

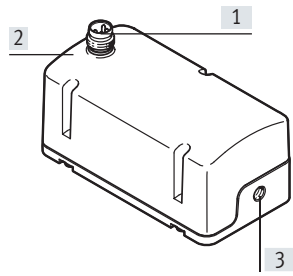
## Proportional flow control valve VEMD

**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. | <b>Advantages:</b> <ul style="list-style-type: none"><li>• Very low energy consumption</li><li>• High dynamic response</li><li>• No self-heating</li><li>• Absolutely silent</li></ul> | <ul style="list-style-type: none"><li>• Excellent price/performance ratio</li><li>• Sturdy and durable</li><li>• Linear control response</li></ul> | <ul style="list-style-type: none"><li>• Small installation space</li><li>• Minimal weight</li></ul> |
|  |  |  |   |

| Mode of operation  |  |  |   |
|--|--|--|---|
|  | [1] Electrical 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 set-point value for the flow rate to be specified and the actual value to be fed back. |
|  | [2] Connection 1 (pressure supply connection)<br>[3] Connection 2 (working connection) |  |   |

| Range of application   |   |  |
|--|---|--|
| The proportional flow control valve VEMD is intended to be used for controlling the flow 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. | For applications with special requirements, such as with regard to hygiene and sterility, additional measures may be required. |

## Low energy consumption

The graph shows current consumption (Y-axis) versus time (X-axis). The Y-axis is labeled 'Y-axis: Current I' and the X-axis is labeled 'X-axis: Time t'. Two areas are plotted: a striped area labeled '1' representing a piezo valve and a grey area labeled '2' representing a solenoid valve. The piezo valve (1) shows a sharp initial peak in current, followed by a rapid decay to near zero, indicating low energy consumption for maintaining its state. The solenoid valve (2) shows a sustained, high current level over time, indicating high energy consumption for maintaining its state.

Y-axis: Current I

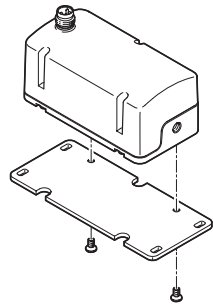
X-axis: Time t

[1] Striped area: Piezo valve

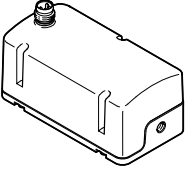
[2] Grey area: Solenoid valve

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.

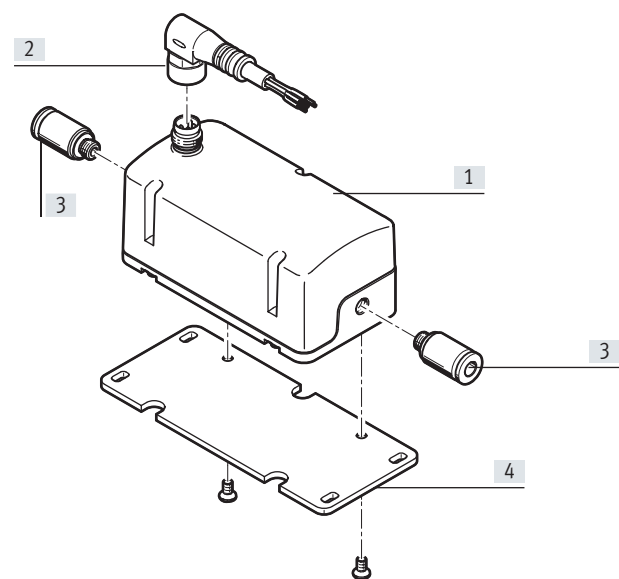
| Mounting   |   |
|--|---|
|  | The valve VEMD is mounted on the wall mounting VAME-P14-W using two screws. |

## Product range overview

|   | Function                        | Description  | Nominal operating voltage | Setpoint value | Flow rate control range | Operating pressure |           |
|---|---------------------------------|--|---------------------------|----------------|-------------------------|--------------------|-----------|
|   |                                 |  | [V DC]                    | [V]            | [l <sub>n</sub> /min]   | [MPa]              | [bar]     |
|  | Proportional flow control valve | Mass flow controller, 2-way valve, normally closed | 24                        | 0.2 ... 10     | 0 ... 20                | 0 ... 0.25         | 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 compressed air tubing with standard O.D. | 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                         |  |

## Datasheet

-  - Flow rate control range  
0 ... 20 l<sub>n</sub>/min
-  - Voltage  
12, 24 V DC
-  - Operating pressure  
0 ... 0.25 MPa



## General technical data

|                                       |                                   |          |
|---------------------------------------|-----------------------------------|----------|
| Valve function                        | 2-way proportional flow regulator |          |
| 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                        | Not reversible                    |          |
| Product weight                        | [g]                               | 92       |

1) The flow 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 61076-2-104  |                               |
| 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 |                               |

## Datasheet

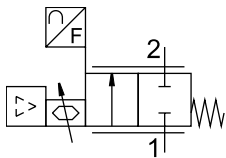
| Operating and environmental conditions       |   |                          |
|--|---|--------------------------|
| Operating pressure                           | [MPa]   | 0 ... 0.25               |
|  | [bar]   | 0 ... 2.5                |
| Overload pressure                            | [MPa]   | 0.6                      |
|  | [bar]   | 6                        |
|  | [psi]   | 87                       |
| Burst pressure                               | [MPa]   | 1                        |
|  | [bar]   | 10                       |
|  | [psi]   | 145                      |
| Medium                                       | <ul style="list-style-type: none"> <li>Oxygen (oxygen applications according to IEC 60601-1 only on request)</li> <li>Compressed air to ISO 8573-1:2010 [5:4:1]</li> <li>Inert gases</li> <li>Nitrogen</li> </ul> |                          |
| Note on the medium                           | Lubricated operation not possible   |                          |
| Ambient conditions                           | Not suitable for use in an oxygen-enriched environment according 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   |                          |
| Conforms to standard                         | EN 61000-6-2 (EMC)  |                          |
|  | EN 61000-6-3 (EMC)  |                          |
| CE marking (see declaration of conformity)   | To EU EMC Directive <sup>1)</sup>   |                          |
|  | To EU RoHS Directive <sup>1)</sup>  |                          |
| UKCA marking (see declaration of conformity) | UK regs EMC <sup>1)</sup>   |                          |
|  | UK regs RoHS <sup>1)</sup>  |                          |
| KC mark                                      | KC EMC  |                          |

1) For information about the area of use, see the EC declaration of conformity at: [www.festo.com/catalogue/...](http://www.festo.com/catalogue/...) → Support/Downloads.

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     |
| PWIS conformity   | VDMA24364 zone III |

### Circuit symbol



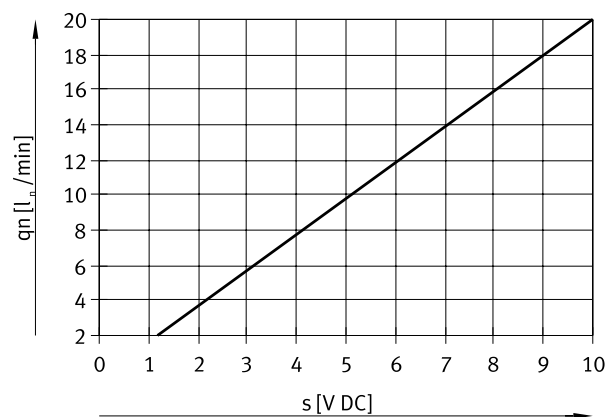
2-way valve, normally closed

| 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   |
|                |                               |
|                |                               |

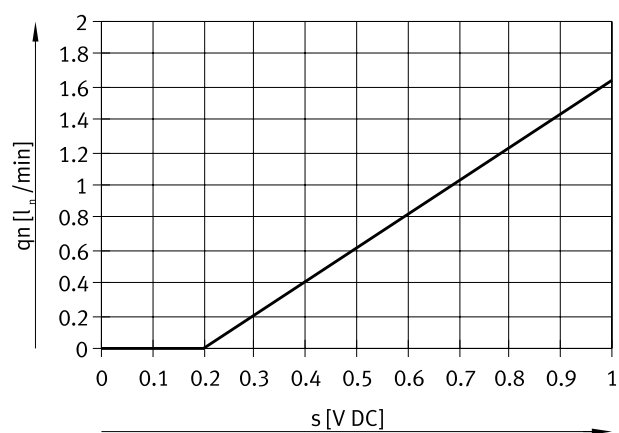
## Datasheet

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

Complete range of values

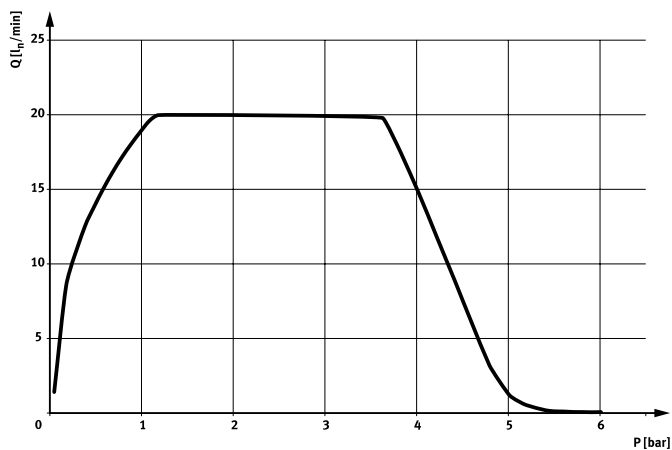


The range in detail

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

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

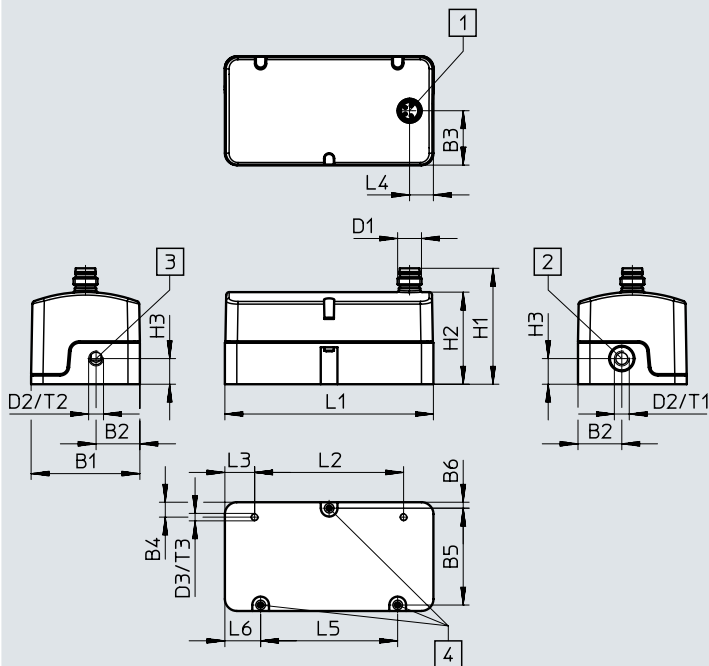
## Maximum flow rate plotted against operating pressure, at room temperature





## Datasheet

## Dimensions

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

- [1] Connecting plug, 4-pin
- [2] Pressure supply port 1
- [3] Working port 2
- [4] Mounting points through-holes  
Ø 2.2 mm

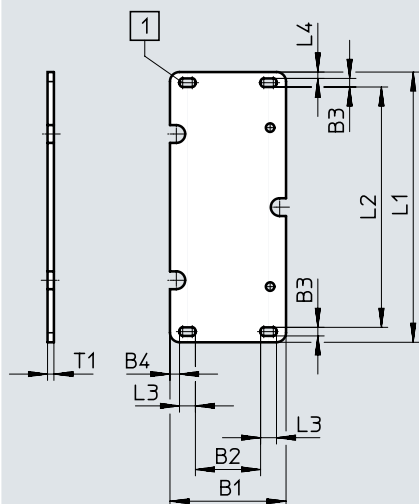
| Type | B1   | B2   | B3   | B4 | B5   | B6 | D1   | D2 | D3   |
|------|------|------|------|----|------|----|------|----|------|
| VEMD | 36.5 | 14.7 | 18.3 | 5  | 32.5 | 2  | M8x1 | M5 | M2.5 |

| 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)

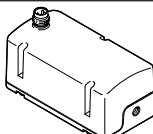
## Wall mounting

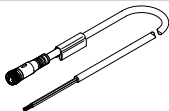
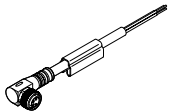
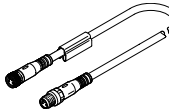
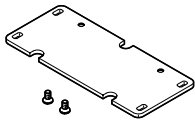




- [1] Mounting recess

| 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                                 |            | Nominal operating voltage | Part no. | Type    |                               |
|  | [MPa]  | [bar]      | [V DC]                    |          |         |                               |
| Proportional flow control valve  |  |            |                           |          |         |                               |
|  | Mass flow controller, 2-way valve, normally closed | 0 ... 0.25 | 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   |   |                | Datasheets → 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 hex   | Metal design   | 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 design | 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 hex   | Metal design   | 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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