MICHELL Instruments

ES20
Compact Sampling System
User's Manual

97447 Issue 2.1
August 2020

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

Use this information when contacting Michell Instruments for service purposes.

Instrument	
Code	
Serial Number	
Invoice Date	
Location of Instrument	
Tag Number	

Instrument	
Code	
Serial Number	
Invoice Date	
Location of Instrument	
Tag Number	

Instrument	
Code	
Serial Number	
Invoice Date	
Location of Instrument	
Tag Number	

ES20
Compact Sampling System

For Michell Instruments' contact information please go to
www.michell.com

Contents

Figures

Appendices

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

Abbreviations

The following abbreviations are used in this manual:

AC	alternating current
barg	pressure unit (=100 kP or 0.987 atm)
ºC	degrees Celsius
ºF	degrees Fahrenheit
DC	direct current
dp	dew point
Hz	Hertz
kg	kilogram(s)
lb	pound
Nl/min	normal liters per minute
mA	milliampere
max	maximum
min	minute(s)
%	percentage
psig	pounds per square inch
scfh	standard cubic feet per hour
temp	temperature
V	Volts
W	Watts
Ω	Ohms

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.

1 INTRODUCTION

Michell Instruments designs and manufactures a broad range of sampling systems for a wide spectrum of industries and processes from the economical compressed air market to the oil and gas process market.

The ES20 Compact Sampling System (CSS) is a standard modular product designed to appeal to customers who require an economic system delivered for fast integration into their own work package.

Fast delivery is achieved through a simple modular build system on a single base plate design completed with supply chain stocking of all required ES20 CSS parts.

The ES20 CSS is a standard fast delivery product, covering a small portion of the Michell Instruments' overall sampling system and process analyzer sampling system capabilities.

1.1 Materials

To ensure continuous and reliable dew-point or moisture measurement it is important that the dew-point transmitter is exposed to stable conditions of the gas to be monitored.

The ES20 CSS utilizes high quality materials which ensure that the sample gas travels smoothly through the system.

Gas wetted parts:

- Stainless steel tube, filter housing and fittings (316 stainless steel)
- Filter element (borosilicate glass microfibers)
- Transmitter sample block (316 stainless steel)
- Flowmeter (borosilicate glass) with Viton® seals
- Pump (Teflon®)

1.2 Filtration

If the gas contains impurities it is crucial to remove the contaminants before they reach the sensing device. The ES20 CSS is supplied with a filter housing into which recyclable particulate or coalescing filter cartridges can be inserted.

Filtration methods:

- Particulate filter (solid contaminants)
- Coalescing filter with adjustable drain (solid and liquid aerosol contaminants)
- HDPE guard (filter) for sensing element (standard)
- Air filter (with vacuum pump (standard)

1.3 Pressure Control and Measurement

Pressure has a direct effect on dew point. The ES20 CSS utilizes a set of configurable options for atmospheric or system line pressure dew-point measurement.

Pressure control features:

- Pressure gauge (dual scale: bar and psi)
- Isolation valves (needle valve type)
- Self-regulating vacuum pump

1.4 Flow Control

Flow rate of a gas can affect the transmitter's accuracy and influence the systems' response time. Every sampling system contains a set of components which help to maintain optimum flows of 1 to 5 Nl/min (2.1 to 10.6 scfh).

Flow control:

- Flowmeter (with particulate or coalescing filter)
- Isolation valves (needle valve type)
- Flowmeter with needle valve (with vacuum pump only)

1.5 Mounting Variants

Depending on the application the sampling system can be supplied in 3 variations:

- Mounted on base plate
- Mounted on base plate inside a windowed GRP enclosure
- Mounted on base plate inside a windowed SS enclosure (316 stainless steel)

1.6 System Designs

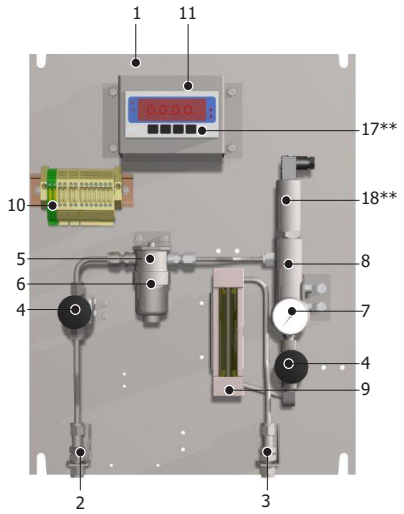
The ES20 CSS can be supplied in various configurations and can be used with many Michell products and accessories such as:

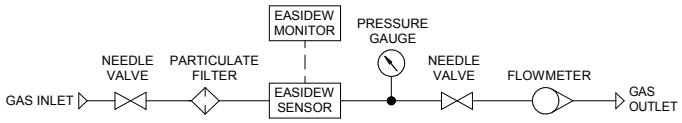
- Easidew Transmitter
- Easidew I.S. Transmitter
- Easidew PRO I.S. Transmitter
- Easidew Online Hygrometer
- Cermet II Hygrometer
- Cooling or venting coil

1.7 System Configurations

ES20 CSS fitted with Particulate Filter

	Components used	Specifications
1	Base plate	316 stainless steel
2	Inlet process connection and material	6mm or ¼" fitting (316 stainless steel)
3	Outlet process connection and material	6mm or ¼" fitting (316 stainless steel)
4	Isolation valve	Needle valve type
5	Filter housing	316 stainless steel (340 barg maximum), gasket (Viton®)
6	Particulate filter (inside filter housing)	Borosilicate glass microfibres (99.5+% removal of 0.1 micron particles)
7	Pressure gauge	0 to 20 barg (dual scale: bar and psi)
8	Sensor sample block	5/8" SS sample block (316 stainless steel)
9	Flowmeter	Borosilicate glass (2 to 12 Nl/min), seals (Viton®)
10	Terminal rail	13 terminals
11	Process indicator mounting bracket (optional)	1/8 DIN cutout

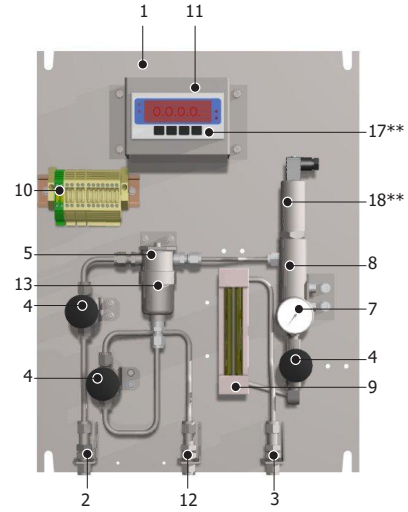


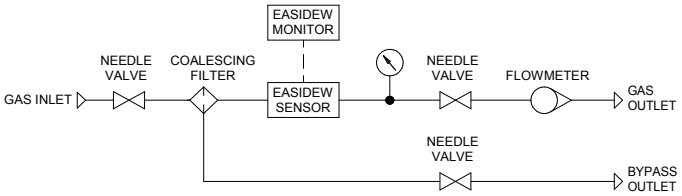


ES20 CSS fitted with Coalescing Filter*

	Components used	Specifications
12	Drainage connection	6mm or ¼" fitting (316 stainless steel)
13	Coalescing filter (inside filter housing)	Borosilicate glass microfibres (99.5+% removal of 0.1 micron particles and aerosols)

***In addition to particulate filter fitted components**

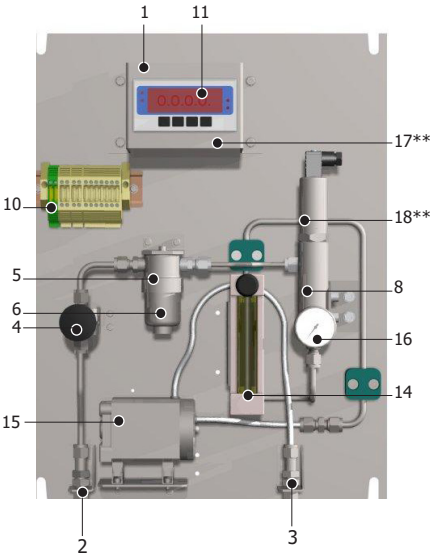


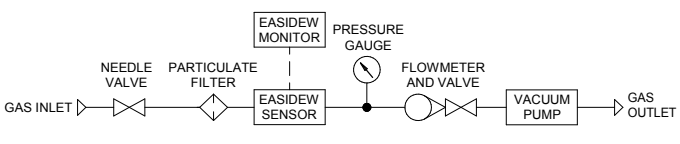


ES20 CSS fitted with Vacuum Pump*

	Components used	Specifications
14	Flowmeter with needle valve	Borosilicate glass (2 to 12 Nl/min), seals (Viton®)
15	Vacuum pump	Anti-overpressure mechanism (Teflon®)
16	Pressure gauge	-1 to 1 barg

***In addition to particulate filter fitted components**



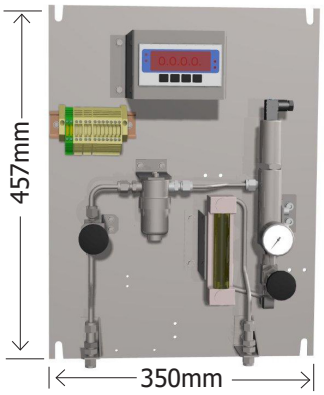


Optional Dew-Point Measurement Device

	Components used	Specifications
17	Monitor *(to be ordered separately)***	Refer to Monitor datasheet
18	Dew-Point Transmitter *(to be ordered separately)***	Refer to Transmitter datasheet

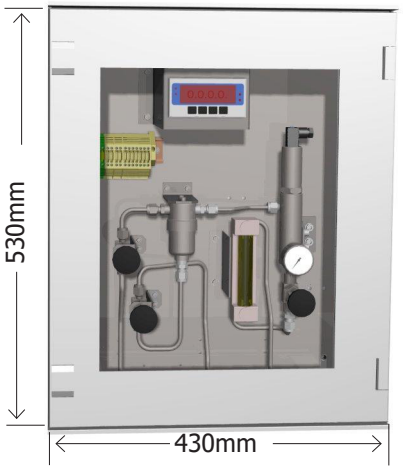
1.8 Enclosure Configurations

Base Plate



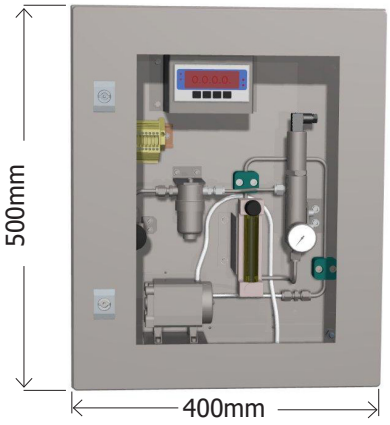
2mm (D)

GRP Enclosure



200mm (D)

Stainless Steel Enclosure



200mm (D)

2 INSTALLATION

2.1 Sampling System Installation

It is essential that the connection of electrical and gas supplies to this instrument be undertaken by competent personnel.

Relevant sections of this manual must be read in full before commencing measurement (see below).

2.1.1 Relevant Manual Section for Installation

Please check below for the relevant product code structure and select the manual section associated with the sampling system ordered.

NOTE: Compare the 2nd (Feature B - filter) and 4th (Feature D - pressure) option from the ordered ES20 CSS product code with the table below:

Section 2.2	Section 2.3	Section 2.4
B1 - D1 Process or Atmospheric Pressure	B2 - D1 Process or Atmospheric Pressure	B1 - D2 Vacuum Pressure

2.2 Process or Atmospheric Pressure With Particulate Filter

NOTE: All other options from the product configuration have no effect on the operation described in this Section.

2.2.1 Mounting Details

The ES20 CSS base plate or enclosure is designed to be wall-mounted. It should be rigidly mounted vertically in a position free from high vibration levels and shaded from direct sunlight.

Dimensional drawings are shown in Section 1.8.

2.2.2 Gas Connections

Gas connections to the ES20 CSS are via 6mm or ¼" Swagelok® tube fittings located at the base of the mounting plate or enclosure.

Connections are marked as follows:

GAS IN	Sample gas entry point with a maximum supply pressure of 20 barg (145 psig)
GAS OUT	Sample gas exit point

Care must be taken to ensure that the outlet isolation valve is not fully closed.

2.2.3 Electrical Connections

All electrical connections should be made to the terminal rail supplied in the sampling system.

For GRP and SS housing versions - all cables to or from the sampling system should go through the M20 plastic cable glands provided at the base of the enclosure.

2.2.4 Power Supply

NOTE: Refer to the label on the terminal rail for the supply voltage required by the sampling system.

Go to Section 2.5 - Dew-Point Measurement System.

2.3 Process or Atmospheric Pressure With Coalescing Filter

NOTE: All other options from the product configuration have no effect on the operation described in this Section.

2.3.1 Mounting Details

The ES20 CSS base plate or enclosure is designed to be wall-mounted. It should be rigidly mounted vertically in a position free from high vibration levels and shaded from direct sunlight.

Dimensional drawings are shown in Section 1.8.

2.3.2 Gas Connections

Gas connections to the ES20 CSS are via 6mm or ¼" Swagelok® tube fittings located at the base of the mounting plate or enclosure.

Connections are marked as follows:

GAS IN	Sample gas entry point with a maximum supply pressure of 20 barg (145 psig)
GAS OUT	Sample gas exit point

Care must be taken to ensure that the outlet isolation valve is not fully closed.

2.3.3 Drainage Connections

Drainage connections to the ES20 CSS are via 6mm or ¼" Swagelok® tube fittings located at the base of the mounting plate or enclosure.

2.3.4 Electrical Connections

All electrical connections should be made to the terminal rail supplied in the sampling system.

For GRP and SS housing versions - all cables to or from the sampling system should go through the M20 plastic cable glands provided at the base of the enclosure.

2.3.5 Power Supply

NOTE: Refer to the label on the terminal rail for the supply voltage required by the sampling system.

Go to Section 2.5 - Dew-Point Measurement System.

2.4 Vacuum Pressure With Particulate Filter

NOTE: All other options from the product configuration have no effect on the operation described in this Section.

2.4.1 Mounting Details

The ES20 CSS base plate or enclosure is designed to be wall-mounted. It should be rigidly mounted vertically in a position free from high vibration levels and shaded from direct sunlight.

Dimensional drawings are shown in Section 1.8.

2.4.2 Gas Connections

Gas connections to the ES20 CSS enclosure are via 6mm or ¼" Swagelok® tube fittings located at the base of the mounting plate or enclosure.

Connections are marked as follows:

GAS IN	Sample gas entry point with a maximum supply pressure of 1 bara (14.5 psia)
GAS OUT	Sample gas exit point

Care must be taken to ensure that the outlet isolation valve is fully open.

2.4.3 Electrical Connections

All electrical connections should be made to the terminal rail supplied in the sampling system.

For GRP and SS housing versions - all cables to or from the sampling system should go through the M20 plastic cable glands provided at the base of the enclosure.

2.4.4 Power Supply

NOTE: Refer to the label on the terminal rail for the supply voltage required by the sampling system.

Go to Section 2.5 - Dew-Point Measurement System.

The following procedures must be carried out by a qualified installation engineer.

2.5 Dew-Point Measurement System

The dew-point measurement system is **NOT** supplied as standard.

A dew-point measurement system can be obtained by contacting your local distributor or Michell Instruments (see www.michell.com for details).

NOTE: Refer to the relevant installation sections from the manual supplied with Michell's dew-point measurement system.

2.6 Monitor Installation

The monitor is **NOT** supplied as standard.

A monitor can be obtained by contacting your local distributor or Michell Instruments (see www.michell.com for details).

NOTE: Refer to the relevant sections from the manual supplied with Michell's monitor.

2.7 Process Connection

The following procedures must be carried out by a qualified installation engineer.

2.7.1 Transmitter Connection

The transmitter cable is **NOT** supplied as standard.

A cable can be obtained by contacting your local distributor or Michell Instruments (see www.michell.com for details).

NOTE: Please refer to the relevant sections from the manual supplied with Michell's product, e.g. Easidew Online.

2.7.2 Monitor Connection

Note: Please refer to the relevant sections from the manual supplied with Michell's product, e.g. Easidew Online or Easidew monitor.

2.7.3 Terminal Rail Connection

The transmitter cable can be directly connected to the terminal rail. In order to do that, refer to terminal markings.

The transmitter requires a 12 to 28 V supply.

Make sure that the correct power supply is provided, otherwise the transmitter can be damaged.

3 OPERATION

3.1 Sampling Start-Up Procedure

The ES20 CSS is designed for continuous operation.

Immediately after the power is applied, all the electronic components, including the dew-point transmitter, will begin operation and all measured output signals can be viewed on a fitted monitor or wired to other receivers from the terminal rail.

It is essential that the connection of electrical and gas supplies to this instrument be undertaken by competent personnel.

Relevant sections of this manual must be read in full before commencing measurement (see below).

3.1.1 Relevant Manual Section for Operation

Please check below for the relevant product code structure and select the manual section associated with the sampling system ordered.

NOTE: Compare the 2nd (Feature B - filter) and 4th (Feature D - pressure) option from the ordered ES20 CSS product code with the table below:

Section 3.2	Section 3.3	Section 3.4	Section 3.5	Section 3.6
B1 - D1 Process Pressure with Particulate Filter	B2 - D1 Process Pressure with Coalescing Filter	B1 - D1 Atmospheric Pressure with Particulate Filter	B2 - D1 Atmospheric Pressure with Coalescing Filter	B1 - D2 Vacuum Pressure with Particulate Filter

3.2 Process Pressure With Particulate Filter

NOTE: All other options from the product configuration have no effect on the operation described in this Section.

3.2.1 Sample Flow 'Start-Up' Procedure

Proceed as follows:

1. Ensure the outlet isolation valve is fully **CLOSED.**
2. Open the inlet isolation valve slowly, making sure that the pressure indicated on the pressure gauge does not exceed the maximum operational pressure of 20 barg (290 psig). If achievable, ensure that the inlet isolation valve is fully **OPEN**.
3. Adjust the outlet isolation valve, setting the sample gas flow rate to approximately 5 Nl/min (10.6 scfh) (indicated on the flowmeter).
4. Allow the sample gas to purge the system for the period of time indicated in the Good Measurement Practice Section (Stabilization Times).

3.3 Process Pressure with Coalescing Filter

NOTE: All other options from the product configuration have no effect on the operation described in this Section.

3.3.1 Sample Flow 'Start-Up' Procedure

Proceed as follows:

1. Ensure the outlet and drain isolation valves are fully **CLOSED**.
2. Open the inlet isolation valve slowly, making sure that the pressure indicated on the pressure gauge does not exceed the maximum operational pressure of 20 barg (290 psig). If achievable, ensure that the inlet isolation valve is fully **OPEN**.
3. Adjust the outlet isolation valve, setting the sample gas flow rate to approximately 5 Nl/min (10.6 scfh) (indicated on the flowmeter).
4. If necessary adjust the drain isolation valve to release excessive amount of liquids from the filter housing.

   NOTE: If required the drain isolation valve can be slightly OPEN. It may be necessary to adjust the inlet and outlet isolation valves to achieve normal operating conditions.

5. Allow the sample gas to purge the system for the period of time indicated in the Good Measurement Practice Section (Stabilization Times).

3.4 Atmospheric Pressure with Particulate Filter

NOTE: All other options from the product configuration have no effect on the operation described in this Section.

3.4.1 Sample Flow 'Start-Up' Procedure

Proceed as follows:

1. Ensure the outlet isolation valve is fully **OPEN.**
2. Open the inlet isolation valve making sure that the sample gas flow rate is set to approximately 5 Nl/min (10.6 scfh) (indicated on the flowmeter).
3. Allow the sample gas to purge the system for the period of time indicated in the Good Measurement Practice Section (Stabilization Times).

3.5 Atmospheric Pressure with Coalescing Filter

NOTE: All other options from the product configuration have no effect on the operation described in this Section.

3.5.1 Sample Flow 'Start-Up' Procedure

Proceed as follows:

1. Ensure the outlet is fully **OPEN** and drain isolation valves are fully **CLOSED**.
2. Open the inlet isolation valve making sure that the sample gas flow rate is set to approximately 5 Nl/min (10.6 scfh) (indicated on the flowmeter).
3. If necessary adjust the drain isolation valve to release excessive amount of liquids from the filter housing.

   NOTE: After adjusting the drain isolation valve it may be necessary to adjust the inlet valve to achieve normal operating conditions

4. Allow the sample gas to purge the system for the period of time indicated in the Good Measurement Practice Section (Stabilization Times).

3.6 Vacuum Pressure With Particulate Filter

NOTE: All other options from the product configuration have no effect on the operation described in this Section.

3.6.1 Sample Flow 'Start-Up' Procedure

Proceed as follows:

1. Ensure that the control valve located on the top of the flowmeter is fully **OPEN** by turning fully counter-clockwise (valve is designed for flow adjustment only, not intended to be used as a shut-off valve).
2. Slowly open the inlet isolation valve making sure that pressure indicated on the pressure gauge is within -0.33 barg (-4.7 psig) and 0 barg (0 psig). If achievable, ensure that the inlet isolation valve is fully **OPEN.**

   Note: Ensure that the pressure indicated on the pressure gauge is showing a vacuum and that the flowmeter is not operating. If this is not the case DO NOT switch on the pump.

3. Set the valve on the flowmeter to half way (clockwise to **CLOSE**). Switch on the pump by turning on the power to it. This will allow the sample gas to flow through the system.
4. By adjusting the control valve located on the flowmeter, set the sample gas flow rate to approximately 5 Nl/min (10.6 scfh).
5. Allow the sample gas to purge the system for the period of time indicated in the Good Measurement Practice Section (Stabilization Times).

4 GOOD MEASUREMENT PRACTICE

This section is for general reference, as the ES20 is a full or partial sampling system. The ES20 CSS is designed to operate in a flowing gas stream and is suitable for the measurement of the moisture content of a wide variety of gases. In general, if the gas (in conjunction with water vapor) is not corrosive to ceramics or base metals then it will be suitable for measurement by the ES20 CSS.

The system is designed for operation with sample gas flow rates of 1-5 Nl/min (sample block). Ideally, the flow rate should be set-up between 4 and 6 Nl/min. Flow regulation is provided within the ES20 CSS. Always use high quality valve gear, coupling connections and pipework.

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

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

Flow Rates

Theoretically flow rate has no direct effect on the measured moisture content, but in practice it can have unanticipated effects on response speed and accuracy. The optimal flow rate varies depending on the measurement technology, and can always be found in the instrument or sensor manual.

An inadequate flow rate can:

- Accentuate adsorption and desorption effects on the gas passing through the sampling system.
- Allow pockets of wet gas to remain undisturbed in a complex sampling system, which will then gradually be released into the sample flow.
- Increase the chance of contamination from back diffusion: ambient air that is wetter than the sample can flow from the exhaust back into the system. A longer exhaust (sometimes called a pigtail) can also help alleviate this problem.
- Slow the response of the sensor to changes in moisture content.

An excessively high flow rate can:

- Introduce back pressure, causing slower response times and unpredictable effects on equipment such as humidity generators.
- Result in a reduction in depression capabilities in chilled mirror instruments by having a cooling effect on the mirror. This is most apparent with gases that have a high thermal conductivity such as hydrogen and helium.

Stabilization Times

Suitable stabilization periods should be allowed before taking the final sensor count.

Allow the sample tubing and filter to purge to the following stabilization times (as a minimum requirement):

Dew-Point Temperature °Cdp	Minimum Stabilization Time
-100	5 days
-90	12 hours
-80	10 hours
-70	8 hours
-60	4 hours
-50	2 hours
-40	1 hour
-30	1 hour
-20	1 hour
-10	1 hour
0	1 hour
+10	1 hour
+20	1 hour

5 MAINTENANCE

5.1 General Maintenance Guidelines

Routine maintenance of the sampling system is confined to filter element replacement and regular recalibration of the dew-point transmitter.

5.2 Filter Element Maintenance

The composition of the gas determines the frequency of the filter element replacement, i.e. liquid and particulate contaminates, corrosive elements etc.

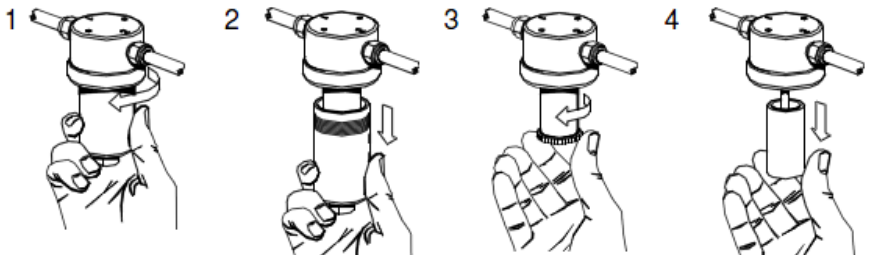
A disposable filter element continues to filter at its original efficiency as long as it is kept in service. The life of the element is determined by the increase in flow resistance caused by trapped solids in the element. The element should be changed when the flow falls below an acceptable level, or the pressure drop becomes too high. In any case the element should be replaced before the pressure drop across it reaches 0.7 barg (10.2 psig). The disposable filter elements cannot be cleaned as the solids are trapped within the depth of the element not on the surface.

5.2.1 Particulate Filter Maintenance

To replace the particulate filter element (Michell part SSF-PF-10PK (pack of 10)), proceed as follows:

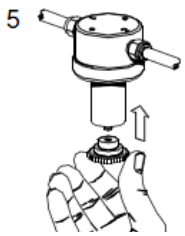
1. Switch off the pump (if fitted) and isolate any gas supplies to the sampling system.

   NOTE: Wear protective gloves when handling the filter housing.

2. 

   Remove the bowl (1,2), element retainer (3) and filter element (4).

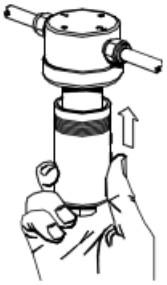
   NOTE: In order to untighten the bowl a spanner/wrench may be needed.



Disposable and sintered PTFE filter elements are sealed by compression against a flat surface (5). Gaskets are not required between the filter element and components of the housing. The element is located by guides which fit the inside diameter of the tube at each end.

The filter tube is securely sealed by tightening the element retainer a 1/4 to 1 turn after it first contacts the filter element, the amount will depend on the housing type and element size. A mark on the end of the retainer is used as a guide.

3. Before replacing the housing bowl ensure that the mating threads and sealing faces are clean and damage free. It is recommended that the threads and sealing faces are lubricated with a small amount of silicone grease before assembly.



4. Re-connect the tube with its fitting to its original configuration.

5. Resume normal system operation by opening up the gas supplies to the sampling system as described in the relevant section of the Start-up Procedures (Section 3).

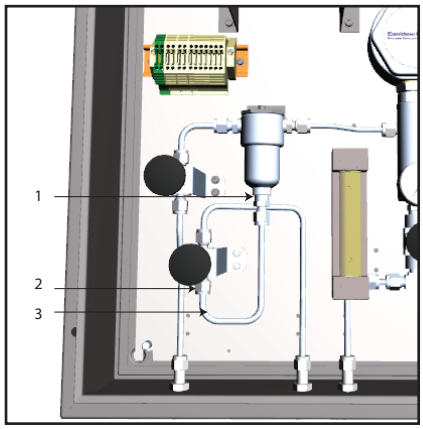
5.2.2 Coalescing Filter Maintenance

To replace the coalescing filter element (Michell part SSF-CF-10PK (pack of 10)), proceed as follows:

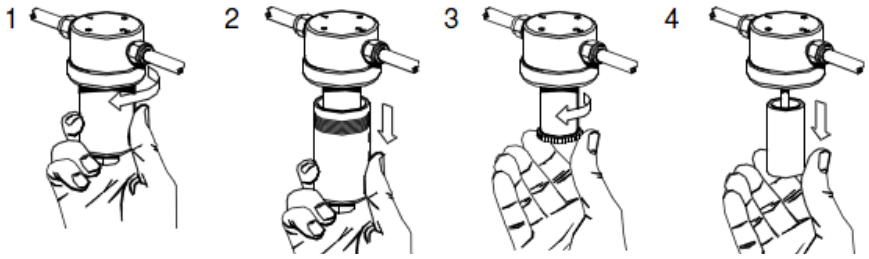
1. Isolate any gas supplies to the sampling system.

   NOTE: Wear protective gloves when handling the filter housing.

2. Unscrew the couplings (1 and 2) on the picture below.

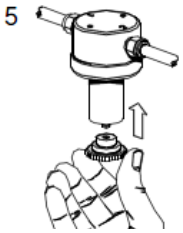


3. Disconnect the tube with its fitting (3).

4. 

   Remove the bowl (1,2), element retainer (3) and filter element (4).

   NOTE: In order to untighten the bowl a spanner/wrench may be needed.

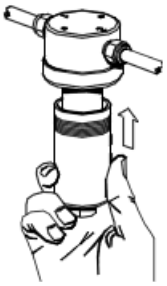


Disposable and sintered PTFE filter elements are sealed by compression against a flat surface (5). Gaskets are not required between the filter element and components of the housing. The element is located by guides which fit the inside diameter of the tube at each end.

The filter tube is securely sealed by tightening the element retainer a 1/4 to 1 turn after it first contacts the filter element, the amount will depend on the housing type and element size. A mark on the end of the retainer is used as a guide.

5. Before replacing the housing bowl ensure that the mating threads and sealing faces are clean and damage free. It is recommended that the threads and sealing faces are lubricated with a small amount of silicone grease before assembly.

6.



Re-connect the tube with its fitting to its original configuration.

7. Resume normal system operation by opening up the gas supplies to the sampling system as described in the relevant section of the Start-up Procedures (Section 3).

5.3 Transmitter Maintenance

Calibration

Routine maintenance of the Easidew transmitter 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 UK National Physical Laboratory (NPL) and the US National Institute of Standards and Technology (NIST) are provided by Michell Instruments.

Michell Instruments offers a variety of re-calibration and exchange sensor schemes to suit specific needs. A Michell representative can provide detailed, custom advice (for Michell Instruments' contact information go to www.michell.com).

Transmitter replacement

The composition of the gas determines the frequency of the transmitter replacement, i.e. liquid and particulate contaminates, corrosive elements, etc.

It is recommended that the transmitter is changed on an annual basis to maintain the accuracy of the system.

Michell Instruments can provide an exchange transmitter. Prior to recalibration being necessary, an exchange transmitter can be ordered from Michell Instruments or any authorized dealer. Once the transmitter and calibration certificate have been received it can be fitted and the original transmitter returned to Michell Instruments.

To replace the transmitter, proceed as follows:

1. Isolate the sampling system from the sample gas supply and switch off all electrical supplies.
2. Unplug the sensor cable, unscrew and withdraw the sensor from the sample block.
3. Fit a new/recalibrated transmitter ensuring the bonded seal is positioned between the sensor and sample block.
4. Plug in the sensor cable and resume normal system operation by opening up the gas supplies to the sampling system in accordance with the relevant section of the Start-up Procedures (Section 3).

Sensor Guard Replacement

Wear protective gloves when handling the sensor guard.

The sensor is supplied with a white HDPE guard (standard) or a stainless steel guard (if specified at time or order). The method of replacement is the same for both types.

HDPE Guard

The HDPE guard provides <10µm protection to the dew-point sensor. It is designed to show any contamination and the guard should be changed if the surface becomes discolored. When replacing the guard, care should be taken to handle the guard by the bottom part only. Replacement guards (EA2-HDPE) - pack of 10 - can be obtained by contacting Michell Instruments (www.michell.com) or your local distributor.

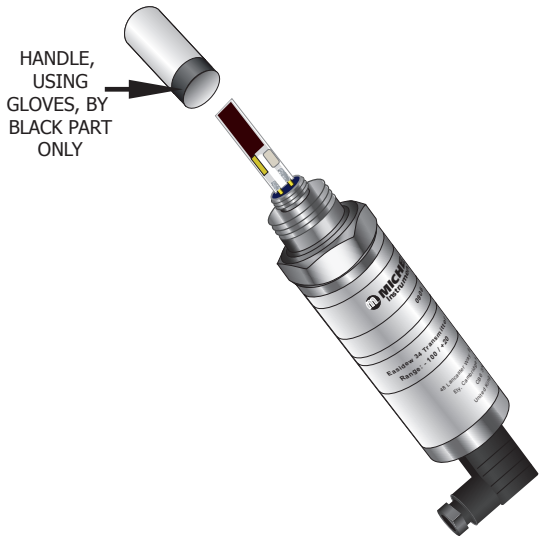


Figure 1 *Replacement of HDPE Guard*

Stainless Steel Guard

The stainless steel guard provides <80µm protection to the dew-point sensor. It is designed to show any contamination and the guard should be changed if the surface becomes discolored.

When replacing the guard, care should be taken to handle the guard by the bottom part only. A replacement guard (SSG) can be obtained by contacting Michell Instruments (www.michell.com) or your local distributor.

Bonded Seal

If the installed bonded seal gets damaged or lost, a pack of 5 replacement bonded seals can be obtained by contacting Michell Instruments, or your local distributor, and quoting part number BS-58-PK5.

Appendix A

Technical Specifications

Appendix A Technical Specifications

Electrical Specifications	
Supply Voltage (Vacuum Pump Only)	230 V AC
Operating Specifications	
Operating Temperature **ES20 fitted with:** Particulate or coalescing filter w/out monitor Particulate or coalescing filter with monitor Vacuum pump with or w/out monitor	 -40 to +60°C (-40 to +140°F) 0 to +50°C (+32 to +122°F) 0 to +40°C (+32 to +104°F)
Compensated Temperature Range:	-20 to +50°C (-4 to +122°F) NOTE: The transmitter accuracy statement is only valid for the temperature range: -20/+50°C (-4 to +122°F)
Storage Temperature:	-40 to +60°C (-40 to +140°F)
Operating Inlet Pressure **ES20 fitted with:** Particulate Filter Coalescing Filter Vacuum Pump	 0 to 20 barg (0 to 290 psig) 0 to 20 barg (0 to 290 psig) -0.3 to 1 barg (-4.7 to 14.5 psig)
Flow Rate	1 to 5 Nl/min (2.1 to 10.6 scfh)
Mechanical Specifications	
Process Connection and Material	Inlet/outlet connections via 6mm or ¼" stainless steel fittings, 316 stainless steel
Ingress Protection No enclosure GRP & SS enclosures	 No protection (base plate only) IP66, NEMA 4X
Housing Material Base plate GRP enclosure SS enclosures	 316 stainless steel Glass fiber reinforced polyester and 4mm safety glass 316 stainless steel and 4mm safety glass
Dimensions Base plate GRP enclosure SS enclosures	 457 x 350 x 2mm (18 x 13.8 x .08") (hxwxd) 530 x 430 x 200mm (20.9 x 16.9 x 7.9") (hxwxd) 500 x 400 x 200mm (19.7 x 15.7 x 7.9") (hxwxd)
Pressure and Flow Control Atmospheric or system pressure Vacuum pressure	 Via isolation valves, pressure gauge and flowmeter Isolation valve, pressure gauge, flowmeter with valve & self-regulating vacuum pump
Gas Filtration	Particulate filter Coalescing filter
Electrical Connections Base plate GRP & SS enclosures	 Via terminal rail Via M20 plastic cable glands
Interchangeability	Fully interchangeable components
Sample Block Process Connection	Compatible with various dew-point transmitters with 5/8" process connection

Compatible Dew-Point Transmitters (5/8" UNF process connection versions only):

- Easidew Transmitter
- Easidew I.S. Transmitter
- Easidew PRO I.S. Transmitter

Appendix B

Quality, Recycling & Warranty Information

Appendix B 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:

- Anti-Facilitation of Tax Evasion Policy
- ATEX Directive
- Calibration Facilities
- Conflict Minerals
- FCC Statement
- Manufacturing Quality
- Modern Slavery Statement
- Pressure Equipment Directive
- REACH
- RoHS3
- WEEE2
- Recycling Policy
- Warranty and Returns

This information is also available in PDF format.

Appendix C

Return Document & Decontamination Declaration

Appendix C 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

http://www.michell.com