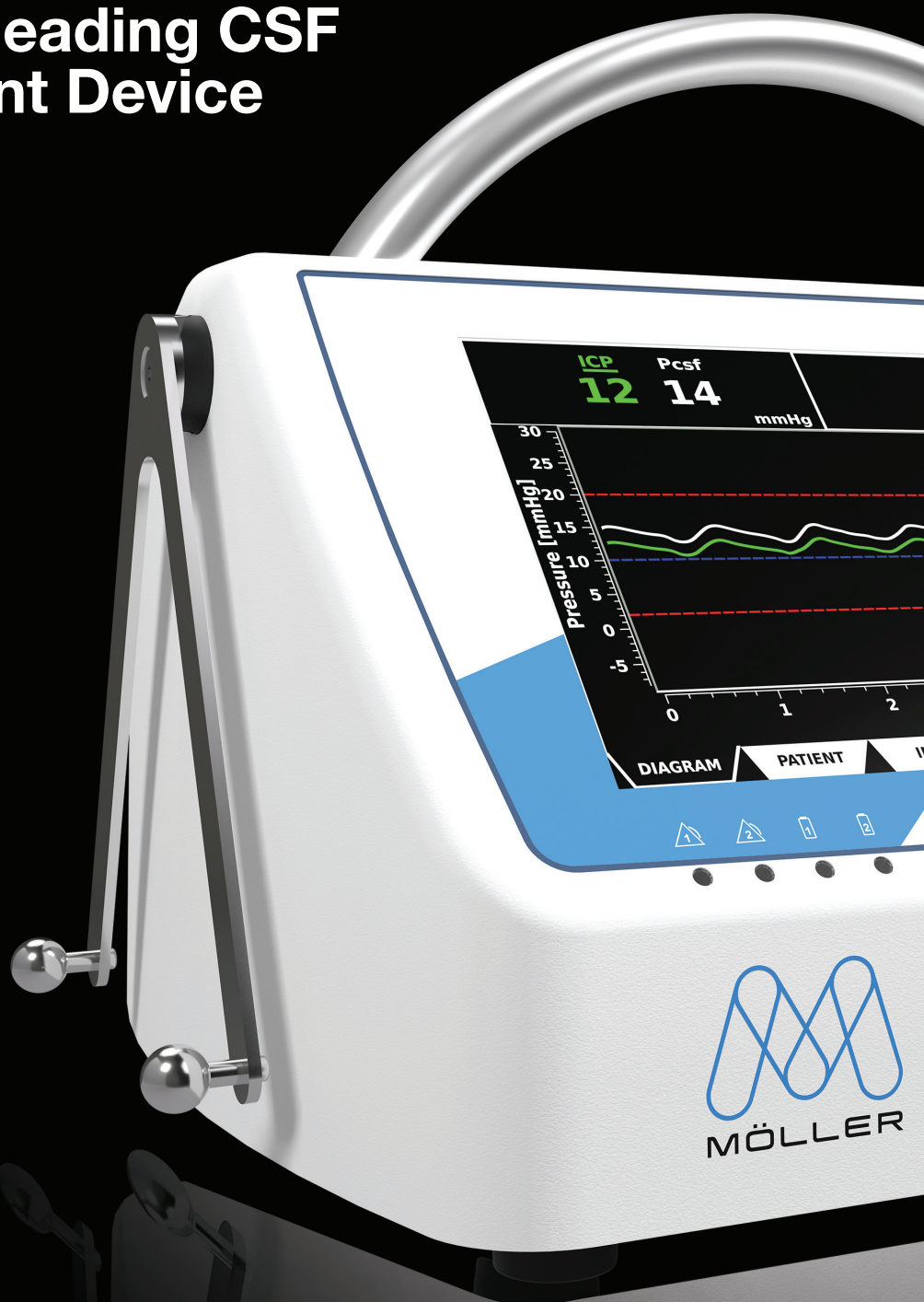


LiquoGuard[®]7 – CSF Management Device
The new way to manage CSF in Aortic Repairs

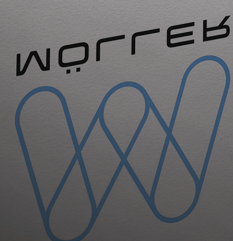
Amazing what's possible.

LiquoGuard®7
**Helps improve Spinal Perfusion and
reduce the risk of Spinal Cord Injury.**

LiquoGuard®7
**MÖLLER's leading CSF
management Device**



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





Technology

Documented Treatment

Patient Safety Concept

Comfort

Improves surgical and post-surgical safety

Full control of CSF pressure and flow

Application

Vascular surgery and Anesthesiology

Perioperative monitoring of neurological status

Pressure controlled CSF drainage

Neurosurgery, emergencies, and orthopedics

Ventricular drainage

Lumbar drainage

Pressure controlled drainage

Volume controlled drainage

Diagnostic and therapeutic support

Katzman Test (lumbar infusion for NPH diagnosis)

Determination of shunt opening pressures and possible suitable shunt settings

Control of shunt settings and functionality

Tap Test

Please note:

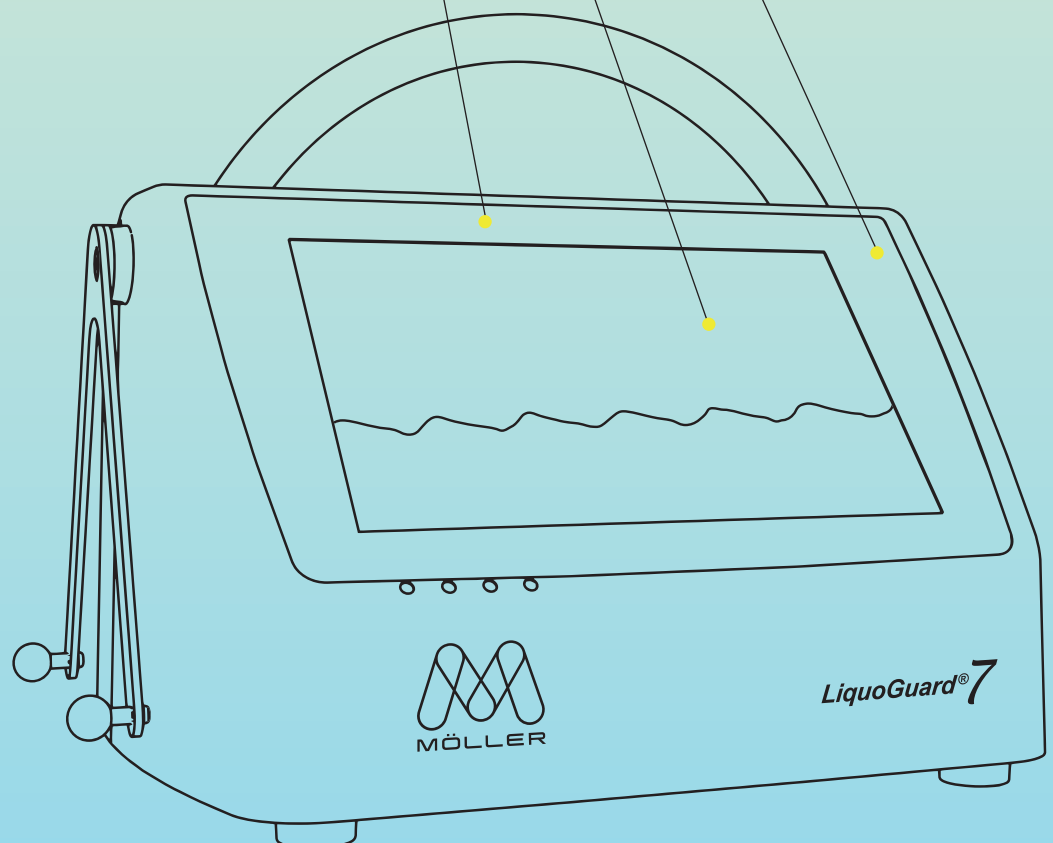
Indications are not approved in all countries.

LiquoGuard®7 **Automated CSF Management**

*Meticulous management
of lumbar drains
is required to help prevent uncontrolled
CSF drainage when using traditional
gravity-based drip chambers.*

*Continuous monitoring
and instant alerts
lower the burden of supervision which frees up
cardiovascular surgical teams to focus on other
critical patient needs, as well as not having to
worry about CSF drainage complications.*

*LiquoGuard®7 allows
early ambulation
for patients without interrupting CSF
drainage. This can help lead to faster
recoveries and reduced costs related
to staffing and extended patient stays.*



LiquoGuard®7

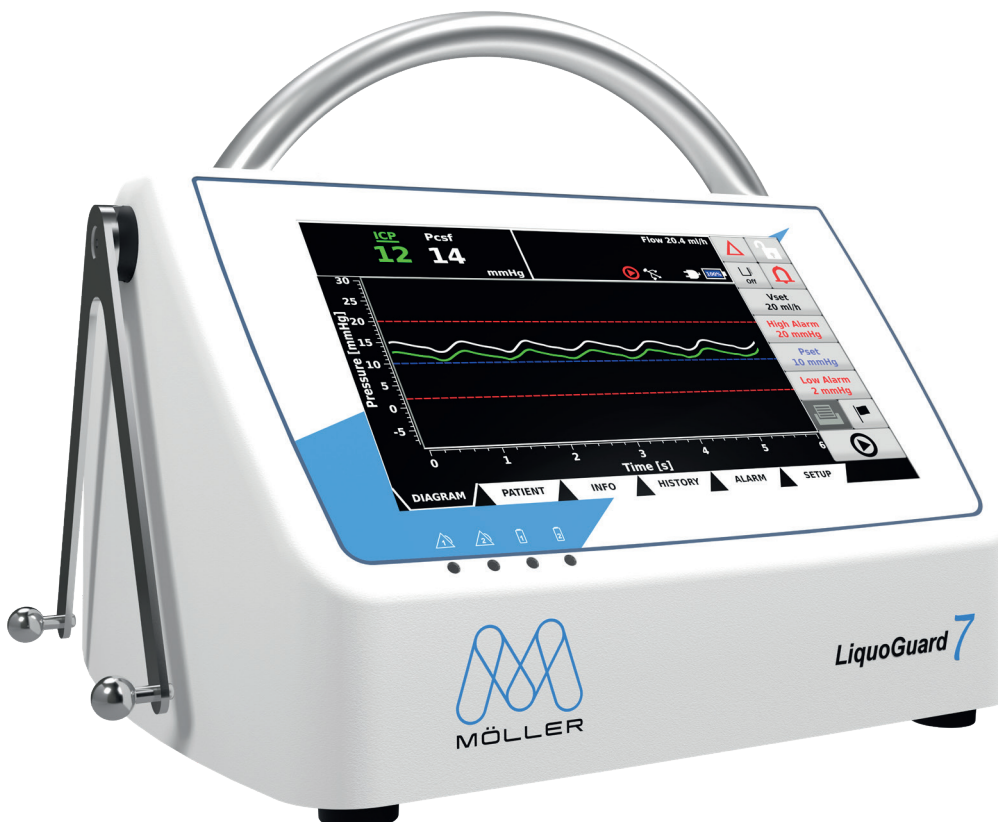
Product Information

LiquoGuard®7 helps cardiovascular surgical teams avoid common adverse events inherent with lumbar drains such as CSF over- or underdrainage and associated risks to patient safety.

Hospitals around the world use *LiquoGuard®7* – the leading automated CSF management device – to accurately measure CSF pressure and drain CSF simultaneously.

Technical data

Dimension (W x H x D)	238.1 x 145 x 212.8 mm
Weight	3.7 kg
Voltage	100-240 VAC
Battery operation	Up to 2h
Pressure sensor Accuracy	± 0.375 mmHg (range of 0-75 mmHg)
Drift	<1 mmHg in long-term tests
Display accuracy	± 2 mmHg
Interfaces	USB (Memory stick, printer), parenchymal sensor, patient monitor



LiquoGuard®7

Maintain a safe CSF Perfusion Pressure with ease

CSF drainage helps protect against spinal cord injury in thoracic and abdominal aortic aneurysm repairs. The main goal is to maintain a safe spinal perfusion pressure during and 24-48 hours after surgery.

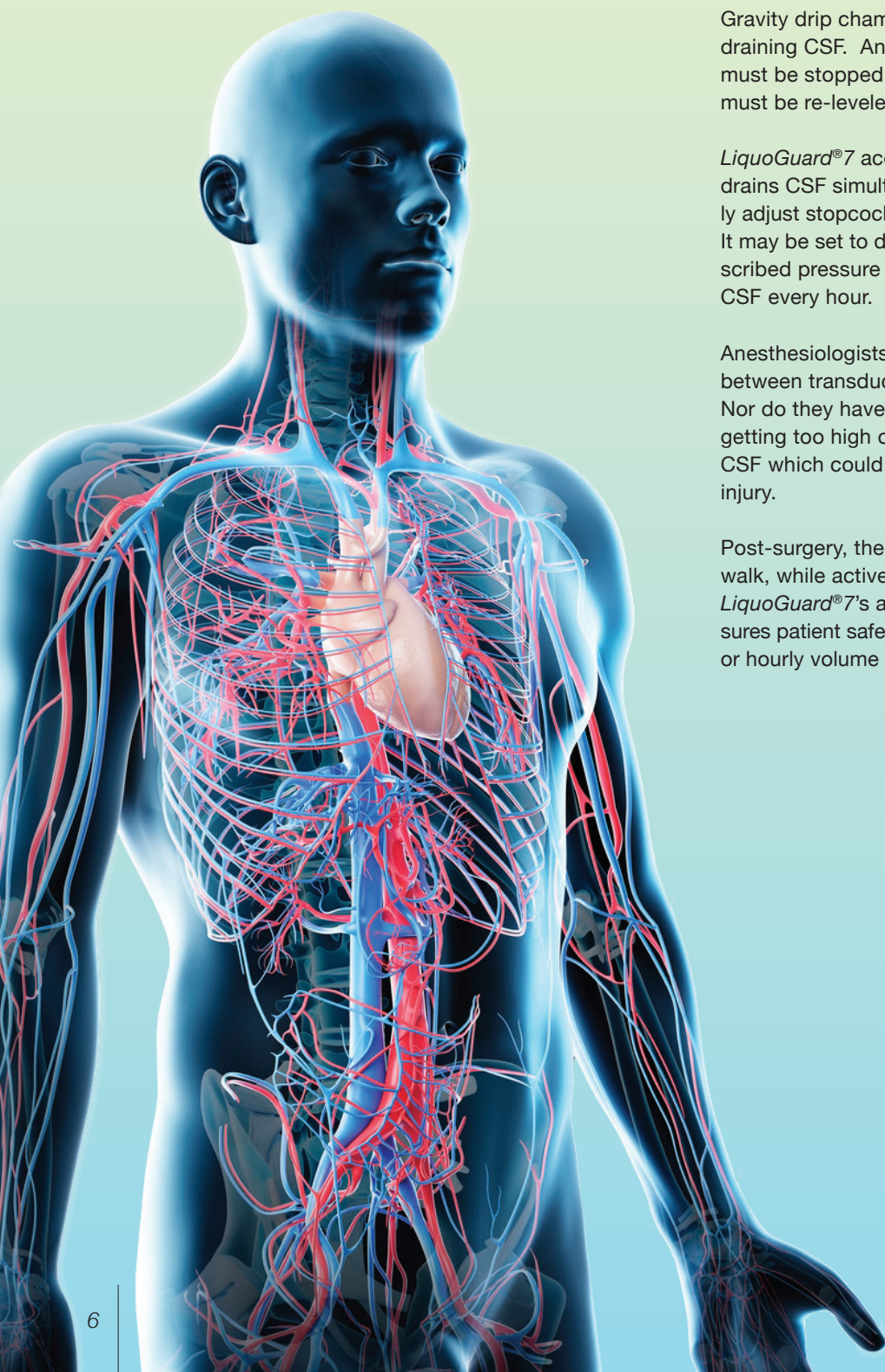
Gravity drip chambers cannot measure pressure while draining CSF. Anytime the patient moves, drainage must be stopped, and the drip chamber transducer must be re-leveled.

LiquoGuard®7 accurately measures pressure and drains CSF simultaneously without the need to manually adjust stopcocks, re-zero or re-level a transducer. It may be set to drain CSF based on a surgeon-prescribed pressure or set to drain a specific volume of CSF every hour.

Anesthesiologists and nurses no longer have to decide between transducing pressure or draining CSF. Nor do they have to worry about the pressure getting too high or too low, or the risk of “dumping” CSF which could result in permanent spinal cord injury.

Post-surgery, the patient can sit up in bed and/or walk, while actively draining CSF.

LiquoGuard®7's automation helps save time and ensures patient safety. Simply preset a desired pressure or hourly volume and *LiquoGuard®7* handles the rest.



LiquoGuard[®]7

Get Alerted to CSF Drainage Issues Immediately

When it comes to gravity-based drains, nurses are typically not aware there is a problem with the drainage process until after it occurs.

LiquoGuard[®]7 is designed to continually monitor for CSF drainage problems. It is a proactive system, unlike gravity-based drains which cannot actively monitor and detect issues.

LiquoGuard[®]7 will notify staff immediately when there is an occlusion, pressure discrepancies, catheter disconnections or leaks in the drainage line.

Clinicians know their lumbar drain patients are being monitored closely and consistently – and only need to intervene when the device senses a problem with the drainage process.

The device not only supervises the patient but also supervises itself. Any inconsistencies in the measured pressure leads to an alarm so the nurse will know immediately when a problem is detected.

Automated notifications:

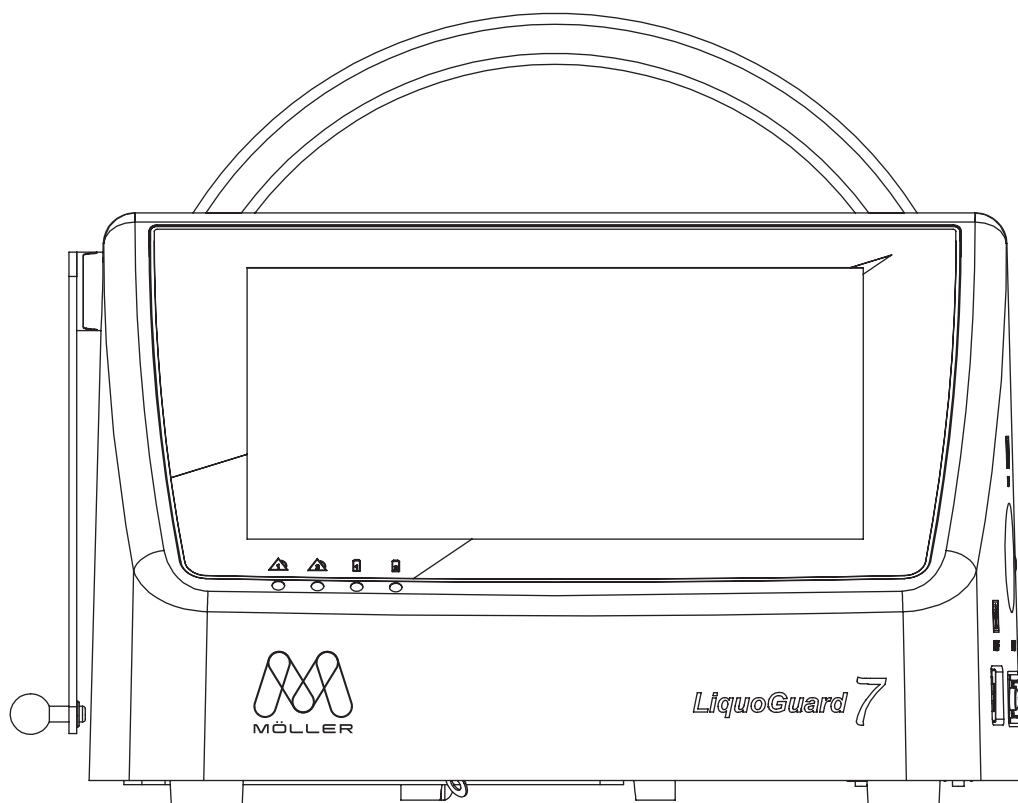
Occluded or kinked catheter

Too high or too low CSF pressure

Too rapid CSF drainage rate

Disconnected or broken catheter

Leak in drainage line



LiquoGuard®7

Get Patients Moving to Expedite Post-Surgical Recovery

Patients connected to gravity drains cannot change their position without the risk of adversely impacting the drainage process. Various studies have shown that immobile patients tend to have longer recovery times.

Early ambulation improves post-surgical outcomes. Automated CSF drainage technology with smart sensors makes this possible.

The drainage bag of the *LiquoGuard®7* is not height dependent and therefore helps reduce the potential for accidental over-drainage, a dangerous and under-reported risk of gravity drains.

LiquoGuard®7 controls the outflow of CSF mechanically, not by gravity. There is no need to open and close stopcocks to control CSF drainage. The patient may sit up or walk freely while actively draining without the risk of “dumping” CSF or having to depend on a nurse to adjust the stopcocks.



LiquoGuard®7 **Reduce Hospital Costs**

CSF management is not without its share of complications. Overdrainage can lead to paralysis.

These issues typically prolong the patient's stay and result in an increased cost to the hospital.

Investing in a smart CSF management device like *LiquoGuard®7* can help your hospital avoid extended stays by significantly reducing the potential for CSF drainage complications. Medical Team time and workload are significantly reduced and simplified.



LiquoGuard®7

Advantages at a Glance



Lowered Risks

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



Get Patients Moving

Earlier mobilization can result in faster patient recovery and improve the healing process.



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 recordings of the course of treatment and integrated alarm management significantly reduce the amount of personnel required.

LiquoGuard®7 automated CSF management technology is easy to program and manage.

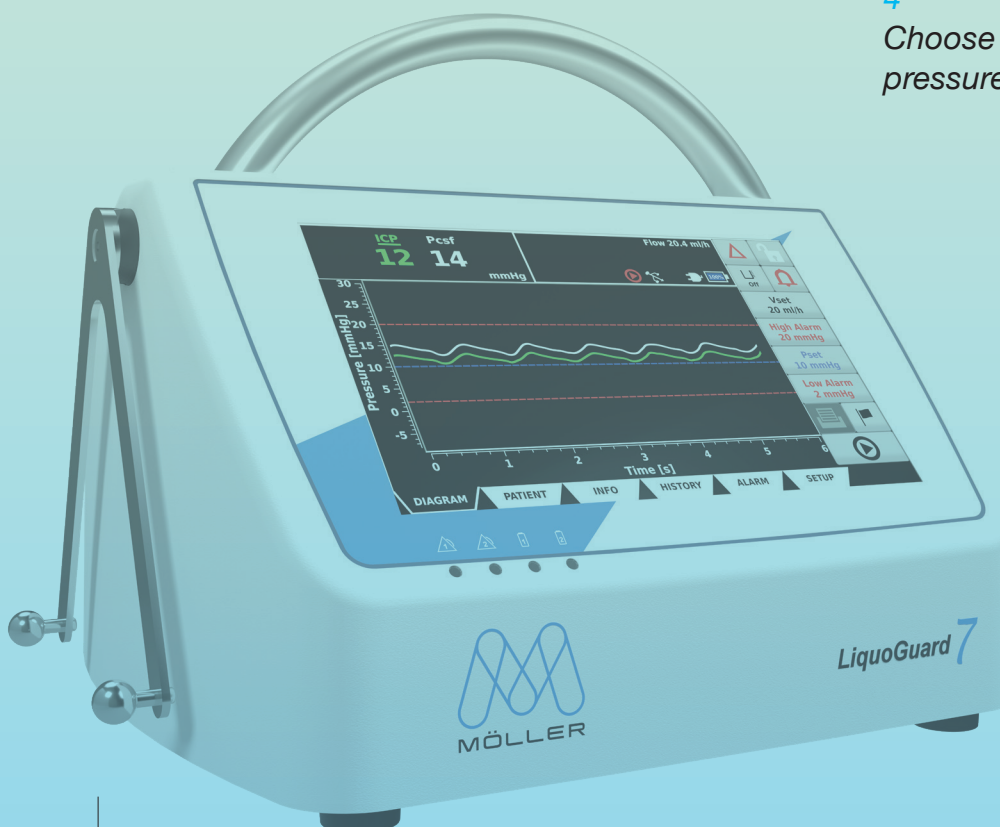
There is no need to:

1
*Level a transducer
each time the patient moves*

2
Manipulate stopcocks

3
*Keep the patient still while
draining to lower the risk of
over-draining CSF*

4
*Choose between measuring
pressure or draining CSF*



LiquoGuard®7 helps professionals prevent handling mistakes, which greatly improves patient safety and leads to faster recoveries

"CSF drainage has become a safe adjunct to our complex aortic repairs since we have started using routinely the LiquoGuard®7 device.

It is a mandatory tool in the armamentarium to prevent spinal cord ischaemia, and the very accurate monitoring of pressure and volumes reduces the risks associated with CSF drainage."

Stephan Haulon, MD

Vascular Surgeon
Aortic Centre Hôpital Marie Lannelongue
Université Paris Sud



"Cerebrospinal fluid drainage is strongly recommended as a spinal cord protective strategy in open and endovascular thoracic aortic repair for patients at high risk of spinal cord ischemic injury. Automatic drainage systems such as LiquoGuard®7 allow the speed and amount of cerebrospinal fluid drained to be programmed in a controlled and safe way according to cerebrospinal fluid pressure, and guarantee appropriate spinal perfusion."

Vincente Riambau, MD

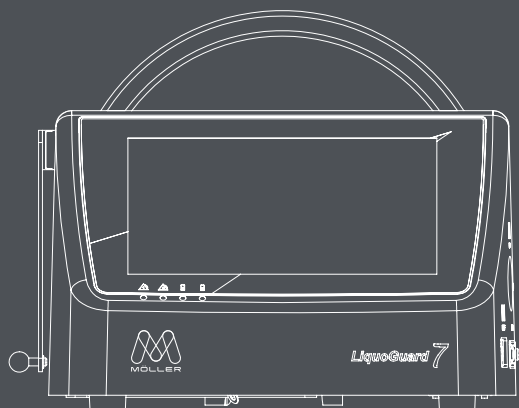
Chief of the Vascular Surgery Division





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