Automated Slide Stainer FS-16-HISTO Instruction for Use

Read carefully before working with the Stainer
Always keep this Instructions for Use near the Stainer

V1.2 English – 20.07.2023

IVD

Dubna 2023

Revision history

Revision	Effective date	Change	Written by
1.0	09.04.2021	Draft	Bezrukov A.V.
1.1	29.04.2022	Revision for CE marking	Kutepov M.V. Bezrukov A.V.
1.2	20.07.2023	Follow-up revision	Bezrukov A.V. Kutepov M.V. Fedorova A.L.

FORBIDDEN TO OPERATE THE STAINER WITHOUT PRIOR READING THE IFU.

CAUTION! ALWAYS KEEP THIS INSTRUCTIONS FOR USE WITH THE STAINER.

MLT LLC reserves the right to change technical specifications as well as manufacturing processes without prior notice. This allows continuous improvement of the technology and manufacturing processes. All significant modifications will be included into technical specifications and published on the manufacturer's website www.mlt.ru.

Latest technological programs, tutorial video materials and supplementary documents for FS-16- HISTO are available at www.fastainer.com, http://fastainer.com/resources.

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For the serial number and year of manufacture, please refer to the Stainer Label at the back of the instrument.

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1 Important Information

General

This Instruction for Use, hereinafter IFU, includes important information related to the operating safety and maintenance of the FS-16-HISTO Automated Slide Stainer (hereinafter – the Stainer). The IFU is an important part of the product. It must be read carefully and completely before setup and prior use of the Stainer and be kept with the instrument at all times. If additional requirements on accident prevention and environmental protection exist in the country of operation, the IFU must be supplemented by appropriate instructions to ensure compliance with such requirements.

FORBIDDEN TO OPERATE THE STAINER WITHOUT PRIOR READING THE IFU. First of all, be sure to carefully read and comply with the requirements of Chapter 2 "Safety".

1.1 Used Symbols and Warnings

1.1.1 Warnings

Warnings **CAUTION!** and **FORBIDDEN** are highlighted as white capital letters on black background. The warnings are followed by the text in capital letters.

In the group of warnings, the first ones refer to the safety of personnel.

Symbol or Abbreviation	Description
CAUTION!	The CAUTION! sign is used to attract the attention of personnel to the ways and methods that shall be strictly followed to avoid operation failures and repair of the Stainer, or when extra carefulness is vital when handling the device or materials.
FORBIDDEN	The FORBIDDEN sign indicates that failure to observe the specific restrictions or requirements to the ways and methods of handling the materials and the Stainer may result in safety violation.

1.1.2 Symbols

Symbol	Name of the symbol	Location, designation
⚠	Warning, Danger	Lid of the Stainer. Toxic and corrosive reagents. Protective equipment required.
🔥	Fire Hazard	Lid of the Stainer. Highly flammable liquids.
☣	Biological Hazard	Lid of the Stainer. Hazardous biological samples. Protective equipment required.
⚠	Warning, Danger	Rear panel of the Stainer beside the fuses' lid. Risk of fire when wrong fuses are used.
⚠	Warning, Danger	Manipulator housing in the center of the Working Chamber. Warning about the risk of injuries by moving manipulator.
🔥	Hot Surface	Inside the Working Chamber beside the Drying Station. The symbol warns about a risk of burns because of hot surfaces. Do not touch these parts. The symbol shown here indicates areas where the temperature may exceed 60°C.
O	OFF	Right side of the control unit, power switch.
I	ON	Right side of the control unit, power switch.
IVD	IN VITRO Diagnostic Medical Device	IFU, label on the rear panel of the Stainer.
SN	Serial Number	IFU, label on the rear panel of the Stainer.
REF	Catalog Number	IFU, label on the rear panel of the Stainer.
▲▲	Manufacturer	IFU, label on the rear panel of the Stainer.
✕	Manufacture Date	IFU, label on the rear panel of the Stainer.
EC REP	Authorized Representative in the EU	IFU, label on the rear panel of the Stainer.
🏭	Importer or Distributor	IFU, label on the rear panel of the Stainer.
10 A	Fuse Rating	IFU, label on the rear panel of the Stainer.
📖	Refer to the Instruction for Use	Operational documentation.

↑↑	UP	Labels on the packing box of the Stainer, indicating the correct position of the cargo.
(glass symbol)	Fragile. Caution. Fragile Cargo. Careful Handling	Labels on the packing box of the Stainer, stating the necessity of careful handling of fragile cargo.
(stacking limit symbol)	Limit on the number of tiers in a stack	Labels on the packing box of the Stainer. The maximum number of tiers when stacking is 2 (Two).
(umbrella symbol)	Protect from moisture	Labels on the packing box of the Stainer, stating the necessity to protect the cargo from moisture.
(sun symbol)	Protect from sun radiation	Labels on the packing box of the Stainer, stating the necessity to protect the cargo from sun radiation.
(arrow symbol)	Open here	Labels on the packing box of the Stainer. Operational documentation.
MLT	MLT LLC logo	IFU, label on the rear panel of the Stainer, labels on the packing box of the instrument. A stylized image of the manufacturing company's name.

1.1.3 Stainer Label

The label containing the Stainer's name, its serial number, the year of manufacture and other information is installed on the rear panel of the instrument. (📖 3.1.1)

Figure 1. Stainer Label

1.1.4 Menu Options, Touch Screen Buttons and Functions

Menu Options are shown in capital letters between double angle quotation marks as follows: «PROCESS», «SERVICE», «CONFIGURATION», etc.

Touch Screen Buttons are shown in the text as boxed words in capital letters as follows: ENTER , YES , STOP .

Touch Screen Buttons with Icons

◄ ► – for switching between two screens with a list of technological programs.

▼ , ▲ – for switching between screens with the same application (5 screens with a list of reagents, screens with program listings).

◀ – for deleting the last entered character (number).

Messages displayed on the screen are shown in capital letters between single angle quotation marks as follows: <PROGRAM WAS CHANGED>, <SAVE THE CHANGES?>.

1.2 Intended use

The FS-16-HISTO Automated Slide Stainer is an instrument for IN VITRO diagnostics. The instrument is designed for staining the biological preparations on slides and can be used for morphological examinations. The primary use is histology (H&E technic and various special histological technics);.and patho-cytology (particularly – Papanicolaou stain, for conventional and LBC preparations).

FORBIDDEN TO USE THE STAINER FOR ANY PURPOSE OTHER THAN DESIGNATED.

The violation of this requirement may result in accidents, injuries, damages to the instrument. The intended use implies compliance with all requirements of the IFU, including observance of the control and maintenance intervals, a routine check of expiry dates, and quality of reagents. The Stainer executes a selected technological program automatically. The manufacturer is not responsible for any faults in programming caused by the user during operation, including use of inappropriate reagents or their inappropriate placement, starting a program with closed lids of troughs, etc.

1.3 Compatibility with Reagents and Accessories of Other Manufacturers

The Stainer is an open system. The programs, supplied with the Stainer, may need corrections of parameters or changes in programs if used with reagents of other manufacturers. Most cases may require correction of the duration of technological treatments. Staining Kits manufactured by MLT LLC are supplied with an Operational Instruction with a recommended technological program. The end user is responsible for the programs compiled independently, for the reagents purchased from other manufacturers or for self-manufactured reagents.

FORBIDDEN TO USE ACCESSORIES AND SPARE PARTS NOT AUTHORIZED BY THE MANUFACTURER.

1.4 Qualification of Personnel

The FS-16-HISTO may be operated only by trained laboratory specialists – doctors and lab technicians. All laboratory personnel assigned to operate the Stainer shall read this IFU with all appendices carefully and be familiar with all technical specifications of the Stainer before starting.

FORBIDDEN TO OPERATE THE STAINER UNLESS THE PERSONNEL HAVE COMPLETED A SAFETY TRAINING.

FORBIDDEN TO OPERATE THE STAINER UNLESS THE PERSONNEL HAVE READ CAREFULLY THIS IFU WITH ALL APPENDICES.

2 Safety

2.1 General Safety Instructions

This Stainer has been developed, manufactured and tested under safety requirements for electrical laboratory instruments. For the reasons of safety, the instrument must be operated only according to the directions contained in this IFU and only for its intended use. If additional requirements on accident prevention and environmental protection exist in the country of operation, the IFU must be supplemented by appropriate instructions to ensure compliance with such requirements.

2.2 Special safety statements

The Stainer net weight is 25 kg. When packed, some accessories are placed inside the working chamber, so that the total weight amounts to about 30 kg.

FORBIDDEN TO RAISE AND CARRY THE INSTRUMENT, HOLDING IT BY THE UPPER PANEL.

FORBIDDEN TO CONNECT TO THE POWER SUPPLY WITH A DAMAGED POWER CABLE: ELECTRIC SHOCK MAY RESULT!

FORBIDDEN TO OPERATE THE FAULTY INSTRUMENT: ELECTRIC SHOCK AND MECHANICAL INJURY MAY RESULT!

The Stainer shall be connected to ~ 230V power supply with a grounded cable. The socket shall also be grounded.

FORBIDDEN TO OPERATE THE STAINER UNLESS IT IS CONNECTED TO GROUND.

Potentially dangerous toxic and irritant reagents, highly flammable liquids and biological products may be used during the operation. Safety glasses shall be used when required.

FORBIDDEN TO OPERATE THE STAINER UNLESS IT IS CONNECTED TO VENTILATION OR CHARCOAL FILTER, OR IS INSTALLED UNDER AN EXHAUST HOOD.

FORBIDDEN TO HAVE MEALS IN THE ROOM, WHERE THE STAINER IS INSTALLED.

Highly flammable liquids, such as spirits, spirit-based stain solutions, xylene or xylene substitutes may be used during operation.

FORBIDDEN TO INSTALL THE STAINER IN DIRECT VICINITY OF A FLAME OR SPARKS.

FORBIDDEN TO INSTALL THE STAINER IN ROOMS NOT EQUIPPED WITH FIRE EXTINGUISHING APPLIANCES SUCH AS CO_2 OR HALON FIRE EXTINGUISHERS.

For the standard instruction on fire safety measures refer to 📖 **Appendix A**.

FORBIDDEN TO DISASSEMBLE THE STAINER: ELECTRIC SHOCK MAY RESULT! ANY UNAUTHORIZED DISASSEMBLING THE STAINER VOIDS THE WARRANTY.

3. General characteristics

3.1 Description of Stainer

3.1.1 Stainer Design

The Stainer consists of a technological unit (4) with a Working Chamber and a lid (1) and a control unit (3) with a touch-screen (2).

Figure 2. Front View

1 – transparent lid; 2 – touch-screen; 3 – control unit; 4 – technological unit with Working Chamber; 5 – microSD card slot with lid; 6 – power switch.

Figure 3. Rear View

7 – exhaust water outlet; 8 – ventilation outlet*; 9 – tap water inlet; 10 – screw-type foot; 11 – nameplate with the serial number and year of manufacture; 12 – protective cover of electrical fuses; 13 – socket for connecting the power cable.

*The ventilation inlet, protected by a removable grille and filter, is located at the bottom of the instrument.

Figure 4. Top View: Working Chamber of Technological Unit

14 – grab of manipulator; 15 – arm of manipulator; 16 – manipulator housing; 17 – upper panel of Stainer; 18 – trough; 19 – lid of trough; 20 – drainage hole of Flow-Through Station; 21 – water level sensor; 22 – flow-through trough; 23 – stations numeration index plate

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3.1.2 Accessories: Troughs and Racks

The available racks and troughs for the Stainer are as follows:
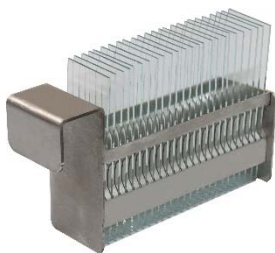
RV-25
Rack for 25 slides
REF 06.01.00

TV-25-PP
Polypropylene Trough
Color: white
For use with RV-25, RV-20, RV-10 Racks
REF 06.06.00
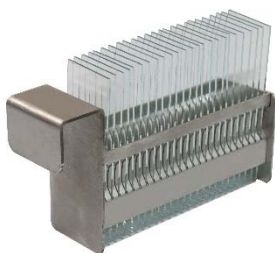
RV-20
Rack for 20 slides
REF 06.02.00

TV-25-POM
Polyoxymethylene Trough
Color: grey
For use with RV-25, RV-20, RV-10 Racks
REF 06.06.00-01

RV-10
Rack for 10 slides
REF 06.08.00

TV-10-PP
Polypropylene Trough
Color: white
For use with RV-10 Racks
REF 06.07.00

RI-20
Rack-insert for 20 slides
REF 07.00.02

TV-10-POM
Polyoxymethylene Trough
Color: grey
For use with RV-10 Racks
REF 06.07.00-01

RH-20
Rack-holder
For use with RI-20 Rack-insert
REF 07.01.00

TV-25-S
For use with RV-25, RV-20, RV-10, RH-20 Racks
REF 06.05.00

PP – Troughs (made of polypropylene, white color) are recommended for working with any reagents EXCEPT xylene and its substitutes.
POM – Troughs (made of polyoxymethylene, gray color) are recommended for use ONLY with xylene and its substitutes.
S – Throughs (made of stainless steel) are recommended for working with any reagents.

CAUTION! RH-20 RACK-HOLDER SHALL BE USED WITH RI-20 RACK-INSERT ONLY.

Figure 5. RI-20 Rack-Insert and RH-20 Rack-Holder Assembly

The Stainer is supplied with RV-25 racks for 25 slides, RV-20 and RI-20 racks for 20 slides and RV-10 racks for 10 slides.

The Stainer is supplied with three types of troughs:

TV-25-PP and TV-10-PP – a polypropylene trough **(color: either white, or natural half-transparent)** recommended when handling aqueous solutions; spirits; and acetone.

TV-25-POM and TV-10-POM – a polyoxymethylene trough **(color: grey)** recommended when handling xylene; substitutes of xylene; aqueous solutions; and solution with pH≥7.

TV-25-M – **stainless steel** trough is recommended for working with aqueous and alcoholic solutions, acetone, xylene, xylene substitutes, aqueous solutions pH≥7. It is not recommended to use with solutions containing acids and iodine solutions.

CAUTION! RV-20, RV-20 AND RV-25 RACKS ARE NOT COMPATIBLE WITH TV-10 TROUGHS.

CAUTION! RECOMMENDED VOLUME OF LIQUID FOR TROUGHS:

Trough type	Rack type	Number of loaded slides, pcs.	Recommended volume of liquid in the trough, ml
TV-25-PP TV-25-POM TV-25-M	RV-25 (RV-20)	25 (20)	210±5
		12 (10)	220±5
		5	230±5
	RH-20	20	220±5
		10	235±5
		5	250±5
	RV-10	10	240±5
TV-10-PP	RV-10	10	100±5

TV-10-POM		5	110±5

CAUTION! AFTER WORKING WITH THE DEVICE, IT IS NECESSARY TO DRAIN THE REAGENTS FROM THE TROUGHS, CLEAN THE TROUGHS WITH DETERGENT, RINSE THOROUGHLY WITH WATER AND DRY. CLEAN THE RACK WITH DETERGENT FROM STAIN CONTAMINATION, RINSE THOROUGHLY WITH WATER AND DRY.

3.1.3 MicroSD Card and MicroSD Card Slot

The Stainer is supplied with the microSD card, and the microSD card slot (Figure 2, p. 5). The memory card is used to store microprocessor firmware data. The firmware can be updated or edited using the «Stainer Firmware Editor» software (**Appendix D**).The microSD card slot is at the right-side panel of the control unit, above the power switch. A hinged lid closes access to the card. To open it, pull the upper part of the lid. To extract the microSD card, press it with your finger. The card will sink a little, and when released, it will be available for retrieval. It can be extracted by taking with two fingers. To install the microSD card after working with it, hold it with two fingers so that the fixation tooth is at the upper part and insert it into the slot until it snaps. Close the lid.

3.1.4 Principle of Stainer Operation

The principle of the staining process is the sequential programmed movement of racks with slides from station to station where technological operations are carried out.

The Working Chamber of the Stainer is covered with a transparent lid and has compulsory ventilation, which ensures safety in handling toxic reagents.

The Stainer includes the following types of stations:

● station with a flow-through trough (tap water)

● station for drying or heating with warm air flow

● Combined Stations – either for placement of troughs with liquid reagents or for placement of racks with slides, what makes it possible to create an optimum configuration of an instrument for each staining technique and even for each laboratory.

The instrument allows for staining slides using a group method. The slides shall be placed into a rack. The racks shall be loaded into the Working Chamber and arranged at Parking Stations automatically with the help of the manipulator (15). When the loading of racks is complete, the Stainer starts performing the technological program: the manipulator moves

the racks with slides from station to station, where troughs with reagents are installed and technological operations are performed (fixation, staining, washing, and so on).

Processing duration, the reagent type and the station where an operation to be performed are programmable and changeable. Control and programming are performed using a color touch-screen display. Programming functions include not only the consequence and duration of technological operations but also their parameters and modes. For instance, a technological operation can be performed in a number of ways: immersion into the reagent, immersion with a programmed period of activation, repeated dipping of slides into the reagent (this can accelerate the speed of processing).

When rack processing is complete, it moves back to the initial station, where it was loaded in the beginning*— the Stainer signals about completion of processing of each rack and all loaded racks. Unloading of racks is performed automatically with the help of the manipulator.

The mechanics of Stainer is unique in simplicity and reliability. The racks with slides rotate not only in a horizontal plane but also up and down. Lifting the rack from the reagent is followed by inclining and vibration, that facilitates draining of excess liquid from slides and the rack. Thus, the transfer of reagents between troughs is very low. The manipulator mechanism is designed in such a way that the rack is firmly fixed in its grab, making it possible to perform high-speed movements (during dipping, shaking, transferring from station to station, etc.). The option to program the time of holding the rack over the trough ('draining time') allows for flowing off the excessive reagent. Programming the run interval for the new rack processing makes it possible to configure programs with simultaneous processing of several racks. To increase the performance, there is a possibility to install several troughs with the reagent that is used for a most time-consuming operation.

Thus, the Stainer provides a good number of opportunities to make the process of staining FAST, versatile, and efficient despite its compact size.

3.2 Technical Specifications

Number of combined stations	15
Number of drying stations	0
Number of washing stations (with a flow-through trough)	1
Size of slides	76×26×1,0 mm
Stained part of a slide	~ 26×55 mm
Ventilation of the working chamber	forced
Heating modes of the drying station	strong / weak
Graphic touch screen (control)	480×272 pixels
Number of staining programs, supplied with the Stainer	4
Max. number of staining programs	32
Max. number of steps in a program	30
Max. number of programmed reagents' names	96
Power supply	~ 230 V ± 10%, 50 Hz
Power consumption, no more than	300 VA
Dimensions	580×615×335 mm
Weight	25 kg

3.3 Environmental Conditions

Operational temperature:	from 15 to 35 °C
Operational relative humidity:	80 %, non-condensing
Storage temperature:	from -40 to +50 °C
Storage relative humidity:	80 %, non-condensing
Transportation temperature:	from -40 °C to +50 °C
Transportation relative humidity:	80 %, non-condensing

CAUTION! AFTER TRANSPORTATION AT A TEMPERATURE BELOW 0°C, THE INSTRUMENT SHALL BE KEPT IN NORMAL CLIMATIC CONDITIONS FOR AT LEAST 4 HOURS WITHOUT OPENING THE PACKAGE.

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* Racks for slides of other sizes are available for order.

3.4 Delivery Package

A standard delivery package includes:

Description	Product code REF	Quantity
Automated slide Stainer FS-16-COMBO	944330.005.02	1
RV-25 rack for slides (for 25 slides)	06.01.00	2*
RV-10 rack for slides (for 10 slides)	06.08.00	0*
RI-20 rack-insert for slides (for 20 slides)	07.00.02	0*
RH-20 rack-holder (for rack-insert RIV-20)	07.01.00	0*
TV-25-PP trough for reagents with a lid (for racks: RV-10 RV-25, RV-20, RH-20)	06.06.00	15*
TV-25-POM trough for reagents with a lid (for racks: RV-10 RV-25, RV-20, RH-20)	06.06.00-01	5*
TV-10-PP trough for reagents with a lid (for rack RV-10)	06.07.00	0*
TV-10-POM trough for reagents with a lid (for rack RV-10)	06.07.00-01	0*
TV-25-M trough for reagents with a lid (for racks: RV-10 RV-25, RV-20, RH-20)	06.05.00	0*
Kit for tap water connection: 1. Water supply hose – 1 pc. 2. Drain hose – 1 pc. 3. Clamp for drain hose – 1 pc.	05.70.00	1
Kit for connection to ventilation or charcoal filter: 1. Flexible ventilation duct – 1 pc. 2. Clamp for vent. duct - 2 pcs.	05.10.00	1
Filter holder	05.03.00	0*
Charcoal filter	05.04.00	0*
Power cable	05.50.00	1
Fuse 250V, 10A (glass)	05.51.00	2
Instruction For Use	944330.005.02 IFU	1
	* - Quantity may vary by agreement with customer	

4. Unpacking and Installation of Stainer

4.1 Site requirements

The Stainer shall be placed on a solid horizontal surface with the dimensions min. 0.6 m long and 0.6 m wide. A grounded socket for connection to power shall be located not farther from the installation site than the length of the cable (1.5 m). The Stainer shall be installed in close proximity to the water supply and drain (1 - 1.2 m), and the laboratory ventilation system. It is possible to install the instrument in an exhaust hood, in this case, connection to the ventilation system is not required.

4.2 Unpacking

The Stainer is packed in a corrugated cardboard box and a polyethylene film hood.

CAUTION! AFTER TRANSPORTATION AND STORAGE UNDER LOW TEMPERATURES AND BEFORE UNPACKING, THE STAINER MUST BE KEPT IN TRANSPORTATION PACKING FOR AT LEAST 4 HOURS UNDER NORMAL ENVIRONMENTAL CONDITIONS.

CAUTION! STAINER IS HEAVY. USE ADDITIONAL HELP WHEN LIFTING AND POSITIONING.

To unpack, cut open the box, by cutting the band that fixes together the flaps on the upper side of the box. Open the box, by unbending the flaps, take out of the niche in the upper corrugated cardboard gasket a bag with documentation. Take off the upper gasket. Take out lateral gaskets.

Take out the Stainer, using the transportation belts (or polyethylene film, in which the device has been packed).

FORBIDDEN TO RAISE AND CARRY THE DEVICE, HOLDING IT BY THE UPPER PANEL. (⏍ Figure 4, Figure 6.17).

Set the Stainer free from the polyethylene film and transportation belts. Open the upper lid of the Stainer, take the corrugated cardboard box (24, 27) and gaskets by its sides (25, 26, 28) out of the Working Chamber.
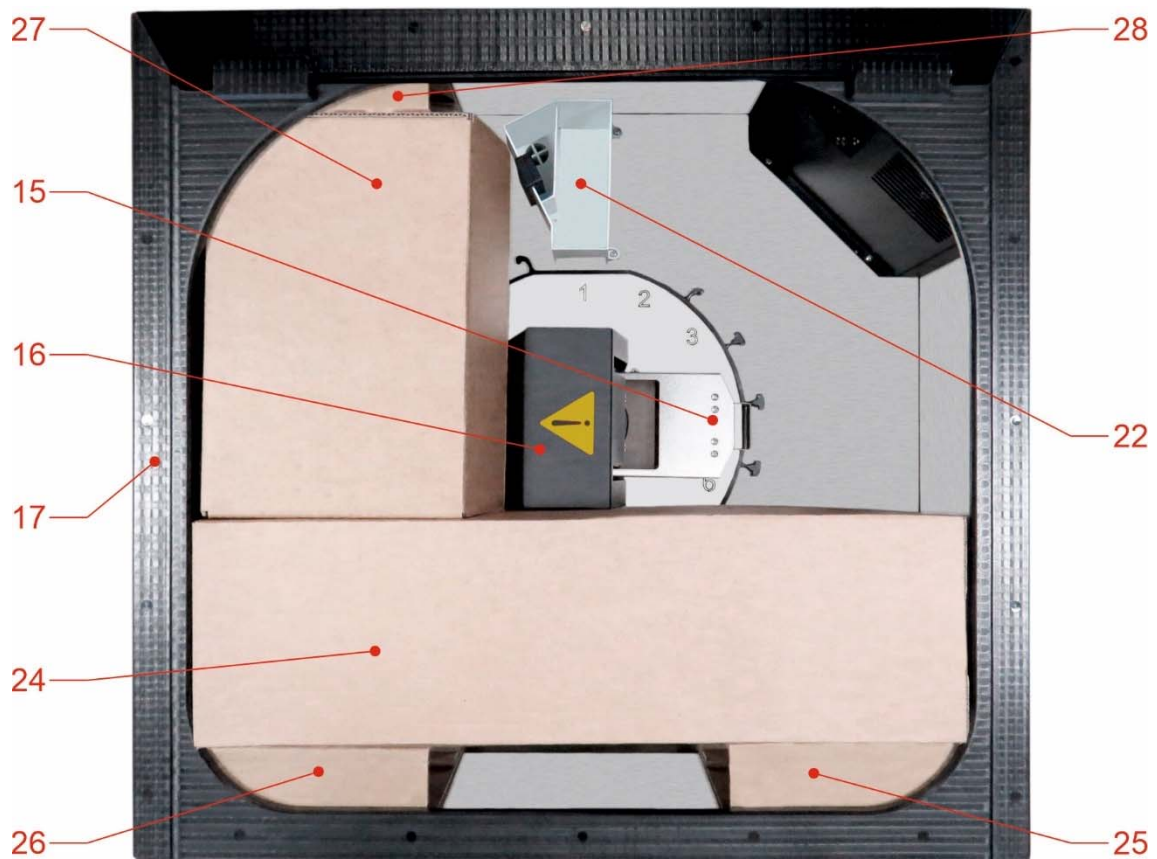
Figure 6. Unpacking of Stainer. Top View of Working Chamber with Lid Open

15 – arm of manipulator; 16 – shell of manipulator; 17 – upper panel of Stainer; 22 – flow-through trough (tap-water); 23 – drying station; 24 – box with accessories (troughs with lids, racks); 27 – additional box with accessories; 25,26,28 – gaskets.

CAUTION! IT IS RECOMMENDED TO SAVE THE BOX (27, 24) AND THE GASKETS (25, 28, 26). THEY WILL BE NEEDED TO PACK THE STAINER FOR TRANSPORTAION. THE BOX (24) FIXES THE MANIPULATOR DURING TRANSPORTAION. PAY ATTENTION TO THE POSITION OF THE MANIPULATOR'S ARM.

CAUTION! IT IS RECOMMENDED TO KEEP THE ORIGINAL PACKING OF THE STAINER AND ACCESSORIES.

CAUTION! ANY DEVICE, ITS PART, OR ACCESSORY, BEING RETURNED TO MLT LLC, OR REQUIRING MAINTENANCE AT THE OPERATION SITE, MUST BE APPROPRIATELY CLEANED AND DISINFECTED. (⬛ [11. Confirmation of Decontamination](#)).

4.3 Connection

Place the Stainer on the installation site. If necessary, level the instrument horizontally using the screw feet (10) (Figure 3).

4.3.1 Power Connection

The Stainer is connected to the electric socket with a power cord, which is supplied with the device. Connect the power cord to the power supply inlet (13) (Figure 3) at the rear of the device. Connect the power cord to a grounded electric socket. The socket must be compatible with the power cord plug. If not, do not use adapters, but replace either the socket or the power cord.

FORBIDDEN TO OPERATE THE STAINER UNLESS IT IS CONNECTED TO GROUND.

4.3.2 Connection to Ventilation

If no exhaust hood is provided for Stainer, it shall be connected to the laboratory ventilation system using, as a rule, flat ventilation tubes made of plastic 110 x 55 mm in size, with appropriate fittings. The section between the Stainer and the ventilation tubes shall be made of flexible corrugated ventilation duct 100 mm in diameter (D100). The flexible ventilation duct shall be fixed at the Stainer's ventilation inlet (8) (Figure 3) with a clamp. A connector of round plastic ducts shall be installed and fixed with a clamp at the other end. Next, the ventilation duct structure shall be installed in accordance with the characteristics of rooms.

Where it is not possible to connect the instrument to the laboratory ventilation system or to place the instrument into a fume hood, the external Charcoal Filter shall be used (Figure 7).

Figure 7 Charcoal Filter mounted on Filter Holder

The flexible duct from the set for connection to ventilation 05.10.00 is fixed to the outlet vent pipe (8) (Figure 3) of the device with a clamp, the other end of the flexible duct is fixed to the inlet pipe of the Charcoal Filter.

Install the Filter on the supplied Holder.

CAUTION! THE CHARCOAL FILTER SHOULD BE REPLACED EVERY THREE MONTHS. IF THE INSTRUMENT HAS NOT BEEN USED FOR A LONG TIME, IT IS RECOMMENDED TO INSTALL A NEW FILTER.

FORBIDDEN TO WORK WITH THE INSTRUMENT UNLESS IT IS CONNECTED TO VENTILATION OR EXTERNAL FILTER, OR IS INSTALLED OUTSIDE AN EXHAUST HOOD.

4.3.3 Connection to Drain

Connection to the drain system is the same as for washing machines. A 1.5 m long, 3/4"-3/4" drain hose for washing machines (Figure 8) is required for water discharge.

Figure 8. Drain Corrugated Hose (for washing machines)

Connect the hose to the water outlet (7) in the niche on the rear panel of the instrument. Attach the hose to the outlet with a clamp. The hose may be placed into the stub of a drainpipe or fit onto the siphon stub designed for connection of washing machines and dishwashers. When connecting to the siphon stub, fix the hose with a clamp.

CAUTION! BEFORE CONNECTION CHECK THE SIPHON STUB FOR A BACKFLOW BARRIER - IT SHALL BE REMOVED BECAUSE THE WATER SHALL BE DRAINED BY GRAVITY.

CAUTION! THE DRAIN HOSE SHALL NOT BE KINKED, BENT OR PINCHED CAUSING HOSE DAMAGE OR RESTRICTING WATER FLOW.

CAUTION! THE WASTE WATER OUTLET SHALL BE LOCATED ABOVE THE POINT WHERE THE HOSE IS CONNECTED TO THE DRAIN SYSTEM AND ABOVE THE EDGES OF THE SINK, TO WHICH THE SIPHON IS CONNECTED. THE DRAIN HOSE SHALL BE INSTALLED AND FIXED WITH A SUFFICIENT DESCENDING GRADIENT FROM THE OUTLET OF THE STAINER. WHEN LAYING THE HOSE, MAKE SURE THAT THERE ARE NO BENDS OR REVERSE GRADIENT.

4.3.4 Connection to Water Supply

Connection to the water supply system shall be performed using 3/4"-3/4" flexible water supply hose for washing machines (included into delivery package).

Figure 9. Connection Hose

(flexible 3/4"-3/4" connection hose for washing machines)

Attach the hose corner fitting to the tap water inlet (8) on the rear panel of the Stainer with a nut. Tighten the nut with hand. Connect the other end of the hose to cold water tap having a ¾" pipe thread. Tighten the nut with hand. Turn on the tap, check for water leaks. If necessary, tighten the nuts of the hose.

CAUTION! THE WATER SUPPLY HOSE MUST NOT BE KINKED, BENT, OR PINCHED CAUSING HOSE DAMAGE OR RESTRICTING WATER FLOW.

CAUTION! THE CONNECTION HOSE MUST NOT BE TENSIONED. IF THE SUPPLIED HOSE IS TOO SHORT, CHANGE IT TO A LONGER ONE, WHICH CAN HOLD THE WATER PRESSURE IN THE WATER SUPPLY SYSTEM.

CAUTION! MAKE SURE THERE ARE NO LEAKS IN THE WATER SUPPLY AND IN THE DRAIN SYSTEMS AND THAT THERE ARE NO BENDS AT THE DRAIN HOSE BEFORE STARTING THE OPERATION.

CAUTION! WHEN THE WORK IS FINISHED, IT IS RECOMMENDED TO TURN OFF THE TAP.

5. Operation and Control of Functioning

5.1 Main Menu, Menu Structure

Operation and functioning control of the Stainer performed via a 480 x 272-pixel color touch screen.

Once the Stainer is switched on, it starts self-testing, and a welcome screen with a manufacturer's (or dealer's) logo appears on the touch screen (Figure 10), then the Stainer switches to the Main Menu (Figure 11).

Figure 10. Welcome Screen

Figure 11. Main Menu

The upper line of the screen contains the name of the program.

The warning to check the operational readiness of the Stainer is displayed in the middle of the screen. Before operation, a lab technician shall place troughs with reagents into the Working Chamber following the technological program protocol, and check the expiration date of reagents.

In the bottom of the screen the following buttons are displayed:

PROGRAMMES   START OF PROGRAM   CONFIGURATION

PROGRAMMES – access to «PROGRAMMING» menu (selection of a technological program from available options, correction of parameters and creating new programs).

START OF PROGRAM – access to «PROCESS» menu (loading and unloading of racks, processing of racks with slides according to a selected program).

CONFIGURATION – access to «CONFIGURATION» menu (changing configuration of the Stainer: changing properties of stations, including selection of the reagent and the time of rack holding above a trough to let the reagent be drained; changing the interval to run new racks; access to «SERVICE» menu).

5.2 PROGRAMMING» Menu. Programming New Techniques, Editing Parameters for Previously Downloaded Techniques

To access the menu section «PROGRAMMING», press the button PROGRAMMES in the Main Menu.

.

PROGRAMMING	SELECTION OF PROGRAM :		DEMO
DEMO	H-E HIST	H-E HIST-2	PAP-DIFF
PAP-DIFF-2	PAP-DIFF-3	[NEW]	
MAIN MENU		◀▶	

Figure 12. «PROGRAMMING» Menu

The upper line indicates the application of the current screen: current menu section <PROGRAMMING> and current program: <DEMO>.

The list of available uploaded programs is displayed in the middle of the screen. To select a program, press the respective button. Pressing the button DEMO starts a demonstration program for familiarization with the Stainer and checking its working capacity.

In the bottom of the screen the following buttons are displayed:

MAIN MENU   ◄►

MAIN MENU – return to the Main Menu.

◄► – to switch between screens with a list of programmed techniques (total 2 screens with 16 reserved buttons each).

To program a new technique, press the button [NEW] and enter the number of technological operations (Figure 13).

Figure 13. Entering Number of Operations for New Program

Enter the required number of operations and press the button ENTER.

Figure 14. Entering Name for New Program

Then enter the name of new program (up to 12 alphanumerical symbols) (Figure 14).

Enter the name of new program and press the button ENTER to switch to the screen of program editing. If the entered name is unique, i.e., it has not been entered before, a template of a new program (Figure 15) with already given number of operations appears on the screen. Otherwise, the Stainer will suggest entering a different name.

PROGRAMMING		DEMO-4		N = 4
N	REAGENT	MODE	ACTIVATION	TIME
1	TAP WATER	IMMERSION	00	00:06
2	TAP WATER	IMMERSION	00	00:06
3	TAP WATER	IMMERSION	00	00:06
4	TAPWATER	IMMERSION	00	00:06
5				
MAIN MENU	CANCEL	ENTER	▲	▼

Figure 15. Template of New Program DEMO-4 (4 technological operations).

Programming is performed by editing the template:

- Selection of appropriate reagent for each technological operation. (<DRYER> (drying and heating) and <BLOTTER> (removal of liquid from a rack and slides' ends) are conventionally considered as reagents. To start editing, touch the screen at the spot of the parameter, which you need to edit. Then perform editing by selecting reagents from the list. To enter a new reagent, press the button NEW (reagent screen No. 5). For the manufacturer's list of reagents refer to 📖 **Appendix B**.

REAGENT SELECTION		SCREEN 1		AC…AU (1-16)
1 ACETIC ACID	2 ACETONE	3 ACID SOLUTION	4 ALCOHOL
5 ALCOHOL-1	6 ALCOHOL-2	7 ALCOHOL-3	8 ALCOHOL-4
9 ALCOHOL-5	10 ALCOHOL-6	11 ALCOHOL100%	12 ALCOHOL100%-1
13 ALCOHOL100%-2	14 ALCOHOL100%-3	15 ALCOHOL SOLN.	16 AURAMINE-RHO.
CANCEL		▲	▼

Figure 16. Screen of reagent selection No. 1 (in total up to 6 screens).

- Selection of manipulator operation <REGIME> (<IMMERSION> or <DIPPING>). To change the regime, touch the screen at the spot of required parameter.

Regime <IMMERSION>. The regime, when the rack with slides is immersed into the reagent and kept in this position until the end of technological operation.

Regime <DIPPING>. The regime, when the rack is dipped time after time into the trough with reagent without holding. For <DIPPING> regime it is required to set the number of dipping cycles from 1 to 99, but not the time of processing. When the number of cycles is set to «1», the rack is dipped into the trough and lifted out immediately.

- Selection of the value for <AGITATION> parameter

The parameter <AGITATION> is programmed only for the regime <IMMERSION>. It defines the period of repetition of rack up-and-down reciprocating movements without its complete lifting out of the reagent. <AGITATION> allows mixing the reagent and accelerates the technological operation. The value of the parameter <AGITATION> shall be set within 0-99 sec. interval. With the value <00> there will be no up-and-down reciprocating movements. The regime <00> shall be used when mixing of reagent is undesirable, for example, when using a Giemsa working solution that tends to precipitate.

For programming, touch the screen at the spot of the required parameter and enter the required values with the screen digital keyboard.

- Selection of the value for <TIME> parameter

This parameter defines the duration of the technological operation. For programming, touch the screen at the spot of the required parameter and enter the required values with the screen digital keyboard.

Parameters of previously uploaded programs are changeable in the same way. To finish editing, press the button ENTER, and the Stainer will go to the PIN (personal identification number) entry screen.

```
┌─────────────────────────────────────────────────────┐
│        ENTER THE NEW PIN (000 - 255)                │
├───────────┬───────────┬───────────┬───────────┬─────┤
│           │           │           │           │     │
│     0     │     1     │     2     │     3     │  4  │
│           │           │           │           │     │
├───────────┼───────────┼───────────┼───────────┼─────┤
│           │           │           │           │     │
│     5     │     6     │     7     │     8     │  9  │
│           │           │           │           │     │
├───────────┴─────┬─────┴───────────┼───────────┴─────┤
│     CANCEL      │      ENTER      │       ◄█         │
└─────────────────┴─────────────────┴─────────────────┘
```

Figure 17. NEW PIN Entry Screen

PIN is useful to prevent unauthorized program editing. It is possible to choose any 3-digit PIN in the range 000-999. After entering a NEW PIN, press the button ENTER, and the Stainer will return to the main menu.

CAUTION! CONFIRMATION IS REQUIRED TO SAVE A NEW PROGRAM AND CHANGES. After pressing the button START OF PROCESS in the Main Menu, the system will offer to save a new program (Figure 18).

```
┌─────────────────────────────────────────────────────┐
│  PROGRAM :           DEMO-4              N = 4       │
├─────────────────────────────────────────────────────┤
│                                                     │
│                                                     │
│                                                     │
│             PROGRAM WAS CHANGED                     │
│             SAVE THE CHANGES?                       │
│                                                     │
│                                                     │
│                                                     │
├─────────────────────────┬───────────────────────────┤
│         YES             │          NO               │
└─────────────────────────┴───────────────────────────┘
```

Figure 18. Saving Confirmation Screen

If you press the button NO, the program will be run, but after you switch off the Stainer, it will be deleted from the memory.

CAUTION! FOLLOW THE PIN INPUT FORMAT (3 DIGITS)

If you enter a PIN of one or two digits (invalid format), the technology program will assign a default PIN code (255), and a message appears on the screen:

<div align="center">

<INCORRECT PIN FORMAT

DEFAULT SETTED PIN IS 255

TOUCH THE SCREEN TO CONTINUE>

</div>

The Stainer allows you to create and save up to 32 programs. All programs, including the preprogrammed ones (factory default), can be edited. An edited program can be saved under a new name (as a new program), in this case the following message will appear on the screen:

<div align="center">

<SAVE CHANGED PROGRAM

UNDER A NEW NAME?>

</div>

If you press the button YES, the edited program will be saved under a new name and a new PIN. The saved program will be added to the section «PROGRAMMING». If you press the NO button, it is required to enter the PIN, which was entered before in the course of new program saving.

ENTER THE PIN				
0	1	2	3	4
5	6	7	8	9
CANCEL		ENTER		◄◄

Figure 19. The PIN Enter Screen (saving changes in program under old name)

After entering PIN, press the button ENTER, and the Stainer will return to the main menu.

CAUTION! DO NOT ENTER INCORRECT PIN.

If the entered PIN is correct, then after pressing the button START OF PROCESS, the system will offer to save the edited program under the previous name:

<p style="text-align:center; color:red;"><PROGRAM WAS CHANGED</p>
<p style="text-align:center; color:red;">SAVE THE CHANGES?></p>

With the button YES the system will overwrite the edited program.

If you press the button NO, the edited program will be run, but after you switch off the Stainer, the changes will not be saved.

If the entered PIN is incorrect, then after pressing the button START OF PROCESS, the system will display the following message:

<p style="text-align:center;"><INCORRECT PIN IS ENTERED</p>
<p style="text-align:center;">ALL CHANGES MADE TO THE PROGRAM ARE CANCELED</p>
<p style="text-align:center;">TOUCH THE SCREEN TO RETURN TO THE MAIN MENU></p>

Prior to program a new technique, it is advisably to define what reagents will be used, to count the number of technological operations, to consider how to arrange troughs with reagents. To develop a new program, use the special form, the template for which is given in 📖 **Appendix C**. An editable file with template can be uploaded at the website www.fastainer.com in the **"RESOURCES"** section.

Alternatively, you can write a new program using the special PC software «Stainer Firmware Editor» (📖 **Appendix D**).

5.3 «CONFIGURATION» Menu. Programming and Control of Configuration, Performing Service Functions

To access the menu section «CONFIGURATION», press the button CONFIGURATION in the Main Menu.

Figure 20. «CONFIGURATION» Menu

The upper line displays the current status <CONFIGURATION> and the current program <DEMO>, and the interval to run new racks into the process in HH:MM:SS format.

The configuration for a selected program in the form of 16 rectangular buttons corresponding to 16 stations is displayed in the middle of the screen. The buttons for technological stations are colored in blue. They contain the following information: station No., appointed reagent, <RESOURCE> value (remaining number of technological operations for a station with the reagent until its replacement). The buttons <PARKING> for Parking Stations are colored in white and display station No. Parameters and application of each station can be changed by pressing the button with a respective number.

The format of buttons:

NN	RESOUR	XXX
STATION APPLICATION		

where: <NN> – station number, <STATION APPLICATION> – application of station, <RESOUR XXX> – how many times it is left for a manipulator to revert to a station with reagent until it has to be changed (resource limit of a reagent), (the limit is set by the operator within the interval 0-255, default value is 255).

The <STATION APPLICATION> parameter can be set to the following values:

- <FLOW> (only for Station No. 1)

- <PARKING> (parking station, into which a rack with slides will be loaded). The parameter is not editable, as the loading of racks is automatic.

- <TECHNOLOGICAL> (the station where preparations are processed). Once a trough with reagent is placed into a station, it is required to select the reagent from a list of 64 preprogrammed ones (refer to 📖 **Appendix B**) or enter the new name (in total up to 96 names).

For editing changeable parameters of configuration (e.g. <MODE> for Station No. 1) press the blue button right of the name of parameter.

The station <DRYER> (Station No. 1) has the following configuration parameters (Figure 21):

Figure 21. Configuration of Station No. 2 <FLOW-THROUGH>

- < STATION APPLICATION > parameter < FLOW-THROUGH > – not editable
- <REAGENT> parameter <TAP WATER> – not editable
- <RESOURCE LIMIT> – not editable (only for station <FLOW-THROUGH>)
- <DELAY> – editable parameter: duration of holding the rack in upper position after lifting out of a trough (0-99 seconds, default value is 10).

Stations No. 3-16 can allocate troughs with reagents or racks, these stations must have respective application values: <TECHNOLOGICAL> or <PARKING>. All parameters of stations designated as <TECHNOLOGICAL>, in contrast to <FLOW-THROUGH>, are editable (Figure 22).

Figure 22. Configuration of Station No. 3 with Reagent

- <STATION APPLICATION> parameter <TECHNOLOGICAL> – editable parameter. The station is reserved for a trough with reagent. On pressing the button

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TECHNOLOGICAL, the value is switched to <PARKING>, this means that the station is now designated for placement of racks. The only editable parameter of Parking Stations is <STATION APPLICATION>.

- <REAGENT> parameter <BUFFER PH<7> (reagent name) – editable parameter. If necessary, the reagent name can be changed by pressing the button with the parameter's name and selecting the required name from the list. To enter a new reagent, press the button NEW (reagent screen No. 5 or 6). For the manufacturer's list of reagents refer to 📖 **Appendix B**.

- <RESOURCE LIMIT> – editable parameter: the value means the number of times left for a manipulator to use the station with reagent until exhaustion of its limit (e.g. because of changing properties). The admissible limit of usages shall be set by an operator within the interval 0-255, default value is 255.

CAUTION! WHEN THE VALUE REACHES ZERO, A MESSAGE APPEARS ON THE SCREEN, WARNING ABOUT EXHAUSTION OF THE REAGENT RESOURCE LIMIT:

<RESOURCE LIMIT OF TROUGH # XX IS EXHAUSTED>

This allows you to replace the reagent in the respective trough timely. To continue the process, press the button CANCEL. Each reloading of the Stainer resets the value.

- <DELAY> – editable parameter: duration of holding the rack in upper position after lifting out of a trough (0-99 seconds, default value is 10).

When returning to the previous screen by pressing the button CANCEL the set values will be saved.

At the bottom of «CONFIGURATION» menu (Figure 18) the following buttons are displayed:

MAIN MENU   INTERVAL   SERVICE

MAIN MENU – return to the Main Menu
INTERVAL – set the interval for running racks with slides in to the process (refer to 5.3.1)
SERVICE – to switch to the Service Menu.

5.3.1 Programming of Racks Run Interval

The default interval is programmed automatically and is equal to the sum of durations of all technological operations for a certain technological program excluding the time required for rack reposition and holding above the trough following its lifting.

To process racks in parallel and to increase the performance of the Stainer respectively, the interval value can be changed with accuracy of a second. Maximum duration of the interval is 16 hours 00 minutes 00 seconds. Data format is HH:MM:SS. The interval value of is entered using a digital keyboard (Figure 24). To delete a value entered incorrectly press the button ◀. To save the entered interval value, press the button ENTER.

ENTER DURATION OF INTERVAL		HHMMSS	1-160000	
0	1	2	3	4
5	6	7	8	9
CANCEL		ENTER		◀

Figure 23. Programming of Interval

CAUTION! WHEN CALCULATING AN OPTIMAL INTERVAL, IT IS REQUIRED TO TAKE INTO CONSIDERATION THAT THE TIME, SPENT FOR RACK REPOSITION AND HOLDING ABOVE THE TROUGH FOR DRAINING, IS NOT ADDED TO THE INTERVAL BY DEFAULT. BEFORE STARTING A NEW PROGRAM WITH REAL REAGENTS, IT IS REQUIRED TO CHECK THAT THE INTERVAL HAS BEEN CALCULATED CORRECTLY BY RUNNING THE PROGRAM WITH EMPTY RACKS.

The user shall calculate the interval independently considering the fact that when the time of rack processing in reagent elapses, the station of next processing (next reagent) shall be unoccupied. If this condition is not fulfilled (the programmed interval is too small), the rack will be moved back to the initial Parking Station. The technological program for this rack will continue when the station with respective reagent becomes free.

Alternatively you can select an optimal interval using the special PC software «Stainer Firmware Editor» (▯ **Appendix D**).

5.3.2 «SERVICE» Menu. Realization of Service Functions

To access the Service Menu functions, press the button SERVICE (Figure 24):

SERVICE	DEMO
POSITIONING TEST	TECH. PROGRAMS RELOADING
WATER SUPPLY – PROGRAMMED	RESERVE
ACCEPTANCE TEST	RESERVE
SOFTWARE VERSION	FACTORY RESET
MAIN MENU	CANCEL

Figure 24. Service Functions Menu

POSITIONING TEST – checking the operability of the Stainer and its accessories (positioning test program). The program is designed to check the mutual positioning of accessories and manipulator. The test program is recommended for commissioning the Stainer and identification of defective accessories.

WATER SUPPLY – PROGRAMMED ⇔ WATER SUPPLY – CONTINUOUS – are designed to program the water supply into the flow-through trough.

- <PROGRAMMED> – water supply turns on automatically as soon as the rack is positioned at the flow-through trough,

- <CONTINUOUS> – the water supplied to a flow-through trough continuously.

To switch between modes, press the button.

ACCEPTANCE TEST – service section for acceptance tests, which is protected with a password. The section is used by engineering personnel of the manufacturing company and by personnel of certified testing centers during tests. This mode is unavailable for lab personnel.

SOFTWARE VERSION – version of the software appears on the screen when the button is pressed.

TECH. PROGRAMS RELOADING ⇔ SOFTWARE RELOADING ⇔

⇔ TOTAL FIRMWARE RELOADING - is intended to set the mode of firmware reloading by changing data on SD card. The data on SD card is changed with «Stainer Firmware Editor» PC software. (**Appendix D**).

RESERVE – inactive buttons, reserved by the manufacturer.

FACTORY RESET – resetting to the initial configuration of the manufacturer. To perform the factory reset, select this section and press the button YES.

CAUTION! WITH PRESSING YES ALL THE PROGRAMS AND NAMES OF REAGENTS, PROGRAMMED BY THE USER WILL BE DELETED.

5.4 «PROCESS» Menu. Loading and Unloading of Racks. Processing of Racks with Slides according to Preset Technological Program

To access the menu section **«**PROCESS**»**, press the button START OF PROCESS in the 📖 Main Menu.

5.4.1 Loading of Racks

After pressing the button START OF PROCESS, the Stainer will offer to load racks with slides, and the following message will appear on the screen:

```
PROCESS              DEMO              N=9

         PUT THE RACK IN THE MANIPULATOR
              AND PRESS THE BUTTON

       <CONTINUE> - TO UPLOAD ONE MORE RACK

         <FINISH> - TO FINISH OF UPLOADING


        CONTINUE              FINISH
```

Figure 26. «PROCESS» Menu – Loading of Racks

At the same time the manipulator starts moving. The Stainer checks the readiness for loading of the nearest Parking Station and stops the manipulator's arm above Station No. 6. Open the lid of the Stainer. Take the rack with the right hand and put its handle into the manipulator's grab, as it is shown in Figure 26.

Figure 26. Loading/Unloading of Rack

14 – grab of the manipulator; 15 – arm of the manipulator; 29 – rack; 30 – handle of rack.

5.4.2 Continuation of Racks Loading

Press the button CONTINUE. The manipulator will place the rack at the nearest unoccupied Parking Station automatically, depending on the technological program (technique), and return to the loading position above Station No. 4, and the following message will appear on the screen:

<PUT THE RACK IN THE MANIPULATOR

AND PRESS THE BUTTON

<CONTINUE> - TO UPLOAD ONE MORE RACK

<FINISH> - TO FINISH THE UPLOADING>

Racks can be loaded to unoccupied Parking Stations either until the Stainer configuration for the used technological program allows them to do this, or at the user's discretion.

5.4.3 Completion of Racks Loading

CAUTION! CLOSE THE LID OF THE WORKING CHAMBER AND PRESS THE BUTTON FINISH. The Stainer starts to perform the technological program. If the lid is open, a message requiring closing the lid will appear.

When a technological program is in progress, the screen displays the name and status of stations.

Figure 27. Status Screen of <DEMO> Program

5.4.4 Loading of Additional Racks during Technological Program

To load additional racks when the program is in progress, press the button UPLOAD (Figure 28).

Manipulator is busy. If the manipulator is busy, the following message appears on the screen:

AFTER TRANSFER OF THE RACK

DEVICE WILL UPLOAD

NEXT RACK

Manipulator is not busy. When the manipulator becomes free, the arm moves to the loading position above Station No. 4, and the following message appears on the screen:

<PUT THE RACK IN THE MANIPULATOR

AND PRESS THE BUTTON

<CONTINUE> - TO UPLOAD ONE MORE RACK

<FINISH> - TO FINISH THE UPLOADING>

Open the lid of the Stainer. Take the rack with the right hand and put its handle into the manipulator's grab, as it is shown in Figure 25.

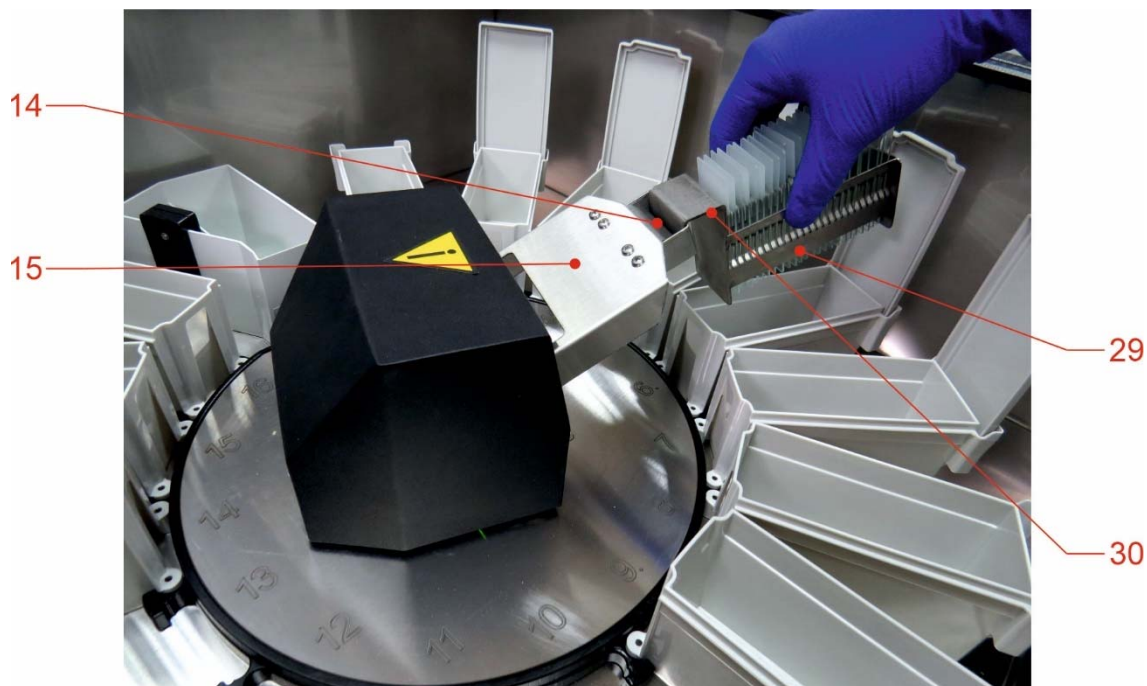### 5.4.5 Continuation of Racks Loading

Press the button CONTINUE. The manipulator will place the rack at the nearest unoccupied Parking Station automatically, depending on the technological program

(technique), and return to the loading position above Station No. 4, and the following message will appear on the screen:

<PUT THE RACK IN THE MANIPULATOR

AND PRESS THE BUTTON

<CONTINUE> - TO UPLOAD ONE MORE RACK

<FINISH> - TO FINISH THE UPLOADING>

Racks can be loaded to unoccupied Parking Stations until the Stainer configuration for the used technological program allows them to do this.

Completion of Racks Loading

CAUTION! CLOSE THE LID OF THE WORKING CHAMBER AND PRESS THE BUTTON FINISH. The Stainer starts to perform the technological program. If the lid is open, a message requiring to close the lid appears. When loading is finished, the Stainer returns to the performance of the technological program.

5.4.6 Unloading of Racks

Processed racks can be unloaded before all the loaded racks are processed. Processed racks are displayed as green highlighted rectangles on the status screen (Figure 26 - the rack at Station No. 7 has already been processed).

To unload, check for processed racks, and press the button UNLOAD (Figure 26).

Manipulator is busy. If the manipulator is busy, the following message appears on the screen:

<AFTER TRANSFER OF THE RACK

DEVICE WILL UNLOAD

PROCESSED RACK>

Manipulator is not busy. When the manipulator becomes free, it takes the nearest processed slide and moves it to the loading position above Station No. 4, and the following message appears on the screen:

<AFTER REMOVING OF THE RACK

PRESS THE BUTTON <CONTINUE>

Open the lid of the Stainer and take the processed rack out of the manipulator. Press the button CONTINUE.

If there are several processed racks in the Working Chamber, the Stainer will unload all of them before continuing to process the remaining unprocessed slides. When the processing of all racks is complete, the following message appears on the screen, accompanied by a sound.

<div align="center">

<AFTER REMOVING OF THE RACK

PRESS THE BUTTON <CONTINUE>

</div>

When all of the racks have been unloaded, the Stainer switches back to the Main Menu.

5.5 Status Screen During Technological Process

The status of the Stainer during technological process is shown on the screen (Figure 28, Figure 29).

PROCESS	DEMO		N = 9
1 FLOW TAP WATER	2 RESOUR 254 BUFFER PH<7	3 RESOUR 254 BLOTTER	4 RESOUR 254 AZURE
5 RESOUR 254 EOSIN	6 OCCUPIED LEISHMAN F-S	7 READY RACK	8 2 / 9 RACK
9 RACK	10 RACK	11 PARKING	12 PARKING
13 PARKING	14 PARKING	15 PARKING	16 PARKING
UPLOAD	CANCEL	STOP	UNLOAD

Figure 28. Status Screen of <DEMO> Program

The upper line of the screen displays the name of selected (current) program and the number of technological operations (N) in this program.

In the bottom of the screen the following four control buttons are displayed during technological process (Figure 28, Figure 29):

UPLOAD – load a new rack

CANCEL – return to the status screen, stop the error sound alarm

STOP/START – stop/start the technological process

UNLOAD – unload a ready (processed) rack.

In the middle of the screen 16 inactive buttons with numbers 1 to 16 are displayed. The buttons contain information on the status of the technological process.

Buttons for Technological Stations (BLUE COLOUR) are displayed in the following formats:

Display format of buttons for technological stations during standby:

NN	RESOUR XXX
	REAGENT

where: <NN> – station No., <REAGENT> – reagent, according to the programmed configuration, <RESOUR XXX> – how many times it is left for the manipulator to revert to a station with reagent until it has to be changed (resource limit of a reagent), (the limit is set by the operator within the interval 0-255, default value is 255).

Display format of buttons for stations during technological operation:

NN	MM:SS
	REAGENT

where: < MM:SS > – time of processing at the station, MM – minutes, SS – seconds. When the rack is not immersed in the reagent, but the station is occupied (e.g. the rack is lifted and held for draining) "OCCUPIED" indicator will be displayed instead of the time indication.

Buttons for Parking Stations

Display format of stations reserved for a rack (**WHITE COLOR**) (Figure 28, stations No. 11-16):

NN	
	PARKING

Where <NN> – Station No. (henceforth)

Display format of stations with a loaded unprocessed rack (**YELLOW COLOR**) (Figure 28, Stations No. 9,10):

NN	
	RACK

Display format for the stations with ongoing rack processing (**PINK COLOR**) (Figure 28, Station No. 8):

NN	No/Nt
RACK	

where: <No> – current operation No., <Nt> – total number of operations.

Display the format of stations with processed racks ready for unloading (**GREEN COLOR**) (Figure 29, Station No. 8).

NN	READY
RACK	

6. Preparing for Operation

FORBIDDEN TO SWITCH ON THE STAINER WITHOUT PRIOR READING THE IFU.

CAUTION! BEFORE SWITCHING ON THE STAINER, MAKE SURE THAT THE WORKING CHAMBER DOES NOT CONTAIN ANY EXTRANEOUS ITEMS, THE TROUGHS ARE ARRANGED IN THEIR PLACES.

6.1 Activation

Switch on the Stainer with the power switch (6) at the right panel. Once the instrument is on, the backlight of the touch screen on the control unit lights up. A welcome screen with a manufacturer's logo appears on the screen. Ten seconds later, the Stainer switches to the Main Menu with control buttons, and a reminder about the necessity to check the configuration of the Stainer and readiness of troughs with reagents appears on the screen. At the same time, the electromagnetic valve is activated, and tap water starts to fill the flow-through trough. The Stainer performs self-test, when it is finished, the manipulator arm positions opposite Station No. 1.

6.2 Operability Check

Before starting the operation, it is advisable to check operability of the Stainer and its accessories. Mutual positioning of troughs, Parking Stations and manipulator's grab during operation shall be checked using the positioning test.

6.2.1 Positioning Test

The positioning test helps to detect irregularities in the geometry of the Stainer and its accessories caused by transportation or careless handling.

Place troughs AT STATIONS No.3 through No.16 of the Stainer. The positioning elements of troughs shall fit into notches of the positioning disk.

FORBIDDEN TO PUT RACKS INTO THE TROUGHS.

Activate the Stainer using the power switch (6).

Once the Main Menu is loaded, consecutively press the following buttons:

CONFIGURATION ➜ SERVICE ➜ POSITIONING TEST

The following message will appear on the touch screen:

PUT THE RACK HANDLE INTO THE GRAB OF

MANIPULATOR AND TOUCH THE SCREEN

TO EXIT, PRESS <CANCEL>

CAUTION! POSITIONING TEST SHALL BE PERFORMED WITH AN OPEN LID. NO FOREIGN ITEMS (INCLUDING OPERATOR'S HANDS) SHALL IMPEDE MANIPULATOR MOVEMENTS.

CAUTION! MOVING MANIPULATOR MAY CAUSE HAND INJURIES.

Put the handle of rack into the manipulator's grab. Remove hands from the Working Chamber. Touch the screen – the manipulator will start moving from station to station, pausing for 2 seconds at each station. A message on the screen warns:

DO NOT TOUCH MOVING PARTS OF
MANIPULATOR UNTIL FULL STOP

When the Stainer has checked all stations, it will return the rack in reverse order to the initial Station No. 1 (Drying Station). When the bottom of rack touches the closest to manipulator wall of trough or the upper edge of the closest to manipulator wall of trough, further operation with this rack is prohibited: the geometry is broken, the rack shall be repaired at the manufacturer or by an authorized company.

CAUTION! IN CASE OF ERRORS IN THE OPERATION OF STAINER, IMMEDIATELY PRESS THE BUTTON CANCEL, THEN SWITCH OFF THE INSTRUMENT AND, IF NECESSARY, CHANGE THE FAULTY PART.

FORBIDDEN TO PUT HANDS AND FOREIGN ITEMS INTO THE WORKING CHAMBER OF THE STAINER DURING POSITIONING TEST.

Once the positioning test for the first rack is complete, a positioning test message will appear on the screen again.

Check all the rest supplied racks with the positioning test.

To exit from the positioning program upon completion of all racks checking, press the button CANCEL.

6.2.2 Check of Manipulator Movement Locking

Switch on the Stainer, consecutively press the following buttons, starting from the Main Menu:

PROGRAMMES ➜ DEMO ➜ ENTER ➜ START OF PROCESS

The Stainer will start a demonstration program <DEMO>.

Press the button STOP during movement of the manipulator. The movement must stop. Press the button START – the movement must resume.

Open the lid of the Working Chamber during movement of the manipulator. The movement stops and the following message appears on the screen:

<p style="text-align: center; color: red;">CLOSE THE LID, TO CONTINUE THE PROCESS
PRESS THE BUTTONS <CANCEL> AND THEN <START></p>

Close the lid of the Working Chamber. The movement must resume following consecutive pressing the buttons CANCEL ➜ START.

Once the check of the manipulator movement locking is complete, switch off the Stainer using the power switch on the left panel.

6.2.3 Recommendations on Technological Programs Checking

Before starting the routine operation of the Stainer with real laboratory preparations, it is recommended to check the functioning of selected or newly programmed techniques and to perform trial staining with model preparations.

Following uploading the program, it is required to check configuration of the Stainer, correct position of troughs, absence of lids on troughs, and connections to water supply, drain and ventilation systems. The first running of a program is recommended to be performed without reagents. It is advisable to perform trial runs of a program with maximum number of loaded racks for visual checking any errors.

Following the tests without reagents, perform staining with test preparations. Depending on the technique, blood preparations of appropriate quality, buccal smears, etc. can be used for test staining.

7. Operation Procedure

7.1 Before Starting

All recommended safety measures shall be fully complied (Chapter 2). Check connections of the Stainer to electrical, ventilation, water supply and drain systems. Make sure that the Stainer is installed strictly horizontally. Check the arrangement of troughs in the Stainer and that the troughs are not covered with lids.

The Stainer is supplied with a flow-through trough. Turn on the cold water supply.

7.2 Activation

Switch on the Stainer using the power switch (6) at the right panel of the control unit.

Check all the points following the message:

<div style="color:red; text-align:center">

BEFORE YOU START THE PROCESS,

CHECK COMPLIANCE OF THE PROGRAM,

CONFIGURATION OF STAINER,

RESOURCE LIMIT OF REAGENTS

</div>

If necessary, select or program the required technique (. 5.2) Fill the troughs with reagents following the selected program and configuration.

CAUTION! TROUGHS SHALL BE INSTALLED AT ALL STATIONS: BOTH TECHNOLOGICAL AND PARKING ONES (NO. 3 TO 9), IRRESPECTIVE OF THE SELECTED PROGRAM AND CONFIGURATION (FIGURE 4).

FORBIDDEN TO FILL THE TROUGHS DIRECTLY IN THE WORKING CHAMBER OF THE STAINER. If some liquid is spilled accidentally, remove it with a wet cloth.

Load the racks (5.4.1)

Close the lid of the Working Chamber. Press the button START OF PROCESS to run a programmed staining technique.

Processed racks can be unloaded before completion of all loaded racks processing (5.4.2).

Once processing is complete, unload the racks (5.4.3).

Switch off the Stainer.

In the case of short-time (several hours) stopping of operation it is acceptable to cover the troughs with lids and close the lid of the Stainer.

In the case of long-time stopping of operation, it is required to turn off the water supply, remove the reagents and wash the troughs. The Working Chamber shall be cleaned if required. Close the lid of the Stainer.

FORBIDDEN TO LEAVE BOTH CLOSED AND OPEN TROUGHS WITH CHEMICALLY ACTIVE, HIGHLY FLAMMABLE, COMBUSTIBLE AND TOXIC REAGENTS (ACID SOLUTIONS, IODINE SOLUTIONS, SPIRITS, XYLENE, ACETONE, METHANOL-BASED FIXATORS, ETC.) IN THE WORKING CHAMBER OF THE STAINER UPON COMPLETION OF OPERATION.

8. Cleaning, Disinfection and Maintenance

8.1 Cleaning and Disinfection of Outer Surfaces and Working Chamber

Outer surfaces and the Working Chamber of the Stainer shall be cleaned and disinfected with soft cloth and cleansing disinfecting agent once a week or more often, depending on the pollution intensity.

CAUTION! DO NOT TREAT THE LID OF THE STAINER WITH SOLVENTS.

8.2 Flow-Through Trough and Drain System

Clean the flow-through trough with a small lab brush or toothbrush no less than once a week. After cleaning, wash the flow-through trough. The <CONTINUOUS> mode can be used for washing the flow-through trough («SERVICE» menu):

CONFIGURATION ➜ SERVICE ➜ WATER SUPPLY – PROGRAMMED

To prevent the growth of bacteria, the flow-through troughs shall be disinfected and the drain system shall be washed.

   a) Drain the flow-through trough and wipe it with a soft cloth and a disinfecting agent

   b) To wash the drain, carefully pour 5% sodium hypochlorite solution into the drainage hole of the flow-through trough

   c) Once the treatment is complete, thoroughly wash the flow-through trough and the drain with water, switching on the Stainer for several minutes (for filling and refilling of the flow-through trough). If necessary, repeat washing.

In the event of drain hose clogging it shall be cleaned or replaced with a new one. To replace the drain hose:

   a) Remove the lid of water drain

b) Remove the clamp of water drain

c) Disconnect the hose, clean it with water

d) Once the cleaning/changing is finished the drain hose shall be attached in the reverse sequence.

8.3 Troughs for Reagents

Remove the reagents from troughs, clean the troughs with cleansing agent, thoroughly wash with water and dry.

8.4 Racks

Remove all stain contaminations from racks with cleansing agent, thoroughly wash and dry.

8.5 Water Mesh Filter

The mesh filter on the connection hose prevents clogging of the water supply system. The mesh filter shall be cleaned as it becomes clogged.

The mesh filter is installed inside the threaded part of the tap water inlet (8) (Figure 3) and can be accessed from the outside of the Stainer for cleaning (an additional mesh filter can also be installed inside the connection hose).

Cleaning the mesh filter:

a) Turn off the water supply

b) Unscrew the nut of the connection hose from the Stainer

c) Carefully take out the mesh filter and wash it. Wash outer and inner parts of the screw joint

d) Install the filter back into place

e) Attach the connection hose to the Stainer

f) Turn on the water supply tap and check all the joints.

8.6 Air Filter

The air filter is installed on the bottom panel of the Stainer and designed for protection of the inner space of the Stainer from dust and dirt.

The air filter shall be changed or cleaned as it becomes dirty but at least once a year.

Changing the air filter:

a) Take racks and troughs out of the working chamber, take off the removable working table.

b) Cautiously lift the Stainer from the left side.

c) Remove the protective lid and take out the filter element

d) Once the cleaning/changing is finished the filter element shall be installed in the reverse sequence.

9. Troubleshooting

Failure	Probable Causes	Suggested Actions
The Stainer does not power up	1 Blown fuses.	1 Change the fuses. It is allowed to change the fuses only when the Stainer is off (the power cable shall be unplugged). Remove lid from the fuses to change them (12) (⬛ Figure 3).
	2 Faulty power cable.	2 Change the power cable.
Failure when grabbing the rack with the manipulator	Rack/Parking Station (trough) geometry is broken.	Detect the defective accessory using ⬛ Positioning Test. Change the defective accessory.
Failure when loading racks	1 Mispositioning of troughs (positioning elements do not fit into the notches of positioning disk).	1 Install the parking stations correctly.
	2 Trough lids not removed.	2 Remove lids from troughs.
Overflow of the flow-through trough, actuation of the water level sensor. The Stainer emits an intermittent sound alarm with a message on the screen: <WATER SYSTEM IS CORRUPTED>.	1 Improper installation of the drain hose.	Check installation of the drain hose (is shall be installed and fixed with a sufficient descending gradient from the outlet). When laying the hose, make shure there are no revers slopes of hose.
	2 Drain clogging.	Clean or change the hose (⬛ Item 8.2).

In other cases, contact the manufacturer for repair of the Stainer.

CAUTION! BEFORE SENDING THE STAINER FOR REPAIR, IT MUST BE PROPERLY CLEANED AND DISINFECTED (⬛.Chapter 11).

10. Decommissioning and Disposal

CAUTION! THE STAINER MUST BE CLEANED AND DISINFECTED BEFORE DECOMMISSIONING AND DISPOSAL (⬛.Chapter 11).

CAUTION! THE STAINER AND ITS PARTS MUST BE DISPOSED ACCORDING TO

EXISTING APPLICABLE LOCAL REGULATIONS.

11. Confirmation of Decontamination

CAUTION! ANY DEVICE, ITS PART, OR ACCESSORY, BEING RETURNED TO MLT LLC, OR REQUIRING MAINTENANCE AT THE OPERATION SITE, MUST BE PROPERLY CLEANED AND DISINFECTED.

A template of a decontamination certificate is available at www.fastainer.com/resources.
When returning the instrument, its part, or accessory, a copy of filled and signed Decontamination Certificate shall be attached or handed over to a specialist of the service department. The sender is responsible for the products sent without the confirmation above or with a partially filled certificate. The products considered by the manufacturer as potentially harmful will be sent back at the expense and under the responsibility of the sender.

1 General

1.1 This Instruction has been developed to ensure fire safety during operation with an automated Stainer produced by MLT LLC (hereinafter the Stainer).

Some technological operations executed with the Stainer require the use of highly flammable liquids (HFL) and combustible liquids (CL): methanol, ethanol, xylene, etc. The main risks of fire are caused by HFL.

2 Requirements to Room

2.1 The room where the Stainer will be operated shall satisfy the local fire safety requirements. The room shall be equipped with fire-extinguishing means according to the current standards. It is required to provide free access to fire-fighting appliances and electric equipment.

2.2 The source of ignition caused by the Stainer must be extinguished with a CO2/freon fire extinguisher. A CO2 fire extinguisher shall be charged with dioxide. A freon fire extinguisher shall be charged with halogenated extinguishing agent. Capacity of the fire extinguisher must be at least 2 liters.

2.3 It is forbidden to leave heating appliances in use unattended, use appliances with open heating elements, use defective heating appliances, smoke in the room where the Stainer is operated. It is not allowed to use a naked flame, carry out hot works, store combustible materials and waste in volumes excessing the shift requirement.

3 HFL and CL Handling Safety Measures

3.1. Highly flammable and combustible liquids can be stored in working rooms in the amount not exceeding the shift requirement, according to approved standards, in thick-walled glasses or non-breakable vessels with tight corks, placed in a metal case with a lid.

3.2. Joint storage of the substances which chemical interaction can cause fire or explosion is not allowed.

3.3. The liquids shall be transported to the rooms in closed safe containers.

3.4. The working surfaces of tables and exhaust hoods intended for working with the Stainer and HFL shall have coating and skirting made of incombustible materials. The skirtings preventing liquids from flowing down must be defectless.

3.5. It is not allowed to carry out any works in the exhaust hoods if there are substances, materials and equipment, not relating to the performed operations, as well as when an

exhaust hood is defective, or the ventilation system is off.

3.6. At the end of working day, all HFL waste must be collected in a special closed container and removed from the laboratory for further recycling. It is forbidden to discharge HFL and CL into the drain system.

3.7. In case of HFL spilling in the Stainer or its close vicinity, the power supply shall be off immediately using the circuit breaker located out of the room. The spilled HFL must be covered up with dry sand or sawdust, wiping materials, then gathered and placed into a closable container. The gathered HFL must be disposed of on the same day. It is forbidden to continue operation in the room until the odor of the spilled liquid vanishes completely.

4 Response to Device Fire

4.1. In case of HFL ignition in the Working Chamber, close its lid and power off the Stainer. If the burning does not stop, use a CO_2 fire extinguisher for further extinguishing. First, blow through the ventilation grilles on the Stainer body. The inflow ventilation grill is located on the bottom of the Stainer, the exhaust ventilation grill – at the back panel. If possible, it is recommended to remove the air filter from the inflow ventilation grill. If the burning in the Working Chamber does not stop, cautiously open the lid and fill the working chamber with gas from the fire extinguisher. Try to avoid spattering of reagents from the troughs.

4.2. If the flame develops outside the Working Chamber of the Stainer, close the lid, switch off the Stainer and use a CO_2 fire extinguisher for further extinguishing. First, release the fire-extinguishing agent to the ventilation grilles on the Stainer body.

N	REAGENT	N	REAGENT	N	REAGENT	N	REAGENT
1	ACETIC ACID	17	AZURE	33	FLUOROCHROME	49	SAFRANIN
2	ACETONE	18	AZURE-EOSIN	34	FUCHSIN	50	SOLUTION-1
3	ACID SOLUTION	19	BLOTTER	35	GENTIANVIOLET	51	SOLUTION-2
4	ALCOHOL	20	BUFFER	36	GIEMSA SOLN.	52	SOLUTION-3
5	ALCOHOL-1	21	BUFFER PH<7	37	HCL ACID	53	STAIN-1
6	ALCOHOL-2	22	BUFFER PH~7	38	HEMATOXYLIN	54	STAIN-2
7	ALCOHOL-3	23	BUFFER PH>7	39	LEISHMAN F-S	55	STAIN-3
8	ALCOHOL-4	24	BRILL.GREEN	40	LUGOL SOLN.	56	TAP WATER
9	ALCOHOL-5	25	CARB.FUCHSIN	41	M-G FIXATIVE	57	THIONIN
10	ALCOHOL-6	26	CRYST.VIOLET	42	METHANOL	58	WRIGHT F-S
11	ALCOHOL100%	27	DIST.WATER	43	METHYL.BLUE	59	XYLENE-1
12	ALCOHOL100%-1	28		44	METH.VIOLET	60	XYLENE-2
13	ALCOHOL100%-2	29	EOSIN	45	NEUTRAL RED	61	XYLENE-3
14	ALCOHOL100%-3	30	ETHANOL	46	PAP-2 (OG)	62	XYLENE-4
15	ALCOHOL SOLN.	31	ETHANOL +HCL	47	PAP-3 (EA)	63	XYLENE-5
16	AURAMINE-RHO.	32	FIXATIVE	48	PAP-MIX	64	XYLENE-E
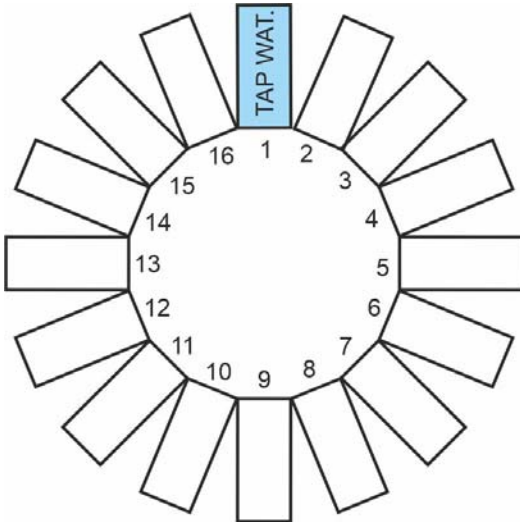
Notice:

56	TAP WATER

Reagent with particular properties. Indispensable reagent of Station No. 2.

64	XYLENE-E

Reagent with particular properties. When this reagent is assigned to a station, where the last operation of a program is performed, the processed rack with slides remains at the last station in <XYLENE-E> and does not return to the Parking Station.

DEVICE: FS-16-HISTO	NAME OF PROGRAM:	DATE:

N	REAGENT	CONFIGURATION FS-16-HISTO	N	REAGENT
16			1	TAP WATER
15			2	
14			3	
13			4	
12			5	
11			6	
10			7	
9			8	

№	REAGENT	REGIME (I, D)	AGITATION SS	TIME MM:SS	DELAY SS	RESOURCE 000
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
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24						
25						

Stainer Firmware Editor (SFE) User Manual

The program «Stainer Firmware Editor» is designed to edit the firmware file for the automated stainers, developed by MLT LLC. The program allows to edit, copy and delete technological programs available in the firmware file, create new technological programs, edit the list of user reagents, and select the optimal intervals for launching racks for processing.

System requirements

Microsoft Windows 8,8.1,10 x86/x64

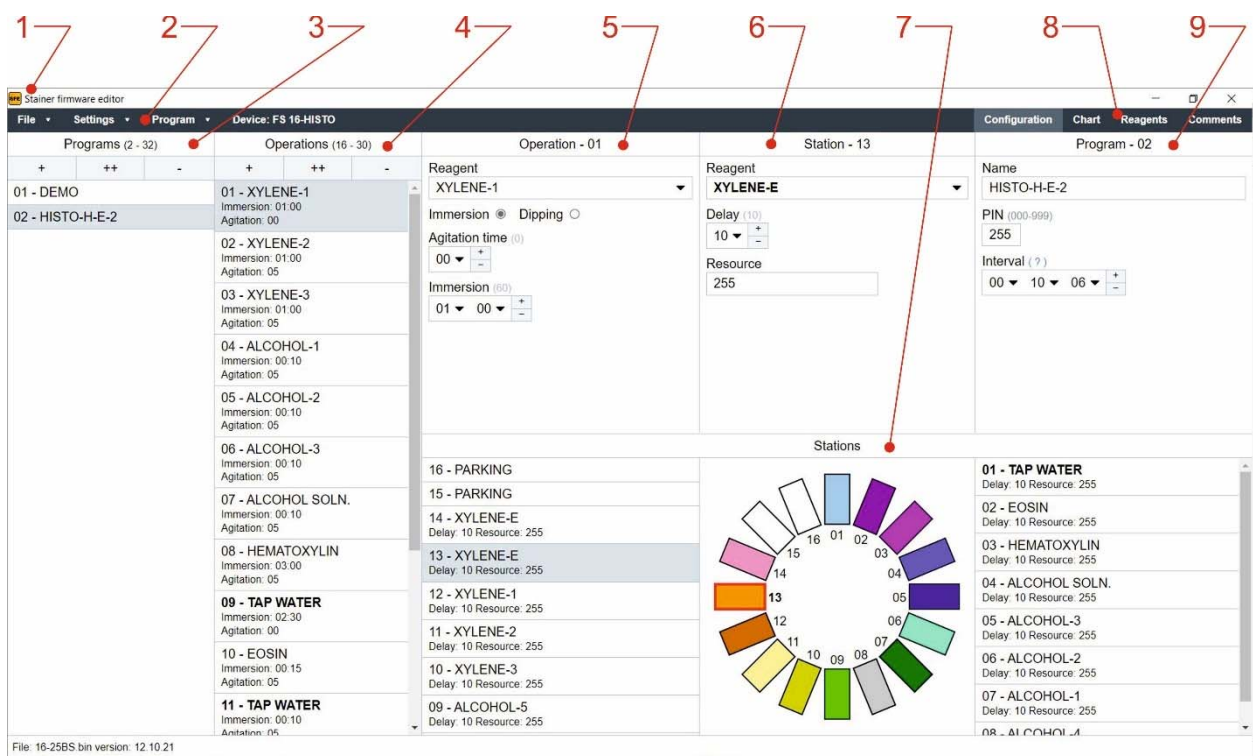**1 Main Screen («Configuration»)**

Figure E-1. Main Screen («Configuration»)

1 – Logo. 2 – Main Menu. 3 – Programs - list of available technological programs in the current (opened) firmware. 4 – Operations - list of operations available in the selected technological program. 5 – Operation - selected operation settings. 6 – Station - settings for selected station. 7 – Configuration of the Stainer and selection of stations. 8 – Screen Selector: «Configuration» or «Chart» or «Reagents» or «Comments». 9 – Program - selected technology program settings (name, new rack running interval and PIN).

1.1 Buttons of the Main Menu (2)

File

    Open   – Open the firmware file

    Save   – Save the firmware file to the selected folder

    Load defaults   – Reset the firmware to the factory state

    Close   – Close the firmware file

    Exit   – Exit application (with confirmation dialog)

Settings

    Application language   – Change application language

    Firmware language   – Change firmware language

Program

    Save protocol   – Save technological protocol in pdf

    Upload technological program – Load one or more technological programs

    Save technological program   – Upload the selected process program to a file

1.1.1 Selector of the window (8):

Configuration.   – Select Configuration screen

Chart   – Select Chart screen

Reagents   – Edit the list of reagents

Comments   – Edit comments

1.2 «Programs» (3) - List of Available Technological Programs in Current (Opened) Firmware

Programs (1-32)

+   – Add new technological programs

++   – Copy a technological program from the list

| **-** | – Delete a technological program from the list |

Programs can be swapped using the Drag and Drop method.

1.3 «Operations» (4) – List of Technological Operations Available in Selected Technological Program

| **Operations** (1-30) |

+	– Add new technological operation
++	– Copy a technological operation from the list
-	– Delete a technological operation

Operations can be swapped using the Drag and Drop method.

1.4 <Operation> (5) - Settings for Selected Operation

| **Operation-XX** |

Selection of a reagent (station) for Operation No. XX. If the configuration has no station with reagent, the selected reagent will be assigned to the first available station (PARKING).

Selection of the type of manipulator action (immersion or dipping). Depending on the selected reagent and the type of action, you can set the agitation time, the number of dips, or the time of immersion.

1.5 «Station» (6) - Settings for Selected Station

| **Station-YY** |

Once an operation is selected, the station will be selected automatically, where **YY** is station No. Appropriate station settings will be available depending on the selected reagent or the type of station.

1.8 «Stations» (7) – Configuration of the Stainer and Selection of Stations

Selection of the configuration of the Stainer. The station shall be selected by pressing an appropriate icon. When creating a new program, it is advisable to create a configuration first.
Stations (only user defined) can be swapped using the Drag and Drop method.

1.9 Screen Selector (part of the Main Menu. Refer to 1.1.)   **(8)**

Configuration.   – Select Configuration screen

Chart   – Select Chart screen

Reagents   – Edit the list of reagents

Comments   – Edit comments

1.9 – «Program» (9) - Settings for Selected Technology Program

The **«Program»** Menu is designed to set up the name, rack running interval and PIN for a technological program.
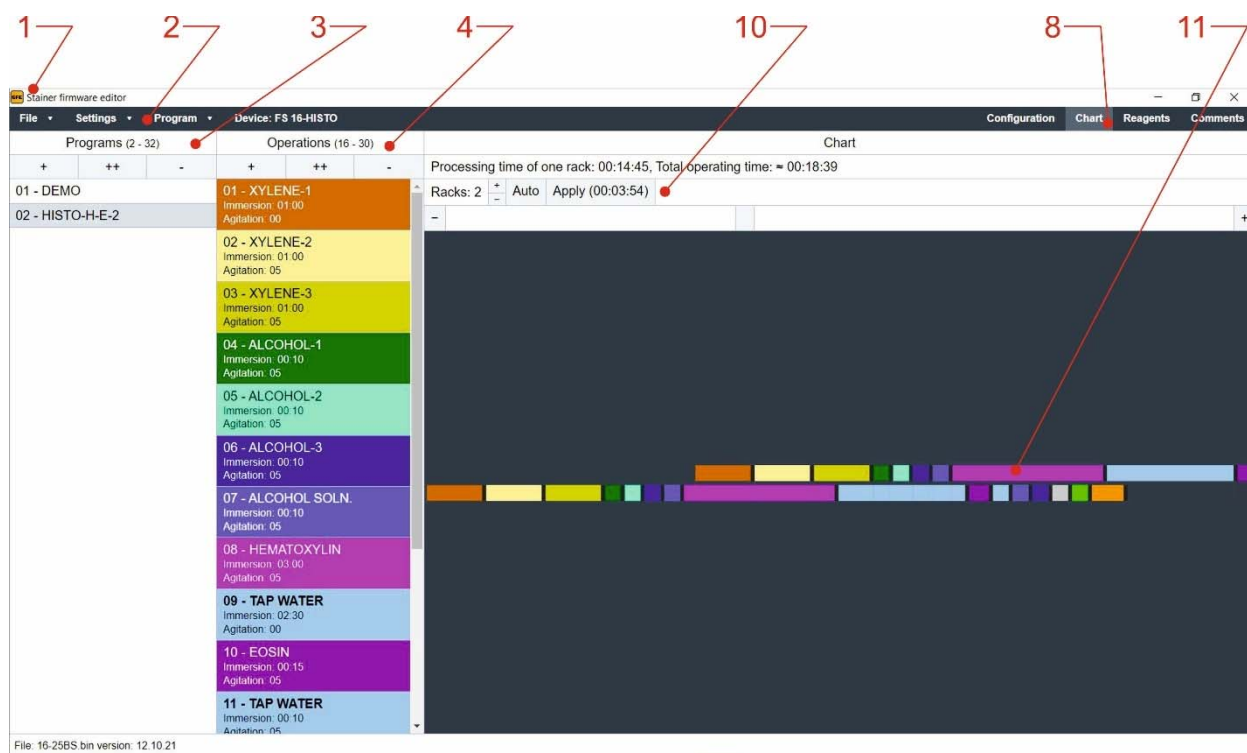
2 «Chart» Screen

Figure E-2. «Chart» Screen

1 – Logo. 2 – Main Menu. 3 – Programs - list of available technological programs in the current (opened) firmware. 4 – Operations - list of operations available in the selected technological program. 8 – Screen Selector: «Configuration», «Chart», «Reagents» or «Comments». 10 – Interval settings bar. 11 The technology program Gantt chart screen.
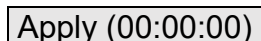
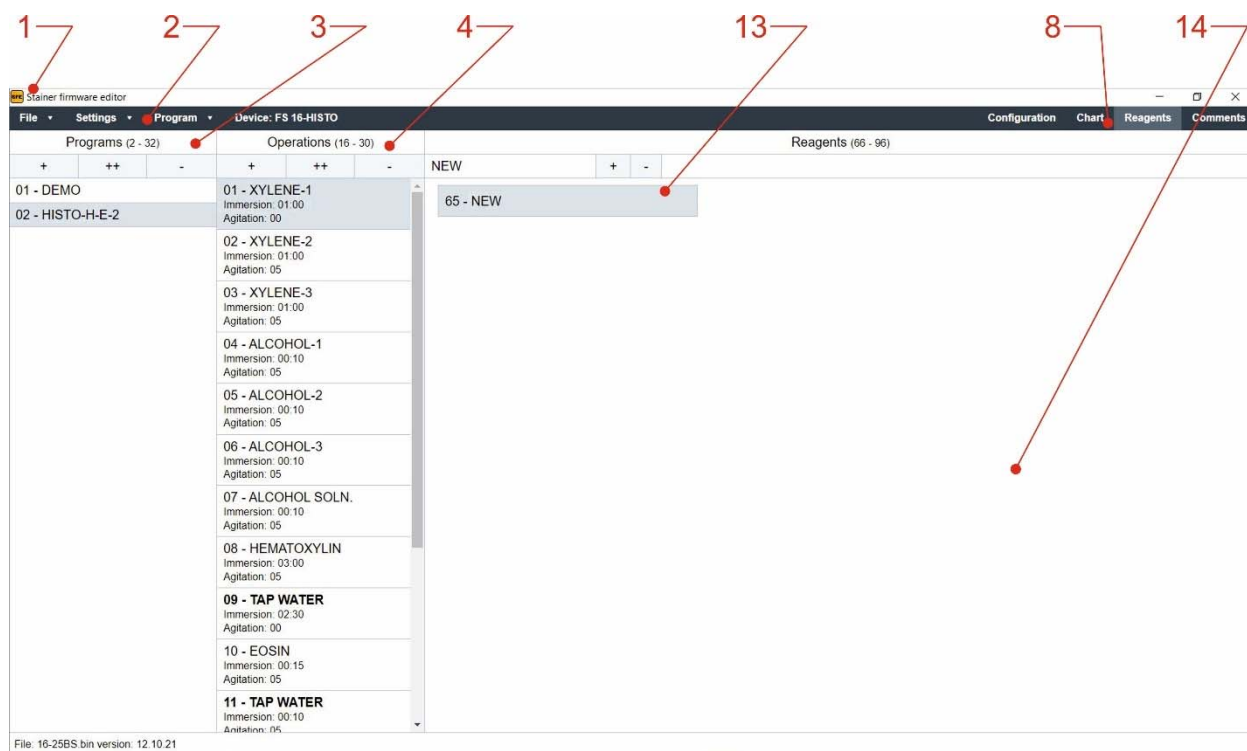| Interval		
+ -	–	Change the interval value
☐	–	Slider to change the interval value
Auto	–	Automatic setting of interval value
Apply (00:00:00)	–	Apply selected settings

3 User-Defined Reagents Setting Screen

Figure E-3. «Reagents» Screen

1 – Logo. 2 – Main Menu. 3 – Programs - list of available technological programs in the current (opened) firmware. 4 – Operations - list of technological operations in the selected technological program. 8 – Screen Selector: «Configuration», «Chart», «Reagents» or «Comments». 13 – New reagent input bar. 14 - List of user-defined reagents.

The reagent used in any of the technological programs cannot be deleted.

4 Preparation of New Technological Programs Firmware

CAUTION! THE LABORATORY STAFF ONLY IS ALLOWED TO OVERWRITE THE FIRMWARE OF TECHNOLOGICAL PROGRAMS.

THE LABORATORY STAFF IS **FORBIDDEN** TO RELOAD THE INSTRUMENT SOFTWARE AND THE TOTAL FIRMWARE.

In order to develop a new firmware, it is required to create the technological programs then upload them to the specified folder on PC with installed SFE. Copies of the technological programs can also be obtained from the manufacturer – MLT LLC. The technological programs shall be developed in the approved valid SFE version. Once the programs are prepared, it is required to upload them to SFE application (Main Menu => «Program» => «Upload technological program»). The name of an uploaded program will appear in the list of technological programs (Position 3, Figure E-1). The order of the programs in the list

can be changed using the mouse (drag and drop). Then a firmware shall be created in accordance with the developed list of programs. (Main Menu => «File» => «Save»).

5 Reloading of New Firmware

In order to reload the new firmware, it is required to remove SD card from the switched off instrument (refer to 3.1.3 Micro SD card and micro SD card slot.) It is advisable to save the firmware that is recorded on the extracted SD card. To do this, copy all the files from the SD card to a separate folder on the computer. After that, you should save to the card *.bin file prepared with SFE. Before installing the card into the device, it is necessary to turn on the instrument and set the boot option TECH. PROGRAMS RELOADING in the «SERVICE» menu. To do this, press the buttons CONFIGURATION => SERVICE and set the mode TECH. PROGRAMS RELOADING, using a cyclic switch: SOFTWARE RELOADING ⇔ TOTAL FIRMWARE RELOADING ⇔

⇔ TECH. PROGRAMS RELOADING (top button in the right column Figure 25).

After that turn off the device. Install the SD card in the switched-off instrument. Turn on the device. The screen will display the firmware download process. It is forbidden to perform any actions with the device before its completion.

Upon uploading the new firmware, check the Main Menu - «PROGRAMS» menu for these programs.

Combined Station – a station that can be used both as Parking and as Technological one, depending on the configuration of the Stainer. FS-16-HISTO is equipped with Combined Stations No.2 through No.16.

CL - combustible liquids.

Display, Control and Programming Unit (hereinafter **Control unit**) – a microprocessor-based device for indication, control, and programming, equipped with a touch screen.

Drying Station, Dryer – a station equipped with an air electric heater and a fan. The drying station is designed for drying slides during **technological program running.**

HFL - highly flammable liquids.

IFU – Instruction for Use

Manipulator – a device installed in the Working Chamber of the Stainer designed for moving racks with slides along specified trajectory and according to a selected technological program. A manipulator includes a circular-motion carriage with a drive; an arm with a drive, which lifts, lowers and tilts the racks; a grab on the arm, which picks up and fixes the handle of the rack.

Parking Station – a combined station designed for placing a rack with untreated slides; the rack can temporarily be held at the Parking Station while carrying out a sequence of **Technological Operations**; the rack returns to the Parking Station at the end of a **Technological Program**.

PIN – personal identification number.

Rack– a stainless steel holder for slides with a handle.

Stainer – an automated programmable Slide Stainer "Fastainer-16-HISTO" ("FS-16-HISTO").

Station – a sector on the working table intended for the placement of **Troughs** and **Racks**.

Station with a flow-through Trough – a trough located on the working table, connected to the water supply system to provide washing or time-exposure of slides in tap water.

Technological Operation - a set of sequential actions with a rack with slides within the same station (lowering, processing slides in the reagent, taking out, time-exposure for reagent drain).

Technological Program - a set of sequential **technological operations** that ensure the preparation staining according to a given technique. **The technological program** has an assigned name and PIN (personal identification number).

Trough – a vessel for reagents intended for placement and positioning **rack** during **Technological Operations**.

Working Chamber – space inside the Stainer enclosed by the working table and the walls and lid of the Working Chamber, where technological operations are performed.

Working Table – a table in the Working Chamber of the Stainer, on which Combined Stations, racks, troughs are installed.