MESSIAH

R4200

User's Manual

IVD

This product is medical device

信進메딕스(주)
SHIN JIN MEDICS INC.

MESSIAH R4200

User's Manual

Rev. B. 09. '19

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* Where to display the description: Product rear attachment

CONTENTS

1. Precaution

1.1. Symbols

Symbol	Meaning	Description
	In Vitro Diagnostic Device	Represents a medical device used as an in vitro diagnostic medical device.
	Batch code	To identify the manufacturer's batch or lot code, for example on a medical device or the corresponding packaging. The code shall be place adjacent to the symbol.
	Serial Number	To identify the manufacturer's serial number, for example on a medical device or its packaging. The serial number shall be placed adjacent to the symbol.
	Date of Manufacture	Indicates the date that the medical device was manufactured.
	Caution	Indicates the need for the user to refer to the user's manual for important information to note, such as warnings and cautions that can't be displayed on the medical device itself for a variety of reasons.
	Caution; risk of electric shock	To identify equipment, for example, the welding power source, that has risk of electric shock.
	Warning; Laser beam	To warn of a laser beam.
	Warning; Crushing of hands	Warnings about hand pressing when carrying equipment.
	Do not actuate during operation	To identify controls which must not be operated during the machine run.
	Warning: Biohazardous substance	To indicate a reference to substances that may be hazardous to men, animals, plants, or the environment based on biological activity (for example, holding a virus).
	handle with care	To indicate that the contents of the transport package are fragile and the package shall be handled with care.
	This way up	To indicate correct upright position of the transport package.
	Fragile	To indicate that the contents of the transport package are fragile and the package shall be handled with care.
	Keep away from rain	To indicate that the transport package shall be kept away from rain and in dry conditions.

1.2 Installation Precautions

⚠ Caution

(1) Do not use this instrument in a place with high humidity because it has a built-in NaI(Tl) as its main component and is very sensitive to humidity. (Do not use in humidity over 95%)

- ▸ This may result in deterioration of the performance and life of the instrument.

(2) Avoid exposure to direct sunlight.

- ▸ It may cause malfunction or injury.

(3) Maintain an interval of 30cm from the wall and install horizontally in a place without vibration.

- ▸ It may cause malfunction or injury.

(4) Be sure to check the maximum load when installing the machine in a work desk, etc., rather than in a workbench.

- ▸ It may cause malfunction or injury.

(5) Avoid locations that are flammable or explosive for safety reasons.

- ▸ It may cause fire, breakdown and explosion.

(6) Install the power cord in a location where the user can easily remove it.

- ▸ It may cause fire, breakdown and explosion.

⚠ Electric shock hazard

(7) Be sure to check the rated voltage and connect it to the capacity.

- ▸ It may cause electric shock, fire or malfunction.

(8) The instrument should be installed in a place where stable voltage can be supplied(Allowable voltage variation rate: ±10%). If not, connect it to a current stabilizer or a UPS.

- ▸ It may cause electric shock, fire or malfunction.

(9) Be sure to use a grounding outlet.

- ▸ It may cause electric shock, fire or malfunction.

1.3 Usage Precautions

⚠ Caution

(1) Do not use in places where room temperature is less than 0 degrees, 40 degrees or more, and humidity is 95% or more.

- ▸ The instrument may not operate normally.

(2) Be sure to fill the tube with the Rack before operating the Washer.

- ▸ It may cause injury due to malfunction.

(3) Do not leave the measured tube on the deck.

▸ There is a possibility of problems such as background rise due to instrument's contamination.

(4) This product should only be used as an in vitro diagnostic medical device. Please read this manual together with the IVD product manual before use.

▸ It may cause injury due to malfunction.

(5) Be sure to wear protective clothing such as lab coats, gloves, and glasses when handling the sample and reagent components. Wash hands thoroughly after handling. If the reagent gets on your skin or gets in your eyes, wash with running water. If any problem is found, consult a doctor.

▸ There is a risk of unknown pathogenic viruses, bacterial infections and radiation exposure.

(6) Conduct the test regularly according to the equipment maintenance procedure in the user manual and check whether it is normal or abnormal.

▸ The instrument may not operate normally.

(7) Check the recommended intervals for replacement and management of core components for each module of the equipment so that consumables within the expiration date can be used. In addition, do not use the product beyond the expiration date when using the reagent.

▸ It may cause injury due to malfunction.

Biohazardous substance

(8) Be careful when handling as there may be biohazardous materials in the waste tank that stores medical waste among the components.

▸ There is a risk of unknown pathogenic viruses, bacterial infections and radiation exposure.

Waste tank

Operation prohibited during device operation

(9) Do not open or close the opening/closing cover while the instrument is in operation.

▸ It may cause injury due to malfunction.

(10) Do not remove the rack or carrier while the washer is in progress.

▸ It may cause injury due to malfunction.

Electric shock hazard

(11) Do not plug or unplug the power plug with wet hands.

▸ It may cause electric shock.

(12) If the instrument smells strange or smokes, turn off the main power and contact the person in charge to take action.

- It may cause electric shock or fire.

(13) Please note that if you open the inside of the instrument due to unavoidable reasons, there is a high voltage converter.

- It may cause electric shock.

Risk of laser radiation

(14) Do not access the laser emitting from 'the barcode front bracket'.

- There is a risk of eye or skin exposure due to beam and scattered light.

Barcode front bracket


1.4 Shipping Precautions

Caution of Hand pressed

(1) Since the product is heavy, make sure that at least four people unpack and carry it.

- It may fall off or collide with it, causing damage or injury.

Handling Precautions Breakage Caution

(2) When unpacking, be careful not to scratch the outer surface of the device with sharp objects such as blades.

- This may damage the product.

(3) When transporting equipment, be careful not to throw equipment or subject it to strong impacts.

- This may damage the product.

Carrying Caution

(4) Always treat the bottom of the package and equipment with the bottom facing down.

- This may damage the product.

Caution in rainy weather

(5) Avoid the rain to prevent the outer packaging from getting wet and keep it dry.

▸ This may damage the product.

1.5 Others Precautions

⚠ Caution

(1) Do not wipe the device with chemical solution such as thinner or solvent, and use neutral detergent.

▸ It may cause discoloration, deformation, breakage or fire.

(2) Parts replacement and repair modification are prohibited except for service personnel authorized by us.

▸ Never make repairs at your own discretion.

(3) For any inquiries regarding repair or disposal of the equipment, please contact the following.

T e l : +82-70-8277-6929

Mail : jason@diakey.com

2. Product composition

2.1 Check: Product composition

※ After receiving the product, check the components of this unit before installation.

No	Component	Quantity	Image
1	Control Rack	4 EA	
2	Reagent Rack(Carrier)	2 EA	
3	Target Rack	40 EA	
4	Sample Rack	20 EA	
5	Washer module test rack	1 EA	
6	Reagent Bottle	10 EA	
7	Shield Tube	10 EA	
8	Power Cable(220V)	1 EA	
9	LAN cable	1 EA	

No	Component	Quantity	Image
10	PC	1 EA	
11	Monitor ARM	1 EA	
12	Keyboard	1 EA	
13	Mouse	1 EA	
14	Washer Module Needle Cleaning tool	1 EA	
15	Dispenser Module Needle Cleaning tool	1 EA	
16	Hose set	5 EA	
17	PC adapter	1 EA	
18	Waste tank A, B / Washing solution tank A, B / Flushing tank	Each 1 EA	

2.2 Product specification

	Specification	Description
Dispenser	Needle Count	4
	Level Sense	Capacitive method
	Volume	10 ~ 1000ul with steps of 1ul
	Throughput	200 Tests / hour
Incubator	Stroke	0.0225mm
	Shaking Type	straight-line motion
	Speed	up to 1200 RPM
Washer	Dispensing Volume	0 ~ 3.0ml
Counter	Type	Scintillation Detector - NaI(Tl)
	Efficiency	> 70% (I-125), > 55% (I-129)
	Detector Type	Through-hole type
	Countable Energy	2~10 Channels / KeV

2.3 Product exterior

(1) Main body

Front	Rear	Right side	Left side
			

Front	Rear
	

No.	Designation	Function	Remarks
1	Power switch	Switches power on and off the instrument	Front
2	Storage cabinet	For storing solution Tank and other items	
3	Power connection	The part connecting the input power cord	Rear
4	LAN Port	The part connecting with PC for instrument control	

3. MESSIAH R4200 Installation

3.1 Installation environment

(1) Remove the packaging material and place the product body where you will use it. It should be installed in a horizontal place with flat surface and no vibration.

(2) Place the washing solution tank and the waste tank in desired positions and connect rubber lacquer and sensor.

(3) Check the appearance of the product and connect the power cord to the power connection on the back.

(4) Connect the power cord to a power outlet with a power consumption of 275 VA or higher.

(5) Connect the LAN Cable to the back of the product and connect the supplied PC and LAN cables.

(6) Connect the adapter of the supplied PC to the power connection of the PC and connect the power cord to the power outlet.

Power connection & LAN port (Rear part of the product)

3.2 Power supply

(1) Check the power connection of the product and press the power button on the front.

Power button (Front part of the product)

4. How to use

4.1 Preparation before use

(1) Clean the top of the deck.

(2) Ensure that no tubes are placed inside the equipment and remove them if present.

(3) Check the initialization status after turning on the power of the equipment and judge the abnormality.

(4) Check around the equipment for contaminated sources such as tubes, etc, and remove them if present.

(5) Check the background value before using the equipment.

4.2 How to use and Operation procedure

4.2.1 START

- When the program is started for the first time, the device connection and initialization test are performed as shown in the figure.
- If all the tests are successfully completed, the R4200 main window will open.
- [a]If connection fails or [b] If the device initialization test fails, the following message appears.

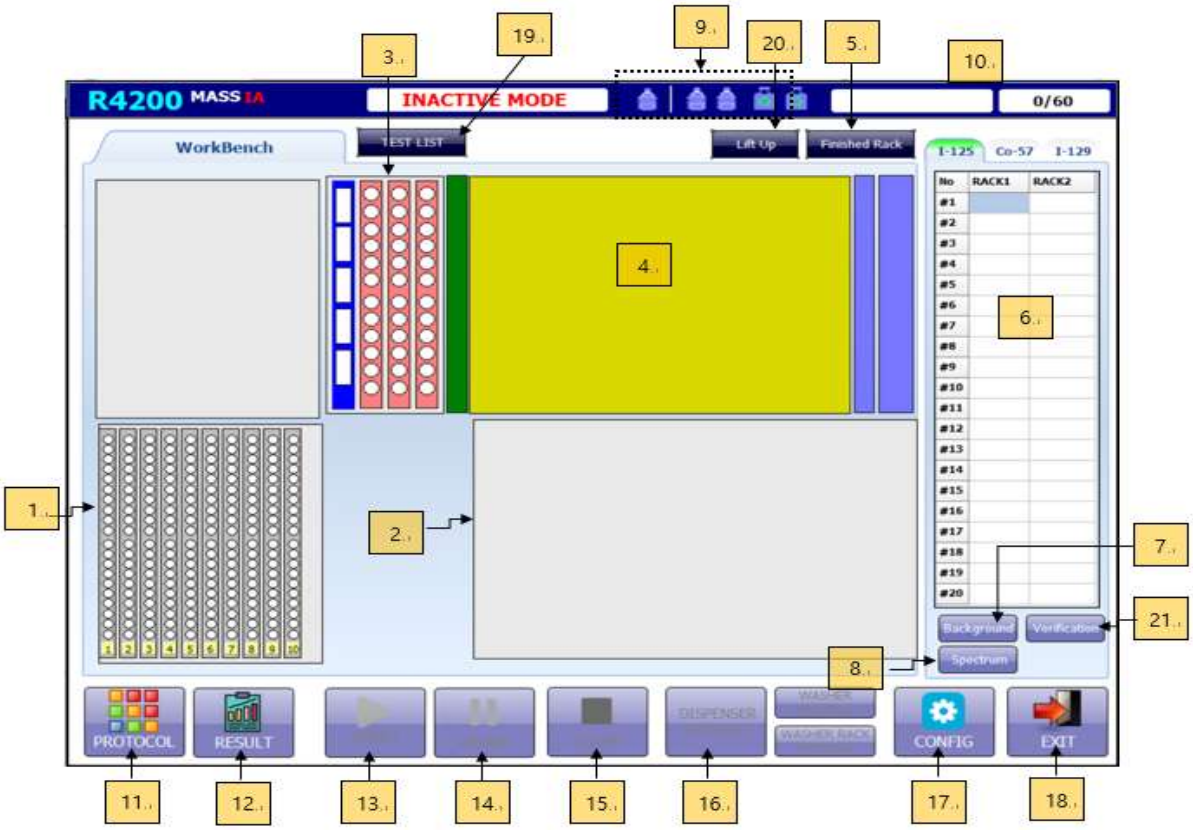
a) If connection fails

The '[Inactive Mode]' and '[Close]' buttons appear with an error message of '[Error] Network Connection Fail'. In case of 'Inactive Mode', you can't control the equipment, but you can modify the equipment settings or check the test results.

b) If the device initialization test fails

The cause of the failure of the equipment is displayed on the screen, and '[Calibration Mode]' and '[Close]' buttons appear. You can test the equipment through 'Config' at run time as [Calibration Mode], but you can't perform the test.

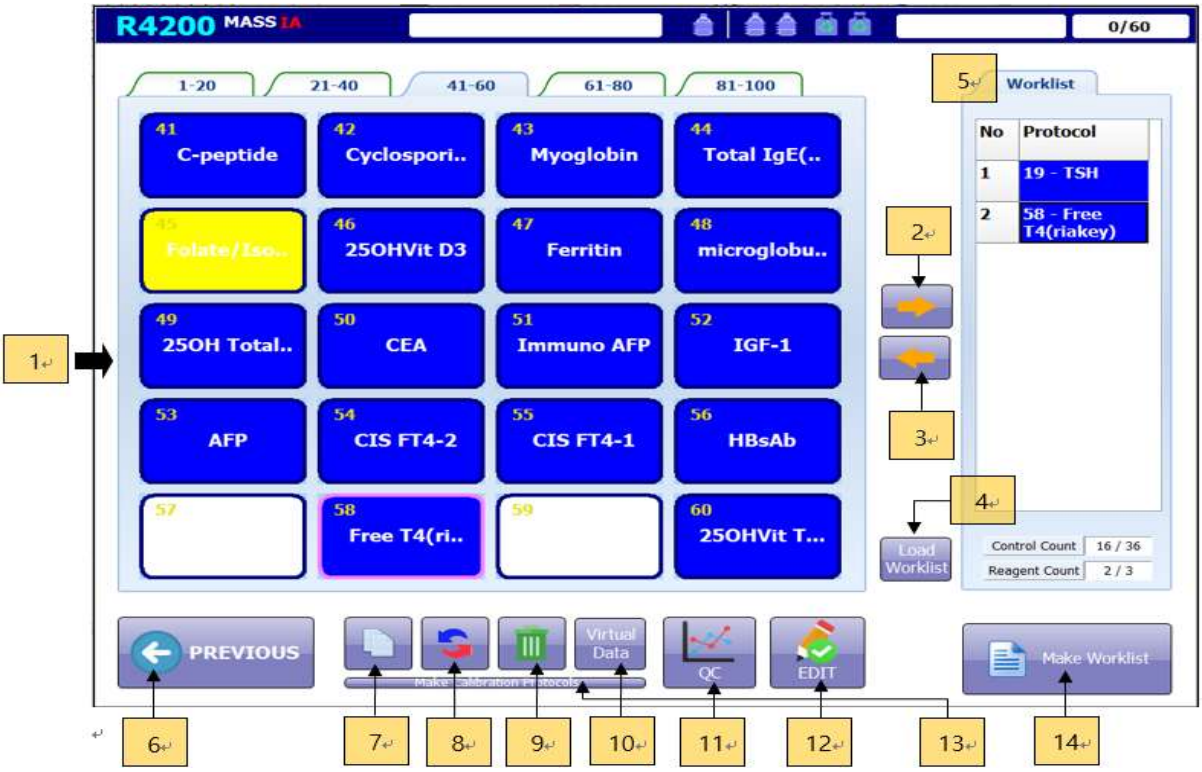
4.2.2 Main View



No.	Designation	Functions
1	Sample Deck	- Deck for placing sample rack
2	Target Deck	- Deck for placing target rack
3	Reagent Deck	- Deck for placing reagent carrier and control rack
4	Working Deck	- Deck for placing dispensing, incubation, washing, etc.
5	Finished Rack	- Displays the finished rack.
6	Counting Board	- The gamma ray measurement value is displayed.
7	Background	- Displays the currently applied background value. - Records that have been measured in the past can be identified.
8	Spectrum	- The measurement spectrum of the isotope being measured can be identified.
9	Solution Tank Status	- Display the status of the washing solution - From left to right, displays the status of one needle washing solution, two washing solutions, and two wastewater.
10	Counting Status	- Displays the item and the time being measured.
11	PROTOCOL	- Modification, addition, deletion of Test items - Create worklist
12	RESULT	- Check the test results.
13	START	- When you create a worklist, the start button is activated. Press this to start the test.

14	PAUSE	- Pause the ongoing test.
15	STOP	- Stop the ongoing test.
16	PRIMING	- Before starting the test, perform to remove the air in the needle hose.
17	CONFIG	- Configure the environment.
18	EXIT	- Exit the program.
19	TEST LIST	- Check the continuous inspection test item.
20	Lift Up/Lift Down	- Perform 'Lift Up/Lift Down' for decontamination.
21	Verification	- Proceed with verification.

4.2.3 Protocol List

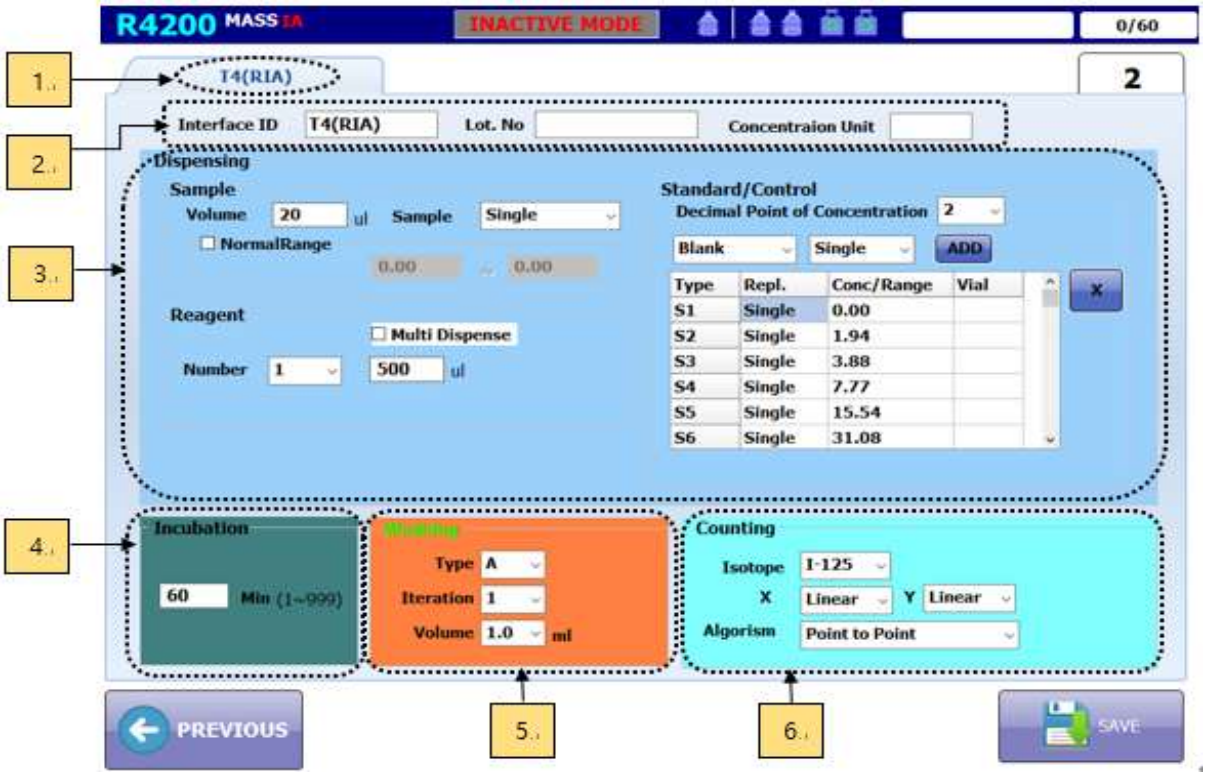


No.	Designation	Functions
1	Protocol	- Each protocol is displayed. - The quantitative test is blue, the qualitative test is red, the semi-quantitative test is green, and the dual label is pink.
2	Worklist Add	- Add the selected item to the test progress list.
3	Worklist Delete	- Delete the selected item to the test progress list.
4	Load Worklist	- Reload the previous worklist.
5	Work List	- Up to 6 items can be processed for inspection.
6	PREVIOUS	- Go to previous screen.

7	Copy Protocol	- Copies the selected test.
8	Swap Protocol	- Change the position of the protocol.
9	Delete Protocol	- Delete the selected protocol.
10	Virtual Data	- Create virtual data.
11	Protocol QC	- Q.C the control and ED measurements according to the westgard rule.
12	EDIT	 Modify the protocol. If there is an empty protocol, a pop-up window will appear as shown in fig 4. **Quantitative:** Quantitative assays **Qualitative:** Qualitative assays **Semi Quanti.:** Semi-quantitative assays **Dual Label:** Simultaneous testing of I-125 and Co-57 measurements
13	Make Calibration Protocols	- Create a protocol that measures I-125 verify, I-129 verify, Co-57 verify, and background.
14	Make Worklist	- Create a worklist using the selected protocol.

4.2.4 Protocol Modification

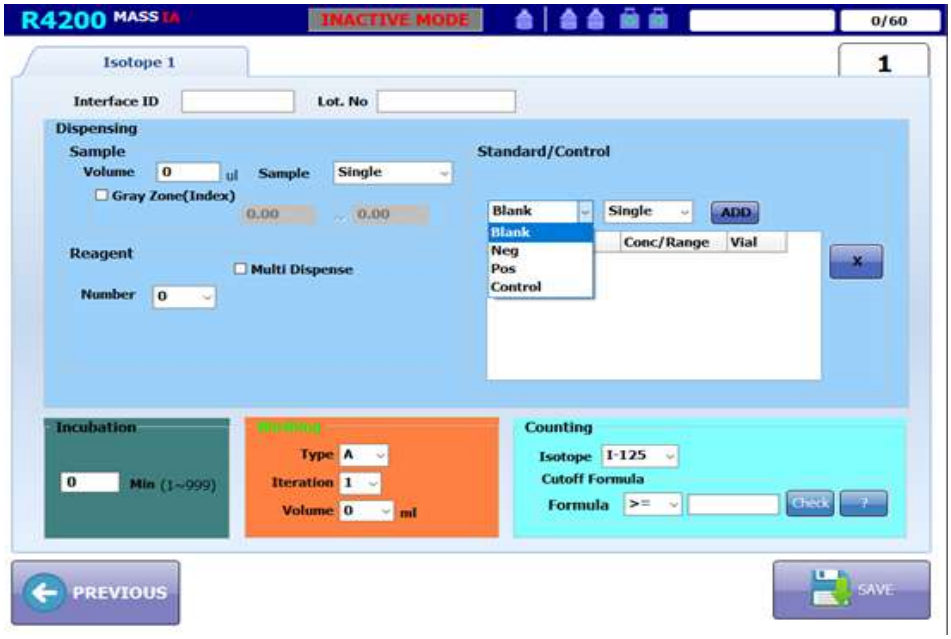
(1) Quantitative assays



No.	Designation	Functions
1	Protocol Name	- Enter the name of the test, and double-click to modify it.

2	Common Info	- Interface ID / Lot Number / Concentration Unit
3	Dispensing	**Dispensing information** - Sample: Set the sample volume and number of divisions. - If you enter the normal range, a warning will be displayed when the sample is out of the concentration range. - Reagents: Set the number of dispensed reagents and dispense volume in common. - Standard/Control: Set the concentration of the standard, the concentration of the control, and number of dispense. - In the case of control, the control set by the public vial is placed at the end of the test.
4	Incubation	- Specify reaction time
5	Washing	- Specify the washing solution type, dispense volume, and number of washes.
6	Counting	- Counting Information Specify the x, y scales and algorithms of the measurement isotope and standard for quantitation.

(2) Qualitative assays



It is mostly the same as the quantitative test, except that negative, positive control is added to standard/control item, and standard is removed. In counting, there is no x, y scale, and you will enter the formula in cutoff formula part. In the formula, enter 'N' for negative control and 'P' for positive control.

For example, if you enter (N + P) / 2,

Cut off = (CPM of negative control + CPM of positive control) / 2

(3) Semi-Quantitative assays

It is mostly the same as the qualitative test, and the equation for calculating the concentration is not calculated by the standard but is calculated by the formula. In the formula, the CPM of the measured sample is used for the calculation, and the notation is marked 'X'.

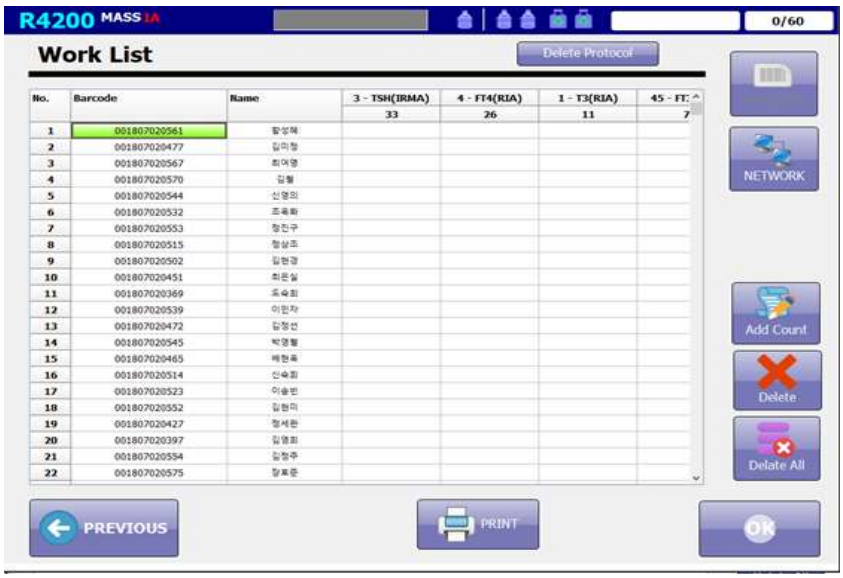
For example, for (N + X) / P, the concentration is

Concentration = (CPM of negative control + CPM of sample) / positive control)

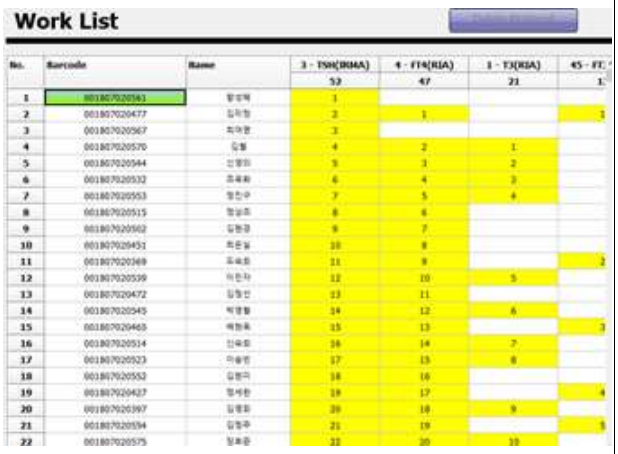
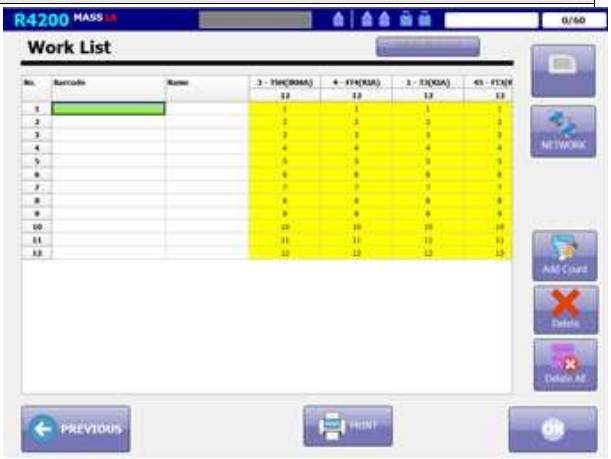
(4) Dual Label Assay

This test is performed when ^{125}I and ^{57}Co are labeled at the same time, and ^{125}I and ^{57}Co are measured simultaneously by one measurement.

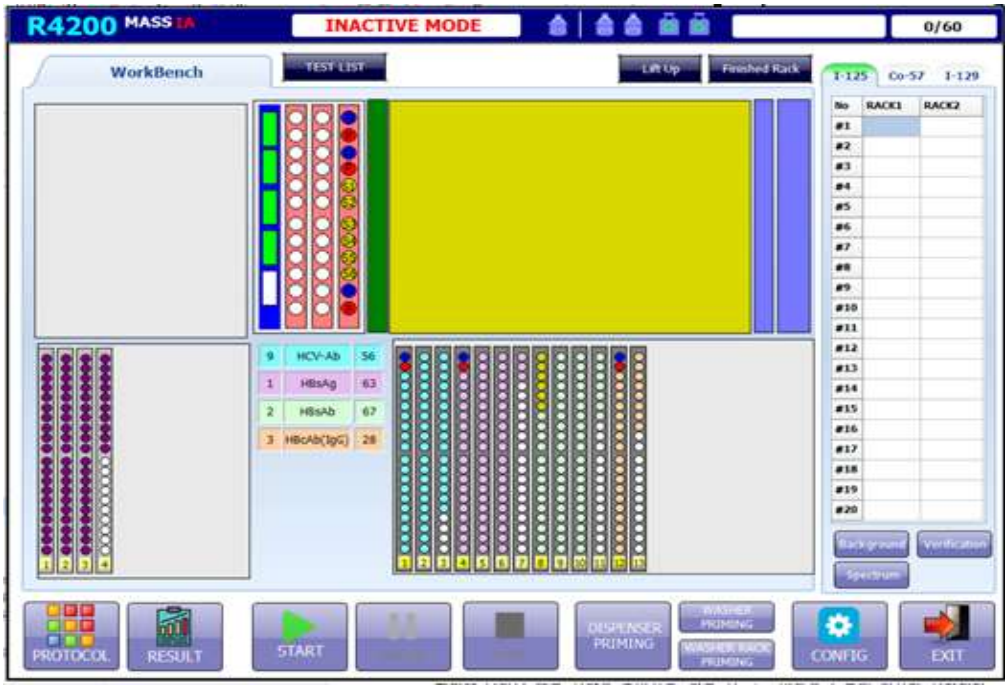
4.2.5 Inspection Progress



Click 'the make worklist button' on screen **'4.2.3 Protocol List'** to display the worklist. The screen list that appears basically shows the barcode and name information of the previously performed sample. If you want to delete the previous information, click delete all. There are two ways to add sample as shown in the table below.

How to add as a barcode	How to add via user input
	
If you enter the number of tubes in the pop-up window that appears when you click the barcode button, the rack on the sample deck is moved to automatically check the tube barcode number. When bar code reading is completed, test information is received and displayed through communication with the server.	If you enter the number of tubes in the pop-up window that appears when you click the Add count button, the number of tubes specified in the worklist is added. Double-click on the tube grid you want to test for each sample to add the test. When the input of the sample information is completed, click the ok button. Then the selection screen of the inspection process appears.

If you press the ok button on the worklist screen, the screen for selecting the inspection process appears as shown above. If you do not check the item in 'the new standard', use 'Standard CPM' of the previous test. Confirm the CPM by pressing the **'..'** button. In Select work process, it is possible to proceed by selecting the desired test among the Dispensing, Incubation, Washing, and Measurement items. When the setting is completed, press the OK Button.



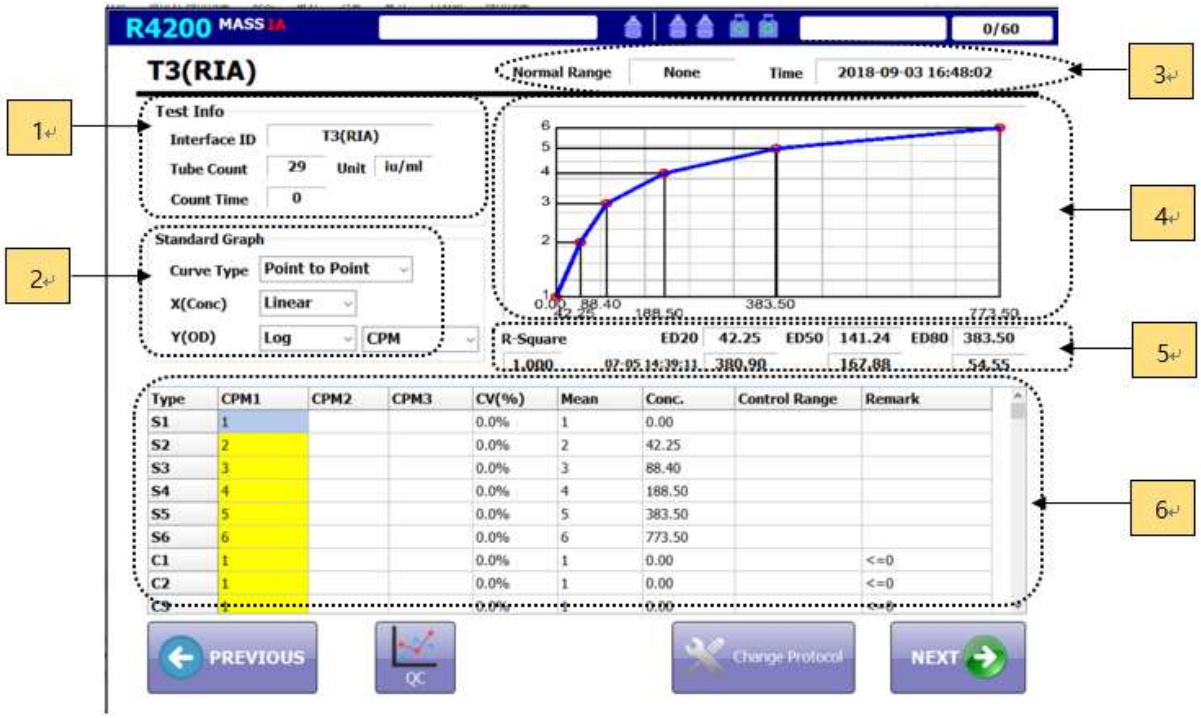
On the screen, the test layout is displayed based on the assay process selected above. Prepare the reagents as shown on the screen, and press the play button to start the test.

4.2.6 Test Results

If you click "RESULT" button on the Main view, the following list of results by date is displayed. Select a test and click the "RESULT" button to display the result screen.

No.	Designation	Functions
1	Test results calendar	- Test results calendar by date - The number of tests is displayed below the date
2	List of test results	- Result list of selected dates
3	PREVIOUS	- Go back to previous screen
4	DELETE	- Deletes the selected test result
5	RESULT	- Displays the selected test result
6	Protocol QC	- Quality Control of control and ED measurement results in accordance with Westgard rules.

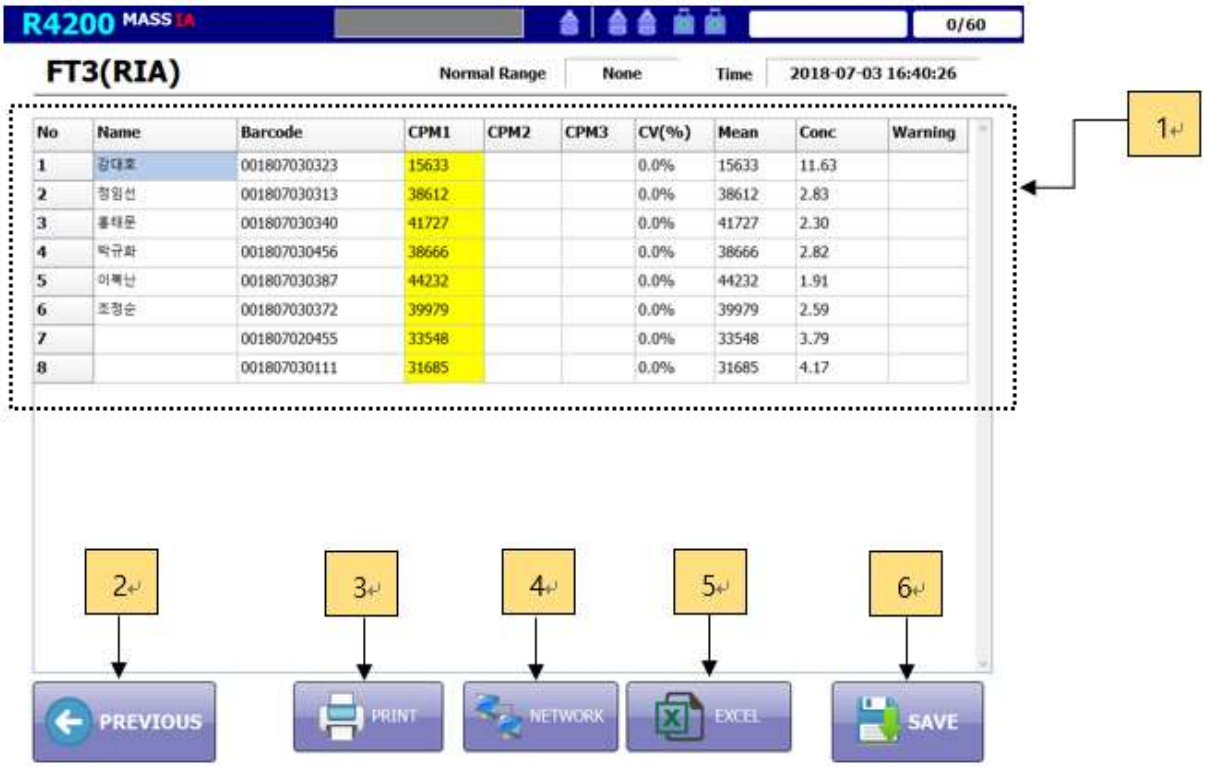
(1) Quantitative Assays



The CPM of the measured reagent is displayed, and the part marked in yellow is the data that the user can modify. When the data is modified, the concentration is calculated immediately. If the calculation fails, the phrase "Regression Fail" appears in the graph window.

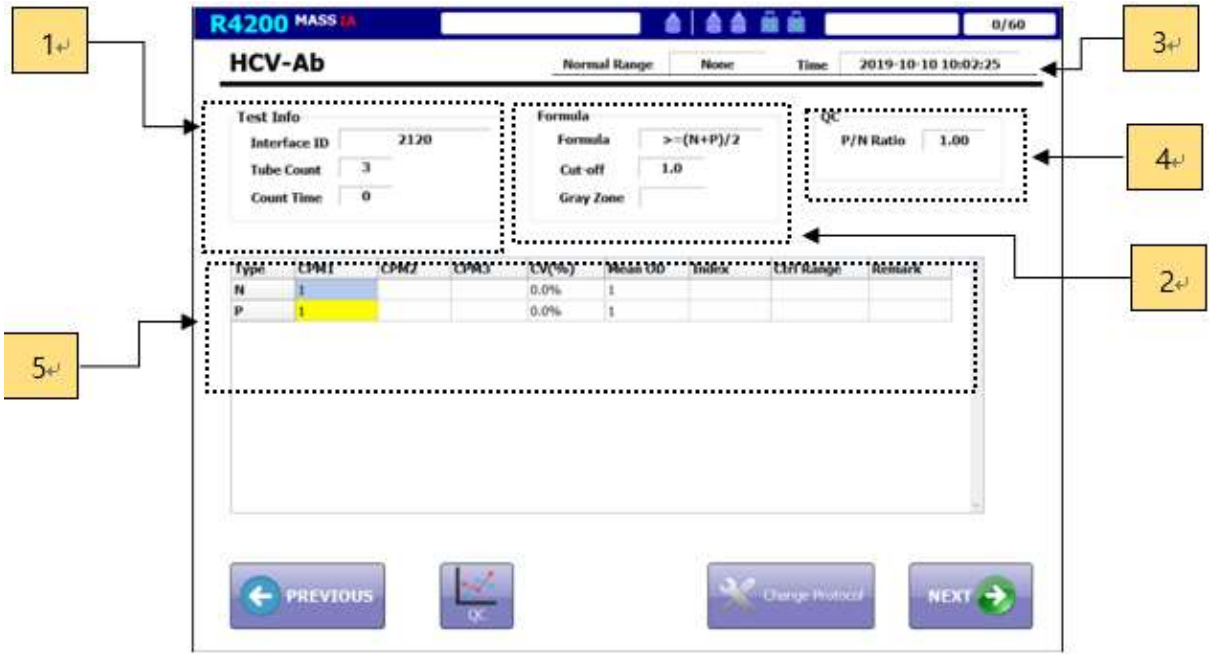
No.	Designation	Functions
1	Test Info	Interface ID, Tube Count, Unit, Count time
2	Standard Graph Info	Select the X, Y scale and graph type
3	Normal Range & Test time	The normal range of the sample and the test time are shown. This information also appears when you press the next button to confirm the sample information.
4	Standard Graph	Standard Graph
5	ED20, ED50, ED80	The currently calculated ED20, ED50 and ED80 appear, along with information from previous tests.
6	Reagent measurement list	Measurement results of standard and control are shown.

- Measurement result of sample (Quantitative Assays)



No.	Designation	Functions
1	Sample measurement result	The information of the sample is displayed. If the concentration of the sample goes out of the normal range, the warning is displayed.
2	PREVIOUS	Go back to previous screen
3	PRINT	Print the result
4	NETWORK	Send results to the network
5	EXCEL	Save the result as a CSV file
6	SAVE	Save the result

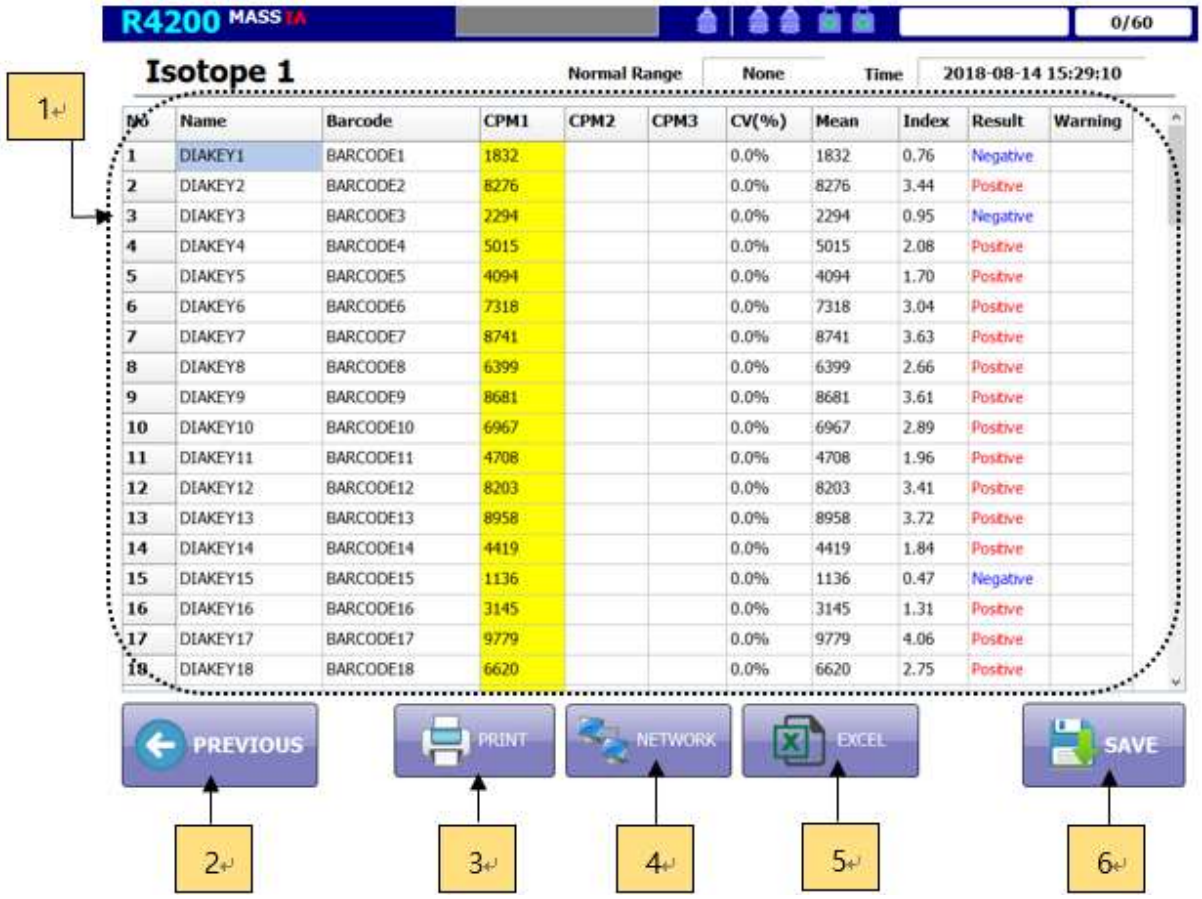
(2) Qualitative Assays



Similar to the quantitative test, the CPM of the measured reagent is displayed, and the yellow portion is the data that the user can modify. When the data is modified, the concentration is calculated immediately. If the calculation fails, "Regression Fail" appears in the graph window.

No.	Designation	Functions
1	Test Info	Interface ID, Tube count, Count time
2	Formula Info	Calculation formula of Cut off
3	Normal Range & Test time	The normal range of the sample and the test time are shown. This information also appears when you press the next button to confirm the sample information.
4	P/N Ratio	Positive-Negative ratio
5	Reagent measurement list	Measurement results of standard and control are shown.

- Measurement result of sample (Qualitative Assays)



No	Name	Barcode	CPM1	CPM2	CPM3	CV(%)	Mean	Index	Result	Warning
1	DIAKEY1	BARCODE1	1832			0.0%	1832	0.76	Negative	
2	DIAKEY2	BARCODE2	8276			0.0%	8276	3.44	Positive	
3	DIAKEY3	BARCODE3	2294			0.0%	2294	0.95	Negative	
4	DIAKEY4	BARCODE4	5015			0.0%	5015	2.08	Positive	
5	DIAKEY5	BARCODE5	4094			0.0%	4094	1.70	Positive	
6	DIAKEY6	BARCODE6	7318			0.0%	7318	3.04	Positive	
7	DIAKEY7	BARCODE7	8741			0.0%	8741	3.63	Positive	
8	DIAKEY8	BARCODE8	6399			0.0%	6399	2.66	Positive	
9	DIAKEY9	BARCODE9	8681			0.0%	8681	3.61	Positive	
10	DIAKEY10	BARCODE10	6967			0.0%	6967	2.89	Positive	
11	DIAKEY11	BARCODE11	4708			0.0%	4708	1.96	Positive	
12	DIAKEY12	BARCODE12	8203			0.0%	8203	3.41	Positive	
13	DIAKEY13	BARCODE13	8958			0.0%	8958	3.72	Positive	
14	DIAKEY14	BARCODE14	4419			0.0%	4419	1.84	Positive	
15	DIAKEY15	BARCODE15	1136			0.0%	1136	0.47	Negative	
16	DIAKEY16	BARCODE16	3145			0.0%	3145	1.31	Positive	
17	DIAKEY17	BARCODE17	9779			0.0%	9779	4.06	Positive	
18	DIAKEY18	BARCODE18	6620			0.0%	6620	2.75	Positive	

No.	Designation	Functions
1	Sample measurement result	The information of the sample is displayed. If the concentration of the sample goes out of the normal range, the warning is displayed.
2	PREVIOUS	Go back to previous screen
3	PRINT	Print the result
4	NETWORK	Send results to the network
5	EXCEL	Save the result as a CSV file
6	SAVE	Save the result

4.2.7 Config

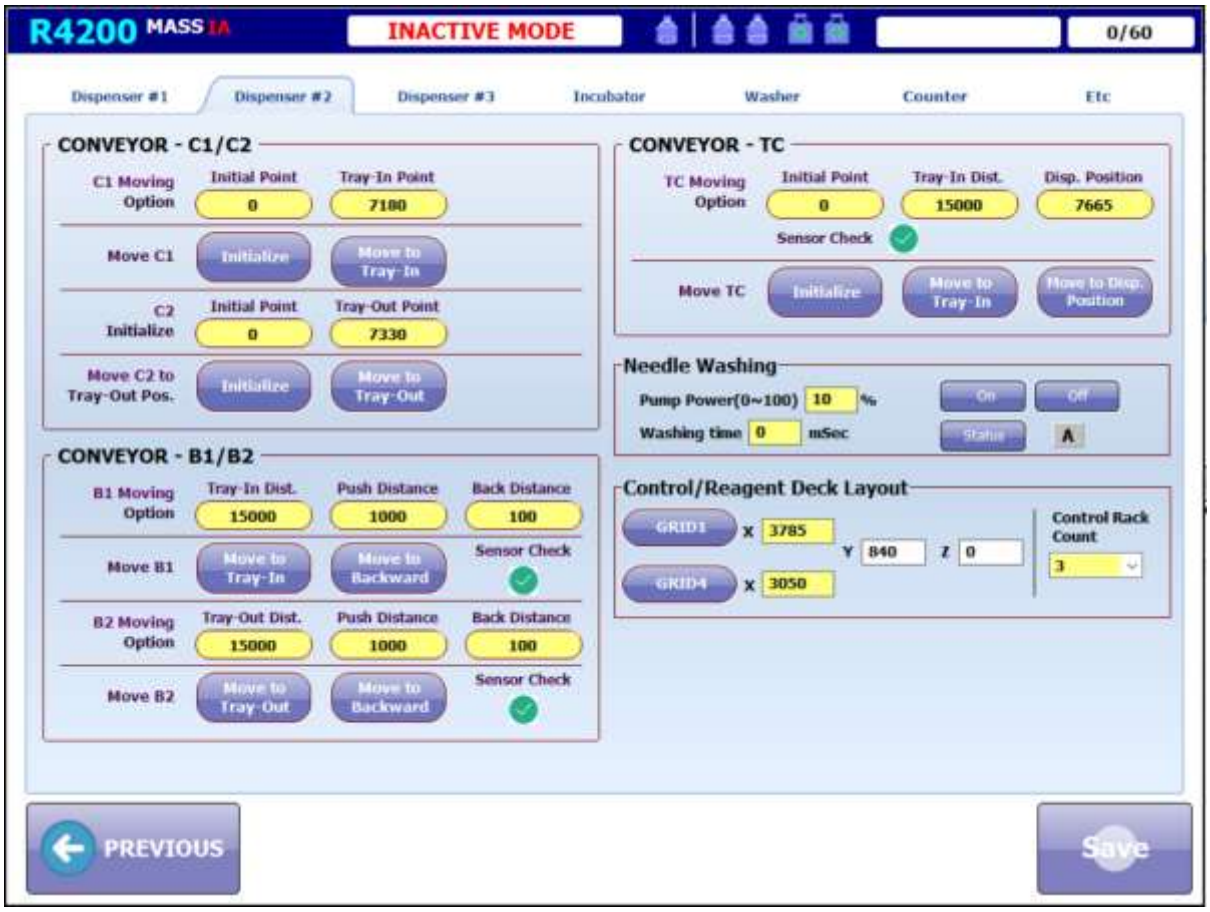
By default, if the input box is yellow, it is stored in memory as the value used in the operation of the instrument. The white input box simply inputs a value to test the operation of the equipment and is initialized when the program is restarted.

(1) Dispenser #1

No.	Designation	Functions
1	XY-AXIS	**[Needle]** **Needle Space:** Needle spacing of normal tube **[16mm tube]** **16 mm tube:** Use of 16mm tube **16 mm tube space:** Needle spacing when using 16mm tube
2	BARCODE READER	**Move Length:** Distance to finally move rack **Start Position:** The location where the barcode's first data is stored **Tube Width:** Spacing between tubes

		ON: Turn on the barcode. **OFF:** Turn off the barcode.
3	Z-AXIS	**[SELECTION NEEDLES]** Select needle to operate **[MOVEMENT]** **Move Speed:** Needle speed **Move Point:** Final position of the needle **[LEVEL SENSING]** **Sensitivity:** Needle sensitivity

(2) Dispenser #2



No.	Designation	Functions
1	CONVEYOR – C1/C2	**[C1 Moving Option]** **Initial Point**: Initial position value of CONVEYOR C1 **Tray-In Point**: Initial position of the rack

		[C2 Initialize] **Initial Point**: Initial position value of CONVEYOR C2 **Tray-In Point**: Where the rack is ejected
2	CONVEYOR –TC	**[TC Moving Option]** **Initial Point:** Initial position of the rack on the target carrier **Tray-In Dist.:** Distance the target carrier is moving **Disp. Position:** The dispensing position of the target
3	CONVEYOR –B1/B2	**[B1 Moving Option]** **Tray-In Dist.**: Distance from conveyor B1 to the tray at the initial position of the rack **Push Distance**: Push distance **Back Distance**: Backward distance **[B2 Moving Option]** **Tray-Out Dist.**: Distance discharged from rack at conveyor B1 **Push Distance**: Push distance **Back Distance**: Backward distance
4	Needle Washing	**Pump Power:** The power of the pump to operate for needle washing ※ Caution: Proceed after setting the valve of the syringe pump to bypass. **Washing Time:** Time to dispense water
5	Control/Reagent Deck Layout	**Set the position of the deck on which the reagents are placed.** GRID1 is located on the bottom right support when viewed from the front, and GRID2 is located on the support on the left. **Control Rack Count:** Set how many control racks to place

(3) Dispenser #3

번호	이름	기능
1	Aspiration/Dispensing	**Setting up suction and discharge of liquid** **Syringe Pump:** Used when running Syringe pump. **Aspiration Layer:** On inhalation, set the liquid layer inside the needle. **Dispensing Layer:** When discharging, set the dispensing speed. **Common Vial:** Set up a common vial.
2	Sample/Reagent/Washing Chamber Position	**[SAMPLE]** **Start Rack Tube/Last Tube:** Positioning of sample rack and tube **Level Start Pos/Z-Max:** Position aspiration of sample tube **[Target]** **Start Pos/Last Post:** Position of target rack, tube **Sample Disp. Position:** Set sample dispensing location **STD/CTR Disp. Position:** Dispensing position of standard and control **Reagent Disp. Position:** Set reagent dispensing position **[Control]**

		Start Pos/Last Pos: Set the position of the control. **Level Start Pos/Z-Max:** Set the aspiration position of the control. **[Reagent]** **Start Pos/Last Pos:** Set the position of the reagent. **Level Start Pos/Z-Max:** Set the aspiration position of the reagent. **[Needle Washing]** **Waste Position/Washing Position:** Set the needle waste/washing position.
3	Multi Dispensing	**Multi Dispensing Volume:** Set volume to perform multi dispensing **Multi Dispensing Tube Count:** Set the number of tubes to perform the first dispensing. **Factor:** For each multi-dispensing configuration, set the factor.

(4) Incubator

No.	Designation	Functions
1	Init	**Shaker Initialization** **Start X:** Shaking position **Open Grip Pos:** Position when the gripper is opened.

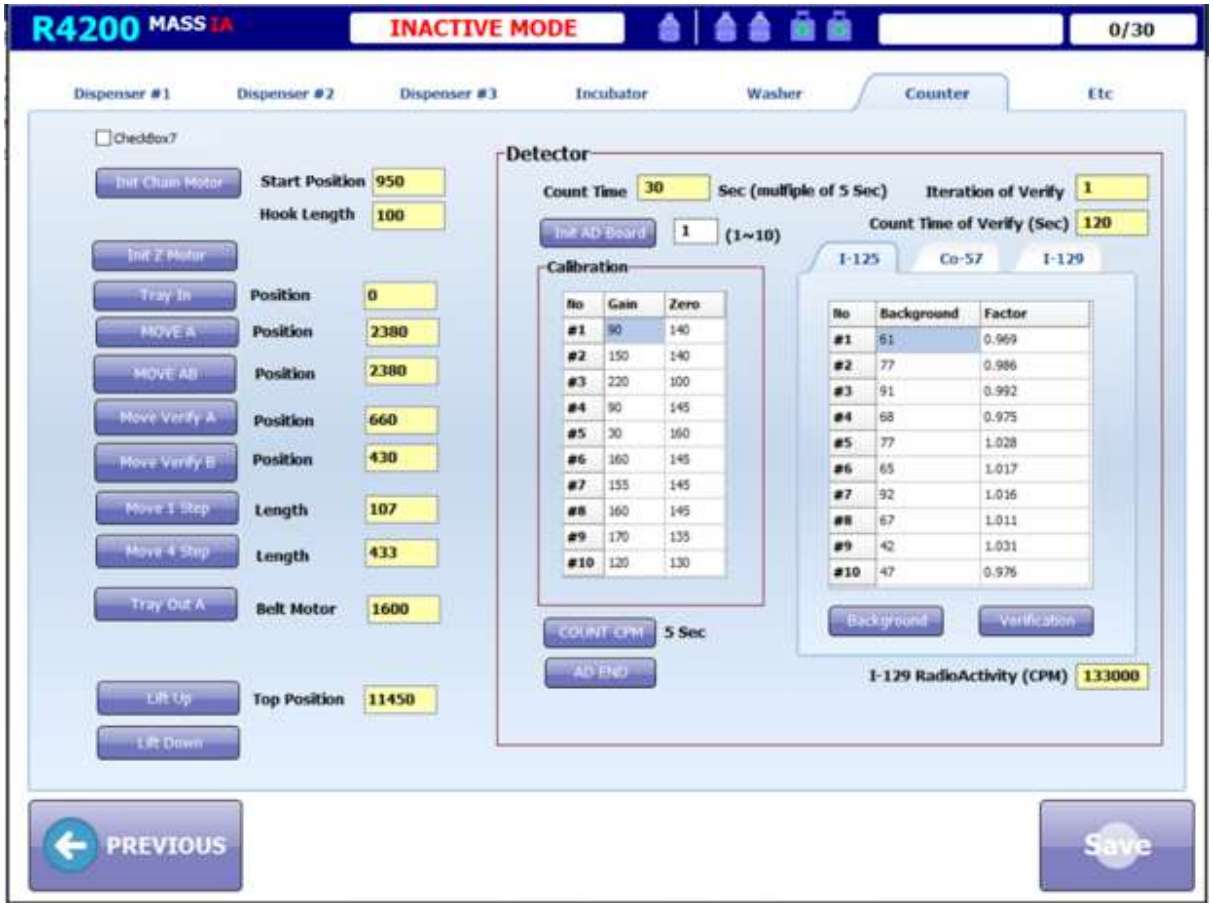
		Hold Grips Pos: Position when the gripper is closed **I :** Position of inside gripper **O :** Position of outer gripper **Rack Width:** 1 space to transfer rack
2	Get Rack	Position of holding rack where dispense is completed. The grip is taken after advancing the rack at regular intervals, indicating tis position.
3	Move Rack	Move the rack. Move by the specified number of racks.
4	Back Rack	Retract rack.
5	Put Rack	Place the rack in the washing position.
6	Put Back Rack	Leave the put rack behind and place the rack one space behind.
7	Rotate	Shake with the Stroke and RPM values.

(5) Washer

No.	Designation	Functions
1	Init	Initialize the washer.

2	Get Status	Get the washing solution and the condition of the waste water bottle.
3	Solution Type	Choose from A and B solutions.
4	Dispensing Pump Power	Set pump power (0~100 %).
5	Priming	Performance information for priming operation.
6	Washing	Performance information of the washing operation.
7	Start, Stop, Pause	Start, stop and pause washing.
8	Vacuum Pump	Start/Stop the vacuum pump.
9	Needle Waste Pump	Start/Stop the needle cleaning pump.

(6) Counter



No.	Designation	Functions
1	Init Chain Motor	Initialize the chain motor.

2	Init Z Motor	Initialize the Z-Motor
3	Tray In	Enter the rack.
4	Back Rack	Retract the rack.
5	Move A	It is used when there is only one rack to be measured. The rack is located at the right position after entering.
6	Move AB	It is used when there are two racks to be measured. The first rack is to the right and the next rack is to the left.
7	Move Verify A	Move to position for verifying the detector 1~5.
8	Move Verify B	Move to position for verifying the detector 6~10.
9	Move 1	Move by 1 tube interval.
10	Move 4	Move by 4 tube interval.
11	Tray Out A	Eject the rack. Set the interval using the belt motor when discharging.
12	Lift Up	Lift up the lift.
13	Lift Down	Lift down the lift.
14	Gain	Set the signal amplification degree (recommend: 10~250).
15	Zero	Set the zero point.
16	Background	Background measurement result by detector. (It can be set by the user)
17	Factor	Factor value by detector CPM is calculated by multiplying the value specified here.

(7) Etc

Set up the network interface.

RS-232, TCP-IP, and Network File can be specified, and this device can be bidirectional interface.

When the test is complete, you can choose whether to automatically send the results to the print and network interfaces.

The network interface is based on RS-232

5. Maintenance

5.1 Dispenser Module

- Please check regular testing of the dispenser module to determine if it is normal or faulty.

Interval	- Once a day
Purpose	- Ensure that the dispenser module needle is blocked by foreign objects or that there is no problem with the hose connection. - Check if there is a problem with the motor that drives the needles of the dispenser module.
In the case of normal	- Needles of the dispenser module carry out the cleaning function.
In the case of fault	- If you can't see fault from the motor, hose or structure of the machine with the naked eye and the needle does not emit water for internal cleaning, try to remove the foreign object with the enclosed dispenser needle cleaning wire. - If there is any abnormality in the dispensing even after attempting to remove the foreign object, request service from our staff and take appropriate measures. - If the needles does not move or produces a strange rubbing sound and does not operate normally, ask the service person for service and take appropriate action.

5.2 Shaker Module

- Apply power to the instrument and run the MESSIAH R4200 manager program to check whether the shaker module is normal or abnormal.

Interval	- Once a day
Purpose	- Check whether the shaker module can be operated normally.
In the case of normal	- After the power is connected, the position is automatically initialized after about 2 seconds. - After the device power is connected, the position is automatically initialized when the program is executed.
In the case of fault	For the following faults, contact our staff for service. - If position initialization does not proceed automatically after approx. 2 seconds after power is connected to the instrument. - When the program is running, an error screen for the shaker module appears in red text.

5.3 Washer Module

- Please check regular testing of the washer module to determine if it is normal or faulty.
- Perform the test using the washer module test rack enclosed with the instrument.
- Perform the test using the needle cleaning wire include with the instrument.

Interval	- 1 time before new protocol starts
Purpose	- Make sure that the dispensing function of the washer module is correct. - Make sure that the suction function of the washer module is correct. - Check for leaks by assembly problems or aging of the washer module. - Make sure if the washer solution is insufficient or the waste tub is full.
In case of normal	- Each tube in the washer module test rack is constantly filled with washing solution and there is almost no residue left in each tube after suction. - After running the program, the icon for washing solution or waste tank is displayed as normal on the main screen.
In case of fault	- If the washing solution does not rise up constantly in each tube of the washer module test rack and the dispensing volume is different, try to remove the foreign substance by using the cleaning wire in the needle which is less dispensed. (If you remove the foreign substance and test again, but have a problem, please contact our staff for service.) - After the suction of the washer module, if any residue remains in the washer module test rack tube, try to remove the debris by using a cleaning wire for the tube's suction needle. (If you remove the foreign substance and test again, but have a problem, please contact our staff for service.) - If there is a leak in the washer module, please contact us for service. - If the washer solution or waste tank icon is displayed in red on the main screen after executing the program and an error message appears, refill the washing solution and empty the waste tank. (If you fill the washing solution and empty the waste tank, but have problems, please contact us for service.)

5.4 Detector Module

- Check and maintain the performance of your equipment with regular verify.

Interval	- Once a week
Purpose	- Adjust the coefficient efficiency displacement between detectors. - Measure the resolution and coefficient efficiency of ^{125}I.
When the device is normal	- Difference: Within ±1.5% - Resolution: Less than 34%
When the device is abnormal	- Try Verify again - If the criterion is not satisfied continuously, take appropriate action by asking our staff for services. (Device value setting, Detector replacement, etc)

- Check the contamination level of the equipment with regular background measurements.

Interval	- At least once a day - After verify (recommend) - Every time a test item is measured)
Purpose	- Natural radioactivity and radioactive material contamination degree in the periphery of the detector are measured. - The measured background is automatically subtracted from the test result.
When the device is normal	- Less than 150cpm (Based on 60 second count)
When the device is abnormal	- Remove the contamination source by wiping the measuring part with a soft cloth using a decontamination solution, neutral detergent or alcohol. - If the criterion is not satisfied continuously, take appropriate action by asking our staff for services. (Remove contamination source, Instrument setting value adjustment, Parts replacement, etc)

5.5 Fuse

- When replacing the fuse, be sure to read and understand the following precautions.

Electric shock hazard

(1) To ensure continued protection from the risk of fire, replace it with a Fuse standard of the type and grade specified in this instrument. (Spec.: 250V, T6.3AL, 5x20mm, Type: Slow-Blow(Time delay))

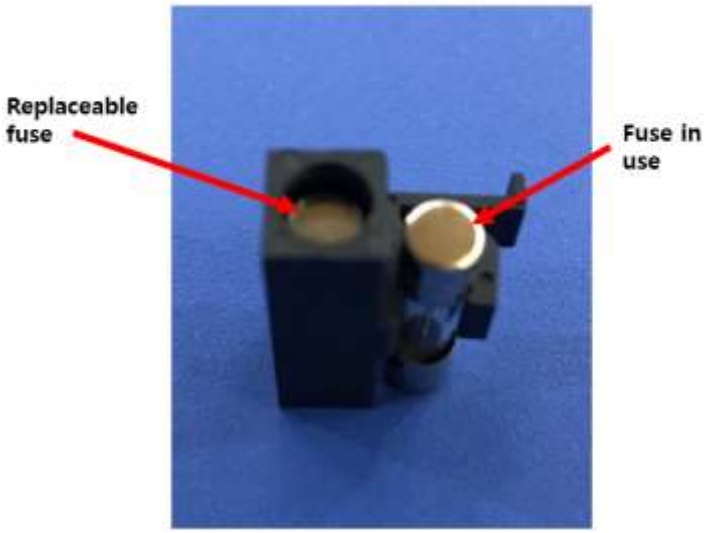
▸ It may cause electric shock, fire or malfunction.

(2) When replacing the fuse, disconnect the power cord from the instrument and disconnect it from the external power source at least one minute before operation to prevent electric shock.

▸ During operation of the high-voltage power supply, the equipment may be subject to severe electric shock, which could result in physical injury or death.

- This instrument uses one overcurrent fuse and has one replaceable fuse.

(Spec.: 250V, T6.3AL, 5x20mm, Type: Slow-Blow(Time Delay))



Fuse inserted in fuse cover

- Replacement

① Turn off the power at the rear of the MESSIAH r4200 and disconnect the power cord.

② Insert a small flat head screwdriver into the bottom of the power cord connection part and push it slightly in the direction of the arrow as shown below.

Power cord connection at the back of the device

③ Take out the fuse cover and check the condition of the fuse.

④ Remove the fuse to be removed from the fuse cover and replace it with a new fuse of 250V, T6.3AL, 5x20mm size.

Fuse (250V, T6.3AL, 5x20mm)

⑤ Put the fuse cover back onto the power cord connection and close the fuse cover.

⑥ Press the fuse cover back to the original position.

⑦ Connect the power cord of the device.

5.6 Storage method

1) Storage condition

- Temperature: 0℃ ~ 40℃
- Humidity: 15% R.H ~ 95% R.H.
- Pressure: 70 ~ 106 kPa

2) Carrying condition

- Temperature: 0℃ ~ 40℃
- Humidity: 15% R.H ~ 95% R.H.

6. Recommended cycle for replacement and maintenance of each module core part

6.1 Dispenser Module

System	Interval	Action	Note
4-Needles	6 Month	Replace or Cleaning	
Pipetting tubing	6 Month	Replace or Rinse	
Internal 4 way tubing	6 Month	Replace or Rinse	
Internal 4 way terminal block	12 Month	Rinse	
System liquid supply tubing	12 Month	Replace or Rinse	
1mL tubes & tips	12 Month	Replace	
3way valves	6 Month	Replace	
X, Y axis belt of needle arm	6 Month	Maintenance	
Pulley of X, Y axis belt	6 Month	Maintenance	
Washing bath	6 Month	Cleaning	

6.2 Shaker Module

System	Interval	Action	Note
Screw shaft	6 Month	Spreadgrease & Maintenance	
Rubber pad	12 Month	Check, Replace	
Checking bolt locks	6 Month	Maintenance	
Rack holder	12 Month	Check	
Rack holder legs	12 Month	Check	

6.3 Washer Module

System	Interval	Action	Note
Bundle of needles	1 Month	Cleaning	
	12 Month	Check, Replace	
Water supply tubing	3 Month	Rinse	
	12 Month	Check, Replace	
Suction tubing	12 Month	Replace	
Priming bath	3 Month	Cleaning	

6.4 Counter Module

System	Interval	Action	Note
Detector	1 Month	Verify	
Shield tube	3 Month	Check, Replace	
Elevator screw shaft	12 Month	Cleaning & Spreadgrease	
Chain	6 Month	Check tensioner & Check stain	

7. Trouble shooting

Error	Solutions
Power does not turn on.	1. Ensure that the power cord is connected to external power. 2. Make sure the power cord is plugged into the appliance. 3. Make sure that the power switch of the equipment is switched off. 4. If you have checked all of the above but the power does not come on, please ask for a check.
Power is on, but mechanical fricatives or loud noises are heard.	1. After the power is off, check that there is foreign substance in the moving part of the equipment. 2. If you can't find or remove the foreign object, but you have a problem with it, please ask for inspection.
It suddenly stops running.	1. Make sure the power is connected properly. 2. Make sure the power switch is pressed incorrectly. 3. Make sure you accidentally pressed the 'pause' or 'stop' button. 4. If you have checked all of the above and it still does not work, please request a check.
It smells of burning in the system.	1. Disconnect the power cord and immediately disconnect external power. 2. Please ask for inspection.
You receive an error message that includes the word 'Level sense'.	1. Make sure that you did not use the wrong protocol. 2. After setting up the protocol, make sure that the sample, control, tracer, etc actually displayed on the main screen are arranged equally. 2-1. If it is deployed differently, place the reagent or sample as set on the main screen and press the retry button. 3. Check that the amount of reagent or sample placed is insufficient or empty. 3-1. If the amount of reagent or sample is insufficient or empty, fill it and press the retry button. 4. If you have checked all of the above and it still does not work, please ask for a check.
You receive an error message that includes the word 'Location' or 'deck'.	1. Ensure that the sample rack or target rack is well seated in the belt and guide. 2. Make sure that the sample rack or target rack is moving well with the belt.

	3. As the sample rack or target rack moves, check that the switch that detects rack loading is pressed.(It is normal to be pressed) 4. If you can't solve the problem by checking the above procedure, please request a check.
When running pc program, you get an error message 'Network connection fail'.	1. Make sure that the power is on in the instrument. 2. Make sure that the LAN cable on the back of the pc and the device is well connected. 3. If you have checked all of the above and it still does not work, please request a check.
If other error message appears	1. Please ask for inspection.

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