Medical–Biological
Research & Technologies

Inteliwasher 3D-IW8

Microplate washer

Operating Manual
Certificate

For version
V.3AW

Contents

1. Safety precautions

Attention! Please make sure you have fully read and understood the Manual before using the equipment and pay special attention to sections marked by this symbol.

Note: Paragraphs marked with this symbol contain information about important functions and use of the device.

GENERAL SAFETY PRECAUTIONS

- Use only as specified in the Operating Manual provided.
- Protect the unit from shocks and falling.
- After transportation or storage, keep the unit at room temperature for 2-3 hours before connecting to the mains.
- Before diagnostics, study carefully the possibilities and operation procedures of the unit in order to obtain reproducible and credible results. Check any unclear issues with the supplier.
- It is not recommended to leave the operating unit unattended for a long period.
- Change the bottles or connecting tubes only when the unit is switched off.
- In case of doubt about the quality and uniformity of the completed washing program, disregard the results obtained and repeat the washing procedure.
- Accuracy of the obtained testing results depends on the quality of the microplate rinsing procedure. To assure correctness of the rinsing procedure, regularly exercise visual control over reproducibility of liquid volume dosing.
- Before using any cleaning or decontamination methods except those recommended by the manufacturer, check with the manufacturer that the proposed method will not damage the equipment.
- Do not make modifications to the design of the unit.

ELECTRICAL SAFETY

- Connect only to an external power supply with voltage corresponding to that on the serial number label. Use only the external power supply provided with this product.
- Do not plug the power supply into an ungrounded power socket, and do not use an ungrounded extension lead.
- Ensure that the switch and external power supply connector are easily accessible during use.
- Disconnect the unit from the mains before relocating it.
- If liquid penetrates into the unit, disconnect it from the mains and do not use it until it is checked by a repair and maintenance technician.
- Do not operate the unit in premises where condensation can form. Operating conditions of the unit are defined in the Specifications section.

DURING OPERATION

- Do not operate the unit in environments with aggressive or explosive chemical mixtures. Please contact manufacturer for possible operation of the unit in specific atmospheres.
- Do not operate the unit if it is faulty.
- Always have the cover protecting against aerosol spread (hereinafter protective cover) installed during operation.
- Do not operate the unit if any of the needles is clogged or malfunctions.
- Never touch the needles or place fingers or other parts under the needles during operation. Manifold needles are sharp and can cause injury.
- Always switch off the unit before changing the manifold.
- If liquid spills on the guiding rail, stop the operation, clean and wipe the surface dry.
- Do not allow the waste bottle to overflow the maximum level during operation (there is a mark on the side surface of the bottle). Take necessary precautions utilizing waste liquid in accordance with general laboratory standards.

AFTER OPERATION

- Carry out the cycle of system washing (on the unit front panel, use the button System rinsing) with distilled water and do not dry. This will keep the system in permanent operation condition.
- Clean the guiding rail under the platform and wipe it dry to prevent oxidation layer formation and to prolong working life of the unit.

BIOLOGICAL SAFETY

- It is the user's responsibility to carry out appropriate decontamination if hazardous material is spilt on or penetrates into the equipment.
- In diagnostic researches, potentially dangerous biological materials can be used. When working with such materials, always use protective clothing and eye protection. Always have the protective cover installed during operation.

2. General information

Inteliwasher 3D-IW8 series microplate washer is designed for washing various types of standard microplates, microstrips and microarrays on FastFRAME (rectangular well shape frame). Washer is suitable for washing wells with different bottom shapes, flat, U-shape and V-shape. The unit is fully programmable, ensuring multi-step solution ripening, aspiration and soaking cycle during a particular period of time, as well as combinations of aspiration, liquid dispensing and soaking.

The unit has 50 programs divided into 5 following aspiration categories (see scheme1 below):

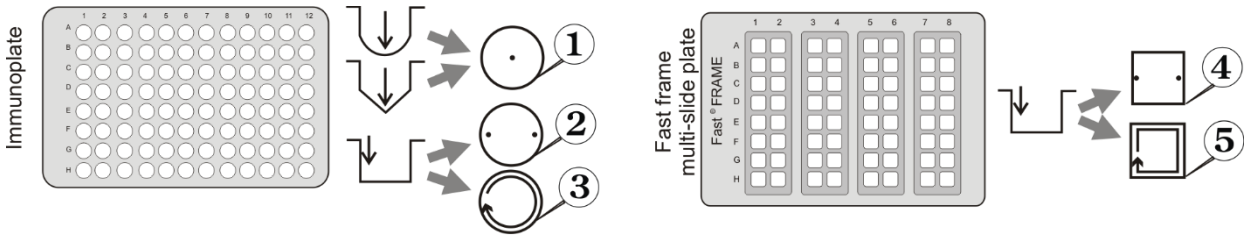
Type 1 (programs 1.0 – 1.9) IPF96 U/V is intended for U-shape and V-shape immunoplates, 1 point aspiration.

Type 2 (2.0 – 2.9) IPF96 FLAT-2 is intended for flat-bottom shape immunoplates, 2 point aspiration.

Type 3 (3.0 – 3.9) IPF96 FLAT-C is intended for rectangular shape immunoplates, full-circle aspiration direction.

Type 4 (4.0 – 4.9) FastFRAME-2 is intended for multi-slide* plate with rectangular wells.

Type 5 (5.0 – 5.9) FastFRAME-C is intended for multi-slide* plate with rectangular wells.



Scheme 1

Note. Optional 4-channel washing solution weight logger, 4CHW Logger allows automatic buffer bottles and waste bottle volume control.

The unit is supplied with 8-channel washing head for dispensing/aspiration, 3 bottles for washing and rinsing solutions, a large waste bottle and small aerosol catching bottle with hydrophobic filter that eliminates risk of contamination with bacteria, viruses and infected particle from wasted liquid to an atmosphere. Hydrophobic filter bacterial efficiencies is very high, up to 99.999% particles bigger than 0.027 μm (which is smaller than Hepatitis A, B and C).

The unit provides:

- washing mode;
- rinsing mode;
- mixing mode;
- single point, two point, circular (circle or rectangular path);
- possibility of additional solution mixing during time gap between two work cycles;
- possibility to use microtest plates by different manufacturers, ensured by automated plate set up (adjust-ing to different depths of plate wells);
- round-bottom plate and strip washing mode;
- possibility of user-defined programs with adjustable parameters.

* The FastFRAME (Schleicher&Shuell) multi-slide plate or analog plate of another manufacturer, that is compatible with standard 1 x 3 inch (25 x 76 mm) glass slides.

3. Getting started

3.1 Unpacking.

Remove packing materials carefully and retain them for future shipment or storage of the unit. Examine the unit carefully for any damage incurred during transit. The warranty does not cover in-transit damage. Warranty covers only the units transported in the original package.

3.2 Complete set. The set includes:

No. in Fig.1	Name	Quantity
1	3D-IW8 Inteliwasher	1 piece
2	Platform for plates	1 piece
3	Manifold	1 piece
4	Protecting cover	1 piece
5	External power supply	1 piece
6	Tubes (outside/inside diam./length 6/3/600 mm)	5 pieces
7	Tube for manifold (outside/inside diam./length 3.2/1.6/400 mm)	1 piece
8	Tube for manifold (outside/inside diam./length 5/3/440 mm)	1 piece
9	Tube for hydrophobic filter (outside/inside diam. 9/6 mm)	1 piece
10	Half-litre bottle with connectors for aerosol collection	1 piece
11	1-litre bottles with sieve filters and connectors for reagents	3 pieces
12	2-litre bottle with connector for collecting of waste liquid	1 piece
13	Hydrophobic filters for half-litre bottle	2 pieces
14	Manifold cleaning set	1 piece
15	Syringe for liquid flushing in hoses	1 piece
16	Power cord	1 piece
17	Operating manual, certificate	1 copy
18	4-channel washing solution weight logger, 4CHW Logger	on request

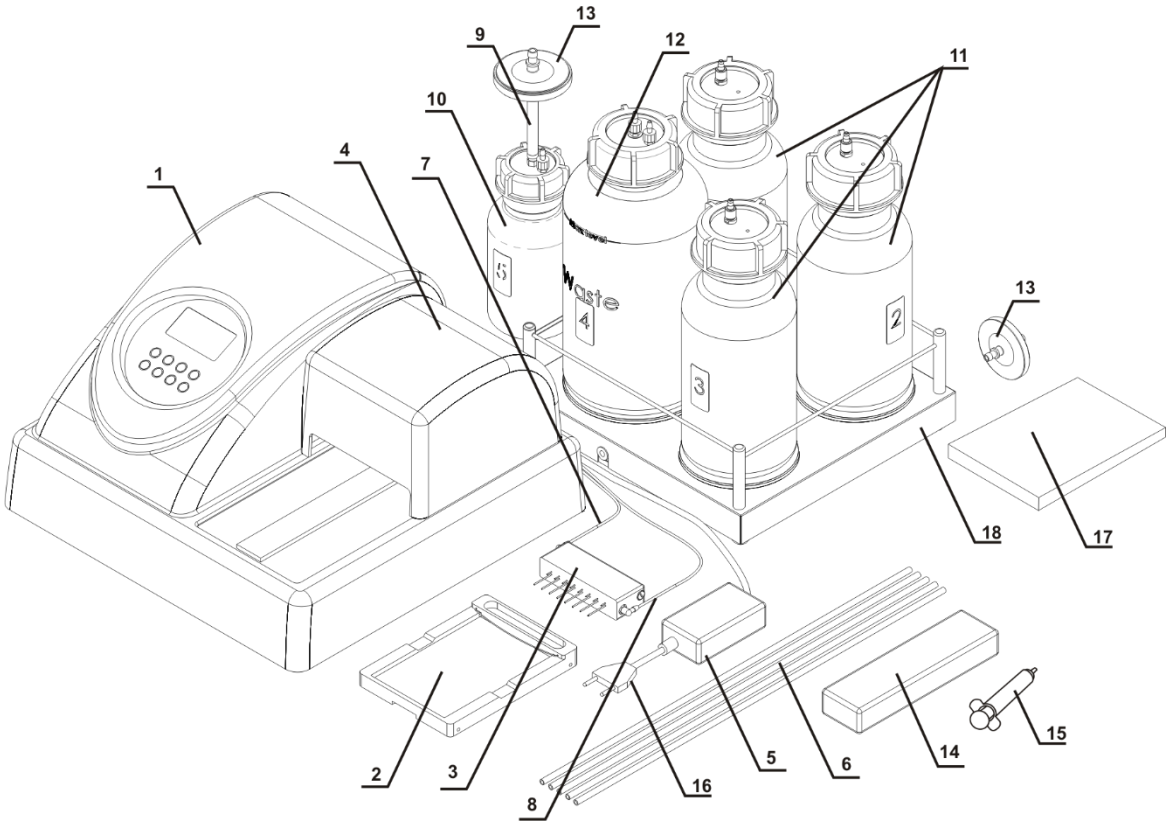


Fig. 1. Complete set

3.3. **Storage and transportation.**

During long-term storage, keep the unit and all its accessories in original packaging in a dry dust-free place.

Note: Remove the washing solution completely from the hydraulic system in case of long-term storage (more than 8 h).

Use the original packaging for transportation whether transported by air, water or land.

Attention! We do not accept warranty claims related to damages caused by improper packaging.

To pack the unit properly:

3.3.1. Remove the manifold, tubes and platform for plates.

3.3.2. Put on packaging blocks onto sides of the unit and place it into the original carton box.

3.3.3. Place the manifold into protecting case; place syringe, manifold cleaning set and the platform into PE bag. Place the bag and the case with the manifold in the corners of the box between the packaging blocks and the side panels of the carton box; place the 2-litre bottle and the half-litre bottle in free space between the packaging blocks and the side panels of the carton box.

3.3.4. Insert the top section into the carton box by bending the section downwards along the perimeter and inserting the bent parts between the walls of the original carton box and packaging blocks, so that the device and the remaining content of the box are fully covered.

3.3.5. Put the soft foam sheet (grey) with the smooth side down on the resulting horizontal carton surface.

3.3.6. Put the remaining three bottles and other accessories on the foam sheet.

Note: If 4-channel weight logger is included in the kit, insert pads under scale cups, then place the logger into top section of packaging.

3.3.7. Cover everything with another sheet of soft foam material with the smooth side up.

3.3.8. Close the box and seal with packing tape.

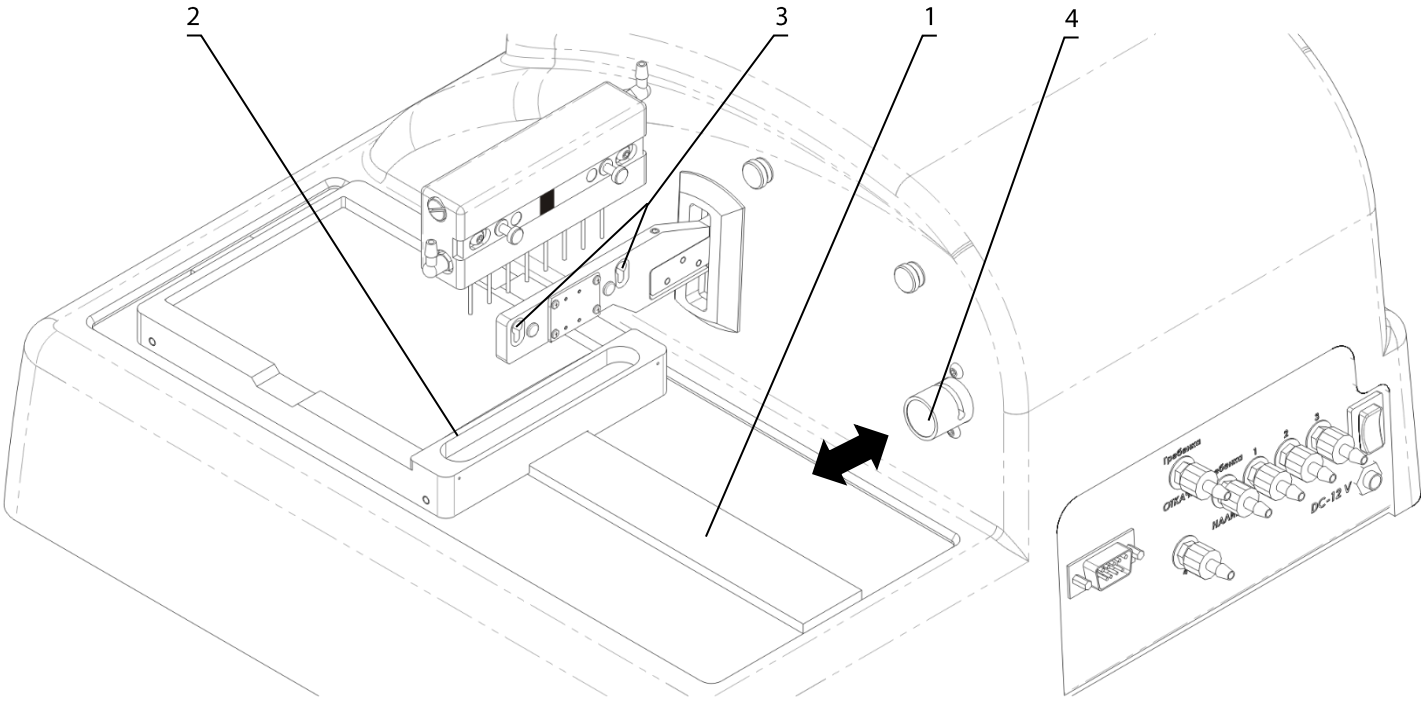


Fig. 2. Unit side and back overview. Setting up.

3.4. **On-site unit installation and preparing for operation.**

3.4.1. Place the unit on a strong horizontal surface, which can safely support weight of the unit. To provide optimal ventilation, ensure 100 mm clearance on each side. Operation conditions are described in the **Specification** section.

3.4.2. Remove the protecting cover.

3.4.3. Unpack the plate platform.

3.4.4. Place the plate platform on the railing (fig. 2/1) so that the plate holder (flat spring) faces the rear side of the unit (fig. 2/2). Magnet on the other side of the rail locks the platform into start position.

Note: If the plate platform is installed improperly, the magnet does not hold it in place and the platform will be able to move freely. Move the platform along the railing until the magnets lock. Increase of resistance to movement indicates that the magnets are locked.

3.4.5. Unpack the manifold.

3.4.6. Install the manifold in the slots of the holder arm (fig. 2/3). Magnets in the manifold and the holder arm connect and align the manifold.

3.4.7. Connect the manifold inlet connector supplying the liquid and the **blue**-coloured **Washing Head Dispense** connector at the rear panel of the unit (fig. 3/2) with a tube (fig.1/7).

3.4.8. Connect the manifold outlet connector and the **yellow**-coloured **Washing Head Aspirate** connector at the rear panel of the unit (fig. 3/4) with a tube (fig.1/8).

Note: Use the provided labels for marking bottles with washing solutions and bottles for collecting waste liquid and aerosol.

3.4.9. Connect the #4 **green**-coloured **Waste bottle** outlet on the rear side of the unit to the connector of 2-litre bottle #4 for waste liquid collecting (fig. 3/1).

3.4.10. Place the tube for the hydrophobic filter (fig.1/9) on the connector of the half-litre bottle #5, then place the hydrophobic filter on the tube (fig.1/13). Check that the “IN” marking on the filter is facing the bottle #5 (fig. 11).

3.4.11. Connect the Waste bottle #4 to the half-litre bottle #5 (fig.3/10).

On the rear side of the unit:

3.4.12. Connect bottle with buffer #1 to the inlet connector (#1 – **red**, fig. 3/3) with a tube (fig.1/6).

3.4.13. Connect bottle with buffer #2 to the inlet connector (#2 – **black**, fig. 3/5) with a tube (fig.1/6).

3.4.14. Connect bottle with buffer #3 to the inlet connector (#3 – **white**, fig. 3/6) with a tube (fig.1/6).

3.4.15. Insert the manifold tube (fig. 3/2) into the valve opening (fig. 2/4). Press the valve in the direction of the arrow and hold the valve while stretching the tube and pulling it through the opening. Release the valve.

Note: Make sure that all connections are secured tightly.

3.4.16. Install the protective cover. Ensure that all tubes are covered, but are not squeezed.

3.4.17. Place bottles near the unit.

3.4.18. If 4-channel weight logger is included in the kit, remove pads from underside of scale cups. Place bottles on the 4-channel weight logger according to the numbering. Connect the RS-232 with the cable to the plug connector on the rear side of the unit (fig. 3/7).

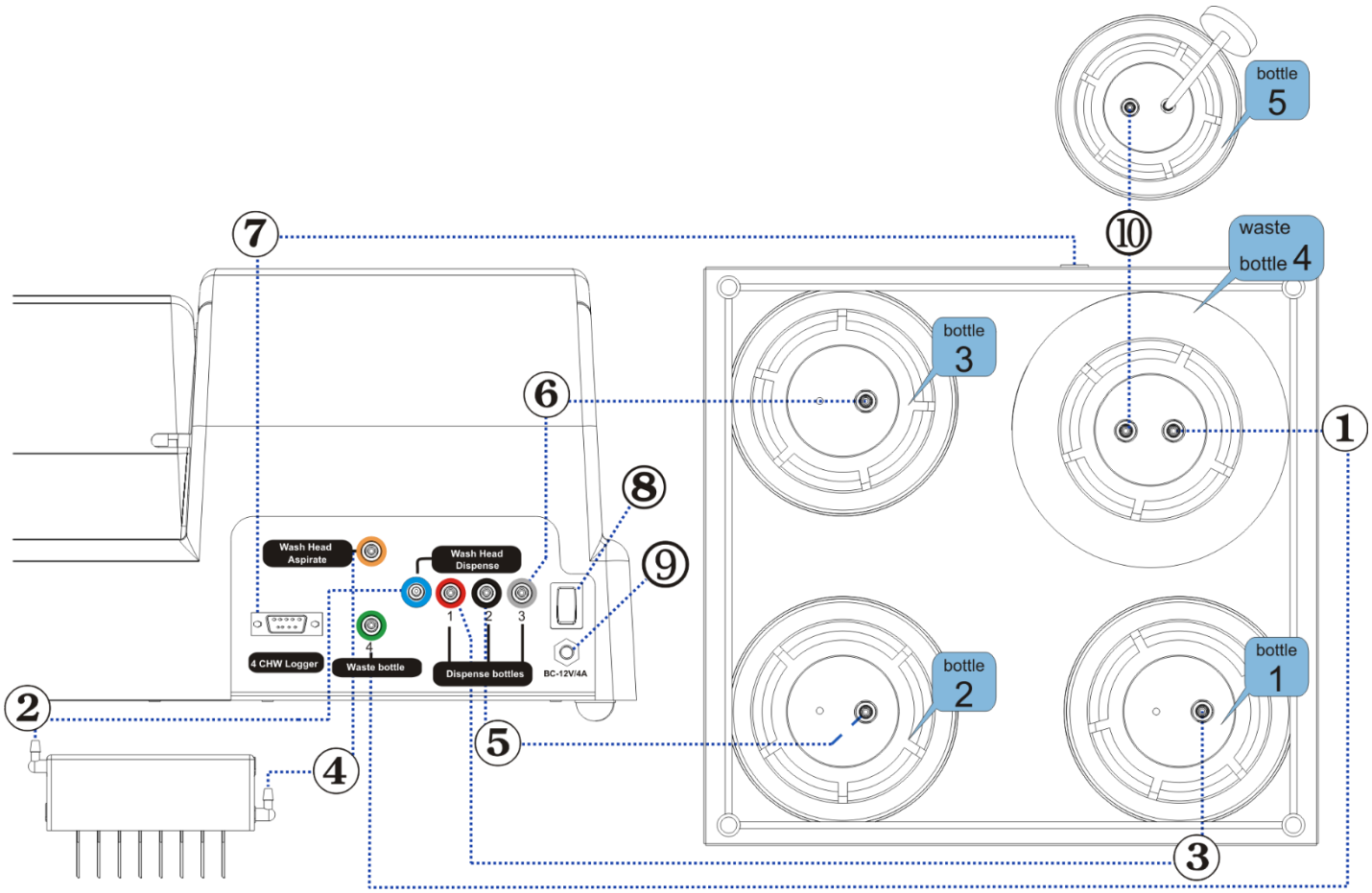


Fig. 3. Assembly diagram

Warning! Before connecting the unit to the mains outlet, check that the power switch (fig. 3/9) is in position **O** (off).

3.5. **Switching on**

3.5.1. Connect the external power supply to the power socket (fig.3/8) on the rear panel of the unit.

3.5.2. Connect the power cord to the external power supply (fig.1/16)

3.5.3. Connect the external power supply to the grounded power socket.

3.5.4. Switch on the unit (position **I**) using the power switch on the rear panel.

3.5.5. When switched on, the unit performs full initialisation cycle and displays the message" Power on reset"

Note: Full initialisation cycle takes no longer than 5 seconds.

4. Operation

4.1. Before starting plate washing:

- Fill the rinsing liquid bottle (#3) with distilled water or appropriate cleansing solution.
- Fill the necessary bottles (#1 and/or #2) with washing solutions.

4.2 Initial parameters of all programs are given in Table 1. All values are adjustable. User programs can be inputted as 00-100. User programs can be created by changing the template of the original program.

All programs are divided into 5 categories with 10 programs each. Each category corresponds to a different type of microplate:

- Category **IPF96 U/V** (01) is intended for U-shape and V shape well immunoplates.
- Categories **IPF96 FLAT-2** (02) and **IPF96 FLAT-C** (03) are intended for flat-bottom well immunoplates.
- Categories **FastFRAME-2** (04) and **FastFRAME-C** (05) are intended for Watman Schleicher & Shuell FastFRAME plates with rectangular wells.

Program #	**01**	**02**	**03**	**04**	**05**	**06**	**07**	**08**	**09**	**10**
Dispense	NO	YES	YES	YES	YES	YES	YES	YES	YES	YES
Aspirate	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Shake	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Dispense rate	03	03	03	03	03	03	03	03	03	03
Aspirate rate	03	03	03	03	03	03	03	03	03	03
Soak time, s	-	30	30	30	30	30	30	30	30	30
Shake time, s	-	-	-	-	-	-	-	-	-	-
Dispensed volume, µl	-	350	350	350	350	350	350	350	350	350
Aspiration time, s	1	1	1	1	1	1	1	1	1	1
Final aspirate, s	-	2	2	2	2	2	2	2	2	2
First aspirate	-	NO	YES	YES	NO	YES	YES	YES	YES	NO
Wash by rows	-	NO	YES	YES	NO	YES	YES	YES	YES	NO
On two channels	-	NO	NO	YES	NO	YES	YES	NO	NO	NO
Num.of 1 wash cycles	01	01	05	05	01	03	05	07	07	07
1 channel	-	-	-	02	-	02	02	-	-	-
Num.of 2 wash cycles	-	-	-	01	-	01	01	-	-	-
2 channel	-	-	-	01	-	02	01	-	-	-

Table 1. Initial parameters of all user programs.

All possible program parameters and their meaning are shown in Table 2.

Parameter	**Value or range**	**Description**
Parameter	Value or range	Description
Dispense	yes/no	Perform fill
Aspirate	yes/no	Perform aspiration*
Shake	yes/no	Plate shaking on the platform during the cycle
Dispense rate	01..03	Speed of liquid filling (100; 200; 300 µl/s)
Aspirate rate	01..03	Speed of liquid aspiration
Soak limit, s	0..300 (step 10 s)	Time between fill and aspiration
Shake limit, s	05..150 (step 5 s)	Shaking time
Dispensed volume	25…1600 (step 25)	Volume of dispensed liquid
Aspirate time, ms	200..3000 ms (step 200 ms)	Time of aspiration from well in cycle
Final aspirate, s	200..3000 ms (step 200 ms)	Time of last aspiration in the cycle
First aspirate	yes/no	Aspiration is the first action in a cycle
Wash by rows	yes/no	Each row is washed once per cycle
On two channels	yes/no	Use 2 washing solutions
Num.of wash cycles	1..15	Number of washes with first solution
1 channel	1..3	Number of bottle to use for the main washing
Second chan. cycles	01..15	Number of washes with second solution
2 channel	1..3	Number of bottle to use for the second washing

Table 2. Program parameters and their definitions

4.3. Install the plate on the platform.

Attention! When installing a plate the first time or when a different type of plate is installed perform plate setup to adjust the manifold lowering depth (see paragraph 4.20).

Note: When working with the FastFRAME plates, remove the plate holder (fig. 2/2). Install it back when working with immunoplates.

* During aspiration, the waste fluid bottle is detected automatically – bottle #4. The number is not specified on the display.

4.4. Use the **Enter** (fig. 5/1) key to select category, depending on the used plate type. Use the **+** and **-** keys (fig. 5/3) to select required washing program from 1 to 10. Program category and number are displayed in the top right corner of the display (fig. 4/1)

4.5. Press the **Program Parameters** key (fig. 5/4) to view the parameters of program. In the program, 1st parameter is activated (Dispense...yes/no, fig. 5/5).

4.6. Use the **+** and **-** keys to select necessary value and press the **Enter** key to save changes to the active parameter and proceed to the next. This way you will be able to review and/or change all parameters.

4.7. Press the **Back row** key (fig. 5/6) to return to the previous parameter in the program.

4.8. Press the **Program Parameters** key to exit parameter view and change mode and save the program.

4.9. Press the **Esc** key (fig. 5/7) to exit parameter view and change mode without saving.

4.10. Press the **Run/Stop** key (fig. 5/2) to start the program.

4.11. If it is necessary to wash less than 12 rows on a microplate, press the **Rows** key (fig. 5/6) before starting. Following message appears on the display, figure 6.

4.12. Select necessary number of rows to rinse using **+** and **-** keys.

4.13. Press the **Run/Stop** key to save changes and start the unit operation.

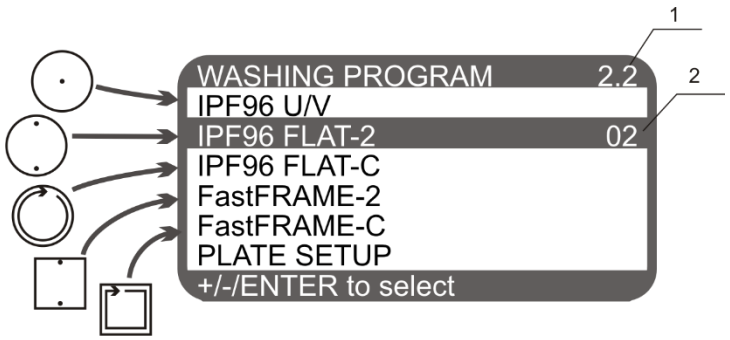
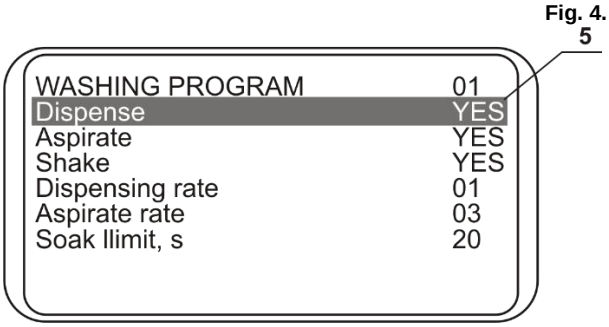


Fig. 4. Program selection



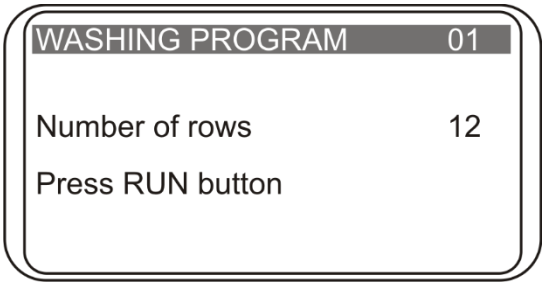


Fig. 6. Setting number of rows to rinse

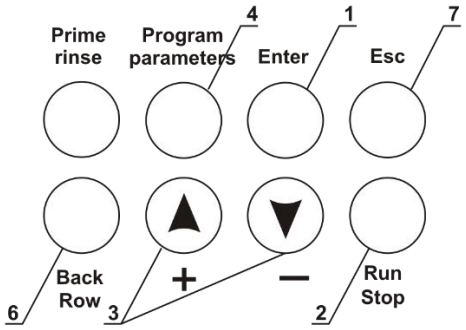


Fig. 5. Control panel

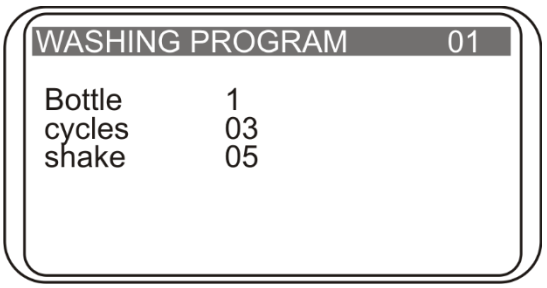


Fig. 7. Display during operation

4.14 If operation requires washing from two channels (parameter “On two channels” set to YES), confirmation of the correct bottle number for second wash appears on the display before starting the program (fig. 9). Select necessary bottle number using **+** and **-** keys and press the **Run/Stop** key.

4.15. During operation, display shows program number, currently used bottle number and the number of cycles left (fig. 7). If the current action has time tracking (soaking or shaking), then the elapsed time is displayed.

4.17. If 4-channel washing solution weight logger is connected to the unit, then during operation, display shows program number, currently used bottle number, the number of cycles left and the remaining volume percentage of liquid in the bottles (fig. 8). For the waste bottle, filled liquid amount is displayed accordingly based on 2-litre bottle volume percentage.

4.18. To stop the program during operation, press the **Run/Stop** key. The message “Cancelled by operator” appears on the lower line of the display. Press the **Run/Stop** key to restart the washing.

Note: If operation requires washing from one channel (parameter “On two channels” set to NO), washing parameters for the second channel are not displayed. Respectively, if two channels are set (parameter “On two channels” set to YES), washing parameters for the second channel are displayed and can be adjusted as needed (Table 3).

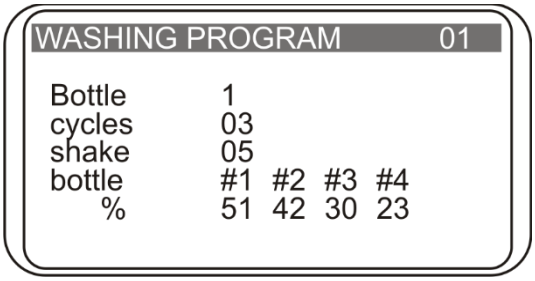


Fig. 8. Display during operation with connected 4-CHW Logger

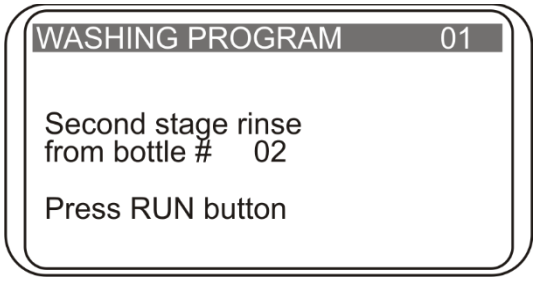


Fig. 9. Choosing the bottle number for rinse on the second channel

4.19. When the cycle is completed, unit produces an informative sound signal. Proceed to section **5. Operation closedown** of this manual.

Attention! Always perform the rinsing cycle using distilled water after finishing the operation at the end of working day. This will help to keep the unit in working order and prevent head channel clogging.

4.20. **Plate setup.**

When installing a plate for the first time or when a plate of different type is used, setup the manifold needles lowering depth.

4.20.1. Press the **Enter** key in the start mode, the following message appears on the display (fig. 10).

4.20.2. To calibrate, press **Run/Stop** key. The manifold measures the depth of the plate well by touching the plate surface first and then the bottom of the well. The unit saves the difference of the measured values.

Dispense	YES
Aspirate	YES
Shake	YES
Dispense rate	03
Aspirate rate	03
Soak limit, s	00
Shake limit, s	30
Dispensed volume	300
Aspirate time, ms	1000
Final aspirate, ms	2000
First aspirate	YES
Wash by rows	YES
On two channels	YES
Num.of wash cycles	03
1 channel	01
2 chan. cycles	01
2 channel	02

Table 3. All parameters of programs with two channels

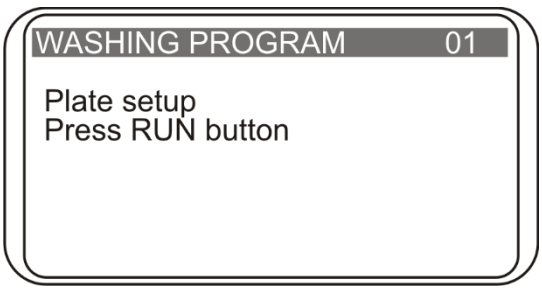


Fig. 10. Manifold lowering depth identification

5. Operation closedown

5.1. When the cycle is completed, a sound signal will inform that the unit stopped the operation.

Attention! Always perform the rinsing cycle using distilled water after finishing the operation at the end of working day. This will help to keep the unit in working order and prevent manifold channel clogging.

5.2. Press **Prime rinse** (fig. 11/1), display shows “PRIME RINSE, the channel 01”. Select the correct channel with using **+** and **-** (fig. 11/2). Press **Run/Stop** (fig. 11/3) key and the system will perform rinsing cycle. Repeat the procedure twice, if necessary.

5.3. Disconnect the tube from selected bottle, and press **Prime rinse** key again to dry the tube with air.

5.4. After finishing the operation, remove the tube from the valve opening to prevent deformation (wall gluing) of the dosing valve tube. To remove the tube, press the valve on the side (fig. 2/4, 2/⇔) and stretch the tube a little when pulling it through an opening.

5.5. Switch the unit off using mains switch on the rear panel (position **O**, off).

5.6. Unplug the external power supply from the mains.

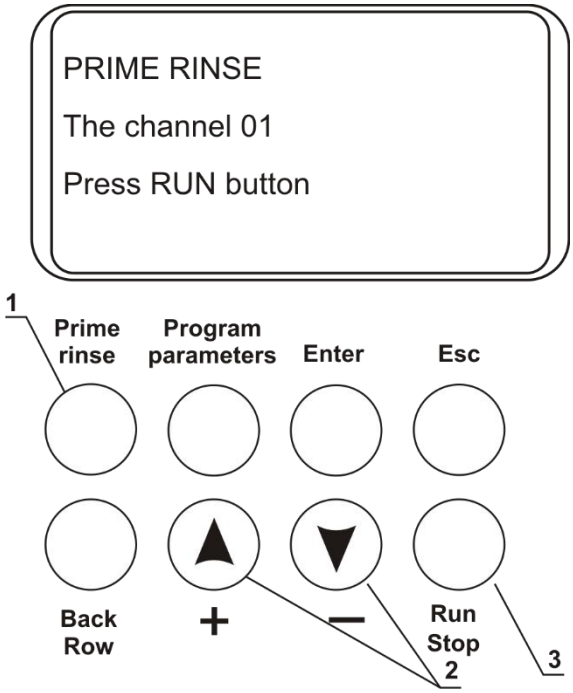


Fig. 11. System rinse

6. Program error messages

Table 4 shows the program cycle error messages, their description and possible solutions.

#	Displayed message	Description	Troubleshooting
1.	E_TRAIL_HOME ERROR	Initial platform position error	*
2.	E_TRAIL_STEP ERROR	Platform movement error	*
3.	HEAD MOVE DOWN ERROR	Head movement error	*
4.	HEAD MOVE UP ERROR	Head movement error	*
5.	K_RESET ERROR	Error moving valve into initial position	*
6.	K_POSITION ERROR	Error moving valve into set position	*
7.	CANCELED BY OPERATOR	Program execution is stopped by operator	Press **Run/Stop** key
8.	E_TRAIL_FOR ERROR	Platform movement error	*
9.	E_TRAIL_BACK ERROR	Platform movement error	*
10.	BOTTLE 4 OVERFLOWED	Overflow of waste collection bottle	Empty the bottle
11.	BOTTLE EMPTY	Buffer bottle needs to be filled	Fill the bottle
12.	PLATE ERROR	Plate calibration is required	See 4.21
13.	HEAD ERROR	Head movement error	*
14.	E_LANDING_ZONE ERROR	Error moving plate into working zone	*
15.	HEAD MODULE IO ERROR	Head movement error	*
16.	E_TRAIL_IO ERROR	Platform movement error	*
17.	PUMP MODULE IO ERROR	Error moving syringe into set position	*
18.	E_RX_TIMEOUT	4 CHW Logger error	*
19.	E_RX_ZERO_LEN		
20.	E_RX_BAD_CRC		

Table 4. Program error messages

* Repair only by service engineers and trained specialists.

7. Specifications

The unit is designed for operation in cold rooms, incubators (excluding CO_2 incubators) and closed laboratory rooms at ambient temperature from +4°C to +40°C in a non-condensing atmosphere and maximum relative humidity 80% for temperatures up to 31°C decreasing linearly to 50% relative humidity at 40°C.

- Dispense system of liquid dosage for each channel separately;
- Minimum dispense volume ..... 25 µl
- Maximum dispense volume ..... 1600 µl
- Dispense increment ..... 25 µl
- Irregular liquid dosage at 300 µl ..... max. ±2.5% or 7.5 µl
- Allowed residual liquid volume in plate well ..... max. 2 µl
- Number of wells washed simultaneously 8
- Number of washing cycles ..... 1 - 15
- Aspiration time ..... 1 - 3 s
- Aspiration/dispensing speed ..... 3 levels
- Choice of 3 washing buffers
- Maximum number of washing liquids in program 2
- Dispense system ..... sphincter valve
- Soaking time ..... 0 – 300 s (increment 10 s)
- Shaking time ..... 0 – 150 s (increment 5 s)
- Number of washed rows ..... 1 – 12
- Time of plate single wash (350 µl) ..... max. 45 s
- Number of programs 50
- Plate platform and manifold movement ..... automated
- Indication of operation modes ..... 8-line LCD
- Dimensions ..... 375x345x180 mm
- Weight* ..... 11 kg
- Input current/power consumption ..... 12 V, 1.8 A / 22 W
- External power supply ..... input AC 100–240 V 50/60 Hz, output DC 12 V

Optional accessories	Description	Catalogue number
4CHW Logger	4-channel washing solution weight logger, max. loading per scale cup 2 kg, dimensions 267x252x97 mm, weight* 3 kg	BS-060102-AAI

Replacement parts	Description	Catalogue number
Bottle #1	Assembled (with weight, tube, filter)	BS-060102-S26
Bottle #2	Assembled (with weight, tube, filter)	BS-060102-S27
Bottle #3	Assembled (with weight, tube, filter)	BS-060102-S28
Bottle #4	Assembled with tube	BS-060102-S29
Bottle #5	Assembled (with filter, tube)	BS-060102-S43
Hydrophobic filter	For bottle #5	BS-060102-S44
Filter complete set	Filter, weight, tube	BS-060102-S01
Silicone tube set	6 pcs.	BS-060102-S39

Biosan is committed to continuous improvement of the unit's properties and quality and reserves the right to alter unit's design and specifications without additional notice.

* Accurate within ±10%.

8. Maintenance and troubleshooting

8.1. If the unit requires maintenance, disconnect the unit from the mains and contact your local Biosan representative or Biosan service department.

8.2. All maintenance and repair operations must be performed only by qualified and specially trained personnel.

8.3. Do not use non-conforming parts for repair. The manufacturer provides all necessary services and spare parts. To order necessary services and parts, please contact your supplier.

8.4. Maintenance checks. The following checks can be done by user.

8.4.1. Daily maintenance.

- clean the surface of the device from liquid droplets and contamination;
- clean and wipe dry the surface around the guiding rail (fig. 2/1);
- perform the rinsing cycle twice using distilled water after finishing the operation (see section 5).

8.4.2. Monthly.

- With 75% ethanol solution, clean mounting surface of the plate platform and plate holder spring.

8.5. Ethanol (75%) or other cleaning agents recommended for cleaning of laboratory equipment can be used for cleaning and disinfection of the unit.

8.6. Filter replacement (fig.11)

8.6.1. It is recommended to change the hydrophobic filter once in six months; in particular cases, e.g. at intensive operation, once in three months (to order the filter, you have to know the product identification number, see the table in Specifications chapter).

8.6.2. Disconnect the filter from outlet tube, remove the filter, insert a new filter into the socket and tighten it.

Attention! Maintain the mounting of the filter according to fig. 11. The “IN” marking should be located on the side of the inlet tube (facing the bottle).

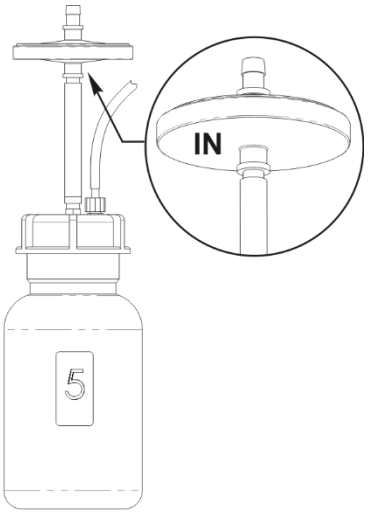


Fig. 11. Filter mount

8.7. Troubleshooting

Symptom	Possible cause	Action required
Manifold dosing error Volume of washing solution does not correspond to the set volume, dosing unevenness is observed along the plate wells or the washing solution is not dispensed at all.	1. Poor contact between the bottle hose connector and the device 2. The hose is overbent 3. Obstruction of sieve filters 4. Obstruction of dispensing channel of the manifold or a needle 5. Absence of liquid in bottles	1. Ensure proper connection of the bottle with the device. 2. Check if the hose is overbent and straighten it if necessary. 3. Check if the sieve filters in bottles No. 1, 2 and 3 are clogged. 4. Check if the dispensing channel of the manifold or needles is not obstructed. If yes, perform cleaning (see the section “Obstruction of dispensing channel or a needle in the manifold” in this Table); 5. Ensure presence of liquid in the bottles No. 1, 2 and 3; fill up liquid in a bottle if needed. (Attention: with 4CHW Logger, information on liquid levels in bottles is shown on the display).

Table 5. Troubleshooting.

Symptom	Possible cause	Action required
Obstruction of dispensing channel or a needle in the manifold	During operation needles of the manifold can be obstructed.	1. Determine the obstructed needle by checking the underfilling of a well. **Warning!** Be careful working with the manifold, prevent pricks and injuries caused by needles, they may contain dangerous infections! 2. Take off the manifold from the device, put it down with needles upward. Clean the aspiration channel needles with the wiping rod Ø 0.80 mm, and clean needles of the dispensing channel with the wiping rod Ø 0.45 mm, inserting the wiping rod against stop and removing it. 3. After cleaning, install the manifold on the device and do the rinsing procedure to ensure proper operation of the needle. 4. In case of repeated obstruction, execute requirements of pp. 1 and 2, unscrew the manifold's plugs, disconnect the dispensing and aspirating tubes, clean the dispensing or aspiration channel with the wiping rod, rinse the manifold with the 75% solution of ethanol, replace the plugs, install the manifold on the device and ensure the proper operation of needles.
Washing solution is not dispensed into a plate	Deformation (wall gluing) of dosing valve tube due to the long-term storage or standstill of the device	1. Remove the tube from the valve. 2. In the case of deformation, open with fingers the closed part of the dosing valve. 3. Insert the tube into the valve opening to position shown in fig. 2/4. **Note:** In order to release the tube, press the valve on the side and slightly stretch the tube pulling it through the opening.
Wear or damage of the valve tubes and the pump	The connecting tubes are worn out or damaged during exploitation.	Turn off the device and have it checked by a specialist. Only service engineers and trained specialists are allowed to replace the tubes.
Volume of residual liquid in a well exceeds the admissible value (2 µl)	1. Depth of the manifold immersion is not determined. 2. Obstruction of the manifold aspiration channel or a needle.	1. Perform well depth measurement in the automatic mode. 2. Check if the aspiration channel and needles are not obstructed. If yes, do their cleaning (see the section "Obstruction of dispensing channel or a needle in the manifold" in this Table). If it does not help, turn off the device and have it checked by a specialist.
On starting the operation, the device does not fetch liquid from the active bottle.	Insufficient liquid quantity in the pipe.	To solve this problem, complete the following procedure: - Stop the program. - Prepare a syringe with 5 ml of distilled water. - Unscrew the hose from the active bottle. - Press **Prime Rinse** key. - Using **+** and **-** keys, select number of the active bottle and press the "Start". - At the moment when the pump begins operation, gradually fill the hose with distilled water from the syringe. - Tighten the hose on the bottle. If the pump does not restore performance, contact the service engineer

Table 5. Troubleshooting (continued).

9. Warranty and claims

9.1. The Manufacturer guarantees the compliance of the unit with the requirements of Specifications, provided the Customer follows the operation, storage and transportation instructions.

9.2. The warranted service life of the unit from date of delivery to the Customer is 24 months (exclude items mentioned in the table of Specifications point). Contact your local distributor to check availability of extended warranty.

9.3. Warranty covers only the units transported in the original package.

9.4. If any manufacturing defects are discovered by the Customer, an unsatisfactory equipment claim shall be compiled, certified and sent to the local distributor address. Please visit www.biosan.lv, Technical support section to obtain the claim form.

9.5. The following information will be required in the event that warranty or post-warranty service comes necessary. Complete the table below and retain for your record.

Model	Inteliwasher 3D-IW8
Serial number	
Date of sale	

10. Glossary

1	Rinsing mode	plate washing mode consisting of consequent dispension and aspiration to/from wells.
2	Mixing mode	provides mixing of solution in wells by shaking the platform
3	Single point aspiration	plate washing mode which provides solution aspiration from the centre point of a well.
4	Double aspiration	plate washing mode which provides solution aspiration consequently from two opposite points of a well
5	Strip washing mode	plate washing by rows
6	Dispensing	filling wells with a set solution volume
7	Waste bottle	the bottle for collecting the aspirated liquid
8	Plate setup	procedure for automatic measurement of well depth
9	Run mode	command to start the washing program
10	Enter	in program setup mode, this command is used for confirming one by one the program parameters
11	Rows	command to set the number of washable rows
12	Stop mode	command to stop the washing program

11. EU declaration of conformity

EU Declaration of Conformity

Unit type	Microplate washers
Models	**IW-8, 3D-IW8**
Serial number	14 digits styled XXXXXXYYMMZZZZ, where XXXXXX is model code, YY and MM – year and month of production, ZZZZ – unit number.
Manufacturer	SIA BIOSAN Latvia, LV-1067, Riga, Ratsupites str. 7/2
Applicable Directives	EMC Directive 2014/30/EU LVD Directive 2014/35/EU RoHS2 2011/65/EU WEEE 2012/19/EU
Applicable Standards	LVS EN 61326-1: 2013 Electrical equipment for measurement, control and laboratory use. EMC requirements. General requirements. LVS EN 61010-1: 2011 Safety requirements for electrical equipment for measurement, control, and laboratory use. General requirements.

We declare that this product conforms to the requirements of the above Directives

Signature	Signature
Svetlana Bankovska Managing director	Aleksandr Shevchik Engineer of R&D
19.07.2016. Date	19.07.2016 Date

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