Easidew PRO I.S.
Process Dew-Point Transmitter
User's Manual

97130 Issue 11.1, February 2012

Michell Instruments

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EASIDEW PRO I.S.

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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.

Pressure Safety

DO NOT permit pressures greater than the safe working pressure to be applied to the instrument. The specified safe working pressure is 45 MPa (450 barg / 6500 psig). 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 the Easidew PRO I.S. is 12 months. The instrument should be returned to Michell Instruments or one of their accredited service agents for re-calibration.

Safety Conformity

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

EC Declaration Of Conformity

EC Declaration of Conformity

Manufacturer: Michell Instruments Limited

Address: 48 Lancaster Way Business Park
Ely, Cambridgeshire
CB6 3NW. UK.

Equipment Type: **Easidew PRO I.S. Dew-point Transmitter**

Directive 94/9/EC ATEX

Provisions of the Directive fulfilled by the Equipment:

Group II Category 1G Ex ia IIC T4 -20°C ≤ Ta ≤ +70°C

Notified Body for EC-Type Examination and Production (QAN):

Baseefa, Buxton. UK. Notified Body No. 1180

EC-Type Examination Certificate:

Baseefa06ATEX0330X/2

Standards used:

EN 50020:2002
(From October 2009 this standard ceased to have harmonised status and has now been replaced by **EN60079-11:2007.** A technical review of this new standard against the old standard showed that the equipment is in conformance with the relevant requirements and that the State of the Art is maintained. The Essential Health & Safety Requirements of the Directive is still maintained with no changes necessary for the safe and reliable functioning and operation of the product with respect to the risks of explosion).

EN 60079-0:2004 (Technically identical to EN 60079-0:2006 which is harmonised)
Other Standards and Specifications used:

EN 60079-25:2004

IECEx

Certificate of Conformity No.

IECEx BAS 06.0090X (Issue No. 2) Ex ia IIC T4 (-20°C ≤ Ta ≤ +70°C)

Harmonised Standards used:

IEC60079-11:1999

Other Standards and Specifications used:

IEC60079-0:2004

Other Directives

2004/108/EC EMC Directive
2006/95/EC Low Voltage Directive
Is in conformity with the following Standard(s) or Normative Document(s):
EN61326-1:2006 *Electrical equipment for measurement, control and laboratory use - EMC requirements.*

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

Andrew M.V. Stokes, Technical Director
August 2011

ECD Easidew IS Issue 03

Abbreviations

The following abbreviations are used in this Manual:

bara	bar absolute
barg	bar gauge
°C	degrees Celsius
°F	degrees Fahrenheit
DC	direct current
µm	micro-meter
lbf-ft	pound foot
Nl/min	normal liters per minute
mA	milliampere
Mpa	megapascal
m/sec	meters per second
mW	milli Watts
nF	nano-Farad
Nm	Newton meter
ppm_V	parts per million by volume
RH	relative humidity
scfh	standard cubic feet per hour
scfs	standard cubic feet per second
V	volts

Warnings

The following general warning listed below is applicable to this instrument. It is 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.

Calibration Facilities

Michell Instruments' calibration facilities are among the most sophisticated in the world and have been recognized for their excellence.

Traceability to the National Physical Laboratory (NPL) UK is achieved through our UKAS Accreditation (Number 0179). This covers dew point over the range -90 to +90°C (-130 to +194°F) and also Relative Humidity.

Dew-point calibrations are also traceable to the National Institute for Standards & Technology (NIST) USA over the range -75 to +20°C (-103 to +68°F).

NOTE: Standard traceable calibration certificates for instruments and sensors are not issued under our UKAS accreditation. UKAS certificates are usually to special order and are clearly identified.

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.

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.

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

Manufacturing Quality

Michell Instruments is registered with the British Standards Institute for Quality Assurance to:

BS EN ISO 9001: 2008

Rigorous procedures are performed at every stage of production to ensure that the materials of construction, manufacturing, calibration and final test procedures meet the requirements laid down by our BSI approved Quality System.

Please contact Michell Instruments if the product does not arrive in perfect working order.

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 PRO I.S. has been manufactured, tested and calibrated to the highest available standards and should arrive in perfect working order, ready for installation into a gas or liquid measurement application.

For questions about the instrument or how to install and operate it, contact your local representative. Refer to Appendix D for details of Michell Instruments' worldwide offices' contact information.

2 ABOUT EASIDEW PRO I.S. PROCESS DEW-POINT TRANSMITTER

The Easidew PRO I.S. is a continuous, on-line, 4-20 mA transmitter for the measurement of moisture content in air, other non-corrosive gases and non-polar liquids. It is designed specifically for use within Zone 0, 1 & 2 hazardous areas.

Its key features are:

- ±1°C dp accuracy
- Zone 0, ATEX and IECEx Certification
- Class 1, Division 1, FM & CSA Certification
- Moisture in liquids capability
- Rugged weatherproof housing to IP66 / NEMA 4
- 2-wire connection / linear 4 –20 mA signal
- Operating pressure range - up to 45 Mpa
- Operating range - 100 to +20°C dew point
- Moisture content ppm_V or ppm_W
- Powered by any DC source from 12 to 28 V

3 FACTORY CALIBRATION

The Easidew PRO I.S. is fully factory-tested and calibrated prior to delivery and is supplied with its own Calibration Certificate, providing direct traceability to both UK *National Physical Laboratory* (NPL) and US *National Institute of Standards and Technology* (NIST) Humidity Standards. The sensor is certified at thirteen dew-point levels across its operating range against a certified reference hygrometer, using a mass-flow humidity generator system as a source of reference calibration gas.

Periodic re-calibration is recommended in order to maintain the highest quality of measurement in your application. Michell Instruments recommends that you have your Easidew PRO I.S. re-calibrated annually unless it is used in a mission-critical application or in a dirty or contaminated environment, in which case the calibration interval should be reduced accordingly.

Michell Instruments can offer a variety of re-calibration and exchange transmitter schemes to suit your specific needs. Your local representative will be pleased to provide detailed, custom advice.

4 PREPARATION FOR USE

On delivery, check that all the following standard components are present in the packing box:

- Easidew PRO I.S. Transmitter
- Bonded Seal
- Certificate of Calibration
- 3 off cable crimps
- Mounting Bracket (optional)

The Easidew PRO I.S. is protected within the main packaging by a blue cap covering the transmitter connector and a small desiccant capsule installed inside the plastic protective transit cover. Neither of these items is required for the operation of the Easidew PRO I.S.

Prior to installation of the Easidew PRO I.S., unscrew and remove the plastic protective transit cover and retain for future use. Take care to prevent any contamination of the transmitter before installation. **NOTE: Do not handle the sintered guard.**

The Easidew PRO I.S. Transmitter can be mounted either in a flow-through sampling block (optional extra) or directly inserted into a pipe or duct and can be operated at pressures up to 45 MPa (450 barg / 6500 psig) when fitted with the bonded seal provided.

NOTE: Pass the bonded seal over the 5/8"-18 UNF mounting thread and assemble into the sampling location by hand, using the spanner flats only. **DO NOT grip and twist the Easidew PRO I.S. cover when installing the transmitter.** When installed, fully tighten using a spanner until the bonded seal is fully compressed and to a torque of 30.5 to 32.5 Nm (22.5 to 24 lbf-ft).

The recommended fluid flow rate, when mounted in the optional sampling block, is 1 to 5 Nl/min (2.1 to 10.6 scfh). However, for direct insertion applications, fluid flow can be from static to 10 m/sec (353 scfs).

After installation into the flow stream, the Easidew PRO I.S. housing (provided it is not mounted onto a wall bracket) may be positioned at any angle, through approximately 330º of rotation, to allow for the cable gland positioning. To position the housing - loosen the large clamping nut sufficiently to allow free rotation of the sensor assembly within the transmitter body.

The Easidew PRO I.S. is fitted with a mechanical stop to prevent over-rotation of the sensor assembly within the transmitter body - this could damage the sensor wires.

Rotate the sensor housing until the cable gland is in the desired position. While firmly holding the housing in position, re-tighten the large clamp nut up against the housing seal using a spanner/ wrench of the correct size. **Do not apply excessive force.**

The Easidew PRO I.S. can be supplied with an optional wall-mounting bracket. This allows the customer to support the transmitter physically ensuring that the stress on the mounting flange is kept to a minimum.

The bracket needs to be attached to the Easidew PRO I.S. (see *Figure 4.1)* using the hex screws provided. It can be fitted either horizontally or vertically and can then be attached to a wall or plate to provide support for the transmitter.

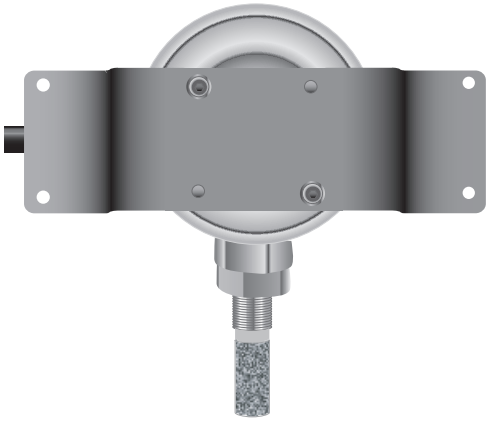


Figure 4.1 *Wall-mount bracket*

5 TRANSMITTER CABLE

Cable connection to the Easidew PRO I.S. is made via the internal terminal block.

5.1 Preparation of the Sensor Cable

It is essential that, to comply with Hazardous Area Certification of the product, the crimps supplied must be fitted onto any cable installed into the connector.

NOTE: *Figures 5.1* to *5.3* shown below, should be followed in detail. The crimps should be applied such that there is no possibility of a conductor strand of a core becoming free.

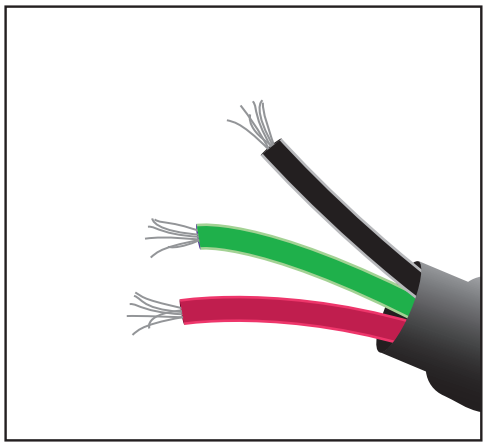


Figure 5.1 *Bare wires*

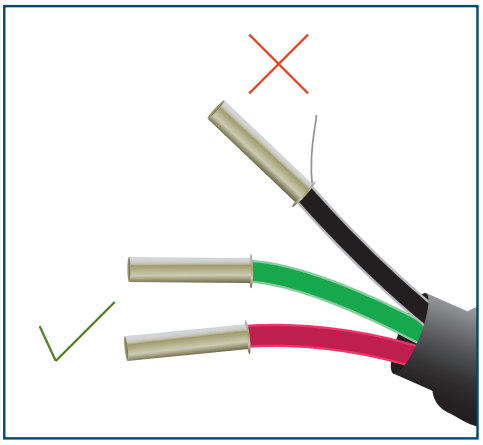


Figure 5.2 *Crimped wires*

When the crimp is made it should have a minimum of 2 positions of crimping. After the crimp is made it should be trimmed to a length of 5mm (see *Figure 5.3)*. When the crimps are installed into the connector terminal block ensure they are fully inserted, as shown in *Figure 5.4*, before tightening the terminal clamping screw.

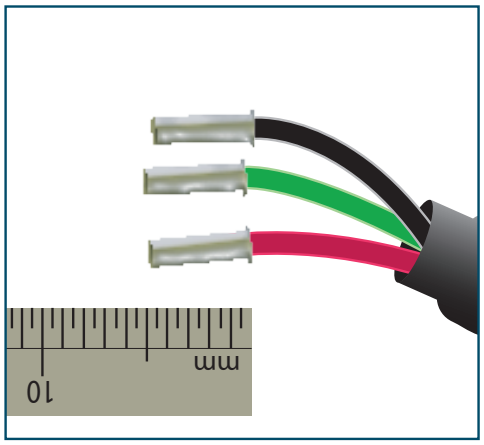


Figure 5.3 *Cut to 5mm*

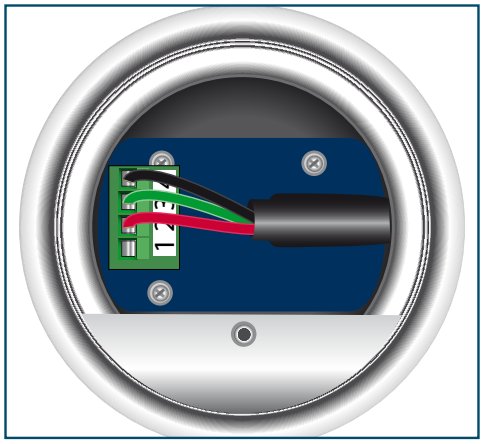
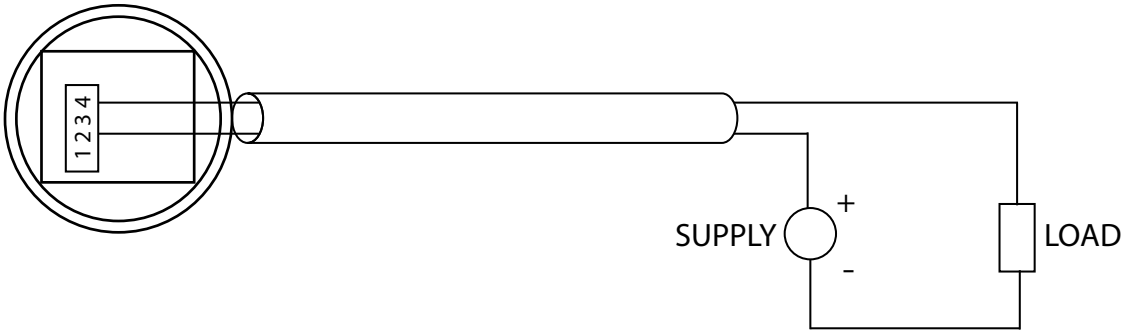


Figure 5.4 *Connection to Easidew PRO I.S.*

When all wire connections are made, ensure that there is a minimum clearance distance and a minimum creepage distance in air of 2mm (0.8 in) between each terminal.

CAUTION: **Always connect the 4-20 mA return signal to a suitable load (see *Figure 5.5)* before the power is applied. Without this connection the transmitter may be damaged if allowed to operate for prolonged periods.**

Electrical Connection



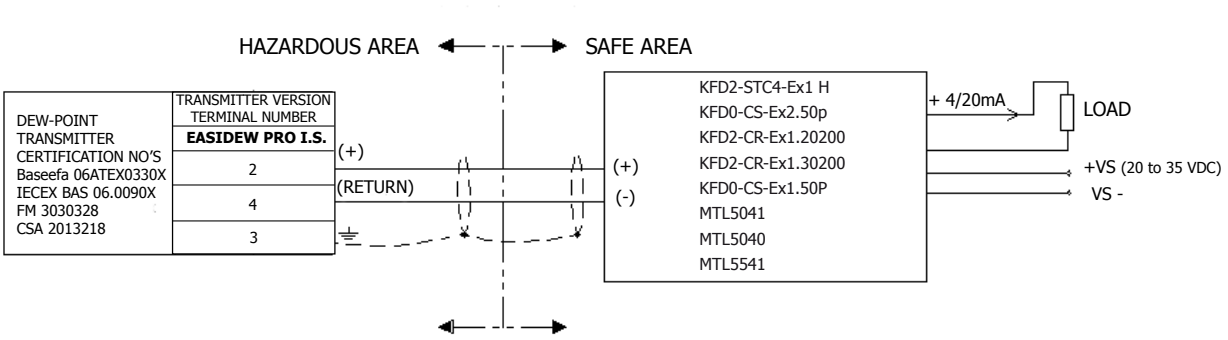


Figure 5.5 *Hazardous Area Connection*

6 INSTALLATION IN HAZARDOUS AREAS

The Easidew PRO I.S. is certified intrinsically safe for use in hazardous areas, by Notified Body Baseefa Ltd. The instrument conforms to the ATEX & IECEx standards specified in EN60079-0:2004, EN50020:2002, IEC60079-0:2004 and IEC60079-11:1999 with certification code:

II 1 G Ex ia IIC T4 (-20°C ≤ Ta ≤ +70°C)

The Easidew PRO I.S. is also certified for use in Hazardous Areas by FM Approvals and CSA, with certification code:

IS / I / 1 / ABCD / T4 Ta = +70°C, Entity Ex90385, IP66

Before using the Easidew PRO I.S. in any hazardous environment, ensure that you are fully familiar with the relevant standards relating to the certification of this instrument; and also with the further information relating to intrinsically safe apparatus to be found in standard EN 60079-14:1997 or equivalent, and up-to-date codes of practice in the country of installation.

The Easidew PRO I.S. must be installed using a specified Galvanically Isolated Interface unit as shown in the system drawings in Appendix C.

Installation of the Easidew PRO I.S. *MUST* be as per the system drawings in order to comply with the Intrinsic Safety Certification.

7 MEASUREMENT AND CONFIGURATION

The Easidew PRO I.S. can be configured to provide an output of 4-20 mA (2-wire connection) for the following:

Dew point (-100 to +20°C)

Moisture content in gas (0 - 3000 ppm_V)

Moisture content in liquids (0 - 3000 ppm_W)

The Easidew PRO I.S. can be purchased factory configured as required. Alternatively the Easidew PRO I.S. can be configured by the customer, using the Easidew Communications Kit (EA2-CK) and Easidew Application Software. The Easidew Communications kit can be purchased from Michell Instruments or your local representative. For a free copy of the Application Software contact Michell Instruments UK office (see Appendix D for contact details).

For moisture content in gas the calculation from the measured dew point is assumed to be at atmospheric pressure. Alternatively a fixed gas pressure needs to be programmed into the Easidew PRO I.S.

For moisture content measurement in liquid the Easidew PRO I.S. requires the saturation constant of the liquid to be programmed into the transmitters, either at the factory or by the customer using the Application Software.

The transmitter requires a 6-point look-up table for saturation constants up to 3000 ppm_W over the temperature range 0 to 50°C. Saturation constants for 8 common liquids can be programmed into the Easidew PRO I.S. via the Application Software. Alternatively the user can program saturation constants manually.

The Application Software Help file provides detailed instructions on how to perform this task.

8 INSTALLATION AND SAMPLING

8.1 Dry Down

If the Easidew PRO I.S. is installed into a new application then the time taken for the sensor to dry down from ambient conditions to the operational dew-point level of the process will normally be shorter than the time taken to dry down the process itself.

However, if the Easidew PRO I.S. is installed into an application which has previously been purged with dry gas then there may be a significant time required for sensor dry down. The exact time taken will depend on a number of factors such as target dew point, construction of sampling system (see Section 8.2) and flow rate of the fluid.

8.2 Sampling Hints

Be Sure the Sample is Representative of the Fluid 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 (see *Figure 7.1),* as entrained liquids or particulate contamination may be drawn into the sensing element.

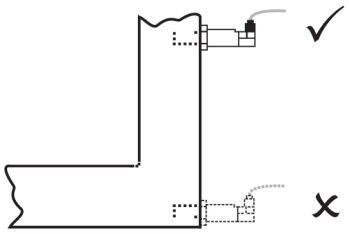


Figure 8.1 *Installation location*

Minimize Dead Space in Sample Lines

Dead space (see *Figure 7.2)* causes moisture entrapment points, increased system response times and measurement errors, as a result of the trapped moisture being released into the passing sample fluid and causing an increase in partial vapor pressure.

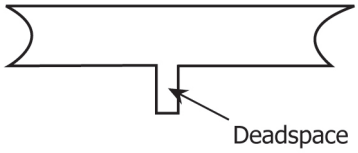


Figure 8.2 *Indication of dead space*

Remove Any Particulate Matter from the 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 fluid, 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.

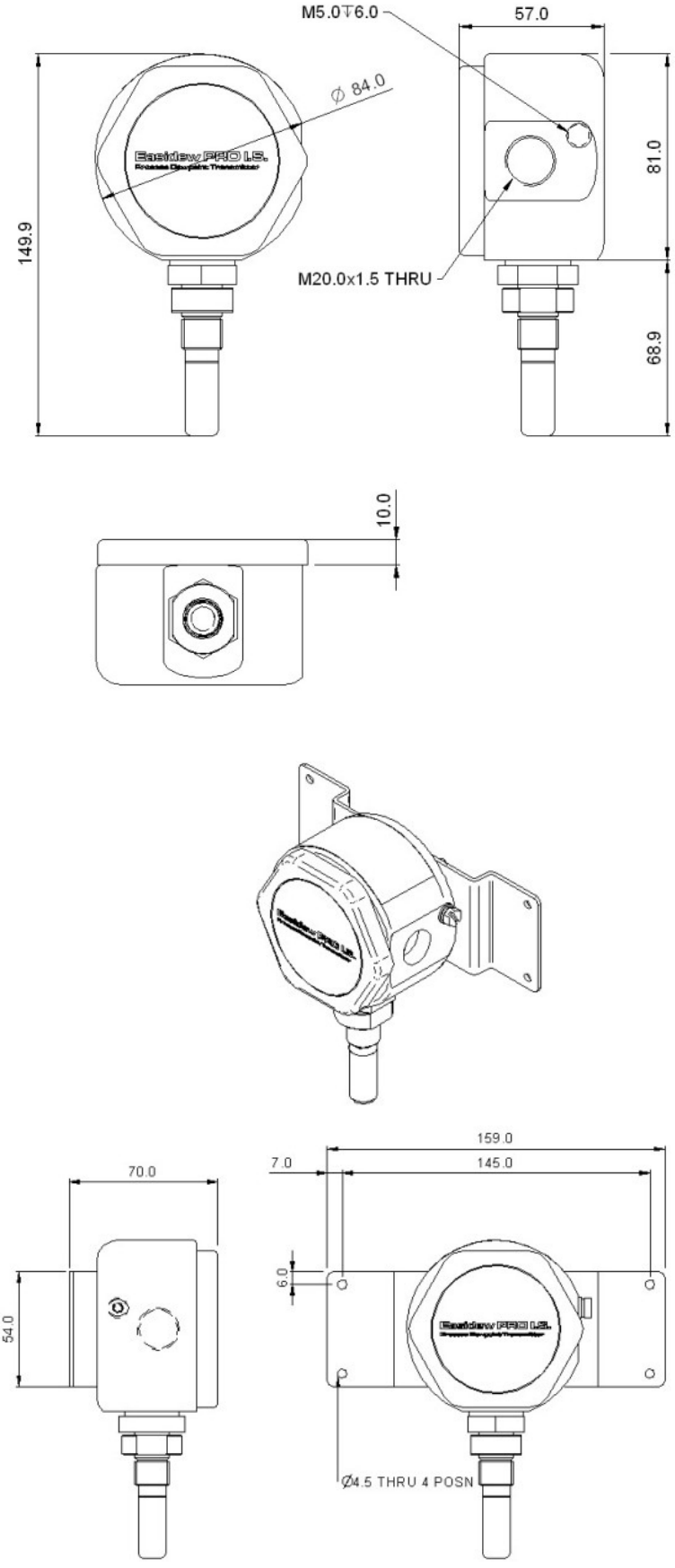
9 MAINTENANCE

Routine maintenance of the Easidew PRO I.S. is confined to regular re-calibration by exposure of the Easidew to sample gases of known moisture content to ensure that the stated accuracy of the Easidew is maintained. Calibration services traceable to the National Physical Laboratory (UK) and the National Institute of Standards and Technology (USA) are provided by Michell Instruments.

10 SINTERED GUARD

The sintered guard provides protection to the dew-point sensor, and should be replaced at regular intervals, depending on the contamination in the fluid being measured. When replacing the sintered guard, care should be taken to handle it on the lower part only to prevent contamination.

11 EASIDEW PRO I.S. DIMENSIONAL DRAWING



Appendix A

Technical Specifications

Appendix A Technical Specifications

Performance		
Measurement Range (dew point)	-100 to +20°C (-148 to +68°F) dew point	
Accuracy (dew point)	±1°C (±1.8°F) dew point (+20 to -60°C (+68 to -76°F)) ±2°C (±3.6°F) dew point (-60 to -100°C (-76 to -148°F))	
Response Time	5 mins to T95 (dry to wet)	
Repeatability	0.5°C (±0.9°F) dew point	
Electrical Output/Input		
Output Signal	4-20 mA (2-wire connection) current source. User-configurable over range	
Output	Dew point, moisture content for ppm_V, ppm_W	
Output Range	Dew point -100 to + 20°C (-148 to +68°F) Moisture content in gas: 0 – 3000 ppm_V Moisture content in liquid: 0 – 3000 ppm_W	
Supply Voltage	12-28 V DC	
Load Resistance	Max 250 Ω @ 12 V; 500 Ω @ 24 V	
Current Consumption	23 mA (depending on signal output)	
Saturation Constants (For moisture in liquids measurements only)	6-point look-up table for saturation constants up to 3000 ppm_W over the temperature range 0 to 50°C Saturation constants for 8 common liquids can be programmed into the Easidew PRO I.S. via the Application Software. Alternatively the user can program saturation constants manually	
Operating Conditions		
Operating Humidity	0–100% RH	
Operating Temperature	-40 to +60°C (-40 to +140°F)	
Operating Pressure	45 MPa (450 barg / 6500 psig) max	
Flow Rate	1 to 5 Nl/min mounted in standard sampling block 0 to 10 m/sec direct insertion	
Mechanical Specification		
Hazardous Area Certificates	ATEX - II 1 G Ex ia IIC T4 (-20°C ≤ Ta ≤ +70°C) FM - IS / I / 1 / ABCD / T4 Ta = +70°C CSA - IS Class 1 Div 1 Groups ABCD T4 IECEx - Ex ia IIC T4 (-20°C ≤ Ta ≤ +70°C)	
Ingress Protection	IP66 in accordance with standard BS EN 60529:1992, and NEMA 4 in protection accordance with standard NEMA 250-2003	
Housing Material	Stainless steel	
Mounting Thread	5/8" - 18 UNF	
Filter	80 µm sintered guard HDPE Guard <10 µm (optional)	
Weight	1.27 kg (2.8 lbs)	
Electrical Connections	Screw terminal	
Fault Conditions (factory programmed)	Condition Sensor fault Under-range dew point Over-range dew point	Output 23 mA 4 mA 20 mA
Approved Galvanic Isolators	KFD2-CR-EX1.20200 / KFD2-CR-EX1.30200 KFD0-CS-EX1.50P / KFD0-CS-EX2.50P KFD2-STC4-EX1.H / MTL5041, MTL5040, MTL5541	

Appendix B

Hazardous Area Certification

Appendix B Hazardous Area Certification

The Easidew PRO I.S is certified compliant to the ATEX Directive (94/9/EC), and IECEx for safe use within a hazardous area and has been assessed so by Baseefa Ltd (Notified Body 1180).
This product conforms to the Standards EN 60079-0:2004, EN60079-11:2007, IEC60079-0:2004, IEC60079-11:1999 and is attributed with a product certification code:

 II 1 G Ex ia IIC T4 (-20°C ≤ Ta ≤ +70°C)

ATEX Certificate Number :	Baseefa06ATEX0330X
ATEX System Certificate Number:	Baseefa 07Y0027
IEC Certificate Number:	IECEx BAS 06.0090X

The Easidew PRO I.S. is also certified for use in Hazardous Areas by FM Approvals and CSA, with certification code:

IS / I / 1 / ABCD / T4 Ta = +70°C, Entity Ex90385, IP66

FM Certificate Number:	3030238
CSA Certificate Number:	2013218

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

B.1 Terminal Parameters

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

B.2 Special Conditions of Use

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.

The plastic plug and socket create a potential for electrostatic discharge so must not be rubbed with a dry cloth or cleaned with solvents.

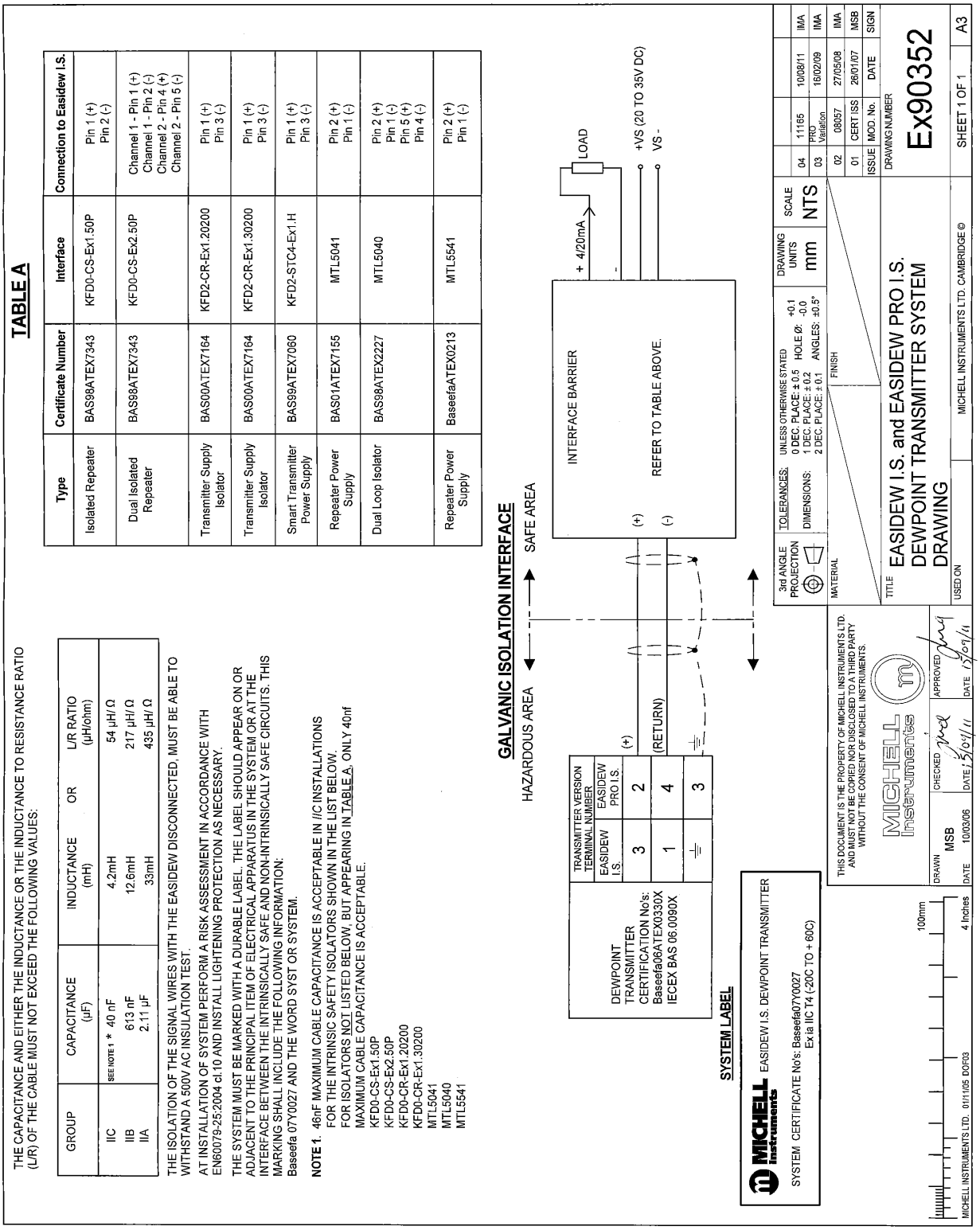
The Easidew I.S. Dew-Point Transmitter does not withstand the 500 V AC insulation test to frame. This must be taken into account when installing the equipment.

Appendix C

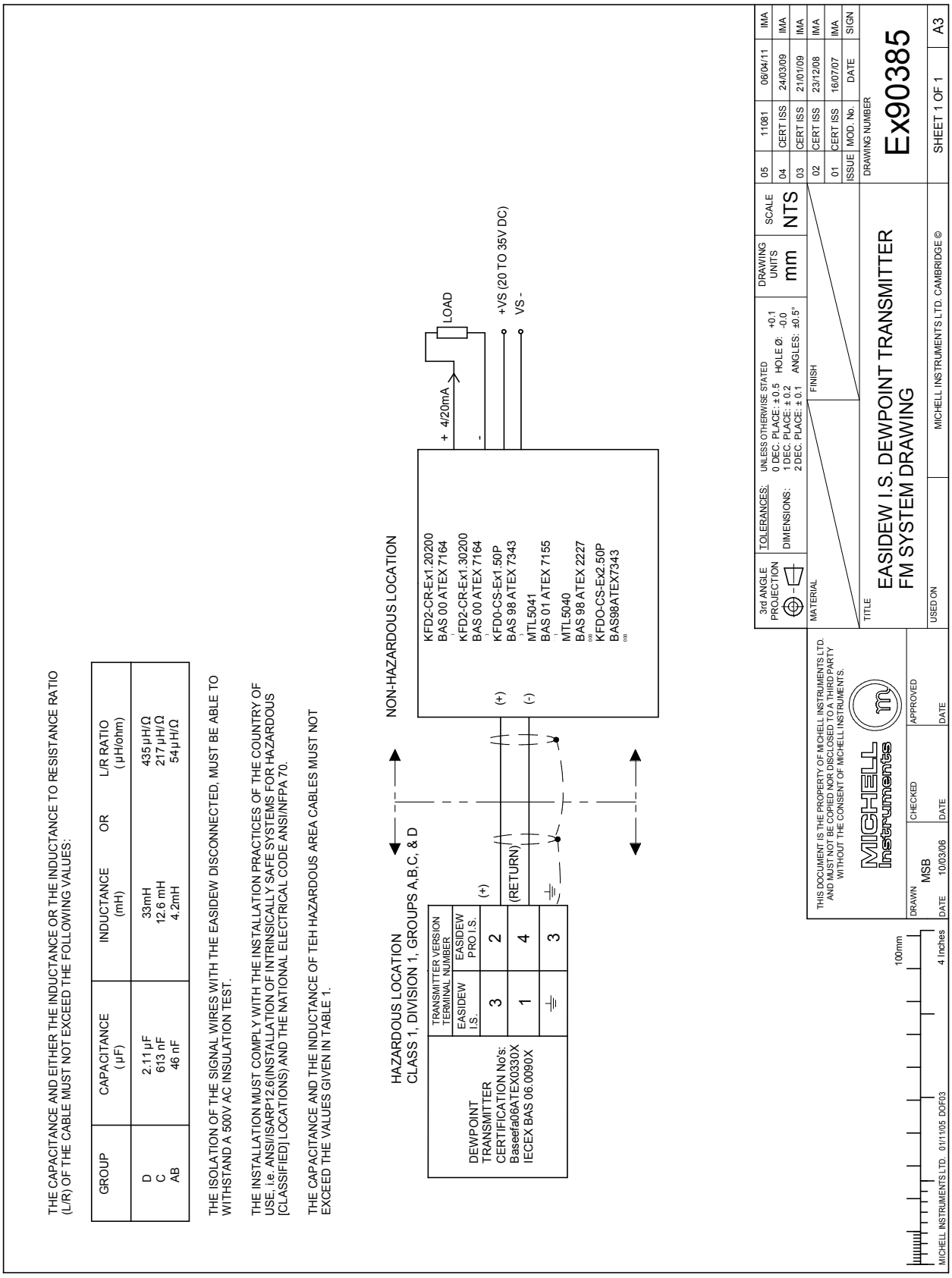
System Drawings

Appendix C System Drawings

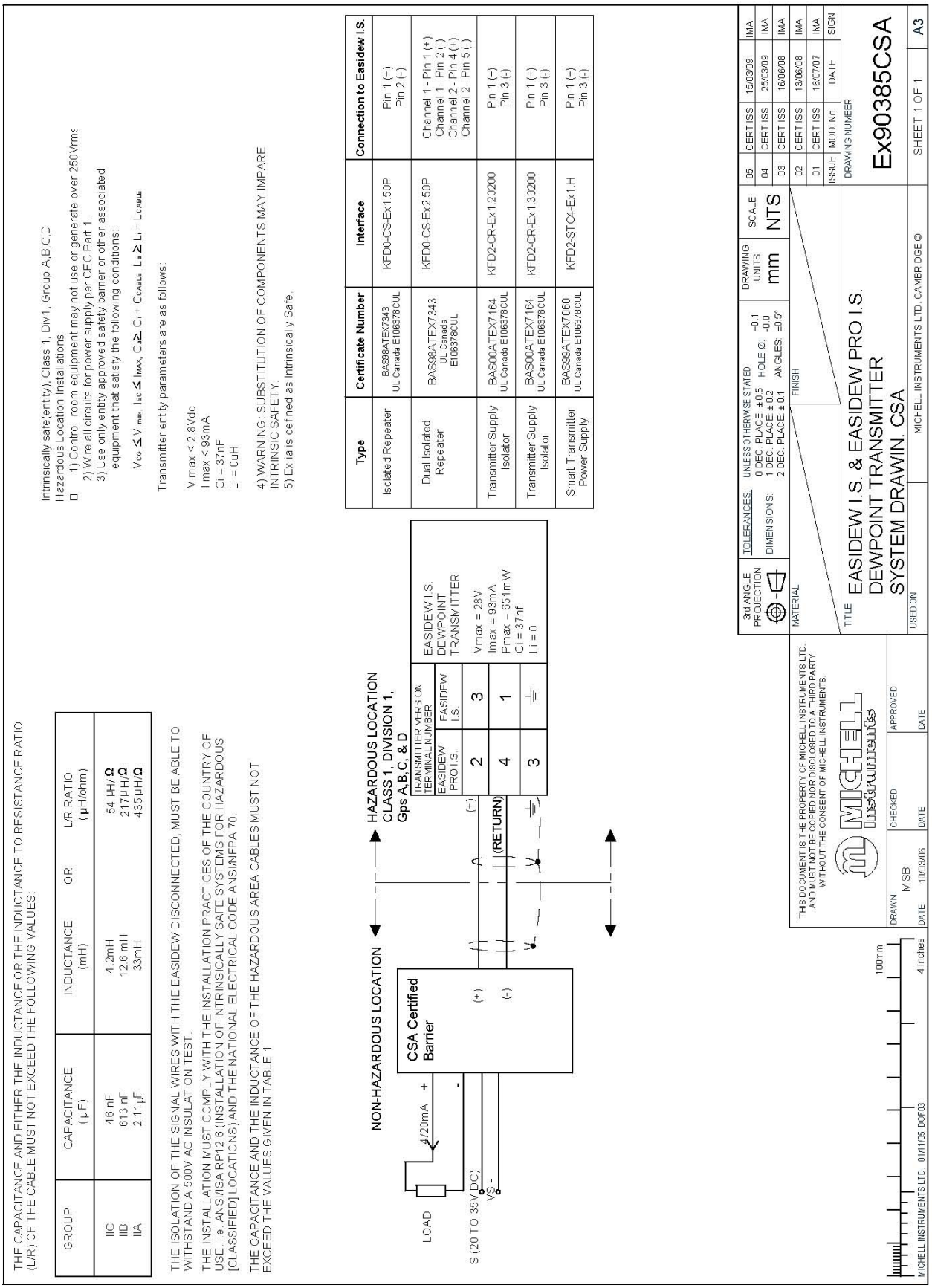
C.1 Baseefa Approved System Drawing



C.2 FM Approved System Drawing



C.3 CSA Approved System Drawing



Appendix D

List of Worldwide Michell Instruments' Offices

Appendix D List Of Worldwide Michell Instruments' Offices

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