



MICHELL
Instruments

PROMET EExd

Process Moisture Analyzer Sampling
Systems

**Installation, Operation &
Maintenance Manual**

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Welcome



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1. OVERVIEW

The PROMET EExd Sampling Systems are designed for continuous on-line measurement and monitoring of the moisture content of a hydrocarbon gas. The sampling systems can be located close to the process gas sample take-off point in a potentially explosive environment designated zone 1 hazardous area.

PROMET Process Moisture Analyzer Sampling Systems are specifically designed for the measurement of moisture content in Natural Gas. The systems are configured with the necessary filtration, pressure letdown and flow control required for measurements at pressure before finally venting to an atmospheric or a low pressure flare line system. A fast-loop bypass flow arrangement is included to reduce sample flow response time lag and enabling the filter to be drained automatically of any potential hydrocarbon liquids and hydrates formed.

Two separate series of sampling systems are available; one designed for the requirements of Trace Moisture applications such as molecular sieve drying at LPG plants and one for the more general moisture measurements in Natural Gas from processing through pipeline transmission. Each of these systems can also be supplied as either 1 or 2 channel systems. The more general Natural Gas systems are supplied with triple filtration consisting of particulate and membrane filter and glycol absorption. For systems intended to measure Trace Moisture levels, single filtration is provided that consists of a stainless steel mesh particulate filter.

The sampling systems gas handling components are supplied mounted on a chassis panel that can be fitted within a stainless steel insulated enclosure. The enclosure provides environmental protection to IP66 and fitted with mounting brackets suitable for wall mounting.

Sampling systems fitted within enclosures are temperature controlled to maintain a constant temperature environment of at least 10 °C above the highest envisaged dew point temperature independent of surrounding temperature variations. The temperature control system consists of a heater controlled by a fixed preset thermostat to provide internal ambient air temperature control of >15 °C. For higher temperature control, systems can be supplied with a heater controlled by an adjustable setpoint thermostat to achieve internal ambient air temperature control up to 60 °C for maintaining more stable measurement conditions for installations in adverse climates.

All sample gas wetted metallic parts in AISI 316L stainless steel with Viton soft parts that comply with the NACE standard MR-01-75 (latest edition). Tube fittings are twin ferrule compression type. All gas and cable entries are located in the base of the enclosure.

Sampling systems can be supplied in various configurations/options:

- Indoor (chassis panel mounted)
- Outdoor (304/316 stainless steel enclosure)
- 1 or 2 channels
- Standard operating pressure (69 barg (1000 psig))
- High operating pressure (138 barg, (2000 psig))
- Enclosure heating (fixed/adjustable control)
- Enclosure cooling (adjustable control)
- Trace heated sample line

Sample System gas handling components comprise of the following:

- Gas Inlet Isolation Valve(s)
(BV1 for 1 channel):
(BV4 for 2 channel):
Allows user to manually isolate the system from the process sample gas supply line for maintenance or servicing.
- Filter(s)

Natural Gas systems
(F1 for 1 channel):
(F4 for 2 channel):
Provides protection from contamination of particulate matter down to 60 microns using a stainless steel sinter filtration.

Natural Gas systems
(F1 for 1 channel):
(F5 for 2 channel):
Provides protection from contamination of liquid carry-over of hydrocarbon mist particles using membrane filtration.

Natural Gas systems
(F3 for 1 channel):
(F6 for 2 channel):
Provides protection from contamination of glycol vapour using a "Glyorb"™ absorption cartridge.

Trace Moisture systems
(F1 for 1 channel):
(F2 for 2 channel):
Provides protection from contamination of particulate matter down to 5 microns using a stainless steel mesh filtration.
- Line Pressure Gauge(s)
(PG1 for 1 channel):
(PG2 for 2 channel):
Indicates the sample gas line pressure.

-
- Process Moisture Analyzer:
(PROMET EExd): Provides measurement and output of moisture content of the sample gas (1 or 2 channels).

 - Sample Flow Letdown Pressure Regulator(s)

Natural Gas systems
(PR1/PR2 for 1 channel):
(PR5/PR6 for 2 channel): Provides pressure letdown from line pressure to a lower vent pressure. Standard version has 1 stage of pressure letdown. High pressure version has 2 stages of pressure letdown.

Trace Moisture systems
(PR1/PR2 for 1 channel):
(PR3/PR4 for 2 channel): Provides pressure letdown from line pressure to a lower vent pressure. Standard version has 1 stage of pressure letdown. High pressure version has 2 stages of pressure letdown.

 - Non Return Valve(s)

Natural Gas systems
(NRV1 for 1 channel):
(NRV3 for 2 channel): Provides protection for the system from backpressure of vent gas when sample gas is not flowing.

Trace Moisture systems
(NRV1 for 1 channel):
(NRV2 for 2 channel): Provides protection for the system from backpressure of vent gas when sample gas is not flowing.

 - Sample Flowmeter & Valve(s)

Natural Gas systems
(FM1 for 1 channel):
(FM3 for 2 channel): Allows the user to manually set and indicate the sample gas flowrate across the moisture analyzer dew point sensor.

Trace Moisture systems

(FM1 for 1 channel):

(FM2 for 2 channel):

Allows the user to manually set and indicate the sample gas flowrate across the moisture analyzer dew point sensor.

- Gas Outlet Isolation Valve(s)

(BV2 for 1 channel):

(BV5 for 2 channel):

Allows the user to manually isolate the system from the gas vent line for maintenance or servicing.

- Gas Letdown Vent Isolation Valve(s)

(BV3 for 1 channel):

(BV6 for 2 channel):

Allows the user to manually letdown any sample gas pressure within the system (depressurise to atmosphere) for maintenance or servicing.

Bypass flow gas handling components (Natural Gas systems only) comprise of the following:

- Bypass Flow Letdown

Pressure Regulator(s)

(PR3/PR4 for 1 channel):

(PR7/PR8 for 2 channel):

Provides pressure letdown from line pressure to a lower vent pressure. Standard version has 1 stage of pressure letdown. High pressure version has 2 stages of pressure letdown.

- Non Return Valve(s)

(NRV2 for 1 channel):

(NRV4 for 2 channel):

Provides protection for the system from backpressure of vent gas when sample gas is not flowing.

- Bypass Flowmeter & Valve(s)

(FM2 for 1 channel):

(FM4 for 2 channel):

Allows the user to manually set and indicate the bypass gas flowrate across the membrane filter.

1.1 Manufacturing Quality

Your sampling system should reach you in perfect working condition. Michell Instruments are registered with the British Standards Institute for Quality Assurance to BS EN ISO 9001: 2000.

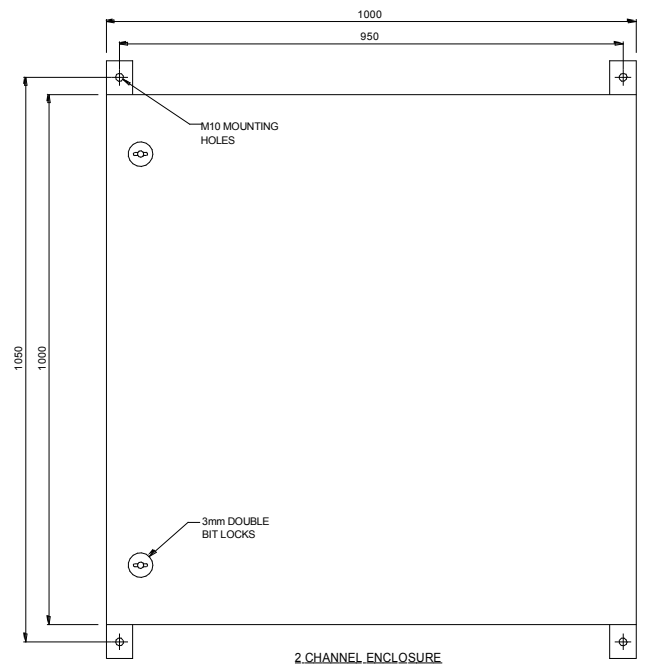
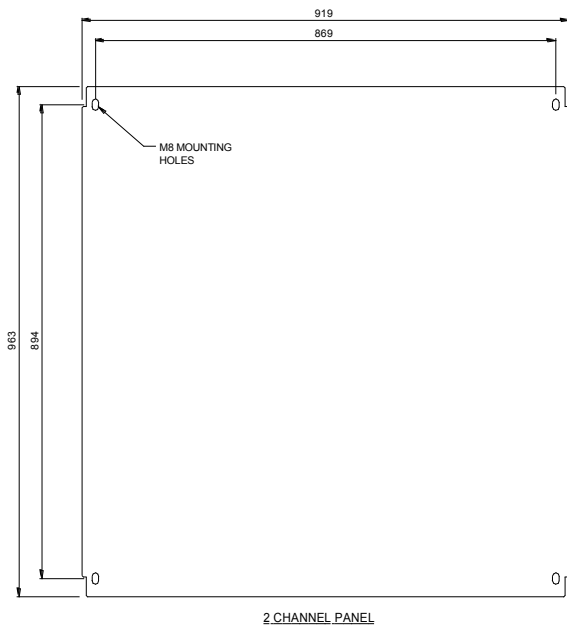
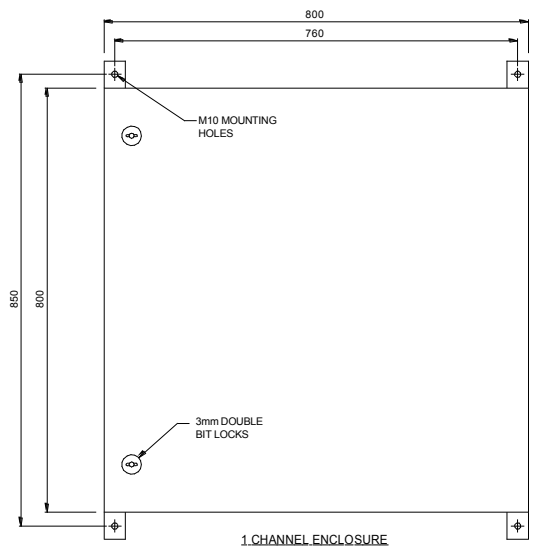
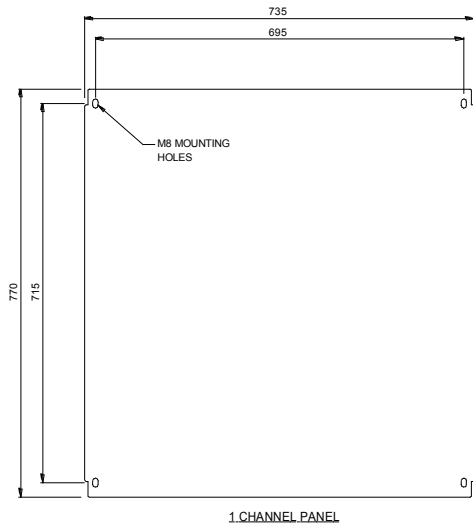
We have rigorous procedures at every stage of production to ensure that the materials of construction, manufacturing, calibration and final test procedures meet the requirements laid down by our Quality System which is approved by BSI.

2. INSTALLATION

Sampling Systems are assembled onto a panel for indoor installations or in a stainless steel enclosure for outdoor installations. All are suitable for wall mounting.

When an outdoor system is supplied the internal insulation and temperature control circuits allow the sampling system to be positioned outside at a point as close to the sample gas take-off point as possible so minimising sample line response time lag in a designated zone 1 hazardous area.

The enclosures provide environmental ingress protection to IP66 and should be mounted vertically and free of any appreciable vibration in a permanently shaded position to prevent heating effects through sun radiation.



2.1 Gas Connections

Note: Ensure that the process sample gas supply line is well flushed through to clear any liquids and debris present prior to connection to the Sampling System.

Connections are as follows:

1. Sample Gas Inlet - 6mm/ ¼" OD *Swagelok* tube fitting.
(standard – 69 barg (1000 psig) maximum pressure or high pressure – 138 barg (2000 psig) maximum.)
2. Sample Gas Outlet - 6mm/ ¼" OD *Swagelok* tube fitting.
(Vent to atmosphere/low pressure flare. 7 barg (100 psig) maximum back pressure).
3. Letdown Gas Vent- 6mm/ ¼" OD *Swagelok* tube fitting.
(Vent to atmosphere.)

2.2 Power Supply Connection

A single-phase ac mains power supply is required to operate the heater circuit and analyzer within the sampling systems.

The factory set power supply voltage is indicated on a yellow label located on the rear panel. The user cannot change the specified power supply voltage.

Cable entry into the sampling system enclosures is through a Ø20 mm clearance hole located in the base of the enclosure. A suitably sized cable gland should be used and if armoured cable is used then this should be terminated at this point. Cable entry into the sampling system panel mounted versions is directly into the 'POWER CIRCUITS' junction box.

Connections are made onto terminals within the 'POWER CIRCUITS' junction box. Cable entry into the junction box is provided through an ISO M20 thread or EExe plastic cable gland.

- | | | |
|---|---|---------|
| 1 Channel version terminals are marked: | 1 | Live |
| | 4 | Neutral |
| | E | Earth |
| 2 Channel version terminals are marked: | 1 | Live |
| | 5 | Neutral |
| | E | Earth |

Note: An M8 earth stud is provided in the base of the enclosures. This must be used to earth the sampling systems. For panel mounted versions earthing connections should be made directly to the Earth Busbar.

2.3 Output Wiring Connections

Cable entry into the sampling system enclosures is through a Ø20 mm clearance hole located in the base of the enclosure. A suitably sized cable gland should be used and if armoured cable is used then this should be terminated at this point. Cable entry into the sampling system panel mounted versions is directly into the 'OUTPUTS' junction box.

Connections are made onto terminals within the 'OUTPUTS' junction box. Cable entry into the junction box is provided through an ISO M20 thread or EExe plastic cable gland.

1 Channel Version wiring connections are as follows:

Terminal No.	Output
1	Channel 1 Process Alarm Relay NC
2	Channel 1 Process Alarm Relay COM
3	Channel 1 Process Alarm Relay NO
4	Channel 1 Analyzer Status Alarm Relay NC
5	Channel 1 Analyzer Status Alarm Relay COM
6	Channel 1 Analyzer Status Alarm Relay NO
7	Not Used
8	Not Used
9	Not Used
10	Not Used
11	Not Used
12	Not Used
13	MODBUS digital Comms B
14	MODBUS digital Comms A
15	MODBUS digital Comms Earth
16	Channel 1 Moisture measurement current +mA
17	Channel 1 Moisture measurement current -mA
18	Channel 1 Pressure measurement current +mA
19	Channel 1 Pressure measurement current -mA
20	Not Used
21	Not Used
22	Not Used
23	Not Used
E	Screen

2 Channel Version wiring connections are as follows:

Terminal No.	Output
1	Channel 1 Process Alarm Relay NC
2	Channel 1 Process Alarm Relay COM
3	Channel 1 Process Alarm Relay NO
4	Channel 1 Analyzer Status Alarm Relay NC
5	Channel 1 Analyzer Status Alarm Relay COM
6	Channel 1 Analyzer Status Alarm Relay NO
7	Channel 2 Process Alarm Relay NC
8	Channel 2 Process Alarm Relay COM
9	Channel 2 Process Alarm Relay NO
10	Channel 2 Analyzer Status Alarm Relay NC
11	Channel 2 Analyzer Status Alarm Relay COM
12	Channel 2 Analyzer Status Alarm Relay NO
13	MODBUS digital Comms B
14	MODBUS digital Comms A
15	MODBUS digital Comms Earth
16	Channel 1 Moisture measurement current +mA
17	Channel 1 Moisture measurement current -mA
18	Channel 1 Pressure measurement current +mA
19	Channel 1 Pressure measurement current -mA
20	Channel 2 Moisture measurement current +mA
21	Channel 2 Moisture measurement current -mA
22	Channel 2 Pressure measurement current +mA
23	Channel 2 Pressure measurement current -mA
E	Screen

3. OPERATION

Operation of the PROMET EExd Sampling Systems should be carried out in conjunction with and referring to the PROMET EExd Process Moisture Analyzer Users Guide prior to commencing system start-up procedure.

Before commencing the start up procedure it is essential to ensure the installation conforms to the correct Hazardous area and local plant standards.

Check all cables are according to certificated approved specifications and as a minimum are as described below:

Minimum Cable Requirements	
Power Cable	3 core, 0.75 mm ² conductor area (6A)
Communications Cable	Communications: For use with 4-20mA only or Modbus only - 2 pairs, 0.5 mm ² conductors and with an overall braided screen.
Communications Cable	For use with 4-20mA and Modbus - 4 pairs individually screened, 0.5 mm ² conductors and with a overall braided screen.

There is a mandatory purge procedure stipulated as part of the hazardous area certification of the PROMET EExd product. This procedure must be fully carried out prior to any power or signal connections to the PROMET EExd being energised.

This procedure must also be carried out at any time following service or maintenance periods that causes any of the PROMET EExd or associated gas handling equipment sample lines to be disconnected.

It is not necessary to carry out this procedure if, during a shut down period, the sample lines have not been disconnected, or if the power or signal connections only have been disconnected.

Before commencement of the start-up procedure ensure that all power and signal connections to the PROMET EExd flameproof enclosure are fully isolated and if necessary observe the stipulated de-energisation period of 45 minutes.

Before any gas pressure is applied, check all gas inlet & outlet connections are fully tightened up and that all valves and regulators are in the closed position.

BEFORE power is applied to the sampling system check that the PROMET EExd Power Isolator switch is set to the OFF position.

Apply power to the sampling system and allow the temperature within the enclosure to stabilise. This will prevent the possibility of condensation occurring within the gas handling components during start-up.

3.1 Start-Up Procedure

1. Close the Letdown Gas Vent Isolation Valve (BV3 for 1 channel and BV6 for 2 channel).
2. Open the Gas Outlet Isolation Valve (BV2 for 1 channel and BV5 for 2 channel).
3. Open the Gas Inlet Isolation Valve (BV1 for 1 channel and BV4 for 2 channel).
4. Fully open the Sample Flow Letdown Pressure Regulator (PR1 for 1 channel and PR5 for 2 channel) and if the high pressure option is fitted then also fully open the Letdown Pressure Regulator (PR2 for 1 channel and PR6 for 2 channel).
5. Adjust the Sample Flowmeter & Valve (FM1 for 1 channel and FM3 for 2 channel) to indicate a gas flowrate of approximately 0.2 m³/h (3.3 L/min).
6. For Natural Gas systems only! Fully open the Bypass Flow Letdown Pressure Regulator (PR3 for 1 channel and PR7 for 2 channel) and if the high pressure option is fitted then fully open the Letdown Pressure Regulator (PR4 for 1 channel and PR8 for 2 channel).
7. For Natural Gas systems only! Adjust the Bypass Flowmeter & Valve (FM2 for 1 channel and FM4 for 2 channel) to indicate a gas flowrate of approximately 0.36 m³/h (6 L/min).
8. Switch on the power to the PROMET EExd Process Moisture Analyzer using the PROMET EExd Power Isolator switch located on the 'Power Circuits' junction box.
9. Close the enclosure door and allow the temperature to stabilise for at least one hour before monitoring a measurement.

3.2 Shut-Down Procedure

Note: There is a mandatory de-energisation time period of 45 minutes stipulated in the certification of the PROMET EExd product. This special condition must be fully carried out prior to removing the cover of the PROMET EExd flameproof enclosure.

Proceed as follows:

1. Isolate the sampling system from the process sample gas supply line by CLOSING the Gas Inlet Isolation Valves (BV1 for 1 channel and BV4 for 2 channel).
2. Allow a short period of time (say 3 minutes) for the sampling system to vent/depressurise.
3. Isolate the sampling system from the gas vent/flare line by CLOSING the Gas Outlet Isolation Valve (BV2 for 1 channel and BV5 for 2 channel).
4. Fully depressurise the sampling system by OPENING the Gas Letdown Vent Isolation Valve (BV3 for 1 channel and BV6 for 2 channel).

4. OPTIONS

4.1 Enclosure Heater Temperature Control

Sampling systems fitted within enclosures are temperature controlled to maintain a constant temperature environment of at least 10°C above the highest envisaged dew point temperature independent of surrounding temperature variations. The temperature control system as standard consists of a heater controlled by a fixed preset thermostat to provide internal ambient air temperature control of >15°C.

As an option the temperature control system can be supplied with a heater controlled by an adjustable setpoint thermostat to achieve internal ambient air temperature control up to 60°C for maintaining more stable measurement conditions for installations in adverse climates.

The capillary tube thermostat marked 'Enclosure Heater Thermostat' contains an adjustment screw for the temperature control set point (factory set to approximately 25°C) to maintain an ambient air temperature >20°C.

***WARNING** this operation will expose electrical parts operating at high voltage therefore isolate power supply from sampling system and if necessary ascertain that no Explosive Gas Atmosphere is present before making adjustments.*

To adjust the setting proceed as follows:

1. Unscrew and remove the cover of the thermostat box.
2. Turn an adjustment screw pointer located inside, clockwise to increase and anti-clockwise to decrease the temperature set point.
3. The temperature markings around the adjustment screw pointer equate to the approximate temperature values for the heater of 0 °C to 60 °C.
4. After adjustment is complete replace the cover of the thermostat box.

***WARNING:** The thermostat setting should not be increased such that the internal temperature of the sampling system rises above 60°C which is the maximum permitted ambient temperature (T_{amb}) of the certified PROMET EExd Analyzer.*

4.2 Trace Heated Sample Line

As an option a trace heated sample line can be supplied with sampling systems to ensure the sample gas temperature from the process take-off point to the analyzer is maintained at a constant temperature of at least 10 °C above the highest envisaged dew point temperature independent of surrounding temperature variations.

The trace heated sample line consists of 6mm OD 316L stainless steel seamless tube and BSX™ self-regulating heating cable with non-hygroscopic glass fibre insulation and polymer outer jacket.

The self-regulating heat output of BSX™ cable varies in response to the surrounding conditions along the entire length of a circuit. Whenever the heat loss increases (as ambient temperature drops), the heat output of the cable increases. Conversely when the heat loss decreases (as ambient temperature rises), the cable reacts by reducing its heat output. BSX™ cables are approved/certified for use in zone 1 & 2 (category 2 & 3) classified areas.

The trace heated sample line is connected directly onto the Gas Inlet Isolation Valve (via bulkhead entry seal gland when fitted to an enclosure) within the sampling systems and the heating cable is terminated onto terminals within the 'POWER CIRCUITS' junction box. Cable entry into the junction box is provided through an M25 EExe plastic cable gland.

1 Channel version terminals are marked:

2	Live (either conductor – no polarity)
5	Neutral (either conductor– no polarity)
E	Earth (green/yellow conductor)

2 Channel version terminals are marked:

2 & 3	Live (either conductor – no polarity)
6 & 7	Neutral (either conductor– no polarity)
E	Earth (green/yellow conductor)

4.3 Enclosure Cooling

As an option an enclosure cooling kit can be fitted to the stainless steel enclosure. The cooling device is a Vortex tube driven by instrument grade (liquid and particulate free) compressed air. An adjustable preset thermostat controls a solenoid valve permitting the flow of compressed air through the vortex tube. A manifold (clear plastic pipe) positioned around the internal walls of the enclosure distributes the cooling air throughout.

The cooling thermostat operates when the internal temperature within the enclosure rises above 40°C and falls below 30°C – switches on and off respectively.

Operation of the enclosure cooling system is fully automatic once a compressed air and mains power supply are provided then no further adjustment is required.

5. MAINTENANCE

WARNING *This system operates under high pressure. Isolate and depressurise the sampling systems before attempting any maintenance or servicing.*

Maintenance of the PROMET EExd Process Moisture Analyzer Sampling System should be done in conjunction with the maintenance instructions of the PROMET EExd Process Moisture Analyzer Users Guide prior to commencing any maintenance.

Routine maintenance of the system is confined to filter element replacements.

5.1 Membrane Filter Element Replacement

Used on Natural Gas systems only!

Life expectancy of the filter element is dependent upon operating conditions in each specific application. As a minimum, it is recommended that the membrane filter element be changed every 12 months. If inspection of the removed element shows that it is in poor/good condition after 12 months operation then the operating period between replacements may be reduced/increased accordingly.

To replace the membrane filter element, proceed as follows:

1. Isolate the sampling system from the gas supply in accordance with the System Shutdown Procedure.
2. Unscrew and remove the filter head from the body of the filter (F2).
3. Remove and discard the o-ring and membrane.
4. Refit a new membrane and o-ring (*Michell Part No. PTS-MFE*).
5. Replace the filter head back into the body of the filter until it reaches the mechanical stop. – Do Not Use a Spanner/Wrench!
6. Resume normal system operation in accordance with the System Start-Up Procedure.

5.2 Glycol Absorption Cartridge Replacement

Used on Natural Gas systems only!

Life expectancy of the absorption cartridge is dependent upon operating conditions in each specific application. As a minimum, it is recommended that the glycol absorption cartridge be changed every 1 month. If inspection of the removed cartridge shows that it is in poor/good condition after 1 months operation then the operating period between replacements may be reduced/increased accordingly.

To replace the glycol absorption cartridge, proceed as follows:

1. Isolate the sampling system from the gas supply in accordance with the System Shutdown Procedure.
2. Unscrew and remove the filter bowl from the body of the filter (F3).
3. Remove and discard the black glycol filter cartridge.
4. Refit a new glycol filter cartridge (*Michell Part No. PTS-GAC*).
5. Replace the filter bowl back into the body of the filter until it reaches the mechanical stop.
6. Resume normal system operation in accordance with the System Start-Up Procedure.

5.3 Particulate Filter Element Replacement

Used on Natural Gas systems only!

Life expectancy of the filter element is dependent upon operating conditions in each specific application. As a minimum, it is recommended that the membrane filter element be changed every 12 months. If inspection of the removed element shows that it is in poor/good condition after 12 months operation then the operating period between replacements may be reduced/increased accordingly.

To replace the particulate filter element, proceed as follows:

1. Isolate the sampling system from the gas supply in accordance with the System Shutdown Procedure.
2. Unscrew and remove the filter hex nut from the body of the filter (F1) - *Take care not to lose the spring inside the nut!*
3. Carefully prise out the sintered filter element from the filter body and clean/discard the filter element.
4. Push fit a cleaned/new filter element (*Michell Part No. CD2-PFE*).
5. Replace the filter hex nut back onto the body of the filter until it reaches a mechanical stop by hand – Tighten (nip) up with a spanner/wrench - *Ensure the spring is present inside the nut!*
6. Resume normal system operation as described in the System Start-Up Procedure.

Used on Trace Moisture systems only!

Life expectancy of the filter element is dependent upon operating conditions in each specific application. As a minimum, it is recommended that the particulate filter element be changed every 12 months. If inspection of the removed element shows that it is in poor/good condition after 12 months operation then the operating period between replacements may be reduced/increased accordingly.

To replace the particulate filter element, proceed as follows:

1. Isolate the sampling system from the gas supply in accordance with the System Shutdown Procedure.
2. Unscrew and remove the filter bowl from the body of the filter (F1).
3. Remove and clean/discard the filter element.
4. Refit a new filter element (*Michell Part No. PTS-PFE*).
5. Replace the filter bowl back into the body of the filter until it reaches the mechanical stop.
6. Resume normal system operation as described in the System Start-Up Procedure.

6. TECHNICAL SPECIFICATION

Gas Wetted Materials:	316L stainless steel with Viton soft parts.
Sample Gas:	Hydrocarbon/Natural Gas
Sample Gas Pressure:	Standard – 1 to 69 barg (1000psig) High pressure – 1 to 138 barg (2000psig)
Sample Gas Flowrate:	Range 0-0.4 m ³ /h (0 to 6.66 L/min). (0.2 m ³ /h (3.3 L/min) nominal setting)
Bypass Gas Flowrate: (Natural Gas systems)	Range 0-0.4 m ³ /h (0 to 6.66 L/min). (0.36 m ³ /h (6 L/min) nominal setting)
Filters:	Membrane – type 5 microporous polymer with liquid block. Glycol – ‘Ultra Glysorb’ proprietary absorbent material. Particulate – 60 micron stainless steel sinter or 5 micron woven stainless steel micromesh.
Enclosures:	304/316 stainless steel fitted with wall mounting brackets. (Ingress protection rated to IP66/NEMA 4)
Enclosure Heating:	Standard – 100W heater with preset 20°C set point thermostat. (1 heater for 1 Channel, 2 heaters for 2 Channel) Optional – Adjustable (0-60°C) set point thermostat.
Sample Gas Connections:	6 mm / ¼ " OD <i>Swagelok</i> twin ferrule tube fittings.
Cable Entries:	Ø 20 mm clearance holes in base of enclosures. ISO M20 threads or plastic EExe cable glands (9-13 mm cable) in junction boxes.
Power Supply:	110-120 VAC 60 Hz <u>OR</u> 220-240 VAC 50 Hz
Power Consumption:	300 Watt max. for 1 channel, 500 W max. for 2 channel
Operating Temperature:	-20 to +60°C <95%RH
Weight:	60 Kg max. for 1 channel, 90 Kg max. for 2 channel
Enclosure Cooling: (Optional)	Compressed air via Vortex tube controlled by adjustable set point thermostat. Maximum cooling capacity = 410W @ internal temp of 35°C and external temp of 55°C with maximum air input temperature of 40°C.
Heat Traced Sample Line: (Optional)	6mm / ¼ " OD 316L stainless steel seamless tube and BSX™ self-regulating heating cable (15 Watt/metre) with non-hygroscopic glass fibre insulation and polymer outer jacket (supplied by Thermon type Cellex®Tubetrace®)

APPENDIX A CONTACT DETAILS

For Customer Service, please feel free to contact us via our website: www.michell.com