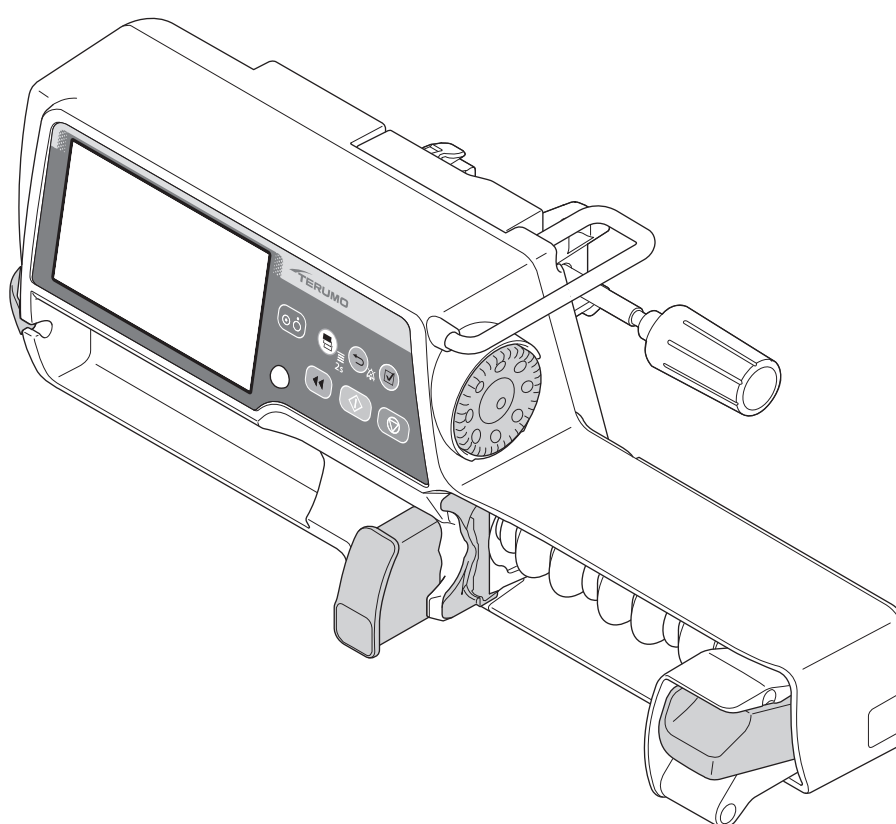


TERUFUSION™ Syringe Pump Type SS3 TE-SS730/TE-SS830

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 Syringe Pump Type SS3 is intended for the infusion of general and local anesthetics, vasodilators, cardiotonics, parenteral feeding, anti-cancer drugs, labor-inducing drugs and blood transfusion at ICU, CCU, NICU, operating rooms or general wards.

This equipment intends to be used to inject a drug solution from a syringe constantly at a preset hourly flow rate.

Model	Catalogue number	Communication function	Hereinafter referred to as
TE-SS730	TE-SS730xxx	—	TE-SS730
	TE-SS732xxx	RS-232C	TE-SS732
TE-SS830	TE-SS83xxxx	Infrared communication (IrDA), Wireless LAN	TE-SS830

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.

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

- The alarm functions include Occlusion alarm, Pressure alarm^{*1}, Nearly Empty alarm, Slider Displacement alarm, Syringe Barrel Detection alarm, Syringe Displacement alarm, Link Interruption alarm^{*1}, Plunger Displacement alarm, Battery alarm, Shutdown Notice alarm, Power Failure alarm, Re-alarm, Start Reminder, No Flow Rate alarm, No VTBI alarm^{*2} and Completion alarm^{*2}.
^{*1}: TE-SS830 only. Contact TERUMO trained service technicians for details.
^{*2}: Only if the VTBI setting function is enabled (Default: disabled)
- The Occlusion alarm detection sensitivity level can be changed according to the condition of use.

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).)

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 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. 12 hours of continuous operation for solution delivery at a flow rate of 5 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-SS830 only)

- The infrared communication allows communication with the optional Communication Rack System^{*3}.
- The wireless LAN allows communication with the network system.
^{*3}: TERUFUSION Communication Rack System (Model: TE-RS800)
TERUFUSION Communication Rack System (Extension) (Model: TE-RS811)

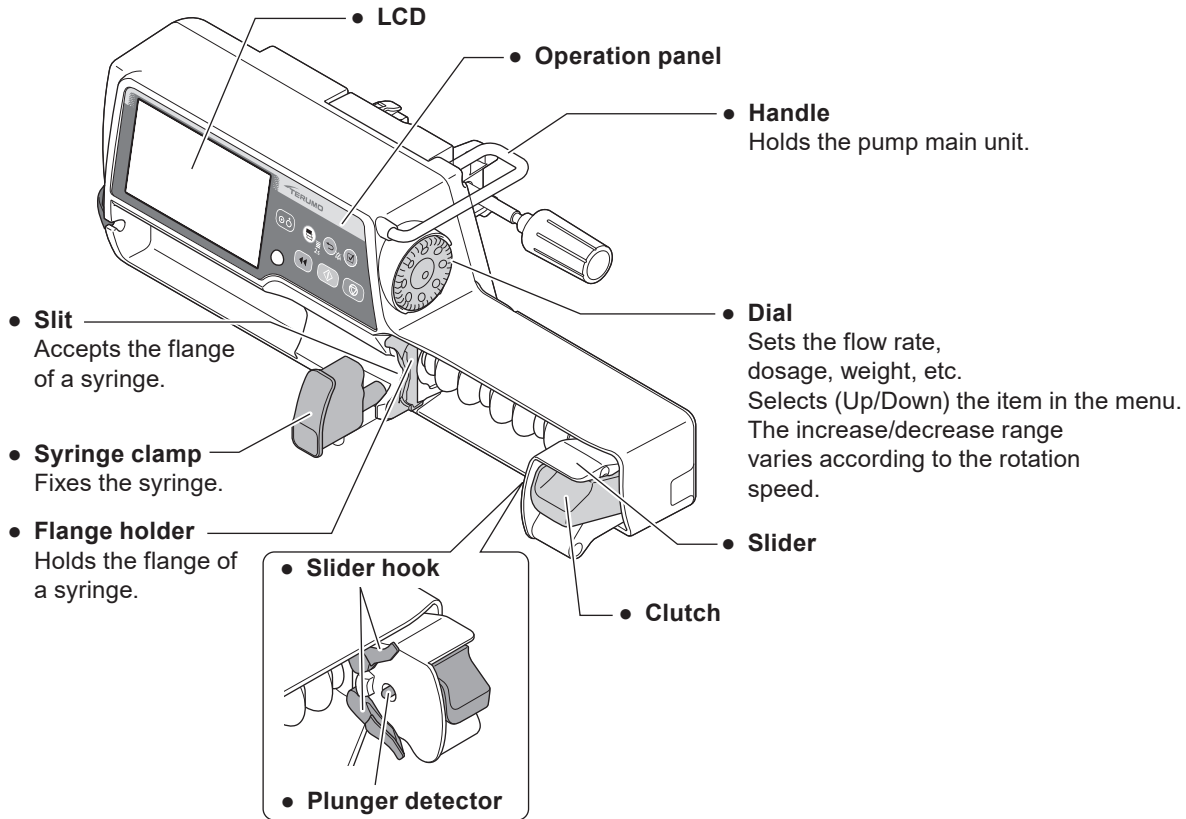
Unit Correlation

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

Parts Description

Exterior Diagram

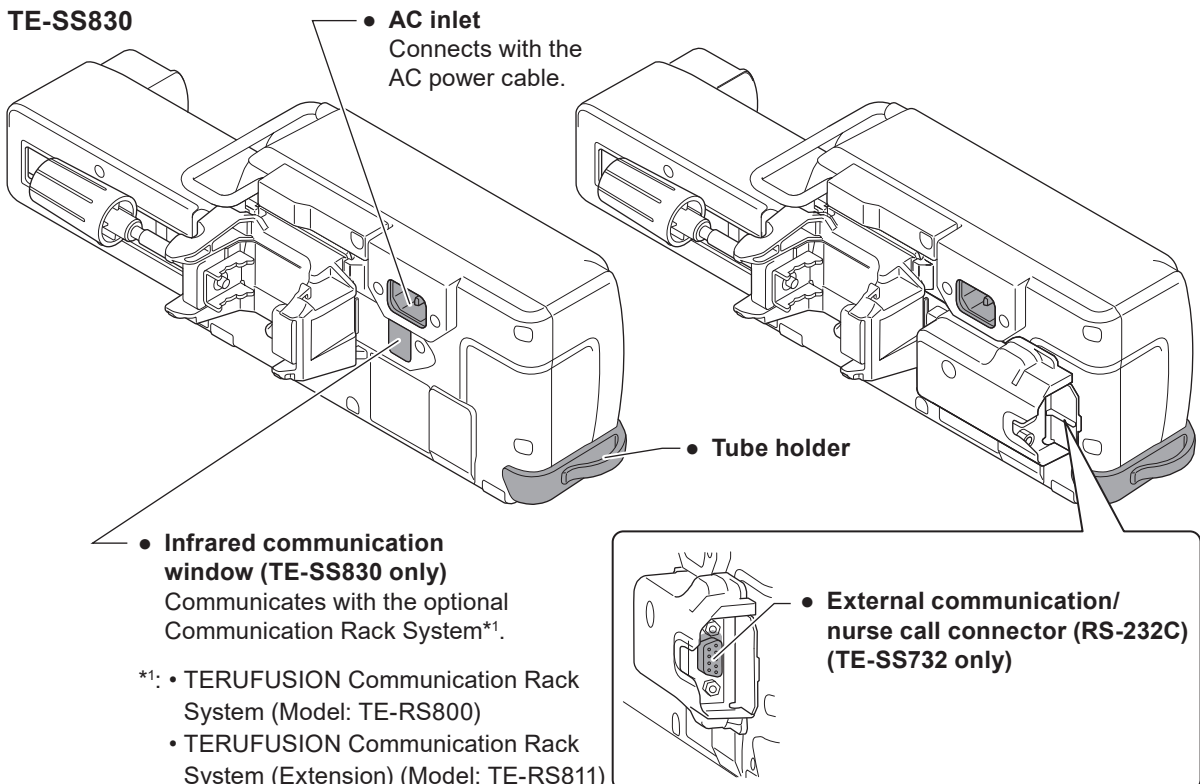
◆ Front view

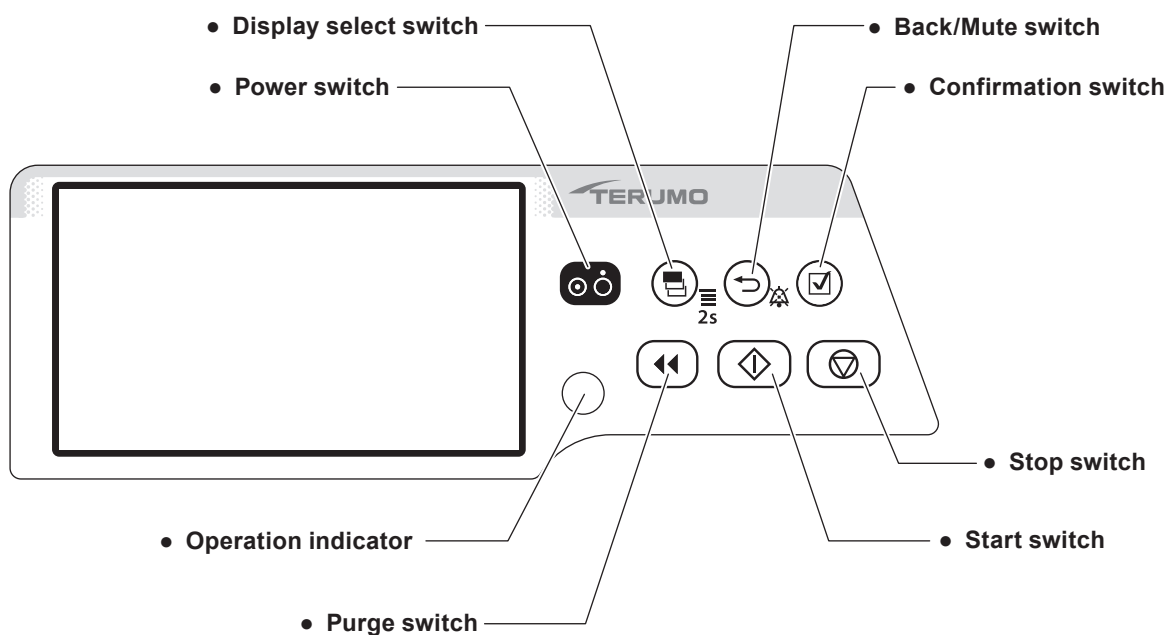










◆ Rear view

TE-SS730
TE-SS830

TE-SS732



Operation Panel


Name	Function
 Power switch	Turns the power ON/OFF.
 Purge switch	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.
 Start switch	Starts the solution delivery.
 Stop switch	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 52.)
 Display select switch	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.
 Back/Mute switch	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.
 Confirmation switch	Confirms the item selection and is also used for check confirmation.
 Operation indicator	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-SS830. However, screen and menu layout is similar for the other models.

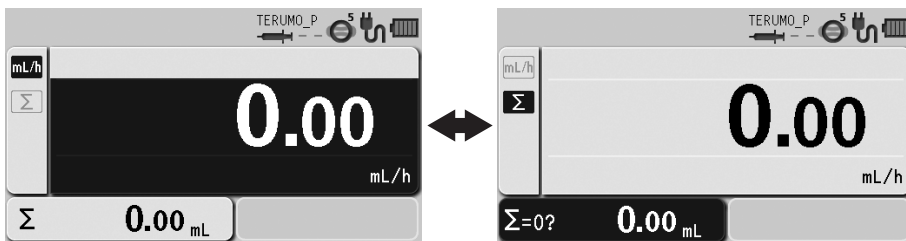
◆ Flow rate screen

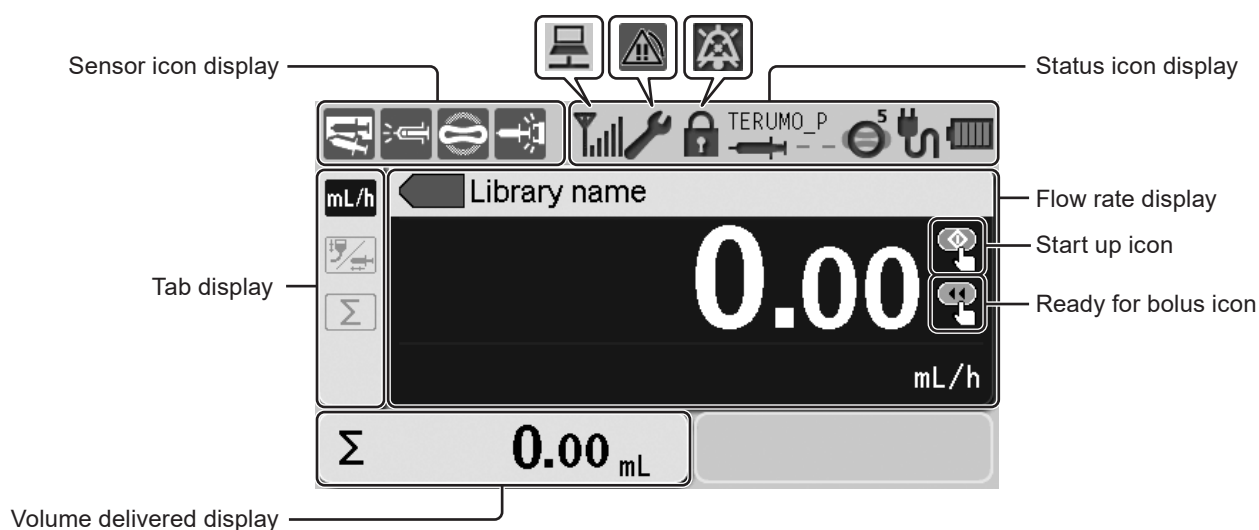


1	Flow rate display	Displays the value and information for the flow rate (mL/h), etc.
2	Volume delivered display	Displays the volume delivered.



















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>Battery icon 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">  5 bars (green): Approx. 12 hours  4 bars (green): Approx. 8 hours  3 bars (green): Approx. 6 hours  2 bars (green): Approx. 4 hours  1 bar (orange): Approx. 30 min (when the Battery alarm has not been issued) (In the case of a continuous solution delivery at a flow rate of 5 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>AC icon Displays connection/disconnection of the AC power supply.</p>		When AC power is not connected
		When AC power is connected
 <p>Occlusion icon 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 6 (Default).
		The occlusion detection pressure level is 10.

Parts Description

 <p>Occlusion icon 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>Syringe brand/Syringe size icon</p>		Syringe brand	
		Syringe size to be used (5, 10, 20, 30, 50) (If a syringe has not been set or has not been correctly detected, the size display indicates "--".)	
 <p>Keypad lock icon 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>Mute icon Displays when an alarm is muted.</p>		Alarm is muted	
 <p>Maintenance icon 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>Alarm icon 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>Wireless LAN icon Displays the strength of the signal. (TE-SS830 only)</p>		Antenna only is flashing: The wireless LAN module is faulty. Antenna only is lit: Connection to the network system is not established.	Antenna + signal strength bars light grey: Connection to the network system is established. Antenna + signal strength bars light green: During communication.
		Signal condition: Poor	
			
			
			
			
 <p>Communication icon Displays during the infrared communication (IrDA) or external communication (RS-232C).</p>		During communication	

◆ Sensor icon display







 Syringe Displacement icon	Displays when a syringe displacement is detected.
 Nearly Empty icon	Displays when the syringe is detected to be nearly empty.
 Occlusion icon	Displays when an occlusion is detected.
 Slider Displacement icon	Displays when a plunger displacement or slider displacement is detected.

Note



- Nearly Empty icon and Occlusion icon are displayed when Syringe Empty occurs. (See page 107.)

◆ Tab display

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

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

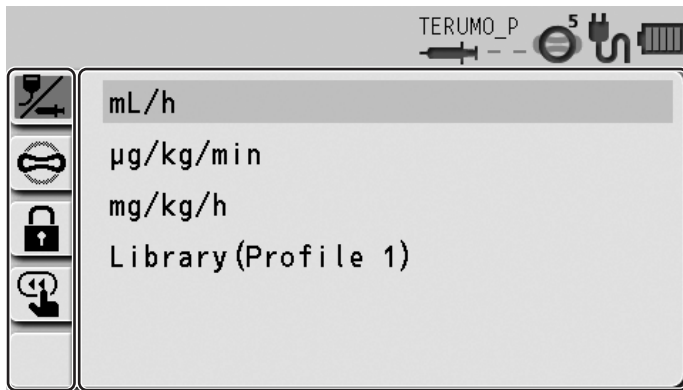
◆ Ready icon

 Start up icon	Displays when solution delivery is ready to start.
 Ready for bolus icon	Displays when the pump is ready to start bolus.

◆ Menu screen

For the programming procedure, see page 53.

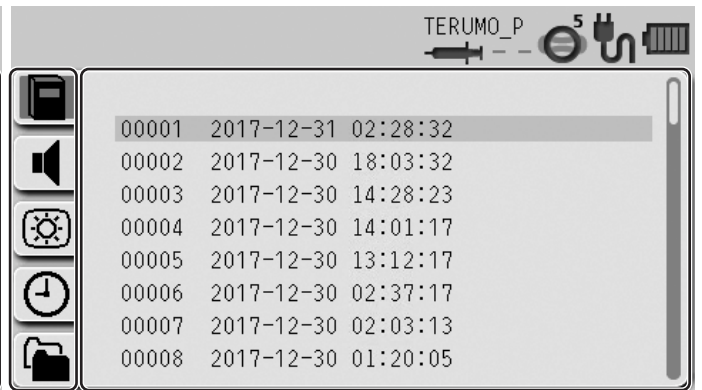
Menu 1



Menu tab

Menu details display

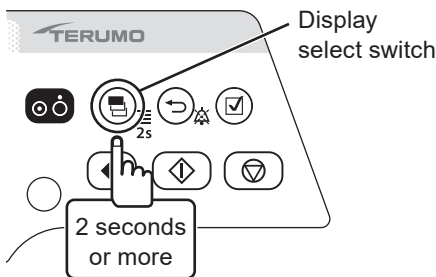
Menu 2

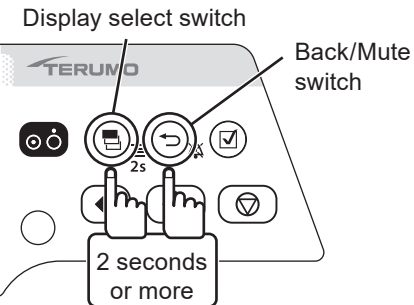









Menu tab

Menu details display

Menu	Menu tab	Menu details	Note
Menu 1 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.	 Dose mode select	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-SS830).
	 Occlusion detection pressure	1 to 10 (± 10 kPa ↔ ± 120 kPa)	Sets the occlusion detection pressure level.
	 Keypad lock	ON OFF	Sets the keypad lock function to ON or OFF.
	 Bolus	Hands On Bolus Hands Free Bolus	Bolus infusion is available with the Purge switch.
	 Advanced dose mode (TE-SS830 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.)
	 Combination dose mode (TE-SS830 only)	—	For details, contact TERUMO trained service technicians.

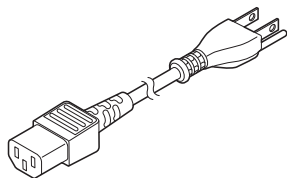


Menu	Menu tab	Menu details	Note
<p>Menu 2 While pressing the Back/Mute switch, press and hold the Display select switch for 2 seconds or more.</p> 	 History	Up to 10,000 events	Checks the operation history.
	 Sound volume	Alarm sound: 1: Low 2: Medium 3: High Step: Step up Operation sound: 0: Very low 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.
	 Brightness	1 to 5 (Dark ↔ Bright)	Sets the brightness level.
	 Date and time	Year, Month, Day, Hour, Minute	Sets the date and time.
	 Profile (TE-SS830 only)	Profile range can be set through TERUFUSION Drug Library Manager or TERUFUSION Software Package (settable up to 30 items).	Selects the profile.
	 Communication environment (TE-SS830 only)	Selection of Communication environment table (up to 10) Wireless LAN ON/OFF	Sets the communication environment.
	 Password	If the password is set, some special functions are password protected.	Displays the menu only available to TERUMO trained service technicians.

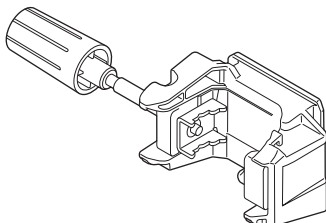
Standard Accessories

Standard accessories supplied with this product:

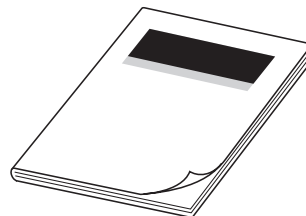
- AC power cable



- Pole clamp (Screw type)



- Instruction manual



Optional Accessories

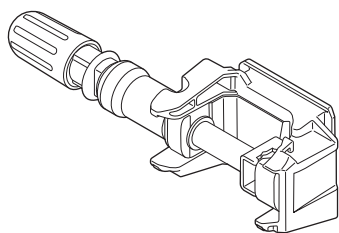
Optional accessories are sold separately.

The specifications and external appearance of the product may be changed without notice for the purpose of improvement.

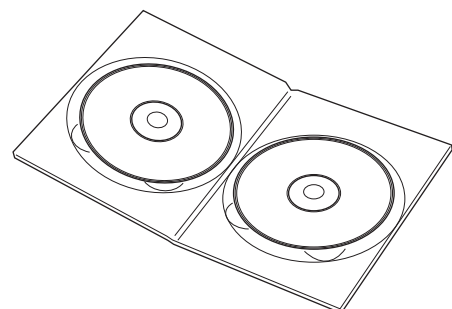
For details, see the instruction manuals supplied with each product.

Name	Model	Catalogue number
TERUFUSION 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

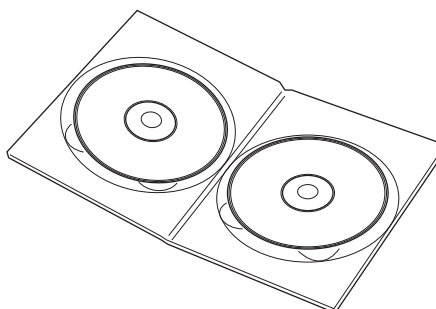
- TERUFUSION One Touch Pole Clamp (TE-877)



- TERUFUSION Drug Library Manager (TE-SW800)



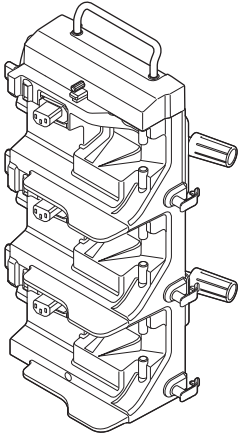
- TERUFUSION Software Package (TE-SW800)



Notes

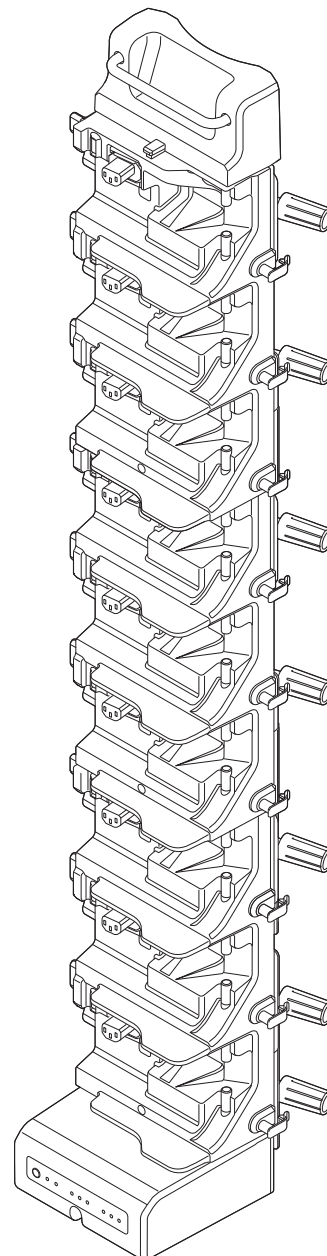
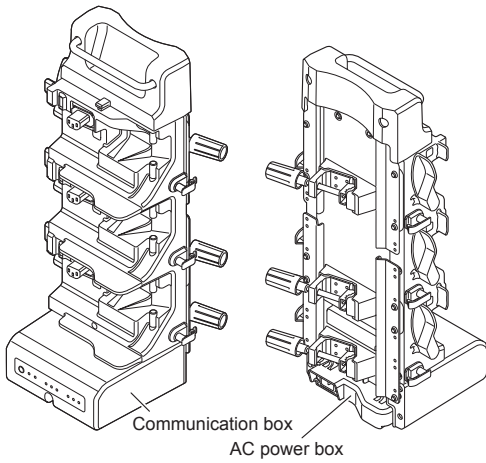
- Some functions of TERUFUSION Drug Library Manager and TERUFUSION Software Package are not available for TE-SS732. All functions of TERUFUSION Drug Library Manager and TERUFUSION Software Package are available for TE-SS830.
- When using the TERUFUSION Drug Library Manager or TERUFUSION Software Package, 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)

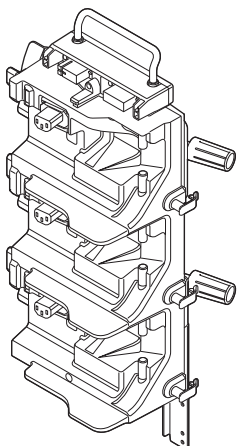


TERUFUSION Communication Rack System (TE-RS800)

<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.

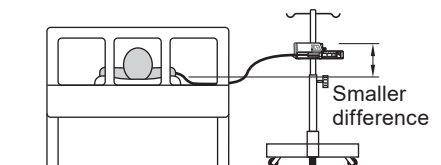
Caution

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

- After the power is turned on, a syringe that corresponds to the syringe brand name displayed on the LCD should be used. [The flow rate accuracy and alarm function cannot be guaranteed if a wrong syringe is used.]
- Always check the infusion status (decreasing volume of drug solution), connecting site 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 setting a syringe, ensure that the syringe plunger has been firmly set onto the slider hook and that the syringe has been correctly set into the sections including checking that the flange of the syringe has been inserted into the flange holder. The elevation difference between this product and the patient should be kept to a minimum. [Drug solution may not be delivered correctly due to rapid infusion caused by displacement of the syringe plunger from the slider hook, incorrect detection of the syringe size, etc.]
- When an occlusion occurs due to tube bend in the infusion line, blocked filter, blood clot inside the needle or other reasons, close the infusion line on the downstream side, and 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 (temporarily excessive infusion of drug solution)” to the patient. 2. The pump will not operate until occlusion is removed.]
- Do not apply any pressure to the syringe plunger or slider. [The syringe plunger may be pushed, causing bolus infusion to the patient.]
- When removing the syringe installed in this product, the three way stopcock (if used) of the infusion line should be closed before removing it. [It may result in excessive infusion (siphoning free flow by gravity) of drug solution.]
- 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, it interferes with the movement of the syringe (the sliding resistance of the plunger increases), frequently causing the Occlusion alarm to be issued.]
- 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.
- The product should not be used for an extracorporeal circuit etc. that may lead to an extreme negative or positive pressure. [Solution delivery may not be carried out correctly or rapid infusion may occur due to displacement of the syringe gasket from the plunger or displacement of the syringe plunger from the slider hook. In addition, solution delivery may not be carried out correctly because of bolus infusion, back-flow, etc.]



Warnings

- 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.]
- A syringe other than specified should not be used for this product. [If using a syringe other than those specified, the flow rate accuracy and alarm functions cannot be guaranteed.]

Cautions

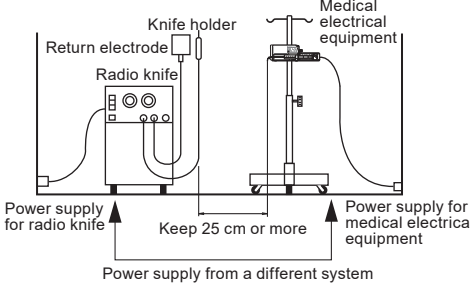
- When using a syringe (specified sterile syringe for general use) for this product, ensure that the nominal capacity of the syringe is not exceeded. [If exceeded, the accuracy of flow rate or the alarm function cannot be guaranteed.]
- Use the AC power cable included and connect to an earthed AC power 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.]
- Before inserting an intravenous needle or connecting an infusion line with the connecting site, always bleed the air inside the infusion line by pressing the purge switch and ensure that the slider pushes the syringe plunger. [1. This product may cause harm to a patient due to air injection, since it does not have a function to detect air in the infusion line. 2. This product may not be able to deliver solution for a while after started if there is a gap between the syringe plunger and the slider, or between the syringe flange and the flange holder (on the clamp side).]
- Before starting solution delivery, check that the settings for any errors. (e.g. an error in the digit of flow rate etc.) [This product does not have a function to determine the correct values, possibly resulting in excessive infusion or insufficient infusion to a patient.]
- 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 or short dosing time, the solution delivery should be monitored with extra care. [The flow rate accuracy cannot be guaranteed.]
- Turn the power on before the syringe is inserted, and check that the LCD and operation indicator are flashing, and that the buzzer sounds. [If the power is turned on when a syringe is installed, this product cannot operate a normal self-check (self-diagnosis).]
- When installing a syringe, pull forward the clamp and turn. Then, after the syringe is set, turn the clamp back to the original position and gently push it to fix the syringe. In addition, the slider should be moved while holding the clutch. [Any unreasonable operation or excess operation will cause failure of this product.]
- When setting the plunger to the slider, ensure that there is no gap between the syringe plunger and slider. [If the plunger is set and there is a gap, the air or drug solution may be sucked by the slider hook.]
- After a syringe has been installed, do not apply any force such as pulling or pushing the infusion line. [Applying these forces may result in displacing the syringe barrel from the predefined position, temporarily delivering or sucking the drug solution.]
- When starting solution delivery, check the volume delivered and then clear it as needed before use.
- When purging, check the purge volume as rapid infusion continues after the Purge switch is pressed. [It may result in excessive infusion.]
- After an Occlusion alarm is issued, always eliminate the cause of occlusion before starting. [In order to correct the volume of bolus at the time of handling occlusions, this product has functions to automatically reduce the pressure inside the infusion line at the occurrence of the Occlusion alarm (pulling back the slider, subtraction from the volume delivered). Therefore, if starting without removing the cause, the infusion may not be carried out correctly such as causing the drug solution in the infusion line to flow back to the syringe, or a repetitive Occlusion alarm status.]
- This product should be placed and used on a level and stable location. In addition, when using the IV pole, ensure that the stand is stable and this product is securely fixed to it. [Dropping or falling may result in damage or failure.]
- 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.]
- 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.]
- Disconnect the AC power cable from this product to remove it from the AC power source. Do not place this product in an area with obstacles that block the AC power cable from being disconnected.

Precautions

Cautions

- 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.]
- During solution delivery, at a low flow rate in particular, do not move this product up or down. [The internal pressure level of the infusion line changes due to gravity, which may cause excessive infusion or back-flow.]
- 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.]
- When purging a drug solution with high viscosity through a thin intravenous needle, an Occlusion alarm is likely to be issued even if the infusion line is not occluded. A solution with high viscosity, deliver it at the rate of 100 mL/h or lower, not by purging it. [If purging is continued, an Occlusion alarm may frequently be issued or the solution may be unable to be delivered.]
- Use the drug solution after it has adjusted to the room temperature. [If the drug solution is used when it is still cold, it interferes with the movement of the syringe (causing resistance of the plunger), frequently causing the Occlusion alarm to be issued.]
- Use this product at the level of the patient's heart in a range of ± 130 cm.
- When using this product together with other infusion systems, note that the alarm functions can be activated by one of those systems.
- 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.]
- 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.]
- 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.]
- In a case where a manufacturer has made changes to their syringe, the flow rate accuracy and alarm function may not be guaranteed. If any fault is observed, immediately stop using the product and contact TERUMO trained service technicians.
- 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.]
- 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.]

Cautions

- 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.]
 - 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.]
 - 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 connecting this product with other medical equipment or network system, check its conformance to IEC 60601-1 (EN 60601-1) and IEC 60601-1-2 (EN 60601-1-2) 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.] (TE-SS732 only)
 - 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. (TE-SS732 only)
 - When using the wireless LAN communication function, the effect on other equipment by radio interference should be considered. [It may affect other equipment.] (TE-SS830 only)
 - 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.] (TE-SS830 only)
 - 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.

Compatible Syringes

Use a syringe specified below.

This pump accepts TERUMO syringes and other major syringe brands listed in the table below.

The range of syringe brand selection can be limited. Contact TERUMO trained service technicians.

Warning

- Before setting a syringe, ensure the brand of the syringe to be used is the same as the one specified on the pump. If the brands do not match, the flow rate accuracy and alarm functions can not be guaranteed.

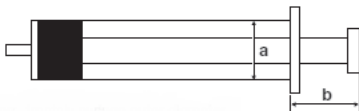
Caution

- Before using the syringe pump, ensure that the size dimension of the syringe is the same as listed below. If there is any change in the syringe specification, the flow rate accuracy and alarm functions may not be guaranteed. If any fault is observed, immediately stop using the product and contact TERUMO trained service technicians.

◆ List of Compatible Syringe Brands

For your reference, these are the dimensions as measured in March 2012.

Display	Syringe Brand	Acceptable syringe sizes									
		5 mL		10 mL		20 mL		30 mL		50/60 mL	
		a [mm]	b [mm]	a [mm]	b [mm]	a [mm]	b [mm]	a [mm]	b [mm]	a [mm]	b [mm]
TERUMO_J	TERUMO JAPAN	15	14	17	18	22	19	26	23	—	—
TERUMO_P	TERUMO PHILIPPINES	15	14	17	18	22	19	26	23	32	24
NIPRO	NIPRO	15	14	17	18	22	19	26	23	32	24
ASPEN	DIPRIVAN	—	—	—	—	—	—	—	—	30	17
BD_USA	BD PLASTIPAK USA	14	14	17	13	22	16	24	17	30	17
B.BR_OMN	B BRAUN OMNIFIX	14	17	18	16	22	16	24	17	31	20
B.BR_PER	B.BRAUN ORIGINAL-PERFUSOR	—	—	—	—	21	16	—	—	31	38
P_FERTE	PENTAFERTE	15	16	17	17	22	16	26	13	29	18
CHIRANA	CHIRANA	—	—	—	—	—	—	—	—	30	21
CODAN	CODAN	14	14	17	13	23	17	—	—	30	20
CODAN_30	CODAN	—	—	—	—	—	—	23	17	—	—
CODAN_PR	CODAN PERFUSION	—	—	—	—	—	—	—	—	30	37
BD_PRECS	BD PRECISE	—	—	—	—	23	21	—	—	32	24
BD_PERFS	BD PLASTIPAK PERFUSION	—	—	—	—	—	—	—	—	31	38
BD_IRELD	BD PLASTIPAK IRELAND	—	—	—	—	21	16	24	16	30	16



Size a : Approximate outer diameter of syringe

Size b : Approximate length from syringe flange to the end of the plunger when the plunger is completely slid into the syringe.

Cautions

- Only use specified syringes with luer lock for the pump.
- TERUMO cannot accept any responsibility for errors in flow due to modifications of the syringe specifications introduced by the manufacturer.
- Differences in factors such as size and plunger force in compatible syringes may not fulfill flow rate accuracy of infusion.
- Contact the syringe supplier for details on syringe specifications.

Note

- When a custom syringe list is created by specifying a brand for each syringe size among the available syringes, it can be registered to the pump to be available for use. Contact TERUMO trained service technicians.

Prior to the initial use of the pump, set the date and time to record history correctly. (See page 79.)
 Before use, carefully read “Precautions” and the labels attached to the product.

Prior to the Pump being Used

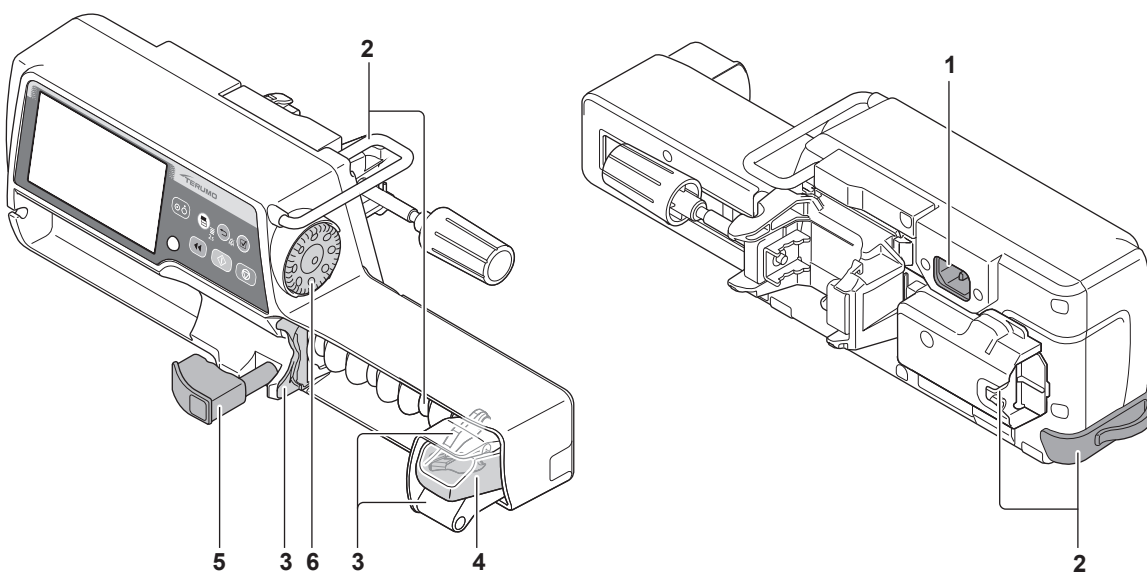
Connect to the AC power supply and charge (8 hours or more) with the power turned off.

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.**

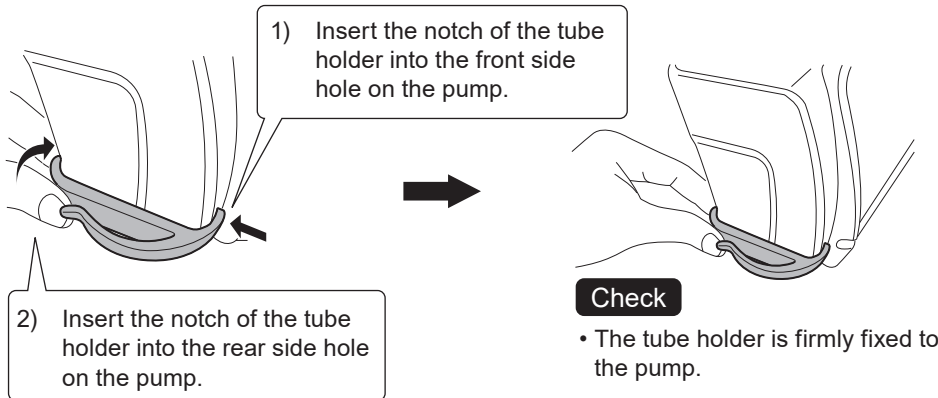
◆ Main unit/AC power cable



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 handle, rubber protector, tube holder and RS-232C connector cover (if RS-232C is connected) (TE-SS732 only).
3. There is no damage or adhered drug solution on the slider, slider hook and flange holder (including Slit).
4. When moving the slider left and right with the clutch pushed, it should move smoothly, and when it is moved to the left most position while the power is on, the Nearly Empty alarm should be issued. (See page 111.)
5. There is no adhered drug solution on the syringe clamp and that it moves back and forth smoothly.
6. There is no 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 99.

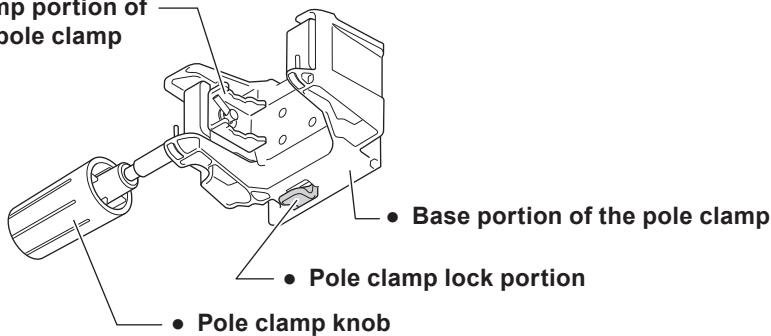
Notes

- 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.



◆ Pole clamp



- Clamp portion of the 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 99.
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 without a syringe installed.

1. The operation indicator lights in green and red alternately.
2. The message "Self-check" is displayed on the LCD, and the LCD flashes.
3. The buzzer sounds.
4. The alarm icons, slider displacement icon , and syringe displacement icon  are flashing.

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

1. The level of the 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 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.

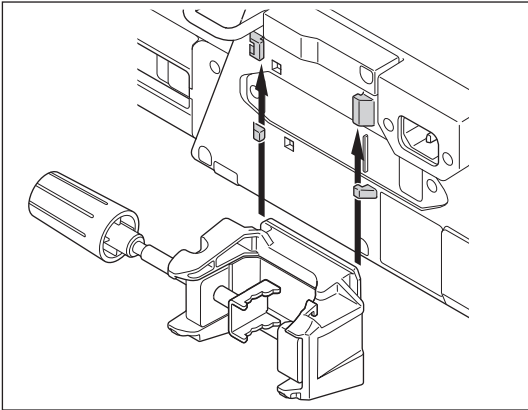
- The AC power cable is completely inserted into the AC inlet of the main unit.

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 pump from the lower side.**

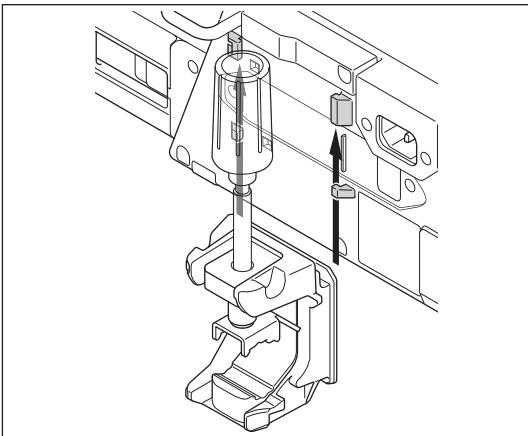
Check

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

Note

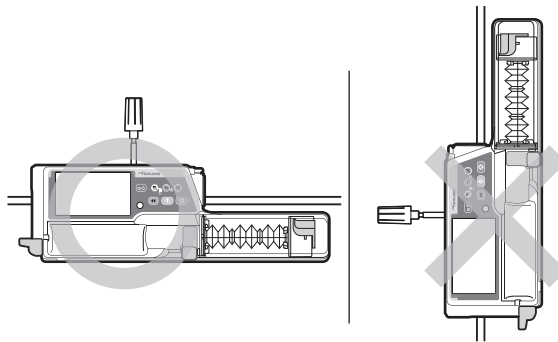
- For instructions on attaching the IV pole and other parts, see page 22.

To attach to a horizontal pole

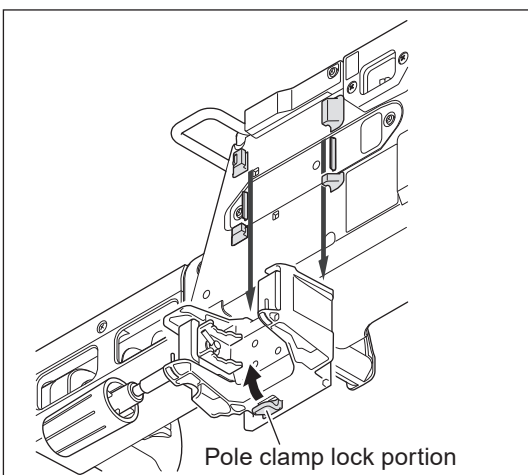


Notes

- 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 (TE-SS732 only) may produce difficulties attaching to some horizontal bars depending on the diameter of the bar. (It can be installed on to "Horizontal Rail".)
- Do not attach the pump in the vertical direction.



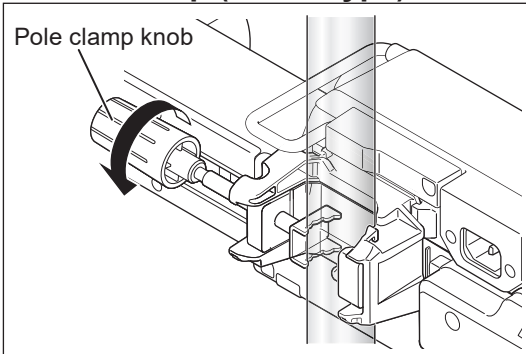
◆ Detach the pole clamp



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

Attaching/Detaching to the IV Pole

◆ Pole clamp (Screw type)

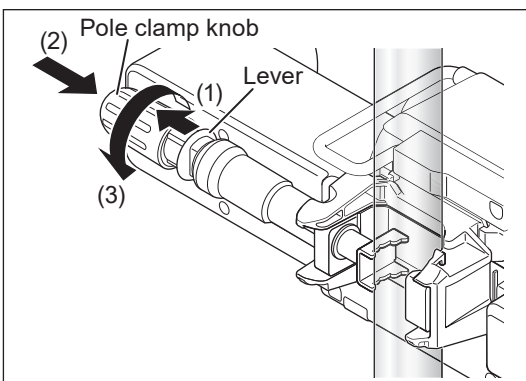


- Turn the pole clamp knob to fix the pump firmly to the IV pole.

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

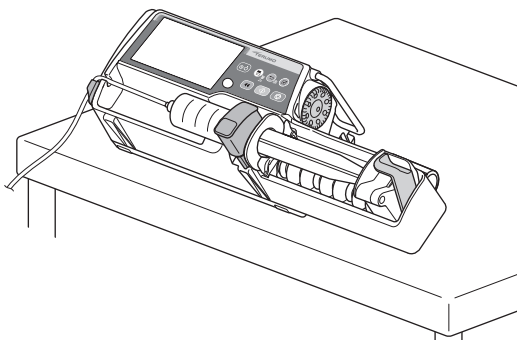
- To attach the pole clamp quickly, before fixing it to the IV pole completely, pull and hold the lever (1), push the knob in the direction of (2) and turn the knob in the direction of (3) to fix the pump. (The lever cannot be pulled after the pump is fixed to the pole).
- To detach the pole clamp from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

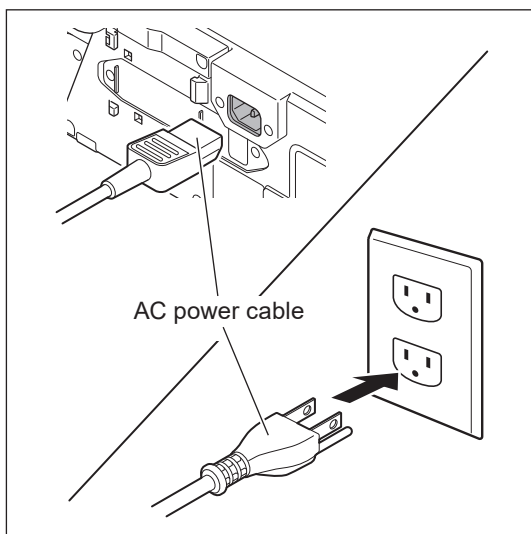
- Make sure that pole clamp is firmly fixed to the IV pole and the IV pole is stable. When transporting with the unit fixed to the IV pole, be aware as the pump may drop or fall due to a floor step, slope, contact with surrounding objects, etc.
- When a pole clamp is used, do not release it until you 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.

Note

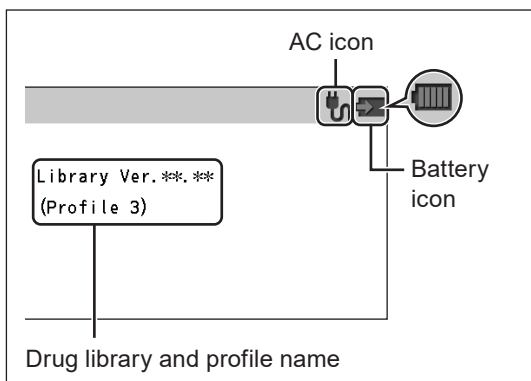
- The syringe pump can be set tilted with the pole clamp attached as shown below.



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-SS830 only)” (page 81) should be displayed on the LCD (TE-SS830 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 74.
- 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

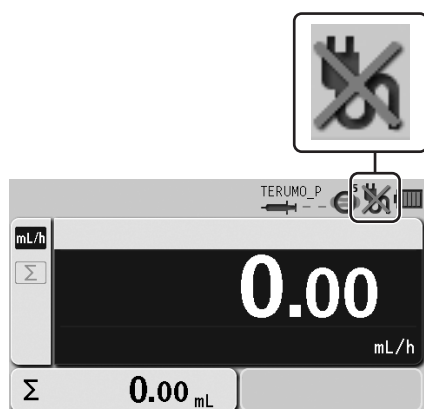
- Please ensure AC inlet and all connections are clean and dry prior to use. If moisture is present, make sure that the power is turned off and the AC power cable is removed from both main unit and AC power source, and then thoroughly wipe with a dry cloth.
- Use the AC power cable included and connect 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. 12 continuous hours. (In the case of continuous solution delivery at a flow rate of 5 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. 12 hours
-  4 bars (green): Approx. 8 hours
-  3 bars (green): Approx. 6 hours
-  2 bars (green): Approx. 4 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 5 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

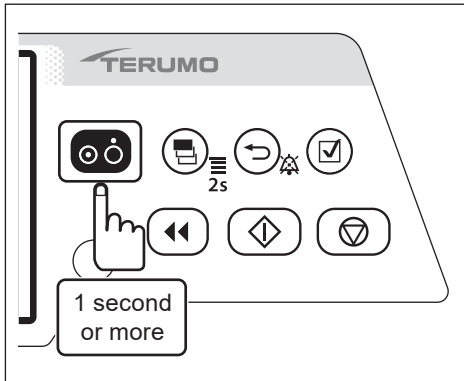
- The operating hours of the internal battery are only an estimation. Since the actual operating hours may be shorter pay extra attention to the status of the main unit when the internal battery is used.
- When the battery charge level goes down, the Battery alarm sounds. Connect the AC cable immediately.
- 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.)

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 syringe installed. 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.

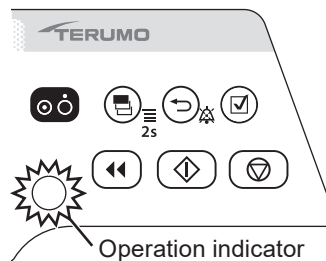
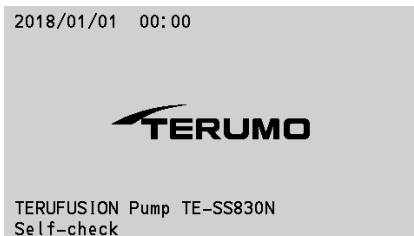


- **Press and hold the Power switch for 1 second or more until the TERUMO logo screen is displayed to turn the power on.**

Checks

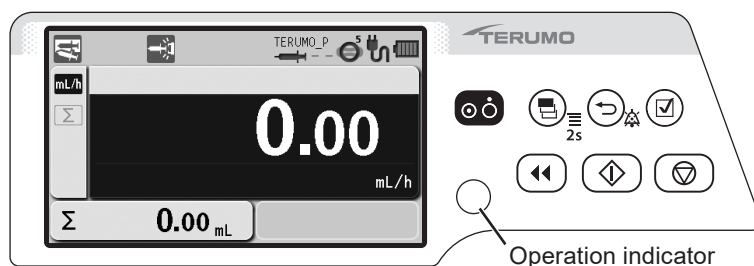
When turning the power on, the following occur simultaneously;

- 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.



Checks

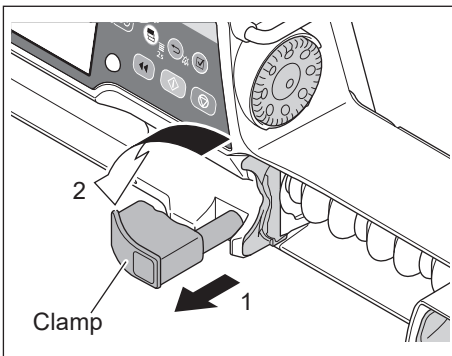
- The syringe displacement icon  and the slider displacement icon  are displayed flashing on the LCD.
- The AC icon  is displayed.
- The battery icon is displayed, not indicating the sub-battery failure.
- The operation indicator is off.

Setting the Syringe

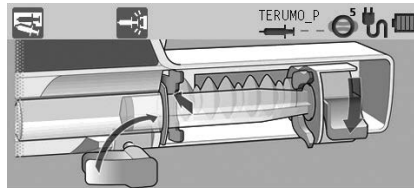
- 1) Close the infusion line and attach a syringe filled with solution to it using aseptic technique.

Caution

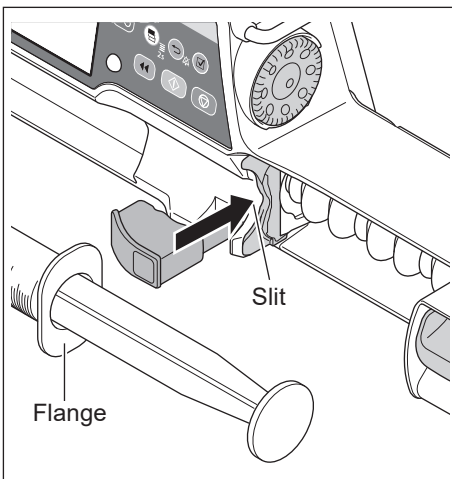
- Only use specified syringes with luer lock for the pump.



- 2) Pull the clamp forward and turn.



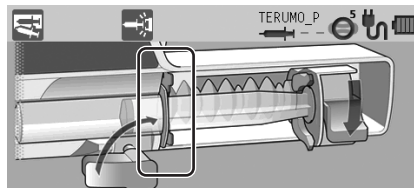
Place the syringe



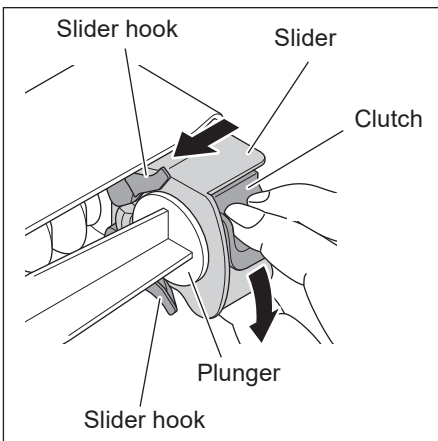
- 3) Insert the flange into the slit.

Checks

- Check the LCD as shown below.
- The syringe flange is correctly fitted into the slit.



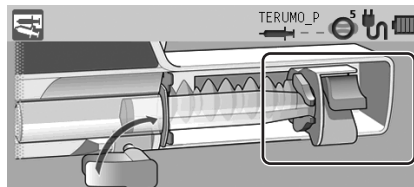
Place the syringe



- 4) While holding the clutch, move the slider until it meets the plunger, and then release the clutch. If the following guidance in the figure below does not display, perform this step again.

Checks

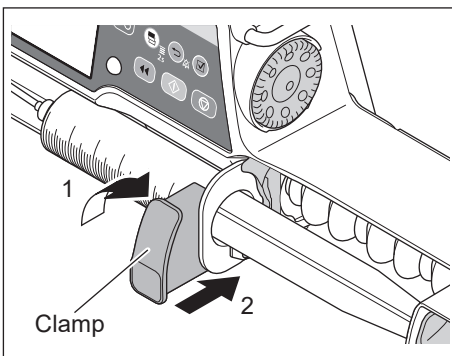
- The clutch appearing in the LCD should look as shown below.
- The slider displacement icon is turned off.



Place the syringe


Note

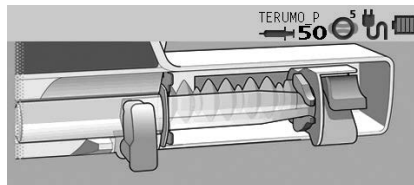
- If the process is not completed after several attempts, the clutch may be ill fitting. Ensure that the infusion line is not attached to a patient and then apply light pressure to the slider to push the clutch into position. The clutch may click when fitted into the position.



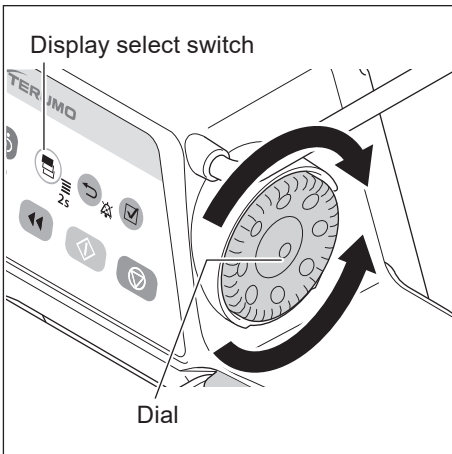
- 5) Turn the clamp and gently push it to fix the syringe.

Check

- The message "Syringe Barrel OK xx mL" is displayed on the LCD, and the syringe displacement icon  is not displayed. (xx is the size of the held syringe.)



Syringe Barrel OK 50mL



6) Turn the Dial or press the Display select switch to select a syringe brand.

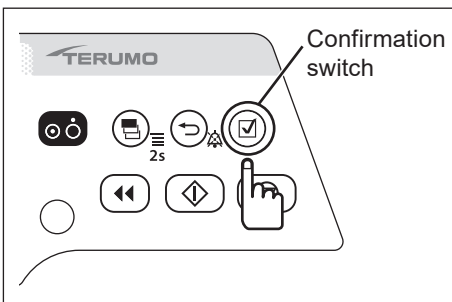
Warning

- After the syringe type is selected, recheck that the setting has been adjusted correctly.

Notes

- Turning the Dial or pressing the Display select switch moves the white frame.
- The pump will automatically detect the syringe size.

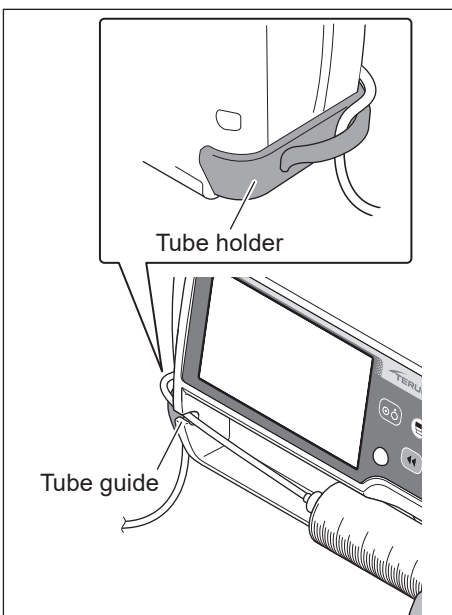
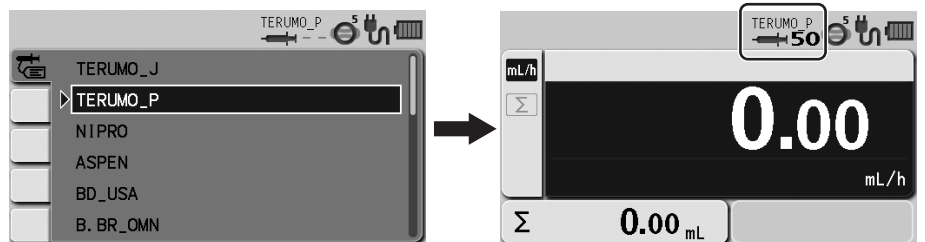
Syringe brand tab



7) Press the Confirmation switch.

Check

- The syringe brand and the syringe size are displayed on the LCD correctly.



8) Insert the tube completely into the tube guide and set the tube to the tube holder.

Warning

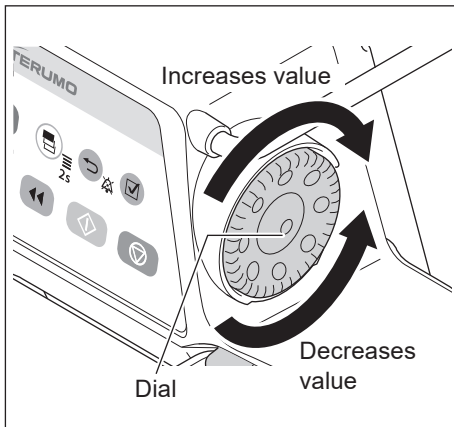
- When setting a syringe, ensure that the syringe plunger has been firmly set onto the slider hook and that the syringe has been correctly set and that the flange of the syringe has been inserted into the flange holder. The elevation difference between this product and the patient should be kept to a minimum. Drug solution may not be delivered correctly due to rapid infusion caused by displacement of the syringe plunger from the slider hook, incorrect detection of the syringe size, etc.

Cautions

- When setting a plunger into the slider, check that there is no gap between the plunger of the syringe and the slider. If the plunger is set with gap between them, air or drug solution may be drawn in by the slider hook.
- If the LCD displays the syringe displacement icon and the buzzer sounds, check the syringe has been set correctly, and re-set if necessary. If the syringe is not installed at the correct position, the solution delivery cannot be started.
- Even after the syringe is set in the proper position, if any fault is observed, immediately stop using the product and contact TERUMO trained service technicians.
- When installing a syringe, make sure that the syringe size and brand displayed on the LCD correspond to the syringe. If they do not correspond with each other, it may cause unintended solution delivery.
- When installing a syringe, pull forward the clamp and turn. Then, after the syringe is set, turn the clamp back to the original position and gently push it to fix the syringe. In addition, the slider should be moved while holding the clutch. Any unreasonable operation or excess operation will cause failure of this product.
- When using a syringe (specified sterile syringe for general use) for this product, ensure that the nominal capacity of the syringe is not exceeded. If exceeded, the accuracy of flow rate or the alarm function cannot be guaranteed.

Setting Flow Rate

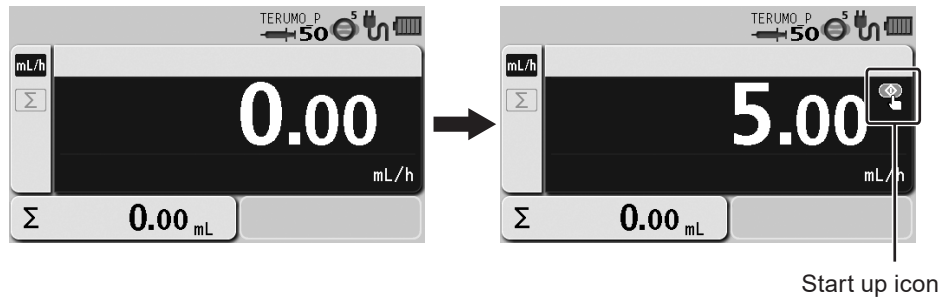
Set the flow rate per hour.



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

Note

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



Notes

- The flow rate can be set within the range of the following values.

Setting range:

0.01 to 150.00 mL/h

Note that the upper limit of the flow rate can be changed in the following ranges:

0.01 to 150.00 mL/h (when using syringe of 5 mL)

0.01 to 300.00 mL/h (when using syringe of 10 mL, 20 mL, 30 mL)

0.01 to 1200.00 mL/h (when using syringe of 50/60 mL)

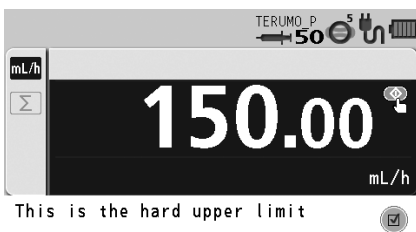
Step:

0.01 mL/h step (0.01 to 10.00 mL/h)

0.10 mL/h step (10.00 to 100.00 mL/h)

1.00 mL/h step (100.00 to 1200.00 mL/h)

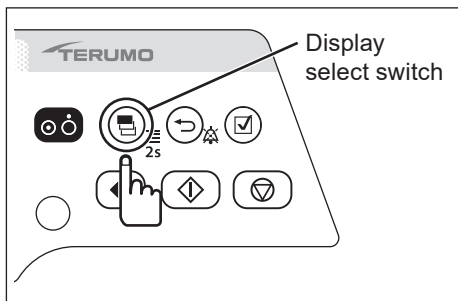
- When 150.00 mL/h is reached, the confirmation message "This is the hard upper limit" is displayed on the LCD.



- 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

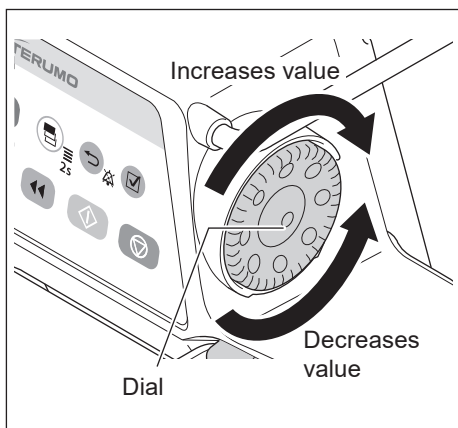
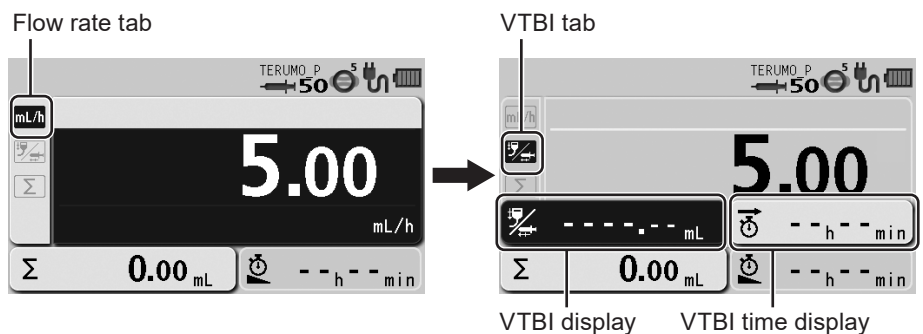
Set the VTBI for the solution delivery (Default: disabled).
 To activate this feature, contact TERUMO trained service technicians.
 Setting VTBI to enable (ON) also sets VTBI time to enabled (ON).



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

Notes

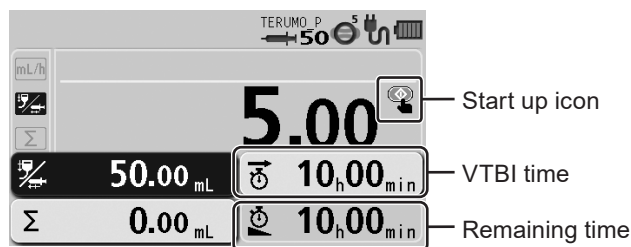
- The VTBI tab is selected.
- The flow rate display shows the VTBI display and the VTBI time display.
- The VTBI display appears in dark blue (selected).



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.

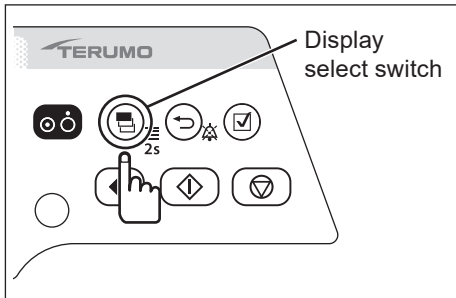


Notes

- The VTBI can be set from 0.10 to 9999.00 and "----.---" (Unlimited).
- In the case of a solution delivery with no setting for the VTBI ("----.---": Unlimited), the pump will not stop until the Syringe Empty is issued due to running out drug solution, and therefore the product should be stopped before running out of the drug solution.
- 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.

Setting VTBI Time

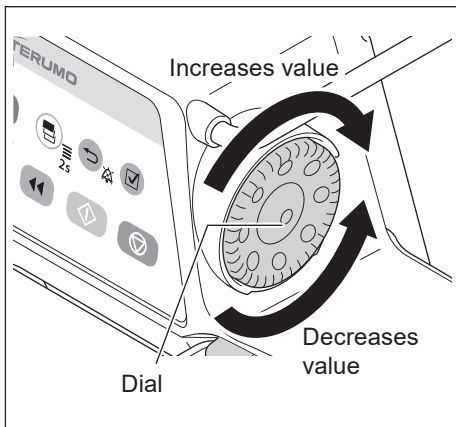
Set up the time period to complete the dose (Default: disabled).
 The flow rate is recalculated from the VTBI and VTBI time specified.
 To activate this feature, contact TERUMO trained service technicians.
 Setting VTBI to enable (ON) also sets VTBI time to enabled (ON).



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

Note

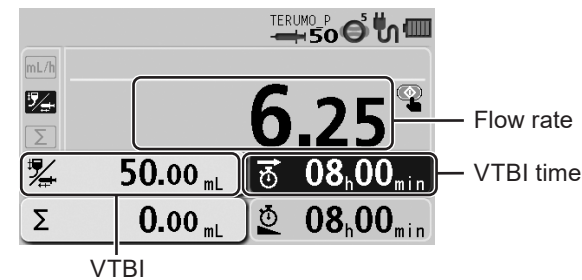
- The VTBI time display appears in dark blue (selected).



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.

◆ 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 0.1 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

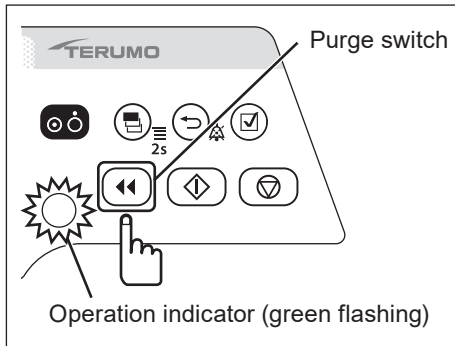
- The KVO is a flow rate set in advance to operate under certain conditions in order to keep the patient line open.
- Note that the symbol KOR (Keep Open Rate) is commonly used as an alias for KVO.
- According to IEC 60601-2-24 (EN 60601-2-24), clause 201.3.209, KVO (Keep Vein Open) is commonly used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

◆ Stopping Keep Vein Open

- 1) Press the Back/Mute switch twice to stop the alarm and return to flow rate screen.**
- 2) Press the Stop switch to cancel the Keep Vein Open (KVO) function and the operation stops.**

Priming

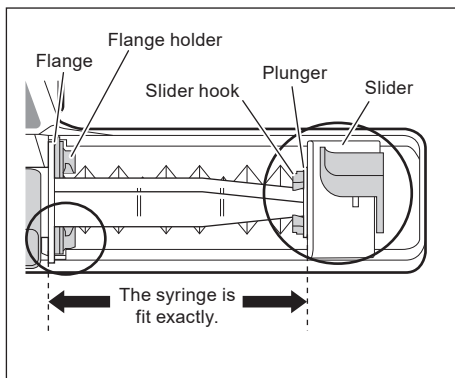
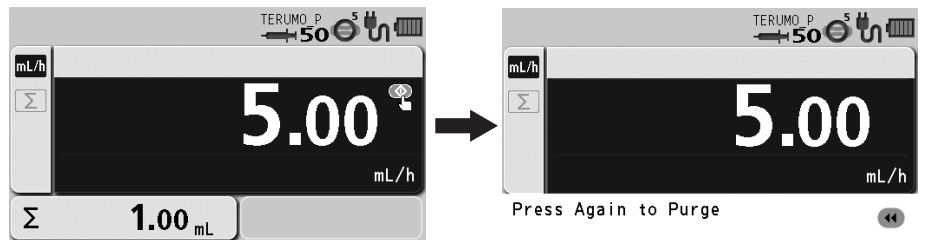
Before connecting the infusion line to the patient, perform priming to extract air from the line.



1) Press the Purge switch.

Note

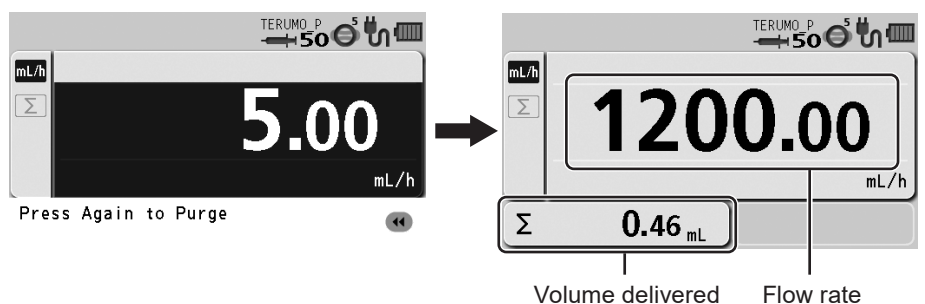
- The message "Press Again to Purge" is displayed on the LCD.



2) Press and hold the Purge switch to perform priming.

Notes

- During the priming operation, the buzzer sounds and the operation indicator flashes green.
- During the priming operation, the priming volume is displayed on the flow rate display.
- If any other switch is pressed while the Purge switch is pressed, the safety function detects it as an abnormal operation and stops purging.
- After the priming operation is finished, the screen transits to the flow rate screen.



Notes

- The syringe size and the volume purged are as follows:
 - When using syringe of 5 mL: approx. 150 mL/h
 - When using syringe of 10 mL: approx. 300 mL/h
 - When using syringe of 20 mL: approx. 400 mL/h
 - When using syringe of 30 mL: approx. 500 mL/h
 - When using syringe of 50/60 mL: approx. 1200 mL/h
- With the Purge switch pressed and held, the volume delivered display shows the volume purged.
- The upper limit of purge volume can be set. Contact TERUMO trained service technicians.
- The priming function will not work when the syringe pump is stopped by an alarm.

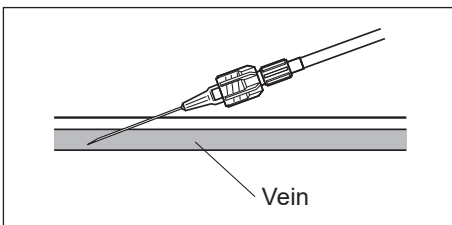
Cautions

- Before inserting an intravenous needle or connecting an infusion line with the connecting site, always prime the infusion line by pressing the Purge switch. This product may cause harm to a patient due to air injection, since it does not have a function to detect air in the infusion line.

Cautions

- Failure by any mechanical gap may cause considerable delay in the start of the infusion. This is especially the case when a large syringe (e.g. 50 mL) is used at very low flow rate settings and/or when anti-siphon valves are used in the infusion line. Use the priming function to remove any mechanical gap: between the syringe plunger and the slider; between the flange and the syringe pump slit.
- When purging the solution, note that the volume purged is not added to the volume delivered. If this is not considered, the volume delivered will differ from the actual infusion volume.
- When purging a drug solution with high viscosity through a thin intravenous needle, an Occlusion alarm is likely to be issued even if the infusion line is not occluded. To deliver a solution with high viscosity, deliver it at the rate of 100 mL/h or lower, not by purging it. If purging is continued, an Occlusion alarm may frequently be issued or the solution may be unable to be delivered.

Inserting a Needle

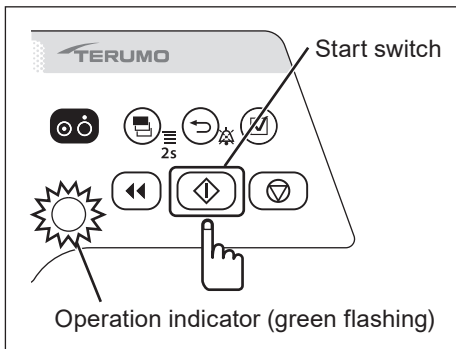


- 1) **Check**
 - The pump is stopped.
- 2) **Insert the needle according to the internal hospital procedures.**

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.

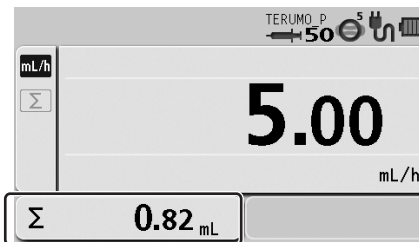
Starting Solution Delivery



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

Notes

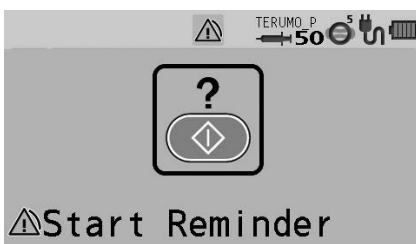
- The buzzer sounds.
- The operation indicator flashes green.
- The volume delivered increases.
- Flow rate can be changed during solution delivery. Rotate the Dial in the flow rate display to change the flow rate and the confirmation message appears. Press the Start switch to start solution delivery at the changed flow rate.



Volume delivered

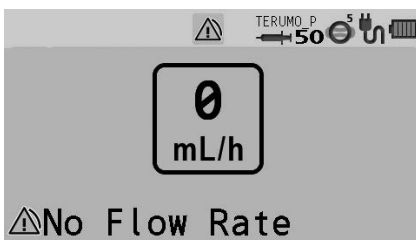
Notes

- 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 39) if you want to temporarily extend the Start Reminder.



When Solution Delivery Cannot Start

The alarm sounds and the following warnings display. (See page 103.)



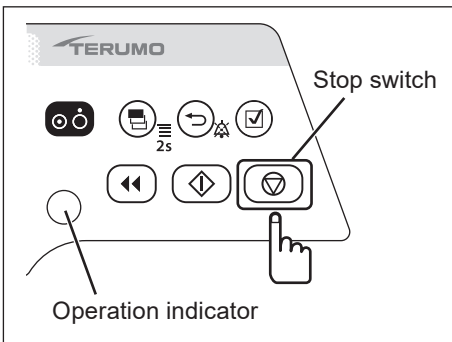
No Flow Rate alarm (yellow)

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

Cautions

- If soft and hard limits are not activated before starting solution delivery, check the settings for any mistakes such as an error in the digit of flow rate. This product does not have a function to determine whether or not the set values are appropriate, 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 syringe.

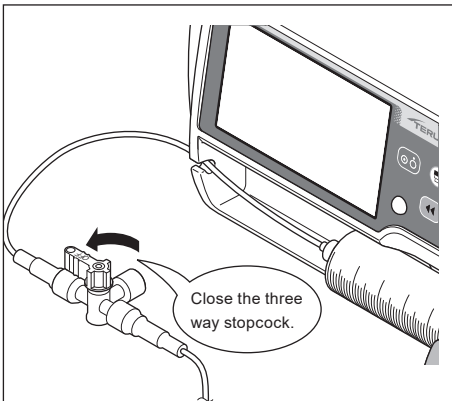
Stopping Solution Delivery



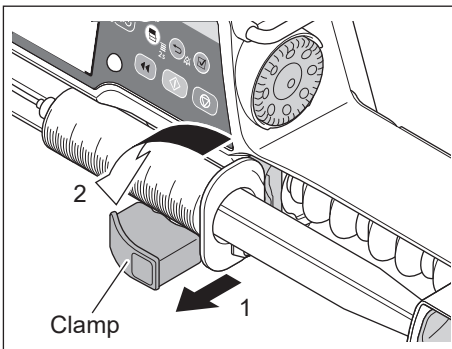
1) Press the Stop switch.

Notes

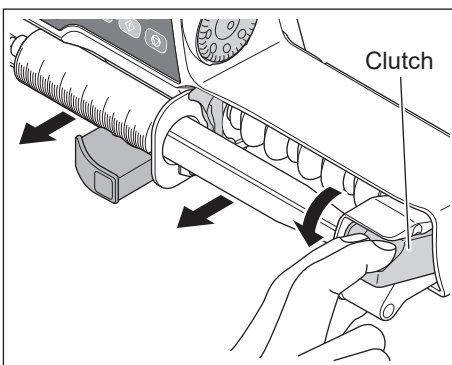
- The buzzer sounds and the operation indicator turns off, then the operation stops.
- The volume delivered stops increasing.



2) Close the infusion line.



3) Pull the clamp and then turn.

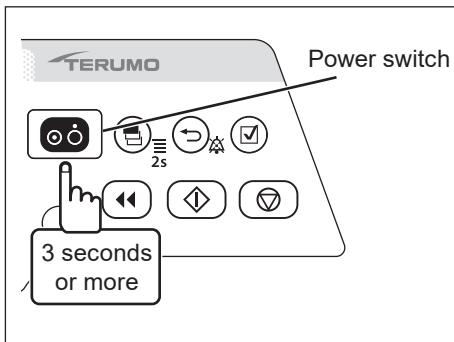


4) While holding the clutch, remove the syringe.

Warning

- When removing the syringe installed in this product, first close the three way stopcock etc. of the infusion line. Otherwise excessive infusion (siphoning free flow by gravity) of the drug solution may occur.

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

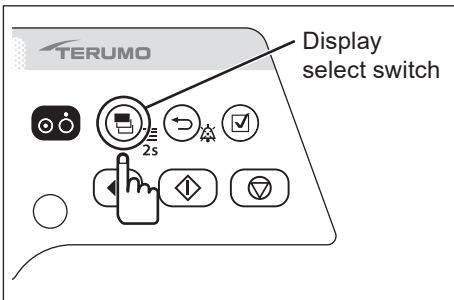
- While holding the Power switch, the power off buzzer sounds, then the LCD displays count-down arrows and turns off.



- 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.

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

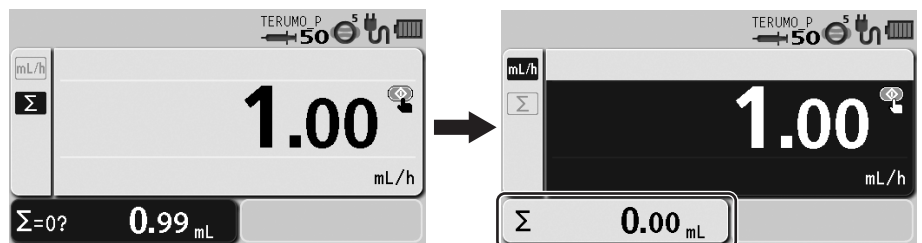
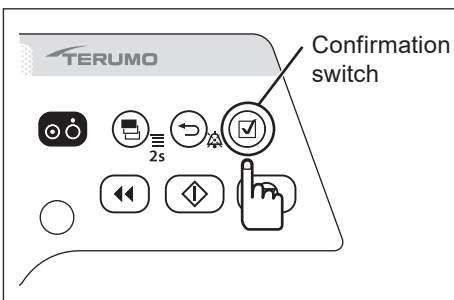
Note

- 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

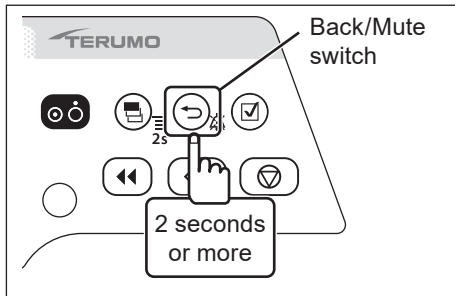
- When resuming the solution delivery after the value of the volume delivered is cleared to "0" mL, check the flow rate and the VTBI, and re-set as required.
- To check the volume delivered after clearing the value, use the history function. (See page 71.)
- Turning the power off clears the volume delivered 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 syringe is set 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

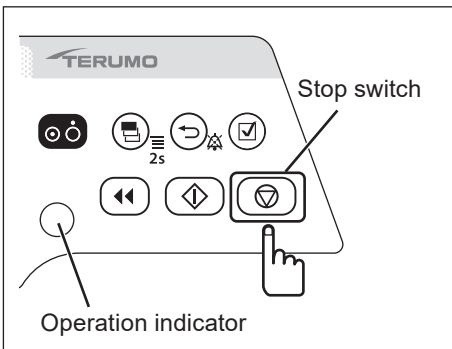
- The LCD displays the message "Stand By".



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.

Replacing Syringe to Continue Solution Delivery



- 1) Press the Stop switch to stop the solution delivery.

Note

- For details on stopping solution delivery, see page 36.

- 2) Close the infusion line.

- 3) Remove the syringe.

Note

- For details on removing the syringe, see page 36.

- 4) Check that the syringe brand to be used matches the syringe brand displayed on the LCD, and then place the syringe.

Note

- For details on setting the syringe, see page 26.

- 5) Perform priming before starting solution delivery to the patient, and keep the plunger pushed by the slider.

Note

- For details on priming, see page 33.

- 6) Clear the volume delivered as required.

Note

- For details on clearing the volume delivered, see page 38.

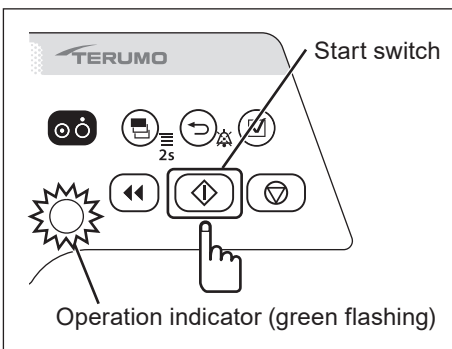
- 7) Switch the solution delivery to the patient side, open the infusion line, and then press the Start switch to start solution delivery.

Check

- The flow rate is correctly set.

Notes

- The operation indicator flashes green.
- The volume delivered increases.

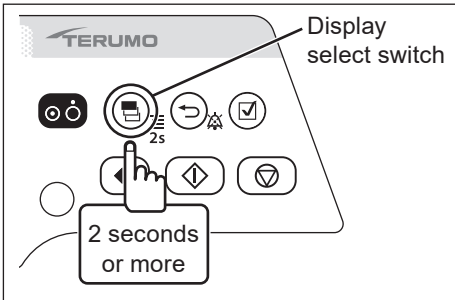


Selecting Dose Mode (Weight Mode)

The dose unit setting can be selected.

Note

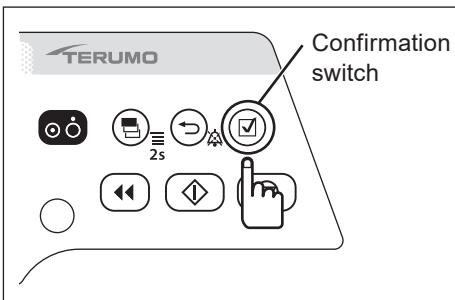
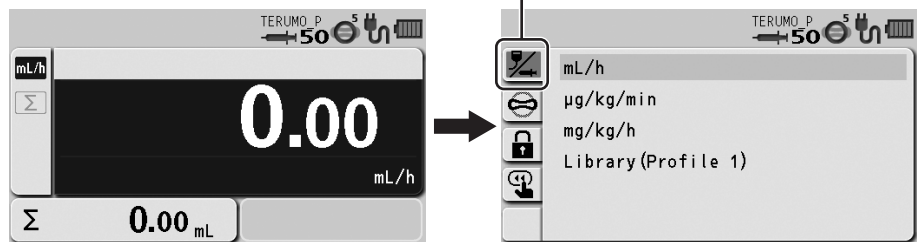
- To disable the selecting dose mode, contact TERUMO trained service technicians.



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

Note

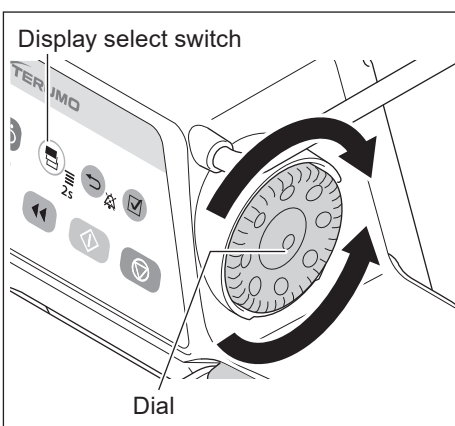
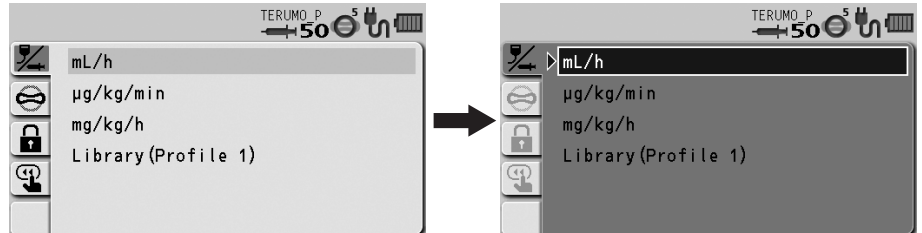
- The menu 1 screen is displayed and then the dose mode select (Dose) display appears.



- 2) Press the Confirmation switch.**

Note

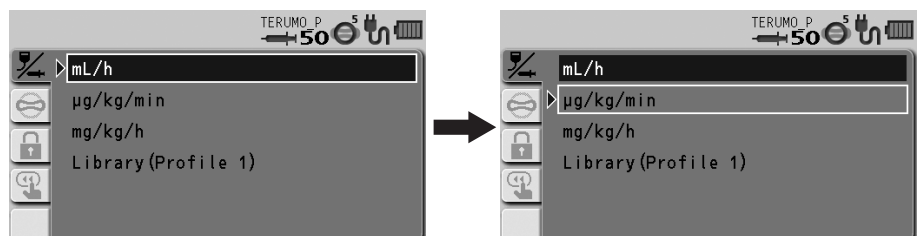
- The existing dose mode (light blue) changes to the selected status (dark blue).

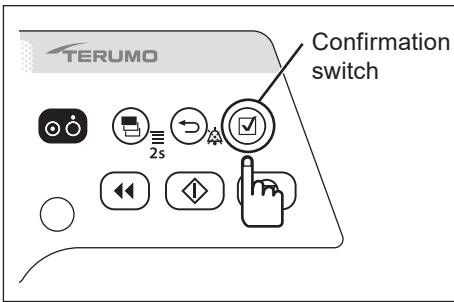


- 3) Turn the Dial or press the Display select switch to select "µg/kg/min" or "mg/kg/h".**

Notes

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

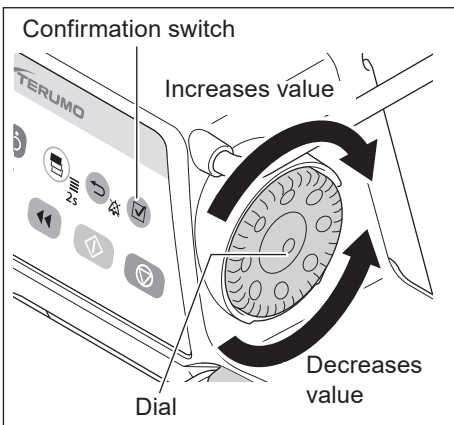
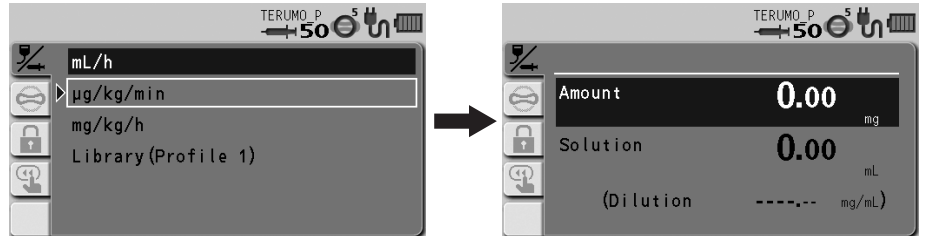




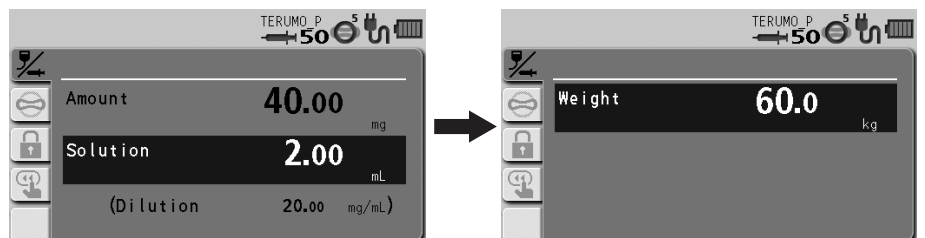
4) Press the Confirmation switch.

Note

- The input screen of amount and solution appears.

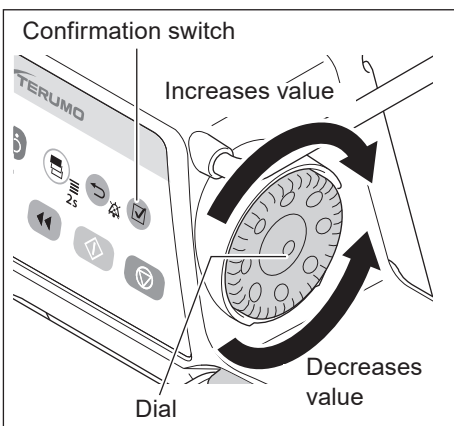


5) Use the Dial to adjust the value of amount and solution, and press the Confirmation switch.

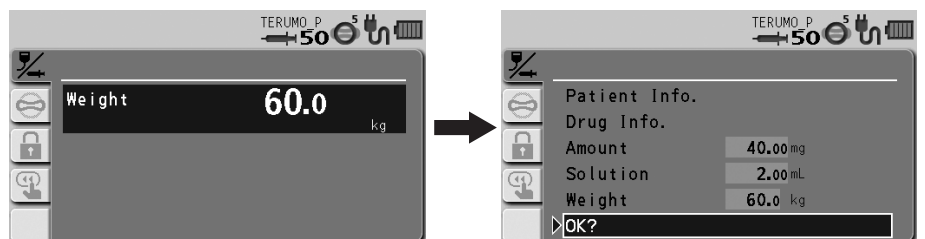


Notes

- 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.
- If 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.

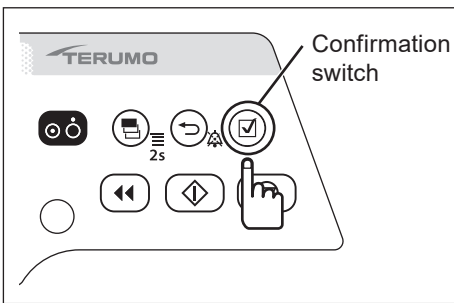


6) Use the Dial to adjust the value of weight, and press the Confirmation switch.



Notes

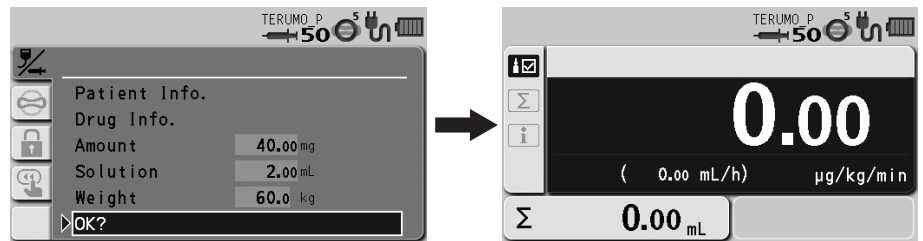
- Weight can be set within the range of 0.1 to 300.0 kg.
- Pressing the Confirmation switch displays the parameter confirmation screen.



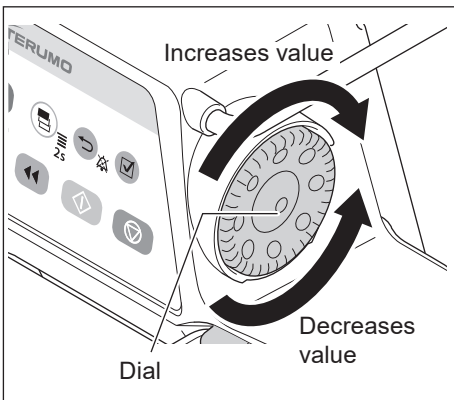
7) Check the parameter value and that “OK?” is selected, press the Confirmation switch.

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.



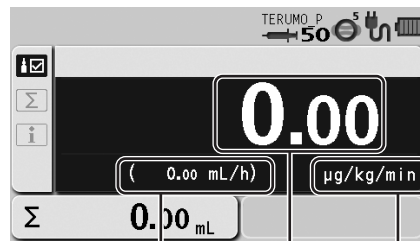
- Press the Display select switch to select info tab **i**. The setting information appears.
- Parameter values can be changed from the screen displayed by selecting info tab **i**.
- For details about the contents that can be checked from info tab **i**, see page 48.



8) Turn the Dial to adjust the dosage.

For example: $\mu\text{g}/\text{kg}/\text{min}$

For example: $\text{mg}/\text{kg}/\text{h}$



Flow rate Dose rate Dose unit

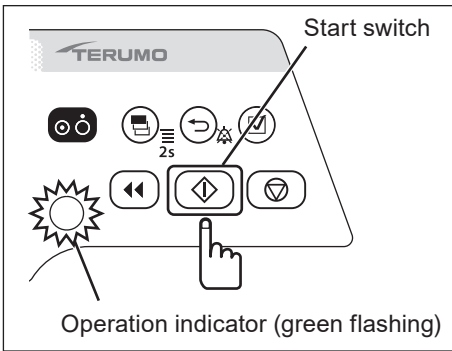
Notes

- The dosage can be set within the range below.
Dose unit = $\mu\text{g}/\text{kg}/\text{min}$: 0.01 to 999.00
Dose unit = $\text{mg}/\text{kg}/\text{h}$: 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 116.



9) 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)"

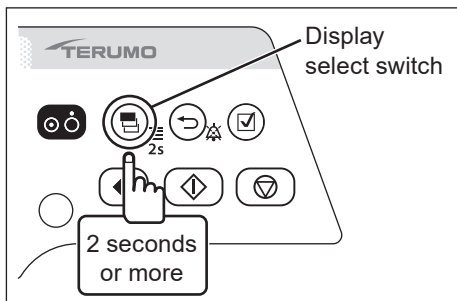
*2: Coefficient to convert "mg" to "μg"

- 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-SS830 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.



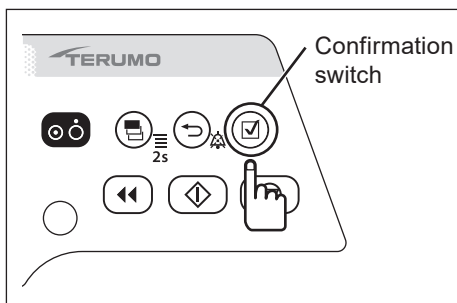
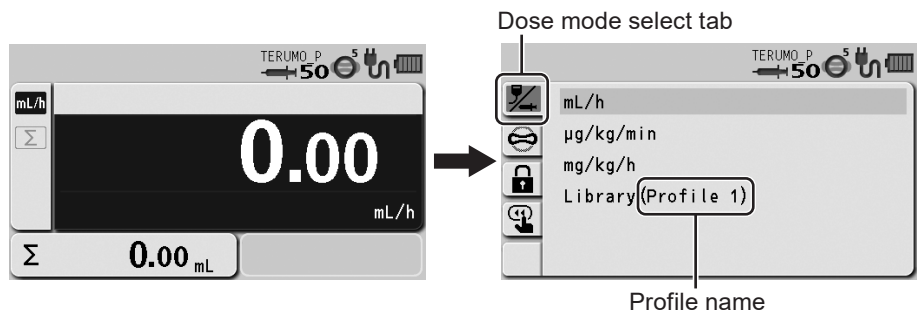
1) Press and hold the Display select switch for 2 seconds or more when solution delivery stopped.

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 81.

Check

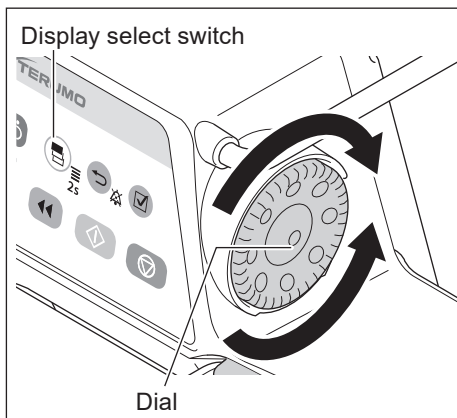
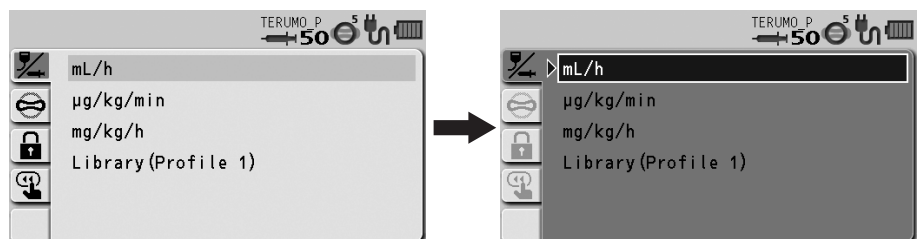
- A correct profile name is displayed.



2) Press the Confirmation switch.

Note

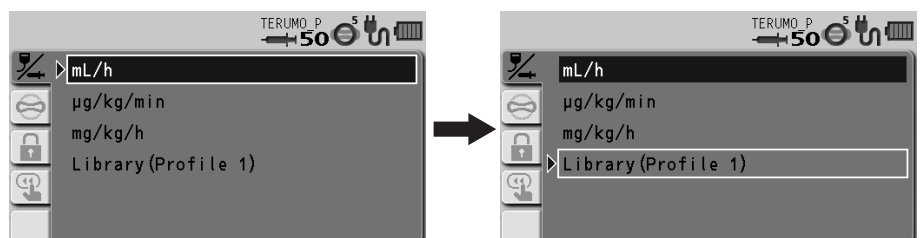
- The existing dose mode (light blue) changes to the selected status (dark blue).

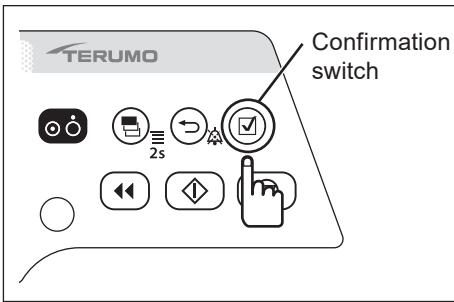


3) Turn the Dial or press the Display select switch to select the library.

Note

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

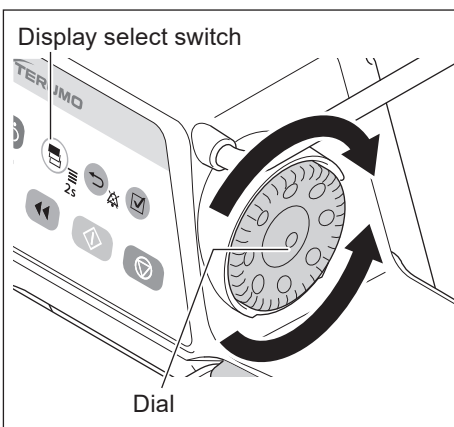
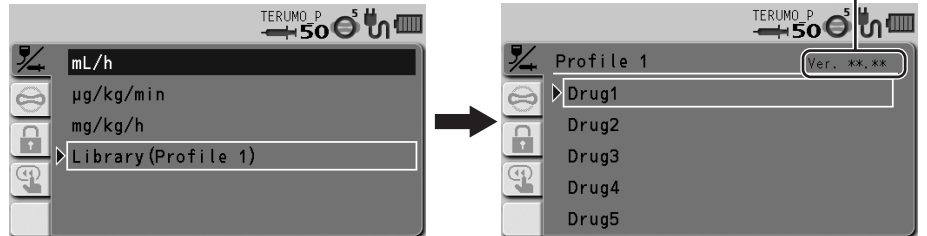




4) Press the Confirmation switch.

Notes

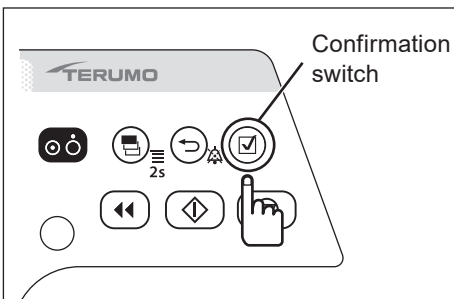
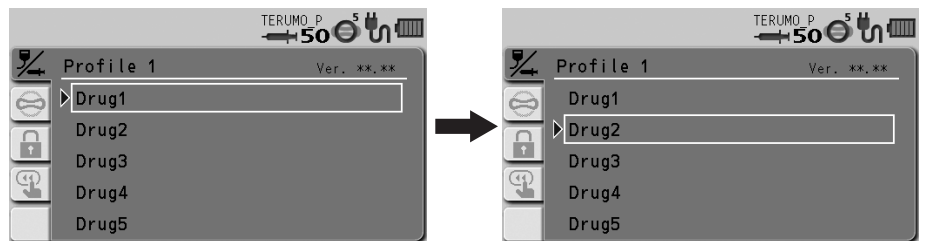
- The screen changes to the library selection display.
- The selected library is displayed in dark blue.



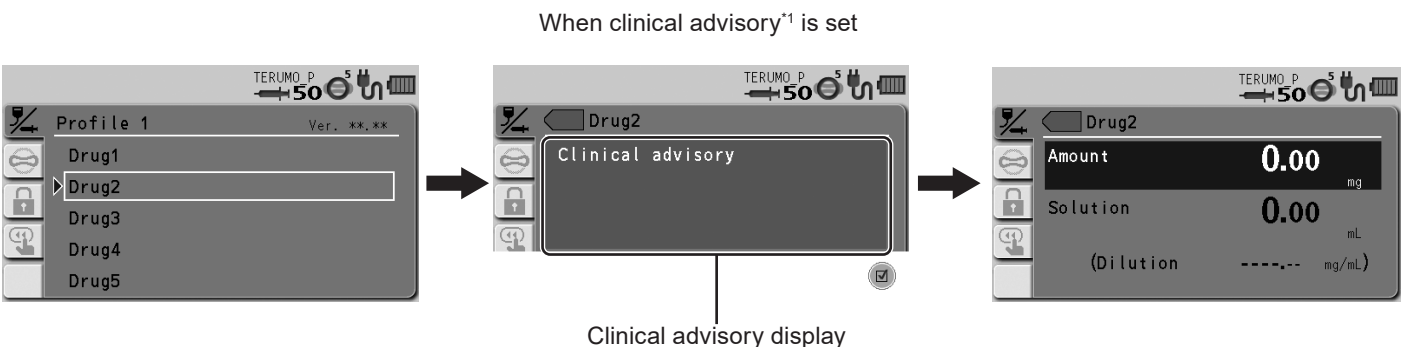
5) Turn the Dial or press the Display select switch to select the library name, shown as “Drug2” in the example.

Note

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

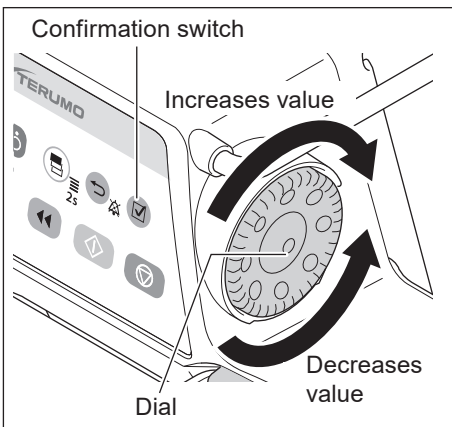


6) Press the Confirmation switch.



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^{*2}. 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.

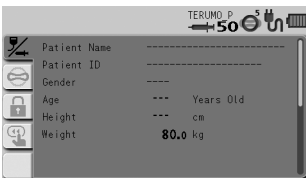


Notes

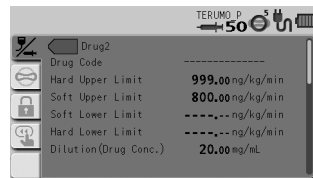
- When the dilution is set in the drug library, the dilution parameter cannot be changed.
- Amount, solution and weight can be set within the following range.
 Amount: 0.01 to 999.00*
 Solution: 0.01 to 999.00*
 Weight: 0.1 to 300.0 kg

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

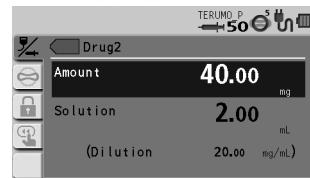
- With every press of the Confirmation switch, the input area moves to the next one.
- When the Back/Mute switch is pressed, the parameter input is cancelled and the screen returns to the previous status.
- When all the parameters are input, the parameter confirmation screen appears.
- The background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



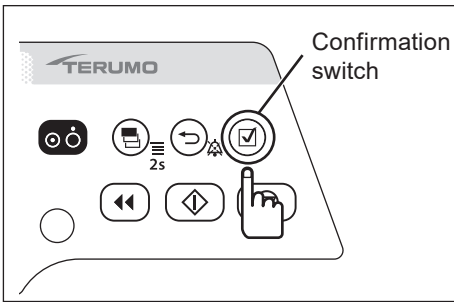
Drug information screen



Parameter value setting screen (Amount/Solution)



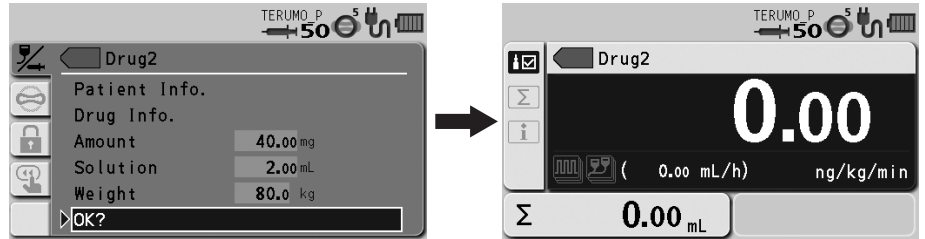
Parameter value setting screen (Weight)



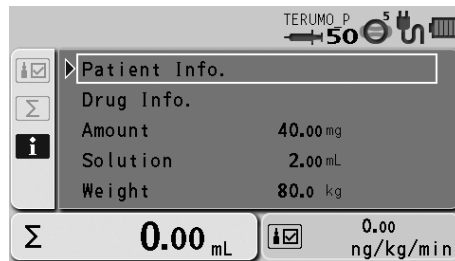
8) Check the parameter value and that “OK?” is selected, and press the Confirmation switch.

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.

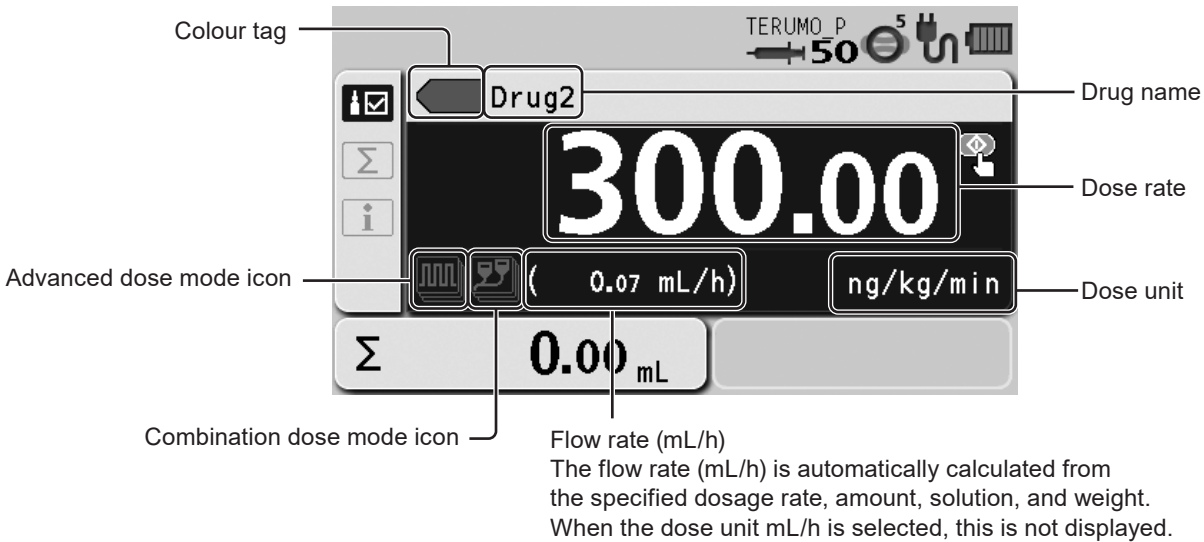


The following operations can be performed on this display:






- 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



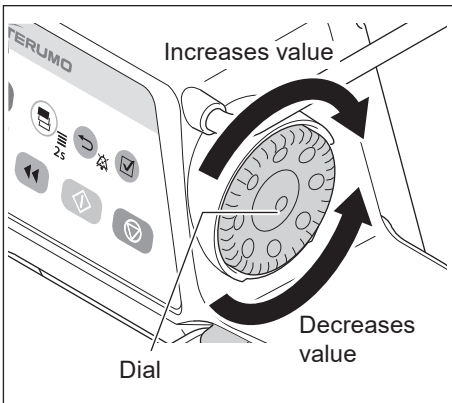
- Colour tag
Selection is possible from 16 colours.
- Advanced dose mode icon/combination dose mode icon
The icon to indicate the dose mode is displayed.
When using an advanced dose mode, see page 66.

 Advanced dose mode icon	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”.	
	Note <ul style="list-style-type: none"> • If no advanced dose mode can be set for the selected library, the advanced dose mode icon is not displayed. 	
	 Interval/Intermittent mode icon	Two specified dosage rates are alternately delivered at regular intervals for the specified number of steps.
	 Multi-step mode icon	The speed of solution delivery increases or decreases at the specified levels.
	 Delayed Start mode icon	Solution delivery starts after the specified time has elapsed.
 Combination dose mode icon	For details, contact TERUMO trained service technicians.	

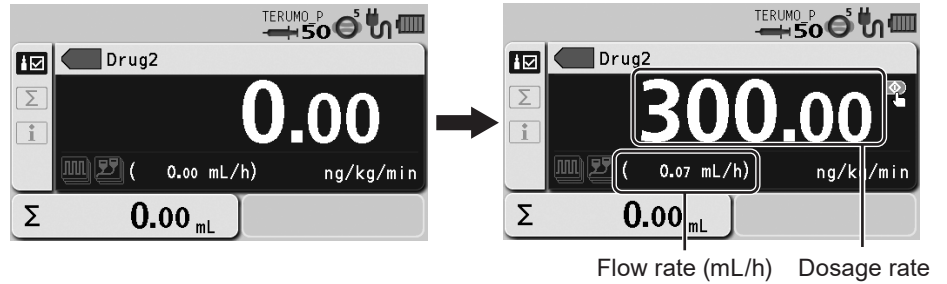
- See the dedicated editing software (TERUFUSION Drug Library Manager or TERUFUSION Software Package) for how to set an advanced dose mode and colour tag.

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 :
 - 0.01 to 150.00 mL/h (when using syringe of 5 mL)
 - 0.01 to 300.00 mL/h (when using syringe of 10 mL, 20 mL, 30 mL)
 - 0.01 to 1200.00 mL/h (when using syringe of 50/60 mL)
 - 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

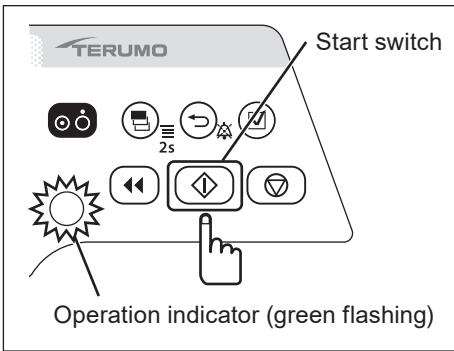
If the flow rate reaches the hard limit of the lower limit or the hard limit of the upper limit, the “This is the hard lower limit” or “This is the hard upper limit” confirmation message is displayed on the LCD. Even if the Confirmation switch is pressed, the upper or lower limit cannot be overridden.
- 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 116.



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

Notes

- The operation indicator flashes green.
- The volume delivered increases.
- 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.
- Change the dose mode from mL/h to another mode in drug library during solution delivery.

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
VTBI setting	Allows you to set the VTBI. (For details, see page 31.)
VTBI time setting	Allows you to set the time limit. (For details, see page 32.)
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"> • Flow rate and VTBI: change the rate to 100-step increments • Date and time: change the rate to hour and month • History and library: change the rate to page feeding
Syringe brand setting	The syringe brand can be selected after the power is turned on and the syringe installation has finished.
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"> • When setting the flow rate over the soft limit, the flow rate will be displayed in orange. • When the drug library mode or body weight dose mode ($\mu\text{g}/\text{kg}/\text{min}$, $\text{mg}/\text{kg}/\text{h}$) is selected, the flow rate range setting function is not available. (See page 41.)
Change the Nearly Empty alarm setting	Allows you to set the Nearly Empty alarm position based on the time before the syringe is empty.
Change the KVO flow rate	Allows you to set 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 62.)
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-SS830 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-SS830 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 “ μ ” to “mc”. ON: mc, OFF: μ
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"> • 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.
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
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.
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.

See pages 10 and 11 for the menu list.

Notes

- While changing the menu settings, pressing the Start switch does not start solution delivery.
- Occlusion detection pressure, keypad lock, 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.

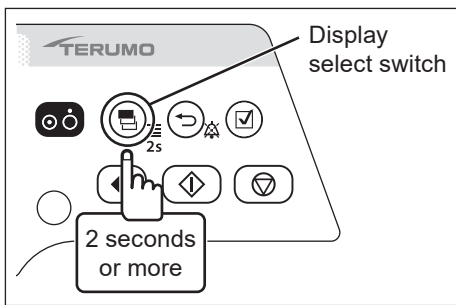
Setting	Occlusion detection pressure	Setting	Occlusion detection pressure
1	± 10 kPa	6	± 70 kPa (Default)
2	± 20 kPa	7	± 90 kPa
3	± 30 kPa	8	± 100 kPa
4	± 40 kPa	9	± 110 kPa
5	± 50 kPa	10	± 120 kPa

Warning

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

Notes

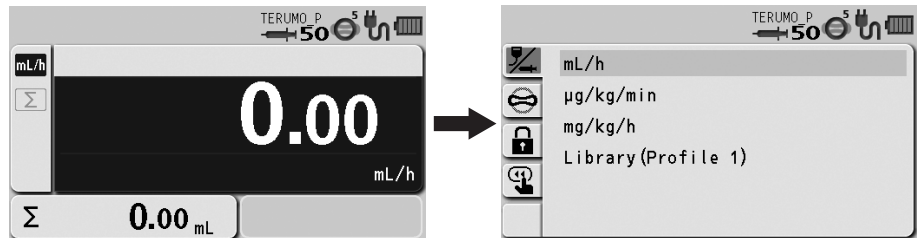
- If using on "Level 10", the pressure of an infusion line increases at occlusion, possibly resulting in the syringe connection etc. being disconnected. Periodically check that the connection of the infusion line is secured.
- If using on "Level 1", an Occlusion alarm is frequently issued, especially 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.
- When an Occlusion alarm is issued, the occlusion icon  may not reach the orange level (more than 75%) for the following reasons:
 - When the bolus reduction function is activated in order to mitigate the occlusion status
 - When the syringe is fully pressed (stopped after the Nearly Empty alarm or an internal pressure equivalent to the set "Level 4" occlusion pressure value is detected)
 * After an Occlusion alarm is issued internal pressure may build up even if the occlusion icon has not turned orange.
- Use the occlusion icon  as follows:
 - To check the in-line pressure when using a small syringe and a small diameter administration set and/or infusing a highly viscous solution.
 - To make sure the infusion line has been opened.

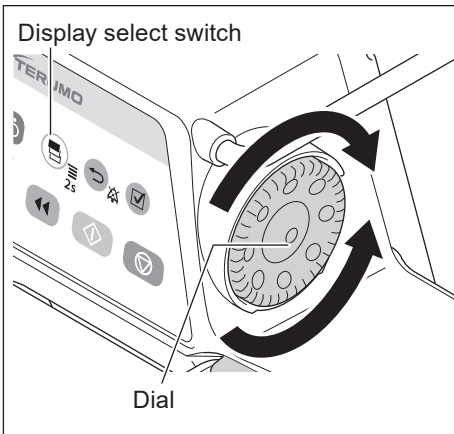


- Press and hold the Display select switch for 2 seconds or more.

Note

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

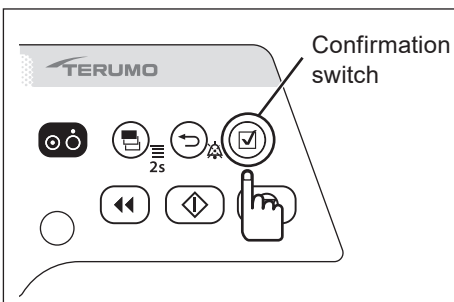
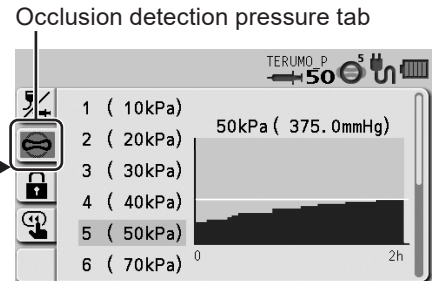
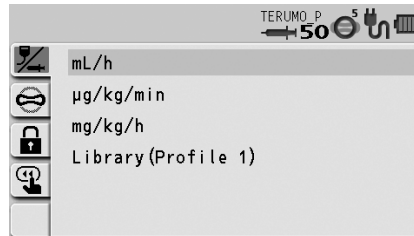




2) Turn the Dial or press the Display select switch to select the occlusion detection pressure tab .

Note

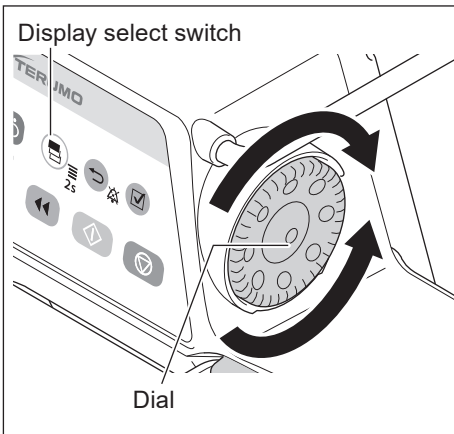
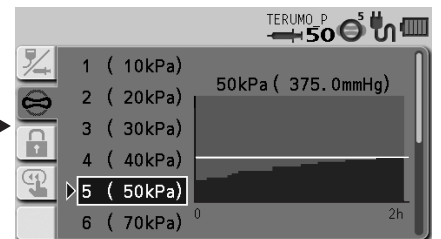
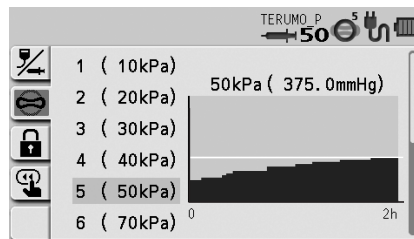
- The occlusion detection pressure setting display has appeared.



3) Press the Confirmation switch.

Note

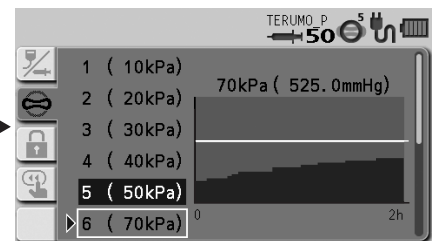
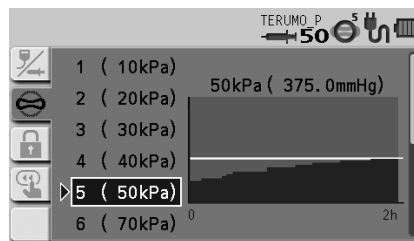
- The existing occlusion detection pressure (light blue) changes to the selected status (dark blue).



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

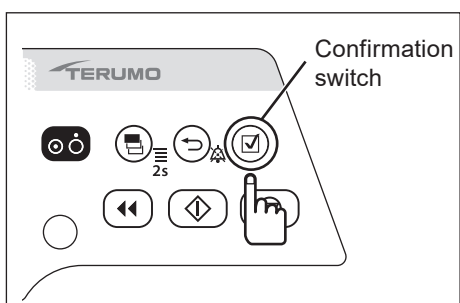
Note

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




Notes

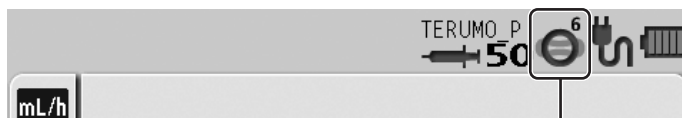
- Left side : Occlusion detection pressure setting
- Right side: Occlusion history graph
 - In the graph, the horizontal axis indicates the time and the vertical axis indicates the occlusion detection pressure.
 - Displays a graph of the history of occlusion pressure value in the past 2 hours. The horizontal 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

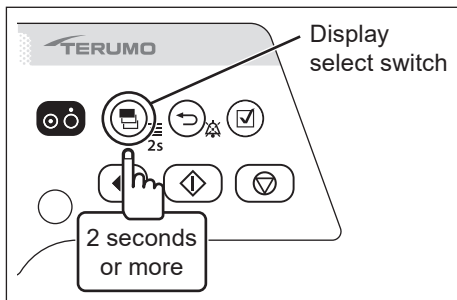
Keypad Lock Function

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

◆ To enable the keypad lock

Notes

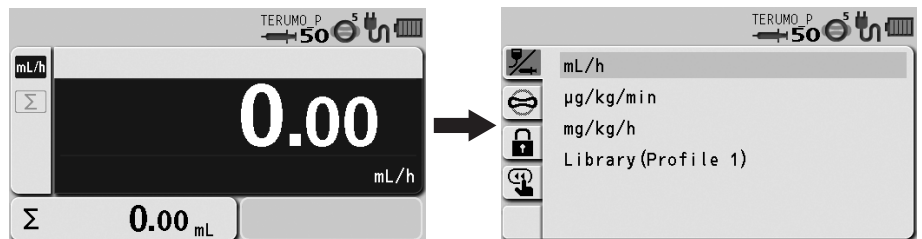
- Even if the keypad lock is enabled, the Power switch and the Start switch can be operated. The keypad lock release operation (press and hold the Back/Mute switch for 2 seconds or more) is also allowed when the keypad lock is enabled.
- Even if the Stop switch is pressed, the solution delivery cannot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

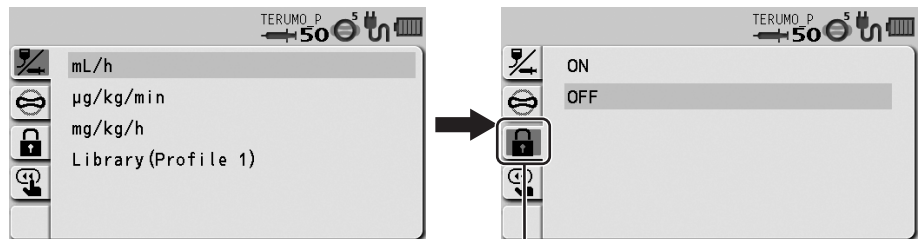
- The menu 1 screen is displayed and the icons are ready to be selected.



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

Note

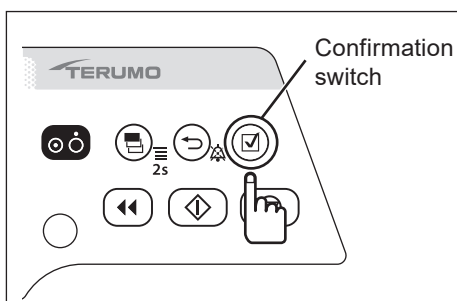
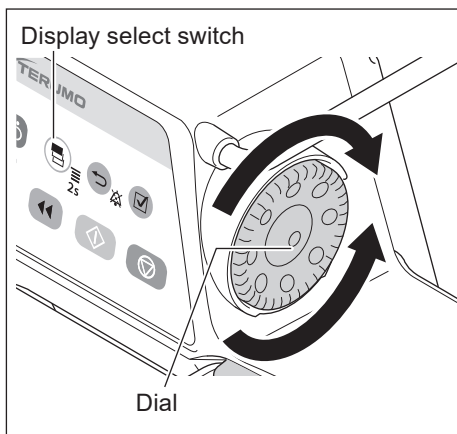
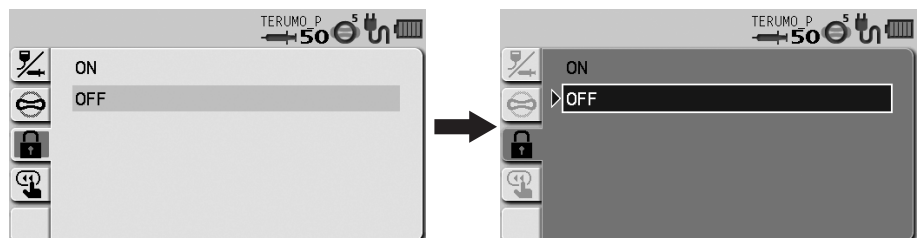
- The keypad lock ON/OFF setting display has appeared.



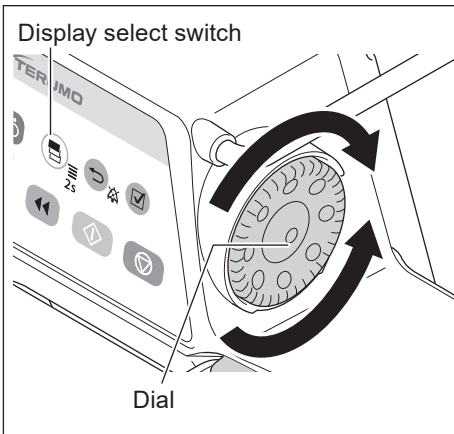
- 3) Press the Confirmation switch.

Note

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



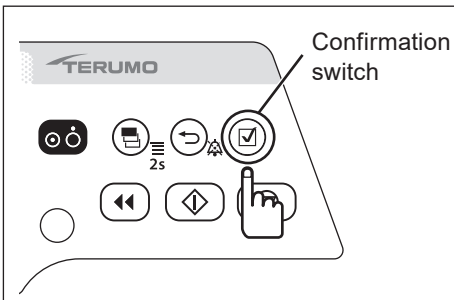
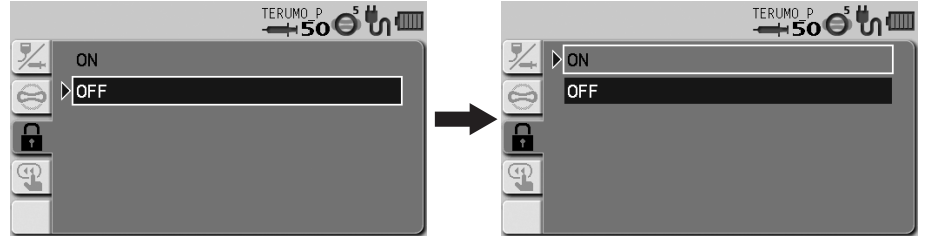
Changing Settings on the Menu



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


Note

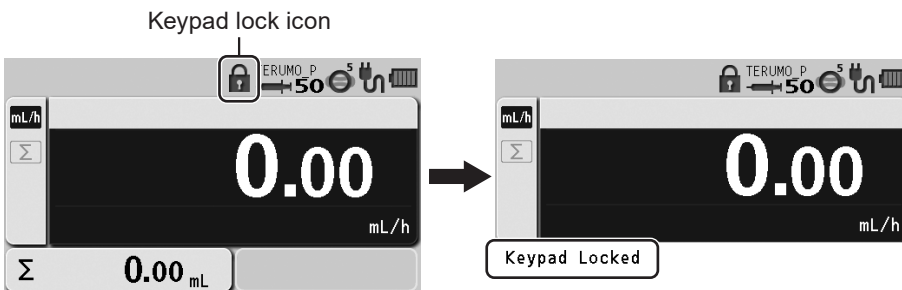
- Turning the Dial or pressing the Display select switch moves the white frame.



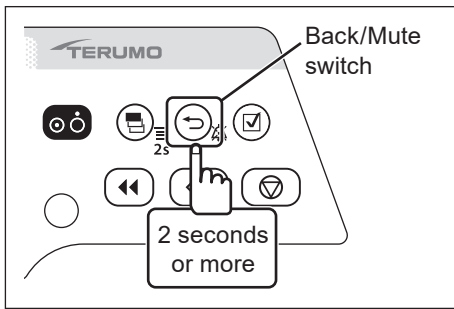
5) Press the Confirmation switch to confirm the selection.

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.

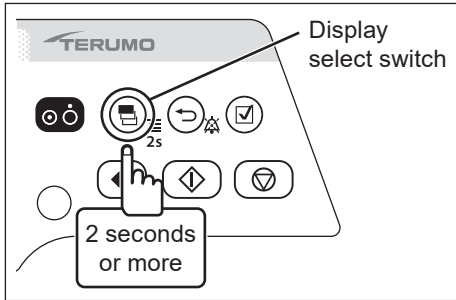
Note

- 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.)

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.

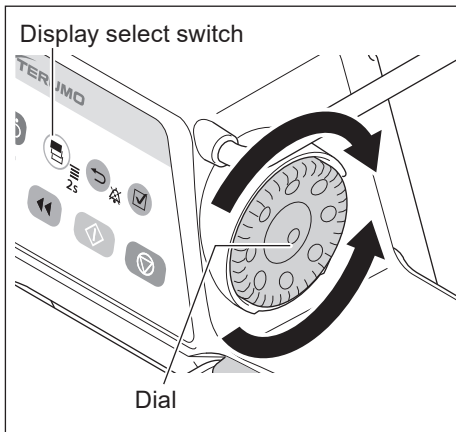
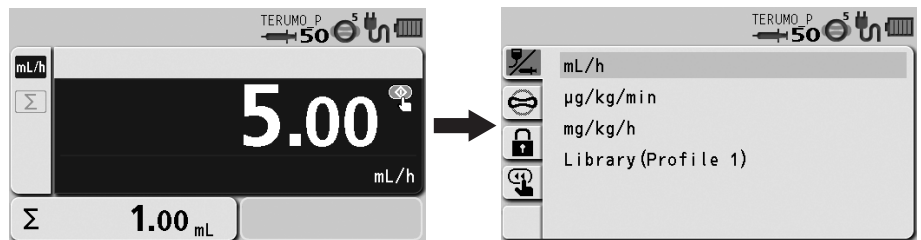
◆ Hands On Bolus



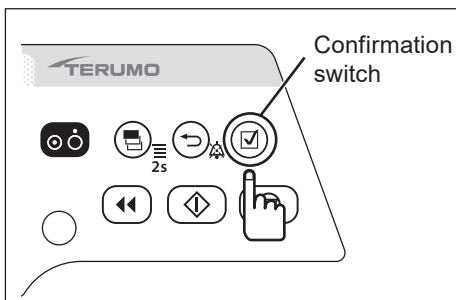
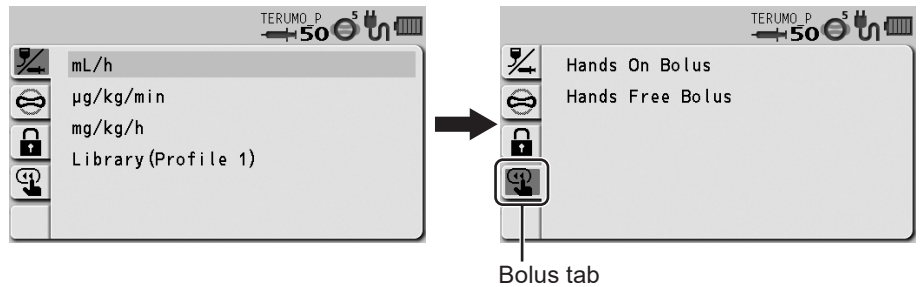
1) Press and hold the Display select switch for 2 seconds or more.

Notes

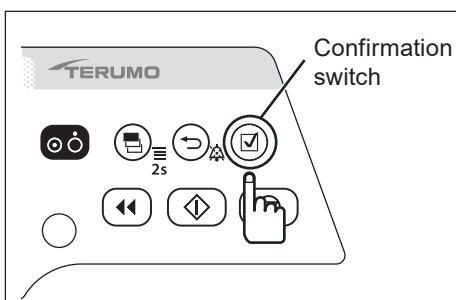
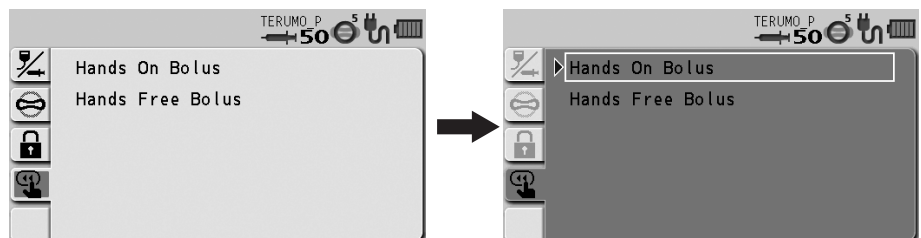
- The menu 1 screen is displayed and the icons are ready to be selected.
- VTBI needs to be set before setting this function if VTBI has been enabled.



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



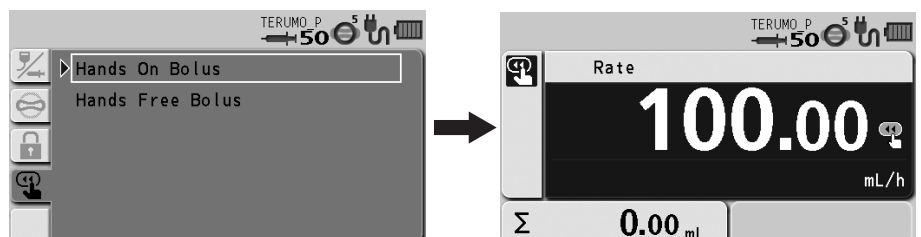
3) Press the Confirmation switch.

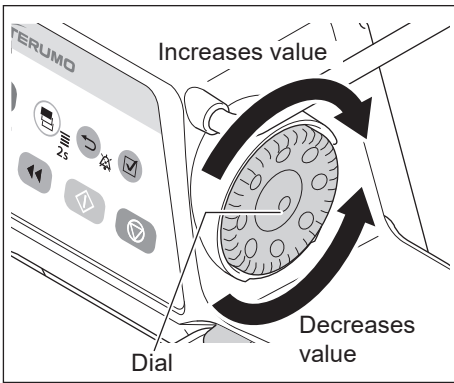


4) Press the Confirmation switch to confirm the selection.

Note

- The current Bolus flow rate setting screen appears.

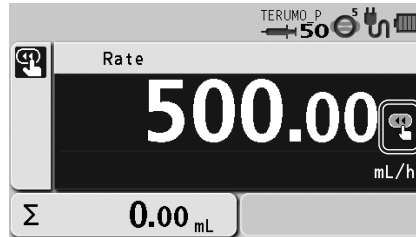




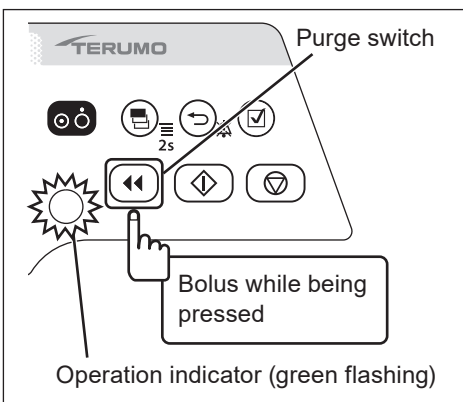
5) Turn the Dial to set the Bolus flow rate.

Note

- The Bolus flow rate can be set by 100 mL/h in the following value range.
 - When using syringe of 5 mL: 100 mL/h
 - When using syringe of 10, 20, 30 mL: 100 mL/h to 300 mL/h
 - When using syringe of 50/60 mL: 100 mL/h to 1200 mL/h



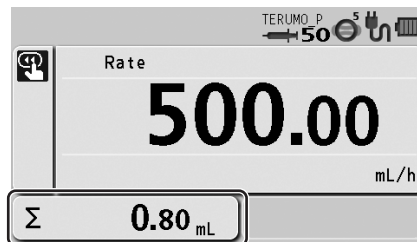
Ready for bolus icon



6) 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



Volume delivered

7) Release the Purge switch to stop the bolus.

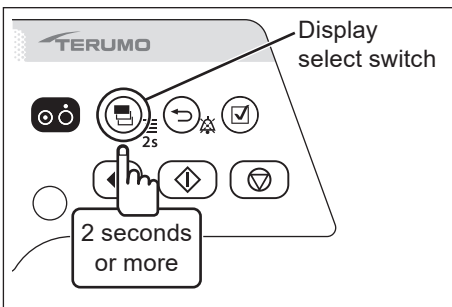
Notes

- 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.

Changing Settings on the Menu

◆ Hands Free Bolus

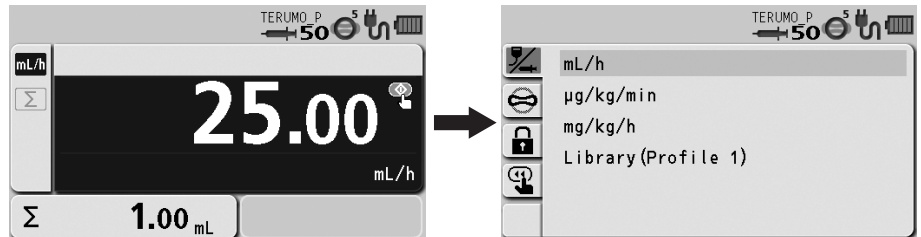
Setting the Bolus VTBI and Bolus VTBI time enables automatic calculation of the Bolus flow rate (mL/h) and execution of bolus infusion without holding down the Purge switch. (Hands Free Bolus function)



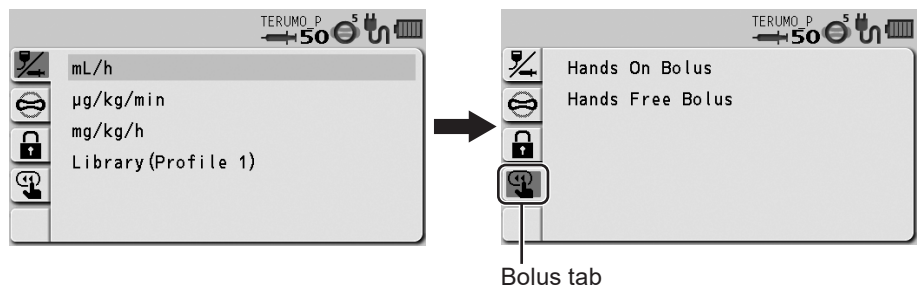
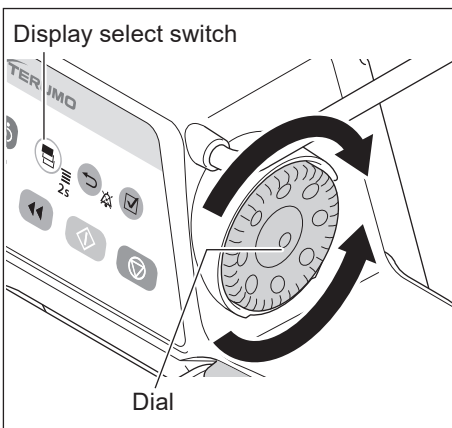
1) Press and hold the Display select switch for 2 seconds or more.

Notes

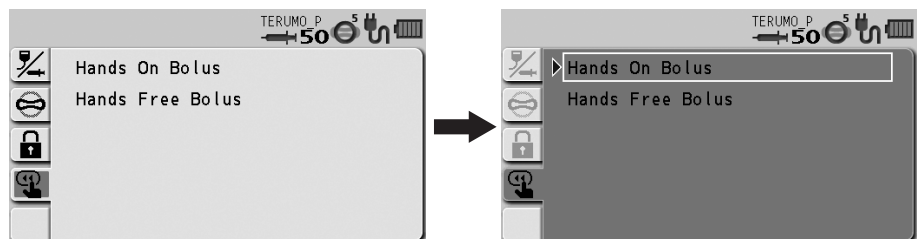
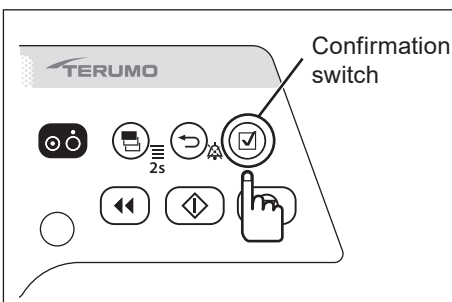
- The menu 1 screen is displayed and the icons are ready to be selected.
- VTBI needs to be set before setting this function if VTBI has been enabled.



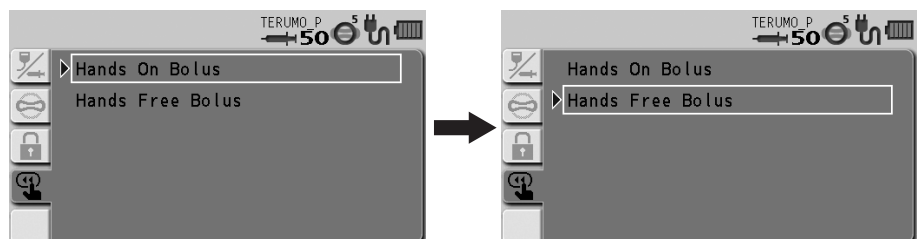
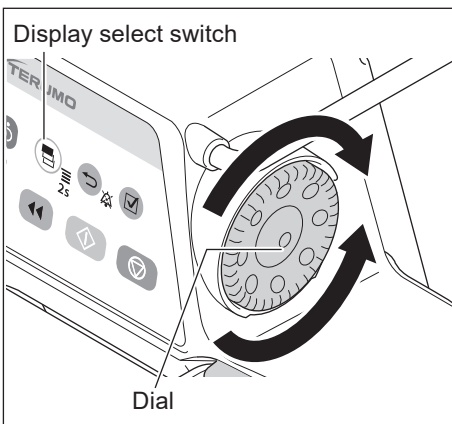
2) Turn the Dial or press the Display select switch to select the bolus tab.

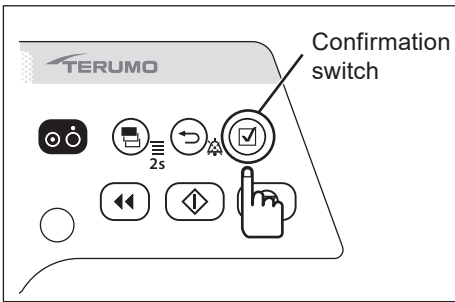


3) Press the Confirmation switch.



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

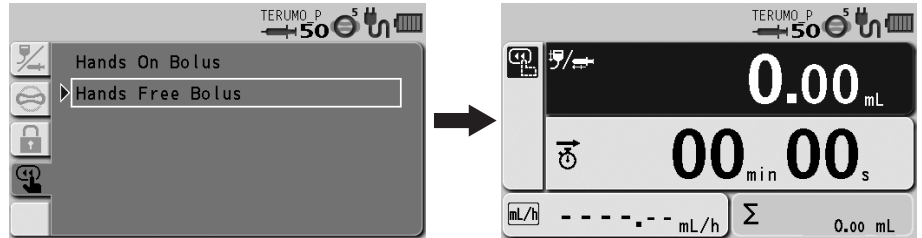




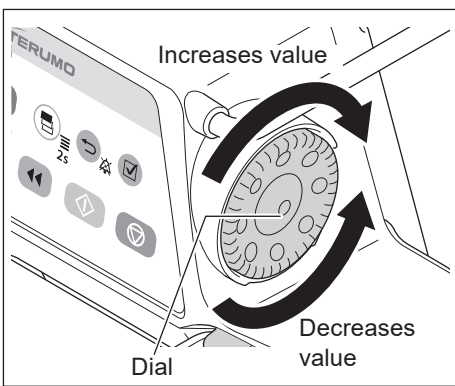
5) Press the Confirmation switch.

Notes

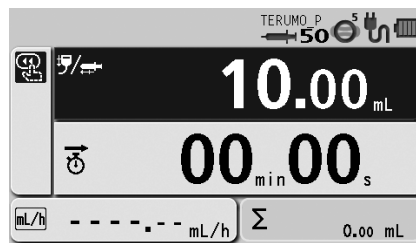
- The bolus setting display appears.



- 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.

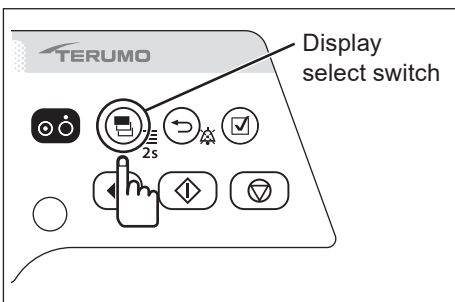


6) Turn the Dial to set the Bolus VTBI.

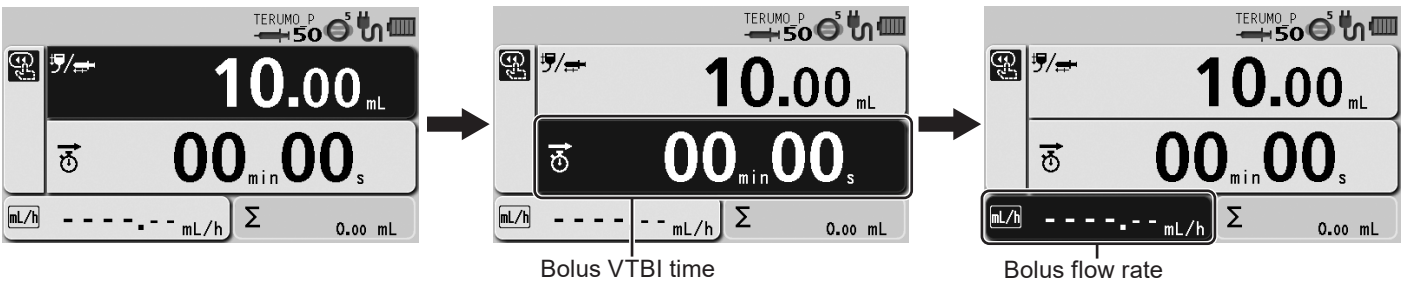


Notes

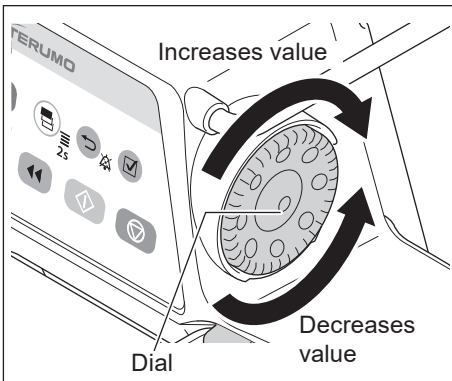
- The Bolus VTBI can be set within the range below.
VTBI: 0.01 to 999.00
- The Bolus VTBI must be set within the values obtained by subtracting the volume delivered from the VTBI.



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



Changing Settings on the Menu

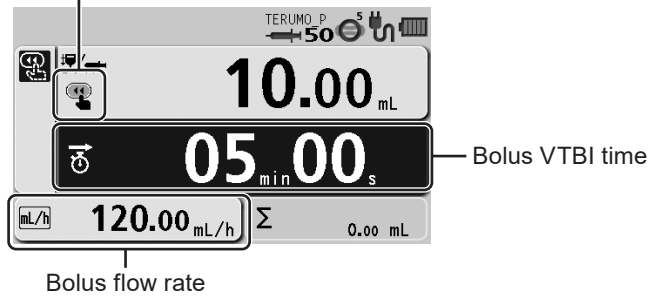


8) Turn the Dial to set the Bolus VTBI time or the Bolus flow rate.

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.

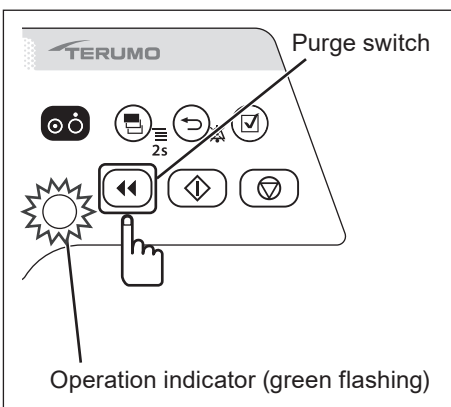
Ready for bolus icon



- The Bolus flow rate can be set within the range of the following values.
Setting range:
0.01 to 150.00 mL/h (when using syringe of 5 mL)
0.01 to 300.00 mL/h (when using syringe of 10 mL, 20 mL, 30 mL)
0.01 to 1200.00 mL/h (when using syringe of 50/60 mL)
Step:
0.01 mL/h step (0.01 to 10.00 mL/h)
0.10 mL/h step (10.00 to 100.00 mL/h)
1.00 mL/h step (100.00 to 1200.00 mL/h)
- The Bolus VTBI time can be set within the range below.
Bolus VTBI time: 00min01s to 60min00s

Caution

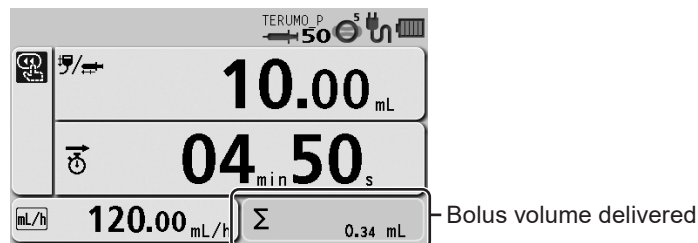
- When using the Hands Free Bolus function, the setting cannot take a flow rate (mL/h) calculation result outside the flow rate setting range, and therefore it should be reconfigured. [----.-] or [0.00] is displayed, not allowing solution delivery.



9) 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.





10) The bolus ends when the VTBI is reached.

Check


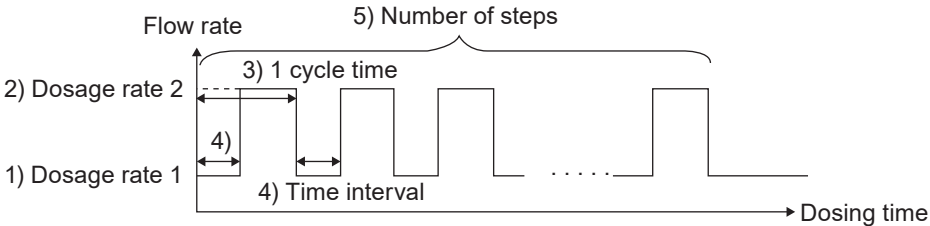

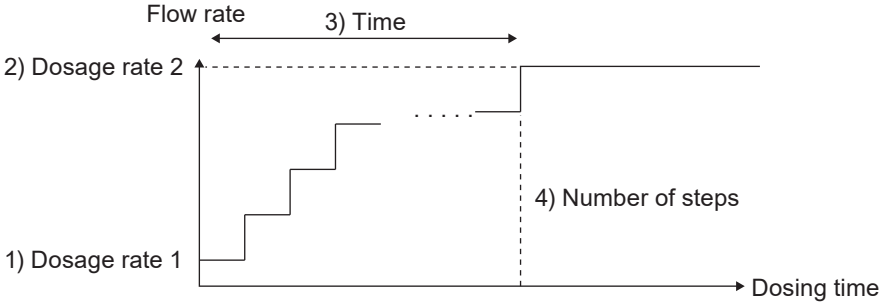

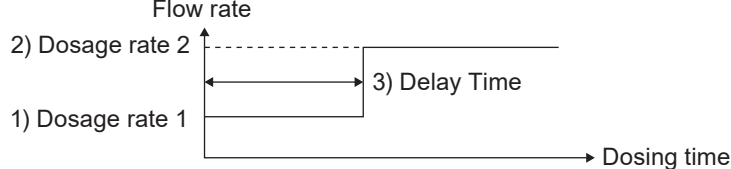
- The screen returns to the flow rate screen when the VTBI has been reached and the bolus has been completed.

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-SS830 only)

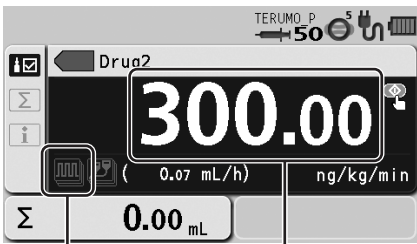
An advanced dose mode can be selected from the three advanced dose modes in the table below according to the selected drug. A library should be registered before selecting the advanced mode. Use the dedicated editing software (TERUFUSION Drug Library Manager or TERUFUSION Software Package) for registration. See page 45 for how to select the library.

Advanced dose mode	Details																
 <p>Interval/Intermittent Mode</p>	<p>Two specified dosage rates are alternately delivered at regular intervals for the specified number of steps.</p>  <p>Input parameters</p> <table border="1"> <tr> <td>1)</td> <td>Dosage rate 1</td> <td>For the dosage rate range, see page 47.</td> </tr> <tr> <td>2)</td> <td>Dosage rate 2 (Displays: Final Flow Rate)</td> <td>When using an advanced dose mode, 0.00 can be set for the dosage 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 47.	2)	Dosage rate 2 (Displays: Final Flow Rate)	When using an advanced dose mode, 0.00 can be set for the dosage 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 47.															
2)	Dosage rate 2 (Displays: Final Flow Rate)	When using an advanced dose mode, 0.00 can be set for the dosage 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>Multi-step Mode</p>	<p>The speed of solution delivery increases or decreases at the specified levels (up to 10 levels).</p>  <p>Input parameters</p> <table border="1"> <tr> <td>1)</td> <td>Dosage rate 1</td> <td>For the dosage rate range, see page 47.</td> </tr> <tr> <td>2)</td> <td>Dosage rate 2 (Displays: Final Flow Rate)</td> <td>When using an advanced dose mode, 0.00 can be set for the dosage 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 47.	2)	Dosage rate 2 (Displays: Final Flow Rate)	When using an advanced dose mode, 0.00 can be set for the dosage 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 47.															
2)	Dosage rate 2 (Displays: Final Flow Rate)	When using an advanced dose mode, 0.00 can be set for the dosage rate.															
3)	Time (Displays: Time to Final Flow Rate)	00h01min to 23h59min															
4)	Number of steps (Displays: Steps)	1 to 10 steps															
 <p>Delayed Start Mode</p>	<p>Solution delivery starts after the specified time has elapsed.</p>  <p>Input parameters</p> <table border="1"> <tr> <td>1)</td> <td>Dosage rate 1</td> <td>For the dosage rate range, see page 47.</td> </tr> <tr> <td>2)</td> <td>Dosage rate 2 (Displays: Final Flow Rate)</td> <td>When using an advanced dose mode, 0.00 can be set for the dosage 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 47.	2)	Dosage rate 2 (Displays: Final Flow Rate)	When using an advanced dose mode, 0.00 can be set for the dosage rate.	3)	Delay Time (Displays: Delay Time)	00h01min to 23h59min							
1)	Dosage rate 1	For the dosage rate range, see page 47.															
2)	Dosage rate 2 (Displays: Final Flow Rate)	When using an advanced dose mode, 0.00 can be set for the dosage 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.)

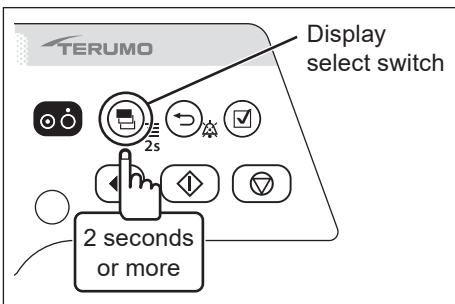


Advanced dose mode icon Dosage rate 1

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

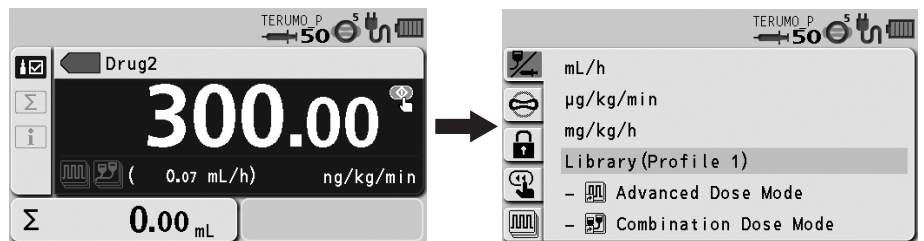
- When using an advanced dose mode, 0.00 can be set for the dosage rate.
- See page 45 for how to select the library.
- If the selected library has been enabled to accept an advanced dose mode, the advanced dose mode icon is displayed on the LCD. If an advanced dose mode is unacceptable, no icon is displayed.
- 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 6.



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

Note

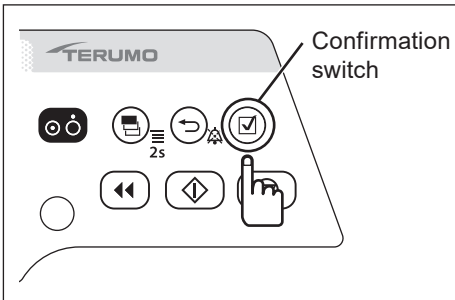
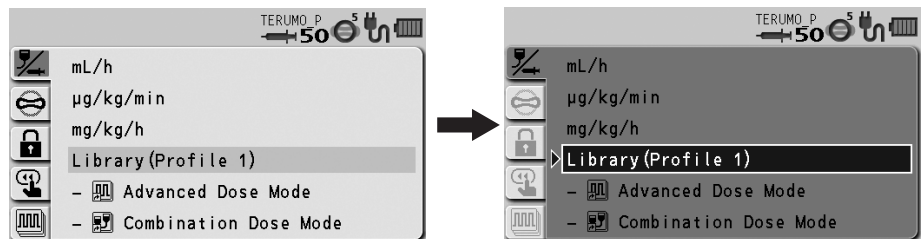
- The menu 1 screen is displayed and then the dose mode select (Dose) display appears.



3) Press the Confirmation switch.

Note

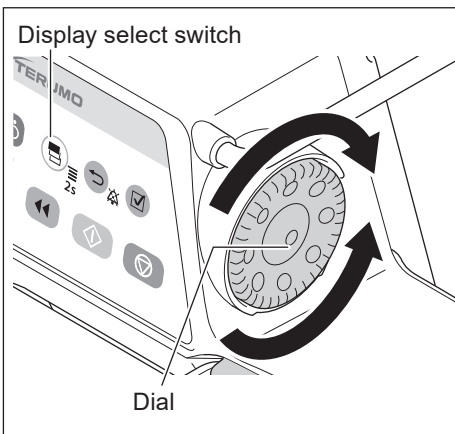
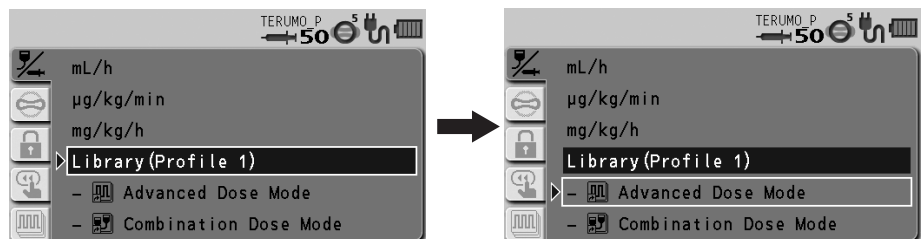
- “Library” (light blue) changes to the selected status (dark blue).



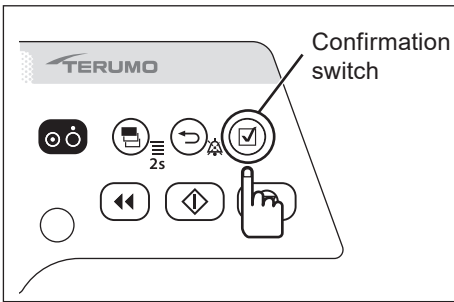
4) Turn the Dial or press the Display select switch to select the “ advanced mode” displayed below “Library”.

Note

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



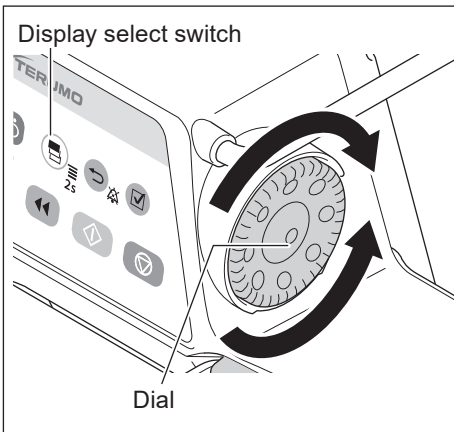
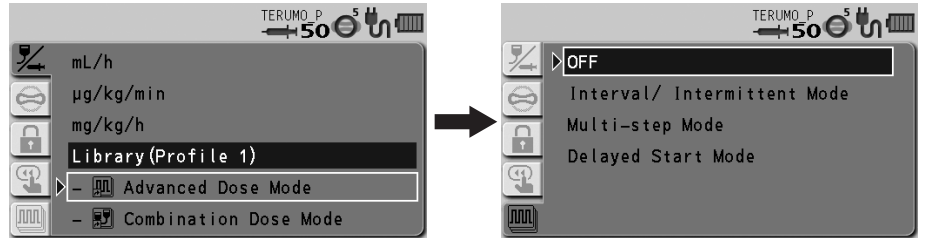
Changing Settings on the Menu



5) Press the Confirmation switch.

Note

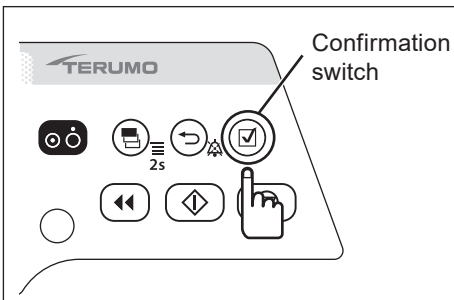
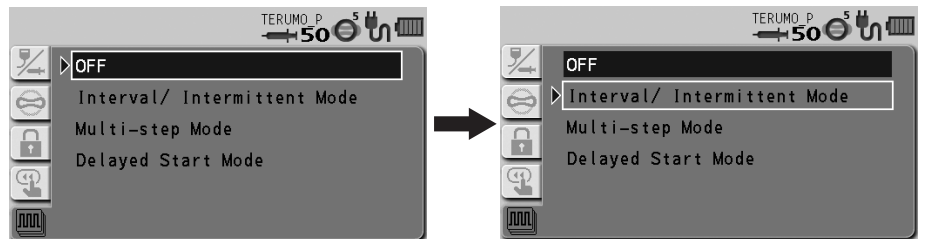
- The available advanced dose modes are displayed.



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

Note

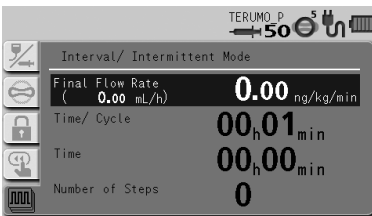
- Turning the Dial or pressing the Display select switch moves the white frame.



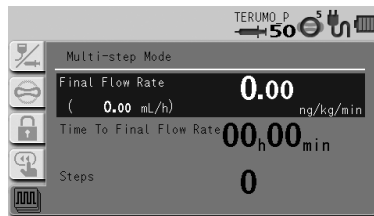
7) Press the Confirmation switch.

Note

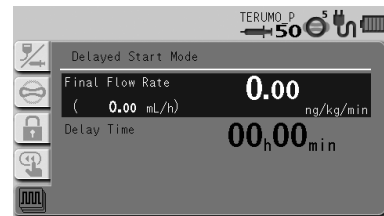
- The screen changes to the parameter input display.



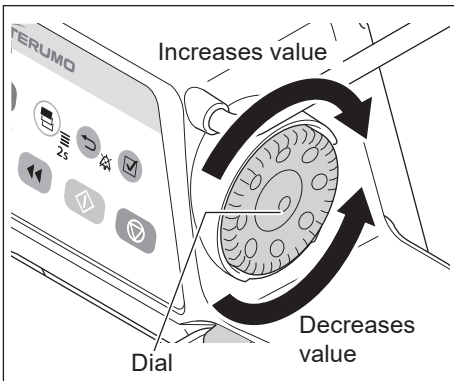
Interval/Intermittent Mode



Multi-step Mode



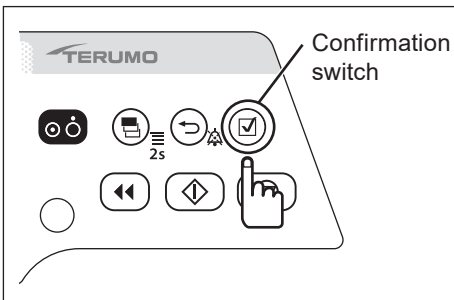
Delayed Start Mode



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

Notes

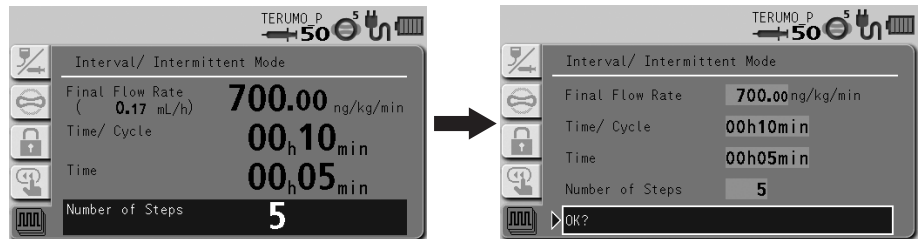
- With every press of the Confirmation switch, the input area moves to the next one.
- When the Back/Mute switch is pressed, the parameter input is cancelled and the screen returns to the previous status.



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

Note

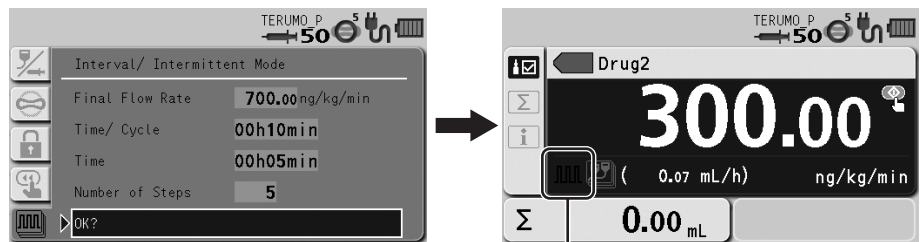
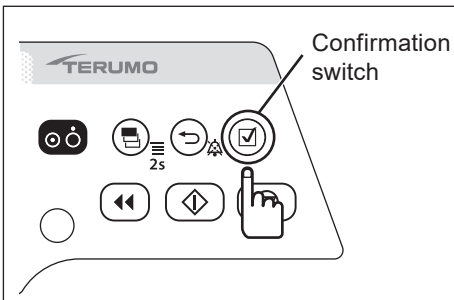
- The parameter confirmation screen appears.



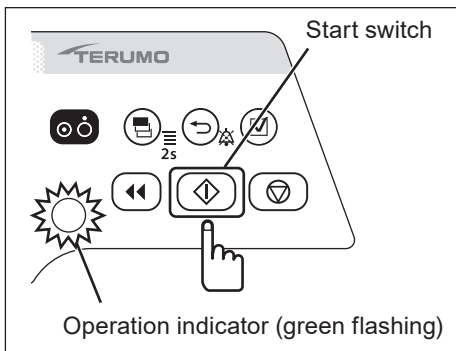
10) Check the parameter value and that "OK?" is selected, press the Confirmation switch.

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.



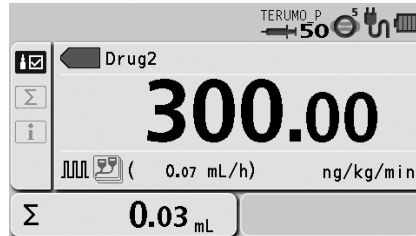
The selected advanced dose mode icon
(See page 66.)



11) 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.

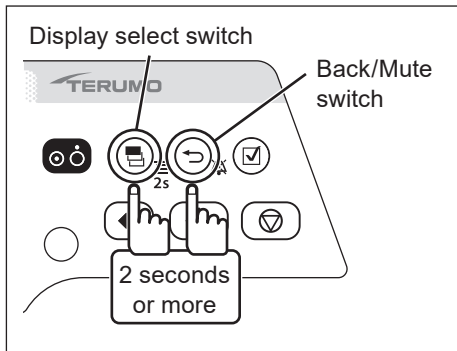


History Function

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

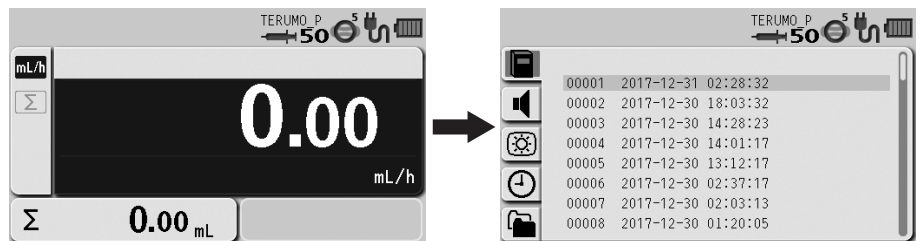
- The battery charge level display indicates the current status regardless of the displayed operation history.
- If the pump is dropped then a shock record will be created in the history. This record will be shown at the top of history.



- 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.

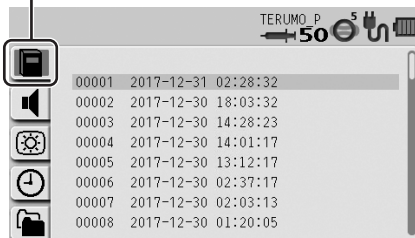


- 2) Turn the Dial or press the Display select switch to select the history tab .

Note

- The history display has appeared.

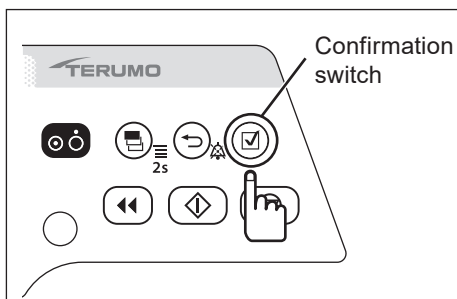
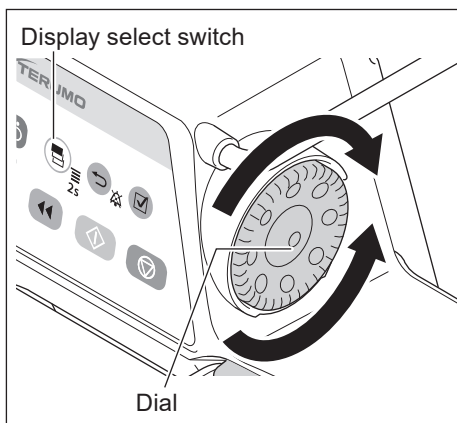
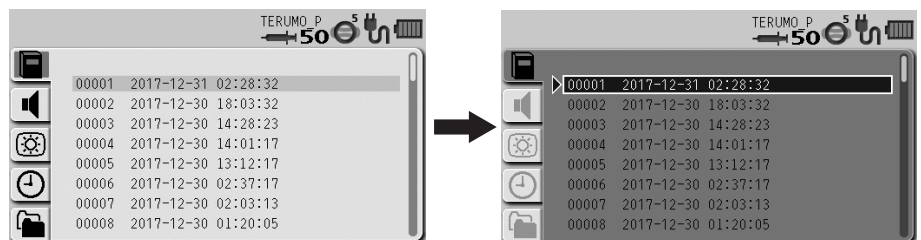
History tab

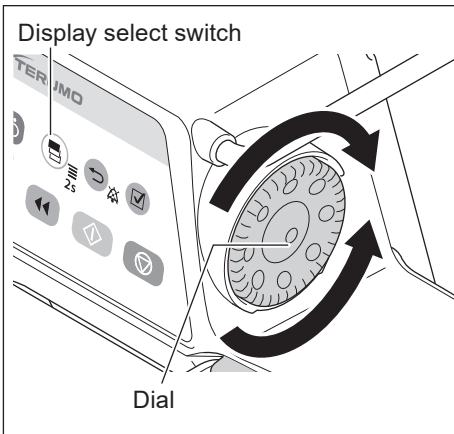


- 3) Press the Confirmation switch.

Note

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

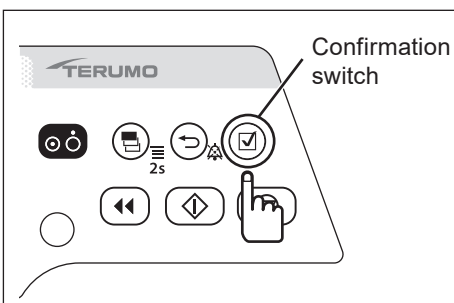
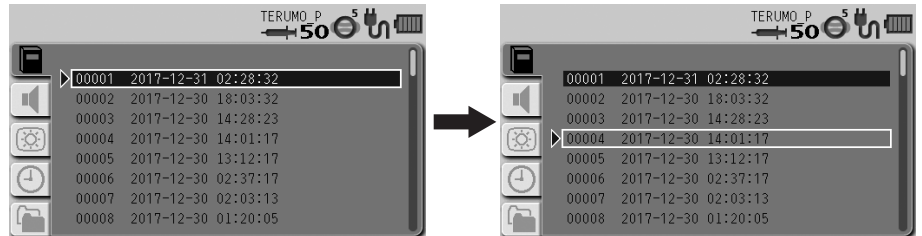




4) Turn the Dial or press the Display select switch to select the desired operation history.

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.

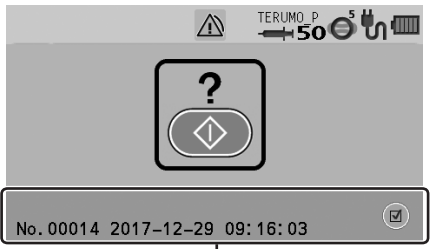
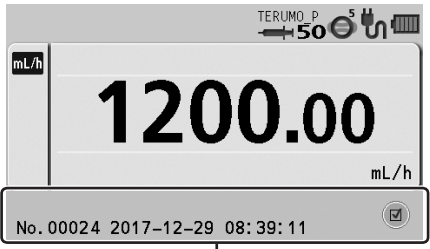
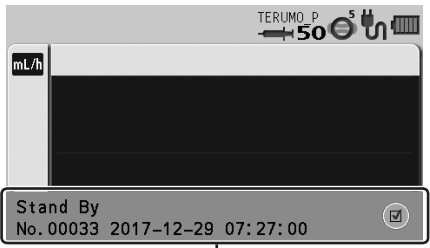


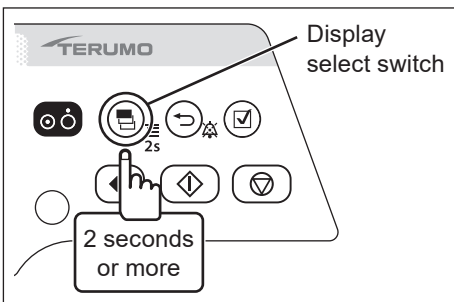
5) Press the Confirmation switch to display the detailed history and turn the Dial or press the Display select switch to select a history.

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 style="text-align: center;">White</p>	White	Operation history information
<p style="text-align: center;">Green</p>	Green	Operation history during solution delivery

Example of operation history	Colour of bottom area of LCD	Operation status
 <p>Pink</p>	Pink	Operation history during stop
 <p>Blue</p>	Blue	Operation history during purge or bolus (Hands On Bolus, Hands Free Bolus)
 <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.

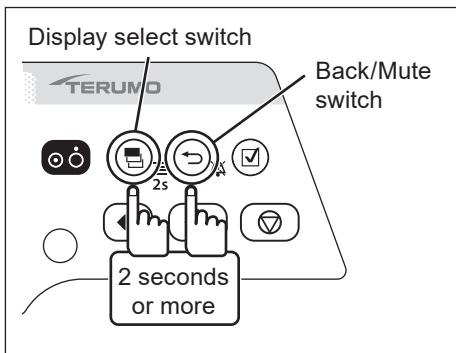
Note

- Set the correct time and date by following the procedure described on page 79 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.

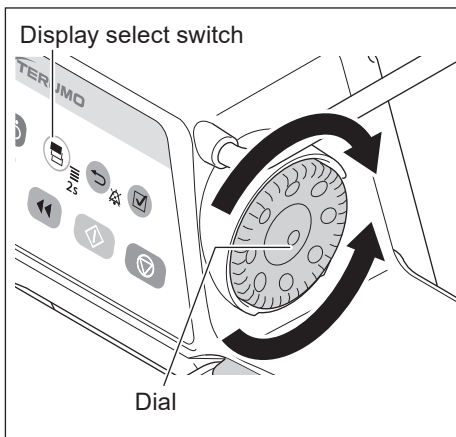
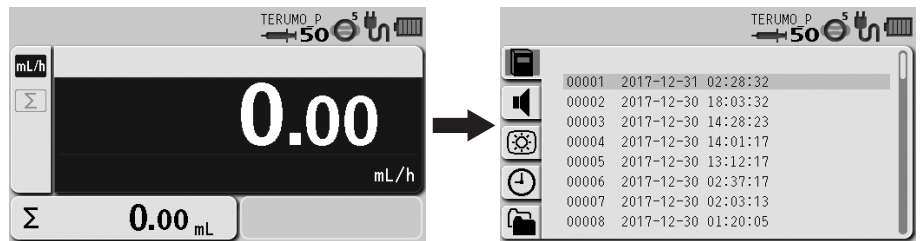
Type	Volume setting	Default setting	Note
Alarm Volume	1 to 3, Step	2	0 (very low), 1 (low), 2 (medium), 3 (high), Step (1 → 2 → 3)
Key Operating Volume	0 to 3	1	The 3 (high) volume is at least 60 dB (A), the 2 (medium) volume is between (low) and (high), and the 1 (low) volume is at least 50 dB (A).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



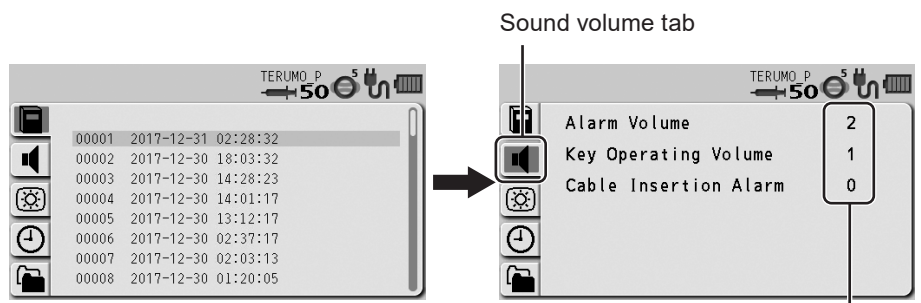
- 1) With the Back/Mute switch pressed and held, press and hold the Display select switch for 2 seconds or more.

Note

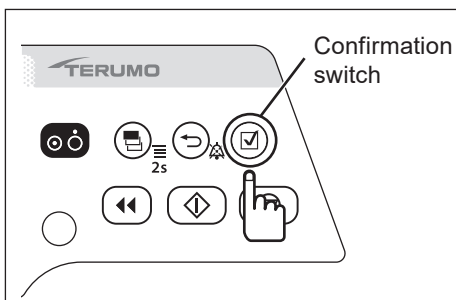
- The menu 2 screen is displayed and the icons are ready to be selected.



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



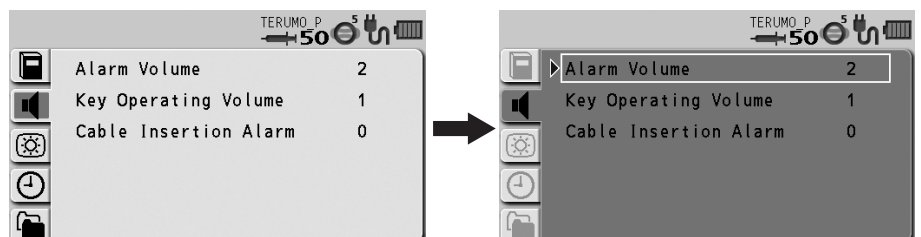
Current setting value

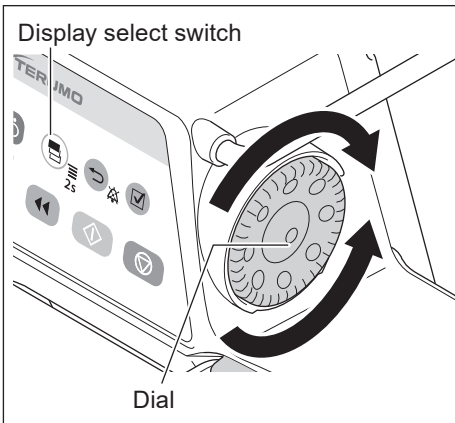


- 3) Press the Confirmation switch.

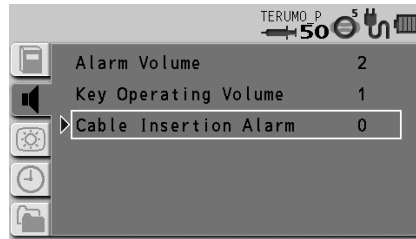
Note

- The white frame is displayed.





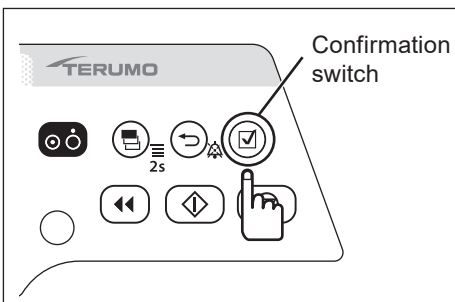
4) Turn the Dial or press the Display select switch to select an item to change.



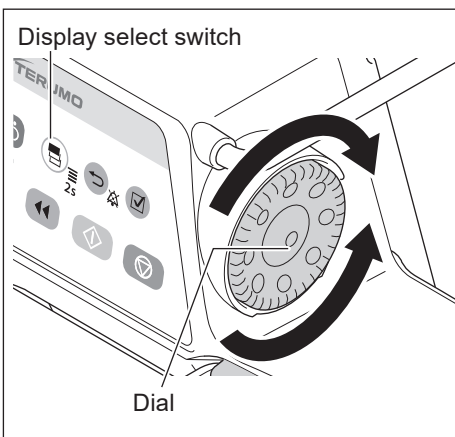
5) Press the Confirmation switch to confirm the selection.

Note

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

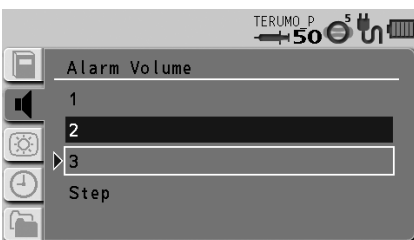


6) Turn the Dial or press the Display select switch to select the volume.

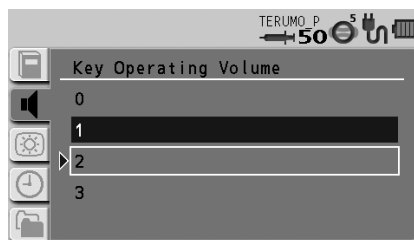


Notes

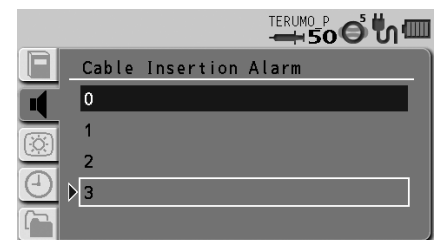
- Turning the Dial or pressing the Display select switch moves the white frame.
- When the white frame is placed on a desired level, the sound is audible.
- If "Step" for the alarm volume is selected, the volume levels increase in three steps.



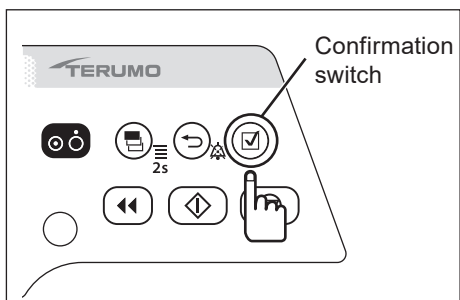
Alarm Volume



Key Operating Volume



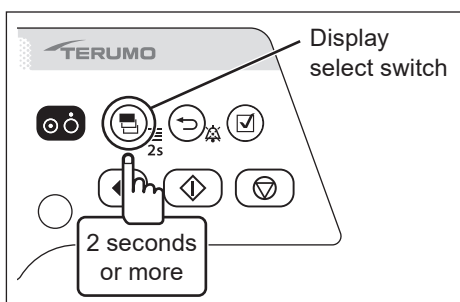
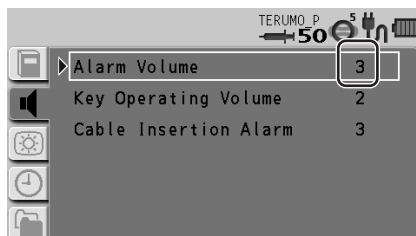
Cable Insertion Alarm



7) Press the Confirmation switch to confirm the selection.

Check

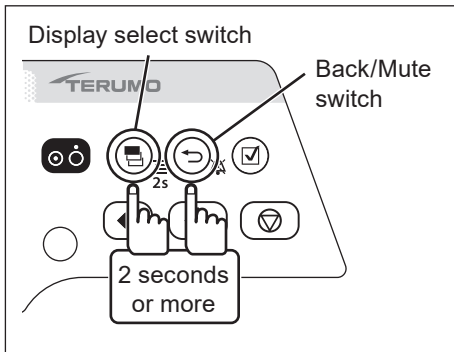
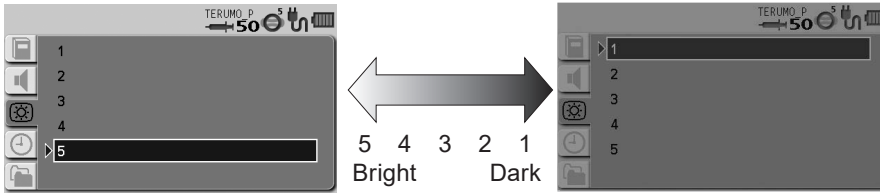
- The selected volume is displayed.



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

Changing the Brightness

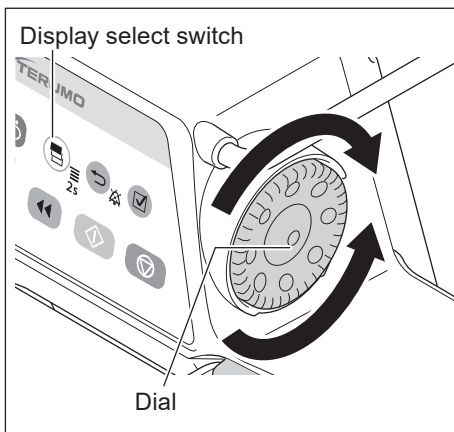
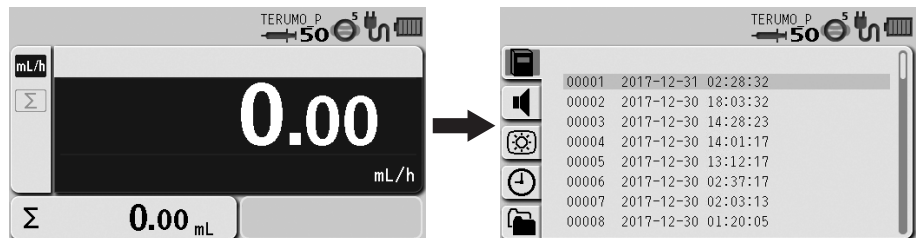
The brightness can be set in 5 levels (Default: 5).



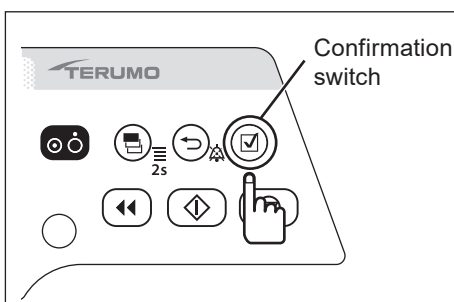
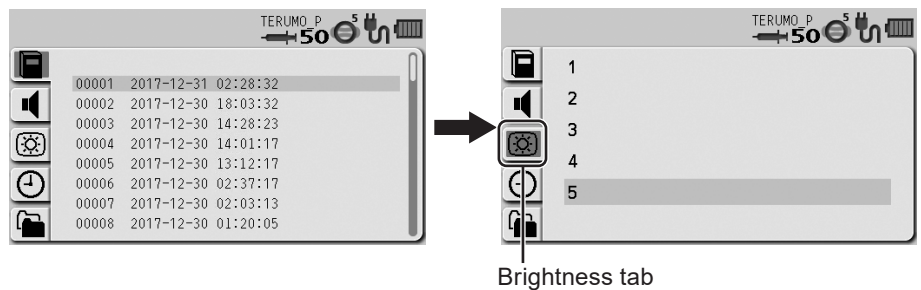
- 1) With the Back/Mute switch pressed and held, press and hold the Display select switch for 2 seconds or more.

Note

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



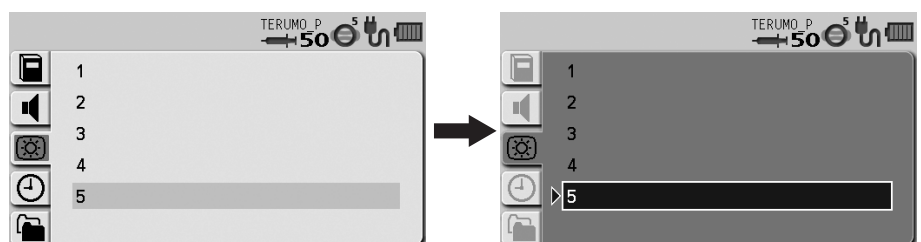
- 2) Turn the Dial or press the Display select switch to select the brightness tab .



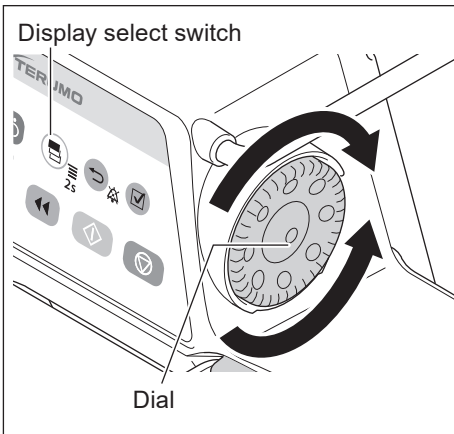
- 3) Press the Confirmation switch.

Note

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



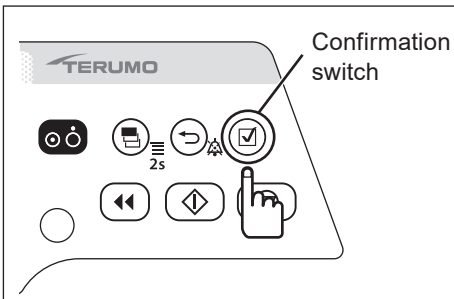
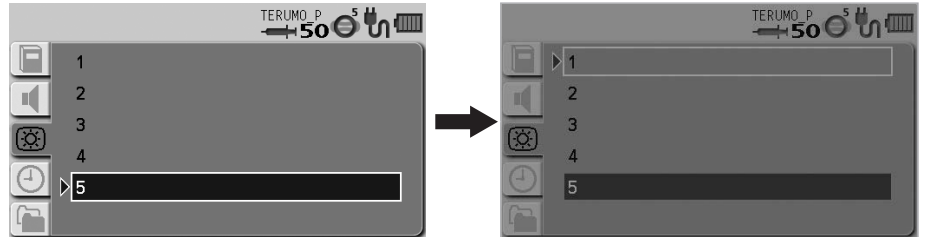
Changing Settings on the Menu



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

Notes

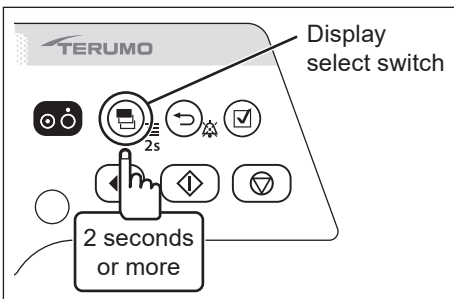
- Turning the Dial or pressing the Display select switch moves the white frame.
- When the white frame is placed on a desired brightness level, the brightness level is shown.



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

Check

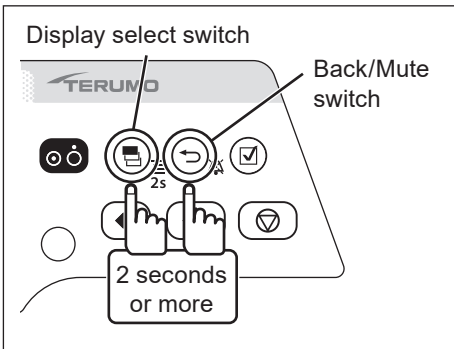
- The LCD is displayed with the brightness selected.



- 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

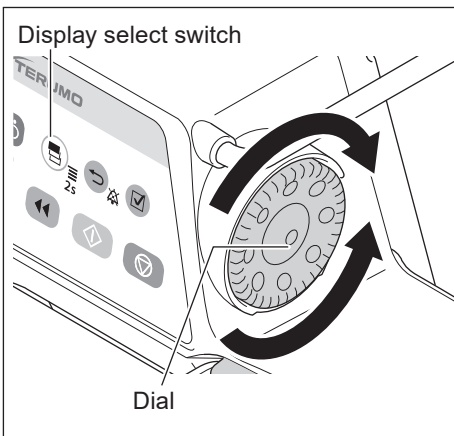
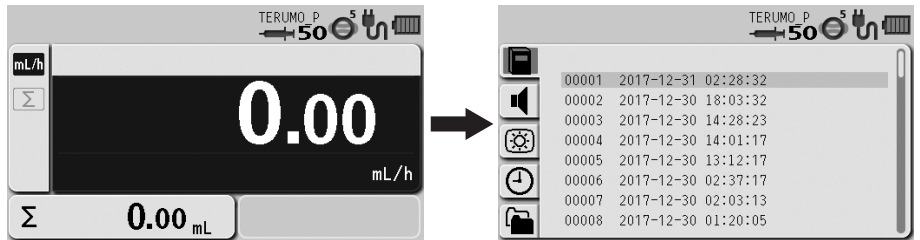
The date and time can be set. Set year, month, date, hour, and minute.



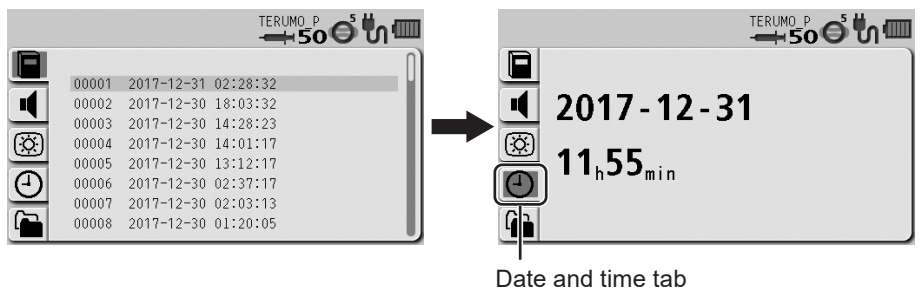
- 1) With the Back/Mute switch pressed and held, press and hold the Display select switch for 2 seconds or more.

Note

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



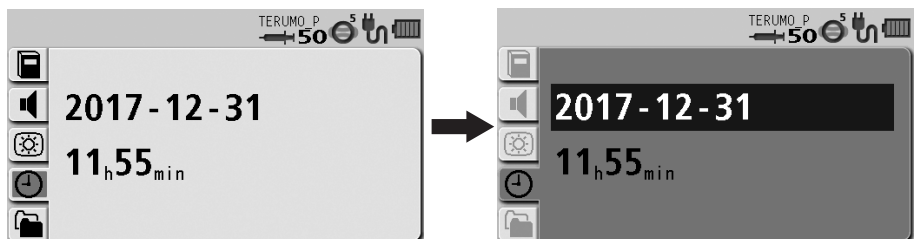
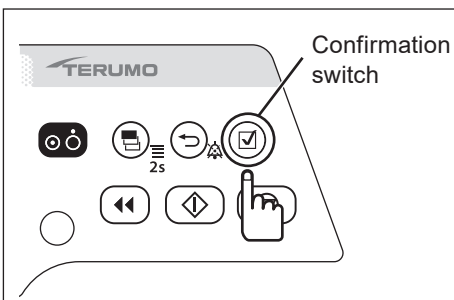
- 2) Turn the Dial or press the Display select switch to select the date and time tab .



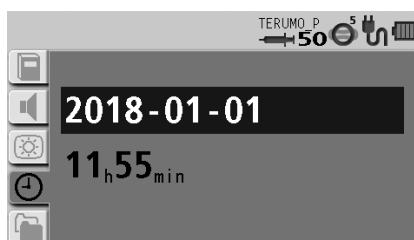
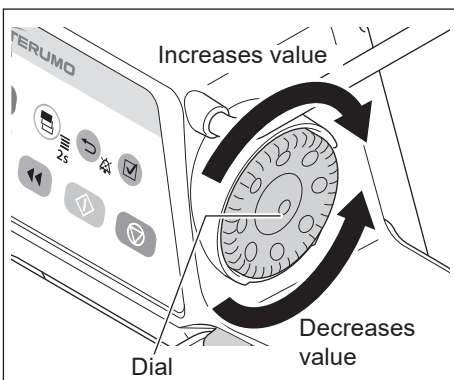
- 3) Press the Confirmation switch.

Note

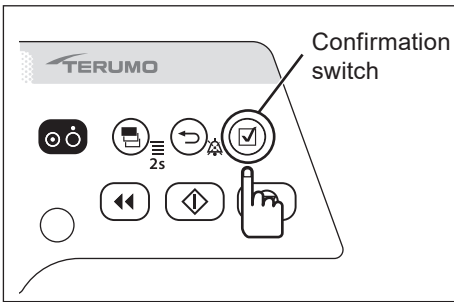
- Year - month - date is displayed in dark blue (selected).



- 4) Turn the Dial to change the date.



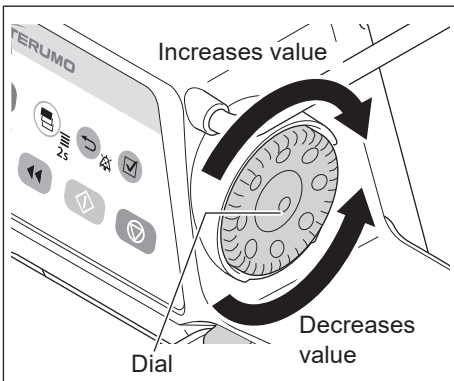
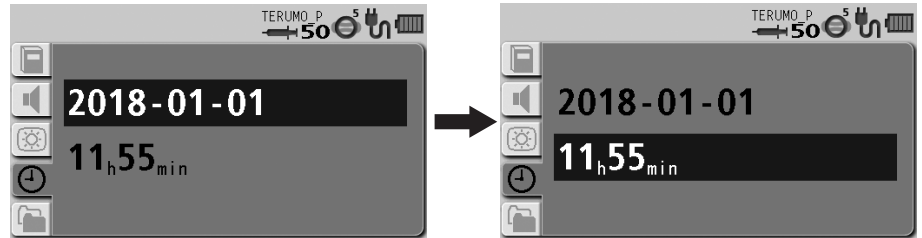
Changing Settings on the Menu



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.



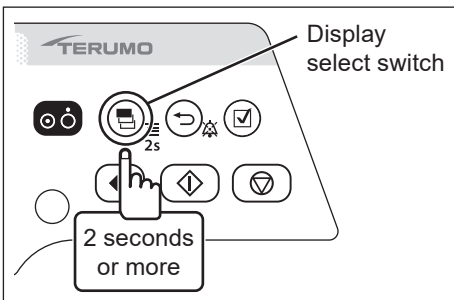
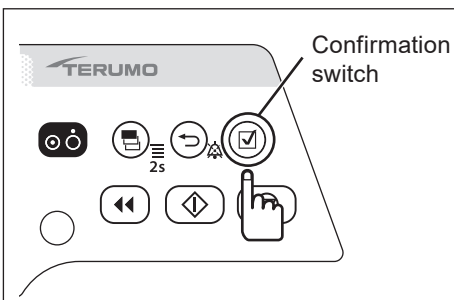
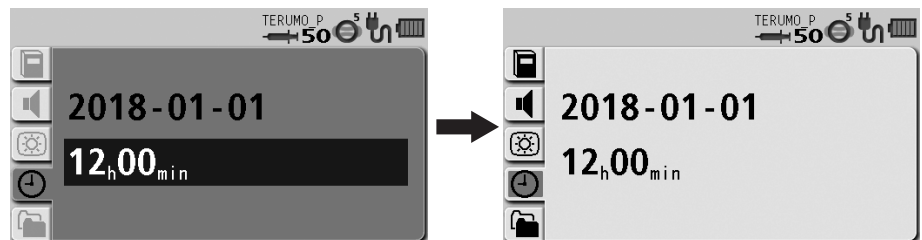
Note

- 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.

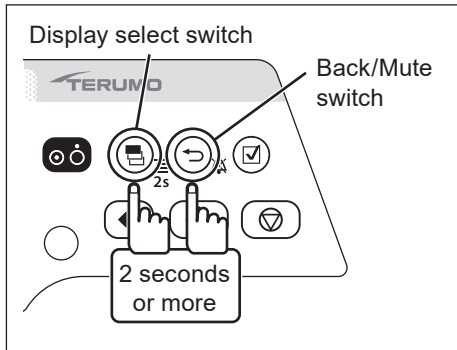


8) Press and hold the Display select switch for 2 seconds or more to return to the flow rate screen.

Profile (TE-SS830 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.

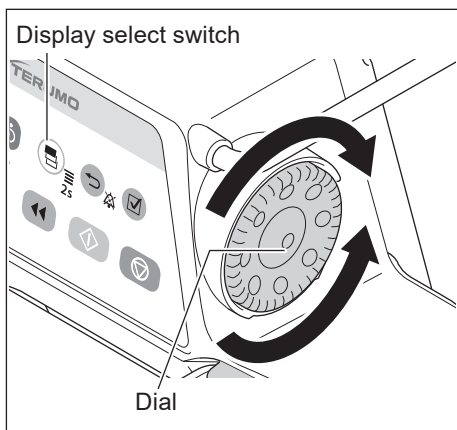
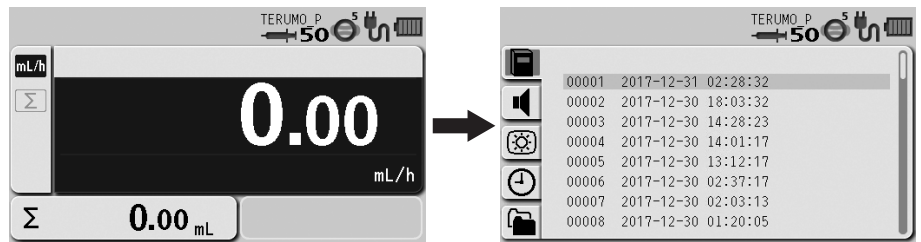
See page 45 for how to select the library.



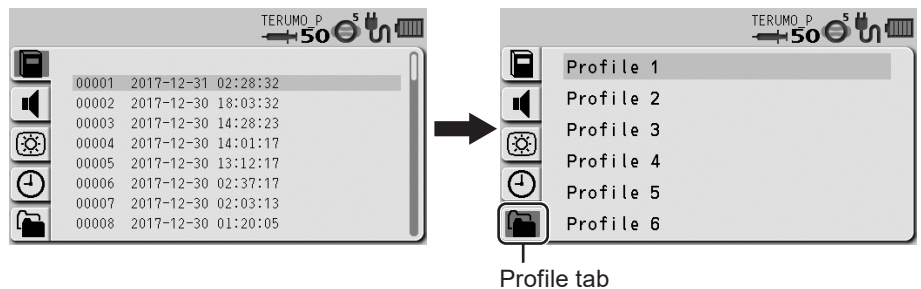
- 1) With the Back/Mute switch pressed and held, press and hold the Display select switch for 2 seconds or more.

Note

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



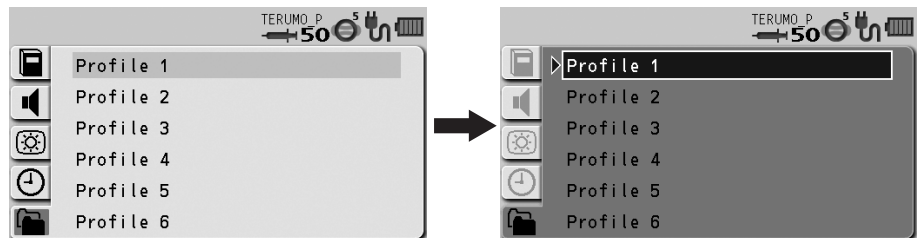
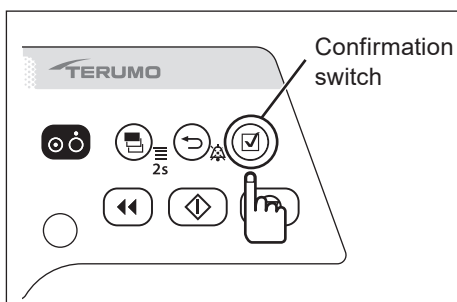
- 2) Turn the Dial or press the Display select switch to select the profile tab . If no library or profile is registered, the profile tab is not displayed.



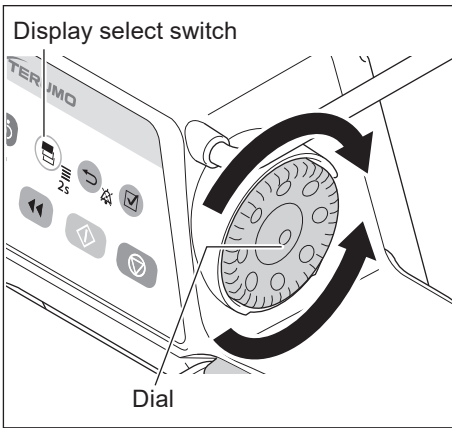
- 3) Press the Confirmation switch.

Note

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



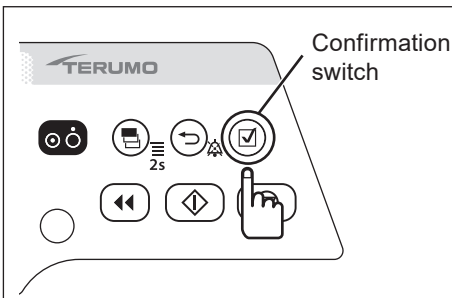
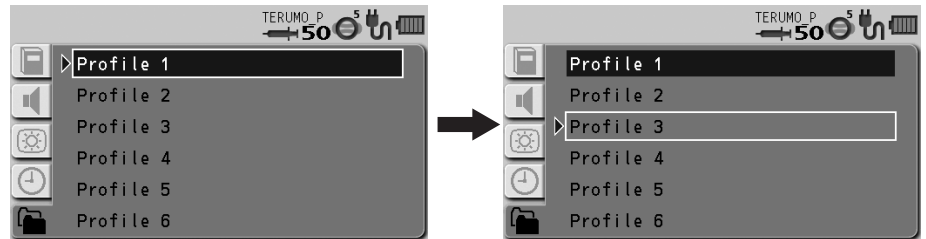
Changing Settings on the Menu



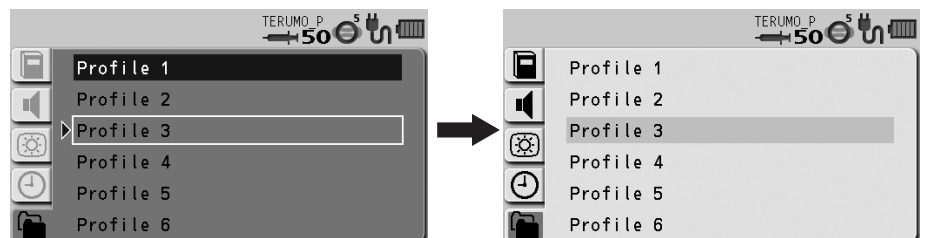
4) Turn the Dial or press the Display select switch to select a profile.

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 45).

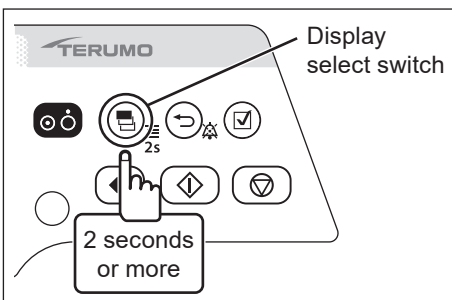
Note

- 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.

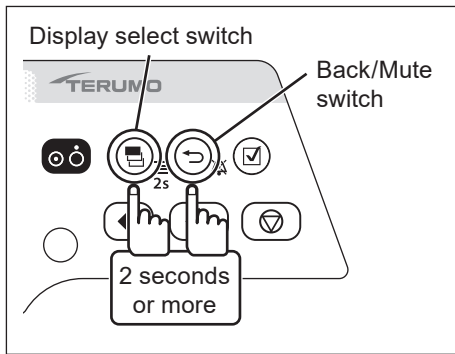


Communication Environment (TE-SS830 only)

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

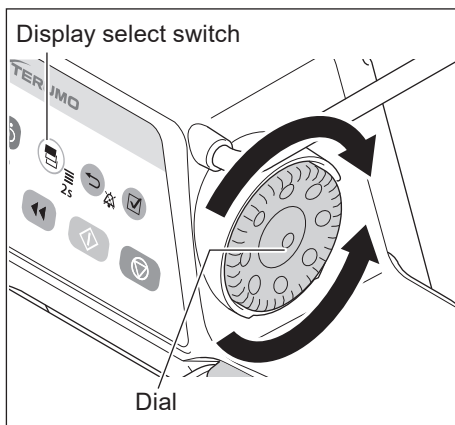
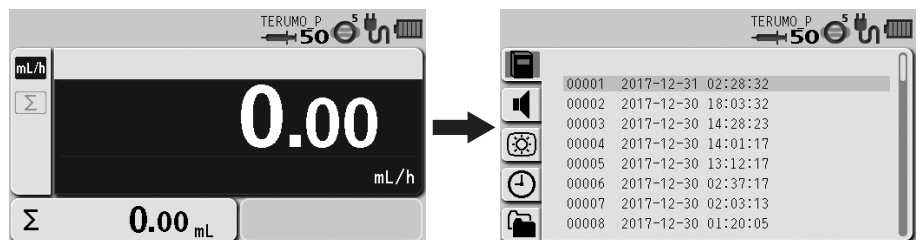
For details about how to register the communication environment setting to the pump unit, contact TERUMO trained service technicians.



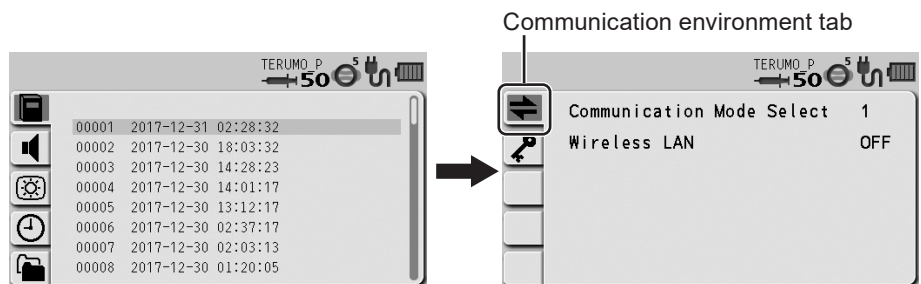
- 1) With the Back/Mute switch pressed and held, press and hold the Display select switch for 2 seconds or more.

Note

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



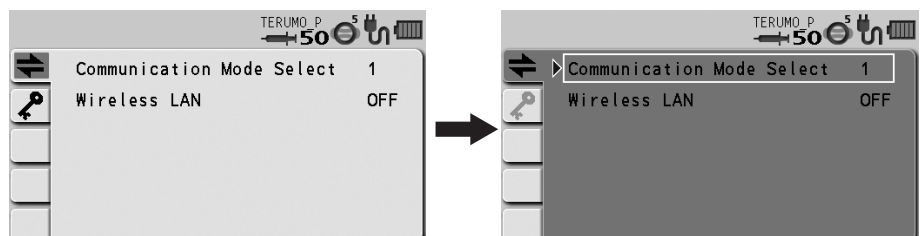
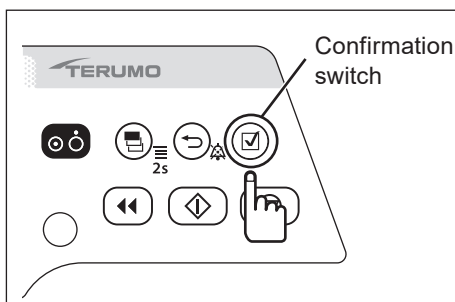
- 2) Turn the Dial or press the Display select switch to select the communication environment tab ⇄ .



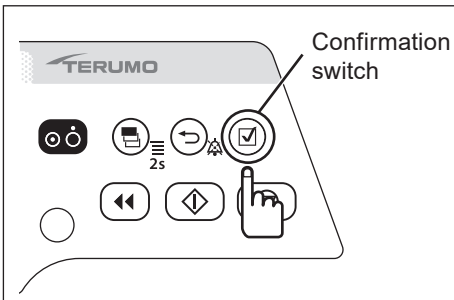
- 3) Press the Confirmation switch.

Note

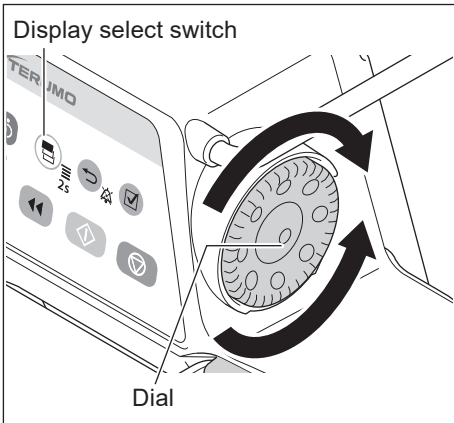
- The status changes from the icon selection (light blue) to the item selection (white frame).



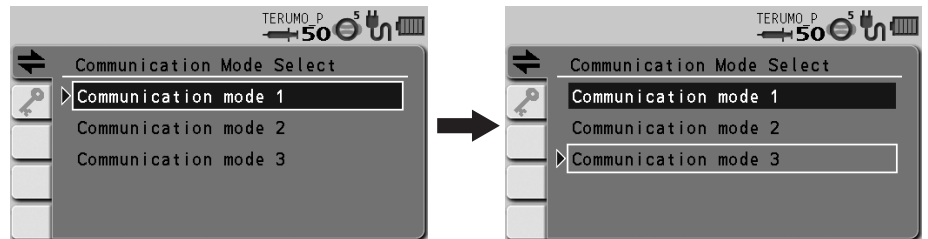
Changing Settings on the Menu



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

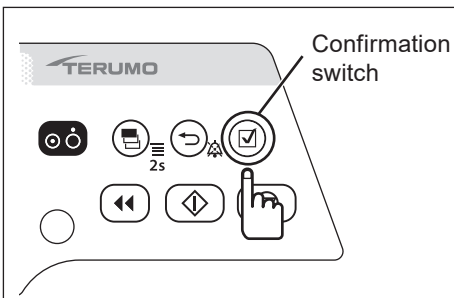


- 5) Turn the Dial or press the Display select switch to select the communication environment you want to set from the list of registered communication environments.



Notes

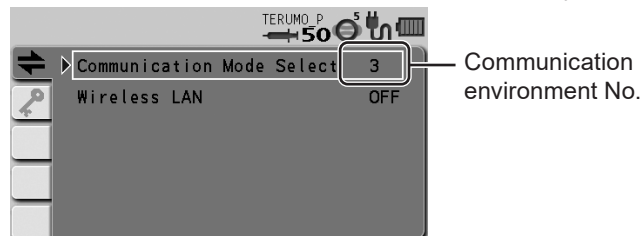
- Turning the Dial or pressing the Display select switch moves the white frame.
- The specified communication environments are restricted depending on the set profile.



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

Check

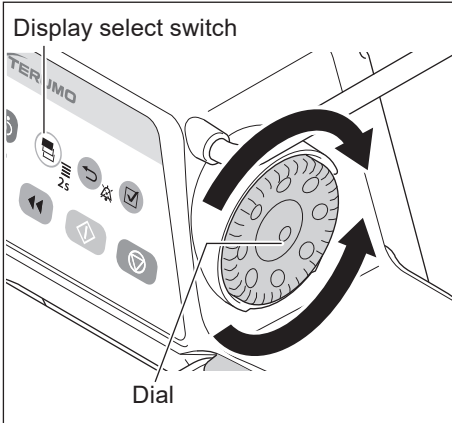
- The set communication environment No. is displayed on screen.



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

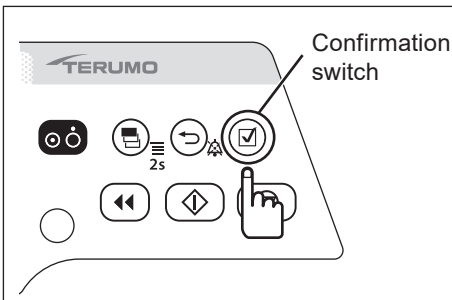
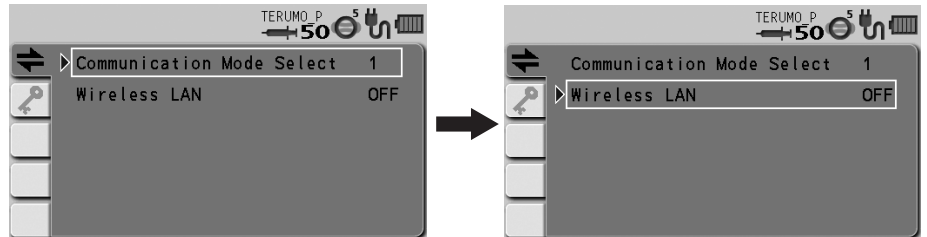
◆ Wireless LAN ON/OFF setting

- 1) Follow Steps 1) to 3) of “Communication Environment” (page 83) to display the communication environment setting screen.
- 2) Turn the Dial or press the Display select switch to select Wireless LAN.

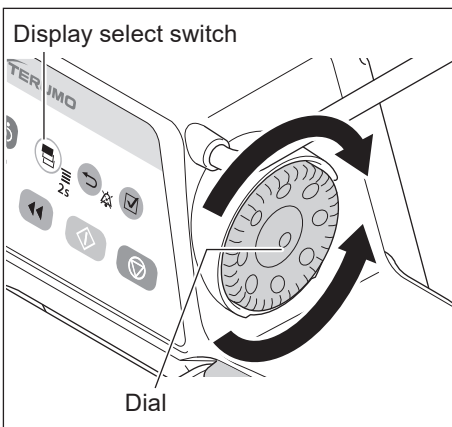
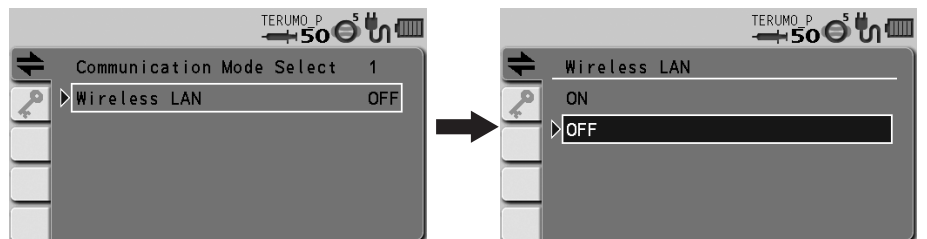


Note

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



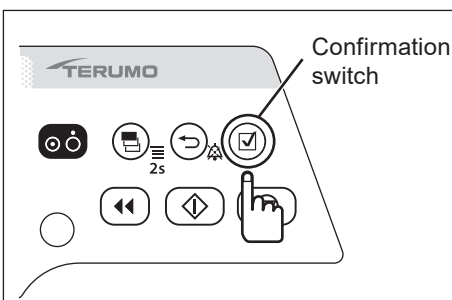
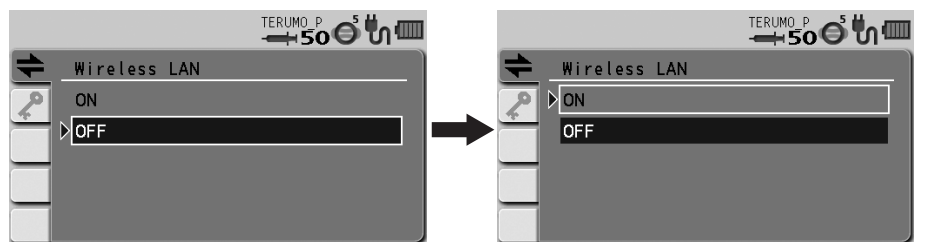
- 3) Press the Confirmation switch.



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

Notes

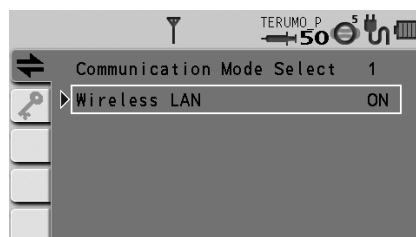
- The existing setting has been selected (dark blue).
- Turning the Dial or pressing the Display select switch moves the white frame.



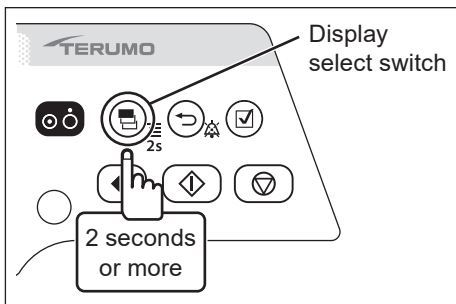
- 5) Press the Confirmation switch to confirm the selection.

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.

About External Communication Functions

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-SS830 only)	External communication (RS-232C) (TE-SS732 only)	Wireless LAN (TE-SS830 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-SS835xxx 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 (EN 60601-1) and IEC 60601-1-2 (EN 60601-1-2) 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 (EN 60601-1) and IEC 60601-1-2 (EN 60601-1-2). 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.

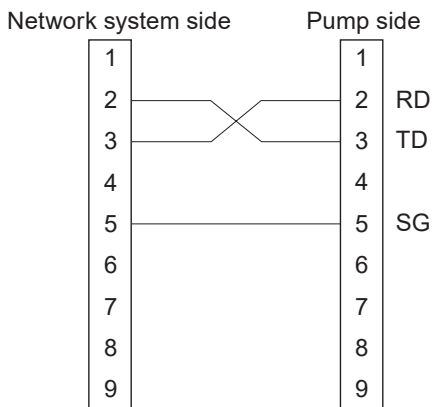
< IrDA (For infrared communication)>

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.

Cable connection example (For RS-232C)



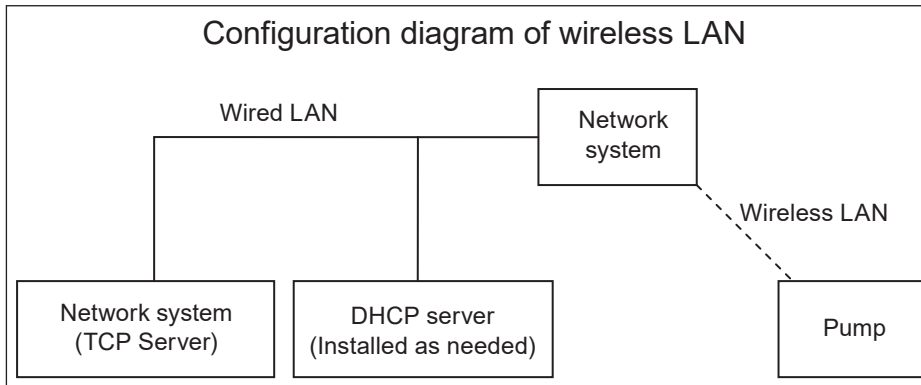
Note

- 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

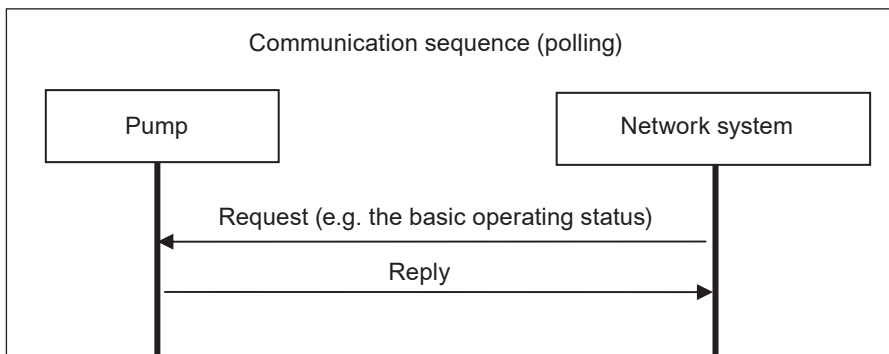
- When using the wireless LAN communication function, the effect on other equipment by radio interference should be considered.
- When connecting this product with a network, the settings of this product and the network system need to be compatible. Contact a vendor specialist for the correct settings 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 92.
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 93 "Data Format".
- **SubCommand:**
For details, see page 93 "Data Format".
- **Data:**
Data is sent according to Command or SubCommand.
For details, see page 93 "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	Occlusion alarm		
		b4	Syringe Displacement alarm		
		b5	Plunger Displacement alarm		
		b6	Slider Displacement alarm		
		b7	Syringe Barrel Detection alarm		
		b8	Nearly Empty alarm		
		b9-b12	(Reserved)		
		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)				
Operation monitor	1	b0-b1 (low order)	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	Plunger status monitor (0: Set, 1: Not set)		
		b6	(Reserved)		
		b7 (high order)	(Reserved)		
		One bit used for b2-b7. ("1" indicates active.)			

Item	Size (Byte)	Details	
Syringe status	1	0x0	None
		0x1	(Reserved)
		0x2	5 mL
		0x3	10 mL
		0x4	20 mL
		0x5	30 mL
		0x6	50 mL
		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 Invalid value (when the function is disabled): 0xEEEEEE	
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	
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	
Syringe brand number	1	Brand number of the syringe 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>9C1E[ETX]
```

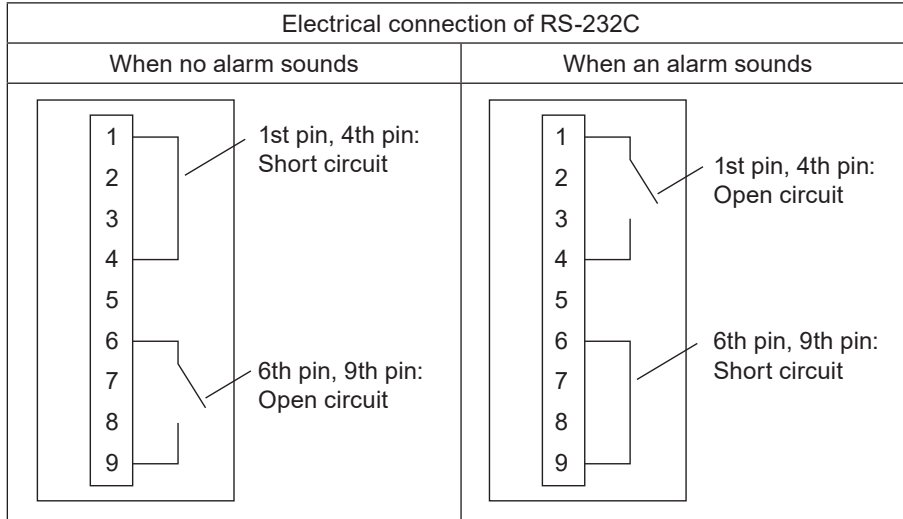
Note) [STX]: 0x02, [ETX]: 0x03

* This is an example of the reply where the pump is stopped.
In this case, CRC is "9C1E".

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 syringe 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, slider and clutch on a regular basis. Failure to conduct the regular cleaning may result in damage, failure or malfunction to/of this product.
- If any parts (clamp, clutch part 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 clamp 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.
- If the flange holder or clutch suffers from stiff movement or gets very dirty, it should be cleaned with a damp (not wet) soft cloth.

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:

- One Touch Pole Clamp (specified parts only)

For details, see page 99.

How to Clean Components

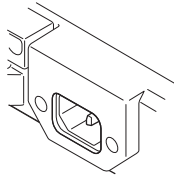
After use, clean all components as described below.

Cleaning the AC inlet

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

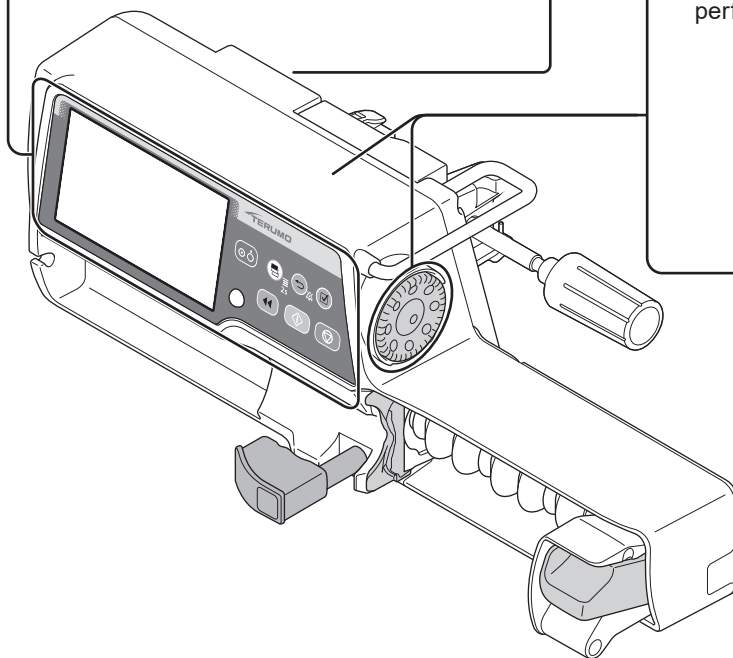
Caution

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



Cleaning the panel surface

Wipe with a damp (not wet) soft cloth.

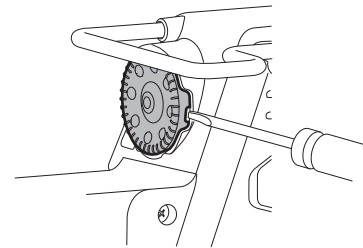


Cleaning the outside of the syringe pump and the Dial

Wipe with a damp (not wet) soft cloth. When disinfecting, use a designated disinfectant. The Dial is fixed to the body of the pump with a magnet. Remove it following the procedure below before cleaning.

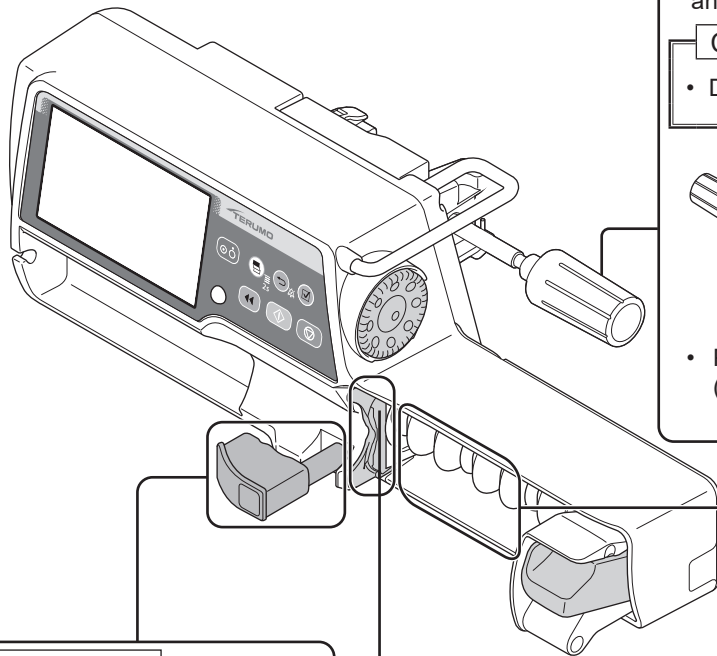
How to remove the Dial

- 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.



Cautions

- Do not rub the panel surface with a hard object.
- Do not rub with a hard object such as forceps or with a sharp object etc.



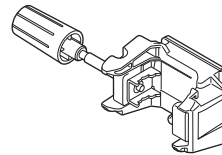
Cleaning the pole clamp

Detach the pole clamp from the pump, and wipe with a damp (not wet) soft cloth.

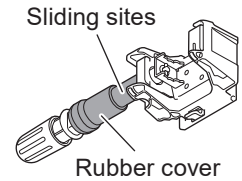
* Do not use ethanol to disinfect the rubber cover and the sliding sites as indicated by ■ .

Caution

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



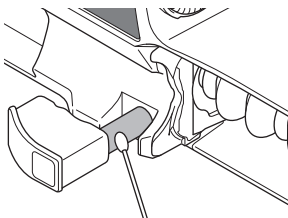
- Pole clamp (screw type)



- TERUFUSION One Touch Pole Clamp (Optional accessory)

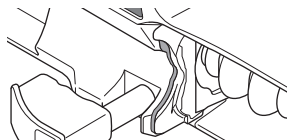
Cleaning the clamp

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



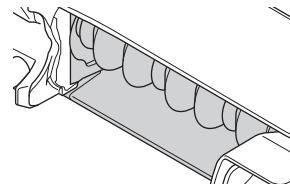
Cleaning the flange slit and the Holding flange.

Wipe with a damp (not wet) soft cloth.



Cleaning the rubber protector and around the rubber protector

Wipe with a damp (not wet) soft cloth.



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.
- 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 syringe 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.

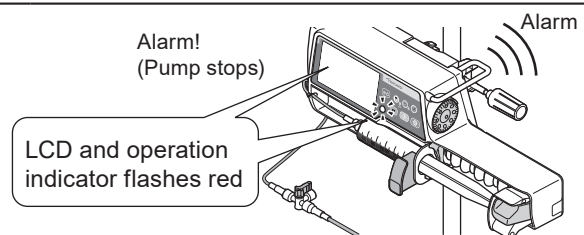
Troubleshooting procedure

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

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

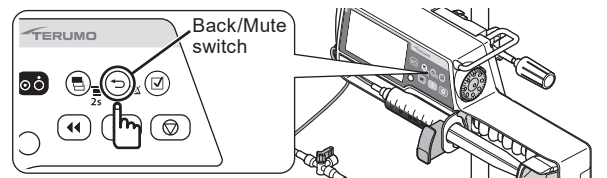
Notes

- 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 8 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.

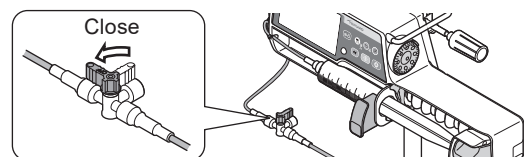


2) Mute and check alarm content.

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.)



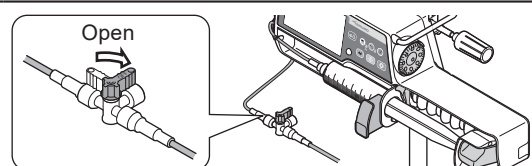
3) Close the three way stopcock etc. (if in use)



4) Inspect the cause. Check any applicable occurrence/cause from pages 105 to 115.

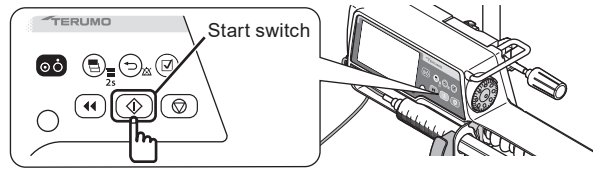
5) Eliminate the cause. Eliminate the cause in accordance with the instructions from pages 105 to 115.

6) Open the three way stopcock etc. (if in use)



7) Confirm and restart.

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



High priority alarm

◆ Plunger Displacement alarm



⚠ Plunger Detection



Plunger disconnected from the slider!
Clamp the line and replace the syringe correctly

⚠ Plunger Detection

Occurrence	Cause	Action
<ul style="list-style-type: none"> LCD: The Plunger Displacement alarm display flashes red. Operation indicator: Flashes red. Buzzer: Activates. Pump: Stops. 	<ul style="list-style-type: none"> The plunger has been displaced during solution delivery. 	<ol style="list-style-type: none"> Re-set the syringe correctly. (See page 26.) Prime the line, ensuring that the plunger is kept in the slider to prevent the solution from being delivered to the patient. (See page 33.)
<ul style="list-style-type: none"> LCD: The Plunger Displacement alarm display flashes red. Operation indicator: Flashes red. Buzzer: Activates. Pump: Remains stopped. Unable to start even after the syringe has been correctly set. 	<ul style="list-style-type: none"> Drug solution is adhered on the plunger detector. The malfunction of the internal sensor of the plunger detector is suspected. (After the alarm is issued, the solution delivery cannot start while the power is on.) 	<ul style="list-style-type: none"> If any adhered drug solution is present, turn off the power and clean the plunger detector. If the problem persists, contact TERUMO trained service technicians to request repair.

◆ Syringe Displacement alarm



⚠ Syringe Detection

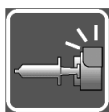


Syringe removed!
Clamp the line and place the syringe correctly

⚠ Syringe Detection

Occurrence	Cause	Action
<ul style="list-style-type: none"> LCD: The Syringe Displacement alarm display flashes red. Operation indicator: Flashes red. Buzzer: Activates. Pump: Stops. 	<ul style="list-style-type: none"> The syringe has been displaced during solution delivery. 	<ol style="list-style-type: none"> Replace the syringe correctly. (See page 26.) Prime the line, ensuring that the plunger is kept in the slider to prevent the solution from being delivered to the patient. (See page 33.)
<ul style="list-style-type: none"> LCD: The Syringe Displacement alarm display flashes red. Operation indicator: Flashes red. Buzzer: Activates. Pump: Remains stopped. Unable to start even after the syringe has been correctly set. 	<ul style="list-style-type: none"> Drug solution is adhered on the syringe clamp and/or flange holder, or they are damaged. The malfunction of the internal sensor of the syringe clamp and/or flange holder is suspected. (After the alarm is issued, the solution delivery cannot start while the power is on.) 	<ul style="list-style-type: none"> If any adhered drug solution is present, turn off the power and clean the syringe clamp and/or flange holder. (See page 99.) If the problem persists, contact TERUMO trained service technicians to request repair.

◆ Slider Displacement alarm



⚠ Slider Detection



Slider not in the correct position!
Clamp the line and check the slider position

⚠ Slider Detection

Occurrence	Cause	Action
<ul style="list-style-type: none"> LCD: The Slider Displacement alarm display flashes red. Operation indicator: Flashes red. Buzzer: Activates. Pump: Stops. 	<ul style="list-style-type: none"> The slider has been displaced during solution delivery. 	<ol style="list-style-type: none"> Replace the syringe correctly. (See page 26.) Prime the line, ensuring that the plunger is kept in the slider to prevent the solution from being delivered to the patient. (See page 33.)

◆ Occlusion alarm



⚠ Occlusion



Clamp the line and remove the cause of the occlusion

⚠ Occlusion

Occurrence	Cause	Action
<ul style="list-style-type: none"> LCD: The Occlusion alarm display flashes red. Operation indicator: Flashes red. Buzzer: Activates. Pump: Stops. 	<ul style="list-style-type: none"> An occlusion has occurred in the infusion line. (A broken or crushed infusion line, or clogged intravenous needles or infusion line may be the cause.) 	<ol style="list-style-type: none"> Eliminate the cause of occlusion. Prime the line, ensuring that the plunger is kept in the slider to prevent the solution from being delivered to the patient. (See page 33.)
<ul style="list-style-type: none"> The occlusion icon does not turn orange even when an Occlusion alarm is issued. 	<ul style="list-style-type: none"> The internal pressure of the infusion line has been temporarily mitigated by the bolus reduction function. The cause of the occlusion may have been eliminated. 	<ul style="list-style-type: none"> 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 eliminating 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 syringe.
<ul style="list-style-type: none"> An Occlusion alarm is occurring often. 	<ul style="list-style-type: none"> The internal pressure of the infusion line has reached the occlusion pressure set value. 	<ul style="list-style-type: none"> If using a drug solution with a high viscosity or using a thin line, the internal pressure of the infusion line may increase. Review the settings by setting an occlusion pressure value higher than the one currently used, increasing the inner diameter of the infusion line, or reducing the flow rate in accordance with the occlusion icon or the occlusion history graph, etc.

◆ Syringe Empty



⚠ Syringe Empty



⚠ Syringe Empty

Occurrence	Cause	Action																		
<ul style="list-style-type: none"> • LCD: The Syringe Empty display flashes red. • Operation indicator: Flashes red. • Buzzer: Activates. • Pump: Stops. 	<ul style="list-style-type: none"> • The syringe is fully pressed. 	<ul style="list-style-type: none"> • Replace the syringe if you wish to continue the infusion. (See page 40.) The time from full-press to alarm sounding varies according to the product used. The table below shows an example. * When new TERUMO syringes are used. <table border="1"> <thead> <tr> <th></th> <th>5 mL syringe</th> <th>10 mL syringe</th> <th>20 mL syringe</th> <th>30 mL syringe</th> <th>50/60 mL syringe</th> </tr> </thead> <tbody> <tr> <td>1 mL/h</td> <td>Approx. 3 min.</td> <td>Approx. 11 min.</td> <td>Approx. 30 min.</td> <td>Approx. 41 min.</td> <td>Approx. 64 min.</td> </tr> <tr> <td>5 mL/h</td> <td>Approx. 1.0 min.</td> <td>Approx. 2.5 min.</td> <td>Approx. 5.0 min.</td> <td>Approx. 8.5 min.</td> <td>Approx. 12.0 min.</td> </tr> </tbody> </table>		5 mL syringe	10 mL syringe	20 mL syringe	30 mL syringe	50/60 mL syringe	1 mL/h	Approx. 3 min.	Approx. 11 min.	Approx. 30 min.	Approx. 41 min.	Approx. 64 min.	5 mL/h	Approx. 1.0 min.	Approx. 2.5 min.	Approx. 5.0 min.	Approx. 8.5 min.	Approx. 12.0 min.
	5 mL syringe	10 mL syringe	20 mL syringe	30 mL syringe	50/60 mL syringe															
1 mL/h	Approx. 3 min.	Approx. 11 min.	Approx. 30 min.	Approx. 41 min.	Approx. 64 min.															
5 mL/h	Approx. 1.0 min.	Approx. 2.5 min.	Approx. 5.0 min.	Approx. 8.5 min.	Approx. 12.0 min.															

◆ Completion alarm



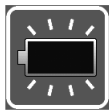
⚠ Infusion Completed



⚠ Infusion Completed

Occurrence	Cause	Action
<ul style="list-style-type: none"> • LCD: The Completion alarm display flashes red. • Operation indicator: Flashes green. • Buzzer: Activates. • Pump: Switches to the keep vein open (KVO) function and continues solution delivery. 	<ul style="list-style-type: none"> • The volume delivered has reached the VTBI. 	<ul style="list-style-type: none"> • A normal operation when the VTBI is set. • Press the Stop switch to stop the KVO solution delivery. (See page 32.)

◆ Shutdown Notice alarm



Shut Down



Low battery!
Connect the pump to the mains to
avoid shut down in a few minutes

Shut Down

Occurrence	Cause	Action
<ul style="list-style-type: none"> • LCD: The Shutdown Notice alarm display flashes red. • Operation indicator: Flashes red. • Buzzer: Activates. • Pump: Stops. 	<ul style="list-style-type: none"> • Battery has no power left. 	<ul style="list-style-type: none"> • Connect immediately to the AC power supply or rack system. (See page 23.) * When using a rack system, see the instruction manual of the rack system.

◆ Power Failure alarm



Power Failure



Low battery!
Connect the pump to the mains to
avoid shut down in a few minutes

Power Failure

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

Medium priority alarm

◆ Pressure alarm (TE-SS830 only)



⚠ Pressure Change



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

⚠ Pressure Change

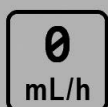
Occurrence	Cause	Action
<ul style="list-style-type: none"> LCD: The Pressure alarm display flashes yellow. Operation indicator: Flashes green. Buzzer: Activates. Pump: Delivers solution. 	<ul style="list-style-type: none"> The internal pressure of the infusion line has rapidly increased or decreased. 	<ul style="list-style-type: none"> 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.

Note

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

Low priority alarm

◆ No Flow Rate alarm



⚠ No Flow Rate

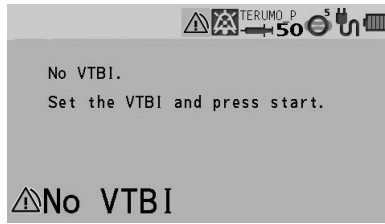


No flow rate has been chosen.
Set the flow rate and press start

⚠ No Flow Rate

Occurrence	Cause	Action
<ul style="list-style-type: none"> LCD: The No Flow Rate alarm display lights up yellow. Operation indicator: Off. Buzzer: Activates. Pump: Remains stopped. 	<ul style="list-style-type: none"> The Start switch was pressed without having set a flow rate. 	<ul style="list-style-type: none"> Set a flow rate and press the Start switch to start solution delivery. (See page 30.)
	<ul style="list-style-type: none"> The flow rate setting exceeds 150 mL/h (for 5 mL syringe) or 300 mL/h (for 10, 20 or 30 mL syringe). 	<ul style="list-style-type: none"> Check the value set and re-set it to equal or less than 150 mL/h or 300 mL/h, depending on the syringe size used. (See page 30.)
	<ul style="list-style-type: none"> Some of the flow rate settings do not apply to the advanced dose or combination dose mode. 	<ul style="list-style-type: none"> Correct those settings and start solution delivery. (See page 66. For the combination dose mode setting, contact TERUMO trained service technicians.)

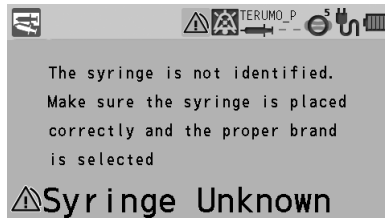
◆ No VTBI alarm



Occurrence	Cause	Action
<ul style="list-style-type: none"> • LCD: The No VTBI alarm display lights up yellow. • Operation indicator: Off. • Buzzer: Activates. • Pump: Remains stopped. 	<ul style="list-style-type: none"> • The Start switch was pressed without having set a VTBI. 	<ul style="list-style-type: none"> • Set a VTBI and press the Start switch to start solution delivery. (See page 32.)
	<ul style="list-style-type: none"> • The Start switch was pressed with the settings as volume delivered \geq VTBI. 	<ul style="list-style-type: none"> • Clear the volume delivered (see page 38) or input a new value in the VTBI (see page 32) and press the Start switch to start solution delivery.

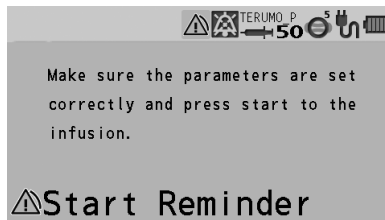
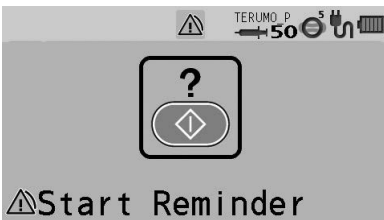
* Only if the VTBI setting function is enabled.

◆ Syringe Barrel Detection alarm



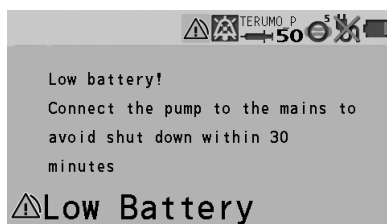
Occurrence	Cause	Action
<ul style="list-style-type: none"> • LCD: The Syringe Barrel Detection alarm display lights up yellow. • Operation indicator: Off. • Buzzer: Activates. • Pump: Stopped. 	<ul style="list-style-type: none"> • The syringe in use does not match the syringe brand set. 	<ul style="list-style-type: none"> • Check that the syringe brand setting matches the syringe in use.
	<ul style="list-style-type: none"> • The clamp is still open. • The flange is not in the slit. • The syringe has not been set at the center of the syringe detector. 	<ul style="list-style-type: none"> • Place the syringe correctly. (See page 26.)

◆ Start Reminder



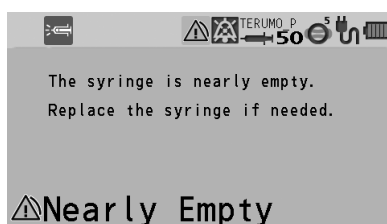
Occurrence	Cause	Action
<ul style="list-style-type: none"> • LCD: The Start Reminder display lights up yellow. • Operation indicator: Off. • Buzzer: Activates. • Pump: Remains stopped. 	<ul style="list-style-type: none"> • The product has been left for 2 minutes or more after being programmed. 	<ul style="list-style-type: none"> • 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 39.) • Check the setting values for flow rate and VTBI, and press the Start switch to start solution delivery. (See pages 30 and 31.)

◆ Battery alarm



Occurrence	Cause	Action
<ul style="list-style-type: none"> • LCD: The Battery alarm display lights up yellow. • Operation indicator: Flashes green (during solution delivery) or off (stopped). • Buzzer: Activates. • Pump: Solution delivery (during solution delivery) or remains stopped (stopped). 	<ul style="list-style-type: none"> • Low battery capacity (approximately 30 minutes), battery level low or battery energy is reducing. 	<ul style="list-style-type: none"> • Connect to the AC power supply or rack system. (See page 23.) * When using a rack system, see the instruction manual of the rack system.

◆ Nearly Empty alarm



Occurrence	Cause	Action
<ul style="list-style-type: none"> • LCD: The Nearly Empty alarm display lights up yellow. • Operation indicator: Flashes green (during solution delivery) or off (stopped). • Buzzer: Activates. • Pump: No change to the status. 	<ul style="list-style-type: none"> • The quantity of the drug solution is low. 	<ul style="list-style-type: none"> • If you want to continue the solution delivery, replace the syringe. (See page 40.)

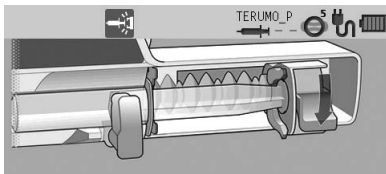
◆ Re-alarm

Occurrence	Cause	Action
<ul style="list-style-type: none"> • LCD: The respective alarm displays flash/light up (the flashing/light up colours are the same as those at the respective alarms). • Operation indicator: Same as for when the alarms are first activated. • Buzzer: Activates. • Pump: No change to the status. 	<ul style="list-style-type: none"> • Operation was not started within 2 minutes after the alarm was muted. (The Nearly Empty alarm during solution delivery is set to 180 minutes.*) 	<ul style="list-style-type: none"> • Follow the corrective action of each alarm.


* For the Nearly Empty alarm during solution delivery, the time is set to 180 minutes due to the continuous normal solution delivery.

Other problems

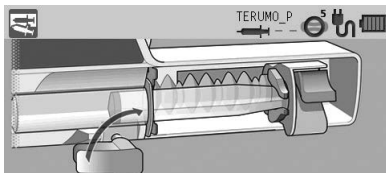
◆ When installing a syringe: Plunger displaced



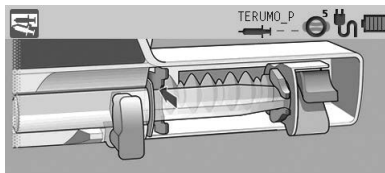
Place the syringe

Occurrence	Cause	Action
<ul style="list-style-type: none"> LCD: [Place the syringe.] Slider displacement icon  flashes. 	<ul style="list-style-type: none"> The plunger has been displaced. 	<ul style="list-style-type: none"> Place the syringe correctly. (See page 26.)



◆ When installing a syringe: Syringe displaced



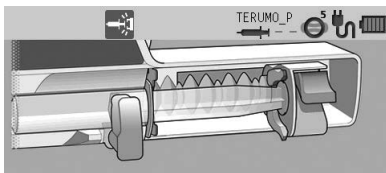
Place the syringe




Place the syringe

Occurrence	Cause	Action
<ul style="list-style-type: none"> LCD: [Place the syringe.] Syringe displacement icon  flashes. 	<ul style="list-style-type: none"> The clamp is still open. The flange is not in the slit. The syringe is not installed correctly. 	<ul style="list-style-type: none"> Place the syringe correctly. (See page 26.)
<ul style="list-style-type: none"> LCD: The Syringe displacement icon  flashes. 	<ul style="list-style-type: none"> The syringe brand setting is incorrect. 	<ul style="list-style-type: none"> Check that the syringe brand setting matches the brand of the syringe to be set.


◆ When installing a syringe: Slider displacement




Place the syringe

Occurrence	Cause	Action
<ul style="list-style-type: none"> LCD: [Place the syringe.] Slider displacement icon  flashes. 	<ul style="list-style-type: none"> The slider has been displaced. 	<ul style="list-style-type: none"> Place the syringe correctly. (See page 26.)



◆ Maintenance timer

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

◆ AC power detector function

Occurrence	Cause	Action
<ul style="list-style-type: none"> The pump cannot be turned on when using AC power. 	<ul style="list-style-type: none"> The AC icon  is not displayed even after the AC power cable is connected. 	<ul style="list-style-type: none"> Check the connection of the AC power cable to the pump and the power supply. (See page 23.)
	<ul style="list-style-type: none"> The AC power cable is damaged. The AC power cable is internally disconnected. 	<ul style="list-style-type: none"> Replace the AC power cable.

◆ Battery Replacement Time/Failure alarm

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


◆ Flow rate

Occurrence	Cause	Action
<ul style="list-style-type: none"> Pressing the Start switch does not start solution delivery. 	<ul style="list-style-type: none"> The infusion line is not open. The syringe is not installed correctly. 	<ol style="list-style-type: none"> Replace the syringe correctly. (See page 26.) Prime the line, ensuring that the plunger is kept in the slider to prevent the solution from being delivered to the patient. (See page 33.)
	<ul style="list-style-type: none"> An occlusion has occurred in the infusion line. 	<ul style="list-style-type: none"> Eliminate the cause of occlusion. (See page 106.)
<ul style="list-style-type: none"> Flow rate accuracy is low. 	<ul style="list-style-type: none"> Syringe has not been installed correctly. 	<ul style="list-style-type: none"> Check the setting of the syringe. (See page 26.)
	<ul style="list-style-type: none"> The syringe in use does not match the syringe brand set on the pump. 	<ul style="list-style-type: none"> Check that the syringe brand setting matches the brand of the syringe in use.
	<ul style="list-style-type: none"> The flow rate is not set correctly. 	<ul style="list-style-type: none"> Correct the flow rate setting.
	<ul style="list-style-type: none"> There is large height difference between the pump and patient. 	<ul style="list-style-type: none"> Adjust the patient to the pump height differential.

◆ External communication

Occurrence	Cause	Action
<ul style="list-style-type: none"> Cannot communicate (RS-232C) 	<ul style="list-style-type: none"> The baud rate, stop bit, parity, or device ID number may not be appropriate. 	<ul style="list-style-type: none"> Check the settings of the connected device. (See page 87.)
	<ul style="list-style-type: none"> Cables are not securely connected. 	<ul style="list-style-type: none"> Reconnect the cable. (See page 87.)
<ul style="list-style-type: none"> Cannot communicate (IrDA) 	<ul style="list-style-type: none"> The infrared communication window is dirty. 	<ul style="list-style-type: none"> Clean the infrared communication window with cotton swabs or gauze, etc.
	<ul style="list-style-type: none"> The pump is not securely attached to the TERUFUSION Communication Rack System. 	<ul style="list-style-type: none"> Make sure that the TERUFUSION Communication Rack System is securely attached to the pump. See the instruction manual of the TERUFUSION Communication Rack System.
	<ul style="list-style-type: none"> The TERUFUSION Communication Rack System is not turned on. 	<ul style="list-style-type: none"> Turn on the TERUFUSION Communication Rack System. See the instruction manual of the TERUFUSION Communication Rack System.
<ul style="list-style-type: none"> Cannot communicate (wireless LAN) 	<ul style="list-style-type: none"> SSID, encryption setting, IP address, subnet mask, default GW, connection destination IP address, communication port, or device ID may not be suitable. 	<ul style="list-style-type: none"> Check the settings of the product or the connected device. (See page 87.)
<ul style="list-style-type: none"> Signal strength icon (Colour = Grey, No signal bar) flashing 	<ul style="list-style-type: none"> The pump is defective. 	<ul style="list-style-type: none"> Contact TERUMO trained service technicians.

◆ Display

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

◆ Failure

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

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

Product name	TERUFUSION Syringe Pump Type SS3
Model	TE-SS730/TE-SS830
Catalogue number	TE-SS730xxx, TE-SS732xxx, TE-SS83xxxx Alphanumeric characters are entered for x in the catalogue number. (See page 122.)
Compatible syringes	Sterilized specified syringes for general use and specified pre-filled syringes (See page 18.)
Syringe size	5 mL, 10 mL, 20 mL, 30 mL, 50/60 mL
Syringe brand	TERUMO or other specified brands
Dose mode	mL/h mode µg/kg/min mode mg/kg/h mode Library mode (TE-SS830 only)
Flow rate setting range	<ul style="list-style-type: none"> • Setting range 0.01 to 150.00 mL/h Note that the upper limit of the flow rate can be changed in the following ranges: 0.01 to 150.00 mL/h (when using syringe of 5 mL) 0.01 to 300.00 mL/h (when using syringe of 10, 20, 30 mL) 0.01 to 1200.00 mL/h (when using syringe of 50/60 mL) • Step 0.01 mL/h step (0.01 to 10.00 mL/h)* 0.10 mL/h step (10.00 to 100.00 mL/h)* 1.00 mL/h step (100.00 to 1200.00 mL/h)* <p>*: 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.)</p>
VTBI setting range	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)
VTBI time setting range	1 min to 99 hours 59 min (1 min step) “-- --” (Unlimited)
Dose rate setting range	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.)
Weight setting range	0.1 to 300.0kg (0.1kg step)
Dilution setting range	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.)
Amount setting range	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.)
Solution setting range	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)

Hands On Bolus flow rate setting range		100.00 mL/h (when using syringe of 5 mL) 100.00 to 300.00 mL/h (when using syringe of 10 mL, 20 mL, 30 mL) 100.00 to 1200.00 mL/h (when using syringe of 50/60 mL) (100.00 mL/h step)
Hands Free Bolus dose rate setting range		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.)
Hands Free Bolus dose time setting range		1 s to 60 min 00 s (1 s step)
Volume delivered display range		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.)
Flow rate accuracy	Machine accuracy	Within $\pm 1\%$ (flow rate ≥ 1.00 mL/h)
	Accuracy including syringe	Within $\pm 2\%$ (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 TERUMO 50/60 mL syringe made in the Philippines (TERUMO_P) at a flow rate of 1.00 mL/h or more (ambient temperature: $23 \pm 2^\circ\text{C}$) according to IEC 60601-2-24 (EN 60601-2-24) standard.) Within $\pm 3\%$ (The hourly precision after one hour has passed since the start of infusion at a constant flow rate of 1.00 mL/h or more according to IEC 60601-2-24 (EN 60601-2-24) standard.)
Occlusion detection pressure		10 to 120kPa (set value) The occlusion detection pressure can be set in 10 levels.
Purge flow rate		Approx. 150 mL/h (when using syringe of 5 mL) Approx. 300 mL/h (when using syringe of 10 mL) Approx. 400 mL/h (when using syringe of 20 mL) Approx. 500 mL/h (when using syringe of 30 mL) Approx. 1200 mL/h (when using syringe of 50/60 mL)
Alarms		Occlusion alarm, Pressure alarm ^{*1} , Nearly Empty alarm, Slider Displacement alarm, Syringe Barrel Detection alarm, Syringe Displacement alarm, Plunger Displacement alarm, Battery alarm, Re-alarm, Shutdown Notice alarm, Power Failure alarm, Start Reminder, No Flow Rate alarm, No VTBI alarm ^{*2} , Completion alarm ^{*2} , Link Interruption alarm ^{*1} . ^{*1} : TE-SS830 only ^{*2} : Only if the VTBI setting function is enabled (Default: disabled).
Safety functions	Remaining volume detection setting function	Sets the Nearly Empty alarm position based on the time before the syringe is empty.
	Occlusion detection pressure select function	Selects the occlusion detection pressure setting values in 10 levels.
	Bolus reduction function	When an occlusion occurs, the slider is drawn back to reduce internal pressure.
	Flow rate range setting function A (Soft limits)	The flow rate setting range can be controlled within the "flow rate setting range" prescribed for each type of syringe. • When you try to set a value outside the range controlled by this function, a message asking for confirmation is displayed. If you confirm the setting, you can set the value which is outside the controlled range and the display colour of the value changes.

Specifications

Safety functions	Flow rate range setting function B (Hard limits)	The flow rate setting range can be controlled within the “flow rate setting range” prescribed for each type of a syringe. • Values outside the range controlled by this function cannot be set.
	Keypad lock function	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.
Available Functions	Syringe installation guidance function	Displays a screen that indicates the syringe installation status on the LCD.
	Syringe brand display function	Displays the syringe brand and size on the LCD.
	Syringe type switch function	Switching syringes is possible by performing the specified operation after the power is turned on.
	VTBI setting function	Sets the VTBI of dosage of drug solution.
	VTBI time setting function	Sets the VTBI time of dosage of drug solution.
	Purge buzzer sound function	When the Purge switch is being pressed, the buzzer sounds.
	Bolus buzzer sound function	During a bolus, the buzzer sounds.
	Volume delivered clear function	Clears the volume delivered display to zero.
	Standby function	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.
	Standby duration time select function	Changes the time to activate a Start Reminder in the standby mode.
	Buzzer volume select function	Changes the buzzer volume.
	Switch operation buzzer sound function	Buzzer sounds when a switch operation is performed.
	Stop transition buzzer sound function	Buzzer sounds when the Stop switch is pressed during solution delivery.
	LCD brightness select function	Changes the LCD brightness.
	Maintenance timer function	Time to next maintenance check can be set. That information is displayed on the LCD.
	Date and time setting function	Sets the date and time.
	External communication function (RS-232C) (TE-SS732 only)	Allows communication with a network system to output the status of the pump (flow rate, alarms, etc.) via RS-232C.
	Free message function (TE-SS732 and 830 only)	Displays a message on the pump via communication.
	External communication function (infrared communication (IrDA)) (TE-SS830 only)	Allows communication with the optional TERUFUSION Communication Rack System to output the status of the pump (flow rate, alarms, etc.) via infrared.

Available Functions	External communication function (wireless LAN) (TE-SS830 only)	Allows communication with a network system to output the status of the pump (flow rate, alarms, etc.) via wireless LAN.
	Nurse call function (TE-SS732 only)	When an alarm is activated, relay contact operates through communication unit.
	History function	Displays the operation history, etc.
	AC power detector function	Detects the presence or absence of AC power supply to the pump and displays that status.
	AC power detector buzzer sound function	Buzzer sounds when AC power supply is provided to or disconnected from the pump.
	Purge volume upper limit setting function	Sets the upper limit of the purge volume.
	Bolus volume upper limit setting function	Sets the upper limit of the hands on bolus volume.
	Keep Vein Open Function	After activation of the Infusion Completion alarm, solution delivery is continued at the keep vein open flow rate.
	Keep Vein Open flow rate select function	Changes the keep vein open flow rate.
	During-start volume delivered clear function	Clears the volume delivered to zero during solution delivery.
	During-start flow rate/dosage rate change function	Changes the flow rate/dosage rate during solution delivery.
	Selecting dose mode during the solution delivery function	Change the dose mode from mL/h to another mode during solution delivery.
	Set value memory function	Saves the current set values (e.g. flow rate, VTBI, dosage and weight) before the power is turned off.
	Alarm melody select function	Changes the buzzing pattern (melody) of the alarm buzzer.
	Setting dial acceleration function	Rotating the Dial while pressing the Stop switch accelerates the setting rate to set items such as the flow rate.
	Hands On Bolus function	After the bolus flow rate is set, a bolus is delivered while the Purge switch is pressed.
	Hands Free Bolus function	When bolus volume and bolus time are set, the flow rate is calculated and a bolus is delivered.
	Shortcut call function	Press multiple keys in combination to directly call the bolus flow rate setting display.
	Night mode function	Changes the LCD brightness for a specified time period.
	Power OFF buzzer sound function	Buzzer sounds as the power is turned off.
	Dose mode select function	The dose mode can be selected among mL/h, µg/kg/min, mg/kg/h and drug library (TE-SS830 only).
	Start-up dose mode select function	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-SS830 only).
	Dose mode information display function	When the AC power cable is connected, the version and the profile of the drug library are displayed before the power is turned on.
	Menu1 (User mode1) shortcut function to dose mode	Enable to go directly to the dose mode select display when the menu screen is selected.

Specifications

Available Functions	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
	Drug/patient information display function	Displays drug information such as dilution, patient information including patient name, age, gender, weight, height, etc. The dilution and weight can be changed.
	Dilution setting function by amount and solution	Selects how to specify the dilution from either Dilution or Amount/Solution.
	Interval/Intermittent dose function (TE-SS830 only)	The specified dosage rate is delivered at the specified regular intervals.
	Multi-step dose function (TE-SS830 only)	The speed of solution delivery increases or decreases at the specified levels (up to 10 levels).
	Delayed Start dose function (TE-SS830 only)	Solution delivery starts after the specified time has elapsed.
	Link function (Switch function A, B) (TE-SS830 only)	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: Interlocks two pumps. Starts solution delivery of the first pump, and then starts solution delivery of the second pump at the predetermined time. After solution delivery of the second pump is started, each pump changes the solution delivery speed according to respective settings. The interlock of the pumps finishes upon completion of the set solution delivery or at alarm timing.
	Come and See ME function (TE-SS830 only)	Automatic call function after a specified time elapses.
	Volume delivered unit select function	When the dose rate is set in mass units, the volume delivered unit can be changed to mass units.
Micro notation select function	Switches “µg” to “mcg” to be displayed in the drug library mode, µg/kg/min mode or mg/kg/h mode.	
Use conditions	Temperature: 5 to 40°C Humidity: 20 to 90% RH (non-condensing) Atmospheric pressure: 70 to 106kPa (700 to 1060hPa)	
Storage conditions*	Temperature: -20 to 45°C Humidity: 10 to 95% RH (non-condensing) Atmospheric pressure: 50 to 106kPa (500 to 1060hPa)	
Transport conditions	Temperature: -20 to 60°C Humidity: 10 to 95% RH (non-condensing) Atmospheric pressure: 50 to 106kPa (500 to 1060hPa)	
Power supply	AC100 to 240V, 50 to 60Hz Battery: Lithium ion battery <ul style="list-style-type: none"> • Continuous use period: Approx. 12 hours (applies when solution is delivered continuously at 5 mL/h in ambient temperature of 25°C with new fully charged battery) • 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. 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"> • 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) 	

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

Power consumption		24VA
Classification	Electric shock protection	Class I equipment and internally powered equipment, Defibrillation-proof type CF applied part
	Mode of operation	Continuous operation
	Protection against harmful ingress of water or particulate matter	IP24
Wireless LAN		<p>Hereby, TERUMO CORPORATION declares that this TERUFUSION Syringe Pump Type SS3 is in compliance with the essential requirements and other relevant provisions of Directive 2014/53/EU.</p> <p>Catalogue number: TE-SS830xxx*</p> <ul style="list-style-type: none"> • Transmit frequency or frequency band: 2412 to 2472 MHz • Type of modulation and frequency characteristics: <ul style="list-style-type: none"> • DBPSK (Differential Binary Phase Shift Keying) • DQPSK (Differential Quadrature Phase Shift Keying) • DSSS (Direct Sequence Spread Spectrum) • CCK (Complementary code keying) • Effective radiated power: <ul style="list-style-type: none"> • IEEE802.11b 10.7 dBm <p>Catalogue number: TE-SS835xxx*</p> <ul style="list-style-type: none"> • Transmit frequency or frequency band: 2412 to 2472 MHz • Type of modulation and frequency characteristics: <ul style="list-style-type: none"> • DSSS (Direct Sequence Spread Spectrum) • OFDM (Orthogonal Frequency-Division Multiplexing) • Effective radiated power: <ul style="list-style-type: none"> • IEEE802.11b 15dBm • IEEE802.11g 13dBm • IEEE802.11n 12dBm <p>* Alphanumeric characters are entered for x in the catalogue number.</p>
Dimensions		<p>Without external communication (RS-232C): 381 mm (W)*¹ x 120 mm (H)*¹ x 112 mm (D)*²</p> <p>With external communication (RS-232C): 381 mm (W)*¹ x 120 mm (H)*¹ x 131 mm (D)*²</p> <p>*¹: Excluding protrusions *²: Excluding protrusions, pole clamp and moving range</p>
Unit Weight		Approx. 2.0 kg
Standard accessories		AC power cable, pole clamp (Screw type), instruction manual

- This product is in compliance with EMC (electromagnetic compatibility) standard IEC 60601-1-2 (EN 60601-1-2) (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 (EN 60601-2-24).
- Conformity standard and directive
 - IEC 60601-1 (EN 60601-1)
 - IEC 60601-1-2 (EN 60601-1-2)
 - IEC 60601-1-6 (EN 60601-1-6)
 - IEC 60601-1-8 (EN 60601-1-8)
 - IEC 60601-2-24 (EN 60601-2-24)
 - MDD (Medical Device Directive) 93/42/EEC (Class IIb)

Specifications

Units Available

Model	Catalogue number	Labeling	Plug type	Computer interface	Dose mode	
					Weight mode	Drug library mode
TE-SS730	TE-SS730EN1	English	European plug	-	Yes	-
	TE-SS730EN2		UK plug			
	TE-SS730DE1	German	European plug			
	TE-SS730FR1	French				
	TE-SS730NL1	Dutch				
	TE-SS730RU1	Russian				
	TE-SS730ES1	Spanish				
	TE-SS730PL1	Polish				
	TE-SS730RO1	Romanian				
	TE-SS730SK1	Slovak				
	TE-SS730SV1	Swedish				
	TE-SS730NO1	Norwegian				
	TE-SS730F11	Finnish				
	TE-SS730HU1	Hungarian				
	TE-SS730IT1	Italian		Italian plug		
	TE-SS730IT3					
	TE-SS732EN1	English	European plug	RS-232C		
	TE-SS732EN2		UK plug			
	TE-SS732DE1	German	European plug			
	TE-SS732FR1	French				
	TE-SS732NL1	Dutch				
	TE-SS732RU1	Russian				
	TE-SS732ES1	Spanish				
	TE-SS732PL1	Polish				
	TE-SS732RO1	Romanian				
	TE-SS732SK1	Slovak				
	TE-SS732SV1	Swedish				
	TE-SS732NO1	Norwegian				
TE-SS732F11	Finnish					
TE-SS732HU1	Hungarian					
TE-SS732IT1	Italian	Italian plug				
TE-SS732IT3						

Model	Catalogue number	Labeling	Plug type	Computer interface	Dose mode		
					Weight mode	Drug library mode	
TE-SS830	TE-SS830EN1	English	European plug	Infrared communication (IrDA), Wireless LAN	Yes	Yes	
	TE-SS830EN2		UK plug				
	TE-SS830DE1	German	European plug				
	TE-SS830FR1	French					
	TE-SS830NL1	Dutch					
	TE-SS830RU1	Russian					
	TE-SS830ES1	Spanish					
	TE-SS830PL1	Polish					
	TE-SS830RO1	Romanian					
	TE-SS830SK1	Slovak					
	TE-SS830SV1	Swedish					
	TE-SS830NO1	Norwegian					
	TE-SS830FI1	Finnish					
	TE-SS830HU1	Hungarian					
	TE-SS830IT1	Italian					Italian plug
	TE-SS830IT3						
	TE-SS835EN1	English	European plug				
	TE-SS835EN2		UK plug				
	TE-SS835DE1	German	European plug				
	TE-SS835FR1	French					
	TE-SS835NL1	Dutch					
	TE-SS835RU1	Russian					
	TE-SS835ES1	Spanish					
	TE-SS835PL1	Polish					
	TE-SS835RO1	Romanian					
	TE-SS835SK1	Slovak					
	TE-SS835SV1	Swedish					
	TE-SS835NO1	Norwegian					
TE-SS835FI1	Finnish						
TE-SS835HU1	Hungarian						
TE-SS835IT1	Italian	Italian plug					
TE-SS835IT3							

Note

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

Device Characteristics

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

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

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 5 mL/h with a new TERUMO syringe (50 mL).

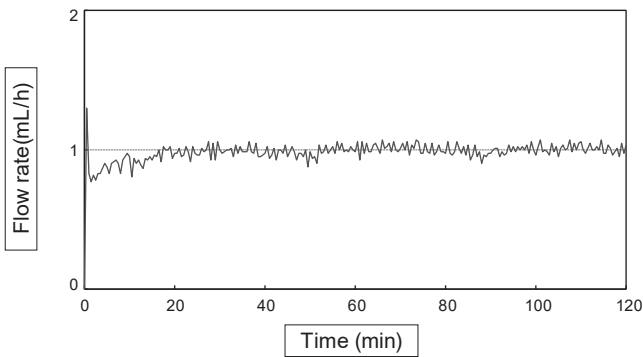
Note

- Flow rate characteristics are correlated with the syringe. Depending on the combination of syringe and pump, the same data as the representative example may not be obtained.

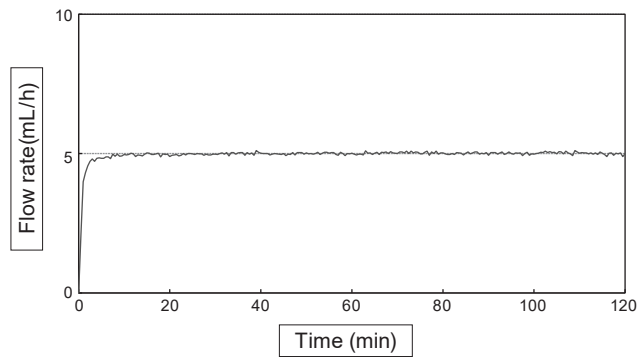
1. Start-up curve

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.

<Flow rate: 1 mL/h>



<Flow rate: 5 mL/h>

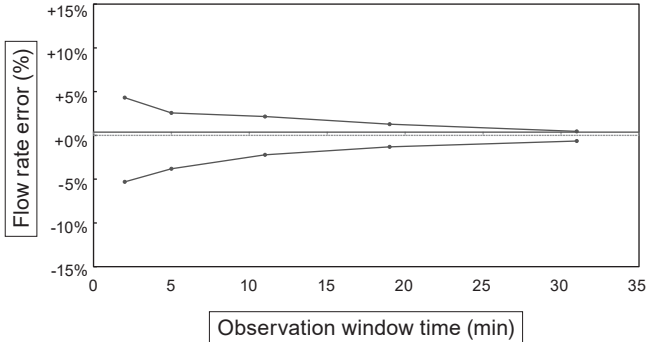


2. Trumpet curve

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.

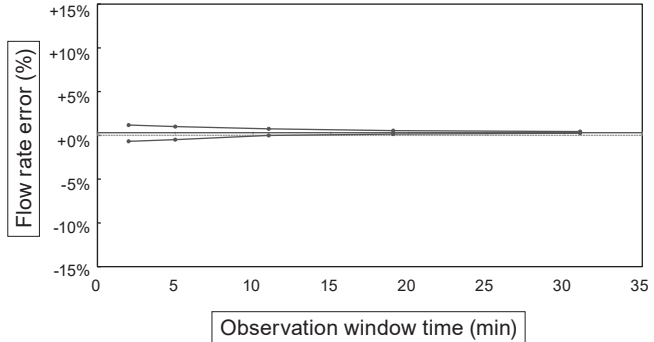
<Flow rate: 1 mL/h>

Flow rate error = +0.37%



<Flow rate: 5 mL/h>

Flow rate error = +0.30%



3. 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	0.8
13.3	-1.3

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 5 mL/h, with a three-stage occlusion pressure setting value (1, 6, 10), and a new TERUMO syringe (50 mL). The measured values may vary depending on the test conditions.

* When the 1m extension tube (internal volume: 1.0 mL) is used.

Note

- The Occlusion alarm occurrence time with solution delivery at the minimum flow rate (0.01mL/h) will be approx. 100 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 ²)		
1	1	10	0.10	68.2	0.04
	6	62	0.64	92.3	0.54
	10	113	1.16	140.6	0.63
5	1	10	0.10	2.0	0.06
	6	62	0.63	18.3	0.46
	10	112	1.14	25.2	0.69

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 Syringe Pump Type SS3, 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 (EN 60601-1-2)

Manufacturer’s declaration - electromagnetic emissions	
The TERUFUSION Syringe Pump Type SS3 is intended for use in the electromagnetic environment specified below. The customer or the user of the TERUFUSION Syringe Pump Type SS3 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 (EN 60601-1-2)

Manufacturer’s declaration - electromagnetic immunity	
The TERUFUSION Syringe Pump Type SS3 is intended for use in the electromagnetic environment specified below. The customer or the user of the TERUFUSION Syringe Pump Type SS3 should assure that it is used in such an environment.	
Immunity test	Immunity test level
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 (EN 60601-1-2)

Immunity test level to proximity fields from RF communications equipment		
The TERUFUSION Syringe Pump Type SS3 is intended for use in the electromagnetic environment specified below. The customer or the user of the TERUFUSION Syringe Pump Type SS3 should assure that it is used in such an environment.		
Emissions test	Test frequency (MHz)	Immunity test level (V/m)
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

This section describes the symbols (icons) used with the TERUFUSION Syringe Pump Type SS3.

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 (self-declaration). "CE0197" means compliance with the Medical Device Directive, 93/42/EEC.		Purge		Humidity limitation
			Start		Atmospheric pressure limitation
			Stop		Stacking limit by number
		IP24	IEC 60529 Degrees of protection provided by enclosures (IP code)		Defibrillation-proof type CF applied part
	Authorized Representative in the European Community	O O	Indicates the connecting position of External communication/nurse call (RS-232C)		Indicates recyclable corrugated paper packing material (Japan)
	Serial number				
	Catalogue number		Indicates the operation to pull the clamp forward		Indicates PE (polyethylene) plastic bag (Japan)
	Date of manufacture		Contents		Recyclable (Lithium-ion battery) Brazil
	Manufacturer		Consult instructions for use		Contains RoHS 6 Restricted Substances (Lithium-ion battery) China
	Alternating current		Follow instructions for use		Recyclable (Lithium-ion battery, Nickel-metal-hydride battery) Taiwan
	DC power supply		This way up		TISI mark (Lithium-ion battery) Thailand
	"off" (for a part of equipment)		Fragile, handle with care		Recyclable (Lithium-ion battery) Japan
	"on" (for a part of equipment)		Keep dry		Separate collection of accumulators and batteries
	Return		Keep away from sunlight		Separate collection of electrical and electronic equipment, European Community
	Mute (Audio paused)		Temperature limit		Non-ionizing electromagnetic radiation

Note

- See pages 5 to 11 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 Syringe Pump Type SS3 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>

FOR INFORMATION ABOUT TERUMO PRODUCTS

- 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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