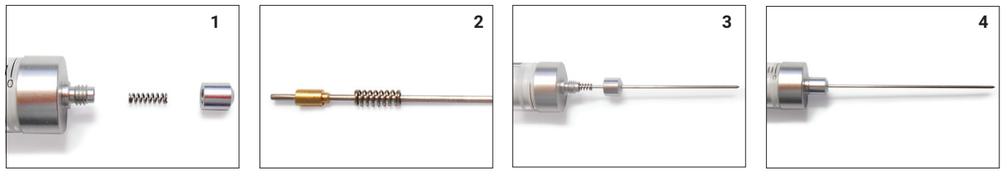
Agilent
Trusted Answers

General Information for Agilent PAL Smart Syringes

- **Smart-Chip:** Each Smart Syringe is equipped with its own read/write chip with preset parameters, ranges and usage tracking. The syringe is automatically recognized by the PAL System and all important parameters are automatically loaded. Every syringe can be traced over its complete lifetime by means of its unique ID.
- **Color code** for easy identification of the syringe volume: Each syringe head is colored according to the color code printed on every CTC syringe package.

- **Syringe type/lot number** on the barrel flange (Version 1). For one type of the PAL Smart Syringes the order number and lot number can be found on the barrel flange of the syringes.
- **Syringe type/lot number** on the barrel (Version 2). For the second type of the PAL Smart Syringes the order number and lot number can be found each in a black square on the barrel of the syringes.
- **Exchangeable needle:** For exchangeable needles, the metal luer lock needs to be unscrewed to insert and fix the needle. When loosening the metal luer, ensure that the small spring does not get lost.

Inserting an exchangeable needle (the spring has to be placed between needle and metal luer)



PAL Smart Syringes

Instructions for use, care, and maintenance from 0.5 µL to 10,000 µL syringes with PTFE, PE, and metal plunger.

Specifications

Operating Temperatures	
Liquid Fixed Needle Syringes	4 to 40 °C
Liquid Exchangeable Needle Syringes	4 to 80 °C
Headspace Syringes	4 to 100 °C
Glue free Headspace and ITEX Syringes	4°C to 150 °C
Accuracy and Reproducibility	±1% of the displaced volume at maximum volume

Instructions

- Before use, check the syringe body for cracks and the needle tip for injuries.
- To perform a manual injection, overfill the syringes and gently press the plunger until the correct volume is reached. Pull the plunger back a little and wipe the needle with a lint-free cloth, preferably without touching the tip of the needle and using the cloth to suck sample out of the syringe.

Inject or dose

- To ensure accuracy, the smallest volume of sample injected should be at least 10% of the total syringe capacity.
- To remove bubbles, prime the syringes in the sample or rotate the syringes with the needle tip pointing upward; then tap the side of the syringe body to remove the bubbles.
- It is recommended to draw up more sample than you want to inject, then release this excess after removing the air bubbles.
- Once the sample has been drawn and primed, it is recommended to clean the syringe from the outside with a lint-free cloth to avoid carryover. Again, be careful not to touch the needle tip with the cloth to prevent the sample from being sucked out of the syringe.
- To avoid carryover between samples, rinse the syringe 5 to 20 times with solvent. Do not forget to dispose of the first 2 to 3 washes.

Cleaning and care

- The choice of syringe cleaner depends on the contaminating material. For cleaning, pure solvents or fully miscible solvent mixtures are usually used. It is recommended not to use halogenated or aromatic solvents such as dichloromethane, chloroform, or toluene where possible. For applications that require these solvents, syringes with removable needles are recommended as the needles are not sticky and there is no risk of detachment.
- After cleaning, rinse the syringes with acetone, remove the plunger, and air dry both.
- Under no circumstances immerse the entire syringe in solvent as this may damage the adhesive used to bond the components of the syringe.
- Wipe the outside of the syringe with a lint-free cloth.
- **Sterilization:** The syringes are not intended for autoclaving.

Plunger maintenance

- A syringe must never be lubricated with grease, as the use of grease will lead to a large number of carryover problems. If the plunger feels rough or slightly tilted, you should clean the syringe.
- Be careful not to touch the plunger and plunger tip with your fingers as this will contaminate them.
- If you remove the plunger from the syringe, clean the syringe and needle before reassembling the syringe. The plunger should be wiped with a lint-free cloth and the syringe cleaned with solvent.

Plunger with PTFE tip

Avoid turning the plunger when the syringe is dry.

Metal plunger

- Avoid unnecessary movement of the plunger when the syringe is dry.
- Never force the plunger.
- Do not move the plunger when the needle is blocked as the pressure generated could damage the syringe body.
- Wipe the plunger clean with a lint-free cloth before replacing. Be careful not to bend the plunger.
- Spare metal plungers for standard syringes are not available. Metal plungers are individually fitted to each syringe body to achieve an ideal seal. This means that the plungers are not interchangeable.

Needle care

- Check the needle for damage before use.
- To expose clogged needles, remove the plunger and fill the syringe with solvent using another syringe. Re-insert the plunger and gently push the solvent through the needle. Never force the plunger. Too much pressure can damage the syringe body. If the needle does not return to normal operation, exchangeable needle syringes are easy to replace. The glass body should also be replaced after three to five exchange needles at the latest to ensure good performance. Fixed needle syringes must be replaced completely. Mechanical cleaning of the needles, strong acids, strong bases, or ultrasound are strongly discouraged. Even if the needle appears perfect again, the syringe can only be used manually and must never be used unattended in the autosampler. The same applies to bent needles that have been more or less “straightened” again. Safe operation in the autosampler is not possible.
- To replace the needles, unscrew the front cover nut and remove the spring and needle. Carefully insert the replacement needle into the front of the syringe, slide the spring and cover nut over the needle, and screw the nut onto the front screw of the syringe body.

Storage

- To prevent damage to the syringe body, store the syringe rings in their original packaging or on a syringe stand.
- Always clean the syringe thoroughly before storage and ensure that it is dry before storage.
- Store PTFE plungers separate from the syringe body.

Shelf life

The syringes can be stored dry and dust-free for more than 2 years

Lifetime expectations

Typical lifetimes of syringes depend to a large extent on the nature of the samples and the process parameters. The samples must be particle-free to prevent abrasion of the plunger, needle, and glass. Oxidizing acids, strong acids, strong bases, inadequate maintenance and cleaning, and operation at high speeds can drastically shorten the lifetime. For fast injections, the syringe should not be filled above 50%. In the example of 10 µL injections and injection rates >20 µL/s, a 25 µL syringe is better than a 10 µL syringe to achieve maximum lifetime.

PE and PTFE plunger

Typical durability of PTFE and PE plungers with pure nonhalogenated solvents is more than 70,000 strokes. This applies to pipetting volumes of 50% of nominal volume and default settings of asprirates and dispensing speeds.

Metal plunger

Metal plungers are much more sensitive than PTFE plungers and must never be used dry or with water. This can cause the plunger to seize, and irreversibly damage the syringe after just a few cycles. The plunger should carefully be removed once a week and rubbed with a lint-free cloth soaked in isopropanol. Typical durability of metal plungers with pure organic solvents is more than 30,000 strokes, if the plunger is frequently celaned once per week with Kimwipes and isopropanol. This applies to pipetting volumes of 50% of the nominal volume and the default settings of the asprirates and dispensing speeds.

Needles

Typical durability of needles with PALsystem-certified septa and the default penetration speeds of syringes are >10,000 penetrations. An unintended collision usually leads to direct damage.

www.agilent.com/chem

DE44265.4971180556

Printed in the USA, March 11, 2021
5994-3151EN

Agilent
Trusted Answers