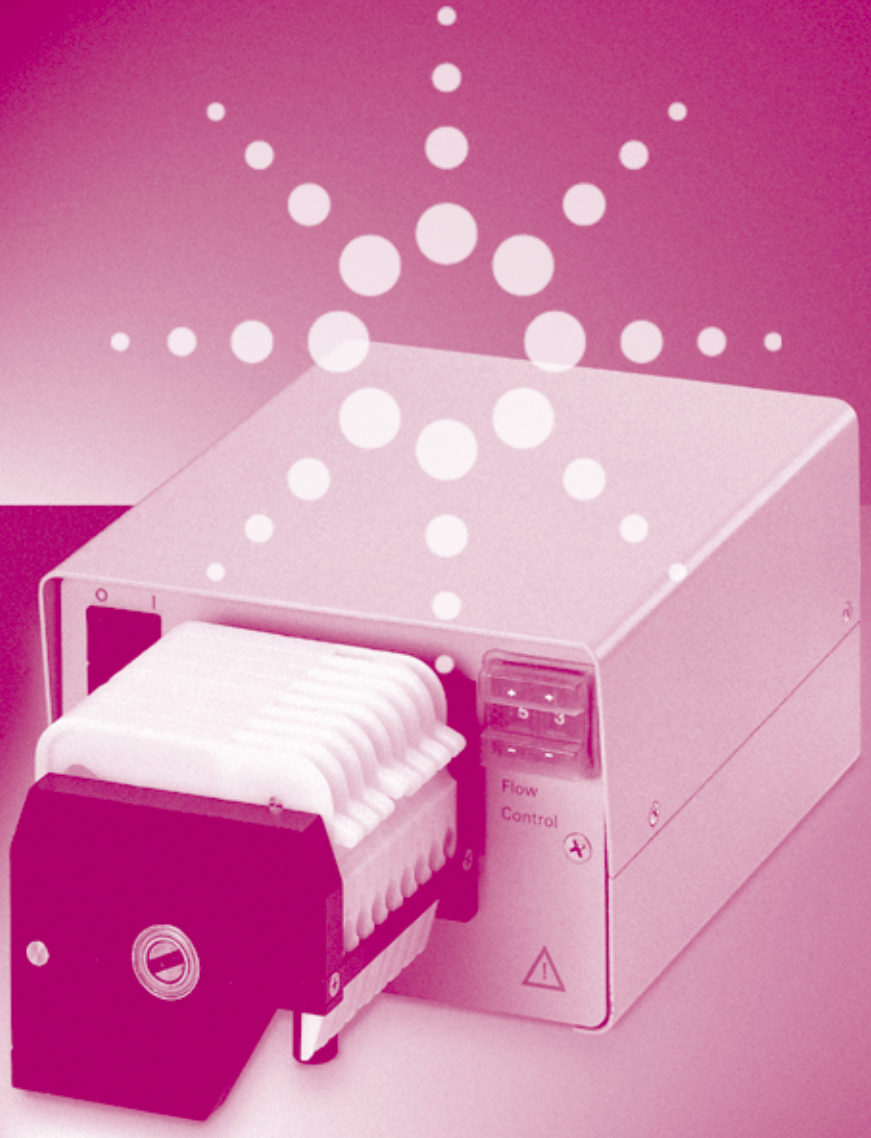
Agilent 89092A Multichannel Pump

User's Guide



Agilent Technologies
Innovating the HP Way

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WARNING

For details of safety, see Safety Information on page 39.

Warning Symbols Used In This Book

The apparatus is marked with this symbol when the user should refer to the instruction manual in order to protect the apparatus against damage.

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User's Guide

About This Guide

This guide describes how you install, operate, and maintain your Agilent 89092A Multichannel Pump.

- Chapter 1 “Installing Your Pump”
- Chapter 2 “Operating Your Pump”
- Chapter 3 “Maintaining Your Pump”
- Chapter 4 “Servicing Your Pump”
- Chapter “Safety Information”

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Legal, Safety and Warranty Information

1

Installing Your Pump

Installing Your Pump

The Agilent 89092A Multichannel Pump is an eight channel peristaltic pump for the Agilent 8453 UV-visible spectrophotometer for multiple simultaneous sampling. It can be operated either remotely or manually.
The pump operates on 100–120 VAC or 220–240 VAC and delivers flow up to ≈13 ml/min and 2 bar from each channel. The pump has a pressure-wheel assembly for up to eight tubing-cassettes. The pump can be remotely controlled to start and stop, and change direction, or it can be operated manually from the front panel.

Table 1 **Technical Specifications**

Power Supply	100–120 VAC, 50–60 Hz
	220–240 VAC, 50–60 Hz
Flow Rate	2 to ≈13 ml/min, with 2.06 mm i.d. tubing
Speed	1 to 67 rpm, CW or CCW
Pumping Distance	up to 7 m
Pumping Pressure	up to 2 bar (30 psi)
Operating Temperature	0 to 40 °C
Non-Operating Temperature	-40 to 65 °C

Viewing the Pump

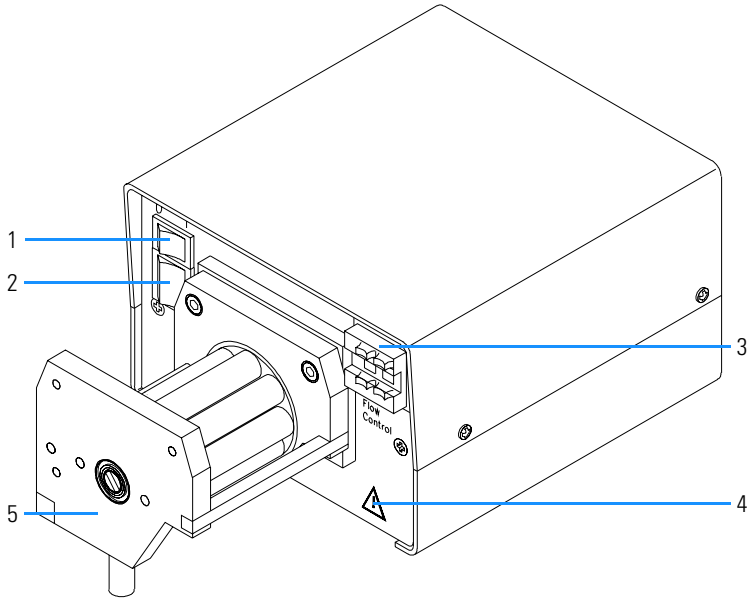
The pump has three functional parts:

- Controls
- Cable connectors
- Cassettes

Controls

The front panel controls are a line power switch (1), a three-position control switch (2), a flow control switch (3), and a safety symbol (4). See Figure 1.

Figure 1 **Front View of the Pump**



The pressure-wheel assembly (5) for the tubing-cassettes is on the front of the pump.

CAUTION

Do not touch the pressure-wheel assembly when it is turning. Your fingers may become trapped. The safety symbol  indicates a potential hazard to the user and pump during operation.

ACHTUNG

Berühren Sie den Pumpenkopf nicht, während die Förderrollen sich drehen, da die Finger in die Mechanik eingezogen werden können. Das Sicherheitssymbol  auf der Vorderseite des Gerätes weist auf diese potentielle Gefahr für den Benutzer hin.

PRECAUCION

No toque el conjunto rotor-presurizador mientras éste gira. Ello podría atrapar sus dedos. El símbolo de seguridad  en el panel frontal indica un riesgo potencial para el usuario y para la bomba durante la operación.

ATTENTION

Ne touchez pas le cylindre de pompe lorsqu'il est en mouvement. Vos doigts peuvent s'y prendre. Un symbole de sécurité,  sur le panneau avant indique les risques encourus par l'utilisateur pendant l'operation.

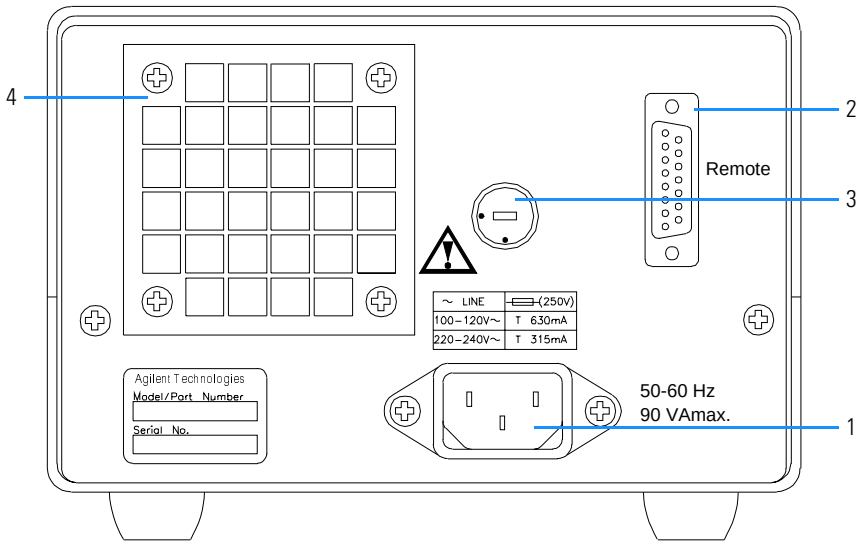
PRECAUZIONE

Non toccare la ruota della pressione quando sta girando; le dita potrebbero rimanere intrappolate. Il simbolo di sicurezza  sul pannello frontale, segnala un rischio potenziale per l'operatore e per la pompa, durante il funzionamento.

Cable Connectors

The rear panel has a power socket (1), a remote cable connector (2), a line voltage selector (3), and a fan outlet (4). See Figure 2.

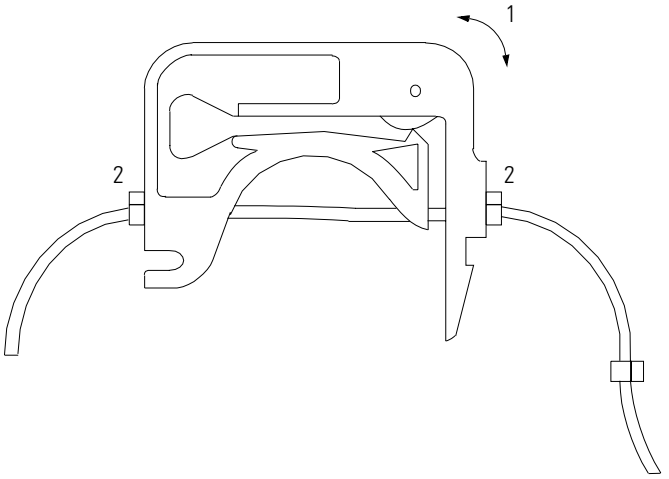
Figure 2 **Rear View of the Pump**



Cassettes

The tubing-cassette has a pressure control lever (1), and slots for the tubing with locating holes for the fixing-collars (2). See Figure 3.

Figure 3 **Tubing-Cassette**



Installing Your Pump

Installing the pump comprises 3 stages:

Stage 1 Installing cables in the pump

Stage 2 Installing tubing in the cassette

Stage 3 Installing tubing-cassette in the pump

Stage 1: Installing Cables

The voltage selector and cable connectors are on the rear panel. See Figure 2 for details.

WARNING **Make sure line-power cord is disconnected before changing line-voltage setting.**

WARNUNG **Wenn der Netzspannungswahlschalter betätigt wird, darf das Netzkabel nicht angeschlossen sein.**

CUIDADO **Asegúrese que el cable de red est desconectado antes de cambiar el selector de voltaje.**

ATTENTION **Assurez-vous que le câble secteur n'est pas connecté avant de changer la tension d'alimentation.**

ATTENZIONE **Assicuratevi che il cavo di alimentazione sia scollegato prima di spostare il selettore di voltaggio.**

WAARSCHUWING **Zorg dat de voedingskabel losgekoppeld is, voordat de voedingsspanning wordt veranderd.**

1 Set the correct voltage option (110 V or 220 V) for operation from your line power supply.

2 Push connector of power cord into line power socket.

3 Push connector of the MCP-remote cable (part number 5062-2409) into the remote control connector on the rear of the pump. When this cable is connected, the control switch on the front panel does not function. This prevents you using the pump manually during automatic operation.

Stage 2: Installing Tubing

The tubing for the pump is 2.06 mm i.d. The pump includes one pack of tubing, 12 pieces per pack (part number 5041-2166). There are three fixing-collars on each piece of tubing. This allows you to use the tubing in two positions. See Figure 3 for details.

1 Move the pressure control lever (1, Figure 3) of the tubing-cassette clockwise to the right-most position, that is, the lever is horizontal.

2 Put the pump tubing in the tubing-cassette, locating the fixing-collars (2) on each side of the cassette in the locating holes. Make sure that the fixing-collars are pointing upwards and the tubing cannot slide out of the cassette.

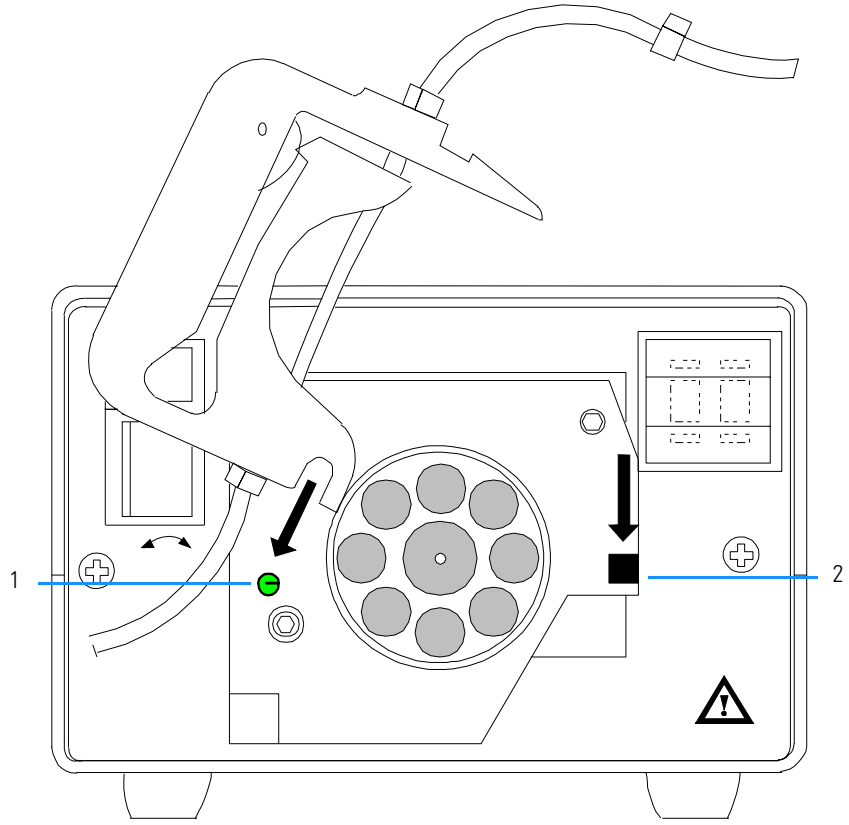
3 Repeat for each of the cassettes.

Stage 3: Installing Tubing-Cassette

1 Make sure the pressure control lever (1, Figure 3) of the tubing-cassette clockwise is in the right-most position, that is, the lever is horizontal.

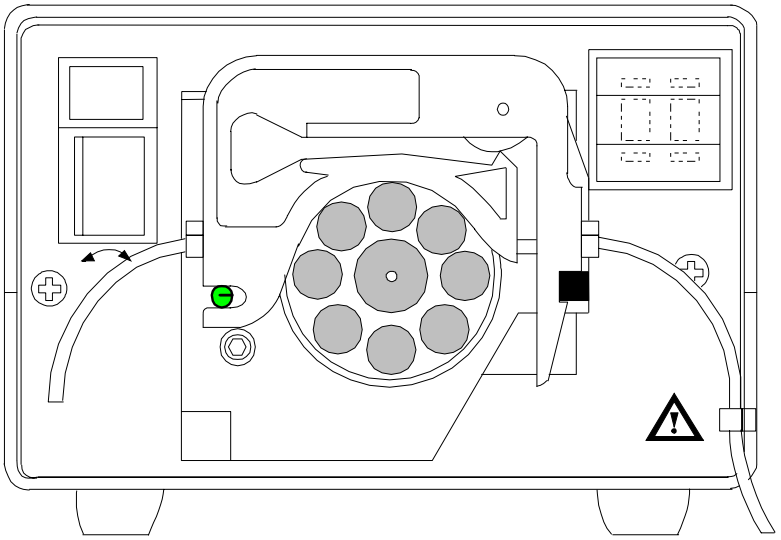
2 Put the tubing-cassette on the pressure-wheel assembly by placing the cassette on the mounting pivot (1 in Figure 4).

Figure 4 **Placing Tubing-Cassette**



3 Press the cassette down to lock the right side onto the locking-bar (2).

Figure 5 **Tubing-Cassette in Position**



4 Repeat for each of the cassettes.

5 Connect the pump tubing to the other accessories. See relevant manual, for example, *Setting Up and Validation* for the Agilent 89550A Automated Dissolution Testing System.

You are now ready to operate your pump. See Chapter 2 “Operating Your Pump”.

2

Operating Your Pump

You may operate the pump remotely or manually with or without the MCP-remote cable. Before using the pump with the remote cable adjust the flow rate as described in the next section.

Adjusting Flow Rate

1 Remove the MCP-remote cable from the remote connector at the rear of the pump.

2 Turn on the line power at the line switch on the front of the pump.

3 Place the left end of the tubing in a reservoir of liquid.

4 Place the right end of the tubing in a empty waste beaker.

5 Press the control switch on the front panel to the right to pump clockwise.

6 Set the flow control to about 60.

7 Adjust the pressure control lever stepwise until liquid flows. Increase the pressure 2 to 3 steps to ensure constant flow.

NOTE

You will need to adjust the pressure control level from time to time to maintain constant flow. When you cannot increase the pressure further, use the second part of the tubing or replace it. See “Stage 2: Installing Tubing” on page 14.

8 Change the flow setting for the desired flow rate according to Table 2.

Table 2 **Flow Settings**

Flow Setting	Approximate Flow Rate
40	6.0 ml/min
60	8.5 ml/min
80	1.5 ml/min

9 Reconnect the MCP-remote cable to the remote connector to enable remote operation from the Agilent 8453 spectrophotometer.

For operating the pump through the MCP-remote cable from the Agilent 8453 spectrophotometer, see the appropriate manual.

3

Maintaining Your Pump

Maintenance tasks that you can do on your pump

Maintaining Your Pump

Maintenance of the pump is divided into four parts:

1. Removing the tubing-cassette for changing tubing.
2. Changing the pressure-wheel assembly.
3. Replacing a worn or broken drive belt.
4. Changing the fuse.

Order numbers for replacing parts are shown in Table 3.

Table 3 **Replacement Parts**

Part Number	Description
5041-2166	Pump Tubing (pack of 12)
5041-2167	Cassette (to hold tubing in pump)
5062-2409	MCP-Remote Cable
89092-69001	Drive Assembly, 110 V
89092-69002	Drive Assembly, 220 V
89092-60003	Pressure-Wheel Assembly
89092-60004	Drive Belt
2110-0458	T500 mA fuse for 220 VAC operation
2110-0457	T1 A fuse for 110 VAC operation

Removing Tubing-Cassette

You may want to change the pump tubing for different applications, or when it becomes worn. You must remove the tubing-cassette to change the tubing.

WARNING **Make sure the line-power cord is disconnected before removing the tubing-cassettes.**

WARNUNG **Bitte den Netzstecker ziehen, bevor die Schlauchkasetten entnommen werden.**

CUIDADO **Asegúrese que el cable de red está desconectado antes de retirar el cartucho soporte del tubo.**

ATTENTION **Assurez vous que le cordon secteur est déconnecté avant d'enlever les porte-tubes.**

ATTENZIONE **Verificare che il cavo di alimentazione sia scollegato prima di rimuovere le cassette dei tubi.**

1. Release the tubing-cassette from the right side of the pressure wheel by pressing the snap-lock lever to the left and upwards of the locking-bar.
2. Remove the tubing-cassette from the mounting pivot on the left side of the pressure wheel by lifting upwards.
3. Remove pump tubing. Release the fixing-collars on each side of the cassette from the locating holes. Slide the tubing out of the cassette. See "Stage 2: Installing Tubing" on page 14 for replacing the tubing, and "Stage 3: Installing Tubing-Cassette" on page 14 for replacing the tubing-cassette.

Changing Pressure-Wheel Assembly

It may be necessary to replace the pressure-wheel assembly when it becomes worn or damaged. Also there are a number of reasons why it may be necessary to replace the drive assembly:

- A new fuse blows immediately.
- Pump does not work in manual operation.
- Pumping speed is not steady.

Removing Pressure-Wheel Assembly

See Table 3 for the part numbers for exchanging the pressure-wheel assembly and drive assembly. For exchanging either part you remove the pressure-wheel assembly.

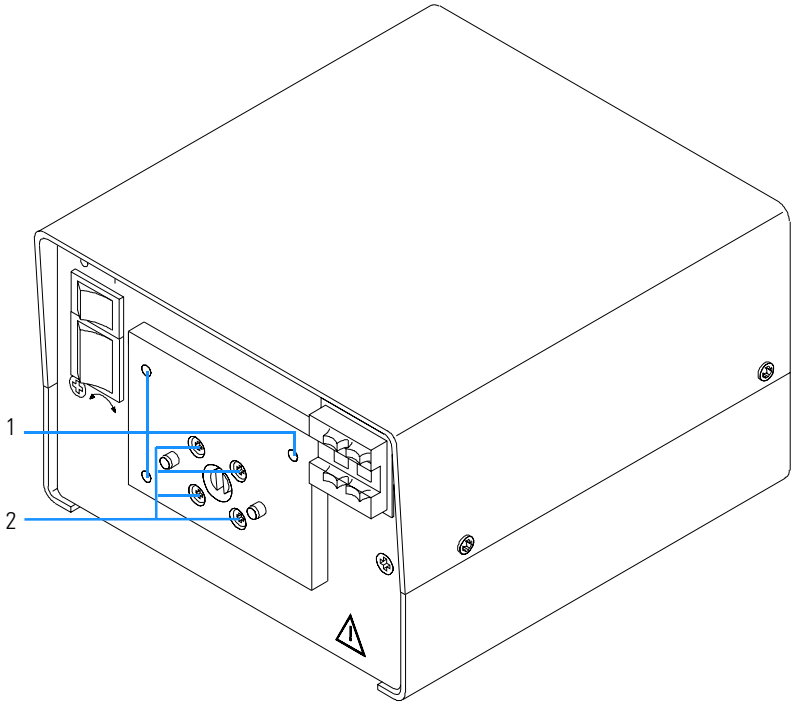
Tool required:

❑ Hexagonal key, 3 mm, to remove pressure wheel.

1 Remove the tubing-cassettes, see “Removing Tubing-Cassette” on page 21.

2 See Figure 6 (1) for the position of the screw holes to aid in locating the screws. Using a 3 mm hex key, unscrew the three screws holding the pressure-wheel assembly to the front of the pump.

Figure 6 **Pump with the Pressure-Wheel Assembly Removed**



3 Pull the pressure-wheel assembly from the front mounting.

Replacing Pressure-Wheel Assembly

1 Place the pressure-wheel assembly on the front mounting. You may need to use a flat-tip screwdriver to turn the drive shaft of the pressure-wheel assembly to align it with the flange in the front of the power housing.

2 Screw the three screws through the pressure-wheel assembly to the front of the pump, using a 3 mm hex key.

Changing Drive Belt

If the pressure wheel does not rotate the drive belt may be broken. If the speed is not steady the drive belt may be worn. You must change the drive belt if it is broken or worn.

Tools required:

- ❏ Phillips screwdriver to remove screws on cover.
- ❏ Slot screwdriver to remove drive belt.

To change the drive belt you remove the pressure-wheel assembly, the pump housing cover, and the gear box mounting-plate.

1 Remove the pressure-wheel assembly, see “Removing Pressure-Wheel Assembly” on page 22.

2 Remove pump housing cover. Using a Phillips screwdriver, unscrew the four screws holding pump housing top cover, as shown in Figure 7. Lift the cover upwards to remove the top cover.

CAUTION

The boards contain electronic parts that are sensitive to electrostatic discharge. Do not attempt to install boards, unless you use a portable grounding kit (part number 9300-0794). Do not touch any of the components on the boards. Do not place boards on any plastic or plastic-coated surface.

ACHTUNG

Die Leiterplatten enthalten elektronische Bauteile, die gegen elektrostatische Entladung empfindlich sind. Verwenden Sie daher bei der Installation der Leiterplatten immer ein elektrostatisches Erdungskit (Teilenummer 9300-0794). Fassen Sie keine Bauteile auf den Karten an. Legen Sie die Karten nicht auf Plastikoberflächen.

PRECAUCION

La tarjeta contiene componentes electrónicos que son sensibles a las descargas eléctricas. No intente instalar esta tarjeta a no ser que utilize un equipo portable de puesta a tierra (9300-0794). No toque ninguno de los componentes de la tarjeta. No coloque la tarjeta sobre ninguna superficie de plastico o plastificada.

ATTENTION

La carte porte des composants électroniques qui sont sensibles aux décharges électrostatiques. N'essayez pas d'installer cette carte sans l'ensemble portable de mise à la terre (9300-0794). Ne touchez aucun des composants. Ne posez pas la carte sur une surface plastique ou recouverte de plastique.

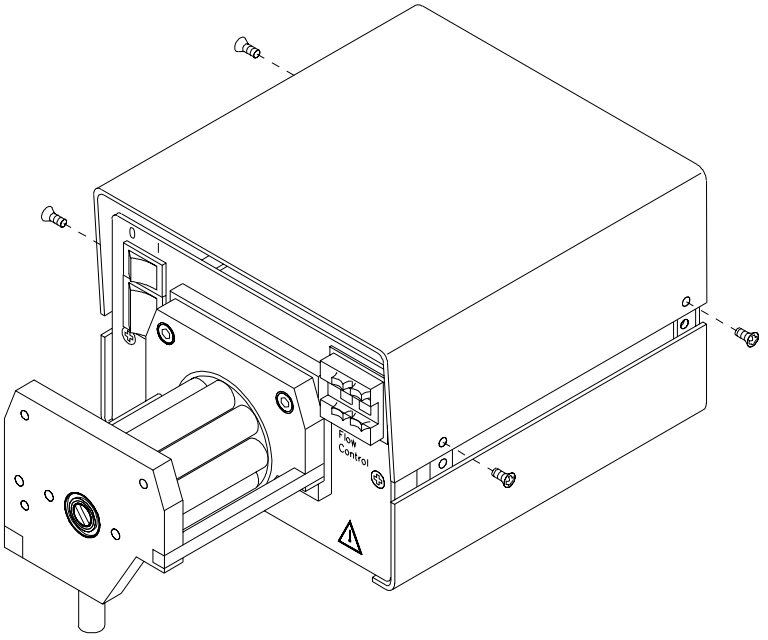
PRECAUZIONE

La scheda contiene parti elettroniche sensibili alle scariche elettriche. Non toccate i componenti della scheda. Non posate la scheda sopra superfici di plastica. Installate la scheda solo con un kit di messa a terra (9300-0794).

VOORZICHTIG

Het board bevat elektronische onderdelen die gevoelig zijn voor elektronische ontlading. Probeer niet om het board te installeren, tenzij u gebruik maakt van een verplaatsbare aardingsset (onderdeelnummer 9300-0794). Geen van de componenten van het board mag ooit worden aangeraakt. Het board mag nooit op plastic of een met plastic gecoate ondergrond worden geplaatst.

Figure 7 **Lifting Pump Housing Cover**



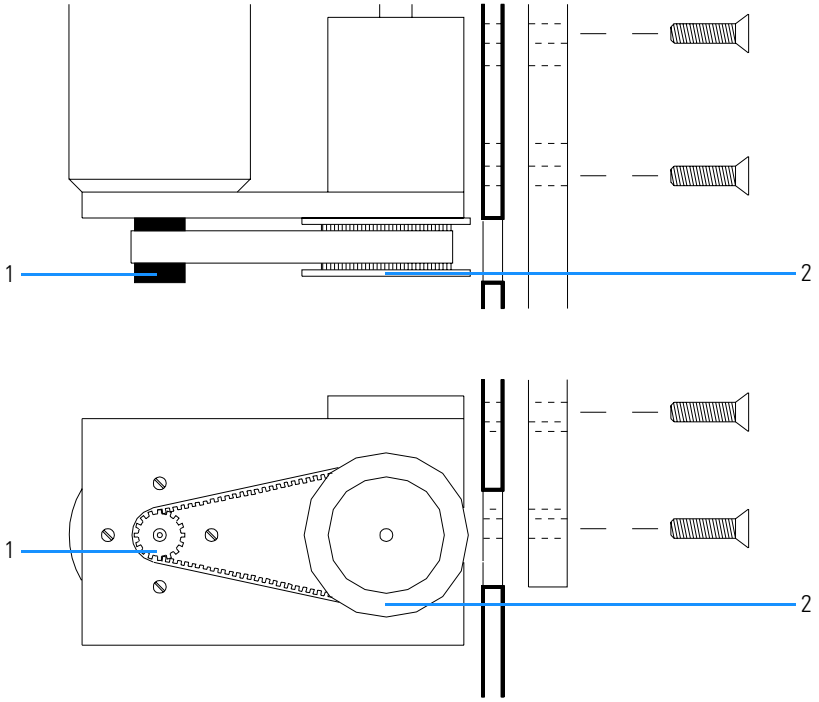
3 Remove gear box mounting-plate. See Figure 6 (2) for the position of the screws holes to aid in locating the screws. Using a Phillips screwdriver, unscrew the four screws holding the gear box mounting-plate to the front of the pump. This releases the gear box and drive belt from the front panel.

Removing Drive Belt

1 Using a slot screwdriver, push the drive belt off the toothed-drive wheel (1, Figure 8), at the same time turning the toothed-drive wheel of the gear box (2, Figure 8).

2 Remove the drive belt from the toothed-wheel of the gear box (2).

Figure 8 **Drive Belt of the Pump**



Replacing Drive Belt

1. Put the drive belt (part number 89092-60004) over the toothed-wheel of the gear box (2).
2. Push the drive belt onto the toothed-drive wheel (1), at the same time turning the toothed-drive wheel of the gear box (2).
3. Replace the gear box mounting-plate. Check Figure 6 for the correct positioning of the plate.
4. Screw the four screws into the gear box mounting-plate, using a Phillips screwdriver.
5. Replace the pump housing cover.
6. Screw the four screws into the top cover, using a Phillips screwdriver, see Figure 7.
7. Replace the pressure-wheel assembly, see “Replacing Pressure-Wheel Assembly” on page 23.

Changing Fuse

If your pump does not work check the fuse. The fuse is behind the power socket. Remove the fuse cover to access the fuse. See Table 3 for the part numbers. Select the correct fuse for the voltage setting you use.

WARNING **Make sure line-power cord is disconnected before installing or replacing a fuse.**

WARNUNG **Sicherungen dürfen nur bei nicht angeschlossenem Netzkabel installiert oder gewechselt werden.**

CUIDADO **Asegúrese que el cable de red está desconectado antes de instalar o cambiar un fusible.**

ATTENTION **Assurez-vous que le câble secteur n'est pas connecté avant de changer un fusible.**

ATTENZIONE **Assicuratevi che il cavo di alimentazione sia scollegato prima di installare o sostituire un fusibile.**

WAARSCHUWING **Zorg dat de voedingskabel losgekoppeld is, voordat een zekering wordt geplaatst of vervangen.**

To change the fuse:

1. Use a screwdriver to open the fuse cover.
2. Remove the fuse and replace with a new one.
3. Close the fuse cover.

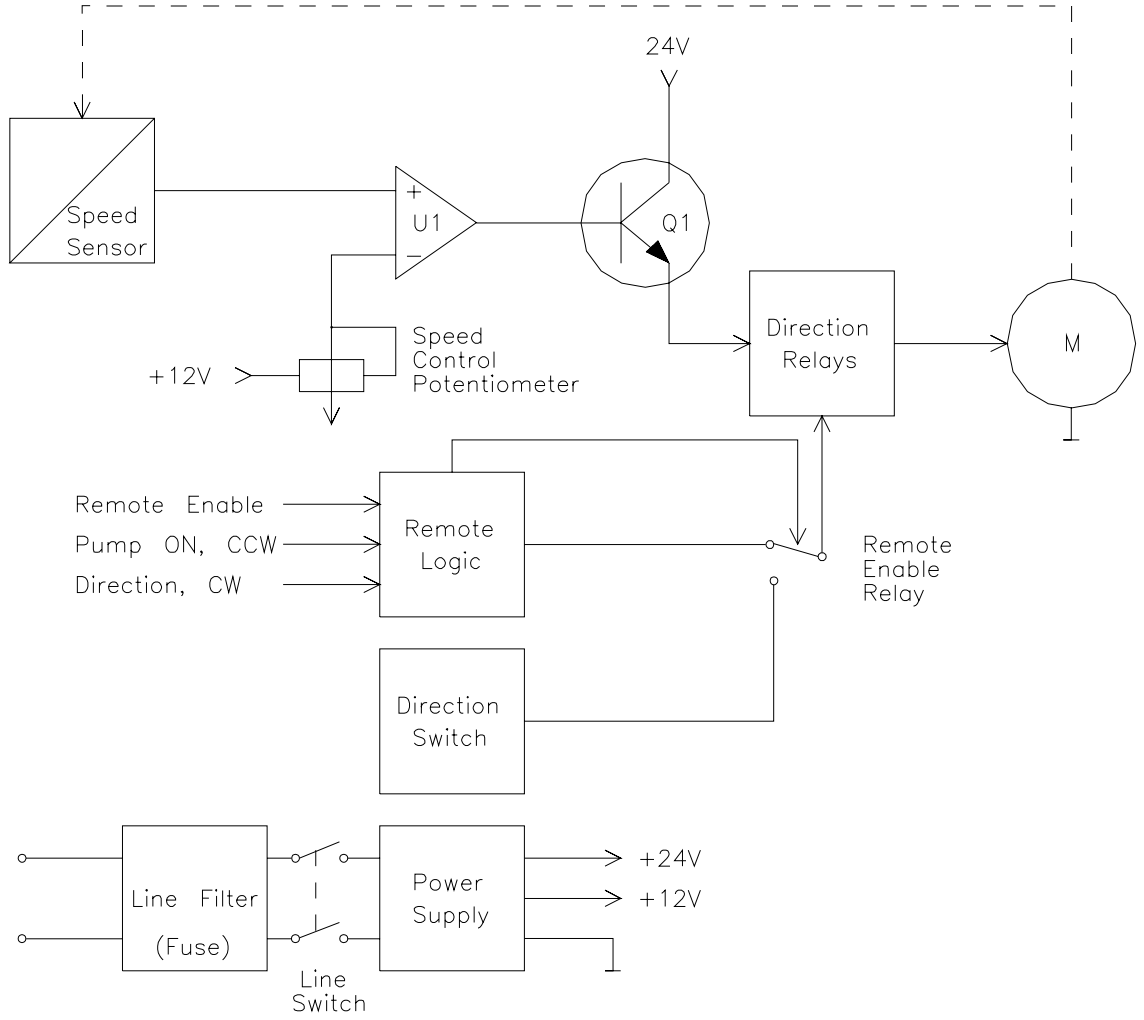
4

Servicing Your Pump

Descriptions of the electronics and procedure for checking remote operation of the pump (for Agilent Technologies service personnel only)

Electronics Description

Figure 9 **Pump Drive Electronics**



A description of the parts in Figure 9 follow in the next sections.

Pump Drive Electronics

Speed Control Potentiometer

The speed control potentiometer gives a set point for the motor speed to the operational amplifier U1. The numbers on the potentiometers are in arbitrary units.

Speed Sensor

The speed sensor consists of a speed generator and an amplifier. The voltage produced is proportional to the cycles of the motor.

Amplifier U1, Transistor Q1, Direction Relays, Motor M

The voltages from the speed control potentiometer are compared with the speed sensor and the result is used to drive the 24 VDC motor M (through Q1 and the direction relays).

Remote Logic, Remote Enable Relay

For remote operation connecting the remote cable to the pump automatically pulls the remote enable line to ground. When this occurs the remote logic connects to the direction relays and the remote lines are used to control the pump. When Pump on, CCW line is pulled to ground the pump turns on in a counterclockwise direction. In addition, when the Direction, CW line is also pulled to ground the pump turns on in a clockwise direction.

For the pin connections see Table 4.

Direction Switch

For manual operation the direction switch, on the front panel, controls the direction of the pump through the direction relays. This switch is operational only when the remote cable is not connected.

Power Supply

The line voltage connects to the line filter, which contains a line fuse. The line voltage feeds through the line switch into the power supply which contains a transformer, rectifier and regulation circuits. A linear voltage regulator controls the +12 VDC line.

Line Fuse

Access to the line fuse in the line filter is from the rear of the instrument.

- ❏ T500 mA (part number 2110-0458) for 220 VAC operation.
- ❏ T1 A (part number 2110-0457) for 110 VAC operation.

Checking Remote Operation

There are three different parts to check the remote operation of the pump:

- ❏ Remote cable
- ❏ Remote cable connector on pump
- ❏ Wiring of MCP-remote cable

Remote Cable

To check the switching capability of the remote plug:

1. Remove the MCP-remote cable from the remote connector on the rear of the pump.
2. Allow the pump to operate. Turn on the pump. Select a direction for pumping by pressing the switch. Set the flow control switch to a value greater than zero.
3. Reconnect the MCP-remote cable, the operation of the pump stops.

Remote Cable Connector

To check the remote function manually:

1. Remove the MCP-remote cable from the remote connector on the rear of the pump.
2. Turn on the pump.
3. Do not allow the pump to operate. Select no direction for pumping by switching to the middle position. Set the flow control switch to a value greater than zero.
4. Using a piece of wire connect:

   pin 3 to pin 1 (ground) for counterclockwise pumping.

   pin 3 and pin 4 to pin 1 (ground) for clockwise pumping.

Wiring of MCP-Remote Cable

The MCP-remote cable is a 1 meter, shielded cable with a 37 pin connector to the GPIO connector on the Agilent 8453 spectrophotometer, and a 15 pin

male connector to the pump and a 9 pin connector to an accessory for using external contacts from the dissolution testing software.

To check the wiring of the remote cable:

1 Remove the MCP-remote cable from the remote connector on the rear of the pump and from the GPIO connector on the Agilent 8453 spectrophotometer.

2 Check for electrical continuity between the connectors on the cable as in Table 4. The other pins in the cable are not connected.

Table 4 **Control Signals for Pump**

Pump Connector Pin Number	GPIO Connector Pin Number	Function
1	10	Ground
2	—	Remote enable (-)†
3	8	Pump On, CCW (-)
4	7	Direction, CW (-)
7		24 VDC
8		0 - 10 VDC
9		Actual speed voltage
10		12 VDC

(-) = active low
† connected to ground

Table 5 **Control Signals for Accessory**

GPIO Connector Pin Number	Accessory Connector Pin Number	Function
1	1	Ground
2	2	Data Line (Out) E1
3	3	Data Line (Out) E2
4	4	Data Line (Out) E3

Legal, Safety and Warranty Information

Warranty Statement

All Chemical Analysis Products

Agilent Technologies warrants its chemical analysis products against defects in materials and workmanship. For details of the warranty period in your country, call Agilent. During the warranty period, Agilent will, at its option, repair or replace products which prove to be defective. Products that are installed by Agilent are warranted from the installation date, all others from the ship date.

If buyer schedules or delays installation more than 30 days after delivery, then warranty period starts on 31st day from date of shipment (60 and 61 days, respectively for products shipped internationally).

Agilent warrants that its software and firmware designed by Agilent for use with a CPU will execute its programming instructions when properly installed on that CPU. Agilent does not warrant that the operation of the CPU, or software, or firmware will be uninterrupted or error-free.

Limitation of Warranty

Onsite warranty services are provided at the initial installation point. Installation and onsite warranty services are available only in Agilent service travel areas, and only in the country of initial purchase unless buyer pays Agilent international prices for the product and services. Warranties requiring return to Agilent are not limited to the country of purchase.

For installation and warranty services outside of Agilent's service travel area, Agilent will provide a quotation for the applicable additional services.

If products eligible for installation and onsite warranty services are moved from the initial installation point, the warranty will remain in effect only if the customer purchases additional inspection or installation services, at the new site.

The foregoing warranty shall not apply to defects resulting from:

1 improper or inadequate maintenance, adjustment, calibration, or operation by buyer,

2 buyer-supplied software, hardware, interfacing or consumables,

3 unauthorized modification or misuse,

4 operation outside of the environmental and electrical specifications for the product,

5 improper site preparation and maintenance, or

6 customer induced contamination or leaks.

THE WARRANTY SET FORTH IS EXCLUSIVE AND NO OTHER WARRANTY, WHETHER WRITTEN OR ORAL, IS EXPRESSED OR IMPLIED. AGILENT SPECIFICALLY DISCLAIMS THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

Limitation of Remedies and Liability

THE REMEDIES PROVIDED HEREIN ARE BUYER'S SOLE AND EXCLUSIVE REMEDIES. IN NO EVENT SHALL AGILENT BE LIABLE FOR DIRECT, INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES (INCLUDING LOSS OF PROFITS) WHETHER BASED ON CONTRACT, TORT OR ANY OTHER LEGAL THEORY.

Responsibilities of the Customer

The customer shall provide:

1 access to the products during the specified periods of coverage to perform maintenance,

2 adequate working space around the products for servicing by Agilent personnel,

3 access to and use of all information and facilities determined necessary by Agilent to service and/or maintain the products (insofar as these items may contain proprietary or classified information, the customer shall assume full responsiblity for safeguarding and protection from wrongful use),

4 routine operator maintenance and cleaning as specified in the Agilent operating and service manuals, and

5 consumables such as paper, disks, magnetic tapes, ribbons, inks, pens, gases, solvents, columns, syringes, lamps, septa, needles, filters, frits, fuses, seals, detector flow cell windows, and so on.

Responsibilities of Agilent Technologies

Agilent Technologies will provide warranty services as described in the following table.

Table 6 **Warranty Services**

Services During Warranty*	Warranty Period**	Type
Agilent 3DCE instruments, Agilent 1100 Series LC modules, Agilent 8453 UV-visible spectrophotometers	1 Year	Onsite
CE, LC, UV-visible supplies and accessories	90 Days	Onsite
Columns and consumables***	90 Days	Return to Agilent
Gas discharge and tungsten lamps	30 Days	Return to Agilent
Repairs performed onsite by Agilent****	90 Days	Onsite

* This warranty may be modified in accordance with the law of your country. Please consult your local Agilent office for the period of the warranty, for shipping instructions and for the applicable wording of the local warranty.

** Warranty services are included as specified for chemical-analysis products and options purchased concurrently provided customer is located within a Agilent-defined travel area. Agilent warranty service provides for 8 a.m. to 5 p.m. onsite coverage Monday through Friday, exclusive of Agilent holidays.

*** Columns and consumables are warranted to be free from defects for a period of 90 days after shipment and will be replaced on a return-to-Agilent basis if unused.

**** Agilent repair warranty is limited to only the item repaired or replaced.

Safety Information

The following general safety precautions must be observed during all phases of operation, service, and repair of this instrument. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture, and intended use of the instrument. Agilent Technologies assumes no liability for the customer's failure to comply with these requirements.

General

This is a Safety Class I instrument (provided with terminal for protective earthing) and has been manufactured and tested according to international safety standards.

Operation

Before applying power, comply with the installation section. Additionally the following must be observed.

Do not remove instrument covers when operating. Before the instrument is switched on, all protective earth terminals, extension cords, auto-transformers, and devices connected to it must be connected to a protective earth via a ground socket. Any interruption of the protective earth grounding will cause a potential shock hazard that could result in serious personal injury. Whenever it is likely that the protection has been impaired, the instrument must be made inoperative and be secured against any intended operation.

Make sure that only fuses with the required rated current and of the specified type (normal blow, time delay, and so on) are used for replacement. The use of repaired fuses and the short-circuiting of fuseholders must be avoided.

Some adjustments described in the manual, are made with power supplied to the instrument, and protective covers removed. Energy available at many points may, if contacted, result in personal injury.

Any adjustment, maintenance, and repair of the opened instrument under voltage should be avoided as much as possible. When inevitable, this should be carried out by a skilled person who is aware of the hazard involved. Do not attempt internal service or adjustment unless another person, capable of

rendering first aid and resuscitation, is present. Do not replace components with power cable connected.

Do not operate the instrument in the presence of flammable gases or fumes. Operation of any electrical instrument in such an environment constitutes a definite safety hazard.

Do not install substitute parts or make any unauthorized modification to the instrument.

Capacitors inside the instrument may still be charged, even though the instrument has been disconnected from its source of supply. Dangerous voltages, capable of causing serious personal injury, are present in this instrument. Use extreme caution when handling, testing and adjusting.

Safety Symbols

Table 7 **Safety Symbols used on Instruments and in Manuals**

Symbol	Description
	The apparatus is marked with this symbol when the user should refer to the instruction manual in order to protect the apparatus against damage.
	Indicates dangerous voltages.
	Indicates a protected ground terminal.

WARNING	**The WARNING sign denotes a hazard. It calls attention to a procedure, practice or the like, which, if not correctly done or adhered to, could result in injury or loss of life. Do not proceed beyond a warning sign until the indicated conditions are fully understood and met.**
WARNUNG	**Das WARNUNG Zeichen weist auf eine Gefahr für den Menschen hin. Wenn die Anweisungen und Verfahrensweisen oder ähnliches nicht befolgt und korrekt ausgeführt werden, könnte das eine erhebliche Verletzungsgefahr oder Lebensgefahr zur Folge haben. Solange die neben dem Warnungzeichen angegebenen Anweisungen nicht vollständig verstanden und ausgeführt sind, sollten keine weiteren Schritte unternommen werden.**
CUIDADO	**El signo de CUIDADO denota un riesgo. Remite a un procedimiento o práctica que de no ser llevada a cabo correctamente, podría resultar en un daño o pérdida de vida. No continue cuando exista un signo de cuidado hasta que las condiciones indicadas hayan sido completamente entendidas y satisfechas.**
ATTENTION	**Le signe ATTENTION dénote un risque. Il appelle une précaution quant á une procédure ou une pratique qui, si elle n'est pas correctement suivie, peut résulter en une blessure ou même en un risque pour la vie. S'assurer d'avoir rempli toutes les conditions indiquées avant de continuer.**
ATTENZIONE	**La scritta ATTENZIONE indica un pericolo. Essa richiama l'attenzione su una situazione che può portare a danni anche gravi per le persone. Non proseguire oltre tale indicazione senza aver ben compreso il rischio ed aver seguito le istruzioni per evitarlo.**
WAARSCHUWING	**Het teken WAARSCHUWING wijst op gevaar. Indien de aanwijzingen, procedures etc. niet opgevolgd en korrekt uitgevoerd worden, kan dat een aanzienlijk risiko en zelfs levensgevaar met zich mee brengen. Zolang de naast het waarschuwingsteken aangegeven aanwijzingen niet volledig begrepen en opgevolgd zijn, dienen geen verdere stappen ondernomen te worden.**

CAUTION

The CAUTION sign denotes a hazard. It calls attention to an operating procedure, practice or the like, which, if not correctly done or adhered to, could result in damage to or destruction of part or all of the equipment. Do not proceed beyond a caution sign until the indicated conditions are fully understood and met.

ACHTUNG

Das ACHTUNG-Zeichen weist auf eine mögliche Beschädigung der Geräte hin. Wenn Anweisungen und Verfahrensweisen oder ähnliches nicht befolgt und korrekt ausgeführt werden, könnte das eine Beschädigung oder Zerstörung eines Teils oder des gesamten Gerätes zur Folge haben. Solange die neben dem Achtungzeichen angegebenen Anweisungen nicht vollständig verstanden und ausgeführt sind, sollten keine weiteren Schritte unternommen werden.

PRECAUCION

El signo de PRECAUCION denota un riesgo. Remite a un procedimiento o práctica que de no ser llevada a cabo correctamente podría resultar en un daño o destruccion parcial o total del equipo. No continue cuando exista un signo de precaución hasta que las condiciones indicadas hayan sido completamente entendidas y satisfechas.

AVERTISSEMENT

Le signe AVERTISSEMENT dénote un risque. Il appelle une précaution quant á une procédure ou une pratique qui, si elle n'est pas correctement suivie, peut résulter en un dommage ou même une destruction du matériel. S'assurer d'avoir rempli toutes les conditions indiquées avant de continuer.

PRECAUZIONE

La scritta PRECAUZIONE indica un pericolo. Essa richiama l'attenzione su una situazione che può portare a danni anche permanenti allo strumento. Non proseguire oltre tale indicazione senza aver ben compreso il rischio ed aver seguito le istruzioni per evitarlo.

VOORZICHTIG

Het teken VOORZICHTIG wijst op gevaar voor een mogelijke beschadiging van de instrumentatie. Het vraagt de aandacht voor een praktijk, werkwijze etc. welke, indien niet opgevolgd en korrekt uitgevoerd, kan leiden tot beschadiging of vernieling van de apparatuur of een deel ervan. Zolang de naast het teken voorzichtig aangegeven aanwijzingen niet volledig begrepen en opgevolgd zijn, dienen geen verdere stappen ondernomen te worden.

Radio Interference

Manufacturer's Declaration

This is to certify that this equipment is in accordance with the Radio Interference Requirements of Directive FTZ 1046/1984. The German Bundespost was notified that this equipment was put into circulation, the right to check the series for compliance with the requirements was granted.

Test and Measurement

If test and measurement equipment is operated with equipment unscreened cables and/or used for measurements on open set-ups, the user has to assure that under operating conditions the radio interference limits are still met within the premises.

Herstellerbescheinigung

Hiermit wird bescheinigt dass dieses Gerät/System in Übereinstimmung mit den Bestimmungen von Postverfügung 1046/84 funkentstört ist. Der Deutschen Bundespost wurde das Inverkehrbringen dieses Gerätes/Systems angezeigt und die Berechtigung zur Überprüfung der Serie auf Einhaltung der Bestimmungen eingeräumt.

Test- und Messgeräte

Werden Mess- und Testgeräte mit ungeschirmten Kabeln und/oder in offenen Messaufbauten verwendet, so ist vom Betreiber sicherzustellen, dass die Funk-Entstörbestimmungen unter Betriebsbedingungen an seiner Grundstcksgrenze eingehalten werden.

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In This Book

This guide describes how you install, operate, and maintain your Agilent 89092A Multichannel Pump.

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