



VAT Vakuumventile AG  
CH-9469 Haag, Schweiz

**Product data sheet**  
**Series 653, DN 100 - 350 mm (I.D. 4" - 12")**  
**Ordering No. 653...-.....-.....**

# 1 Description

This product is a throttling pendulum valve with isolation functionality. It is intended to use for downstream pressure control applications.

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

| DN  |      | Ordering numbers |   |     |          |                        |   |          |   |   |          |   |   |
|-----|------|------------------|---|-----|----------|------------------------|---|----------|---|---|----------|---|---|
| mm  | inch | blank aluminum   |   |     |          | hard anodized aluminum |   |          |   |   |          |   |   |
|     |      | ISO-F            |   | JIS |          | ISO-F                  |   | JIS      |   |   |          |   |   |
| 100 | 4    | 65340-PA         | x | y   | 65340-JA | x                      | y | 65340-PH | x | y | 65340-JH | x | y |
| 160 | 6    | 65344-PA         | x | y   | 65344-JA | x                      | y | 65344-PH | x | y | 65344-JH | x | y |
| 200 | 8    | 65346-PA         | x | y   | 65346-JA | x                      | y | 65346-PH | x | y | 65346-JH | x | y |
| 250 | 10   | 65348-PA         | x | y   | 65348-JA | x                      | y | 65348-PH | x | y | 65348-JH | x | y |
| 320 | 12   | 65350-PA         | x | y   | 65350-JA | x                      | y | 65350-PH | x | y | 65350-JH | x | y |
| 350 | 14   | --               |   |     | 65351-JA | x                      | y | --       |   |   | 65351-JH | x | y |



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

Controller configurations:

|  |  |   |   |   |       |       |  |  |           |               |               |  |                   |           |   |              |                 |   |              |                |   |                      |                |   |                                    |           |   |                              |               |   |                              |              |   |                                   |                                    |  |
|--|--|---|---|---|-------|-------|--|--|-----------|---------------|---------------|--|-------------------|-----------|---|--------------|-----------------|---|--------------|----------------|---|----------------------|----------------|---|------------------------------------|-----------|---|------------------------------|---------------|---|------------------------------|--------------|---|-----------------------------------|------------------------------------|--|
| <table border="0"> <tr> <td style="border: none;"> <table border="0"> <tr> <td style="border: none;">x</td> <td style="border: none;"> </td> <td style="border: none;"> </td> <td style="border: none;">y</td> </tr> <tr> <td colspan="4" style="border: none;">-----</td> </tr> </table> </td> <td style="border: none;">Interface</td> <td style="border: none;">Sensor inputs</td> </tr> </table> | <table border="0"> <tr> <td style="border: none;">x</td> <td style="border: none;"> </td> <td style="border: none;"> </td> <td style="border: none;">y</td> </tr> <tr> <td colspan="4" style="border: none;">-----</td> </tr> </table> | x |   |   | y     | ----- |  |  |           | Interface     | Sensor inputs | <table border="0"> <tr> <td style="border: none;">G = basic version</td> <td style="border: none;">H = RS232</td> <td style="border: none;">2</td> </tr> <tr> <td style="border: none;">A = with SPS</td> <td style="border: none;">E = Logic (A/D)</td> <td style="border: none;">2</td> </tr> <tr> <td style="border: none;">H = with PFO</td> <td style="border: none;">Q = DeviceNet®</td> <td style="border: none;">2</td> </tr> <tr> <td style="border: none;">C = with SPS and PFO</td> <td style="border: none;">F = Profibus *</td> <td style="border: none;">2</td> </tr> <tr> <td style="border: none;">T = basic version with VC master *</td> <td style="border: none;">K = RS485</td> <td style="border: none;">2</td> </tr> <tr> <td style="border: none;">V = with SPS and VC master *</td> <td style="border: none;">N = CC-Link *</td> <td style="border: none;">2</td> </tr> <tr> <td style="border: none;">U = with PFO and VC master *</td> <td style="border: none;">X = EtherCAT</td> <td style="border: none;">2</td> </tr> <tr> <td style="border: none;">W = with SPS, PFO and VC master *</td> <td style="border: none;">S = VC slave (without interface) *</td> <td></td> </tr> </table> | G = basic version | H = RS232 | 2 | A = with SPS | E = Logic (A/D) | 2 | H = with PFO | Q = DeviceNet® | 2 | C = with SPS and PFO | F = Profibus * | 2 | T = basic version with VC master * | K = RS485 | 2 | V = with SPS and VC master * | N = CC-Link * | 2 | U = with PFO and VC master * | X = EtherCAT | 2 | W = with SPS, PFO and VC master * | S = VC slave (without interface) * |  |
| <table border="0"> <tr> <td style="border: none;">x</td> <td style="border: none;"> </td> <td style="border: none;"> </td> <td style="border: none;">y</td> </tr> <tr> <td colspan="4" style="border: none;">-----</td> </tr> </table>   | x  |   |   | y | ----- |       |  |  | Interface | Sensor inputs |               |  |                   |           |   |              |                 |   |              |                |   |                      |                |   |                                    |           |   |                              |               |   |                              |              |   |                                   |                                    |  |
| x  |  |   | y |   |       |       |  |  |           |               |               |  |                   |           |   |              |                 |   |              |                |   |                      |                |   |                                    |           |   |                              |               |   |                              |              |   |                                   |                                    |  |
| -----  |  |   |   |   |       |       |  |  |           |               |               |  |                   |           |   |              |                 |   |              |                |   |                      |                |   |                                    |           |   |                              |               |   |                              |              |   |                                   |                                    |  |
| G = basic version  | H = RS232  | 2 |   |   |       |       |  |  |           |               |               |  |                   |           |   |              |                 |   |              |                |   |                      |                |   |                                    |           |   |                              |               |   |                              |              |   |                                   |                                    |  |
| A = with SPS   | E = Logic (A/D)  | 2 |   |   |       |       |  |  |           |               |               |  |                   |           |   |              |                 |   |              |                |   |                      |                |   |                                    |           |   |                              |               |   |                              |              |   |                                   |                                    |  |
| H = with PFO   | Q = DeviceNet®   | 2 |   |   |       |       |  |  |           |               |               |  |                   |           |   |              |                 |   |              |                |   |                      |                |   |                                    |           |   |                              |               |   |                              |              |   |                                   |                                    |  |
| C = with SPS and PFO   | F = Profibus *   | 2 |   |   |       |       |  |  |           |               |               |  |                   |           |   |              |                 |   |              |                |   |                      |                |   |                                    |           |   |                              |               |   |                              |              |   |                                   |                                    |  |
| T = basic version with VC master *   | K = RS485  | 2 |   |   |       |       |  |  |           |               |               |  |                   |           |   |              |                 |   |              |                |   |                      |                |   |                                    |           |   |                              |               |   |                              |              |   |                                   |                                    |  |
| V = with SPS and VC master *   | N = CC-Link *  | 2 |   |   |       |       |  |  |           |               |               |  |                   |           |   |              |                 |   |              |                |   |                      |                |   |                                    |           |   |                              |               |   |                              |              |   |                                   |                                    |  |
| U = with PFO and VC master *   | X = EtherCAT   | 2 |   |   |       |       |  |  |           |               |               |  |                   |           |   |              |                 |   |              |                |   |                      |                |   |                                    |           |   |                              |               |   |                              |              |   |                                   |                                    |  |
| W = with SPS, PFO and VC master *  | S = VC slave (without interface) *   |   |   |   |       |       |  |  |           |               |               |  |                   |           |   |              |                 |   |              |                |   |                      |                |   |                                    |           |   |                              |               |   |                              |              |   |                                   |                                    |  |

|   |
|---|
| SPS = Sensor Power Supply<br>(±15VDC power supply for sensor)                       |
| PFO = Power Failure Option<br>(valve closes / opens automatically at power failure) |
| VC = Valve Cluster<br>(for operating several valves synchronously)                  |

\* not yet available

Example: 65340-PAGH

Aluminium valve with ISO-F DN100 flanges, RS232 interface, with 2 sensor inputs

|                 |                          |                 |
|-----------------|--------------------------|-----------------|
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## 2 Technical data

### 2.1 Valve unit

|   |  |   |
|---|--|---|
| Pressure range (unheated on delivery)   |  |   |
| <ul style="list-style-type: none"> <li>Aluminum</li> <li>Aluminum, hardanodized</li> </ul>    |  | 1 × 10E-8 mbar to 1.2 bar (abs)<br>1 × 10E-6 mbar to 1.2 bar (abs)  |
| Leak rate valve seat (unheated on delivery)   |  |   |
| <ul style="list-style-type: none"> <li>Aluminum</li> <li>Aluminum, hardanodized</li> </ul>    |  | 1 × 10E-9 mbar ls <sup>-1</sup><br>1 × 10E-4 mbar ls <sup>-1</sup>  |
| Leak rate valve body (unheated on delivery)   |  |   |
| <ul style="list-style-type: none"> <li>Aluminum</li> <li>Aluminum, hardanodized</li> </ul>    |  | 1 × 10E-9 mbar ls <sup>-1</sup><br>1 × 10E-5 mbar ls <sup>-1</sup>  |
| Cycles until first service (unheated and under clean conditions)                              |  |   |
| <ul style="list-style-type: none"> <li>Pressure control</li> <li>Closing / opening</li> </ul> |  | 1'000'000<br>200'000  |
| Admissible operating temperature  |  |   |
| <ul style="list-style-type: none"> <li>Valve body</li> <li>Ambient</li> </ul>                 |  | ≤ 120°C<br>≤ 50°C   |
| Mounting position (valve seat on chamber side recommended)                                    |  |   |
| <ul style="list-style-type: none"> <li>DN100...250</li> <li>DN320...350</li> </ul>            |  | Any<br>Horizontally and vertically restricted as shown below*   |
| Process side materials  | valve body / plate   | EN AW-6061 (3.3211)   |
|   | sealing ring   | EN AW-6061 (3.3211), AISI 305 (1.4303), AISI 420C (1.3541), AISI 631 (1.4568)                             |
|   | other parts  | AISI 316L (1.4404, 1.4435), AISI 440 (1.4122), AISI 301 (1.4310), AISI 316 Ti (1.4571), AISI 304 (1.4301) |
| Seals   | plate, body, bonnet, rotary feedthrough, shaft feedthrough | FKM (e.g. Viton®)<br>FFKM optional  |

\*

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| DN (nominal I. D.)  | [mm]                | 100      | 160      | 200      | 250      | 320      | 350      |
|---|---------------------|----------|----------|----------|----------|----------|----------|
|   | [Inch]              | 4"       | 6"       | 8"       | 10"      | 12"      | 14"      |
| Operating time (s):   |                     |          |          |          |          |          |          |
| Open to close / Close to open   | [s]                 | 3 / 4    | 3 / 4    | 3 / 4    | 3 / 4    | 5 / 6    | 5 / 6    |
| Pressure control (throttling) Default Speed                                 | [s]                 | 0.7      | 0.8      | 0.9      | 0.9      | 1.1      | 1.3      |
| Pressure control (throttling) Fast speed                                    | [s]                 | 0.4      | 0.4      | 0.5      | 0.5      | 0.6      | 0.7      |
| Min. controllable conductance (N <sub>2</sub> molecular flow) <sup>1)</sup> | [ls <sup>-1</sup> ] | <3       | <5       | <10      | <15      | <22      | <25      |
| Max. Conductance (N <sub>2</sub> molecular flow) <sup>1)</sup>              | [ls <sup>-1</sup> ] | 1'700    | 5'000    | 12'000   | 22'000   | 30'000   | 43'000   |
| Max. differential pressure on the plate in closed position                  | [mbar]              | 1'200    | 1'200    | 1'200    | 1'200    | 1'200    | 1'200    |
| Max. differential pressure during operation                                 | [mbar]              | 30       | 10       | 5        | 5        | 5        | 5        |
| Compressed air min. – max. overpressure                                     | [bar]               | 4...7    | 4...7    | 4...7    | 4...7    | 4...7    | 4...7    |
|   | [psi]               | 58...102 | 58...102 | 58...102 | 58...102 | 58...102 | 58...102 |

| DN (nominal I. D.) | [mm]   | 100 | 160 | 200 | 250 | 320 | 350 |
|--------------------|--------|-----|-----|-----|-----|-----|-----|
|                    | [Inch] | 4"  | 6"  | 8"  | 10" | 12" | 14" |
| Weight (approx.)   | [kg]   | 12  | 18  | 22  | 29  | 48  | 59  |
|                    | [lbs]  | 27  | 40  | 49  | 64  | 106 | 130 |



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## 2.2 Control unit

|                           |                       |  |
|---------------------------|-----------------------|--|
| Power supply input        | connector             | D-Sub, DA-15, male   |
|                           | supply voltage        | +24 VDC ( $\pm 10\%$ ) @ 0.5 V pk-pk max.                              |
| Power consumption         | (control / drive)     | 70 W (max.)<br>with optional SPS + 40 W<br>with optional PFO + 10 W    |
| Ambient                   | temperature           | 0 °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        | -10 ... +10 V  |
|                           | input resistance      | 100 k $\Omega$   |
|                           | ADC resolution        | 0.1 mV   |
|                           | sampling rate         | 2 ms   |
|                           | power supply (output) | +24 VDC / 1.5 A max. or<br>$\pm 15$ VDC / 1.2 A max. (with SPS option) |
| Position resolution       |                       | 58'000 (full stroke)   |
| Actuator type             |                       | Stepper motor with servo control                                       |
| Pressure control accuracy |                       | 5 mV or 0.1% of setpoint, the higher value applies                     |
| Ingress Protection        |                       | IP 30  |

|                 |                          |                 |
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**2.3 Interface**

Power Connector

|                 |                                    |   |
|-----------------|------------------------------------|---|
| Connector       |                                    | D-Sub, DA-15, male                        |
| Digital inputs  | input 1                            | interlock open (adjustable with CPA 4.0)  |
|                 | input 2                            | interlock close (adjustable with CPA 4.0) |
|                 | voltage control<br>contact control | 12 ... 24V / 4 ... 8 mA<br>24V / 8 mA     |
| Digital outputs | output 1                           | valve opened (adjustable with CPA 4.0)    |
|                 | output 2                           | valve closed (adjustable with CPA 4.0)    |
|                 | load                               | max. 70 V / 0.1 A                         |

Logic

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

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 |
|               | physical layer | 100BASE-Tx (IEEE 802.3)  |
| Cable         |                | shielded Ethernet CAT5e or higher                                |



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CC-Link

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

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                             | Generic "B" for valves with cluster option<br>Generic "C" |
| Supply voltage | transceiver at microstyle connector | 24 Vnom, 11 ... 25V; max. 0.5 W                           |

RS485

|                        |                   |  |
|------------------------|-------------------|--|
| Connector              |                   | D-Sub, DB-25, female                         |
| Communication settings | baud rate         | 1200,2400,4800,9600,19200,38400,57600,115200 |
|                        | data bits         | 7 or 8                                       |
|                        | stop bits         | 1 or 2                                       |
|                        | parity bit        | even, odd, none                              |
|                        | topology          | half duplex, full duplex                     |
|                        | network           | point to point, multiple devices             |
|                        | adress range      | 0 ... 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                                    |



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RS232

|                        |   |   |
|------------------------|---|---|
| Connector              |   | D-Sub, DB-25, female  |
| Communication settings | baud rate<br>data bits<br>stop bits<br>parity bit | 1200,2400,4800,9600,19200,38400,57600,115200<br>7 or 8<br>1 or 2<br>even, odd, none |
| Digital inputs         | number of inputs                                  | 2   |
|                        | voltage control<br>contact control                | 5 ... 24V / 2 ... 10 mA<br>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   |

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 automatically or may be configured |
|               | node address | SW configurable (0 – 125)   |

Valve Cluster

|              |               |   |
|--------------|---------------|---|
| Cluster link | Connector     | 2 x RJ45  |
|              | Communication | RS485   |
|              | Adress range  | 0 = master<br>1 ... 79 = slave address<br>set by switches |

**2.4 General data**

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

|                 |                          |                 |
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