8.1.2 Actuator HYC4520M04 Series

8.1.2.1 Technical Data HYC4520M04-F, HYC4520M04-R

Actuator, bolted to manifold.

**Valve pin Operation**

- **Operation medium**: hydraulic
- **Operation pressure**: 120 bar (1740 psi)
- **Flow rate**: 3 l/min / 40 bar (580 psi)
- **Valve pin response time**: ~0.5 s / 40 bar (580 psi)
- **Valve pin stroke**: 20 mm
- **Valve pin adjustment**: ± 1.5 mm via adjustment threads from outside
- **Closing force**: 14100 N / 120 bar (1740 psi)
- **Opening force**: 14100 N / 120 bar (1740 psi)
- **Connections**: M 12 x 1.5 (8-L)

**Cooling**

- **Medium**: Cooling water
- **Flow rate**: 6 l/min
- **Pressure**: max. 8 bar (116 psi)
- **Temperature**: 30 - 60 °C (86 °F - 140 °F)
  - Temp. difference IN/OUT max. 5 °C
- **Connections**: M 12 x 1.5 (8-L) max. 3 actuators in a row

**Valve Pin**

- **Valve gate pin**: Ø 6 mm, Ø 8 mm
- **Attachment**: Quick coupling, antirotation

---

**NOTICE**

To ensure long life and continued flawless operation of the actuator, we recommend using a service medium that complies with the requirements of classification 21/18/13 pursuant to ISO 4406.

The coolant used should be properly modified, e.g. filtered water with an anti-corrosion and frost-proof agent.

After switch off the hot runner heater, the cooling for the actuator have to be turned on for at least 15 minutes, to avoid damages of the actuator sealing.
8.1.2.2 Exploded View HYC4520M04 Series

HYC4520M04 Series- This actuator is for position monitoring with position sensor unit.

In this section the actuator parts are identified with the numbers indicated in the following figure, which shows the components.

**NOTICE**

Always tighten the screws to the torques specified in the respective table (section 13).

### Actuator parts HYC4520M04 Series

<table>
<thead>
<tr>
<th>No.</th>
<th>Qty.</th>
<th>Description</th>
<th>Item</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>Cylinder housing complete</td>
<td>HYC4520HC01</td>
</tr>
<tr>
<td>1.1</td>
<td>1</td>
<td>Cylinder housing</td>
<td>HYC4520CH02</td>
</tr>
<tr>
<td>1.2</td>
<td>1</td>
<td>Piston</td>
<td>HYC4520P02</td>
</tr>
<tr>
<td>1.3</td>
<td>1</td>
<td>Adjustment screw</td>
<td>HYC4520AS01</td>
</tr>
<tr>
<td>1.4</td>
<td>1</td>
<td>Adjustment screw core</td>
<td>HYC4520AC01</td>
</tr>
<tr>
<td>1.5</td>
<td>1</td>
<td>Spacer</td>
<td>HYC4520SP01</td>
</tr>
<tr>
<td>1.6</td>
<td>3</td>
<td>Vacant</td>
<td></td>
</tr>
<tr>
<td>1.7</td>
<td>1</td>
<td>Position sensor unit</td>
<td>DFPS02</td>
</tr>
<tr>
<td>1.8</td>
<td>1</td>
<td>Seal kit (complet)</td>
<td>HYC4520SK01</td>
</tr>
<tr>
<td>1.8.1</td>
<td>1</td>
<td>Piston seal</td>
<td>2G2/45-37,5-3.2</td>
</tr>
<tr>
<td>1.8.2</td>
<td>2</td>
<td>Rod seal</td>
<td>C1-2038-V3664</td>
</tr>
<tr>
<td>1.8.3</td>
<td>2</td>
<td>Guiding element</td>
<td>FB2,3-1,5L70,5</td>
</tr>
<tr>
<td>1.8.4</td>
<td>1</td>
<td>O-ring</td>
<td>VIOR37x4FPM80</td>
</tr>
<tr>
<td>1.8.5</td>
<td>2</td>
<td>Back up ring</td>
<td>Y22331PS030</td>
</tr>
<tr>
<td>1.9</td>
<td>1</td>
<td>Adapter</td>
<td>HYC4520AD02</td>
</tr>
<tr>
<td>1.10</td>
<td>3</td>
<td>Socket head cap screw</td>
<td>DIN912-M6x20-12.9</td>
</tr>
<tr>
<td>1.11</td>
<td>2</td>
<td>Socket head cap screw</td>
<td>DIN912-M4x12-12.9</td>
</tr>
<tr>
<td>1.12</td>
<td>1</td>
<td>Socket set screw</td>
<td>DIN913-M8x16-45H</td>
</tr>
<tr>
<td>1.13</td>
<td>4</td>
<td>Socket head cap screw</td>
<td>Din912 M4x16-12.9</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>Cooling plate (F) full contact surface</td>
<td>HYC4018CP01</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>Cooling plate (R) reduced contact surface</td>
<td>HYC4018CP02</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>Spacer plate</td>
<td>HYC4013MP02</td>
</tr>
<tr>
<td>4</td>
<td>4</td>
<td>Socket head cap screw</td>
<td>DIN912-M6x95-12.9</td>
</tr>
<tr>
<td>5</td>
<td>4</td>
<td>Socket head cap screw</td>
<td>DIN912-M6x14-12.9</td>
</tr>
</tbody>
</table>
8.1.2.3 Tools for Assembling and Disassembling the Actuator

The following overview contains a list of special tools needed for the assembly and disassembly of the actuator.

Assembly and Disassembly Tools - ATCYL04

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>Item</th>
</tr>
</thead>
<tbody>
<tr>
<td>(T01)</td>
<td>Adjustment Tool cpl.</td>
<td>ATCYL0301</td>
</tr>
<tr>
<td>(T01.1)</td>
<td>Body</td>
<td>ATCYL030101</td>
</tr>
<tr>
<td>(T01.2)</td>
<td>Handle</td>
<td>ATCYL030102</td>
</tr>
<tr>
<td>(T02)</td>
<td>Fitting nut cpl.</td>
<td>ATCYL0402</td>
</tr>
<tr>
<td>(T02.1)</td>
<td>Fitting nut</td>
<td>ATCYL040201</td>
</tr>
<tr>
<td>(T02.2)</td>
<td>Socket</td>
<td>ATCYL040202</td>
</tr>
<tr>
<td>(T03)</td>
<td>Installation cone</td>
<td>ATCYL0404</td>
</tr>
<tr>
<td>(T04)</td>
<td>Spread tube</td>
<td>ATCYL0405</td>
</tr>
<tr>
<td>(T05)</td>
<td>Calibration tube</td>
<td>ATCYL0406</td>
</tr>
<tr>
<td>(T06)</td>
<td>Assembly tool cpl.</td>
<td>ATCYL0407</td>
</tr>
<tr>
<td>(T06.1)</td>
<td>Assembly tool body.</td>
<td>ATCYL040701 AS</td>
</tr>
<tr>
<td>(T06.2)</td>
<td>Handle</td>
<td>ATCYL040702</td>
</tr>
<tr>
<td>(T06.3)</td>
<td>Parallel pin</td>
<td>DIN6325-3m 6x10</td>
</tr>
<tr>
<td>(T07)</td>
<td>Assembly tool</td>
<td>ATCYL0408 AS</td>
</tr>
<tr>
<td>(T08)</td>
<td>Cylinder pin</td>
<td>ATCYL0104</td>
</tr>
</tbody>
</table>

**NOTICE**

These tools are not included with the Hot Runner System and must be ordered from Synventive separately.
8.1.2.4 Enhancements, Options and Accessories

<table>
<thead>
<tr>
<th></th>
<th>Cooling Full for Valve Pin Guide</th>
<th>Cooling Reduced for Valve Pin Guide</th>
<th>Position Sensor Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>HYC4520M04-F</td>
<td>●</td>
<td>-</td>
<td>●</td>
</tr>
<tr>
<td>HYC4520M04-R</td>
<td>-</td>
<td>●</td>
<td>●</td>
</tr>
</tbody>
</table>

- Standard
○ Optional
- not possible

**Cooling Plate with Contact Surface to the Valve Pin Guide**

HYC4520M04-F with cooling plate HYC4018CP01 for full contact surface to the valve pin guide.

HYC4520M04-R with cooling plate HYC4018CP02 for reduced contact surface to the valve pin guide.
8.1.2.5 Disassembling the Actuator HYC4520M04 Series

**DANGER**

**Danger to Life by Hydraulic**

Serious personal injury or death can result from connecting or disconnecting hydraulic hoses under pressure.

Hydraulic works must be carried out by qualified persons.

Use personal protective equipment, face protection, headgear, anti oil gloves.

The hoses in Hot Runner systems and the injection mold are under high pressure and high temperatures

Before disconnecting or connecting any hydraulic hoses:

- The Injection Molding Machine must be shut down.
- The electrical disconnect properly locked out.
- The hoses have to be depressurized.

**In Emergency case - Switch all systems off.**

1) Close the valve pin gate, so that the piston (1.2) is in bottom position.
2) Remove the hydraulic hoses from the actuator connection ports.

3) Unscrew and remove the socket head cap screws (4).
4) Slide the actuator in the indicated direction (Sign, Pin Release) on top of the actuator.

**NOTICE**

This will disengage the actuator from the valve pin.

Regular positioning of the actuator on the cooling plate (A)

**NOTICE**

The movement depends on the direction of connections for coolant distribution.

Positioning of the actuator crosswise to the cooling plate (B)

**NOTICE**

In case of mounting crosswise on the cooling plate, it is possible to disengage the actuator from the valve pin in opposite direction too.

5) Remove the actuator housing (1) from the cooling plate (2).
Disassembling the Adjustment Screw Assembly and Piston

1) Unscrew the two socket head cap screws (1.11).
2) Remove the position sensor unit (1.7).

3) Unscrew the three socket head cap screws (1.10).
4) Remove the spacer (1.5).

5) Loosen the socket set screw (1.12).

6) Using the assembly aid (T06), unscrew the adjustment screw (1.3) inclusive adjustment screw core (1.4) out of the actuator housing (1.1).
NOTICE
During the work at the piston, make sure the magnetic core will not be damaged.

7) Screw the fitting nut (T02) into the actuator housing (1.1).

8) Install a valve pin (VP) so it engages into the slots of the piston (1.2).
9) Pull the piston (1.2) with the valve pin (VP) while turning the fitting nut (T02) until the piston (1.2) is released.
10) Dismount the two elements of the piston seal (1.8.1).
    ● O-ring (1.8.1) (a)
    ● sealing element (1.8.1) (b)

11) Dismount the following seals out of the actuator housing (1.1).
    (1.8.2) Rod seal
    (1.8.3) Guiding element
    (1.8.5) Back up ring
Dismounting the Adjustment Screw Seal Kit

1) To unscrew the adjustment screw core (1.4) from the adjustment screw (1.3), insert this assembly in the assembly tool (T07).

2) Insert cylinder pins (T08) in the respective holes of the assembly tool (T07).

3) Unscrew the four socket head cap screws (1.13).

4) Pull the cylinder pins (T08) from the holes.

5) Pull the adjustment screw (1.3) from the assembly aid (T07).

6) Pull out the complete sealing kit from the adjustment screw assembly (1.3), (1.4):
   - (1.8.2) Rod seal
   - (1.8.3) Guiding element
   - (1.8.4) O-ring
   - (1.8.5) Back up ring
8.1.2.6 Assembling the Actuator HYC4520M04 Series

Installing the Piston Seal

To mount the piston seal (1.8.1) on the piston (1.2), proceed as follows:

1) Fit the mounting cone (T03) on the piston (1.2).

2) Mount the O-ring (1.8.1) (a) into the seal groove of the piston (1.2).

3) Lubricate the sealing element (1.8.1) (b) of the piston (1.2) with hydraulic oil or white grease.

4) Using the spreader sleeve (T04) and the mounting cone (T03), push the sealing element (1.8.1) (b) into the seal groove of the piston (1.2).

5) Insert the piston (1.2) uniformly in the calibration sleeve (T05).

**NOTICE**

During the work at the piston, make sure the magnetic core will not be damaged.

**NOTICE**

After disassembly of the sealing elements, the original seals should be replaced.

**NOTICE**

This will precisely align the piston seal (1.8.1) with the piston (1.2).
Installing the Piston into the Actuator Housing

1) Apply Loctite 272 adhesives to the thread of the adapter (1.9) at the position sensor side.

![Image](Doc001200.png)

**NOTICE**
To screw in the magnetic core (1.7) into the adapter (1.9) use a screw M2 (b), a counter nut (a) and an allen key.

2) Screw the magnetic core of the position sensor (1.7) into the adapter (1.9).

![Image](Doc001365.png)

3) Apply Loctite 272 adhesives to the thread of the adapter (1.9) at the piston side.

4) Screw the premounted magnetic core (1.7) and adapter (1.9) with a screw M2 (b), counter nut (a) and allen key into the piston (1.2).

![Image](Doc001197.png)

**NOTICE**
After disassembly of the system, the original sealing elements should be replaced.

5) Lubricate the following seals with hydraulic oil or white grease.
   - (1.8.2) Rod seal
   - (1.8.3) Guiding element
   - (1.8.5) Back up ring

6) Insert seals (1.8.2) (1.8.3) (1.8.5) into the actuator housing (11).

7) Fix spacer (1.5) with three socket head cap screws (1.10) secured by Loctite adhesives.

![Image](Doc001196.png)

8) Position the fitting nut (T02.1) (T02.2) over the piston (1.2).
NOTICE
During mounting of the piston (1.2), it is important the piston is not jammed in the actuator housing (1.1).

9) Install the piston (1.2) while turning clockwise the fitting nut (T02.1) (T02.2) into the actuator housing (1.1) up to the stop.

10) Position piston by using the adjustment tool (T01).

NOTICE
Ensure, valve pin slot (a) in piston is facing in the direction of hydraulic supplies (b).

11) Insert the position sensor (1.7) into the octagonal cutout of the piston.

NOTICE
The cable at the position sensor (1.7) has to be facing in the direction of hydraulic supplies (b) at the actuator housing (1.1).

12) Fix position sensor unit (1.7) with two socket head cap screws (1.11) secured by Loctite adhesives.
Installing the Adjustment Screw Assembly into the Actuator Housing

**NOTICE**

After disassembly of the system, the original sealing elements should be replaced.

1) Lubricate the following seals with hydraulic oil or white grease.
   - (1.8.2) Rod seal
   - (1.8.3) Guiding element
   - (1.8.4) O-ring
   - (1.8.5) Back up ring

2) Insert seals into adjustment tool assembly (1.3) (1.4).

3) Put upper adjustment tool (1.3) and lower adjustment tool core (1.4) into assembly tool assembly tool (T07).
4) Secure against rotation with cylinder pins Ø 5 mm (T08).
5) Lubricate the thread of the socket head cap screws (1.13) with Loctite adhesives.
6) Screw adjustment tool (1.3) and adjustment tool core (1.4) together by using four socket head cap screws (1.13).

**NOTICE**

Use torque wrench with wrench insert and the torque specified in the respective table in section 13.

7) Pull the cylinder pins (T08) out of the holes.
8) Take the adjustment screw assembly (1.3) (1.4) out of the assembly tool (T07).
9) Lubricate all seals of the adjustment tool assembly (1.3) (1.4) with hydraulic oil or white grease.
   (1.8.2) Rod seal
   (1.8.3) Guiding element
   (1.8.4) O-ring
   (1.8.5) Back up ring

10) By using assembly tool cpl. (T06) screw adjustment screw (1.3) (1.4) into cylinder housing (1.1).

11) Screw the adjustment screw assembly (1.3) (1.4) to basic position, 1,5 mm deep into the actuator housing to the basic position.

12) Fix the adjustment screw assembly (1.3) (1.4) with the hexagon socket set screw (1.12).

   **NOTICE**
   Use a torque wrench for a torque of 15 Nm (11 ft-lbs).
Mounting the Actuator on the Manifold

Insertion of valve pin head into piston cutout

**NOTICE**

Do not use the cylinder housing as support to get the system into the mold (no hammering e.g.).

This sign refers to the direction of valve pin release.

Ensure, needle slot (a) in piston is lined up for insertion of the valve pin head in the direction of hydraulic supplies (b).

1) Slide the actuator so it engages the pin head slots (b).
2) Place the actuator on the cooling plate (2).
3) Move the actuator so that the valve pin head (a) slides in the final position inside the piston (1.2) cutout (b).

4) Lubricate the thread of the socket head cap screws (4) with high-temperature assembly paste (anti-seize compound).

**NOTICE**

This is an important measure to prevent thread corrosion due to aggressive gases, which could be released during plastics processing.

5) Screw the actuator with socket head cap screws (4).

**NOTICE**

Tighten socket head cap screws (4) in an X pattern (a, d, c, b). Use torque wrench with wrench insert and the torque specified in the respective table in section 13.
8.1.2.7 Valve Pin Height Adjustment HYC4520M Series

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

**WARNING**

<table>
<thead>
<tr>
<th>Hot Surfaces Hazard</th>
</tr>
</thead>
<tbody>
<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>
<tr>
<td>For first aid contact your medical / safety representing</td>
</tr>
</tbody>
</table>

**NOTICE**

<table>
<thead>
<tr>
<th>Hazard of Material Damage</th>
</tr>
</thead>
<tbody>
<tr>
<td>The following steps are to be performed with the Hot Runner installed in the mold, and the system at operating temperature.</td>
</tr>
<tr>
<td>Actuator cooling must be on to prevent damage to the actuator seals.</td>
</tr>
<tr>
<td>● Cooling medium temperature: min. 30 °C max. 60 °C</td>
</tr>
<tr>
<td>● Pressure cooling medium max. 8 bar</td>
</tr>
<tr>
<td>● Temp. difference IN/OUT max. 5 °C</td>
</tr>
<tr>
<td>After switch off the hot runner heater, the cooling for the actuator have to be turned on for at least 15 minutes, to avoid damages of the actuator sealing.</td>
</tr>
</tbody>
</table>
Height Adjustment of Cylindrical shut-off Valve Pin

**WARNING**
**Hot Surfaces Hazard**
Contact between the skin and hot surfaces could result in burns.

1) Loosen the socket set screw (1.12).
2) Close the valve gate by pressure on the hydraulic connection (A) (closed).

3) Turn the adjustment screw assembly (1.3) (1.4) with the suitable pin (a) in the required position.

   HYC4520M series - dowel pin (a) 5 mm Ø (0.197”)

   **NOTICE**
   HYC4520M series valve pin height can be adjusted within +/- 1,5 mm (0.06”).
   Turning one hole forward results in a height adjustment of 0,25 mm at the valve pin.

4) Fix the adjustment screw assembly (1.3) (1.4) with the socket set screw (1.12) in the actuator housing (1.1) to the torque value below.

   **NOTICE**
   Torque value 15 Nm (11 ft-lbs)
Height Adjustment of Conical shut-off Valve Pin

**WARNING**

*Hot Surfaces Hazard*

Contact between the skin and hot surfaces could result in burns.

1) Loosen the socket set screw (1.12).
2) Close the valve gate by pressure on the hydraulic connection (A) (closed).

3) Turn the adjustment screw assembly (1.4) (1.3) with the suitable dowel pin (a) clockwise to the front position.

   HYC4520M series - dowel pin (a) Ø 5 mm (0.197")

   **NOTICE**

   Turning one hole forward results in a height adjustment of 0,25 mm at the valve pin.

   HYC4520M series valve pin height can be adjusted within +/- 1,5 mm (0.06").

4) Move the valve gate pin in the valve gate closed position with a reduced air pressure of approx. 2.76 bar (40 psi) at the "CLOSED" hydraulic connection (b).

5) Turn the adjustment screw assembly (1.4) (1.3) using the suitable pin (a) counter clockwise until you feel resistance.

   **NOTICE**

   Now the valve pin is adjusted without preload.

6) Depressurize the actuator and turn the adjustment screw assembly (1.4) (1.3) clockwise in the range from a half to a full pitch (0,13 mm, 0.005" - 0.25 mm, 0.010") of hole to preload the valve pin.

7) Fix the adjustment screw assembly (1.4) (1.3) with the socket set screw (1.12) in the actuator housing (1.1) to the torque value below.

   **NOTICE**

   Torque value 15 Nm (11 ft-lbs)