

## User Guide

# DiluCult™ and DiluCult™ 2 instruments



The life science business of Merck KGaA, Darmstadt, Germany operates as MilliporeSigma in the US and Canada.

## Table of Contents

|                                                |           |                                                             |           |
|------------------------------------------------|-----------|-------------------------------------------------------------|-----------|
| <b>Introduction</b>                            | <b>3</b>  | <b>Using the Monitoring Software</b>                        | <b>14</b> |
| System Overview                                | 3         | Downloading the Software                                    | 14        |
| Part Numbers                                   | 3         | Using the Software                                          | 15        |
| Operator and Equipment Safety                  | 3         | Using the Function Buttons                                  | 16        |
| System Components                              | 5         | <b>Maintenance</b>                                          | <b>16</b> |
| <b>Setting Up the Instrument</b>               | <b>6</b>  | Cleaning the Instrument                                     | 16        |
| Unpacking the Instrument                       | 6         | Maintaining the Pump Head                                   | 16        |
| Installing the Instrument                      | 6         | Replacing the Pump Head                                     | 17        |
| <b>Operating the Instrument</b>                | <b>11</b> | Cleaning the Robotic Arm<br>(DiluCult™ 2 Instrument Only)   | 17        |
| Powering the Instrument On                     | 11        | Cleaning the Nozzle Holder<br>(DiluCult™ 2 Instrument Only) | 17        |
| Ensuring the Accuracy of the Weighing Platform | 11        | <b>Error Messages</b>                                       | <b>18</b> |
| Using the Digital Display/Control Panel        | 11        | <b>Troubleshooting</b>                                      | <b>18</b> |
| Dilution                                       | 12        | <b>Standard Product Warranty</b>                            | <b>19</b> |
| Distribution                                   | 13        | <b>Technical Assistance</b>                                 | <b>19</b> |
| <b>Calibrating the Instrument</b>              | <b>14</b> |                                                             |           |

## Notice

The information in this document is subject to change without notice and should not be construed as a commitment by Merck KGaA, Darmstadt, Germany. Merck KGaA, Darmstadt, Germany assumes no responsibility for any errors that may appear in this document. This manual is believed to be complete and accurate at the time of publication. In no event shall Merck KGaA, Darmstadt, Germany be liable for incidental or consequential damages in connection with, or arising from, the use of this manual.

## Introduction

### System Overview

DiluCult™ and DiluCult™ 2 dilutor instruments are designed to facilitate work in a microbiological safety cabinet. They are low in height and have a removable drip tray.

### Part Numbers

| Model                  | Cat. No.   |
|------------------------|------------|
| DiluCult™ Instrument   | 5427530001 |
| DiluCult™ 2 Instrument | 5427600001 |

### Operator and Equipment Safety

All employees who will operate and/or be near the DiluCult™ and DiluCult™ 2 instruments must comply with the following:

- Read and understand this user guide before using the DiluCult™ and DiluCult™ 2 instruments. Failure to follow operating instructions could result in user injury or damage to the instrument.
- Read and understand all maintenance instructions in this user guide before performing maintenance on the instruments. Failure to follow instructions could result in user injury or damage to the instrument.
- Any alteration of the DiluCult™ and DiluCult™ 2 instruments from factory specification may cause unsafe conditions, and will void the product warranty.
- Service should be performed by trained and authorized personnel only. Do not attempt to open the DiluCult™ and DiluCult™ 2 instrument housing.
- Place the DiluCult™ and DiluCult™ 2 instruments upright on a clean, flat, stable, horizontal surface, away from any source of excessive heat and close to an easily accessible, properly grounded power supply outlet. Do not run the instrument in any other position.
- Ensure there is at least 5 cm of open space behind the instruments. Do not obstruct the ventilation.
- Do not expose the DiluCult™ and DiluCult™ 2 instruments to liquid. If liquid gets inside the instrument through the ventilation cut-outs at the back of the instrument, avoid any contact with the instrument, turn the power off, and contact your local representative.
- Do not install the DiluCult™ and DiluCult™ 2 instruments in a humid area. Humidity can cause electrical shock and short circuit.
- Before cleaning, shut down the DiluCult™ and DiluCult™ 2 instruments and disconnect them from the power source.
- The power supply must be protected by a fuse below the main connection.
- The electrical installation must comply with local standards.
- Do not use or store flammable liquids (kerosene, gasoline, etc.) in or near the DiluCult™ and DiluCult™ 2 instruments. These substances may evaporate and present a risk of fire or explosion.
- The bag + sample + diluent must not exceed the authorized weight on the weighing platform:  
DiluCult™: 3,000 g  
DiluCult™ 2: 5,000 g
- Do not apply shock or excessive pressure to the weighing cell.
- Ensure that there is no obstacle that might interfere with the weighing cell.
- Ensure that the drip tray is correctly positioned. An improperly positioned tray can cause malfunction of the weighing platform.
- Do not use sharp objects (pens or sharp fingernails) to press the buttons on the digital display/control panel.
- Be sure that there are no visible defaults such as unstable zero or zero drift.
- For the DiluCult™ 2 instrument, do not activate the robotic arm manually. The arm must not undergo any kind of shock or pressure.
- For the DiluCult™ 2 instrument, check that there are no obstacles that could interfere with the robotic arm.
- Do not put fingers in the pump. Fingers could be pinched.

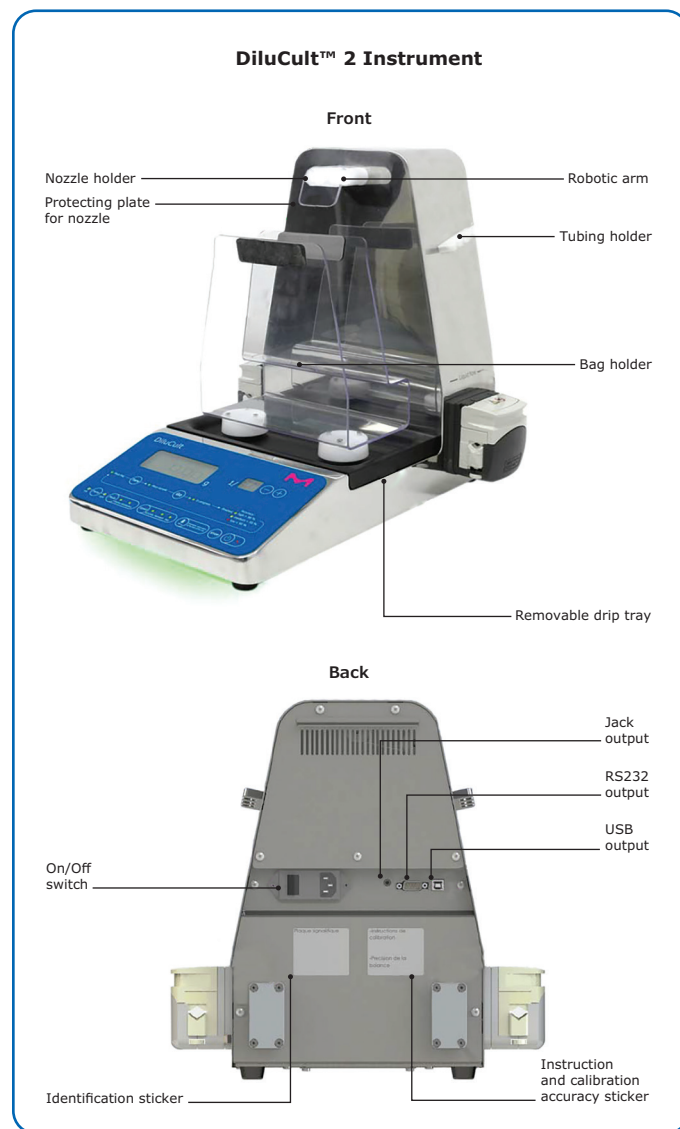
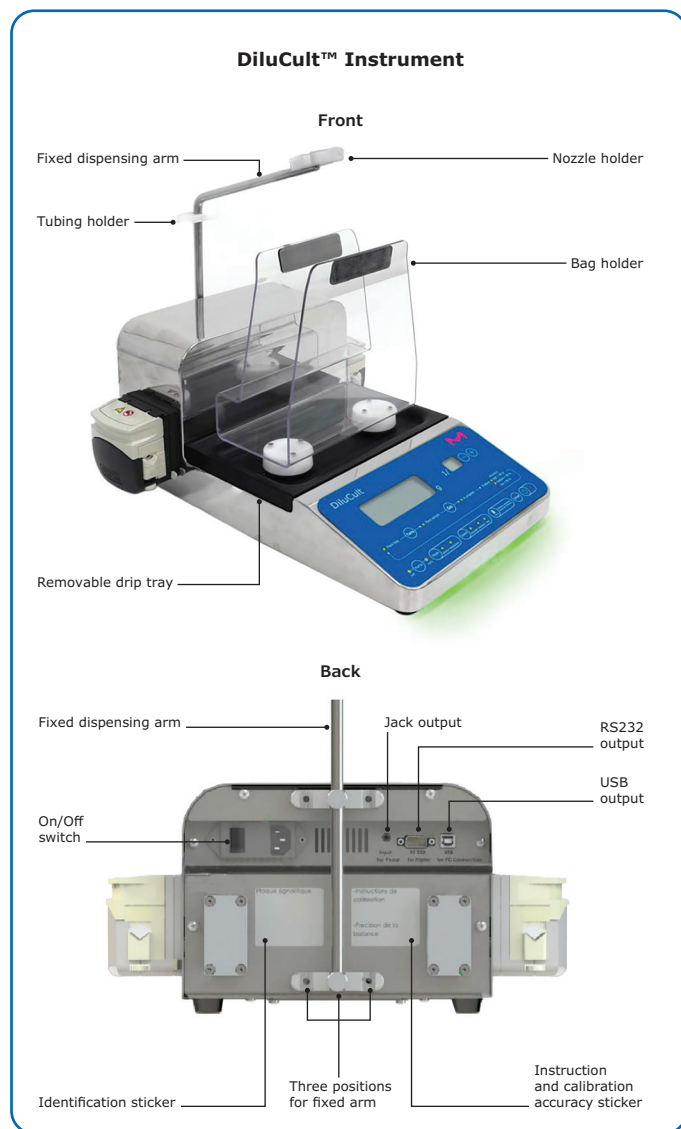
## Specifications

| Category                                                                    | DiluCult™ Instrument                                                                                                                                 | DiluCult™ 2 Instrument                         |
|-----------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|
| Cat. No.                                                                    | 5427530001                                                                                                                                           | 5427600001                                     |
| Weighing range                                                              | 0.1 g to 3,000 g                                                                                                                                     | 0.1 g to 5,000 g                               |
| Weighing accuracy                                                           | 0 to 100 g: ±0.05 g<br>100 g to 3,000 g: ±0.1%                                                                                                       | 0 to 100 g: ±0.05 g<br>100 g to 5,000 g: ±0.1% |
| Minimum weight for dilution                                                 | 5 g                                                                                                                                                  | 5 g                                            |
| Minimum weight for distribution                                             | 5 g                                                                                                                                                  | 5 g                                            |
| Minimal weight of the sample                                                | 1 g                                                                                                                                                  | 1 g                                            |
| Maximum authorized weight                                                   | 3,000 g                                                                                                                                              | 5,000 g                                        |
| Ideal functioning temperature for optimal accuracy of the weighing platform | -10 °C/+ 40 °C                                                                                                                                       | -10 °C/+ 40 °C                                 |
| Accuracy of the instrument from 1 to 100 g                                  | ±0.05 g                                                                                                                                              | ±0.05 g                                        |
| Accuracy of the instrument from 100 to 5,000 g                              | ±0.1%                                                                                                                                                | ±0.1%                                          |
| Maximum weight without support                                              | 4,500 g                                                                                                                                              | 7,000 g                                        |
| Dilution factor                                                             | 1/2 to 1/99                                                                                                                                          | 1/2 to 1/99                                    |
| Dilution accuracy                                                           | > 98%                                                                                                                                                | > 99%*                                         |
| Dilution time for a 25 g sample diluted at 1/10                             | < 9 s**                                                                                                                                              | < 9 s**                                        |
| Dilution time for a 375 g sample diluted at 1/10                            | –                                                                                                                                                    | < 80 s**                                       |
| Dispensing time for 90 mL                                                   | < 7 s**                                                                                                                                              | < 7 s**                                        |
| Dispensing time for 225 mL                                                  | < 10 s**                                                                                                                                             | < 10 s**                                       |
| Maximum number of pumps                                                     | 2 integrated                                                                                                                                         | 2 integrated                                   |
| Dispensing/distribution mode                                                | Fast/Standard/Accurate                                                                                                                               | Fast/Standard/Accurate                         |
| Traceability                                                                | Printer/Monitoring software (data export to Microsoft® Excel®, OpenOffice® Calc, LibreOffice® Calc, printer)                                         |                                                |
| Exported data                                                               | Sample weight/Total weight/Dilution factor/Dilution accuracy/Right or left pump + with monitoring software: Sample number/Name of operator/Date/Time |                                                |
| Connection                                                                  | RS232 output: To connect a printer; USB output: To connect a computer; Jack output: To connect a foot pedal                                          |                                                |
| Weight                                                                      | 12 kg                                                                                                                                                | 14.2 kg                                        |
| Dimensions (width x depth x height)                                         | 37 x 44 x 38 cm<br>14.6 x 17.3 x 14.9 in.                                                                                                            | 37 x 48 x 38 cm<br>14.6 x 18.9 x 14.9 in.      |
| Power source                                                                | 100–240 V ~± 10%                                                                                                                                     | 50/60 Hz ± 2 Hz 60 w                           |
| Fuse                                                                        | T3.15A L 250V 5 x 20 mm                                                                                                                              |                                                |
| Installation category                                                       | II                                                                                                                                                   |                                                |
| IP                                                                          | 2                                                                                                                                                    |                                                |
| In compliance with                                                          | ISO 7218/ISO 6887-1/FDA-BAM<br>EI 61010-1: 2010                                                                                                      |                                                |

\*In standard or accurate mode

\*\*With booster kit in fast mode

## System Components



**Note: Use the RS232 output to connect to a printer. Use the USB output to connect to a computer.**

## Setting Up the Instrument

### Unpacking the Instrument

1. Remove the instrument components from all packaging without damaging the packing materials.
2. Save the original packaging materials to be used if the instrument must be shipped for maintenance at a later date.

#### DiluCult™ Instrument

The shipping box contains the following:

- One dispensing assembly (6.4 mm diameter for GL45 bottle per pump)
- One fixed arm assembly
- One set of 10 GeckoGrip
- One set of adhesive gum
- One monitoring software CD
- One power cord
- One USB cable
- One Allen wrench
- One quick-start guide
- One Certificate of Conformity

#### DiluCult™ 2 Instrument

The shipping box contains the following:

- One dispensing assembly (6.4 mm diameter for GL45 bottle per pump)
- One set of 10 GeckoGrip
- One set of adhesive gum
- One monitoring software CD
- One power cord
- One USB cable
- One quick-start guide
- One Certificate of Conformity
- Optional accessories

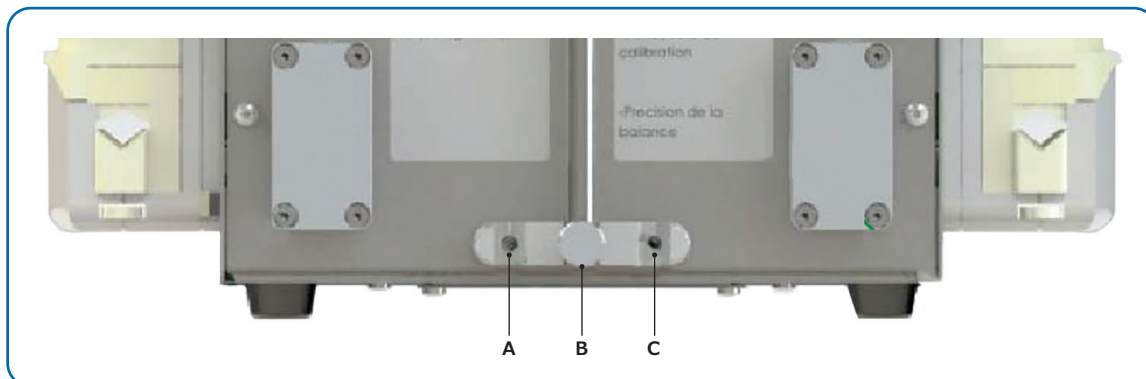
### Installing the Instrument

Place the instrument on a flat, stable, horizontal surface, away from any source of excessive heat and close to an easily accessible, properly grounded power supply outlet.

**Note: A flat, stable, horizontal, vibration-free surface is necessary for the accuracy of the weighing platform.**

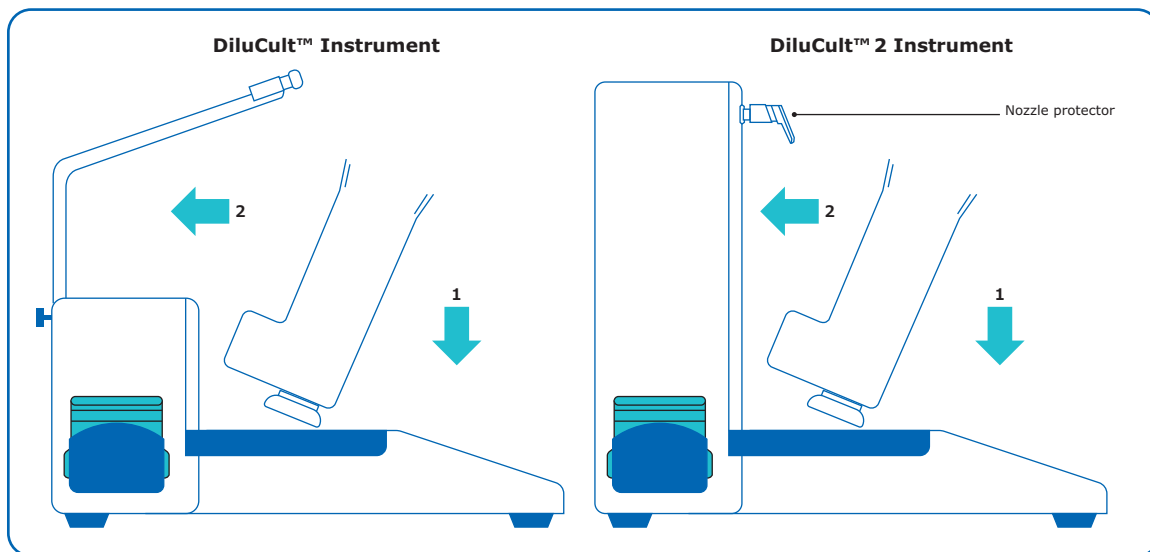
#### Installing the Fixed Arm (DiluCult™ Instrument Only)

Install the fixed arm at the back of the instrument. Use the Allen wrench and two screws provided. Choose between three possible positions: A, B, or C.

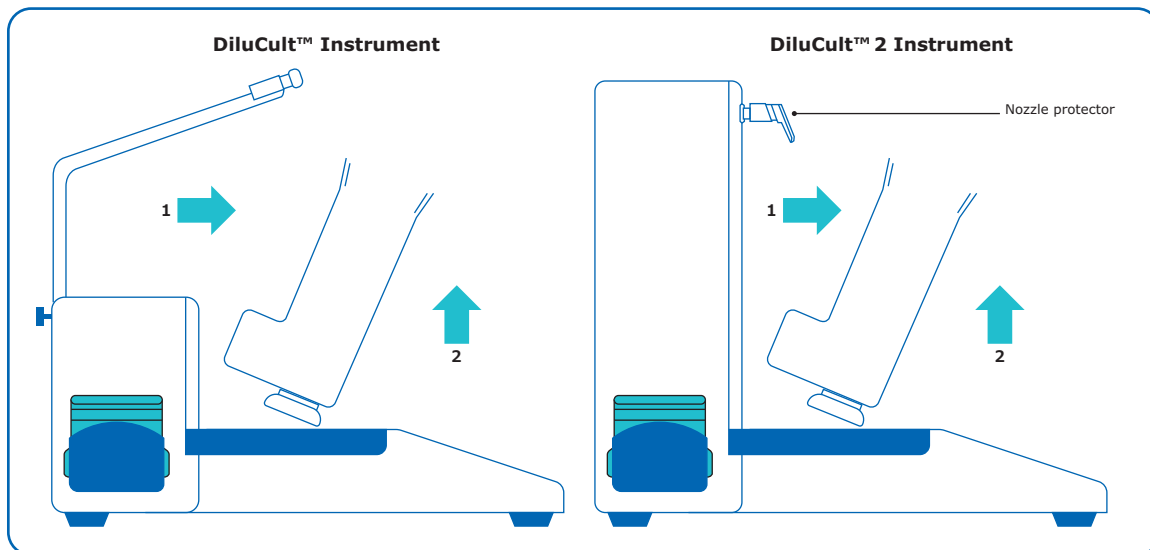


## Installing the Bag Holder

Clip the bag holder into the two holes in the base of the instrument. For the DiluCult™ 2 instrument only, also clip on the magnetized nozzle protector.



To remove the bag holder, tilt it forward and then lift it up.



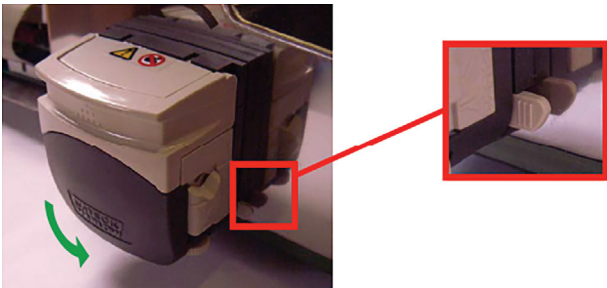


## Installing the Booster Kit (Optional)

The booster kit is composed of a pump and a pump extension.

To insert the pump extension between the pump and the pump holder:

1. Remove the tube from the pump.
2. Remove the pump by pressing the tab and turning it at the same time in the direction of the arrow.
3. Release the pump.



4. Clip the pump extension on the pump.

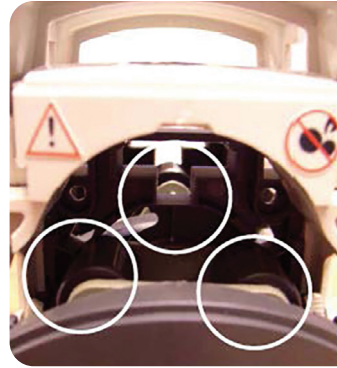


5. Open the 2 covers.

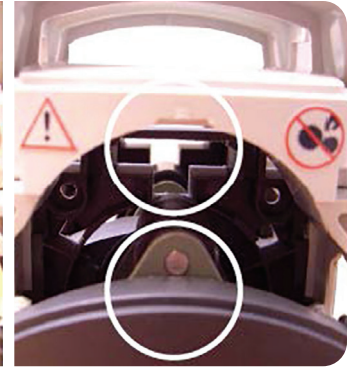


6. Ensure that the rollers of the main pump and pump extension are *not* aligned. They should be staggered in relation to each other:

**Correct alignment**



**Incorrect alignment**



If the alignment is incorrect, separate the pump from the pump extension by pushing the tab. Move the roller wheel slightly to the side and clip the pump and the pump extension together again.

7. Replace the booster kit on the pump holder.

To assemble the tubing for the booster kit, remove the pump tubing from the current assembly and replace it with the double tubing supplied with the booster kit.





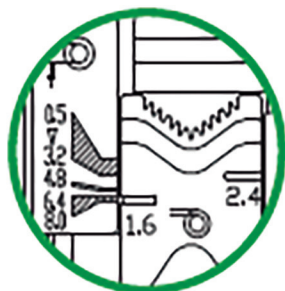
### Installing the Distribution Assembly

1. Place the tube weight at the bottom of the bottle and screw the GL45 cap on the top.
2. Install the tubing. **The direction of flow is indicated by the arrows on the housing.**
3. For tubing with an internal diameter smaller than 6.4 mm (delivered as standard), see Adjusting the Pump and Inserting the Tubing (page 10).
4. Place the tubing in the tubing holder.
5. Remove the protection cap and insert the nozzle into the nozzle holder.

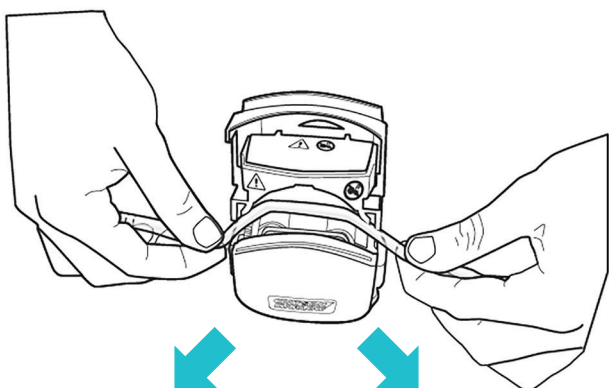


## Adjusting the Pump and Inserting the Tubing

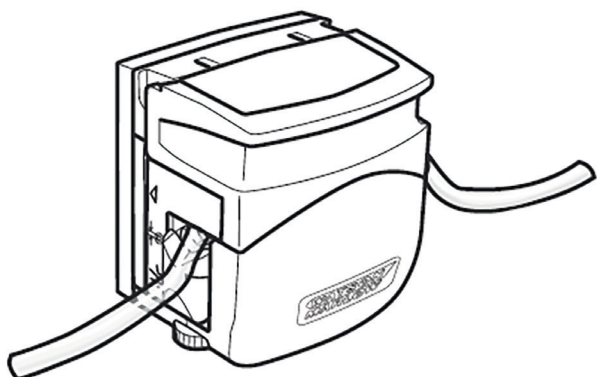
1. The factory setting for tubing diameter is 6.4 mm. To change the setting, turn the button on each side of the pump to obtain the right setting.



2. Insert the tubing into the pump.

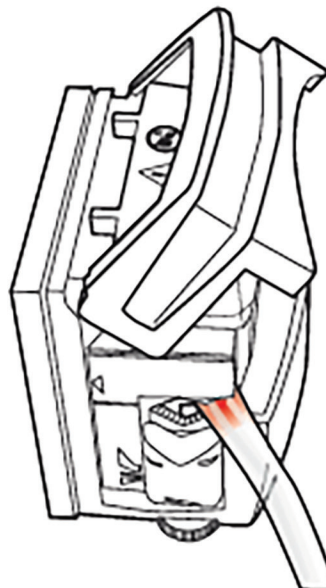


3. Close the pump, keeping the tubing stretched.

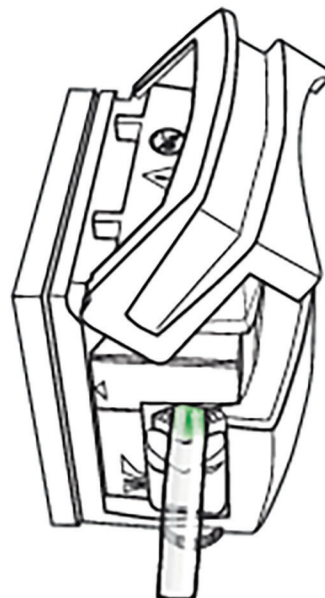


**Note: Make sure tubing is not pinched. This can cause the tube to be pierced.**

Tubing is pinched



Tubing is not pinched



## Operating the Instrument

### Powering the Instrument On

1. Plug the power cord into the electrical power source (from 100 V~ to 240 V~).
2. Turn the main switch to the "I" position.
3. Press the power button on the digital display/control panel. A green light glows under the instrument, indicating that it is ready to function. The arm of the DiluCult™ 2 instrument is initialized.

### Ensuring the Accuracy of the Weighing Platform

To ensure greater accuracy of the weighing platform, wait 10 minutes before the first use until the weighing cell reaches room temperature.

When the weighing cell is at room temperature, select dilution mode by pressing the  button. Tare by pressing the  button.

Put a certified 500 g standard weight on the bag holder. If the displayed weight on the digital display/control panel is *not*  $500 \pm 0.5$  g, calibrate the instrument (see Calibrating the Instrument, page 14).

### Using the Digital Display/Control Panel

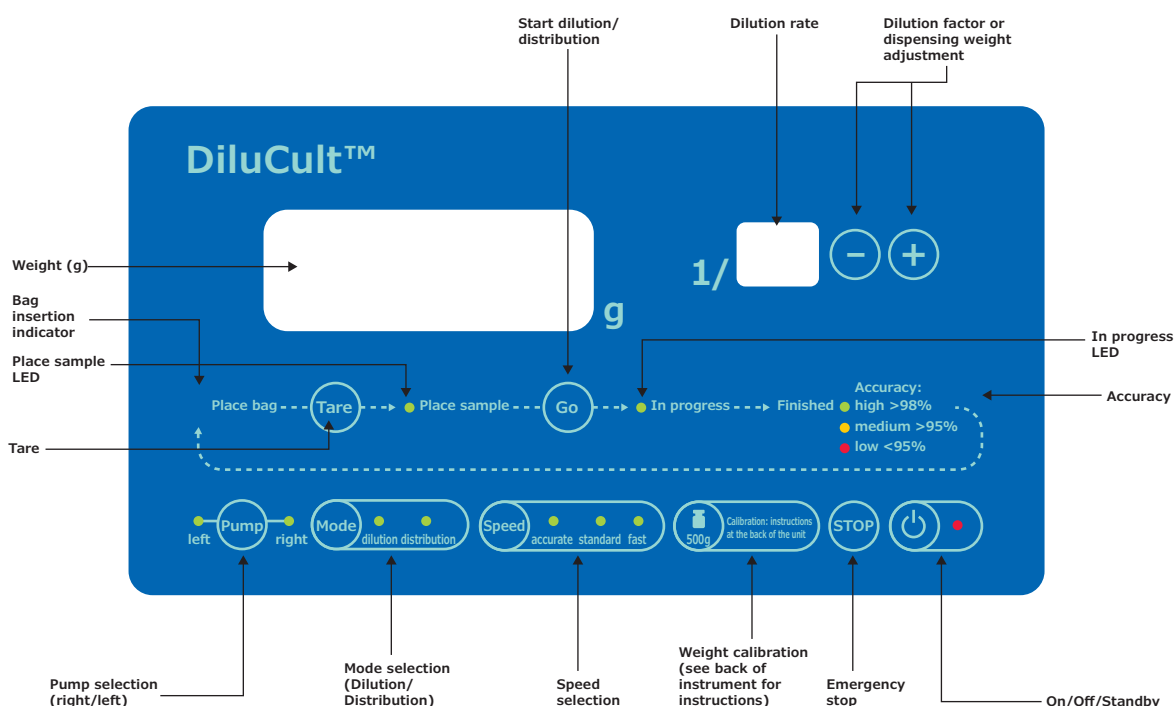
The digital display/control panel consists of:

- 10 action keys
- 14 control LEDs that indicate the current status of the process and the result of the dilution/distribution process.

2 control screens:

- Dilution mode: the weight and dilution rate
- Distribution mode: the adjustable weight targeted by the user

**Note: The instrument automatically goes into sleep mode after 30 minutes of inactivity. Press the on/off/standby button  to resume activity.**



## Dilution

1. Place the bag holder on the instrument.
2. Select dilution mode by pressing the  button. Two beeps sound, and the "Dilution" LED lights.
3. Select the pump (right or left) by pressing the  button.
4. Select one of 3 modes by pressing the  button:
  - Fast: Fast flow with lower accuracy
  - Standard: Standard flow with standard accuracy
  - Accurate: Slow flow with optimal accuracy

**Note: Choose the Accurate mode to prime the instrument for the first dilution after opening the pumps, changing the tubing, or changing the container. This guarantees an accuracy greater than 98%.**

6. Select the dilution rate by pressing the   buttons.

**The dilution/distribution mode, the selected pump, the dilution rate, and the chosen speed remain in the instrument's memory even after the instrument is switched off.**

7. Place the bag in the bag holder.
8. Press the  button. A beep sounds.
9. When the "Place sample" LED lights, place the sample in the bag. The weight of the sample appears on the screen.
10. The color of the light under the instrument indicates the stability of the weighing cell:
  - Blue indicates that the weighing cell is not stable. Wait for the instrument to stabilize before processing.
  - Green indicates that the weighing platform is stable. Proceed with the process.
11. Start the dilution by pressing the  button. The "In progress" LED lights. This indicates that the dilution is taking place. The lights under the instrument turn orange and flash slowly. The robotic arm of the DiluCult™ 2 instrument moves forward simultaneously.

12. To stop the dilution at any time, press the  button. A beep sounds.

13. To resume the dilution, press the  button.

This process can be repeated as many times as necessary during the dilution. During these interruptions, the diluent, the tubing, the pump (right/left), and speed can all be changed before the current dilution finishes.

The process may also be started all over again. To stop everything, press the  button a second time. Three beeps sound.

When the dilution is finished:

- A beep sounds.
- The final weight is displayed.
- An LED indicates the obtained accuracy of the dilution:
  - Green = high
  - Orange = medium
  - Red = low
- The lights under the instrument flash quickly, indicating the accuracy with a color code.
- The robotic arm of the DiluCult™ 2 instrument moves back.
- To run the process again with the same type of bag, place a bag in the bag holder and press the  button.

**Note: The weight of the bag remains in the instrument's memory. As long as all the bags weigh the same, multiple samples can be prepared ahead of time and diluted one after the other without changing settings on the instrument.**

## Distribution

1. Place the bag holder on the instrument and insert a sterile bag.  
or  
If a container other than a bag is to be used, remove the bag holder and place the container on a suitable support.

2. Select distribution mode by pressing the  button. Two beeps sound, and the "Distribution" LED lights.

**Note: In Distribution mode, the small display at the top right of the digital display/control panel is off.**

3. The main display shows the target weight. Press the   buttons to change the weight.
4. Select the pump (right or left) by pressing the  button.
5. Select one of 3 modes by pressing the  button:
  - Fast: Fast flow with lower accuracy
  - Standard: Standard flow with standard accuracy
  - Accurate: Slow flow with optimal accuracy

**Notes: Choose the Accurate mode to prime the instrument for the first dilution after opening the pumps, changing the tubing, or changing the container. This guarantees an accuracy greater than 98%.**

**The dilution/distribution mode, the selected pump, the amount of liquid to distribute, and the chosen speed remain in the instrument's memory even after the instrument is switched off.**

6. Start the dispensing by pressing the  button. The "In progress" LED lights. This indicates that the dispensing is taking place. The light under the instrument turns orange and flashes slowly. The robotic arm of the DiluCult™ 2 instrument moves forward simultaneously.
7. To stop the dispensing at any time, press the  button. A beep sounds.
8. To resume the dispensing, press the  button.

This process can be repeated as many times as necessary during the dispensing. During these interruptions, the diluent, the tubing, the pump (right/left), and speed can all be changed before the current dispensing finishes.

The process may also be started all over again. To stop everything, press the  button a second time. Three beeps sound.

When the dispensing is finished:

- A beep sounds.
- The final weight is displayed.
- An LED indicates the obtained accuracy of the dispensing:
  - Green = high
  - Orange = medium
  - Red = low
- The lights under the instrument flash quickly, indicating the accuracy with a color code.
- The robotic arm of the DiluCult™ 2 instrument moves back.

To run the process again with the same type of container, place a container and press the  button.

**Note: The weight of the container remains in the instrument's memory. As long as all the containers weigh the same, multiple samples can be prepared ahead of time and dispensed one after the other without changing settings on the instrument.**

## Calibrating the Instrument

Calibrate the instrument if, after taring, the displayed weight is not as accurate as:

- $\pm 0.05$  g for weights inferior to 100 g
- $\pm 0.1\%$  for weights superior to 100 g

Use **only** a certified weight of 500 g to calibrate the instrument.

**Note: Calibration instructions are also located on the back of the instrument.**

1. Select dilution mode by pressing the  button. Two beeps sound, and the "Dilution" LED lights.
2. Press and hold the  button for 2 seconds. "0.00 g" flashes on the screen and 3 beeps sound.
3. Ensure that the bag holder or the platform is clean and empty.
4. Press the  button again. "500.0 g" flashes on the screen and 1 beep sounds.
5. Place a standard 500 g weight on the platform.
6. Press the  button again. The instrument beeps 3 times.
7. Remove the weight. The instrument is calibrated and ready for use.

## Using the Monitoring Software

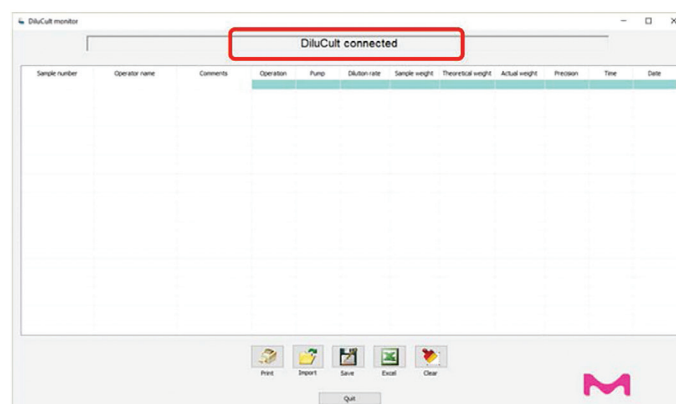
For traceability, the DiluCult™ instrument monitoring software saves the dilution and distribution data in CSV (comma-separated values) format, and can transfer the data to the following formats:

- Microsoft® Excel®
- OpenOffice® Calc
- LibreOffice® Calc

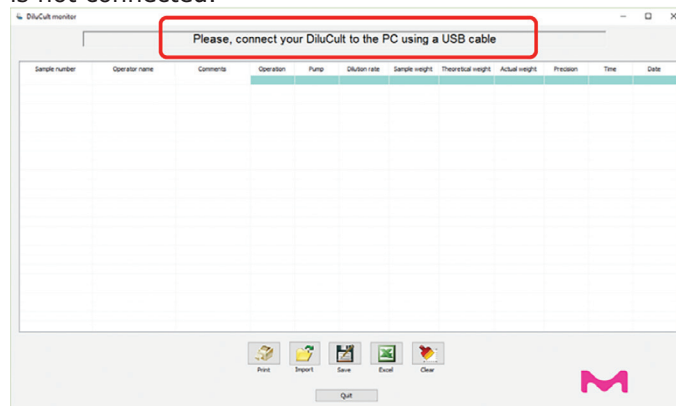
The spreadsheets can be printed from the computer. A label can be printed from a printer attached to the instrument. Contact your local service representative for information about installing a printer.

## Downloading the Software

8. Connect the DiluCult™ instrument to a computer with the supplied USB cable.
9. Insert the monitoring software CD supplied with the instrument and launch the DiluFlow.exe software. If the following screen displays, the instrument is connected:



If the following screen displays, the instrument is not connected.



Ensure that the DiluCult™ instrument is turned on and that the cable is connected. Relaunch the DiluFlow.exe software.

## Using the Software

To create a record of dilution and distribution processes, launch either dilution or distribution on the instrument. The following screen displays:

| Sample number | Operator name  | Comments | Operation    | Pump       | Dilution rate | Sample weight | Theoretical weight | Actual weight | Precision | Time     | Date       |
|---------------|----------------|----------|--------------|------------|---------------|---------------|--------------------|---------------|-----------|----------|------------|
| 1245L-638-MP  | Henri Michel   | OK       | Distribution | Right pump |               | 245.90        | 245.90             | 245.90        | 99.6      | 10:10:18 | 05/01/2016 |
| 1227E-178-PA  | Jean Durand    | R.A.S    | Distribution | Right pump |               | 290.80        | 290.80             | 290.80        | 99.8      | 10:10:17 | 05/01/2016 |
| ME-S8965-552  | Maurice Dupond | R.A.S    | Dilution     | Right pump | 10            | 25.10         |                    | 25.10         | 99.4      | 10:10:16 | 05/01/2016 |

Each line in the table records information about a new process. Information in the first three fields is entered by the user. Information in other fields (which have a green background) is automatically filled in after the process is complete. The following information is displayed for each process.

| Field              | Description                                                                                                                                       |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|
| Sample number      | Entered by the user using the computer keyboard or the barcode reader.                                                                            |
| Operator name      | Entered by the user using the computer keyboard or the barcode reader.                                                                            |
| Comments           | Entered by the user using the computer keyboard.                                                                                                  |
| Operation          | Dispensing or Dilution.                                                                                                                           |
| Pump               | Left pump or Right pump.                                                                                                                          |
| Dilution rate      | Displayed when the process performed is a dilution. Displayed as a whole number (no decimal places): the number N when the dilution ratio is 1/N. |
| Sample weight      | Displayed in grams with 2 decimal places.                                                                                                         |
| Theoretical weight | Displayed when the process performed is a distribution. Displayed as a whole number (without decimals) in grams.                                  |
| Actual weight      | Displayed in grams with 2 decimal places.                                                                                                         |
| Precision          | Displayed as a percentage with 1 decimal place.                                                                                                   |
| Time               | Computer time.                                                                                                                                    |
| Date               | Computer date.                                                                                                                                    |

### Note:

- The titles of the columns are in English.
- The field separator in the CSV file is a comma or a semicolon, depending on country and the language used by the computer.
- The decimal separator is a point or a comma, depending on country and the language used by the computer.
- The format of date and time is dependent on country and the language used by the computer.

Information in the first three fields can be entered either before or after the process is run. Following is a sample of the recommended workflow with information in the first three columns entered before the processes are run.

| Sample number | Operator name  | Comments | Operation | Pump | Dilution rate | Sample weight | Theoretical weight | Actual weight | Precision | Time | Date |
|---------------|----------------|----------|-----------|------|---------------|---------------|--------------------|---------------|-----------|------|------|
| 1245L-638-MP  | Henri Michel   |          |           |      |               |               |                    |               |           |      |      |
| 1227E-178-PA  | Jean Durand    |          |           |      |               |               |                    |               |           |      |      |
| ME-S8965-552  | Maurice Dupond |          |           |      |               |               |                    |               |           |      |      |
| LP-S897-MAZ   | Marie Bernard  |          |           |      |               |               |                    |               |           |      |      |



## Using the Function Buttons

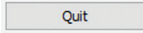
Function buttons are located at the bottom of the screen:



To save the process data in a file, click the  button. Navigate to the appropriate location. The format of the saved file is CSV (comma-separated values).

To save the file in spreadsheet format in Microsoft® Excel®, OpenOffice® Calc, or LibreOffice® Calc, the spreadsheet software must be installed on the computer. Click the  button. Navigate to the appropriate location.

Click the  button to delete the process data on the screen.

Click the  button to exit the software.

## Maintenance

### Cleaning the Instrument

During operation, clean up any leakage quickly and thoroughly.

**Note: Do not use bleach to clean the DiluCult™ instrument housing. Bleach could corrode the stainless steel.**

**During cleaning, do not let any liquid drip into the instrument.**

#### Autoclavable items:

- Dispensing assemblies
- Filter
- Bottle

#### Non-autoclavable items:

- Instrument housing
- Pumps
- Bag holder
- Drip tray
- Fixed arm
- Nozzle holder (including roller)
- Protecting plate for nozzle

## Follow these maintenance practices:

- Autoclave all the dispensing assemblies every day when working in sterile conditions.
- Replace the silicone tubing whenever the tubing is not air-tight or becomes sticky or stiff.
- Every 20 autoclavings, replace the air filter.
- To rinse the tubing using the DiluCult™ instrument:
  - Fill a bottle with water or another rinsing fluid.
  - Place the tube weight and the tubing in the bottle.
  - Pull the nozzle out of the nozzle holder by leaving the tubing in the pump and place the tubing into the rinsing bottle.
  - Select the distribution mode by pressing .
  - Choose 100 g to dispense and press the  button. The tubing is rinsed.
  - Repeat this operation as many times as necessary.

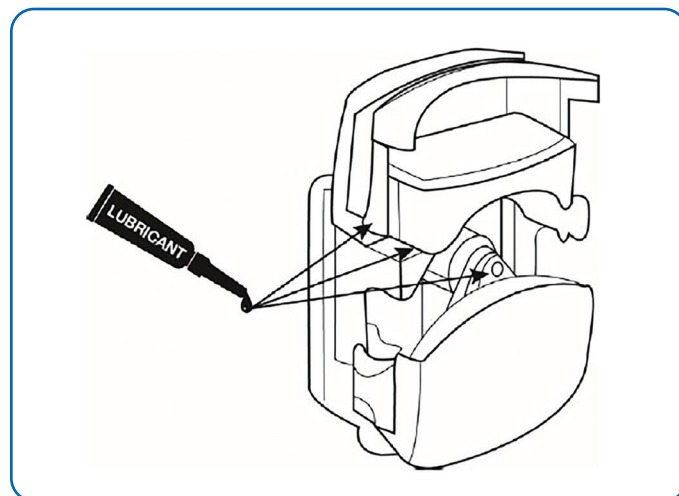
## Maintaining the Pump Head

The pump head is not autoclavable.

To clean the pump head:

1. Unplug the instrument.
2. Remove dust and dirt with a soft cloth.
3. Wipe all surfaces with a disinfecting wipe.

Once a week, grease the pump head to prevent premature wearing. Apply a universal multi-purpose grease to the friction areas:



## Replacing the Pump Head

Peristaltic pump heads have been tested to undergo approximately 10,000 openings. The life expectancy of a pump head depends on use and handling conditions. Replace the pump head when it wears out.

The following conditions indicate that the pump head may be wearing out:

- The pump does not prime easily
- Dispensing takes a long time
- Trial if new tubing is unsuccessful
- There is a gap between the cover and the body of the pump

## Cleaning the Robotic Arm (DiluCult™ 2 Instrument Only)

Clean the two metallic rods of the arm daily to ensure that the instrument functions correctly.



1. Switch the instrument to standby mode by pressing the  button.
2. Press the  button twice. The arm initializes.
3. Clean the 2 rods with ethanol or a disinfecting wipe.
4. Turn the instrument on again by pressing the  button. The arm initializes and retracts.

## Cleaning the Nozzle Holder (DiluCult™ 2 Instrument Only)

1. Switch the instrument to standby mode by pressing the  button.
2. Press the  button twice. The arm initializes.
3. Unscrew the nozzle holder using the Allen key supplied with the instrument. The screw is located under the holder.
4. Remove the holder.
5. Clean the holder with a disinfecting wipe

**Note: The roller is not autoclavable.**

6. Replace the holder and secure it in place with the screw.
7. Turn the instrument on again by pressing the  button. The arm initializes and retracts.

## Error Messages

If operation fails, the device displays an error: Err 1, Err 2, Err 3, or Err 4.

| Error message                       | Technical issue                                                                                                                                                                | Solution                                                                                                                                                                                                                            |
|-------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Err 1 (DiluCult™ 2 instrument only) | The robotic arm cannot move automatically.                                                                                                                                     | Ensure that nothing is blocking the movement of the arm and repeat the process.                                                                                                                                                     |
| Err 2                               | For a dilution, the weight of the sample is too low (< 0.5 g) or too high (the total weight after dilution should not exceed the weight capacity of the DiluCult™ instrument). | Replace the sample and start the dilution again.                                                                                                                                                                                    |
| Err 3                               | The liquid does not flow.                                                                                                                                                      | Ensure that the tubing is correctly placed in the pump and nothing is preventing the liquid from flowing in the tubing. Press the  button again. |
| Err 4                               | At the end of a calibration, one of the 2 measures (the empty weight or the 500 g calibrated weight) is wrong.                                                                 | Ensure that nothing is resting on the weighing platform that could alter the measurement.                                                                                                                                           |

## Troubleshooting

Before contacting us, ensure that the solution to your technical issue is not in the following table.

| Technical issue                                      | Solution                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| The display shows Err 1, Err 2, Err 3, or Err 4.     | See Error Messages.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| The instrument does not start.                       | <p>Ensure the power cord is connected.</p> <p>Ensure that the power switch is in the on position: "I".</p> <p>Check that the 2 fuses at the back of the instrument are functional (value: T3.15A).</p>                                                                                                                                                                                                                                                                                                                        |
| There are air bubbles in the diluent.                | Ensure that the tubing is correctly inserted in the peristaltic pump and follows the direction of the flow indicated on the side of the instrument.                                                                                                                                                                                                                                                                                                                                                                           |
| The indicated weight cannot remain stable.           | <p>Ensure that the instrument has been turned on for 10 minutes.</p> <p>Ensure that the drip tray is properly positioned.</p> <p>Ensure that the weighing cell holes are free.</p> <p>Ensure that the instrument is not subjected to any vibrations.</p> <p>Ensure that the instrument is horizontal.</p> <p>Ensure that there is no air flow affecting the weighing.</p> <p>Switch the instrument off and on to re-initialize it.</p> <p>After following all of the above suggestions, repeat the calibration procedure.</p> |
| The motor makes a noise but the pump does not start. | <p>Ensure that the tubing is correctly positioned in the pump (see Adjusting the Pump and Inserting the Tubing).</p> <p>Ensure that the tubing is not pinched.</p> <p>Ensure that the rollers of the pump are not blocked.</p> <p>Ensure that the pumps are set correctly (see Adjusting the Pump and Inserting the Tubing).</p> <p>Stretch the tubing on both sides without opening the pump.</p>                                                                                                                            |
| The pump perforates the tubing.                      | <p>Ensure that the tubing has been correctly inserted and centered in the pump (see Adjusting the Pump and Inserting the Tubing).</p> <p>Ensure that the pumps are set correctly (see Adjusting the Pump and Inserting the Tubing).</p>                                                                                                                                                                                                                                                                                       |
| The pump does not intake the liquid.                 | <p>Ensure that the pumps are correctly set (see Adjusting the Pump and Inserting the Tubing).</p> <p>Ensure that the tubing is correctly inserted in the peristaltic pump and follows the direction of the flow indicated on the side of the instrument.</p>                                                                                                                                                                                                                                                                  |

| Technical issue                                                                                                   | Solution                                                                                                                                                                                                                                                                                                                          |
|-------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| The liquid flows back to the bottle.                                                                              | Ensure that the pumps are set correctly (see Adjusting the Pump and Inserting the Tubing).<br>Ensure that the tubing is not pinched.                                                                                                                                                                                              |
| <b>Standard or Accurate Mode:</b><br>The pump slows down before the end of the dilution or dispensing.            | Mechanical vibrations could be disturbing the instrument. Ensure that the instrument is placed on a clean, flat, stable, horizontal surface and is not subjected to vibration.                                                                                                                                                    |
| <b>Fast Mode:</b><br>The instrument dispenses too much or not enough liquid and the accuracy is not satisfactory. | An error occurred during auto-calibration of the pump flow. Proceed to a new dispensing/dilution process.                                                                                                                                                                                                                         |
| The computer does not display dilution or dispensing reports.                                                     | Ensure that the DiluCult™ instrument is connected to the USB cable. Disconnect and then reconnect the cable and ensure that the computer makes a sound every time. If the computer does not have ability to make sounds after the connection, check in the list displayed by the device manager that a new device has been added. |
| The GeckoGrip is not efficient anymore.                                                                           | Clean the grip with water and soap.<br>After several cleanings, replace the grip with a new cut (a set of 10 is provided with the instrument).<br>If the grip is not adapted to the application, use the adhesive gum provided with the instrument.<br>Order replacement grips.                                                   |

## Standard Product Warranty

The applicable warranty for the products listed in this publication may be found at: **[www.sigmaaldrich.com/terms](http://www.sigmaaldrich.com/terms)** (within the “Terms and Conditions of Sale” applicable to your purchase transaction).

## Technical Assistance

For more information, visit the Customer Service page at **[www.sigmaaldrich.com](http://www.sigmaaldrich.com)**.

MilliporeSigma  
400 Summit Drive  
Burlington, MA 01803

[sigmaaldrich.com/dilutionpreparation](https://sigmaaldrich.com/dilutionpreparation)

