

pipetman®

M

User's Guide

EN





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INTRODUCTION

Congratulations on the purchase of your PIPETMAN® M, the electronic pipette with guaranteed performance in both standard and repetitive pipetting modes.

PIPETMAN M is a motorized member of the PIPETMAN® family of pipettes from Gilson, requiring virtually no pipetting forces to aspirate and dispense samples. Combining PIPETMAN's renowned accuracy, precision, and robustness with user-friendly functions, PIPETMAN M reduces pipetting fatigue, and increase pipetting efficiency.

PIPETMAN M is a unique pipette with only two buttons to operate the pipette and reach all menu options:

- **Push button:** set the volume by turning the button left or right and then pipette with a simple push.
- **Mode button:** access additional features like repetitive mode, mix, or maintenance functions.









Only two buttons are needed to perform routine pipetting tasks.













PIPETMAN M features the classic PIPETMAN® look with additional functionalities:

- **Intuitive interface** with five pipetting modes for a large number of applications: standard pipetting, repetitive, mix, reverse, and custom mode.
- **Minimal effort:** aspirate and dispense with one click of the push button and eject tips with ease to help reduce the risk of repetitive strain injuries (RSI).
- **Maximum comfort:** the lightweight and balanced design of PIPETMAN M offers an ergonomic design that rests comfortably in your hand as you pipette.
- **Minimized pipetting variability:** the motorized piston allows for high reproducibility and accuracy while pipetting.
- **Increased performance** for all day pipetting comfort.



PIPETMAN M is available in 20 models covering a range from 0.5 µL to 10 mL in single channel and 0.5 µL to 1200 µL in multichannel:

| PIPETMAN M SINGLE CHANNEL | | | |
|--|---------------|--------------|--|
| Model | Part Number | Volume Range | |
|  P10M | F81022 | 0.5-10 µL | |
|  P20M | F81023 | 2-20 µL | |
|  P100M | F81013 | 5-100 µL | |
|  P200M | F81024 | 20-200 µL | |
|  P300M | F81014 | 20-300 µL | |
|  P1200M | F81015 | 100-1200 µL | |
|  P5000M | F81016 | 500-5000 µL | |
|  P10mLM | F81017 | 1-10 mL | |

| PIPETMAN M MULTICHANNEL | | | |
|---|---------------|--------------|--|
| Model | Part Number | Volume Range | |
|  P8x10M | F81025 | 0.5-10 µL | |
|  P12x10M | F81026 | | |
|  P8x20M | F81027 | 1-20 µL | |
|  P12x20M | F81028 | | |
|  P8x100M | F81018 | 10-100 µL | |
|  P12x100M | F81019 | | |
|  P8x200M | F81029 | 20-200 µL | |
|  P12x200M | F81030 | | |
|  P8x300M | F81031 | 10-300 µL | |
|  P12x300M | F81032 | | |
|  P8x1200M | F81020 | 50-1200 µL | |
|  P12x1200M | F81021 | | |



PARTS CHECKLIST AND ACCESSORIES



Parts Checklist

Take a moment to verify that the following items are in the box:

- PIPETMAN M pipette
- Power Supply 5V with AC adapter and cable
- 4 Battery side tags
- 4 Ejector side tags
- Tip ejector extension (P10M model only)
- Quick Guide
- Safety bag
- Certificate of conformity (including bar-code sticker)
- Lubricant (except for P10M, and the multichannel models)

Accessories

| ACCESSORIES | PART NUMBER |
|--|-------------|
| POWER CARROUSEL: 5-position charging carousel for single and multichannel models | FB1001 |
| Battery side tags (set of 4) | F807013 |
| Ejector side tags (set of 4) | F807014 |

Please contact your Gilson representative to order additional accessories.

Chapter 3

GETTING STARTED

NOTE

PIPETMAN M is provided with a minimal battery charge. Before using your new PIPETMAN M, we strongly recommend that you fully charge the battery. PIPETMAN M charges 80% of its full battery capacity in less than an hour, it takes three hours to fully charge the battery. Please refer to Chapter 12 [Power Management](#) on page 18 for charging procedure.

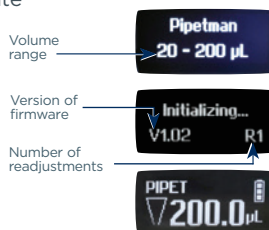
Switch on your PIPETMAN M. Press the push button to activate the pipette. The start-up screen appears:

The pipette will do a self calibration test and the firmware will reset the piston.

During initialization, the volume range, version of the firmware, and the number of readjustments is displayed on the screen (refer to [Standard Readjustment](#) on page 22).

Your PIPETMAN M is preset to PIPET mode and is now ready to pipette (Refer to Chapter 5 [Pipetting Just Like with PIPETMAN](#) on page 7).

PIPETMAN M goes into sleep mode (display turns off) after three minutes of inactivity. Press the push button to reactivate the pipette. Your last setting and pipetting mode will appear on the screen.



DESCRIPTION

Upper part

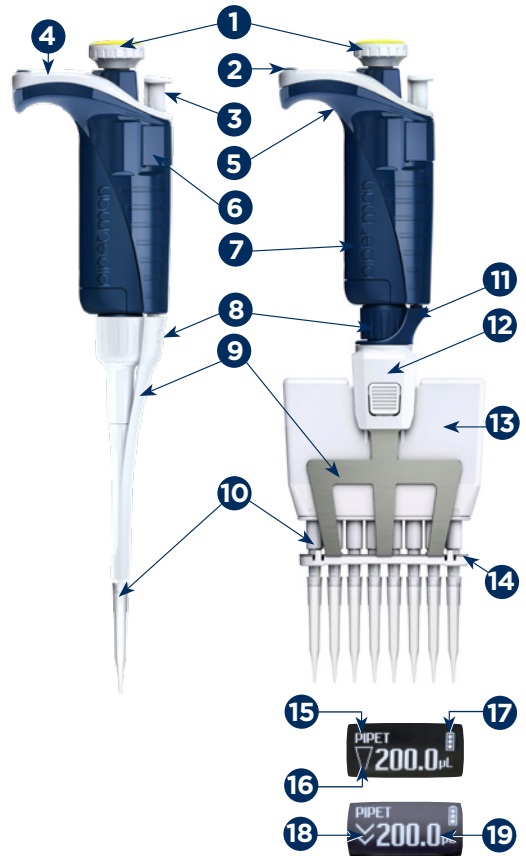
- 1 Push button and volume adjustment knob
- 2 Mode button: direct access to all menu functions
- 3 Tip ejector button
- 4 Display
- 5 Elastomer plug to cover the battery charging port
- 6 Identity-tag clip
- 7 Identity-tag window
- 8 Connecting nut — attaches handle to lower part

Lower part

- 9 Tip ejector: removable to access tip holder
- 10 Optimized tip holder to reduce tip fitting and ejection forces, removable for cleaning and servicing
- 11 Ejector clip
- 12 Ejector support
- 13 Cover
- 14 Ejector spacer

Screen

- 15 Pipetting Mode
- 16 Aspirate and dispense indicator
- 17 Battery status
- 18 Purge indicator
- 19 Volume

**Figure 1**

PIPETMAN® M single and multichannel models

Reset

To reset your pipette, simultaneously press on the push button 1 and mode button 2 and hold for at least five seconds.

Switch off

To switch off your PIPETMAN M, press the push button 1 and hold for at least five seconds.

Display

The PIPETMAN M display is an Organic Light-Emitting Diode (OLED) screen. It shows the current mode and operation step, pipetting volume, battery indicator and piston status (aspirated and dispensed volume) in real time. Warning messages appear in the place of volume.



PIPETTING JUST LIKE WITH PIPETMAN

Using PIPETMAN M is as easy as using a mechanical PIPETMAN. Your PIPETMAN M is set by default to “*PIPET Mode*”, which means forward pipetting. Select a volume and then start to pipette.

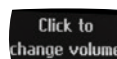


Switch On

Press push button.

Adjust the Volume Setting

1. Hold your PIPETMAN M in a nearly vertical position.
2. Turn the push button half way. The screen will display: “*Click to change volume.*”
3. Press the push button; the volume on the display will start blinking and you can now adjust the volume:
 - Turn the push button either clockwise to decrease volume or counter clockwise to increase volume, as indicated on the button.
 - Press the push button one time when finished. The volume is locked.



Purge Volume

The tip can be emptied at any time during a pipetting cycle.

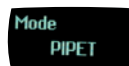
1. Turn the push button quickly: the message “*Click to abort*” will appear on the screen.
2. Click on the push button to validate: the liquid will be dispensed and an automatic purge followed by piston reset to zero will occur.

PIPETTING MODES

PIPETMAN M offers more pipette modes for a large number of applications: you will find all pipetting modes in the menu (for system settings refer to the Chapter 7 [Pipetting Speed Control](#) on page 13 and Chapter 13 [Configuration](#) on page 20). Access the menu by pushing the mode button. **To choose one of the pipetting modes, turn the push button and then click to confirm your selection.**

PIPET Mode

This is the classic pipette mode (forward pipetting) for simple aspirating and dispensing.



NOTE

You can use the PIPET Mode for all standard applications like DNA extraction, plasmid isolation, cloning, dilution, PCR, qPCR and many others. You can easily pipette aqueous liquids like buffer, chemical solutions (MgCl₂, KCl ...), and biological samples such as blood, DNA, and RNA.

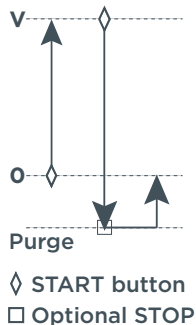




1. Fit a tip suitable for the model of PIPETMAN M that you are using (preferably use PIPETMAN DIAMOND Tips for assurance of accurate and precise results, refer to Chapter 8 [PIPETMAN DIAMOND Tips](#) on page 13).

NOTICE Always fit a tip before using any pipette.

2. Press the push button to aspirate the selected volume.
3. To dispense: click (press and release) the push button. Three things happen: sample dispense, automatic purge, and piston reset to zero. Or, keep your thumb pressing the push button until the end of the dispense cycle: the piston reset takes place after releasing the push button again. This feature enables you to remove the tip from the liquid, without aspirating anything.
4. Eject tip by pressing the ejection button.



Your PIPETMAN M is ready for the next pipetting cycle while maintaining the volume and the last settings.

Figure 2
PIPET Mode

Continue pipetting as you would with your mechanical PIPETMAN; it's as simple as that to use your new, electronic pipette!

REPETITIVE Mode

The REPETITIVE Mode allows you to distribute the same volume repeatedly in a predefined number (N) of equal aliquots. You supply the aliquot volume (AV) and the pipette automatically calculates the number of aliquots possible from the nominal (maximum) volume (NV) of the pipette as follows:

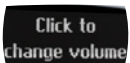


$$N = NV/AV \text{ (e.g., } 120 \mu\text{L} \times 10 \text{ for P1200M).}$$

You also can decrease the number of repetitions (e.g., $120 \mu\text{L} \times 10 - (n \geq 1)$) for P1200M).

NOTE The REPETITIVE Mode is ideal for dispensing aliquots, e.g., dispensing a PCR master mix into PCR tubes or 96-well, pipetting elution buffer for DNA extraction, preparing a target for spectrometric analyses, distributing loading buffer into samples, etc.

1. Press mode button to access system menu, where you can choose between different pipette modes. Select **REPETITIVE Mode** by turning the push button. To confirm your selection click on the push button.
2. Turn the push button half way, the screen will display: *"Click to change volume."*
3. Press the push button; the volume on the display will start to blink, and you can now adjust the volume.



Set the aliquot volume

1. Click the push button, set the volume by turning the push button and click again to confirm your settings.
2. Set the aliquot number: the maximal number of aliquots has been calculated by your PIPETMAN M. The number of aliquots flashes and you can decrease this number (N - (n ≥ 1)) by turning the push button.
3. Press again to confirm your settings.

- Fit a tip suitable for the model of PIPETMAN M that you are using (preferably use PIPETMAN DIAMOND Tips for assurance of accurate and precise results; refer to Chapter 8 [PIPETMAN DIAMOND Tips](#) on page 13).

NOTICE

Always fit a tip before using any pipette.

- Press push button to aspirate total volume. The volume aspirated will be a little bit more than required (extra volume). The extra volume is necessary to ensure equal operating conditions for each dispensed aliquot.

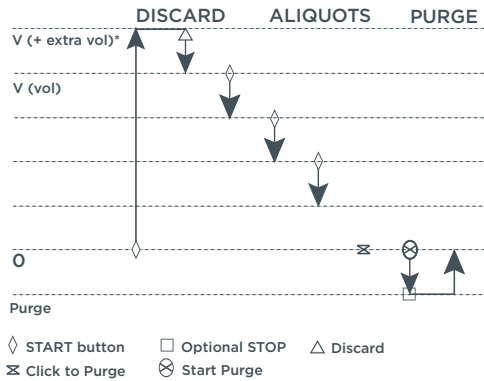


Figure 3
REPETITIVE Mode

Dispense

Press the push button. **DISCARD** appears on the screen. Discard the extra volume and continue dispensing the aliquots. PIPETMAN M distributes the aliquot volume each time you click the push button. The number of aliquots left to dispense is displayed on the screen. A warning beep indicates the last aliquot.

Purge

Press the push button, **PURGE** appears on the screen, click again to purge and reset the piston. Keep your thumb pressing the push button until the end of the purge: the piston reset takes place after you release the push button again. This feature enables you to remove the tip from the liquid, without aspirating anything.

Eject Tip

Pressing the ejection button.

MIX Mode

This is the classic pipette mode (forward pipetting) followed by a mixing phase, composed of repeatedly aspirating and dispensing, as well as an optional forward pipetting step.



NOTE

The MIX Mode can be used to prepare a PCR master mix, enzyme restriction mix, protein solution, oligonucleotide dilution and to mix samples with gel loading buffer and so on...you can mix two different solutions or homogenize one solution. If you work with higher viscosity than water (e.g., restriction enzyme), you may change the aspiration speed (refer to Chapter 7 [Pipetting Speed Control](#) on page 13). If you work with genomic DNA, then you should always pipette very carefully to avoid shearing and nicking.

- Press mode button to access menu, where you can choose between different pipette modes. Select **MIX Mode** by turning the push button, to confirm your selection click on the push button.
- Set the first volume, named **VOLUME 1**: press the push button, set the volume by turning the push button and click to confirm your selection. This is the first volume you will aspirate and dispense. Set the second volume, named **VOLUME 2**: press the push button, you can now set the second volume by turning the push button. Click again to confirm your settings.



NOTE

If you set **VOLUME 1** or **VOLUME 2** = 0 μL , then the step will not appear. If you set **VOLUME 1** and **2** = 0 μL , then the cycle will start directly with the **MIX** step.

3. Set the **MIX** volume: press the push button, set the volume by turning the push button. Confirm your settings with a simple click. This is the volume which will be aspirated and dispensed repeatedly. “**MIX**” as long as you press the push button.
4. Set the additional pipetting volume, named **VOLUME 3**: You can choose a volume to be aspirated and dispensed after the mixing step, so you can continue routine pipetting. Press the push button, and then set the volume by turning the push button. Confirm your settings by a simple click.

NOTE

If you set the **VOLUME 3** = 0 μL , then the cycle will stop after the **MIX** step.

5. Fit a tip suitable for the model of PIPETMAN M that you are using (preferably use PIPETMAN DIAMOND Tips for assurance of accurate and precise results; refer to Chapter 8 [PIPETMAN DIAMOND Tips](#) on page 13).

NOTICE

Always fit a tip before using any pipette.

Aspirate VOLUME 1

Press the push button.

Dispense

Press and release the push button: three things happen: sample dispense, automatic purge and piston reset to zero. Or, keep your thumb pressing the push button until the end of the dispense cycle: the piston reset takes place after you release the push button again.

This feature enables you to remove the tip from the liquid, without aspirating anything.

Aspirate and Dispense the Second Volume

“**VOLUME 2**”, repeat steps Aspirate Volume 1 and To dispense.

Mix

Press push button; as long as you keep your thumb pressing the button, the pipette continues mixing. Release the push button to complete the current mixing cycle.

Purge

Press push button, **PURGE** appears on the screen, click again to purge and reset the piston.

Pipette

If you have chosen a **VOLUME 3** > 0, you can now aspirate and dispense this volume by repeating steps 2 and 3.

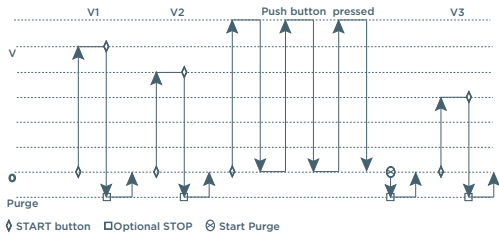


Figure 4
MIX Mode

NOTE

If you choose **VOLUME 1** = 0, then step 2 won't occur, if you choose **VOLUME 2** = 0 μL , then step 4 won't occur, as well if you set **VOLUME 1** and **2** = 0 μL , then step 1-4 will disappear. If you set **VOLUME 3** = 0 μL step 7, then will not occur.

REVERSE Mode

The **REVERSE Mode** is reverse pipetting with a manual pipette. During aspiration, additional liquid is added. After delivery, the excess volume remains in the tip and is discarded.



The **REVERSE Mode** is ideal for pipetting viscous liquids; liquids with high vapor pressure or those that tend to foam. Your PIPETMAN M aspirates a selected volume and an excess. This excess compensates for the liquid that remains as a film inside the tip during dispensing. For example: protein extraction, cell lysis, plasmid isolation, cell culture, buffer preparation and, many others.

Electrophoresis Gels Loading Protocol

Electrophoresis gels loading protocol: first change the pipetting speed of your pipette (refer to Chapter 7 [Pipetting Speed Control](#) on page 13). Aspiration can be done by using the standard speed (by default speed 6). Dispensing should be done very slowly and carefully, to prevent swirling and spilling of the samples, so select the lowest speed 1.

NOTICE

If you purge without pulling out the tip air bubbles could get into your gel!

1. Press mode button to access system menu, where you can choose between different pipette modes. Select **REVERSE Mode** by turning the push button. To confirm your selection click, the push button.

Set the volume

1. Press the push button, set the volume by turning the push button and press again to confirm your settings.
2. Fit a tip suitable for the model of PIPETMAN M that you are using (preferably use PIPETMAN DIAMOND Tips for assurance of accurate and precise results; refer to Chapter 8 [PIPETMAN DIAMOND Tips](#) on page 13).

NOTICE

Always fit a tip before using any pipette.

Aspirate

Press push button to aspirate the selected volume. An amount of liquid equal to the amount of purged air is added. The volume aspirated will be a little bit more than the set volume.

Dispense

Press push button to dispense the volume, the additional amount of liquid remains in the tip.

Purge

Press push button, “PURGE” appears on the screen, press again to purge and reset the piston. Keep your thumb pressing the push button until the end of the purge: the piston reset takes place after you release the push button again. This feature enables you to remove the tip from the liquid, without aspirating anything.

Eject tip

Press the ejection button.

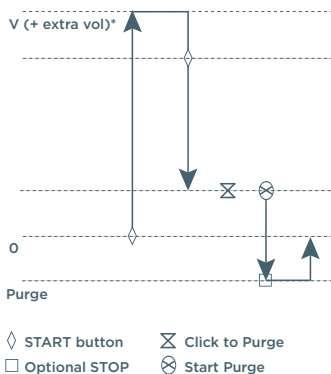


Figure 5
REVERSE Mode





CUSTOM Mode

The **CUSTOM Mode** enables personalized pipetting protocol creation on a PC for transfer to PIPETMAN M through PIPETMAN M programmable software, an easy-to-use software. To use this mode, the software has to be installed on the PC (file downloadable on www.gilson.com/pipetmanm).

To install PIPETMAN M software:

1. Download PIPETMAN M software zip file and extract the installation files. Then choose the program corresponding to your operating system (Windows® 32-bit or 64-bit).
2. Double-click the installer and follow the instructions on the screen to complete the installation.
3. When completed, the PIPETMAN M Software icon will appear on desktop of the PC if “*Create desktop shortcut*” was selected.
4. If PIPETMAN M Software is not launched automatically, then double-click the PIPETMAN M icon on the desktop.

Once installed, the PIPETMAN M Software can be run by any user on the installed PC.

You can then create, edit, import, or export custom protocols easily and rapidly.

To create a protocol, choose tasks in PIPETMAN M programmable software:

- **Aspirate:** aspirates specified volume into the tip.
- **Beep:** makes pipette produce a beep sound while selected tasks are executed.
- **Dispense:** delivers the specified volume from the tip.
- **Dispense all:** dispenses all remaining volume from the tip followed by a purge action.
- **Mix:** aspirates then dispenses a specified volume one or more times.
- **Purge:** dispenses all remaining volume from the tip followed by purging extra volume.
- **Repetitive:** dispense liquid into a number of aliquot.
- **Reverse:** handle liquid using reverse pipetting.
- **Wait:** introduces a wait for a specified number of seconds.
- **Wait for click:** pauses the protocol until Push button is clicked.

In this mode, the protocols can be automatically executed, avoiding repetitive pushes on the button, helping to decrease risk of RSI.

To transfer a protocol to your PIPETMAN M pipette, click **Transfer custom protocols to pipette** and follow the instructions on the screen.

The **CUSTOM Mode** is available in pipettes from firmware version V2.02.

For more information on PIPETMAN M Software, refer to [Appendix B - Z Factor](#) on page 52.

PIPETTING SPEED CONTROL

PIPETMAN M is set by default on speed 6 (maximum speed). You may need to change the speed of aspiration or dispensing depending on your application. You can change aspiration speed and dispensing speed independently of one other: from very slow to very fast (speed 1 – speed 6). Your speed selection is memorized for each pipetting mode until you change it again.

1. Press mode button to access system menu, where you can find the different pipette modes, the speed menu and configuration menu.
2. Select **SPEED** by turning the push button, to confirm your selection click on the push button.
3. Set **ASPIRATION SPEED**: aspiration speed is blinking, set the speed by turning the push button and click to confirm your selection.
4. Set **DISPENSING SPEED**: dispensing speed is blinking, set the speed by turning the push button and click to confirm your selection.

After selecting the speed you go automatically back to pipetting mode.

PIPETMAN® DIAMOND TIPS

PIPETMAN DIAMOND Tips are made to the highest specifications; strict quality control is maintained throughout the manufacturing process. These tips are used to calibrate PIPETMAN M, therefore for optimum performance we recommend using PIPETMAN Tips with your PIPETMAN M.

However, PIPETMAN M also offers you a high compatibility with a large number of other tips. For more information, please contact your Gilson distributor.

Every PIPETMAN DIAMOND Tip is individually marked with an identification number (ID). To ensure accuracy and precision, Gilson's quality assurance system focuses on the following critical parameters:

- PIPETMAN DIAMOND Tips are made from pure polypropylene (virgin, metal-free, to avoid the possibility of contamination). They are available sterilized and with filters.
- Sterilized PIPETMAN DIAMOND Tips are certified free of detectable RNases, DNases, DNA, RNA, and proteases.
- Optimized shape (revised collar for optimum sealing, thin walls, and fine point), making them easier to mount, more flexible, with no vortexing, and improved precision.
- PIPETMAN DIAMOND Tips are free from even microscopic defects, especially at the orifice. All surfaces are smooth and hydrophobic, thereby avoiding the excessive retention of liquids that causes poor accuracy and a lack of precision.

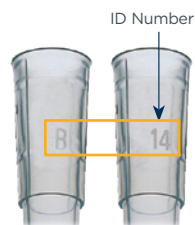


Figure 6
ID number



- Mold and cavity references are marked on the collar, ensuring the traceability. For quality assurance purposes, batch numbers appear on all packages (bags and boxes).
- They form an air-tight seal with the tip holder, preventing the leaks that cause poor accuracy and a lack of precision.
- PIPETMAN DIAMOND Tips (except filter tips) may be autoclaved at 121°C for 20 minutes at 0.1 MPa.

NOTICE Do not autoclave PIPETMAN Filter Tips as the filter will be damaged.

NOTE To ensure the best performance from your Gilson pipette, you should ALWAYS use PIPETMAN DIAMOND Tips (in accordance with ISO8655) system, because PIPETMAN Tips were used to establish the specifications.

| PIPETMAN M SINGLE CHANNEL VARIABLE VOLUME MODELS | | | |
|--|-----------------------|-------------------------|--------------|
| Model | PIPETMAN DIAMOND Tips | | Volume Range |
| P10M | D10* DL10* | DF10 DFL10 | 0.5-10 µL |
| P20M | D200 | DF30 | 2-20 µL |
| P100M | D200 | D100 | 5-100 µL |
| P200M | D200 D300 | DF200 DF300 | 20-200 µL |
| P300M | D200 D300 | DF200 DF300 | 20-300 µL |
| P1200M | D1000 D1200 | DF1000 DF1200 | 100-1200 µL |
| P5000M | D5000 | | 500-5000 µL |
| P10mLM | D10mL | | 1-10 mL |
| PIPETMAN M MULTICHANNEL | | | |
| P8x10M | D10 DL10 | DF10 DFL10 | 0.5-10 µL |
| P12x10M | | | |
| P8x20M | DL10 D200 | DFL10 DF30 | 1-20 µL |
| P12x20M | | | |
| P8x100M | D200 | DF100 | 10-100 µL |
| P12x100M | | | |
| P8x200M | D200 D300 | DF100 DF200 DF300 | 20-200 µL |
| P12x200M | | | |
| P8x300M | D200 D300 | DF200 DF300 | 10-300 µL |
| P12x300M | | | |
| P8x1200M | D1200 | DF1200 | 50-1200 µL |
| P12x1200M | | | |

* A plastic adapter is required to eject D10 and DF10 tips (short tips). The adapter is supplied with P10M. No adapter is required when using DL10 and DFL10 tips (long tips).

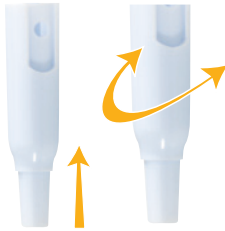


Figure 7
Plastic adapter

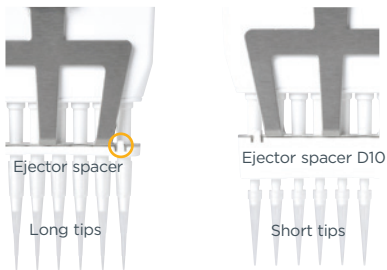


Figure 8
P8x10M and P12x10M

GUIDELINES FOR GOOD PIPETTING

Aspirate and Dispense

Fit new PIPETMAN DIAMOND Tips for the best results (refer to Chapter 18 [Specifications](#) on page 29).

Single Channel Model

For single channel models, push the tip holder into the tip using a slight twisting motion to ensure a firm and airtight seal.

MultiChannel Model

PIPETMAN DIAMOND tips are best fitted with the ROCKY RACK technique, invented by Gilson, available only in our TIPACK and TOWERPACK.



Pre-Wet the Tips

All Models

Pre-wetting the tips before pipetting helps prepare the tips for the best pipetting performance. Ideally, the pre-wet includes both immersing the tip in the liquid and performing one pipetting step.

Pre-wetting the tips helps ensure that volumes that you pipette will achieve accuracy and precision within specifications.

Hold the pipette vertically and immerse the tip in the liquid (refer to page 14). Press the push button to aspirate the set volume of liquid. Wait a few seconds (time depends on model, refer to page 14); then withdraw the pipette tip from the liquid. You may wipe any droplets away from the outside of the tip using a medical wipe; however if you do so, take care to avoid touching the orifice of the tip.

Place the end of the tip against the inside wall of the recipient vessel (at an angle of 10° to 40°). Press the push button. Wait for at least a few seconds before releasing the push button to expel any residual liquid from the tip. While removing the pipette draw the tip along the inside surface of the vessel.

Eject the tip by pressing firmly on the tip ejector button.

Table 1

Immersion depth and wait time

| MODEL | IMMERSION DEPTH (MM) | WAIT TIME (SECONDS) |
|--------------------|----------------------|---------------------|
| P10M | 1 | 1 |
| P20M | 2-3 | 1 |
| P100M | 2-4 | 1 |
| P200M | 2-4 | 1 |
| P300M | 2-4 | 1 |
| P1200M | 2-4 | 2-3 |
| P5000M | 3-6 | 4-5 |
| P10mLM | 5-7 | 4-5 |
| P8x10M/P12x10M | 1 | 1 |
| P8x20M/P12x20M | 2-3 | 1 |
| P8x100M/P12x100M | 2-4 | 1 |
| P8x200M/P12x200M | 2-3 | 1 |
| P8x300M/P12x300M | 2-3 | 1 |
| P8x1200M/P12x1200M | 2-4 | 2-3 |



General Guidelines for Good Pipetting

- Make sure that you fit new tips.
- Each new tip should be pre-wetted with the liquid to be pipetted.
- When aspirating, keep the tip at a constant depth below the surface of the liquid (refer to table 1 on page 15).
- Change the tip before aspirating a different liquid, sample, or reagent.
- Change the tip if a droplet remains at the end of the tip from the previous pipetting operation.
- Liquid should never enter the tip holder. To prevent this:
 - Never turn the pipette upside down,
 - Never lay the pipette on its side when there is liquid in the tip(s),

The Gilson Stand Adapter (refer to Chapter 2 [Parts Checklist and Accessories](#) on page 5) is recommended for use with the CARROUSEL™ and SINGLE™ Pipette Holder to store your PIPETMAN M pipette in the vertical position. Alternatively the POWER CARROUSEL™ can be used to store and charge up to five PIPETMAN M pipettes.

- When pipetting liquids with temperatures different to the ambient temperature, pre-wet the tip several times before use in order to reach equilibrium between the temperatures of the liquid and the pipette's dead volume.
- For volatile liquids, saturate the dead volume by aspirating and dispensing the liquid repeatedly before aspirating the sample.

After pipetting acids or other corrosive liquids that emit vapors, clean the pipette, as described in Chapter 15 [Cleaning and Decontamination](#) on page 26.

The pipette can be used between 4°C and 40°C, but the specifications may vary (refer to Chapter 18 [Specifications](#) on page 29).

- Do not pipette liquids at temperatures above 50°C or below 4°C.

NOTE

Extreme temperatures can affect accuracy and precision.

Chapter 10

PERSONALIZE YOUR PIPETMAN® M

Tip Ejector Extension for Use with P10M

Tip ejector extension is required to eject D10 tips and is supplied with P10M pipettes.

The tip ejector extension which is made of PVDF (polyvinylidene Fluoride), is autoclavable.

To fit a tip ejector extension:

1. Hold the pipette with the push button upright.
2. Hold the extension with the slot upright.
3. Slide the extension over the tip holder.
4. Push the extension firmly onto the end of the tip ejector until it clicks into place (see opposite).

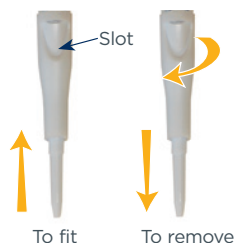


Figure 9
Fit a tip ejector

To remove a tip ejector extension (see opposite):

1. Hold the pipette in one hand and grip the extension with the other.
2. Gently twist the extension (either direction) and pull it away from the pipette.

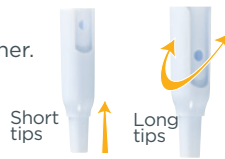


Figure 10
Remove a tip ejector

Personal Label - Name and/or Application Tag

Your PIPETMAN M offers you two options to mark your pipette.

You can personalize your pipette with a name tag and/or an application tag:

Window Tag:

1. Remove the window by inserting a small screwdriver in the access slot.
2. Position the name tag on the pipette.
3. Clip the window back in place.



Figure 11
Name and application tag

Clip Tag:

1. Pull off the clip.
2. Position the name tag into the clip.
3. Clamp the clip back in place.

Chapter 11

GOOD LABORATORY PRACTICE FEATURES

Your PIPETMAN M is fully compliant to ISO8655 standard and is CE marked (for EMC and LDV directives).

PIPETMAN M includes the following good laboratory practice (GLP) features.

General

- Lockable volume.
- Volume range is printed on the push button.
- Volume range is displayed on the screen.
- Serial number is engraved on the body (handle) of the pipette and encoded in the firmware.
- Bar code: on the box and with the certificate (can be transferred).

Personalization by nametags (for marking application and/or user name), refer to Chapter 10 [Personalize your PIPETMAN M](#) on page 16.

Cycle Counters

- From last volume setting (to count the number of cycles in the current “run”).
- From manufacture and since the last service (refer to Chapter 14 [Maintenance](#) on page 20).
- By indicators (R1, R2, R3 ... Rx) each time pipette is readjusted.

Maintenance intervals can be specified by weeks or number of cycles elapsed.





Alarms

- Low battery warning.
- Service is overdue warning (refer to Chapter 14 [Maintenance](#) on page 20).
- Service alert can be set “On” or “Off”.

Chapter 12

POWER MANAGEMENT

The PIPETMAN M battery has been designed to ensure 900 pipetting cycles (750 for PIPETMAN M Multi 200 μ L and 300 μ L) at maximum speed (up to nine 96-well plates) between two charge cycles. For service continuity when needing more capacity, your PIPETMAN M can also be used while charging with the same performance as a fully charged pipette.

Battery Charging

PIPETMAN M charges 80% of its full battery capacity in less than an hour, and it takes three hours to fully charge the battery.

Charge your pipette by using the power supply:

1. Connect the AC adapter to a suitable AC power supply.
2. Plug the adapter into the USB port of the pipette.

The pipette starts charging.

Charge your pipette by using stand adapter (refer to Chapter 2 [Parts Checklist and Accessories](#) on page 5):

1. Place the stand adapter on your Gilson Single Pipette Holder or Carrousel.
2. Remove the plug. Now place your pipette on the Stand Adapter and plug the power transformer into the stand adapter.

The pipette starts charging.

Battery charging of PIPETMAN M using the POWER CARROUSEL:

1. Install the POWER CARROUSEL as described above.
2. Remove the plug. Now place your pipette on the charging position, please ensure that the pipette is properly fitted to the contacts on the top of the carrousel (a proper fitting will trigger a beep sound).

The pipette starts charging.



Stand adapter

Figure 12
PIPETMAN® M Power supply



Figure 13
POWER CARROUSEL for PIPETMAN® M

Working with Charger Connected to the Pipette

PIPETMAN M can also be used for pipetting while charging.

1. Plug the power supply into your pipette.
2. Press the push button to start your pipette.

PIPETMAN M is ready to pipette.

NOTE

You can also recharge PIPETMAN M by USB with your PC; however it will take much longer than by power supply.

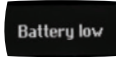
NOTICE

Use only the original power transformer supplied by Gilson. Use of an incompatible power supply can damage your PIPETMAN M.

Do not operate PIPETMAN while connected to a PC.

Low Battery Warning

PIPETMAN M has a low battery alert. As the battery runs down, the low battery message appears. The warning is replaced by a blinking symbol of an empty battery. If it is not recharged, the pipette will switch off after a while. Settings will not be lost.



If the battery is completely discharged (black screen, no operation) connect the pipette to the charger for at least five minutes, and then a "batt. too low" message will appear. The pipette will display the last settings used a few minutes later and will continue charging.

Changing the Battery

If the following symptoms occur, please contact your Gilson service center:

- PIPETMAN M battery won't charge or will not operate even if connected to the charger at least for 10 minutes.
- PIPETMAN M battery provides you very short cycle time or permanently needs to be used in connected mode.

CAUTION

PIPETMAN M uses a Lithium-Ion battery. Operation on the battery is done at user's risk only. Opening the pipette voids the warranty.





Chapter 13

CONFIGURATION

Enter the menu using the mode button. You will find not only the pipetting programs and the speed control, but also the menu **CONFIGURATION**, including **SERVICE** and **ADJUSTMENT** (refer to Chapter 14 [Maintenance](#) below).

The navigation of the menus is always done in the same way — make your selection by rotating the push button and then enter and confirm with a click.

The **Configuration** menu allows you to set up the following items:

- **Volume limit:** Here you can fix the maximal volume of the pipette (by default = nominal volume). For example, you have a P200M pipette, but you would like to use it with your PIPETMAN Diamond Filter Tips DF100, you can set the maximal volume at 100 μL and you won't risk contamination of your pipette.
- **Beeper:** You can switch the tone of your pipette on or off.
- **Contrast:** You can choose a value of 1 to 5 to set up the contrast of the screen.
- **Service:** refer to Chapter 14 [Maintenance](#) below

Adjustment: refer to Chapter 14 [Maintenance](#) below.

- **Language:** Available from the firmware version 1.20. Languages available are English, Chinese and Japanese. To change the language, enter in the **Configuration** menu:
 1. Select your language by turning the push button.
 2. Click on the push button to confirm your selection. The language selected is blinking.
 3. Press and hold the Mode button for two seconds to confirm your selection.



Chapter 14

MAINTENANCE

PIPETMAN M requires very little maintenance. However, to ensure pipette accuracy, precision, and robustness please proceed periodically with a two-minute inspection as recommended by Gilson.

Your PIPETMAN M allows you to:

- Get service information.
- Readjust the pipette to user settings.
- Return to factory settings.



- Replace spare parts (for detailed information refer to Chapter 14 [Maintenance](#) and Chapter 19 [Safety Precautions and Limitation of Use](#) on page 31).
- Prepare the pipette for cleaning or autoclaving by “disassembly” of the parts specified (refer to Chapter 15 [Cleaning and Decontamination](#) on page 26).

Service Information

PIPETMAN M provides you with all required service information. It will help you establish an easy diagnosis and plan any service operation with your accredited Gilson service center.

You will find in the **SERVICE** menu following sub menus:

- Disassembly
- Service info
- Service settings
- Pipette info

The navigation of the menu is always done in the same way. Make your selection by rotating the push button, enter and confirm with a simple click.

- **Disassembly:**
 - The multichannel models should not be disassembled: only the push button and the tip ejector can be replaced.
 - Only the lower part of the single models can be disassembled, the push button, the connecting nut, and the tip ejector can be replaced.
 - This option allows you to disassemble the lower part safely (protection of the piston and the actuator). If you select disassembly, the following screen appears: “Now, you can remove the lower part of your pipette with complete security”.
- **Service info** provides you with maintenance information; you cannot modify any of the items:
 - Number of pipetting cycles since last maintenance.
 - Number of weeks since last maintenance.
- **Service settings** gives you the option to organize your maintenance, you can set following service points:
 - Number of cycles until next maintenance.
 - Number of weeks until next service.
 - Service date.
 - Activate or deactivate the Service alert.

NOTE

Changes of service settings will reset all the service info to zero.

- **Pipette info** provides information about your pipette; you cannot modify any of the items:
 - Version of firmware.
 - Serial number.
 - Total number of cycles (one cycle: up and down of the piston).
 - Number of readjustments carried out by this pipette.



Adjustment

Press the mode button to enter the menu. Select “*Configuration*” by rotating the push button and click to confirm your selection. Enter the sub-menu in the same way and select the “*Adjustment*” menu.

The adjustment menu allows you to access the following items:

- Standard readjustment
- Reset settings

Standard Readjustment

This menu allows you to adjust the pipette using three calibration points: 10%, 50%, and 100% of nominal volume (in according with ISO8655 recommendations).

You may want to calibrate your pipette for solutions with a density, viscosity, surface tension or vapour pressure that are different than that of water. To return to the factory settings, choose **Reset settings**. Your PIPETMAN M will be reset to the three factory calibration values that are permanently stored in the pipette’s firmware.

In accordance with ISO 8655 Gilson recommends a gravimetric procedure for pipette calibration. This gravimetric method is used to establish the mean mass of a given volume of water (taking into account evaporation losses, where necessary). After converting the mean mass to a volume (using the Z factor, refer to [Appendix B - Z Factor](#) on page 52), enter the measured volumes(s) into the pipette’s memory and the software readjusts the pipette accordingly. This method requires the strict monitoring of environmental conditions and the use of routinely controlled equipment that is adapted to the volume being measured.

Conversion to volume must take into account the density of the liquid as well as evaporation during the cycle time. For each measurement, the corresponding volume (V_i) can be calculated as follows:

W_i is the weight as read on the balance

e is the mean evaporation loss during the cycle time

$$V_i = (W_i + e) Z$$

Z expressed in L/mg, is a conversion factor incorporating density of water buoyed in air, at test temperature and barometric pressure (refer to [Appendix B - Z Factor](#) on page 52)

For volumes greater than 20 μ L, the evaporation factor can be disregarded.

For more information please refer to “*Verification procedure for accuracy and precision*” which you can download from the Gilson website (www.gilson.com).

Maintenance Operation

Disassembly of your PIPETMAN M to Change and Clean Parts

It is best to inspect your pipette regularly and to routinely clean and change parts as required. To help you to keep up a regular schedule and in the interests of good laboratory practices (GLP), you can configure your pipette to display an alarm before servicing is due (refer to page 18).

| | |
|-------------|--|
| NOTE | The following maintenance operation should only be done when the pipette is in DISASSEMBLY Mode . |
|-------------|--|

Maintenance Warning

PIPETMAN M notifies you when maintenance is due (Service alert is set by default to “On”). The following message 1 will appear:



After validation by a click, the following message 2 appears:

1. If you click to confirm within 10 seconds, the pipette will automatically switch to **Disassembly** mode so you can carry out your maintenance safely.
2. Wait longer than 10 seconds and the option to have a reminder in one week will appear 3.
3. Click to confirm. Your pipette will be operational again.

Maintenance Operation for Single Channel Models

Tip Holder and Tip Ejector

These parts must be changed if they are damaged. You may also remove these parts for cleaning or decontamination purposes.

Changing the Tip Ejector

1. Keep the tip ejector button depressed and grip the top of the tip ejector with the other hand.
2. Gently rotate the tip ejector counterclockwise and separate its connector from the operating rod.
3. Pull the tip ejector away from the body of the pipette.
4. Clean or autoclave the tip ejector and refit or replace it by reversing the procedure.



Figure 14
Ejector clip

Changing the Tip Holder (Lower Part)

After removing the tip ejector, you may remove the lower part of the tip holder, which is more likely to become contaminated or damaged than the upper part. Removal of the lower part is shown below; for the upper part refer to [Removing the Piston](#) on page 24 (special precautions are necessary).

1. Gently rotate the lower part of the tip holder counterclockwise to unscrew it from the upper part.
2. Separate the parts and remove the O-ring (refer to [Changing the Seal and/or O-ring](#) on page 24)
3. Clean, and if required, autoclave the lower part of the tip holder (autoclaving: 20 min. at 121°C and 0.1MPa)
4. If required, lubricate the piston (refer to [How to Lubricate the Piston](#) on page 25) and fit a new O-ring.
5. Screw the two parts together, making sure that the two parts are fully tightened, by hand.
6. Refit the tip ejector.

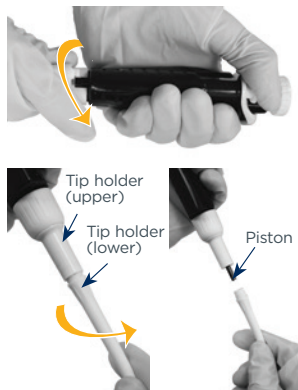


Figure 15
Changing the tip holder

NOTICE

After autoclaving the tip holder and tip ejector may change color, however this has no impact on the performance.



Changing the Seal and/or O-ring

The O-ring is positioned on the piston; it should not be autoclaved, if worn or damaged in any way, it must be replaced (refer to Chapter 20 [Replacement Parts](#) on page 32).

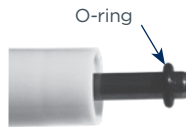


Figure 16
O-ring

To access the O-ring, remove the tip ejector and unscrew the lower part of the tip holder. You should now be able to remove the O-ring from the piston. Sometimes, the O-ring may be found in the recess at the top end, of the lower part of the tip holder. If required, lubricate the piston (refer to [How to Lubricate the Piston](#) on page 25), and then fit a new O-ring by sliding it onto the piston. Reassemble the pipette. Depending on the pipette model the dimensions of the O-ring will vary (refer to Chapter 20 [Replacement Parts](#) on page 32).

Servicing the Piston

You may remove the piston assembly to clean, lubricate, or change the piston.

Removing the Piston

1. Remove the tip ejector and (optionally) the lower part of the tip holder. If you remove the lower part, take care to remove the O-ring as described in [Changing the Seal and/or O-ring](#) above.
2. Unscrew the connecting nut (turn by hand, counterclockwise).
3. Gently remove the connecting nut and upper tip holder.
4. Pull off the piston assembly from the body of the pipette — separate the parts (see below).
5. Clean and autoclave (if required) the piston and holder, together with any other parts that may need to be treated in the same way (refer to Chapter 15 [Cleaning and Decontamination](#) on page 26).



Figure 17
Piston

NOTE

The specifications of the pipette should be checked after changing any part.

In the case of P1200M, the piston holder, piston, and guide are a unit — do not try to separate them.

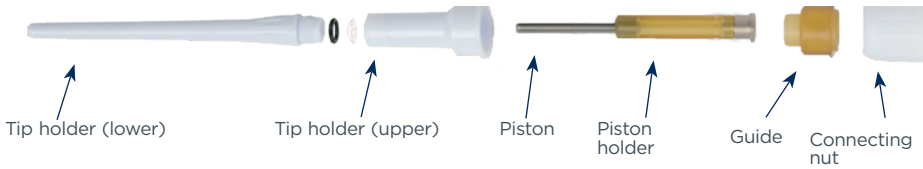
NOTICE

Don't pull on the piston to remove the assembly.

6. Lubricate the piston, refer to Figure 18 on page 25.
7. Reassemble the piston and guide; then carefully insert the assembly into the body of the pipette. The guide should hold the piston assembly inside the body of the pipette. You can hear a “click” when the piston is back in place.

NOTE

Take care not to touch the piston, and that it is dust-free. If needed, clean the assembly with a dust-free cloth.


Figure 18

Tip holder parts

8. Reassemble the upper part of the tip holder and the connecting nut, and then refit to the body of the pipette by rotating the connecting nut clockwise until it is finger tight. Fit the O-ring (for P10M, the seal) and reassemble the lower part of the tip holder. Refit the tip ejector.

The seals for P10M are fragile and can be used only once; therefore, after unscrewing the lower part of the tip holder you must fit a new seal.

How to Lubricate the Piston (except P10M)

Use only Gilson lubricant (P/N: F2070902, as supplied).

Squeeze a small quantity from the tube onto a clean, lintless cloth. Use the cloth to transfer the lubricant to the piston. Ensure that the piston is evenly lubricated and that you wipe away any excess — remember only a fine film of lubricant is required (over the entire piston).

Maintenance Operation for Multichannel Models

For multichannel models, the lower part should not be disassembled: only the push button, the connecting nut, and the tip ejector can be replaced.

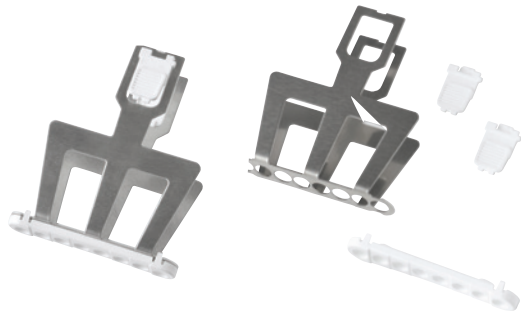
Changing the Tip Ejector

To remove the tip ejector, keep both ejector locks depressed. Pull the tip ejector down.

To refit the tip ejector, gently re-insert the tip ejector vertically into the rails of the ejector support. Pull lightly on the tip ejector to check the position.

Replace the Ejector Spacer

1. Gently press the tabs from the ejector spacer and remove it from the tip ejector.
2. Insert the ejector spacer and click it to the tip ejector.


Figure 19

Tip ejector and tip ejector spacer

CLEANING AND DECONTAMINATION

PIPETMAN M is designed so that the parts normally in contact with contaminants can easily be cleaned and decontaminated.

As part of your quality system, you may have procedures for pipette decontamination. We recommend that you refer to [Decontamination Procedures for Gilson Pipettes](#), which you can download from Gilson's website.

If you use chemical solutions for decontamination or detergents for cleaning, other than those specified below, you should check with your supplier that the solution or detergent is safe for use with one of the following materials: PP (Polypropylene), PBT (Polybutylene Terephthalate), PC (Polycarbonate), POM (Polyoxymethylene), PVDF (Polyvinylidene Fluoride), PEI (Polyetherimide), and stainless steel.

Cleaning

The pipette must be cleaned, as described below, before it is decontaminated. For cleaning your PIPETMAN M you may use a simple soap solution or any of the solutions mentioned in [Decontamination Procedures for Gilson Pipettes](#).

NOTICE

Use alcohol (ethanol or isopropanol) to clean up the dirt and dust on the tip holder.

Liquid must not enter the handle of the pipette.

Single Channel Models

External

1. Remove the tip ejector for cleaning (refer to Chapter 14 [Maintenance](#) on page 20).
2. Replace the elastomer plug to protect battery charging port.
3. Wipe the entire pipette with a soft-cloth or lint-free tissue impregnated with soap solution, to remove all dirty marks. If the pipette is very dirty, a brush with soft plastic bristles may be used.
4. To rinse, wipe the entire pipette with a soft-cloth or lint-free tissue impregnated with distilled water.
5. Leave to air dry.

Internal

The following components only can be immersed in a cleaning solution: **tip ejector, tip holder, connecting nut, and piston.**

1. Disassemble the pipette as described in Chapter 14 [Maintenance](#) on page 20).
2. Set aside the handle in a dry and secure location.
3. Clean the individual components using an ultrasonic bath (20 minutes at 50°C) or with a soft cloth and brushes.





4. Rinse the individual components with distilled water.
5. Leave the parts to dry by evaporation or wipe them with a clean soft cloth or lint-free tissue.
6. Lubricate the piston and reassemble the pipette according to the instructions given in Chapter 14 [Maintenance](#) on page 20).

Multichannel Models

The following components **only** can be immersed in a cleaning solution: **tip ejector, ejector locks and ejector spacer**.

1. Remove the tip ejector and the ejector spacer (refer to Chapter 14 [Maintenance](#) on page 20).
2. Immerse the tip ejector, ejector locks, and ejector spacer in the cleaning solution or wipe them with a soft cloth or lint-free tissue impregnated with the cleaning solution.
3. Rinse the components with distilled water.
4. Leave the parts to dry by evaporation or wipe them with a clean, soft cloth or lint-free tissue.
5. Refit the tip ejector.

NOTE

Please note that although the lower part of PIPETMAN M multichannel can withstand a few autoclaving cycles, we do not recommend autoclaving it.

Decontamination

Autoclaving – Single Channel Models

However, after separation from the body, any of the following components of the volumetric module may be autoclaved individually: tip ejector, connecting nut, tip holders, pistons, and seals (except O-rings).

1. Clean the parts to be autoclaved, especially the tip holders.
2. Put the parts in an autoclaving bag.
3. Autoclave for 20 minutes at 121°C and 0.1 MPa.
4. Check that the parts are dry before reassembling the pipette.

Set the pipette aside to stabilize at room temperature for at least 6 hours.

The body (handle) of the pipette is not autoclavable.

NOTICE

The specifications of the pipette should be checked after autoclaving/disassembling.

Chemical Decontamination – Single and Multichannel Models

You may choose to decontaminate your pipette chemically, in accordance with your own procedures. Whatever decontaminant you use, check that it is compatible with the plastics used in the construction of the pipette (refer to page 22).



Non-Immersible Parts

1. Wipe the handle of the pipette with a soft cloth or lint-free tissue covered with the chosen decontaminant.
2. Wipe the handle of the pipette with a soft cloth or lint-free tissue covered with distilled water.

Immersible Parts

Only the following components can be immersed in a decontaminant solution:

- **Single channel models** ⇨ tip ejector, tip holder (both parts), connecting nut, piston (including holder), and guide.
- **Multichannel models** ⇨ tip ejector, ejector locks, and ejector spacer.

Please note that although the lower part of PIPETMAN M multichannel can withstand a few number of autoclaving cycles, we do not recommend autoclaving it.

1. Disassemble the pipette as described in Chapter 14 [Maintenance](#) on page 20).
2. Immerse the components in the decontaminant solution or wipe them according the instructions given by the manufacturer or supplier of the decontaminant.
3. Rinse the individual components with distilled or sterile water.
4. Leave the parts to dry by evaporation or wipe them with a clean, lint-free tissue or soft cloth.
5. Lubricate the piston and reassemble the pipette according to the instructions given in this chapter.

Chapter 16

LEAK TEST

This test may be performed at any time to check that the pipette does not leak, especially after performing a maintenance or decontamination procedure. If a pipette fails this test, you should replace the faulty part (e.g., O-ring, tip holder, etc.) and repeat this test, after making sure that the pipette is correctly reassembled.

1. Fit a PIPETMAN DIAMOND Tip.
2. Set the pipette to the nominal volume.
3. Aspirate the nominal volume from a beaker of distilled water.
4. Hold the pipette in the vertical position and wait for 20 seconds.

If a water droplet appears at the end of the tip, there is a leak (refer to Chapter 17 [Troubleshooting](#) on page 29)

If you see no droplet, re-immerses the tip below the surface of water.

The water level inside the tip should remain constant; if the level goes down, then there is a leak (refer to Chapter 17 [Troubleshooting](#) on page 29)

For multichannel models, check if the water level between each tip is the same.

TROUBLESHOOTING

In case of malfunction, first reset the pipette by pressing on the push button and the mode button simultaneously for at least eight seconds.

If the problem persists, you may consult the following table that identifies potential problems and their solutions.



Before returning any pipette to your local Gilson service center, ensure that it is completely free of chemical, biological, or radioactive contamination. Please use the included safety bag.

| PROBLEM | POSSIBLE CAUSE | PAGE |
|---------------------------|------------------------------------|-------|
| Pipette is leaking sample | Worn O-ring | 24 |
| Pipette won't aspirate | Unscrewed lower part of tip holder | 24 |
| | Damaged or corroded piston | 24 |
| | Damaged tip holder | 23 |
| | Improper repair or assembly | 22-25 |
| | Connecting nut is loose. | 24-25 |
| | Software needs to be reset | 6 |
| Noisy operation | Piston needs lubricating | 25 |
| Pipette is inaccurate | Improper repair or assembly | 22-25 |
| | Unscrewed lower part of tip holder | 24 |
| | Pipette is out of adjustment | 22 |
| | Connecting nut is loose | 24-25 |

| PROBLEM | POSSIBLE CAUSE | PAGE |
|------------------------|------------------------------------|-------|
| Pipette is not precise | Unscrewed lower part of tip holder | 24 |
| | Incorrect operator technique | 15 |
| | Worn O-ring | 24 |
| | Connecting nut is loose | 24-25 |
| | Damaged or corroded piston | 24 |
| | Damaged tip holder | 23 |
| Tips fall or don't fit | Low quality tips | 13-14 |
| | Damaged tip holder | 23 |
| | Damaged tip ejector | 23-25 |
| | Ejector spacer is damaged | 25 |
| | Tip ejector is loose | 23-25 |
| | Dirty tip holder | 23 |
| No OLED display | Pipette is in sleep mode | 5 |
| | Battery needs recharging | 13 |
| | Software needs to be reset. | 6 |
| No operation possible | Battery needs recharging. | 13 |
| | Software needs to be reset | 6 |
| Calibration impossible | Software needs to be reset | 6 |

SPECIFICATIONS

PIPETMAN M is a high quality pipette that offers excellent accuracy and precision; it is fully compliant with ISO 8655 and is CE marked.

The figures given in the [PIPETMAN M Maximum Permissible Errors](#) Table 2 on page 30 were obtained using “PIPETMAN DIAMOND Tips”. These figures are only guaranteed when using genuine PIPETMAN DIAMOND Tips.

Each pipette is inspected and validated by qualified technicians according to the Gilson quality system. Gilson declares that its manufactured pipettes comply with the requirements of the ISO 8655 standard, by type testing.





The adjustment is carried out under strictly defined and monitored conditions (ISO 8655-6):

- Basis of adjustment, Ex.
- Reference temperature, 20°C
- Relative humidity, 50%
- Barometric pressure, 101 kPa
- Use of distilled water grade 3 (ISO 3696)
- Ten measurements for each test volume, which are nominal volume, 50% of nominal volume and 10% of nominal volume. (tested mode: PIPET, speed 6 with PIPETMAN DIAMOND Tips)

Table 2

PIPETMAN® M maximum permissible errors

| PIPETMAN M SINGLE CHANNEL — VARIABLE VOLUME MODELS | | | | | | | | | | |
|--|-----------------------|------------------|-------------|-----------------------|-------------|-----------------------|--------------------|------------------------|-----------------------|-------------------|
| Model | PIPETMAN DIAMOND Tips | | Part Number | Gilson Specifications | | | | ISO 8655-2 | | |
| | | | | Standard PIPET mode | | | | REPETITIVE mode volume | Systematic error (µL) | Random error (µL) |
| | | | | Volume Range | Volume (µL) | Systematic error (µL) | Random error (µL) | | | |
|  PI10M | D10 DL10 | DF10 DFL10 | F81022 | 0.5–10 µL | 0.5 | ± 0.040 | ≤ 0.013 | 0.5–10 µL | ± 0.12 | ≤ 0.08 |
| | | | | | 1 | ± 0.025 | ≤ 0.012 | | ± 0.12 | ≤ 0.08 |
| | | | | | 5 10 | ± 0.060 ± 0.080 | ≤ 0.020 ≤ 0.025 | | ± 0.12 ± 0.12 | ≤ 0.08 ≤ 0.08 |
|  PI20M | D200 | DF30 | F81023 | 2–20 µL | 2 | ± 0.075 | ≤ 0.025 | 2–20 µL | ± 0.2 | ≤ 0.1 |
| | | | | | 10 | ± 0.100 | ≤ 0.035 | | ± 0.2 | ≤ 0.1 |
| | | | | | 20 | ± 0.150 | ≤ 0.050 | | ± 0.2 | ≤ 0.1 |
|  PI100M | D200 | D100 | F81013 | 5–100 µL | 5 | ± 0.35 | ≤ 0.10 | 5–100 µL | ± 0.8 | ≤ 0.3 |
| | | | | | 10 | ± 0.30 | ≤ 0.10 | | ± 0.8 | ≤ 0.3 |
| | | | | | 50 | ± 0.38 | ≤ 0.12 | | ± 0.8 | ≤ 0.3 |
| | | | | | 100 | ± 0.40 | ≤ 0.15 | | ± 0.8 | ≤ 0.3 |
|  PI200M | D200 D300 | DF200 DF300 | F81024 | 20–200 µL | 20 | ± 0.40 | ≤ 0.15 | 5–200 µL | ± 1.6 | ≤ 0.6 |
| | | | | | 100 | ± 0.80 | ≤ 0.22 | | ± 1.6 | ≤ 0.6 |
| | | | | | 200 | ± 1.00 | ≤ 0.26 | | ± 1.6 | ≤ 0.6 |
|  PI300M | D200 D300 | DF200 DF300 | F81014 | 20–300 µL | 20 | ± 0.80 | ≤ 0.16 | 10–300 µL | ± 4.0 | ≤ 1.5 |
| | | | | | 30 | ± 0.70 | ≤ 0.20 | | ± 4.0 | ≤ 1.5 |
| | | | | | 150 | ± 0.90 | ≤ 0.23 | | ± 4.0 | ≤ 1.5 |
| | | | | | 300 | ± 1.05 | ≤ 0.30 | | ± 4.0 | ≤ 1.5 |
|  PI1200M | D1000 D1200 | DF1000 DF1200 | F81015 | 100–1200 µL | 100 | ± 2.5 | ≤ 0.4 | 20–1200 µL | ± 16 | ≤ 6.0 |
| | | | | | 120 | ± 2.4 | ≤ 0.4 | | ± 16 | ≤ 6.0 |
| | | | | | 600 1200 | ± 3.6 ± 6.0 | ≤ 0.8 ≤ 1.2 | | ± 16 ± 16 | ≤ 6.0 ≤ 6.0 |
|  PI5000M | D5000 | | F81016 | 500–5000 µL | 500 | ± 10 | ≤ 2 | 100–5000 µL | ± 40 | ≤ 15.0 |
| | | | | | 2500 | ± 15 | ≤ 4 | | ± 40 | ≤ 15.0 |
| | | | | | 5000 | ± 25 | ≤ 7 | | ± 40 | ≤ 15.0 |
|  PI10mLM | D10mL | | F81017 | 1–10 mL | 1 mL | ± 25 | ≤ 4 | 200 µL–10 mL | ± 60 | ≤ 30.0 |
| | | | | | 5 mL | ± 30 | ≤ 8 | | ± 60 | ≤ 30.0 |
| | | | | | 10 mL | ± 50 | ≤ 12 | | ± 60 | ≤ 30.0 |
| PIPETMAN M MULTICHANNEL | | | | | | | | | | |
|  PI8x10M | D10 DL10 | DF10 DFL10 | F81025 | 0.5–10 µL | 0.5 | ± 0.05 | ≤ 0.02 | 0.5–10 µL | ± 0.24 | ≤ 0.16 |
| | | | | | 1 | ± 0.04 | ≤ 0.02 | | ± 0.24 | ≤ 0.16 |
|  PI12x10M | D10 D200 | DF10 DF30 | F81026 | 1–20 µL | 5 | ± 0.08 | ≤ 0.04 | 1–20 µL | ± 0.24 | ≤ 0.16 |
| | | | | | 10 | ± 0.10 | ≤ 0.06 | | ± 0.24 | ≤ 0.16 |
|  PI8x20M | DL10 D200 | DFL10 DF30 | F81027 | 1–20 µL | 1 | ± 0.08 | ≤ 0.05 | 1–20 µL | ± 0.4 | ≤ 0.2 |
| | | | | | 2 | ± 0.09 | ≤ 0.06 | | ± 0.4 | ≤ 0.2 |
|  PI12x20M | D200 | DF100 DF300 | F81028 | 10–100 µL | 10 | ± 0.15 | ≤ 0.10 | 5–100 µL | ± 0.4 | ≤ 0.2 |
| | | | | | 50 | ± 0.25 | ≤ 0.12 | | ± 0.4 | ≤ 0.2 |
|  PI8x100M | D200 | DF100 | F81018 | 10–100 µL | 10 | ± 0.25 | ≤ 0.14 | 5–100 µL | ± 1.6 | ≤ 0.6 |
| | | | | | 50 | ± 0.50 | ≤ 0.20 | | ± 1.6 | ≤ 0.6 |
|  PI12x100M | D200 D300 | DF100 DF300 | F81019 | 20–200 µL | 20 | ± 0.80 | ≤ 0.25 | 5–200 µL | ± 1.6 | ≤ 0.6 |
| | | | | | 100 | ± 1.00 | ≤ 0.30 | | ± 3.2 | ≤ 1.2 |
|  PI8x200M | D200 D300 | DF100 DF300 | F81029 | 20–200 µL | 20 | ± 0.50 | ≤ 0.16 | 5–200 µL | ± 3.2 | ≤ 1.2 |
| | | | | | 100 | ± 1.00 | ≤ 0.30 | | ± 3.2 | ≤ 1.2 |
|  PI12x200M | D200 D300 | DF100 DF300 | F81030 | 10–300 µL | 200 | ± 2.00 | ≤ 0.50 | 10–300 µL | ± 3.2 | ≤ 1.2 |
| | | | | | 10 | ± 1.00 | ≤ 0.18 | | ± 8.0 | ≤ 3.0 |
|  PI8x300M | D200 D300 | DF200 DF300 | F81031 | 10–300 µL | 30 | ± 1.00 | ≤ 0.18 | 10–300 µL | ± 8.0 | ≤ 3.0 |
| | | | | | 150 | ± 1.50 | ≤ 0.375 | | ± 8.0 | ≤ 3.0 |
|  PI12x300M | D300 | DF300 | F81032 | 50–1200 µL | 300 | ± 2.40 | ≤ 0.45 | 50–1200 µL | ± 8.0 | ≤ 3.0 |
| | | | | | 50 | ± 4.0 | ≤ 0.7 | | ± 32 | ≤ 12 |
|  PI8x1200M | D1200 | DF1200 | F81020 | 50–1200 µL | 120 | ± 4.0 | ≤ 0.7 | 50–1200 µL | ± 32 | ≤ 12 |
| | | | | | 600 | ± 6.0 | ≤ 1.5 | | ± 32 | ≤ 12 |
| PI12x1200M | D1200 | DF1200 | F81021 | 50–1200 µL | 1200 | ± 9.6 | ≤ 1.8 | 50–1200 µL | ± 32 | ≤ 12 |
| | | | | | | | | | | |

Gilson maximum permissible errors are guaranteed only when PIPETMAN pipettes are used with the recommended PIPETMAN DIAMOND Tips.

Under these conditions:

- Gilson volumetric specifications in standard pipetting (PIPET mode) are guaranteed with a performance exceeding ISO 8655-2 recommendations for this mode.
- In the absence of ISO recommendations for repetitive pipetting mode for air-displacement pipettes, Gilson volumetric specifications for repetitive pipetting (REPETITIVE mode) are guaranteed within ISO 8655-2 recommendations for standard pipetting (Cf. ISO 8655-2 table 2 above).

SAFETY PRECAUTIONS AND LIMITATIONS OF USE



For safety reasons, it is important to observe the following instructions:

- **Battery and electrical specifications:**


NOTICE

We strongly recommend you fully charge the battery before using the pipette. PIPETMAN M is supplied with an AC adaptor that is suitable for your country. You must only use an original Gilson AC adaptor specific to this product. Charge the battery in the pipette, using the AC-adaptor or the stand adapter.

Use AC adaptor and stand adapter indoors.

CAUTION

PIPETMAN M uses a Lithium-Ion battery. Operation on the battery is done at user's risk only. Opening the pipette voids the warranty. Dispose of used batteries in accordance with legal regulations. Batteries may not be disposed of with household waste and may explode if disposed in fire.

- Li-ion battery pack; 1 Ah / 3.6 V. Charging time: approx. 3 hours for a fully discharged battery (80% in one hour).
- AC adaptor : Input voltage, country-specific: 100-240 V, 50/60 Hz (0.5A max.) Output voltage: +5 V DC, 3.5A (17.5W max.)
- Class II  this device is double insulated.

WARNING

Do not use PIPETMAN M in a potentially explosive environment or with potentially explosive chemicals.

When pipetting infectious, radioactive, toxic, and other hazardous solutions, please observe all the safety precautions (e.g., wear protective clothing, goggles and gloves) and regulations appropriate for your country.

NOTICE

Do not allow the liquid to enter the body of the pipette.

- **Storage conditions**
Temperature: -20°C to 50°C - Humidity max: 80%
- **Temperature of use**
Between 4°C and 40°C (specifications may vary).
- **Use only genuine PIPETMAN DIAMOND Tips** and original Gilson's accessories and spare parts. If the equipment is used in a manner not specified by Gilson in the user's guide, the protection provided in the equipment may be impaired.
- **Equipment disposal**
This equipment must not be disposed of with unsorted municipal waste. Instead, it is your responsibility to correctly dispose of your waste equipment by handing it over to an authorized facility for separate collection and recycling. It is also your responsibility to decontaminate the equipment in case of biological, chemical, and/or radiological contamination so as to protect from health hazards the persons involved in the disposal and recycling of equipment. For more information about where you can drop off your waste equipment for recycling, please contact your local dealer from whom you originally purchased the product or your local council. By doing so, you will help conserve natural resources and you will ensure that your waste equipment is recycled in a manner that protects human health and the environment. Thank you.
- PIPETMAN M can be used indoor and outdoor, if precautions are respected as described above and in the the good laboratory practices (GLP).



REPLACEMENT PARTS

Single Channel Models

| DESCRIPTION | P10M | P20M | P100M | P200M | P300M | P1200M | P5000M | P10mLM |
|------------------------|----------|----------|----------|----------|----------|----------|----------|----------|
| Connecting nut | F807012 | F807012 | F807012 | F807012 | F807012 | F807012 | F807012 | F807012 |
| Battery tag, 1x4 | F807013 | F807013 | F807013 | F807013 | F807013 | F807013 | F807013 | F807013 |
| Ejector tag, 1x4 | F807014 | F807014 | F807014 | F807014 | F807014 | F807014 | F807014 | F807014 |
| Power supply USB | F807015 | F807015 | F807015 | F807015 | F807015 | F807015 | F807015 | F807015 |
| Power tub cover | F807022 | F807022 | F807022 | F807022 | F807022 | F807022 | F807022 | F807022 |
| Battery window | F807005 | F807005 | F807005 | F807005 | F807005 | F807005 | F807005 | F807005 |
| Ejector window | F807006 | F807006 | F807006 | F807006 | F807006 | F807006 | F807006 | F807006 |
| Lubrican tube 3.5g | - | F3070902 | F3070902 | F3070902 | F3070902 | F3070902 | F3070902 | F3070902 |
| Seal, 1x5 | F161902 | - | - | - | - | - | - | - |
| Seal & O-Ring, 5 sets | - | F144863 | - | - | - | - | - | - |
| O-ring, 1x5 | - | - | F807146 | F2070501 | F807134 | F807152 | F807148 | F807149 |
| Tip holder, upper part | F2070117 | F2070117 | F807135 | F2070517 | F2070517 | F2070617 | - | - |
| Tip holder, lower part | F2070218 | F2070318 | F807136 | F2070518 | F807153 | F2070618 | F2070719 | F807147 |
| Button assembly | F807141 | F807142 | F807119 | F807143 | F807120 | F807121 | F807122 | F807123 |
| Tip ejector assembly | F807008 | F807009 | F807130 | F807010 | F807010 | F807011 | F807131 | F807132 |
| Piston assembly | F807017 | F807018 | F807126 | F807019 | F807127 | F807020 | F807128 | F807129 |

Multichannel Models

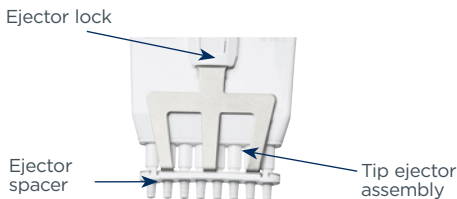


Figure 20
Multichannel ejector

| DESCRIPTION | P8X10M | P12X10M | P8X20M | P12X20M | P8X100M | P12X100M | P8X200M | P12X200M | P8X300M | P12X300M | P8X1200M | 12X1200M |
|----------------------|---------|---------|---------|---------|---------|----------|---------|----------|---------|----------|----------|----------|
| Battery tag, 1x4 | F807013 | F807013 | F807013 | F807013 | F807013 | F807013 | F807013 | F807013 | F807013 | F807013 | F807013 | F807013 |
| Ejector tag, 1x4 | F807014 | F807014 | F807014 | F807014 | F807014 | F807014 | F807014 | F807014 | F807014 | F807014 | F807014 | F807014 |
| Power supply USB | F807015 | F807015 | F807015 | F807015 | F807015 | F807015 | F807015 | F807015 | F807015 | F807015 | F807015 | F807015 |
| Power tub cover | F807022 | F807022 | F807022 | F807022 | F807022 | F807022 | F807022 | F807022 | F807022 | F807022 | F807022 | F807022 |
| Battery window | F807005 | F807005 | F807005 | F807005 | F807005 | F807005 | F807005 | F807005 | F807005 | F807005 | F807005 | F807005 |
| Ejector window | F807006 | F807006 | F807006 | F807006 | F807006 | F807006 | F807006 | F807006 | F807006 | F807006 | F807006 | F807006 |
| Button assembly | F807141 | F807141 | F807144 | F807144 | F807124 | F807124 | F807143 | F807143 | F807145 | F807145 | F807125 | F807125 |
| Ejector spacer | F507001 | F507003 | F507001 | F507003 | F507001 | F507003 | F507001 | F507003 | F507001 | F507003 | F807139 | F807140 |
| Ejector spacer D10 | F807117 | F807118 | - | - | - | - | - | - | - | - | - | - |
| Ejector lock | F507008 | F507008 | F507008 | F507008 | F507008 | F507008 | F507008 | F507008 | F507008 | F507008 | F507008 | F507008 |
| Tip ejector assembly | F507005 | F507006 | F507005 | F507006 | F507005 | F507006 | F507005 | F507006 | F507005 | F507006 | F807137 | F807138 |



PIPETMAN M SOFTWARE



What is PIPETMAN M Software?

PIPETMAN® M Software is an easy-to-use software for creating custom pipetting protocols for PIPETMAN M pipettes. Use it to create personalized pipetting protocols on your PC, and to transfer these protocols to PIPETMAN M pipettes in the Custom Mode, where you can execute them.

PIPETMAN M Software runs on Windows® 7, Windows® 8, and Windows® 8.1. The software file is downloadable on www.gilson.com/pipetmanm

Passwords and User Information

When running the PIPETMAN M Software for the first time (e.g. after installation), you are prompted to enter some information regarding your password and your institution.

User Password

Enter user password and select a *Hidden question/Hidden answer* (used to recover forgotten passwords). You can also select I don't want to use passwords. You can still switch to start using passwords later (in main menu select *Other administration* ► *Change password*).

User Profile

Provide Institution/Company details. Providing this information is optional and can also be done later (in main menu select *Other administration* ► *Institution/Company profile*).

During the installation you are prompted to enter a *Recovery* password that will be used to retrieve forgotten passwords.

Password must contain 8–30 characters, start with a letter, contain at least one numerical digit and one uppercase letter (no special symbols allowed).

NOTE

When using a password, please make sure you remember or save your *Recovery password* and/or the answer to the *Hidden question* — those are the only two means of retrieving your login information in the event of forgetting the password (see following section).

Forgotten Password

Users who use password protection have to provide the password to run PIPETMAN M Software and to modify custom protocols in PIPETMAN M.



In the case of a forgotten password, click the *Forgotten Password* button on the PIPETMAN M login window. Select one of the following options to recover the forgotten password:

- *I know the answer to the hidden question*
- *I have the recovery password*
- And click *Next*. Provide the answer to the *Hidden question* or the *Recovery password* on the next screen and click *Next*. On the following window, provide a new password and click *Finish*.

Home Screen

After launching PIPETMAN M Software you are directed to the home screen.

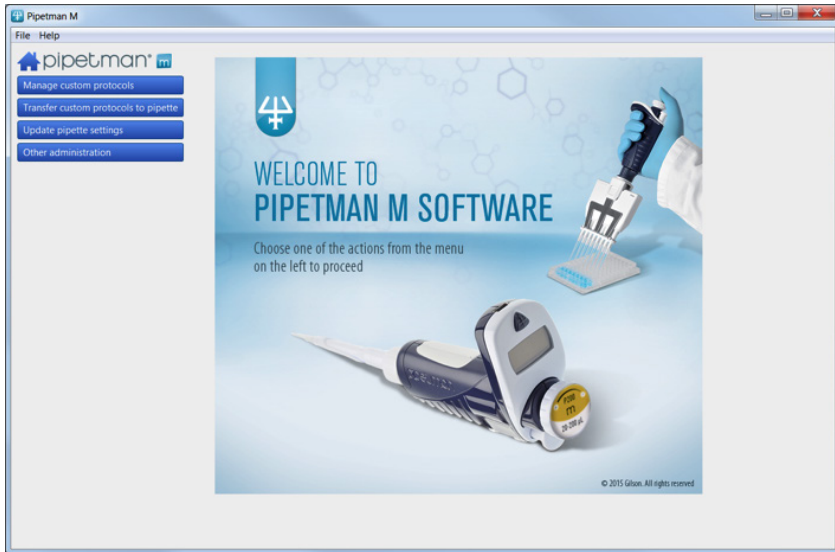



Figure 21

PIPETMAN® M Software home screen

The home screen offers the following options:

- **Manage custom protocols:** *Create, edit, import or export custom protocols.*
- **Transfer custom protocols to pipette:** Connect a PIPETMAN M pipette via USB cable and transfer a selected custom protocol to the PIPETMAN M pipette.
- **Update pipette settings:** Access additional pipette settings such as locking functionality, sound alerts, maximum volume limit, or pipette firmware updates.



- **Other administration:** Manage the inventory of your PIPETMAN M pipettes, view history of custom protocol uploads to specific PIPETMAN M pipettes, manage passwords and the Company/Institution profile. By clicking the home icon  you return to the home screen.
- **Menu bar** offers the following options:
 - File ► Exit; exit the PIPETMAN M Software
 - Help ► Help; access the user’s guide
 - Help ► About; access basic information on the PIPETMAN M Software.

Installing PIPETMAN M Software

PC Requirements for PIPETMAN M Software

PIPETMAN M Software is supported on PC with Windows® 7, Windows® 8 and Windows® 8.1.

Table below lists the PC system requirements for the software.

| SYSTEM | MINIMUM / ALLOWED | RECOMMENDED |
|--------------------------|---|-------------------------|
| Operating system | Windows 7 | Windows 7 and above |
| Hard drive | 1 GB | 10 GB |
| Processor speed | 2.0 GHz | 2.0 GHz |
| RAM | 1 GB | 2 GB |
| Screen resolution | 480x800, 768x1024, 720x1280, 768x1280, 800x1280, 768x1366 | 768x1024 |
| Text size (Windows only) | 100%, 125%, 150% | 100% |
| USB | USB 2.0 High-speed port | USB 2.0 High-speed port |

Installing PIPETMAN M Software

1. Download the appropriate PIPETMAN M Software installation file for your operating system to the PC.
2. Double-click the installer and follow the instructions on the screen to complete the installation.
3. When completed, the PIPETMAN M Software icon will appear on desktop of the PC if *Create Desktop Shortcut* is checked.
4. If PIPETMAN M Software is not launched automatically, double-click the PIPETMAN M icon on the desktop.
5. Once installed, the PIPETMAN M Software can be run by any user on the installed PC.



Installing the Drivers

On Windows® 7 systems, drivers are installed along with the installer. On some Windows® 8 and Windows® 8.1 systems, drivers might need to be installed manually.

Software Files

PIPETMAN M Software stores information about custom pipetting protocols in specific files with the extension .pmp.

Uninstalling PIPETMAN M Software

When uninstalling PIPETMAN M, you can select to remove the user data (select checkbox *Remove user data* during uninstall process). This will remove all user data, custom protocols, pipette data and history related to pipettes and protocols.

Creating and Managing Custom Protocols

In *Manage custom protocols* you can create, edit, import or export custom protocols.


Creating a Custom Protocol

Start creating a new custom protocol from scratch by clicking the *Create a new protocol* button.

Specify the *Protocol name* (e.g. *DNA-isolation*) and click *Create*. The edit custom protocol screen appears with the Protocol info and Protocol setup tabs.


- In the *Protocol info* tab, select a pipette from a list of PIPETMAN M models. Enter the name of the user who created the protocol (*protocol created by: field*) and enter any comments into the *Comments* box, if required.

In the *Protocol setup* tab, build a pipetting protocol by adding tasks from the *Available* tasks list (on the left of the screen) to the *Protocol* pane (on the right of the screen) and modifying the task's default parameters:

1. Select a task in the *Available task* list.
2. Drag-and-drop it to the Protocol pane, use the arrow button  or simply double-click on the task).
3. Modify the task's parameters in the *Edit* task window that opens automatically after you add the task to protocol, and click *Create* to add the task.
4. Add further tasks to the protocol if desired.
5. When the protocol contains all desired tasks, click the *Save* button to store the protocol. If you are using password protection, you will be asked to confirm this action by entering your password.

The protocol is now listed in *Manage custom protocols*.

Protocols can contain up to 40 tasks.

Tasks listed in the protocol pane will be executed on the PIPETMAN M from top to bottom. You can move the task's position in the protocol by drag-and-drop movement or by using up/down arrows next to the task .

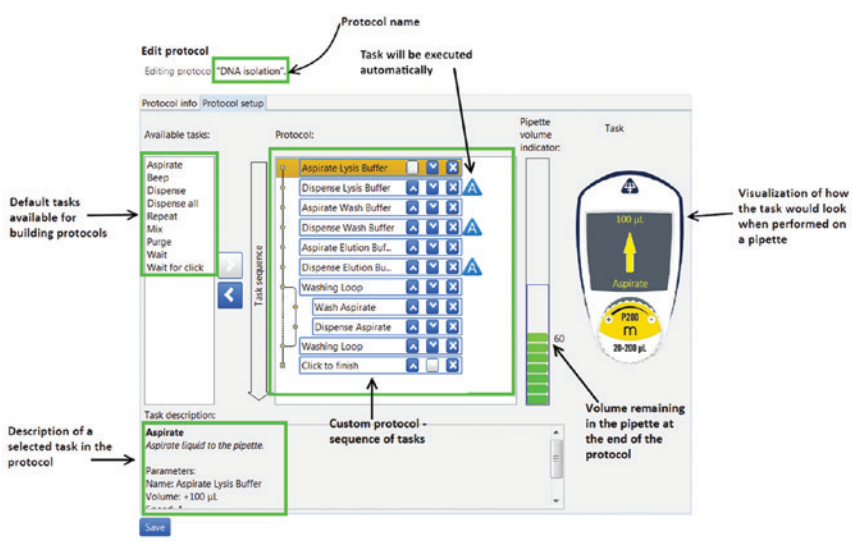



Figure 22
Building a custom protocol

Default tasks available:

- **Aspirate:** aspirates specified volume into the tip.
- **Dispense:** dispenses specified volume from the tip.
- **Dispense all:** dispenses all remaining volume from the tip followed by a purge action.
- **Repeat⁽¹⁾:** enables repetition of any task once or more.
- **Mix:** mixes the specific volume in one or more cycles.
- **Purge:** dispenses all remaining volume from the tip followed by purging extra volume.
- **Wait:** introduces a wait for a specified number of seconds.
- **Wait for click:** pauses the protocol until Push button is clicked.
- **Beep:** makes pipette produce a beeping sound while selected tasks are executed.

Add tasks to the protocol through drag-and-drop actions, by selecting a task and clicking the arrow button  or by double-clicking the task. Drag-and-drop actions position the tasks in the following way: the selected task will be placed directly above the task highlighted in the protocol section. If you are moving a task upwards or creating a new task, the task will be positioned above the highlighted task. If you are moving the task downwards, the task will be dropped after the highlighted task.

After you add a task to the protocol, you can modify task parameters.

NOTE

⁽¹⁾Tasks within *Repeat* will be executed in a sequence for the specified number of iterations.

Example: If Repeat contains two tasks: *Aspirate 20 µL* followed by *Dispense 20 µL* and the number of iterations is set to 3, the tasks will be executed on PIPETMAN M in the following order: 1. *Aspirate 20 µL*, 2. *Dispense 20 µL*, 3. *Aspirate 20 µL*, 4. *Dispense 20 µL*, 5. *Aspirate 20 µL*, and 6. *Dispense 20 µL*.



Default Task Parameters

Each task has modifiable parameters, defined as follows:

Aspirate and Dispense tasks have the following parameters:

- Task name⁽²⁾: specify the name of the task.
- Volume (μL)⁽²⁾: specify the volume for the task in μL .
- Speed⁽²⁾: specify the speed for aspirating and dispensing.
- Comments: enter any comments related to the task.
- Display text⁽²⁾: enter text that is displayed on the pipette's LCD screen when the task is activated.

NOTE

The number of characters for Display text is limited ⁽³⁾.

- Execute automatically (checkbox)⁽⁴⁾: specify whether the task should be executed automatically after the previous task is completed.

Dispense all task has the following parameters:

- Task name⁽²⁾: specify the name of the task.
- Speed⁽²⁾: specify the speed for the dispense.
- Comments: enter any comments related to the task.
- Display text⁽²⁾: enter text that is displayed on the pipette's LCD screen when the task is activated.

NOTE

The number of characters for Display text is limited ⁽³⁾.

- Execute automatically (checkbox)⁽⁴⁾: specify whether the task should be executed automatically after the previous task is completed.

Repeat task has the following parameters:

- Task name⁽²⁾: specify the name of the task.
- Number of iterations⁽²⁾: specify how many times the pipette should repeat the tasks that are placed inside the repeat task.
- Comments: enter any comments related to the task.

NOTE

For certain PIPETMAN M models the minimal volumes in *Aspirate* and *Dispense* tasks might be different if these tasks are located inside *Repeat* loop.



Mix task has the following parameters:

- Task name⁽²⁾: specify the name of the task.
- Volume (μL)⁽²⁾: specify the volume for the task in μL .
- Aspiration speed⁽²⁾: specify the speed for the aspiration.
- Dispense speed⁽²⁾: specify the speed for the dispense.
- Use push button mixing (checkbox): when checked, mixing will be performed continuously for as long as the user holds the push button on the pipette; once the push button is released, mixing stops and the next task in the protocol is executed.
- Number of cycles⁽²⁾: specify how many times the volume should be mixed.
- Comments: enter any comments related to the task.
- Display text⁽²⁾: enter text that is displayed on the pipette's LCD screen when the task is activated.

NOTE

The number of characters for Display text is limited ⁽³⁾.

- Execute automatically (checkbox)⁽⁴⁾: specify whether the task should be executed automatically after the previous task is completed.

Purge task has the following parameters:

- Task name⁽²⁾: specify the name of the task.
- Comments: enter any comments related to the task.
- Display text⁽²⁾: enter text that is displayed on the pipette's LCD screen when the task is activated.

NOTE

The number of characters for Display text is limited ⁽³⁾.

- Execute automatically (checkbox)⁽⁴⁾: specify whether the task should be executed automatically after the previous task is completed.

Wait task has the following parameters:

- Task name⁽²⁾: specify the name of the task.
- Duration(s)⁽²⁾: specify the duration of the pause in seconds.
- Comments: enter any comments related to the task.
- Display text⁽²⁾: enter text that is displayed on the pipette's LCD screen when the task is activated.

NOTE

The number of characters for Display text is limited ⁽³⁾.

Wait for click task has the following parameters:

- Task name⁽²⁾: specify the name of the task.
- Comments: enter any comments related to the task.
- Display text⁽²⁾: enter text that is displayed on the pipette's LCD screen when the task is activated.



Beep task has the following parameters:

- Task name⁽²⁾: specify the name of the task.
- Comments: enter any comments related to the task.
- Example of use: in order to produce a beep sound with duration of 1 second on the pipette before the *Aspirate* task, position the following set of tasks before the Aspirate task:
 - Beep task (creates the beep start and end tasks).
 - Wait task (with duration 1 s), which should replace the beep placeholder task between the two beep tasks.

NOTE

⁽²⁾Parameters marked with an asterisk are mandatory.

⁽³⁾Pipettes are able to display a limited number of characters on their LCD screen. If you use longer strings of characters in Display text not all may be displayed.

⁽⁴⁾Display text field is disabled when Execute automatically is checked.

Additionally, the *Use Push button* mixing option for mix mode is also disabled for tasks that are automatically executed.

Editing, Cloning, and Deleting Tasks

Once the task is listed in the protocol, you can edit its parameters by selecting the task, right-clicking on it and selecting *Edit task*, or by double-clicking the task. The *Edit task* window opens, where you can modify the task’s parameters and store them.

You can clone a task by *right-clicking* on the desired task and selecting *Clone task*. Add task window opens, where you can rename the task and change the parameters if desired. When done, add the task to the protocol by clicking *Create* button. The task is added immediately after the original task.

You can delete tasks from the protocol by *right-clicking* on the desired task and selecting *Delete task*. Alternatively, you can select a task in the protocol and click the left-arrow . When deleting a task, a pop-up window appears, where you can confirm task deletion.

Pipette Volume Indicator

As you build a protocol, the pipette volume indicator will display how much of the pipette’s maximum volume is used at the end of the protocol with indicator bars (green to red color). The exact volume is also displayed next to the color bars (displayed in microliters). If you click on a particular task, a rectangle will mark the volume of the current task (blue rectangle indicates aspirating, and red rectangle indicates dispensing of volume).

If the volume in pipette exceeds the maximal volume, or is below the minimal volume of the pipette, the pipette volume indicator will be surrounded with a red rectangle.

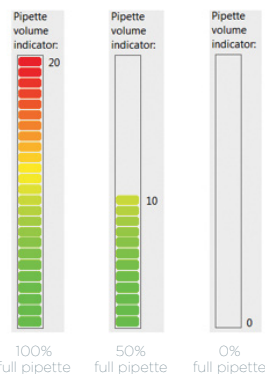





Figure 23 Numbers displayed next to colored bars represents volume remaining in the pipette at the end of protocol (displayed in microliters).



Warning and Error Messages

PIPETMAN M Software verifies the protocol after the addition of each task, or after modification of a task, to determine whether the volume of the pipette is still within the volume specifications for that particular PIPETMAN M model. Should the volume in pipette model fall outside specifications, an error sign  will appear next to the task that caused this. More details about error are available if you position the mouse over the error sign. Protocols that contain one or more error signs  may be saved, however they cannot be transferred to a pipette and cannot be exported.

In certain cases a yellow *warning sign*  will appear next to a protocol in *Manage custom protocols* and *Transfer custom protocols* to pipette. More details about the warning are available if you position the mouse over the warning sign. Such protocols may be transferred to a pipette and can be exported. However, executing these protocols on the pipette repeatedly may cause the pipette to have an error.

Managing Existing Protocols in Manage Custom Protocols

All protocols that have been created are listed in the *Manage custom protocols* window with information on pipette model, date of creation, date of last modification, person that created the protocol, and person that last modified the protocol.

If a protocol contains a warning or an error, the warning or error icon is displayed.

Manage custom protocols
Edit existing protocols, export them or import/create new ones.

| Name | Pipette model | Created on | Last modified on | Created by | Last modified by |
|-----------------------|---------------|------------------|------------------|------------|------------------|
| Dispension task | M1000 | 2014-12-19 11:32 | 2014-12-19 14:54 | Kata | Luka |
| Dispension task_1 | M8x300 | 2014-12-19 15:38 | 2014-12-19 15:38 | Lucky | Lucky |
| Extraction_DNA | M1000 | 2014-12-19 16:00 | 2014-12-19 16:00 | Jane | Jane |
| Mix adding_fast | M10 | 2014-12-19 15:43 | 2014-12-19 15:43 | Lucky | Lucky |
| Mixing | M200 | 2014-12-19 11:41 | 2014-12-19 14:54 | Kata | Tea |
| Mixing fast | M200 | 2014-12-19 15:40 | 2014-12-19 15:40 | Jane | Jane |
| Mixing slow | M200 | 2014-12-19 15:45 | 2014-12-19 15:45 | Martin | Martin |
| PCR_Master Mix | M10 | 2014-12-19 15:42 | 2014-12-19 15:42 | Lucky | Lucky |
| PCR_mix adding | M10 | 2014-12-19 12:27 | 2014-12-19 14:54 | Kata | Matjaz |
| PCR_mix adding sl... | M10 | 2014-12-19 15:41 | 2014-12-19 15:41 | Jeniffer | Jeniffer |
| PCR_sample adding | M10 | 2014-12-19 11:52 | 2014-12-19 15:15 | Kata | Kata |
| PCR_sample isolati... | M200 | 2014-12-19 15:46 | 2014-12-19 15:46 | June | June |
| Plasmid purification | M200 | 2014-12-19 15:47 | 2014-12-19 15:47 | Mathew | Mathew |
| RNA isolation from... | M200 | 2014-12-19 12:36 | 2014-12-19 14:54 | Kata | Jane |
| RNA isolation from... | M1000 | 2014-12-19 14:41 | 2014-12-19 14:41 | Kata | Kata |
| RNA isolation from... | M1000 | 2014-12-19 15:36 | 2014-12-19 15:36 | Jeniffer | Jeniffer |
| RNA purification | M1000 | 2014-12-19 16:00 | 2014-12-19 16:00 | Michael | Michael |
| Sample dilution | M10 | 2014-12-19 15:48 | 2014-12-19 15:48 | Winfred | Winfred |
| qPCR protocol | M10 | 2014-12-19 15:44 | 2014-12-19 15:44 | Juliane | Juliane |

Edit View Clone Export Export PDF report Delete

Import a protocol from file Create a new protocol

Figure 24

Custom protocols are listed in *Manage custom protocol* window.

For each of the protocols listed you can perform the following actions. Simply select the protocol and click on one of the buttons:

- **View:** view a protocol. No parameters can be changed in the “*View mode*”.
- **Edit:** edit a protocol (change the PIPETMAN M model, *rename protocol*, *add/edit/remove tasks*).



- **Clone:** clone a protocol (if you are creating a similar protocol, cloning will save time).
- **Export:** export a protocol to a .pmp file and store it on the PC.
- **Export to pdf:** create a summary of the protocol in the form of a print-ready pdf document.
- **Delete:** delete a protocol.

Alternatively, you can perform these actions by right-clicking on a desired protocol. Editing protocol is also available by double-clicking the selected protocol.

Importing a Protocol

You can add protocols to the *Manage custom protocols* by importing a previously created protocol (.pmp files).

Click on *Import a protocol from file* button, navigate to the .pmp file and click *Open*. The protocol is then available in *Manage custom protocols*.

Practical Tips for Creating Custom Protocols

If you have existing protocols, cloning and modifying them will save you time.

PIPETMAN M Software enables you to easily create a similar protocol on a different PIPETMAN M model. Simply clone the protocol and change the PIPETMAN M model. If necessary, modify the volume of transfers to fit volume specifications of the new PIPETMAN M model.

Transferring Custom Protocols to the Pipette

To transfer a protocol to a PIPETMAN M pipette, click the *Transfer custom protocols to pipette* button and follow the instructions on the screen:

1. Connect pipette to the PC via USB cable and click *Next*.

NOTE

Should the pipette not be recognized immediately, disconnect the USB cable, reconnect it and click *Try again* button. If a pipette is already correctly connected when *Transfer custom protocols to pipette* button is clicked, this step is skipped.

By default, the protocols for the connected PIPETMAN M model are listed. You can access the protocols created for other PIPETMAN M models by selecting the model from the *Show protocols for pipette model*⁽²⁾: drop-down list.

2. Select a protocol in the list and click *Finish*.

If a pipette is locked, transferring protocols will unlock it. For that purpose, a pop-up window appears, where you can confirm that you would like to transfer the selected protocol, unlocking the pipette in the process.

You can also check “*Mute beeps*” if you want to disable any pipette sounds during beep tasks.

3. Disconnect the pipette. The Custom protocol is now available on the pipette.

NOTE

Protocols that have a red *error sign*  cannot be transferred to pipettes.






- You can transfer a protocol created for a different PIPETMAN M model to the connected pipette, providing the protocol is using volumes within the connected pipette's volume specifications. Protocols that contain volumes outside connected pipette's volume will have a red error sign .
- The pipette must be registered in the software prior to transferring custom protocols. If the connected pipette is not yet registered, a pop-up appears which informs you that the pipette is not yet registered. Here, you can click on *Add pipette now*, which takes you to the pipette management screen, or you can proceed to/stay at step 1 by clicking *Connect different pipette*.
- On the bottom left of *Transfer custom protocols to pipette* wizard, you can find the *Pipette connection information* — An icon accompanied with text which reports the current connectivity status. The icon is green  if there is a pipette connected to the PC or gray  when there are no pipettes connected. The connectivity status is refreshed when any of the buttons is clicked.



Figure 25

Selecting a protocol for transfer to a PIPETMAN M P200M pipette.



Updating Pipette Settings

Here you can set the following configurations on the connected PIPETMAN M pipette:

- Set the *Beep* to *On* or *Off* (switches the tone of the pipette to *On* or *Off*). *Beep On* and *Off* only affects the built-in pipette protocols, as well as *Aspirate*, *Dispense*, *Mix*, *Purge tasks* (but NOT beep task!).
- Set the *Lock pipette* *On* or *Off* (Lock pipette *On* disables access to Configuration, *Speed* and *Mode* on PIPETMAN M pipette).
- Set *Maximal volume limit*: this sets the maximal allowed volume on the particular pipette; it cannot be higher than pipette's specified maximal volume. Simply enter the volume (in μL) in the field.
- Update Firmware.

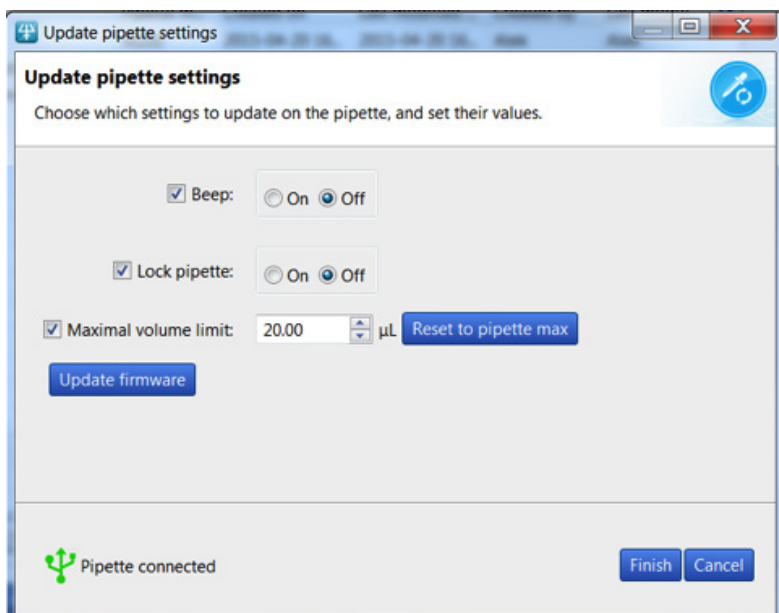


Figure 26
Update pipette settings.

To modify these configurations, follow these steps:

1. Click *Update pipette settings* in the main menu.
2. If a pipette is already correctly connected, proceed to step 4.
3. Connect pipette to the PC via USB cable and click *Next*. Should the pipette not be recognized immediately, disconnect the USB cable, reconnect it and click *Try again* button.





4. Check the checkbox for the configuration that you would like to change and then modify it (e.g. change Beep from On to Off; or modify the Maximal volume limit); Unchecked configurations will not be updated.
5. Click *Finish*.
6. Disconnect pipette.

You can refresh the pipette's Maximal volume limit to pipette's specified maximal volume by clicking the Reset to pipette max.

NOTE

The pipette must be registered in the software prior to transferring custom protocols. If the connected pipette is not yet registered, a pop-up appears which informs you that the pipette is not yet registered. Here, you can click on *Add pipette now*, which takes you to the pipette management screen, or you can proceed to/stay at step 1 by clicking *Connect different pipette*.

- On the bottom left of Update pipette settings wizard, you can find the *Pipette connection information* — An icon accompanied with text which reports the current connectivity status. The icon is green  if there is a pipette connected to the PC or gray  when there are no pipettes connected. The connectivity status is refreshed when any of the buttons is clicked.

Updating Pipette Firmware

To update firmware on PIPETMAN M pipette follow these steps:

1. Click *Update pipette settings* in the main menu.
2. If a pipette is already correctly connected, proceed to step 4.
3. Connect pipette to the PC via USB cable and click *Next*. Should the pipette not be recognized immediately, disconnect the USB cable, reconnect it and click *Try again* button.
4. Click the *Update firmware* button.
5. Navigate to the firmware file and click *Open*.
6. On the next dialog, click **OK** to confirm the firmware update.

NOTICE

The pipette must not be disconnected during firmware update. Disconnecting pipette could result in pipette malfunction.

7. Wait for the firmware update, click **OK** and disconnect pipette.



Other Administration

Here you can perform the following administrative tasks:

- **Pipette management:** Manage the inventory of your PIPETMAN M pipettes.
- **View history:** View the history of protocol uploads to PIPETMAN M pipettes and the history of protocol modifications by user.
- **Change password:** Change the password to access PIPETMAN M Software.
- **Institution/Company profile:** Manage the information related to your Institution/Company.

Pipette Management

Here you can register your individual PIPETMAN M pipettes. Registering a pipette is required to allow for transfer of your personalized protocols onto the pipette, as well as updating the pipette settings.

Register a new pipette by clicking *Register new* pipette button and follow the instructions on the screen:



1. Connect a pipette to the PC via USB cable and click *Next*. Should the pipette not be recognized immediately, disconnect the USB cable, reconnect it and click *Try again* button. If a pipette is already correctly connected when *Register new pipette* button is clicked, this step is skipped.
2. Type in the name of the pipette and click *Finish*.
3. Pipette is now listed in the *Registered pipettes* list along with the basic information (*Model, Firmware version, Serial number, Minimal volume (μL), Maximal volume (μL), Last maintenance date, Next maintenance date*).

You can rename a pipette in the *Registered pipettes* list by selecting the pipette, clicking the *Rename* button, entering a new name and clicking *Rename*.

You can reset the maintenance dates (*last and next*) by clicking the *Refresh* dates button. This process requires you to connect the selected pipette to the PC.

You can delete a pipette in the *Registered pipettes* list by selecting the pipette, and clicking *Delete this pipette* button.

NOTE

On the bottom left of *Register new pipette* wizard, you can find the *Pipette connection information* — An icon accompanied with text which reports the current connectivity status. The icon is green  if there is a pipette connected to the PC or gray  when there are no pipettes connected. The connectivity status is refreshed when any of the buttons is clicked.



View History

Here you can view the history of protocol uploads to PIPETMAN M pipettes (*tab Protocol upload*) and history of protocol modifications (*tab Protocol management*).

To display the history of protocol uploads to PIPETMAN M pipettes, navigate to the *Protocol upload tab*, select the time interval and click *Show history*. The protocols that have been uploaded to any PIPETMAN M pipette within the selected time interval will be listed in the table below, displaying the following information for each protocol: *Protocol name, Pipette name, Pipette model, Pipette serial, Uploaded on, and Result*.

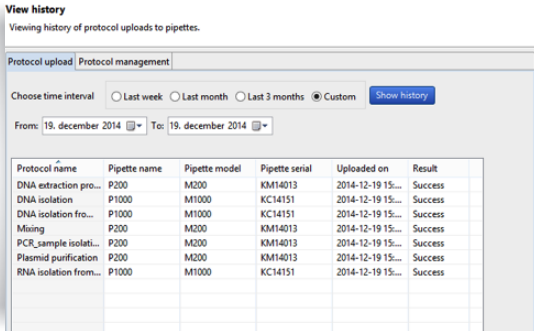


Figure 27

Display history of protocol uploads to PIPETMAN® M pipettes.

To display history of protocol modifications, navigate to *Protocol management tab*, select the time interval, and click *Show history*. The protocols that have been modified within selected time interval will be listed in the table below, displaying the following information for each protocol: *protocol ID, Original protocol name, Modified by, Modified on, and Action*.

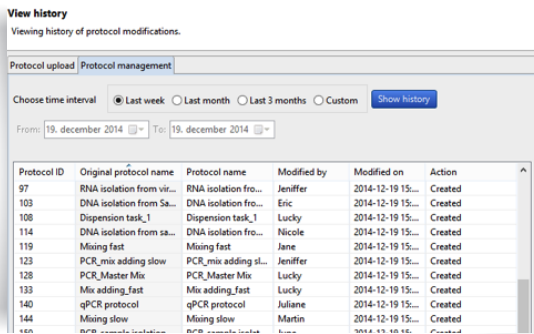


Figure 28

Display history of protocol modification



Change Password

Here you can change a password, change the *Hidden* question and *Hidden answer*, or *disable/enable* the use of passwords (*checkbox: Don't use password*).

NOTICE Remember or store the answer to the hidden question in case of password recovery.

Change password
❌ Password cannot be empty.

Old password:*

Don't use password

New password:*

Confirm new password:*

Hidden question:*

Hidden answer:*

Note: Remember or store the answer to the hidden question in case of password recovery.

Figure 29
Change password, *Hidden question*, *Hidden answer*

Institution/Company Profile

Enter the information related to your Institution/Company here or modify it. Simply enter the information in provided fields and click *Save*.

None of the information is mandatory.

Company profile
Change your institution/company profile.

Institution:

Department:

Address 1:

Address 2:

City:

Zip code:

State:

Country:

Figure 30
Enter the information related to your Institution/Company

EC DECLARATION OF CONFORMITY



Gilson certifies on its sole responsibility that the products listed below:

P10M, P20M, P100M, P200M, P300M, P1200M, P5000M, P10mLM, P8x10M, P12x10M, P8x20M, P12x20M, P8x100M, P12x100M, P8x200M, P12x200M, P8x300M, P12x300M, P8x1200M, P12x1200M.

Comply with the requirements of the following standards:

Standards for EU

Electromagnetic Compatibility Directive 2014/30/EU

Low Voltage Directive 2014/35/EU

The use of hazardous substances directive 2015/863/EU



Standards for UK

Electromagnetic Compatibility, Regulation 2016, BS EN Standard 61326-1

Electrical Equipment (Safety), Regulation 2016, BS EN Standard 61010-1





Chapter 23

WARRANTY

Gilson warrants this pipette against defects in material under normal use and service for a period of 24 months from the date of purchase.

This warranty shall not apply to pipettes which are subject to abnormal use and/or improper or inadequate maintenance (contrary to the recommendations given in the user's guide), including, but not limited to pipettes which have been subjected to physical damage, improper handling, or spillage or exposure to any corrosive environment. This warranty shall also be void in the event pipettes are altered or modified by any party other than Gilson or its designates. Gilson's sole liability under this warranty shall be limited to, at Gilson's sole option, repair or replacement of any defective components of pipettes or refund of the purchase price paid for such pipettes.

THE FOREGOING WARRANTY IS EXCLUSIVE AND GILSON HEREBY DISCLAIMS ALL OTHER WARRANTIES, WHETHER EXPRESS OR IMPLIED, INCLUDING ANY WARRANTIES OF MERCHANTABILITY AND ANY WARRANTIES OF FITNESS FOR A PARTICULAR PURPOSE, UNDER NO CIRCUMSTANCES SHALL GILSON BE LIABLE FOR ANY CONSEQUENTIAL, PUNITIVE, INDIRECT OR INCIDENTAL DAMAGES ARISING OUT OF ANY BREACH OF ANY EXPRESS OR IMPLIED WARRANTY.

APPENDICES



Appendix A - Example of a Performance Check

Below is an example of how to evaluate the performance of PIPETMAN P10M at 1 μ L.

1. Determine the mean value \bar{e} of the evaporation loss e_i that occurs during your pipetting cycles. Proceed as described in [Appendix C - Evaporation Loss](#) on page 53 to determine \bar{e} .

$$\bar{e} = \frac{1}{m} \sum_{i=1}^m e_i$$

m : number of weighings

$e_1 = 0.016$ mg $e_3 = 0.021$ mg
 $e_2 = 0.018$ mg $e_4 = 0.017$ mg

$$\bar{e} = (e_1 + e_2 + e_3 + e_4) / 4$$

$$\bar{e} = (0.016 + 0.018 + 0.021 + 0.017) / 4$$

$$\bar{e} = 0.018 \text{ mg/per cycle}$$

2. Change the pipette tip and perform the first weighing. Then, keep a regular cycle and perform the ten following measurements.

$W_r = 0.957$ mg
 $W_1 = 0.968$ mg $W_6 = 0.966$ mg
 $W_2 = 0.960$ mg $W_7 = 0.955$ mg
 $W_3 = 0.984$ mg $W_8 = 0.972$ mg
 $W_4 = 0.942$ mg $W_9 = 0.958$ mg
 $W_5 = 0.969$ mg $W_{10} = 0.967$ mg

W_r : rinsing measurement which is disregarded for the calculation

3. Calculate the mean weight

$$\bar{W} = \frac{1}{n} \sum_{i=1}^n W_i$$

n : number of weighings

W_i : weighing results

$$\bar{W} = (0.968 + 0.960 + 0.984 + 0.942 + 0.969 + 0.966 + 0.955 + 0.972 + 0.958 + 0.967) / 10$$

$$\bar{W} = 0.964 \text{ mg}$$

4. Calculate the mean volume. For a temperature of 21.5°C and an air pressure of 1013 hPa, the Z factor is equal to 1.0032 μ L/mg (see table 3 in [Appendix B - Z Factor](#) on page 52).

$$\bar{V} = (\bar{W} + \bar{e}) \times Z$$

$$\bar{V} = (0.964 + 0.018) \times 1.0032$$

$$\bar{V} = 0.985 \mu\text{L}$$

5. Evaluate accuracy

Systematic error (E): $E = \bar{V} - V_0$

V_0 : true value set on the instrument
 $E = 0.985 - 1 = -0.015 \mu\text{L}$

Relative error (E%): $E\% = (\bar{V} - V_0) \times 100 / V_0$
 $E\% = (-0.015 \times 100) / 1 = -1.50 \%$

6. Evaluate precision (repeatability)

Standard Deviation (SD_w)

$$SD_w = \sqrt{\sum_{i=1}^n \frac{(W_i - \bar{W})^2}{n - 1}}$$

$$SD_w^2 = \frac{1}{n - 1} \sum_{i=1}^n (W_i - \bar{W})^2$$

$$SD_w^2 = \frac{1}{9} \left[\begin{aligned} &(0.968 - 0.964)^2 + (0.960 - 0.964)^2 + (0.984 - 0.964)^2 + \\ &(0.942 - 0.964)^2 + (0.969 - 0.964)^2 + (0.966 - 0.964)^2 + \\ &(0.955 - 0.964)^2 + (0.972 - 0.964)^2 + (0.958 - 0.964)^2 + \\ &(0.967 - 0.964)^2 \end{aligned} \right]$$

$$SD_w = 0.011 \text{ mg}$$

Random error (SD_v):

$$SD_v = SD_w \times Z$$

$$SD_v = 0.011 \times 1.0032 = 0.011 \mu\text{L}$$



Appendix B - Z Factor

The reference calculation equation is :

$$Z = [1/(P_w - P_A)] [1 - (P_A/P_B)] \quad \text{Where:}$$

P_A = density of air at t°C.
 P_w = density of the test liquid at t°C.
 P_B = density of the balance weights.
 Use 8 g/cc for P_B

NOTE

Weights conforming to International recommendation N°33 of OIML have been adjusted to give results when weighing in air as if the density of the weights were 8.0 g/mL.

Values of the conversion factor Z (μL/mg) as a function of temperature and pressure for distilled water.

Table 3

Z Factor

| TEMPERATURE (°C) | AIR PRESSURE (HPA) | | | | | |
|---------------------|--------------------|--------|--------|--------|--------|--------|
| | 800 | 853 | 907 | 960 | 1013 | 1067 |
| 15 | 1.0018 | 1.0018 | 1.0019 | 1.0019 | 1.0020 | 1.0020 |
| 15.5 | 1.0018 | 1.0019 | 1.0019 | 1.0020 | 1.0020 | 1.0021 |
| 16 | 1.0019 | 1.0020 | 1.0020 | 1.0021 | 1.0021 | 1.0022 |
| 16.5 | 1.0020 | 1.0020 | 1.0021 | 1.0022 | 1.0022 | 1.0023 |
| 17 | 1.0021 | 1.0021 | 1.0022 | 1.0022 | 1.0023 | 1.0023 |
| 17.5 | 1.0022 | 1.0022 | 1.0023 | 1.0023 | 1.0024 | 1.0024 |
| 18 | 1.0022 | 1.0023 | 1.0024 | 1.0024 | 1.0025 | 1.0025 |
| 18.5 | 1.0023 | 1.0024 | 1.0025 | 1.0025 | 1.0026 | 1.0026 |
| 19 | 1.0024 | 1.0025 | 1.0025 | 1.0026 | 1.0027 | 1.0027 |
| 19.5 | 1.0025 | 1.0026 | 1.0026 | 1.0027 | 1.0028 | 1.0028 |
| 20 | 1.0026 | 1.0027 | 1.0027 | 1.0028 | 1.0029 | 1.0029 |
| 20.5 | 1.0027 | 1.0028 | 1.0028 | 1.0029 | 1.0030 | 1.0030 |
| 21 | 1.0028 | 1.0029 | 1.0030 | 1.0030 | 1.0031 | 1.0031 |
| 21.5 | 1.0030 | 1.0030 | 1.0031 | 1.0031 | 1.0032 | 1.0032 |
| 22 | 1.0031 | 1.0031 | 1.0032 | 1.0032 | 1.0033 | 1.0033 |
| 22.5 | 1.0032 | 1.0032 | 1.0033 | 1.0033 | 1.0034 | 1.0035 |
| 23 | 1.0033 | 1.0033 | 1.0034 | 1.0035 | 1.0035 | 1.0036 |
| 23.5 | 1.0034 | 1.0035 | 1.0035 | 1.0036 | 1.0036 | 1.0037 |
| 24 | 1.0035 | 1.0036 | 1.0036 | 1.0037 | 1.0038 | 1.0038 |
| 24.5 | 1.0037 | 1.0037 | 1.0038 | 1.0038 | 1.0039 | 1.0039 |
| 25 | 1.0038 | 1.0038 | 1.0039 | 1.0039 | 1.0040 | 1.0041 |
| 25.5 | 1.0039 | 1.0040 | 1.0040 | 1.0041 | 1.0041 | 1.0042 |
| 26 | 1.0040 | 1.0041 | 1.0042 | 1.0042 | 1.0043 | 1.0043 |
| 26.5 | 1.0042 | 1.0042 | 1.0043 | 1.0043 | 1.0044 | 1.0045 |
| 27 | 1.0043 | 1.0044 | 1.0044 | 1.0045 | 1.0045 | 1.0046 |
| 27.5 | 1.0044 | 1.0045 | 1.0046 | 1.0046 | 1.0047 | 1.0047 |
| 28 | 1.0046 | 1.0046 | 1.0047 | 1.0048 | 1.0048 | 1.0049 |
| 28.5 | 1.0047 | 1.0048 | 1.0048 | 1.0049 | 1.0050 | 1.0050 |
| 29 | 1.0049 | 1.0049 | 1.0050 | 1.0050 | 1.0051 | 1.0052 |
| 29.5 | 1.0050 | 1.0051 | 1.0051 | 1.0052 | 1.0052 | 1.0053 |
| 30 | 1.0052 | 1.0052 | 1.0053 | 1.0053 | 1.0054 | 1.0055 |



Appendix C – Evaporation Loss

Procedure for the Determination of Evaporation Loss

Use the same distilled water, weighing vessel, and balance as you will be using for the gravimetric check.

Half fill the weighing vessel with distilled water.

1. Cover the weighing vessel with its lid and place it on the balance using a pair of tweezers.
2. Aspirate a sample.
3. Tare the balance and take the weighing vessel out of the balance.
4. Take off the lid with tweezers.
5. Dispense the sample into a dummy vessel.
6. Replace the lid on the weighing vessel and, using tweezers, replace the vessel on the balance.
7. Read the negative result e_1 (record the absolute value).
8. Repeat steps 3 to 8, three times to obtain e_2 , e_3 , and e_4 .
9. Calculate the evaporation loss e using the formula:

$$\bar{e} = \frac{1}{4}(e_1 + e_2 + e_3 + e_4)$$

NOTE

In normal conditions, this value is usually between 0.01 mg and 0.03 mg.



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