User Guide

HT2000H, HT2100H, HT2000HT

Static Headspace GC Autosamplers

sampling for science

www.hta-it.com

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1 Introduction

1.1 Intended use and restrictions

HT2000H, HT2100H and HT2000HT are static headspace autosamplers for gas chromatography.

Headspace gas chromatography (GC) is a technique used for the concentration and analysis of volatile organic compounds in almost any sample matrix.

The autosampler must be used in a professional environment, and only by properly trained users. The autosampler must be used according to the regulations in force regarding the safety in testing laboratories.

A list (not exhaustive) of typical applications of the autosampler is reported below:

- Environmental analysis
- Quality control in the chemical and pharmaceutical industry
- Studies related to pharmaceuticals
- Drug discovery
- Other techniques or areas of application are possible.

The safety measures and precautions regarding use, maintenance and repair, are not intended for applications that require the use of toxic or infectious substances.

Every possible mixture or omission of a component cannot be recognized or previously prevented. The operator that will use the autosampler must be trained about the used substances, their hazards, their use and their proper disposal. For the correct use of the used substances, refer to chemicals safety data sheets (MSDS) and to the regulations, laws, directives and safety decrees currently in force that regulate the behaviour inside the testing laboratories.

The insertion and positioning of the sample (vial), the insertion of syringes and all the other preparation activities are under the sole responsibility of the user. The user must operate in accordance with the law, in particular the ones concerning the safety of testing laboratories and accident prevention.

The operator must be trained to operate the equipment in accordance with the safety standards for the laboratories. The autosampler does not have specific protection mechanisms against substances that are corrosive, potentially infectious, toxic and radioactive or against other substances that can be hazardous to health. However, when the autosampler is used, because

of the handled substances, the user could need to use individual protection measures such as gloves, masks and goggles; the use of such devices must comply with the regulations currently in force regarding the safety of testing laboratories.

The use of the autosampler for any technique invasive for humans or animals is explicitly prohibited. The autosampler must be used only in the manner described in the usage instructions. Any other use may affect the autosampler and operator safety.

HTA s.r.l. Is not responsible for damage caused, even only in part, by improper use of the autosampler, by unauthorized modification of it, by different or missing execution of the procedures described in this manual, or by the use of the autosampler violating the applicable laws and regulations.

The autosampler has been designed and tested in accordance with current safety standards.

1.2 Symbol table

Please carefully read this table before using your autosampler. These symbols are used in this manual.

	**Generic warning**
	**Attention: dangerous voltage**
	**Attention: mechanical hazard**
	**Biological risks** (if applicable for the substances used with the autosampler)
	**Hot surface**

1.3 Warning

Read the following warnings before unpacking or using the unit.

	See paragraph 1.1 “Intended use and restrictions” and be sure you have understood it.
	See EU Declaration of Compliance enclosed with the autosampler.
	Before removing the autosampler from the box, please carefully read paragraphs 3.1 “Unpacking and preliminary operations” and 3.2 “Autosampler assembly”.
	Before switching the autosampler ON check the correct voltage.
	Electrical Hazards. Every analytical instrument has specific hazards, so ensure you read and comply with the following precautions.
	Use only the power supply system supplied with the autosampler. The use of a different system could cause damage to the equipment and/or compromise safety. There are no operator-serviceable or replaceable parts inside the power supply. In case of failure, contact the Technical Assistance Centre. Violations of these directives imply the immediate invalidation of the warranty and service contract.
	The supplied power cord must be inserted into a power outlet with a protective earth contact (ground). When using an extension cord, make sure that the cord also has an earth contact.
	Do not change the external or internal grounding connections. Tampering with or disconnecting these connections could endanger you and/or damage the autosampler.
	The product is designed and tested in accordance with international safety standards.
	You do not need to make any changes to the electrical connections or to the chassis of the autosampler in order to ensure safe operation.
	Do not turn the autosampler on if you suspect that it has incurred any kind of electrical damage or if it shows visible signs of damage. If, for any reason, the safety protections were compromised or the autosampler shows visible signs of damage, disconnect the power cord and contact an HTA representative. The power cord connector is considered to be the disconnecting device of the product. Electrical damage may have occurred if the autosampler shows visible signs of damage, or has

	been transported under severe stress.
	The operator is responsible for the adequate decontamination in case of spilling of dangerous substance over or inside the autosampler. The operator is also responsible about the use of cleaning or decontamination agents. The agents shall not cause hazard due to reaction with the autosampler or other materials contained inside. If there are doubt about the use of cleaning or decontamination agents contact an HTA representative.
	With regards autosampler recycling and disposal the following operations have to be performed: switch off the autosampler and remove syringe, samples and reagents, eliminating any contamination of the instrument in accordance with national and international safety regulations.
	Damage can also result if the autosampler is stored for prolonged periods under unfavourable conditions (e.g. subjected to heat, water, etc.).
	Do not place the autosampler in a position which makes it difficult to handle the disconnecting device of the autosampler.
	Always disconnect the power cord before attempting any type of maintenance.
	Capacitors inside the autosampler may still be charged even if the autosampler is turned off.
	The autosampler includes a number of integrated circuits. These circuits may be damaged if exposed to excessive line voltage fluctuations and/or power surges.
	If, for technical reasons, it is necessary to work on autosampler parts which are only accessible using a tool, contact the Technical Assistance Centre. Violation of this directive implies the immediate invalidation of the warranty and service contract. These restrictions do not affect normal operations such as syringe installation and removal.
	Avoid contact with the autosampler while it is running.
	Do not try to open or close the sample tray manually, unless it is strictly necessary. In this case, follow the instructions of paragraph 8.16.1 “Tray opening by hand”.
	To avoid accidents, observe the rules of good laboratory practice while handling solvents, reagents and consumables. Observe the safety regulations regarding the chemicals being used, as indicated in their specific Material safety data sheets (MSDS). Carefully check the physical and chemical properties of the substances before use.

	Do not use vials without sealing caps. Vapors from volatile solvents may be hazardous and flammable. Acidic vapors may be corrosive for the mechanical parts.
	The autosampler complies with section 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.
	This autosampler has been tested and found to comply with the limits for a Class A digital device, pursuant to section 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.
	If, during the start up process or while the running the machine, you notice unusual noises or vibrations, stop the operating process and contact the Technical Assistance Centre.
 	The warning signals stuck on the turret and on the oven cover indicate the presence of moving parts, including the syringe and the fan in HT2000H/HT2000HT. Be careful to avoid bumps or cuts.
	The biohazard warnings present on the turret and on the oven cover indicates the possible presence of biological or hazardous substances. This depends on the types of substances used with the autosampler.
	The autosampler can heat the vials in the oven and the sample in the syringe up to 170°C (HT2000H), 150°C (HT2100H) and 300°C (HT2000HT). For that reason the oven and the syringe holder are labelled as hot surfaces. Be careful to avoid burns. Allow the heated syringe adapter to cool down before attempting to change or inspect the syringe. Do not touch the vials, without adequately protected hands, for at least 30 minutes after the vial is removed from the oven.
	The autosampler can heat the vials in the oven and the sample in the syringe up to 170°C (HT2000H), 150°C (HT2100H) and 300°C (HT2000HT). The autosampler is not intended to be used with a large quantity of flammable substances. Verify, according to analysis of the laboratories safety standard and safety cards of chemical substances, that substances can be used at this temperature without any risk to the operator and/or the environment.

	The HT2000H/HT2000HT oven is equipped with a fan, which is used to assist temperature stabilization and the cooling down of the oven. This fan must not be obstructed as it may affect the operation of the unit.
	The autosampler must be located in a place that provides good ventilation. Environmental temperature must be from 15°C to 35°C and relative humidity must be between 5-80% (not condensing). If these environmental conditions are not met, it may affect the performance or damage the unit.
	During headspace operation the syringe is cleaned after each injection with inert, clean gas (e.g. N2 or He). Therefore a gas supply line must be available close to the autosampler. Do not use flammable purging gases. Do not use hydrogen as a purging gas. Hydrogen creates a potential explosion hazard due to the venting of gases.
	Only for HT2000HT. Standard version syringe installed in the Standard syringe warmer assembly can not work at temperature higher than 150°C. Do not set higher temperatures. The system can be seriously damaged.

1.4 Standards Compliance

The applicable rules for this autosampler are the following:

- 2014/35/EU Low-Voltage Equipment Directive.
- 2014/30/EU Electromagnetic Compatibility Directive.
- 2011/65/EU Restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS) Directive.
- 2006/42/EC Machinery Directive

HT2000H and HT2100H have been tested to and complies with the following safety standards:

- IEC 61010-1, Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use – Part 1:General Requirements.
- IEC 61010-2-010, Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use – Part 2-010:Particular Requirements for laboratory equipment for the heating of materials.
- IEC 61010-2-081, Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use – Part 2-081:Particular Requirements for Automatic and Semiautomatic Laboratory Equipment for Analysis and Other Purpose.

In addition, HT2000H and HT2100H have been tested to and complies with IECEE CB Scheme, including USA and Canadian national deviations. In particular the following standards are covered:

- UL 61010-1.
- CSA C22.2 No. 61010-1.
- EN 61010-1.

HT2000H and HT2100H have been tested to and comply with the following Electromagnetic Compatibility (EMC) standards:

- EN 61326-1, EMC Requirements for Electrical Equipment for Measurement, Control and Laboratory Use – Part 1: General Requirements.
- FCC CFR 47 Part 15, Code of Federal Regulations, Title 47 Part 15 Radio Frequency Devices Subpart B, Unintentional radiation.

1.5 General specification

This is an autosampler for gas chromatography.
The autosampler is compatible with most Gas Chromatographs (GC).
It can be installed on GCs with both one and two injectors.In the case of GCs with two injectors, your autosampler can be configured to inject automatically into one or the other injector.
The sample vials are transported into the oven for preconditioning. The sample is heated and simultaneously shaken in order to facilitate the state change and reach the equilibrium, then a heated gas-tight syringe is moved over the incubator and the headspace sample is withdrawn. After sample injection the syringe is automatically cleaned by purging with inert gas.
The autosampler can be programmed by using the touch screen display (only for HT2000H and HT2000HT versions) or by a PC using an Ethernet or RS232C connection (optional).

1.6 Functions available only through HTA Autosampler Manager

Vial Leakage Check

HTA Autosampler Manager allows the user to enable the Vial Leakage Check (ACCESS SEQUENCE: Setup-Options).
If this option is enabled, the pressure inside vials is monitored by an heuristic procedure in order to check against anomalous values that are indicative of a vial leakage problem.
The Vial leakage test can discriminate for samples which are correctly sealed vs. bad crimping or missing septa. Each sample is marked with PASS or FAIL information in HTA Autosampler Manager windows.

Method development option

During method development it can be useful to test methods characterized by a progressive increment of a specific parameter in order to define which are the best settings for this parameter.

The parameters that can be increased in this way are the syringe/oven temperature and the incubation time.

This option is only available with “HTA Autosampler Manager”, using the “Method development” tab. For the detailed explanation of this option, please refer to “HTA Autosampler Manager” online help.

1.7 Versions

1.7.1 Description

The autosampler is available in the following versions:

HT2000H

This version is equipped with a touch screen interface.

It has a moving tray with 42 vial positions.

It has a 6 position oven (incubation temperature up to 170°C) equipped with an orbital shaker

HT2100H

This version is equipped with a keypad.

It has a fixed tray with 14 vial positions.

It has 1 position oven (incubation temperature up to 150°C) with a sussultatory shaker.

Require a PC for set up, service, method and sequence editing.

HT2000HT

This version is equipped with a touch screen interface.

It has a moving tray with 42 vial positions.

It has a 3 position oven (incubation temperature up to 300°C) equipped with an orbital shaker.

1.7.2 Options

Available for all versions:

1.90.501 - HTA Autosampler Manager (Standard Version)

PC software. This may be sold as an option. Please check with your service representative.

1.90.502 - HTA Autosampler Manager (CFR 21 Part 11)

PC software compliant with CFR 21 Part 11 regulation. This may be sold as an option. Please check with your service representative.

1.91.295 - System integrity kit

The System integrity kit is sold as an option. The System integrity test is used to verify the syringe integrity. This test can easily be executed at the beginning of each batch in a very convenient way.

This functionality is made in a heuristic approach (for detailed description of this function see paragraph 11 “Appendix A – Glossary”).
The following accessories can be supplied upon request:

HTA Part Number	Description
3.23.000	External Pressure Regulator
1.93.822	Swagelok adapter for HT2x00x serie
1.93.820	Spacers kit for 10ml vial (6pc/pk) (only for HT2000H)
1.93.821	Spacers kit for 10ml vial (15pc/pk) (only for HT2100H)
1.93.828	Spacers kit for 6ml vial (6pc/pk) (only for HT2000H)
1.91.280	Syringe kit 1ml for Headspace autosampler
3.20.010	Syringe kit 5ml for Headspace autosampler
1.91.330	Syringe Warmer High Temperature (Assembly) for HT2000HT
1.93.824	System integrity kit (Headspace)
C00028	Manual Crimper for 20mm Caps
C00029	Manual De-Crimper for 20mm Caps

1.8 Technical Specifications

DIMENSIONS

HT2000H/HT2000HT

Height	640mm
Width (closed oven cover)	330mm

Width (open oven cover)	350mm
Depth (closed tray)	320mm
Depth (open tray)	520mm

HT2100H

Height	640mm
Width	280mm
Depth	320mm

WEIGHT

HT2000H/HT2000HT	10kg
HT2100H	8kg

ELECTRICAL SPECIFICATIONS

Power supply:

Voltage	100-240 ±10%Vac
Frequency	50-60Hz
Max Current	1.6 A (HT2000H/HT2000HT); 1.4-0.7 (HT2100H)

Autosampler HT2000H/HT2000HT:

Voltage	24Vdc
Power	120W

Autosampler HT2100H:

Voltage	24Vdc
Power	60W

INTERFACE SPECIFICATIONS

To GC	TTL
To PC	Ethernet 10/100 Optional: RS232C (available on a limited number of models)

Ethernet cable should be Category 5 (or higher)

RS232 cable: max distance PC – autosampler: 1.80m (opt. 3.50m)

ADDITIONAL REQUIREMENTS (for HT2100H only)

HT2100H requires a PC for set up, service, method and sequence editing

ENVIRONMENT CONDITIONS

Room temperature limits	15°C - 35°C
Ambient humidity limits	5% - 80% (not-condensable)
Maximum altitude	2000m

SOUND PRESSURE LEVEL

Maximum measured level	60dBA (below the limits of 85dBA defined by the regulations in force)

SAFETY INFORMATION

The autosampler is classified as shown below:

Pollution degree	2
Overvoltage category	II
Devices for use indoors	

TRAY AND SYRINGE FEATURES

Tray capacity	42 vial positions (HT2000H and HT2000HT) 14 vial positions (HT2100H)
Syringe volume	1-2.5-5ml
Maximum pressure in the injector (2.5ml syringe)	5 bar

ANALYTICAL PARAMETERS

Conditioning

HT2000H

Oven positions	6
Oven Temperature	off, from 40°C1 to 170°C
Incubation time	from 0 to 999min step 1min
Shaking method	orbital
Shaker speed	from very low to very high
Shaking cycles	on/off, from 0 to 9.9min

HT2100H

Oven positions	1
Oven Temperature	off, from 40°C2 to 150°C
Incubation time	from 0 to 999min step 1min

Shaking method	sussultatory
Shaker speed	from very low to very high
Shaking cycles	on/off, from 0 to 9.9min
HT2000HT	
Oven positions	3
Oven Temperature	off, from 40°C3 to 300°C
Incubation time	from 0 to 999min step 1min
Shaking method	orbital
Shaker speed	from very low to very high
Shaking cycles	on/off, from 0 to 9.9min
Sampling	
Syringe Temperature	off, from 40°C to 150°C (standard version syringe) or 250°C (HT version syringe installed on HT2000HT)
Sample volume	0.01ml stepwise
Pull Up Strokes	up to 15 strokes
Sample speed	from 0.1 to 100ml/min (40ml/min for 1ml syringe)
Injection	
Injection speed	from 0.5 to 100ml/min (40ml/min for 1ml syringe)
Pre/Post injection dwell time	from 0 to 99s
Enrichment cycles	up to 15
Dwell time between enrichment cycle	from 0 to 100min
Syringe purge	
Flush time	from 0 to 99min
Purge temperature	off, from 40°C to 150°C (standard version syringe) or 250°C (HT version syringe installed on HT2000HT)

1.9 PC software requirements (HTA Autosampler Manager)

See HTA Autosampler Manager Online Help for the related PC specifications.

2 Equipment Description

2.1 Parts Definition

2.1.1 HT2000H/HT2000HT Overview

2.1.1.1 HT2000H/HT2000HT Main parts

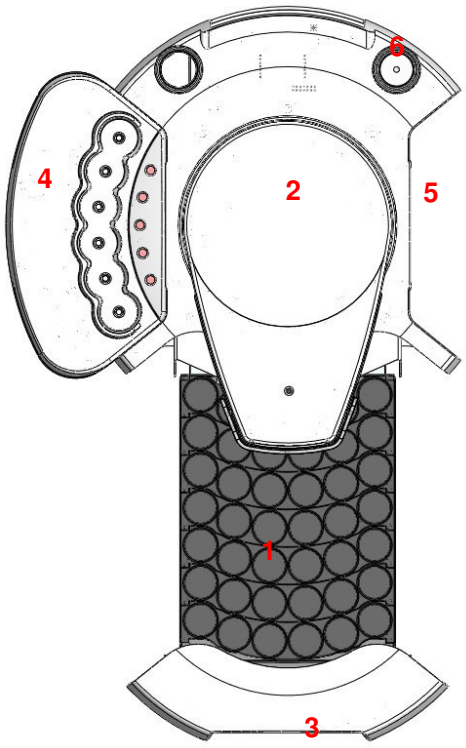


Figure 1: HT2000H/HT2000HT (tray open) top view

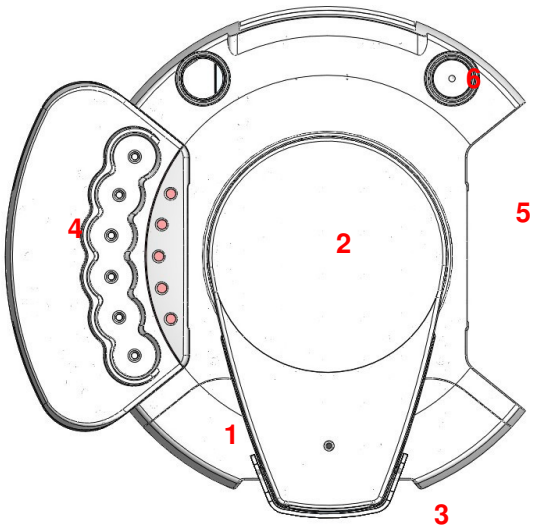


Figure 2: HT2000H/HT2000HT (tray closed) top view

1 **MOVING TRAY** (1 rack with 42 sample positions)

2 **TURRET**: holds the syringe

3 **TOUCH SCREEN DISPLAY**

4 **INCUBATION OVEN/SHAKER**: where samples are heated.

The incubation oven/shaker may also be located on the left or right side of the autosampler, depending on how the autosampler is configured. Left/Right side configuration is factory set.

5 **INJECTION AREA**: region where an injection can be made.

The injection area may also be located on the left or right side of the autosampler.

6 SYSTEM INTEGRITY TOOL AREA: only if the System integrity kit option has been supplied (see paragraph 1.7.2 “Options”.)

2.1.1.2 HT2000H/HT2000HT Sample rack

HT2000H/HT2000HT standard version uses a 42-position rack.

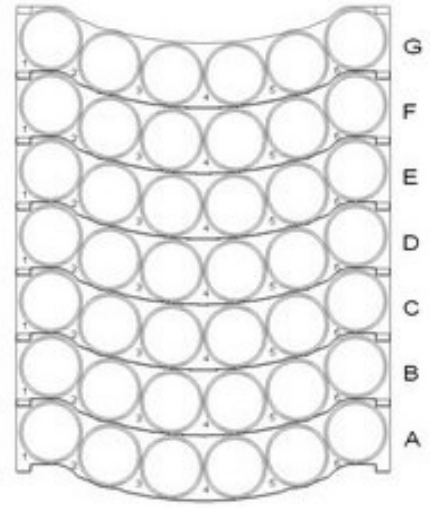


Figure 3: HT2000H/HT2000HT 42 position rack

Each vial is identified with two digits (a letter and a number):

A.	6
Letter (row)	Number (column)

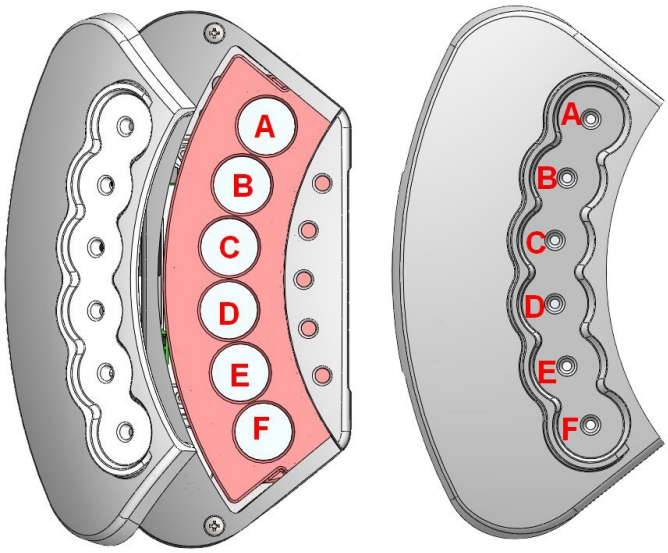
The letters (from A to G) indicate the rows, while the numbers indicate the columns (from 1 to 6).

2.1.1.3 HT2000H Incubation oven

On the side of the autosampler there is an incubation oven with 6 heated vial positions.

The oven is equipped with a fan, which is used to assist temperature stabilization and the cooling down of the oven.

Left configuration



Right configuration

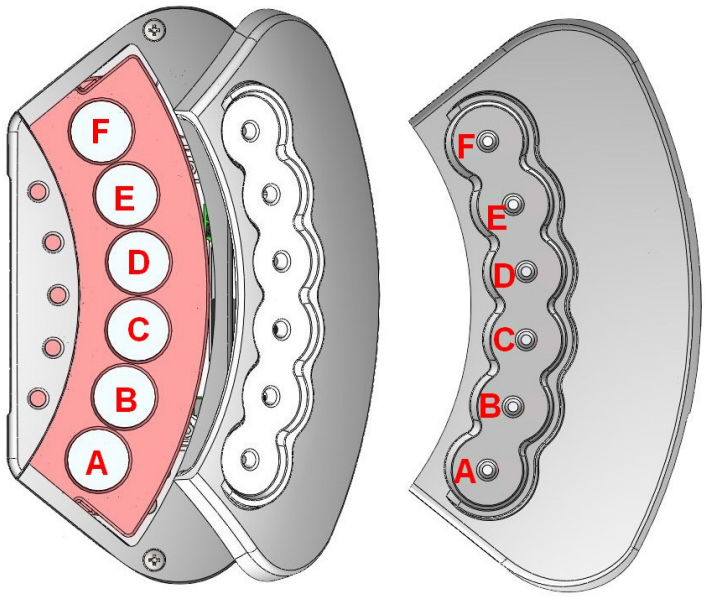


Figure 4: HT2000H Incubation oven

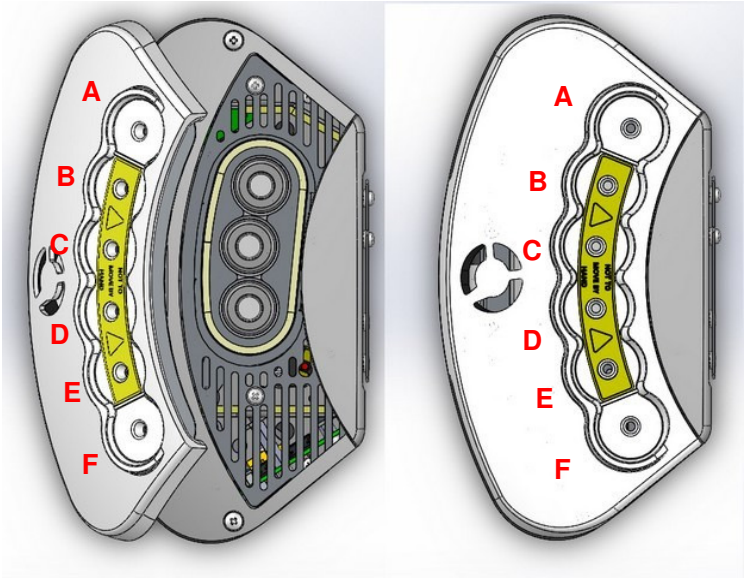
The oven positions are labelled A-F. In the left figure, the oven is shown open, while in the right figure it is shown closed.

2.1.1.4 HT2000HT Incubation oven

On the side of the autosampler there is an incubation oven with 3 heated vial positions.

The oven is equipped with a fan, which is used to assist temperature stabilization and the cooling down of the oven.

Left configuration



Right configuration

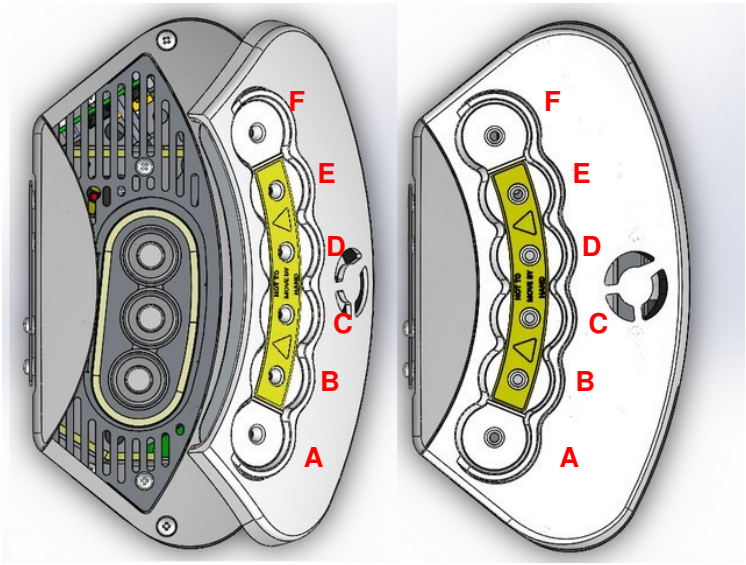


Figure 5: HT2000HT Incubation oven

The oven positions are labelled A-F, but only position B-C-D are used (3 positions). In the left figure, the oven is shown open, while in the right figure it is shown closed.

2.1.1.5 HT2000H /HT2000HT Autosampler base

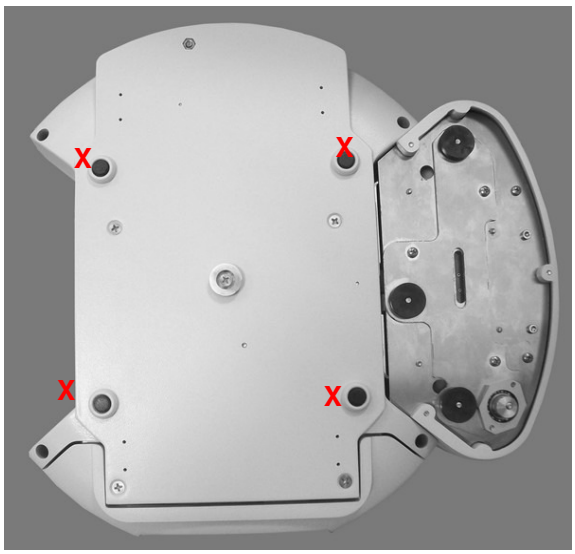


Figure 6: Left location for incubation oven (bottom view)

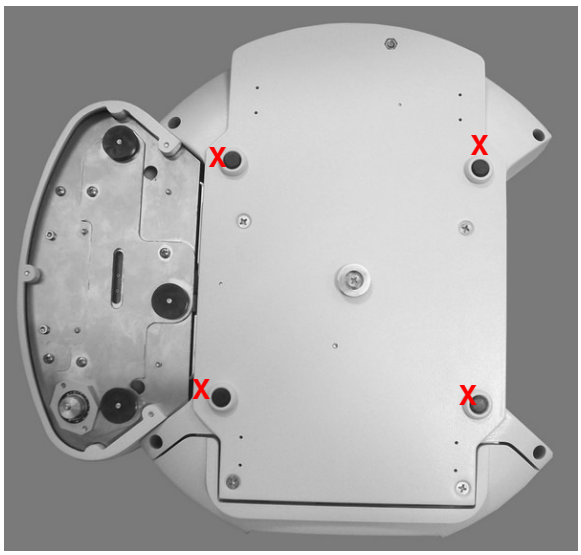


Figure 7: Right location for incubation oven (bottom view)

“X” marks the rubber feet, these are important for the installation procedure (see paragraph 3.3.1 “Autosampler installation on the mounting plate“).

2.1.1.6 HT2000H/HT2000HT Control panel: touch screen display

The touch screen display is on the front of the unit.

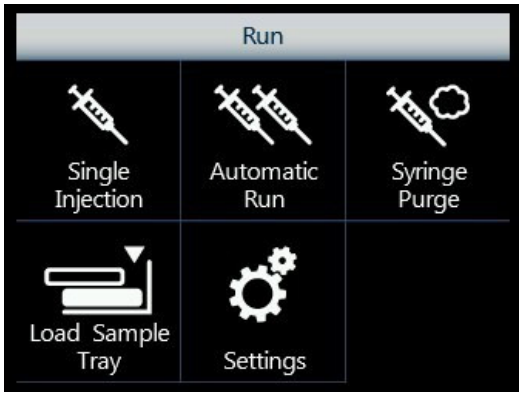


Figure 8: Touch screen display

The HT2000H/HT2000HT has a colour LCD display with touch control. The touch screen display can be used to edit the method, sample list or set up as well as running the samples.

For further information on the HT2000H/HT2000HT touch screen display please refer to paragraph 2.4 “Touch screen display description (HT2000H/HT2000HT)”.

2.1.2 HT2100H Overview

2.1.2.1 HT2100 Main parts

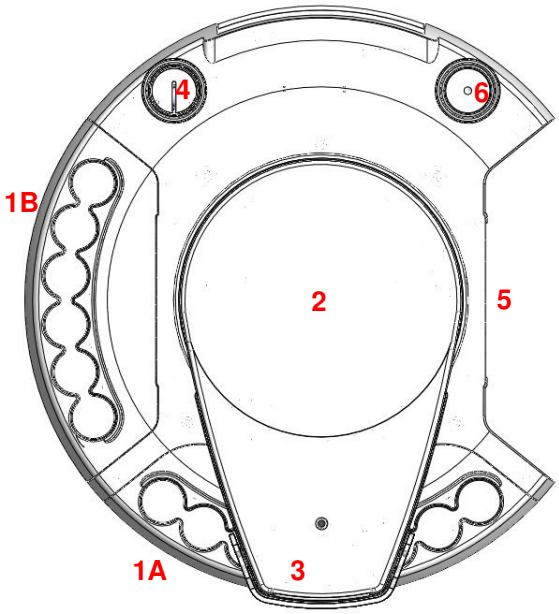


Figure 9: HT2100H top view

1 **DOUBLE FIXED RACK**: rack 1A with 8 positions and rack 1B with 6 positions (total 14 sample positions).

The 1B rack may be located on the left or right side of the autosampler, depending on how the autosampler is configured. Left/Right side configuration is factory set.

2 **TURRET**: holds the syringe

2 **KEYPAD**

3 **INCUBATION OVEN/SHAKER**: where one sample is heated

5 **INJECTION AREA**: region where an injection can be made

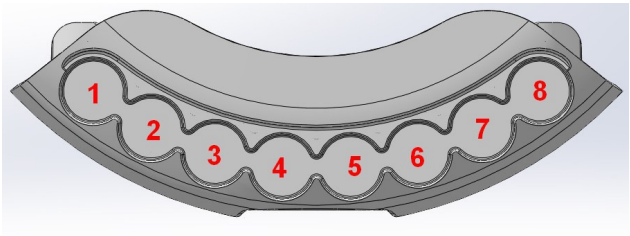
The injection area may also be located on the left or right side of the autosampler.

6 **SYSTEM INTEGRITY TEST EXECUTION AREA**: only if the System integrity kit option has been supplied (see paragraph 1.7.2 “Options”.)

2.1.2.2 HT2100H Sample rack

HT2100H uses a 14-position double fixed rack.

rack 1A



Rack 1B (left configuration) **Rack 1B (right configuration)**

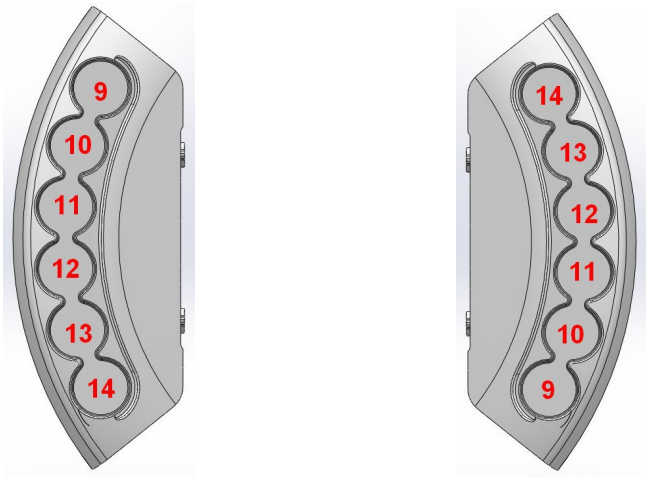


Figure 10: HT2100H 14 positions double fixed rack

Each vial is identified by a number (from 1 to 14). In block 1A (on the front of the autosampler) vial positions are numbered from 1 to 8, in block 1B (on the left or right side of the autosampler, depending on the factory configuration) vial positions are numbered from 9 to 14.

2.1.2.3 HT2100H Incubation oven

On the back of the autosampler there is the incubation oven, with 1 heated vial positions.

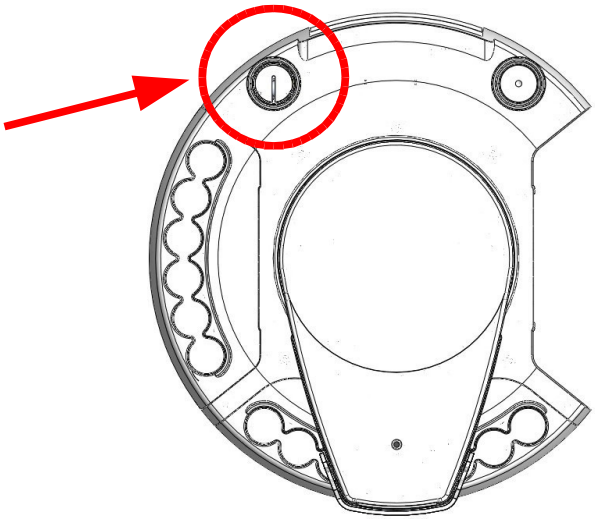


Figure 11: HT2100H Incubation oven

2.1.2.4 HT2100H Autosampler base

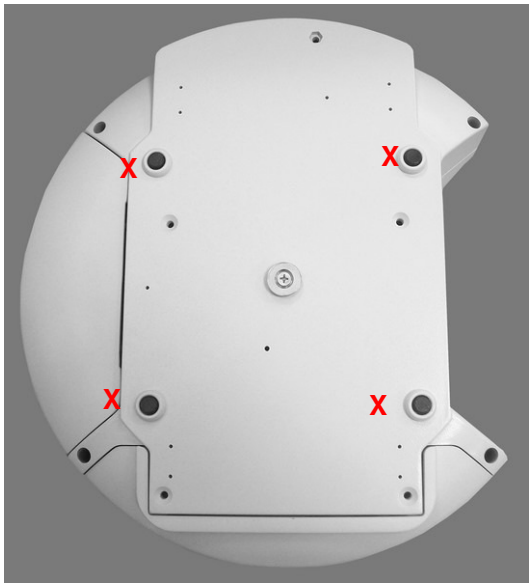


Figure 12: Right location for rack 1B (bottom view)

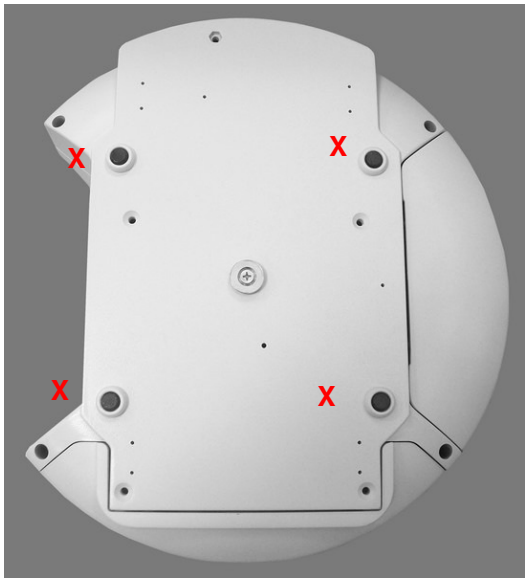


Figure 13: Left location for rack 1B (bottom view)

“X” marks the rubber feet, these are important for the installation procedure (see paragraph 3.3.1.1 “Unlock the autosampler from the mounting kit”).

2.1.2.5 HT2100H Control panel: keypad

In the front of HT2100H there is the keypad.

Figure 14: Keypad (HT2100H)

The HT2100H uses a keypad with 4 keys (Move, Start, Wash, Stop) and 4 status LEDs (Err, Ready, Setup, Run). This keypad is used for sample execution and basic maintenance/setup tasks. The method, sample list and set up editing is performed exclusively by a PC. For further information on the HT2100H keypad, please refer to chapter 6 “HT2100H operations”.

2.1.3 Syringe location

The syringe is located in the turret. To access the syringe, push up the sliding lid (red arrow in the figure below).

Figure 15: Sliding lid down

Figure 16: Sliding lid up

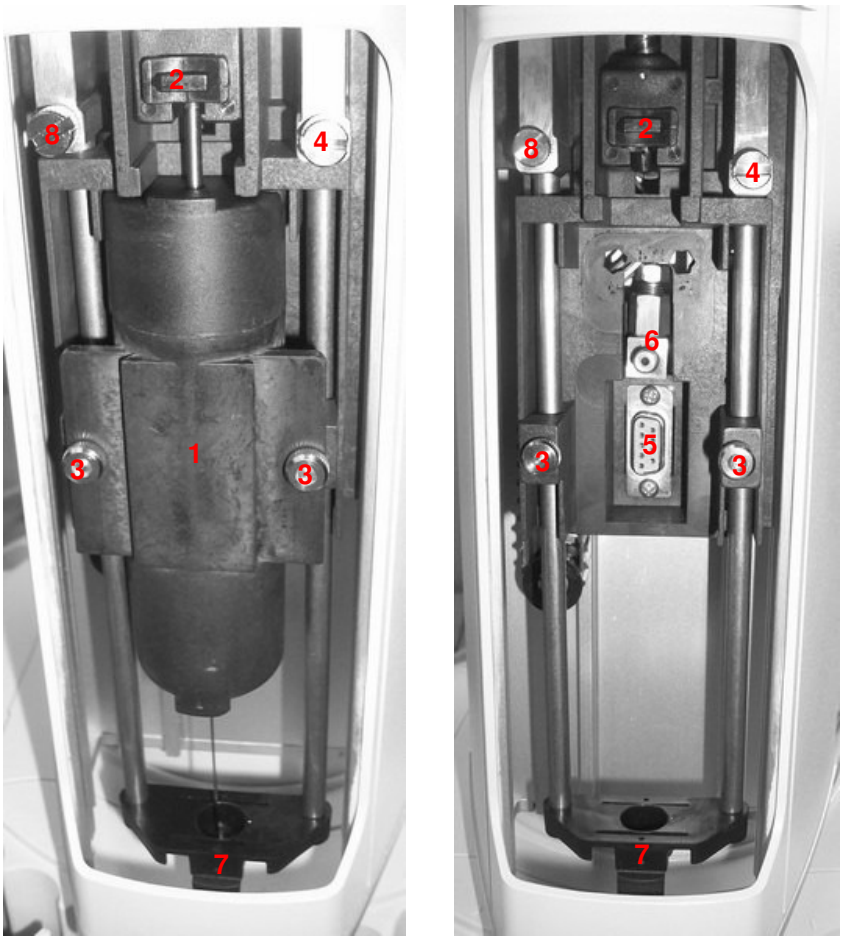


Figure 17: Syringe location

The syringe location contains the following parts:

1. Syringe warmer assembly: installed (left), not installed (right)
2. Plunger holder with plunger locker
3. Retaining nuts
4. Needle height regulator (right block)
5. Syringe connection socket
6. Flushing gas inlet
7. Vial locator
8. Safety lock (left block)

The syringe warmer assembly and the vial locator are shown in detail in the figures below:

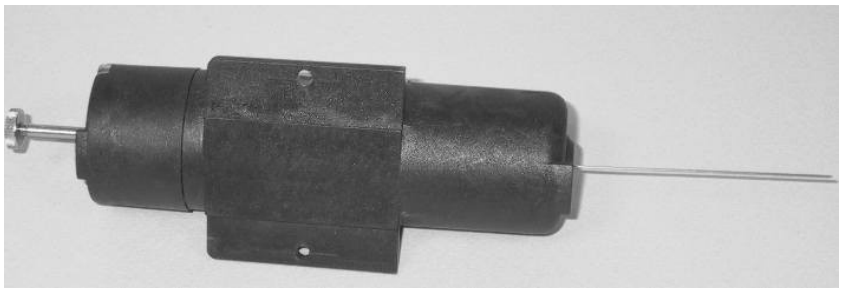


Figure 18: Syringe warmer assembly

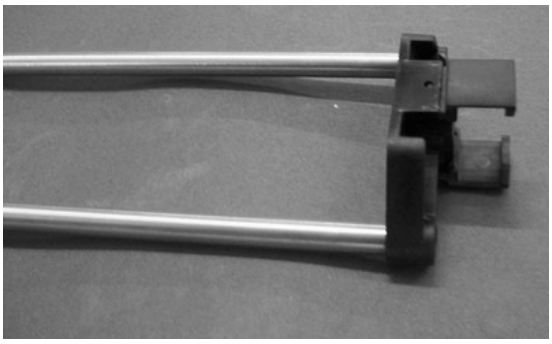


Figure 19: Vial locator

The **Plunger Locker** has two different faces in order to locate different kinds of syringe pistons. These faces are indicated as “S side” and “B side”. When “S side” is required, please have “S side” facing down; when “B side” is required, please have “B side” facing down.
For the HT2000H and HT2100H, side B must be faced downward.

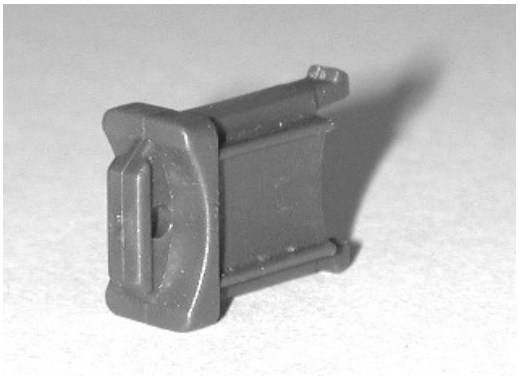


Figure 20: “S” side of the plunger locker

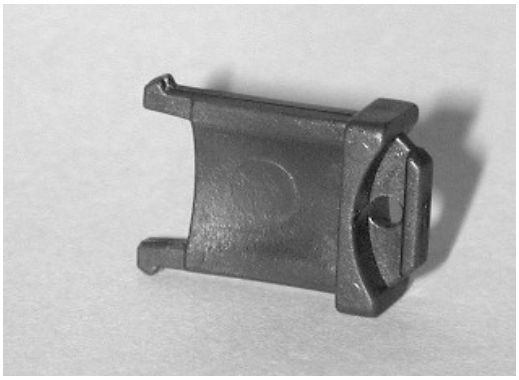


Figure 21: “B” side of the syringe locker

2.1.4 Connection panel

On the rear of the autosampler there is the connection panel:

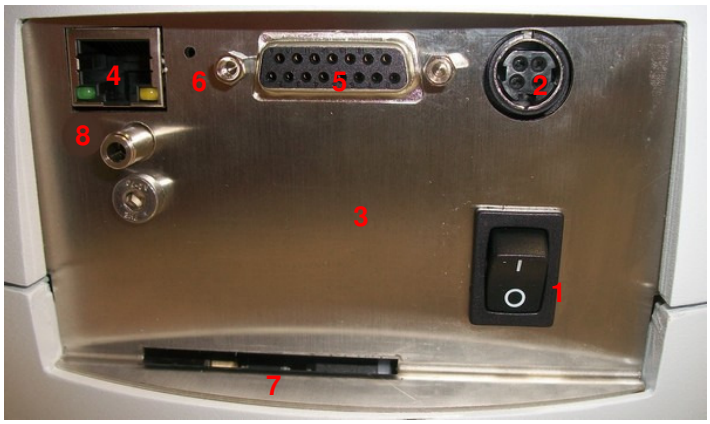


Figure 22: Connection panel

1	**I/O**:	ON/OFF Power switch
2	**Power cable socket:**	low voltage power connection (external power supply) - +
3	**RS232C connector:**	for remote control (serial connection, optional, not present in this picture)
4	**RJ45 10/100 auto-sensing connector:**	for remote control (Ethernet connection, standard)
5	**GC connector:**	for other devices (GC, analyzer....)
6	**Service Ethernet reset:**	reserved for Service Representative
7	**Service Emergency release:**	reserved for Service Representative
8	**Gas connection for syringe purge:**	inlet 1/8”

For further information on this purge line connection please refer to paragraph 3.3.4 “Purge line connections”.

Warning

Use only the power supply system supplied with the autosampler. The use of different system could cause damage to the equipment and/or compromise safety.

The autosampler is powered by an external power supply, as shown in the figure below:

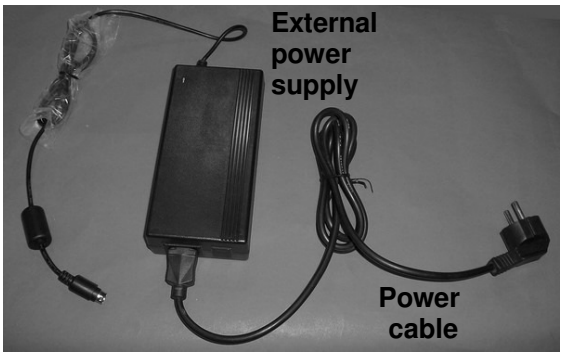


Figure 23: External power supply

This external power supply has to be connected to socket number 2 in ***Figure 22***.

2.2 Moving parts

These are the moving parts of the autosampler:

- The **turret** can rotate 320°.
- The **needle location** can move vertically by a maximum of 303mm.
- The **plunger** can move by a maximum of 65mm inside the syringe.
- The moving **sample tray** can be opened/closed (220mm of movement) (in the HT2100H version it is fixed).
- The oven cover for HT2000H/HT2000HT (identified as **cover**) can rotate 35°(open/close position);
- The **elevator** for HT2100H can move vertically by a maximum of about 24mm (open/close position).
- The **shaker** (orbital shaker for HT2000H/HT2000HT and sussultatory shaker for HT2100H) allows vial(s) agitation with a programmable speed.
- The **fan** (not present in the HT2100H version) is used to assist temperature stabilization and the cooling down of the oven.

The movements are made with DC motors, with position control made by encoders.

Warning

Do not try to open or close the sample tray manually, unless it is strictly necessary. In this case, follow the instructions of paragraph 8.16.1 “Tray opening by hand”.

Warning

If necessary, it is possible to move the turret and needle motors by hand, very carefully, but **only when the autosampler is switched off**. Rapid movements or movements with the autosampler switched on can damage the autosampler.

2.3 Tool kit

The autosampler is provided with a tool kit containing:

1. Syringe pointer that may be used for the syringe installation (see paragraph 4.2.2 “Setup: Syringe warmer assembly installation”) and for locking/unlocking the autosampler from the mounting kit (see paragraphs 3.3.1 “Autosampler installation on the mounting plate” and 3.3.1.1 “Unlock the autosampler from the mounting kit”).

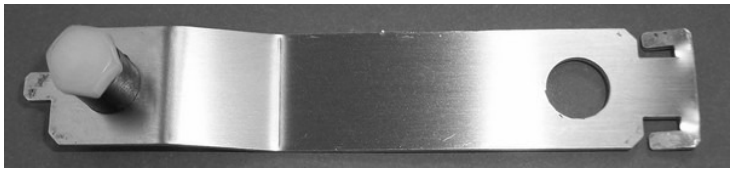


Figure 24: Syringe pointer

2. Allen key (2.5mm) that it is used for syringe replacement (see paragraph 9.1.5 “Syringe replacement in the syringe warmer assembly”):

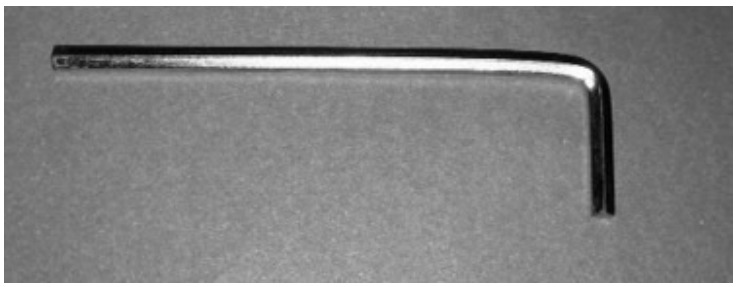


Figure 25: Allen key

With some accessories (spacers kit) these tools are provided:

1. Tweezers type 1 used to extract the relative spacer:

Figure 26: Tweezer_type 1

2. Tweezers type 2 used to extract the relative spacer:

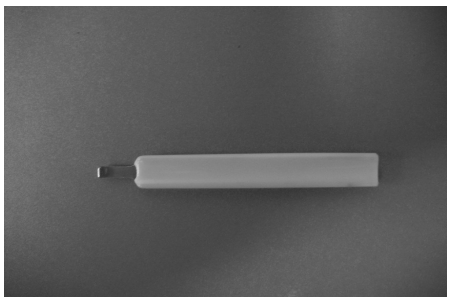


Figure 27: Tweezer_type 2

2.4 Touch screen display description (HT2000H/HT2000HT)

2.4.1 Touchscreen use

HT2000H/HT2000HT uses touchscreen displays. These can be controlled using your finger tip or with a dedicated stylus.

Only use a stylus approved by HTA as using any other stylus (or a pen or pencil), may scratch and damage the touchscreen.

The touch screen recognizes the following actions:

- **single tap:** gently press the area of interest to select a menu option or press any button area.
- **prolonged tap:** gently keep the area of interest pressed for short time. It is used with the increase/decrease buttons to increase/decrease the selected value faster.

In all the screens:

- the areas that can be tapped have a black background (tapping the other areas of the screen will have no effect);

- the enabled buttons use a white font and the disabled buttons use grey font; a button could be disabled because the associated action is not allowed or because other actions must be completed first;
- when a button has been tapped, the background becomes blue for a while.

2.4.2 Screen templates

The screens can be grouped according to type. These are:

2.4.2.1 Screen type 1: Screen saver

Screen type 1:

Figure 28: Screen type 1

See paragraph 3.4 “Start-Up”.

2.4.2.2 Screen type 2: Menu

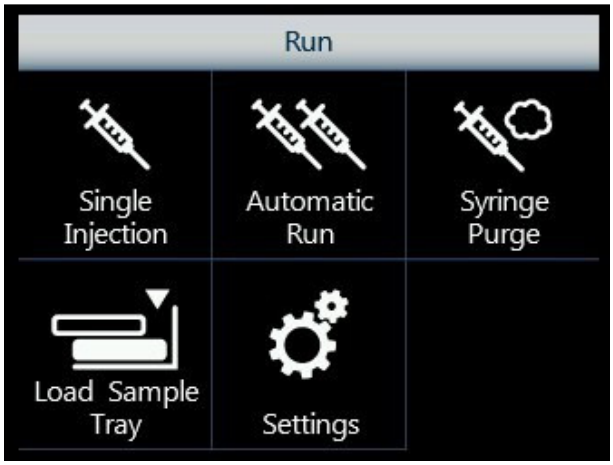


Figure 29: Screen type 2_example A

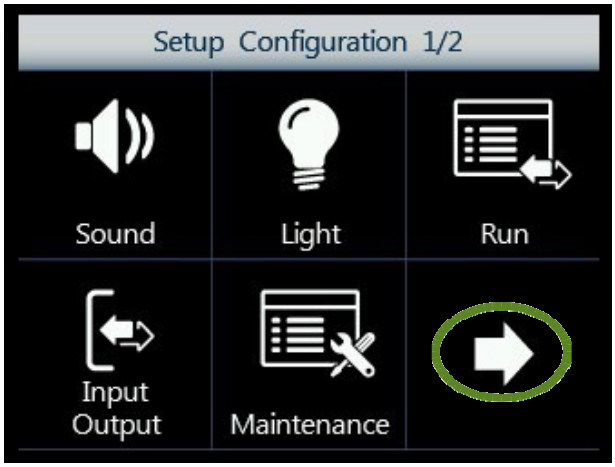


Figure 30: Screen type 2_example B

In this menu, there are up to 6 buttons available. Tap one of the buttons to enter the respective menu/sub menu/function.

Special icons:

- ARROW (see example B, green circle). If more than 6 buttons are available, an ARROW icon is displayed, press this to access the additional buttons..
- EXIT: exits from the current menu.

2.4.2.3 Screen type 3: Parameter display and selection

Screen type 3:

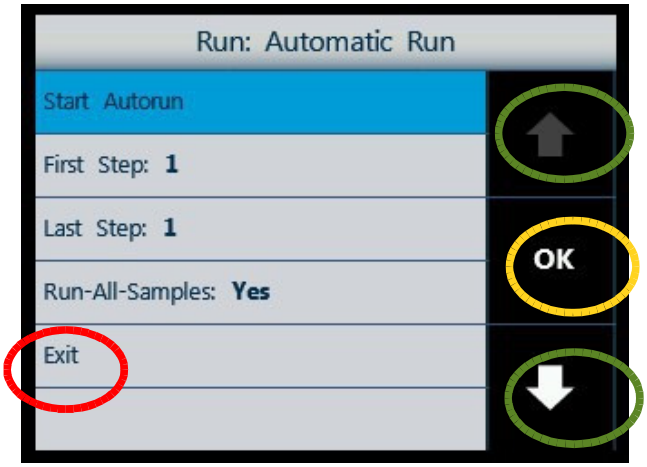


Figure 31: Screen type 3_example A

Use the arrows on the right (green circles) to move between the different option/parameters.

Tap “OK” (yellow circle) to access the selected option/parameter for editing. The selected parameter/option is highlighted with a blue background.

Select “EXIT” (red circle) to exit from this screen. “EXIT” is always the last option on the list; if the list includes a large number of items you may be required to press the “DOWN arrow” several times to reach the “EXIT” option.

2.4.2.4 Screen type 4: Parameter editing

Screen type 4:

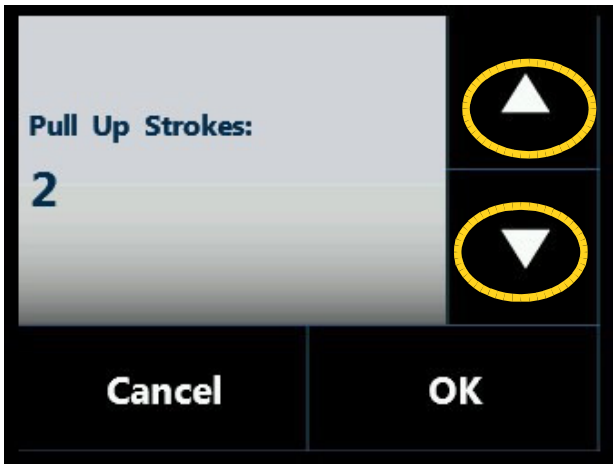


Figure 32: Screen type 4

This screen type is used for parameter editing.

Use the arrows on the right (yellow circles) to change the value of the parameter.

Tap “OK” or “SAVE” (not present in this particular example) to confirm the modification, otherwise “CANCEL” .

2.4.2.5 Screen type 5: Pop-up Message

Screen type 5:

Figure 33: Screen type 5_example A

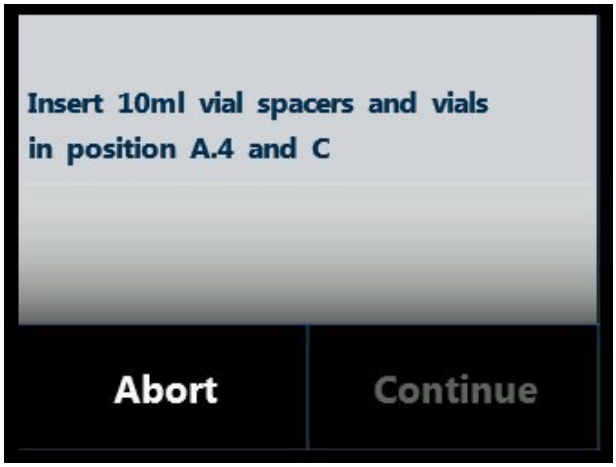


Figure 34: Screen type 5_example B

The grey area shows a notification/confirmation message. The lower part of the screen shows the action buttons.

These include:

- “SAVE” to store the editing,
- “CANCEL” to exit without saving,

- “CONTINUE” to confirm,
- “STOP” or “ABORT” to interrupt the procedure
- etc...

Tap the relevant command to perform the task.

2.4.2.6 Screen type 6: Status Information

Screen type 6

Figure 35: Screen type 6_example A

Figure 36: Screen type 6_example B

This screen type describes the status of the autosampler when it is running (injection or wash). The buttons in the lower part of the screen can show:

- “STOP” to stop the running operation;
- “MENU” to access additional options.

2.4.3 Limited Warranty

Due to technology constrains, the touch screen display may have a minor defect. A minor defect refers to a defect which is not considered to be able to substantially degrade the product application or a defect that deviates from existing standards almost unrelated to the effective use of the product or its operation, such as black spot, white spot, bright spot, pinhole, black line, white line, contrast variation, glass defect, polarizer defect, etc.. The minor defects do not give right to repair or part substitution under warranty, unless the number of minor defects substantially degrades the product application.

3 Installation

Warning

The autosampler must be located in a place that provides good ventilation.

The HT2000H/HT2000HT oven is equipped with a fan, which is used to assist temperature stabilization and the cooling down of the oven.

This fan must not be obstructed as it may affect the operation of the unit.

Environmental temperature must be from 15°C to 35°C and relative humidity must be between 5-80% (not condensing). If these environmental conditions are not met, it may affect the performance or damage the unit.

3.1 Unpacking and preliminary operations

Take care when unpacking the unit.

Check the integrity of the box before opening it to ensure it is not damaged. If it is, please inform your local dealer before unpacking the autosampler from the box.

When the autosampler has been unpacked, check the autosampler itself and the accessories provided (*compare these with the packing list enclosed*).

Ensure that everything listed in the packing list is in the box. If not, please advise your dealer.

Warning

Do not switch the autosampler on before it is correctly mounted on the bracket (see paragraph 3.3.1 “Autosampler installation on the mounting plate” to avoid the risk of overturning.

3.2 Autosampler assembly

1. Open the box.

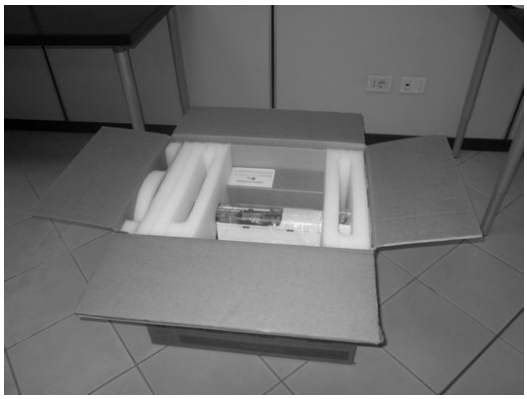
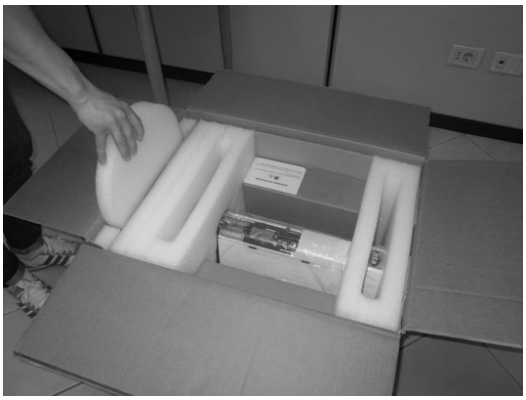


Figure 37: Open the box

2. Remove the protective cushions.



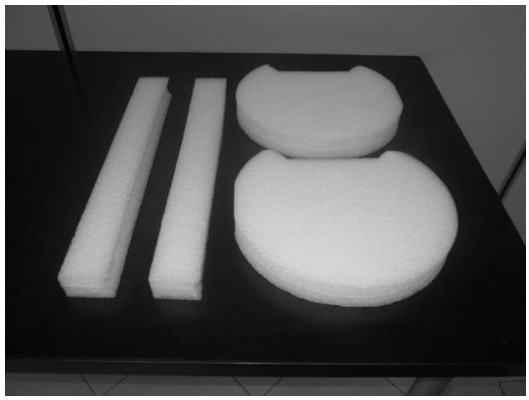


Figure 38: Remove the cushions

3. Extract the autosampler from the box and place it on a flat surface in a vertical position.

Figure 39: Extract the autosampler from the box

Figure 40: Place the autosampler on a flat surface

4. Cut the adhesive tape to open the packaging.

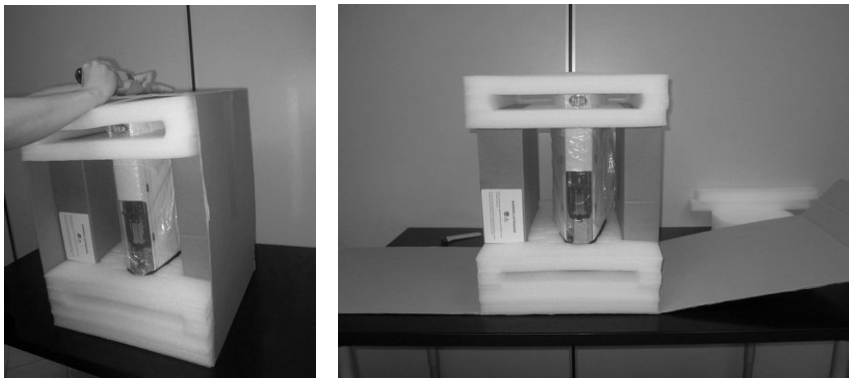


Figure 41: Cut the adhesive tape

5. Remove the upper protective cushions.

Figure 42: Remove the upper cushions

6. Remove the accessory boxes and extract the included accessories.

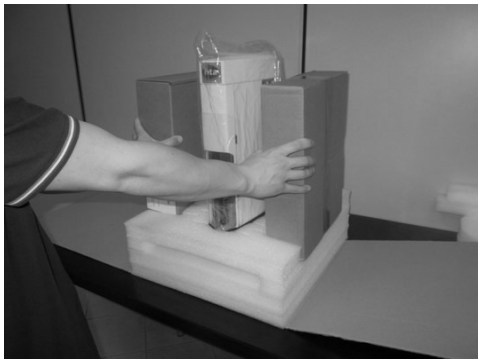


Figure 43: Remove the accessory boxes

7. Remove the lower protective cushions.

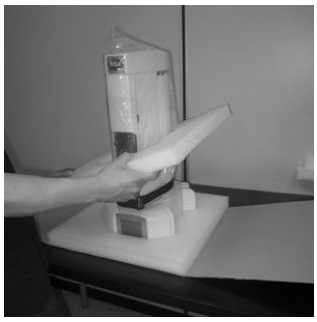


Figure 44: Remove the cushions

8. Check the product sheet to verify that the autosampler configuration (left or right) is consistent with your GC (see paragraphs 2.1.1.5 “HT2000H /HT2000HT Autosampler base” and 2.1.2.4 “HT2100H Autosampler base”). If the configuration of the autosampler is not correct with respect to your GC specification, please contact your local supplier.
9. Remove the protection belt and polythene bag from the tower.

Figure 45: Remove the protection belt

Figure 46: Remove the polythene bag

10. Remove the tower protection.

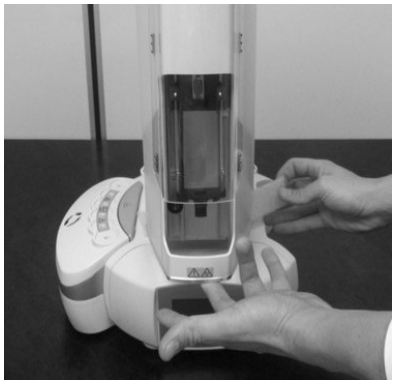


Figure 47: Remove the tower protection

3.2.1 How to lift and carry the autosampler

Warning

Before lifting and moving the autosampler it is necessary to remove all of the removable elements:

- HT2100H: sample vials;
- HT2000H/HT2000HT: sample vials and sample rack.

The autosampler must be lifted and carried by hand as shown in the following figure:

Figure 48: How to lift and carry the autosampler

3.3 Installation

Please read this chapter before using the autosampler . To install the autosampler follow the instructions below.

HT2000H/HT2000HT installation operations should be performed using the touch screen display.
HT2100H installation operations should be performed only by using a PC, through the software "HTA Autosampler Manager"; this has the same screens described below for the HT2000H/HT2000HT.

1. Install the autosampler on the mounting plate (see paragraph 3.3.1 "Autosampler installation on the mounting plate").
2. Move the safety lock from the shipping position to the operating position (see paragraph 3.3.2 "Safety Lock setting");
3. Connect cables (see paragraph 3.3.3 "Electrical connections").
4. Connect purge line (see paragraph 3.3.4 "Purge line connections");
5. Switch on the autosampler (see paragraph 3.4 "Start-Up");
6. Install PC software (see paragraph 3.5 "PC connection and software installation") (This operation is mandatory for HT2100H, and optional for HT2000H/HT2000HT).
7. Install the syringe (see paragraph 4.2.2 "Setup: Syringe warmer assembly installation").
8. Select the analyzer (see paragraph 4.2.1.1 "Alignment: Analyzer Default").
9. Align the autosampler on the GC Injector(s) (see paragraphs 4.2.1.2 "Alignment: Front Injector" and 4.2.1.3 "Alignment: Rear Injector").
10. **For HT2000H/HT2000HT only**. Install the sample rack(s) (see paragraph 7.6.1 "Change tray/rack type").
11. Perform the touch and plunger zero procedure (see paragraph 4.2.1.4 "Alignment: Touch Plunger Zero").
12. Finish the installation (see paragraph 3.9 "Basic training").

3.3.1 Autosampler installation on the mounting plate

Warning

Follow the instructions **with the autosampler switched off.** Moving the unit with the autosampler switched ON can cause serious damage to the autosampler.

Please follow these instructions in the following order:

1. Ensure that the autosampler mounting plate is correctly installed on the analyzer and that it allows the correct centering of the autosampler over the injector. The instructions for mounting plate installation are not available in this manual (for this information see the service documentation). The mounting plate is specific for the GC brand and model. The following figure shows an example:

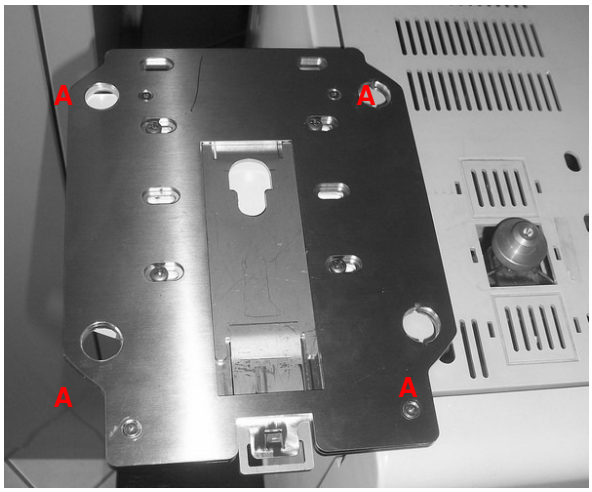
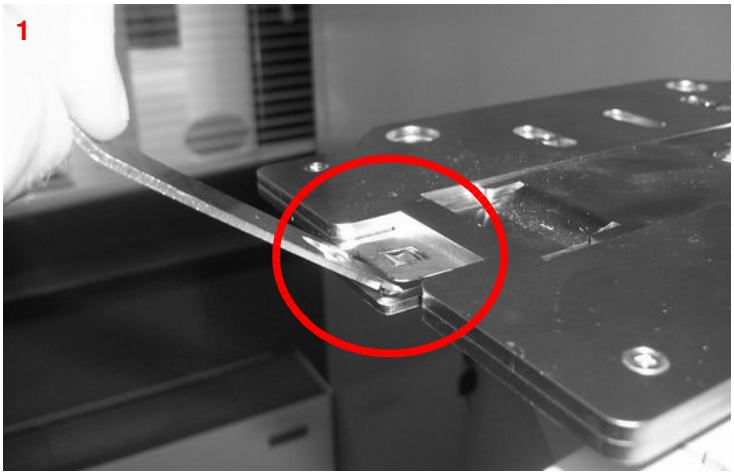


Figure 49: Example of a mounting plate correctly mounted on a GC

2. Open the mounting plate locker, pulling it out using the syringe pointer shown in the Figure 24. The opening procedure is shown in the figures below.



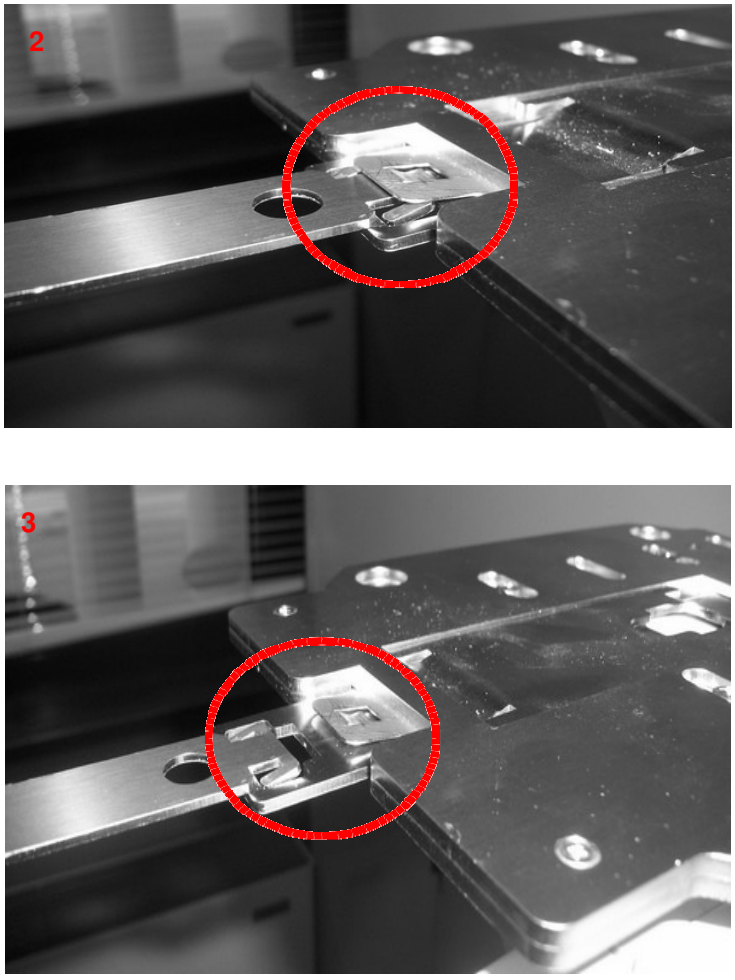


Figure 50: Mounting plate locker opening (example)

3. Place the autosampler over the mounting plate, ensuring that the four rubber feet of the autosampler (indicated with “X” in ***Figure 6*** and ***Figure 7***) fit the four plate holes indicated with the letter A in Figure 49:

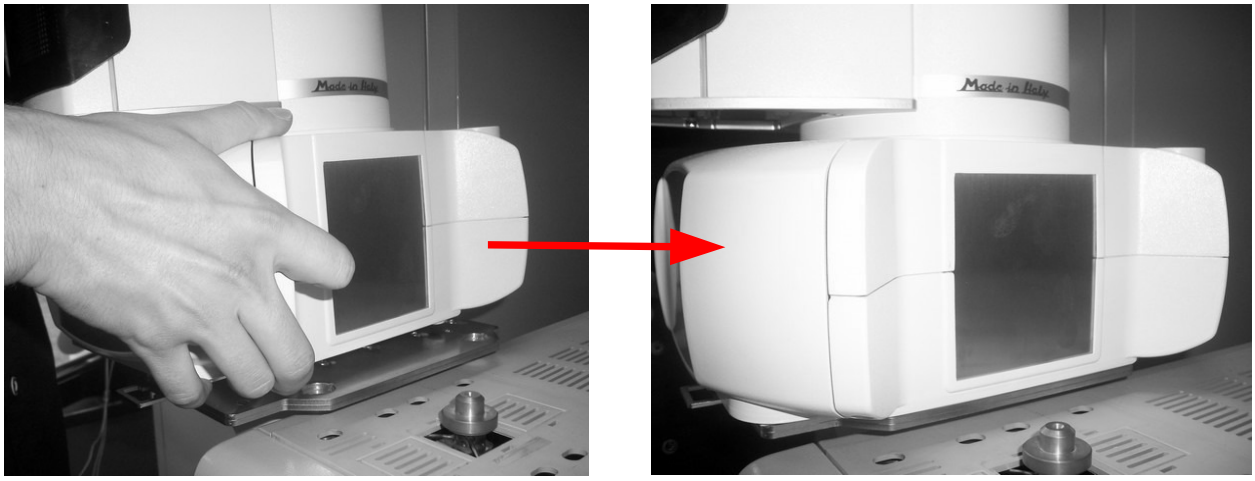


Figure 51: Autosampler mounting over the mounting plate

4. Fix the autosampler on the plate, closing the locker and pulling it in.

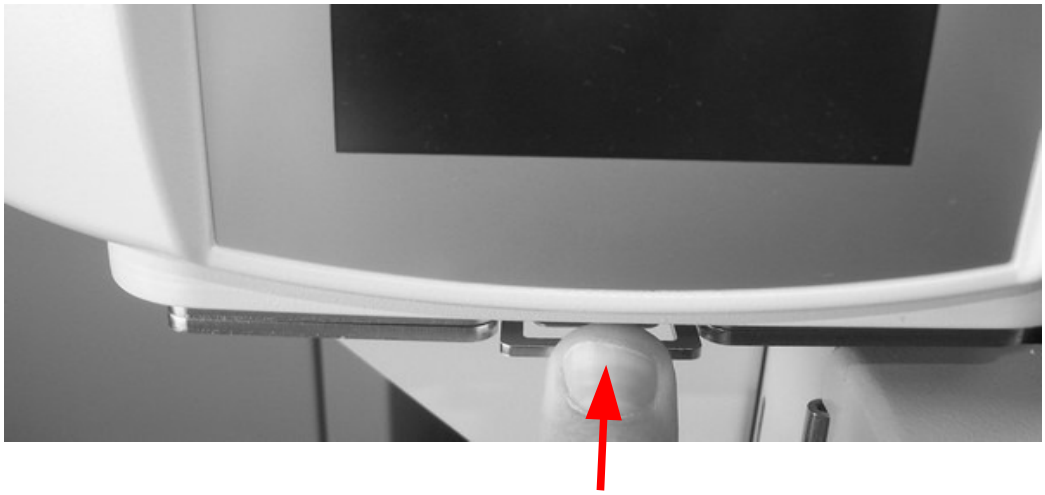


Figure 52: Mounting plate locker closing

3.3.1.1 Unlock the autosampler from the mounting kit

1. Open the mounting plate locker, pulling it out using the syringe pointer shown in ***Figure 24***.

   The opening procedure is shown in the figure below.

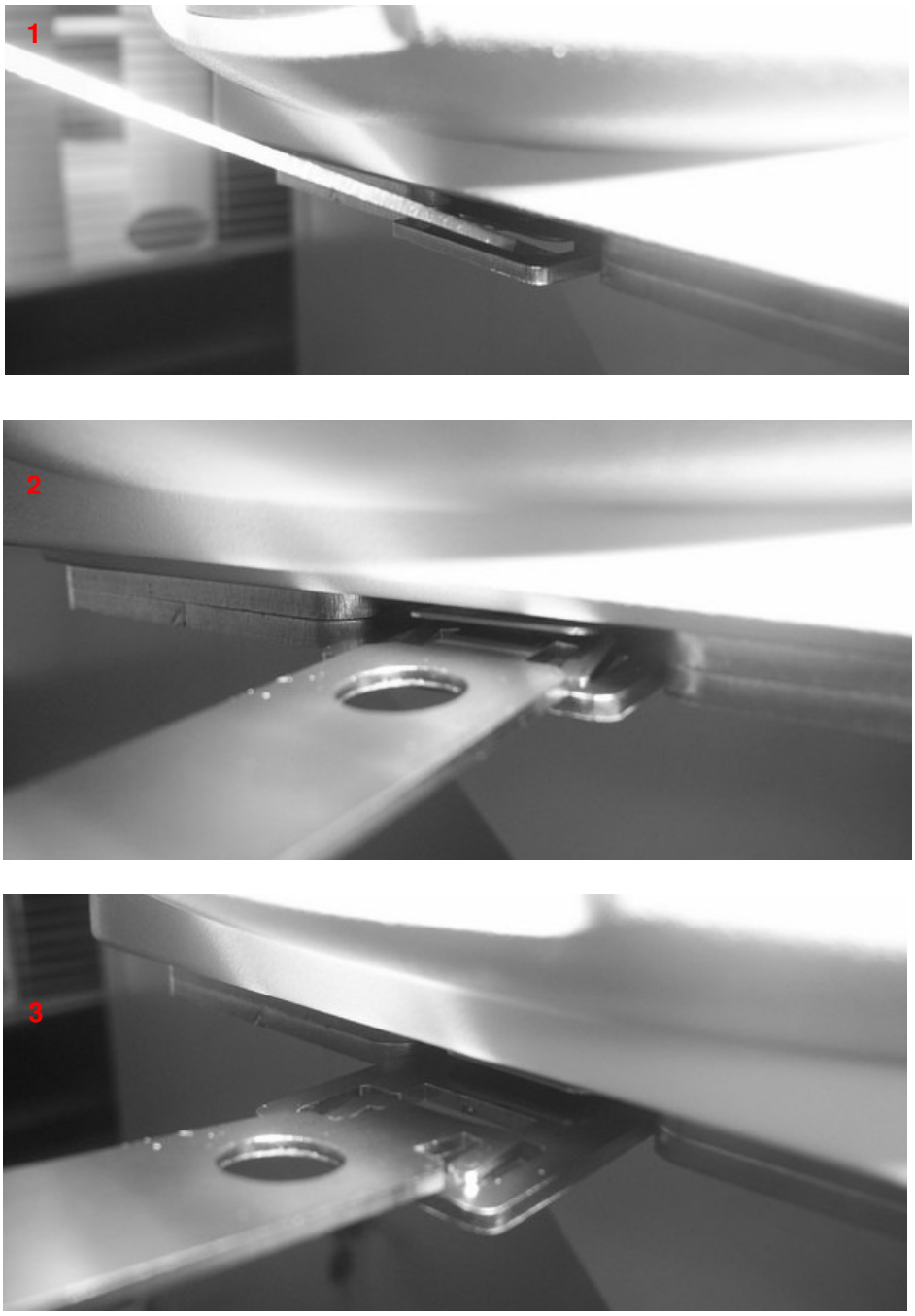


Figure 53: Mounting plate locker opening

2. Lift and remove the autosampler.
3. Close the mounting plate locker, by pushing it in. The plate returns as shown in Figure 49.

3.3.2 Safety Lock setting

When shipped the autosampler has the safety lock on, as shown in Figure 59; to work correctly it should be set as shown in Figure 58.

Figure 54: Shipping position

Figure 55: Moving_1

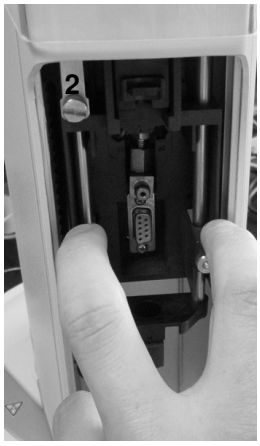


Figure 56: Moving_2

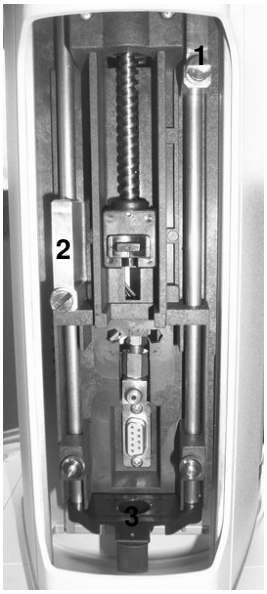


Figure 57: Moving_3

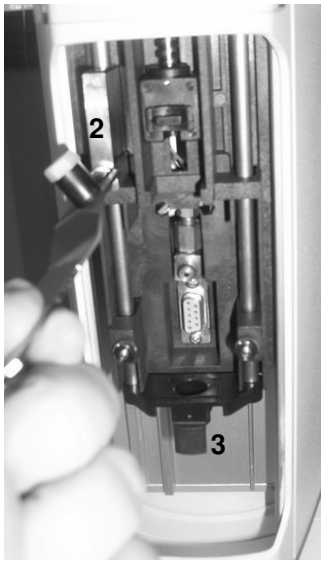


Figure 58: Moving_4

Figure 59: Operating position

1. Needle Guide regulator (right block)
2. Safety lock (left block)
3. Vial locator

In order to set the regulating lock, please proceed as follows:

Warning

If you don't adjust the safety lock, after start up the autosampler will display an error message (see paragraph 8 "Troubleshooting"). For an accurate first installation, do not release the needle guide regulator – right block (see paragraph 4.2.2 "Setup: Syringe warmer assembly installation").

1. Open the Syringe location by pushing up the sliding lid (see ***Figure 15***).
2. Lift down the sledge manually (see ***Figure 54*** and ***Figure 54***) till the left block become visible (see ***Figure 57***).
3. Loosen the left block (safety lock) using the supplied syringe pointer (see ***Figure 24***) as shown in ***Figure 57***.
4. Let the right block move down until it rests on the sledge.
5. Lift the left block about 2-3mm above the right block level and lock it.
6. Verify that the vial locator can be lifted freely by hand. If not, verify that the right and left block are locked parallel.
7. Close the sliding lid.

3.3.3 Electrical connections

Warning

Check that the autosampler is switched OFF.

Do not use a power supply system different from the one supplied with this unit. This could cause damage to the autosampler or to the person using it.

Proceed as follows:

1. Connect the analyzer to its connector (number 5 in ***Figure 22***) (15 pin port) using the interface cable provided with the mounting kit.

2. Insert the power cable inside the socket (number 2 in ***Figure 22***) This cable is connected to an external power supply (low voltage) (see paragraph 2.1.4 “Connection panel“). Connect the external power supply to the mains power.
3. If PC connection is needed (optional for HT2000H/HT2000HT, mandatory for HT2100H):
   - in case of an Ethernet connected autosampler: insert the Ethernet cable provided with the autosampler in the port indicated with the number 4 in ***Figure 22***, then plug it into any Ethernet port available.
   - in case of an RS232 connected autosampler: insert the serial cable provided with the autosampler in the port indicated with the number 4 in ***Figure 22***, then on the PC side to any RS232C port available.

3.3.4 Purge line connections

Warning

During headspace operation, the syringe is cleaned after each injection with inert, clean gas (e.g. N_2 or He). Therefore a gas supply line must be available close to the autosampler. Do not use flammable purging gases. Do not use hydrogen as a purging gas. Hydrogen creates a potential explosion hazard due to the venting of gases.

To flush the syringe between injections, a suitable gas source (e.g. Nitrogen) must be connected to the gas inlet 1/8” located on the rear of the autosampler (number 8 in ***Figure 22***) The inlet gas has to be regulated by using a pressure regulator (only provided as an optional accessory, see paragraph 3.6.1 “External pressure regulator installation”) at 1 bar maximum (15psi or 100kPa). The inlet gas should be at room temperature.

Purge gas must be 99.9995% pure. See the table below for the acceptable purge gas. It is recommended that high quality traps are used in order to remove hydrocarbons, water and oxygen.

Purge gas requirements	Purity	Notes
Helium	99.9995%	Hydrocarbon free
Nitrogen	99.9995%	

3.4 Start-Up

The main power switch is on the back of the autosampler (see ***Figure 22***, switch 1), switch it ON ("I" position).

When the autosampler (HT2000H/HT2000HT versions) is switched on a program loading screen appears (see paragraph 2.4.2 "Screen templates "). Then the displays shows the autosampler firmware release.

After the program has loaded the display shows the "HOME SCREEN" (see paragraph 7.1 "Home screen").

During the start up process, the autosampler will proceed to check the incubation oven.

For HT2000H/HT2000HT, if the oven is not empty, a screen appears asking if the oven has to be unloaded. If so, a following screen asks where to move the vial(s).

For HT2100H, if the single position oven is not empty, the autosampler moves the vial automatically from the oven to position 14 of the sample rack (see paragraph 2.1.2.2 "HT2100H Sample rack"). If this position is also busy the 4 status LED will blink. Please connect "HTA Autosampler Manager" and access the virtual screen. A screen asks where to move the vial.

Warning

The virtual screen is available only with LAN connection. It is not available with RS232 connection.

3.5 PC connection and software installation

"HTA Autosampler Manager" software is required for the use of HT2100H, it is optional for the HT2000H/HT2000HT.

Warning

HTA Autosampler Manager comes in two versions: Standard version and CFR 21 Part 11 version. In the document in which is reported the Activation key you will find information about the version for which you have been granted a license.

An activation key is required to enable communication with the autosampler. Every autosampler has its own key which is associated with its serial number. Without the activation key, the software can only be used in "DEMO" mode.

In the Demo mode you can not:

- run a sample list, a single injection or washes;
- read from/download to the autosampler methods, sequences and set up settings;
- set the key (for HT2100H only);
- see the virtual screen.

3.5.1 Autosampler controlled by LAN-connected PC

3.5.1.1 Default IP address

The factory Ethernet configuration of the autosampler is as shown below (it may be subject to change):

1) IP Address:192.168.0.207
2) Subnet Mask: 255.255.0.0
3) Gateway: 192.168.0.1
4) Ports: 20101 (TCP), 20102 (TCP), 20201 (UDP)

The IT/ network administrator must verify that any software firewall installed on the PC is:

- disabled;
- or enabled, but is not blocking the “HTA Autosampler Manager” application and the ports 20101 (TCP), 20102 (TCP) and 20201 (UDP);

The IT/ network administrator must also be informed about the IP address, because it could be in conflict with the adresses of other devices connected to the LAN or be outside the subnet segment of the LAN. If necessary, you can change the IP configuration (see paragraph IP address/Subnet mask modification3.5.1.3 “IP address/Subnet mask modification“).

3.5.1.2 Operations

To control the autosampler by PC, proceed as follows:

1) Connect the autosampler to your lab LAN (see paragraph 3.3.3 “Electrical connections”);
2) The IT/ network administrator must verify that the firewall protection does not prevent communication between the software application “HTA Autosampler Manager” and the autosampler (see paragraph 3.5.1.1 “Default IP address”).
3) Install “HTA Autosampler Manager” on the PC. "HTA Autosampler Manager" is provided on the CD supplied with the instrument. Follow the wizard to install the software (self-explaining). Make sure to select proper version (Standard version or CFR 21 Part 11 version).

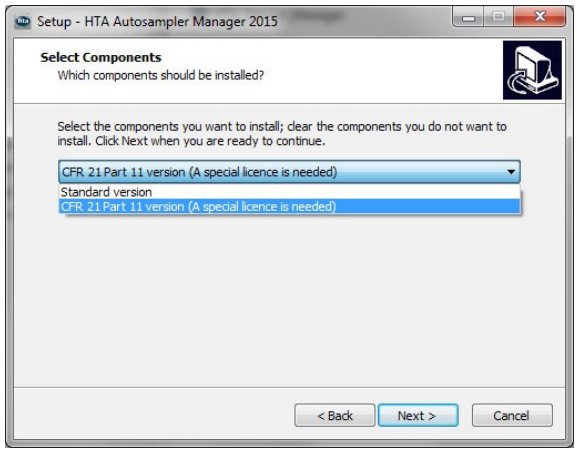
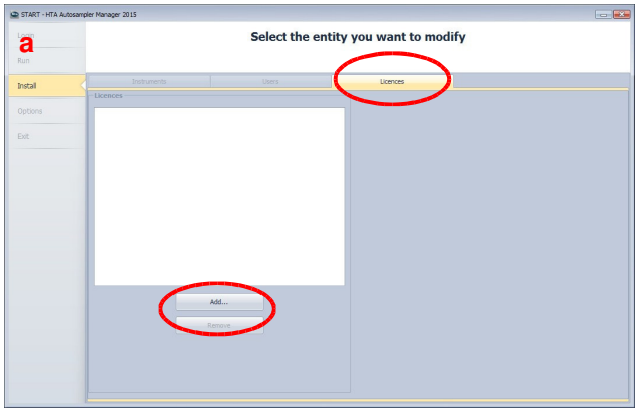


Figure 60: Software versione selection

4) Run the software.
5) (For HTA Autosampler Manager CFR 21 Part 11 version only). At the first access of the software the activation licence is required (click on “Add” from figure “a”, tab “Licences” enabled). Then Administrator creation is required (click on “Add” from figure “b”, tab “Users” enabled). The screen “c” appears to add the administrator, then it will be possible to create the other users.



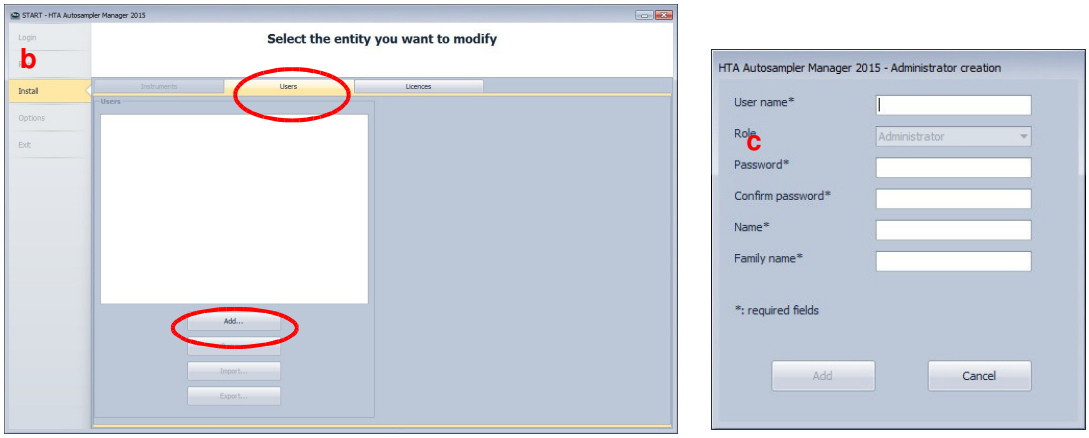


Figure 61: HTA Autosampler Manager CFR 21 Part 11

6) From the following screen (tab “Instruments” enabled) click on “Add new”:

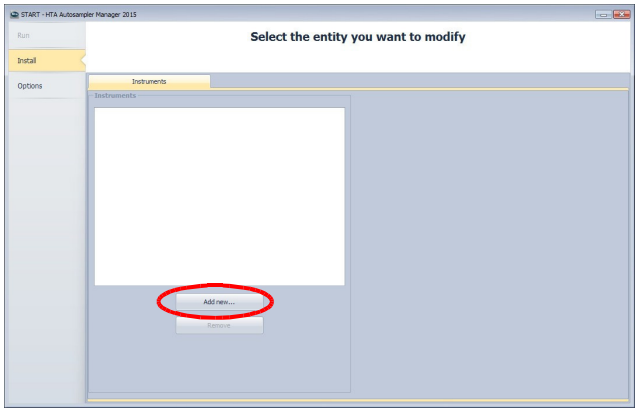


Figure 62: HTA Autosampler Manager screenshot

7) From the following screen, click on “Next”:

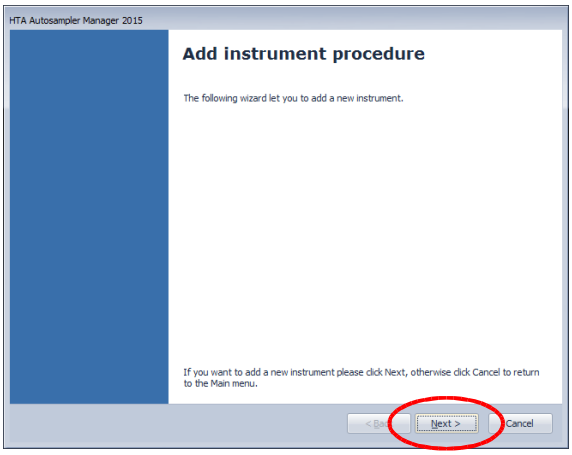


Figure 63: HTA Autosampler Manager screenshot

8) Give a “Name” to the instrument in order to identify it more easily, and then click on “Next”:

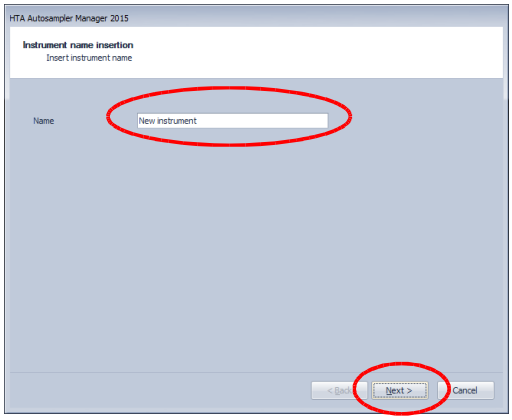


Figure 64: HTA Autosampler Manager screenshot

9) Confirm the instrument is connected by "TCP/IP port" (Default) by pressing on “Next”:

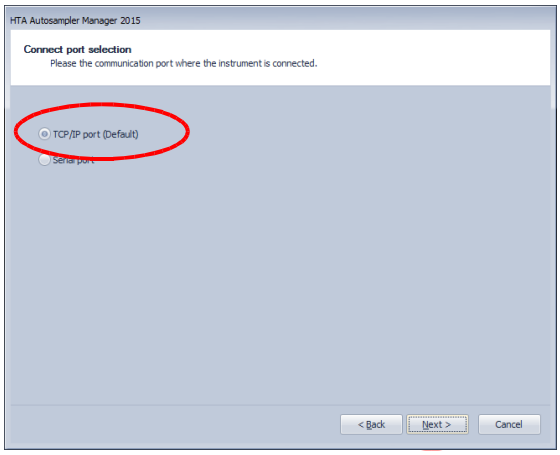


Figure 65: HTA Autosampler manager screenshot

10) All the instruments currently connected by Ethernet (LAN) are shown in the following screen. Click on one instrument and then on "Next". If your instrument is not found you can re-try pressing “Refresh”.

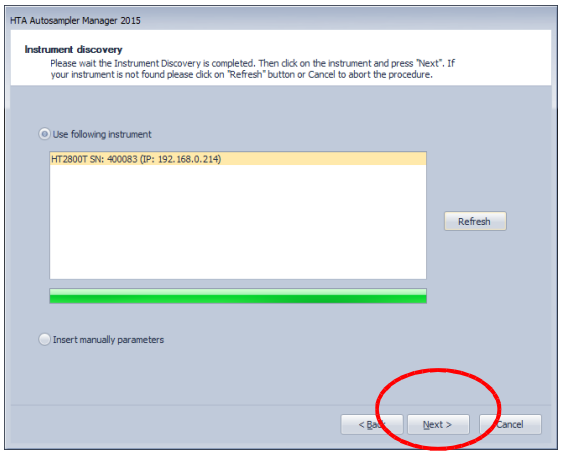


Figure 66: HTA Autosampler manager screenshot

11) Fill in the form with your data. Click on “Next”:

12) Fill in the form with the analyzer data. Click on “Next”:

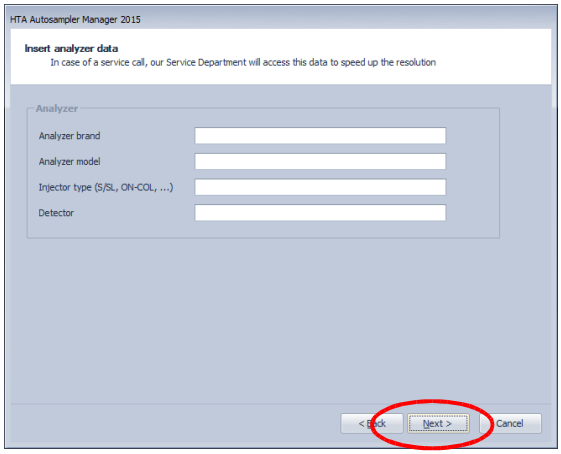


Figure 67: HTA Autosampler Manager screenshot

13) Insert the Activation key supplied with the instrument:

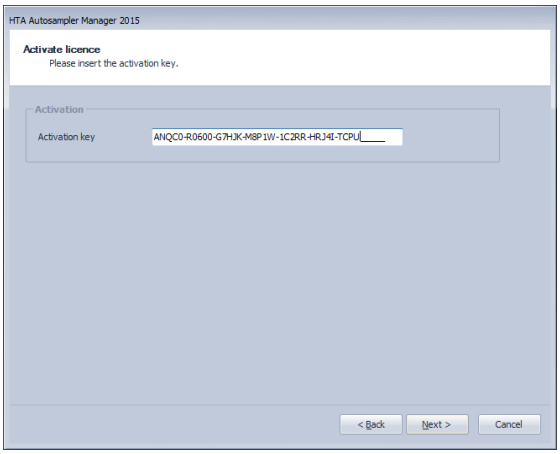


Figure 68: HTA Autosampler Manager screenshot

14) The ending of the activation procedure depends on your type of Internet connection:

a) If you have an Internet connection (not via Proxy server) an automatic activation starts.

b) If you do not have an internet connection available on the PC you are working with, click on “Activate offline”.

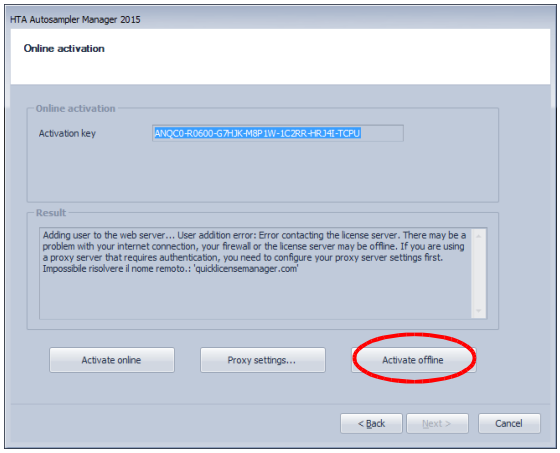


Figure 69: HTA Autosampler Manager screenshot

15) The following window appears:

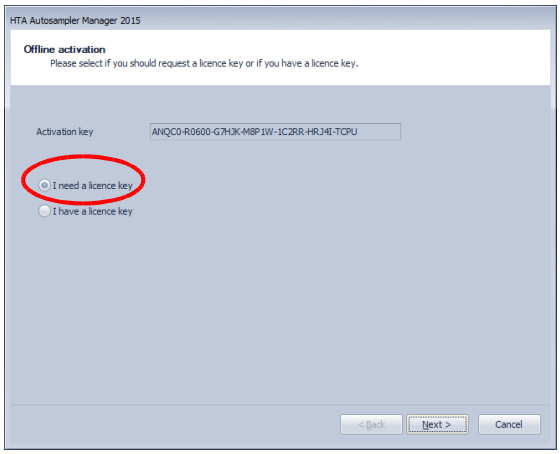


Figure 70: HTA Autosampler Manager screenshot

- If you already have a "**licence key**": select "**I have a licence key**" and then insert it in the dedicated field.

- If you do not have a "**licence key**" select "**I need a licence key**" and then "**Request licence key**". Follow the wizard to complete the activation procedure.

16) In any case, end the activation procedure by clicking on "Finish":

17) Finally, click on "Run" button, select the instrument name on the left part of the window and then click on "Open":

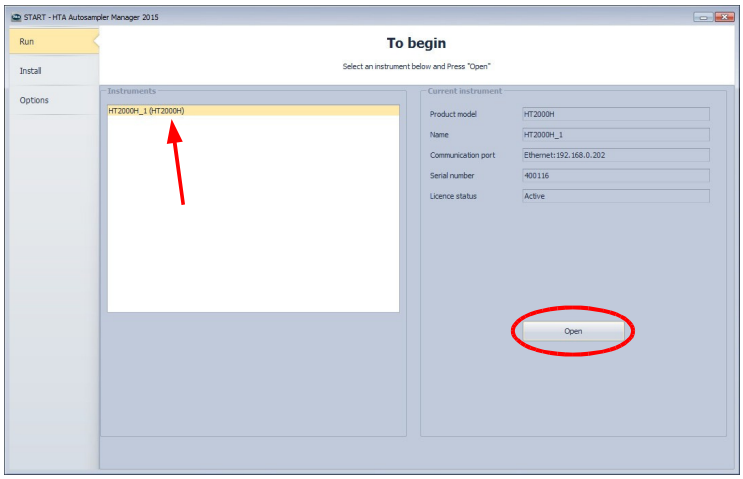


Figure 71: HTA Autosampler Manager screenshot

18) The following screen appears. The "Help online" section can help you with the autosampler handling by the software.

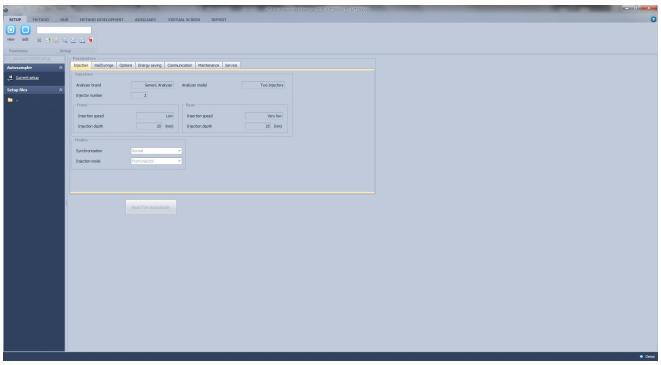


Figure 72: HTA Autosampler Manager screenshot

3.5.1.3 IP address/Subnet mask modification

If it necessary to modify the IP address/Subnet mask proceed as follows:

1) Connect the autosampler directly to the PC, inserting the Ethernet cable provided with the autosampler in the port indicated with the number 4 in ***Figure 22*** and then into the Ethernet port of the PC (see paragraph 3.3.3 “Electrical connections”);
2) The IT/ network administrator must verify that the PC you are working with has a static IP address (do not work with DHCP);
3) Run “HTA Autosampler Manager”;
4) “Open” your autosampler window (see paragraph 3.5.1.2 “Operations”, point 16) and 17)) and from the Set up-Communication window change the IP address or the Subnet mask as shown in the figure below (press “Edit” button to enable the modification and then “Download the autosampler” to make the change effective) In order to get information about a valid IP address/Subnet mask and other related information, please ask your IT/ network administrator.

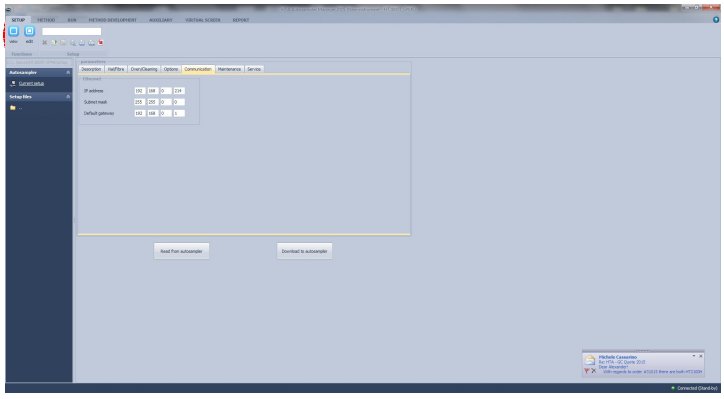


Figure 73: P address/Subnet mask modification

5) Follow the wizard to end the procedure (the instrument has to be switched off/on). If a communication problem occurs, close the software and run it again.utosampler connected directly to the PC.

3.5.2 Autosampler connected directly to the PC

3.5.2.1 Autosampler connected directly to the PC by the Ethernet port

1) Connect the autosampler directly to the PC, inserting the Ethernet cable provided with the autosampler in the port indicated with the number 4 in Figure 23 and then into the Ethernet port of the PC (see paragraph 3.3.3 “Electrical connections”);
2) The IT/ network administrator must verify that the PC you are working with has a static IP address (do not work with DHCP);
3) Then operate as described in paragraph 3.5.1.2 “Operations“ starting from point 3).

3.5.2.2 Autosampler connected directly to the PC by a RS232 port

1) Connect the autosampler directly to the PC, inserting the serial cable provided with the autosampler in the port indicated with the number 4 in ***Figure 22*** and then onto the PC in any RS232C port available. (see paragraph 3.3.3 “Electrical connections”);
2) Then operate as described in paragraph 3.5.1.2 “Operations“ starting from point 3). The only difference is that, instead of selecting “TCP/IP port” (see point 9)), you have to select “Serial Port” and then choose the product model and the correct communication port from the combo boxes.

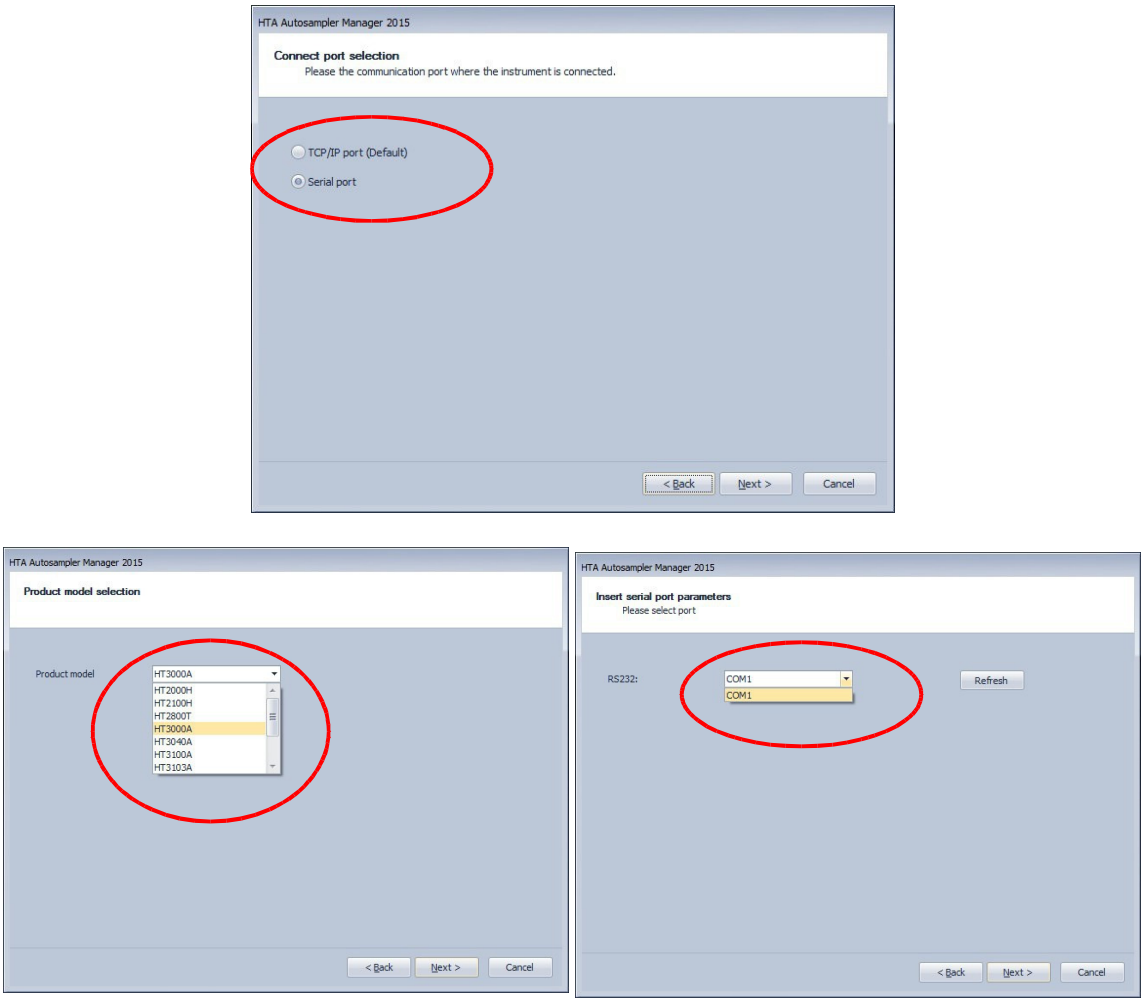


Figure 74: PC connection by RS232 port

3.6 Accessories installation

Warning

During headspace operation the syringe is cleaned after each injection with inert, clean gas (e.g. N2 or He). Therefore a gas supply line must be available close to the autosampler. Do not use flammable purging gases. Do not use hydrogen as a purging gas. Hydrogen creates a potential explosion hazard due to the venting of gases.

3.6.1 External pressure regulator installation

This optional accessory is used to regulate the pressure of the gas used for the syringe flushing (e.g. Nitrogen).

The pressure regulator output must be set at 1 bar maximum (15psi or 100kPa). The external pressure regulator is shown in the figure below:

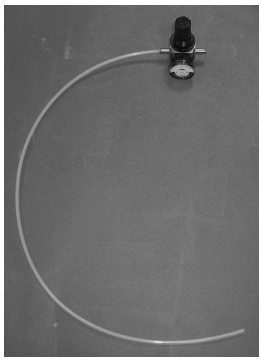


Figure 75: External pressure regulator

The pressure regulator must be inserted between the gas source and the gas inlet of the autosampler in order to regulate the inlet pressure.

In detail, the 1/8" tube coming out from the regulator (number 1 in the following figure) must be connected to the gas inlet 1/8" located on the rear of the autosampler (number 8 in ***Figure 22***).

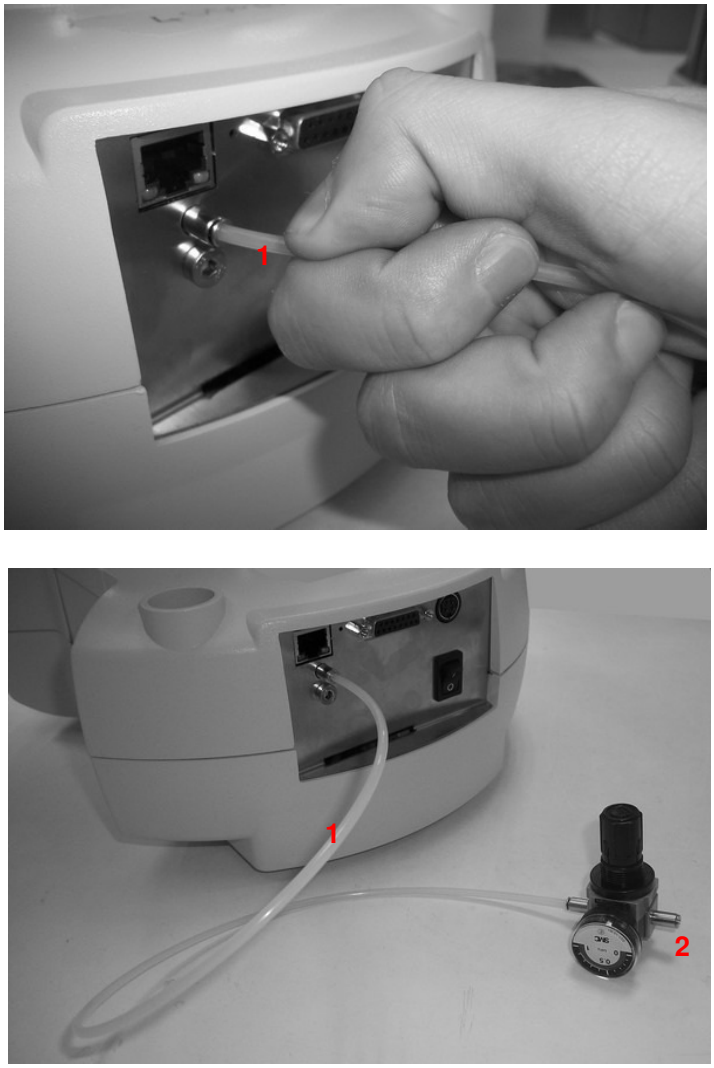


Figure 76: External pressure regulator connection

The other end of the regulator (number 2 in the figure above) must be connected to the gas source.

3.6.2 Swagelok Adapter installation

1 Use a Hexagon key (2mm) to unscrew the Rapid fitting terminal (indicated with the letter A in the figure below):

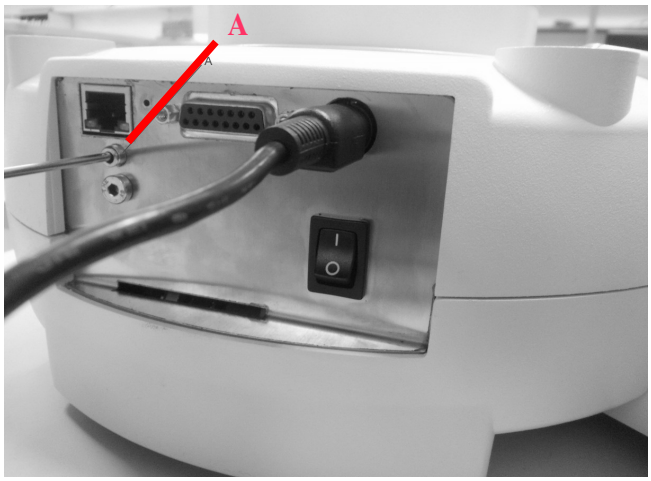


Figure 77: Swagelok adapter installation_1

2 Put the O.R. (indicated with the letter B in the figure below) on the new fitting (indicated with the letter C in the figure below):

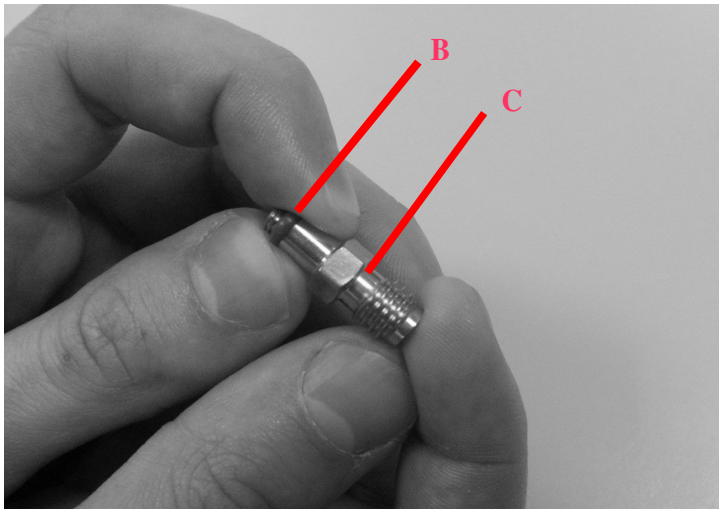


Figure 78: Swagelok adapter installation_2

3 Use an open-end wrench (8mm) to screw the fitting and the washer on the female adapter (indicated with the letter D in the figure below):

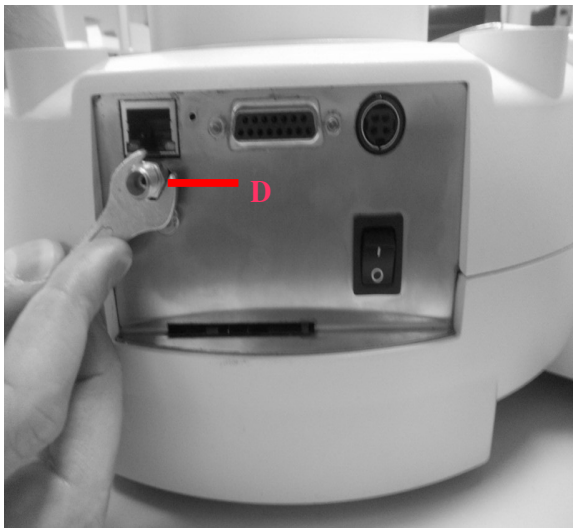


Figure 79: Swagelok adapter installation_3

3.6.3 System integrity tool installation

1 Remove the upper part of the Syringe integrity tool (as indicated in the figure below):

Figure 80: System integrity tool installation_1

2 Insert the septum (indicated with the letter A in the figure below) in the lower part of the Syringe integrity tool:

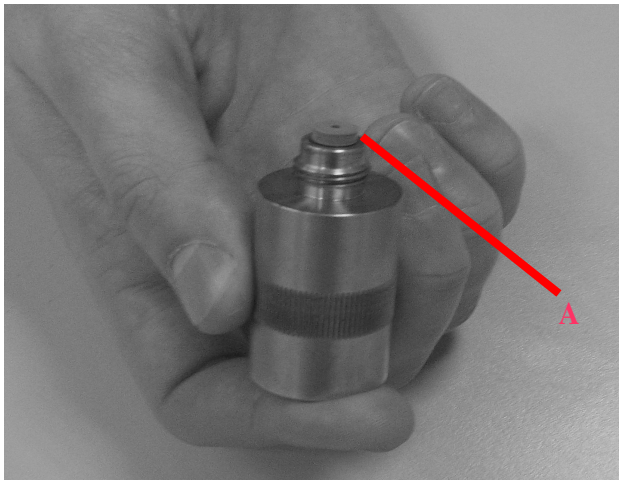


Figure 81: System integrity tool installation_2

3 Screw by hands the upper part (indicated with the letter B in the figure below) of the Syringe integrity tool to the lower part (indicated with the letter C in the figure below):

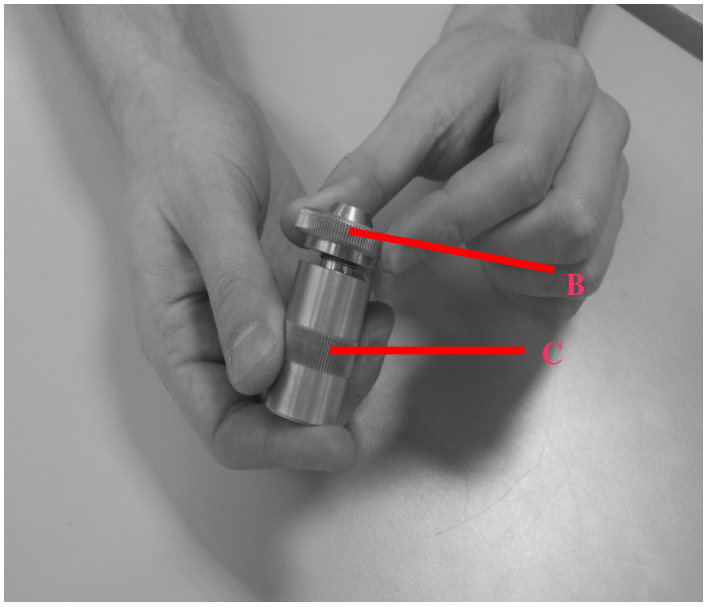


Figure 82: System integrity tool installation_3

4 Place the System Integrity tool in position number 6 of ***Figure 1*** for HT2000H/HT2000HT, and ***Figure 9*** for HT2100H.

Figure 83: System integrity tool installation_4

3.7 Preparing sample vial

Warning

These operations must be completed by competent personnel, properly trained regarding the procedures described in this manual: any missing or different execution of the described procedures can cause damage to the autosampler or to the person working on the equipment.
For sample handling see paragraph 1.1 “Intended use and restrictions”.

For HT2000H/HT2000HT:

- Follow the instruction for sample loading 7.5 “Load and Unload Sample Vial”);
- Prepare the sample vial;
- Put the vial in the rack.

For HT2100H:

- Press “MOVE” on the keypad, (see paragraph 6.1 “Keys“), so the turret rotates and the sample rack is accessible;
- Prepare the sample vial;
- Put the vial in the rack.

3.7.1 Vial capping (Crimping Cap)

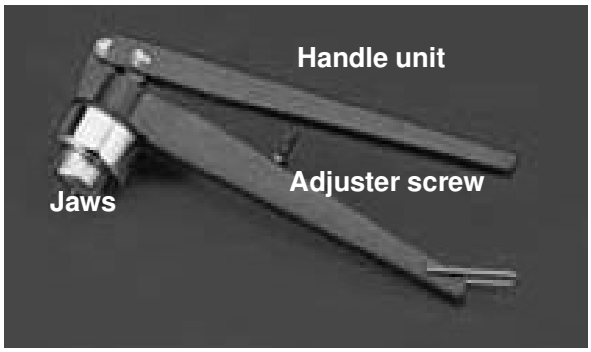


Figure 84: Crimper

You must have a crimper available. Fit the septum on the cap, then:

- Clean the inside surfaces of the crimper jaws.
- Place the crimp cap over the top of the vial.
- Hold the vial and place the crimper on top of it. Squeeze the handle until it touches the adjuster screw.

Check each vial for proper crimping. Correct crimp features:

- flat cap surface;
- flat septa surface;
- tight fitting of the cap edge;
- plain and undeformed cap sides.

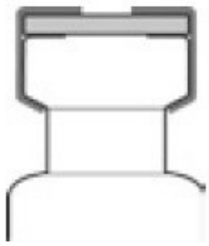
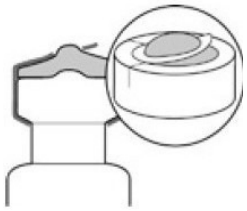


Figure 85: Correct crimp

In the next table, some examples of incorrect crimp are shown:

Untight cap edge (undercrimped)	**Upward bulge of the crimp cap** (overcrimped)	**Deformation of the crimp cap sides** (over-crimped)	**Convex looking liner** (overcrimped)	**Rounded edges/ Upward bulge of the cap/Liner** (overcrimped)
				
Adjust crimping pressure and adjust crimping height	Adjust crimping pressure and adjust crimping height	Adjust crimping height	Adjust crimping pressure	If the cap is stretched too much under the crimp neck, the bridges of the scorelines suf-fer too much stress and can break open at even low pressure (below 3 bars) or, in the worst cases can even tear apart be-side the scorelines

3.8 Final installation operations

Omissis.

3.9 Basic training

At the end of the installation procedure, the Service engineer must instruct the user about the basic operations of the autosampler. After this basic training, the user should be able to perform the following operations:

- Single injection (see paragraph 7.2 “Single injection” and 7.3 “Automatic run”)
- Automatic run (see paragraph 7.3 “Automatic run”)

- Syringe purge (see paragraph Syringe purge7.4 “Syringe purge“)
- Method and sequence creation and editing (see paragraph 5 “Programming “)
- Syringe replacement (see paragraph 4.2.2 “Setup: Syringe warmer assembly installation “)
- Front and rear injector alignment (see paragraphs 4.2.1.2 “Alignment: Front Injector and 4.2.1.3 “Alignment: Rear Injector”).

4 Set Up operations

The HT2100H set up operations can only be performed using a PC, and the "HTA Autosampler Manager". HT2000H/HT2000HT set up operations are performed by using the touch screen display, as described in the paragraphs below.

Warning

Set-up must be completed by competent personnel, properly trained regarding the procedures described in this manual: any missing or different execution of the described procedures can cause damage to the autosampler or to the person operating it.

However, in particular, you should pay attention to the moving parts such as the sledge, syringe , needle, the cover of the oven etc...Some parts of the autosampler (oven, syringe, needle or vials) can work at high temperatures. Be careful to avoid burns. Allow these parts to cool down before handling them.

Wrong settings could cause damage to the syringe and/or to the autosampler.

4.1 View Parameters

Access sequence: RUN>SETTINGS>VIEW PARAMETERS

This information is organized on multiple pages: press NEXT to change the page. View parameters shows the following information:

- **Syringe Volume:** nominal volume of the installed syringe**;**
- **Tray Type**: the tray type installed. This shows the number of vial positions, dimension of sample vials and needle draw depth inside the vial;
- **Analyzer Brand**: shows the analyzer brand (see paragraph 4.2.1.1 "Alignment: Analyzer Default ");
- **Analyzer Model**: shows the analyzer model (see paragraph 4.2.1.1 "Alignment: Analyzer Default ");
- **Front Injector Depth**: shows the needle insertion depth into the front injection port;
- **Front Injector Insertion Speed**: shows the needle insertion speed into the injector;

- **Rear Injector Depth**: shows the needle insertion depth into the rear injector. This parameter is shown only if the autosampler is set to work with the rear injector;
- **Rear Injector Insertion Speed:** shows the needle insertion speed into the injector. This parameter is shown only if the autosampler is set to work with the rear injector;
- **IP Address, Subnet Mask, Gateway:** shows the LAN connection data (see paragraph 3.5.1.1 “Default IP address”).

Select “**Exit**” to exit from the “VIEW PARAMETERS” screen.

4.2 Setup

Access sequence: RUN>SETTINGS>SETUP

In the “SETUP” screen the following menus are available:

- **Alignment**: aligns injectors and edit rack settings (see paragraph 4.2.1 “Setup: Alignment”);
- **Syringe Installation:** used to install the syringe (see paragraph 4.2.2 “Setup: Syringe warmer assembly installation “);
- **Manual Operation:** moves the autosampler motors for diagnostic or emergency needs (see paragraph 4.2.3 “Setup: Manual operations”
- **Configuration:** edits autosampler settings (see paragraph 4.2.4 “Setup: Configuration”);
- **Service**: maintenance operation on the autosampler (see paragraph 4.2.5 “Setup: Service“).

Select “**Exit**” to exit from the “SETUP” screen.

4.2.1 Setup: Alignment

This is used to align the sample tray and GC injection port. Access sequence: RUN>SETTINGS>SETUP>ALIGNMENT From this screen access the following sub menu:

- **Analyzer Default**: selects the correct analyzer on which the autosampler is mounted (see paragraph 4.2.1.1 “Alignment: Analyzer Default “). If no analyzer has been selected, the front and rear injector buttons will not be available;
- **Front injector**: aligns the front injector (see paragraph 4.2.1.2 “Alignment: Front Injector);
- **Rear injector**: aligns the rear injector (see paragraph 4.2.1.3 “Alignment: Rear Injector”).
- **Touch Plunger Zero**: to re-execute alignment procedure (see paragraph 4.2.1.4 “Alignment: Touch Plunger Zero”);
- **Tray Install**: to install and edit rack settings (see paragraph 4.2.1.5 “Alignment: Tray Install”).

Select “**Exit**” to exit from this screen and return to the “Setup” screen (see paragraph 4.2 “Setup“).

4.2.1.1 Alignment: Analyzer Default

Access sequence: RUN>SETTINGS>SETUP>ALIGNMENT>ANALYZER DEFAULT

The first screen (“Setup: Analyzer Brand”) shows a list of analyzer brands. Each brand is associated with a list of models (second screen: “Set up: Analyzer Model”).

Verify that the selected analyzer (marked blue) matches your analyzer.

If not, select the brand of your analyzer and then the model. If your analyzer is not present in the list select “Generic” and then set the number of injection ports. In particular select:

- “1” for one injection port;
- “2” for two injection ports;
- “Basement” for special application only (during the injector alignment operation, the unit will simply touch the unit base).

Once complete, any previous data relating to the installation will be erased.

Select “**Exit**” to exit from this screen and return to the “ALIGNMENT” screen (see paragraph 4.2.1 “Setup: Alignment”). Perform the alignment on the front injector (see paragraph 4.2.1.2 “Alignment: Front Injector) and rear injector if present (see paragraph 4.2.1.3 “Alignment: Rear Injector”).

4.2.1.2 Alignment: Front Injector

Access sequence: RUN>SETTINGS>SETUP>ALIGNMENT>FRONT INJECTOR

When “Front injector” is selected, the screen shows “Wait: Front Injector Alignment in progress”” (Tap “STOP”, if you want to end this procedure). The autosampler will go directly to the last position stored in memory or to the default position for the selected analyzer 4.2.1.1 “Alignment: Analyzer Default “).

-If the vial locator finds the injector, the following message appears: “Confirm Front injector Alignment?”

- Tap “CONFIRM” if the autosampler is correctly aligned over the injector. Set the Front Injector injection depth and the Front Injector needle insertion speed (Very Low, Low, Medium, High or Very high). Tap “SAVE” to save these settings, otherwise tap “ABORT”.
- Tap “DO MANUAL” to modify the alignment (if needed). A screen appears to manually move the turret and needle. Move the turret and needle by pressing the arrows to center the injector. Tap “STORE” to save the alignment (this button is enabled only if the touch sensor is “ON”, so the vial locator must be touching the injector), otherwise tap “ABORT”. Set the Front Injector injection depth and the Front Injector needle insertion speed (Low, Medium, High or Very high). Tap “SAVE” to save these settings, otherwise tap “ABORT”.

-If the vial locator does not find the injector, the following message appears: “Injector not found”. In this case, only the “DO MANUAL” or “ABORT” buttons are enabled.

Select “**Exit**” to exit from this screen and return to the “ALIGNMENT” screen (see paragraph 4.2.1 “Setup: Alignment“).

4.2.1.3 Alignment: Rear Injector

Access sequence: RUN>SETTINGS>SETUP>ALIGNMENT>REAR INJECTOR

Tap “Rear Injector” from the “Setup: Alignment” screen to set the alignment of the rear injection (see paragraph 4.2.1 “Setup: Alignment”).

The procedure for rear injector alignment is the same as for the front injector (see paragraph above).

Select “**Exit**” to exit from this screen and return to the “ALIGNMENT” screen (see paragraph 4.2.1 “Setup: Alignment”).

4.2.1.4 Alignment: Touch Plunger Zero

Access sequence: RUN>SETTINGS>SETUP>ALIGNMENT>TOUCH PLUNGER ZERO

Follow the instructions of the wizard. Place a capped sample vial in the indicated position and ensure the capped waste vial is in the waste position. If the System integrity kit has been provided, also place the System integrity tool in the position indicated with 6 in ***Figure 1*** for HT2000H/HT2000HT and ***Figure 9*** for HT2100H. Tap “Continue” to start, (or “ABORT” to quit). The plunger touch procedure is then run automatically. The vial locator touches the indicated position of the oven cover, the indicated vial in the oven, the indicated vial in the tray, the injector/s and on the System integrity area. Then the syringe zero procedure is performed. This procedure can be stopped or skipped by tapping the appropriate button.

Select “**Exit**” to exit from this screen and return to the “ALIGNMENT” screen (see paragraph 4.2.1 “Setup: Alignment”);

4.2.1.5 Alignment: Tray Install

Access sequence: RUN>SETTINGS>SETUP>ALIGNMENT>TRAY INSTALL

This screen shows a list of trays/racks stored in memory. The following options are available:

- **Add new**: adds a new tray/rack;
- **Remove:** removes a tray/rack;

Select a tray to view or edit its details. The number of vial positions, dimension of the sample vials and the needle draw depth inside the sample vial can be modified if your sampler allows it. If you modify a parameter, a screen displays: “Modifying tray”. Tap “SAVE” to confirm, otherwise tap “CANCEL”. A confirmation screen appears “Tray parameters has been modified”. Tap “CONTINUE“.

Select “ADD NEW”, to set the number of vial positions, the dimension of the sample vials and the needle draw depth inside the sample vial of the new tray/rack (e.g.: 121-2ml-30mm).
To remove a rack, select “REMOVE” then select the tray/rack that you want to remove. A confirmation screen appears “The selected tray has been removed”. Tap “CONTINUE”.
Select “**Exit**” to exit from this screen and return to the “ALIGNMENT” screen (see paragraph 4.2.1 “Setup: Alignment“).

4.2.2 Setup: Syringe warmer assembly installation

HT2000HT allows the installation of standard or High temperature version of the Syringe Warmer Assembly. Syringe Warmer High Temperature Assembly for HT2000HT is sold as an option (see paragraph 1.7.2 “Options “). See paragraph 12.1.1 “How to select the correct syringe type (only for HT2000HT)” to check the proper syringe to be installed.

The syringe is installed inside the syringe warmer assembly provided with unit. Access sequence: RUN>SETTINGS>SETUP>SYRINGE INSTALLATION

1. From the Setup menu, tap “Syringe installation” to start the procedure:

Figure 86: Syringe installation screen

2. The following screen appears, while the autosampler automatically moves the syringe location to an accessible position.

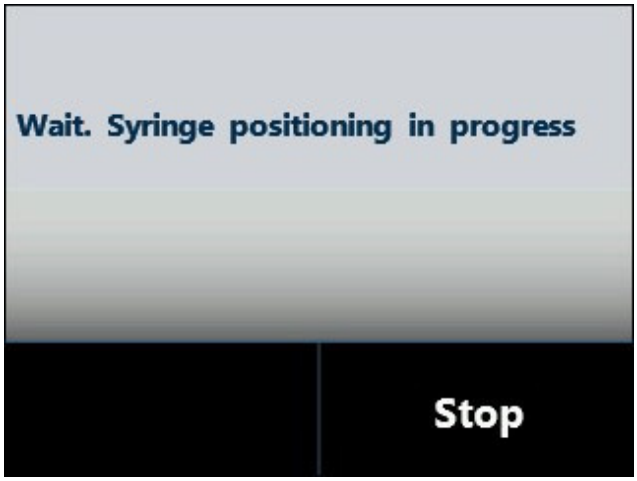


Figure 87: Syringe positioning screen

3. When the autosampler is ready, the following screen appears:

Figure 88: Syringe remove and installation screen

4. The autosampler should be automatically positioned in a convenient position to allow the syringe warmer assembly installation. If this position is OK, proceed to step 5.
5. If the position is not convenient, tap “MANUAL” to display the following screen. From here, it is possible to move the plunger, turret and needle in order to reposition the autosampler to your desired position.

Figure 89: Syringe Install Manual Move screen

6. Follow this procedure:
   a) Open the syringe location by pushing up the sliding lid.

Figure 90: Sliding lid opening

b) Remove the plunger locker by pulling it out using the syringe pointer shown in Figure 24.

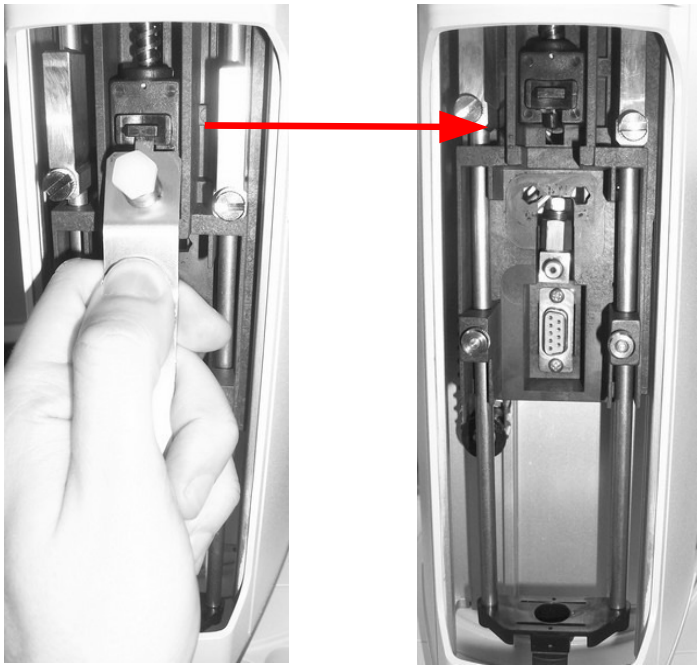


Figure 91: Plunger locker removing

c) Remove the retaining nuts as shown in the figure below.

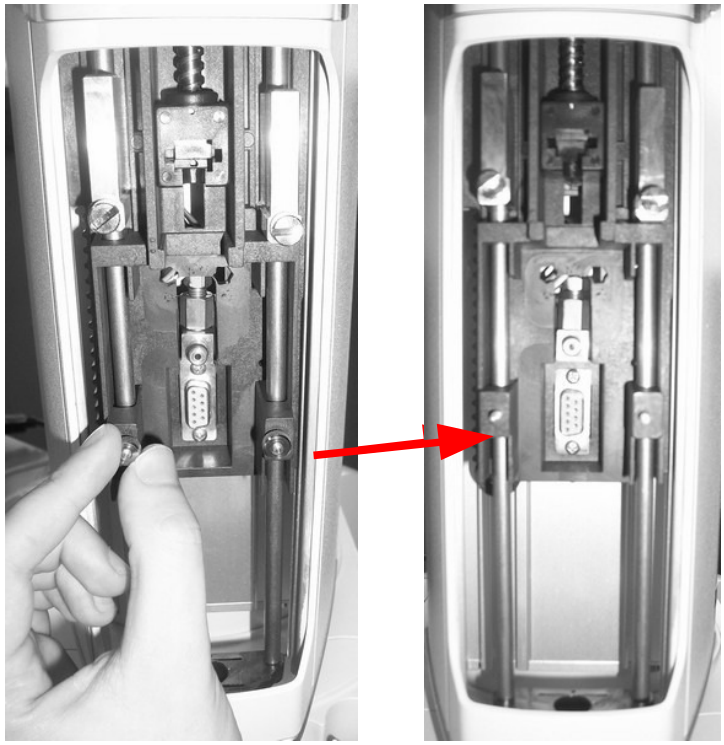


Figure 92: Retaining nuts removing

d) If this is the first installation, proceed directly to point “f)“.

e) If this is a syringe replacement, remove the pre-existent syringe warmer assembly with care, as shown in the figure below:

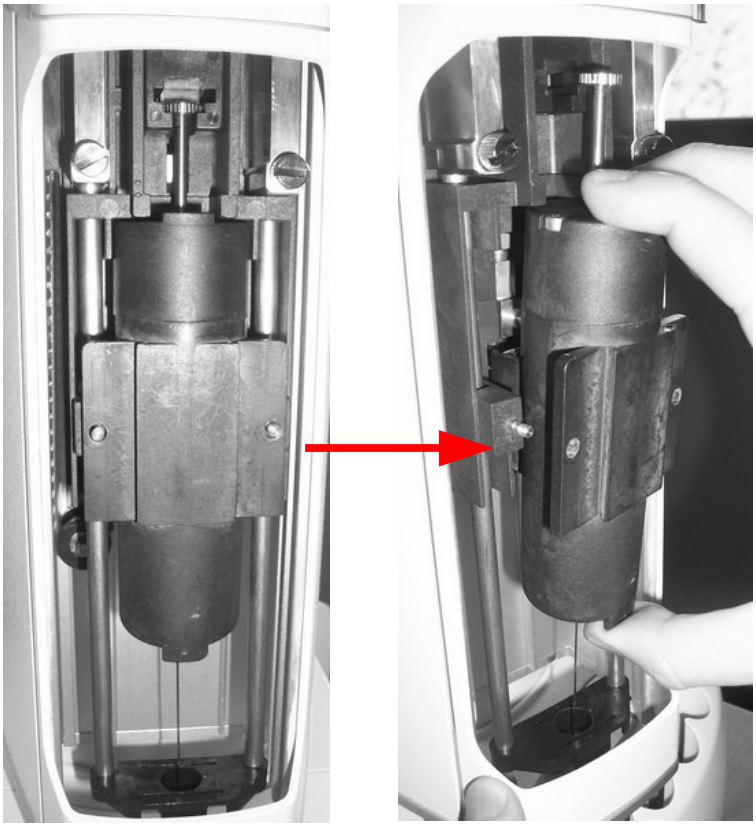


Figure 93: Syringe warmer assembly removal

Then proceed with the syringe replacement as described in paragraph 9.1.5 “Syringe replacement in the syringe warmer assembly“and proceed to point “f)“.

f) Mount the syringe warmer assembly with the new syringe installed in the syringe location. Take care to insert the needle inside the vial locator and then plug the syringe warmer assembly into the D-shape connector (number 5 in ***Figure 17***). Insert the plunger in the plunger holder (number 2 in ***Figure 17***).

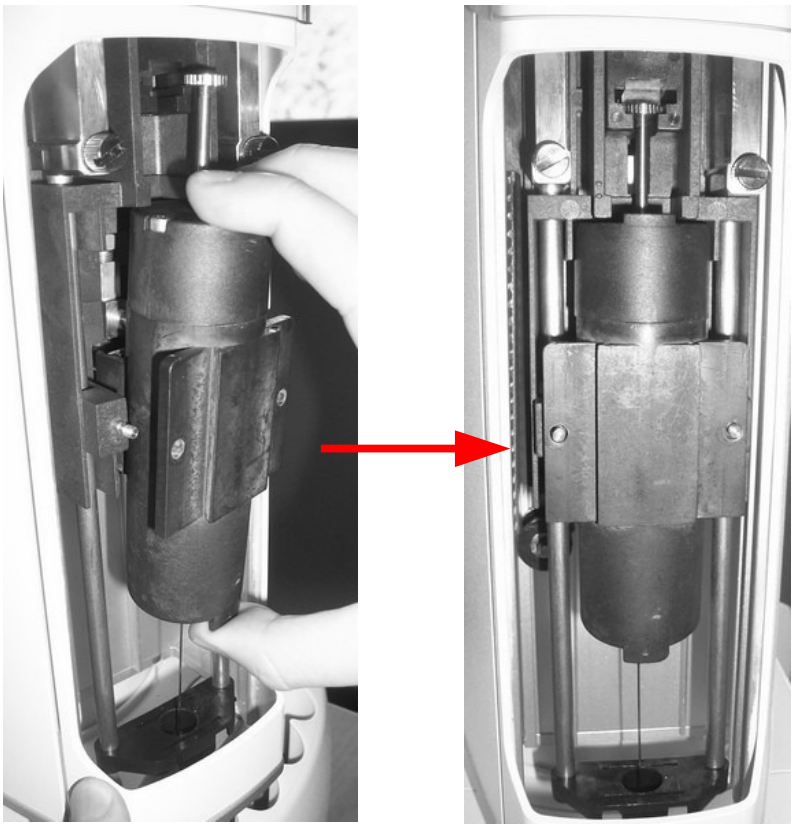


Figure 94: Syringe warmer assembly positioning

g) Reposition the retaining nuts and tighten them:

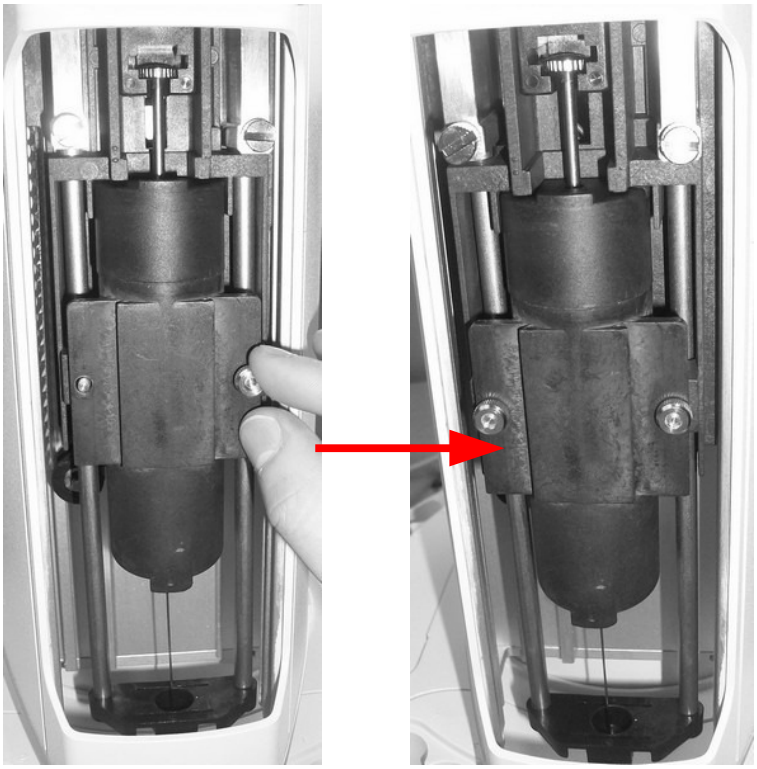


Figure 95: Retaining nuts repositioning

h) Reinsert the piston locker ensuring that the B side (see ***Figure 20***) is faced downward.

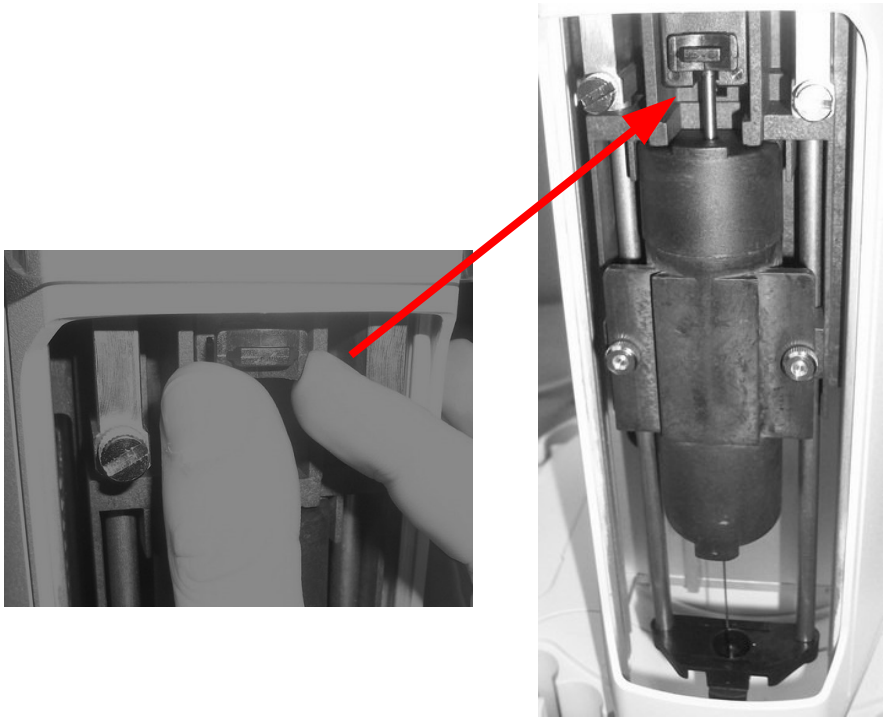


Figure 96: Plunger locker positioning

i) Close the Syringe location by pulling down the lid.

Figure 97: Sliding lid closing

j) From the screen reported in ***Figure 88*** or ***Figure 89*** tap “CONTINUE”: then the following screen appears:

Figure 98: Syringe volume setting screen

k) Set the syringe volume and tap “SAVE” to store the information.

l) Only for HT2000HT. If Syringe Warmer High Temperature Assembly for HT2000HT has been installed you should select as syringe type: “High Temperature”. If Syringe Warmer Assembly for standard version syringe has been installed you should select as syringe type: “Standard”. If the screen for the syringe type selection does not appear contact the Technical Assistance Service.

m) The autosampler will start “Plunger zero” to automatically complete syringe installation.

n) The autosampler will also automatically start the syringe conditioning. This procedure should take about 90 minutes.

Warning

Set-up must be completed by competent personnel, properly trained regarding the procedures described in this manual: any missing or different execution of the described procedures can cause damage to the autosampler or to the person operating it.

However, in particular, you should pay attention to the moving parts such as the sledge, syringe, needle, the cover of the oven etc...Some parts of the autosampler (oven, syringe, needle or vials) can work at high temperatures. Be careful to avoid burns. Allow these parts to cool down before handling them.

Wrong settings could cause damage to the syringe and/or to the autosampler.

Warning

The syringe conditioning procedure can be skipped during the autosampler installation because the syringe has been already conditioned by the manufacturer. This procedure can also be skipped in case of the same syringe re-installation. If the syringe barrel or the syringe plunger or both the parts are new, the procedure must be carried out.

4.2.2.1 Syringe warmer assembly removal

Warning

Plunger, syringe and needle are heated up to 150°C (standard version syringe) or 250°C (HT version syringe installed on HT2000HT). We recommend taking care to prevent injury.

To remove the syringe warmer assembly follow the instructions given in paragraph 4.2.2 “Setup: Syringe warmer assembly installation” excluding points “d)“-“f)“. Instead of executing these points simply remove the syringe warmer assembly.

4.2.3 Setup: Manual operations

This function allows manual movement of the autosampler motors.

Access sequence: RUN>SETTINGS>SETUP>MANUAL OPERATION

This screen displays a list of the autosampler motors.

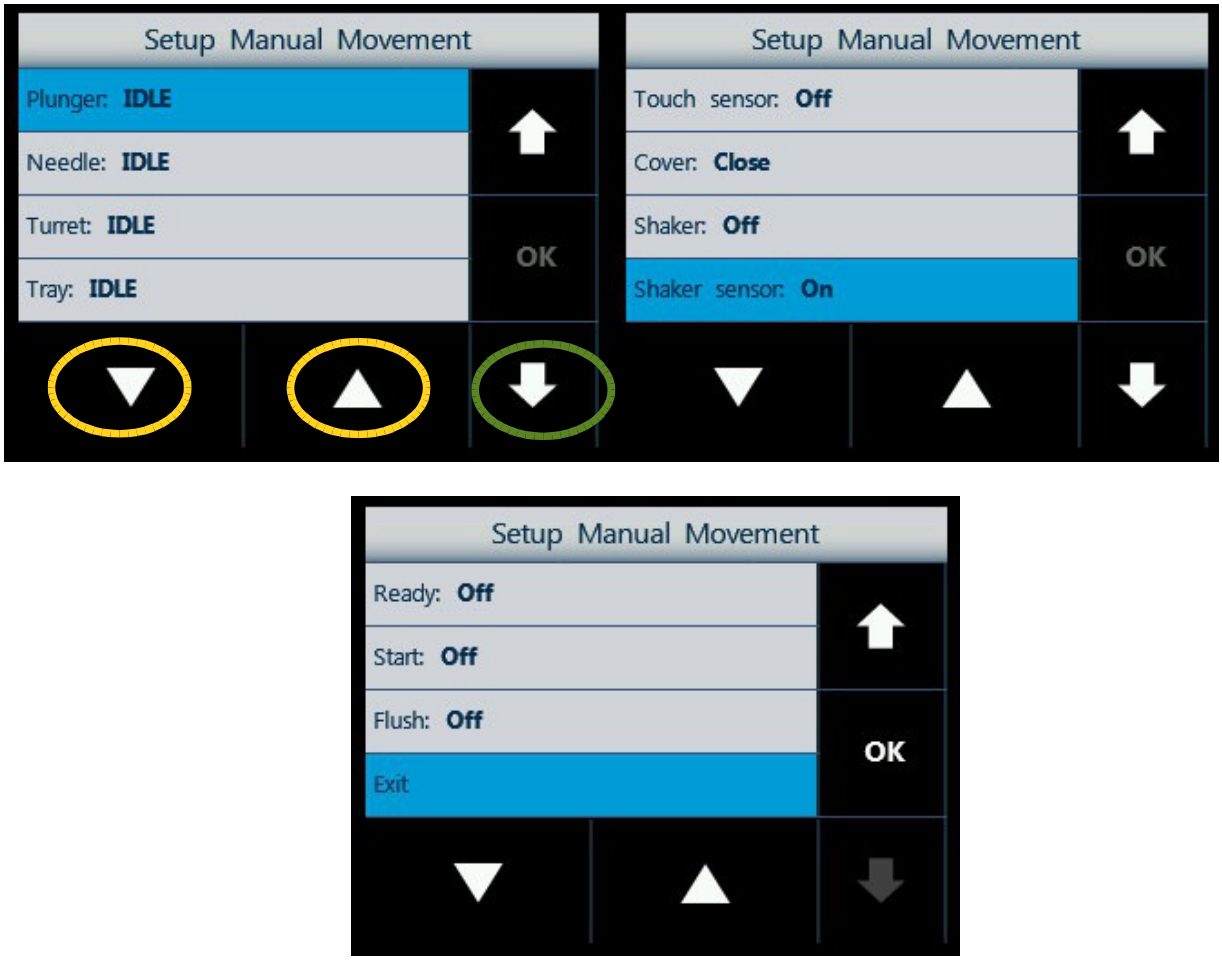


Figure 99: Screen type 7

Select a motor using the arrows on the right (green circle), and use the ▲▼ (yellow circle) arrows to:

- raise (▲) or lower (▼) the plunger;
- raise (▲) or lower (▼) the syringe holder (needle motor);
- rotate the turret to the right hand side (▲) or to the left hand side (▼);
- move the tray towards the open (▼) or towards the closed position (▲) (operation not possible for HT2100H version);
- open (□) or close (□) the oven cover for HT2000H/HT2000HT or the elevator for HT2100H (closed position is the incubation position);
- increase (□) or decrease (□) the shaker;
- increase and start (□) or decrease and stop (□) the fan. Besides the plunger, needle, turret and tray motor, it is written its status:

Run	When the motor is moving
Idle	When the motor is not moving

Error	An error occurred in the movement

The status of the oven cover/elevator can be:

Open	The oven cover is open/ the Elevator is in the highest position (both not suitable for conditioning)
Moving	The oven cover is moving/ the Elevator is moving
Close	The oven cover is closed/ the Elevator is in the lowest position (both suitable for conditioning)

The status of the shaker can be:

Off	The shaker is not active
Very Low clockwise	The shaker is active (very low speed). Clockwise rotation.
Low clockwise	The shaker is active (low speed). Clockwise rotation.
Medium clockwise	The shaker is active (medium speed). Clockwise rotation.
High clockwise	The shaker is active (high speed). Clockwise rotation.
Very High clockwise	The shaker is active (very high speed). Clockwise rotation.
Very Low anti clockwise	The shaker is active (very low speed). Anticlockwise rotation.
Low anticlockwise	The shaker is active (low speed). Anticlockwise rotation.
Medium anticlockwise	The shaker is active (medium speed). Anticlockwise rotation.
High anticlockwise	The shaker is active (high speed). Anticlockwise rotation.
Very High anticlockwise	The shaker is active (very high speed). Anticlockwise rotation.

Press “OK” to move the shaker at the set speed. The status of the fan can be:

Off	The fan is not active
Low	The fan is active (low speed)
Medium	The fan is active (medium speed)

High	The fan is active (high speed)
Very High	The fan is active (very high speed)

Press “OK” to move the fan at the set speed. This screen also shows:

- **Touch sensor**: it is “ON” if the vial locator has detected the presence on an object, or “OFF” if it is not touching.
- **Shaker sensor**: it is “ON” when the shaker is in the position suitable for vial loading and unloading, it is “OFF” in all the other positions (shaker sensor is not available for HT2100H).
- **Ready**: shows the “Ready” signal status (see paragraph 4.2.4.4 “Setup configuration: Input Output”);
- **Start:** shows the “Start” signal status (see paragraph 4.2.4.4 “Setup configuration: Input Output”). By pressing “OK”, this signal is activated for about 1 second.
- **Sync-out**: shows the “Sync-out” signal status. Pressing “OK” this signal is activated.
- **Sync-in**: show the “Sync-in” signal status.
- **Flush:** shows the status of the flushing valve. It is “ON” when the valve is open and the gas can flush the syringe, it is “OFF” when the valve is closed. Press “OK” to change the valve status.

Select “**Exit**” to exit from the “Setup Manual Operation” screen and return to the “Setup” screen (see paragraph 4 “Set Up operations“).

4.2.4 Setup: Configuration

Access sequence: RUN>SETTINGS>SETUP>CONFIGURATION

This is used to define some general settings of the autosampler. The information is shown on multiple pages.

Use this screen to access the following sub menus:

- **Sound**: changes the sound effects of the autosampler (see paragraph 4.2.4.1 ”Setup configuration: Sound”);
- **Light**: changes the syringe illumination settings (see paragraph 4.2.4.2 “Setup configuration: Light“);
- **Run**: changes the settings for the injection sequence (see paragraph 4.2.4.3 “Setup configuration: Run “);
- **Input Output**: changes the input/output parameters to/from the analyzer (see paragraph 4.2.4.4 “Setup configuration: Input Output”);

- **Maintenance**: displays information and changes settings about preventive maintenance counters (see paragraph 4.2.4.5 “Setup configuration: Maintenance“);
- **Advanced**: edits the advanced parameters of the autosampler (see paragraph 4.2.4.6 “Setup configuration: Advanced”);
- **Activation:** enables the optional features of the autosampler (see paragraph 4.2.4.7 “Setup configuration: Activation”).

4.2.4.1 Setup configuration: Sound

Access sequence: RUN>SETTINGS>SETUP>CONFIGURATION>SOUND

- Select “**2**” to emit a sound when the touch screen is tapped;
- Select “**1**” to emit a sound after the end of each single injection, every sample during an automatic run, when “save” or “store” is tapped, or if the autosampler memory is erased;
- Select “**0**” to disable the sound emission.

Tap “SAVE” to store the modification, otherwise “CANCEL”.

Select “**Exit**” to exit from this screen and return to the “Setup Configuration”” screen (see paragraph 4.2.4 “Setup: Configuration“).

4.2.4.2 Setup configuration: Light

Access sequence: RUN>SETTINGS>SETUP>CONFIGURATION>LIGHT

This is used to change the light setting

- Select “**On**” to switch on the syringe illumination;
- Select “**Off**” to switch off the syringe illumination;
- Select: “**Injection**” to switch on the syringe illumination during injection only; Tap “SAVE” to store the modification, or “CANCEL”.

Select “**Exit**” to exit from this screen and return to the “Setup Configuration” screen (see paragraph 4.2.4 “Setup: Configuration”).

4.2.4.3 Setup configuration: Run

Access sequence: RUN>SETTINGS>SETUP>CONFIGURATION>RUN

Use this to change the following operational parameter:

- **Tray Behaviour**: to set tray position during automatic run;

Tray Behaviour	**Closed**: the tray remains closed during run
	Open: the tray remains open during run

This parameter is not editable for the HT2100Hversion.

- **Power-on Restart**: sets autosampler restart after a power failure. It should be set to “ON” only if your GC/analyzer and your data acquisition system are also able to restart automatically;

Power on-Restart	**On**: If the power is lost during a run, when the power comes back on, the autosampler will restart the injection that it was carrying out at the moment of the power failure
	Off: If the power is lost during a run, when the power comes back on, the autosampler will return to the home screen (see paragraph 7.1), without completing the run

- **Injection mode**: sets the predefined injection mode. This parameter is editable only if the system is configured for two injectors. This setting is always used for single injection runs, while during an automatic run it is only used if the injection mode in the injection sequence is set to "Default" (otherwise it will take the mode specified in the injection sequence). See paragraph 5.3.2 "Setting sequence step parameters":

Injection Mode	**Front**: the autosampler injects only in the first injector
	Rear: the autosampler injects only in the second injector
	Confirmation: the autosampler injects the same sample in both injectors (see "Confirmation mode" explanation in paragraph 11 "Appendix A – Glossary").

- **Injection Synchro**: sets the synchronization mode between the autosampler and the analyzer or other instruments during the execution of one or more injections.

Injection Synchro	**The autosampler starts sample preparation**	**The autosampler injects the sample in the injector**	**The autosampler gives the "Start" signal to the analyzer**
Normal	At the reception of the "Ready" signal from the analyzer	After ending sample preparation the autosampler checks again the presence of the "Ready" signal from the analyzer and then starts the injection	At the beginning of the syringe plunger movement
Trigger	As Normal	As Normal	As Normal

Injection Synchro	The autosampler starts sample preparation	The autosampler injects the sample in the injector	The autosampler gives the "Start" signal to the analyzer
A-Start	At the reception of the "Ready" signal from the analyzer	After ending the sample preparation the autosampler checks again for the presence of the "Ready" signal from the analyzer and then starts the injection	When the autosampler touches the injector
D-Start	At the reception of the "Ready" signal from the analyzer	After ending the sample preparation the autosampler checks again for the presence of the "Ready" signal from the analyzer and then starts the injection	At the end of the syringe plunger movement
EA	As Normal		
Normal w/o Rdy	At the end of the analysis time set in the autosampler method (see paragraph 5.2.2.1)	After the ending sample preparation	At the beginning of the syringe plunger movement
DIN (to be set for special application only)	At the reception of the "Ready" signal from the analyzer	No injection is carried out	At the beginning of the syringe plunger movement, when needle has reached the proper depth inside the vial

- **Shaker speed**. It sets the speed of the shaking.
- **Maintenance Warnings**. It sets when the Maintenance Warning messages (see paragraph 4.2.4.5 "Setup configuration: Maintenance") can be displayed.

Maintenance Warning	**Normal**: the Maintenance Warning messages will be displayed at the beginning of each run, if the set limit is reached (see 4.2.4.5).
	Only at Start up: the Maintenance Warning messages will be displayed only at Start up, if the set limit is reached (see 4.2.4.5).

- **User Interface**. It set the modality of the Home screen.

User Interface	**Standard**: The Home screen will be in the Standard modality (to see the functions accessible from this screen see paragraph 7.1.1).
	Quick Start: The Home screen will be in the Quick modality. Quick modality is a simplified modality in which you can start working by simply tapping "Start" (to see the functions accessible from this screen see paragraph 7.1.2).

Select "**Exit**" to exit from this screen and return to the "Setup Configuration"" screen (see paragraph 4.2.4 "Setup: Configuration").

4.2.4.4 Setup configuration: Input Output

Access sequence: RUN>SETTINGS>SETUP>CONFIGURATION>INPUTOUTPUT

From here, it is possible to change the input / output parameters to/from the analyzer:

- **Ready on**: sets the "ON" state of the "Ready" signal. This signal is used to start the sampler and must match the signal given by the analyzer.

Ready on	**Low**: the autosampler starts the injection when the analyzer provides a low logical level of voltage for the "Ready" signal;
	High: the autosampler starts the injection when the analyzer provides a high logical level of voltage (+5V) for the "Ready" signal

- **Start on**: to set the "ON" state of the "Start" signal from the autosampler to the analyzer during the injection. This parameter has to be set according to the analyzer.

	Open: during the injection (for about 1 second) the pins 3 (SAMPINS-NO) and 6 (SAMPINS COM) are open, while before and after the injection they are closed (see paragraph 13.1 GC connector").

Start on	**Close**: during the injection (for about 1 second) the pins 3 (SAMPINS-NO) and 6 (SAMPINS COM) are closed (short-circuit), while before and after the injection they are open (see paragraph 13.1 GC connector").

Select "**Exit**" to exit from this screen and return to the "Setup Configuration"" screen (see paragraph 4.2.4 "Setup: Configuration").

4.2.4.5 Setup configuration: Maintenance

Access sequence: RUN>SETTINGS>SETUP>CONFIGURATION>NEXT>MAINTENANCE

This is used to display information and settings of the preventive maintenance counters:

- **Plunger Strokes Counter**: is the number of plunger strokes performed since the last reset. Select "Plunger Strokes Counter", if you want to reset the number of Plunger Strokes. Tap "ERASE" to reset, otherwise tap "CANCEL". If reset the unit says: "Plunger Stroke Counter has been reset".
- **Plunger Strokes Limit**: is the limit of plunger strokes, at which point a Maintenance Warning message is displayed. Select "Plunger Strokes Limit", if you want to edit it (if you set it to "Off", there is no limit and the warning message never appears);
- **Injection Counter**: is the number of injections performed since the last reset. Select "Injection Counter", if you want to reset the number of injections. Tap "ERASE" to reset, otherwise tap "CANCEL". If you reset this, a notification screen appears: "Injections Counter has been reset";
- **Injection Limit**: is the limit of injection number, at which point a Maintenance Warning message is displayed. Select "Injection Limit", if you want to edit it (if you set it to "Off", there is no limit and the warning message never appears).
- **System integrity test**: if available, it enables or disables the System integrity test execution (see below) at the beginning of each automatic run.

The Plunger Stroke Counter/Limit are to monitor the syringe "wear and tear".

The Injection Counter/Limit are used to monitor the GC and predict when the GC septa or injection liner should be replaced.

Please note:

- The counters are automatically reset when the warning message is cleared;
- The Plunger Stroke Counter is automatically reset after a new syringe installation.

The System integrity kit is sold as an option (see paragraph 1.7.2 "Options"). The System integrity test is used to verify the syringe integrity.

If this test is enabled, at the beginning of each batch, the system performs a check to verify the system integrity through a heuristic procedure. This test is carried out using the System integrity

tool (see ***Figure 1*** and ***Figure 2*** for HT2000H and HT2000HT and ***Figure 9*** for HT2100H).The septum of this tool should be replaced periodically (see paragraph 3.6.3 “System integrity tool installation“).
This check can verify if it is better to replace the syringe (barrel and plunger). Please note that this check does not replace the necessary periodic validations you have to program for the instrument qualification. If the test fails, a warning message appears (see paragraph 8.14 “System integrity test fail“).

Select “**Exit**” to exit from this screen and return to the “Setup Configuration”” screen (see paragraph 4.2.4 “Setup: Configuration“).

4.2.4.6 Setup configuration: Advanced

Access sequence: RUN>SETTINGS>SETUP>CONFIGURATION>NEXT>ADVANCED
This menu is password protected and is only accessible to service representatives.

4.2.4.7 Setup configuration: Activation

Access sequence:RUN>SETTINGS>SETUP>CONFIGURATION>NEXT>Activation
This screen contains a list of 9 optional features (from 1 to 9). Select a feature to enable it (to know if there feature available for activation, contact your sales representative).
A screen showing the following message: “**You are activating the feature X**” (“X” is the feature number) appears.

- Tap **CANCEL** to return to the previous screen.
- Tap **TEMPORARY** to temporarily enable the selected feature (see below how to proceed)**.**
- Tap **FULL**, to definitively enable the selected feature. A password is required for the activation. Please contact your sales representative to get the password.

If you have tapped “TEMPORARY” a screen showing the following message: **“Random number: X”** appears. If this is your first activation attempt, send this random number to your sales representative to obtain the password for the temporary activation. Then tap “CONTINUE” to access the screen for the password entry and temporarily enable the feature. If you haven't received the password yet, from the screen for the password entry you can tap “CANCEL” and retry the activation later. You have only to re-execute the described operations. The unit will re-show you the same random number (because you have already tried the activation, but you haven't complete it). Directly tap “ACTIVATE” to access the screen for the password entry and temporarily enable the feature.

4.2.5 Setup: Service

Access sequence: RUN>SETTINGS>SETUP>SERVICE
This menu is password protected and is only accessible to service representatives.

5 Programming

5.1 HT2100H: Methods and Sequence

HT2100H methods and sequences can only be programmed by PC, using the “HTA Autosampler Manager”. After programming, the HT2100H may be disconnected from the PC and operated by the integrated keypad as described in chapter 6 “HT2100H operations”.

5.2 HT2000H/HT2000HT: Methods

5.2.1 Method Menu

This function is used to edit or view the injection method parameters. Access sequence: RUN>SETTINGS>METHODS

The “RUN: METHODS” screen contains a list of the 10 methods (from 0 to 9) stored in the unit memory.

The methods can be identified by the number or by a name.

The name can only be created or edited using a PC (using the “HTA Autosampler Manager” software). Once the names have been created, they will be visible on the touch screen.

Select a method number/name to enter in the “METHOD X” screen (X is a number from 0 to 9 that can be followed by the method name) and to view or edit its parameters. See paragraph 5.2.2 “Method X: Setting method parameters”.

Select “**Tools**” to access the “METHOD TOOLS” screen (see paragraph 5.2.3 “Method tools “) Tap “**Exit**” to exit from the “RUN: METHODS” screen.

5.2.2 Method X: Setting method parameters

Each method contains a set of analytical parameters. Use this screen to view or edit these parameters.

Access sequence: RUN>SETTINGS>METHODS>METHOD X

In the “METHOD X” screen the following sub menus are available:

- **General:** see paragraph 5.2.2.1;
- **Advanced:** see paragraph 5.2.2.2;
- **Preparation:** see paragraph 5.2.2.3
- **Sample:** see paragraph 5.2.2.4

- **Injection**: see paragraph 5.2.2.5;

Tap "**Exit**" to exit from the "METHOD X" screen.

If one of these parameters has been changed a confirmation screen appears "Modifying Method X". Tap "SAVE" to save the modifications or "CANCEL" to exit without saving. The display will return to the "RUN: METHODS" screen.

5.2.2.1 General parameters

Access sequence: RUN>SETTINGS>METHODS>METHOD X>GENERAL

The following parameters can be viewed/edited:

- **Syringe Volume**: volume of the syringe. The syringe volume affects the limits of other parameters such as speed and volume;
- **Analysis Time**: time of the sample analysis (for details see below).
- **Method Type**: parameter not editable;
- **Preparation Time**: displays how long the autosampler needs to perform a cycle. It is calculated from the instrument and is not editable *(Time needed to transfer the vial from the tray to the incubator, filling time, injection time, etc.).*

Select "**Exit**" to exit from this screen and return to the "RUN: METHOD X" screen (see paragraph 5.2.2 "Method X: Setting method parameters").

Analysis time

The Analysis time is the GC run time plus any additional time needed for the GC to execute any post-run program and then return to a Ready state.

Please consider that the autosampler uses the Analysis time (GC cycle time) to calculate throughput and timing. An accurate Analysis time is crucial to optimizing throughput and for correctly processing samples.

If the Analysis time is too long, this can cause lowered throughput because vials wait longer than needed before processing. If the Analysis time is too short, this can cause sequence faults because the vial may sit too long while waiting for the GC to become Ready. It is better to enter a longer time than needed than to enter too short a time and possibly reduce sample quality.

To determine the Analysis time, program the GC to perform a sequence of two or three blank (no injection) runs. If you are using a Data system, you can determine the cycle time from the data system sequence log and compare the start times for the runs. A good Analysis time is the average difference between the start times, plus 0.2 to 0.5 minutes. If you are not using a Data system, watch the GC. Count the time between the start of the first run and when the GC becomes Ready for the second run, then add 1 minute.

You can also estimate the Analysis time without making a run. By adding the GC oven program duration and the duration of any post-run programs, you can get close to the true cycle time.
Also consider time for data processing. While in most cases data processing is not a problem, a very busy Data system may need extra time between samples.
To validate the Analysis time, look at the GC run time. The Analysis time cannot be less than the total run time. Then look at the GC post run program duration. The Analysis time cannot be less than the total run time plus the post run program duration.
Finally, consider that the GC cooling time may vary according to room temperature: the higher the room temperature is the more time is needed for the GC cooling time; typically it implies a shorter time during winter seasons and a longer time during summer seasons. Therefore, the analysis time should be set according to the worst scenario (summer season).

5.2.2.2 Advanced parameters

Access sequence: RUN>SETTINGS>METHODS>METHOD X>ADVANCED

The following parameters can be viewed/edited:

- **Enrichment Cycle(s)**: the number of enrichments in the injection cycle. The enrichment allows the user to inject a higher quantity of sample.
- NOTE. It is only possible to enrich the sample by multiple injections if the gas chromatograph can support this feature by a proper trapping system.
- **Dwell Between Injections**: delay time between any enrichment, to allow the headspace vial to equilibrate.

Select "**Exit**" to exit from this screen and return to the "RUN: METHOD X" screen (see paragraph 5.2.2 "Method X: Setting method parameters").

5.2.2.3 Preparation parameters

Warning

Only for HT2000HT. Standard version syringe installed in the Standard syringe warmer assembly can not work at temperature higher than 150°C. Do not set higher temperatures. The system can be seriously damaged.

Access sequence: RUN>SETTINGS>METHODS>METHOD X>PREPARATION

The following parameters can be viewed/edited:

- **Syringe Temperature:** temperature of conditioning of the syringe. This value can be between 40°C and 150°C (standard version syringe)/250°C (HT version syringe installed on HT2000HT) or off (inactive conditioning);
- **Oven Temperature:** temperature of conditioning of the oven. This value can be between 40°C[1] and 170°C (for HT2000H)/ 150°C (for HT2100H)/ 300°C (for HT2000HT) or off (inactive conditioning);
- **Incubation:** sample incubation time inside the oven;
- **Shaker On:** interval time during incubation time in which the sample is shaken;
- **Shaker Off:** interval time during incubation time in which the sample is not shaken.

Warning

Do not set an oven temperature lower than the ambient temperature. It could provoke an oven error (see paragraph 8.13 "Oven error").

Select "**Exit**" to exit from this screen and return to the "RUN: METHOD X" screen (see paragraph 5.2.2 "Method X: Setting method parameters").

5.2.2.4 Sample parameters

Access sequence: RUN>SETTINGS>METHODS>METHOD X>SAMPLE

The following parameters can be viewed/edited:

- **Sample Volume**: volume of sample to be injected;
- **Fill Volume:** the volume that the syringe dispenses inside the vial if the "Syringe Prefill" has been selected as "Y*ES",* or the volume that the syringe aspirates and dispenses from the vial during the Pull Up Strokes (if the Pull Up Strokes number set is different from zero);
- **Pull Up Strokes**: the number of pre-aspirate strokes (during each stroke the "Fill Volume" is aspirated and ejected). *This procedure assures a good mix of the sample*.
- **Equilibration Delay:** delay time between sample pick up and the syringe moving from the sample;
- **DHS Time**: to be set for special application only;
- **Sample speed:** speed of the plunger during the syringe filling operation;
- **Syringe Prefill:** syringe-filling mode. You can choose if, when the needle comes in the vial, the syringe plunger has to be pulled up (**YES**) or pushed down (**NO**), before the septum has been pierced.

[1] **Or the minimum oven temperature that can be set in your special autosampler version**

Select “**Exit**” to exit from this screen and return to the “RUN: METHOD X” screen (see paragraph 5.2.2 “Method X: Setting method parameters”).

5.2.2.5 Injection parameters

Access sequence: RUN>SETTINGS >METHODS>METHOD X>INJECTION

The following parameters can be viewed/edited:

- **Injection speed**: the syringe dispensation speed used during injection;
- **Pre Injection Dwell**: the waiting time of the syringe needle inside the injection port before making the injection;
- **Post Injection Dwell**: is the waiting time of the syringe needle inside the injector after the injection;
- **Flush Time:** syringe flush time after the injection.

Select “**Exit**” to exit from this screen and return to the “RUN: METHOD X” screen (see paragraph 5.2.2 “Method X: Setting method parameters”).

5.2.3 Method tools

Access sequence: RUN>SETTINGS>METHODS>TOOLS

In the “METHOD TOOLS” screen (see paragraph 5.2 “HT2000H/HT2000HT: Methods“), the following options are available:

- **Restore Default**: used to load the default settings for a method;
- **Copy Methods**: used to copy the parameters from one method to another.

If you select “RESTORE DEFAULT”, you have to select the method to reset. A confirmation screen appears “Loading default parameter for method X”. Tap “LOAD” to restore the default parameters and “CANCEL” not to make the restore operation. If you select “COPY METHODS”, you have to select the source method and the destination method. Tap “CONTINUE” to confirm and “ABORT” not to make the method copy.

Select “Exit” to exit from this screen and return to the “RUN: METHODS” screen (see paragraph 5.2.1 “Method Menu”).

5.2.4 Example

Below there is an example method, and you can use this to create your own method.

Please keep in mind that the example method should be adapted depending on your analysis technique, analyzer model, inlet type, etc. and therefore this may not be suitable for your application.

5.2.4.1 Typical GC Method

General	**Syringe Volume**	2.5ml
	Analysis Time	[2]
Advanced	**Enrichment Cycle(s)**	1
	Dwell Between Injections	0min
Preparation	**Syringe Temperature**	40 to 150°C-250°C[3]
	Oven Temperature	40[4] to 150°C-170-300°C[5]
	Incubation	[6]
	Shaker On	0.2
	Shaker Off	0.1
Sample	**Sample Volume**	0.5
	Fill Volume	1ml
	Pull Up Strokes	2
	Equilibration Delay	1s
	DHS Time	[7]
	Sample speed	6ml/min
	Syringe Prefill	No
Injection	**Injection Speed**	15-30ml/min
	Pre Injection Dwell	1
	Post Injection Dwell	3
	Flush TIme	3min (1 bar)

[2] GC Cycle Time: GC run time plus any additional time needed for the GC to execute any post-run program, then return to a Ready state.

[3] Value depends on application. Typically: Oven Temperature plus 10°C. 150°C is the maximum temperature for the standard version syringe, while 250°C is the maximum temperature for the high temperature version installed on HT2000HT.

[4] Or the minimum oven temperature that can be set in your special autosampler version

[5] Value depends on application. Consider boiling point of solvent. 170°C is the maximum temperature that can be set for HT2000H, 150°C is the maximum temperature that can be set for HT2100H, 300°C is the maximum temperature that can be set for HT2000HT.

[6] The incubation time has to be established with method development 1.6 "Functions available only through HTA Autosampler Manager".

[7] To be set for special application only.

5.3 HT2000H/HT2000HT: Sequence

5.3.1 Sequence Menu

This function is used to edit a sample list (later refered to as Sequence). Access sequence: RUN>SETTINGS>SEQUENCES

The sequence is a program (a list of instructions) that defines a series of injections also know as an Automatic Run (see paragraph 7.3 “Automatic run”). The program has 16 steps (1 to 16). Each step defines different parameters involved in the injection cycle (tray type, method, first sample, last samples, cycles etc..). Each step can work alone or with other steps (see para 7.3 “Automatic run”).

The “RUN: SEQUENCES” screen displays the sequence steps stored in the autosampler memory. The steps can be identified by the number or by a name.

The name can only be created or edited using a PC. Once the names have been created, they will be visible on the touch screen.

Select a step number/name to enter the “STEP X” screen (X is a number from 0 to 16, that can be followed by the step name) to view or edit the parameters. See paragraph 5.3.2 “Setting sequence step parameters”).

Select “**Tools**” to access to the “SEQUENCE TOOLS” screen (see paragraph 5.3.3 “Sequence tools”)

Tap “**Exit**” to exit from the “RUN: SEQUENCES” screen.

5.3.2 Setting sequence step parameters

This screen is used to display or edit a sequence step. Access sequence: RUN>SETTINGS>SEQUENCES>STEP X

In the “STEP X” screen (to see how reach this screen see paragraph 5.3 “HT2000H/HT2000HT: Sequence“), the following parameters are available:

- **Tray type:** specifies the type of tray to use;
- **Method:** specifies the method to be used;
- **First Sample**: specifies the number of the first vial to run;
- **Last Sample:** specifies the number of the last vial to run; all the vials from the first sample to the last sample position will be run. Therefore, the last sample must be equal to or higher than the first sample;
- **Injection Mode:** can have one of the following values:

Default	Uses the injection port defined in the Setup (see paragraph 4.2.4.3 “Setup configuration: Run”)
Front	Injects only in the first injector
Rear	Injects only in the second injector

Confirmation	It injects the same sample in both front and rear injectors (see paragraph 11 “Appendix A – Glossary”.

- **Name**: shows the name of the sequence step.

Tap “**Exit**” to exit from the “STEP X” screen.

If any parameters have been changed, a confirmation screen appears stating “Modifying sequence step X”. Tap “SAVE” to save the modifications or “CANCEL” to exit without saving.

The display return to the “RUN: SEQUENCES” screen.

5.3.3 Sequence tools

Access sequence: RUN>SETTINGS>SEQUENCES >TOOLS

In the “SEQUENCE TOOLS” screen (to see how to reach this screen, see paragraph 5.3 “HT2000H/HT2000HT: Sequence“), the following options are available:

- **Add New**: adds a new sequence step;
- **Copy as New**: creates a new sequence step by copying parameters from an existing one;
- **Reorder:** changes the order of the sequence steps;
- **Remove**: removes a sequence step.

If you select “ADD NEW” the following message appears: “A new step has been added at position X”. Tap “CONTINUE” to confirm.

If you select “COPY AS NEW”, first select the source step to copy, then the following message appears “A new step has been copied at position X”. Tap “CONTINUE” to confirm.

If you select “REORDER”, you have to select the new step position (target position) and tap “MOVE”. A screen appears: “Step X has been moved to position Y”. “Y” will be the new step position.

If you select “REMOVE”, you have to select the step to remove, and then a screen appears: “Step X has been removed”. Tap “CONTINUE” to confirm.

Select “Exit” to exit from this screen and return to the “RUN: SEQUENCES” screen (see paragraph 5.3.1 “Sequence Menu “).

6 HT2100H operations

6.1 Keys

Warning

The virtual screen is available only with LAN connection. It is not available with RS232 connection.

On the keypad there are 4 keys: **Move, Start, Purge, Stop.** They have different functions depending on the autosampler status:

During operations:

- **MOVE** moves the turret from the stand-by position to the injection area (to allow sample loading) and vice versa.
- **START/Upward arrow** starts a sample sequence. All the samples in the rack will be processed (the injection parameters are defined on the PC).
- **PURGE/Downward arrow** performs a syringe purge (as defined with the PC).
- **STOP** pauses or aborts the current operation. Specifically:
    - Pressing once, pauses the operations.
    - Then:
        - pressing START resumes the operation;
        - pressing STOP again, aborts the operations.

On error (excluding blocking[8] error):

- **MOVE** changes the selected motor.
- **START/Upward arrow** moves the selected motor up or clockwise.
- **PURGE/Downward arrow** moves the selected motor down or anticlockwise.

[8] **Non-blocking errors may be resolved without PC usage.**
Blocking errors require you to connect the autosampler to a PC in order to get additional information about the error type and possible solutions.

- **STOP** should be pressed as soon as the error condition has been fixed.
  - press once to retry the operation;
  - press twice to abort current operations.

6.1.1 Keys Settings

"HTA Autosampler Manager" can define the function of the "PURGE" and "START" keys.

In "HTA Autosampler Manager", select "Auxiliary" tab and then "Key Settings". If additional help is needed, please refer to "HTA Autosampler Manager" online help.

6.2 Status Indicators

On the keypad there are 4 LEDs: **Err, Set, Run, Rdy.**

6.2.1 Reference table

Legend:

○ OFF

● ON

★ Blinking

Err	Set	Run	Rdy	Meaning
○	○	○	○	Autosampler is OFF. Press main switch on the back to power it ON.
●	●	●	●	Initialization in progress. Please wait for initialization to be completed.
★	★	★	★	Blocking error detected. Please connect "HTA Autosampler Manager" and check "Virtual Screen" tab in order to get more information about error type.
○	○	○	●	Autosampler is ready to accept new commands.
○	○	●	○	Autosampler is busy while executing a sample sequence or a single wash.
○	○	★	○	Autosampler is in PAUSE status. Press START to resume. Press STOP to abort.
○	○	★	★	Autosampler is aborting operations in progress.

Err	Set	Run	Rdy	Meaning
○	●	○	○	Autosampler is in SETUP mode. SETUP mode may be entered in an automatic way (error detected) or in a manual way (by PC software). Please connect “HTA Autosampler Manager”, if not connected yet, and act on the “Virtual Screen” tab to exit from the SETUP mode. While in SETUP mode, no operations (start of sample sequence, syringe wash) are allowed.
●	●	○	○	A non-blocking error has occurred. Plunger motor is selected. Keypad enters in error modality: • by acting on the “Upward arrow” / “Downward arrow” key you can move the selected motor • by pressing the “MOVE” key you can select a different motor • by pressing the “STOP” once to retry the operations that have generated the error. • by pressing the “STOP” twice to abort the operations that have generated the error.
●	○	●	○	A non-blocking error has occurred. Needle motor is selected. Keypad enters in error modality: • by acting on the “Upward arrow” / “Downward arrow” key you can move the selected motor • by pressing the “MOVE” key you can select a different motor • by pressing the “STOP” once to retry the operations that have generated the error. • by pressing the “STOP” twice to abort the operations that have generated the error.
●	○	○	●	A non-blocking error has occurred. Turret motor is selected. Keypad enters in error modality: • by acting on the “Upward arrow” / “Downward arrow” key you can move the selected motor • by pressing the “MOVE” key you can select a different motor • by pressing the “STOP” once to retry the operations that have generated the error. • by pressing the “STOP” twice to abort the operations that have generated the error.

Err	Set	Run	Rdy	Meaning
●	○	○	○	A non-blocking error has occurred on Touch Sensor. No motor is selected. Keypad has entered in error modality: • by pressing the “MOVE” key you can select a motor • by acting on the “Upward arrow” / “Downward arrow” key you can move the selected motor • by pressing the “STOP” once to retry the operations that have generated the error. • by pressing the “STOP” twice to abort the operations that have generated the error.
●	○	●	●	A non-blocking error has occurred. Elevator motor is selected. Keypad enters in error modality: • by acting on the “Upward arrow” / “Downward arrow” key you can move the selected motor • by pressing the “MOVE” key you can select a different motor • by pressing the “STOP” once to retry the operations that have generated the error. • by pressing the “STOP” twice to abort the operations that have generated the error.

7 HT2000H/HT2000HT Operations

7.1 Home screen

After the START UP procedure, the autosampler will move the turret to the central position, and the touch screen shows the Home screen.

The Home screen is available in two modalities: Standard (see paragraph 7.1.1) and Quick Start (see paragraph 7.1.2 “Home screen: Quick Start User Interface”).

The Quick Start modality is a simplified modality in which you can start working by simply tapping “Start” (for details see paragraph 7.1.2 “Home screen: Quick Start User Interface”).

To modify the Home screen modality, set the User Interface (see paragraph 4.2.4.3 “Setup configuration: Run”).

7.1.1 Home screen: Standard User Interface

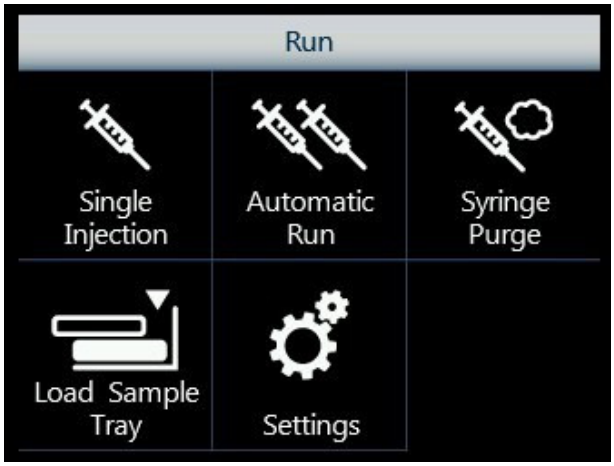


Figure 100: Home screen: Standard user Interface

From here, it is possible to access the following functions:

- **Single Injection:** performs an injection from a specific sample vial (see paragraph 7.2);
- **Automatic Run:** performs an automatic cycle of injections from different sample vials (see paragraph 7.3)
- **Syringe Purge:** flushes the syringe with gas (see paragraph 7.4);
- **Load Sample Tray:** opens the tray to load/unload the samples (see paragraph 7.5)
- **Settings:** accesses other autosampler functionalities and menus (see paragraph 7.6).

Tap one of these options to enter the respective sub menu.

To move to the Quick Start User Interface, see paragraph 4.2.4.3 “Setup configuration: Run”).

7.1.2 Home screen: Quick Start User Interface

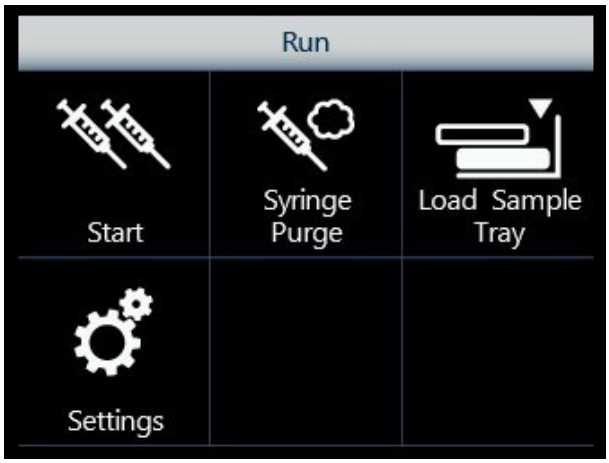


Figure 101: Home screen: Quick User Interface

From here, it is possible to access the following functions:

- **Start:** the autosampler will run all the stored sequence steps (see 5.3.1 “Sequence Menu “) processing all the vials set in each sequence step (note that after detecting two empty positions it will automatically stop).
- **Syringe Purge:** purges the syringe with gas (see paragraph 7.4);
- **Load Sample Tray:** opens the tray to load/unload the samples (see paragraph 7.5).
- **Settings:** accesses other autosampler functionalities and menus (see paragraph 7.6). Tap one of these options to enter the respective sub menu.

To move to the standard User Interface, see paragraph 4.2.4.3 “Setup configuration: Run”).

7.2 Single injection

This function is used to carry out one or more injections from a single vial. Access sequence: RUN>SINGLE INJECTION.

In the “Single Injection” screen you need to define the injection parameters:

- **Method**: (from 0 to 9);
- **Sample**: the vial position of the sample to be injected (e.g.: A.2).

Select “**Start Injection**” to perform the single injection. During the single injection, the status information is displayed. Tap “STOP” to stop the procedure and then “ABORT” to confirm or “RESUME” to continue the single injection procedure.

Select “**Exit**” to exit from the “Single Injection” screen and return to the home screen.

7.3 Automatic run

This function is used to carry out a sequence of injections from different sample vials. Access sequence: RUN>AUTO RUN.

In the "Automatic Run" screen you need to define the following parameters:

- **First step**: sets the first step of the sequence;
- **Last step**: sets the last step of the sequence;
- *It is only possible to select existing steps: numbers corresponding to non-existent steps will not be displayed. To set-up or modify a sequence please refer to paragraph 5.3 "HT2000H/HT2000HT: Sequence". The Last Step must be equal to or greater than the First Step: for example if you set the "First step" as "5", the last step must be "5" or higher (6-7-8-9 etc...).*
- **Run-All-Samples**: select one of the following values:

Yes	"Run-All-Samples" function is active: after two empty positions on the rack, the autosampler will stop and will not continue with the other vials set in the sequence
No	"Run-All-Samples" function is not active: after two empty positions on the rack, the autosampler will not stop and will continue looking for the other vials in the sequence

*The "Run-All-Samples" function can be used to run a lower set of samples than normal without having to program a separate sequence. In the sequence step, set the "Last vial" (see paragraph 5.3 "*HT2000H/HT2000HT: Sequence*") to the last vial position in the rack (G.6 for HT2000H/HT2000HT, see paragraph 2.1.1.2 "*HT2000H/HT2000HT Sample rack*"), even if there are fewer samples. If the "Run-All-Samples" function is active (select "Yes") and the run is started, then the autosampler will process all the samples available, and after detecting two empty positions it will automatically stop. This option allows the operator to always use the same sequence of steps (without needing to change the first and last vials every time), even if* the number of samples to process *changes from time to time.*

Select "**Start Automatic run**" to start the automatic run.

During the automatic run, a screen ("AUTOMATIC RUN EXECUTION") displays status information.

Select:

“MENU” to display method or sequence information; to inject the sample immediately (see paragraph 7.3.2 “Immediate Injection “), to skip the sample injection (see paragraph 7.3.3 “Skip Next Vial option “), or to add or remove samples in the tray/s; “STOP” to end the automatic run (see paragraph 7.3.1 “Interrupting an automatic run).

Select “**Exit**” to exit from the “Automatic Run” screen and return to the home screen.

7.3.1 Interrupting an automatic run

During the automatic run, from the “AUTOMATIC EXECUTION SCREEN” (see paragraph 7.3 “Automatic run”), tap “**STOP**” to stop the procedure, then:

- tap “**ABORT**” to stop the unit immediately;
- tap “**TERMINATE OVEN**” to continue the execution of the samples present in the oven;
- tap “**RESUME**” to continue operations as before.

7.3.2 Immediate Injection

During the automatic run, the “AUTOMATIC EXECUTION SCREEN” is displayed (see paragraph 7.3 “Automatic run“). Then follow the access sequence: AUTOMATIC EXECUTION SCREEN>MENU>IMMEDIATE INJECTION

This function can only be activated during the sample conditioning. When this option is activated the autosampler stops the current sample conditioning and immediately injects it.

Once the immediate injection has been made, the autosampler will re-start the automatic injection procedure from the point of interruption.

7.3.3 Skip Next Vial option

During the automatic run, the “AUTOMATIC EXECUTION SCREEN” is displayed (see paragraph 7.3 “Automatic run“). Then follow the access sequence: AUTOMATIC EXECUTION SCREEN>MENU>SKIP NEXT VIAL

This function can only be activated during the sample conditioning. When this option is activated, the autosampler stops the current sample conditioning and replaces the sample to its original position of the tray without injecting it.

The autosampler will re-start the automatic injection procedure from the point of interruption.

7.4 Syringe purge

Warning

Only for HT2000HT. Standard version syringe installed in the Standard syringe warmer assembly can not work at temperature higher than 150°C. Do not set higher temperatures. The system can be seriously damaged.

This function is used to purge the syringe with gas. Access sequence: RUN>SYRINGE PURGE.
In the "Syringe Purge" screen you can set:

- **Flush Time**: sets how long the syringe purge must take;
- **Purge Temperature**: sets the syringe purging temperature. This value can be between 40°C and 150°C (standard version syringe)/ 250°C (high temperature syringe installed on HT2000HT) or off (inactive conditioning);

Select "**Start Purge**" to run the syringe purge. Whilst the syringe is being purged the unit will display the status information. Tap "STOP" to stop the procedure.
Select "**Exit**" to exit from the "Start Purge" screen and return to the home screen.

7.5 Load and Unload Sample Vial

Access sequence: RUN>LOAD SAMPLE TRAY The unit will open the tray.
When the tray is open, samples can be loaded or removed. Tap "CLOSE" to close the tray after sample loading/unloading.

7.6 Settings Menu

Access sequence: RUN>SETTINGS
In this screen the following sub menus are available:

- **Methods:** see paragraph 5.2 "HT2000H/HT2000HT: Methods";
- **Sequences:** see paragraph 5.3 "HT2000H/HT2000HT: Sequence";
- **Tray Type:** see paragraph 7.6.1 "Change tray/rack type";
- **View Parameters:** see paragraph 4.1 "View Parameters";

- **Setup:** see paragraph 4.2 “Setup”;

Eco Savings: used to set the stand by parameters (see paragraph 7.6.2 “Eco Savings”). Tap “**Exit**” to exit from the “RUN: SETTINGS” screen and return to the home screen.

7.6.1 Change tray/rack type

This function is used to change the rack type to be used during the run.

This operation has to be performed when the autosampler is installed on a GC. Access sequence: RUN>SETTINGS>TRAY TYPE

In the “TRAY TYPE” screen you will see a list of the racks stored in the unit memory.

The racks are described by the number of vial positions, dimension of sample vials and needle draw depth inside the sample vial (example: 42-10ml-25mm). Select the rack type to install. If the rack is not shown in the tray list it has to be created (see paragraph 4.2.1.5 “Alignment: Tray Install”).

A wizard for mounting the new rack/s starts. Follow it:

- if necessary, remove the old rack (do not do this during autosampler installation);
- install the new rack (see paragraph 7.6.1.1 “Rack mounting” for mounting the rack in the correct way)
- Place a vial in the indicated position. Tap “Continue” to go on, otherwise “ABORT”;
- The unit will ask to run the touch procedure. This can be run (recommended) or skipped.

Warning

If the dimension of the sample vials has been modified (6ml-10ml-20ml), the user has to install or remove (if present) the spacers using the suitable tweezers (Spacers kits are sold as options, see paragraph 1.7.2 “Options“). In particular for HT2000H/HT2000HT, the spacers must be installed in the six positions of the oven and for HT2100H, the spacers must be installed in the 14 positions of the sample rack and in the single position of the oven.

Select “**Exit**” to exit from the “TRAY TYPE” screen.

7.6.1.1 Rack mounting

Place the rack in the tray paying attention that the letter A has to face toward the operator (see figure below).

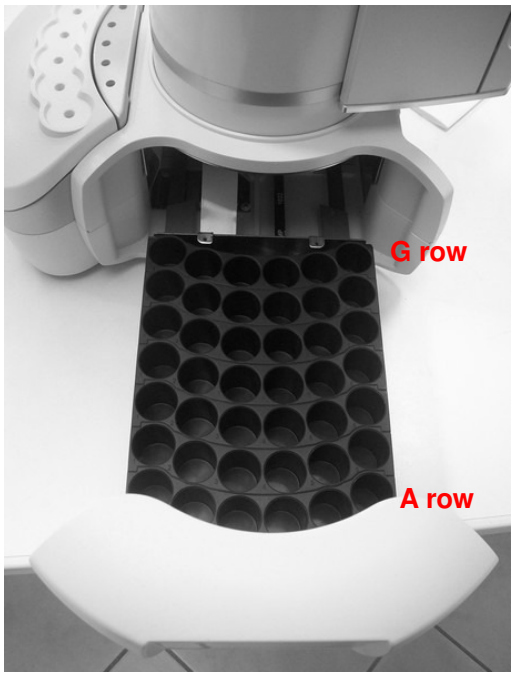


Figure 102: HT2000H/HT2000HT rack placing

7.6.2 Eco Savings

Warning

Only for HT2000HT. Standard version syringe installed in the Standard syringe warmer assembly cannot work at temperature higher than 150°C. Do not set higher temperatures.

This function is used to set the stand by temperatures. Access sequence: RUN>SETTINGS>ECO SAVINGS In the "Eco Savings" screen you can set:

- **St by syringe**: sets the syringe stand by temperature. This value can be between 40°C and 150°C (standard version syringe)/ 250°C (HT version syringe installed on HT2000HT) or off (inactive conditioning);
- **St by oven**: sets the oven stand by temperature. This value can be between 40°C[9] and 170°C (for HT2000H)/ 150°C (for HT2100H)/ 300°C (for HT2000HT) or off (inactive conditioning);

[9] **Or the minimum oven temperature that can be set in your special autosampler version**

- **St by flush:** allows the user to open or close the valve that controls the purging gas flow inside the syringe. Select one of the following values:

On	The valve is open and the gas is flushing inside the syringe
Off	The valve is closed.

Select "**Exit**" to exit from the "Eco Savings" screen and return to the home screen.

8 Troubleshooting

8.1 Introduction

Warning

Troubleshooting must be handled by competent personnel, properly trained with the procedures described in this manual: any missing or different execution of the described procedures can cause damage to the autosampler or to the person working on it.
However, in particular, pay attention to the moving parts such as the sledge, syringe, needle etc...
Wrong operations could cause damage to the syringe and/or to the autosampler.

Warning

Some parts of the autosampler (oven, syringe, needle or vials) can work at high temperatures. Be careful to avoid burns. Allow these parts to cool down before handling them.

The list of the possible errors generated by the autosampler are summarized in this chapter.
If the solutions given do not solve the problem, please contact your Supplier or the Technical Assistance Centre.
Before calling the Technical Assistance Centre please check that:
all instructions were carefully followed;

- all the options listed were tried;
- all cables are connected correctly.

8.2 Start up errors

8.2.1 Safety lock error

Error message:

“Is safety lock in operating position? If NO, switch off and check user manual”

Causes:

- Autosampler has not been moved from the shipping to the operating position, before the autosampler was switched on (see paragraph 3.3.2 “Safety Lock setting”).
- Touch sensor is not working correctly.

Solution:

- If the autosampler has not been moved from the shipping to the operating position, as suggested by the error message, switch off the autosampler and set the safety lock as described in paragraph 3.3.2 “Safety Lock setting”). Then switch on the autosampler.
- If the safety lock setting has already been performed, there is a mechanical problem. Tap “YES” and see paragraph 8.4 “Touch Sensor problems”.

8.2.1 Vial locator error

Error message:

“Attention! Vial locator in critical position! Press Disengage and move the vial locator to a safe position, then press Exit "

Causes:

Autosampler was switched off suddenly, while the vial locator was picking up/replacing a vial.

Solution:

Tap “DISENGAGE” to enter the screen from which it is possible to move the motors (see paragraph 4.2.3 “Setup: Manual operations“).

Raise the needle motor. If present, remove the vial from the vial locator and replace it in its original position. Check that all the vials are correctly positioned in the rack.

Finally tap “EXIT”.

8.2.2 Memory error

8.2.2.1 BMO reading error

Error message:

“Error during BMO reading!"

Causes:

Autosampler cannot read the Border Mark Out parameters.

Solution:

Tap “CONTINUE”. The “Setup: Service” screen appears (see paragraph 4.2.5 “Setup: Service”). Contact your Supplier or the Technical Assistance Centre to solve the problem.

8.2.2.2 Method reading error

Error message:

“Error during methods reading!"

Causes:

Autosampler cannot read the parameters of the saved methods.

Solution:

Tap “CONTINUE”. Try to switch on-off the autosampler. If the error message appears again, contact your Supplier or the Technical Assistance Centre to solve the problem.

8.2.2.3 Sequence reading error

Error message:

“Error during sequences reading!"

Causes:

Autosampler cannot read the param.eters of the saved sequences.

Solution:

Tap “CONTINUE”. Try to switch on-off the autosampler. If the error message appears again, contact your Supplier or the Technical Assistance Centre to solve the problem.

8.3 Method errors

8.3.1 Fill Volume/Pull Up Strokes settings incompatibility

Error message:

“Please add a volume for Fill Volume or set to 0 Pull-up strokes”

Causes:

You have set a “Fill volume” to zero, but you have set “Pull Up Strokes” to a value different to zero. These settings are not compatible.

Solution:

Tap “CONTINUE” to edit the method (set “Fill volume” to a value different from zero or set the “Pull Up Strokes” to zero).

8.3.1 Fill volume/Syringe Pre-Fill settings incompatibility

Error message:

“Please add a volume for Fill Volume or set to NO Syringe Pre-Fill”

Causes:

You have set a “Fill volume” to zero, but you have set the Syringe Pre-Fill to “YES”. These settings are not compatible.

Solution:

Tap “CONTINUE” to edit the method (set “Fill volume” to a value different from zero or set the “Syringe Pre-fill” to NO).

8.4 Touch Sensor problems

Error message:

“Warning: Check Touch Sensor!”

Causes:

Touch sensor is not working correctly (normally always on). It is possible that there are mechanical problems.

Solution:

Tap “DISENGAGE” to enter the screen from which it is possible to move the motors to try to unlock the system and solve the problem (see paragraph 4.2.3 “Setup: Manual operations“).

Ensure that the vial locator can move up and down freely and that the left safety lock is higher than the right lock (see paragraph 3.3.2 “Safety Lock setting”)

To exit manual operations, tap “EXIT”**.** If the problem is solved, the autosampler will re-start the Automatic run procedure from the point of interruption.

8.5 Falling vials

In most cases if a vial falls during transport the problem is due to an incorrectly crimped cap (see paragraph 3.7.1 “Vial capping (Crimping Cap)“ for correct vial capping).

Warning

The autosampler only works properly by using vials with a round bottom. It has been tested with vial types reported in 12.2 “Sample vials“.

To reduce this problem, the crimping tool should be regularly checked to ensure that the cap cannot turn once it is crimped, and that the under edge of the cap is flush with the vial lip. Also, check that any obstacles do not hinder the turret and that the vial handlers at the end of the arm are clean.

In that case we recommend to check:

- check the vial handlers are not broken;
- check the vial, septa and the crimp cap*;*
- check if the turret has had an unexplained collision with some object, and if vial handlers or the vials are dirty.
- check the turret alignment, if not correct, contact your Supplier or the Technical Assistance Centre.

8.6 Obstacle found

Error message:

“Warning: Obstacle found over the X!” “Try to remove the obstacle”

(Where “X” can be a sample vial, a position in the oven or the front or rear Injector)

Causes:

The autosampler has found an obstacle over the indicated position.

Solution:

Remove the obstacle. If necessary, tap “DISENGAGE” to enter the manual operation screen to move the motors and unlock the system (see paragraph 4.2.3 “Setup: Manual operations“). To exit manual operations, tap “EXIT”**.**

Tap “RETRY” to re-start the Automatic run procedure from the point of interruption.

If the problem persists, the Touch & Plunger procedure must be repeated 4.2.1.4 “Alignment: Touch Plunger Zero”).

8.7 Obstacle found during cover movement

Error message:

“Warning: Obstacle found during cover movement!” “Try to remove the obstacle”

Causes:

The autosampler has found an obstacle during cover movement

Solution:

Remove the obstacle. If necessary, tap “DISENGAGE” to enter the manual operation screen to move the motors and unlock the system (see paragraph 4.2.3 “Setup: Manual operations“). To exit manual operations, tap “EXIT”**.**

Tap “RETRY” to re-start the Automatic run procedure from the point of interruption.

8.8 Mismatch errors

8.8.1 Single injection mismatch error

If the method parameters conflict with those defined in “setup”, the unit will display an error message.

Examples are shown below.

Syringe Volume mismatch

Error message:

“Warning: Run Error Parameters” “Method X: Syringe Volume mismatch”

(Where “X” is the method used for the single injection)

Causes:

The syringe volume set during installation (see paragraph 4.2.2 “Setup: Syringe warmer assembly installation “) is different from the syringe volume set in the method (5.2.2.1 “General parameters”).

Solution:

Tap “EXIT” and/or:

edit the syringe volume set in the method;

replace the syringe with one that has the correct capacity;

change the syringe volume set during installation if this doesn't match the installed syringe.

Restart the single injection.

8.8.2 Automatic run mismatch errors

If the method parameters in any part of an automatic run conflict with those defined in “setup”, the unit will display an error message. The unit will show where the problem occurs. These include the following:

8.8.2.1 Syringe Volume mismatch

Error message:

“Warning: Run Error Parameters”

“Step X: Syringe Volume mismatch in Method Y”

(Where “X” is the sequence step and “Y” is the method used)

Causes:

The syringe volume set during installation (see paragraph 4.2.2 “Setup: Syringe warmer assembly installation “) is different from the syringe volume set in the method used (5.2.2.1 “General parameters”).

Solution:

Tap “EXIT” and/or:

edit the syringe volume set in the method;

replace the syringe with one that has the correct capacity;

change the syringe volume set during installation if this doesn't match the installed syringe.

Then restart the automatic run.

8.8.2.2 Tray Type mismatch

Error message:

“Warning: Run Error parameters” “Step X: Tray Type mismatch” *(Where “X” is the sequence step)*

Causes:

The tray type set in the “TRAY TYPE” screen (see paragraph 7.6.1.1 “Rack mounting”) is different from that set in the sequence step (see paragraph 5.3.2 “Setting sequence step parameters“).

Solution:

Tap “EXIT” and/or:

- change the tray type set in the sequence step to match the installed tray (see paragraph 5.3.2 “Setting sequence step parameters“);
- change the tray type set in the “TRAY TYPE” screen (see paragraph 7.6.1 “Change tray/rack type”) to match the installed tray.
- replace installed tray with the correct one (see paragraph 4.2.1.5 “Alignment: Tray Install”) and change the tray type set in the “TRAY TYPE” screen (see paragraph 7.6.1 “Change tray/rack type”).

Then restart the automatic run.

8.8.2.3 Injection Mode mismatch

Error message:

“Warning: Run Error parameters” “Step X: Injection Mode mismatch”

Causes:

The injection mode in the sequence step (see paragraph 5.3.2 “Setting sequence step parameters“) is different from the injector type/number in the setup (see paragraph 4.2.1 “Setup: Alignment “).

Example: only one injector is defined in setup, but “Rear” or “Confirmation” injection mode is used in the sequence step.

Solution:

Tap “EXIT”. Modify the injection mode in the sequence step (see paragraph 5.3.2 “Setting sequence step parameters“) or the injector type/number in setup setup (see paragraph 4.2.1 “Setup: Alignment “). In the latter case run the injector alignment.

Restart the automatic run.

8.9 Missing errors

8.9.1 Missing: front injector alignment

Error message:

“Missing: front injector alignment”

Causes:

Front injector alignment (4.2.1.2 “Alignment: Front Injector”) has not been performed after the change of Analyzer brand or model (4.2.1.1 “Alignment: Analyzer Default”).

Solution:

Perform the Front injector alignment (4.2.1.2 “Alignment: Front Injector”).

8.9.2 Missing: rear injector alignment

Error message:

“Missing: rear injector alignment”

Causes:

Rear injector alignment (4.2.1.3 “Alignment: Rear Injector”) has not been performed after the change of Analyzer brand or model (4.2.1.1 “Alignment: Analyzer Default”).

Solution:

Perform the Rear injector alignment (4.2.1.3 “Alignment: Rear Injector”).

8.9.3 Missing: touch & plunger zero

Error message:

“Missing: touch & plunger zero”

Causes:

“Touch Plunger Zero” procedure is missing (“4.2.1.4 “Alignment: Touch Plunger Zero”).

Solution:

Execute the “Touch Plunger Zero” procedure (“4.2.1.4 “Alignment: Touch Plunger Zero”).

8.10 Timeout error

8.10.1 Peripheral communication timeout

Error message:

"Time-out communication with peripheral: X"

(Where "X" can be Plunger, Needle, Turret, Tray, Shaker etc...).

Causes:

The communication with the a peripheral fails.

Solution:

Tap "RETRY" to retry the communication with the peripheral.

Tap "DISENGAGE" to enter in the screen from which it is possible to move the motors to try to unlock the system and to solve the problem 4.2.3 "Setup: Manual operations").

Tap "ABORT" to stop the operations.

If the problem isn't solved, switch the autosampler OFF, wait 30 seconds and switch it ON again. Retry the operation.

If the problem persists contact the Technical Assistance Centre, supplying the error message.

8.11 Mechanical errors

Error message:

"Name motor error: Code XXX"

(Where "Name motor" can be Plunger, Needle, Turret, Tray, Shaker and "XXX" specifies the error).

The code is useful for technical purposes but does not give a definitive cause.

Causes:

The autosampler can not complete a movement.

Solution:

Check the unit for obstacles and remove if present. You can tap "DISENGAGE" to enter "Manual operations" and move the locked motors and try to solve the problem (see paragraph 4.2.3 "Setup: Manual operations"). Tap "EXIT" to return to the main menu

If the problem isn't solved, switch the autosampler OFF, wait 30 seconds and switch it ON again. Retry the operation.

If the problem persists contact the Technical Assistance Centre, supplying the error message and error code.

8.12 Heating errors

Error message:

“Warning”

“Y heater: Code XXX Oven: ZZZ°C(WWW°C) Syringe: KKK°C(JJJ°C)

(“Y” can be the Oven or the Syringe according to the heater that has generated the error, “XXX” specifies the error, “ZZZ” is the set temperature for the oven, “WWW is the read temperature for the oven, “KKK” is the set temperature for the syringe, “JJJ” is the set temperature for the syringe). The code is useful for technical purposes but does not give a definitive cause.

Causes:

The autosampler can not complete an operation.

Solution:

Tap “ABORT” to stop the operations. Retry the operation.

If the problem is not solved, switch the autosampler OFF, wait 30 seconds and switch it ON again. Retry the operation.

If the problem persists contact the Technical Assistance Centre, supplying the error message and error code.

8.13 Oven error

Error message:

“Oven error: 8 1”

Causes:

The current ambient temperature is lower than the oven temperature set in the method (see paragraph 5.2.2.3 “Preparation parameters”).

Solution:

Set an oven temperature in the method (see paragraph 5.2.2.3 “Preparation parameters”) higher than the ambient temperature.

8.14 System integrity test fail

Error message:

“The System Integrity test is failed. Please check the integrity of the syringe”

Causes:

The possible causes are:

- Septum of the System integrity tool must be replaced.
- Syringe (barrel and plunger) must be replaced.

Solution:

- Press **RETRY** to re-execute the test;
- Press **CONTINUE**, to go on with the run, even if the test has failed.
- Press **ABORT** to stop the run and solve the problem.

To solve the problem, the first operation that must be carried out is the replacement of the septum of the System integrity tool (see paragraph 3.6.3 “System integrity tool installation”) for the septum replacing instructions.

After the septum change, re-execute the test.

If the System integrity test fails again, press ABORT one more and replace the syringe. Replace both the syringe barrel and plunger (see paragraph 9.1.5 “Syringe replacement in the syringe warmer assembly”). Re-execute the run.

8.15 Damage to syringe needle

Damaged syringe needles are normally caused by using incorrect vials, syringes or injection septum; they can also be caused by the incorrect syringe installation/configuration.

It is recommended to:

Try to identify the cause of the damage and the position in which the damage happened. Ensure the alignment on the sample vials and on the injector(s) (see paragraphs 4.2.1 “Setup: Alignment”) were made correctly. Check that the septa of the sample vials and injector are correctly pierced in the centre.

Check that the syringe was installed correctly, as indicated in paragraph 4.2.2 “Setup: Syringe warmer assembly installation”, and ensure that all instructions and notes were followed. In particular, check that the vial locator was correctly aligned with the needle tip, as indicated in the following figure:

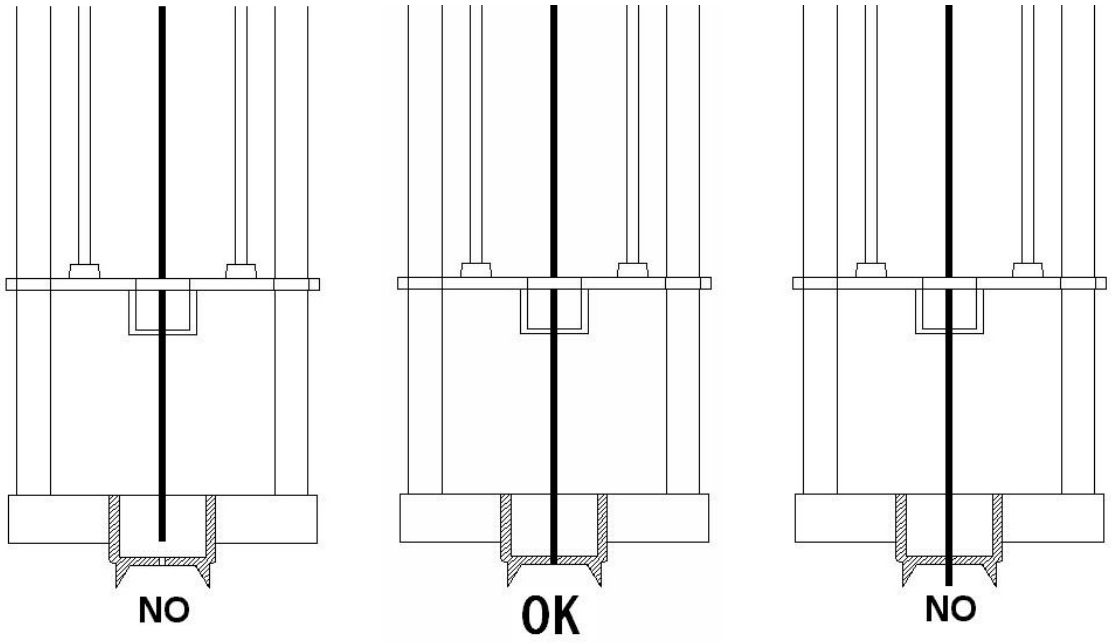


Figure 103: Damage to the syringe needle

- Verify the specifications of the syringe with that supplied in Appendix B – Consumables. In particular, check that the needle used has a tip suitable for the septum to pierce.
- Verify suitable septa were used.
- Check that there are no obstacles inside the vial(s) (such as an insert).
- Inspect the syringe to check for abnormalities (see paragraph 8.15.1 “Syringe inspection “).

8.15.1 Syringe inspection

Before installing a syringe inside the syringe warmer assembly (see paragraph 9.1.5 “Syringe replacement in the syringe warmer assembly”):

- Roll the syringe over a clean flat surface. If the tip of the needle moves in a circle, straighten it by bending it carefully near the connection point to the barrel and check it again (see figure below).
- Check the needle to ensure it is free from burrs and ridges. These can abrade pieces of the septum and leave particles inside the vial. The ridges can be see under 10X magnification. If there are ridges, polish the needle by pulling it through a folded piece of fine emery paper between your finger and thumb until the ridges are gone. Ensure the tip of the syringe is not damaged.
- Check the syringe plunger by sliding it up and down a few times. It should move easily without sticking or binding. If it sticks, remove it and clean it using a suitable solvent.

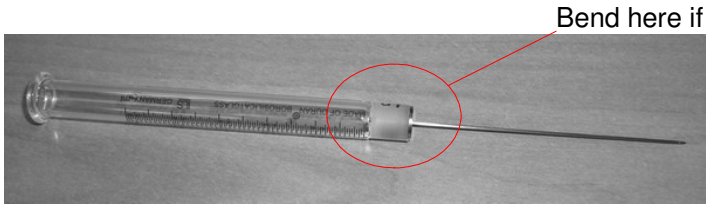


Figure 104: Syringe inspection

8.16 Tray emergency release

Applies only to HT2000H/HT2000HT.

If the tray doesn't open automatically (and samples are inside), please proceed as follows:

- Switch autosampler OFF;
- Wait 30 sec;
- Switch it ON again;
- Try to open the tray by selecting the “Load sample tray” icon in the home screen. If it is not possible to access the home screen, try to access the manual operation screen;
- If this fails, switch autosampler OFF;
- Disconnect it from the mains power;
- Pull the tray gently out by hand (see paragraph 8.16.1 “Tray opening by hand”). Do not pull the tray out with the power switched on.

8.16.1 Tray opening by hand

The tray opening must be performed by hand only if it is strictly necessary. Do not pull the tray out with the power switched on.

Pull out the tray using both hands, as shown in the ***Figure 105*** (images 1 and 2). Do not pull the tray with only one hand, as shown in the third image of the figure.

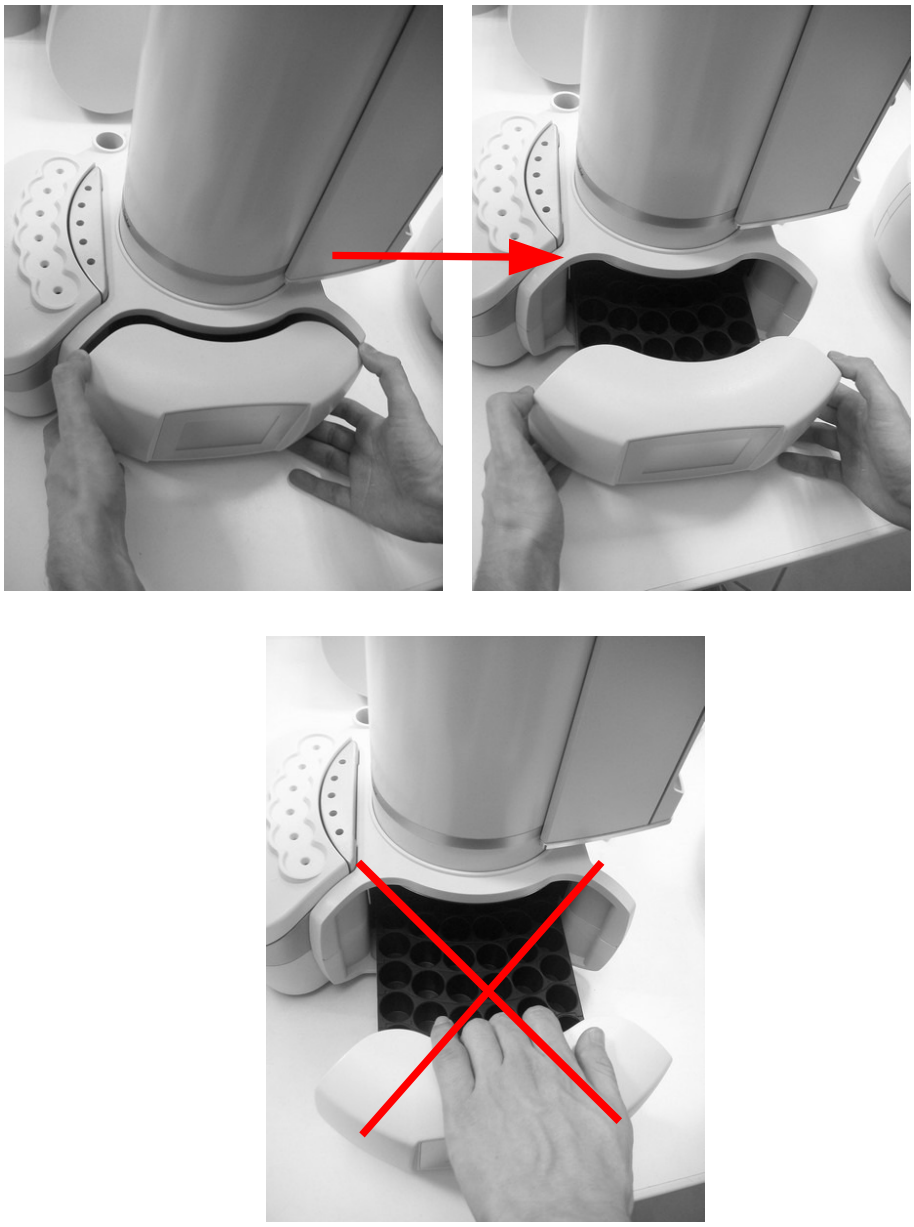


Figure 105: Tray opening by hand

8.17 “HTA Autosampler Manager” troubleshooting

8.17.1 Autosampler and PC do not communicate (connection by LAN)

Error screen:

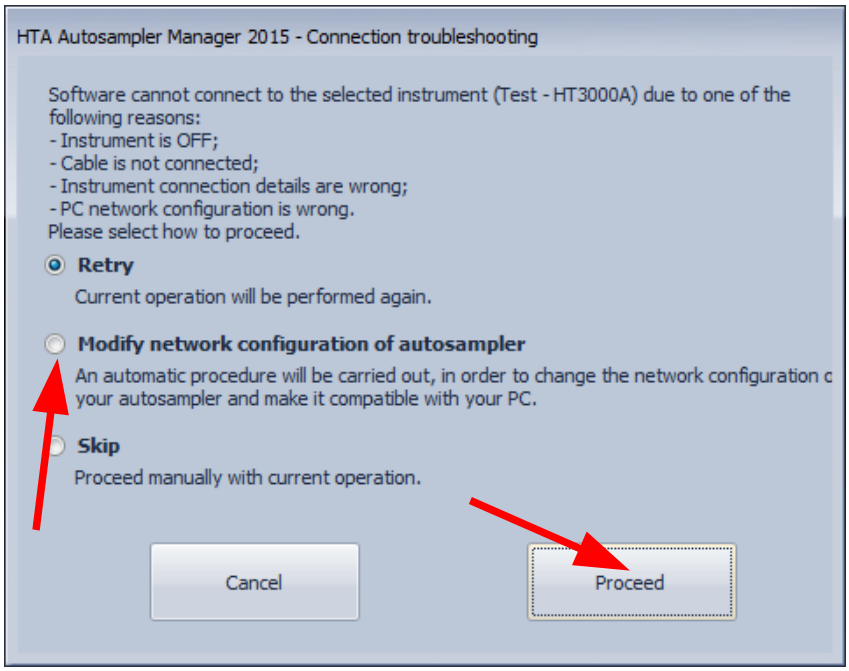


Figure 106: Connection troubleshooting

Causes:

The autosampler can not communicate with the PC.

Solution:

Proceed as follow:

1. Preliminary checks:
    - Check that the autosampler is switched on, all the cables are correctly installed, and that all instructions were carefully followed.
    - The IT/ network administrator must also verify that any software firewall installed on the PC is: disabled or enabled but it is not blocking the “HTA Autosampler Manager” application and the ports 20101 (TCP), 20102 (TCP) and 20201 (UDP).
    - If one of these conditions was missed, fix it and simply click on “Retry”, otherwise go ahead with step 2).
2. Click on “Modify network configuration of autosampler” and then on “Proceed”. In this way an automatic procedure start to change the network configuration of your autosampler and make it compatible with your PC. The following screen appears:

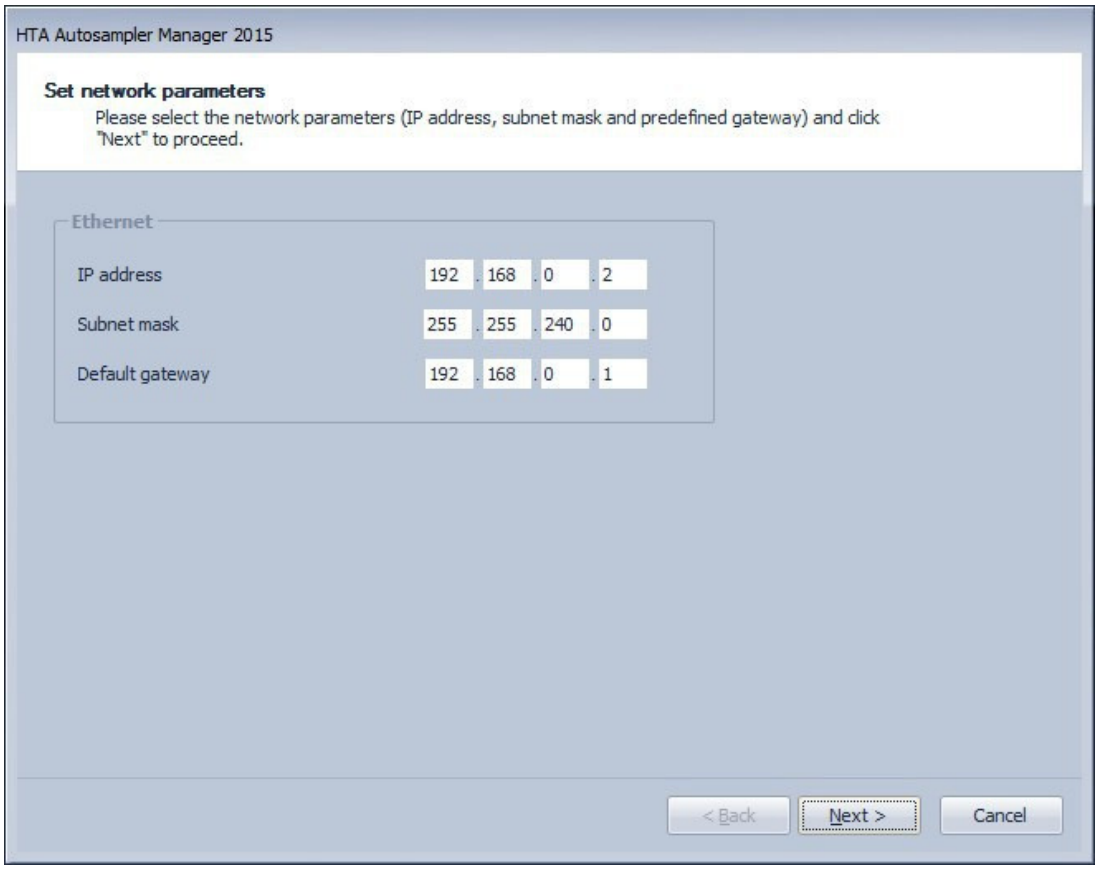


Figure 107: Set network parameters

3. The IT/ network administrator must check that the suggested network parameters (IP address, Subnet mask, gateway) are actually compatible with your network.
4. If the checking passes, click on “Next” to start the automatic assignment of the new network configuration of your autosampler.

8.18 Analytical troubleshooting

The indications given below are for gas chromatography applications and may not be suitable for other analysis techniques for which this autosampler could be used.

When troubleshooting chromatographic symptoms, always remember that the headspace sampler is only part of the system. Evaluate the whole system in order to isolate the problem. Often, issues that appear in the chromatography can be caused by a problem in one or more of the following, in order:

- The sample;
- The sample preparation (inlcuding the consumable hardware, such as vials, septa, syringe, solvent and so forth);
- The Data system (acquisition setpoints, integration parameters, peak identification settings, quantitation settings and reporting);
- The GC (method or hardware);
- The headspace autosampler (method or hardware).

To troubleshoot chromatographic symptoms, begin troubleshooting with the sample and sample preparation.

8.18.1 Reproducibility issue

Sample peaks or responses are not reproducibile.

Possible causes	Solutions
Syringe is dirty	Increase the syringe purge time in the method (see paragraph 5.2.2.5). Set the syringe temperature 10°C above the oven temperature (see paragraph 5.2.2.3).
Vacuum created in sample vial	Reduce sample volume (see paragraph 5.2.2.4).
Improperly crimped vials	Check vial cap by attempting to rotate manually. Loose caps may cause selective loss of more volatile components from sample. Adjust crimping tool correctly (see paragraph 3.7.1).
None or too low Syringe flush gas pressure	Check pressure at External pressure regulator during the syringe purge. Check gas flow at syringe needle tip.
Method parameters	Check all the method parameters, in particular the sample speed, the pull up strokes (see paragraph 5.2.2.4), the injection speed and the post injection dwell (see paragraph 5.2.2.5).

8.18.2 Peak distortion or tailing

Possible causes	Solutions
Method parameters	Check all the method parameters, in particular the sample speed, the pull up strokes (see paragraph 5.2.2.4), the injection speed and the post injection dwell (see paragraph 5.2.2.5).
Needle penetration speed in GC injector	Check the injection parameters (see paragraph 5.2.2.5).
GC injector liner not suitable	Check the liner geometry according to the recommendations of the GC manufacturer.
GC related parameters	Any parameter like injector, oven or detector temperature can contribute to bad peak shape. Check the column type and connections (square cut connections). Check the troubleshooting guide of the GC manufacturer.

8.18.3 Carry over issue

Possible causes	Solutions
Syringe is dirty	Increase the syringe purge time in the method (see paragraph 5.2.2.5). Set the syringe temperature 10°C above the oven temperature (see paragraph 5.2.2.3).
None or too low Syringe flush gas pressure	Check pressure at External pressure regulator during the syringe purge. Check gas flow at syringe needle tip.

8.18.4 Unexplained chromatographic peaks

Possible causes	Solutions
Purge gas is dirty	Check purge gas for impurities.

8.18.5 Retention times not repeatable

Possible causes	Solutions
Problem in the GC system	Check the GC for leaks in the inlet, including septum. Check the liner type used.

8.18.6 Faulty temperature read-out

Possible causes	Solutions
Probe or sensor of the syringe holder temperature are broken	Contact your service representative.
Probe or sensor of the oven temperature is broken	Contact your service representative.

9 Maintenance

Warning

These operations must be completed by competent personnel, properly trained in the procedures described in this manual: any missing or different execution of the described procedures can cause damage to the autosampler or to the person working on it.

However, in particular, pay attention to the moving parts such as the sledge, syringe, needle, the cover of the oven etc...

For the sample handling, see paragraph 1.1 “Intended use and restrictions” and 1.3 “Warning”.

Warning

Some parts of the autosampler (oven, syringe, needle or vials) can work at high temperatures. Be careful to avoid burns. Allow these parts to cool down before handling them.

9.1 Ordinary maintenance

The autosampler does not require periodical maintenance other than that described below.

9.1.1 Cleaning of vial rack/tray

For HT2000H/HT2000HT:

- Open the tray (7.5 “Load and Unload Sample Vial”);
- Remove the rack from the tray;
- Clean the rack and tray with a non-abrasive detergent solution.
- Dry with a dry cloth.
- Replace the rack inside the tray and close the tray.

For HT2100H:

- In the Run time mode, press the **MOVE** key to move the turret to allow free access to the rack (see paragraph 6.1 “Keys“),
- Clean the vial rack using a non-abrasive detergent solution.
- Dry with a dry cloth.
- Press the **MOVE** key to reposition the turret.

9.1.2 External cleaning of cabinet

- Switch OFF the autosampler.
- Remove the power cable from the rear.
- Carefully clean the control panel (touch screen or keypad) and fragile parts using only a damp cloth. They must not be cleaned with solvents or detergents.
- Clean the cabinet using a non-abrasive detergent solution.
- Dry with a dry cloth.

Do NOT use water, solvents, detergents or spray on electrical parts.

9.1.3 Incubation oven cleaning

Warning

Oven surface and spacers (when inserted) are heated at high temperature and can be very hot. We recommend taking care in order to prevent burns.

- Be sure that the autosampler is in stand-by status and that no other operations are in progress.
- Set the oven stand-by temperature to off (see paragraph 7.6.2 “Eco Savings”);
- Only for HT2000H/HT2000HT: enter “manual operations” and open the oven cover (see paragraph 4.2.3 “Setup: Manual operations”);
- Turn OFF the autosampler and remove the power cable;
- Wait until the incubator oven cools down;
- Remove the spacers (if present) using the suitable tweezers ;
- Clean the incubator and the spacers;
- Reinstall the spacers (if needed);
- Let the oven dry;
- Connect the autosampler to the power supply and switch ON the unit;

- Only for HT2000H/HT2000HT enter “manual operations” and close the oven cover (see paragraph 4.2.3 “Setup: Manual operations”).

9.1.4 Touch screen display cleaning

Wet a soft, lint-free or microfibre cloth with distilled water. Wring out as much water as you can. Make sure the cloth is damp but not wet. Wipe the screen in a gentle motion to remove dust, oil, or fingerprint smudges.

Another option is to use a screen cleaner kit that includes antistatic wipes.

Finish cleaning the touch screen with a dry lint-free cloth to wipe away any excess moisture, then turn it back on.

9.1.5 Syringe replacement in the syringe warmer assembly

9.1.5.1 Standard version syringe: 1ml to 1ml syringe replacement/ 2.5ml to 2.5ml syringe replacement/ 5ml to 5ml syringe replacement

Syringes should be replaced according to sample throughput and sample dirtiness/matrix.

To replace the syringe, it is necessary to disassemble and reassemble the syringe warmer assembly that contains the syringe. In the following picture, the syringe warmer assembly is shown.

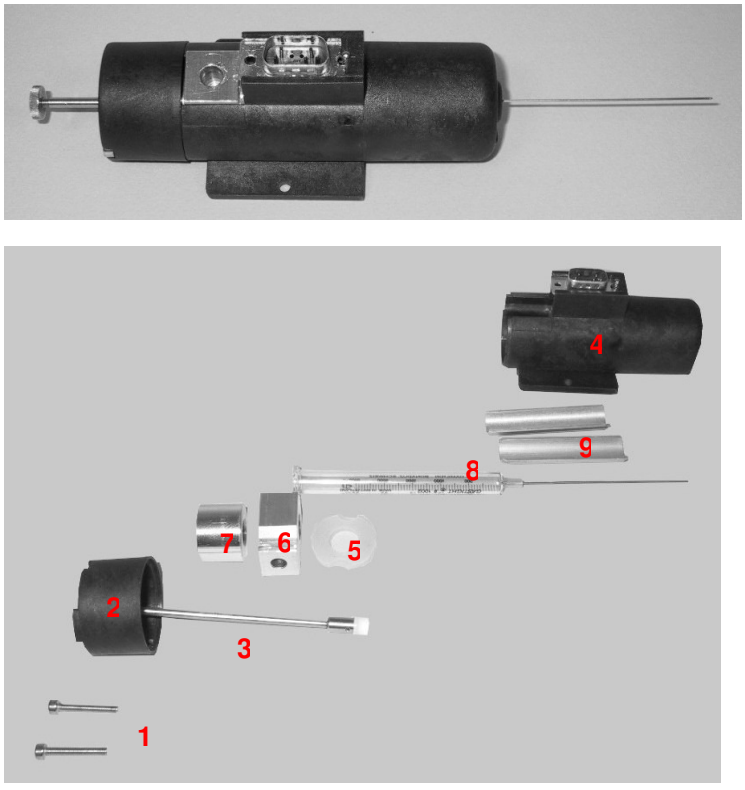


Figure 108: Exploded view of the syringe warmer assembly

1. Main screws
2. Upper cover
3. Syringe plunger
4. Heating body
5. Insulating gasket
6. Syringe holder
7. Upper spacer
8. Syringe barrel
9. Lower spacers (not used for 5ml syringe)

Proceed as described below:

1. Remove the two main screws (number 1 in ***Figure 109***) that secure the upper cover using the supplied allen key (see paragraph 2.3 “Tool kit“).

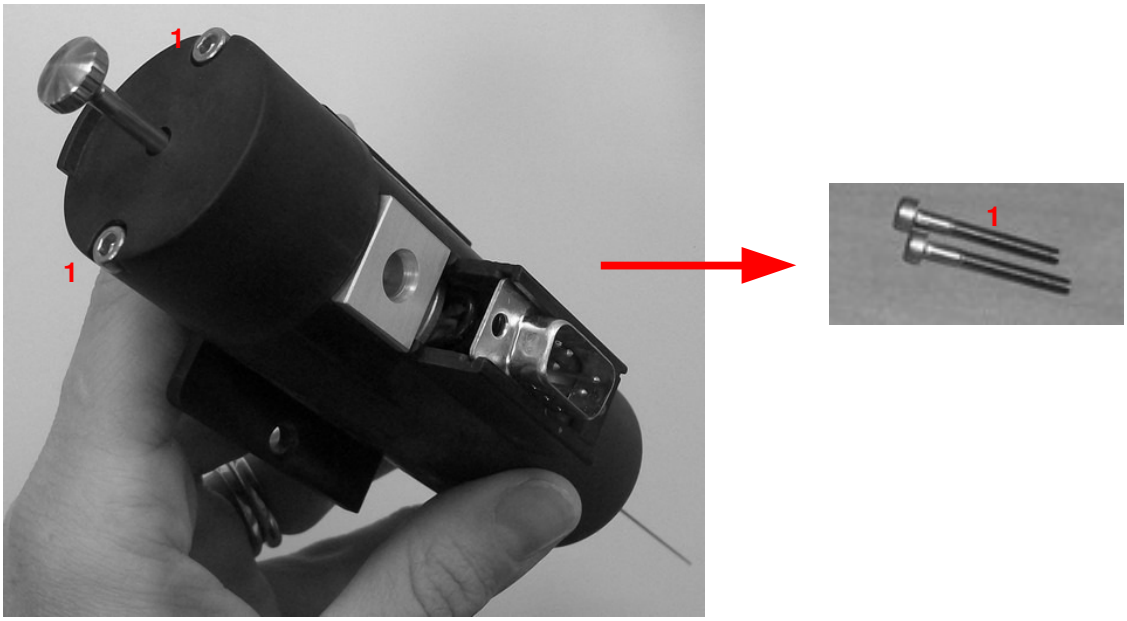


Figure 109: Main screw

2. Gently lift up the upper cover (number 2 in ***Figure 110***) and the syringe plunger (number 3 in Figure 109)) to detach them from the heating body (number 4 in ***Figure 110***).

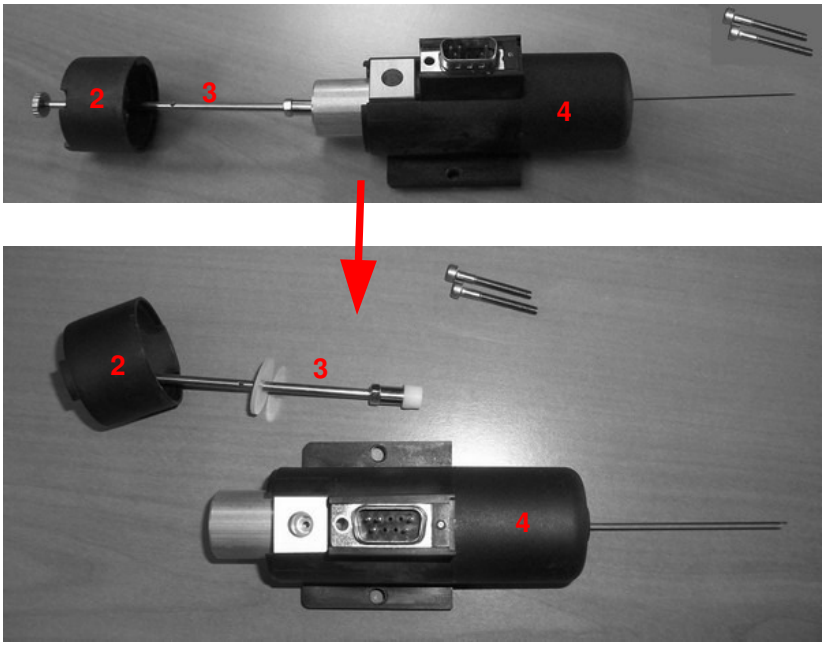


Figure 110: Removing the upper cover and the syringe plunger

3. Extract the syringe barrel (number 8 in ***Figure 111***), with the insulating gasket (number 5 in ***Figure 111***), the syringe holder (number 6 in ***Figure 111***), the upper spacer (number 7 in ***Figure 111***) and the lower spacers (number 9 in ***Figure 111***, not present in the 5ml syringe) from the heating body (number 4 in ***Figure 111***). This operation is shown below:

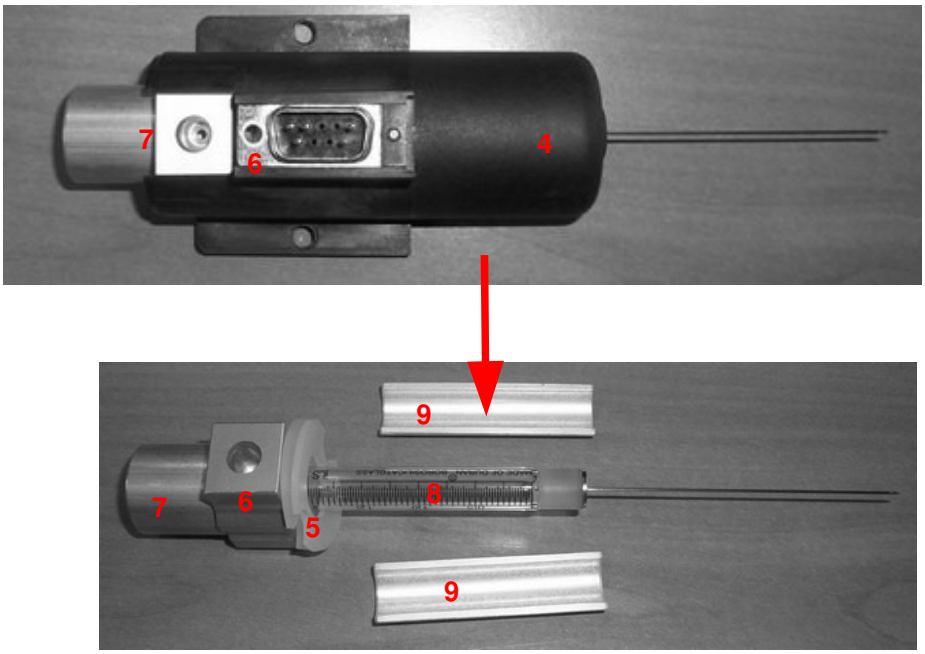


Figure 111: Syringe warmer assembly disassembling_1

4. The insulating gasket (number 5 in ***Figure 112***), the syringe holder (number 6 in ***Figure 112***), the upper spacer (number 7 in ***Figure 112***) and lower spacers (number 9 in ***Figure 112***, not present in the 5ml syringe) must be extracted from the syringe barrel (number 8 in ***Figure 112***). Pull them out from the needle side and do it very gently without forcing. Please note that all of the elements should be separated naturally during the syringe barrel extraction from the heating body.

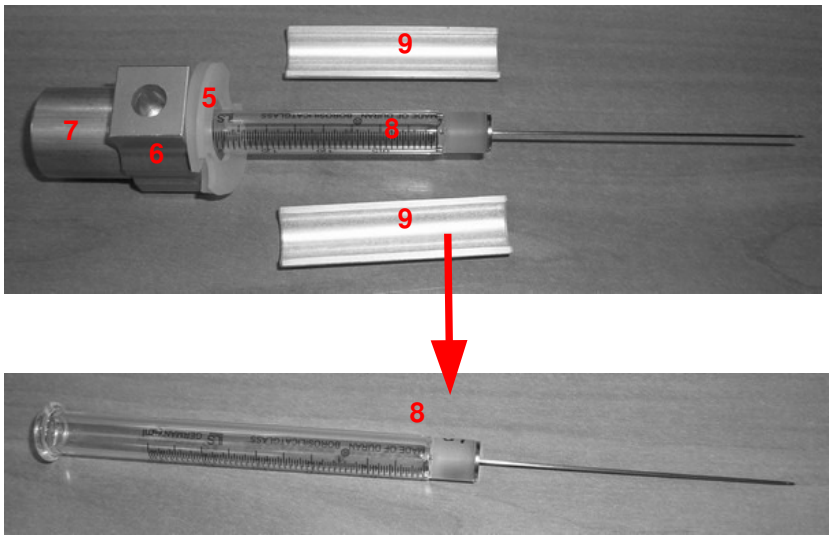


Figure 112: Syringe warmer assembly disassembling_2

5. Replace the syringe barrel with a new one.
6. Re-assemble the syringe warmer assembly. Start by placing the lower spacer (number 9 in ***Figure 113***) inside the heating body. This operation must not be carried out for 5ml syringe.

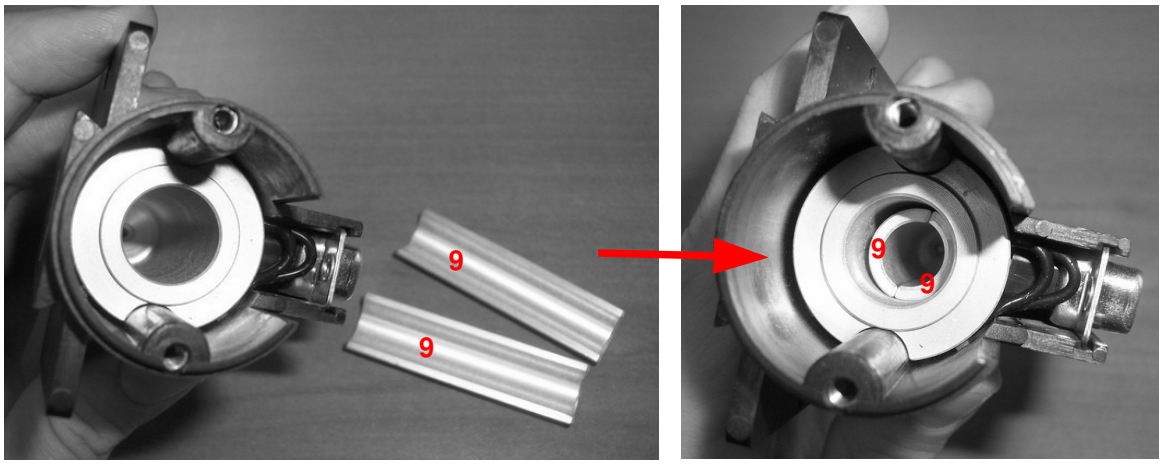


Figure 113: Lower spacers positioning

7. Also place the insulating gasket (number 5 in ***Figure 114***) inside the heating body (number 4 in ***Figure 114***).

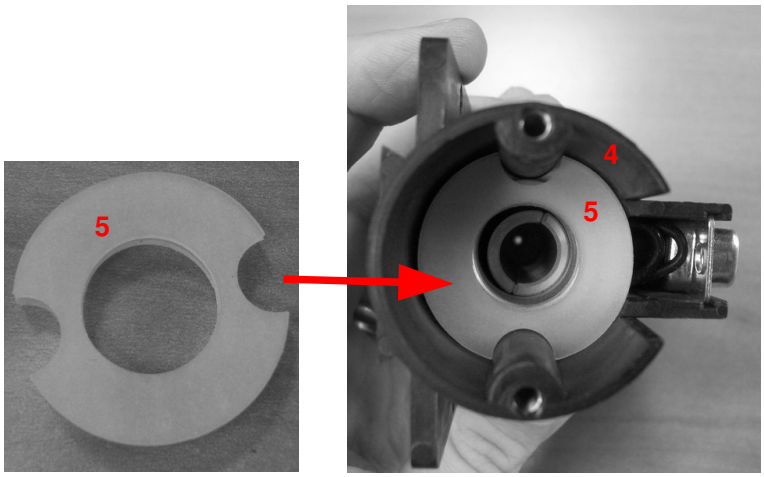


Figure 114: Insulating gasket positioning

8. Slide (from the needle side) the upper spacer (number 7 in ***Figure 115***) inside the syringe barrel (number 8 in ***Figure 115***). Be careful to insert it in the correct orientation.

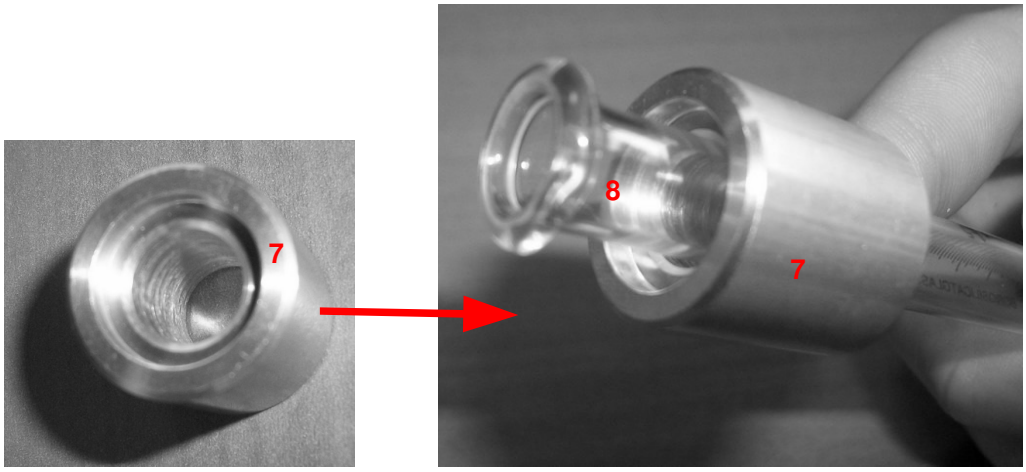


Figure 115: Upper spacer positioning

9. Also insert (sliding from the needle side) the syringe holder (number 6 in ***Figure 116***). It should offer a little resistance during insertion.

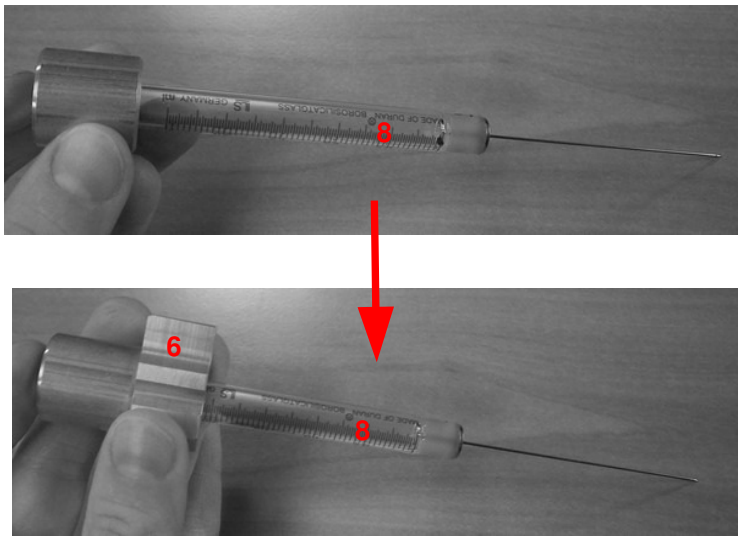


Figure 116: Syringe holder positioning

10. Insert the syringe barrel (number 8 in ***Figure 117***), with the upper spacer (number 7 in ***Figure 117***) and the syringe holder (number 6 in ***Figure 117***) mounted on it, in the heating body. The needle has to be inserted through the hole in the bottom of the body.

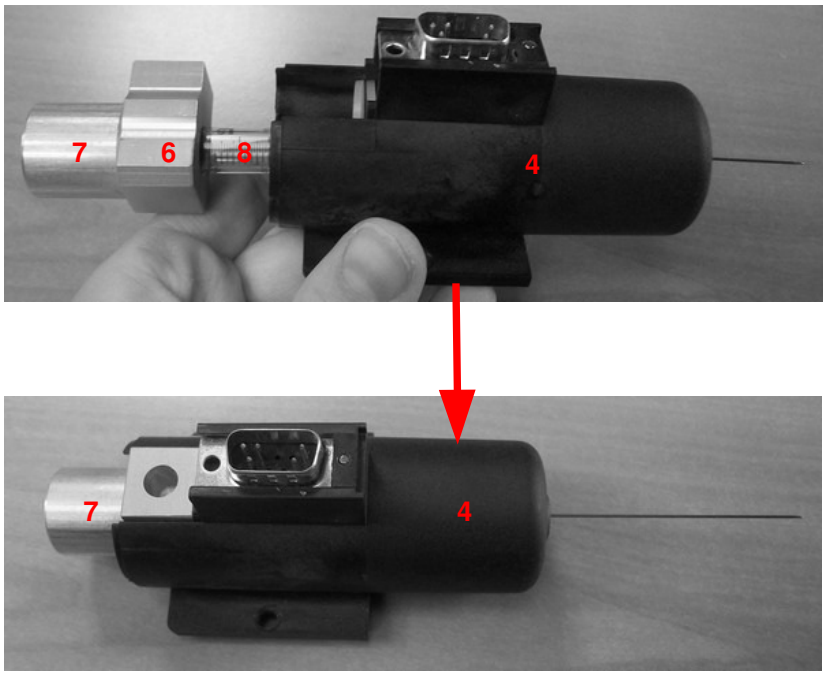


Figure 117: Syringe barrel mounting inside the heating body

11. Only if necessary, also replace the syringe plunger (it is substituted with a lower frequency than the syringe barrel). Remove the plunger (number 3a, 3b and 3c in ***Figure 118***) from the upper cover (number 2 in ***Figure 118***). To separate the plunger from the upper cover unscrew the nut indicated with the number 3a. All the components can be disassembled. After replacing the plunger, re-assemble the plunger and the upper cover.

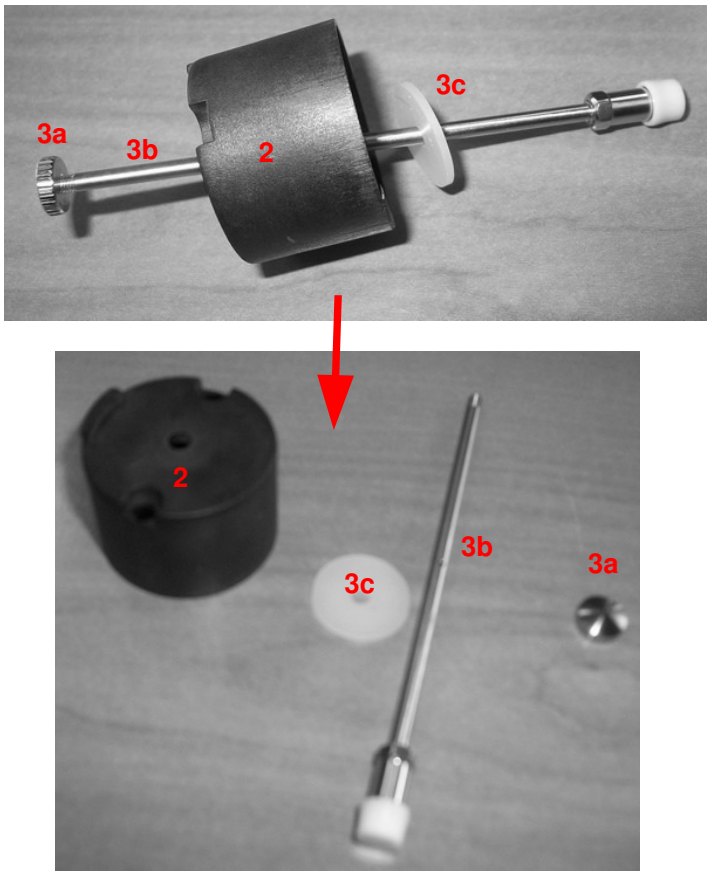


Figure 118: Syringe plunger replacing

12. Insert the upper cover with the syringe plunger in the syringe barrel. Be sure that the cover fits perfectly with the heating body. Screw in the two main screws that hold the two parts.
13. To replace the syringe warmer assembly in the syringe location see paragraph 4.2.2 “Setup: Syringe warmer assembly installation “.

9.1.5.2 Standard version syringe: 2.5ml to 5ml syringe replacement

Proceed as described below:

1. Remove the two main screws (number 1 in ***Figure 109***) that secure the upper cover using the supplied allen key (see paragraph 2.3 “Tool kit “).
2. Gently lift up the upper cover (number 2 in ***Figure 110***) and the syringe plunger (number 3 in ***Figure 110***) to detach them from the heating body (number 4 in ***Figure 110***).

3. Extract the syringe barrel (number 8 in ***Figure 111***),), with the insulating gasket (number 5 in ***Figure 111***), the syringe holder (number 6 in ***Figure 111***), the upper spacer (number 7 in ***Figure 111***) and the lower spacers (number 9 in ***Figure 111***) from the heating body (number 4 in ***Figure 111***
4. The insulating gasket (number 5 in ***Figure 112***), the syringe holder (number 6 in ***Figure 112***), the upper spacer (number 7 in ***Figure 112***) and lower spacers (number 9 in ***Figure 112)*** must be extracted from the syringe barrel (number 8 in ***Figure 112***). Pull them out from the needle side and do it very gently without any forcing. Please note that all of the elements should be separated naturally during the extraction of the syringe barrel from the heating body.
5. Replace the 2.5ml syringe barrel with the 5ml syringe barrel.
6. Re-assemble the syringe warmer assembly. Note that the lower spacers (number 9 in ***Figure 113***) are not required for the 5ml syringe.
7. Place the insulating gasket (number 5 in ***Figure 114***) inside the heating body (number 4 in ***Figure 114***).
8. Slide (from the needle side) the 5ml upper spacer (number 7 in ***Figure 115***) inside the syringe barrel (number 8 in ***Figure 115***). Be careful to insert it in the correct orientation. Please note that 5ml upper spacer has a bigger diameter than the 2.5ml one.
9. Also insert (sliding from the needle side) the syringe holder (number 6 in ***Figure 116***). It should offer a little resistance during insertion. Please note that 5ml syringe holder has a bigger diameter than the 2.5ml one.
10. Insert the syringe barrel (number 8 in ***Figure 117***), with the upper spacer (number 7 in ***Figure 117***) and the syringe holder (number 6 in ***Figure 117***) mounted on it in the heating body. The needle has to be inserted through the hole in the bottom of the body.
11. Proceed with the replacing of the 2.5ml syringe plunger with the 5ml syringe plunger. Remove the plunger (number 3a, 3b and 3c in ***Figure 118***) from the upper cover (number 2 in ***Figure 118***). To separate the plunger from the upper cover unscrew the nut indicated with the number 3a. All the components can be disassembled. After the plunger is replaced, re-assemble the plunger and the upper cover,
12. Insert the upper cover with the syringe plunger in the syringe barrel. Be sure that the cover fits perfectly with the heating body. Screw in the two main screws that hold the two parts.
13. To replace the syringe warmer assembly in the syringe location, see paragraph 4.2.2 “Setup: Syringe warmer assembly installation”“.

9.1.5.3 Standard version syringe: 2.5ml to 1ml syringe replacement

Proceed as described below:

14. Remove the two main screws (number 1 in ***Figure 109***) that secure the upper cover using the supplied allen key (see paragraph 2.3 “Tool kit “).
15. Gently lift up the upper cover (number 2 in ***Figure 110***) and the syringe plunger (number 3 in ***Figure 110***) to detach them from the heating body (number 4 in ***Figure 110***).
16. Extract the syringe barrel (number 8 in ***Figure 111***),), with the insulating gasket (number 5 in ***Figure 111***), the syringe holder (number 6 in ***Figure 111***), the upper spacer (number 7 in ***Figure 111***) and the lower spacers (number 9 in ***Figure 111***) from the heating body (number 4 in ***Figure 111).***
17. The insulating gasket (number 5 in ***Figure 112***), the syringe holder (number 6 in ***Figure 112***), the upper spacer (number 7 in ***Figure 112***) and lower spacers (number 9 in ***Figure 112)*** must be extracted from the syringe barrel (number 8 in ***Figure 112***). Pull them out from the needle side and do it very gently without any forcing. Please note that all of the elements should be separated naturally during the extraction of the syringe barrel from the heating body.
18. Replace the 2.5ml syringe barrel with the 1ml syringe barrel.
19. Re-assemble the syringe warmer assembly. Start by placing the lower spacer (number 9 in ***Figure 113***) inside the heating body. Please note that 1ml lower spacer has a lower diameter than the 2.5ml one.
20. Place the insulating gasket (number 5 in ***Figure 114***) inside the heating body (number 4 in ***Figure 114***).
21. Slide (from the needle side) the 1ml upper spacer (number 7 in ***Figure 115***) inside the syringe barrel (number 8 in ***Figure 115***). Be careful to insert it in the correct orientation. Please note that 1ml upper spacer has a lower diameter than the 2.5ml one.
22. Also insert (sliding from the needle side) the syringe holder (number 6 in ***Figure 116***). It should offer a little resistance during insertion. Please note that 1ml syringe holder has a lower diameter than the 2.5ml one.
23. Insert the syringe barrel (number 8 in ***Figure 117***), with the upper spacer (number 7 in ***Figure 117***) and the syringe holder (number 6 in ***Figure 117***) mounted on it in the heating body. The needle has to be inserted through the hole in the bottom of the body.
24. Proceed with the replacing of the 2.5ml syringe plunger with the 1ml syringe plunger. Remove the plunger (number 3a, 3b and 3c in ***Figure 118***) from the upper cover (number 2 in ***Figure 118***). To separate the plunger from the upper cover unscrew the nut indicated with the number 3a. All the components can be disassembled. After the plunger is replaced, re-assemble the plunger and the upper cover,

25. Insert the upper cover with the syringe plunger in the syringe barrel. Be sure that the cover fits perfectly with the heating body. Screw in the two main screws that hold the two parts.
26. To replace the syringe warmer assembly in the syringe location, see paragraph 4.2.2 “Setup: Syringe warmer assembly installation”“.

9.1.5.4 HT version syringe: needle and plunger replacement

To replace the needle proceed in the following way:

1. Unscrew the ferrule (indicated with the arrow in the figure below - b) to remove the needle from the Syringe Warmer High Temperature Assembly for HT2000HT (figure below - c). Remove the spring and the ferrule from the needle (figure below - d).

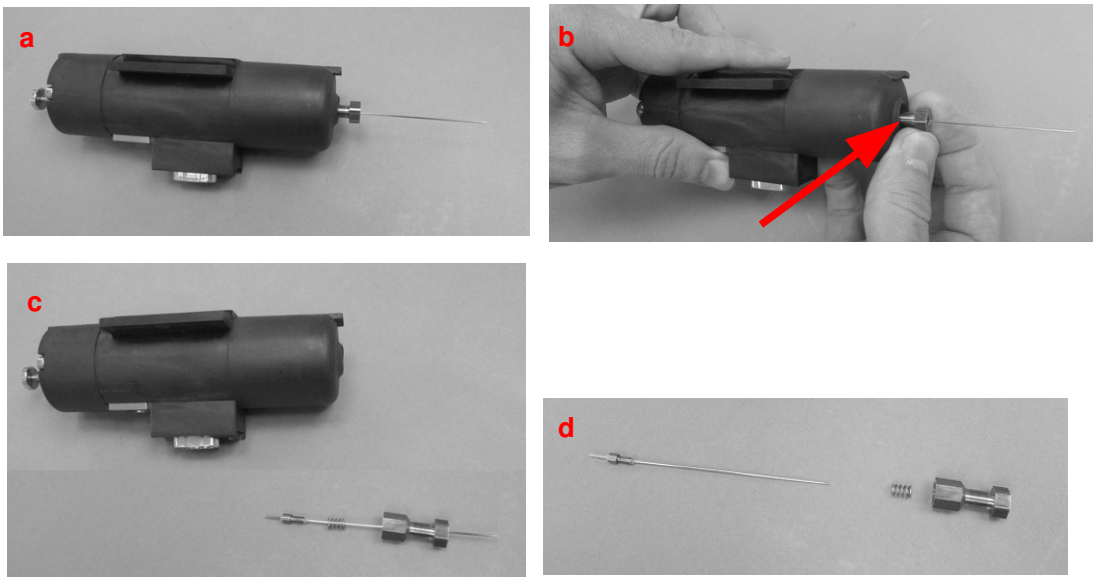
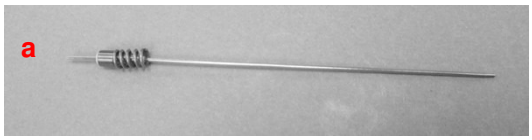


Figure 119: HT syringe needle removal

2. Apply the spring to the new needle (figure below – a), insert the needle with spring applied on it into the syringe warmer assembly (figure below - b) and fix it with the ferrule (figure below – c).



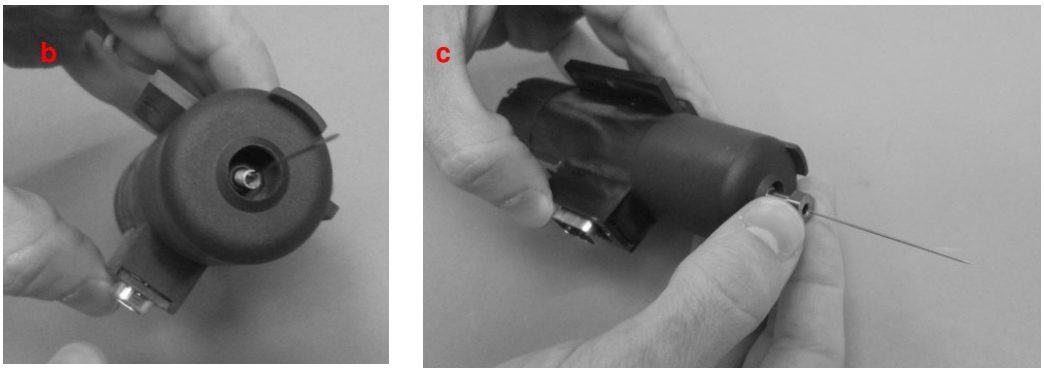


Figure 120: HT syringe needle installation

3. To replace the plunger simply lift it up (figure below – a), remove it from the Syringe Warmer High Temperature Assembly for HT2000HT(figure below – b), and replace it (figure below – c).

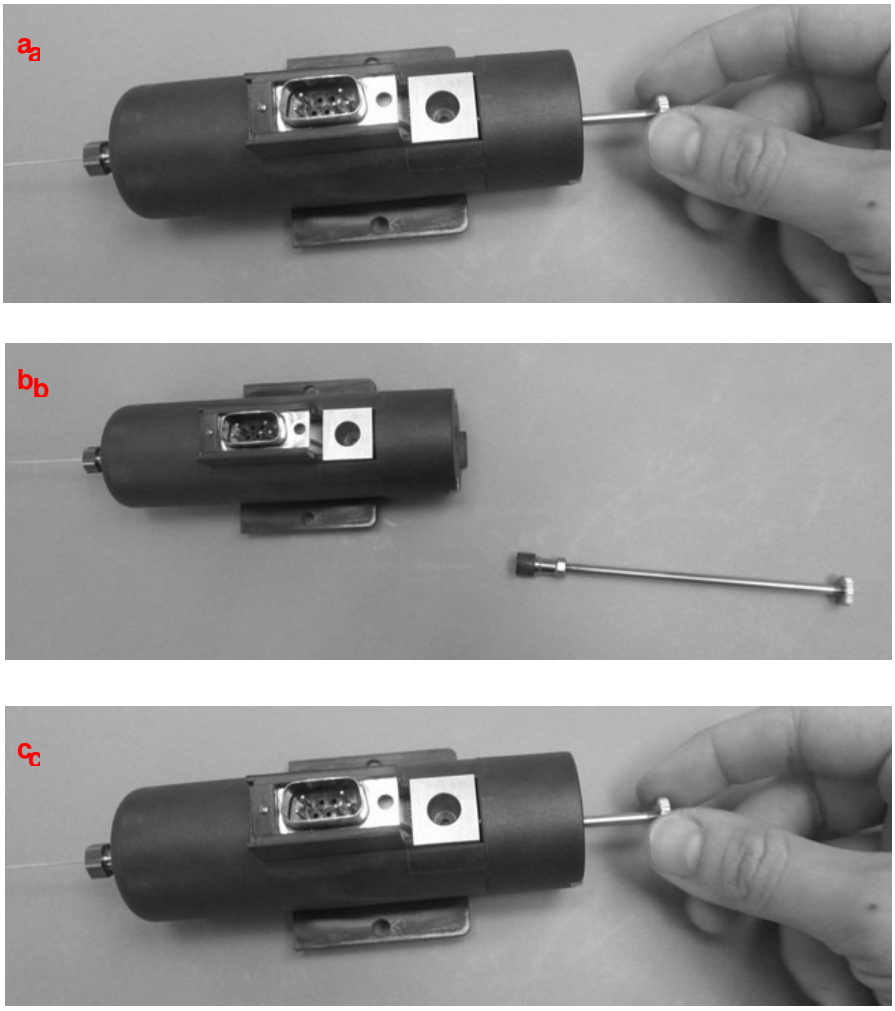


Figure 121: HT syringe plunger replacement

9.1.6 Septum of the System integrity tool replacement

The septum of the System integrity tool must be replaced every 30 sample sequences.

The Syringe integrity tool location is shown in position 6 of ***Figure 1*** for HT200H/HT2000HT and of ***Figure 9*** for HT2100H.

To replace the septum, perform the following operations:

- remove the System integrity tool from its location;
- remove the old septum from the tool (see procedure in paragraph 3.6.3 “System integrity tool installation” for detailed instructions);
- insert the new septum in the tool and tighten it;
- reposition the System integrity tool inside its location.

9.1.7 Preventive maintenance pack

It is possible to order a preventive maintenance pack (PN 1.93.831). This kit includes the following parts:

Description	Suggested Replacement Frequency
Antifriction Stickers: Silver + Standard Writing	every year
Turret Sliding Plate	every year
20ml headspace vial for perfomance check	
Septa & Caps for headspace vial for perfomance check	
Needle Guide Rod	
Needle Guide Assembly	every year
Septa for System Integrity Tool (pack)	as needed

Syringes that are NOT included in the preventive maintenance kit should be replaced according to sample throughput and sample dirtiness/matrix.

9.2 Extraordinary maintenance

For any other maintenance operation not indicated in this manual, please contact your Supplier or Technical Assistance Centre. The operator is not authorized to perform any operations outside of the normal working use of the unit.

10 Uninstalling and disposal

Warning

These operations must be completed by competent personnel, properly trained in the procedures described in this manual: any missing or different execution of the described procedures can cause damage to the autosampler or to the person working on it.

However, in particular, pay attention to the moving parts such as the sledge, syringe, needle etc...

For the sample handling see paragraph 1.1 “Intended use and restrictions”.

Warning

Some parts of the autosampler (oven, syringe, needle or vials) can work at high temperatures. Be careful to avoid burns. Allow these parts to cool down before handling them.

10.1 Autosampler uninstalling

To uninstall the autosampler perform the following operations in sequence:

1. Remove the syringe warmer assembly according to the instructions given in paragraph 4.2.2.1 “Syringe warmer assembly removal”. Remove any residual substances from the instrument in accordance with the applicable safety regulations;
2. Remove sample vials and dispose of any residual substances from the instrument in accordance with any applicable safety regulations;
3. For HT2000H/HT2000HT remove the rack(s) from the tray (to open the tray follow the instructions in paragraph 7.5 “Load and Unload Sample Vial”);
4. Raise the syringe location to the top using the needle motor (4.2.3 “Setup: Manual operations“);
5. Loosen the left lock;

6. Raise the vial locator;
7. Tighten the left lock;
8. Lift up the sledge manually (see **Figure 54**);
9. Lower the sliding lid;
10. Switch off the autosampler;
11. Unplug the external power supply from the main power and then remove the power cord from the autosampler;
12. Disconnect the interface cable from the autosampler port and from the analyzer;
13. Disconnect the pneumatic connection;
14. Disconnect, if present, the Ethernet cable from the autosampler and from the Ethernet connector of the PC or of the Switch;
15. Disconnect, if present, the RS232C cable from the autosampler port and from the serial port of the PC;
16. Unlock the autosampler from the bracket that fixes it to the analyzer (3.3.1.1 “Unlock the autosampler from the mounting kit”)
17. Raise the autosampler from the bracket and place it in a vertical position.

10.2 Autosampler shipping

The autosampler can only be shipped in the original packaging. If the autosampler has already been installed you must perform the following:

1. Perform the uninstalling procedure described in paragraph 10.1 “Autosampler uninstalling”.
2. Repack the accessories in the accessory boxes. Seal the accessory boxes with a suitable adhesive tape.
3. Apply the tower protection.

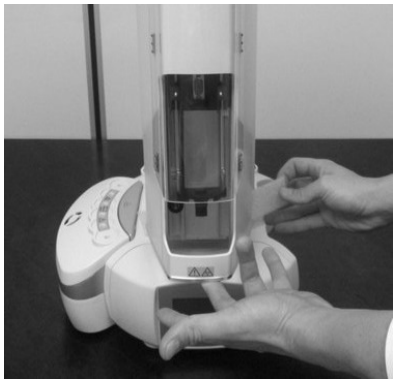


Figure 122: Apply the tower protection

4. Apply the polythene bag and the protection belt to the autosampler tower.

Figure 123: Apply the polythene bag

Figure 124: Apply the protection belt

5. Apply the lower protective cushions.

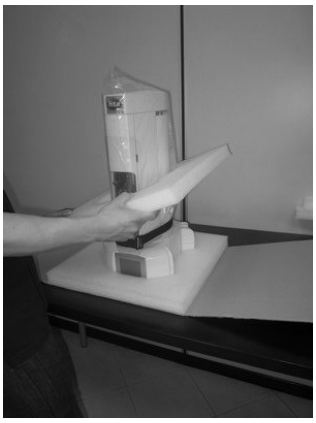


Figure 125: Position the lower cushions

6. Position the sealed accessory boxes on the autosampler sides.

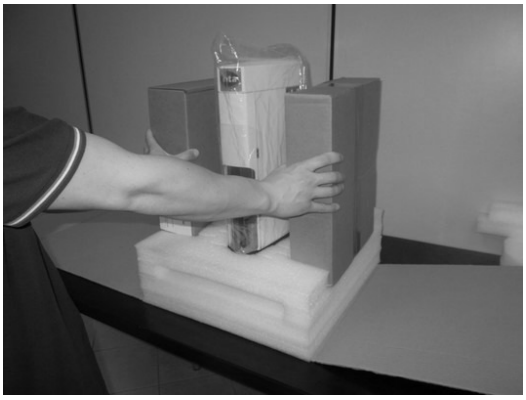


Figure 126: Position the accessory boxes

7. Position the upper protective cushions.

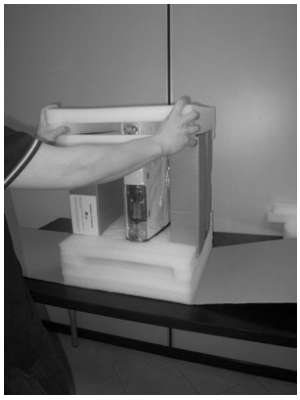


Figure 127: Position the upper cushions

8. Close the packaging using a suitable adhesive tape.

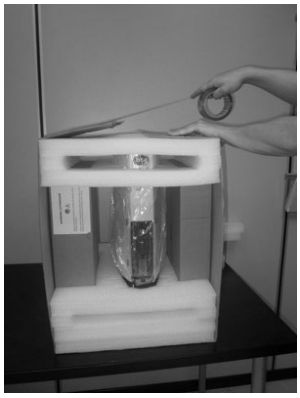


Figure 128: Close the packaging by adhesive tape

9. Put the autosampler in the original box.

Figure 129: Put the autosampler in the box

10. Insert the protective cushions.

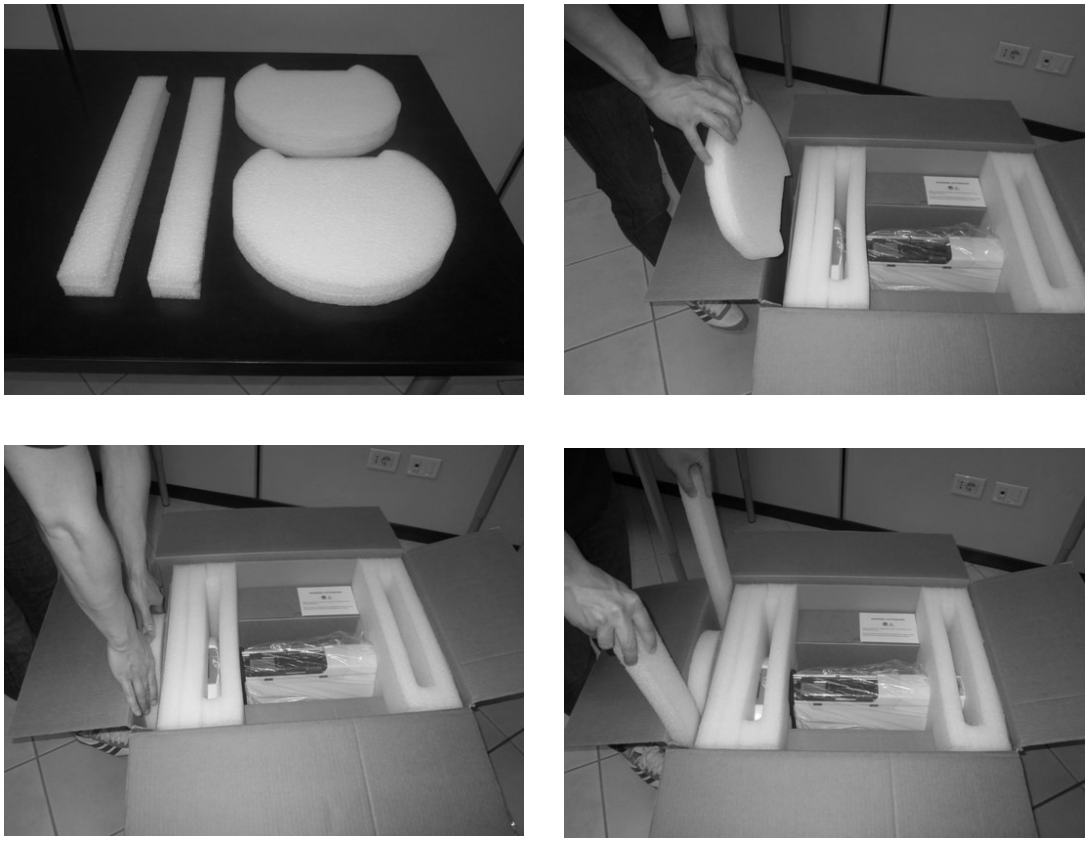


Figure 130: Insert the cushions

11. Close and seal the box using suitable adhesive tape.

10.2 Autosampler disposal

If the autosampler has to be disposed of, perform the following:

Execute the uninstalling procedure described in 10.1 “Autosampler uninstalling”.
Place the autosampler and its accessory parts in the original packaging or into another type of packaging suitable for transport. If you need further information, contact your dealer or the Technical Assistance Centre.

10.3 Disposal instructions

INFORMATION FOR THE USERS

According to the Directive 2002/95/CE, 2002/96/CE and 2003/108/CE, concerning the restriction of the use of certain hazardous substances in the electrical and electronic equipment and the waste disposal.

The symbol of the crossed bin shown on the equipment or on its packaging indicates that the product is to be collected separately from the other waste. Thereof the user must deliver the equipment to the appropriate collection points for electrical and electronic waste or to his sale representative (if a new similar equipment is bought).The appropriate separated collection allows the recycling, the treatment and the disposal. It can help to avoid possible negative effects on the environment and on the human health and allows the recycling of the materials that constitute the equipment. Be aware that the abusive disposal of the product causes the

HTA s.r.l., as electronic devices manufacturer, is engaged in the financing and management of electronic equipment's disposal activities. For updated information about the disposal mode and the collection points:

- contact your sales representative;
- visit www.hta-it.com website and look for the WEEE section;
- send an e-mail to weee@hta-it.com.

11 Appendix A – Glossary

Head Space Technique

Head Space technique is an indirect method to inject components with low boiling points from liquid or solid samples. The method is based on the analysis of vapours released from a sample that has been incubated at a constant temperature for a given period of time. Head Space technique has some advantages compared to other techniques: quick preparation time compared to analysis time, possibility to analyse samples that cannot be analysed in liquid or in solid state, less cross contamination problems and higher sensitivity, as this procedure can be considered as a pre-concentration step before injection.

Sequence

A sequence is an ordered series of sample vials to prepare and inject, including the method needed to prepare each vial.

Confirmation Mode

Confirmation Mode Technique injects the same sample into two injectors to confirm the analysis. The GC is started on the first injection.

Touch sensor

It is used by the autosampler to detect when the vial locator has touched a surface (or obstacle).

System integrity test

The System integrity kit is sold as an option (see paragraph 1.7.2 “Options “). The System integrity test is used to verify the syringe integrity. To enable this function see paragraph 4.2.4.5 “Setup configuration: Maintenance “.

If this test is enabled, at the beginning of each batch the system performs a check to verify the syringe integrity through a heuristic procedure. This test is carried out using the system integrity tool (see ***Figure 1*** and ***Figure 2*** for HT2000H/HT2000HT and ***Figure 9*** for HT2100H).The septum of this tool should be replaced periodically (see paragraph 3.6.3 “System integrity tool installation”). This check can verify if it is better to replace the syringe (barrel and plunger). Please note that this check does not replace the necessary periodic validations you have to program for the instrument qualification. If the test fails, a warning message appears (see paragraph 8.14 “System integrity test fail“).

Vial leakage check

This function can only be enabled by the HTA Autosampler Manager (Setup-Options). If this option is enabled, the pressure inside vials is monitored by a heuristic procedure in order to check against anomalous values that are indicative of a vial leakage problem.

The Vial leakage test can discriminate samples correctly sealed vs. bad crimping or missing septa. Each sample is marked with PASS or FAIL information in HTA Autosampler Manager Windows.

12 Appendix B – Consumables

Warning

For the sample and reagents handling, see paragraphs 1.1 “Intended use and restrictions” and 1.3 “Warning”.

12.1 Syringes

Syringe Type	Syringe Warmer Assembly	HTA part number	Volume	Description
Standard Version	1.93.841	3.21.027	1 ml	Glass Barrel
		3.21.025	1 ml	Plunger
		3.21.400	2,5 ml	Glass Barrel
		3.21.300	2,5 ml	Plunger
		3.20.400	5 ml	Glass Barrel
		3.20.300	5 ml	Plunger
HT Version (available only for use with HT2000HT)	1.91.331	1.91.334		Needle (2pc)
		1.91.342	2,5 ml	Plunger

12.1.1 How to select the correct syringe type (only for HT2000HT)

Look at the following table to check which kind of syringe you need according to the syringe temperature you want to set.

Syringe Temperature	Syringe Type
Off	Standard version syringe
40-100°	Standard version syringe
100-150°C	Standard version syringe/ HT version syringe
151-250°C	Only HT version syringe

Warning

Only for HT2000HT. Standard version syringe installed in the Standard syringe warmer assembly can not work at temperature higher than 150°C. Do not set higher temperatures. The system can be seriously damaged.

12.2 Sample vials

HTA Part Number	Description	Temperature Range (°C)
1.29.949	6ml transparent vials with round end	
1.29.941	10ml transparent vials with round end	
1.29.942	20ml transparent vials with round end	
1.29.940	Septa and caps for HS vials in SIL/PTFE	from -40 to +200°C.

12.2.1 Vial specifications

- Vials must be approved for head space techniques;
- Rounded end;
- Clear or amber glass (amber glass is suitable for light sensitive samples).

Warning

Correct sample vial dimensions are essential for proper operation. Vials that do not comply with these guidelines should cause autosampler errors. Service calls and repairs found to be due to vials and microvials that do not comply with these guidelines are not covered under warranty or the service contract.

12.2.1.1 Specifications for 20ml vials

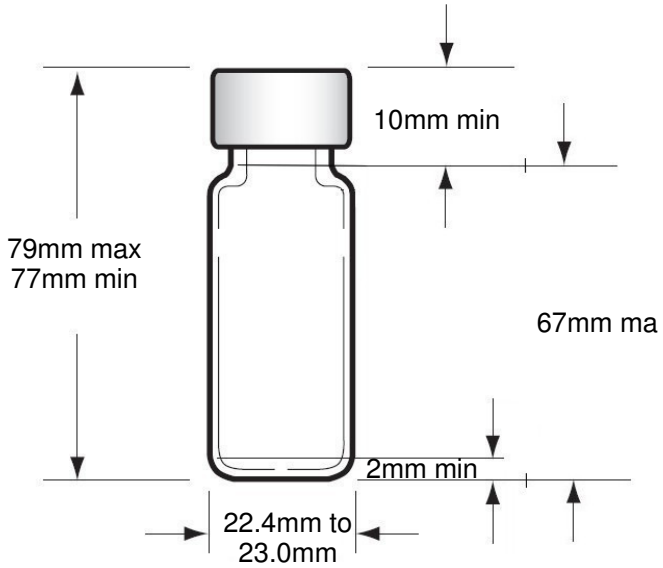


Figure 131: 20ml sample vial dimensions

12.2.1.2 Specifications for 10ml vials

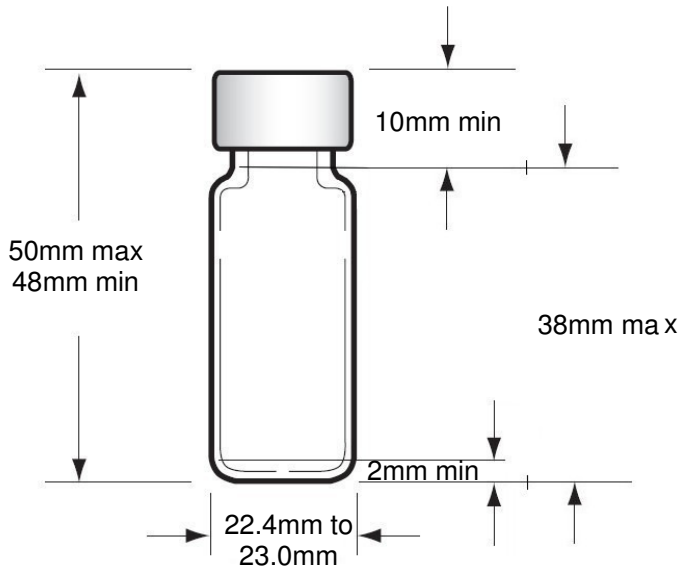


Figure 132: 10ml sample vial dimensions

12.2.1.3 Specifications for 6ml vials

Suitable only for HT2000H/HT2000HT autosampler (not for HT2100H)

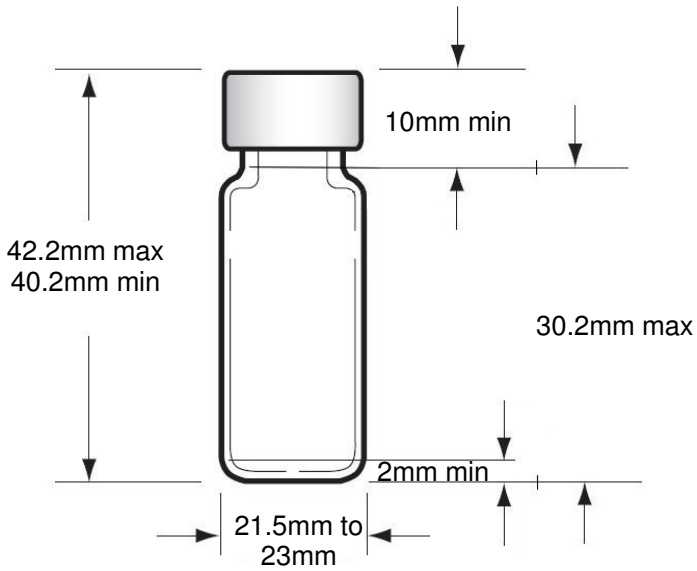


Figure 133: 6ml sample vial dimensions

12.2.2 Cap specifications

The autosampler uses sample vials with crimp caps.

The Minimum diameter of the pierceable area is 9mm.

In general, do not use crimp caps more than once for headspace analysis.

12.2.3 Septa specifications

Septum material	Compatible with	Incompatible with	Thickness
PTFE/silicone rubber	PTFE resistance until punctured, then septa will have the compatibility of silicone (alcohol, acetone, ether, DMF, DMSO)	ACN, THF, benzene, chloroform, pyridine, toluene, hexane, heptane	2-3mm

For more detailed compatibility data refer to the manufacturer's recommendations. In general, do not use septa more than once for headspace analysis.

13 Appendix C – Connection panel

13.1 GC connector

The GC connector is on the connection panel (see paragraph 2.1.4 “Connection panel“).

DB15 pin #	Function	Note
1	**+5 Volts**	Exit = Max. 20 mA
2	**FREE3-IN**	Signal input (true low); Low-level = 0÷0.5 V Hi-level = 4÷12 V
3	**SAMPINS-NO**	Exit = Relay contact (open by default)
4	**GCRDY**	Signal input (true high); Low-Level = 0÷0.5 V Hi-level = 4÷12V
5	**GND**	Ground
6	**SAMPINSCOM**	Relay common contact
7	**FREE1-NC**	Exit = Relay contact (closed by default)
8	**ENDSAMP-NC**	Exit = Relay contact (closed by default)
9	**GCRDY**	Signal input (true low); Low-Level = 0÷0.5 V Hi-level = 4÷12 V
10	**FREE1-NO**	Exit = Relay contact (open by default)
11	**ENDSAMPL-NO**	Exit = Relay contact (open by default)
12	**FREE2**	Signal input (true low); Low-Level = 0÷0.5 V Hi-level = 4÷12 V
13	**FREE1-COM**	Relay common contact
14	**ENDSAMPL-COM**	Relay common contact
15	**SAMPINS-NC**	Exit = Relay contact (closed by default)

Relay specification: V_{max} = 24 V ; I_{max} = 1A DB15 Connector

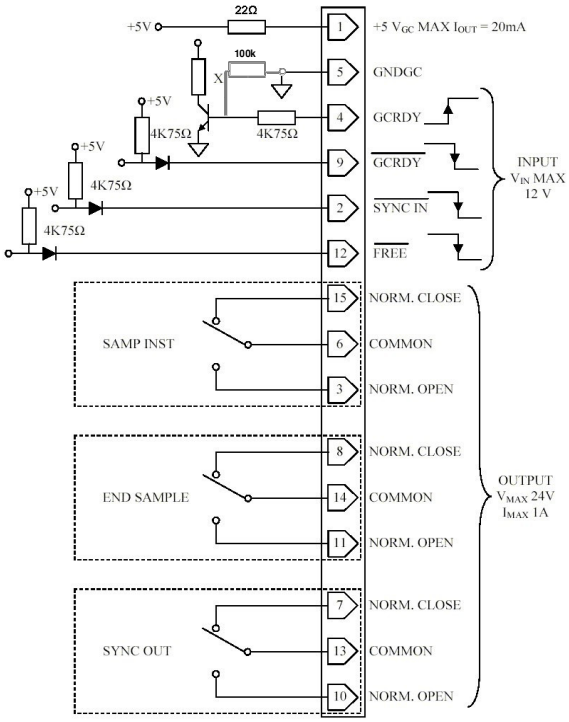


Figure 134: GC Connector

13.1.1 Typical GC interface

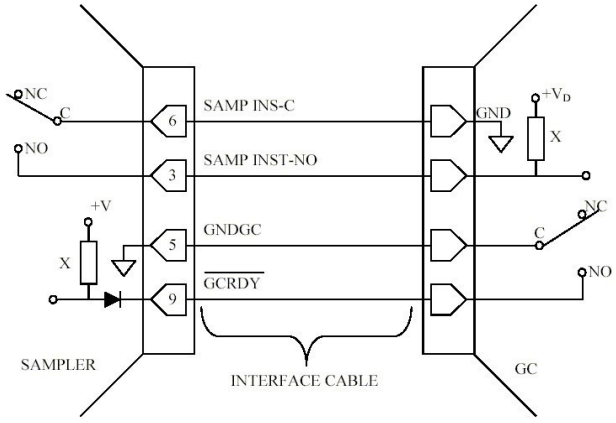


Figure 135: Common interface

13.2 RS232C interface (optional)

RS232C Connector, DB9 Connector

DB9 pin #	Function	Note
1	**N.C.**	n.c.
2	**TX**	Transmission
3	**RX**	Receiving
4	**DSR**	Internally connected with DSR signal
5	**DGND**	
6	**DTR**	Internally connected with DTR signal
7	**CTS**	
8	**RTS**	
9	**N.C.**	

FIGURE INDEX