



## Direct-acting 2-way proportional valve

- Proportional valve for flow or pressure control and fuel cell systems and other hydrogen applications
- Integrated shut-off function with reliably high tightness
- Excellent responding behaviour and high setting range
- Available as sub-base or cartridge variant for quick system integration
- Degree of protection IP65 or IP6K9K with automotive plug

Product variants described in the data sheet may differ from the product presentation and description.

### Can be combined with

	<b>Type 6027</b> Direct-acting 2/2-way plunger valve	▶
	<b>Type 6030</b> Direct-acting 2/2-way plunger valve	▶
	<b>Type 6440</b> Servo-assisted 2/2-way piston valve	▶
	<b>Type 8325</b> Pressure transmitter for general applications, 0...25 bar	▶

### Type description

The Type 6020 direct-acting proportional valve can be used as an actuator for process control. Due to an elastomeric seat seal, the valve closes tight up to the orifice-specific nominal pressure class (integrated shut-off function). This valve is especially suitable for challenging control functions (higher setting range, dry gases, etc.). Cartridge and sub-base connections, and solenoids with automotive plugs with degree of protection IP6K9K, are available for optimised use in fuel cells.



## Table of contents

<b>1. General technical data</b>	<b>3</b>
<b>2. Circuit functions</b>	<b>4</b>
<b>3. Materials</b>	<b>4</b>
3.1. Bürkert resistApp .....	4
<b>4. Dimensions</b>	<b>5</b>
4.1. Threaded version .....	5
Complete valve .....	5
Solenoid coil dimensions .....	6
4.2. Cartridge version.....	7
Complete valve .....	7
Solenoid coil dimensions .....	8
Cartridge connection diagram .....	8
4.3. Sub-base version .....	9
Complete valve .....	9
Solenoid coil dimensions .....	10
Sub-base connection diagram.....	10
<b>5. Performance specifications</b>	<b>11</b>
5.1. Flow characteristics .....	11
Determination of $K_v$ value .....	11
5.2. Exemplary characteristic curve of a proportional valve .....	11
<b>6. Product operation</b>	<b>12</b>
6.1. Control unit .....	12
<b>7. Ordering information</b>	<b>12</b>
7.1. Bürkert eShop .....	12
7.2. Bürkert product filter .....	12
7.3. Ordering chart for stationary applications, cable plug form A according to DIN EN 175301 - 803 (IP65 coil) .....	13
Standard version.....	13
7.4. Ordering chart mobile applications with automotive plug (IP6K9K coil).....	14
7.5. Ordering chart accessories.....	14
Cable plug Type 2518, form A according to DIN EN 175301 - 803 .....	14

## 1. General technical data

Product properties	
Dimensions	Detailed information can be found in chapter "4. Dimensions" on page 5 .
Material	
Seal	EPDM, FKM
Body	Stainless steel
Coil	Epoxy
Tightness	10 <sup>-2</sup> mbar l/s, higher degrees of tightness (10 <sup>-4</sup> mbar l/s) on request
Pressure	
Bursting pressure	250 bar for sub-base and threaded body 110 bar for cartridge body
Differential pressure <sup>1.)</sup>	0...25 bar Detailed information can be found in chapter "7. Ordering information" on page 12.
Nominal diameter	DN 2.5...DN 8
Thermal insulation class of solenoid	Class H
Performance data	
Typical values of positioning behaviour <sup>2.)</sup>	
Response sensitivity	< 1 % of end value <sup>3.)</sup>
Hysteresis	< 15 %
Repeat accuracy	< 1 % of end value <sup>3.)</sup>
Setting range	1:100
Actuating time (10...90 %)	< 25 ms
Nominal operating mode	Continuous operation 100 % ED
Electrical data	
Operating voltage	12 V DC, 24 V DC
Power consumption	21 W
Maximum coil current <sup>4.)</sup>	850 mA (for 21 W and 24 V coil)
PWM frequency <sup>5.)</sup>	300...400 Hz
Medium data	
Operating medium	Neutral gases, liquids on request Optimized for hydrogen
Medium temperature	-40 °C...+85 °C
Viscosity	Max. 21 mm <sup>2</sup> /s (21 cSt)
Process/port connection & communication	
Electrical connection	Plug contacts according to DIN EN 175 301 - 803 shape A for cable plug <b>Type 2518</b> ▶. Detailed information can be found in chapter "Cable plug Type 2518, form A according to DIN EN 175301 - 803" on page 14. Automotive plugs for IP6K9K coil variants
Port connection size	Cartridge, sub-base, G ¼, G ⅜, G ½, NPT ¼, NPT ⅜, NPT ½
Approvals and certificates	
Degree of protection	IP65 with cable plug, IP6K9K with automotive plug, NEMA 4X with cable plug <b>Type 2518</b> ▶ and <b>Type 2509</b> ▶ with stainless steel versions (other versions on request)
Environment and installation	
Installation position	Any, preferably actuator face up
Ambient temperature	-40 °C...+85 °C

1.) Pressure data: overpressure to atmospheric pressure, depending on nominal diameter, tightness seal or nominal pressure

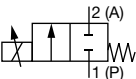
2.) Characteristic data of control behaviour depends on process conditions.

3.) For flow rate measurement

4.) Maximum value: value depends on operating pressure

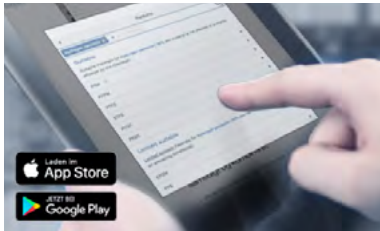
5.) PWM: pulse-width modulation

## 2. Circuit functions

Symbol	Description
	<b>Circuit function A (CF A)</b> 2/2-way solenoid proportional control valve Direct-acting Normally closed

## 3. Materials

### 3.1. Bürkert resistApp



#### Bürkert resistApp – Chemical resistance chart

You want to ensure the reliability and durability of the materials in your individual application case? Verify your combination of media and materials on our website or in our resistApp.

[Start chemical resistance check](#)

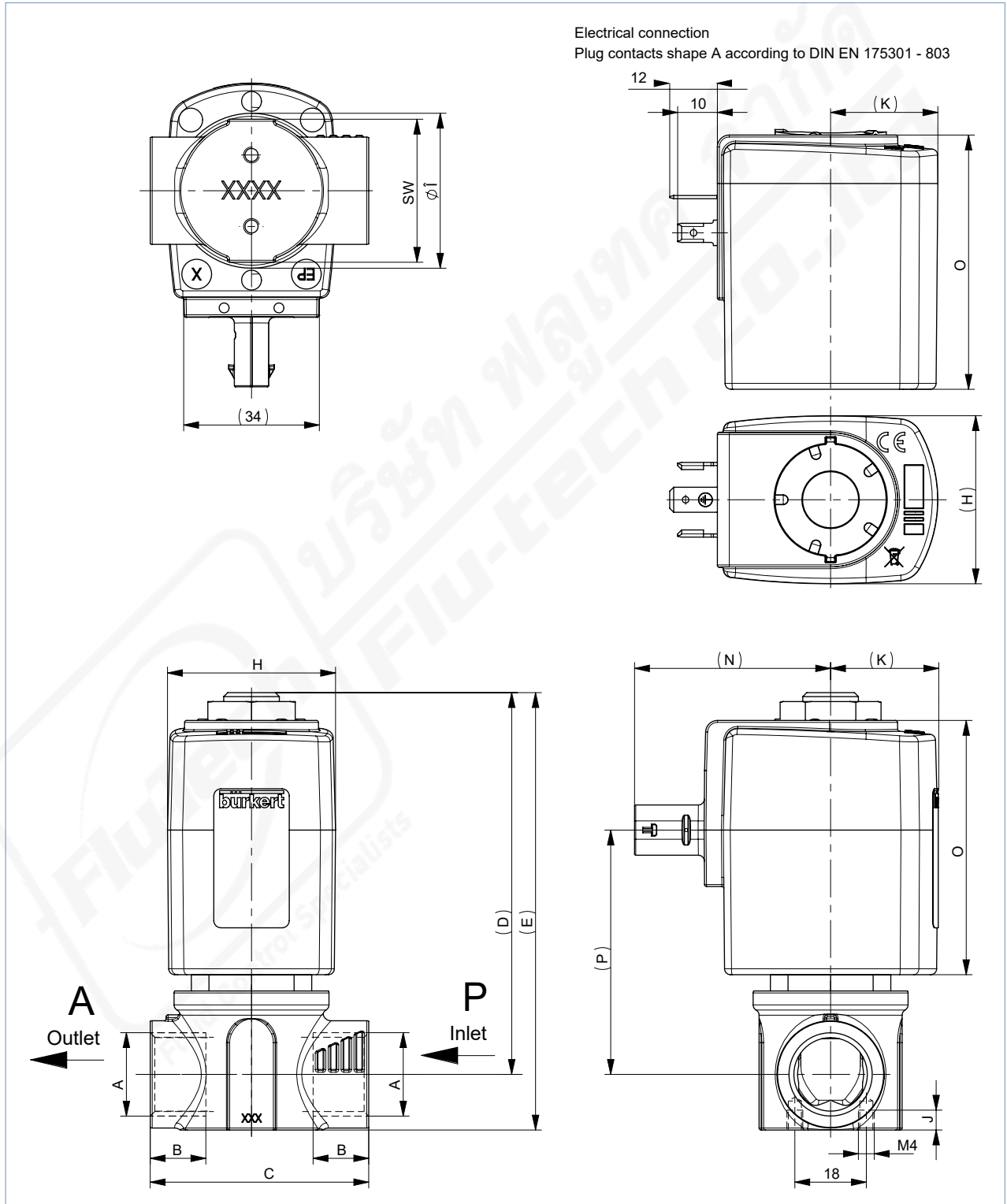
## 4. Dimensions

### 4.1. Threaded version

#### Complete valve

**Note:**

- Dimensions in mm
- The corresponding dimensions of the solenoid coil can be found in chapter **“Solenoid coil dimensions”** on page 6.



DN	A (port connection) [Zoll]	B [mm]	C [mm]	(D) [mm]	(E) [mm]	I [mm]	J [mm]	(P) [mm]	SW [mm]
4.0	G3/8	12	55	96	108	39	5	61	36
	NPT3/8	10.3							
	RC3/8	10.1							
6.0...8.0	G1/2	14	55	96	110	39	5	61	36
	NPT1/2	13.7							
	RC1/2	13.2							

### Solenoid coil dimensions

#### Note:

The corresponding dimensions to the letters mentioned can be found in chapter "Complete valve" on page 5.

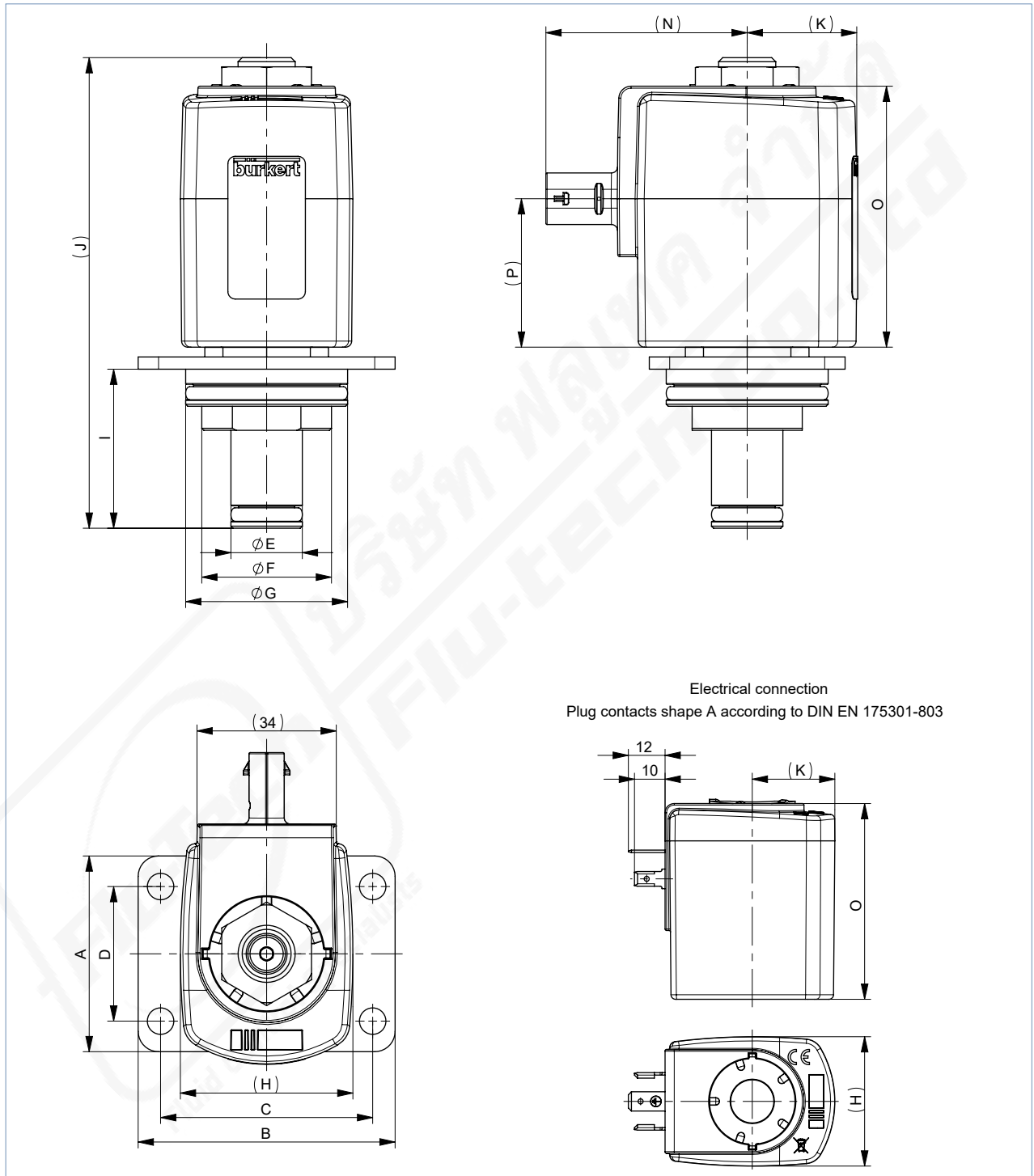
Electrical connection	Coil size	(H)	(K)	(N)	O
		[mm]	[mm]	[mm]	[mm]
Form A according to DIN EN 175301 - 803	K	42	27	–	64
Plug KOSTAL MLK1.2 / TE MCON 1.2, 2 pin, coding A (male)				49	

### 4.2. Cartridge version

#### Complete valve

**Note:**

- Dimensions in mm
- The corresponding dimensions of the solenoid coil can be found in chapter “Solenoid coil dimensions” on page 8.



DN	Port connection	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F [mm]	G [mm]	I [mm]	(J) [mm]
2.5...8.0	FC17	48	63	52	33	17.5	31.8	39.7	39	115

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**Solenoid coil dimensions**

**Note:**

The corresponding dimensions to the letters mentioned can be found in chapter “Complete valve” on page 7.

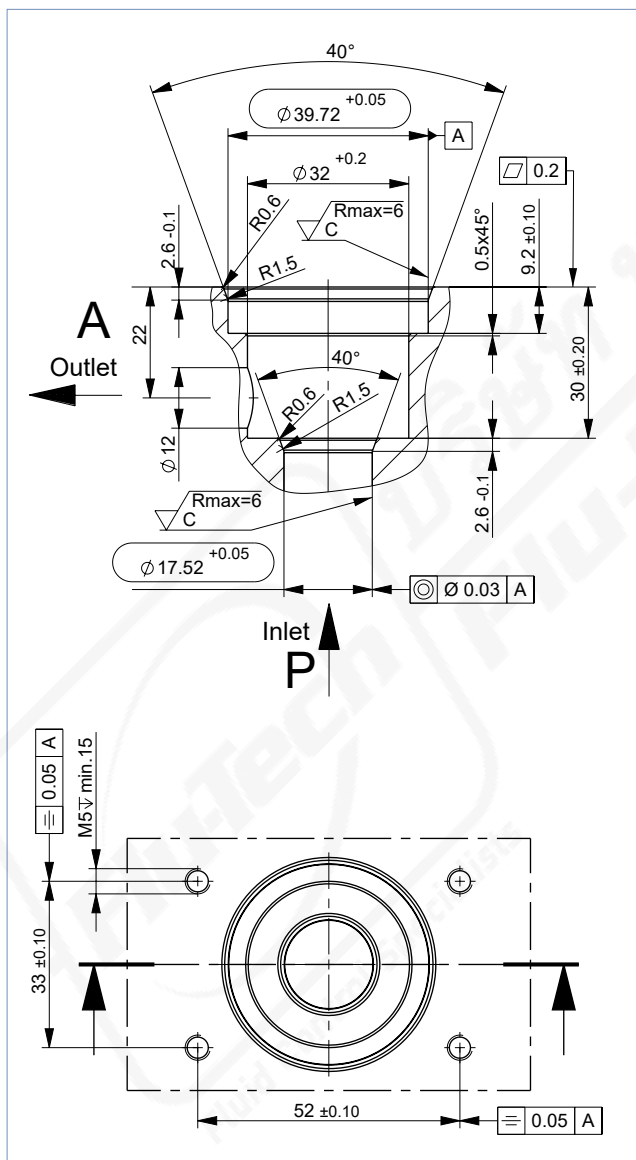
DN	Electrical connection	Coil size	(H) [mm]	(K) [mm]	(N) [mm]	O [mm]	(P) [mm]
2.5...8.0	Form A according to DIN EN 175301 - 803	K	42	27	-	64	36
	Plug KOSTAL MLK1.2 / TE MCON 1.2, 2 pin, coding A (male)				49		

**Cartridge connection diagram**

**Note:**

Dimensions in mm

**Connection contour FC17, coil size K (AC19)**



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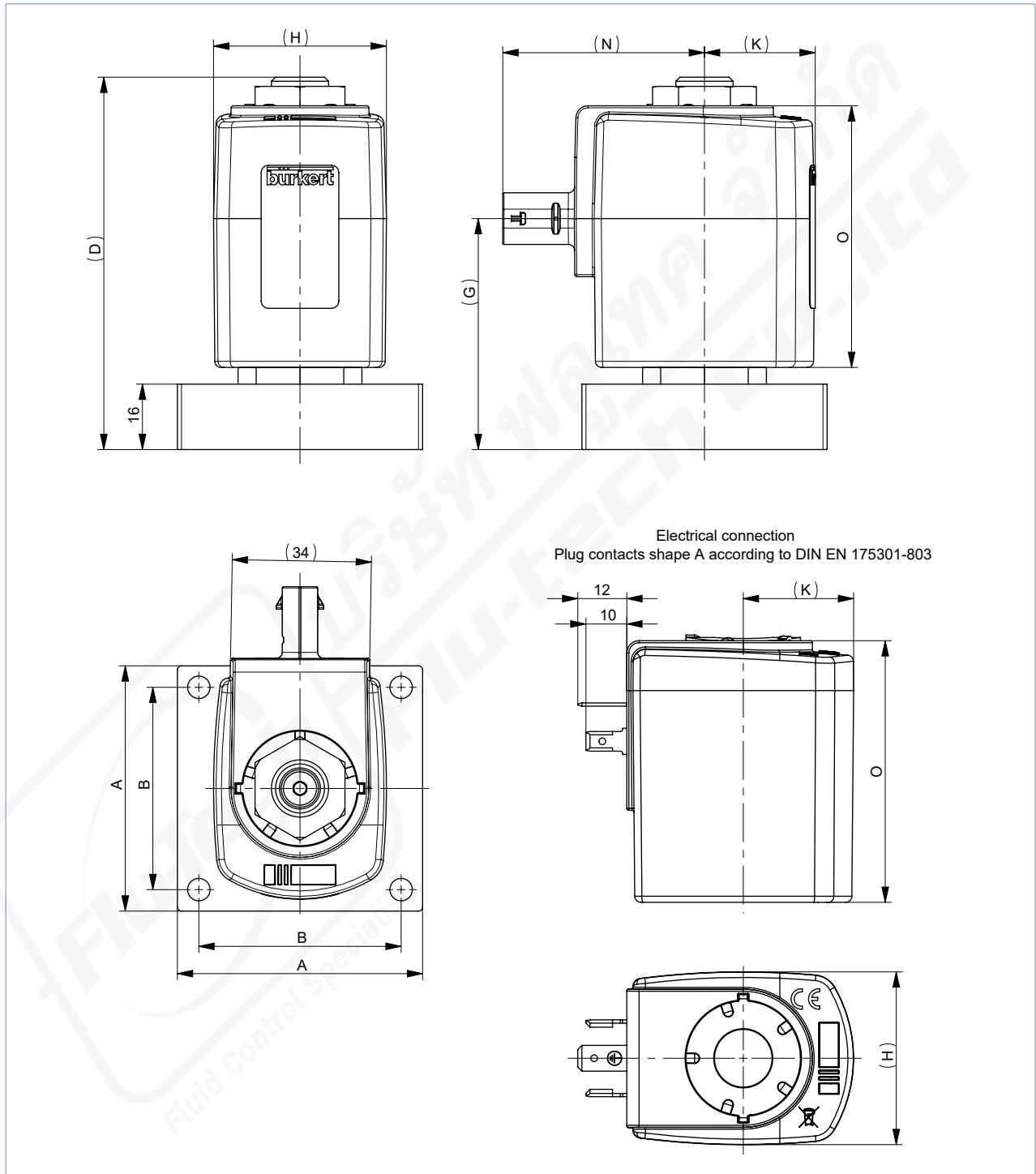


### 4.3. Sub-base version

#### Complete valve

**Note:**

- Dimensions in mm
- The corresponding dimensions of the solenoid coil can be found in chapter “Solenoid coil dimensions” on page 10.



DN	Port connection	A [mm]	B [mm]	C [mm]	(D) [mm]	(G) [mm]
2.5 / 3.0 / 4.0	FK15	60	49.5	16	91	56

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**Solenoid coil dimensions**

**Note:**

The corresponding dimensions to the letters mentioned can be found in chapter **“Complete valve”** on page 9.

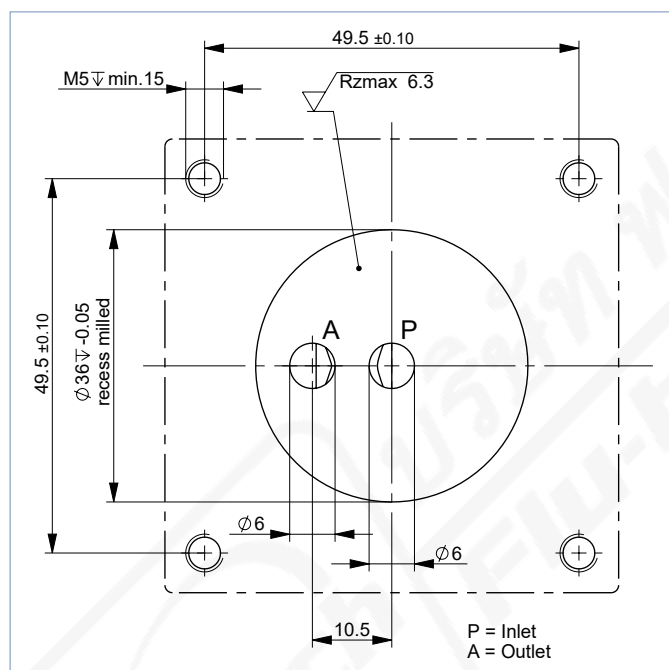
DN	Electrical connection	Coil size	(H) [mm]	(K) [mm]	(N) [mm]	O [mm]
2.5 / 3.0 / 4.0	Form A according to DIN EN 175301 - 803	K	42	27	-	64
	Plug KOSTAL MLK1.2 / TE MCON 1.2, 2 pin, coding A (male)					

**Sub-base connection diagram**

**Note:**

- Dimensions in mm
- P = Inlet, A = Outlet

**Connection contour FK15, DN 2,5...DN 4,0, coil size K (AC19)**



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## 5. Performance specifications

### 5.1. Flow characteristics

#### Determination of $K_V$ value

Pressure drop	$K_V$ value for liquids [m <sup>3</sup> /h]	$K_V$ value for gases [m <sup>3</sup> /h]
<b>Sub-critical</b> $p_2 > \frac{p_1}{2}$	$= Q \sqrt{\frac{\rho}{1000 \Delta p}}$	$= \frac{Q_N}{514} \sqrt{\frac{T_1 \rho_N}{p_2 \Delta p}}$
<b>Supercritical</b> $p_2 < \frac{p_1}{2}$	$= Q \sqrt{\frac{\rho}{1000 \Delta p}}$	$= \frac{Q_N}{257 p_1} \sqrt{T_1 \rho_N}$

$K_V$	Flow coefficient	[m <sup>3</sup> /h] <sup>1)</sup>
$Q_N$	Standard flow rate	[m <sup>3</sup> /h] <sup>2)</sup>
$p_1$	Inlet pressure	[bar] <sup>3)</sup>
$p_2$	Outlet pressure	[bar] <sup>3)</sup>
$\Delta p$	Differential pressure $p_1 - p_2$	[bar]
$\rho$	Density	[kg/m <sup>3</sup> ]
$\rho_N$	Standard density	[kg/m <sup>3</sup> ]
$T_1$	Medium temperature	[(273+t)K]

- 1.) Measured for water,  $\Delta p = 1$  bar, over the valve
- 2.) At reference conditions 1.013 bar and 0 °C (273 K)
- 3.) Absolute pressure

### 5.2. Exemplary characteristic curve of a proportional valve

#### Note:

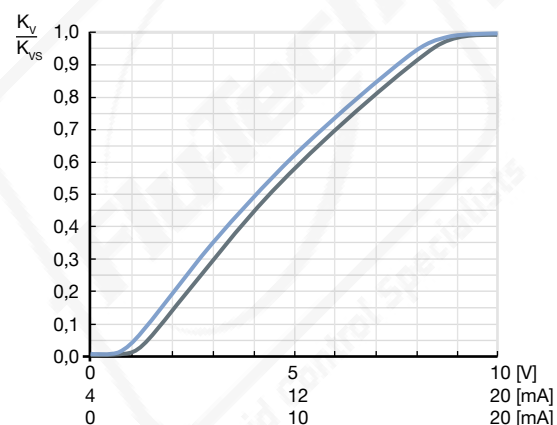
In continuous flow applications, the choice of an appropriate valve size is very important. The optimum size should be selected such that the resulting flow in the system is not unnecessarily reduced by the valve. However, a sufficient part of the pressure drop should be taken across the valve even when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

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

Otherwise, an ideal, linear valve characteristic is deformed into a curved system characteristic.

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

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



## 6. Product operation

### 6.1. Control unit

The control takes place via a PWM signal (pulse width modulation). The pulse duty factor of the PWM signal determines the coil current and thus the position of the actuating armature.

## 7. Ordering information

### 7.1. Bürkert eShop



#### Bürkert eShop – Easy ordering and quick delivery

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### 7.2. Bürkert product filter



#### Bürkert product filter – Get quickly to the right product

You want to select products comfortably based on your technical requirements? Use the Bürkert product filter and find suitable articles for your application quickly and easily.

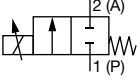
[Try out our product filter](#)

### 7.3. Ordering chart for stationary applications, cable plug form A according to DIN EN 175301 - 803 (IP65 coil)

#### Standard version

#### Note:

- Please note that the cable plug has to be ordered separately, see “[Cable plug Type 2518, form A according to DIN EN 175301 - 803](#)” on page 14 or separate data sheet [Type 2518](#) ▶.
- Further variants with alternative voltages, NPT or RC internal threads are possible on request.
- Please note: If a specific orifice size is required for a significantly lower pressure range (MAWP) than in the table below, a specific valve setting is recommended for more efficient operation after consultation with your Bürkert contact.

Circuit function	Port connection	Orifice	C <sub>vs</sub> value water	Pressure range (MAWP <sup>1.)</sup> )	Article no. 024/DC
		[mm]	[m <sup>3</sup> /h]	[bar]	[V/Hz]
<b>Stainless steel body, seal material EPDM/EPDM</b>					
<b>CF A</b> 2/2-way solenoid proportional control valve Direct-acting Normally closed 	<b>Threaded body with G thread</b>				
	G ¼	3.0	0.26	18	X
		4.0	0.45	10	X
	G ½	6.0	0.9	4.5	X
		8.0	1.3	2	X
	<b>Cartridge body</b>				
	FC17	2.5	0.2	25	X
		3.0	0.26	22	X
		4.0	0.45	12	X
		6.0	0.9	5	X
		6.5	1.1	4	X
		8.0	1.3	2.5	X
	<b>Sub-base body</b>				
	FK15	2.5	0.2	25	X
		3.0	0.26	22	X
		4.0	0.45	12	X

X: on request

1.) Maximum available working pressure

#### 7.4. Ordering chart mobile applications with automotive plug (IP6K9K coil)

##### Note:

- Further variants with alternative voltages, NPT or RC internal threads are possible on request.
- Please note: If a specific orifice size is required for a significantly lower pressure range (MAWP) than in the table below, a specific valve setting is recommended for more efficient operation after consultation with your Bürkert contact.

Circuit function	Port connection	Orifice	K <sub>vs</sub> value water	Pressure range (MAWP <sup>1.)</sup> )	Article no. 024/DC
		[mm]	[m <sup>3</sup> /h]	[bar]	[V/Hz]
<b>Stainless steel body, seal material EPDM/EPDM</b>					
<b>CF A</b> 2/2-way solenoid proportional control valve Direct-acting Normally closed 	<b>Threaded body with G thread</b>				
	G ¼	3.0	0.26	18	X
		4.0	0.45	10	X
	G ½	6.0	0.9	4.5	X
		8.0	1.3	2	X
	<b>Cartridge body</b>				
	FC17	2.5	0.2	25	X
		3.0	0.26	22	X
		4.0	0.45	12	X
		6.0	0.9	5	X
		6.5	1.1	4	X
		8.0	1.3	2.5	X
	<b>Sub-base body</b>				
	FK15	2.5	0.2	25	X
		3.0	0.26	22	X
		4.0	0.45	12	X

X: on request

1.) Maximum available working pressure

#### 7.5. Ordering chart accessories

##### Cable plug Type 2518, form A according to DIN EN 175301 - 803

##### Note:

For further versions see data sheet [Type 2518](#) ▶.

Cable plug	Dimensions	Version	Voltage	Article no.
		Without circuitry (AC/DC)	0...250 V AC/DC	314802