Varian, Inc.
2700 Mitchell Drive
Walnut Creek, CA 94598-1675/usa

ProStar 340 UV-Vis Detector

Operation Manual

QUALITY SYSTEM ISO 9001 CERTIFIED

03-914783-00:Rev. 3

VARIAN

Quality Systems At Varian, Inc.

The ISO 9000 series standards were created in Geneva in 1987 to cut through a morass of conflicting quality definitions. These standards define a model for quality assurance systems in product design, development, manufacturing, installation, service, and customer support. They are now the worldwide quality assurance benchmark used to gauge the strength of a company's commitment to quality, and the value of its quality systems.

Various organizations around the world, such as the British Standards Institution (BSI), provide certified, objective auditors to scrutinize quality procedures, product development, manufacturing processes, and customer satisfaction programs. No company can claim ISO 9000 series registration unless it receives a stamp of approval from the demanding quality assessors of BSI or similar accredited examining body. ISO 9000 series registration constitutes an objective third-party report to determine the level of a supplier's commitment to quality.

In 1992, Varian, Inc., Analytical Instruments became registered to the most comprehensive of the ISO 9000 series standards — ISO 9001. ISO 9001 registration means that every stage of our quality system, including product development, manufacturing, final test, shipping, and parts and supplies has been rigorously examined against the most exacting set of internationally recognized standards. It means we live up to a standard of quality that you can count on today, and into the future. Our Quality System has received ISO 9001 certification number FM21797.

The quality systems that earned us ISO 9001 registration have direct benefits for our customers:

- We can speed instruments to you faster than ever before. Emergency orders can be processed even faster.
- We fill your orders promptly and completely.
- We have implemented a system of continuous feedback from our customers — we are aware of your needs today and tomorrow.
- We have improved your productivity by cutting systems failure rates in half and speeding service response time.
- We have embedded continuous improvement into the fabric of our organization so that we can achieve even higher levels of quality in the future.
- We are embedding GLP requirements into our products and services to help you meet your regulatory compliance requirements.

ISO 9001 registration is not enough. For us, quality is defined by our customers. We are not satisfied unless you are satisfied. We are striving to understand customer needs, using independent surveys, user groups, customer advisory boards, and our “Hallmark of Quality” response program, in addition to individual face-to-face customer contact. Our products and our processes are configured to meet those needs.

We know that you are seeking more than the most advanced processes and top-notch applications expertise. You want to join forces with a partner committed to delivering world-class quality, reliability, and value — on time, every time.

QUALITY SYSTEM ISO 9001 CERTIFIED

Our overriding aim is to be that partner.

Varian, Inc. Analytical Instrument Warranty

Hardware Products

All analytical instruments sold by Varian, Inc. are warranted to be free from defects in material and workmanship for the periods specified and in accordance with the terms on the face of Varian's quotation or as otherwise agreed upon in writing between Varian and the Customer. The warranty period begins on the date of **shipment** from Varian to the original Customer. However, where installation is paid for by the Customer or included in the purchase price, the warranty period begins upon completion of installation. If the Customer schedules **installation** to start later than 30 days after delivery or if such delay is caused through the Customer's inability to provide adequate facilities or utilities or through failure to comply with Varian's reasonable pre-installation instructions or through other omissions by Customer, then the warranty period starts on the 31st day from date of shipment. Moreover Varian will charge the Customer for labor and other expenses involved in making multiple or follow-up installation service calls.

Software Products

Where software is provided within the frame of a license agreement concluded between the Customer and Varian, any warranty shall be strictly in accordance with the terms of such agreement.

In the absence of a license agreement and unless an alternate warranty period is agreed upon in writing between Varian and the Customer, the warranty period is as specified on the face of Varian's quotation. Varian warrants such software products, if used with and properly installed on Varian hardware or other hardware as specified by Varian to perform as described in the accompanying Operator's Manual and to be substantially free of those defects which cause failure to execute respective programming instructions; however, Varian does not warrant uninterrupted or error-free operation.

Remedies

The sole and exclusive remedy under hardware warranty shall be **repair** of instrument malfunctions which in Varian's opinion are due or traceable to defects in original materials or workmanship or, at Varian's option, **replacement** of the respective defective parts, provided that Varian may as an alternative elect to **refund** an equitable portion of the purchase price of the instrument or accessory.

Repair or replacement under warranty does not extend the original warranty period.

Repair or replacement under warranty claims shall be made in Varian's sole discretion either by sending a Customer Support Representative to the site or by authorizing the Customer to return the defective accessory or instrument to Varian or to send it to a designated service facility. The Customer shall be responsible for loss or damage in transit and shall prepay shipping cost. Varian will return the accessory or instrument to the Customer prepaid and insured. Claims for loss or damage in transit shall be filed by the Customer. To correct software operation anomalies, Varian will issue software revisions where such revisions exist and where, in Varian's opinion, this is the most efficient remedy.

Limitation of Warranty

This **warranty does not cover** software supplied by the Customer, equipment and software warranted by another manufacturer or replacement of expendable items and those of limited life, such as but not limited to: Filters, glassware, instrument status lamps, source lamps, septa, columns, fuses, chart paper and ink, nebulizers, flow cells, pistons, seals, fittings, valves, burners, sample tubes, probe inserts, print heads, glass lined tubing, pipe and tube fittings, variable temperature dewars, transfer lines, flexible discs, magnetic tape cassettes, electron multipliers, filaments, vacuum gaskets, seats and all parts exposed to samples and mobile phases.

This **warranty shall be void** in the event of accident, abuse, alteration, misuse, neglect, breakage, improper operation or maintenance, unauthorized or improper modifications or tampering, use in an unsuitable physical environment, use with a marginal power supply or use with other inadequate facilities or utilities. Reasonable care must be used to avoid hazards.

This warranty is expressly in lieu of and excludes all other express or implied warranties, including but not limited to warranties of merchantability and of fitness for particular purpose, use or application, and all other obligations or liabilities on the part of Varian, unless such other warranties, obligations or liabilities are expressly agreed to in writing by Varian.

Limitation of Remedies and Liability

The remedies provided herein are the sole and exclusive remedies of the Customer. In no case will Varian be liable for incidental or consequential damages, loss of use, loss of production or any other loss incurred.

Safety Information

Operating Instructions

This instruction manual is provided to help you establish operating conditions which will permit safe and efficient use of your equipment. Special considerations and precautions are also described in the manual, which appear in the form of **NOTES**, **CAUTIONS**, and **WARNINGS** as described below. It is important that you operate your equipment in accordance with this instruction manual and any additional information which may be provided by Varian. Address any questions regarding the safe and proper use of your equipment to your local Varian office.

NOTE

Information to aid you in obtaining optimal performance from your instrument.

CAUTION

Alerts you to situations that may cause moderate injury and/or equipment damage, and how to avoid these situations.

WARNING

Alerts you to potentially hazardous situations that could result in serious injury, and how to avoid these situations.

Warning Symbol	Warning Description
 **WARNING: SHOCK HAZARD**	Hazardous voltages are present inside instrument. Disconnect from main power before removing screw-attached panels.
 **WARNING: CHEMICAL HAZARD**	Hazardous chemicals may be present. Avoid contact, especially when replenishing reservoirs. Use proper eye and skin protection.
 **WARNING: BURN HAZARD**	Very hot or cryogenically cold surfaces may be exposed. Use proper skin protection.
 **WARNING: EYE HAZARD**	Eye damage could occur either from flying particles, chemicals, or UV radiation. Use proper eye and face protection.
 **WARNING: FIRE HAZARD**	The potential for fire may be present. Follow manual instructions for safe operation.
 **WARNING: EXPLOSION HAZARD**	The potential for explosion may exist because of type of gas or liquid used.
 **WARNING: RADIATION SOURCE**	Ionizing radiation source is present. Follow manual instructions for safe operation.
 **WARNING: MOVING PARTS**	Keep hands and fingers away.

General Safety Precautions

Follow these safety practices to ensure safe equipment operation.

- Perform periodic leak checks on all supply lines and pneumatic plumbing.
- Do not allow gas lines to become kinked or punctured. Place lines away from foot traffic and extreme heat or cold.
- Store organic solvents in fireproof, vented and clearly labeled cabinets so they are easily identified as toxic and/or flammable materials.
- Do not accumulate waste solvents. Dispose of such materials through a regulated disposal program and not through municipal sewage lines.

NOTICE: This instrument has been tested per applicable requirements of EMC Directive as required to carry the European Union CE Mark. As such, this equipment may be susceptible to radiation/interference levels or frequencies which are not within the tested limits.

WARNING This instrument is designed for chromatographic analysis of appropriately prepared samples. It must be operated using appropriate gases and/or solvents and within specified maximum ranges for pressure, flows, and temperatures as described in this manual. If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

WARNING It is the responsibility of the Customer to inform Varian Customer Support Representatives if the instrument has been used for the analysis of hazardous biological, radioactive, or toxic samples, prior to any instrument service being performed or when an instrument is being returned to the Service Center for repair.

Electrical Hazards

- Disconnect the instrument from all power sources before removing protective panels to avoid exposure to potentially dangerous voltages.
- When it is necessary to use a non-original power cord plug, make sure the replacement cord adheres to the color coding and polarity described in the manual and all local building safety codes.
- Replace blown fuses with fuses of the size and rating stipulated on the fuse panel or in the manual.
- Replace faulty or frayed power cords immediately with the same type and rating.
- Make sure that voltage sources and line voltage match the value for which the instrument is wired.

Compressed Gas Cylinders

- Store and handle compressed gases carefully and in strict adherence to safety codes.
- Secure cylinders to an immovable structure or wall.
- Store and move cylinders in an upright, vertical position. Before transport, remove regulators and install cylinder cap.
- Store cylinders in a well-ventilated area away from heat, direct sunshine, freezing temperatures, and ignition sources.
- Mark cylinders clearly so there is no doubt as to their contents.
- Use only approved regulators and connections.
- Use only connector tubing that is chromatographically clean (Varian Part Number 03-918326-00) and has a pressure rating significantly greater than the highest outlet pressure from the regulator.

GC Safety Practices

Exhaust System

No special exhaust ducting is necessary for GC detectors installed in a well-ventilated room except when the detectors are used to test hazardous chemicals. If you do install ducting:

- Use only fireproof ducting.
- Install a blower at the duct outlet.
- Locate duct intakes such that their vibration or air movement does not effect detector operation.
- Check periodically for proper operation of the duct.
- Ensure proper ventilation in lab area.

Radioactive Source Detectors

- Read carefully and comply with all NOTES, CAUTIONS, and WARNINGS in the Ni^{63} ECD manual.
- Perform the tests for removable radioactive contamination described in the Ni^{63} ECD manual.
- Comply with leak test schedules and procedures.

Burn Hazard

Heated or cryogenically cooled zones of gas chromatographs can remain hot or cold for a considerable time after instrument power is turned off. To prevent painful burns, ensure that all heated or cooled areas have returned to room temperature or wear adequate hand protection before you touch potentially hot or cold surfaces.

LC Safety Practices

High Pressure Hazard

- If a line ruptures, a relief device opens, or a valve opens accidentally under pressure, potentially hazardous high liquid pressures can be generated by the pump causing a high velocity stream of volatile and/or toxic liquids.

- Wear face protection when you inject samples or perform routine maintenance.
- Never open a solvent line or valve under pressure. Stop the pump first and let the pressure drop to zero.
- Use shatter-proof reservoirs capable of operating at 50-60 psi.
- Keep the reservoir enclosure closed when the reservoir is under pressure.
- Read and adhere to all NOTES, CAUTIONS, and WARNINGS in the manual.

Flash Chromatography

The operator should be familiar with the physico-chemical properties of the components of the mobile phase.

Keep solvents from direct contact with the polyurethane supply tubing as certain solvents will cause weakening and leaks with possible bursting.

All components of the system should be connected to a common power supply and common ground. This ground must be a true ground rather than a floating ground.

Non-polar solvents can develop a static charge when pumped through the system. All vessels that contain mobile phase (including tubing and collection vessels) must be grounded to dissipate static electricity.

Employ static measuring and static discharge devices (e.g., air ionizers) to safeguard against the buildup of static electricity.

Ultraviolet Radiation

Liquid chromatograph detectors that use an ultraviolet light source have shielding to prevent radiation exposure to personnel.

For continued protection:

- Ensure that protective lamp covers of variable and fixed wavelength detectors are in place during operation.
- Do not look directly into detector fluid cells or at the UV light source. When inspecting the light source or fluid cell, always use protective eye covering such as borosilicate glass or polystyrene.

Spare Parts Availability

It is the policy of Varian to provide operational spare parts for any instrument and major accessory for a period of five (5) years after shipment of the final production run of that instrument. Spare parts will be available after this five (5) year period but on an *as available* basis. Operational spare parts are defined as those individual electrical or mechanical parts that are susceptible to failure during their normal operation. Examples include relays, lamps, temperature probes, detector elements, motors, etc. Sheet metal parts, structural members or assemblies and castings, printed circuit boards, and functional modules are normally capable of being rebuilt to like-new condition throughout their useful life and therefore will be supplied only on an *as available* basis after the final production run of the instrument.

Service Availability

Varian provides a variety of services to support its customers after warranty expiration. Repair service can be provided by attractively priced service contracts or on a time and material basis. Technical support and training can be provided by qualified personnel on both a contractual or as-needed basis.

Varian, Inc. Analytical Instruments Sales Offices

For Sales or Service assistance and to order Parts and Supplies, contact your local Varian office.

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VARIAN

www.varianinc.com

Sicherheitsinformationen

Arbeitsanleitungen

Diese Arbeitsanleitung will Ihnen bei der Aufstellung solcher Arbeitsbedingungen helfen, die einen sicheren und wirkungsvollen Gebrauch Ihrer Geräte ermöglichen. Besondere Überlegungen und Vorsichtsmaßnahmen erscheinen in diesem Handbuch in Form von **HINWEIS**, **ACHTUNG** und **WARNUNG,** wie unten beschrieben. Es ist wichtig, daß Sie Ihr Gerät in Übereinstimmung mit dieser Arbeitsanleitung und allen möglichen zusätzlichen Informationen von Varian betreiben. Alle Fragen bezüglich Sicherheit und Handhabung Ihres Gerätes richten Sie an Ihr Varian Büro.

HINWEIS

Eine Information, um einen optimalen Wirkungsgrad Ihres Instruments zu erzielen.

ACHTUNG

Weist auf Situationen, die zu mäßiger Beeinträchtigung und/oder zu Geräteschäden führen und auf die Vermeidung dieser Situationen hin.

WARNUNG

Weist auf mögliche Gefahrensituationen, die zu ernsthaften Verletzungen führen können und auf die Vermeidung dieser Situationen hin.

Warnungssymbol	Warnungsbeschreibung
WARNUNG ELEKTRISCHER SCHLAG	Gefährliche Spannungen bestehen innerhalb des Instruments. Trennen Sie das Gerät vom Netz, bevor Sie abschraubbare Paneele entfernen.
WARNUNG CHEMISCHE GEFAHR	Gefährliche Chemikalien können vorhanden sein. Vermeiden Sie jeden Kontakt, besonders beim Auffüllen der Reservoirs. Benutzen Sie wirksamen Augen und Hautschutz.
WARNUNG VERBRENNUNGSGEFAHR	Sehr heiße oder tiefstgekühlte Oberflächen können freigelegt sein. Benutzen Sie einen wirksamen Hautschutz.
WARNUNG AUGENVERLETZUNG	Herumfliegende Partikel, Chemikalien oder UV-Strahlung können Augenschäden verursachen. Tragen Sie deshalb einen geeigneten Schutz für Augen und Gesicht.
WARNUNG FEUERGEFAHR	Es besteht eine mögliche Feuergefahr. Beachten Sie die Vorschriften im Handbuch für eine gefahrlose Benutzung.
WARNUNG EXPLOSIONSGEFAHR	Eine mögliche Explosionsgefahr besteht infolge der benutzten Gas- oder Flüssigkeitsart.
WARNUNG STRAHLUNGSQUELLE	Es besteht eine ionisierende Strahlungsquelle. Beachten Sie die Vorschriften im Handbuch für eine gefahrlose Benutzung.
WARNUNG BEWEGTE TEILE	Bleiben Sie mit Ihren Händen und Fingern weg.

Allgemeine Sicherheitsmaßnahmen

Befolgen Sie diese Sicherheitspraktiken für eine gefahrlose Gerätebenutzung.

- Prüfen Sie regelmäßig alle Versorgungs und Pneumatikleitungen auf Lecks.
- Gasleitungen dürfen nicht geknickt oder angestochen werden. Verlegen Sie die Leitungen außerhalb von Laufwegen und abseits von extremer Hitze oder Kälte.
- Lagern Sie organische Lösungsmittel in feuerfesten, belüfteten und eindeutig bezeichneten Schränken, damit sie leicht als toxische und/oder brennbare Materialien erkannt werden.
- Sammeln Sie keine Lösungsmittelabfälle. Entsorgen Sie solche Materialien über ein geregeltes Entsorgungsprogramm und nicht über die öffentlichen Abwasserleitungen.

HINWEIS: Dies Instrument wurde nach den zutreffenden Vorschriften der EMC Direktive getestet, die zum Führen des CE Zeichens der Europäischen Union berechtigen. Dieses Gerät kann an sich auf Strahlungs-/Störpegel oder Frequenzen außerhalb der getesteten Grenzen reagieren.

WARNUNG Dies Instrument ist für chromatographische Analysen entsprechend präparierter Proben gedacht. Es muß mit geeigneten Gasen und/oder Lösungsmitteln und innerhalb der im Handbuch spezifizierten maximalen Werte für Druck, Flüsse und Temperaturen betrieben werden.

WARNUNG Der Kunde ist vor der Durchführung irgendeines Geräteservices verpflichtet den Varian Kundendienstvertreter zu informieren, wenn das Instrument für Analysen gefährlicher biologischer, radioaktiver oder toxischer Proben benutzt worden ist.

Elektrische Gefahren

- Lösen Sie das Instrument von allen Stromquellen, bevor Sie Schutzpaneele entfernen, damit Sie nicht mit potentiell gefährlichen Spannungen in Berührung kommen.
- Wenn ein Nicht-Original Netzkabelstecker benutzt werden muß, muß das Austauschkabel die im Handbuch beschriebene Farbcodierung und Polarität beibehalten und alle örtlichen Sicherheitsvorschriften erfüllen.
- Ersetzen Sie durchgebrannte Sicherungen nur mit Sicherungen der Werte, die am Sicherungspaneel oder im Handbuch angegeben sind.
- Ersetzen Sie fehlerhafte oder durchgescheuerte Netzkabel sofort durch Kabel gleicher Art.
- Sorgen Sie dafür, daß Spannungsquellen und die Netzspannung den gleichen Wert haben, für den das Instrument verdrahtet ist.

Gasdruckflaschen

- Lagern und handhaben Sie komprimierte Gase vorsichtig und in strikter Einhaltung der Sicherheitsvorschriften.
- Befestigen Sie die Gasflaschen an feststehenden Aufbauten oder an Wänden.
- Lagern und transportieren Sie Gasflaschen in aufrechter Stellung. Druckregler zuvor abnehmen.
- Lagern Sie Gasflaschen in gut durchlüfteten Räumen, weit genug weg von Heizungen, direktem Sonnenschein, Frosttemperaturen und Entzündungszonen.
- Kennzeichnen Sie die Flaschen so eindeutig, daß kein Zweifel über deren Inhalt bestehen kann.
- Benutzen Sie nur geprüfte Druckminderer und Verbindungsstücke.
- Benutzen Sie nur chromatographisch reines Verbindungsrohr (Varian Part Number 03-918326-00), das wesentlich höheren Druck als den höchsten Ausgangsdruck des Druckminderers aushält.

GC Sicherheitspraktiken

Abgassystem

Für GC Detektoren, die in einem gut durchlüfteten Raum installiert sind, ist keine spezielle Abgasführung erforderlich, außer wenn die Detektoren zum Testen gefährlicher Chemikalien benutzt werden. Wenn Sie eine Abgasführung installieren:

- Benutzen Sie nur feuerfeste Führungen.
- Installieren Sie ein Gebläse am Ausgang.
- Ordnen Sie die Ansaugöffnung so an, daß ihre Erschütterungen oder Luftströmungen nicht die Detektorfunktion beeinträchtigen.
- Prüfen Sie regelmäßig die einwandfreie Arbeitsweise der Abgasführung.
- Sorgen Sie für gute Entlüftung im Laborbereich.

Radioaktive Detektoren

- Lesen Sie sorgfältig und befolgen Sie alle **HINWEISE**, **ACHTUNGEN** und **WARNUNGEN** im Ni^{63} ECD Handbuch.
- Führen Sie die Tests für zu beseitigende radioaktive Kontamination durch, die im Ni^{63} ECD Handbuch beschrieben sind.
- Erfüllen Sie die Zeitpläne und Verfahren zur Dichtigkeitsprüfung.

Verbrennungsgefahr

Beheizte oder tieftemperaturgekühlte Zonen des Gaschromatographen können beträchtlich lange heiß oder kalt bleiben, nachdem das Instrument bereits abgeschaltet ist. Zur Vermeidung schmerzhafter Verbrennungen müssen Sie darauf achten, daß alle beheizten oder gekühlten Zonen auf Raumtemperatur zurückgegangen sind oder Sie müssen ausreichenden Handschutz benutzen, bevor Sie möglicherweise heiße oder kalte Oberflächen berühren.

LC Sicherheitspraktiken

Gefahr durch hohen Druck

Wenn eine Leitung bricht, eine Entlüftungseinheit sich öffnet oder ein Ventil sich unbeabsichtigt unter Druck öffnet, kann durch die Pumpe möglicherweise ein gefährlich hoher Flüssigkeitsdruck entstehen, der einen Strahl flüchtiger und/oder toxischer Flüssigkeiten von hoher Stömungsgeschwindigkeit verursacht.

- Tragen Sie einen Gesichtsschutz, wenn Sie Proben injizieren oder Routinewartungen durchführen.
- Öffnen Sie niemals eine unter Druck stehende Lösungsmittelleitung oder ein Ventil. Halten Sie zuerst die Pumpe an und lassen Sie den Druck auf Null abfallen.
- Benutzen Sie splittersichere Reservoirs, die für einen Druck von 3,4 bis 4,1 bar ausgelegt sind.
- Halten Sie die Reservoirverkleidung geschlossen, wenn die Reservoirs unter Druck stehen.
- Lesen Sie und befolgen Sie alle **HINWEISE**, **ACHTUNGEN** und **WARNUNGEN** im Handbuch.

Blitzlicht-Chromatographie

Der Bediener sollte mit den physikalisch-chemischen Eigenschaften der Komponenten vertraut sein, aus denen sich die mobile Phase zusammensetzt.

Vermeiden Sie direkten Kontakt der Lösungsmittel mit den Zuführungsleitungen aus Polyurethan, da einige Lösungsmittel das Material der Leitungen schwächen und damit Undichtigkeiten oder Brüche hervorrufen können.

Alle Systemkomponenten sollten an der gleichen Netzstromquelle und einer gemeinsamen Erdung angeschlossen sein. Dabei muss es sich um eine echte, nicht um eine schwebende Erdung handeln.

Nicht-polare Lösungsmittel können sich beim Pumpen durch das System statisch aufladen. Alle Gefäße, die mobile Phase enthalten (einschließlich Leitungen und Sammelgefäße), müssen zur Ableitung elektrostatischer Aufladungen geerdet sein.

Setzen Sie Geräte zur Messung und Ableitung elektrostatischer Aufladungen (z.B. Geräte zur Luftionisierung) als Maßnahmen gegen den Aufbau statischer Elektrizität ein.

Ultraviolette Strahlung

Detektoren in Liquidchromatographen, die eine ultraviolette Lichtquelle benutzen, besitzen eine Abschirmung, die das Bedienungspersonal gegen Abstrahlungen schützt. Zum ständigen Schutz:

- Achten Sie darauf, daß die schützende Lampenabdeckung der Detektoren mit variablen und festen Wellenlängen während des Betriebs an ihrem Platz ist.
- Schauen Sie nicht direkt in die Flüssigkeitszellen im Detektor oder in die UV Lampe. Zum Inspizieren der Lichtquelle oder der Flüssigkeitszelle benutzen Sie immer einen wirksamen Augenschutz, wie er durch Borsilikatglas oder Polystyrol gewährleistet wird.

Verfügbarkeit von Ersatzteilen

Es ist Varian's Grundsatz, Ersatzteile für alle Instrumente und die wichtigsten Zubehöre für einen Zeitraum von fünf (5) Jahren nach dem Fertigungsauslauf dieser Geräteserie verfügbar zu haben. Nach diesem Zeitraum von fünf (5) Jahren können Ersatzteile auf der Basis *solange vorhanden* bezogen werden. Als Ersatzteil werden hier solche elektrischen und mechanischen Einzelteile verstanden, die unter normalen Bedingungen ausfallen können. Beispiele sind Relais, Lampen, Temperaturfühler, Detektorelemente, Motore usw. Metallbleche, Formteile oder Baugruppen und Gußteile, PC Boards und Funktionsmodule können normalerweise neuwertähnlich für eine brauchbare Lebensdauer instandgesetzt werden und werden deshalb nur auf der Basis *solange vorhanden* nach dem Produktionsauslauf des Instruments geliefert werden.

Serviceverfügbarkeit

Varian bietet seinen Kunden auch nach dem Auslaufen der Garantie eine Vielfalt von Serviceleistungen an. Reparaturservice kann zu attraktiven Preisen über eine Wartungsvereinbarung oder nach Zeit- und Materialaufwand zur Verfügung gestellt werden. Technische Unterstützung und Training bieten wir Ihnen durch qualifizierte Chemiker sowohl auf einer Kontraktbasis als auch nach Ihren Erfordernissen an.

Varian Analytical Instruments Verkaufsbüros

Für Verkaufs oder Servicehilfe und zum Bestellen von Teilen und Zubehören setzen Sie sich bitte mit Ihrem Varian Büro in Verbindung.

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VARIAN

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Informations et mesures de sécurité

Instructions de fonctionnement

Ce manuel d'instruction est conçu pour aider l'utilisateur à créer des conditions opératoires lui permettant de faire fonctionner le matériel efficacement et en toute sécurité. Il contient entre autres certaines observations spéciales présentées sous forme de **NOTES, MISES EN GARDE** et **AVERTISSEMENTS.** Il est important de faire fonctionner ce matériel conformément aux instructions du présent manuel et à toute autre information émanant de Varian. S'adresser au bureau régional Varian pour toute question relative à la sécurité ou à l'utilisation correcte du matériel.

NOTE

Information destinée à tirer le meilleur parti du matériel sur le plan des performances

MISE EN GARDE

Attire l'attention sur une situation pouvant occasionner des dommages corporels légers et/ou des dégâts mineurs à l'appareil et indique comment remédier à cette situation

AVERTISSEMENT

Attire l'attention sur une situation potentiellement dangereuse pouvant occasionner des dommages corporels importants et indique comment remédier à cette situation

Symboles d'avertissement	Description
 **ATTENTION RISQUE D'ELECTROCUTION**	Exposition à des tensions dangereuses. Débrancher le matériel du secteur avant de dévisser les panneaux protecteurs.
 **ATTENTION SUBSTANCES CHIMIQUES DANGER**	Présence éventuelle de substances chimiques dangereuses. Eviter tout contact, en particulier lors du remplissage des réservoirs. Prendre les mesures de protection adéquates pour les yeux et la peau.
 **ATTENTION RISQUE DE BRÛLURES**	Exposition à des surfaces chaudes ou traitées cryogéniquement. Prendre les mesures de protection adéquates pour la peau.
 **ATTENTION DANGER POUR LES YEUX**	Les dommages causées aux yeux sont de deux natures différentes : jet de particules et de produits chimiques ou radiations UV. Utiliser des protections du visage et des yeux appropriées.
 **ATTENTION RISQUE D'INCENDIE**	Risque potentiel d'incendie. Se conformer aux instructions du manuel pour faire fonctionner le matériel en toute sécurité.
 **ATTENTION RISQUE D'EXPLOSION**	Risque potentiel d'explosion en raison du type de gaz ou de liquide utilisé.
 **ATTENTION SOURCE DE RADIATION**	Présence d'une source de radiation ionisante. Se conformer aux instructions du manuel pour faire fonctionner le matériel en toute sécurité.
 **ATTENTION PIECES EN MOUVEMENT**	Garder les mains et les doigts hors de portée.

Précautions générales en matière de sécurité

Les pratiques suivantes garantissent une utilisation sans risques du matériel:

- Effectuer régulièrement des essais d'étanchéité de tous les conduits d'alimentation et de tous les tuyaux du système pneumatique.
- Ne pas travailler avec des conduits de gaz déformés ou percés. Installer les conduits de gaz à l'écart des allées et venues et à l'abri du chaud ou du froid.
- Conserver les solvants organiques dans des récipients à l'épreuve du feu, bien ventilés et portant mention de la nature de leur contenu, en particulier lorsque lesdits solvants sont toxiques et/ou inflammables.
- Ne pas accumuler les solvants de rebut. Les éliminer conformément à un programme agréé d'élimination des déchets et non via les égouts municipaux.

NOTE: Ce matériel a été testé conformément aux dispositions de la directive CME afin de pouvoir porter le sigle CE de l'Union européenne. Il en résulte qu'il peut être sensible à des niveaux de radiation/d'interférence ou à des fréquences se situant hors des limites testées.

ATTENTION Ce matériel est conçu pour effectuer des analyses chromatographiques d'échantillons préparés selon des méthodes appropriées. Il convient de le faire fonctionner avec les gaz et/ou les solvants adéquats et dans les limites des pressions, des débits et des températures maximales spécifiées dans le présent manuel.

ATTENTION Le client est tenu d'informer le service Varian d'assistance à la clientèle que son matériel a été utilisé pour l'analyse d'échantillons biologiques dangereux, radioactifs ou toxiques avant que n'en soit effectué la maintenance.

Risques de chocs électriques

- Déconnecter le matériel de toute source d'alimentation avant d'en démonter les panneaux de protection, sous peine de s'exposer à des tensions dangereuses.
- En cas d'utilisation d'un cordon d'alimentation n'étant pas d'origine, s'assurer que celui-ci soit conforme à la polarité et au codage des couleurs décrits dans le manuel d'utilisation ainsi qu'à toutes les normes régionales de sécurité régissant le secteur de la construction.
- Remplacer les fusibles sautés par des fusibles de même type que ceux stipulés sur le panneau des fusibles ou dans le manuel d'utilisation.
- Remplacer les cordons d'alimentation défectueux ou dénudés par des cordons d'alimentation de même type.
- S'assurer que les sources de tension et la tension de secteur correspondent à la tension de fonctionnement du matériel.

Bouteilles à gaz comprimé

- Ranger et manipuler les bouteilles à gaz comprimé avec précaution et conformément aux normes de sécurité.
- Fixer les bouteilles à gaz comprimé à un mur ou à une structure inamovible.
- Ranger et déplacer les bouteilles à gaz comprimé en position verticale. Avant de transporter les bouteilles à gaz comprimé, retirer leur régulateur.
- Ranger les bouteilles dans un endroit bien ventilé et à l'abri de la chaleur, des rayons directs du soleil, du gel ou des sources d'allumage.
- Marquer les bouteilles de manière à n'avoir aucun doute quant à leur contenu.
- N'utiliser que des connexions et régulateurs agréés.
- N'utiliser que des tuyaux de raccordement propres sur le plan chromatographique (Varian P/N 03-918326-00) et pouvant supporter des pressions sensiblement plus élevées que la plus haute pression de sortie du régulateur.

Mesures de sécurité en CPG

Système d'échappement

Les détecteurs CPG installés dans une pièce bien ventilée ne nécessitent pas de conduits spéciaux d'échappement excepté lorsqu'ils sont destinés à analyser des substances chimiques dangereuses. Lors de l'installation de tels conduits:

- N'utiliser que des conduits à l'épreuve du feu
- Installer un ventilateur à la sortie du conduit.
- Placer les orifices d'aspiration de manière à ce que les vibrations ou les mouvements d'air n'affectent pas le fonctionnement du détecteur.
- Vérifier périodiquement l'état du conduit.
- S'assurer que le laboratoire est correctement ventilé.

Détecteurs à source radioactive

- Se conformer au manuel d'utilisation de l'ECD Ni^{63}, en particulier à ses **NOTES**, **MISES EN GARDE ET AVERTISSEMENTS**.
- Effectuer les tests de décontamination radioactive décrits dans le manuel d'utilisation de l'ECD Ni^{63}.
- Se conformer aux procédures et au calendrier des essais d'étanchéité.

Risque de brûlures

Les zones des chromatographes à gaz chauffées ou traitées cryogéniquement peuvent rester très chaudes ou très froides durant une période plus ou moins longue après la mise hors tension du matériel. Pour éviter les brûlures, s'assurer que ces zones sont revenues à température ambiante ou utiliser un dispositif adéquat de protection des mains avant de les toucher.

Mesures de sécurité en CPL

Risques liés aux hautes pressions

En cas de rupture d'un tuyau ou en cas d'ouverture accidentelle d'une vanne alors que le système est sous pression, la pompe peut occasionner des dommages en expulsant à grande vitesse des jets de liquides volatiles et/ou toxiques.

- Mettre un masque de protection lors de l'injection des échantillons ou en effectuant les opérations de maintenance de routine.
- Ne jamais déconnecter un conduit de solvant ou une vanne sous pression. Arrêter préalablement la pompe et laisser la pression descendre à zéro.
- Utiliser des réservoirs incassables à 50-60 psi.
- Laisser l'enceinte du réservoir fermée lorsque le réservoir est sous pression.
- Se conformer aux **NOTES**, **MISES EN GARDE ET AVERTISSEMENTS** du manuel d'utilisation**.**

Chromatographie Flash

L'utilisateur aura la connaissance des propriétés physico-chimiques des constituants de la phase mobile.

Eviter le contact direct des solvants avec les tuyaux en polyuréthane : certains solvants sont susceptibles de provoquer des faiblesses et des fuites avec risques d'explosion.

Tous les constituants du système devront être connectés à une source de courant commune et à une prise de terre commune. Cette prise de terre devra être fixe et non mobile.

Les solvants non-polaires peuvent produire de l'électricité statique lorsqu'ils passent au travers du système. Les bouteilles qui contiennent la phase mobile (incluant les tuyaux et les flacons de collecte de fractions) doivent être mises à la terre pour éliminer l'électricité statique.

Utiliser des appareils de mesure et de décharge d'électricité statique (par exemple des ionisateurs d'air) pour combattre la formation d'électricité statique.

Radiations ultraviolettes

Les détecteurs CPL utilisant une source lumineuse ultraviolette comportent un écran destiné à se prémunir contre les expositions aux rayonnements.

Pour s'assurer une protection permanente:

- Vérifier que le couvercle de protection de la lampe des détecteurs opérant à des longueurs d'onde variables et fixes soit bien en place durant le fonctionnement du matériel.
- Ne pas regarder directement les cellules du détecteur ou la source d'UV. Se protéger systématiquement les yeux lors du contrôle de la source lumineuse ou des cellules, par exemple au moyen de verres borosilicatés ou en polystyrène.

Disponibilité des pièces de rechange

La politique de Varian consiste à fournir des pièces de rechange pour tous les appareils et accessoires majeurs durant une période de cinq (5) ans après livraison de leur production finale. Les pièces de rechange ne sont fournies au terme de cette période de cinq (5) ans que suivant les disponibilités. Il faut entendre par pièces de rechange les pièces individuelles électriques ou mécaniques susceptibles de défaillance au cours de leur utilisation normale. Par exemple, les relais, les lampes, les sondes thermiques, les éléments de détecteur, les moteurs, etc. Les parties en tôles, les éléments ou assemblages structurels et les pièces de fonderie, les cartes à circuits imprimés et les modules fonctionnels sont normalement susceptibles d'être remis à l'état neuf pendant toute la durée de leur vie utile et ne sont dès lors fournies, au terme de la production finale des appareils, que suivant les disponibilités.

Service d'assistance à la clientèle

Varian fournit divers services destinés à aider sa clientèle après expiration de la garantie: service de réparation sur base de contrats de maintenance à prix attractifs ou sur base d'accords à durée limitée portant sur du matériel spécifique; support technique et service de formation assurés par des chimistes qualifiés sur base contractuelle ou en fonction des besoins spécifiques.

Points de vente des instruments analytiques Varian

Contactez votre point de vente régional Varian pour toute question commerciale ou de service d'assistance à la clientèle ou pour passer commande de pièces et de fournitures.

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Informazioni sulla Sicurezza

Instruzioni per l'Uso

Questo manuale ha lo scopo di aiutare l'operatore ad utilizzare lo strumento in modo sicuro ed efficiente. Le considerazioni e le precauzioni speciali vengono presentate in questo manuale sotto forma di avvisi di **NOTA**, **CAUTELA** e **ATTENZIONE**. E' importante che lo strumento venga utilizzato rispettando le istruzioni fornite in questo manuale o che verranno fornite successivamente dalla Varian. Per ogni eventuale chiarimento sull'uso o sulla sicurezza, si prega di contattare la Varian di Leinì (TO).

NOTA

Sono informazioni utili ad ottenere le prestazioni migliori da parte dello strumento.

ATTENZIONE

Allerta l'operatore su situazioni che potrebbero causare ferite leggere e danni limitati allo strumento ed il modo di evitarle.

ATTENZIONE

Allerta l'operatore su situazioni potenzialmente pericolose che possono causare danni molto seri ed il modo di evitarle.

Segnali di ATTENZIONE	Descrizione del Pericolo
 **ATTENZIONE** **Pericolo di folgorazioni**	Nello strumento sono presenti tensioni pericolose. Scollegare il cavo di alimentazione prima di togliere il pannello fissato con le viti.
 **ATTENZIONE** **ESPOSIZIONE A SOSTANZA CHIMICHE**	Possono essere presenti composti chimici pericolosi. Evitare il contatto, specialmente quando si riempiono i contenitori. Usare protezioni opportune per la pelle e per gli occhi.
 **ATTENZIONE** **Pericolo di scottature**	Pericolo di esposizione a superfici molto calde o raffreddate criogenicamente. Usare protezioni opportune per la pelle.
 **ATTENZIONE** **PERICOLO PER GLI OCCHI**	Particelle volanti, agenti chimici o radiazioni UV possono danneggiare gli occhi. Vanno quindi utilizzate le opportune protezioni per gli occhi e per il volto.
 **ATTENZIONE** **Pericolo di incendio**	Pericolo potenziale di incendio. Seguire le istruzioni del manuale per lavorare con una maggiore sicurezza.
 **ATTENZIONE** **Pericolo di esplosioni**	C'è pericolo di esplosioni a causa del tipo di gas o liquido utilizzato.
 **ATTENZIONE** **Pericolo di radiazioni**	E' presente una radiazione ionizzante. Seguire le istruzioni del manuale per lavorare con una maggiore sicurezza.
 **ATTENZIONE** **Parti in movimento**	Non tenere le mani o le dita vicino.

Norme di Sicurezza

Per lavorare in modo sicuro sullo strumento, Vi consigliamo si adottare le seguenti procedure.

- Verificare periodicamente che non ci siano perdite sulle linee e sui raccordi pneumatici.
- Evitare che le linee dei gas vengano piegate o forate. Le linee vanno posizionate in modo tale da non essere calpestate e lontane da sorgenti o troppo calde o troppo fredde.
- I solventi organici vanno conservati in armadi speciali antiincendio, ventilati e con indicazioni chiare sul contenuto di materiali tossici e/o infiammabili.
- Non accumulare i solventi utilizzati. Adottare un programma regolare di smaltimento, ma mai nelle acque di scarico.

AVVERTENZA: Questo strumento è stato testato secondo le Direttive EMC allo scopo di poter utilizzare il Marchio CE della Comunità Europea. Questo strumento può essere suscettibile a radiazioni/interferenze o frequenze che non sono entro i limiti collaudati.

ATTENZIONE Questo strumento è progettato per l'analisi cromatografica di campioni opportunamente preparati. Deve essere utilizzato usando gas e solventi adatti a questo scopo ed entro i limiti massimi di pressione, flusso e temperatura riportati in questo manuale. Se lo strumento non viene utilizzato secondo le modalità specificate dal costruttore, le condizioni di sicurezza previste potranno non essere sufficienti.

ATTENZIONE E' responsabilità del Cliente informare il Servizio Tecnico Varian, prima di qualsiasi intervento di riparazione, se lo strumento è stato utilizzato per l'analisi di campioni biologicamente pericolosi, radioattivi o tossici.

Pericoli Elettrici

- Prima di togliere i pannelli di protezione, scollegare lo strumento da tutte le alimentazioni elettriche in modo da evitare l'esposizione a voltaggi potenzialmente pericolosi.
- Quando si rende necessario sostituire il cavo di alimentazione, assicurarsi che il nuovo cavo rispetti sia le codifiche di colore e di polarità riportate nel manuale di istruzioni che quelle stabilite dalle norme di sicurezza del laboratorio.
- Sostituire i fusibili bruciati solo con fusibili che abbiano le stesse caratteristiche; queste ultime sono riportate sul pannello dei fusibili e/o nel manuale di istruzioni.
- Sostituire immediatamente i cavi di alimentazione difettosi o consumati con cavi dello stesso tipo e con le stesse caratteristiche.
- Assicurarsi che il voltaggio del pannello di alimentazione corrisponda a quello dello strumento da collegare.

Bombole dei Gas

- Occorre prestare molta attenzione quando si spostano bombole di gas compressi. Rispettare tutte le norme di sicurezza.
- Assicurare le bombole ad una parete o ad una struttura fissa.
- Spostare e conservare le bombole sempre in posizione verticale. Togliere i manometri prima di spostare le bombole.
- Conservare le bombole in un'area ben ventilata, non infiammabile, lontana da sorgenti di calore, non esposta a temperature troppo fredde o alla luce diretta del sole.
- Evidenziare in modo chiaro e che non lasci dubbi il contenuto di ogni bombola.
- Usare solo manometri e raccordi di qualità.
- Usare solo tubazioni cromatograficamente pulite (Numero di Parte Varian 03-918326-00) e calibrate per pressioni superiori a quella massima di uscita dal manometro.

Procedure di Sicurezza in GC

Scarico dei Gas

Per i rivelatori GC non è richiesto alcun sistema particolare di scarico dei gas, se lo strumento è installato in una stanza ben ventilata e se non viene utilizzato per l'analisi di sostanze chimiche pericolose. Se si deve installare un sistema di scarico dei gas:

- Usare condutture non infiammabili
- Installare un aspiratore in uscita
- Posizionare la presa d'aria in modo che le vibrazioni e il movimento dell'aria non disturbino il rivelatore.
- Eseguire verifiche periodiche per garantire un funzionamento corretto.
- Garantire una buona ventilazione nel laboratorio.

Rivelatori a Sorgente Radioattiva

- Leggere e rispettare tutte gli avvisi di **NOTA**, **CAUTELA** e **ATTENZIONE** riportati nel manuale del rivelatore ECD al Ni^{63}.
- Eseguire tutti i test di contaminazione radioattiva rimovibile descritti nel manuale dell'ECD al Ni^{63}.
- Rispettare tutte le procedure e le scadenze di verifica per eventuali perdite.

Pericolo di Scottature

Le zone calde o raffreddate criogenicamente del gascromatografo possono mantenere la loro temperatura per parecchio tempo, dopo aver spento lo strumento. Per evitare scottature, assicurarsi che le zone riscaldate o raffreddate siano a temperatura ambiente oppure indossare delle protezioni adeguate prima di toccare tali superfici.

Procedure di Sicurezza in LC

Pericolo di Alte Pressioni

In caso di rottura di una linea o di apertura accidentale di una valvola, quando il sistema è sotto pressione, la pompa può liberare liquidi tossici e/o volatili molto pericolosi.

- E' opportuno adottare un sistema di protezione del viso quando si inietta il campione o si esegue una manutenzione routinaria del sistema.
- Non smontare mai una linea del solvente od una valvola quando il sistema è sotto pressione. Fermare prima la pompa ed aspettare che la pressione scenda a zero.
- Usare dei contenitori per solventi infrangibili ed in grado di lavorare a 50-60 psi.
- Quando i contenitori sono sotto pressione, usare una protezione esterna.
- Leggere e rispettare tutti gli avvisi di **NOTA**, **CAUTELA** e **ATTENZIONE.**

Cromatografia Flash

L'operatore deve conoscere le proprietà fisico-chimiche delle componenti della fase mobile.

I solventi non vanno messi in contatto diretto con il tubo di erogazione in poliuretano, dal momento che alcuni solventi possono causare indebolimento e perdite con possibili scoppi.

Tutte le componenti del sistema vanno collegate ad una fonte di alimentazione e ad una messa a terra comuni. E' meglio che per quest'ultima venga utilizzata una spina con polo di terra.

I solventi non-polari possono sviluppare una carica statica quando vengono pompati attraverso il sistema. Tutti i recipienti che contengono la fase mobile (inclusi i tubi e i recipienti di raccolta) devono avere una messa a terra per disperdere l'elettricità statica.

Vanno utilizzati dispositivi di misurazione e scarico (ad esempio ionizzatori d'aria) per evitare l'aumento di elettricità statica.

Radiazioni Ultraviolette

I rivelatori di cromatografia liquida che usano sorgenti a luce ultravioletta montano degli schermi di protezione per evitare che gli operatori siano esposti a radiazioni pericolose.

Per una protezione sicura:

- Assicurarsi che i coperchi delle lampade dei rivelatori a lunghezza fissa e variabile siano sempre al loro posto, quando si lavora.
- Non guardare mai direttamente dentro le celle o alla sorgente di luce UV. Quando si vuole ispezionare la lampada o le celle, usare sempre delle protezioni adatte per gli occhi, quali vetro in borosilicato e polistirolo.

Disponibilità delle Parti di Ricambio

E' politica della Varian il fornire le parti di ricambio per lo strumento ed i suoi accessori per un periodo di cinque (5) anni a partire dalla data di produzione dell'ultima unità della serie. Le parti di ricambio saranno disponibili anche dopo questo periodo di cinque (5) anni ma solo in base alla disponibilità delle stesse. Per parti di ricambio si intendono i componenti elettrici e meccanici soggetti ad usura durante l'uso, in condizioni normali, dello strumento. Come esempio, citiamo i relay, le lampade, i probe di temperatura , i componenti del rivelatore, i motorini, ecc. Le parti strutturali o da fusione, le schede elettroniche ed i moduli funzionali possono essere ricostruiti e rimessi a nuovo durante tutto il loro periodo di vita e perciò sarà possibile acquistarli, dopo la produzione dell'ultima unità delle serie, solo in base alla loro disponibilità.

Servizi Tecnico

La Varian, alla scadenza del periodo di garanzia, è in grado di fornire ai suoi clienti un'ampia scelta di opzioni. Le riparazioni possono essere effettuate sulla base di contratti di manutenzione particolarmente vantaggiosi od in base ad una tariffa oraria piu' il costo delle parti. A richiesta, si possono avere corsi per operatori sia sotto forma di contratto che a tariffe da concordare.

Uffici Vendite della Divisione Strumenti Analitici della Varian

Per informazioni relative alla Vendita, al Servizio Tecnico o all'acquisto di Parti di ricambio, si prega di contattare l'ufficio Varian piu' vicino.

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Instrucciones de Seguridad

Instrucciones de Operación

Este Manual de Instrucciones está diseñado para ayudarle a establecer las condiciones de operación que le permitan operar su instrumento de forma segura y eficaz. Así mismo, se describen consideraciones especiales ó precauciones, que aparecen en forma de **NOTA**, **PRECAUCION**, y **ATENCION** como se indica más abajo.Es importante que utilice el instrumento de acuerdo con este Manual de Operación y cualquier otra información que le proporcione Varian. Remita a la Oficina Local de Varian cualquier cuestión que tenga respecto al correcto uso de su equipo.

NOTA

Información para ayudarle a obtener unas prestaciones óptimas de su instrumento.

¡PRECAUCION!

Le alerta de situaciónes que pueden causar daños moderados a la salud ó al equipo, y cóm evitar esas situaciones.

ATENCIÓN

Le alerta de potenciales situaciones peligrosas que pueden causar serios daños, y cómo evitar esas situaciones.

Símbolo	Descripción
 **ATENCIÓN PELIGRO DE DESCARGA ELÉCTRICA**	El instrumento utiliza voltages peligrosos. Desconecte el interruptor general antes de retirar los paneles atornillados.
 **ATENCIÓN PELIGRO QUÍMICO**	Peligro de productos químicos. Evite el contacto, especialmente cuando rellene los depósitos. utilice protección de ojos y piel.
 **ATENCIÓN PELIGRO DE QUEMADURAS**	Superficies posiblemente calientes ó frías (criogénico). Utilice protección para la piel.
 **ATENCIÓN PELIGRO PARA LOS OJOS**	Las partículas volátiles, productos químicos o radiación UV pueden causar daños en los ojos. Usar las debidas protecciones para la cara y los ojos.
 **ATENCIÓN PELIGRO DE FUEGO**	Peligro potencial de fuego. Siga las instrucciones del Manual de Operación para su seguro funcionamiento.
 **ATENCIÓN PELIGRO DE EXPLOSIÓN**	Peligro potencial de explosión debido al tipo de gas ó líquido empleado.
 **ATENCIÓN PELIGRO DE RADIACIÓN**	Peligro por Fuente de radiación. Siga las instrucciones del Manual de Operación para su seguro funcionamiento.
 **ATENCIÓN PARTES EN MOVIMIENTO**	Mantenga alejados los dedos y las manos.

Precauciones Generales de Seguridad

Siga estas indicaciones de seguridad para una correcta operación del equipo.

- Realice verificaciones periódicas de fugas en todas las líneas de suministro y tuberías.
- No permita que las líneas de gas se doblen ó pinchen. Manténgalas alejadas de zonas de paso y del calor ó frío excesivo.
- Guarde los disolventes orgánicos en cabinas ventiladas, a prueba de fuego, y etiquetadas para que puedan ser fácilmente identificadas como material tóxico y/ó inflamable.
- No acumule disolventes inservibles. Deseche todo el material inservible a través de un programa especial de desechos y no a través del sistema convencional.

NOTA: Este instrumento ha sido testado bajo las normas de la Directiva EMC según requerimientos de la Marca CE de la Unión Europea. Por lo tanto, este equipo puede ser sensible a niveles de radiaciones / interferencias ó frecuencias que no estén incluidas dentro de los límites testados.

ATENCIÓN Este instrumento está diseñado para análisis cromatográfico de muestras preparadas apropiadamente. Debe ser operado usando gases y/ó disolventes apropiados y con unos niveles máximos de presión, flujos y temperaturas, según se describe en este manual.

ATENCIÓN El Usuario tiene la obligación de informar al Servicio Técnico de Varian cuando el instrumento vaya a ser empleado para análisis de muestras peligrosas de origen biológico, radioactivo ó tóxico, antes de comenzar a realizar cualquier análisis.

Peligros Eléctricos

- Desconecte el instrumento de todos las conexiones eléctricas a la red antes de retirar los paneles para evitar la posible exposición a peligrosos voltages.
- Cuando sea necesario emplear una clavija eléctrica no original, asegurese de colocar los cables de acuerdo con el código de colores y polaridades descritos en el manual y los códigos de seguridad de la red eléctrica.
- Sustituya los fusibles fundidos con fusibles del tipo y tamaño estipulados en el panel de fusibles ó en el manual.
- Sustituya los cables deteriorados inmediatamente con cables del mismo tipo y graduación.
- Asegureses de que los valores de las líneas de electricidad se ajustan a los valores para los que el Instrumento ha sido preparado.

Botellas de Gas Comprimido

- Guarde y maneje las botellas de gas con cuidado y de acuerdo con las normas de seguridad.
- Asegure las botellas a una estructura inmovil ó a la pared.
- Guarde y mueva las botellas en posición vertical. Retire los reguladores antes de transportarlas.
- Guarde las botellas en un área ventilada, lejos de fuentes de calor, de luz solar directa y de temperaturas extremadamente bajas.
- Identifique las botellas claramente para evitar cualquier duda sobre su contenido.
- Utilice sólamente reguladores y conexiones aprobadas.
- Utilice sólo tubos de conexión cromatográficamente límpios (Varian p/n 03-918326-00) y que tengan una graduación de presión significativamente mayor que la mayor presión del regulador.

GC Prácticas de Seguridad

Sistema de Extracción

No se necesita un sistema de extracción para los detectores GC instalados en un laboratorio bien ventilado, excepto cuando se analicen muestras químicas peligrosas. Si instala un sistema de extracción:

- Utilice conductos a prueba de fuego.
- Instale un ventilador al final del sistema.
- Instale entradas de aire cuya vibración no afecte al trabajo del detector.
- Compruebe periódicamente el correcto funcionamiento del sistema.
- Asegurese de una correcta ventilación del laboratorio.

Detectores con fuentes radioctivas

- Lea con cuidado y cumpla todas las **NOTAS**, **PRECAUCION**, y **ATENCION** del Manual del Detector Ni^{63} ECD.
- Realice los test de contaminación radioactiva descritos en el Manual del Detector Ni^{63} ECD.
- Cumpla con los plazos y procedimientos de test de fugas.

Peligro de Quemaduras

Las zonas de calor ó frío (criogénicas) del Cromatógrafo de Gases pueden permanecer calientes ó frías durante bastante tiempo después de apagar el instrumento. Para evitar quemaduras asegureses de que todas las áreas que se calienten ó enfríen han vuelto a la temperatura ambiente, ó protejase adecuadamente las manos, antes de tocar las superficies potencialmente calientes ó frías.

LC Prácticas de Seguridad

Peligro de Alta Presión

Si se rompe una línea de presión, ó se abre una válvula de seguridad accidentalmente bajo presión, la bomba puede generar líquidos a alta presión potencialmente peligrosos, produciendo un chorro a alta velocidad de líquidos volátiles y/ó tóxicos.

- Lleve protección facial cuando inyecte muestras ó realice mantenimiento de rutina.
- Nunca abra una línea ó una válvula bajo presión. Apague la bomba antes y deje que la presión baje a cero.
- Utilice depósitos irrompibles que sean capaces de operar a 50-60 psi.
- Mantenga cerrada la junta del depósito cuando se haye bajo presión.
- Lea y cumpla todas las **NOTA**, **PRECAUCION**, y **ATENCION** del manual.

Cromatografía Flash

El operador debe familiarizarse con las propiedades físico-químicas de los componentes de la fase móvil.

Alejar los disolventes del contacto directo con los tubos de poliuretano ya que ciertos disolventes pueden causar reblandecimiento de los tubos o posibles fugas con riesgo de explosión.

Todos los componentes del sistema deben estar conectados a un enchufe común con toma de tierra común. Esta toma de tierra debe ser una toma de tierra verdadera en lugar de flotante.

Los disolventes no-polares pueden originar carga estática cuando son bombeados por el sistema. Todos los recipientes que contienen fase móvil (incluyendo los tubos y los recipientes de recogida) deben estar conectados a tierra para disipar la electricidad estática.

Utilizar medidores de carga estática y los debidos dispositivos de descarga (por Ej., ionizadores de aire) para salvaguardarse contra la creación de electricidad estática.

Radiación Ultravioleta

Los detectores del Cromatógrafo de Líquidos que utilizan una fuente de luz ultravioleta disponen de protección para prevenir exposiciones radioactivas al personal.

Para una correcta protección:

- Asegurese de que las cubiertas de protección de la lámpara de los detectores está correctamente situada durante su funcionamiento.
- No mire directamente a las celdas del detector ó a la fuente de luz UV. Cuando inspeccione la fuente de luz ó la celda, utilice siempre una protección para los ojos como gafas de borosilicato ó poliestireno.

Disponibilidad de Recambios

Es Política de Varian disponer de Recambios para cualquier instrumento y la mayoría de los accesorios por un periodo de cinco (5) años después del último instrumento fabricado. Los recambios durante esos cinco años estarán disponibles, pero siempre bajo el sistema *"Según disponibilidad"*. Los Recambios están definidos como todas aquellas partes individuales mecánicas ó eléctricas que son susceptibles de fallo durante su normal proceso de operación. Por ejemplo, relés, lámparas, sondas de temperatura, elementos del detector, motores, etc. Las planchas de metal, partes de la estructura, placas de circuitos integrados, y otros módulos funcionales son normalmente susceptibles de reparación y por lo tanto sólo estarán disponibles bajos el sistema *"Según disponibilidad"* después del último instrumento fabricado.

Disponibilidad de Servicio

Varian ofrece una gran variedad de sistemas de Servicio para mantener el soporte a sus usuarios tras el periodo de garantía. El Soporte de Servicio se ofrece a través de atractivos Contratos de Servicio ó bajo un sistema de facturación de mano de obra y materiales. El mantenimiento y el entrenamiento se realiza por ingenieros cualificados bajo Contrato ó petición.

Oficinas de Instrumentación Analítica Varian

Para cualquier consulta sobre Instrumentación Analítica, Servicio Técnico ó Recambios y Accesorios, contacte con su oficina local:

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VARIAN

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Table of Contents

Introduction

The ProStar 340 is a variable wavelength UV/visible absorbance detector for liquid chromatography. Using various combinations of flowcells and lamps, the detector can be adapted for applications from capillary to preparative scale.

Theory of Operation

Figure 1 illustrates the optical system for the detector. Only one lamp (D2 or tungsten) can be mounted at a time. Both lamps are continuum lamps that jointly provide consistent intensity across the entire spectrum from 190 to 800 nm. Two sets of baffles are used to minimize stray light. Wavelength selection is provided by a concave holographic grating actuated by a mechanical wavelength drive.

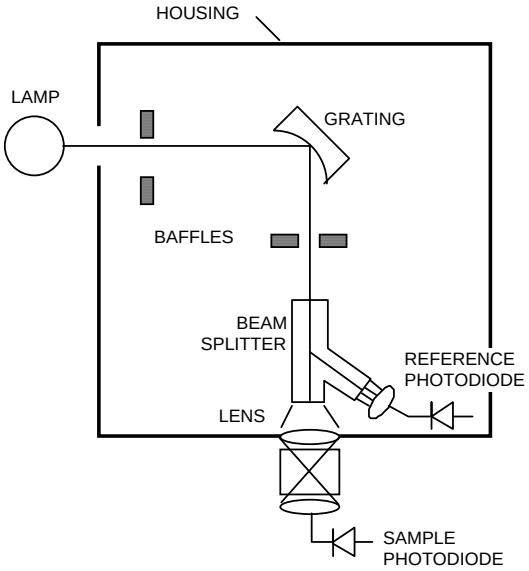


Figure 1 Optical System

True double beam operation is provided by a fiberoptic beam splitter. A reference photodiode continuously monitors the light from one leg of the beam splitter. The other leg is imaged by a lens through a sample cell onto the sample photodiode.

The photodiodes are connected to individual preamplifiers. The preamp output voltages are directly proportional to the light intensity at the photodiode active surfaces (see Figure 2).

The outputs of the preamplifiers are sent to an analog ratiometer. The output of this circuit is a voltage that is directly proportional to the negative logarithm of the ratio of the sample signal to the reference signal. This voltage is supplied to the rear panel as the 1V/AU integrator output and as the adjusted absorbance full scale recorder output.

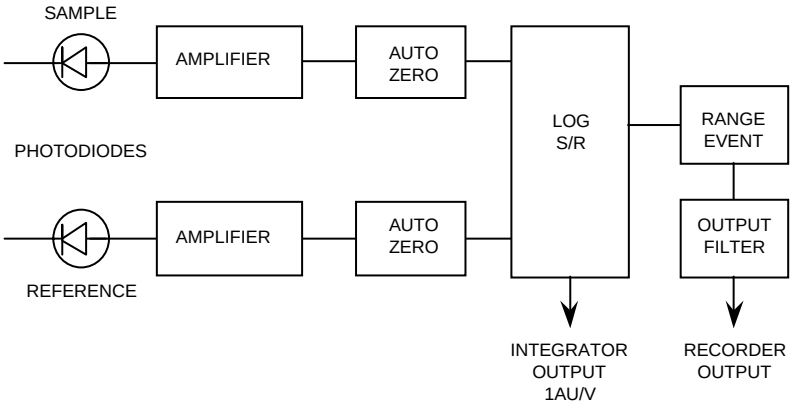


Figure 2 Electronics Block Diagram

Installation

Unpacking

Carefully unpack the detector from the shipping container and inspect both the unit and packing material for any signs of damage. If any damage is noted, contact the carrier company immediately. Any damage sustained in transit is the responsibility of the carrier, who will need to inspect the shipping container if any damage claim is filed.

In addition to this manual, the shipping container contains a power cord and any options which you ordered. Carefully check the packing list against the contents of the container. If anything is missing, check the packing materials carefully for the overlooked items. If any items are missing, contact LC Technical Services at 1-800-FOR-HPLC, or your local Varian office.

In addition to the detector, you will need the following items for setup and initial operation:

- Strip chart recorder or integrator and connecting cables.
- Liquid Chromatograph.
- Column.
- Standard test mix.
- Appropriate solvents, reagents, etc.
- Nuts and ferrules appropriate to the column end-fittings being used.
- Wrenches appropriate to column end-fittings.
- Connecting tubing and union (if column cannot be connected directly to the cell).

Location

Place the detector on a firm, flat surface, such as a laboratory bench top, near the column outlet. Allow at least 5 inches of clear space between the rear panel of the unit and any wall or obstruction. This gives access to the rear panel connections and provides a free flow of cooling air.

System Description

Front Panel

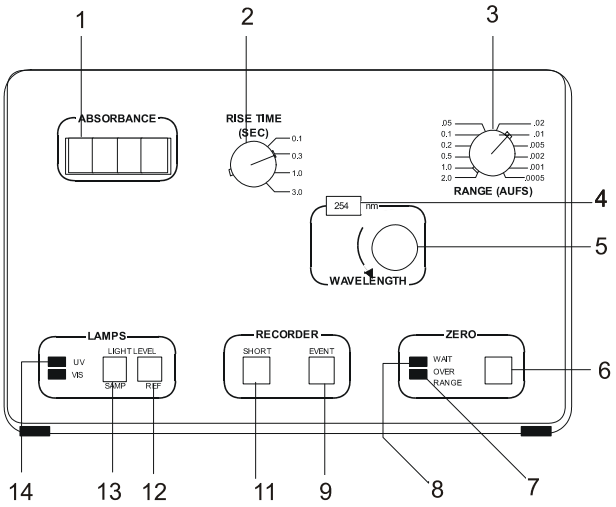


Figure 3 Front Panel

1. Display: A 3-1/2 digit LED display provides absorbance values up to 1.999 AU. This display also shows the relative sample and reference beam intensities when you press switch 8 (sample) or 9 (reference).
2. Rise Time Selection Switch: A four-position rotary switch controls the degree of filtering performed by a Second Order Bessel filter. Rise times of 0.1, 0.3, 1.0, and 3.0 seconds can be chosen. Typically, Rise Time in seconds approximates 2x Time Constant in seconds.
3. Range Selection Switch: A twelve-position rotary switch controls the full scale output range for the rear panel-positioned Recorder Output. Full scale ranges of 2.0, 1.0, 0.5, 0.2, 0.1, 0.05, .02, 0.01, 0.005, 0.002, 0.001, and 0.0005

AUFS are provided. This switch does not affect the fixed 1V/AU output of the rear panel integrator output.

4. Wavelength Indicator: A mechanical three-digit indicator displays operating wavelength.
5. Wavelength Selector: A mechanical continuous turn control selects wavelengths from 190 to 800 nm. Rotating this control clockwise decreases wavelength; counter-clockwise rotation increases wavelength. The arrow shows the direction of rotation to increase wavelength.

CAUTION

Do not force the wavelength control below 180 nm or over 820 nm. Damage to the wavelength drive may result.

6. Autozero Switch: A momentary switch activates an autozezro circuit capable of zeroing greater than 1.5 AU. After pushing this button, the Wait Light will turn on and the recorder output will be shunted to zero volts. Within three seconds a new zero value will be calculated and the Wait Light will turn off. The Over-Range Light will illuminate when the total absorbance within the flowcell exceeds the capacity of the circuit.
7. Over Range Light: A green LED indicates a total absorbance in the flowcell which exceeds the autozezro circuit capacity. The unit will continue to output voltages proportional to absorbance upon both recorder and integrator outputs. There will be an offset proportional to difference of the new baseline to that of a true zero baseline. For instance, if the autozero circuit functions to set the new zero value to 0.002 AU, all output absorbance values will contain an offset of 0.002.
8. Wait Indicator Light: A green LED indicates a fixed, zero volt recorder output. This occurs when:
    - Powering up the unit. After the lamp has ignited, it is necessary to press Switch 6 – autozero. The Wait Indicator will then shut off and the recorder outputs will become active.

- Pressing the autozero switch. After the new zero value has been stored, the light turns off and the recorder outputs will become active.

9. Event Switch: A momentary switch sends an event mark of approximately 20% deflection to the recorder output. This switch does not affect the integrator output.
10. Short Switch: A momentary switch shorts the recorder output terminals to zero volts. Pressing and holding the switch allows the user to set the chart recorder pen position. This switch does not affect the integrator output.
11. Reference Light Intensity Switch: A momentary switch displays a value which is proportional to the light intensity at the reference photodiode.
12. Sample Light Intensity Switch: A momentary switch displays a value which is proportional to the light intensity at the sample cell photodiode.
13. Visible (VIS) Lamp Indicator: A green LED indicates that a Tungsten lamp is present in the instrument and is lit.
14. Ultra Violet (UV) Lamp Indicator: A green LED indicates that a Deuterium (D2) lamp is present in the instrument and is lit.

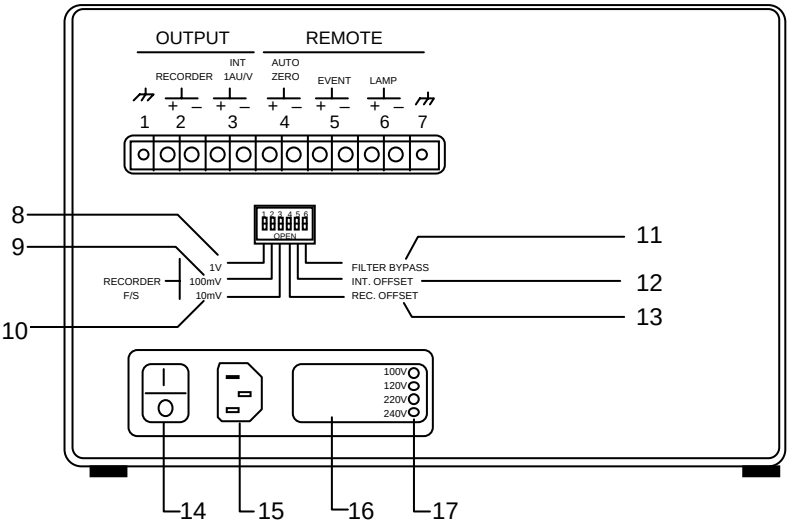


Figure 4 Back Panel

1. Earth Ground: This terminal is continuous with the earth ground.

NOTE: Do note use this terminal as negative ground for any output or input function. Doing so may create ground loops resulting in excessive noise.

2. Recorder Outputs: Two terminals supply an analog output for a strip chart recorder or integrator. The full scale outputs of these terminals are selectable from 10 mV, 100 mV, and 1.0V. This output is dependent upon the position of the Range and Rise Time controls.
3. Integrator Output: Two terminals supply a fixed 1 AU/V analog output to be used with an integrator. This output is independent of the Range control, Rise Time control, Short and Event switches, but dependent upon the autozero control.
4. Remote autozero: Two terminals provide a remote auto zero function. A momentary contact closure or TTL low activates the autozero circuit.
5. Remote Event: Two terminals provide an event mark with a momentary contact closure or TTL low.
6. Remote Lamp Shut-Off: Two terminals provide a remote means of switching off the lamp. Lamps are shut off by providing a continuous contact closure or TTL low. Lamps are re-ignited by the interruption of a contact closure or TTL low.
7. Earth Ground: This terminal is continuous with the earth ground.

Recorder Full Scale Voltage Selection Switches: Three two-position rocker switches (8, 9, and 10) control the full scale voltage of the recorder output. These switches do not affect the integrator output.

8. Pressing the top half of this switch to rock it upward to “ON” sets the full scale recorder output to 1.0V when Switches 9 and 10 are “OFF”.
9. Pressing the top half of this switch to rock it upward to “ON” sets the full scale recorder output to 100 mV when Switches 8 and 10 are “OFF”.

10. Pressing the top half of this switch to rock it upward to “ON” sets the full scale recorder output to 10 mV when Switches 8 and 9 are “OFF”.
11. Filter By-Pass Switch: A two-position rocker switch controls a bypass circuit for the Second Order Bessel filter. Pressing the top half of this switch so that it is “ON” disables the front panel Rise Time Control and results in an effective rise time of 0.1 seconds.
12. Integrator Offset Switch: A two-position rocker switch provides an additional +10 mV offset to the fixed 1 AU/V signal of the integrator output when the switch is in the ON position. This switch does not affect the recorder output. This integrator offset is supplied to aid integrators incapable of zeroing for a negative drifting baseline. In most cases, it need not be used.
13. Recorder Offset Switch: A two-position rocker switch provides a +10% fixed offset to the recorder output. This offset is independent of full scale range or full scale voltage. This recorder offset does not affect the integrator output.
14. Power Switch: A two-position rocker switch turns the instrument on and off. Pressing the top half of this switch to rock it upward powers up the unit. Pressing the bottom half of the switch to rock it downward shuts the unit off.
15. Power Connector: A three-pin receptacle is provided that accepts a standard modular power line cord.
16. Fuse Block: Pry out this block to allow access to the fuses and voltage control. It contains one 1.0 Amp slow-blow fuse (for 100-120 Vac operation) and two 0.5 Amp slow-blow fuses (220-240 Vac operation).
17. Voltage Control Selector: A four position voltage selector allows the instrument to be operated at 100, 120, 220, or 240 Vac (50/60 Hz).

Flowcell Housing and Lamp Housing

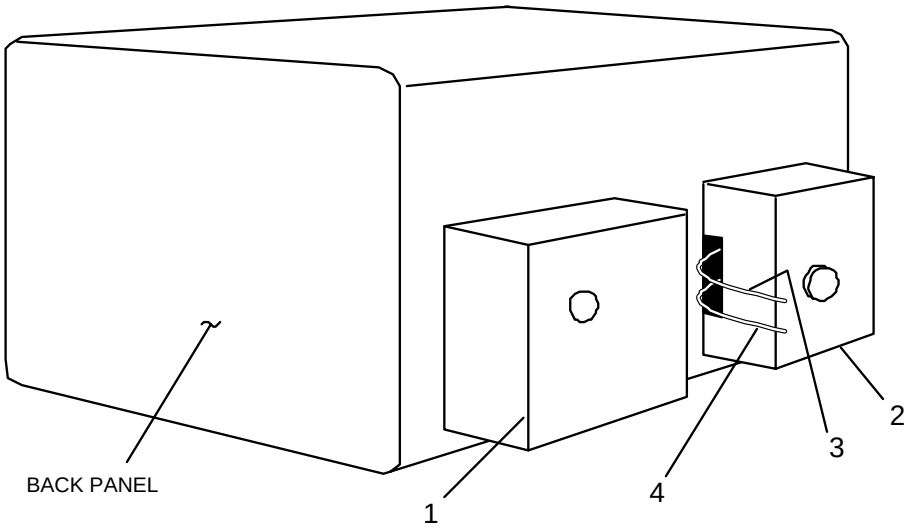


Figure 5 Flowcell Housing and Lamp Housing

WARNING:
BURN HAZARD

WARNING:
EYE HAZARD

NEVER remove the lamp housing cover when power is connected. UV radiation from the D2 lamp can damage skin and eyes. Lamps become very hot. Use care when handling them to avoid burns.

1. Lamp Housing Cover: Remove the screw and cover to access the lamp.
2. Flowcell Housing Cover: Remove to access the flowcell and sample photodiode.
3. Flowcell Exit Tubing: Connect to a fraction collector, back-pressure device, or waste.
4. Flowcell Inlet Line: Connect to the column outlet, directly if possible.

NOTE: If you wish to connect two detectors in series, be sure to minimize the total tubing length from this detector outlet to the inlet of the other detector, to prevent excessive band broadening.

The outlet and inlet tubing ID, OD, and position may vary according to the flowcell in use. Consult the flowcell manual for more details.

Electrical Connections

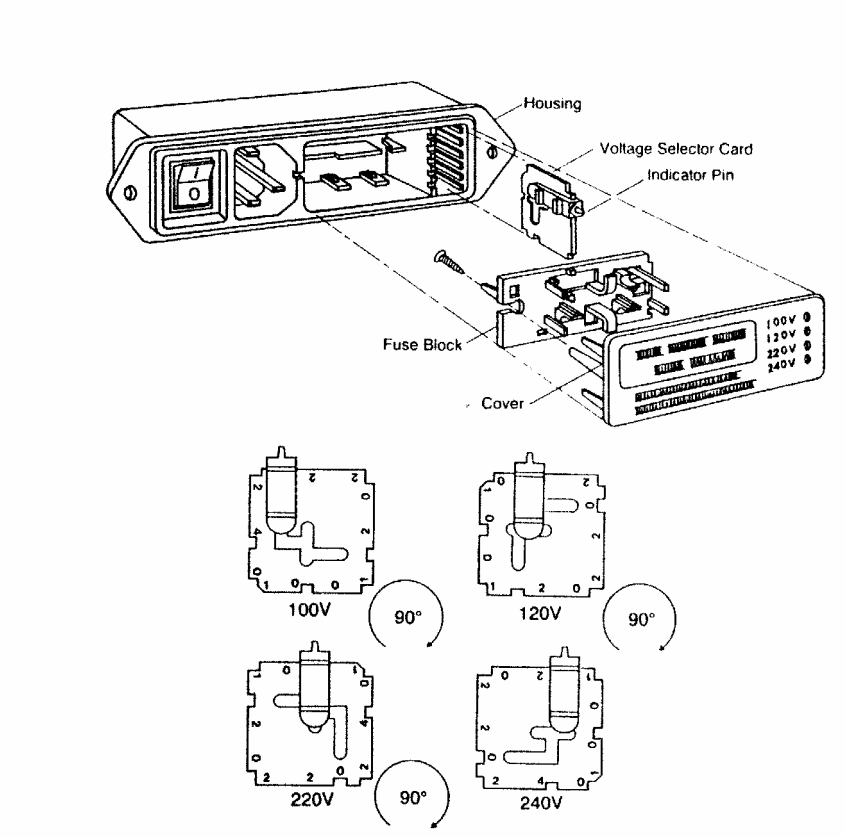


Figure 6 Voltage Selection

Setting Voltage

WARNING:
SHOCK HAZARD

Make sure the power cord is disconnected from the rear panel of the detector.

Refer to the figure above. Check the voltage selector block located next to the power cord connector on the rear panel. The plastic tab indicates the voltage for which instrument has been set (100, 120, 220, or 240V; 50/60Hz). If the voltage is set incorrectly, reset it to the proper value before proceeding further.

Insert the blade of a small screwdriver into the slot next to the connector and pry open the fuse block. Pull the fuse block straight out. Using a pair of longnose pliers, pull the voltage selector card straight out. Orient the plastic indicator for your voltage) then press the selector card back into place. Ensure that the fuse block is properly oriented for the selected voltage by rotating the block along its longitudinal axis until:

- The long single fuse faces outward for 100 and 120V (1 Amp slow-blow).
- The two short fuses face outwards for 200 and 220V (0.5 Amp slow-blow).

Snap the fuse block cover back into place.

Setting Recorder Full-scale Voltage

The detector provides a single strip chart recorder channel. The full scale voltage for this channel may be set at 10 mV, 100 mV, or 1.0V using a bank of switches located on the Rear Panel (see Figure 7). The instrument is factory configured to 10mV full scale. To change the full scale voltage:

1. Press the bottom half of switch #3 so that it rocks downward to OFF.
2. For 100 mV full scale, press the top part of switch #2 so that it rocks to ON.
3. For 1.0V full scale, press the top half of switch #1 so that it rocks to ON.

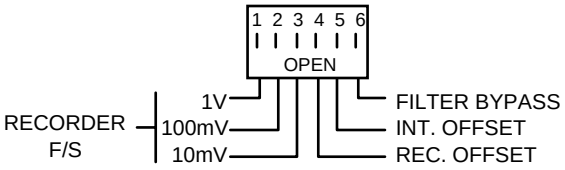


Figure 7 Recorder Full-scale Voltage Switches

NOTES:	If any of these switches are switched on together, the recorder output shows uncalibrated full scale. Ensure that only one switch is on at a time. These switches do not affect integrator output.

Recorder Connections

The recorder cables are connected at the I/O terminal on the back panel. The cables should have about 1/4" of bare wire or a spade connector. Connect the positive input of the recorder to the positive screw on the recorder output. Connect the input of the recorder to the negative screw on the recorder output.

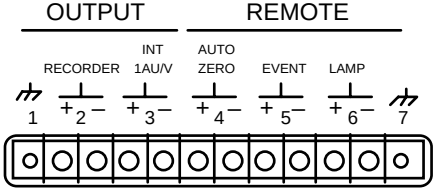


Figure 8 Input/Output Terminal

Integrator Connections

The detector also provides a fixed-span output (1V/AU) for use with an integrator or data acquisition system. This is independent of the rise time control, full scale range and voltage settings of the unit. However, its output will reflect the zeroing of the autozero circuit. Thus, a changing baseline can be corrected by pushing the autozero switch.

Connect the input line of the integrator in an identical manner as was outlined for the strip chart recorder.

Power Cord

Power to the detector is provided by a standard modular power cord assembly. Connect the power cord to the receptacle next to the fuse block.

Remote Connections

The detector provides external remote control connections. (You do not need to connect these in order to finish the initial installation and check-out. In that case, go to the Fluid Connections section.) Refer to Figure 8 for Remote connections.

Autozero

The autozero connection duplicates the function for the autozero switch on the Front Panel whenever it is connected to a momentary contact closure or TTL low.

Connect the triggering device so that the positive (+) line is connected to the positive pole and the negative (–) line is connected to the negative pole of the remote Autozero terminal. The remote autozero is triggered by shunting across its two input terminals.

Event

The Event connection duplicates the function of the Event Button on the front panel whenever it is connected to a momentary contact closure or TTL low.

Connect the triggering device so that the positive (+) line is connected to the positive pole and the negative (–) line is connected to the negative pole of the remote Event terminal. The remote Event is triggered by shunting across its two input terminals.

NOTE:	If you notice excessive noise when a remote triggering device is connected or used, there may be a ground loop in the circuit. Ensure that the remote device has a negative output which is isolated from the earth ground.

Lamp

The Lamp connection turns the lamp off when supplied with a constant contact closure or TTL low.

Connect the triggering device so that the positive (+) line is connected to the positive pole and the negative (–) line is connected to the negative pole of the Remote Lamp terminal. The Remote Lamp shut-off is triggered by shunting across its two input terminals. Interruption of this shunt re-ignites the lamp.

NOTE: If the lamp is switched off by the Remote Lamp Shutoff and then re-ignited, the fixed zero volt recorder output function indicated by the front panel Wait LED will not be maintained. The recorder output will return to a level representative of the current absorbance and last-stored zero value. The Autozero circuit should be activated.

Fluid Connections

The detector fluid inlet is the lower tube protruding from the rear wall of the cell compartment (see Figure 5). As a general rule, the less tubing between the column outlet and the flowcell, the better. Ideally, the column outlet should be connected directly to the detector inlet line. If this is not possible, you should use a minimum length of narrow bore (0.010 inch ID) connecting tubing and a zero dead volume union.

Because different columns use different fittings, the detector is supplied with a bare tube end to allow connection to any column accepting 1/16 inch OD tubing. You should use nuts and ferrules suitable to your column.

Connect the cell outlet (the upper tube protruding from the rear wall of the cell compartment) to a line leading to an appropriate waste reservoir. If bubble formation in the detector cell causes problems, you may wish to connect the cell outlet to a restrictor or back pressure device providing 20-60 psi backpressure.

NOTE: Before connecting a new piece of tubing or column to the detector, pump several mL of clean solvent through it to waste. This action will clean any particulates or oil from the inside bore of the tubing, which would otherwise reach the sample cell or heat exchanger.

Operation

Introduction

Turn on the HPLC system and allow the column to equilibrate with the flowing eluant (the time required will depend upon your particular column and eluant). If you have not already done so, turn ON the power to the detector using the switch located on the lower rear panel.

Turn the Range selector knob to 2.0 AUFS and Rise Time selector to 1.0 sec. Adjust the wavelength drive to the appropriate wavelength for your test mix.

During the lamp ignition period, adjust the chart recorder pen to your desired position. After lamp ignition, the appropriate lamp indicator (UV for D2, Vis for Tungsten) will light, an absorbance will be shown on the LED display, and the Wait Light will still be lit. During this interval, the recorder output will be fixed at zero volts while the integrator output will transmit a voltage related to the present flowcell absorbance and last zero value stored in the autozero circuit memory. To activate the recorder output, press the autozero switch.

NOTE: When the unit is first switched on, the display will show random values, typically 1 or -1. The Wait LED will be ON. The D2 lamp ignites in approximately 20 seconds; the tungsten lamp ignites immediately.

This feature protects the chart recorder from rapidly moving and slamming into its margin if the detector is inadvertently set at a sensitive range and a large discrepancy exists between flowcell absorbance and the last stored zero value.

After the lamp has ignited and the autozero button has been pushed, it will be necessary to push the Short Switch to set the

recorder output to zero volts to allow adjustment of the chart recorder pen. The Short Switch does not affect the integrator output.

Set the detector to a more sensitive range such as 0.01 AUFS and monitor the baseline until a straight, non-drifting baseline is noted.

NOTE: Allow approximately one hour for the detector to be ready for operation.

Setting Detector Controls

After the column has equilibrated and the detector has warmed up, prepare a sample to be injected. Set the detector parameters according to the following guidelines.

Wavelength

Turn the wavelength selector until the wavelength indicator coincides with the wavelength of maximal absorbance for your sample. Wavelength ranges are:

- 190-380 nm for the standard deuterium lamp.
- 380-800 nm for the optional tungsten lamp.

Rotating this control clockwise decreases wavelength while a counter-clockwise rotation will increase wavelength. The arrow indicates the direction of rotation for increasing wavelength.

CAUTION

Do not force the control below 180 nm or over 820 nm. Damage to the wavelength drive may result.

NOTE: For best reproducibility, always set your desired wavelength from the same direction, and from at least 10 nm away from its desired value. For example, to set 254 nm, always move the dial to about 244 nm (or 264 nm) and then make the final setting to 254 nm.

Range

Rotate the Range Selector Switch to an appropriate full scale absorbance for your sample. Full scale ranges of 2.0, 1.0, 0.5, 0.2, 0.1, 0.05, 0.02, 0.01, 0.005, 0.002, 0.001, and 0.005 AUFS are provided. This switch does not affect the fixed 1 V/AU output of the rear panel located integrator output.

Rise Time

As a general rule a rise time equivalent to 1/10 of the fastest peak base-width should be used. Too short a rise time results in an unnecessarily noisy baseline, while too long a rise time may distort the shape of the peak. For most LC applications, a rise time value of 1.0 second is sufficient.

The Second Order Bessel filter provides user selectable rise times of 0.1, 0.3, 1.0, and 3.0 seconds. For extremely fast peaks, a filter by-pass switch is provided on the rear panel (Figure 7, Switch #6).

NOTE:	Although the filter may distort peak shape at long rise times, peak area is always maintained. Integration can be safely performed for the purpose of quantitative analysis from the recorder output.

Pressing the top portion of this switch turns the circuit on, disables the rise time selector, and results in an effective rise time of 0.1 seconds.

Performing a Test Run

After setting the detector parameters, the instrument should be zeroed. As a general rule, it is a good idea to autozero the detector prior to each injection.

Zero the detector, inject your sample, and activate the event mark. You should note an approximate 20% deflection on the recorder. Note the peaks as they appear on the strip chart recorder. Readjust the parameters of wavelength, range, and rise time to optimize the chromatography.

Shut Down

As a general rule, it is recommended that the flowcell be flushed with several volumes of clean, non-ionic eluant. This is especially important if ionic buffer solutions have been used. After flushing, simply turn the power switch on the back panel to the OFF (downwards) position.

The lamp may be shut-off remotely with the rear panel located Lamp Shut-off terminal. This will prolong lamp life while the detector is not in use. The lamp is shut off by providing a continuous contact closure or TTL low. The lamp is re-ignited by interrupting the contact closure or TTL low.

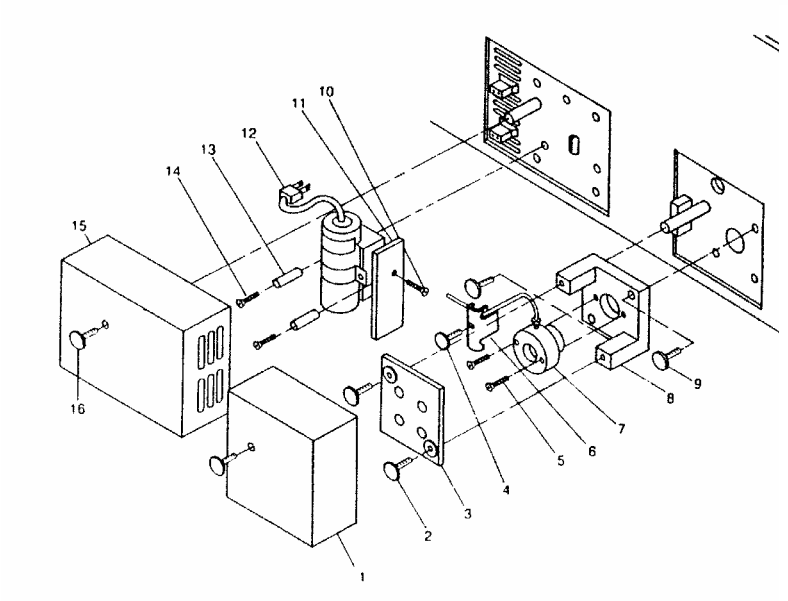
NOTE:	After the lamp is remotely re-ignited, the strip chart recorder output will transmit a voltage related to the current flowcell absorbance and the last stored zero value in the autozero circuit

Maintenance and Troubleshooting

Changing the Flowcells

The detector can accommodate a variety of flowcells with different pathlengths, illuminated volumes, and wetted materials, for different applications. All flowcells are provided premounted in a holder assembly to minimize alignment problems. Detailed instructions specific to the various flowcells are included with the flowcells themselves. This section of the manual provides general guidelines for maintenance and service of the flowcell and lamp assemblies.

The flowcell is located in the forward housing on the left side of the detector.



1. Cell Cover
2. Photodiode Retaining Screw
3. Photodiode Mount
4. Tubing Strain Relief Thrumbscrew
5. Cell Retaining Screws
6. Tubing Strain Relief Clamp
7. Cell Body Assembly
8. Cell Holder
9. Cell holder Tumbscrews
10. Lamp Light Shield Screw
11. Lamp Light Shield
12. Deuterium Lamp Assembly and Plug
13. Lamp Thrumbscrew Standoff
14. Lamp Thrumbscrew
15. Lamp Cover
16. Lamp Cover Screw

Figure 9 Flowcell and Lamp Assemblies

To change the flowcell:

WARNING:
SHOCK HAZARD

Make sure the power cord is disconnected from the rear panel of the detector.

1. Disconnect the cell inlet tube from the column or connecting tube and free the cell outlet tubing.
2. Remove the cell cover by unscrewing the thumbscrew and pulling the cover straight back to expose the photodiode mount.
3. Unscrew the two thumbscrews on the photodiode mount and pull the photodiode mount straight back (see figure above).

The connecting cable is long enough to allow the photodiode mount to rest on the bench top.

CAUTION

Avoid scratching or putting fingerprints on the photodiode, flowcell windows, or the monochromator lens. The photodiode surface should be cleaned with spectroscopic grade methanol and lint-free lens paper.

4. Loosen the thumbscrew holding the tubing strain relief clamp in place and gently pull the clamp towards you far enough to disengage the tubing from the clamp.

5. Unscrew the two thumbscrews securing the cell holder assembly in place and pull the cell holder assembly straight back toward you to remove it.

6. Replacement cells are mounted pre-aligned in a cell holder assembly. Installation reverses the removal process.

7. Slide the cell holder assembly onto the alignment dowels. The inlet line should enter the bottom of the cell in order to provide efficient bubble flushing. Securely fasten the cell holder assembly with the two thumbscrews.

8. Slip the inlet and outlet tubes into the slots in the strain relief clamp and tighten the thumbscrews holding the clamp in place.

9. Replace the photodiode mount and fasten it securely with the two thumbscrews.

10. Replace the cell cover (be careful not to pinch the cable or the tubing) and fasten it securely with the thumbscrew.

11. Reconnect the inlet line to the column or connecting tubing and reconnect the outlet tubing to the fraction collector, back-pressure device, or appropriate waste reservoir.

12. Reconnect the power cord to the rear panel of the detector.

Flow Cell Maintenance

Cleaning the Flowcells

If at all possible, we discourage the disassembly of flowcells for routine cleaning purposes. Most cells can be adequately cleaned by flushing with several milliliters of appropriate solvent. We recommend the following solvents for this purpose:

1. Methanol
2. Tetrahydrofuran
3. Methylene chloride
4. HPLC grade water
5. 6 nitric Acid following by flushing with HPLC Grade Water

Cell Disassembly

If flushing proves inadequate for cleaning purposes or if the flow cell becomes leaky, requiring gasket replacement, the following procedure should be followed for flowcell disassembly: (see Figure 10).

1. Remove the flow cell assembly from the detector as described in the installation section of this manual.
2. Remove the two screws which secure the flow cell body to the flow cell mount and free the flow cell from its mount.
3. Using a wide, flat-blade screwdriver, remove the window retaining nut (11).
4. Remove the retaining washer (10). Note that it is installed concave-side up.
5. With a fine pair of forceps, gently lift out the flow cell window (9). Be careful not to scratch these windows. Clean the window using spectroscopic grade methanol and lint-free lens paper.
6. Note the orientation of the tear drop of the flow cell gasket (8.). It should be installed so that both the optical bore (the

large hole) and fluid bore (the small hole) are not covered. Remove the cell gasket with a pair of fine forceps.

7. Repeat steps 3 through 6 above for the other side of the cell.

8. If the inlet or outlet tubes are clogged, remove them as follows:

   - Remove the exit tubing (7) by unscrewing its fitting (2) and pulling the tube straight forward.
   - Unscrew the heat exchanger restraint screw (5) and remove the screw and washer (4).
   - Unwind the inlet tubing (1) from around the cell body (I6).
   - Remove the inlet tubing (1) by unscrewing its fitting and pulling the tube straight out.
   - Remove the remaining heat conductive epoxy out of the heat exchanger groove which circumscribes the cell body.

The flow cell body may be cleaned by soaking it in spectroscopic grade methanol. For best results, an ultrasonic bath should be used.

Flow Cell Reassembly

NOTE:	For best results, the flow cell gaskets should be replaced each time the cell is disassembled.

Refer to Figure 10 in the following procedure:

1. With a pair of fine forceps, replace the cell gasket (8) in its proper orientation so that both the optical bore (large hole) and fluid bore (small hole) are exposed by the tear drop.

2. Carefully replace the cell window (9).

3. Install the retaining washer (10) so that its concave surface faces away from the cell body.

4. Replace the window retaining nut (11). Tighten to 14 inch-pounds. To avoid possible damage to the windows, do not exceed 14 inch-pounds of torque.

5. Repeat steps 1 through 4 for the other side of the flow cell.

6. If the cell tubing was removed, re-install as follows:

    - Replace the cell inlet tubing by replacing its fitting into the inlet hole (the one next to the hole for the heat exchanger restraint).

    - Bend the tubing around the cell so that it circumscribes the cell body in the heat exchanger groove before it approaches the hole for the heat exchanger restraint.

    - To improve heat exchange between the inlet tubing and flow cell body, a heat conductive epoxy should be applied into the groove before the tubing is installed.

    - After the epoxy has been applied, secure the tubing into the heat exchanger groove by replacing the heat exchanger restraining screw (5) and washer (4).

    - Replace the cell outlet tubing by placing its fitting into the outlet tubing hole.

7. Reinstall the flow cell body on the flow cell holder using the two mounting screws. Insure that the protruding nose piece of the flow cell is inserted into the cell mount.

8. Reinstall the flow cell onto the detector as outlined in the installation section of this manual.

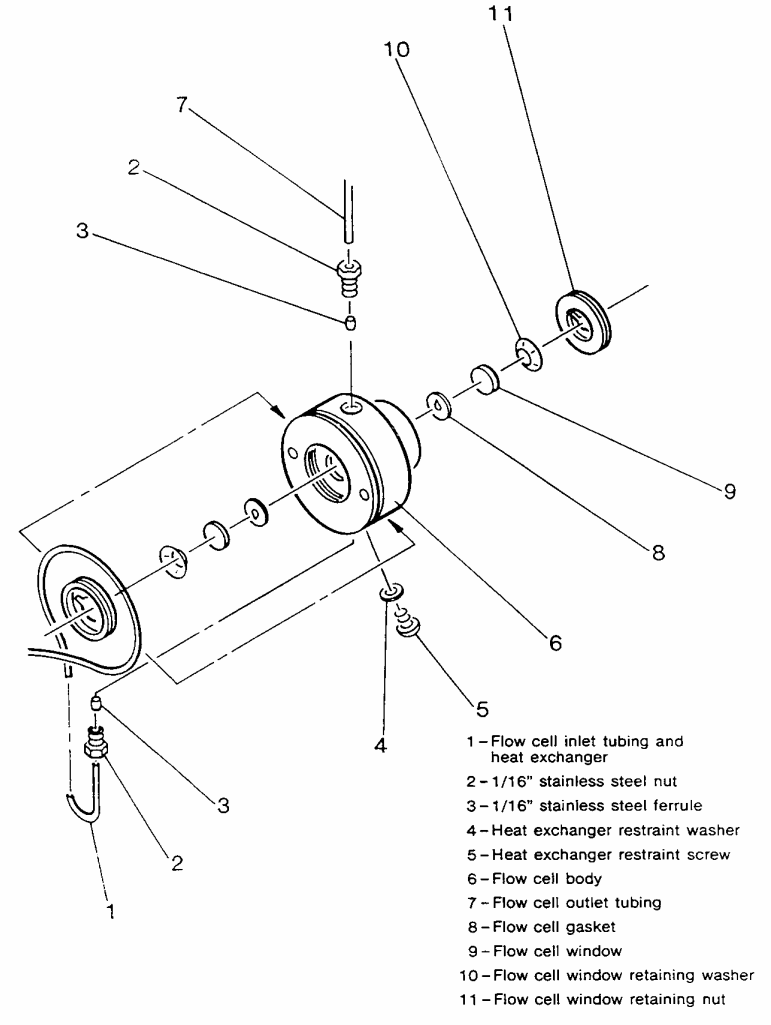


Figure 10 Flowcell

Changing the Lamp

The detector accepts two light sources: a deuterium lamp (for wavelengths in the range 190-380 nm) and a tungsten lamp (for wavelengths in the range 380-800 nm). If your detector was ordered for operation in the visible spectrum, the tungsten lamp is installed. If you ordered your detector in the standard configuration, it is equipped with the D2 lamp. Only one lamp can be mounted in the instrument at a time. Consequently, moving from the UV to the visible requires the removal of the D2 lamp and installation of the tungsten lamp. All lamp assemblies are pre-aligned and no further alignment is necessary when changing from one lamp to another.

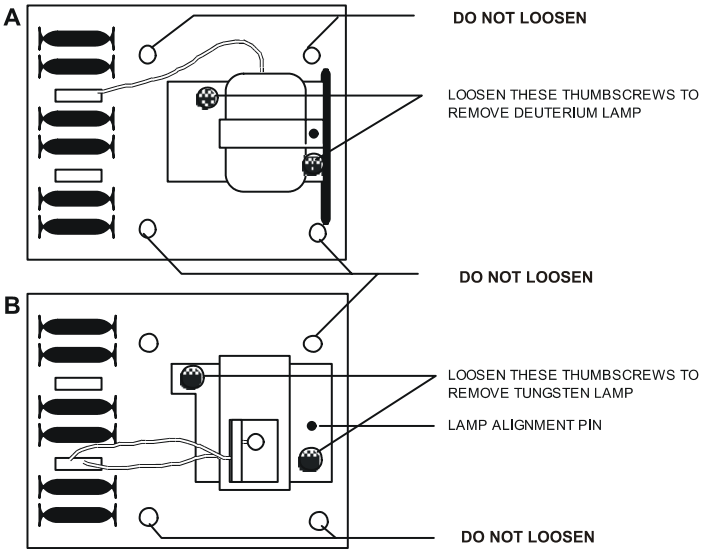


Figure 11: Lamp Assemblies (A: Deuterium, B: Tungsten)

Deuterium (D2) Lamp

The Deuterium Lamp is rated for 1,000 hours of life to 1/2 the original intensity. This does not mean that the lamp will burn out after 1,000 hours, merely that its intensity will be reduced to 50% of its original output. Each D2 lamp assembly is equipped with a

chronometer indicating the total hours of operation. The chronometer is read by noting the position of the “gap” in the mercury tube against the graduated background.

To check the lamp intensity:

1. Power up the unit. Wait approximately 10 minutes.
2. Adjust the wavelength drive to read 254 nm from a position at least 10 nm below.
3. Push the Reference Light Intensity Switch.
4. If the displayed value is:

≥ 100	lamp is good
99-50	lamp is marginal
<50	replace lamp

As a general rule, the D2 lamp should produce reference light intensities greater than 50 from 190-380 nm.

Removing the D2 Lamp

1. Disconnect the power cord from the back panel of the detector.
2. Remove the screw and remove the lamp housing (the rear housing on the left side of the detector to expose the lamp (see Figure 5).

WARNING:
EYE HAZARD

UV light can damage eyes and skin. Always disconnect the power cord before working in the vicinity of the lamp.

WARNING:
BURN HAZARD

The D2 lamp gets very hot. Care must be taken while handling it to prevent burns. Always allow the lamp to cool before removal.

3. Disconnect the UV lamp lead from the detector by gently pulling it straight back toward you. DO NOT twist the connector while pulling (see Figure 11).

4. Unscrew the two thumbscrews holding the lamp mount in place, and pull the lamp mount straight back towards you. Be careful not to lose the two aluminum standoffs or the thumbscrews. Be careful not to get fingerprints on the lamp.

Installing the D2 Lamp

1. Slide the lamp mount onto the alignment dowel located to the left of the monochromator's aperture (the mount has a pre-drilled hole to accommodate the dowel), Figure 11A. The lamp leads should emerge from the top of the lamp.

2. Use the thumbscrews and aluminum standoffs to attach the lamp assembly to the detector.

3. Connect the lamp lead to the upper of the two terminals in the lamp compartment.

4. Replace the lamp housing and its retaining screw.

CAUTION

NEVER loosen the screw holding the lamp to the mount, and NEVER attempt to rotate or move the lamp up or down in the mount. Doing so will degrade the system performance. The lamp is provided as a pre-aligned assembly.

If the lamp is plugged into the wrong connector, it will fail to light. No harm will be done.

Tungsten Lamp

The lifetime of the tungsten lamp is approximately 2,500 hours. To check the tungsten lamp intensity:

1. Power up the unit if it is not already on. Wait approximately 10 minutes.

2. Adjust the wavelength drive to 550 nm from a position at least 10.0 nm below.

3. Push the Reference Light Intensity Switch.

4. If the displayed value is:

≥ 100	lamp is good
99-50	lamp is marginal
<50	replace lamp

In general, a value less than 15 for the 380-450 nm range and less than 50 for 450-800 nm range is indicative of a bad tungsten lamp.

The tungsten lamp should be used for all wavelengths above 380 nm. The user may notice higher relative light intensities for the D2 than the tungsten lamp from 380-450 nm. However, this light represents the second order diffraction spectra of the D2 lamp and should not be used.

To install the tungsten lamp, the D2 lamp must first be removed. To remove the D2 lamp, refer to *Removing the D2 Lamp*, page 29.

WARNING:
BURN HAZARD

The tungsten lamp gets very hot. Allow sufficient time for it to cool before attempting removal.

Removing the Tungsten Lamp

1. Make sure that the power cord is disconnected from the rear panel of the detector.

2. Remove the screw and remove the lamp housing on the left side of the detector to expose the tungsten lamp.

Installing the Tungsten Lamp

1. Slide the tungsten lamp assembly along the same alignment dowel used for the D2 lamp (see Figure 11B).

2. Fasten the tungsten lamp assembly using the same two screws and aluminum standoffs that are used to fasten the D2 lamp assembly to the detector.

3. Plug the tungsten lamp power cord into the lower of the two receptacles located on the detector.

4. Replace the lamp housing and its retaining screws.

Troubleshooting

Most problems with HPLC detectors are actually caused by other parts of the system. Noisy and drifting baselines, poor reproducibility in quantitative analysis, and similar problems are more often the result of dissolved air bubbles, contaminated eluants, dirty samples, or damaged columns rather than of actual problems with detector hardware.

To effectively focus on troubleshooting detector problems, on-board diagnostic tips are discussed first. Then there is a troubleshooting table organized by symptom, cause, remedy.

Light Intensity Diagnostics

The detector provides the capability of monitoring relative light intensities at both the sample and reference photodiodes. If an unusually noisy baseline is noted, relative intensities of reference and sample light should be assessed. Acceptable values are dependent upon the flowcell used, wavelength of operation, and background absorbance. The basic guidelines are as follows:

1. A clean flowcell and good lamp will yield a reference to sample light ratio of approximately 2:1.

2. An unusually high reference to sample light ratio may indicate:

   - dirty flowcell
   - excessive absorbance by solvent

3. An acceptable ratio of reference to sample light accompanied by a reference light level less than 50 indicates a bad lamp.

Proper Full Scale Voltage Output

An exceptionally noisy baseline may also be due to an inappropriate full scale voltage output setting for the strip chart recorder. To test if the detector full scale output voltage is properly configured:

1. Press the Short Switch and move the recorder pen to a good reference point.
2. Release the Short Switch and press the Event Switch.
3. The event mark should be approximately 20% full scale if the output voltage is properly configured.
4. If the event mark is too large, the output voltage needs to be reduced.
5. If the event mark is too small, the output voltage needs to be increased.

The instrument is factory configured to 10 mV full scale. To change the full scale voltage:

1. Press the bottom half of Switch #3 so that it rocks downward to the OFF position (see).
2. For a 100 mV scale output, press the top part of Switch #2 so that it rocks to the ON position (upwards).
3. For a 1.0 V full scale output, press the top portion of Switch #1 so that it rocks to the ON position (upwards).

Filter Bypass Switch

An exceptionally noisy baseline not responsive to the Rise Time Selector on the front panel may be the result of an activated Filter Bypass Switch. When the Filter Bypass Switch is on, the front panel rise time control is bypassed and a resultant rise time of 0.1 seconds is created. To deactivate the Filter Bypass Circuit:

1. Push the bottom half of Switch #6 (see Figure 7) until it rocks downward to the OFF position.

Troubleshooting Guide

For further assistance phone 1-800-FOR-HPLC or contact your local Varian office.

Symptom	***Possible Cause***	***Suggested Remedy***
Spikes on a recorder baseline.	Bubbles passing through cell.	Degas solvent and/or supply back pressure to the sample cell, also check all high pressure fittings for leaks (both liquid and gases).
	External triggering device is creating electrical noise.	Check electrical lines for good connection and/or interference from broad cast radiation. Check for ground loops.
	Extremely large supply voltage transients on the line.	Remove systems that consume high power from the line.
Noisy baseline on recorder (random).	Sample cell windows are contaminated.	Flush cell with solvents (methanol, acetone, water, 6N nitric acid, water) and check for leaks.
	Sample input line has a leak.	Check all lines from the output of the column to the input of the sample cell for leaks.
	Bubble trapped in sample cell.	Increase flow rate and/or back pressure on cell.
	Recorder or integrator is grounded and is causing a “ground loop” problem.	Check recorder with voltmeter to see if either of the signal inputs is grounded to case or earth ground.
	Photodiode window is dirty or not attached properly.	Remove and clean photodiode window.
	Sample cell is not screwed down to the main unit.	Check sample cell mounts and cell holder assembly.

Symptom	*Possible Cause*	*Suggested Remedy*
	Output span of the detector does not match input range of recorder or integrator.	Press event mark to see if the “spike” is approximately 20% of scale.
	External triggering device is causing a ground loop problem.	Use only triggering device with ground isolated from earth ground.
Recorder baseline drifts excessively.	Contamination of sample cell windows has occurred.	Flush cell with solvents (methanol, acetone, water, 6N nitric acid, water). Inspect cell and photodiode for fingerprints and smudges and clean if necessary.
	Solvent from column is changing absorption.	Column is filled with UV absorbers that are bleeding - replace column; impure solvent is equilibrating with the column. Replace solvent with purer grade, switch to a longer wavelength so that background absorption fluctuates less.
	Leakage in the lines from column to flowcell.	Check lines for leakage.
	Tiny bubble trapped in the sample cell.	Increase flow rate and/or backpressure.
	Output span of detector does not match input span of recorder or integrator.	Press Event Mark to check for a 20% full scale spike.
	Large temperature fluctuations are occurring.	Remove detector from the source of drafts of hot and cold air.
	Flowcell, photodiode assembly, or flowcell cover is loose.	Tighten thumbscrews fastening flowcell holder and flowcell cover.

Appendix

Specifications

Wavelength:	190-380 nm standard Deuterium lamp, 380-800 nm with optional Tungsten lamp.
Wavelength Drive:	Manual drive with mechanical wavelength indicator.
Band Width:	6 nm.
Wavelength Accuracy:	± 1 nm.
Wavelength Precision:	± 0.1 nm.
Optical Methodology:	Standard Deuterium lamp (190-380 nm) and optional Tungsten lamp (380-800 nm) light sources with concave holographic grating monochromator with double-beam optics. Provision for purging the monochromator.
Range Selections:	2.0, 1.0, 0.5, 0.2, 0.1, 0.05, 0.02, 0.01, 0.005, 0.002, 0.001, and 0.0005 AUFS.
Recorder Output:	Single output with 10 mV, 100mV, or 1.0 V full scale capability with a switch providing +10% full scale offset at each setting.
Integrator Output:	1.0 V/AU analog output, independent of range control but dependent upon autozero function. A switch supplying an additional +10.0mV is provided on the rear of the unit.
Remote Controls:	Rear Panel input for: autozero, Event Mark, and Remote Lamp Shut-Off.
Noise:	± 2 x 10^{-5} AU from 220-280 nm with 1.0 sec rise time (static, dry flowcell).
Drift:	< 2 10^{-4} AU/hour after 1 hour warmup.
Zero-Adjust:	Autozezro circuit capable of offsetting greater than 1.5 AU with standard flowcell.
Chart Recorder Filter:	Second Order Bessel filter with four user selected rise times (0.1, 0.3, 1.0, and 3.0 seconds). Rise time in seconds approximates 2x time constant in seconds. A filter bypass switch located on the rear panel provides an equivalent rise time of 0.1 seconds.
Display:	A 3½ digit LED displays absorbance and relative sample and reference light intensities.

Flowcells:	Pathlengths from 0 mm to 10 mm, cell volumes from 0 mL to 15 mL, stainless steel, titanium, or Kel-F, contact materials, sapphire windows. 1000 psi pressure rating for stainless steel cells, 500 psi pressure rating for Kel-F cells, 2,000 psi pressure rating for variable pathlength preparative cells; 7,000 psi pressure rating for high pressure microbore cell.
Dimensions:	6 ¼ inches high, 13 ¼ inches deep, 9 ¾ inches wide.
Weight	20 lbs.
Line Voltage	100, 120, 220, 240 Vac (± 10%), 50 or 60 Hz.

Parts and Accessories

PART NUMBER	***DESCRIPTION***
LAMPS	
R000088515	Pre-aligned Deuterium Lamp Assembly
R000088516	Pre-aligned Tungsten Lamp Assembly
FLOWCELLS	
R000088506	Conventional HPLC: 6 mm path, 9 µL volume, SS
R000088507	Microbore HPLC: 3 mm path, 1. µL volume, SS
R000088508	Semi-Prep/glass column: 3 mm path, 4.5 µL volume, SS
R000088509	Biocompatible HPLC: 6 mm, 9 µL, volume, Kel-F, rated to 500 psi
R000088510	Variable-path preparative: 0-3 mm path, 0-4.6 µL volume, SS, 1/8 inch fittings, rated to 2000 psi
R000088511	Conventional HPLC: 10mm path, 15 µL volume, SS
R000088512	Capillary HPLC and SFC: 240 µm path, 35 nL volume, borosilicate, rated to 5000 psi
R000088513	Preparative biocompatible: pathlength adjusts from 0-3 mm, 0-4.6 µL volume, titanium, rated to 2000 psi
R000088514	High pressure microbore for packed cell SFC and LC/MS: 2 mm path, 250 nL volume, SS, rated to 7000 psi