Gravity Assisted Valve for the Treatment of Adult Hydrocephalus





Aesculap Neurosurgery



The Valve

The Miethke *GAV*° is a unique gravitational valve for the treatment of adult hydrocephalus.

The valve combines tried and tested ball-in-cone technology with an innovative gravitational unit. This combination allows an automatic adjustment of the opening pressure according to the position of the patient's body, thus effectively eliminating the risk of potential overdrainage.

Conventional differential pressure and programmable valves are passive systems. The opening pressure selected does not adjust to the different ICP situation which occurs following a change in the patient's body position.

As a result, many hydrocephalus patients suffer from side effects ranging from chronic headaches to slit ventricles.

'Unlike conventional differential pressure shunts,
gravitational shunts can be used
in the treatment of high-risk patients with
longstanding overt ventriculomegaly in adults
Significant risk of overdrainage can be avoided.' 1

¹ Kiefer M, Eymann R, Strowitzki M, Steudel WI. Gravitational Shunts in Longstanding Overt Ventriculomegaly in Adults. Neurosurgery. 2005;57(1):109–19.



The strengths of the GAV° valve lie precisely here. By means of the gravitational mechanism, the GAV° actively varies its opening pressure as soon as this becomes necessary due to alterations in the patient's body position. As a result, CSF drainage is as physiological as possible.

This also makes the valve particularly well suited for the treatment of NPH patients, as well as for extreme forms of hydrocephalus, such as LOVA (longstanding overt ventriculomegaly in adults)¹.

The GAV° valve is made from titanium, a material that stands for outstanding precision, reliability and biocompatibility. It is MRI compatible and offers effective protection against subcutaneous pressure.

The very slim, streamlined valve design facilitates extremely easy implantation in the retroauricular area.



The Valve

- Combined ball-in-cone and gravitational unit
- Active adaptation of opening pressure to the body position maintains physiological drainage of CSF
- Effective treatment against overdrainage avoids chronic headache and hematomas
- Easy implantation of the streamlined valve lowers infection
- The use of titanium as housing material permits high flow volume with small valve dimensions, reducing the risk of obstruction

'The gravitational ball valves... showed the closest relation to physiological flow requirements.' ²

² Oikonomou J, Aschoff A, Hashemi B, Kunze S. New valves – new dangers? 22 valves (38 probes) designed in the nineties in ultralong-term tests (365 days). *Eur J Pediatr Surg.* 1999; 9 Suppl 1:23-6.





Our Recommendation:*

Height of patient	Standard valve
up to 160 cm	5 / 30 cmH ₂ 0
160 - 180 cm	5 / 35 cmH ₂ 0
over 180 cm	5 / 40 cmH ₂ 0

Your choice:

 GAV^* is available in different pressure level settings. Each pressure level is specially coded, enabling the valve to be identified on post-operative X-rays.

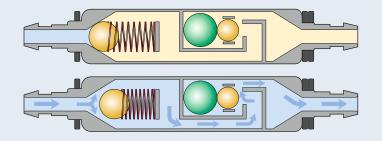
Opening pressure horizontal / vertical (cmH ₂ 0)	<i>GAV®</i> on X−ray
5 / 30	
5 / 35	
5 / 40	
10 / 30	
10 / 40	
10 / 50	

^{*} These guide values are not binding. Other specifications may be preferable depending on the individual patient and anamnesis.

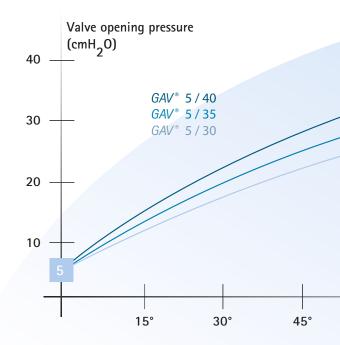
Supine Function

Implantation parallel to the patient's body axis allows precise and reliable functionality of the GAV° .

- When the patient is supine, the *GAV*[®] is in a horizontal position.
- The low pressure setting of the ball-in-cone unit keeps the patient's intraventricular pressure within physiological limits.
- The freely moving balls in the gravitational unit do not create any additional resistance when the patient is supine, and automatically keep the flow channel open in this position.





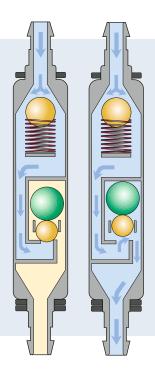


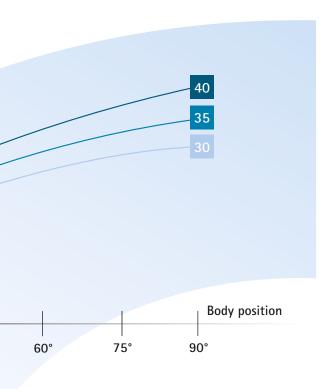


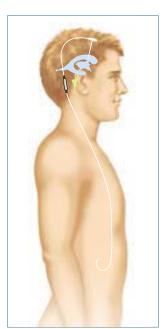
Upright Function

When the patient becomes upright, the gravitational unit is activated:

- A higher valve opening pressure is produced, since the opening pressures of both valve mechanisms (ball-in-cone and gravitational unit) must now be overcome.
- This higher valve opening pressure in the upright position effectively prevents overdrainage and guarantees physiological intracranial pressure in this body position, too.







GAV*

■ Single valve



Connector: d = 1.9 mmGrav. valve: d = 4.6 mm

Scale 1:1

50

Valve pressure level (cmH₂0*)

Cat. no.		85 <u>4</u>	
FV310T**	up to 160 cm	5	30
FV311T**	160 - 180 cm	5	35
FV312T**	over 180 cm	5	40
■ Special pressure	levels		
FV313T		10	30
FV314T		10	40

10

FV315T

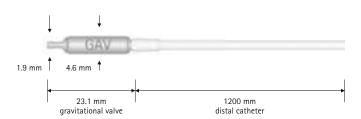
^{* 1} cm $H_2O = 0.74$ mmHg

^{**} Standard pressure level
These guide values are not binding.
Other specifications may be preferable depending on the individual patient and anamnesis.



GAV® with distal catheter

Single valve with integrated distal catheter



Connector: d = 1.9 mm

Grav. valve: d = 4.6 mm

Catheter: $d_1 = 1.2 \text{ mm}, d_0 = 2.5 \text{ mm}$

Scale 1:1

Valve pressure level (cmH₂0*)

Cat. no.		05 <u>4</u>	
FV316T**	up to 160 cm	5	30
FV317T**	160 - 180 cm	5	35
FV318T**	over 180 cm	5	40
• Special proceure	lovols		

■ Special pressure levels

FV319T	10	30
FV320T	10	40
FV321T	10	50

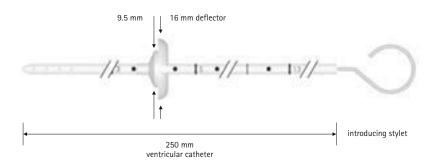
^{* 1} cm $H_2O = 0.74$ mmHg

^{**} Standard pressure level These guide values are not binding.
Other specifications may be preferable depending on the individual patient and anamnesis.

GAV* SHUNTSYSTEM

- Valve with integrated distal catheter
- Ventricular catheter with introducing stylet and deflector





d = 1.9 mm Connector: Grav. valve: d = 4.6 mm

Catheter: $d_i = 1.2 \text{ mm}, d_0 = 2.5 \text{ mm}$

Valve pressure level (cmH₂O*)

Scale 1:1

Cat. no.		05A	
FV322T**	up to 160 cm	5	30
FV323T**	160 - 180 cm	5	35
FV324T**	over 180 cm	5	40
■ Special pressure	levels		

Special	pressure	leve	IS

FV325T	10	30
FV326T	10	40

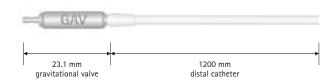
^{*} $1 \text{ cmH}_2\text{O} = 0.74 \text{ mmHg}$

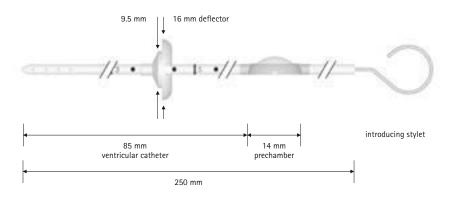
^{**} Standard pressure level These guide values are not binding.
Other specifications may be preferable depending on the individual patient and anamnesis.



GAV* SHUNTSYSTEM with prechamber

- Valve with integrated distal catheter
- Ventricular catheter with introducing stylet, integrated prechamber and deflector





Connector: d = 1.9 mmGrav. valve: d = 4.6 mm

Catheter: $d_i = 1.2 \text{ mm}, d_0 = 2.5 \text{ mm}$

Valve pressure level (cmH₂0*)

Cat. no.		05A	
FV328T**	up to 160 cm	5	30
FV329T**	160 - 180 cm	5	35
FV330T**	over 180 cm	5	40
■ Special pressure	e levels		
FV331T		10	30
FV332T		10	40

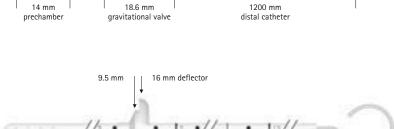
Scale 1:1

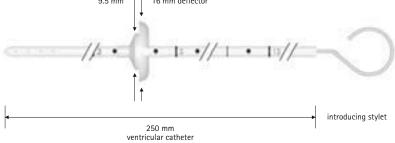
^{*} $1 \text{ cmH}_2\text{O} = 0.74 \text{ mmHg}$

^{**} Standard pressure level These guide values are not binding.
Other specifications may be preferable depending on the individual patient and anamnesis.

GAV* SHUNTSYSTEM with prechamber

- Valve with integrated distal catheter and prechamber
- Ventricular catheter with introducing stylet and deflector





Connector: d = 1.9 mmGrav. valve: d = 4.6 mm

Catheter: $d_i = 1.2 \text{ mm}, d_0 = 2.5 \text{ mm}$

Valve pressure level (cmH₂0*)

Scale 1:1

40

Cat. no.		05 <u>4</u>	
FV340T**	up to 160 cm	5	30
FV341T**	160 - 180 cm	5	35
FV342T**	over 180 cm	5	40
■ Special pressure	levels		
FV343T		10	30

10

FV344T

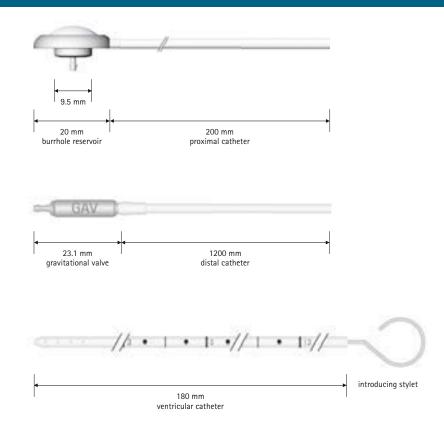
^{*} $1 \text{ cmH}_2\text{O} = 0.74 \text{ mmHg}$

^{**} Standard pressure level
These guide values are not binding.
Other specifications may be preferable depending on the individual patient and anamnesis.



GAV* SHUNTSYSTEM with burrhole reservoir

- Burrhole reservoir with integrated proximal catheter
- Valve with integrated distal catheter
- Ventricular catheter with introducing stylet



Connector: d = 1.9 mm Grav. valve: d = 4.6 mm

Catheter: $d_i = 1.2 \text{ mm}, d_0 = 2.5 \text{ mm}$

Scale 1:1

Valve pressure level (cmH₂O*)

Cat. no.		05 <u>4</u>	
FV334T**	up to 160 cm	5	30
FV335T**	160 - 180 cm	5	35
FV336T**	over 180 cm	5	40

■ Special pressure levels

FV337T	10	30
FV338T	10	40
FV339T	10	50

^{*} $1 \text{ cmH}_2\text{O} = 0.74 \text{ mmHg}$

^{**} Standard pressure level These guide values are not binding.
Other specifications may be preferable depending on the individual patient and anamnesis.

GAV* SHUNTSYSTEM with SPRUNG RESERVOIR

- SPRUNG RESERVOIR* with integrated proximal catheter
 - *Flushing reservoir allows for the checking of the ventricular catheter's patency and ensures only distal drainage.
- Valve with integrated distal catheter
- Ventricular catheter with introducing stylet

 $\begin{array}{ll} \mbox{Connector:} & \mbox{d} = 1.9 \mbox{ mm} \\ \mbox{Grav. valve:} & \mbox{d} = 4.6 \mbox{ mm} \\ \mbox{Catheter:} & \mbox{d}_{1} = 1.2 \mbox{ mm, d}_{0} = 2.5 \mbox{ mm} \\ \end{array}$

20 mm
SPRUNG RESERVOIR

200 mm
proximal catheter

23.1 mm
gravitational valve

1200 mm
distal catheter

introducing stylet

ventricular catheter

Scale 1:1

30

40

Valve pressure level (cmH₂O*)

Cat. no.		05A					
FV346T**	up to 160 cm	5	30				
FV347T**	160 - 180 cm	5	35				
FV348T**	over 180 cm	5	40				
■ Special pressure levels							
		ı	1				

10

10

FV349T

FV350T

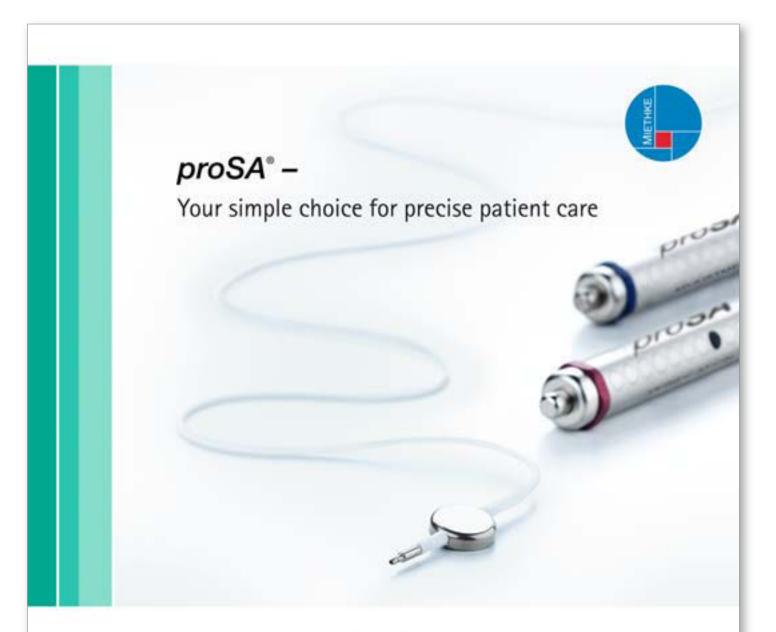
^{*} $1 \text{ cmH}_2\text{O} = 0.74 \text{ mmHg}$

^{**} Standard pressure level: These guide values are not binding.
Other specifications may be preferable depending on the individual patient and anamnesis.



Our Shunt Systems - Your Choice

Shunt System		Description	Indication				Patient		Grav	MRT-
			adult HC	ped. HC	NPH	F	active	bed ridden	assist.	comp. 3 Tesla
proSA°		Adjustable gravitational unit with differential pressure valve	X	X	X		X	X	X	X
proGAV°		Adjustable differential pressure valve with gravitational unit	X	X	X		X	X	X	X
GAV [®]		Gravitational valve for adult hydrocephalus	X		X		X		X	X
paediGAV°		Gravitational valve for pediatric hydrocephalus		X			X		X	X
SHUNTASSISTANT*	-	Gravitational unit for integration in shunt systems, to prevent overdrainage	X	X	X		X		X	X
DUALSWITCH® VALVE		Gravitational valve for extra large CSF flow volume	X		X	X	X		X	X
miniNAV°	-450	Differential pressure valve especially for premature and newborn infants or recumbent, non-active patients	X	X				X		X
Accessories	25.0									



Aesculap Neurosurgery

- New generation of adjustable MIETHKE shunts
- Unique treatment options for hydrocephalus patients
- Wide adjustment range from 0 to 40 cmH₂0
- 3 Tesla MRI conditional
- Effective treatment against overdrainage
- No inadvertent readjustments by external magnetic fields

Aesculap - a B. Braun company



Aesculap AG | Am Aesculap-Platz | 78532 Tuttlingen | Germany Phone +49 (0) 74 61 95-0 | Fax +49 (0) 74 61 95-26 00 | www.aesculap.com





Aesculap, Tuttlingen

Miethke, Potsdam

Alliance for innovations

When two strong partners combine their expertise, innovative and groundbreaking solutions frequently arise that would scarcely have been possible working alone.

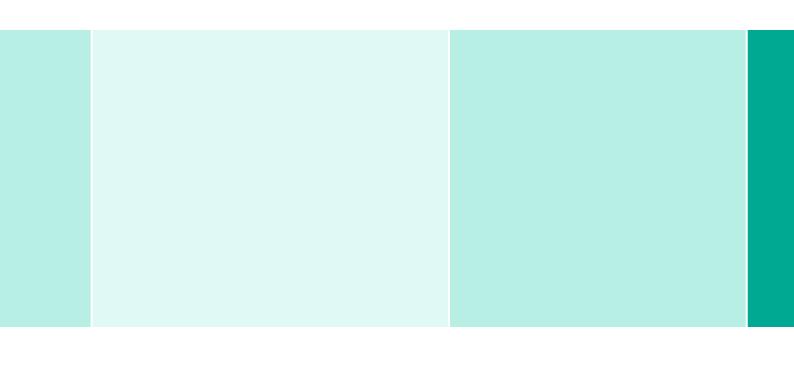
Aesculap and Miethke have followed this path and have been cooperating since 1999. In 2010 the successful partnership has been further strengthened, with the shareholding by Aesculap AG in Miethke GmbH & Co. KG. The goal was and is to develop better solutions for the difficult treatment of hydrocephalus and to make them available all over the world.

This vision has inspired and motivated everyone involved. An intensive dialogue was initiated with customers, doctors and patients about the problems associated with this complex medical condition. New solutions were developed and discussed in small circles of experts and scientific symposia.

The eventual outcome of this fruitful process was the market introduction of a gravitational unit – which can effectively reduce overdrainage of cerebrospinal fluid. A unique product worldwide, and a milestone in modern hydrocephalus therapy.

What has already been achieved is only the beginning. For us, it is a duty and a necessity to continue along the path we have begun. In the patients' interest we will carry on our extensive investment into research and development and will not tire of learning more, collecting new insights and remaining open for future developments.

We will continue to venture in new directions and cross frontiers in order to be able to help where no solutions have yet been found.



Manufacturer acc. MDD 93/42/EEC

CHRISTOPH MIETHKE GMBH & CO. KG

Christoph Miethke GmbH & Co. KG | Ulanenweg 2 | 14469 Potsdam | Germany Phone +49 331 62 083-0 | Fax +49 331 62 083-40 | www.miethke.com

Aesculap AG \mid Am Aesculap-Platz \mid 78532 Tuttlingen \mid Germany Phone +49 7461 95-0 \mid Fax +49 7461 95-26 00 \mid www.aesculap.com

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