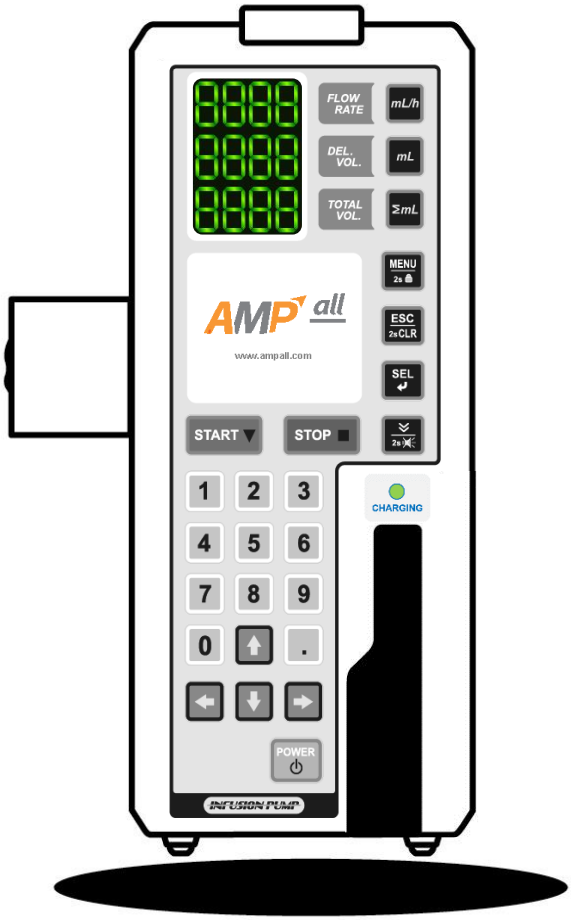
INFUSION PUMP OPERATING MANUAL

CE 1639



IP-7700

AMP all

ADVANCED MICRO PUMPING TECHNOLOGY

Leader in the Medical industry

Table of Contents

- You can download the manual through the AMPall website at www.ampall.com
- The battery may have discharged due to the delivery period.
- Please connect to a power socket for fully charging before the first use.

1 Intended use

Thank you for purchasing the IP-7700 infusion pump. For safe and proper use, please read this user manual carefully before operating the device. If you have any questions while reading the manual, please contact the supplier. Additionally, please keep this user manual in a safe place.
The IP-7700 infusion pump is a medical device used for the infusion of drugs such as chemotherapy agents, antineoplastic agents, labor-inducing agents, enteral nutrition, and analgesics. It is commonly used in operating rooms, intensive care units (ICUs), emergency rooms (ERs), recovery rooms, and general wards. Utilizing an infusion method, the IP-7700 pump provides dual monitoring of infusion processes through a drop sensor, ensuring ease of operation and high precision in flow rate control.
The following clinical benefit is expected: Increase patient treatment effect by accurately injecting the intended medication through effective infusion control

Medical indication

The IP-7700 Infusion Pump is intended for the infusion of substances such as anticancer drugs, oxytocic, nutrition, and chemotherapy medication.
This device is designed to provide high flow-rate accuracy and ease of use during infusion, featuring an equipped peristaltic finger system and drop sensor control.

Patient population

- **Considerations: Requirement Description**
  - Age: Suitable for all ages under medical supervision
  - Weight: Applicable to all weights; dosage and infusion rate determined by medical staff.
  - Health: Applicable to patients requiring intravenous infusion therapy.
  - Nationality: Applicable to multiple nationalities
  - Gender: Not gender-specific.
  - Patient Condition: The patient is not the user; however, condition such as agitation, unconsciousness, or critical illness may affect usage monitoring.
  - Intended Site of Use:
    - Intended part: Not limited
    - Condition: Intact skin
- **Education**
  - Minimum: Qualified healthcare professional (e.g., nurse, clinician, biomedical engineer)
  - Maximum: No maximum
- **Knowledge**
  - Minimum:
    - Able to read and understand Western Arabic numerals written in Arial font
    - Basic knowledge of human anatomy
    - Understands hygiene principles
  - Maximum: No maximum
- **Language Understanding**
  - Minimum: Proficient in the local language
  - Maximum: Able to understand manuals written in English
- **Experience**
  - Minimum: Trained medical staff authorized for infusion therapy.
  - Maximum: No maximum
- **Permissible Impairments**
  - Minimum:
    - Mild visual impairment or vision corrected to log MAR 0.2
    - Average age-related short-term memory impairment
    - Hearing impairment up to 40%, resulting in 60% of normal hearing between 500 Hz and 2 kHz

Intended conditions of Use

- **Consideration: Conditions**

(1) Environment and Hygienic Requirements

- Operating conditions
  - Temperature: +5 ℃ to +40 ℃
  - Barometric Pressure: 700 hPa to 1060 hPa
  - Humidity: 30 % R.H. to 90 % R.H.
- Storage and Transport Conditions
  - Temperature: -20 ℃ to +45 ℃
  - Barometric Pressure: 500 hPa to 1060 hPa
  - Humidity: 10 % R.H. to 95 % R.H.

(2) Device Characteristics and Use Conditions

- Non-sterile device
- Multiple patient use
- Duration: less than ten min. contact
- Ambient luminance range: 100 lx to 1500 lx
- Frequency of use: Reusable (Not limited)
- Location: Hospital environment
- Mobility: Portable ME equipment

Operating Principle

This device is designed for high flow-rate accuracy and ease of use during the infusion of solutions, featuring advanced sensors and audio-visual alarms for enhanced safety and monitoring.

NOTE

IFUs are currently available in English only. However, if the device is to be used in a country where another language is required, the IFU will be provided in the appropriate local language.

2 Features

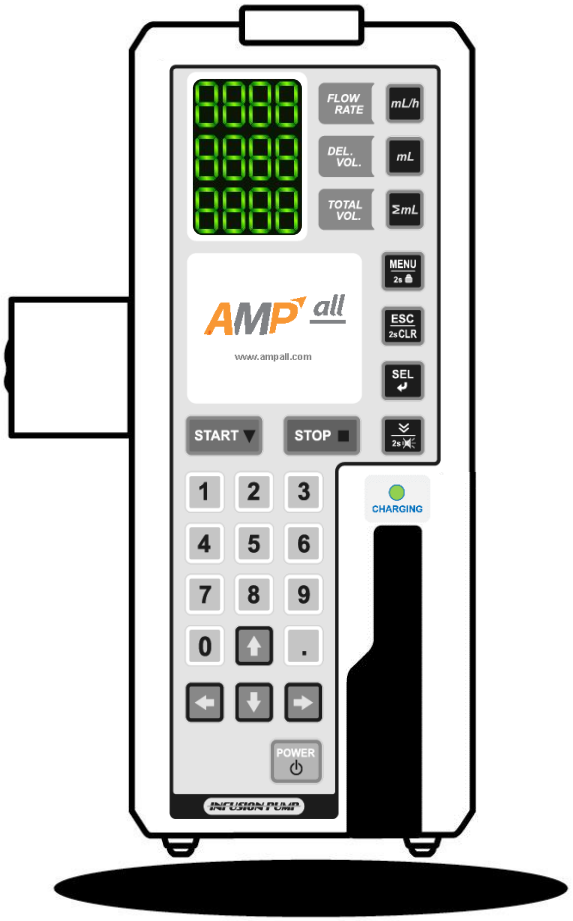
- **Open System** – Up to 10 IV set brands can be set.
- **Dual CPU Architecture –** Equipped with a MAIN CPU for operational control and a SUB CPU for motor driving. Both CPUs monitor each other to ensure safe infusion.
- **Numeric Keypad**– Convenient input using a numeric keypad (0 to 9).
- **Self-Testing** – Automatically performs a self-test when the power is turned on.
- **K.V.O. (Keep Vein Open)** – Prevents catheter occlusion caused by blood clotting by switching to a preset low flow rate (1ml/h to 10ml/h) after the preset volume is reached.
- **Key Lock Function** – Includes general lock/unlock settings. Unlocking requires password input for added security.
- **Infusion Settings** – Automatically calculates the third parameter when any two of the following are entered: flow rate, delivery volume, or infusion time.
- **Retain Memory Function** – Previous settings are stored and retained even when the power is turned off
- **System Level Settings** – Adjustable buzzer volume in 3 levels, and occlusion pressure in 9 levels (4.5 psi to 14.5 psi).
- **Data Retention Period** – Internal data is preserved for up to 5 years in case of power failure.

- **Free Flow Prevention** – The infusion set automatically locks to prevent free flow when if the door is opened.
- **Nurse Call** – Enables connection to nurse call system or central PC.
- **Rechargeable Battery** – Ensures uninterrupted infusion with the built-in rechargeable battery that allows the pump to operate continuously without stopping.
- **Enhanced Safety** – Features dual CPUs designed to immediately halt infusion in the event of a pump malfunction during operation.
- **Purge Flow rate** – Adjustable within a range of 0.1–1000 mL/h or 0.1–1800 mL/h (optional).
- **Bolus Flow rate** – ON/OFF function with a setting range of 0.1–1000 mL/h or 0.1–1800 mL/h (optional), and a volume range of 1–9999 mL.
- **History Call Back** – Stores and retrieves up to 10 or 2000 **(optional)** infusion records.
- **Profile Function** – Allows pre-setting of infusion environment (flow rate/delivery volume/infusion time) in increments of at least 1 hour. Supports continuous infusion based on a 24-hour profile **(optional).**
- **Dosage Mode (Body weight mode)** – DOSE RATE, Automatically calculates and displays the flow rate (flow rate) when entering patient's weight, drug amount, and solution volume **(optional).**
- **Drug Library** – Stores up to 100 drugs across 20 categories, enabling quick access based on drug type **(optional).**
- **Parameter Adjustment During Infusion**- Allows real-time modification of infusion parameters, including flow rate, delivery volume, and total volume, even while the infusion is in progress **(optional).**

NOTE

- If you are using this medical device and have reason to believe that a serious incident has occurred, please report it to the distributor, the manufacturer and your national competent authority.

3. Description



3-1 Front View

3-2 LCD Display Overview

3-3 Inside the Door

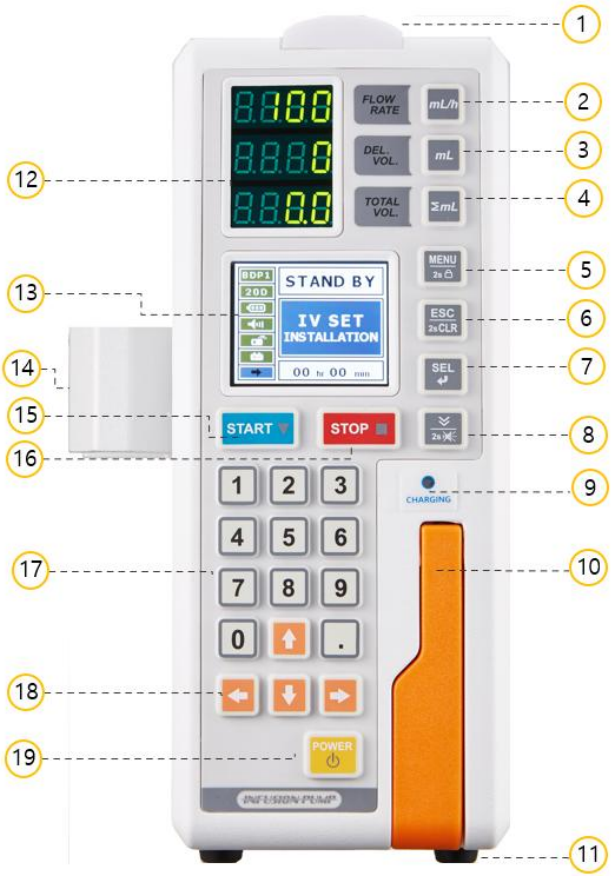
3-4 Rear View

3-5 Side View

3-6 Included Components

3 Description

3-1 Front View



① STATUS LED (Status Lamp): LED indicator showing the current status of the device.

NOTE
- Red: High-level alert, flashing at 1.5Hz.
- Yellow: Medium-level alert, flashing at 0.5Hz.
- Deep blue: Low-level alert (Notification).
- Green: Normal infusion.
- Blue: Indicates Purge/K.V.O., Bolus or Profile infusion

② FLOW RATE: Button used to set and adjust the infusion flow rate (mL/h).
③ DEL. VOL. (Delivery Volume): Button used to set and adjust the delivery volume (mL).
④ TOTAL VOL (Total Volume): Button displaying the total volume of fluid delivered so far (mL).
⑤ MENU/2sLOCK: Short press to open the menu screen; long press (2 seconds) to lock or unlock the keypad.
⑥ ESC/2sCLR: Short press to return to the previous screen; long press (2 seconds) to clear the current setting.
⑦ SEL (Select): Button for selecting menu options and saving settings.
⑧ PURGE: Button used to expel air bubbles from the IV set during setup.

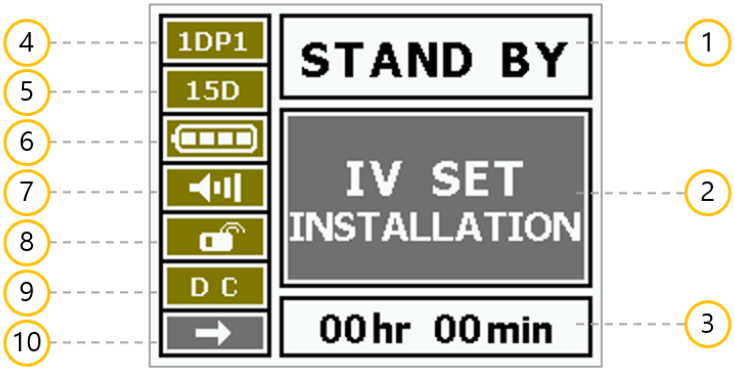
NOTE
- During infusion: Functions as the bolus button.
- Long press (2 seconds): Activates the silence function, muting alarms for 2 minutes after an error

⑨ CHARGING Indicator: Displays the battery charging status
- Green: Battery fully charged.
- Orange: Indicates charging in progress.

NOTE
- Blinking: Indicates battery fault.

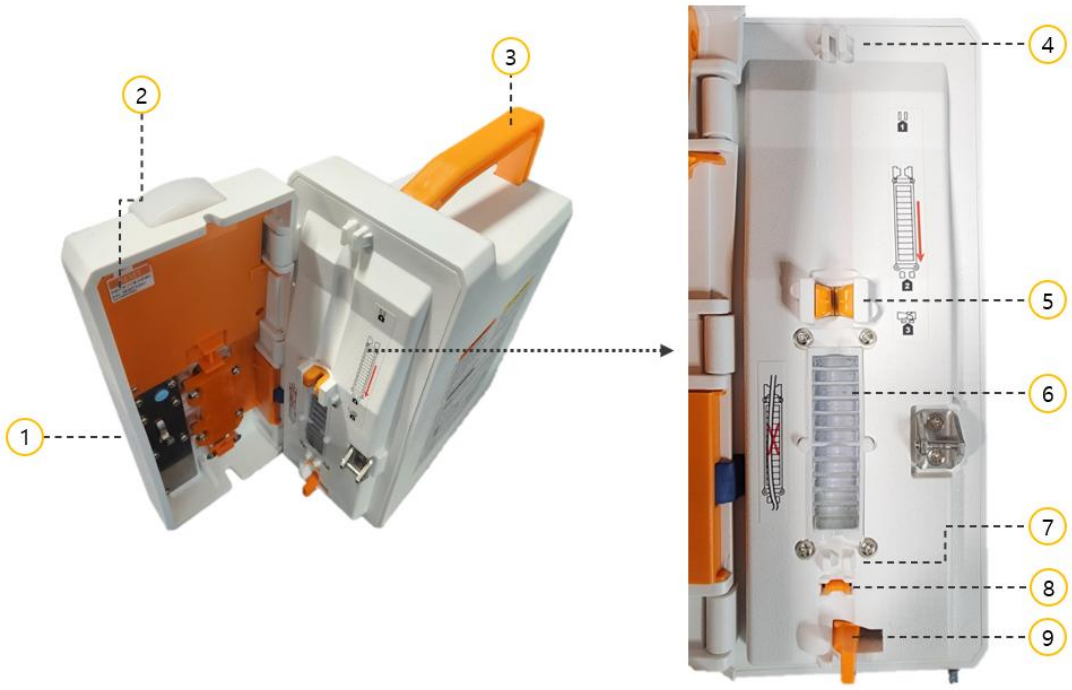
⑩ Door Lock Lever: Device for securing the door. Pulling the lever upward allows the door to be opened.
⑪ Rubber Feet: Rubber feet providing stability and support for the equipment.
⑫ FND Display: Display screen showing the infusion flow rate (FLOW RATE), delivery volume (DEL. VOL.), and total volume delivered (TOTAL VOL.).
⑬ LCD: Screen displaying current system information.
⑭ Pole Clamp: Device for securing the device to a pole.
⑮ START: Button to initiate the infusion process.
⑯ STOP: Button to stop the infusion process.
⑰ Numeric Buttons: Buttons for inputting infusion parameters.
⑲ Direction Buttons: Buttons for adjusting numeric positions and values during setup.
⑳ POWER: Press and hold for about 2 seconds to turn the power on. Press and hold again for about 2 seconds while the power is on to turn it off.

3-2 LCD Display Overview



① Infusion Status Display
② Operation Status Display
③ Remaining Infusion Time Display
④ IV Set Brand Abbreviation Display
⑤ Drops per 1mL for IV Set: 15D, 19D, 20D, 60D
⑥ Battery Level Display
⑦ Buzzer Level Display
⑧ Button Lock Status Display
⑨ Power Source Indicator (AC Power, Battery, DC Power)
⑩ Expected Battery Usage: Pressing the right arrow key displays the approximate available battery

3-3 Inside the Door



NOTE

① Door
② System Reset Switch: In case of emergency, press the reset switch to turn off the system power.
③ Handle: Used for carrying or repositioning the device.
④ Tubing Guide: Component used to secure the tubing set in place.
⑤ Air-in-line Detector: Detects the presence of air in the tubing set.
⑥ Peristaltic Fingers: Delivers fluid using peristaltic motion.
⑦ Tubing Guide: Secures the tubing set.
⑧ Occlusion Detector: Detects blockages in the tubing.
⑨ Tubing Clamp: Stops infusion when the door is opened.

3-**4 Rear** View

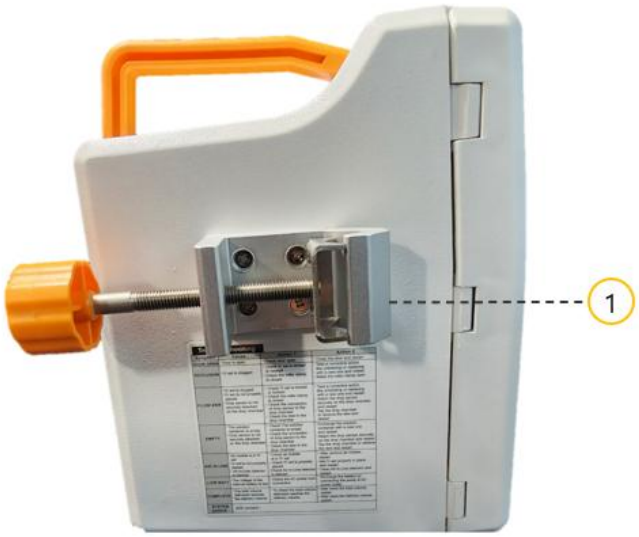
① Nurse Call Connector: Connects to the nurse call system installed in the patient's room.

② Drop Sensor Connector: Port for connecting the drop sensor.
③ AC Outlet: Connects to the AC power supply.
④ DC Jack: Connects to a 12V DC adapter.

NOTE

- Ensure to use an approved adapter that guarantees electrical safety for medical devices.

3-5 Side View



① Pole Clamp: A device used to secure the equipment to a pole or stand.

3-6 Components

① IP-7700 Product

② IP-7700 Operating Manual

③ Drop Sensor(Optional)

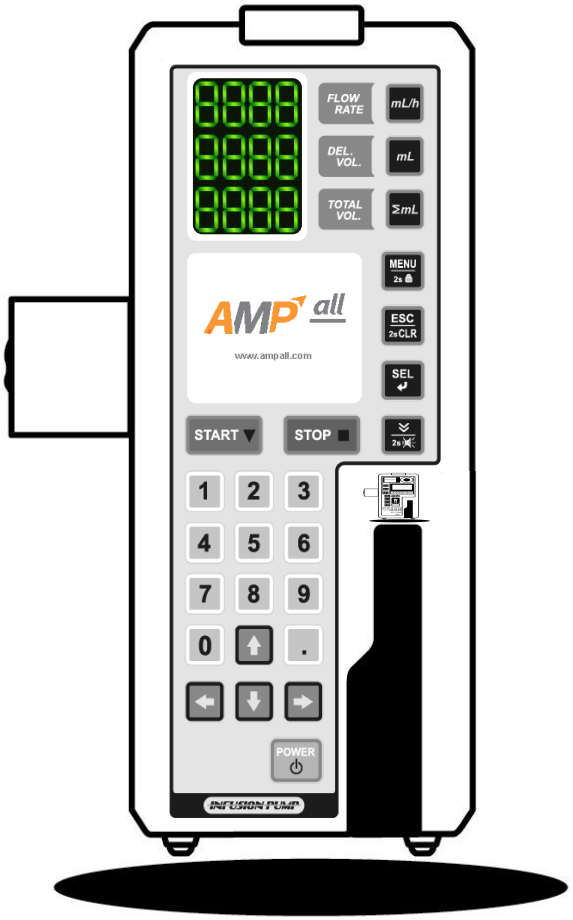
④ AC Power Cable

NOTE

Drop Sensor: This sensor detects medication drops falling into the drip chamber of the infusion set and triggers an error if the drop interval is abnormal.

- Size: 35 x 93 x 18 mm
- Weight: 0.1 kg

4. Prior to IP-7700 use



4-1 Explanation of Symbols

4-2 Precautions Before Use

4-3 Precautions During Use

4-4 Cleaning Instructions

4-5 Storage

4-6 Maintenance Checks

4 Prior to IP-7700 use

4-1 Explanation of Symbols

This user manual includes essential safety and usage instructions, marked by specific symbols as shown in the illustration on the left.

NOTE

"**NOTE**" is used throughout this manual to highlight important information that ensures proper usage of the device.

4-2 Precautions before use 

- This device is a medical device.
- Keep the device away from equipment that emits high-frequency waves (e.g., defibrillators/AEDs), as such equipment may interfere with its operation.
- If simultaneous use with high-frequency devices is unavoidable, please follow these precautions:
  - Do not use high-frequency or electromagnetic wave-generating equipment near this device.
  - Maintain a safe distance between this device and wave-generating devices.
  - Do not connect wave-generating devices and this device to the same power outlet.
  - Frequently verify that the device is operating normally.
- In case of abnormal operation:
  - Lock the infusion set manually, turn off the power, remove the needle from the patient, and detach the infusion set from the pump. Then, immediately contact the place of purchase.
- Do not use the device in environments where flammable substances are present.
- Do not use the device in high electromagnetic environments such as MRI rooms.
- If you plan to use an infusion set from a manufacturer other than AMPall, consult your distributor to confirm compatibility. Use of incompatible sets may affect flow accuracy and alarm functions
- Before starting infusion, confirm that the infusion set to be used matches the one set on the device.
- Ensure that the infusion tube is properly inserted into the air detector and occlusion detector. Otherwise, the warning function may not work properly.
- Confirm that the infusion tube is in a straight line above the drive unit. Otherwise, the delivery volume may not be accurate.
- Device cannot detect damage to the infusion tube. Therefore, regularly check for damage to the infusion tube during infusion.
- Due to the risk of ignition from heat or impact, charge the rechargeable battery within the specified range of use only. Also, do not charge the battery with other equipment by separating it.
- Check for damage to the device and accessories. If the device or accessories have been subjected to impact, do not use them even if there is no external damage, and immediately contact the place of purchase.
- Do not attempt to disassemble or repair the device if there is a malfunction. Contact the place of purchase promptly. The manufacturer is not responsible for malfunctions caused by consumer mishandling that does not follow the warnings provided.
- This device should be used by trained professionals who are familiar with the instructions for use of the device.

- Please use the accessories provided in this manual.
- Do not use the device for purposes other than those specified, such as transfusion.
- Be cautious if infusion comes into contact with the built-in power outlet of the device, as it may cause leakage.
- The pump's design ensures that the infusion of the drug is not affected by gravity.
- Before use, check if you are prepared according to the following:
  - Plan ahead for potential pump malfunctions.
  - Check if labels are attached to the infusion pump channel and tube to prevent errors.
  - Verify infusion pump settings and monitor patients for over or under-infusion.
  - Utilize all available safeguards to prevent and respond to pump issues.

4-3 Precautions during use

- This device does not detect whether the fluid is being infused correctly into the blood vessels. Check that the needle is inserted accurately and observe the patient's condition carefully.
- When powered by batteries, check the battery level and be cautious of the battery usage time (4-5 hours).
- The device operates when connected to an external power outlet. If an external outlet is unavailable, the device can be operated using the built-in rechargeable battery.
- During device operation, regularly check the drop rate to ensure the accuracy of the delivery volume.
- When connecting the patient and the infusion set, ensure that the tubing clamp is not forcibly opened to prevent free flow.
- Securely fix the device to the patient's IV pole to prevent it from falling.
- If infusion is not occurring due to twisting or blockage of the infusion tube, pressure inside the tube may increase, causing it to expand. In this case, remove the patient connection and close the manual roller clamp on the infusion set to prevent bolus infusion, then release the twist in the infusion tube and remove the blockage.
- Take appropriate action when warning sounds occur. (Refer to the emergency measures section)
- Avoid subjecting the device to excessive shock during use.
- If the same section of the infusion tube has been attached to the drive unit for more than 12 hours, change the attachment position of the infusion tube to a new location 10 cm away before use. Prolonged attachment to the same section may affect the accuracy of the delivery volume.
- The manufacturer is not responsible for malfunctions caused by consumer mishandling that does not follow the warnings and precautions listed above.

4-4 Cleaning Instructions

- Before cleaning the device externally, make sure to turn off the power [POWER] button and unplug the external power cord.
- Do not immerse the device in water.
- Avoid submerging the device in liquid or allowing moisture to penetrate the device.
- Do not clean the device with alcohol or other solvents.

4-4-1 External Pump Cleaning

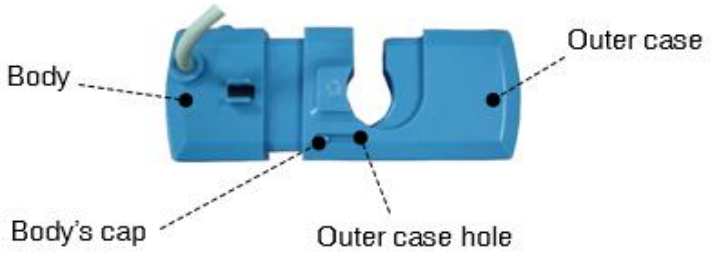
- If the exterior of the device is stained, use a soft cloth or towel dampened with cold or lukewarm water to wipe it, then allow it to air dry. Make sure to check if the built-in power outlet is dry.
- Avoid using heat sources like hair dryers to dry the exterior of the device.

4-4-2 Bubble Detector/Blockage Detector Cleaning

- If the bubble detector or blockage detector is stained, use a soft cloth or towel dampened with cold or lukewarm water to wipe it, then allow it to air dry.
- Do not use sharp tools like tweezers to clean the detectors.

4-4-3 Drop Sensor Cleaning

- Before cleaning the drop sensor, completely detach it from the device.
- If the drop sensor is stained, wipe it gently with a soft cloth or towel dampened with cold or lukewarm water, then let it air dry. Be careful not to get water droplets on the drop sensor connector. If it does get wet, allow it to dry completely.
- Follow these steps to clean the drop sensor:
  - Use a small flathead screwdriver to push and remove the outer case as shown in the diagram.
  - Use a soft cloth or towel dampened with cold or lukewarm water to wipe the body of the drop sensor.
  - Clean the outer case and spring.
  - Allow the cleaned components to air dry.
  - After drying, reassemble the drop sensor by placing the spring in the center right of the drop sensor body and pushing the outer case until the body's cap fits into the hole of the outer case.



4-5 Storage

- When using and storing this device, please observe the following:
- Keep away from direct sunlight and devices that emit high-frequency radiation.
- It may be affected by pressure, temperature, humidity, dust, salt, and ions.
- Avoid external impacts or excessive force.
- The storage conditions for the device are as follows:
  - Ambient temperature: -20°C to 45°C
  - Relative humidity: 10% to 95% R.H.
  - Atmospheric pressure: 500 to 1060 hPa

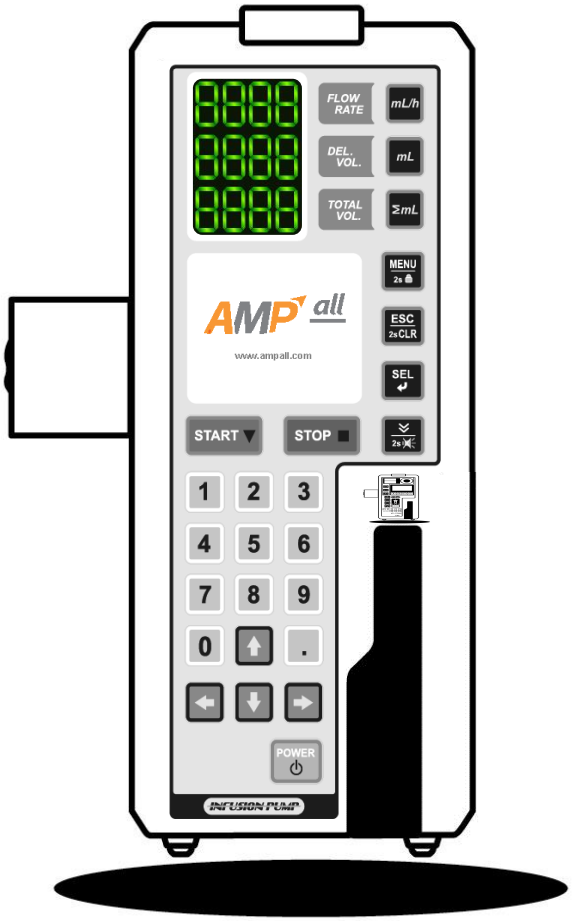
4-6 Maintenance Checks

- If there is any abnormality in the operation of the device, stop operation immediately and contact the point of purchase.
- Do not arbitrarily disassemble the device as it may cause malfunction.
- If the device or accessories have been subjected to impact, even if there is no external damage, do not use them and contact the point of purchase immediately.
- For safe and long-term use of the device, it is recommended to undergo regular maintenance checks from the point of purchase.
- Since the lifespan of the built-in rechargeable battery in the device may shorten over time, it is advisable to operate the device using the battery once a month. If the operating time is shortened even after normal battery charging, contact the point of purchase for a new battery replacement.

NOTE

- When initially using the device or if it has not been used for a long time, connect the device to an external power outlet for at least 6 hours to charge the built-in rechargeable battery before use.
- If the charged battery level is low and there is no available external power outlet, the operation of the device may stop.

5. Operating Procedure



5 Operating Procedure

5-1 Initial Setup

5-1-1 Attaching the Pump to the Pole Stand

- Use the pole clamp located on the left side of the device to securely fasten the pump to the pole stand (hanger fixation stand) to prevent it from falling off completely.

5-1-2. Connecting the Power Cord

- Connect the power cord to the AC outlet located on the back of the device, then connect it to an external power outlet or connect a DC 12V adapter to the DC jack on the back of the device.
- Depending on the type of power used by the device, an icon will appear on the left side of the LCD screen.

Icons	Contents
	AC Power in Use
	DC Power in Use
	Internal Battery in Use

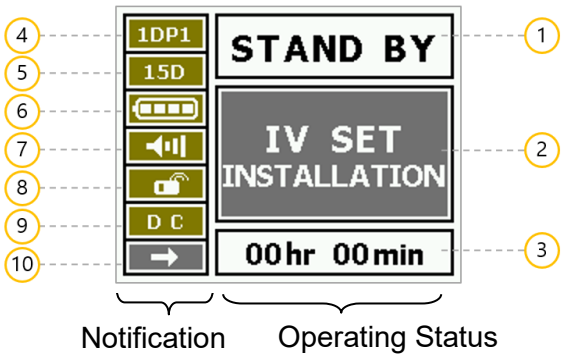
5-1-3 Connecting Drop Sensor (Optional)

- When using the drop sensor, please connect the plug to the drop sensor connector located on the back of the device.

- If you use any drop sensor other than the one paired with the pump, the drop sensor may not operate correctly.
- Ensure that the green lamp on the drop sensor flashes each time a drop falls. If the flashing is irregular or there is no response, please contact the point of purchase.

5-1-4 Power On

- Press the [POWER] button for 2 seconds.
- After a confirmation beep, the power will be turned on, and SELF TESTING will proceed for 3 seconds on the LCD screen.
- The LCD display is divided into notification status indicators on the left and operating status indicators on the right, as shown in the figure below.

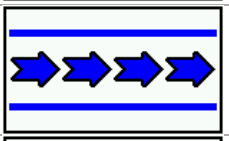
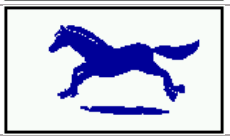


- The manufacturer's name of the infusion set being used will appear in the upper left corner. It is essential to verify that the manufacturer's name displayed on the solution set and LCD screen is correct.
- If a different infusion set is used from the one set up, the accuracy of the infusion cannot be guaranteed.

① Infusion Status Display

Indications	Contents	Indications	Contents
STAND BY	Infusion Standby Status	PROFILE STAND BY	Profile Mode Standby
STAND BY	Infusion Standby Warning	PROFILE STAND BY	Profile Mode Infusion Standby Warning
INFUSING	Infusion in Progress	PROFILE	Profile Mode Infusion in Progress
INFUSING	Infusion Warning During Progress	PROFILE	Profile Mode Infusion Warning During Progress
INFUSING	K.V.O. Infusion in Progress	PROFILE	Profile Mode Infusion Completed, K.V.O. Infusion in Progress
BOLUS	Bolus Infusion in Progress	NEOSTIGMIN STAND BY	Drug Library Standby (Optional)
NEOSTIGMIN	Drug Library Infusion in Progress (Optional)		

② Operation Status Display-Normal status (Notification)

Indications	Contents	Indications	Contents
IV SET INSTALLATION	Infusion Set Attachment Standby	WARNING CLEAR TOTAL VOL.	You must delete the total volume when it exceeds the scheduled delivery volume.
FLOW RATE SETTING..	Flow Rate Setting in Progress	PURGE MODE	Air Removal Mode in Progress
DEL.VOL. SETTING..	Delivery Volume (DEL. VOL.) Setting in Progress	WARNING D.LIMIT= ∞	Notification: Delivery volume Setting is 0, indicating infinite mode operation.
TOTAL VOL. CLEAR..	Deleting Total volume (TOTAL VOL.)	COMPLETE KEEP VEIN	Infusion completed, K.V.O. Infusion in progress
COMPLETE	Setting Complete	PASSWORD	Enter password to unlock
WARNING OVER RANGE READJUSTED	The set amount was automatically readjusted as it exceeded the set range	PRESS "START" BUTTON	Notification: Settings are complete and the solution is installed. Waiting to start infusion.
	Infusion in Progress Icon 1		Infusion in Progress Icon 2
WARNING SET FLOW RATE	Notification for when the flow rate is not set.		

- Operation Status Display-Warning status (Red Background - White Text)

Indications	Contents	Indications	Contents
WARNING SET DEL.VOL.	Infusion started without setting the delivery volume or when the delivery volume matches or exceeds the total volume.	WARNING BATTERY EMPTY	Power cut off due to low battery when using battery power.
WARNING SET FLOW RATE	Infusion started without setting the flow rate.	WARNING BATTERY LOW	Low battery level when using battery power.
WARNING AIR INLINE	Air bubbles detected during infusion.	WARNING EMPTY ERROR	No more drops detected by the drop sensor.
WARNING OCCLUSION BOTTOM	Occlusion detected during infusion.	WARNING FLOW ERROR	The drop sensor is detecting earlier than the set threshold.

WARNING OPEN DOOR	Door opens during infusion.	WARNING SET BOLUS	Attempting bolus without bolus settings.
WARNING "STOP" INFUSING	Incorrect button pressed during infusion.	WARNING CLEAR TOTAL VOL.	Attempted to infuse while the total volume is 9999.0mL
BOLUS LIMITED BY DEL.VOL.	Attempted to administer a bolus infusion in K.V.O. mode. Unable to administer further bolus as the scheduled delivery volume has been reached.	WARNING RPM ERROR	The motor rotation is irregular.
SYSTEM ERROR n	Internal system error n (n is a number) 0 - Communication 1 - Real Time Clock (RTC) 2 - Memory 3 - Value Error		

- If system error 1 occurs, please ensure to set the time on the device.
- For system errors 0, 2, and 3, please reboot the device or reset the system using the reset button.
- If the system error continues to occur repeatedly, please contact the distributor or manufacturer for assistance.

③ Displaying infusion progress

Indications	Contents	Indications	Contents
D.LIMIT= ∞	The scheduled delivery volume of '0mL' indicates infinite mode infusion	F.RATE IS 0	Unable to administer infusion due to a flow rate of '0mL/h'.
00hr 00min	The remaining time until the scheduled delivery volume when infused at the set flow rate. (HH hour MM min).	00:00 000%	Infusion rate during infusion (Remaining time HH:MM, Progress % from 0 to 100)
TIME OVER	When infused at the set flow rate, the infusion time exceeds 999 hours.	T.OVER 000%	When infused at the set flow rate, the infusion time exceeds 999 hours.

④ IV Set Brand Abbreviation Display
⑤ Drop Count per 1mL for IV Set: 15D, 19D, 20D, 60D
⑥ Battery Level Display
⑦ Buzzer Level Display
⑧ Button Lock Status Display
⑨ Power Input Type Display (AC Power, Battery, DC Power)
⑩ Expected Battery Usage: Pressing the right arrow key will approximately display the available battery capacity.

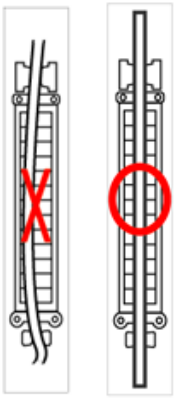
5-1-5 Power off

- Press the [POWER] button for 2 seconds on the initial screen.
- The pump logo will appear on the LCD screen with a confirmation sound, and approximately 2 seconds later, the power will turn OFF.

NOTE

- Power cannot be turned off during infusion.

5-2 Mounting of IV Set



- Verify if the designated infusion set for this device is used.
- Ensure that the infusion set is properly inserted into its place.
- Check for any abnormalities in the condition of the infusion set.
- Open the door of the device and push to the right to unlock the tubing clamp.
- Insert the infusion tube fully as shown in the right image, ensuring it stays within the grooves of the air bubble detection unit, interlocking drive unit, and occlusion detection unit.
- The occlusion detection unit should move smoothly when pressed with a finger.

- If the infusion tube is not properly inserted into the grooves of the air bubble detection unit, peristaltic drive unit, and occlusion detection unit, it may cause Free Flow, resulting in reduced accuracy of the delivery volume and frequent alarms.
- If the same part of the infusion tube has been attached to the peristaltic drive unit for more than 12 hours, please change the attachment position of the infusion tube to a new position 10cm away and then use it.
- Prolonged attachment of the tube to the same area may cause deformation of the tube, which can affect the accuracy of the delivery volume.

NOTE

- When it is necessary to replace the infusion set during infusion, please follow the steps below:
  ① Stop the device operation.
  ② Close the manual roller clamp and open the door of the device to remove the infusion set.
  ③ Replace the infusion set with a new one and remove any air in the infusion tube.
  ④ Attach the infusion tube to the device.
  ⑤ Close the device door and open the manual roller clamp.
  ⑥ Restart the infusion.

※ Compatible infusion set

Manufacturer	Model
B.D. (Becton Dickinson)	AN122, A120F
K.V. (Korea Vaccine)	S203, S203T

5-3 Closing the Door

- Close the door of the device and lock it by pressing the door lock lever downwards

- Be careful not to trap the infusion tube in the door while doing this

5-4 Installation of Drop Sensor (Optional)

- Attach the drop sensor vertically to the drop chamber.
- Do not attach it when not in use.
- For accurate detection, attach it between the drop nozzle inside the drop chamber and the fluid surface within the chamber.
- If the drop sensor is not properly attached vertically, it may cause an "EMPTY ERROR" due to sensor detection error.

5-5 Applicable Drop Count (drops/ml)

- You can set the infusion set capacity in the [INFUSION SET] menu.
- This device supports four different infusion set capacities: 15, 19, 20, 60 drops/ml.

NOTE

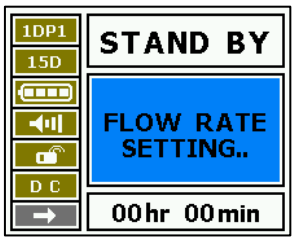
- In the infusion-set selection menu, you can choose the set volume from predefined options; you cannot modify it arbitrarily. If you need a different infusion-set volume, please contact your supplier.

5-6 Setting Flow Rate (ml/h)

- Press the [FLOW RATE (ml/h)] button to make the numbers flash at the top of the FND. You can set the flow rate (ml/h) using the numbers and the [.] button.
- Pressing the [ESC/2s CLR] button for 2 seconds will delete everything.
- After entering the flow rate, press the SEL button to save it, and it will automatically return to the initial screen.
- When setting the flow rate, it will be displayed on the LCD screen as shown in the figure below.

NOTE

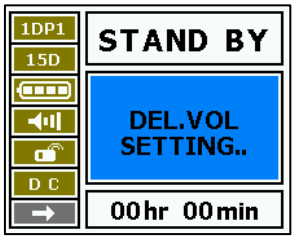
- The set flow rate is saved in the internal memory and will not be erased even if the power is turned off.
- If the set flow rate is out of range, the message "OVER RANGE READJUSTED" will appear, and it will be automatically adjusted.



- In drug library mode or profile mode, the flow rate cannot be changed.
- If not in K.V.O. mode, you can still change the infusion rate even during infusion. Please contact the manufacturer or distributor to utilize this function.
- If the flow rate is adjusted during infusion and reaches the planned delivery volume, the setting will immediately stop, switch to K.V.O. mode.
- This IP-7700 pump is equipment tested for infusion accuracy with liquids of ISO 3696 class III or higher grade. For liquids with high viscosity (density), it is imperative to observe whether the drop chamber's drop count matches the flow rate proportionally for a certain period of time. If there are any discrepancies, adjustments must be made for accurate usage.

5-7 Setting Delivery Volume(ml)

- Press the [DEL.VOL (ml)] button to make the numbers flash in the middle of the FND. You can set the delivery volume (ml) using the numbers and the [.] button.
- Pressing the [ESC/2s CLR] button for 2 seconds will delete everything.
- After entering the delivery volume, press the SEL button to save it, and it will automatically return to the initial screen.
- When setting the delivery volume, it will be displayed on the LCD screen as shown in the figure below.



NOTE

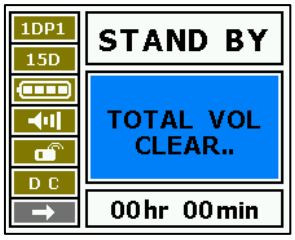
- The set delivery volume is saved in the internal memory and will not be erased even if the power is turned off.

- The set infusion volume should be set slightly below the actual volume in the IV bag. Once this volume is reached, the pump will automatically switch to a low-flow “K.V.O.” (Keep Vein Open) mode to prevent line occlusion from blood coagulation
- Setting the programmed infusion volume to 0 mL allows continuous infusion at the selected flow rate until the bag is empty.
- If the programmed infusion volume is set to “∞,” the cumulative volume counter will stop at 9,999 mL.
- In Drug Library or Profile modes, the infusion rate cannot be changed once infusion has started.
- Outside of K.V.O. mode, you may adjust the programmed infusion volume during infusion. To enable this feature, please contact your manufacturer or supplier.
- During infusion, if the delivery volume is reached when setting the delivery volume, the setting will immediately stop, and the device will switch to K.V.O. mode

5-8 Deleting Total Volume (Σml)

- The total volume refers to the total amount infused up to that point.
- Pressing the [TOTAL.VOL (Σml)] button will make the numbers flash at the bottom of the FND.
- Pressing the [ESC/2sCLR] button for 2 seconds will delete the total volume, and a confirmation sound will be heard, resetting the value to "0.0".
- Pressing the [SEL] button will save it, and it will automatically return to the initial screen.

- When setting the total volume, it will be displayed on the LCD screen as shown in the figure below.



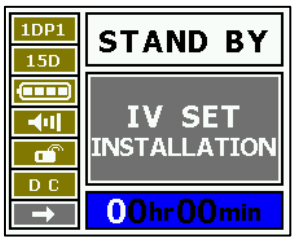
NOTE

- The total volume can reach a maximum of 9999.0mL, so when it reaches 9999.0, it must be reset to '0' in order to resume infusion.

- If the device is not in K.V.O. mode, the total volume can be cleared even during infusion. To enable this feature, please contact the manufacturer or distributor.
- During infusion, if the delivery volume is reached while deleting the total volume, the setting will immediately stop, and the device will switch to K.V.O mode.
- In profile infusion mode, you cannot delete the total volume. Please stop the infusion and then delete it.

5-9 Setting Infusion Time

- Pressing the [SEL] button on the right side of the initial screen will switch the screen to the input mode for the scheduled infusion time, indicated by the flashing at the bottom of the LCD screen. You can input the infusion time in the format HH:MM using the number buttons.
- This input is only possible if at least one of the flow rate or delivery volume values has been entered.
- When setting the infusion time, any unset values for flow rate or delivery volume will be automatically set.
- When setting the infusion time, it will be displayed on the LCD screen as shown in the figure below.



NOTE

- Cumulative volume (TOTAL VOL.) is not automatically calculated, so it must be manually checked to ensure accuracy.
- If neither the flow rate nor the delivery volume is set, a warning will be issued.

5-10 Setting IV Set and Air Removal

- Connect the infusion set to the infusion tube.
- Fill the drop chamber with approximately one-third of the solution.
- Open the manual roller clamp on the solution set to allow the solution to reach the needle at the end of the set. Alternatively, press the [PURGE] button continuously to remove air.
- Once the solution reaches the needle, lock the manual roller clamp to stop the solution from flowing further.

NOTE

- The amount infused by the Purge function is included in the Total Volume measurement.
- While continuously pressing the [PURGE] button on the "STAND BY" screen of the LCD window for air removal from the solution tube, the pump delivers the solution at the set speed (1ml/h to maximum speed).

5-11 Insertion of IV Set Needle

- Insert the needle into the patient.

- This device does not have a function to detect whether the needle is properly inserted into the vein.
- It is essential to periodically check whether the needle is correctly inserted into the vein and if the solution is being accurately delivered.

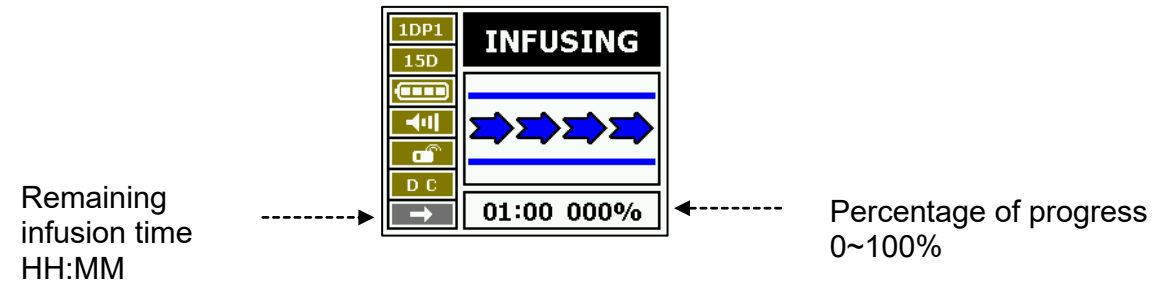
5-12 Start of Infusion

5-12-1 Normal infusion mode.

- Before starting the infusion, ensure that the set flow rate, delivery volume, and selected solution set capacity are accurate.
- Press the [START] button to initiate the infusion.
- The green LED light on the [STATUS] indicator located on the front of the pump will flash, and the screen will display "INFUSING" along with an operating symbol, indicating that the pump is functioning properly.

NOTE

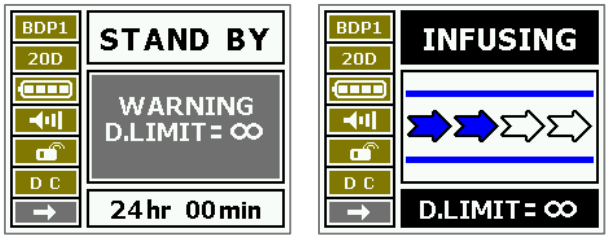
- Ensure that the set flow rate is being delivered correctly.
- If irregular flow rates or volumes are detected, immediately stop the device operation and contact the supplier.
- The following screen is displayed during infusion.
- During infusion, press the [MENU/2sLOCK] button for 2 seconds to lock/unlock button usage.



5-12-2 Infinite infusion mode

- When the delivery volume is set to '0', the infusion will proceed in infinite mode.
- The total volume will be displayed up to a maximum of 9999.0mL.

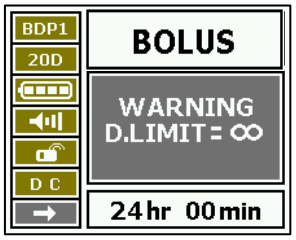
- Upon starting the infusion and during the infusion progress display window, "D.LIMIT= ∞" (the
- mathematical symbol for infinity) will be displayed.



- Once the total volume reaches 9999.0mL, no further accumulation is possible.
- In Infinite mode, the K.V.O. function does not operate.
- In the infinite infusion mode, when the total infused volume reaches 9999 mL, an alarm will sound at 20-second intervals; however, the infusion will continue at the set infusion rate.

5-12-3 Bolus infusion mode

- Bolus infusion allows a specified volume (Bolus Volume) to be delivered at a different rate (Bolus Rate) during an ongoing infusion.
- To begin bolus infusion, press the [PURGE] button for more than 2 seconds during infusion, and "BOLUS" will appear on the display, indicating bolus mode has started.
- During bolus infusion, the FND screen displays the bolus rate, bolus volume, and accumulated bolus amount.
- The bolus rate and volume must be set to 'ON', and if the set volume is '0' or the setting is 'OFF', a "WARNING SET BOLUS" message will appear.
- Refer to the "Bolus Rate Settings" and "Setting up Bolus Function" in the system setup menu to configure these settings.



NOTE

- In "Normal Infusion Mode", bolus infusion cannot exceed the set infusion amount.
- In "Infinite Infusion Mode", bolus infusion can continue indefinitely.
- Pressing the [STOP] button during bolus infusion halts all infusions, even if the bolus dose is not completed.
- Bolus infusion is not available in Profile Mode.

5-12-4 Profile/Drug library mode

- There is a profile infusion function that allows for infusion at different rates every hour for 24 hours.
- There is a drug library function that allows for setting different infusion rates and volumes for each drug
- Please refer to the respective function setup mode.

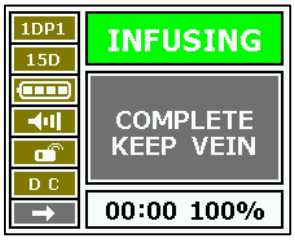
- The Profile/Drug library function is an optional feature. If you wish to use it, please contact the vendor or manufacturer for inquiries.

5-13 Completion of Infusion

- When the set total volume reaches the preset delivery volume, the LCD screen alternately displays the word "COMPLETE" and "KEEP VEIN" along with a blinking indicator and confirmation sound.
- The device switches to a low flow rate to prevent catheter occlusion due to blood clotting (K.V.O.)
- The K.V.O. function remains active until the infusion is stopped by pressing the [STOP] button.
- The following screen is displayed during K.V.O. infusion.

NOTE

- If the delivery volume is set to 0 and the infusion runs continuously, the K.V.O. function will not be activated.



5-14 Pause of Infusion

- Pressing the [STOP] button during infusion will stop the infusion.
- Before resuming, make sure the flow rate, delivery volume, and the capacity of the infusion set are correct.
- After confirming, press the [START] button to resume the infusion.

NOTE

- If any other button is pressed, a warning message "WARNING STOP-INFUSING" will appear on the LCD screen.
- Press the [STOP] button and then the [START] button to resume.

5-15 Power Off

- Press and hold the [POWER] button for 2 seconds to turn the power on or off. However, pressing the [POWER] button during infusion will not turn off the power.
- First, press the [STOP] button to stop the operation, then press the [POWER] button to turn off the power.
- After locking the roller clamp on the infusion set, open the device door and slide the tubing clamp to the right to unlock it, then remove the infusion set.

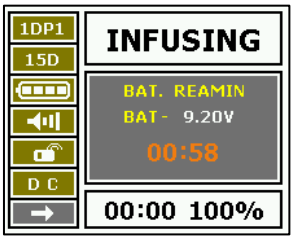
- If the infusion set is removed without fully locking the manual roller clamp, unintended medication may be administered to the patient, so special attention must be taken to prevent this from occurring.

5-16 Checking Battery Remaining

- While in standby or during infusion, pressing the right arrow [→] button allows you to check the battery level.
- Pressing the left arrow [←] button returns you to the battery level screen mode.
- If there is no button input for 20 seconds on the battery level screen, it will automatically return.
- The following screen displays the battery level screen displayed during standby and infusion.

① [STAND BY] Battery Remaining

② [Infusing] Battery Remaining



NOTE

- Battery level time may vary depending on the battery status, so please keep that in mind.

5-17 Handling Alarm

- If an error occurs, press and hold the [SILENCE] button for 2 seconds to silence the alarm. If appropriate action is not taken within 2 minutes, the alarm will sound again.

NOTE

- Please refer to the Trouble shooting manual in this manual.

5-18 Use of Adapter Power

- The adapter is not included in the product components.
- This device can be operated by an adapter DC 24V 1A, DV 12V 2A.

NOTE

- Make sure the adapter cord has an outer diameter of 5.5mm and an inner diameter of 2.1mm.
- Be sure to use products that have passed electrical safety tests such as IEC60601 for medical devices.

5-19 Use of Battery Power

- This device operates by being connected to an external power outlet or a DC jack. In the event of a disruption in external power, it will automatically switch to operate using the built-in rechargeable battery.
- When the device is connected to external power, the battery will automatically begin recharging.

NOTE

- Charging requires a minimum of 6 hours to reach full capacity.
- A fully charged battery can power the device for approximately 4 hours when the flow rate is set to 125mL/h.

- When using the internal battery as a power source, a "BATTERY LOW" warning will appear if the rechargeable battery capacity is insufficient. In this case, connect the device to an external power supply immediately.
- If the battery becomes completely depleted, the device will be automatically shut off. Therefore, do not disconnect the external power supply during infusion if the battery capacity is not sufficient.
- The lifespan of the internal rechargeable battery may decrease over time. It is recommended to have the battery inspected annually by the supplier.
- Even if the rechargeable battery is not used for an extended period, it should be fully charged at least once a month to ensure safe long-term use.
- To check the status of the rechargeable battery, perform complete discharge followed by full recharge 2-3 times to confirm normal operation.
- When initially using the device or after prolonged periods of non-use, connect the device to an external power outlet for at least 6 hours to charge the internal rechargeable battery.

5-20 Nurse Call Function

- Connect the nurse call cord to the nurse call connector located on the back of the device, then connect it to the nurse call system installed in the hospital
- When an alarm occurs, an error message appears on the LCD screen, and depending on the severity of the alarm, a leakage (contact) signal is generated

Alarm Level	Contents	Contact time
High	Occlusion, air detection, drop sensor error door open during infusion	Every 2 seconds
Medium	System error (Internal memory, communication)	Every 4 seconds
Low	Low battery, standby door open, not set	not occurring

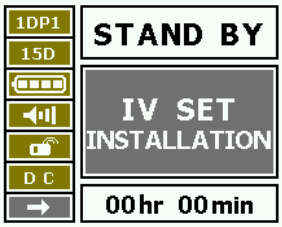
- The Nurse Call Code number used: 06LA548

5-21 Keypad Lock Function

NOTE

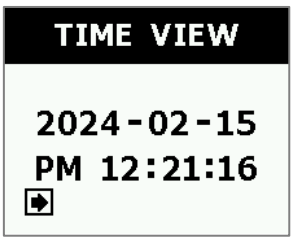
- Press and hold the [MENU/2s] button for 2 seconds to lock the button input while in infusion or standby mode. To unlock, press the [MENU/2s] button for 2 seconds again, or enter the designated PASSWORD according to the settings.
- When locked, a padlock icon will appear on the left side of the display to indicate the locked state.

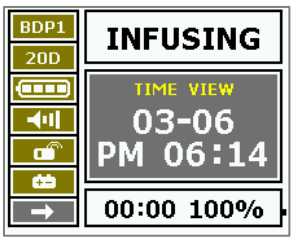
Lock status indication ----------▶



5-22 Checking Time

- Pressing the left arrow [←] button during standby or infusion will display the current time.
- Pressing the right arrow [→] button will return to the initial screen mode.
- The screen will automatically return after 20 seconds of no button input in the time display mode.
- The following image shows the time display screen.

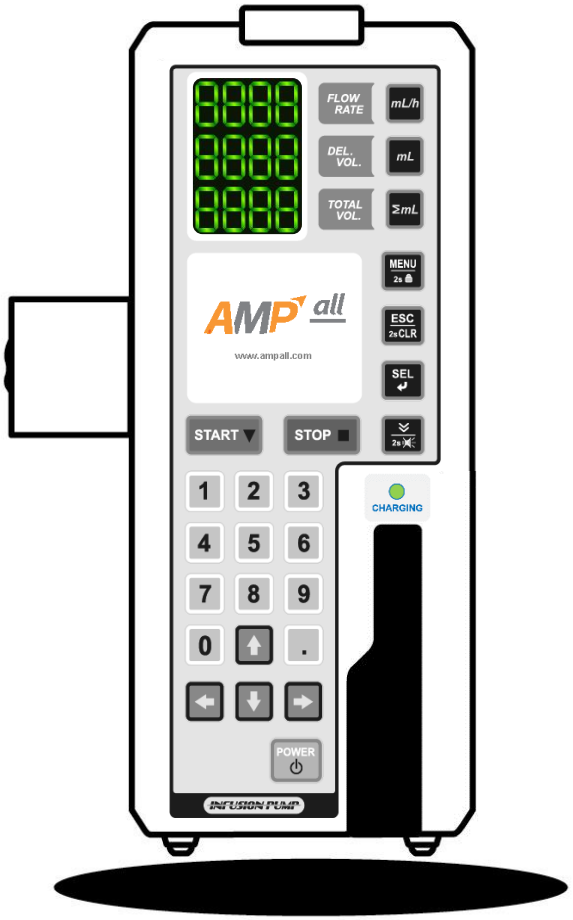




NOTE

- The system uses the time as the reference for recording infusions. If the displayed time is inaccurate, please adjust it via the menu settings

6. System setup



6-1 System Setup Menu Configuration

6-2 Buzzer Level Settings

6-3 Occlusion Level Settings

6-4 Infusion Set Configuration

6-5 Other Flow rate Settings

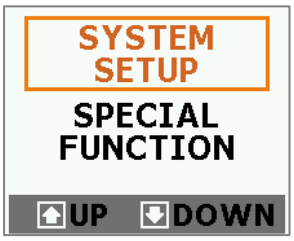
6-6 Display Settings

6-7 Configuration Settings

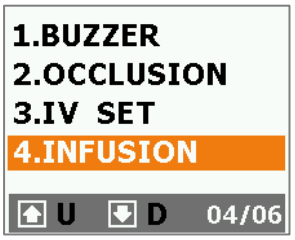
6 System setup

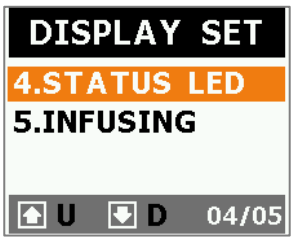
6-1 System Setup Menu Configuration

- This device is divided into two main menus: SYSTEM SETUP and SPECIAL FUNCTION.
- The SYSTEM SETUP menu consists of six submenus as shown in the image below.



- The [4. INFUSION] menu and the [5. DISPLAY] and [6. CONFIG] menus each have their own submenus.





- When you press the [MENU] button, the menu screen will appear, and then you select SYSTEM SETUP by pressing the [SEL] button.
- The MENU options under SYSTEM SETUP are as follows:

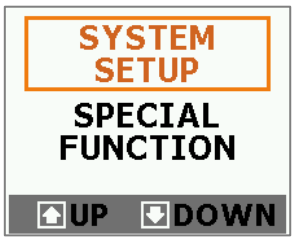
NOTE

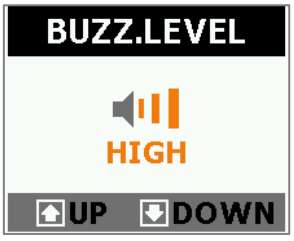
If no button is pressed for 20 seconds in any menu setting, the device will automatically return to the menu setting mode.

Menus	Contents	Menus	Contents
1.BUZZER	Buzzer volume setting	4.INFUSION	Purge, Bolus, K.V.O settings
2.OCCLUSION	Occlusion level setting	5.DISPLAY	Time, Backlight, Status Lamp, Infusion Logo
3.IV SET	Infusion set brand setting	6.CONFIG	Button Lock, Bolus On/Off, Ketone

6-2 Buzzer Level Settings

- Selecting MENU → SYSTEM SETUP → BUZZER in sequence will display the "BUZZ . LEVEL" menu on the LCD screen as shown in the image below.





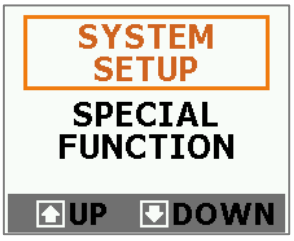
- You can adjust the BUZZER LEVEL by pressing the [UP]/[DOWN] buttons, with three levels available: HIGH, MIDDLE, and LOW.
- Once you've adjusted the level, you can confirm the buzzer size by the sound it emits.
- Press the [SEL] button to confirm your selection or [ESC]/[STOP] button to cancel and return.
- After setting, it will automatically switch back to the previous menu screen.

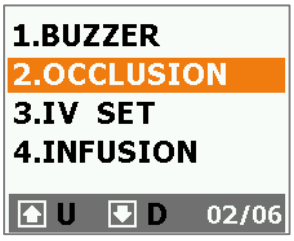
NOTE

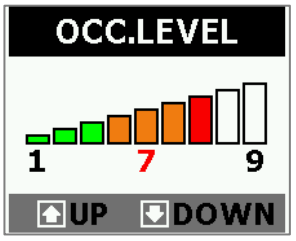
- By default, the device is shipped with the "HIGH" level setting.

6-3 Occlusion Level Settings

- Selecting MENU → SYSTEM SETUP → OCCLUSION in sequence will display the "OCC . LEVEL" menu on the LCD screen as shown in the image below.







- You can adjust the occlusion level by pressing the [UP]/[DOWN] buttons, with levels ranging from 1 to 9.
- Level 1 represents the most sensitive occlusion detection level, while level 9 indicates the least sensitive.
- The numbers in the middle indicate the current level, with the ends representing the range from 1 to 9.
- Press the [SEL] button to confirm your selection or [ESC]/[STOP] button to cancel and return to the previous menu.
- After setting, it will automatically switch back to the previous menu screen.

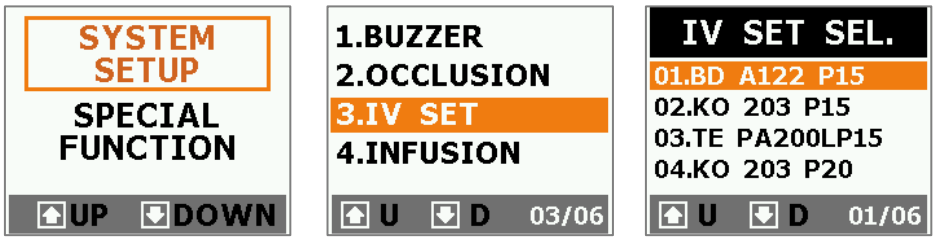
NOTE

- The product is shipped with the level set to "7" by default.

Level	Pressure Range	EN60601-2-24:2015 Test Results
Level 1-3	4.5 PSI or above, less than 7.5 PSI	Level1, 25mL/h: Within 10 seconds Infusion volume within 0.07mL Measuring Pressure:5.08PSI (35.0kPa)
Level 4~6	7.5 PSI or above, less than 11.5 PSI	-
Level 7~9	11.5 PSI or above, less than 14.5 PSI	Level 9, 25mL/h: Within 180 seconds Infusion volume within 1.25mL Measuring Pressure:12.8PSI (88.0kPa)

6-4 Infusion Set Configuration

- Selecting MENU → SYSTEM SETUP → IV SET will display the "IV SET SEL." menu on the LCD screen as shown in the image below.



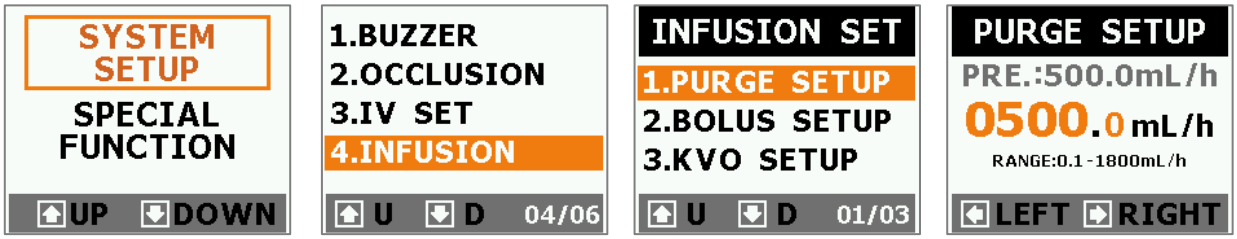
- You can use the [UP]/[DOWN] buttons to select a pre-configured infusion set. Up to 10 infusion sets can be selected based on predefined specifications.
- Press the [SEL] button to confirm your selection or [ESC]/[STOP] button to cancel and return to the previous menu.
- After setting, it will automatically switch back to the previous menu screen.

- Please ensure that the selected infusion set matches the infusion set product you intend to use.
- The manufacturer is not responsible for any issues resulting from the use of non-specified infusion sets.
- To use an infusion set other than the pre-configured options, please contact your seller or the manufacturer for assistance.

6-5 Other Flow rate Settings

6-5-1 Purge rate setting

- Selecting MENU → SYSTEM SETUP → INFUSION → PURGE SETUP will display the "PURGE SETUP" menu on the LCD screen as shown in the image below



- When entering the menu, the pre-set value will be displayed.

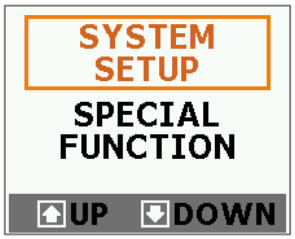
- You can adjust the settings by pressing the [UP]/[DOWN] buttons and the number buttons when the numbers are blinking at the setting position.
- Use the left and right arrow buttons to move to different setting positions.
- RANGE indicates the range of settings.
- Press the [SEL] button to confirm your selection or [ESC]/[STOP] button to cancel and return.
- After setting, it will automatically switch back to the previous menu screen.

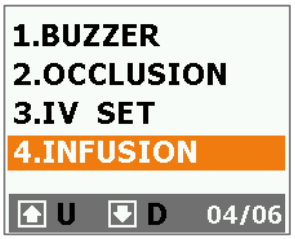
NOTE

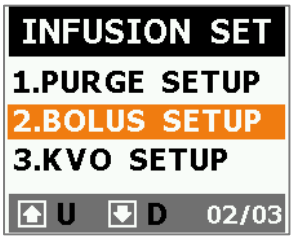
- The product is shipped with a default flow rate setting of 500mL/h.

6-5-2 Bolus rate setting

- The Bolus function allows you to change the rate during infusion to deliver a specific amount of fluid. Selecting MENU → SYSTEM SETUP → INFUSION →BOLUS SETUP will display the "BOLUS SET" menu on the LCD screen as shown in the image below.







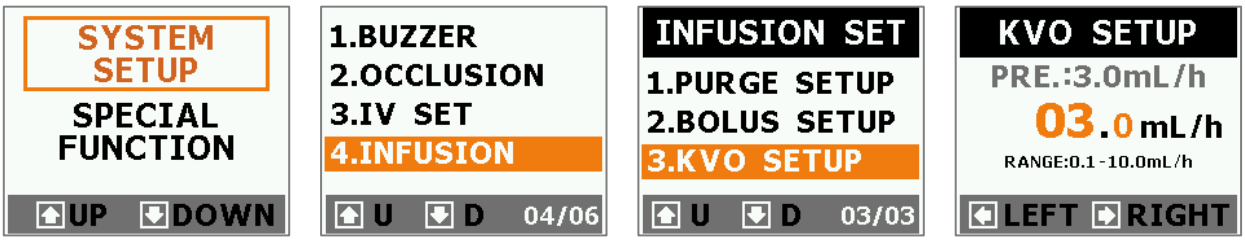
- When entering the menu, the pre-set value will be displayed.
- You can adjust the settings by pressing the [UP]/[DOWN] buttons and the number buttons when the numbers are blinking at the setting position.
- Use the left and right arrow buttons to move to different setting positions.
- RANGE indicates the range of settings.
- Press the [SEL] button to confirm your selection or [ESC]/[STOP] button to cancel and return to the previous menu.
- After setting, it will automatically switch back to the previous menu screen.

NOTE

- By default, the bolus flow rate and bolus volume are set to 0 mL/h and 0 mL, respectively, when the product is shipped.
- The bolus function must be enabled (set to ON) in the CONFIG settings to use this feature.
- To initiate a bolus infusion, press and hold the [PURGE] button for more than 2 seconds during infusion.

6-5-3 K.V.O. setting

- The K.V.O. (Keep Vein Open) function maintains infusion at a low rate after the programmed delivery volume has been delivered to prevent venous thrombosis due to clotting.
- Selecting MENU → SYSTEM SETUP → INFUSION → KVO SETUP will display the "KVO SETUP" menu on the LCD screen as shown in the image below.



- When entering the menu, the pre-set value will be displayed.
- You can adjust the settings by pressing the [UP]/[DOWN] buttons and the number buttons when the numbers are blinking at the setting position.
- Use the left and right arrow buttons to move to different setting positions.
- RANGE indicates the range of settings.
- Press the [SEL] button to confirm your selection or [ESC]/[STOP] button to cancel and return to the previous menu.
- After setting, it will automatically switch back to the previous menu screen.

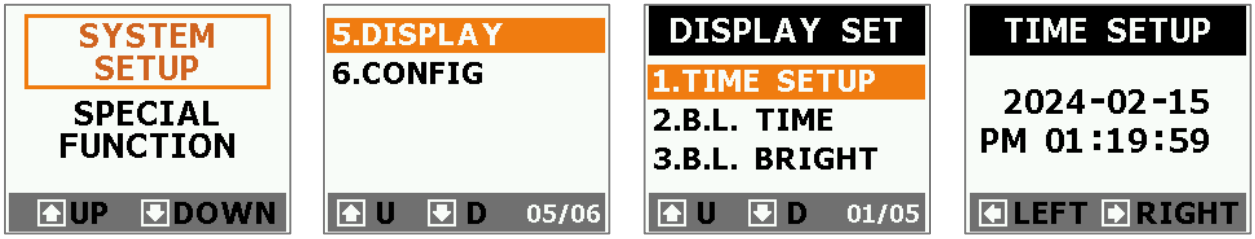
NOTE

- The product is shipped with a default bolus K.V.O. flow rate to 3.0 mL/h

6-6 Display setting

6-6-1 Time setting

- Selecting MENU → SYSTEM SETUP → DISPLAY → TIME SETUP will display the "TIME SETUP" menu on the LCD screen as shown in the image below



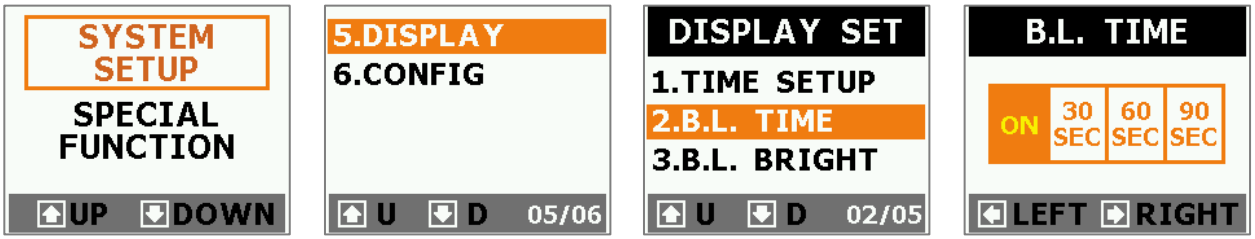
- When a number blinks at the setting position, you can adjust it by pressing the [UP]/[DOWN] buttons and the number buttons.
- Use the left and right arrow buttons to move to different setting positions.
- Use the [UP]/[DOWN] buttons to set AM/PM for indicating morning or afternoon.
- Press the [SEL] button to confirm your selection or [ESC]/[STOP] button to cancel and return to the previous menu.
- After setting, it will automatically switch back to the previous menu screen.

NOTE

- The system uses this time as the reference for recording infusions. Since there is no automatic correction, slight discrepancies may accumulate over time.

6-6-2 Backlight time setting

- The backlight time setting determines how long the LCD backlight remains on after a button input.
- Selecting MENU → SYSTEM SETUP → DISPLAY → B.L. TIME will display the "B.L. TIME" menu on the LCD screen as shown in the image below.



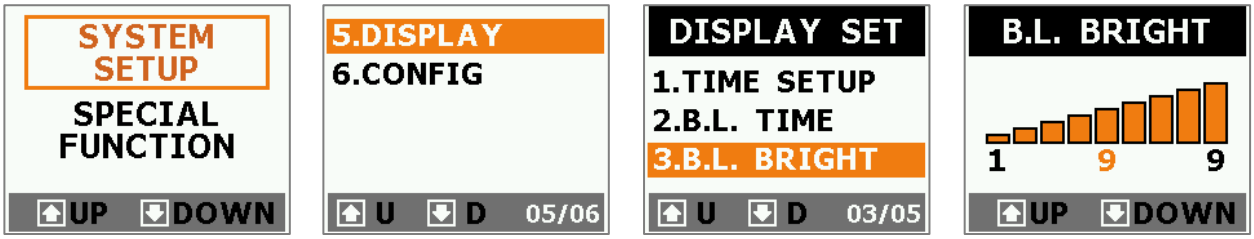
- You can navigate to different setting positions using the left and right arrow buttons.
- You can choose from options ranging from backlight always ON to 30, 60, or 90 seconds.
- When you've made your selection, press the [SEL] button to confirm and complete the setting. If you want to cancel and return to the previous menu, press the [ESC]/[STOP] button.
- After setting, it will automatically switch back to the previous menu screen.

NOTE

- The product is shipped with the backlight always ON by default.
- To reduce power consumption when running on battery, set the backlight timeout to 30 seconds.

6-6-3 Backlight brightness setting

- Selecting MENU → SYSTEM SETUP → DISPLAY → B.L.BRIGHT will display the "B.L.BRIGHT" menu on the LCD screen as shown in the image below.



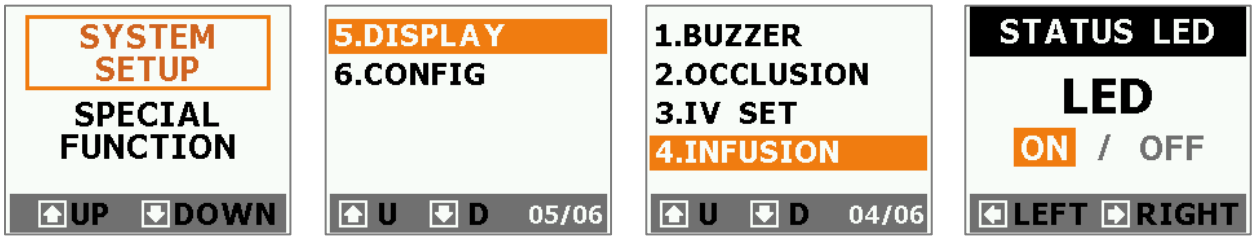
- You can adjust the blockage level by pressing the [UP]/[DOWN] buttons, with levels ranging from 1 to 9.
- Level 1 is the darkest level.
- Press the [SEL] button to confirm your selection or [ESC]/[STOP] button to cancel and return to the previous menu.
- After setting, it will automatically switch back to the previous menu screen.

NOTE

- The product is shipped with a default setting of level "9".
- To reduce power consumption when running on battery or to lower brightness, set the level to 1.

6-6-4 Status lamp setting

- The status lamp setting controls the operation of the lamp located at the top.
- Selecting MENU → SYSTEM SETUP → DISPLAY → STATUS LED will display the "STATUS LED" menu on the LCD screen.



- You can toggle the status LED ON/OFF using the [UP]/[DOWN] or [←]/[→] buttons.
- When the lamp is turned off, the status lamp will not light up during infusion or alarm states.
- Press the [SEL] button to confirm your selection or [ESC]/[STOP] button to cancel and return to the previous menu.
- After setting, it will automatically switch back to the previous menu screen.

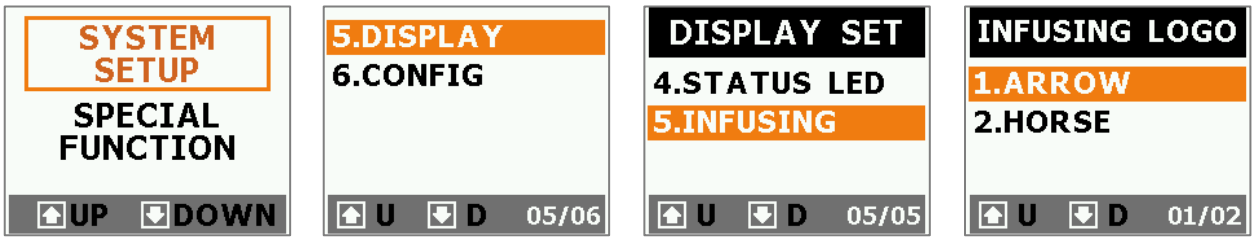
NOTE

- The product is shipped with the status LED set to "ON" by default.
- To reduce power consumption when running on battery, you may turn off the LED.

6-6-5 Infusion progress screen display setting

This function allows you to select the operation display screen to show on the infusion progress screen.

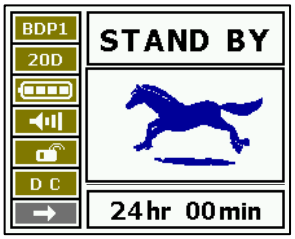
- When you select MENU → SYSTEM SETUP → DISPLAY → INFUSING, the LCD screen will display the "INFUSING LOGO" menu as shown below.



- Use the [UP]/[DOWN] and [←]/[→] buttons to select the logo.
- Press the [SEL] button to confirm your selection. Press [ESC]/[STOP] to cancel and return to the previous menu
- After setting, it will automatically switch back to the previous menu screen.

① Progressing ARROW

② Running HORSE



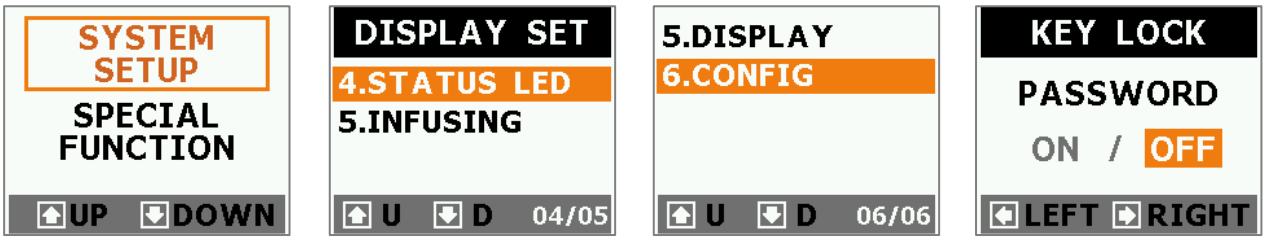
NOTE

- The product is shipped with the "ARROW" logo selected by default.

6-7 Configuration Settings

6-7-1 Button lock setting

- This menu allows you to set the button lock function to prevent operation by anyone other than the operator during infusion or standby.
- Select MENU → SYSTEM SETUP → CONFIG → KEY LOCK PASS. The LCD screen will display the "KEY LOCK" menu as shown below.



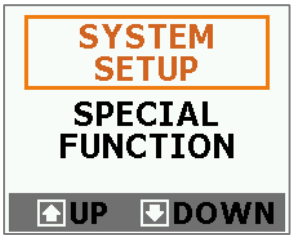
- Use the [UP]/[DOWN] and [←]/[→] buttons to set ON/OFF.
- If set to ON, a 4-digit password must be entered to unlock the buttons.
- Press the [SEL] button to confirm your selection. Press [ESC]/[STOP] to cancel and return to the previous menu.
- After setting, it will automatically switch back to the previous menu screen.

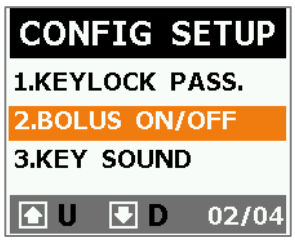
NOTE

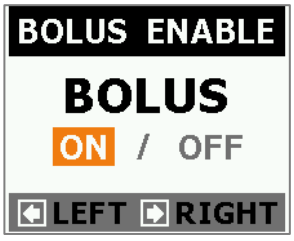
- The setting is shipped with "OFF" as the default.

6-7-2 Setting up the bolus function

- Select MENU → SYSTEM SETUP → CONFIG → BOLUS ON/OFF to access the "BOLUS ENABLE" menu on the LCD screen.







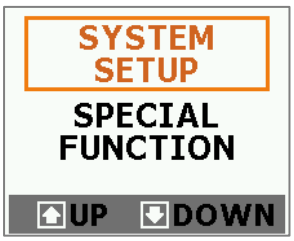
- Use the [UP]/[DOWN] or [←]/[→] buttons to select ON/OFF.
- If set to OFF, the bolus function cannot be used.
- Press the [SEL] button to confirm the settings, or press [ESC]/[STOP] to cancel and return to the previous menu.
- After setting, it will automatically return to the previous menu screen.

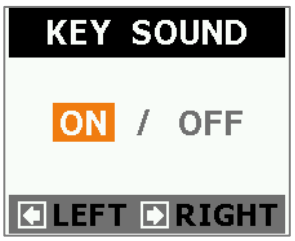
NOTE

- The setting is shipped with "OFF" as the default.

6-7-3 Key tone setting

- Selecting MENU → SYSTEM SETUP → CONFIG → KEY SOUND will bring up the "KEY SOUND" menu on the LCD screen, as shown in the image below





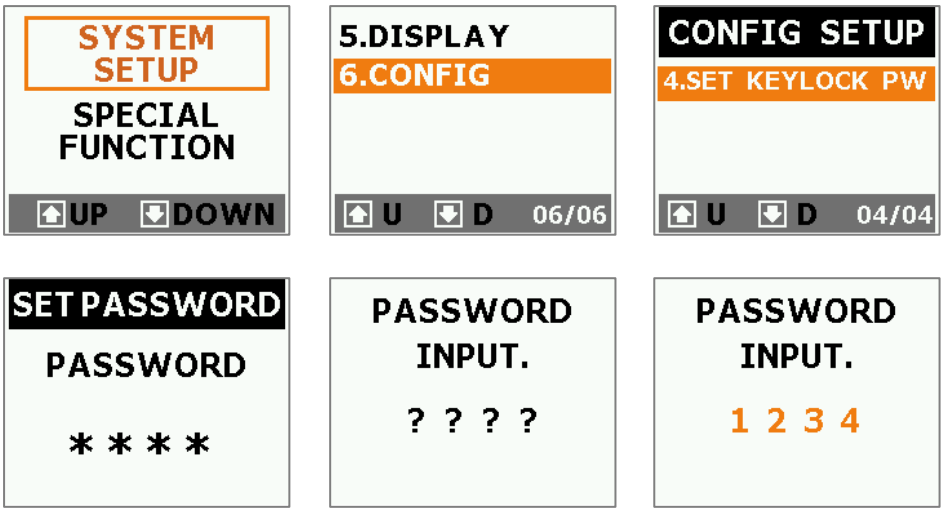
- Press the [UP]/[DOWN] or [←]/[→] buttons to toggle between ON and OFF.
- When set to OFF, no beep sound will occur when pressing the buttons.
- Press the [SEL] button to confirm the setting, or press [ESC]/[STOP] to cancel and return to the previous menu.
- After setting, the screen will automatically return to the previous menu.

NOTE

- The product is shipped with the setting "ON" enabled by default.

6-7-4 Button lock password setup.

- When you select MENU→SYSTEM SETUP→CONFIG→SET KEYLOCK PW, the LCD screen will display the "SET PASSWORD" menu as shown below.

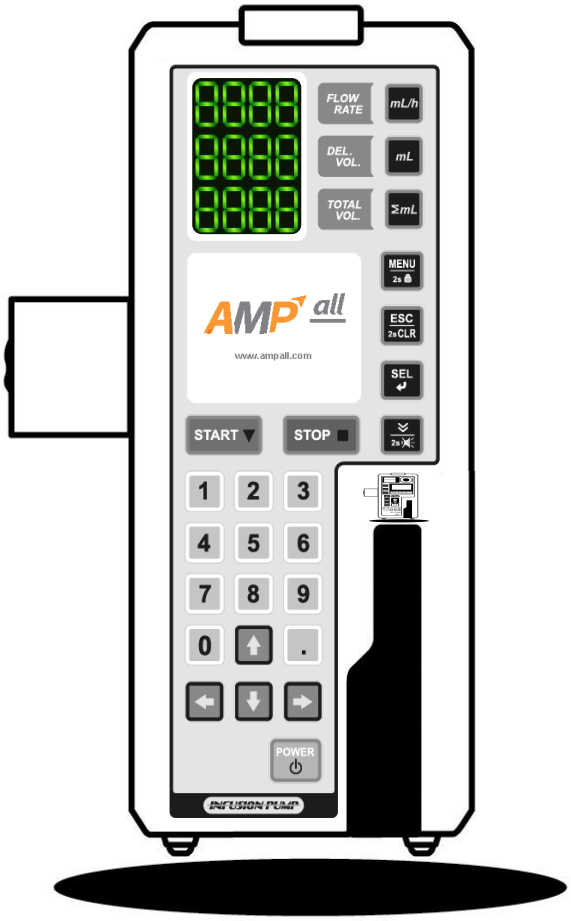


- Please enter the previously set 4-digit password. The default password is "0000".
- If the password is correct, the message "PASS" will be displayed, and you can proceed with the password setup.
- If the password is incorrect, the message "FAIL" will be displayed, and you will return to the previous menu.
- In the "PASSWORD INPUT" menu, enter the 4-digit password using the number buttons.
- For example, if you entered "1234", press the [SEL] button to complete the setup.
- Press [ESC]/[STOP] to cancel and return.
- After the setup, the screen will automatically return to the previous menu.

NOTE

- The default password upon product shipment is "0000".
- If the password is forgotten, please contact your vendor or the manufacturer for assistance.

7.Special Functions setup



7-1 Special Functions Menu Configuration

7-2 Dosage Function

7-3 History Function

7-4 Profile Function

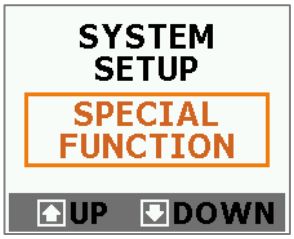
7-5 Drug Library Function

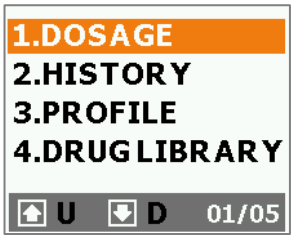
7-6 Pro Mode

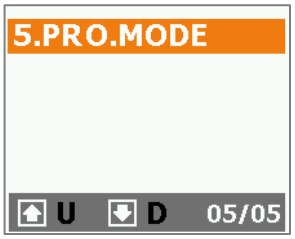
7 Special Functions setup

7-1 Special Functions Menu Configuration

- This device is divided into two main menus: System Setup and Special Function.
- The Special Function menu consists of five submenus as shown in the figure below.







- Press the [MENU] button to access the menu screen, then select SPECIAL FUNCTION and press [SEL].
- SPECIAL FUNCTION includes the following options.

- This menu contains optional features. If you would like to enable them, please contact your dealer or the manufacturer.

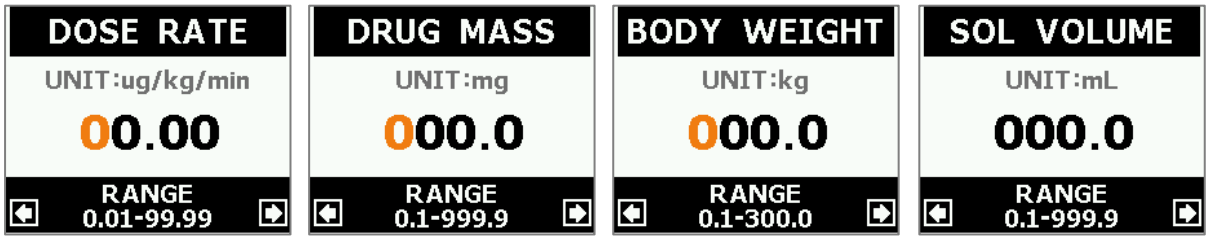
NOTE

- In all menu settings, if there is no button input for 20 seconds, it will automatically return to the menu setting mode.
- The table below shows the menu contents according to the option settings.

Menus	Contents	Options
1.DOSABE	Dosage Automatic Calculation Feature	Optional
2.HISTORY	Infusion History Review Feature	Basic: 10 events, Option: 2000 events
3.PROFILE	24-Hour Profile Infusion Function	Optional
4.DRUG LIBRARY	2000-Entry Drug Library	Optional
5.PRO MODE	Infusion set addition feature	Sales representative or manufacturer usage function
Maximum flow rate	Maximum 1000mL/h	Maximum 1800mL/h

7-2 Dosage function

- The Dosage Function allows you to calculate the optimal infusion rate based on infusion time, patient weight, drug concentration, and other patient-specific factors.
- When you select MENU → SPECIAL FUNCTION → DOSAGE, the LCD screen displays the "DOSE RATE" menu as shown in the image below.



- Proceed with the inputs in the order: "DOSE RATE" - "DRUG MASS" - "BODY WEIGHT" - "SOL VOLUME".
- Utilize the number buttons and [UP]/[DOWN] buttons to input parameters within the designated range at each step.
- Navigate to the desired input field using the left and right arrow [←]/[→] buttons.
- Press the [SEL] button to confirm each step once the input is complete.
- [Press the [ESC/2sCLR] button to return to the previous step for correction if needed.
- Upon reaching the final step, all values entered will be displayed.
- Select "YES" using the left and right arrow [←]/[→] buttons to confirm if the input is correct, then proceed to complete the process.

- Once the input is complete, the flow rate is automatically calculated using the entered parameters, and it will be displayed at the top of the FND as a calculation formula.

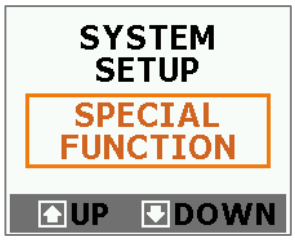
$$\left\{ \frac{\text{Dose Rate (ug/kg/min)} \times \text{Body Weight(kg)} \times \text{Solution Volume(ml)}}{\text{Drug Mass(mg)} \times 1000} \right\} \times 60$$

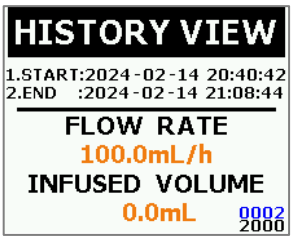
NOTE

- The infusion flow rate cannot be set beyond the maximum allowable limit. If the calculated rate exceeds this limit, the message "Flow Rate Exceeds – Readjusted!" will appear, and the rate will be automatically adjusted to the maximum allowable value.
- The scheduled delivery volume and cumulative total volume must be set manually and are not automatically calculated.

7-3 History Function

- When you select MENU → SPECIAL FUNCTION → HISTORY, the LCD screen will display the "HISTORY VIEW" menu as shown in the image below.





- "0001.240214-21:12" represents the most recent record logged on February 14, 2024, at 21:12.
- Press the [UP]/[DOWN] buttons to navigate to the desired information, then press [SEL] to confirm.
- You can view the start time [1. START]and end time [2. END] of the infusion.
- Check the flow rate [FLOW RATE] and infused volume [INFUSED VOLUME].
- The numbers in the bottom right corner indicate the position of the information.
- In view mode, use the directional keys to move through the information.
- Press [ESC]/[STOP] to return once viewing is complete.

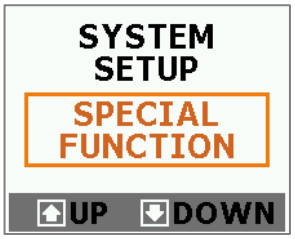
NOTE

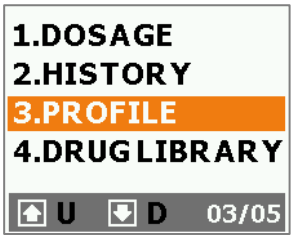
- You can view up to 10 infusion records, and depending on the option settings, you can view up to 2000 records.
- To enable the option for store 2000 records, please contact your supplier or manufacturer.

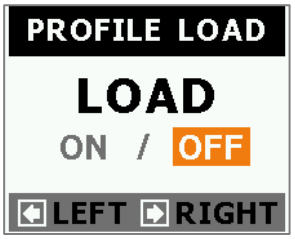
7-4 Profile Function

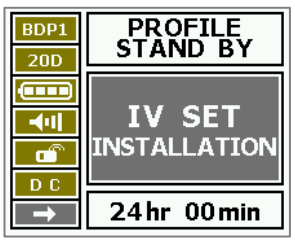
7-4-1 Using the Profile feature

- The profile function allows infusion at different rates set at one-hour intervals over a 24-hour period.
- Select MENU → SPECIAL FUNCTION → PROFILE → PROFILE LOAD to access the profile settings menu.
- If no profile is set, the message "Please Setup PROFILE first!" will be displayed, and the system will automatically return. Ensure to configure the profile settings before use.









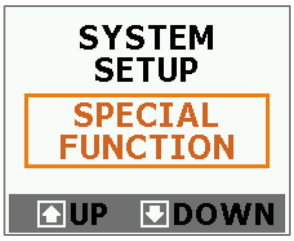
- If a profile is set, you can activate the profile function by selecting ON. Once activated, the system will switch to PROFILE mode and automatically set the flow rate and total scheduled volume for the 1st profile over a 24-hour period before returning to the initial screen.
- Selecting OFF will deactivate the profile function, returning to the previous normal mode where the flow rate, scheduled volume, and total infused volume will be displayed on the FND screen before auto-returning.

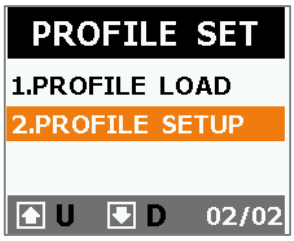
NOTE

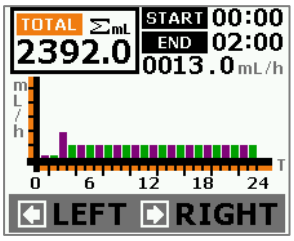
- When in profile mode, even if the power is turned off, the system will maintain the profile mode.
- Starting infusion in profile mode will follow the set flow rates at one-hour intervals over 24 hours from the starting point.
- Even if infusion is stopped, the system will remember the current profile position. Be sure to check the accumulated total volume and progress rate when resuming infusion.
- To restart the profile from the beginning (1st profile), reset the accumulated total volume to 0.
- During infusion, press the [MENU/2sLOCK] button for 2 seconds to lock/unlock button usage.

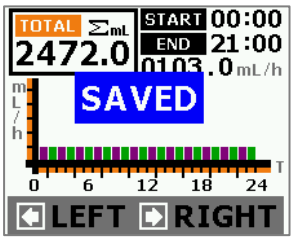
7-4-2 Profile Editor

- The profile function allows infusion at different rates set at 1-hour intervals over a 24-hour period.
- Selecting MENU → SPECIAL FUNCTION → PROFILE → PROFILE SETUP will display the PROFILE EDIT menu on the LCD screen.









- Move the cursor to each input position using the left and right arrow [←]/[→] buttons.
- Input values using the number buttons and [UP]/[DOWN] buttons.
- Press [SEL] to set the first END time.
- The time units for setting are in 1-hour increments, up to 24 hours.
- Depending on the set time range, the corresponding graph position will flash.
- Press [SEL] to input the flow rate per hour within the specified range.
- For the next segment, the END time of the previous segment becomes the START time, and you input the END time again.
- The total volume [TOTAL] is automatically calculated in the top left corner.
- Press [ESC] to move back to the previously set segment.

- Once the settings are complete, verify the graph size for each flow rate by pressing [SEL] repeatedly to confirm the flow rates for each segment.
- Press [START] to save the profile. "SAVED" will appear on the screen, and it will return to the menu automatically.

NOTE

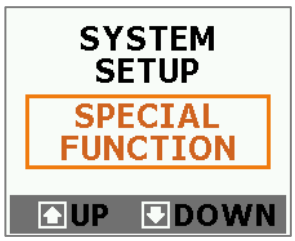
- If the flow rate is set lower than the K.V.O., it will automatically convert to the K.V.O. value.
- The total volume cannot exceed 9999 ml.
- If you want to proceed with the profile for less than 24 hours, entering preset K.V.O. flow rate or 0mL/h for the remaining portion will automatically set it to K.V.O. flow rate.
- Continuous K.V.O. flow rate at the end will persist as K.V.O. infusion during profile infusion, effectively setting the profile for less than 24 hours.

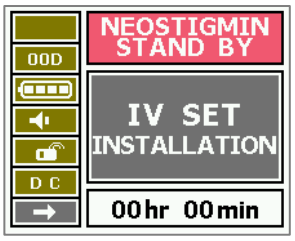
The continuous K.V.O at the end is not included in the total volume [TOTAL].

7-5 Drug Library function

7-5-1 Using the Drug Library feature

- The Drug Library feature allows you to assign separate flow rates and delivery volumes for drugs used repeatedly and to conveniently use the stored information.
- Selecting MENU → SPECIAL FUNCTION → DRUG LIBRARY → LIBRARY LOAD will display the "DRUB LIB. LAOD" menu on the LCD screen.
- If no library is selected or set up, the message "Please Setup LIBRARY first!" will be displayed, and it will automatically return. Set up the library.





- If the library is set up, you can activate the library function by selecting ON. Once activated, the system will switch to Drug Library mode, and the selected library color and drug information will be displayed at the top of the LCD screen.
- Selecting OFF will deactivate the library function and return the system to normal mode, where flow rates and scheduled delivery volumes are shown on the FND screen. The system will then return automatically.

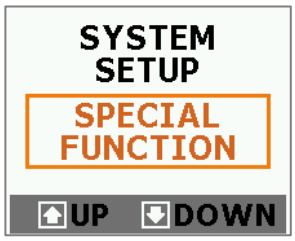
NOTE

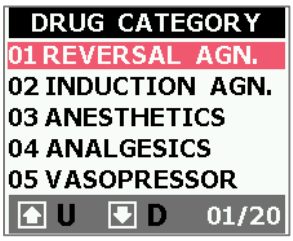
- When the Drug Library mode is activated, it remains enabled even after the power is turned off.
- In Drug Library mode, flow rate and delivery volume cannot be changed directly from the home screen.

- To modify the flow rate and delivery volume in Drug Library mode, navigate to: MENU → SPECIAL FUNCTION→ DRUG LIBRARY→ LIBRARY SETUP → EDIT, then set the flow rate and delivery volume setting.

7-5-2 Drug library editing

- Drug library function allows separate assignment of flow rate and planned delivery volume for regularly used drugs, facilitating convenient access to stored information. Select MENU → SPECIAL FUNCTION → DRUG LIBRARY → LIBRARY SETUP to access the DRUG CATEGORY editing menu on the LCD screen.

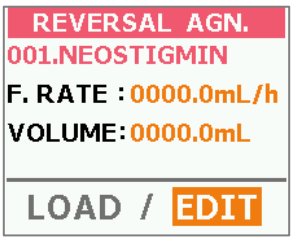


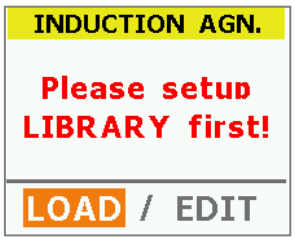


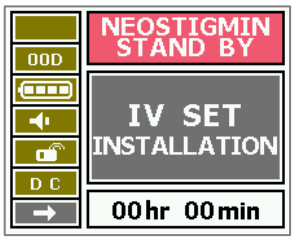
- Use the [UP]/[DOWN] buttons to navigate to the desired category for editing/loading among the 20 categories, then press the [SEL] button to select.
- The predefined names/colors and factory default values for the 20 categories are as follows:
- Category and Library List NOTE

Category Names	Colors	Descriptions	RGB565	Default Drug Library name 1	Default Drug Library name 2
1.REVERSAL AGENTS		Magenta	F2CE	NEOSTIGMIN	GLYCOPYRRO
2.INDUCTION AGENTS		Dark yellow	EF43	PROPOFOL	KETAMINE
3.ANESTHETICS		Light gray	C5B4	KETAMINE	LIDOCAINE
4.ANALGESICS		Cyan	869C	MORPHINE	FENTANYL
5.VASOPRESSOR		Dark pink	DDDA	DOPAMINE	MEPHENTERM
6.ANTICHOLINERGICS		Green	AEAD	ATROPINE	GLYCOPYRRO
7.ANTIBIOTIC		Light blue	0013	PENICILLIN	CEPHALOSPO
8.ANTIVIRAL		Royal	000F	ACYCLOVIR	GANCICLOVI
9.ANTIFUNGAL		Brown	7800	FLUCONAZOL	AMPHOTERIC
10.ANTICANCER		Dark blue	220D	PACLITAXEL	DOXORUBICI
11.CARDIOVASCULAR		Olive	7BE0	NITROGLYCE	DOBUTAMINE
12.ANTIARRHYTHMICS		Dark Orange	D324	AMIODARONE	QUININDIUM
13.ANTIHYPERTENSIVE		Sky blue	07FF	FUROSEMIDE	BUMETANIDE
14.SEDATIVE		Dark Blue	003F	MIDAZOLAM	PROPOFOL
15.ANTICOAGULANT		Dark green	03E0	HEPARIN	WARFARIN
16.IMMUNOSUPPRESSIVE		Blue	0013	HYDROCORTI	DEXAMETHAS
17.ANTIPSYCHOTIC		Bright brown	BC40	ATROPINE	GLYCOPYRRO
18.ANTIEMETIC		Green	03E0	ONDANSETRO	METOCLOPRA
19.ANTICONVULSANTS		Pure blue	001F	PHENYTOIN	LEVITIRACE
20.NUTRIENTS		purple	780F	VITAMIN	POTASSIUM

- Use the [UP]/[DOWN] buttons to scroll through the categories to find the medication list you want to edit, then press the [SEL] button to select it.







- Use the left and right arrow [←]/[→] buttons to edit, or navigate to the medication you want to load under [LOAD], then press the [SEL] button to select.
- If the information for the selected medication is empty when [LOAD] is chosen, the display will show "Please Setup LIBRARY first!" and return to the main menu automatically.
- Once the drug library is correctly set up, it returns to the home screen, and the selected medication, such as [NEOSTIGMIN], is labeled accordingly.
- This label remains even when the power is turned off, and if you no longer wish to use the drug library, you must set it to OFF according to the instructions in " Using the Drug Library feature ".
- Selecting [EDIT] enters medication edit mode.
- Use the left and right arrow buttons to navigate to the desired alphabet position and press [SEL] to complete the input.
- Pressing [SEL] alone moves to the next character position, allowing for input of up to 10 characters for the medication name.
- Pressing the [ESC] button will navigate to the next infusion rate setting position.
- Use the number buttons and [UP]/[DOWN] buttons to input the flow rate (F.RATE) at the designated position.
- Use the number buttons and [UP]/[DOWN] buttons to input the delivery volume (VOLUME) at the designated position.
- After completing the input for the last digit of the VOLUME, press [SEL] to save the value.

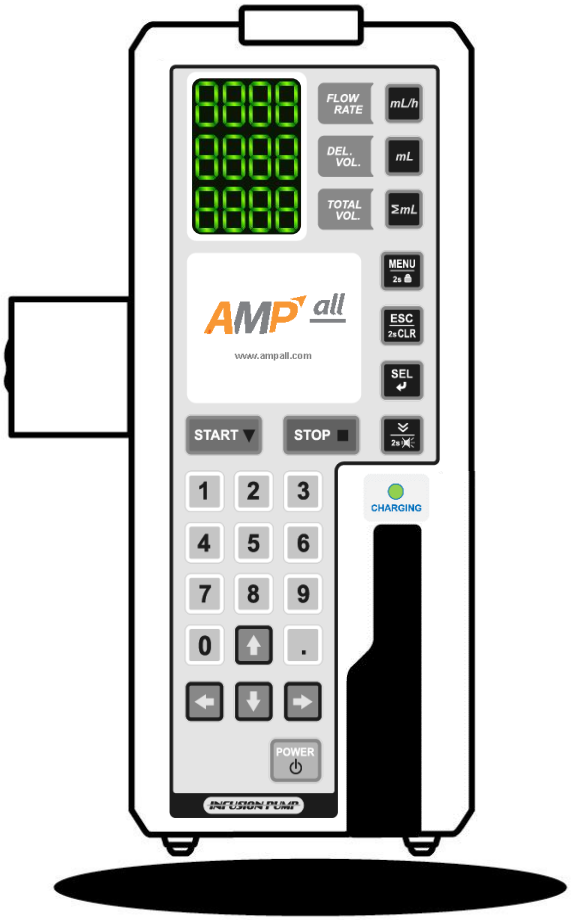
NOTE

- When the Drug Library mode is activated, it will be maintained even if the power is turned off.
- In drug library mode, you cannot change the flow rate and delivery volume from the initial screen.
- In drug library mode, to change the flow rate and delivery volume, select MENU → SPECIAL FUNCTION→ DRUG LIBRARY→ LIBRARY SETUP → EDIT, then set the flow rate(F.RATE) and delivery volume(VOLUME).

7-6 Pro Mode

- The Pro Mode is intended for testing the addition and removal of infusion sets and is not accessible to users.
- For infusion set changes or additions, please contact the distributor or manufacturer.

8. Trouble shooting



If any issues occur, please take the following actions. If the problem cannot be resolved using these steps, contact your local authorized dealer immediately.

8 Trouble shooting

NOTE Whenever alarm goes off, the pump stops infusion and [STATUS] LED on top of the pump flashes red. The alarm will only sound in the event of an error during infusion.

Symptom	Cause	Action
Pump is not switched on.	• AC or DC power cord is not connected properly	▶Check the AC or DC power cord connection. • Never connect both AC and DC power to the pump at the same time 
	• Internal battery has deteriorated	▶Stop the operation of the pump and replace with a new battery through your local authorized dealer.
	• The voltage of the internal battery is low.	▶Recharge the battery fully for more than 6 hours by connecting the pump to an AC power outlet.
The [AIR] LED flashes and alarm sound goes off with showing "AIR IN LINE" on the LCD.	• Air bubble is in the tubing • IV set is not properly placed • Air-In-Line detector is stained	1. Turn the alarm off by pressing [SILENCE] button. ▶2. Make "STAND-BY" mode by pressing [STOP] button. ▶3. Close the manual roller clamp on IV set. ▶4. Open the door and push the release lever to the right to release the tubing clamp. ▶5. Take the infusion line from the pump and tap the tube to make the air bubble gather into the drip chamber. (In case that Air-In-Line detector is stained, clean it with a gauze cloth or similar, moistened with cold or tepid water) ▶6. Set the infusion line back properly in place. ▶7. Close and lock the door securely. ▶8. Open the manual roller clamp on IV set. ▶9. Check the setting delivery rate, delivery limit and volume of medicine bag. ▶10. Restart infusion by pressing [START] button.
	• IV set is not compatible with this pump.	▶Check the compatibility of IV set with your local dealer.
The [OCC] LED flashes and alarm sound goes off with showing "OCCLUSION" on the LCD.	• The manual roller clamp is closed.	▶1. Turn the alarm off by pressing [SILENCE] button. ▶2. Make "STAND-BY" mode by pressing [STOP] button. ▶3. Open the manual roller clamp on IV set. ▶4. Check the setting delivery rate, delivery limit and volume of medicine bag. ▶5. Restart infusion by pressing [START] button

Symptom	Cause	Action
The [OCC] LED flashes and alarm sounds continuously showing "OCCLUSION" on the LCD.	• The manual roller clamp is closed.	▶6. Close and lock the door securely. ▶7. Open the manual roller clamp on IV set. ▶8. Check the setting delivery rate, delivery limit and volume of medicine bag. ▶9. Restart infusion by pressing [START] button.
	• IV set is not compatible.	▶Check the compatibility of IV set with your local dealer.
	• Tubing is kinked or twisted • IV set is not properly placed • Tubing is stretched or shrunk	▶1. Turn the alarm off by pressing [SILENCE] button. ▶2. Make "STAND-BY" mode by pressing [STOP] button. ▶3. Close the manual roller clamp on IV set. ▶4. Open the door and push the release lever to the right to release the tubing clamp. ▶5. Take the infusion line from the pump, check the infusion line and take a corrective action like untwisting or replacing with a new one to solve the problem of occlusion. ▶6. Set the infusion line back properly in place. ▶7. Check the setting delivery rate, delivery limit and volume of medicine bag. ▶8. Restart infusion by pressing [START] button.
The [FLOW] LED flashes and alarm sounds continuously showing "FLOW ERR" on the LCD. Also, [FLOW] LED flashes and alarm sounds continuously in case of Free Flow situation.	• The setting of drop volume is not correct. (e.g., In case of the use of IV set with 60drops/ml, the drop volume is set at 15drops/ml, 19drops/ml or 20drops/ml.)	▶1. Turn the alarm off by pressing [SILENCE] button. ▶2. Make "STAND-BY" mode by pressing [STOP] button. ▶3. By pressing [INFUSION SET] button, select the correct drops. ▶4. Check the setting delivery rate, delivery limit and volume of medicine bag. ▶5. Restart infusion by pressing [START] button.
	• The same site of the tubing has been set at peristaltic finger section for a long time (over 12 hours).	▶1. Turn the alarm off by pressing [SILENCE] button. ▶2. Make "STAND-BY" mode by pressing [STOP] button. ▶3. Close the manual roller clamp on IV set. ▶4. Open the door and push the release lever to the right to release the tubing clamp. ▶5. Either move the tubing connected to this pump at a distance of more than 10cm to reset or replace IV set with a new one. ▶6. Set the infusion line back properly in place. ▶7. Close and lock the door securely. ▶8. Open the manual roller clamp on IV set. ▶9. Check the setting delivery rate, delivery limit and volume of medicine bag. ▶10. Restart infusion by pressing [START] button.
The [DOOR] LED flashes and alarm sounds continuously showing "DOOR OPEN" on the LCD.	• Door is open.	▶1. Turn the alarm off by pressing [SILENCE] button. ▶2. Make "STAND-BY" mode by pressing [STOP] button. ▶3. Close and lock the door securely. ▶4. Check the setting delivery rate, delivery limit and volume of medicine bat. ▶5. Restart infusion by pressing [START] button.
The [BATTERY] Low level LED flashes and alarm sounds continuously showing "BATT LOW" on the LCD.	• The voltage of the internal battery is low	▶1. Turn the alarm off by pressing [SILENCE] button. ▶2. Make "STAND-BY" mode by pressing [STOP] button. ▶3. Recharge the battery fully for more than 6 hours by connecting the pump to an AC power outlet.
	• Internal battery has deteriorated	▶Stop the operation of the pump and replace with a new battery through your local authorized dealer.

Symptom	Cause	Action
The [FLOW] LED flashes and alarm sounds continuously showing "FLOW ERR" on the LCD. Also, [FLOW] LED flashes and alarm sounds continuously in case of Free Flow situation.	• IV set is not compatible with this pump.	▶Check the compatibility of IV set with your local dealer.
	• Tubing is not properly placed	▶1. Turn the alarm off by pressing [SILENCE] button. ▶2. Make "STAND-BY" mode by pressing [STOP] button. ▶3. Close the manual roller clamp on IV set. ▶4. Open the door and push the release lever to the right to release the tubing clamp. ▶5. Set the infusion line properly in place. ▶6. Close and lock the door securely. ▶7. Open the manual roller clamp on IV set. ▶8. Make sure to check that the delivery rate, delivery limit and drop volume that were set. ▶9. Restart infusion by pressing [START] button.
	• Drip sensor is not securely attached on the drip chamber on IV set.	▶1. Turn the alarm off by pressing [SILENCE] button. ▶2. Make "STAND-BY" mode by pressing [STOP] button. ▶3. Attach the drip sensor securely on the drip chamber. Make sure that the surface of drip chamber and drip sensor is dry. ▶4. Make sure to check that the delivery rate, delivery limit and drop volume that were set ▶5. Restart infusion by pressing [START] button.
The [EMPTY] LED flashes, and alarm sounds continuously showing "EMPTY" on the LCD.	• The solution container is empty	▶1. Turn the alarm off by pressing [SILENCE] button. ▶2. Make "STAND-BY" mode by pressing [STOP] button. ▶3. In case of completing the infusion, close the manual roller clamp on IV set and remove the needle from the skin. (In case of continuing the infusion, close the manual roller clamp, remove the needle from the skin and exchange the solution container with a new one and restart infusion by following the operating procedure)
	• Air or dew is in Drip chamber	▶1. Turn the alarm off by pressing [SILENCE] button. ▶2. Make "STAND-BY" mode by pressing [STOP] button. ▶3. Tap the drip chamber to remove air or dew ▶4. Make sure to check that the delivery rate, delivery limit and drop volume that were set. ▶5. Restart infusion by pressing [START] button.
	• Peristaltic fingers do not move	▶ Stop the operation of the pump and contact your local authorized dealer.

Symptom	Cause	Action
The [EMPTY] LED flashes and alarm sounds continuously showing "EMPTY" on the LCD despite the remaining solution in the container.	• Tubing is kinked or twisted. • Tubing is stretched or shrunk	▶1. Turn the alarm off by pressing [SILENCE] button. ▶2. Make "STAND-BY" mode by pressing [STOP] button. ▶3. Close the manual roller clamp on IV set. ▶4. Open the door and push the release lever to the right to release the tubing clamp. ▶5. Take the infusion line from the pump, check the infusion line and take a corrective action like untwisting or replacing with a new one to solve the problem of occlusion. ▶6. Set the infusion line back properly in place. ▶7. Close and lock the door securely. ▶8. Open the manual roller clamp on IV set. ▶9. Check the setting delivery rate, delivery limit and volume of medicine bag. ▶10. Restart infusion by pressing [START] button.
	• The wire in the cable of the drop sensor is damaged.	▶ Stop the operation of the pump and contact your local authorized dealer.
	• The drop sensor is stained	▶1. Turn the alarm off by pressing [SILENCE] button. ▶2. Make "STAND-BY" mode by pressing [STOP] button. ▶3. Clean it with a gauze cloth or similar, moistened with cold or tepid water. ▶4. Attach the drop sensor securely on the drop chamber. ▶5. Check the setting delivery rate, delivery limit and volume of medicine bag. ▶6. Restart infusion by pressing [START] button.
	• The manual roller clamp on IV set is closed.	▶1. Turn the alarm off by pressing [SILENCE] button. ▶2. Make "STAND-BY" mode by pressing [STOP] button. ▶3. Open the manual roller clamp on IV set. ▶4. Check the setting delivery rate, delivery limit and volume of medicine bag. ▶5. Restart infusion by pressing [START] button.
	• Drop sensor is not securely attached on the drip chamber on IV set.	▶1. Turn the alarm off by pressing [SILENCE] button. ▶2. Make "STAND-BY" mode by pressing [STOP] button. ▶3. Attach the drop sensor securely on the drop chamber. Make sure that the surface of drop chamber and drop sensor is dry. ▶4. Check the setting delivery rate, delivery limit and volume of medicine bag. ▶5. Restart infusion by pressing [START] button.

- Before restarting infusion, make sure to check the delivery rate, delivery limit and drop volume are correctly set.
- After restarting infusion, check the drip rate to ensure the delivery of the solution at the selected rate.
- If any irregularity is detected, immediately stop the operation of the pump and contact your local authorized dealer.

NOTE

- Repeat Alarm Function
  : If no action is taken within 2 minutes after the alarm was switched off by press [SILENCE] button, the repeat alarm will sound again.
- Due to environmental regulations, used Ni-MH battery must be returned to AMPall or distributor for proper disposal.

- In this pump, the delivery rate is not controlled by the drop sensor detecting the drop rate in the drop chamber.
- Therefore, to compensate the fluctuations in drop volume caused by the solution's viscosity, the delivery rate and limit should be adjusted as follows.

- If infusion is performed without considering the factors mentioned above, the actual fluid flow rate and the intended infusion volume may be lower than expected. Additionally, the device will not detect this discrepancy.

[Example]

- When 50% Glucose solution is to be delivered at the delivery rate of 100 ml/h,
- the delivery rate and limit should be compensated by + 10%

- Intended delivery rate: 100ml/h → Compensated value: 100ml/h x 1.10 = 110ml/h
- Intended delivery limit: 1,000ml → Compensated value: 1,000ml x 1.10 = 1,100ml

1. In case of using IV set of 15, 19 or 20drops/ml

Compensation Rate	Solution
0%	• Isotonic Sodium Chloride Solution • 10% Glucose • 20% Fat Emerson
10%	• 50% Glucose
20%	• 70% Glucose

2. In case of using IV set of 60drops/ml

Compensation Rate	Solution
0%	• Isotonic Sodium Chloride Solution • 10% Glucose • 20% Fat Emerson
10%	• 50% Glucose
15%	• 70% Glucose

9 Information on EMC

9.1 Guidance and Manufacturer's Declaration – Electromagnetic Emissions

The EUT is designed to operate in the electromagnetic environment described below. It is the responsibility of the customer or the user to ensure that the EUT is used within this specified environment.

Emission test	Compliance	Electromagnetic environment - Guidance
RF Emissions CISPR 11	Group 1	The EUT uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment
RF Emissions CISPR 11	Class A	The EUT is suitable for use in ail establishments, including domestic establishments and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes
Harmonic emissions IEC 61000-3-2	Class A	
Voltage fluctuations / Flicker emissions IEC 61000-3-3	Complies	

9.2 Guidance and Manufacturer's Declaration – Electromagnetic Immunity

The EUT is designed to operate in the electromagnetic environment described below. It is the responsibility of the customer or the user to ensure that the EUT is used within this specified environment.

Immunity test	IEC 60601 Test level	Compliance level	Electromagnetic environment -Guidance
Electrostatic discharge (ESD) IEC 61000-4-2	±(2,4,6)kV Contact ±(2,4,8)kV air	±(2,4,6)kV Contact ±(2,4,8)kV air	Floors should be wood, concrete or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30%.
Surge IEC 61000-4-5	AC Mains (Line to Line): ± (0.5, 1) kV (Line to Earth): ± (0.5, 1,2) kV	AC Mains (Line to Line): ± (0.5, 1) kV (Line to Earth): ± (0.5, 1,2) kV	Mains power quality should be that of a typical commercial or hospital environment.
Power frequency magnetic field immunity IEC 61000-4-8	3 A/m	3 A/m	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment.

Voltage dips, short interruptions IEC 61000-4-11	<5% UT (>95% dip in UT) for 0.5cycle 40% UT (60% dip in UT) for 5 cycle 70% UT (30% dip in UT) for 25 cycle <5% UT (<95% dip in UT) for 5 s	<5% UT (>95% dip in UT) for 0.5cycle 40% UT (60% dip in UT) for 5 cycle 70% UT (30% dip in UT) for 25 cycle <5% UT (<95% dip in UT) for 5 s	Mains power quality should be that of a typical commercial or hospital environment. If the user of the EUT image intensifier requires continued operation during power mains interruptions, it is recommended that the EUT image intensifier be powered from an uninterruptible power supply or a battery.
NOTE U1 is the A.C. Mains voltage prior to application of the test level.			

9.3 Guidance and Manufacturer's Declaration – Electromagnetic Immunity

The EUT is designed to operate in the electromagnetic environment described below. It is the responsibility of the customer or the user to ensure that the EUT is used within this specified environment.

Immunity test	IEC 60601 Test level	Compliance level	Electromagnetic environment - Guidance
Conducted RF IEC 61000-4-6 Radiated RF IEC 61000-4-3	3 Vrms 150 kHz to 80MHz 3 V/m 80 MHz to 2.5GHz	3 Vrms 150 kHz to 80MHz 3 V/m 80MHz to 2.5GHz	Portable and mobile RF communications equipment should be used no closer to any part of the EUT, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter. Recommended separation distance $d = [\frac{3,5}{V_1}]\sqrt{P}$ $d = [\frac{3,5}{E_1}]\sqrt{P}$ 80 MHz to 800 MHz $d = [\frac{7}{E_1}]\sqrt{P}$ 800 MHz to 2,5 GHz where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and d is the recommended separation distance in meters (m). Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey, a should be less than the compliance level in each frequency range. b Interference may occur in the vicinity of equipment marked with the following symbol : 
NOTE 1)For frequencies at 80MHz and 800MHz, the separation distance for the higher frequency range applies. NOTE 2) These guidelines may not apply in all cases, as electromagnetic propagation is affected by absorption and reflection from structures, objects and people.			

a Field strength from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcast and TV broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which the EUT is used exceeds the applicable RF compliance level above, the EUT should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as re-orienting or relocating the EUT.
b Over the frequency range 150kHz to 80MHz, field strengths should be less than [V1] V/m.

9.4 Recommended separation distances between portable and mobile RF communications equipment and the EUT
There is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of the EUT can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the EUT as recommended below, according to the maximum output power of the communications equipment.

Rated maximum output power of transmitter [W]	Separation distance according to frequency of transmitter [m]		
	150kHz to 80MHz $d = [\frac{3,5}{V_1}]\sqrt{P}$	80MHz to 800MHz $d = [\frac{3,5}{E_1}]\sqrt{P}$	800MHz to 2.5GHz $d = [\frac{7}{E_1}]\sqrt{P}$
	V1=3Vrms	E1=3V/m	E1=3V/m
0.01	0.116	0.1166	0.2333
0.1	0.368	0.3687	0.7378
1	1.166	1.1660	2.3333
10	3.687	3.6872	7.3785
100	11.660	11.6600	23.333

For transmitters with a maximum output power not listed above, the recommended separation distance d in meters (m) can be estimated using the equation applicable to the frequency of the transmitter, where p is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer.

NOTE 1)For frequencies at 80MHz and 800MHz, the separation distance for the higher frequency range applies.
NOTE 2) These guidelines may not apply in all cases, as electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

9.5 Immunity and Compliance Level

Immunity test	IEC 60601 Test Level	Actual Immunity Level	Compliance Level
Conducted RF IEC 61000-4-6	3Vrms 150kHz to 80MHz	3Vrms	3Vrms
Radiated RF IEC 61000-4-3	3Vrms 80MHz to 2.5GHz	3V/m	3V/m

9.6 Guidance and Manufacturer's Declaration – Electromagnetic Immunity

The EUT is designed to operate in the electromagnetic environment described below. It is the responsibility of the customer or the user to ensure that the EUT is used within this specified environment.

Immunity test	IEC 60601 test level	Compliance level	Electromagnetic environment - Guidance
Conducted RF IEC 61000-4-6	3 Vrms 150 kHz to 80MHz	3 Vrms 150 kHz to 80MHz	The EUT must be operated only within a shielded location that provides a minimum RF shielding effectiveness. Additionally, every cable entering the shielded location must also meet the minimum RF shielding effectiveness requirements. Field strengths outside the shielded location, from fixed RF transmitters as determined by an electromagnetic site survey, should be less than 3V/m. (a)
Radiated RF IEC 61000-4-3	3 V/m 80 MHz to 2.5GHz	3 V/m 80MHz to 2.5GHz	Interference may occur near equipment bearing the following symbol: 

NOTE 1) These guidelines may not apply in all cases, as electromagnetic propagation is affected by absorption and reflection from structures, objects and people.
NOTE 2) It is essential to verify the actual shielding effectiveness and filter attenuation of the shielded location be verified to assure that they meet the minimum specification.

a Field strength from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcast and TV broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength outside the shielded location in which the EUT is used exceeds 3V/m, the EUT should be observed to verify normal operation.
If abnormal performance is observed, additional measures may be necessary, such as relocating the EUT or using a shielded location with a higher RF shielding effectiveness and filter attenuation.

10 Specifications

- **INFUSION**

FLOW RATE	0.1 ~ 1000ml/h (0.1ml steps), 0.1~1800.0mL/h(Optional)
ACCURACY WITH APPROVED I.V. SET	ml/h control mode: ±5%
DELIVERY VOLUME	0.1 ~ 9999ml
TOTAL INFUSED VOLUME	0.1 ~ 9999ml
K.V.O RATE	IV set: 15, 19, 20ml - 3ml/h / IV set: 60ml - 1ml/h (Adjustable from 0.1~10ml/h)

- **MECHANICAL**

PUMPING MECHANISM	Linear Peristaltic Finger
DROP SENSOR	External (Optional)
DIMENSIONS (W×D×H)/Weight	100×190×250 (mm)/ Approximately 3.5kg

- **ALARM**

AIR IN LINE, OCCLUSION, DOOR OPEN, EMPTY CONTAINER, DEIVCE MALFUNCTION, K.V.O. RATE (INFUSION COMPLETION), FLOW ERROR (I.V. SET FREE FLOW PROTECTION), LOW BATTERY, REPEAT ALARM

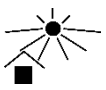
- **FEATURES**

PURGE RATE	Adjustable from 1 to 1000ml/h, 0.1~1800.0mL/h(Optional)
NURSE CALL	DC 12V, 1.0A
History Call Back	10 events or 2000 events (Optional)
Drug Library (Optional)	20 category and 100 libraries per category.
KEYPAD LOCK, RETAIN MEMORY, REMAINNING TIME, ALARM REPEAT, OPEN SYSTEM(Calibration is available for 10 brands of IV sets), K.V.O., PURGE, BOLUS, OCC LEVEL(9 steps : 4.5~14.5 psi), HISTORY CALL-BACK, DOSAGE MODE, NURSE CALL**(optional)**, PROFILE**(optional)**, CENTRAL SYSTEM**(optional),** Changing infusion settings during infusion **(optional).**	

- **OTHER PARAMETERS**

POWER REQUIREMENTS	~ 100 - 240Vac, 50/60Hz or DC 24V 2A, 12V 1A ⎓
POWER CONSUMPTION	40VA
CLASSIFICATIONS	Class IIb / Internal power supply / Type CF
BATTERY/OPERATION/CHARGING	Ni-MH 9.6V 2000mAh /4hrs. (at 125ml/h)/more than 6 hrs.
BATTERY LIFE	1.5~2 years
OPERATION CONDITIONS	+5~40℃, 30~90% RH (no condensation), 700 ~ 1060 hPa
STORAGE CONDITIONS	-20~45℃, 10~95% RH (no condensation), 500 ~ 1060 hPa
WARRANTY PERIOD	1 year
Expected service Life	5 years
Water proof	IPX3

11 Symbols

Means	Symbols	Means	Symbols
Caution		Rated power input, A.C.	
Manufacture information		Rated power input, D.C.	
Manufacturing Date and year		Battery, general	
Refer to instructions for use		Keep dry	
The product should be recycled separately from household waste. When this product reaches its end of life, follow the local laws and regulations of disposal.		Fragile	
Serial Number		This way up	
Manufacturer's EU representative information		Use no hooks	
Water proof level IPX3	IPX3	Indicates the temperature limits to which the medical device can be safely exposed.	
DC Power		Indicates the range of humidity to which the medical device can be safely exposed.	
Type CF applied part		Indicates the range of atmospheric pressure to which the medical device can be safely exposed.	
Classification Class I		To indicate that transport package shall not be exposed to sunlight.	
AC Power		Model Number	
CE Marking of conformity	CE 1639	Medical Device	MD

AMPall and its authorized distributors (hereinafter "AMPall Representatives") warrant that this product will be free from defects in materials and workmanship for the duration of the warranty period. This warranty does not cover failures resulting from accident, unauthorized modification or disassembly, abuse, or misuse.

If the customer discovers a defect in the product within the warranty period and returns it to an authorized AMPall Representative, the Representative will, at its discretion and at no charge, either repair or replace the defective unit. AMPall Representatives will also cover the cost of shipping the repaired or replaced product back to the customer's original location.

Return shipping of the repaired or replaced product to the customer's original location will be at the expense of AMPall Representatives. If, however, AMPall Representatives determine that the product is not defective under the terms of this warranty, the customer will be responsible for all handling, transportation, and labor costs.

This warranty is the sole and exclusive warranty provided, superseding all other warranties, whether express or implied.

• Manufacturer: AMPall Co., Ltd.
3F, Annex Hankook Junja Hyeopdong B/D, 114 Gasan digital 2-ro,
Geumcheon-gu, Seoul, 08506, Korea
TEL: 82-2-858-2839~41
FAX: 82-505-350-2442
E-mail: ampall@ampall.com

• EC Representative: AR Experts B.V.
Boeingavenue 209, 1119PD Schiphol-Rijk, The Netherlands
TEL: +31 (0)88 995 1333
E-mail: info@ar-experts.eu

Warranty Card

Thank you for purchasing an AMPall product. The IP-7700 warranty is valid from the date of purchase. Please record the purchase date on your warranty card and keep this card with the device at all times to ensure full customer support.

Product Name	Infusion Pump
Model Name	IP-7700
Manufacturing Date	
Warranty Period	1 years

Purchasing Date	20 / / (year/ month/ date)
Customer	Name: Tel.:
	Address:
Retailer	Name: Tel.:
	Address:

- **Repairing Record**

Date	Contents of Repair	Confirmation

☆ Please show this Warranty Card when you request repairing service.

3F. Annex Hankook Junja Hyeopdong B/D,
114, Gasan digital 2-ro, Geumcheon-gu, Seoul, Korea.
TEL : +82-2-858-2839~41 / FAX : +82-505-350–2442
E-mail : ampall@ampall.com / Website: www.ampall.com