

## Proportional flow control valve VEMD

**FESTO**



## Key features

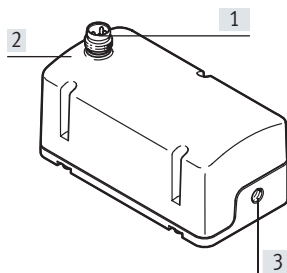
## Description

Thanks to the integrated low-noise piezo technology, minimal energy consumption and compact dimensions, the valve VEMD is perfectly suited to mobile applications.

## Advantages:

- Very low energy consumption
- High dynamic response
- No self-heating
- Absolutely silent
- Excellent price/performance ratio
- Sturdy and durable
- Linear control response
- Small installation space
- Minimal weight

## Mode of operation



- [1] Electrical connection  
 [2] Connection 1 (pressure supply connection)  
 [3] Connection 2 (working connection)

The VEMD is a mass flow controller with integrated piezo actuator. The flow rate is controlled via a closed loop control circuit with integrated thermal sensor.

An analogue interface allows the setpoint value for the flow rate to be specified and the actual value to be fed back.

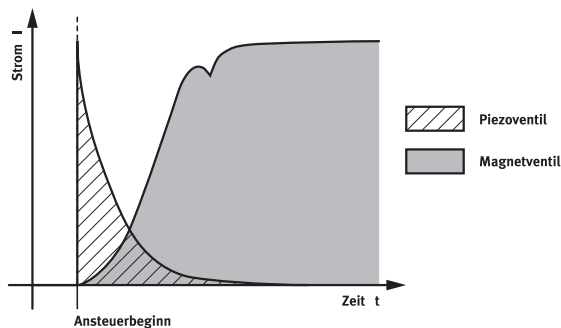
## Range of application

The proportional flow control valve VEMD is intended to be used for proportionally controlling the flow rate of air and inert gases in relation to a specified setpoint value.

The flow control valve is suitable for applications in medical technology within the bounds of the specified technical characteristics.

Additional measures may be required such as for hygiene and sterility for applications with special requirements,

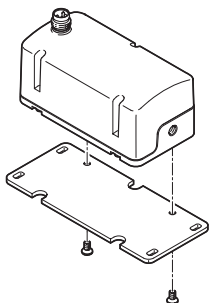
## Low energy consumption



Compared with solenoid valves, proportional valves with piezo technology require virtually no energy to maintain an active state thanks to their capacitive principle. The piezo valve operates like a capacitor: it needs current only at the start in order to charge the piezoceramics.

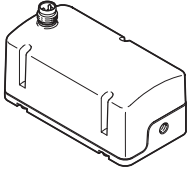
No further energy is needed to maintain its state. The valves therefore generate no heat. They consume up to 95% less energy than solenoid valves, which permanently require an electrical current

## Mounting



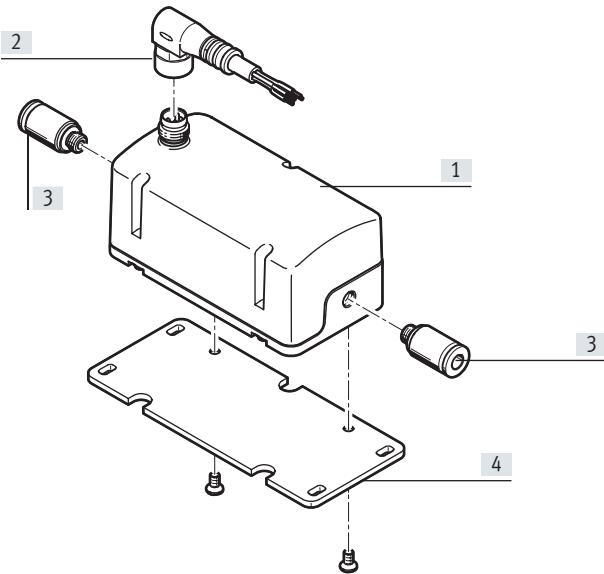
The valve VEMD is mounted on the wall mounting VAME-P14-W using two screws.

## Product range overview

| Function                        | Description   | Nominal operating voltage                          | Setpoint value | Flow rate control range | Operating pressure |           |
|---------------------------------|---|--|----------------|-------------------------|--------------------|-----------|
|                                 |   | [V DC]   | [V]            | [l <sub>n</sub> /min]   | [bar]              |           |
| Proportional flow control valve |  | Mass flow controller, 2-way valve, normally closed | 24             | 0.2 ... 10              | 0 ... 20           | 0 ... 2.5 |
|                                 |   |  | 12             |                         |                    |           |

## Peripherals overview

## VEMD on mounting plate



| Designation                              | Brief description                                     | → Page/Internet |
|--|---|-----------------|
| [1] Proportional flow control valve VEMD | –   | 10              |
| [2] Connecting cable NEBU                | –   | 10              |
| [3] Push-in fitting QSM/NPQM             | For connecting tubing with standard outside diameters | 10              |
| [4] Mounting plate VAME-P14              | For mounting the valve                                | 10              |

## Type codes

|      |                                 |  |
|------|---------------------------------|--|
| 001  | Series                          |  |
| VEMD | Proportional flow control valve |  |

|     |                                |  |
|-----|--------------------------------|--|
| 002 | Directional control valve type |  |
| L   | In-line valve                  |  |

|     |                                |  |
|-----|--------------------------------|--|
| 003 | Valve function                 |  |
| 6   | 2/2-way valve, normally closed |  |

|     |                    |  |
|-----|--------------------|--|
| 004 | Nominal width [mm] |  |
| 1.4 | 1.4                |  |

|     |                 |  |
|-----|-----------------|--|
| 005 | Flow rate range |  |
| 20  | 20 l/min        |  |
| 14  | 14 l/m          |  |

|     |                      |  |
|-----|----------------------|--|
| 006 | Pressure range [bar] |  |
| D21 | 0 ... 2.5            |  |




|     |                      |  |
|-----|----------------------|--|
| 007 | Pneumatic connection |  |
| M5  | M5                   |  |

|     |                           |  |
|-----|---------------------------|--|
| 008 | Nominal operating voltage |  |
| 1   | 24 V DC                   |  |
| 5   | 12 V DC                   |  |

|     |                                |  |
|-----|--------------------------------|--|
| 009 | Electrical connection          |  |
| R1  | Individual connector M8, 4-pin |  |
| LS1 | PCB plug, 4-pin                |  |

|     |                                      |  |
|-----|--------------------------------------|--|
| 010 | Setpoint input for individual valves |  |
| V1  | 0 ... 10 V                           |  |
| V4  | 0.2 ... 10 V                         |  |

## Data sheet

-  Flow rate control range  
0 ... 20 l<sub>n</sub>/min
-  Voltage  
12, 24 V DC
-  Operating pressure  
0 ... 2.5 bar



## General technical data

|                                       |                       |                                       |
|---------------------------------------|-----------------------|---------------------------------------|
| Valve function                        |                       | 2-way proportional flow control valve |
| Flow rate control range <sup>1)</sup> | [l <sub>n</sub> /min] | 0 ... 20                              |
| Dimensions W x L x H                  | [mm]                  | 37x70x31                              |
| Nominal width                         | [mm]                  | 1.4                                   |
| Pneumatic connection 1, 2             |                       | Female thread M5                      |
| Type of mounting                      |                       | Direct mounting via thread            |
| Mounting position                     |                       | Any                                   |
| Flow direction                        |                       | Non-reversible                        |
| Product weight                        | [g]                   | 92                                    |

1) The flow rate is calibrated at the factory to the physical standard conditions in accordance with DIN 1343 (1013 mbar, 0 °C)

## Electrical data

|                                   | VEMD-L-6-14-20-D21-M5-1-R1-V4         | VEMD-L-6-14-20-D21-M5-5-R1-V4 |
|-----------------------------------|---------------------------------------|-------------------------------|
| Electrical connection             | Plug M8x1, 4-pin, to EN 60947-5-2     |                               |
| Nominal operating voltage         | [V DC] 24                             | 12                            |
| Operating voltage range           | [V DC] 22 ... 26.4                    | 11.1 ... 13.2                 |
| Analogue input signal range       | [V] 0.2 ... 10                        |                               |
| Analogue output signal range      | [V] 0.2 ... 10                        |                               |
| Setpoint value                    | [V] 0.2 ... 10                        |                               |
| Max. electrical power consumption | [W] 1                                 |                               |
| Max. current consumption          | [mA] 40                               | 65                            |
| Duty cycle                        | [%] 100                               |                               |
| Reverse polarity protection       | For operating voltage connections     |                               |
| Degree of protection              | IP40, in any mounting position        |                               |
|                                   | IP51, in horizontal mounting position |                               |

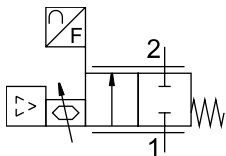
## Data sheet

| Operating and environmental conditions     |       |   |
|--|-------|---|
| Operating pressure                         | [bar] | 0 ... 2.5   |
| Overload pressure                          | [bar] | 6   |
| Burst pressure                             | [bar] | 10  |
| Medium                                     |       | <ul style="list-style-type: none"> <li>• Oxygen (oxygen applications to IEC 60601-1 only on request)</li> <li>• Compressed air to ISO 8573-1:2010 [6:4:4]</li> <li>• Inert gases</li> <li>• Nitrogen</li> </ul> |
| Note on the medium                         |       | Operation with lubricated medium not possible   |
| Ambient conditions                         |       | Not suitable for use in an environment enriched with oxygen to IEC 60601-1  |
| Special characteristics                    |       | Oxygen-compatible to DIN EN 1797  |
| Accuracy of flow rate                      | [%]   | ± (4% o.m.v. + 1.25% FS)  |
| Repetition accuracy FS                     | [%]   | 1   |
| Hysteresis FS                              | [%]   | 2.5   |
| Linearity error FS                         | [%]   | 2   |
| Temperature coefficient K                  | [%]   | 0.1   |
| Ambient temperature                        | [°C]  | 0 ... 50  |
| Temperature of medium                      | [°C]  | 5 ... 40  |
| Storage temperature                        | [°C]  | - 20 ... 70   |
| Certification                              |       | RCM   |
| CE marking (see declaration of conformity) |       | To EU EMC Directive <sup>1)</sup>   |

- 1) For information about the area of use, see the EC declaration of conformity at: [www.festo.com/sp](http://www.festo.com/sp) → Certificates.  
If the devices are subject to usage restrictions in residential, commercial or light-industrial environments, further measures for the reduction of the emitted interference may be necessary.

| Materials         |  |
|-------------------|--|
| Seals             | EPDM, NBR  |
| Housing           | Reinforced PA  |
| Note on materials | RoHS-compliant<br>Contains paint-wetting impairment substances |

## Circuit symbol



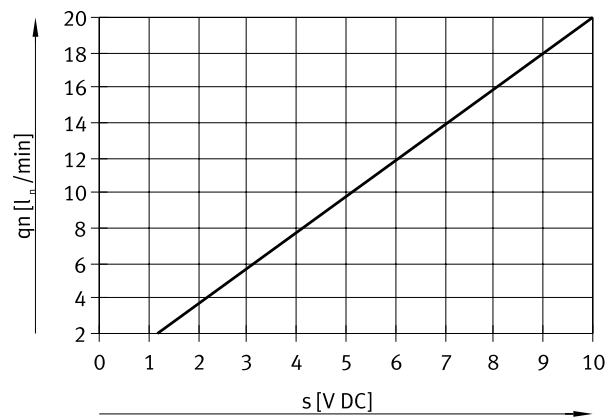
2-way valve, normally closed

| Pin allocation |     |                               |                               |
|----------------|-----|-------------------------------|-------------------------------|
|                | Pin | Function                      |                               |
|                |     | VEMD-L-6-14-20-D21-M5-1-R1-V4 | VEMD-L-6-14-20-D21-M5-5-R1-V4 |
|                | 1   | +24 V DC supply voltage       | +12 V DC supply voltage       |
|                | 2   | + Setpoint value 0.2 ... 10 V |                               |
|                | 3   | GND                           |                               |
|                | 4   | + Actual value 0.2 ... 10 V   |                               |

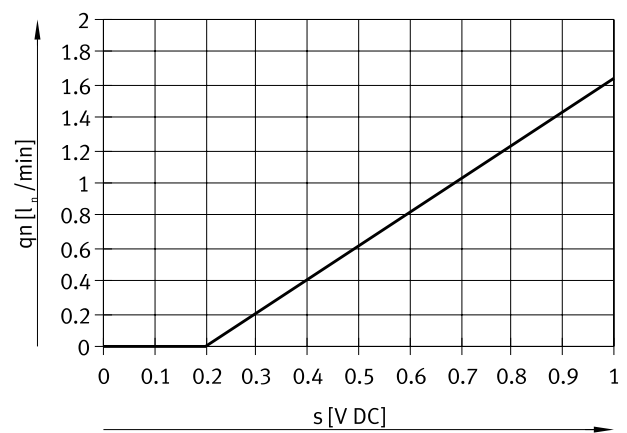
## Data sheet

Flow rate  $q_n$  as a function of setpoint value  $s$ 

Complete range of values

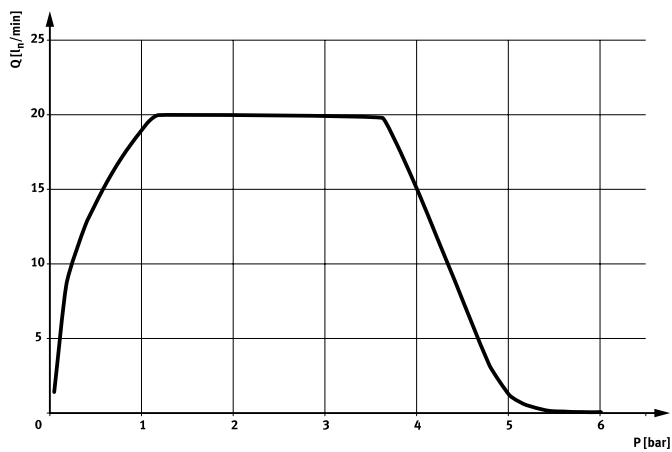


Detail area

Formula for calculating the setpoint value  $s$  as a function of the required nominal flow rate

$$s = \frac{9,8 \cdot (q_n + 4 \div 9,8)}{20}$$

## Maximum flow rate plotted against operating pressure, at room temperature

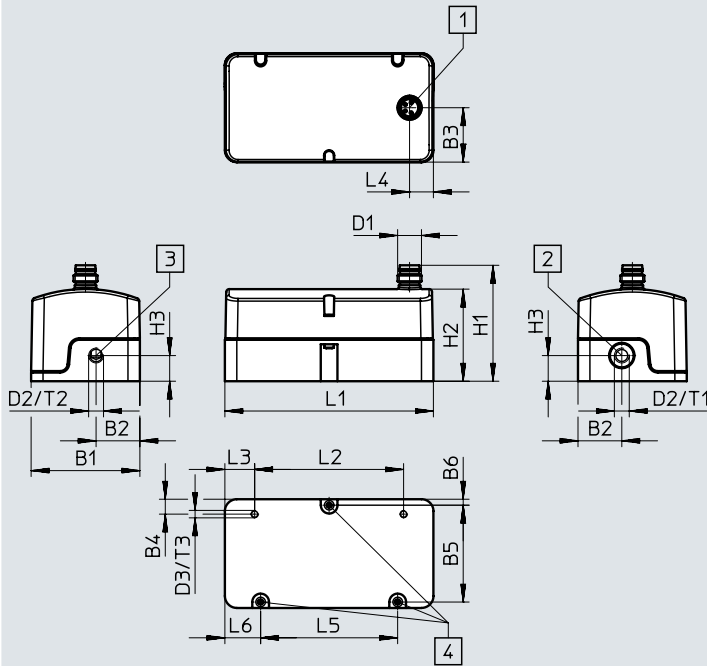




Data sheet

Dimensions

Download CAD data → [www.festo.com](http://www.festo.com)



- [1] Connecting plug, 4-pin
- [2] Pressure supply connection 1
- [3] Working connection 2
- [4] Mounting point through-holes with 2.2 mm diameter

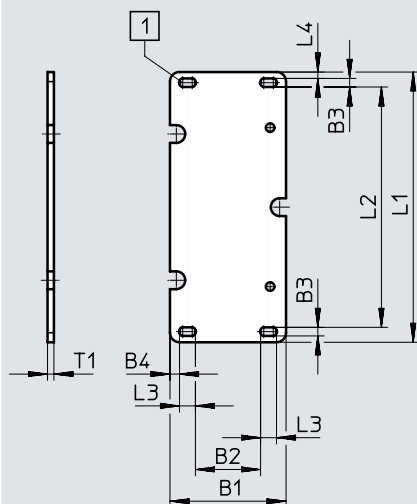
| Type | B1   | B2   | B3   | B4 | B5   | B6 | D1   | D2 | D3   |
|------|------|------|------|----|------|----|------|----|------|
| VEMD | 36.5 | 14.7 | 18.3 | 5  | 32.5 | 2  | M8x1 | M5 | M2.5 |

| Type | H1   | H2   | H3  | L1 | L2 | L3 | L4 | L5 | L6 | T1 | T2 | T3 |
|------|------|------|-----|----|----|----|----|----|----|----|----|----|
| VEMD | 38.9 | 30.9 | 8.6 | 70 | 50 | 10 | 8  | 46 | 12 | 8  | 5  | 5  |

Dimensions

Download CAD data → [www.festo.com](http://www.festo.com)

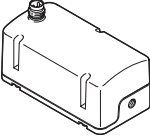
Wall mounting

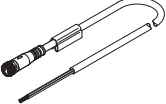
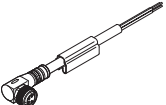
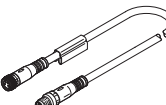
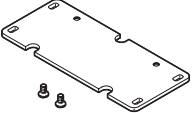




- [1] Mounting recess

| Type       | B1   | B2   | B3  | B4 | L1 | L2   | L3 | L4 | T1 |
|------------|------|------|-----|----|----|------|----|----|----|
| VAME-P14-W | 36.5 | 20.5 | 2.7 | 3  | 85 | 75.6 | 5  | 2  | 2  |

## Accessories

| Ordering data  |  | Description | Operating pressure<br>[bar] | Nominal operating voltage<br>[V DC] | Part no.                      | Type |
|--|--|-------------|-----------------------------|-------------------------------------|-------------------------------|------|
| Proportional flow control valve  |  |             |                             |                                     |                               |      |
|  | Mass flow controller, 2-way valve, normally closed | 0 ... 2.5   | 24                          | 8086472                             | VEMD-L-6-14-20-D21-M5-1-R1-V4 |      |
|  |  |             | 12                          | 8086473                             | VEMD-L-6-14-20-D21-M5-5-R1-V4 |      |

| Ordering data  |   | Description     | Part no.             | Type                 |                   |
|--|---|-----------------|----------------------|----------------------|-------------------|
| Connecting cable   |   |                 |                      |                      |                   |
| Data sheets → Internet: nebu   |   |                 |                      |                      |                   |
|    | Straight socket, M8x1, 4-pin<br>Open end, 4-wire          | 2.5 m           | 541342               | NEBU-M8G4-K-2.5-LE4  |                   |
|  |   | 5 m             | 541343               | NEBU-M8G4-K-5-LE4    |                   |
|    | Angled socket, M8x1, 4-pin,<br>Open end, 4-wire           | 2.5 m           | 541344               | NEBU-M8W4-K-2.5-LE4  |                   |
|   | Straight socket, M8x1, 4-pin<br>Straight plug M8x1, 4-pin | 2.5 m           | 554035               | NEBU-M8G4-K-2.5-M8G4 |                   |
|  |   | 5 m             | 541345               | NEBU-M8W4-K-5-LE4    |                   |
| Wall mounting  |   |                 |                      |                      |                   |
|  | For mounting the valve                                    |                 | 5225721              | VAME-P14-W           |                   |
| Push-in fitting, male thread M5  |   |                 |                      |                      |                   |
|  | With internal hexagon                                     | Metal version   | For tubing O.D. 4 mm | 558657               | NPQM-DK-M5-Q4-P10 |
|  |   |                 | For tubing O.D. 6 mm | 558658               | NPQM-DK-M5-Q6-P10 |
|  |   | Polymer version | For tubing O.D. 3 mm | 153313               | QSM-M5-3-I        |
|  |   |                 | For tubing O.D. 4 mm | 153315               | QSM-M5-4-I        |
|  |   |                 | For tubing O.D. 6 mm | 153317               | QSM-M5-6-I        |
|  | With external hexagon                                     | Metal version   | For tubing O.D. 3 mm | 153302               | QSM-M5-3          |
|  |   |                 | For tubing O.D. 4 mm | 153304               | QSM-M5-4          |
|  |   |                 | For tubing O.D. 6 mm | 153306               | QSM-M5-6          |

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