



VAT Vakuumventile AG  
CH-9469 Haag, Schweiz

## Product data sheet

### Control butterfly with isolation function

**Series 616, DN 40 - 100; gear box actuator (1:25)**

**Ordering No. 616..-....-....**

**“Pressure control”**

## 1 Description

This product is a Butterfly control valve with extended control range and isolation functionality for downstream pressure control in vacuum systems.

This Product Data Sheet is valid for the valve ordering number(s):

| DN  |      | aluminum, hard anodized |   |       |          | stainless steel |          |       |          |   |   |
|-----|------|-------------------------|---|-------|----------|-----------------|----------|-------|----------|---|---|
| mm  | inch | ISO-KF                  |   | ISO-F |          | ISO-KF          |          | ISO-F |          |   |   |
| 40  | 1 ½  | 61632-KH                | X | Y     |          |                 | 61632-KE | X     | Y        |   |   |
| 50  | 2    | 61634-KH                | X | Y     |          |                 | 61634-KE | X     | Y        |   |   |
| 63  | 2 ½  |                         |   |       | 61636-PH | X               | Y        |       | 61636-PE | X | Y |
| 80  | 3    |                         |   |       | 61638-PH | X               | Y        |       | 61638-PE | X | Y |
| 100 | 4    |                         |   |       | 61640-PH | X               | Y        |       | 61640-PE | X | Y |

  

| X   |  | Y               |  | Sensor Inputs |
|---|--|-----------------|--|---------------|
| Controller configurations                           |  | Interface       |  |               |
| G = Basic version                                   |  | H = RS232 + AO  |  | 2             |
| A = With SPS  |  | K = RS485 + AO  |  | 2             |
| H = With PFO  |  | E = Logic (A/D) |  | 2             |
| C = With SPS and PFO                                |  | Q = DeviceNet®  |  | 2             |
|   |  | F = Profibus    |  | 2             |
| SPS = Sensor Power Supply                           |  | N = CC-Link     |  | 2             |
| (+/-15 VDC power for external pressure sensor)      |  | X = EtherCAT    |  | 2             |
| PFO = Power Failure Option                          |  | Z = Ethernet    |  | 2             |
| (Valve opens/closes automatically at power failure) |  |                 |  |               |

  

Example: 61638-PEGH = stainless steel valve, ISO-F DN80; RS232, 2 sensors



Sample picture only. Specified product may differ in size, flange and options



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## 2 Technical data

### 2.1 Valve unit

|   |                                     |   |                        |                         |                        |                         |
|---|-------------------------------------|---|------------------------|-------------------------|------------------------|-------------------------|
| Pressure range at 20°C (unheated on delivery)                                     |                                     |   |                        |                         |                        |                         |
| - Stainless steel   | (616 ... E. ...)                    | 1 × 10E-8 mbar to 1.2 bar (abs)   |                        |                         |                        |                         |
| - Aluminum hard anodized  | (616 ... H. ...)                    | 1 × 10E-6 mbar to 1.2 bar (abs)   |                        |                         |                        |                         |
| Leak valve seat at 20°C (unheated on delivery)                                    |                                     |   |                        |                         |                        |                         |
| - Stainless steel   | (616 ... E. ...)                    | 1 × 10E-9 mbar ls <sup>-1</sup>   |                        |                         |                        |                         |
| - Aluminum hard anodized  | (616 ... H. ...)                    | 1 × 10E-4 mbar ls <sup>-1</sup>   |                        |                         |                        |                         |
| Leak valve body at 20°C (unheated on delivery)                                    |                                     |   |                        |                         |                        |                         |
| - Stainless steel   | (616 ... E. ...)                    | 1 × 10E-9 mbar ls <sup>-1</sup>   |                        |                         |                        |                         |
| - Aluminum hard anodized  | (616 ... H. ...)                    | 1 × 10E-5 mbar ls <sup>-1</sup>   |                        |                         |                        |                         |
| Cycles until first service (unheated and under clean conditions)                  |                                     |   |                        |                         |                        |                         |
| • Pressure control  |                                     | 2'000'000   |                        |                         |                        |                         |
| • Closing / opening   |                                     |   |                        |                         |                        |                         |
| ○ DN 40...50  |                                     | 250'000   |                        |                         |                        |                         |
| ○ DN 63...100   |                                     | 100'000   |                        |                         |                        |                         |
| Admissible operating temperature  |                                     |   |                        |                         |                        |                         |
| • Valve body  |                                     | 10°C to 120°C   |                        |                         |                        |                         |
| • Ambient   |                                     | 10°C ... ≤ 50°C; (<35 °C recommended)   |                        |                         |                        |                         |
| Mounting position (valve seat towards chamber)<br>support recommended             |                                     | any<br>DN40...100 (if actuator is not vertically oriented)                                    |                        |                         |                        |                         |
| Process side materials  | body / plate                        | Stainless steel: AISI 316L (1.4404 or 1.4435)<br>Aluminum - EN AW-6082 (3.2315) hard anodized |                        |                         |                        |                         |
|   | shaft / plate screws / ..           | Stainless steel: AISI 316L (1.4404 or 1.4435)   |                        |                         |                        |                         |
|   | shaft bearing                       | Iglidur® X  |                        |                         |                        |                         |
| Seals<br>• Standard*)   | Plate                               | FKM (e.g. Viton®)   |                        |                         |                        |                         |
|   | rotary feed through atmosphere side | FKM (e.g. Viton®)   |                        |                         |                        |                         |
|   | rotary feed through vacuum side     | FKM (e.g. Viton®)   |                        |                         |                        |                         |
| DN (nominal I. D.)  | [mm]<br>[inch]                      | <b>40</b><br><b>1½"</b>   | <b>50</b><br><b>2"</b> | <b>63</b><br><b>2½"</b> | <b>80</b><br><b>3"</b> | <b>100</b><br><b>4"</b> |
| Max. differential pressure on plate (close position) [mbar]                       |                                     | 1000  | 1000                   | 1000                    | 1000                   | 1000                    |
| Operating time:   | Open to close / Close to open [s]   | 0.6   | 0.6                    | 0.6                     | 0.6                    | 0.6                     |
|   | Pressure control (throttling) [s]   | 0.5   | 0.5                    | 0.5                     | 0.5                    | 0.5                     |
| Min. controllable conductance (N <sub>2</sub> molecular flow) [ls <sup>-1</sup> ] |                                     | 0.05  | 0.1                    | 0.15                    | 0.2                    | 0.25                    |
| Max. conductance (N <sub>2</sub> molecular flow) [ls <sup>-1</sup> ]              |                                     | 60  | 120                    | 220                     | 360                    | 600                     |
| Weight (approx.)<br>Aluminum valve  | Aluminum [kg]                       | 2.5   | 2.7                    | 3.8                     | 4.8                    | 5.2                     |
|   | Aluminum [lbs]                      | 5.5   | 6                      | 8.4                     | 10.6                   | 11.5                    |
| Weight (approx.)<br>Stainless steel valve   | Steel [kg]                          | 3.3   | 3.6                    | 5.9                     | 8.8                    | 9.7                     |
|   | Steel [lbs]                         | 7.3   | 7.9                    | 13                      | 19.4                   | 21.4                    |

Behavior in case of power failure:

Depending on configuration  
(with or without PFO (Power Fail Option))

|                   |                          |                  |
|-------------------|--------------------------|------------------|
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## 2.2 Control unit

|  |                       |   |
|--|-----------------------|---|
| Power supply input                         | connector             | D-Sub, DA-15, male  |
|  | supply voltage        | +24 VDC (±10%) @ 0.5 V pk-pk max.   |
| Power consumption <sup>1)</sup>            | (control / drive)     | 40 W (max.)<br>with optional SPS: +40 W<br>with optional PFO: +10 W<br>+3 W max. (from DeviceNet® to DeviceNet® Interface board of valve) |
| Ambient                                    | temperature           | 10 °C to +50 °C max. (<35 °C recommended)   |
|  | humidity              | 0 to 95% RH, non-condensing   |
| Interface                                  | remote                | Refer to chapter 2.3  |
|  | service port          | USB-B (USB 2.0)   |
| Sensor                                     | connector             | D-Sub, DA-15, female  |
|  | number of inputs      | 2   |
|  | signal voltage        | 0 ... 10V DC linear with pressure   |
|  | input voltage range   | -10 ... +10 V   |
|  | input resistance      | 100 kΩ  |
|  | ADC resolution        | 0.1 mV  |
|  | sampling rate         | 2 ms; moving median (10 mSec)   |
|  | power supply (output) | +24 VDC / 1.5 A max. or<br>±15 VDC / 1.2 A max. (with SPS option)   |
| Actuator                                   |                       | Motor: Stepper, field oriented control (foc)<br>Encoder: Incremental, 20'000 puls per rotation<br>Gearbox: Ratio 1:25, backlash <0.4°     |
| Movement range                             | CLOSE - OPEN          | 158°  |
| Valve mechanics                            |                       | Deflection lever transfers 158° gearbox output to ≈90° gate movement; nonlinear transfer  |
| Pressure control performance <sup>2)</sup> |                       | 5 mV or 0.1% of set point, the higher value applies.  |
| Ingress Protection                         |                       | IP 40   |

<sup>1)</sup> Rush in current not considered

<sup>2)</sup> Documented on model process chamber

Actual dimensions and special configuration: dimensional drawing & optional 3D model

|                   |                          |                  |
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## 2.3 Interface

### 2.3.1 Power Connector – all interfaces

|                 |                 |   |
|-----------------|-----------------|---|
| Connector       |                 | D-Sub, DA-15, male                      |
| Digital inputs  | input 1         | interlock OPEN (adjustable with CPA 4)  |
|                 | input 2         | interlock CLOSE (adjustable with CPA 4) |
|                 | voltage control | 12 ... 24V / 4 ... 8 mA                 |
|                 | contact control | 24V / 8 mA                              |
| Digital outputs | output 1        | valve OPEN (adjustable with CPA 4)      |
|                 | output 2        | valve CLOSE (adjustable with CPA 4)     |
|                 | load            | max. 70 V / 0.1 A                       |

### 2.3.2 Logic

|                 |                   |                         |
|-----------------|-------------------|-------------------------|
| Connector       |                   | D-Sub, DB-25, female    |
| Digital inputs  | number of inputs  | 8                       |
|                 | voltage control   | 5 ... 24V / 2 ... 10 mA |
|                 | contact control   | 3.3V / 2 mA             |
| Digital outputs | number of outputs | 4                       |
|                 | load              | max. 70 V / 0.1 A       |
| Analog input    | number of inputs  | 2                       |
|                 | voltage range     | 0 ... 10V               |
|                 | input resistance  | 100 kOhm                |
| Analog outputs  | number of outputs | 2                       |
|                 | voltage range     | 0 ... 10V               |
|                 | load              | max. 1 mA               |

|                   |                          |                  |
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#### 2.3.3 RS232

|                        |                   |  |
|------------------------|-------------------|--|
| Connector              |                   | D-Sub, DB-25, female   |
| Communication settings | baud rate         | 1200,2400,4800,9600,19200,38400,57600, <b>115200</b> <sup>1)</sup> |
|                        | data bits         | 7 or <b>8</b> <sup>1)</sup>  |
|                        | stop bits         | <b>1</b> <sup>1)</sup> or 2  |
|                        | parity bit        | even, odd, <b>none</b> <sup>1)</sup>                               |
| Digital inputs         | number of inputs  | 2  |
|                        | voltage control   | 5 ... 24V / 2 ... 10 mA  |
|                        | contact control   | 3.3V / 2 mA  |
| Digital outputs        | number of outputs | 2  |
|                        | load              | max. 70 V / 0.1 A  |
| Analog outputs         | number of outputs | 2  |
|                        | voltage range     | 0 ... 10V  |
|                        | load              | max. 1 mA  |

<sup>1)</sup> Default setting by firmware; Configuration-File (or CPA) can be used to change

#### 2.3.4 RS485

|                        |                   |  |
|------------------------|-------------------|--|
| Connector              |                   | D-Sub, DB-25, female   |
| Communication settings | baud rate         | 1200,2400,4800,9600,19200,38400,57600, <b>115200</b> <sup>1)</sup> |
|                        | data bits         | 7 or <b>8</b> <sup>1)</sup>  |
|                        | stop bits         | <b>1</b> <sup>1)</sup> or 2  |
|                        | parity bit        | even, odd, <b>none</b> <sup>1)</sup>                               |
|                        | topology          | half duplex, <b>full duplex</b> <sup>1)</sup>                      |
|                        | network           | point to point, <b>multiple devices</b> <sup>1)</sup>              |
|                        | adress range      | <b>0</b> <sup>1)</sup> ... 255                                     |
| Digital inputs         | number of inputs  | 2  |
|                        | voltage control   | 5 ... 24V / 2 ... 10 mA  |
|                        | contact control   | 3.3V / 2 mA  |
| Digital outputs        | number of outputs | 2  |
|                        | load              | max. 70 V / 0.1 A  |
| Analog outputs         | number of outputs | 2  |
|                        | voltage range     | 0 ... 10V  |
|                        | load              | max. 1 mA  |

<sup>1)</sup> Default setting by firmware; Configuration-File (or CPA) can be used to change

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#### 2.3.5 DeviceNet

|                |  |   |
|----------------|--|---|
| Connector      |  | microstyle, 5-pin, male   |
| Communication  | protocol                               | DeviceNet, group 2 slave only                                     |
|                | data rate                              | 125, 250, 500 kbaud<br>by switch or network programmable          |
|                | MAC ID                                 | address 00 - 63<br>by switch or network programmable              |
|                | profile                                | <b>Generic “C”</b> <sup>1)</sup><br>Process Control Device (ODVA) |
| Supply voltage | transceiver at<br>microstyle connector | 24 V <sub>nom</sub> , 11 ... 25V; max. 0.5 W                      |

<sup>1)</sup> Default setting by firmware; Configuration-File can be used to change (or CPA)

#### 2.3.6 Profibus

|               |              |   |
|---------------|--------------|---|
| Connector     |              | D-Sub, DE-9, female   |
| Communication | protocol     | Profibus DP-V1, DP-V0   |
|               | data rate    | 9.6, 19.2, 45.45, 93.75, 187.5, 500 kbps,<br>1.5, 3, 6, 12 Mbps<br>The baud rate is detected <b>automatically</b> <sup>1)</sup> or may be<br>configured |
|               | node address | SW configurable (0, <sup>1)</sup> – 125)  |

<sup>1)</sup> Default setting by firmware; Configuration-File (or CPA) can be used to change

#### 2.3.7 CC-Link

|               |                |  |
|---------------|----------------|--|
| Connector     |                | D-Sub, DE-9, female  |
| Communication | protocol       | CC-Link V2   |
|               | data rate      | 156, 625, 500 kbps,<br>2.5, 5, <b>10 Mbps</b> <sup>1)</sup><br>SW configurable |
|               | station number | SW configurable ( <b>1</b> ) – 64)   |

<sup>2)</sup> Default setting by firmware; Configuration-File can be used to change (or CPA)

|                   |                          |                  |
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#### 2.3.8 EtherCAT

|               |                |   |
|---------------|----------------|---|
| Connector     |                | 2 x RJ45, 8-pin (socket), IN and OUT  |
| Communication | protocol       | Protocol specialized for EtherCAT   |
|               | node address   | Explicit device identification or station alias, set by switches<br><b>Default: 0-0-0</b> |
|               | physical layer | 100BASE-Tx (IEEE 802.3)   |
| Cable         |                | shielded Ethernet CAT5e or higher   |

#### 2.3.9 Ethernet

|               |                |                                      |
|---------------|----------------|--------------------------------------|
| Connector     |                | 2 x RJ45, 8-pin (socket), IN and OUT |
| Communication | protocol       | Telnet                               |
|               | node address   | IP Address (DHCP or static)          |
|               | physical layer | 100BASE-Tx (IEEE 802.3)              |
| Cable         |                | shielded Ethernet CAT5e or higher    |

|                   |                          |                  |
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### 2.4 General data

|                     |  |
|---------------------|--|
| Weight              | refer to chapter: 2.1  |
| Dimensional drawing | Refer to dimensional drawing of specific valve ordering number<br>(available on request) |

|                   |                          |                  |
|-------------------|--------------------------|------------------|
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