Benefits
- In case of sudden pump emergency stops, CLASAR® check valve reduces pressure surges in the pipeline
- Silent and non-slam check valve
- Easy installation
- Suitable for vertical, horizontal and diagonal mounting
- Quick flow recovery

Features
- Closing time (dynamic response) is a fraction of a second
- Avoids pressure surges in the pipeline or minimizes them
- Suitable for high pressure applications (PN50 - 725 psi)
- No risk of axial disc jamming as the CLASAR® does not have an axial shaft
- Short face to face, enabling easy installation
- Perfect disc sealing
- Excellent erosion resistance of the axial disc
- Corrosion free axial disc material
- No maintenance required
- Suitable for a wide range of applications due to the available materials

Applications
- Water pumping stations:
  - potable water
  - irrigation
  - water process
  - seawater
- Chemical industries
- HVAC applications

Technical data
- Size range: DN80 - DN1800 (3” - 72”)
- Maximum working pressure:
  - DN80 - DN500: 50 bar (725 psi) at ambient temperature
  - DN600 - DN800: 25 bar (362 psi) at ambient temperature
  - DN900 - DN1000: 20 bar (290 psi) at ambient temperature
  - DN1200 - DN1800: 16 bar (232 psi) at ambient temperature
- Temperature range: -10°C to +130°C (+50°F to +266°F)
- Flange accommodation:
  - EN 1092-1
  - ISO 2084
  - EN 1759
  - ANSI B16.5
  - ANSI B16.47 A
  - MSS SP44
  - AWWAC207
- Others on request
**Figure 1: Example shown is a DN450 wafer check valve**

<table>
<thead>
<tr>
<th>Number</th>
<th>Component</th>
<th>Description</th>
</tr>
</thead>
</table>
| 1      | **Body** (or upstream body) | - One piece precision casting.  
- The body profile is thoroughly developed and hydraulically tested in flow control laboratories.  
- It allows quick recovery of the flow.  
- Body coating according to the latest regulations in force. |
| 2      | **Arrows**                 | These visible marks are cast directly on the body. They warranty correct installation. |
| 3      | **Tagplate**               | In Stainless Steel, contains main information concerning the product.         |
| 4      | **Axial disc**             | - Available in different types of corrosion free materials.  
- Is the only moving part.  
- The mechanical properties allows:  
  * Very short closing time resulting from low inertia. This results in low pressure surges during closing.  
  * Perfect disc sealing.  
  * Noise free closing action.  
  * Excellent shock and vibration resistance.  
  * High erosion resistance  
- Profiled section enables flow guidance and auto centering of the disc |
| 5      | **O-ring**                 | Ensures perfect sealing.                                                     |
| 6      | **Spring**                 | Corrosion free materials.                                                   |
| 7      | **Backing plate** (or downstream body) | - One piece precision casting.  
- The body profile is thoroughly developed and hydraulically tested in flow control laboratories.  
- It allows quick recovery of the flow.  
- Body coating according to the latest regulations in force. |
| 8      | **Lifting lug**            | For easy valve installation handling.                                        |

**Figure 2: Approvals and certificates**

- PED category 1
- ATEX II 2 G/D Ex c

The CLASAR® range holds the following approvals and certificates:

**Water:**

ACS

The Sapag plant is ISO 9001 approved

**Figure 3: Section of wafer check valve**

DN80 - DN500 (3" - 20"): Wafer body type  
DN600 - DN1800 (24" - 72"): Flanged body type
Operating principles

Non return valves mounted on large supply networks and in pumping station delivery lines are required to operate frequently. Statistics show that when serious pressure surge occurs, this is often due to the fact that an incorrect type of valve has been installed. For example, when a pump is switched off in a pumping station, the flow reduces the speed, stops and is subsequently reversed (Figure 4 and 5). The valve then closes under the effect of the disc’s weight or a return spring, or by the reversal of the flow.

Experience and calculations show that this reversal can occur within an extremely short time (from 1/100 to 1/10 of a second). If the valve does not respond quickly, closure will occur sharply during reversed flow conditions, with the result that:

- the disc is slammed against the seating with a creation of a loud shock wave
- water hammer is created causing pressure surge

Shock waves and pressure surge stress installation which may result in mechanical failure of the valve components and pipeline.

These problems are even more emphasized if an air pressurized, water tank is inserted in the system (Figure 6). In this case, flow reversal in this short pipe between the tank and the pump occurs very rapidly. The valve must therefore operate even quicker in order to avoid serious damages.

Figure 4

[Diagram of a check valve and a pump]

Figure 5

[Diagram of a pressure surge zone]

Figure 6

[Diagram of a pressure surge zone with a tank and a pump]

Description of high dynamic response check valve

The features of ideal check valve can be summarized in the graph (Figure 7)

- \( t = 0 \) The pump stops
- \( t = t_0 \) The velocity of the water is \( V = 0 \). It is the beginning of the reverse flow.
- \( T = t_1 \) The obturator of the check valve is positioned on the seat:
  - The reverse velocity of the water is \( V_1 \)
  - The reverse flow is stopped immediately
  - The overpressure is proportional to the reverse velocity \( (V_1) \)

The ideal check valve should close at \( t = t_0 \)

CLASAR® fulfils this requirement as this check valve has:

- Short face to face, thus reducing the stroke of the axial disc
- No axial shaft that may increase the closing time (risk of jamming)
- Density of the axial disc material = 1 (no inertia of the axial disc in water, low weight of the axial disc)
- Spring enhancing the closing time
- No creation of shock at closing time due to metal/plastic contact

Pressure surge comparison with different check valves

Figure 8 shows the water hammer resulting from closure of various type of valves under identical operating conditions:

1. Single flap valve
2. Dual plate check valve
3. CLASAR®

Figure 7: Fluid velocity towards time

[Diagram showing fluid velocity, velocity of the water column, pressure surge zone, deceleration, and maximum reverse velocity]

Figure 8: Pressure surge comparison

[Diagram showing pressure surge comparison with different check valves]
Check valves CLASAR®
Characteristics

Flow coefficients (Kv, Cv)

Kv is the flow in m³/h of water, at an average temperature of 20°C, crossing the valve creating a headloss of 1 bar.

<table>
<thead>
<tr>
<th>DN (mm)</th>
<th>80</th>
<th>100</th>
<th>125</th>
<th>150</th>
<th>200</th>
<th>250</th>
<th>300</th>
<th>350</th>
<th>400</th>
<th>500</th>
<th>600</th>
<th>700</th>
<th>800</th>
<th>900</th>
<th>1000</th>
<th>1200</th>
<th>1400</th>
<th>1600</th>
<th>1800</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size (inch)</td>
<td>3”</td>
<td>4”</td>
<td>5”</td>
<td>6”</td>
<td>8”</td>
<td>10”</td>
<td>12”</td>
<td>14”</td>
<td>16”</td>
<td>18”</td>
<td>20”</td>
<td>24”</td>
<td>28”</td>
<td>32”</td>
<td>36”</td>
<td>40”</td>
<td>48”</td>
<td>56”</td>
<td>64”</td>
</tr>
<tr>
<td>Kv</td>
<td>171</td>
<td>268</td>
<td>417</td>
<td>602</td>
<td>1186</td>
<td>1704</td>
<td>2312</td>
<td>3067</td>
<td>4003</td>
<td>4830</td>
<td>6937</td>
<td>13091</td>
<td>12170</td>
<td>21378</td>
<td>19319</td>
<td>38451</td>
<td>52549</td>
<td>68635</td>
<td>88867</td>
</tr>
<tr>
<td>(Cv = 1.16 Kv)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<td></td>
</tr>
</tbody>
</table>

Headloss (Δp)

Simplified formula:

\[ \Delta p = \rho \times \left( \frac{Q}{K_v} \right)^2 \]

Definitions:
- \( \Delta p \) = headloss (bar)
- \( \rho \) = density (for water, \( \rho = 1 \))
- \( Q \) = flow (m³/h)
- \( K_v \) = flow coefficient (m³/h)

10 mWC = 1 bar = 100 kPa = 14.5 psi

Selection table for materials

<table>
<thead>
<tr>
<th>Medium</th>
<th>Bodies</th>
<th>Axial disc</th>
<th>Spring</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cold water</td>
<td>Ductile iron, Epoxy</td>
<td>Stainless steel</td>
<td>Aluminum bronze</td>
</tr>
<tr>
<td>Hot water</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Demineralized water</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sea water</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drinking water</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heating - HVAC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acids (low concentration)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alcohol</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oils</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hydrocarbons</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Pentair reserves the right to change the contents without notice
Valve dimensions (mm)

Figure 10

<table>
<thead>
<tr>
<th>DN (mm)</th>
<th>Size (inch)</th>
<th>ØA</th>
<th>ØB</th>
<th>C</th>
<th>D</th>
<th>ØE</th>
<th>Weight (Kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>80</td>
<td>3”</td>
<td>90</td>
<td>142</td>
<td>80</td>
<td>115</td>
<td>132</td>
<td>2</td>
</tr>
<tr>
<td>100</td>
<td>4”</td>
<td>113</td>
<td>174</td>
<td>100</td>
<td>140</td>
<td>162</td>
<td>5.5</td>
</tr>
<tr>
<td>125</td>
<td>5”</td>
<td>136</td>
<td>210</td>
<td>125</td>
<td>170</td>
<td>192</td>
<td>11</td>
</tr>
<tr>
<td>150</td>
<td>6”</td>
<td>163</td>
<td>246</td>
<td>150</td>
<td>195</td>
<td>216</td>
<td>17</td>
</tr>
<tr>
<td>200</td>
<td>8”</td>
<td>224</td>
<td>290</td>
<td>127</td>
<td>256</td>
<td>271</td>
<td>22</td>
</tr>
<tr>
<td>250</td>
<td>10”</td>
<td>275</td>
<td>352</td>
<td>146</td>
<td>310</td>
<td>326</td>
<td>36</td>
</tr>
<tr>
<td>300</td>
<td>12”</td>
<td>323</td>
<td>398</td>
<td>181</td>
<td>360</td>
<td>376</td>
<td>53</td>
</tr>
<tr>
<td>350</td>
<td>14”</td>
<td>373</td>
<td>460</td>
<td>222</td>
<td>413</td>
<td>435</td>
<td>80</td>
</tr>
<tr>
<td>400</td>
<td>16”</td>
<td>418</td>
<td>520</td>
<td>232</td>
<td>460</td>
<td>485</td>
<td>100</td>
</tr>
<tr>
<td>450</td>
<td>18”</td>
<td>569</td>
<td>544</td>
<td>260</td>
<td>507</td>
<td>536</td>
<td>150</td>
</tr>
<tr>
<td>500</td>
<td>20”</td>
<td>518</td>
<td>626</td>
<td>292</td>
<td>565</td>
<td>590</td>
<td>180</td>
</tr>
<tr>
<td>600</td>
<td>24”</td>
<td>615</td>
<td>920</td>
<td>435</td>
<td>930</td>
<td>960</td>
<td>350</td>
</tr>
<tr>
<td>700</td>
<td>28”</td>
<td>715</td>
<td>1120</td>
<td>500</td>
<td>1130</td>
<td>1160</td>
<td>675</td>
</tr>
<tr>
<td>800</td>
<td>32”</td>
<td>820</td>
<td>1180</td>
<td>515</td>
<td>1190</td>
<td>1220</td>
<td>1100</td>
</tr>
<tr>
<td>900</td>
<td>36”</td>
<td>930</td>
<td>1480</td>
<td>710</td>
<td>1490</td>
<td>1520</td>
<td>1600</td>
</tr>
<tr>
<td>1000</td>
<td>40”</td>
<td>1030</td>
<td>1500</td>
<td>730</td>
<td>1510</td>
<td>1540</td>
<td>2050</td>
</tr>
<tr>
<td>1200</td>
<td>48”</td>
<td>1230</td>
<td>1890</td>
<td>900</td>
<td>1900</td>
<td>1930</td>
<td>3400</td>
</tr>
<tr>
<td>1400</td>
<td>56”</td>
<td>1430</td>
<td>2265</td>
<td>1120</td>
<td>2275</td>
<td>2305</td>
<td>5400</td>
</tr>
<tr>
<td>1600</td>
<td>64”</td>
<td>1660</td>
<td>2520</td>
<td>1352</td>
<td>2540</td>
<td>2570</td>
<td>8100</td>
</tr>
<tr>
<td>1800</td>
<td>72”</td>
<td>1860</td>
<td>2850</td>
<td>1440</td>
<td>2890</td>
<td>2920</td>
<td>11850</td>
</tr>
</tbody>
</table>

Notes

(1) The choice of the axial disc material depends on the application parameters, please contact factory.

(2) External diameter and drilling in accordance with the flange standards.

(3) Dimensions in mm, weights in kg are given as guide.
Maximum working pressure

<table>
<thead>
<tr>
<th>DN (mm)</th>
<th>80</th>
<th>100</th>
<th>125</th>
<th>150</th>
<th>200</th>
<th>250</th>
<th>300</th>
<th>350</th>
<th>400</th>
<th>450</th>
<th>500</th>
<th>600</th>
<th>700</th>
<th>800</th>
<th>900</th>
<th>1000</th>
<th>1200</th>
<th>1400</th>
<th>1600</th>
<th>1800</th>
</tr>
</thead>
<tbody>
<tr>
<td>MWP (bar)</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
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<td>50</td>
<td>50</td>
<td>25</td>
<td>25</td>
<td>25</td>
<td>25</td>
<td>20</td>
<td>20</td>
<td>16</td>
<td>16</td>
<td>16</td>
<td>16</td>
</tr>
<tr>
<td>MWP (psi)*</td>
<td>725</td>
<td>725</td>
<td>725</td>
<td>725</td>
<td>725</td>
<td>725</td>
<td>725</td>
<td>725</td>
<td>725</td>
<td>725</td>
<td>362</td>
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<td>362</td>
<td>290</td>
<td>290</td>
<td>240</td>
<td>240</td>
<td>240</td>
<td>240</td>
</tr>
</tbody>
</table>

* at ambient temperature

Mounting between flanges

<table>
<thead>
<tr>
<th>DN (mm)</th>
<th>Size (inch)</th>
<th>80</th>
<th>100</th>
<th>125</th>
<th>150</th>
<th>200</th>
<th>250</th>
<th>300</th>
<th>350</th>
<th>400</th>
<th>450</th>
<th>500</th>
<th>600</th>
<th>700</th>
<th>800</th>
<th>900</th>
<th>1000</th>
<th>1200</th>
<th>1400</th>
<th>1600</th>
<th>1800</th>
</tr>
</thead>
<tbody>
<tr>
<td>EN 1092-1, DIN 2501, BS 4504, ISO 2084, ISO 7005, EN 1759, ANSI B 16.5, ANSI B16.47 A, MSS SP 44, AWWA C207</td>
<td>PN 6, PN 10, PN 16, PN 25, PN 40, Class 150, Class 150, Class 150, Class 300, Class 150</td>
<td>See ANSI B16.4 A, See ANSI B 16.5</td>
<td></td>
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</tr>
</tbody>
</table>

Notes: - Possible for all versions

Figure 11: DN80 to DN500 (3” to 20”):
Wafer mounting

Figure 12:
DN600 to DN1800 (24” to 72”):
Flanged mounting (raised face type)

Figure 13: On request
(DN600 to DN1800):
Flanged mounting (flat face type)

Example of a test on DN700 (28”) carried out on every single valve of our production

Pentair reserves the right to change the contents without notice
General
CLASAR® check valves can be mounted in any position (horizontal, vertical and diagonal direction).
CLASAR® is supplied without flange gaskets and bolts.

Storage
This equipment in storage should be adequately protected against weather influence, salt sea-air dust and moisture.
Room temperature should not be below -10°C (+50°F)
No special precautions are required for storage longer than 6 months.

Mounting instructions
As for most valves and fittings, sliding flanges or similar on the pipework are recommended to provide the clearances needed to insert and remove the valve and to prevent unacceptable stressing due to inevitable misalignment.
At least one of the pipes connected to the valve must be firmly bolted to withstand the thrust during valve closure.

Instructions before start up:
• Before mounting, carefully check the valve for cleanliness. Remove possible pollutions and particles from the pipework and flush the system thoroughly with water or compressed air as appropriate.
Important! Particular care should be taken to remove pieces of welding rod chips liable to damage the axial disc and sealing surfaces.
• Never weld the flanges to the pipe when the CLASAR® is in position because this might damage the axial disc.
• Provide a trash rack or strainer that will prevent particles from interfering the valve’s functionality.
• Check that the flow takes place in the direction shown by the arrow on the valve
• CLASAR® wafer type valves must be perfectly aligned with the pipe centerline. Use spacer tubes mounted on tie-rods if necessary.

Installation recommendation

Figure 14

Figure 15

Figure 16
Ordering code

A code with the following basic information is marked on the tagplate:
5 characters defining type and materials
For the order, completing the below data with the following information:
• the nominal diameter (DN)
• the flange connection
• and, if applicable, the valve options

Body and backing plate
201 Ductile iron
202 Ductile NiResist alloy
203 Stainless steel
204 Aluminium bronze
205 Duplex

Axial disc (1)
1 Polyurethane
3 PTFE

Spring (1)
1 Standard stainless steel
3 Inconel®

DN (mm)
DN80 (3") - DN1800 (72")

Flanges: type
(For class flanges, precise the standard)
See page 6

PS
Working pressure (CWP)

Valve options
FF Flat face

Approvals and certificates:
P Potable water approved
X ATEX approved

Notes:
(1) The choice of the material depends on the application parameters, please contact factory.

Examples

1. CLASAR® with body and counter flange in ductile iron, axial disc in polyurethane, spring in stainless steel, DN200 for mounting between flanges defined by EN1092 in PN16, with a working pressure of 10 bar

CLASAR® 20111-200 PN16 PS10:

• Body and backing plate (Ductile iron)
• Axial disc (Polyurethane)
• DN (200)
• Flanges (EN 1092 PN16)
• Working pressure (10 bar max)
• Spring (Stainless steel)

2. Same check valve but potable water approved (ACS) with a working pressure of 10 bar.

CLASAR® 20111-200 PN16 PS10 P(ACS):

• Body and backing plate (Ductile iron)
• Axial disc (Polyurethane)
• Spring (Stainless steel)
• DN (200)
• Flanges (EN 1092 PN16)
• Working pressure (10 bar max)
• Potable water approved (ACS)