9.2 Plate Actuation

9.2.1 Plate Actuation, Actuators above Plate

Plate actuation is ideal for synchronized filling of high cavitation molds

- High cavitation synchronized needle opening
- Consistent part filling (weight)
- Low service costs

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Basic Elements of the Plate Actuation System:

- Actuation plate
- Stop buttons
- Actuators (pneumatic)
- Piston rod set
- Guiding set complete
- Valve pin suspension assemblies with anti rotation screws

---

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- Actuation plate
- Stop buttons
- Actuators (pneumatic)
- Piston rod set
- Guiding set complete
- Valve pin suspension assemblies with anti rotation screws

---

Pitch Dimensions

Nozzle 06E = min. 22 mm
Nozzle 09E = min. 27 mm

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Doc007517.png

Doc007518.png
9.2.1.1 Mounting the Plate Actuation System

**WARNING**

**Heavy Weight Hazard**

Transport and lifting equipment should be operated only by trained personnel. Use personal protective equipment, such as head gear, safety shoes and work gloves. Operate lifting and transport equipment slowly and carefully to avoid uncontrolled swinging of the manifold.

Lifting and transport equipment for lifting Hot Runner Systems shall be approved and properly rated taking into account the weight and size of the manifold. When unpacking the Plate Actuation Hot Runner System, there is a risk of injury due to falling parts and sharp edges. Maintain a minimum distance of 1 m from the Hot Runner System.

For first aid contact your medical / safety representing.

**NOTICE**

**Hazard of Material Damage**

Without consulting Synventive it is not permitted to do modifications to the hot runner system e.g. geometrical changes to the nozzle tip, except the part shape adjustment in the area of material allowance.

Never install or remove the hot runner when the manifold or nozzles are hot, this may cause damage to the nozzles.

Move the Hot Runner System only up or down at room temperature 20 °C (68 °F). Always tighten the screws to the torque specified in the respective table in section 4.

**Tools for Assembling, Disassembling and Adjusting the Valve Pins**

- Magnetic Rod
- Snap Ring Plier (Extra long)

To adjust the valve pins, the tool ATCYL2102 and a commercially Hexagon Socket Wrench is required.
9.2.1.2 Assemble the Actuation Plate

Assemble the Stop Buttons on both Side

1) Assemble the stop buttons on both side (Manifold Side / Clamping Plate Side).
2) Fix the stop buttons with screws.

Assemble the Anti-rotation Screws on the Manifold Side

1) Assemble the anti-rotation screws (DIN7984-M6X8) on the manifold side.

Assemble the Valve Pin Suspension Sleeve (VPSS-0x) on the Manifold Side

1) Assemble the valve pin suspension sleeves (01) at the actuation plate from the manifold side.
2) Fix the valve pin suspension sleeves (01) with washers (04) and retaining rings for shafts (05) from the clamping plate side.
### Valve Pin Suspension Version 1 for:
Valve pin Ø 3.0 mm VPS-30-01 / Valve pin Ø 3.8 mm VPS-38-01

<table>
<thead>
<tr>
<th>Pos.</th>
<th>Part No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>VPSS-01</td>
<td>Valve Pin Suspension Sleeve</td>
</tr>
<tr>
<td>02</td>
<td>PNC4508B-HS-02</td>
<td>Hanger screw M11x1, Valve pin Ø 3.0</td>
</tr>
<tr>
<td></td>
<td>PNC4508B-HS-01</td>
<td>Hanger screw M11x1, Valve pin Ø 3.8</td>
</tr>
<tr>
<td>03</td>
<td>PNC4508B-LS-01</td>
<td>Lock Screw M11x1</td>
</tr>
<tr>
<td>04</td>
<td>W-17-24-2-01</td>
<td>Washer; 17x24x2</td>
</tr>
<tr>
<td>05</td>
<td>DIN471-17X1</td>
<td>Retaining ring for shafts DIN471</td>
</tr>
<tr>
<td>06</td>
<td>DIN7984-M6X8-10.9</td>
<td>Hexagon socket cap screw DIN7984</td>
</tr>
</tbody>
</table>

### Valve Pin Suspension Version 2 for:
Valve pin Ø 3.0 mm VPS-30-02 / Valve pin Ø 3.8 mm VPS-38-02

<table>
<thead>
<tr>
<th>Pos.</th>
<th>Part No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>VPSS-02</td>
<td>Valve Pin Suspension Sleeve</td>
</tr>
<tr>
<td>02</td>
<td>PNC4508B-HS-02</td>
<td>Hanger screw M11x1, Valve pin Ø 3.0</td>
</tr>
<tr>
<td></td>
<td>PNC4508B-HS-01</td>
<td>Hanger screw M11x1, Valve pin Ø 3.8</td>
</tr>
<tr>
<td>03</td>
<td>PNC4508B-LS-01</td>
<td>Lock Screw M11x1</td>
</tr>
<tr>
<td>04</td>
<td>W-17-24-2-02</td>
<td>Washer; 17x24x2</td>
</tr>
<tr>
<td>05</td>
<td>DIN471-17X1</td>
<td>Retaining ring for shafts DIN471</td>
</tr>
<tr>
<td>06</td>
<td>DIN7984-M6X8-10.9</td>
<td>Hexagon socket cap screw DIN7984</td>
</tr>
</tbody>
</table>

### Valve Pin Suspension Version 3 for:
Valve pin Ø 3.0 mm VPS-30-03 / Valve pin Ø 3.8 mm VPS-38-03

<table>
<thead>
<tr>
<th>Pos.</th>
<th>Part No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>VPSS-02</td>
<td>Valve Pin Suspension Sleeve</td>
</tr>
<tr>
<td>02</td>
<td>PNC4508B-HS-02</td>
<td>Hanger screw M11x1, Valve pin Ø 3.0</td>
</tr>
<tr>
<td></td>
<td>PNC4508B-HS-01</td>
<td>Hanger screw M11x1, Valve pin Ø 3.8</td>
</tr>
<tr>
<td>03</td>
<td>PNC4508B-LS-01</td>
<td>Lock Screw M11x1</td>
</tr>
<tr>
<td>04</td>
<td>W-17-24-2-01</td>
<td>Washer; 17x24x2</td>
</tr>
<tr>
<td>05</td>
<td>DIN471-17X1</td>
<td>Retaining ring for shafts DIN471</td>
</tr>
<tr>
<td>06</td>
<td>DIN7984-M6X8-10.9</td>
<td>Hexagon socket cap screw DIN7984</td>
</tr>
</tbody>
</table>
Assemble the Guiding Bushings in the Actuation Plate

1) Assemble the guiding bushings (GB) in the guiding bush seat (GBS).
2) Fix the guiding bushings with retaining rings for shafts DIN471 (RB)
3) Screw the guiding bush seat (GBS) into the actuation plate.

Assemble the Piston Rod Set on the Actuation Plate

1) Install the seal (06) at the Piston Rods (04).
2) Assemble the Anti-rotation screws DIN7984-M6X8 (05) for the piston rod (04) on the manifold side of the actuation plate.
3) Assemble the piston rods (04) on the manifold side of the actuation plate.
4) Assemble the washers (03) and the retaining rings for shaft (02) at the piston rods (04) from the clamping plate side.

Details Piston Rod
9.2.1.3 Assemble the Hot Runner System

**WARNING**

Heavy Weight Hazard

1) Assemble the Hot Runner on the Cavity Plate.
2) Mount the Cooling Plate.

Mount the Guide Set Complete

1) Assemble all Guide Pillars (GP).
**NOTICE**

For lubrication use high-pressure long therm lubricant Strack Z9080

2) Assemble the Ball Retainers (BR) on the Guide Pillars (GP).

---

**WARNING**

Heavy Weight Hazard

3) Mount the Actuation Plate (AP) into the Cooling Plate (CP).

---

**WARNING**

Heavy Weight Hazard

4) Assemble Top Clamp Plate (TCP).
9.2.1.4 Assemble the Actuator

**NOTICE**
For lubrication use Krytox GPL205.

To lubricate the piston sliding surface is essential for the actuator lifetime.

To lubricate the piston ring seals is helpful to assemble the actuator.

**NOTICE**
The seals are already mounted on the actuators.

1) Insert the actuator Housing Cover 1 (HC) into the cutout of the Top Clamping Plate (TCP).

**NOTICE**
The seal on bottom of the Housing Cover 1 (HC) has to be directed against the cutout bottom.

2) Insert the Actuator (A) into the cutout.
3) Assemble the Fixing Unit (FU) on the Piston Rod (PR).

**NOTICE**
Use torque wrench with wrench insert and the torque specified in the respective table in section 4.

4) Assemble the upper Housing Cover (HCT).

**NOTICE**
The two threaded holes (x) must face upwards.

5) Fix the Housing Cover (HCT) with two Hexagon Socket Set Screws DIN912-M6X10-12.9 (M6) and Washers DIN125 A (W).

**NOTICE**
Use torque wrench with wrench insert and the torque specified in the respective table in section 4.
9.2.1.5 Assemble and Adjust the Valve Pins

Precondition for the following steps are to be performed with the Hot Runner installed in the mold, and the system at operating temperature.

<table>
<thead>
<tr>
<th>WARNING</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hot Surfaces Hazard</strong></td>
</tr>
<tr>
<td>Contact between the skin and hot surfaces could result in burns.</td>
</tr>
<tr>
<td>Use personal protective equipment, such as gloves, apron, sleeves and face protection, to guard against burns.</td>
</tr>
<tr>
<td>When servicing or handling the hot runner system outside the manifold plates or the injection molding machine, care must be taken to heed the hot surface exposure warnings.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>NOTICE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hazard of Material Damage</strong></td>
</tr>
<tr>
<td>The following steps are to be performed with the HR installed in the mold, and the system at operating temperature.</td>
</tr>
<tr>
<td><strong>Cooling must be on to prevent damage to the actuator seals.</strong></td>
</tr>
<tr>
<td>The design provides an indirect cooling through the top clamp plate (max. 80 °C / 175 °F), otherwise cooling lines are required.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>NOTICE</th>
</tr>
</thead>
<tbody>
<tr>
<td>The hot runner system must be at operation temperature. The cooling in the mold must be turned on to prevent damaging of sealings in the actuator.</td>
</tr>
<tr>
<td>To adjust the valve pin, the actuation plate has to be on close position. In order to ensure this, we recommend fixing it with compressed air on the actuator.</td>
</tr>
<tr>
<td>The actuator must be under pneumatic pressure the whole time the valve pin adjustment operation is performed.</td>
</tr>
</tbody>
</table>

1) Move and fixing the actuation plate to close position use compressed pneumatic pressure on the actuator.

2) Fit in the valve pins.

<table>
<thead>
<tr>
<th>NOTICE</th>
</tr>
</thead>
<tbody>
<tr>
<td>In order to ensure this, we recommend fixing it with compressed air on the actuator.</td>
</tr>
</tbody>
</table>
3) Hang the valve pin into the hanger screw.
4) Push the valve pin via the hanger screw up to the suspension sleeve.
5) Screw the hanger screw with the attached valve pin into the valve pin suspension sleeve.

6) Adjust the valve pin with a hexagon Socket Wrench (SW) as followed.

**NOTICE**
The basic setting for the valve gate pin is 16 mm between the Valve pin Suspension (VS) top edge and the top edge from the Hanger Screw (HS).

7) Rotate the Hanger Screw (HS) with a hexagon socket wrench into the Valve pin Suspension sleeve (VS).

**NOTICE**
During the fine tuning process it is possible to move the Valve Pin (VP) in every direction 0.5 mm (1/2 rotation).
The exact position for the valve pin has to be checked at the front of the valve pin - depends on the nozzle tip.
The reason to unscrew the Hanger Screw (HS) would be for valve pin maintenance or replacement.
If the deviation to the basic settings of 16 mm is more than 0.5 mm, the adjustments do not correspond to the parameters of the mold or do not correspond to the Synventive standard.
8) Heat the hot runner system to the working temperature.
9) Turn the Locking Screw (LS) up to the Hanger Screw (HS).

**NOTICE**
For actuator assembly the Lock Screw (LS) has to be fastened against the Hanger Screw (HS).

10) Rotate the Lock Screw (LS) with the Adjustment Tool ATCY2102 (AT) into the Valve pin Suspension sleeve (VS).
11) Apply pressure to pneumatic actuator to move the plate in close position. The actuators must be under pneumatic pressure the whole time the valve pin adjustment operation is performed.

**NOTICE**
The recommended air pressure is 87 psi (6 bars).

12) Push from the front (cavity side) the valve pin in order to compensate the axial play of the valve pin. And keep a slight pressure on the valve pin.
13) Adjust the valve pin and measure the valve pin position at the front (cavity) until in desired position.
14) Hold against turning the Hanger Screw (HS) with the hexagon Socket Wrench (SW).
15) At the same time tighten the Lock Screw (LS) with the Adjustment Tool ATCY2102 (AT) and a ring wrench (size 6 mm).
16) Repeat steps 11 - 15 for all valve pins.
17) Move the plate using pneumatic cylinders a few times in open and close position. Keep the plate in close position using pneumatic pressure.
18) Push from the front (cavity side) the valve pin in order to compensate the axial play of the needle.
19) Measure the valve pin position at the front (cavity). Readjust valve pin if necessary.

### 9.2.1.6 Tool Service without Plate Actuation System Disassembly

**WARNING**
Hot Surfaces Hazard
This operation has to be done with the tool cooled down to room temperature.

**NOTICE**
It’s possible to disassemble the actuation plate system and valve pins can remain in manifold without changing settings.

This operation is only possible when the top clamping plate and cooling plate are separately screwed together.
9.2.1.7 Lift up the upper Half of the Tool

1) Remove the retaining ring DIN471-17X1 at the valve pin suspension.

**NOTICE**
Extra long snap ring plier is required for this. It is not necessary to remove the clamping plate.

2) Remove the washer W-17-24-2-02 with a magnetic Pick-Up tool.

**NOTICE**
Extra long snap ring plier is required for this. It is not necessary to remove the clamping plate.

3) Unscrew the screws to disconnect the top package from the rest of the mold.

**NOTICE**
Refer to the mold assembly drawings.

4) After removing the retaining rings and washers at the valve pin suspension, the upper half of the tool can be lifted together with the actuation plate.

**NOTICE**
The valve pin suspension is not loosened, so valve pin position is not changed. It’s possible to make a tool service without adjusting the valve pins again.

In case the screws have to be opened, the valve pins have to be adjusted again.

The complete valve pin suspension with hanger and lock screw is rotatable (without loosen the screws).
9.2.1.8 Assemble the upper Half of the Tool after Service

**NOTICE**

At all single valve pin suspension sets at the manifold side of the actuation plate are screws (Doc007523.png).

With this screws (DIN912-M6x10-12.9) it is not possible to rotate the suspension sleeve and the valve pin will be secured against anti-rotation. If the upper half of the tool (containing the actuation plate) will be assembled on the lower half of the tool (containing the hot runner system) then it is likely the recess at the suspension sleeve (see Doc007546.png) will not match with the screws (DIN912-M6x10-12.9).

1) Pre position the valve pin suspension sets to match the anti-rotation screws in the plate.

2) Place the upper half of the tool (containing the actuation plate) on the lower half of the tool.

**NOTICE**

As long as the guide is not in the correct position in the actuation plate, it can be rotated easily.
NOTICE

In the hole of the actuation plate is a marker (bore) it has to be aligned with the marker on the suspension sleeve.

3) Rotate clockwise all valve pin suspension sleeves to match the markers on the actuation plate (bore) with the markers on the suspension sleeves.

CAUTION

If you try to bring the suspension bushing in the correct position by turning it to the left, it is possible that the lock of the valve pin suspension will be loosened.

NOTICE

When rotated against a resistance the valve pin position will get adjusted - the reference suspension sleeve - anti-rotation screw is provided.

4) Check for all suspension sleeves with a calliper the dimension from upper surface of the Top Clamp Plate (TCP) to the seat for the washer at the Actuation Plate (AP). The dimension has to be 79.1 mm.

NOTICE

A distance of 79.1 mm from upper surface of the Top Clamp Plate (TCP) to the seat for the washer at the Actuation Plate (AP) means the distance of 4.6 mm from upper surface of the Valve pin Suspension Sleeve (VS) to the seat of the washer at the Actuation Plate.

The 4.6 mm gauge on all valve pin mounting bushings (VS) is necessary for the valve pin suspension bushings to be fixed.
5) Place the washers W-17-24-2-02 on the seats at the valve pin suspension positions.

6) Assemble the retaining rings DIN471-17X1 at the valve pin suspensions.
9.2.1.9 Nozzle Deactivating
If necessary, each nozzle can be deactivated independently.

**NOTICE**
This is a fast solution when using the remaining nozzles.

**WARNING**
Hot Surfaces Hazard
This operation has to be done with the system cooled down to room temperature.

1) Apply compressed air to the pneumatic tool connection CLOSED, to bring the actuation plate to the valve gates closed position.
2) Remove the retaining ring DIN471-17X1 from the valve pin suspension.

**NOTICE**
To remove the retaining ring, without dismounting the clamping plate, an extra long snap ring plier is required.

3) Remove the washer W-17-24-2-02 with a Magnetic Rod / Pick-Up tool.

**NOTICE**
The valve pin can get damaged. To avoid this, the valve pin suspension must be adjusted to the front.
4) Hold against turning the Hanger Screw (HS) with the hexagon Socket Wrench (SW).
5) At the same time loosen the Lock Screw (LS) with the adjustment tool ATCY2102 (AT) and a ring wrench (size 6 mm).
6) Turn the Lock Screw (LS) three complete turns counterclockwise.

**NOTICE**

After one and a half turns, the valve pin suspension (VS) is released from the anti-rotation screw and thus no longer secured against rotation.

7) Fix the new position by turning the Hanger Screw (HS) counter clockwise and the Lock Screw (LS) clockwise.

**NOTICE**

Before the system is put back into operation after the nozzles have been deactivated, the heating of the out of service nozzles must also be deactivated.
9.2.1.10 Blocking Pin

**NOTICE**

After the unit "Valve Pin Suspension" has been detached from the actuation plate, the position of the valve pin has to be locked with a blocking pin.

When this pin is not mounted, the valve pin could be pushed back by the injection pressure and open the nozzle.

1) The length X must be measured.
2) The blocking pin should be manufactured according to the dimensions in image Doc007744.png
3) The blocking pin has to have contact to the machine plate.