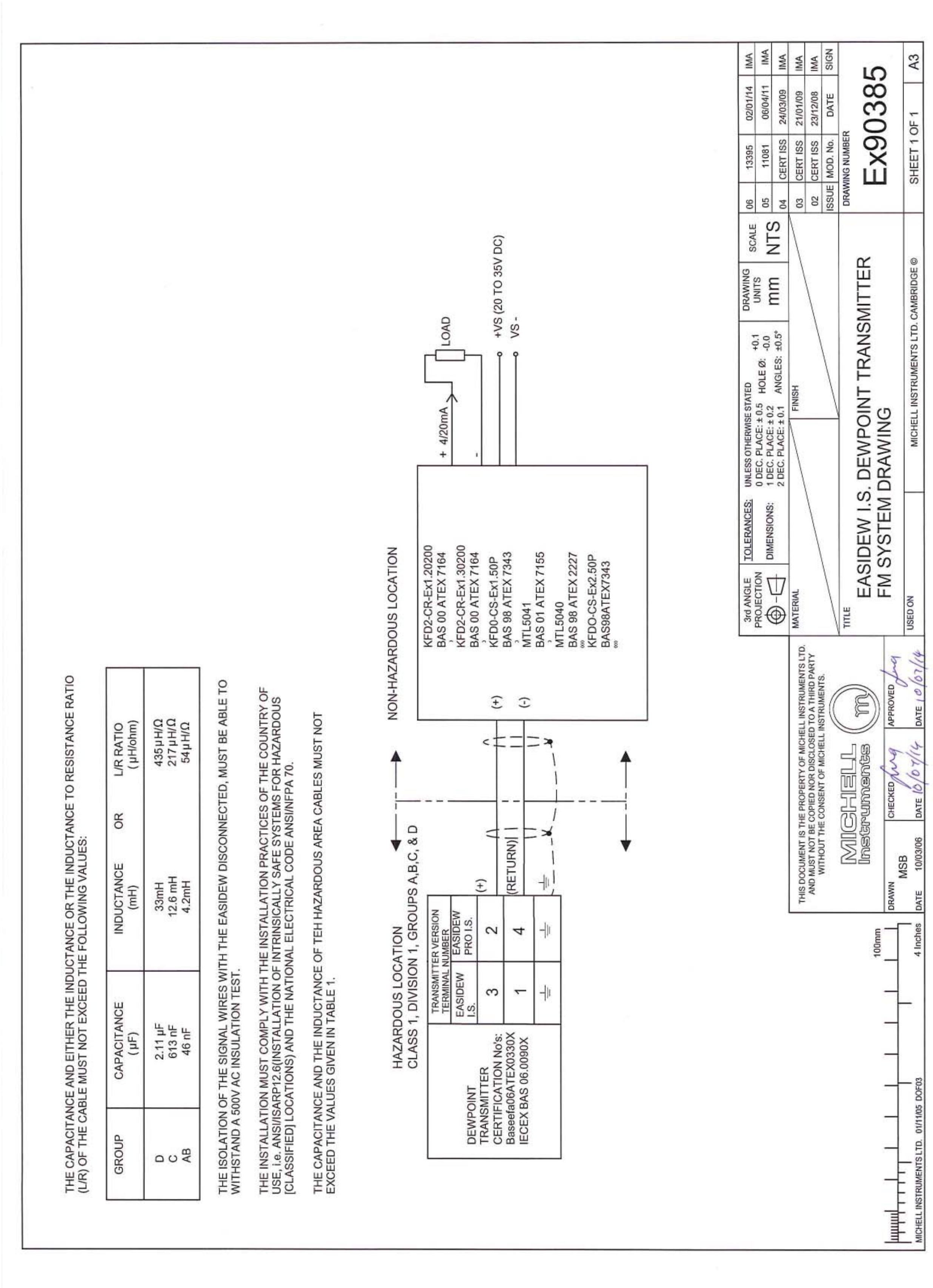
USED ON

MICHELL INSTRUMENTS LTD. CAMBRIDGE ©

SHEET 1 OF 1 A3

100mm
4 Inches
MICHELL INSTRUMENTS LTD. 01/11/05 DOF03

E.2 FM Approved System Drawing



E.3 CSA Approved System Drawing

THE CAPACITANCE AND EITHER THE INDUCTANCE OR THE INDUCTANCE TO RESISTANCE RATIO (L/R) OF THE CABLE MUST NOT EXCEED THE FOLLOWING VALUES:

GROUP	CAPACITANCE (μF)	INDUCTANCE (mH) OR	L/R RATIO (μH/ohm)
AB	46 nF	4.2mH	54 μH/ Ω
C	613 nF	12.6 mH	217 μ H/Ω
D	2.11μF	33mH	435 μ H/Ω

THE ISOLATION OF THE SIGNAL WIRES WITH THE EASIDEW DISCONNECTED, MUST BE ABLE TO WITHSTAND A 500V AC INSULATION TEST.

THE INSTALLATION MUST COMPLY WITH THE INSTALLATION PRACTICES OF THE COUNTRY OF USE. i.e. ANSI/ISA RP12.6 (INSTALLATION OF INTRINSICALLY SAFE SYSTEMS FOR HAZARDOUS [CLASSIFIED] LOCATIONS) AND THE NATIONAL ELECTRICAL CODE ANSI/NFPA 70.

THE CAPACITANCE AND THE INDUCTANCE OF THE HAZARDOUS AREA CABLES MUST NOT EXCEED THE VALUES GIVEN IN TABLE 1

Intrinsically safe(entity), Class 1, Div1, Group A,B,C,D
Hazardous Location Installations

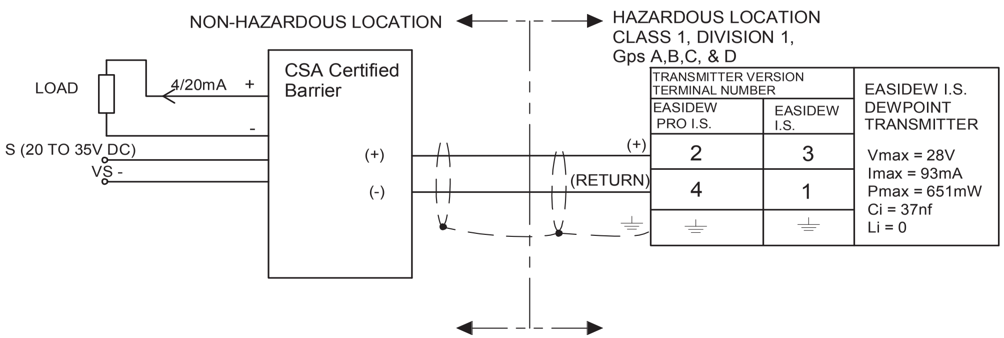
1) Control room equipment may not use or generate over 250Vrms.
2) Wire all circuits for power supply per CEC Part 1.
3) Use only entity approved safety barrier or other associated equipment that satisfy the following conditions:

$V_{CG} \leq V_{max}$, $I_{SC} \leq I_{MAX}$, $C_a \geq C_i + C_{CABLE}$, $L_a \geq L_i + L_{CABLE}$

Transmitter entity parameters are as follows:

V max < 2.8Vdc
I max < 93mA
Ci = 37nF
Li = 0uH

4) WARNING: SUBSTITUTION OF COMPONENTS MAY IMPARE INTRINSIC SAFETY.
5) Ex ia is defined as Intrinsically Safe.



Type	Certificate Number	Interface	Connection to Easidew I.S.
Isolated Repeater	BAS98ATEX7343 UL Canada E106378CUL	KFD0-CS-Ex1.50P	Pin 1 (+) Pin 2 (-)
Dual Isolated Repeater	BAS98ATEX7343 UL Canada E106378CUL	KFD0-CS-Ex2.50P	Channel 1 - Pin 1 (+) Channel 1 - Pin 2 (-) Channel 2 - Pin 4 (+) Channel 2 - Pin 5 (-)
Transmitter Supply Isolator	BAS00ATEX7164 UL Canada E106378CUL	KFD2-CR-Ex1.20200	Pin 1 (+) Pin 3 (-)
Transmitter Supply Isolator	BAS00ATEX7164 UL Canada E106378CUL	KFD2-CR-Ex1.30200	Pin 1 (+) Pin 3 (-)
Smart Transmitter Power Supply	BAS99ATEX7060 UL Canada E106378CUL	KFD2-STC4-Ex1.H	Pin 1 (+) Pin 3 (-)

100mm
4 Inches
MICHELL INSTRUMENTS LTD. 01/11/05 DOF03

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MICHELL Instruments

DRAWN MSB | CHECKED | APPROVED
DATE 10/03/06 | DATE | DATE

3rd ANGLE PROJECTION
TOLERANCES: UNLESS OTHERWISE STATED
DIMENSIONS: 0 DEC. PLACE: ± 0.5; 1 DEC. PLACE: ± 0.2; 2 DEC. PLACE: ± 0.1; HOLE Ø: +0.1 -0.0; ANGLES: ±0.5°
DRAWING UNITS mm
SCALE NTS

ISSUE	MOD. No.	DATE	SIGN
07	13395	16/12/13	IMA
06	11081	06/04/11	IMA
05	CERT ISS	15/06/09	IMA
04	CERT ISS	25/03/09	IMA
03	CERT ISS	16/06/08	IMA

MATERIAL
FINISH

TITLE EASIDEW I.S. & EASIDEW PRO I.S. DEWPOINT TRANSMITTER SYSTEM DRAWIN. CSA

DRAWING NUMBER Ex90385CSA

USED ON
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SHEET 1 OF 1 A3

Appendix F

Quality, Recycling & Warranty Information

Appendix F Quality, Recycling & Warranty Information

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

www.michell.com/compliance

This page contains information on the following directives:

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

This information is also available in PDF format.

Appendix G

Return Document & Decontamination Declaration

Appendix G Return Document & Decontamination Declaration

Decontamination Certificate

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

Instrument			Serial Number	
Warranty Repair?	YES	NO	Original PO #	
Company Name			Contact Name	
Address				
Telephone #			E-mail address	
Reason for Return /Description of Fault:				

Has this equipment been exposed (internally or externally) to any of the following?
Please circle (YES/NO) as applicable and provide details below

Biohazards	YES	NO
Biological agents	YES	NO
Hazardous chemicals	YES	NO
Radioactive substances	YES	NO
Other hazards	YES	NO

Please provide details of any hazardous materials used with this equipment as indicated above (use continuation sheet if necessary)

Your method of cleaning/decontamination

Has the equipment been cleaned and decontaminated?	YES	NOT NECESSARY

Michell Instruments will not accept instruments that have been exposed to toxins, radio-activity or bio-hazardous materials. For most applications involving solvents, acidic, basic, flammable or toxic gases a simple purge with dry gas (dew point <-30°C) over 24 hours should be sufficient to decontaminate the unit prior to return.
Work will not be carried out on any unit that does not have a completed decontamination declaration.

Decontamination Declaration

I declare that the information above is true and complete to the best of my knowledge, and it is safe for Michell personnel to service or repair the returned instrument.

Name (Print)		Position	
Signature		Date	

MICHELL Instruments

F0121, Issue 2, December 2011

NOTES

EU Declaration of Conformity

MICHELL Instruments

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

CE

On behalf of the above named company, I declare that, on the date that the equipment accompanied by this declaration is placed on the market, the equipment conforms with all technical and regulatory requirements of the listed directives.

PROMET I.S.

and complies with all the essential requirements of the EU directives listed below.

2014/30/EU EMC Directive
2014/35/EU Low Voltage Directive (LVD)

and (effective from 22nd July 2017)
2011/65/EU Restriction of Hazardous Substances Directive (RoHS2)
RoHS2 EU Directive 2011/65/EU (Article 3, [24]) states, *"industrial monitoring and control instruments means monitoring and control instruments designed exclusively for industrial or professional use".* (mandatory compliance effective date 22nd July 2017).

and has been designed to be in conformance with the relevant sections of the following standards or other normative documents.

EN61326-1:1997	Electrical equipment for measurement, control and laboratory use – EMC requirements –Class B (emissions) and Industrial Locations (immunity).
EN61010-1:2001	Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use - Part 1: General Requirements

2014/68/EU PE Directive
This product and sample systems & accessories that may be supplied with them do not bear CE marking for the Pressure Equipment Directive, and are supplied in accordance with Article 4, paragraph 3 of 2014/68/EU by using SEP (sound engineering practice) in the design and manufacturer and are provided with adequate instructions for use.

Andrew M.V. Stokes, Technical Director

December 2016

MICHELL
Instruments

http://www.michell.com