pipetman®

M connected

User's Guide

EN

GILSON®

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Chapter 1

INTRODUCTION

Congratulations on the purchase of your PIPETMAN® M Connected, the electronic pipette with guaranteed performance in both standard and repetitive pipetting modes. For more information visit **www.gilson.com/en/guaranteedperformance.**

PIPETMAN M Connected is a Bluetooth® enabled 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 Connected will reduce pipetting fatigue, and increase pipetting efficiency.

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

PIPETMAN M Connected features the classic PIPETMAN look with additional functionality:

- **Intuitive interface** with five pipetting modes for a large number of applications: forward 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 Connected 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 Connected 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 CONNECTED SINGLE CHANNEL		
Model	Part Number	Volume Range
P10M	**F81040**	0.5–10 µL
P20M	**F81041**	2–20 µL
P100M	**F81042**	5–100 µL
P200M	**F81043**	20–200 µL
P300M	**F81044**	20–300 µL
P1200M	**F81045**	100–1200 µL
P5000M	**F81046**	500–5000 µL
P10mLM	**F81047**	1–10 mL

PIPETMAN M CONNECTED MULTICHANNEL		
Model	Part Number	Volume Range
P8x10M	**F81048**	0.5–10 µL
P12x10M	**F81049**	
P8x20M	**F81050**	1–20 µL
P12x20M	**F81051**	
P8x100M	**F81052**	10–100 µL
P12x100M	**F81053**	
P8x200M	**F81054**	20–200 µL
P12x200M	**F81055**	
P8x300M	**F81056**	10–300 µL
P12x300M	**F81057**	
P8x1200M	**F81058**	50–1200 µL
P12x1200M	**F81059**	

Chapter 2

PARTS CHECKLIST AND ACCESSORIES

Parts Checklist

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

- PIPETMAN M Connected 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 carrousel for single and multichannel models	FB1001
Battery side tags (set of 4)	F807013
Ejector side tags (set of 4)	F807014
Bluetooth® USB Dongle	F807027

Please contact your Gilson representative to order additionnal accessories.

Chapter 3

GETTING STARTED

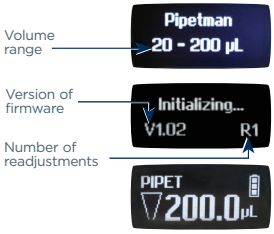
NOTE

PIPETMAN M Connected is provided with a minimal battery charge. Before using your new pipette, we strongly recommend that you to fully charge the battery. PIPETMAN M Connected charges 80% of its full battery capacity in less than an hour, but it takes three hours to fully charge the battery. Please refer to Chapter 12 Power Management on page 20 for charging procedure.

Switch on your PIPETMAN M Connected. 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 24).



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

PIPETMAN M Connected goes into sleep mode after three minutes of inactivity. The display will shut off. Just press the push button to reactivate the pipette. Your last setting and pipetting mode will appear on the screen.

Chapter 4

DESCRIPTION

Upper part

1. Push button and volume adjustment knob
2. Menu 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

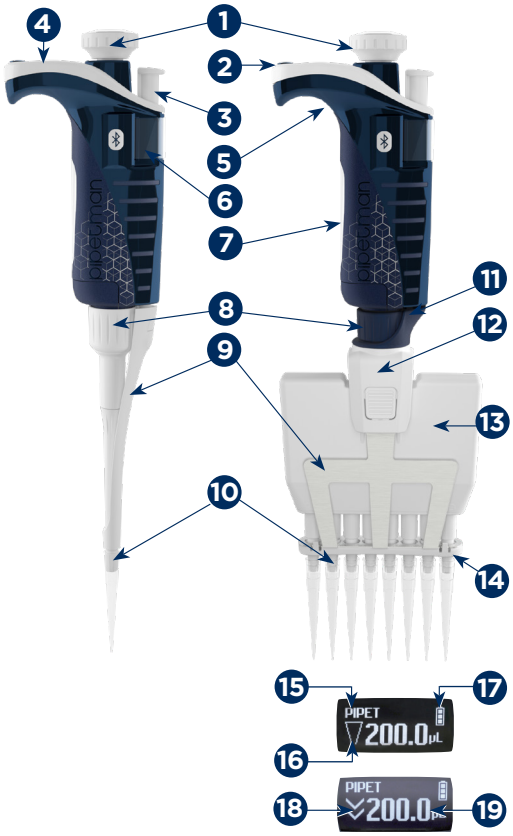


Figure 1
PIPETMAN® M Connected single and multichannel models

Reset

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

Switch Off

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

Display

The PIPETMAN M display is an Organic Light-Emitting Diod (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.

Chapter 5

PIPETTING JUST LIKE WITH PIPETMAN

Using PIPETMAN M Connected is as easy as using a mechanical PIPETMAN. Your PIPETMAN M Connected 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 Connected 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, 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.

Chapter 6

PIPETTING MODES

PIPETMAN M Connected offers more pipette modes for a large number of applications: you will find all pipetting modes in the menu (for system settings refer to Chapter 8 Pipetting Speed Control on page 15 and Chapter 14 Configuration on page 22). Access the menu by pushing the menu 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.

Fit a tip suitable for the model of PIPETMAN M Connected that you are using (preferably use PIPETMAN Tips for assurance of accurate and precise results, refer to Chapter 9 PIPETMAN DIAMOND Tips on page 15).

NOTICE Always fit a tip before using any pipette.

1. Press the push button to aspirate the selected volume.
2. 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.
3. Eject tip by pressing the ejection button.

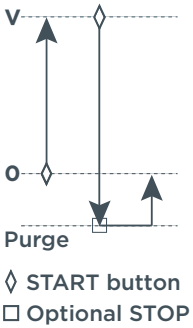


Figure 2
PIPET Mode

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

Continue pipetting as you would with your mechanical PIPETMAN Connected; 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 (e.g., 120 µL x 10 for P1200M).

You also can decrease the number of repetitions (e.g., 120 µL x 10-(n ≥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 menu 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, you can now adjust the volume.

Set the Aliquot Volume

1. Cick 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 Connected. 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.

4. Fit a tip suitable for the model of PIPETMAN M Connected that you are using (preferably use PIPETMAN Tips for assurance of accurate and precise results; refer to Chapter 9 PIPETMAN DIAMOND Tips on page 15).

NOTICE	Always fit a tip before using any pipette.

5. 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.

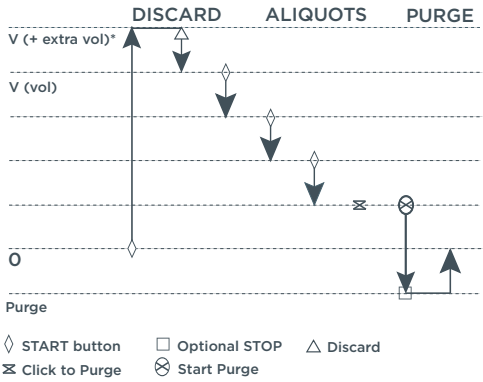


Figure 3
REPETITIVE Mode

Dispense

Press the push button. DISCARD appears on the screen. Discard a part of the extra volume and continue dispensing the aliquots. PIPETMAN M Connected 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 dispose and then purge the rest of the extra volume 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 8 Pipetting Speed Control on page 15). If you work with genomic DNA, then you should always pipette very carefully to avoid shearing and nicking.

1. Press menu button to access menu, where you can choose between different pipette modes. Select **MIX Mode** by turning the push button, then to confirm your selection click on the push button.

2. Set the first volume, named **VOLUME 1:** click 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**: click 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: click 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. Click 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 Connected that you are using (preferably use PIPETMAN DIAMOND Tips for assurance of accurate and precise results; refer to Chapter 9 **PIPETMAN DIAMOND Tips** on page 15).

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.

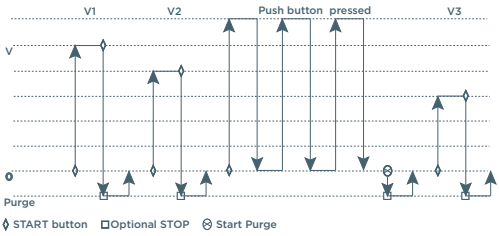


Figure 4
MIX Mode

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.

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.

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 Connected 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 8 PIPETTING SPEED CONTROL on page 15). 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 menu 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 9 PIPETMAN DIAMOND Tips on page 15).

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.

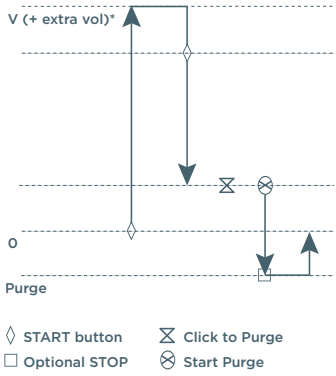


Figure 5
REVERSE Mode

Eject tip

Press the ejection button.

CUSTOM Mode

The CUSTOM Mode enables personalized pipetting protocol creation on a PC or tablet for transfer to PIPETMAN M Connected through PIPETMAN M Software, an easy-to-use software. To use this mode on a PC, the software has to be installed on it.

PIPETMAN M Software is downloadable on **www.gilson.com/pipetmanmconnected**.

You can also directly download the PIPETMAN M Software Android® app on your tablet.

To install PIPETMAN M software on a PC:

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 or tablet.

You can then create, edit, import, or export custom up to 10 personalized pipetting protocols, easily and rapidly.

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

- **Aspirate:** aspirates specified volume into the tip.
- **Beep:** makes pipette produce a beep sound while selected tasks are executed.
- **Dispense:** dispenses specified volume from the tip.
- **Dispense all:** dispenses all remaining volume from the tip followed by a purge action.
- **Loop:** enables repetition of any task once or more. Tasks between Loop (start) and Loop (end) will be executed in sequence for the specified number of iterations.
- **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, where during aspiration, additional liquid is added and after delivery, the excess volume remains in the tip and is discarded.
- **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 Connected pipette, click ***Transfer custom protocols to pipette*** and follow the instructions on the screen.

For more information on PIPETMAN M Software, refer to the *User's Guide PIPETMAN M Software* LT801562.

Chapter 7

BENEFIT FROM THE BLUETOOTH® CONNECTION

PIPETMAN M Connected is a smart Bluetooth connected pipette that stores your data in the cloud for you to recall. It is compatible with the Gilson Connect platform of apps and has the ability to be connected to a Bluetooth 4.0 smart-ready tab or phone or any PC equiped with a Bluetooth key. You can work with your smart pipette on any of the Gilson apps, according to your daily goals.

PIPETMAN M Connected can be connected to the PIPETMAN M Software and the Gilson apps either with the USB cable or using the Bluetooth® connection.

NOTE	Bluetooth specifications: Frequency Band: 2400–2483.5 MHz Power Output: 0.3 dBm

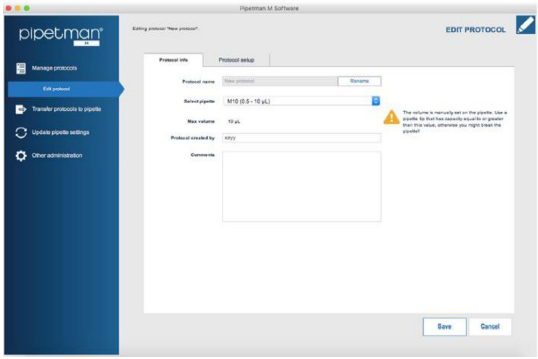
Connect via Bluetooth

1. Connect the Bluetooth key (part number F807027) to a USB port. (PC only, not required when using a tablet).
2. Press the push button on the pipette to switch it on and begin initialization.
3. When initialization is complete, press the menu button on the pipette.
4. Press and hold the push button for 2–3 seconds until the Bluetooth indicator lights flash and then release the push button.

Associated with TRACKMAN® Connected and its PipettePilot application, PIPETMAN M Connected will reduce risks of human errors by transferring verifiable pipetting parameters and commands in the pipette.

Please visit www.gilsonconnect.com to learn more about Gilson applications.

PIPETMAN M Connected has is own software:
PIPETMAN M Software, and can be used with TRACKMAN Connected to reduce risks of human errors by transferring verifiable pipetting parameters and commands in the pipette.



Connection with the PIPETMAN M Software

When it is necessary to have the pipette connected, the software will prompt you. If the pipette has been registered previously, it is only necessary to activate the Bluetooth on the pipette to make the connection; however, if this is the first time the pipette is being used in the software, it is necessary to register the pipette.

1. From the main menu, select Other administration and then Pipette management.
2. Select + next to Registered pipettes.
3. Connect the pipette.

If connecting via Bluetooth:

- On the tablet, select The software searches for pipettes with Bluetooth activated (indicator lights flashing).
- On the PC, select Connect via BLE. The software searches for pipettes with Bluetooth activated (indicator lights flashing).

NOTE	Many devices may be detected, but only one can be connected.

If connecting via USB:

- Use a USB cable to connect the pipette to the PC.
- Select Connect via USB. The connected pipette appears in the Devices list

4. Select the pipette in the Devices list.
5. Select Next.
6. When prompted, enter a name for the pipette. If the pipette has already been registered, then an informational message will appear.

Current connectivity status is always shown at the bottom left part of the screen where it is clear if the pipette is:

- USB connected 
- There is no connected pipette
- Bluetooth connected 

If you want to connect to another pipette within the same channel as the first connected pipette, it will get disconnected and the new one will get connected while the sign below left remains the same.

For more information about all features PIPETMAN M Software offers you, please read the help section of PIPETMAN M Software.

Chapter 8

PIPETTING SPEED CONTROL

PIPETMAN M Connected 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 menu 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.

Chapter 9

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 Connected, therefore for optimum performance we recommend using PIPETMAN Tips with your PIPETMAN M Connected.

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

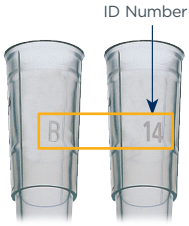


Figure 6
ID number

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 Tips are made from pure polypropylene (virgin, metal-free, to avoid the possibility of contamination). They are available sterilized and with filters.
- Sterilized PIPETMAN 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.

- 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 CONNECTED SINGLE CHANNEL			
Model	PIPETMAN DIAMOND Tips		Volume Range
P10M	D10* DL10*	DF10 DFL10	0.5–10 µL
P20M	D200	DF30	2–20 µL
P100M	D200	DF100	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 CONNECTED MULTICHANNEL			
P8x10M P12x10M	D10 DL10	DF10 DFL10	0.5–10 µL
P8x20M P12x20M	DL10 D200	DFL10 DF30	1–20 µL
P8x100M P12x100M	D200	DF100	10–100 µL
P8x200M P12x200M	D200 D300	DF100 DF200 DF300	20–200 µL
P8x300M P12x300M	D200 D300	DF200 DF300	10–300 µL
P8x1200M P12x1200M	D1200	DF1200	50–1200 µL

* 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).

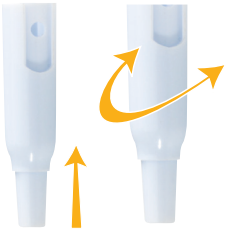


Figure 7
Plastic adapter

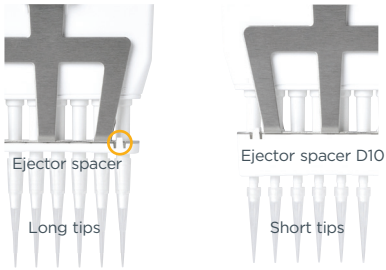


Figure 8
P8x10M and P12x10M

GUIDELINES FOR GOOD PIPETTING

Aspirate and Dispense

Fit new PIPETMAN DIAMOND Tip for the best results (refer to Chapter 19 Specifications on page 31).

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

For multichannel models, PIPETMAN DIAMOND Tips are best fitted from the patented ROCKY RACK available only in our TIPACKs and TOWERPACKs. ROCKY RACK is the dome-shaped part of the pack that contains the tips. ROCKY RACK makes it easy to securely fit the tips to a multichannel pipette, ensuring an airtight seal on all channels without the need to use undue pressure or to touch the tips.

All Models

Pre-rinse the tip. Pre-rinsing consists of aspirating the first volume of liquid and then dispensing it back into the same vessel (or to waste). Subsequent volumes that you pipette will have levels of accuracy and precision within specifications. Some liquids (e.g., protein-containing solutions and organic solvents) can leave a film of liquid on the inside the wall of the tip; pre-rinsing the tip minimizes any errors that may be related to this phenomenon.

Hold the pipette vertically and immerse the tip in the liquid (refer to page 16). Press the push button to aspirate the set volume of liquid. Wait a few seconds (time depends on model, refer to page 16); 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.

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-rinsed 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 17).
- 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 Parts Checklist and Accessories on page 5) is recommended for use with the CARROUSEL™and Single™ Pipette Holder to store your PIPETMAN M Connected 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-rinse 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 you should 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 28.

The pipette can be used between +4°C and +40°C, but the specifications may vary (refer to Chapter 19 Specifications on page 31).

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

NOTE Extreme temperatures can affect accuracy and precision!

Chapter 11

PERSONALIZE YOUR PIPETMAN® M CONNECTED

Tip Ejector Extension for Use with P10M

Tip ejector extensions are required to eject D10 tip and are 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).

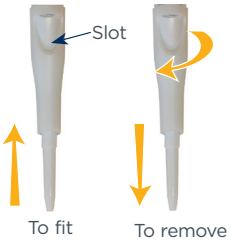


Figure 9
Fit a tip ejector

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.

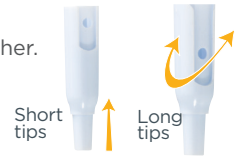


Figure 10
Remove a tip ejector

Personal Label – Name and/or Application Tag

Your PIPETMAN M Connected 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.

Clip tag:

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

Figure 11
Name and application tag

Chapter 12

GOOD LABORATORY PRACTICE FEATURES

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

PIPETMAN M Connected 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 11 **Personalize your PIPETMAN M Connected** on page 18.

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 15 **Maintenance** on page 22).
- 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 15 **Maintenance** on page 22).
- Service alert can be set *"On"* or *"Off"*.

Chapter 13

POWER MANAGEMENT

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

Figure 12
PIPETMAN® M Connected Power supply

Battery Charging

PIPETMAN M Connected 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. First 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 Connected using the POWER CARROUSEL:

1. First 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.

Figure 13
POWER CARROUSEL for PIPETMAN® M Connected

Working with Charger Connected to the Pipette

PIPETMAN M Connected 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 Connected is ready to pipette.

NOTE

You can also recharge PIPETMAN M Connected 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 Connected!

Do not operate PIPETMAN while connected to a PC.

Low Battery Warning

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

⚠CAUTION

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

Chapter 14

CONFIGURATION

Enter the menu using the menu 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 15 **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 15 **Maintenance** below
- **Adjustment:** refer to Chapter 15 **Maintenance** below.

Chapter 15

MAINTENANCE

PIPETMAN M Connected 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 Connected 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 15 Maintenance on page 22 and **Safety Precautions and Limitation of Use** on page 33).
- Prepare the pipette for cleaning or autoclaving by "disassembly" of the parts specified (refer to Chapter 16 **Cleaning and Decontamination** on page 28).

Service Information

PIPETMAN M Connected 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: *"DISASSEMBLY – Click to exit".*

- **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 menu 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 Connected 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 36), 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 (**Vi**) can be calculated as follows:

$$Vi = (Wi + e)\,Z$$

Wi is the weight as read on the balance

e is the mean evaporation loss during the cycle time

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 36)

For volumes greater than 50 µL, 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 Operations

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 25).

NOTE	**The following maintenance operation should only be done when the pipette is in Service menu (refer to page 23).**

Maintenance Warning

PIPETMAN M Connected notifies you when maintenance is due (Service alert is set by default to *"On"*). The following message ❶ will appear:

After validation by a click, the following message ❷ 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 ❸.
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.

Figure 14
Ejector clip

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.

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).

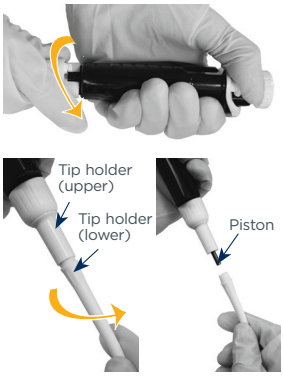


Figure 15
Changing the tip holder

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 26)
3. Clean, and if required, autoclave the lower part of the tip holder (autoclaving: 20 min. at 121°C and 0.1MPa)
1. If required, lubricate the piston (refer to How to Lubricate the Piston on page 27) and fit a new O-ring.
2. Screw the two parts together, making sure that the two parts are fully tightened, by hand.
3. Refit the tip ejector.

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 Replacement Parts on page 34).

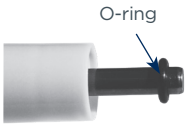


Figure 16
O-ring

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 27) 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 21 Replacement Parts on page 34).

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.

Figure 17
Piston

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 16 Cleaning and Decontamination on page 28).

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, see Figure 19 on page 27.
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.**

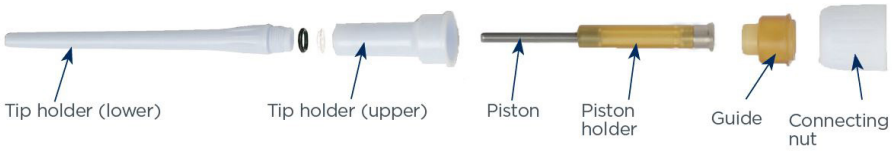


Figure 18
Tip holder upper part

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.

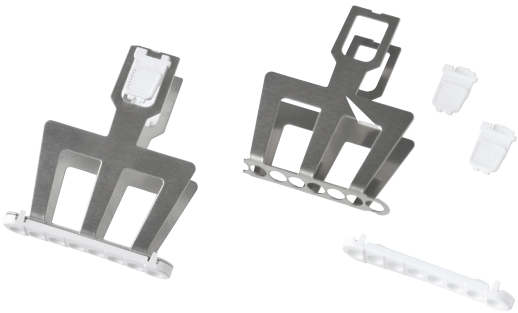


Figure 19
Tip ejector and tip ejector spacer

Chapter 16

CLEANING AND DECONTAMINATION

PIPETMAN M Connected 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 Connected 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 15 **Maintenance** on page 22).
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 15 **Maintenance** on page 22).
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 15 Maintenance on page 22).

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 15 Maintenance on page 22).
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 Connected 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.

NOTICE

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

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 24).

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 Connected multichannel can withstand a few number of autoclaving cycles, we do not recommend autoclaving it.

1. Disassemble the pipette as described in Chapter 15 **Maintenance** on page 22).
2. Immerse the components in the decontaminant solution or wipe them according the intructions 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 17

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) 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 18 **Troubleshooting** on page 31)

If you see no droplet, re-immerse 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 18 **Troubleshooting** on page 31)

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

Chapter 18

TROUBLESHOOTING

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

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

⚠WARNING **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	26
Pipette won't aspirate	Unscrewed lower part of tip holder	26
	Damaged or corroded piston	26
	Damaged tip holder	25
	Improper repair or assembly	24–27
	Connecting nut is loose.	26–27
	Software needs to be reset	6
Noisy operation	Piston needs lubricating	27
Pipette is inaccurate	Improper repair or assembly	24–27
	Unscrewed lower part of tip holder	26
	Pipette is out of adjustment	24
	Connecting nut is loose	26–27

PROBLEM	POSSIBLE CAUSE	PAGE
Pipette is not precise	Unscrewed lower part of tip holder	26
	Incorrect operator technique	17
	Worn O-ring	26
	Connecting nut is loose	26–27
	Damaged or corroded piston	26
	Damaged tip holder	25
Tips fall or don't fit	Low quality tips	15–16
	Damaged tip holder	25
	Damaged tip ejector	25–27
	Ejector spacer is damaged	27
	Tip ejector is loose	25–27
	Dirty tip holder	25
No OLED display	Pipette is in sleep mode	5
	Battery needs recharging	15
	Software needs to be reset.	6
No operation possible	Battery needs recharging.	15
	Firmware needs to be reset	6
Calibration impossible	Firmware needs to be reset	6

Chapter 19

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 **Gilson Maximum Permissible Errors** Table 2 on page 32 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 Connected maximum permissible errors

PIPETMAN M CONNECTED 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)			
P10M	D10 DL10	DF10 DFL10	**F81040**	0.5–10 µL	0.5 1 5 10	± 0.040 ± 0.025 ± 0.060 ± 0.080	≤ 0.013 ≤ 0.012 ≤ 0.020 ≤ 0.025	0.5–10 µL	± 0.12 ± 0.12 ± 0.12 ± 0.12	≤ 0.08 ≤ 0.08 ≤ 0.08 ≤ 0.08
P20M	D200	DF30	**F81041**	2–20 µL	2 10 20	± 0.075 ± 0.100 ± 0.150	≤ 0.025 ≤ 0.035 ≤ 0.050	2–20 µL	± 0.2 ± 0.2 ± 0.2 ± 0.2	≤ 0.1 ≤ 0.1 ≤ 0.1 ≤ 0.1
P100M	D200	D100	**F81042**	5–100 µL	5 10 50 100	± 0.35 ± 0.30 ± 0.38 ± 0.40	≤ 0.10 ≤ 0.10 ≤ 0.12 ≤ 0.15	5–100 µL	± 0.8 ± 0.8 ± 0.8 ± 0.8	≤ 0.3 ≤ 0.3 ≤ 0.3 ≤ 0.3
P200M	D200 D300	DF200 DF300	**F81043**	20–200 µL	20 100 200	± 0.40 ± 0.80 ± 1.00	≤ 0.15 ≤ 0.22 ≤ 0.26	5–200 µL	± 1.6 ± 1.6 ± 1.6	≤ 0.6 ≤ 0.6 ≤ 0.6
P300M	D200 D300	DF200 DF300	**F81044**	20–300 µL	20 30 150 300	± 0.80 ± 0.70 ± 0.90 ± 1.05	≤ 0.16 ≤ 0.20 ≤ 0.23 ≤ 0.30	10–300 µL	± 4.0 ± 4.0 ± 4.0 ± 4.0	≤ 1.5 ≤ 1.5 ≤ 1.5 ≤ 1.5
P1200M	D1000 D1200	DF1000 DF1200	**F81045**	100–1200 µL	100 120 600 1200	± 2.5 ± 2.4 ± 3.6 ± 6.0	≤ 0.4 ≤ 0.4 ≤ 0.8 ≤ 1.2	20–1200 µL	± 16 ± 16 ± 16 ± 16	≤ 6.0 ≤ 6.0 ≤ 6.0 ≤ 6.0
P5000M	D5000		**F81046**	500–5000 µL	500 2500 5000	± 10 ± 15 ± 25	≤ 2 ≤ 4 ≤ 7	100–5000 µL	± 40 ± 40 ± 40	≤ 15.0 ≤ 15.0 ≤ 15.0
P10mLM	D10mL		**F81047**	1–10 mL	1 mL 5 mL 10 mL	± 25 ± 30 ± 50	≤ 4 ≤ 8 ≤ 12	200 µL–10 mL	± 60 ± 60 ± 60	≤ 30.0 ≤ 30.0 ≤ 30.0
PIPETMAN M CONNECTED MULTICHANNEL										
P8x10M	D10 DL10	DF10 DFL10	**F81048**	0.5–10 µL	0.5 1 5 10	± 0.05 ± 0.04 ± 0.08 ± 0.10	≤ 0.02 ≤ 0.02 ≤ 0.04 ≤ 0.06	0.5–10 µL	± 0.24 ± 0.24 ± 0.24 ± 0.24	≤ 0.16 ≤ 0.16 ≤ 0.16 ≤ 0.16
P12x10M			**F81049**							
P8x20M	DL10 D200	DFL10 DF30	**F81050**	1–20 µL	1 2 10 20	± 0.08 ± 0.09 ± 0.15 ± 0.25	≤ 0.05 ≤ 0.06 ≤ 0.10 ≤ 0.12	1–20 µL	± 0.4 ± 0.4 ± 0.4 ± 0.4	≤ 0.2 ≤ 0.2 ≤ 0.2 ≤ 0.2
P12x20M			**F81051**							
P8x100M	D200	DF100	**F81052**	10–100 µL	10 50 100	± 0.25 ± 0.50 ± 0.80	≤ 0.14 ≤ 0.20 ≤ 0.25	5–100 µL	± 1.6 ± 1.6 ± 1.6	≤ 0.6 ≤ 0.6 ≤ 0.6
P12x100M			**F81053**							
P8x200M	D200 D300	DF100 DF200 DF300	**F81054**	20–200 µL	20 100 200	± 0.50 ± 1.00 ± 2.00	≤ 0.16 ≤ 0.30 ≤ 0.50	5–200 µL	± 3.2 ± 3.2 ± 3.2	≤ 1.2 ≤ 1.2 ≤ 1.2
P12x200M			**F81055**							
P8x300M	D200 D300	DF200 DF300	**F81056**	10–300 µL	10 30 150 300	± 1.00 ± 1.00 ± 1.50 ± 2.40	≤ 0.18 ≤ 0.18 ≤ 0.375 ≤ 0.45	10–300 µL	± 8.0 ± 8.0 ± 8.0 ± 8.0	≤ 3.0 ≤ 3.0 ≤ 3.0 ≤ 3.0
P12x300M			**F81057**							
P8x1200M	D1200	DF1200	**F81058**	50–1200 µL	50 120 600 1200	± 4.0 ± 4.0 ± 6.0 ± 9.6	≤ 0.7 ≤ 0.7 ≤ 1.5 ≤ 1.8	50–1200 µL	± 32 ± 32 ± 32 ± 32	≤ 12 ≤ 12 ≤ 12 ≤ 12
P12x1200M			**F81059**							

Gilson maximum permissible errors are guaranteed only when PIPETMAN pipettes are used with the recommended PIPETMAN DIAMOND Tips. Visit www.gilson.com/en/guaranteedperformance.

Under these conditions, Gilson volumetric specifications in standard pipetting (PIPET mode) are guaranteed with a performance exceeding ISO 8655-2 recommendations for this mode.

*These PIPETMAN DIAMOND Tips can be used with the indicated pipettes for the REPETITIVE mode but not until the maximal volume of the pipette in PIPET mode. Please refer to the volume range of your tips.

Recommended tips to get best results in REPETITIVE mode.

Chapter 20

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 Connected 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-adapter or the stand adapter.**

Use AC adaptor and stand adapter indoors.

⚠CAUTION	**PIPETMAN M Connected 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 Connected 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 Connected can be used indoor and outdoor,if precautions are respected as described above in this handbook and in the good laboratory practices (GLP).

Chapter 21

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

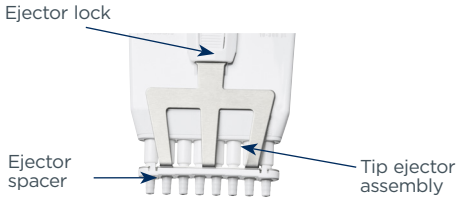


Figure 20
Multichannel ejector

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	F507139	F507140
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	F507137	F507138

APPENDICES

Appendix A – Example of a Performance Check

Below is an example of how to evaluate the performance of PIPETMAN M Connected P10M at 1 µL.

1. **Determine the mean value e of the evaporation loss e_i** that occurs during your pipetting cycles. Proceed as described in Appendix C - Evaporation Loss on page 35 to determine e_i.

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

m : number of weighings

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

$\bar{e} = (e_1+e_2+e_3+e_4) / 4$
$\bar{e} = (0.016+0.018+0.021+0.017) / 4$
$\bar{e} = 0.018$ 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

$\bar{W} = (0.968+0.960+0.984+0.942 + 0.969+0.966+0.955+0.972 + 0.958+0.967) / 10$
$\bar{W} = 0.964$ 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 µL/mg (see table 3 in Appendix B - Z factor on page 34).

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

$\bar{V} = (0.964+0.018) \times 1.0032$
$\bar{V} = 0.985$ µL

5. **Evaluate accuracy**

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

V_0 true value set on the instrument
$E = 0.985 - 1 = -0.015$ µL

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)

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

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

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

$SD_w = 0.011$ mg

Random error (**SDv**):

$SD_v = SD_w \times Z$

$SD_v = 0.011 \times 1.0032 = 0.011$ µL

Appendix B – Z Factor

The reference calculation equation is :

$$Z = [1/(P_W - P_A)]\,[1-(P_A/P_B)]$$

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	AIR PRESSURE (HPA)					
(°C)	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 $\mathbf{e_2}$, $\mathbf{e_3}$, and $\mathbf{e_4}$.
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.

Chapter 22

REGULATORY COMPLIANCE

Gilson certifies on its sole responsibility that PIPETMAN M Connected complies with the requirements of the following European Directives:

2014/30/EU	Electromagnetic compatibility, EMC
2014/35/EU	Low Voltage Directive, LVD
2014/53/EU	Radio Equipment Directive

CE

This Bluetooth enabled device also complies with the following requirements:

USA, User information: Contains FCC ID: 2AAQS-ISP1507

Canada, User information: Contains IC: 11306A-ISP1507

Japan, TELEC certification n°207-16ISP5

The WEEE symbol (crossed-out wheeled bin), according to the European Directive 2012/19/EU, indicates separate collection for WEEE – Waste of Electrical and Electronic Equipment.

Do not dispose electronic devices and their batteries in a household bin, use the recycling path in place in your country.

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.

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