

Contrast Delivery System

Dual Shot Alpha Operation Manual

Alpha

Dual Shot Alpha

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1. Introduction

Thank you for purchasing our Contrast Delivery System Dual Shot.

- Please read this Operation Manual thoroughly before using this system in order to use it properly.
- For easy reference for users, please keep this Operation Manual in a convenient place after reading.
- Please observe cautions given herein including important items to prevent any hazard to the user of this system or others and damage to any properties that may arise.

Marking

- Markings used in this Operation Manual and their description are as follows.













	Danger	This is used when incorrect operation may directly lead to death or serious injury, damage of the equipment and occurrence of fire.
	Warning	This is used when incorrect operation may indirectly lead to death or serious injury, damage of the equipment and occurrence of fire.
	Caution	This is used when incorrect operation may cause injury or physical damage.

Dual Shot Alpha

Introduction

















■ Instruction symbols

The following symbols are used in the “Contrast Delivery System/Dual Shot”.

Symbol	Description
	Beware of getting your fingers pinched.
	Caution! Read the description of Appendix.
	Indicates to avoid the direct sunlight.
	Indicates that wet by rain is prohibited.
	Indicates cautions for handling.
	Indicates not to turn over.
	Indicates the temperature condition.
	Indicates the production date.
	Indicates that the power of the main unit is ON.
	Indicates that the power of the main unit is OFF.
	Indicates that the power of the console is ON/OFF.
	Indicates a protective earth terminal.

Dual Shot

Introduction

Symbol	Description
	Indicates that the current is alternate.
	Indicates hazardous voltages.
	Indicates start of injection.
	Indicates stop of injection.
	Indicates conformity to the CF type.
	Forward (Fast)
	Forward (Middle)
	Forward (Slow)
	Backward (Fast)
	Backward (Middle)
	Backward (Slow)
	Indicates conformity to the European Medical Device Standards.
	The TUV Rheinland solution for North America - testing and certification of your electro-medical devices according to U.S. and Canadian standards
	Indicates a list of memory for each injection mode.
	Switches over the injection screen mode.
	Indicates a list of results.

2.Before Use



Warning

This system is aimed for a medical practitioner to inject contrast medium in radiography.

Do not use this system for any purpose other than the intended such as injection of drugs, chemical therapy and use with connected external equipment other than specified by us. We shall not be liable for any malfunction of this system and the followings resulting from the use other than the intended.

- Any malfunction and/or damage of this system resulting from not adhering to the warnings and/or operating instructions specified in this Operation Manual.
- Any malfunction and/or damage of this system resulting from the deviation of operating environment specified in this Operation Manual, such as power source, installation condition, etc.
- Any malfunction and/or damage of this system resulting from any natural disaster, such as fire, earthquake, flood and lightening.
- Any malfunction, damage and accidents of this system resulting from other company's products.

Any future modification may be made to this Operation Manual without any prior notice.

Multiple Portable Socket-Outlets(MPSO) should not be used for this equipment.

Please contact us if you need clarification or if you notice any error or concerns in this Operation Manual. (Refer to the end of this Manual.)

This system complies with **EN 60601-1-2:2001**. This system uses high-frequency energy for the internal function only and does not provide it to the patients. However, note that even small amount of leakage of the high-frequency energy may damage the highly-sensitive equipment.



Warning

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions:

- (1) this device may not cause harmful interference, and
- (2) this device must accept any interference received, including interference that may cause undesired operation.

Caution:

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

If used according to the instructions, this radio system meets the basic requirements of article 3 and the remaining applicable conditions of the R&TTE directive (1995/5/EG) of March 1999.

Equipment Classification according to ETSI EN 300 330: Class 2.

3. Cautions in Use (for Safety)

- Please read this Operation Manual thoroughly before using this system in order to use it properly.
- For easy reference for users, please keep this Operation Manual in a convenient place after reading it.



3-1. This system must not be used by anyone other than the qualified and trained person.

3-2. When installing this system, pay attention to the following.

- 1) Install the system in the area where fluid does not splash.
- 2) Install the system in the dried and light resistant area within the acceptable ranges of atmospheric pressure, temperature and humidity.
- 3) Refrain from dusty place or the place in the air containing salinity or sulfur.
- 4) Do not install the system in the area where chemicals are stored or gases may be generated.
- 5) Use this system at the stable condition, avoiding inclination, oscillating and shock.
- 6) Note that the voltage, frequency and current capacity of the power supply are in the range of tolerance.
- 7) Connect the earth properly.

3-3. Care must be taken to the following prior to operation.

- 1) Be well aware that the combined use with other additional devices misguides an exact diagnosis, or has a possibility of causing the dangerous situation.
- 2) Make sure to use the disposables (syringes, tubes, winged needles, etc.) specifically provided for this system.

**3-4. Pay attention to the following while operating this system.**

- 1) Contrast medium and medicine must be injected according to the prescribed usage and dosage.
Refer to the instruction manual of the contrast medium if necessary.
- 2) Condition of the whole system and the patient must be watched continuously to ascertain that they are in the good state.
- 3) If any unusual conditions are detected in the system and/or of the patients, appropriate actions such as ensuring safety of the patient, stopping the system, etc. must be taken.
- 4) Do not use the devices (electric knife, telemeter for medical use, and cellular phone) that generate the high-frequency wave at the place near this system.
(It might cause the malfunction of the system.)

3-5. After operating this system, follow the procedures described below.

- 1) Put back the switches and dials, etc. to the original state according to the predefined procedures, and turn the main power off.
- 2) Do not forcibly take off cables, etc. from the outlet by grasping the cable itself and so forth. The cable may be damaged and it may become the cause of a fire and/or electrification.
- 3) For the place to be stored, note the precautions described in the above 1) to 4) in 3-2.
- 4) Keep the accessories, cords, and terminals clean.
- 5) The system should be thoroughly cleaned so that it may function without causing any problems in the next operation.

3-6. When the system gets trouble, leave the system as it is and ask the professional person for repair.**3-7. Do not remodel the system.**



3-8. Maintenance and checkup

- 1) The system and its parts should be inspected once a year periodically.
- 2) When the system is operated after a long unused period of time, make sure before operation that it functions properly and safely.

3-9. Others

- 1) There is a risk of possible fire or electrical shock if usage is continued under any abnormal condition, such as but not limited to smoke or unusual smell/noise. Immediately turn off the power switch of the unit and unplug the power cord from the outlet. Please make sure there is no more smoke before contacting us for repair.
- 2) Do not unplug the power cord with wet hands. It could cause electrical shock.
- 3) Never remove the housing. Electrical shock may occur if you touch the inside.
- 4) Do not fabricate, forcefully bend/twist/pull, apply heat to the power cord, put anything heavy on the power cord or place the unit on top of the power cord. If the cord is damaged, please have it replaced. It could cause fire or electric shock.
- 5) Before use, ensure the status of a stopcock of the injection route surely. Injection with a stopper closed may damage the syringe.
- 6) Pressure limit should not exceed the tolerable pressure* for the syringe and injection route.
* For tolerable pressure limit for the syringe and injection circuit, see the Operation Manuals for the syringe and injection route.
- 7) In the condition or injection route set for extreme pressure increase, pressure may transiently exceed the pressure limit.
- 8) For prevention of accidents (injection of air, reuse of a syringe, etc.) to be caused by forgetting replacement of a used syringe, make sure that a backward key is operated after the syringe is removed.
- 9) If contrast medium or physiological saline is leaked into the system, turn off the power switch of the system and remove a power code plug from an outlet, and call our support center. Continued use at such condition may cause fire or electric shock.

Appropriate Consumables

This system is used to inject the contrast medium at a set flow rate for a CT diagnosis.

- Do not use this unit for any purpose other than the above.
- There may be strong pressure during the injecting process which is caused by the high viscosity of the contrast media. Please use a syringe, a lock-type extension tube and a needle that have the appropriate pressure endurances.

Proper syringes

Product name	Type
Nemoto Disposable Syringe	100mL
	200mL
	50mL

*1 Nemoto Disposable Syringe 50 mL is exclusive for Head B.

*2 A 50 mL syringe adaptor (option) is needed.

4. Main Specifications

Electric Rating

	Main Unit	Head	Console
Voltage rating	120/230 V 50/60Hz		
Power output or consumption	MAX 150 V A		
Type of protection	Class I		
Level of protection	Type CF		
Splash-proof construction	—	Drip-proof	—
Classification by operation mode	Continuous operation		
AP・APG support	Not supported		

Safety Device

Error Message and Halt

ERR1 - 90

Halt after an error message is displayed

Buzzer

Halt after buzzer goes off

Fuse

Main unit

5A250V (For 120V region)

2.5A250V(For 230V region)

HEAD

3.2A250V (Built into the head)

Installation Condition

When not operatedTransportation and storage
 Temperature: -40 °C - 70 °C
 Humidity: 10% - 100%
 Atmospheric pressure: 700hPa - 1060hPa

When operatedThe system may not give the performance as specified
 in the specification if it is used under the conditions
 other than below.
 Temperature: 10 °C - 40 °C
 Humidity: 30% - 75%

Dual Shot Alpha**Main Specifications**

Atmospheric pressure: 700hPa - 1060hPa

Programming Range**Volume Programming Range**

Nemoto disposable syringe 200mL	1 - 200mL
Nemoto disposable syringe 100mL	1 - 100mL

Flow Rate Programming Range

A Head	
Nemoto disposable syringe 200mL	0.1mL - 10mL/sec
Nemoto disposable syringe 100mL	0.1mL - 10mL/sec
B Head	
Nemoto disposable syringe 50mL	0.1mL - 10mL/sec

Pressure Limiter Programming Range

Nemoto disposable syringe 200mL	1 - 200psi (15kg/cm ² 1372kPa)
Nemoto disposable syringe 100mL	1 - 300psi (21kg/cm ² 2058kPa)

Scan Time

Range	0 - 300sec
-------	------------

Interval Time

Range	0 - 300sec
-------	------------

Delay Time

Range	0 - 300sec
-------	------------

5. Composition of the System

5-1. Composition of the System

- 1) Head (A ceiling mounting type is an option at shipment.)
- 2) Main Unit
- 3) Console
- 4) A set of stand

A set of floor stand (a standard set at shipment)

Note) A stand set is not included in the type for ceiling mounting.

- 5) Accessories

Main unit power cable

Console cable

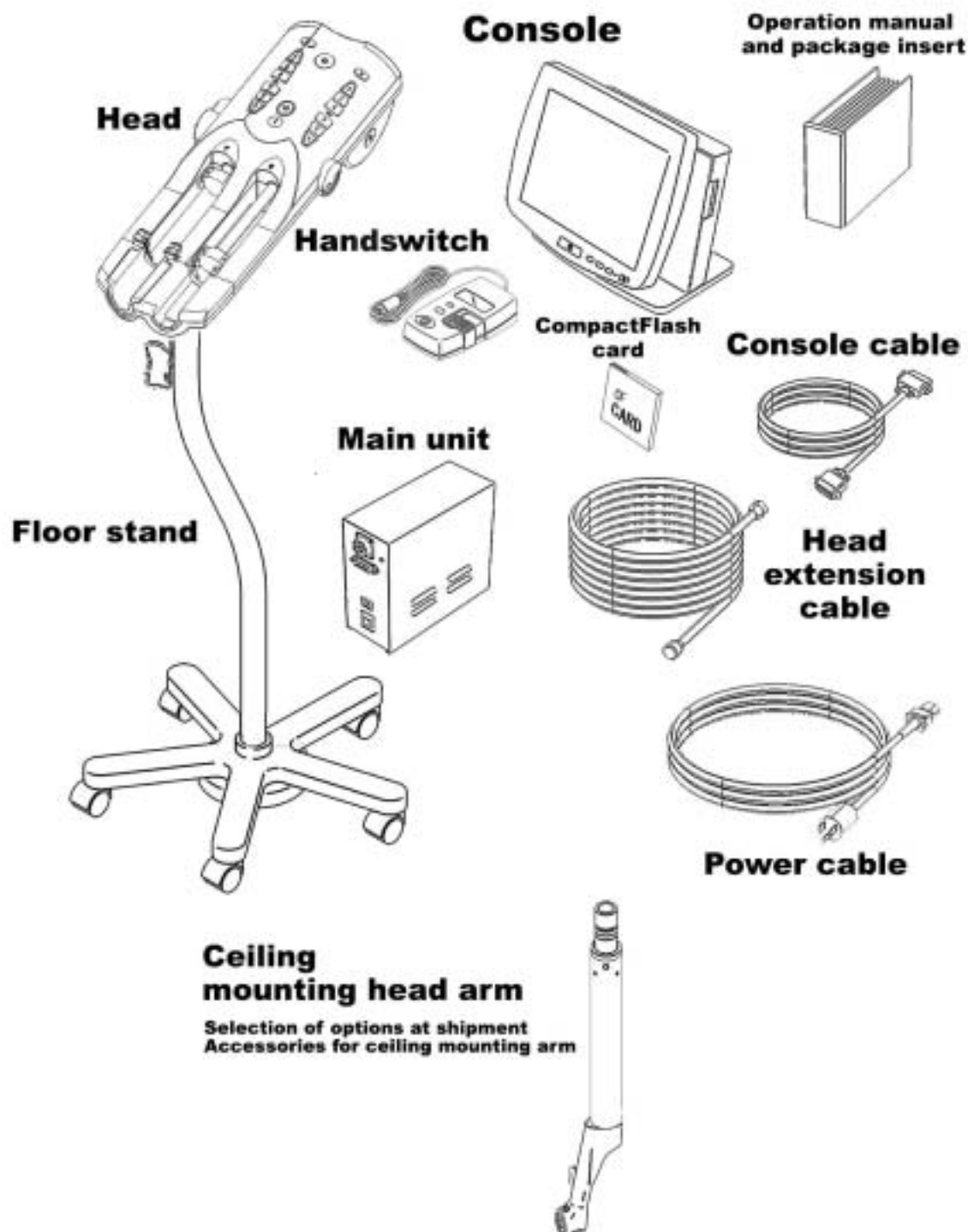
Head extension cable

Handswitch

CompactFlash card

Ceiling mounting arm (Option)

<Composition Articles>



5-2. Installation Procedure

1. Assemble the Stand and mount the Head onto it.



**Screw bolts securely when assembling a stand, etc.
It is dangerous when the bolts are loosen.**

2. Connect the Head to the Main Unit with the Head Cable.
3. Connect the Console to the Main Unit with the Console Cable.
4. Connect the Handswitch to the Console.
5. Connect the power cable to the Main Unit last, and then, insert the power plug into the outlet.

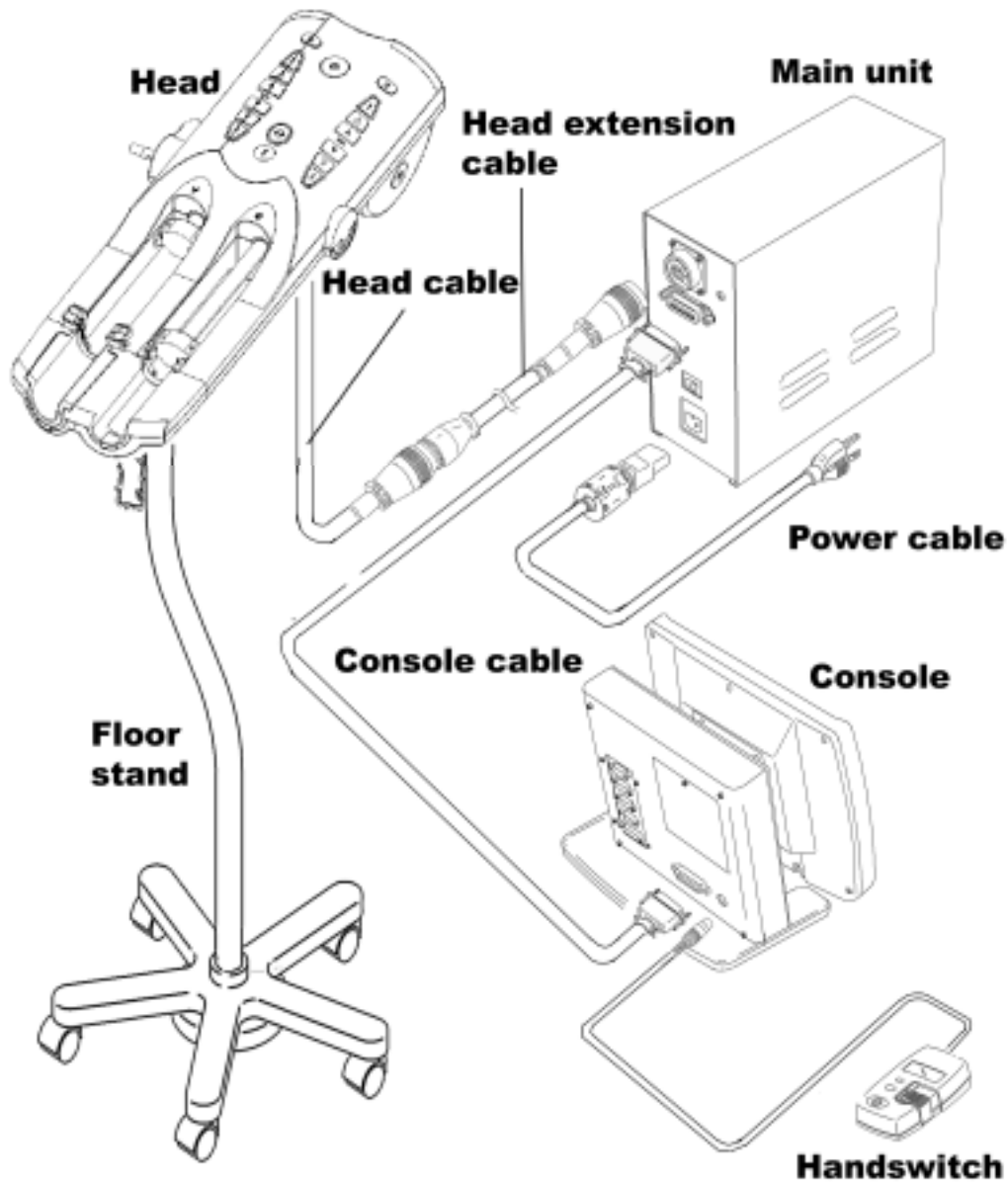


**Connect each connector correctly always checking the
connection diagram. It may induce damage in future.**



**When the usable outlet has 2 pins, use a 2 pin/3pin
adapter for the power connector and make earth
connection.**

5-3. Connection Diagram

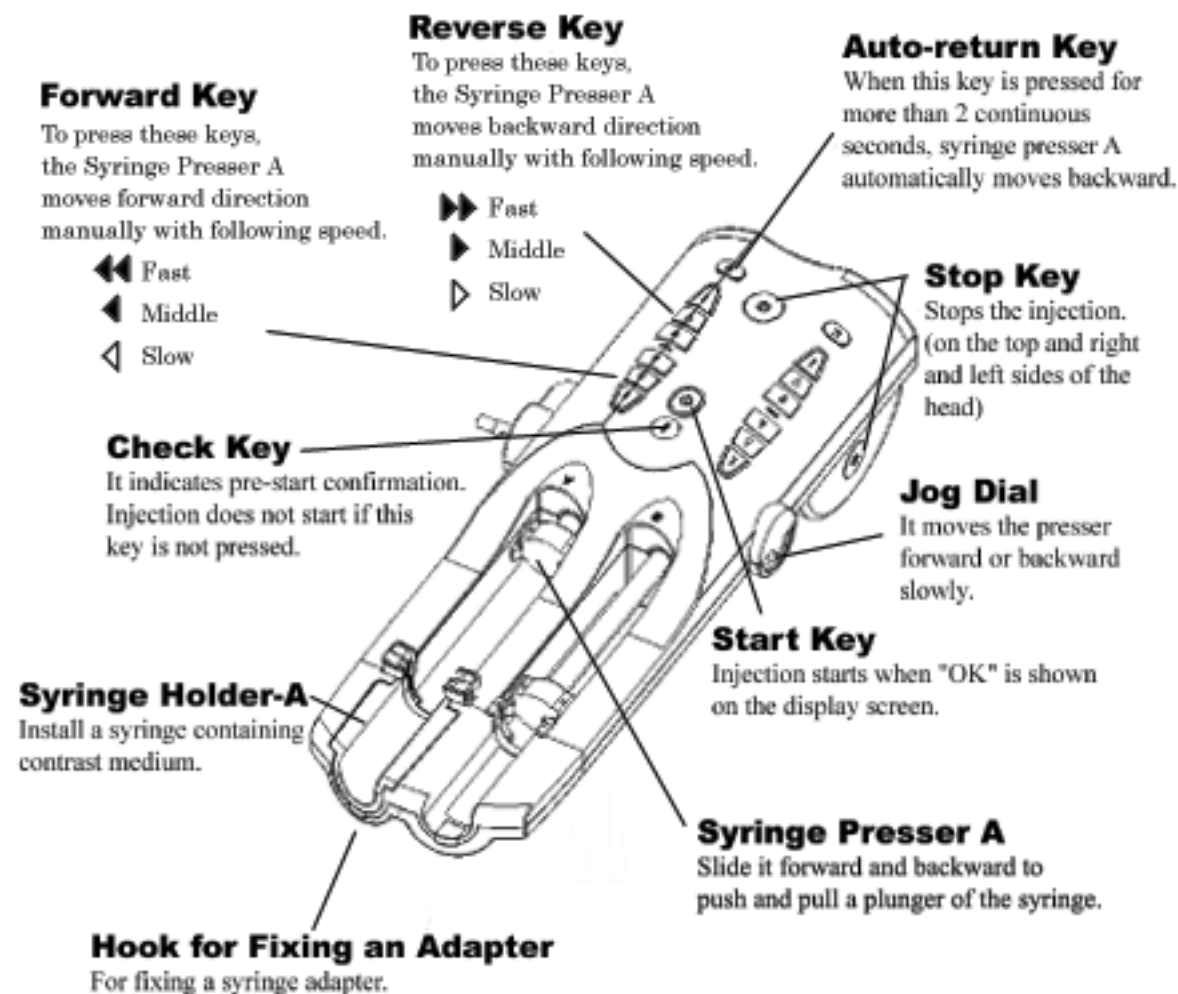


Never connect the connectors to any products other than those designated by us.

6. Names of Individual Parts

6-1. Head

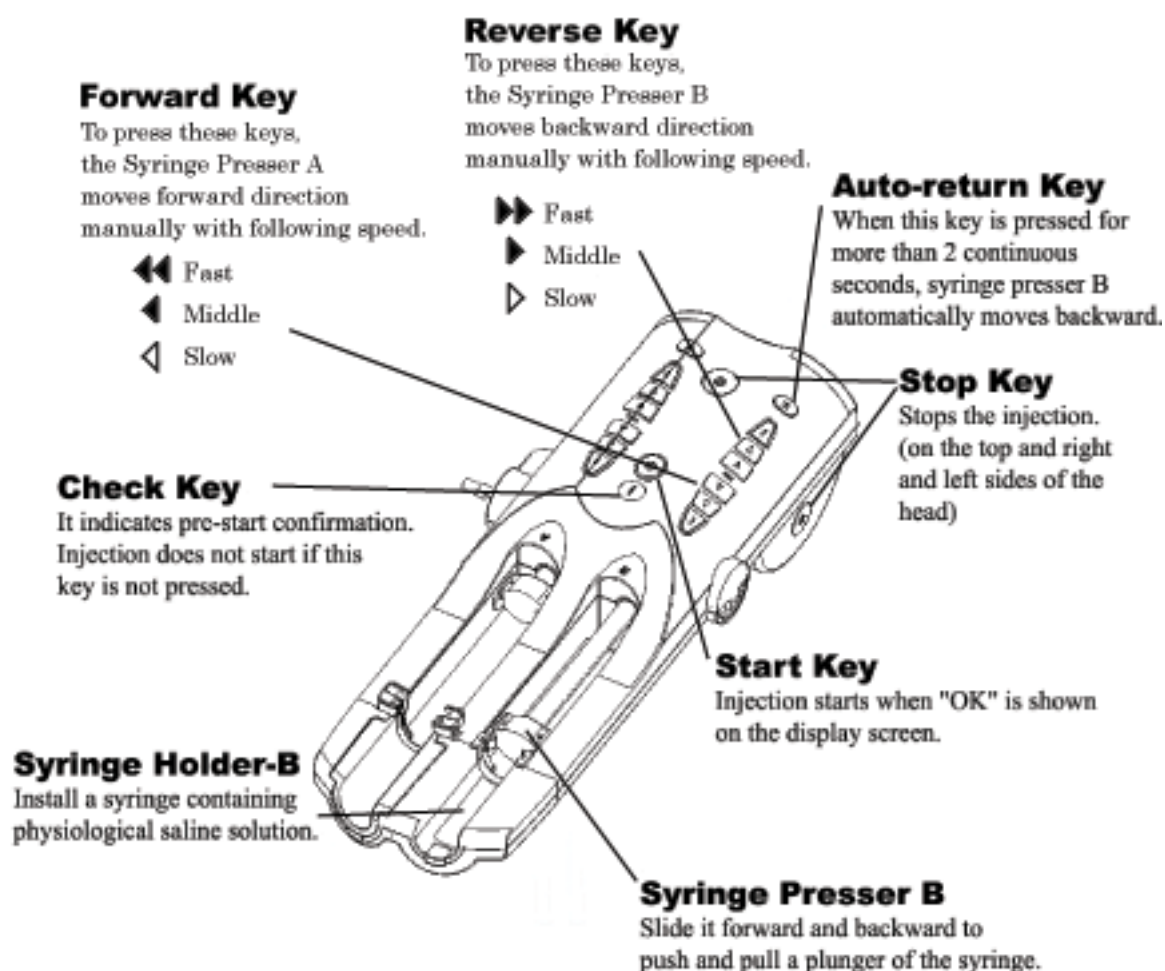
<A Head>



Dual Shot Alpha

Names of Individual Parts

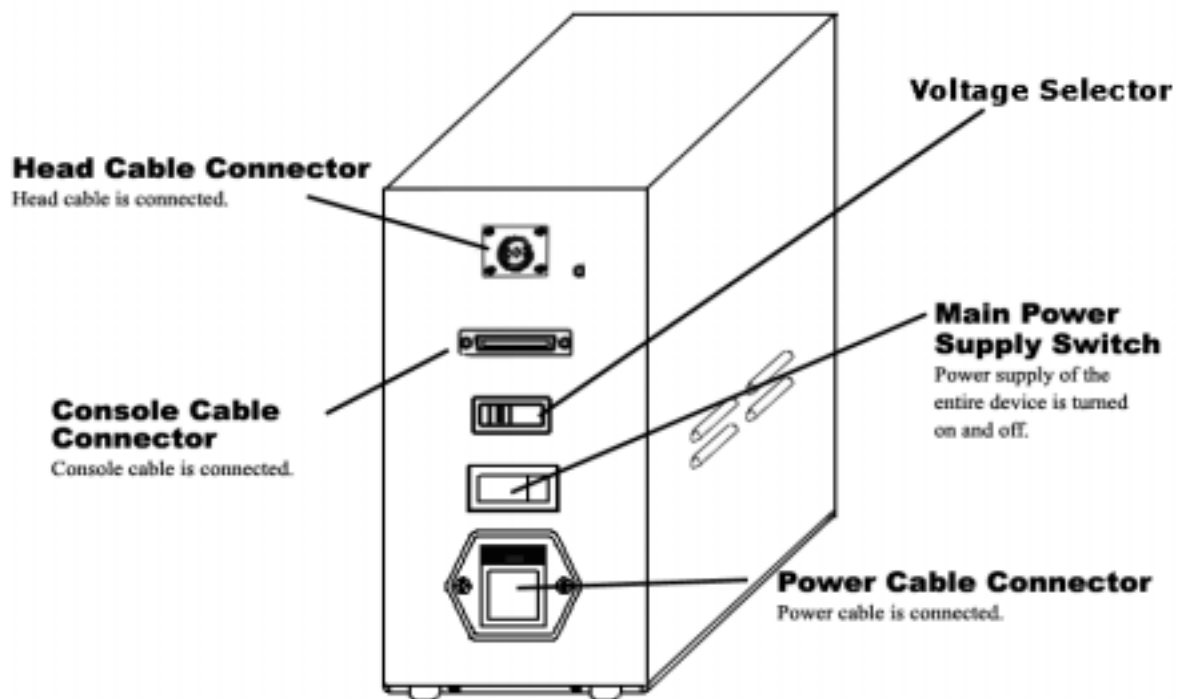
<B Head>



Dual Shot Alpha

Names of Individual Parts

6-2. Main Unit

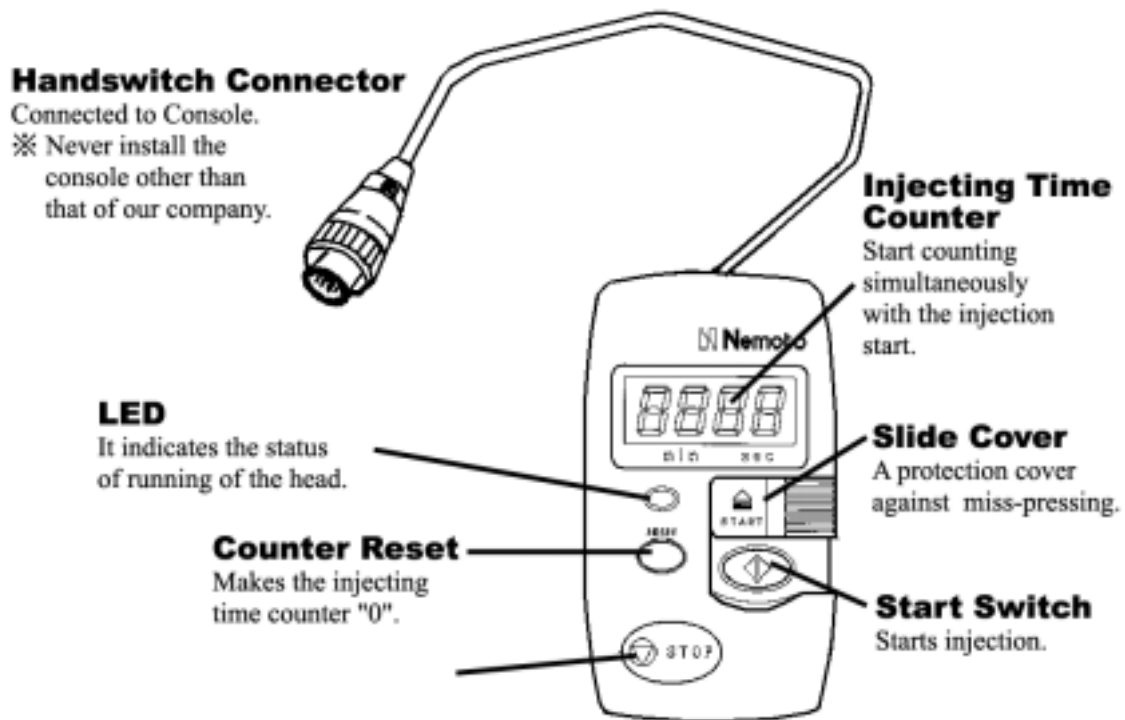


※ Never connect the connectors to any products other than those designated by us.

Dual Shot Alpha

Names of Individual Parts

6-3. Handswitch



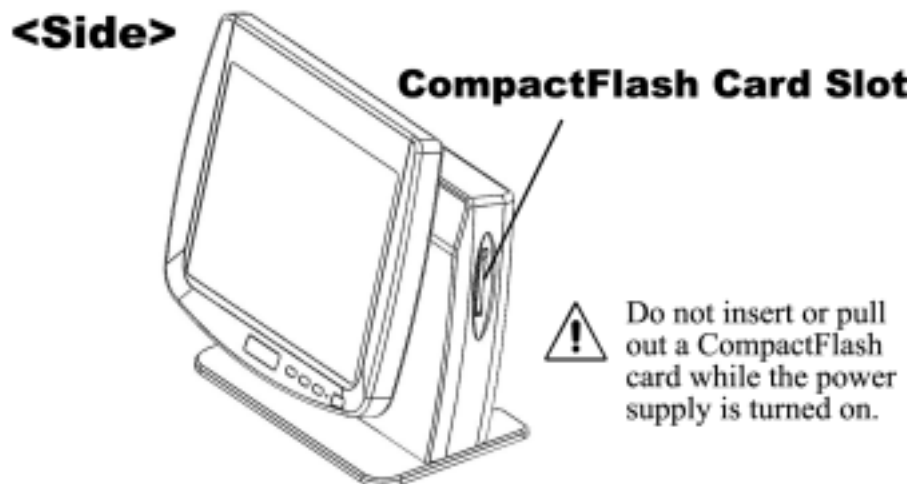
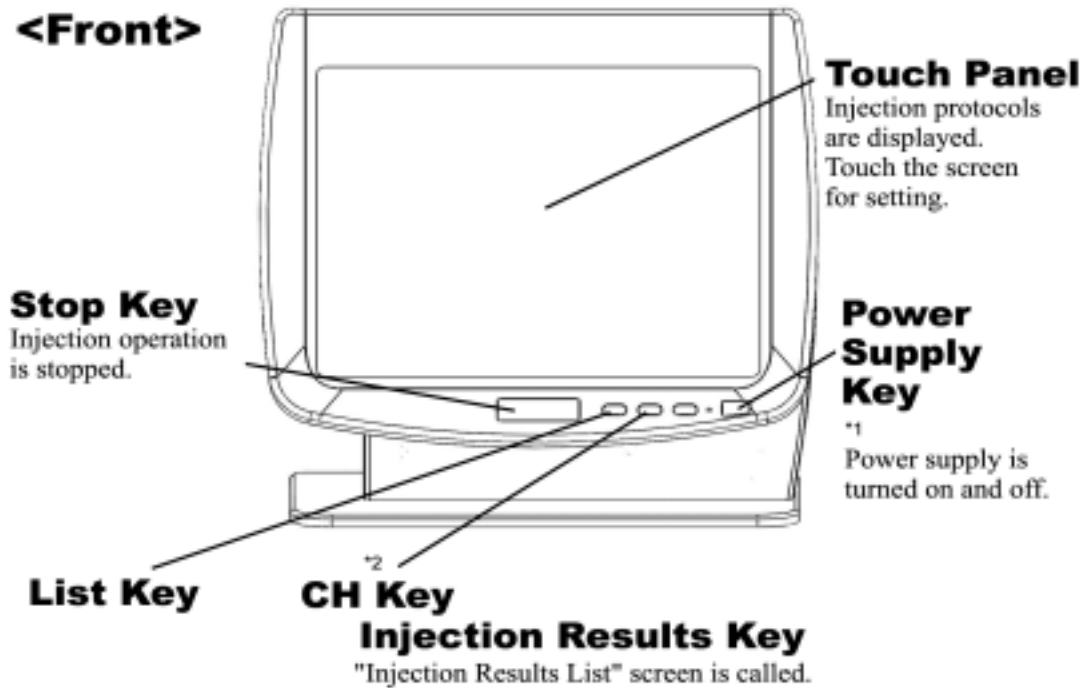
■ LED

- Standby lights up
- During injecting..... blinks
- During delay/interval..... blinks
- Injection termination (not operating)..... lights out

Dual Shot Alpha

Names of Individual Parts

6-4. Console



- *1 The power doesn't enter if there is no main power supply of the main unit. Push the POWER key surely when you turn off the power.
- *2 Push the CH key firmly to switch the injection screen.

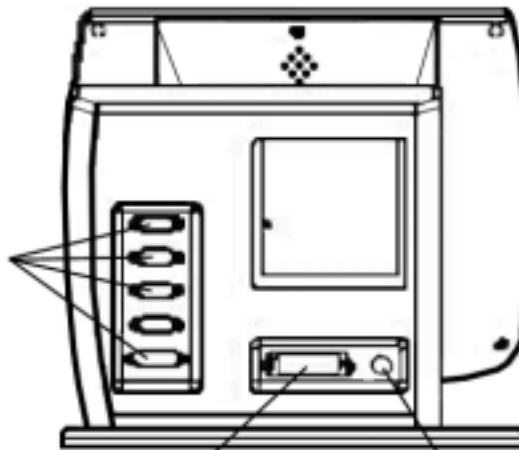
Dual Shot Alpha

Names of Individual Parts

<Back>

Connector for RS-232-C

It connects with the external device specified by us. ※

**Main Unit Connector**

It connects with a main unit. ※

Handswitch Connector

It connects with a Handswitch. ※

※ Never connect the connectors to any products other than those designated by us.

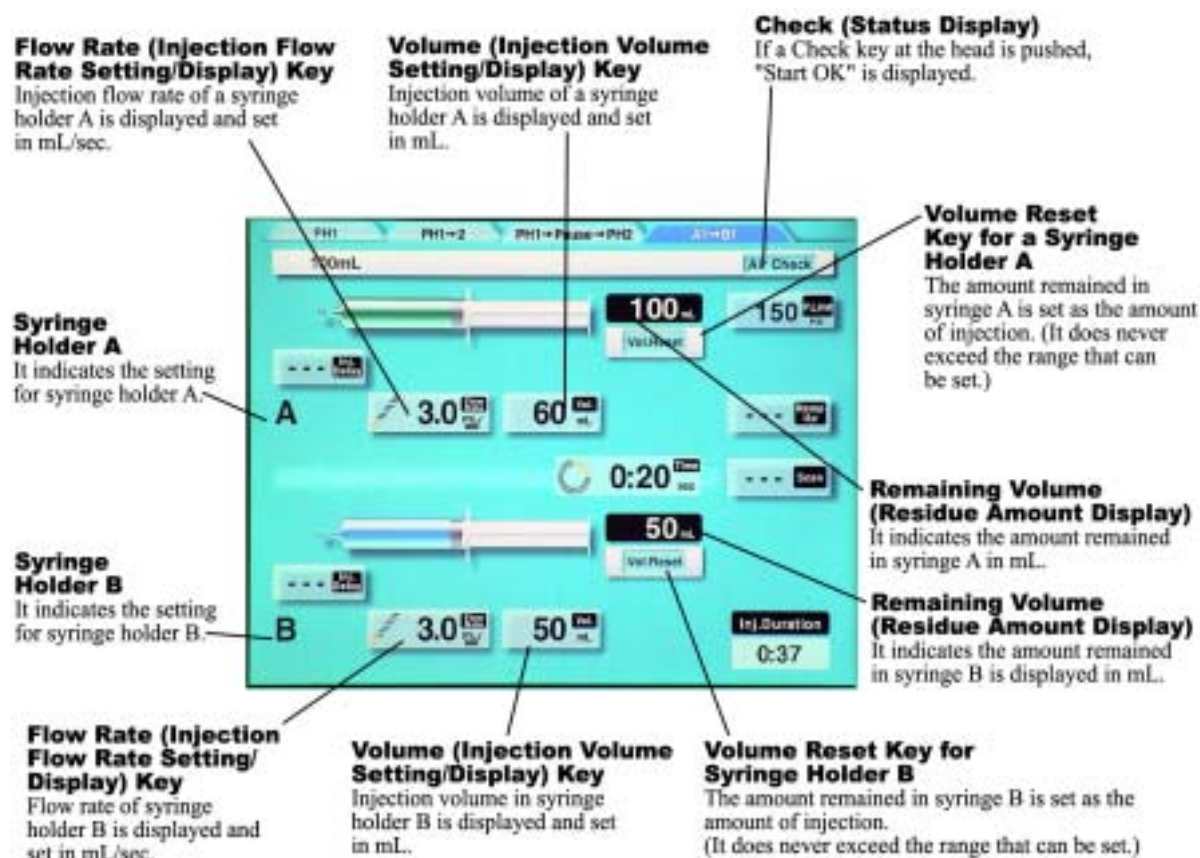
Dual Shot Alpha

Names of Individual Parts

Display

<Setting Screen 1>

It explains each part as an example of A1 → B1.

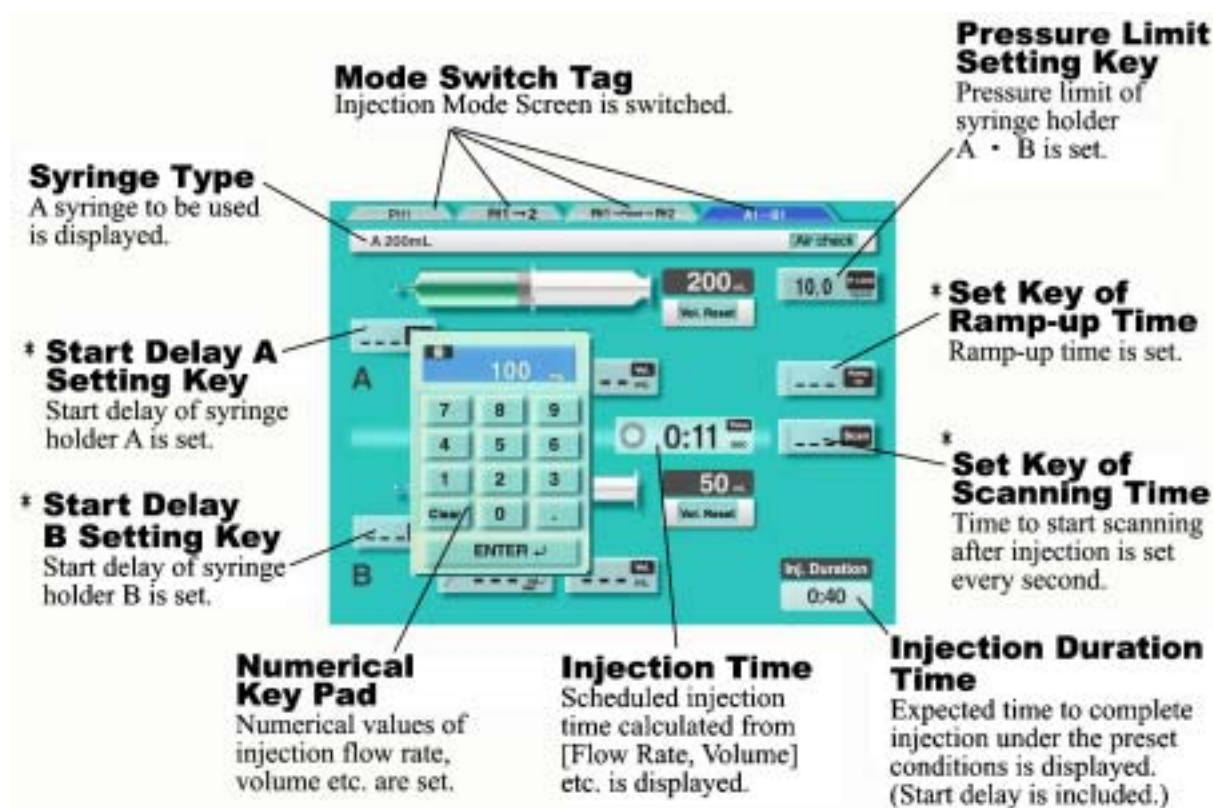


Dual Shot Alpha

Names of Individual Parts

<Set Screen 2>

It explains each part as an example of A1 → B1.

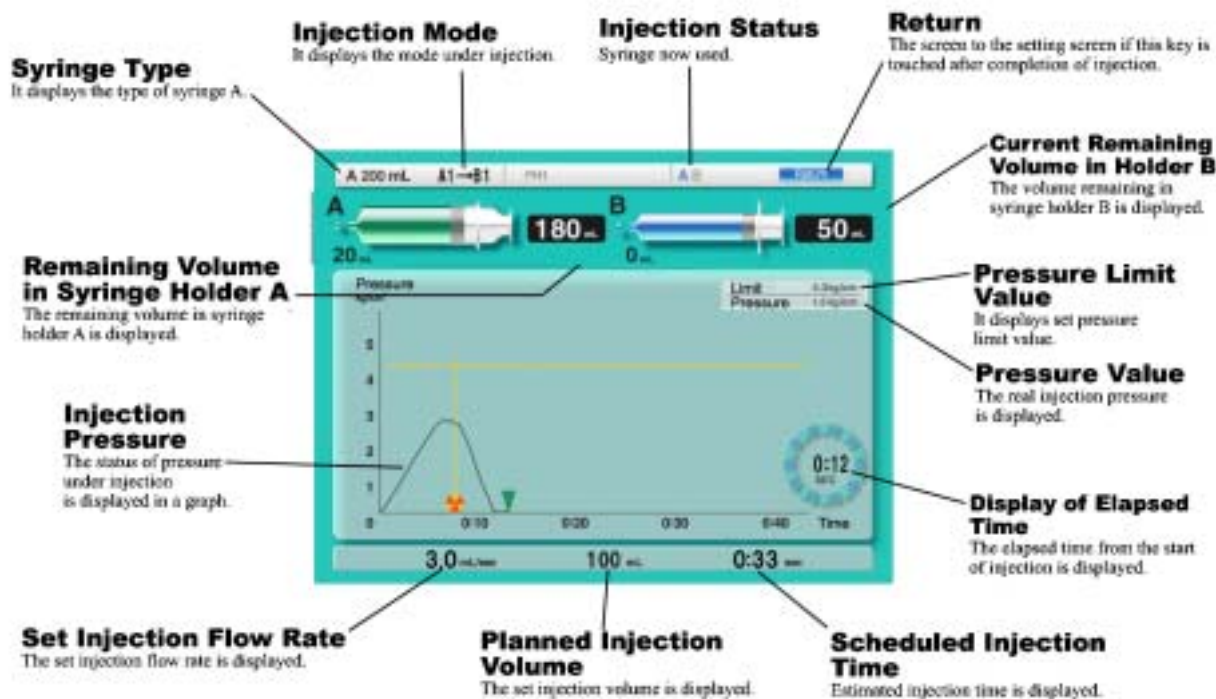


* It is not displayed at shipment setting. Please consult your Dealer if you want to display.

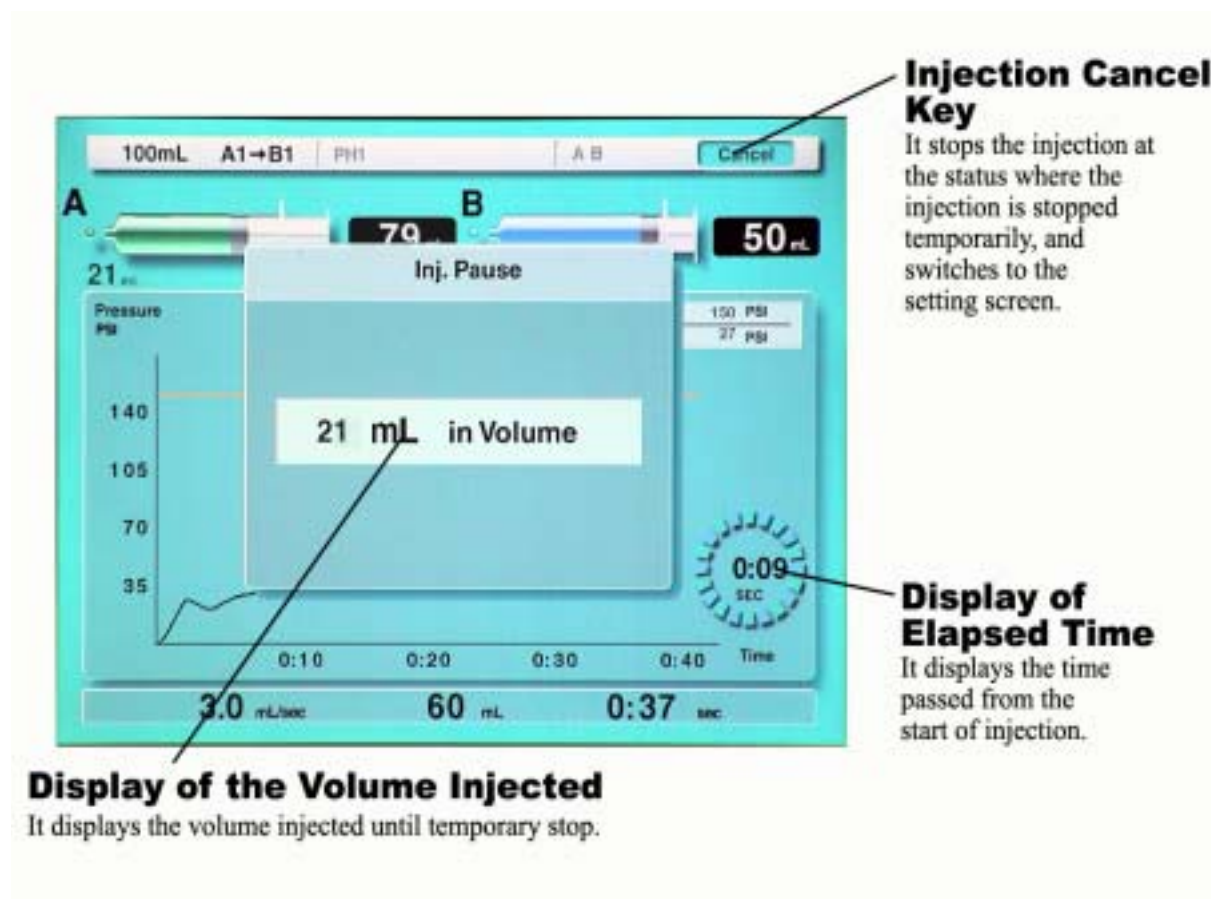
Dual Shot Alpha

Names of Individual Parts

<Injection Screen>

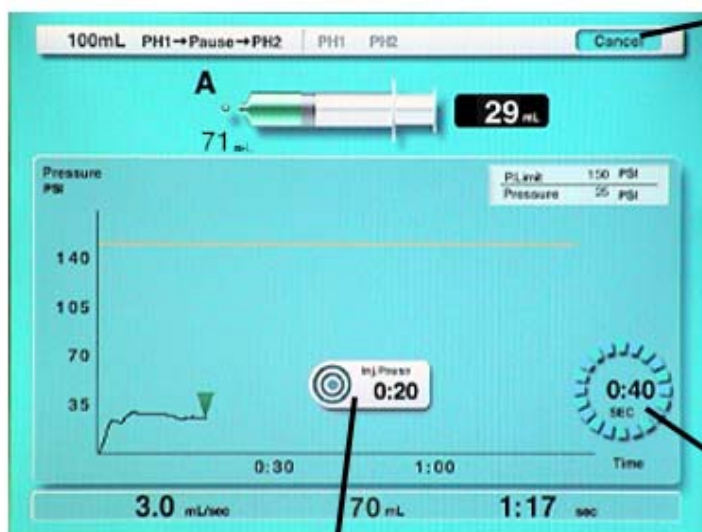


<Screen of Temporary Stop of Injection: Normal Injection>



<Screen of Temporary Stop of Injection>

A case of injection of PH1 → Pause → PH2



Injection Cancel Key

It stops the injection at the status where the injection is stopped temporarily, and switches to the setting screen.

Display of the Time Stopped Injection

It displays the time stopped injection.

Display of Elapsed Time

It displays the time passed from the start of injection.

Dual Shot Alpha**Names of Individual Parts****6-5. Accessories****Operation manual (this book)**

It explains how to operate Dual Shot, a contrast delivery system.
Be sure to read carefully before use.
Read the separate sheets also.

**Handswitch**

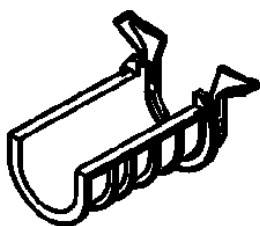
It is used to start an injection of the contrast in the operation room.

**CompactFlash card**

It is a card for an additional function such as QUICK SELECT MODE.



Please see respective manuals.

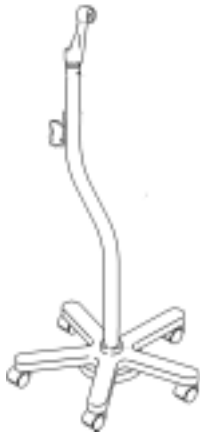
**Adapter for a 100 mL syringe**

It is used when a 100 mL syringe is used.
For usable syringes, see "Recommended consumables".

**Head extension cable**

It is used when a head cable is extended.

Dual Shot Alpha**Names of Individual Parts**

**Stand (option)**

It supports the head.

It is not included when a ceiling mounting arm is ordered.

**Power cable**

It connects to the AC power.

**Console cable**

It connects the console and the main unit.

**Ceiling mounting head arm**

It is used when the ceiling mounting type of the system is used.

7. Basic Procedures

7-1. How to Turn On Power Supply



① Main unit power supply - ON

Turn ON the "Main power supply" switch behind the main unit.



② Console power supply - ON

Push the "Power supply" key in front of the console.



The power doesn't enter if the main power switch of the main unit is turned OFF.



Do not insert or pull out the power cable or head cable when the power switch is ON.



③ Please wait.

The message of "Please wait for a while." is displayed on the screen.

④ Initial screen

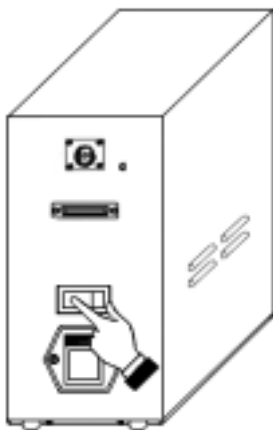
Screen is displayed in a few seconds.

7-2. How to Turn Off Power Supply



① Console power supply - OFF

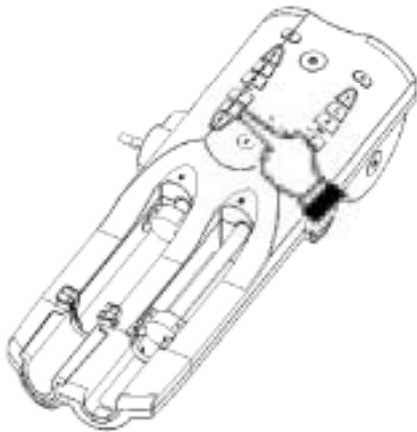
Push the power supply key of the console.
Power supply LED on the display disappears.



② Main unit power supply - OFF (When it is not used for a long time)

Turn OFF the "Main power supply switch"
behind the main unit.

7-3. Basic Operations

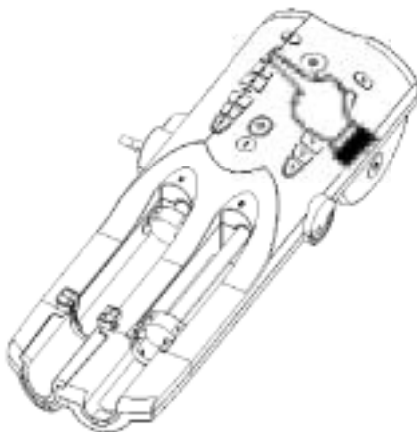


Forward

The presser advances while the key is being pressed, and pushes the plunger at following speed.

- ◀◀ Fast
- ◀ Middle
- ◁ Slow

(In Middle and Slow speed, the presser stops automatically after advancing 10mL.)



Reverse

The presser reverses while the key is being pressed, and pulls the plunger at low speed.

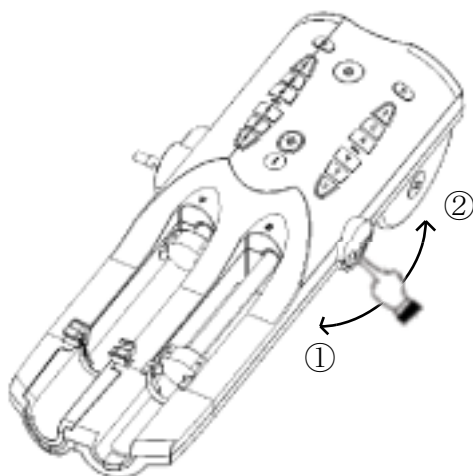
- ▶▶ Fast
- ▶ Middle
- ▷ Slow

(The presser stops automatically after reversing 10mL.)

Use the auto-return key to fill the contrast.

Dual Shot Alpha

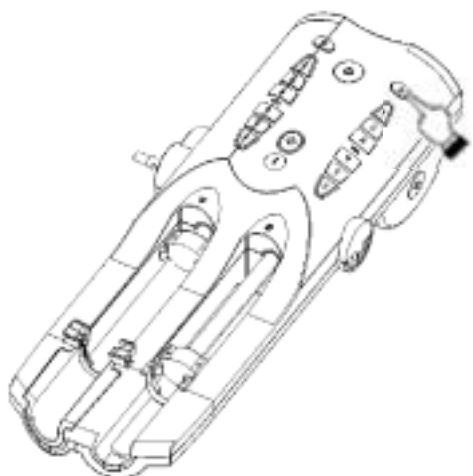
Basic Procedures



Slow movement (jog dial)

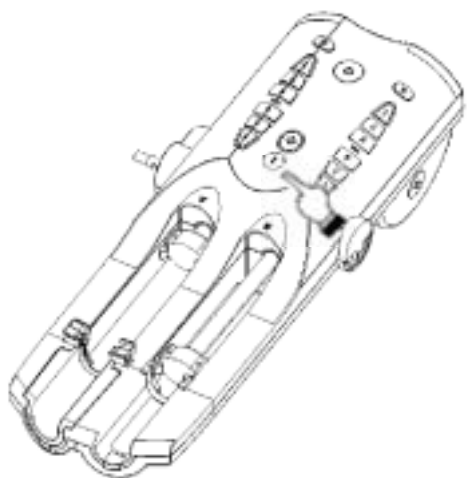
If the shuttle at the side of the head is moved ahead or back, the A head presser slowly moves ahead or back.

When the shuttle is pulled ① in the direction of the tip of the head, the presser moves in the injection direction. When the shuttle is pulled ② in the direction of the back of the head, the presser moves in the direction of filling the contrast.



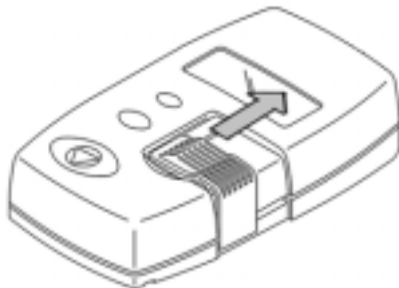
Auto-return

The presser automatically reverses to the edge of the back if the button is pressed for more than 2 seconds.

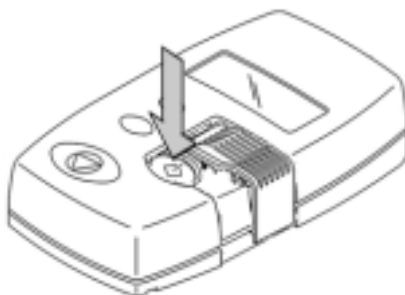


Check

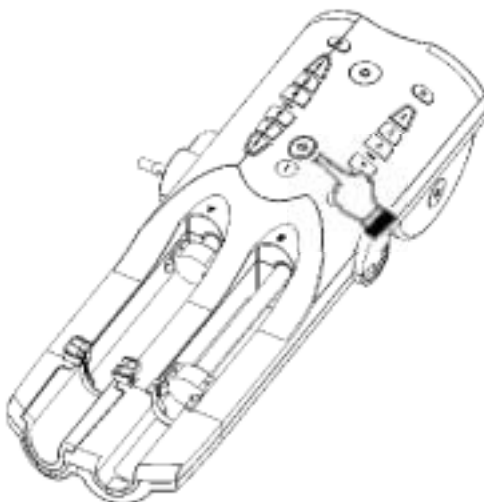
Press this button after verifying the injection route. If this button is not pressed, a contrast injection can not be performed.

Dual Shot Alpha**Basic Procedures****Start of the contrast injection from the operation room****Push up the cover of the handswitch to open**

Push up the cover to protect malfunction of the handswitch.

**Push the start button**

Push the start button hidden under the cover to start injection.

Start of the contrast injection from the examination room**Push the start key of the head**

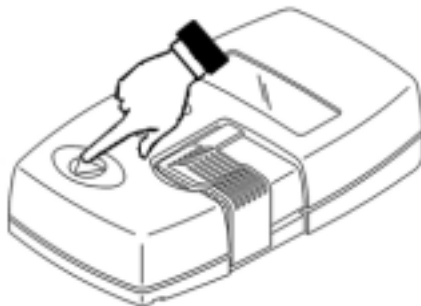
Push the start key of the head to start injection.

Stop of injection in the examination room

There are injection stop buttons on both sides and the top of the head.
Pushing either of these buttons stops injection temporarily.

Temporary stop of injection with the console button

There is an injection stop button in the lower center of the front panel of the console.

Temporary stop of injection with the handswitch

There is an injection stop button at the lower side of the handswitch.

Indication of temporary stop is displayed on the screen if injection is temporarily stopped.

If you want to continue injection, push the start button of the head or handswitch.
Then injection starts again.

Dual Shot Alpha Basic Operations of the Setup Screen

7-4. Basic Operations of the Setup Screen

7-4-1. Setting of Values



● Change of flow rate.

- ① Touch the "Flow Rate" (in the frame)".
The touch sound is sounded and a fine adjustment key is displayed.



- ② If you want fine adjustment of the value, touch "+" or "-" in the fine adjustment frame. The set value will increase or decrease.

If you continue to touch, the value changes continuously. The value that can be changed continuously is;

Flow Rate: up to ± 2 mL/sec



- ③ When you touch the set value part of the fine adjustment frame, a numerical key pad will appear.

Input the flow rate value to set and touch the "ENTER" to complete the setting.

Dual Shot Alpha Basic Operations of the Setup Screen



Touch the frame of the injection volume. A fine adjustment key is displayed.

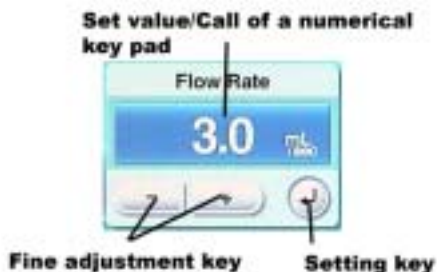
Touch the frame of the set value. A numerical key pad will be displayed.

A fine adjustment key disappears automatically in about five seconds.



Injection volume is set with the numerical key pad.

Press the "ENTER" after the numerical setting is completed. Setting is completed.



Touch the frame of the Flow Rate. A fine adjustment key frame will be displayed.

Touch the frame of the set value. A numerical key pad will be displayed.

The fine adjustment key frame disappears automatically in about five seconds.



Injection flow rate is set with the numerical key pad.

Press the "ENTER" after the numerical setting is completed. Setting is completed.

Dual Shot Alpha Basic Operations of the Setup Screen



Touch the frame of the P.Limit (Pressure Limit). The numerical key pad will be displayed.

$$1\text{MPa} = 1.01972 \times 10 \text{ kgf/cm}^2 = 1.45038 \times 10^2 \text{ psi}$$



Touch the frame of the Inj. Delay (Injection Delay). The numerical key pad will be displayed.

The left side of ":" shows minutes and the right side shows seconds.

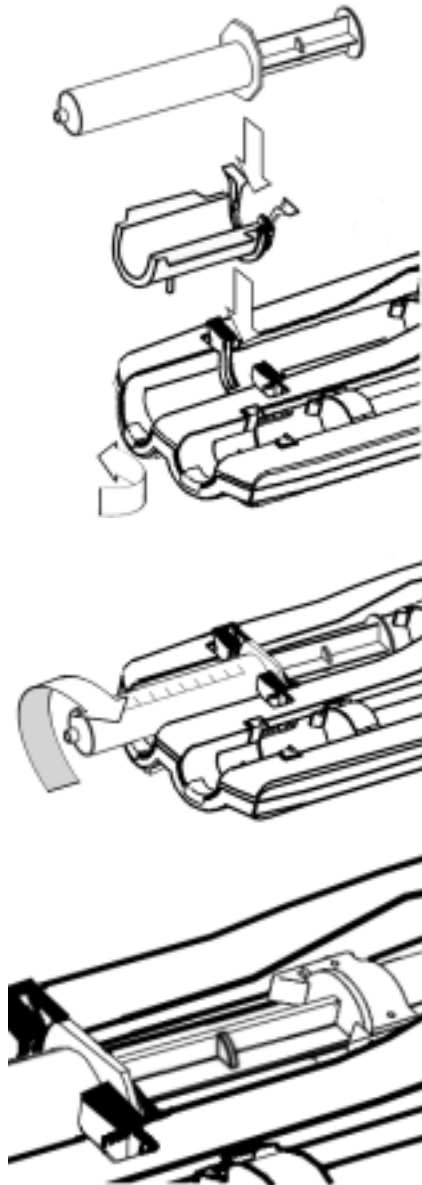
Example)

Input "1:20" for "one minute and 20 seconds".

Dual Shot Alpha Installation and Detachment of a Syringe

7-5. Installation and Detachment of a Syringe

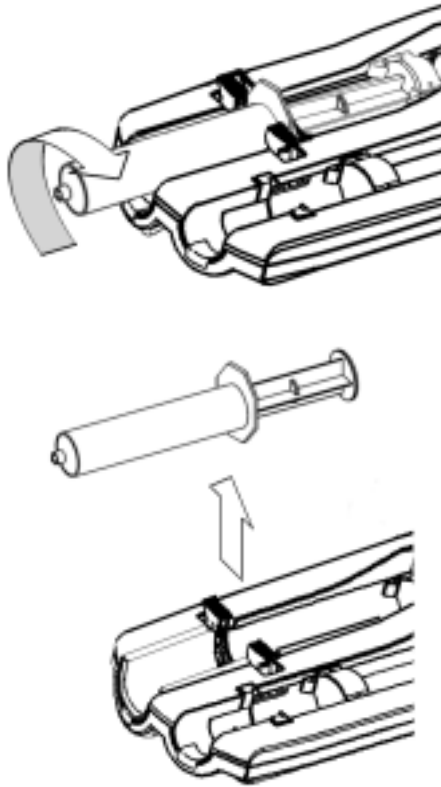
7-5-1. Installation of a 100 mL Syringe



- ① Pull the presser to the end position.
- ② Open a syringe clamber with fingers to prepare attachment of a syringe.
- ③ Install the adapter for 100 mL syringe, and close the syringe clamp.
(Close the hook under the head for fixing the syringe adapter tightly.)
- ④ Install a syringe in the state that the flange of the syringe looks long (or in the state that the scale of the syringe is seen from the side), and turn the syringe so as the scale is placed upside.
- ⑤ Move the presser ahead, and closely contact the plunger of the syringe.
Ensure that the claws of the presser head tightly held the plunger.
- ⑥ Install the injection route including an extension tube, etc.

Dual Shot Alpha Installation and Detachment of a Syringe

7-5-2. Detachment

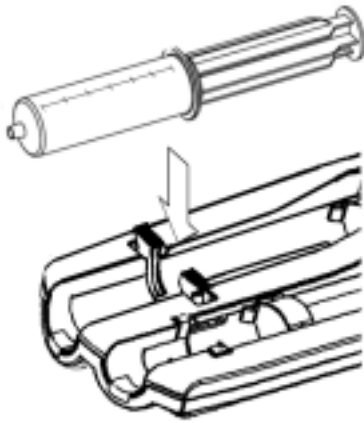


- ① Remove the injection route from the patient.
- ② Turn the syringe 90 degrees.

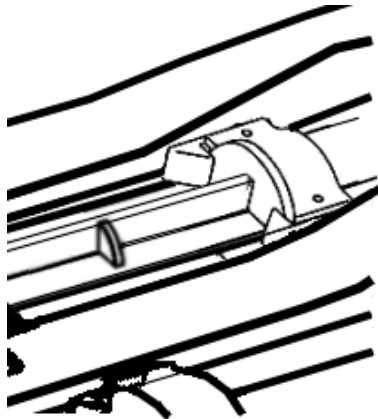
- ③ Take out the syringe straight up to detach.

Dual Shot Alpha Installation and Detachment of a Syringe

7-5-3. Installation of a 200 mL Syringe

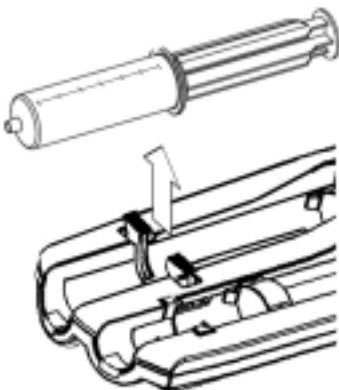


- ① Open a syringe clamper, and attach a 200 mL syringe so as the scale is placed upside.



- ② Move the presser ahead.
Move the presser ahead and connect to a plunger of the syringe tightly.
Ensure that the claws of the presser head tightly held the plunger.
- ③ Install the injection route including an extension tube, etc.

7-5-4. Detachment of a 200 mL Syringe

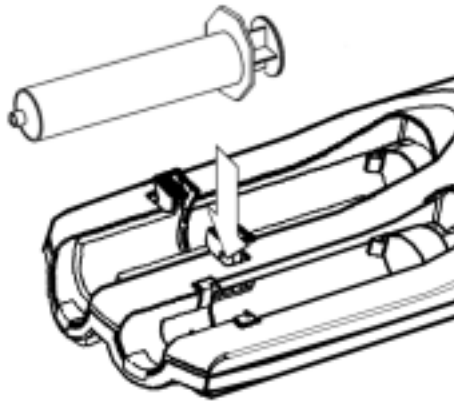


- ① Remove the injection route from the patient after completion of injection.
- ② Take out the syringe straight up to detach.

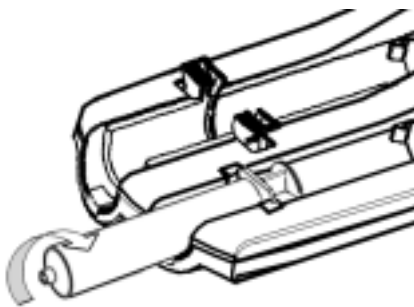
Dual Shot Alpha Installation and Detachment of a Syringe

7-5-5. Installation of B Side Syringe

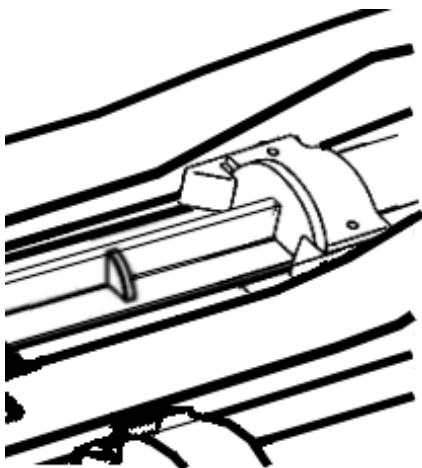
- ① Pull the presser to the end position.



- ② Install a syringe in the state that the flange of the syringe looks long (or in the state that the scale of the syringe is seen from the side), and turn the syringe so as the scale is placed up side.

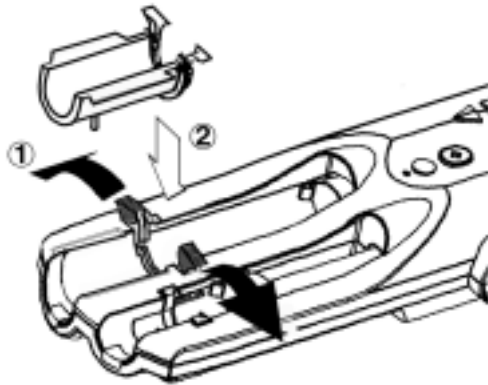


- ③ Move the presser ahead, and closely contact the plunger of the syringe. Ensure that the claws of the presser head tightly held the plunger.

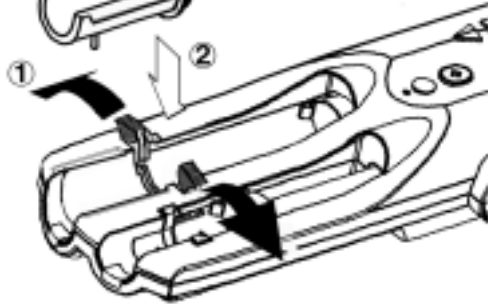


Dual Shot Alpha Installation and Detachment of a Syringe

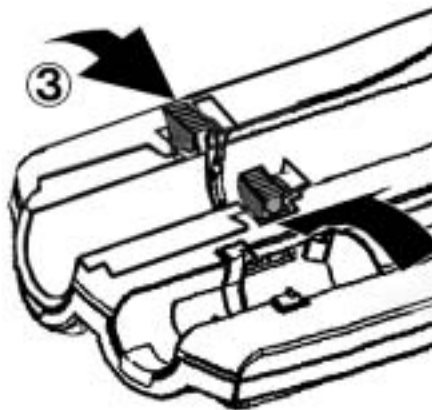
7-5-6. Installation of a 100 mL Syringe Adapter



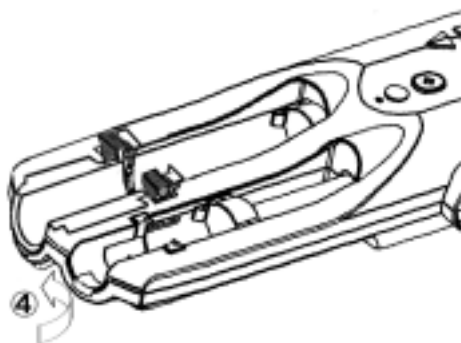
① Open a syringe clamper on the Head A side.



② Insert the flange of the syringe adapter into the slot.



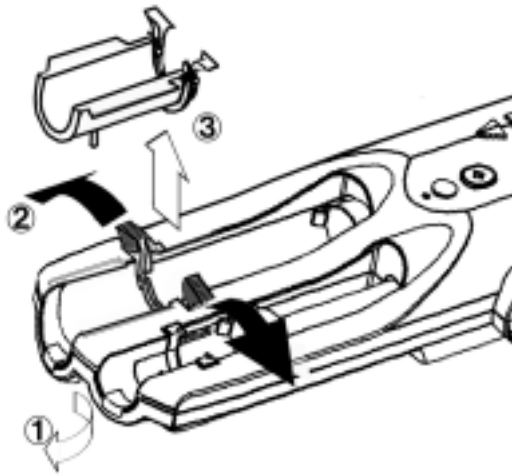
③ Close the syringe clamper with fingers.



④ Fix the adapter surely with a hook for fixing the syringe adapter attached at the back side of the syringe holder.

Dual Shot Alpha Installation and Detachment of a Syringe

7-5-7. Detachment of a 100 mL Syringe Adapter

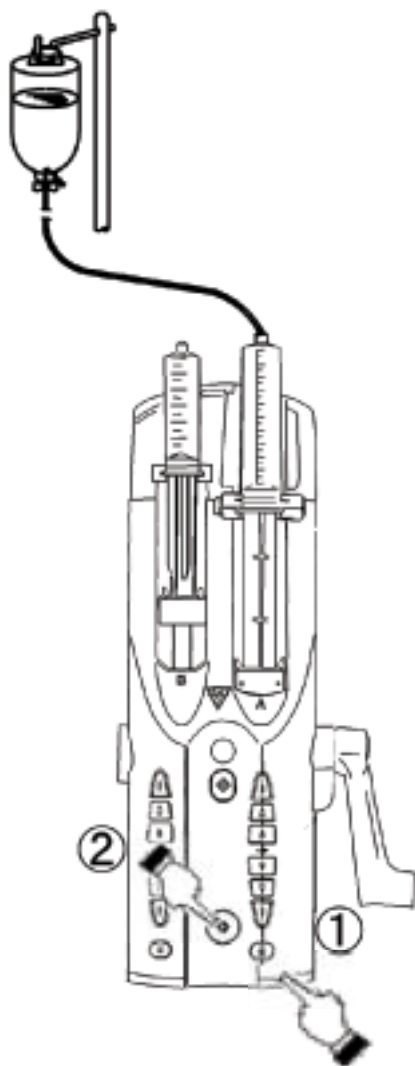


- ① Turn the syringe adapter hook in the direction of the arrow.
- ② Open the syringe clamber with fingers.
- ③ Remove the syringe adapter.

Dual Shot Alpha Aspiration and Connection of the Injection Circuit

7-6. Filling

- Filling contrast medium or physiological saline solution



Upturn the edge of the head and connect the syringe to the contrast bottle with a tube. Press the auto-return key ① for more than 2 seconds. Then filling will start. When the contrast has reached the designated filling level, press the stop key ② to stop filling.

After the filling is completed, set the injection route before use.

Filling at faster speed may cause negative pressure in the syringe and produce bubbles inside the syringe. Filling should be performed slowly.

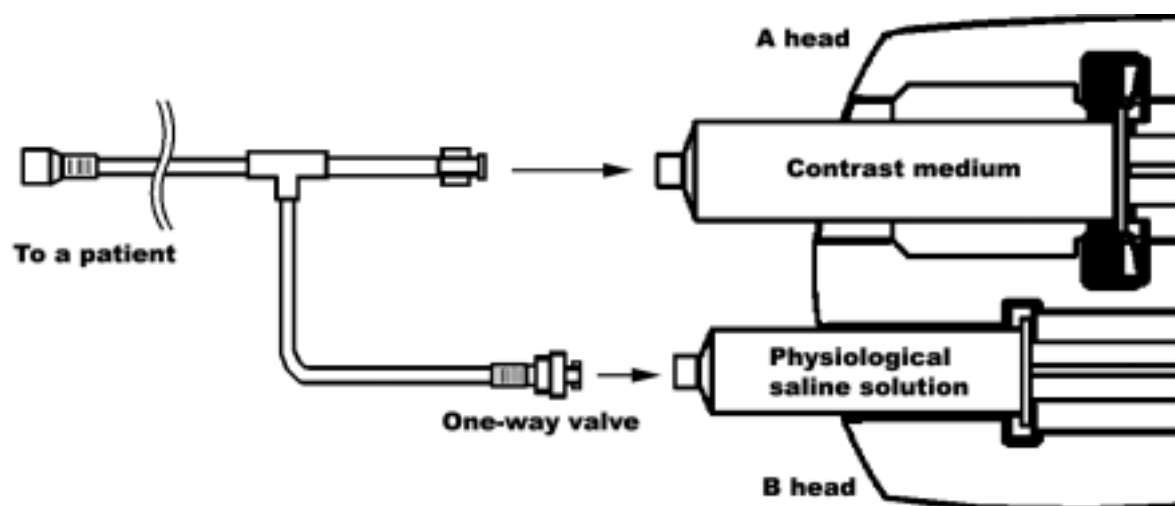
Dual Shot Alpha Aspiration and Connection of the Injection Circuit

7-7. Connection of the Injection Route

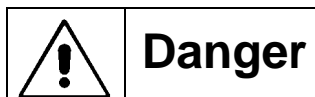
Connection of the injection route

1. Head B side: Set the syringe containing physiological saline solution.
Connect a tube with an one-way valve, and fill physiological saline solution in the tube to the level of the branch of the tube.
2. Head A side: Set the syringe containing contrast medium.
Connect the female connector to the syringe, and remove air with contrast medium.

* For air removal, the edge of the head should be turned upside.



Lock surely before connecting the injection route.
(The route might be disconnected.)



Pay careful attention to clean/unclean area.

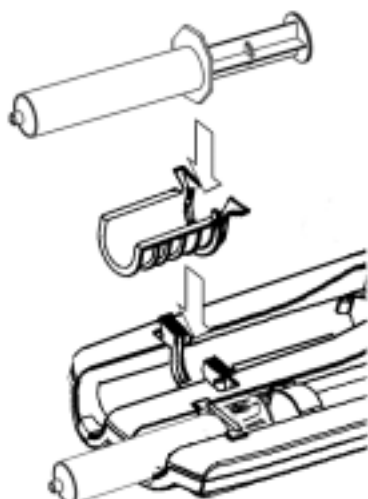
7-8. Operation Procedure

1) Setting injection parameters



Set the injection parameters for contrast medium most suitable for each examination.

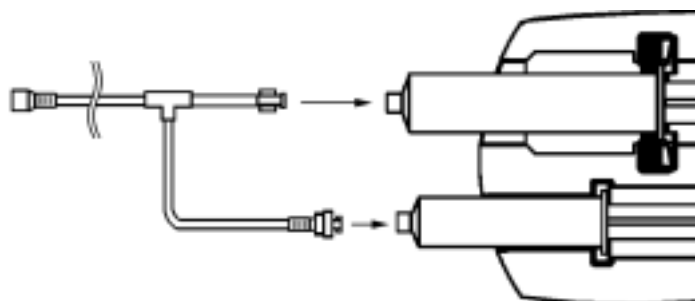
2) Install a syringe into the head.



The examination to use both A and B is shown as an example.

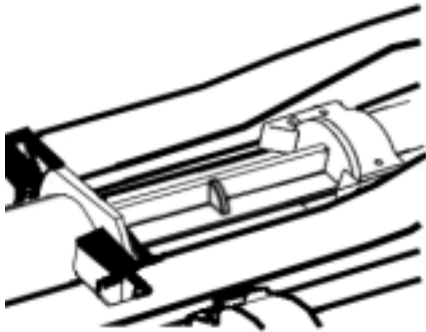
Install the syringe filled with the contrast to use in the side A and the syringe containing the saline in the side B.

3) Attach the injection route.

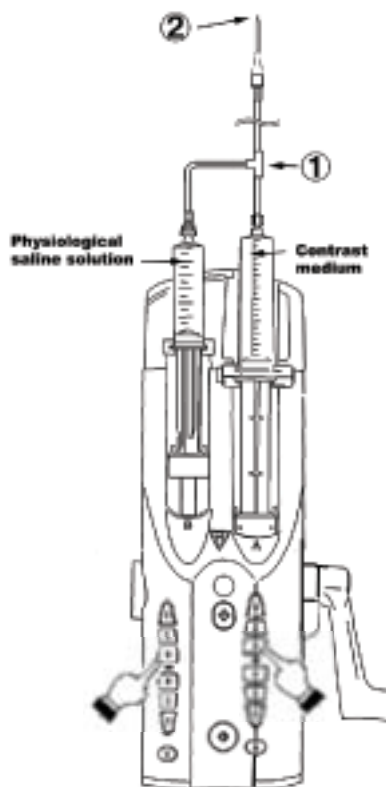


Attach the injection route to the syringe.

4) Closely contact the presser to the syringe plunger.

Dual Shot Alpha**Operation Procedure**

Closely contact the presser of the injector to the plunger of the syringe.



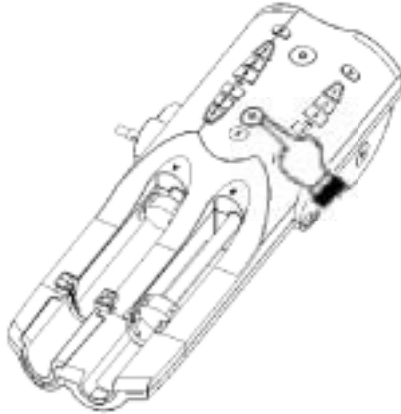
The tip of the head is turned upside, and the presser is slowly moved to the direction of injection in order to remove air in a syringe, a tube and a needle.

- 5) Push out air in the syringe for the contrast and the tube. (Push out the contrast to the branch point ① of the tube.)
- 6) Push out air in the syringe containing saline, the tube and the needle point ② .

Dual Shot Alpha

Operation Procedure

7) Push the air-check button.



Push the check button on the head after confirming no air contained in the injection route.

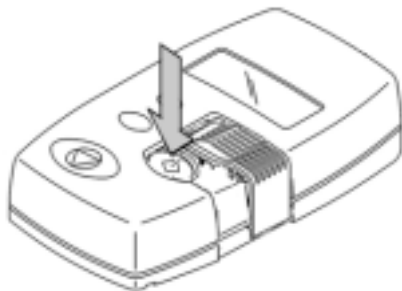
8) Check that start is ready.



Confirm that "Start OK" was displayed on the right of the setting screen.

If the "Start OK" is not displayed, the condition unable to inject has been set.

9) Start injection.



Injection can be started by pushing a start button of the handswitch in the operation room.

Use a start button of the head if you want to start injection in the examination room.



Pay attention to leakage during injection. It may cause damage to a patient. If any abnormality is found, stop the system immediately. The system does not stop automatically even if leakage occurred.

Dual Shot Alpha**Operation Procedure**

10) Low-pressure warning



A low-pressure warning may be displayed and operation may be stopped, if pressure is not loaded continuously while 5 mL of drug solution is injected. Syringe, needle and injection route should be checked.

When injection pressure is 0.5kg/cm^2 or less, the following will occur.

0.1 - 1.4 mL/sec ----- warning message

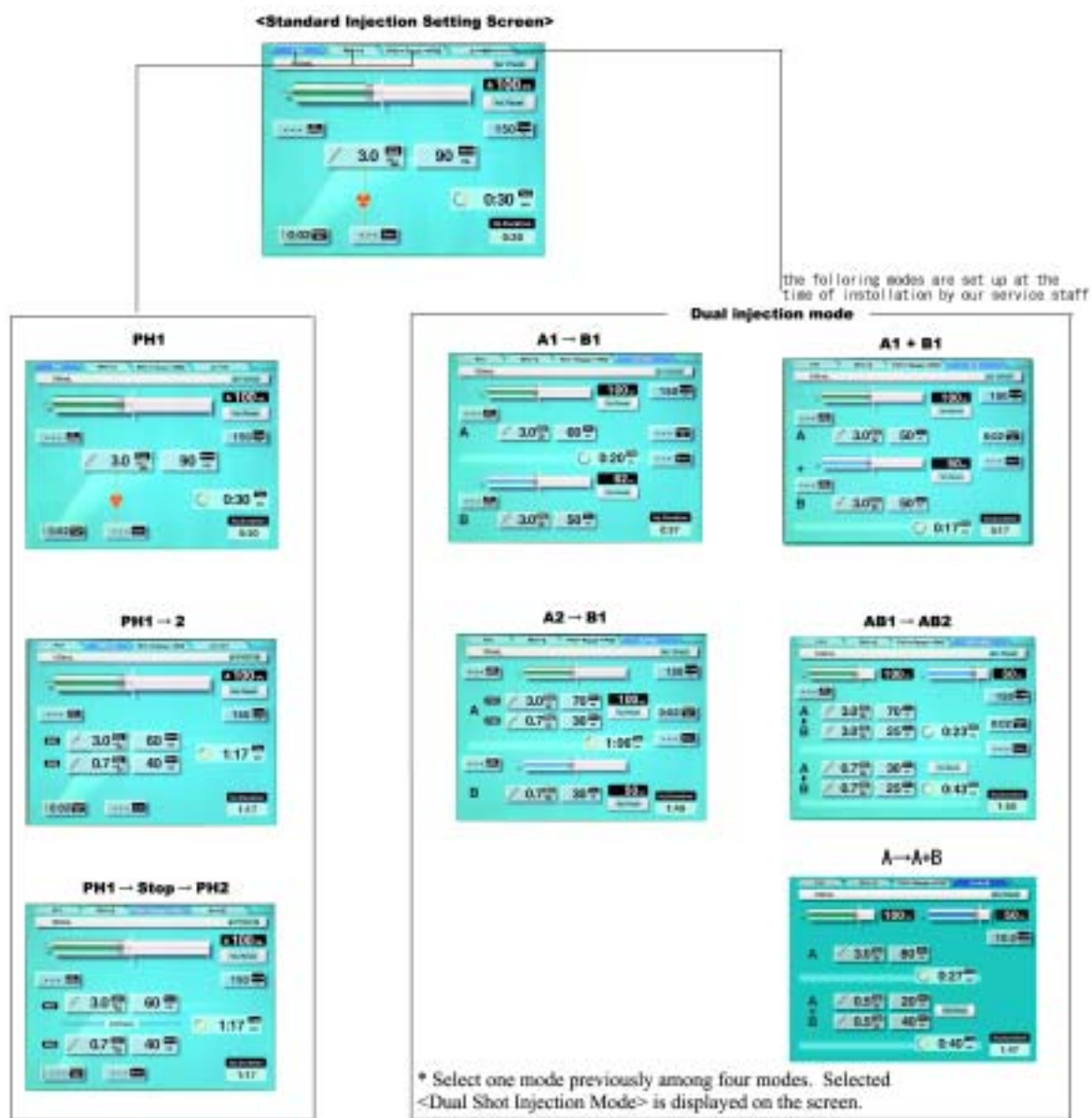
1.5 - 10.0 ml/sec----- injection stop

Dual Shot Alpha

Injection Mode

7-9. Injection Mode

7-9-1. Shift of Setting Mode



* Please ask your service staff for change of dual injection mode.

Dual Shot Alpha

Injection Mode

7-9-2. PH1 Setting and Multi Setting



1) PH1

Only the side of the head A operates.

Running is completed by one operation for injection.

The system is stopped automatically if the planned volume has been injected.

7-9-3. Setting of PH1 → 2



Only the side of the head A operates.

You can divide injection into 2 phases in a serial operation.

7-9-4. Setting of PH1 → Stop → PH2



Only the side of the head A operates.

Inject separately for two phases.

If one phase is completed, injection stops temporarily, and stops until injection start is ordered again.

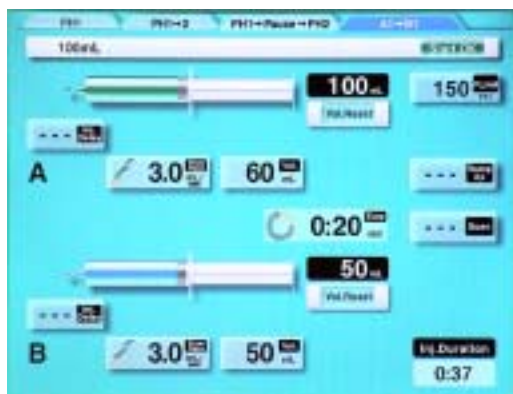
For re-injection, push the START button of the handswitch or the START key of the head.

Dual Shot Alpha

Injection Mode

7-9-5. Setting of A1 → B1 (dual injection mode)

Injecting the side B after injection of the side A.



Use the heads A and B.

After contrast medium is injected from the head A, physiological saline solution is injected from the head B.

7-9-6. Setting of A2 → B1 (dual injection mode)

Injecting the side B after 2-phases injection on the side A.



Use the heads A and B.

After contrast medium is injected separately for two phases from the head A, physiological saline solution is injected from the head B.

7-9-7. Setting of A1+B1 (dual injection mode)

Injecting from both sides of A and B at the same time.



Use the heads A and B.

Injection will be started from both heads A and B.

Dual Shot Alpha

Injection Mode

7-9-8. Setting of AB1 → AB2 (dual injection mode)

(Injecting the side B after injection of the side A) is repeated twice.



Use the heads A and B.

After contrast medium is injected from the head A, physiological saline solution is injected from the head B.

This serial operation is repeated twice.

7-9-9. Setting of A → A+B (dual injection mode)

Injecting from both sides of A and B at the same time after injecting the side A.



Use the heads A and B.

After contrast medium is injected from the head A, contrast medium and physiological saline solution are injected from both heads A and B at the same time.



For setting pressure limit, set a proper value after a syringe adapter is installed and the types of tube and needle to be used is checked. Moreover, do not set the pressure limit more than resistance pressure * of the syringe and the injection route.

* Please see the operation manual of injection route for the resistance pressures of the syringe and the injection route.



In the setting or injection route to increase extreme pressure, the pressure may temporarily exceeds the set value of the pressure limit.

7-10. Other Screens

Results of injection

Results of injection can be confirmed, if necessary.

The results of every injection can be listed or drawn in a graph.

"Table of list": It presents the minimum information including date and the maximum pressure.

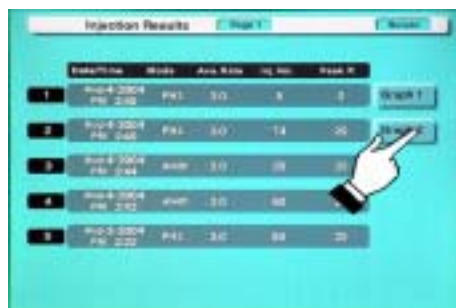
"Graph": It presents the state of pressure from the start to completion of injection.

*** The results of injection will record the latest results of 20 injections regardless of injection mode. Old data will be deleted one by one.**

*** Graph of pressure will be deleted if the power supply is dropped.**



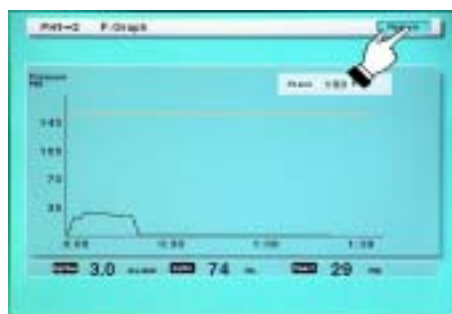
1. Push the "Results key" under the right front of the console.



2. The newest 5 results are displayed on the Injection Results screen.

Touch the "Page 1" on the center of the screen. Other 15 results will be displayed by 5 results.

When you want to see the pressure graph of the injection result, touch the "Graph" key on the right side of the results data frame.



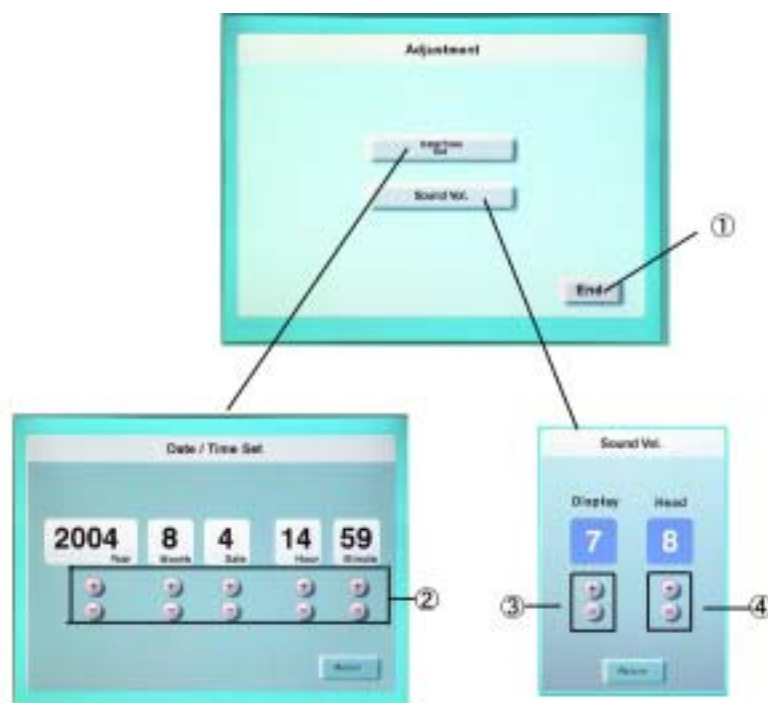
3. The "GRAPH" button displays the results of this injection state.

If you want to return to the list display, press the "Return" in the upper right of the screen.

8. Adjustment screen (setting of date and adjustment of volume)



Push a switch in the inside of the hole with an end-rounded stick.



- ① This key is pressed when setting of date and adjustment of sound volume are finished.
When this key is pressed, the power supply is automatically turned off. Turn on the power supply of the device again for use.
 - ② It changes date and time. Correct time and date of the injection results, if they are wrong.
 - ③ The operation sound volume of the console can be adjusted [0 (silence) - 15 (maximum sound)].
 - ④ The operation volume of the head can be adjusted [(0 (silence) - 15 (maximum sound))].
- * **Do not turn the display sound volume to 0, as the warning sound volume also changes.**

Dual Shot Alpha Daily Inspection and Periodic Inspection

9. Daily Inspection and Periodic Inspection

Appropriate repair and maintenance need to be performed to maintain function of Contrast Delivery System Dual Shot. The following maintenance schedule is recommended.

Daily: Check and clean each part of the system.

Monthly: Check and clean each part of the system and check its operation.

Yearly: Calibration and check of each part of the system by our trained service staff are recommended. Periodic maintenance is needed once a year to guarantee the system functions.

Daily inspection

Always perform the following inspection before using this system.

If any malfunction is found, immediately stop using the system and contact us.

Inspection of a system and accessories

- 1) Check movement of the presser of the head by moving it back and forth to each limit position without the syringe mounted before use.
- 2) Check that all displays and lamps are illuminated.
- 3) Check that no flaws, breaks and wear are found in the connecting cable of the system. Also check that the cable is connected properly. Check that no other equipment except for this system (the equipment specified by us) is connected.
- 4) Check that the system and the accessories are not damaged.
- 5) Use of inappropriate accessories may cause malfunction of the system or damage to the patient. Check that they are appropriate.

Inspection of Head and Stand

- 1) Check that no damage such as cracks is found on the head cover.
- 2) Check that the head and the head arm rotate freely and the head does not rotate more than 180° in the vertical and horizontal directions.
- 3) Check that the casters of the stand move smoothly and the locking mechanism operates properly.
- 4) Check that the support of the stand moves up and down smoothly.
- 5) Check that no damage such as cracks is found on the stand and all bolts and screws are tightly screwed.

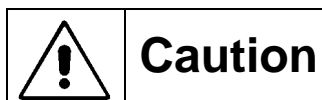
Dual Shot Alpha Daily Inspection and Periodic Inspection

Inspection of Ceiling Mounted Arm (option)

- 1) Check that there are no cracks, bents, wear and looseness in the support and arm.
- 2) Check that the support can be moved lightly without bending.
- 3) When any defects are detected, inform us immediately.

Cleaning

- 1) One of the main causes of malfunction is adhesion of the contrast on the head. Always clean the head after use. In general, the contrast can be removed easily with a dry cloth immediately after it adheres to it.
If the contrast adhered to dried out, remove it with a cloth dampened with warm water or water.
- 2) Inform us if the contrast gets inside the system.



- **To avoid electric shock, always turn the power off and unplug the power cable when cleaning the system.**
- **Never use organic solvents such as thinner and benzene because they cause malfunction of the system as well as are not effective to the contrast.**

Operation inspection

- 1) Check movement of the presser of the head by moving it back and forth to each limit position without the syringe mounted before use.
- 2) Move the presser of the head forward by keeping pressing the forward key without the syringe mounted, and check that the presser stops at 10mL automatically.
- 3) Check that all displays and lamps are illuminated.
- 4) Start injection under the injection conditions programmed and check that the values of the injection conditions are displayed on the screen and the system operates properly.

10. Troubleshooting

This system incorporates an automated diagnostic function to ensure the higher safety in consideration of various possible malfunctions. When any abnormality occurs, this function activates and displays the description and the error number on the screen.

Use this automated diagnostic function to deal with troubles of operation of the system or of connection.

In some cases such as damage of external appearance of the system, abnormal noise, and other unpredictable malfunction by us *, the automated diagnostic function may not be effective. In such a case, please contact us.

* Depending on the malfunction, the drug solution of 10mL may be injected until the system stops.

Pressure limit warning is indicated during injection	
Problem	Pressure limit is activated. (The flow rate is kept down.)
Cause	The pressure limit setting is too low for the flow rate. The injection route (needle, tube, catheter, etc.) is too narrow or almost clogged.
Solution	The injection conditions need to be reviewed.

Turn the power off when either of the following errors appears.

Error 1	
Problem	Over pressure
Cause	The stopcock is closed.
Solution	Check the route from the syringe to the tip of the catheter (needle), or conduct an injection test without loading a syringe and see if the Error 1 message is still displayed.
Error 2	
Problem	Over volume
Cause	Error in the injection volume count due to the outside noise.
Solution	Change the location of the main unit, console or head.

Dual Shot Alpha

Troubleshooting

Error 3	
Problem	Abnormal injection flow rate
Cause	More than 25% error of the setting has occurred.
Solution	Conduct an injection test without loading a syringe. Also, make sure there aren't any scratches on the cable, etc.
Error 4	
Problem	Excessive injection time
Cause	More than 25% error of the setting has occurred.
Solution	Conduct an injection test without loading a syringe. Also, make sure there aren't any scratches on the cable, etc.
Error 5	
Problem	Short of volume
Cause	More than 25% error of the setting has occurred.
Solution	Conduct an injection test without loading the syringe. Also, make sure there aren't any scratches on the cable, etc.
Error 6	
Problem	Abnormal motor stopping
Cause	The motor does not work.
Solution	Conduct an injection test without loading the syringe. Also, make sure there aren't any scratches on the cable, etc.
Error 11	
Problem	Encoder trouble
Cause	Disconnection of the head cable, trouble with the motor.
Solution	Conduct an injection test without loading a syringe. Make sure there aren't any scratches on the cable, etc.

Error 13	
Problem	Trouble with the limit sensor
Cause	Both forward and reverse limits functioned at the same time.
Solution	Make sure there aren't any scratches on the cable, etc. Turn off/on the power and check the forward/reverse operation to each limit.
Error 14	
Problem	Trouble with the safety circuit
Cause	Motor moves randomly regardless to the operator's intent.
Solution	Shut off the power supply, and turn on again to see what happens.
Error 17	
Problem	Trouble with the head switch
Cause	The switch on the head area is pushed when the power is applied.
Solution	Shut off the power supply and check the switches on the head area.

* Contact your dealer if the problem persists even after checking the above.

* Contact your dealer if the problem other than the above occurred.

11. Contact Information

Manufacturer

NEMOTO KYORINDO CO., LTD.
2-27-20 HONGO, BUNKYO-KU
TOKYO 113-0033
JAPAN

