10.1.4 Nozzle 16E-04 / 22E-04 Series

**NOTICE**

Always tighten the screws to the torque specified in the respective table in section 13.

### WARNING

**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.

**Hazard of Pressurized Air**

Pressurized air blow can result in hot plastic or foreign bodies entering the eyes, causing vision damage.

Following work must be carried out by qualified and experienced persons.

Use personal protective equipment: Face protection, hearing protection and gloves.

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.
Technical Data - Threaded Nozzle 16E-04 / 22E-04 Series

Threaded Nozzle 16E-04

<table>
<thead>
<tr>
<th>Description</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flow bore (J)</td>
<td>Ø 16 mm</td>
</tr>
<tr>
<td>Nozzle length (L)</td>
<td>110 - 650 mm</td>
</tr>
<tr>
<td>Nozzle cutout (D)</td>
<td>Ø 50 mm</td>
</tr>
<tr>
<td>Thermocouple</td>
<td>Type J, Type K</td>
</tr>
<tr>
<td>Nozzle tips</td>
<td>VSP, VTP, VSW, VTW, TFP, TTP, TTW</td>
</tr>
</tbody>
</table>

Threaded Nozzle 22E-04

<table>
<thead>
<tr>
<th>Description</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flow bore (J)</td>
<td>Ø 22 mm</td>
</tr>
<tr>
<td>Nozzle length (L)</td>
<td>110 - 650 mm</td>
</tr>
<tr>
<td>Nozzle cutout (D)</td>
<td>Ø 60 mm</td>
</tr>
<tr>
<td>Thermocouple</td>
<td>Type J, Type K</td>
</tr>
<tr>
<td>Nozzle tips</td>
<td>VSP, VTP, VSW, VTW, TFP, TTP, TTW</td>
</tr>
</tbody>
</table>

Parts of the Nozzles 16E-04 / 22E-04

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

NOTICE

Always tighten the screws to the torque specified in the respective table in section 13.
Assembly / Disassembly Tools

In this section the Stripping and Mounting Tool parts are identified with the numbers indicated in the following figure.

**Heater Disassembly Tool Compl. AT16E-0102, AT22E-0102**

<table>
<thead>
<tr>
<th>Pos.</th>
<th>Qty.</th>
<th>Part No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1.1</td>
<td>1</td>
<td>ATCYL0104</td>
<td>Stop bolt</td>
</tr>
<tr>
<td>T1.2</td>
<td>1</td>
<td>ATCYL0102</td>
<td>Guide</td>
</tr>
<tr>
<td>T1.3</td>
<td>1</td>
<td>ATCYL0101</td>
<td>Slide Hammer</td>
</tr>
<tr>
<td>T1.4</td>
<td>1</td>
<td>AT16E010201</td>
<td>Disassembly tube 16E</td>
</tr>
<tr>
<td>T1.5</td>
<td>2</td>
<td>DIN6325-6M6X30</td>
<td>Parallel pin</td>
</tr>
<tr>
<td>T1.6</td>
<td>2</td>
<td>AT16E010202</td>
<td>Clamping jaws</td>
</tr>
<tr>
<td>T1.7</td>
<td>1</td>
<td>AT16E010203</td>
<td>Clamping ring</td>
</tr>
<tr>
<td>T1.8</td>
<td>2</td>
<td>DIN6325-6M6X20</td>
<td>Parallel pin</td>
</tr>
<tr>
<td>T1.9</td>
<td>2</td>
<td>DIN916-M4X6-45H</td>
<td>Set screw</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pos.</th>
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<th>Part No.</th>
<th>Description</th>
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<tr>
<td>T1.1</td>
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<td>1</td>
<td>ATCYL0102</td>
<td>Guide</td>
</tr>
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<td>Slide Hammer</td>
</tr>
<tr>
<td>T1.4</td>
<td>1</td>
<td>AT22E010201</td>
<td>Disassembly tube 16E</td>
</tr>
<tr>
<td>T1.5</td>
<td>2</td>
<td>DIN6325-6M6X30</td>
<td>Parallel pin</td>
</tr>
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<td>2</td>
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<tr>
<td>T1.9</td>
<td>2</td>
<td>DIN916-M4X6-45H</td>
<td>Set screw</td>
</tr>
</tbody>
</table>
Nozzle Tip Assembly Tools

Tip Assembly Tool for 16E-04 Nozzle Tips
TTW, TTP, TFP
(T2) AT-16-040102  (T1) AT-16-040101
Also used for the assembly of seal caps.

Tip Assembly Tool for 22E-04 Nozzle Tips
TTW, TTP, TFP
(T2) AT-22-040102  (T1) AT-22-040101
Also used for the assembly of seal caps.

10.1.4.1 Nozzle Thermocouple Information

Heaters with J-type and K-type thermocouples are available.

The heater and the thermocouple are not separate heater an thermocouple have to be replaced together.

Color Coding of Thermocouples

**NOTICE**

Take notice of the production and color identification of thermocouple cables.

Synventive uses J and K type thermocouples. Their color coding is given in the following table.

<table>
<thead>
<tr>
<th>Type</th>
<th>International standard IEC 584-3</th>
</tr>
</thead>
<tbody>
<tr>
<td>J</td>
<td>Black + Black + White + Green</td>
</tr>
<tr>
<td>K</td>
<td>Green + White</td>
</tr>
</tbody>
</table>

Table 1: International color coding for temperature sensors
10.1.4.2 Disassembly the Nozzle 16E-04 / 22E-04 Series

Disassembling the Nozzle Front Heater

1) Remove the retaining ring (8) from the nozzle tip (9).
2) Remove the component ring (7).
3) Unscrew and remove the socket set screws from the front heater (6).
4) Take the heater stripping tool (AT16E0102) and open the clamping jaws (T1.6).

5) Move the heater stripping tool (AT16E0102) over the front heater.

6) Close the clamping jaws (T1.6), by turning the clamping ring (T1.7).

**NOTICE**

The parallel pin (T1.8) has to be in the hole from the front heater (6).

7) To remove the nozzle front heater (6), slide the hammer (T1.3) against the stop bolt (T1.1) repeatedly until the nozzle heater is released.
Disassembling the Nozzle Rear Heater

**NOTICE**

Depending on the nozzle length is a rear heating element (3) used.

1) The nozzle front heater (6) must be dismounted from the nozzle body (1), as described in the above section.

2) Remove the cover tube (5).
3) Remove the retaining ring (4).

4) Pull the rear heating element (3) from the nozzle body (1).
5) Remove the head ring (2) from the nozzle body (1).
Disassembling the Nozzle and the Nozzle Tip

⚠️ WARNING

Hazard of Pressurized Air

Pressurized air blow can result in hot plastic or foreign bodies entering the eyes, causing vision damage.

Following work must be carried out by qualified and experienced persons.

Use personal protective equipment: Face protection, hearing protection and gloves.

1) The nozzle has to be screwed into the manifold.

2) Remove the circlip (8) from the nozzle tip (9).

3) Remove the component ring (7).
NOTICE
To dismount the nozzle tip (7.1) from the nozzle, if there is plastic material in the nozzle, the tip (7.1) must be heated-up. Never use an acetylene or welding torch, as severe nozzle damage can occur from over-heating.

4) Heat the nozzle tip (7.1) using a heat gun to the maximum temperature of 200°C (392°F).

WARNING
Hot Surfaces Hazard
Contact between the skin and the hot nozzle could result in burns.
Following works must be carried out by qualified persons.
Use personal protective equipment, such as gloves, apron, sleeves and face protection, to guard against burns.

5) Fix the nozzle body (1) with a wrench and loosen the nozzle tip (9) from the nozzle body (counter clockwise).

WARNING
Hazard of Pressurized Air
Pressurized air blow can result in hot plastic or foreign bodies entering the eyes, causing vision damage.
Use personal protective equipment: Face protection, hearing protection and gloves- PSA.

6) Clean the nozzle tip using pressurized air to remove as much residual plastic as possible.
Disassembling the Nozzle Body

**WARNING**

<table>
<thead>
<tr>
<th><strong>Hazard of Pressurized Air</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Pressurized air blow can result in hot plastic or foreign bodies entering the eyes, causing vision damage.</td>
</tr>
<tr>
<td>Following work must be carried out by qualified and experienced persons.</td>
</tr>
<tr>
<td>Use personal protective equipment: Face protection, hearing protection and gloves.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Hot Surfaces Hazard</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Contact between the skin and the hot nozzle could result in burns.</td>
</tr>
<tr>
<td>Use personal protective equipment: Face protection, hearing protection and gloves.</td>
</tr>
</tbody>
</table>

1) Cool the nozzle body (1) to approximately 25 °C (77 °F)
2) Dismount the nozzle front heater (6) and rear heater (3), as described on page 308 and on page 310.
3) Dismount the nozzle tip (9) from the nozzle body (1), as described on page 313.

4) Use a wrench to loosen the nozzle body (1) from the manifold by rotation (counter clockwise).
10.1.4.3 Assembling the Nozzles 16E-04 / 22E-04 Series

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

**NOTICE**

Always tighten the screws to the torque specified in the respective table in section 13.

<table>
<thead>
<tr>
<th>Pos.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Nozzle body</td>
</tr>
<tr>
<td>2</td>
<td>Head ring</td>
</tr>
<tr>
<td>3</td>
<td>Rear heating element (optional)</td>
</tr>
<tr>
<td>4</td>
<td>Retaining ring</td>
</tr>
<tr>
<td>5</td>
<td>Cover tube</td>
</tr>
<tr>
<td>6</td>
<td>Front heater</td>
</tr>
<tr>
<td>7</td>
<td>Component ring</td>
</tr>
<tr>
<td>8</td>
<td>Retaining ring</td>
</tr>
<tr>
<td>9</td>
<td>Nozzle tip</td>
</tr>
<tr>
<td>10</td>
<td>Wear insert (optional)</td>
</tr>
<tr>
<td>11</td>
<td>Cooling bushing (optional)</td>
</tr>
</tbody>
</table>
Assembling the Nozzle Body

1) Apply spotting ink on the nozzle body (1) bottom surface (SF1).

2) Screw in the nozzle body (1) hand-tight into the manifold thread until seated.

3) Unscrew the nozzle body (1) from the manifold.

4) Check the matching between the manifold bottom surfaces (SF2) and the nozzle body surface (SF1).

NOTICE

The surfaces must bear on all surfaces uniformly and flatly, in particular on the manifold contact face.

In case of any uncertainty, clean the surfaces with a cleaning cloth. If the next ink test is still unsatisfactory, please - contact Synventive Customer Service or Technical Support.

With a positive ink test, clean the surfaces and proceed to the next step.
5) Lubricate the thread (not the face) of the nozzle body with high-temperature assembly paste (antiseize compound).

**NOTICE**

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

6) Tighten the nozzle body (1) to the manifold.

**NOTICE**

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

---

**Mounting the Nozzle Rear Heater**

1) Slide the head ring (2), onto the nozzle body (1) up to the surface of the hexagon.

**NOTICE**

The opening of the head ring (2) has to match with the cable connections (see customer drawing).
2) Bend the cable at the rear heater (3) corresponding to the opening at the head ring (2).

3) Slide the rear heating element (3), onto the nozzle body (1) up to the surface of the hexagon.
4) Fit the retaining ring (4) into the groove at the nozzle body (1).

**NOTICE**

The opening from the retaining ring (4) has to match with the opening from rear heating element (3).

---

**Mounting the Nozzle Front Heater**

1) Assemble the nozzle body (1) on the manifold, as described on page 315.
2) Assemble the rear heater (3) on the nozzle body (1), as described on page 316.
3) Lead the cable of the front heater (6) through the cover tube (5).
4) Hold the cover tube (5) to the front heater (6).
5) Bend the cable at the front heater (6) corresponding to the opening at the head ring (2), about 90 degrees.
6) Slide the cover tube (5) together with the front heater (6) over the nozzle body (1).

**NOTICE**

The wire from the front heater (6) has to be at the opening from the rear heater (3).

7) Push the front heater (6) onto the nozzle body (1).

8) Fix the front heater (6) with two set screws at the nozzle body (1).
Assembling the Nozzle Tips TTW, TTP, TFP

**TTW Nozzle Tip Assembly**

1) Place the tip nut (a) into the tool (T2).
2) Using the tool (T1) to push the tip insert (b) into the tip nut (a).
3) Place the torpedo (c) on the tip insert (b).
4) Using the tool (T1) to push the torpedo (c) and the tip insert (b) into the tip nut (a).

**TTP Nozzle Tip Assembly**

1) Place the tip nut (a) on the tool (T2).
2) Using the tool (T1) to push the tip insert (b) into the tip nut (a).
3) Place the torpedo (c) on the tip insert (b).
4) Using the tool (T1) to push the torpedo (c) and the tip insert (b) into the tip nut (a).

**TFP Nozzle Tip Assembly**

1) Place the tip nut on the tool (T2).
2) Using the tool (T1) to push the tip insert (b) into the tip nut (a).
Shown are the tip nuts, for checking the correct seating of the tip inserts

- **Good**
- **Bad**
- **Incorrect**

**NOTICE**

See examples of good and incorrect insert installations. Make sure the insert must not exceed the height of the nozzle tip head. Incorrect items should not be further processed.

---

**Assemble the Seal Cap on VSW, VTW, TTW Nozzle Tips**

1. Place the tip nut (a) on the tool (T2).
2. Place the seal cap (b) on the tip nut (a).
3. Using the tool (T1) to push the seal cap (b) on the tip nut (a).

**Mounting the Nozzle Tip on the Nozzle Body**

1. Assemble the nozzle body (1) on the manifold (12), as described on page 315.
2. Assemble the rear heater (3) on the nozzle body (1), as described on page 316.
3. Assemble the front heater (6) on the nozzle body (1), as described on page 317.
4. Apply spotting ink on the nozzle tip (9) bottom surface (SF1).
5. Screw in the nozzle tip (9) hand-tight into the nozzle body (1) until seated.
6. Unscrew the nozzle tip (9) from the nozzle body (1).
7) Check the matching between the nozzle body (1) surface (SF2) and the nozzle tip (9) surface (SF1).

**NOTICE**

The nozzle must bear uniformly on the outer surfaces (SF2) (SF1) uniformly and flatly, in particular on the nozzle body contact face (SF1).

**NOTICE**

In case of any uncertainty, clean the surfaces with a cleaning cloth. If the next ink test is still unsatisfactory - please contact Synventive Customer Service or Technical Support.

8) With a positive ink test clean the surfaces and proceed to the next step.

9) Lubricate the thread (not the face) of the nozzle tip (9) body with high-temperature assembly paste (antiseize compound).

**NOTICE**

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

10) Screw in the nozzle tip (9) into the nozzle body hand-tight.

11) Tighten the nozzle tip (9) into the nozzle.

**NOTICE**

Use torque wrench with wrench insert and the torque specified in the respective table in section 13.
12) Place the component ring (7) on the nozzle body (1).

![Image](Doc006734.png)

**WARNING**

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

Cool the nozzle to approximately 25 °C (77 °F).

13) Mount the retaining ring (8) on nozzle tip (9).

![Image](Doc006733.png)