

# Aesculap Neurosurgery

*DUALSWITCH® VALVE*

*MONOSTEP® VALVE*



Shunt systems for hydrocephalus treatment



*DUALSWITCH<sup>®</sup> VALVE*  
*MONOSTEP<sup>®</sup> VALVE*



## *Alliance for innovation*

When two strong partners combine their know-how, this often leads to innovative and groundbreaking solutions, which could not be achieved independently by any of the partners.

Following this philosophy, Aesculap and Miethke have been cooperating since 1999. Our aim was and still is to develop and make available worldwide better solutions for the complex treatment of hydrocephalus.

This vision inspired and motivated everybody in our cooperation. It started with an intensive exchange with customers, doctors and patients about the difficult issues involved in hydrocephalus therapy. New solutions were conceived and discussed in small circles of experts and at scientific meetings.

This process finally resulted in the market launch of the first gravitational system, which effectively prevents overdrainage of cerebrospinal fluid (CSF). – a world first and milestone in modern hydrocephalus therapy.

So we already achieved a lot, but this is only the beginning. We are determined to continue on the route we embarked on. For the good of the patient, we will continue with our considerable investments in research and development and will not tire to learn more, create further expertise and remain open for future developments.



*Aesculap, Tuttlingen*



*Miethke, Potsdam*

*We will continue to venture in new directions  
and cross every frontier to provide help for cases where  
a solution has not been found yet.*



# DUALSWITCH® VALVE MONOSTEP® VALVE

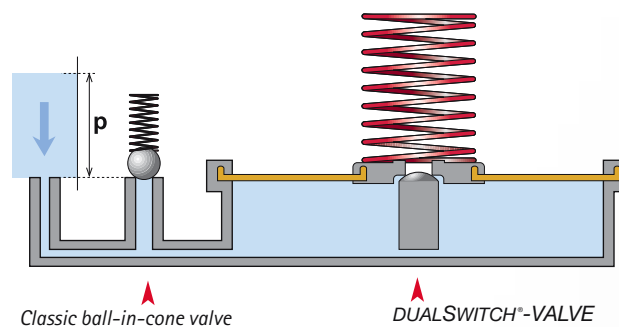
## DUALSWITCH® VALVE MONOSTEP® VALVE the valve

When treated with a shunt system, patients with posthemorrhage hydrocephalus are faced with the risk of valve blockages due to blood-loaded cerebrospinal fluid. A high protein level or tumor cells in the CSF, too, can lead to such problems. These issues were given particular consideration in the development of the *DUALSWITCH® VALVE* and *MONOSTEP® VALVE*. The parallel valve chambers present a very large surface area to the CSF, thus ensuring reliable operation even with contaminated fluid.

As is evident from the equation

$$P=F/A \quad (P=\text{pressure}, F=\text{force}, A=\text{area}),$$

a large area also allows a stronger force. This force is provided by a relatively stiff spring, making the valve mechanism effectively immune against any effects caused by proteins, blood or tumor cells.



With the *DUALSWITCH® VALVE* and the *MONOSTEP® VALVE* we offer you two "special solutions", which catch the eye not least because of their particular shell design.



For many years now, the *DUALSWITCH® VALVE* is also used very successfully in the treatment of NPH. Numerous publications offer evidence for its effectiveness for that indication. In a similar way as in our *GAV®* valve, a special gravitational mechanism in the *DUALSWITCH® VALVE* prevents shunt overdrainage.

*“After 6 years of experience with the DSV, we arrived at a clearly positive assessment of the reliability of the design principle of this gravity-assisted hydrostatic valve. ...*

*Because of the low incidence of over and under-drainage and the good postoperative results, we recommend implanting DSV as ventriculo-peritoneal shunts for patients with INPH.”\**

\*U. Meier, Department of Neurosurgery, clinic for accident cases Berlin, Berlin, Germany  
"Gravity valves for idiopathic normal-pressure hydrocephalus: a prospective study with 60 patients"  
Acta Neurochir (2005) [Suppl] 95:201-205





# DUALSWITCH® VALVE MONOSTEP® VALVE

DUALSWITCH® VALVE  
the valve

*“The gravitational ball valves...showed the closest  
relation to physiological flow requirements.”\**

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

- Valve system with parallel chambers and integrated gravity unit
- Physiological CSF drainage through active adaptation of the opening pressure to the patient's physical position
- Effective protection against CSF overdrainage, thus prevention of slit ventricle syndrome
- Reduced risk of blockage thanks to maximized flow volume and very robust yoke springs

DUALSWITCH®-VALVE





#### Our recommendation:\*\*

| Patient's height | Standard valve             | NPH valve                 |
|------------------|----------------------------|---------------------------|
| up to 160 cm     | 10 / 30 cmH <sub>2</sub> O | 5 / 30 cmH <sub>2</sub> O |
| 160 - 180 cm     | 10 / 40 cmH <sub>2</sub> O | 5 / 40 cmH <sub>2</sub> O |
| above 180 cm     | 10 / 50 cmH <sub>2</sub> O | 5 / 50 cmH <sub>2</sub> O |

\*\* These guide values are not binding. Other specifications may be preferable for the individual patient and anamnesis.

- We recommend implanting the *DUALSWITCH® VALVE* in the thoracic region. The implantation height of the implant does not affect its functionality in any way.

#### Your choice:

The *DUALSWITCH® VALVE* is available with various pressure levels. Each pressure level is identified by a special marker code, which can be read through postoperative radiography.

| Opening pressure horizontal/vertical (cmH <sub>2</sub> O) | <i>DUALSWITCH®-VALVE</i> X-ray marker code | Opening pressure horizontal/vertical (cmH <sub>2</sub> O) | <i>DUALSWITCH®-VALVE</i> X-ray marker code |
|---|--|---|--|
| 5 / 30  |  | 10 / 50   |  |
| 5 / 40  |  | 13 / 30   |  |
| 5 / 50  |  | 13 / 40   |  |
| 10 / 30   |  | 13 / 50   |  |
| 10 / 40   |  |   |  |

#### *DUALSWITCH® VALVE*

*Our recommendation  
Your choice*



# DUALSWITCH® VALVE MONOSTEP® VALVE

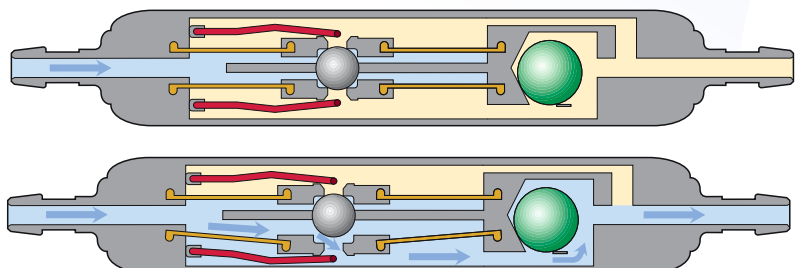
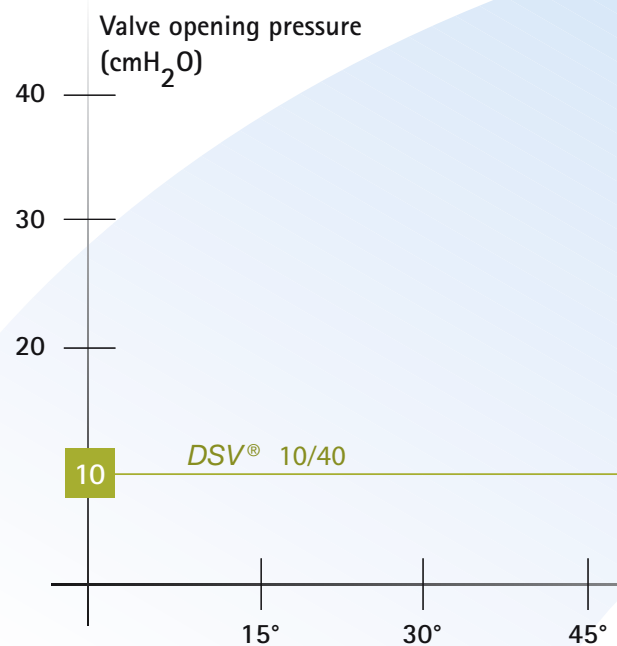
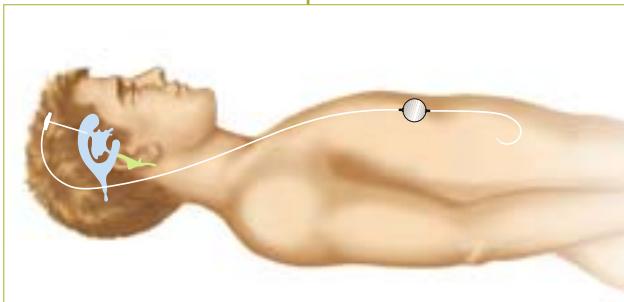
## DUALSWITCH® VALVE

### The Functions

#### Supine Function

Precise and safe functioning of the *DUALSWITCH® VALVE* is ensured by implanting the valve parallel to the body axis.

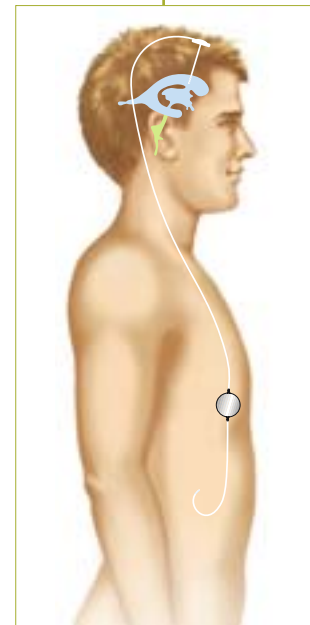
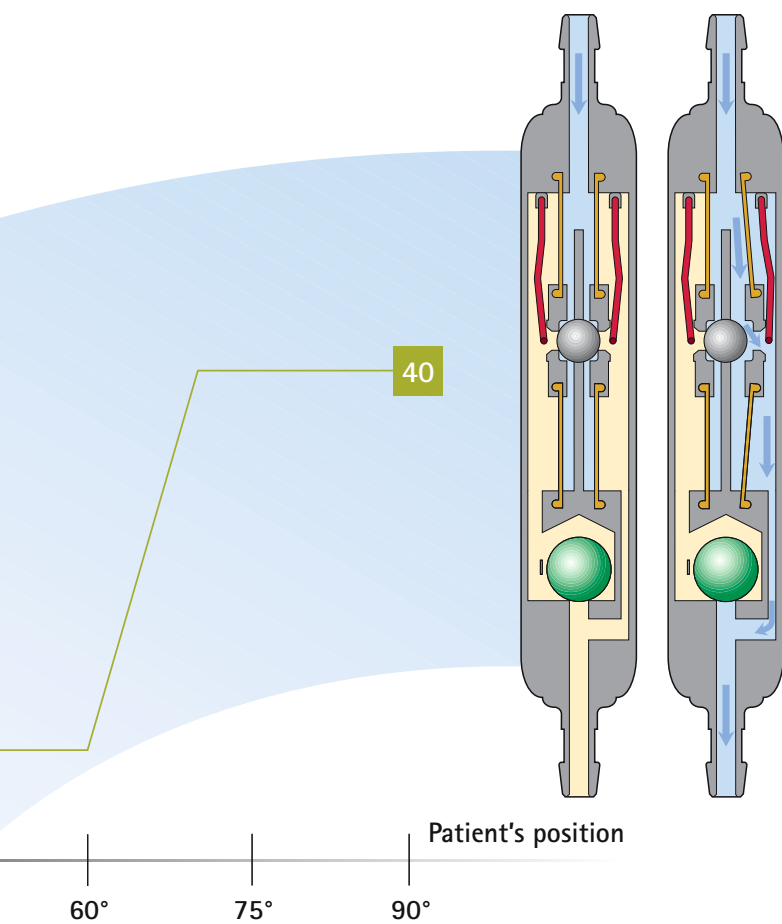
- When the patient is supine, the *DUALSWITCH® VALVE* is in a horizontal position.
- The low-pressure level valve chamber keeps the patient's intraventricular pressure within physiological limits.
- The ball of the gravity unit can move freely and does not present an additional flow resistance while the patient is lying down, because the flow channel at this point is kept open automatically.





## DUALSWITCH® VALVE

### The Functions



### Upright Function

The gravity unit is activated whenever the patient moves to an upright position.

- From a body angle of approx. 60°, the valve automatically switches to activation of the higher-pressure valve chamber.
- This higher valve opening pressure in the upright position effectively prevents overdrainage and ensures that a physiological brain pressure is maintained in this position too.

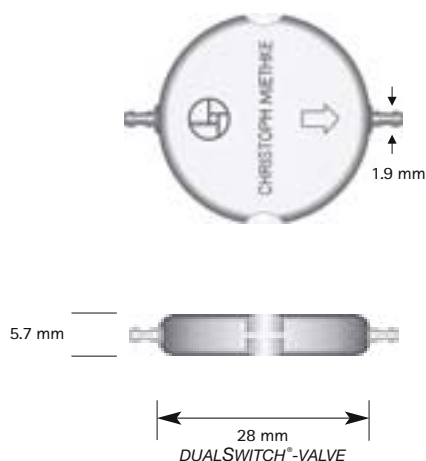


# DUALSWITCH® VALVE

## MONOSTEP® VALVE

### DUALSWITCH® VALVE

Single valve with two connections



Scale 1:1

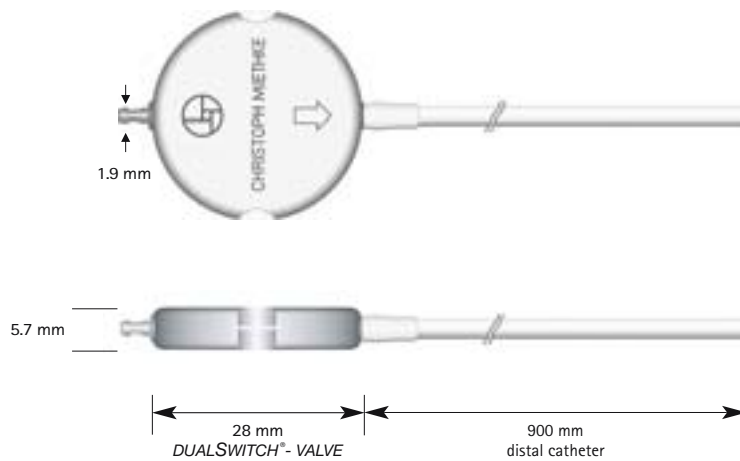
| Art. no. | Valve pressure level (cmH <sub>2</sub> O*) |    |
|----------|--|----|
|          |  |    |
| FV190T   | 5  | 30 |
| FV191T   | 5  | 40 |
| FV192T   | 5  | 50 |
| FV100T   | up to 160 cm**                             | 30 |
| FV101T   | 160 – 180 cm**                             | 40 |
| FV102T   | above 180 cm**                             | 50 |
| FV103T   | 13   | 30 |
| FV104T   | 13   | 40 |
| FV105T   | 13   | 50 |

\*\*Standard pressure levels. These guide values are not binding. Other specifications may be preferable for the individual patient and anamnesis.

\* 1 cmH<sub>2</sub>O = 0.74 mmHg



## DUALSWITCH® VALVE with distal catheter





Scale 1:1

Single valve with  
preattached distal  
catheter

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

DUALSWITCH® VALVE

| Art. no. | Valve pressure level (cmH <sub>2</sub> O*)  |   |
|----------|---|---|
|          |  |  |
| FV370T   | 5   | 30  |
| FV371T   | 5   | 40  |
| FV372T   | 5   | 50  |
| FV118T   | up to 160 cm**  | 30  |
| FV119T   | 160 – 180 cm**  | 40  |
| FV120T   | above 180 cm**  | 50  |
| FV121T   | 13  | 30  |
| FV122T   | 13  | 40  |
| FV123T   | 13  | 50  |

\*\*Standard pressure levels. These guide values are not binding. Other specifications may be preferable for the individual patient and anamnesis.

\* 1 cmH<sub>2</sub>O = 0.74 mmHg



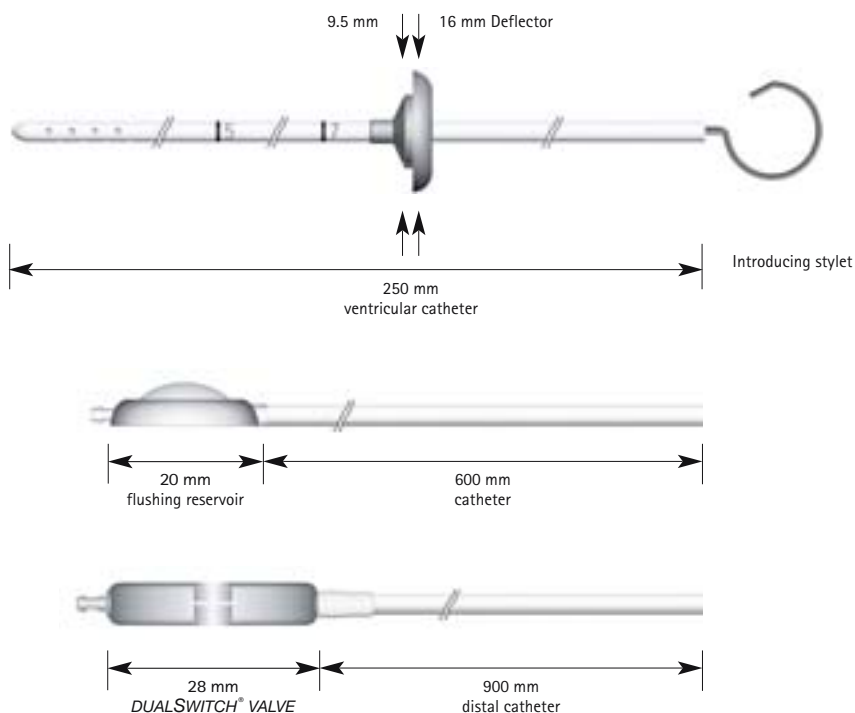
# DUALSWITCH® VALVE MONOSTEP® VALVE

## DUALSWITCH® SHUNT SYSTEM with FLUSHING RESERVOIR

### Valve system with two connections

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

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



Scale 1:1

### Valve pressure level (cmH<sub>2</sub>O\*)

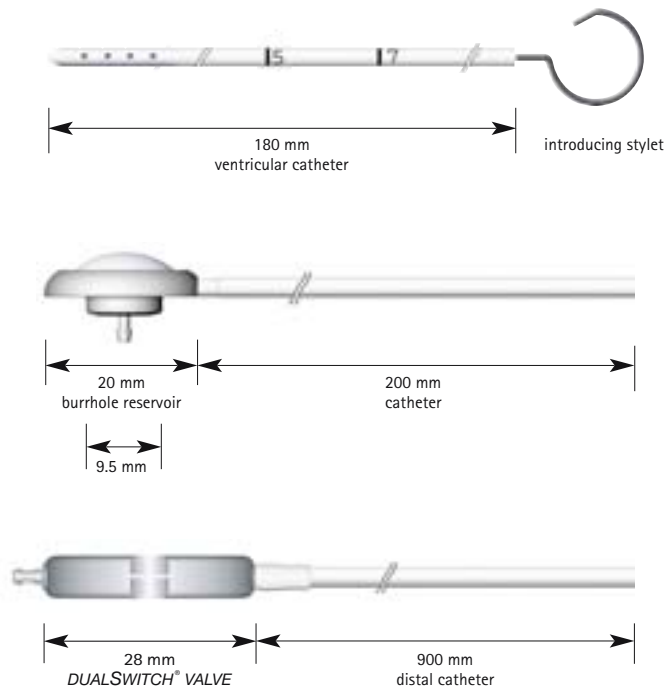
| Art. no. |                |    |
|----------|----------------|----|
| FV379T   | 5              | 30 |
| FV380T   | 5              | 40 |
| FV381T   | 5              | 50 |
| FV172T   | up to 160 cm** | 30 |
| FV173T   | 160 - 180 cm** | 40 |
| FV174T   | above 180 cm** | 50 |
| FV175T   | 13             | 30 |
| FV176T   | 13             | 40 |
| FV177T   | 13             | 50 |

\*\*Standard pressure levels. These guide values are not binding. Other specifications may be preferable for the individual patient and anamnesis.

\* 1 cmH<sub>2</sub>O = 0.74 mmHg



## DUALSWITCH® SHUNT SYSTEM with BURRHOLE RESERVOIR



Scale 1:1

### Valve system with two connections

- Ventricular catheter with mandrel
- Burrhole reservoir with integrated catheter
- Valve with integrated distal catheter

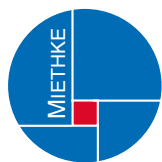
all catheters:  $d_i = 1.2 \text{ mm}$ ,  $d_o = 2.5 \text{ mm}$

DUALSWITCH® VALVE

| Art. no. | Valve pressure level (cmH <sub>2</sub> O*) |    |
|----------|--|----|
|          |  |    |
| FV376T   | 5  | 30 |
| FV377T   | 5  | 40 |
| FV378T   | 5  | 50 |
| FV145T   | up to 160 cm**                             | 30 |
| FV146T   | 160 – 180 cm**                             | 40 |
| FV147T   | above 180 cm**                             | 50 |
| FV148T   | 13   | 30 |
| FV149T   | 13   | 40 |
| FV150T   | 13   | 50 |

\*\*Standard pressure levels. These guide values are not binding. Other specifications may be preferable for the individual patient and anamnesis.

\* 1 cmH<sub>2</sub>O = 0.74 mmHg



# DUALSWITCH® VALVE MONOSTEP® VALVE

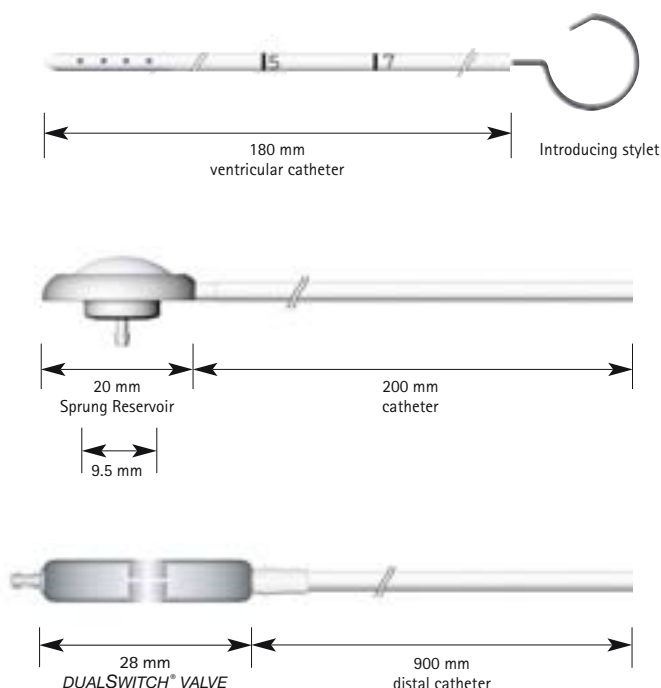
## DUALSWITCH® SHUNT SYSTEM with SPRUNG RESERVOIR\*

### Valve system with two connections

- Ventricular catheter with introducing stylet
- Burrhole reservoir with integrated catheter; design acc. to Dr. Sprung
- Valve with integrated catheter



\* Flushable reservoir for control of the ventricular catheter's patency and the distal share of drainage

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



Scale 1:1

### Valve pressure level (cmH<sub>2</sub>O\*)

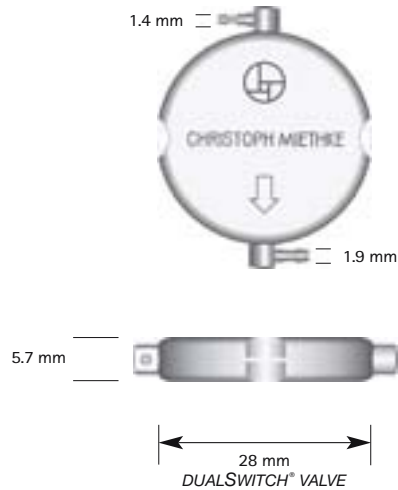
| Art. no.              |  |  |
|-----------------------|---|---|
| FV385T                | 5   | 30  |
| FV386T                | 5   | 40  |
| FV387T                | 5   | 50  |
| FV388T up to 160 cm** | 10  | 30  |
| FV389T 160 – 180 cm** | 10  | 40  |
| FV390T above 180 cm** | 10  | 50  |

\*\*Standard pressure levels. These guide values are not binding. Other specifications may be preferable for the individual patient and anamnesis.

\* 1 cmH<sub>2</sub>O = 0.74 mmHg



## DUALSWITCH® VALVE for L-P drainage





Single valve with two connections

■ for lumbo-peritoneal drainage

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

Scale 1:1

### Valve pressure level (cmH<sub>2</sub>O\*)

| Art. no. |   |   |
|----------|---|---|
|          |  |  |
| FV373T   | 5   | 30  |
| FV374T   | 5   | 40  |
| FV375T   | 5   | 50  |
| FV127T   | up to 160 cm**  | 10  |
| FV128T   | 160 – 180 cm**  | 10  |
| FV129T   | above 180 cm**  | 10  |
| FV130T   | 13  | 30  |
| FV131T   | 13  | 40  |
| FV132T   | 13  | 50  |

\*\*Standard pressure levels. These guide values are not binding. Other specifications may be preferable for the individual patient and anamnesis.

\* 1 cmH<sub>2</sub>O = 0.74 mmHg



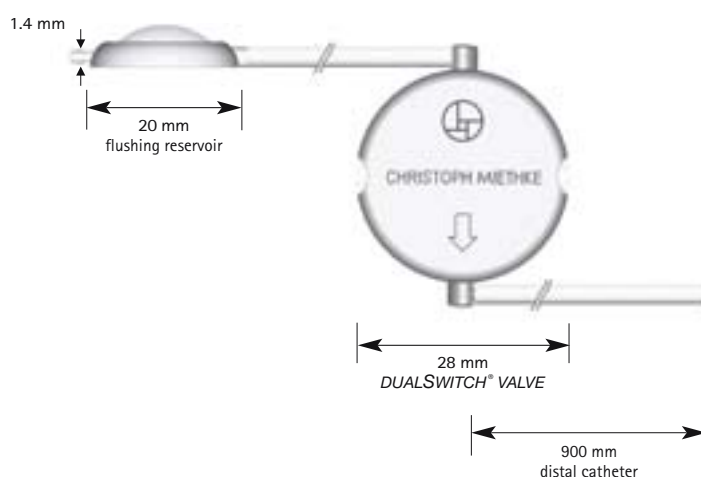
# DUALSWITCH® VALVE MONOSTEP® VALVE

## DUALSWITCH® SHUNT SYSTEM for L-P drainage

### Valve system with one connection



- Valve only, with integrated flushing reservoir and integrated distal catheter
- for lumbo-peritoneal drainage

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



Scale 1:1

### Valve pressure level (cmH<sub>2</sub>O\*)

| Art. no.              |  |  |
|-----------------------|---|---|
| FV382T                | 5   | 30  |
| FV383T                | 5   | 40  |
| FV384T                | 5   | 50  |
| FV163T up to 160 cm** | 10  | 30  |
| FV164T 160 - 180 cm** | 10  | 40  |
| FV165T above 180 cm** | 10  | 50  |
| FV166T                | 13  | 30  |
| FV167T                | 13  | 40  |
| FV168T                | 13  | 50  |

\*\*Standard pressure levels. These guide values are not binding. Other specifications may be preferable for the individual patient and anamnesis.

\* 1 cmH<sub>2</sub>O = 0.74 mmHg





# *proGAV*<sup>®</sup> – the adjustable MIETHKE gravitational valve

3 Tesla  
MRI safe



## Aesculap Neurosurgery

- Adjustable ball-in-cone valve, 0–200 mmH<sub>2</sub>O
- Integrated "SHUNTASSISTANT<sup>®</sup>" for effective protection against overdrainage
- "Active-Lock" mechanism to prevent unintended readjustment in MRI fields up to 3 Tesla
- Set pressure level can be read without use of X-ray imaging
- Handy instruments for easy readjustment and reading of the pressure level
- High-precision titanium valve technology



# DUALSWITCH® VALVE

## MONOSTEP® VALVE

### MONOSTEP® VALVE

The valve  
Your choice

In contrast to the DUALSWITCH® VALVE, the MONOSTEP® VALVE has only one valve chamber and no gravity unit, so that it operates as a standard differential pressure valve. Its unique configuration with a relatively large flow volume and a robust yoke spring ensure reliable operation.

MONOSTEP® VALVE



#### Your choice:

The MONOSTEP® VALVE is available with various pressure levels. Each pressure level is identified by a special marker code, which can be read through postoperative radiography.

| Opening pressure<br>horizontal (cmH <sub>2</sub> O) | MONOSTEP® VALVE<br>X-ray marker code |
|---|--------------------------------------|
| 5   |                                      |
| 7   |                                      |
| 10  |                                      |
| 13  |                                      |
| 16  |                                      |



Our recommendation:\*\*

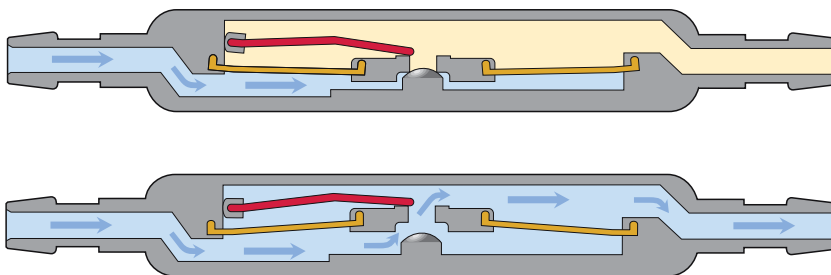
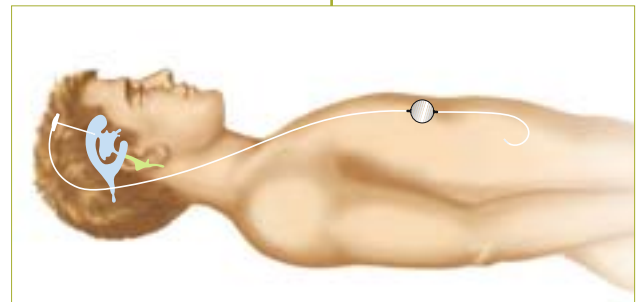
| Patient's height | Standard valve        |
|------------------|-----------------------|
| any height       | 10 cmH <sub>2</sub> O |

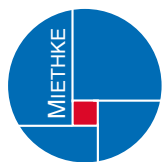
\*\* These guide values are not binding. Other specifications may be preferable for the individual patient and anamnesis.

**MONOSTEP® VALVE**  
*Our recommendation*  
*Mode of operation*

### Horizontal mode

- The **MONOSTEP® VALVE** is particularly suitable for passive, recumbent patients.
- For active patients who will stand up or sit, we recommend combining this valve with a **SHUNT-ASSISTANT®** or **PAEDI-SHUNTASSISTANT®**, respectively.

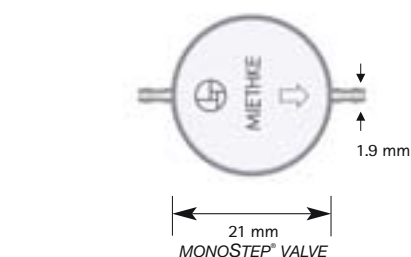





# DUALSWITCH® VALVE MONOSTEP® VALVE

## MONOSTEP® VALVE

Single valve with two connections



Scale 1:1

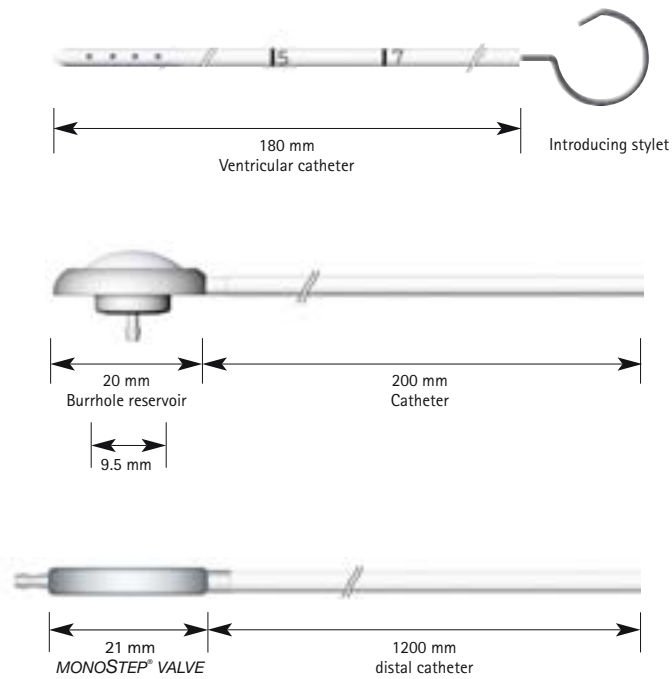
| Art. no. | Valve pressure level (cmH <sub>2</sub> O*)   |
|----------|--|
|          |  |
| FV200T   | 5  |
| FV201T   | 7  |
| FV202T** | 10   |
| FV203T   | 13   |
| FV204T   | 16   |

\*\*Standard pressure level. This guide value is not binding. Other specifications may be preferable for the individual patient and anamnesis.

\* 1 cmH<sub>2</sub>O = 0.74 mmHg



## MONOSTEP® SHUNT SYSTEM with BURRHOLE RESERVOIR



Scale 1:1

### Valve system with two connections

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

all catheters:  $d_i = 1.2 \text{ mm}$ ,  $d_a = 2.5 \text{ mm}$

| Art. no. | Valve pressure level (cmH <sub>2</sub> O*) |  |
|----------|--|--|
|          |  |  |
| FV210T   | 5  |  |
| FV211T   | 7  |  |
| FV212T** | 10   |  |
| FV213T   | 13   |  |
| FV214T   | 16   |  |

\*\*Standard pressure level. This guide value is not binding. Other specifications may be preferable for the individual patient and anamnesis.

\* 1 cmH<sub>2</sub>O = 0.74 mmHg

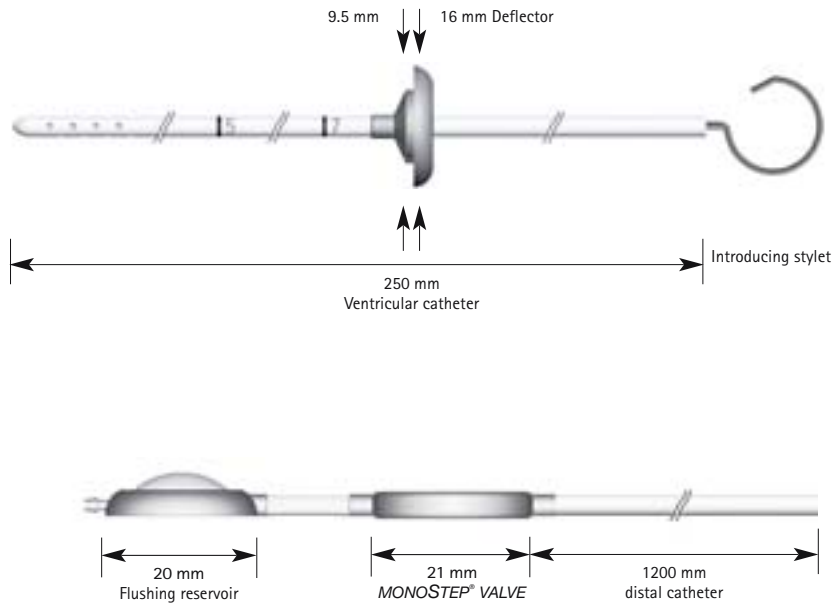


# DUALSWITCH® VALVE MONOSTEP® VALVE

## MONOSTEP® SHUNT SYSTEM with FLUSHING RESERVOIR


### Valve system with one connection

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



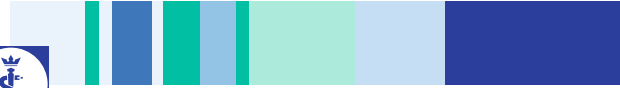
all catheters:  $d_i = 1.2 \text{ mm}$ ,  $d_a = 2.5 \text{ mm}$

Scale 1:1

| Art. no. | Valve pressure level (cmH <sub>2</sub> O*)   |  |
|----------|--|--|
|          |  |  |
| FV220T   | 5  |  |
| FV221T   | 7  |  |
| FV222T** | 10   |  |
| FV223T   | 13   |  |
| FV224T   | 16   |  |

\*\*Standard pressure level. This guide value is not binding. Other specifications may be preferable for the individual patient and anamnesis.

\* 1 cmH<sub>2</sub>O = 0.74 mmHg





AESCULAP®

Manufacturer acc. MDD 93/42/EEC

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**B | BRAUN**  
SHARING EXPERTISE

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