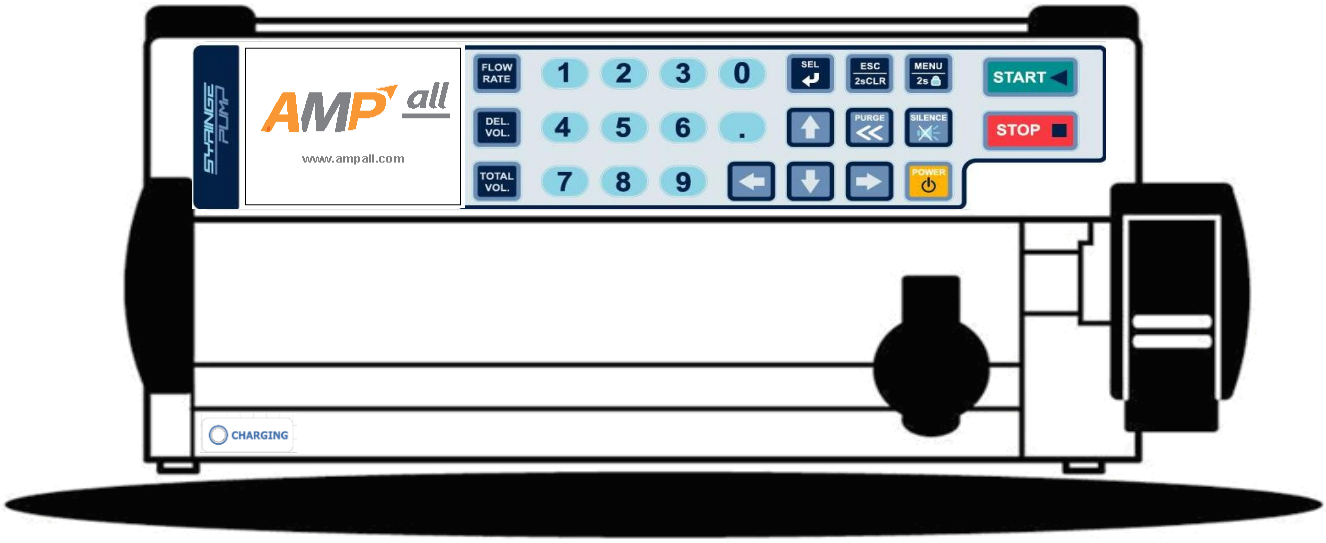
SYRINGE PUMP OPERATING MANUAL



SP-8800

AMP all

ADVANCED MICRO PUMPING TECHNOLOGY

Leader in the Medical industry

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 our SP-8800 Syringe 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 your place of purchase. Also, please keep this manual in a safe place for future reference.
The SP-8800 is an electronically controlled syringe pump intended for the controlled and accurate administration of medications and fluids via disposable syringes through intravenous or other clinically appropriate infusion routes.
The device is intended for use in professional healthcare environments by trained healthcare professionals or under their supervision.
The SP-8800 provides programmable infusion control, multi-level occlusion monitoring, syringe detection mechanisms, and audiovisual alarm systems to support stable and accurate delivery of the programmed infusion parameters in accordance with essential performance requirements.
The device may be used in adult and pediatric patients, including neonates and infants, when operated under appropriate professional supervision.

Intended medical indication

The SP-8800 Syringe Pump is designed for the infusion of solution such as vasopressors, depressor drugs, anticoagulants, anesthetics, anti-cancer drugs, oxytocic agents, nutritional solutions, chemotherapy medications, and blood in Intensive Care Units (ICU), Coronary Care Units (CCU), Neonatal Intensive Care Units (NICU), or operating rooms.
This device is equipped with advanced sensors and audio-visual alarm functions, enabling high flow-rate accuracy and ease of operation during solution infusion.

Indication

- The SP-8800 Syringe Pump enables the precise and programmable delivery of medications and fluids using disposable syringes via intravenous or other clinically appropriate infusion routes.
- It is intended for controlled infusion therapy in professional healthcare environments under the supervision of trained healthcare professionals.
- The device supports accurate administration of prescribed infusion parameters in adult and pediatric patients, including neonates, when clinically indicated.

Contraindication

- Use with incompatible syringes:
  - Only syringes approved or validated by the manufacturer shall be used. The use of non-approved syringes may result in inaccurate flow rates, alarm malfunction, or unsafe infusion delivery.

- Procedures requiring blood transfusion control beyond the specified performance range of the device:

- The device is not intended for applications requiring transfusion control outside the validated operating specifications.

- Situations requiring monitoring beyond the functional capabilities of the device:
  - The device does not detect extravasation or verify correct vascular access. Clinical monitoring by healthcare professionals is required during infusion therapy.

Intended patient population

✓ **Considerations: Description of Requirements**

- 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 state: The patient is not the user; however, condition such as agitation, unconsciousness, or critical illness may affect usage monitoring.
- Intended part of the body or type of tissue applied to or interacted with
  - Intended part: Not limited
  - Condition: Intact skin

Intended user profile (Operator Profile)

- 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

✓ **Considerations: Condition**

(1) Environment including hygienic requirements

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

(2) Device Characteristics and Use Conditions

- None-Sterile
- Multiple patient use
  Duration: Less than ten min. contact
- Ambient luminance range: 100 lx to 1500 lx
- Frequency of use: Reusable (Not limited)
- Location: In hospital environment
- Mobility: Portable ME equipment

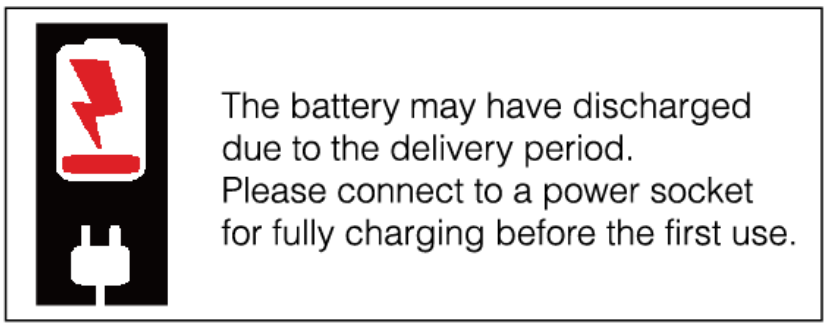
Operating principle

This device is equipped with advanced sensors and audiovisual alarm features, designed to ensure high flow rate accuracy and easy operation during solution infusion.

NOTE

The currently provided Instructions for Use (IFU) are available only in English. However, if the IFU is required in countries where other languages are used, it will be provided in the appropriate language.

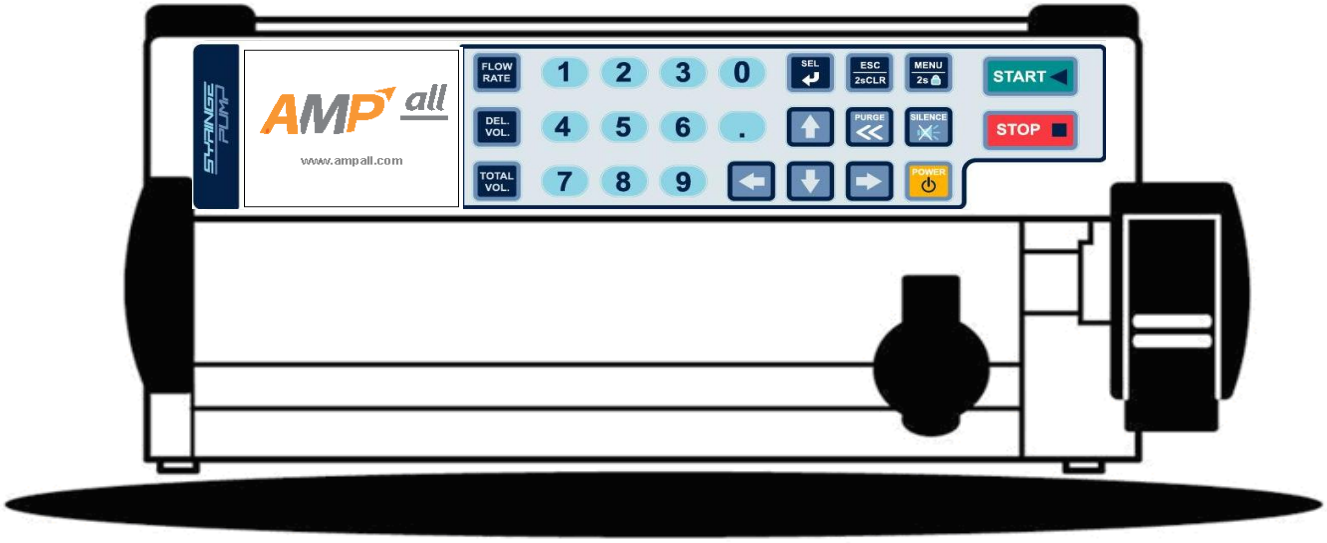
NOTE



2 Features

- **Self-Testing** – When the power is turned on, a self-test will automatically be performed.
- **Automatic syringe detection** – The device is compatible with 10, 20, 30, and 50 ml syringes. Once a syringe is installed, its size is automatically detected and displayed on the LCD screen.
- **Shortcuts** – You can access the Syringe Brand, OCC level, and Buzzer level settings menu with simple shortcuts.
- **K.V.O.(Keep Vein Open)** – When the set delivery volume is reached, the syringe pump automatically switches to a pre-set low flow rate (0.1ml/h ~ 10ml/h) to prevent catheter occlusion due to blood clotting.
- **Key Lock Function** – Depending on the settings, there is a general lock function and a lock function that requires a password to unlock.
- **Infusion Settings** – If you enter any two of the following: Flow rate, Delivery volume, or Delivery time, the remaining value will be automatically calculated and displayed.
- **Retain Memory** – The previously set value is stored in memory and is not erased even when the power is turned off.
- **Alarm repeat**– If the alarm is not resolved, it will continue to repeat until addressed.
- **Open System** – Up to 10 syringe brands can be set.
- **System level Settings** – Buzzer level: 3 levels, Occlusion level: 9 levels (300mmHg~800mmHg)
- **Purge Flow Rate** – Setting range: 0.1~1200ml/h, or 0.1~2000mL/h (optional)
- **Bolus Flow Rate** – ON/OFF, Setting range (0.1~1200ml/h or 0.1~2000mL/h (optional)
- **Anti-Bolus Function** – ON/OFF, When OCC is occurred, it slightly releases pressure to prevent a bolus
- **History Call back** – It can store and review records of 10 or 2000 (optional) infusions.
- **Dosage Mode(Body weight mode)** – When DOSE RATE, patient weight, drug amount, and solution volume are entered, the flow rate is automatically calculated and displayed. (optional)
- **Dosage unit setup** – mL/h, mg/kg/h, mg/kg/min, μg/kg/h, μg/kg/min.
- **Data retention period**– The internal data retention period in the event of a power outage is five(5) years..
- **Enhanced safety** – The syringe pump equipped with dual CPUs is designed to immediately stop infusion if a malfunction occurs during infusion.
- **Rechargeable Battery** – It is possible to continue infusion continuously using the built-in rechargeable battery without stopping the pump operation.
- **Profile** – The infusion parameters(infusion rate/target volume/infusion time) can be set in at least one-hour increments, allowing infusion according to the set parameters for up to 24 hours.". (optional)
- **Drug Library** – Depending on the type of medication, the syringe pump can conveniently store the names and infusion parameters of up to 100 drugs in each of 20 categories. (optional)
- **Nurse Call** – It is a function to connect the device to a Nurse Call system.
- **Dual CPU** – It is composed of a Main CPU processing operations and numerical data and a Sub CPU controlling the motor. These two CPUs monitor each other to ensure the safety of infusion.
- **Numeric buttons** – Easily set the infusion parameters by using the numeric keypad from 0 to 9.
- **Changing the set parameters during infusion(Titration)** – During infusion, you can adjust the flow rate, delivery volume, and total infused volume. (optional)

3. Description



3-1 Front View

3-2 Rear View

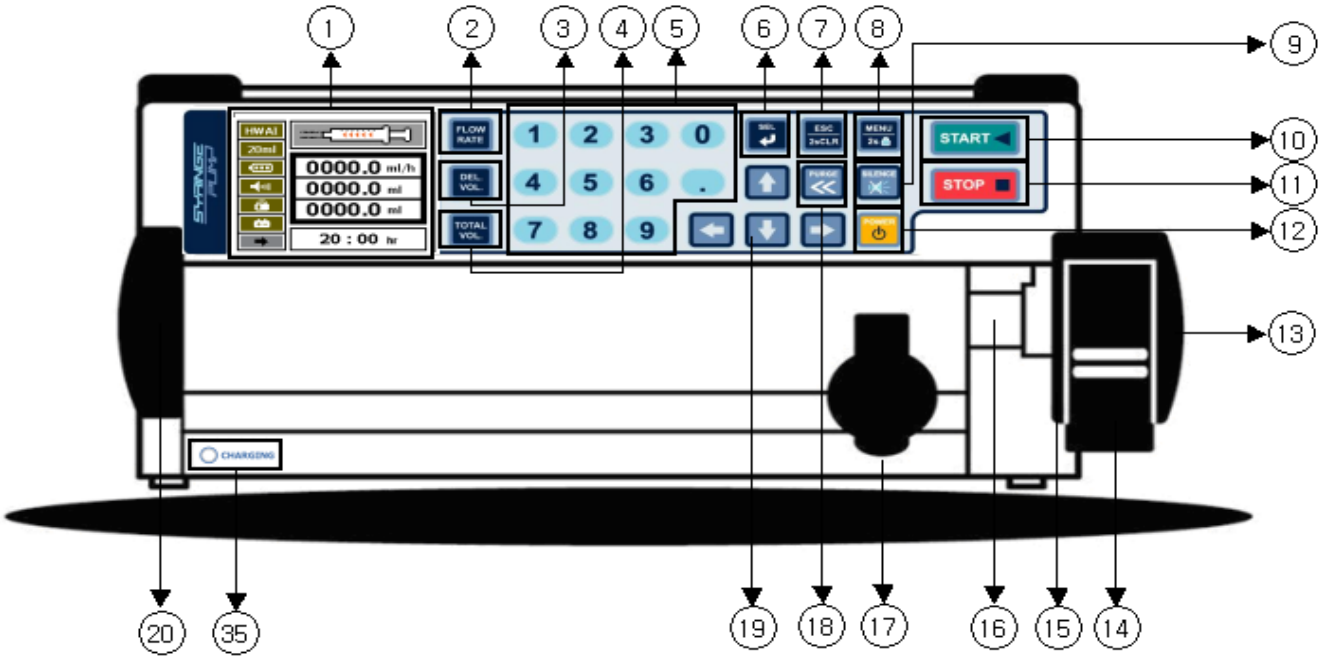
3-3 Side View

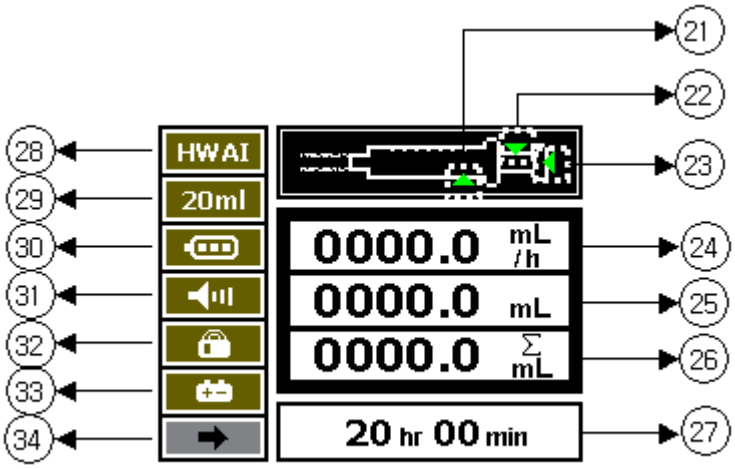
3-4 Syringe

3-5 Components

3 Description

3-1 Front View





① LCD: LCD display indicating the current operating status.

② FLOW RATE: This button is used to set and adjust the infusion rate (mL/h).

③ DEL. VOL.: This button is used to set and adjust the delivery volume (mL).

④ TOTAL VOL: This button displays the total infused volume (∑mL).

⑤ Numeric Buttons: These buttons are used to input the infusion parameters.

⑥ SEL: This is the menu selection and save button.

⑦ ESC/2sCLR: When pressed briefly, it moves to the previous step, and when held for 2 seconds, it deletes the settings.

⑧ MENU/2s : When pressed briefly, it moves to the MENU screen, and when held for 2 seconds, it functions as the button lock/unlock switch.

⑨ SILENCE: When a warning (error) sound occurs, pressing the button will mute it for 2 minutes, after that, the alarm will resume.

⑩ START: The button for starting infusion.

⑪ STOP: The button for stopping infusion.

⑫ POWER: Press and hold for about 2 seconds to turn the power on.
To turn the power off, press and hold for more than 2 seconds while the device is on.

⑬ SLIDER: This is the part that pushes the plunger of the syringe for infusion.

⑭ HANDLE LEVER: When the handle lever is lifted upward, the slide clutch holding the syringe plunger is released, allowing the syringe to be removed or installed.

⑮ Slider clutch: It is a mechanism that secures or releases the syringe plunger using the handle lever.

◯,16 Slit: This is the part where the finger grips of the syringe are inserted.

◯,17 Clamp: The part that secures the barrel of the syringe.

◯,18 PURGE: It is used to push and remove air bubbles in IV tubing line and syringe, and it operates while being pressed. NOTE During infusion, it is used for the BOLUS function.

◯,19 Direction setting button: Used for setting the position of numbers, increasing/decreasing numbers, and adjusting the position

◯,20 Line Guide: The part that secures the IV tubing line.

◯,21 Clamp Indicator: The clamp is indicated by a red light when it is open.

◯,22 Slider Clutch Open Indicator: The slider clutch is indicated by a red light when it is not holding the syringe plunger.

◯,23 Handle Lever Indicator: The handle lever is indicated by a red light when it is in the raised position.

◯,24 Display the FLOW RATE setting value.

◯,25 Display the DEL VOL setting value.

◯,26 Display the TOTAL VOL value.

◯,27 Display the INFUSION TIME.

◯,28 Display the Syringe BRAND.

◯,29 Syringe size: Display the 10㎖, 20㎖, 30㎖ and 50㎖.

◯,30 Battery Status: It indicates the remaining battery level.

◯,31 BUZZER Status: It displays the set alarm volume.

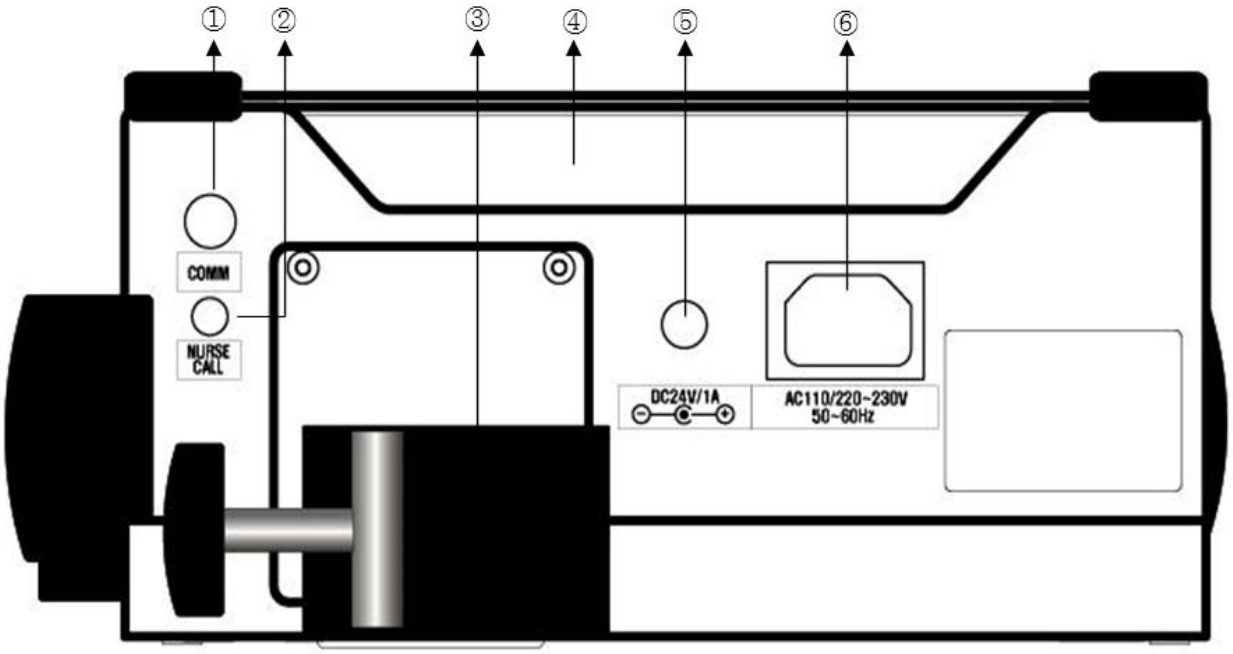
◯,32 LOCK Status: It indicates the button lock status.

◯,33 Power Supplier: It displays the current power input status. (AC, DC, BATTERY)

◯,34 BATTERY REMAIN: It approximately displays the remaining battery time.

◯,35 CHARGING: It indicates the power charging status (green when the battery is fully charged, orange when charging)

3-2 Rear View



① Communication Connector (RS232 Connector)

② Nurse Call Connector (Nurse Call Connector): Connect alarm terminal cord installed in the ward.

③ Pole Clamp: clamp to secure to a pole for stability.

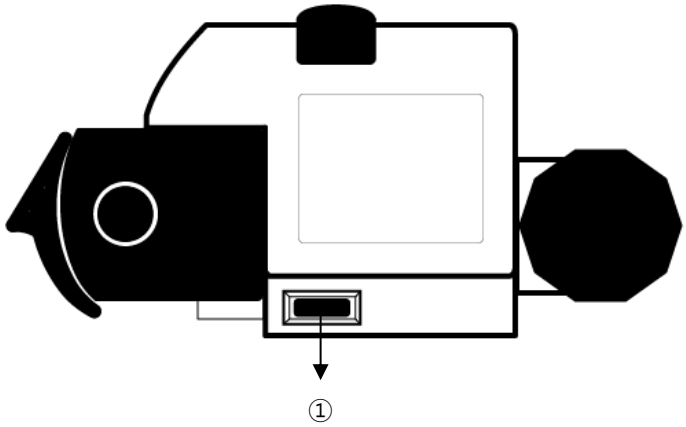
④ Handle: handle for mobility during transportation.

⑤ Adaptor Connector: Connector for DC12V adaptor connection.

NOTE Please use an approved adapter specifically designed for medical devices to ensure electrical safety.

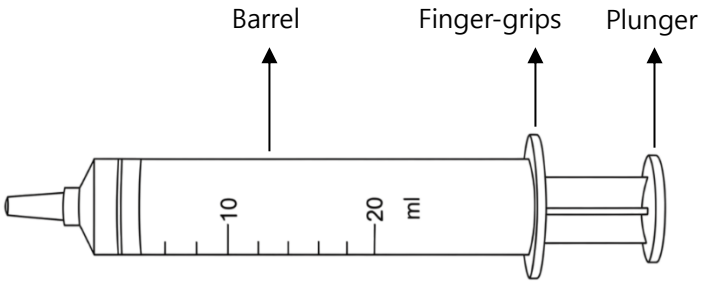
⑥ AC Power Supply Connector: Connector for AC power connection

3-3 Side View



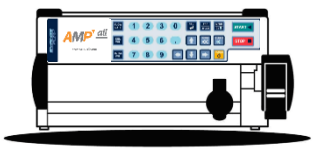
① Coupler: This is the screw used to secure the device when stacking (connecting) two or more units, allowing it to be fastened to the device placed below.

3-4 Syringe



3-5 Components

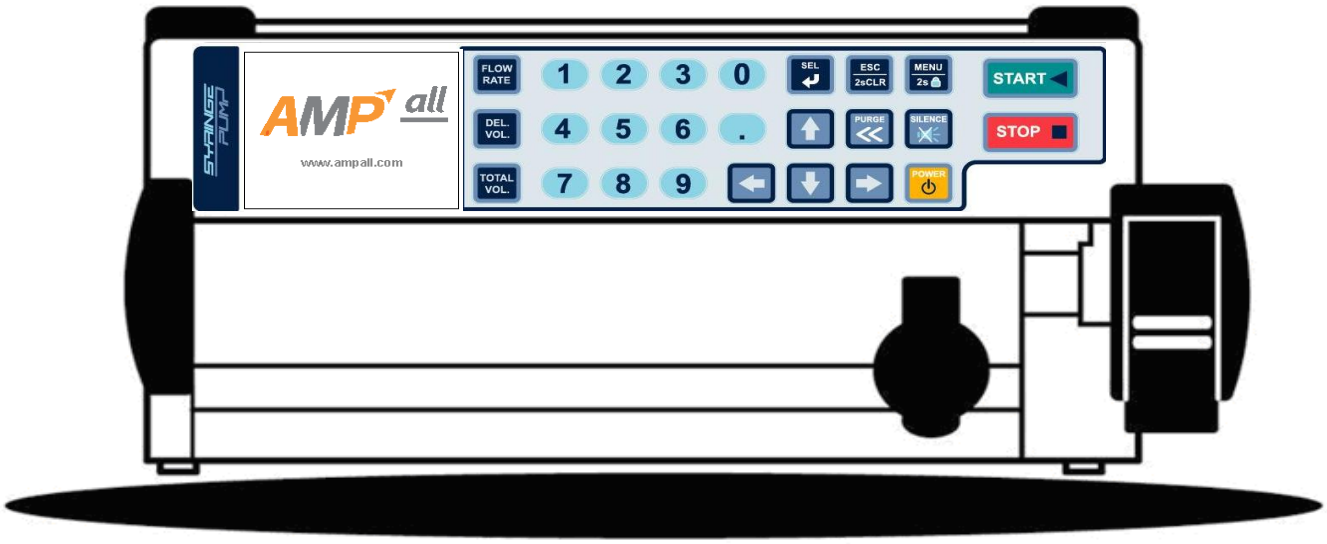
① SP-8800 Product



② AC Power Cable

③ Operating Manual

4. Prior to use



4 Prior to use

4-1 Explanation of Symbols

This manual contains essential instructions for using the product, indicated by the icons shown on the left.

NOTE To highlight important information and ensure proper operation, these manual employs "NOTE" indicators, as illustrated on the left.

4-2 Precautions before use 

- **Intended Use:**
  - This device is a medical pump for therapeutic infusion only. Do not use it for any other purpose.
- **Interference from High-Frequency Devices:**
  - Keep defibrillators (AEDs) and other high-frequency or electromagnetic-wave–generating equipment at a safe distance.
  - Before each use, verify that no such devices are nearby.
  - Never operate this pump and another high-frequency or electromagnetic device simultaneously.
  - Do not plug the pump and any wave-generating device into the same power outlet.
  - Perform regular functional checks to confirm normal pump operation.
- **Malfunction Response:**
  - Engage the manual lock on the infusion set.
  - Turn off power immediately.
  - Remove the needle from the patient and disconnect the infusion set.
  - Contact your point of purchase for service.
- **Flammability and Radiation Hazards:**
  - Do not use this pump in environments containing flammable substances.
  - Do not operate near strong electromagnetic fields (e.g., MRI suites).
- **Syringe Compatibility and Installation:**
  - Use only syringes specified by AMPALL Co., Ltd. If using a different brand, confirm compatibility with your supplier beforehand—non-compatible syringes can compromise infusion accuracy and alarm function.
  - Ensure the syringe is securely and correctly installed. Improper seating may cause reverse flow, over-infusion, or under-infusion.
- **Infusion Tubing:**
  - Inspect the tubing regularly during infusion for kinks or damage.
  - If infusion ceases due to twisting or blockage, relieve the obstruction immediately to prevent excessive internal pressure.
- · **Single-Use Reminder:**
  - All syringes are single-use only and must not be reused.
- · **Power and Battery Operation:**
  - Primary operation is via external AC power.
  - When AC power is unavailable, the built-in rechargeable battery will power the device.

- Connecting to a DC adapter will run the pump but will not charge the battery.
- Do not remove the battery to charge it with external equipment.
- Operate the battery only within the specified temperature and shock-free environment to prevent fire risk.

➢ **Pre-Use Inspection:**
- Examine the pump and all accessories for damage. If the device has sustained any shock—even without visible damage—do not use it. Contact your point of purchase immediately.

➢ **Maintenance and Repair:**
- Do not attempt to disassemble or repair the pump yourself. Any unauthorized service may void the warranty and is not covered by the manufacturer.

➢ **Operator Qualifications:**
- Only trained healthcare professionals who have read and understood this manual should operate the device.

➢ **Accessory Use:**
- Use only the accessories and consumables specified in this manual.

➢ **Prohibited Uses:**
- Do not use for blood transfusion or the infusion of fluids outside the specified parameters.
- Do not infuse high-viscosity medications not approved for this pump.

➢ **Spill Prevention:**
- Be cautious of liquid spills near the power inlet to avoid electrical leakage.

➢ **Gravity Independence:**
- The pump's operation is unaffected by gravity—medication delivery remains consistent regardless of pump orientation.

➢ **Preparation Checklist:**
- Establish a contingency plan for pump malfunctions.
- Label pump channels and tubing clearly to prevent line-mix errors.
- Continuously monitor the patient to verify correct pump settings and infusion rates.
- Familiarize yourself with all troubleshooting protocols before initiating therapy.

4-3 Precautions during use 

- This device is a medical instrument. Use only for the purposes specified in this manual.
- The pump does not verify that medication enters the bloodstream. Confirm correct needle placement and continuously observe the patient's condition.
- Fasten the device firmly to the IV pole to prevent it from falling.
- Use only the accessories and consumables listed in this manual.
- Read and fully understand all instructions before operating the device.
- AC Power: Connect to mains power whenever available. Battery Operation: When running on the internal rechargeable battery, monitor battery level and note that run time is approximately 4–5 hours.
- Immediately follow the steps in the "Emergency Procedures" section whenever an alarm sounds.
- Never force open the roller clamp or handle while the patient remains connected—this can cause uncontrolled free flow.

- If infusion stops due to kinks or blockages and tubing pressure increases:
- Disconnect the patient end. 2. Close the roller clamp. 3. Straighten the tubing and clear the obstruction. 4. Reconnect and resume infusion.
- Do not subject the device to strong shocks or drops during use.
- The manufacturer is not responsible for malfunctions resulting from failure to follow these warnings and precautions.

4-4 Cleaning Instructions 

- Power Down: Before cleaning, press the POWER button to turn the device off and unplug the external power cord.
- No Immersion: Never immerse the device or expose it to running water. Keep moisture and foreign substances away from all openings.
- Exterior Wipe-Down: Clean only the outer surfaces with a soft, lint-free cloth dampened with mild, pH-neutral detergent. Wring out excess liquid thoroughly before wiping.
- Avoid Harsh Chemicals: Do not use alcohol, solvents, bleach, or abrasive cleaners, as they may damage the casing and seals.

4-4-1 External Pump Cleaning

- Stain Removal: If the pump's exterior becomes soiled, dampen a soft cloth or towel with cold or lukewarm water, wring it out thoroughly, and gently wipe the surface.
- Drying: After cleaning, let the pump air-dry completely—pay special attention to ensure the built-in power inlet is fully dry before reconnecting.
- Heat Sources Prohibited: Do not use hot-air devices (e.g., hair dryers) or direct heat to speed drying, as excessive heat may damage the housing and internal components.

4-5 Storage

- Please observe the following precautions when using and storing this device.:
- Keep the device away from direct sunlight and high-frequency generating equipment.
- The device may be affected by atmospheric pressure, temperature, humidity, dust, salt, and ions.
- Do not subject the device to external shocks or excessive force.
- The storage conditions for the device are as follows:
  - Ambient temperature: -10°C to 45°C
  - Relative humidity: 10~ 95% R.H.
  - Atmospheric pressure: 500 to 1060hPa.

4-6 Maintenance Checks

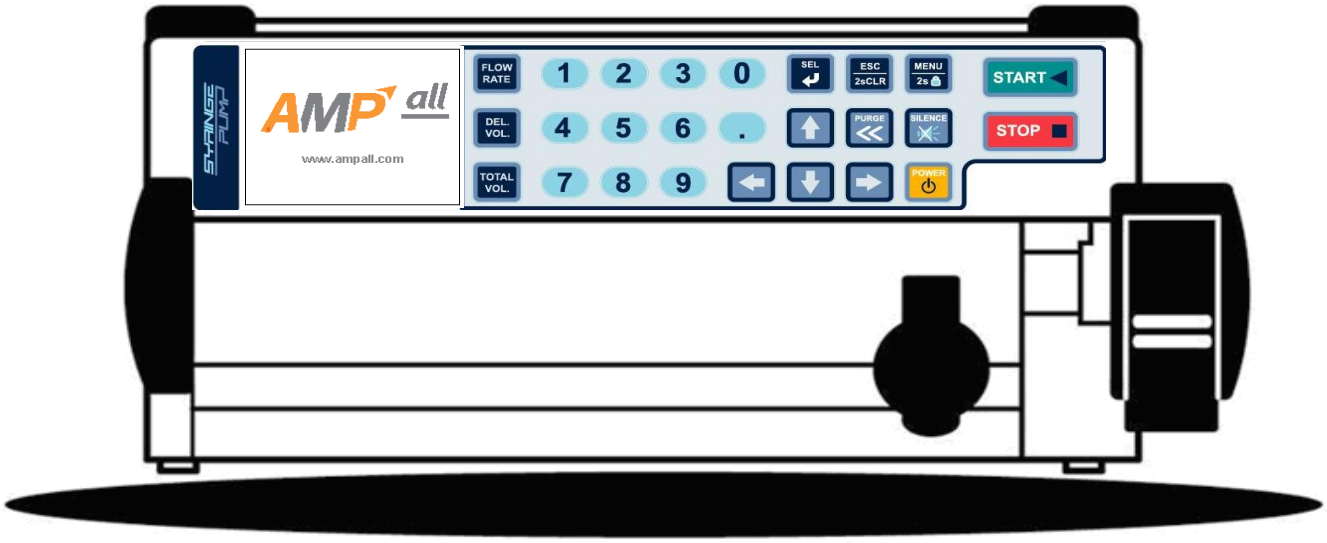
- If there is any abnormality in the operation of the device, stop operation immediately and contact the point of purchase.
- Do not arbitrarily disassemble the device as it may cause malfunction.
- If the device or accessories have been subjected to impact, even if there is no external damage, do not 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.
- Over time, the built-in rechargeable battery in the device may experience reduced lifespan. Therefore, please operate the device using the battery at least once a month. If the operating time is significantly shortened even after a normal battery charge, please contact the point of purchase for 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

- Using the rear pole clamp, fasten the pump to the IV pole and tighten it until the unit is firmly secured and unable to shift, ensuring it cannot fall.

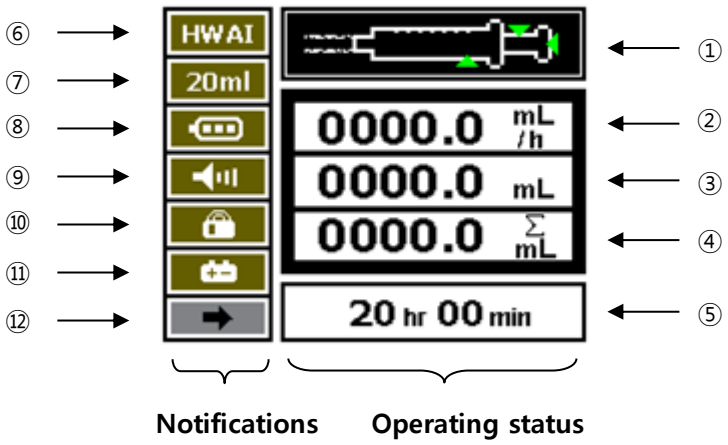
5-1-2 Connecting the Power Cord

- 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 port 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 Power On

- Press the [POWER] button for 2 seconds.
- After a confirmation beep, the power turns on and a SELF TESTING process runs on the LCD for 3 seconds.
- The LCD screen is split into two sections—notifications on the left and operating status on the right—as shown below.



- The manufacturer's name of the syringe being used appears in the upper left corner, and make sure to verify that the manufacturer name on the syringe matches the one shown on the LCD.
- If a syringe different from the one set is used, the infusion accuracy cannot be guaranteed.

① Syringe attachment status

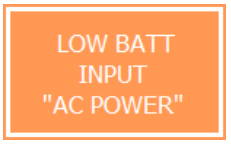
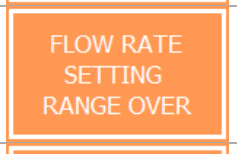
Display	Description	Display	Description
	Syringe Installation Status Display: Green LED for normal installation, red LED flashing for abnormal installation		Infusion operation status indication.
	During infusion, NEAR EMPTY alarm status is displayed.		Infusion occlusion error status indication

② Flow rate(mL/h) displayed

③ Delivery volume(mL) displayed

④ Total infused volume(mL) displayed: ② to ④ show alternating displays of status indication and general information when specific conditions occur.

[Display of Alarm Status-Caution, Warning]

Display	Description	Display	Description
	Standby Alarm: Infusion not started within 2 minutes after syringe installation and setting completion.		The display of LOW BATTERY Alarm
	Syringe Plunger Clamp Open before Infusion alarm		The display of Syringe Lever Open Alarm
	Syringe Plunger Clutch Open before Infusion alarm		Flow rate setting error alarm displayed
	Delivery volume setting error alarm displayed		NEAR EMPTY (Infusion near completion) alarm displayed.
	Infusion Complete and K.V.O. infusion in progress notification		Enter password to unlock button
	Syringe Plunger Clutch Open during Infusion warning		Syringe Plunger Clamp Open during Infusion warning
	Plunger Handle Open warning during infusion		Infusion Occlusion during Infusion warning
	Infusion Range Complete warning during infusion		

⑤ Infusion time and Status display: infusion time and operation status are alternately displayed.

[Display of Operation Status]

Display	Description	Display	Description
	Standby status		Normal infusing status
	Bolus infusing status		ANTI-BOLUS status
	Profile Mode status (optional)		Drug Library Mode status (optional)

⑥ Syringe brand abbreviation display

⑦ Syringe capacity display: 10mL(cc), 20mL(cc), 30mL(cc), 50mL(cc)

⑧ Battery level indication

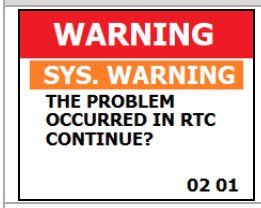
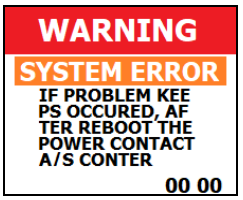
⑨ Buzzer level indication

⑩ Button lock status indication

⑪ Input power type indication (AC power, battery, DC power)

⑫ Battery usage forecast: Press the right arrow key to approximately display the available battery capacity.

[System error indication]

Display	Description	Display	Description
	The display of RTC error		The display of Empty Battery Alarm
	The display of system error		

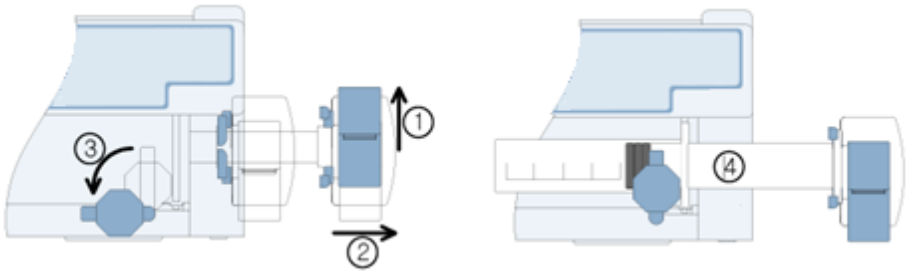
- If "RTC ERR (02 01)" occurs, please reset the time on the SP-8800 device. If not reset, usage time will not be saved.
- When "BATT. EMPTY WARNING" occurs, please supply external power.
- If other system errors (00 00) continue to occur repeatedly, please contact the manufacturer for assistance

5-1-5 Power Off

- Press the [POWER] button for 2 seconds on the initial screen.
- With a confirmation sound, the pump logo will appear on the LCD, and after about 2 seconds, the power will turn OFF.
- During infusion, the power cannot be turned off. NOTE

5-2 Syringe Installation

- Please verify if the specified syringe is being used with this device.
- Please follow the steps below to connect the device and then insert the syringe.
  ① Lift the handle lever.
  ② pull the slider fully to the right.
  ③ Pull the clamp outward and rotate it to the left to open it.
  ④ Pull the clamp and rotate it upward to lock it, and confirm that the syringe is properly seated..



- If the syringe is not properly placed in the slit, the flow rate accuracy and alarm system are not guaranteed.
- **To ensure accurate infusion performance, including both infusion rate and delivery volume, the SP-8800 Syringe Pump must be used with syringes calibrated specifically by AMPall.**
- **The use of non-calibrated syringes may lead to inaccurate infusion rates, incorrect delivery volumes, frequent alarms, or improper medication administration. AMPall assumes no civil or criminal liability for any inaccuracies or incidents arising from the use of syringes that have not been calibrated by AMPall.**

⑤ After infusion tube is placed in Line Guide, push the slider slowly until it hits push-button of the slider.
⑥ When the slider hits the push-button, slider hook automatically gets down to fix the syringe.
⑦ When the syringe is set in the pump, [SYRIGNE SIZE] LED lights on according to the size of syringe.
⑧ Press and hold [PURGE] button until a drop of solution at the end of the infusion set appears to remove air bubble in the infusion tube. PURGE flow rate is displayed in blue on the screen and can be set in the menu (6-5-1 PURGE SETUP).

NOTE

- The purging volume is added to the total infused volume. The initial PURGE Flow Rate is 300mL/h.
- When it's necessary to replace the syringe during infusion, follow these steps:
  ① Stop the device operation.
  ② Close the manual tube clamp and disconnect the patient connection line.
  ③ Remove the syringe from the device.
  ④ Replace the syringe with a new one and place it to the device. Use the (PURGE) button to remove any air in the infusion tubing.
  ⑤ Connect the infusion set to the patient and open the manual tube clamp.
  ⑥ Restart the infusion.

5-3 Setting Flow Rate(mL/h)

- Press the FLOW RATE (ml/h) button.

- The FLOW RATE screen displays four sections—menu status, previous setting, current setting, and allowable range—allowing you to enter the desired infusion rate (mL/h) using the numeric keypad.

- After entering the flow rate, press the SEL button to save it, and it will automatically return to the initial screen.
- To delete all settings, press the [ESC/2s CLR] button for 2 seconds.
- The flow rate setting range is as follows. **[0.1ml/h steps]**

Syringe	Flow Rate Range	Optional Flow Rate Range
10ml	0.1ml/h ~ 300ml/h	0.1ml/h ~ 600ml/h
20ml	0.1ml/h ~ 400ml/h	0.1ml/h ~ 1000ml/h
30ml	0.1ml/h ~ 500ml/h	0.1ml/h ~ 1300ml/h
50ml	0.1ml/h ~ 1200ml/h	0.1ml/h ~ 2000ml/h

NOTE

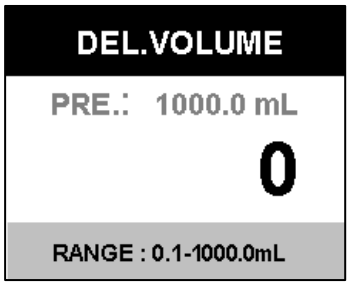
- The option flow rate range can vary depending on the specific configuration of the device. To obtain the exact option flow rate range, please contact the manufacturer or supplier.
- Once you set the flow rate, it's saved to the pump's internal memory and retained even after the power is turned off.
- When the flow rate setting exceeds the allowable range, "RANGE OVER" will be displayed.

- When operating in the optional Drug library or Profile mode, the infusion rate cannot be modified.
- If not in K.V.O. mode, you can still adjust the flow rate even during infusion. To use this feature, please consult the manufacturer or distributor.
- When adjusting the flow rate during infusion, if the delivery volume is reached, the adjustment stops immediately and switches to K.V.O. mode.
- This pump is tested for infusion accuracy with liquids of at least ISO 3696 class III grade or higher. For medications with high viscosity (specific gravity), careful observation during infusion is necessary, and adjustments should be made if there are any errors.

5-4 Setting Delivery Volume(mL)

- Press the DEL.VOL. (ml) button.

- The DEL.VOLUME screen displays four section—menu status, previous setting, current setting, and allowable range—and you can enter the desired delivery volume in mL using the numeric keypad.



→ Menu status
→ Previous delivery volume
→ Current delivery volume
→ Range

- To clear all settings, press and hold the [ESC/2s CLR] button for 2 seconds.
- After entering the delivery volume, press the SEL button to save it and automatically return to the initial screen.
- The range for setting the delivery volume is from 0.1 ml to 1000.0 ml, with intervals of 0.1 ml.

NOTE

- The set infusion volume is stored in the internal memory and will not be erased even if the power is turned off.
- When the delivery volume is set to 0 mL, the pump automatically defaults to a maximum volume of 1000.0 mL for infusion.

- Set the delivery volume to just below the syringe's total medication volume; once that volume is reached, the pump will automatically switch to a low "keep-vein-open" flow rate (K.V.O.) to prevent catheter occlusion from blood coagulation.
- If the delivery volume is set to 0ml, it automatically defaults to the maximum infusion volume of 1000ml.
- In Drug Library or Profile modes, the delivery volume cannot be adjusted.
- When operating outside of K.V.O. mode, you can adjust the delivery volume during infusion—please contact the manufacturer or distributor to enable this feature.
- When you adjust the delivery volume during infusion, the pump stops infusion as soon as the programmed volume is delivered and automatically switches to K.V.O. mode.
- The infusion volume delivered during K.V.O. mode is cumulative.

5-5 Deleting Total Infused Volume(ΣmL)

- The total infused volume represents the cumulative amount of fluid delivered over time.
- Press the TOTAL.VOL (ΣmL) button.
- The INFUSION ACCUMULATED VOLUME (∑ mL) screen is divided into four sections—menu status, previous total infused volume, current total infused volume, and reset method—as shown below.

→ **Menu status**
→ **Previous total infused volume**
→ **Current total infused volume**
→ **Clear method**

- Press and hold the [ESC/2s CLR] button for two seconds until you hear a confirmation beep; the total infused volume will then reset to 0.0 m.
- Press the [SEL] button to confirm, and it will automatically return to the initial screen.

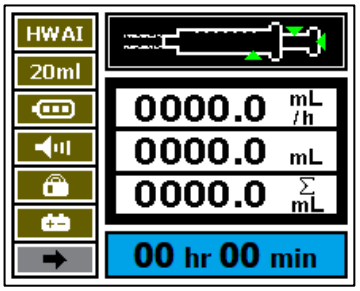
NOTE

- When the total infused volume reaches 1000.0 mL, you must reset the counter to 0.0 mL before infusion can resume.

- When operating outside of K.V.O. mode, you can reset the total infused volume during infusion; please contact the manufacturer or distributor to enable this feature.
- If you reset the total infused volume during infusion and the programmed delivery volume is reached at the same time, infusion will stop immediately and the pump 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.

5-6 Setting Infusion Time

- From the home screen, press the [SEL] button to enter the time-input display; the infusion-time field at the bottom of the LCD will blink, allowing you to enter the duration in HH:MM format using the numeric keypad.



→ Infusion time

- This option is available only after entering at least one parameter, such as flow rate or delivery volume.

- When you set the flow rate, the pump automatically calculates and configures related parameters—such as delivery volume and infusion time.
- The infusion time can be set from 1 minute up to 99 hours and 59 minutes; any value outside this range will not be accepted or displayed.

5-7 Insert the needle into the patient

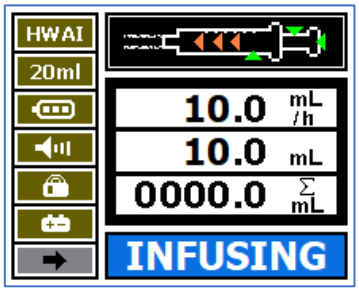
- Ensure there is no air in the syringe and tube, and that the needle is filled with medication to the tip.
- Ensure the needle is correctly inserted into the patient.

⚠
- This device cannot verify proper needle placement in the vein; always confirm correct insertion and continuously monitor the patient's condition.

5-8 Start of Infusion

5-8-1 Normal Infusion Mode

- Press the [START] button to initiate infusion.
- During infusion, a triangle icon moves across the center of the LCD syringe-status screen, while the infusion time and "INFUSING" indicator flash alternately on the status display.

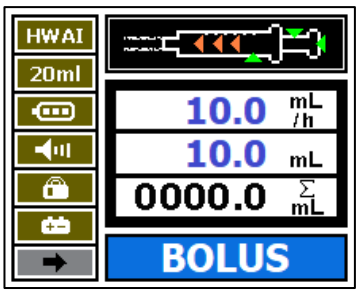


NOTE

- Ensure that the set flow rate is being delivered correctly.
- If you observe any deviation from the programmed infusion rate or volume, stop the pump immediately and contact your supplier.
- Press the [MENU/2s 🔒 button for 2 seconds during infusion or standby to lock/unlock button usage.

5-8-2 Bolus Infusion Mode

- Pressing the [PURGE] button during infusion activates the bolus (temporary additional infusion) function.
- Bolus infusion ON/OFF, bolus infusion rate, and bolus infusion volume can be set in the menu (6-5-2 Bolus Flow Rate Setting).
- During a bolus operation, the status display alternates between flashing the infusion time and the "BOLUS" indicator.



NOTE

- The pump will not deliver a bolus volume beyond the programmed amount. When the programmed amount is exceeded, it automatically switches to K.V.O mode.
- Pressing the [STOP] button during a bolus infusion immediately halts all infusions—even if the programmed bolus volume has not yet been fully delivered.
- The bolus function is unavailable in Profile mode.

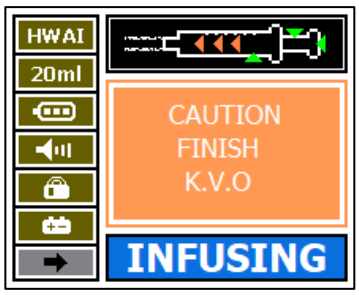
5-8-3 Profile/Drug Library Mode

- The pump offers a profile infusion feature that allows you to set different infusion rates for each hour over a 24-hour period.
- The pump includes a Drug Library feature, allowing you to configure specific infusion rates and volumes for each medication
- For detailed configuration instructions, refer to the setup mode for each function.
- The Profile/Drug library function are an optional feature; please contact your vendor or manufacturer to enable them.

- This device does not have a feature to detect whether the needle has been properly inserted into the vein.
- Regularly confirm that the needle remains correctly positioned in the vein and that medication delivery is proceeding as intended.

5-9 Completion of Infusion

- Once the accumulated volume reaches the programmed infusion volume, the LCD screen alternates between the set volume display and the "K.V.O." message, accompanied by an alarm sound and a flashing indicator.
- The device switches to a low flow rate to prevent catheter occlusion due to blood clotting during the infusion (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:



5-10 Pause of Infusion

- Pressing the [STOP] button during medication infusion will halt the infusion.
- Before resuming medication infusion, ensure that the programmed flow rate, infusion volume, and syringe capacity are correct.
- After confirming all settings, press the [START] button to resume medication infusion.

NOTE

- If the device is not used or restarted within 2 minutes after pausing the infusion, a "STAND-BY" alarm will occur.

5-11 Power OFF

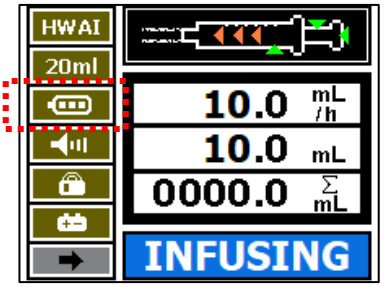
- Press and hold the [POWER] button for 2 seconds to turn the power on or off. However, pressing the [POWER] button during infusion does not turn off the power.
- First, press the [STOP] button to stop the device operation, then press the [POWER] button to turn the power off.
- After removing the patient connection line, take out the syringe and infusion set.

- If the infusion set is removed without fully locking the manual roller clamp, unintended medication could be administered to the patient, so special attention must be paid to ensure this does not happen.

5-12 Checking Battery Remaining

- While in standby or infusion mode, pressing the right arrow [→] button displays 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.

Battery Remain →



NOTE

- Actual run time may vary depending on the battery's condition and remaining charge, so please plan accordingly.

5-13 Handling Alarm

- When an error occurs, press and hold the **[SILENCE]** button for two seconds to mute the alarm; if no corrective action is taken within two minutes, the alarm will reactivate.

NOTE

- Please refer to the Trouble Shooting in this manual.

5-14 Use of Adaptor Power

- The adapter is not included in the product components.
- This device can be operated by an adapter DC 12V 1.0A.

NOTE

- Make sure the adapter cord has an outer diameter of 5.5mm and an inner diameter of 2.1mm.
- Be sure to use the adapters that have passed electrical safety tests such as IEC60601 for medical devices.
- When operating on the DC adapter, the battery will not charge.
- The Cable length is up to 3m.

5-15 Use of Battery Power

- The device is powered either by connecting to an AC mains outlet or via the DC input jack. If external power is interrupted, the device automatically switches to its internal rechargeable battery.
- When connected to external AC power, the internal battery automatically begins 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 5mL/h.
- The battery level is indicated on the top right of the LCD screen as  , when it reaches  , the infusion stops, and a [BATTERY EMPTY] warning occurs.
- The battery does not charge when using the adaptor.

- When running on the internal battery, if remaining capacity is low the display will show "BATTERY LOW"; when this warning appears, you must immediately reconnect to external power.
- If the internal battery becomes fully depleted, the device will shut off automatically—do not disconnect external power during an infusion when battery capacity is low.
- The internal rechargeable battery's capacity will diminish over time; therefore, arrange an annual inspection with your supplier to verify battery health.
- Even if the rechargeable battery has not been used for an extended period, fully charge it at least once a month to ensure safe long-term operation.
- To verify the rechargeable battery's condition, complete two to three full discharge–recharge cycles and confirm that the device operates normally after each cycle.
- Before first use—or after long periods of inactivity—plug the device into AC power for at least six hours to fully charge the internal rechargeable battery.

5-16 Nurse Call

- Connect the nurse call cord to the connector on the rear panel of the device, then plug the other end into the hospital's nurse call system.
- When a warning occurs, an error message is displayed on the LCD screen, and for high-severity warnings, an electric leakage (contact) signal is generated.

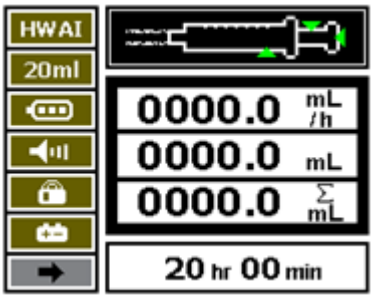
Alarm Level	Contents	Time
High	Occlusion, Syringe Dislodgement, Battery Empty, Motor Stop, System Error (Memory, Communication)	5 sec
Low	Low Battery, Standby Alert, Not Set in Standby	Not occurred

- The used Nurse Call Code Number: 06LA548
- The Cable length is up to 3m.

5-17 Button Lock

- Press and hold the [MENU/2s 🔒| button for 2 seconds to lock the button input in the infusion or standby state. To unlock, press and hold the [MENU/2s 🔒 button for 2 seconds again, or enter the designated PASSWORD according to the settings.
- When the controls are locked, the left-hand padlock icon changes to indicate the locked state.

Lock Status →

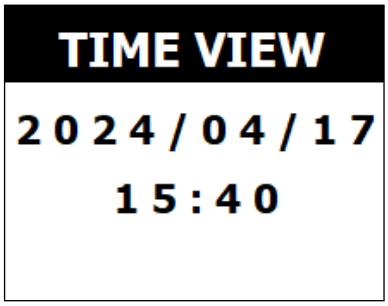


NOTE

- You can enable or disable the unlock password and change the password itself in the menu under (6-7-5 Button Lock Password Setting).
- If you forget the password, reset it via the Password Change menu (6-7-5 Button Lock Password Setting).

5-18 Time View

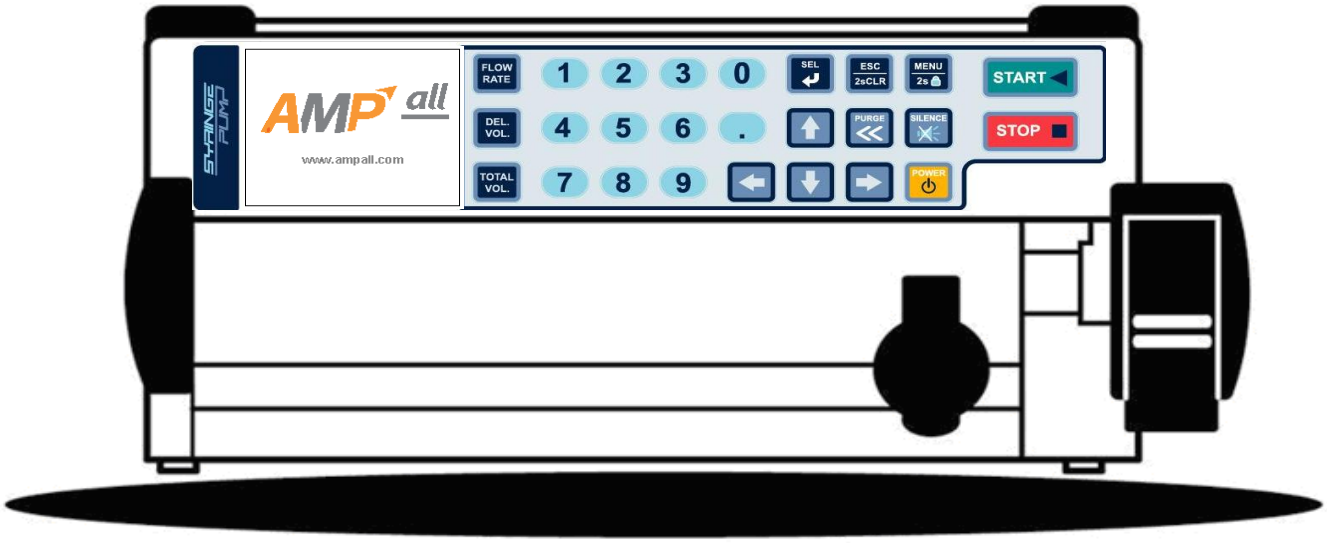
- Pressing the left arrow [←] button during standby or infusion will display the current time.
- Pressing the right arrow [→] button will return to the initial screen mode.
- If there is no button input for 5 seconds on the time display screen, it will automatically return.
- The screen below shows the time display screen.



NOTE

- The device's internal clock is used to timestamp entries in the History Call-Back feature; if the displayed time is incorrect, adjust it via Menu (6-6-1 TIME SETUP).

6. System Setup

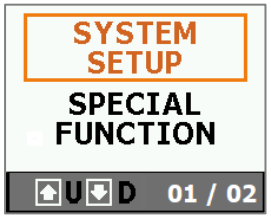


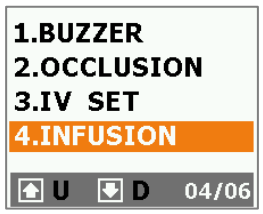
6 System Setup

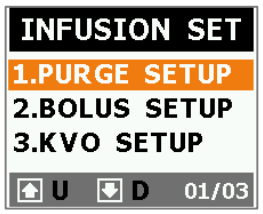
6-1 System Setup's Menus

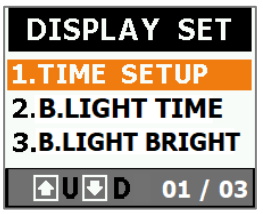
- This device consists of the SYSTEM SETUP menu and the SPECIAL FUNCTION menu.

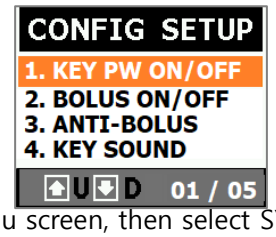
- In the settings menu of the SYSTEM SETUP, there are six menus as shown in the figure below.
- [4. INFUSION], [5. DISPLAY] and [6. CONFIG] menus have separate sub-menus.

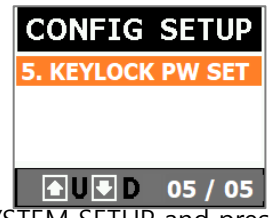












- Press the [MENU] button to navigate to the menu screen, then select SYSTEM SETUP and press [SEL].
- The MENU options under SYSTEM SETUP are as follows:

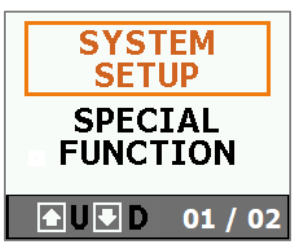
NOTE

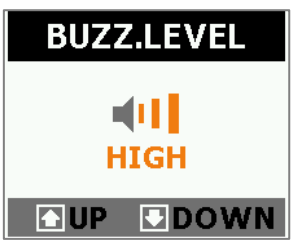
- If there's no button input for 60 seconds in any menu setting, it will automatically return to the menu setting mode.

Menu	Descriptions	Menu	Descriptions
1.BUZZER	Setting the buzzer volume	4.INFUSION	Setting the PURGE, BOLUS and K.V.O.
2.OCCLUSION	Setting the occlusion level	5.DISPLAY	Setting the TIME, Backlight and Backlight Bright
3.BRAND SET	Setting the syringe brand	6.CONFIG	Setting the Button lock On/Off, Bolus On/Off, Anti-bolus On/Off, Button sound On/Off and Button lock password.

6-2 Buzzer

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





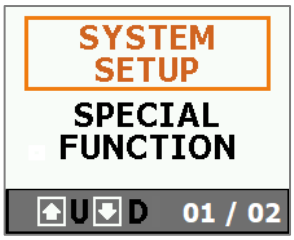
- Use the [UP]/[DOWN] buttons to adjust the BUZZER LEVEL, which can be set to HIGH, MIDDLE, or LOW.
- When you adjust the buzzer volume level, the device emits a tone at the selected volume so you can verify the setting.
- Press the [SEL] button to confirm the setting, and press [ESC]/[STOP] to cancel and return to the previous menu.
- After setting, it will automatically return to the previous menu screen.

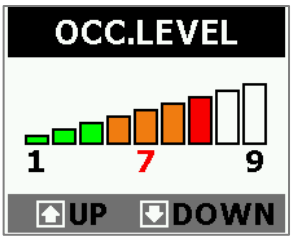
NOTE

- The initial setting is level "HIGH".

6-3 Occlusion

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





- Use the [UP]/[DOWN], [←][→] buttons to adjust the occlusion level, which can be set from 1 to 9.
- Level 1 indicates the most sensitive occlusion detection.
- The number in the middle indicates the current level, with the ends representing the range from 1 to 9.
- Press the [SEL] button to confirm the setting, and press [ESC]/[STOP] to cancel and return to the previous menu.
- After setting, it will automatically return to the previous menu screen.

NOTE

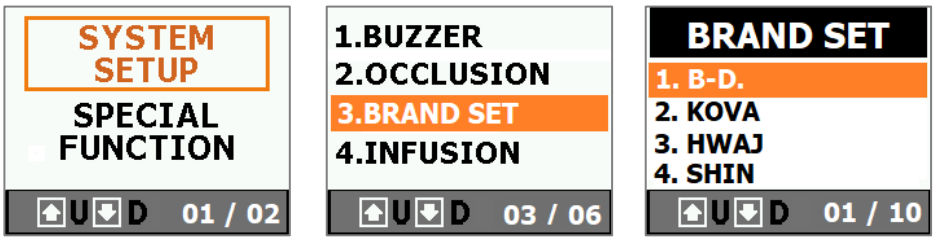
- The initial setting is level "5".

Level	Pressure Range	EN 60601-2-24 Test Results
1~3	300±100mmHg (40.0±13.3kPa) or 0.41±0.14 kgf/㎠	5mL/h (Max. within 10min), 1mL/h (Max. within 35min). - Max. Bolus (within 0.8mL)
4-6	500±100mmHg (66.7±13.3kPa) or 0.68±0.14 kgf/㎠	-
7~9	800±200mmHg (106.7±26.7kPa) or 1.09±0.27 kgf/㎠	5mL/h (Max. within 15min), 1mL/h (within 25hours) - Max. Bolus (within 0.6mL)

Since the pressure applied to the syringe and infusion line is not immediately released in a syringe pump, the user must pull the slider backward and re-load the syringe to relieve the occlusion when an occlusion alarm is activated.

6-4 Brand Set

- Select MENU→SYSTEM SETUP→BRAND SET, the LCD screen will display the "BRAND SET" menu as shown in the image below.



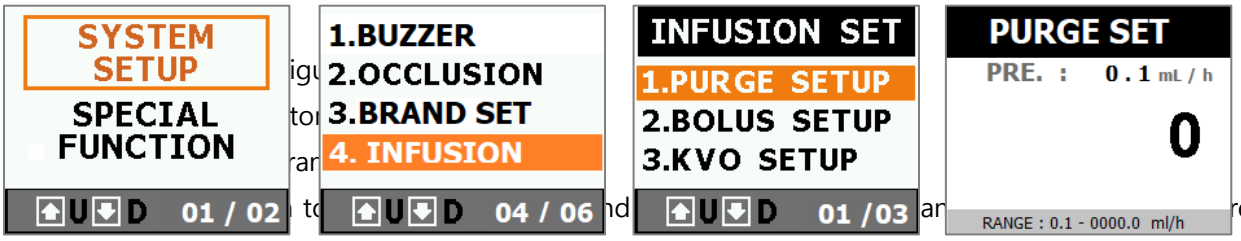
- Use the [UP]/[DOWN] buttons to select the pre-configured syringe brand.
- Syringe brands can be selected up to a maximum of 10 based on pre-order specifications.
- Press the [SEL] button to confirm the setting, and press [ESC]/[STOP] to cancel and return to the previous menu.
- After setting, it will automatically return to the previous menu screen.

- Please ensure that the brand of syringe you intend to use matches the configured brand name.
- The manufacturer assumes no liability for any issues resulting from the use of non-specified syringes.
- For any syringe sets not already preconfigured, please consult your vendor or the manufacturer for compatibility.

6-5 Infusion

6-5-1 Purge Setup

- Select MENU→SYSTEM SETUP→INFUSION→PURGE SETUP, the LCD screen will display the "PURGE SETUP" menu as shown in the image below.



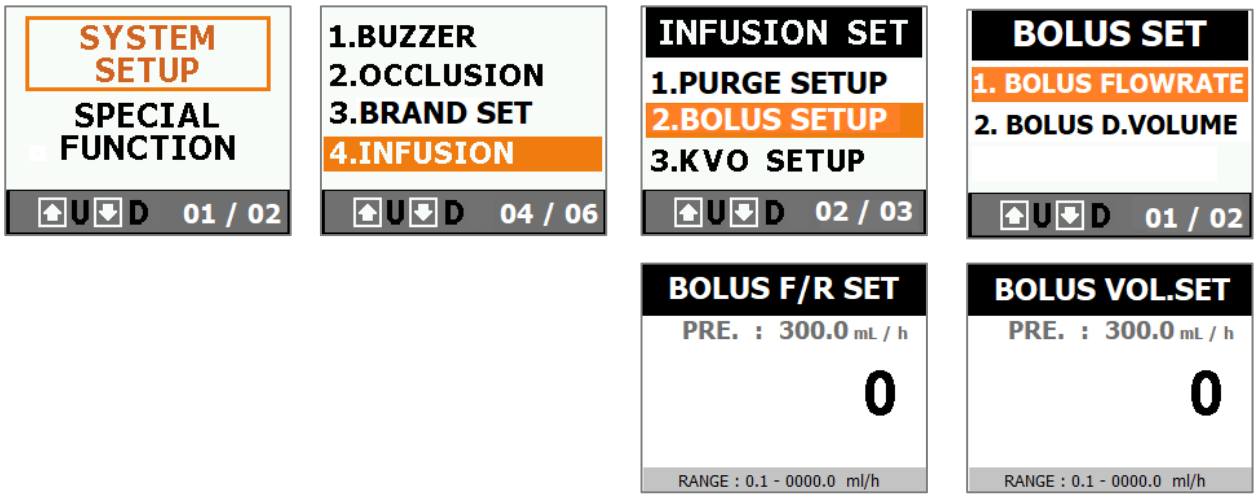
- After setting, it will automatically return to the previous menu screen.

NOTE

- The initial PURGE FLOW RATE is 300 mL/h.

6-5-2 Bolus Setup

- The bolus function lets you temporarily adjust the infusion flow rate to deliver a predetermined volume of fluid.
- Select MENU→SYSTEM SETUP→INFUSION→BOLUS SETUP, the LCD screen will display the "BOLUS SET" menu as shown in the image below.
- The "BOLUS SET" menu consists of two modes: "BOLUS FLOWRATE" setting mode for setting the flow rate and "BOLUS D.VOLUME" setting mode for setting the delivery volume.



- PRE. value is pre-configured value.
- Press the number buttons to set.
- RANGE indicates the range of settings.
- Press the [SEL] button to confirm the setting, and press [ESC]/[STOP] to cancel and return to the previous menu.
- After setting, it will automatically return to the previous menu screen.

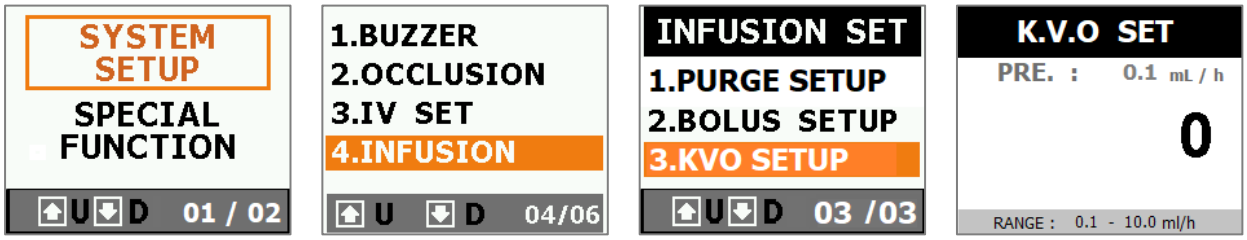
NOTE

- By default, the bolus function is configured with a flow rate of 300 mL/h and a delivery volume of 1 mL.
- The bolus function is enabled in the CONFIG settings and must be switched ON to use.

- To activate the bolus function, press and hold the [PURGE] button for 2 seconds during infusion.

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

- The K.V.O. (Keep Vein Open) function maintains infusion at a low rate, set as K.V.O., to prevent catheter occlusion due to blood coagulation when the total infused volume reaches the delivery volume.
- Select MENU→SYSTEM SETUP→INFUSION→KVO SETUP, the LCD screen will display the "KVO SETUP" menu as shown in the image below.



- PRE. value is pre-configured value.
- Press the number buttons to set.
- RANGE indicates the range of settings.
- Press the [SEL] button to confirm the setting, and press [ESC]/[STOP] to cancel and return to the previous menu.
- After setting, it will automatically return to the previous menu screen.

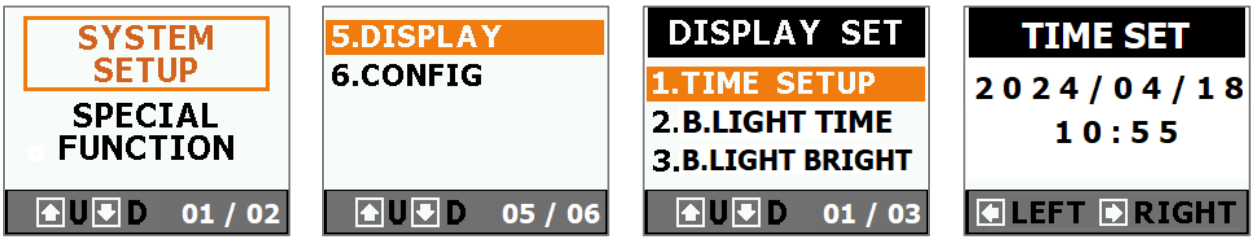
NOTE

- The initial K.V.O. FLOW RATE is 0.1 mL/h.

6-6 Display

6-6-1 Time Setup

- Select MENU→SYSTEM SETUP→DISPLAY→TIME SETUP, the LCD screen will display the "TIME SETUP" menu as shown in the image below.



- Press the number buttons to set.
- Use the [←][→] buttons to move the setting position.
- Set the time in 24-hour mode.
- Press the [SEL] button to confirm the setting, and press [ESC]/[STOP] to cancel and return to the previous menu.
- After setting, it will automatically return to the previous menu screen.

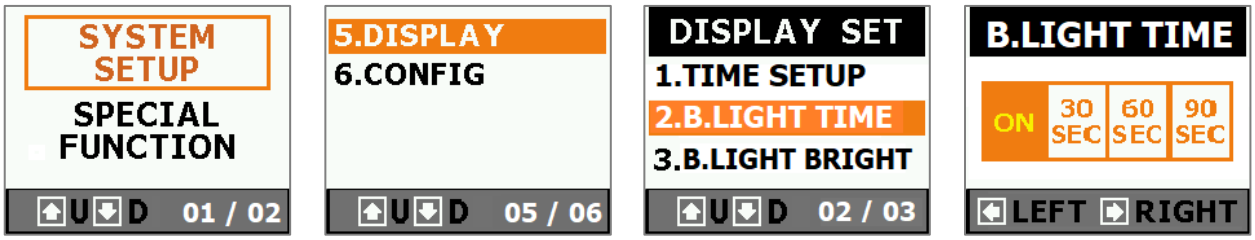
NOTE

- Time is used as the reference time for HISTORY CALL-BACK.

- Because the device lacks automatic time correction, clock errors may accumulate over time.

6-6-2 Back Light Time

- The backlight timer controls how long the LCD backlight remains on after a button press.
- Select MENU→SYSTEM SETUP→DISPLAY→B.L. TIME, the LCD screen will display the "B.L.TIME" menu as shown in the image below.



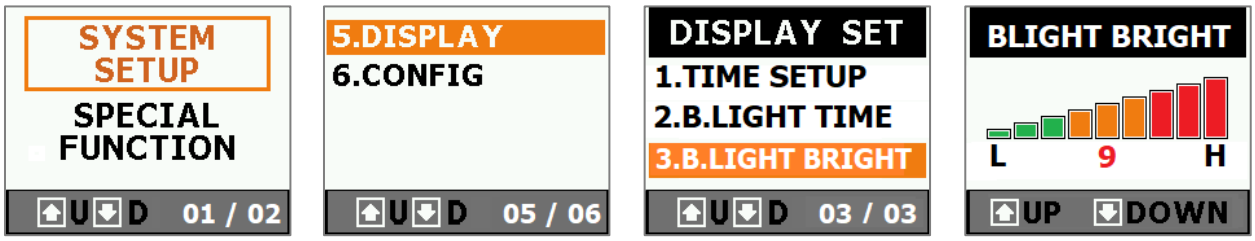
- Press the [←][→] buttons to move the position.
- Set the backlight to either "always ON", 30, 60, or 90 seconds.
- Press the [SEL] button to confirm the setting, and press [ESC]/[STOP] to cancel and return to the previous menu.
- After setting, it will automatically return to the previous menu screen.

NOTE

- The initial setting of the product is set to always "ON".
- For optimal battery life, set the LCD backlight timeout to 30 seconds.

6-6-3 Back Light Brightness

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



- Press the [UP]/[DOWN] buttons to adjust the level, ranging from 1 to 9.
- Level 1 represents the darkest setting.
- The number in the middle indicates the current level, with the ends representing the range from 1 to 9.
- Press the [SEL] button to confirm the setting, and press [ESC]/[STOP] to cancel and return to the previous menu.
- After setting, it will automatically return to the previous menu screen.

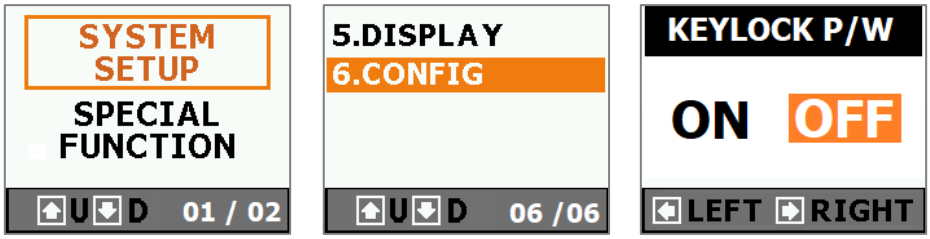
NOTE

- The initial level setting is set to level 9.
- If you want to reduce power consumption or dim the brightness when running on battery power, set it to level 1.

6-7 Config

6-7-1 Keylock Password On/Off

- This menu lets you enable the button-lock feature, which prevents any input except from the authorized operator while the device is in infusion or standby mode.
- Select MENU→SYSTEM SETUP→CONFIG→KEY PW ON/OFF, the LCD screen will display the "KEY LOCK P/W" menu as shown in the image below.



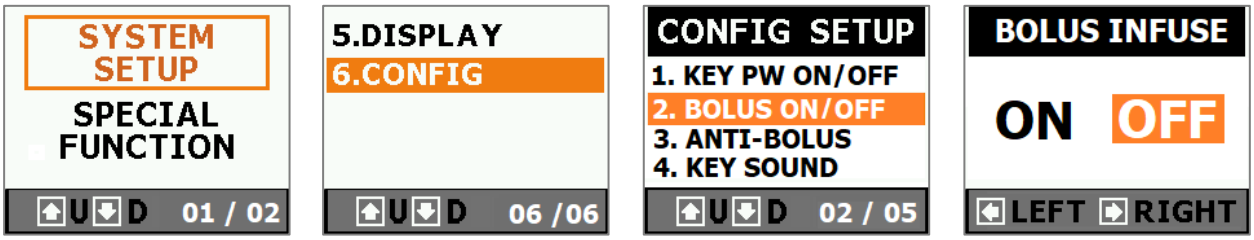
- Press the [←][→] buttons to switch the setting between ON and OFF.
- If set to ON, enter a 4-digit password to unlock the buttons.
- Press the [SEL] button to confirm your selection, and press [ESC]/[STOP] to cancel and return to the previous menu.
- After setting, it will automatically return to the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

NOTE

- The initial setting of the device is set to "OFF".

6-7-2 Bolus On/Off

- Select MENU→SYSTEM SETUP→CONFIG→BOLUS ON/OFF, the LCD screen will display the "BOLUS INFUSE" menu as shown in the image below.



- Press the [←][→] buttons to switch the setting between ON and OFF.
- Setting it to OFF disables the bolus function.
- Press the [SEL] button to confirm your selection, and press [ESC]/[STOP] to cancel and return to the previous menu.
- After setting, it will automatically return to the previous menu screen

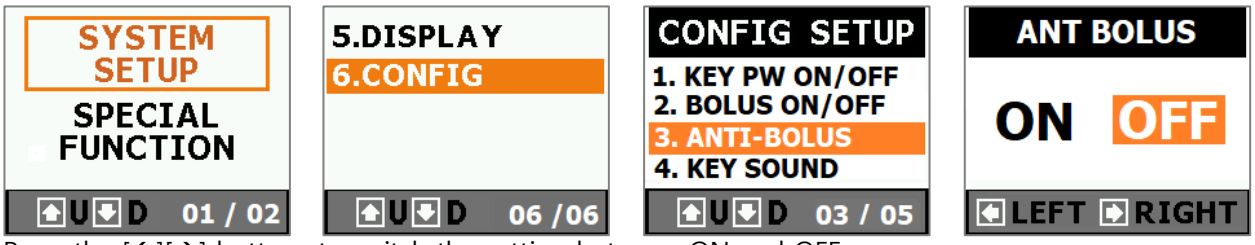
NOTE

- The initial setting of the device is set to "OFF".

6-7-3 Anti-Bolus

- Select MENU→SYSTEM SETUP→CONFIG→ANTI BOLUS, the LCD screen will display the "ANTI BOLUS"

menu as shown in the image below.



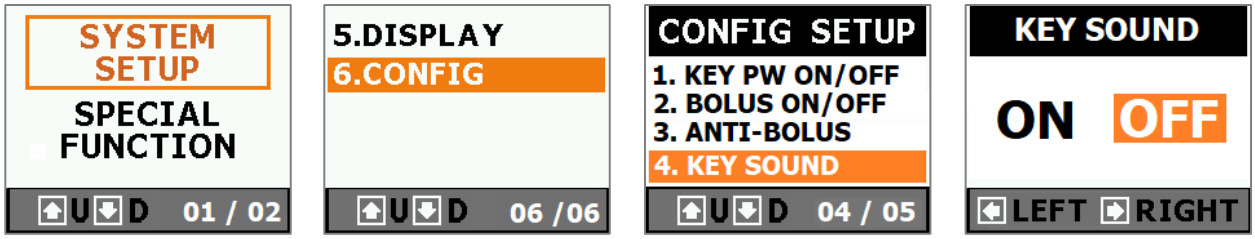
- Press the [←][→] buttons to switch the setting between ON and OFF.
- Setting it to OFF disables the anti-bolus function.
- Press the [SEL] button to confirm your selection, and press [ESC]/[STOP] to cancel and return to the previous menu.
- After setting, it will automatically return to the previous menu screen.

NOTE

- The Anti-Bolus function prevents a sudden bolus of medication resulting from pressure buildup in the catheter when an occlusion occurs.
- The initial setting of the product is set to "OFF".

6-7-4 Key Sound

- Select MENU → SYSTEM SETUP → CONFIG → KEY SOUND, the LCD screen will display the "KEY SOUND" menu as shown in the figure below.



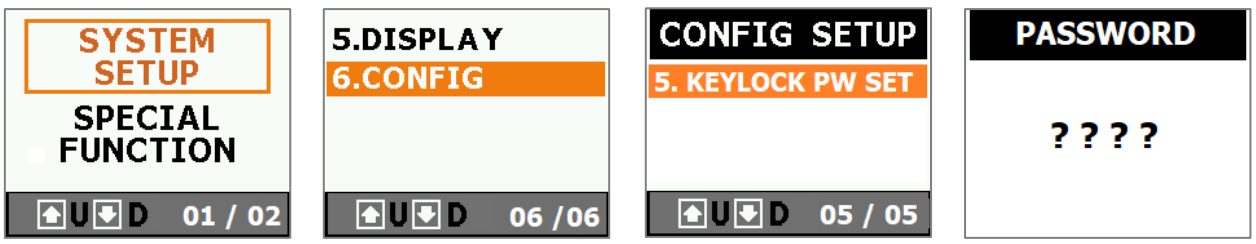
- Press the [←][→] buttons to switch the setting between ON and OFF.
- If set to OFF, no beep will occur when pressing the buttons.
- Press the [SEL] button to confirm the selection, or press [ESC]/[STOP] to cancel and return to the previous menu.
- After setting, it will automatically return to the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

NOTE

- The initial setting of the product is set to "ON".

6-7-5 Button Lock Password

- Select MENU → SYSTEM SETUP → CONFIG → KEYLOCK PW SET, and the "PASSWORD" menu will appear on the LCD screen as shown in the figure below.

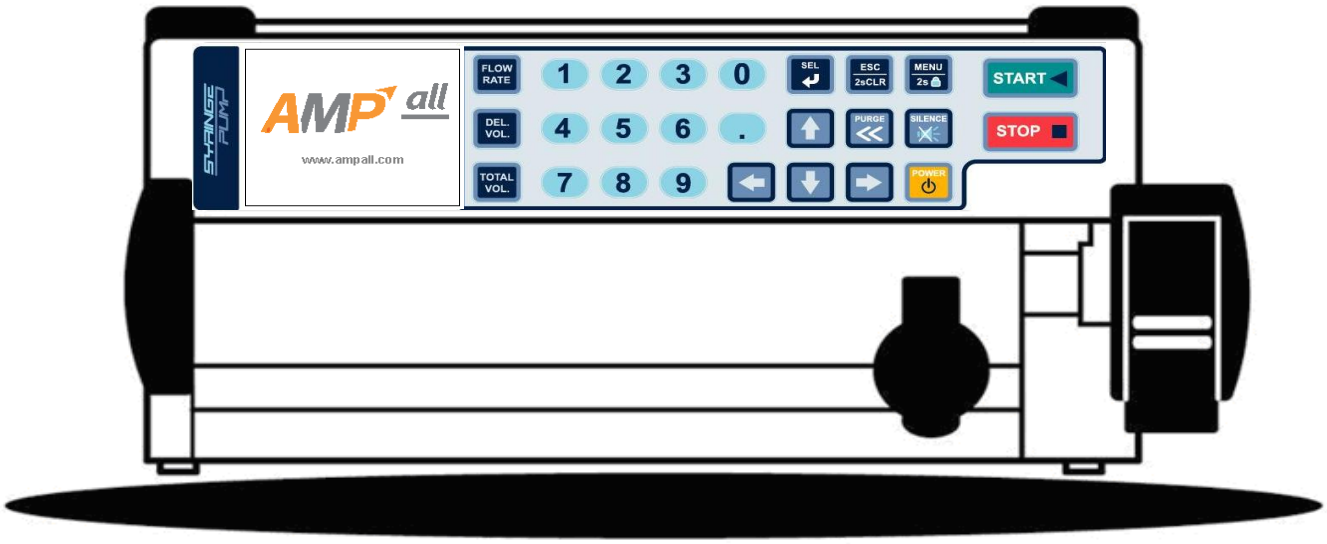


- Enter the four-digit password sequentially, excluding the [STOP], [.] and [POWER] buttons.
- Press the [.] button to complete the setting after entering the four digits.
- After the setting, it will automatically return to the previous menu screen.
- Press the [STOP] button to cancel and return to the previous menu.

NOTE

- The initial password for the device is "0000".

7. Special Functions

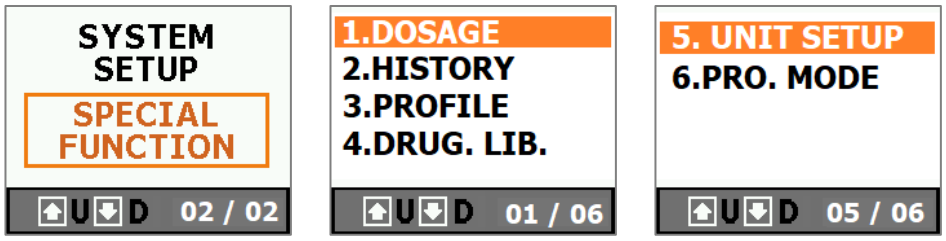


7 Special Functions

7-1 Special Function's Menus

- This device consists of the SYSTEM SETUP menu and the SPECIAL FUNCTION menu.

- In the settings menu of the SPECIAL FUNCTION, there are six menus as shown in the figure below



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

NOTE

- This menu includes optional features. Please contact the seller or manufacturer if you wish to use them.

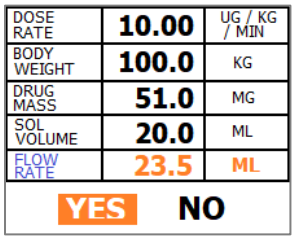
- In all menu settings, it automatically returns to the menu setting mode after 60 seconds of no button input.
- The table below illustrates the menu content according to the option settings.

MENU	Descriptions	Option availability
1.DOSAGE	Automatic calculation function for syringe dosage	Option
2.HISTORY	History Call-Back function	General 10 events, Optional 2000 events
3.PROFILE	1~24 hours Profile Infusion function	Option
4.DRUG LIBRARY	Drug Library with capacity for 2000 entries	Option
5.UNIT SETUP	Conversion function for DOSE RATE units of DOSAGE	-
6.PRO MODE	Addition function for syringe brands	Sales representative or manufacturer usage function
MAX. FLOW RATE	10mL Syringe: 300mL/h 20mL Syringe: 400mL/h 30mL Syringe: 500mL/h 50mL Syringe: 1200mL/h	10mL Syringe: 600mL/h 20mL Syringe: 1000mL/h 30mL Syringe: 1300mL/h 50mL Syringe: 2000mL/h

7-2 Dosage

- The DOSAGE function adjusts the infusion rate according to the patient's weight, infusion time, body weight, and drug concentration to determine the optimal dosage.
- Selecting MENU → SPECIAL FUNCTION → DOSAGE displays the "DOSE RATE" menu on the LCD screen as shown in the figure below.

- Enter the inputs in the following order: "DOSE RATE" - "BODY WEIGHT" - "DRUG MASS" - "SOL VOLUME".
- Use the number buttons to input the values within the specified range at each step.
- Press the left and right arrows [←][→] to move to the desired input position.
- Once input is complete, press the [SEL] button to confirm each step.
- Press the [ESC/2sCLR] button to return to the previous step for re-entry if needed.
- In the final step, all the values entered will be displayed.
- Press the left and right arrows [←][→] to select "YES" if the inputs are correct, then press [SEL] to confirm and complete the process.



- Once input is completed, the infusion rate is automatically calculated according to the following formula and displayed in the FLOW RATE.

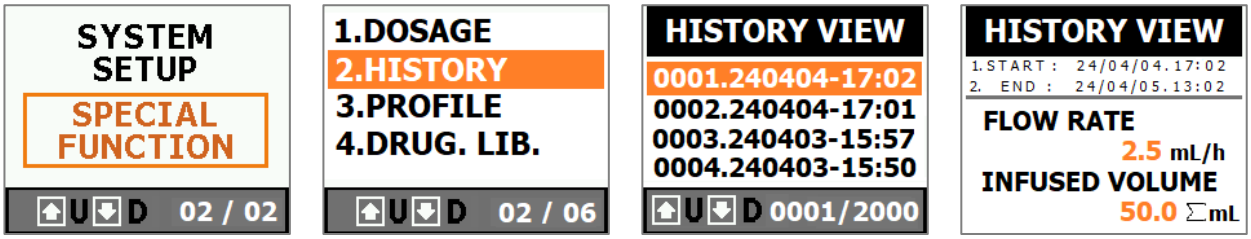
$$\left\{ \frac{\text{Dose Rate (ug/kg/min)} \times \text{Body Weight(kg)} \times \text{Solution Volume(ml)}}{\text{Drug Mass(mg)} \times 1000} \right\} \times 60$$

NOTE

- The infusion rate cannot be set to exceed the maximum rate. If the calculated rate exceeds the maximum rate, **"FLOW RATE: OVER"** is displayed on the screen, and it moves to the reset menu.
- The DELIVERY VOLUME and the TOTAL VOLUME are not automatically set.

7-3 History

- Selecting MENU → SPECIAL FUNCTION → HISTORY displays the "HISTORY VIEW" menu on the LCD screen as shown in the figure below



- "0001.240404-17:02" indicates the most recent information recorded on April 4th, 2024, at 17:02.
- Press the [UP]/[DOWN] buttons to navigate to the desired information, then press the [SEL] button to

confirm.

- You can check the start time [1.START], end time [2.END], infusion rate [FLOW RATE], and infused volume [INFUSED VOLUME].
- The numbers in the bottom right corner indicate the position of the information.
- Once viewing is complete, press [ESC]/[STOP] to return.

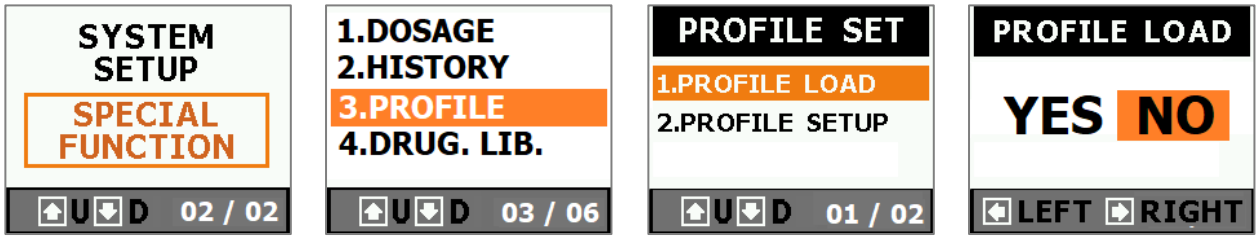
NOTE

- The device allows you to view information for 10 infusions, with the option to view information for up to 2000 infusions depending on the settings.
- To expand the storage capacity to 2000 entries, please contact the vendor or manufacturer for assistance.

7-4 Profile

7-4-1 Profile Load

- The Profile function enables you to program distinct infusion rates for each hour over a 1–24 hour period.
- Selecting MENU → SPECIAL FUNCTION → PROFILE → PROFILE LOAD displays the "PROFILE LOAD" menu on the LCD screen as shown in the figure below.
- If no PROFILE is set, the default value is automatically set to 0.1 mL/h for 1 hour.



- If a PROFILE is setting, you can activate the PROFILE function by selecting ON. Once activated, the system switches to PROFILE mode and returns to the initial screen.
- Setting PROFILE LOAD to OFF will suspend the PROFILE function and return to the previous normal mode.

NOTE

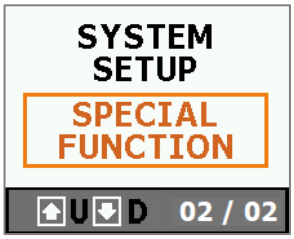
- When the power is turned off, the PROFILE mode switches to normal mode.
- When infusion is initiated in PROFILE mode, the pump delivers fluid at the predefined hourly rates in

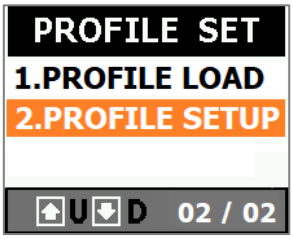
NOTE ce—up to 24 hours from the starting baseline.

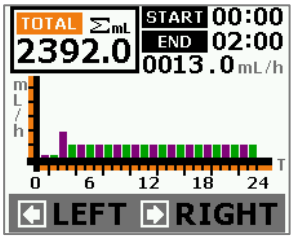
- If infusion is paused or stopped, the pump retains its position within the profile—always verify the accumulated volume and progress percentage before resuming.

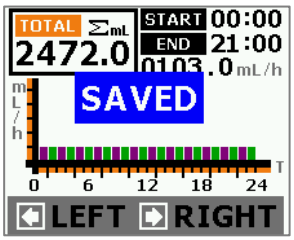
7-4-2 Profile Setup

- The PROFILE function is a feature that allows infusion at different rates set at 1-hour intervals for up to 24 hours.
- Selecting MENU → SPECIAL FUNCTION → PROFILE → PROFILE SETUP displays the PROFILE edit menu on the LCD screen as shown in the figure below.









- Move to each setting position using the left and right arrows [←][→].
- Enter values using the numeric keypad.
- Press the [SEL] button to set the first END time.
- The setting time unit is 1 hour set up to a maximum of 24 hours.
- The configured segments' values are displayed graphically.
- Press the [SEL] button to input the infusion rate per hour for the corresponding range.
- The next segment starts from the END time of the previous segment, and you input the END time again.
- The total infusion volume [TOTAL] is automatically calculated in the top left corner.
- During setup, press the [ESC] button to return to the first setup segment.
- In the view mode, pressing the [ESC] or [STOP] button returns to the previous menu.
- After completing the setup, review the infusion-rate graph and press [SEL] repeatedly to cycle through and confirm each programmed segment's rate.
- When you press the [START] button, the PROFILE is saved, and the message "SAVED" is displayed on the screen. Then, it automatically returns to the previous menu.

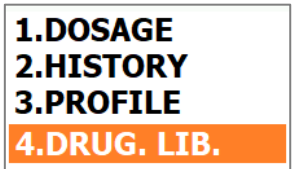
NOTE

- Segments programmed with a flow rate of 0 mL/h will default to the minimum K.V.O. rate of 0.1 mL/h to prevent catheter occlusion.
- The total infusion volume cannot exceed 1000mL.
- Please input 0 mL/h for the FLOW RATE during times outside of the desired infusion PROFILE.
- The K.V.O. volume for preventing vascular occlusion is also added to the total infusion volume [TOTAL]

7-5 Drug Library

7-5-1 Drug Library On/Off

- The Drug Library feature lets you predefine infusion rates and delivery volumes for frequently used medications, then conveniently apply those stored settings by selecting the desired drug.
- Selecting MENU → SPECIAL FUNCTION → DRUG LIBRARY → LIBRARY ON/OFF displays the "DRUG.LIB ON?" menu on the LCD screen as shown in the figure below.
- If you wish to use the drug library function, select ON to activate it.



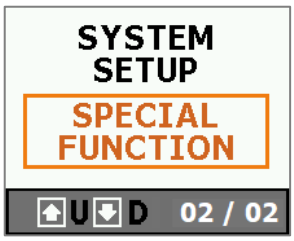
- When activated, the system switches to drug library mode, and when you LOAD the drug library (7-5-2 DRUG LIBRARY SETUP), the selected library color and medication information are displayed at the top of the LCD.
- When set to OFF, the library function is disabled, and the previous normal mode is restored.

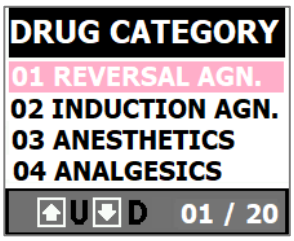
NOTE

- If Drug Library mode is enabled, it remains active even after the device is powered off.
- In drug library mode, you cannot change the infusion rate and delivery volume on the initial screen.
- To change the infusion rate and delivery volume in drug library mode, select MENU → SPECIAL FUNCTION → DRUG LIBRARY → LIBRARY SETUP → EDIT and proceed with the settings.

7-5-2 Drug Library Setup (Load and Edit)

- The Drug Library feature lets you assign and store specific infusion rates and delivery volumes for frequently used medications, enabling quick selection and application of these preset settings.
- Selecting MENU → SPECIAL FUNCTION → DRUG LIBRARY → LIBRARY SETUP displays the DRUG CATEGORY edit menu on the LCD screen as shown in the figure below.





- Navigate through the 20 categories using the [UP]/[DOWN] buttons to select the category you want to edit/load, then press the [SEL] button to confirm your selection.
- The factory default settings for the 20 predefined category names/colors and values are as follows.

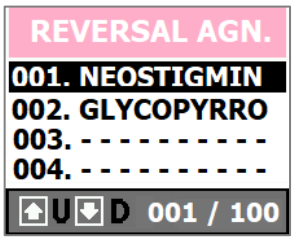
NOTE

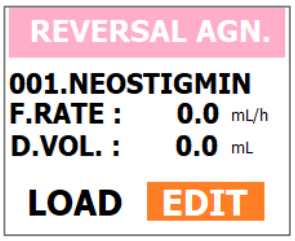
- Default setting includes a library list for 20 categories.

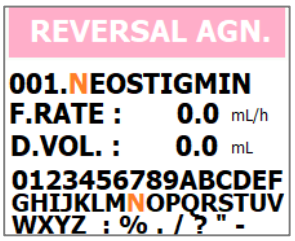
Category Names	Colors	Descriptions	RGB565	Default Drug Library name 1	Default Drug Library name 2
1.REVERSAL AGENTS		Magenta	F2CE	NEOSTIGMIN	GLYCOPYRRO
2.INDUCTION AGENTS		Dark yellow	EF43	PROPOFOL	KETAMINE
3.ANESTHETICS		Light gray	C5B4	KETAMINE	LIDOCAINE
4.ANALGESICS		Cyan	869C	MORPHINE	FENTANYL
5.VASOPRESSOR		Dark pink	DDDA	DOPAMINE	MEPHENTERM
6.ANTICHOLINERGICS		Green	AEAD	ATROPINE	GLYCOPYRRO
7.ANTIBIOTIC		Light blue	0013	PENICILLIN	CEPHALOSPO

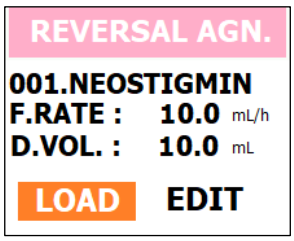
8.ANTIVIRAL		Royal	000F	ACYCLOVIR	GANCICLOVI
9.ANTIFUNGAL		Brown	7800	FLUCONAZOL	AMPHOTERIC
10.ANTICANCER		Dark blue	220D	PACLITAXEL	DOXORUBICI
11.CARDIOVASCULAR		Olive	7BE0	NITROGLYCE	DOBUTAMINE
12.ANTIARRHYTHMICS		Dark Orange	D324	AMIODARONE	QUININDIUM
13.ANTIHYPERTENSIVE		Sky blue	07FF	FUROSEMIDE	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

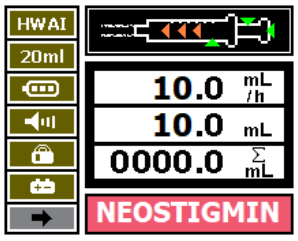
- Within the category, use the [UP]/[DOWN] buttons to navigate the list of drugs to edit, then press the [SEL] button to select.











- To edit using the left and right arrows [←][→], navigate to [EDIT], then position it on [LOAD] for the corresponding drug, and press the [SEL] button to select.
- If information is missing for the selected drug when [LOAD] is selected, the message "RANGE OVER" will be displayed, and it will automatically return to the parent menu.
- If the drug library is set up correctly, return to the initial screen, and the selected [NEOSTIGMIN] will be displayed as the label, as shown in the example.
- The label remains even if the power is disconnected, and if you no longer wish to use the drug library, you must set the "Drug Library Function (7-5-1 Drug Library Function)" according to the content to OFF.
- Selecting [EDIT] enters the drug editing mode.
- Use the left and right arrows [←][→] to navigate to the desired alphabet at each input position, then press [SEL] to complete the input.
- Pressing [SEL] alone moves to the next character position, allowing up to 10 characters for the drug name.
- Pressing [ESC] moves to the next delivery volume setting position.
- Input using the number buttons for the FLOW RATE(F.RATE) setting position.

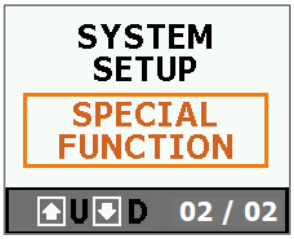
- Input using the number buttons for the DELIVERY VOLUME(D.VOL.) setting position.
- After completing input at the last digit of DELIVERY VOLUME(D.VOL.), press [SEL] to save the value.

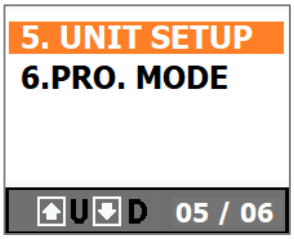
NOTE

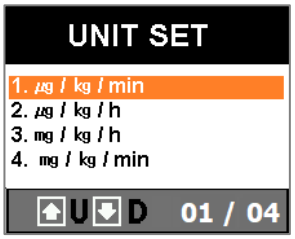
- In the DRUG LIBRARY mode, you cannot change the FLOW RATE(F.RATE) and DELIVERY VOLUME(D.VOL.) on the initial screen.
- To change the FLOW RATE(F.RATE) and DELIVERY VOLUME(D.VOL.) in the DRUG LIBRARY mode, select MENU -> SPECIAL FUNCTION -> DRUG LIBRARY -> LIBRARY SETUP -> EDIT, and then set the DRUG LIBRARY.

7-6 Unit Setup

- This function changes the setting unit of DOSAGE in the urban function to the unit that suits the user.
- Selecting MENU -> SPECIAL FUNCTION -> UNIT SETUP displays the "UNIT SET" menu on the LCD screen as shown in the figure below.



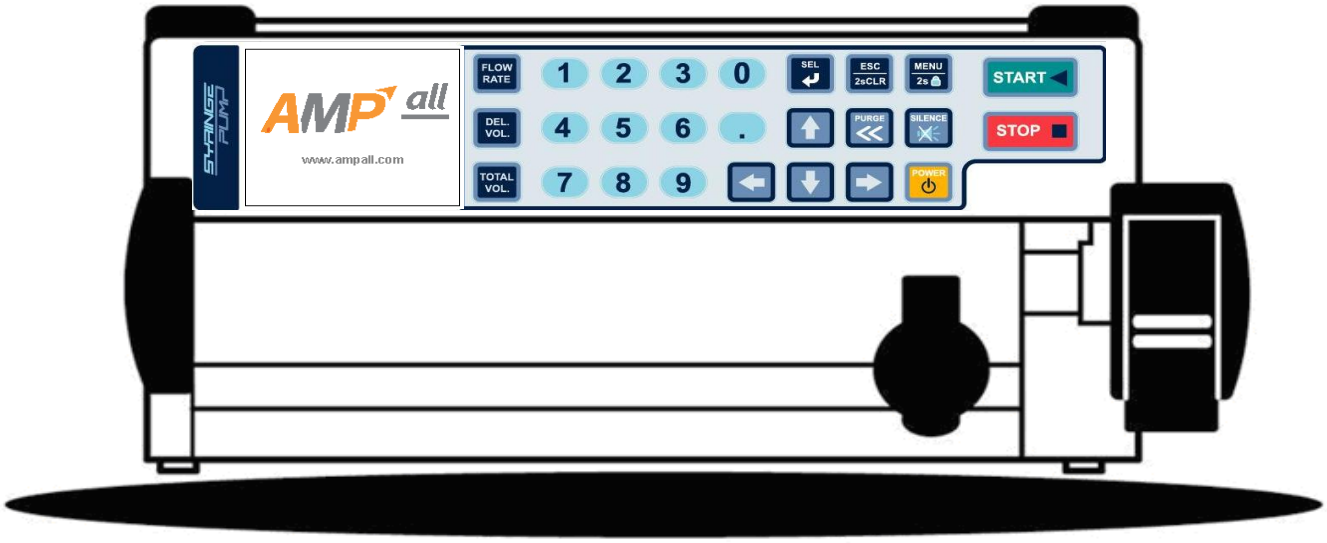




7-7 Pro. Mode

- PRO. MODE is a testing mode for adding and removing syringe sets, inaccessible to users.
- For changing or adding syringe sets, please contact the vendor or manufacturer.

8. Trouble Shooting



8 Trouble Shooting

- If any malfunction or abnormal operation occurs during use, immediately refer to and follow the steps outlined in the emergency procedures section.
  If you encounter any issues, perform the following steps; if the problem persists after these actions, contact your local authorized dealer immediately.

NOTE

- Each time an alarm sounds, the pump automatically halts infusion—alarms occur only when an error arises during infusion, and the red status indicator on the LCD will flash.

Symptom	Cause	Action
Pump cannot be switched on.	• AC or DC power cord is not inserted 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 24 hours by connecting the pump to an AC power outlet. ⚠ • Because of an industrial waste, used Ni-MH battery must be returned to AMPALL or distributor.
[OCCLUSION] LED flashes and alarm sounds.	• The infusion line is kinked or twisted	▶1. Turn the alarm off by pressing [SILENCE] button. ▶2. Check the infusion line and take a corrective action like untwisting or replacing with a new one to solve the problem of occlusion ▶3. Press [STOP] button to show "STAND-BY" on the LCD. ▶4. Restart infusion by pressing [START] button.
	• When infusion is restarted, the alarm sounds again, and the pump stops	▶1. The system is in trouble. ▶2. Turn the alarm off by pressing [SILENCE] button. ▶3. Please contact your local authorized dealer.
[FINISH] LCD display and alarm sounds	• The syringe is completely empty	▶1. Turn the alarm off by pressing [SILENCE] button. ▶2. To continue the infusion, replace the syringe with a new one. ▶3. Press [STOP] button to show "STAND-BY" on the LCD. ▶4. Restart infusion by pressing [START] button.
[NEAR EMPTY] LED flashes and alarm sounds.	• The syringe is nearly empty (Finishing infusion in 5 minutes before, the flash light and warning sound occurring)	▶1. Press [STOP] button to stop infusion. ▶2. To continue the infusion, replace with the new syringe filled with solution. ▶3. Restart infusion by pressing [START] button.

Symptom	Cause	Action
[SLIDER HOOK] LED flashes and alarm sounds	• Slider Hook does not fix Push-Button of syringe	▶1. Turn the alarm off by pressing [SILENCE] button. ▶2. Make Slider Hook fix Push-Button of syringe. ▶3. Press [STOP] button to show "STAND-BY" on the LCD. ▶4. If re-infusion is needed, restart infusion by pressing [START] button.
[CLAMP] LED flashes and alarm sounds	• Clamp does not fix Barrel of syringe	▶1. Turn the alarm off by pressing [SILENCE] button. ▶2. Pull the clamp, turn it to the left up to 90° and put the finger grips of syringe into the slit. ▶3. Press [STOP] button to show "STAND-BY" on the LCD. ▶4. If re-infusion is needed, restart infusion by pressing [START] button.
[CLUTCH] LED flashes and alarm sounds	• Clutch is not properly engaged	▶1. Turn the alarm off by pressing [SILENCE] button. ▶2. Make the clutch engaged properly. ▶3. Press [STOP] button to show "STAND-BY" on the LCD. ▶4. If re-infusion is needed, restart infusion by pressing [START] button.
"BATT-LOW" on the LCD and alarm sounds	• The voltage of internal battery is low	▶1. Press [STOP] button to stop infusion. ▶2. Recharge the battery fully for 24 hours by connecting the pump to an AC power outlet. ▶3. Restart infusion by pressing [START] button.
"KEEP-VEIN" on the LCD and alarm sounds	• In the operation, the total volume delivered reaches the delivery limit	▶ Stop K.V.O. rate by pressing [STOP] button
	• The total volume delivered exceeds the delivery limit	▶1. Stop K.V.O. rate by pressing [STOP] button ▶2. When infusion is newly needed, set the delivery volume again or clear the total volume delivered.
When [PURGE] button is pressed, the alarm sounds.	• The syringe is not set properly • Even when the syringe is set again, purging does not occur	▶1. Set the syringe correctly. ▶2. The system is in trouble. ▶3. Please contact your local authorized dealer
"ERROR" is on the LCD	• The system is in trouble	▶ Please contact your local authorized dealer
Even when [START] button is pressed, the alarm sounds, and the pump does not start.	• The value of "flow rate, delivery limit, dose rate, body weight, drug volume, or solution volume" is not set correctly • Clutch is not properly engaged • The syringe is not set properly • The low voltage of the internal battery	▶ Confirm the values that were set. ▶ Engage the clutch correctly. ▶ Set the syringe correctly. ▶Recharge the battery fully for more than 24 hours by connecting the pump to an AC power outlet.

Symptom	Cause	Action
[SYRINGE SIZE] LED and [CLAMP] LED flash	• The syringe, which is used, may be different from the one specified in the pump in terms of manufacturer • When infusion is restarted, the alarm sounds again, and the pump stops	▶ Make sure that the syringe, which is used, is the same as the one specified in the pump in terms of manufacturer. To use the syringe of different manufacturer, please contact your local authorized dealer. ▶ The system is in trouble. ▶1. Turn the alarm off by pressing [SIL ENCE] button. ▶2. Turn off the power. ▶3. Please contact your local authorized dealer for repair
The accuracy of flow rate is questionable.	• The syringe, which is used, may be different from the one specified in the pump in terms of manufacturer • Otherwise, the system is suspected to be in trouble	▶Make sure that the syringe, which is used, is the same as the one specified in the pump in terms of manufacturer. ▶To use the syringe of different manufacturer, please contact your local authorized dealer. ▶Please contact your local authorized dealer for repair.
The operation hour by battery is too short after recharging the battery	• Internal battery has deteriorated • Otherwise, the system is suspected to be in trouble	▶ Stop the operation of the pump and replace with a new battery through your local authorized dealer. ▶ Please contact your local authorized dealer for repair.
Battery is not recharged even when it is connected to AC power outlet.	• AC power cord is not inserted properly • AC power cord has deteriorated • Otherwise, the system is suspected to be in trouble	▶Check the AC power cord connection. ▶ Replace with a new AC power cord. ▶ Please contact your local authorized dealer for repair.
Battery is not recharged even when it is connected to DC power outlet.	• DC power cord is not inserted properly • DC power cord has deteriorated • Otherwise, the system is suspected to be in trouble	▶ Check the DC power cord connection. ▶Replace with a new DC power cord. ▶ Please contact your local authorized dealer for repair.

- Before resuming infusion, verify that the programmed flow rate, delivery volume, and syringe capacity are all correct.
- After initiating re-infusion, ensure the pump is delivering the programmed flow rate accurately.
- If you detect any deviation from the programmed infusion rate or volume, stop the pump immediately and contact your supplier.

NOTE

When an error occurs, press the **[SILENCE]** button to mute the alarm; if no corrective action is taken within two minutes, the alarm will sound again.

9 Specifications

FLOW RATE	(Default) (0.1ml/h steps) 10ml: 0.1 ~ 300ml/h 20ml: 0.1 ~ 400ml/h 30ml: 0.1 ~ 500ml/h 50ml: 0.1 ~ 1200ml/h	(Optional) (0.1ml/h steps) 10ml: 0.1 ~ 600ml/h 20ml: 0.1 ~ 1000ml/h 30ml: 0.1 ~ 1300ml/h 50ml: 0.1 ~ 2000ml/h
ACCURACY WITH APPROVED SYRINGE SET	Within ±2%	
TOTAL INFUSED VOLUME	0.1 ~ 1000ml	
DELIVERY VOLUME	0.1 ~ 1000ml	
BOLUS FLOW RATE	Same as Flow rate setting range	
K.V.O. Rate	0.1 ~ 10ml/h	
DIMENSIONs(W x D x H)	220 x 130 x 108 (mm)	
WEIGHT	2kg	
PURGE FLOW RATE	Same as Flow rate setting range	
NURSE CALL	DC 12V, 1A	
ALARMs	PURGE, BOLUS, K.V.O., OCC LEVEL (9 steps), NEAR EMPTY, CLUTCH OPEN, SLIDER HOOK OPEN, LOW/EMPTY BATTERY, STANDBY, FLOW ERROR, CLAMP OPEN, ALARM REPEAT, DEVICE MALFUNCTION.	
SPECIAL FUNCTIONs	PAUSE, RETAIN MEMORY, REMAINNING TIME, OPEN SYSTEM (Calibration is available for 10 brands of Syringe), NURSE CALL (optional), ALARM Control, KEYPAD LOCK. PROFILE MODE (optional) HISTORY CALL-BACK: 10 events or 2000 events (optional) DOSAGE MODE (optional) DRUG LIBRARY: 20 categories and 100 libraries per category. (optional) Changing infusion settings during infusion (optional) CENTRAL SYSTEM (optional)	
POWER REQUIREMENTs	~ 100 - 240Vac, 50/60Hz or DC 12V 1A ⎓	
POWER COMSUMPTION	45VA	
CLASSIFICATIONS	Class I / Internal power supply / Type CF	
WATER Proof	IPX3	
BATTERY Specification	9.6V Ni-MH 2000mAh	
BATTERY Operation Time	about 4hrs (at 5ml/h)	
Battery Charging Time	more than 6hrs	
Battery Warranty	1 year	
OPERATION CONDITIONS	+5~40℃, 30~90% RH (no condensation), 700~1060hpa	
STORAGE CONDITIONS	-20~45℃, 10~95% RH (no condensation), 500~1060hpa	
Expected service Life	5 Years	

10 Information on EMC

10.1 Guidance and Manufacturer's Declaration – Electromagnetic Emissions

The EUT is intended for use in the electromagnetic environment specified below. The customer or the user of the EUT should assure that it is used in such an 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	

10.2 Guidance and Manufacturer's Declaration – Electromagnetic Immunity

The EUT is intended for use in the electromagnetic environment specified below. The customer or the user of the EUT should assure that it is used in such an 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.			

10.3 Guidance and Manufacturer's Declaration – Electromagnetic Immunity

The EUT is intended for use in the electromagnetic environment specified below. The customer or the user of the EUT should assure that it is used in such an 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	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 $d = [\frac{3,5}{V_1}]\sqrt{P}$
Radiated RF IEC 61000-4-3	3 V/m 80 MHz to 2.5GHz	3 V/m 80MHz to 2.5GHz	$d = [\frac{3,5}{E_1}]\sqrt{P}$ 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 deter-

			mined 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) At 80MHz and 800MHz, the higher frequency range applies. NOTE 2) These guidelines may not apply in all situations. 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.			

10.4 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 rated at 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) At 80MHz and 800MHz, the separation distance for the higher frequency range applies.
NOTE 2) These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

10.5 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

10.6 Guidance and Manufacturer's Declaration – Electromagnetic Immunity

The EUT is intended for use in the electromagnetic environment specified below. The customer or the user of the EUT should assure that it is used in such an 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 used only in a shielded location with a minimum RF shielding effectiveness and, for each cable that enters the shielded location with a minimum RF shielding effectiveness and, for each cable that enters the shielded location Field strengths outside the shielded location from fixed RF transmitters, as determined by an electromagnetic site survey, should be less than 3V/m. (a) Interference may occur in the vicinity of equipment marked with the following symbol: 
Radiated RF IEC 61000-4-3	3 V/m 80 MHz to 2.5GHz	3 V/m 80MHz to 2.5GHz	
NOTE 1) These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people. NOTE 2) It is essential that 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.			

11 Symbols

Description	Symbol	Description	Symbol

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 represent-ative information		Use no hooks	
Water proof level	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	

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.

Warranty Card

Thank you for purchasing an AMPall product. The SP-8800 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	SP-8800
Manufacturing Date	
Warranty Period	1 year

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.**

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