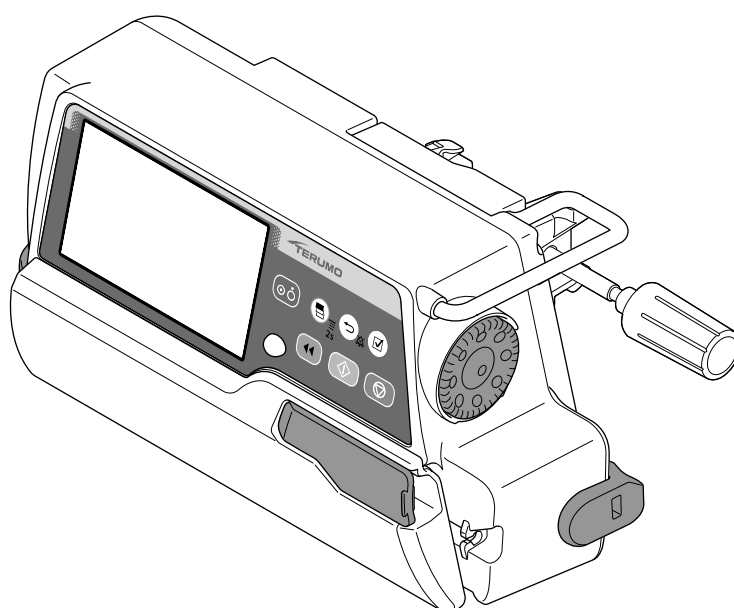


# TERUFUSION™ Infusion Pump Type LM3 TE-LM730/TE-LM830

## Instruction Manual

CE 0197



Store this instruction manual in a convenient location for future reference whenever necessary. Read the instructions carefully before using the product, and operate in accordance with instructions. Perform maintenance and inspections to ensure safe use and extend the life of this product.

 **TERUMO**

# Contents

Read this instruction manual carefully to fully understand this product and ensure its safe use. For an explanation regarding the introduction of this product, consult with TERUMO trained service technicians. Conduct safety training sessions for this product before use.

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## Purpose and Overview

The TERUFUSION Infusion Pump Type LM3 is intended for the infusion of general and local anesthetics, vasodilators, cardiotonics, parenteral feeding, chemotherapy medications, anti-cancer drugs, labor-inducing drugs, anti-coagulants and blood transfusion at ICU, CCU, NICU, operating rooms or general wards.

This equipment is intended for continuous intravenous delivery of medications (such as drug solutions) at a specified hourly rate of flow. This equipment adopts the peristaltic finger technology.

Model	Catalogue number	Communication function	Anti-free flow system	Hereinafter referred to as
TE-LM730	TE-LM730xxx	—	Equipped	TE-LM730A
	TE-LM730xxxN		—	TE-LM730N
	TE-LM732xxx	RS-232C	Equipped	TE-LM732A
	TE-LM732xxxN		—	TE-LM732N
TE-LM830	TE-LM83xxxx	Infrared communication (IrDA), Wireless LAN	Equipped	TE-LM830

Alphanumeric characters are entered for x in the catalogue number.

## Features

### Dose unit

- The flow rate (mL/h) can be automatically calculated based on the dose units such as µg/kg/min. The calculated contents of the flow rate can be checked on the screen.

### Anti-free flow system (TE-LM730A, TE-LM732A and TE-LM830 only)

- When removing a tube from the infusion pump, this system prevents inadvertent excessive infusion by automatically closing the tube with the anti-free flow clip of the dedicated infusion set as the door is opened.

### Stable infusion

- The dedicated infusion set allows stable infusion.
- The “MIDPRESS” method allows less degradation of the tube over time during prolonged use, maintaining a constant level of accuracy.

### Secure tube attachment

- The AIS (Anti Irregular Set) system makes it difficult to close the door if the tube has not been placed correctly. The tube guide helps in positioning the tubing correctly.

### Easy-to-read display

- With a 4.3 inch (10.9 cm) colour LCD, clear and precise visibility has been achieved.
- The operation indicator allows the operation/stop/alarm status to be easily recognised.
- The internal battery charge and level indicator is displayed on the LCD with 5 bars.

### Wide range of alarm functions

- Provided with Battery alarm, Shutdown Notice alarm, Power Failure alarm, Air-in-line alarm, Upper Occlusion alarm, Lower Occlusion alarm, Pressure alarm\*<sup>1</sup>, Nearly Empty alarm, Anti-free Flow Clip alarm\*<sup>2</sup>, Door alarm, Flow Rate Abnormality alarm, Completion alarm (the Keep Vein Open (KVO) function continues solution delivery at 1 mL/h), Link Interruption alarm\*<sup>1</sup>, Re-alarm, Start Reminder, Free Flow alarm, Line Empty alarm, Drip Sensor Dislocation alarm, No Flow Rate alarm and No VTBI alarm. (The Flow Rate Abnormality alarm, Free Flow alarm, Line Empty alarm and Drip Sensor Dislocation alarm are available only if the dedicated drip sensor is used.)

\*<sup>1</sup>: TE-LM830 only. Contact TERUMO trained service technicians for details.

\*<sup>2</sup>: TE-LM730A, TE-LM732A and TE-LM830 only.

- The Air-in-line alarm and Occlusion alarm detection sensitivity level can be changed according to the condition of use. The Air-in-line alarm can also issue an alarm if accumulated microbubbles exceed a certain value within 15 minutes. (Default: disabled)

### Additional safety functions

- The keypad lock function disables any switch operations after being set to prevent any operational errors or inadvertent operations. (Except for Start switch, Power switch and Back/Mute switch (for operation to release the keypad lock).)

## Purpose, Overview and Features of the Product

### User-friendly shape and structure

- With a unit weight of approx. 2.0 kg, the carrying burden is reduced, and allows for stable installation with the pole clamp included.
- The rubber door seal seals the main unit and the door, providing protection from infiltration of drug solution.
- The rounded-cornered body is easy to clean even when drug solution has adhered.

### Dual power supply system

- Dual power supply system with AC power and internal battery
- The internal battery can provide approx. 5 hours of continuous operation for solution delivery at a flow rate of 25 mL/h at ambient temperature of 25°C, with a fully-charged new battery.
- The internal battery can be charged to approx. 80% in 3 hours.
- The sub-battery is used for a Power Failure alarm in case both power supplies are lost.

### Communication function (TE-LM830 only)

- The infrared communication allows communication with the optional Communication Rack System\*<sup>1</sup>.
- The wireless LAN allows communication with the network system.

\*<sup>1</sup>: TERUFUSION Communication Rack System (Model: TE-RS800)

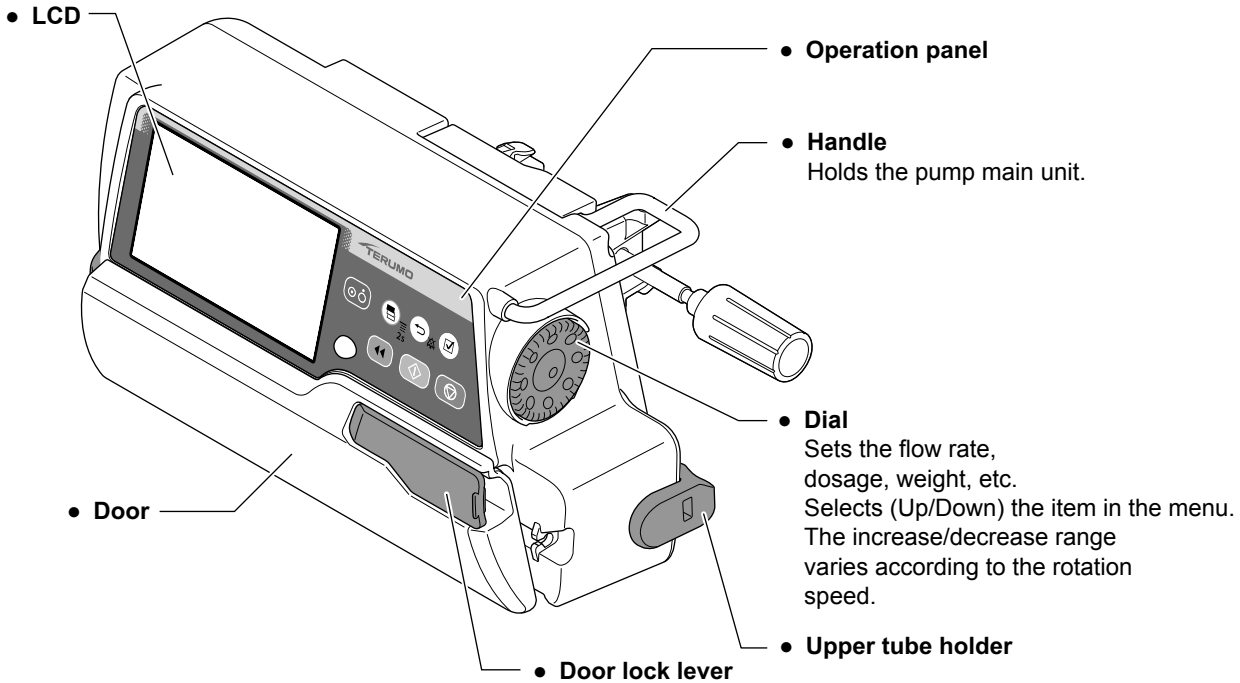
TERUFUSION Communication Rack System (Extension) (Model: TE-RS811)

## Unit Correlation

mcg/kg/min and µg/kg/min have the same meaning and are interchangeable.

## Exterior Diagram

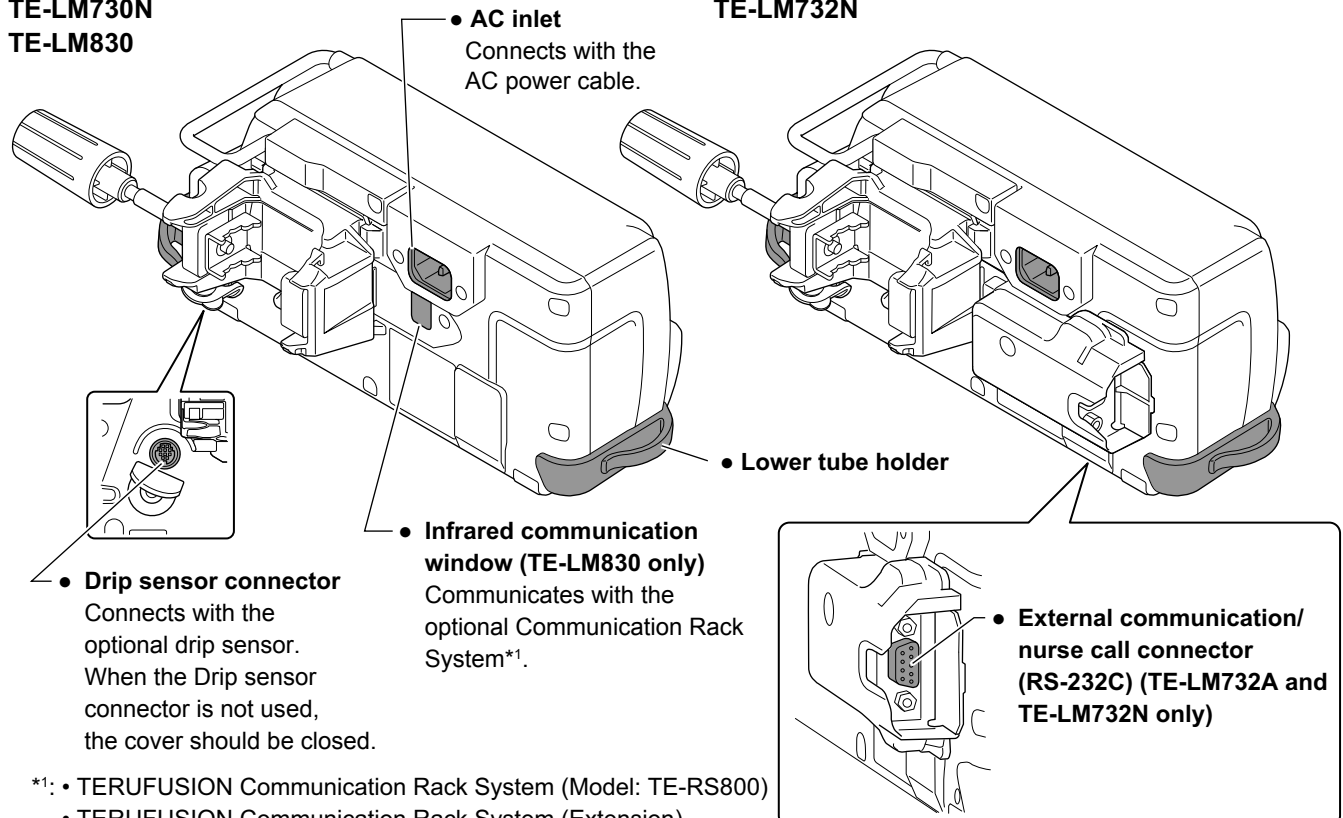
### ◆ Front view



### ◆ Rear view

TE-LM730A  
TE-LM730N  
TE-LM830

TE-LM732A  
TE-LM732N

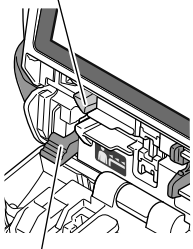


\*1: • TERUFUSION Communication Rack System (Model: TE-RS800)  
• TERUFUSION Communication Rack System (Extension) (Model: TE-RS811)

## ◆ Infusion line attachment

TE-LM730N  
TE-LM732N

- **Tube clamp**  
When the door is opened, the tube clamp compresses the tube.

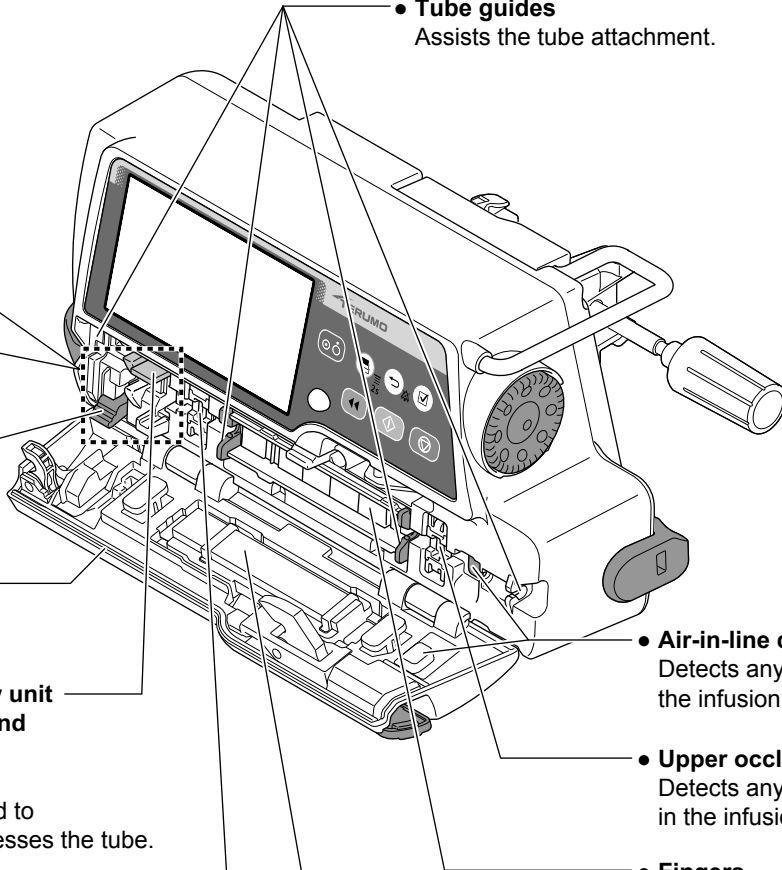


- **Release lever**  
Releases the tube clamp.

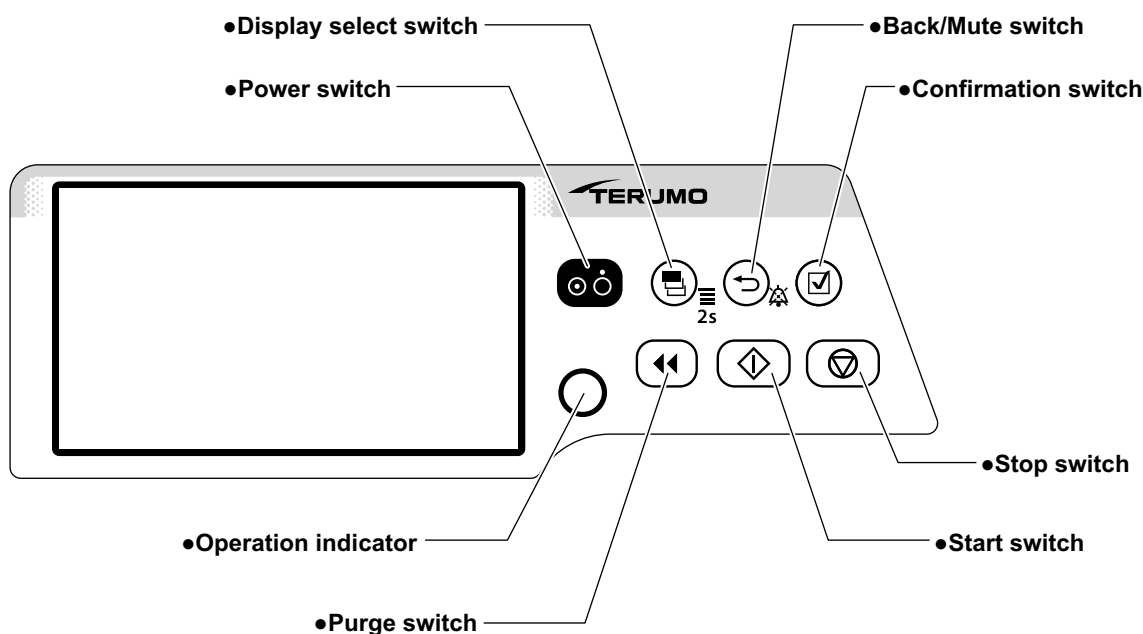
TE-LM730A  
TE-LM732A  
TE-LM830









- **Tube guides**  
Assists the tube attachment.

- **Release lever**  
Releases the tube clamp.
- **Rubber door seal**  
Prevents any infiltration of drug solution.
- **Tube clamp / Anti-free flow unit (TE-LM730A, TE-LM732A and TE-LM830 only)**  
When the door is opened, the anti-free flow clip inserted to the anti-free flow unit compresses the tube. The tube clamp will also be compressed when the door is opened.
- **Lower occlusion detector**  
Detects any lower occlusion in the infusion line.
- **Buffer plate**  
Presses the infusion set against the fingers.



- **Air-in-line detector**  
Detects any air inside the infusion line.
- **Upper occlusion detector**  
Detects any upper occlusion in the infusion line.
- **Fingers**  
Delivers solution by pressing the infusion line.

**Operation Panel**


Name	Function
 <b>Power switch</b>	Turns the power ON/OFF.
 <b>Purge switch</b>	In the stop status, press and hold this switch to perform a rapid infusion. In the bolus (Hands On/Hands Free) mode, press or press and hold the switch to start the bolus infusion. The buzzer sounds and the operation indicator flashes in green.
 <b>Start switch</b>	Starts the solution delivery.
 <b>Stop switch</b>	Stops the solution delivery. Rotating the Dial while pressing the Stop switch accelerates the setting rate to set items such as the flow rate. (See page 60.)
 <b>Display select switch</b>	Switches the selected item (Flow rate screen, Menu screen). Press and hold for 2 seconds or more on the flow rate screen to go to the menu screen.
 <b>Back/Mute switch</b>	Mute the alarm. Returns to the previous menu screen. In the stop status, press and hold for 2 seconds or more to standby. In the keypad lock status, press and hold for 2 seconds or more to release the keypad lock.
 <b>Confirmation switch</b>	Confirms the item selection and is also used for check confirmation.
 <b>Operation indicator</b>	Displays the operation status. Green flashing: Solution delivery in progress No light: Stopped/Standby mode Red flashing: Stopped by an alarm Green and red lighting alternately: Self-check (self-diagnosis) operation in progress Red light: Device fault

## Screen Description

### Note

- As an example, this manual uses screen display examples from TE-LM830. However, screen and menu layout is similar for the other models.

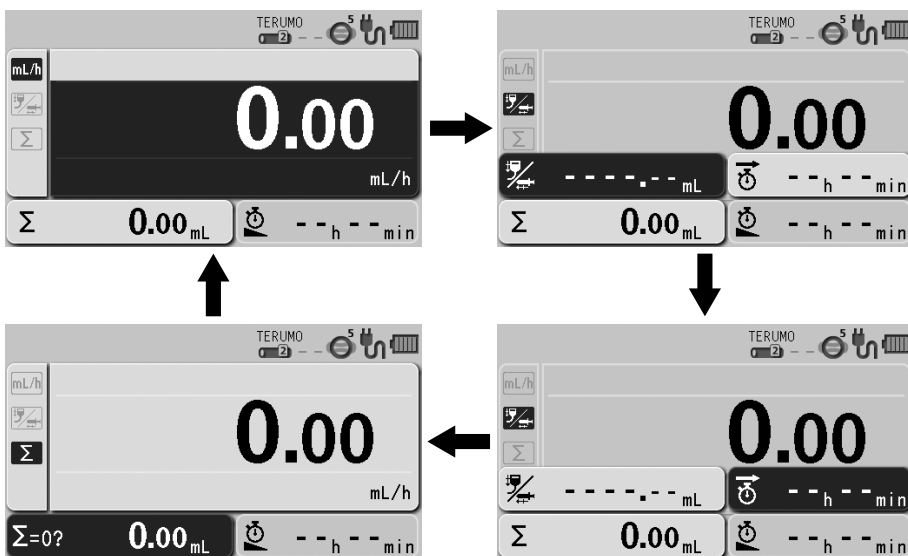
### ◆ Flow rate screen

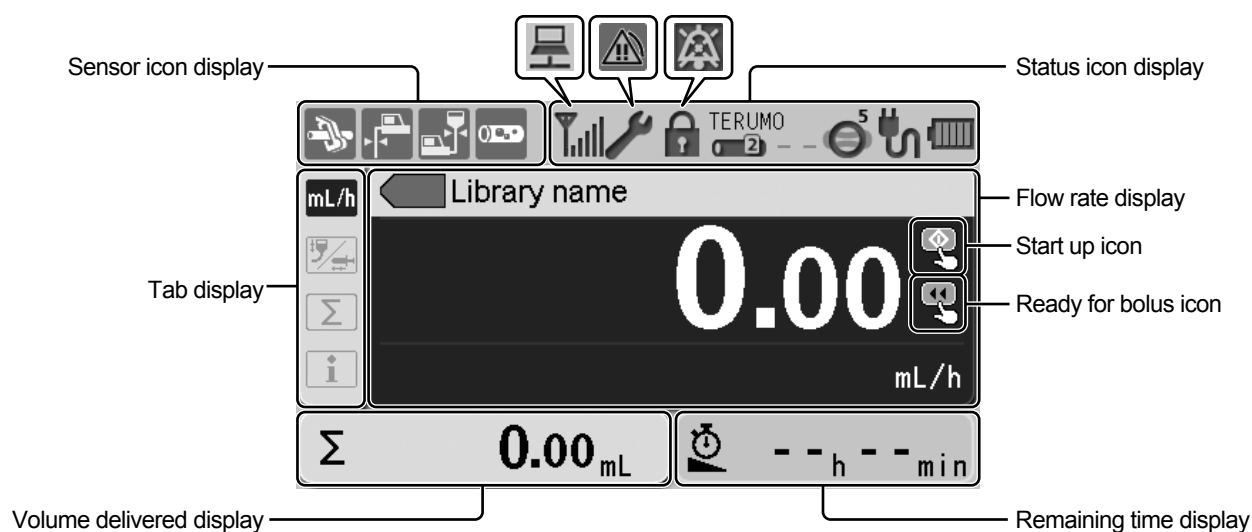


1	Flow rate display	Displays the value and information for the flow rate (mL/h), etc.
2	VTBI display	Displays the VTBI (Volume to be infused).
3	VTBI time display	Displays the VTBI time.
4	Volume delivered display	Displays the volume delivered.
5	Remaining time display	Displays the remaining time.



















### Notes

- Each time you press the Display select switch, selected items rotate as shown below. Selected item turns dark blue.
- If not operated for 10 seconds, the input area moves to the flow rate display.

































◆ Status icon display





 <p><b>Battery icon</b> Displays the remaining battery level.</p>	 (lit)	When AC power is connected and charge is full.
	 and the remaining battery level flashing alternately	When AC power is connected and battery is charging.
	 (flashing every other second)	Battery failure
	 (flashing every half second)	Battery and sub-battery* failure
	 and the remaining battery level flashing alternately every other second	Sub-battery failure or low battery
	Battery charge level (displayed in 5 bars) <ul style="list-style-type: none"> <li> 5 bars (green): Approx. 5 hours</li> <li> 4 bars (green): Approx. 3.5 hours</li> <li> 3 bars (green): Approx. 2.5 hours</li> <li> 2 bars (green): Approx. 2 hours</li> <li> 1 bar (orange): Approx. 30 min (when the Battery alarm has not been issued)</li> </ul> (In the case of a continuous solution delivery at a flow rate of 25 mL/h at ambient temperature of 25°C, with new battery after charging for 8 hours or more with the power turned off.) The battery can be charged to approx. 80% in 3 hours. * The sub-battery is used for a Power Failure alarm.	
 <p><b>AC icon</b> Displays connection/disconnection of the AC power supply.</p>		When AC power is not connected
		When AC power is connected
 <p><b>Occlusion icon</b> The occlusion detection pressure is displayed in 10 levels (1 to 10) in the upper right of the icon.</p>		The occlusion detection pressure level is 1.
		The occlusion detection pressure level is 5 (Default).
		The occlusion detection pressure level is 10.

## Parts Description

 <p><b>Occlusion icon</b> The internal pressure level of the infusion line that does not reach the level of Occlusion alarm is displayed in 4 levels.</p>	 (grey)	Below 25% of the specified occlusion detection pressure.	
	 (green)	25% or more of the specified occlusion detection pressure.	
	 (yellow)	50% or more of the specified occlusion detection pressure.	
	 (orange)	75% or more of the specified occlusion detection pressure.	
 <p><b>Infusion set brand/ Drip volume/ Air-in-line alarm sensitivity icon</b></p>		Infusion set brand	
		Drip volume of the infusion set used (20 drops, 60 drops ≈ 1mL) (If the drip sensor is not connected, "--" appears instead of the drip volume.)	
		Air-in-line alarm sensitivity select function (1: High, 2: Low)	
 <p><b>Keypad lock icon</b> Displays when the keypad lock is enabled (ON).</p>		When the keypad lock is enabled (ON).	
	(No indicator)	When the keypad lock is disabled (OFF).	
 <p><b>Mute icon</b> Displays when an alarm is muted.</p>		Alarm is muted	
 <p><b>Maintenance icon</b> Displays when the maintenance timer set period has elapsed.</p>		When the set time period has elapsed For the setting method, contact TERUMO trained service technicians.	
 <p><b>Alarm icon</b> Displays when an alarm sounds.</p>	 (Background colour: red)	When a high priority alarm sounds.	
	 (Background colour: yellow)	When a medium priority alarm sounds.	
	 (Background colour: yellow)	When a low priority alarm sounds.	
 <p><b>Wireless LAN icon</b> Displays the strength of the signal. (TE-LM830 only)</p>		Antenna only is flashing: The wireless LAN module is faulty.	Antenna + signal strength bars light grey: Connection to the network system is established. Antenna + signal strength bars light green: During communication.
		Antenna only is lit: Connection to the network system is not established.	
		Signal condition: Poor	
			
			








 <p><b>Communication icon</b> Displays during the infrared communication (IrDA) or external communication (RS-232C).</p>		During communication
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### ◆ Sensor icon display



 <p><b>Anti-free flow icon</b> (TE-LM730A, TE-LM732A and TE-LM830 only)</p>	Displays when the anti-free flow clip has not been attached.
 <p><b>Lower occlusion detector icon</b></p>	Displays when a lower occlusion is detected.
 <p><b>Upper occlusion detector icon</b></p>	Displays when an upper occlusion is detected.
 <p><b>Air-in-line detector icon</b></p>	Displays when air-in-line is detected.

### ◆ Tab display

\* A selected item that can be entered is displayed in dark blue.

 <p><b>Flow rate tab</b></p>	Used for setting the flow rate.
 <p><b>Dose rate tab</b></p>	Used for setting the dose rate when the library or the weight mode is selected.
 <p><b>VTBI tab</b></p>	Used for setting the VTBI.
 <p><b>Volume delivery clear tab</b></p>	Used for clearing volume delivery.
 <p><b>Info tab</b></p>	Displays the setting information (unit, weight, drug amount, solution amount, etc.).
 <p><b>Hands On Bolus tab</b></p>	Used for setting the Hands On Bolus function.
 <p><b>Hands Free Bolus tab</b></p>	Used for setting the Hands Free Bolus function.

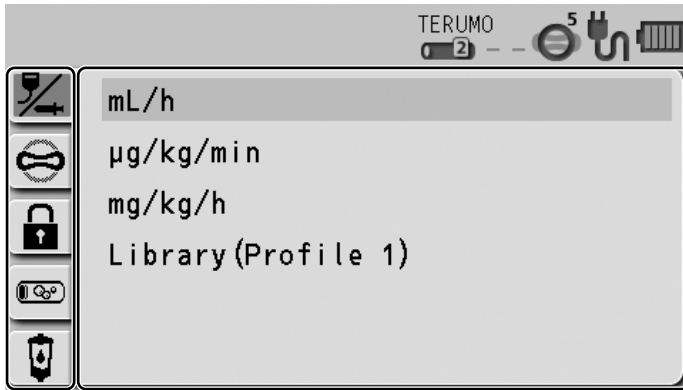
### ◆ Ready icon

 <p><b>Start up icon</b></p>	Displays when solution delivery is ready to start.
 <p><b>Ready for bolus icon</b></p>	Displays when the pump is ready to start bolus.

## ◆ Menu screen

For the programming procedure, see page 62.

Menu 1



Menu tab

Menu details display

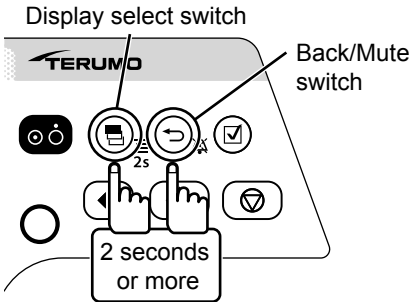







Menu 2



Menu tab

Menu details display

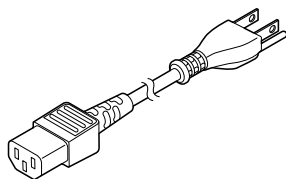
Menu	Menu tab	Menu details	Note
<b>Menu 1</b> Press and hold the Display select switch for 2 seconds or more. This moves the input area to the next item before displaying the menu screen.			
	 <b>Dose mode select</b>	mL/h µg/kg/min mg/kg/h Library	Other dose units can be specified in the Drug Library. "Library" is displayed after uploading the Drug Library (for TE-LM830).
	 <b>Occlusion detection pressure</b>	1 to 10 (± 30 kPa ↔ ± 120 kPa)	Sets the occlusion detection pressure level.
	 <b>Keypad lock</b>	ON OFF	Sets the keypad lock function to ON or OFF.
	 <b>Air-in-line detection sensitivity</b>	High Low	Sets the air-in-line detection sensitivity in 2 levels.
	 <b>Drip volume</b>	20 60	Sets the drip volume in 2 levels.
	 <b>Bolus</b>	Hands On Bolus Hands Free Bolus	Bolus infusion is available with the Purge switch.
	 <b>Advanced dose mode</b> (TE-LM830 only)	OFF Interval/Intermittent Mode Multi-step Mode Delayed Start Mode	Selects an advanced dose mode. (Displayed when a drug library that allows for advanced dose mode is selected.)
	 <b>Combination dose mode</b> (TE-LM830 only)	—	For details, contact TERUMO trained service technicians.

Menu	Menu tab	Menu details	Note
<b>Menu 2</b> While pressing the Back/Mute switch, press and hold the Display select switch for 2 seconds or more.  	 <b>History</b>	Up to 10,000 events	Checks the operation history.
	 <b>Sound volume</b>	Alarm sound: 1: Low 2: Medium 3: High Step: Step up Operation sound: 0: Very low 1: Low 2: Medium 3: High Cable insertion or extraction sound: 0: Very low 1: Low 2: Medium 3: High	Sets the sound volume level.
	 <b>Brightness</b>	1 to 5 (Dark ↔ Bright)	Sets the brightness level.
	 <b>Date and time</b>	Year, Month, Day, Hour, Minute	Sets the date and time.
	 <b>Profile (TE-LM830 only)</b>	Profile range can be set through TERUFUSION Drug Library Manager or TERUFUSION Software Package (settable up to 30 items).	Selects the profile.
	 <b>Communication environment (TE-LM830 only)</b>	Selection of Communication environment table (up to 10) Wireless LAN ON/OFF	Sets the communication environment.
	 <b>Password</b>	If the password is set, some special functions are password protected.	Displays the menu only available to TERUMO trained service technicians.

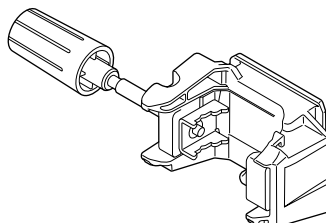
## Standard Accessories

Standard accessories supplied with this product:

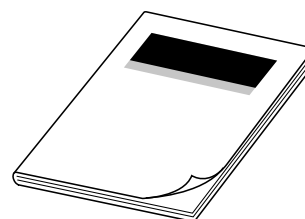
- AC power cable



- Pole clamp (Screw type)



- Instruction manual



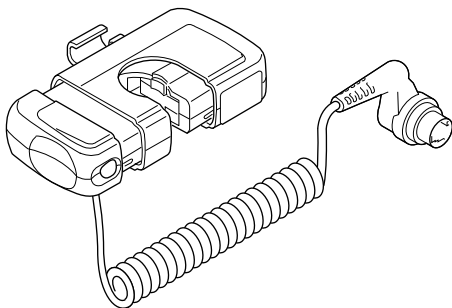
### Optional Accessories

Optional accessories are sold separately.

The specifications and external appearance of the product may be changed without notice for the purpose of improvement. For details, see the instruction manuals supplied with each product.

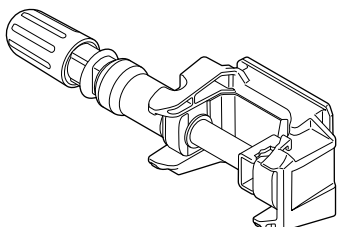
Name	Model	Catalogue number
TERUFUSION Drip Sensor Type LM	TE-977	TE*977
TERUFUSION One Touch Pole Clamp	TE-877	TE*877
TERUFUSION Drug Library Manager	TE-SW800	TE*SW800BE
TERUFUSION Software Package	TE-SW800	TE*SW800PE
TERUFUSION Standard Rack System	TE-RS700	TE*RS700N
TERUFUSION Communication Rack System	TE-RS800	TE*RS800N TE*RS800N03
TERUFUSION Communication Rack System (Extension)	TE-RS811	TE*RS811N

- Drip sensor (TE-977)

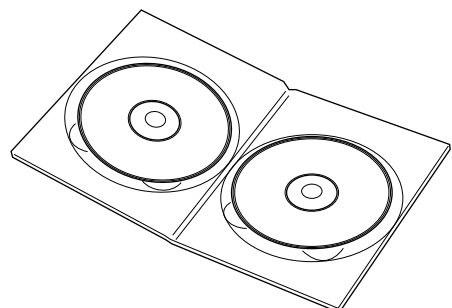


Attaching the dedicated drip sensor allows monitoring of the dripping status inside the drip chamber and indicates free flow, empty line (solution run-out) or any abnormal flow rate with an alarm.

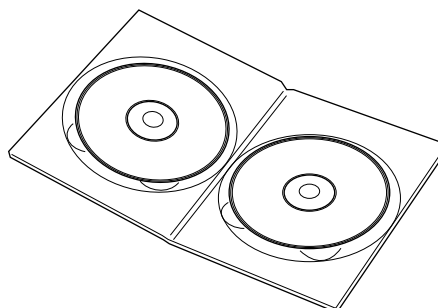
- TERUFUSION One Touch Pole Clamp (TE-877)



- TERUFUSION Drug Library Manager (TE-SW800)



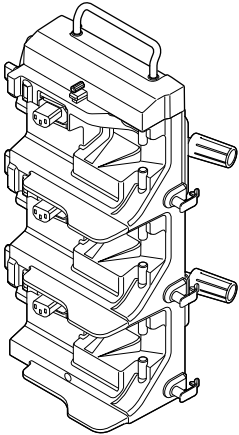
- TERUFUSION Software Package (TE-SW800)



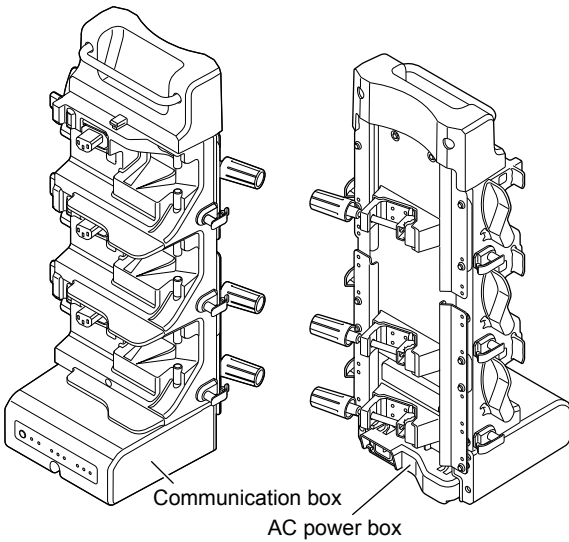
#### Notes

- Some functions of TERUFUSION Drug Library Manager and TERUFUSION Software Package are not available for TE-LM732A and TE-LM732N.  
All functions of TERUFUSION Drug Library Manager and TERUFUSION Software Package are available for TE-LM830.
- When using the TERUFUSION Drug Library Manager or TERUFUSION Software Package, be sure to check the compatible with that version of the pump you use. For the version, contact TERUMO trained service technicians. If the incorrect version is used, some parts of the TERUFUSION Drug Library Manager or TERUFUSION Software Package are displayed abnormally.

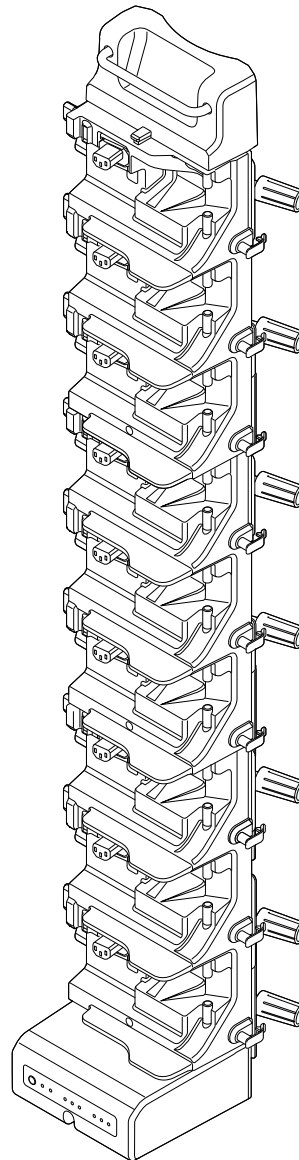
- Rack system  
TERUFUSION Standard Rack System (TE-RS700)



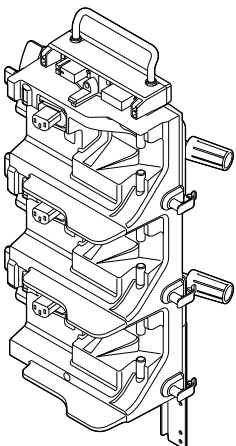
TERUFUSION Communication Rack System (TE-RS800)



<Combination Examples>



TERUFUSION Communication Rack System (Extension) (TE-RS811)



Notes

- Up to three rack systems can be joined for use.
- To join rack systems, contact TERUMO trained service technicians.

# Precautions

To ensure safe and correct use of this product, please observe all precautions.  
Non-compliance with precautions and incorrect use may result in damage or injury.  
The following are signs used in this manual and their meanings:

## Warning

This label preceding a precaution indicates that there will be a possible risk of death or personal injury if the precaution given is not complied with.

## Caution

This label preceding a precaution indicates that there will be a possible risk of personal injury or property damage if the precaution given is not complied with.

## Use

### Warnings

- Always check the infusion status (dripping status, decreasing volume of drug solution) and puncture site at the start of the infusion. In addition, conduct the same check during infusion on a regular basis, including patient rounds.
- When an occlusion occurs due to tube bend in the infusion line, failure to open the manual roller clamp, blocked filter, blood clot inside the needle or other reasons, close the infusion line on the downstream side and, if applicable, open the anti-free flow clip or make sure it is open\*1, and release the internal pressure of the infusion line, and then eliminate the cause of the occlusion before starting. [1. The internal pressure of infusion line from the pump to the occluded section in the downstream is high. Simply removing the cause of occlusion will result in “bolus infusion (temporally excessive infusion of drug solution)” to the patient. 2. The pump will not operate until occlusion is removed.]
- When removing the infusion set from the pump, always close the infusion set with the manual roller clamp and then open the door and release the tube clamp. [If not, it can cause an excessive infusion by a free flow.] [Since the anti-free flow clips are only assisting tools to prevent free flow caused by failure to close a manual roller clamp, they do not have an open/close function equivalent to manual roller clamps.\*1]
- When using at a low flow rate or under a low temperature, monitor the solution delivery carefully to check for any occurrence of occlusion. [The solution delivery may be interrupted for a period due to: 1. The flow rate setting decreases, the time from occlusion occurrence to detection becomes longer. 2. The temperature decreases, the tube of the infusion set becomes harder and thus the pressure to detect an occlusion becomes higher, making the time from occlusion occurrence to detection longer.]
- When using this product in environments with high background noise levels, the alarm sound volume of this product should be adjusted so that alarms can be heard. [Background sound pressure levels higher than the alarm sound volume may drown out an alarm, resulting in health hazard to the patient.]
- When using this product with one or more other products, or with a similar device, make sure of the optimum alarm settings for all those devices. [Unintended alarm settings may result in health hazard to the patient.]
- Since this product does not have an airtight structure, it should not be used or stored in an active gas environment (including sterilizer gas), nebulizer-sprayed environment, high-humidity environment, etc. It should not be submerged into water. [If the electronic components inside the product are affected, there may be subsequent damage and time degradation which will cause failure of this product.]
- The product should not be used or stored in a flammable environment.
- This product should not be used in conjunction with gravity infusion. [1. If this product suffers a downstream occlusion lower than the connection with the gravity infusion line, the Occlusion alarm will not operate. 2. If bubbles are entrained in the downstream of the infusion line due to emptied gravity infusion line first, the normal infusion cannot be carried out nor does the alarm operate.]
- The product should not be used for an extracorporeal circuit etc. that may lead to an extreme negative or positive pressure. [The flow rate accuracy and Occlusion alarm cannot be guaranteed.]

\*1: TE-LM730A, TE-LM732A and TE-LM830 only

## Cautions

- An infusion set other than those with the specified anti-free flow clip should not be used with this product. See the instructions for use for the dedicated infusion set. [If a non dedicated infusion set is used, the solution cannot be delivered.]\*<sup>1</sup>
- An infusion set other than the infusion sets specified in this manual (see page 21) should not be used with this product. See the instructions for use for the dedicated infusion set. [If a non dedicated infusion set is used, the flow rate accuracy and alarm function cannot be guaranteed.]\*<sup>2</sup>
- A dedicated drip sensor is an optional accessory. Use only the prescribed one. Otherwise, drip detection and alarm functions cannot be guaranteed.
- Use the AC power cable included and connect to an earthed AC power source. The AC power cable included should not be used for other equipment. [Using an AC power cable other than the one specified may result in failure of this product. In addition, if used without an earth connection, the electrical safety of this product is not guaranteed.]
- When setting the tube, ensure that there is no bend, dent or slack in the tube and that the tube is set straight into the fingers, tube guides, various detectors and tube clamp. [Incorrect loading may result in abnormal solution delivery such as excessive infusion, insufficient infusion or non-administration of drug solution.]
- It is recommended to place the manual roller clamp on the downstream side of the pump for use.
- Before inserting an intravenous needle, always remove the air from inside the infusion line. [Failure to remove the air may cause patient harm and interfere with the normal solution delivery.]
- When setting the tube, do not pull excessively hard. [The tube may be deformed, and therefore the original functionality or performance of this product may not be achieved. (flow rate error and various alarm functions etc.)]
- This product has a built in safety system so the door will not close if the tube has not been set correctly (AIS (Anti Irregular Set) system). If the door is unusually difficult to close, check that the tube has been set correctly instead of forcing the door closed. [Forcing the door closed may result in damage to or leakage of the device and/or tube.]
- When starting solution delivery, check the volume delivered and then clear it as needed before use.
- When an Occlusion alarm sounds, be sure to eliminate the cause of occlusion before resuming solution delivery. [This product is equipped with a countermeasure function for an Occlusion alarm that decreases the bolus volume by reducing internal pressure of infusion line. If solution delivery is resumed without eliminating the cause of occlusion, solution may not be delivered properly.]
- If solution delivery is resumed without eliminating the cause of occlusion, e.g., when the power turns back on after an Occlusion alarm, the alarm detection may not operate correctly. This may cause loosening or damaging of the connecting sections of the infusion set or starting bolus due to high internal pressure of infusion line.
- After the infusion set is attached, the door is closed and the manual roller clamp is opened, if any dripping of drug solution is observed, check the infusion set (the dedicated infusion set), the attachment status of the tube (correctly attached), and any fault in the infusion set and devices (whether or not damaged).
- Ensure that the pole clamp is fixed to the IV pole. Also ensure that the IV pole is stable. [Dropping or falling may result in damage or failure.]
- Before starting solution delivery, check that the settings for any errors in the digit of flow rate etc., or whether the flow rate and VTBI have been accidentally swapped. [This product does not have a function to determine the correct values, possibly resulting in excessive infusion or insufficient infusion to a patient.]
- Do not place the set inversely (upstream and downstream section). [The patient's blood may be drawn up into the tubing.]
- The anti-free flow clip should not be moved while the anti-free flow clip is closed. [The anti-free flow clip may get caught, resulting in stretching or damaging the tube.]\*<sup>1</sup>
- When the anti-free flow clip has been closed for a long period of time, the tube may be stretched, damaged, etc. If any fault is observed in the tube, it should not be used.\*<sup>1</sup>
- In the case of a solution delivery with no setting for the VTBI ("----": Unlimited), the pump will not stop until an alarm is issued. The pump should be stopped before running out of the drug solution. It is recommended to set a VTBI slightly less than the volume of the drug solution container.
- If the product is used under conditions that do not meet those specified for the flow rate accuracy described in "Specifications", such as a low flow rate, short dosing time, or ambient temperature, the solution delivery should be monitored with extra care. [The flow rate accuracy cannot be guaranteed.]
- Turn the power on while the door is open, and check that the LCD and operation indicator are flashing, that the buzzer sounds and that the fingers are moving. [If the power is turned on when the door is closed, this product cannot operate a normal self-check (self-diagnosis).]
- When fixing this product to the IV pole, the specified pole clamp should be used. [If a pole clamp that has not been specified is used, the function cannot be guaranteed. It may cause failure or accident.]

\*<sup>1</sup>: TE-LM730A, TE-LM732A and TE-LM830 only\*<sup>2</sup>: TE-LM730N and TE-LM732N only

### Cautions

- When attaching a pole clamp to the pump, ensure that it is set securely. [Failure to do so may result in falling of the pump or pole clamp.]
- When a pole clamp is used, do not release it until you have checked that this product is securely fixed to the IV pole. [Failure to do so may result in falling of this product due to the loosened pole clamp knob.]
- When using the drip sensor, ensure that the drip volume setting displayed on the LCD is correct. [The free flow and flow rate fault will not be detected automatically.]
- Do not use the infusion set with a damaged anti-free flow clip, and do not remove the anti-free flow clip.\*1
- The anti-free flow clip should be attached to the anti-free flow unit in the correct position. Do not insert any object other than anti-free flow clip into the anti-free flow unit. [It may cause damage or result in interfering with the normal operation of the device or anti-free flow clip.]\*1
- The AC power cable must be removed when the system needs to be disconnected from mains power. Do not put the pump in a position in which it is difficult to remove the AC power cable.
- No part of this product, including the infusion line, should be taken into or used in a control area for radiation devices/ MRI or inside a hyperbaric oxygen therapy room. If any part of this product is accidentally brought into these environments, immediately discontinue use. [This product is not designed to be used in these environments. Malfunction, damage or degradation of this product may occur or it may lead to explosion.]
- Since this product is precision equipment, it should not be used if it has received any impact (drop to floor, falling from the IV pole, violent shock). [Even though no fault is observed in the product appearance, the original functionality or performance (flow rate accuracy and various alarm functions, etc.) of this product may not be achieved, and therefore inspection is required.]
- Use the drug solution after it has adjusted to the room temperature. If used when it is still cold, air bubbles are produced due to evaporation of dissolved air and this causes Air-in-line alarms to occur more frequently.
- The elevation difference between the infusion pump and the patient should not be excessively large. [Building a negative pressure inside the infusion set may cause a detection of dented tube, resulting in issuing an Occlusion alarm.]
- Do not use this product together with other infusion systems. [If solution delivery is performed simultaneously by connecting the infusion line of this product with another infusion system or their accessories, the original functionality or performance of this product may not be achieved.]
- When using the drip sensor and a drug with low or high viscosity (such as glucose injection, blood, blood products), it may result in a Flow Rate Abnormality alarm etc., even in the normal infusion status, and potentially stop the pump operation.
- To ensure that the drip sensor can work effectively;
  - (1) Check that the drip opening of the drip chamber is clean, and do not immerse the drip opening into drug solution.
  - (2) Set the liquid volume inside the drip chamber to about 1/3, and make sure that there is no fog or droplets inside the drip chamber.
  - (3) The drip sensor should be attached the correct way up so that the drip sensor is placed in the middle between the drip opening of the drip chamber and the liquid surface, and the drip chamber is vertical. [Dripping cannot be detected correctly.] For details, see the instruction manual for the drip sensor.
  - (4) Do not apply any vibration that can result in vibrating the liquid surface inside the drip chamber. [Flow Rate Abnormality alarm etc. may be issued, possibly stopping the pump operation.]
  - (5) The drip sensor should be placed in a position not exposed to direct sunlight or strong light. [Since dripping cannot be detected correctly, a Flow Rate Abnormality alarm etc. may be issued, possibly stopping the pump operation. Even if it is correctly set up, flow rate fault and/or free flow may not be detected.]
- Before disconnecting the drip sensor plug from the drip sensor connector, always turn off the power. [If disconnecting the plug during solution delivery, an error or the Drip Sensor Dislocation alarm will be issued and the pump will stop.]
- Use an earthed AC power supply for normal use. The internal battery is an auxiliary power source for when the AC power supply is not adequately available during transportation, power failure, etc.
- Before use, check the manuals of the medical supplies and medical equipment that are used in combination.
- This product should only be operated by skilled personnel.
- Regular inspections should be conducted. If any fault is observed, stop using this product and request an inspection and repair. [The original functionality or performance of this product may not be achieved.]
- Attention is required not to apply any strong static electricity. [It may result in failure or malfunction.]
- Prior to first use, or if unused for a long period, connect this product to an earthed AC power supply and provide a sufficient charge (8 hours or more) with the power turned off. [If not sufficiently charged, this product may not be able to operate using the internal battery during a power failure, etc.]

\*1: TE-LM730A, TE-LM732A and TE-LM830 only

## Cautions

- Even within the normal conditions of use, this product should not be used under conditions that cause a sudden temperature change. [Condensation inside the product results in damage and time degradation, and therefore the original functionality or performance of this product may not be achieved.]
- The AC power cable, communication or nurse call cable, used for this product should not be pinched with forceps or equipment, e.g. caster, or punctured with a needle. [If a cable is damaged, electric shock or fire may occur. The original functionality or performance of this product may not be achieved.]
- This product should not be used in a place where vibration, dust, mist, corrosive gas, etc., occurs or in a place where the product is sprayed with liquid. If solution is spilled on this product, thoroughly wipe with a dry soft cloth. [The original functionality or performance of this product may not be achieved, and it may cause a malfunction.]
- Since drug solution may cause a short circuit, ensure that the connecting sections of the AC inlet and AC power cable are not wet when connecting. If moisture is present, ensure that the power is turned off and the AC power cable is removed from both the pump and earthed AC power source, and then thoroughly wipe with a dry cloth. [Since this product does not have a waterproof structure, it may affect the electrical components inside, and cause a malfunction.]
- It is recommended to use Luer Lock infusion sets for secure infusion line connection.
- Although this product minimizes the deformation in tubes and allows a stable solution delivery, its flow rate may vary from the specified range or an Occlusion alarm may be issued if used for over a specified time. To maintain a stable infusion, either move the tube at the pump attachment by more than 15 cm or replace the infusion set with a new one at a regular interval. This should be conducted every 24 hours when the high flow rate accuracy at the start of solution delivery is required to be maintained. [Continuous solution delivery for a long period may cause tube deformation, resulting in decreased flow rate or Occlusion alarm. It is confirmed through our in-house testing that after 96 hours of continuous use, the flow rate accuracy is decreased by  $2\pm 1\%$  from the value at the start of solution delivery.]
- When transporting with the pump fixed to the IV pole, do not hold the handle of the pump nor apply pressure from the top. [The pole clamp may be dislocated or damaged.]
- If the anti-free flow clip is wet with drug solution, it should be wiped off immediately. The anti-free flow clip should not be used to clip anything other than tubes. [The anti-free flow clip may not close or may be damaged.]\*<sup>1</sup>
- When this product is transported while in use, do not touch the switches, etc. Use the keypad lock function as needed. [Touching the switches etc. without the keypad lock enabled may result in an operation (power on/off, stop, start, rapid infusion) that is not intended by this product.]
- The LCD and the Operation panel (switches etc.) of this product should not be pressed with excessive force and should not be operated with a pointed object. [It may cause damage to or failure of the LCD or the Operation panel.]
- Do not disassemble, make alterations (including actions that interfere with the functionality or performance such as taping the LCD or a movable part) to, or repair this product. [This may result in failure, damage or device performance degradation of this product.]
- This product should only be used with a sufficient power supply. [If the power supply is not sufficient, the internal battery will be used for the operation, which may result in no power supply in an emergency situation.]
- This product should not be used for the purpose of delivering sterilizing solution such as povidone-iodine. [Being exposed to the components of sterilizing solution may result in degradation or damage to the components of this product.]
- When using devices (mobile phones, radio devices, radio knives, defibrillators, etc.) that emit an electromagnetic wave within the area of this product, they should be used as far away as possible and you should verify the normal operation of this product in the configuration it is used. In addition, this product should use a power supply of a system isolated from these devices and should obtain secure earth connection. [Malfunction in this product may result in critical harm to the patient.]
- It is recommended to use the dedicated drip sensor (Model: TE-977) for this product in order to detect any flow rate fault or free flow during solution delivery. However, a flow rate fault cannot be detected if the dripping inside the drip chamber is a continuous flow.
- When using the TERUFUSION-pump-specific infusion set under the following conditions, the drug solution may not flow for several tens of seconds at the start, which may result in issuing a Flow Rate Abnormality alarm, etc. (When using the drip sensor (Model: TE-977)):
  - (1) When used in an environment of 30°C or higher
  - (2) When left alone for several minutes after the tube has been set up and the door has been closed"

\*1: TE-LM730A, TE-LM732A and TE-LM830 only

### Cautions

- When used in the vicinity of a radio knife (Medical radio knives are surgical equipment for incision and coagulation by high energy radiofrequency current), check the following before use.
  - (1) Radio knives have a different level of high-frequency noise emission depending on the types, and using old models (vacuum tube gap type) in combination should be particularly avoided as the noise levels from those are higher.
  - (2) The distance from the radio knife cord (knife holder, knife cord and return electrode cord) and radio knife body to this product should be kept to a minimum of 25 cm.
  - (3) The radio knife and this product should be operated by a power supply from a separate system, and both should be securely earthed.
- When this product is used under a low temperature, the status of solution delivery such as the remaining amount of drug solution should be monitored with extra care. [The flow rate accuracy may be reduced by 10% under a temperature of less than 10°C.]
- When using this product with a high flow rate, the status of solution delivery such as the remaining amount of drug solution should be monitored with extra care. [If an infusion set not made with PVC is used with a flow rate of more than 500 mL/h, the flow rate accuracy may be reduced by 10%.]
- When connecting this product with other medical equipment or network system, check its conformance to IEC 60601-1:2005+A1:2012 (EN 60601-1:2006+A1:2013) and IEC 60601-1-2:2014 (EN 60601-1-2:2015) prior to use in order to ensure the system safety.
- When connecting this product with a network system or other equipment, for safety, checking the manufacturer's specifications of the equipment is recommended. In addition, use EMI compliant products for the connection cable.
- When using the external communication function, pay particular attention, as it is more susceptible to the effect from a radio knife, mobile phone, radio device, defibrillator, etc. Regularly check that this product is operating normally.
- If connecting with a nurse call, always check in advance with the electrical contractor for compatibility, and connect with a system for which the connection function has been confirmed. [The functions regarding connection are not guaranteed.]\*<sup>1</sup>
- If connecting with a buzzer or lamp instead of a nurse call, it should be used with a capacity of 12V DC, 1A or less.\*<sup>1</sup>
- When using the wireless LAN communication function, the effect on other equipment by radio interference should be considered. [It may affect other equipment.]\*<sup>2</sup>
- When connecting this product with a network, the settings of this product and the network system need to be compatible. Contact a vendor specialist for the correct settings and allow only the system administrator to perform settings. [Failure to connect with correct settings may result in interfering with the original functionality or performance of this product and affecting the network system.]\*<sup>2</sup>
- Connection to a network including other devices may cause unpredicted and unacceptable risks for the patient, the user, or a third person. Be sure to identify, analyze, evaluate, and control those risks.
- Subsequent changes to the IT-network could introduce new risks and require additional analysis.
  - Changes to the IT-network include:
    - (1) Changes in the IT-network configuration.
    - (2) Connection of additional items to the IT-network.
    - (3) Disconnecting items from the IT-network.
    - (4) Update of equipment connected to the IT-network.
    - (5) Upgrade of equipment connected to the IT-network.
- When using the IV pole, follow the instructions for the IV pole.

\*1: TE-LM732A and TE-LM732N only

\*2: TE-LM830 only

Use an infusion set specified below.  
 Follow the instructions for use of the respective infusion sets for details.  
 For flow rate accuracy, see page 131.

## ◆ The respective infusion sets for TE-LM730A, TE-LM732A, TE-LM830

<b>Pump-Specific infusion sets</b>
TERUFUSION Solution Administration Set for Infusion pump
SURPLUG Solution Administration Set
SURPLUG AD Solution Administration Set

<b>Pump-Specific infusion sets (high precision type)</b>
Not available yet

<b>Pump-Specific blood transfusion sets</b>
TERUFUSION Blood Administration Set for Infusion pump

## ◆ The respective infusion sets for TE-LM730N, TE-LM732N

<b>Pump-Specific infusion sets</b>
TERUFUSION Solution Administration Set for Infusion pump
SURPLUG Solution Administration Set
SURPLUG AD Solution Administration Set

<b>Pump-Specific infusion sets (high precision type)</b>
TERUFUSION Solution Administration Set for Infusion pump

<b>Pump-Specific blood transfusion sets</b>
TERUFUSION Blood Administration Set for Infusion pump

### Caution

- When using the TERUFUSION-pump-specific infusion set under the following conditions, the drug solution may not flow for several tens of seconds at the start, which may result in issuing a Flow Rate Abnormality alarm, etc. (With use of the drip sensor):
  - (1) When used in an environment of 30°C or higher
  - (2) When left alone for several minutes after the tube has been set up and the door has been closed

# Preparation

Prior to the initial use of the pump, set the date and time to record history correctly. (See page 91.)  
Before use, carefully read “Precautions” and the labels attached to the product.

## Prior to the Pump being Used

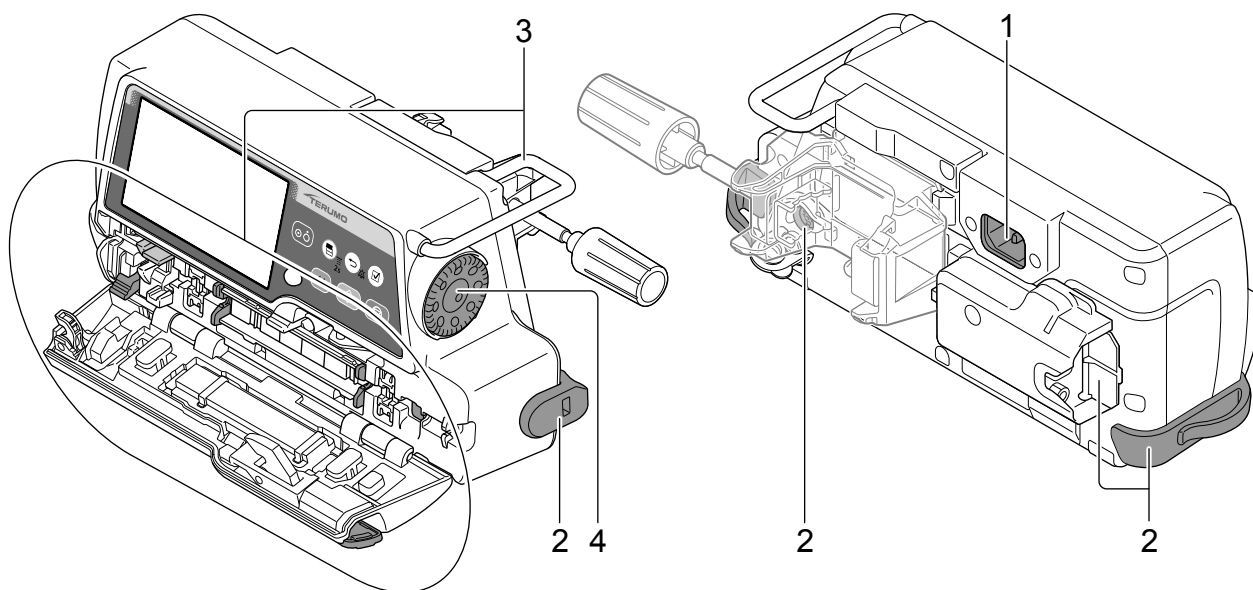
Connect to the AC power supply and charge (8 hours or more) with the power turned off.

## Prior-to-use Inspection

Check the following points before use.

- 1) **There is no damage to the main unit, AC power cable or pole clamp, and that there is no malfunction due to adhered drug solution.**

### ◆ Main unit/AC power cable



1. There is no damage, dent or adhered drug solution on the AC inlet and AC power cable.
2. There is no damage to the drip sensor connector cover, Upper tube holder/Lower tube holder and RS-232C connector cover (if RS-232C is connected)\*1.
3. There is no damage to the handle, the tube guides, the fingers, the buffer plate, the various detectors, the tube clamp, and the anti-free flow unit\*2.
4. There is no adhered drug solution on the Dial, it turns smoothly, and flow rate setting can be set when the power is on.  
If there is adhered drug solution, promptly clean in accordance with the directions on page 111.

\*1: TE-LM732A and TE-LM732N only

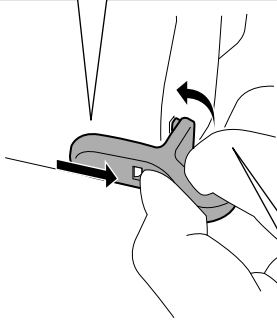
\*2: TE-LM730A, TE-LM732A and TE-LM830 only

## Notes

- If the tube holder comes off, follow the procedure below to attach it.
- When inserting the notch of the tube holder into the hole on the rear side, insert while pulling the tube holder towards the rear side. Forcibly inserting into the hole may cause damage to the notch.

## Upper tube holder

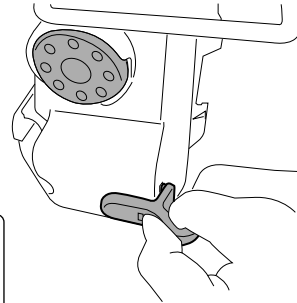
1) Hook the hole of the Upper tube holder to the notch on the pump upstream side.



2) Insert the notch of the Upper tube holder into the rear side hole on the pump upstream side.

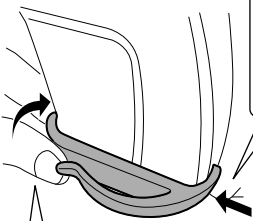
## Check

- The Upper tube holder is firmly fixed to the pump.

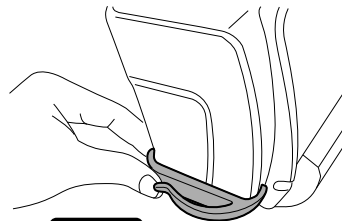


## Lower tube holder

1) Insert the notch of the Lower tube holder into the front side hole on the pump downstream side.



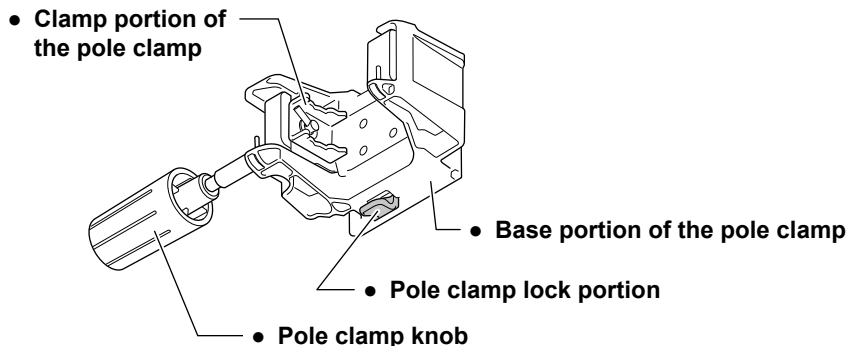
2) Insert the notch of the Lower tube holder into the rear side hole on the pump downstream side.



## Check

- The Lower tube holder is firmly fixed to the pump.





## ◆ Pole clamp



1. There is no damage to any part of the pole clamp and that the clamp is clean.
2. When attaching pole clamp to the pump, it should lock in place firmly with an audible click.
3. There is no adhered drug solution on the pole clamp part and the clamp can be moved smoothly.


\* If there is adhered drug solution, promptly clean in accordance with the directions on page 111.  
Clean periodically even if there is no adhered drug solution.

### 2) The following self-check (self-diagnosis) operations should be performed when the power is turned on using the internal battery while the door is left open without an infusion set installed.


1. The operation indicator lights in green and red alternately and the fingers move slightly.
2. The message "Self-check" is displayed on the LCD, and the LCD flashes.
3. The buzzer sounds.
4. Infusion sets guidance is displayed, and when the door is closed, the icons "Air-in-line detector " , "Upper occlusion detector " , "Lower occlusion detector " and "Anti-free flow "\*1 flash on the LCD.

\*1: TE-LM730A, TE-LM732A and TE-LM830 only

### 3) Neither Battery alarm or Power Failure alarm has been issued.

1. The level of battery icon on the LCD has two bars (green)  or more.
2. Neither Battery alarm (yellow) or Power Failure alarm (red) is displayed on the LCD.

### 4) When the AC power cable is connected, the LCD displays the AC icon .

1. When the AC power cable is inserted into the AC inlet on the rear side of the main unit completely, the AC icon  is displayed.
2. If the internal battery is not fully charged, fully charge it.

#### Note

- During charging,  and  flash alternately.

### 5) When the AC power cable is connected, there is no looseness or any fault.

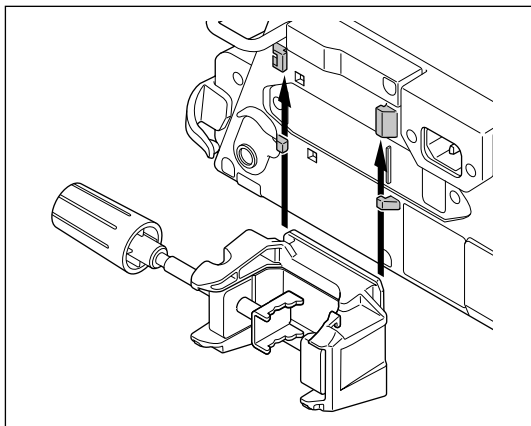
- The AC power cable is completely inserted into the AC inlet of the main unit.

## Attaching/Detaching a Pole Clamp

### ◆ Attach the pole clamp

The pole clamp can be locked at the pole clamp lock portion only in the direction shown in the figures below.

#### To attach to a vertical pole



- **Insert the pole clamp along the grooves on the back of the infusion pump from the lower side.**

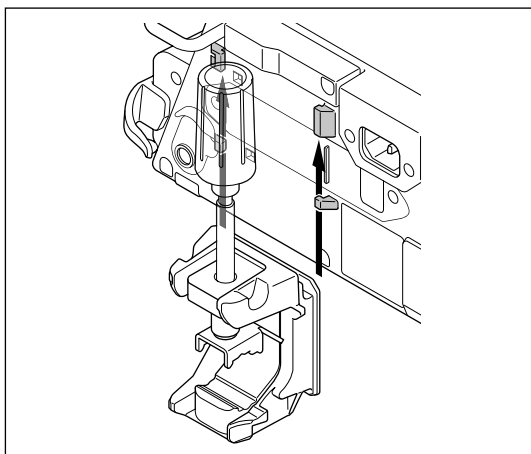
#### Check

- The pole clamp must be securely inserted. It should lock in place firmly with an audible click.

#### Note

- For instructions on attaching the IV pole and other parts, see page 26.

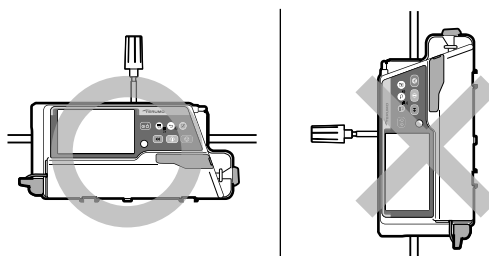
#### To attach to a horizontal pole



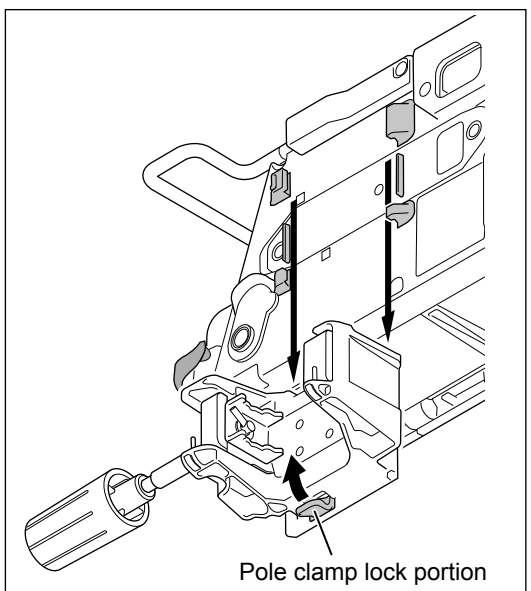
#### Notes

- The pole clamp can be attached in the vertical direction as shown in the figure. Note that the pump cannot be installed in the rack system when the pole clamp is attached in the vertical direction.
- A pump with an RS-232C connector cover may produce difficulties attaching to some horizontal bars depending on the diameter of the bar. (It can be installed on to "Horizontal Rail".)\*1
- Do not attach the pump in the vertical direction.

\*1: TE-LM732A and TE-LM732N only



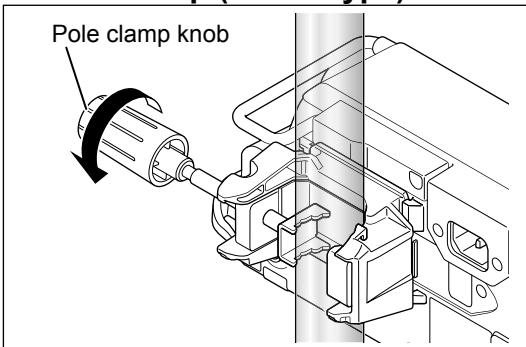
### ◆ Detach the pole clamp



- **Pull the pole clamp downward while pressing and holding the pole clamp lock portion.**

## Attaching/Detaching to the IV Pole

### ◆ Pole clamp (Screw type)

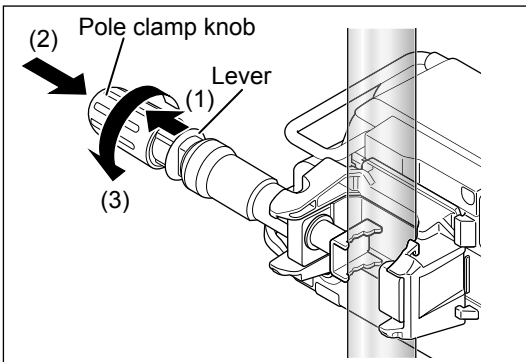


- Turn the pole clamp knob to fix the pump firmly to the IV pole.

#### Note

- When removing the pump from the IV Pole, hold the main unit and turn the pole clamp knob opposite to the arrow shown in the figure.

### ◆ TERUFUSION One Touch Pole Clamp (Optional accessory)



- Turn the pole clamp knob to fix the pump firmly to the IV pole.

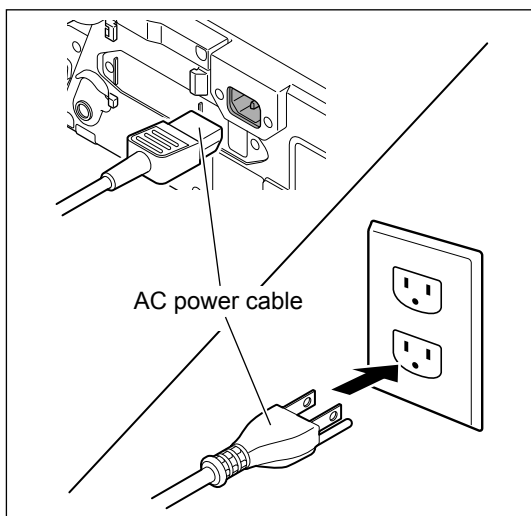
#### Notes

- To attach the pole clamp quickly, before fixing it to the IV pole completely, pull and hold the lever (1), push the knob in the direction of (2) and turn the knob in the direction of (3) to fix the pump. (The lever cannot be pulled after the pump is fixed to the pole).
- To detach the pole clamp from the IV pole quickly, loosen it slightly by turning the knob in the reverse direction of (3), pull and hold the lever (1), and pull the knob in the reverse direction of (2).

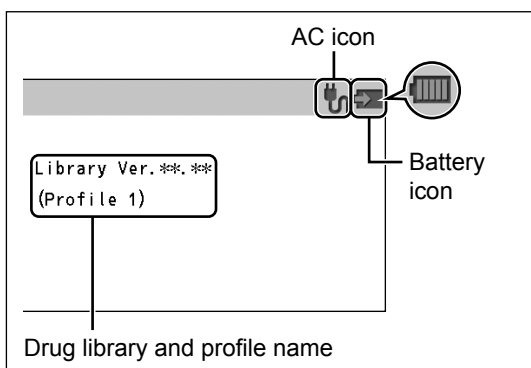
#### Cautions

- Make sure that pole clamp is firmly fixed to the IV pole and the IV pole is stable. When transporting with the unit fixed to the IV pole, be aware as the pump may drop or fall due to a floor step, slope, contact with surrounding objects, etc.
- When a pole clamp is used, do not release it until you have checked that this product is securely fixed to the IV pole. Failure to do so may result in falling of this product due to the loosened pole clamp knob.
- Do not turn the knob while the lever has been pulled. It may cause damage.
- Do not pull the lever while it has been fixed to the IV pole. It may cause damage.

## Connecting to AC Power





- 1) Firmly connect the AC power cable (included) to the AC inlet.
- 2) Connect the plug to an AC power source with an earth connection.



### Checks

- The AC icon and battery icon should be displayed on the LCD.
- The version of the drug library and the profile name set with the procedure in "Profile (TE-LM830 only)" (page 93) should be displayed on the LCD (TE-LM830 only).

### Notes

- Even if the power is off, if the AC power has been supplied, the AC icon is displayed.
- The battery can be charged even if the power is off. The battery icon  (charging) is displayed. There may be cases where the remaining battery level and  (battery failure) flash alternately every other second when there is a sub-battery failure or low battery.
- If the AC power cable is disconnected or connected with power turned on, the buzzer sounds (Default setting: 0 (very low)). For the changing sound volume, see page 86.
- If the AC power cable is disconnected with power turned on, the LCD becomes dim (2 levels of brightness setting). When the AC power cable is reconnected, the previous brightness is restored.


### Cautions

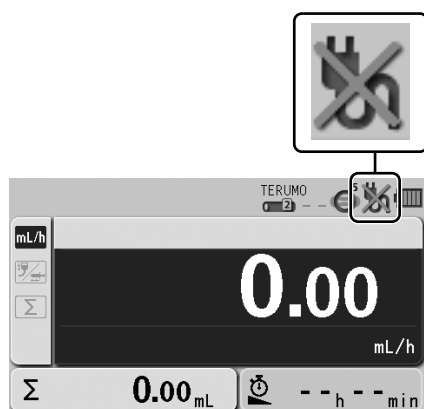
- Please ensure AC inlet and all connections are clean and dry prior to use. If moisture is present, make sure that the power is turned off and the AC power cable is removed from both main unit and AC power source, and then thoroughly wipe with a dry cloth.
- Use the AC power cable included and connect to an earthed AC power source.
- Use an earthed AC power supply for normal use. The internal battery is an auxiliary power source for when the AC power supply is not adequately available during transportation, power failure, etc.
- This product should only be used with a sufficient power supply. If the power supply is not sufficient, the internal battery will be used for the operation, which may result in no power supply in an emergency situation.

## Operating by the Internal Battery






If the AC power supply is cut off, while in use or the power supply is reduced, the power supply is automatically switched to the internal battery. The operation with internal battery is available for approx. 5 continuous hours. (In the case of continuous solution delivery at a flow rate of 25 mL/h at ambient temperature of 25°C, with new battery after charging for 8 hours or more with the power turned off.)

When operating on the internal battery, the brightness of LCD backlight becomes two levels lower.

\* In the case of no AC power, the LCD displays the AC icon .



Battery charge level (displayed in 5 bars)

-  5 bars (green): Approx. 5 hours
-  4 bars (green): Approx. 3.5 hours
-  3 bars (green): Approx. 2.5 hours
-  2 bars (green): Approx. 2 hours
-  1 bar (orange): Approx. 30 min (when the Battery alarm has not been issued)

(In the case of continuous solution delivery at a flow rate of 25 mL/h at ambient temperature of 25°C, with new battery after charging for 8 hours or more with the power turned off.)

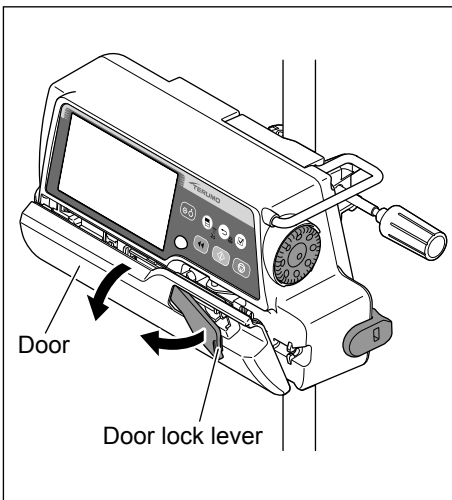
### Cautions

- Prior to first use after purchase, or if unused for a long period, connect this product to an AC power supply with an earth connection and provide a sufficient charge (8 hours or more) while it is turned off. If not sufficiently charged, this product may not be able to operate using the internal battery during a power failure, etc.
- Time degradation of the internal battery will cause shorter operating hours than indicated by the battery icon on the LCD. The battery should be replaced regularly approx. every 2.5 to 3 years (sub-battery: 1 to 2 years). (Since the flashing cross on the battery icon indicates battery failure or replacement timing, use it as an indication for battery replacement.)
- If any fault is observed while operating using the internal battery, immediately stop using the product and contact TERUMO trained service technicians.

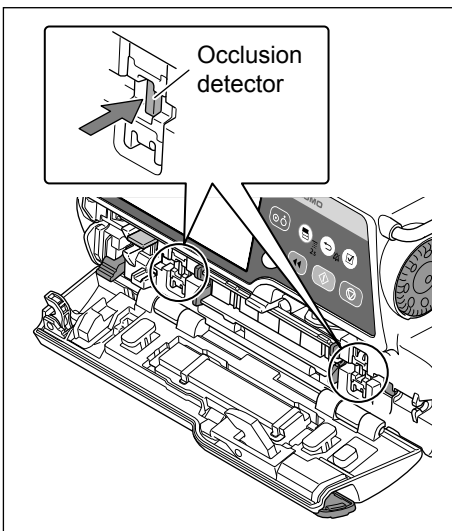
### Notes

- The operating hours of the internal battery are only an estimation. Since the actual operating hours may be shorter, pay extra attention to the status of the main unit when the internal battery is used.
- When the battery charge level goes down, the Battery alarm sounds. Connect the AC cable immediately.
- The alarm will continue to sound for approx. 30 minutes before the solution delivery is automatically stopped. (Even after muting, the alarm will sound again every 2 minutes.)
- If no action is taken for approx. 30 minutes after the Battery alarm sounds, the Shutdown Notice alarm will sound and the solution delivery will be stopped. Then approx. 3 minutes later, the power is automatically turned off. (The Shutdown Notice alarm will continue to alarm sound until the AC cable is connected. It cannot be muted by the Back/Mute switch.)

## Opening the Door



1) Pull the door lock lever to open the door.



2) **Check**

- The occlusion detectors move smoothly when lightly pressing them with your finger.

### Caution

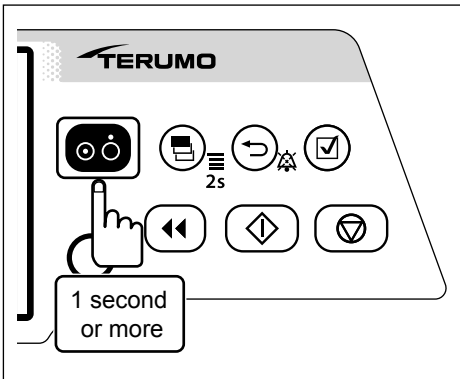
- If any adhered drug solution is present, the solution delivery or alarm detection may not operate correctly or may interfere with the normal operation of the clamp part and/or movable part of the pole clamp. If any drug solution is present, clean immediately with a cotton swab. (See page 111.)

## Turning the Power On

Please ensure the product is fit for purpose prior to use.

### Cautions

- Conduct the self-check (self-diagnosis) of this product without a tube installed and with the door left open. Otherwise the self-check may not be conducted properly.
- Check for any fault by conducting a self-check. If a fault is observed, immediately discontinue use and contact TERUMO trained service technicians.

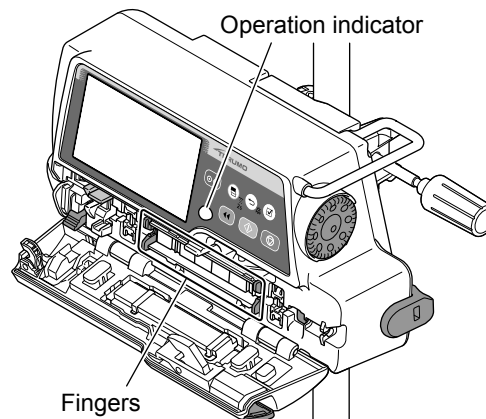
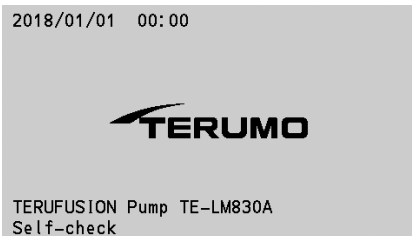


- **Keeping the door open, press and hold the Power switch for 1 second or more until the TERUMO logo screen is displayed to turn the power on.**

### Checks

When turning the power on, the following occur simultaneously;

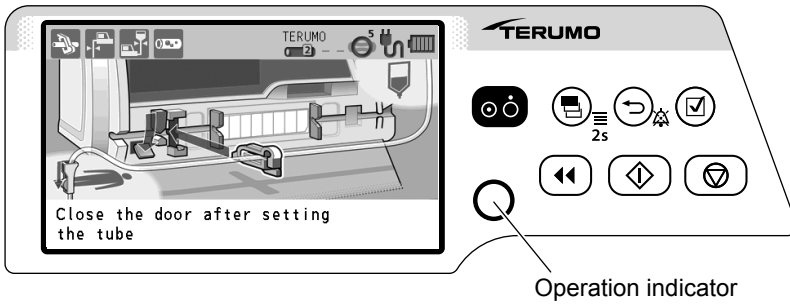
- Fingers move slightly.
- TERUMO logo appears on the display.
- LCD flashes 3 times.
- Operation indicator repeats lighting green and red alternately, and then buzzer sounds.




### Notes

- A timer for maintenance can be set in this product. When the period set for the maintenance timer is reached, a maintenance request is displayed at start up. When the request is displayed, contact TERUMO trained service technicians.
- When the period set for the maintenance timer is reached, this screen displays at every start up until the setting is changed. For the setting method, contact TERUMO trained service technicians.

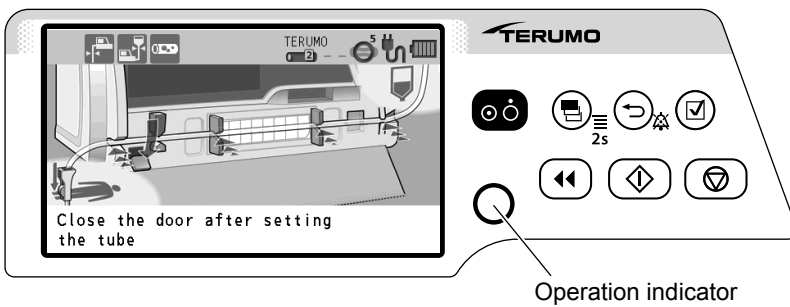
TE-LM730A, TE-LM732A and TE-LM830



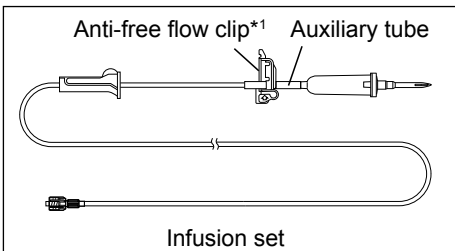
Checks

- The message “Close the door after setting the tube” and guidance displays on the LCD.
- The AC icon  is displayed.
- The battery icon is displayed, not indicating the sub-battery failure.
- The operation indicator is off.

TE-LM730N and TE-LM732N



Checking an Infusion Set

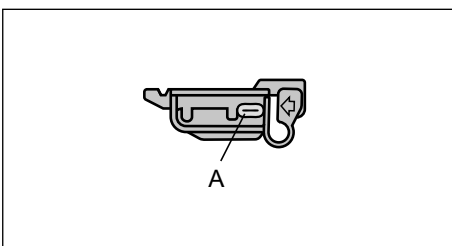


Checks

- Only the dedicated infusion set should be used. (See page 21.)
- Check set for damage.

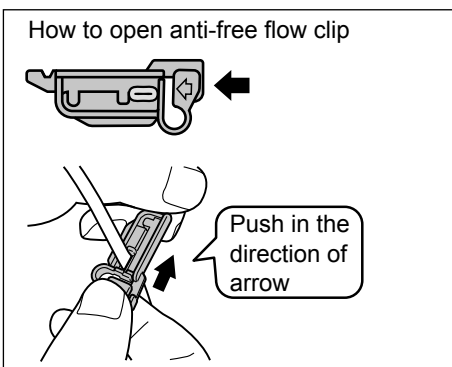
\*1: TE-LM730A, TE-LM732A and TE-LM830 only

◆ Anti-free flow clip (for TE-LM730A, TE-LM732A and TE-LM830)



Notes

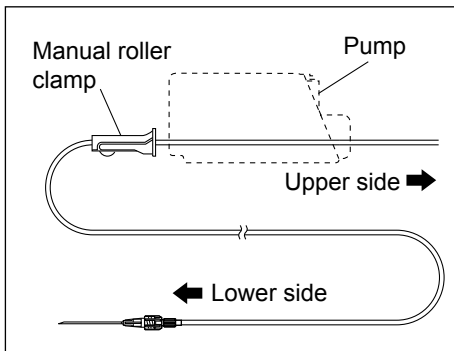
- When the anti-free flow clip closes the tube with pressure at the correct position (A in the left figure), the anti-free flow system performs the normal operation. Do not move the tube to another position.
- Do not hold the infusion set by holding only the anti-free flow clip. The anti-free flow clip may open unintentionally.



Notes

- Lightly push the arrow mark (←) in the left figure to open the anti-free flow clip.
- When an infusion set is unpacked, the anti-free flow clip should be open. If the anti-free flow clip has been closed, check for any fault in the tube and anti-free flow clip.

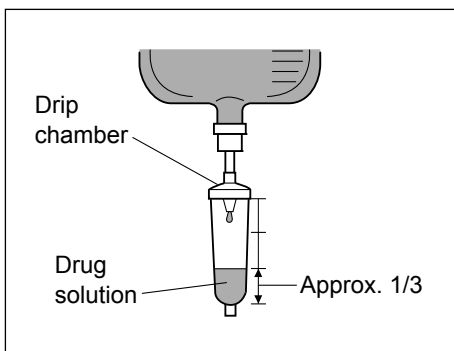
## Preparing an Infusion Set and Priming



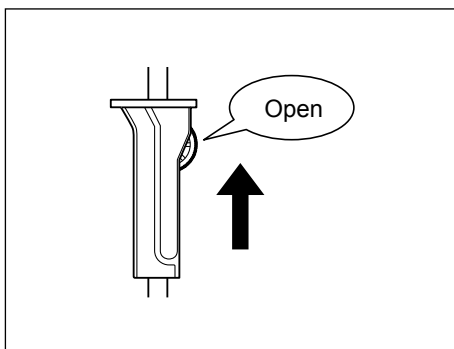
- 1) Place the manual roller clamp of the infusion set on the lower side of the infusion pump, and close the manual roller clamp.

### Note

- Setting up the manual roller clamp on the lower side of the infusion pump allows suppression of bolus infusion (temporary excessive infusion of drug solution) at the time that any cause of occlusion is removed. In addition, when an Air-in-line alarm is issued, air bubbles can be released into the drip chamber by closing the manual roller clamp.

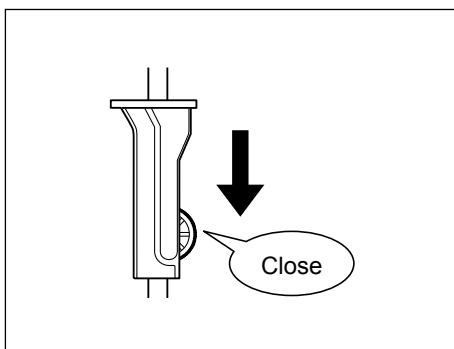


- 2) Insert the spike of the infusion set into the drug solution container and squeeze the drip chamber so that the drug solution fills it to approx. 1/3 of the drip chamber.



- 3) Check that the anti-free flow clip is open. (TE-LM730A, TE-LM732A and TE-LM830 only)

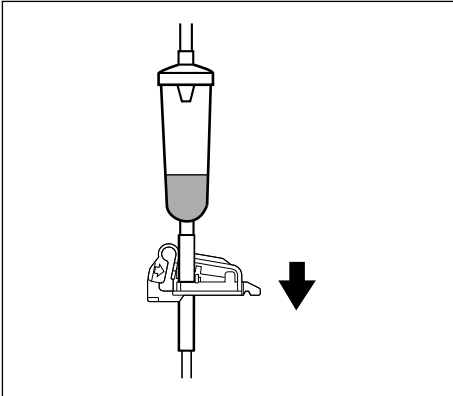
- 4) Open the manual roller clamp to allow the drug solution to fill the line. (Priming)



- 5) After the completion of priming, close the manual roller clamp.

## Attaching a Tube

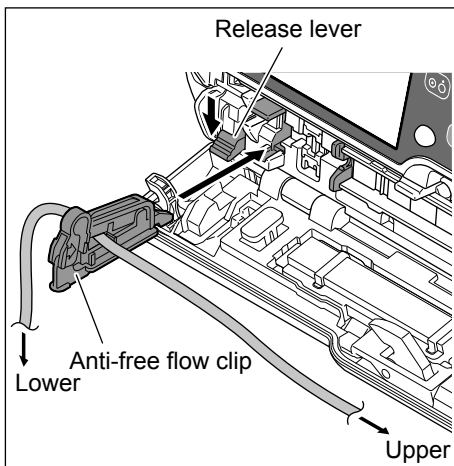
### ◆ For TE-LM730A, TE-LM732A and TE-LM830



- 1) Check that the anti-free flow clip is open, and then move it lower down the tubing.

#### Check

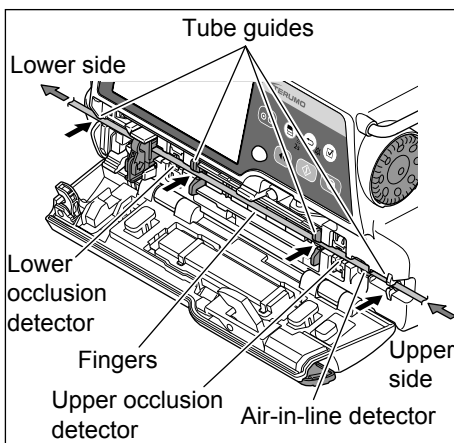
- Position the anti-free flow clip in such a way that there is no excess tension or sag in the tube.



- 2) Press down the release lever to open the tube clamp, check the direction of the anti-free flow clip and insert it completely into the anti-free flow unit keeping it straight.

#### Note

- Inserting completely closes the anti-free flow clip.

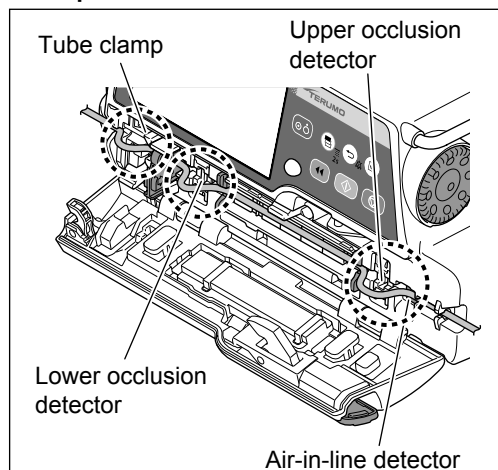


- 3) Keep the tube straight and insert the tube completely into the tube guides (4 positions).

#### Checks

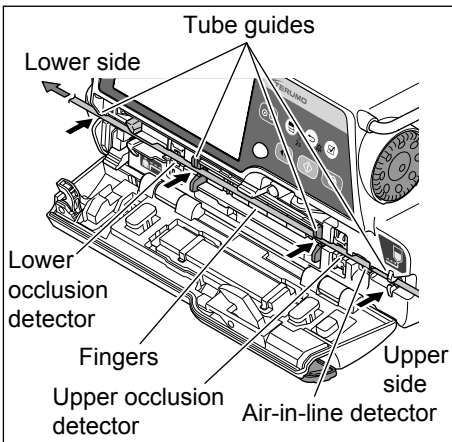
- The tube is not broken or crushed, and that it is set straight without sag.
- The tube is correctly set in the air-in-line detector and the occlusion detectors.

#### Example of false installation



## ◆ For TE-LM730N and TE-LM732N

1) Press down the release lever to open the tube clamp.



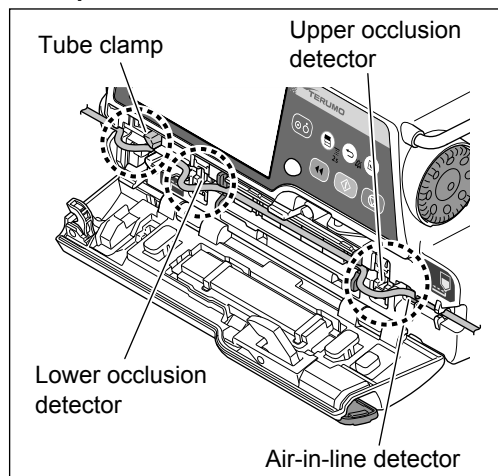
2) Keep the tube straight and insert the tube completely into the tube guides (4 positions).

### Checks

- The tube is not broken or crushed, and that it is set straight without sag.
- The tube is correctly set in the air-in-line detector and the occlusion detectors.
- Ensure that the tube is attached in the correct direction.

When attached correctly, the tubing from the drip chamber must enter the upper side of the pump, and the tubing going to the patient must exit the lower side of the pump.

### Example of false installation

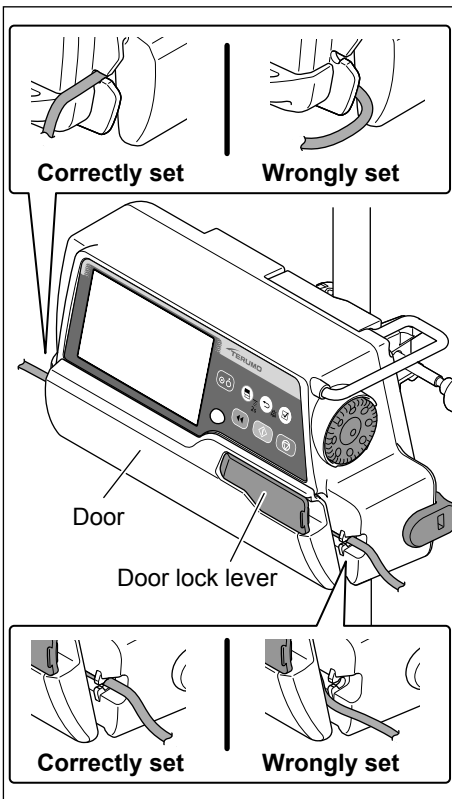


### Cautions

- When setting the tube, ensure that there is no bend, dent or slack in the tube and that the tube is set straight into the fingers, tube guides, various detectors and tube clamp. Incorrect loading may result in abnormal solution delivery such as excessive infusion, insufficient infusion or non-administration of drug solution.
- When setting the tube, do not pull excessively hard. The tube may be deformed, and therefore the original functionality or performance of this product may not be achieved. (flow rate error and various alarm functions etc.)
- Although this product minimizes the deformation in tubes and allows a stable solution delivery, its flow rate may vary from the specified range or an Occlusion alarm may be issued if used for over a specified time. To maintain a stable infusion, either move the tube at the pump attachment by more than 15 cm or replace the infusion set with a new one at a regular interval. This should be conducted every 24 hours when the high flow rate accuracy at the start of solution delivery is required to be maintained. [Continuous solution delivery for a long period may cause tube deformation, resulting in decreased flow rate or Occlusion alarm. It is confirmed through our in-house testing that after 96 hours of continuous use, the flow rate accuracy is decreased by  $2\pm 1\%$  from the value at the start of solution delivery.]
- The anti-free flow clip should not be moved while the anti-free flow clip is closed.\*1
- Do not place the set inversely (upstream and downstream section). [The patient's blood may be drawn up into the tubing.]

\*1: TE-LM730A, TE-LM732A and TE-LM830 only

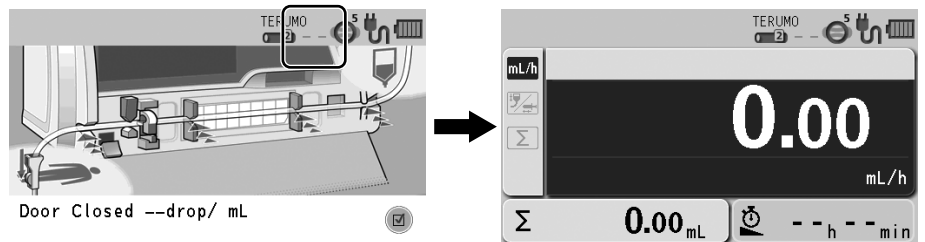
## Closing the Door



### 1) When closing the door, lock the door with the door lock lever.

#### Checks

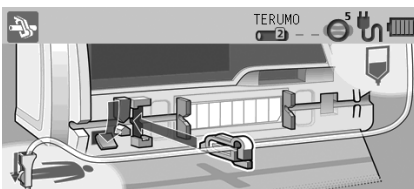
- The message “Door Closed -- drop/ mL” appears on the LCD and then the screen changes to the flow rate screen.  
(Only when the drip sensor is not set to -- drop/mL.)
- When the drip sensor is set, one of the messages below appears.  
Drip volume 20 drop/mL: “Door Closed 20 drop/mL”  
Drip volume 60 drop/mL: “Door Closed 60 drop/mL”



- The tube is not caught in the door.
- All the sensor icons are turned off.


#### Caution

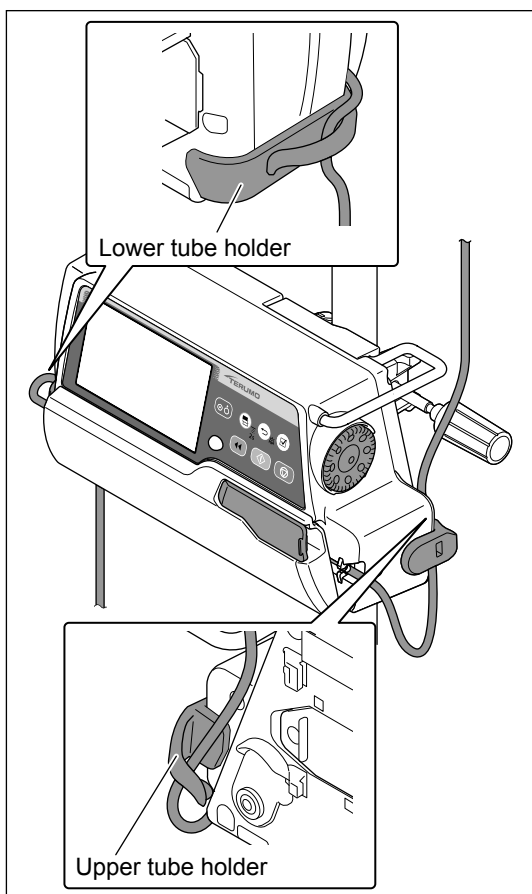
- This product has a safety system making it hard to close the door when the tube has not been set straight (AIS (Anti Irregular Set) system). Forcing the door closed may result in damage to the device and/or tube.  
If the door is hard to close, check that the tube is set correctly instead of forcing the door closed.



Re-insert the anti-free flow clip

#### Note

- If the door is closed without the anti-free flow clip inserted, the anti-free flow icon  is displayed. Before re-attaching the tube, make sure that the manual roller clamp is closed, then open the door and insert the anti-free flow clip into the anti-free flow unit (TE-LM730A, TE-LM732A and TE-LM830 only).



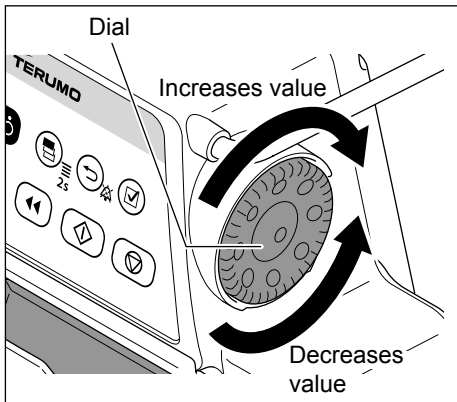
### 2) Set the tube to the Upper and Lower tube holders.

#### Caution

- When setting the tube, do not pull excessively hard. The tube may be deformed, and therefore the original functionality or performance of this product may not be achieved. (flow rate error and various alarm functions etc.)

## Setting Flow Rate

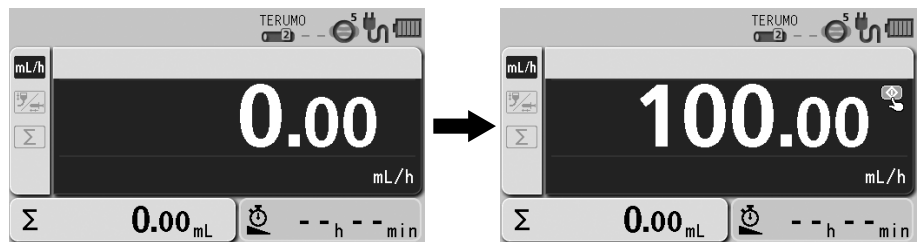
Set the flow rate per hour.



- Use the Dial to adjust the flow rate in the flow rate screen.

### Note

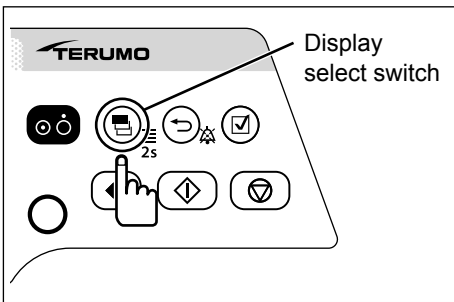
- The flow rate display appears in dark blue (selected).



### Notes

- The flow rate can be set within the range of the following values.  
0.10 to 1200.00 mL/h  
When the drip sensor is attached:  
20 drop/mL: 0.10 to 1200.00 mL/h  
60 drop/mL: 0.10 to 300.00 mL/h
- The flow rate value is updated according to the VTBI and VTBI time. (See pages 38 and 39.)
- For safety, the Dial is designed to make the initial half turn without changing the value on the display. When the value starts to change, the buzzer sounds momentarily for confirmation. When you stop rotating the Dial and start it again in less than 1.5 seconds, the value changes without the initial half turn.
- Rotating the Dial while pressing the Stop switch allows changing the setting at the rate of 100 times.
- When the Dial is turned, a line appears under the numerals to indicate the currently changing digit. (When the Dial is rotated while pressing the Stop switch, an underline appears to the second digit to the left from the normal digit.)
- The set flow rate can be changed during solution delivery. When the Dial is turned on the flow rate screen during solution delivery, the flow rate setting area turns dark blue where the set flow rate increases or decreases in accordance with the Dial operation. The Start switch confirms the set flow rate and changes the solution flow rate. (When the Start switch is not pressed within approx. 5 seconds, it returns to the set flow rate before change.)

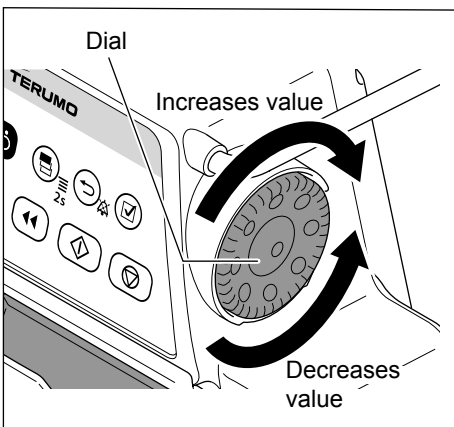
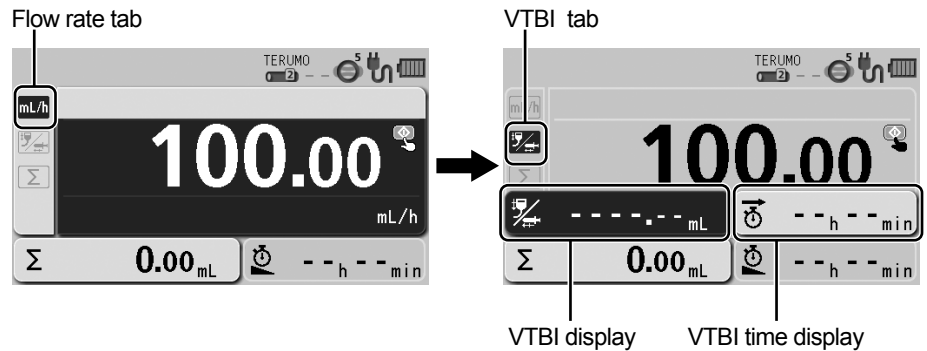
## Setting VTBI



### 1) Press the Display select switch to select the VTBI display.

#### Notes

- The VTBI tab is selected.
- The flow rate display shows the VTBI display and the VTBI time display.
- The VTBI display appears in dark blue (selected).



### 2) Use the Dial to adjust the VTBI.

#### Note

- When the flow rate has already been entered, the VTBI time display indicates the remaining time and VTBI time calculated from the flow rate and VTBI.



#### Notes

- The VTBI can be set from 0.10 to 9999.00 and "----" (Unlimited).
- The VTBI can also be set in mass units. In this case, VTBI can be set from 0.01 ng to 9999.99 kg and "----" (Unlimited). (When the selecting dose mode (weight mode/drug library) is set.)
- If not operated for 10 seconds, the input area moves to the flow rate display.
- VTBI can be changed only when delivery is stopped.
- Rotating the Dial while pressing the Stop switch allows changing the setting at the rate of 100 times.

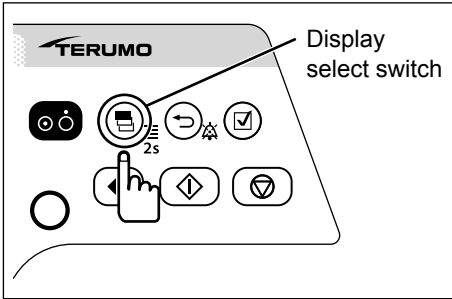
#### Caution

- In the case of a solution delivery with no setting for the VTBI ("----": Unlimited), the pump will not stop until an alarm is issued. The pump should be stopped before running out of the drug solution. It is recommended to set a VTBI slightly less than the volume of the drug solution container.

## Setting VTBI Time

Set up the time period to complete the dose.

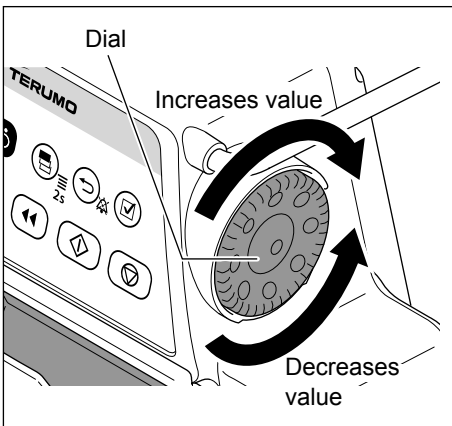
The flow rate is recalculated from the VTBI and VTBI time specified.



**1) Press the Display select switch to select the VTBI time display.**

**Note**

- The VTBI time display appears in dark blue (selected).



**2) Use the Dial to adjust the VTBI time.**

**Notes**

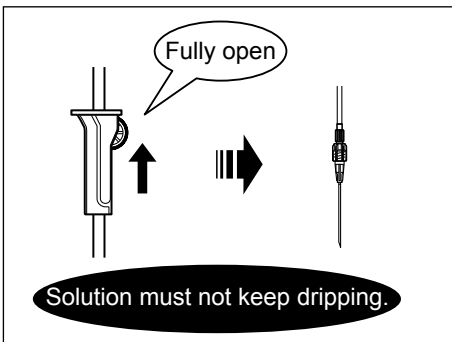
- The VTBI time can be set between 00 h 01 min and 99 h 59 min.
- When the VTBI is set to "----" (Unlimited), the VTBI time cannot be set.
- If not operated for 10 seconds, the input area moves to the flow rate display.



**Cautions**

- The flow rate is updated according to the VTBI and VTBI time. Before starting solution delivery, check the value.
- When using the VTBI time setting function, the setting cannot take a flow rate (mL/h) calculation result outside the flow rate setting range, and therefore it should be reconfigured. [----] or [0.00] is displayed, not allowing solution delivery.

### Opening the Manual Roller Clamp on the Infusion Set



- Fully open the manual roller clamp of the infusion set.

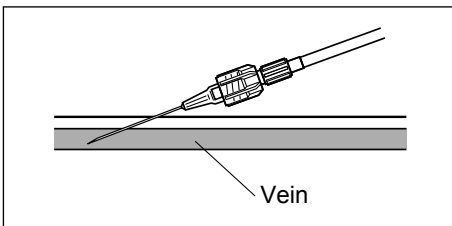
#### Checks

- No drug solution drips from the needle tip or the inside of the drip chamber of the infusion set.
- The flow rate setting is correct.

#### Cautions

- After the infusion set is attached, the door is closed and the manual roller clamp is opened, if any dripping of drug solution is observed, check the infusion set (the dedicated infusion set), the attachment status of the tube (correctly attached), and any fault in the infusion set and devices (whether or not damaged).
- If none of the defects are identified and dripping is observed, it is likely that the pump is defective. Immediately stop using the product and contact TERUMO trained service technicians.

### Inserting a Needle

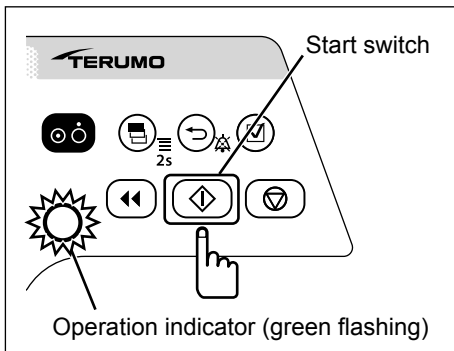


- 1) **Check**
  - The pump is stopped.
- 2) **Insert the needle according to the internal hospital procedures.**

#### Warning

- This product does not have an alarm function to detect extravascular infusion due to intravenous needle coming out of vein. Periodically check the puncture site.

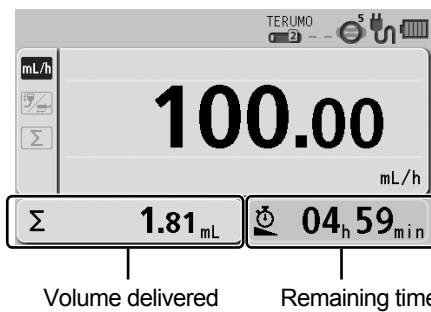
## Starting Solution Delivery



- **Check the flow rate setting and press the Start switch to start solution delivery.**

### Notes

- The buzzer sounds.
- The operation indicator flashes green.
- Dripping inside the drip chamber starts.
- The volume delivered increases and the remaining time decreases as shown below.
- Flow rate can be changed during solution delivery. Rotate the Dial in the flow rate display to change the flow rate and the confirmation message appears. Press the Start switch to start solution delivery at the changed flow rate.



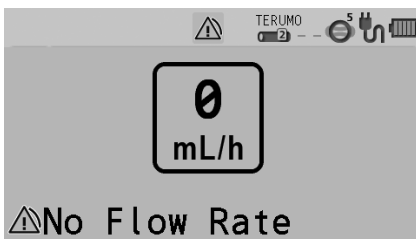
### Notes

- When the pump is fully set but not started, after 2 minutes the LCD displays the Start Reminder screen (yellow) and the buzzer sounds.
- Use the standby function (see page 48) if you want to temporarily extend the Start Reminder.



## When Solution Delivery Cannot Start

The alarm sounds and the following warnings display. (See page 115.)



### No Flow Rate alarm (yellow)

The flow rate has not been set. Set the flow rate and press the Start switch again.



### No VTBI alarm (yellow)

The VTBI has not been set. Set the VTBI and press the Start switch again.

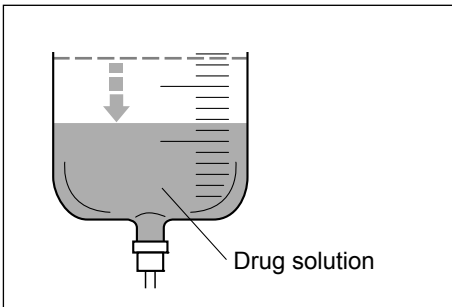
## Operation Procedure

### Cautions

- Before starting solution delivery, check the settings for any errors in the digit of flow rate etc., or whether the flow rate and VTBI have been accidentally swapped.  
This product does not have a function to determine the correct values, possibly resulting in excessive infusion or insufficient infusion to a patient.
- If any fault is observed, immediately stop the solution delivery and check the setting and the attachment status of the tube.

### Note

- When using the optional drip sensor, the dripping inside the drip chamber may become intermittent (continuous dripping → stop → continuous dripping); however, there is functionally no problem.

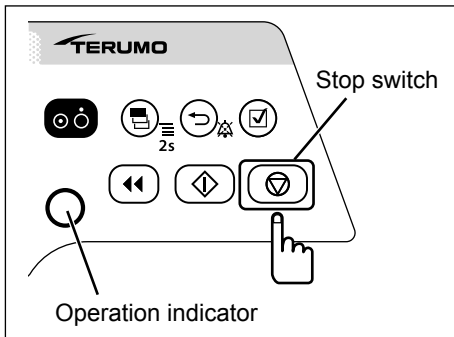


### Check

- Check periodically that the drug solution is reducing and the puncture site is in good condition.

## Temporarily Stopping Solution Delivery

### ◆ To stop solution delivery



- **Press the Stop switch to stop the solution delivery.**

### Notes

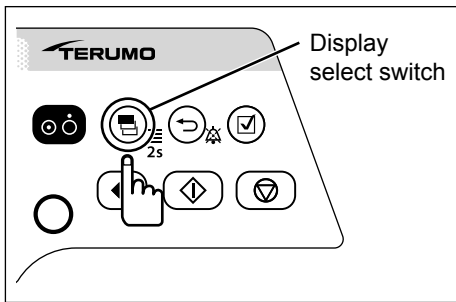
- The buzzer sounds and the operation indicator turns off, then the operation stops.
- The volume delivered stops increasing.
- The remaining time stops decreasing.



Volume delivered

Remaining time

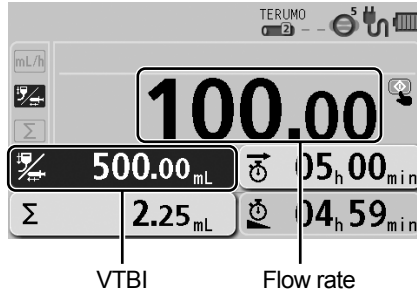
◆ To resume solution delivery



1) Press the Display select switch.

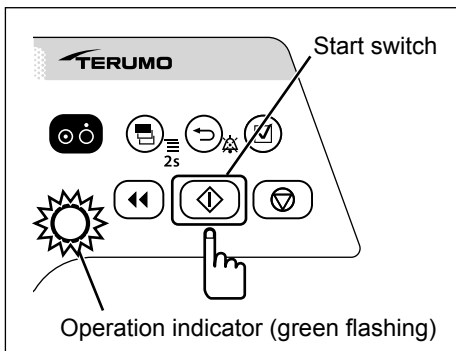
**Check**

- The settings of the flow rate and the VTBI are correct.



VTBI

Flow rate



2) Press the Start switch.

**Notes**

- The operation indicator flashes green.
- The volume delivered increases.
- The remaining time decreases.

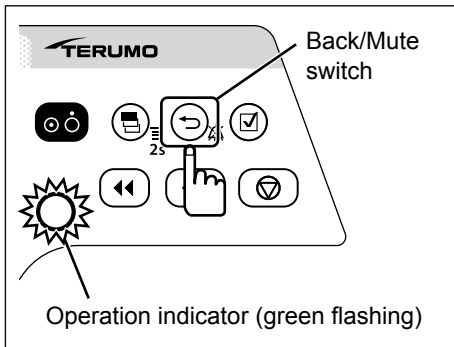


Volume delivered

Remaining time

## Completing Solution Delivery

The “Infusion Completed” message flashes on the screen and the alarm sounds when the volume delivered reaches the VTBI.



**1) Press the Back/Mute switch twice to stop the alarm and return to flow rate screen.**

### Notes

- The volume delivered reaches the VTBI setting.
- The operation indicator flashes green.
- The screen has changed to the flow rate screen (KVO function).



## ◆ Keep Vein Open (KVO) Function

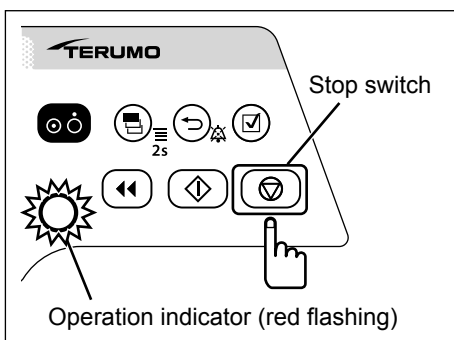
When the volume delivered reaches the VTBI, the KVO function is activated, and thus the flow rate is automatically changed to 1.00 mL/h. If the set flow rate is lower than the flow rate of the KVO, solution delivery continues at the set flow rate. If you wish to change the flow rate of the KVO, contact TERUMO trained service technicians.

### Notes

- The KVO is a flow rate set in advance to operate under certain conditions in order to keep the patient line open.
- Note that the symbol KOR (Keep Open Rate) is commonly used as an alias for KVO.
- According to IEC 60601-2-24:2012 (EN 60601-2-24:2015), clause 201.3.209, KVO (Keep Vein Open) is commonly used as a synonym for KOR (Keep Open Rate).

### Caution

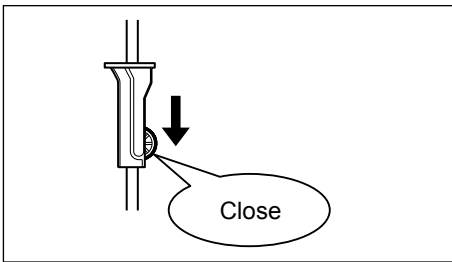
- In the case of a solution delivery with no setting for the VTBI (“----.--”: Unlimited), the pump will not stop until an alarm is issued. The pump should be stopped before running out of the drug solution. It is recommended to set a VTBI slightly less than the volume of the drug solution container.



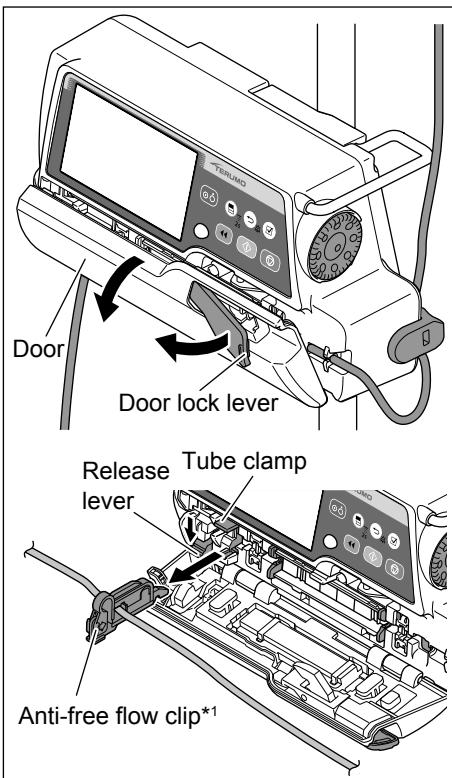
**2) Press the Stop switch to cancel the Keep Vein Open (KVO) function and the operation stops.**

### Checks

- The operation indicator flashes red.
- The dripping stops.



3) Close the manual roller clamp on the infusion set.



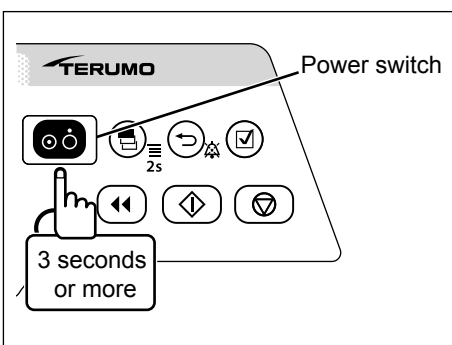
4) Open the door, press down the release lever to release the tube clamp, and remove the tube from the tube guides and tube holder. Remove the anti-free flow clip\*1.

**Warning**

- Ensure the manual roller clamp is closed on the infusion set before opening the door, and then release the tube clamp to remove the tube. Since the anti-free flow clip is only an assisting tool to prevent free flow caused by failure to close a manual roller clamp, the anti-free flow clip does not have an open/close function equivalent to a manual roller clamp.\*1

\*1: TE-LM730A, TE-LM732A and TE-LM830 only

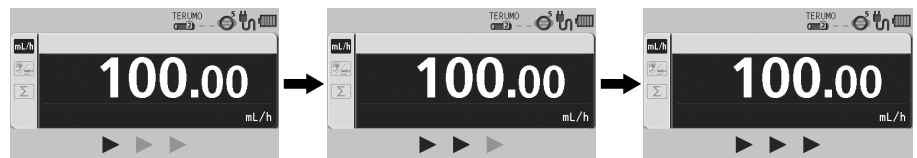
**Turning the Power Off**



• When the operation ends, press and hold the Power switch for 3 seconds or more to turn the power off.

**Notes**

- While holding the Power switch, the power off buzzer sounds, then the LCD displays count-down arrows and turns off.

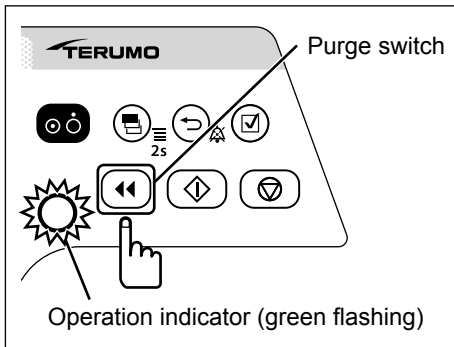


- If the Power switch is pressed and held during solution delivery, a buzzer sounds indicating that solution delivery is in progress. The buzzer continues to sound for approx. 3 seconds until the power is turned off.

# Other Operation Procedures

## Purging

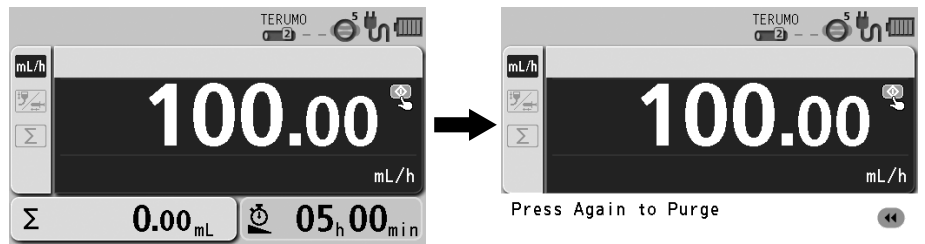
While the solution delivery is stopped, purging is available.



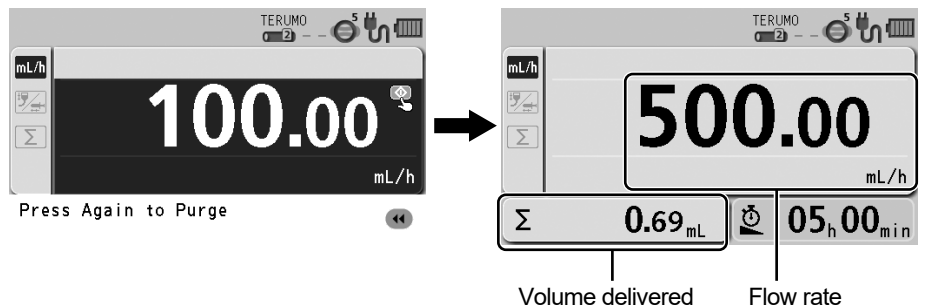
### 1) Press the Purge switch when the solution delivery is stopped.

#### Note

- The message "Press Again to Purge" is displayed on the LCD.



### 2) Press and hold the Purge switch to perform purging.



#### Notes

- The buzzer sounds and the operation indicator flashes green.
- The flow rate is switched to 500 mL/h.
- If any other switch is pressed while the Purge switch has been pressed, the safety function detects it as an abnormal operation and stops purging.

#### Notes

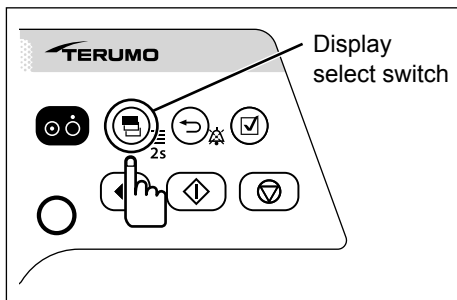
- While the Purge switch is pressed and held, the volume delivered display shows the volume purged. After the purge is finished, the screen returns to the display of volume delivered.
- The upper limit of purge volume can be set. Contact TERUMO trained service technicians.
- The solution delivery cannot be purged when an alarm is not cleared.

#### Cautions

- When purging the solution, note that the volume purged is not added to the volume delivered.
- Purging is intended for priming the infusion line without patient being connected.

## Clearing the Volume Delivered

The volume delivered can be cleared.



- 1) Press the Display select switch repeatedly until the volume delivered display is selected.

**Note**

- The volume delivered display appears in dark blue (selected).



Volume delivered display

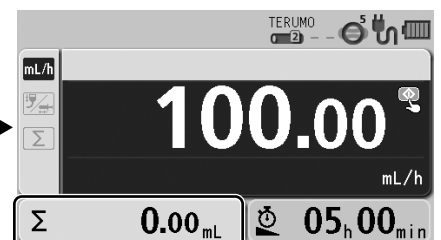
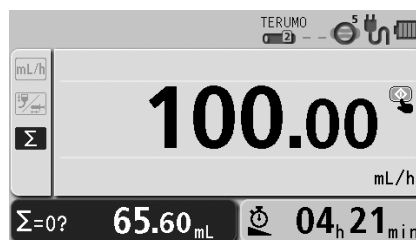
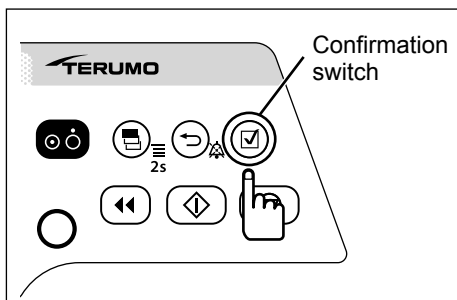
**Note**

- The volume delivered can be cleared when solution delivery is in progress or when stopped.

- 2) Press the Confirmation switch.

**Note**

- The buzzer sounds, the volume delivered is cleared to "0", and the screen returns to the flow rate screen.



Volume delivered

**Notes**

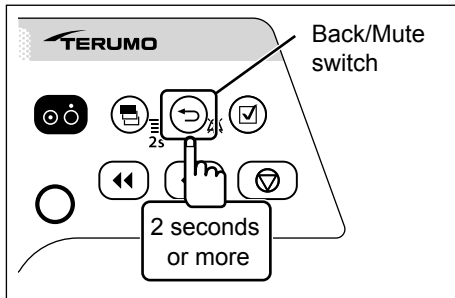
- When resuming the solution delivery after the value of the volume delivered is cleared to "0" mL, check the flow rate and the VTBI, and re-set as required.
- To check the volume delivered after clearing the value, use the history function. (See page 83.)
- Turning the power off clears the volume delivered to "0".
- If not operated for 10 seconds, the input area moves to the flow rate display.

### Standby Function

The standby function can extend the Start Reminder.

#### Check

- The infusion set is attached and the solution delivery is ready to be started.



- **Press and hold the Back/Mute switch for 2 seconds or more. (The standby mode is entered.)**

#### Note

- The LCD displays the message "Stand By".



#### Notes

- The default standby time is 24 hours. To change this, contact TERUMO trained service technicians (the time can be changed to 24 hours or less).
- Turning the Dial or pressing any switch cancels standby mode.
- The standby mode cannot be entered when an alarm has been issued. Eliminate the cause of the alarm first.

### Using for Blood Transfusion

- When using the pump for blood transfusion, comply with the requirements for the usage of blood products.
- Ensure that the specified pump-specific blood transfusion set is used. (See page 21.)
- The basic operation of the pump is the same as when using it for infusion.
- In the case of blood transfusion, the delivery accuracy may decrease several percent.

#### Caution

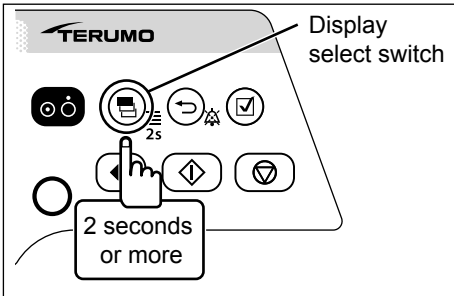
- When using the device for blood transfusion, note that high blood viscosity may cause the drip sensor to not properly detect a flow rate fault.

## Selecting Dose Mode (Weight Mode)

The dose unit setting can be selected.

**Note**

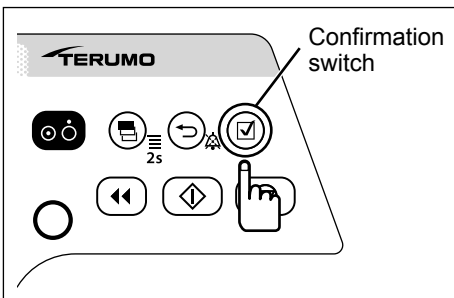
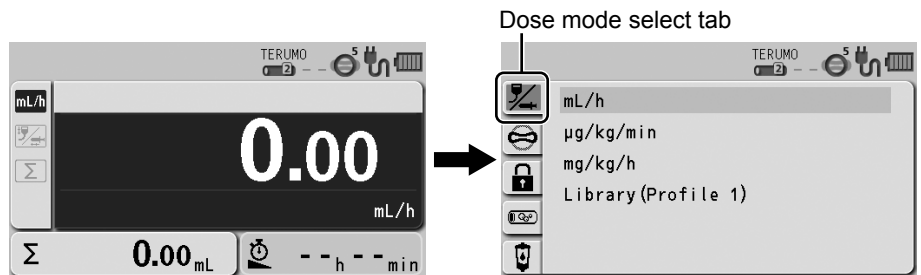
- To disable the selecting dose mode, contact TERUMO trained service technicians.



- 1) Press and hold the Display select switch for 2 seconds or more while the solution delivery is stopped.**

**Note**

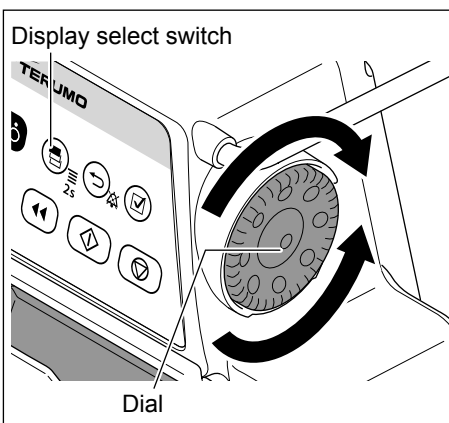
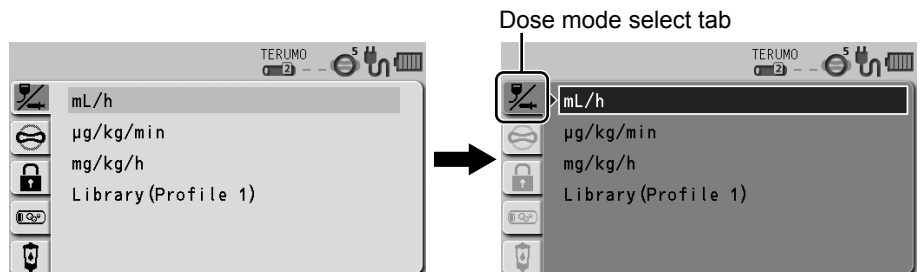
- The menu 1 screen is displayed and then the dose mode select (Dose) display appears.



- 2) Press the Confirmation switch.**

**Note**

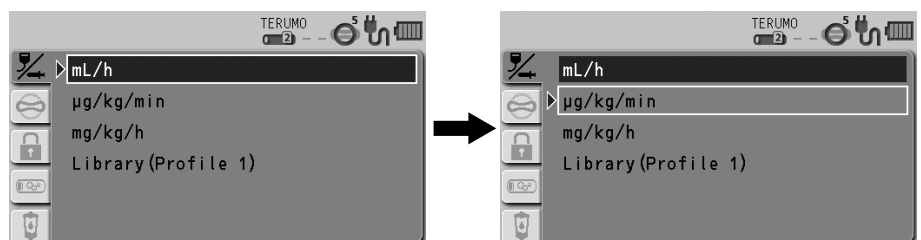
- The existing dose mode (light blue) changes to the selected status (dark blue).

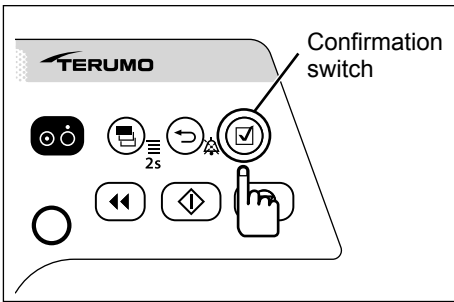


- 3) Turn the Dial or press the Display select switch to select "µg/kg/min" or "mg/kg/h".**

**Notes**

- Turning the Dial or pressing the Display select switch moves the white frame.
- Select "mL/h" to return to the default setting.

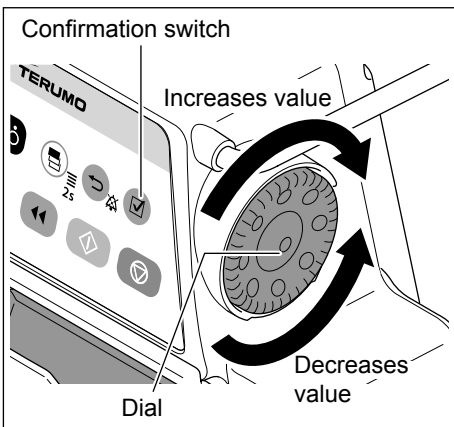
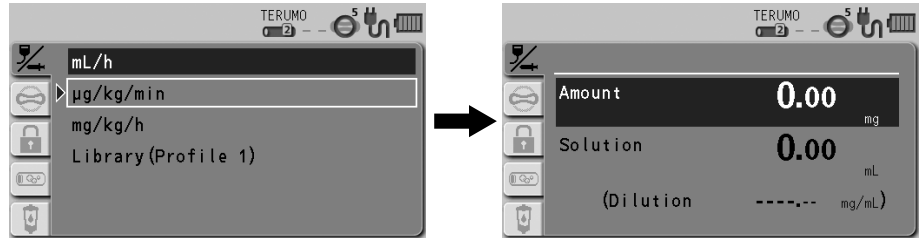




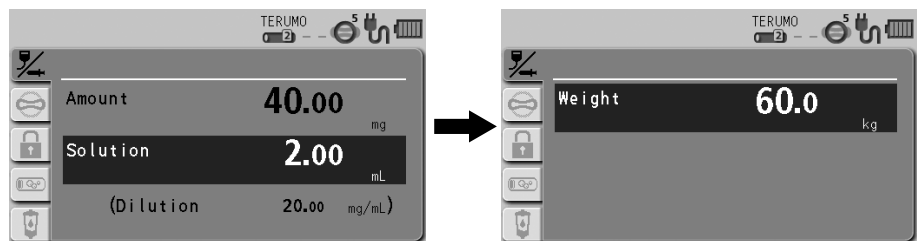
#### 4) Press the Confirmation switch.

**Note**

- The input screen of amount and solution appears.

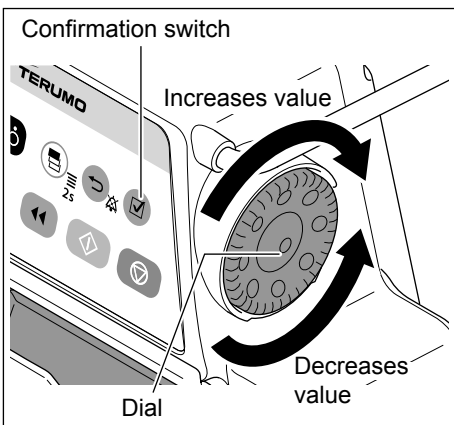


#### 5) Use the Dial to adjust the value of amount and solution, and press the Confirmation switch.



**Notes**

- The amount and solution can be set within the range below.  
 Amount (drug amount): 0.01 to 999.00 mg\*  
 Solution (solution amount): 0.01 to 999.00 mL\*  
 \* Setting range of the dilution =  $\frac{\text{Amount}}{\text{Solution}}$ : 0.01 to 999.00 mg/mL
- If you want to set by Dilution, contact TERUMO trained service technicians.
- When the Confirmation switch is pressed after setting the drug amount, the input area moves to Solution.
- When the Confirmation switch is pressed after setting the solution amount, the input screen of body weight appears.
- When the Back/Mute switch is pressed, the parameter input is cancelled and the screen returns to the previous status.

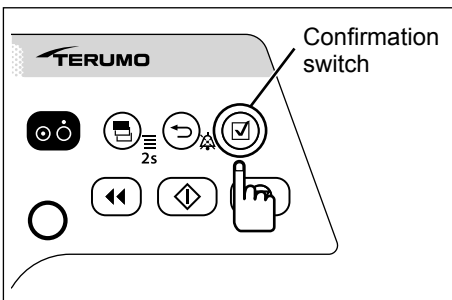


#### 6) Use the Dial to adjust the value of weight, and press the Confirmation switch.



**Notes**

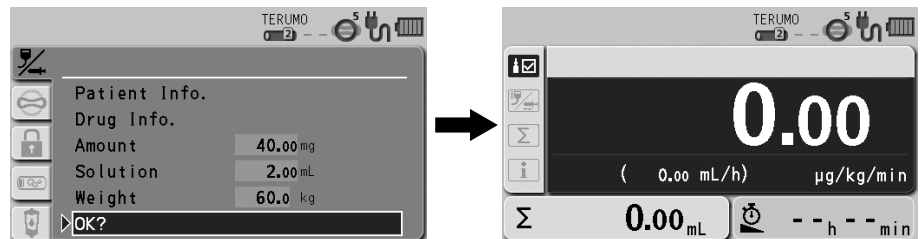
- Weight can be set within the range of 0.1 to 300.0 kg.
- Pressing the Confirmation switch displays the parameter confirmation screen.



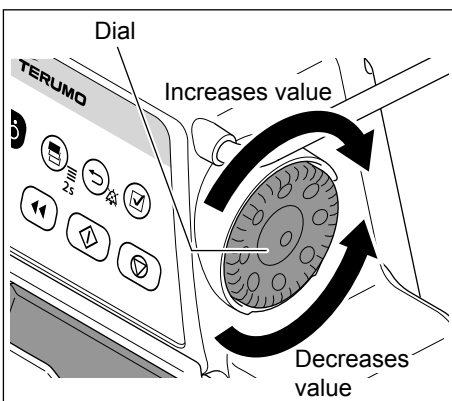
**7) Check the parameter value and that “OK?” is selected, press the Confirmation switch.**

**Notes**

- Parameter changes can be identified by the change in background colour on the parameter confirmation screen.
- When the Back/Mute switch is pressed on the parameter confirmation screen, the parameter input is cancelled and the screen returns to that of step 3.
- Parameter values can be changed from the parameter confirmation screen.
- When the Confirmation switch is pressed, the flow rate display appears.



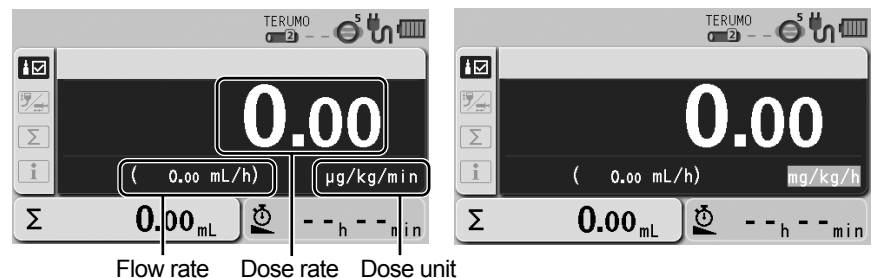
- Press the Display select switch to select info tab **i**. The setting information appears.
- Parameter values can be changed from the screen displayed by selecting info tab **i**.
- For details about the contents that can be checked from info tab **i**, see page 56.



**8) Turn the Dial to adjust the dosage.**

For example: µg/kg/min

For example: mg/kg/h



**Notes**

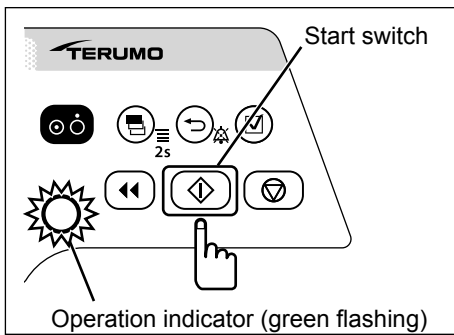
- The dosage can be set within the range below.  
Dose unit = µg/kg/min: 0.01 to 999.00  
Dose unit = mg/kg/h: 0.01 to 999.00
- Based on amount, solution, weight, dosage, the flow rate (mL/h) is automatically calculated, and the flow rate display shows the result.

**Caution**

- If the calculation of flow rate (mL/h) is outside of the setting range\*, “0.00 mL/h” or “----- mL/h” is displayed and solution delivery does not start even if the Start switch is pressed. Make the setting again within the flow rate setting range.

\* For details about the flow rate setting range, see page 130.

**9) Set the VTBI. (See page 38.)**



### 10) Press the Start switch to start solution delivery.

#### Checks

- The set value is correct.
- The operation indicator flashes green.
- The volume delivered increases.

#### Notes

##### Calculation Formula of Flow Rate

$$\text{Flow rate (mL/h)} = \frac{\text{Dose rate } (\mu\text{g/kg/min.}) \times \text{Body weight (kg)} \times \text{Solution (mL)}}{\text{Amount (mg)} \times 1000^{(*)2}} \times 60^{(*)1} = \frac{\text{Dose rate (mg/kg/h)} \times \text{Body weight (kg)} \times \text{Solution (mL)}}{\text{Amount (mg)}}$$

\*1: Coefficient to convert "minute (min.)" to "hour (h)"

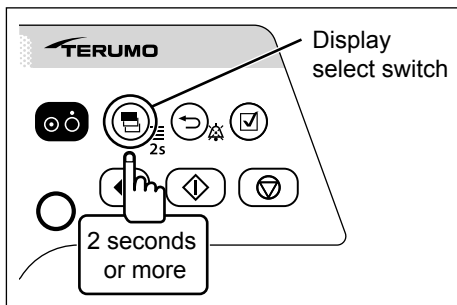
\*2: Coefficient to convert "mg" to "μg"

- Switching the dose unit or re-selecting the same dose unit changes the values of flow rate, dosage, amount, solution, and volume delivered to "0".
- Even after the setting is completed, the unit returns to mL/h when the power is turned off.
- Patient name, Patient ID, Gender, Age, Height and Weight can be acquired via communication with an external device. For the setting method, contact TERUMO trained service technicians.

## Selecting Dose Mode (Drug Library) (TE-LM830 only)

The dose mode can be selected from the drug library.

Use the dedicated editing software (TERUFUSION Drug Library Manager or TERUFUSION Software Package) for registration. For details, contact TERUMO trained service technicians.



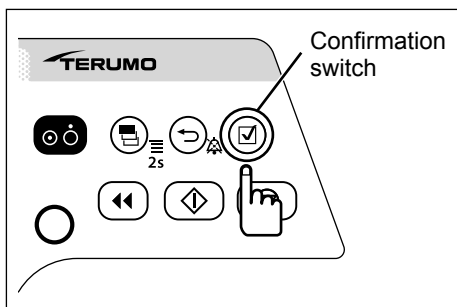
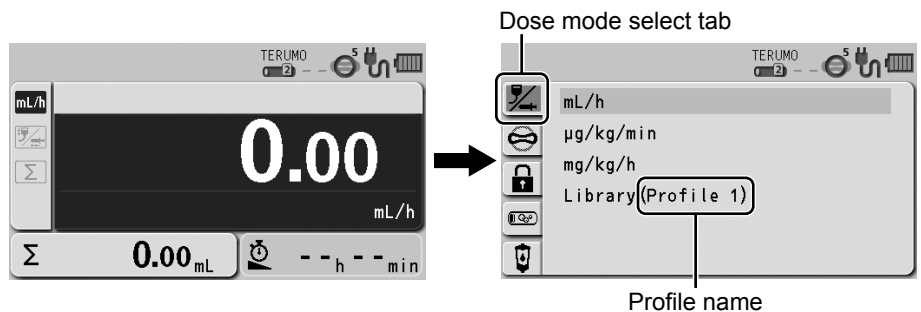
### 1) Press and hold the Display select switch for 2 seconds or more when solution delivery is stopped.

#### Notes

- The menu 1 screen is displayed and then the dose mode select (Dose) display appears.
- The set profile names are displayed next to "Library".
- Profiles allow drugs to be classified according to their use and registered in the pump. Selecting a profile can limit the available libraries. To change the profile, see page 93.

#### Check

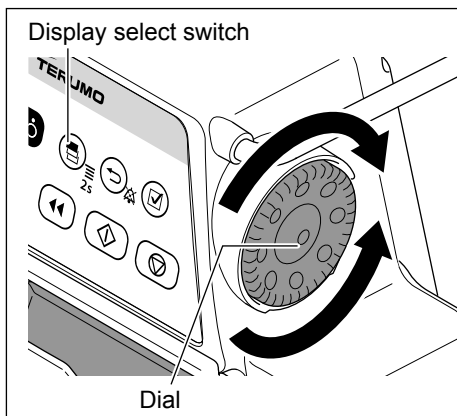
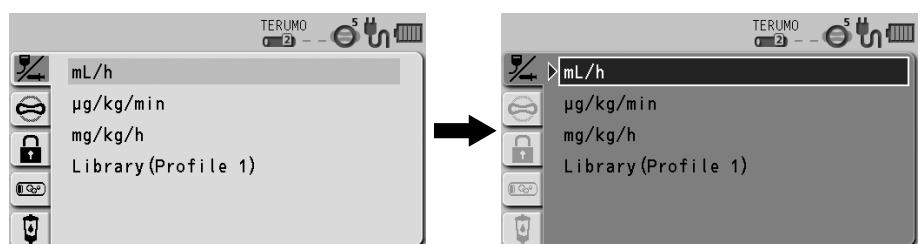
- A correct profile name is displayed.



### 2) Press the Confirmation switch.

#### Note

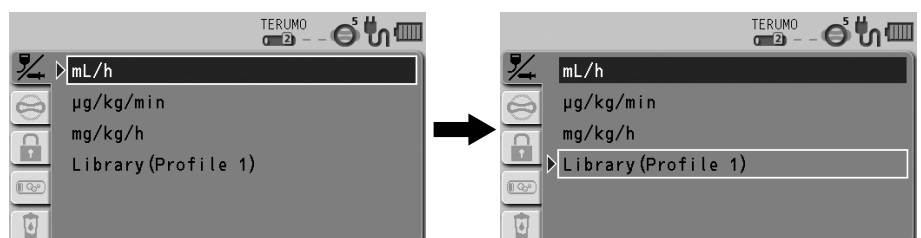
- The existing dose mode (light blue) changes to the selected status (dark blue).

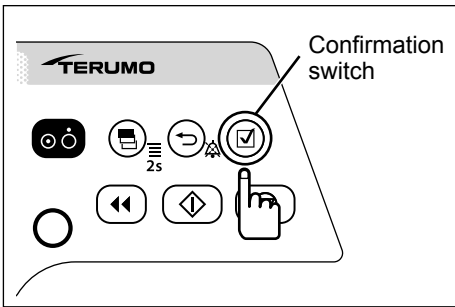


### 3) Turn the Dial or press the Display select switch to select the library.

#### Note

- Turning the Dial or pressing the Display select switch moves the white frame.

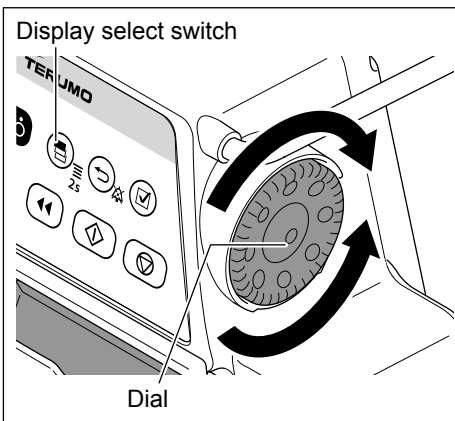
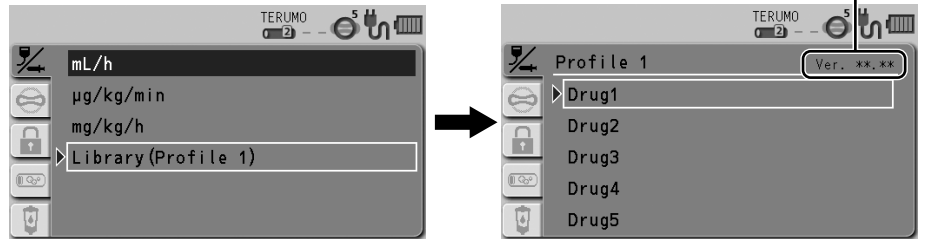




#### 4) Press the Confirmation switch.

##### Notes

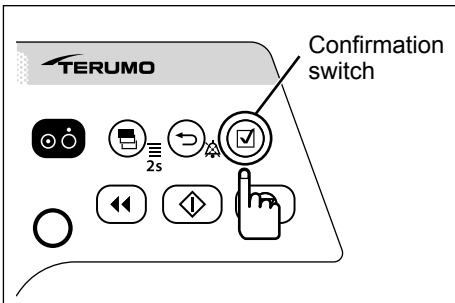
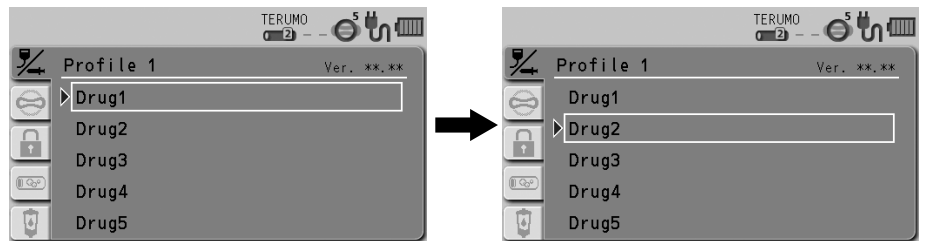
- The screen changes to the library selection display.
- The selected library is displayed in dark blue.



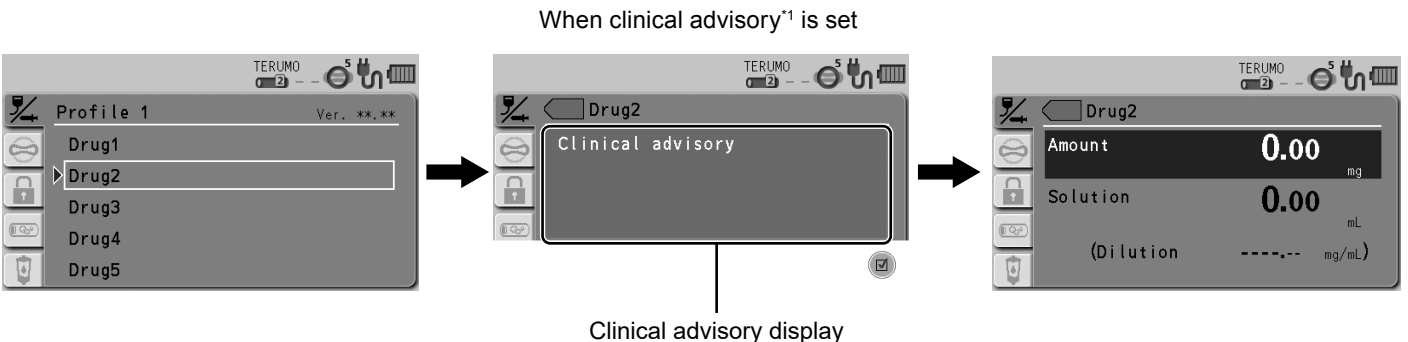
#### 5) Turn the Dial or press the Display select switch to select the library name, shown as “Drug2” in the example.

##### Note

- Turning the Dial or pressing the Display select switch moves the white frame.

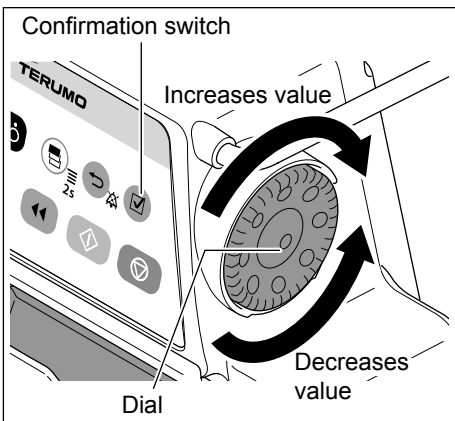


#### 6) Press the Confirmation switch.



##### Notes

- If clinical advisory is set, a message appears. With every press of the Confirmation switch, the screen changes to the input screen of amount and solution, or the input screen of dilution<sup>\*2</sup>. If you want to set by Dilution, contact TERUMO trained service technicians.
- \*1: Clinical advisory is a function to display a cautionary message about the selected library. The message can be registered up to 120 characters. See the dedicated editing software (TERUFUSION Drug Library Manager or TERUFUSION Software Package) for how to set the clinical advisory for each drug library.
- \*2: When the dilution is set in the drug library, the input screen of dilution appears.
- When the dose unit is mL/h, the screen changes to the parameter confirmation screen of step 8.



7) If necessary, turn the Dial to set each parameter (amount, solution, and weight), and press the Confirmation switch.

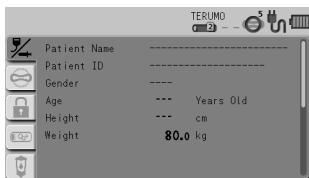


**Notes**

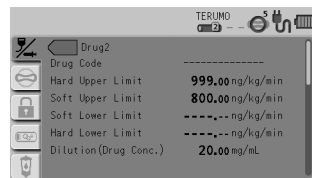
- When the dilution is set in the drug library, the dilution parameter cannot be changed.
- Amount, solution and weight can be set within the following range.  
 Amount: 0.01 to 999.00\*  
 Solution: 0.01 to 999.00\*  
 Weight: 0.1 to 300.0 kg

\* Can be set within the range of the dilution =  $\frac{\text{Amount}}{\text{Solution}}$ ; 0.01 to 999.00

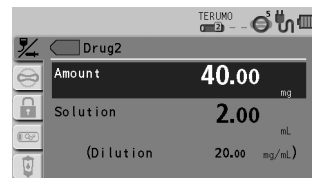
- With every press of the Confirmation switch, the input area moves to the next one.
- When the Back/Mute switch is pressed, the parameter input is cancelled and the screen returns to the previous status.
- When all the parameters are input, the parameter confirmation screen appears.
- The background colour of the changed parameter value changes on the parameter confirmation screen.
- When the Back/Mute switch is pressed on the parameter confirmation screen, the parameter input is cancelled and the screen returns to that of step 5.
- Information of the patient and drugs can be checked, or parameter values can be changed from the parameter confirmation screen.



Patient information screen



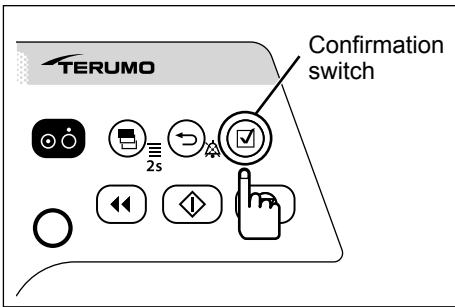
Drug information screen



Parameter value setting screen (Amount/Solution)



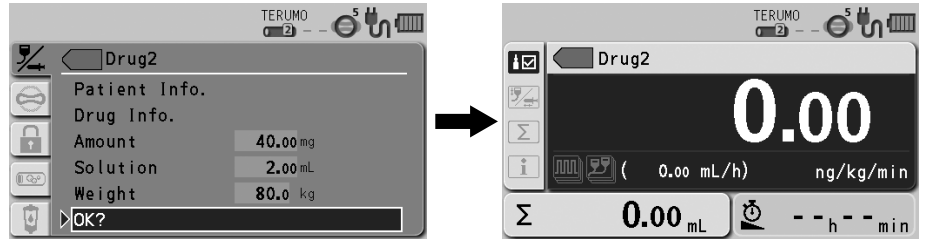
Parameter value setting screen (Weight)



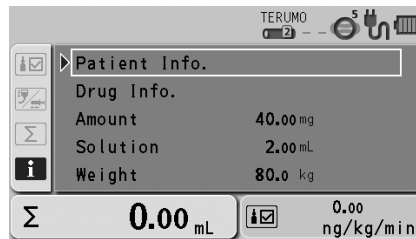
## 8) Check the parameter value and that “OK?” is selected, and press the Confirmation switch.

### Notes

- When the Confirmation switch is pressed, the flow rate display appears.



- When the Display select switch is pressed and info tab **i** is selected, the set information is displayed.

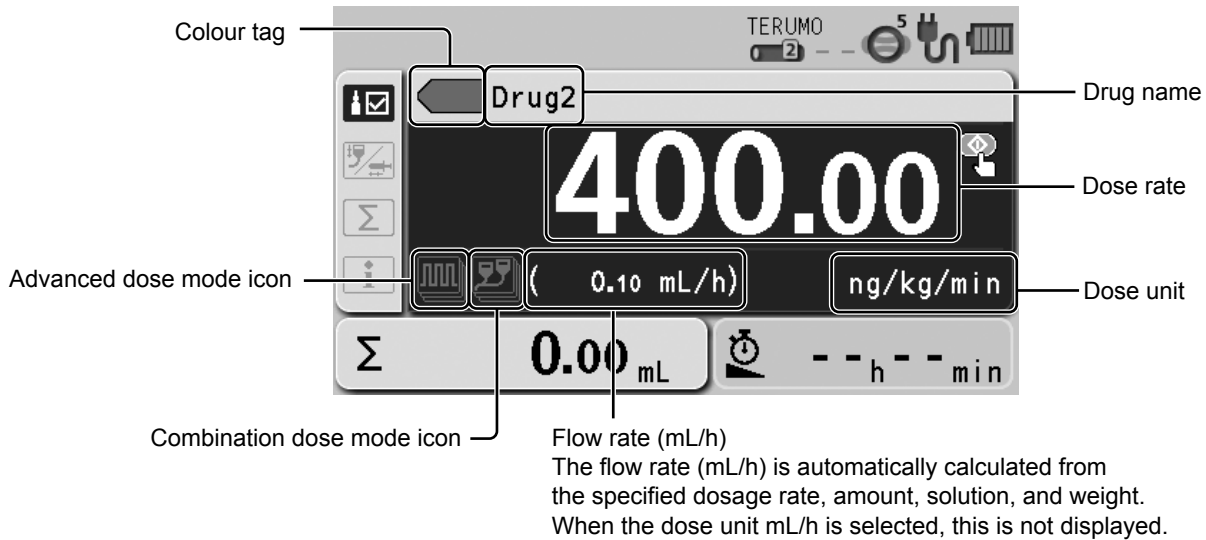


The following operations can be performed on this display:






- Displaying patient information
- Displaying drug information
- Changing parameter values

- To operate one of these, turn the Dial to select the item and press the Confirmation switch.
- When the Back/Mute switch is pressed on the parameter confirmation screen, the parameter input is cancelled and the screen returns to the previous status.

Library display



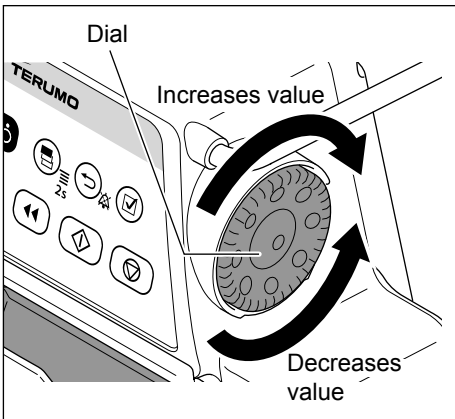
- Colour tag  
Selection is possible from 16 colours.
- Advanced dose mode icon/combination dose mode icon  
The icon to indicate the dose mode is displayed. When using an advanced dose mode, see page 78.

 <b>Advanced dose mode icon</b>	The icon is displayed when the advanced dose modes below can be selected. For details of each dose method, see “TERUFUSION Drug Library Manager” or “TERUFUSION Software Package”. <b>Note</b> • If no advanced dose mode can be set for the selected library, the advanced dose mode icon is not displayed.	
	 <b>Interval/Intermittent mode icon</b>	Two specified dosage rates are alternately delivered at regular intervals for the specified number of steps.
	 <b>Multi-step mode icon</b>	The speed of solution delivery increases or decreases at the specified levels.
	 <b>Delayed Start mode icon</b>	Solution delivery starts after the specified time has elapsed.
 <b>Combination dose mode icon</b>	For details, contact TERUMO trained service technicians.	

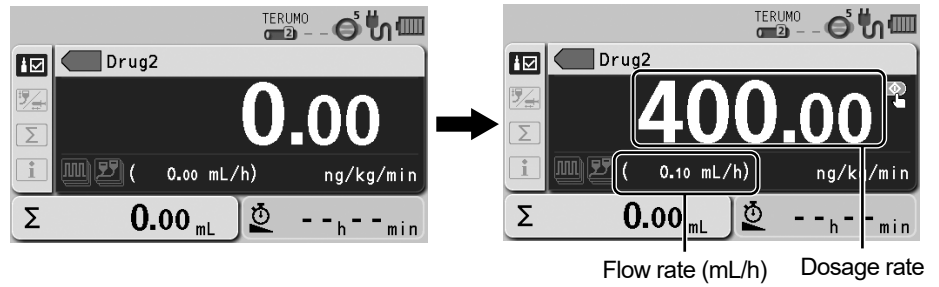
- See the dedicated editing software (TERUFUSION Drug Library Manager or TERUFUSION Software Package) for how to set an advanced dose mode and colour tag.

Notes

- The “Combination Dose Mode” which can be used in combination with a rack system (optional accessory) is available in the library. Contact TERUMO trained service technicians for details.
- “Pressure alarm” is available in the library as a safety function. See “TERUFUSION Drug Library Manager or TERUFUSION Software Package” or contact TERUMO trained service technicians for details.
- “Come and See ME” is available in the library as a special function. See “TERUFUSION Drug Library Manager or TERUFUSION Software Package” or contact TERUMO trained service technicians for details.



9) Turn the Dial to adjust the dosage.



Notes

- The range of the dosage rate is as follows:

- Dose unit = mL/h : 0.10 to 1200.00  
When using the optional drip sensor  
20 drop/mL : 0.10 to 1200.00  
60 drop/mL : 0.10 to 300.00

- Dose unit = other than mL/h : 0.01 to 999.00

Follow the specified range if the flow rate range is specified for the drug library registration. The available ranges of two types are shown below. (For details about how to set, see the dedicated editing software (TERUFUSION Drug Library Manager or TERUFUSION Software Package).)

- Soft limit

If the flow rate reaches the soft limit of the lower limit or the soft limit of the upper limit, the “Soft lower limit reached, Override?” or “Soft upper limit reached, Override?” confirmation message is displayed on the LCD. Press the Confirmation switch to override the upper or lower limit. When the upper or lower limit is overridden, the flow rate value turns orange.

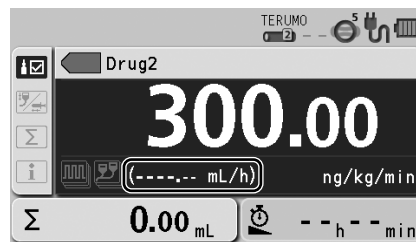
- Hard limit

If the flow rate reaches the hard limit of the lower limit or the hard limit of the upper limit, the “This is the hard lower limit” or “This is the hard upper limit” confirmation message is displayed on the LCD. Even if the Confirmation switch is pressed, the upper or lower limit cannot be overridden.

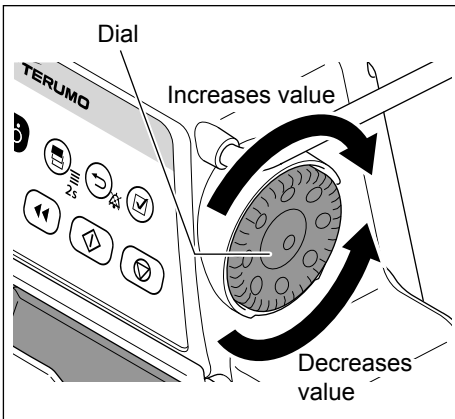
- When a dose unit other than mL/h is selected, the flow rate (mL/h) is automatically calculated from the specified amount, solution, weight and dosage rate, and displayed in the flow rate display.

Caution

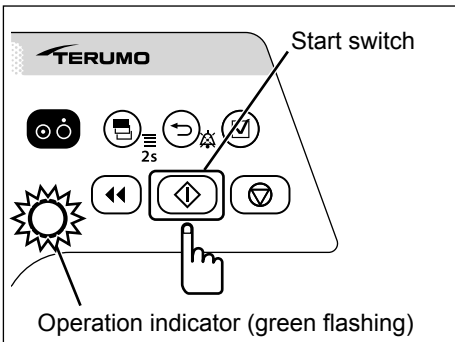
- If the calculation of flow rate (mL/h) is outside of the setting range\*, “0.00 mL/h” or “----- mL/h” is displayed and solution delivery does not start even if the Start switch is pressed. Make the setting again within the flow rate setting range.



\* For details about the flow rate setting range, see [Notes] above or “Specifications” on page 130.



10) Set the VTBI. (See page 38.)



11) Check the flow rate setting and press the Start switch to start solution delivery.

**Notes**

- The operation indicator flashes green.
- The volume delivered increases and the remaining time decreases.
- Even after the setting is completed, the unit returns to mL/h when the power is turned off.
- The amount and solution are re-set when the drug library has been changed or the power is turned off.
- The set weight is re-set when the power is turned off.

### Setting Special Functions

The following settings are selectable by changing the internal settings of this product. Taking account of a subsequent impact on product performance, contact TERUMO trained service technicians.

Setting item	Description of function
Setting dial acceleration function	Rotating the Dial while pressing the Stop switch accelerates the setting rate to set items such as the flow rate. This function is not available during solution delivery. Pressing the Stop switch stops the solution delivery. <ul style="list-style-type: none"> <li>• Flow rate and VTBI: change the rate to 100-step increments</li> <li>• Date and time: change the rate to hour and month</li> <li>• History and library: change the rate to page feeding</li> </ul>
Flow rate range setting function A (Soft limits) Flow rate range setting function B (Hard limits)	Sets the limitation of the flow rate in 2 levels; the soft limit (can be exceeded after confirmation) and the hard limit (cannot be exceeded). <ul style="list-style-type: none"> <li>• When setting the flow rate over the soft limit, the flow rate will be displayed in orange.</li> <li>• When the drug library mode or body weight dose mode (<math>\mu\text{g}/\text{kg}/\text{min}</math>, <math>\text{mg}/\text{kg}/\text{h}</math>) is selected, the flow rate range setting function is not available. (See page 49.)</li> </ul>
Change the KVO flow rate	Sets the KVO flow rate within the range of 0.10 to 3.00 mL/h.
Hands Free Bolus setting	When bolus volume and bolus time are set, flow rate is calculated and the bolus infusion is available. (For details, see page 74.)
Volume delivered unit select function	In the case of mass system dose mode, the unit for volume delivered or VTBI can be changed from volume (mL) to mass (g).
Alarm melody select function	Changes the alarm melody from Pattern 1 to Pattern 2. The default setting is Pattern 1.
Night mode setting	If the device is left non-operated for 30 seconds between 21:00 to 5:00 (customizable), the brightness can be automatically lowered by two levels (customizable).
Change the standby duration	Up to 24 hours with 10 minute intervals.
Dose mode select function	The dose mode can be selected among mL/h, $\mu\text{g}/\text{kg}/\text{min}$ , $\text{mg}/\text{kg}/\text{h}$ and drug library (TE-LM830 only).
Start-up dose mode select function	The initial dose mode after the power is turned on can be selected. Select from mL/h, $\mu\text{g}/\text{kg}/\text{min}$ , $\text{mg}/\text{kg}/\text{h}$ , or drug library (TE-LM830 only).
Dilution setting function by amount and solution	Selects how to specify the dilution from either Dilution or Amount/Solution.
Micro notation select function	Switches the dose unit from " $\mu$ " to "mc". ON: mc, OFF: $\mu$
Selecting dose mode during the solution delivery function	Change the dose mode from mL/h to another dose mode during solution delivery. The flow rate setting and volume delivered in the mL/h mode are retained after the dose mode is changed. <ul style="list-style-type: none"> <li>• If the flow rate (mL/h) is smaller than the lower limit or bigger than the upper limit of the hard limit in the setting value of the drug library etc., this function is not available.</li> </ul>
Bolus buzzer sound function	Enable to sound the buzzer during bolus.
Purging confirmation screen select function	Turn the purging confirmation screen ON/OFF. ON : Activate the purging with a confirmation screen OFF: Activate the purging without a confirmation screen
Air-in-line Alarm (Accumulated bubble detection function)	Increase the sensitivity level for bubbles accumulated. The alarm is issued if accumulated microbubbles exceed 1 mL within 15 minutes. * Air-in-line alarm may occur more frequently when you increase the accumulated bubble detection.
Purge volume upper limit setting function	The upper limit of purge volume can be set. The purging stops when the set upper limit is reached.
Bolus volume upper limit setting function	When the Hands On Bolus function is enabled, the upper limit of bolus volume can be set. Bolus stops when the set upper limit is reached.

Setting item	Description of function
Menu1 (User mode1) shortcut function to dose mode	Enable to display the dose mode select display by pressing and holding the Display select switch for 2 seconds or more. ON : Displays the dose mode select screen. OFF: Displays the Menu 1 screen.
Set value memory function	Saves the current set values (e.g. flow rate, VTBI, dosage and weight) before the power is turned off.
Remaining volume detection setting function	Selects the time to activate the Nearly Empty alarm from Disabled (no alarm), 5 min., 10 min., and 15 min.

## Changing Settings on the Menu

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See pages 12 and 13 for the menu list.

### Notes

- While changing the menu settings, pressing the Start switch does not start solution delivery.
- Occlusion detection pressure, keypad lock, air-in-line detection sensitivity, bolus, advanced dose mode and combination dose mode on Menu 1 can be selected or set during solution delivery. Other items are not available.
- How to exit menus
  - Method 1) Press and hold the Display select switch in the menu for 2 seconds or more.  
If the setting has not been completed, the setting is cancelled and the display goes to the flow rate screen.
  - Method 2) Press the Back/Mute switch repeatedly.  
If the setting has not been completed, the setting is cancelled and the display goes back to the previous screen.
- If an alarm occurs before pressing the Confirmation switch or the Back/Mute switch while setting the menu, any changes will return to the settings before the alarm was issued.
- Time before the screen returns to the flow rate screen.
  - (1) Level in which menu tab has been selected:  
Goes back to the flow rate screen after 10 seconds of no operation.
  - (2) Levels on and after which menu tab has been specified:  
Goes back to the flow rate screen after 2 minutes of no operation.

## Occlusion Detection Pressure


The occlusion detection pressure can be set in 10 levels.

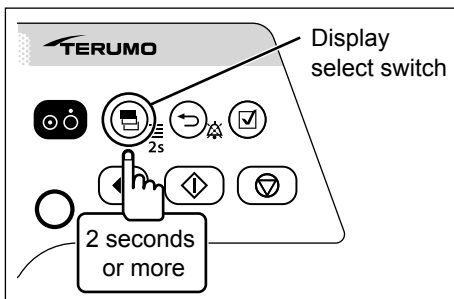
Setting	Occlusion detection pressure	Setting	Occlusion detection pressure
1	± 30 kPa	6	± 80 kPa
2	± 40 kPa	7	± 90 kPa
3	± 50 kPa	8	± 100 kPa
4	± 60 kPa	9	± 110 kPa
5	± 70 kPa (Default)	10	± 120 kPa

### Warning

- After the occlusion detection pressure is selected, check that the setting has been adjusted correctly.

### Notes

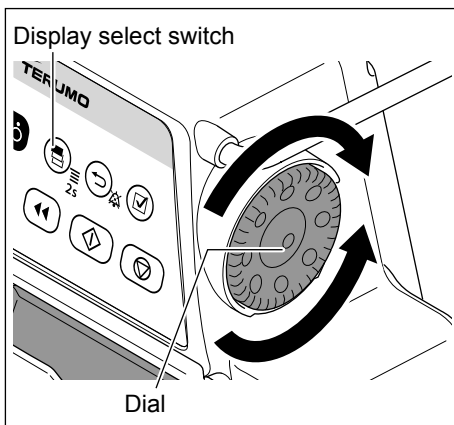
- If using on “Level 10”, the pressure of an infusion line increases at occlusion, possibly resulting in the infusion line etc. being disconnected. Periodically check that the connection of the infusion line is secured.
- If using on “Level 1”, an Occlusion alarm is frequently issued, especially when using a drug solution with high viscosity, possibly resulting in solution delivery being interrupted. In such cases, review the set value of the occlusion pressure by using the graph of the history of occlusion pressure value as a guide.
- Although the Occlusion alarm sounds, the internal pressure level may not reach the level of 75% or higher (the Occlusion icon in orange) due to the activated bolus reduction function.
- Use the occlusion icon  as follows:
  - (1) To check the in-line pressure when using a small diameter administration set and/or infusing a highly viscous solution.
  - (2) To make sure the infusion line has been opened.



- 1) Press and hold the Display select switch for 2 seconds or more.

### Note

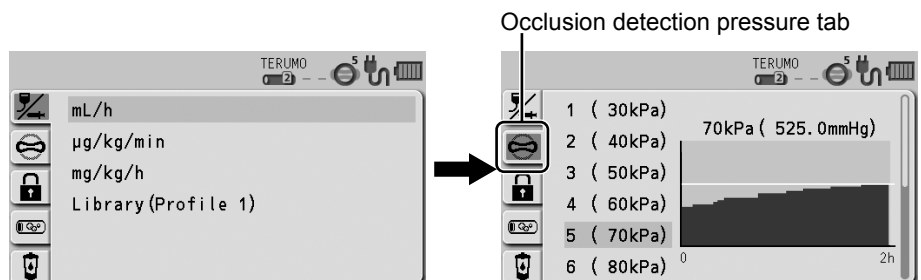
- The menu 1 screen is displayed and the icons are ready to be selected.



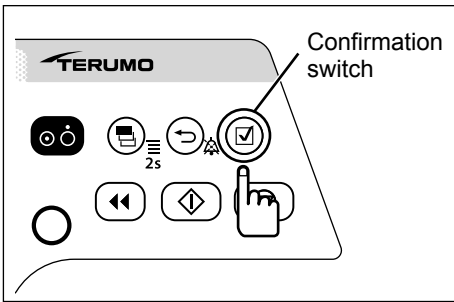
- 2) Turn the Dial or press the Display select switch to select the occlusion detection pressure tab .

### Note

- The occlusion detection pressure setting display has appeared.



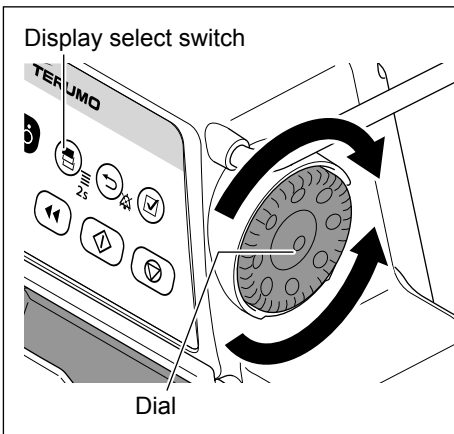
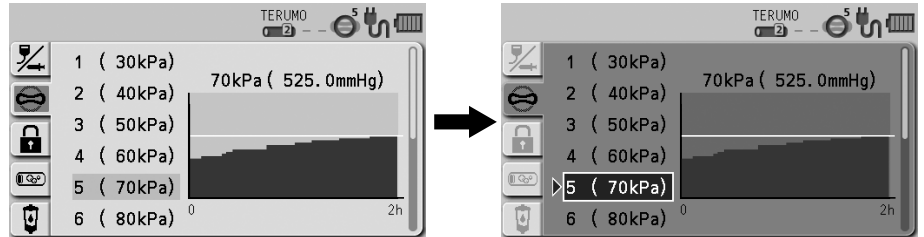
# Changing Settings on the Menu



### 3) Press the Confirmation switch.

**Note**

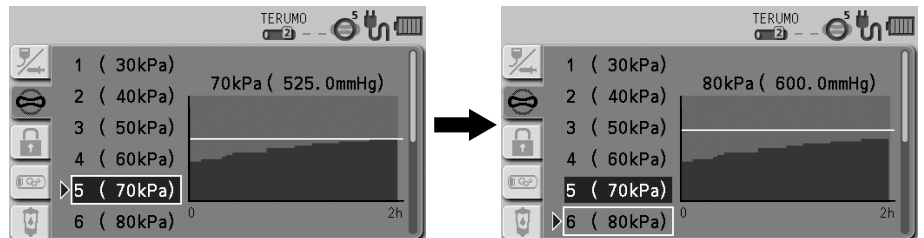
- The existing occlusion detection pressure (light blue) changes to the selected status (dark blue).



### 4) Turn the Dial or press the Display select switch to select occlusion detection pressure.

**Note**

- Turning the Dial or pressing the Display select switch moves the white frame.




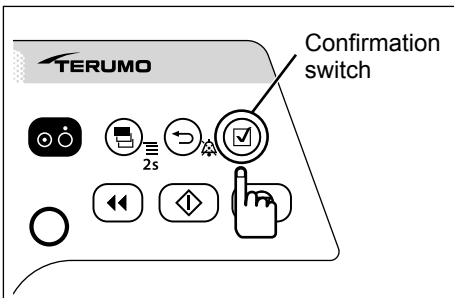
**Notes**

- Left side : Occlusion detection pressure setting
- Right side : Occlusion history graph
  - In the graph, the horizontal axis indicates the time and the vertical axis indicates the occlusion detection pressure.
  - Displays a graph of the history of occlusion pressure value in the past 2 hours. The horizontal line in the graph indicates the currently selected occlusion detection pressure. (This history is deleted when the power is turned off.)
  - The graph is updated every 2 minutes.

### 5) Press the Confirmation switch to confirm the selection.

**Note**

- The occlusion icon  in the status icon display shows the selected occlusion detection pressure.



Occlusion icon

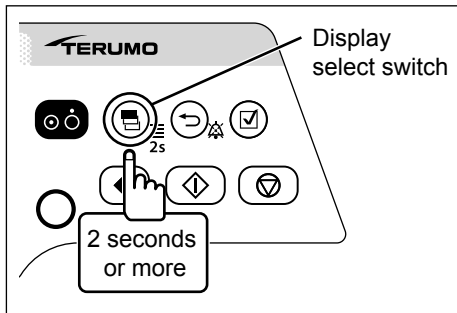
## Keypad Lock Function

The panel operation can be disabled to prevent inadvertent operation while solution delivery is stopped or in-progress.

### ◆ To enable the keypad lock

#### Notes

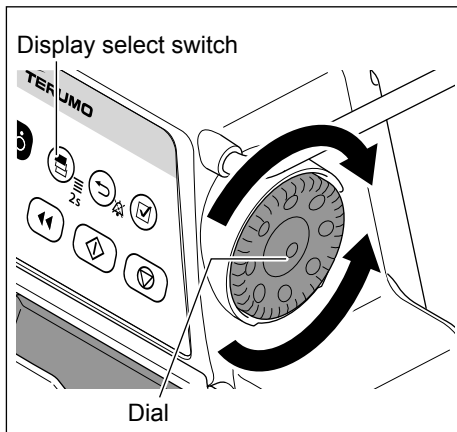
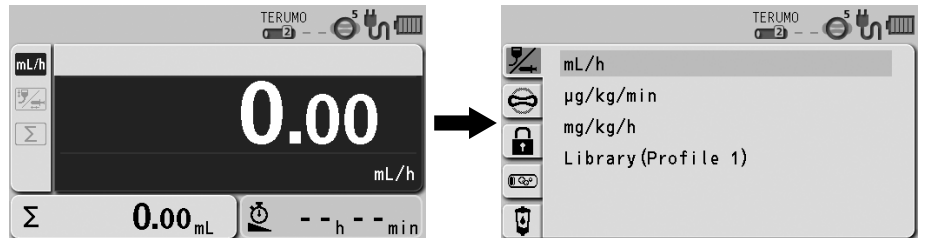
- Even if the keypad lock is enabled, the Power switch and the Start switch can be operated. The keypad lock release operation (press and hold the Back/Mute switch for 2 seconds or more) is also allowed when the keypad lock is enabled.
- Even if the Stop switch is pressed, the solution delivery cannot be stopped when the keypad lock is enabled. To stop solution delivery, first release the keypad lock.



1) Press and hold the Display select switch for 2 seconds or more.

#### Note

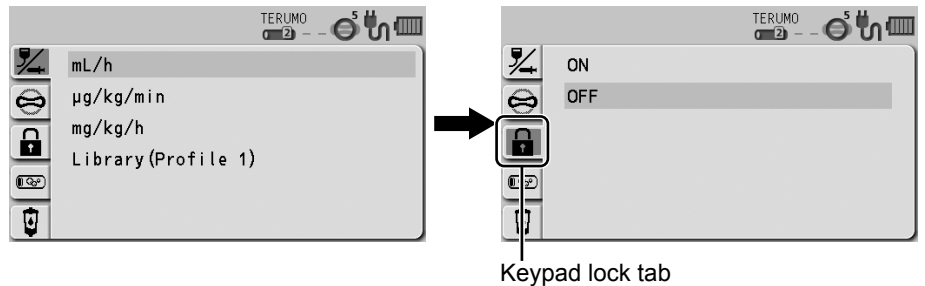
- The menu 1 screen is displayed and the icons are ready to be selected.



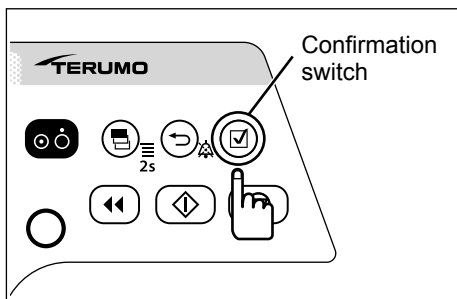
2) Turn the Dial or press the Display select switch to select the keypad lock tab .

#### Note

- The keypad lock ON/OFF setting display has appeared.



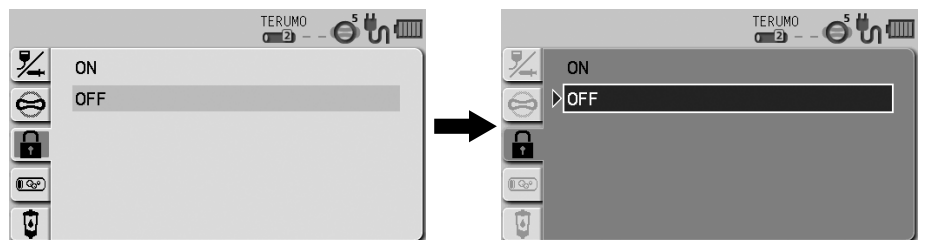
Keypad lock tab



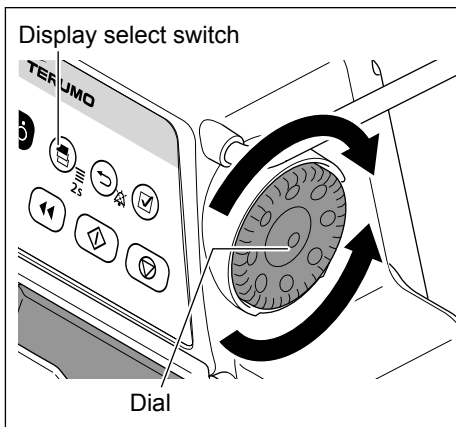
3) Press the Confirmation switch.

#### Note

- The existing setting (light blue) changes to the selected status (dark blue).



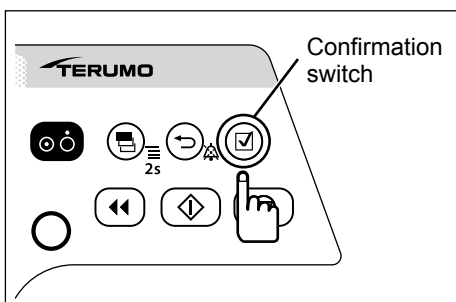
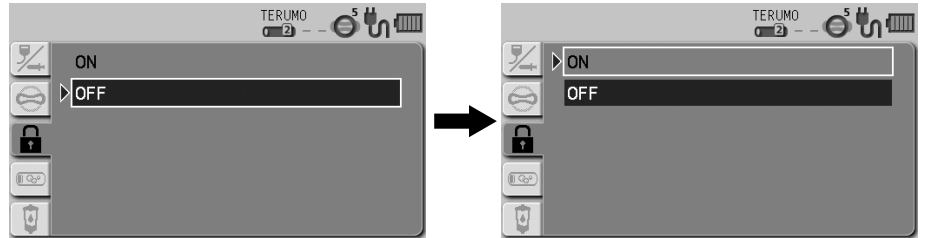
## Changing Settings on the Menu



4) Turn the Dial or press the Display select switch to select ON.


### Note

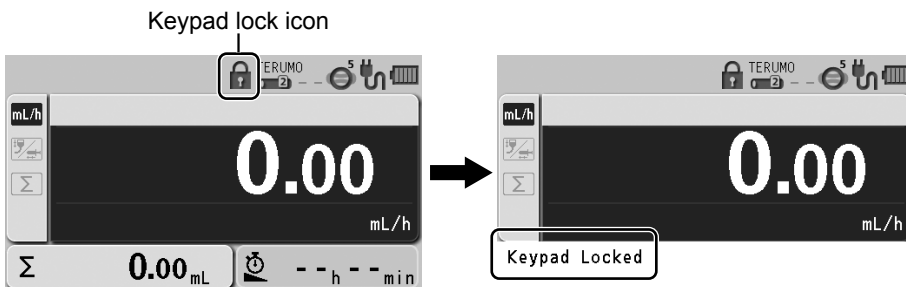
- Turning the Dial or pressing the Display select switch moves the white frame.



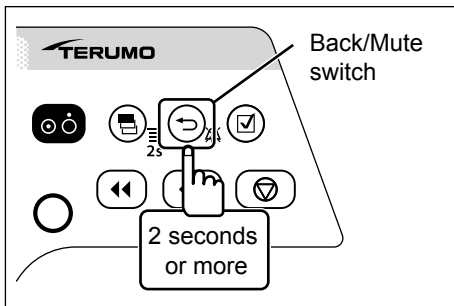
5) Press the Confirmation switch to confirm the selection.

### Checks

- The keypad lock icon  appears in the status icon display.
- The keypad lock message appears when the Dial or a switch (other than the Power switch and Start switch) is operated.



### ◆ To release the keypad lock



- **Press and hold the Back/Mute switch for 2 seconds or more to release the keypad lock.**

#### Check

- The keypad lock icon has disappeared.



#### Note

- Even while the keypad lock is on, the Power switch and the Start switch are available.

#### Note

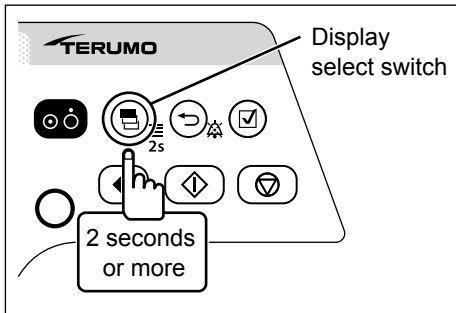
- In the case of a high-priority alarm, the keypad lock function is automatically switched off. However, the keypad lock will not be disabled by Start Reminder. (If the status allows startup, the solution delivery can be started while the keypad lock is enabled.)

## Air-in-line Alarm Sensitivity Select Function

The air-in-line detection sensitivity can be set in 2 levels.

### Warning

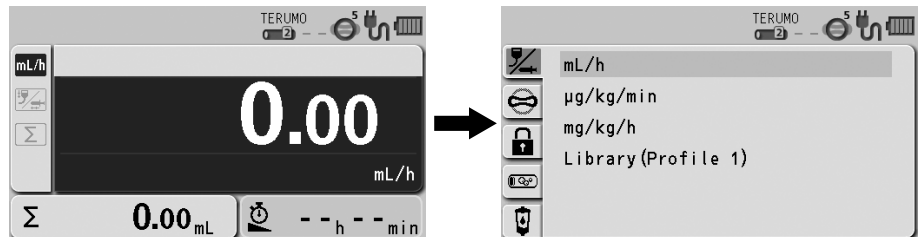
- After the air-in-line alarm sensitivity is selected, check that the setting has been adjusted correctly.



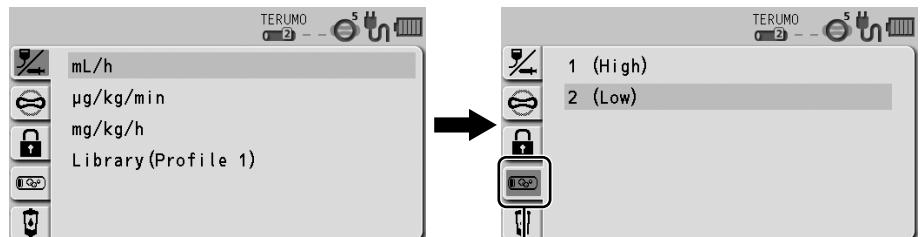
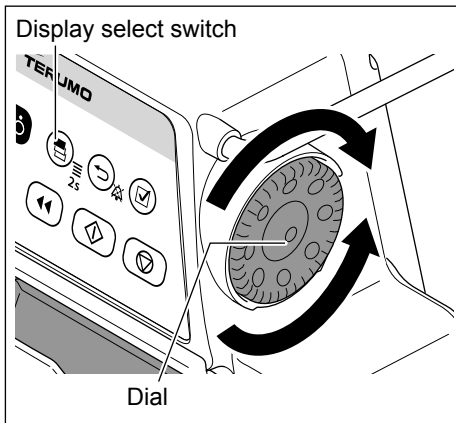
- 1) Press and hold the Display select switch for 2 seconds or more.

### Note

- The menu 1 screen is displayed and the icons are ready to be selected.



- 2) Turn the Dial or press the Display select switch to select the Air-in-line alarm sensitivity tab .

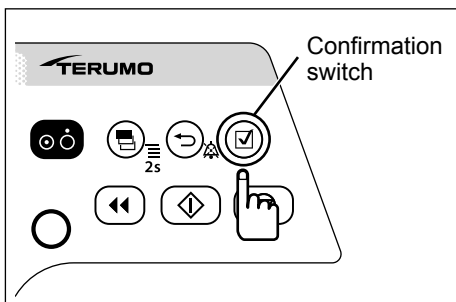
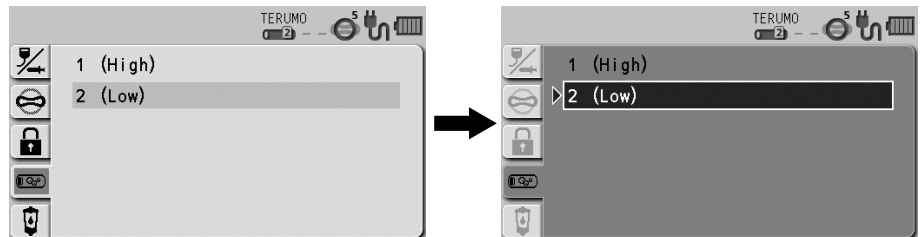


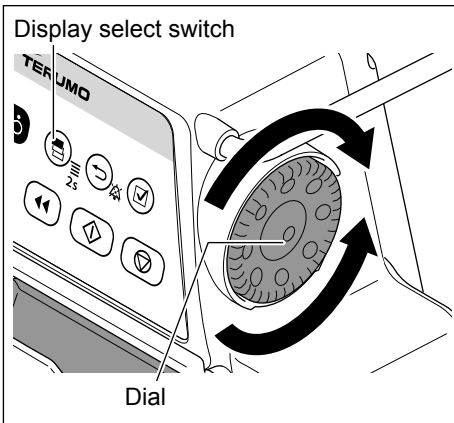
Air-in-line alarm sensitivity tab

- 3) Press the Confirmation switch.

### Note

- The existing setting (light blue) changes to the selected status (dark blue).

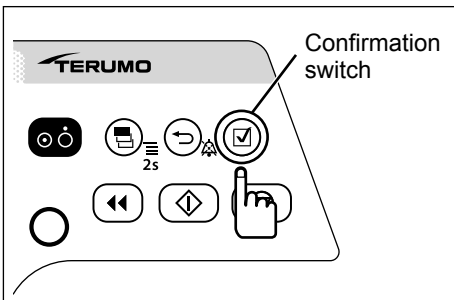
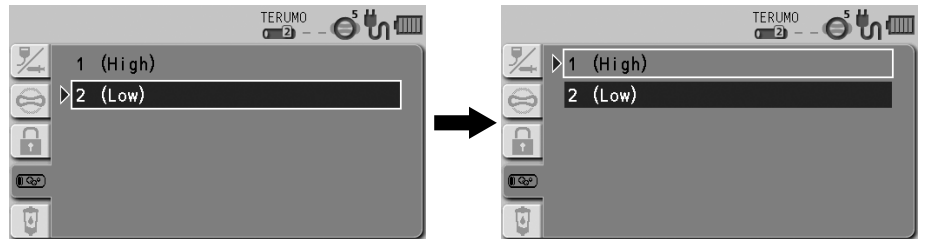




4) Turn the Dial or press the Display select switch to select the Air-in-line alarm sensitivity.

**Note**

- Turning the Dial or pressing the Display select switch moves the white frame.



5) Press the Confirmation switch to confirm the selection.

Sensitivity setting\*1

Display	Detail
1 (High)	High: High sensitivity of Air-in-line alarm
2 (Low)	Low: Low sensitivity of Air-in-line alarm (Default)

\*1: With the dedicated infusion set, the high sensitivity detects approx. 0.04 mL of air and the low sensitivity detects approx. 0.08 mL of air.

## Changing a Drip Volume

Drip volume can be set in two levels.

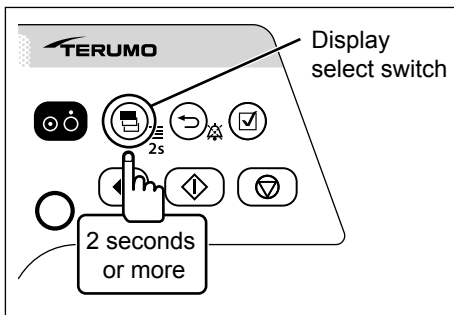
(Set so that the Flow Rate Abnormality alarm, Free Flow alarm and Line Empty alarm can be issued correctly when the drip sensor is used.)

### Warning

- After the drip volume is selected, check that the setting has been adjusted correctly.

### Note

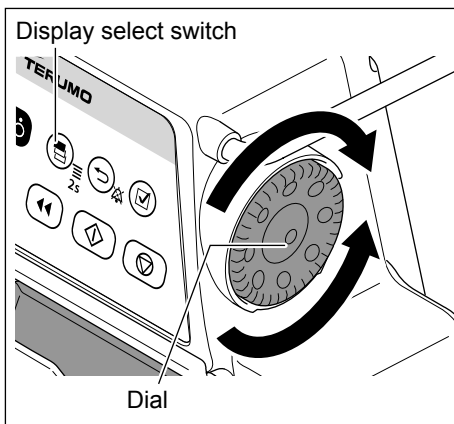
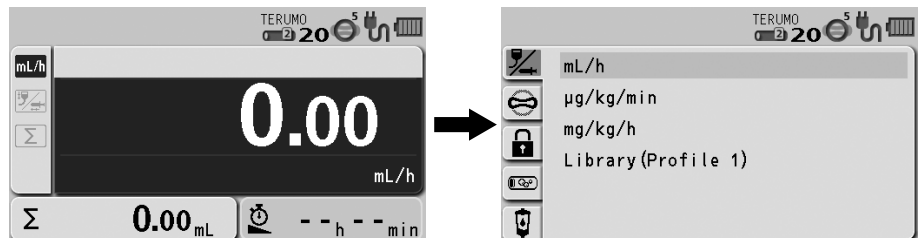
- If the drip sensor is not connected, "--" appears instead of the Infusion set brand/Drip volume/Air-in-line alarm sensitivity icon in the status icon display. The set level is valid only when the drip sensor is connected.



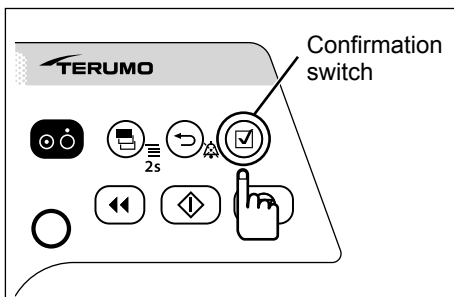
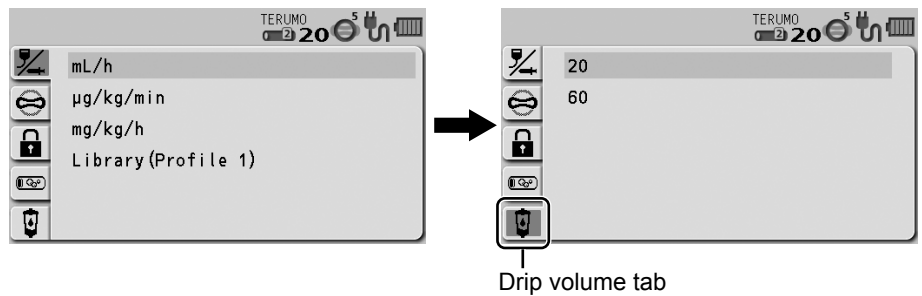
- 1) Press and hold the Display select switch for 2 seconds or more.

### Note

- The menu 1 screen is displayed and the icons are ready to be selected.



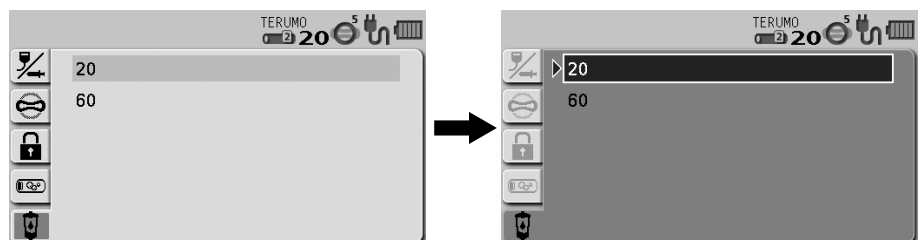
- 2) Turn the Dial or press the Display select switch to select the drip volume tab.

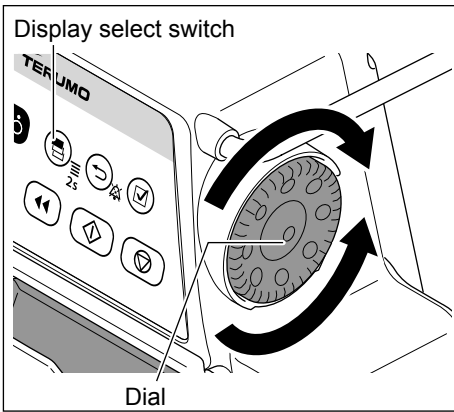


- 3) Press the Confirmation switch.

### Note

- The existing setting (light blue) changes to the selected status (dark blue).





4) Turn the Dial or press the Display select switch to select a drip volume.

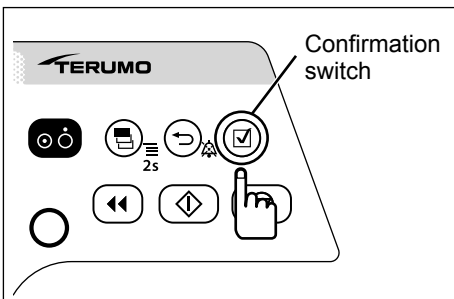
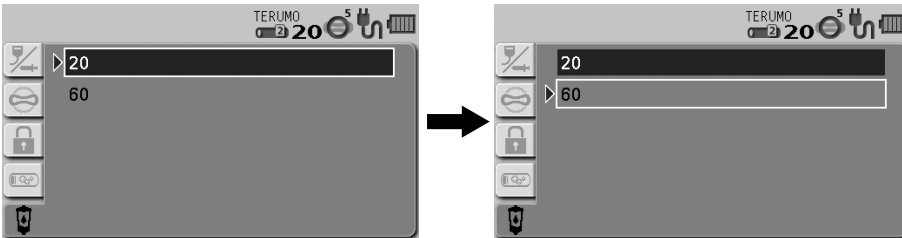
**Note**

- See page 21 for the infusion sets and select the appropriate drip volume as indicated on the packaging of the infusion set.

Display	Detail
20	20 drop/mL
60	60 drop/mL

**Note**

- Turning the Dial or pressing the Display select switch moves the white frame.



5) Press the Confirmation switch to confirm the selection.

**Note**

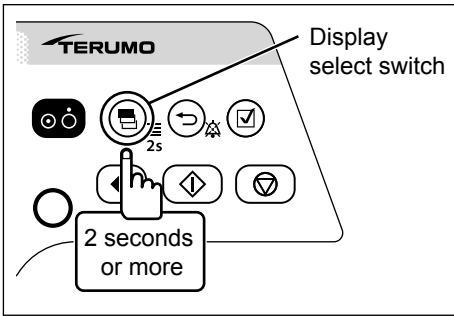
- The drip volume appears beside the Infusion set brand/Drip volume/Air-in-line alarm sensitivity icon in the status icon display.



## Bolus

The bolus can be performed when solution delivery is in progress or when stopped. There are two ways for selecting bolus either through the menu or pressing the Purge switch while pressing the Back/Mute switch. In addition, every time the Purge switch is pressed while Back/Mute switch is pressed, you can switch between the Hands On Bolus and Hands Free Bolus.

### ◆ Hands On Bolus



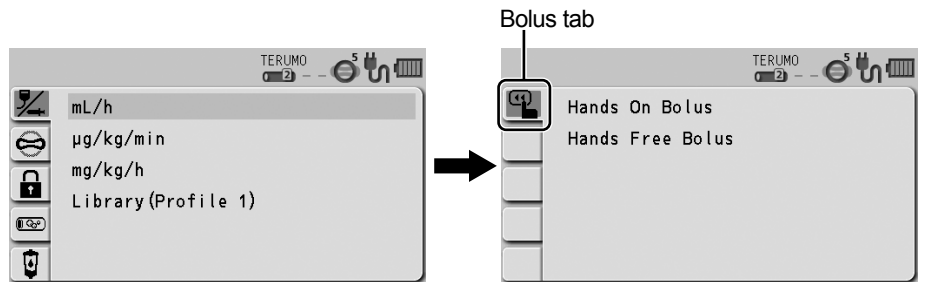
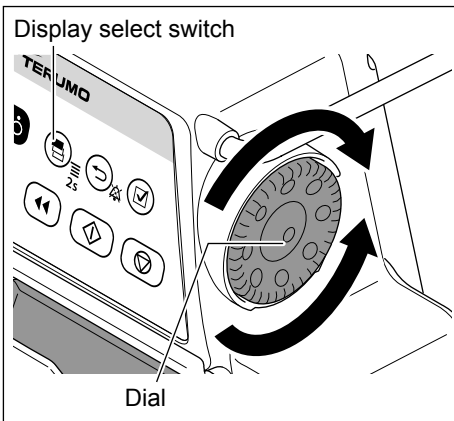
- 1) The VTBI has been set.
- 2) Press and hold the Display select switch for 2 seconds or more.

#### Note

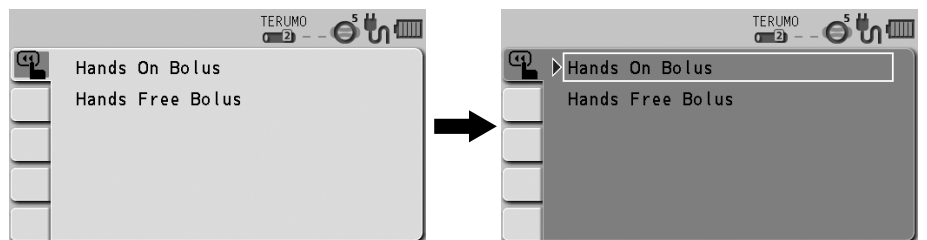
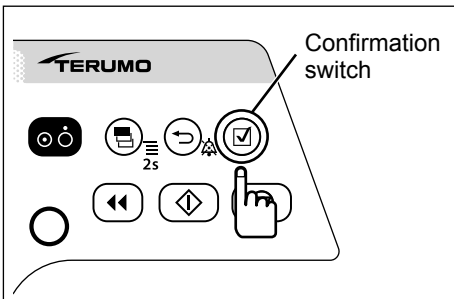
- The menu 1 screen is displayed and the icons are ready to be selected.

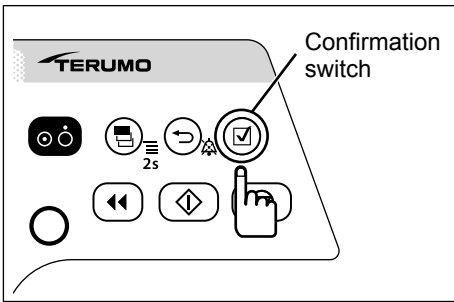


- 3) Turn the Dial or press the Display select switch to select the bolus tab .



- 4) Press the Confirmation switch.

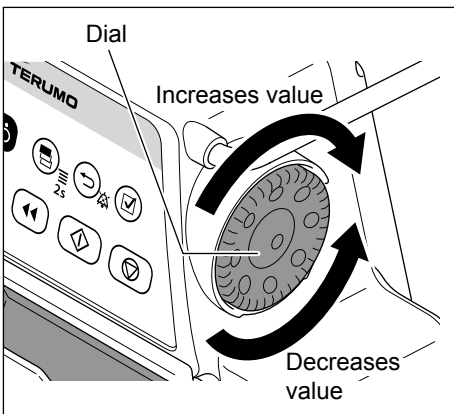
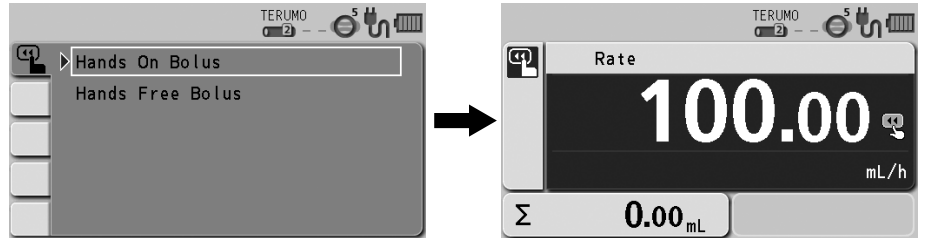




**5) Press the Confirmation switch to confirm the selection.**

**Note**

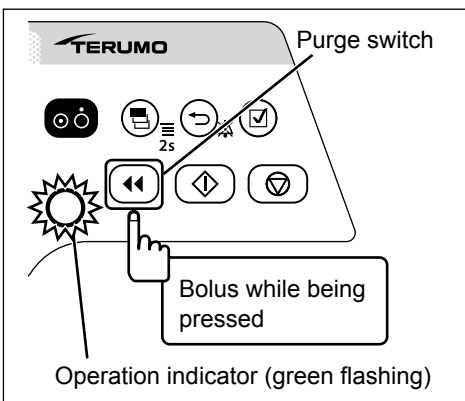
- The current Bolus flow rate setting screen appears.



**6) Turn the Dial to set the Bolus flow rate.**

**Note**

- The Bolus flow rate can be set by 100 mL/h in the following value range.  
 When not using the drip sensor:  
 100.00 to 1200.00 mL/h  
 When using the drip sensor:  
 20 drop/mL: 100.00 to 1200.00 mL/h  
 60 drop/mL: 100.00 to 300.00 mL/h



**7) Press and hold the Purge switch to start the bolus.**

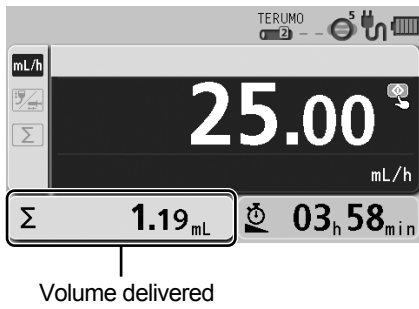
**Notes**

- The operation indicator flashes green.
- The bolus volume delivered increases.
- The buzzer sounds during solution delivery.
- The bolus operating sound can be muted. To change this, contact TERUMO trained service technicians.



Bolus volume delivered

## Changing Settings on the Menu



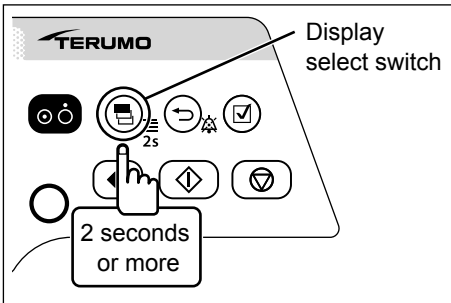
### 8) Release the Purge switch to stop the bolus.

#### Notes

- If the Purge switch is pressed again within 1.5 seconds after being released, Hands On Bolus continues and the bolus volume delivered display is maintained.
- If exceeding 1.5 seconds after the Purge switch has been released, the screen returns to the flow rate screen.
- While the Purge switch is pressed, the volume delivered display shows the bolus volume delivered. When releasing the Purge switch, the display shows the sum of the volume delivered. (The bolus volume delivered is added to the sum of the volume delivered.)
- When bolus infusion during solution delivery is completed, solution delivery starts at the same flow rate as before the bolus infusion.
- A Completion alarm occurs if the volume delivered reaches the VTBI when bolus infusion is used during solution delivery. The solution delivery continues at the flow rate of KVO (Keep Vein Open).
- The dose setting (flow rate) of Hands On Bolus remains set, and is used when the next Hands On Bolus is performed, until the power is turned off or the dose mode is switched.
- The upper limit of bolus volume can be set. To change this, contact TERUMO trained service technicians.

### ◆ Hands Free Bolus

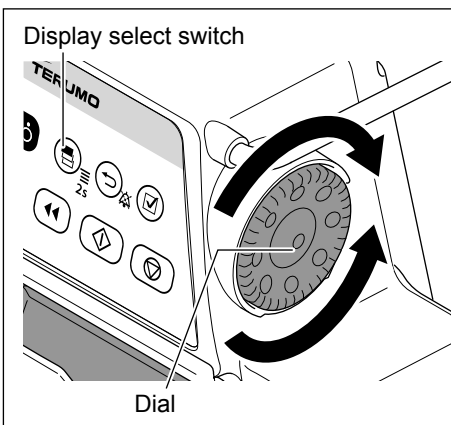
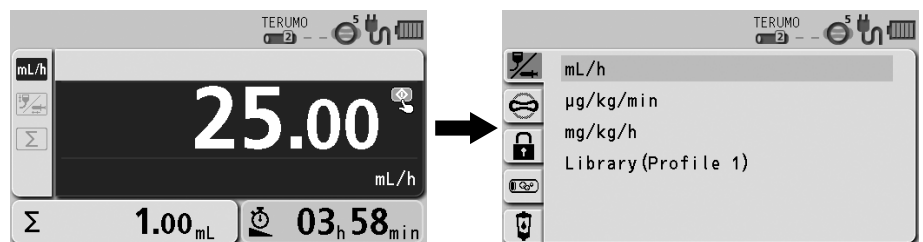
Setting the Bolus VTBI and Bolus VTBI time enables automatic calculation of the Bolus flow rate (mL/h) and execution of bolus infusion without holding down the Purge switch. (Hands Free Bolus function)



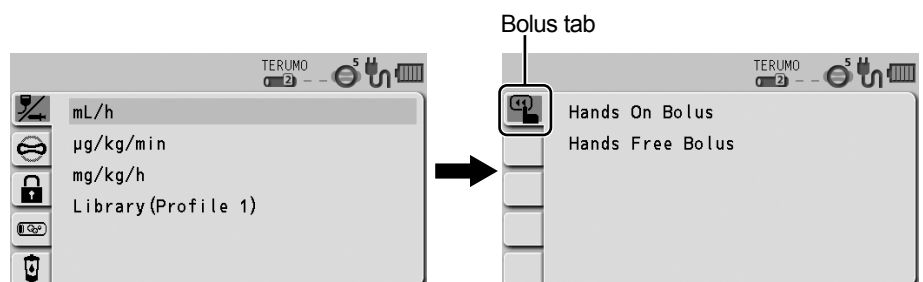
- 1) The VTBI has been set.
- 2) Press and hold the Display select switch for 2 seconds or more.

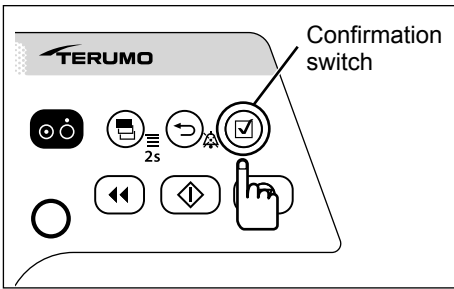
#### Note

- The menu 1 screen is displayed and the icons are ready to be selected.

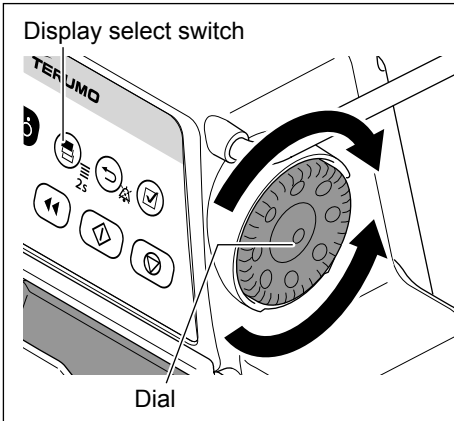
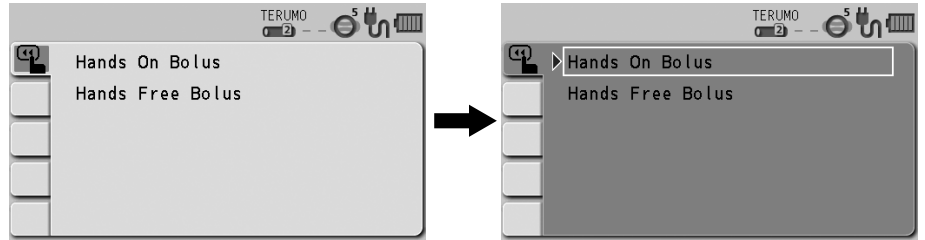


- 3) Turn the Dial or press the Display select switch to select the bolus tab .

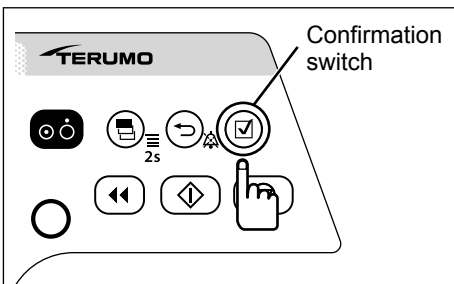
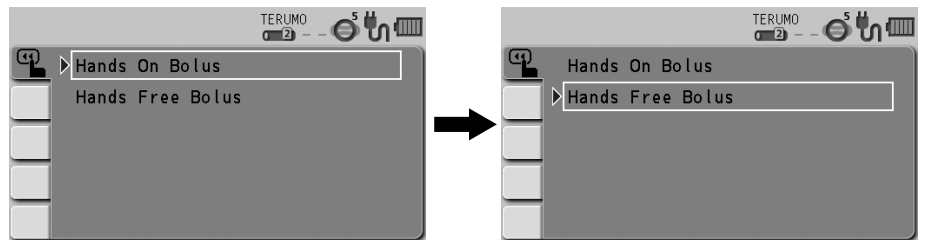




4) Press the Confirmation switch.



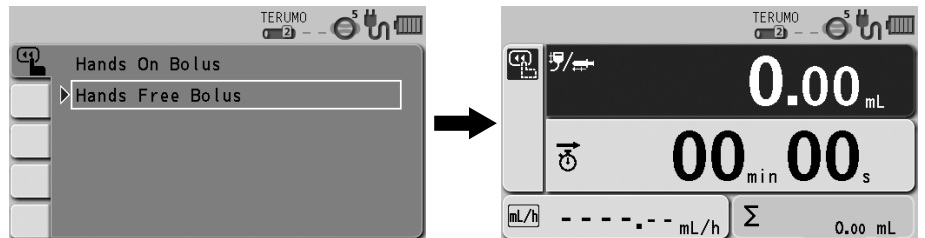
5) Turn the Dial or press the Display select switch to select the Hands Free Bolus.



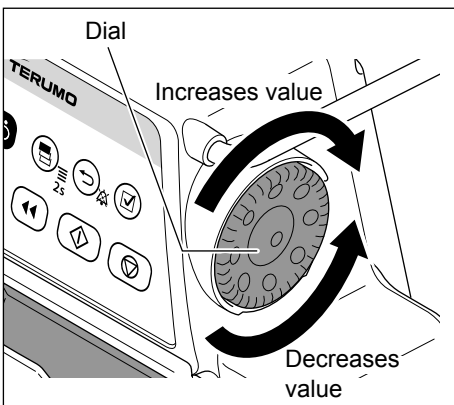
6) Press the Confirmation switch.

**Notes**

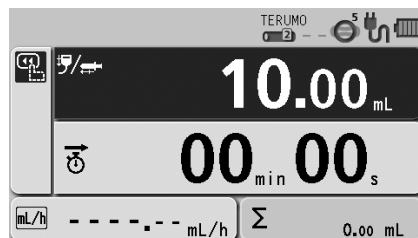
- The bolus setting display appears.



- When the flow rate screen is displayed, the Hands Free Bolus screen can be displayed by pressing and holding the Back/Mute switch and pressing the Purge switch twice.



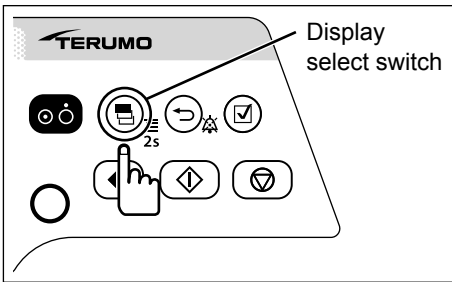
7) Turn the Dial to set the Bolus VTBI.



**Notes**

- The Bolus VTBI can be set within the range below.  
VTBI: 0.01 to 999.00
- The Bolus VTBI must be set within the values obtained by subtracting the volume delivered from the VTBI.

## Changing Settings on the Menu

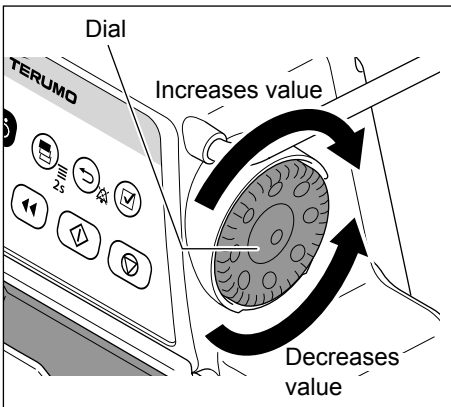


- 8) Press the Display select switch to select the Bolus VTBI time or the Bolus flow rate.



Bolus VTBI time

Bolus flow rate

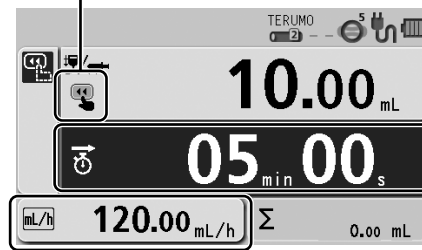


- 9) Turn the Dial to set the Bolus VTBI time or the Bolus flow rate.

### Notes

- The Bolus VTBI time or the Bolus flow rate (mL/h) has been calculated from the Bolus VTBI, and is displayed.
- The ready for bolus icon is displayed.

Ready for bolus icon



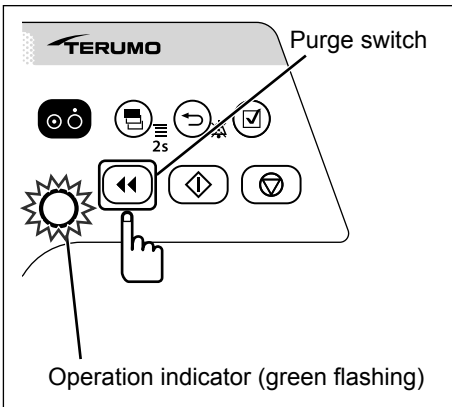
Bolus VTBI time

Bolus flow rate

- The Bolus flow rate can be set within the range of the following values.  
0.10 to 1200.00 mL/h  
When the drip sensor is attached:  
20 drop/mL: 0.10 to 1200.00 mL/h  
60 drop/mL: 0.10 to 300.00 mL/h
- The Bolus VTBI time can be set within the range below.  
Bolus VTBI time: 00min01s to 60min00s

### Caution

- When using the Hands Free Bolus function, the setting cannot take a flow rate (mL/h) calculation result outside the flow rate setting range, and therefore it should be reconfigured. [----] or [0.00] is displayed, not allowing solution delivery.



## 10) Press the Purge switch to start the bolus.

### Notes

- The operation indicator flashes green.
- The bolus volume delivered increases.
- The alarm melody sounds during solution delivery.



## 11) The bolus ends when the VTBI is reached.

### Check


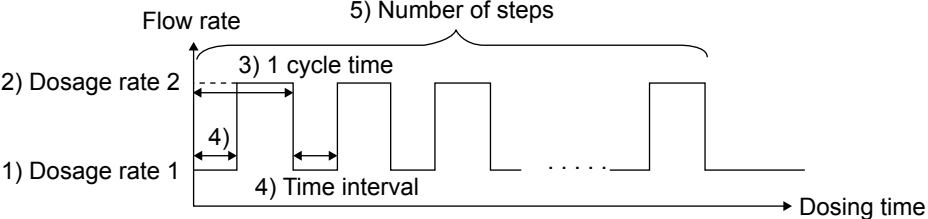

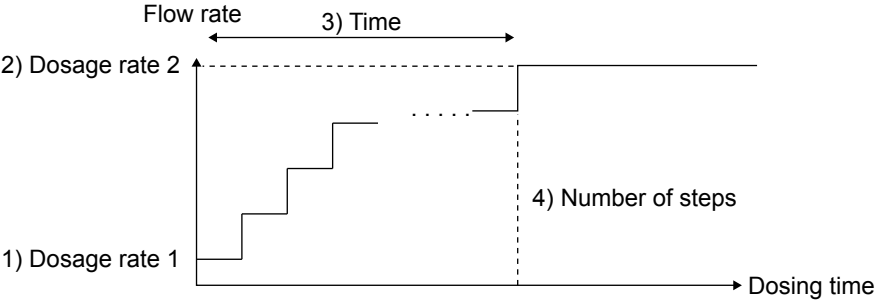

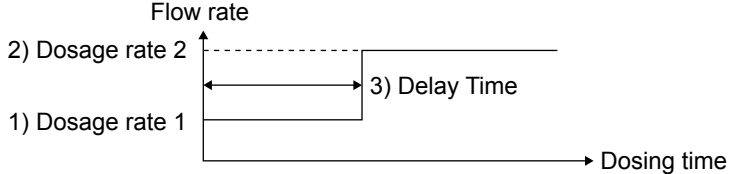
- The screen returns to the flow rate screen when the VTBI has been reached and the bolus has been completed.

### Notes

- The volume delivered display area displays the amount of bolus during bolus infusion, and displays the sum of the amount of bolus and the volume delivered when the VTBI is attained and the bolus ends.
- When bolus infusion during solution delivery is completed, solution delivery continues at the flow rate before the bolus infusion.
- A Completion alarm occurs if the volume delivered reaches the VTBI when bolus infusion is used during solution delivery. The solution delivery continues at the flow rate of KVO (Keep Vein Open).
- Pressing the Stop switch forcibly stops Hands Free Bolus.

## Advanced Dose Mode (TE-LM830 only)

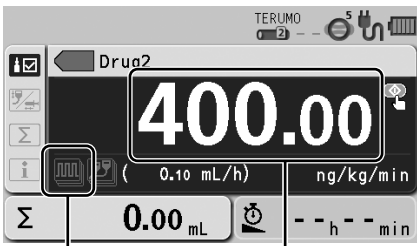
An advanced dose mode can be selected from the three advanced dose modes in the table below according to the selected drug. A library should be registered before selecting the advanced mode. Use the dedicated editing software (TERUFUSION Drug Library Manager or TERUFUSION Software Package) for registration. See page 53 for how to select the library.

Advanced dose mode	Details														
 <p><b>Interval/Intermittent Mode</b></p>	<p>Two specified dosage rates are alternately delivered at regular intervals for the specified number of steps.</p>  <p><b>Input parameters</b></p> <table border="1" data-bbox="379 786 1485 958"> <tr> <td>1)</td> <td>Dosage rate 1</td> <td rowspan="2">For the dosage rate range, see page 55. When using an advanced dose mode, 0.00 can be set for the dosage rate.</td> </tr> <tr> <td>2)</td> <td>Dosage rate 2 (Displays: Final Flow Rate)</td> </tr> <tr> <td>3)</td> <td>1 cycle time (Displays: Time/Cycle)</td> <td>00h02min to 23h59min</td> </tr> <tr> <td>4)</td> <td>Time interval (Displays: Time)</td> <td>00h01min to 23h58min</td> </tr> <tr> <td>5)</td> <td>Number of steps (Displays: Number of Steps)</td> <td>1 to 255 steps</td> </tr> </table>	1)	Dosage rate 1	For the dosage rate range, see page 55. When using an advanced dose mode, 0.00 can be set for the dosage rate.	2)	Dosage rate 2 (Displays: Final Flow Rate)	3)	1 cycle time (Displays: Time/Cycle)	00h02min to 23h59min	4)	Time interval (Displays: Time)	00h01min to 23h58min	5)	Number of steps (Displays: Number of Steps)	1 to 255 steps
1)	Dosage rate 1	For the dosage rate range, see page 55. When using an advanced dose mode, 0.00 can be set for the dosage rate.													
2)	Dosage rate 2 (Displays: Final Flow Rate)														
3)	1 cycle time (Displays: Time/Cycle)	00h02min to 23h59min													
4)	Time interval (Displays: Time)	00h01min to 23h58min													
5)	Number of steps (Displays: Number of Steps)	1 to 255 steps													
 <p><b>Multi-step Mode</b></p>	<p>The speed of solution delivery increases or decreases at the specified levels (up to 10 levels).</p>  <p><b>Input parameters</b></p> <table border="1" data-bbox="379 1357 1485 1496"> <tr> <td>1)</td> <td>Dosage rate 1</td> <td rowspan="2">For the dosage rate range, see page 55. When using an advanced dose mode, 0.00 can be set for the dosage rate.</td> </tr> <tr> <td>2)</td> <td>Dosage rate 2 (Displays: Final Flow Rate)</td> </tr> <tr> <td>3)</td> <td>Time (Displays: Time to Final Flow Rate)</td> <td>00h01min to 23h59min</td> </tr> <tr> <td>4)</td> <td>Number of steps (Displays: Steps)</td> <td>1 to 10 steps</td> </tr> </table>	1)	Dosage rate 1	For the dosage rate range, see page 55. When using an advanced dose mode, 0.00 can be set for the dosage rate.	2)	Dosage rate 2 (Displays: Final Flow Rate)	3)	Time (Displays: Time to Final Flow Rate)	00h01min to 23h59min	4)	Number of steps (Displays: Steps)	1 to 10 steps			
1)	Dosage rate 1	For the dosage rate range, see page 55. When using an advanced dose mode, 0.00 can be set for the dosage rate.													
2)	Dosage rate 2 (Displays: Final Flow Rate)														
3)	Time (Displays: Time to Final Flow Rate)	00h01min to 23h59min													
4)	Number of steps (Displays: Steps)	1 to 10 steps													
 <p><b>Delayed Start Mode</b></p>	<p>Solution delivery starts after the specified time has elapsed.</p>  <p><b>Input parameters</b></p> <table border="1" data-bbox="379 1765 1485 1877"> <tr> <td>1)</td> <td>Dosage rate 1</td> <td rowspan="2">For the dosage rate range, see page 55. When using an advanced dose mode, 0.00 can be set for the dosage rate.</td> </tr> <tr> <td>2)</td> <td>Dosage rate 2 (Displays: Final Flow Rate)</td> </tr> <tr> <td>3)</td> <td>Delay Time (Displays: Delay Time)</td> <td>00h01min to 23h59min</td> </tr> </table>	1)	Dosage rate 1	For the dosage rate range, see page 55. When using an advanced dose mode, 0.00 can be set for the dosage rate.	2)	Dosage rate 2 (Displays: Final Flow Rate)	3)	Delay Time (Displays: Delay Time)	00h01min to 23h59min						
1)	Dosage rate 1	For the dosage rate range, see page 55. When using an advanced dose mode, 0.00 can be set for the dosage rate.													
2)	Dosage rate 2 (Displays: Final Flow Rate)														
3)	Delay Time (Displays: Delay Time)	00h01min to 23h59min													

- “Dosage rate 1” can be set in the Dose Rate in the flow rate setting screen.
- There is no rule stating which of the volumes between dosage rate 1 and dosage rate 2 should be larger.
- If one of the dosage rate 1 or 2 is not set, solution delivery does not start.
- The dosage rate must be set within the setting range for each library.
- The calculation result of flow rate (mL/h) must be set within the flow rate setting range.

**Note**

- When registering library, determine the range of the dosage rate considering the drug and the dose method. (Depending on the setting of the dosage rate, the occlusion may occur due to the thrombus formation within the infusion line.)




Advanced dose mode icon

Dosage rate 1

**1) Follow step 1) to 9) on “Selecting Dose Mode (Drug Library)” to select the library name, shown as “Drug2” in the example, and set the dosage rate 1.**


**Notes**

- When using an advanced dose mode, 0.00 can be set for the dosage rate.
- See page 53 for how to select the library.
- If the selected library has been enabled to accept an advanced dose mode, the advanced dose mode icon  is displayed on the LCD. If an advanced dose mode is unacceptable, no icon is displayed.

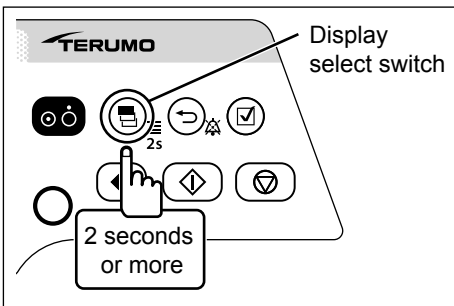
**2) Set the VTBI.**

See page 38 for how to select the VTBI.

**Note**

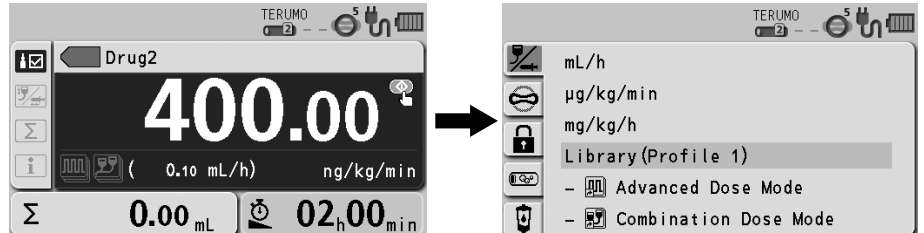
- There are two procedures to select the advanced dose mode:  
One is selecting the Advanced dose mode on the menu tab of the menu 1 screen. The other one is selecting the “ Advanced Dose Mode” displayed below “Library” in the dose mode select display, as described in the following steps. If you perform the former procedure, go to step 7.

**3) Press and hold the Display select switch for 2 seconds or more.**



**Note**

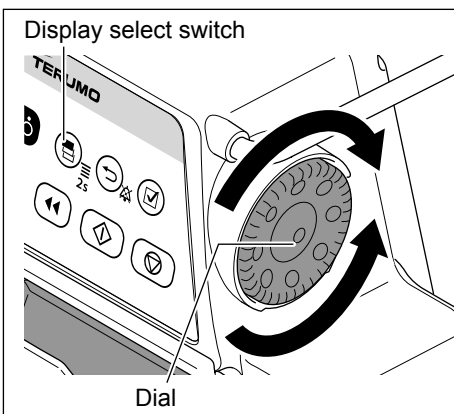
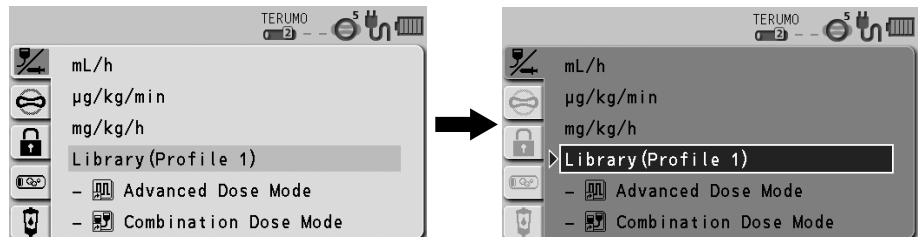
- The menu 1 screen is displayed and then the dose mode select (Dose) display appears.



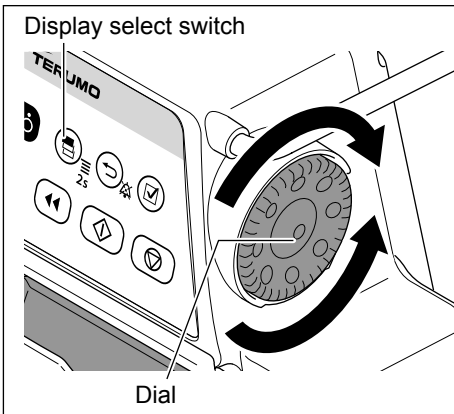
**4) Press the Confirmation switch.**

**Note**

- “Library” (light blue) changes to the selected status (dark blue).



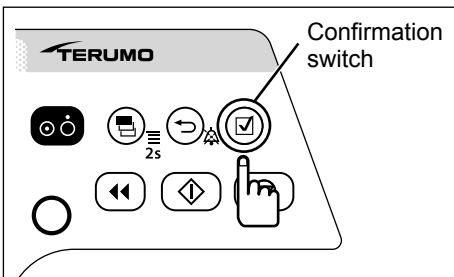
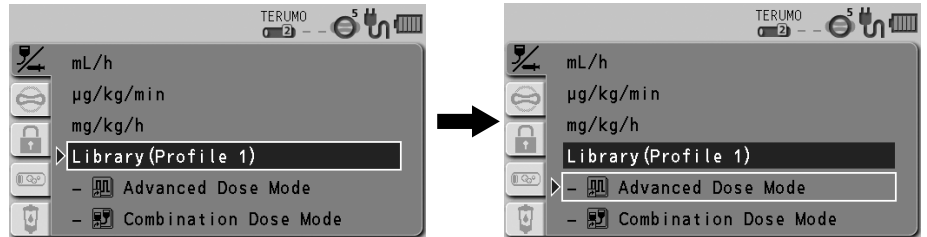
## Changing Settings on the Menu



- 5) Turn the Dial or press the Display select switch to select the “ advanced mode” displayed below “Library”.

**Note**

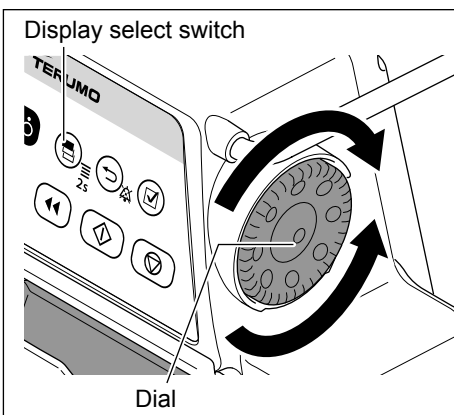
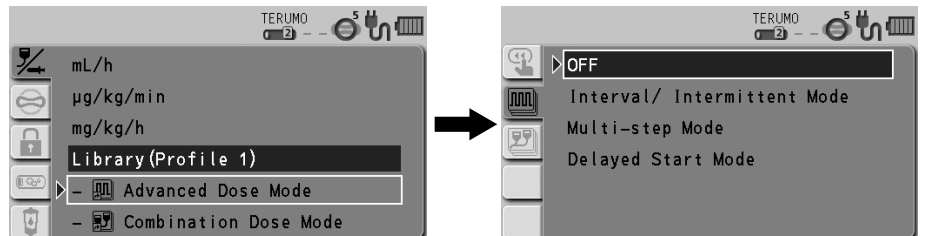
- Turning the Dial or pressing the Display select switch moves the white frame.



- 6) Press the Confirmation switch.

**Note**

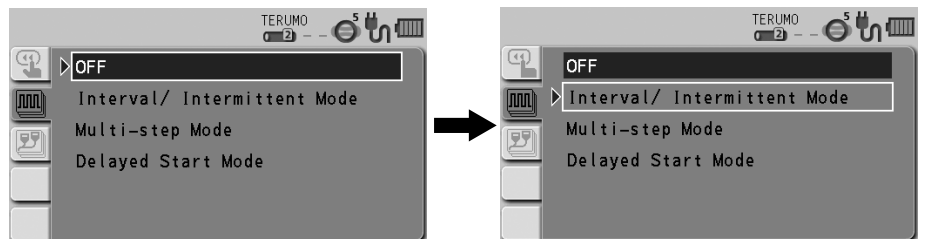
- The available advanced dose modes are displayed.

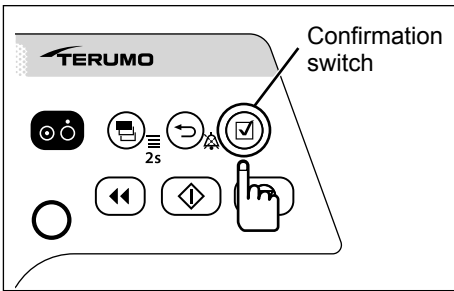


- 7) Turn the Dial or press the Display select switch to select the advanced dose mode.

**Note**

- Turning the Dial or pressing the Display select switch moves the white frame.

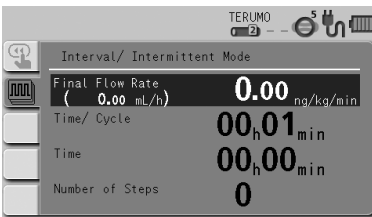




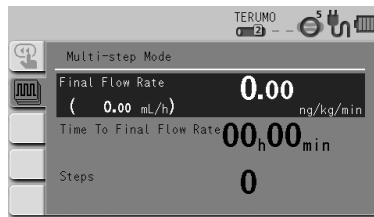
8) Press the Confirmation switch.

**Note**

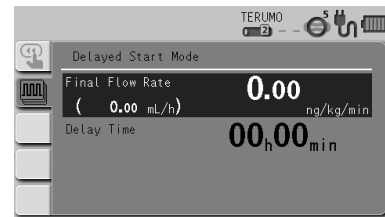
- The screen changes to the parameter input display.



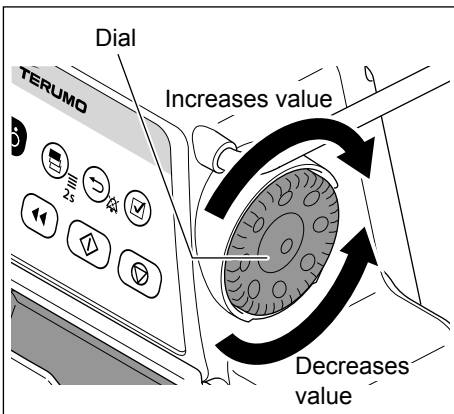
Interval/Intermittent Mode



Multi-step Mode



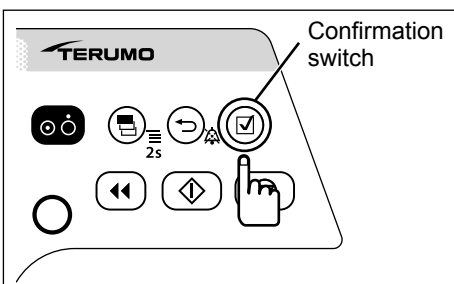
Delayed Start Mode



9) Turn the Dial to input the parameters and press the Confirmation switch.

**Notes**

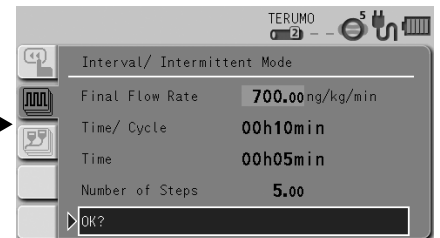
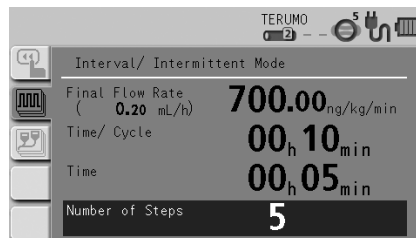
- With every press of the Confirmation switch, the input area moves to the next one.
- When the Back/Mute switch is pressed, the parameter input is cancelled and the screen returns to the previous status.

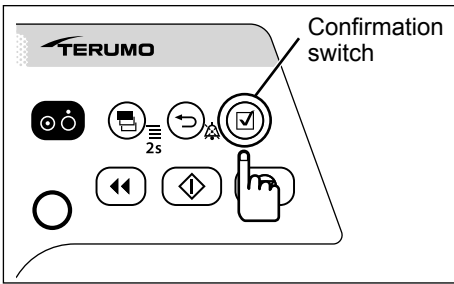


10) Input all the parameters and press the Confirmation switch.

**Note**

- The parameter confirmation screen appears.

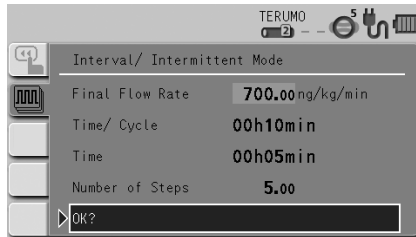




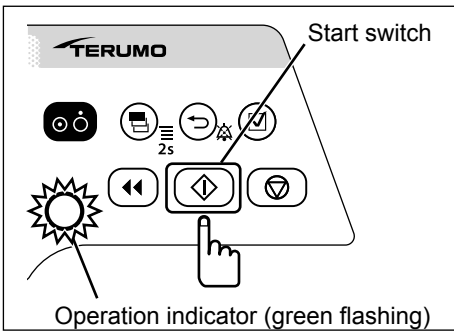
**11) Check the parameter value and that “OK?” is selected, press the Confirmation switch.**

**Checks**

- The input parameter is correct.
- The screen returns to the flow rate screen, and the icon of the selected advanced dose mode is displayed in the lower left of the flow rate display.



The selected advanced dose mode icon (See page 78.)



**12) Press the Start switch.**

**Notes**

- The solution delivery has started and is executed at the specified dose settings.
- The operation indicator flashes green.
- The volume delivered increases.
- The remaining time is recalculated based on the specified flow rate.

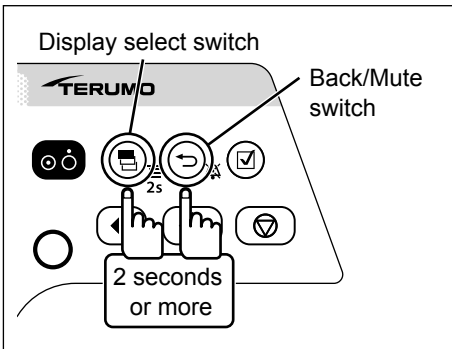


## History Function

With the history function, operation history (such as date, time, set flow rate, when the solution delivery was started or stopped, or when an alarm occurred) can be checked. The latest records of max. 10,000 items are stored. If 10,000 items are exceeded, the records are deleted from the oldest first.

### Notes

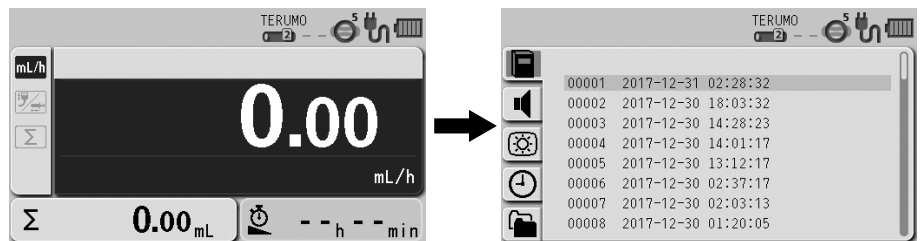
- The battery charge level display indicates the current status regardless of the displayed operation history.
- If the pump is dropped then a shock record will be created in the history. This record will be shown at the top of history.



- 1) **With the Back/Mute switch pressed and held, press and hold the Display select switch for 2 seconds or more.**

### Note

- The menu 2 screen is displayed and the icons are ready to be selected.

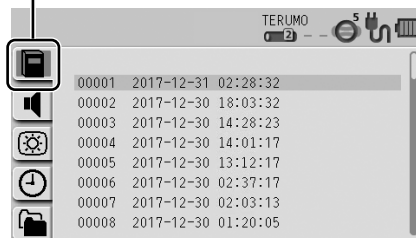


- 2) **Turn the Dial or press the Display select switch to select the history tab .**

### Note

- The history display has appeared.

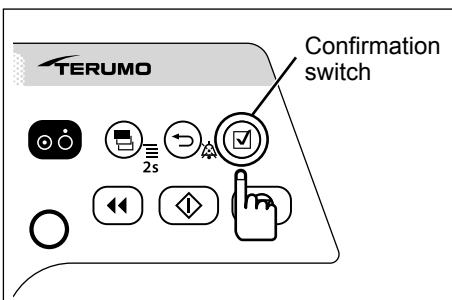
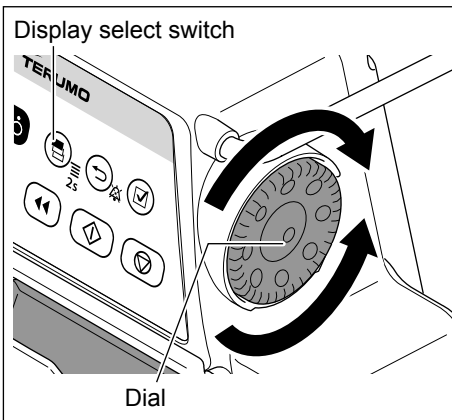
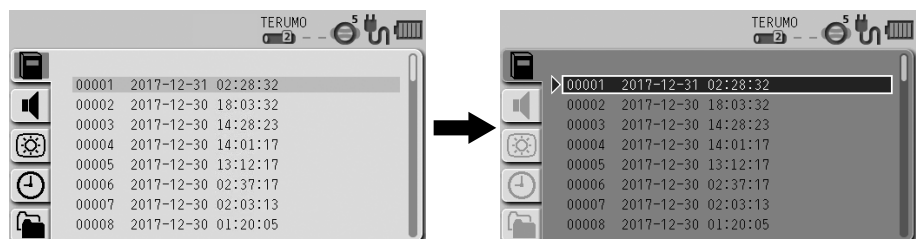
### History tab

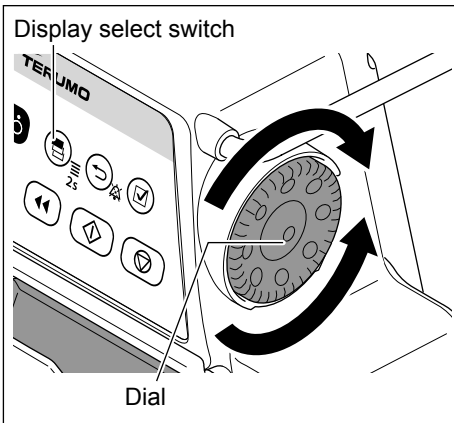


- 3) **Press the Confirmation switch.**

### Note

- The existing setting (light blue) changes to the selected status (dark blue).

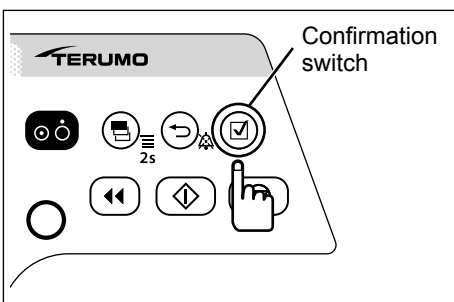
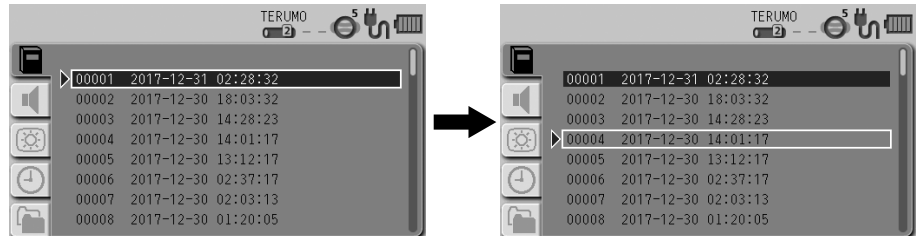




4) Turn the Dial or press the Display select switch to select the desired operation history.

**Notes**

- Turning the Dial or pressing the Display select switch moves the white frame to the next operation history item.
- Some items of the operation history are divided when a number is assigned.

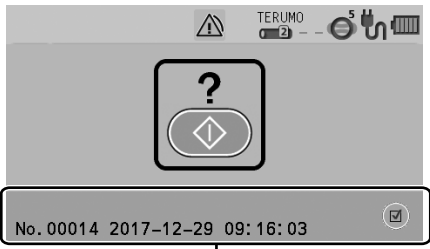
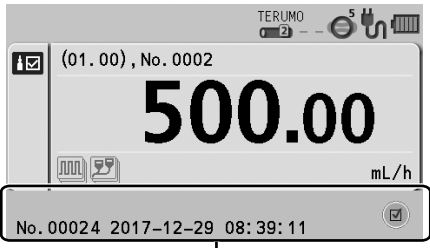



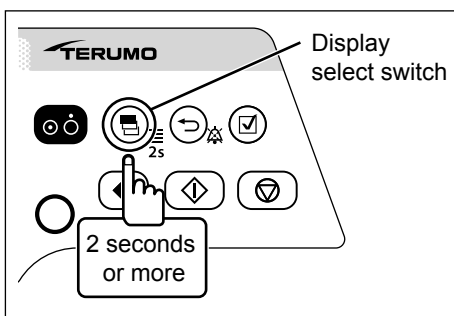
5) Press the Confirmation switch to display the detailed history and turn the Dial or press the Display select switch to select a history.

**Notes**

- The operation histories are classified by operation status and identified with the colours at the bottom area of LCD as shown in the table below.
- Screen transition
  - As described in Step 4), the Display select switch or Dial can be used to move up and down in the list.
  - Pressing the Confirmation switch in the list display displays the detailed history.
  - Pressing the Back/Mute switch in the detailed history returns to the list display.
  - The Display select switch or Dial can be used to move the previous or next detailed history.

Example of operation history	Colour of bottom area of LCD	Operation status
<p>No. 00011 2017-12-29 10:16:15</p> <p>White</p>	White	Operation history information
<p>No. 00023 2017-12-29 09:15:13</p> <p>Green</p>	Green	Operation history during solution delivery

Example of operation history	Colour of bottom area of LCD	Operation status
 <p>No. 00014 2017-12-29 09:16:03</p> <p>Pink</p>	Pink	Operation history during stop
 <p>(01.00), No. 0002</p> <p>500.00 mL/h</p> <p>No. 00024 2017-12-29 08:39:11</p> <p>Blue</p>	Blue	Operation history during purge or bolus (Hands On Bolus, Hands Free Bolus)
 <p>Stand By</p> <p>No. 00033 2017-12-29 07:27:00</p> <p>Orange</p>	Orange	Operation history during standby



**6) Press and hold the Display select switch for 2 seconds or more to return to the flow rate screen.**

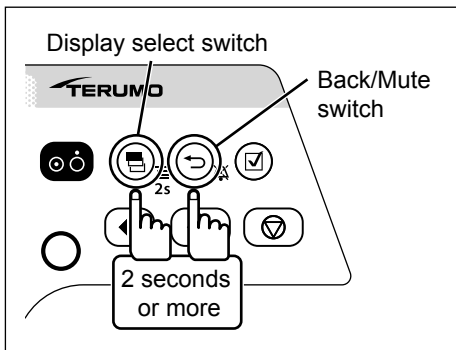
**Note**

- Set the correct time and date by following the procedure described on page 91 prior to use.

## Changing the Sound Volume

The Alarm Volume, the Key Operating Volume, and the Cable Insertion Alarm can be set on 4 levels.

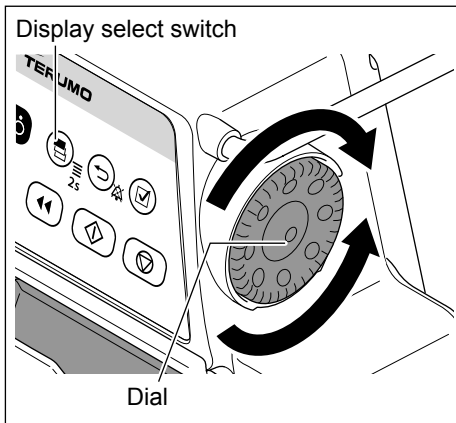
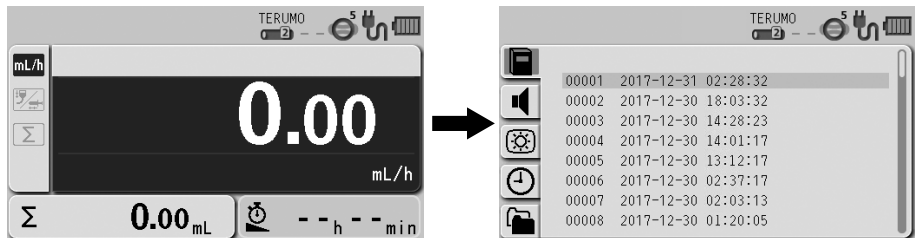
Type	Volume setting	Default setting	Note
Alarm Volume	1 to 3, Step	2	0 (very low), 1 (low), 2 (medium), 3 (high), Step (1 → 2 → 3) The 3 (high) volume is at least 60 dB (A), the 2 (medium) volume is between (low) and (high), and the 1 (low) volume is at least 50 dB (A). The measurements of these volumes were conducted based on IEC 60601-2-24:2012 (EN 60601-2-24:2015). For details, refer to IEC 60601-2-24:2012 (EN 60601-2-24:2015).
Key Operating Volume	0 to 3	1	
Cable Insertion Alarm	0 to 3	0	



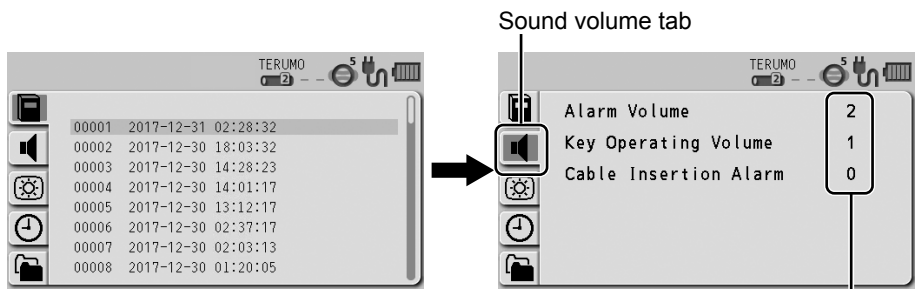
- 1) With the Back/Mute switch pressed and held, press and hold the Display select switch for 2 seconds or more.

**Note**

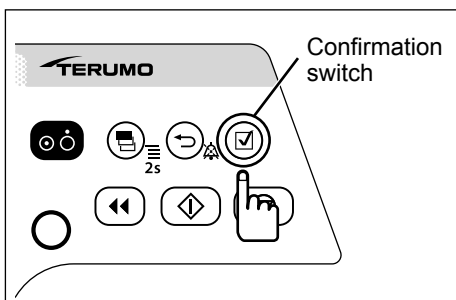
- The menu 2 screen is displayed and the icons are ready to be selected.



- 2) Turn the Dial or press the Display select switch to select the sound volume tab.



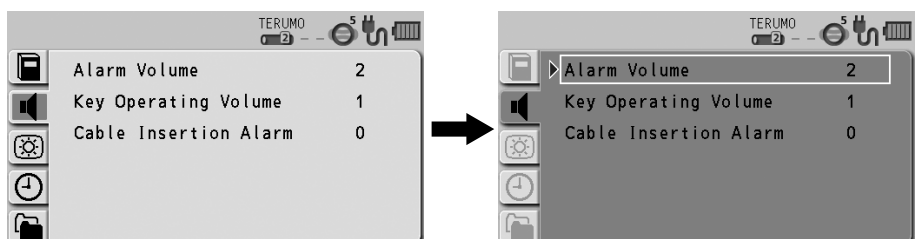
Current setting value

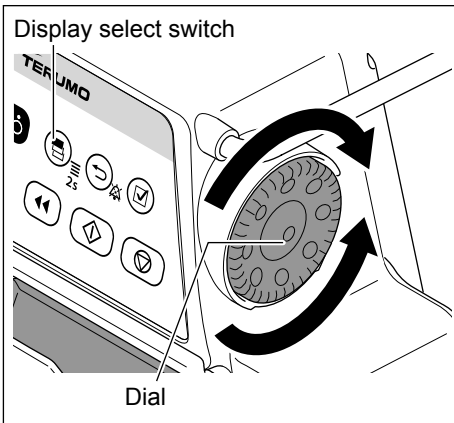


- 3) Press the Confirmation switch.

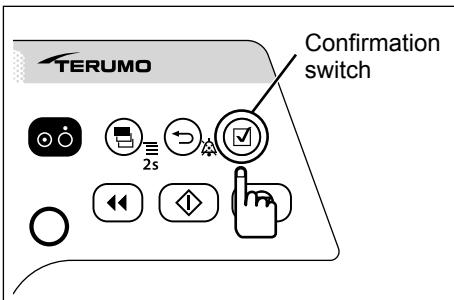
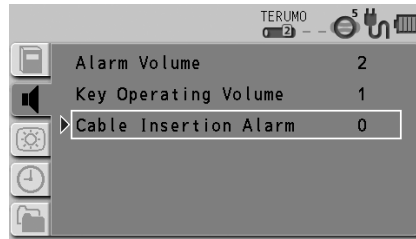
**Note**

- The white frame is displayed.





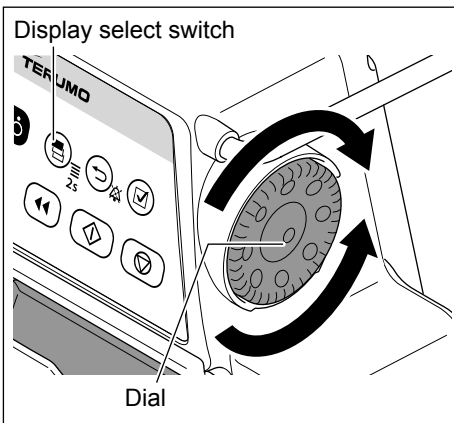
4) Turn the Dial or press the Display select switch to select an item to change.



5) Press the Confirmation switch to confirm the selection.

**Note**

- The display for the item to be changed has appeared.



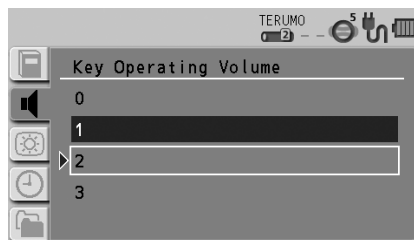
6) Turn the Dial or press the Display select switch to select the volume.

**Notes**

- Turning the Dial or pressing the Display select switch moves the white frame.
- When the white frame is placed on a desired level, the sound is audible.
- If "Step" for the alarm volume is selected, the volume levels increase in three steps.



Alarm Volume

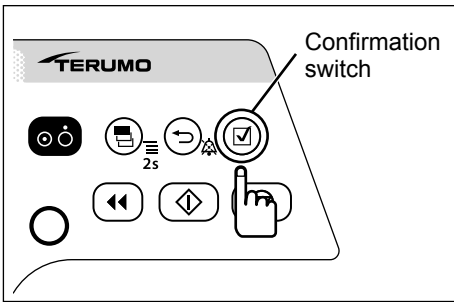


Key Operating Volume



Cable Insertion Alarm

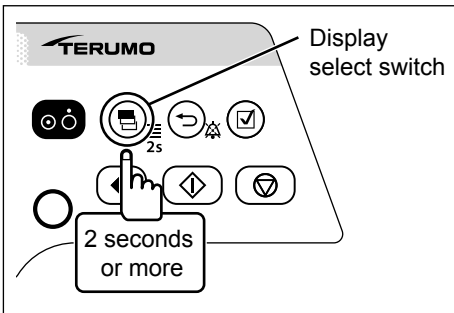
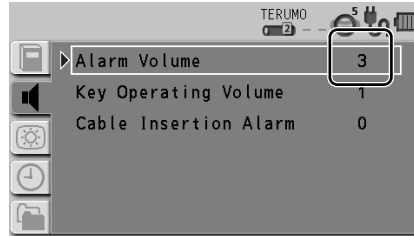
## Changing Settings on the Menu



7) Press the Confirmation switch to confirm the selection.

### Check

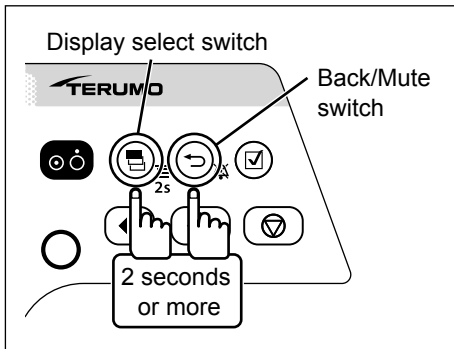
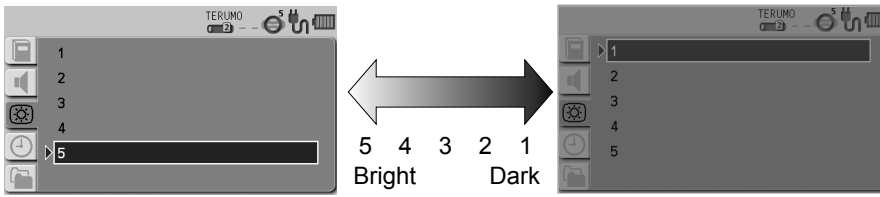
- The selected volume is displayed.



8) Press and hold the Display select switch for 2 seconds or more to return to the flow rate screen.

## Changing the Brightness

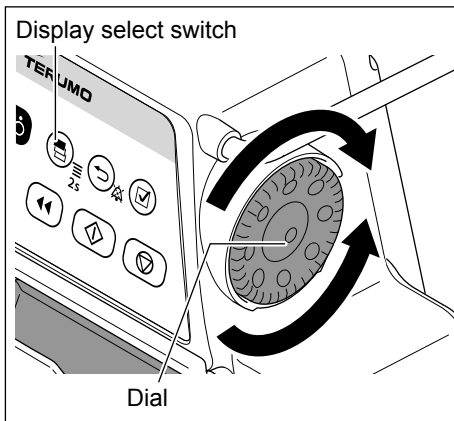
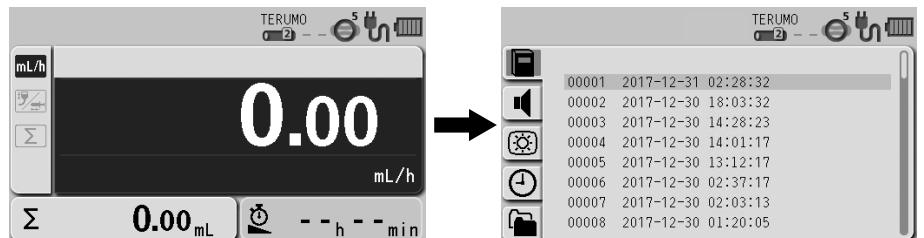
The brightness can be set in 5 levels (Default: 5).



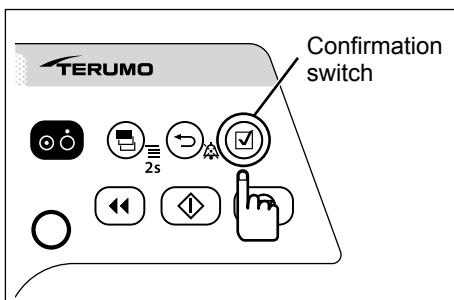
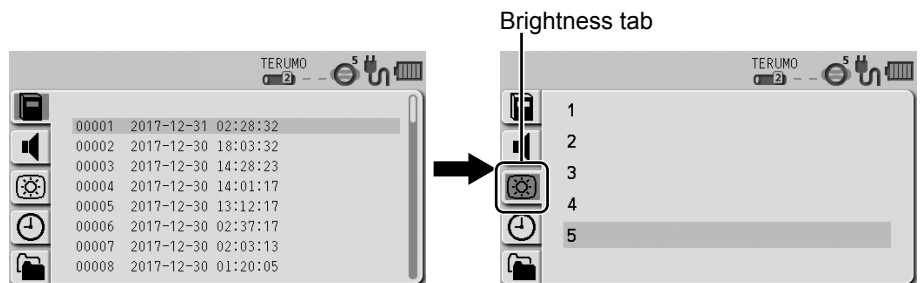
- 1) With the Back/Mute switch pressed and held, press and hold the Display select switch for 2 seconds or more.

**Note**

- The menu 2 screen is displayed and the icons are ready to be selected.



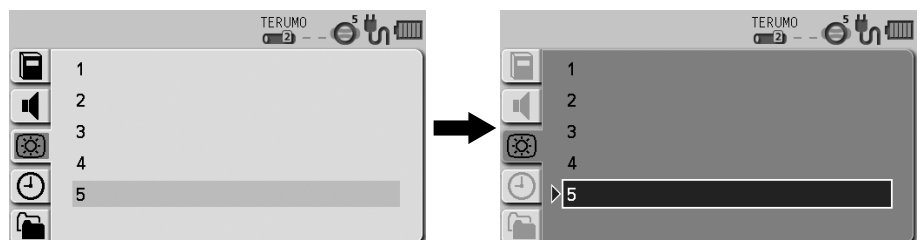
- 2) Turn the Dial or press the Display select switch to select the brightness tab .



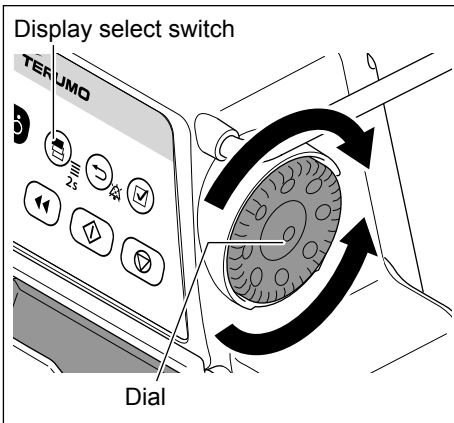
- 3) Press the Confirmation switch.

**Note**

- The existing setting (light blue) changes to the selected status (dark blue).



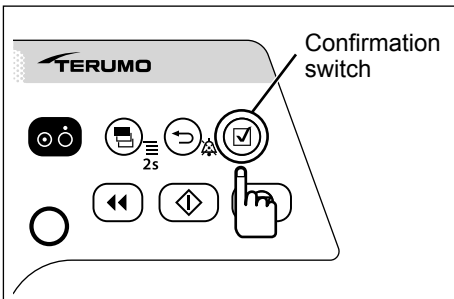
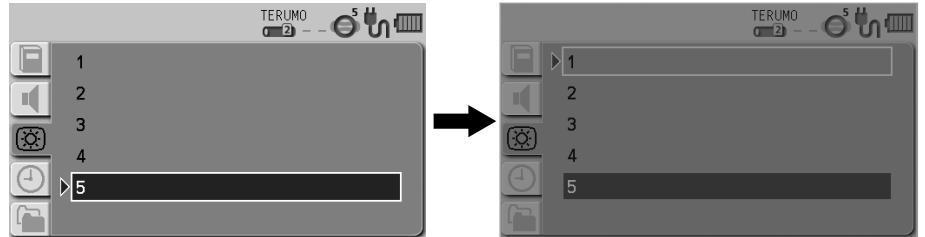
## Changing Settings on the Menu



- 4) Turn the Dial or press the Display select switch to select a brightness level.

### Notes

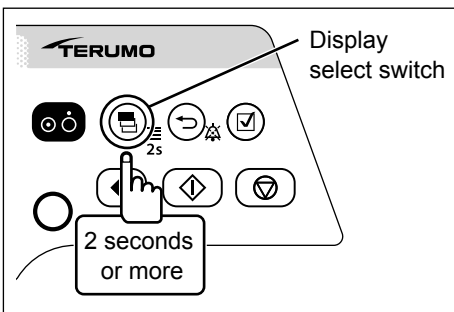
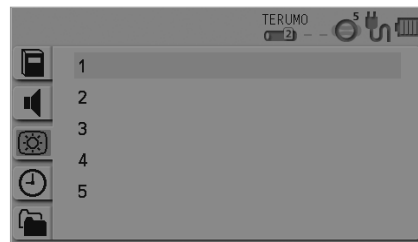
- Turning the Dial or pressing the Display select switch moves the white frame.
- When the white frame is placed on a desired brightness level, the brightness level is shown.



- 5) Press the Confirmation switch to confirm the selection.

### Check

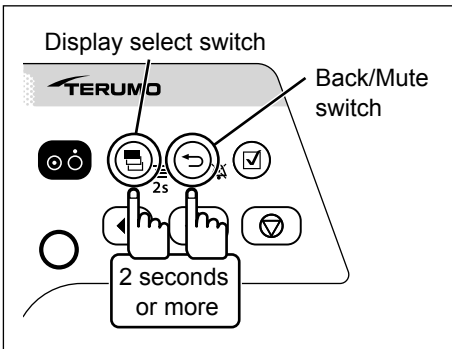
- The LCD is displayed with the brightness selected.



- 6) Press and hold the Display select switch for 2 seconds or more to return to the flow rate screen.

## Setting the Date and Time

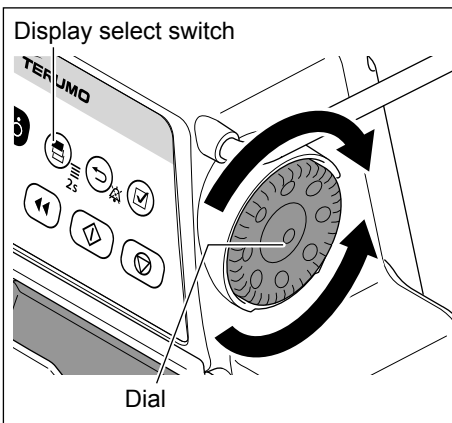
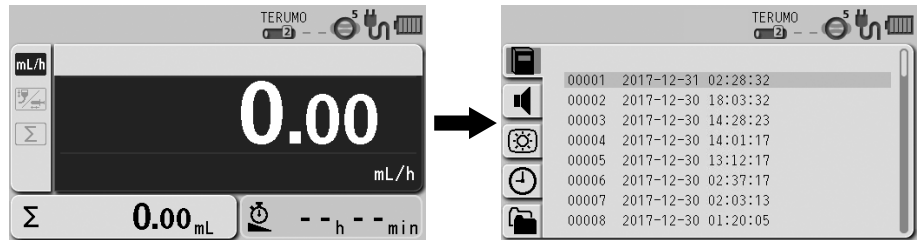
The date and time can be set. Set year, month, date, hour, and minute.



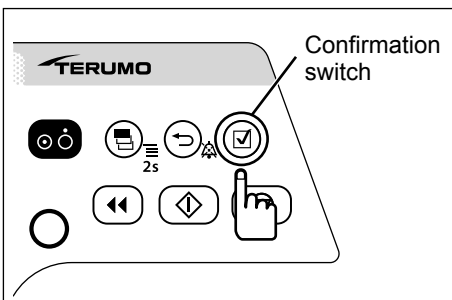
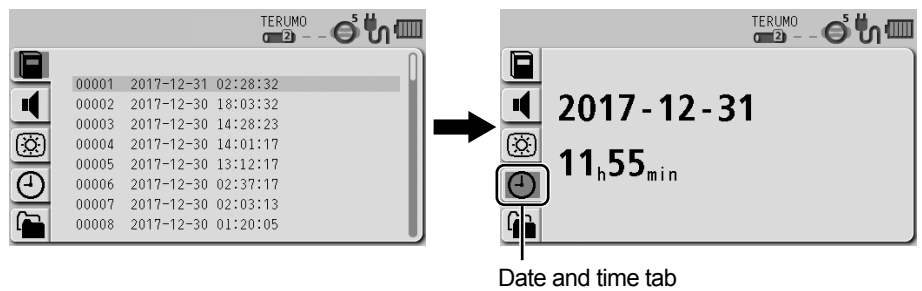
- 1) With the Back/Mute switch pressed and held, press and hold the Display select switch for 2 seconds or more.

**Note**

- The menu 2 screen is displayed and the icons are ready to be selected.



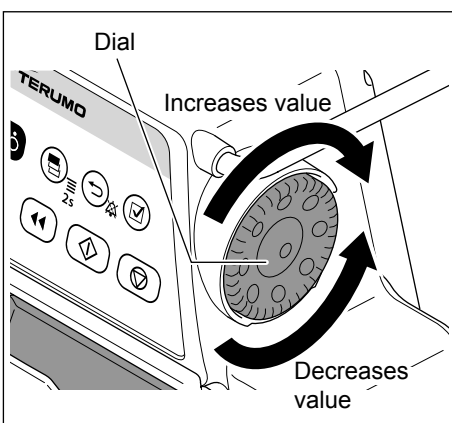
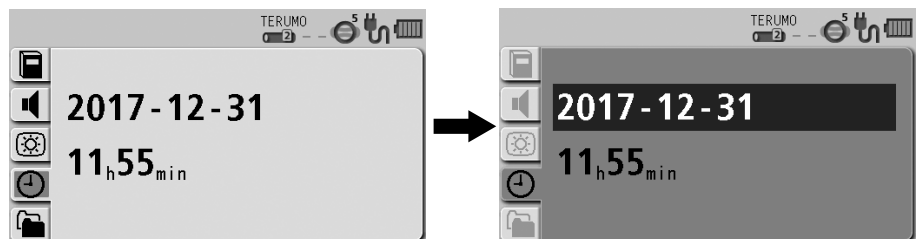
- 2) Turn the Dial or press the Display select switch to select the date and time tab .



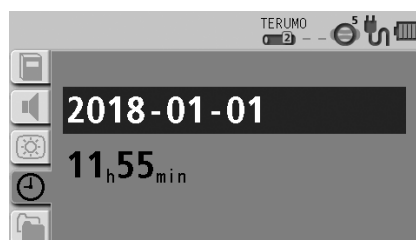
- 3) Press the Confirmation switch.

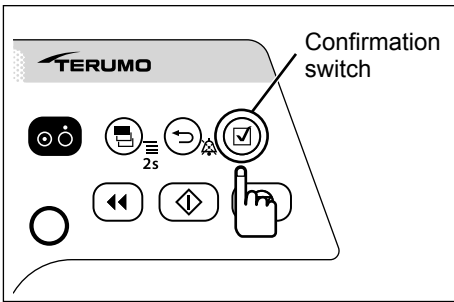
**Note**

- Year - month - date is displayed in dark blue (selected).



- 4) Turn the Dial to change the date.

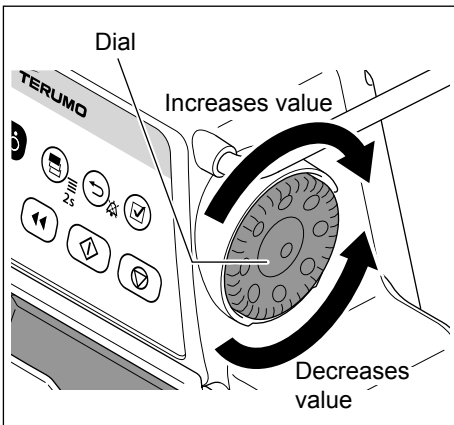
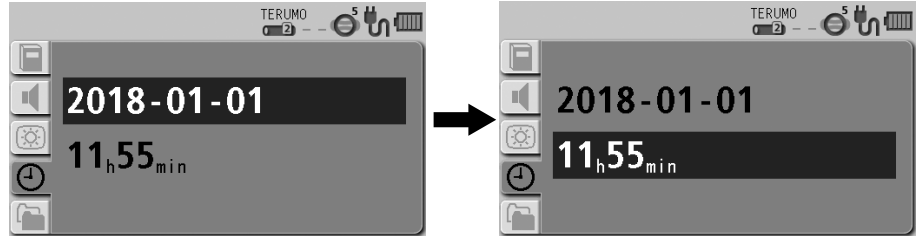




## 5) Press the Confirmation switch.

### Note

- The date setting is confirmed and hour - minute is displayed in dark blue (selected).



## 6) Turn the Dial to change the time.



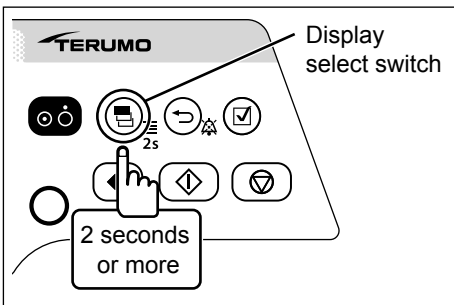
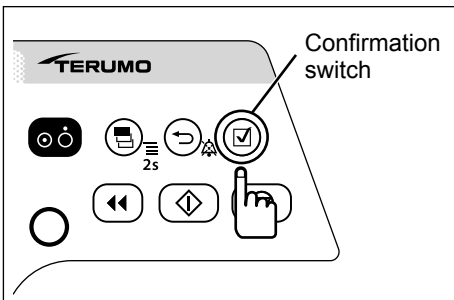
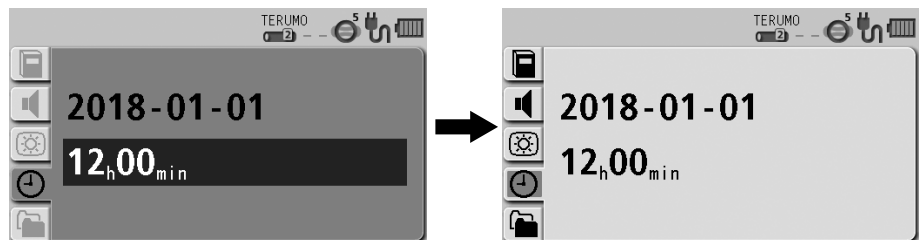
### Note

- When the Back/Mute switch is pressed, the parameter input is cancelled and the screen returns to the previous status.

## 7) Press the Confirmation switch.

### Notes

- The time setting is confirmed and the menu 2 screen appears with the icons in the selected status.
- The time is set to 00 seconds.

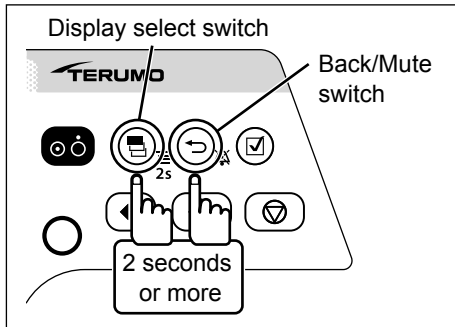


## 8) Press and hold the Display select switch for 2 seconds or more to return to the flow rate screen.

## Profile (TE-LM830 only)

Profiles allow drugs to be classified according to their use and need to be registered in the drug library software. Selecting a profile can limit the drugs available to each individual profile. Up to 30 profiles can be registered. Profiles can only be selected, if a library is uploaded to the pump.

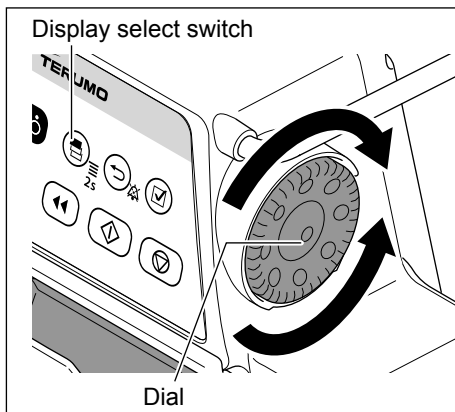
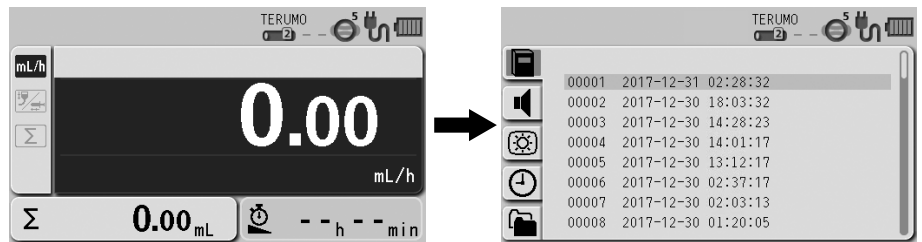
See page 53 for how to select the library.



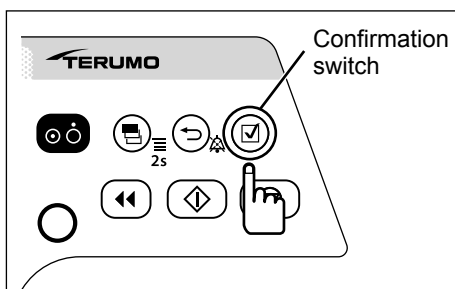
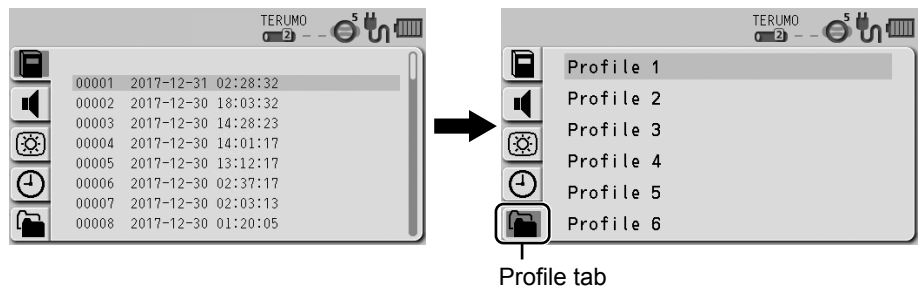
- 1) With the Back/Mute switch pressed and held, press and hold the Display select switch for 2 seconds or more.

**Note**

- The menu 2 screen is displayed and the icons are ready to be selected.



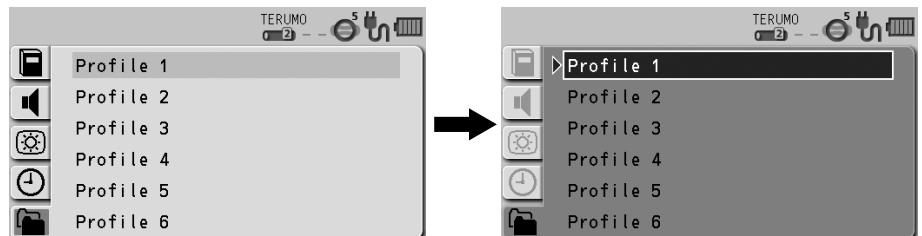
- 2) Turn the Dial or press the Display select switch to select the profile tab. If no library or profile is registered, the profile tab is not displayed.



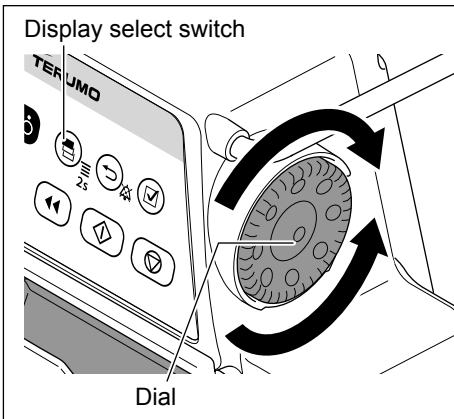
- 3) Press the Confirmation switch.

**Note**

- The existing setting (light blue) changes to the selected status (dark blue).



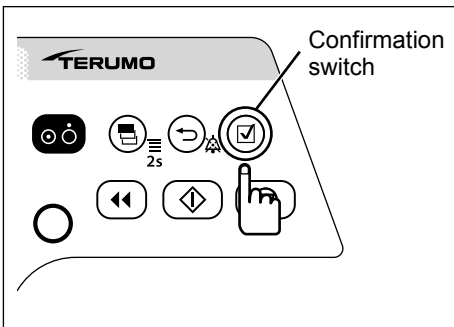
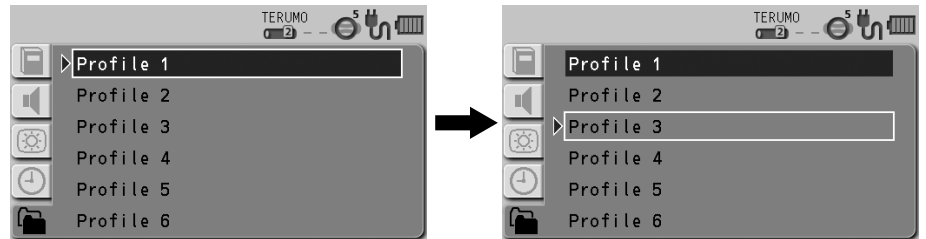
## Changing Settings on the Menu



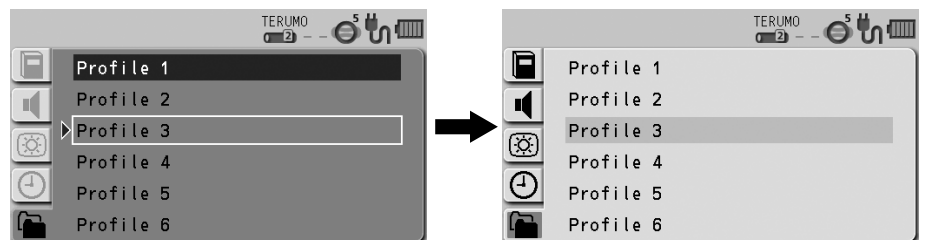
- 4) Turn the Dial or press the Display select switch to select a profile.

### Note

- Turning the Dial or pressing the Display select switch moves the white frame.



- 5) Press the Confirmation switch to confirm the selection.



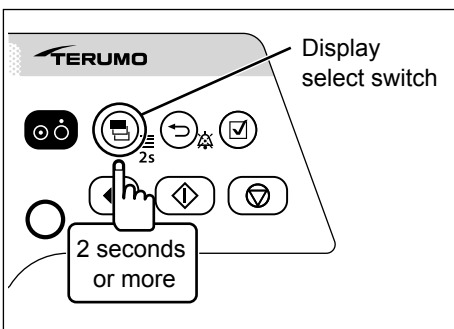
### Check

- In "Drug library", only the drugs set in the selected profile are available. (See page 53).

### Note

- See the dedicated editing software (TERUFUSION Drug Library Manager or TERUFUSION Software Package) for profile setting and registration of each drug.

- 6) Press and hold the Display select switch for 2 seconds or more to return to the flow rate screen.



### Note

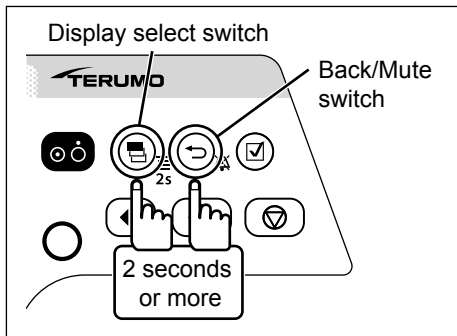
- When the AC power has been supplied, the selected profile will be displayed on the LCD after turning off the power.

## Communication Environment (TE-LM830 only)

Wireless LAN can be turned ON/OFF and the communication environment can be set. Up to 10 communication environments can be registered.

### ◆ Communication environment setting

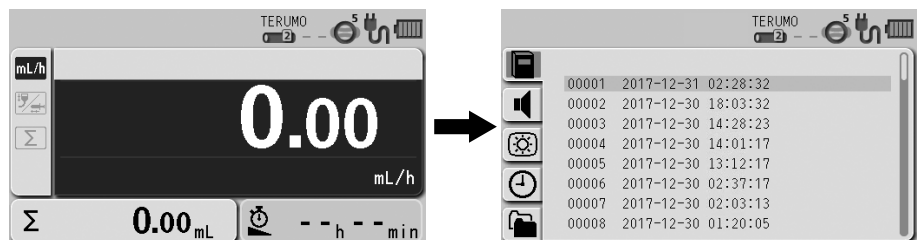
For details about how to register the communication environment setting to the pump unit, contact TERUMO trained service technicians.



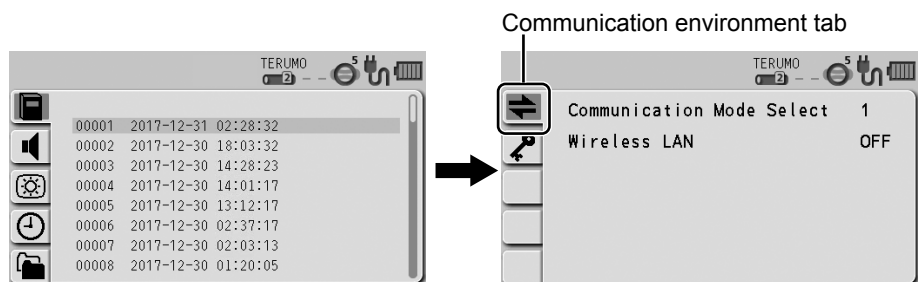
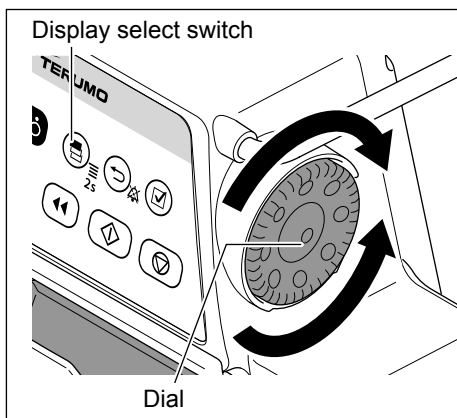
- 1) With the Back/Mute switch pressed and held, press and hold the Display select switch for 2 seconds or more.

#### Note

- The menu 2 screen is displayed and the icons are ready to be selected.



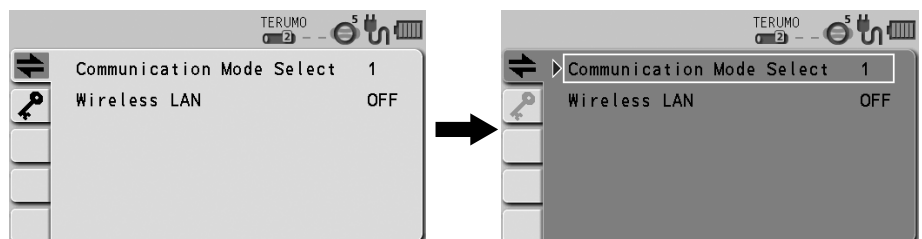
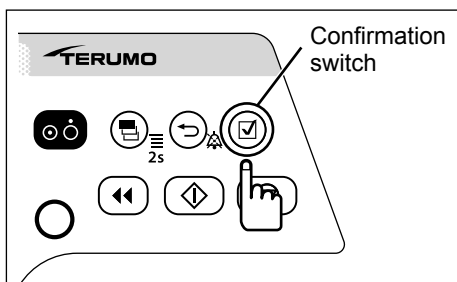
- 2) Turn the Dial or press the Display select switch to select the communication environment tab ⇄ .



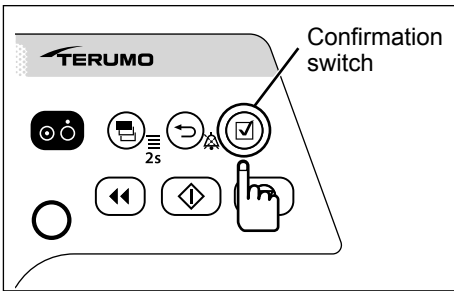
- 3) Press the Confirmation switch.

#### Note

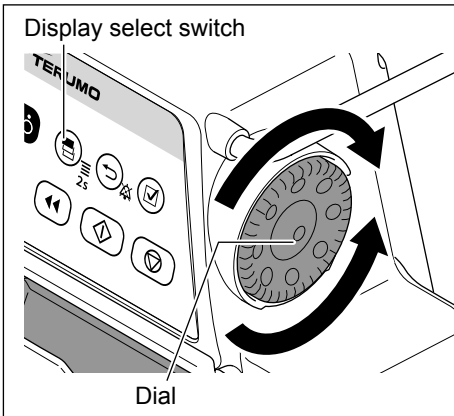
- The status changes from the icon selection (light blue) to the item selection (white frame).



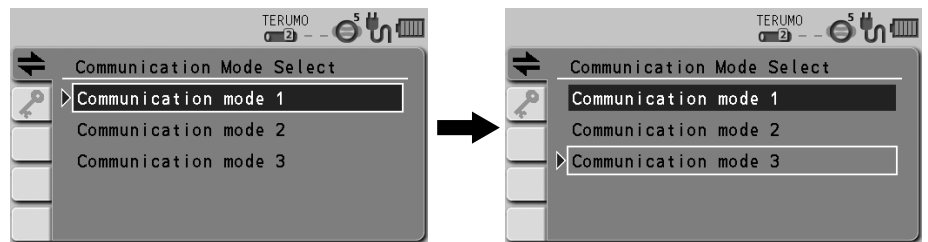
## Changing Settings on the Menu



- 4) Check that “Communication Mode Select” is selected, and then press the Confirmation switch.

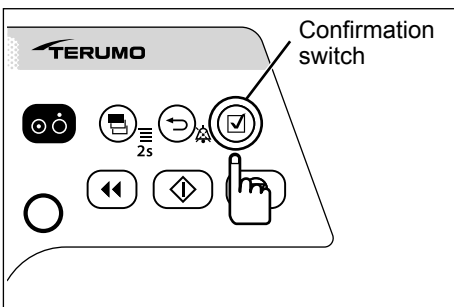


- 5) Turn the Dial or press the Display select switch to select the communication environment you want to set from the list of registered communication environments.



### Notes

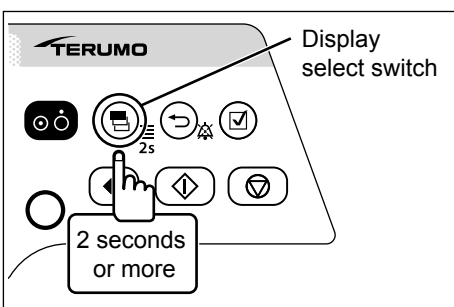
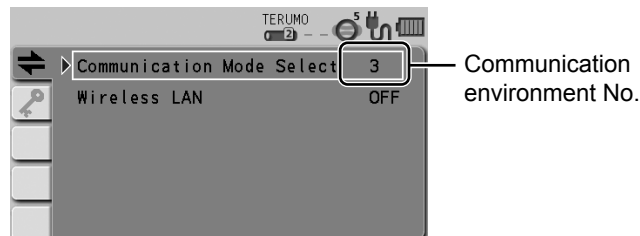
- Turning the Dial or pressing the Display select switch moves the white frame.
- The specified communication environments are restricted depending on the set profile.



- 6) Press the Confirmation switch to confirm the selection.

### Check

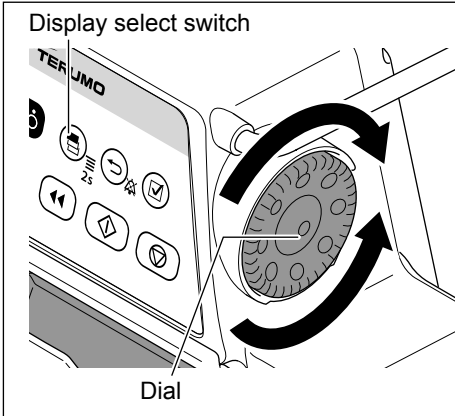
- The set communication environment No. is displayed on screen.



- 7) Press and hold the Display select switch for 2 seconds or more to return to the flow rate screen.

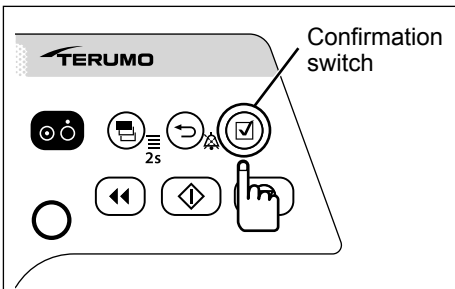
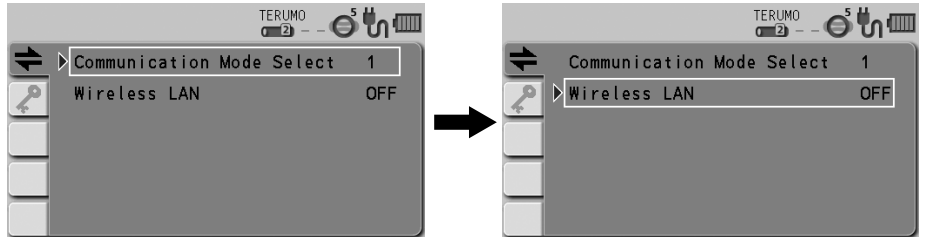
## ◆ Wireless LAN ON/OFF setting

- 1) Follow Steps 1) to 3) of “Communication Environment” (page 95) to display the communication environment setting screen.
- 2) Turn the Dial or press the Display select switch to select Wireless LAN.

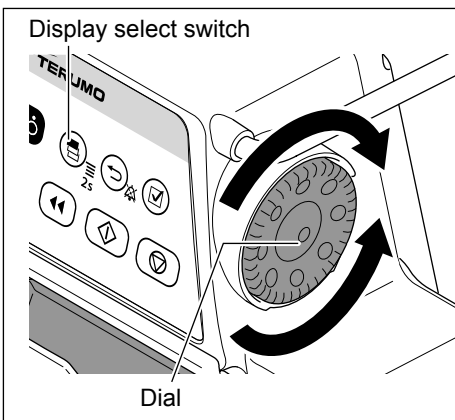
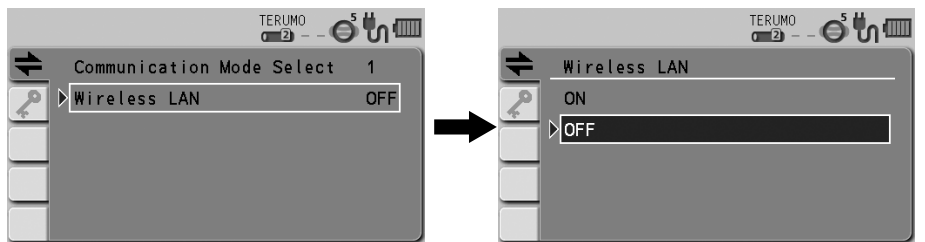


### Note

- Turning the Dial or pressing the Display select switch moves the white frame.



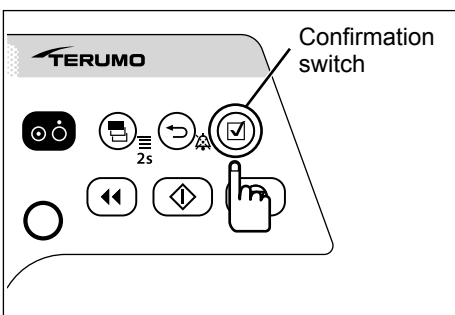
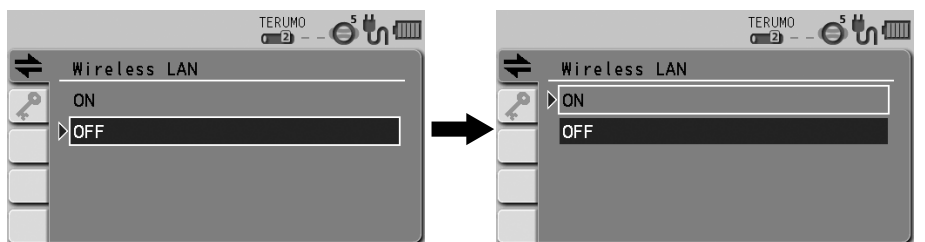
- 3) Press the Confirmation switch.



- 4) Turn the Dial or press the Display select switch to select ON/OFF.

### Notes

- The existing setting has been selected (dark blue).
- Turning the Dial or pressing the Display select switch moves the white frame.



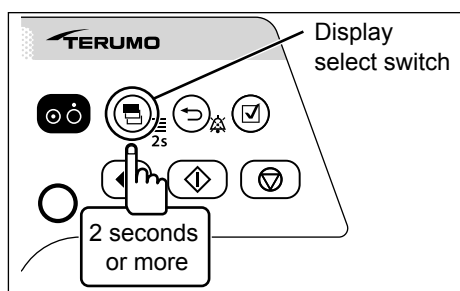
- 5) Press the Confirmation switch to confirm the selection.

### Check

- The selected wireless LAN setting is displayed.



## Changing Settings on the Menu



- 6) Press and hold the Display select switch for 2 seconds or more to return to the flow rate screen.

## Overview

Use infrared communication (IrDA), external communication (RS-232C) or wireless LAN to output the status of the pump to a network system (e.g. monitor system or CIS). (The status of the pump cannot be changed from a network system.) Ensure that the network system and the pump use the same communication conditions.

List of communication specifications

Communication method	Infrared communication (IrDA) (TE-LM830 only)	External communication (RS-232C) (TE-LM732A and TE-LM732N only)	Wireless LAN (TE-LM830 only)
Transmission rate	115200bps	115200bps	IEEE802.11b: 1Mbps to 11Mbps IEEE802.11g*: 6Mbps to 54Mbps IEEE802.11n*: 6.5Mbps to 72.2Mbps
Data length	8 bits	8 bits	-
Start bit	1 bit	1 bit	-
Stop bit	2 bits	1 bit	-
Parity check	None	None	-
Frequency (Europe)	-	-	2412 MHz (ch1) to 2472 MHz (ch13)
Encryption scheme	-	-	WPA2 (AES/TKIP), WPA (AES/TKIP), WEP
Operational mode	-	-	Infrastructure mode
LAN Standard	-	-	IEEE802.11b/g/n*

\* IEEE802.11g/n is applicable to catalogue number: TE-LM835xxx only.

Alphanumeric characters are entered for x in the catalogue number.

### Cautions

- When this product is connected with other devices, particularly note the following:
  1. When connecting this product with other medical equipment or network system, check its conformance to IEC 60601-1:2005+A1:2012 (EN 60601-1:2006+A1:2013) and IEC 60601-1-2:2014 (EN 60601-1-2:2015) prior to use in order to ensure the system safety.
  2. When connecting this product with a network system or other equipment, for safety, checking the manufacturer's specifications of the equipment is recommended. In addition, use EMI compliant products for the connection cable.
  3. When using the external communication function, pay particular attention, as it is more susceptible to the effect from a radio knife, mobile phone, radio device, defibrillator, etc. Regularly check that this product is operating normally.
  4. If connecting with a nurse call, always check in advance with the electrical contractor for compatibility, and connect with a system for which the connection function has been confirmed. [The functions regarding connection are not guaranteed.]
  5. If connecting with a buzzer or lamp instead of a nurse call, it should be used with a capacity of 12V DC, 1A or less.
  6. When using the wireless LAN communication function, the effect on other equipment by radio interference should be considered. [It may affect other equipment.]
  7. When connecting this product with a network, the settings of this product and the network system need to be compatible. Contact a vendor specialist for the correct settings and allow only the system administrator to perform settings. [Failure to connect with correct settings may result in interfering with the original functionality or performance of this product and affecting the network system.]
- Connection to a network including other devices may cause unpredicted and unacceptable risks for the patient, the user, or a third person. Be sure to identify, analyze, evaluate, and control those risks.
- Subsequent changes to the IT-network could introduce new risks and require additional analysis.
  - Changes to the IT-network include:
    1. Changes in the IT-network configuration.
    2. Connection of additional items to the IT-network.
    3. Disconnecting items from the IT-network.
    4. Update of equipment connected to the IT-network.
    5. Upgrade of equipment connected to the IT-network.

## About External Communication Functions

### Cautions

<Cautions regarding connecting communication cables, communication devices and the nurse call button>

- When using this product's external communication function to connect a network system and a nurse call button, check the specifications of the monitor manufacturer, the communication cable manufacturer, and the nurse call button manufacturer, and further, check safe operation. Further, when connecting to a nurse call button, do not exceed this product's rating (maximum 1 A). Also, in order to check the safety of the connections as a system, check their compatibility with IEC 60601-1:2005+A1:2012 (EN 60601-1:2006+A1:2013) and IEC 60601-1-2:2014 (EN 60601-1-2:2015). Not following these cautions could result in interference with other medical electrical equipment or breakdown.

### Notes

- Operating time using the internal battery is decreased when using external communication while using with the internal battery.
- The specified message (free message function) can be displayed on the pump unit via communication. (For details, contact TERUMO trained service technicians.)

## Network System Connection

### Procedure for Connecting the Network System

#### Caution

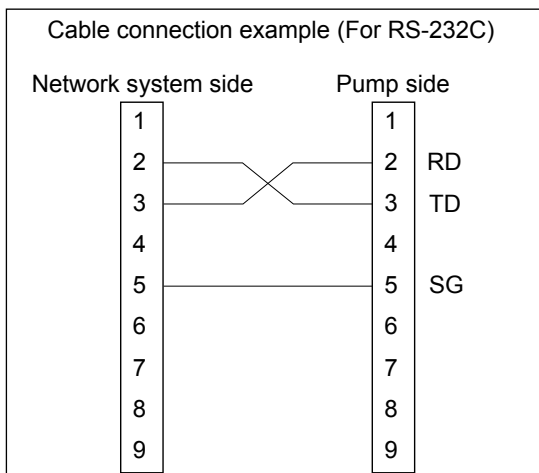
- When connecting this product with a network system or other equipment, for safety, checking the manufacturer's specifications of the equipment is recommended. In addition, use EMI compliant products for the connection cable.

#### < IrDA (For infrared communication)>

Fix the pump into the optional TERUFUSION Communication Rack System and then turn the power on for both so that the pump and rack system automatically communicate with each other. See the instruction manual for the rack system for communication between rack system and external device.

#### < RS-232C (For external communication terminal)>

- 1) Check that all the devices are powered off.
- 2) Connect the cable.
- 3) Turn on the devices.



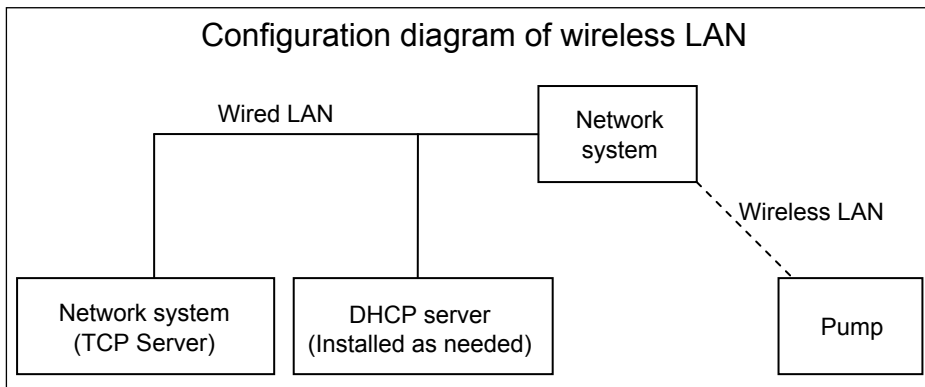
#### Note

- TERUMO cannot guarantee the connection.

## About External Communication Functions

### <Wireless LAN>

- 1) Use the TERUFUSION Drug Library Manager or TERUFUSION Software Package to set the communication environment in the pump.
- 2) Select a communication environment setting to be used for the pump.
- 3) Enable the wireless LAN of the pump.



### Cautions

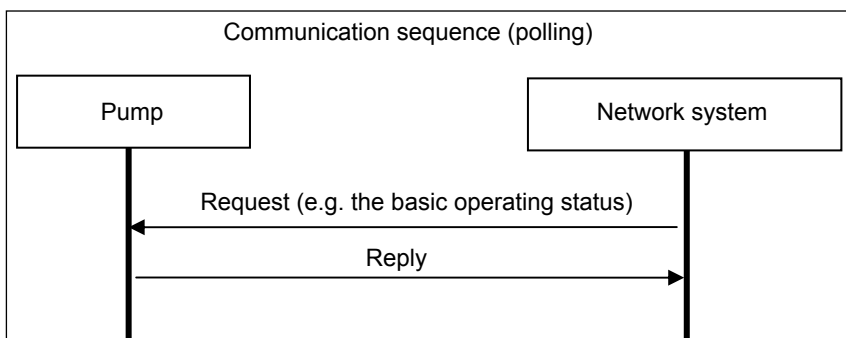
- When using the wireless LAN communication function, the effect on other equipment by radio interference should be considered.
- When connecting this product with a network, the settings of this product and the network system need to be compatible. Contact a vendor specialist for the correct settings and allow only the system administrator to perform settings.

### Note

- TERUMO cannot guarantee the connection.

### Transmission Procedure

When the network system sends an instruction (REQ: REQUEST) to the pump, the pump replies (REP: REPLY) to the instruction. The pump communicates with the network system on the predefined network (TCP Server) over the wireless LAN. The following shows an example of the communication sequence.



### Notes

- It does not respond to data without a matching device ID (identification information), in other words, received content is not self-addressed.
- Wireless LAN communication is not available when it is attached to the rack system and is conducting IrDA communication.

## Packet

### <Packet format>

The following shows the packet format.

#### Packet format

STX 0x02	Packet data (XML format) (Arbitrary size)	CRC16 (4byte)	ETX 0x03
-------------	--	------------------	-------------

(Packet data and CRC16 use ASCII code.)

- STX  
0x02 (Fixed)
- Packet data  
Data division written in XML format (For details, see this page "Packet <Packet data>".)
- CRC16  
Error detection calculation for the packet data division. The polynomial to be used is CRC-16-CCITT.
- ETX  
0x03 (Fixed)
- Measures for a packet error  
If the pump receives data without STX and/or ETX, the data previously received become invalid.  
If the pump receives data with the CRC error, the data previously received become invalid.

### <Packet data>

For the XML declaration statement, only `<?xml version="1.0"?>` is allowed.

Do not use the DOCTYPE declaration.

A space, a tab, and any control code including a line break are not allowed.

XML entity reference notation is not supported.

### • Request packet data format

The following shows the request packet data format used when a network system (or TERUFUSION Communication Rack System) makes a request to the pump.

#### Request packet data format

```
<?xml version="1.0"?>
```

<REQ>	<DEVID></DEVID>	<CMD></CMD>	</REQ>
-------	-----------------	-------------	--------

- REQ tag:  
This tag and its element are required.  
This indicates a request packet from the network system to the pump.  
The pump does not reply to a request without this tag.
- DEVID tag:  
This tag is required.  
This tag indicates the device ID of the pump.  
The pump replies when the device ID of the element matches that of the pump.  
When the network system obtains the device ID of the pump, the element is omitted. If element is omitted, the pump replies to only the DEVID tag without conditions, and sends its own device ID as the reply data.
- CMD tag:  
This tag indicates the command and data to the pump.  
The pump replies to one CMD tag.  
For details on the element commands and data, see page 104.  
The element is converted using Base64.

## About External Communication Functions

### • Reply packet data format

The following shows the reply packet data format used when the pump replies to a request packet.

#### Reply packet data format

```
<?xml version="1.0"?>
```

<REP>	<DEVID></DEVID>	<CMD></CMD>	</REP>
-------	-----------------	-------------	--------

- **REP tag:**  
This tag indicates the reply from the pump to the request command sent by the network system.
- **DEVID tag:**  
This tag indicates the device ID of the pump.
- **CMD tag:**  
This tag indicates the command and data from the pump to the request command.  
For details on the element commands and data, see this page “Command Format <Reply>”.  
The element is converted using Base64.

### Command Format

#### <Request>

The following shows the format of a request command received by the pump.

The request command is used as the element of the CMD tag of a request packet format.

#### Request command format

Sequence	Command	SubCommand	Data
----------	---------	------------	------

- **Sequence:**  
For a command from the network system: 0x00-0x7E  
For a command from the TERUFUSION Communication Rack System: 0x80-0xFE  
The following sequence numbers are reserved: 0xFF and 0x7F.
- **Command:**  
For details, see page 105 “Data Format”.
- **SubCommand:**  
For details, see page 105 “Data Format”.
- **Data:**  
Data is sent according to Command or SubCommand.  
For details, see page 105 “Data Format”.

#### <Reply>

The following shows the format of a reply command the pump sends.

The reply command is used as the element of the CMD tag of the reply packet format.

#### Reply command format

Sequence	Command	SubCommand	Execution result	Data
----------	---------	------------	------------------	------

- **Sequence:**  
The pump sends the same value as the sequence number of the request command received.
- **Command:**  
The pump sends the same value as that of Command of the request command received.
- **SubCommand:**  
The pump sends the same value as that of SubCommand of the request command received.

- **Execution result:**

When the pump has received a request command and successfully processed it, the pump sends “0x00” indicating that execution is successful.

If the request command failed due to an error, the pump sends a value between 0x11 and 0x15 as the execution result.

The following table lists the execution results.

Item	Size	Details
Execution result	1	0x00: Successfully processed
		0x11: Command or SubCommand cannot be identified or is undefined.
		0x12: The command is invalid, being unable to be executed.
		0x13: Short message
		0x14: Long message
		0x15: The parameter is outside the range.

- **Data:**

If the execution is successful (0x00), the pump sends the processing results according to the requested command and the sub command.

If the execution failed due to errors (0x11, 0x12, 0x14, 0x15), the pump sends the requested command and the sub command.

If the execution failed due to the error (0x13), the pump sends 0x000000.

### Data Format

#### <Requesting basic operating status>

- **Overview**

The current basic operating status of the pump is obtained.

- Command : 0x01
- SubCommand : 0x0000: Basic operating status is Request.
- Data

Network system → Pump : None

Pump → Network system : With data (See below.)

The following table lists the details of the “Basic operating status” data:

#### Basic operating status (Do not handle reserved data.)

Item	Size (Byte)	Details	
Software Ver.	2	Range: 0x0000-0xFFFF	
Basic operating status	1	Upper 4 bits	
		0x0	Stop (Reserved)
		0x1	Start (Reserved)
		0x2	Standby (Reserved)
		0x3	Purge (Reserved)
		0x4	Hands On Bolus (Reserved)
		0x5	Hands Free Bolus (Reserved)
		0x6-0xF	(Reserved) (Reserved)
(Reserved)	1	(Reserved)	
(Reserved)	1	(Reserved)	

## About External Communication Functions

Item	Size (Byte)	Details	
Alarm information	3	b0 (low order)	Shutdown Notice alarm
		b1	Link Interruption alarm
		b2	Completion alarm
		b3	Lower Occlusion alarm
		b4	Anti-free Flow Clip alarm (TE-LM730A, TE-LM732A and TE-LM830) (Reserved) (TE-LM730N and TE-LM732N)
		b5	Drip Sensor Dislocation alarm
		b6	Free Flow alarm
		b7	Line Empty alarm
		b8	Flow Rate Abnormality alarm
		b9	Air-in-line alarm
		b10	Upper Occlusion alarm
		b11	Door alarm
		b12	Nearly Empty alarm
		b13	Power Failure alarm
		b14	(Reserved)
		b15	AC power detector function
		b16	No Flow Rate alarm
		b17	(Reserved)
		b18	No VTBI alarm
		b19	Battery alarm
		b20	Start Reminder
		b21	Pressure alarm
		b22	Maintenance timer
		b23 (high order)	Battery Replacement Time/Failure alarm
		One bit used for each item. ("1" indicates active.)	
Power status	1	b0-b3 (low order)	Battery level 0x0: (Reserved) 0x1: Remaining battery level, 1 bar 0x2: Remaining battery level, 2 bars 0x3: Remaining battery level, 3 bars 0x4: Remaining battery level, 4 bars 0x5: Remaining battery level, 5 bars 0x6-0xF: (Reserved)
		b4-b5	Power type 0x0: Battery drive 0x1: AC drive 0x2-0x3: (Reserved)
		b6-b7 (high order)	Sub-battery status 0x0: (Reserved) 0x1: Sub-battery, normal 0x2: Sub-battery, abnormal 0x3: (Reserved)

Item	Size (Byte)	Details	
Operation monitor	1	b0-b1 (low order)	Lower Occlusion monitor (0x0: 0%, 0x1: 25%, 0x2: 50%, 0x3: 75%)
		b2	(Reserved)
		b3	Alarm sound status (0: Without sound, 1: With sound)
		b4	Keypad lock status (0: Not locked, 1: Locked)
		b5	Monitor for the door (0: Close, 1: Open)
		b6	Drip sensor status (0: Connected, 1: Not connected)
		b7 (high order)	Anti-free flow clip (0: Not attached, 1: Attached) (TE-LM730A, TE-LM732A and TE-LM830) (Reserved) (TE-LM730N and TE-LM732N)
		One bit used for b2 - b7. ("1" indicates active.)	
Infusion set status	1	0x0	(Reserved)
		0x1	20 drops
		0x2	60 drops
		0x3	(Reserved)
		0x4	(Reserved)
		0x5	(Reserved)
		0x6	(Reserved)
		0x7-0xFF	(Reserved)
Flow rate	3	Value of 100 times the set flow rate	
Volume delivered	3	Value of 100 times the volume delivered	
VTBI	3	Value of 10 times the VTBI Infinite: 0xFFFFFFFF	
Dosage rate	3	Value of 100 times the dosage	
Unit of dosage rate	1	0x00: mL/h 0x04: µg/kg/min 0x08: mg/kg/h	
Weight	2	Value of 10 times the weight Invalid value (when the function is disabled): 0xFFFF	
Dilution	3	Value of 100 times the dilution Invalid value (when the function is disabled): 0x000000	
Unit of dilution	1	0x13: mg/mL Invalid value (when the function is disabled): 0x00	
Drug library Ver.	2	Version of the drug library Drug library is registered: 0x0001-0xFFFF Drug library is not registered: 0x0000	
Drug library number	2	Number of the drug library Selecting dose mode (weight mode) No.1 (µg/kg/min): 0x0FFD Selecting dose mode (weight mode) No.2 (mg/kg/h): 0x0FFE Invalid value (when the function is disabled): 0x0000	
Occlusion pressure setting	1	bit0-bit3: Setting of occlusion pressure. 1 to 10. Occlusion pressure range: 0x01-0x0A bit7: Setting of occlusion detection pressure 1 = In 10 levels (bit4-bit6: Reserved)	
Hands On Bolus flow rate	2	100.00 to 1200.00 mL/h (100 mL/h step)	
Hands Free Bolus VTBI	3	Value of 100 times the Bolus VTBI Invalid value (when the function is disabled): 0x000000	

## About External Communication Functions

Item	Size (Byte)	Details
Hands Free Bolus dose time (Bolus VTBI time)	2	0 to 3600 s (1 s step) Invalid value (when the function is disabled): 0x0000
Hands Free Bolus flow rate	3	Value of 100 times the flow rate Invalid value (when the function is disabled): 0x000000
Infusion set brand number	1	Brand number of the infusion set selected
Total number of bytes	46	

\* For more details, contact TERUMO trained service technicians.

### Format of Transmitted and Received Packet

When a network system communicates with the pump, the monitor obtains the device ID from the pump identifying itself. Then, the monitor starts to communicate with the pump.

The following shows the format of communication packet.

#### 1. Device ID request (network system → pump)

Data example

```
[STX]<?xml version="1.0"?><REQ><DEVID></DEVID></REQ>8411[ETX]
```

Note) [STX]: 0x02, [ETX]: 0x03

\* In this case, CRC is "8411".

#### 2. Device ID reply (pump → network system)

Data example

```
[STX]<?xml version="1.0"?><REP><DEVID>000100700000001201000001</DEVID></REP>D38C[ETX]
```

Note) [STX]: 0x02, [ETX]: 0x03

\* This is an example of the reply where the device ID is "000100700000001201000001".  
In this case, CRC is "D38C".

#### 3. Basic operating status request (network system → pump)

Data example

```
[STX]<?xml version="1.0"?><REQ><DEVID>000100700000001201000001</DEVID><CMD>AQEAAA==</CMD></REQ>A9A4[ETX]
```

Note) [STX]: 0x02, [ETX]: 0x03

\* This is an example of the basic operating status request where the device ID is "000100700000001201000001", the sequence number is "01", the command is "01", and the sub command is "0000".  
In this case, CRC is "A9A4".

#### 4. Basic operating status reply (pump → network system)

Data example

```
[STX]<?xml version="1.0"?><REP><DEVID>000100700000001201000001</DEVID><CMD>AAEAAAADAQAAAAAAAFVA  
AAAAAAAAAAAAAAAAAAD//wAAAACZmQAAAgAAAAAAAAAAAAAAAAA</CMD></REP>85C8[ETX]
```

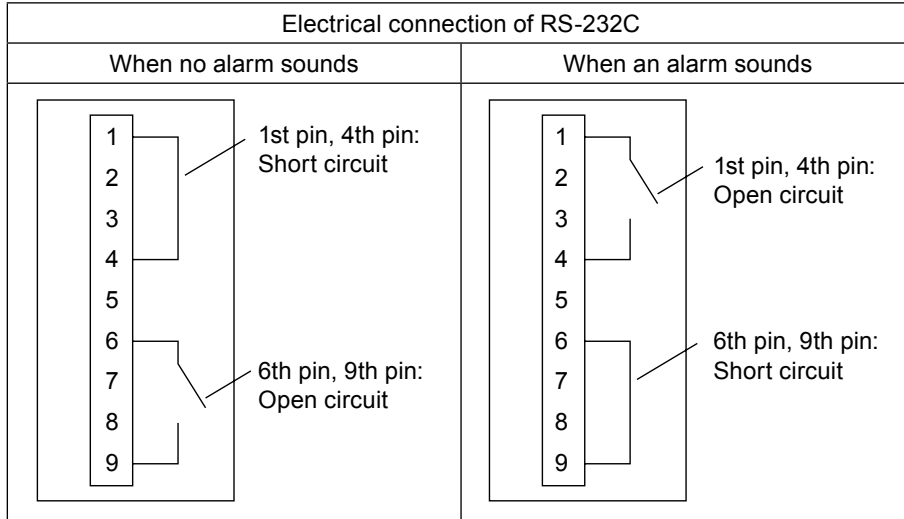
Note) [STX]: 0x02, [ETX]: 0x03

\* This is an example of the reply where the pump is stopped.  
In this case, CRC is "85C8".

**Procedure for Connecting to Nurse Call**

The pump can output a nurse call alarm by using the RS-232C.

**1) Connect the pins of the external communication/nurse call connector.**



**Cautions**

- If connecting with a nurse call, always check in advance with the electrical contractor for compatibility, and connect with a system for which the connection function has been confirmed.
- If connecting with a buzzer or lamp instead of a nurse call, it should be used with a capacity of 12V DC, 1A or less.

**Notes**

- TERUMO cannot guarantee the connection.
- If an alarm sounds, this product sends signals to the nurse call for approx. 5 seconds.
- If an error is displayed, this product sends a continuous signal.

In order to ensure the safe use of the infusion pump, make sure it is cleaned and inspected after use and stored in an appropriate environment. If you find any damage or malfunction, immediately stop using the pump and contact TERUMO trained service technicians.

## Cleaning

### Cautions

- Clean the AC inlet, fingers, occlusion detector etc. on a regular basis. Failure to conduct the regular cleaning may result in damage, failure or malfunction to/of this product.
- If any parts (fingers, occlusion detector etc.) of this product need to be removed for cleaning, contact TERUMO trained service technicians.
- When disinfecting, do not use a sterilizer. Use a gauze (damp with antiseptic solution) to wipe the product, and wipe off the antiseptic solution with a gauze (damp with cold/lukewarm water), and then thoroughly wipe off any moisture with a dry soft cloth.
- Before cleaning, always turn off the power and disconnect the AC power cable. Otherwise it may cause an electrical shock hazard. When AC power is supplied by the optional rack system (Model: TE-RS700, TE-RS800, TE-RS811), first remove the pump from the rack system, then conduct cleaning.
- If any adhered drug solution is present, the solution delivery or alarm detection may not operate correctly or may interfere with the normal operation of the clamp part and/or movable part of the pole clamp. If any drug solution is present, clean immediately with a cotton swab.
- Do not wipe with undesignated alcohol, other organic solvents such as thinner, or povidone-iodine. Using organic solvent or any antiseptic solution other than those permitted for use may result in damage to or failure of this product.
- Do not use an electric dryer to dry this product. This product may be damaged.
- This product and the pole does not have a waterproof structure. Therefore, do not wash with running water or immerse in water. It may cause damage or failure of the product.

Examples of disinfectants (ingredient names) which can be used are listed below.

### Examples of Cleaning Disinfectants (Ingredient Names)

Ingredient Name	Dilution (e.g.)
Chlorhexidine gluconate	5%
Benzalkonium chloride	10%
Ethanol*	76.9 - 81.4vol%

When using disinfectant, follow the instruction manual of each disinfectant (regarding degree of dilution, etc.).

\* Do not use ethanol to disinfect the following:

- Air-in-line detector and occlusion detector of the main unit
- Drip sensor
- One Touch Pole Clamp (specified parts only)

For details, see page 111.

## How to Clean Components

After use, clean all components as described below.

### Cleaning the panel surface

Wipe with a damp (not wet) soft cloth.

### Cleaning the outside of the infusion pump and the Dial

Wipe with a damp (not wet) soft cloth.

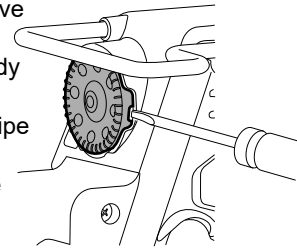
When disinfecting, use a designated disinfectant.

The Dial is fixed to the body of the infusion pump with a magnet.

Remove it following the procedure below before cleaning.

#### How to remove the Dial

- 1 Turn the groove of the Dial to the rear of the device.
- 2 Place a flathead screwdriver in the groove of the Dial and push it outwards.
- 3 Remove the Dial and wipe clean the body and the Dial.  
Grease is applied to the shaft. Do not wipe it off.
- 4 When you have finished cleaning, fit the Dial back onto the body.
- 5 After fitting, turn on the power.  
Check that setting for flow rate etc., can be performed.

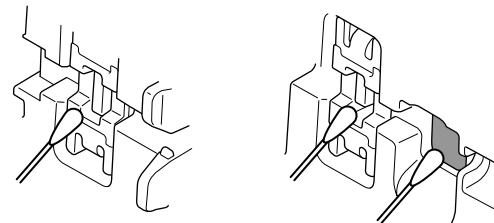


### Cleaning the buffer plate

Wipe dirt off gently with a cotton swab or damp cloth (not wet).

Cleaning the tube clamp/anti-free flow unit (TE-LM730A, TE-LM732A and TE-LM830).  
Cleaning the tube clamp (TE-LM730N and TE-LM732N only).

Lightly wipe off dirt with a cotton swab or damp cloth (not wet).



### Cleaning the air-in-line detector and the occlusion detectors

Wipe dirt off gently with a cotton swab or damp cloth (not wet).

\* Do not use ethanol to disinfect the Air-in-line detector and the occlusion detector.


### Cautions

- Do not rub the panel surface with a hard object.
- Pay attention not to damage the tube attachment surface when cleaning.
- Do not rub with a hard object such as forceps or with a sharp object etc.

## After Use

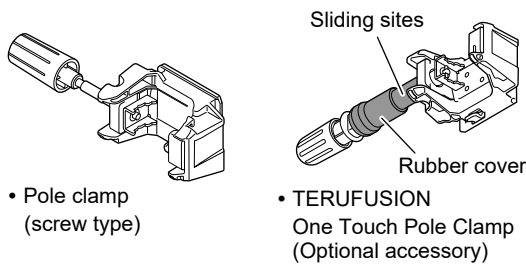
### Cleaning the pole clamp

Wipe with a damp (not wet) soft cloth.

\* Do not use ethanol to disinfect the rubber cover and the sliding sites as indicated by .

#### Caution

- Do not soak the pole clamp in water to clean it.

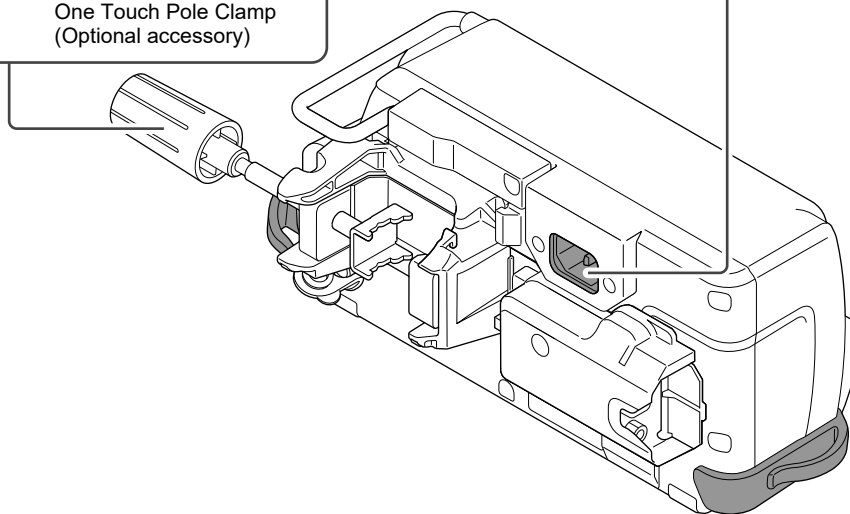
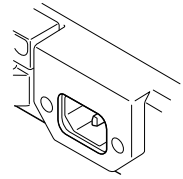


### Cleaning the AC inlet

Lightly wipe off dirt with a cotton swab or damp cloth (not wet).

#### Caution

- After cleaning, completely dry the AC inlet before use. Otherwise an electric shock or short circuit may occur resulting in failure of the product.



## Storage

After inspecting the pump, store it in an environment which conforms to the following storage conditions.

Temperature: -20°C to 45°C

Humidity: 10% to 95% RH (non-condensing)

Atmospheric pressure: 50 to 106kPa (500 to 1060hPa)

Ensure that the battery is charged in preparation for its next use.

### Warnings

- Since this product does not have an airtight structure, it should not be used or stored in an active gas environment (including sterilizer gas), nebulizer-sprayed environment, high-humidity environment, etc. It should not be submerged into water. If the electronic components inside the product are affected, there may be subsequent damage and time degradation which will cause failure of this product.
- The product should not be used or stored in a flammable environment.

### Cautions

- Do not store this product in a place with a high level of vibration, dust, mist or corrosive gas.
- Do not expose this product to direct sunlight or ultraviolet irradiation for a long period of time. The exterior may experience colour change, deformation or deterioration.
- Do not store this product in a place where an environment of atmospheric pressure, temperature, humidity, ventilation, salt content or sulfur content may cause an adverse effect.
- Do not store this product in a storage area for chemicals or in a place that generates gases.

**Cautions**

- When transporting this product, avoid any shock, vibration, dust, high temperature and high humidity. Transport conditions: Temperature: -20 to 60°C, Humidity: 10 to 95% RH (non-condensing), Atmospheric pressure: 50 to 106kPa (500 to 1060hPa)
- If the battery is not used for a long period after being charged, the amount of charge decreases due to self-discharge. Do not store the battery in a discharge status. Storing the battery left in a discharge status may cause degradation, resulting in making it unavailable in emergency situations.

# Maintenance and Inspections

## Maintenance and Inspection Items by TERUMO Certified Service Technicians

### Cautions

- If any fault is observed, immediately stop using the product and contact TERUMO trained service technicians.
- Do not disassemble, make alterations (including actions that interfere with the functionality or performance such as taping the LCD or a movable part) to, or repair this product. This may result in failure, damage or device performance degradation of this product.
- Do not use any replacement parts other than those specified. The original functionality or performance of this product may not be achieved.

### Periodic Maintenance

Perform a periodic maintenance inspection to ensure safe operation and the longest possible life of the infusion pump. Contact your local distributor for details on the nature and frequency of the maintenance inspection.

### From TERUMO

- When ordering repairs or maintenance inspections, if there is a possibility of infection, disinfect the product in advance.

### Battery replacement

#### Periodically replaced parts

Over a period of time, the battery will gradually deteriorate. Please see chart below for replacement schedule.

Part name	Elapsed years	Replacement reason
Battery (Lithium-ion battery)	2.5 to 3 years	• Even when charged, after a short period of time "Battery alarm" is displayed and the buzzer sounds.
Sub-battery (Nickel-metal-hydride battery)	1 to 2 years	• The Power Failure alarm does not function properly.

\* Depending on frequency of use and usage environment, the time for replacement for each part may change and replacement of parts other than those scheduled for replacement may also be required. Consult TERUMO trained service technicians regarding necessity and replacement.

\* The life span of the equipment is at least 6 years in the case of standard use.

### Fuse replacement

This product incorporates a fuse inside the structure. For replacement, contact TERUMO trained service technicians.

## Waste and Recycle

Electrical and electronic equipment (EEE) and batteries contain materials, components and substances which can be dangerous to the environment and harmful to human health if waste electrical and electronic equipment (WEEE) and batteries are not disposed of correctly.

Waste electrical and electronic equipment and batteries must not be disposed of with the remainder of unseparated waste, but should instead be collected separately. In this way, the environmental impact associated with disposal of WEEE and batteries is reduced and there will be more opportunity for reusing, recycling and recovering WEEE and recycling batteries.

The Lithium-ion battery and Nickel-metal-hydride battery should be removed from the equipment by TERUMO certified service technicians. Please contact your local distributor.

At end of life, please dispose of this equipment and batteries according to your local regulations. Contact your local distributor or municipality for details of the available collection schemes. The embedded memory back-up lithium coin battery, collected together with this equipment at end of life as WEEE, is to be removed and treated by the recycling center.

When an alarm/error occurs, the factors below may be the cause. Follow the procedure for dealing with each alarm/error as it arises.

## Cautions

- If the fault persists even after the following measures, a device failure is suspected. Contact TERUMO trained service technicians to request repair.
- Even under the same condition, the alarm timing depends on the alarm sensitivity level.
- Before pressing the Start switch to resume solution delivery after cancelling an alarm condition, ensure that you check the flow rate and VTBI settings.

## Note

- If there is an alarm condition as the power is turned on, the alarm display flashes but the buzzer does not sound.

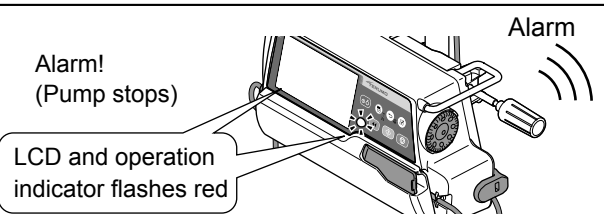
## Troubleshooting procedure

### 1) Alarm (e.g. High priority alarm).

Alarm displayed on LCD. Operation indicator flashes red.  
Check the status such as stopped solution delivery.

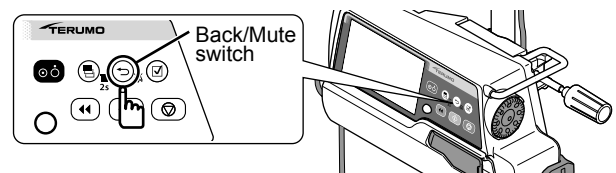
#### Notes

- The priority of the alarm status is as follows:
  - (1) High priority: Alarms flashing red on LCD
  - (2) Medium priority: Alarms flashing yellow on LCD
  - (3) Low priority: Alarms lighting up yellow on LCD.
 \* Refer to the Alarm icon on page 10 for the alarm priority.
- When more than one alarm sounds at the same time, the higher priority alarm is displayed on the LCD. Be sure to stop all the activated alarms by the relevant countermeasures.

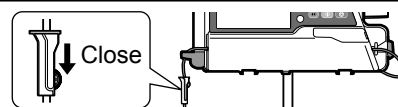


### 2) Mute and check alarm content.

When the alarm is muted with the Back/Mute switch, the alarm content will be displayed. Press the Back/Mute switch again to return to the flow rate screen. (The type of alarm flashes in the lower part of the screen.) The Completion alarm, No Flow Rate alarm, and No VTBI alarm are automatically muted. The screen returns to the flow rate setting screen.

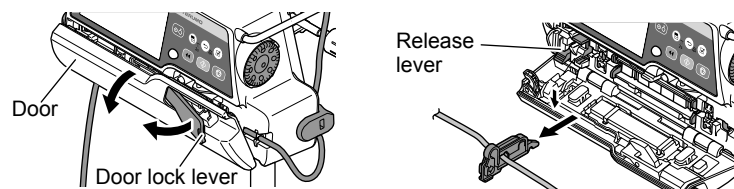


### 3) Close the manual roller clamp.



### 4) Open the door.

Press down the release lever to release the tube clamp.

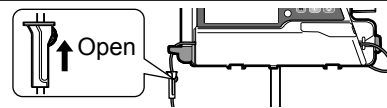


**5) Inspect the cause.** Check any applicable occurrence/cause from pages 117 to 129.

**6) Eliminate the cause.** Eliminate the cause in accordance with the instructions from pages 117 to 129.

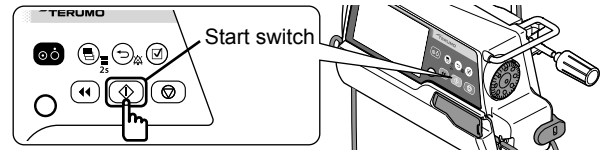
**7) Close the door.** Use the door lock lever for secure locking.

### 8) Open the manual roller clamp.



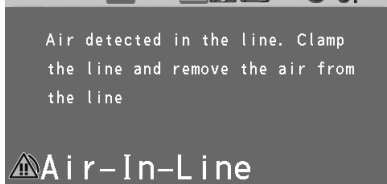
### 9) Confirm and restart.

Check the flow rate, VTBI, etc., and resume the solution delivery.



## High priority alarm

### ◆ Air-in-line alarm



Occurrence	Cause	Action
<ul style="list-style-type: none"> <li>• LCD: The Air-in-line alarm display flashes red.</li> <li>• Operation indicator: Flashes red.</li> <li>• Buzzer: Activates.</li> <li>• Pump: Stops.</li> </ul>	<ul style="list-style-type: none"> <li>• The drug solution has run out.</li> </ul>	<ul style="list-style-type: none"> <li>• If you wish to continue the infusion, replace the drug solution and start infusion following usual procedure. (See page 32.)</li> <li>• To end infusion, close the manual roller clamp, open the door, release the tube clamp and remove the set. (See page 44.)</li> </ul>
	<ul style="list-style-type: none"> <li>• There is air in the infusion set.</li> </ul>	<ul style="list-style-type: none"> <li>• Detach the infusion set and tap the tube to chase the air up into the drip chamber.</li> </ul>
	<ul style="list-style-type: none"> <li>• The infusion set is not installed correctly.</li> <li>• The door was closed without the infusion set installed.</li> </ul>	<ul style="list-style-type: none"> <li>• Re-set the infusion set correctly. (See page 33.)</li> </ul>
	<ul style="list-style-type: none"> <li>• The air-in-line detector is dirty.</li> </ul>	<ul style="list-style-type: none"> <li>• If the air-in-line detector is dirty, wipe it clean with a cotton swab or damp cloth (not wet). (See page 111.)</li> </ul>
	<ul style="list-style-type: none"> <li>• An infusion set other than those specified is being used.</li> </ul>	<ul style="list-style-type: none"> <li>• If an infusion set other than the ones specified is being used, replace it with the dedicated infusion set. (See page 21.)</li> </ul>
	<ul style="list-style-type: none"> <li>• The line upstream of the infusion pump is occluded.</li> </ul>	<ul style="list-style-type: none"> <li>• See page 118 "Upper Occlusion alarm".</li> </ul>

#### Notes

- The Air-in-line alarm may occur due to an upper occlusion instead of the Upper Occlusion alarm. In this case, see page 118 "Upper Occlusion alarm".
- If you wish to change the detection sensitivity, see page 68 "Air-in-line Alarm Sensitivity Select Function".

#### Caution

- Allow drug solution to reach room temperature before use. If used when cold, air bubbles are produced due to evaporation of dissolved air and this causes Air-in-line alarms to occur frequently.

## ◆ Upper Occlusion alarm



### Upper Occlusion



Occlusion between the infusion container and the pump.  
Clamp the line and remove the cause of the occlusion.

### Upper Occlusion

Occurrence	Cause	Action
<ul style="list-style-type: none"> <li>• LCD: The Upper Occlusion alarm display flashes red.</li> <li>• Operation indicator: Flashes red.</li> <li>• Buzzer: Activates.</li> <li>• Pump: Stops.</li> </ul>	<ul style="list-style-type: none"> <li>• The line upstream of the infusion pump is occluded. (A broken or crushed infusion set, or the occlusion of the infusion line may be the cause.)</li> </ul>	<ul style="list-style-type: none"> <li>• Detach the infusion set and inspect it, and eliminate the cause of the occlusion.</li> </ul>
	<ul style="list-style-type: none"> <li>• An infusion set other than those specified is being used.</li> </ul>	<ul style="list-style-type: none"> <li>• If an infusion set other than the ones specified is being used, replace it with the dedicated infusion set. (See page 21.)</li> </ul>
	<ul style="list-style-type: none"> <li>• The infusion set is not installed correctly.</li> <li>• The door was closed without the infusion set installed.</li> </ul>	<ul style="list-style-type: none"> <li>• Re-set the infusion set correctly. (See page 33.)</li> </ul>

◆ Lower Occlusion alarm



Lower Occlusion



Occlusion between the pump and the patient.  
Clamp the line and remove the cause of the occlusion.

Lower Occlusion

Occurrence	Cause	Action
<ul style="list-style-type: none"> <li>LCD: The Lower Occlusion alarm display flashes red.</li> <li>Operation indicator: Flashes red.</li> <li>Buzzer: Activates.</li> <li>Pump: Stops.</li> </ul>	<ul style="list-style-type: none"> <li>The line downstream of the infusion pump is occluded. (A broken or crushed infusion set, or clogged filters, intravenous needles or infusion line may be the cause.)</li> </ul>	<ul style="list-style-type: none"> <li>Detach the infusion set and inspect it, and eliminate the cause of the occlusion.</li> </ul>
	<ul style="list-style-type: none"> <li>An infusion set other than those specified is being used.</li> </ul>	<ul style="list-style-type: none"> <li>If an infusion set other than the ones specified is being used, replace it with the dedicated infusion set. (See page 21.)</li> </ul>
	<ul style="list-style-type: none"> <li>The infusion set is not installed correctly.</li> <li>The door was closed without the infusion set installed.</li> </ul>	<ul style="list-style-type: none"> <li>Re-set the infusion set correctly. (See page 33.)</li> </ul>
<ul style="list-style-type: none"> <li>The occlusion icon does not turn orange even when an Occlusion alarm is issued.</li> </ul>	<ul style="list-style-type: none"> <li>The internal pressure of the infusion line has been temporarily mitigated by the bolus reduction function.</li> <li>The cause of the occlusion may have been eliminated.</li> </ul>	<ul style="list-style-type: none"> <li>Ensure that the cause of the occlusion is eliminated before resuming delivery. The bolus reduction function is not able to eliminate the cause of occlusion. Resuming delivery without eliminate the cause of occlusion may result in the solution delivery not being carried out correctly, including a repetitive Occlusion alarm or drug solution in the infusion line flowing back to the drip chamber.</li> </ul>

Notes

- A Lower Occlusion alarm may be activated under the following conditions even when the product is operating correctly:
  - Drug has high viscosity.
  - Infusion line is narrow.
  - Flow rate is high.

◆ Anti-free Flow Clip alarm (TE-LM730A, TE-LM732A and TE-LM830 only)



AFF Clip



The AFF clip is dislodged!  
Make sure the tubing is positioned correctly and re-insert the AFF clip correctly

AFF Clip

Occurrence	Cause	Action
<ul style="list-style-type: none"> <li>LCD: The Anti-free Flow Clip alarm display flashes red.</li> <li>Operation indicator: Flashes red.</li> <li>Buzzer: Activates.</li> <li>Pump: Remains stopped.</li> </ul>	<ul style="list-style-type: none"> <li>The anti-free flow clip has come off.</li> </ul>	<ul style="list-style-type: none"> <li>Make sure the tubing is positioned correctly and re-insert the anti-free flow clip correctly.</li> </ul>
	<ul style="list-style-type: none"> <li>An infusion set other than those specified is being used.</li> </ul>	<ul style="list-style-type: none"> <li>If an infusion set other than those specified is being used, replace it with the dedicated infusion set. (See page 21.)</li> </ul>

## ◆ Flow Rate Abnormality alarm (only when drip sensor is installed)



### Abnormal Flow

Clamp the line and make sure that the setting of the drop/mL ratio is adequate for the set

### Abnormal Flow

Occurrence	Cause	Action
<ul style="list-style-type: none"> <li>• LCD: The Flow Rate Abnormality alarm display flashes red.</li> <li>• Operation indicator: Flashes red.</li> <li>• Buzzer: Activates.</li> <li>• Pump: Stops.</li> </ul>	<ul style="list-style-type: none"> <li>• An infusion set other than those specified is being used.</li> </ul>	<ul style="list-style-type: none"> <li>• If an infusion set other than the ones specified is being used, replace it with the dedicated infusion set. (See page 21.)</li> </ul>
	<ul style="list-style-type: none"> <li>• An occlusion has occurred.</li> </ul>	<ul style="list-style-type: none"> <li>• Inspect the infusion set and eliminate the cause of the occlusion (remove if necessary).</li> </ul>
	<ul style="list-style-type: none"> <li>• The tube pressed with the fingers remains flattened and does not recover.</li> </ul>	<ul style="list-style-type: none"> <li>• Check that the tube recovers to the normal state. If not, adjust placement.</li> </ul>
	<ul style="list-style-type: none"> <li>• Drug solution with high-viscosity (e.g. glucose injection, blood and blood products) or low-viscosity are used.</li> </ul>	<ul style="list-style-type: none"> <li>• Detach the drip sensor because it does not correctly work with the solution.</li> </ul>
	<ul style="list-style-type: none"> <li>• The drip sensor is not attached in the correct position for detecting dripping of drug solution.</li> </ul>	<ul style="list-style-type: none"> <li>• Attach the drip sensor to the drip chamber correctly. (See operation procedure in the instruction manual for the drip sensor.) At this time, if the contact part of the drip chamber is wet, wipe it with a dry cloth.</li> </ul>
	<ul style="list-style-type: none"> <li>• The drip volume of the infusion set is not set correctly.</li> </ul>	<ul style="list-style-type: none"> <li>• Set the correct drip volume. (See page 70.)</li> </ul>
	<ul style="list-style-type: none"> <li>• The drip sensor has been connected to the pump during solution delivery.</li> </ul>	<ul style="list-style-type: none"> <li>• Check the drip volume setting and the connection of the drip sensor, then resume solution delivery.</li> </ul>
	<ul style="list-style-type: none"> <li>• The drip sensor has been detached during solution delivery.</li> </ul>	<ul style="list-style-type: none"> <li>• Check position and connection of the drip sensor.</li> </ul>
	<ul style="list-style-type: none"> <li>• The sensor of the drip sensor is dirty.</li> </ul>	<ul style="list-style-type: none"> <li>• Clean the drip sensor as described in the instruction manual for the "Drip Sensor" and re-attach it to the drip chamber.</li> </ul>

◆ Line Empty alarm (only when drip sensor is installed)



Empty



Replace the infusion container if needed

Empty

Occurrence	Cause	Action
<ul style="list-style-type: none"> <li>LCD: The Line Empty alarm display flashes red.</li> <li>Operation indicator: Flashes red.</li> <li>Buzzer: Activates.</li> <li>Pump: Stops.</li> </ul>	<ul style="list-style-type: none"> <li>The drug solution has run out.</li> </ul>	<ul style="list-style-type: none"> <li>If you wish to continue the infusion, replace the drug solution and start infusion following usual procedure. (See pages 33 to 41, 44.)</li> <li>To end infusion, close the manual roller clamp, open the door, release the tube clamp and remove the set. (See page 44.)</li> </ul>
	<ul style="list-style-type: none"> <li>An occlusion has occurred.</li> </ul>	<ul style="list-style-type: none"> <li>Inspect the infusion set and eliminate the cause of the occlusion (remove set if necessary).</li> </ul>
	<ul style="list-style-type: none"> <li>An infusion set other than those specified is being used.</li> </ul>	<ul style="list-style-type: none"> <li>If an infusion set other than the ones specified is being used, replace it with the dedicated infusion set. (See page 21.)</li> </ul>
	<ul style="list-style-type: none"> <li>The drip sensor is not correctly attached.</li> </ul>	<ul style="list-style-type: none"> <li>See the instruction manual of the “Drip Sensor” and attach it correctly.</li> </ul>
	<ul style="list-style-type: none"> <li>The sensor of the drip sensor is dirty.</li> </ul>	<ul style="list-style-type: none"> <li>Clean the drip sensor as described in the instruction manual for the “Drip Sensor” and re-attach it to the drip chamber.</li> </ul>
	<ul style="list-style-type: none"> <li>The tube pressed with the fingers remains flattened and does not recover.</li> </ul>	<ul style="list-style-type: none"> <li>Check that the tube recovers to the normal state. If not, adjust placement.</li> </ul>
	<ul style="list-style-type: none"> <li>The drip volume of the infusion set is not set correctly.</li> </ul>	<ul style="list-style-type: none"> <li>Set the correct drip volume. (See page 70.)</li> </ul>

◆ Free Flow alarm (only when drip sensor is installed)



Free Flow



Clamp the line and make sure that the setting of the drop/mL ratio is adequate for the set

Free Flow

Occurrence	Cause	Action
<ul style="list-style-type: none"> <li>LCD: The Free Flow alarm display flashes red.</li> <li>Operation indicator: Flashes red.</li> <li>Buzzer: Activates.</li> <li>Pump: Stopped.</li> </ul>	<ul style="list-style-type: none"> <li>A free flow has occurred.</li> </ul>	<ul style="list-style-type: none"> <li>The infusion set is not correctly set. (See page 33.)</li> </ul>
	<ul style="list-style-type: none"> <li>The infusion set is not installed correctly.</li> </ul>	<ul style="list-style-type: none"> <li>Re-set the infusion set correctly. (See page 33.)</li> </ul>
	<ul style="list-style-type: none"> <li>An infusion set other than those specified is being used.</li> </ul>	<ul style="list-style-type: none"> <li>If an infusion set other than the ones specified is being used, replace it with the dedicated infusion set. (See page 21.)</li> </ul>
	<ul style="list-style-type: none"> <li>The sensor of the drip sensor is dirty.</li> </ul>	<ul style="list-style-type: none"> <li>Clean the drip sensor as described in the instruction manual for the “Drip Sensor” and re-attach it to the drip chamber.</li> </ul>

## ◆ Drip Sensor Dislocation alarm (only when drip sensor is installed)



**Drip Sensor**



The drip sensor is disconnected from the pump!  
Make sure the drip sensor is connected correctly

**Drip Sensor**

Occurrence	Cause	Action
<ul style="list-style-type: none"> <li>LCD: The Drip Sensor Dislocation alarm display flashes red.</li> <li>Operation indicator: Flashes red.</li> <li>Buzzer: Activates.</li> <li>Pump: Stops.</li> </ul>	<ul style="list-style-type: none"> <li>The plug of the drip sensor is disconnected from the drip sensor connector during solution delivery.</li> </ul>	<ul style="list-style-type: none"> <li>Check connection of the drip sensor.</li> </ul>
	<ul style="list-style-type: none"> <li>The drip sensor is internally disconnected.</li> </ul>	<ul style="list-style-type: none"> <li>Contact TERUMO trained service technicians.</li> </ul>

## ◆ Door alarm



**Door Open**



The door is open!  
Close the door properly by locking the door lock lever

**Door Open**

Occurrence	Cause	Action
<ul style="list-style-type: none"> <li>LCD: The Door alarm display flashes red.</li> <li>Operation indicator: Flashes red.</li> <li>Buzzer: Activates.</li> <li>Pump: Stops.</li> </ul>	<ul style="list-style-type: none"> <li>The door is open.</li> </ul>	<ul style="list-style-type: none"> <li>Close the door and securely lock it using the door lock lever. (See page 35.)</li> </ul>

## ◆ Completion alarm



**Infusion Completed**

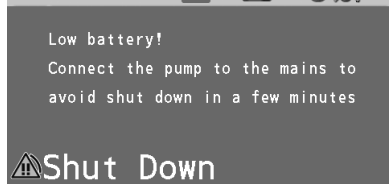
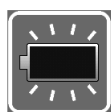


Total volume reached VTBI

**Infusion Completed**

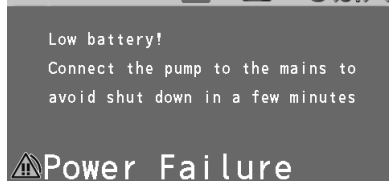
Occurrence	Cause	Action
<ul style="list-style-type: none"> <li>LCD: The Completion alarm display flashes red.</li> <li>Operation indicator: Flashes green.</li> <li>Buzzer: Activates.</li> <li>Pump: Switches to the keep vein open (KVO) function and continues solution delivery.</li> </ul>	<ul style="list-style-type: none"> <li>The volume delivered has reached the VTBI.</li> </ul>	<ul style="list-style-type: none"> <li>A normal operation when the VTBI is set.</li> <li>Press the Stop switch to stop the KVO solution delivery. (See page 44.)</li> </ul>

### ◆ Shutdown Notice alarm



Occurrence	Cause	Action
<ul style="list-style-type: none"> <li>• LCD: The Shutdown Notice alarm display flashes red.</li> <li>• Operation indicator: Flashes red.</li> <li>• Buzzer: Activates.</li> <li>• Pump: Stops.</li> </ul>	<ul style="list-style-type: none"> <li>• Battery has no power left.</li> </ul>	<ul style="list-style-type: none"> <li>• Connect immediately to the AC power supply or rack system. (See page 27.)</li> <li>* When using a rack system, see the instruction manual of the rack system.</li> </ul>

### ◆ Power Failure alarm



Occurrence	Cause	Action
<ul style="list-style-type: none"> <li>• LCD: The Power Failure alarm display flashes red.</li> <li>• Operation indicator: Flashes red.</li> <li>• Buzzer: Activates.</li> <li>• Pump: Stops.</li> </ul>	<p>Two of the following causes have occurred.</p> <ul style="list-style-type: none"> <li>• No AC power supply</li> <li>• Battery failure</li> <li>• Sub-battery failure or low battery</li> </ul>	<ul style="list-style-type: none"> <li>• Connect to the AC power supply and charge (8 hours or more) with the power turned off.</li> <li>If the problem still persists, contact TERUMO trained service technicians.</li> </ul>

## Medium priority alarm

### ◆ Pressure alarm (TE-LM830 only)



#### Pressure Change



The occlusion pressure changed suddenly.  
Check all connections and the patient access.

#### Pressure Change

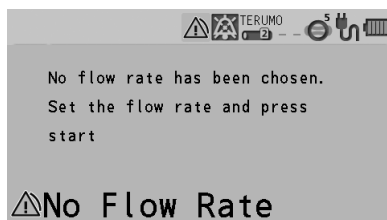
Occurrence	Cause	Action
<ul style="list-style-type: none"> <li>• LCD: The Pressure alarm display flashes yellow.</li> <li>• Operation indicator: Flashes green.</li> <li>• Buzzer: Activates.</li> <li>• Pump: Delivers solution.</li> </ul>	<ul style="list-style-type: none"> <li>• The internal pressure of the infusion line has rapidly increased or decreased.</li> </ul>	<ul style="list-style-type: none"> <li>• Due to a possible fault in the infusion line or at the puncture site, check for any fault. Stop the solution delivery and eliminate the cause.</li> </ul>

#### Note

- This alarm is effective only when the Pressure alarm has been set in the drug library.

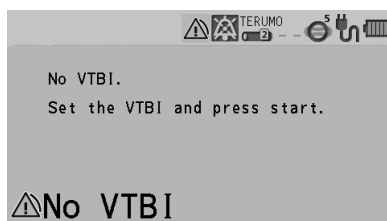
## Low priority alarm

### ◆ No Flow Rate alarm



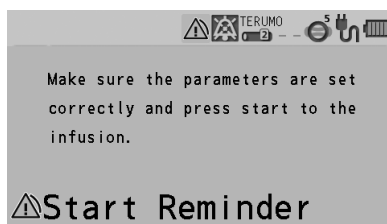
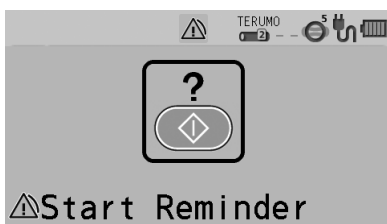
Occurrence	Cause	Action
<ul style="list-style-type: none"> <li>• LCD: The No Flow Rate alarm display lights up yellow.</li> <li>• Operation indicator: Off</li> <li>• Buzzer: Activates.</li> <li>• Pump: Remains stopped.</li> </ul>	<ul style="list-style-type: none"> <li>• The Start switch was pressed without having set a flow rate.</li> </ul>	<ul style="list-style-type: none"> <li>• Set a flow rate and press the Start switch to start solution delivery. (See page 37.)</li> </ul>
	<ul style="list-style-type: none"> <li>• The flow rate exceeds 300 mL/h when the drip volume setting is changed from 20 drop/mL to 60 drop/mL during use of the drip sensor.</li> </ul>	<ul style="list-style-type: none"> <li>• Correct the flow rate setting and start solution delivery. (See page 37.)</li> </ul>
	<ul style="list-style-type: none"> <li>• Some of the flow rate settings do not apply to the advanced dose or combination dose mode.</li> </ul>	<ul style="list-style-type: none"> <li>• Correct those settings and start solution delivery. (See page 78. For the combination dose mode setting, contact TERUMO trained service technicians.)</li> </ul>

### ◆ No VTBI alarm



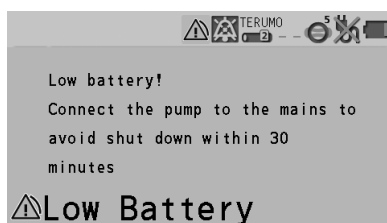
Occurrence	Cause	Action
<ul style="list-style-type: none"> <li>• LCD: The No VTBI alarm display lights up yellow.</li> <li>• Operation indicator: Off</li> <li>• Buzzer: Activates.</li> <li>• Pump: Remains stopped.</li> </ul>	<ul style="list-style-type: none"> <li>• The Start switch was pressed without having set a VTBI.</li> </ul>	<ul style="list-style-type: none"> <li>• Set a VTBI and press the Start switch to start solution delivery. (See page 38.)</li> </ul>
	<ul style="list-style-type: none"> <li>• The Start switch was pressed with the settings as volume delivered <math>\geq</math> VTBI.</li> </ul>	<ul style="list-style-type: none"> <li>• Clear the volume delivered (see page 74) or input a new value in the VTBI (see page 38) and press the Start switch to start solution delivery.</li> </ul>

## ◆ Start Reminder



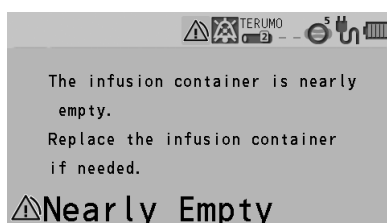
Occurrence	Cause	Action
<ul style="list-style-type: none"> <li>LCD: The Start Reminder display lights up yellow.</li> <li>Operation indicator: Off</li> <li>Buzzer: Activates.</li> <li>Pump: Remains stopped.</li> </ul>	<ul style="list-style-type: none"> <li>The product has been left for 2 minutes or more after being programmed.</li> </ul>	<ul style="list-style-type: none"> <li>If you want to delay operation for a while, press and hold the Back/Mute switch for 2 seconds or more to set the equipment to standby mode. (See page 48.)</li> <li>Check the setting values for flow rate and VTBI, and press the Start switch to start solution delivery. (See pages 37 and 38.)</li> </ul>

## ◆ Battery alarm



Occurrence	Cause	Action
<ul style="list-style-type: none"> <li>LCD: The Battery alarm display lights up yellow.</li> <li>Operation indicator: Flashes green (during solution delivery) or off (stopped).</li> <li>Buzzer: Activates.</li> <li>Pump: Solution delivery (during solution delivery) or remains stopped (stopped).</li> </ul>	<ul style="list-style-type: none"> <li>Low battery capacity (approximately 30 minutes), battery level low or battery energy is reducing.</li> </ul>	<ul style="list-style-type: none"> <li>Connect to the AC power supply or rack system. (See page 27.)</li> <li>* When using a rack system, see the instruction manual of the rack system.</li> </ul>

## ◆ Nearly Empty alarm




Occurrence	Cause	Action
<ul style="list-style-type: none"> <li>LCD: The Nearly Empty alarm display lights up yellow.</li> <li>Operation indicator: Flashes green (during solution delivery) or off (stopped)</li> <li>Buzzer: Activates.</li> <li>Pump: No changes to the status.</li> </ul>	<ul style="list-style-type: none"> <li>The drug solution is running out.</li> </ul>	<ul style="list-style-type: none"> <li>To continue solution delivery, replace the drug solution container with a new one.</li> </ul>
	<ul style="list-style-type: none"> <li>The remaining time has been recalculated based on the specified flow rate for the advanced dose mode.</li> </ul>	<ul style="list-style-type: none"> <li>During solution delivery in the advanced dose mode, the Nearly Empty alarm may be activated/cancelled due to the recalculation of the remaining time.</li> </ul>

**◆ Re-alarm**


Occurrence	Cause	Action
<ul style="list-style-type: none"> <li>• LCD: The respective alarm displays flash/light up (the flashing/lighting up colours are the same as those at the respective alarms).</li> <li>• Operation indicator: Same as for when the alarms are first activated.</li> <li>• Buzzer: Activates.</li> <li>• Pump: No change to the status.</li> </ul>	<ul style="list-style-type: none"> <li>• Operation was not started within 2 minutes after the alarm was muted. (The Nearly Empty alarm during solution delivery is set to over 15 minutes.*)</li> </ul>	<ul style="list-style-type: none"> <li>• Follow the corrective action of each alarm.</li> </ul>

\* For the Nearly Empty alarm during solution delivery, the time is set to over 15 minutes due to the continuous normal solution delivery.



**Other problems**
**◆ Maintenance timer**

Occurrence	Cause	Action
<ul style="list-style-type: none"> <li>• The Maintenance timer indicator  lights up.</li> </ul>	<ul style="list-style-type: none"> <li>• It is time to perform maintenance.</li> </ul>	<ul style="list-style-type: none"> <li>• Contact TERUMO trained service technicians.</li> </ul>

**◆ AC power detector function**

Occurrence	Cause	Action
<ul style="list-style-type: none"> <li>• The pump cannot be turned on when using AC power.</li> </ul>	<ul style="list-style-type: none"> <li>• The AC icon  is not displayed even after the AC power cable is connected.</li> </ul>	<ul style="list-style-type: none"> <li>• Check the connection of the AC power cable to the pump and the power supply. (See page 27.)</li> </ul>
	<ul style="list-style-type: none"> <li>• The AC power cable is damaged.</li> <li>• The AC power cable is internally disconnected.</li> </ul>	<ul style="list-style-type: none"> <li>• Replace the AC power cable.</li> </ul>

**◆ Battery Replacement Time/Failure alarm**

Occurrence	Cause	Action
<ul style="list-style-type: none"> <li>• The battery operation time is short even after fully charged.</li> <li>• The battery icon  is displayed.</li> <li>• The battery icon does not display 5 bars after charging for 8 hours or more.</li> </ul>	<ul style="list-style-type: none"> <li>• The battery has deteriorated or is damaged.</li> </ul>	<ul style="list-style-type: none"> <li>• Replace the internal battery.</li> </ul>
<ul style="list-style-type: none"> <li>•  and the battery charge level appear alternately after more than 8 hours of charging.</li> </ul>	<ul style="list-style-type: none"> <li>• The sub-battery has deteriorated or is damaged.</li> </ul>	<ul style="list-style-type: none"> <li>• Replace the sub-battery.</li> </ul>

## ◆ Flow rate

Occurrence	Cause	Action
<ul style="list-style-type: none"> <li>Pressing the Start switch does not start solution delivery.</li> </ul>	<ul style="list-style-type: none"> <li>The infusion line is not open.</li> <li>The infusion set is not installed correctly.</li> </ul>	<ul style="list-style-type: none"> <li>Re-set the infusion set. (See page 33.)</li> </ul>
	<ul style="list-style-type: none"> <li>The infusion set is occluded.</li> </ul>	<ul style="list-style-type: none"> <li>Eliminate the cause of occlusion. (See pages 118 and 119.)</li> </ul>
<ul style="list-style-type: none"> <li>Flow rate accuracy is low.</li> </ul>	<ul style="list-style-type: none"> <li>The infusion set is not installed correctly.</li> </ul>	<ul style="list-style-type: none"> <li>Check the placement of the infusion set in the pump. (See page 33.)</li> </ul>
	<ul style="list-style-type: none"> <li>The tube has been attached to the same place for a long period.</li> </ul>	<ul style="list-style-type: none"> <li>Check that the tube, when pressed with fingers then released, recovers to the normal state. If not, adjust placement or replace the infusion set.</li> </ul>
	<ul style="list-style-type: none"> <li>An infusion set other than those specified is being used.</li> </ul>	<ul style="list-style-type: none"> <li>If an infusion set other than the ones specified is being used, replace it with the specified infusion set. (See page 21.)</li> </ul>
	<ul style="list-style-type: none"> <li>The flow rate is not set correctly.</li> </ul>	<ul style="list-style-type: none"> <li>Correct the flow rate setting.</li> </ul>
	<ul style="list-style-type: none"> <li>There is large height difference between the pump and patient.</li> </ul>	<ul style="list-style-type: none"> <li>Adjust the patient to the pump height differential.</li> </ul>


## ◆ The door will not close

Occurrence	Cause	Action
<ul style="list-style-type: none"> <li>Even when you try to shut the door, you cannot lock it.</li> </ul>	<ul style="list-style-type: none"> <li>The tube is not installed properly.</li> </ul>	<ul style="list-style-type: none"> <li>Re-set the infusion set. (See page 33.)</li> </ul>

## ◆ External communication

Occurrence	Cause	Action
<ul style="list-style-type: none"> <li>Cannot communicate (RS-232C)</li> </ul>	<ul style="list-style-type: none"> <li>The baud rate, stop bit, parity, or device ID number may not be appropriate.</li> </ul>	<ul style="list-style-type: none"> <li>Check the settings of the connected device. (See page 99.)</li> </ul>
	<ul style="list-style-type: none"> <li>Cables are not securely connected.</li> </ul>	<ul style="list-style-type: none"> <li>Reconnect the cable. (See page 99.)</li> </ul>
<ul style="list-style-type: none"> <li>Cannot communicate (IrDA)</li> </ul>	<ul style="list-style-type: none"> <li>The infrared communication window is dirty.</li> </ul>	<ul style="list-style-type: none"> <li>Clean the infrared communication window with cotton swabs or gauze, etc.</li> </ul>
	<ul style="list-style-type: none"> <li>The pump is not securely attached to the TERUFUSION Communication Rack System.</li> </ul>	<ul style="list-style-type: none"> <li>Make sure that the TERUFUSION Communication Rack System is securely attached to the pump. See the instruction manual of the TERUFUSION Communication Rack System.</li> </ul>
	<ul style="list-style-type: none"> <li>The TERUFUSION Communication Rack System is not turned on.</li> </ul>	<ul style="list-style-type: none"> <li>Turn on the TERUFUSION Communication Rack System. See the instruction manual of the TERUFUSION Communication Rack System.</li> </ul>
<ul style="list-style-type: none"> <li>Cannot communicate (wireless LAN)</li> </ul>	<ul style="list-style-type: none"> <li>SSID, encryption setting, IP address, subnet mask, default GW, connection destination IP address, communication port, or device ID may not be suitable.</li> </ul>	<ul style="list-style-type: none"> <li>Check the settings of the product or the connected device. (See page 99.)</li> </ul>
<ul style="list-style-type: none"> <li>Signal strength icon (Colour = Grey, No signal bar) flashing</li> </ul>	<ul style="list-style-type: none"> <li>The pump is defective.</li> </ul>	<ul style="list-style-type: none"> <li>Contact TERUMO trained service technicians.</li> </ul>

**◆ Display**

Occurrence	Cause	Action
<ul style="list-style-type: none"> <li>The LCD is dim.</li> </ul>	<ul style="list-style-type: none"> <li>The equipment is operated using the internal battery.</li> <li>The equipment is in the night mode. (When the night mode is enabled)</li> </ul>	<ul style="list-style-type: none"> <li>The brightness becomes two levels lower during internal battery operation or night mode operation.</li> <li>If it is not the case, contact TERUMO trained service technicians.</li> </ul>
<ul style="list-style-type: none"> <li>The keypad lock icon  is displayed.</li> </ul>	<ul style="list-style-type: none"> <li>The keypad lock is on.</li> </ul>	<ul style="list-style-type: none"> <li>Press and hold the Back/Mute switch for 2 seconds or more to release the keypad lock.</li> </ul>
<ul style="list-style-type: none"> <li>Displays are irregular and the buzzer sounds.</li> </ul>	<ul style="list-style-type: none"> <li>The pump is defective.</li> </ul>	<ul style="list-style-type: none"> <li>Contact TERUMO trained service technicians to request repair.</li> </ul>
<ul style="list-style-type: none"> <li>The power turns off unexpectedly.</li> </ul>	<ul style="list-style-type: none"> <li>The pump is defective.</li> </ul>	<ul style="list-style-type: none"> <li>Contact TERUMO trained service technicians to request repair.</li> </ul>

**◆ Failure**

Occurrence	Cause	Action
<ul style="list-style-type: none"> <li>“E*” is displayed, the operation indicator lights up red and the buzzer sounds. (* is alphanumeric characters.)</li> </ul>	<ul style="list-style-type: none"> <li>The pump is defective.</li> </ul>	<ul style="list-style-type: none"> <li>Turn off the power and contact TERUMO trained service technicians to request repair.</li> </ul>

**Error Code Table**

Display	Error	Display	Error
E1	Internal electronic circuit fault	E5*	Internal electronic circuit fault
E2*	Internal electronic circuit fault	E8*	Operation key fault
E3	Motor fault	E10*	Internal electronic circuit fault
E4*	Internal electronic circuit fault		

(\* is alphanumeric characters.)

# Specifications

## Main unit

<b>Product name</b>	TERUFUSION Infusion Pump Type LM3
<b>Model</b>	TE-LM730/TE-LM830
<b>Catalogue number</b>	TE-LM730xxx, TE-LM730xxxN, TE-LM732xxx, TE-LM732xxxN, TE-LM83xxxx Alphanumeric characters are entered for x in the catalogue number. (See page 136.)
<b>Compatible infusion sets and transfusion sets</b>	Sterilized specified infusion sets and sterilized specified blood transfusion sets (See page 21.)
<b>Brand of infusion set and blood transfusion set</b>	TERUMO
<b>Dose mode</b>	mL/h mode µg/kg/min mode mg/kg/h mode Library mode (TE-LM830 only)
<b>Flow rate setting range</b>	<ul style="list-style-type: none"> <li>• Setting range               <ul style="list-style-type: none"> <li>• When not using the drip sensor 0.10 to 1200.00 mL/h</li> <li>• When using the drip sensor 0.10 to 1200.00 mL/h (when setting is 20 drop/mL) 0.10 to 300.00 mL/h (when setting is 60 drop/mL)</li> </ul> </li> <li>• Step 0.10 mL/h step ( 0.10 to 100.00 mL/h) * 1.00 mL/h step (100.00 to 1200.00 mL/h) * *: Step can be used when flow rate is set by the Dial. (It will be 0.00 mL/h when the power is turned on.)</li> </ul>
<b>VTBI setting range</b>	0.10 to 100.00 mL (0.10 mL step) 100.00 to 9999.00 mL (1.00 mL step) When the dose rate is set in mass units, setting in mass units is possible. (VTBI setting range: 0.01 ng to 9999.99 kg) “----.--” (Unlimited)
<b>VTBI time setting range</b>	1 min to 99 hours 59 min (1 min step) “-- --” (Unlimited)
<b>Dose rate setting range</b>	0.01 to 10.00 (0.01 step) 10.00 to 100.00 (0.10 step) 100.00 to 999.00 (1.00 step) (In units such as µg/kg/min and mg/kg/h etc.) (It will be 0.00 when the power is turned on.)
<b>Weight setting range</b>	0.1 to 300.0kg (0.1kg step)
<b>Dilution setting range</b>	0.01 to 10.00 (0.01 step) 10.00 to 100.00 (0.10 step) 100.00 to 999.00 (1.00 step) (In units such as mg/mL etc.)
<b>Amount setting range</b>	0.01 to 10.00 (0.01 step) 10.00 to 100.00 (0.10 step) 100.00 to 999.00 (1.00 step) (In units such as µg and mg etc.)
<b>Solution setting range</b>	0.01 to 10.00 (0.01 step) 10.00 to 100.00 (0.10 step) 100.00 to 999.00 (1.00 step) (Unit: mL)

<b>Hands On Bolus flow rate setting range</b>		<ul style="list-style-type: none"> <li>When not using the drip sensor 100.00 to 1200.00 mL/h</li> <li>When using the drip sensor 100.00 to 1200.00 mL/h (when setting is 20 drop/mL) 100.00 to 300.00 mL/h (when setting is 60 drop/mL) (100.00 mL/h step)</li> </ul>
<b>Hands Free Bolus dose rate setting range</b>		0.01 to 10.00 (0.01 step) 10.00 to 100.00 (0.10 step) 100.00 to 999.00 (1.00 step) (In units such as mL and mg/kg etc.)
<b>Hands Free Bolus dose time setting range</b>		1 s to 60 min 00 s (1 s step)
<b>Volume delivered display range</b>		0.00 to 10.00 mL (0.01 mL step) 10.00 to 100.00 mL (0.10 mL step) 100.00 to 9999.00 mL (1.00 mL step) When the dose rate is set in mass units, the volume is expressed in mass units. (Volume delivered display range: 0.01 ng to 9999.99 kg) (It will be 0.00 mL when the power is turned on.)
<b>Flow rate accuracy</b>	<b>Pump-specific infusion sets (high precision type)</b>	Within $\pm 3\%$ (The hourly precision after one hour has passed since the start of solution delivery, in the case where water or a physiological saline solution is used at a constant flow rate of 1.00 mL/h or more (ambient temperature: $23\pm 2^{\circ}\text{C}$ ) according to IEC 60601-2-24:2012 (EN 60601-2-24:2015) standard.)
	<b>Pump-specific infusion sets and pump-specific blood transfusion sets</b>	Within $\pm 5\%^*$ (The hourly precision after one hour has passed since the start of solution delivery, in the case where water or a physiological saline solution is used with a specified infusion set or blood transfusion set (hereinafter called "infusion set") at a constant flow rate of 1.00 mL/h or more (ambient temperature: $23\pm 2^{\circ}\text{C}$ ) according to IEC 60601-2-24:2012 (EN 60601-2-24:2015) standard.) *: The flow rate accuracy is approx. -10% under the lower temperature (approx. $<10^{\circ}\text{C}$ ). The flow rate accuracy of the infusion sets not made with PVC is $\pm 10\%$ at a flow rate of 500 mL/h or more.
<b>Occlusion detection pressure</b>		<ul style="list-style-type: none"> <li>Upper occlusion detection pressure -100 to -30 kPa</li> <li>Lower occlusion detection pressure 30 to 120 kPa (set value) The lower occlusion detection pressure can be set in 10 levels.</li> </ul>
<b>Purge flow rate</b>		Approx. 500 mL/h
<b>Alarms</b>		Upper Occlusion alarm, Lower Occlusion alarm, Nearly Empty alarm, Pressure alarm <sup>*1</sup> , Air-in-line alarm, Anti-free Flow Clip alarm <sup>*2</sup> , Door alarm, Flow Rate Abnormality alarm, Free Flow alarm, Line Empty alarm, Drip Sensor Dislocation alarm, Battery alarm, Shutdown Notice alarm, Power Failure alarm, Re-alarm, Start Reminder, No Flow Rate alarm, No VTBI alarm, Completion alarm, Link Interruption alarm <sup>*1</sup> . * <sup>1</sup> : TE-LM830 only * <sup>2</sup> : TE-LM730A, TE-LM732A and TE-LM830 only
<b>Safety functions</b>	<b>Occlusion detection pressure select function</b>	Selects the lower occlusion detection pressure setting values in 10 levels.
	<b>Air-in-line alarm sensitivity select function</b>	Changes the detection sensitivity of the air-in-line detector.
	<b>Remaining volume detection setting function</b>	Selects the Nearly Empty alarm time.

## Specifications

<b>Safety functions</b>	<b>Tube clamp function</b>	When the door is opened, the tube clamp automatically clamps the infusion set.
	<b>Anti-free flow function (TE-LM730A, TE-LM732A and TE-LM830 only)</b>	When the set is removed from the pump, the anti-free flow clip continues to close the tube. Even if the infusion set is detached from the pump, the tube continues to be squeezed closed by the anti-free flow clip.
	<b>Flow rate range setting function A (Soft limits)</b>	The flow rate setting range can be controlled within the “flow rate setting range” prescribed for each type of infusion set. <ul style="list-style-type: none"> <li>When you try to set a value outside the range controlled by this function, a message asking for confirmation is displayed.</li> </ul> If you confirm the setting, you can set the value which is outside the controlled range and the display colour of the value changes.
	<b>Flow rate range setting function B (Hard limits)</b>	The flow rate setting range can be controlled within the “flow rate setting range” prescribed for each type of infusion set. <ul style="list-style-type: none"> <li>Values outside the range controlled by this function cannot be set.</li> </ul>
	<b>Keypad lock function</b>	Disables switch operations. However, the Start switch, the keypad lock function disable operation (press and hold the Back/Mute switch), and the Power switch still function. When an alarm is activated, the keypad lock is released.
	<b>Bolus reduction function</b>	Reduces the internal pressure of the tube of the infusion set on the lower side by reverse motor rotation.
<b>Available Functions</b>	<b>Infusion set installation guidance function</b>	Displays the installation status of an infusion set and a screen prompting installation of the infusion set on the LCD.
	<b>Infusion set type display function</b>	Displays the type and brand of the infusion set on the LCD.
	<b>Infusion set drip volume select function</b>	Changes in accordance with the drip volume of the infusion set.
	<b>Drip volume display function</b>	Displays the drip volume of the infusion set on the LCD.
	<b>VTBI setting function</b>	Sets the VTBI of dosage of drug solution.
	<b>VTBI time setting function</b>	Sets the VTBI time of dosage of drug solution.
	<b>Purge buzzer sound function</b>	When the Purge switch is being pressed, the buzzer sounds.
	<b>Bolus buzzer sound function</b>	During a bolus, the buzzer sounds.
	<b>Volume delivered clear function</b>	Clears the volume delivered display to zero.
	<b>Standby function</b>	By pressing and holding the Back/Mute switch, the pump can be put in standby mode. In the standby function, the Start Reminder is delayed.
	<b>Standby duration time select function</b>	Changes the time to activate a Start Reminder in the standby mode.
	<b>Buzzer volume select function</b>	Changes the buzzer volume.
	<b>Switch operation buzzer sound function</b>	Buzzer sounds when a switch operation is performed.
	<b>Stop transition buzzer sound function</b>	Buzzer sounds when the Stop switch is pressed during solution delivery.
	<b>LCD brightness select function</b>	Changes the LCD brightness.
	<b>Maintenance timer function</b>	Time to next maintenance check can be set. That information is displayed on the LCD.
<b>Date and time setting function</b>	Sets the date and time.	

<b>Available Functions</b>	<b>External communication function (RS-232C) (TE-LM732A and TE-LM732N only)</b>	Allows communication with a network system to output the status of the pump (flow rate, alarms, etc.) via RS-232C.
	<b>Free message function (TE-LM732A, TE-LM732N and TE-LM830 only)</b>	Displays a message on the pump via communication.
	<b>External communication function (infrared communication (IrDA)) (TE-LM830 only)</b>	Allows communication with the optional TERUFUSION Communication Rack System to output the status of the pump (flow rate, alarms, etc.) via infrared.
	<b>External communication function (wireless LAN) (TE-LM830 only)</b>	Allows communication with a network system to output the status of the pump (flow rate, alarms, etc.) via wireless LAN.
	<b>Nurse call function (TE-LM732A and TE-LM732N only)</b>	When an alarm is activated, relay contact operates through communication unit.
	<b>History function</b>	Displays the operation history, etc.
	<b>AC power detector function</b>	Detects the presence or absence of AC power supply to the pump and displays that status.
	<b>AC power detector buzzer sound function</b>	Buzzer sounds when AC power supply is provided to or disconnected from the pump.
	<b>Purge volume upper limit setting function</b>	Sets the upper limit of the purge volume.
	<b>Bolus volume upper limit setting function</b>	Sets the upper limit of the Hands On Bolus volume.
	<b>Keep Vein Open function</b>	After activation of the Infusion Completion alarm, solution delivery is continued at the keep vein open flow rate.
	<b>Keep Vein Open flow rate select function</b>	Changes the keep vein open flow rate.
	<b>During-start volume delivered clear function</b>	Clears the volume delivered to zero during solution delivery.
	<b>During-start flow rate/dosage rate change function</b>	Changes the flow rate/dosage rate during solution delivery.
	<b>Selecting dose mode during the solution delivery function</b>	Change the dose mode from mL/h to another mode during solution delivery.
	<b>Set value memory function</b>	Saves the current set values (e.g. flow rate, VTBI, dosage and weight) before the power is turned off.
	<b>Alarm melody select function</b>	Changes the buzzing pattern (melody) of the alarm buzzer.
	<b>Setting dial acceleration function</b>	Rotating the Dial while pressing the Stop switch accelerates the setting rate to set items such as the flow rate.
	<b>Hands On Bolus function</b>	After the bolus flow rate is set, a bolus is delivered while the Purge switch is pressed.
	<b>Hands Free Bolus function</b>	When bolus volume and bolus time are set, the flow rate is calculated and a bolus is delivered.

## Specifications

<b>Available Functions</b>	<b>Shortcut call function</b>	Press multiple keys in combination to directly call the bolus flow rate setting display.
	<b>Night mode function</b>	Changes the LCD brightness for a specified time period.
	<b>Power OFF buzzer sound function</b>	Buzzer sounds as the power is turned off.
	<b>Dose mode select function</b>	The dose mode can be selected among mL/h, µg/kg/min, mg/kg/h and drug library (TE-LM830 only).
	<b>Start-up dose mode select function</b>	The initial dose mode after the power is turned on can be selected from mL/h, µg/kg/min, mg/kg/h, or drug library (TE-LM830 only).
	<b>Dose mode information display function</b>	When the AC power cable is connected, the version and the profile of the drug library are displayed before the power is turned on.
	<b>Menu1 (User mode1) shortcut function to dose mode</b>	Enable to go directly to the dose mode select display when the menu screen is selected.
	<b>Drug/patient information function</b>	Displays drug information such as dilution, patient information including patient name, age, gender, weight, height, etc. The dilution and weight can be changed.
	<b>Purging confirmation screen select function</b>	Turn the purging confirmation screen ON/OFF. ON: Activate the purging with a confirmation screen OFF: Activate the purging without a confirmation screen
	<b>Dilution setting function by amount and solution</b>	Selects how to specify the dilution from either Dilution or Amount/Solution.
	<b>Interval/Intermittent dose function (TE-LM830 only)</b>	The specified dosage rate is delivered at the specified regular intervals.
	<b>Multi-step dose function (TE-LM830 only)</b>	The speed of solution delivery increases or decreases at the specified levels (up to 10 levels).
	<b>Delayed Start dose function (TE-LM830 only)</b>	Solution delivery starts after the specified time has elapsed.
	<b>Link function (Switch function A, B) (TE-LM830 only)</b>	Switch function A: Operations of two pumps are linked. When a Completion alarm occurs on the first pump, the second pump starts solution delivery. Switch function B: A single pump controls dose of two kinds of drugs. When a Completion alarm of the first drug occurs, the setting is switched to the second drug and solution delivery starts.
	<b>Come and See ME function (TE-LM830 only)</b>	Automatic call function after a specified time elapses.
	<b>Volume delivered unit select function</b>	When the dose rate is set in mass units, the volume delivered unit can be changed to mass units.
<b>Micro notation select function</b>	Switches "µg" to "mcg" to be displayed in the drug library mode, µg/kg/min mode or mg/kg/h mode.	
<b>Use conditions</b>	Temperature: 5 to 40°C Humidity: 20 to 90% RH (non-condensing) Atmospheric pressure: 70 to 106kPa (700 to 1060hPa)	
<b>Storage conditions*</b>	Temperature: -20 to 45°C Humidity: 10 to 95% RH (non-condensing) Atmospheric pressure: 50 to 106kPa (500 to 1060hPa)	

\* A state in which the equipment is unpacked and stored for subsequent use with the main power supply unplugged.

<b>Transport conditions</b>		Temperature: -20 to 60°C Humidity: 10 to 95% RH (non-condensing) Atmospheric pressure: 50 to 106kPa (500 to 1060hPa)
<b>Power supply</b>		AC100 to 240V, 50 to 60Hz Battery: Lithium ion battery <ul style="list-style-type: none"> <li>• Continuous use period: Approx. 5 hours (applies when solution is delivered continuously at 25 mL/h in ambient temperature of 25°C with new fully charged battery)</li> <li>• Charging time: ≥8 hours (when charged with AC power supply with the power turned off) The battery can be charged to approx. 80% in 3 hours.</li> </ul> Sub-battery: Nickel-metal-hydride battery (for a Power Failure alarm in case of both power supplies are lost) <ul style="list-style-type: none"> <li>• Charging time: ≥8 hours (when charged with a new battery and AC power supply in ambient temperature of 25°C when the power is off)</li> </ul>
<b>Power consumption</b>		28VA
<b>Classification</b>	<b>Electric shock protection</b>	Class I equipment and internally powered equipment, Defibrillation-proof type CF applied part
	<b>Mode of operation</b>	Continuous operation
	<b>Protection against harmful ingress of water or particulate matter</b>	IP22 (Vertically dripping water shall have no harmful effect when the enclosure is tilted at an angle up to 15° from its normal position.)
<b>Wireless LAN</b>		<p>Hereby, TERUMO CORPORATION, declares that this TERUFUSION Infusion Pump Type LM3 is in compliance with the essential requirements and other relevant provisions of Directive 2014/53/EU.</p> <p>Catalogue number: TE-LM830xxx*</p> <ul style="list-style-type: none"> <li>• Transmit frequency or frequency band: 2412 to 2472 MHz</li> <li>• Type of modulation and frequency characteristics: <ul style="list-style-type: none"> <li>• DBPSK (Differential Binary Phase Shift Keying)</li> <li>• DQPSK (Differential Quadrature Phase Shift Keying)</li> <li>• DSSS (Direct Sequence Spread Spectrum)</li> <li>• CCK (Complementary code keying)</li> </ul> </li> <li>• Effective radiated power: <ul style="list-style-type: none"> <li>• IEEE802.11b 10.7 dBm</li> </ul> </li> </ul> <p>Catalogue number: TE-LM835xxx*</p> <ul style="list-style-type: none"> <li>• Transmit frequency or frequency band: 2412 to 2472 MHz</li> <li>• Type of modulation and frequency characteristics: <ul style="list-style-type: none"> <li>• DSSS (Direct Sequence Spread Spectrum)</li> <li>• OFDM (Orthogonal Frequency-Division Multiplexing)</li> </ul> </li> <li>• Effective radiated power: <ul style="list-style-type: none"> <li>• IEEE802.11b 15dBm</li> <li>• IEEE802.11g 13dBm</li> <li>• IEEE802.11n 12dBm</li> </ul> </li> </ul> <p>* Alphanumeric characters are entered for x in the catalogue number.</p>
<b>Dimensions</b>		Without external communication (RS-232C): 253 mm (W)* <sup>1</sup> x 120 mm (H)* <sup>1</sup> x 102 mm (D)* <sup>2</sup> With external communication (RS-232C): 253 mm (W)* <sup>1</sup> x 120 mm (H)* <sup>1</sup> x 121 mm (D)* <sup>2</sup> * <sup>1</sup> : Excluding protrusions * <sup>2</sup> : Excluding protrusions, pole clamp and moving range
<b>Unit Weight</b>		Approx. 2.0 kg
<b>Standard accessories</b>		AC power cable, pole clamp (Screw type), instruction manual

- This product is in compliance with EMC (electromagnetic compatibility) standard IEC 60601-1-2:2014 (EN 60601-1-2:2015) (CISPR group classification and class classification are Group 1 and Class A). It is also in compliance with the EMC level required by IEC 60601-2-24:2012 (EN 60601-2-24:2015).

## Specifications

- Conformity standard and directive
  - IEC 60601-1:2005+A1:2012 (EN 60601-1:2006+A1:2013)
  - IEC 60601-1-2:2014 (EN 60601-1-2:2015)
  - IEC 60601-1-6:2010+A1:2013 (EN 60601-1-6:2010+A1:2015)
  - IEC 60601-1-8:2006+A1:2012 (EN 60601-1-8:2007+A1:2013)
  - IEC 60601-2-24:2012 (EN 60601-2-24:2015)
  - MDD (Medical Device Directive) 93/42/EEC (Class IIb)

## Units Available

Model	Catalogue number	Labeling	Plug type	Computer interface	Dose mode		
					*1	*2	
TE-LM730	TE-LM730EN1	English	European plug	-	Yes	-	
	TE-LM730EN2		UK plug				
	TE-LM730DE1	German	European plug				
	TE-LM730FR1	French					
	TE-LM730NL1	Dutch					
	TE-LM730RU1	Russian					
	TE-LM730ES1	Spanish					
	TE-LM730PL1	Polish					
	TE-LM730RO1	Romanian					
	TE-LM730SK1	Slovak					
	TE-LM730SV1	Swedish					
	TE-LM730NO1	Norwegian					
	TE-LM730FI1	Finnish					
	TE-LM730HU1	Hungarian					
	TE-LM730IT1	Italian					Italian plug
	TE-LM730IT3						
	TE-LM732EN1	English	European plug				RS-232C
	TE-LM732EN2		UK plug				
	TE-LM732DE1	German	European plug				
	TE-LM732FR1	French					
	TE-LM732NL1	Dutch					
	TE-LM732RU1	Russian					
	TE-LM732ES1	Spanish					
	TE-LM732PL1	Polish					
	TE-LM732RO1	Romanian					
	TE-LM732SK1	Slovak					
TE-LM732SV1	Swedish						
TE-LM732NO1	Norwegian						
TE-LM732FI1	Finnish						
TE-LM732HU1	Hungarian						
TE-LM732IT1	Italian	Italian plug					
TE-LM732IT3							

Model	Catalogue number	Labeling	Plug type	Computer interface	Dose mode	
					*1	*2
TE-LM830	TE-LM830EN1	English	European plug	Infrared communication (IrDA), Wireless LAN	Yes	Yes
	TE-LM830EN2		UK plug			
	TE-LM830DE1	German	European plug			
	TE-LM830FR1	French				
	TE-LM830NL1	Dutch				
	TE-LM830RU1	Russian				
	TE-LM830ES1	Spanish				
	TE-LM830PL1	Polish				
	TE-LM830RO1	Romanian				
	TE-LM830SK1	Slovak				
	TE-LM830SV1	Swedish				
	TE-LM830NO1	Norwegian				
	TE-LM830FI1	Finnish				
	TE-LM830HU1	Hungarian				
	TE-LM830IT1	Italian				
	TE-LM830IT3					
	TE-LM835EN1	English	European plug			
	TE-LM835EN2		UK plug			
	TE-LM835DE1	German	European plug			
	TE-LM835FR1	French				
	TE-LM835NL1	Dutch				
	TE-LM835RU1	Russian				
	TE-LM835ES1	Spanish				
	TE-LM835PL1	Polish				
	TE-LM835RO1	Romanian				
	TE-LM835SK1	Slovak				
TE-LM835SV1	Swedish					
TE-LM835NO1	Norwegian					
TE-LM835FI1	Finnish					
TE-LM835HU1	Hungarian					
TE-LM835IT1	Italian	Italian plug				
TE-LM835IT3						

\*1: Weight mode

\*2: Drug library mode

**Note**

- Separate setup procedures are required for the product with voltage-plug combinations other than listed above.

# Device Characteristics

The battery lasts for approximately 5 hours (with continuous solution delivery at 25 mL/h or 1200 mL/h) in ambient temperature of 25°C with a new fully charged battery.

Test data for flow rate characteristics and occlusion characteristics is shown below.

Tests were conducted based on IEC 60601-2-24:2012 (EN 60601-2-24:2015). For details, refer to IEC 60601-2-24:2012 (EN 60601-2-24:2015).

## Flow Rate Characteristics

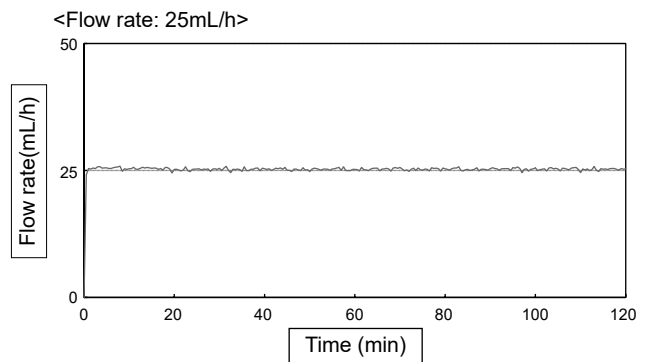
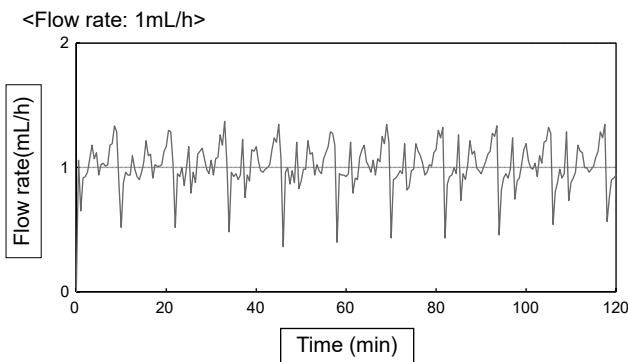
Start-up curves and trumpet curves, which are used as typical explanations of flow rate characteristics, are shown. The data below is representative examples measured for flow rates of 1 mL/h and 25 mL/h with a new TERUFUSION-pump-specific infusion set.

### Notes

- Flow rate characteristics are correlated with the infusion set. Depending on the combination of infusion set and pump, the same data as the representative example may not be obtained.
- The drug solution container placed 50 cm under the pump does not affect the flow rate accuracy.

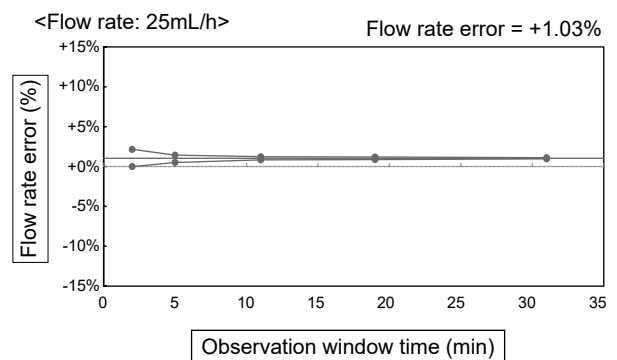
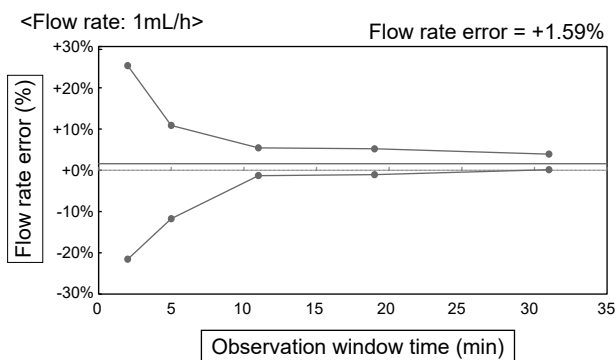
#### 1. Start-up curve

The discharge quantity measured every 30 seconds for a 2-hour measurement period is converted into flow rate values is shown. These graphs show characteristics from immediately after the start of solution delivery to when flow rate has stabilized.



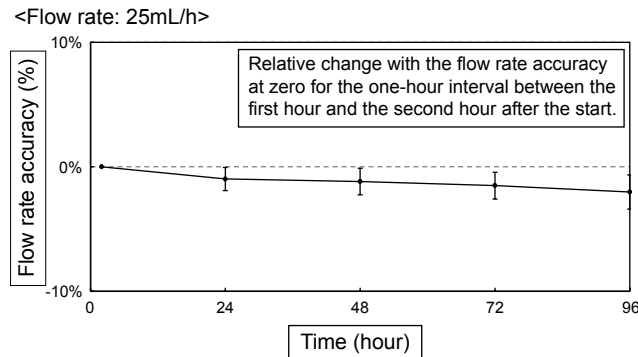
#### 2. Trumpet curve

Data for the latter one hour of the 2-hour measurement period is shown, with the horizontal axis showing the observation window time (minutes) and the vertical axis showing the maximum and minimum flow rate error for each observation window. The narrower the region enclosed between the top and bottom solid lines (the so-called trumpet curve) is, the less pulsatory motion there is.



3. Flow rate characteristics over time

This graph shows data for flow rate characteristics over time for the period from one hour after the start of delivery to the 96-hour mark. The data below is a representative example measured for a flow rate of 25 mL/h with a new TERUFUSION-pump-specific infusion set.



The upper and lower range for each plot indicates the standard deviation value.

4. Influence of pressure on the lower side of the pump (back pressure) on flow rate accuracy

Shows the maximum deviation of flow rate accuracy under normal condition with either -13.3kPa or 13.3kPa of back pressure. -13.3kPa (13.3kPa) of back pressure is equivalent to the condition where the pump is located approx. 136 cm higher (lower) than the patient (in the case of water).

Back pressure (kPa)	Maximum deviation of values (%)
-13.3	2.6
13.3	-2.5

**Occlusion Characteristics**

Typical occlusion detection ability data are occlusion pressure, Occlusion alarm occurrence time, and post-occlusion removal bolus volume. The data below is a representative example measured for flow rates of 1 mL/h and 25 mL/h, with a three-stage occlusion pressure setting value (1, 5, 10), a new TERUFUSION-pump-specific infusion set, and the occlusion clamp position at one meter below the pump. The measured values may vary depending on the test conditions.

**Note**

- The Occlusion alarm occurrence time with solution delivery at the minimum flow rate (0.1mL/h) will be approx. 10 times of those at the flow rate 1mL/h.

Flow rate (mL/h)	Occlusion pressure setting value	Occlusion pressure		Time to activate an Occlusion alarm time (min)	Bolus volume (mL)
		(kPa)	(kgf/cm <sup>2</sup> )		
1	1	23	0.23	16.4	0.13
	5	63	0.64	55.0	0.35
	10	102	1.04	95.1	0.77
25	1	25	0.25	0.7	0.14
	5	67	0.68	2.0	0.37
	10	111	1.13	3.7	0.92

## EMC Technical Information

Medical electrical equipment requires particular care in regards to EMC, and it is necessary to install and use the equipment in accordance with the following EMC information.

### Cautions

- Ensure that the power cable used is the one provided for this product. If not, this product's emissions may increase and its immunity may decrease.
- When using this product in combination with other equipment such as a network system, do not place the equipment next to each other or stack them together. It may cause malfunctioning due to electromagnetic interference.
- Portable RF communications equipment (including peripherals such as antenna cables and external antennas) should be used no closer than 30 cm (12 inches) to any part of the TERUFUSION Infusion Pump Type LM3, including cables specified in this manual. Otherwise, degradation of the performance of this equipment could result.

Table a) – Manufacturer's declaration – electromagnetic emissions – for IEC 60601-1-2:2014 (EN 60601-1-2:2015)

Manufacturer's declaration - electromagnetic emissions	
The TERUFUSION Infusion Pump Type LM3 is intended for use in the electromagnetic environment specified below. The customer or the user of the TERUFUSION Infusion Pump Type LM3 should assure that it is used in such an environment.	
Emissions test	Emissions class and group
RF emissions CISPR 11	Group 1
RF emissions CISPR 11	Class [A]*
Harmonic emissions IEC 61000-3-2	Class [A]
Voltage fluctuations / flicker emissions IEC 61000-3-3	Complies

\* The EMISSIONS characteristics of this equipment make it suitable for use in industrial areas and hospitals (CISPR 11 class A). If it is used in a residential environment (for which CISPR 11 class B is normally required) this equipment might not offer adequate protection to radiofrequency communication services. The user might need to take mitigation measures, such as relocating or re-orienting the equipment.

Table b) – Manufacturer’s declaration – electromagnetic immunity – for IEC 60601-1-2:2014 (EN 60601-1-2:2015)

<b>Manufacturer’s declaration - electromagnetic immunity</b>	
The TERUFUSION Infusion Pump Type LM3 is intended for use in the electromagnetic environment specified below. The customer or the user of the TERUFUSION Infusion Pump Type LM3 should assure that it is used in such an environment.	
<b>Immunity test</b>	<b>Immunity test level</b>
Electrostatic discharge (ESD) IEC 61000-4-2	±8 kV contact ±15 kV air
Radiated RF IEC 61000-4-3	3 V/m 80 MHz to 2.7 GHz See Table c) for immunity test level to RF Wireless communication equipment
Electrical fast transient / burst IEC 61000-4-4	±2 kV for power supply lines ±1 kV for input / output lines
Surge IEC 61000-4-5	±1 kV line(s) to line(s) ±2 kV line(s) to earth
Conducted RF IEC 61000-4-6	3 Vrms 150 kHz to 80 MHz outside ISM bands 6 Vrms 150 kHz to 80 MHz in ISM bands
Power frequency (50-60 Hz) magnetic field IEC 61000-4-8	30 A/m
Voltage dips, short interruptions and voltage variations on power supply input lines IEC 61000-4-11	0% $U_T$ for 0.5 cycle 0% $U_T$ for 1 cycle 70% $U_T$ for 25/30 cycles 0% $U_T$ for 250/300 cycles

Table c) – Immunity test level to proximity fields from RF communications equipment – for IEC 60601-1-2:2014 (EN 60601-1-2:2015)

<b>Immunity test level to proximity fields from RF communications equipment</b>		
The TERUFUSION Infusion Pump Type LM3 is intended for use in the electromagnetic environment specified below. The customer or the user of the TERUFUSION Infusion Pump Type LM3 should assure that it is used in such an environment.		
<b>Emissions test</b>	<b>Test frequency (MHz)</b>	<b>Immunity test level (V/m)</b>
Proximity fields from RF communications equipment IEC 61000-4-3	385	27
	450	28
	710, 745, 780	9
	810, 870, 930	28
	1720, 1845, 1970	28
	2100	10
	2450	28
	2600, 3500	10
	5240, 5500, 5785	9

# Symbols

This section describes the symbols (icons) used with the TERUFUSION Infusion Pump Type LM3.

## Description of Symbols

Symbol	Description of Symbols	Symbol	Description of Symbols	Symbol	Description of Symbols
CE 0197	“CE” means compliance with the European Directive 2011/65/EU on the restriction of the use of certain hazardous substances in electrical and electronic equipment as well as with the essential requirements and other relevant provisions of Directive 2014/53/EU (selfdeclaration). “CE0197” means compliance with the Medical Device Directive, 93/42/EEC.		Start		Temperature limit
			Stop		Humidity limitation
		IP22	IEC 60529 Degrees of protection provided by enclosures (IP code)		Atmospheric pressure limitation
	Authorized Representative in the European Community		Indicates the connecting position of External communication/nurse call (RS-232C)		Stacking limit by number
	Serial number		Indicates the connecting position of the drip sensor		Defibrillation-proof type CF applied part
	Catalogue number		Indicates the upstream section when placing the infusion set		Indicates recyclable corrugated paper packing material (Japan) <small>外箱：ダンボール</small>
	Date of manufacture		Indicates the upstream and the downstream section when placing the infusion set		Indicates PE (polyethylene) plastic bag (Japan) <small>ポリ袋・PE</small>
	Manufacturer		Indicates the downstream section when placing the infusion set		Recyclable (Lithium-ion battery) Brazil
	Alternating current		Contents		Contains RoHS 6 Restricted Substances (Lithium-ion battery)
	DC power supply		Consult instructions for use		Recyclable (Lithium-ion battery, Nickel-metal-hydride battery) Taiwan
	“off” (for a part of equipment)		Follow instructions for use		TISI mark (Lithium-ion battery) Thailand
	“on” (for a part of equipment)		This way up		Recyclable (Lithium-ion battery) Japan <small>Li-ion00</small>
	Return		Fragile, handle with care		Separate collection of accumulators and batteries
	Mute (Audio paused)		Keep dry		Separate collection of electrical and electronic equipment, European Community
	Purge		Keep away from sunlight		Non-ionizing electromagnetic radiation

### Note

- See pages 7 to 13 for symbols on the operation panel and LCD.

## **Simplified EU Declaration of Conformity (Radio Equipment Directive, 2014/53/EU)**

Simplified EU Declaration of Conformity (Radio Equipment Directive, 2014/53/EU)

Hereby, TERUMO CORPORATION declares that the radio equipment type TERUFUSION Infusion Pump Type LM3 is in compliance with Directive 2014/53/EU.

The full text of the EU declaration of conformity is available at the following internet address:

<http://www.terumo-europe.com>

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- If this product should fail to perform as intended, immediately stop using the product and contact the nearest branch or sales office of TERUMO.

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Original instructions

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