Advantages

+ High volumetric and overall efficiency
+ Very good pulsation behavior
+ Robust and compact
+ Low noise emission
+ Multiple flow capable
Function
Rotation of the gears within the pump draws in the pressure fluid (usually hydraulic oil) into the space between the pinion and internal gear. The two smooth running gears help to ensure excellent intake behavior.

In the radial direction, the gear chambers are sealed by gear meshing and the filler piece. In the axial direction, the axial plates seal the pressure chamber with the minimal possible gap. This design minimizes volume losses and increases efficiency. When the gears rotate, the pinion teeth enter the gaps between the internal gear teeth and displace the pressure fluid.

Calculations
Pump flow \[ Q = V_{g,m} \cdot n \cdot \eta_v \cdot 10^{-3} \text{ [l/min]} \]

Power \[ P = \frac{Q \cdot \Delta p}{600 \cdot \eta_g} \text{ [kW]} \]

- \( V_{g,m} \): pump volume per revolution [cm³]
- \( n \): Speed [rpm]
- \( \eta_v \): Volumetric efficiency
- \( \eta_g \): Overall efficiency
- \( \Delta p \): Differential pressure [bar]
Technical data

Design
- Internal gear pump with radial and axial sealing gap compensation

Type
- IPH

Mounting types
- SAE-hole flange; ISO 3019/1

Line mounting
- SAE suction and pressure flange J 518 C Code 61

Sense of rotation
- right or left-hand rotation

Mounting position
- any

Shaft load
- for details of radial and axial drive shaft loads please contact J.M. Voith SE & Co. KG

Input pressure
- 0.8...3 bar absolute pressure (at start up for short time 0.6 bar)

Pressure fluid
- HLP mineral oils DIN 51524. part 2 or 3

Viscosity range
- 10 ... 300 mm²/s⁻¹ (cSt)

Permissible start viscosity
- max. 2 000 mm²/s⁻¹ (cSt)

Permissible temperature of the pressure fluid
- -20 ... + 80 °C

Required purity of the pressure fluid
- Class 8 (NAS 1638)

Filtration
- filtration quotient min. β₂₀ ≥ 75, recommended β₁₀ ≥ 100 (longer life)

Permissible ambient temperature
- -10 ... + 60 °C

The values given apply for
- Pumping of mineral oils with a viscosity of 20 ... 40 mm²/s⁻¹
- An input pressure of 0.8...3.0 bar absolute

Notes
- Peak pressures apply for 15 % of operating time with a maximum cycle time of 1 minute
- Please inquire about peak pressures at non-standard speeds
- Due to production tolerances, the pump volume may be reduced by up to 1.5 %.
IPH Size 4, Rotation and dimensions

Rotation clockwise (cw)

Rotation counterclockwise (ccw)

<table>
<thead>
<tr>
<th>Type / Delivery</th>
<th>c [mm]</th>
<th>e [mm]</th>
<th>g [mm]</th>
<th>h [mm]</th>
<th>i [mm]</th>
<th>k [mm]</th>
<th>Thread</th>
<th>Weight [kg]</th>
<th>SAE Flange No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>IPH 4 – 20</td>
<td>102</td>
<td>36</td>
<td>19</td>
<td>30</td>
<td>58.7</td>
<td>30.2</td>
<td>M10x15</td>
<td>13.5</td>
<td>11</td>
</tr>
<tr>
<td>IPH 4 – 25</td>
<td>108</td>
<td>36</td>
<td>21</td>
<td>30</td>
<td>58.7</td>
<td>30.2</td>
<td>M10x15</td>
<td>14.2</td>
<td>11</td>
</tr>
<tr>
<td>IPH 4 – 32</td>
<td>116</td>
<td>36</td>
<td>24</td>
<td>32</td>
<td>58.7</td>
<td>30.2</td>
<td>M10x15</td>
<td>15.0</td>
<td>11</td>
</tr>
</tbody>
</table>

* Ensure the M10x1 plug screw, hexagon socket SW5, is tightened to a torque of 10 Nm during pumping operation. Dependent on the pump position, filling or ventilation is possible here prior to commissioning.
IPH Size 4, Designs and dimensions

### Standard

**Rotation, Suction port**
- Rotation clockwise, radial suction port

**Mounting flange**
- SAE 2-hole flange

**Shaft end**
- Keyway connection

### Variants

**Rotation, Suction port**
- Rotation counterclockwise, radial suction port

**Mounting flange**
- SAE 4-hole flange

**Shaft end**
- Involute gearing with SAE-4-hole-flange

---

* Direction of rotation free selectable in the illustrated mounting flange/shaft end combination.
**IPH Size 5, Rotation and dimensions**

**Rotation clockwise (cw)**

**Rotation counter-clockwise (ccw)**

<table>
<thead>
<tr>
<th>Type / Delivery</th>
<th>c [mm]</th>
<th>e [mm]</th>
<th>g [mm]</th>
<th>h [mm]</th>
<th>i [mm]</th>
<th>k [mm]</th>
<th>l Thread</th>
<th>Weight [kg]</th>
<th>SAE Flange No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>IPH 5 – 40</td>
<td>138</td>
<td>35</td>
<td>24</td>
<td>35</td>
<td>69.9</td>
<td>35.7</td>
<td>M12 x 19</td>
<td>26.8</td>
<td>12</td>
</tr>
<tr>
<td>IPH 5 – 50</td>
<td>145</td>
<td>35</td>
<td>27</td>
<td>42</td>
<td>69.9</td>
<td>35.7</td>
<td>M12 x 19</td>
<td>28.3</td>
<td>12</td>
</tr>
<tr>
<td>IPH 5 – 64</td>
<td>155</td>
<td>35</td>
<td>29</td>
<td>42</td>
<td>69.9</td>
<td>35.7</td>
<td>M12 x 19</td>
<td>30.0</td>
<td>12</td>
</tr>
</tbody>
</table>

* Ensure the M10x1plug screw, hexagon socket SW5, is tightened to a torque of 10 Nm during pumping operation.
  Dependent on the pump position, filling or ventilation is possible here prior to commissioning.
## IPH Size 5, Designs and dimensions

<table>
<thead>
<tr>
<th>Rotation, Suction port</th>
<th>Mounting flange</th>
<th>Shaft end</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Standard</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rotation clockwise, radial suction port</td>
<td>SAE 2-hole flange</td>
<td>Keyway connection</td>
</tr>
<tr>
<td><img src="image1.png" alt="Diagram 1" /></td>
<td><img src="image0.png" alt="Diagram 0" /></td>
<td><img src="image1.png" alt="Diagram 1" /></td>
</tr>
<tr>
<td><strong>Variants</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rotation counterclockwise, radial suction port</td>
<td>Involute gearing with SAE-2-hole-flange</td>
<td>Involute gearing with SAE-4-hole-flange</td>
</tr>
<tr>
<td><img src="image6.png" alt="Diagram 6" /></td>
<td><img src="image0.png" alt="Diagram 0" /></td>
<td><img src="image1.png" alt="Diagram 1" /></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SAE 4-hole flange</th>
<th>Involute gearing with SAE-4-hole-flange</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="Diagram 1" /></td>
<td><img src="image1.png" alt="Diagram 1" /></td>
</tr>
</tbody>
</table>

* Direction of rotation free selectable in the illustrated mounting flange/shaft end combination.
IPH Size 6, Rotation and dimensions

<table>
<thead>
<tr>
<th>Type / Delivery</th>
<th>c [mm]</th>
<th>e [mm]</th>
<th>g [mm]</th>
<th>h [mm]</th>
<th>i [mm]</th>
<th>k [mm]</th>
<th>l Thread</th>
<th>Weight [kg]</th>
<th>SAE Flange No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>IPH 6 – 80</td>
<td>171</td>
<td>49</td>
<td>32.5</td>
<td>50</td>
<td>77.8</td>
<td>42.9</td>
<td>M12 x 23</td>
<td>50.5</td>
<td>14</td>
</tr>
<tr>
<td>IPH 6 – 100</td>
<td>181</td>
<td>49</td>
<td>36</td>
<td>50</td>
<td>77.8</td>
<td>42.9</td>
<td>M12 x 23</td>
<td>54.0</td>
<td>14</td>
</tr>
<tr>
<td>IPH 6 – 125</td>
<td>193</td>
<td>47</td>
<td>39</td>
<td>50</td>
<td>77.8</td>
<td>42.9</td>
<td>M12 x 23</td>
<td>58.0</td>
<td>14</td>
</tr>
</tbody>
</table>

* Ensure the M10x1 plug screw, hexagon socket SW5, is tightened to a torque of 10 Nm during pumping operation. Dependent on the pump position, filling or ventilation is possible here prior to commissioning.
## IPH Size 6, Designs and dimensions

<table>
<thead>
<tr>
<th>Rotation, Suction port</th>
<th>Mounting flange</th>
<th>Shaft end</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Standard</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rotation clockwise,</td>
<td>SAE 2-hole flange</td>
<td>Keyway connection</td>
</tr>
<tr>
<td>radial suction port</td>
<td></td>
<td></td>
</tr>
<tr>
<td><img src="image1" alt="" /> 1</td>
<td>![image2] 0</td>
<td>![image3] 1</td>
</tr>
<tr>
<td><strong>Variants</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rotation counterclockwise, radial suction port</td>
<td>Involute gearing with SAE-2-hole-flange</td>
<td></td>
</tr>
<tr>
<td><img src="image4" alt="" /> 6</td>
<td>![image5] 0</td>
<td>![image6] 1</td>
</tr>
<tr>
<td>SAE 4-hole flange</td>
<td></td>
<td></td>
</tr>
<tr>
<td>![image7] 1</td>
<td>![image8] 1</td>
<td>![image9] 1</td>
</tr>
</tbody>
</table>

* Direction of rotation free selectable in the illustrated mounting flange/ shaft end combination.
Measurement values – Airborne noise level

**IPH 4**

- Operating pressure $p$ [bar]
- Airborne noise level [dB(A)]

**Measurement values – Efficiency $\eta_v$ and $\eta_g$**

**IPH 4**

- Operating pressure $p$ [bar]
- Efficiency $\%$

**Note**
Measurement taken in a low-noise room. In an anechoic room the measurements are approx. 5 dB(A) lower.

**Measurement conditions**
- Speed: 1500 rpm
- Viscosity of pressure fluid: 46 mm$^2$s$^{-1}$
- Operating temperature: 40 °C
Measurement values – Delivery Q

**IPH 4**

- **Operating pressure p [bar]**
- **Delivery Q in l/min**

---

**Measurement values – Input power P**

**IPH 4**

- **Operating pressure p [bar]**
- **Power P in kW**

---

**IPH 5**

- **Operating pressure p [bar]**
- **Delivery Q in l/min**

---

**Measurement values – Input power P**

**IPH 5**

- **Operating pressure p [bar]**
- **Power P in kW**

---

**IPH 6**

- **Operating pressure p [bar]**
- **Delivery Q in l/min**

---

**Measurement values – Input power P**

**IPH 6**

- **Operating pressure p [bar]**
- **Power P in kW**
Suction and pressure flange according to SAE...

Wrench torque for screws according to ISO 6162
1) Screw EN ISO 4762
2) Round seal ring (O-Ring) ISO-R 1629 NBR
3) Special design. Deviation from SAE J 518 C Code 61

<table>
<thead>
<tr>
<th>SAE flange no.</th>
<th>A Thread [mm]</th>
<th>B [mm]</th>
<th>C [mm]</th>
<th>D [mm]</th>
<th>E 1) [mm]</th>
<th>i [mm]</th>
<th>k [mm]</th>
<th>S 1) Thread [mm]</th>
<th>Max. pressure [bar]</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>G ½</td>
<td>46</td>
<td>54</td>
<td>36</td>
<td>18.66 – 3.53</td>
<td>38.1</td>
<td>17.5</td>
<td>M8</td>
<td>345</td>
</tr>
<tr>
<td>11</td>
<td>G ¾</td>
<td>50</td>
<td>65</td>
<td>36</td>
<td>24.99 – 3.53</td>
<td>47.6</td>
<td>22.3</td>
<td>M10</td>
<td>345</td>
</tr>
<tr>
<td>12</td>
<td>G 1</td>
<td>55</td>
<td>70</td>
<td>38</td>
<td>32.92 – 3.53</td>
<td>52.4</td>
<td>26.2</td>
<td>M10</td>
<td>345</td>
</tr>
<tr>
<td>13</td>
<td>G 1-¼</td>
<td>68</td>
<td>79</td>
<td>41</td>
<td>37.69 – 3.53</td>
<td>58.7</td>
<td>30.2</td>
<td>M10</td>
<td>276</td>
</tr>
<tr>
<td>14 1)</td>
<td>G 1-½</td>
<td>82</td>
<td>98</td>
<td>50</td>
<td>47.22 – 3.53</td>
<td>69.9</td>
<td>35.7</td>
<td>M12</td>
<td>345</td>
</tr>
<tr>
<td>30</td>
<td>G 1-½</td>
<td>78</td>
<td>93</td>
<td>45</td>
<td>47.22 – 3.53</td>
<td>69.9</td>
<td>35.7</td>
<td>M12</td>
<td>207</td>
</tr>
<tr>
<td>15</td>
<td>G 2</td>
<td>90</td>
<td>102</td>
<td>45</td>
<td>56.74 – 3.53</td>
<td>77.8</td>
<td>42.9</td>
<td>M12</td>
<td>207</td>
</tr>
<tr>
<td>16</td>
<td>G 2-½</td>
<td>105</td>
<td>114</td>
<td>50</td>
<td>69.44 – 3.53</td>
<td>88.9</td>
<td>50.8</td>
<td>M12</td>
<td>172</td>
</tr>
<tr>
<td>17</td>
<td>G 3</td>
<td>124</td>
<td>134</td>
<td>50</td>
<td>85.32 – 3.53</td>
<td>106.4</td>
<td>61.9</td>
<td>M16</td>
<td>138</td>
</tr>
<tr>
<td>17/2</td>
<td>G 3-½</td>
<td>136</td>
<td>152</td>
<td>48</td>
<td>98.02 – 3.53</td>
<td>120.7</td>
<td>69.9</td>
<td>M16</td>
<td>35</td>
</tr>
<tr>
<td>18</td>
<td>G 4</td>
<td>146</td>
<td>162</td>
<td>48</td>
<td>110.72 – 3.53</td>
<td>130.2</td>
<td>77.8</td>
<td>M16</td>
<td>34</td>
</tr>
<tr>
<td></td>
<td>G ½</td>
<td>46</td>
<td>54</td>
<td>36</td>
<td>18.66 – 3.53</td>
<td>40.5</td>
<td>18.2</td>
<td>M8</td>
<td>414</td>
</tr>
<tr>
<td>51</td>
<td>G ¾</td>
<td>55</td>
<td>71</td>
<td>35</td>
<td>24.99 – 3.53</td>
<td>50.8</td>
<td>23.8</td>
<td>M10</td>
<td>414</td>
</tr>
<tr>
<td>52</td>
<td>G 1</td>
<td>65</td>
<td>81</td>
<td>42</td>
<td>32.92 – 3.53</td>
<td>57.2</td>
<td>27.8</td>
<td>M12</td>
<td>414</td>
</tr>
<tr>
<td>53a</td>
<td>G 1-¼</td>
<td>78</td>
<td>95</td>
<td>45</td>
<td>37.69 – 3.53</td>
<td>66.6</td>
<td>31.8</td>
<td>M14</td>
<td>414</td>
</tr>
<tr>
<td>54</td>
<td>G 1-½</td>
<td>94</td>
<td>112</td>
<td>50</td>
<td>47.22 – 3.53</td>
<td>79.3</td>
<td>36.5</td>
<td>M16</td>
<td>414</td>
</tr>
<tr>
<td>55</td>
<td>G 2</td>
<td>114</td>
<td>134</td>
<td>65</td>
<td>56.75 – 3.53</td>
<td>96.8</td>
<td>44.5</td>
<td>M20</td>
<td>400</td>
</tr>
<tr>
<td>56</td>
<td>G 2-½</td>
<td>152</td>
<td>180</td>
<td>80</td>
<td>69.45 – 3.53</td>
<td>123.8</td>
<td>58.8</td>
<td>M24</td>
<td>400</td>
</tr>
</tbody>
</table>
Combinations of IPH pumps
• IPH pumps of identical or different sizes can be combined to form multi-flow pumps.
• All sizes with each displacement are available as two or three-flow pumps; four-flow pumps must be designed by Voith.
• The pumps are arranged in increasing order according to size and delivery.

Selection
1. Identify the pressure ranges and then choose the appropriate pump series.
2. Identify the deliveries, and then select the appropriate size(s).
3. Define the sequence of the pumps.
4. Check the torque.
5. Determine the direction of rotation and suction.
6. Specify the mounting flange and shaft end.

Combination of IPH/IP… pumps
• It is possible to combine IPH pumps with other Voith pump series.
• The pumps are arranged by type and size, as shown in the illustration above.
• If identical types or identical sizes follow each other, the pump with the higher pump flow is placed closer to the drive.

Connection, assembly
• As a rule, multi-flow pumps are mounted to the drive using a flange. All information on flange designs and shaft ends is contained in the relevant pump series catalog.
• For further relevant information, such as how to determine the adapter housing, see brochure No. G 1714 (Voith Multi-Flow Pumps).
**Designs**

**Rotation and suction**

- **clockwise (cw)**
  - 1
  - 6
- **counterclockwise (ccw)**
  - 1
  - 6

**Mounting flange**

- For designs and dimensions, see catalog of the relevant pump series.

**Shaft end**

- 0
- 1
- 1
- 0

**Special design**

- 4
- 9
- Special design

**Allowed input torques**

<table>
<thead>
<tr>
<th>Size</th>
<th>A [Nm]</th>
<th>B [Nm]</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>450</td>
<td>300</td>
</tr>
<tr>
<td>5</td>
<td>800</td>
<td>540</td>
</tr>
<tr>
<td>6</td>
<td>1350</td>
<td>800</td>
</tr>
</tbody>
</table>
Type code

IPH  5 - 50  1 0 1

Shaft end
0  Splined gear shaft ANSI B92.1a
1  Parallel shaft with keyway

Mounting flange
0  SAE-2-hole
1  SAE-4-hole

Rotation, Suction port
1  Clockwise rotation, suction port pump
6  Anti-clockwise rotation, suction port pump
4  Clockwise rotation, special design
9  Anti-clockwise rotation, special design

Delivery

<table>
<thead>
<tr>
<th>Size</th>
<th>Delivery</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>25</td>
</tr>
<tr>
<td>5</td>
<td>40</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>64</td>
</tr>
<tr>
<td>6</td>
<td>80</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>100</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>125</td>
</tr>
</tbody>
</table>

Size
Type