

UV-3292 紫外分光檢測器使用手冊

UV-3292 UV spectrophotometric detector operating manual



成都格萊精密儀器有限公司(Chengdu GeLai Technology Co., Ltd)
太陽系分析基礎開發工作室(The Analytical Based Development Center)

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1. 介紹 Introduction

UV-3292 紫外分光檢測器 採用全數位輸出設計。信號經 24 位元 A/D 後由單片機完成對數轉換及調零處理，處理後結果到 RS232 介面。

The UV-3292 UV spectrophotometric detector is implemented with full digital output design。The analog detector signal is converted with zero adjustment by the microcontroller and 24-bit AD converter, with the processed results output to the RS232 interface.

檢測器的光柵直接固定於步進電機的電機軸上，通過單片機程式進行正弦轉換後控制電機進行波長的選擇控制，取代傳統的正弦杆機構，使系統的可靠性及穩定性得到了進一步提高。

The grating of the detector is fixed directly to the motor shaft of the stepping motor。The sinusoidal conversion by the microcontroller control the motor to wavelength selection that replaces the traditional sine bar mechanism, so that the reliability and stability of the system has been further improved.

開機即進行波長校正。

可對波長進行編程控制。

可實施停流自動光譜掃描。

流通池採用 Z 字型設計，並對流通池進行恒溫處理，進而使儀器的雜訊及漂移得到較大的改善。

採用雙光束光路設計，進一步地減少了環境變化對漂移的影響。

可通過更換流通池及相應的系統參數進行光程的調整。可輕鬆地轉換用於分析型，半製備，至大製備型的 HPLC.

具有圖譜類比輸出口。

可通過 RS232 介面由色譜工作站進行控制。

Wavelength calibration is built in system boot steps.

Programmed wavelength control.

Stopped-flow spectral scanning capability

The flow cell is design with Z-shaped and thermostatic features, that improving the instrument noise and drift minimization.

Double beam optical design, further reducing the environmental effect on signal drift.

The light path can be adjusted by changing the optical path of the flow cell and the corresponding system parameters. It can be easily converted for analytical, semi-preparative, large preparative HPLC.

Analog output port for chromatogram acquisition

System controlled by chromatography workstation through RS232 / RS485 / USB interfaces.

2. 性能指標 Performance Indicators

波長範圍 Wavelength range	190~740nm
截止濾光片 Edge filter	370nm
光源 Light source	氘燈 · 鹵鎢燈 (可選) Deuterium lamp, halogen tungsten lamp (optional)
頻寬 Band width	8nm
波長精度 Wavelength precision	±1nm
雜訊 Noise	2×10^{-5} AU (254nm@1mL/min@甲醇) 2×10^{-5} AU (254nm@1ml/min @methanol)
漂移 Drift	15×10^{-5} AU/h (254nm@1mL/min@甲醇) 15×10^{-5} AU/h 254nm@1ml/min @methanol)
最小檢測濃度 Minimum testing concentration	5×10^{-9} g/mL (254nm@1mL/min@甲醇@萘標) 5×10^{-9} g/ml (254nm@1ml/min@methanol@Naphthalene standard)
測量範圍 Testing range	0~2.5AU
顯示 Display	LCD 2×16 英文顯示 LCD 2*16 English
GLP information	燈源的工作時間、燈點燃次數 Working time of light source, Times of light kindled

訂貨資訊 Ordering Information

訂貨號 Order number	產品 Product	數量 Quantity
0-050-009	UV-3292 Multi-wavelength UV detector	1
0-050-005	UV-3293 Multi-wavelength UV detector	1
1-002-011	Semi-preparative flow cell	1
1-002-018	Prepared flow cell	1

3. 紫外分光檢測器結構 UV spectrophotometric detector structure

3.1 光路圖 Optical path diagram

採用氘燈 (D₂ 燈) 作為光源，平面光柵作為分光元件，光電二極體 (光電池) 作為信號接收元件，下圖為 紫外分光檢測器的光路簡圖：

Adopt Deuterium lamp (D₂ lamp) for light source, plane grating for spectral resolution element, and photodiode (photocell) for a signal-receiving element. The next picture shows the optical path diagram of the UV spectrophotometric detector:

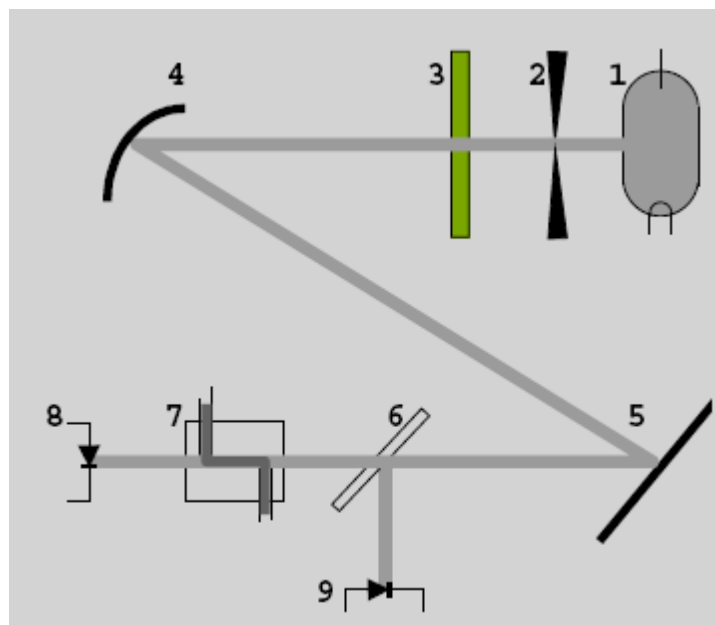


圖 1 紫外分光檢測器光路圖

Figure 1 Optical path diagram of the UV spectrophotometric detector

1) 氘燈 2) 狹縫 3) 濾光片

4) 凹面鏡 5) 平面光柵單色器 6) 分光鏡

7) 流通池 8) 光電二極體 (樣品) 9) 光電二極體 (參比)

1.Deuterium lamp, 2.Slit, 3.Filters, 4.Concave mirror, 5.Plane, 6.grating,
7.monochromator, 8.Spectroscope, 9.Flow cell,
10.Photodiode (for sample slot), 11.Photodiode (for reference slot)

光路圖簡單說明：

A brief description of the Optical path diagram:

如圖 1 所示，從氘燈 (1) 的一束光通過狹縫 (2) 射出。通過濾光片 (3) 後，被凹面鏡 (4) 聚焦到平面光柵單色器 (5) 上，從而得到特定波長的光束。此光束被分光鏡 (6) 分成兩部分。一部分光束傳輸到參比光電二極體 (9) 產生參考信號，另一部分通過流通池 (7) 後，照射到光電二極體 (8) 產生測量信號。

As shown in Figure 1, the deuterium lamp(1) light beam emits from the slit(2), through filter(3), then focused by the concave mirror(4) to the plane grating monochromator(5), thereby obtaining a light beam of a specific wavelength. This beam is divided into two portions by a dichroic mirror(6). One portion of the beam is transmitted to a reference photodiode(9) to generate a reference signal, and the other is conducted to pass through the flow cell(7), that exposure to the photodiode (8), generating a measuring signal.

3.2 前面板 Front Panel

紫外分光檢測器的前面板包括資訊顯示區、面膜鍵盤區和光學單元部件三個部分組成。如圖 2 所示，資訊顯示區、面膜鍵盤區用於顯示和控制檢測器的狀態以及運行參數。前面板光學單元，可以直接對紫外檢測器管路的連接、流通池安裝和維護。

The front panel of the UV spectrophotometric detector if composed of three parts:

Information display area, Keypad area and the optical unit components. As in Figure 2, The Display and Keypad sections are used for displaying and controlling detector status and operation parameters。

The UV detector pipe connection, flow cell installation and maintenances, can be reached directly from the front panel optical unit.



圖 2 紫外檢測器前面板和流通池 Front panel and Flow cell

1) 資訊顯示區 2) 面膜鍵盤區 3) 光學單元部件

1) Information display area 2) Keypad 3) Optical Unit Assembly

3.3 流通池 Flow Cell

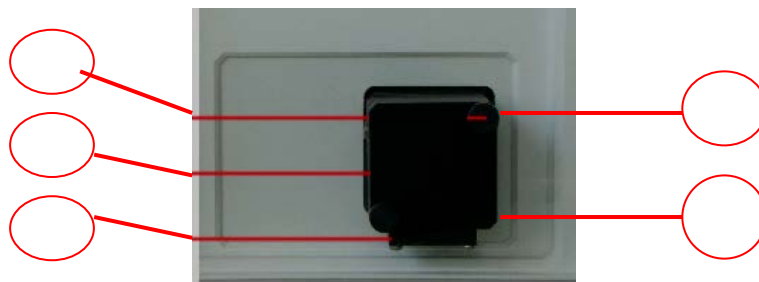


圖 3 流通池區及流通池

Figure 3 Flow Cell areas and Flow cell

1) 流通池固定螺釘 2) 流通池盒 3) 流通池支架

4) 流通池進液口 5) 流通池出液口

1) Fixing screws 2) Cartridge 3) Holder

4) Liquid inlet 5) Liquid outlet

如圖 3 3) 所示“流通池進液口”連接色譜柱，管路與流通池連接處管路一定要保證插到流通池底部，防止死體積產生。5) 所示“流通池出液口”連接反壓器到廢液瓶或餵份收集裝置。1) 鬆開流通池兩個固定螺釘可以將流通池拆卸進行清洗維護，流通池的清洗維護見本說明書“5.1 清洗流通池”及 5.2 “拆卸流通池清洗”，

安裝流通池固定螺釘時一定要上緊固定螺釘，防止漏光。

As shown in FIG. 3, 4), Liquid inlet is connected to chromatography column. The pipe must be inserted as close as possible to the flow cell to prevent from producing dead volume.

As in FIG. 3, 5), Liquid outlet is connected to a back pressure

device, then goto the waste or fraction collection device.

As in FIG. 3, 1), The flow cell can be removed for cleaning and maintenance by loosen the two fixing screws of the flow cell.

See the instructions in "5.1 Cleaning flow cell" and 5.2 "Removing the flow cell for cleansing"

Be sure to install the flow cell with the fixing screws fixed firmly to prevent from leakage of light.

3.4 顯示區和薄膜鍵盤 Membrane keypad and display area

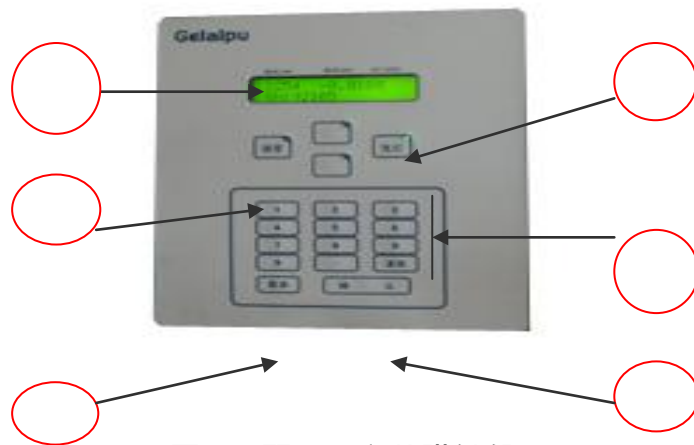


圖 4 顯示區和薄膜鍵盤

Figure 4 Display area and Membrane keypad

- 1) 資訊顯示區 2) 資料登錄鍵及清除鍵 3) 確認鍵
4) 調零鍵 5) 氘燈開/關鍵 6) 翻頁鍵菜單

- 1) Information display area 2) data entry and Clear keys 3) Enter key
4) Zero key 5) Deuterium lamp On/Off key 6) menu page navigation key

資訊顯示區用於顯示檢測器的當前設定波長、信號輸出值，通過操作上下翻頁按鍵，D₂燈能量及累計使用時間功能表、序號及操作功能功能表、標識功能表。薄膜按鍵用於輸入資料、清除資料、實現控制檢測器的自動調零和程式運行（檢測器的程式運行可以由反控工作站軟體來控制實現）等操作。

By operating the up and down paging keys, the Information display area displays pages for the current settings for the wavelength, signal output value, D₂ lamp energy and accumulated operating time, serial number and operating

functions menu, logo menu.

Membrane keypad is used input data, erase the data, and to achieve detector auto-zero and program operation control and other operations .

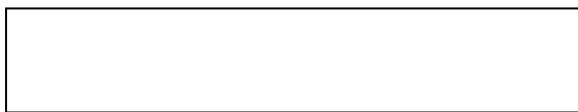
Program running of the detector can also be controlled by the computer workstation software .

1. 液晶顯示幕介面
2. 數位輸入鍵 : 0 - 9 清除鍵 CE : 使錯誤的輸入清除
3. 確認或遊標移動鍵 Enter
4. 調零鍵 Auto Zero : 用於檢測器的自動調零
5. 氙燈開啟與關閉鍵 D2 : 用於檢測器氙燈的開/關
6. 顯示介面切換鍵 Menu

1. LCD display interface
2. Digital input keys: 0 - 9 · Clear key CE: to make wrong input cleared
3. Confirmation or moving cursor: Enter key
4. Zero button Auto Zero: for auto-zero detector signal
5. On/Off Deuterium lamp: for detector deuterium lamp on/off
6. The display interface switching key: Menu

儀器開機自檢後液晶顯示幕顯示主介面，此狀態顯示:

The LCD screen displays the main interface following the Instrument start up, as the display status:



檢測器此時波長為 240nm， ">" 表示可通過數位鍵和 Enter 鍵設置波長；
-0.0000AU 顯示輸出信號值 (AU)， SN : 本機出廠序號 ；

In this case the detector wavelength is 240nm. ">" means that the wavelength can be set with digital and Enter keys;

-0.0000AU is the signal output value (AU), and SN: The instrument manufactory serial number;

按【功能表】翻頁後，顯示:

Press the [Menu] for paging to display :



設置並顯示濾光時間常數 RESPONSE 1.00(秒) · 通過數位鍵和 Enter 鍵設置 · 通常設置 1 (秒); 按確定鍵後設置類比信號量程 AUX RANG 1.00 (AU/V) 通常設置 1.00 (AU/V)

Through the digital keys and Enter key to set the displays the time constant of the filter: RESPONSE 1.00 (seconds) · that is usually set to 1 (sec). Press Enter and then to set analog signal range :AUX RANG 1.00 (AU / V) · that usually is set to 1.00 (AU / V)

再按【功能表】翻頁後顯示：

Press the [Menu] for paging to display as:



氙燈總共點燈時間 D2 TIME h (小時); Sig : 顯示樣品能量 · Ref : 顯示參比能量。
A total of Deuterium lamp lighting time D2 TIME h (hours); Sig: Displays the sample energy, Ref: Display reference energy.

3.5 後視圖 Rear view

儀器的後面板裝有插槽、介面、風扇，用於連接電源、以及資料通信、主機殼散熱等。
The instrument rear panel is equipped with slot, interface, fans, used to connect power, data communications, and the host shell heat dissipation. °



圖 5 紫外分光檢測器後視圖

Figure 5 UV spectrophotometric detector rear view

1) RS-232 通信介面, 2) 220V 電源插座 3) DC24V 主機殼風扇

- 1) RS-232 communication interface
- 2) 220V power input
- 3) DC24V host shell fan

圖 5 所示 1) RS-232 通信介面 (九孔接頭)，通過 RS-232 通信電纜與 PC 機連接，完成與 PC 機的資料交換。並且可以通過預裝反控工作站軟體的 PC 機來控制紫外分光檢測器； 3) DC24V 主機殼風扇，用於主機殼內變壓器及檢測器氙燈的散熱平衡； 2) 220V 電源插座，內置有兩保險管 (250V1A)，其中一個為備用的，方便用戶更換。

As shown in Figure 5， 1) RS-232 communication interface (9-pin connector). Through the RS-232 cable connected to PC, communication, the exchange of data with the PC is completed. Also, a pre-installed PC workstation software can control the UV spectrophotometric detector.

3) The DC24V host shell fan is used to dissipate and balance heat form the host shell transformers and detector deuterium lamp.

2) 220V power input, built two fuses (250V1A), one of which is spare for convenience of replacement。

4.基本操作 Basic Operations

4.1 儀器與工作站的連接 Instrument workstation connection

UV-3292/UV-3293/通過 RS232 與電腦進行通訊，電腦必須有一個空閒的 RS232 串列口以供使用 (可以使用擴展的序列介面，如 USB_to_RS232)。在配件工具包中找出 RS232 連接線，將通訊電纜一端連接於儀器後面板 RS232 通訊介面處，另一端接電腦串列口。並在工作站上將對應的埠號設置好。

在配件工具包中找出 RS232 連接線，將其其中一端插入儀器的 RS232 插槽，另一端與電腦的 RS232 插槽連接。

如使用模擬口，還需通過 D/A 轉換器 Uv-3260 轉換後再連工作站轉接器後方可與連接電腦。
For UV-3292/UV-3293 to communicate with PC, the computer must have a free serial RS232 port or a extended serial interface, such as the 『USB to RS232』 convertor. Find the RS232 cable to the accessory kit, and connect firmly one end of the communication cable to the rear panel RS232 communication interface, and the other end to PC serial port(or USB to RS232 convertor), and then correctly set up the corresponding port position on the workstation configuration.

4.2 儀器的基本操作 Instrument basic operation

- 1 · 使用儀器附件正確連接好檢測器管路,注意流通池出入口(下為進口,上為出口);
- 2 · 將電源電纜線一端插入儀器后面板的電源插座,另一端插入符合以上所述的供電裝置上,打開儀器后面板右電源開關,0 為關斷,1 為打開;
- 3 · 儀器開機後自檢並進行波長自動校正;
- 4 · 自檢通過後儀器處於待機狀態, D2 指示燈亮(表示氘燈已點亮),此時可通過鍵盤設置波長 (nm),濾光時間常數 RESPONSE (通常設置 1 秒); 類比信號量程 AUX RANG 1.00 (通常設置 1.00 AU/V)
- 5 · 熱機待儀器讀數穩定後,按調零鍵 Auto Zero 使檢測器讀數的歸零
- 6 · 儀器開始檢測.

1. Use the instrument parts and accessory to connect detector pipes, paying attention to correctly locate the flow cell liquid inlet in lower position and outlet higher position that may avoid the accumulation of bubble inside the cell.

2. Insert the end of power cable into power input socket of the instrument rear panel, and plug the other end into the power source socket, then turn ON the power switch on the right side of the instrument rear panel, 0 is Off, 1 is On.

3. Self-diagnosis and wavelength calibration is built in system boot steps.

4. After successful Self-diagnosis, the instrument is in standby mode, with D2 indicator lighting (Deuterium lamp is lighted), then you can set the Wavelength (nm) with the keypad, the Filter time constant RESPONSE:1 (usually set to 1 second), and analog signal range AUX RANG: 1.00 (usually set 1.00 AU/V).

5. After the instrument have warmed up to stable readings, press Auto Zero key to zero (minimize) the detector baseline reading.

6. Start to detect baseline and chromatograms.

5. 簡單維護 Simple Maintenance

特別聲明：非專業或者授權人員，禁止開啟本產品的外殼！！否則造成後果自負!!!

5.1 清洗流通池 Cleaning the flow cell

雜訊較大的基線和低靈敏度可能是由流通池被污染所引起的。

按照下面規程沖洗流通池，在大多數情況下是有效的。

- a) 使用下面一種溶劑沖洗流通池：十二烷基磺酸鈉；1m HCL；1m NaOH；乙醇；丙酮。
- b) 用注射器將溶劑注入流通池，保持大約 5 分鐘。
- c) 用水徹底沖洗，然後用平緩的純氮氣流吹趕。

注意：絕不許用壓縮空氣吹幹流通池。因為它含有微小的油滴將會塗附在池的表面！

注意：當暫時不用光學模組時，拆下流通池並用注射器注入蒸餾水沖洗掉微量的鹽和蛋白。儲藏池子前注入 10—25% 的乙醇或異丙醇稀釋液以防止微生物生長。

注意：如果清洗流通池後仍不成功，需拆開流通池清洗透鏡。

Special statement : The opening of this product casing by non-professional or authorized personnels is prohibited .

It will cause invalid Warranty conditions.

5.1 Cleaning the flow cell Cleaning the flow cell

Greater baseline noise and low sensitivity may be caused by contaminated flow cell. Rinse and flush the flow cell according to the following procedures, and in most cases it is effective.

a) Use one of the following solvent to wash the flow cell:

Sodium dodecyl sulfate, 1m HCL, 1m NaOH, Ethanol, Acetone.

b) Injected the solvent flow cell by a syringe, stay the solvent inside for about 5 minutes.

c) Rinse thoroughly with water, then use with a gentle stream of pure Nitrogen air to rush to dry.

5.2 拆卸流通池清洗 Removing the flow cell for cleansing

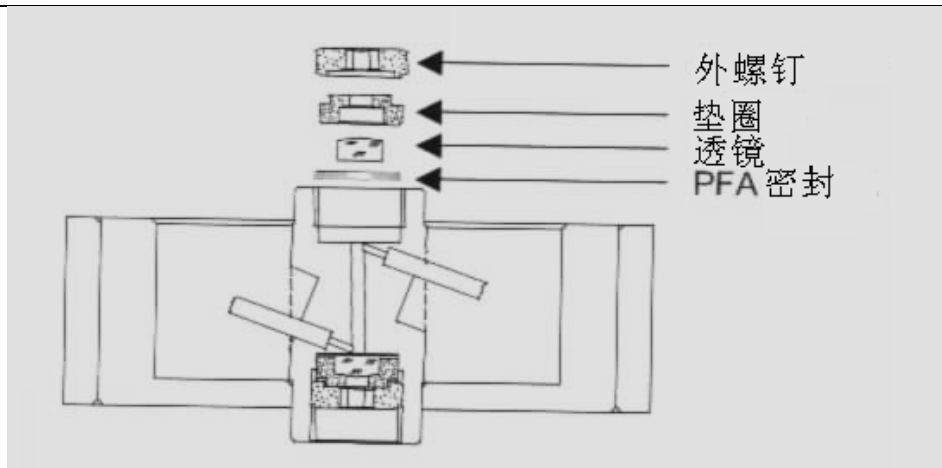


圖 11 流通池剖視圖

Figure 11. A cross-sectional view of the flow cell

- a) 使用流通池備件中的 3mm 六角扳手鬆開外圈螺母。
- b) 用鑷子將裝有透鏡的 PEEK 固定座取下，或在乾淨的桌平面上輕輕磕出。透鏡嵌在 PEEK 固定座中並用聚四氟乙烯密封圈密封。每一次拆裝流通池，都應更換密封圈。
- c) 取下透鏡，用軟布擦拭或選擇適當的溶劑用超聲波清洗。小心不要用手指碰觸乾淨的透鏡。
- d) 以上述過程相反的順序重新裝好流通池，並確保聚四氟乙烯密封圈不要遮擋光路。
- e) 用扳手將外圈螺母小心擰緊，不要損壞透鏡。

a) Use the 3mm hex wrench in the flow cell spare parts to loosen the outer nut.

b) Removed the lens-equipped PEEK holder with a clamp, orgently knock it out onto a flat, clean and soft desk surface.

The Lens is embedded in the PEEK holder with PTFE sealing ring, demanding that each disassembly and assembly of the flow cell should replaces the seals.

c) Remove the lens, wipe with a soft cloth or select the appropriate solvent for ultrasonic cleaning. Be careful not to touch the clean lens with your fingers.

d) Reverse the above procedure in order to Reinstall the flow cell, and make sure not to block the optical path by the PTFE seals.

e) Tighten gently and carefully the outer nut with a wrench to protect

against damage to the lens.

5.3 更換氙燈 Replacing Deuterium lamp

UV-3292/UV-3293 紫外分光檢測器使用的燈源為氙燈，其質保壽命為 1000 小時。

氙燈的實際使用時間取決於多種因素，比如燈點亮的次數、燈平均點亮時間以及對雜訊和靈敏度的要求。

檢查燈能量，樣品和參比兩個光強值。參比值測量的是參比通道中的光強值，

它可以用於檢查燈的品質。

定期檢查參比值（虛擬流通池，波長為 240nm）。尤其當檢測器工作狀態出現雜訊較大或靈敏度降低時檢查該值。當發現參比值接近於或低於 0.1 或者氙燈使用時間超過 1000h 時，則必須更換新氙燈。

UV-3292 / UV-3293 UV spectrophotometric detector used Deuterium lamp as light source, and its warranty life is 1000 hours.

The actual service time of the Deuterium lamp depends on various factors such as the number of ignitions, average lighting time and noise and sensitivity requirements.

Check the light energy, both the sample and reference light intensity values .

The reference value being the light intensity value measured from the reference channel, and it can be used to check the quality of the lamp.

Periodic inspection of reference values (virtual flow cell, a wavelength of 240nm) is necessary , in particular, check this value when the detector appears a larger noise increasing or sensitivity decreasing operating states.

When the reference value is close to or less than 0.1 or Deuterium lamp lighting time exceeds 1000h, it must be replaced with new deuterium lamp.

6. 故障分析處理 Trouble fixing

故障現象 Symptom	解決方法 Solution
6.1、流通池墊片損壞 the flow cell seal is damaged	a、避免過大的背景壓力（壓力降） to avoid excessive back pressure (pressure drop) b、更換墊片 replace the seal

6.2、流通池窗破碎 flow cell windows broken	更換窗口 replace the window
6.3、手緊接頭漏液 manpower joint leakage	擰緊或更換 tighten or replace
6.4、廢液管阻塞 waste tube blockage	更換廢液管 replace the waste tube
6.5、流通池阻塞 fow cell blockage	重新安裝或更換 reinstall or replace
6.6、顯示幕亂碼 display garbled	關機，按 0 重新開機 shutdown, press 0 to reboot
6.7、儀器死機 instrument response crashed	關機，按 0 重新開機 shutdown, press 0 to reboot
6.8、參比 Ref 能量 OK, 樣品 Sig 能量 NO GOOD Reference(Ref)energy OK, Samples (Sig) energy NO GOOD	a 流通池沒有安裝好,漏光,上緊流通池固定螺釘 flow cell is not well installed, may be light leaks, tighten the flow cell fixing screws b 流通池內有氣泡,檢查反壓器是否正常 flow cell bubbles, also check whether the back pressure device is normal c 流通池污染,拆卸流通池清洗 contaminated flow cell, disassembly and cleaning flow cell
6.9、無能量, 不點燈 no energy, 9 does not light	a 按 0 重新開機點燈 press 0 to reboot and lit b 工作站軟體設置錯誤·正確設置檢測器 b Workstation software is set incorrectly, set the detector correctly. c 工作電壓不穩,增加穩壓電源 instable operating voltage, increase power supply

	d 系本公司售後服務 contact the after-sales service
6.10、儀器無法開機 the instrument will not turn	a 檢查電源供電 Check the power supply b 機後面插座保險是否正常 Check if the fuse of power input socket at the rear panel is normal c 聯繫本公司售後服務 contact the after-sales service

7. 售後服務 Service

在使用者遵守保管和使用規則的條件下,從製造單位發貨之日起十二個月內, 若因產品製造品質缺點而發生損壞或不能正常工作時, 製造單位應免費地為使用者修理或更換產品和零件. 同一消耗品廠家質保的使用時間是累積的. 紫外分光檢測器裝配的氘燈屬於消耗品, 其廠家質保的使用時間為 2000 小時.

如因人為不操作不當或故意損壞儀器則不在保修範圍內.

For users complying with the conditions of storage and use rules, and if the products and parts have manufacturing quality defect and does not work correctly, the manufacturer should be free of charge for the user to repair or replace.

The warranty time is within twelve months from the date of shipment from the manufacturing units.

For consumables, such as the Deuterium lamp, the time of warranty for is accumulative. (The Deuterium lamp, the warranty time is 2000 hours)

Also, it is not warranted for damage from improper operation of equipment.

Ordering & Service Information: 訂購和服務信息.

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ChengDu GeLai Technology Co.,Ltd.

成都格萊精密儀器有限公司

NO.137, JIAZIDONGDAO, DAYI COUNTY, CHENGDU, CHINA 611330



UV-3292 紫外分光檢測器使用手冊

UV-3292 UV spectrophotometric detector operating manual

四川省成都大邑工業集中發展區孟灣東路

電話(Phone) : 028-88201806/88201866, 傳真(Fax) : 028-88201866,

Web: <http://www.cdgelai.com>, Email: cdsglp@163.com

The Analytical Based Development Center (ABDC Work Shop)

太陽系分析基礎開發工作室(ABDC)

Zipcode:407, Add: 5th Floor, NO.641, Fu Shun Road, Shi-Tuen District , Taichung City, Taiwan, R.O.C.

407 台中市西屯區福順路 641 號 5 樓, 436 台中市清水區高北里護岸路 140-7 號

Phone: 886-4-24628085, FAX:886-4-22569743,

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Email: service@chromnet.net

LINE:service.abdc, SKYPE: skypeabdc, Twitter: ttabdc, WeChat: wcabdc