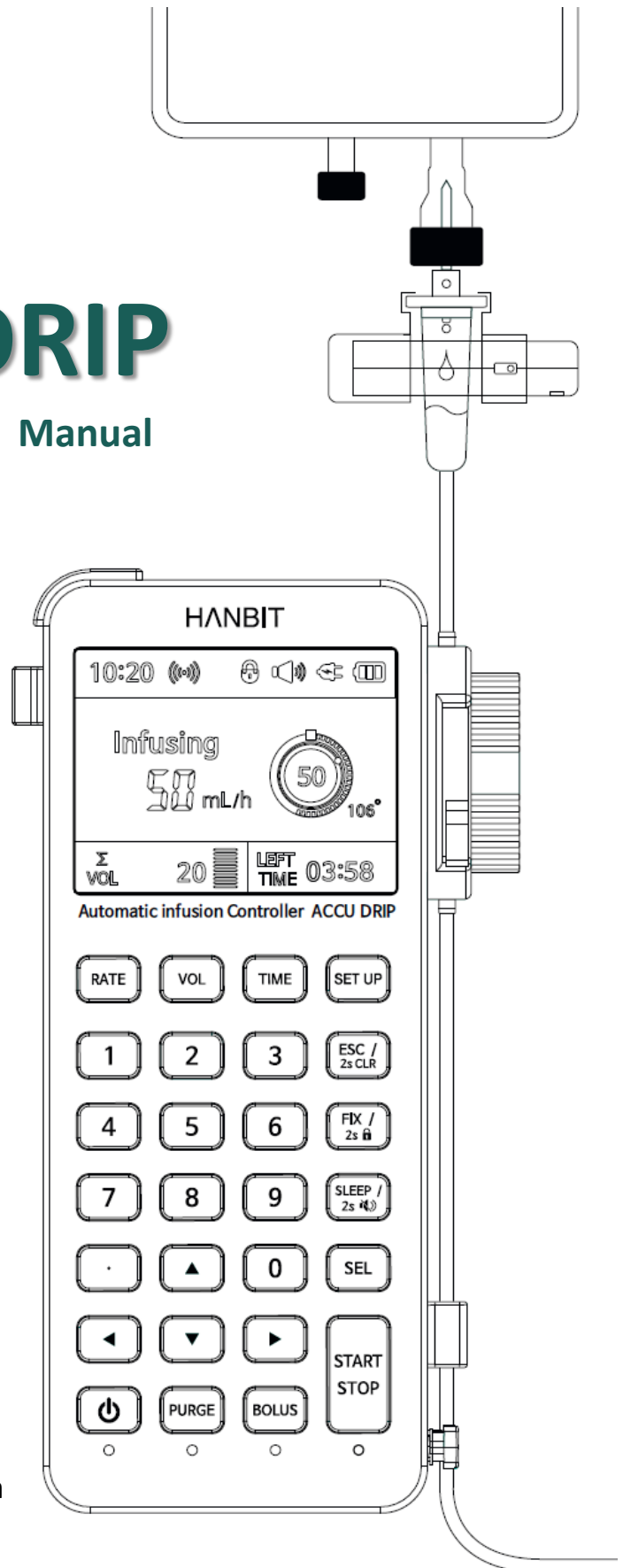


ACCU DRIP

Manual



ACCU DRIP Manual

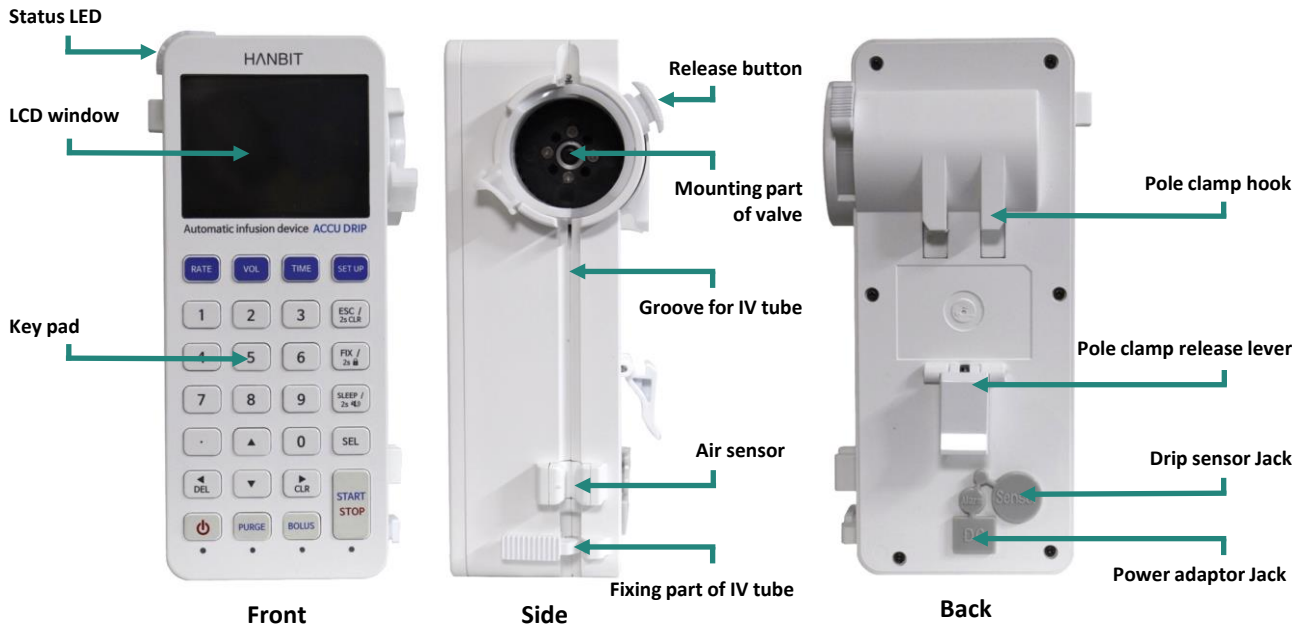
- This manual is provided for use with AccuDrip and AccuValve.
- For safe and proper use, please read this manual carefully before using it.
- It should only be used for medical purposes by experienced medical personnel.
- It can be used to treat all intravenous fluid, including intensive care units, emergency rooms, outpatient clinics, operating rooms, recovery rooms, and general wards.
- We shall not be responsible for any damage or defects caused by arbitrary disassembly or repair.
- Please keep this instruction manual carefully so that you don't lose it.



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ACCU DRIP Overview

- Appearance



- Accessories



Drip sensor

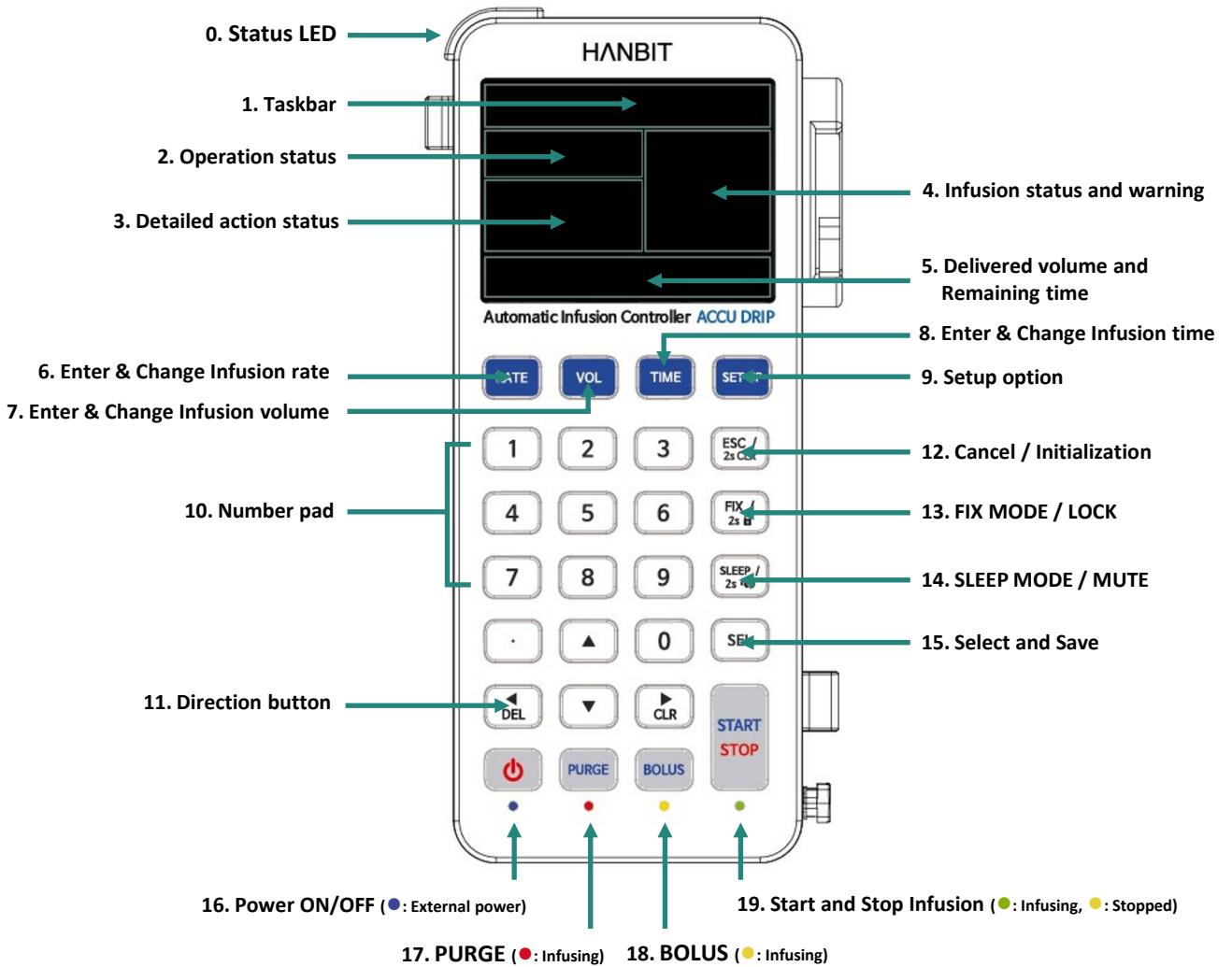


Power adaptor

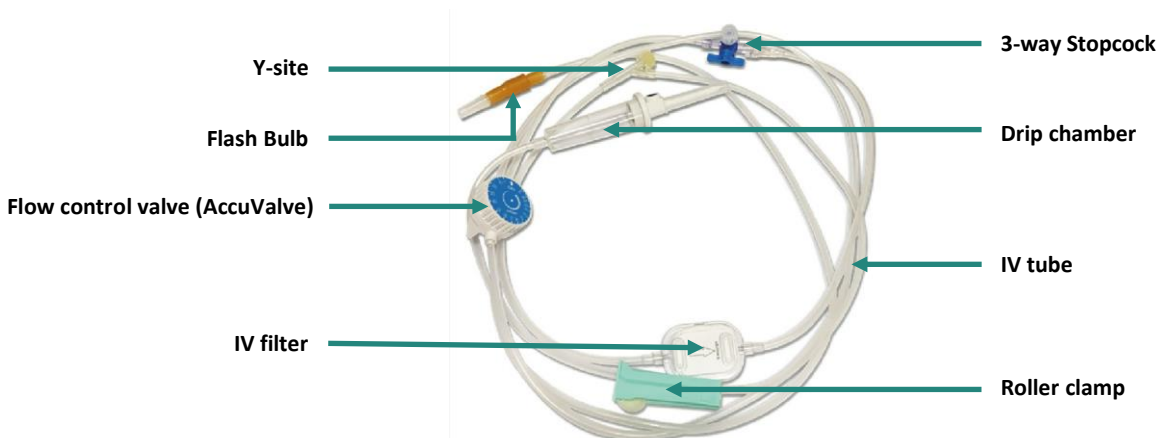


Pole clamp

• Display and Button
















• Dedicated IV set (AccuValve IV set)



• Display Configuration

No	Display	Explanation
1		<ul style="list-style-type: none"> ① Clock ② Network status ③ Keypad lock status ④ Mute status ⑤ AC power status ⑥ Battery status
2		<ul style="list-style-type: none"> • RATE SETTING • STAND BY • WARNING • Calibration... • Infusing • PURGE • BOLUS • mg/kg/min • mg/kg/hr • mg/kg/day • mcg/kg/min • mcg/kg/hr • mcg/kg/day
3		<ul style="list-style-type: none"> • Setting infusion rate • Warning phrase • Amount of infusion on PURGE/BOLUS
4		
5		<ul style="list-style-type: none"> • STAND BY <ul style="list-style-type: none"> ① Scheduled volume ② Scheduled time • Infusing <ul style="list-style-type: none"> ① Delivered volume ② Remaining time

• **Button configuration**

No	Button	Explanation
6		Enter, change and confirm infusion rate
7		Enter, change and confirm infusion volume
8		Enter, change and confirm infusion time
9		<ol style="list-style-type: none"> 1. Move Setup menu when press shortly 2. Move Infusion tab when press and hold at 2 seconds
10	Number pad	Enter number
11		Move Input bar (Cursor)
12		<ol style="list-style-type: none"> 1. Move to previous step when press shortly 2. Initialize infusion mode setting or input values when press and hold at 2 seconds
13		<ol style="list-style-type: none"> 1. Move to Fix mode when press shortly 2. Keypad lock when press and hold at 2 seconds
14		<ol style="list-style-type: none"> 1. Move to Sleep mode when press shortly 2. Voice feedback ON/OFF when press and hold at 2 seconds
15		Select and save input values
16		Power ON/OFF (External power connection : Blue lamp ●)
17		Purge (Infusing: Red lamp ●)
18		Bolus (Infusing: Yellow lamp ●)
19		<p>Start infusion when press at standby status</p> <p>Stop infusion when press during infusion</p> <p>(Infusing: Green lamp ● , Stopped: Yellow lamp ●)</p>

Product features

- ❖ When using the AccuValve IV set, the volume of one drop is 0.05mL under the standard fluid (N/S) and standard infusion conditions (infusion rate of 25mL/h, temperature of 22-24°C, and humidity of 30-50%).
- ❖ The volume difference of one drop according to the type of basic solution (N/S, H/S, D/S, D/W, H/D, etc.) is within $\pm 1\%$.
- ❖ The volume of one drop of fluid slightly decreases as the infusion rate increases, and AccuDrip has a correction formula applied accordingly.
- ❖ Although the maximum flow rate setting can go up to 350mL/h, it is recommended to use it below 200mL/h, as the closer it gets to the maximum flow rate, the higher the possibility of device errors (e.g. flow rate error) due to postural changes. Especially for flow rates above 200mL/h, please ensure that the height of the fluid is secured at around 120-130cm from the bed.
- ❖ We do not recommend using high-concentration nutritional or special fluids or medications with high viscosity without dilution, as the actual volume and the volume of one drop measured by AccuDrip may differ.
- ❖ We do not recommend using cardiovascular drugs that have a fast onset of action and dose rate is important, as AccuDrip takes time to adjust flow rate due to changes in posture and it is uncertain what effect it may have on the patient.

















Patient Safety

- This device is a medical device for intravenous medication and should not be used for other purposes such as blood transfusion.
- To avoid the risk of infection, thoroughly sterilize the fluid set before use. Use of non-sterile infusion sets is prohibited.
- AccuValve IV set, a dedicated infusion set, is prohibited from being reused as a disposable product and must be discarded after use in accordance with the relevant regulations.
- The replacement period for the infusion set to maintain the performance of this device is 48 hours.
- Since this is a Class 1 medical device, the device must only be connected to a power supply with protective ground to avoid the risk of electric shock.
- Use only the AC power adapter specified for this equipment. Using other power adapters can cause damage or injury to the equipment.

- Do not allow liquid to enter or come into contact with openings or connections in the power supply. Exposure of liquid to this area can cause corrosion or breakage of electrical components and risk of electric shock.
- Do not use this device in the presence of flammable anesthetics, high oxygen concentrations, or explosive gases to prevent the risk of explosion.
- To avoid electrical shock, always disconnect the power cord from the outlet before cleaning.
- If the audible alarm signal volume level is lower than the ambient volume level, it may prevent the user from noticing the alarm condition. Use in places with ambient noise levels of 60 dB or less.
- Do not connect or disconnect AC power with wet hands.
- Do not use this device inside the high pressure chamber (e.g. high pressure oxygen).
- The drip sensor may not function normally in high pressure environments or at low temperatures.
- Do not use this device in places where high electromagnetic waves are generated or in MRI rooms.
- Do not heat the equipment or have electric stoves or humidifiers in the vicinity.
- If the alarm occurs, the medical staff should immediately take a solution and restart the device if necessary.
- Check the equipment regularly to prevent accidents.
- The maximum injection rate that can be injected under a single fault condition of this instrument is 4.8 mL/h.
- The device must be located in a suitable location and secured safely. Do not place the instrument body on top of the patient or in a position where the pump may fall and harm the patient.
- Place the IV tube so that it does not twist.
- To prevent explosion, operate the device at least 30 cm away from the flammable anesthetic.
- Do not use other infusion pumps in combination as they may affect flow control due to changes in wave pressure during injection.
- The manufacturer is not responsible for any failures or accidents caused by negligence in handling the above warnings and cautions.

Symbols and Labels on Product

Product Symbols



Symbol	Explanation	Symbol	Explanation	Symbol	Explanation
	Cautions		Alternating current		Beware of breakage
	Manufacturing Date		Blocking from direct sunlight or heat		Temperature for use and storage
	Accessory number		Refer to the instruction manual		Humidity for use and storage
	Serial number		Sway warning		Air pressure for use and storage
IPX2	Waterproof grade		BF type mounting		Notification
	Power adaptor		Beware of humidity		

Product Labels

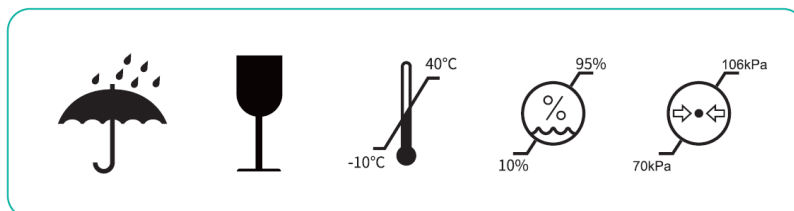
Product Name : AccuDrip
 Model Name : IC-A
 Manufacturer : HANBIT MD company
 Address : 1026, Hyundai Itel, 133, Dunsan-ro, Seo-gu,
 Daejeon, South Korea
 Telephone : +82-42-488-2200
 Manufacturing Authorization Number : 20-614
 Packaging Unit : 1 box
 Power and Battery : 100 ~ 240VAC, 50/60Hz, 0.5 ~ 1.2A
 (Nickel hydrogen, 4.8V, 4200mA)
 Type and Grade of Protection : Grade 1, Internal Power supply,
 BF type

Waterproof Grade : IPX2
 SW version : 1.1
 Serial number : A01202112150001

[This device is a medical device]

Warning Labels



Chapter 1. Operation

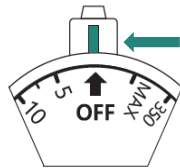
1.1. Preparation

Fasten to the stand

- ① Insert the top of the pole clamp into the hook on the back of the AccuDrip and push the bottom of the pole clamp into the release lever.
- ② Turn the knob of the pole clamp counterclockwise.
- ③ Position the AccuDrip at the appropriate height on the stand, turn the knob of the pole clamp clockwise to ensure that the device is correctly secured to the stand.
 - ⚠ Do not place the device higher than the patient.
 - Do not lean against the device if it is attached to a stand.
 - Do not use the pole clamp if it shows signs of damage.
 - Do not use the pole clamp if it shows signs of damage to the hook or the release lever.

Prepare IV set

- ① The height of the fluid bag or fluid bottle should be 90-100cm from the bed.
 - ⚠ If the height of fluid is low, the appropriate flow rate cannot be obtained by AccuDrip.
 - Since air bubble may be generated when fluid is stored in a cold place and used at room temperature, store fluid at room temperature before using.
- ② Plug in the IV set spike into the insertion site of fluid bag or fluid bottle.
- ③ Open the roller clamp to fill the fluid into the entire IV line, and fill the drip chamber with about 1/2 of the fluid.
- ④ Turn the dial of AccuValve to OFF position.
- ⑤ Remove the Indication bar of AccuValve.



- ④ Set the dial to the OFF position along the indication bar of the AccuValve and remove the indication bar.
- ④ If the above setting is not done properly, the AccuValve cannot be attached to the AccuDrip.

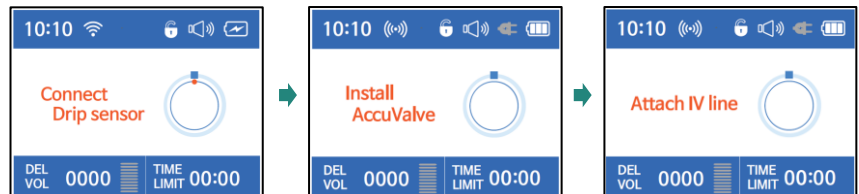
Power on

- After connecting the power cord and pressing the [POWER] button for 2 seconds, the LCD powers up with a confirmation sound and AccuDrip starts after the company logo screen.



Connect the AccuValve IV set

- ① Install AccuValve : Position the AccuValve correctly in the mounting part of the AccuDrip and push the AccuValve.
- ② Attach IV line : Slide aside the holder of the fixing part located below the air sensor to insert the IV line, and verify that the IV line is correctly positioned on the bubble sensor.
- ③ Attach Drip sensor : Push the both side of drip sensor inward, and fit the guide groove of drip sensor into the horizontal protrusion part of the drip chamber. Ensure that the surface of the fluid in the drip chamber is located below the drip sensor.




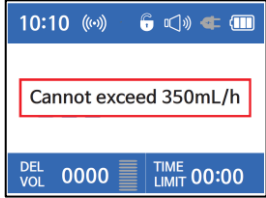
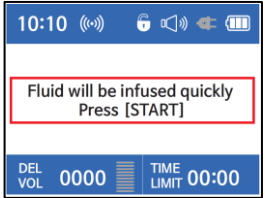
Last check Before infusion



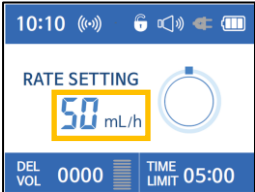
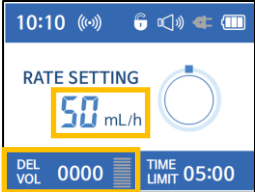
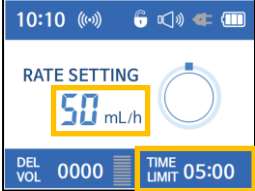
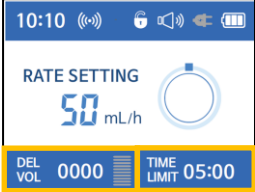
- Make sure the roller clamp is open.
- Make sure that the AccuValve is inserted correctly.
- Make sure the IV line is correctly located on the bubble sensor.
- Make sure the drip sensor is correctly attached to the drip chamber.
- Make sure the battery is sufficient when using the internal battery.
- Make sure that the tube is free of twisting or air.

1.2. Start of Infusion

• Input range

<p>Infusion rate</p>	<ul style="list-style-type: none"> Input range : 1 ~ 350 mL/h  When entering 999 mL/h, fully open to infuse. 1 ~ 9.9 mL/h : 0.1 unit, 10 ~ 350 mL/h : 1 unit <ul style="list-style-type: none"> When input range is 351 ~ 998 mL/h  <ul style="list-style-type: none"> When entering 999 mL/h, fully open 
<p>Infusion volume</p>	<ul style="list-style-type: none"> Input range : 1 ~ 9999 mL
<p>Infusion time</p>	<ul style="list-style-type: none"> Input range : 1min ~ 99hr 59min

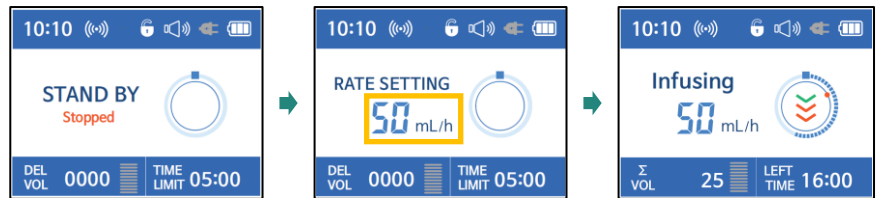
• Initial setting (Various combinations of infusion rate, infusion volume, infusion time)

<p>1. Infusion rate</p>	<ol style="list-style-type: none"> Press the [RATE] button and enter the speed. Press the [START] button to start the infusion. The cumulative volume is displayed automatically. 	
<p>2. Infusion rate & Infusion volume</p>	<ol style="list-style-type: none"> Press the [RATE] button and enter the speed. Press the [VOL] button and enter the scheduled volume. Press the [START] button to start the infusion. The cumulative volume and remaining time is displayed. 	
<p>3. Infusion rate & Infusion time</p>	<ol style="list-style-type: none"> Press the [RATE] button and enter the speed. Press the [TIME] button and enter the scheduled time. Press the [START] button to start the infusion. The cumulative volume and remaining time is displayed. 	
<p>4. Infusion volume & Infusion time</p>	<ol style="list-style-type: none"> Press the [VOL] button and enter the scheduled volume. Press the [TIME] button and enter the scheduled time. Press the [START] button to start the infusion. The infusion rate is calculated, and the cumulative amount and remaining time are displayed. 	

1.3. Changes in conditions after starting infusion

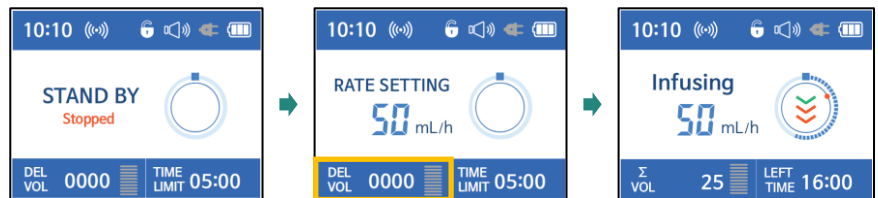
1. Rate change

- ① Press the [STOP] button during infusion to enter the "STAND BY" status.
- ② Press the [RATE] button and enter the speed.
- ③ Restart the infusion with the [START] button.
- ④ The cumulative volume will continue over the previous value and the remaining time will be recalculated.



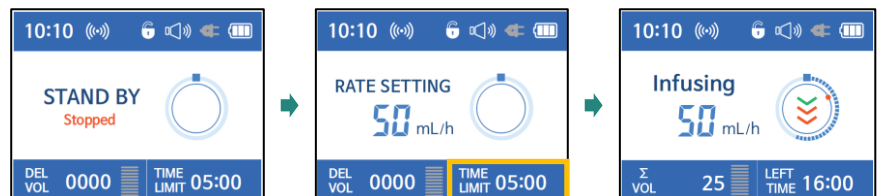
2. Volume change

- ① Press the [STOP] button during infusion to enter the "STAND BY" status.
- ② Press the [VOL] button and enter the scheduled volume.
- ③ Restart the infusion with the [START] button.
- ④ The cumulative volume will be initialized and the remaining time will be recalculated.



3. Time change

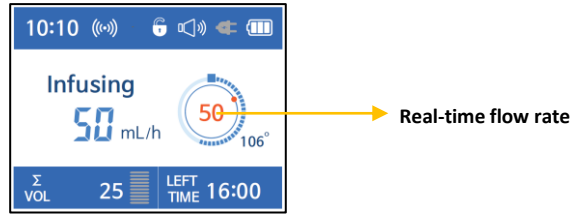
- ① Press the [STOP] button during infusion to enter the "STAND BY" status.
- ② Press the [TIME] button and enter the scheduled time.
- ③ Restart the infusion with the [START] button.
- ④ The cumulative volume will be initialized and the remaining time will be reset.



1.4. Special situations

1. Real-time infusion rate

- Press the [RATE] button for 2 seconds during infusion to display the real-time flow rate on the screen.



2. Delivered volume & Remaining time


- During infusion, the cumulative volume (Σ VOL) and the remaining time (LEFT TIME) are displayed.
- Press the [VOL] button for 2 seconds to display the set scheduled volume.
- Press the [TIME] button for 2 seconds to display the set scheduled time.



3. Pause

- Press the [STOP] button during infusion to enter the "STAND BY" status.
- The LED lamp (●) at the bottom of the [START] button is illuminated with a confirmation sound.

4. Replace new fluid

- ① Press the [STOP] button during infusion to enter the "STAND BY" status.
 - ② Change fluid bag or fluid bottle.
 - ③ Check the drip sensor.
 - ④ Check (or Re-enter) infusion rate, scheduled volume, or scheduled time.
 - ⑤ Press the [START] button to start infusion.
-  If you do not reset the scheduled volume after replacing fluid, the cumulative volume does not start with zero. It will be displayed as a sum of the existing cumulative volume.

5. Sway during infusion

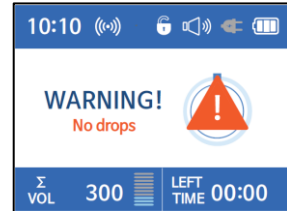
- A "SWAY" notification will be displayed if a shake occurs during injection.
- Infusion rate during sway is not reflected in the control.



1.5. End of Infusion

1. Alarm

- If the infusion rate is set only in the initial setting, the "No drops" alarm will occur after all infusion is complete.
- Press the [STOP] button to disable the alarm.

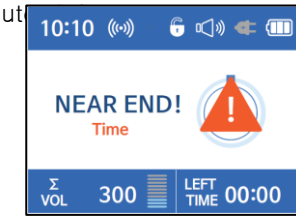
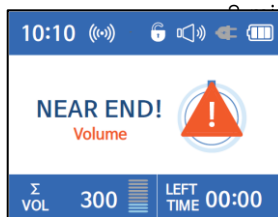


- If 2 of 3 independent variables (rate, volume, time) is set in the initial setting, the "COMPLETE" alarm will occur after the "NEAR END" alarm.
- Press the [STOP] button to stop the infusion and disable the alarm.

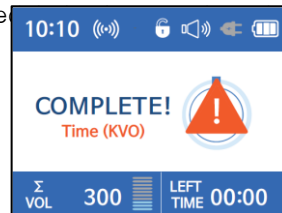
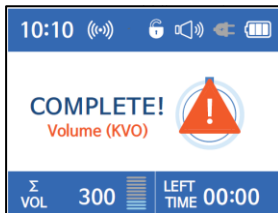


During the "COMPLETE" alarm, fluid is infused with the setting KVO rate.

- ① NEAR END! : When the scheduled volume is 10cc left or the scheduled time is



- ② When the scheduled volume and the scheduled time have



2. Remove AccuValve IV set

- ① Detach Drip sensor : Push the both side of drip sensor inward and disconnect the drip sensor from the drip chamber.
- ② Detach IV line : Slide aside the holder of the fixing part located below the air sensor to remove the IV line.
- ③ Deinstall AccuValve : Push the both side of release button, and turn it clockwise to deinstall the AccuValve.

3. Power OFF

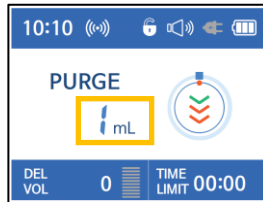
- Press the [POWER] button to power off the device.

Chapter 2. Special functions and Infusion mode


2.1. Special functions

1. PURGE

- Infuse fluid at a maximum rate (350 mL/h) before or during infusion. The amount of infusion during PURGE is not included in the total cumulative volume.



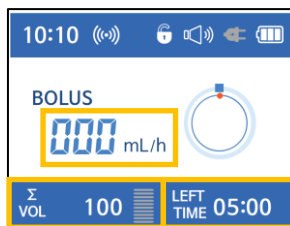
- ① Press the [PURGE] button to enter the PURGE mode.
- ② When holding [PURGE] button, or pressing for each short term, the amount of PURGE injection is increased by 1 mL. Alternatively, enter the PURGE injection volume with the numeric button.
- ③ Press the [START] button to start infusion.


 If you do not press the [START] button after entering, it will return to the previous infusion screen after 5 seconds.


2. BOLUS

- Infuse at a different flow rate during infusion and is used when loading the volume.
- The amount of fluid infused during BOLUS is included in the total cumulative volume.


- ① Press the [BOLUS] button to enter the BOLUS mode
- ② Two variables must be entered: infusion rate, infusion volume, infusion time (setting method is the same as the initial setting)



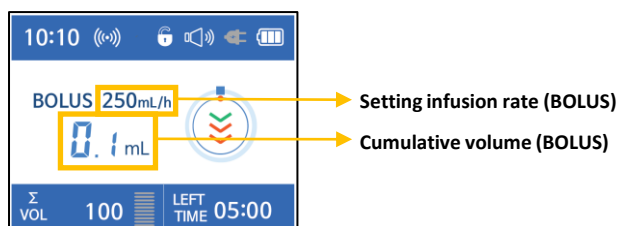
 Set using the [RATE], [VOL], and [TIME] button

 If you want to fully open the flow control valve to infuse fluid, enter 999 in the [RATE] field.

- ③ Press the [START] button to start infusion.

 If you do not press the [START] button after entering, it will return to the previous infusion screen after 10 seconds.

- ④ During BOLUS infusion, the screen shows the cumulative BOLUS volume.



- ⑤ When the BOLUS infusion is complete, it restarts at the infusion rate that was previously entered without further intervention.

3. FIX mode

- If the patient needs frequent postural change (ex. examination, etc.), control of AccuValve can occur frequently. The FIX mode is a function that fixes the current flow rate to prevent the drip sensor from reacting to any possible shakes of the fluid bag
- The amount of infusion during the FIX mode is not included in the total cumulative volume.



- ① Press the [FIX] button briefly to enter the FIX mode.
- ② Press the [FIX] button again briefly to return to the previous screen.

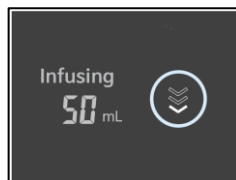


The AccuValve can be removed while maintaining the current infusion rate. (ex. When patients need to maintain fluid during MRI examination)

- Do the following procedure when remove AccuValve.
 - ① Press the [FIX] button to enter the FIX mode while infusing.
 - ② Push the release button of mounting part of valve, and turn it clockwise to deinstall AccuValve.
 - ③ Slide aside the holder of the fixing part located below the air sensor to remove the IV line.
 - ④ Detach drip sensor from drip chamber.
- When AccuValve is deinstalled, AccuDrip enters [Real-time infusion rate] mode.
- Deinstalled AccuValve can be re-installed and used.

4. SLEEP mode

- Dim the screen brightness to help the patients to have comfortable sleep.



- ① Press the [SLP] button briefly to enter the SLEEP mode.
- ② Press any button briefly to return to the previous screen.

5. Mute

- Inactivate voice feedback function.



To avoid user errors, AccuDrip has a voice feedback function that informs users of the entered prescription by voice.

- ① Press 2s button for 2 seconds to mute voice feedback function.
- ② Press 2s button again for 2 seconds to unmute voice feedback function

6. Keypad lock

- Prevent manipulation of the keypad after infusion.

- ① Press 2s button for 2 seconds to lock keypad.
- ② Press 2s button again for 2 seconds to unlock keypad.

2.2. Infusion mode

Start Infusion mode

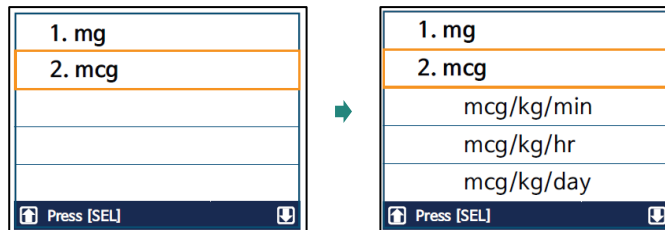
- ① Press the [SET UP] button to enter the setup option
- ② Select the [INFUSION] tab.
- ⓘ Press the [SET UP] button for 2 seconds to enter the infusion mode immediately.



1. Dose rate infusion

- [Dose rate infusion] is the mode that automatically calculate and infuse fluid according to the drug concentration and the patient's weight when prescribing the drug at a rate of dose per kg.

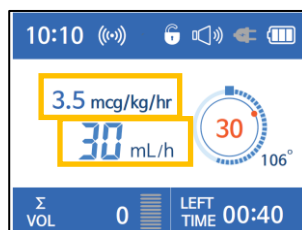
- ① Before starting infusion, select [Dose rate infusion] on the [INFUSION] tab.
- ② After setting the unit of dose rate, press the [SEL] button.



- ③ Enter the dose rate, body weight, drug amount, and diluent volume. You can move the column with the up/down arrow and the [SEL] button.

Dose rate	(mcg/kg/min)	2.4
Body weight	(kg)	0.0
Drug amount	(mg)	0.0
Diluent volume	(mL)	0.0
Flow rate	(mL/h)	

- ④ Press the [START] button to start infusion.
- ⑤ When the infusion is started through [Dose rate infusion], the following screen shows.




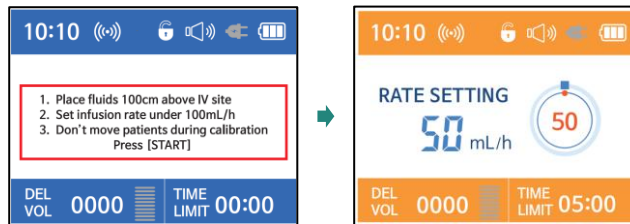
- You can change dose rate as well as infusion rate by pressing [RATE] button to move the category.

- **Input range** (Dose rate infusion)

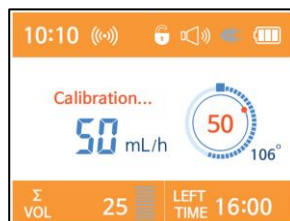
Dose rate	• Input range : 0.01 ~ 99.99 mg-mcg/kg/min-hr-day (0.01 unit)
Body weight	• Input range : 0.1 ~ 300.0 kg (0.1 unit)
Drug amount	• Input range : 1 ~ 999.9 mg (0.1 unit)
Diluent volume	• Input range : 1 ~ 999.9 mL (0.1 unit)



2. Extravasation monitor

- [Extravasation monitor] is the mode used for patients who cannot change their posture. (e.g. Intensive care units or neonatal intensive care units)
 - It detects extravasation in advance and informs medical staffs before infusion is stopped.
-  Because AccuDrip uses gravitational drip, the infusion rate changes momentarily due to the patient's posture change. Do not use this mode for patients who can change their posture because postural change reduces accuracy (specificity).
- ① Make sure that fluid is placed at 100cm above IV site. Set infusion rate under 100 mL/h.
 - ② Before starting infusion, select [Extravasation monitor] on the [INFUSION] tab.
 - ③ Press the [START] button to start the mode.



- ④ After entering the rate, volume, or time for infusion, press the [START] button to start infusion.
- ⑤ When the mode is started, the device performs “Calibration” for 1 to 2 minutes.



-  Calibration is the process of setting the reference value for sounding suspicious extravasation alarm.
-  Avoid patient movement, especially during calibration.

2. Extravasation monitor

- ⑥ If there is a suspected extravasation, the following screen appears, and fluid infusion continues without interruption. Check the catheter insertion site for clinical evidence of extravasation.



- If extravasation is suspected : Press the [STOP] button to stop infusion.
- If extravasation is not suspected, : Press any button to continue infusion. Otherwise, after pressing [STOP] button, press the [START] infusion to continue infusion.

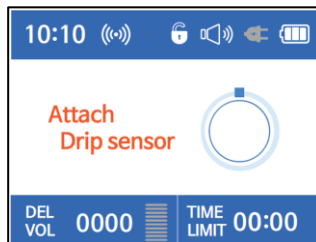
- ⑦ Ignoring the warning raises the threshold for detecting extravasation. This means that the possibility of false positive is lowered when the following warning occurs.

3. Real-time infusion rate

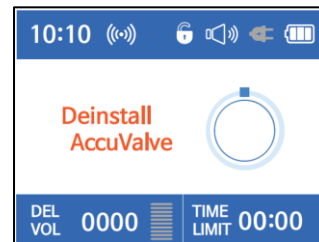
- [Real-time infusion rate] is the mode that enables AccuDrip to measure infusion rate when you use AccuValve IV set alone.

- ① Attach the drip sensor to the AccuValve IV set for which you want to measure the infusion rate.
- ② If the AccuValve is installed in AccuDrip, remove the valve. [Real-time infusion rate] mode only works when the device is not equipped with AccuValve.

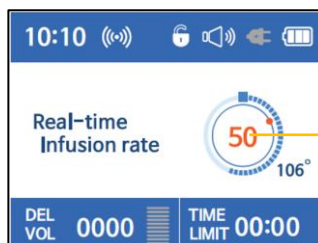
• When not attaching drip sensor



• When not deinstalling AccuValve



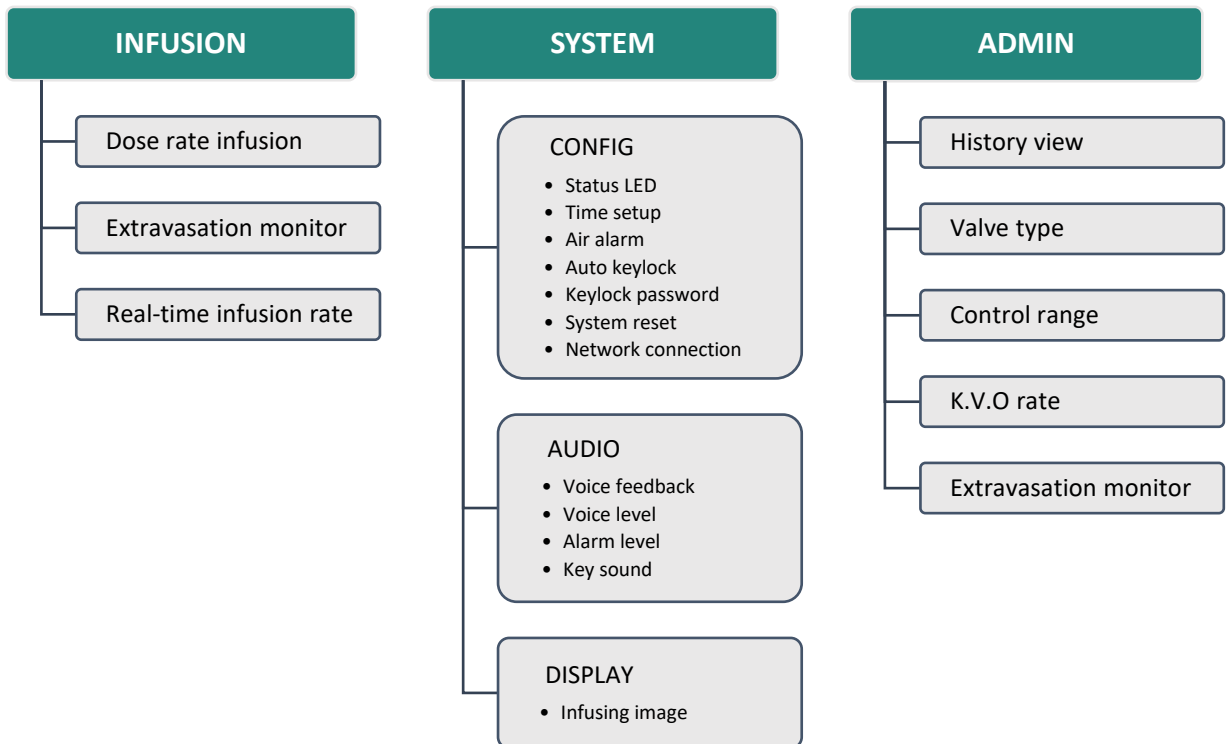
- ③ Select [Real-time infusion rate] on the [INFUSION] tab.
- ④ The following screen displays real-time flow rate being injected from the AccuValve IV set.



→ Real-time flow rate

Chapter 3. Setup Menu

3.1. Configuration

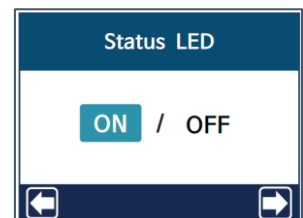


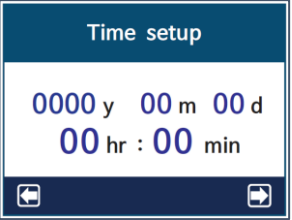
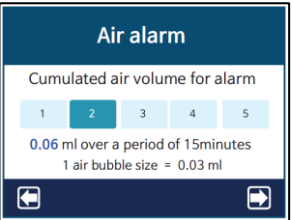
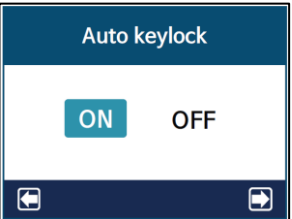
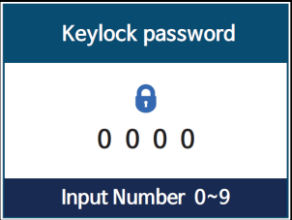
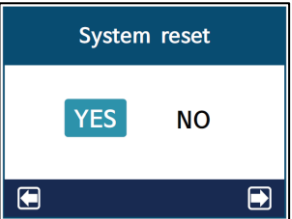
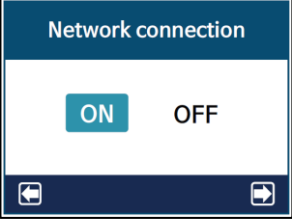
- Press the [SEL] button to select and save
- Press the [ESC] button to go to previous screen, and press the [ESC] button for 2 seconds (2s CLR) to initialize infusion mode setting
- Press the [SEL] button for 5 seconds to enter the [ADMIN] tab

3.2. SYSTEM : CONFIG

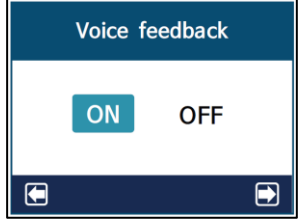
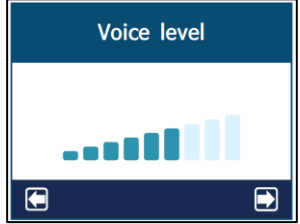
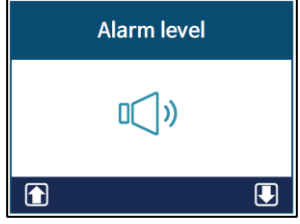

1. Status LED

- ON/OFF setting of the upper left LED status indicator on the AccuDrip
- Initial setting : ON




<p>2. Time setup</p>	<ul style="list-style-type: none"> Set the time displayed on the upper left corner of the LCD display Press the [SEL] button to save time 	
<p>3. Air alarm</p>	<ul style="list-style-type: none"> Set the amount of bubbles that generate air alarm Sum the accumulated amount of air bubbles for 15 minutes to generate an alarm Level 1 to 5, Initial setting : Level 2 (Selected Level Value x 0.03 mL over 15 min) 	
<p>4. Auto keylock</p>	<ul style="list-style-type: none"> ON/OFF setting of the function to lock the keypad automatically at the start of infusion Initial setting: OFF 	
<p>5. Keylock password</p>	<ul style="list-style-type: none"> Set password when unlocking keypad Reset password to unset state when power is OFF 	
<p>6. System reset</p>	<ul style="list-style-type: none"> Initialize all the device setting Initialize all the infusion history record 	
<p>7. Network connection</p>	<ul style="list-style-type: none"> Network settings for integration system Currently not available (will be updated later) 	

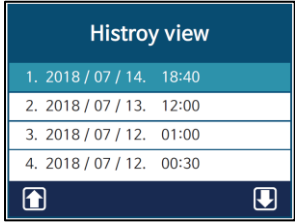
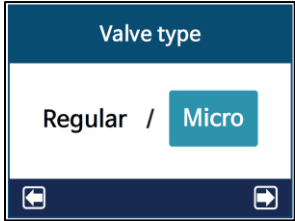

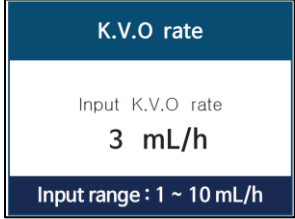
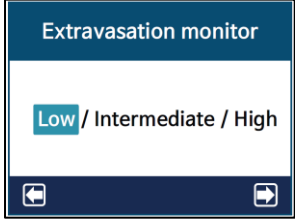
3.3. SYSTEM : AUDIO

<p>1. Voice feedback</p>	<ul style="list-style-type: none"> • ON/OFF setting of the function that rechecks the entered flow rate with voice • Initial setting : ON 	
<p>2. Voice level</p>	<ul style="list-style-type: none"> • Set the volume of voice feedback and key sound • Initial setting : Level 6 	
<p>3. Alarm level</p>	<ul style="list-style-type: none"> • Set the volume level of the warning window • Initial setting: Level 2 	
<p>4. Key sound</p>	<ul style="list-style-type: none"> • ON/OFF setting of the key sound • Initial setting : ON 	

3.4. SYSTEM : DISPLAY

<p>1. Infusing image</p>	<ul style="list-style-type: none"> • Select the screen theme displayed during infusion • Currently no additional screen theme 	
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3.5. ADMIN

<p>1. History view</p>	<ul style="list-style-type: none"> • Check the infusion history record in the device 	 <p>History view</p> <table border="1"> <tr><td>1. 2018 / 07 / 14. 18:40</td></tr> <tr><td>2. 2018 / 07 / 13. 12:00</td></tr> <tr><td>3. 2018 / 07 / 12. 01:00</td></tr> <tr><td>4. 2018 / 07 / 12. 00:30</td></tr> </table>	1. 2018 / 07 / 14. 18:40	2. 2018 / 07 / 13. 12:00	3. 2018 / 07 / 12. 01:00	4. 2018 / 07 / 12. 00:30
1. 2018 / 07 / 14. 18:40						
2. 2018 / 07 / 13. 12:00						
3. 2018 / 07 / 12. 01:00						
4. 2018 / 07 / 12. 00:30						
<p>2. Valve type</p>	<ul style="list-style-type: none"> • Select when using flow control valves with different drop factors • Initial setting : Regular • Currently Microvalve is not selectable 	 <p>Valve type</p> <p>Regular / Micro</p>				
<p>3. Control range</p>	<ul style="list-style-type: none"> • Control range of AccuValve with real-time flow rate (At 5% setting, the device controls the AccuValve when the real-time flow rate is outside the 95%~105% range of the setting infusion rate.) • 3% setting increases battery consumption • Initial setting : 5% 	 <p>Control range</p> <p>3% 5%</p>				
<p>4. K.V.O rate</p>	<ul style="list-style-type: none"> • Set the KVO (Keep Vein Open) rate when infusion ends • Initial setting : 3 mL/h 	 <p>K.V.O rate</p> <p>Input K.V.O rate</p> <p>3 mL/h</p> <p>Input range : 1 ~ 10 mL/h</p>				
<p>5. Extravasation monitor</p>	<ul style="list-style-type: none"> • Set the sensitivity of [Extravasation monitor] mode • Initial setting : Intermediate 	 <p>Extravasation monitor</p> <p>Low / Intermediate / High</p>				

Chapter 4. Alarms

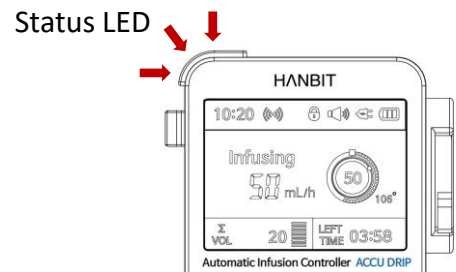
If a problem occurs with the product, take appropriate action according to the following tips. If the problem is not resolved by the following tips, or if any other unmentioned abnormality occurs, please contact the supplier or head office. The lamp on the [STATUS LED], which shows the device status on the upper left side of the main body, is illuminated when the warning sounds.

❖ **When an alarm occurs,**

- ① Press the [STOP] button to enter “STAND BY” state.
- ② After resolving the cause of the alarm, check the rate, time, and amount of fluid before starting the infusion again.
- ③ Press the [START] to start infusion.
- ④ Nevertheless, if alarms occur repetitively or you find anything wrong, stop the device immediately and contact your place of purchase or the head office.



If more than one alarm occurs, the alarm occurs from the higher rank.



Risk level	LED color	Sound level	Infusion status
High	Red	High	Stopped
Intermediate	Yellow	Intermediate	Infusing
X	Green	X	Infusing

Risk level	Message	Sound level	LED color	Infusion status
		Cause		How to do
High	Device error	High	Red	Stopped
		<ol style="list-style-type: none"> 1. Abnormalities of device 2. Temporary hardware failure 		Power off and reboot
High	Check Drip sensor	High	Red	Stopped
		<ol style="list-style-type: none"> 1. Drip sensor is not connected to the main device 2. Drip sensor or cable failure 		Power off and connect the drip sensor again
High	Out of control	High	Red	Stopped
		<p>※ When the control of AccuValve exceeds the adjustment range</p> <ol style="list-style-type: none"> 1. Partially opened roller clamp 2. The height of fluid is too high or low 3. IV line obstruction (twisted, folded) 4. IV flow resistance (vascular obstruction, catheter moving) 5. Filter obstruction 6. Poor contact between drip sensor and drip chamber 		<ol style="list-style-type: none"> 1. Open the roller clamp fully 2. Adjust the height of fluid (90~100cm) 3. Check the IV line and the IV site 4. Change the IV set 5. Check the combined state between drip sensor and drip chamber
High	Flow rate error	High	Red	Stopped
		<p>※ When infusion rate exceeds the error range and dose not return</p> <ol style="list-style-type: none"> 1. Presence of air bubbles at the outlet of fluid bag 2. Directly affected by temperature such as heater or air conditioner 3. Condensation in drip chamber 4. Presence of air bubble in the filter 5. Flow control valve defect of IV set 6. Poor contact between drip sensor and drip chamber 		<ol style="list-style-type: none"> 1. Press drip chamber to inhale air bubble 2. Escape from heater or air conditioner 3. Remove condensation in the drip chamber 4. Change the IV set 5. Check the combined state between drip sensor and drip chamber
High	Valve not in place	High	Red	Stopped
		<p>※ When the AccuValve is not detected in the mounting part of AccuDrip</p> <ol style="list-style-type: none"> 1. The valve is dislodged from the mounting part or not properly secured. 2. Valve detection sensor failure 		Securely attach the AccuValve to the mounting part of AccuDrip and press the [START] button to infuse

Risk level	Message	Sound level	LED color	Infusion status
		Cause		How to do
High	Too many drops	High	Red	Stopped
		※ When the measured flow rate is much faster than setting infusion rate, and cannot be adjusted 1. The height of fluid is too high 2. Catheter is dislodged 3. Damage to the connection site of IV line 4. Postural change is repeated		1. Adjust the height of fluid (90~100cm) 2. Check the IV site and the IV line 3. Change the IV set 4. Avoid repetitive changes in posture
High	Too few drops	High	Red	Stopped
		※ When the measured flow rate is much slower than setting infusion rate, and cannot be adjusted 1. Partially opened roller clamp 2. The height of fluid is too low 3. IV line obstruction (twisted, folded) 4. IV flow resistance (vascular obstruction, catheter moving) 5. Postural change is repeated		1. Open the roller clamp fully 2. Adjust the height of fluid (90~100cm) 3. Check the IV site and the IV line 4. Change the IV set 5. Avoid repetitive changes in posture
High	Air bubble	High	Red	Stopped
		※ When air bubble is detected from the air bubble sensor 1. Presence of air bubble in the IV line 2. Poor contact between air bubble sensor and IV line		1. If air bubbles are found in the IV line, remove air bubbles and restart infusion 2. If air bubbles are not found in the IV line, change the IV set
2-stages (Low-High)	No drops	High	Red	Stopped
		※ When the drip sensor fails to detect the falling droplet at all 1. Fluid is depleted 2. Excessive fluid level or condensation on the surface of drip chamber 3. Closed roller clamp 4. IV line obstruction (twisted, folded) 5. IV flow resistance (vascular obstruction catheter moving) 6. Filter obstruction		• At initial infusion, 1. Open the roller clamp fully 2. Check the fluid level or condensation in the drip chamber • If fluid is depleted, 3. Change fluid and restart • If there is remaining fluid during infusion, 4. Organize IV line and restart 5. Check the condition of vessel and catheter 6. Change the IV set

Risk level	Message	Sound level	LED color	Infusion status
		Cause		How to do
High	Invalid sensing	High	Red	Stopped
		※ When irregular flow rate detected 1. Condensation on the surface of drip chamber 2. Abnormalities of drip sensor		Remove condensation in the drip chamber (Change IV set if necessary)
High	Complete! (KVO)	High	Red	K.V.O
		Entered scheduled volume or scheduled time has ended		Press the [STOP] button to enter "STAND BY" status
Intermediate	Possible Extravasation	Intermediate	Yellow	Infusing
		※ When extravasation is suspected 1. The height of IV site is increased 2. IV line obstruction (twisted or folded)		1. Press the [STOP] button to enter "STAND BY" status, and check the IV site 2. Check the height of IV site 3. Check the IV line
Intermediate	Battery empty	Intermediate	Yellow	Infusing
		Low battery (Below 10%)		Connect the dedicated power adaptor
Intermediate	Tube not in place	Intermediate	Yellow	Infusing
		※ When IV line is not detected in the fixing part of air bubble sensor 1. IV line is deviated from the fixing part of air bubble sensor 2. IV tube detection sensor failure		Fix the IV line correctly to the fixing part of air bubble sensor

Chapter 5. Cleaning

❖ Main device

- When the exterior is stained, use a soft cloth or wipe with a wring towel soaked in cold or lukewarm water and let stand to dry.
- Check if the power battery is dry.
- Be careful not to use a hair dryer.
- Be careful not to allow foreign substances to seep in during cleaning.
- Do not wipe the device with alcohol or other solvents.
- Do not soak or flush the device.
- If not in use for a long time, remove and store the power cord.

❖ Air bubble sensor

- If the bubble sensor area is stained, use a soft cloth or wet the towel in lukewarm water, squeeze and wipe thoroughly, and let it dry.
- Do not use sharp tools such as tweezers to wipe the bubble sensor area.

❖ Drip sensor

- Disconnect the drip sensor completely from the device before cleaning.
- When the drip sensor is stained, use a soft cloth or wipe with a wring towel soaked in cold or lukewarm water and let stand to dry.
- Be careful not to get water in the drip sensor connector. If wet, let it dry.

❖ How to disconnect and clean drip sensor

- ① Use a small straight screwdriver to push and separate the outer casing.
- ② Use a soft cloth or towel dampened with cold or lukewarm water, wring it out well, and wipe the main drip sensor.
- ③ Clean the outer case and the springs.
- ④ Leave the wiped components to dry completely.
- ⑤ After the moisture has dried, reassemble by placing the spring on the outer case and pushing the main drip sensor into it.

Cautions

- Please clean and disinfect the equipment according to the protocol.
- Before disinfecting, please turn off the device and disconnect the AC power cord.
- Before cleaning the equipment, always disconnect the device from the patient, turn off the equipment, and disconnect the power and other devices.
- Be careful not to make contact with any inlet or connection of the equipment or power supply with liquid.
- Always wear gloves when cleaning.
- Do not clean the equipment with diluents, alcohol, or other organic liquids.
- Do not sterilize the equipment with autoclave or ethylene oxide gas.

Chapter 6. External power and Battery

❖ External power

- Do not use a power strip without grounding.
- Before use, check the plug and connect it to the grounded outer part.
- Check the rated voltage and frequency in advance.
- Connect the adapter cord to the internal adapter connector located on the back of the device.
- While in operation by external power, the LED below the [POWER] button will be illuminated.
- If disconnected from the power outlet during operation, the device will automatically operate on the built-in rechargeable battery.

❖ Battery

- If the battery is in use, the device operates on AC power.
- The actual battery life may vary depending on various conditions such as ambient temperature, frequent load, etc.
- Before use, check the battery life.
- When the battery is fully charged, the device can operate for approximately 30 hours (based on 100 ml/h).
- When the charged battery level is low, the operation may stop.
- The battery charge status can be checked on the LCD screen.
- When the "Battery empty" warning alarm is displayed on the LCD, please recharge the device.
- If the device is not connected to a power source, the battery will slowly discharge. Discharge can also occur even if the device is not operating.
- To prevent reduced battery lifespan from long periods of disuse, charge the device once a month.
- When the battery usage time decreases rapidly after full charging, replace it with a new battery.

Chapter 7. Maintenance and Disposal

❖ Maintenance and repair

- The warranty period is one year from the date of purchase. Free repair service can be provided during the warranty period if the product is operated normally.
- To prevent electric shock, only trained service personnel can repair this device, and service staff must disconnect the AC power cord before repairing the device.
- Do not open the case of the device.
- Do not use or clean a dropped or damaged device, even if there is no external damage, and contact the place of purchase.
- When using the device for the first time or after a long period of non-use, please connect it to an external power outlet to charge the built-in rechargeable battery before use.
- Over time, the lifespan of the built-in rechargeable battery may shorten, so if the operating time is reduced even after a normal battery charge, please contact the place of purchase for a new battery replacement.
- Regularly check the normal operation of this device and have a technical safety inspection from the manufacturer every two years.
- Our company is not responsible for malfunctions and accidents due to careless maintenance and storage.

❖ Disposal and recycling

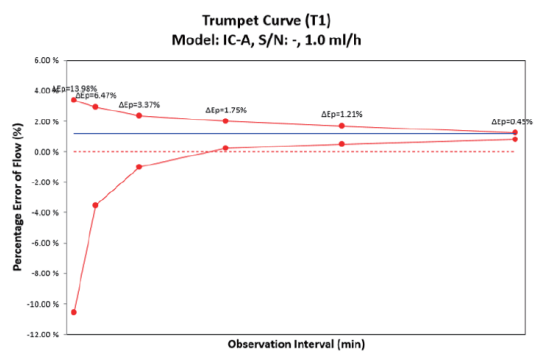
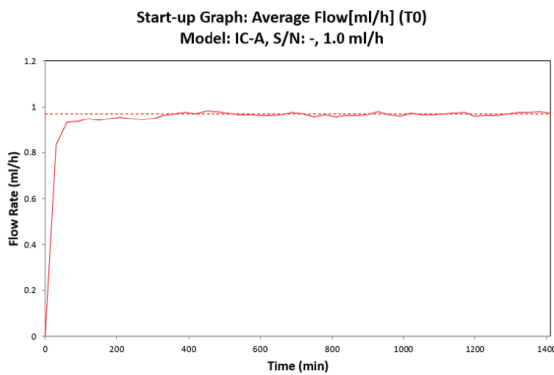
- When disposing of this product, please dispose of it in accordance with the regulations for electronic waste disposal and separation in your area.
- To dispose or recycle, please remove the nickel hydrogen battery from the device.

Technical Data

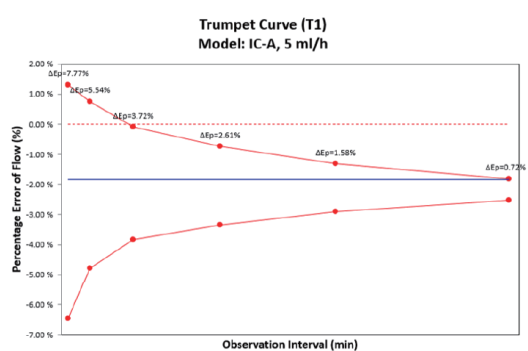
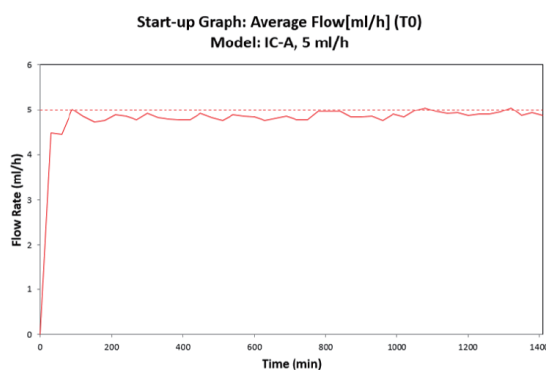
- Start-up curve:** This curve is measured every 30 seconds for 2 hours after the start of infusion. The horizontal axis represents the measured time (min), and the vertical axis represents the measured flow rate (mL/h). The dotted horizontal line represents the set flow rate. The initial curve shows the time until the actual flow rate reaches the set flow rate.
- Trumpet curve:** The horizontal axis of the trumpet curve represents the observation interval, and the vertical axis represents the percentage error of the actual flow rate with respect to the set flow rate. The dotted horizontal line represents the set flow rate. The solid horizontal line represents the overall mean percentage error.

The following characteristic curve is based on the same conditions as IEC 60601-2-4.

- Flow rate: 1mL/h**



- Flow rate: 5mL/h**



Product Specification

❖ Product

Category	Automatic medication infusion controller.
Model name	IC-A
Protection	<ol style="list-style-type: none"> 1. Grade and type of protection <ul style="list-style-type: none"> - Grade of protection: Grade I - Type of protection : Internal power supply, BF type 2. Waterproof grade: IPX-2
Mechanism	Gravity drip

❖ Power supply

Power	12 ~ 15DC, 100 ~ 240VAC, 50/60Hz, 0.5 ~ 1.2A
Battery	<p>Type: Nickel hydrogen 4.8V 4200mA</p> <p>Recharge time: 5 hours</p> <p>Operating time: ~ 24 hours (based on 100mL/h)</p> <p>Battery life: 3 years</p>

❖ Environment

Hazardous environment	Do not use in environments with flammable anesthetic gases mixed with air or oxygen/oxygen nitride.
Operating condition	<p>Temperature: -10 ~ 40°C</p> <p>Humidity: 10 ~ 95%, non-condensable</p> <p>Atmospheric pressure: 70 ~ 106kPa</p>
Storage condition	<p>Temperature: -10 ~ 40°C</p> <p>Humidity: 10 ~ 95%, non-condensable</p> <p>Atmospheric pressure: 70 ~ 106kPa</p>

❖ Alarms

Type	Device error, Check drip sensor, Out of control, Flow rate error, Too many drops, Too few drops, Air bubble, No drops, Valve not in place, Valve occlusion, Invalid sensing, Complete! (KVO), Near End!, Battery empty, Tube not in place
Environment	Possible under 60 dB environment

❖ Specification variables

Drop factor	20 drops, 60 drops (Currently only available of 20 drops)
Control range	± 3%, ± 5% (Default: ± 5%)
Input range of infusion rate	1 ~ 350 mL/h
Input range of bolus	1 ~ 350mL/h (328°), Full open (337°)
Setting range of KVO	1 ~ 10 mL/h
Input range of infusion volume	1 ~ 9999 mL
Input range of infusion time	1min ~ 99hr 59min
Size	78.83 (width) x 64.59 (depth) x 162 (height) mm
Weight	546 g
Maximum injection rate under single fault condition	4.8 mL/h