MIETHKE

Lumboperitoneal Shunts

GRAVITATIONAL VALVE TECHNOLOGY
FOR LUMBOPERITONEAL SHUNTING

www.miethke.com

TREATMENT OF HYDROCEPHALUS
NEED FOR IMPROVEMENT

TREATMENT OF HYDROCEPHALUS

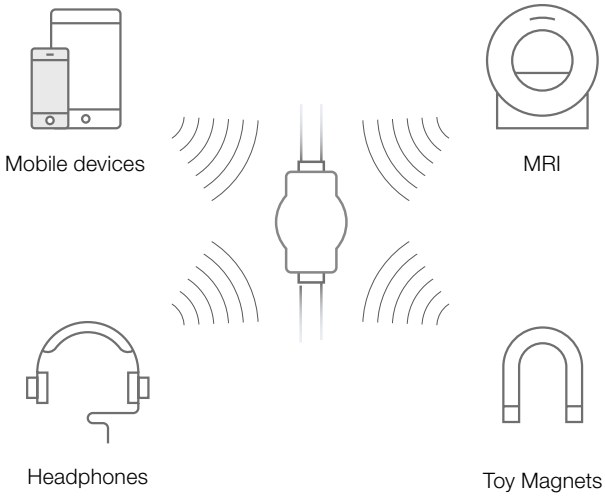
Since the 1960s, the main surgical strategy in managing hydrocephalus is the placement of shunts. Ventriculoperitoneal (VP) shunts are still the surgical standard, but lumboperitoneal (LP) shunts are an increasingly important alternative. However, these conventional shunt types have specific high failure 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.

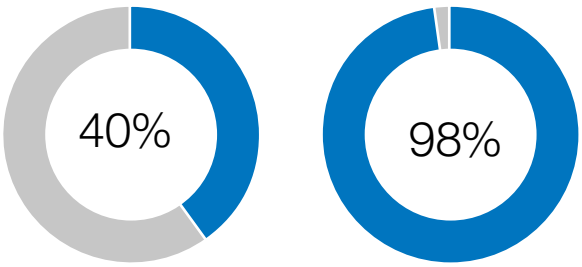
We believe that the current treatment options for hydrocephalus are not definitive and improvement is required.

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

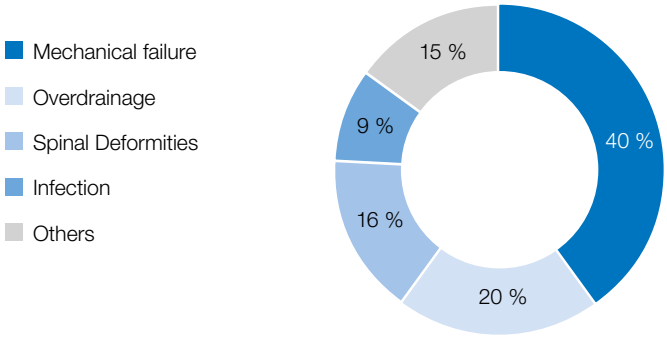


Proportion of shunts failing within 2 years

Proportion of shunts failing within 10 years

» *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

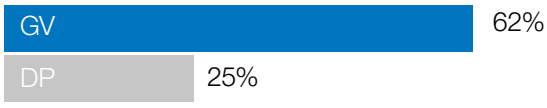
BE CONFIDENT!

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).

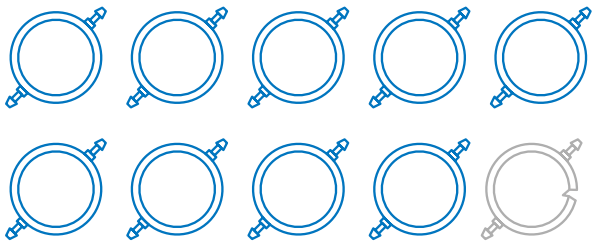
Symptom improvement >2 points on Kiefer-Scale

Daily improvement rated good / very good on Black-Scale

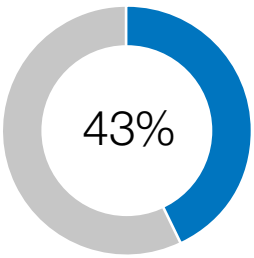


REDUCE COMPLICATIONS!
REDUCE REVISIONS!

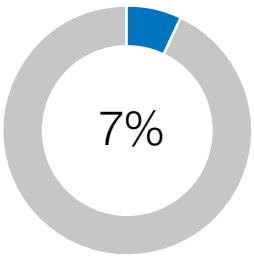
Clinical studies have shown that MIETHKE gravitational devices reduce the risk of revisions (15-19) and overdrainage complications (8, 13).



» *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).

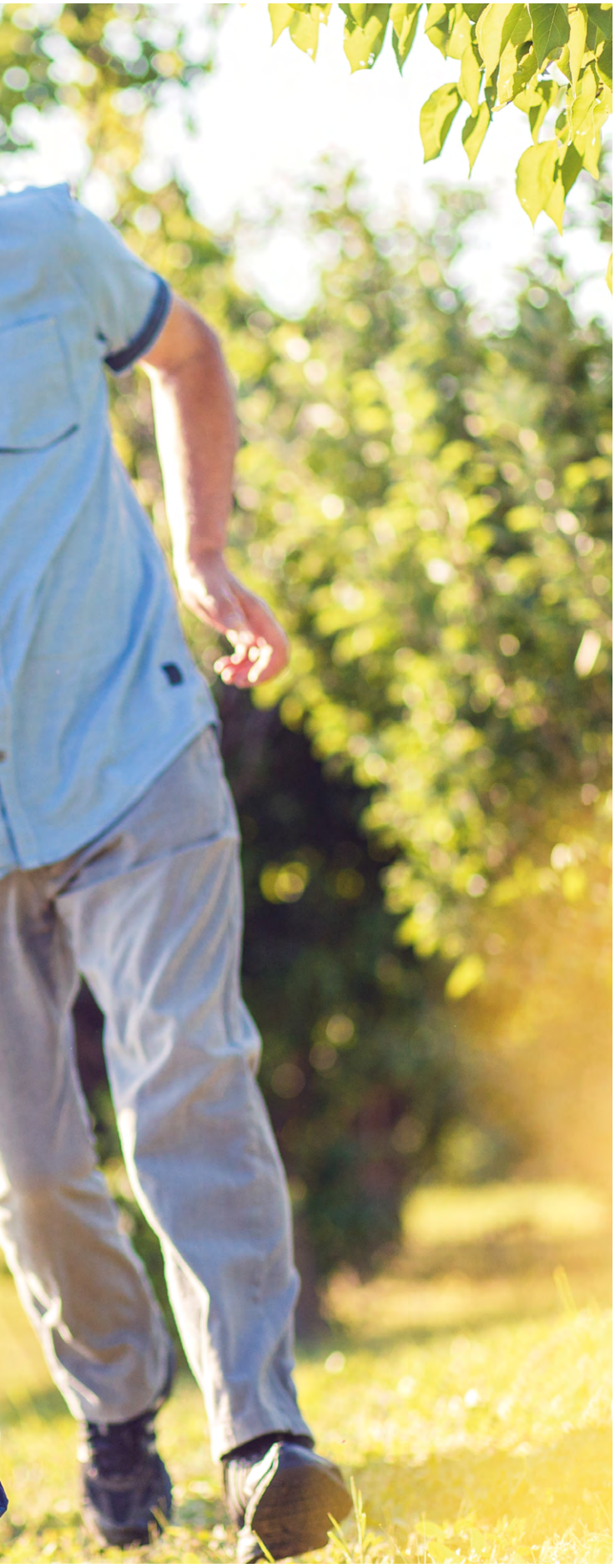
MIETHKE GRAVITATIONAL VALVES

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%

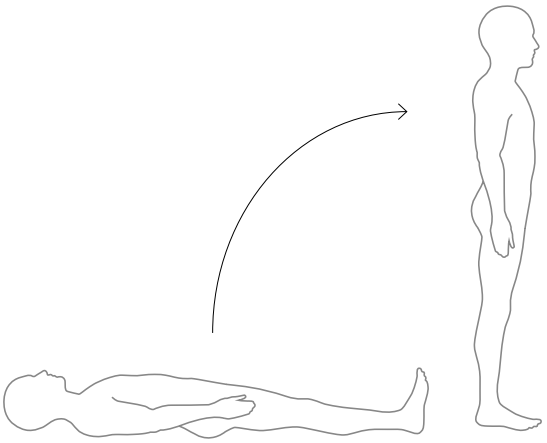
» *higher survival of gravitational valves after primary vs. secondary implantation.* «

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

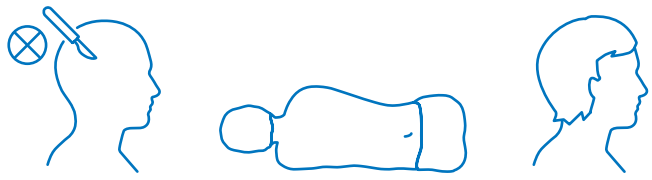
Meeting important requirements of neurosurgeons and patients

- 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)



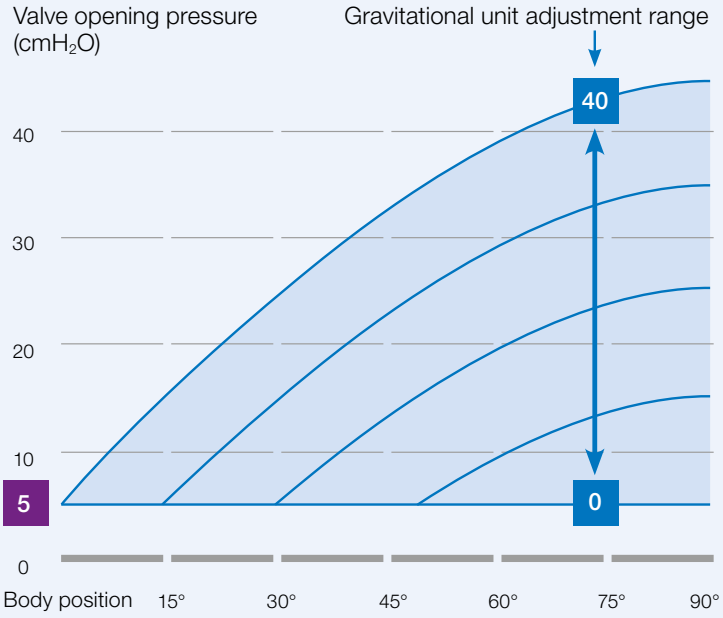
No cranial surgery, minimally invasive

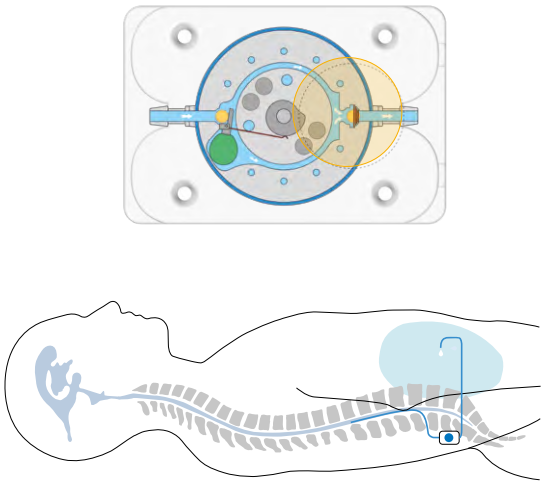
Small postoperative scars

No head shaving

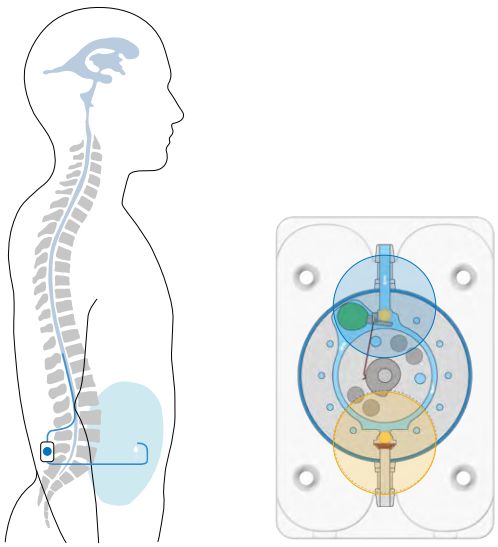
Example of the adjustable gravitational pressure range of an *M.blue LP* with a differential pressure unit of 5 cmH_2O

MIETHKE GVs are hydrocephalus valves operating in a position-dependent manner. GVs consist 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.



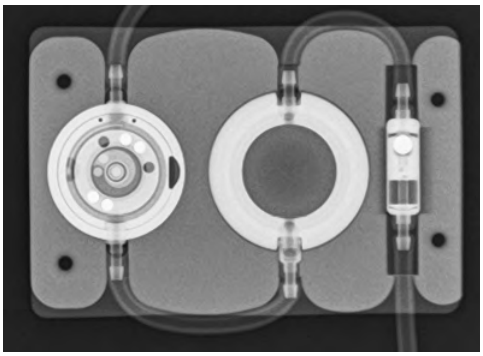
Gravitational unit and differential pressure unit work together when the patient is standing.

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 cmH_2O.
* 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



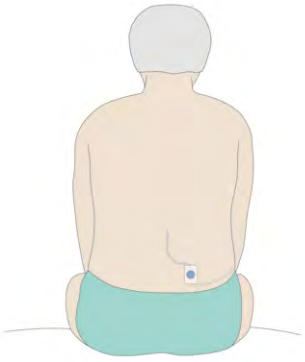
X-ray image of *Valve Board* with *proGAV 2.0 LP right* with *CONTROL RESERVOIR*, (pressure level of *proGAV 2.0* - 20 cmH_2O, pressure level of *SHUNTASSISTANT 2.0* - 20 cmH_2O)

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

HYDROCEPHALUS THERAPY
VALVE ADJUSTMENT IN LUMBOPERITONEAL SHUNTS

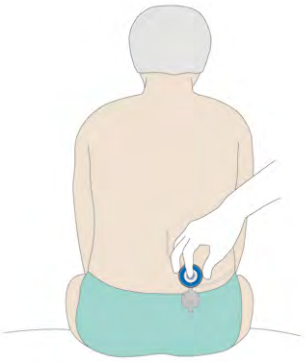
SOFT TOUCH INSTRUMENT FUNCTIONALITY
USER-FRIENDLY ADJUSTMENT AND VERIFICATION

Innovative *M.blue plus Instruments* allow users to measure, verify and adjust the pressure level on *M.blue*'s adjustable gravitational unit (0-40 cmH_2O) 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.



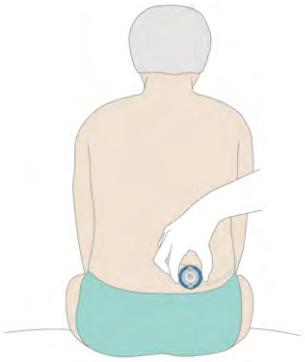
ADJUSTMENT OF MIETHKE LP SHUNTS

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



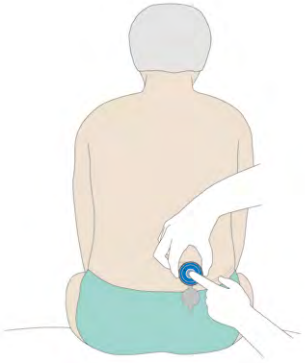
LOCATE

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

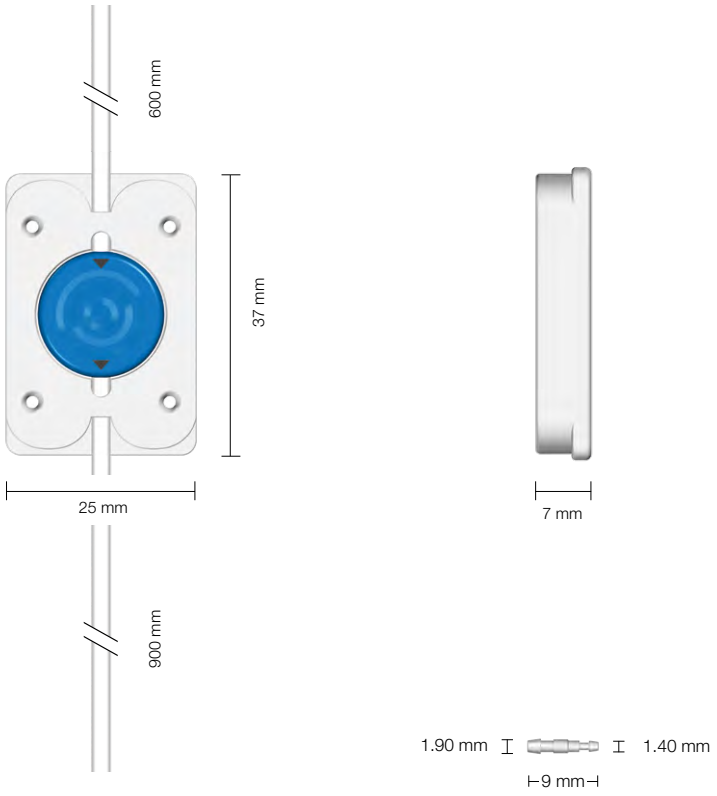
With the help of the inserted *M.blue plus Adjustment Ring* the valve opening pressure can easily be set to the desired level. After setting the valve opening pressure, it is advisable to double-check the pressure level settings.

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_2O)
FX850T	0 cmH_2O	0 - 40 cmH_2O
FX851T	5 cmH_2O	0 - 40 cmH_2O
FX852T	10 cmH_2O	0 - 40 cmH_2O
FX853T	15 cmH_2O	0 - 40 cmH_2O

M.blue®

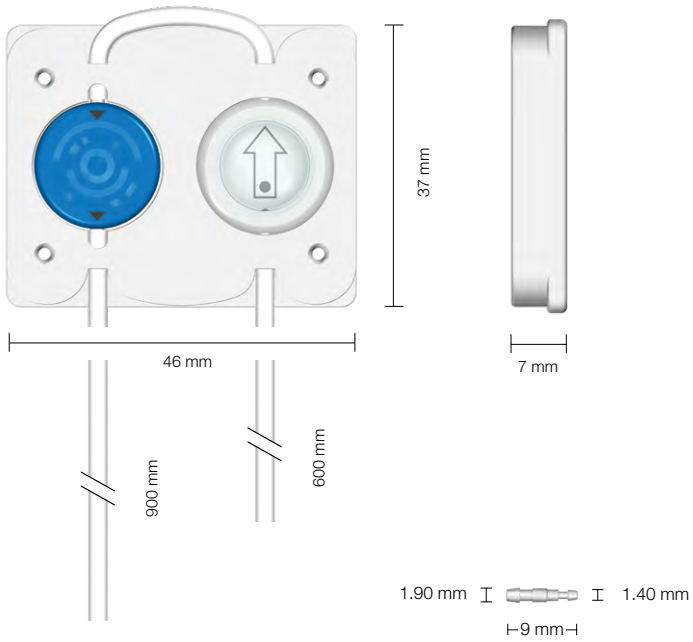
with CONTROL RESERVOIR, lumbar left

+ *Valve Board*
  premounted with:

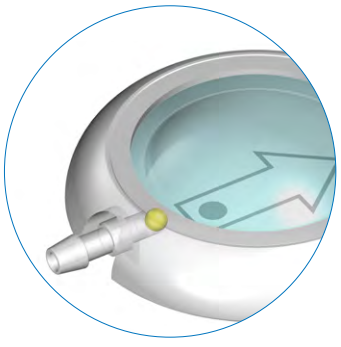
+ *M.blue*
  with CONTROL RESERVOIR,
  Proximal Catheter, 600 mm
  and *Distal Catheter,* 900 mm

+ *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_2O)
FX854T	**0 cmH_2O**	**0 - 40 cmH_2O**
FX855T	**5 cmH_2O**	**0 - 40 cmH_2O**
FX856T	**10 cmH_2O**	**0 - 40 cmH_2O**
FX857T	**15 cmH_2O**	**0 - 40 cmH_2O**

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*

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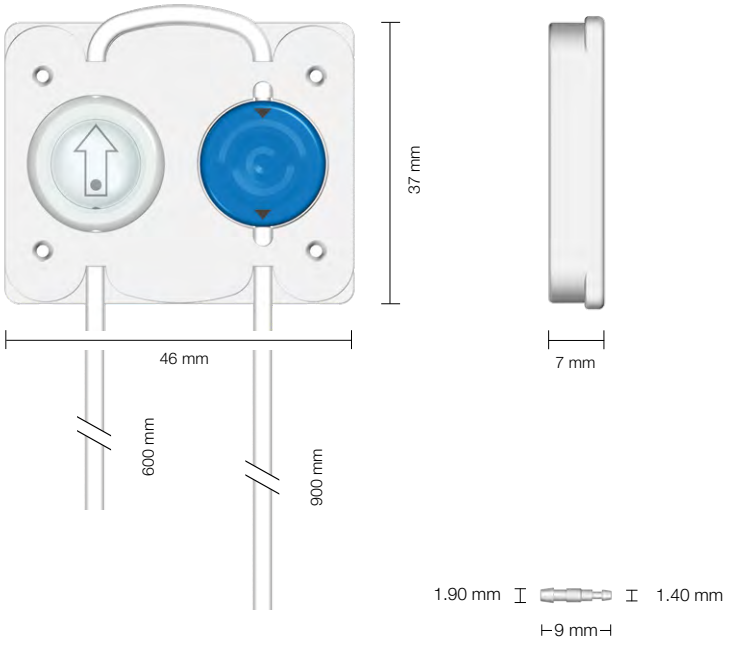
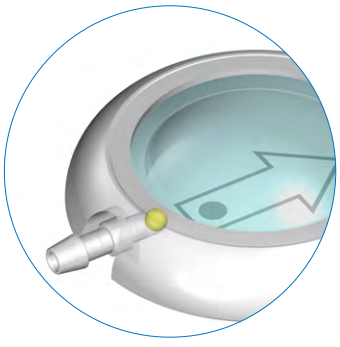


Catheter: d_i = 1.2 mm, d_o = 2.5 mm



CONTROL RESERVOIR

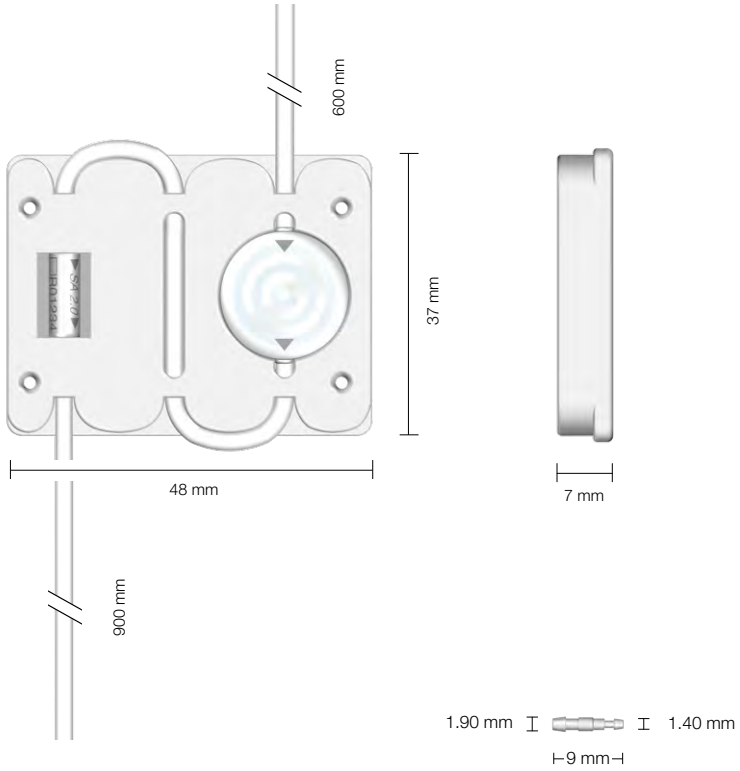
Art. no	Differential pressure unit	Adjustable gravitational unit (preset to 20 cmH_2O)
FX858T	**0 cmH_2O**	**0 - 40 cmH_2O**
FX859T	**5 cmH_2O**	**0 - 40 cmH_2O**
FX860T	**10 cmH_2O**	**0 - 40 cmH_2O**
FX861T	**15 cmH_2O**	**0 - 40 cmH_2O**

proGAV® 2.0 lumbar left

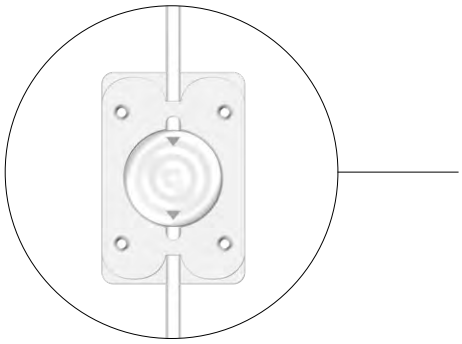
+ *Valve Board*
  premounted with:

+ *proGAV 2.0*
  with *Proximal Catheter,* 600 mm
  and *Distal Catheter,* 900 mm

+ *Titanium Connector, step-down*



Catheter: d_i = 1.2 mm, d_o = 2.5 mm



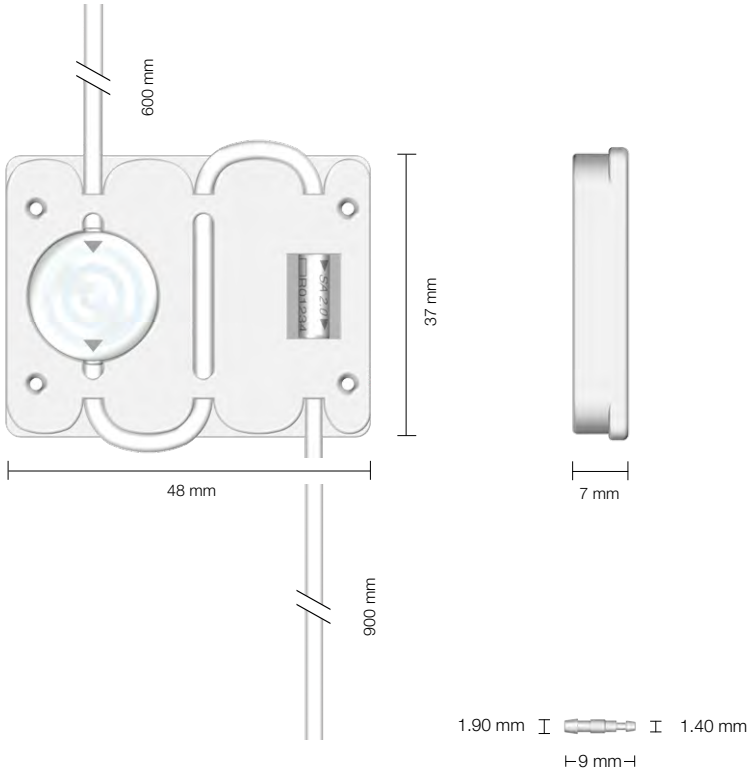
Art. no	Adjustable differential pressure unit (preset to 5 cmH_2O)	Gravitational unit
FX700T	0 - 20 cmH_2O	-
FX701T	0 - 20 cmH_2O	10 cmH_2O
FX702T	0 - 20 cmH_2O	15 cmH_2O
FX703T	0 - 20 cmH_2O	20 cmH_2O
FX704T	0 - 20 cmH_2O	25 cmH_2O
FX705T	0 - 20 cmH_2O	30 cmH_2O
FX706T	0 - 20 cmH_2O	35 cmH_2O

proGAV® 2.0 lumbar right

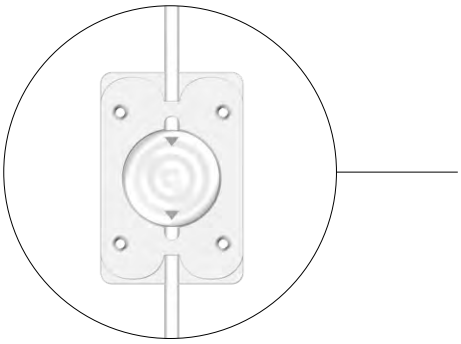
+ *Valve Board*
  premounted with:

+ *proGAV 2.0*
  with *Proximal Catheter,* 600 mm
  and *Distal Catheter,* 900 mm

+ *Titanium Connector, step-down*



Catheter: d_i = 1.2 mm, d_o = 2.5 mm



Art. no	Adjustable differential pressure unit (preset to 5 cmH_2O)	Gravitational unit
FX700T	0 - 20 cmH_2O	-
FX707T	0 - 20 cmH_2O	10 cmH_2O
FX708T	0 - 20 cmH_2O	15 cmH_2O
FX709T	0 - 20 cmH_2O	20 cmH_2O
FX710T	0 - 20 cmH_2O	25 cmH_2O
FX711T	0 - 20 cmH_2O	30 cmH_2O
FX712T	0 - 20 cmH_2O	35 cmH_2O

proGAV® 2.0

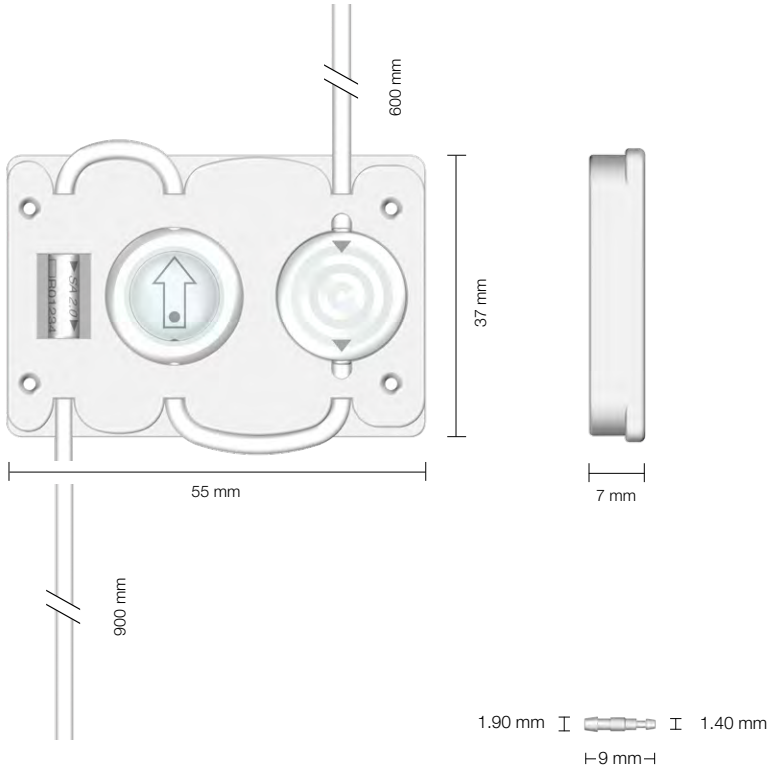
with CONTROL RESERVOIR, lumbar left

+ *Valve Board*
  premounted with:

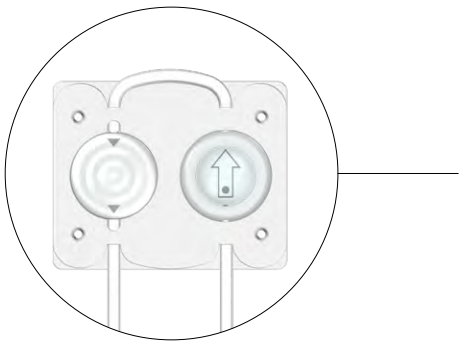
+ *proGAV 2.0*
  with CONTROL RESERVOIR,
  Proximal Catheter, 600 mm
  and *Distal Catheter,* 900 mm

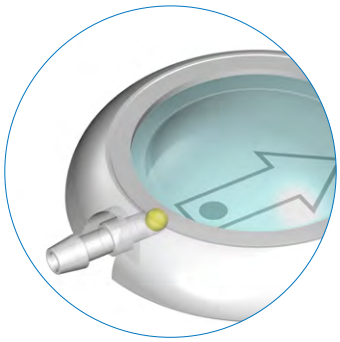
+ *Titanium Connector, step-down*

+ 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_2O)	Gravitational unit
FX713T	**0 - 20 cmH_2O**	**-**
FX714T	**0 - 20 cmH_2O**	**10 cmH_2O**
FX715T	**0 - 20 cmH_2O**	**15 cmH_2O**
FX716T	**0 - 20 cmH_2O**	**20 cmH_2O**
FX717T	**0 - 20 cmH_2O**	**25 cmH_2O**
FX718T	**0 - 20 cmH_2O**	**30 cmH_2O**
FX719T	**0 - 20 cmH_2O**	**35 cmH_2O**

proGAV® 2.0

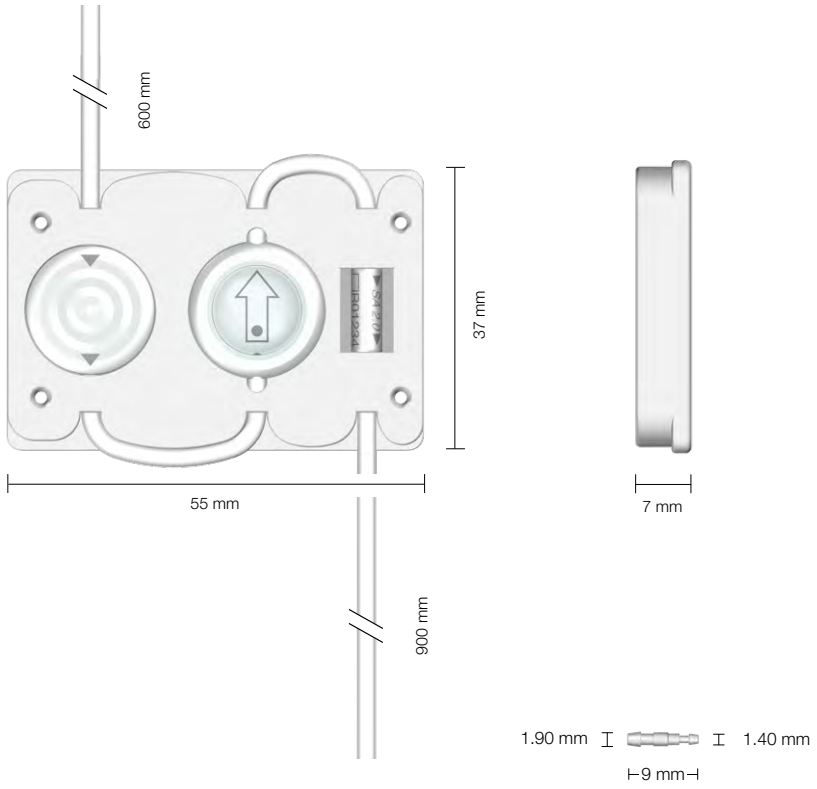
with CONTROL RESERVOIR, lumbar right

+ *Valve Board*
  premounted with:

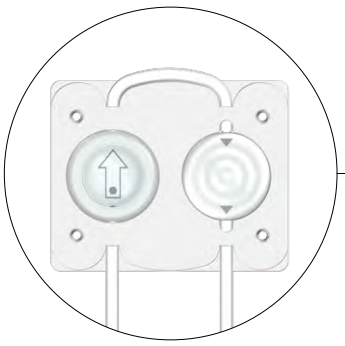
+ *proGAV 2.0*
  with CONTROL RESERVOIR, Proximal Catheter, 600 mm
  and *Distal Catheter,* 900 mm

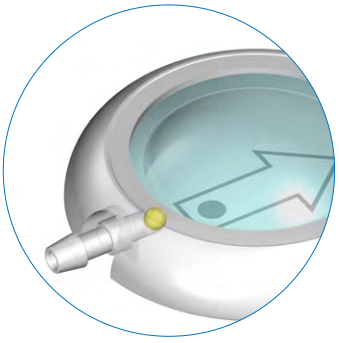
+ *Titanium Connector, step-down*

+ 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

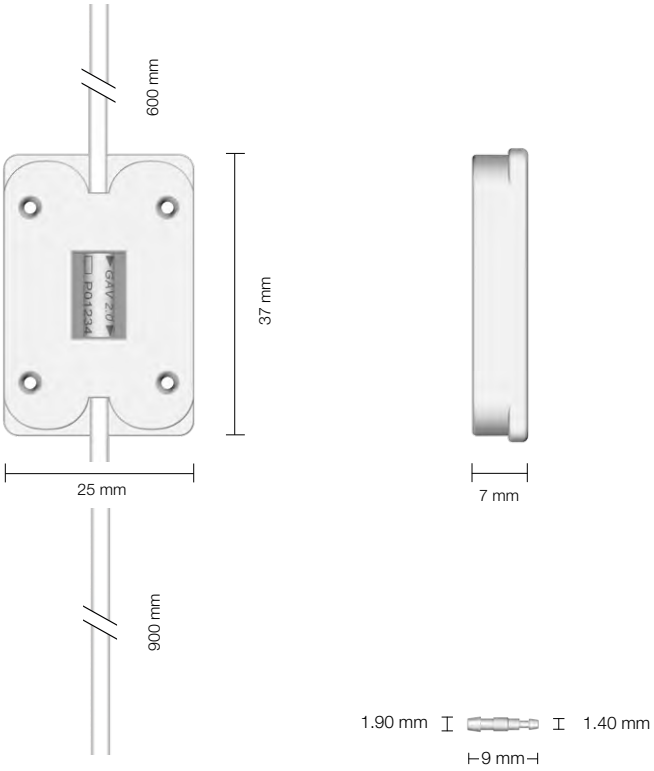
Art. no	Adjustable differential pressure unit (preset to 5 cmH_2O)	Gravitational unit
FX720T	**0 - 20 cmH_2O**	**-**
FX721T	**0 - 20 cmH_2O**	**10 cmH_2O**
FX722T	**0 - 20 cmH_2O**	**15 cmH_2O**
FX723T	**0 - 20 cmH_2O**	**20 cmH_2O**
FX724T	**0 - 20 cmH_2O**	**25 cmH_2O**
FX725T	**0 - 20 cmH_2O**	**30 cmH_2O**
FX726T	**0 - 20 cmH_2O**	**35 cmH_2O**

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_2O	20 cmH_2O
FX183T	5 cmH_2O	25 cmH_2O
FX184T	5 cmH_2O	30 cmH_2O
FX185T	5 cmH_2O	35 cmH_2O
FX186T	10 cmH_2O	25 cmH_2O
FX187T	10 cmH_2O	30 cmH_2O

GAV® 2.0

with CONTROL RESERVOIR, lumbar left

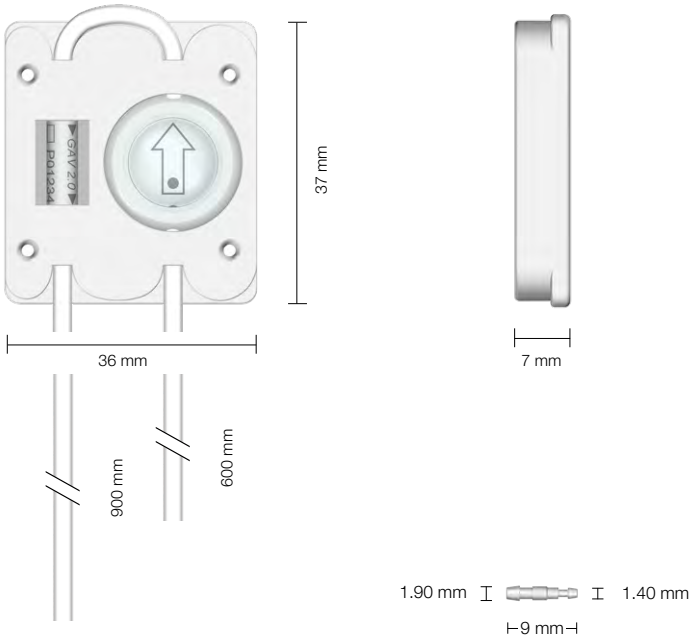
COMING SOON

+ *Valve Board*
  premounted with:

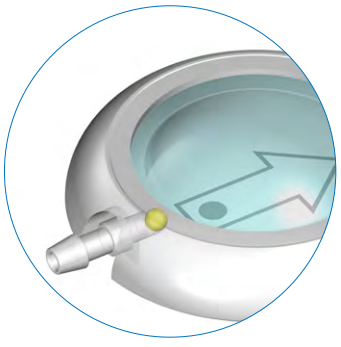
+ *GAV 2.0*
  with CONTROL RESERVOIR,
  Proximal Catheter, 600 mm
  and *Distal Catheter,* 900 mm

+ *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

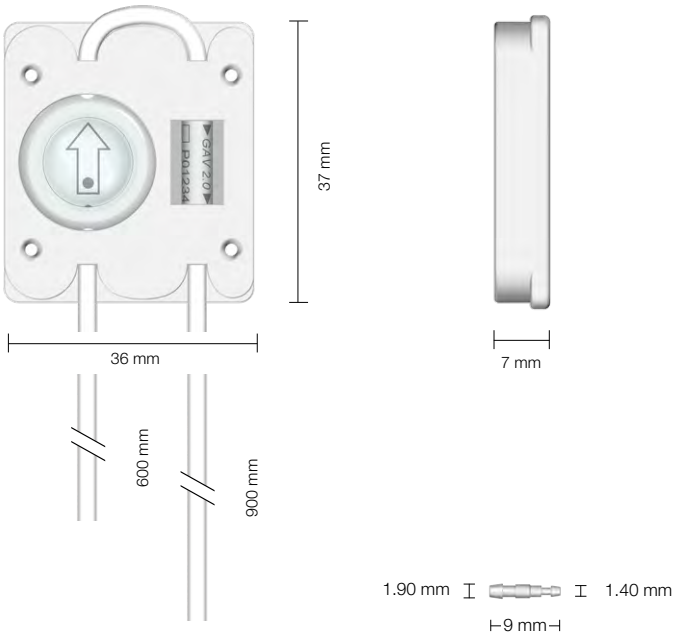
Art. no	Lying	Upright
FX188T	**5 cmH_2O**	**20 cmH_2O**
FX189T	**5 cmH_2O**	**25 cmH_2O**
FX190T	**5 cmH_2O**	**30 cmH_2O**
FX191T	**5 cmH_2O**	**35 cmH_2O**
FX192T	**10 cmH_2O**	**25 cmH_2O**
FX193T	**10 cmH_2O**	**30 cmH_2O**

GAV® 2.0

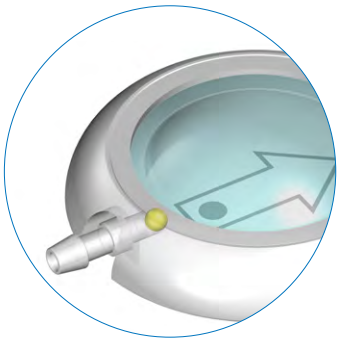
with CONTROL RESERVOIR, lumbar right

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

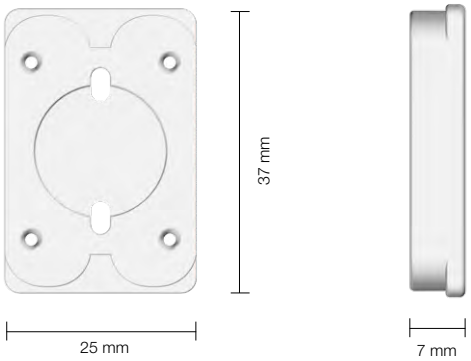


CONTROL RESERVOIR

Art. no	Lying	Upright
FX194T	5 cmH_2O	20 cmH_2O
FX195T	5 cmH_2O	25 cmH_2O
FX196T	5 cmH_2O	30 cmH_2O
FX197T	5 cmH_2O	35 cmH_2O
FX198T	10 cmH_2O	25 cmH_2O
FX199T	10 cmH_2O	30 cmH_2O

M.blue® Board

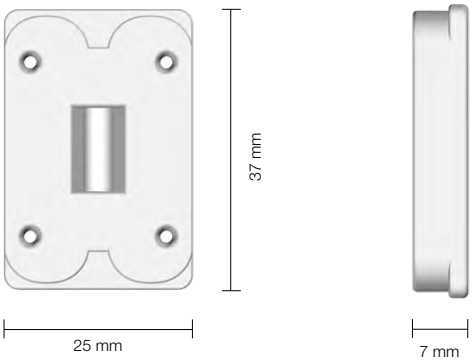
+ *Valve Board* for *M.blue* or *proGAV 2.0*



Art. no
FV087P

GAV® 2.0 Board

+ *Valve Board* for *GAV 2.0* or *SHUNTASSISTANT 2.0*

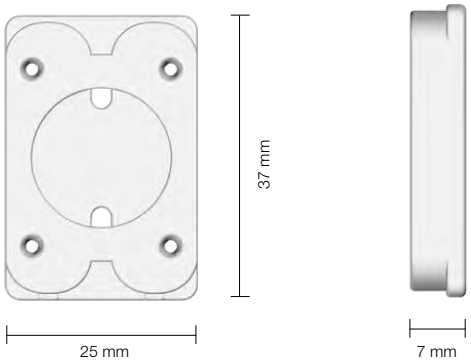


Art. no
FV088P

CONTROL RESERVOIR Board

COMING SOON

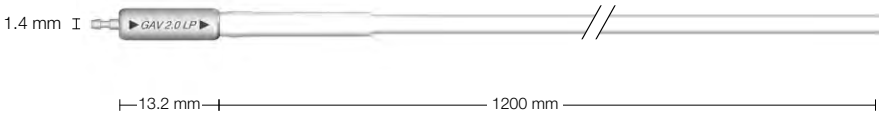
+ *Valve Board* for *CONTROL RESERVOIR*



Art. no
FV089P

GAV® 2.0 LP, straight

\+ *GAV 2.0 LP, straight*
with *Distal Catheter*

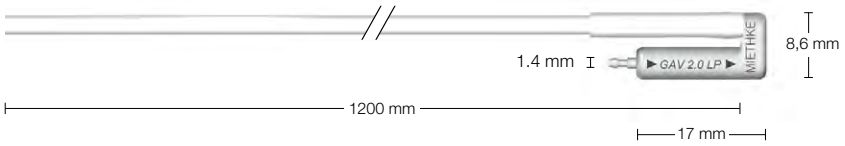


Valve: d_o = 4.2 mm
Connector: d_o= 1.4 mm
for connection with lumbar catheter
Connector: d_o= 1.9 mm
preverably used with
Catheter: d_i = 1.2 mm, d_o= 2.5 mm

Art. no	Lying	Upright
FX222T	5 cmH_2O	20 cmH_2O
FX223T	5 cmH_2O	25 cmH_2O
FX224T	5 cmH_2O	30 cmH_2O
FX225T	5 cmH_2O	35 cmH_2O
FX226T	10 cmH_2O	25 cmH_2O
FX226T	10 cmH_2O	30 cmH_2O

GAV® 2.0 LP, U-formed

+ *GAV 2.0 LP, U-formed*
with *Distal Catheter*

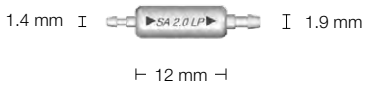


Valve: d_o = 4.2 mm
Connector: d_o= 1.4 mm
for connection with lumbar catheter
Connector: d_o= 1.9 mm
preverably used with
Catheter: d_i = 1.2 mm, d_o= 2.5 mm

Art. no	Lying	Upright
FX228T	5 cmH_2O	20 cmH_2O
FX229T	5 cmH_2O	25 cmH_2O
FX230T	5 cmH_2O	30 cmH_2O
FX231T	5 cmH_2O	35 cmH_2O
FX232T	10 cmH_2O	25 cmH_2O
FX233T	10 cmH_2O	30 cmH_2O

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
preverably used with
Catheter: d_i = 1.2 mm, d_o= 2.5 mm

Art. no	Opening pressure
FX106T	10 cmH_2O
FX107T	15 cmH_2O
FX108T	20 cmH_2O
FX109T	25 cmH_2O
FX110T	30 cmH_2O
FX111T	35 cmH_2O

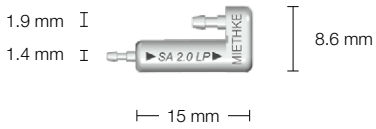
+ *SHUNTASSISTANT 2.0 LP, straight* with *Distal Catheter*

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_2O
FX125T	15 cmH_2O
FX126T	20 cmH_2O
FX127T	25 cmH_2O
FX128T	30 cmH_2O
FX129T	35 cmH_2O

SHUNTASSISTANT 2.0 LP, U-formed

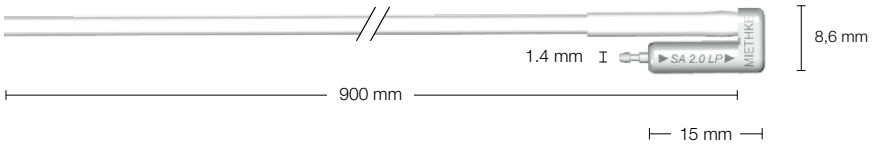
+ *SHUNTASSISTANT 2.0 LP, U-formed*



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

Art. no	Opening pressure
FX112T	10 cmH_2O
FX113T	15 cmH_2O
FX114T	20 cmH_2O
FX115T	25 cmH_2O
FX116T	30 cmH_2O
FX117T	35 cmH_2O

+ *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_2O
FX131T	15 cmH_2O
FX132T	20 cmH_2O
FX133T	25 cmH_2O
FX134T	30 cmH_2O
FX135T	35 cmH_2O

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_2O	30 cmH_2O
FX374T	5 cmH_2O	40 cmH_2O
FX127T	10 cmH_2O	30 cmH_2O
FX128T	10 cmH_2O	40 cmH_2O
FX129T	10 cmH_2O	50 cmH_2O

DUALSWITCH VALVE LP

MIETHKE

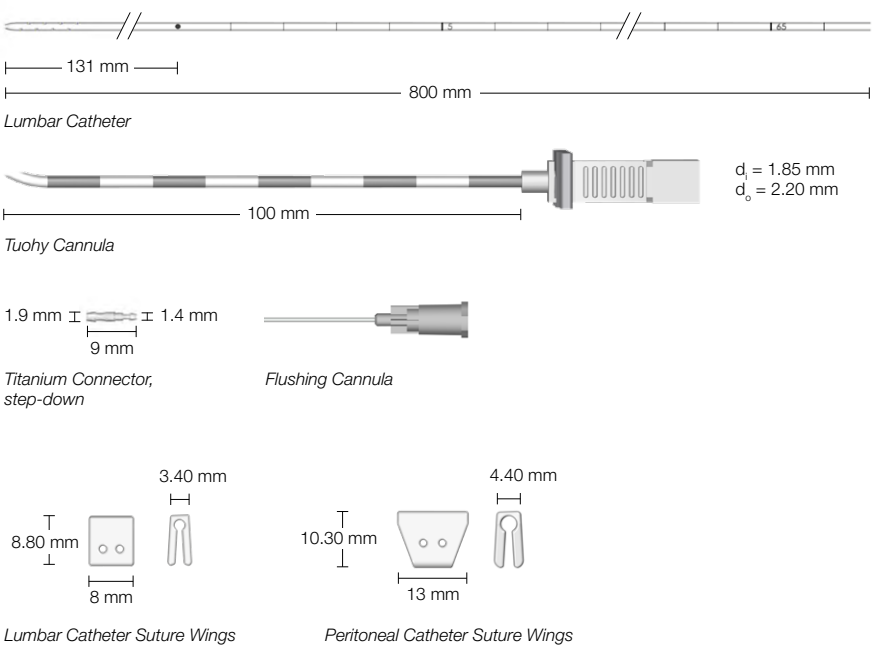
+ Valve with integrated *Prechamber LP* and integrated *Distal Catheter*

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	Lying	Upright
FX382T	5 cmH_2O	30 cmH_2O
FX383T	5 cmH_2O	40 cmH_2O
FX163T	10 cmH_2O	30 cmH_2O
FX164T	10 cmH_2O	40 cmH_2O

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*



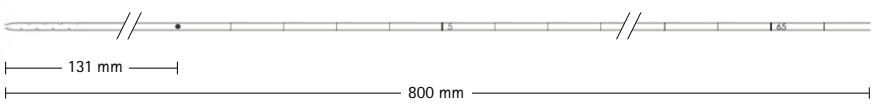
Catheter: d_i = 0.80 mm, d_o = 1.60 mm
Connector: d_o = 1.9 mm to 1.4 mm

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

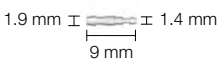
MIETHKE

+ *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



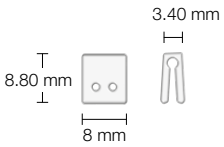
Lumbar Catheter

Tuohy Cannula

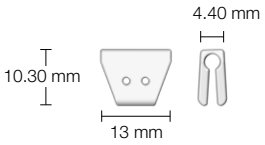


Titanium Connector, step-down

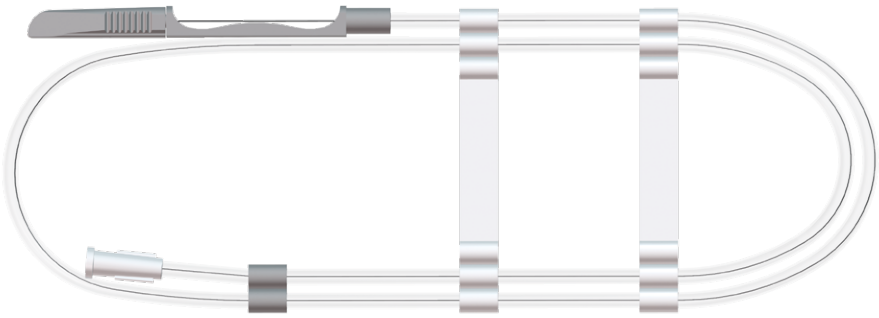

Flushing Cannula



Lumbar Catheter Suture Wings



Lumbar Catheter Suture Wings

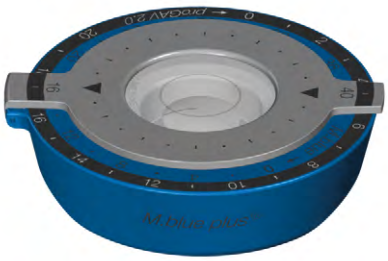

Guide Wire

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

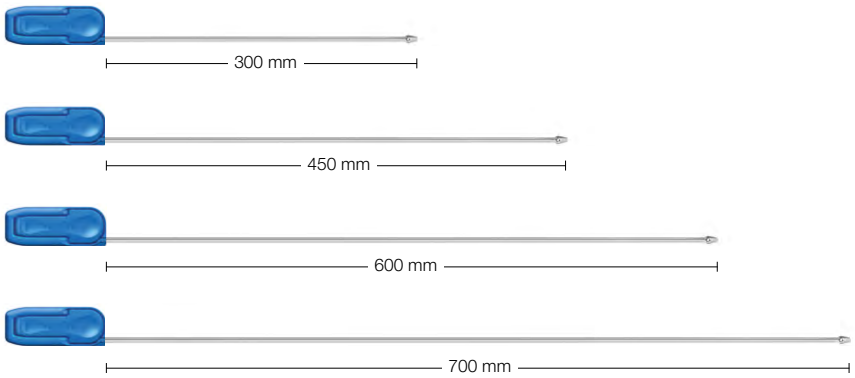
M.blue plus Adjustment Ring

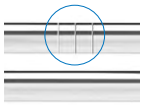
M.blue plus Adjustment Assistant

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 *(with ring marking)*	**FX005SU**	**FX006SU**	**FX007SU**	**FX008SU**
RIGID VERSION *(no ring marking)*	**FX001SU**	**FX002SU**	**FX003SU**	**FX004SU**

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