

# Diaphragm Valve, Metal

with integrated automation module

## Construction

The GEMÜ 651 piston actuated 2/2-way diaphragm valve is designed for use in sterile applications and has a fully integrated automation module. Normally closed and Normally open control functions are available. The automation module is available in two versions. Either as a **combi switchbox** with integrated 3/2-way pilot valve for valve actuation and position feedback or with an integrated **electro-pneumatic positioner**. GEMÜ 651 has a microprocessor controlled, intelligent position sensor as well as an integrated analogue travel sensor system. The **Speed-AP** function simplifies commissioning. The base of the actuator housing is made of stainless steel, the cover is made of a stable transparent plastic material.

## Features

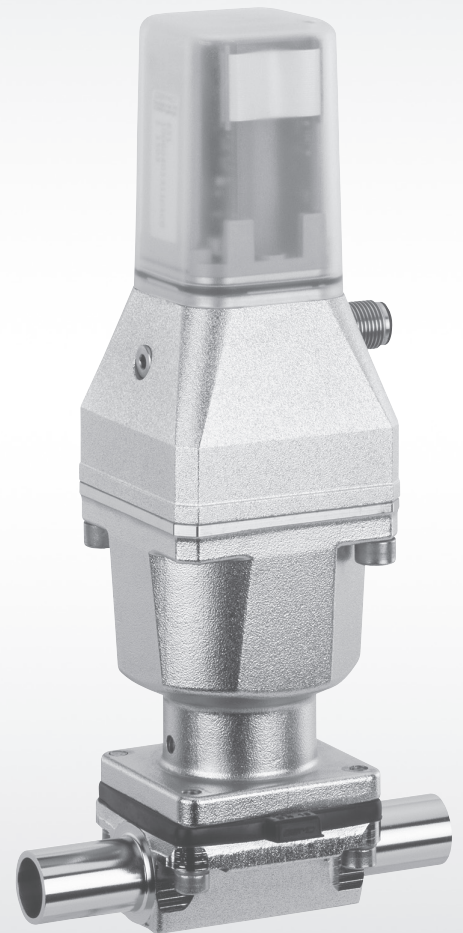
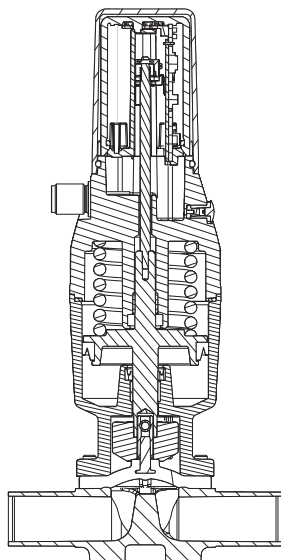
- Suitable for inert and corrosive\* liquid and gaseous media
- Compact design (ideal when space is at a premium)
- CIP cleaning capability
- **Integrated automation module as either**
  - **combi switchbox** or
  - **electro-pneumatic positioner**
- Integrated travel and system control
- AS-Interface field bus connection (option for combi switchbox)

## Advantages

- Reduced planning and cabling time
- Integrated air ports
- **Speed-AP** function for fast commissioning
- Optional flow direction
- Installation for an optimized draining is possible
- M5 control air connectors, available in-line with piping or rotated by 90°

\*see information on working medium on page 2

Sectional drawing



## Technical data

### Working medium

Corrosive, inert, gaseous and liquid media which have no negative impact on the physical and chemical properties of the body and diaphragm material.

The valve will seal in both flow directions up to full operating pressure (gauge pressure).

### Temperatures

**Medium temperature** 14 ... 212 °F

#### Ambient temperature

Actuator size 0/1 32 ... 140 °F

Actuator size 2 32 ... 122 °F

#### Max. permissible temperature of control medium

Actuator size 0/1 140 °F

Actuator size 2 122 °F

#### Flow rate of pilot valve (at 90 psi)

Actuator size 0/1 1.05 gpm

Actuator size 2 7 gpm

#### Sterilisation temperature <sup>(1)</sup>

EPDM (Code 13/3A) max. 302 °F <sup>(2)</sup>, max. 60 min per cycle

EPDM (Code 17) max. 302 °F <sup>(2)</sup>, max. 180 min per cycle

PTFE/EPDM (Code 54) max. 302 °F <sup>(2)</sup>, no time limit per cycle

PTFE/EPDM (Code 5M) max. 302 °F <sup>(2)</sup>, no time limit per cycle

<sup>1</sup> The sterilisation temperature is valid for steam (saturated steam) or superheated water.

<sup>2</sup> If the sterilisation temperatures listed above are applied to the EPDM diaphragms for longer periods of time, the service life of the diaphragms will be reduced. In these cases, maintenance cycles must be adapted accordingly. This also applies to PTFE diaphragms exposed to high temperature fluctuations.

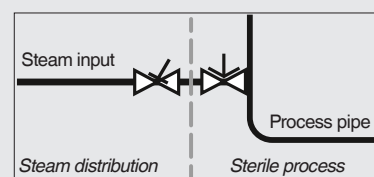
PTFE diaphragms can also be used as steam barriers; however, this will reduce their service life.

The maintenance cycles must be adapted accordingly.

GEMÜ 555 and 505 globe valves are particularly suitable for use in the area of steam generation and distribution.

The following valve arrangement for interfaces between steam pipes and process pipes has proven itself over time:

A globe valve for shutting off steam pipes and a diaphragm valve as an interface to the process pipes.



### Control medium

#### Quality classes to DIN ISO 8573-1

##### Actuator size 0/1

Dust content Class 3 (max. particle size 196.85 µinch), (max. particle density 41.7 lb/gal)

Pressure dew point Class 3 (max. pressure dew point -4 °F)

Oil concentration Class 3 (max. oil concentration 8.3 lb/gal)

##### Actuator size 2

Dust content Class 3 (max. particle size 196.85 µinch), (max. particle density 41.7 lb/gal)

Pressure dew point Class 4 (max. pressure dew point 37.4 °F)

Oil concentration Class 5 (max. oil concentration 208.6 lb/gal)

#### Filling volume

Actuator size 0: 1.71 cu in

Actuator size 1: 4.33 cu in

Actuator size 2: 14.58 cu in

### Materials

Actuator housing Cover: PP  
Base: 1.4408

## Technical data

### General information

|                             |                |
|-----------------------------|----------------|
| Protection class            | IP 65 / IP 67* |
| Electrical protection class | III            |
| Mounting position           | Optional       |

#### Directives

|                                               |                       |
|-----------------------------------------------|-----------------------|
| EMC directive                                 | 2004/108/EG           |
| Interference resistance                       | EN61000-6-2           |
| Interference emission Automation module B2    | EN61000-6-4 (class B) |
| Interference emission Automation module F0/F1 | EN61000-6-4 (class A) |
| Low voltage directive                         | 2006/95/EG            |

\* IP 67 is achieved by piping away the exhausting air. Replace threaded exhaust air plugs by M5 adapter (1434 000 Z2) for this purpose.

|                |           | Operating pressure |            | Control pressure |             | Actuator weight |
|----------------|-----------|--------------------|------------|------------------|-------------|-----------------|
| Diaphragm size | DN        | EPDM               | PTFE       | C.f. 1           | C.f. 2      | [lbs]           |
| 8              | 4 ... 15  | 0 - 150 psi        | 0 - 90 psi | 51 - 102 psi     | max. 65 psi | 2.2             |
| 10             | 10 ... 15 | 0 - 150 psi        | 0 - 90 psi | 65 - 102 psi     | max. 65 psi | 3.3             |
| 25             | 15 ... 25 | 0 - 150 psi        | 0 - 90 psi | 73 - 102 psi     | max. 65 psi | 8.4             |

All pressures are gauge pressures. Operating pressure values were determined with static operating pressure applied on one side of a closed valve. Sealing at the valve seat and atmospheric sealing is ensured for the given values. Information on operating pressures applied on both sides and for high purity media on request.

### Cv values [gpm]

| Pipe standard   | DIN | EN 10357 series B (formerly DIN 11850 series 1) | EN 10357 series A (formerly DIN 11850 series 2) / DIN 11866 series A | DIN 11850 Series 3 | SMS 3008 | ASME BPE / DIN 11866 series C | ISO 1127 / EN 10357 series C / DIN 11866 series B | DIN ISO 228 |
|-----------------|-----|-------------------------------------------------|----------------------------------------------------------------------|--------------------|----------|-------------------------------|---------------------------------------------------|-------------|
| Connection code | 0   | 16                                              | 17                                                                   | 18                 | 37       | 59                            | 60                                                | 1           |
| MG              | DN  |                                                 |                                                                      |                    |          |                               |                                                   |             |
| 8               | 4   | 0.6                                             | -                                                                    | -                  | -        | -                             | -                                                 | -           |
|                 | 6   | -                                               | -                                                                    | 1.3                | -        | -                             | 1.4                                               | 1.6         |
|                 | 8   | -                                               | -                                                                    | 1.5                | -        | 0.7                           | 2.6                                               | -           |
|                 | 10  | -                                               | 2.5                                                                  | 2.5                | 2.5      | 1.5                           | -                                                 | -           |
|                 | 15  | -                                               | -                                                                    | -                  | -        | 2.3                           | -                                                 | -           |
| 10              | 10  | -                                               | 2.8                                                                  | 2.8                | 2.8      | -                             | 2.6                                               | 3.9         |
|                 | 12  | -                                               | -                                                                    | -                  | -        | -                             | -                                                 | 3.7         |
|                 | 15  | 3.9                                             | 4.4                                                                  | 4.4                | 4.4      | -                             | 2.6                                               | 4.7         |
|                 | 20  | -                                               | -                                                                    | -                  | -        | 4.4                           | -                                                 | -           |
| 25              | 15  | 4.8                                             | 5.5                                                                  | 5.5                | 5.5      | -                             | -                                                 | 8.7         |
|                 | 20  | 7.4                                             | 8.2                                                                  | 8.2                | 8.2      | -                             | 5.1                                               | 15.4        |
|                 | 25  | 16.3                                            | 17.5                                                                 | 17.5               | 17.5     | 14.7                          | 14.3                                              | 19.0        |

MG = diaphragm size

Cv values determined acc. to inlet pressure 75 psi,  $\Delta p$  1 psi, stainless steel valve body (forged body) and soft elastomer diaphragm.

The Cv values for other product configurations (e.g. other diaphragm or body materials) may differ. In general, all diaphragms are subject to the influences of pressure, temperature, the process and their tightening torques. Therefore the Cv values may exceed the tolerance limits of the standard.

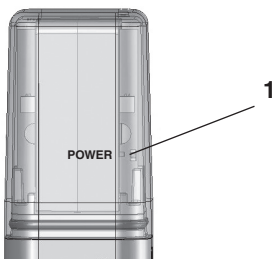
The Cv value curve (Cv value dependent on valve stroke) can vary depending on the diaphragm material and duration of use.

Automation module E0, combi switchbox

Electrical data

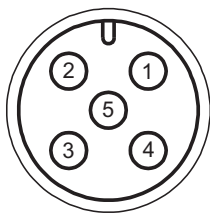
|                              |                                    |
|------------------------------|------------------------------------|
| <b>Power supply</b>          |                                    |
| Power supply $U_V$           | $U_V = 24V\ DC \pm 10\%$           |
| Current consumption          | $I_{typ.} = 40\ mA\ (at\ 24V\ DC)$ |
| Reverse battery protection   | Yes                                |
| <b>Electrical connection</b> |                                    |
| Electrical connection        | M12 5-pin plug (A-coded)           |

Optical indication - Automation module E0



| LED | Designation | Colour |
|-----|-------------|--------|
| 1   | POWER       | yellow |

Electrical connections - Automation module E0



| Connection                 | Pin | Signal name            |
|----------------------------|-----|------------------------|
| X 1<br>A-coded M12<br>plug | 1   | U+, 24V DC pilot valve |
|                            | 2   | n.c.                   |
|                            | 3   | GND                    |
|                            | 4   | n.c.                   |
|                            | 5   | n.c.                   |

Automation module B2, combi switchbox with AS-Interface

Electrical data

|                              |                                                      |
|------------------------------|------------------------------------------------------|
| <b>Power supply</b>          |                                                      |
| Power supply $U_V$           | 26.5 ... 31.6V DC acc. to AS-Interface specification |
| Current consumption          | max. 120 mA                                          |
| Rating                       | Continuously rated                                   |
| Reverse battery protection   | Yes                                                  |
| <b>Electrical connection</b> |                                                      |
| Electrical connection        | M12 5-pin plug (A-coded)                             |
| <b>AS-Interface profile</b>  |                                                      |
| AS-Interface specification   | 3.0; max. 62 slaves                                  |
| AS-Interface profile         | S 7.A.E                                              |
| I/O configuration            | 7                                                    |
| ID-Code                      | A                                                    |
| ID2-Code                     | E                                                    |
| <b>Approvals</b>             |                                                      |
| AS-Interface certificate     | Certificate no.: 65202                               |



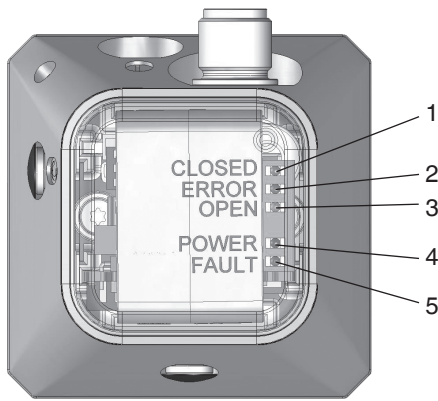
| Inputs / outputs                                            |                                                                                     |                                                                                                     |
|-------------------------------------------------------------|-------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|
| Inputs AS-Interface (as seen from the AS-Interface master)  |                                                                                     |                                                                                                     |
| Bit                                                         | Function                                                                            | Logic                                                                                               |
| DI0                                                         | Indication of Open position                                                         | 0 = process valve not in Open position<br>1 = process valve in Open position                        |
| DI1                                                         | Indication of Closed position                                                       | 0 = process valve not in Closed position<br>1 = process valve in Closed position                    |
| DI2                                                         | Indication of operating mode                                                        | 0 = normal operation<br>1 = programming mode                                                        |
| DI3                                                         | Error 2                                                                             | see table: Error analysis                                                                           |
| FID                                                         | Error 1                                                                             | see table: Error analysis                                                                           |
| Outputs AS-Interface (as seen from the AS-Interface master) |                                                                                     |                                                                                                     |
| Bit                                                         | Function                                                                            | Logic                                                                                               |
| DO0                                                         | Activation of pneum. outlet 2/4 (c.f. 1 and 2)<br>(activation of pilot valve Y1/Y2) | 0 = pneum. outlet 2 vented/outlet 4 pressurized<br>1 = pneum. outlet 2 pressurized/ outlet 4 vented |
| DO1                                                         | Selection of programming mode                                                       | 0 = manual programming<br>1 = automatic programming                                                 |
| DO2                                                         | Selection of operating mode                                                         | 0 = normal operation<br>1 = programming mode                                                        |
| DO3                                                         | not available                                                                       |                                                                                                     |
| Parameter outputs                                           |                                                                                     |                                                                                                     |
| Bit                                                         | Function                                                                            | Logic                                                                                               |
| P0                                                          | Setting of switch points                                                            | see table: Switch points                                                                            |
| P1                                                          | Setting of switch points                                                            | see table: Switch points                                                                            |
| P2                                                          | Setting of switch points                                                            | see table: Switch points                                                                            |

| Switch points |    |    |                       |                         |
|---------------|----|----|-----------------------|-------------------------|
| P2            | P1 | P0 | Switch point OPEN [%] | Switch point CLOSED [%] |
| 0             | 0  | 0  | 12                    | 25                      |
| 0             | 0  | 1  | 25                    | 25                      |
| 0             | 1  | 0  | 6                     | 12                      |
| 0             | 1  | 1  | 12                    | 12                      |
| 1             | 0  | 0  | 25                    | 12                      |
| 1             | 0  | 1  | 6                     | 6                       |
| 1             | 1  | 0  | 12                    | 6                       |
| 1             | 1  | 1  | 25                    | 6                       |

Switch points: The data in the table refers to the percentage of travel before the programmed switching point at which the switch will transmit the position is achieved.

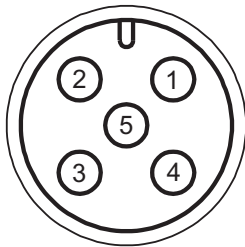
| Error analysis |         |                   |
|----------------|---------|-------------------|
| Error 1        | Error 2 | Error function    |
| 1              | 0       | Internal error    |
| 0              | 1       | Programming error |
| 1              | 1       | Sensor error      |

## Optical indication - Automation module B2



| LED | Designation | Colour |
|-----|-------------|--------|
| 1   | CLOSED      | orange |
| 2   | ERROR       | red    |
| 3   | OPEN        | yellow |
| 4   | POWER       | green  |
| 5   | FAULT       | red    |

## Electrical connections - Automation module B2



| Automation module B2          |     |                |
|-------------------------------|-----|----------------|
| Connection                    | Pin | Signal name    |
| X 1<br>A-coded<br>M12<br>plug | 1   | AS-Interface + |
|                               | 2   | n.c.           |
|                               | 3   | AS-Interface - |
|                               | 4   | n.c.           |
|                               | 5   | n.c.           |

## Automation module F0/F1, positioner

### Electrical data

#### Power supply

Power supply  $U_V$

Current consumption

$U_V = 24V \text{ DC } +10\% / -5\%$

$I_{typ.} = 70 \text{ mA (at 24V DC)}$

#### Analogue input

Accuracy

Set value input

$\leq 0.3 \%$

4-20 mA

#### Digital input

Initialisation input

Voltage

Level "Logical 1"

Level "Logical 0"

Input current

$U_{rated} = 24V \text{ DC}$

$14V \text{ DC} \leq U_H \leq 28V \text{ DC}$

$0V \text{ DC} \leq U_L \leq 8V \text{ DC}$

$I_{typ.} = 2.5 \text{ mA (at 24V DC)}$

#### Electrical connection

Electrical connection

#### Positioner data

System deviation

Initialisation

M12 5-pin plug (A-coded)

$\leq 1 \%$

Automatic via 24V DC signal

#### Display elements

Status display

4 visible LEDs

#### Analogue (Automation module F1)

Accuracy / Linearity

Temperature drift

Resolution

Actual value output

Output

$\leq \pm 1,0 \%$  v.E.

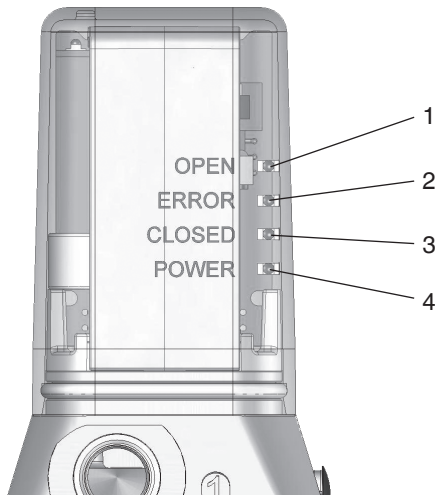
$\leq \pm 0,5 \%$  v.E.

12 bit

4 - 20 mA

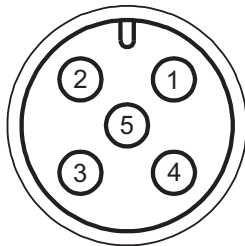
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## Optical indication - Automation module F0/F1



| LED | Designation | Colour |
|-----|-------------|--------|
| 1   | OPEN        | yellow |
| 2   | ERROR       | red    |
| 3   | CLOSED      | orange |
| 4   | POWER       | yellow |

## Electrical connections - Automation module F0/F1

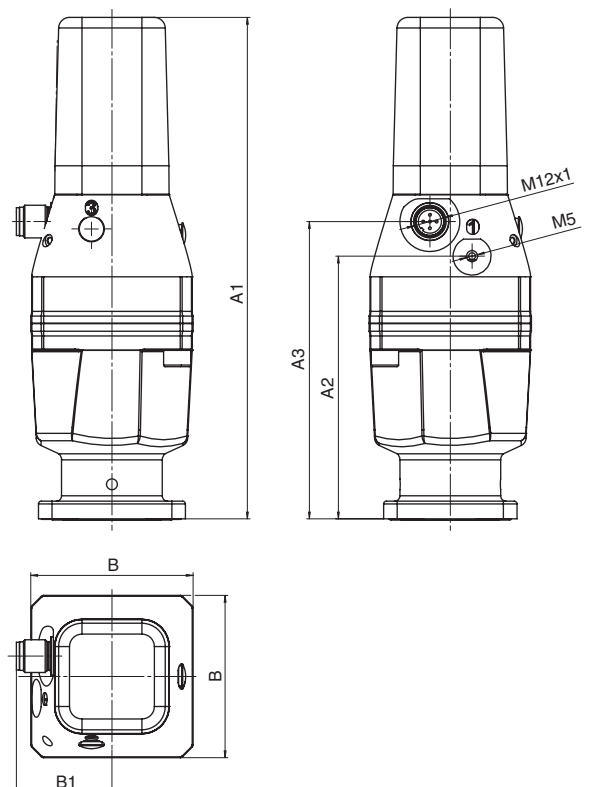


### Automation module F0/F1

| Connection                    | Pin | Signal name                                                                                |
|-------------------------------|-----|--------------------------------------------------------------------------------------------|
| X 1<br>A-coded<br>M12<br>plug | 1   | Uv, 24 V DC supply voltage                                                                 |
|                               | 2   | I+, 4-20 mA set value input                                                                |
|                               | 3   | I- / Uv GND                                                                                |
|                               | 4   | I+, 4-20 mA actual value output<br>(only automation module F1)                             |
|                               | 5   | Uv, initialisation 24 V DC, initialisation is<br>started by impulse signal $t \geq 100$ ms |

## Actuator dimensions - GEMÜ 9651

| Actuator size | Diaphragm size | A1   | A2   | A3   | B    | B2   |
|---------------|----------------|------|------|------|------|------|
| 0             | 8              | 6.30 | 2.83 | 3.35 | 1.93 | 1.38 |
| 1             | 10             | 7.28 | 3.80 | 4.31 | 2.36 | 1.42 |
| 2             | 25             | 7.17 | 5.51 | 4.59 | 3.58 | 2.32 |



## Order data (2/2-way valves)

| Body configuration                                                          | Code |
|-----------------------------------------------------------------------------|------|
| Tank bottom valve body                                                      | B**  |
| 2/2-way body                                                                | D    |
| T body                                                                      | T*   |
| * For dimensions see T Valves brochure                                      |      |
| ** Dimensions and versions on request or according to customer requirements |      |

| Valve body material                        | Code |
|--------------------------------------------|------|
| 1.4435, investment casting                 | C3   |
| 1.4408, investment casting                 | 37   |
| 1.4435 (316L), forged body                 | 40   |
| 1.4435 (BN2), forged body $\Delta$ Fe<0,5% | 42   |
| 1.4539, forged body                        | F4   |

| Nominal size   | Code |
|----------------|------|
| DN 4           | 4    |
| DN 6 NPS 1/8"  | 6    |
| DN 8 NPS 1/4"  | 8    |
| DN 10 NPS 3/8" | 10   |
| DN 15 NPS 1/2" | 15   |
| DN 20 NPS 3/4" | 20   |
| DN 25 NPS 1"   | 25   |

| Diaphragm material                          | Code   |
|---------------------------------------------|--------|
| EPDM                                        | 13 3A* |
| EPDM                                        | 17     |
| EPDM                                        | 19     |
| PTFE/EPDM, one-piece                        | 54     |
| PTFE/EPDM, two-piece                        | 5M**   |
| * for diaphragm size 8                      |        |
| ** Code 5M available from diaphragm size 10 |        |
| Material complies with FDA requirements     |        |

| Connection                                                                  | Code |
|-----------------------------------------------------------------------------|------|
| <b>Butt weld spigots</b>                                                    |      |
| Spigots DIN                                                                 | 0    |
| Spigots EN 10357 series B (formerly DIN 11850 series 1)                     | 16   |
| Spigot EN 10357 series A (formerly DIN 11850 series 2) / DIN 11866 series A | 17   |
| Spigots DIN 11850 series 3                                                  | 18   |
| Spigots JIS-G 3447                                                          | 35   |
| Spigots JIS-G 3459                                                          | 36   |
| Spigots SMS 3008                                                            | 37   |
| Spigots BS 4825 Part 1                                                      | 55   |
| Spigot ASME BPE / DIN 11866 series C                                        | 59   |
| Spigot ISO 1127 / EN 10357 series C / DIN 11866 series B                    | 60   |
| Spigots ANSI/ASME B36.19M Schedule 10s                                      | 63   |
| Spigots ANSI/ASME B36.19M Schedule 5s                                       | 64   |
| Spigots ANSI/ASME B36.19M Schedule 40s                                      | 65   |
| <b>Threaded connections</b>                                                 |      |
| Threaded sockets DIN ISO 228                                                | 1    |
| Threaded spigots DIN 11851                                                  | 6    |
| Cone spigot and union nut DIN 11851                                         | 6K   |
| Aseptic unions on request                                                   |      |
| <b>Clamp connections</b>                                                    |      |
| Clamps ASME BPE for pipe ASME BPE, length ASME BPE                          | 80   |
| Clamps DIN 32676 series B for pipe EN ISO 1127, length EN 558, series 7     | 82   |
| Clamps ASME BPE for pipe ASME BPE, length EN 558, series 7                  | 88   |
| Clamps DIN 32676 series A for pipe DIN 11850, length EN 558, series 7       | 8A   |
| Clamps SMS 3017 for pipe SMS 3008, length EN 558, series 7                  | 8E   |
| Clamps DIN 32676 series C, length FTF ASME BPE                              | 8P   |
| Clamps DIN 32676 series C, length FTF EN 558 series 7                       | 8T   |
| Aseptic clamps on request                                                   |      |
| For overview of available valve bodies see page 14                          |      |



## Order data (2/2-way valves)

| Control function     | Code |
|----------------------|------|
| Normally closed (NC) | 1    |
| Normally open (NO)   | 2    |

| Actuator size                       | Code |
|-------------------------------------|------|
| Actuator size 0 (Diaphragm size 8)  | 0    |
| Actuator size 1 (Diaphragm size 10) | 1    |
| Actuator size 2 (Diaphragm size 25) | 2    |

| Design (actuator)                | Code |
|----------------------------------|------|
| Connection in flow direction     | T    |
| Connection 90° to flow direction | R    |

| Automation module                                                                                                                      | Code |
|----------------------------------------------------------------------------------------------------------------------------------------|------|
| Combi switchbox with integrated pilot valve and status LED                                                                             | E0   |
| Combi switchbox with integrated pilot valve, OPEN / CLOSED position feedback and Speed-AP function, AS-Interface, 62 slaves, Spec. 3.0 | B2   |
| Positioner with Speed-AP function, set value input 4-20 mA                                                                             | F0   |
| Positioner with Speed-AP function, set value input 4-20 mA, actual value output 4-20 mA                                                | F1   |

| Spring set                 | Code |
|----------------------------|------|
| Diaphragm size 8 C.f. 1    | A    |
| Diaphragm size 8 C.f. 2    | 1    |
| Diaphragm size 10 C.f. 1+2 | 1    |
| Diaphragm size 25 C.f. 1+2 | 1    |

## Internal surface finishes for forged and block material bodies <sup>1</sup>

| Readings for Process Contact Surfaces | Mechanically polished <sup>2</sup> |      | Electropolished          |      |
|---------------------------------------|------------------------------------|------|--------------------------|------|
|                                       | Hygienic class DIN 11866           | Code | Hygienic class DIN 11866 | Code |
| Ra ≤ 0,80 µm                          | H3                                 | 1502 | HE3                      | 1503 |
| Ra ≤ 0,60 µm                          | -                                  | 1507 | -                        | 1508 |
| Ra ≤ 0,40 µm                          | H4                                 | 1536 | HE4                      | 1537 |
| Ra ≤ 0,25 µm <sup>3</sup>             | H5                                 | 1527 | HE5                      | 1516 |

| Readings for Process Contact Surfaces acc. to ASME BPE 2016 <sup>4</sup> | Mechanically polished <sup>2</sup> |      | Electropolished              |      |
|--------------------------------------------------------------------------|------------------------------------|------|------------------------------|------|
|                                                                          | ASME BPE Surface Designation       | Code | ASME BPE Surface Designation | Code |
| Ra Max. = 0,76 µm (30 µinch)                                             | SF3                                | SF3  | -                            | -    |
| Ra Max. = 0,64 µm (25 µinch)                                             | SF2                                | SF2  | SF6                          | SF6  |
| Ra Max. = 0,51 µm (20 µinch)                                             | SF1                                | SF1  | SF5                          | SF5  |
| Ra Max. = 0,38 µm (15 µinch)                                             | -                                  | -    | SF4                          | SF4  |

## Internal surface finishes for investment cast bodies

| Readings for Process Contact Surfaces | Mechanically polished <sup>2</sup> |      |
|---------------------------------------|------------------------------------|------|
|                                       | Hygienic class DIN 11866           | Code |
| Ra ≤ 6,30 µm                          | -                                  | 1500 |
| Ra ≤ 0,80 µm                          | H3                                 | 1502 |
| Ra ≤ 0,60 µm <sup>5</sup>             | -                                  | 1507 |

<sup>1</sup> Surface finishes of customized valve bodies may be limited in special cases.

<sup>2</sup> Or any other finishing method that meets the Ra value (acc. to ASME BPE).

<sup>3</sup> The smallest possible Ra finish for 1/4" (DN 8) BS 4825 Part 1 and ASME BPE is 15 µinch.

<sup>4</sup> When using these surfaces, the bodies are marked according to the specifications of ASME BPE.

The surfaces are only available for valve bodies which are made of materials (e.g. GEMÜ material codes 40, 41, F4, 44) and use connections (e.g. GEMÜ connection codes 59, 80, 88) according to ASME BPE.

<sup>5</sup> Not possible for GEMÜ connection code 59, DN 8 and GEMÜ connection code 0, DN 4.

Ra acc. to DIN EN ISO 4288 and ASME B46.1

## Order data (2/2-way valves)

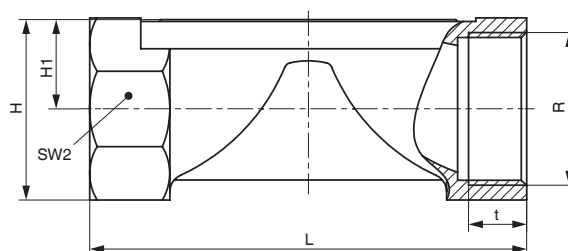
| Order example              | 651 | 15 | D | 60 | 40 | 13 | 1 | 2 | t | 1 |  | B2 | 1503 |
|----------------------------|-----|----|---|----|----|----|---|---|---|---|--|----|------|
| Type                       | 651 |    |   |    |    |    |   |   |   |   |  |    |      |
| Nominal size               |     | 15 |   |    |    |    |   |   |   |   |  |    |      |
| Body configuration (code)  |     |    | D |    |    |    |   |   |   |   |  |    |      |
| Connection (code)          |     |    |   | 60 |    |    |   |   |   |   |  |    |      |
| Valve body material (code) |     |    |   |    | 40 |    |   |   |   |   |  |    |      |
| Diaphragm material (code)  |     |    |   |    |    | 13 |   |   |   |   |  |    |      |
| Control function (code)    |     |    |   |    |    |    | 1 |   |   |   |  |    |      |
| Actuator size (code)       |     |    |   |    |    |    |   | 2 |   |   |  |    |      |
| Design (actuator) (code)   |     |    |   |    |    |    |   |   | t |   |  |    |      |
| Spring set (code)          |     |    |   |    |    |    |   |   |   | 1 |  |    |      |
| Automation module (code)   |     |    |   |    |    |    |   |   |   |   |  | B2 |      |
| Surface finish (code)      |     |    |   |    |    |    |   |   |   |   |  |    | 1503 |

## Body dimensions [inch]

### Threaded sockets, connection code 1 Valve body material: Investment casting (code 37)

| MG | DN | R     | H    | H1   | t    | L    | SW2 | Number of flats | Weight [lbs] |
|----|----|-------|------|------|------|------|-----|-----------------|--------------|
| 8  | 8  | G 1/4 | 0.75 | 0.35 | 0.43 | 2.83 | 18  | 6               | 0.2          |
| 10 | 12 | G 3/8 | 0.98 | 0.51 | 0.47 | 2.17 | 22  | 2               | 0.37         |
|    | 15 | G 1/2 | 1.18 | 0.59 | 0.59 | 2.68 | 27  | 2               | 0.57         |
| 25 | 15 | G 1/2 | 1.11 | 0.58 | 0.59 | 3.35 | 27  | 6               | 0.71         |
|    | 20 | G 3/4 | 1.31 | 0.68 | 0.63 | 3.35 | 32  | 6               | 0.75         |
|    | 25 | G 1   | 1.67 | 0.86 | 0.51 | 4.33 | 41  | 6               | 0.86         |

MG = diaphragm size



## Body dimensions [inch]

### Butt weld spigots, connection code 0, 16, 17, 18 Valve body material: Investment casting (code C3), forged body (code 40, F4)

| Pipe standard   |    |      |      |      |      |      | DIN   |       | EN 10357 series B<br>(formerly<br>DIN 11850 series 1) |       | EN 10357 series A<br>(formerly<br>DIN 11850 series 2) /<br>DIN 11866 series A |       | DIN 11850 Series 3 |       | Weight<br>[lbs] |
|-----------------|----|------|------|------|------|------|-------|-------|-------------------------------------------------------|-------|-------------------------------------------------------------------------------|-------|--------------------|-------|-----------------|
| Connection code |    |      |      |      |      |      | 0     |       | 16                                                    |       | 17                                                                            |       | 18                 |       |                 |
| MG              | DN | NPS  | L    | c    | H1*  | H1** | ød    | s     | ød                                                    | s     | ød                                                                            | s     | ød                 | s     |                 |
| 8               | 4  | -    | 2.83 | 0.79 | 0.33 |      | 0.236 | 0.039 | -                                                     | -     | -                                                                             | -     | -                  | -     | 0.2             |
|                 | 6  | -    | 2.83 | 0.79 | 0.33 |      | -     | -     | -                                                     | -     | 0.315                                                                         | 0.039 | -                  | -     | 0.2             |
|                 | 8  | 1/4" | 2.83 | 0.79 | 0.33 |      | -     | -     | -                                                     | -     | 0.394                                                                         | 0.039 | -                  | -     | 0.2             |
|                 | 10 | 3/8" | 2.83 | 0.79 | 0.33 |      | -     | -     | 0.472                                                 | 0.039 | 0.512                                                                         | 0.059 | 0.551              | 0.079 | 0.2             |
| 10              | 10 | 3/8" | 4.25 | 0.98 | 0.49 |      | -     | -     | 0.472                                                 | 0.039 | 0.512                                                                         | 0.059 | 0.551              | 0.079 | 0.7             |
|                 | 15 | 1/2" | 4.25 | 0.98 | 0.49 |      | 0.709 | 0.059 | 0.709                                                 | 0.039 | 0.748                                                                         | 0.059 | 0.787              | 0.079 | 0.7             |
| 25              | 15 | 1/2" | 4.72 | 0.98 | 0.51 | 0.75 | 0.709 | 0.059 | 0.709                                                 | 0.039 | 0.748                                                                         | 0.059 | 0.787              | 0.079 | 1.4             |
|                 | 20 | 3/4" | 4.72 | 0.98 | 0.63 | 0.75 | 0.866 | 0.059 | 0.866                                                 | 0.039 | 0.906                                                                         | 0.059 | 0.945              | 0.079 | 1.3             |
|                 | 25 | 1"   | 4.72 | 0.98 | 0.75 | 0.75 | 1.102 | 0.059 | 1.102                                                 | 0.039 | 1.142                                                                         | 0.059 | 1.181              | 0.079 | 1.2             |

\* only for investment cast design

\*\* only for forged design

MG = diaphragm size

For materials see overview on page 14

### Butt weld spigots, connection code 60 Valve body material: Investment casting (code C3), forged body (code 40, F4)

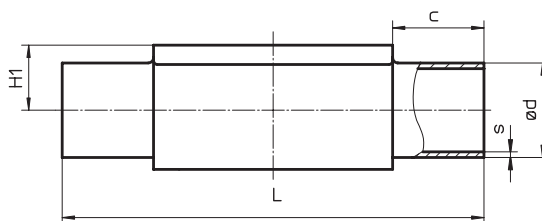
| Pipe standard   |    |      |      |      |      |      | ISO 1127 /<br>EN 10357 series C /<br>DIN 11866 series B |       | Weight [lbs] |
|-----------------|----|------|------|------|------|------|---------------------------------------------------------|-------|--------------|
| Connection code |    |      |      |      |      |      | 60                                                      |       |              |
| MG              | DN | NPS  | L    | c    | H1*  | H1** | ød                                                      | s     |              |
| 8               | 6  | -    | 2.83 | 0.79 | -    | 0.33 | 0.402                                                   | 0.063 | 0.2          |
|                 | 8  | 1/4" | 2.83 | 0.79 | 0.33 | 0.33 | 0.531                                                   | 0.063 | 0.2          |
|                 | 10 | 3/8" | 2.83 | 0.79 | -    | 0.33 | -                                                       | -     | 0.2          |
| 10              | 10 | 3/8" | 4.25 | 0.98 | 0.49 | 0.49 | 0.677                                                   | 0.063 | 0.7          |
|                 | 15 | 1/2" | 4.25 | 0.98 | 0.49 | 0.49 | 0.839                                                   | 0.063 | 0.7          |
| 25              | 15 | 1/2" | 4.72 | 0.98 | 0.51 | 0.75 | 0.839                                                   | 0.063 | 1.4          |
|                 | 20 | 3/4" | 4.72 | 0.98 | 0.63 | 0.75 | 1.059                                                   | 0.063 | 1.3          |
|                 | 25 | 1"   | 4.72 | 0.98 | 0.75 | 0.75 | 1.327                                                   | 0.079 | 1.2          |

\* only for investment cast design

\*\* only for forged design

MG = diaphragm size

For materials see overview on page 14



## Body dimensions [inch]

### Butt weld spigots, connection code 35, 36, 37 Valve body material: Investment casting (code C3), forged body (code 40, F4)

| Pipe standard   |    |      |      |      |      |      | JIS-G<br>3447 |       | JIS-G<br>3459 |       | SMS<br>3008 |       | Weight<br>[lbs] |
|-----------------|----|------|------|------|------|------|---------------|-------|---------------|-------|-------------|-------|-----------------|
| Connection code |    |      |      |      |      |      | 35            |       | 36            |       | 37          |       |                 |
| MG              | DN | NPS  | L    | c    | H1*  | H1** | ød            | s     | ød            | s     | ød          | s     |                 |
| 8               | 6  | -    | 2.83 | 0.79 | -    | 0.33 | -             | -     | 0.413         | 0.047 | -           | -     | 0.2             |
|                 | 8  | 1/4" | 2.83 | 0.79 | -    | 0.33 | -             | -     | 0.543         | 0.065 | -           | -     | 0.2             |
| 10              | 10 | 3/8" | 4.25 | 0.98 | -    | 0.49 | -             | -     | 0.681         | 0.065 | -           | -     | 0.7             |
|                 | 15 | 1/2" | 4.25 | 0.98 | -    | 0.49 | -             | -     | 0.854         | 0.083 | -           | -     | 0.7             |
| 25              | 15 | 1/2" | 4.72 | 0.98 | -    | 0.75 | -             | -     | 0.854         | 0.083 | -           | -     | 1.4             |
|                 | 20 | 3/4" | 4.72 | 0.98 | -    | 0.75 | -             | -     | 1.071         | 0.083 | -           | -     | 1.3             |
|                 | 25 | 1"   | 4.72 | 0.98 | 0.75 | 0.75 | 1.000         | 0.047 | 1.339         | 0.110 | 0.984       | 0.047 | 1.2             |

\* only for investment cast design

\*\* only for forged design

MG = diaphragm size

For materials see overview on page 14

### Butt weld spigots, connection code 55, 59, 63, 64, 65 Valve body material: Investment casting (code C3), forged body (code 40, F4)

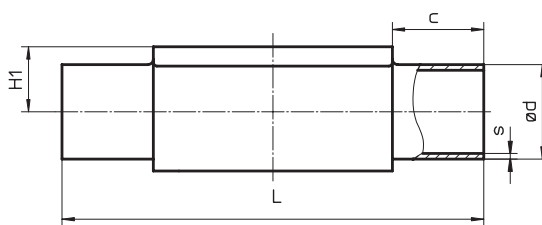
| Pipe standard   |    |      |      |      |      |      | BS 4825<br>Part 1 |       | ASME BPE /<br>DIN 11866<br>series C |       | ANSI/ASME<br>B36.19M<br>Schedule 10s |       | ANSI/ASME<br>B36.19M<br>Schedule 5s |      | ANSI/ASME<br>B36.19M<br>Schedule 40s |       | Weight<br>[lbs] |
|-----------------|----|------|------|------|------|------|-------------------|-------|-------------------------------------|-------|--------------------------------------|-------|-------------------------------------|------|--------------------------------------|-------|-----------------|
| Connection code |    |      |      |      |      |      | 55                |       | 59                                  |       | 63                                   |       | 64                                  |      | 65                                   |       |                 |
| MG              | DN | NPS  | L    | c    | H1*  | H1** | ød                | s     | ød                                  | s     | ød                                   | s     | ød                                  | s    | ød                                   | s     |                 |
| 8               | 6  | -    | 2.83 | 0.79 | -    | 0.33 | -                 | -     | -                                   | -     | 0.406                                | 0.049 | -                                   | -    | 0.406                                | 0.068 | 0.2             |
|                 | 8  | 1/4" | 2.83 | 0.79 | 0.33 | 0.33 | 0.250             | 0.047 | 0.25                                | 0.035 | 0.539                                | 0.065 | -                                   | -    | 0.539                                | 0.088 | 0.2             |
|                 | 10 | 3/8" | 2.83 | 0.79 | 0.33 | 0.33 | 0.375             | 0.047 | 0.375                               | 0.035 | -                                    | -     | -                                   | -    | -                                    | -     | 0.2             |
|                 | 15 | 1/2" | 2.83 | 0.79 | 0.33 | 0.33 | 0.500             | 0.047 | 0.500                               | 0.065 | -                                    | -     | -                                   | -    | -                                    | -     | 0.2             |
| 10              | 10 | 3/8" | 4.25 | 0.98 | -    | 0.49 | 0.375             | 0.047 | 0.375                               | 0.035 | 0.673                                | 0.065 | -                                   | -    | 0.673                                | 0.091 | 0.7             |
|                 | 15 | 1/2" | 4.25 | 0.98 | -    | 0.49 | 0.500             | 0.047 | 0.500                               | 0.065 | 0.839                                | 0.083 | 0.839                               | 1.65 | 0.839                                | 0.109 | 0.7             |
|                 | 20 | 3/4" | 4.25 | 0.98 | 0.49 | 0.49 | 0.750             | 0.047 | 0.750                               | 0.065 | -                                    | -     | -                                   | -    | -                                    | -     | 0.7             |
| 25              | 15 | 1/2" | 4.72 | 0.98 | -    | 0.75 | -                 | -     | -                                   | -     | 0.839                                | 0.083 | 0.839                               | 1.65 | 0.839                                | 0.109 | 1.4             |
|                 | 20 | 3/4" | 4.72 | 0.98 | 0.63 | 0.75 | 0.750             | 0.047 | 0.750                               | 0.065 | 1.051                                | 0.083 | 1.051                               | 1.65 | 1.051                                | 0.113 | 1.3             |
|                 | 25 | 1"   | 4.72 | 0.98 | 0.75 | 0.75 | -                 | -     | 1.000                               | 0.065 | 1.315                                | 0.109 | 1.315                               | 1.65 | 1.315                                | 0.133 | 1.2             |

\* only for investment cast design

\*\* only for forged design

MG = diaphragm size

For materials see overview on page 14

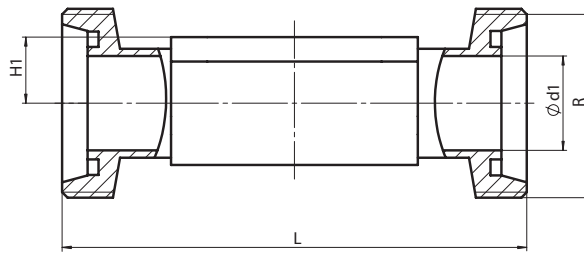


## Body dimensions [inch]

### Threaded connections, connection code 6 Valve body material: Forged body (code 40)

| MG | DN | H1   | ød1   | Thread to DIN 405<br>R | L    | Weight<br>[lbs] |
|----|----|------|-------|------------------------|------|-----------------|
| 8  | 10 | 0.33 | 0.394 | RD 28 x 1/8            | 3.62 | 0.5             |
| 10 | 10 | 0.49 | 0.394 | RD 28 x 1/8            | 4.65 | 0.7             |
|    | 15 | 0.49 | 0.630 | RD 34 x 1/8            | 4.65 | 0.8             |
| 25 | 15 | 0.75 | 0.630 | RD 34 x 1/8            | 4.65 | 1.6             |
|    | 20 | 0.75 | 0.787 | RD 44 x 1/6            | 4.65 | 1.7             |
|    | 25 | 0.75 | 1.024 | RD 52 x 1/6            | 5.04 | 1.7             |

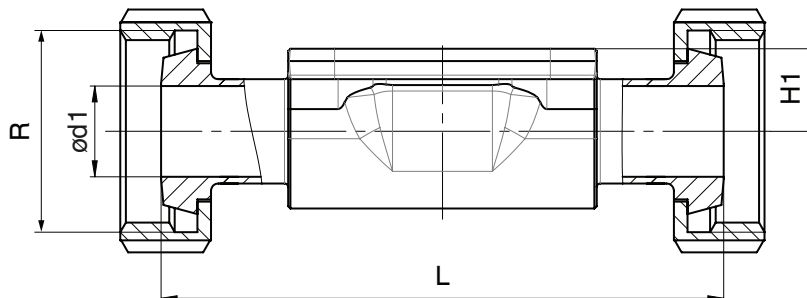
MG = diaphragm size



### Cone spigot, connection code 6K Valve body material: Forged body (code 40)

| MG | DN | H1   | ød1   | Thread to DIN 405<br>R | L    | Weight<br>[lbs] |
|----|----|------|-------|------------------------|------|-----------------|
| 8  | 10 | 0.33 | 0.394 | RD 28 x 1/8            | 3.54 | 0.5             |
| 10 | 10 | 0.49 | 0.394 | RD 28 x 1/8            | 4.57 | 0.7             |
|    | 15 | 0.49 | 0.630 | RD 34 x 1/8            | 4.57 | 0.8             |
| 25 | 15 | 0.75 | 0.630 | RD 34 x 1/8            | 4.57 | 1.6             |
|    | 20 | 0.75 | 0.787 | RD 44 x 1/6            | 4.49 | 1.7             |
|    | 25 | 0.75 | 1.024 | RD 52 x 1/6            | 5.00 | 1.7             |

MG = diaphragm size

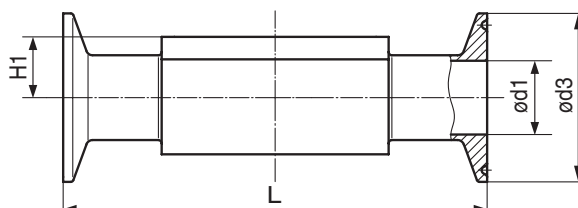


## Body dimensions [inch]

### Clamp connections, connection code 80, 82, 88, 8A, 8E, 8P, 8T Valve body material: Forged body (code 40, F4)

| Pipe connection<br>for clamp |    |       |      | ASME BPE                                                   |       |      |        |       |      | ISO 1127 / EN 10357<br>series C /<br>DIN 11866 series B |       |      | EN 10357 series A<br>(formerly DIN 11850<br>series 2) /<br>DIN 11866 series A |       |      | SMS 3008            |       |   | Weight<br>[lbs] |
|------------------------------|----|-------|------|------------------------------------------------------------|-------|------|--------|-------|------|---------------------------------------------------------|-------|------|-------------------------------------------------------------------------------|-------|------|---------------------|-------|---|-----------------|
| Clamp connection             |    |       |      | Code 80, 88 - ASME BPE<br>Code 8P, 8T - DIN 32676 series C |       |      |        |       |      | DIN 32676 series B                                      |       |      | DIN 32676 series A                                                            |       |      | ISO 2852 / SMS 3017 |       |   |                 |
| Clamp connection<br>code     |    |       |      | 80, 8P                                                     |       |      | 88, 8T |       |      | 82                                                      |       |      | 8A                                                                            |       |      | 8E                  |       |   |                 |
| MG                           | DN | NPS   | H1   | ød1                                                        | ød3   | L    | ød1    | ød3   | L    | ød1                                                     | ød3   | L    | ød1                                                                           | ød3   | L    | ød1                 | ød3   | L |                 |
| 8                            | 6  | 1/8 " | 0.33 | -                                                          | -     | -    | -      | -     | -    | 0.276                                                   | 0.984 | 2.50 | 0.236                                                                         | 0.984 | 2.50 | -                   | -     | - | -               |
|                              | 8  | 1/4"  | 0.33 | 0.180                                                      | 0.984 | 2.50 | -      | -     | -    | 0.406                                                   | 0.984 | 2.50 | 0.315                                                                         | 0.984 | 2.50 | -                   | -     | - | 0.3             |
|                              | 10 | 3/8"  | 0.33 | 0.305                                                      | 0.984 | 2.50 | -      | -     | -    | -                                                       | -     | -    | 0.394                                                                         | 1.339 | 3.50 | -                   | -     | - | 0.4             |
|                              | 15 | 1/2"  | 0.33 | 0.370                                                      | 0.984 | 2.50 | 0.370  | 0.984 | 4.25 | -                                                       | -     | -    | -                                                                             | -     | -    | -                   | -     | - | 0.4             |
| 10                           | 10 | 3/8"  | 0.49 | -                                                          | -     | -    | -      | -     | -    | 0.551                                                   | 0.984 | 4.25 | 0.394                                                                         | 1.339 | 4.25 | -                   | -     | - | 0.7             |
|                              | 15 | 1/2"  | 0.49 | 0.370                                                      | 0.984 | 3.50 | 0.370  | 0.984 | 4.25 | 0.713                                                   | 1.988 | 4.25 | 0.630                                                                         | 1.339 | 4.25 | -                   | -     | - | 0.9             |
|                              | 20 | 3/4"  | 0.49 | 0.620                                                      | 0.984 | 4.00 | 0.620  | 0.984 | 4.61 | -                                                       | -     | -    | -                                                                             | -     | -    | -                   | -     | - | 0.9             |
| 25                           | 15 | 1/2"  | 0.75 | -                                                          | -     | -    | -      | -     | -    | 0.713                                                   | 1.988 | 4.25 | 0.630                                                                         | 1.339 | 4.25 | -                   | -     | - | 1.6             |
|                              | 20 | 3/4"  | 0.75 | 0.620                                                      | 0.984 | 4.00 | 0.620  | 0.984 | 4.61 | 0.933                                                   | 1.988 | 4.61 | 0.787                                                                         | 1.339 | 4.61 | -                   | -     | - | 1.6             |
|                              | 25 | 1"    | 0.75 | 0.870                                                      | 1.988 | 4.50 | 0.870  | 1.988 | 5.00 | 1.169                                                   | 1.988 | 5.00 | 1.024                                                                         | 1.988 | 5.00 | 0.890               | 1.988 | 5 | 1.4             |

MG = diaphragm size



| Overview of valve bodies for GEMÜ 651 |                                                       |         |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
|---------------------------------------|-------------------------------------------------------|---------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
|                                       |                                                       | Spigots |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Connection code                       |                                                       | 0       |    | 16 | 17 |    | 18 | 35 | 36 | 37 |    | 55 | 59 |    | 60 |    | 63 | 64 | 65 |
| Material code                         |                                                       | C3      | 40 | 40 | C3 | 40 | 40 | 40 | 40 | C3 | 40 | 40 | C3 | 40 | C3 | 40 | 40 | 40 | 40 |
| MG                                    | DN                                                    |         |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| 8                                     | 4                                                     | X       | X  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  |
|                                       | 6                                                     | -       | -  | -  | X  | X  | -  | -  | X  | -  | -  | -  | -  | -  | -  | X  | X  | -  | X  |
|                                       | 8                                                     | -       | -  | -  | X  | X  | -  | -  | X  | -  | -  | X  | X  | X  | X  | X  | X  | -  | X  |
|                                       | 10                                                    | -       | -  | X  | X  | X  | X  | -  | -  | -  | -  | X  | X  | X  | -  | -  | -  | -  | -  |
| 10                                    | 15                                                    | -       | -  | -  | -  | -  | -  | -  | -  | -  | -  | X  | X  | X  | -  | -  | -  | -  | -  |
|                                       | 10                                                    | -       | -  | X  | X  | X  | X  | -  | X  | -  | -  | X  | -  | X  | X  | X  | X  | -  | X  |
|                                       | 15                                                    | -       | X  | X  | X  | X  | X  | -  | X  | -  | -  | X  | -  | X  | X  | X  | X  | X  | X  |
| 25                                    | 20                                                    | -       | -  | -  | -  | -  | -  | -  | -  | -  | -  | X  | X  | X  | -  | -  | -  | -  | -  |
|                                       | 15                                                    | -       | X  | X  | X  | X  | X  | -  | X  | -  | -  | -  | -  | -  | X  | X  | X  | X  | X  |
|                                       | 20                                                    | -       | X  | X  | X  | X  | X  | -  | X  | -  | -  | X  | X  | X  | X  | X  | X  | X  | X  |
| 25                                    | 25                                                    | -       | X  | X  | X  | X  | X  | X  | X  | X  | X  | -  | X  | X  | X  | X  | X  | X  | X  |
|                                       | Availability of material code 42, F4: same as code 40 |         |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| MG = diaphragm size                   |                                                       |         |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |

Availability of material code 42, F4: same as code 40

MG = diaphragm size

|                 |    | Threaded connections |    |    | Clamps |    |        |    |    |
|-----------------|----|----------------------|----|----|--------|----|--------|----|----|
| Connection code |    | 1                    | 6  | 6K | 80, 8P | 82 | 88, 8T | 8A | 8E |
| Material code   |    | 37                   | 40 | 40 | 40     | 40 | 40     | 40 | 40 |
| MG              | DN |                      |    |    |        |    |        |    |    |
| 8               | 6  | -                    | -  | -  | -      | K  | -      | K  | -  |
|                 | 8  | X                    | -  | -  | K      | K  | -      | K  | -  |
|                 | 10 | -                    | W  | W  | K      | -  | -      | W  | -  |
|                 | 15 | -                    | -  | -  | K      | -  | W      | -  | -  |
| 10              | 10 | -                    | W  | W  | -      | K  | -      | K  | -  |
|                 | 12 | X                    | -  | -  | -      | -  | -      | -  | -  |
|                 | 15 | X                    | W  | W  | K      | W  | K      | K  | -  |
|                 | 20 | -                    | -  | -  | K      | -  | K      | -  | -  |
| 25              | 15 | X                    | W  | W  | -      | W  | -      | K  | -  |
|                 | 20 | X                    | W  | W  | K      | K  | K      | K  | -  |
|                 | 25 | X                    | W  | W  | K      | K  | K      | K  | K  |

X = Standard

K = Connections completely machined (not welded)

W = Welded construction

Availability of material code 42, F4: same as code 40

MG = diaphragm size

For further metal diaphragm valves, accessories and other products,  
please see our Product Range catalogue and Price List.  
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