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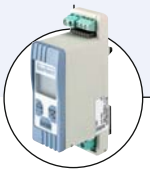
FLUID CONTROL SYSTEMS

# 2/2-Way Solenoid Control Valve

- Excellent range (1:200)
- Very good response
- Compact valve design
- Orifice sizes 0.05 ... 2.0 mm
- Port connection 1/8” or sub-base

Type 2871 can be combined with…



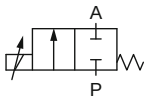
**Type 8605**
Digital control electronics DIN-rail version

**Type 2507**
Cable plug

**Type 8611**
Universal controller

The direct-acting solenoid control valve Type 2871 (20mm installation width) is used as the regulating unit in control loops. Due to an elastomeric seat seal the valve closes tight (integrated shut-off function),up to the DN specific nominal pressure, see ordering chart on page 3.
The plunger of the valve is assembled friction-less, which leads to an extraordinary adjust-ment characteristic. This valve is particularly suitable for demanding control tasks (high control range, dry gases, etc.).

**Circuit function A**




direct acting 2-way solenoid control valve, normally closed

Valve control takes place through a PWM signal [1]. The duty cycle of the PWM signal determines the coil current and hence the position of the plunger. Optionally the valve can also be driven with DC voltage.

Please note the sizing comments for such a control valve on page 2.

[1] PWM pulse width modulation
[2] Pressure data [bar]: Measured as overpressure to the atmospheric pressure, nominal pressure further depends on orifice size
[3] Maximum value, value depends on operating pressure
[4] Characteristic data of control behaviour depends on process conditions
[5] By flow measurement

| Technical Data - Valve | |
|---|---|
| **Body material** | Brass, stainless steel |
| **Seal material** | FKM, EPDM on request |
| **Medium** | Neutral gases, liquids on request |
| **Pressure range** | 0 ... 12 bar [2] – also applicable for technical vacuum |
| **Medium temperature** | -10 ... +90 °C |
| **Ambient temperature** | max. +55 °C |
| **Power supply** | 24 V DC |
| **PWM frequency** | 1500 Hz |
| **Max. coil current** | 220mA [3] |
| **Power consumption** | 2 W (up to DN 0,6), 5 W (from DN 0,8) |
| **Duty cycle** | 100% continuously rated |
| **Port connection** | Sub-base , G 1/8, NPT 1/8, others on request |
| **Electrical connection** | Cable plug Type 2507, Form B industrial standard |
| **Installation** | As required, preferably with actuator in upright position |
| **Typical control data [4] at PWM control** | |
| Hysteresis | < 5% |
| Repeatability | < 0.25% FS[5] |
| Sensitivity | < 0.25% FS – <0.1% FS with DN <0.8 mm [5] |
| Span | 1:200 (DN0.8-2), 1:500 (DN0.05-0.6) |
| Response time (10 -90%) | < 15 ms |
| **Protection class valve** | IP65 |

**Technical data - Control electronics Type 8605 (see separate datasheet)**

The valve control can take place through the control electronics of Type 8605, which converts an analogue input signal into a PWM signal.

**Further functional features of the Type 8605 electronic control unit:**
- Temperature compensation for coil heating by internal current regulation
- Simple adaptation of zero and span settings
- Ramp function to dampen fast set point changes

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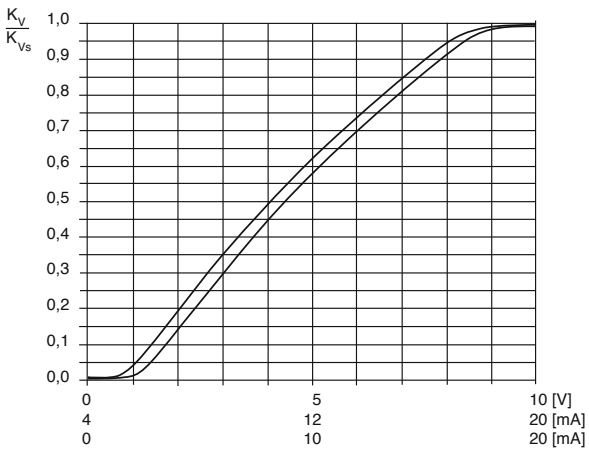
## Characteristics of a solenoid control valve




## Advice for valve sizing

In continuous flow applications, the choice of an appropriate valve size is much more important than with on/off valves. The optimum size should be selected such that the resulting flow in the system is not unnecessarily reduced by the valve. However, a sufficient part of the pressure drop should be taken across the valve even when it is fully opened.

**Recommended value: $\Delta p_{valve}$ > 25 % of total pressure drop within the system**

Otherwise, the ideal, linear valve curve characteristic is changed.

If the differential pressure (difference between inlet and outlet pressure) exceeds half the value of the nominal pressure, the characteristics may change.

For that reason take advantage of Bürkert competent engineering services during the planning phase!

## Determination of the $k_v$ value

| Pressure drop | $k_v$ value for liquids [m³/h] | $k_v$ value for gases [m³/h] |
|---|---|---|
| Subcritical<br>$p_2 > \frac{p_1}{2}$ | $= Q\sqrt{\frac{\rho}{1000\,\Delta p}}$ | $= \frac{Q_N}{514}\sqrt{\frac{T_1\,\rho_N}{p_2\,\Delta p}}$ |
| Supercritical<br>$p_2 < \frac{p_1}{2}$ | $= Q\sqrt{\frac{\rho}{1000\,\Delta p}}$ | $= \frac{Q_N}{257\,p_1}\sqrt{T_1\,\rho_N}$ |

| | | |
|---|---|---|
| $k_V$ | Flow coefficient | [m³/h] [6] |
| $Q_N$ | Standard flow rate | [$m_N^3$/h] [7] |
| $p_1$ | Inlet pressure | [bar] [8] |
| $p_2$ | Outlet pressure | [bar] [8] |
| $\Delta p$ | Differential pressure $p_1$-$p_2$ | [bar] |
| $\rho$ | Density | [kg/m³] |
| $\rho_N$ | Standard density | [kg/m³] |
| $T_1$ | Medium temperature | [(273+t)K] |

[6] measured for water 20°C, Δp 1 bar over the value

[7] At reference conditions 1.013 bar and 0°C (273K)

[8] Absolute pressure

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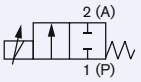
## Ordering chart

### All valves with FKM seals (DN 0.05 and DN 0.1 with PCTFE seat seal)

| Circuit function | Orifice [mm] | Port connection | $k_{vs}$ value water [m³/h] [9] | Nominal pressure [10] [bar] | Max. differential pressure [bar] | Item no. Brass | Item no. Stainless steel |
|---|---|---|---|---|---|---|---|
| A   | 0.05 | sub-base FK01 | 0.00006 | 10 | 10 | 254 985 | 254 986 |
| | | G 1/8 | 0.00006 | 10 | 10 | 254 443 | 254 444 |
| | | NPT 1/8 | 0.00006 | 10 | 10 | 254 968 | 254 971 |
| | 0.1 | sub-base FK01 | 0.00025 | 10 | 10 | 254 987 | 254 988 |
| | | G 1/8 | 0.00025 | 10 | 10 | 254 446 | 254 447 |
| | | NPT 1/8 | 0.00025 | 10 | 10 | 254 972 | 254 973 |
| | 0.2 | sub-base FK01 | 0.001 | 10 | 10 | 254 989 | 254 990 |
| | | G 1/8 | 0.001 | 10 | 10 | 254 448 | 254 450 |
| | | NPT 1/8 | 0.001 | 10 | 10 | 254 974 | 254 975 |
| | 0.3 | sub-base FK01 | 0.002 | 10 | 10 | 254 991 | 254 992 |
| | | G 1/8 | 0.002 | 10 | 10 | 254 451 | 254 452 |
| | | NPT 1/8 | 0.002 | 10 | 10 | 254 977 | 254 978 |
| | 0.4 | sub-base FK01 | 0.004 | 8 | 8 | 254 993 | 254 994 |
| | | G 1/8 | 0.004 | 8 | 8 | 254 453 | 254 454 |
| | | NPT 1/8 | 0.004 | 8 | 8 | 254 979 | 254 980 |
| | 0.6 | sub-base FK01 | 0.01 | 6 | 6 | 254 995 | 254 996 |
| | | G 1/8 | 0.01 | 6 | 6 | 254 455 | 254 457 |
| | | NPT 1/8 | 0.01 | 6 | 6 | 254 981 | 254 982 |
| | 0.8 | sub-base FK01 | 0.018 | 12 | 6 | 235 992 | 235 993 |
| | | G 1/8 | 0.018 | 12 | 6 | 235 994 | 235 995 |
| | | NPT 1/8 | 0.018 | 12 | 6 | 235 996 | 235 997 |
| | 1.0 | sub-base FK01 | 0.027 | 10 | 5 | 235 998 | 235 999 |
| | | G 1/8 | 0.027 | 10 | 5 | 236 000 | 236 001 |
| | | NPT 1/8 | 0.027 | 10 | 5 | 236 002 | 236 003 |
| | 1.2 | sub-base FK01 | 0.038 | 8 | 4 | 236 004 | 236 260 |
| | | G 1/8 | 0.038 | 8 | 4 | 236 261 | 236 262 |
| | | NPT 1/8 | 0.038 | 8 | 4 | 236 263 | 236 264 |
| | 1.6 | sub-base FK01 | 0.055 | 6 | 3 | 236 265 | 236 266 |
| | | G 1/8 | 0.055 | 6 | 3 | 236 267 | 236 268 |
| | | NPT 1/8 | 0.055 | 6 | 3 | 236 269 | 236 270 |
| | 2.0 | sub-base FK01 | 0.090 | 3 | 1.5 | 236 271 | 236 272 |
| | | G 1/8 | 0.090 | 3 | 1.5 | 236 273 | 236 274 |
| | | NPT 1/8 | 0.090 | 3 | 1.5 | 236 275 | 236 276 |

[9] $k_{vs}$ value: Flow rate value for water, measured at +20 °C and 1 bar pressure differential over a fully opened valve.

[11] Pressure data [bar]: Overpressure with respect to atmospheric pressure, with a differential pressure (difference between inlet and outlet pressure) above half of the nominal pressure there are discontinuities in the valve's characteristics possible."

▪ **Please note** that the valves are delivered without control electronics and cable plug (see accessory ordering information).

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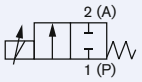
## Ordering chart - variants with approvals

### All valves with FKM seals (DN 0.05 and DN 0.1 with PCTFE seat seal)

| Circuit function | Orifice [mm] | Approvals [11] | Port connection [12] | $k_{vs}$ value water [m³/h] | Nominal pressure [bar] | Max. differential pressure [bar] | Item no. Brass | Item no. Stainless steel |
|---|---|---|---|---|---|---|---|---|
| A   | 0.05 | UR | G 1/8 | 0.00006 | 10 | 10 | 274 900 | 274 904 |
| | | | NPT 1/8 | 0.00006 | 10 | 10 | 274 901 | 274 905 |
| | 0.1 | UR | G 1/8 | 0.00025 | 10 | 10 | 274 902 | 274 906 |
| | | | NPT 1/8 | 0.00025 | 10 | 10 | 274 903 | 274 907 |
| | 0.2 | UR | G 1/8 | 0.001 | 10 | 10 | 274 908 | 274 926 |
| | | | NPT 1/8 | 0.001 | 10 | 10 | 274 909 | 274 927 |
| | | DVGW | G 1/8 | 0.001 | 10 | 10 | on request | on request |
| | 0.3 | UR | G 1/8 | 0.002 | 10 | 10 | 274 910 | 274 928 |
| | | | NPT 1/8 | 0.002 | 10 | 10 | 274 911 | 274 929 |
| | | DVGW | G 1/8 | 0.002 | 10 | 10 | on request | on request |
| | 0.4 | UR | G 1/8 | 0.004 | 8 | 8 | 274 912 | 274 930 |
| | | | NPT 1/8 | 0.004 | 8 | 8 | 274 913 | 274 931 |
| | | DVGW | G 1/8 | 0.004 | 8 | 8 | on request | on request |
| | 0.6 | UR | G 1/8 | 0.01 | 6 | 6 | 274 914 | 274 932 |
| | | | NPT 1/8 | 0.01 | 6 | 6 | 274 915 | 274 933 |
| | | DVGW | G 1/8 | 0.01 | 6 | 6 | on request | on request |
| | 0.8 | UR | G 1/8 | 0.018 | 12 | 6 | 274 916 | 274 934 |
| | | | NPT 1/8 | 0.018 | 12 | 6 | 274 917 | 274 935 |
| | | DVGW | G 1/8 | 0.018 | 12 | 6 | 275 039 | on request |
| | 1.0 | UR | G 1/8 | 0.027 | 10 | 5 | 274 918 | 274 936 |
| | | | NPT 1/8 | 0.027 | 10 | 5 | 274 919 | 274 937 |
| | | DVGW | G 1/8 | 0.027 | 10 | 5 | 275 040 | on request |
| | 1.2 | UR | G 1/8 | 0.038 | 8 | 4 | 274 920 | 274 938 |
| | | | NPT 1/8 | 0.038 | 8 | 4 | 274 921 | 274 939 |
| | | DVGW | G 1/8 | 0.038 | 8 | 4 | 275 041 | on request |
| | 1.6 | UR | G 1/8 | 0.055 | 6 | 3 | 274 922 | 274 940 |
| | | | NPT 1/8 | 0.055 | 6 | 3 | 274 923 | 274 941 |
| | | DVGW | G 1/8 | 0.055 | 6 | 3 | 275 042 | on request |
| | 2.0 | UR | G 1/8 | 0.090 | 3 | 1.5 | 274 924 | 274 942 |
| | | | NPT 1/8 | 0.090 | 3 | 1.5 | 274 925 | 274 943 |
| | | DVGW | G 1/8 | 0.090 | 3 | 1.5 | 275 043 | on request |

[11] **Approvals:** UR (UL recognized)
DVGW - Approval acc. to European gas device guidelines (DIN 3394-1)

[12] **Port connection:** others on request.

**Note**: Delivered without electronic control, Type 8605 and cableplug (see ordering table for accessories).

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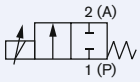
## Ordering chart - variants for higher differential pressures

### All valves with FKM seal

| Circuit function | Orifice [mm] | Approvals | Port connection | $k_{VS}$ value water [m³/h] | Nominal pressure [bar] | Item no. Brass | Item no. Stainless steel |
|---|---|---|---|---|---|---|---|
| A   | 0.8 | | G 1/8 | 0.018 | 12 | 238 928 | 238 930 |
| | | UR | G 1/8 | 0.018 | 12 | 275 025 | 275 030 |
| | 1.0 | | G 1/8 | 0.027 | 10 | 238 936 | 238 931 |
| | | UR | G 1/8 | 0.027 | 10 | 275 026 | 275 031 |
| | 1.2 | | G 1/8 | 0.038 | 8 | 238 937 | 238 932 |
| | | UR | G 1/8 | 0.038 | 8 | 275 027 | 275 032 |
| | 1.6 | | G 1/8 | 0.055 | 6 | 238 939 | 238 933 |
| | | UR | G 1/8 | 0.055 | 6 | 275 028 | 275 033 |
| | 2.0 | | G 1/8 | 0.090 | 3 | 238 940 | 238 934 |
| | | UR | G 1/8 | 0.090 | 3 | 275 029 | 275 034 |

**Note:** The following technical data changes compared with the data on page 1
PWM frequency 800 Hz, span 1:100.
Other connection variations (sub-base, NPT) on request.

## Ordering chart for accessories

### Cable plug Type 2507, form B

The delivery of a cable plug includes the flat seal and fixing screw

| Circuitry | Voltage / frequency | Item no. |
|---|---|---|
| | | |
| Without circuitry | 0 ... 250 V AC/DC | 423 845 |

**Control elecronics, Type 8605** – see separate datasheet

## Further versions on request

**Materials**
Seal materials EPDM, FFKM

**Analytical**
Oxygen version
Parts oil-, fat- and silicon free

**Electrical connection**
12 V Coil
Wire leads 300mm

**Approvals**
UR (UL recognized)
DVGW / device guidelines

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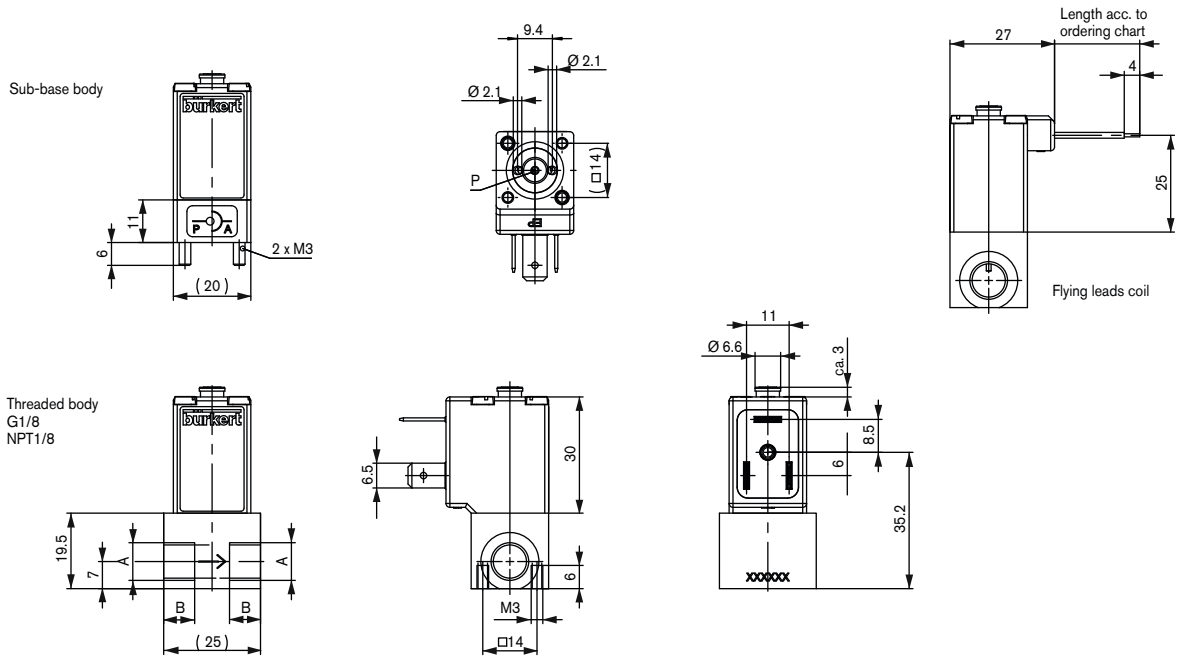
## Dimensions [mm]




| A | B |
|---|---|
| NPT 1/8 | 7 |
| G1/8 | 8 |

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**Note**
You can fill out the fields directly in the PDF file before printing out the form.

## Design data for solenoid control valves

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| | |
|---|---|
| Company | Contact person |
| Customer No | Department |
| Address | Tel./Fax |
| Postcode/Town | E-mail |

■ = Mandatory fields ☐ **Quantity** ☐ **Requested delivery date**

### Process data

| | | | |
|---|---|---|---|
| ■ **Medium** | | | |
| ■ **State of medium** | ☐ **liquid** ☐ **gaseous** | | |
| **Medium temperature** | | °C | |
| ■ **Maximum flow rate** | $Q_{nom}$ = | Unit: | |
| ■ **Minimum flow rate** | $Q_{min}$ = | Unit: | |
| ■ **Inlet pressure at nominal operation** | $p_1$ = | barg | |
| ■ **Outlet pressure at nominal operation** | $p_2$ = | barg | |
| **Max. inlet pressure (nominal pressure)** | $p_{1max}$ = | barg | |
| **Ambient temperature** | | °C | |

### Additional specifications

| | | |
|---|---|---|
| **Body material** | ☐ Brass | ☐ Stainless steel |
| **Seal material** | ☐ FKM | ☐ other ☐ |

**Note** Please state all pressure values as **overpressures with respect to atmospheric pressure** [barg].

## Standard series of solenoid control valves

**Type 2871**
Orifice 0.05 to 2 mm
20 mm coil width

**Type 2873**
Orifice 0.8 to 4 mm
32 mm coil width

**Type 2875**
Orifice 2 to 8 mm
49 mm coil width

Reset Form

In case of special application conditions, please consult for advice.

Subject to alteration.
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