



# GLP3000-500ml 高壓輸液泵 安裝使用手冊

## High-pressure Preparative Chromatography Pump Installation manual



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## 一、概述(Overview)

### 1.1 簡介(Introduction)



圖 1. GLP3500-500ml 高壓輸液泵縮略圖(chromatography pump thumbnail)

GLP3500-500ml 高壓輸液泵採用最新 32 位超高速運算 RISC 中央處理器+32 位 DSP 步



進驅動處理器為核心控制。它基於全數位的頻率發生系統、先進的馬達驅動系統及友好的人機顯示介面使得該設備的操作及控制很方便。先進的泵頭及單向閥設計思路，融會了當今世界上最先進的經驗，使得用戶在各種使用條件下都可以保證輸液的精度及重複性指標。

GLP3500-500ml 高壓輸液泵採用雙柱塞獨立控制，該泵可以配置成等度、線性梯度模式。工作于高壓梯度模式時，上位機可同時控制多台相同型號的高壓輸液泵，並可通過上位機的監控對梯度曲線梯度方式進行驗證。多種通訊模式可選，標準 RS232、RS485、乙太網介面，對高壓輸液泵進行控制。

The GLP3500-500ml high pressure chromatography pump apply the latest ultra-high speed 32-bit RISC computing central processor + 32 bit DSP stepping driver processor as the core controller.

It is based on the frequency generation system, advanced motor drive system and friendly user interface that make the operation and control of the device very convenient.

Advanced pump head and check valve design ideas, a unique blend of the world's most advanced experience, allowing users in a variety of conditions , can guarantee the accuracy and repeatability specifications of infusion. The GLP3500-500ml dual piston high-pressure chromatography pump adopts dual pistons for one independent solvent delivery control.

The pump can be configured in isocratic or linear gradient mode.

While working in high-pressure gradient mode, the host computer or Master controller can control multiple pumps of the same type, and the gradient curve and gradient mode can be monitored through host computer for authentication.

Multiple communication modes, as the standard RS232, RS485, and Ethernet are selectable for pump system control.

## 1.2 工作模式

GLP3500-500ml 高壓輸液泵可以根據使用者的需要，配置成如下幾種模式：

GLP 3500-500ml high pressure chromatogram pump(s) can be configured according to the needs of users to the following modes:

等度製備型 Isocratic Preparative	一個 GLP3500-500ml, 1 ~ 500ml/min. a GLP3500-500ml pump, 1 ~ 500ml/min.
高壓梯度製備型	一個以上的 GLP3500-500ml 高壓輸液泵，最多可配置成



High-pressure gradient Preparative	一個 2 元 至 4 元高壓泵系統. More than one GLP3500-500ml high-pressure chromatography pumps can be configured from binary(2 pumps) to quaternary (4 pumps) high-pressure gradient systems.
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### 1.3 主要特點 : Main features

泵頭 Pump head	根據需要，配備 500ml 泵頭 According demand to equip with a 500ml pump head
壓力自動校準 Automatic pressure calibration	使用者可以對顯示的壓力進行自動校準 Users can automatic calibrate pressure against displayed pressure
流量校準 Flow rate calibration	通過預設的 4 位元數位的改變，精確的校準該設備的輸液精度。 Accurately calibration of the flowrate precision of pump devices by the default four bits digital modulations.
人機界面 HMI	選用 192x64mm 的液晶顯示器，使得使用者編寫程式更直觀，更方便。 Adopt 192x64mm LCD monitor, so that the user may write programs more intuitively and more conveniently.
產品資訊提示 Product Information Tips	通過產品資訊的流覽，可以查詢儀器的出廠編號、安裝日期、泵的執行時間等資料，使用者可根據這些資料決定何時對該設備進行維護等。 By browsing through the product information, you can query the instrument serial number, date of installation, the pump execution time and other information, the user can decide when to carry out maintenance of the equipment based on these data.

## 二、儀器原理及組成

### The instrument principle and composition

#### 2.1 GLP3500-500ml 高壓輸液泵的工作原理簡介

Introduction of the GLP3500-500ml High pressure chromatogram pump working principle.

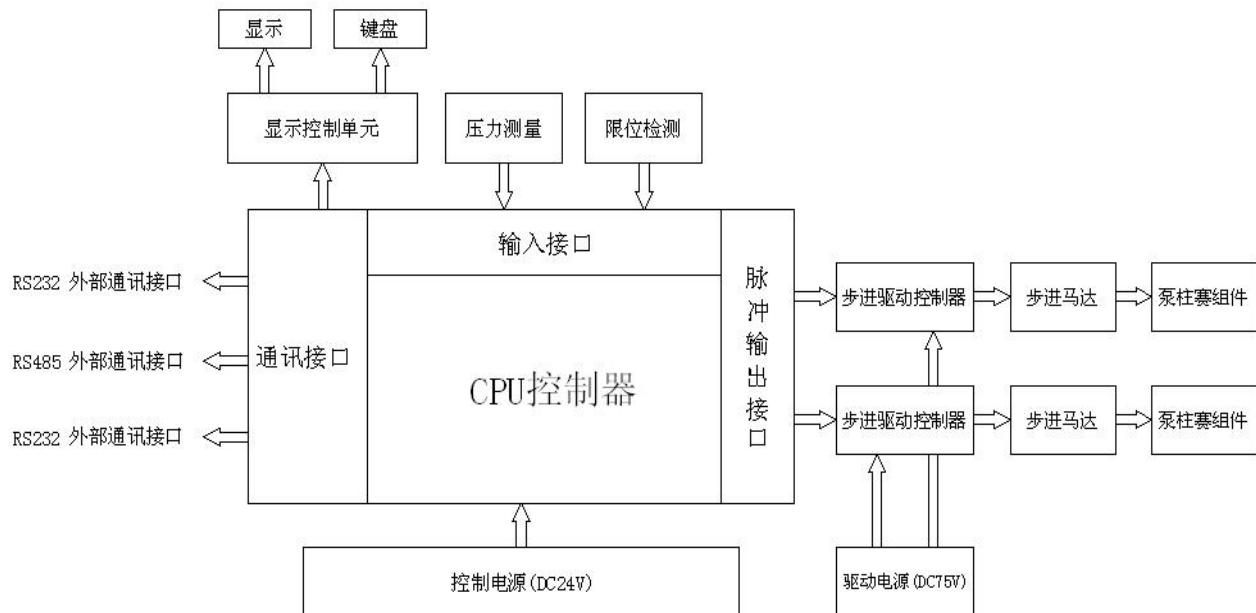


圖 2 GLP3500-500ml 高壓輸液泵原理框圖

FIG.2 Block diagram of the principle of GLP3500-500ml

#### 2.2 GLP3500-500ml 高壓輸液泵主要組成部件

##### Main components

GLP3500-500ml 高壓輸液泵主要由以下五部分組成：

The GLP3500-500ml high pressure chromatogram pump consists of the following five components:

- (1) 電源部件 power supply unit,
- (2) CPU 控制器單元 CPU controller unit,
- (3) 壓力測量控制單元 pressure measurement and control unit,
- (4) 馬達驅動器及馬達 motor drive and motor,
- (5) 泵主體元件部分 pump main element portion.



### (1) 電源部件 power supply unit

由控制電源和驅動電源組成，它為 GLP3500-500ml 高壓製備泵提供 24V 控制電源和 75V 驅動電源，分別提供給壓力測量、控制單元馬達控制頻率發生單元。

Composed of control and drive power supplier, which provides powers of the 24V control and 75V drive that supplies to the pressure measurement and control unit, and the frequency generating unit for motor control.

### (2) CPU 控制器單元 CPU controller unit

是 GLP3500-500ml 高壓輸液泵的核心部分，它使得使用者可以根據需要進行流量設置，選擇泵的工作方式，編寫時間程式等。

It is the core of the GLP3500-500ml high-pressure chromatography pump, which allows the user to set the required flow rates, to select the pump work mode, the edit time programs, etc.

### (3) 壓力測量控制單元 pressure measurement and control unit

測量液路中液體壓力的大小，使用者可根據此數值選擇不同的色譜柱及流動相；通過對最大壓力、最小壓力的設置，可以使得高壓製備泵在最佳的工作狀態，避免超壓和滲漏的發生。

Measuring the size of the fluid pressure in the fluid path, the user can select a different values according to the column type and mobile phase; through the Max / Min pressure setting the high-pressure preparative pumps can be set to the optimum working condition, to avoid excess pressure and leakage.

### (4) 馬達驅動器及馬達 motor drive and motor

為高壓動力的動力裝置，它保證液路中的液體能夠平穩的流經色譜柱及流通池，使製備工作順利進行。

The power driver of the high pressure pumping system, which ensures liquid to flow through the column and flow cell steadily to have smooth preparation separations.

### (5) 主體元件 pump main element portion

主要包括泵頭元件、單向閥元件、定位螺杆機構等組成。



Including components as the pump head and check valve elements, positioning screw mechanism etc.

## 三、安裝 GLP3500-500ml 高壓輸液泵

### 3.1 拆箱

將到貨的儀器拆箱，並檢查儀器有無損壞；如果儀器在運輸過程中發生任何損壞，請儘快向儀器承運部門聲明，並要求相關賠付。

根據隨機的裝箱單檢查儀器及配件是否齊全，如有短缺，請向經銷商聯繫或直接向廠家索取。（詳見裝箱單）。

### 3.2 安裝 Installation

#### 3.2.1 安裝條件 Installation Requirements

GLP3500-500ml 置放在操作間中，檢查工作環境，應滿足：

Check the environment requirements where the GLP3500-500ml is located , and should be met to:

供電電壓 Supply voltage	200~230VAC , 接地電阻 < 2Ω 200 ~ 230VAC, ground resistance <2Ω
環境溫度 Ambient temperature	20°C
環境濕度 Humidity	20%-80%
安裝場地 Installation site	安裝場所應遠離強震動源及強磁場干擾。 installation site should be away from strong vibration source and strong magnetic field

#### 3.2.2 安裝相應泵頭 Install appropriate pump head

根據使用者不同的製備需求，安裝 100ml、250ml、500ml、1L 或 2L 泵頭。

泵頭的安裝方法：

取下泵頭的 2 個緊固螺釘和泵頭與壓力感測器相連的聯接液路管，將所需泵頭按照相反的順序安裝到泵體上。在泵顯示的設置中改成相應的設置。

According to user needs of different preparation demands to install 100ml, 250ml, 500ml, 1L or 2L pump head.

Pump head installation method:

Remove the two fastening screws of pump head, and remove the liquid line pipe that connect pump head and pressure sensor , install the required pump head to the pump body in the reverse order.

Change the appropriate settings in the pump settings display.

### 3.2.3 接通儀器電源 Turn on the power

在完成 3.2.1 及 3.2.2 的工作後，將電源線插入儀器後面板的電源插座中，接通電源。

After completing steps 3.2.1 and 3.2.2, connect the power cord into the instrument back panel and power on.



圖 3 GLP3500-500ml 高壓輸液泵後面板示意圖

Block diagram of the back panel of the GLP3500-500ml high pressure chromatogram pump

 請確信儀器的電源線插接在 3 頭電源插座中，並具有良好的接地。

如果電源接錯，可能造成嚴重的人身傷害。

Be sure to plug in the instrument power supply cord to three outlet pins power socket for correct source voltage, and good grounding.

Wrong power supply connections may cause serious personal injury.

 首次運行泵時，請以小流量運行，並觀察是否有出液，如果連續運幾分鐘都無液體流出，應立刻停機，檢查單向閥及連接管路。如泵頭中沒有吸入液體時，長時間運行泵，將導致泵頭的損壞。

When first time to use the pump, run with small flow rate and to see if the fluid (mobile phase) can be pumped out. If it is not pumped out within a few minutes of continuous operation, stop pumping immediately and check the check valve and connecting tubes.

The pump head will be damaged when long-running with fluid (mobile phase) not sucked.

## 四、操作指南 Operations Guide

### 4.1 基本操作 Basic Operations

GLP3500-500ml 高壓輸液泵的所有功能可通過前面板的 20 個鍵來執行。

這些鍵的功能說明如下：

All functions of the GLP 3500-500ml high pressure chromatography pump may be performed by 20 keys on the front panel.

These keys' function as follows:

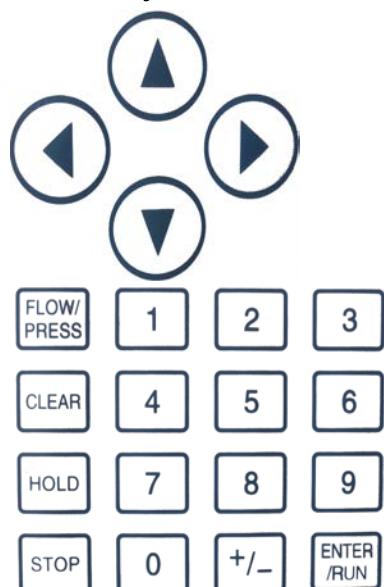


圖 4 GLP3500-500ml 高壓輸液泵按鍵示意圖

Figure 4 GLP3500-500ml high pressure chromatography pump schematic diagram

按鍵 Key	基本功能 Basic functions
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	 STOP	<p><b>返回鍵或停止鍵 Return key or stop key</b></p> <p>1、當液晶顯示器處於監控狀態時，該鍵為停止鍵。 When the LCD is in Monitoring state, the key used for Stop button,</p> <p>2、當在其它畫面時，該鍵為返回健，一旦按此鍵，將返回到監控畫面。 At other context, the key is pressed for Returning to the Monitoring state, When pressed, will return to the monitor screen.</p>
		<p><b>左移鍵或選擇鍵 Left or SELECT key</b></p> <p>1、當設置資料時，該鍵為左移鍵，左移被修改的資料位元，即閃爍顯示數位左移一位元。 When setting the data , the key is the Left Shift key to move the modified data byte left, namely move the flashing digit to left one position.</p> <p>2、產品維護控制時，此鍵為左泵頭控制選擇。 When used for product maintenance control, the key is for selecting the left pump head control .</p> <p>3、在正常監控畫面且泵處於未啟動狀態時，該鍵為一鍵清洗鍵。 In the normal Monitoring state and the pump is not activated, the key is used for One-Key Cleaning.</p>
		<p><b>右移鍵或選擇鍵 Right or SELECT key</b></p> <p>1、當設置資料時，該鍵為右移鍵，右移被修改的資料位元，即閃爍顯示數位右移一位元。 When setting the data , the key is the Right Shift key to move the modified data byte right, namely move the flashing digit to right one position.</p> <p>2、產品維護控制時，此鍵為右泵頭控制選擇。 When used for product maintenance control, the key is for selecting the right pump head control .</p> <p>3、在一鍵清洗鍵啟動後，該鍵為停止鍵。 It stop the running of One-Key Cleaning</p>
		<p><b>畫面鍵或遞增鍵 Previous Screen key or Increment key</b></p> <p>1、當按下該鍵時畫面翻轉到上頁。 Back to previous screen level.</p> <p>2、如果在資料設定狀態，按此鍵被修改位元的數字位元加 1，遞增範圍： 0—&gt;9—&gt;0 When setting the data, it is pressed to add 1 to the current value. Increment range: 0-&gt; 9-&gt; 0.</p>

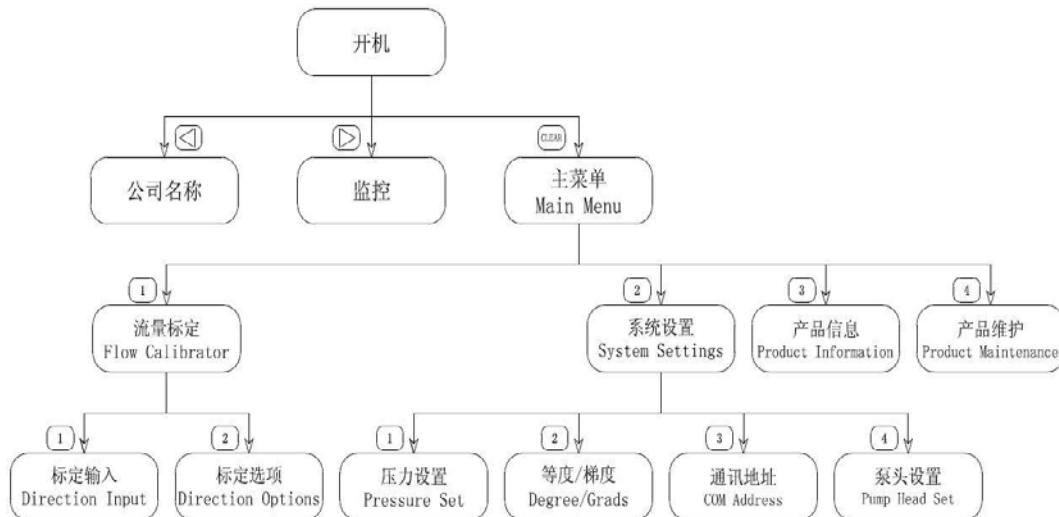


		<b>畫面鍵或遞減鍵 Screen key or Decrement key</b> 1、當按下該鍵時畫面翻轉到下頁。 Goto to next screen level 2、如果在資料設定狀態，按此鍵被修改位元的數字位元減 1，遞減範圍： $9 \rightarrow 0 \rightarrow 9$ When setting the data, it is pressed to subtract 1 from the current value. Increment range: 0-> 9-> 0.
		<b>設置鍵 Parameter Set key</b> 按此鍵開始修改參數設定值，當前正在被修改的參數反色顯示，其中被修改的位元數閃爍顯示。當參數設定為所需參數時，在按  鍵確認保存設定值，如果不需修改本參數，在按  鍵之前再按一次  鍵，則當前修改操作被取消，並繼續修改下一個設定參數。 Press to start modifying parameter settings. The parameter currently being modified is displayed in highlight, in which the byte to be modified flashes. When the parameter is set to the desired values, press the ENTER/RUN key to save the setting, if modification of this parameter is not necessary, press the HOLD key before pressing the ENTER/RUN key to cancel the current modification, and continue to modify the next parameter setting.
		<b>確認鍵或啟動鍵 Enter or Start</b> 1、當液晶顯示器處於監控狀態時，該鍵為啟動鍵。 When the LCD is in monitoring state, this key is Start key. 2、當在參數設定時，該鍵為確認鍵。一旦按此鍵，修改後的設定參數值將被保存，並繼續修改下一個參數值，當前畫面的最後一個參數設定值被修改後，退出設定狀態。 When in parameter setting mode, the key is the ENTER/RUN key. When pressed, the modified parameters will be saved and continue to modify the next parameter value. When the last parameter setting screen has been modified, it exits the setting mode.
		<b>主菜單或返回鍵、清除鍵</b> 1、當液晶顯示器處於監控狀態時，該鍵為主功能表鍵。 2、在主功能表選項中為返回上級菜單，返回鍵 3、當在參數設定時，該鍵為清除鍵。一旦按此鍵，設定參數值將被清除。
		<b>流量監控 Main menu, Return or Clear key</b> 1、當液晶顯示器處於監控狀態以外的其它畫面時，該鍵為快速返回監控主畫面。

	<p>When the LCD is in monitoring state, this key is Main menu key.</p> <p>A key / option in the main menu for returning to the top level, or Back to Previous button.</p> <p>When in parameter setting mode, the key is the CLEAR key. When pressed, the set value will be cleared.</p>
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### 以下圖 5 GLP3500-500ml 高壓輸液泵快速操作流程圖

Figure 5 GLP3500-500ml high pressure chromatography pump quick operation flowchart



## 4.2 上電運行 Power-Run

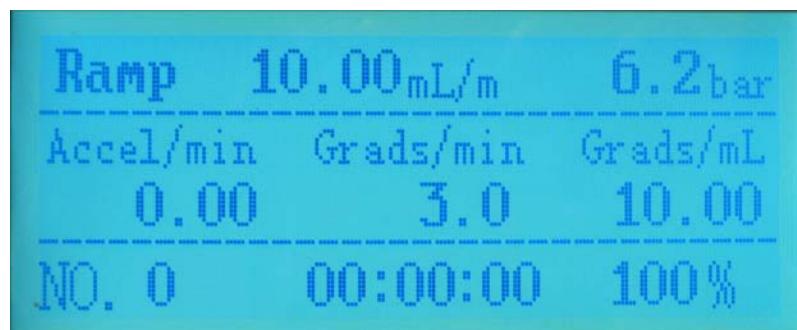


圖 6 GLP3500-500ml 高壓輸液泵開機主介面

Figure 6 GLP3500-500ml high pressure chromatography pump Begin Main-interface



圖 7 GLP3500-500ml 高壓輸液泵開機副介面

Figure 7 GLP3500-500ml high pressure chromatography Begin Sub-interface

在主介面中，並按“ENTER”（RUN）鍵啟動泵，按“STOP”鍵停止泵。按“HOLD”鍵可設置當前加速時間（Accel/min），工作流量(mL/min)。按“向上”鍵切換畫面為副介面，按“向下”鍵切換畫面為主介面，按“CLEAR”鍵切換為主功能表介面。

In the Main-interface, and press " ENTER/RUN " key to start the pump, press the "STOP" button to stop the pump. Press "HOLD" key to set the current acceleration time (Accel/min), working flow rate(mL / min).

Press the "Up" key to switch the screen as Begin Sub-interface, press the "Down" key to switch the Begin Main-interface screen, press the "CL" key to switch the main menu interface.

#### 4.2.1 啟停泵控制 Start and stop the pump

在主介面中，按“ENTER”（RUN）鍵開始運行泵，按“STOP”鍵停止泵。

In the main interface, press ENTER / RUN to start operation of the pump, press "STOP" button to stop the pump.

- i** 1、啟動泵之前，必須保證泵頭中有液存在；

Before starting the pump, you must ensure that the presence of liquid in the pump head.

2、運行前需要對系統設置功能表（System Settings）進行設置如最大、最小壓力數值（MAX, MIN），等度與梯度（Degree/Grads）工作方式選擇，通訊位址（COM Settings）設置，泵頭選擇等。

Before starting , run the system setup menu (System Settings) for settings, such as maximum, minimum pressure value (MAX, MIN), isocratic or gradient (Degree / Grads)



work mode selection, communication addresses (COM Settings) settings , pump head selection.

#### 4.2.2 參數設置 Parameter settings

在主介面中，按“HOLD”鍵可設置當前加速時間(Accel/min), 工作流量(mL/min)。

In the main interface, press "HOLD" key to set the current acceleration time (Accel/min), working flow rate (mL / min).

**i** 1、在主介面中，按“HOLD”鍵參數反色顯示，此時按數位健輸入所需參數後，按“ENTER”鍵確認保存輸入值，接著下一個參數反色顯示，再次輸所需參數後確認保存輸入值，直到最後一個參數完成，如果其中參數不修改，可按“HOLD”鍵跳過此參數。如要退出參數設置按“STOP”鍵。

In the main interface, press "HOLD" key to high light a parameter, then press the digital keys to input the required parameters, then press "ENTER" key to save the input value, then process for other parameter values required for editing and save until the completion of the last parameter, pressing "HOLD" key to skip parameters not to edit. To exit the parameter setting Press "STOP" button.

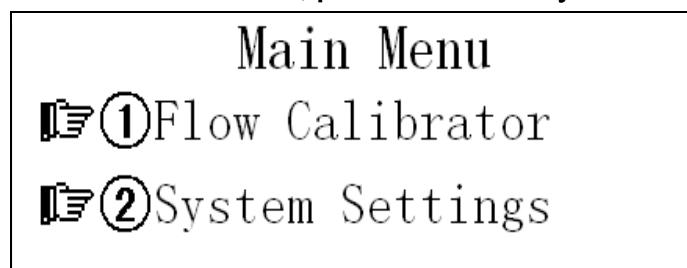
2、在參數設置完成後按“ENTER”鍵確認保存時無法進入下一個參數時，說明設定值過小或過大，此時重新調整設定數字大小，直到能保存輸入值為止。

It must to set a parameter value that is not too small or too large in their respective range, in order to Enter/Run to next parameter.

#### 4.2.3 流量標定 ( Flow Calibrator ) Flow rate Calibration

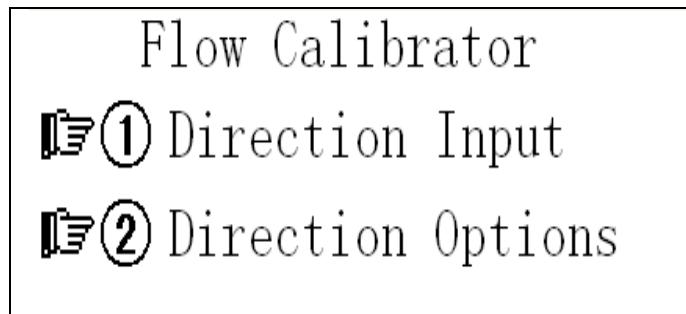
在主介面中，按“HOLD”鍵切換為主功能表(Main Menu)介面如下圖：

In the main interface, press "HOLD" key to switch the Main Menu interface as shown below:



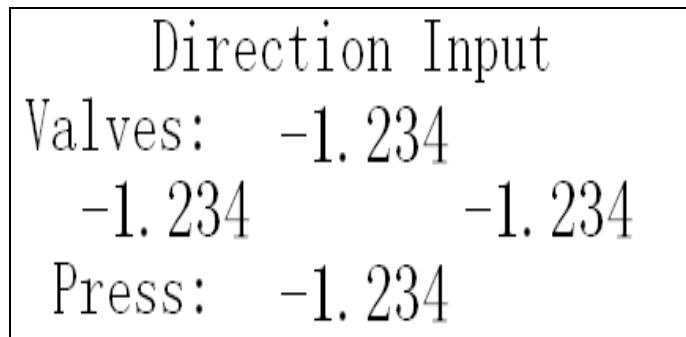
選項“①”數位鍵為流量標定 ( Flow Calibrator )，按“①”數位鍵進入流量標定介面。如下圖：

Option "①" digit key is for flow rate calibration (Flow Calibrator), press "①" digit button to enter the flow rate calibration interface. As shown below:



在流量標定子菜單介面中，按“①”數位鍵切換為標定輸入(Direction Input)介面如下圖：

In the between flow rate calibration sub-menu interface, press the "①" digit key to toggle to the calibration input (Direction Input) interface as shown below:



① 標定輸入(Direction Input) Calibration input

單向閥係數 ( Valves ), 壓力係數 ( Press )

Check valve coefficient (Valves), the pressure coefficient (Press)

1、按“HOLD”鍵參數反色顯示，此時按數位健輸入所需參數後，按“ENTER”鍵確認保存輸入值，接著下一個參數反色顯示，再次輸所需參數後確認保存輸入值，直到最後一個參數完成，如果其中參數不修改，可按“HOLD”鍵跳過此參數。如要退出參數設置按“STOP”鍵。

Press "HOLD" key to highlight a parameter, then press the digital keys to input the required parameters, then press "ENTER" key to save the input value, then process for other parameter values required for editing and save until the completion of the

last parameter, pressing "HOLD" key to skip parameters not to edit. To exit the parameter setting Press "STOP" button.

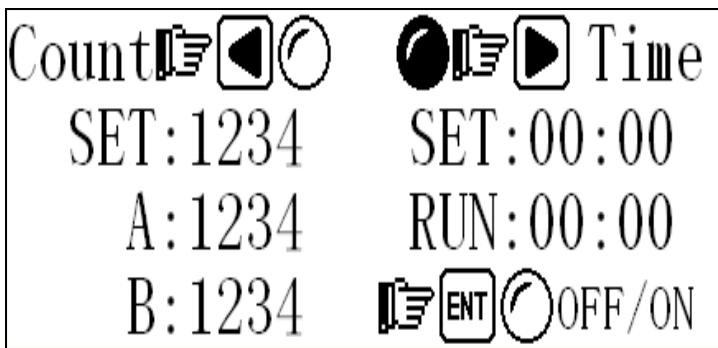
2、在參數設置完成後按“ENTER”鍵確認保存時無法進入下一個參數時，說明設定值過小或過大，此時重新調整設定數字大小，直到能保存輸入值為止。

It must to set a parameter value that is not too small or too large in their respective range, in order to Enter/Run to next parameter.

在流量標定子菜間介面中，按“②”數位鍵切換為標定選項(Direction Options)介面如下圖：

In between flow calibration sub-menu interface, press "②" digit key to toggle to the calibration option (Direction Options)

Interface as shown below:



#### ①標定選項 (Direction Options) Calibration option

計數 ( Count )、計時 ( Time )、標定關/開控制(OFF/ON)

設置參數為： 計時、 計數

Calibration mode : timing, counting

1、按“HOLD”鍵參數反色顯示，此時按數位健輸入所需參數後，按“ENTER”鍵確認保存輸入值，接著下一個參數反色顯示，再次輸所需參數後確認保存輸入值，直到最後一個參數完成，如果其中參數不修改，可按“HOLD”鍵跳過此參數。如要退出參數設置按“STOP”鍵。

Press "HOLD" key to high light a parameter, then press the digital keys to input the required parameters, then press "ENTER" key to save the input value, then process for other parameter values required for editing and save until the completion of the last parameter, pressing "HOLD" key to skip parameters not to edit. To exit



parameter setting Press "STOP" button.

2、在參數設置完成後按“ENTER”鍵確認保存時無法進入下一個參數時，說明設定值過小或過大，此時重新調整設定數字大小，直到能保存輸入值為止。

It must to set a parameter value that is not too small or too large in their respective range, in order to Enter/Run to next parameter.

3、校正方式選擇：按方向鍵“”為計數方式；按方向鍵“”為計時方式；當選擇選定後對應指示燈應反色顯示。

The calibration mode selection: press the arrow keys "" for the counting mode; press the arrow keys "" for the timing mode; When you select the corresponding indicator should be highlighted.

4、校正開/關：按“”鍵一次開，再按一次為關，狀態指示燈反色顯示為開。

Calibration On/Off: Press "ENTER/Run" to toggle ON/OFF, with highlighted indicator corresponding to ON status.

5、以上都設置完成後，按“STOP”鍵快速返回主控介面，按“ENTER”鍵可啟動泵進行測式流量。

After the completion of the above setting, press "STOP" key to quickly return to the main control interface, press "ENTER" key to activate the pump to test flow rate.

設備出廠前已經完成標定，一般情況下是不需要修改的。如確定為設備運行的磨損等原因引起流量不準確，可以進行修改。

如果需要鍵入新的標定參數，必須按照如下程式進行：

The calibration data has been completed in factory before the packging for shipping of the equipment , and is not required to modify under normal circumstances. As precision deviation caused by the wearing of equipment operation etc have been determined, it can be calibrated for modification.

If calibration parameter values updating is necessary, carry out in accordance with the following program:

**(例) 測常壓 (單向閥)****(example)Measuring normal pressure (check valve)****1、準備好量筒**

Have a Measuring Cylinder ready.

**2、設置好以上標定參數及選項 ( 計數=50 )**

Set the calibration parameters and options (count = 50)

**3、將流量設定為 100ml/min**

Set the flow rate to 100ml / min

**4、啟動泵 Start the pump**

**注：泵每次啟動時都有一次復位自檢測功能，自檢完成後開始正常工作**

**NOTE: The pump has a self-test function for piston position recovery at every each running start, and the start to work after the completion of the self-test.**

**5、等自檢測完成後立刻將出液管放入量筒，泵將開始運行**

After the completion of the self-test, immediately put the fluid outlet tube into the measuring cylinder, and the pump will start running.

**6、泵運行後 A 泵頭和 B 泵頭開始計完成次數，當計數值 ( 計時 ) 等於設定值時泵自動停止工作。**

When the pumps start to run, the A pump head and B pump head begin to count, when the count value (time) equal to the set value, the pump automatically stops.

**7、讀出量筒中液體實際值 ( 180mL )**

Read the actual value of the liquid collected in Measuring Cylinder(180mL)

**8、計算：實際值/( A 計數值+B 計數值 )-泵頭標準係數=新的修正值  $180/(50+50)-1.825=-0.025$** 

Calculations: Actual value / (A count value + B count value) - standard pump head

coefficient = new calibration value,  $180/(50+50)-1.825=-0.025$

**9、輸入計算得出的係數，並將計數方式改為計時，輸入一個時間值 ( 00:10 )( 10 分鐘 ) 來驗正新係數是否準確。重複 4 - 7 步，如實測值準確，關閉標定開關，即可開始正常工作，如果還有誤差，重複以上 1-8，直至流量值滿意為止。**

Enter the calculated coefficients, and change to count by timing, then enter a time value (00:10) (10 minutes) to verify the accuracy of the new factor. Repeat steps 4-7, if the Actual value is correct, turn off the calibration switch and you can start to work. If there is an error, repeat steps 1-8 until the flow rate value satisfied.

Before to change flow rate calibration parameters (value), ensure that this value has been

properly recorded.

**(i)** 更改流量校正參數之前，確保此數值已經得到妥善記錄，如果此數值遺忘，將導致非常煩瑣的重新校正。

It will lead to very cumbersome recalibration, if the number is forgotten.

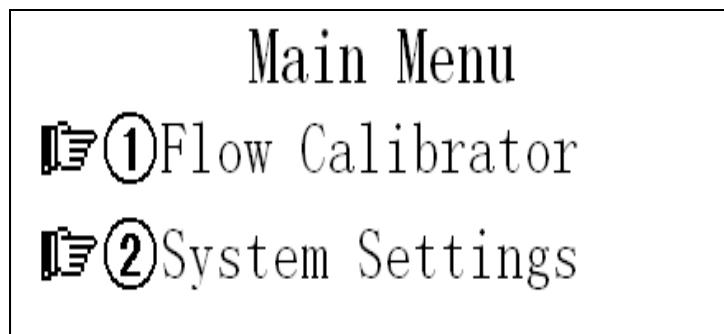
### 4.3 系統設置功能表 ( System Settings ) System Setup Menu

**注：以下功能表中參數設方法同上流量標定**

NOTE: The parameter settings of following menu is same as the previous Flow rate calibration

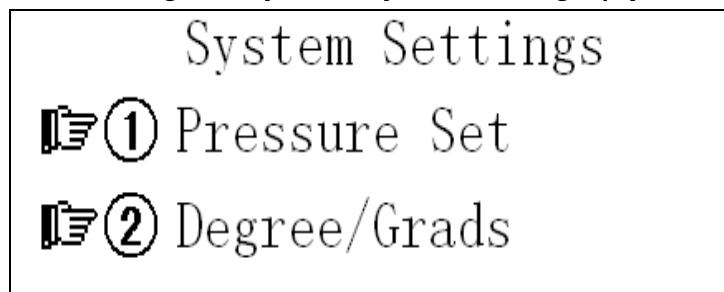
在主介面中，按“CLEAR”鍵切換為主功能表(Main Menu)介面如下圖：

In the main interface, press "CLEAR" button to switch to the main menu (Main Menu) interface, as shown below:



選項“②”數位鍵為系統設置 ( System Settings )，如下圖：

The "②" digital key is for system settings (System Settings), as shown below:



## System Settings

③ COM Settings

④ Pump Head Set

在系統設置 ( System Settings ) 介面中選項“①”數位鍵為壓力設置 ( Pressure Set ) ,  
如下圖 :

In the System Settings (System Settings) interface, the options "①" digit key is for pressure setting (Pressure Set), as shown below:

## Pressure Set

Max pressure 123.4 bar

Min pressure 123.4 bar

1、當系統壓力超過所設定的數值時，GLP3500-500ml 會自動停機，並發出報警提示聲。

when the system pressure exceeds the set value, GLP3500-500ml will automatically stop and alarm alert tone.

2、當系統壓力低於所設定的數值維持兩分鐘以上時，GLP3500-500ml 會自動停機，  
並發出報警提示聲。

when the system pressure is maintained lower than the set value more than two minutes, GLP3500-500ml will automatically stop and alarm alert tone.

在系統設置 ( System Settings ) 介面中選項“②”數位鍵為等度/梯度 ( Degree/Grads ) ,  
如下圖 :

In the System Settings (System Settings) interface, the options "②" digit key is for isocratic / gradient setting(Degree / Grads) , as shown below:



Degree/Grads
000
000=Degree      001=Grads

1、如果選擇 0，則系統以等度模式工作。

Choose 0 for system to operate in isocratic mode.

2、如果選擇 1，則系統以高壓梯度模式工作

Choose 1 to operate in high-pressure gradient mode.

在系統設置 ( System Settings ) 介面中選項“③”數位鍵為通訊設置 ( COM Settings )，如下圖：

In the System Settings (System Settings) interface, the options "③" digit key is for communication settings (COM Settings), as shown below:

COM Address	
Address: 000	
001=A	003=C
002=B	004=D

1、如果選擇 1，則該泵為 A 泵工作。

2、如果選擇 2，則該泵為 B 泵工作。

3、如果選擇 3，則該泵為 C 泵工作。

4、如果選擇 4，則該泵為 D 泵工作。

Select 1,2,3,4 that correspond to pump A , B , C , D respectively.

#### 4.4 新建程式 ( NEW PROGRAM ) 功能表 New program

例：某一應用實例為：Example: An application instance

時間 min	流量 ml/min	A%(甲醇)	B%(水)
--------	-----------	--------	-------

Time	Flow rate	Methanol	Water
5	50.00	70	30
10	50.00	60	40
15	50.00	50	50
20	50.00	40	60
30	50.00	30	70

## 4.5 顯示梯度 ( SHOW GRADIENT ) Display gradient

梯度曲線反映的是泵在實際運行過程中，流動相組份百分比的變化規律。

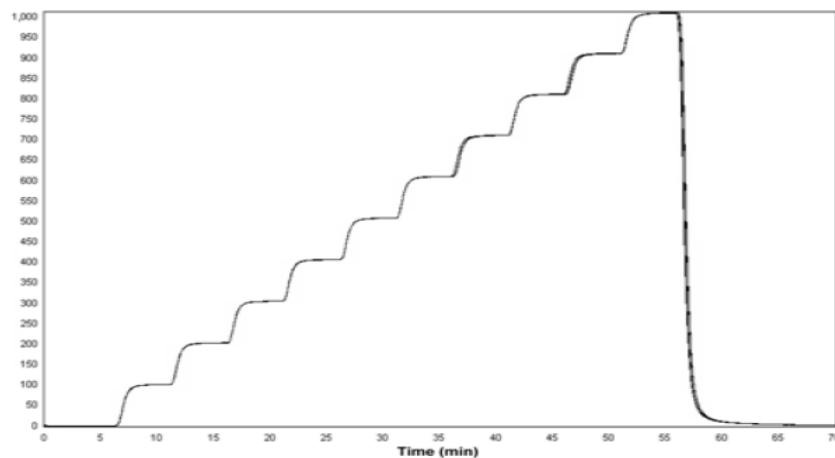
SHOW GRADIENT 可以說明使用者檢查梯度程式編寫的正確與否，泵運行的程式是否和設計者的思路保持一致。

The gradient curve reflects the mobile phase composition percentage variation of the pumps in actual operation.

SHOW GRADIENT can explain to the user to check the correctness of the gradient programming, whether the pump programs is running in consistent with the designer's ideas.

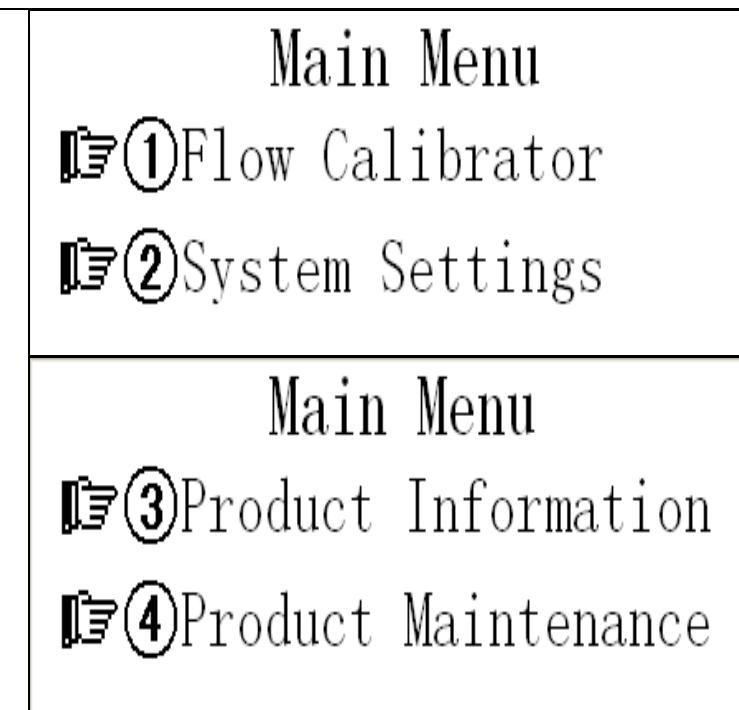
例如觀看以下圖 8 程式的梯度曲線

See the example gradient curve in Figure 8



## 4.6 產品資訊 ( Product Information ) Product Information

在主介面中，按“CLEAR”鍵切換為主功能表(Main Menu)介面如下圖：



選項“③”數位鍵為產品資訊 ( Product Information ), 如下圖：

Product Information
Run time: 1234567:00:00
Product NO.: GLP 123456789
Factory date: 0000-00-00

1、運行總時間 ( Run time )

2、產品編號 ( Product NO. )

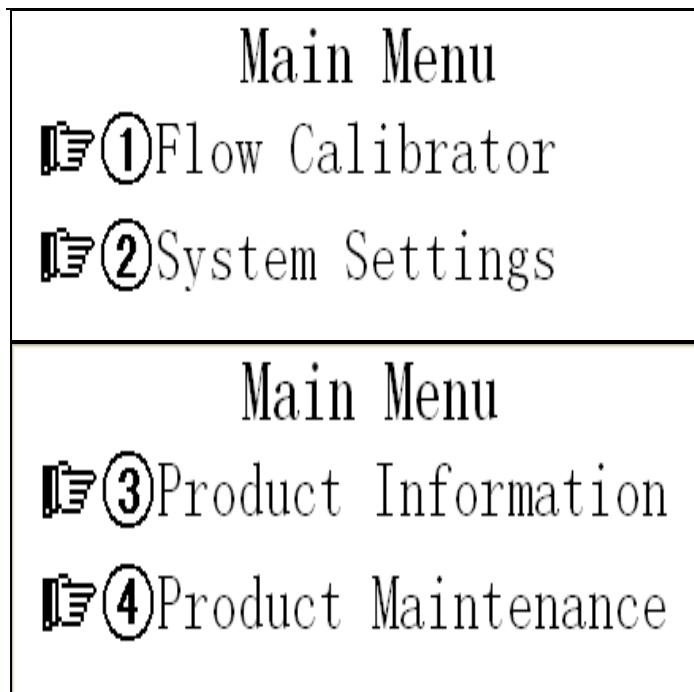
3、安裝日期 ( Factory date )

注：其中參數只能查看，不能修改。

## 4.7 產品維護 ( Product Maintenance ) Product Maintenance

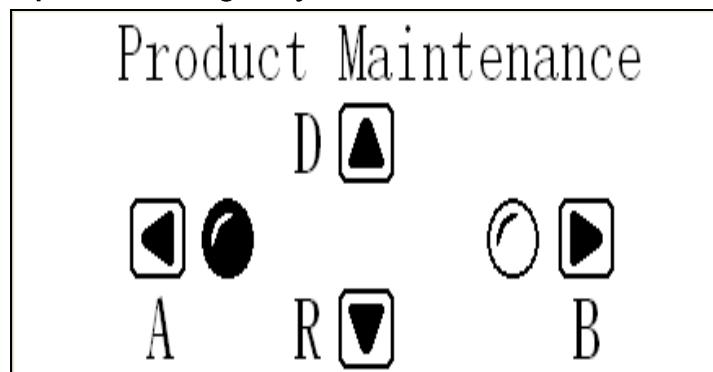
在主介面中，按“CLEAR”鍵切換為主功能表(Main Menu)介面如下圖：

In the main interface, press "CLEAR" button to switch to the main menu (Main Menu) interface as shown below:



選項“④”數位鍵為產品維護 ( Product Maintenance ), 如下圖：

Options "④" digit key is for Product Maintenance, as shown below:

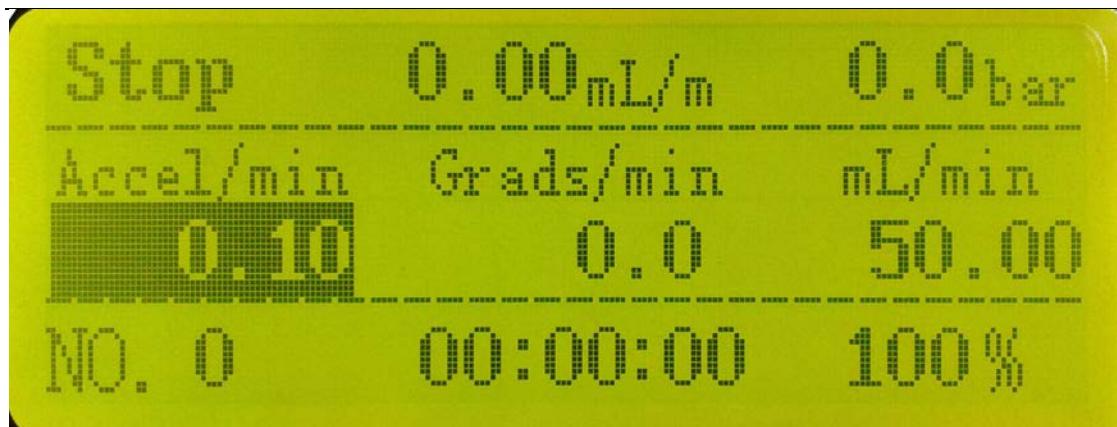


## 4.8 快速設定流速和一鍵啟動設定流速 Quick Flow rate Setting

### 1、加速時間和流量設定 Acceleration time and the flow rate setting

在主介面中，按“HOLD”鍵切換為主功能表(Main Menu)介面如下圖：

In the main interface, press "HOLD" key to switch to the Main Menu interface as shown below:



按 HOLD 此鍵開始修改參數設定值，Accel/min 是修改泵的啟動加速時間，當前正在被修改的參數反色顯示，其中被修改的位元數閃爍顯示。當參數設定為所需參數時，在按 ENTER/RUN 鍵確認保存設定置，如果不需修改本參數，在按 ENTER/RUN 鍵之前再按一次 HOLD 鍵，則當前修改操作被取消，並繼續修改下一個設定參數。

Press the HOLD key to start modifying parameter settings, "Accel/min" is to modify the pump start acceleration time. The parameter currently being modified is highlighted, wherein the number of byte to be modified flashes. When the parameter is set to the desired values, press ENTER/RUN key to save the setting. Press HOLD again before ENTER/RUN key pressed If the modification of this parameter is not necessary to cancel the current modification, and skip to continue editing the setting of next parameters.



按鍵 ENTER/RUN 確定所輸入的流量，按 STOP 返回主控制頁面再按 ENTER/RUN 就可以運行當前所輸入的流量

Press ENTER/RUN to confirm the flow rate input value, press STOP to return to the main control page , then press ENTER/RUN to run the current flow rate input value.

## 2、一鍵清洗流量的設定 Flow rate setting for One key cleaning

按 CLER 此鍵進入菜單

Press CLER key to enter the menu



GLP3000-500ml 高壓輸液泵 安裝使用手冊

High-pressure Preparative Chromatography Pump Installation & User Manual

## Main Menu

- ☛①Flow Calibrator
- ☛②System Settings

按 此鍵往下翻功能表第五項，按下操作面板 5 號鍵進入設定流量界面

Press key to turn to down level menu, and press the operator #5 key to enter the flow rate setting interface

## Main Menu

- ☛⑤一键清洗流量设定

### 一键清洗流量

0.00

mL/min

按 HOLD 鍵開始修改參數設定值然後按 ENTER/RUN 確定所輸入的流量，按 STOP 返回主控制頁面，按面板上 就可啟動一鍵清洗流量，一鍵清洗流量只有按面板上 泵才會停止，在一鍵清洗流量運行時按 STOP 鍵不能停止泵。

Press the HOLD button to start modify the parameter setting value and then press ENTER/RUN to confirm the flow rate. Press STOP to return to the main control page, and press the key on the panel to start pump cleaning flow. The pump cleaning flow can only be stopped by pressing the key on the panel.

The STOP key can not be used to stop the pump cleaning flow.

## 五、與其它設備連線 Connect with other devices

### 5.1 高壓梯度系統 High-pressure gradient system

#### 5.1.1 液路連接 Hydraulic connections

與另外的 GLP3500-500ml 高壓輸液泵相連，可組成多至四元高壓梯度系統。( 見圖 )

**i** 需要配置動態混合器 GLP3500-500ml-DM 動態混合器

More than one GLP3500-500ml high-pressure chromatography pumps can be composed to binary to quaternary high-pressure gradient chromatography systems.(See figure)

The dynamic mixer (GLP3500-500ml-DM) is necessary to be configured here.



圖 9 高壓梯度液路連接示意圖

#### 5.1.2 電器連接 Electrical connections

用專用串列口連接線連接 GLP3500-500ml 高壓輸液泵，連接到電腦通信板埠  
如下圖，

Dedicated serial cable is necessary to connect the GLP3500-500ml high-pressure

chromatography pumps to the computer communications port.

As shown below,

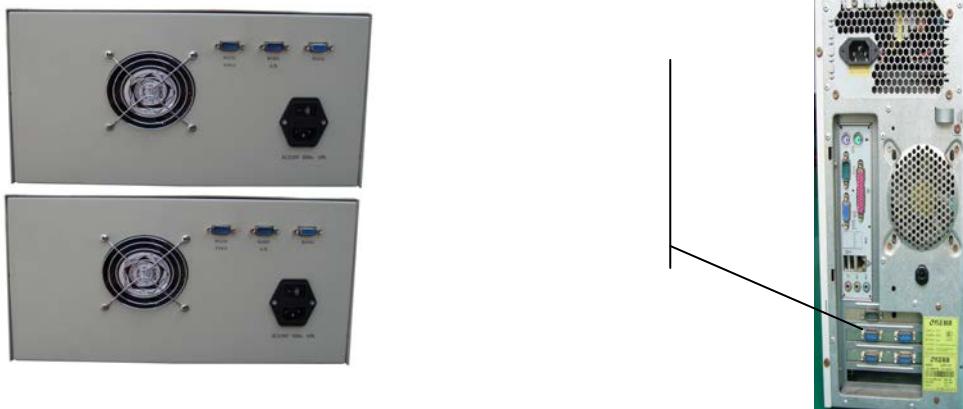


圖 10 高壓梯度串列口連接示意圖

The serial ports connection diagram of High-pressure gradient system

## 六、簡易維修 Basic Maintenance

### 6.1 泵頭安裝及更換

Installation and replacement of the pump head

- (1) 確定泵頭組建安裝及調試完畢。
- (2) 將泵頭沿垂直方向推進。
- (3) 將泵頭上的二個安裝螺釘右旋 2~3 圈。
- (4) 將一對對角的兩個螺釘慢慢旋緊。
- (5) 將另外對角的兩個螺釘慢慢旋緊。
- (6) 確認 4 個螺釘全部旋緊。
- (7) 泵頭的拆卸過程與上述過程相反。

1. Ensure the accomplishment of the pump head Installation, set up and adjustment.
2. Advance the pump head in the vertical direction
3. Rotate clockwise the two pump head installation screws 2-3 circles,



4. Tighten one pair of diagonal screws slowly.
5. Tighten the other pair of diagonal screws slowly, then for .
6. Confirm all the four screws have been tightened
7. The disassembly of the pump head is reversed to above process.

如果泵頭組建壞損或需要清潔時，按照上面的順序拆卸及安裝泵頭。

If the pump head needs cleaning or corrupted, the above disassembly and installation steps should be applied.

## 6.2 單向閥的維護 Check valve maintenance

單向閥元件使用一段時間後，可能變髒。變髒的時間間隔與使用者的維護和儀器的使用頻度及流動相的清潔程度有關。

單向閥變髒後，應及時進行清洗；如若不然會影響泵的流量精度，也會造成壓力波動變大，嚴重時，造成無法吸液。

The check valve should be cleaned once it becomes dirty. If not cleaned , it may affects flow rate accuracy of the pump, and also can cause larger pressure fluctuations, and can result in failed infusion in serious cases.

清洗方法: Cleaning method

- (1)將單向閥從單向閥座上卸下
- (2)小心地取出單向閥
- (3)將單向閥放入燒杯中用丙酮超聲清洗 20 分鐘
- (4)將單向閥重新安裝到單向閥座上。( 注意與取出時的方向要一致 )

- (1)Remove the check valve from the check valve seat.(Note to memo the check valve direction to the check valve seat )
- (2)Carefully remove the check valve.
- (3)Place the check valve into the beaker using ultrasonic cleaning in acetone for 20 minutes.
- (4)Install the check valve back onto the check valve seat. (Note that the check valve direction must be consistent with that it is taken out from the check valve seat).

## 七、 生產廠家保證 Manufacturer guarantee



在遵守操作規程的前提下，我們承諾 GLP3500-500ml 高壓輸泵在安裝日期後的 12 個月內得到保修（密封部件的損壞除外）。

如果因為人為因素，如操作不當造成的儀器損壞，在保修期內收取相關的材料費用。

Under the premise in accordance with the correct operation rules, we have 12 months warranty after the date of installation.

(except the damage to the sealing parts)

Material costs may be charged if damage is caused of human factors, such as damage improper operation of the instrument in all periods including the warranty period.

GLP3500-500ml 高壓輸液泵，出廠時已經進行妥善包裝。如果 GLP3500-500ml 高壓輸液泵送抵用戶處發生因運輸過程造成的損壞，應儘快向相關部門聲明，索取賠付，並通知生產廠家進行修理或更換。

GLP3500-500ml high pressure chromatography pump has been properly packaged at the factory. If it occurs damage caused by transportation , the customer should declare as soon as possible to the relevant departments to notify the manufacturer for repair or replacement.

## 八 . 主要技術指標 Main Specifications

輸液方式: 絲杆傳動模式，雙柱塞吸液

Infusion mode Screw drive parallel twin piston reciprocating pump, double piston pipette

最大工作壓力	Maximum operating pressure
GL3100	35MPa
GLP3250	20MPa
GLP3500	15MPa
GLP3000-1L	12Mpa
GLP3000-2L	10Mpa
流量範圍	Flow rate range
GL3100	0.1 ~ 100ml/min
GLP3250	1 ~ 250ml/min
GLP3500	1 ~ 500ml/min
GLP3000-1L	10 ~ 1000ml/min



GLP3000-2L	10 ~ 2000ml/min
流量精度 Flow accuracy	±1% 在 1-98% 流量範圍內，甲醇/水 80:20 體積比
流量重複性 Flow repeatability	RSD < 0.1%
顯示 Monitor	192×64 點陣螢幕液晶顯示 192×64 pixels LCD
系統保護 System protection	慢速啟動,停止,最大/最小壓力可調,使用者資料自動存儲
系統連接 System Connection	1/16 " -1/8 " 管路連接 1/4 or 1/8 tubing connections
控制 Control	通過前面板或上位機(工作站)設定所有工作參數。工作於高壓梯度模式時，其中一台泵為主泵，控制其它相同型號的高壓輸液泵，並可通過螢幕上的梯度曲線對所實現的梯度方式進行驗證。  The pump can be configured in isocratic or linear gradient mode.  While working in high-pressure gradient mode, the host computer or Master controller can control multiple pumps of the same type, and the gradient curve and gradient mode can be monitored through host computer for authentication.  Multiple communication modes, as the standard RS232, RS485, and Ethernet are selectable for pump system control.
串口模式 Communication modes	通過 RS232 口，RS485 口對高壓輸液泵進行控制
電源 Power supply	220V±10%，50Hz，400W
外形尺寸 Dimensions	460×365×210 (長×寬×高)



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<http://www.chromnet.net/> , [http://chromnet.net/PreparativeDACHPLC\\_English.aspx](http://chromnet.net/PreparativeDACHPLC_English.aspx)

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