8.1.3 Actuator QCVG16M04/-MF04/-M06/-M07

8.1.3.1 Technical Data QCVG16 Series

<table>
<thead>
<tr>
<th>Actuator for Hot Runner Systems, in mold plate, hydraulic.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Valve pin operation</strong></td>
</tr>
<tr>
<td>Operation medium</td>
</tr>
<tr>
<td>Pressure range</td>
</tr>
<tr>
<td>Pressure max.</td>
</tr>
<tr>
<td>Operating flow rate - Instantaneous</td>
</tr>
<tr>
<td>Operating flow rate - Continuous</td>
</tr>
<tr>
<td>Valve pin response time</td>
</tr>
<tr>
<td>Valve pin stroke</td>
</tr>
<tr>
<td>Adjustment</td>
</tr>
<tr>
<td>Connections</td>
</tr>
<tr>
<td><strong>Cooling</strong></td>
</tr>
<tr>
<td>Medium</td>
</tr>
<tr>
<td><strong>Valve pin</strong></td>
</tr>
<tr>
<td>Valve pin diameter</td>
</tr>
<tr>
<td>Attachment</td>
</tr>
</tbody>
</table>

**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.
8.1.3.2 Exploded View QCVG16 Series

This section describes the disassembly and reassembly process to replace seals.

In this section the actuator parts are identified with the numbers indicated in the following figure.

NOTICE

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

### Actuator Parts QCVG16M04 Series

<table>
<thead>
<tr>
<th>No.</th>
<th>Qty.</th>
<th>Description</th>
<th>Item</th>
</tr>
</thead>
<tbody>
<tr>
<td>(01)</td>
<td>1</td>
<td>Cylinder housing for QCVG16M04</td>
<td>QCVG16HA04</td>
</tr>
<tr>
<td>(01)</td>
<td>1</td>
<td>Cylinder housing with flats for use when pitch is less than 126 mm</td>
<td>QCVG16HAF04</td>
</tr>
<tr>
<td>(02)</td>
<td>1</td>
<td>Cylinder cap</td>
<td>QCVG16CC01</td>
</tr>
<tr>
<td>(03)</td>
<td>1</td>
<td>Piston</td>
<td>QCVG16P03</td>
</tr>
<tr>
<td>(04)</td>
<td>1</td>
<td>O-ring</td>
<td>47-98-041</td>
</tr>
<tr>
<td>(05)</td>
<td>1</td>
<td>Seal</td>
<td>OE07005200212C</td>
</tr>
<tr>
<td>(06)</td>
<td>2</td>
<td>Poly-Pack</td>
<td>47-98-9001</td>
</tr>
<tr>
<td>(07)</td>
<td>8</td>
<td>Socket head cap screw</td>
<td>DIN912-M5x12-12.9</td>
</tr>
<tr>
<td>(08)</td>
<td>4</td>
<td>Socket head cap screw</td>
<td>DIN912-M6x50-12.9</td>
</tr>
<tr>
<td>(09)</td>
<td>1</td>
<td>Adjusting screw</td>
<td>QCVG16AS01</td>
</tr>
<tr>
<td>(10)</td>
<td>1</td>
<td>Actuator coupling</td>
<td>QCVG16AC01</td>
</tr>
<tr>
<td>(11)</td>
<td>1</td>
<td>Actuator disk</td>
<td>QCVG16AD01</td>
</tr>
<tr>
<td>(12)</td>
<td>1</td>
<td>Snap ring</td>
<td>73-011-5100-118</td>
</tr>
<tr>
<td>(13)</td>
<td>1</td>
<td>M6 x 18 long cap screw</td>
<td>DIN912-M6x18-12.9</td>
</tr>
<tr>
<td>(14)</td>
<td>1</td>
<td>Actuator support</td>
<td>QCVG16SU01</td>
</tr>
<tr>
<td>(15)</td>
<td>4</td>
<td>Flat head screw</td>
<td>DIN911-M6x12-10.9</td>
</tr>
<tr>
<td>(16)</td>
<td>1</td>
<td>Pin head adapter Ø 8.0</td>
<td>QCVG16PH0801</td>
</tr>
<tr>
<td>(17)</td>
<td>1</td>
<td>Valve pin bushing nut</td>
<td>see BOM</td>
</tr>
<tr>
<td>(18)</td>
<td>1</td>
<td>ø 8.0 Valve pin bushing</td>
<td>see BOM</td>
</tr>
<tr>
<td>(19)</td>
<td>1</td>
<td>Support spacer (when required)</td>
<td>47-30-130-06</td>
</tr>
</tbody>
</table>

### QCVG16M04 Series Parts w/Position Sensor

<table>
<thead>
<tr>
<th>No.</th>
<th>Qty.</th>
<th>Description</th>
<th>Item</th>
</tr>
</thead>
<tbody>
<tr>
<td>(08)</td>
<td>1</td>
<td>Adjusting screw assembly with magnets</td>
<td>QCVG16ASMAG01</td>
</tr>
<tr>
<td>(13)</td>
<td>1</td>
<td>M6 Titanium Socket cap screw 17 mm long</td>
<td>209220</td>
</tr>
<tr>
<td>(20)</td>
<td>2</td>
<td>Hexagon Socket countersunk head cap screw DIN7991</td>
<td>DIN 7991-M6x20-10.9</td>
</tr>
<tr>
<td>(21)</td>
<td>1</td>
<td>QCVG16 P/S assy 3 m cable</td>
<td>QCVG16ASSY03</td>
</tr>
<tr>
<td>(22)</td>
<td>1</td>
<td>QCVG16 P/S assy 5 m cable</td>
<td>QCVG16ASSY05</td>
</tr>
</tbody>
</table>

The actuator support spacer is only used if the bottom airgap is greater than 22 mm with a maximum of 28 mm. When using spacers, use DIN7991-M6x20-10.9 flat head screws (qty4) instead of DIN7991-M6x12-10.9 to bolt down actuator support.
Actuator Parts QCVG16M04/M06/M07

<table>
<thead>
<tr>
<th>No.</th>
<th>Qty</th>
<th>Description</th>
<th>Item</th>
</tr>
</thead>
<tbody>
<tr>
<td>(01) 1</td>
<td></td>
<td>Cylinder housing for:</td>
<td>QCVG16HA04</td>
</tr>
<tr>
<td></td>
<td></td>
<td>QCVG16M04</td>
<td>QCVG16HA06</td>
</tr>
<tr>
<td></td>
<td></td>
<td>QCVG16M06</td>
<td>QCVG16HA07</td>
</tr>
<tr>
<td>(01) 1</td>
<td></td>
<td>Cylinder housing with flats</td>
<td>QCVG16HAF04</td>
</tr>
<tr>
<td></td>
<td></td>
<td>for use when pitch is less than 126 mm</td>
<td></td>
</tr>
<tr>
<td>(02) 1</td>
<td></td>
<td>Cylinder cap</td>
<td>QCVG16CC01</td>
</tr>
<tr>
<td></td>
<td></td>
<td>QCVG16M04 / M07</td>
<td>QCVG16CC02</td>
</tr>
<tr>
<td>(03) 1</td>
<td></td>
<td>Piston</td>
<td>QCVG16PI03</td>
</tr>
<tr>
<td>(04) 1</td>
<td></td>
<td>O-ring</td>
<td>47-98-041</td>
</tr>
<tr>
<td>(05) 1</td>
<td></td>
<td>Seal</td>
<td>OE070005200212C</td>
</tr>
<tr>
<td>(06) 2</td>
<td></td>
<td>Poly-Pack</td>
<td>47-98-9001</td>
</tr>
<tr>
<td>(07) 8</td>
<td></td>
<td>Socket head cap screw</td>
<td>DIN912-M5×12-12.9</td>
</tr>
<tr>
<td>(08) 4</td>
<td></td>
<td>Socket head cap screw</td>
<td>DIN912-M6×50-12.9</td>
</tr>
<tr>
<td>(09) 1</td>
<td></td>
<td>Sensor Plate</td>
<td>47-30-400</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Used on QCVG16M06)</td>
<td></td>
</tr>
<tr>
<td>(10) 4</td>
<td></td>
<td>M3x8 Flat head screws Torque 1 Nm (Used on QCVG16M06)</td>
<td>DIN7991-M3x8-10.9</td>
</tr>
</tbody>
</table>

QCVG16M04/M06/M07 Series Parts (Self Bleeding)

<table>
<thead>
<tr>
<th>No.</th>
<th>Qty</th>
<th>Description</th>
<th>Item</th>
</tr>
</thead>
<tbody>
<tr>
<td>(01) 1</td>
<td></td>
<td>Cylinder housing for:</td>
<td>QCVG16HA04</td>
</tr>
<tr>
<td></td>
<td></td>
<td>QCVG16M04</td>
<td>QCVG16HA06</td>
</tr>
<tr>
<td></td>
<td></td>
<td>QCVG16M06</td>
<td>QCVG16HA07</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>CV Plug Ø 3.9 mm</td>
<td>09-156-00</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>CV Plug Ø 5.5 mm</td>
<td>09-218-00</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>Restrictor Plug</td>
<td>EIS-RE-040-010</td>
</tr>
</tbody>
</table>
8.1.3.3 Disassembling the Actuator QCVG16 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 the Hot Runner System and in the injection mold are under high pressure and high temperatures.
- Before disconnecting or connecting any hydraulic hoses:
  - The injection machine/hydraulic pump must be shut down.
  - The electrical disconnect - properly locked out.
  - Pressure from the hoses must be removed.

1) Disconnect the hydraulic lines from the actuator.

**NOTICE**

Ensure connections are labelled.

2) Remove the snap ring (12).
3) Unscrew and remove the four socket head cap screws M6x50 (08).
4) Remove the actuator housing (01) with 2 long M6 screws in the two threaded holes (a) out of the clamping plate.

### Disassembly of the Actuator and the Seal

1) Remove the socket head cap screws (07) from the actuator cap (02).

2) Remove the piston (03) from the actuator housing (01) with a soft face hammer, clamp, or small press.

3) Carefully remove the seals and O-rings:
   - (04) O-ring
   - (05) O-ring
   - (06) Poly-Pack (x2)

**NOTICE**
The piston seal will need to be cut for removal.
8.1.3.4 Assembling the Actuator QCVG16M04/MF04/M06/M07

Installation of the Piston Seal

1) Clean the seal groove and ensure that there are no scratches.

**NOTICE**

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

2) Install two-piece seal (05). Install inner, rubber portion first. The outer (Teflon) ring will need modest stretching before installation. This may be done by hand. Exercise restraint as over-stretching will make final assembly more difficult. The correct stretch is just enough to allow installation of outer seal by hand.

3) Lubricate the inner seal (05).

4) Install outer, PTFE portion with the support of the tool ATCYL46 to push it into the groove of QCVG16M04.

5) Alternately, the outer (PTFE) ring can be installed by hand; it will need modest stretching before installation. Exercise restraint as over-stretching will make final assembly more difficult. The correct stretch is just enough to allow installation of outer seal by hand.
Installation of the Actuator Housing Poly-Pack

1) Clean the seal groove (a).

   **NOTICE**
   Ensure that the groove (a) has no scratches.

2) Lubricate the seal Poly-Pack (06) with hydraulic oil or white grease.
3) Install the seal Poly-Pack (06) into the groove of the actuator housing (01).

   **NOTICE**
   Pay attention to correct seal orientation.
   The lip of the seal Poly-Pack (06) has to be inward facing to the center of the actuator housing (01).
4) Make certain the seal Poly-Pack (06) is completely seated in the groove.
Installation of the Actuator Cap Inner Seal

1) Clean the seal groove (b).
   
   **NOTICE**
   
   Ensure that the groove (b) has no scratches.
   
2) Lubricate the seal Poly-Pack (06) with hydraulic oil or white grease.
3) Install the seal Poly-Pack (06) into the groove of the actuator cap (02).
   
   **NOTICE**
   
   Pay attention to correct seal orientation.
   
   The lip of the seal Poly-Pack (06) has to be toward facing to the contact surface of the actuator housing (01).

4) Make certain the seal Poly-Pack (06) is completely seated in the groove.

Installation of the Actuator Cap outside O-ring Seal

1) Clean the O-ring groove (c).
   
   **NOTICE**
   
   Ensure that the groove has no scratches.
   
   **NOTICE**
   
   After disassembly of the sealing elements, the seals should be replaced with original seals.

2) Lubricate the O-ring (04) with hydraulic oil or white grease.
3) Install the O-ring (04) into the groove of the actuator cap (02).
   
   **NOTICE**
   
   Make certain the seal is completely seated in the groove.
Installation of the Piston in the Actuator Housing

1) Lubricate all seals with hydraulic oil or white grease.
2) Use a soft face hammer or a small press to fully seat the piston (03) into the actuator housing (01). Insert as shown in figure at right.

**NOTICE**
Resistance will be felt as the seals are compressed. Be careful not to pinch or otherwise damage the new seals during piston (03) insertion into the actuator housing (01).

3) Place a flat plate (P) on piston (03).
4) Install piston (03) into housing with the flange near the Synventive logo side as shown. So not pinch or damage the Teflon Seal (piston).

**NOTICE**
Use a small press to slowly install the piston (03).

5) Lubricate the O-ring (04) of the cylinder cap (02) with hydraulic oil or white grease.
6) Place the cylinder cap (02) over the actuator housing (01).

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

Use a small press to slowly install the cylinder cap (02).

7) Place a flat plate (P) on cylinder cap (02).
8) Align the screw holes before installing cap.
9) Install cylinder cap (02) along with seal to cylinder housing (01) using a light press as shown.

10) Lubricate the thread of the socket head cap screws (07) 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.

11) Tighten the socket head cap screws (07) M5x12.

NOTICE
Torque per specification engraved on the actuator cap.

Installation of the Actuator on the Clamping Plate

1) Install the actuator housing (01) with 4 mounted M6 socket head cap screws (08) into the clamping plate pocket.

NOTICE
Use torque wrench with wrench insert and the torques indicated in the torque table.

2) Connect the hydraulic hoses to the actuator.
Actuator Bleeding QCVG16

Actuator Auto Bleeding (QCVG16M04 / M06 / M07)

Bleeding of the actuator is not necessary due to the “auto-bleed” feature. When the cylinder is in the open position, a small amount of oil is allowed to pass from the pressure side to the tank side. At all other positions, valves prevent hydraulic fluid from bleeding. The amount of oil is small enough to maintain full pressure while allowing enough oil to carry any air from the lines to the tank. It is only necessary to apply pressure for about 2 minutes with the actuators in the open position to complete the bleeding process.

8.1.3.5 Assembling and Disassembling the Position Sensor to QCVG16M04/MF04

1) Assembly: Fix the Position Sensor Assembly (21) onto the hydraulic actuator QCVG16M04 / MF04 with screws DIN7991-M6X20-10.9 (20).
2) Disassembly: Remove the screws DIN7991 M6x20 (20) and then remove the Position Sensor Assembly (21) from the hydraulic actuator QVCG16M04.

**NOTICE**

Adjusting screw (09) protrusion above the back of the piston will result in Position Sensor damage.
8.1.3.6 Valve Pin Height Adjustment QCVG Actuator

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

**WARNING**

**Heavy Weight Hazard**
Transport and lifting equipment should be operated only by trained personnel. 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.
For first aid contact your medical / safety representing

**Hot Surfaces Hazard**
Contact between the skin and hot surfaces could result in burns.
Use personal protective equipment, such as gloves, apron, sleeves and face protection, to guard against burns.
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.
For first aid contact your medical / safety representing

**NOTICE**

**Hazard of Material Damage**
The highest operating pressure is 103 bar (1500 psi), the typical operating pressure is between 41 bar and 82 bar (600 psi and 1200 psi). A lower operating pressure increases the seal life.
The following steps are to be performed with the system at operating temperature.
Clamping plate cooling (max. 100 °C / 210 °F) must be on to prevent damage to the actuator seals.
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.
Height Adjustment of shut-off Valve Gate Pins with QCVG Actuator

Installation and valve pin adjustment

1) Slide the valve pin (VP) into pin head adapter (16).

**NOTICE**
If the pin has previously been contoured, note the orientation.
The pin head adapter (16) is keyed to the actuator support (14), found on the manifold.

2) Place the actuator coupling (10) with the valve pin (VP) and pin head adapter (16) on the actuator support (14).

3) If the Hot Runner System is using a tapered shut-off, make sure the valve pin (VP) is not seated in the gate at this time.
4) Verify that the flange of the actuator coupling (10) is resting on the actuator support (14).

   If a gap is present:

   **NOTICE**
   This indicates the valve pin is making contact in the gate.
   - Rotate the adjusting screw (09) to lift the valve pin until the gap is eliminated.

5) Tighten the set with the socket head cap screw (13).
**WARNING**

Heavy Weight Hazard

6) Install the clamping plate (with the actuator housing already installed in them).

---

**Actuator parts**

- (01) Actuator housing
- (02) Actuator cap
- (03) Piston
- (04) O-ring
- (05) O-ring
- (06) Poly-Pack
- (07) Socket head cap screw M5x12
- (08) Socket head cap screw M6x50
- (09) Adjusting screw
- (10) Actuator coupling
- (11) Actuator disk
- (12) Retaining ring for shafts
- (13) Socket head cap screw M6x18
- (14) Actuator support
- (15) Flat head screw M6x12
- (15) Flat head screw M6x20
- (16) Pin head adapter ø8.0
- (17) Valve pin bushing nut
- (18) Valve pin bushing
- (19) Support spacer (when required)
7) Install the actuator disk (11) over the actuator coupling (10) in the piston (03).

8) Ensure that the retaining ring (12) is correctly positioned in groove of actuator coupling (10).

---

**WARNING**

Hot Surfaces Hazard

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

9) Heat the mold up to operating temperature.

**NOTICE**

Wait additional 30 minutes until the system is entirely heated up.

---

10) Close the actuator with a hydraulic pressure of 2,75 bar (36 psi).
Height adjustment of straight shut-off valve gate pins

- Turn the adjusting screw (09) until the face of the valve pin (VP) is in the desired location for molding (typically 0.13 mm (005") protrusion through the gate).
- To take up the play in the valve pin (VP) and coupling assembly, access the parting-line side of the valve pin (VP) and push against it before locking the socket head cap screw (13).

**NOTICE**
The adjusting Screw (09) has a 1 mm pitch to facilitate fine adjustment.

Height adjustment of conical shut-off valve gate pins

- Turn the adjusting screw (09) clockwise until the valve pin (VP) seats in the gate.
- Then turn off the hydraulics and turn the adjustment screw (09) an additional 1/8 turn clockwise to preload the valve pin (VP) 0.13 mm (005").

**NOTICE**
The adjusting Screw (09) has a 1 mm pitch to facilitate fine adjustment.

11) Holding the adjustment screw (09) in place.
12) Tighten the socket head cap screw (13).

13) Actuate the valve gate several time and check for correct valve pin seating.