

Quick Reference Guide
LiquoGuard®7 - CSF Management Device

Amazing what's possible.

LiquoGuard®7 CSF management



Active Mode:

LiquoGuard®7 automatically drains CSF at a user-defined flow rate whenever the patient's CSF pressure exceeds the target pressure (Pset).



Pause mode:

LiquoGuard®7 will continuously measure the patient's CSF pressure but will not drain CSF.

Intermittently, pressure controlled CSF Management:



LiquoGuard®7 drains CSF at a user-defined flow rate (ml/h) whenever the patient's CSF pressure (Pcsf) or ICP is greater than the value of the target pressure "Pset". When the patient's pressure drops to or below the target value, *LiquoGuard®7* automatically stops draining CSF to maintain the patient's pressure at or slightly below the value of Pset. If the patient's pressure again rises above the value of Pset, *LiquoGuard®7* will drain CSF to lower the patient's pressure to or slightly below Pset.



Continuously, volume controlled CSF Management:

LiquoGuard®7 may be set to drain CSF continuously at a user-defined hourly flow rate (ml/h).

Set-up *LiquoGuard*[®]7



Attach *LiquoGuard*[®]7 to IV Pole.



Connect the *LiquoGuard*[®]7 monitor to mains power.



Turn ON the monitor.

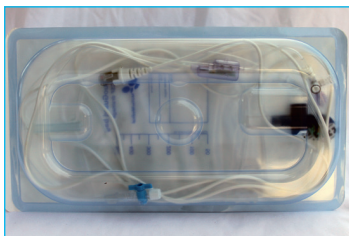
ON OFF



To avoid losing the on-screen history data, do not turn off the *LiquoGuard*[®]7 monitor until the drainage procedure is complete. Data stored internally is available after restart via USB download.

LiquoGuard®7 Set-up

Disposable Tube Set



Verify tube set package is sterile, clean, dry, and not damaged. Under sterile conditions, open the tube set package.



Using sterile technique, connect drainage bag to distal end of *LiquoGuard*®7 tube set. Place drainage bag in holder.



Verify stopcock to drainage bag is open. Verify drainage port at the bottom of the bag is closed. Tensile loads greater than 15 N (1.5 kg) exerted on the tubing may cause it to break. Care must be taken when moving the patient to ensure the tubing is not subjected to excess force.

Load Tube Set

Open pump cover flap and load tubing. On the main display, press and hold the Turn Rotor button to advance the pump clockwise.

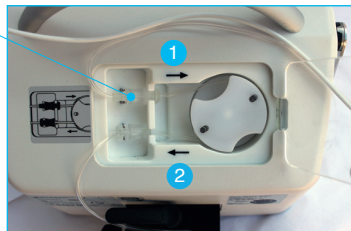
INFO

You can rotate the motor for better engagement of the tube set by pressing the button >Turn rotor<

Turn rotor

Start here when loading and unloading Tube Set.

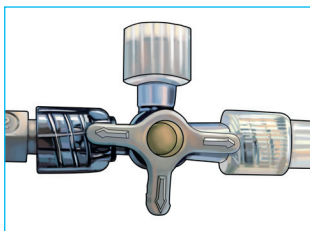
- 1 From Patient Catheter
- 2 To Drainage Bag



Always load and unload the tube set starting at the top (From Patient Catheter). Do not pull on or apply excess force to the tubing when loading or unloading.

LiquoGuard[®] 7 Tube Set

Load Tube Set



Connect the tube set to the patient's catheter.

Adjust the 3-way stopcock to allow flow from the catheter to the *LiquoGuard[®] 7* pressure transducer.



The butt of the stopcock is OFF; the three (3) white arms point toward OPEN pathways.

Prime Tubing Set



Open pump cover flap. On the main display, press and hold the Turn Rotor button to advance the pump clockwise. Hold the button until the tubing is primed to >2 cm beyond the pressure transducer.

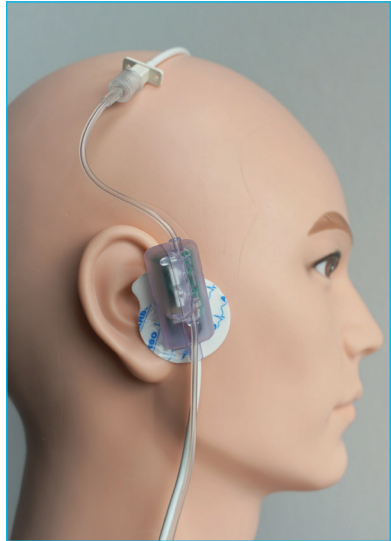
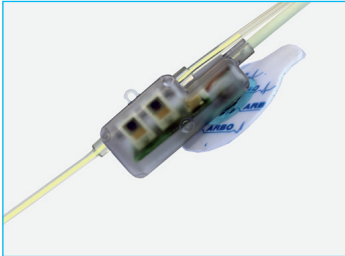
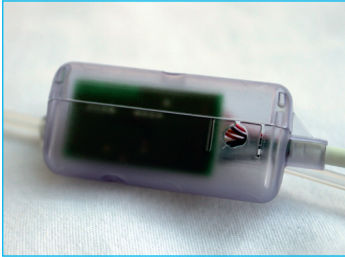


Ensure tubing is primed with patient's CSF to > 2 cm beyond the pressure sensor. If air pockets/bubbles are present between the patient catheter and the pressure sensor, open pump cover flap and press the Turn Rotor button to remove them.

Attach Pressure Sensor to Patient

Ventricular Drainage

Attach the ECG electrode to the pressure sensor and affix it to the patient's head at the height of the Foramen of Monro.



When attaching the transducer to the patient, ensure it is held securely. If the ECG electrode loses adhesion or detaches from the patient, replace it immediately. Any standard ECG electrode may be used to secure the transducer to the patient. For agile patients, it may be advisable to select an electrode with a larger diameter or to suture the sensor to the patient.

LiquoGuard[®] 7 Pressure Sensor

Attach Pressure Sensor to Patient

Lumbar Drainage

Insert the transducer housing into a blue comfort pad (not part of the *LiquoGuard[®] 7* Drainage Set).

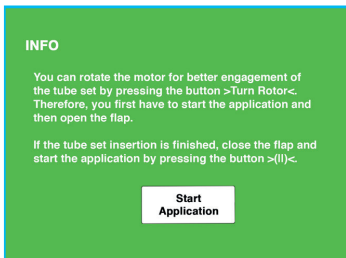
With the transducer positioned adjacent to the catheter insertion site, affix the pad to the patient with tape of Tegaderm.



Start Application



Plug the sensor cable into the LiquoGuard®7 monitor.



Select Start Application.

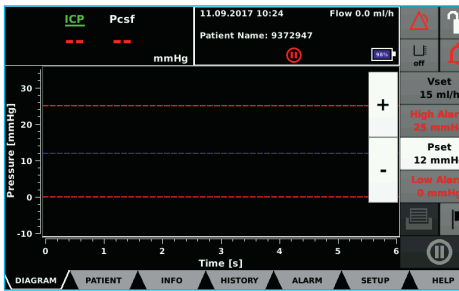


Un-pause the pump.

Set Drainage & Alarm Parameters

Lumbar Drainage

Per the physician's orders, set the drainage and alarm parameters (Vset, High Alarm, Pset, and Low Alarm).



If the Presetting option is Active and profiles are saved, load the applicable Presetting profile. When creating Presetting profiles, select alarm limits that will notify the caregiver immediately should an unsafe condition arise.

The screenshot shows the 'LOAD/SAVE ALL SETTINGS' menu. It has a table with 8 rows and 3 columns. The first column contains numbers 1 through 8. The second column contains text: 'LUMBAR', 'EVD', and three empty boxes. The third column contains 'Load' and 'Save' buttons for each row. To the right of the table are tabs for LANGUAGE, DISPLAY, CONFIG, MAINTENANCE, and PRESETTING. At the bottom, there are two buttons: 'Load from USB' and 'Save to USB'. The navigation bar at the very bottom is the same as in the previous screenshot.

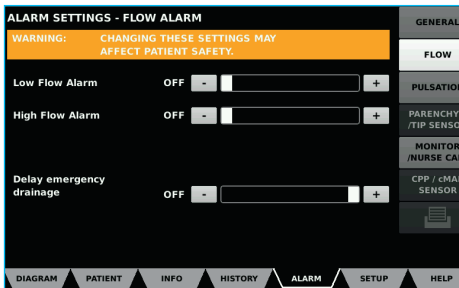
Number	Setting Name	Load	Save
1.	LUMBAR	Load	Save
2.	EVD	Load	Save
3.		Load	Save
4.		Load	Save
5.		Load	Save
6.		Load	Save
7.		Load	Save
8.		Load	Save

Set Drainage & Alarm Parameters

If the Presettings option is not Active, or a preset profile is not selected, system default values for all parameters will load automatically when the *LiquoGuard®7* monitor is turned on. Per the physician's orders, drainage parameters and alarm values must be set/adjusted manually.



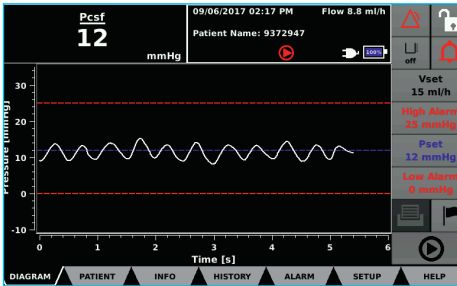
On the Alarm tab, Flow softkey, confirm the Low Flow, High Flow, and Delay of emergency drainage alarms are OFF unless ordered otherwise by the physician.



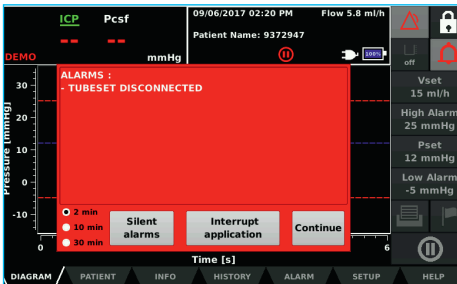
LiquoGuard[®] 7 System

Verify System is Operating Properly

Check for pressure readings on the *LiquoGuard*[®] 7 monitor to verify the system is operating properly.

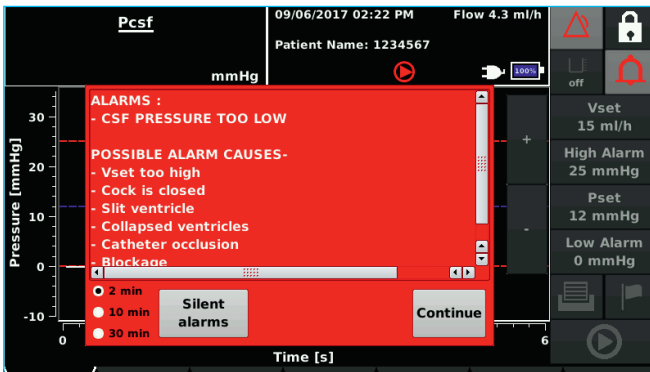


Unless the drainage procedure is complete, do NOT turn off the *LiquoGuard*[®] 7 monitor. If for any reason the tube set must be removed temporarily (e.g. MRI), unplug the pressure sensor cable from the *LiquoGuard*[®] 7 monitor and choose, Interrupt Application.
↗ See also MRI instructions on Page 16.



Managing Alarms

When *LiquoGuard*®7 detects an alarm condition (e.g. Low Pressure, High Pressure, Loss of Pulsation, Loss of Amplitude), a red screen appears on the display. The alarm condition is displayed along with a list of possible causes. Silence the audio alarm for 2, 10, or 30 minutes. Identify the cause of the alarm. Fix the problem.



Visual Alarm Off

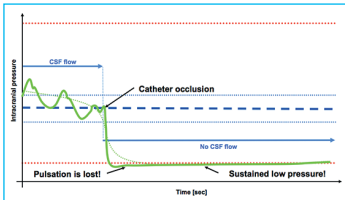


Visual Alarm On



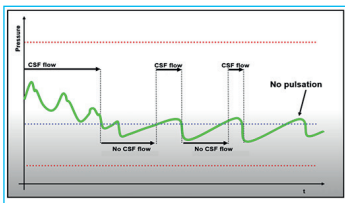
Confirm the alarm condition has been remedied – the visual alarm (flashing red light) is OFF.

Common Alarm Conditions



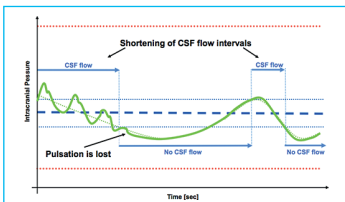
Catheter Occlusion or Disconnection

Loss of pulsation with sustained low pressure is commonly an indication of a catheter occlusion or a disconnected catheter. Within the set alarm delay, *LiquoGuard[®] 7* will sound an alarm to identify a potential catheter occlusion or disconnected catheter.



Partial Catheter Occlusion

Pressure curve rises slowly above Pset and drops sharply when the monitor attempts to drain CSF. Typically, pulsation is dampened, average flow rate decreases, and the Low Flow Alarm will sound if activated.



Collapsed Ventricles

Loss of pulsation with shortened CSF flow rates may be an indication of collapsed ventricles. Based on the loss of pulsation, *LiquoGuard[®] 7* is able to sound the alarm.



Adjusting the monitor's settings may prevent the notification of an alarm condition. The *LiquoGuard[®] 7* alarm concept requires the audio/visual alarms are always noted by the caregiver. Refer to the *LiquoGuard[®] 7* IFU for additional information regarding the setting of parameters.

Post-drainage Instructions

- 1 Pause the pump
- 2 Close the 3-way stopcock to the patient's catheter.
- 3 Disconnect the *LiquoGuard*[®]7 Tube Set from the closed patient catheter.
- 4 Remove the Tube Set from the pump.
(Lift cover flap and Turn Rotor). ↗ See also Page 4.
- 5 Discard the Tube Set and drainage bag in an approved biohazardous waste receptacle.
- 6 Unplug the pressure sensor cable from the *LiquoGuard*[®]7 monitor.
- 7 Turn OFF the *LiquoGuard*[®]7 monitor.

MRI



The *LiquoGuard*[®]7 monitor is not MRI compatible and must be kept outside of the MRI magnet room. Only *LiquoGuard*[®]7 Tube Sets with an **MRI indicator sticker** on the label are MRI compatible. Keep the *LiquoGuard*[®]7 monitor connected to mains power while idle. Do **NOT** turn off the *LiquoGuard*[®]7 monitor. Reconnect the *LiquoGuard*[®]7 Tube Set as soon as possible after application interruption.

- 1 Remove Tube Set sensor cable from the *LiquoGuard*[®]7 monitor. Select Interrupt Application.
- 2 Close the 3-way stopcock to the patient's catheter. Do **NOT** disconnect tube set from catheter.
- 3 Remove Tube Set from pump.
- 4 Remove drainage bag from holder.
Do NOT disconnect the drainage bag from the tube set.
- 5 Lay the tube set and drainage bag next to the patient on the MRI bed.
- 6 Ventricular Drainage Procedures:
Detach ECG electrode and pressure sensor from the patient's head.

Lumbar Drainage Procedures:
Detach the blue comfort pad/pressure sensor from the patient's hip/back.
- 7 Proceed to MRI.

Post MRI Procedure

- 1 Place drainage bag in holder.
- 2 Ventricular Drainage Procedures:
Reattach ECG electrode to pressure sensor and affix it to the patient's head.

Lumbar Drainage Procedures:
Reattach the blue comfort pad/pressure sensor to the patient's hip/back.
- 3 Load Tube Set into pump.
- 4 Open 3-way stopcock to patient catheter.
If present, remove air pockets/bubbles -Turn Rotor.
- 5 Plug-in pressure sensor cable. Select Start Application.
- 6 Un-pause pump
- 7 Check for pressure readings on monitor display to verify system is operating properly.

LiquoGuard[®] 7 Monitor

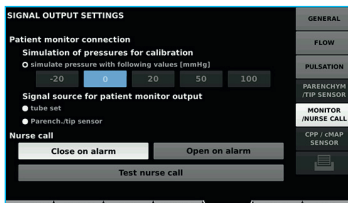
Bedside Monitor Connection



The *LiquoGuard*[®] 7 monitor may be interfaced with a wide range of hospital bedside monitors. Contact your local *LiquoGuard*[®] 7 representative or refer to the *LiquoGuard*[®] 7 IFU for additional information.



Connect one end of the interface cable to the bedside monitor and the other end to *LiquoGuard*[®] 7.



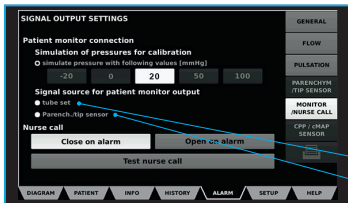
Upon connecting *LiquoGuard*[®] 7 to the bedside monitor, the pressure calibration screen will automatically appear on the *LiquoGuard*[®] 7 display.

Zero the bedside monitor.

Bedside Monitor Connection



Simulate additional pressure values on the *LiquoGuard[®]7* calibration screen to verify they are displayed correctly on the bedside monitor screen. To call up the calibration screen at a later time, press the Alarm tab and Monitor/Nurse Call softkey. Alternatively, disconnect the interface cable and reconnect it again.



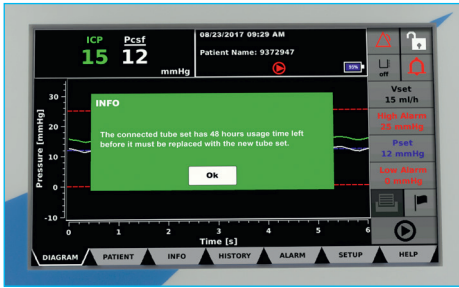
After calibration is complete, select the Tube Set radio button as the source for pressure readings displayed on the bedside monitor.

Tube Set
Parenchymal / Tip Sensor

LiquoGuard[®] 7 Tube Set Change

Changing the Tube Set

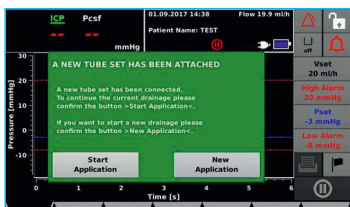
48 hours prior to expiration, *LiquoGuard*[®] 7 displays a notification on the display. No audio alarm is sounded. Additional visual warnings are displayed every 8 hours until the Tube Set expires.



90 Minutes prior to expiration, a visual warning is displayed and an audio alarm is sounded.



Changing the Tube Set



- 1 Remove Tube Set sensor cable from the *LiquoGuard*®7 monitor. Select Interrupt Application.
- 2 Close the 3-way stopcock to the patient's catheter.
- 3 Using sterile technique, disconnect the Expired Tube Set from the patient's catheter. Connect a NEW Sterile Tube Set to the patient's catheter.
- 4 Remove Expired Tube Set from pump, drainage bag from holder, and discard Expired Tube Set in biohazardous waste receptacle.
- 5 Load NEW Sterile Tube Set
➤ See Instructions on Pages 4-9
- 6 Start Application

LiquoGuard® 7

Advantages at a Glance

Simultaneously measures CSF pressure and drain cerebrospinal fluid under controlled conditions.

Application

Vascular surgery and anesthesiology

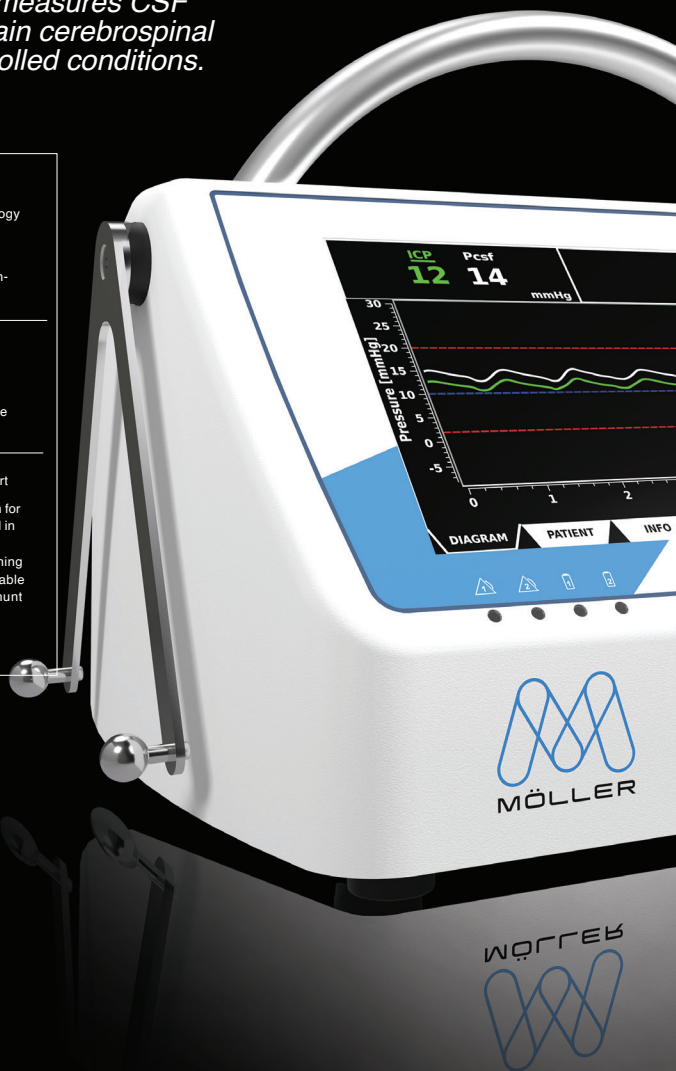
Perioperative monitoring of spinal perfusion pressure
Pressure and/or volume-controlled CSF drainage

Neurosurgery, emergencies

Ventricular drainage
Lumbar drainage
Pressure controlled drainage
Volume controlled drainage

Diagnostic and therapeutic support

Katzman Test (lumbar infusion for NPH diagnosis) (not approved in all countries)
Determination of shunt opening pressures and possible suitable shunt settings. Control of shunt settings and functionality
Tap Test





Lowered Risks

Significantly reduce accidental over and under drainage through direct fixation of the transducer to the patient.



Get Patients Moving

Early ambulation has been shown to reduce adverse events and decrease length of stay.



Fully Automated

Whether a pressure event, occluded, kinked, or disconnected catheter – the sophisticated alarm system informs you about issues when they occur.



Reduce Hospital Costs

Staff time is greatly reduced and the treatment of non-critical patients no longer needs to be done in the ICU.



Documented Treatment

Continuous monitoring and integrated alarm management during the course of treatment helps reduce the time nurses interact with the patient.

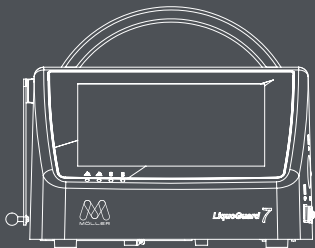


Caution:
Federal (USA) law restricts this device to sale by or on the order of a physician.
Rx only. Refer to product IFU for instructions, warnings, precautions, and contraindications.

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