MIETHKE

B|BRAUN
SHARING EXPERTISE

WE UNDERSTAND.

NEUROSURGERY

LUMBOPERITONEAL SHUNTS

GRAVITATIONAL VALVE TECHNOLOGY FOR LUMBOPERITONEAL SHUNTING

TREATMENT OF HYDROCEPHALUS

NEED FOR IMPROVEMENT

MIETHKE

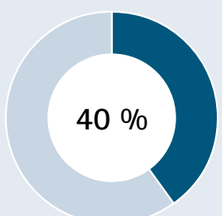
TREATMENT OF HYDROCEPHALUS

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).

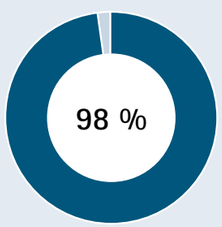
Mechanical failure, such as obstruction and valve malfunction, followed immediately by overdrainage, remain the most common causes of multiple shunt revisions (5). Revisions are burdensome for patients and are accompanied by unavoidable perioperative risks.

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

HIGH FAILURE RATES (1)



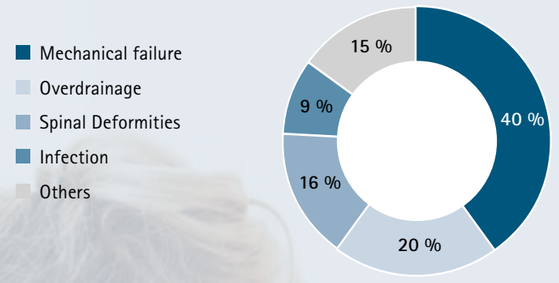
Proportion of shunts failing within **2 years**



Proportion of shunts failing within **10 years**

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

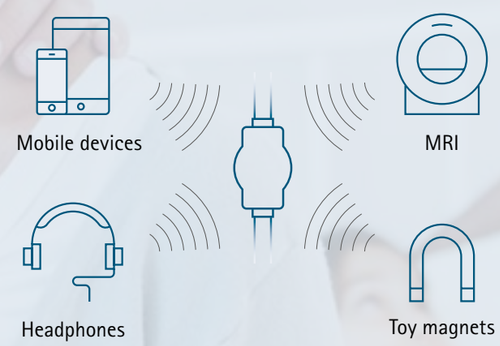
COMPLICATIONS LP-SHUNTING (5)



» About one in four patients experience at least one complication (2)

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).



GRAVITATIONAL VALVES BY MIETHKE

DEVELOPED TO ENSURE SAFETY

MIETHKE

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).

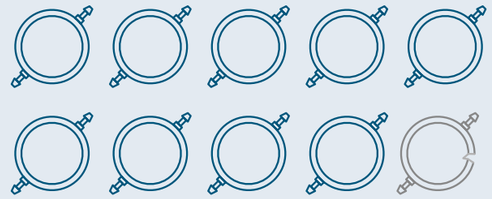
GRAVITATIONAL VALVES (GV) IMPROVE PATIENT OUTCOMES COMPARED TO DIFFERENTIAL PRESSURE VALVES (DP) (14).

Symptom improvement > 2 points on Kiefer-Scale

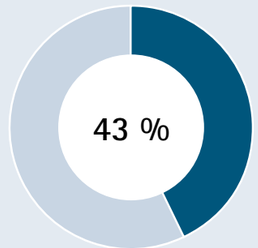
Daily improvement rated good / very good on Black-Scale

REDUCE COMPLICATIONS! REDUCE REVISIONS!

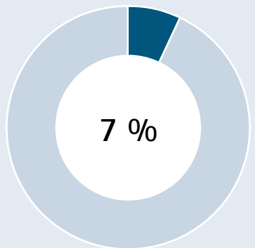
Clinical studies have shown that MIETHKE gravitational devices reduce the risk of revisions (15-19) and overdrainage complications (8, 13).



» 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

MIETHKE

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 magneticfields of up to 3 Tesla (20).

MIETHKE GRAVITATIONAL VALVES

Ti

Made from Titanium for high MRI- and biocompatibility

Protected against reprogramming up to 3 Tesla

Small valves

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 over-drainage 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

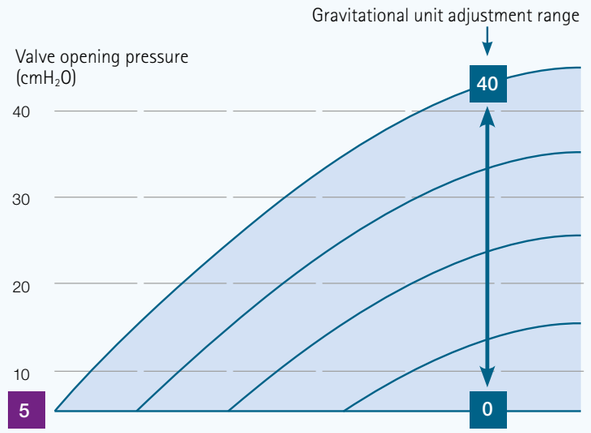
POTENTIAL BENEFITS FROM LP-SHUNTS (29, 33)

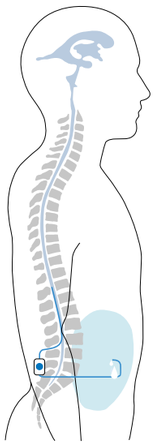
HYDROCEPHALUS THERAPY

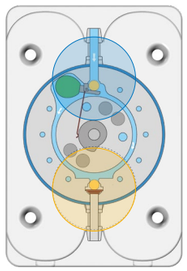
FUNCTIONALITY OF GRAVITATIONAL VALVES AND PRESSURE LEVEL RECOMMENDATION

EXAMPLE OF THE ADJUSTABLE GRAVITATIONAL PRESSURE RANGE OF AN *M.blue* LUMBAR WITH A DIFFERENTIAL PRESSURE UNIT OF 5 CMH_2O

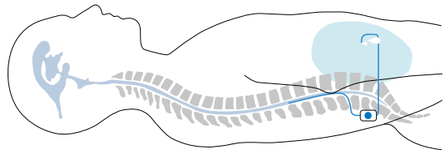
MIETHKE GVs are hydrocephalus valves operating in a position-dependent manner. GVs consist of a gravitational unit and a differential pressure unit. The combination of these two units adjusts the opening pressure automatically depending on what position the patient is in, thus countering the risk of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

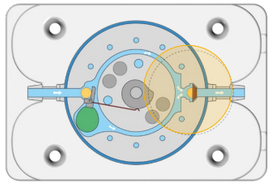






Gravitational unit and differential pressure unit work together when the patient is standing





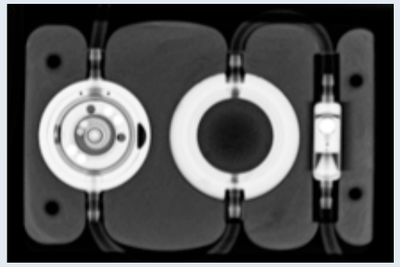
Only the differential pressure unit is active when the patient is supine

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		Combined opening pressure	
	differential pressure unit	gravitational unit	horizontal potition	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* with prechamber, lumbar right (pressure rating of *proGAV 2.0* - 20 cmH_2O pressure rating of *SHUNTASSISTANT 2.0* - 25 cmH_2O)

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

Download on the App Store

GET IT ON Google Play

HYDROCEPHALUS THERAPY

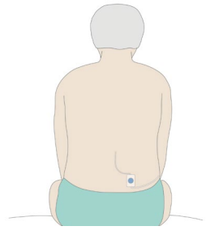
VALVE ADJUSTMENT IN LUMBOPERITONEAL SHUNTS

MIETHKE

SOFT TOUCH INSTRUMENT FUNCTIONALITY

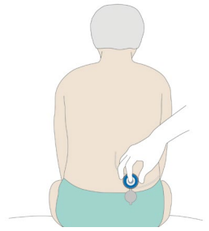
USER-FRIENDLY ADJUSTMENT AND VERIFICATION

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.



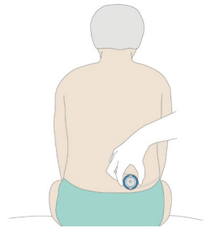
ADJUSTMENT OF MIETHKE LP-SHUNTS

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



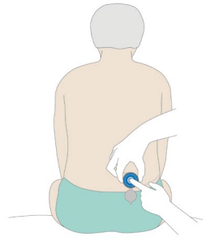
LOCATE

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

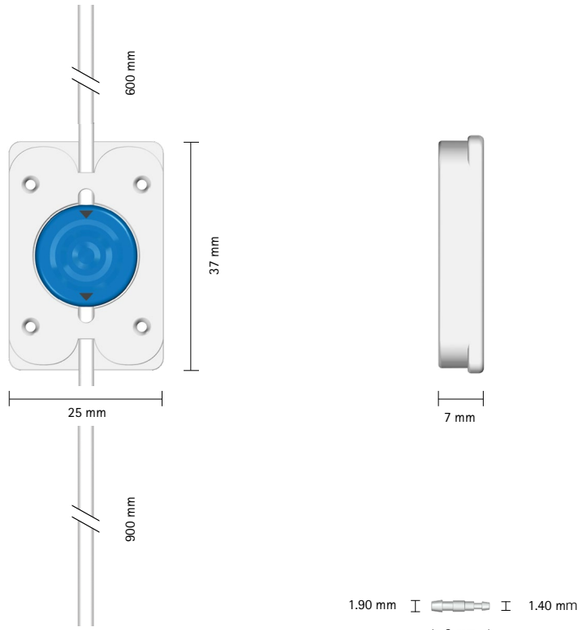
With the help of the inserted adjustment ring the valve opening pressure can easily be set to the desired level. After setting the valve opening pressure, it is advisable to double-check the pressure level settings.

M.blue®

LUMBAR

- Valve board premounted with:
- *M.blue*
  with proximal catheter 600 mm
  and peritoneal catheter 900 mm
- Step-down connector

Catheter: d_i = 1.2 mm, d_o = 2.5 mm



M.blue®

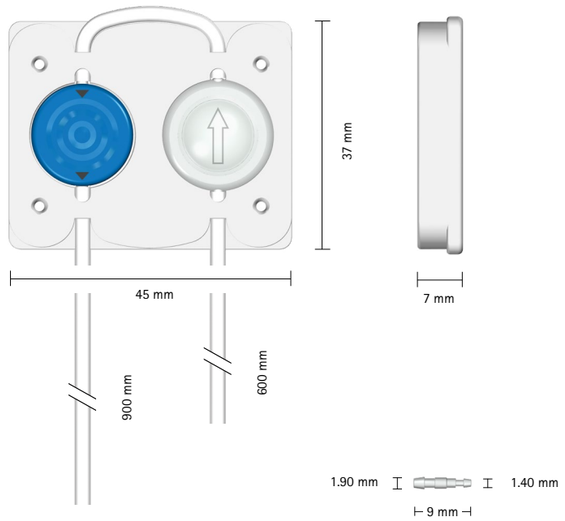
Art. No.	Differential pressure unit	Adjustable gravitational unit (preset to 20 cmH_2O)
FX850T	0 cmH_2O	0 - 40 cmH_2O
FX851T	5 cmH_2O	0 - 40 cmH_2O
FX852T	10 cmH_2O	0 - 40 cmH_2O
FX853T	15 cmH_2O	0 - 40 cmH_2O

M.blue®

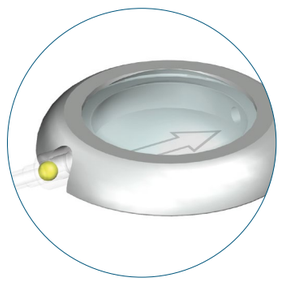
WITH *CONTROL RESERVOIR*, LUMBAR LEFT

COMING SOON

- Valve board premounted with:
- *M.blue* with *CONTROL RESERVOIR*, proximal catheter 600 mm and peritoneal catheter 900 mm
- Step-down connector
- An additional valve in the inlet of the *CONTROL RESERVOIR* makes it possible to pump cerebrospinal fluid in the direction of drainage only, allowing inspection of both the distal drainage section as well as the lumbar catheter.



Catheter: d_i = 1.2 mm, d_o = 2.5 mm



CONTROL RESERVOIR

M.blue®

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

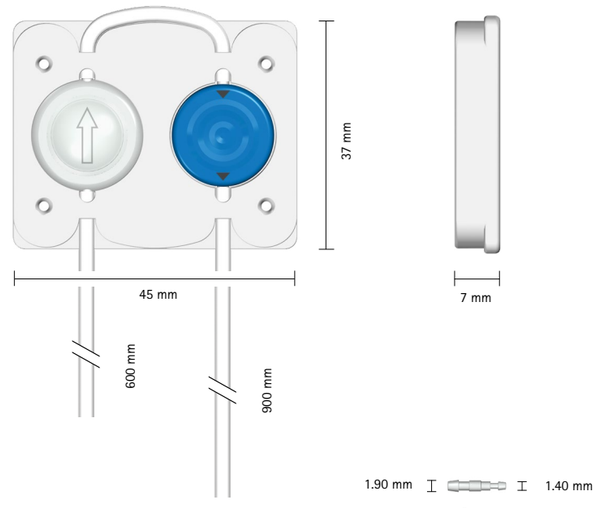
M.blue®

WITH *CONTROL RESERVOIR*, LUMBAR RIGHT

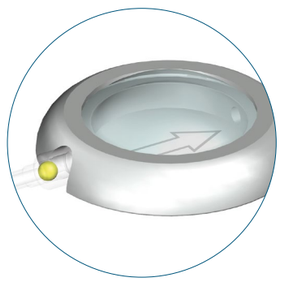
MIETHKE

COMING SOON

- Valve board premounted with:
- *M.blue* with *CONTROL RESERVOIR*, proximal catheter 600 mm and peritoneal catheter 900 mm
- Step-down connector
- An additional valve in the inlet of the *CONTROL RESERVOIR* makes it possible to pump cerebrospinal fluid in the direction of drainage only, allowing inspection of both the distal drainage section as well as the lumbar catheter.



Catheter: d_i = 1.2 mm, d_o = 2.5 mm



CONTROL RESERVOIR

M.blue®

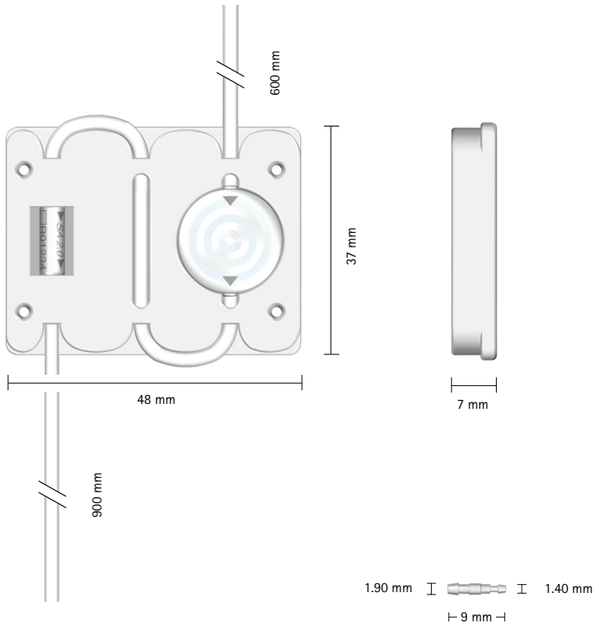
Art. No.	Differential pressure unit	Adjustable gravitational unit (preset to 20 cmH_2O)
FX858T	0 cmH_2O	0 - 40 cmH_2O
FX859T	5 cmH_2O	0 - 40 cmH_2O
FX860T	10 cmH_2O	0 - 40 cmH_2O
FX861T	15 cmH_2O	0 - 40 cmH_2O

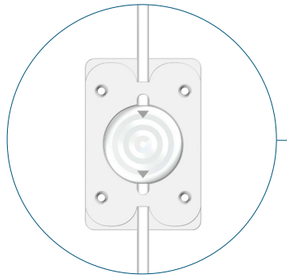
proGAV® 2.0

LUMBAR LEFT

- Valve board premounted with:
- *proGAV 2.0*
  with proximal catheter 600 mm
  and peritoneal catheter 900 mm
- Step-down connector

Catheter: d_i = 1.2 mm, d_o = 2.5 mm





proGAV® 2.0

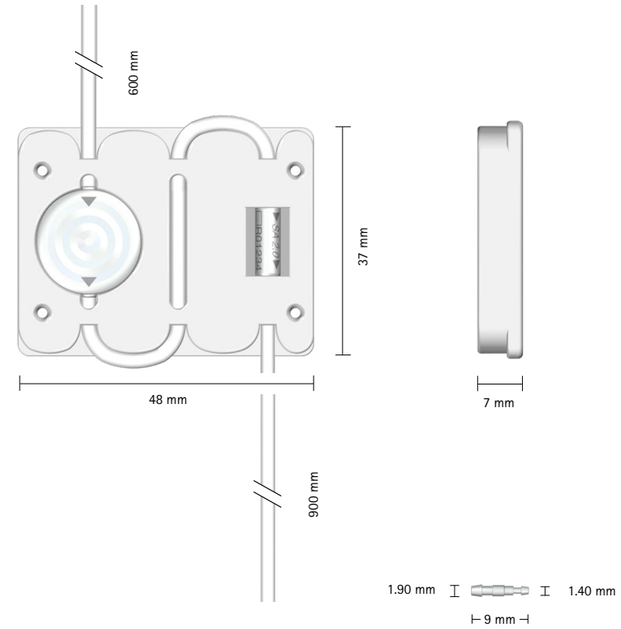
Art. No.	Graviational unit	Differential pressure unit (preset to 5 cmH_2O)
FX700T	-	0 - 20 cmH_2O
FX701T	10 cmH_2O	0 - 20 cmH_2O
FX702T	15 cmH_2O	0 - 20 cmH_2O
FX703T	20 cmH_2O	0 - 20 cmH_2O
FX704T	25 cmH_2O	0 - 20 cmH_2O
FX705T	30 cmH_2O	0 - 20 cmH_2O
FX706T	35 cmH_2O	0 - 20 cmH_2O

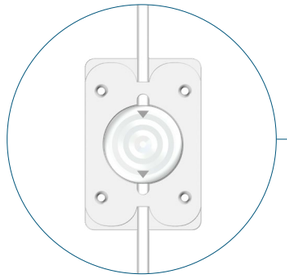
proGAV® 2.0

LUMBAR RIGHT

- Valve board premounted with:
- *proGAV 2.0*
  with proximal catheter 600 mm
  and peritoneal catheter 900 mm
- Step-down connector

Catheter: d_i = 1.2 mm, d_o = 2.5 mm





proGAV® 2.0

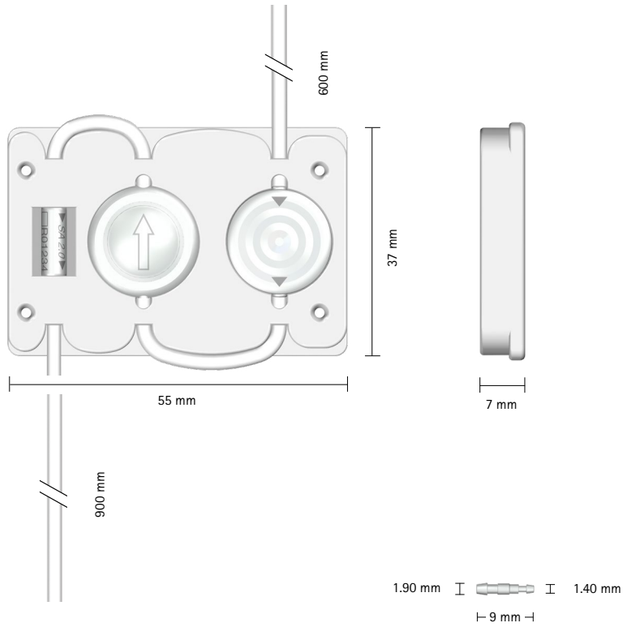
Art. No.	Graviational unit	Differential pressure unit (preset to 5 cmH_2O)
FX700T	-	0 - 20 cmH_2O
FX707T	10 cmH_2O	0 - 20 cmH_2O
FX708T	15 cmH_2O	0 - 20 cmH_2O
FX709T	20 cmH_2O	0 - 20 cmH_2O
FX710T	25 cmH_2O	0 - 20 cmH_2O
FX711T	30 cmH_2O	0 - 20 cmH_2O
FX712T	35 cmH_2O	0 - 20 cmH_2O

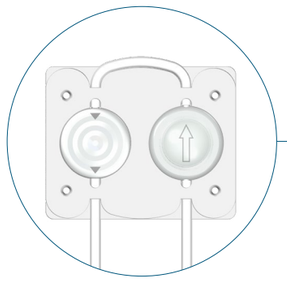
proGAV® 2.0

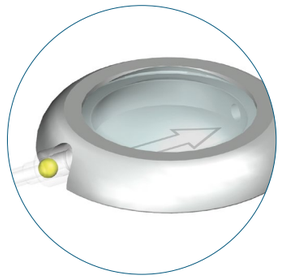
WITH *CONTROL RESERVOIR*, LUMBAR LEFT

- Valve board premounted with:
- *proGAV 2.0* with *CONTROL RESERVOIR*, proximal catheter 600 mm and peritoneal catheter 900 mm
- Step-down connector
- An additional valve in the inlet of the *CONTROL RESERVOIR* makes it possible to pump cerebrospinal fluid in the direction of drainage only, allowing inspection of both the distal drainage section as well as the lumbar catheter.

Catheter: d_i = 1.2 mm, d_o = 2.5 mm







CONTROL RESERVOIR

proGAV® 2.0

Art. No.	Graviational unit	Differential pressure unit (preset to 5 cmH_2O)
FX713T	-	0 - 20 cmH_2O
FX714T	10 cmH_2O	0 - 20 cmH_2O
FX715T	15 cmH_2O	0 - 20 cmH_2O
FX716T	20 cmH_2O	0 - 20 cmH_2O
FX717T	25 cmH_2O	0 - 20 cmH_2O
FX718T	30 cmH_2O	0 - 20 cmH_2O
FX719T	35 cmH_2O	0 - 20 cmH_2O

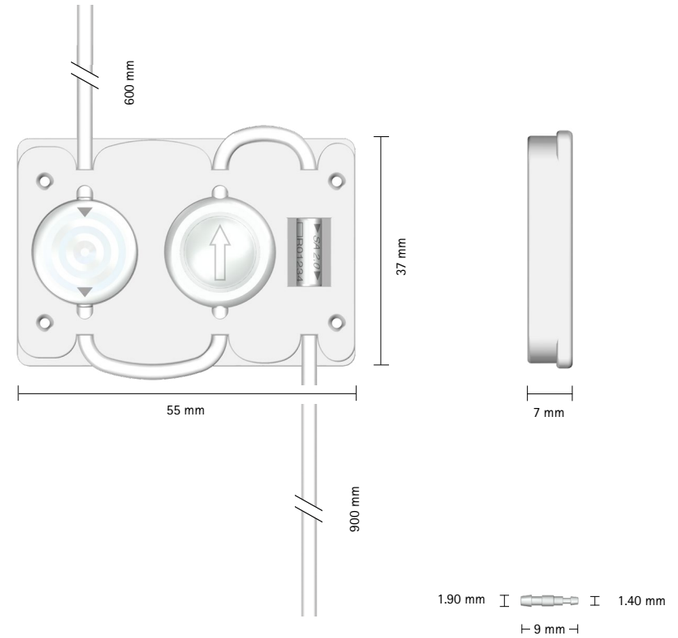
proGAV® 2.0

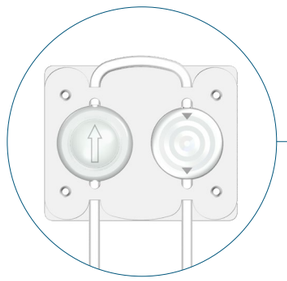
WITH *CONTROL RESERVOIR*, LUMBAR RIGHT

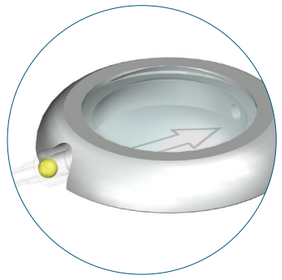
MIETHKE

- Valve board premounted with:
- *proGAV 2.0* with *CONTROL RESERVOIR*, proximal catheter 600 mm and peritoneal catheter 900 mm
- Step-down connector
- An additional valve in the inlet of the *CONTROL RESERVOIR* makes it possible to pump cerebrospinal fluid in the direction of drainage only, allowing inspection of both the distal drainage section as well as the lumbar catheter.

Catheter: d_i = 1.2 mm, d_o = 2.5 mm







CONTROL RESERVOIR

proGAV® 2.0

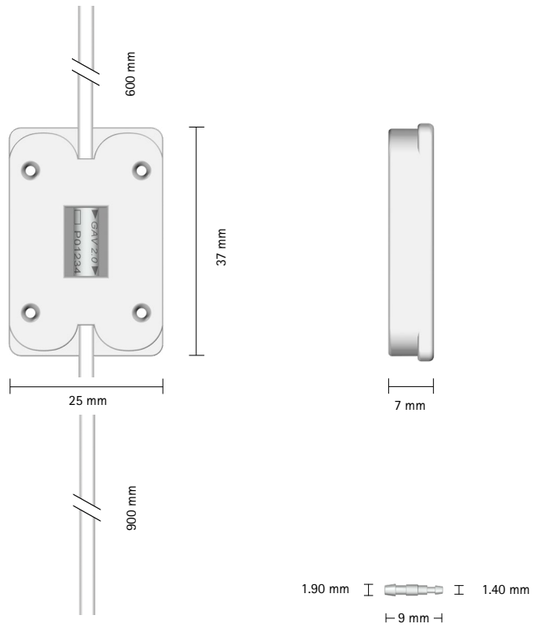
Art. No.	Graviational unit	Differential pressure unit (preset to 5 cmH_2O)
FX720T	-	0 - 20 cmH_2O
FX721T	10 cmH_2O	0 - 20 cmH_2O
FX722T	15 cmH_2O	0 - 20 cmH_2O
FX723T	20 cmH_2O	0 - 20 cmH_2O
FX724T	25 cmH_2O	0 - 20 cmH_2O
FX725T	30 cmH_2O	0 - 20 cmH_2O
FX726T	35 cmH_2O	0 - 20 cmH_2O

GAV® 2.0

LUMBAR

- Valve board premounted with:
- *GAV 2.0*
  with proximal catheter 600 mm
  and peritoneal catheter 900 mm
- Step-down connector

Catheter: d_i = 1.2 mm, d_o = 2.5 mm



GAV® 2.0

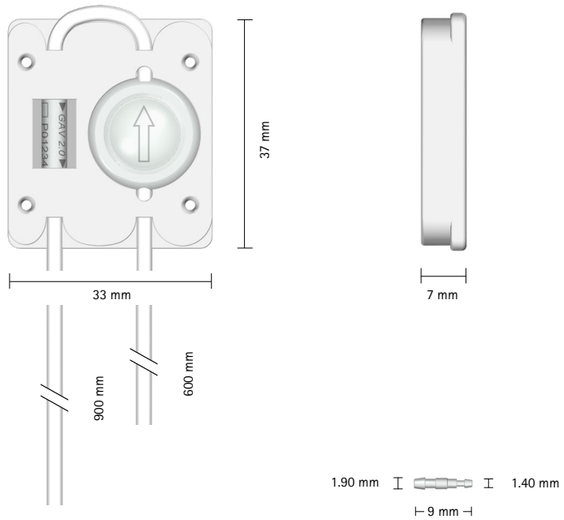
Art. No.	Lying	Upright
FX182T	5 cmH_2O	20 cmH_2O
FX183T	5 cmH_2O	25 cmH_2O
FX184T	5 cmH_2O	30 cmH_2O
FX185T	5 cmH_2O	35 cmH_2O
FX186T	10 cmH_2O	25 cmH_2O
FX187T	10 cmH_2O	30 cmH_2O

GAV® 2.0

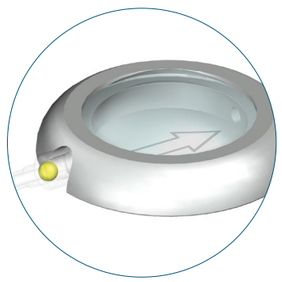
WITH *CONTROL RESERVOIR*, LUMBAR LEFT

COMING SOON

- Valve board premounted with:
- *GAV 2.0* with *CONTROL RESERVOIR*, proximal catheter 600 mm and peritoneal catheter 900 mm
- Step-down connector
- An additional valve in the inlet of the *CONTROL RESERVOIR* makes it possible to pump cerebrospinal fluid in the direction of drainage only, allowing inspection of both the distal drainage section as well as the lumbar catheter.



Catheter: d_i = 1.2 mm, d_o = 2.5 mm



CONTROL RESERVOIR

GAV® 2.0

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

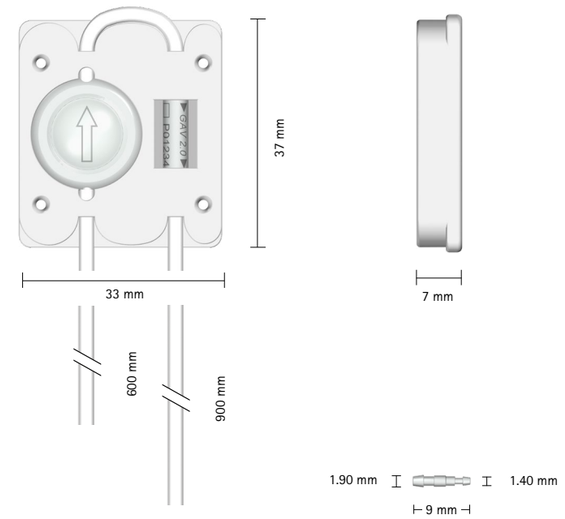
GAV® 2.0

WITH *CONTROL RESERVOIR*, LUMBAR RIGHT

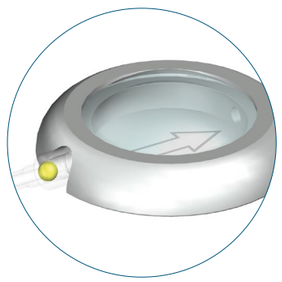
MIETHKE

COMING SOON

- Valve board premounted with:
- *GAV 2.0* with *CONTROL RESERVOIR*, proximal catheter 600 mm and peritoneal catheter 900 mm
- Step-down connector
- An additional valve in the inlet of the *CONTROL RESERVOIR* makes it possible to pump cerebrospinal fluid in the direction of drainage only, allowing inspection of both the distal drainage section as well as the lumbar catheter.



Catheter: d_i = 1.2 mm, d_o = 2.5 mm



CONTROL RESERVOIR

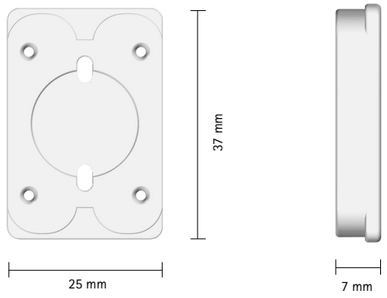
GAV® 2.0

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

MIETHKE

VALVE BOARD FOR *M.blue®* OR *proGAV® 2.0*

- Valve board
  for *M.blue* or *proGAV 2.0*

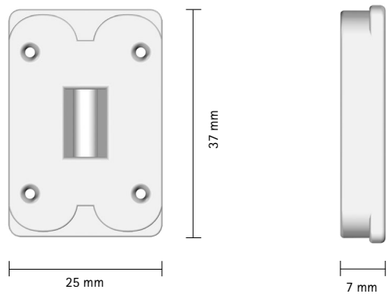


VALVE BOARD

Art. No.	Description
FV087P	Valve board for *M.blue®* or *proGAV® 2.0*

VALVE BOARD FOR *SHUNTASSISTANT® 2.0* OR *GAV® 2.0*

- Valve board
  for *SHUNTASSISTANT 2.0*
  or *GAV 2.0*



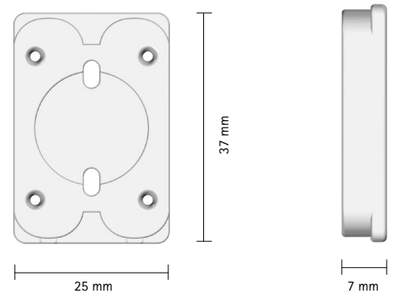
VALVE BOARD

Art. No.	Description
FV088P	Valve board for *SHUNTASSISTANT® 2.0* or *GAV® 2.0*

COMING SOON

VALVE BOARD FOR *CONTROL RESERVOIR*

- Valve board
  for *CONTROL RESERVOIR*



VALVE BOARD

Art. No.	Description
FV089P	Valve board for *CONTROL RESERVOIR*

GAV® 2.0 LP

GAV® 2.0 LP, STRAIGHT

- *GAV 2.0 LP* Valve (straight) with distal catheter (1200 mm)

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

GAV® 2.0 LP, STRAIGHT

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
FX227T	10 cmH_2O	30 cmH_2O

GAV® 2.0 LP

GAV® 2.0 LP, U FORM

MIETHKE

- *GAV 2.0 LP* Valve (U-Form) with distal catheter (1200 mm)

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

GAV® 2.0 LP, U FORM

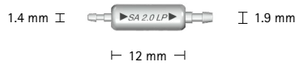
Art. No.	Lying	Upright
FX228T	5 cmH_2O	20 cmH_2O
FX229T	5 cmH_2O	25 cmH_2O
FX230T	5 cmH_2O	30 cmH_2O
FX231T	5 cmH_2O	35 cmH_2O
FX232T	10 cmH_2O	25 cmH_2O
FX233T	10 cmH_2O	30 cmH_2O

SHUNTASSISTANT® 2.0 LP

MIETHKE

SHUNTASSISTANT® 2.0 LP, STRAIGHT

- Valve LP, straight

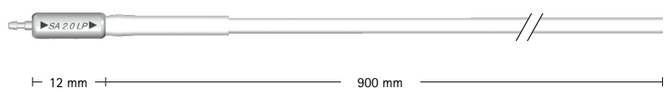


Valve: d_o = 4.2 mm
Connector: d_o= 1.4 mm
for connection with lumbar catheter
Connector: d_o= 1.9 mm
preverably used with
Catheter: d_i = 1.2 mm, d_o= 2.5 mm

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 LP, straight
  with distal catheter (900 mm)

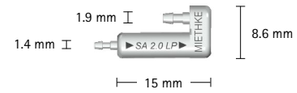


Valve: d_o = 4.2 mm
Connector: d_o= 1.4 mm
for connection with lumbar catheter
Connector: d_o= 1.9 mm
Catheter: d_i = 1.2 mm, d_o= 2.5 mm

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-FORM

- Valve LP, U-Form

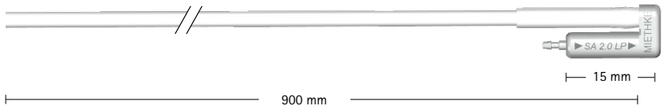


Valve: d_o = 4.2 mm
Connector: d_o= 1.4 mm
for connection with lumbar catheter
Connector: d_o= 1.9 mm
preverably used with
Catheter: d_i = 1.2 mm, d_o= 2.5 mm

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-FORM WITH DISTAL CATHETER

- Valve LP, U-Form
  with distal catheter (900 mm)



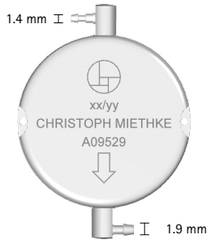
Valve: d_o = 4.2 mm
Connector: d_o= 1.4 mm
for connection with lumbar catheter
Connector: d_o= 1.9 mm
Catheter: d_i = 1.2 mm, d_o= 2.5 mm

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

DUALSWITCH® VALVE FOR LP DRAINAGE

- Single valve with two connections



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

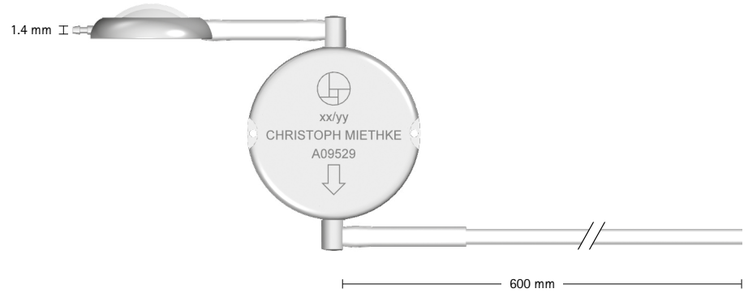
Art. No.	Lying	Upright
FV373T	5 cmH_2O	30 cmH_2O
FV374T	5 cmH_2O	40 cmH_2O
FV127T	10 cmH_2O	30 cmH_2O
FV128T	10 cmH_2O	40 cmH_2O
FV129T	10 cmH_2O	50 cmH_2O

DUALSWITCH® VALVE

MIETHKE

DUALSWITCH® SHUNT SYSTEM FOR LP DRAINAGE

- Valve system with one connection
- Valve only, with integrated flushing reservoir 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, do= 2.5 mm

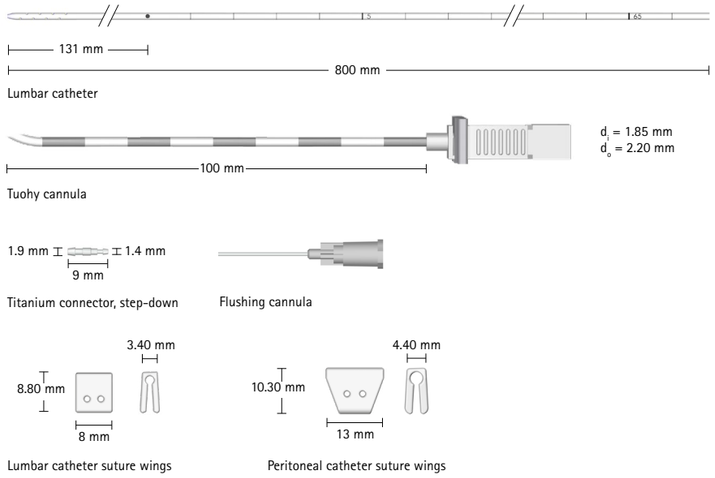
Art. No.	Lying	Upright
FV382T	5 cmH_2O	30 cmH_2O
FV383T	5 cmH_2O	40 cmH_2O
FV163T	10 cmH_2O	30 cmH_2O
FV164T	10 cmH_2O	50 cmH_2O

LUMBAR CATHETER SET

LUMBAR CATHETER WITH OPEN TIP

- Barium impregnated silicone catheter for X-ray visibility
- Catheter with 16 drainage holes, in four opposite rows
- Length markings on both sides of the catheter
- Length markings aligned to the Tuohy cannula
- Barium impregnated silicone suture wings for X-ray visibility
- Step-down connector 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, long Tuohy cannula · **Lumbar catheter with open tip, 800 mm long** · Tuohy cannula 14G, insertion length 100 mm · Lumbar catheter suture wings, peritoneal catheter suture wings · Titanium connector, step-down · Flushing cannula lumbar catheter

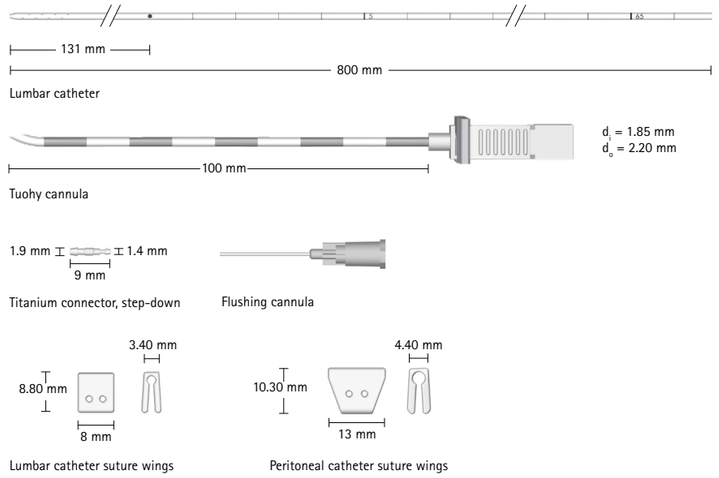
LUMBAR CATHETER SET

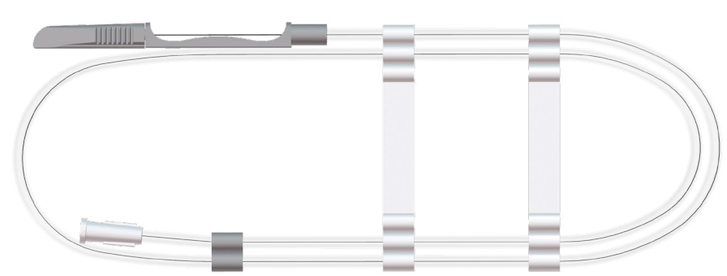
MIETHKE

LUMBAR CATHETER WITH CLOSED TIP

- Barium impregnated silicone catheter for X-ray visibility
- Catheter with 16 drainage holes, in four opposite rows
- Length markings on both sides of the catheter
- Length markings aligned to the Tuohy cannula
- Barium impregnated silicone suture wings for X-ray visibility
- Step-down connector 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
Guide wire: d_o = 0.46 mm



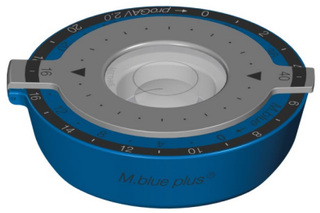

Guide wire

Art. No.	Description
FV084P	Lumbar Catheter Set, closed tip, long Tuohy cannula · Lumbar catheter with closed tip, 800 mm long · Tuohy cannula 14G, insertion length 100 mm · Lumbar catheter suture wings, peritoneal catheter suture wings · Titanium connector, step-down · Flushing cannula lumbar catheter · Guide wire

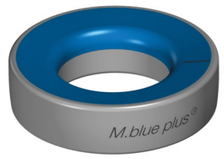
M.blue plus® INSTRUMENTS

SOFT TOUCH INSTRUMENTS

- *M.blue plus* instrument 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

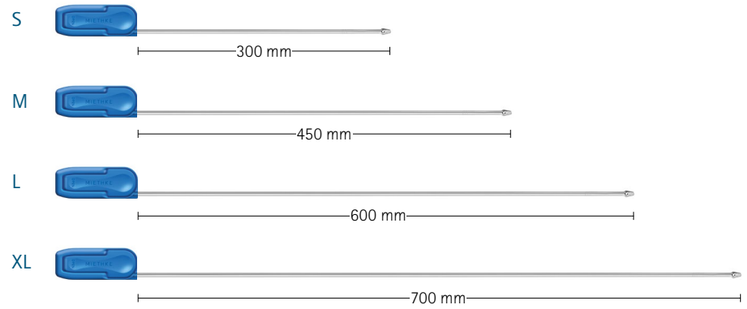
Art. No.	Instruments
FX890T	*M.blue plus*® instrument set (includes FX891T and FX892T)
FX891T	*M.blue plus*® compass
FX892T	*M.blue plus*® adjustment ring
FX893T	*M.blue plus*® adjustment assistant

TUNNELLER

VARIATIONS

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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