Agilent 1100 Series Sample Capacity Extension

Reference Manual

Agilent Technologies

Notices

Manual Part Number

G2257-90000

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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.

Warning Symbols Used on the Instrument

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

In this Manual, you will find ...

1 Overview

An overview of the Sample Capacity Extension system and its capabilities.

2 Installation

Complete instructions for the installation and set-up of the Well-plate handler and Automation Interface, and the optional barcode readers and rack extension.

3 Software Navigation

A description of the set-up panels and dialog boxes for the Sample Capacity Extension.

4 Working with the Sample capacity Extension

A description of the features of the ChemStation that are specific to the Sample Capacity Extension, with examples of their use.

5 Troubleshooting and Error Handling

Information on the available maintenance and test functions, with a list of possible errors and how to fix them.

A Safety Information

Important information on symbols and labels that appear on the product or in the documentation.

Contents

1 Overview

Figure 1 The G2257A Sample Capacity Extension

Description

The Agilent 1100 Series Sample Capacity Extension is a flexible and upgradeable robotic well-plate loading system. The basic unit, comprising a Well-plate Handler and an Automation Interface, is capable of sequentially loading up to twenty 96-well or 384-well plates into the Well-plate Sampler.

The Agilent 1100 Series Sample Capacity Extension works in conjunction with the Well-plate Sampler and either fully automatically with the ChemStation or interactively with the Agilent 1100 Control Module. The Well-plate Handler moves sample well-plates from an input rack to the Automation Interface, which moves the well-plate into position in the Well-plate Sampler. When the sequence is complete, the Automation Interface collects the well-plate from the Well-plate Sampler, and the Well-plate Handler retrieves the plate and places it into an output rack. This process is repeated for up to 20 well-plates (expandable to 80) in a single run.

To prevent sample contamination, well-plates with lids can be used, or closing mats can be used to prevent evaporation. The Well-plate Handler removes the lid prior to processing the plate, then replaces the lid after processing. Alternatively, a lid or an additional empty well-plate can be used as a “topper” on the stack to prevent contamination or evaporation of the top well-plate. The Well-plate Handler removes the topper prior to processing the stack, then replaces the topper on the stack.

Specifications

General Instrument

Plate Capacity	**Standard, 8.5-inch rack** 16 shallow well-plates (14 mm height) 7 deep well-plates (31 mm height) 4 deep well-plates (48 mm height) 6 vial plates for 54 × 2 ml vials **Standard, 10-inch rack** 20 shallow well-plates (14 mm height) **Extended, 8.5-inch rack** 64 shallow well-plates (14 mm height) 28 deep well-plates (31 mm height) 16 deep well-plates (48 mm height) 24 vial plates for 54 × 2 ml vials **Extended 10-inch rack** 80 shallow well-plates
Well-plates Supported	96-well plates 96-deep-well plates 384-well plates Well-plate with Closing matsor fails 96-well plates with glass inserts and caps
Plate Storage Areas	**Standard** 2 removable racks **Extended** 5 removable racks
Housing Materials	Kydex-T Plastic covering aluminum internal support plates
Gripper Materials	White acetyl housing; aluminum fingers; polyurethane grip pads
Locating Plate Materials	Sheet steel
Arm Mechanism	Ball bearing axis with stainless steel pivot shaft; mechanical stops to prevent continuous rotation (330° maximum)
Spill Control	Interior components protected from accidental spillage by spill shield rim located beneath rotating arm base
Ventilation/Cooling	12 volt fan located in the Well-plate Handler base

Robotic Arm

Rotary Travel	330 °
Horizontal Reach	25.4 cm (10.0 in) overall reach, 14 cm (5.5 in) beyond boundary of base
Vertical Reach	Maximum 36.6 cm (14.4 in) from table, minimum 10.2 cm (4.0 in) from table, total 26.4 cm (10.4 in) vertical travel distance

Physical Performance

Rotary stepper motor	400 steps per motor revolutions; 0.41 mm (0.016 in) resolution per motor step at 25.4 cm (10.0 in) radius; <5 seconds per full rotation (330°)
Vertical Stepper Motor	400 steps per motor revolutions; 0.08 mm (0.003 in) vertical resolution per motor step; approximately 3 seconds per complete vertical motion (one direction)
Home Position	Optical sensors for rotary and vertical arm home (zero) positions
Plate Sensor	Mechanical push-button sensor

Environmental

G2255A Well-plate Handler

Operating Temperature	15°C to 40°C
Operating Humidity	0 to 85%, non-condensing
Storage Temperature	-20°C to 65°C
Transient Over-voltages	Installation Category II
Pollution	Pollution Degree 2
Altitude	Up to 2000M
Output	154 BTU/hr
Indoor Use Only	

G2254A Automation Interface

Operating Temperature	5°C to 55°C
Operating Humidity	< 95%, at 25 – 40°C, non-condensing
Altitude	Up to 2000M

Physical

G2255A Well-plate Handler

Size (H × W × D)	49 cm × 47 cm × 72 cm
Weight	18 kg

G2257A including Agilent 1100 HPLC System

Size (H × W × D)	49 cm × 84 cm × 72 cm

Optional Rack Extension

Size (H × W × D)	49 cm × 26 cm × 72 cm

Electrical

G2255A Well-plate Handler

Power Input	100-120/200-240V AC, 50/60 Hz (autosensing), 45 watts maximum
Line Voltage	100-120/200-240V AC, autosensing
Line Frequency	50/60 Hz
Fuses	For 120V operation: One 1.5-A, 0.25 in. x 1.25 in. (0.64 cm. x 3.2 cm.) For 240V operation: Two 1.0-A, 0.2 in. x 0.08 in. (5.2-mm x 20-mm).
Grounding	Through the power cord
Computer Interface	RS-232 serial (double shielding required)
Microprocessor Board	80C188 microprocessor-based; 1 reversible DC motor; RS-232 communications link; 2 stepper motors; 4 sensors; Auxiliary 15 pin D Connector: 1 stepper motor, 2 - 12V outputs, 3 sensors

G2254A Automation Interface

Line Voltage	CAN DC in, 24V
Interfaces	CAN to any Agilent 1100 module

Barcodes

Supported barcode types	Code 39, Code 128, Codabar, 2 of 5 Interleaved
Line thickness	Between 0.19 and 1 mm
Maximum width	60 mm. A 60 mm barcode with 1 mm lines must be placed on the landscape side of the plate.
Protecting foil	Allowed
Positioning	For end-mounted barcodes, the top edge of the bars must be 9 mm or more above the bottom edge of the plate.

2
Installation

WARNING

Switch the system power OFF before beginning these procedures.

Use only the tools listed in this manual to perform the steps described in the instructions.

Never perform any operation on the instrument in an environment where potentially damaging liquids or gases are present.

NOTE

Do not loosen or tighten any screws, or touch parts other than those specifically designated in the instructions. Doing so may cause misalignment and could void the instrument warranty.

Never force any component to fit if it will not do so easily.

Site Preparation

Bench Space Requirements

The Well-plate Handler should be assembled in its permanent position on a sturdy lab bench with at least three electrical outlets nearby. It is easier to assemble the Well-plate Handler and align it with the well-plate device if you unplug and remove the Automation Interface from the laboratory bench first (take note of the location of any cables connected to the device).

NOTE The bench top must be sturdy enough to support the weight of the computer, the Well-plate Handler, and the Agilent 1100 system without sagging. An uneven surface will result in the misalignment of the Automation Interface and Well-plate Handler.

G2257A

Size (H × W × D)	49 cm × 47 cm × 72 cm
Weight	18 kg

G2257A with optional Rack Extension

Size (H × W × D)	49 cm × 73 cm × 72 cm

G2257A including Agilent 1100 HPLC System

Size (H × W × D)	49 cm × 84 cm × 72 cm

G2257A with optional Rack Extension and including Agilent 1100 HPLC System

Size (H × W × D)	49 cm × 110 cm × 72 cm

No additional gases, water or exhaust are required for the G2257A.

Contents of the G2257A Shipping Kit

The part numbers given in this section are for reference only. For part numbers to use in ordering exchange, replacement of consumable items, see "Parts List" on page 89.

G2254A Automation Interface

- Customization kit (Part No. G2255-68708) containing
  Alignment assembly
  Screws
  Location plate
  Adjustment sheet
  4 spacers to adjust the Well-plate Handler height
  Location pin
  3 spacers to adjust the optional Rack Extension height
- Cabinet kit (Part No. G2254-68700)
- Standard Accessory kit (Part No. G2254-68705) containing
  54-vial plate
  CAN cable
  CAN DC-out cable
  Hex key
  Adapter plate assembly
  Country-specific power cord for the Well-plate Handler
  Manual
  Declaration of Conformity

G2255A Well-plate Handler

- Well-plate Handler including standard gripper set and button extension
- 2 removable 8.5-inch racks (Part No. G2255-68709)
  or
  2 removable 10-inch racks (Part No. G2255-68710), gripper set and screwdriver
- Well-plate Handler base plate
- RS-232 communications cable [6 ft, (1.8 m) 9-pin to 9-pin]
- 13/64 inch open end wrench

- Spare fuses
- Screws and washers

Barcode Reader (optional)

- Fixed barcode reader
- Hand-held barcode reader
- Adapter cable
- Hex key
- Mounting bracket
- Screws

Rack Extension (optional)

- Rack Extension base plate
- 3 removable racks (8.5-inch or 10-inch)
- Screws

Installation

The installation of the G2257A Sample Capacity Extension consists of the following procedures:

- Installing the Automation Interface in the Well-plate Sampler,
- Setting up the Well-plate Handler,
- Calibrating the Well-plate Handler positions,
- Installing and adjusting the optional fixed barcode reader,
- Connecting the optional hand-held barcode reader.

Installing the Automation Interface

1 Unpack the autosampler (G1367A or G1377A).

2 Remove the front door from the autosampler (see Figure 2).

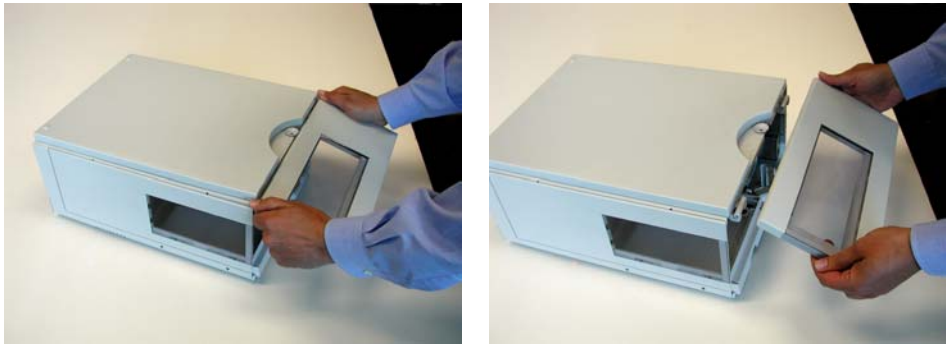

Figure 2 Removing the front door of the Autosampler

3 Remove the funnel (see Figure 3).

Figure 3 Removing the funnel

4 Remove the plastic cover (see Figure 4).

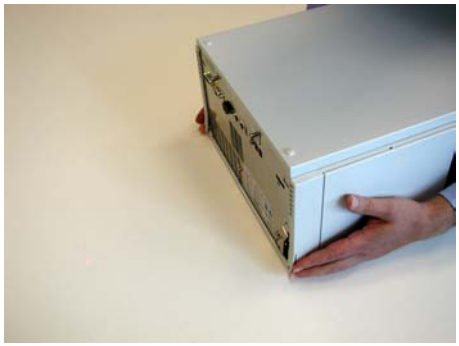

Figure 4 Removing the cover

5 Remove any installed tray (see Figure 5).

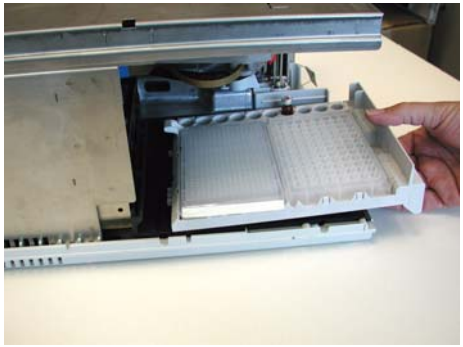

Figure 5 Removing the tray

6 Remove the two rubber plugs by use of a small, spiky screw-driver or tweezers (see Figure 6).

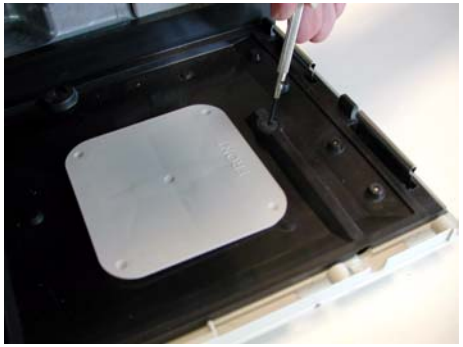

Figure 6 Removing the rubber plugs

7 Assemble the new plastic cover (see Figure 7).

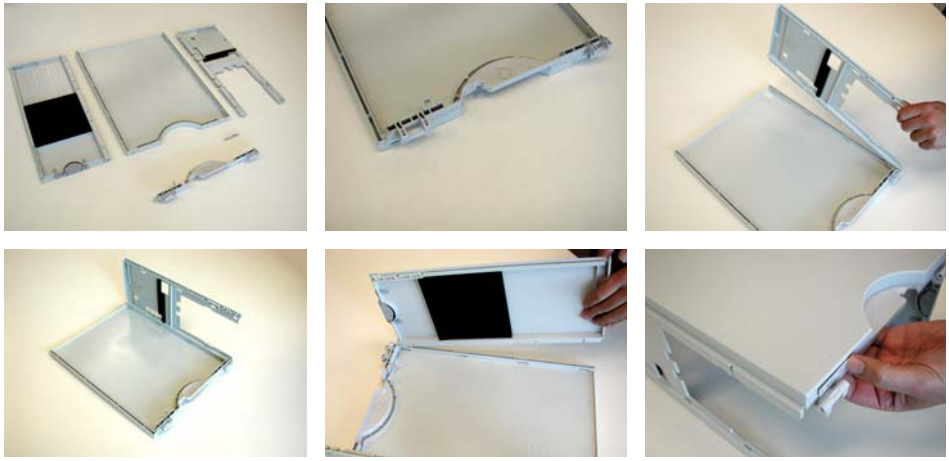

Figure 7 Assembling the new cover

8 Install the assembled plastic cover.

CAUTION When you install the cover, make sure that you do not trap the corrugated tube.

9 Insert the adapter plate (see Figure 8).

Figure 8 Inserting the adapter plate

10 Re-install the funnel and the front door.

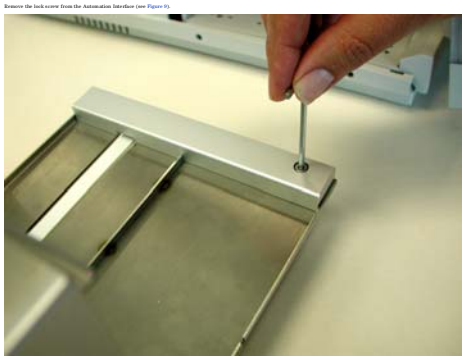

Figure 9 Removing the lock screw from the Automation Interface

11 Move the Automation Interface into the autosampler (see Figure 10).

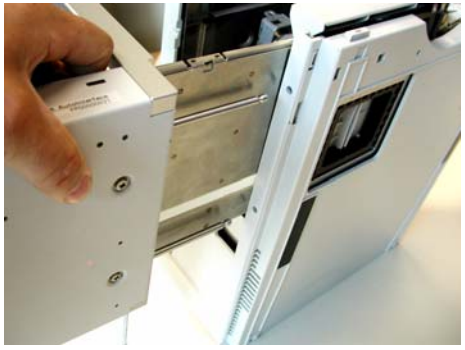

Figure 10 Moving the Automation Interface into the autosampler

12 Fasten the two lock screws (see Figure 11).

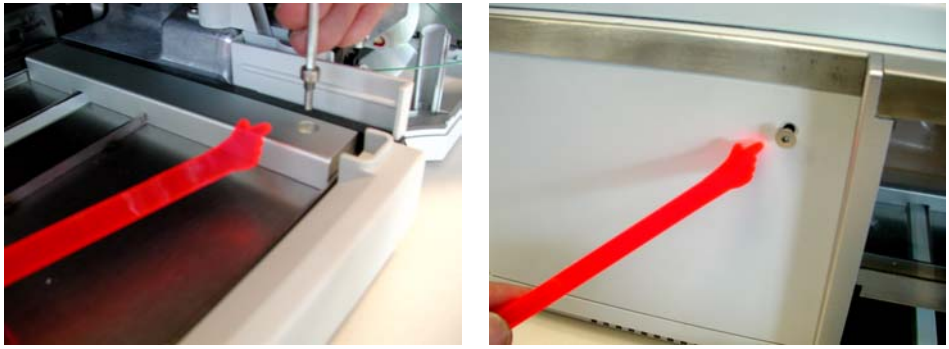

Figure 11 Fastening the lock screws

13 Assemble the alignment plate assembly. Use the two M4 screws from the G2254A Automation Interface package to screw the sheet metal part with two big holes together with the plastic part (see Figure 12).

Figure 12 Assembling the alignment plate assembly

14 Use the six *inch* screws from the G2255A Well-plate Handler package, together with the spacers and washers, to screw the sheet metal parts and the base plate from the Well-plate Handler together (see Figure 13). Fix the screws centrally in the adjustment slots.

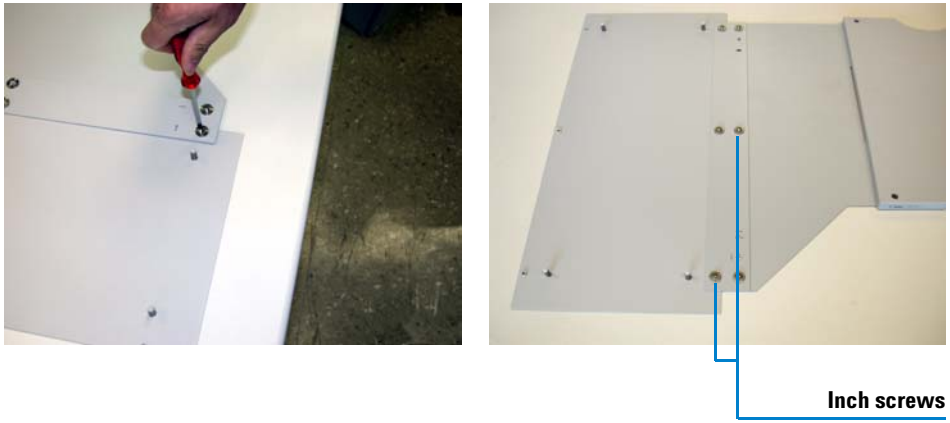

Figure 13 Assembling the sheet metal parts

15 Set up the Agilent 1100 modules on the plastic base-plate.

NOTE At least one 1100 module must be placed below the sampler in the stack, and the maximum allowable height is two modules, each 140 mm high. If you have two modules below the well-plate sampler, you need to set the Well-plate Handler on four spacers.

Setting Up the Well-plate Handler

What you will need

- Phillips-head screwdriver
- small, flat-blade screwdriver
- small Phillips-head screwdriver
- 13/64 inch open-ended wrench
- Needle-nosed pliers

Changing the Fuse Configuration, if necessary

The Well-plate Handler is delivered for 230–240V operation using two 1.0 Amp fuses. To convert the unit from the dual 1.0 Amp fuse configuration used for 230-240V operation to the single 1.5 Amp fuse configuration used for 100-120V operation, refer to the diagrams and instructions below. Otherwise, proceed to "Seating the Well-plate Handler on its Locating Plate" on page 21.

WARNING

Electrical shock hazard.

Disconnect the power cord before changing the fuses.

For continued fire protection and correct functioning of the unit, replace fuses only with fuses of the same type and rating.

1 Ensure the Well-plate Handler's power switch is in the OFF position and the power cord is unplugged.

2 Using a small flat-blade screwdriver, gently pry the cover/fuse block assembly away from the power entry port housing and remove (see Figure 14).

Figure 14 Prying open the cover/fuse-block assembly

3 Grasp the voltage selector card (not the indicator pin which is attached to it) using needle-nosed pliers and remove it from the housing (see Figure 15).

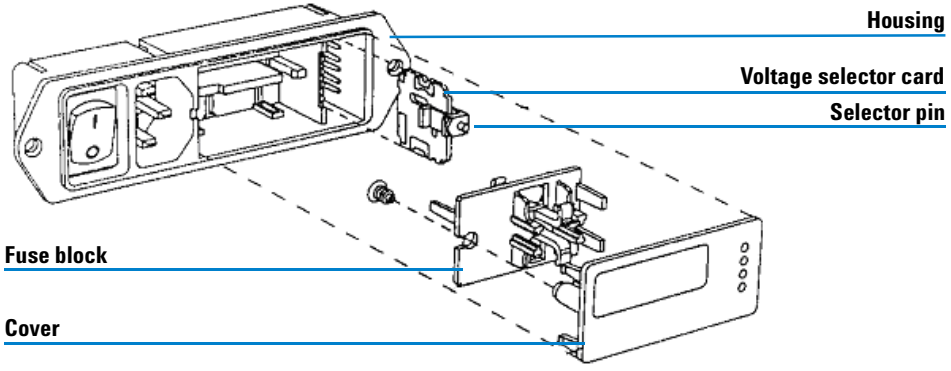

Figure 15 Fuse-block assembly

4 Position the voltage selector card so that the desired voltage appears along the bottom edge.

5 Move the indicator pin along the guide to the position opposite the selected voltage (see Figure 16). Seat the indicator securely into the positioning notch.

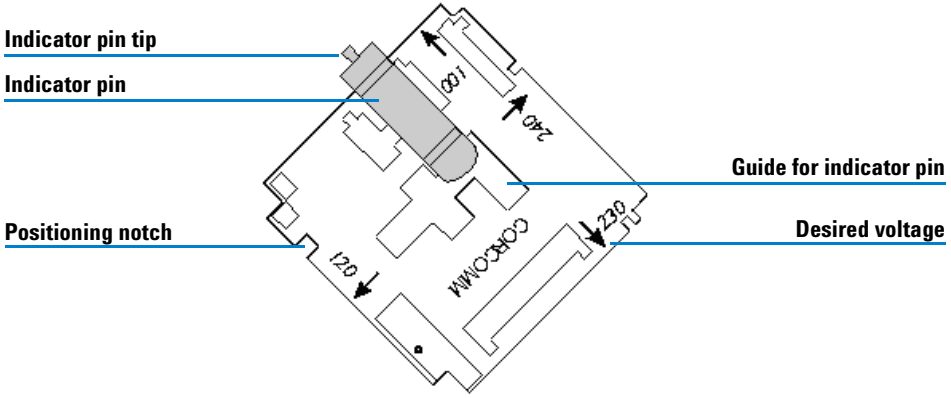

Figure 16 Voltage Selector Card

The indicator pin is correctly positioned for 230V. The pin tip will be visible at the 230 “window” in the cover.

6 Insert the voltage selector card into the power entry port housing so that the selected voltage points inward and the indicator pin faces outwards (towards the cover).

7 Loosen the Phillips head screw on the fuse pedestal two turns. Remove the fuse block by sliding it up and away from the screw and pedestal, as shown in Figure 17.

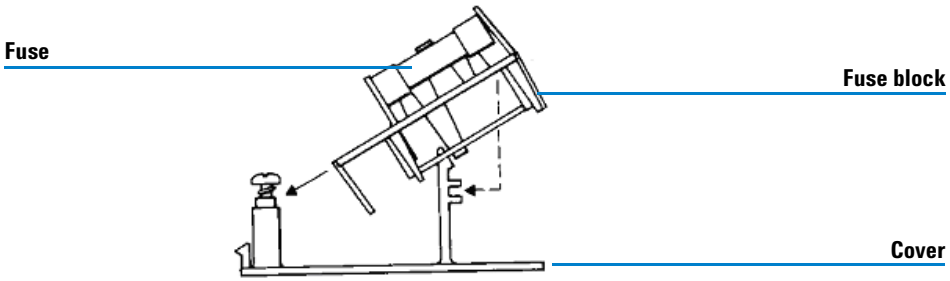

Figure 17 Removing the fuse-block

8 Invert the fuse block so the two 1.0 Amp fuses are on top for 230–240V operation, or the single 1.5 Amp fuse is on top for 110–120V operation.

9 Confirm that the fuses are seated securely in the fuse block

10 Slide the fuse block back into position and tighten the screw. Make sure that the active fuse(s) face(s) out, see Figure 18.

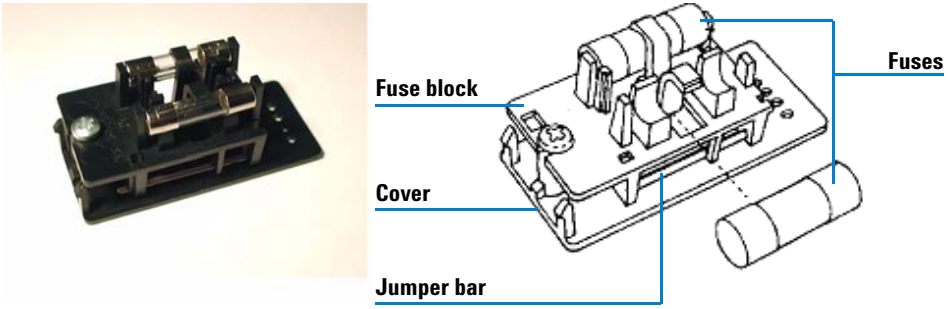

Figure 18 Fuse-block assembly

11 Slide the cover/fuse block assembly back into the power entry port housing. Snap the cover/fuse block assembly securely into place.

Seating the Well-plate Handler on its Locating Plate

WARNING **The Well-plate Handler weighs approximately 32 pounds (14.53 kg) and should be lifted with care. Take the proper precautions to avoid injury.**

Four white-tipped locating pins on the Well-plate Handler locating plate are designed to fit into holes on the underside of the Well-plate Handler.

- If you have just one Agilent 1100 module below the sampler, you can place the Well-plate Handler directly on the pins on the locating plate.
- If you have two 140-mm-high modules below the sampler, you need to place four 30-mm spacers on the locating plate before placing the Well-plate Handler on the spacer pins (see Figure 19).

Figure 19 30 mm spacers (left) and mounted on the locating plate

NOTE The package contains four 30-mm spacers for the Well-plate Handler and three spacers for the optional rack extension. Do not discard the three additional spacers.

Modifying the Well-plate Handler for 10-inch Racks

If you intend to use the Well-plate Handler with 10-inch racks instead of 8.5-inch racks, you need to make the following modifications:

1 Unscrew the button extension from the underside of the gripper arm (see Figure 20).

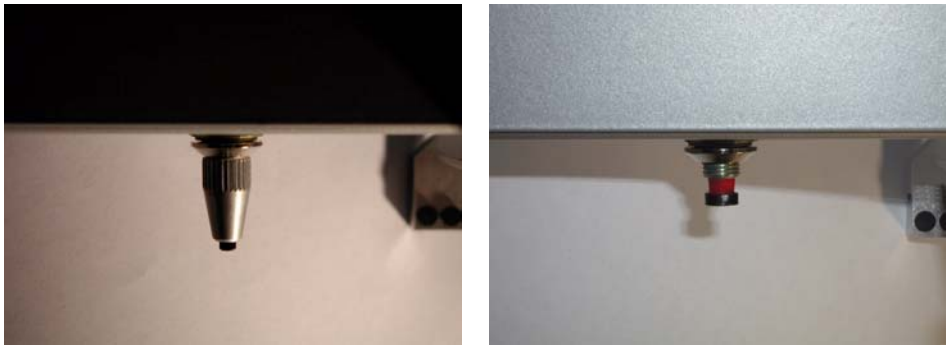

Figure 20 The button extension (left) and removed (right)

NOTE You can move the gripper arm while the Well-plate Handler is switched off without damaging the instrument.

2 Remove the two Phillips-head screws from the gripper fingers at each side of the gripper, and remove the fingers.

3 Install the new gripper finger set that was delivered with the 10 inch rack kit, with the fingers pointing down. Ensure that all screws are tight.

CAUTION Store the button extension and the gripper fingers for the 8.5-inch racks carefully in a safe place, in case you need to convert the Well-plate handler back to 8.5-inch rack configuration.

Installing the Input and Output Racks

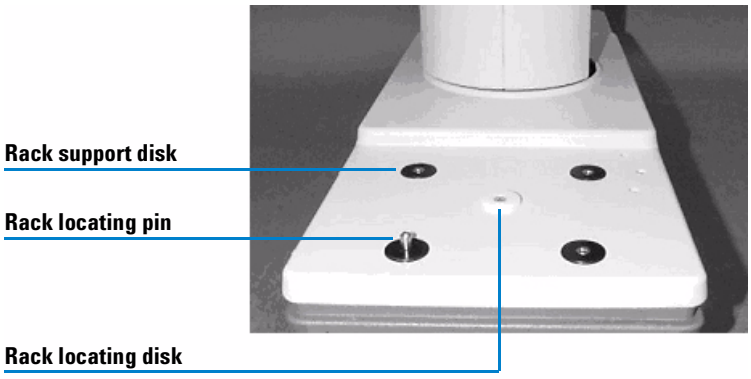

Figure 21 Input Rack Location

1. Locate the hole for the Rack Locating Pin in the bottom of the rack.
2. Place the rack on the white Rack Locating Disk so the Rack Locating Pin fits into the hole on the bottom of the rack. The racks should be in portrait orientation (short edge of the well-plate closest to the Well-plate Handler) with the channel for the Well-plate Handler arm towards the center of the Well-plate Handler.
3. Place the other rack on the Well-plate Handler in the same manner (see Figure 22).

Figure 22 Input and output racks on the Well-plate Handler

Installing the Optional Rack Extension

1. Screw the rack extension locating plate to the Well-plate Handler base plate suing the three screws provided.
   The locating plate has slotted mounting holes to allow for lateral alignment; set the locating plate centrally in the slots.
2. Seat the rack extension on its locating plate.
   Three white-tipped locating pins on the locating plate are designed to fit into holes on the underside of the rack extension.
   - If the Well-plate Handler is placed directly on its locating pins, you can place the rack extension directly on the pins on its locating plate.
   - If the Well-plate Handler is placed on four 30-mm spacers on the locating plate, place the three large spacers on the rack extension locating plate (see Figure 23) before placing the rack extension on the spacer pins.

Figure 23 Rack extension spacers (left) and mounted on the locating plate

3 Place the three racks on the rack extension as described in “Installing the Input and Output Racks" on page 24 (see Figure 24).

Figure 24 Rack extension installed

Installing the Optional Fixed Barcode Reader

The fixed barcode reader can be installed on either the side of the Automation Interface (the **portrait** position), or in one of three positions at the rear (the **landscape** position). Its position, and how you place the plates in the racks, will be determined by where you place the barcodes on the plates (see Figure 25 and Figure 26).

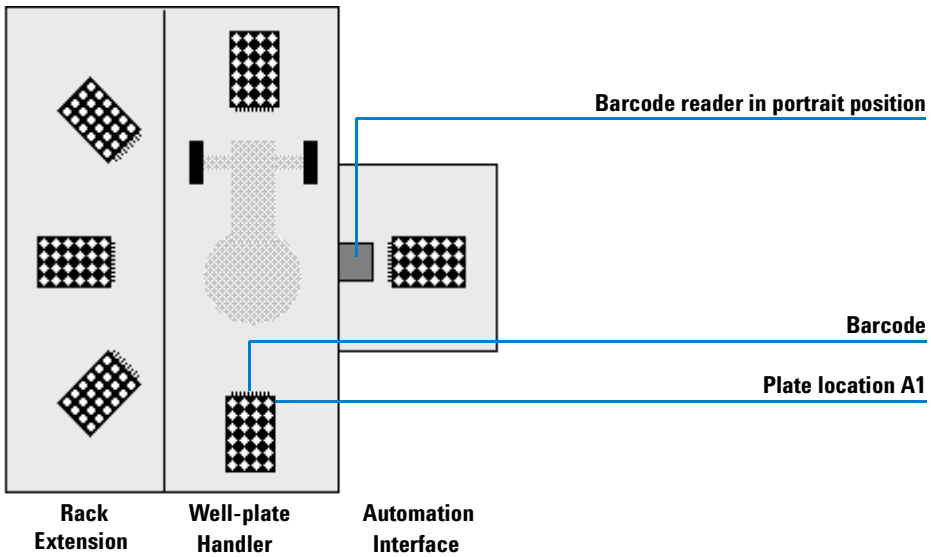

Figure 25 Barcodes on the ends of the plates

NOTE The default position is the portrait position. With this arrangement, you can read 60-mm long barcodes with the hand-held barcode reader when the plates are mounted in the rack. If you want to use the landscape position, and also read the plates with the hand-held barcode reader when they are in the rack, the barcodes must be no longer than 40 mm.

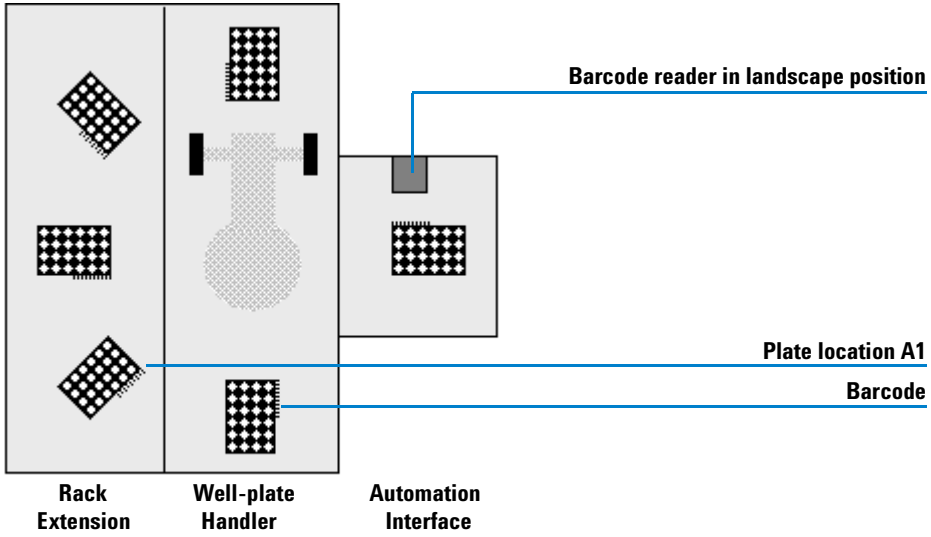

Figure 26 Barcodes on the sides of the plates

The barcode reader has two pairs of mounting screws: one pair towards the front of the reader, and one pair towards the rear. The mounting plate has two mounting positions: one towards the front, and one towards the rear.

Installing the Barcode Reader in Portrait Position

1 Remove the front pair of mounting screws from the barcode reader.

NOTE Leave the rear mounting screws in place to prevent dust entering the barcode reader.

2 Mount the barcode reader on the front position of the mounting plate, as in Figure 27.

Figure 27 Barcode reader mounting position for portrait position

3 Install the barcode reader and its mounting plate on the side of the Automation Interface, and remove the protection film.

Installing the Barcode Reader in Landscape Position

1 Remove the rear pair of mounting screws from the barcode reader.

NOTE Leave the front mounting screws in place to prevent dust entering the barcode reader.

2 Mount the barcode reader on the rear position of the mounting plate, as in Figure 28.

Figure 28 Barcode reader mounting position for landscape position

3 Install the barcode reader and its mounting plate on one of the three positions at the rear of the Automation Interface, and remove the protection film.
Three positions are available on the rear of the Automation Interface; the position you select will depend on where you place the barcodes on the plates.

Installing the Optional Hand-held Barcode Reader

The hand-held barcode reader is connected between the computer keyboard and the computer.

NOTE The hand-held barcode reader is designed for connection to a keyboard with a mini-DIN connector. If your keyboard uses a USB connector, you need to use an adapter to convert the USB plug to a mini-DIN plug.

1 Shut the computer down, if necessary.
2 Unplug the keyboard connector from the rear panel of the computer.
3 Plug the male connector of the hand-held barcode reader into the keyboard socket on the rear panel of the computer.
4 Plug the keyboard connector into the free female connector of the hand-held barcode reader.
5 Restart the computer.

Configuring the Hand-held Barcode Reader

The hand-held barcode reader is preconfigured to read the following barcode types:

- Code 128
- Code 39 (without checksum)
- Code 2 of 5 interleaved (without checksum)
- Codabar (without transfer of start/stop)

If you want to change the configuration of the hand-held barcode reader, for example to read Code 39 or Code 2 of 5 interleaved with checksum, or Codabar with transfer of start/stop, you must read each of the seven barcodes in Table 1 on page 32, in the sequence shown in the table.

NOTE Barcodes 5, 6 and 7 have two options. You select only one each of these options to install. If, at a later date, you want to change any of these options, you must reinstall all seven commands in the correct sequence.

1 To read a barcode, point the barcode reader at the barcode and press the trigger. An audible note confirms that the barcode has been registered.

Barcode Requirements

For reliable and accurate reading of barcodes, observe the following requirements:

- Line thickness must be between 0.19 and 1 mm.
- Maximum width of the barcode is 60 mm. A 60 mm barcode with 1 mm line thickness must be placed on the landscape side of the plate.
- A clear protecting foil is allowed.
- For end-mounted barcodes, the top edge of the bars must be 9 mm or more above the bottom edge of the plate.

Use the Barcode Reader Test function (see “Automation Interface Test" on page 79) to check the readability of your barcodes.

Table 1 Hand-Held Barcode reader configuration barcodes

Sequence No.	Barcode	Optional Barcode
• 1 •	 $+$* Basic scanner installation	
• 2	 $+CP500$- Keyboard registration AT/PS2	
• 3	 $+EA1196$- Stop bit, Return character	
• 4	 $+AZ0AI11$- Code 128	
• 5	 $+AB11$- Code 39 without checksum	 $+AB12$- Code 39 with checksum
• 6	 $+AC110628$- Code 2/5 interleaved without checksum, 6–28 characters	 $+AC120628$- Code 2/5 interleaved with checksum, 6–28 characters
• 7	 $+AD111$- Codabar without transfer of Start/Stop	 $+AD112$- Codabar with transfer of Start/Stop

Making the Electrical Connections

WARNING **Ensure that the power switches of all units are OFF and that the power cords are unplugged from the power source before proceeding.**

1 Connect the fixed barcode reader cable to the port labeled **Barcode Reader Rear** on the Automation Interface (see Figure 29).

2 Connect the CAN Cable from the Automation Interface to one of the other Agilent 1100 modules (see Figure 29).

3 Connect the auxiliary power cable from the Automation Interface to any Agilent 1100 module with a free power outlet (see Figure 29).

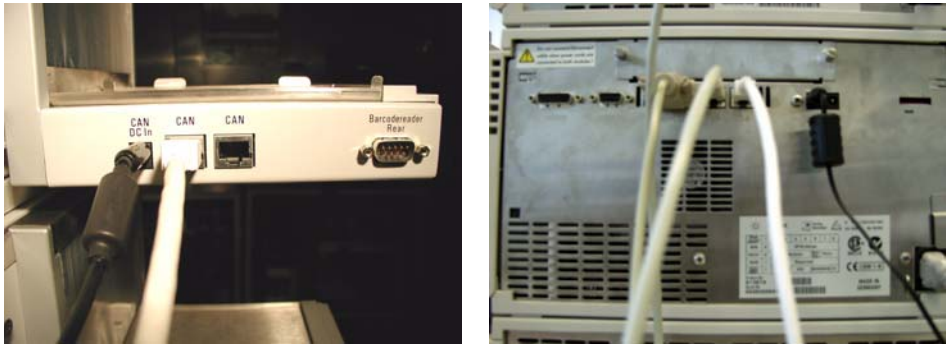

Figure 29 Connections to the Automation Interface and Well-plate Sampler

4 Remove the protection cap of the RS-232 port of the Well-plate Sampler.

5 Connect the RS-232 cable from the Well-plate Sampler (female connector) to the C-Port of the Well-plate Handler (male connector). See Figure 30.

Figure 30 Rear panel of the Well-plate Handler

6 Connect all necessary power cords.

7 Switch on all units.

Adjusting the Barcode Reader Position

The height of the barcode reader can be adjusted so that the reading is continuously successful.

1 Place a plate with a barcode on the transport position of the Automation Interface.

2 Loosen the two screws at either side of the barcode reader mounting plate (see Figure 31), so that the barcode reader height can be adjusted.

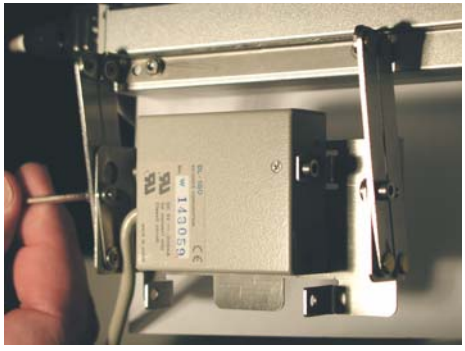

Figure 31 Adjusting the barcode reader position

Using the ChemStation

a Switch to the **Diagnostics** view, and display the **Automation Interface Test** dialog box (see "Testing with the ChemStation" on page 79).

b Click the **Barcode Adjustment** button. The barcode reader reads continuously.

Using the Hand-held Controller

a From the **Tests** screen, display the **Automation Interface Tests**.

b Select **Barcode Adjustment On** and click **Execute**. The barcode reader reads continuously.

3 Adjust the height of the barcode reader until the two LEDs display green lights. You can view the status of the LEDs using the mirror plate below the barcode reader mounting plate (see Figure 32).

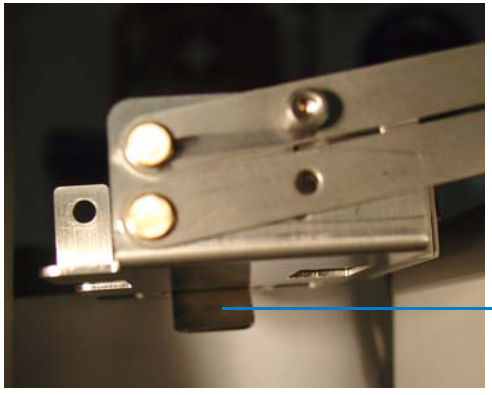

Figure 32 The mirror plate below the barcode reader mounting plate

4 When the two LEDs display green lights, tighten the two screws at either side of the barcode reader mounting plate.

5 Turn off the Barcode Adjustment mode in the ChemStation or the Hand-held Controller.

6 Use the Test Barcode Reader function of the ChemStation or the Hand-held Controller to check the accuracy and consistency of the barcode reading.

Adjusting the Lateral Position of the Well-plate Handler

The position of the Well-plate Handler must be aligned with the Automation Interface so that

- the transport position of the Automation Interface is at the same radius as the racks,
- the well-plate in the transport position of the Automation Interface is located centrally between the gripper fingers.

The adjustment is made in three stages:

1. A preliminary adjustment, described in “Preliminary Adjustment of the Well-plate Handler Position" on page 37, where the Well-plate Handler arm and gripper are moved manually.
2. Well-plate handler teaching, described in “Well-plate Handler Teaching" on page 39, in which the rotary and vertical positions of the well-plate handler gripper arm are calibrated.
3. A fine adjustment, described in “Fine Adjustment of the Well-plate Handler Position" on page 45, using the Test functions of the ChemStation or Hand-held Controller to align the Well-plate Handler with the Automation Interface.

Preliminary Adjustment of the Well-plate Handler Position

These adjustments are made by moving the Well-plate Handler arm and gripper fingers manually. These actions do not damage the Well-plate Handler mechanisms.

1 Turn off the power on the back panel of the Well-plate Handler.

2 Loosen the six adjusting screws holding the Well-plate Handler in position.

3 Place a plate in the rack **R1**.

4 Position the gripper arm above rack **R1**.

5 Move the arm down until it touches the plate.

6 Squeeze the gripper fingers so that they grip the plate.

7 Keeping the gripper fingers closed, raise the arm until the plate is clear of the rack.

8 Rotate the arm until it is positioned above the Automation Interface.

9 Lower the arm until the rack is placed on the transport position of the Automation Interface.

10 Adjust the position of the Well-plate Handler until the plate is squarely and centrally positioned on the transport position of the Automation Interface.

11 Tighten the adjustment screws.

If you have fitted the optional rack extension, you must also adjust its lateral position.

1 Loosen the three adjusting screws holding the rack extension in position.

2 Place a plate in the rack **R1**.

3 Position the gripper arm above rack **R1**.

4 Move the arm down until it touches the plate.

5 Squeeze the gripper fingers so that they grip the plate.

6 Keeping the gripper fingers closed, raise the arm until the plate is clear of the rack.

7 Rotate the arm until it is positioned above rack **R5**.

8 Lower the arm until the rack is immediately above the rack

9 Adjust the position of the rack extension until the plate is squarely and centrally positioned above rack **R5**.

10 Tighten the adjustment screws.

Well-plate Handler Teaching

You use the Well-plate Handler teaching routines to calibrate the rotary and vertical positions of the gripper arm of the Well-plate Handler. The teaching routines are necessary during installation, and after moving or replacing either the Well-plate Handler or Automation Interface.

Teaching using the ChemStation

Well-plate handler teaching is available from the **Maintenance** menu of the **Diagnostic** view of the ChemStation. Teaching is done via the **Well-plate Handler Teaching** dialog box.

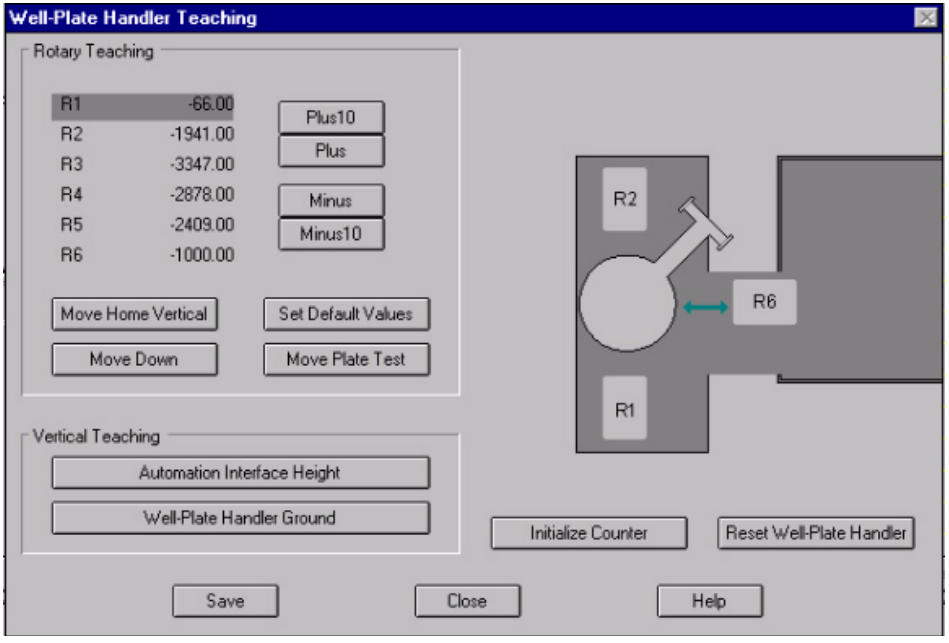

Figure 33 Well-plate Handler Teaching dialog box

The teaching commands are separated into two groups: **Rotary Teaching** calibrates the rotary positions, **Vertical Teaching** calibrates the vertical positions. In addition, the **Reset Well-plate Handler** button moves the gripper arm to its rotary and vertical home positions. The **Initialize Counter** button is used to reset the **WPH Movements** counter in the Module Details of the Well-plate Sampler to zero, for example after maintenance or exchange of the Well-plate Handler.

NOTE The rotary home position is not directly above position R1.

Rotary Teaching

The **Rotary Teaching** group contains a list of the coordinates for each of the rack positions and the Automation Interface transport position. You select a position to calibrate, for example, R1, and use the buttons to set the coordinates. The Well-plate Handler arm can be rotated about 330 degrees, via a stepper motor with 3400 steps. Positive numbers move the arm in a clockwise direction; negative numbers move the arm counter-clockwise.

Plus 10	Moves the Well-plate Handler arm 10 steps clockwise.
Plus	Moves the Well-plate Handler arm one step clockwise.
Minus	Moves the Well-plate Handler arm one step counter-clockwise.
Minus 10	Moves the Well-plate Handler arm 10 steps counter-clockwise.
Move Home Vertical	Moves the Well-plate Handler arm to its topmost position.
Move Down	Moves the Well-plate Handler arm 1.5 cm downwards.
Set Default Values	Sets the factory-default coordinates.
Move Plate Test	Moves the Well-plate Handler arm down until it encounters a plate, picks up the plate, moves the arm to the vertical home position, moves the arm down, releases the plate and moves the arm back to its vertical home position.

Rotary Teaching Instructions

1 Click **Set Default Values**.

2 Select position **R1**.

3 Click **Move Down** until the arm sits just above the rack.

4 Click **Plus 10** and/or **Plus** to move the arm clockwise, or **Minus 10** and/or **Minus** to move the arm counter-clockwise until the gripper is centralized in the rack, as in Figure 34.

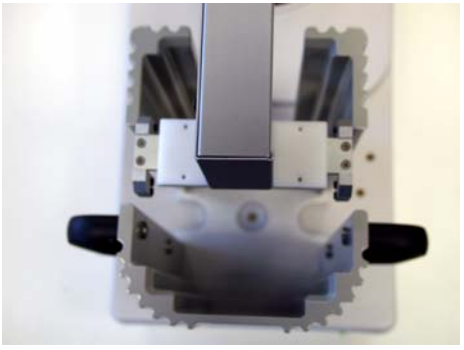

Figure 34 Gripper arm centralized in the rack

5 Select a new rack position and repeat instructions 3 and 4.

NOTE All positions must be taught, including those of the optional rack extension, if fitted.

6 Select position R6 (Automation Interface).

7 Click **Move Down** until the arm sits just above the transport position.

8 Repeat instructions 3 and 4.

9 Click **Save** to save the coordinates.

Vertical Teaching

The vertical teaching calibrates two positions:

- the **Automation Interface Height** calibrates the height of a well-plate on the Automation Interface transport position.
- the **Well-plate Handler Ground** calibrates the height of a single well-plate in the rack.

Automation Interface Height	Moves to position R6, and moves the arm down until it encounters a plate.

NOTE A plate must be installed in the transport position of the Automation Interface.

Well-plate Handler Ground	Moves to position R1, and moves the arm down until it encounters a plate.

NOTE A single plate must be installed in rack R1.

Vertical Teaching Instructions

1. Place a well-plate in the transport position of the Automation Interface.
2. Click **Automation Interface Height**.
3. Select the plate type from the list displayed in the dialog box.
4. Remove all well-plates from rack R1.
5. Transfer the well-plate from the Automation Interface to rack R1.
6. Click **Well-plate Handler Ground**.
7. Select the plate type from the list displayed in the dialog box.
8. Click **Save** to save the coordinates.

Teaching using the Hand-held Controller

The teaching commands are separated into two groups: **Rotary Positions** is a manual procedure for calibrating the rotary positions, **Vertical Positions** calibrates the vertical positions automatically. Both sets of teaching commands are available from the **Teaching** button of the Well-plate Handler **Tests** screen (see Figure 35).

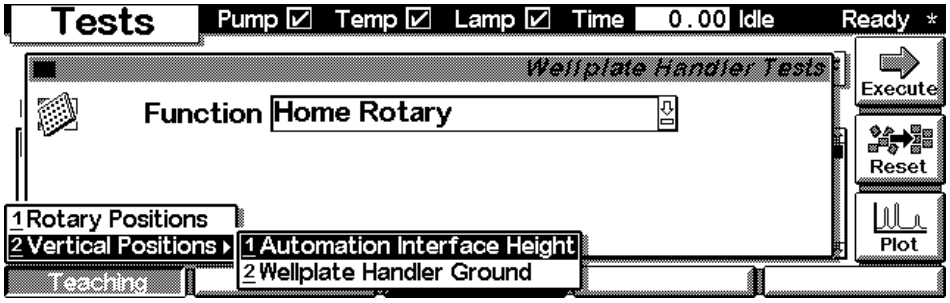

Figure 35 Accessing the Teaching commands in the Hand-held Controller

Rotary Teaching Instructions

Goto Pos moves the gripper arm to the selected rotary position, and you align the arm using the left and right cursor control buttons (see Figure 36). The movement of the arm is accelerated when you keep the button pressed. You can use the up and down cursor control buttons to position the gripper nearer the rack, so that you can judge the alignment more easily.

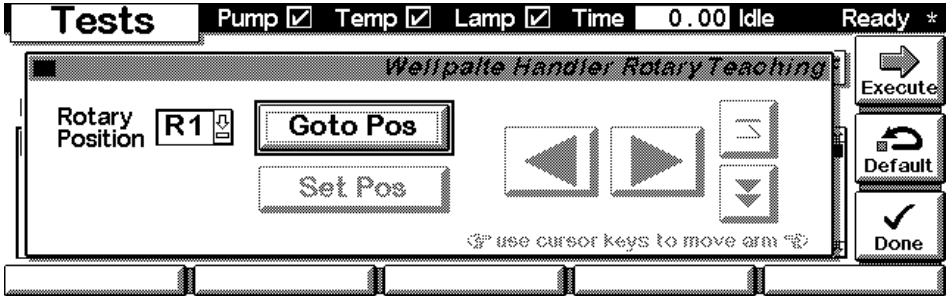

Figure 36 Rotary Teaching screen of the Hand-held Controller

1 Click **Default** to set the default values.
2 Select position **R1** and click **OK**.
3 Click the cursor down button until the arm sits just above the rack.
4 Click the cursor left and right buttons until the gripper is centralized in the rack.

NOTE You can make a more accurate judgement of the alignment by placing a plate in the rack and moving the gripper arm down until it sits just above the plate.

5 Click **OK** to set the position.
6 Click the cursor up button until the arm is clear of the rack.
7 Select a new rack position and repeat instructions 3 – 6.

NOTE All positions must be taught, including those of the optional rack extension, if fitted.

8 Select rotary position R6 (Automation Interface) and click **OK**.
9 Click **Move Down** until the arm sits just above the transport position.
10 Repeat instructions 3 – 6.

NOTE You can make a more accurate judgement of the alignment by placing a plate on the transport position of the Automation Interface and moving the gripper arm down until it sits just above the plate.

Vertical Teaching Instructions

The two vertical positions, **Automation Interface Height** and **Well-plate Handler Ground**, (see Figure 35 on page 43), are calibrated automatically.

1 Place a well-plate in the transport position of the Automation Interface.
2 Select **Automation Interface Height**.
3 Select the plate type from the displayed list and click **OK** to continue.
4 Remove all well-plates from rack **R1**.
5 Transfer the well-plate from the Automation Interface to rack **R1**.
6 Select **Well-plate Handler Ground**.
7 Select the plate type from the displayed list and click **OK** to continue.

Fine Adjustment of the Well-plate Handler Position

These adjustments are made by moving the Well-plate Handler arm and gripper fingers using the Test functions of the Well-plate Handler. See “Testing with the ChemStation" on page 74 or “Testing with the Hand-Held Controller" on page 77 for details of the available test functions.

NOTE You cannot complete these fine adjustments until you have completed the Well-plate Handler Teaching described in “Well-plate Handler Teaching" on page 39.

Adjusting the radius

NOTE We recommend that you make these adjustments using the 54-vial tray, with vials in positions C1 and D1. This is especially important if you intend to use the 54-vial tray in your work.

1. Place a plate in the rack **R1**.
2. Use the Test functions of the Well-plate Handler to
   - **a** position the gripper arm above rack **R1**,
   - **b** move the arm down until it encounters the plate,
3. Ensure that the plate detection button clears the vials and makes contact with the rim of the plate.
4. Use the Test functions of the Well-plate Handler to
   - **a** close the gripper fingers,
   - **b** raise the arm until the plate is clear of the rack,
   - **c** position the arm above the Automation Interface,
   - **d** lower the arm until the rack is placed on the transport position of the Automation Interface.

5 If the plate does not sit correctly on the transport position of the Automation Interface,
   a raise the plate clear of the Automation Interface,
   b loosen the three screws on the adjustment plate that allow you to move the Well-plate Handler sideways relative to the Automation Interface.
6 Adjust the position of the Well-plate Handler until the plate is lowered exactly on to the transport position of the Automation Interface.
7 Tighten the screws.

Adjusting for the gripper fingers

NOTE We recommend that you make these adjustments using the 54-vial tray. This is especially important if you intend to use the 54-vial tray in your work.

1 Place a plate on the transport position of the Automation Interface.
2 Use the Test functions of the Well-plate Handler to
   a position the gripper arm above the Automation Interface (**R6**),
   b move the arm down until it encounters the plate.
   c close and open the gripper fingers.
3 If the plate moves when you close the gripper fingers, loosen the three screws on the adjustment plate that allow you to move the Well-plate Handler forward and back relative to the Automation Interface.
4 Adjust the position of the Well-plate Handler until there is no movement of the plate when you close the gripper fingers.
5 Tighten the screws.
6 Loosen the four screws holding the gripper fingers.
7 Use the Test functions of the Well-plate Handler to close the gripper fingers. This ensures that the gripper fingers are correctly aligned with the plate.
8 Tighten the four screws.

Adjusting the centering spring

NOTE We recommend that you make these adjustments using the 54-vial tray. This is especially important if you intend to use the 54-vial tray in your work.

1 Open the front door of the Well-plate Sampler.

2 Remove the plate from the transport position of the Automation Interface and place it in the rear position in the Well-plate Sampler.

3 Check that the plate slides easily left and right.
If the plate does not slide easily, remove it and compress slightly the centering spring on the rear wall. Recheck the movement.

De-Installation of the Automation Interface

The Automation Interface is incompatible with the temperature control of the Well-plate Sampler. If you want to use the Well-plate Sampler with temperature control, you must de-install the Automation Interface.

1. Disconnect all connections to the Automation Interface
2. Remove the two lock screws holding the Automation Interface (see Figure 11)
3. Withdraw the Automation Interface from the Well-plate sampler and replace the lock screws in position in the Automation Interface.
4. Remove the adapter plate.
5. Replace the two rubber plugs (see Figure 6).
6. Install the Well-plate Sampler tray.
7. In the Trays group of the Injector Configuration dialog box of the ChemStation, ensure that a tray is configured, not the Automation Interface (see “Well-plate Handler Configuration" on page 50).
8. Re-install the plastic screen from the original cover of the Well-plate Sampler.

3
G2257A Software Navigation

Using the Sample Capacity Extension with the ChemStation

Well-plate Handler Configuration

The Well-plate Handler is configured using the **Well-plate Handler Configuration** dialog box, which is accessed from the **Injector Configuration** dialog box of the well-plate sampler. To make the **Well-plate Handler Configuration** dialog box accessible, you select **Automation Interface** in the **Trays** group of the **Injector Configuration** dialog box; this activates a **Well-plate Handler Config.** button (see Figure 37).

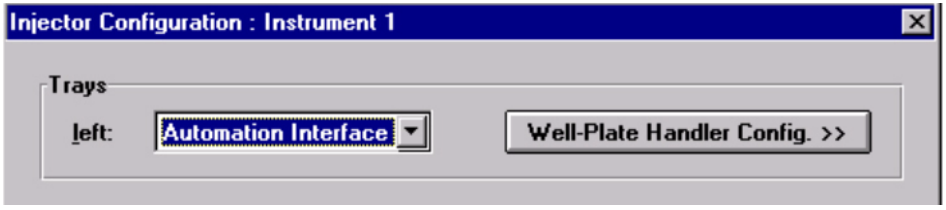

Figure 37 Injector Configuration dialog box, Trays group

Clicking the **Well-plate Handler Config.** button displays the **Well-plate Handler Configuration** dialog box, which contains all the parameters necessary for the operation of the Well-plate Handler. The parameters are in four groups (see Figure 38)

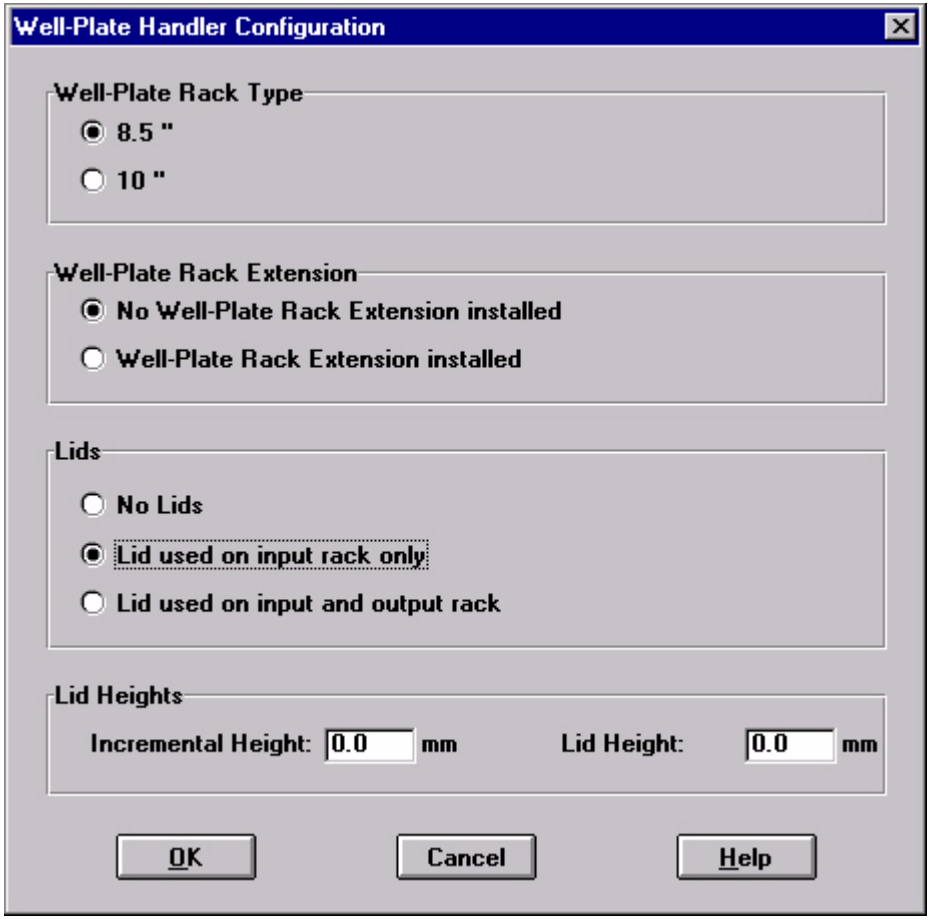

Figure 38 Well-plate Handler Configuration dialog box

Well-plate Rack Type

In the **Well-plate Rack Type** group, you specify the type of rack you have installed:

	Rack Label	Compatible Plate Types
8.5"	Deepwell Stack	16 shallow well-plates or 4 deep well-plates (max. height 48 mm).
10"	Microplate Stack	20 shallow well-plates (max. height 16 mm). Not compatible with deep well-plates.

NOTE All racks must be of the same type.

Well-plate Rack Extension In the **Well-plate Rack Extension** group, you specify whether a Rack Extension, giving you three additional racks, is installed or not.

Lids In the **Lids** group, you specify whether lids are used on the top plate of the input rack(s), on the top plates of both input and output racks, or not at all. If lids are used, you must specify the dimensions in the Lid Heights group.

Lid Heights If you use lids, you must specify both the **Incremental Height** (the additional height the lid adds to the height of the plate) and the **Lid Height** (the total height of the lid).

Measuring lid heights

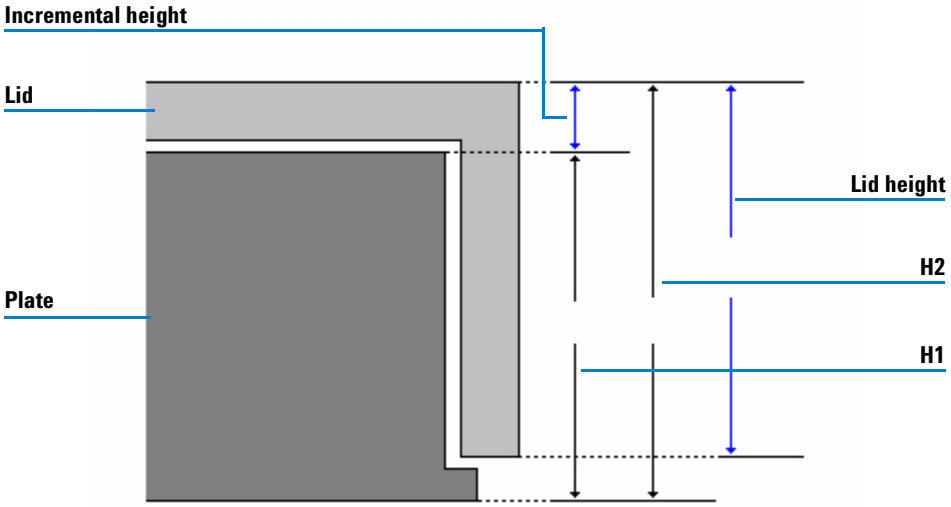

Figure 39 Well-plate and lid heights

Incremental Height

1. Place the well-plate on the bench and measure its height (H1).
2. Place the lid on the well-plate and measure the total height (H2).

3 Subtract H1 from H2 to get the **Incremental Height**:

Incremental Height = $H2 - H1$

Lid Height

1 Remove the lid from the well-plate and place it on the bench.

2 Measure the height of the lid.

4
Working with the Sample Capacity Extension

What is a Hypersequence?

A hypersequence is a sequence of sequences. Figure shows how a hypersequence is constructed: each hypersequence comprises one or more sequences. The hypersequence has its own set of parameters and its own hypersequence table. Each sequence of the hypersequence is governed by its own parameters and sequence table.

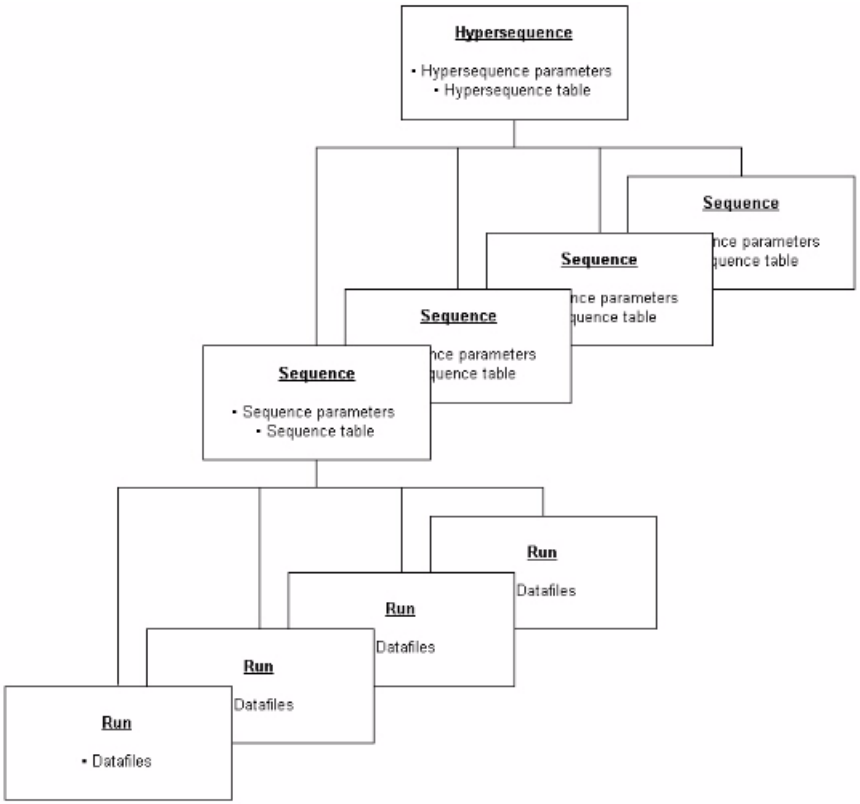

Figure 40 The contents of a hypersequence

Creating a Hypersequence

Hypersequence Parameters

The **Hypersequence Parameters** dialog box (see Figure 41) allows you to specify the settings for running and reporting the hypersequence. To display the **Hypersequence Parameters** dialog box, you select **Hypersequence** from the **Sequence** menu of the **Method and Run Control** and select **Hypersequence Parameters** from the sub-menu.

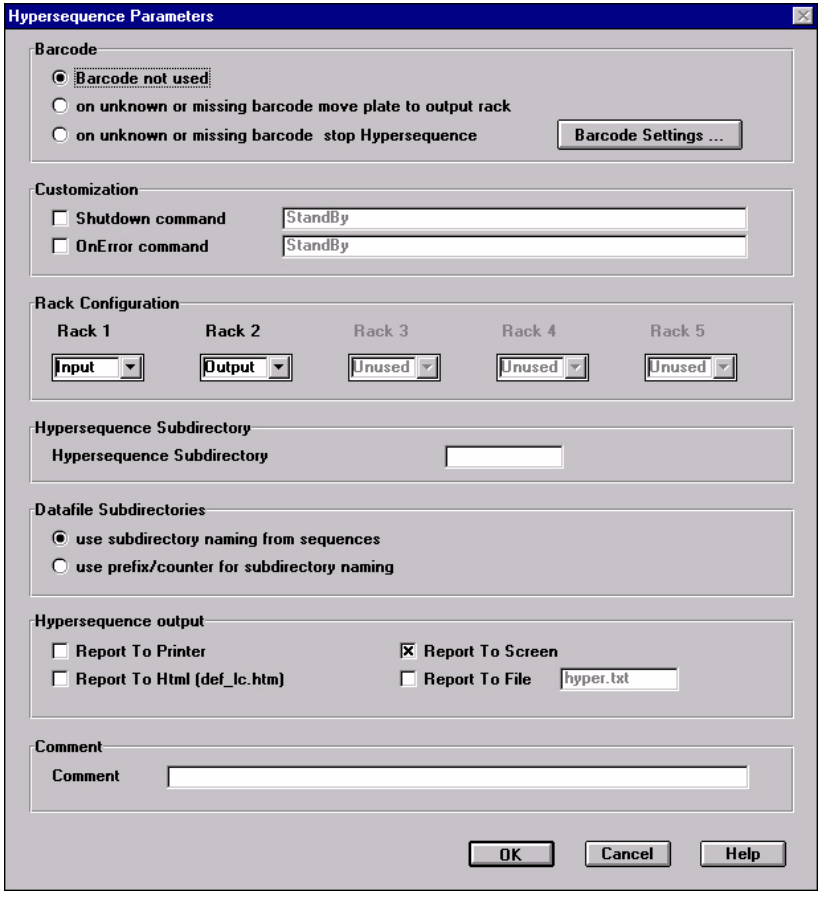

Figure 41 The Hypersequence Parameters dialog box

Barcode

In the **Barcode** group, you specify the action to be taken when the barcode reader on the Automation Interface encounters an unknown or missing barcode. You can also turn of the use of barcodes by choosing the option **Barcode not used**; this disables the **Barcode** column in the **Hypersequence Table**.

The **Barcode Settings** button displays the **Barcode Settings** dialog box, which allows you to specify the settings necessary to read your barcodes (see "Barcode Settings" on page 61).

Customization

You use the **Customization** group to specify what happens at the end of the hypersequence (shutdown) and/or when the system encounters an error condition.

Valid commands include:

- `LAMPALL OFF`
- `PUMPALL OFF`
- `STANDBY`

Valid macros include:

- `SHUTDOWN.MAC` *(user-written)*

Rack Configuration

In the **Rack Configuration** group, you specify the initial usage of the racks. The racks are numbered as in Figure 42:

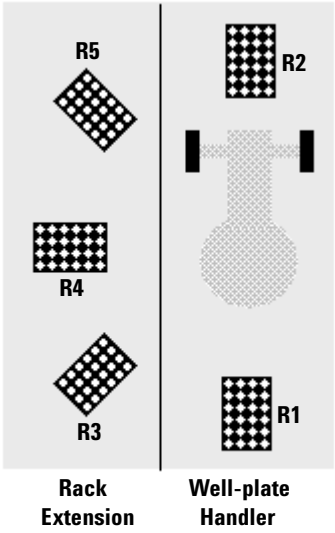

Figure 42 Rack numbering in the Well-plate Handler

If a Rack Extension is not installed, Racks 3, 4 and 5 are unavailable.

At least one rack must be marked as the **Input** rack, and at least one must be marked as the **Output** rack. If you mark four input racks and one output rack, the first free input rack becomes an output rack, and so on.

Hypersequence Subdirectory

You use the **Hypersequence Subdirectory** group to specify where the datafile subdirectories of the individual sequences are stored.

By default, the Hypersequence subdirectory is blank, and the datafiles are stored in the subdirectories specified in the **Datafile Subdirectories** group. You type the name of the hypersequence subdirectory in the corresponding text box. If the subdirectory does not exist, it will be created automatically when the hypersequence is started.

Datafile Subdirectories

You use the **Datafile Subdirectories** group to specify where the datafiles in the individual sequences of the hypersequence are stored. If you choose **use subdirectory names from sequences**, the datafiles are stored in the subdirectory as specified in the **Subdirectory** field in the **Data File** group of the **Sequence Parameters** dialog box.

If you choose **use prefix/counter for subdirectory names**, you can specify a prefix and a counter that is incremented for each sequence in the hypersequence. This option overrides the subdirectory naming in the **Sequence Parameters** dialog box.

Hypersequence Output

In the **Hypersequence Output** group, you specify the reports that will be produced. In addition to the printed report and the report to the screen, you can also choose to save reports in HTML format (with a standard naming convention using the hypersequence name) and/or in text format, where you can specify the name of the report.

Comment

You can add a free-text comment for the hypersequence in this field.

Barcode Settings

The **Barcode Settings** dialog box is displayed when you select the **Barcode Settings** button from the **Hypersequence Parameters** dialog box. It allows you to specify the settings necessary to read your barcodes.

Checksum

In the **Checksum** group, you specify whether the checksum is activated or deactivated.

NOTE If you enable the checksum, you may need to reconfigure the hand-held scanner, see "Configuring the Hand-held Barcode Reader" on page 30.

Start/Stop Character

In the **Start/Stop Character** group, you specify whether a start/stop character is transmitted or not.

NOTE If you enable the transmission of a start/stop character, you may need to reconfigure the hand-held scanner, see "Configuring the Hand-held Barcode Reader" on page 30.

Table 2 shows the barcode types that are supported.

Table 2 Supported Barcode Types

Barcode Type		Barcode Settings
• Code 39	Checksum	Set to match barcode writer parameters
	Start/Stop Character	Set to match barcode writer parameters
• Code 128	Checksum	Ignored (always activated)
	Start/Stop Character	Ignored (always deactivated)
• Interleaved 2 of 5	Checksum	Set to match barcode writer parameters
	Start/Stop Character	Ignored (always deactivated)
• Codabar	Checksum	Ignored (always deactivated)
	Start/Stop Character	Set to match barcode writer parameters

The Hypersequence Table

The **Hypersequence Table** allows you to specify the sequences that are to be included in the hypersequence. To display the **Hypersequence Table**, you select **Hypersequence** from the **Sequence** menu of the **Method and Run Control** and select **Hypersequence Table** from the sub-menu.

You can compile the table either manually, using the table editing buttons, or automatically, using the hand-held barcode reader.

- If you make the table manually, the hypersequence follows the order of the line numbers in the table.

NOTE The plates must be placed in the rack in the same order as in the table, i.e. the top plate in Input Rack 1 is the top plate in the hypersequence table.

- If you make the table using the hand-held barcode reader, the order of the plates in the rack defines the order in which the sequences in the hypersequence are run.

NOTE If you use the hand-held barcode reader to set up your hypersequence, you can change the order of the plates in the rack, or insert new plates, while the hypersequence is running.

The **Hypersequence Table** contains five columns (see Figure 43).

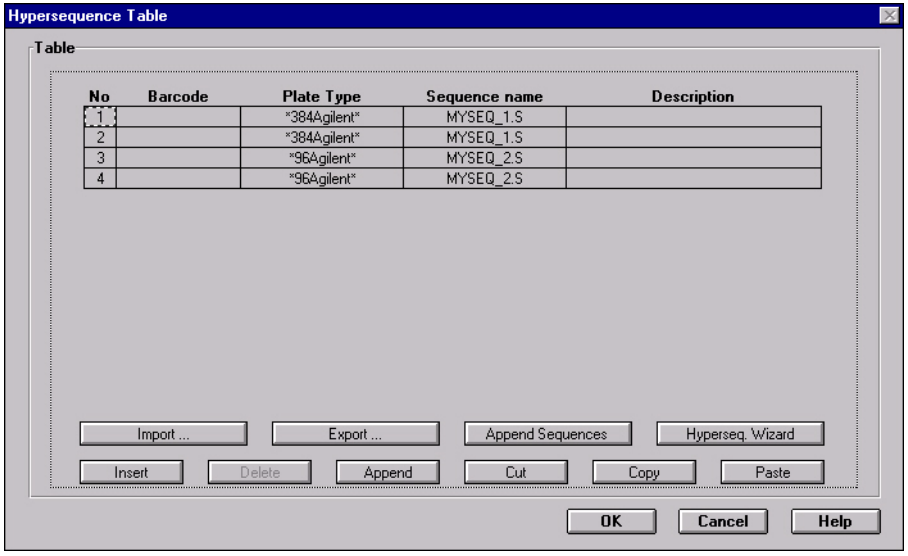

Figure 43 The Hypersequence Table

No.

The line number of the hypersequence.

Barcode

The barcode of the plate as read by the hand-held barcode reader. If the **Barcode not used** option in the **Hypersequence Parameters** dialog box is selected, the **Barcode** column is read-only.

Plate Type

You select the plate type from the drop-down list. The list includes both preconfigured well-plate types and custom well-plate types.

Sequence Name

You select the sequence from the drop-down list. The list contains all the sequences in the current default sequence path.

Description

You can enter a description of the sequence in this field.

Below the table are the buttons that help you to complete the hypersequence table:

Import	Imports a hypersequence from a file; see Making an Import file
Export	Exports the hypersequence table to a csv file.
Append Sequences	Displays the Hypersequence Append Lines dialog box, which allows you to append a number of lines to your hypersequence table.
Hyperseq. Wizard	Displays the Hypersequence Wizard, which allows you to add multiple plates to the hypersequence table using a new sequence based on an existing sequence template.
Insert	Insets a line in the hypersequence table above the currently-selected line.
Delete	Deletes the currently-selected line in the hypersequence table.
Append	Appends a line to the end of the hypersequence table.
Cut	Deletes the currently-selected line in the hypersequence table and places it on the clipboard.
Copy	Copies the currently-selected line in the hypersequence table to the clipboard.
Paste	Pastes the line on the clipboard into the hypersequence table at the current position.

Importing an import file

Instead of setting up the hypersequence directly in the **Hypersequence Table**, you can set up the hypersequence in a spreadsheet program (for example, Microsoft Excel) or a text editor (for example, Microsoft Notepad), and import it as a file.

NOTE The import process also apples to sequence tables, when you import a file into the sequence table.

Using the **Import Configuration** dialog box (see Figure 44), you can import sequence tables or hypersequences in text format, for example based on a Character-Separated Value (.csv) or text (.txt) file. The **Import Configuration** dialog box is displayed when you select **Import Hypersequence** from the **Hypersequence** menu of the **Sequence** menu of **Method and Run Control** (or, for sequence tables, **Import Sequence** from the **Sequence** menu of the **Method and Run Control**).

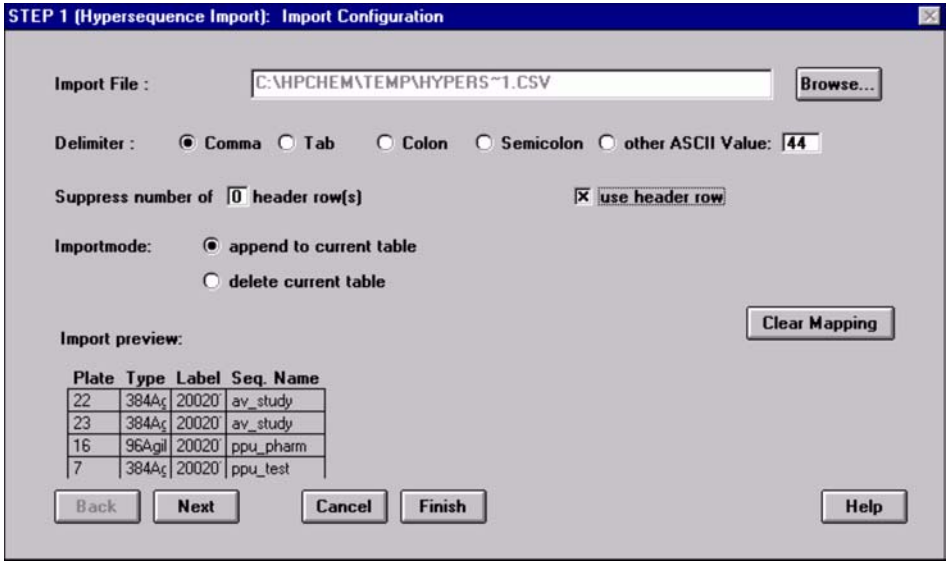

Figure 44 The Import Configuration dialog box

Import File

This field contains the name of the file to import. You use the **Browse . . .** button to display a file selection dialog box, from which you can select the file to import; see also "Making an import file" on page 68.

Delimiter

You have to specify which delimiter (characters such as comma, tab, and so on) separates each field in the text file. If you create the file in Microsoft Excel, and save it as a CSV file, you select the **Comma** delimiter option. If you create

the file in Microsoft Notepad, you have to select as delimiter the character you used to separate the columns. Figure 45 gives an example of an import file that uses a semicolon as delimiter.

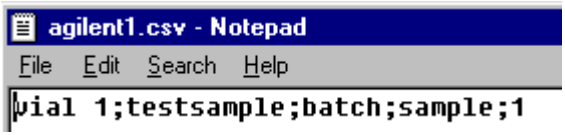

Figure 45 An import file using a semicolon as delimiter

NOTE You must not use a period (.), ascii 46, as delimiter.

Suppress number of () header rows

You have the possibility to suppress the first n lines of your file. Those lines can be used for comments and are neither imported nor displayed in the **Import Preview**.

Use header row

If you enable **Use header row**, the first unsuppressed line in the text file is assumed to be column header information, and is not imported. However, the header information is displayed in the **Import Preview**.

NOTE We recommend that you use a header line to enable you to easily associate the columns in your imported file with the columns in the hypersequence table (or sequence table).

Import Mode

You select **append to current table** to append the imported file to the current hypersequence table or sequence table, or **delete current table** to replace the current hypersequence table or sequence table with the imported file.

Clear Mapping

You click the **Clear Mapping** button to remove any mapping of the columns in the imported file to the columns in the sequence table or hypersequence table. Mapping is the process of associating the columns of your imported file with the columns in the hypersequence table or sequence table.

Import Preview

The **Import Preview** shows a tabular view of the imported file.

The **Next** button displays the **Map Hypersequence Table** dialog box (or **Map Sequence Table** dialog box) for the next step of the import process; the **Finish** button ends the import process at the current stage.

NOTE If you click **Finish** before you have correctly mapped all columns to the sequence table, the unmapped columns will not be imported.

In the second stage of the import process, you map the columns in the import file with those in the hypersequence (or sequence) table, using the **Map Hypersequence Table** (or **Map Sequence Table**) dialog box (see Figure 46)

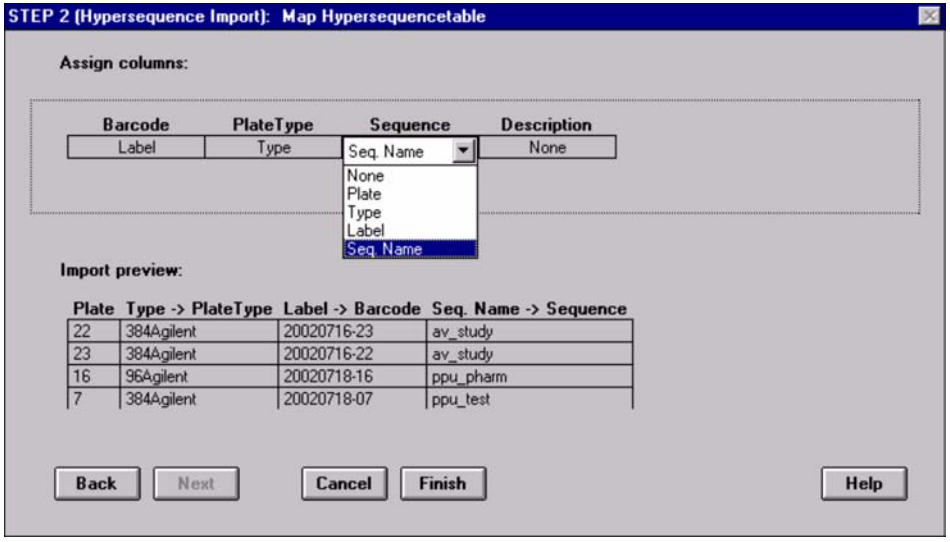

Figure 46 Mapping the columns

Assign Columns

This table allows you to make the mapping assignments for each column in the imported file. To map a column in the imported file to a column in the sequence table, you click in the cell to display a combo box, then select the appropriate column from the displayed list.

Import Preview

The **Import Preview** shows a tabular view of the imported file. As you map the columns of the imported file to the columns of the **Hypersequence Table**, the mapping assignments are displayed in the column headers.

Making an import file

You can make an import file for your sequence (or hypersequence) using either a spreadsheet program, such as MS Excel, or a text editor, such as Notepad. In all cases, the file must consist of a list of items separated by a valid character (delimiter). If you use MS Excel to make your import file, and save the file as CSV (Comma delimited), each item in each line of the file is separated by a comma, and each line ends with a line break. If you use Notepad to make your import file, you can select a different delimiter character, for example a colon (ascii 58), space (ascii 32) or tab (ascii 9) (but not a period (ascii 46)) instead of a comma.

You may precede your list of items with header information (as many lines as you like) that will not appear in the sequence import table, and you can include column headings to help you later when you map your import file to the sequence table (or hypersequence table). If you have ChemStore installed, you may include custom fields. The column headings need not be the same as the headings in the sequence table.

The items that you include in your file must be valid sequence table entries, for example, method names, sample types, calibration levels, etc. You can use any valid sample location formats; they are translated automatically on import. Any invalid items in the import file are logged in the Import Summary.

Checks for Sequence Table columns:

Column Name	Valid Range
Location	Must be a valid location string, e.g. Vial 1, 2, P1-A1, P1-B-2, etc. The validity of the Location with the configured plates is not checked.
Sample Type	Sample, Calibration or Control Sample; the check is not case-sensitive.
Method	It is not necessary that the method exists, although this check is made. Inclusion of the extension .m is optional; other extensions are ignored.
Inj/Location	1 – 99 or blank.
CalLevel	1 – 99 or blank.
UpdateRF	No Update, Average, Replace, Bracket or Delta%; the check is not case-sensitive.
UpdateRT	No Update, Average or Replace; the check is not case-sensitive.
Interval	1 – 999 or blank.
Data Filename	Inclusion of the extension .d is optional; other extensions are ignored.
Dilution, Multiplier, ISTD Amount, Sample Amount	Any positive value or blank.
Inj Volume	0 – Max. Inj. Vol or blank
Study Name (only if ChemStore is installed)	The study must exist in order for custom fields to be imported.

An MS Excel file for sequence import may look similar to Figure 47

	A	B	C	D	E	F
1	Sequence Import File					
2	**Position**	**Name**	**Type**	**Meth**	**Injections**	**Level**
3	Vial 1	Cal 1	Calibration	def_lc	1	1
4	2	Cal 2	Calibration	def_lc	1	2
5	1-A-1	Samp 1	Sample	def_lc	3	
6	1A02	Samp 2	Sample	def_lc	3	
7	P1-a-3	Samp 3	Sample	def_lc	3	
8						

Figure 47 An MS Excel file for sequence import

The same file displayed in a text editor (for example, Notepad) would look like Figure 48.

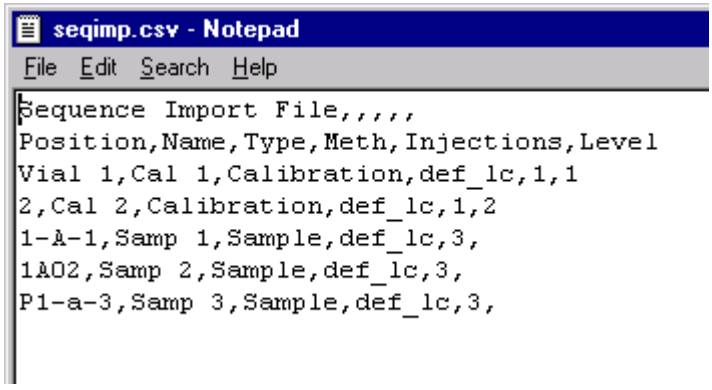

Figure 48 The sequence import file displayed in Notepad

When mapped to the sequence table, the file looks like Figure 49.

Line	Location	Sample Name	Method Name	Inj/Location	Sample Type	Cal Level
1	Vial 1	Cal 1	def_lc	1	Calibration	1
2	Vial 2	Cal 2	def_lc	1	Calibration	2
3	P1-A-01	Samp 1	def_lc	3	Sample	
4	P1-A-02	Samp 2	def_lc	3	Sample	
5	P1-A-03	Samp 3	def_lc	3	Sample	

Figure 49 The sequence import file mapped to the sequence table

Checks for Hypersequence Table columns:

Column Name	Valid Range
Plate Type	The plate type must exist.
Sequence	Inclusion of the extension .s is optional; other extensions are ignored.

An MS Excel file for hypersequence import may look similar to Figure 50.

	A	B	C	D	E
1	Hypersequence Import File				
2					
3	**Type**	**Plate**	**Seq.**	**Comment**	
4	*96Agilent*	20020826/15	dfv_96_2	dfv sequence	
5	*96Agilent*	20020827/22	dfv_96_6	dfv seq (modified)	
6	*384Agilent*	20020828/26	pbb384_1	pbb sequence	
7	*96Agilent*	20020826/17	dfv_96_2	dfv sequence	
8					

Figure 50 An MS Excel file for hypersequence import

The same file displayed in a text editor (for example, Notepad) would look like Figure 51.

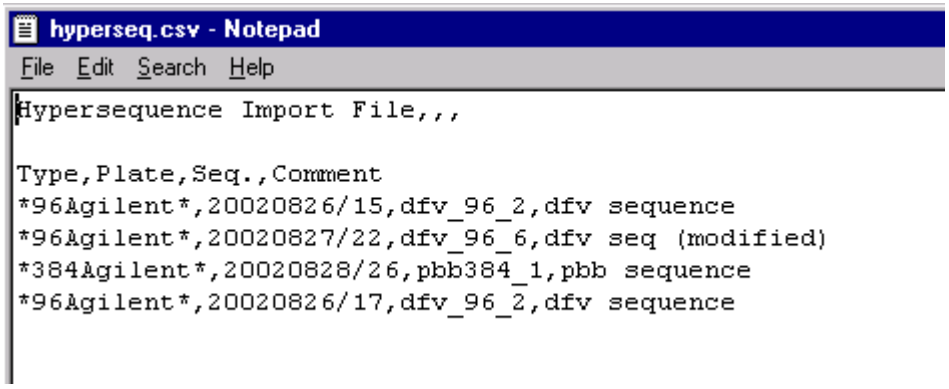

Figure 51 The hypersequence import file displayed in Notepad

When mapped to the hypersequence table, the file looks like Figure 52.

No	Barcode	Plate Type	Sequence name	Description
1	20020826/15	"96Agilent"	dfv_96_2	dfv sequence
2	20020827/22	"96Agilent"	dfv_96_6	dfv seq (modified)
3	20020828/26	"384Agilent"	pbb384_1	pbb sequence
4	20020826/17	"96Agilent"	dfv_96_2	dfv sequence

Figure 52 The hypersequence import file mapped to the hypersequence table

5
Troubleshooting and Error Handling

Well-plate Handler Test

Each movement of the Well-plate Handler can be carried out under manual control. This is useful during troubleshooting, where close observation of each of the steps is required to confirm a specific failure mode or verify successful completion of a repair. Each step command consists of a series of individual commands which move the components to predefined positions enabling the specific step to be done.

Testing with the ChemStation

In the ChemStation, the Well-plate Handler test is carried out using the **Well-plate Handler Test** dialog box, where the movements are separated into single-step instructions and multi-step functions (see Figure 53).

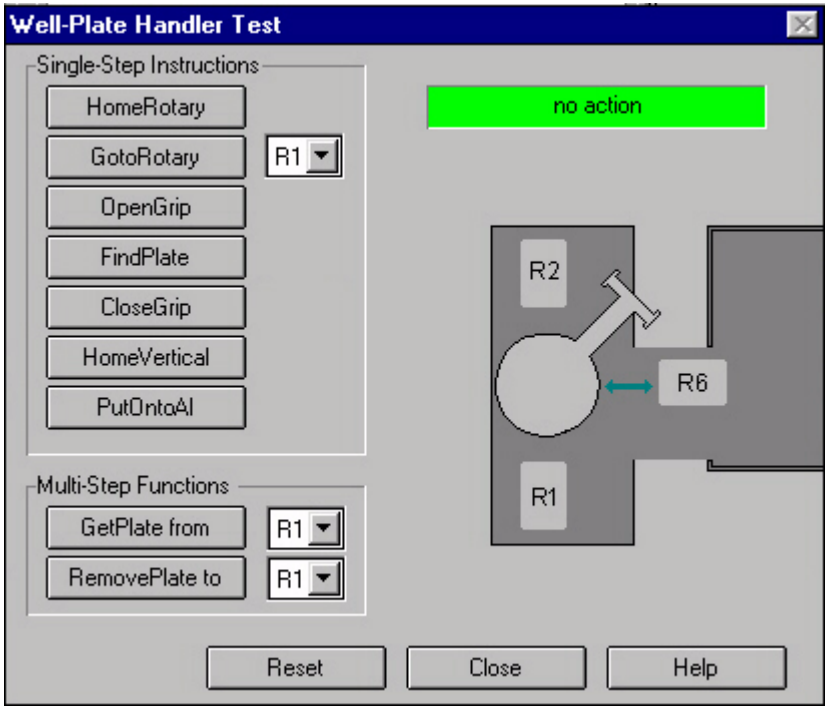

Figure 53 Well-plate handler Test dialog box

Single-Step Instructions

HomeVertical Moves the Well-plate Handler arm to its topmost position.

HomeRotary Moves the Well-plate Handler arm to its rotary home position.

NOTE The rotary home position is not directly above rack R1.

OpenGrip Opens the gripper.

CloseGrip	Closes the gripper.
GoToRotary	Moves the Well-plate Handler arm to the specified rack position. You select the rack position from the drop-down list.
FindPlate	Moves the Well-plate Handler arm down until it encounters a plate. There must be a plate in the position specified in GoToRotary.
PutOntoAI	Transfers a plate to the Automation Interface. You use this command after GoToRotary, FindPlate and CloseGrip.

Multi-Step Functions

GetPlate From	Transfers a plate from the specified rack to the Automation Interface. You select the rack position from the drop-down list.

NOTE A plate must be installed in the specified rack.

RemovePlate To	Transfers a plate from the Automation Interface to the specified rack. You select the rack position from the drop-down list

NOTE A plate must be installed in the transport position of the Automation Interface.

The **Reset** button resets the Well-plate Handler to its initial state.

Testing with the Hand-Held Controller

The Well-plate Handler **Tests** screen (see Figure 54) gives access to a selection of single-step commands that allow you to move the gripper arm and gripper fingers for the purposes of test or adjustment.

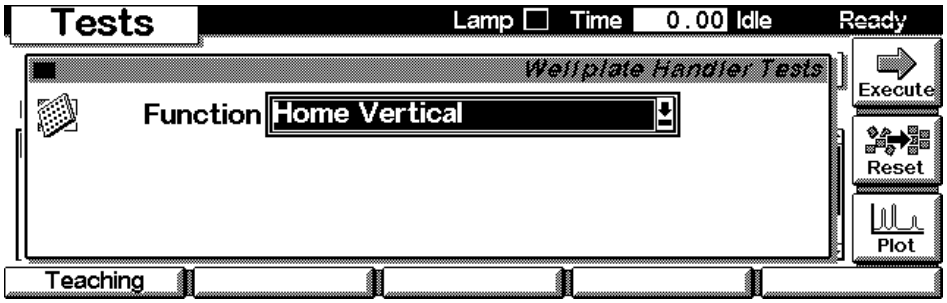

Figure 54 The Well-plate Handler Tests screen

Home Vertical Moves the Well-plate Handler arm to its topmost position.

Home Rotary Moves the Well-plate Handler arm to its rotary home position.

NOTE The rotary home position is not directly above rack R1.

Open Grip Opens the gripper.

Close Grip Closes the gripper.

GoTo Rotary Position Moves the Well-plate Handler arm to the selected rack position.

You select the rack position using the up and down cursor keys.

Find Plate	Moves the Well-plate Handler arm down until it encounters a plate. There must be a plate in the position specified in GoTo Rotary Position.
Put onto Automation IF	Transfers the plate in the gripper to the transport position of the Automation Interface.

Automation Interface Test

Each movement of the Automation Interface can be carried out under manual control. This is useful during troubleshooting where close observation of each of the steps is required to confirm a specific failure mode or verify successful completion of a repair. Each step command consists of a series of individual commands which move the components to predefined positions enabling the specific step to be done.

Testing with the ChemStation

In the ChemStation, the Automation Interface test is carried out using the Automation Interface Test dialog box (see Figure 55).

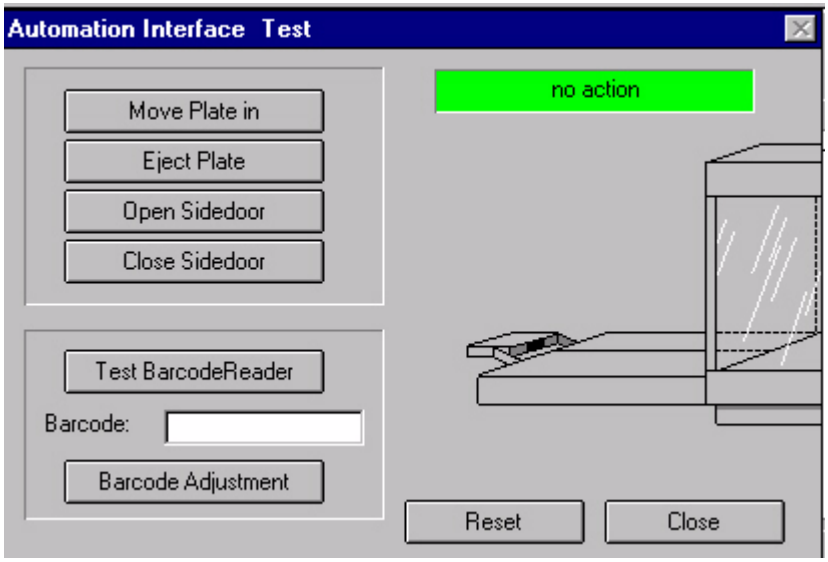

Figure 55 Automation Interface Test dialog box

Insert Plate Opens the door and transfers the plate from the Automation Interface into the sampler.

NOTE A plate must be installed in the transport position of the Automation Interface.

Eject Plate Opens the door and transfers the plate from the sampler into the Automation Interface.

NOTE A plate must be installed in the well-plate autosampler.

Open Door Opens the door.

Close Door Closes the door.

Test Barcode Reader Reads the barcode on the plate on the Automation Interface transport and displays the result in the field.

The **Reset** button resets the Automation Interface to its initial state.

Testing with the Hand-Held Controller

The Automation Interface Tests screen (see Figure 56) gives access to a selection of commands that allow you to test or adjust the Automation Interface.

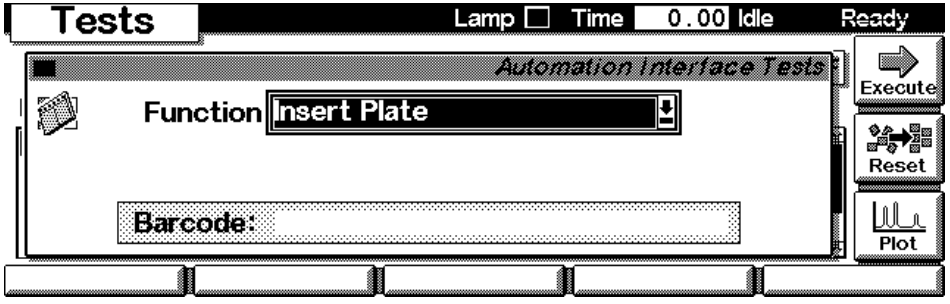

Figure 56 Automation Interface Tests screen

Insert Plate	Opens the door and transfers the plate from the Automation Interface into the sampler.

NOTE A plate must be installed in the transport position of the Automation Interface.

Eject Plate	Opens the door and transfers the plate from the sampler into the Automation Interface.

NOTE A plate must be installed in the well-plate autosampler.

Open Door	Opens the door.
Close Door	Closes the door.
Test Barcode Reader	Reads the barcode on the plate on the Automation Interface transport and displays the result in the field.
Barcode Adjustment On	Switches the fixed barcode reader to continuous mode, to allow you to adjust its position.
Barcode Adjustment Off	Switches off continuous mode on the fixed barcode reader.

Solving Problems

Well-plate Handler does not turn on when switched on.

Possible Cause	Solution
Power cord is not firmly plugged in.	Verify power cord is firmly seated in receptacles.
Fuse has blown.	Replace fuse(s).
Fuse configuration is not correct.	Refer to "Changing the Fuse Configuration, if necessary" on page 18.

The Well-plate Handler arm does not move down far enough to depress the plate sensor switch.

Possible Cause	Solution
The vertical offset for the position has been trained too high.	In the software, adjust and save the vertical offset for the correct plate type. **Note:** Place only one well-plate in a rack or device position when teaching the vertical offset.

For all other problems, contact Agilent Technologies Product Support.

Error Messages

AI Door Error

Possible Causes	Actions
The Automation Interface door is blocked	Remove any blockages
A door sensor has failed	Replace the Automation Interface

Plate Error

Possible Causes	Actions
The plate does not move correctly	Remove the plate
The transport belt is dirty or wet	Clean the transport belt
The transport belt is damaged	Replace the Automation Interface
The transport belt sensor has failed	Replace the Automation Interface
The plate is stuck in the gripper of the Well-plate Handler	Use the Automation Interface test function to open the gripper of the Well-plate Handler

AI Door Sensor Error

Possible Causes	Actions
The Automation Interface door was opened manually	Do not open the Automation Interface door manually, always use the Automation Interface test function to open the door
An Automation Interface door sensor is defective	Replace the Automation Interface

Power Failure on AI

Possible Causes	Actions
The Well-plate Sampler was switched off	Switch on the Well-plate Sampler
The 24V power was disconnected from the Well-plate Sampler or from the Automation Interface	Reconnect the 24V power cord
The 24V power cord is damaged	Replace the 24V power cord
The internal 24 V power circuit has failed	Verify functionality using Automation Interface test in diagnosis

Well-plate Sampler Thermostat Enabled Error

Possible Causes	Actions
The Well-plate Sampler thermostat was switched on	The Well-plate Sampler thermostat should not be used while the Automation Interface is installed

Maintenance

WARNING

All maintenance procedures described in this manual can be safely performed by qualified personnel. Maintenance not covered in this manual should be performed only by an Agilent Technologies representative.

Switch OFF the power and disconnect the power cord from the power supply before performing any maintenance procedure that requires removal of any panel or cover, or disassembly of any interior instrument component.

Removal of protective covers marked with the High Voltage warning symbol shown at left can result in a safety hazard.

Cleaning the Well-plate Handler

WARNING

BIOHAZARD Wear gloves during any cleaning procedure that could involve contact with hazardous materials or fluids.

Periodically, you should clean the outside surfaces of the Well-plate Handler using a cloth or sponge dampened with water, alcohol, glass cleaner, or a mild soap solution diluted with water. If using glass cleaner or mild soap, wipe with a damp cloth or sponge after cleaning to remove any residue. Do not use abrasive cleaners. Do not spray cleaner onto the instrument. Clean the finger pads of the gripper with alcohol or other residue-free solvent.

Should fluids spill on the base of the Well-plate Handler, the fluid is directed away from the rotating base by means of a fluid barrier located beneath it. Wipe up any spills immediately. Clean only the exterior of the unit. Never remove any instrument panels to clean the inside of the instrument. Do not allow excess water or other fluids to drip inside the instrument.

Changing the Fuse(s)

Fuses burn out occasionally and must be replaced. If the power indicator light on the front of the unit does not light after switching ON the Well-plate Handler, first check to see whether the power cord is securely seated in a functioning power outlet and in the Well-plate Handler power cord receptacle at the rear of the Well-plate Handler. If the power failed while the Well-plate Handler was on, check that the power cord is not loose or disconnected and that power to the outlet is functioning properly. If these checks fail to remedy the loss of power, follow the steps listed below to replace the fuses.

Spare fuses are shipped with Well-plate Handler. If you no longer have spare fuses, you may obtain new ones from Agilent Technologies. The Well-plate Handler uses the following fuses:

- U.S.: 1.5 amp, 0.25 x 1.25 inch
- Metric: 1.0-amp, 5.0 x 20 mm

WARNING **Make sure the power to the Well-plate Handler is OFF and that the power cord is unplugged from the instrument or the power source before proceeding with the following instructions.**

1. Switch OFF power to the Well-plate Handler and remove the power cord from the power outlet or from the Well-plate Handler power cord receptacle.
2. Using a small, flat-blade screwdriver, gently pry the cover/fuse block assembly away from its housing and remove it to access the fuses.
3. On the fuse block, loosen the Phillips-head screw two turns and remove the fuse block by sliding it up and away from the screw and pedestal.
4. Remove the blown fuse: either the two 1.0-amp fuses or the single 1.5-amp fuse and replace with fuses of the same rating.
5. Making sure that the active fuses face out, slide the fuse block back into position and tighten the screw.
6. Slide the cover/fuse block assembly back into the housing and snap into place on the rear panel of the Well-plate Handler.
7. Reconnect the power cord to the Well-plate Handler and to the wall outlet and then reconnect the other cables previously disconnected.

WARNING **When the Well-plate Handler is switched ON, the Well-plate Handler arm moves to the vertical and horizontal home positions. Ensure that you are out of the way of the arm before switching ON the Well-plate Handler.**

8 Verify correct fuse replacement by switching ON the Well-plate Handler power - the Well-plate Handler should initialize immediately.

Moving the Well-plate Handler

1 Remove any well-plates from the Input and Output racks.

2 Switch OFF the power and unplug the power cord from the power outlet and from the receptacle on the rear panel of the instrument. Disconnect the communications cable from the rear panel of the instrument.

3 Prepare a space to accommodate the Well-plate Handler during the move (an empty area on the lab bench or a sturdy cart).

WARNING **The Well-plate Handler weighs approximately 32 pounds (14.53 kg) and should be lifted with care. Take the proper precautions to avoid injury.**

4 Lift the Well-plate Handler straight up and off the locating pins of the Well-plate Handler Locating Plate and set it carefully on the bench or cart. Depending on the distance that you are moving the instrument, you may wish to repackage the Well-plate Handler in its original shipping carton.

5 Disconnect the locating plate screws and remove the Well-plate Handler Locating Plate, setting it aside with the Well-plate Handler.

CAUTION Do not lose any of the screws or spacers.

6 To reinstall the Well-plate Handler, follow the instructions in Chapter 2, “Installation” to assemble and re-calibrate the Well-plate Handler.

Long-Term Shutdown

If you will not be using the Well-plate Handler for an extended period of time, clean the external surfaces of the instrument, unplug the Well-plate Handler from the main power source, and cover with a plastic or cloth cover.

Parts List

Table 3 Exchange Parts/Assemblies

Part Number	Description
• G2254-69000	1100 Automation Interface replacement kit
• G2255-69000	1100 Well-plate Handler replacement kit
• 5065-9928	1100 Barcode Reader mounted replacement
• 5065-9929	1100 Barcode Reader hand-held replacement

Table 4 Non-Exchange Parts/Assemblies

Part Number	Description
• G2255-25000	Gripper set 8.5-inch
• G2255-25001	Gripper set 10-inch
• G2255-24700	Button extension
• G2255-68708	Customization kit complete
• G2254-04100	Location plate
• G2254-04102	Adjustment sheet
• G2255-24701	Spacer 30 mm i.d. (Qty 4)
• G2255-24702	Spacer ring (Qty 3)
• G2254-60002	Alignment assembly
• G2254-68700	Cabinet kit
• G2254-68705	Standard accessory
• 5181-1519	CAN cable, 1 m
• 5181-1533	Cable-CAN-DC-out
• 8710-2411	Hex key 3 mm, 12 cm long
• 8710-1181	Hex key 2.5 mm
• G2254-60001	Adapter plate assembly

Table 4 Non-Exchange Parts/Assemblies (continued)

Part Number	Description
• G2255-68740	Fuse kit

Table 5 Consumable items

Part Number	Description
• G2255-68709	8.5-inch well-plate rack (Qty 2)
• G2255-68710	10-inch well-plate rack (Qty 2)

A
Safety Information

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 6 shows safety symbols used on the instrument and in the manuals.

Table 6 Safety Symbols

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.
	CE Compliance mark.

Table 6 Safety Symbols (continued)

Symbol	Description
	Signifies that the unit has passed safety tests for grounding, high voltage spikes and voltage leakage.
	Indicates a risk of body parts, hair, jewelry or clothing getting caught in a moving part.

Equipment Labels

Equipment labels are color coded as follows:

Yellow:	Caution, risk of danger
Red:	Stop
Blue:	Mandatory action
Green:	Safe condition or information

Warning and Caution Notes in this Manual

WARNING **A warning alerts you to situations that could cause physical injury or damage to the equipment. Do not proceed beyond a warning until you have fully understood and met the indicated conditions.**

CAUTION A caution alerts you to situations that could cause a possible loss of data. Do not proceed beyond a caution until you have fully understood and met the indicated conditions.

Radio Interference

FCC

This device complies with Part 15 of the FCC (United States Federal Communications Commission) Rules. Operation is subject to the following two conditions:

- This device may not cause harmful interference, and
- This device must accept any interference received, including interference that may cause undesired operation.

Never use cables other than the ones supplied by Agilent Technologies to ensure proper functionality and compliance with safety or EMC regulations.

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.

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Select “Products” - “Chemical Analysis”

It will provide also the latest firmware of the Agilent 1100 series modules for download.

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In This Book

This book contains the following information:

- hardware installation procedures
- navigation through the G2257A Sample Capacity Extension specific software
- creating a hypersequence, with examples
- troubleshooting

G2257-90000