



Dissolution Heater / Circulator (G7986B)

## Operator's Manual

# Notices

## Manual Part Number

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Agilent Technologies, Inc.  
3501 Stevens Creek Blvd.  
Santa Clara, CA 95052 USA

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## Safety Notices

### CAUTION

A **CAUTION** notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in damage to the product or loss of important data. Do not proceed beyond a **CAUTION** notice until the indicated conditions are fully understood and met.

### WARNING

A **WARNING** notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in personal injury or death. Do not proceed beyond a **WARNING** notice until the indicated conditions are fully understood and met.

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## Content

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# 1

## Safety

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The Agilent Dissolution Heater / Circulator (G7986B) has been designed and tested so that when used properly you have an accurate and safe accessory.

If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

Operation of an Agilent Dissolution Heater / Circulator (G7986B) involves the use of aqueous liquids. Unskilled, improper, or careless use of this instrument can create shock hazards, fire hazards, or other hazards which can cause death, serious injury to personnel, or severe damage to equipment and property.

Information on safety practices is provided with your instrument and operation manuals. Before using your instrument or accessories, you must thoroughly read these safety practices.

Observe all relevant safety practices at all times.

## Electrical Hazards

The heater / circulator contains electrical circuits, devices, and components operating at dangerous voltages. Contact with these circuits, devices, and components can cause death, serious injury, or painful electric shock.

Panels or covers should not be removed at any time. There are no user-serviceable parts inside. This unit should only be opened and repaired at an Agilent repair center.

Application of the wrong supply voltage, connection of the instrument to an incorrectly wired supply outlet, or lack of proper electrical grounding can create a fire hazard or a potentially serious shock hazard and could seriously damage the instrument and any attached ancillary equipment.

Always use a three-wire outlet with ground connection which is adequately rated for the load. The installation must comply with local, state, and federal safety regulations.

Do not connect the instrument to the main power supply until you have made sure that the operating voltage is correctly set for the main power supply in the specific outlet in your laboratory to which the equipment will be connected.

## Warning

**WARNING**

A 'Warning' message appears in the manual when failure to observe instructions or precautions could result in death or injury.

Read all warnings and cautions carefully and observe them at all times.

## Caution

**CAUTION**

A 'Caution' message appears in the manual when failure to observe instructions could result in damage to equipment (Agilent supplied and / or other associated equipment).

## Note

**NOTE**

A 'Note' appears in the manual to give advice or information.

## Information Symbols



The apparatus is marked with this symbol when the user should refer to the instruction manual in order to protect the operator from risk of harm and to protect the apparatus against damage.



Indicates dangerous voltages.



Indicates a protected ground terminal.



The apparatus is marked with this symbol when hot surfaces are available and the user should not touch it when heated up.



Confirms that a manufactured product complies with all applicable European Community directives. The European Declaration of Conformity is available at <http://regulations.corporate.agilent.com/DoC/search.htm>.



Manufacturing date.



I

Switches main power on.

0

Switches main power off.



Indicates Waste Electrical and Electronic Equipment (WEEE) Directive. Do not dispose of in domestic household waste.

**Note:** To return unwanted products, contact your local Agilent office, or see <http://www.agilent.com> for more information.

## Sound Emission

### **Manufacturer's Declaration**

This statement is provided to comply with the requirements of the German Sound Emission Directive of 18 January 1991.

This product has a sound pressure emission (at the operator position) < 70 dB.

- Sound Pressure  $L_p < 70$  dB (A)
- At Operator Position
- Normal Operation
- According to ISO 7779:1988/EN 27779/1991 (Type Test)



## 2

# Introduction

Serial Number Format 13

The Dissolution Heater / Circulator (G7986B) is intended to heat and circulate water in the baths of Agilent dissolution apparatus only. It consists of a cartridge heater, pump and associated control / power electronics with a connector to interface with the dissolution apparatus for temperature and pump control.

**WARNING**

**The Dissolution Heater / Circulator (G7986B) contains electrical circuits, devices, and components operating at dangerous voltages. Contact with these circuits, devices and components can cause death, serious injury, or painful electric shock.**

**CAUTION**

Panels or covers should not be removed at any time. There are no user-serviceable parts inside. This unit should only be opened and repaired at an Agilent repair center.

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## Serial Number Format

The serial number contains 10 characters and follows this syntax:

**CC1234XXXX**

Syntax Code	Meaning	Description
CC	Country of origin	2 alpha characters matching the required trade designation for the country of origin
12	Year of manufacture	'09' for 2009, '10' for 2010, etc.
34	Week of manufacture	'01' for week 1 to '52' for week 52

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# Setting Up and Operating the Heater / Circulator

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## Initial Setup

Complete the following sections to initially set up the Agilent Dissolution Heater / Circulator (G7986B).

## Physical Specifications

Parameter Name	Value	Comment
Weight	2.7 kg (6.0 lbs)	
Dimension (height x width x depth)	162 × 325 × 157 mm (with extended feet for 708-DS) (6.4 × 12.8 × 6.2 inches)	
	109 × 325 × 157 mm (without extended feet for BIO-DIS) (4.3 × 12.8 × 6.2 inches)	
Line voltage	100 - 120 V~, ±10% 220 - 240V~, ±10%	
Line frequency	50 / 60 Hz, ±5%	
Power consumption	1 400 VA	
Ambient operating temperature	5° to 40°C	
Ambient non-operating temperature	-40° to 70° C	
Humidity	80% rH for temperatures up to 31°C, decreasing linear to 50% rH at 40°C	Non-condensing
Operating altitude	Up to 3000 m	
Non-operating altitude	Up to 4600 m	
Safety standards: IEC, EN, CSA, UL	Installation category II, Pollution degree 2	For indoor use only
ISM Classification	ISM Group 1 Class A	According to CISPR 11



## Unpacking Your Heater / Circulator

Complete the following steps to unpack your heater / circulator:

- 1 Carefully remove all items from the shipping carton.
- 2 Check all items for damage during shipping. If any damage to the instrument is evident, contact both the carrier who delivered the instruments to you and Agilent. Though claims for damage should be filed with the carrier, we will be glad to help you in filing a claim and in getting your system up and running as quickly as possible.
- 3 Check the shipping carton for any items which may have come loose during shipping before discarding or storing the packaging.
- 4 Place the unit on a clear, dry, and level section of the bench top as close to the dissolution apparatus as possible. At least eight inches (20 cm) of unobstructed space should be available behind the unit for easy access to the power and liquid connections. As with any electronic apparatus, the area around the instrument must be kept clean and dry.

### WARNING

**The electrical connection at the back of the equipment is the primary disconnect for the instrument. The heater / circulator should be positioned to allow accessibility to the power cords for easy disconnection.**

A properly grounded, GFC recommended AC power receptacle rated at 15 amps or higher should be available within six feet (two meters) of the unit.

## Power Cords

Country-specific power cords are available for the module. The female end of all power cords is identical. It plugs into the power-input socket at the rear. The male end of each power cord is different and designed to match the wall socket of a particular country or region.

Agilent makes sure that your instrument is shipped with the power cord that is suitable for your particular country or region.

**WARNING****Absence of ground connection**

**The absence of ground connection can lead to electric shock or short circuit.**

- Never operate your instrumentation from a power outlet that has no ground connection.

**WARNING****Unintended use of supplied power cords**

**Using power cords for unintended purposes can lead to personal injury or damage of electronic equipment.**

- Never use a power cord other than the one that Agilent shipped with this instrument.
- Never use the power cords that Agilent Technologies supplies with this instrument for any other equipment.
- Never use cables other than the ones supplied by Agilent Technologies to ensure proper functionality and compliance with safety or EMC regulations.

**WARNING****Power cords**

**Solvents may damage electrical cables**

- Prevent electrical cables from getting in contact with solvents.
- Exchange electrical cables after contact with solvents.

## Before Applying Power

### WARNING

#### Wrong voltage range, frequency or cabling

#### Personal injury or damage to the instrument

- Power Cord temperature and flammability specification: minimum 60 °C.
- Verify that the voltage range and frequency of your power distribution matches to the power specification of the individual instrument.
- Never use cables other than the ones supplied by Agilent Technologies to ensure proper functionality and compliance with safety or EMC regulations.
- Make all connections to the unit before applying power.

## Ground the Instrument

### WARNING

#### Missing electrical ground

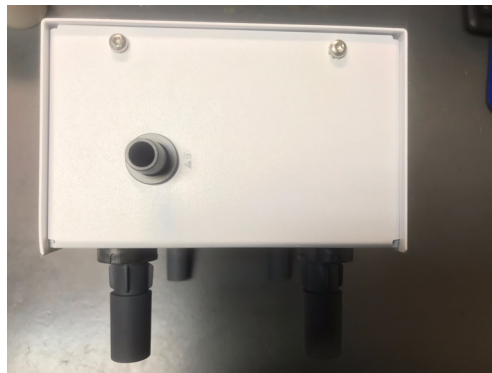
#### Electrical shock

- If your product is provided with a grounding type power plug, the instrument chassis and cover must be connected to an electrical ground to minimize shock hazard.
- The ground pin must be firmly connected to an electrical ground (safety ground) terminal at the power outlet. Any interruption of the protective (grounding) conductor or disconnection of the protective earth terminal will cause a potential shock hazard that could result in personal injury.

## Heater / Circulator Setup



**Figure 1.** Water Outlet, Power Connector / Switch, LEDs and Ctrl In Connector



**Figure 2.** Water Inlet

- 1 Place the heater / circulator into its operating position. See the operator's manual for your dissolution apparatus for further guidance.

**NOTE**

If installing on a 708-DS, attach the isolator legs to the heater / circulator. Legs are inserted into the receptors on the bottom of the unit and turned 1/4-turn counter-clockwise. Ensure the isolators on the legs of the heater / circulator are properly positioned to eliminate vibration from the heater / circulator.

Legs are not required when the heater / circulator is used with other instruments.

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- 2 Locate the two pieces of plastic tubing and the two stainless steel clamps.
- 3 Slide a clamp over the free end of the tubing and attach it to the supply inlet located on the left side of the heater / circulator. Tighten the clamp by turning the screw in the clamp.
- 4 Slide the other clamp over the free end of the tubing and attach the free end to the outlet located on the right side of the heater / circulator. Tighten the clamp by turning the screw in the clamp. Do not over-tighten as damage may occur.
- 5 Recheck all connections.
- 6 Connect the six-pin cable to the heater / circulator and the other end into the position marked BATH HEATER on the dissolution apparatus rear panel.
- 7 Connect the power cord to the heater / circulator.

**CAUTION**

**Fill the water bath before turning on the heater / circulator to avoid damaging the heating elements.**

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## Priming and Initial Power-up

**CAUTION**

**Do not use bleach. Use ultrapure water when possible to minimize scale and mineral buildup. Use algaecide to inhibit mold and bacteria growth. Check the label to ensure the formulation is compatible with the plastic materials used in the water bath construction. The flow paths of the heater / circulator are primarily stainless steel and should tolerate most clear water bath formulations.**

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- 1 Turn on the power to the heater / circulator using the switch located on the unit.
- 2 Ensure the water flow through the heater / circulator begins.
- 3 Ensure no leaks are present at any of the tubing connections.

## Indicator LEDs



**Figure 3.** LEDs

## Status Light (1)

- Off: Heater / Circulator is off
- Red: Error (over-temperature detected or hardware error)
- Yellow: Pump is off
- Green: Pump is running

## Heating (2)

- Illuminates when the heater is actively heating

## Fuse error (3)

- This LED is only active when the status LED is red ("error")
- Illuminated or blinking: Hardware error
- Off: Over-temperature detected

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# Troubleshooting

Problem	Possible Cause	Suggested Solution
No power apparent to the instrument	No electricity to equipment	Ensure power cord is properly connected to the outlet and to the equipment. Measure AC voltage at wall outlet.
Status LED not illuminated	Outlet or power cord may be faulty	Check power cord for defects. Measure AC voltage at universal end of power cord or test with other known working equipment.
Noisy operation	Water bath level may be too low	Add water to water bath.
	Something in contact with instrument	Inspect unit to ensure nothing is touching the unit.
	Pump is/was running too long dryly	<b>1</b> Check the water flow. <b>2</b> If the pump is damaged, replace the unit and/or send it to an Agilent repair center. There are no user-serviceable parts inside the unit.
Bath water neither circulates nor warms up	Connection may be missing	Check if power switch on.
		Check if power cable loose.
		Check if mini-din control / communication cable loose or faulty.
	Dissolution apparatus temperature probe or control circuitry may be faulty	Check whether the displayed actual temp on the dissolution apparatus is lower than the set point.

Problem	Possible Cause	Suggested Solution
Bath water circulates but does not warm up	Temperature setting may be incorrect	Ensure the correct temperature is selected on the dissolution apparatus.
	Heater / circulator PCBA, communication cable, or dissolution apparatus control circuitry may be faulty	Check if mini-DIN control / communication cable loose or faulty.
	Bath temperature probe may be faulty	Check whether the displayed actual temp on the dissolution apparatus is lower than the set point.
Bath temperature is not stable and/or incorrect	Heater / circulator temperature probe may be faulty or wires loosened	<ol style="list-style-type: none"> <li>1 Clean the bath temperature probe jack with a clean, dry cloth.</li> <li>2 Exchange the bath temperature probe with a known-good one if available.</li> <li>3 If bath temperature still not stable and/or correct, replace the unit and/or send it to an Agilent repair center. There are no user-serviceable parts inside the unit.</li> </ol>
Water collects under the heater	Pump may be leaking	<ol style="list-style-type: none"> <li>1 Turn heater / circulator off and disconnect from power.</li> <li>2 Inspect hose clamps and tighten if necessary (or look for hole in hose)</li> <li>3 Clean any excess water and wait 1 hour.</li> <li>4 If water is found coming from inside the heat / circulator, exchange the unit.</li> </ol>
Errors indicated by illuminated LEDs	Status LED is red and Fuse error LED is off	<ol style="list-style-type: none"> <li>1 Wait for 5 minutes.</li> <li>2 Turn off the heater / circulator.</li> <li>3 Wait for another 10 seconds.</li> <li>4 Turn on the heater / circulator.</li> </ol>
	Status LED is red and Fuse error LED is on	Hardware error detected. Replace the unit and/or send it to an Agilent repair center. There are no user-serviceable parts inside the unit.

## Preventive Maintenance

**WARNING**

**The instrument contains electrical circuits, devices and components operating at dangerous voltages. Contact with these circuits, devices, and components can cause death, serious injury, or painful electric shock.**

Preventive maintenance intervals may vary depending on frequency of instrument usage.

### Monthly

- Clean and dry all surfaces.
- Apply an algacide, bactericide, or any other additive that will not corrode plastic or stainless steel to the water bath or system.
- If the water is high in calcium, a 10% solution of white vinegar and water can be used to remove deposits. *Do not use this solution more than once a month.*
- Flush external tubing and check clamps for corrosion.
- Clean the external bath temperature probe with alcohol to remove deposits. Deposits can reduce the measurement accuracy.
- Inspect control / communication cable for damage or corrosion. Inspect the power entry module for corrosion and clean it if necessary.

### Obtaining Warranty and Other Services

To place a service order (warranty or other services), please contact your local Customer Care Center. Contact information can be found at [www.agilent.com](http://www.agilent.com) under your country using the Contact Us link. Place your service request using the displayed phone number or E-mail address.

## In This Book

- Chapter 1 Safety
- Chapter 2 Introduction
- Chapter 3 Setup and Operation
- Chapter 4 Troubleshooting and Maintenance

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