



Lumboperitoneal Shunts

**GRAVITATIONAL VALVE TECHNOLOGY
FOR LUMBOPERITONEAL SHUNTING**

WE UNDER STAND

The Gravity of the Situation





TOGETHER FOR A BETTER LIFE WITH HYDROCEPHALUS

We have a long and intensive partnership with B. Braun in the field of neurosurgery. We are driven by a common vision: to improve the lives of hydrocephalus patients around the world with innovative solutions.

Our Strong Partner in Neurosurgery:

B | BRAUN
SHARING EXPERTISE

www.bbraun.com

"Our partnership with B. Braun has always been based on trust, expertise and mutual respect on an equal footing. This was already the case in 1999, when we began our joint journey with B. Braun as an innovative start-up. Today, this partnership also means friendship for us with so many long-standing companions worldwide."

Christoph Miethke, CEO and founder of
Christoph Miethke GmbH & Co. KG.



OUR PARTNERSHIP WITH B. BRAUN

What connects us is an intensive and simultaneously a very special partnership with B. Braun.

Together we have been successfully selling MIETHKE products in more than 60 countries worldwide for many years.

Our cooperation is an exciting combination of B. Braun's almost 185 years of expertise as one of the world's leading medical technology companies and our agility as an innovative company and technology leader for gravity-based shunt technology. Above all, however, it is supported by a large number of colleagues, product experts and international contacts with a shared understanding of values.

We listen carefully to the voices of patients and neurosurgeons around the world and constantly question our own status quo. We passionately research, learn, develop and share our knowledge.



MARY, 22

"My hydrocephalus makes me grow."

TOGETHER FOR A BETTER LIFE WITH HYDROCEPHALUS

We share a common vision: to improve the lives of hydrocephalus patients around the world with innovative solutions. What drives us every day is our responsibility for people. With quality, responsibility, scientific and meticulous work, proximity, diversity and mutual respect, we want to meet this responsibility together and worldwide every day.

This is not just a promise but a self-conception of who we are.

Our Strong Partner in Neurosurgery:

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SHARING EXPERTISE

www.bbraun.com

TREATMENT OF HYDROCEPHALUS

NEED FOR IMPROVEMENT



TREATMENT OF HYDROCEPHALUS

Since the 1960s, the main surgical strategy in managing hydrocephalus is the placement of shunts. Ventriculoperitoneal (VP) shunts are still the surgical standard, but lumboperitoneal (LP) shunts are an increasingly important alternative. However, these conventional shunt types have specific high failure rates, each with its own typical causes. Almost every fourth patient is affected by complications (1, 2) with no difference between conventional and programmable valves (3, 4).

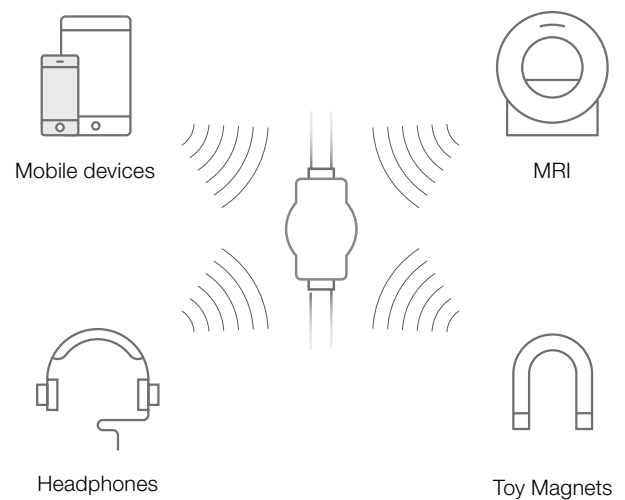
Mechanical failure, such as obstruction and valve malfunction, followed immediately by overdrainage, remain the most common causes of multiple shunt revisions (5). Revisions are burdensome for patients and are accompanied by unavoidable perioperative risks.

We believe that the current treatment options for hydrocephalus are not definitive and improvement is required.

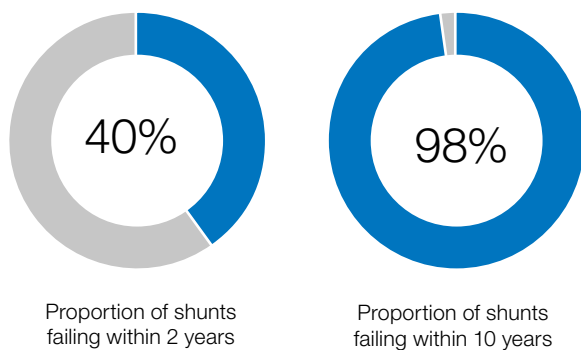


ACCIDENTAL REPROGRAMMING

As the optimal pressure setting of adjustable valves is of great importance for the patient, the accidental reprogramming of adjustable valves by external magnetic fields, e.g., from smartphones, is a cause of concern and leads to great uncertainty among patients and doctors (6-10).

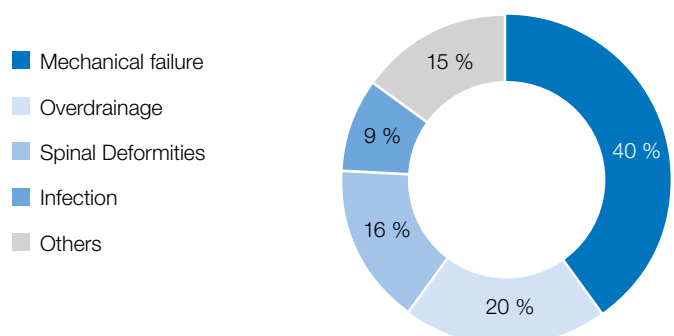


HIGH FAILURE RATES



» High failure rates overshadow the effectiveness of shunts (1). «

COMPLICATIONS LP-SHUNTING (5)



» About one in four patients experiences at least one complication (2). «

GRAVITATIONAL VALVES BY MIETHKE

DEVELOPED TO ENSURE SAFETY



BE CONFIDENT!

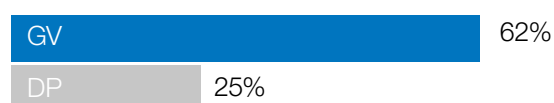
Gravitational shunts provide neurosurgeons with a possibility to address the posture-dependent effects of gravity, with positive clinical outcomes for the patient and a significant reduction of overdrainage events (11-13).

GRAVITATIONAL VALVES (GV) IMPROVE PATIENT OUTCOMES COMPARED TO DIFFERENTIAL PRESSURE VALVES (DP) (14).

Symptom improvement >2 points on Kiefer-Scale



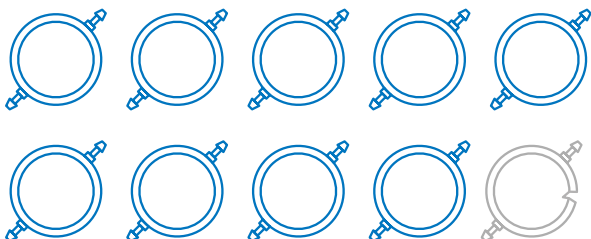
Daily improvement rated good / very good on Black-Scale



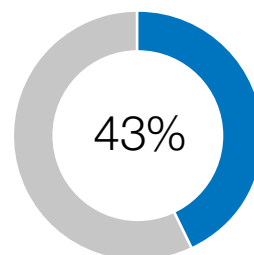


REDUCE COMPLICATIONS! REDUCE REVISIONS!

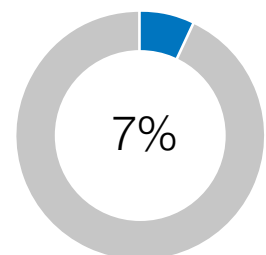
Clinical studies have shown that MIETHKE gravitational devices reduce the risk of revisions (15-19) and overdrainage complications (8, 13).



» Valve survival rates up to 90% at 12 months (17). «



Overdrainage rate
with **differential**
pressure valves (16)



Overdrainage rate
with **gravitational**
valves (16)

» Implanting a gravitational valve avoids one additional overdrainage complication in about every third patient (16). «

GRAVITATIONAL VALVES BY MIETHKE

DEVELOPED TO ENSURE SAFETY

AVOID MECHANICAL FAILURE!

All MIETHKE valves are manufactured with high precision from titanium. The small valves have aligned flow paths, rigid housing unsusceptible to subcutaneous pressure and high MRI- and biocompatibility.

DON'T LET MAGNETIC FIELDS BOTHER YOU!

The "Active-Lock mechanism" protects programmable MIETHKE valves against reprogramming by magnetic fields of up to 3 Tesla (20).

MIETHKE GRAVITATIONAL VALVES



Made from Titanium
for high MRI- and
biocompatibility



Protected against
reprogramming
up to 3 Tesla



Small valve



Rigid housing
unsusceptible to
subcutaneous pressure





BENEFIT FROM PRIMARY IMPLANTATION (21)!

22%

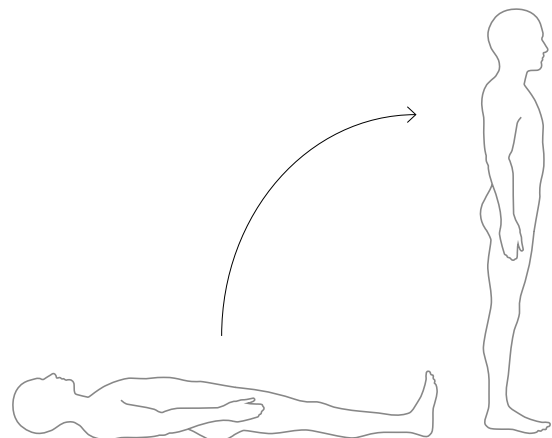
» higher survival of gravitational valves after primary vs. secondary implantation. «

GET IT RIGHT THE FIRST TIME!

Early treatment with the optimal therapy is important for patients with hydrocephalus (21, 22) and can also help to avoid shunt replacements and associated perioperative risks.

OPTIMIZE – DON'T COMPROMISE!

Gravitational shunts allow for the prevention of overdrainage in the standing position without compromising the pressure setting for the supine position. The optimal opening pressure for each patient can be set both for the upright and the supine position – without needing to compromise.



» With gravitational valves the optimal pressure for both supine and upright position can be set. «

HYDROCEPHALUS THERAPY

LUMBOPERITONEAL SHUNT AS AN ALTERNATIVE

MIETHKE develops innovative gravitational valves with low opening pressures in supine position and simultaneous high overdrainage protection in upright position, that improve patient outcome compared to conventional differential pressure valves (14, 16). This reflects our philosophy to provide the best possible treatment of hydrocephalus.

VP-shunt placement is the most common treatment, whereas LP shunts are less commonly used due to initial reports of high rates of complications (23).

Recent international studies provide evidence that LP-shunting is equally as effective as VP-shunting for normal pressure hydrocephalus (NPH) and is associated with comparable complication rates (24-27); without statistically significant difference between the two groups (25, 26, 28). As a matter of fact LP-shunting has become an increasingly popular treatment option (24, 26-31).

Early treatment with the optimal therapy is essential (32). Hydrostatic pressure is created in every patient in an upright position driven by gravity. VP- and LP shunts are in principle equally at risk of overdrainage in standing position, if no resistance compensation is considered, such as gravitational valves. Thus, avoiding overdrainage is just as important for LP- as it is for VP shunts (27).

Modern gravitational valve technology from MIETHKE, which has proven its superiority in overdrainage prevention for VP shunts, can now also be used for LP shunts using the *MIETHKE Valve Board* (15, 20).



ADJUSTABLE GRAVITATIONAL VALVES AND ACCESSORIES

Meeting important requirements of neurosurgeons and patients

- Valve technology for the special requirements of a life with hydrocephalus: mobility, growth, changes in the course of disease
- Superior clinical outcome of gravitational valves: survival rates, improvement in patient symptoms
- Reliable overdrainage protection
- MRI conditional up to 3 Tesla
- Safe from unintentional adjustment by everyday magnets such as smartphones, toys, induction cookers and safety barriers at the airports

MIETHKE Valve Board: FLEXIBILITY AND SAFETY IN APPLICATION

- Various treatment options: *M.blue*, *proGAV 2.0*, *GAV 2.0* and *SHUNTASSISTANT 2.0*
- Different configurations available: with and without *CONTROL RESERVOIR*
- Various placement options: e.g. dorsal, paramedian; ventral, anterolateral; thoracic
- Firm and reliable fixation for axial alignment of gravitational valves
- Integrated kinking protection of catheters
- Intuitive, secure and comfortable instruments

POTENTIAL BENEFITS FROM LP SHUNTS (29, 33)



No cranial surgery,
minimally invasive



Small postoperative
scars



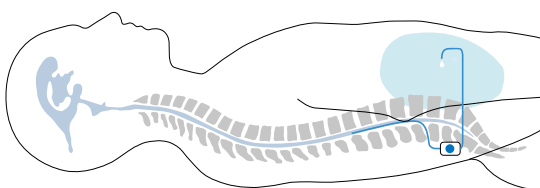
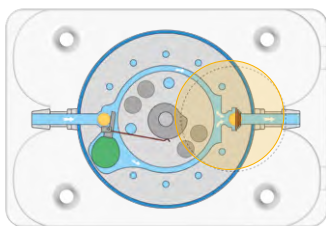
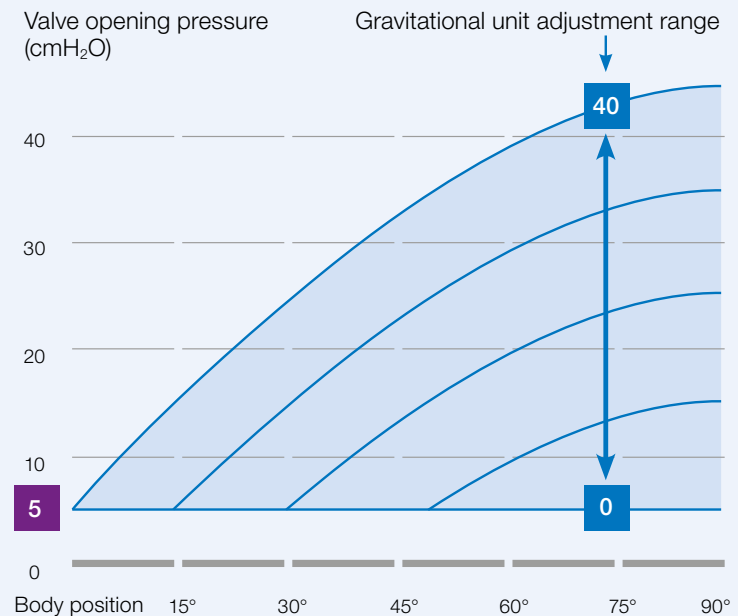
No head shaving

HYDROCEPHALUS THERAPY

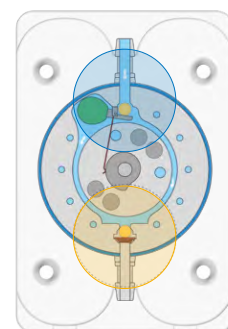
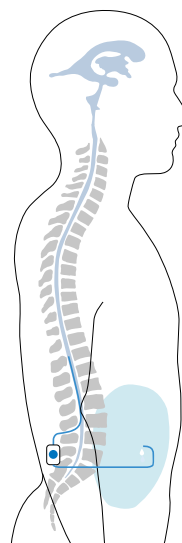
FUNCTIONALITY OF GRAVITATIONAL VALVES AND PRESSURE LEVEL RECOMMENDATION

Example of the adjustable gravitational pressure range of an *M.blue LP* with a differential pressure unit of 5 cmH₂O

MIETHKE GVs are hydrocephalus valves operating in a position-dependent manner. GV consists of a gravitational unit and a differential pressure unit. The combination of these two units adjusts the opening pressure automatically depending on what position the patient is in, thus countering the risk of possible overdrainage complications, particularly when the patient is in an upright and active position.



Only the differential pressure unit is active when the patient is supine.



Gravitational unit and differential pressure unit work together when the patient is standing.

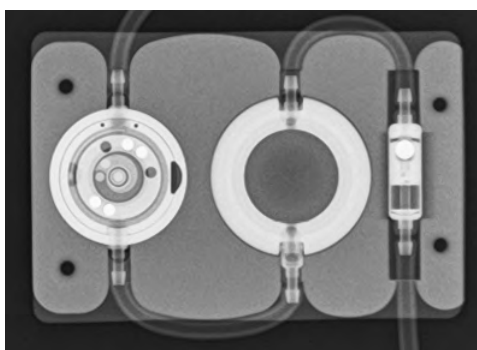
STANDARD PRESSURE LEVELS*

The choice of the appropriate pressure level depends on several factors, including age, degree of activity, size and stature of the patient.

Patient	Selection of pressure levels		Opening pressure in total	
	differential pressure unit 	gravitational unit 	horizontal position 	upright position 
Adults	5	25	5	30
Adults < 1.60 m	5	20	5	25
Adults > 1.80 m	5	30	5	35
Adults from 65 years	5	20	5	25
Adults from 65 years < 1.60 m	5	15	5	20
Adults from 65 years > 1.80 m	5	25	5	30

All indicated pressure levels are in cmH₂O.

* This is a non-binding recommendation for the attending physician. According to his diagnosis, the physician decides each case independently, without instructions and individually. The stated values consider the current scientific knowledge up to 02/2021



X-ray image of Valve Board with proGAV 2.0 LP right with CONTROL RESERVOIR, (pressure level of proGAV 2.0 - 20 cmH₂O, pressure level of SHUNTASSISTANT 2.0 - 20 cmH₂O)



X-ray recognition and product information can be found in the free MIETHKE App.

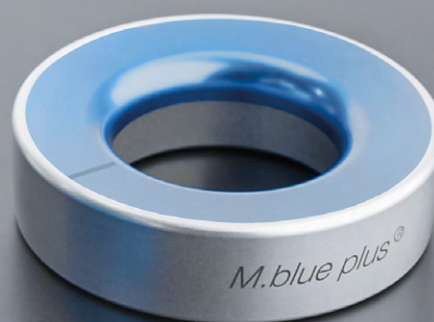
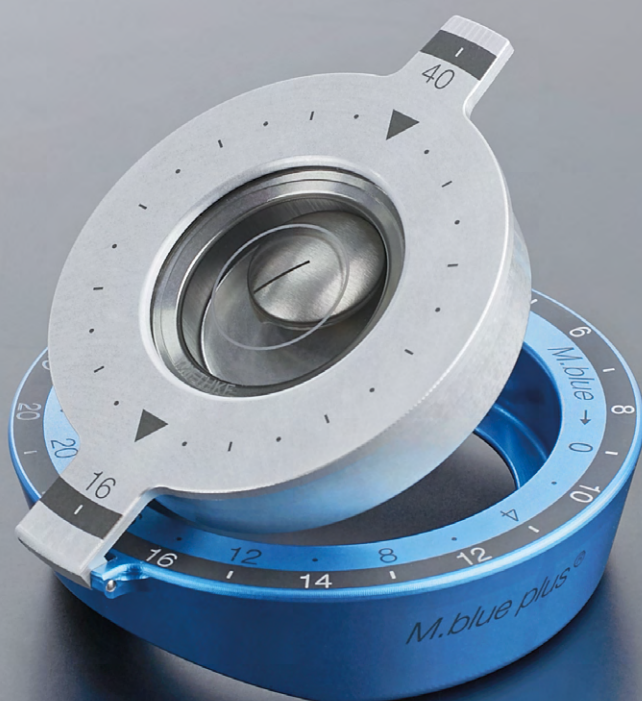


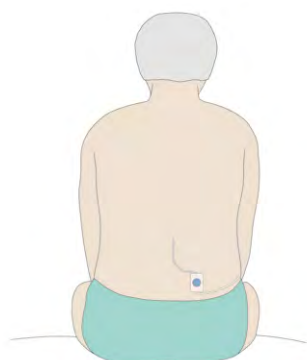
HYDROCEPHALUS THERAPY

VALVE ADJUSTMENT IN LUMBOPERITONEAL SHUNTS

SOFT TOUCH INSTRUMENT FUNCTIONALITY USER-FRIENDLY ADJUSTMENT AND VERIFICATION

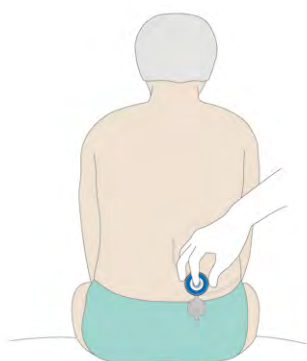
Innovative *M.blue plus Instruments* allow users to measure, verify and adjust the pressure level on *M.blue's* adjustable gravitational unit (0-40 cmH₂O) as well as the pressure level on the adjustable differential pressure unit *proGAV 2.0*. The instruments offer simple steps for the physician and make the adjustment process comfortable for patients.





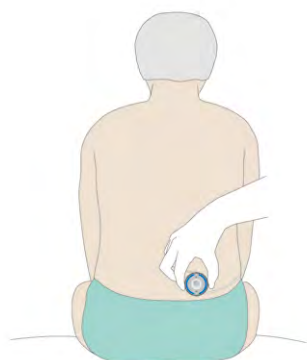
ADJUSTMENT OF MIETHKE LP SHUNTS

Patient after LP-shunting in a sitting and slightly bent downward position for shunt valve adjustment.



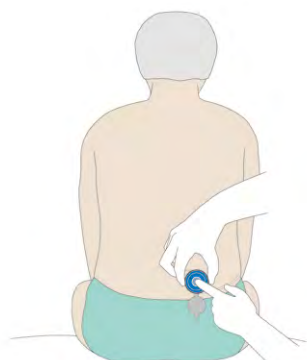
LOCATE

Locate valve by palpating the area with your finger through the open *M.blue plus Compass*.



CHECK

Close *M.blue plus Compass* and use the floater to lock location and read current valve opening pressure settings.

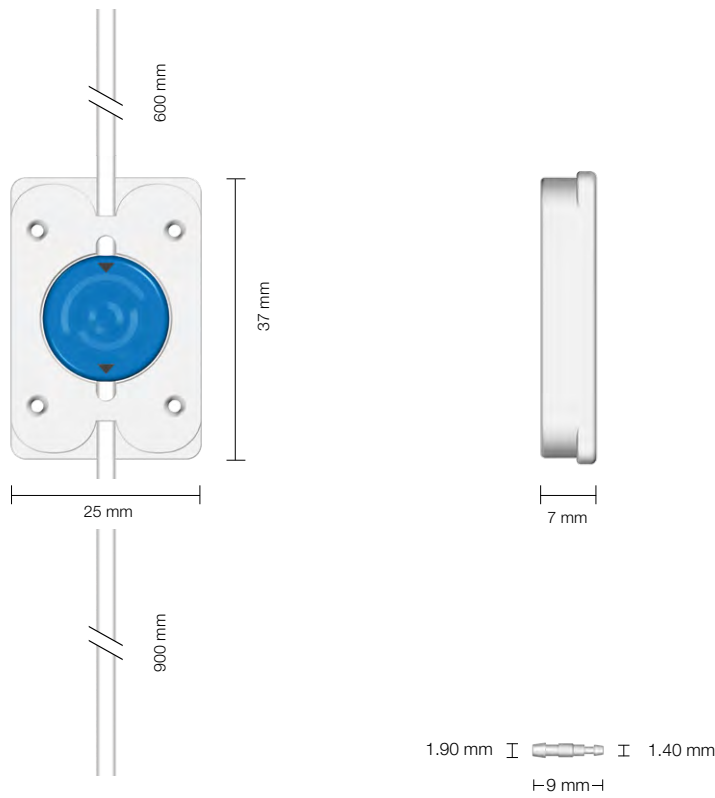


ADJUST

With the help of the inserted *M.blue plus Adjustment Ring* the valve opening pressure can easily be set to the desired level. After setting the valve opening pressure, it is advisable to double-check the pressure level settings.

M.blue® lumbar

- + Valve Board
premounted with:
- + M.blue
with Proximal Catheter, 600 mm
and Distal Catheter, 900 mm
- + Titanium Connector, step-down



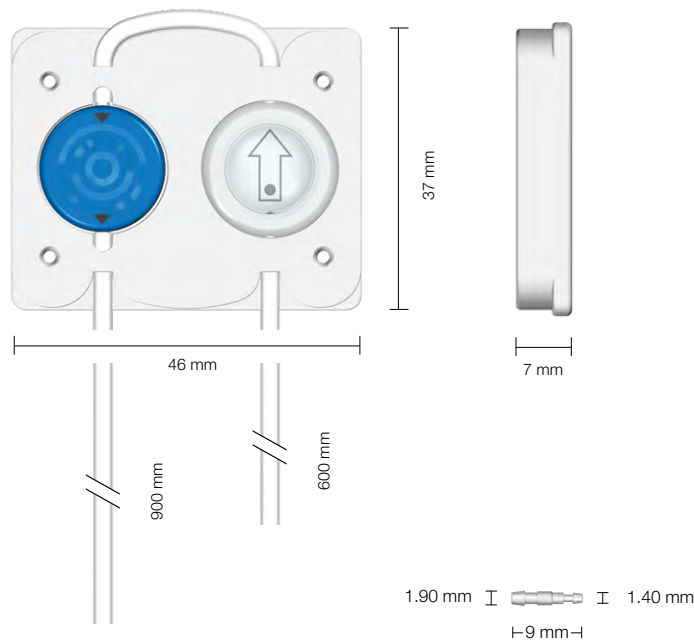
Catheter: d_i = 1.2 mm, d_o = 2.5 mm

Art. no	Differential pressure unit	Adjustable gravitational unit (preset to 20 cmH ₂ O)
FX850T	0 cmH ₂ O	0 - 40 cmH ₂ O
FX851T	5 cmH ₂ O	0 - 40 cmH ₂ O
FX852T	10 cmH ₂ O	0 - 40 cmH ₂ O
FX853T	15 cmH ₂ O	0 - 40 cmH ₂ O

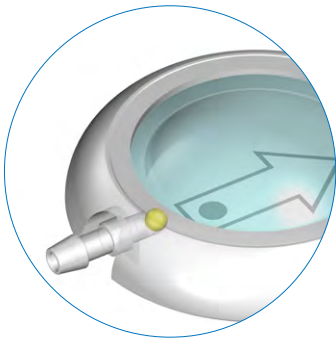
M.blue[®]

with CONTROL RESERVOIR, lumbar left

- + Valve Board premounted with:
- + M.blue with CONTROL RESERVOIR, Proximal Catheter, 600 mm and Distal Catheter, 900 mm
- + Titanium Connector, step-down
- + An additional valve in the inlet of the CONTROL RESERVOIR makes it possible to pump cerebrospinal fluid in the direction of shunting only, allowing inspection of both the distal shunting section as well as the Lumbar Catheter.



Catheter: d_i = 1.2 mm, d_o = 2.5 mm



CONTROL RESERVOIR

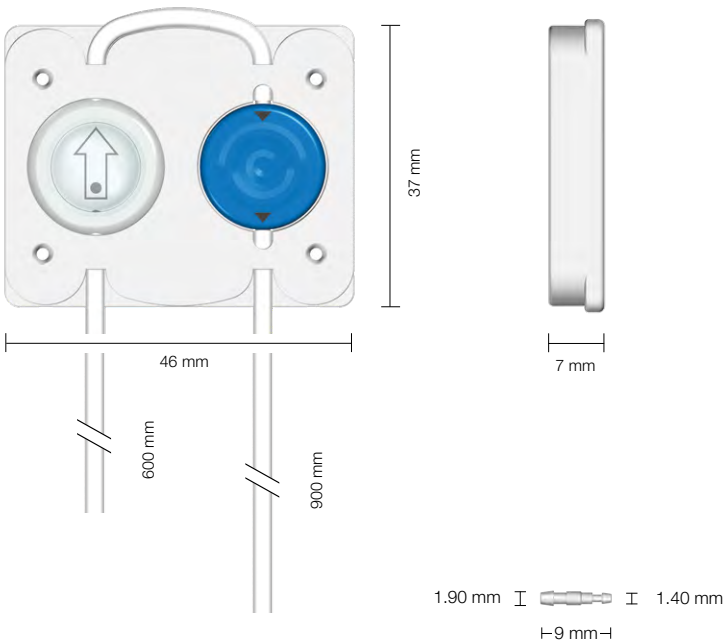
Art. no	Differential pressure unit	Adjustable gravitational unit (preset to 20 cmH ₂ O)
FX854T	0 cmH ₂ O	0 - 40 cmH ₂ O
FX855T	5 cmH ₂ O	0 - 40 cmH ₂ O
FX856T	10 cmH ₂ O	0 - 40 cmH ₂ O
FX857T	15 cmH ₂ O	0 - 40 cmH ₂ O

M.blue®

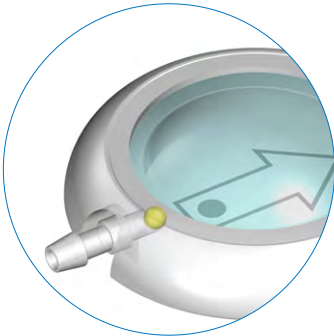
with CONTROL RESERVOIR, lumbar right



- + Valve Board premounted with:
- + M.blue with CONTROL RESERVOIR, Proximal Catheter, 600 mm and Distal Catheter, 900 mm
- + Titanium Connector, step-down
- + An additional valve in the inlet of the CONTROL RESERVOIR makes it possible to pump cerebrospinal fluid in the direction of shunting only, allowing inspection of both the distal shunting section as well as the Lumbar Catheter.



Catheter: $d_i = 1.2\text{ mm}$, $d_o = 2.5\text{ mm}$

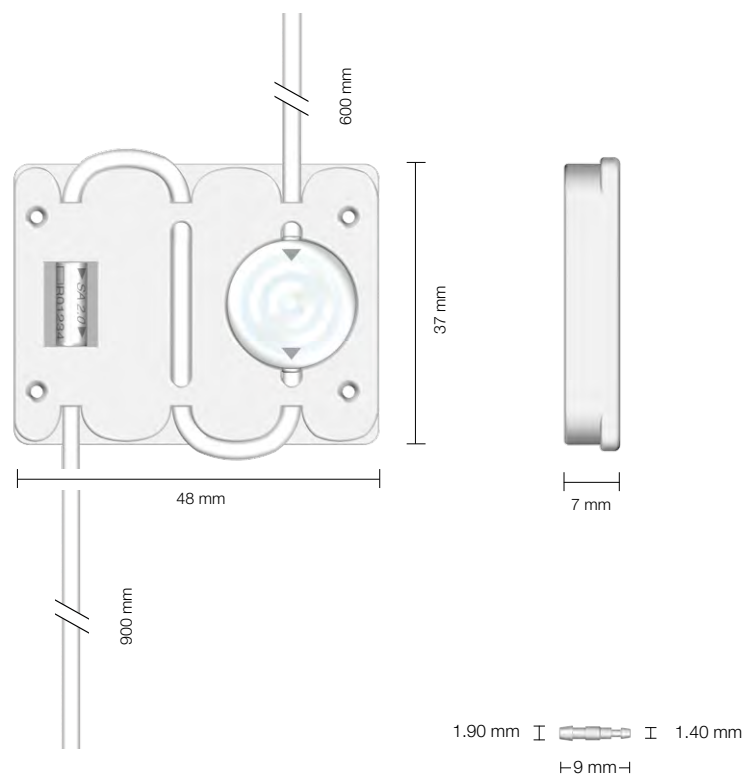


CONTROL RESERVOIR

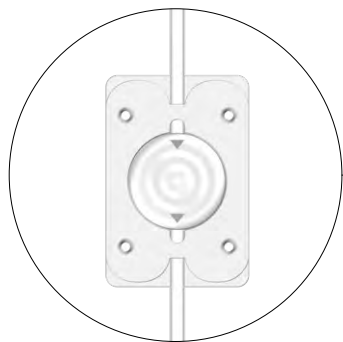
Art. no	Differential pressure unit	Adjustable gravitational unit (preset to 20 cmH ₂ O)
FX858T	0 cmH ₂ O	0 - 40 cmH ₂ O
FX859T	5 cmH ₂ O	0 - 40 cmH ₂ O
FX860T	10 cmH ₂ O	0 - 40 cmH ₂ O
FX861T	15 cmH ₂ O	0 - 40 cmH ₂ O

proGAV[®] 2.0 lumbar left

- + Valve Board
premounted with:
- + proGAV 2.0
with Proximal Catheter, 600 mm
and Distal Catheter, 900 mm
- + Titanium Connector, step-down

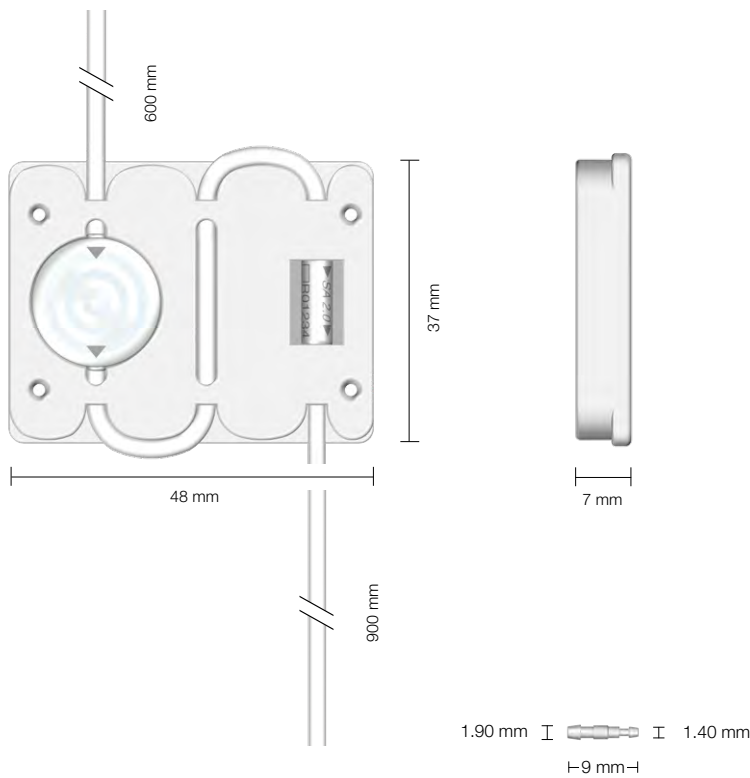


Catheter: $d_i = 1.2\text{ mm}$, $d_o = 2.5\text{ mm}$

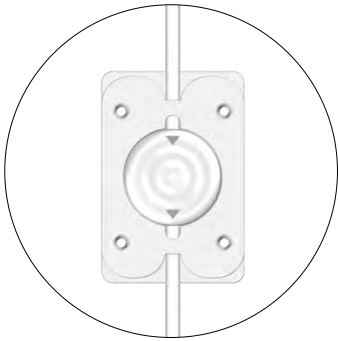


Art. no	Adjustable differential pressure unit (preset to 5 cmH ₂ O)	Gravitational unit
FX700T	0 - 20 cmH ₂ O	-
FX701T	0 - 20 cmH ₂ O	10 cmH ₂ O
FX702T	0 - 20 cmH ₂ O	15 cmH ₂ O
FX703T	0 - 20 cmH ₂ O	20 cmH ₂ O
FX704T	0 - 20 cmH ₂ O	25 cmH ₂ O
FX705T	0 - 20 cmH ₂ O	30 cmH ₂ O
FX706T	0 - 20 cmH ₂ O	35 cmH ₂ O

- + Valve Board
premounted with:
- + proGAV 2.0
with Proximal Catheter, 600 mm
and Distal Catheter, 900 mm
- + Titanium Connector, step-down



Catheter: $d_i = 1.2\text{ mm}$, $d_o = 2.5\text{ mm}$

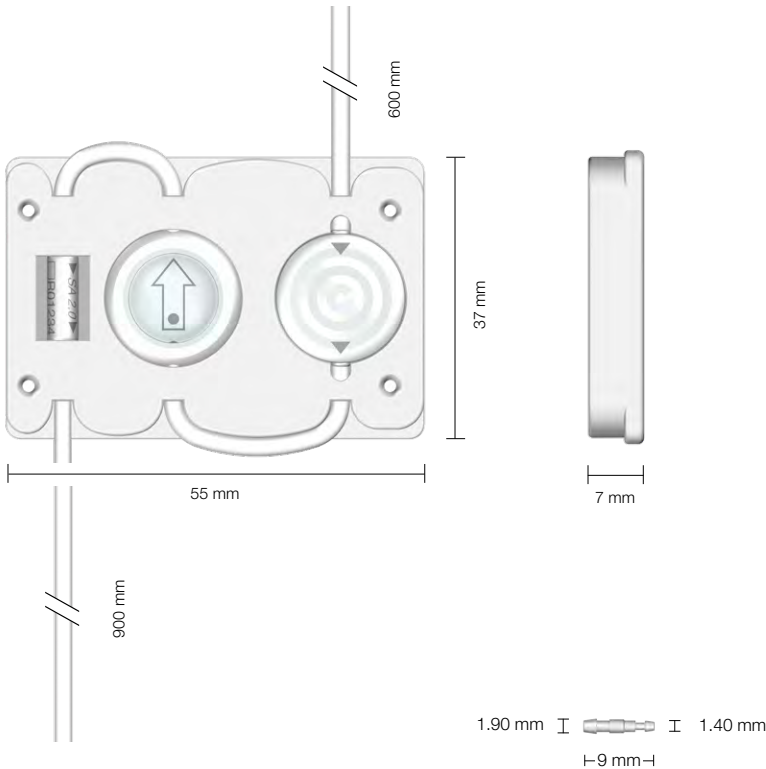


Art. no	Adjustable differential pressure unit (preset to 5 cmH ₂ O)	Gravitational unit
FX700T	0 - 20 cmH ₂ O	-
FX707T	0 - 20 cmH ₂ O	10 cmH ₂ O
FX708T	0 - 20 cmH ₂ O	15 cmH ₂ O
FX709T	0 - 20 cmH ₂ O	20 cmH ₂ O
FX710T	0 - 20 cmH ₂ O	25 cmH ₂ O
FX711T	0 - 20 cmH ₂ O	30 cmH ₂ O
FX712T	0 - 20 cmH ₂ O	35 cmH ₂ O

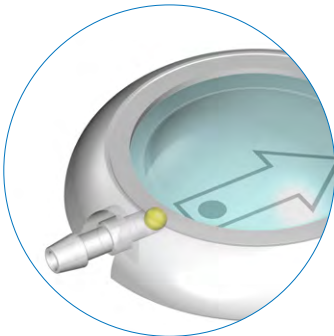
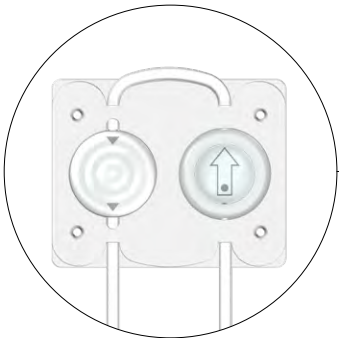
proGAV® 2.0

with CONTROL RESERVOIR, lumbar left

- + Valve Board premounted with:
- + proGAV 2.0 with CONTROL RESERVOIR, Proximal Catheter, 600 mm and Distal Catheter, 900 mm
- + Titanium Connector, step-down
- + An additional valve in the inlet of the CONTROL RESERVOIR makes it possible to pump cerebrospinal fluid in the direction of shunting only, allowing inspection of both the distal shunting section as well as the Lumbar Catheter.



Catheter: d_i = 1.2 mm, d_o = 2.5 mm



CONTROL RESERVOIR

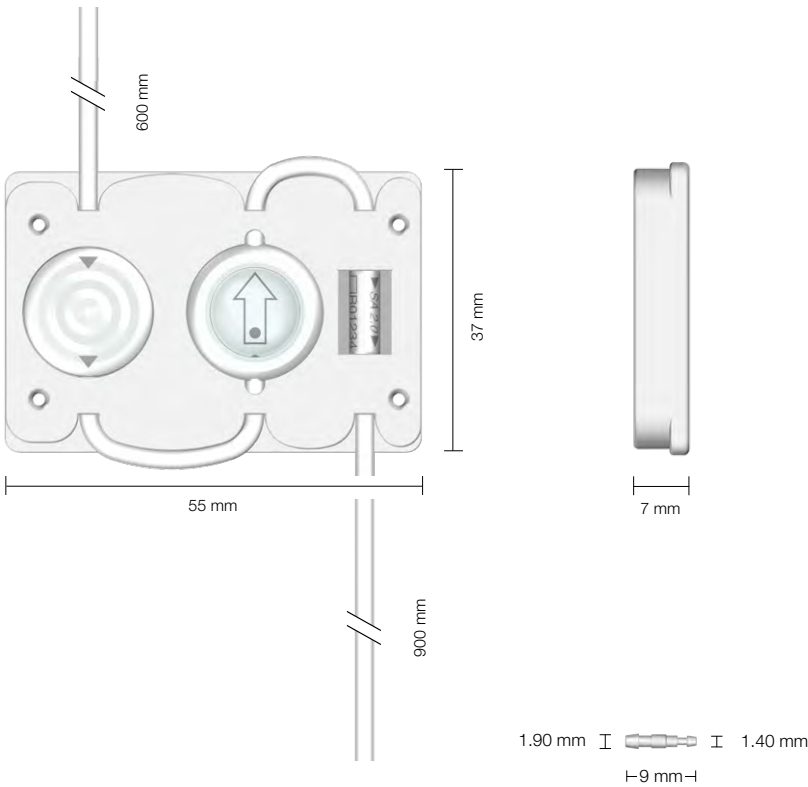
Art. no	Adjustable differential pressure unit (preset to 5 cmH ₂ O)	Gravitational unit
FX713T	0 - 20 cmH ₂ O	-
FX714T	0 - 20 cmH ₂ O	10 cmH ₂ O
FX715T	0 - 20 cmH ₂ O	15 cmH ₂ O
FX716T	0 - 20 cmH ₂ O	20 cmH ₂ O
FX717T	0 - 20 cmH ₂ O	25 cmH ₂ O
FX718T	0 - 20 cmH ₂ O	30 cmH ₂ O
FX719T	0 - 20 cmH ₂ O	35 cmH ₂ O

proGAV[®] 2.0

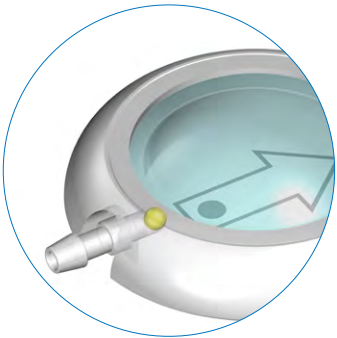
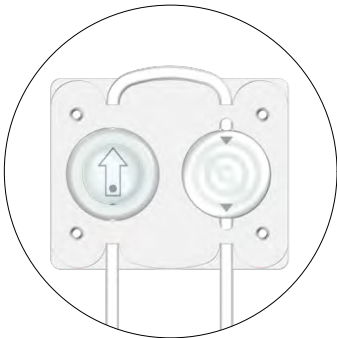
with CONTROL RESERVOIR, lumbar right



- + Valve Board premounted with:
- + proGAV 2.0 with CONTROL RESERVOIR, Proximal Catheter, 600 mm and Distal Catheter, 900 mm
- + Titanium Connector, step-down
- + An additional valve in the inlet of the CONTROL RESERVOIR makes it possible to pump cerebrospinal fluid in the direction of shunting only, allowing inspection of both the distal shunting section as well as the Lumbar Catheter.



Catheter: d_i = 1.2 mm, d_o = 2.5 mm

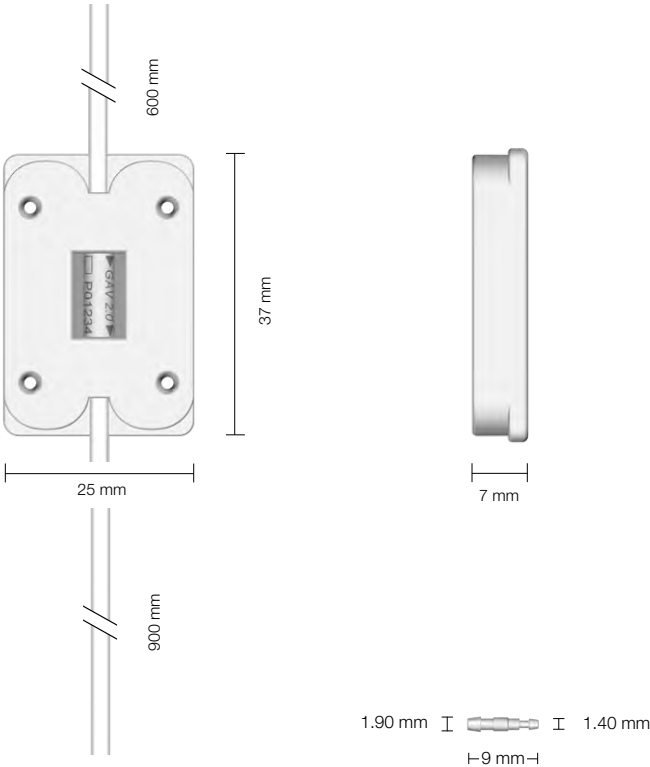


CONTROL RESERVOIR

Art. no	Adjustable differential pressure unit (preset to 5 cmH ₂ O)	Gravitational unit
FX720T	0 - 20 cmH ₂ O	-
FX721T	0 - 20 cmH ₂ O	10 cmH ₂ O
FX722T	0 - 20 cmH ₂ O	15 cmH ₂ O
FX723T	0 - 20 cmH ₂ O	20 cmH ₂ O
FX724T	0 - 20 cmH ₂ O	25 cmH ₂ O
FX725T	0 - 20 cmH ₂ O	30 cmH ₂ O
FX726T	0 - 20 cmH ₂ O	35 cmH ₂ O

GAV[®] 2.0 lumbar

- + Valve Board
premounted with:
- + GAV 2.0
with Proximal Catheter, 600 mm
and Distal Catheter, 900 mm
- + Titanium Connector, step-down



Catheter: d_i = 1.2 mm, d_o = 2.5 mm

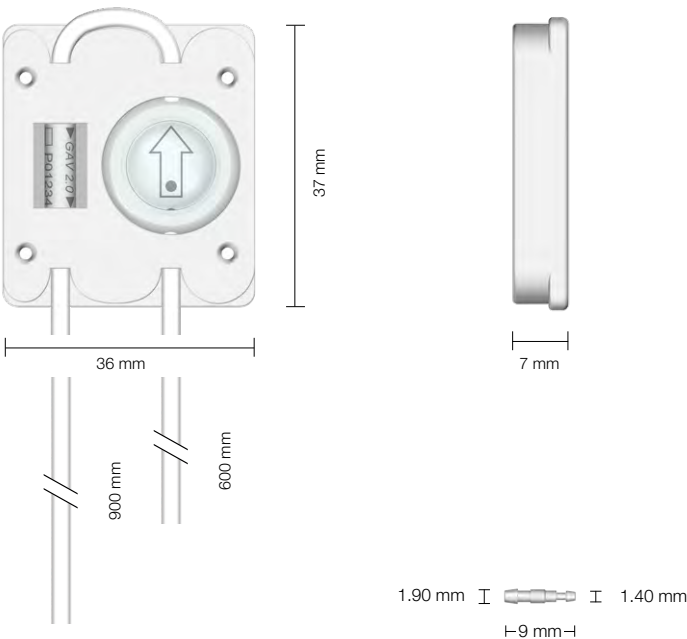
Art. no	Lying	Upright
FX182T	5 cmH ₂ O	20 cmH ₂ O
FX183T	5 cmH ₂ O	25 cmH ₂ O
FX184T	5 cmH ₂ O	30 cmH ₂ O
FX185T	5 cmH ₂ O	35 cmH ₂ O
FX186T	10 cmH ₂ O	25 cmH ₂ O
FX187T	10 cmH ₂ O	30 cmH ₂ O

GAV[®] 2.0

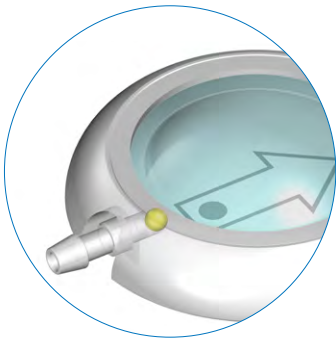
with CONTROL RESERVOIR, lumbar left

COMING SOON

- + Valve Board premounted with:
- + GAV 2.0 with CONTROL RESERVOIR, Proximal Catheter, 600 mm and Distal Catheter, 900 mm
- + Titanium Connector, step-down
- + An additional valve in the inlet of the CONTROL RESERVOIR makes it possible to pump cerebrospinal fluid in the direction of shunting only, allowing inspection of both the distal shunting section as well as the Lumbar Catheter.



Catheter: d_i = 1.2 mm, d_o = 2.5 mm



CONTROL RESERVOIR

Art. no	Lying	Upright
FX188T	5 cmH ₂ O	20 cmH ₂ O
FX189T	5 cmH ₂ O	25 cmH ₂ O
FX190T	5 cmH ₂ O	30 cmH ₂ O
FX191T	5 cmH ₂ O	35 cmH ₂ O
FX192T	10 cmH ₂ O	25 cmH ₂ O
FX193T	10 cmH ₂ O	30 cmH ₂ O

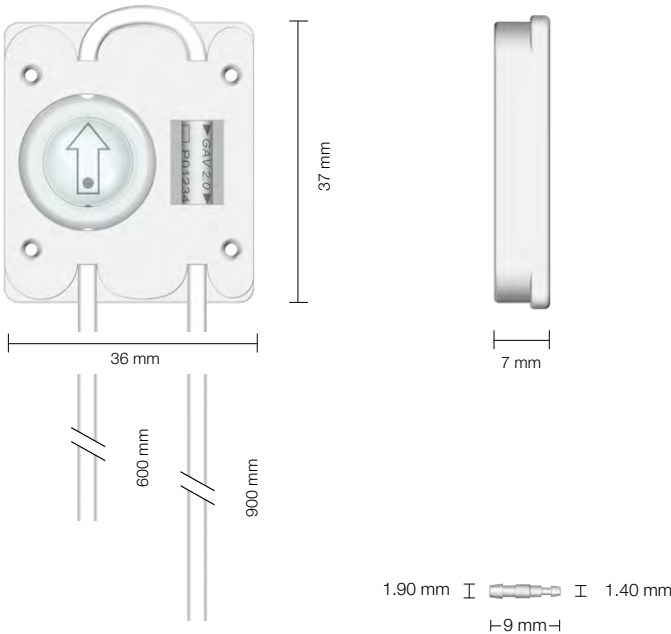
GAV[®] 2.0

with CONTROL RESERVOIR, lumbar right

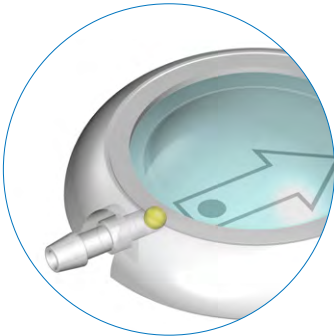
MIETHKE

COMING SOON

- + Valve Board premounted with:
- + GAV 2.0 with CONTROL RESERVOIR, Proximal Catheter, 600 mm and Distal Catheter, 900 mm
- + Titanium Connector, step-down
- + An additional valve in the inlet of the CONTROL RESERVOIR makes it possible to pump cerebrospinal fluid in the direction of shunting only, allowing inspection of both the distal shunting section as well as the Lumbar Catheter.



Catheter: d_i = 1.2 mm, d_o = 2.5 mm

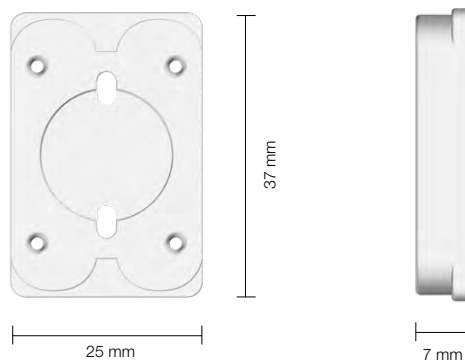


CONTROL RESERVOIR

Art. no	Lying	Upright
FX194T	5 cmH ₂ O	20 cmH ₂ O
FX195T	5 cmH ₂ O	25 cmH ₂ O
FX196T	5 cmH ₂ O	30 cmH ₂ O
FX197T	5 cmH ₂ O	35 cmH ₂ O
FX198T	10 cmH ₂ O	25 cmH ₂ O
FX199T	10 cmH ₂ O	30 cmH ₂ O

M.blue® Board

- + Valve Board for
M.blue or proGAV 2.0

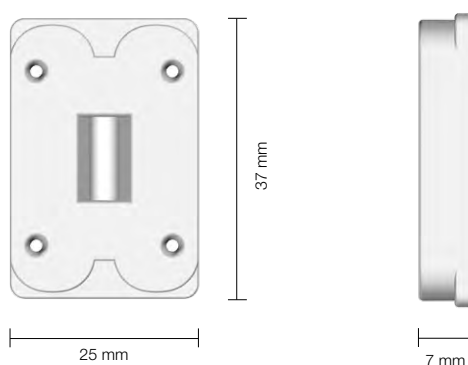


Art. no

FV087P

GAV® 2.0 Board

- + Valve Board for GAV 2.0
or SHUNTASSISTANT 2.0

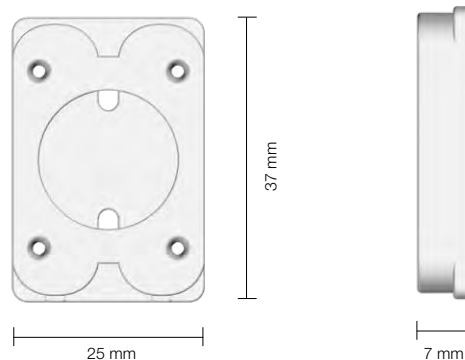


Art. no

FV088P

COMING SOON

+ Valve Board for
CONTROL RESERVOIR



Art. no

FV089P

GAV[®] 2.0 LP, straight

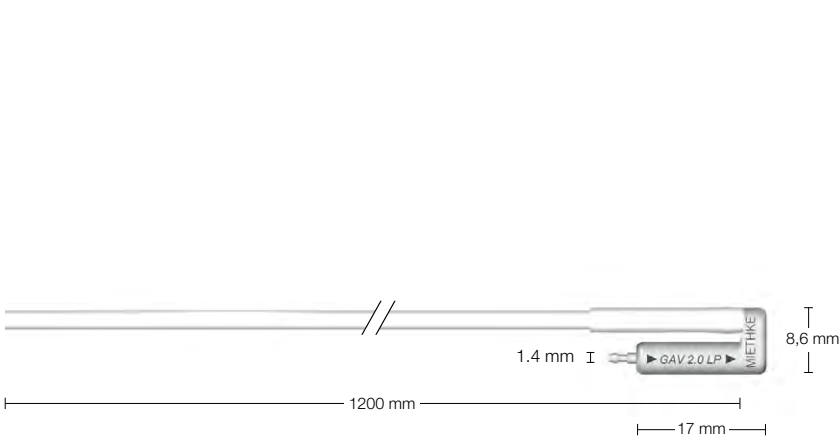
+ GAV 2.0 LP, straight
with Distal Catheter



Valve: d_o = 4.2 mm
 Connector: d_o= 1.4 mm
 for connection with lumbar catheter
 Connector: d_o= 1.9 mm
 preverably used with
 Catheter: d_i = 1.2 mm, d_o= 2.5 mm

Art. no	Lying	Upright
FX222T	5 cmH ₂ O	20 cmH ₂ O
FX223T	5 cmH ₂ O	25 cmH ₂ O
FX224T	5 cmH ₂ O	30 cmH ₂ O
FX225T	5 cmH ₂ O	35 cmH ₂ O
FX226T	10 cmH ₂ O	25 cmH ₂ O
FX226T	10 cmH ₂ O	30 cmH ₂ O

+ GAV 2.0 LP, U-formed
with Distal Catheter

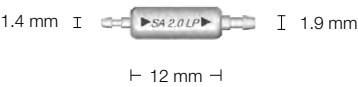


Valve: $d_o = 4.2$ mm
Connector: $d_o = 1.4$ mm
for connection with lumbar catheter
Connector: $d_o = 1.9$ mm
preferably used with
Catheter: $d_i = 1.2$ mm, $d_o = 2.5$ mm

Art. no	Lying	Upright
FX228T	5 cmH ₂ O	20 cmH ₂ O
FX229T	5 cmH ₂ O	25 cmH ₂ O
FX230T	5 cmH ₂ O	30 cmH ₂ O
FX231T	5 cmH ₂ O	35 cmH ₂ O
FX232T	10 cmH ₂ O	25 cmH ₂ O
FX233T	10 cmH ₂ O	30 cmH ₂ O

SHUNTASSISTANT 2.0 LP, straight

+ SHUNTASSISTANT 2.0 LP, straight



Valve: $d_o = 4.2$ mm
Connector: $d_o = 1.4$ mm
for connection with lumbar catheter
Connector: $d_o = 1.9$ mm
preferably used with
Catheter: $d_i = 1.2$ mm, $d_o = 2.5$ mm

Art. no	Opening pressure
FX106T	10 cmH ₂ O
FX107T	15 cmH ₂ O
FX108T	20 cmH ₂ O
FX109T	25 cmH ₂ O
FX110T	30 cmH ₂ O
FX111T	35 cmH ₂ O

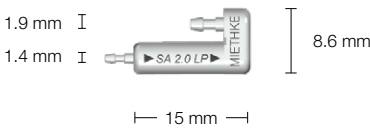
+ SHUNTASSISTANT 2.0 LP, straight
with Distal Catheter



Valve: $d_o = 4.2$ mm
Connector: $d_o = 1.4$ mm
for connection with lumbar catheter
Connector: $d_o = 1.9$ mm
Catheter: $d_i = 1.2$ mm, $d_o = 2.5$ mm

Art. no	Opening pressure
FX124T	10 cmH ₂ O
FX125T	15 cmH ₂ O
FX126T	20 cmH ₂ O
FX127T	25 cmH ₂ O
FX128T	30 cmH ₂ O
FX129T	35 cmH ₂ O

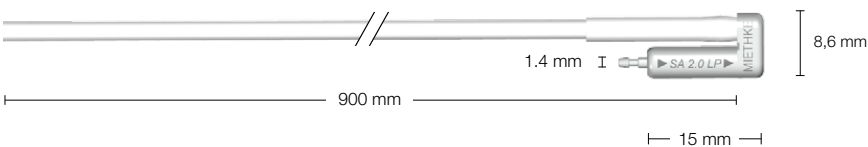
+ SHUNTASSISTANT 2.0 LP, U-formed



Valve: $d_o = 4.2$ mm
Connector: $d_o = 1.4$ mm
for connection with lumbar catheter
Connector: $d_o = 1.9$ mm
preferably used with
Catheter: $d_i = 1.2$ mm, $d_o = 2.5$ mm

Art. no	Opening pressure
FX112T	10 cmH ₂ O
FX113T	15 cmH ₂ O
FX114T	20 cmH ₂ O
FX115T	25 cmH ₂ O
FX116T	30 cmH ₂ O
FX117T	35 cmH ₂ O

+ SHUNTASSISTANT 2.0 LP, U-formed
with Distal Catheter



Valve: $d_o = 4.2$ mm
Connector: $d_o = 1.4$ mm
for connection with lumbar catheter
Connector: $d_o = 1.9$ mm
Catheter: $d_i = 1.2$ mm, $d_o = 2.5$ mm

Art. no	Opening pressure
FX130T	10 cmH ₂ O
FX131T	15 cmH ₂ O
FX132T	20 cmH ₂ O
FX133T	25 cmH ₂ O
FX134T	30 cmH ₂ O
FX135T	35 cmH ₂ O

DUALSWITCH VALVE LP

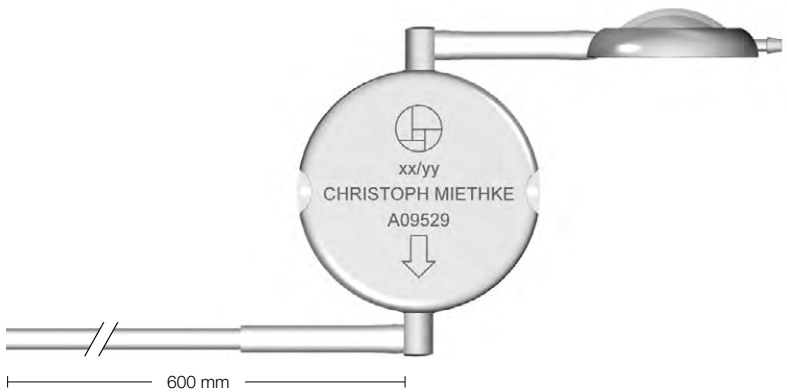
- + Single valve with two connections



Connector: d_o= 1.4 mm
for connection with lumbar catheter
Connector: d_o= 1.9 mm

Art. no	Lying	Upright
FX373T	5 cmH ₂ O	30 cmH ₂ O
FX374T	5 cmH ₂ O	40 cmH ₂ O
FX127T	10 cmH ₂ O	30 cmH ₂ O
FX128T	10 cmH ₂ O	40 cmH ₂ O
FX129T	10 cmH ₂ O	50 cmH ₂ O

- + Valve with integrated
Prechamber LP and
integrated *Distal Catheter*

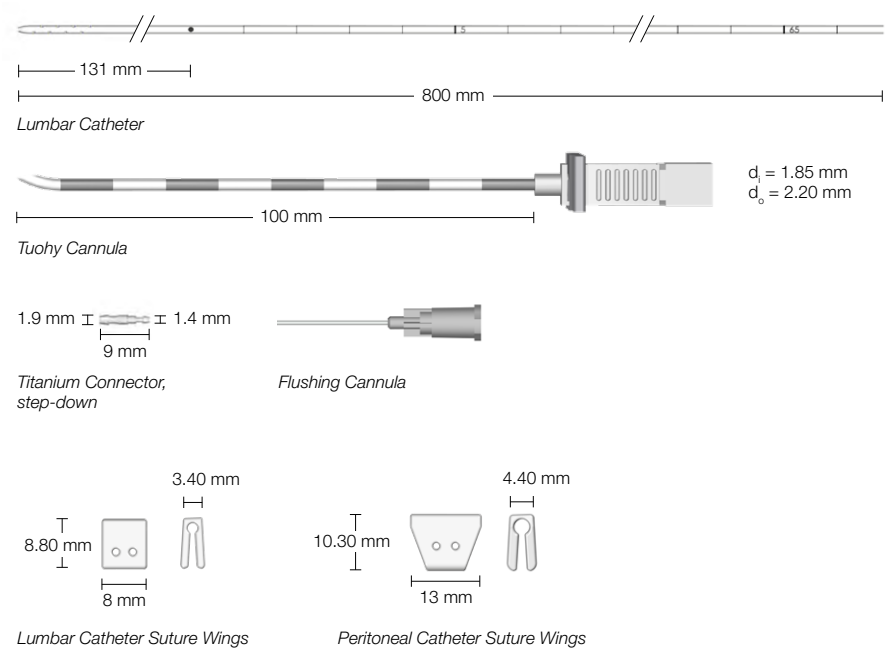


Connector: $d_o = 1.4\text{ mm}$
for connection with lumbar catheter
Connector: $d_o = 1.9\text{ mm}$
Catheter: $d_i = 1.2\text{ mm}$, $d_o = 2.5\text{ mm}$

Art. no	Lying	Upright
FX382T	5 cmH ₂ O	30 cmH ₂ O
FX383T	5 cmH ₂ O	40 cmH ₂ O
FX163T	10 cmH ₂ O	30 cmH ₂ O
FX164T	10 cmH ₂ O	40 cmH ₂ O

Lumbar Catheter Set, Open Tip

- + Lumbar Catheter made of radiopaque silicone with barium sulfate
- + Lumbar Catheter with 16 drainage holes, in four opposite rows
- + Length markings on both sides of the Lumbar Catheter
- + Length markings aligned to the Tuohy Cannula
- + Suture Wings made of radiopaque silicone with barium sulfate
- + Titanium Connector, step down for connecting standard catheter to Lumbar Catheter



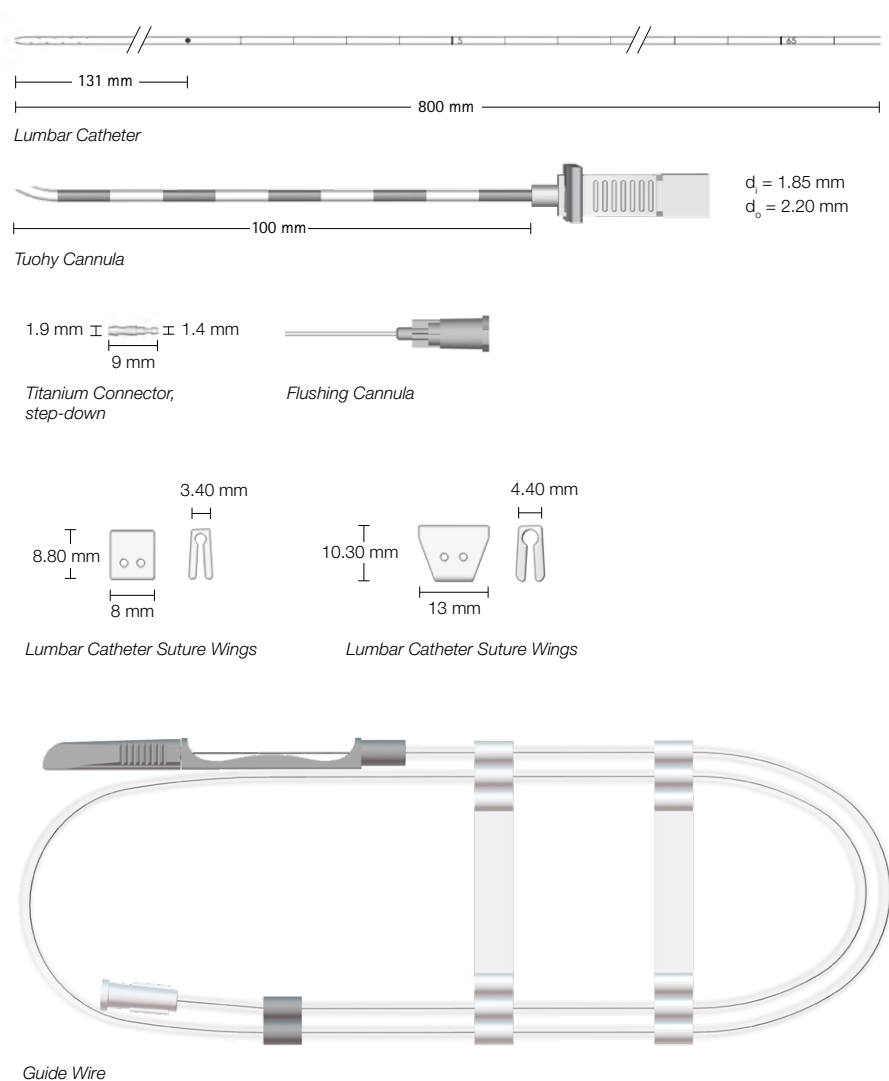
Catheter: $d_i = 0.80$ mm, $d_o = 1.60$ mm
Connector: $d_o = 1.9$ mm to 1.4 mm

Art. No	Description
FV083P	Lumbar Catheter Set, open Tip, Tuohy Cannula • Lumbar Catheter with open tip, 800 mm • Tuohy Cannula 14G, insertion length 100 mm • Lumbar Catheter Suture Wings, Peritoneal Catheter Suture Wings • Titanium Connector, step-down • Flushing Cannula

Lumbar Catheter Set, Closed Tip



- + Lumbar Catheter made of radiopaque silicone with barium sulfate
- + Lumbar Catheter with 16 drainage holes, in four opposite rows
- + Length markings on both sides of the Lumbar Catheter
- + Length markings aligned to the Tuohy Cannula
- + Suture Wings made of radiopaque silicone with barium sulfate
- + Titanium Connector, step down for connecting standard catheter to Lumbar Catheter
- + Guide Wire

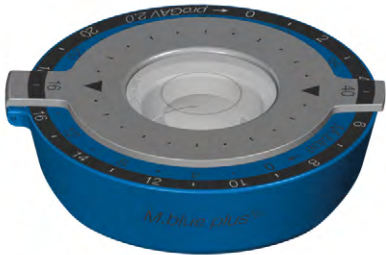


Catheter: $d_i = 0.80$ mm, $d_o = 1.60$ mm
Connector: $d_o = 1.9$ mm to 1.4 mm
Guide wire: $d_o = 0.46$ mm

Art. No	Description
FV084P	Lumbar Catheter Set, closed Tip, Tuohy Cannula · Lumbar Catheter with closed tip, 800 mm · Tuohy Cannula 14G, insertion length 100 mm · Lumbar Catheter Suture Wings, Peritoneal Catheter Suture Wings · Titanium Connector, step-down · Flushing Cannula · Guide Wire

M.blue plus® Instruments

- + M.blue plus Instruments Set
- + M.blue plus Compass
- + M.blue plus Adjustment Ring
- + M.blue plus Adjustment Assistant



M.blue plus Compass



M.blue plus Adjustment Ring

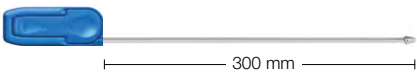


M.blue plus Adjustment Assistant

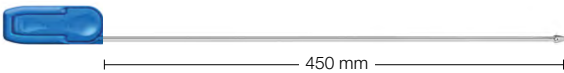
Art. no.	Instruments
FX890T	M.blue plus Instruments Set (contains FX891T and FX892T)
FX891T	M.blue plus Compass
FX892T	M.blue plus Adjustment Ring
FX893T	M.blue plus Adjustment Assistant

4 lengths available in
standard or rigid version

+ S - 300 mm



+ M - 450 mm

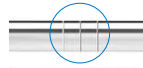


+ L - 600 mm



+ XL - 700 mm



		300 mm	450 mm	600 mm	700 mm
	STANDARD VERSION <i>(with ring marking)</i>	FX005SU	FX006SU	FX007SU	FX008SU
	RIGID VERSION <i>(no ring marking)</i>	FX001SU	FX002SU	FX003SU	FX004SU

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