Constant glandwater flow, regardless of:

- Fluctuating slurry pressure
- Fluctuating glandwater pressure
- Gland condition
Introduction - Controlling glandwater flow rate using Maric flow control valves

- Assumptions

What the Maric flow control valve does
- What the Maric flow control valve does not do
- Benefits, & Why use the Maric flow control valve
- Recommended for the alumina industry
- How the conventional Maric flow control valve works

Product Data - Screwed valves, Stainless steel

Product Data - No 15 Flow control check (FCC) valves

Product Data - No 25 Flow control check (FCC) valves

Product Data - Wafer type valves - Table D

How to specify Maric flow control valves and establish part numbers

Performance curves

Determining Maric valve pressure differential range and correct glandwater pressure
- Introduction
- Minimum glandwater pressure required
- Maximum glandwater pressure permissible

Example calculations

Centrifugal pumps plumbed in series

Installation Instructions

Operating Instructions
- Maintenance
- Spare Parts
- Troubleshooting Guide
- Valve Identification
- Noise
- Life Expectancy
- After Sales Service

DISCLAIMER: Whilst Maric Flow Control Australia quote conditions that the valves will accurately operate within, it is possible that individual on-site conditions may result in the valves not performing as expected. No responsibility shall be taken by Maric for the subsequent failure of an installation as a result of relying solely on the information contained herein. It is therefore recommended that prior to commissioning, the pump or gland-packing supplier or manufacturer examine the installation and specifications of the flow control valve selected for its suitability.
Introduction
This booklet is designed to provide information on how Maric Flow Control valves can compliment centrifugal and centrifugal slurry pumping installations by ensuring a constant glandwater flow rate.

It also provides valve suppliers and engineers with the necessary information to establish full and precise Maric Flow Control valve specifications, and part numbers for the purpose of ensuring the desired outcome will actually be achieved.

The term Glandwater, used throughout this document, refers to the sealing or packing water supplied to the glands of centrifugal pumps fitted with conventional gland-packing type sealing arrangements.

Maric flow controllers are also suitable for controlling flow rate of “flushing” or “quench” water to mechanical seals.

Assumptions
This document assumes that the user of the Maric flow control valves is aware of;
- the desired maximum gland-water flow rate,
- the normal and maximum discharge pressure of the centrifugal pump, ie: The maximum pressure the gland is sealing against, and
- the recommended glandwater pressure differential desired across the gland.

This document assumes that the preferred Maric valve body material is stainless steel. It therefore includes product data on stainless steel valve bodies only.

This document also assumes for the alumina industry, that EPDM type rubber control rings are required due to this materials ability to handle both caustic and high temperature environments.
What the Maric Valve DOES  The Maric flow control valve is designed to deliver a fixed, pre-set, constant (maximum) flow of water, irrespective of pressure differential across it, (within a given range).

In the case of glandwater, this means

**CONSTANT GLANDWATER FLOW, regardless of:**
- Fluctuating slurry pressure
- Fluctuating glandwater pressure
- Gland condition

Maric “Flow Control Check” valves, (FCC valves), also offer a reliable backflow prevention feature.

What the Maric Valve DOES NOT DO  The flow controller is not designed to control pressure.

The flow controller will not allow a flow rate greater than the gland will permit. ie; if the gland is too restrictive, or has been over-tightened.

Benefits & Why Use a Maric Valve?  Maric Flow Control valves are used to; –

- **Protect centrifugal pump glands**, through;
  - A constant supply of glandwater to the gland, ensures the life of expensive pump seals are maximized.
  - Prevents one centrifugal pump from robbing all the available glandwater in the event of its failure, which could result in the simultaneous failure of all other glands supplied from the same water supply.

- **Prevent unnecessary dilution of slurry**, (or liquor in the alumina refining industry) by ensuring that glands cannot receive more than a pre-determined flow rate. A lower than set rated flow is not a particular concern here, as the condition of the gland will ultimately determine flow rate, up to the pre-set maximum permitted by the flow controller. Full rated flow of the flow controller will only result when gland is sufficiently loose enough or worn to enable it.

Minimize wastage of available packing water supplies.

Recommended for Alumina Industry  Stainless steel flow controllers, fitted with EPDM type control rubber rings are vital for use in alumina refineries due to their caustic and/or high temperature environments.

Maric Flow Control Check valves are particularly recommended for the alumina industry, due to the benefit provided by the reliable non-return feature.

How the Conventional Maric Flow Control Valve Works  The flow control valves utilize a flexible rubber control ring, with an orifice diameter that responds instantly to fluctuations in water pressure. As pressure differential increases, the orifice diameter reduces to maintain the pre-set flow rate.

Likewise, as pressure reduces, the orifice opens up to maintain the pre-set flow rate.

These valves are particularly suitable for use on poor water quality, because the flow controlling element is a rubber material, and flexes under normal operation. This minimizes the risk of blockage, and eliminates the build-up of scale.
Stainless Steel Screwed Valves

Availability & Specifications – Maric Flow Control Valves

<table>
<thead>
<tr>
<th>Body Sizes</th>
<th>BSP Configurations</th>
<th>NPT Configurations</th>
<th>Flow Rate Availability</th>
</tr>
</thead>
<tbody>
<tr>
<td>6x3mm (1/4”x 1/8”)</td>
<td>F&amp;M</td>
<td>-</td>
<td>from 0.15 to 9 l/m</td>
</tr>
<tr>
<td>6mm (1/4”)</td>
<td>F&amp;F, F&amp;M</td>
<td>F&amp;F</td>
<td>from 0.15 to 9 l/m</td>
</tr>
<tr>
<td>10mm</td>
<td>M&amp;F</td>
<td>F&amp;F</td>
<td>from 0.15 to 9 l/m</td>
</tr>
<tr>
<td>15mm</td>
<td>F&amp;F, M&amp;F, F&amp;M</td>
<td>F&amp;F</td>
<td>from 0.15 to 23 l/m</td>
</tr>
<tr>
<td>20mm</td>
<td>F&amp;F</td>
<td>F&amp;F</td>
<td>from 0.15 to 54 l/m</td>
</tr>
<tr>
<td>25mm</td>
<td>F&amp;F, M&amp;F, F&amp;M</td>
<td>F&amp;F</td>
<td>from 0.4 to 114 l/m</td>
</tr>
<tr>
<td>32mm</td>
<td>F&amp;F</td>
<td>F&amp;F</td>
<td>from 15 to 233 l/m</td>
</tr>
<tr>
<td>40mm</td>
<td>F&amp;F</td>
<td>F&amp;F</td>
<td>from 15 to 233 l/m</td>
</tr>
<tr>
<td>50mm</td>
<td>F&amp;F</td>
<td>F&amp;F</td>
<td>from 15 to 233 l/m</td>
</tr>
</tbody>
</table>

Dimensions & Weights

<table>
<thead>
<tr>
<th>Nominal size</th>
<th>1/4” x 1/8”</th>
<th>1/4”</th>
<th>10</th>
<th>15</th>
<th>20</th>
<th>25</th>
<th>32</th>
<th>40</th>
<th>50</th>
</tr>
</thead>
<tbody>
<tr>
<td>A/F Dimension “A”</td>
<td>18.0</td>
<td>18.0</td>
<td>22.0</td>
<td>25.4</td>
<td>31.8</td>
<td>40.0</td>
<td>57.0</td>
<td>57.0</td>
<td>70.0</td>
</tr>
<tr>
<td>FF Body Length “B”</td>
<td>-</td>
<td>32.0</td>
<td>-</td>
<td>41.8</td>
<td>47.9</td>
<td>58.0</td>
<td>66.2</td>
<td>66.2</td>
<td>74.8</td>
</tr>
<tr>
<td>MF Body Length “C”</td>
<td>-</td>
<td>15.0</td>
<td>-</td>
<td>23.2</td>
<td>-</td>
<td>39.7</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>FM Body Length “D”</td>
<td>18.6</td>
<td>18.6</td>
<td>-</td>
<td>23.2</td>
<td>-</td>
<td>36.4</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>NPT (F&amp;F only)</td>
<td>-</td>
<td>32.8</td>
<td>33.1</td>
<td>42.0</td>
<td>43.1</td>
<td>57.0</td>
<td>61.6</td>
<td>61.6</td>
<td>62.4</td>
</tr>
<tr>
<td>Approx Weight Kg</td>
<td>0.03</td>
<td>0.04</td>
<td>0.05</td>
<td>0.1</td>
<td>0.18</td>
<td>0.22</td>
<td>0.83</td>
<td>0.7</td>
<td>1.0</td>
</tr>
</tbody>
</table>

Standard Performance

Unless otherwise specified, standard Nitrile “Precision” type control rubbers are fitted giving the valve the following standard performance:

Pressure Differential Range
140 – 1000 kPa (Higher DP options available)

Headloss
140 kPa at rated flow. (At lower than rated flows headloss reduces significantly.)

Flow Rate Accuracy
+/- 10%

Available Flow Rates

(litres/min)

<table>
<thead>
<tr>
<th>Flow Rate (litres/min)</th>
</tr>
</thead>
</table>
| 0.15 / 0.2 / 0.25 / 0.3 / 0.35 / 0.4 / 0.45 / 0.5 / 0.63 / 0.7 / 0.8 / 0.9 / 1.0 / 1.1 / 1.2 / 1.3 / 1.5 / 1.6 / 1.8 / 2.0 / 2.3 / 2.5 / 2.8 / 3.0 / 3.2 / 3.5 / 4.0 / 4.5 / 5.0 / 5.5 / 6.3 / 7.0 / 8.0 / 9.0 / 10 / 11 / 12 / 13 / 15 / 16 / 18 / 20 / 23 / 25 / 28 / 32 / 36 / 41 / 45 / 49 / 54 / 59 / 66 / 73 / 82 / 91 / 102 / 114 / 125 / 138 / 150 / 162 / 180 / 199 / 216 / 233 lpm up to 342 lpm

Materials

| Body | 316 Stainless Steel to ASTM484/A276 |

<table>
<thead>
<tr>
<th>Threads, BSPT</th>
<th>BSPT to AS ISO 7.1-2008 Male Series R, Female RP (Standard)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Threads, NPT</td>
<td>NPT to ANSI/ASME B1.20.1 Female NPSC, Male NPT</td>
</tr>
</tbody>
</table>

Max Pressure Differential
2000 kPa (for N7 & E7 rubbers only)

Max Hydrostatic Pressure
6000 kPa

Max Temperature
60°C for Nitrile control rubbers, 100°C for EPDM, 200°C for Viton

Compatible Control Rubbers

Standard Precision P (Non Standard LP, N6, N7, EP, E7, V, HF)

Specifying valves

When ordering these valves, please be sure to specify:

- Body size
- (NPT if applicable)
- Thread configuration
- Body material
- Control rubber material and pressure differential range - if other than Precision
- Flow Rate
Product Data

Flow Control Check Valve – 15mm

Application
For providing the centrifugal pumping industry with a constant glandwater flow rate to pump glands, with backflow prevention. A constant pre-set maximum flow rate to centrifugal pump glands can be achieved irrespective of fluctuating gland-water supply pressure, gland condition, or centrifugal pump discharge pressure.

Benefits
- A constant supply of glandwater to the gland, ensures the life of expensive pump seals are maximised.
- Can ensure that the slurry will not be unnecessarily diluted.
- Prevents one centrifugal pump from robbing all the available gland water in the event of its failure, which could result in the simultaneous failure of all other glands supplied from the same water supply.
- Minimise wastage of available water supplies

Features
- Constant glandwater flow rate
- Back-flow prevention
- High pressure and high temperature handling
- Corrosion and scale resistant assembly

Non-Return Feature. The maintenance free design of the Maric valve uses the flow control rubber as the flexible sealing component in the non-return mechanism. The flexing of the control rubber under normal operating conditions prevents scale build-up on the rubbers surface, which ensures a reliable seal, even after extended periods of no reverse pressure.

Standard Performance
Unless otherwise specified, EP type EPDM control rubbers are fitted giving the valve the following standard performance;

- Pressure Differential Range: 140 – 1500 kPa
- Headloss: 140 kPa at rated flow. (At lower than rated flows headloss, reduces significantly.)
- Flow Rate Accuracy: +/- 20%
- Available Flow Rates: 0.4 / 0.5 / 0.63 / 0.7 / 0.8 / 0.9 / 1.0 / 1.1 / 1.2 / 1.3 / 1.5 / 1.6 / 1.8 / 2.0 / 2.3 / 2.5 / 2.8 / 3.0 / 3.2 / 3.5 / 4.0 / 4.5 / 5.0 / 5.5 / 6.3 / 7.0 / 8.0 / 9.0 / 10 / 11 / 12 / 13 / 15 / 16 / 18 lpm
- Check Valve Operation: Closed when reverse pressure of 70 kPa exists
- Body Material: 303 Stainless Steel to ASTM484/A582
- Thread Configuration: F&M, Female inlet (parallel), Male outlet (tapered)
- Threads, BSPT: 15mm (1/2") BSPT to AS1722.1 Female Series RP, Male Series R
- Threads, NPT (non-standard): 15mm (1/2") NPT to ANSI/ASME B1.20.1, Female NPSC, Male NPT
- Max Hydrostatic Pressure: 6000 kPa
- Temperature Range: 0 - 100 degrees C.

Non-Standard Specifications
High pressure, “E7”, 170 – 2000 kPa. is also available. Alternative flow rates apply

Performance Curve Options – Maric, No 15 Flow Control Check Valve
EP = 140 - 1500 kPa, High Pressure 2 (E7) = 170 - 2000 kPa

Please Specify When Ordering:

- Body Size: 15mm
- Configuration: F&M
- Body Material: Stainless
- Control Rubber: EP (or E7)
- Check: C
- Flow Rate: 0.4 to 18 lpm

Example Part Number for 18 lpm;

15 FM S EP C 18 (Add N here for NPT if required)
**Product Data**

**Flow Control Check Valve – 25mm**

**Application**
For providing the centrifugal pumping industry with a constant glandwater flow rate to pump glands, with backflow prevention. A constant pre-set maximum flow rate to centrifugal pump glands can be achieved irrespective of fluctuating gland-water supply pressure, gland condition, or centrifugal pump discharge pressure.

**Benefits**
- A constant supply of glandwater to the gland, ensures the life of expensive pump seals are maximised.
- Can ensure that the slurry will not be unnecessarily diluted.
- Prevents one centrifugal pump from robbing all the available gland water in the event of its failure, which could result in the simultaneous failure of all other glands supplied from the same water supply.
- Minimise wastage of available water supplies

**Features**
- Constant glandwater flow rate
- Back-flow prevention
- High pressure and high temperature handling
- Corrosion and scale resistant assembly

**Non-Return Feature.** The maintenance free design of the Maric valve uses the flow control rubber as the flexible sealing component in the non-return mechanism. The flexing of the control rubber under normal operating conditions prevents scale build-up on the rubbers surface, which ensures a reliable seal, even after extended periods of no reverse pressure.

**Standard Performance**
Unless otherwise specified, standard Nitrile “Precision” type control rubbers are fitted giving the valve the following standard performance;

- **Pressure Differential Range**: 140 – 1000 kPa
- **Headloss**: 140 kPa at rated flow. (At lower than rated flows, headloss reduces significantly.)
- **Flow Rate Accuracy**: +/- 10%
- **Available (Precision) Flow Rates** (litres/min)
  - 15 / 16 / 18 / 20 / 23 / 25 / 28 / 32 / 36 / 41 / 45 / 49 / 54 / 59 / 66 lpm

**Check Valve Operation**
Closed when reverse pressure of 70 kPa exists

**Body Material**: 316 Stainless Steel to ASTM484/A276

**Thread Configuration**
- F&M, Female inlet (parallel), Male outlet (tapered)
- BSPT
  - 25mm (1”) BSPT to AS1722.1 Female Series RP, Male Series R
- NPT (non-standard)
  - 25mm (1”) NPT to ANSI/ASME B1.20. Female NPSC, Male NPT

**Max Hydrostatic Pressure**: 6000 kPa

**Temperature Range**: 0 - 60 degrees C. (100°C for non-standard EPDM control rubbers)

**Non-Standard Specifications**
**Control rubber material**: EPDM for higher temp and/or caustic handling

**Pressure differential ranges**: 140 - 1500 kPa, & 170 - 2000 kPa. In EPDM or Nitrile - Refer to “How to Specify Maric Valves” Alternative flow rates apply. Flow accuracy is +/- 20%

---

Please Specify When Ordering:

**Options / Description**
- **Body Size**: 25mm
- **Configuration**: F&M
- **Body Material**: Stainless
- **Control Rubber**: Precision (or other)
- **Check**: C
- **Flow Rate**: 18 to 66 lpm

Example Part Number for 66 lpm:
25 FM S P C 66
(Add N here for NPT if required)
Product Data

Stainless Steel Wafer type valves - Table D

Availability & Specifications – Maric Flow Control Valves

Designed for mounting between Table “D” pipe flanges.

Sizes | flow rate ranges avail. | standard no. of control rubbers
--- | --- | ---
25mm | from 0.4 to 114 l/m | 1
32mm | from 15 to 114 l/m | 1
40mm | from 15 to 233 l/m | 1
50mm | from 15 to 342 l/m | 1 – 3
65mm | from 15 to 456 l/m | 4
80mm | from 15 to 699 l/m | 3
100mm | from 15 to 1279 l/m | 6
150mm | from 15 to 2320 l/m | 12
200mm | from 114 to 4427 l/m | 19
250mm | from 114 to 6058 l/m | 26
300mm | from 114 to 8854 l/m | 38

Dimensions & Weights

<table>
<thead>
<tr>
<th>Nominal size</th>
<th>20</th>
<th>25</th>
<th>32</th>
<th>40</th>
<th>50</th>
<th>65</th>
<th>80</th>
<th>100</th>
<th>150</th>
<th>200</th>
<th>250</th>
<th>300</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diameter</td>
<td>61.0</td>
<td>71.0</td>
<td>75.0</td>
<td>86.0</td>
<td>98.0</td>
<td>111.0</td>
<td>130.0</td>
<td>162.0</td>
<td>219.0</td>
<td>276.0</td>
<td>336.0</td>
<td>386.0</td>
</tr>
<tr>
<td>Thickness</td>
<td>22.0</td>
<td>22.0</td>
<td>22.0</td>
<td>22.0</td>
<td>22.0</td>
<td>22.0</td>
<td>24.0</td>
<td>24.0</td>
<td>28.0</td>
<td>32.0</td>
<td>40.0</td>
<td>40.0</td>
</tr>
<tr>
<td>Approx Weight Kg</td>
<td>0.45</td>
<td>0.5</td>
<td>0.7</td>
<td>0.9</td>
<td>1.2</td>
<td>1.2</td>
<td>1.6</td>
<td>2.7</td>
<td>5.0</td>
<td>11.0</td>
<td>19.0</td>
<td>31.0</td>
</tr>
</tbody>
</table>

Standard Performance

Unless otherwise specified, standard Nitrile “Precision” type control rubbers are fitted giving the valve the following standard performance;

| Pressure Differential Range | 140 – 1000 kPa (Higher DP options available) |
| Flow Rate Accuracy | +/- 10% |
| Headloss | 140 kPa at rated flow. (At lower than rated flows headloss reduces significantly.) |

Available Flow Rates

| Flow Rate | .4 / .45 / .5 / .55 / .63 / .7 / .8 / .9 / 1.0 / 1.1 / 1.2 / 1.3 / 1.5 / 1.6 / 1.8 / 2.0 / 2.3 / 2.5 / 2.8 / 3.0 / 3.2 / 3.5 / 4.0 / 4.5 / 5.0 / 5.5 / 6.3 / 7.0 / 8.0 / 9.0 / 10 / 11 / 12 / 13 / 15 / 16 / 18 / 20 / 23 / 25 / 28 / 32 / 36 / 41 / 45 / 49 / 54 / 59 / 66 / 73 / 82 / 91 / 102 / 114 / 125 / 138 / 150 / 162 / 180 / 199 / 216 / 233 lpm up to 8854 lpm |

Materials

| Body material | 316 Stainless Steel to ASTM484/A276 |

Sealing O’Rings

Nitrile, potable water approved to AS4020 or EPDM or Viton if applicable

Flange Specification

Suits standard table “D” flanges to AS2129 and AS4087 Class 14

Alternative specs are available - Refer to Valve Selection Guide for additional info.

Standard Wafers are not full flange type i.e. flange bolts locate wafer concentrically and remain visible when viewing assembly. Wafers are fitted with an o’ring in each face for sealing against smooth flat faced flanges. Gaskets will however be required where grooved, raised or rough cast face flanges are used.

PVC and Poly Stub Flanges note; Due to smaller I.D. of these flanges/pipes, optional spacers are often required to prevent restriction.

Max Pressure Differential

2000 kPa (for N7 & E7 rubbers only)

Max Hydrostatic Pressure

6000 kPa

Max Temperature

60°C for Nitrile control Rubbers - 100°C for EPDM - 200°C for Viton

Compatible Control Rubbers

Standard Precision P (Non Standard LP, N6, N7, EP, E7, V, HF)

Specifying valves

When ordering these valves, please be sure to specify:

- Body size
- Flange specification (if other than Table D)
- Body material
- Control rubber material and pressure differential range (if other than Precision)
- Flow Rate
How to Specify Maric Flow Control Valves and Establish Part Numbers (Stainless Steel valves only)

Important: Refer to the Product Data section through-out this process

When purchasing a Maric valve, please specify each of the components below. The full description (specification) then condenses into an appropriate part number as illustrated below.

Screwed Type Valves – your 7 step specifying guide

1. Connection Size
   - 6, 10, 15
   - 20, 25, 32
   - 40, 50

2. Thread Spec
   - standard BSP
   - Non-Standard NPT required insert N here

3. Configuration
   - MF, FM, or FF
   - First letter specifies inlet.

4. Body Material
   - Stainless Steel
   - Other materials on Request

5. Control Rubber
   - Precision = P
   - High Pressure 1 = N6
   - High Pressure 2 = N7
   - EPDM = EP
   - EPDM High Pressure 2 = E7
   - Viton = V
   - Hi Flow = HF

6. Check Valve
   - (if applic.)
   - Only available in 15 & 25mm, F&M, Stainless Steel
   - If required insert C here
   - Check Valve = C

7. Flow Rate
   - In litres per minute

Wafer Type Valves – your 5 step specifying guide

1. Body Size
   - 20, 25, 32, 40, 50, 65, 80, 100, 150, 200, 250, 300mm

2. Flange Spec
   - Australian - for table D no character req’d.
   - Table C, E, F, H, J
   - Class14 - C14
   - Class21 - C21
   - American ANSI
   - ANSI150 = A1
   - ANSI300 = A3
   - BS4504, DIN, EN & ISO7005
   - PN10, PN16, PN25
   - Japanese JIS2220
   - PN10 - J10
   - PN16 - J16
   - PN25 - J25

3. Body Material
   - Stainless Steel
   - Other materials on Request

4. Control Rubber
   - Precision = P
   - High Pressure 1 = N6
   - High Pressure 2 = N7
   - EPDM = EP
   - EPDM High Pressure 2 = E7
   - Viton = V
   - Hi Flow = HF

5. Flow Rate
   - In litres per minute

Insert Type Valves – contact your nearest Maric Representative
How to Specify Maric Flow Control Valves and Establish Part Numbers (Stainless Steel valves only)

Control Rubber Material and Pressure Differential Range Options

<table>
<thead>
<tr>
<th>Pressure Differential Range</th>
<th>Maric Name</th>
<th>Control Rubber Material</th>
<th>Abbreviation</th>
<th>Flow Rate Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>140 – 1000 kPa</td>
<td>Precision</td>
<td>Nitrile</td>
<td>“P”</td>
<td>+/- 10%</td>
</tr>
<tr>
<td>140 – 1500 kPa</td>
<td>High Pressure 1 (HP1)</td>
<td>Nitrile</td>
<td>“N6”</td>
<td>+/- 20%</td>
</tr>
<tr>
<td>140 – 1500 kPa</td>
<td>Epdm Standard</td>
<td>EPDM</td>
<td>“EP”</td>
<td>+/- 20%</td>
</tr>
<tr>
<td>170 – 2000 kPa</td>
<td>High Pressure 2 (HP2)</td>
<td>Nitrile</td>
<td>“N7”</td>
<td>+/- 20%</td>
</tr>
<tr>
<td>170 – 2000 kPa</td>
<td>Epdm High Pressure 2</td>
<td>EPDM</td>
<td>“E7”</td>
<td>+/- 20%</td>
</tr>
</tbody>
</table>

Important: The “abbreviation” characters above specify both the control rubber material and the pressure differential range.

Nitrile - is the standard general purpose control rubber material used in conventional flow control valves.

EPDM - is recommended for the alumina industry due to its high temperature and caustic handling.

Maric Flow Control Valve Performance Curve

Performance Curve Comparisons

This graph shows typical performance characteristics of each of the three available Pressure Differential Ranges as shown on the How to specify Maric Flow Control Valves document.
Determining Correct Pressure Differential Range & Glandwater Pressure

Introduction
For reliable glandwater flow control, selecting the flow controller of the correct pressure differential range is vital, and should be determined in conjunction with calculating the correct glandwater pressure.

The pressure rating of the valve selected must be sufficiently high enough to handle the gland water supply pressure, and the glandwater pressure must be high enough to provide for the minimum pressure differential required across the Maric flow controller. When introducing a Maric Flow Control Valve, it is possible that an existing installations glandwater pressure may need to be increased to allow for the pressure differential required by the flow controller.

Firstly calculate what apparent minimum glandwater pressure will be required, by adding up the centrifugal pump discharge pressure, plus the recommended differential required across the gland. Then check that the flow controller will handle that glandwater pressure. If not, then it will be necessary to use a higher pressure rated valve. This may in turn, then require a small increase in glandwater pressure.

Minimum Glandwater Pressure Required
The minimum glandwater pressure required will be the sum of the following three requirements;

A • The maximum duty pressure of the centrifugal pump, (not shut head pressure) plus,
B • An allowance of 50 to 100 kPa, to overcome restriction of the actual gland itself.
(Note this may vary from one gland manufacturer to another.)
C • The minimum pressure differential required for the flow control valve, ie. 140 or 170kPa

If pressure is set too low, the flow controller will have insufficient differential across it, and flow rate will be proportionally low. See brochure or performance curves for how this affects flow rate.

Important - Prior to the centrifugal pump starting, and just after it is stopped, the glandwater system is likely to still be running and delivering glandwater.
During this time, the Maric valve may have little or no pressure on its discharge end, resulting in the pressure differential across the valve being the full glandwater pressure.
Therefore, when selecting a flow controller, ensure that its pressure differential range is high enough to handle the full glandwater pressure.

Maximum Glandwater Pressure Permissible
As far as the flow controller is concerned, the maximum gland water pressure permissible can be as high as the maximum pressure tolerated for the particular flow control valve selected.
In general however, it is recommended that this be set just a small amount above the minimum requirement as described above. This is because too high a pressure differential across a gland may result in damage to it.

If the pressure is set too high, three situations could result;

• flow rate may reduce below specified accuracy, or
• control rubber may jam in the orifice resulting in no flow at all, or
• control rubber may blow completely through orifice allowing uncontrolled high flow.

Recommended Glandwater Pressure
The recommended glandwater pressure supplied to the flow controller should be at least 50 to 100 kPa above the minimum glandwater pressure calculated above. This should be appropriate to allow for system irregularities, and also ensures that the flow controller is not working at the extreme bottom limit of its range.
Determining Correct Pressure Differential Range & Glandwater Pressure cont.

Examples

The following examples show installation pressures typically encountered on site, for any flow rate, in increasingly higher pressure scenarios, for the purpose of showing both;

A, how to calculate the pressure at which the glandwater supply must be set, and therefore;

B, determining what Maric valve pressure differential range will be required.

Note, these examples assume that the pre-set constant flow rate is actually desirable, continuously. If the flow controller is being used only to prevent excessive flow in the event of total gland failure, then the allowance for full minimum pressure differential quoted for the particular valve type may not need to be included in the calculations.

Abbreviations used;

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PD</td>
<td>Pressure Differential</td>
</tr>
<tr>
<td>GWP</td>
<td>Gland Water Pressure</td>
</tr>
<tr>
<td>HP1</td>
<td>High Pressure 1, 140 – 1500 kPa</td>
</tr>
<tr>
<td>HP2</td>
<td>High Pressure 2, 170 – 2000 kPa</td>
</tr>
</tbody>
</table>

Special Note: Centrifugal Pump Pressure (max) must always include any existing suction head pressure to the pump.

Example 1

Max centrifugal pump pressure + suction head; **600 kPa**  
Gland requirement; **50 kPa**

Due to relatively low pressures, let's first assume a **Precision valve** may be suitable.

Minimum GWP will be; 600 kPa for the slurry pump + 50 kPa for the gland + 140 kPa for the Maric valve, totalling 790 kPa.

Recommended GWP would be just above this, at approximately 840 kPa.

Maximum GWP will be the maximum pressure a Precision type valve will handle, which is 1000 kPa.

Conclusion; **A Precision type valve is suitable.**

In this installation, any of the higher pressure rated valves would also be suitable, provided that the minimum GWP provided sufficient pressure to overcome the minimum headloss of these alternative valves. The Maximum GWP could then be higher if preferred.

Alternative example 1

For the HP1 valve, set the GWP between 790 & 1500 kPa. (790 = 600 + 50 + 140 min for the HP1 valve, and 1500 = max for the HP1 valve). Recommended GWP would be around 840 kPa.

Alternative example 2

For the HP2 valve, set GWP to between 820 & 2000 kPa. (820 = 600 + 50 + 170 = min for HP2 and 2000 = max. for HP2). Recommended GWP would be around 870 kPa. Note however, the latter two valves will offer an inferior flow rate accuracy of +/- 20%.

Example 2

Max centrifugal pump pressure + suction head; **1200 kPa**  
Gland requirement; **50 kPa**

In this case a Precision valve will not be suitable, as 1200 exceeds its spec. Let’s try a 1500 kPa rated **HP1 valve** and test the theory.

Minimum GWP would be; 1200 + 50 + 140 (for HP1 valve) = 1390 kPa. This is within the range of the HP1 valve

Recommended GWP would be around 1440 kPa.

Maximum GWP would be 1500 as per the HP1 valve max spec.

Conclusion; **A HP1 valve will be suitable.**

Alternative Example

A HP2 (2000 kPa rated) valve would also be suitable, if the GWP was set to between 1420 – 2000 kPa. (1420 = 1200 + 50 + 170), (2000 = max for HP2)

Example 3

Max centrifugal pump pressure + suction head; **1400 kPa**  
Gland requirement; **50 kPa**

In this case neither a Precision or HP1 valve will be suitable, as we can predict that the GWP will need to exceed 1500 kPa. A **HP2 valve** will be required here.

GWP must be set between 1620 & 2000 kPa. 1620 = 1400 + 50 + 170 (for HP2 valve), 2000 = maximum for HP2 valve.

Recommended GWP would be around 1670 kPa.

Example 4

Max centrifugal pump pressure + suction head; **1900 kPa**  
Gland requirement; **50 kPa**

Glandwater pressure here would need to be at least 2120 kPa. (2120 = 1900 + 50 + 170). This is higher than the pressure differential rating for the HP2 type valve and an alternative method of protecting glands may need to be sought.

The flow controllers however, are generally robust enough the handle a good margin above this pressure. In addition to this, many flow controllers never see the full glandwater pressure as the differential across it.

Please contact a Maric rep for a recommendation.
Multiple Centrifugal Pumps, Plumbed in Series

It is common for Maric flow control valves to be used in installations where one glandwater system supplies two or more centrifugal pumps connected in series for the purpose of boosting pressure. In determining the pressure differential range of the Maric flow controller, there are two selection strategies to choose from as follows;

1. **Use Precision valves on the lower pressure stages**, with pressure reducing valves before the flow controller to protect it, and use appropriate higher pressure rated valves on higher pressure stages without pressure reducing valves.

   **Advantages;** The use of Precision valves provides greater flow rate accuracy.
   **Disadvantages;** Requires the purchase of additional pressure control valves.

2. **Using valves of all the same pressure differential range.**

   **Advantages;** Simplicity. One valve type and specification used throughout.
   **Disadvantages;** Inferior flow accuracy on the first stages, where Precision valves may have been able to be used.
Installation Instructions

All Valve Types;
Valves must be installed the right way around or immediate valve failure may result. A direction of flow arrow is stamped on the outside diameter of the valve body.

It is recommended to orientate the valves stamped data toward the top, or in such a position to facilitate identification.

Bends or elbows immediately in front of valve will not affect the valves performance, however due to the relative high velocity of the water jets exiting the valve, and possible erosion issues, it is recommended that a straight pipe, the length of approximately the nominal diameter of the fitting, be fitted on valves outlet.

Use of Sieves;
The installation of a sieve upstream of the Maric valve is recommended where solid particles larger than one third of the valves orifice diameter is likely to be encountered. The mesh aperture should be around one quarter to one third of the valves orifice diameter.

Screwed Valves;
Refer to direction of flow arrow. Standard threads are BSPT (sealing/tapered), Male series R, Female RP. The use of thread tape or similar is recommended for a watertight seal.

PVC Screwed Valves;
Maximum recommended tightness is hand tight, plus a quarter turn.”

Wafer Type Valves;
Wafers are fitted with an o’ring in each face for sealing against smooth, flat faced flanges. Gaskets will however be required where grooved, raised or rough cast face flanges are used.

Standard wafers are orifice plate style, i.e. they are not full flange type, see diagram
Flange bolts will locate the wafer concentrically, and remain visible between the flanges when viewing the assembly.

There will be some clearance (generally around 2 to 3mm, but up to 5 mm on larger wafer sizes) between wafer O.D. and the bolts. This is normal. The wafer should be located as close as possible to concentric prior to final clamping.

Flanges must have aperture dimensions of no less than the nominal size of the flange. i.e. a 100NB flange, must have an internal diameter, (where it butts up against the wafer valve), of no less than 100.0 mm. If it is less than this, then the flanges will either require machining (chamfering) at an angle of 45 degrees, out to the nominal diameter, or adaptors, below, fitted. Otherwise the valves inlet and outlet orifii will be covered more than is permitted and will restrict flow rate to less than the specification of the valve. It is common for a large portion of the outer aperture of the inlet orifii to be covered by the flanges, and up to 3mm of the outlet orifii to be covered by the flanges. This is normal, and will not affect performance.

PVC & Poly stub flanges usually have smaller inside diameters which can restrict valve flow as above. Therefore, optional adaptors are usually required. Contact Maric for a recommendation.

Insert Type Valves;
Installation varies according to application. They must be installed as per the direction of flow arrow.
Operating Instructions:
Maric valves automatically maintain a constant, pre-set, flow rate, irrespective of pressure (within a range), by means of a rubber control ring, whose orifice diameter varies, as the pressure differential across it varies. The greater the pressure, the smaller the orifice, and vice versa. Therefore constant flow rate. The valve has no external actuations and requires no adjustments. Provided the valve is supplied with a pressure sufficient to produce a pressure differential across it within its specified range, then the valve will deliver its rated flow within rated flow rate accuracy. Refer also to Installation Instructions for more information.

Maintenance: No specific maintenance requirements are pertinent to Maric Flow Control Valves.

Troubleshooting Guide:

<table>
<thead>
<tr>
<th>Problem</th>
<th>Cause</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>No flow</td>
<td>Valve is blocked</td>
<td>Remove valve and clear the blockage – Install sieve</td>
</tr>
<tr>
<td></td>
<td>There is no pressure differential across valve</td>
<td>Turn on the supply to the valve</td>
</tr>
<tr>
<td>Flow rate is</td>
<td>Valve is installed backward</td>
<td>Turn it around</td>
</tr>
<tr>
<td>below spec</td>
<td>Flow rate has been measured incorrectly</td>
<td>Check or recalibrate and re-measure</td>
</tr>
<tr>
<td></td>
<td>Pressure differential across valve is below</td>
<td>Increase pressure to within the pressure</td>
</tr>
<tr>
<td></td>
<td>the minimum requirement</td>
<td>differential range of the valve</td>
</tr>
<tr>
<td></td>
<td>Pressure differential across valve is above</td>
<td>Reduce pressure to within the</td>
</tr>
<tr>
<td></td>
<td>its maximum limit</td>
<td>pressure differential range of the valve</td>
</tr>
<tr>
<td></td>
<td>Valve is partly blocked</td>
<td>Clear blockage</td>
</tr>
<tr>
<td></td>
<td>Flange bore is too small - restricting flow</td>
<td>Chamfer or bore out flanges to the nominal</td>
</tr>
<tr>
<td></td>
<td></td>
<td>bore of the pipe</td>
</tr>
<tr>
<td></td>
<td>Incompatible environment has attacked</td>
<td>Replace valve with one fitted with control</td>
</tr>
<tr>
<td></td>
<td>control rubber affecting control rubber</td>
<td>rubber suitable for the environment</td>
</tr>
<tr>
<td></td>
<td>performance</td>
<td></td>
</tr>
<tr>
<td>Flow rate is</td>
<td>Control rubber has blown through valve</td>
<td>Replace control valve and asses installation</td>
</tr>
<tr>
<td>above spec</td>
<td>orifice resulting from excessive pressure</td>
<td>for cause of excessive pressure</td>
</tr>
<tr>
<td></td>
<td>differential or a high pressure spike</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Flow rate has been measured incorrectly</td>
<td>Check or recalibrate and re-measure</td>
</tr>
<tr>
<td></td>
<td>Valve is installed backward</td>
<td>Turn it around</td>
</tr>
<tr>
<td></td>
<td>Control rubber has blown through orifice due</td>
<td>Replace valve and re-install in accordance</td>
</tr>
<tr>
<td></td>
<td>to valve being installed backwards</td>
<td>with direction of flow arrow stamped on body</td>
</tr>
<tr>
<td></td>
<td>Incompatible environment has caused</td>
<td>Replace valve with one fitted with control</td>
</tr>
<tr>
<td></td>
<td>control rubber to harden</td>
<td>rubber suitable for the environment</td>
</tr>
<tr>
<td></td>
<td>Incompatible environment has dissolved rubber</td>
<td>Replace valve with one fitted with control</td>
</tr>
<tr>
<td></td>
<td></td>
<td>rubber suitable for the environment</td>
</tr>
<tr>
<td>Valve is noisy</td>
<td>Valves can be noisy. Noise is often proportional</td>
<td>• Use Kwylfo valves designed for quiet operation</td>
</tr>
<tr>
<td></td>
<td>to valve size, and pressure differential across</td>
<td>• Reduce or increase pressure differential</td>
</tr>
<tr>
<td></td>
<td>it. If none of the techniques to the right are</td>
<td>• Relocate valve or bury it underground</td>
</tr>
<tr>
<td></td>
<td>a practical solution to your issue, please</td>
<td>• Lag the valve and outlet pipe in an</td>
</tr>
<tr>
<td></td>
<td>contact a Maric Rep for other possible</td>
<td>acoustic enclosure or material</td>
</tr>
<tr>
<td></td>
<td>alternative remedies</td>
<td>• Alter the valves outlet pipework</td>
</tr>
<tr>
<td></td>
<td></td>
<td>construction, to alter its resonant</td>
</tr>
<tr>
<td></td>
<td></td>
<td>characteristics</td>
</tr>
</tbody>
</table>

Valve Identification: Valves are stamped with; Maric Australia, WaterMark details if applicable, direction of flow arrow, flow rate, manufacture date and a part number. Comparing the part number with the “Establishing Part Numbers” page in the product catalogue, will enable identification of full valve specifications.

Noise: Both flow rate and external factors affect the noise emitted from a maric valve. In most situations the noise level will be between 75 and 85 dB. However in some circumstances may attain 93 dB.

Life Expectancy: Approximately 20 years, depending on accuracy required. Flow rate increases generally one half to one percent per year. Therefore in 20 years time, flow rate may be 10% to 20% higher than when valve was originally supplied. Poor water quality may accelerate aging.

After Sales Service: Your nearest Maric distributor or representative, as listed on our website; www.maric.com