



VARIAN

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

ProStar 430 AutoSampler

Operation Manual



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.

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 Ni⁶³ ECD manual.
- Perform the tests for removable radioactive contamination described in the Ni⁶³ 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.

The following is a Federal Communications Commission advisory: This equipment has been tested and found to comply with the limits of a Class A computing device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

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.

Argentina

Buenos Aires
Tel. +54.11.4.783.5306

Australia

Mulgrave, Victoria
Tel. +61.3.9566.1134

Austria

Vösendorf bei Wien
Tel. +43.1.699.9669

Benelux

Bergen Op Zoom
Tel. +31.164.282.800

Brazil and Latin America (S)

São Paulo
Tel. +55.11.820.0444

Canada

Mississauga, Ontario
Tel. 800.387.2216

China

Beijing
Tel. +86.106209.1727

Europe

Middelburg, The Netherlands
Tel. +31.118.671.000

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Les Ulis Cédex
Tel. +33.1.6986.3838

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Darmstadt
Tel. +49.6151.7030

India

Mumbai
Tel. +91.22.857.0787/88/89

Italy

Torino
Tel. +39.011.997.9111

Japan

Tokyo
Tel. +81.3.5232.1211

Korea

Seoul
Tel. +82.2.345.22452

Mexico and Latin America (N)

Mexico City
Tel. +52.5.523.9465

Russian Federation

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Switzerland

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Taiwan

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Tel. +886.2.698.9555

United Kingdom and Ireland

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Venezuela

Valencia
Tel. +58.41.257.608

United States

Walnut Creek, California, USA
Tel. +1.800.926.3000
(GC and GC/MS)
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(LC)



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



WARNUNG ELEKTRISCHER SCHLAG



WARNUNG CHEMISCHE GEFAHR



WARNUNG VERBRENNUNGSGEFAHR



WARNUNG AUGENVERLETZUNG



WARNUNG FEUERGEFAHR



WARNUNG EXPLOSIONSGEFAHR



WARNUNG STRAHLUNGSQUELLE



WARNUNG BEWEGTE TEILE

Warnungsbeschreibung

Gefährliche Spannungen bestehen innerhalb des Instruments. Trennen Sie das Gerät vom Netz, bevor Sie abschraubbare Paneele entfernen.

Gefährliche Chemikalien können vorhanden sein. Vermeiden Sie jeden Kontakt, besonders beim Auffüllen der Reservoirs. Benutzen Sie wirksamen Augen und Hautschutz.

Sehr heiße oder tiefstgeköhlte Oberflächen können freigelegt sein. Benutzen Sie einen wirksamen Hautschutz.

Herumfliegende Partikel, Chemikalien oder UV-Strahlung können Augenschäden verursachen. Tragen Sie deshalb einen geeigneten Schutz für Augen und Gesicht.

Es besteht eine mögliche Feuergefahr. Beachten Sie die Vorschriften im Handbuch für eine gefahrlose Benutzung.

Eine mögliche Explosionsgefahr besteht infolge der benutzten Gas- oder Flüssigkeitsart.

Es besteht eine ionisierende Strahlungsquelle. Beachten Sie die Vorschriften im Handbuch für eine gefahrlose Benutzung.

Blieben 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 Austausch kabel 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 durchgeschauerte 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 Ni⁶³ ECD Handbuch.
- Führen Sie die Tests für zu beseitigende radioaktive Kontamination durch, die im Ni⁶³ 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 Inspeizieren 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.

Argentina

Buenos Aires
Tel. +54.11.4.783.5306

Australia

Mulgrave, Victoria
Tel. +61.3.9566.1134

Austria

Vösendorf bei Wien
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Korea

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Mexico and Latin America (N)

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Russian Federation

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Taiwan

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United Kingdom and Ireland

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Venezuela

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United States

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Tel. +1.800.926.3000
(GC and GC/MS)
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(LC)



VARIAN

www.varianinc.com

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 causés 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 Ni⁶³, 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 Ni⁶³.
- 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

Istruzioni 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



ATTENZIONE
Pericolo di folgorazioni



ATTENZIONE
ESPOSIZIONE A
SOSTANZA CHIMICHE



ATTENZIONE
Pericolo di scottature



ATTENZIONE
PERICOLO PER
GLI OCCHI



ATTENZIONE
Pericolo di incendio



ATTENZIONE
Pericolo di esplosioni



ATTENZIONE
Pericolo di radiazioni



ATTENZIONE
Parti in movimento

Descrizione del Pericolo

Nello strumento sono presenti tensioni pericolose. Scollegare il cavo di alimentazione prima di togliere il pannello fissato con le viti.

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.

Pericolo di esposizione a superfici molto calde o raffreddate criogenicamente. Usare protezioni opportune per la pelle.

Particelle volanti, agenti chimici o radiazioni UV possono danneggiare gli occhi. Vanno quindi utilizzate le opportune protezioni per gli occhi e per il volto.

Pericolo potenziale di incendio. Seguire le istruzioni del manuale per lavorare con una maggiore sicurezza.

C'è pericolo di esplosioni a causa del tipo di gas o liquido utilizzato.

E' presente una radiazione ionizzante. Seguire le istruzioni del manuale per lavorare con una maggiore sicurezza.

Non tenere le mani o le dita vicino.

Norme di Sicurezza

Per lavorare in modo sicuro sullo strumento, Vi consigliamo di 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 Ni⁶³.
- Eseguire tutti i test di contaminazione radioattiva rimovibile descritti nel manuale dell'ECD al Ni⁶³.
- 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 più 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 più 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 **ATENCIÓN** 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 situaciones que pueden causar daños moderados a la salud ó al equipo, y cómo evitar esas situaciones.



ATENCIÓN

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

Símbolo



ATENCIÓN
PELIGRO DE
DESCARGA ELÉCTRICA



ATENCIÓN
PELIGRO QUÍMICO



ATENCIÓN
PELIGRO DE
QUEMADURAS



ATENCIÓN
PELIGRO PARA LOS OJOS



ATENCIÓN
PELIGRO DE FUEGO



ATENCIÓN
PELIGRO DE EXPLOSIÓN



ATENCIÓN
PELIGRO DE RADIACIÓN



ATENCIÓN
PARTES EN MOVIMIENTO

Descripción

El instrumento utiliza voltages peligrosos. Desconecte el interruptor general antes de retirar los paneles atornillados.

Peligro de productos químicos. Evite el contacto, especialmente cuando rellene los depósitos. utilice protección de ojos y piel.

Superficies posiblemente calientes ó frías (criogénico). Utilice protección para la piel.

Las partículas volátiles, productos químicos o radiación UV pueden causar daños en los ojos. Usar las debidas protecciones para la cara y los ojos.

Peligro potencial de fuego. Siga las instrucciones del Manual de Operación para su seguro funcionamiento.

Peligro potencial de explosión debido al tipo de gas ó líquido empleado.

Peligro por Fuente de radiación. Siga las instrucciones del Manual de Operación para su seguro funcionamiento.

Mantenga alejados los dedos y las manos.

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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 voltajes.
- 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 inmóvil 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 sólo reguladores y conexiones aprobadas.
- Utilice sólo tubos de conexión cromatográficamente limpios (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 radioactivas

- Lea con cuidado y cumpla todas las **NOTAS**, **PRECAUCION**, y **ATENCION** del Manual del Detector Ni⁶³ ECD.
- Realice los test de contaminación radioactiva descritos en el Manual del Detector Ni⁶³ 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 haya 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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Tel. +31.164.282.800

Brazil and Latin America (S)

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Introduction

The ProStar 430 is an AutoSampler that offers a wide variety of possibilities for HPLC. It incorporates among other things the following features:

- suitable for use with various types of plates by various manufacturers.
- capable of executing full loop injections, partial loopfill injections and μL pickup.
- accommodates use of various types of syringes (volumes of 100 μL , 250 μL , 500 μL , 1000 μL , or 10 mL).
- fully compatible with other laboratory equipment.
- apparatus designed for routine analysis and method development.

In addition options like plate cooling and a second switching valve are available for the ProStar 430. These options enhance the uses for the ProStar 430.

Typographical Conventions

The following typographical conventions are used in this manual:

Initial Capitals	are used for names of the menus: Ready Menu, Series Menu etc.
<CAPITALS>	are used to refer to soft function keys
bold type	is used for names of keys in the keypad
[0100]	is used to indicate values that have to be entered with the numerical keypad.

Injection Principle

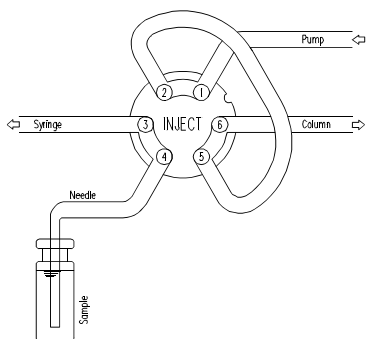
The ProStar 430 offers three different methods of injection for an analytical run:

- | | |
|------------------|--|
| Full loop | The sample loop is completely (quantitatively) filled with sample resulting in extremely good reproducibility. |
| Partial Loopfill | The sample loop is partially filled with sample; this means low sample loss and programmable injection volumes. |
| μ L Pick-up | After aspiration of sample, the sample is transported into the loop with transport liquid (mobile phase); this means no sample loss. |

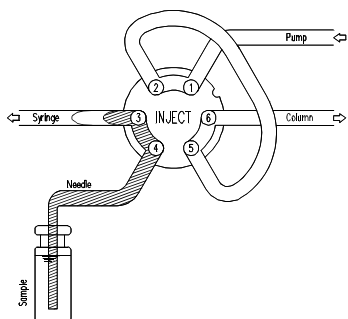
The ProStar 430 uses a syringe to aspirate the sample from a well into the sample loop. To prevent contamination of the syringe the ProStar 430 is equipped with a buffer tubing between the syringe and the injection valve. Wash solvent is used to remove the sample from the buffer tubing and sample needle, and to rinse the buffer tubing and sample needle.

The switching sequence for a full loop injection is schematically shown in the following figures:

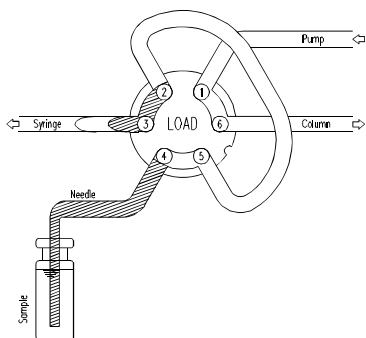
Full loop Injections



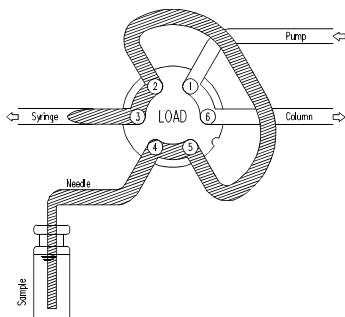
The initial situation: the injector is in the INJECT position. The sample needle has entered the well after the air needle has pre-punctured the septum. Headspace pressure is applied through the outer air needle to ensure that no air or vapor bubbles are formed during sample aspiration.



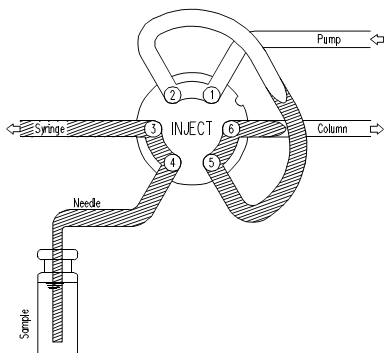
The syringe dispenser aspirates the programmed flush volume from the sample well to fill the sample line with sample and remove wash solvents.



The injection valve switches in LOAD position, placing a "sharp" sample front at the inlet of the sample loop.



For full loop injections the sample loop is quantitatively filled by transporting two or more times the loop volume through the loop, depending on the volume of the loop.



The injection valve switches in INJECT position. The sample loop is now part of the HPLC mobile phase flow path: sample is transported to the column. The analysis time starts.

If one injection is to be done from each well or if a wash routine has to be performed after every injection, the needle withdraws from the well directly after the injection and, if programmed, directly performs a wash. After the analysis time a new sequence is started.

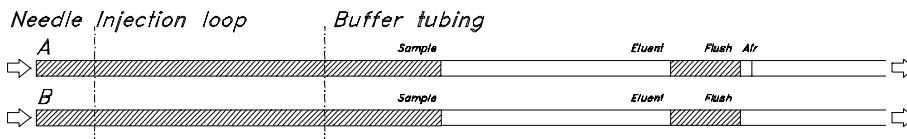
If more than one injection is done from the same well without a wash routine, the ProStar 430 withdraws a flush volume after the analysis time to compensate for diffusion of mobile phase from the rotor groove into the first part of the sample line during the analysis time. The flush volume between injections is not programmable and is always 50% of the programmed flush volume. If the total amount of sample withdrawn with the next injection from the well will exceed the total volume of the buffer tubing, the buffer tubing is emptied into the wash position before the next injection. The next fill sequence will then start with a full flush volume.

Air Segment

An air segment can be used to reduce the amount of flush volume. This air segment is at the front of the flush volume and will not be injected and therefore will not influence the injection. Use of an air segment can be enabled in the System Menu (General Menu).

With a standard needle the flush volumes must be: minimal 30 μL for injections with air segment and 35 μL for injections without air segment. If the samples are highly viscous it may be

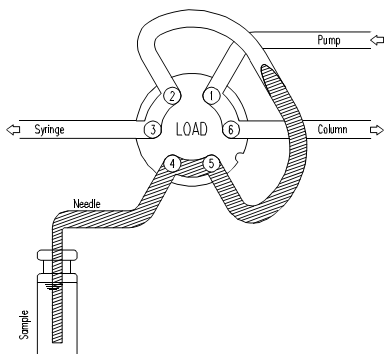
necessary to program larger flush volumes and reduce the syringe speed for better performance.



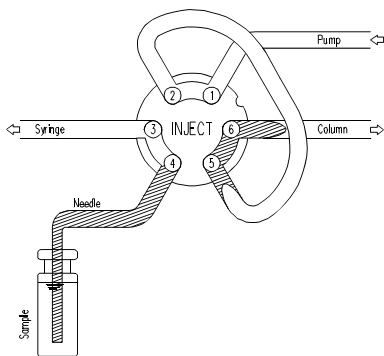
A = with air segment; B = without air segment

Partial loopfill Injections

The switching sequence for a partial loopfill injection is schematically shown in the following figures:



For partial loopfill injections the sample loop is filled by transporting the programmed injection volume into the sample loop.

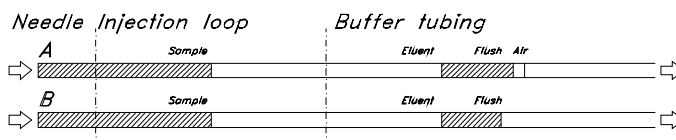


The injection valve switches into the INJECT position. The sample loop is now part of the HPLC mobile phase flow path: the sample is transported to the column. The analysis time starts.

The next injection sequence will start with a flush of 50% of the programmed flush volume, in case an injection from the same vial and no wash routine is programmed. Otherwise it will start with a flush of the programmed flush volume. If the aspiration of sample for the next injection will exceed the total volume of the sample buffer tubing, the buffer tubing is emptied before the next injection. The next injection will start with the programmed flush, see also the full loop injections.

Air Segment

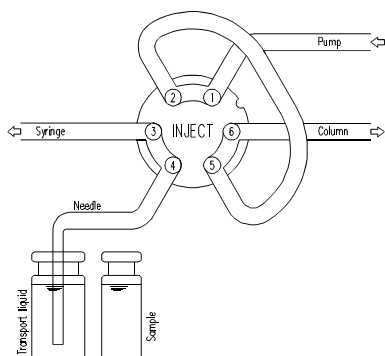
An air segment can be used to reduce the amount of flush volume. This air segment is at the front of the flush volume and will not be injected. Use of an air segment can be enabled in the System Menu (General Menu).



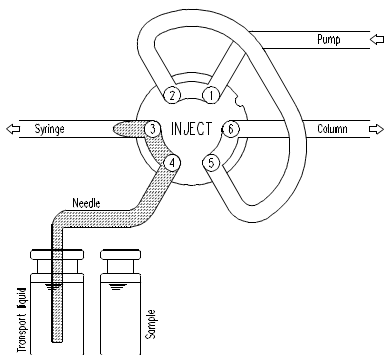
A = with air segment; B = without air segment

μ L Pick-up Injections

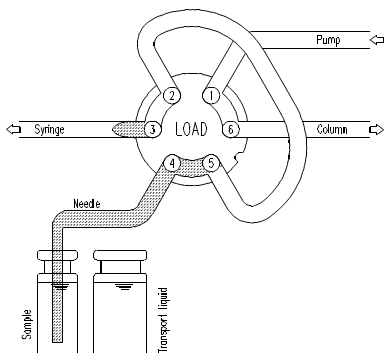
The switching sequence for a μ L pick-up injection is schematically shown in the following figures.



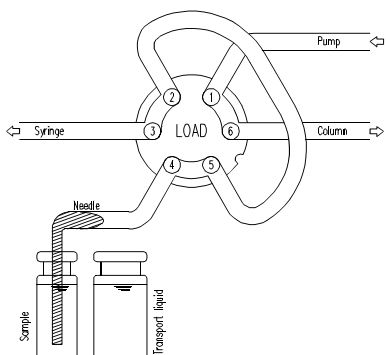
The initial situation: the injection valve is in INJECT position. The sample needle has entered the vial of transport liquid (mobile phase, to avoid disturbance of the chromatogram with an additional peak of the transport solvent) after the air needle has pre-punctured the septum. The headspace pressure, applied through the outer air needle, ensures that no air or vapor bubbles are formed during wash solvent aspiration.



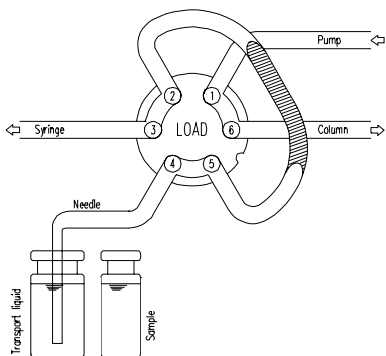
For the first injection after a wash or after emptying of the buffer tubing, the syringe dispenser aspirates transport liquid from the transport vial to fill the sample line with transport liquid and remove wash solvent.



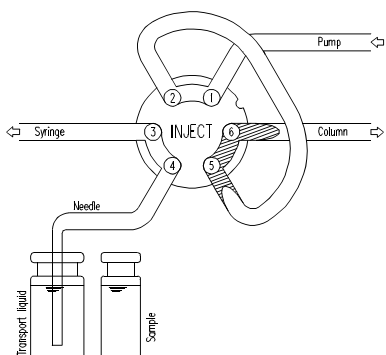
The needle moves from the transport vial to the sample well. The injection valve is switched to the LOAD position.



The programmed injection volume is aspirated from the sample well.



The sample needle moves back to the transport vial. The sample is quantitatively transported into the loop, with transport liquid (mobile phase) from the transport vial.



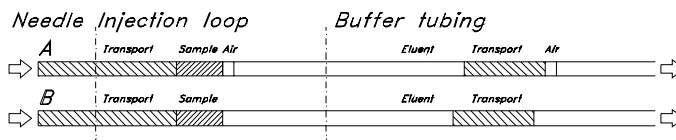
The injection valve is switched to INJECT. The sample loop is now part of the HPLC mobile phase flow path: sample is transported to the column. The analysis time starts to run.

The next sequence will skip the first withdrawal of transport solvent, unless a wash routine is performed or the ProStar 430 has emptied the buffer tubing to waste. In those cases the sequence is completely repeated.

Air Segment

If an air segment has been programmed, it appears at the front of the first plug of transport liquid and at the front of every sample plug. Use of an air segment can be enabled in the System Menu (General Menu).

NOTE: The air segment at the front of the sample plug is injected into the HPLC system.



μL pickup injections with (A) or without (B) air segment.

NOTE: In case of μL pick-up injections there will be no air pressure (headspace pressure) on the sample well to prevent errors due to air expansion during switching from sample well to transport vial.

You are advised to switch off use of an Air segment in the System Menu if the μL pick-up injection method is used.

Front View of the ProStar 430

1. Cover (in open position)
2. Buffer tubing
3. Injection valve (Rheodyne)
4. Tubing holder
5. Needle unit
6. Screw to fasten cover
7. Transport/reagent vials
8. Plate
9. Plate holder
10. Drain wash position
11. Condensed water and leakage
12. Wash position
13. Wash solvent bottle
14. Syringe
15. Syringe waste tubing

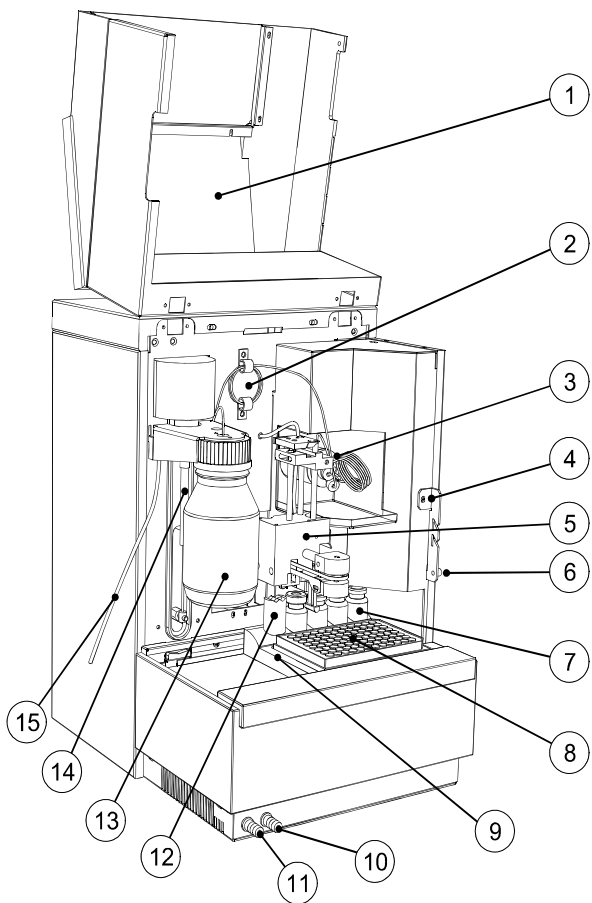


Figure 1 Front View of the ProStar 430

Back View of the ProStar 430

1. Communication interface connector (RS232 or RS422/485)
2. CE-mark
3. I/O connectors
4. Mains switch
5. Mains input
6. Fuses and voltage selector
7. Type label
8. Fan (if plate cooling is installed)
9. Ventilation holes

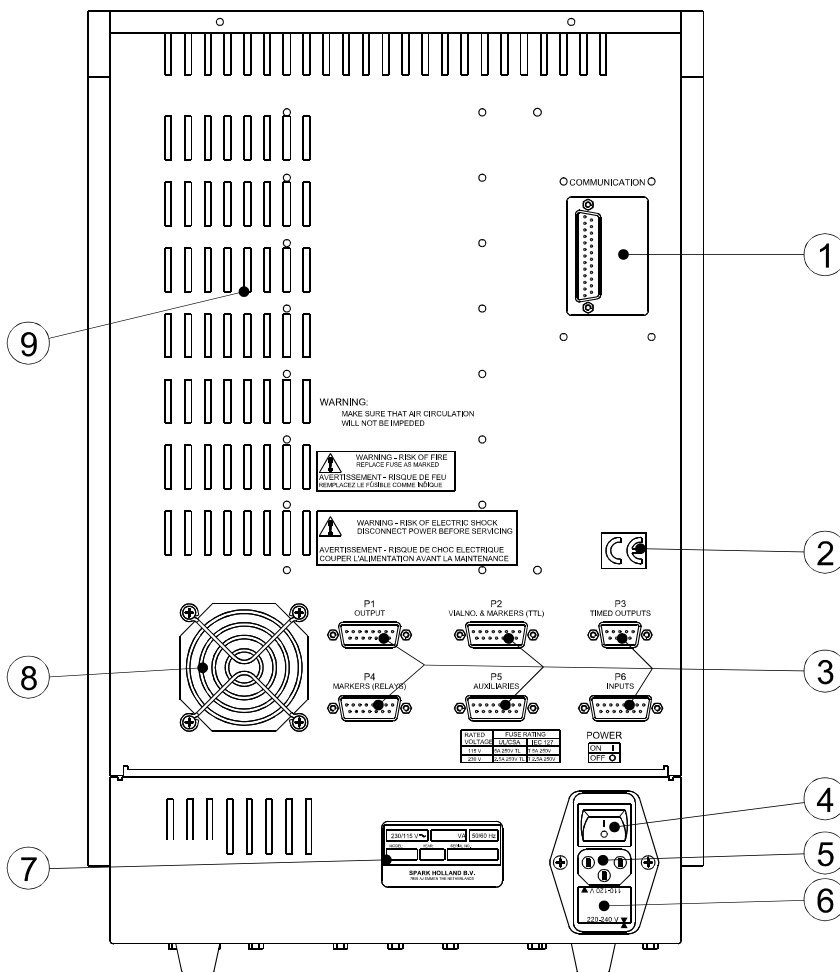


Figure 2 Back of the ProStar 430

Keypad and Display of the ProStar 430

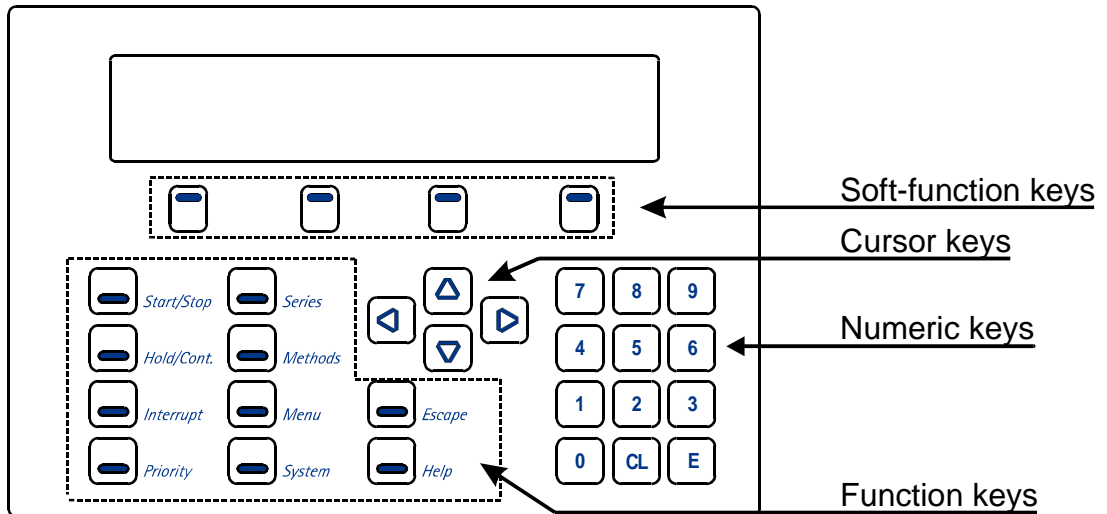


Figure 3 Keypad and display

Soft Function Keys

The label assigned to these keys depends on the menu that is active. The label of each key is shown in the bottom line of the display.

Cursor Keys

Used to move to a different field in the display, to move to a different field in a menu, or to make a displayed value higher or lower.

Numeric Keys

- **0 to 9:** to enter numerals in the various programming fields.
- **CL:** to clear a value in a field or replace it by NONE or AUTO.
- **E:** stands for Enter; to go through menu lines or to confirm a choice made in a menu or a value entered. The entered value is checked for validity and then saved.

Function Keys

Run Control Keys

Start/Stop: to start or stop automatic processing, or to reset the system after an error has occurred.

Hold/Cont.: to hold or continue the analysis time. The analysis time is extended by the period that Hold is active.

Interrupt: not used

Priority: to stop a run to process a priority sample before analyzing the rest of the programmed sample series. Before the run is interrupted processing of the present sample will be finished. As soon as the priority sample has been analyzed, the analytical run is resumed. A priority sample is a series of one well with an injection method, a wash method and a time base method defined in a template (only possible if the correct settings are entered in the System Menu).

Programming Keys

Series: to enter the Series Menu in which series can be defined for an analytical run.

Methods: to enter the Methods Menu in which methods can be programmed for use in an analytical run.

Menu: this key can only be used if [MENU] or [MN] is shown in the top right hand corner of the display. If pressed more possibilities of the menu are displayed.

System: to enter the System Menu in which system settings can be entered

General Keys

Escape: allows the user to leave the programming mode or go to a previous level in the menu. Entered values are checked for validity and then saved.

Help: to display help information; available only for a limited number of functions!

Installation



CAUTION

Do not install the ProStar 430 in areas subject to shock, dust, or in direct sunlight. Do not place it near a source of heat, as this will disturb tray cooling (if this option is installed).

The ProStar 430 must only be connected to power sources and apparatus with protective grounding.

Execute the following steps to install the ProStar 430:

1. Lift the ProStar 430 from the shipping container. Make sure you keep the apparatus upright; lift it by placing your hands under the ProStar 430.
2. Place the ProStar 430 in its operating location, preferably on the left hand side of the HPLC system. Make sure the ventilation holes are not obstructed. Allow the instrument to acclimatize for 1 hour.
3. Install plate holder, Figure 1 (5), in the ProStar 430 (on the flat surface underneath wash solvent bottle; as far to the left and to the back as possible).
4. Check whether local voltage matches voltage indicated on back panel of the ProStar 430.
5. Connect the power cord to the ProStar 430, Figure 2,(5).
6. Switch the ProStar 430 on by using the switch at the back of the apparatus, Figure 2 (4).

The ProStar 430 now starts up. The display indicates that a self-test and initialization procedure are executed. After completion of this procedure the following appears on the display:

10:26 TUESDAY DECEMBER 16-97 [MENU] READY (x.xx)
<EXCHANGE> <WASH> <SYR END> <UTILS>

Preparation for Use

This section describes procedures for replacement or installation of parts, either for maintenance or for preparation of the ProStar 430 for an analytical run.

NOTE: Please note that the power should **not** be switched off for any of the procedures described below as soft function keys in the Ready Menu must be used.

A number of items required for use of the ProStar 430 are factory-installed. However, after the installation procedure has been executed, check that the following have been correctly installed before you start to use the ProStar 430:

- HPLC pump & column connections
- waste tubing
- wash solvent bottle
- syringe
- needle assembly
- syringe, sample loop and buffer tubing
- plate holder and plate
- reagent vials/transport vials.

NOTE: Loosen the screw at the right-hand side of the cover, Figure 1 (6), and lift the cover to be able to execute the procedures described in this section.

HPLC Connections

Make the following connections:

- HPLC pump to port 1 of the injection valve
- HPLC column to port 6 of the injection valve

The instrument has been flushed with isopropanol before dispatch from the factory. Make sure that the mobile phase of your HPLC system is miscible with isopropanol, or start up with an intermediate solvent as mobile phase (disconnect the HPLC column).

NOTE:	It is very important that the contents of the sample loop are injected in back flush onto the column, therefore: do not exchange column and pump connections at the injection valve.
-------	--

Waste Tubing

Make the following connections:

Syringe waste: put the end of the syringe waste tube, Figure 1, (15) in a bottle placed next to the ProStar 430.

Drain wash-position: connect the hose to the drain wash connector of the ProStar 430, see Figure 1 (10); place the other end of the hose in a bottle placed on the floor. Through this drain all liquid dispensed to waste at the back of the plate is removed.

Condensed water and leakage: connect the hose to the drain port of the ProStar 430, see Figure 1 (11). Place the other end of the hose in a waste container on the floor. Through this hose all leakage solvents and condensed water (if Peltier cooling is installed) are drained.

Make sure that the flow path of the hoses is not obstructed in any way.

Wash Solvent

The ProStar 430 has a 250 mL wash solvent bottle. Execute the following steps to install the 250 mL wash solvent bottle:

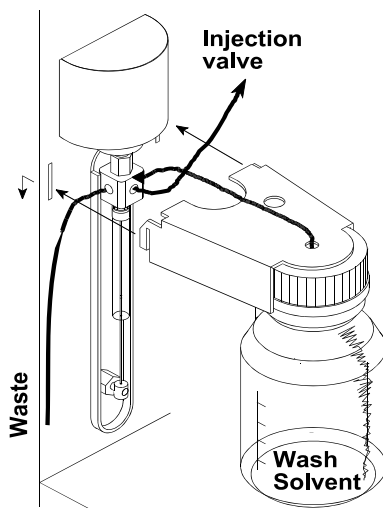


Figure 4 Wash Solvent Bottle

1. Fill the wash solvent bottle with the appropriate wash solvent. Use of methanol (organic solvent, no buffers) or a mixture of water and isopropanol (80/20) is recommended. Before using the wash solvent, degas it with Helium or an ultrasonic bath.
2. Screw the bottle to the cap in the holder.
3. Place the holder in the ProStar 430 as indicated in Figure 4.
4. Put the wash solvent tube in the wash solvent.
5. Lower the cover of the ProStar 430
6. Select soft function key **<SYR END>** in the Ready Menu to fill the syringe.

7. Place the syringe back in home position by selecting soft function key **<SYR HOME>**.
8. Repeat steps 6 and 7 until the wash solvent tube and the syringe are completely filled.
9. Select soft function key **<WASH>** to perform a standard wash routine.
10. If any air remains in the syringe, select **<SYR END>** again to fill the syringe with wash solvent; press **<SYR HOME>** again to move contents to waste. Repeat if there is still air in the syringe and gently tap the syringe as wash solvent is dispensed to waste.

If you use an application that requires more than 250 mL of wash solvent for a complete run, install a longer tube (with flanged end for valve fitting) and place a larger bottle next to the ProStar 430. To fill the wash solvent tube, you may have to repeat the above-mentioned filling procedure (steps 6 and 7) a few times.

Syringe

The ProStar 430 is supplied with a 250 μ L syringe. It is also possible to use the ProStar 430 with a 100 μ L, 500 μ L, 1000 μ L, or 10 mL syringe. Execute the following steps to install a syringe.

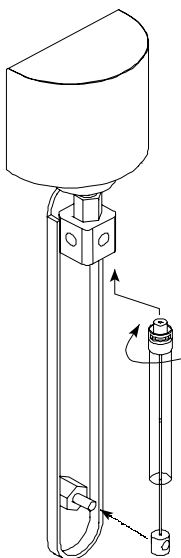


Figure 5 Replacing the Syringe

1. Select soft function key **<SYR END>** in the Ready Menu to move the syringe to end position.
2. Lift the cover.
3. Unscrew the top of the syringe (turn clockwise).
4. Pull the bottom of the syringe towards you; you can now remove the syringe (refer to figure above).
5. Fill the new syringe with wash solvent and make sure that all air bubbles are removed from the syringe.
6. Connect the bottom of the filled syringe to the ProStar 430.
7. Screw the top of the filled syringe to the ProStar 430 (counterclockwise).

8. Lower the cover.
9. Select soft function key **<SYR HOME>** to remove air from the syringe. The syringe moves to home position and its contents is dispensed to waste.
10. If any air remains in the syringe, select **<SYR END>** again to fill the syringe with wash solvent; press **<SYR HOME>** again to move contents to waste. Repeat if there is still air in the syringe and gently tap the syringe as wash solvent is dispensed to waste.
11. Select soft function key **<WASH>** in the Ready Menu to execute a standard wash routine. All tubing connected to the syringe valve is filled and rinsed.

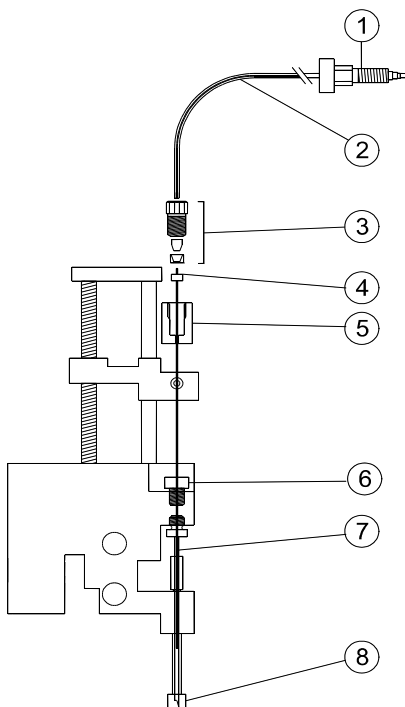
Select the appropriate syringe in the System Menu and install the correct buffer tubing.

Needle Assembly

The needle used for sampling consists of two parts:

- pre-puncturing needle: a hollow needle used for puncturing of the septum, capmat or sealer; also used to put headspace pressure on the sample (approximately 0.5 bar).
- sample needle: placed inside the hollow prepuncturing needle; used for the actual transport of sample. Different types of needles can be used here (see Appendix). If a needle with deviating diameter is used, a different air outlet nut, see Figure 6 (6), must be used that matches the injection needle.

NOTE: Most commercially available sealers or capmats cannot be used in combination with headspace pressure. You are advised to switch off headspace pressure in those cases (System Menu, General Menu).



The following elements can be identified in the needle assembly:

1. Nut and ferrule
2. Needle tubing
3. Needle connection nut
4. Standard sample needle
5. Needle holder
6. Air outlet nut
7. Prepuncturing needle
8. Sensor (detects plate height, missing plate and missing vials).

Numbers 1, 2, 3, 4, and 6 constitute the sample needle.

Figure 6 Needle Assembly

Execute the following steps to replace a needle:

1. Loosen the needle connection nut (3).
2. Loosen the nut (1) .
3. Carefully pull out sample needle and tubing.
4. Insert a new sample needle and tube through the needle holder (5) and tighten the nut (4).
5. Connect the other end of the tube to port 4 of the injection valve using a nut and ferrule. Do not tighten too much to prevent block of tubing.

6. Lower the cover of the ProStar 430.
7. Check sample needle height (default height: 5 mm from plate). If necessary, adjust the value in the System Menu (General Menu).
8. Select soft function key **<WASH>** in the Ready Menu to clean the new sample needle.

Optional Needles

Needles of the following types can be installed in the ProStar 430:

- LSV needle sample needle with large inner diameter for viscous samples, or in case large volumes are loaded in the loop
- PEEK needle biocompatible needle
- Fused silica needle needle with small inner diameter for small injection volumes
- Extended needle needle for switching valve placed in the side panel of the ProStar 430
- Silica-coated needle needle for use with liquids that would be damaging to a stainless steel needle

Refer to the Appendix for an overview of options available for the ProStar 430.

Execute the following steps to install any of these needles:

1. Remove needle as described in *Needle Assembly Section*, page 21.
2. Remove the standard air outlet nut, Figure 6 (6) and replace it by the nut supplied with the optional sample needle.
3. Install optional sample needle as described in *Needle Assembly* section, page 21
4. Adjust settings in System Menu (General Menu) to the volume of the new needle tubing, page 57).

Combination of Syringe, Sample Loop and Buffer Tubing

The 250 µL syringe is the standard syringe; combined with the standard 500 µL buffer and the standard 100 µL sample loop, the following injection volume range is available for the various injection modes:

Full loop	100 µL
Partial loopfill	1 - 50 µL
µL pick-up	1 - 27 µL

The maximum injection volumes are calculated with the following formulas:

Full loop:	injection volume	= loop volume
Partial loopfill:	max. injection volume	= 50% of loop volume
µL pick-up:	max. injection volume	= (loop volume - 3 x needle tubing volume) 1/2

Five sizes of syringes can be used in the ProStar 430: 100 µL, 250 µL, 500 µL, 1000 µL and 10 mL. The 10 mL syringe can only be used in the User Program (must be enabled in System Menu) and not for the standard injection modes.

Full loop gives maximum reproducibility (RSD < 0.3%), but not maximum accuracy, since loop volume is specified with an accuracy of ± 10%.

Minimum sample loss = 230 µL (2 x loop overfill + flush volume for needle) for the standard 100 µL loop.

Partial loopfill gives maximum accuracy (depends on syringe accuracy) and reproducibility better than 0.5% RSD for injection volumes > 5 µL

Minimum sample loss (Flush volume) = 30 µL

30 μ L is the recommended minimum flush volume (combined with an air segment); smaller flush volumes can be programmed, but will result in decreased performance.

μ L Pick-up means zero sample loss, maximum accuracy (same as partial loopfill), but slightly diminished reproducibility: RSD better than 1% for injection volumes > 5 μ L.

5 μ L of air is injected together with the sample, if an air segment is selected in the System Menu.

For some cases other combinations of syringe, loop and/or buffer are advised:

Injection volumes smaller than 5 μ L:

Partial loopfill: use a 100 μ L syringe for maximum reproducibility and accuracy. Use a 20 μ L sample loop to avoid loss of accuracy due to expansion of the loop content when switching from inject to load position prior to sample loading. When working with high pressure (200 bar), this loss may be 0.1 - 0.5 μ L for a 100 μ L loop.

Note that the minimum sample loss in partial loopfill mode is 30 μ L (recommended minimum flush volume) for the first injection and an additional 15 (always half the programmed flush volume) for additional injections from the same well. If a wash between injections has been programmed, sample loss is 30 μ L for every injection. For zero sample loss injections, use the μ L Pick-up injection mode.

μ L Pick-up: use a 100 μ L syringe for optimum accuracy and reproducibility. Do not use a smaller sample loop! The sample plug is transported into the loop, preceded by a programmable air segment of 5 μ L (if selected in System Menu; you are advised to switch off the air segment with μ L Pick-up), with a plug of transport liquid which equals 2.5 times the programmed needle tubing volume.

Injection volumes up to twice the standard:

With the standard 250 μL syringe, standard needle with tubing (15 μL) and standard 500 μL buffer, but with a 200 μL sample loop, the maximum injection volumes are:

Full loop	200 μL (sample loss remains 230 μL since loops > 100 μL need only one loop volume overfill; 30 μL pre-flush)
Partial loopfill	100 μL
μL Pick-up	77 μL

Volumes smaller than 5 μL may be injected, but reproducibility and accuracy may not be < 0.5% for partial loopfill or < 1% for μL pick-up.

In short: loop < 100 μL : loop has to be filled three times

loop \geq 100 μL - 499 μL : loop has to be filled twice

loop \geq 500 μL : loop has to be filled 1.5 times

For volumes larger than 200 μL :

Use the 2000 μL buffer, the appropriate sample loop size and the appropriate syringe: Syringe volume > 2 x injection volume. Injection volumes larger than 500 μL are possible, but the sample may contaminate the syringe. Program sufficient wash after use!

Appropriate buffer tubing for each type of syringe:

Syringe	Buffer tubing
100 μL	500 μL
250 μL	500 μL
500 μL	2000 μL
1000 μL	2000 μL
10 mL	15 mL

NOTE: The 10 mL syringe and the 15 mL buffer tubing can only be used in combination with the User Program and not with the standard injection methods.

Plates and Sample Handling

The ProStar 430 accommodates use of the following types of plates:

- 96-low wells
- 96-high wells
- 384-low wells
- 48-vials
- Plates of user defined height (These must be specially configured.)

A sensor, Figure 6 (8), takes care of plate detection, plate height detection, and vial detection.

Because the ProStar 430 uses headspace pressure during sample injections, it is very important that samples are properly handled. Note the following:

- Standard wells can best be filled by means of a narrow-end pipette to allow air to escape when filling the well.
- Do not fill wells to the rim as sample might be forced into the pre-puncturing needle, causing cross-contamination of samples and contamination of the sample needle.
- For vials: make sure the seals are airtight to prevent air bubbles in the sample and prevent evaporation of volatile samples; check seals after crimping: if the cap can be turned easily, the seal is not airtight and the handcrimper should be adjusted.

NOTE: If wells are used that are not airtight switch off headspace pressure in the System Menu (General Menu).
Check whether the needle height is sufficient for the new type of plate that is installed (System Menu, General Menu). Adjust if necessary.

To replace a plate in the ProStar 430:

1. Select soft function key **<PLATES>**.
2. Select soft function key **<EXCHANGE>** in the Ready Menu. The plate moves to the left.
3. Take out and replace the plate.
4. Select soft function key **<PLATE HOME>**. The plate moves to operating position again.

If you have replaced the plate by a plate of the same type, you are now ready. If you have installed a new type of plate, execute the following steps:

1. Press **System**.
2. Select soft function key **<PLATES>**.
3. Press **E**.
4. Select the soft function key for the type of plate concerned.
5. Press **E** and determine whether to process the plate in **<ROWS>** or **<COLUMNS>**.
6. Press **E**.
7. Press **Escape** twice to return to the Ready Menu.

A message appears to indicate that all programmed series will be reset. The user must redefine series because the settings in the System Menu have been altered.

Configuring the ProStar 430 for User Defined Plate Heights

It is possible to use plates of almost any height in the ProStar 430. In order to do this, the ProStar 430 must have version 2.02 or later software. The system must be configured to use user

defined plates, and it must be calibrated for the actual plate height.

Execute the following steps for configuration:

1. Press **System**
2. Press **<PLATES>**.
3. Press **E**.
4. Press **Menu** The menu entry user defined will be displayed.
5. Press **<User Def>**
6. Press **E**.
7. Enter the number of plates that will be used in the instrument. Note, the Maximum number of plates is equal to the number of plates in the plate holder + 1 (the one that is being sampled at the present time.)
8. Press **E**.
9. Enter whether the plates will be processed in rows or columns and whether transport vials will be used.

The ProStar 430 is now configured to have a user defined plate height. Now it will be necessary to calibrate the plate height.

To calibrate the plate height:

1. Press **Escape** until the Ready menu is accessed
2. Press **<Plates>** to Access the plates menu
3. Press **<Plate>** to set the plate height

A screen will appear on which you can press **Help** or **E**. If you press Help, the following text will appear on multiple screens to instruct you how to adjust the plate height:

*Press **<Default>** to accept the following heights
As well for single as for the maximum number
Of stacked plates.*

*One – 96 – low plate 14.5 mm
One – 384 – Low plate 14.5 mm
One – 96 – high plate 42.0 mm
Six stacked – 96 – low plates 77 mm*

*Six stacked - 384 - low plates 79 mm
Two Stacked – 96 – high plates 82 mm*

*Press **<ADJUST>** to calibrate different plate
Heights*

*Convention in all adjust screens:
Press **E** to accept new plate height
Press **ESC** to exit without saving*

*Place maximum number of plates in lift
This number depends on plate settings!
Place a ruler on top the right side
Press **<LIFT-DOWN>** or **<LIFT-UP>** until the top
Plate touches the ruler
Press **E** to enter the next adjust screen*

*Lift will move to maximum plate height
Take out plates. Leave 1 plate in the lift
Place a ruler on top of right lift again*

*Press **<LIFT-DOWN>** or **<LIFT-UP>** until
The top plate touches the ruler
Press **E** to accept single plate height*

*Lift will move to home position
Screen will return to main menu*

Placing Reagent Vials/Transport Vials

Execute the following steps to replace reagent vials/transport vials:

1. Select soft function key **<EXCHANGE>** in the Ready Menu. The plate holder moves to the left.
2. Take out the reagent vials/transport vials, Figure 1 (7), and replace them with other reagent vials/transport vials.

3. Select soft function key **<PLATE HOME>**. The plate moves to operating position again.

NOTE: Reagent and transport vials can be placed in any of the four positions. Transport vials must be placed in a continuous row.

In the System Menu, go to the Plates Menu to define the position for first and last Transport vial.

Plate Feeder

The Plate feeder is a factory-installed option that allows you to feed a maximum of 7 plates of the same type into the Endurance (one plate on the plate holder and six in the feeder). The following types of plates can be used with the feeder:

- 96-low plates (max. 6 plates in feeder)
- 96-high plates (max. 2 plates in feeder)
- 384-low plates (max. 6 plates in feeder)

The maximum height of plates that can be stacked into the feeder lift is 83.5 mm.



CAUTION

The 48-vials cannot be used in the plate feeder.

Changes in operation if the Endurance Feeder option is installed:

In the Series menu you have to enter a plate number to define the location of wells, apart from the location of wells in rows and columns. For example, you can define the location of sample wells in a mix method on plate 1, and define the location of the destination wells on plate 5.

The Ready menu displays <PLATES> as the first soft function key; press this key to enter the Direct control plate handling menu. This menu offers the following possibilities:

- <EXCHANGE>** to move the plate holder (Figure 1, number 9)
- <LEFT-LIFT>** to move the left lift up or down (refer to Figure 7)
- <RIGHT-LIFT>** to move the right lift up or down (refer to Figure 7)
- <PLATE>** To enter the plate height determination menu. This menu offers the following possibilities

<DEFAULT>

For default plate sizes:

Height of one 96-low plate: 14.5 mm

Height of six stacked 96-low plates: 77 mm

Height of one 96-high plate: 42 mm

Height of two stacked 96-high plates: 82 mm

Height of one 384-low plate: 14.5 mm

Height of six stacked 384-low plates: 79 mm

<ADJUST>

Before adjusting the plate height, be sure the appropriate plate type has been selected in system settings (System Menu, Plates, refer to page 47).

The Adjust Menu allows you to calibrate the Endurance feeder to use plates of a different height:

1. Place six or two plates (depending on settings) in the right lift (refer to Figure 7).
2. Place a ruler on top of the right lift
3. Select **<LIFT-DOWN>** or **<LIFT-UP>** until the top plate touches the ruler.
4. Press **E** to confirm the height of the six stacked plates.
5. Remove 5 plates from the right lift.
6. Repeat steps 2 – 5 to calibrate the Endurance for single plate height.
7. Press **E** to confirm the new plate height settings.

Using the Feeder:

1. Make sure there are no plates in the left lift.
2. Define the type of plates you are going to use in the usual manner (refer to page 27).
3. Select **<PLATES>** in the Ready menu.
4. Select **<RIGHT-LIFT>** in the Plates menu.
5. Select **<LIFT-UP>**. The lift moves up.
6. Place a plate on the right lift (see Figure 7, number 2).
7. Select **<NEXT PLATE>** to move the lift one position down. You can now place another plate on the right lift.
8. Repeat step number 7 until:
 - you have placed the required number of plates on the lift; press **Escape** twice to return to the Ready Menu.
 - until the lift is full; press **Escape** to return to the Ready Menu.

Keep in mind that the plate that is on the plate holder in the Endurance is number 1, the plates on the lift are numbered 2 through 7. The uppermost plate in the lift is number 2.

The Feeder is now ready for use.

The left lift is used for storage of plates that have been processed and for plate switching sequences. At the end of the programmed series Endurance will make sure that plate number 1 is always on bottom of the left lift, and the plate with the highest number will be on the plate holder.

Example: If 7 plates are used, plate number 7 will be on the plate holder at the end of the programmed series, plate number 1 will be at the bottom of the left lift, plate number 2 will be on top of number 1 and the uppermost plate in the left lift will be number 6.



CAUTION

Make sure that the tray holder of the Endurance always contains a plate at the start of programming a series.

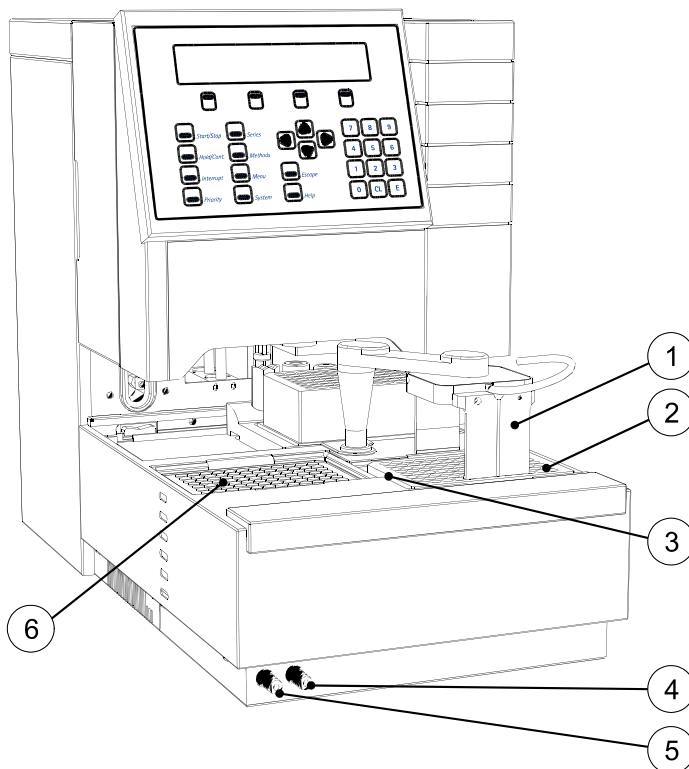


Figure 7 Feeder Option

- | | |
|-------------------------|--------------------------------|
| 1. Grab head | 4. Drain wash-position |
| 2. Right lift | 5. Condensed water and leakage |
| 3. Plates in right lift | 6. Left lift |

I/O Connections

The ProStar 430 has six standard I/O connectors on the rear side; five OUTPUT connectors and one INPUT connector. Refer to Figure 2 for location of connectors.

The communication connector is a standard RS232 or an RS422/485 communication interface connector. The configuration of the I/O connector is described in the tables below.



CAUTION

The manufacturer will not accept any liability for damages directly or indirectly caused by connecting the ProStar 430 to instruments which do not meet relevant safety standards.

Contact closures outputs

The following three tables with programmable outputs (P1), marker outputs (P4) and auxiliary outputs (P5) are contact closures outputs (floating NO/NC contact); see Figure 8.

Table 1 Connector P1 OUTPUTS (2 programmable outputs and alarm output)

1. OUT 1 - Normally open	8. Spare
2. OUT 1 - Common	9. Spare
3. OUT 1 - Normally closed	10. Alarm output - Normally open
4. OUT 2 - Normally open	11. Alarm output - Common
5. OUT 2 - Common	12. 24 V DC
6. OUT 2 - Normally closed	13. Power ground
7. Spare	14. Power ground

$$V_{MAX} = 28 V_{DC} / V_{AC}, I_{MAX} = 0.25 A$$

NOTE: The Alarm output will be activated whenever an error occurs. Refer to the *Maintenance and Troubleshooting* section on page 82 for a description of the error codes of the ProStar 430.

Table 2 Connector P4 MARKERS

1. Inject marker - Normally open	8. Labeled well marker - Common
2. Inject marker - Common	9. Labeled well marker - Normally closed
3. Inject marker - Normally closed	10. STOP I/O - Normally open
4. Well marker - Normally open	11. STOP I/O - Common
5. Well marker - Common	12. STOP I/O - Normally closed
6. Well marker - Normally closed	13. 24 V DC
7. Labeled well marker - Normally open	14. Power ground
	15. Power ground

$$V_{MAX} = 28 V_{DC} / V_{AC}, I_{MAX} = 0.25 A$$

Table 3 Connector P5 AUXILIARIES

- | | |
|----------------------------|-----------------------------|
| 1. AUX 1 - Normally open | 8. AUX 3 - Common |
| 2. AUX 1 - Common | 9. AUX 3 - Normally closed |
| 3. AUX 1 - Normally closed | 10. AUX 4 - Normally open |
| 4. AUX 2 - Normally open | 11. AUX 4 - Common |
| 5. AUX 2 - Common | 12. AUX 4 - Normally closed |
| 6. AUX 2 - Normally closed | 13. 24 Vdc |
| 7. AUX 3 - Normally open | 14. Power ground |
| | 15. Power ground |

$V_{MAX} = 28 \text{ Vdc} / \text{Vac}$ $I_{MAX} = 0.25\text{A}$
--

NOTE: Maximum current for 24 Vdc supply is 0.5A total.

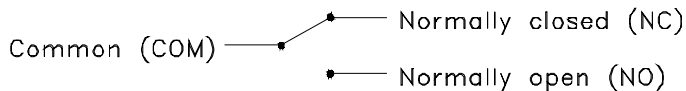


Figure 8 Contact Closures outputs

TTL Outputs

The following tables show the marker outputs (P2) and a 4 bit time base code output (P3), programmable in a time base method. Both connectors are TTL level outputs, a connection diagram is shown in Figure 9.

Table 4 Connector P2 TTL OUTPUTS

1. INJECT MARKER	9. not connected
2. VIAL/WELL MARKER	10. not connected
3. LABELED WELL MARKER	11. not connected
4. STOP I/O	12. not connected
5. not connected	13. Signal ground
6. not connected	14. Signal ground
7. not connected	15. Signal ground
8. not connected	

All markers are active low (logical 0).

$V_{MAX} = 5.5 \text{ V}$, logical 1 > 3.5 V, logical 0 < 1.0 V. DC output source / sink current $\pm 20 \text{ mA}$.

NOTE: A marker output pulse will be generated when the injection valve switches from LOAD to INJECT. However, in a User Program markers have to be programmed by the user.

Table 5 Connector P3 TIMED OUTPUTS; 4 bit time base code output

1	TB 0 (HEX) (1) 6	Signal ground
2	TB 1 (HEX) (2) 7	Signal ground
3	TB 2 (HEX) (4) 8	Signal ground
4	TB 3 (HEX) (8) 9	Signal ground
5	not used	

$V_{MAX} = 5.5 \text{ V}$, logical 1 > 3.5V, logical 0 < 1.0V. DC output source / sink current $\pm 20 \text{ mA}$.

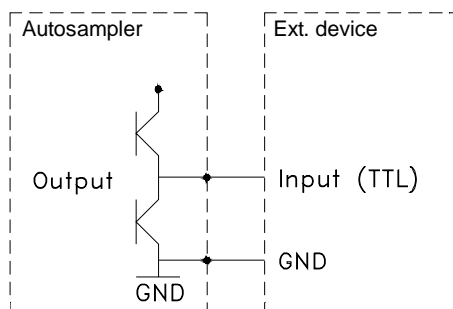


Figure 9 TTL output

TTL Inputs

The following connector is an active high or active low TTL input; it can be defined in the System Menu. The NEXT INJECTION INPUT and the NEXT WELL INPUT can be used when the ProStar 430 works in REMOTE CONTROL. The FREEZE INPUT and STOP I/O input can be used to control the ProStar 430 by other devices. The four inputs (INPUT 1 to 4) can only be used in the user program, e.g. to control the sequence of the steps in this method. A connection diagram is shown in Figure 9.

Table 6 Connector P6 INPUTS (TTL)

1. NEXT INJECTION INPUT	9. Signal ground
2. NEXT WELL INPUT	10. Signal ground
3. FREEZE INPUT	11. Signal ground
4. STOP I/O	12. Signal ground
5. INPUT 1	13. Signal ground
6. INPUT 2	14. Signal ground
7. INPUT 3	15. Signal ground
8. INPUT 4	

Next Injection Input This input will start the next injection sequence when the ProStar 430 is started in remote control. When the injection sequence is finished the ProStar 430 will wait for the next input.

From the Ready Menu a NEXT INJECTION INPUT will start the last programmed series. In this case the ProStar 430 will not wait for the NEXT INJECTION INPUT before continuing with the next injection. The ProStar 430 will execute the complete RUN as if it was started with the **Start/Stop** key.

Next Well Input With this input the ProStar 430 will perform the next injection from the next well, even if not all injections from that well in the programmed injection method have been executed.

Freeze Input The ProStar 430 will freeze the analysis time for the time this input is active. If the FREEZE INPUT is activated while the analysis time is not running, the ProStar 430 will perform all programmed pre-injection sample handling (mix method and loading part of the injection method). But the ProStar 430 will wait with injecting the sample until the FREEZE INPUT is no longer active.

Stop I/O With this input the run of the ProStar 430 is immediately aborted. The Ready Menu appears in the display. In case the ProStar 430 is in remote control, the run of the ProStar 430 is immediately aborted but the ProStar 430 remains in remote control and cannot be restarted with a NEXT INJECTION INPUT

Input 1-4

Programmable input, can be used in the user program.

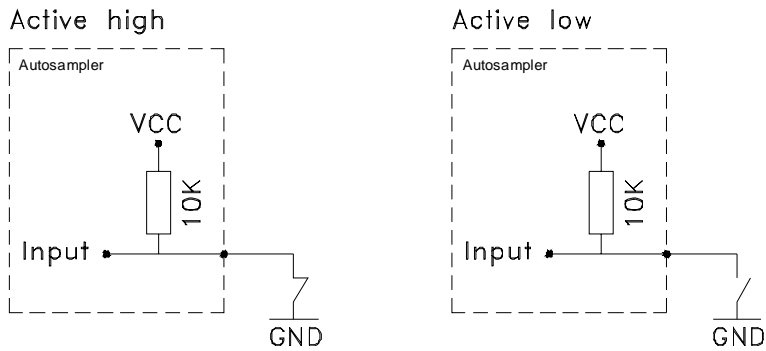


Figure 10 TTL Input

Operation

Getting Started

Menus of the ProStar 430

The software of the ProStar 430 is menu-driven. The most important menus are:

- **Ready Menu:** this menu appears after the ProStar 430 has been switched on. It offers very general possibilities for among other things methods management and communication with other apparatus.
- **System Menu:** this menu appears after the **System** key in the keypad has been selected. It offers general possibilities for entering settings for an analytical run. Please note that settings may have been factory-installed to suit particular wishes of the user. In that case no changes will have to be made in the System Menu. You are advised to enable only those facilities that you will need, to ensure that menus are as concise as possible.
- **Methods Menu:** this menu appears after the **Methods** key in the keypad has been selected. The menu allows you to program a method to be used in an analytical run and to assign a number to it.
- **Series Menu:** this menu appears after the **Series** key in the keypad has been selected. The menu allows you to define a series, and to assign a number and a method to it for the analytical run.

Use the following **keys** to go through the menus:

E	ENTER; to confirm a choice or to select a choice made in a screen, or to step through menu lines
cursor keys	to change values in a field or to move to a different field in a screen
Escape	to return to a previous menu
CL	to remove a value from a field and enter NONE or DEFAULT
soft function keys	labels displayed in bottom line of the screen; to go to submenus

If [MENU] or [MN] is displayed in the top right hand corner of the screen, you can press the Menu key in the keypad to display more possibilities offered by the menu. Refer to page 12 for an explanation of all keys in the keypad.

Convenient Working Order

After you have determined what type of analytical run you want to perform, the most convenient working order for the ProStar 430 is:

1. Enter settings in the System Menu. Note that the settings for the ProStar 430 probably already have been correctly entered (factory-installed).
2. Program a method for the analyses you wish to perform in the Methods Menu.
3. Define a series and link a programmed method to a range of wells in the Series Menu.
4. Execute the series.

Please note that you may use a different order; however, you should keep in mind that settings entered in the System Menu determine which possibilities appear in the Methods and Series menus.

Types of Methods and Links to Series

The ProStar 430 offers the following types of methods for different parts of the sample handling routine:

- **injection** method: contains information on the injection routine, flush volume and analysis time.
- **wash** method: describes a wash volume and when a wash must be executed.
- **mix** method: a pre-injection method in which additional sample handling can be performed (e.g. pre-column derivatization).
- **timebase** method: a post-injection method with which outputs to other devices (e.g. integrator or pump) and switching of the ISS valve are controlled.
- **user program**: offers the possibility to program sequences of all actions that can be executed by the ProStar 430 in separate steps.

Each programmed method is assigned a number. The ProStar 430 offers the possibility to store a combination of defined methods in a template. A template is also identified by a number.

Methods must be linked to series before they can be used. The following possibilities are offered by the ProStar 430:

- You can assign an individual method to a series: methods (mix, injection, wash, timebase) can be linked to wells in a series.
- You can assign a template to a series: a combination of various programmed methods (mix, injection, wash, timebase) can be defined in a template. The template is linked to a range of wells in a series. In this way all steps in an analytical run are laid down and stored.
- You can assign a user program to a series: a possibility to combine all possible steps in the analytical process in

one program. The user determines the order of the separate actions the ProStar 430 has to perform.

Executing a Series

Execution of a series is only possible if you have programmed a method and defined a series for the samples you wish to analyze. Series are not stored in battery backup and exist only for as long as the ProStar 430 is switched on.

Execute the following steps:

1. Start programming the series by pressing **Start/Stop**.
2. Enter the number of the first series to perform and the number of the last series to perform.
3. Select **<START>** to start the actual analytical run. The ProStar 430 starts to execute the series you have defined.

After the ProStar 430 has executed the run, the Ready Menu will appear again.

Refer to *Using the ProStar 430*, page 47 for a number of examples illustrating this working order.

It is possible to program series and methods during a run. Press Series or Methods; the possibilities offered in the menus are identical to those offered when the ProStar 430 is idle.

If a series or method is changed, the new values become active the next time the ProStar 430 starts a series. The series currently running are not affected by the changes.

Executing a Series in Remote Control

To execute a series from remote control, execute the following steps:

1. Press **Start/Stop**.
2. Enter the number of the first and the last series to be performed.
3. Select **<REMOTE>** to enter the remote control mode. The ProStar 430 will now operate as slave of another device and can be controlled with Next injection input and Next well input. To indicate that remote control is active, an “r” is displayed in the bottom left corner of the display during execution of the series. At the end of the series the message “Series completed via remote control” is displayed.
4. Press **Escape** to return to the Ready Menu.

Refer to the I/O Connections section beginning on page 35 for more information on remote control.

Using the ProStar 430

Following are examples of actions that can be performed with the ProStar 430. Please note that this chapter does not describe all types of actions that can be performed. Try to do these examples to learn to work with the ProStar 430.

These examples can be executed after the ProStar 430 has been installed and all items described in the previous section correctly set up.

Example 1. A 10 μ L partial loopfill injection

After the ProStar 430 has been switched on, an initialization procedure is executed. In this example it is assumed that a loop of 100 μ L, needle tubing of 15 μ L and a syringe of 250 μ L has been installed. Wait until the Ready Menu appears on the screen, then execute the following steps:

For system settings:

Press keys	Description
System	to enter the System Menu
<GENERAL> E	to enter the General Menu
[0100] E	to define the volume of the installed loop
[015] E	to define the volume of the needle tubing
<250> E	to define the volume of the syringe
<NORMAL> E	to set syringe speed to normal
[05] E	to set sample needle height to 5 mm
<YES> E	to enable use of air segment
<NO> E	to switch off headspace pressure
Escape	to return to the System Menu
<PLATES> E	to enter the Plates Menu
<96-LOW>	to define the type of plate to be used
<IN ROWS>	to define the processing order of wells
Escape Escape	to return to the Ready Menu

For this example all other settings used will be default.

To program a method:

Press keys	Description
Methods	to enter the Methods Menu
<INJECTION> [01] E	program injection method number 1
<PARTIAL> E	to select partial loopfill injection method
[100] E	to define an analysis time of 1 minute
[030] E	to define a flush volume of 30 µL
[1] E	to define the number of injections per well
[100] E	to set the injection volume at 10.0 µL
Escape Escape	to return to the Ready Menu

To define the series:

Press keys	Description
Series	to enter the Series Menu
[01] E	to define the Series number
[01] E	to define the injection method number
CL E	to enter <NONE> for wash method
<ROW A> [01] E	to define location of the first sample well
<ROW A> [01] E	to define location of the last sample well
Escape	to return to the Ready Menu

To run the series:

Place a sample in position A 1 of the plate.

Press keys	Description
Start/Stop	to start the ProStar 430
[01] E	to start at series number 1
[01] E	to stop after execution of series number 1
<START>	to start the analytical run

The ProStar 430 will now locate well A 01 and perform a 10 µL partial loopfill injection. The display of the ProStar 430 will indicate the status (Checking tray, Flushing, Loopfill, Running, Rinse buffer, Running). The display also indicates the number of the defined series (01), the method number (01) and the well on which the analysis is performed (A 01).

At the end of the defined analysis time the Ready Menu will be displayed again to indicate that the ProStar 430 is ready for the next analytical run.

Example 2. A 3 x 10 µL injection with µL pick-up, wash between injections

In this example a different injection method is used than in the previous one. For that reason several settings must be adapted in the System Menu.

For system settings:

Press keys	Description
System	to enter the System Menu
<GENERAL> E	to enter the General Menu
E until Air segment appears	to go to the Air segment field
<NO> E	to switch off air segment
Escape	to return to the System Menu
<PLATES> E	to enter the Plates Menu
E E	to go to transport vials field
[1] E	to define position of the first transport vial
[1]	to define position of the last transport vial
Escape Escape	to return to the Ready Menu

To program a method:

Press keys	Description
Methods	to enter the Methods Menu
<INJECTION> [02] E	to define method number 02
<PICK-UP> E	to select the injection mode for this method
[100] E	to define the analysis time
[3] E	to define the number of injections per well
[100] E	to define volume of 10.0 µL for 1st injection
[100] E	to define volume of 10.0 µL for 2nd injection
[100] E	to define volume of 10.0 µL for 3rd injection
Escape	to return to the Methods Menu
<WASH>	to enter the Wash Menu
[01] E	to define wash method number 01
<INJECTION> E	to select wash between injections
[300]	to define the wash volume
Escape Escape	to return to the Ready Menu

To define the series:

Press keys	Description
Series	to enter the Series Menu
[01] E	to define the series number
[02] E	to define the injection method for this series
[01] E	to define the wash method for this series
<ROW A> [01] E	to define the location of the first sample well
<ROW A> [01]	to define the location of the last sample well
Escape	to return to Ready Menu

To run the series:

Put a vial with transport solvent (mobile phase) in transport vial position 1 (left). Make sure the transport vial is correctly filled before starting a new series.

Press keys	Description
Start/Stop	to start the ProStar 430
[01] E	to start at series 01
[01] E	to stop after series 01
<START>	to start execution of the series.

At the end of the defined analysis time the Ready Menu will appear again to indicate that the ProStar 430 is ready for the following next run.

Example 3. A 1:10 dilution followed by a 10 µL partial loopfill injection

This example describes how to let the ProStar 430 transfer 360 µL from Reagent A to the destination vial, add 40 µL of sample, mix 3 times with 250 µL and subsequently inject 10 µL.

For system settings:

Press keys	Description
System	to enter the System Menu
<USAGE> E	to enter the Usage Menu
E E	to go to the Mix field
<ENABLED>	to enable use of mix methods
Escape	to return to the System Menu
<PLATES> E	to enter the Plates Menu
<96-HIGH>	to select 96 deepwell plate
<COLUMNS>	to select processing in columns (A1, B1, etc)
CL	to disable use of transport vials
Escape Escape	to return to the Ready Menu

As soon as a change has been entered in the System settings, the message “ALL SERIES DEFAULT” appears. The user will have to redefine series because the settings have been changed.

To program the injection method:

Press keys	Description
Methods	to enter the Methods Menu
<INJECTION> [03] E	to enter the Injection Menu
<PARTIAL> E	to select partial loopfill injection mode
[100] E	to define the analysis time
[50] E	to define the flush volume
[3] E	to define the number of injections per well
[100] E	to enter the injection volume for 1st injection
[100] E	to enter the injection volume for 2nd injection
[100] E	to enter the injection volume for 3rd injection
Escape	to return to the Methods Menu

To program the mix method:

Press keys	Description
<MIX>	to enter the Mix Menu
[1] E	to define Mix method number 1
<INSERT>	to define mix method step number 1
<ASPIRATE> [50] <AIR> E	to aspirate an air segment of 5.0 µL
<INSERT>	to define mix method step number 2
<ASPIRATE> [2250]	to aspirate 225.0 µL
Menu <REAG-A> E	to perform defined asp. from reagent vial A
<INSERT>	to define mix method step number 3
<DISPENSE> [1800]	to dispense 180.0 µL to
▶ ▶ [02] E	destination well
<INSERT>	to define mix method step number 4
<DISPENSE> [500]	to dispense 50.0 µL
<WASTE> ▶ [5] E	to dispense defined volume to waste
<INSERT>	to define mix method step number 5
<REPEAT> [1] ◀ [4] E	to repeat last four steps once
<INSERT>	to define mix method step number 6
<ASPIRATE> [50] <AIR> E	to aspirate an air segment of 5.0 µL
<INSERT>	to define mix method step number 7
<ASPIRATE> [600] <SAMPLE>	to aspirate 60.0 µL of
E	sample
<INSERT>	to define mix method step number 8
<DISPENSE> [400]	to dispense 40.0 µL
<DESTINATION> ▶ ▶ [2] E	to destination well
<INSERT>	to define mix method step number 9
<DISPENSE> [500] <WASTE>	to dispense 50.0 µL
▶ [5] E	to waste
<INSERT>	to define mix method step number 10
<ASPIRATE> [500] <AIR> E	to aspirate an air segment of 50.0 µL
<INSERT>	to define mix method step number 11
<ASPIRATE> [2000]	to aspirate 200.0 µL
<DESTINATION> ▶ [3] E	from the destination well
<INSERT>	to define mix method step number 12
<DISPENSE> [2000] ▶ [9] E	to dispense 200.0 µL to the destination well
<INSERT>	to define mix method step number 13
<REPEAT> [3]	to repeat the last 2 steps three times
Escape Escape	to return to the Ready Menu

To define the series:

Press keys	Description
Series	to enter the Series Menu
[01] E	to define series number 1
[01] E	to select Mix method number 1 for this series
[03] E	to select Injection method number 3
CL E	to select <NONE> for wash method
<ROW A> [1] E	to define location of first sample well
<ROW A> [1] E	to define location of last sample well
<ROW B> [1] E	to define location of first destination well
[1] E	to define position of Reagent A
Escape	to return to the Ready Menu

To run the series:

Put sample in position A 01; position B 01 is used as empty destination well. Place a filled reagent vial in position 1. Make sure the reagent vial is filled correctly before starting a new series.

Press keys	Description
Start/Stop	to start the ProStar 430
[01] E	to start at series number 1
[01] E	to stop after series number 1
<START>	to start processing of sample

The ProStar 430 will now start searching for the Reagent vial and transport 180 µL to the destination well twice, then 40 µL of sample will be added and after mixing 3 times a 10 µL injection will be performed.

Example 4. Defining a template and adding a protection code

This examples describes how to incorporate the injection method (02) and wash method (01) defined in example 2 in a template. A protection code will be added.

For system settings:

Press keys	Description
System	to enter the System Menu
<USAGE> E	to enter the Usage Menu
[123456] E	to enter a 6-digit code (memorize this code!)
E	to go to the mix methods field
<DISABLED> E	to disable use of mix methods
E E	to go to the template field
<ENABLED>	to enable templates
Escape Escape	to return to the Ready Menu

After use of templates has been enabled the message "ALL SERIES DEFAULT" appears. The user will have to redefine series because the settings have been changed.

To select the methods to be incorporated in the template:

Press keys	Description
Methods	to enter the Methods Menu
[123456] E	to enter the methods protection code
<TEMPLATE>	to enter the Template Menu
[01] E	to define the number for the template
[02] E	to define the injection method for this template
[01]	to define the wash method for this template
Escape Escape	to return to the Ready Menu

To define the series:

Press keys	Description
Series	to enter the Series Menu
[01] E	to define the Series number
[01] E	to define the Template method number
<ROW A> [01] E	to define the first sample well
<ROW B> [01] E	to define the last sample well
Escape	to return to the Ready Menu

To run the series:

Press keys	Description
Start/Stop	to start the ProStar 430
[01] E	to start analysis at series 01
[01] E	to stop after analysis of series 01
<START>	to start the analytical run

The ProStar 430 now performs the same actions as in Example 2, except that analysis is performed on two wells: A 01 and B 01.

NOTE: Select **<DEFAULT ALL>** in the Ready Menu (Utilities Menu) to erase all series and methods defined in these examples and to default all settings.

Ready Menu

NOTE: This section describes all possibilities offered by the ProStar 430 software, in the order in which they appear on the screen.

The Ready Menu contains the following soft function keys:

- <PLATES>** Use this key to move the plate to the left, move the lifts up and down and to adjust the plate height
- <EXCHANGE>** Use this key to move the plate to the left. In this position the plate can be replaced without damage to the equipment. Select soft function key **<Plate Home>** to move the plate to the operating position again
- <LEFT-LIFT>** Use this key to move the left lift up to the top to more easily take plates out of the lift.
- <RIGHT-LIFT>** Use this key to move the right lift up to the top to more easily take plates out of the lift.
- <PLATE>** Use this key to adjust the plate height for different size plates. The **<help>** key contains complete instructions for making the adjustment.
- <WASH>** Use this key to start a standard wash procedure. All tubing connected to the syringe valve will be filled and rinsed with wash solvent.
- <SYR END>** Use this key to move the syringe to end position if you wish to replace the syringe needle or to simplify filling of wash solvent tubing. A syringe volume of wash solvent is aspirated from the wash solvent bottle and the wash solvent tube is filled.

Select soft function key **<SYR HOME>** to dispense the syringe contents to syringe waste and to move the syringe to standard operating position again
- <UTILS>** Use this key to go to the Utilities Menu. If use of a method protection code is enabled in the System Menu, the code must be entered to access the Utilities Menu. The menu offers the following possibilities:

- <COPY>** to copy a method. Enter the type (mix, injection, timebase, wash) and the number of the method to be copied. Then enter a number to define the destination method. Any existing method stored under that number will be overwritten.
- <ERASE>** to erase a method (Template, Methods, User Program). If Template and User Program are disabled in the System Menu, the soft function keys for erasing a standard Method (mix, injection, wash, timebase) appear. Note that it is not possible to erase the user program if the protection code for the user program is enabled in the System Menu.
- <LOG>** The ProStar 430 keeps a log of system-relevant events (**<EVENTS>**); records error messages that have been generated) and keeps count of actions of valves and syringe movements (**<COUNT>**). A message appears after every 50,000 syringe actions and after every 200,000 syringe valve actions: "Lifetime of syringe (valve) maybe exceeded. Check for possible leakage!"
- Syringe: if you do not replace the syringe at this moment and tell the system "not to display this message again", the message will not be displayed again until 50,000 more syringe actions have been counted. Syringe valve: will have to be replaced and the counter for valve actions will have to be reset by the maintenance engineer.
- <DEFAULT ALL>** to change all software settings to default. All series, methods, templates and the user program (unless protected by protection code) will be erased.

NOTE: If **<DEFAULT ALL>** is selected, check whether hardware configuration still is compatible with settings entered in the System Menu.

- <SSV> (option)** Use this key to start a procedure in which all lines of the solvent selection valve can be primed. The menu offers the following possibilities:
- <SSV1>** to open the corresponding port of the solvent selection valve.
to
- <SSV6>**
- <PRIME>** to prime the selected solvent line with one syringe volume. The last selected port will remain active after leaving the SSV mode.

<COOL> (option) Use this key to enter the programming mode for Peltier plate cooling. The programmable temperature range is 4°C to 40°C. The maximum cooling capacity is approximately 12°C below ambient (refer to the Appendix for specifications). Connect the condensed water and leakage connector to a waste container on the floor to drain condensed water.

If the cool option is switched **<ON>** the following soft function keys can be selected:

<MANUAL> temperature control will remain OFF until it is switched on again by the user (in this menu).

<AUTOMATIC> Temperature control will be switched OFF after all programmed series have been executed.

<DATE-TIME> Temperature control will be switched OFF at a date and time that can be programmed.

<SERIAL> Use this key to put the ProStar 430 in serial mode to allow for control of the autosampler by way of PC (RS232 interface). Select a device identifier in the System Menu. If a method protection code was defined in the system settings, this code must be entered to get access to serial mode. The following soft function keys appear:

<PANIC> Press this key to begin a stop sequence in which all tubing is rinsed and the valve and I/O ports are reset. At the end of the sequence serial mode is resumed.

<EXIT> Press this key to end serial mode and return to the Ready Menu.

<SERVICE> Indicates service required. To be used by authorized personnel only. The Service Menu is protected by a service code.

System Menu

The System Menu contains the following soft function keys:

<GENERAL> Press this key to enter values for:

Loop Volume, Needle Tubing, Syringe Volume	These values have to be entered because the ProStar 430 can be fitted with various types of syringes. Every needle and needle tubing volume requires a different minimum flush volume. The default flush volume equals two times the volume of needle and tubing.
---	---

NOTE:	The 10 mL syringe can only be selected if the use of the User Program is enabled in the System Menu (Usage Menu). When the 10 mL syringe is selected, only the User Program can be used. Use of other types of methods will be disabled.
--------------	--

Syringe Speed and Scale Factor	The aspirating speed of the syringe used in injection methods can be adapted depending on viscosity of samples. Alternatively syringe speeds can be reduced by entering a scale factor. The syringe speed will be the scale factor multiplied by the syringe speed. The speed of the syringe during the wash or the rinsing procedure of the buffer are not affected by this setting.
Needle Height	Distance between the needle point and the plate holder (default: 5 mm). The value is only used in injection methods (for mix methods this value is programmable in the method itself).
Skip Missing Vials	Appears only if a plate with 48 vials is selected in System Menu (Plates Menu). YES means that empty spaces are skipped during the run. NO means that the ProStar 430 will stop if an empty space is encountered during the run; an error code will be generated.
Air Segment	Decide whether an air segment will be used for analytical runs.
Headspace Pressure	To switch headspace pressure on or off. The ProStar 430 uses headspace pressure to facilitate transport of sample into the loop. The compressor will always be used during a wash procedure. Please note that accuracy and reproducibility may decrease if headspace pressure is switched off. However, headspace pressure will only be useful if sample wells are airtight.
Time Display	Offers a choice between two types of time representation.
Key click, error beep and alarm buzzer	Offer the possibility to switch sound signals on or off.

Table 7 Overview of General Settings

General setting for	Default	Possible range
loop volume	100 µL	5 - 1000 µL
needle tubing	15 µL	1 - 200 µL
syringe volume	250 µL	100, 250, 500, 1000 µL or 10 mL
syringe speed	normal	low, normal or high
scale factor	1.0	0.1 - 1.0
needle height	5 mm	0 - 40 mm
skip missing vials	yes	yes or no
air segment	yes	yes or no
headspace pressure	no	yes or no
time base display	HH:MM:SS	H:MM:SS or H:MM:mm
key click	on	on or off
error beep	on	on or off
alarm buzzer	on	on or off

<USAGE>

Press this key to enter the following Usage settings:

	SETTINGS	DEFAULT
Protection Code	To enter a code for protection of methods. Enter a six digit code (000000-999999) for protection of all methods. Press CL to erase the code. If a code has been defined it is not possible to enter the System Menu and the programming menus without entering the protection code.	None
Timebase methods	To enable or disable the possibility to program timebase methods. The ProStar 430 controls other connected equipment during analysis time. Program timebase methods in the Methods Menu	Disabled

	SETTINGS	DEFAULT
Mix methods	To enable or disable the possibility to program mix methods for the ProStar 430. Program mix methods in the Methods Menu. Please note that the ProStar 430 cannot analyze priority samples during a run if the mix method is enabled.	Disabled
User program	To enable or disable the possibility to program a user program. If this function is enabled it is possible to enter a user program protection code (6 digits). Program the user program in the Methods Menu. Please note that the ProStar 430 cannot analyze priority samples during a run if the user program is enabled.	Disabled
Labeled wells	To enable or disable the possibility to program labeled wells. Program the location of labeled wells in the Series Menu.	Disabled
Templates	To enable or disable the possibility to program templates. Program templates in the Methods Menu.	Disabled
Calibration well	To enable or disable the possibility of programming calibration wells. Program the location of the calibration wells in the Series Menu.	Disabled

NOTE: You are advised to disable as many functions in the Usage Menu as possible to make sure that other menus do not contain possibilities that are irrelevant for the type of analyses you are to perform.

<PLATES>	Use this key to define the type of plates that will be used. Five types can be selected: 96-low (default), 96-high, 384-low, 48-vials, or user defined. After a plate type has been selected, enter:
Well processing method	In rows (left to right) or in columns (top to bottom).
First transport vial	Enter a number 1 – 4, or press CL.

	<p>Last transport vial</p> <p>Enter a number 1 - 4.</p> <p>Vials can be placed in any of the four positions. Transport vials must be placed in a continuous row.</p>
<IO>	<p>Use this key to enter the I/O configuration mode and define the following:</p>
	<p>Inject-marker pulse length</p> <p>To define the length of the inject-marker pulse.</p>
	<p>Well-marker pulse length</p> <p>To define the length of the well-marker pulse.</p>
	<p>Labeled well marker pulse length</p> <p>To define the length of the well-marker pulse of the labeled well.</p>
	<p>Input edge next injection</p> <p>To define the edge sensitive inputs for the next injection.</p>
	<p>Input edge next well</p> <p>To define the edge sensitive inputs for the next well.</p>
	<p>Freeze input active</p> <p>To define whether the freeze input is active when high, or freeze input is active when low.</p>
	<p>Reset outputs after last series</p> <p>To determine whether the outputs should be reset to default after the last series.</p> <p>Refer to page 35 for more specific information on I/O connections.</p>

Table 8 Overview I/O Menu

Possibility	Default	Range
inject-marker pulse length	1.0 s	0.1 - 2.0
well-marker pulse length	1.0 s	0.1 - 2.0
labeled well marker pulse length	1.0 s	0.1 - 2.0
input edge next injection	falling	falling or rising
input edge next well	falling	falling or rising
freeze input active	low	low or high
reset outputs after last series	no	yes or no

<CLOCK>

Use this key to switch the system clock on or off. Select ON to enter the clock menu in which you can set date (yy,mm,dd) and time (hh,mm). This date and time will be displayed in the Ready Menu.

<COMM.>

Use this key to define a device identifier for communication with other equipment (e.g., a PC). An identifier between 20 and 29 can be selected for the ProStar 430.

Methods Menu

This menu allows the user to program various types of methods: it is possible to define 24 separate injection methods, 5 wash methods, 5 timebase methods, 9 mix methods and one user program.

It is also possible to program a combination of methods and save them in a template. The settings entered in the System Menu determine the possibilities offered by the Methods Menu.

<TEMPLATE>

Use this key to enter a menu in which the contents of a template can be defined. First assign a number to the template, then link the numbers of methods to the template. A maximum of 24 templates can be programmed. The following items can be entered to fill a template:

User program instead of methods

If soft function key **<YES>** is selected, the complete template is filled with the user program; no other methods can be added. If soft function key **<NO>** is selected the template can be filled with the following:

- **mix method number**
- **injection method number**
- **wash method number**
- **timebase method number**

<METHODS>

Use this key to enter a menu in which methods can be defined:

<MIX>

(If enabled in System Menu, Usage Menu)

Use this key to program a method that allows you to perform pre-injection sample handling, e.g. pre-column derivatization, dilution or adding of internal standard. Nine mix methods can be programmed; the maximum number of steps that can be programmed for the total of 9 mix methods and the user program is 240. Assign a number to the mix method. The Mix Menu appears:

<EDIT>: an existing step or a new step for a new mix method

<INSERT>: a new step in an existing method before the displayed step

<DELETE>: the displayed step

"End of mix method" means that the mix method is empty; if an existing mix method is selected, the first line of the mix method is displayed. Scroll through the steps of the existing method with the cursor keys and use the soft function keys to enter changes in an existing method.

The following types of steps can be programmed for a mix method:

- <ASPIRATE>** (Sample, air, destination, reagent A-D) a programmed volume. Speed of syringe can be selected from 1-9. Height (H) indicated is the distance of the needle point to the plate holder (default: 5 mm). The maximum amount which can be aspirated is the total volume of the syringe.
- <DISPENSE>** (Sample, waste, destination, reagent A-D) a programmed volume from the buffer tubing. Speed of the syringe can be selected from 1 - 9. Height (H) indicated is the distance of the needle point to the plateholder (default: 5 mm). It is possible to dispense a larger volume than the volume aspirated in previous actions. The aspirated amount will be complemented with liquid from the wash solvent bottle to total the programmed dispense volume.
- <WAIT>** To define a pause (H:MM:SS, maximum of 9 hours, 59 minutes and 59 seconds).
- During the pause, the needle will move to home position (if the previous step is an aspirate or dispense action). If you want the needle to stay in the same position, an aspirate or dispense step of 0 μ L must be programmed at the desired position
- <REPEAT>** Enter the number of steps that must be repeated and how often they must be repeated.
- <WASH>** Enter the volume for needle wash. Buffer is rinsed to waste.
- <INJECTION>** Use this key to program a method that defines injection methods (max. 24) for a run of the types full loop, partial loopfill or μ L pick-up. Enter a number for the injection method you are going to program. If the selected method is locked because of changes in the settings (System Menu) after programming the method, the word LOCK is displayed. The method can be unlocked by programming valid values in the method itself or by restoring the values in the System Menu.
- Use the soft function keys to select an injection method, then enter values for:

Analysis time	The time between switching the injection valve to inject and the start of processing the next sample.
Flush volume	The amount of sample taken from a vial before the loop is filled with sample. Default value: 30 µL (combined with an air segment).

NOTE: Flush volumes of less than twice the volume of the needle and tubing will result in decreased performance.

Number of injections per vial	Maximum value is 9.
Injection volume	Can be entered for each injection per vial. The maximum programmable injection volumes are:
<i>Partial loopfill</i>	50% of the programmed loop volume
<i>µL Pick-up</i>	50% of the programmed loop volume Not programmable, is equal to the loop volume but needs more sample to fill the loop (3 x loop volume for loop volumes < 100 µL; 2 x loop volume for loop volumes ≥ 100 µL - 499 µL; 1.5 x loop volume for loop volumes ≥ 500 µL).
<i>Full Loop</i>	Not programmable, is equal to the loop volume but needs more sample to fill the loop (3 x loop volume for loop volumes < 100 µL; 2 x loop volume for loop volumes ≥ 100 µL - 499 µL; 1.5 x loop volume for loop volumes ≥ 500 µL).

<WASH> Use this key to program wash methods. It is possible to program a wash between injections, samples or series. For each wash method the volume of wash solvent can be defined. The minimum programmable volume is 300 µL.

<TIMEBASE> (If enabled in System Menu, Usage Menu)

Press this key to enable control of the optional ISS valve and other devices via auxiliary or binary outputs. A maximum of 5 timebase methods can be programmed. The menu offers the following soft function keys:

<AUX> Scroll through all program lines by pressing **E** or select AUX to move to the next auxiliary.

<VALVES>

Controls the ISS valve and the solvent selection valve. The ISS valve can only be programmed if the optional ISS valve is installed. 6-1 and 2-1 refer to the interconnected ports of the valves. Press **E** to scroll through programming lines (Only if SSV option is installed). Enter the time and the SSV port number (value between 1 and 6).

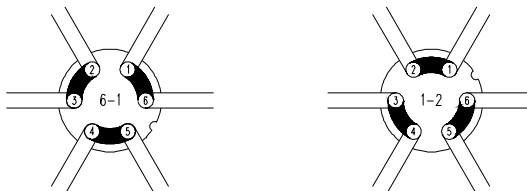


Figure 11 ISS Valve, interconnected ports

<CODE>

Outputs: enter a time and a value between 1 and 15, hexadecimal output. Press **E** to scroll through the programming lines.

<END>

To enter the end time for timed events program; press **E** to scroll through the programming lines. If no value is filled in or if **CL** is pressed, the ProStar 430 will automatically generate an end time. The end time is equal to the analysis time programmed in the injection method used in the same series.

If end time exceeds the programmed analysis time, this end time overrules the analysis time.

It is possible to program events after the end time, but these events are not carried out during a run.

<USER PROGRAM>

The user program offers the possibility to program all possible actions required for a sample handling sequence in separate steps. Note that the total number of steps for the user program and all nine mix methods cannot exceed 240. The user program can be protected by a special user program protection code (System Settings, Usage Menu). If no user program has been programmed yet, "end of user program" is displayed. Otherwise, the first line of the programmed method appears. The soft function keys appear:

<EDIT>: an existing step or program a new step for the user program.

<INSERT>: a new step before the displayed step

<DELETE>: delete the displayed step

The edit and insert menus offer the following soft function keys:

<ASPIRATE> a programmed volume from sample well, ambient air, destination vial, wash, or one of the reagent vials into the buffer tubing. Speed and height of syringe can be entered (refer to Table 9). The maximum volume that can be aspirated is the total volume of the syringe.

<DISPENSE> a programmed volume from the buffer tubing into the sample well, waste, destination vial, wash or one of the reagent vials. Speed and height of syringe can be entered (refer Table 9).

It is not possible to dispense a larger volume than the total volume aspirated in previous actions.

<SYR VALVE> to control the connections of the syringe to one of its three tubes:

<NEEDLE>: connection to sample needle

<WASH>: connection to wash solvent bottle

<WASTE>: connection to syringe waste tubing.

<SYR> to control the movements of the syringe.

<LOAD>: the syringe with the programmed volume

<UNLOAD>: the syringe with the programmed volume

<HOME>: the volume previously aspirated will be dispensed to the last programmed position, and the syringe will be initialized again.

<WASH> to execute a needle wash; the content of the buffer tubing is not rinsed to waste before the start of the wash. The programmed volume of wash solvent is used to wash the needle at the wash position.

The wash position may be contaminated with the contents of the buffer tubing, which may generate cross-contamination. To prevent contamination of the wash position, program a dispense to waste action before programming a wash action.

- <VALVES>** To program positions of high pressure valves (ISS, injector valve, SSV). The injector valve has two positions: **<INJECT>** and **<LOAD>**. The ISS optional valve has positions 1-6 and 1-2 (Figure 11).
- <WAIT>** to program a pause (max. 9 hours, 59 minutes, 59 seconds).

NOTE: During the pause, the needle will move to home position (if the previous step is an aspirate or dispense action). If you want the needle to stay in the same position, an aspirate or dispense step of 0 µL must be programmed at the desired position.

- <COMPRES>** to activate the compressor to put air pressure on a sample. The compressor will stay active until it is switched off (in a next programmed step). The compressor will be automatically switched off at the end of the needle wash routine if a needle wash is used.
- <AUX>** to control the four standard auxiliaries (contact closures).
- <WAIT-IN>** to program a pause in which the ProStar 430 waits for one of the four inputs to become **<HIGH>** or **<LOW>** before continuing with the next step.
- <PROG-OUT>** to define two programmable outputs (contact closures). These are similar to the auxiliaries, but only available in the user program.
- <CODE>** to program the output to the connector P3 TIMED OUTPUTS. This is a HEX output in the range 0 to 15.
- <MARKERS>** The markers normally generated in the ProStar 430 are not active in the user program, but can be programmed in this screen. Select marker and status (inject, vial, labeled).
- <SSV>** (option): to define the Solvent Selection Valve (SSV) port position, range 1 to 6.

Table 9 Syringe Speed

SPEED	SYRINGE				
	100 μ L	250 μ L	500 μ L	1000 μ L	10 mL
1	50 μ L/min	125 μ L/min	250 μ L/min	500 μ L/min	0.5 mL/min
2 (low)	125 μ L/min	315 μ L/min	630 μ L/min	1255 μ L/min	1.3 mL/min
3 (normal)	250 μ L/min	625 μ L/min	1250 μ L/min	2495 μ L/min	2.5 mL/min
4 (high)	375 μ L/min	940 μ L/min	1880 μ L/min	3765 μ L/min	3.8 mL/min
5	770 μ L/min	1920 μ L/min	3840 μ L/min	7680 μ L/min	7.7 mL/min
6	1070 μ L/min	2675 μ L/min	5335 μ L/min	10665 μ L/min	10.7 mL/min
7	1370 μ L/min	3430 μ L/min	6855 μ L/min	13710 μ L/min	13.7 mL/min
8	1745 μ L/min	4365 μ L/min	8725 μ L/min	17450 μ L/min	17.5 mL/min
9	2135 μ L/min	5335 μ L/min	10670 μ L/min	21335 μ L/min	21.3 mL/min



During the dispense action the pressure in the buffer tubing will increase. To prevent damage of the buffer tubing, the flow should not exceed the value of 6 mL/min for water. (Maximum speed 9 for 100 μ L and 250 μ L-syringes, speed 6 for a 500 μ L syringe and speed 4 for 1000 μ L and 10 mL syringe.) If more viscous liquids are used the speeds should be reduced.

Series Menu

This menu allows you to define the run sequence in a series. A maximum of 24 series can be programmed. A series contains information about the methods to be used for a range of wells. This can be a template, a separate method (mix, injection, wash, timebase), or the user program. Information on location of wells, labeled wells or calibration wells is also programmed in a series.

NOTE:	The settings entered in the System Menu and the methods defined in the Methods Menu determine which possibilities appear in the Series Menu.
-------	--

Table 10 Series Parameters

<i>Without templates</i>	<i>With templates</i>
<input type="radio"/> Use user program Yes/No <input checked="" type="radio"/> Injection method number <input checked="" type="radio"/> Wash method number <input type="radio"/> Time base methods number <input type="radio"/> Mix method number <i>Time base and mix method are only available if enabled in the System Menu</i>	<input checked="" type="radio"/> Template number
<input type="radio"/> Use calibration wells Yes/No <ul style="list-style-type: none"> <input type="radio"/> First calibration well <input type="radio"/> Last calibration well <input type="radio"/> No. of samples between calibration <i>Calibration wells are only available if enabled in the System Menu; not available if Mix Method has been programmed</i>	
	<input checked="" type="radio"/> First sample well <input checked="" type="radio"/> Last sample well
	<i>Only if a mix method has been programmed, or if used in user program:</i> <ul style="list-style-type: none"> <input type="radio"/> First destination well <input type="radio"/> Vial Reagent-A <input type="radio"/> Vial Reagent-B <input type="radio"/> Vial Reagent-C <input type="radio"/> Vial Reagent-D
	<i>Only if the use of labelled wells has been enabled in the System Menu:</i> <ul style="list-style-type: none"> <input type="radio"/> Labelled well no. 1 <input type="radio"/> Labelled well no. 2 <input type="radio"/> Labelled well no. 3 <input type="radio"/> Labelled well no. 4

☒ marked questions are always asked in series

☐ marked questions depend on the used methods and the settings entered in the System Menu.

Explanation

After you have entered the required settings in the System Menu and after you have programmed methods to be used for an analytical run, you can press Series to enter the Series Menu. Table 10 gives an overview of the items you have to define for the Series.

With Templates

If you are going to execute an analytical run by way of a template, you will only be asked to enter the template number and to indicate the location of the first sample well and the last sample well.

Without Templates

If you are going to execute an analytical run without using a template, you will be asked to enter an injection method number and a wash method number, and you will have to indicate the location of the first sample well and last sample well.

If you have enabled use of calibration wells in the System Menu (Usage Menu), you will have to define whether you will use calibration wells, and indicate the location of the first and last calibration well, and indicate the number of wells between calibration wells.

However, if you have for example enabled use of a Mix Method in the System Menu (Usage Menu), you will also have to define the location of the First destination well and Reagent vials.

NOTE: Series are stored in the ProStar 430 memory for as long as the power is on. As soon as power is switched off, all programmed series will be deleted.

It is not possible to leave the Series Menu before all values have been programmed.

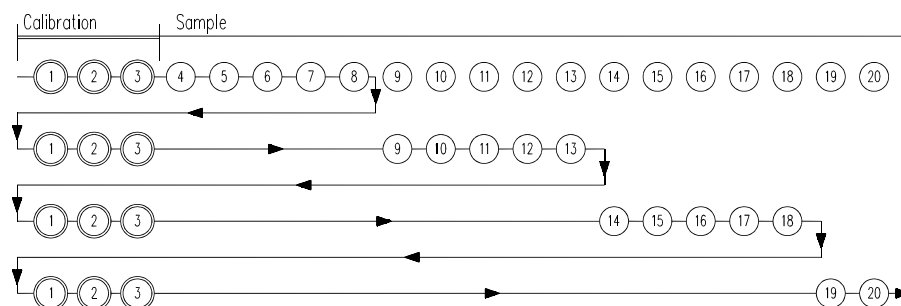


Figure 12 Injection sequence with 3 calibration wells between every 5 wells

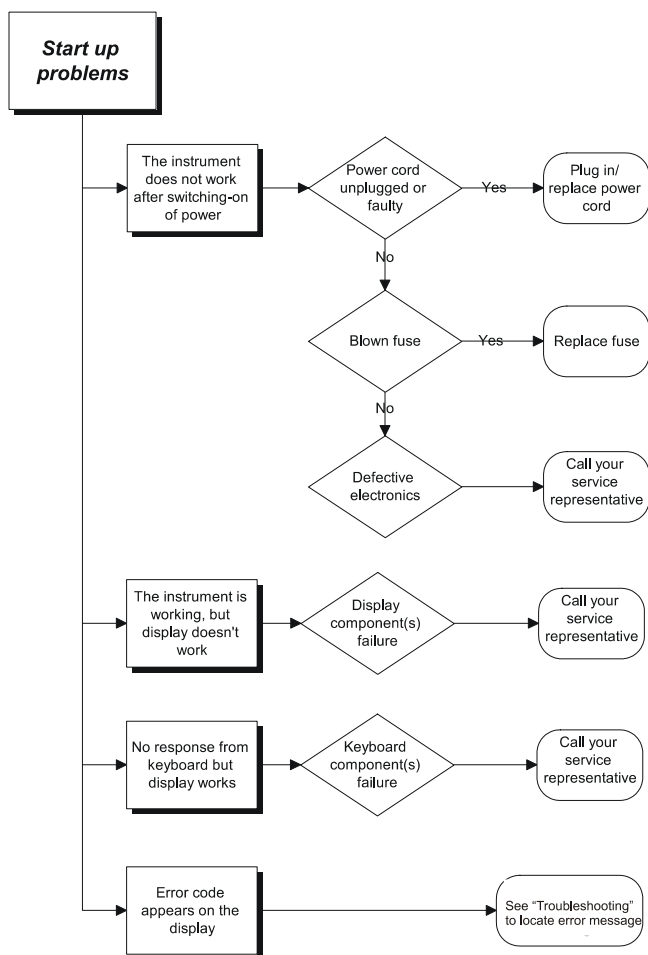
Programming Options

[illegible]

Programming Options

	Ready Menu						◀ [Menu] ▶					
	<Exchange>	<Wash>	<Sry End>	<ULTS>		<SERIAL>	<SSV>**	<COOL>**	<SERVICE>			
				<Copy>	<Erase>	<Log>	<Default All>					
	Move Plates Move Lifts Adjust Plate Height	Perform standard wash	Move syringe	Copy method	Erase methods & Userprog	Log-book	All methods erased, all settings to default	Comm. protocol	Prime solvent valve	Cool ON/OFF Setpoint Switch ON/OFF		
										Service Mode		
[System]	System Settings										◀ [Menu] ▶	
	<GENERAL>		<USAGE>		<PLATES>		<IO>		<CLOCK>		<COMM.>	
	Loop volume Needle tubing Syringe volume Needle Height Skip missing wells Air segment Headspace pressure Time base display Key click Error buzzer Alarm buzzer		Method protection code Use time base method Use mix method Use user-program User-program protection code Use labeled wells Use templates Use calibration wells		Type of plate Process in ROWS/ COLUMNS Number of transport vials		Inj. Marker pulse Well marker pulse Lab. Well marker pulse Input edge next inj. Input edge next vial Freeze input active Reset outputs after series		System clock Date Time		Device identifier	
Method	METHODS PROGRAMMING											
	<TEMPLATE>		<METHOD>							<USERPROG>		
	User prog* or Mix method injection Wash method Timebase method*		METHODS <INJECTION>				<WASH>		<TIMEBASE>*		<MIX>*	
			Injection Methods				Wash volume Wash between: –Series –Wells –Injections		Timebase program: 4x AUX 1 4x AUX 2 4x AUX 3 4x AUX 4 4x ISS 8x SSV 8x CODE OUT END TIME		Mix method: ASPIRATE –sample –destination –air –reagent DISPENSE –sample –destination –waste –reagent REPEAT Wait Wash	
			<FULL>				<PARTIAL>		<PICK-UP>			
			Analysis time Flush volume Injection/well				Analysis time Flush volume Injection/well Inj. volumes		Analysis time Injection/well Inj. volumes			
[Series]	With Templates Template Use calibration wells (yes/no) * – calibration wells – calibration interval Sample Wells Destination wells * Reagent wells * Labeled wells *		Without Templates User program (yes/no) or Mix method* Injection method Wash method Timebase method* Use calibration wells (yes/no)* – calibration wells – calibration interval Sample Wells Destination wells * Reagent wells * Labeled wells *									
[Start/ Stop]	First series Last series <START> <REMOTE>											
[Priority]	Template Well number		Injection Method Wash method Timebase method Well Number									
[Interrupt]	Not Used											
[Help]	Context and status sensitive help screen (if available)											

Maintenance and Troubleshooting



Analytical problems

In case of analytical problems you will have to determine whether they are caused by the autosampler or by the rest of the system.

NOTE:

Quick check!

Replace the valve with a manual injection valve to discriminate between valve problems and other problems.

Perform a number of manual Full loop injections. If the results are good, the autosampler is faulty; if not, the HPLC system should be checked.

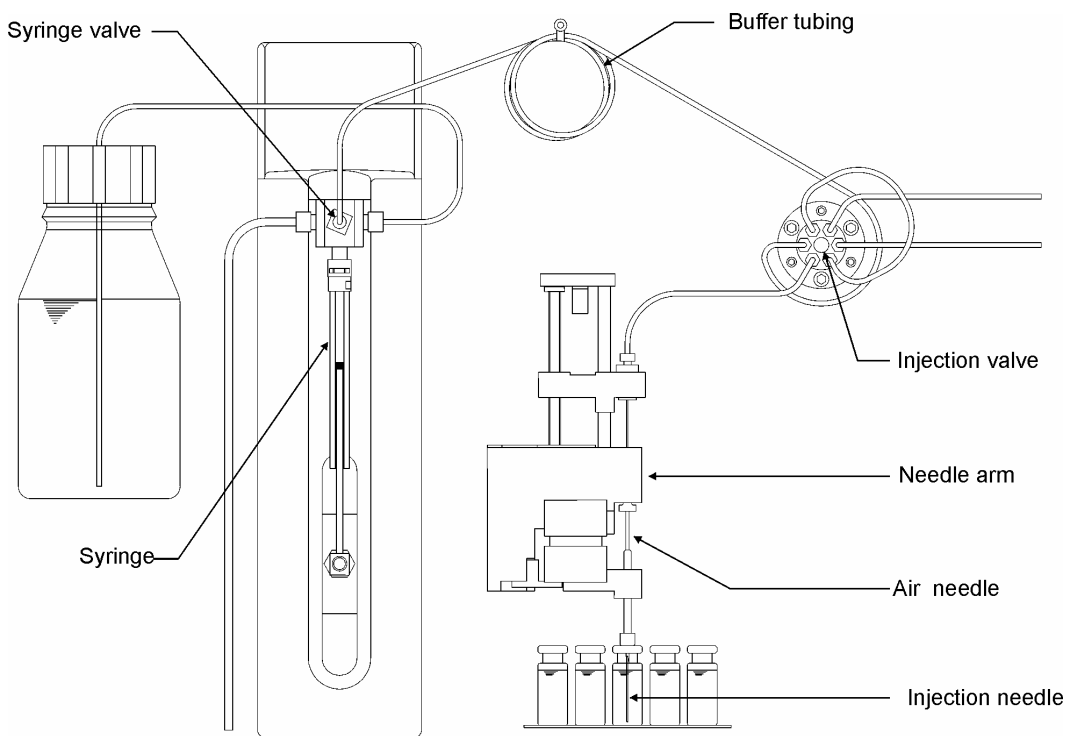
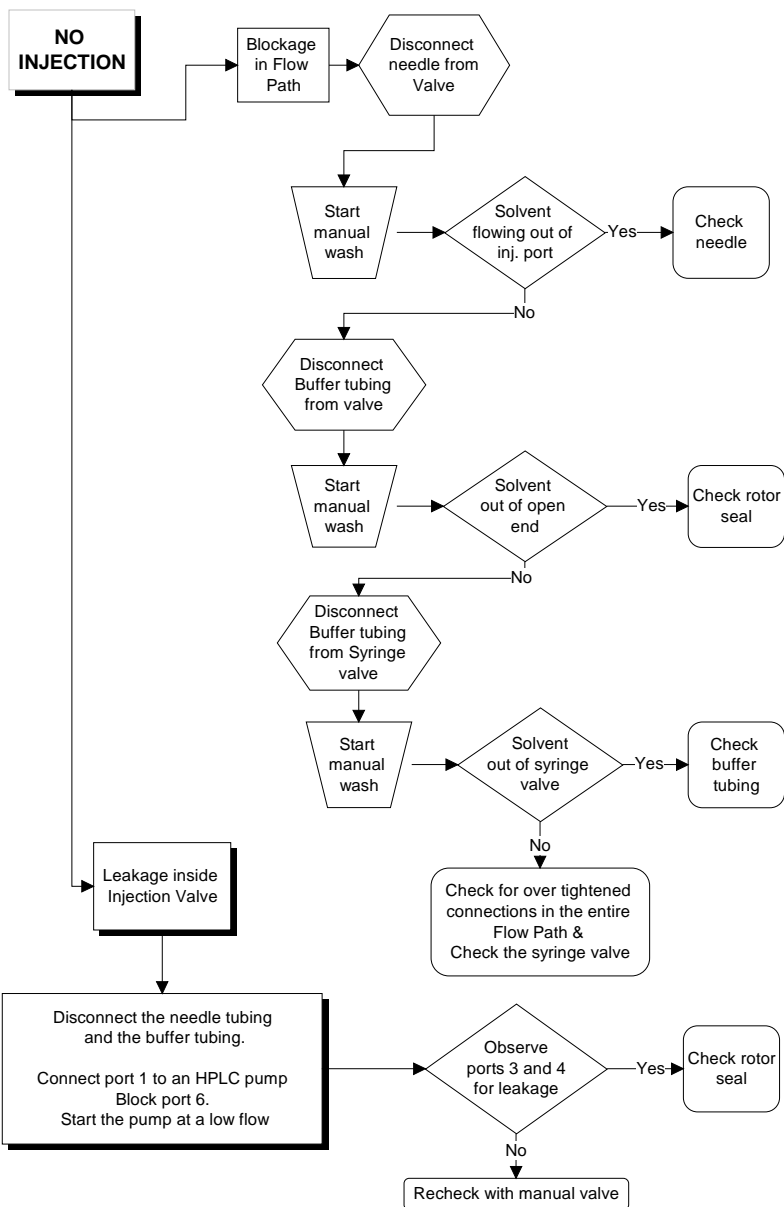
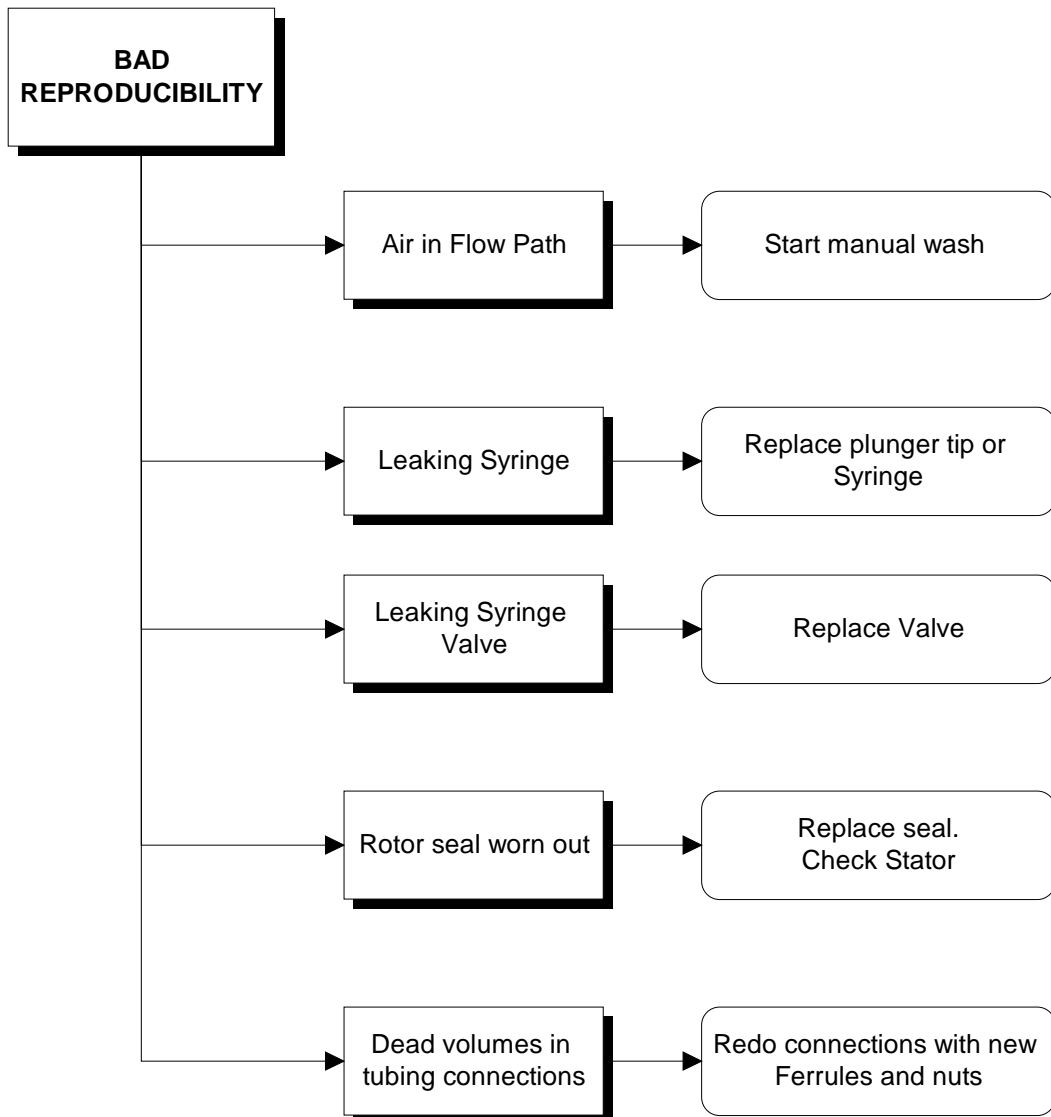


Figure 13 Fluidics Diagram

In the flowcharts on the next pages it is assumed that the ProStar 430 does not display any error messages.

Please keep in mind that analytical problems might be caused by external influences, like temperature and/or light-sensitive samples. For this reason it is important to make sure that the application was running without problems before and that no changes have been made in the settings (System Menu).





Error Codes

The ProStar 430 will display an **error message** if the user tries to enter invalid data. Information on the allowed range will be displayed. If something goes wrong in the physical operations of the ProStar 430, an **error code** will be displayed. Press the **Start/Stop** key twice to lift the message and try to repair the failure condition with the help of the explanation of the code concerned.

Injection Valve and ISS Unit

ERROR 11	Injection valve is not in a valid position.
ERROR 12	The injection valve did not switch within 1.5 seconds.
ERROR 13	The switching time of the injection valve exceeds 500 msec.
ERROR 14	ISS valve is not in a valid position.
ERROR 15	The ISS valve did not switch within 1.5 seconds.

Syringe Dispenser Unit

ERROR 21	The syringe valve did not switch.
ERROR 22	The syringe did not reach home position in time.
ERROR 23	The syringe spindle did not make the correct number of rotations.
ERROR 24	The spindle does not rotate.
ERROR 25	The syringe valve did not find a valid position.

Injection Needle Unit

ERROR 30	The sample needle arm did not reach or leave home position (vertical).
ERROR 31	The sample needle arm is in an invalid horizontal position while moving down.
ERROR 32	The sample needle arm did not reach or leave destination within a certain time (horizontal).
ERROR 34	Sample needle arm not in vertical home position while moving horizontally.

ERROR 39	Vial sensor sticks.
ERROR 40	The sample needle spindle does not rotate correctly.
ERROR 41	The sample needle did not reach or leave home position.
ERROR 42	The sample needle is not at home position.
ERROR 53	The sample needle arm is not in the home position while moving the plate.

Plate

ERROR 59	Missing plate.
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Vials

ERROR 60	Missing vial. Only available when Skip Missing Vial is set to NO in the System Settings and during the execution of the Mix of a sample on 48-vial plate.
ERROR 62	Missing transport vial.
ERROR 64	Missing vial for reagent A.
ERROR 65	Missing vial for reagent B.
ERROR 66	Missing vial for reagent C.
ERROR 67	Missing vial for reagent D.
ERROR 68	Missing destination vial.
ERROR 69	Not enough transport liquid available due to missing transport vials.

Electronics

ERROR 71	Flexprint of the sample needle is not connected.
ERROR 72	Invalid configuration of the ProStar 430, PCB missing.
ERROR 73	Current limit of the external I/O exceeded.
ERROR 75	Error occurred during initialization, the ProStar 430 cannot start.

Plate holder

ERROR 90	Plate home time-out, plate did not reach home position (home error).
ERROR 91	Plate did not reach or leave home position during run.
ERROR 92	Plate holder missing.
ERROR 93	Dirt on the plate holder.

Appendix

Specifications

General

Working temperature	5 - 40°C
Storage temperature	-25 / +60°C
Humidity	20 - 80% RH
Sample viscosity	0.1 - 5 cP
Sample capacity	1 plate + 4 x 10 mL vials.
Plates (refer to figure B.1)	types: 48-vials, 96-low, 96-high, 384-low Max. height: 47 mm (incl. cap); min. height: 12.5 mm (incl. cap). Note: Select high (height per plate 42 mm) or low (height per plate 14.5 mm) plate in System Menu.
Vial dimensions	6 x 8 vials, dimensions base plate 128 x 85,8 mm Maximum outer diameter for each of 48-vials: 12 mm
Reagent/transport vials	Dimensions 10 mL vials: 22 x 47 mm (incl. cap); min. 40 mm (incl. cap)
Loop volume	5-1000 µL
Puncturing accuracy needle	± 0.5 mm
Pre-puncturing septa/caps	With air needle, dual needle action
Plate & height detection	Missing plate & height detection by vial sensor

Plate tray drive	> 5 cm/sec
Switching time injection valve	Electrically < 100 msec
Headspace pressure	Built-in compressor
Wash solvent	250 mL internal wash solvent bottle
Dispenser syringe	100 µL , 250 µL (standard), 500 µL, 1000 µL, or 10 mL
Wetted parts	SS316, PTFE, TEFZEL, VESPEL, Glass, Teflon (Optional PEEK, Fused silica)

Analytical performance

Capped and Seal Vials

Reproducibility

full loop injections	RSD \leq 0.3 %
partial loopfill injections	RSD \leq 0.5 %, injection volumes > 5 µL, with headspace pressure on the vial and 30 µL pre-flush with air segment.

Open vials/plates, valid at 1.0 cP:

Reproducibility

full loop injections	RSD \leq 0.3 %
partial loopfill injections	RSD \leq 0.5 %; injection volumes > 5 µL, without headspace pressure on the vial and 30 µL pre-flush with air segment.
µL pick-up injections	RSD \leq 1.0 %; injection volumes > 5 µL. without headspace pressure on the vial.

Memory Effect

< 0.01 % with programmable needle wash

Programming

Injection methods	Full loop injections Partial loopfill injections
Injection volume	5 µL - 1 mL, full loop, depending on system settings 1 - 500 µL, with 0.1 µL increments for partial loopfill 1 µL - max. volume, with 0.1 µL increments for µL pick-up max. volume = ((loop volume - 3 x needle volume)/2)
Injections per vial	Max. 9 (volumes are programmable for each injection)
Analysis time	Max. 9 hrs. 59 min. 59 sec.
Needle wash	Programmable (between injections, wells or series)
Priority sample	Freely programmable
Series	Freely programmable, 24 series max.

Physical

Dimensions (W x D x H)	280 mm x 400 mm x 440 mm
Weight	23 kg 26 kg if cooling option is installed

Electrical

Power requirements	115 Vac; + 15/-20 %; 50 Hz/60 Hz; 250 VA 230 Vac; + 15/-20 %; 50 Hz/60 Hz; 250 VA
Fuses	For 115 Vac; two 5.0 T-Type fuses (¼" x 1¼", UL/CSA) For 230 Vac; two 2.5 AT-fuses (5 x 20 mm, IEC 127) All fuses UL-listed and CSA-certified

Communication

OUTPUTS

Inject marker
Well marker
Labeled well marker
Stop I/O
4 Auxiliary outputs
2 Programmable outputs
Alarm output
4 Bit timebase

INPUTS

Next injection input
Next well input
Freeze input
Stop I/O
4 Programmable inputs

Options

Sample cooling

Built-in Peltier cooling processing unit
Programmable Range : 4° C - 40° C
Cooling capacity: Ambient -12° C (measured on cooling plate)

Integrated stream switching (ISS)

One optional high pressure 6-port valve

Solvent selection valve (SVV)

6-way integrated solvent selection valve

Options and Accessories

The following accessories are available for the ProStar 430:

Part Number	Description
R000088050	Needle wash insert vial
R000088051	Needle body
0391478800	Operation Manual
0392611060	Valco Injection Valve
0392611061	Valco Biocompatible Injection Valve
0392607967	Flanged tube fitting 1/8 (pck/5)
0392607968	Flanged tube fitting 1/16 (pck/5)
0392607831	Plunger replacement tip 100 μ L (pck/10)
0392607832	Plunger replacement tip 500 μ L (pck/10)
0392607964	Plunger replacement kit 1 mL (pck/10)
R000088052	Sample needle including tubing ferrules and nuts
R000088064	Serum sample needle including tubing ferrules and nuts
R000088068	Peek sample needle including tubing ferrules and nuts
0392607835	Silica-coated/steel sample needle including tubing ferrules and nuts
0392607836	Silica-coated/steel serum needle including tubing ferrules and nuts
R000088065	Sample needle extra long including tubing ferrules and nuts
0392607837	Serum sample needle extra long including tubing ferrules and nuts
R000088066	Peek sample needle extra long including tubing ferrules and nuts
0392607838	Fused silica needle including tubing ferrules and nuts
0392607839	Fused silica needle extra long including tubing ferrules and nuts
0392607804	Buffer tubing 500 μ L

Part Number	Description
0392607805	Buffer tubing 2000 µL
0392607971	Syringe waste tubing
0392607972	Syringe wash tubing
0392607847	Buffer tubing 15 mL
R000088053	Air/prepuncturing needle
0392607963	Plunger replacement tip 250 µL (pck/10)
0392607848	Shipkit ProStar 430
0392607908	Syringe valve
0392607922	Luerlock connection syringe valve
R000088055	Wash solvent bottle 250 mL
0392607962	Syringe 1000 µL
R000088067	Syringe 10 mL
R000088057	Syringe 100 µL
0392607810	Syringe 250 µL
R000088059	Syringe 500 µL
0190018200	5 µL SS Loop for Valco Valve
0190018202	20 µL SS Loop for Valco Valve
0392611011	50 µL SS Loop for Valco Valve
0190018204	100 µL SS Loop for Valco Valve
0392611012	250 µL SS Loop for Valco Valve
0190018205	500 µL SS Loop for Valco Valve
0392611013	1000 µL SS Loop for Valco Valve
0392611014	2000 µL SS Loop for Valco Valve
0392611015	5000 µL SS Loop for Valco Valve
0392611016	10 mL SS Loop for Valco Valve
0392611017	20 µL PEEK Loop for Valco Valve

Part Number	Description
0392611018	50 µL PEEK Loop for Valco Valve
0190018208	100 µL PEEK Loop for Valco Valve
0392611019	250 µL PEEK Loop for Valco Valve
0392611020	500 µL PEEK Loop for Valco Valve
0392611021	1000 µL PEEK Loop for Valco Valve
0392611022	2000 µL PEEK Loop for Valco Valve
2869450201	Package of 10 Valco Ferrules
2869450101	Package of 10 Valco Nuts
0392607983	Valco Fingertight PEEK Nut
0392607984	Valco Fingertight PEEK Ferrule

The following Plates and Inserts are available for the ProStar 430.

Part Number	Description
0392607760	350 µL Round Well Titer Plate Polypropylene 50/box
0392607761	1 mL Round Well Titer Plate Polypropylene, 50/box
0392607762	350 µL Square Well Titer Plate Polypropylene, 50/box
0392607763	1 mL Square Well Titer Plate Polypropylene, 50/box
0392607764	2 mL Square Well Titer Plate Polypropylene, 50/box
0392607765	Piercible Round Well Sealing Cap Polypropylene, 50/box
0392607766	Piercible Square Well Sealing Cap Polypropylene, 50/box
0392607767	300 µL Glass Insert with Snap Cap for 03-926077-61, 100/box
0392607768	300 µL Glass Insert for 03-926077-61, 100/box
0392607769	Snap Caps for Glass Inserts, 100/box
0392607770	384 Well Polypropylene Plates 50/Box