

醫用氣體常用分析儀器之驗證與維護

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Compiled by Sean Kuo SEP. 2011, version A

MEDICAL GAS ANALYSIS & QUALITY CONTROL SYSTEM (MGAQ)

醫療氣體分析和品質控制系統



Compiled by Sean Kuo Oct. 2010, version A

MEDICAL GAS ANALYSIS & QUALITY CONTROL (MGAQ)

醫療氣體分析和品質控制系統

- 透過醫療氣體分析和品質控制系統(MGAQ)和軟體可分析，收集資料和醫療氣體品質確認和控制，在生產控管達到最低的操作錯誤和提升醫療氣體品質。
- 設計可有全自動解決方案或手動方式，透過軟體和自動化控制可全自動進行分析並列印分析證明書 (COA)。
- 設計注重於使用最少的樣品氣體提供最有效快速的分析結果，並提供使用者可完全追溯的品質控管功能。
- 以下是依循歐洲藥典和美國藥典建議各類醫療氣體分析儀。

OXYGEN (O₂) 氧氣

分析氣體	濃度	分析儀
O ₂	>99.5%	Paramagnetic 順磁
CO ₂	<300 ppm	Infrared 紅外線
CO	<5 ppm	Infrared 紅外線
H ₂ O	<67 ppm	Electrolytic Hygrometer 電化學式溼度計

MEDICAL AIR 醫療空氣

分析氣體	濃度	分析儀
O2	20.4-21.4%	Paramagnetic 順磁
CO2	<500 PPM	Infrared 紅外線
CO	<5 PPM	Infrared 紅外線
SO2	< 1 PPM	UV Fluorescence 紫外線螢光
OIL	<0.1 mg/M3	Oil Detector Tube 油質測試管
NO&NO2	<2 PPM TOTAL	Chemiluminescence 化學發光
H2O	<67 PPM	Electrolytic Hygrometer 電化學式溼度計

NITROUS OXIDE (N2O) 一氧化氮

分析氣體	濃度	分析儀
N2O	>98%	Infrared 紅外線
CO2	<500 PPM	Chromatograph 氣像層析
CO	<5 PPM	Chromatograph 氣像層析
NO&NO2	<2 PPM TOTAL	Chemiluminescence 化學發光
H2O	<67 PPM	Electrolytic Hygrometer 電化學式溼度計

CARBON DIOXIDE (CO2) 二氧化碳

分析氣體	濃度	分析儀
CO2	>99.5%	Infrared 紅外線
CO	<5 PPM	Chromatograph 氣像層析
Total Sulphur (S)	< 1 PPM	UV Fluorescence 紫外線螢光
NO&NO2	<2 PPM TOTAL	Chemiluminescence 化學發光
H2O	<67 PPM	Electrolytic Hygrometer 電化學式溼度計

NITROGEN (N2) 氮氣

分析氣體	濃度	分析儀
N2	>99.5%	Chromatograph 氣像層析
CO2	<300 PPM	Infrared 紅外線
CO	<5 PPM	Infrared 紅外線
O2	<50 PPM	Electrochemical Cell 電化學
H2O	<67 PPM	Electrolytic Hygrometer 電化學式溼度計

MEDICAL OXYGEN (O₂) MGAQ MAINTENANCE & CALIBRATION

醫療氧氣分析和品質控制系統維護保養校正

瑞澤 ISO9001, AJA, CALIBRATION & MAINTENANCE OF OXYGEN ANALYZER



OXYGEN (O₂) 氧氣

分析氣體	濃度	分析儀
O ₂	>99.5%	Paramagnetic 順磁
CO ₂	<300 ppm	Infrared 紅外線
CO	<5 ppm	Infrared 紅外線
H ₂ O	<67 ppm	Electrolytic Hygrometer 電化學式溼度計

PARAMAGNETIC O₂ & INFRARED CO₂ & CO ANALYZER

順磁式氧氣和紅外線二氧化碳和一氧化碳分析儀

分析氣體	濃度	分析儀
O ₂	>99.5%	Paramagnetic 順磁
CO ₂	<300 ppm	Infrared 紅外線
CO	<5 ppm	Infrared 紅外線

SERVOMEX 4100 醫療氣體純度，不純物分析儀



4000 系列有美國食品藥檢局 FDA 和 歐洲藥典 EP 認證

SERVOMEX 4100 醫療氣體純度，不純物分析儀

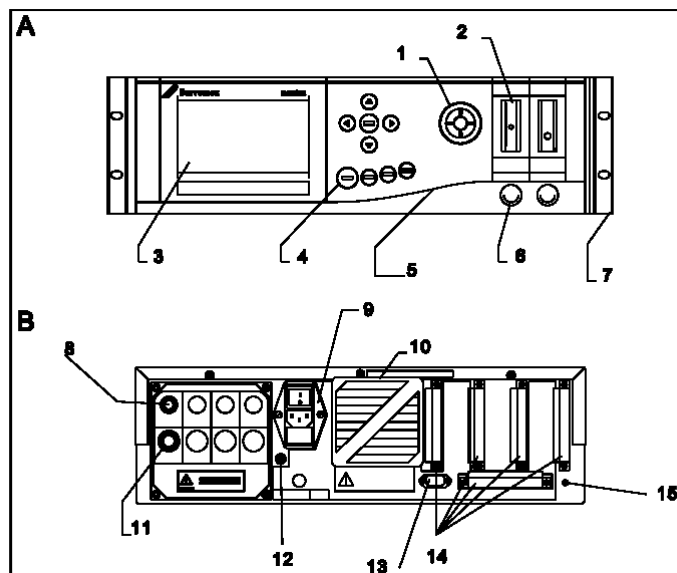


Figure 1.1 Key features of Xentra

Key:	A	FRONT VIEW	8	Sample inlet(s)
	B	REAR VIEW	9	Mains power connector
	1	Sample filter (optional)	10	Fan and filter
	2	Flowmeter(s) (optional)	11	Sample outlet(s)
	3	Display	12	Functional earth
	4	Keypad	13	Serial output port
	5	Display adjustment	14	Signal terminals
	6	Needle valve(s) (optional)	15	Screen
	7	Rack mounting brackets		

SERVOMEX 4100 醫療氣體純度，不純物分析儀

Measurement & principle 量測和原理	Range 量測範圍
O2 Purity, 氧氣純度，含壓力補償，順磁感測器	0- 95%, 99 -100%, O2
O2 Control, 氧氣純度，順磁感測器	0-100% , O2
Trace Oxygen 微氧，氧化鋯感測器	0-21000 ppm, O2
Trace CO2 微量二氧化碳，紅外線濾波相關分析法	0-5/100 vpm, 0-50/500 vpm, CO2
Trace N2O, 微量一氧化氮，紅外線濾波相關分析法	0-50/500 vpm , N2O
Trace CO, 微量一氧化碳，紅外線濾波相關分析法	0-50/500, 0-100/1000, 500/5000 vpm, N2O
Trace CH4, 微量甲烷，紅外線濾波相關分析法	0-50/500 vpm, 0-100/1000 vpm, CH4
% CO2, 二氧化碳濃度，紅外線單光源單波長分析法	0-2500, 5000 ppm , 0-1, 2.5, 5, 10, 25, 50, 100% CO2
% CO, 一氧化碳濃度，紅外線單光源單波長分析法	0-1, 2.5, 10% ,CO
Moisture, 水份，露點計	-100 to +20°C, 0-3,000 ppm H2O
Moisture, 水份，露點計	-120 to -40°C, H2O

SERVOMEX 4100 醫療氣體純度，不純物分析儀

Installation 安裝方式	3U 19" rack	
Operation interface 操作介面	Menu drive 菜單式軟體介面	
Sample stream 進樣	4 independent gas streams 最多四道獨立進樣管線	
Calibration 校正	Manual, timer or remote, 可手動，自動定時，或遠端觸發	
Analogue outputs 類比輸出	2 analogue outputs, 兩組4-20 mA 輸出	
Alarm outputs 警報輸出	3 volt-free relay alarm outputs, 三組乾接點警報輸出	
Analogue inputs 類比輸入	2 external analogue inputs, 兩組4-20 mA 輸入	
Serial output 通訊輸出	RS232, RS485, ASCII, MODBUS RTU, MODBUS ASCII, NAMUR	
Flow meter 流量計	最多兩組浮子式流量計	
Accuracy 精準度	O2 Purity, 氧氣純度，含壓力補償，順磁感測器	< 0.02% O2
	O2 Control, 氧氣純度，順磁感測器	< 0.15% O2
	Trace Oxygen 微氧，氧化鋯感測器	< 0.1 ppmO2
	Trace CO2 微量二氧化碳，紅外線濾波相關分析法	< 0.1 ppm CO2 / < 0.5 ppm CO2
	Trace N2O, 微量氧化亞氮，紅外線濾波相關分析法	< 0.5 ppm N2O
	Trace CO, 微量一氧化碳，紅外線濾波相關分析法	< 0.5 ppm CO
	Trace CH4, 微量甲烷，紅外線濾波相關分析法	< 0.5 ppm CH4
	% CO2, 二氧化碳濃度，紅外線單光源單波長分析法	1% F.S.
	% CO, 一氧化碳濃度，紅外線單光源單波長分析法	1% F.S.
	Moisture, 水份，露點計	±2°C dewpoint
	Moisture, 水份，露點計	±2°C dewpoint

SERVOMEX 4100 維護保養校正報告

MACRO 瑞澤企業股份有限公司

文件制/修/廢履歷表

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MG-OR-002.8

SERVOMEX 4100 醫療氣體純度，不純物分析儀

1. 每年定期更換風扇過濾棉。
2. 測漏 (注意進樣壓力最高 8 PSIG) , 打入 100% N₂, V_{diff} 訊號應小於 < 0.1 V , 如果 V_{diff} 過高例如 0.6 V:
 - 移除光源的 CO₂ scrubber , 注入 N₂ 至光源(SOURCE) , 如果 V_{diff} 下降 , 光源或光源的 scrubber 有漏。
 - 如果 V_{diff} 不變 , 將 O₂ 注入濾波光片轉盤 (CHOPPER BOX) , 如果 V_{diff} 下降代表 CO₂ scrubber 已失效或濾波光片轉盤有漏。
 - 如果 V_{diff} 還是不變 , 將N₂注入偵測器 (DETECTOR) , 如果 V_{diff} 下降代表偵測器 scrubber 或偵測器有漏。

SERVOMEX 4100 醫療氣體純度，不純物分析儀

1. 簡單錯誤由PCB板上LED 顯示.
2. 分析儀螢幕顯式之錯誤.
3. 輸出訊號錯誤

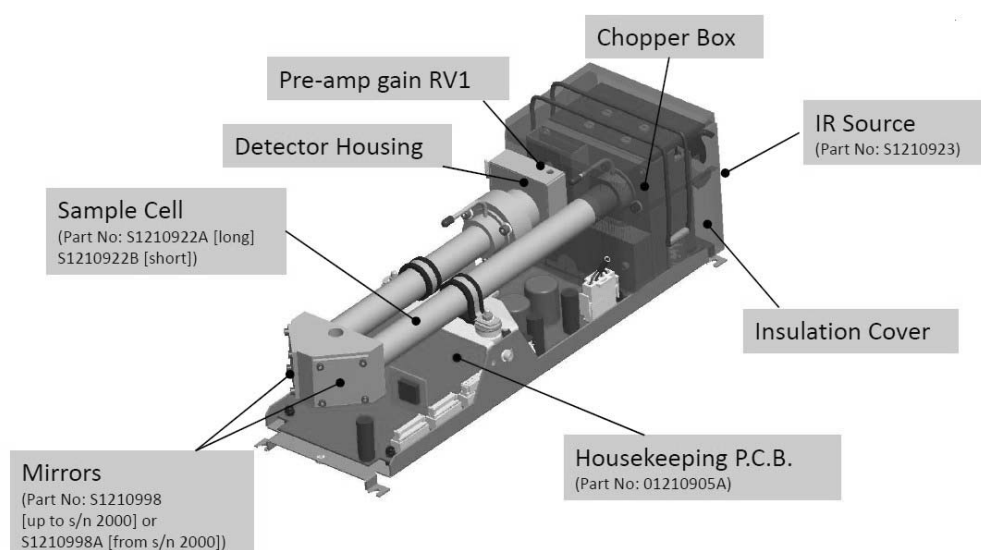
注意:

1. 紅外線濾波相關分析法的 SENSOR 和紅外線單光原單波長分析法的 SENSOR 容易受到汙染，檢查維修時須注意避免油脂和指紋不要沾到濾波轉盤 (FILTER WHEELS), 視窗 (WINDOWS), 反射鏡 (MIRRORS), 和光源 (SOURCE LENS)上。
2. 注意所有氣體密封原件避免受損。

簡單錯誤由PCB板上LED 顯示.

紅外線濾波相關分析法感測模組 GFX BENCH

GfX Folded Bench

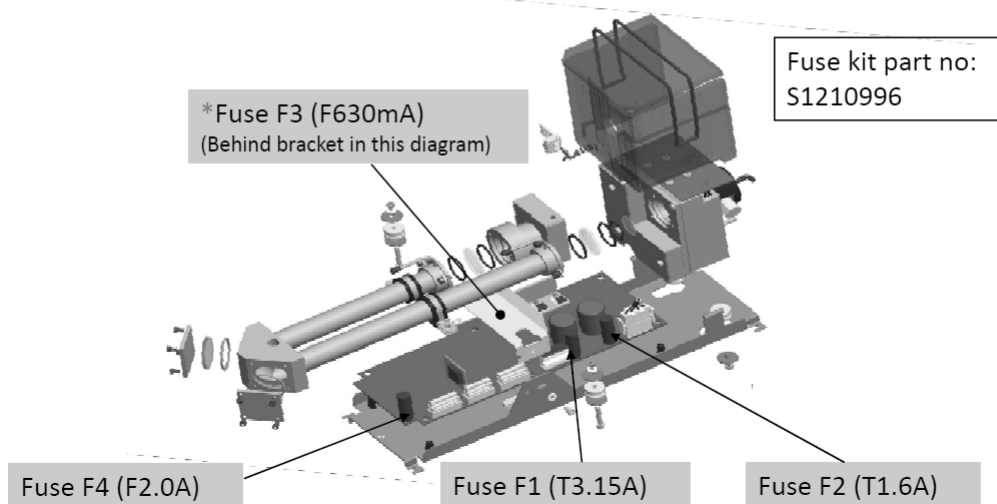


紅外線濾波相關分析法感測器: 保險絲

GfX Bench - exploded view (Showing location of Fuses)

On older units F3 was F1.6A.

If working on one of these earlier units fuse F3 should be changed to F630mA



- Fuse F1 (T3.15A) Sample cell heater.
- Fuse F2 (T1.6A) Chopper wheel.
- Fuse F3 (F630mA) IR source power*.
- Fuse F4 (F2.0A) Chopper box heater.

紅外線濾波相關分析法感測器: 訊號整理PCB狀態指示燈

LED Location

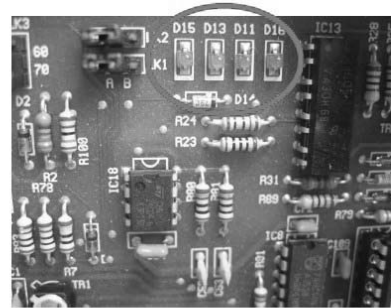
LED D15 (Power OK)

LED D11 (Source OK)

LED D13 (Motor OK)

LED D16 (Bench OK)

(This LED will turn off if any other fault LED extinguishes).



Picture of LED locations on housekeeping P.C.B. (01210905).

正常應該4個 LED 都要亮.

紅外線濾波相關分析法感測器: SOURCE OK LED (D11)

Source OK LED (D11)

Check Fuse F3 (F630mA).

- If open circuit, replace fuse.

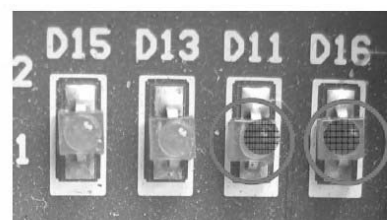
If OK,

- Switch on bench, connect voltmeter to inner pins (2 & 3) of PL4 (source voltage sense). Check voltage is 2.0volts dc +/- 0.02v

If not OK, replace housekeeping pcb.

If OK,

- Switch off power, disconnect IR source from PL4. Check source resistance between inner pins (2 & 3). Resistance should be <2 ohms. If outside of these limits, replace source.



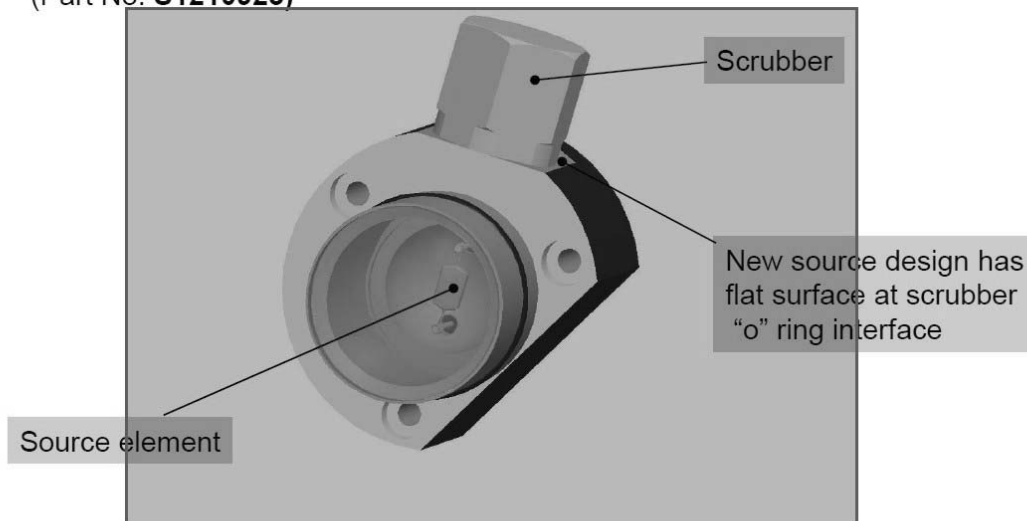
<2 ohms resistance

1. 確認FUSE F3 (F630 mA) · 如開路更換保險絲
2. 供電給主機 · 使用電表量測 PL4 光源的 PIN 2, PIN3 之電壓 · 確認電壓為 2.0 VDC +/- 0.02 VDC · 如超出更換訊號整理 PCB
3. 關掉電源 · 拆除 IR SOURCE 光源 · 用電表確認 IR SOURCE PL4 光源的PIN 2, PIN3阻抗 · 如超出 2 ohms 更換IR SOURCE 光源

紅外線濾波相關分析法感測器: GFx SOURCE ASSEMBLY

GFx Source Assembly

(Part No: **S1210923**)



紅外線濾波相關分析法感測器: MOTOR OK LED (D13)

Motor OK LED (D13)

Check fuse F2 (T1.6A).

If OK,

Check the chopper wheel is free to rotate, not hitting or grazing any part of the chopper box.



Tip.

If ambient noise is low, listen carefully near chopper box to see if you can hear wheel rotation without any knocks or scrapping sounds.

1. 確認 FUSE F2 (T1.6A)
2. 確認濾波片轉盤 (CHOPPER WHEEL) 轉動無問題，可聽馬達轉動聲音是否異常
3. 關掉電源，拆除 IR SOURCE 光源，用電表確認 IR SOURCE PL4 光源的 PIN 2, PIN3 阻抗，如超出 2 ohms 更換 IR SOURCE 光源
4. 確認 CHOPPER BOX 的 O-RING
5. 如 CHOPPER WHEEL 轉動有問題，確認接線，端子，和訊號整理 PCB
6. CHOPPER BOX 外殼一旦拆過，須重新更換 SCRUBBER 然後重新用 N2 PURGE

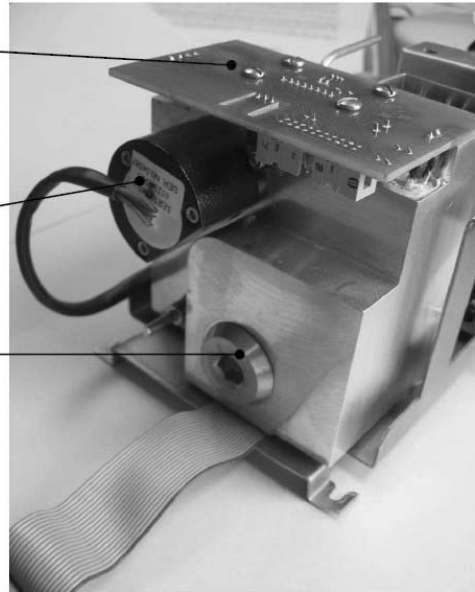
紅外線濾波相關分析法感測器: CHOPPER BOX

Chopper Box

Chopper box P.C.B.
(Part No: S1210904)

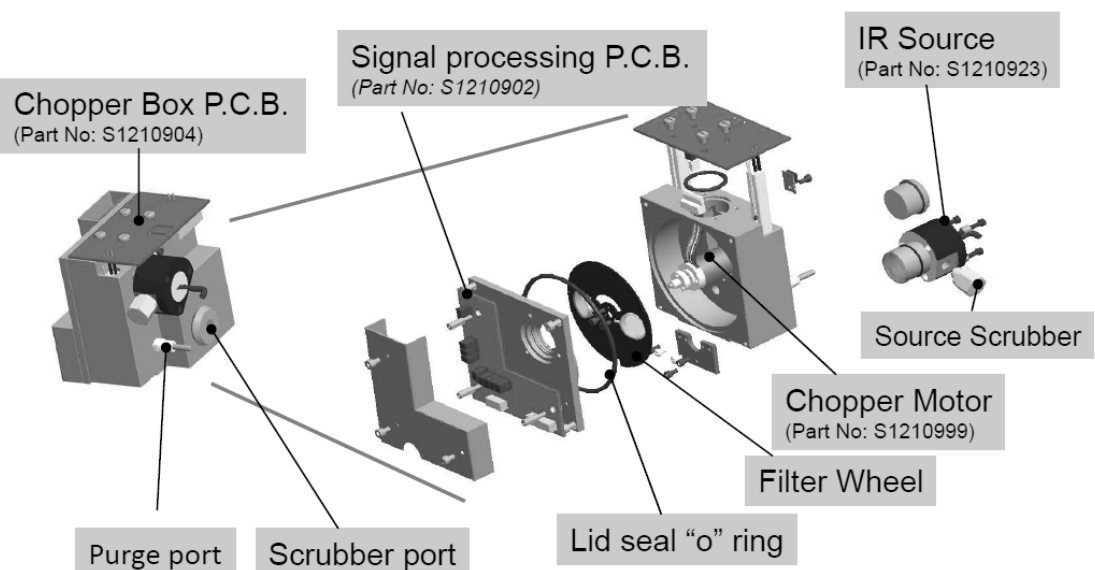
IR Source
(Part No: S1210923)

Chopper box scrubber
plug



紅外線濾波相關分析法感測器: CHOPPER BOX

GFx Chopper box detail

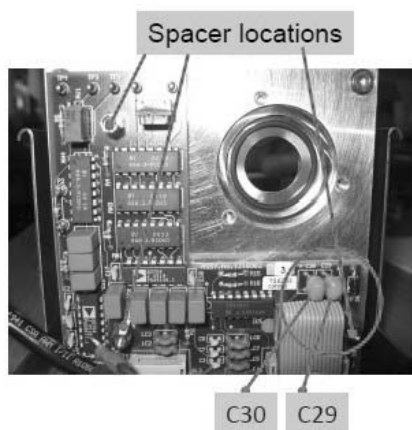


分析儀螢幕顯示之錯誤.

分析儀螢幕顯示問題

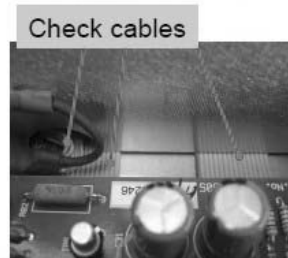
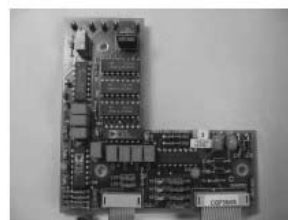
- 顯示螢幕閃爍，沒有任何字體或數字顯示，螢幕有橫線
- 通常應該是螢幕的供電接地線或 0 V 線有問題
- 也有可能是其他PCB 或接頭所造成的。
- 最有可能是DETECOTR TUBE 連接至訊號處理 PCB板 (01210902 SIGNAL PROCESSING PCB)這一塊所造成的。

01210902 P.C.B. details



Note...

Be cautious if removing spacer, as damage can occur to capacitors C29 & C30. Use a 5.5mm socket to loosen/tighten spacer.



分析儀螢幕顯示問題

解決方案: 拆除 DETECTOR偵測器，如果螢幕恢復正常，更換一片新的 SIGNAL PROCESSING PCB, 若還是有問題，更換連接排線。

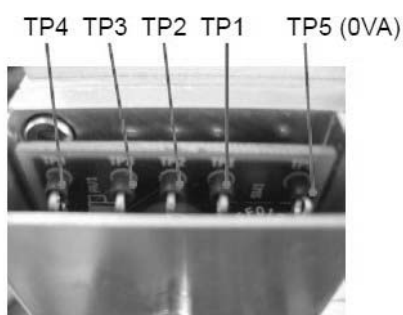
注意: 任何 PCB 或排線故障都有可能造成螢幕故障。

氣體訊號調整

Gas signal adjustments

*(Under zero conditions
i.e. Nitrogen in sample Cell).*

- Gas Sig (V_{gas}) TP4(+) wrt TP5 (0VA)
- Gas Sig (V_{N_2}) TP3 (+) wrt TP5 (0VA)
- Diff Sig (V_{diff}) TP2 (+) wrt TP5 (0VA)



Signal Processing P.C.B. test points



Location of RV1 – Detector pre-amp Gain adjustment

Detector housing close-up

- 當使用N2 purge 時, 可測試 V_{gas} , V_{N_2} , V_{diff}
- 可使用 RV1電位器對偵測器前置放大器進行調整

氣體訊號調整

- 使用電表量測 TP3 (+VE) 與 TP5 (0 V) 之間的電壓，電壓應落在 1 VDC +/- 0.01 VDC 間 (VN2)，使用RV1電位器做調整
- 如無法達到代表光學路徑受汙染
- 在開始拆解光學路徑前先確認光源是否正常，光源電壓 (SW1 位置 5 電壓應為 2 V)，光源阻抗應小於 < 2 ohms

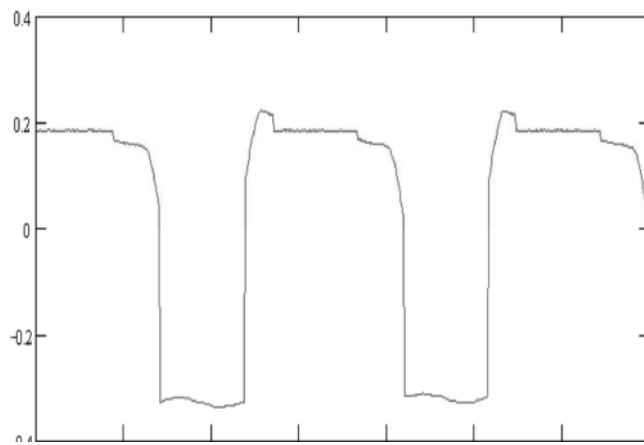
光學路徑汙染

- 拆解 GFx 模組時，檢查反光鏡 MIRROR，樣品氣艙體視窗 CELL WINDOW,樣品氣艙體視窗 CELL WINDOW, 樣品氣體管路 TUBE。如有發現汙染或腐蝕狀況應立即更換。
- 確認汙染源頭為何?
- 如無發現汙染狀況，檢查訊號整理 PCB (HOUSEKEEPING PCB) 上的光源電壓開關是設定在位置 5 (2 V)
- 如光源電壓正確，更換光源
- 確認DETECTOR PCB 是否有短路到 DETECTOR 的外殼
- 確認DETECTOR 排線
- 確認訊號處理 PCB (SIGNAL PROCESSING PCB)
- 使用示波器確認濾光轉盤交流電壓(TP1 , TP5) 穩定同步。如有雜訊，更換訊號整理 PCB (HOUSEKEEPING PCB)

氣體訊號調整

- 如果Vdiff 無法使用 訊號處理PCB (SIGNAL PROCESSING PCB) 上的SW1 和 RV1 調整至 0.00 VDC $\pm$ 0.01 VDC 間:
 - 確認 DETECTOR 訊號如下圖

Detector signal from TP1 of signal processing P.C.B

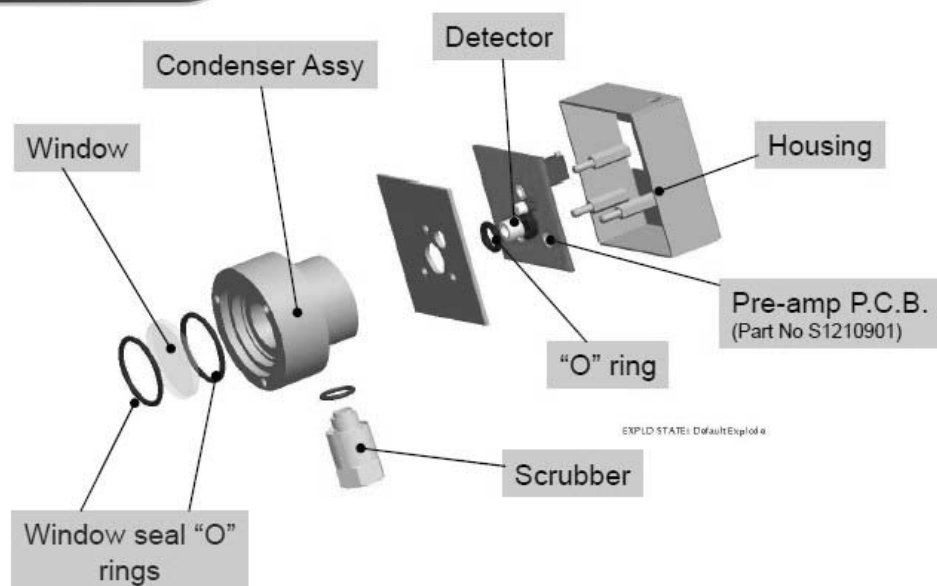


- 如還是有問題，濾波轉盤 (FILTER WHEEL) 或光學比色皿 CUVETTE須更換

輸出訊號錯誤

紅外線濾波相關分析法偵測器: DETECTOR

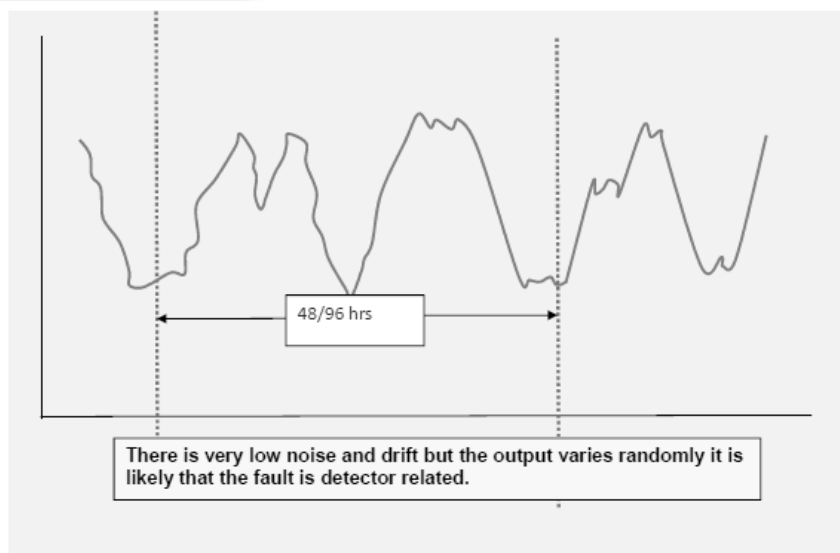
GFx Detector Assembly



讀值低震盪，無規律漂移

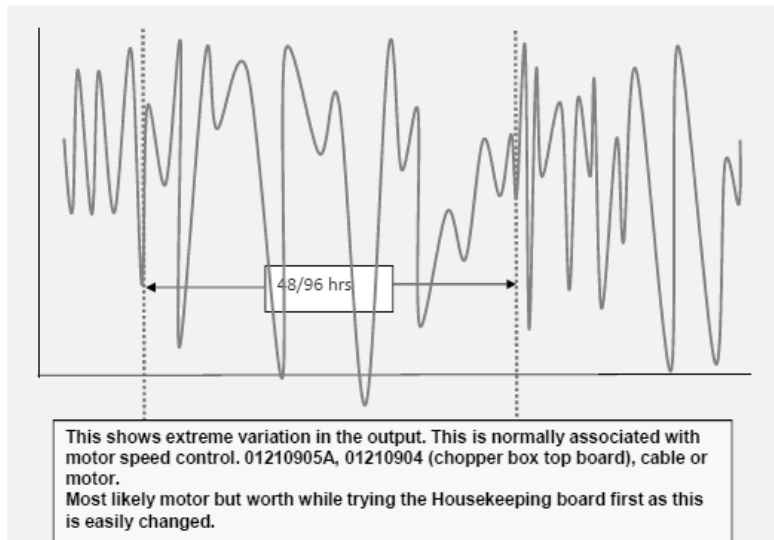
- DETECTOR 偵測器有問題 或 DETECTOR AMP 偵測器訊號放大器

Detector problems



讀值不穩，劇烈飄移

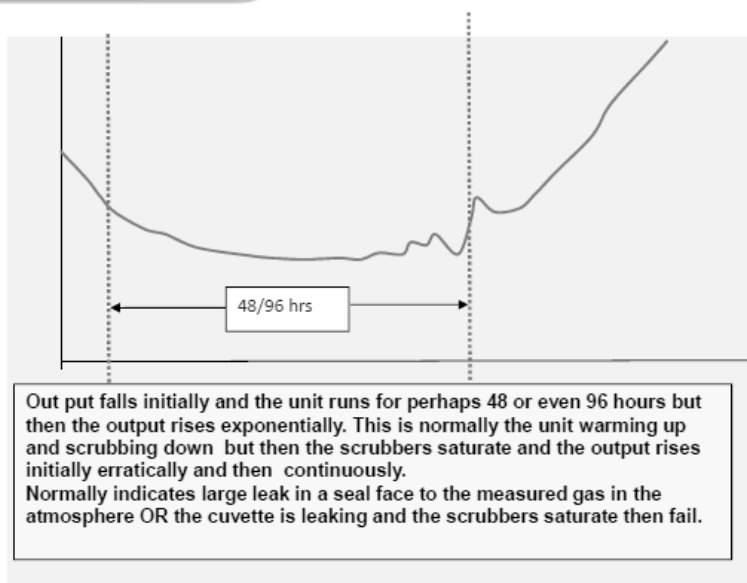
Motor speed control issues



- 訊號整理 PCB (HOUSEKEEPING PCB) 上控制濾波轉盤(CHOPPER)的電路有問題 或 CHOPPER BOX PCB 有問題
- 濾波轉盤馬達 (CHOPPER BOX MOTOR) 或接線有問題

分析路徑有洩漏

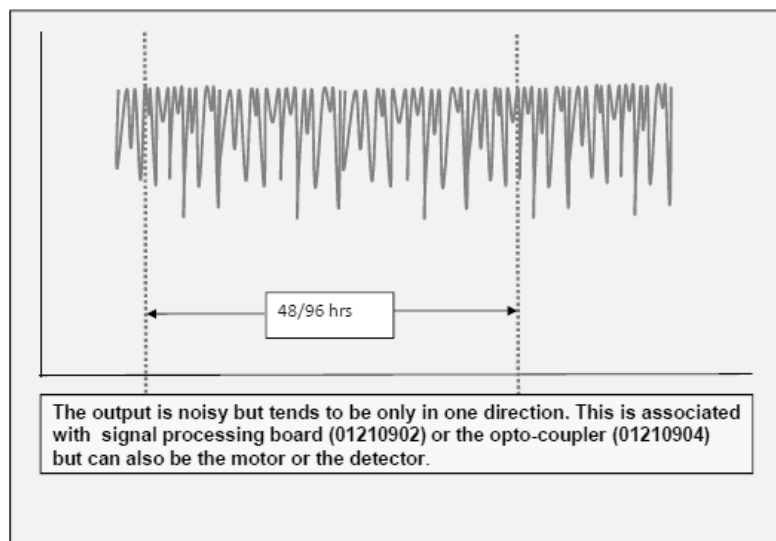
Large leak indication



- 讀值一開始下降，之後開始快速飆高
- 分析路徑和光學路徑有漏密合度不足

讀值和輸出有雜訊和不穩

Unidirectional noise on output



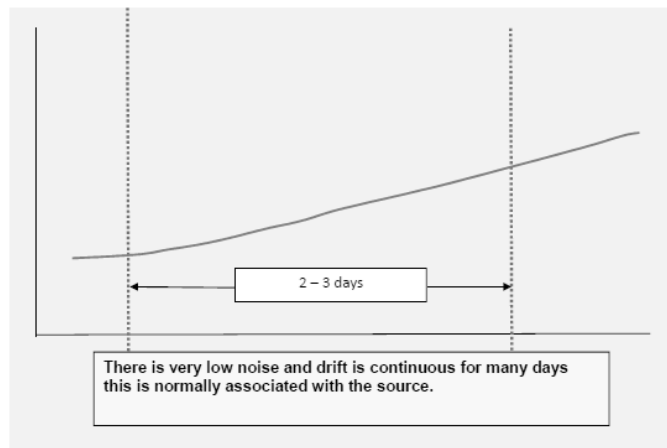
- 讀值和輸出有雜訊和不穩，單一方向雜訊
- SIGNAL PROCESSING PCB 訊號處理 PCB 有問題
- OPTO-COUPLER 光電耦合器有問題
- CHOPPER馬達有問題

GFx 紅外線濾波相關分析法量測低濃度 CO₂

- GFx 感測器的光學模組裡的密封原件和 SCRUBBER 建議每兩年更換一次

CO2讀值穩定上升

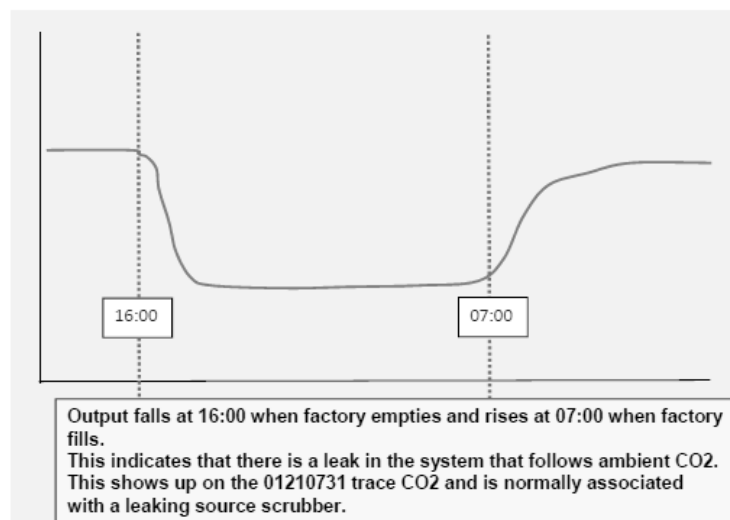
Example of Positive Drift



- 光學路徑中有低濃度的洩漏
- SCRUBBER 須更換
- 光源不穩
- 光學路徑受汙染
- 光學比色皿CUVETTE有漏

CO2低濃度洩漏

Leak within optical path



- 當周界空氣CO2 下降(廠區晚上時)，CO2讀值跟著下降。當周界空氣CO2 上升 (廠區早上時)，CO2讀值跟著上升。
- SOURCE 光源 SCRUBBER 有漏
- 光學路徑和原件有漏

更換 SCRUBBER 後的訊號設定

- 更換 SCRUBBER 後須重新設定所有訊號電壓:
 1. 使用 N2 purge 分析儀，偵測器 DETECTOR 的前置放大器 PRE-AMP 中的電位器 POTENTIOMETER (VN2) 須調整到 1 V
 2. 調整訊號處理 PCB (SIGNAL PROCESSING PCB) 上的 SW8 開關調至到 7 或 8 的位置，然後調整旁邊的電位器 (RV1) 到 0 V (Vdiff)
 3. 重複步驟 1 & 2 直到達到所需的電壓值
 4. 如果無法達到則須更換光源 SOURCE
 5. 使用 300 ~400 ppm CO2 bal. N2 氣體 purge 分析儀，如無反應代表光學比色皿 CUVETTE 有漏
 6. 使用 N2 purge 分析儀，如果 Vdiff 訊號無法迅速的回到 0 V 代表 SAMPLE CELL 分析艙體受到污染。

更換 SCRUBBER 時須注意事項

- 更換 SCRUBBER 時須注意事項:
 1. 使用 Barrietta 油(液態鐵氟龍)密封光源外殼 SOURCE BOX 和 CHOPPER BOX 上的 'O' RING 增加密合度
 2. CHOPPER BOX 上裝 SCRUBBER 的 SCRUBBER PORT 接頭應使用 O-RING
 3. 不要使用 PTFE 膠帶去纏繞 SCRUBBER PORT 接頭上的螺牙
 4. 定期更換 PURGE PORT ADAPTER

SERVOMEX 4100 醫療氣體純度，不純物分析儀

主機:

1. SPARES KIT, 2 YEARS OF OPERATION
2. FILTER ELEMENT, FAN,
3. SENSOR INTERFACE PCB,
4. INVERTER 24 VDC TO 600 V
5. CCFL BACKLIGHT ASSEMBLY, FOR BLUE/WHITE DISPLAY
6. SWITCHED MODE POWER SUPPLY
7. TUBING / FITTINGS REFURB. KIT

順磁感測器:

1. PARAMAGNETIC CELL
2. PARAMAGNETIC MODULE HEATER PLATE

紅外線濾波相關分析法感測器:

1. SCRUBBER ASSEMBLY
2. KIT SCRUBBER SACHET
3. KIT, I.R. SOURCE
4. KIT, 1210 FUSES

紅外線單光源單波長分析法感測器:

1. FUSE, 2.5A QAHBC

MEDICAL OXYGEN (O₂) ANALYZERS 醫療氧氣分析儀

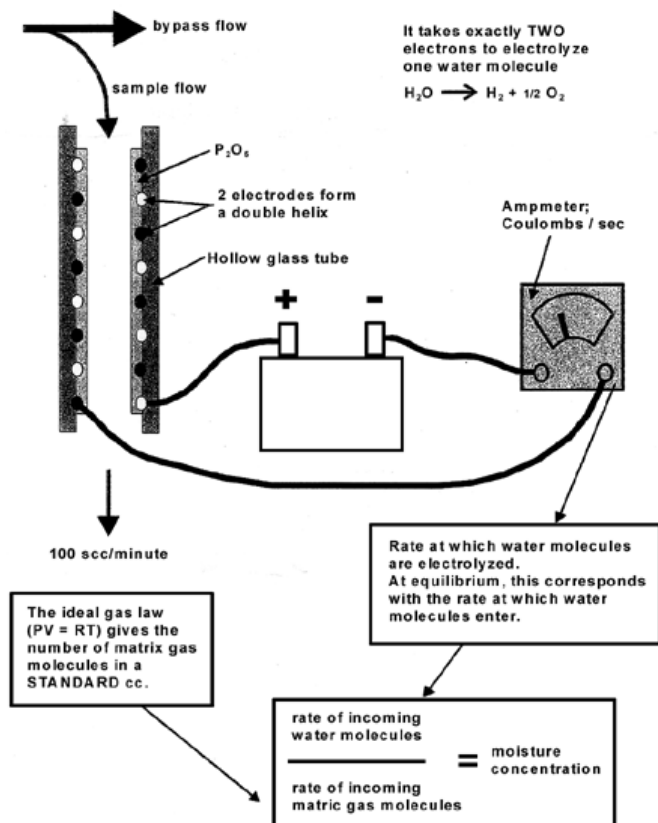
分析氣體	濃度	分析儀
O ₂	>99.5%	Paramagnetic 順磁
CO ₂	<300 ppm	Infrared 紅外線
CO	<5 ppm	Infrared 紅外線
H ₂ O	<67 ppm	Electrolytic Hygrometer 電化學式溼度計

ELECTROLYTIC HYGROMETER 電化學式溼度計(水份分析儀/露點計)

分析氣體	濃度	分析儀
H ₂ O	<67 ppm	Electrolytic Hygrometer 電化學式溼度計

P₂O₅ – PHOSPHOROUS PENTOXIDE 五氧化二磷

Principle of Operation



Disadvantages 缺點

- ◆ P₂O₅ coating can be destroyed when on UHP gases, need to wet up periodically, 五氧化二磷感測器在長時間使用於高純度氣體中需要定期對感測電極塗料
- ◆ Problems when H₂ and O₂ are present in sample gas due to recombination, 若氫氣和氧氣重組時會造成錯誤的水份讀值
- ◆ Needs precise flow control, 流量控制的誤差會造成準確度大幅降低
- ◆ High moisture levels will overload sensor, 高水含量會造成感測器受損

MEECO AQUAVOLT+ 水份分析儀



MEECO AQUAVOLT+ 規格

Range 量測範圍	0-20 ppmV
Accuracy 精確度	± 2% of reading or 20 ppb, which ever is greater
Alarms 警報	(1) Cell Failure (2) User Adjustable Moisture Level Alarms
Flow Control 流量	Recommended Inlet Flow: 1.1 L/min combined sample & bypass
Lower Detection Limit 最低偵測極限	35 ppbV
Environmental Condition 周界操作環境	0° to +60° Celsius +20% to 80% RH, non-condensing, non-corrosive atmosphere
Power 電源	100 - 240 VAC, 50/60 Hz
Sample Gas 樣品氣組成	AIR, ARGON, CARBON DIOXIDE, HELIUM, HYDROGEN, METHANE, NEON, NITROGEN, OXYGEN, XENON, OTHER
Sample Inlet Pressure 樣品氣壓力	10 – 3,000 PSIG (0.68 - 206.8 BarG)
Signal Outputs 訊號輸出	One isolated 0 – 5 V DC analog output or One isolated 4-20 mA output; user defined RS-232 serial communication port
Units of Measure 可換算單位	ppbV, ppmV, ppmW, dewpoint in °C or °F

MEECO AQUAVOLT+ 操作介面介紹

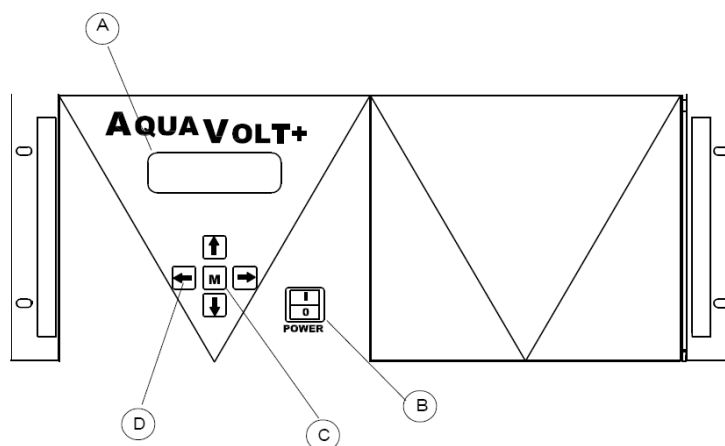


Figure 1

- | | |
|--------------------------|---|
| (A) Alphanumeric Display | Vacuum-fluorescent display, 2 characters high x 20 characters wide; displays moisture reading, units of measure, set-up selections and alarm status. |
| (B) Power Switch | Main Power on/off function |
| (C) "Menu" Key | Use to access the various set-up menus or to enter a selected option on the alphanumeric display |
| (D) Arrow Keys | Left and right arrow keys are used to display menu parameters for review or editing. The up and down arrow keys enable the operator to adjust the value of the parameter displayed. |

MEECO AQUAVOLT+ 電氣連接介面介紹

Rear Panel

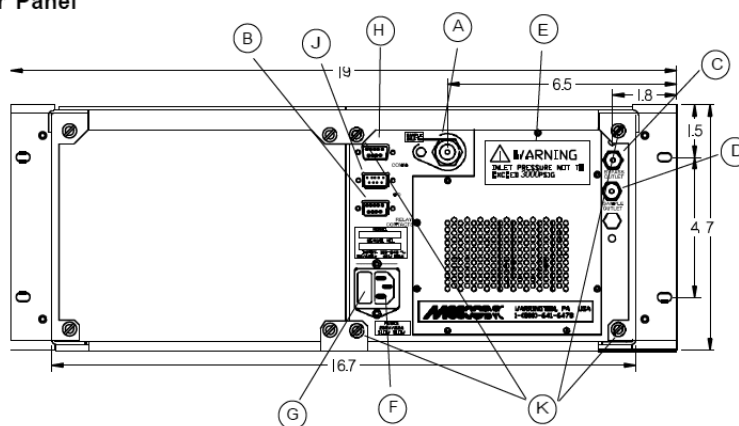


Figure 2a (also see figure 2B and 2C page 13)

- | | |
|------------------------|--|
| (A) Sample Inlet | 1/4" VCR male bulkhead fitting; 10-3000 psig (0.7-204 Bar) inlet pressure |
| (B) Alarms | Connector for alarm outputs |
| (C) Bypass Outlet | 1/8" male compression bulkhead fitting |
| (D) Sample Outlet | 1/8" male compression bulkhead fitting |
| (E) Cell Access Panel | For removal and replacement of electrolytic cell; also for access to internal pressure regulator for pressure adjustment |
| (F) Power Entry Module | Connector for main power |
| (G) Fuses (2) | Holds two 2.5A main power fuses |
| (H) RS-232 Connector | Connector for serial interface |
| (J) I/O Connector | Connector for 0-5 VDC / 4-20 mA / 0-20mA / 0-24 mA output |

MEECO AQUAVOLT+ 內部元件介紹

Internal View

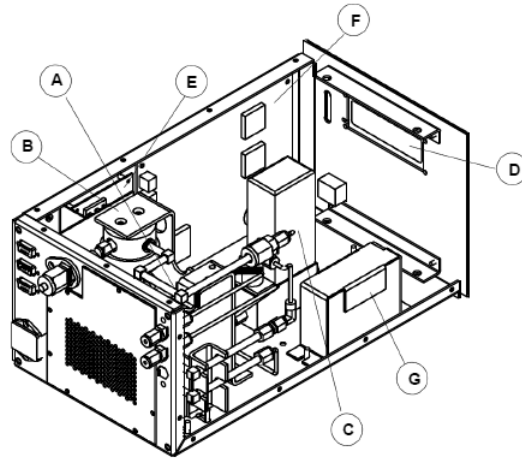


Figure 3

Internal View (components)

(A) Electrolytic Cell	Senses moisture
(B) Sample Inlet Pressure Regulator	Do not allow inlet pressures to exceed 3000 psig (204 Bar) or go lower than 10 psig (0.7 Bar)
(C) Sample Mass Flow Controller	0–200 sccm control range (100 sccm standard for N ₂)
(D) Vacuum Fluorescent Display	Alphanumeric display; 2 characters high x 20 characters wide
(E) Power Supply	±15 VDC and +5 VDC; power supply for the mass flow controller, display and main board.
(F) Main Board	Single controller board for all logic, A/D, relay and communication functions
(G) 67.5V Battery	Provides power to cell during shipment or power loss

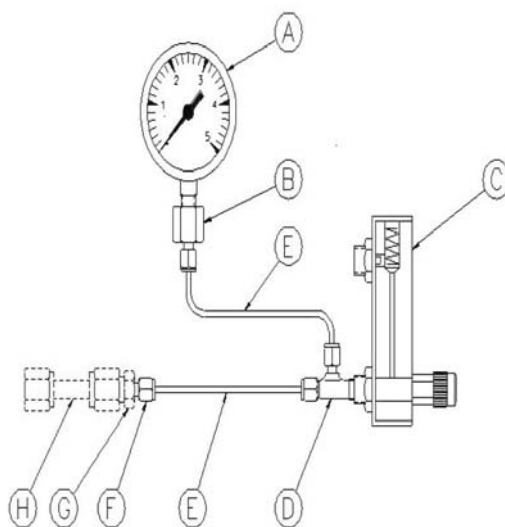
MEECO AQUAVOLT+ START-UP 開機

1. 連接電源
2. 開啟 Main Power Switch，螢幕自動亮起
3. 導入樣品氣，purge 最少5分鐘
4. 確認入口壓力在25 psig - 150 psig (1.7 - 10.2 Bar)之間
5. 調整內建調壓閥 internal pressure regulator
 1. 從分析儀後端抽出拆卸外殼
 2. 將內建調壓閥逆時鐘開到最底
 3. 按 'M', Menu 鍵選擇 parameter adjustment mode 參數調整模式
 4. 選擇 'GAS' 選項
 5. 選擇樣品氣種類後按'M'鍵
 6. 選擇 'MODE' 選項
 7. 選擇'SERVICE'後按'M'鍵
 8. 按右鍵直到 "Service Mode Bypass" 出現
 9. 用上下鍵將 bypass flow 調至 1,100 sccm 後按'M'鍵
 10. 接上MEECO壓力量測模組
 11. 調整內建調壓閥直到壓力量測模組壓力表顯示 5 PSIG

MEECO PRESSURE MEASUREMENT KIT

壓力量測模組

- (A) Pressure gauge, 0-10 psig readout
- (B) One female fitting (reduction fitting)
- (C) One rotameter, 0-3 scfh readout
- (D) One male run tee
- (E) 1/8" OD stainless steel or PTFE tube (approximately 24")
- (F) Cap nut and ferrule



TOLERANCES SHOWN IN NOTES			
MEECO			
DESIGN	SCALE	DRAWN BY	EMP
#	1:2	APPROVED BY	
FUNCTIONAL	TYPE	EXTERNAL PRESSURE MEASUREMENT KIT	
#			
ANALOG	DATE	DRAWING NUMBER	
	3-19-90	103029	

MEECO AQUAVOLT+ STATUS DISPLAY

狀態顯示

Status Display

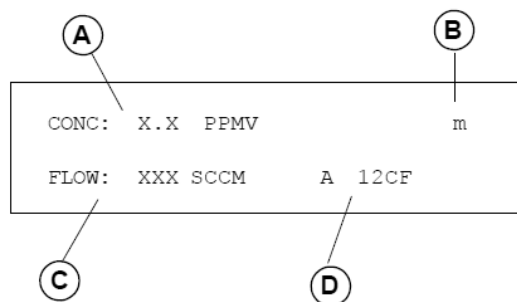


Figure 4

(A) Moisture Reading

This reading represents the measured moisture content of the sample gas.

(B) Mode Indicator

S - Service
M - Measure

(C) Flow Rate Indication

This area of the display will show the sample flow rate in sccm.

(D) Alarm State

1 - User Set
2 - User Set
C - Cell Alarm
F - Flow Alarm

MEECO AQUAVOLT+ ADJUSTING PARAMETERS

參數設定調整

Display Text 參數	Range of Value 選項	Definition or Usage 功能
Operating Mode: 操作模式	MEASURE, SERVICE SHUTDOWN	Measure Mode measures moisture under default parameters, whereas Service Mode parameters may be altered.
Moisture Units 濕度單位	PPMv, PPBv, DewPoint ° C, # / MMSCF DewPoint ° F,	
Sample Gas Type: 樣品氣種類	AIR, ARGON, CARBON DIOXIDE, HELIUM, HYDROGEN, METHANE, NEON, NITROGEN, OXYGEN, XENON, OTHER	The type of gas being analyzed. This is required so that the mass flow controller can adapt for differing molecular weights.
K-fac for User Gas: 樣品氣種類代數	0.50 to 3.00	K factor, for mass flow controllers, when using a gas not listed in the Gas Type parameter. This menu is shown only when gas type = OTHER. (see Appendix 3)
Communications ID#: 通訊代號	0 to 15	Aquavolts adress for serial communications.

MEECO AQUAVOLT+ ADJUSTING PARAMETERS

參數設定調整

Recorder Output MODE: 類比輸出訊號模式	0-5 Vdc, 4-20 mA, 0-20 mA, 0-24 mA	The selection of recorder output signal.
Recorder Scale: 類比輸出範圍	1 - any value, up to the upper limit of the unit. (.02ppm increments)	The range of values to provide full scale output of the recorder output..
Level Alarm Type: 濃度警報驅動RELAY輸出功能	1 or 2 (ENABLED or DISABLED)	The effect of the derived moisture level on the alarm output relay. Alarms will always be displayed in the Status Display regardless of this setting.
Level Alarm Value: 濃度警報設定值	Upper limit of unit (user set) to lower detection limit of unit.	The value at which point the derived moisture level is considered to be an alarm.
Cell Alarm: 水分感測器警報	Always Enabled	Alarm will trigger when the reading is below the lower detection limit.
Flow Alarm Type: 流量警報驅動RELAY輸出功能	ENABLED, DISABLED	The effect of flow deviation on the alarm output relay. Alarms will always be displayed in the Status Display regardless of this setting.
Flow Alarm Deviation: 流量誤差容許	3 to 25 (% of scale deviation)	The amount of deviation from set point at which to be considered a flow alarm.
Software Revision: 軟體版本	Read only, not adjustable	Software version and release date of the installed EPROM.
Uptime: 距離上次開機已運轉時間	Read only, not adjustable	Duration that the unit has been powered up.

訊號接端

Alarm Relay Connector



1. 0-5Vdc Signal Out
2. 0-5 Vdc Common
3. 4-20 / 0-20 / 0-24 mA Common
4. 4-20 / 0-20 / 0-24 mA Signal Output

nc - Normally Closed
com - Common
no - Normally Open



5. com - Low Level Alarm
4. nc - Low Level Alarm
9. no - Low Level Alarm
1. com - Level Alarm1
2. nc - Level Alarm 1
6. no - Level Alarm1
8. com - Level Alarm 2
3. nc - Level Alarm 2
7. no - Level Alarm 2

MEECO AQUAVOLT 維護保養校正報告

文件制/修/廢履歷表

MG-OR-002A

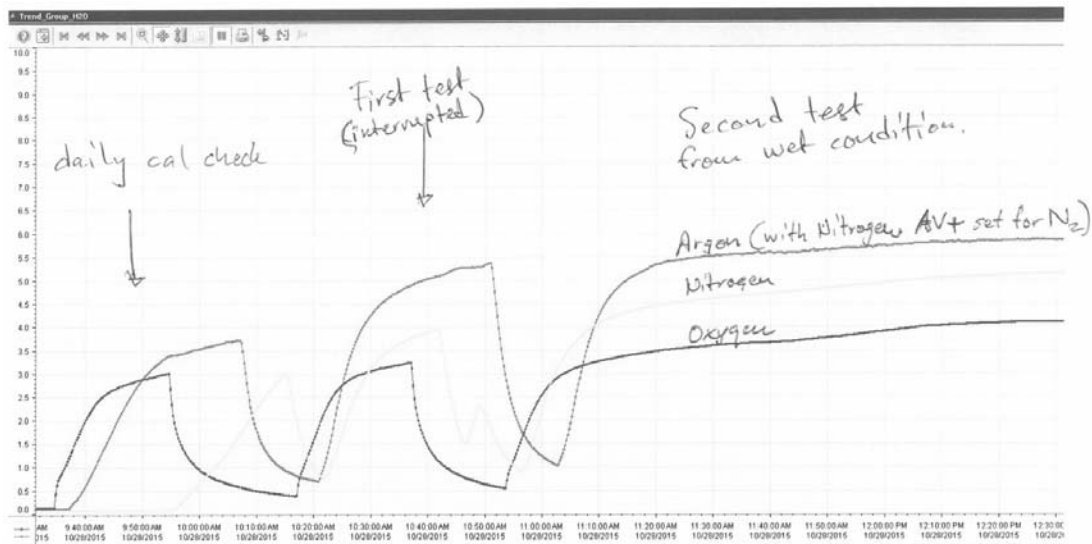
P2O5 SENSOR CELL 保護

- 當水分含量低於儀器最低偵測極限LDL超過10%時，儀器會對 P2O5 sensor 斷電，儀器會每5分鐘確認直到讀值等於或大於LDL時，儀器才會回復正常分析，斷電期間讀值顯示和輸出都會停止在斷電前的狀態。
- 若來源氣體長時間地於儀器最低偵測極限 LDL，可加裝 SMA防止 P2O5 sensor 過於乾燥造成傷害失效。
- 當水分含量超過使用者設定最高分濃度時，儀器會在自動將流量調小並在螢幕上顯示此狀況變免 P2O5 sensor 吸收過多水分而飽和後無反應，此狀況會影響儀器精準度。

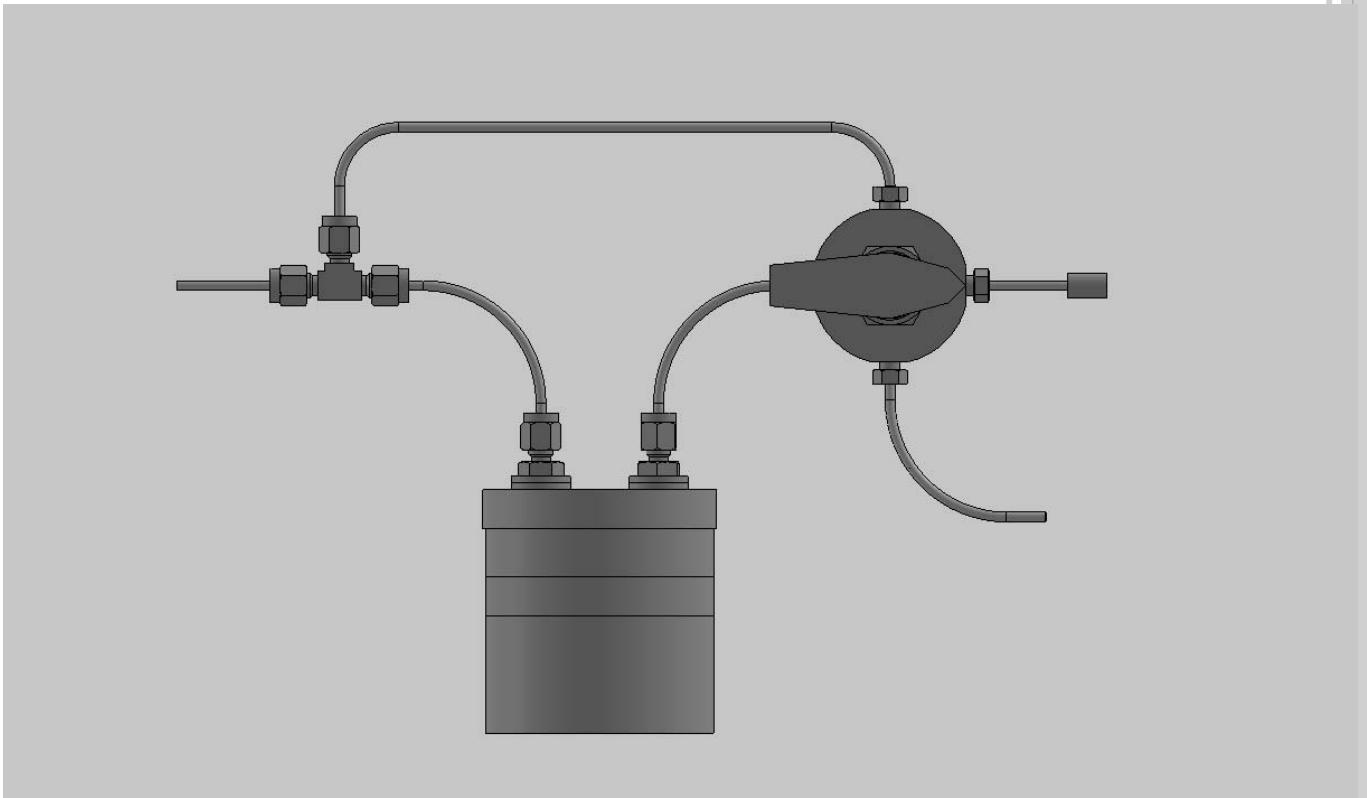
SMA



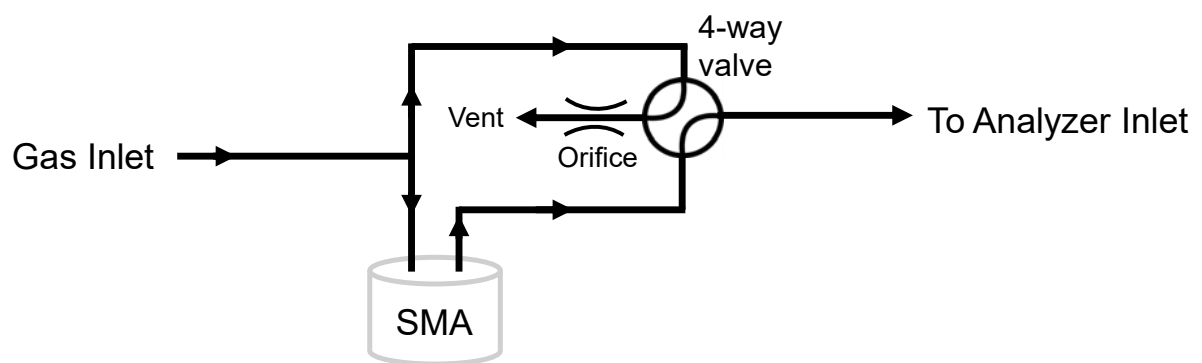
- SMA 幫助 AquaVolt+ 分析儀達到最佳化的速度和偵測極限，對於標準水份鋼瓶反應更快，在低ppm水份反應時時間小於 15 mins.



SMA 模組



SMA 模組



- 氣體持續透過SMA進行加濕。
- 所有管線持續吹掃 Purge，無空管或污染的可能性。
- 透過關閉閥或塞酸將 Bypass Outlet (Vent)關閉可增加加濕量。

SMA 可避免 P2O5 乾燥 & 進行水份反應測試

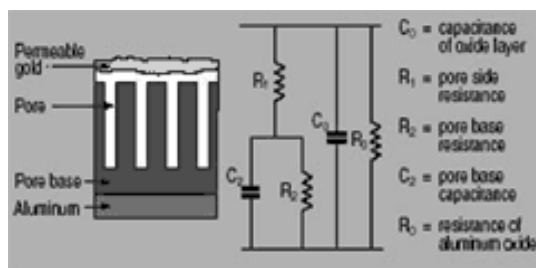


- 使用SMA模組將 Bypass Outlet (Vent) 完全開時，樣品氣水份會上升約 0.5 ppm。少量的加濕當要回復到原樣品氣水份濃度時所需乾燥時間較短。
- 使用SMA模組將 Bypass Outlet (Vent) 完全關閉時，樣品氣水份會上升約 3.5 ppm。大量的加濕讓儀器對於真正的水份汙染反應速度較快。
- 建議沒有分析時也通氣經過SMA持續對 P2O5 加濕避免乾燥損壞。

MEECO AQUAVOLT+ , SPARE PARTS 備品清單

FUSE, 2.5 A	P/N: L3380	2 UNITS
AILR (Inert gases only) cell with battery (shelf life-3 months)	P/N: T7000	1 UNIT
AOLR (Oxygen Cell with battery (shelf life-3 months)	P/N: T7001	1 UNIT
AHLR (Hydrogen Cell with battery (shelf life-3 months)	P/N: T7002	1 UNIT
Battery	P/N: L0027	1 UNIT
+5/ +/- 15 Volt Power Supply	P/N: L3240	1 UNIT
PCB Assembly	P/N: L3795	1 UNIT

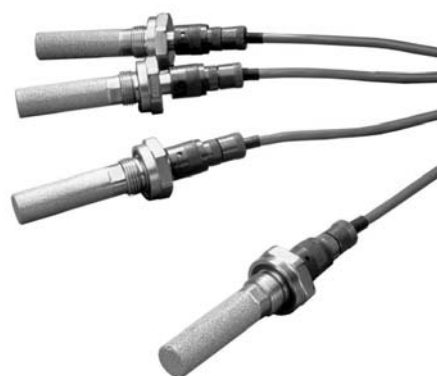
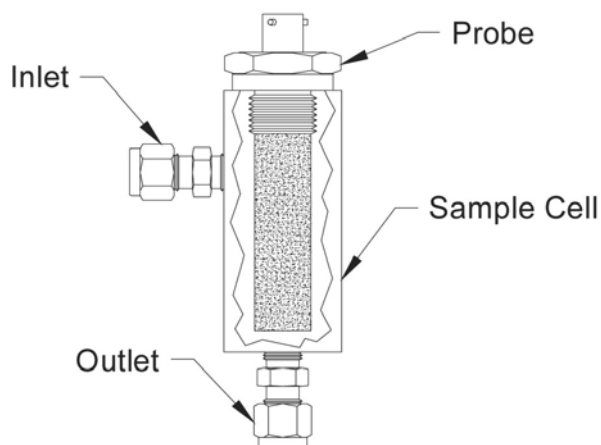
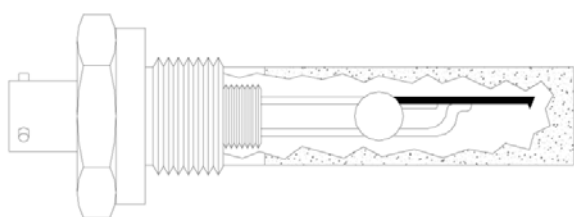
CAPACITANCE – ALUMINUM OXIDE 電容式，氧化鋁



Aluminum Oxide Sensor

- Advantages 優點
 - ◆ **Low in cost**，低價位
 - ◆ **Compatible w/ most gases**，可用於市面上絕大部份的氣體
 - ◆ **Fast response at high levels**，在量測高濃度時反應數度快
- Disadvantages 缺點
 - ◆ **Very slow to get to low levels**，在量測低濃度時反應數度極慢
 - ◆ **Not very sensitive at low levels**，在量測低濃度時反應不靈敏
 - ◆ **Aging causes inaccuracies**，電容體老化容易造成精準度降低
 - ◆ **Calibration intensive**，須時常校正

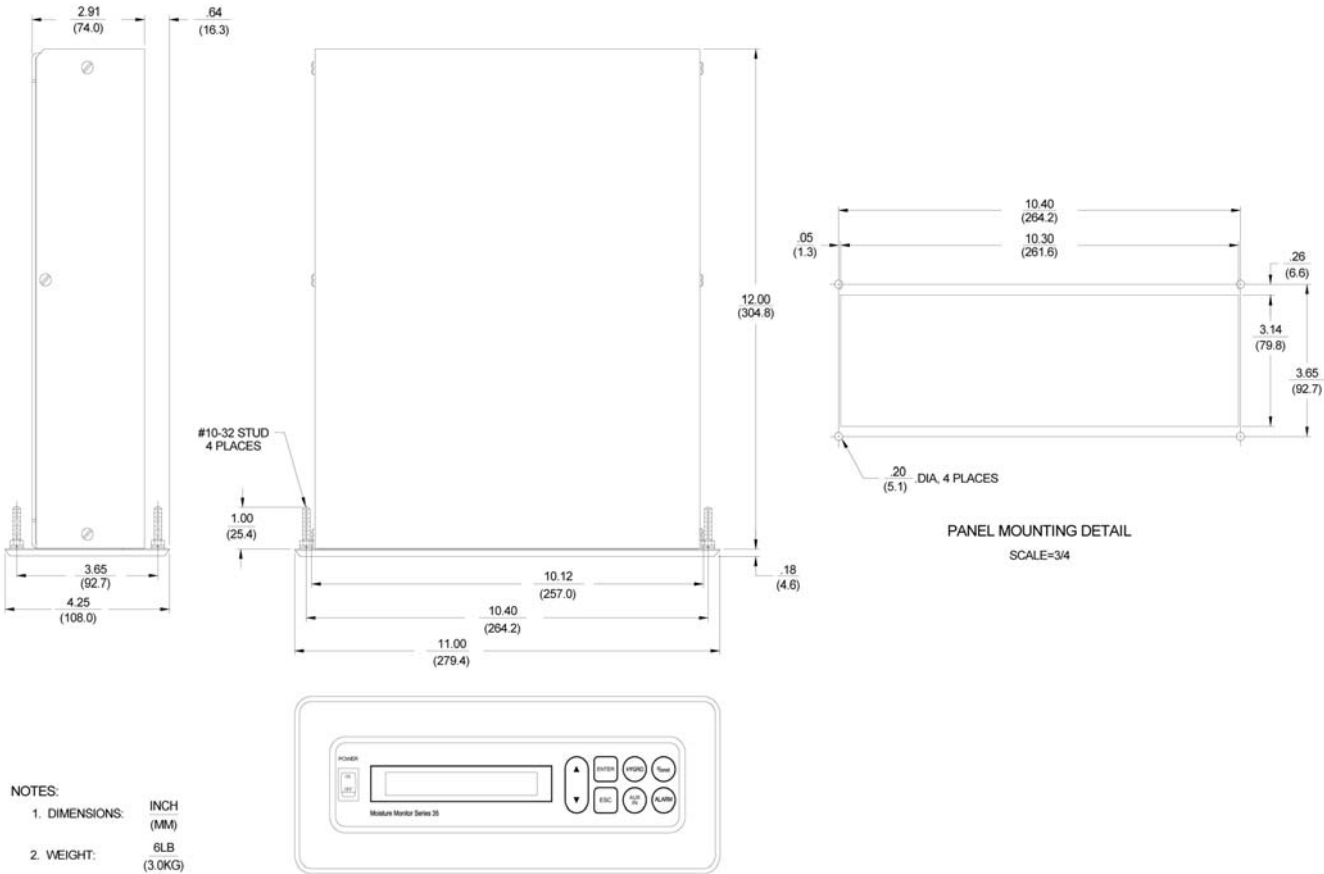
G.E. PANAMETRICS M2 SENSOR PROBE 露點感測探棒



G.E. PANAMETRICS M2 SENSOR PROBE 規範

Intrinsic Safety 本安認證	BAS01ATEX1096X II 1 G EEx ia IIC T4 (-20°C to +80°C) CSA C US Class I, Division 1, Groups A,B,C&D T4, LR44204-23
Calibration 校正	由原廠NIST實驗室露點產生器製造標準氣體校正。 校正有效期為校正後 6個月。
Dew/Frost Point Calibration Ranges 有效校正範圍	• Overall capability: 60°C to -110°C • Standard calibration range: 20°C to -80°C with data to -110°C • Ultralow calibration range: -50°C to -100°C with data to --110°C
Accuracy 精確度	• ±2°C in range of 60°C to -65°C • ±3°C in range of -66°C to 110°C
Repeatability 重現性	• ±0.5°C in range of 60°C to -65°C • ±1.0°C in range of -66°C to -110°C
Temperature 周界操作溫度	Operating: -10°C to 70°C
Operating Pressure 樣品氣壓力	5 µHg to 5000 psig (345 bar)
Flow Range 樣品氣流量	Static to 10,000 cm/s linear velocity at 1 atm
Input Voltage 供電需求	1 VAC, 77 Hz

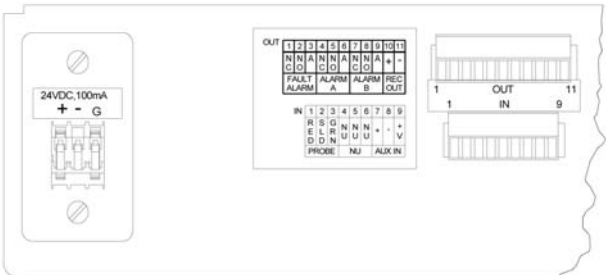
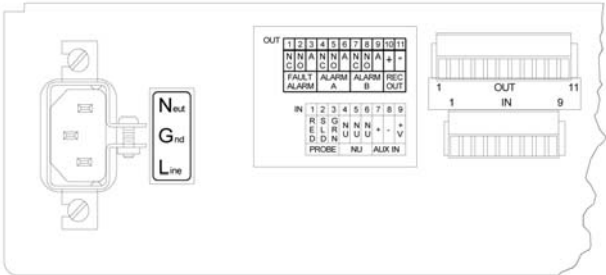
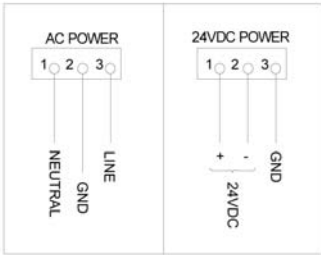
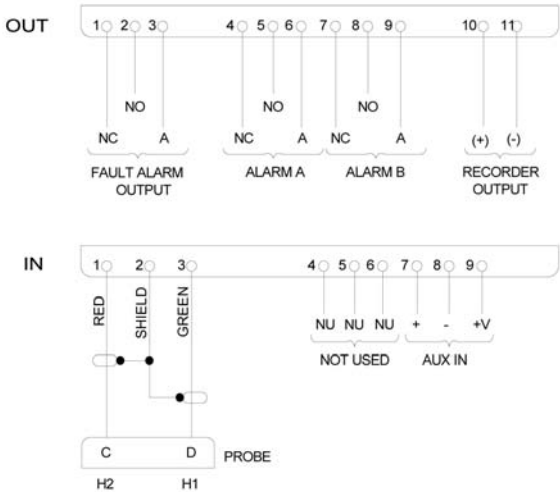
G.E. PANAMETRICS MMS35 露點控制器



G.E. PANAMETRICS MMS35 控制器

Functions: 功能	Dew Point 顯示露點 PPMv in gases at constant pressure 顯示 PPM水份 (pressure by programmable constant)
Inputs: 使用 M 系列 sensor	Single input via M-Series probe connected to a terminal strip. Probe may be remotely located up to 600 m (2,000 ft) from electronic console. Auxiliary: 4 to 20 mA input.
Recorder Output: 類比輸出	0 to 20-mA, 4 to 20-mA or 0 to 2-V analog, linear in parameter chosen.
Alarm Relays: 警報繼電器	Standard: 8A @ 250 VAC, 8A @ 30 VDC Hermetically Sealed: 0.3A @ 115 VAC, 2A @ 28 VDC Optional Form: C
Display Units: 顯示單位	Dew/frost point temperature: °C, °F PPMv Pressure: psi(g), bar, kPa(g), kg/cm2(g) MH: raw signal.
Power Requirements: 電源	AC power supply: Specify as 100, 120, 220, or 240 VAC, 50/60 Hz Optional DC power supply: 24 VDC Input power: 12 watts, maximum.
Temperature: 周界操作溫度	Operating: 0° to 60°C (32° to 140°F) Storage: -20° to 70°C (-22° to 158°F)

G.E. PANAMETRICS MMS35 電器接端



G.E. PANAMETRICS MMS35 電器接端

Table 2-5: High & Low Alarm Connections

Connect Alarm A:	To ALARM A Terminal Block:
NC Contact	pin #4
NO Contact	pin #5
A Contact	pin #6
Connect Alarm B:	To ALARM B Terminal Block:
NC Contact	pin #7
NO Contact	pin #8
A Contact	pin #9

Table 2-8: Recorder Output Connections

Connect:	To REC OUT Terminal Block:
Out (+)	pin #10
Return (-)	pin #11

Table 2-9: Auxiliary Input Connections

Connect:	To IN Terminal Block:
Out (+)	pin #7
Return (-)	pin #8
Power (+V)	pin #9

Table 2-6: Fault Alarm Connections

Connect Fault Alarm:	To FAULT ALARM Terminal Block:
NC Contact	pin #1
NO Contact	pin #2
A Contact	pin #3

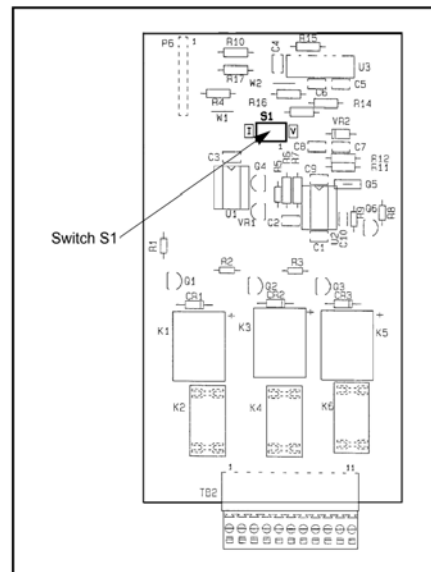
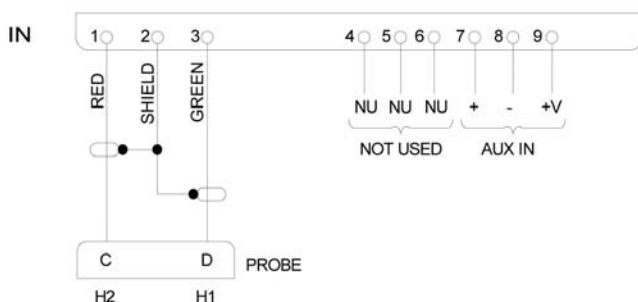
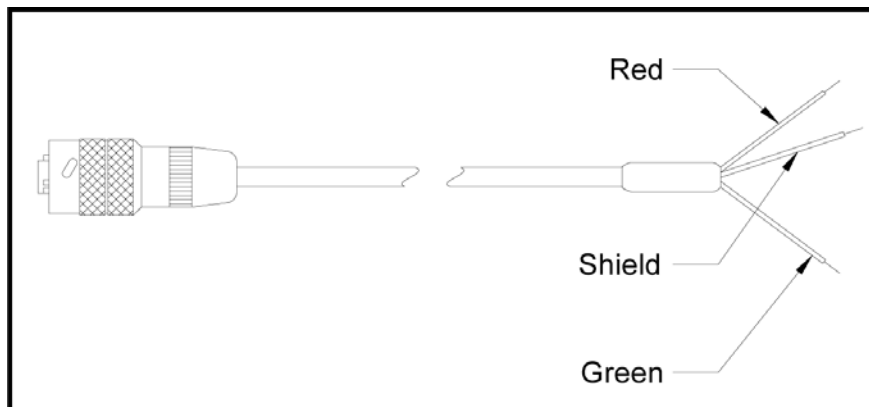


Figure 2-7: S1 Location on 703-1175 Output Board

‘S1’ 開關選至 ‘I’: 電流輸出
‘S1’ 開關選至 ‘V’: 電壓輸出

CONNECTING SENSOR PROBE TO MMS35 感測器接線



Connect:	To PROBE Terminal Block:
Red (H2) wire	pin #1
Shield	pin #2
Green (H1) wire	pin #3

請務必使用原廠提供
SENSOR 電線

USER PROGRAM 使用者設定菜單

Table 3-1: Entering the User Program

Press These Keys:	To Display:
1. [ESC]	ESC
2. [ENTER], [ESC]	PROGRAM MENU displays for 1 sec, then: DP RANGE

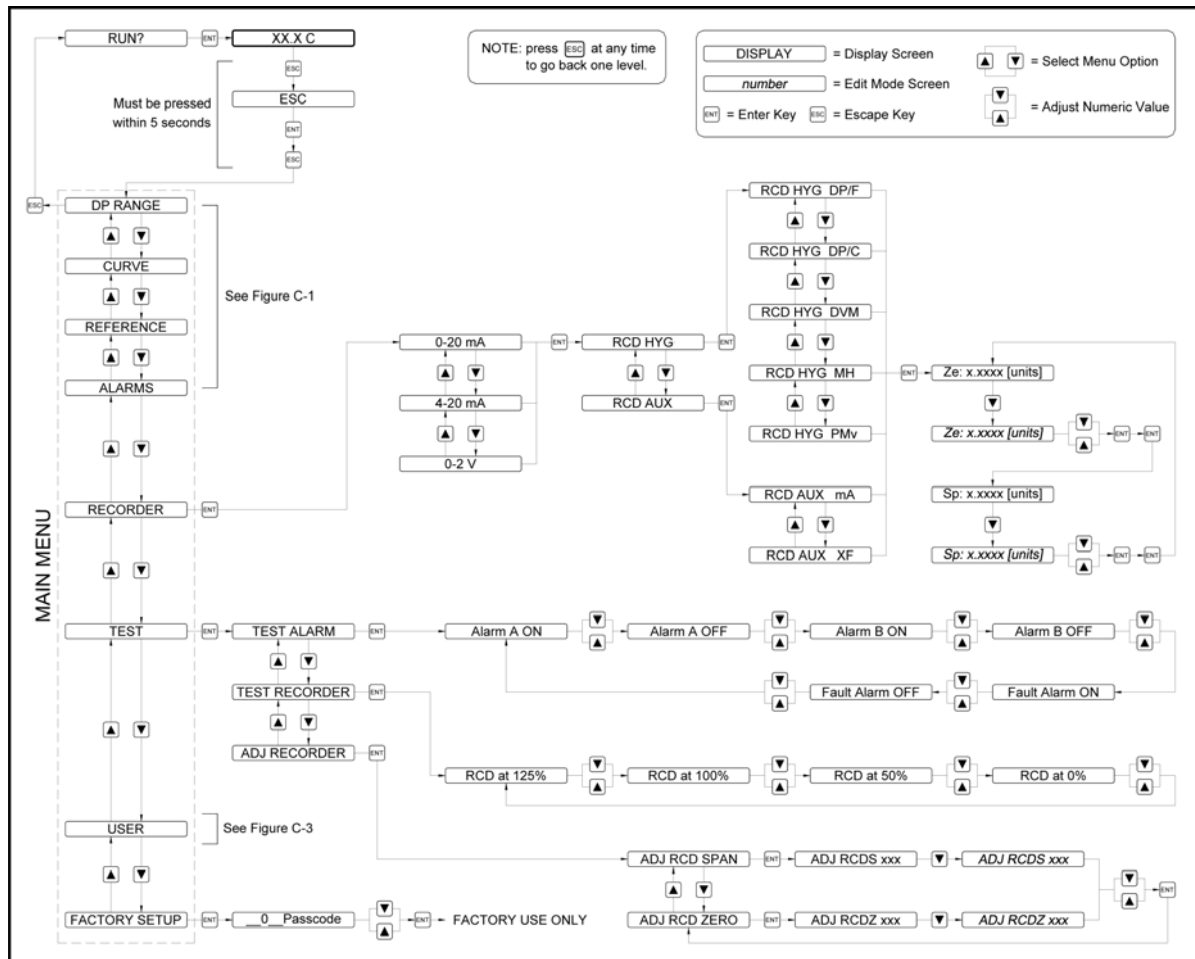
進入 User Program菜單。

隨時要離開 User Program 按住 [ESC] 件直到 'RUN?' 出現後，按 [ENTER] 回到量測模式。

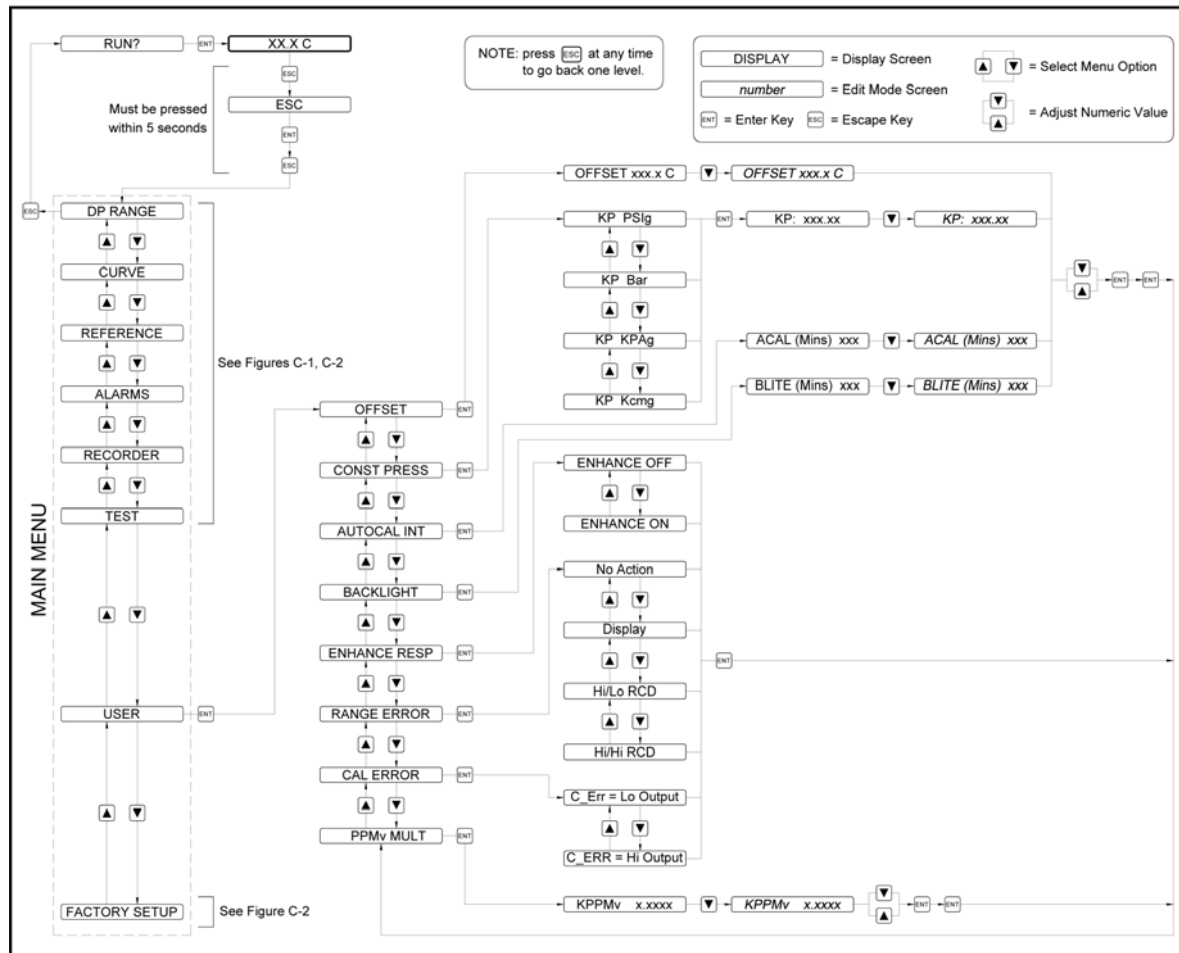
USER PROGRAM 使用者設定菜單

DP RANGE 露點量測範圍	輸入露點分析線性最高和最低露點
CURVE 露點分析線性 (安裝校正後或新 sensor 用)	輸入線性校正點
REFERENCE 水份分析儀範圍	輸入水份分析最高和最低濃度
ALARMS 警報設定	High, low, fault 警報設定
RECORDER 類比輸出設定	類比輸出範圍 (ZERO, SPAN) 設定 · 量測模式設定
TEST 訊號測試	類比輸出和警報輸出測試
USER 使用者設定選項	Offset value 修正露點讀值, constant pressure 露點轉水份用分析壓力值, PPMv constant multiplier 水分倍數, Autocal interval 自動電子訊號校正間隔, computer enhanced response 取終點反應輸出(用於 purge 乾燥時), backlight 顯示背光設定, range and calibration error handling sensor 訊號超出範圍和內部校正參數錯誤處理設定
FACTORY SETUP 工廠設定專用	for factory use only

DP RANGE · CURVE · REFERENCE · ALARM 軟體菜單



RECORDER, TEST, FACTORY SETUP 軟體菜單



CURVE 露點分析線性設定 (安裝校正後或新 SENSOR用)

CURVE

由主選單 Menu 進入 'CURVE'

MH CURVE

選擇 "MH CURVE"

ENTER MH CURVE

選擇輸入13點露點校正點

-110°C/MH 0.1890

使用上下鍵選擇每一個露點校正點並完成設定

ENTER PROBE S/N

選擇輸入 SENSOR PROBE 序號

XXXXXX

S/N

原廠建議 SENSOR PROBE 每6個月送認證合格露點實驗室校正

GE PANAMETRICS MMS TROUBLESHOOTING 故障排除

症狀	原因	系統反應	解決方案
SENSOR 準確度 有疑慮	等待分析儀穩定時間不夠	SENSOR 在乾燥製成露點讀值過高， 在濕製成露點讀值過低	確認系統purge時間足夠，改變流量後若 露點改變代表管線有漏。
	取樣點露點與 製成露點不同	SENSOR 露點讀值過高或過低	Readings may be correct if the sampling point and main stream do not run under the same process conditions. The different process conditions cause readings to vary. Refer to Appendix A for more information. If sampling point and main stream conditions are the same, check sample system pipes, and any pipe between the sample system and main stream for leaks. Also, check sample system for adsorbing water surfaces, such as rubber or plastic tubing, paper-type filters, or condensed water traps. Remove or replace contaminating parts with stainless steel parts.
	SENSOR 受汙染	Probe reads too wet or too dry.	Clean the sensor and the sensor shield as described in Appendix A. Then reinstall the sensor.
	SENSOR 受汙染	Probe reads high dew point.	Clean the sensor and the sensor shield as described in Appendix A, then reinstall the sensor. Also, install a proper filter (i.e. sintered or coalescing element).

G.E. PANAMETRICS M2 SENSOR 校正報告

MACRO

瑞澤企業股份有限公司



MACRO GROUP ENTERPRISE CO., LTD.
110 台北市基隆路一段 432 號 9 樓 2 樓
TEL: 02-27226636
FAX: 02-27251251
E-mail: ana@macrotd.com.tw

露點(微水)分析儀維護保養報告

客戶名稱: GE PANAMETRICS/USA
儀器型號: MIS, MTS, MMS
Model No: MIS, MTS, MMS
Analyzer S/N: 331995PR

報告號碼: MGL-160105.0203
報告日期: 2016/05/06
設備編號: 露點(微水)分析儀
Range: -110°C to 20°C
Probe S/N: 331995PR

NO	Dew Point	MH
Number	(Dew Pt)	Reading
1	-110	0.2273
2	-100	0.2352
3	-90	0.2434
4	-80	0.2518
5	-70	0.2587
6	-60	0.2656
7	-50	0.2724
8	-40	0.2791
9	-30	0.2853
10	-20	0.2915
11	-10	0.2976
12	0	0.3037
13	20	0.3099

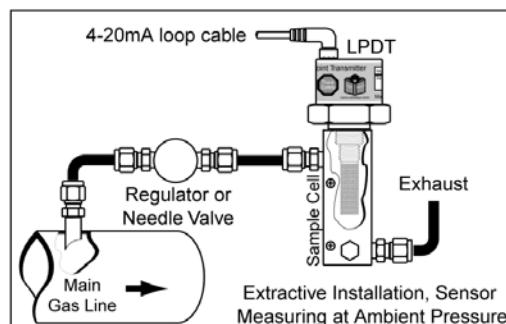
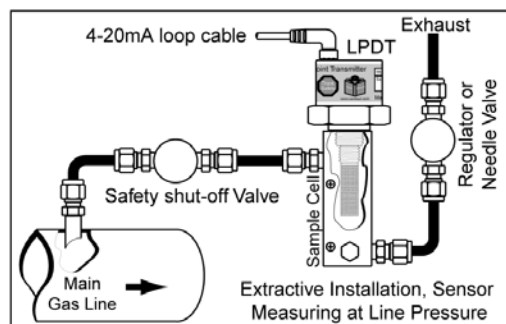
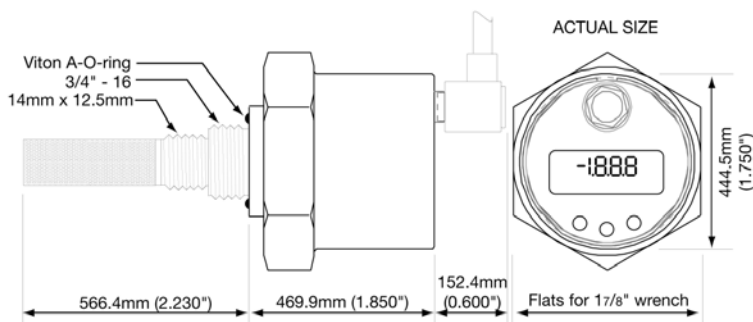
NOTE 附註:

- Used standards:
A. Analyzer: Chilled Mirror Hygrometer, model #: RH 373LX, S/N: 12-0748
B. Analyzer calibrated by: Thunder Scientific Corporation, report #: 10552, NIST certified
- 95% confidence interval with uncertainties considering intrinsic errors with this method:
DP range -80°C to -70°C: $\pm 0.6^\circ\text{C}$ DP range -70°C to 10°C: $\pm 0.2^\circ\text{C}$
- NIST traceable operating range: -80°C to +20°C, analyzer displays from: -110°C to +20°C
- Ambient temperature at calibration: 24.0°C, ambient humidity at calibration: 60.0%

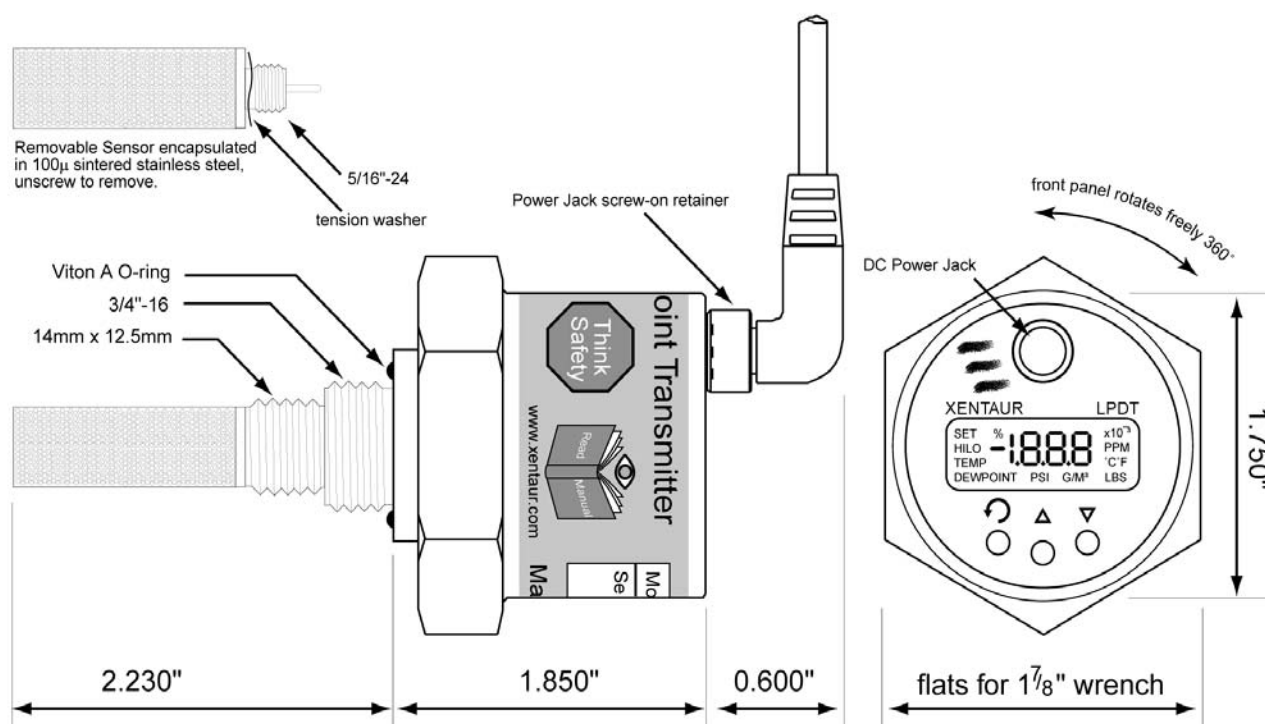
客戶簽名: 主筆: 彭文鳳 校對: 吳啟廷 吳啟廷
亞東工業氣體股份有限公司 瑞澤企業股份有限公司 瑞澤企業股份有限公司
MGL-QB-037A

COSA XENTAUR LPDT 露點計

-100°C TO +20°C DEWPOINT



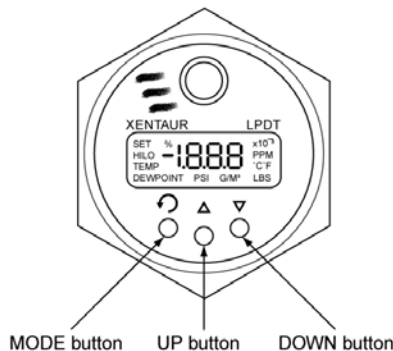
COSA XENTAUR LPDT 露點計



COSA XENTAUR LPDT 露點計規範

Dewpoint Range 露點範圍	- XTR-100: 20°C to -100°C with data to 20°C - XTR-65: 20°C to -65°C with data to 20°C
Accuracy 精確度	±3°C
Repeatability 重現性	±0.5°C
Temperature 周界操作溫度	Operating: -10°C to 70°C
Sample Flow Range 樣品氣流量範圍	100 m/s @ 1 ATM
Flow Range 樣品氣流量	Static to 10,000 cm/s linear velocity at 1 atm
Calibration Method 校正方式	- 大氣SPAN確認 - 更換新 sensor, 每1年更換 sensor一次
Temperature Measurement 樣品氣溫度量測	內建溫度 sensor
Indicators 顯示器	3.5 digit LCD
Engineering Units 顯式單位	°C, °F, ppmv, LBS H2O/mm scf, gm H2O/M3
Analog Output 類比輸出	4-20 mA
Pressure Operating Range 樣品氣壓力	- Standard: 34 bar, 500 PSI - Optional: 340 bar, 5,000 PSI
Power 電源	10~33 VDC

COSA XENTAUR LPDT 操作模式

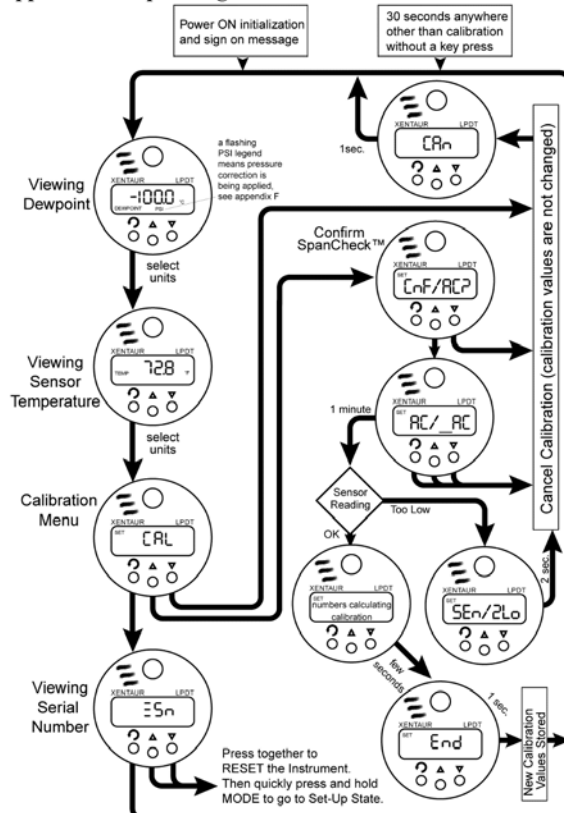


按 MODE button 後

1. View Dewpoint 'DEWPOINT', 露點顯示 (按上下鍵更換單位, °C, °F, PPM, LBS and G/M³)
2. View Temperature 'TEMP' 氣體溫度顯示 (按上下鍵更換單位, °C, °F)
3. Start Calibration 'CAL' 開始校正
 - 按上鍵螢幕顯示 "CnF" 出現
 - 將 Sensor Probe 從流通槽拔出
 - 再按一次上鍵螢幕持續顯示 "AC" 大約60 秒後會顯示Sensor 種類: "XTR-100 (-100°C to +20°C)"
 - 最後出現 'End' 後回復量測模式
 - 回復量測後可能會顯示 'SEn' 代表Sensor水份保和, 將Sensor 裝回流通槽內後Purge 水份下降後將重新顯示露點。
 - 如在校正中出現 'SEn' 和 '2Lo' 代表電容量過低, 確定Sensor 與錶頭連接正常。
4. View Serial Number 序號顯示

COSA XENTAUR LPDT 操作模式

Appendix A: Operating State User Interface flowchart



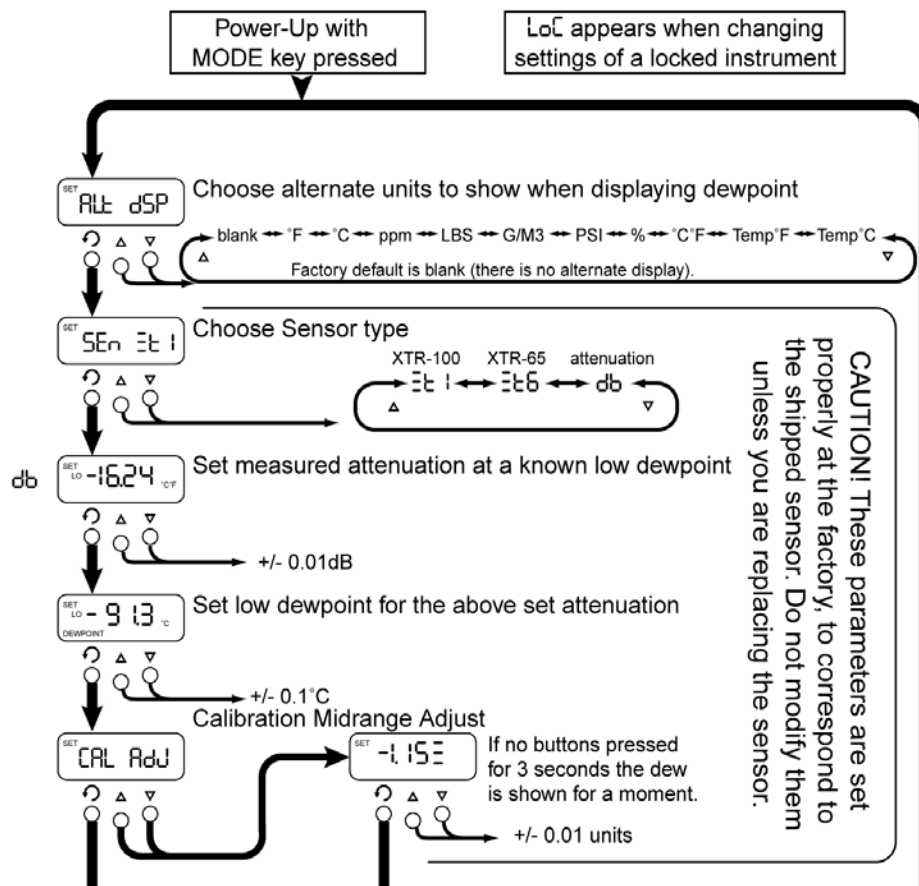
LEGEND: 1. Arrows leading out from below a button depict the flow as a result of pressing the button.
 2. Arrows leading out of other locations depict flow as a result of completing a function or a time-out.
 3. A slash '/' in the display area, is used to depict two alternately shown (flashing back and forth) messages.

COSA XENTAUR LPDT 設定模式

開機時持續按 MODE button 後進入設定模式

1. Display of alternate unit: 量測模式時，第二組輪流顯示選項
2. Selecting the sensor type:
 - XTR-100 (-100°C to +20°C) 或 XTR-65 (-65°C to +20°C)
3. Adjusting low end sensor attenuation and dewpoint, sensor 衰減和低點設定，更換 Sensor 後需重新設定，由原廠提供設定值
4. Calibration Adjustment: -50°C to -10°C 精確度參數設定，更換 Sensor 後需重新設定，由原廠提供設定值
5. Testing Analog Output: 4-20 mA 輸出測試，下鍵測試 4 mA，上鍵測試 20 mA
6. Output range setting: 4-20 mA 相對應露點設定
7. Lock/Unlock the instrumt: 設定模式上鎖，上鍵開鎖，下鍵上鎖

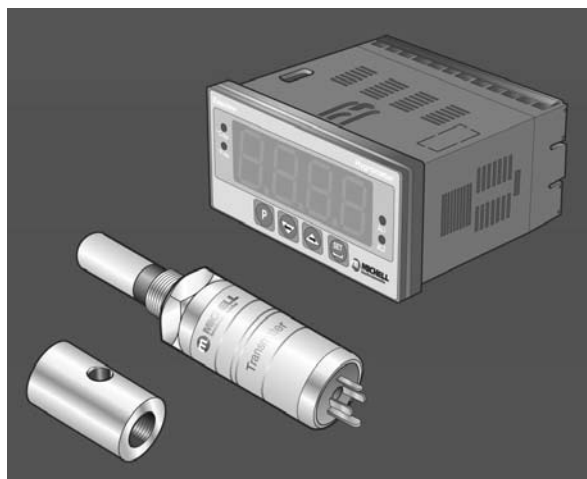
COSA XENTAUR LPDT 設定模式



COSA XENTAUR LPDT 保養維護校正

- 原廠建議SENSOR 每年須送回原廠合格露點實驗室校正或更換SENSOR 新品以確保分析反應和曲線正常。
- 請聯絡代理商安排送回原廠效正或更換SENSOR事宜。

MICHELL EASIDEW 露點計



MICHELL EASIDEW 露點計規範

Transmitter

Type	Michell Easidew
Transmitter Torque Loading	Minimum 30.5 Nm (22.5 lbf-ft)
Calibration Range	-100 to +20°C (-148 to +68°F) dew point
Output	4-20 mA current source configurable over the entire dew-point range
Interchangeability	Fully interchangeable
Dew-Point Accuracy	± 2°C (± 3.6°F)
Operating Temperature	-40 to +60°C (-40 to +140°F)
Storage Temperature	-40 to +75°C (-40 to +167°F)
Temperature Coefficients	Temperature compensated across operating temperature range
Operating Pressure	10-6 bara vacuum to 45 MPa (450 barg / 6500 PSI)
Flow Rate	1 to 5 l/min (2.1 to 10.6 SCFH) mounted in standard sampling block 0 to 10 m/sec (0 to 353 SCFS) direct insertion (80 µm sintered guard)
Traceable Certification	-90 to +20°C (-130 to +68°F) dew point traceable to the National Physical Laboratory; -75 to +20°C (-103 to +68°F) dew point traceable to NIST (USA) [For dew points < -90°C (< -130°F): Direct reference to a fundamental cooled mirror dew-point meter]
Environmental Protection	IP66 and NEMA 4
Weight	150g (5.29oz)

MICHELL EASIDEW MICHELL EASIDEW 露點計保養維護，校正

- 確認樣品氣無冷凝水或粉塵
- 原廠建議SENSOR 每年須送回原廠合格露點實驗室校正或更換SENSOR 新品以確保分析反應和曲線正常。
- 請聯絡代理商安排送回原廠效正或更換SENSOR事宜。



MICHELL CERMAX 露點計



MICHELL CERMAX 露點計規範

Sensor	Kahn Ceramic Moisture Sensor
Gas wetted components	316 stainless steel Components
Gas connections	1/8" Swagelok inlet and outlet fittings.
Display	Standard version: 240 x 64 dot matrix LCD
Range	Calibrated from -100 to +20 oC dewpoint; readings to -120 and +30 oC dewpoint
Accuracy	+/- 1 oC from -60 to +20 oC dewpoint; +/- 2 oC from -100 to -60 oC dewpoint
Resolution	0.1 oC dewpoint, 3 significant figures for other units
Units	oC, oF, K dewpoint, PPM(V), PPM(W) for air, N2, H2, CO2, natural gas, %RH, gm-3 (natural gas), #/MMSCF (natural gas)
Secondary input	0-20 mA or 4-20 mA for temperature or pressure
Data storage	Up to 10,000 samples of primary and secondary variable, time and date stamp and identification tag
Communications	RS232C for stored data
Power	Internal re-chargeable battery pack (removable) charged by external a.c. powered 6V charger (supplied). 24 hours normal operation between charges. Charge time is up to 12 hours but can be up to 14 hours if the instrument is in use at the same time.
Case	Custom polyurethane case with integral padded carry handle
Dimensions	250W x 300D x 150H mm approx.
Weight	8.8 lbs (3 kg)
Ingress Protection	IP65
Operating temperature	-20 to +50 OC

MICHELL CERMAX 操作模式

- 顯示 “**USER SETUP: DEFAULT or PREVIOUS**” 按 ‘0’ 可選擇”現場量測模式”或”實驗室模式”。
- 現場量測模式: 適用於現場攜帶行須快速反應速度應用，精確度在 2°C dp 左右，通常量測在 15 分鐘內可以穩定，適用於總量測時間低於2小時的量測。如露點低於 -80°C dp 時請使用”實驗室模式”。
- ”實驗室模式”:高精準度，反應穩定時間較久，適用於長時間量測。

MICHELL CERMAX 露點計保養維護，校正

- 確認樣品氣無冷凝水或粉塵
- 原廠建議SENSOR 每年須送回原廠合格露點實驗室校正或更換SENSOR 新品以確保分析反應和曲線正常。
- 請聯絡代理商安排送回原廠效正或更換SENSOR事宜。