

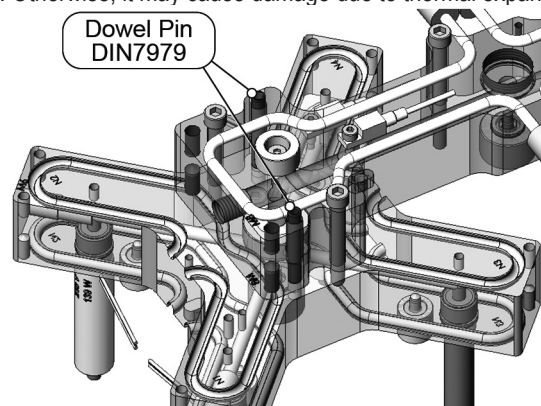


4 Installation of the Hot Runner System

This section describes the steps for installing the Hot Runner System in the injection mold. Please identify the necessary dimensions from the customer drawing for the Synventive Hot Runner System.

4.1 General Instructions for Installation

- If the cavity plate is not guided on pillars or pins when moving, there is a risk of damage to the nozzle tips.
- Electrical terminals for attaching cables to the Hot Runner System shall never be allowed to come into contact with the coolant or hydraulic fluid. This could lead to a short circuit in the system, or cause an electrical fire which may lead to damage of the Hot Runner System.
- To ensure long life and continued flawless operation of the actuator, we recommend using a coolant 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.
- Power cables and fluid distribution systems should be installed loosely, making sure they are not compressed during assembly. Keep in mind the thermal expansion of the Hot Runner System during operation.
- During assembly, the Hot Runner System and the injection mold shall have the same temperature. Synventive Hot Runner Systems are designed to be installed and removed from the mold at room temperature. Installing or removing Hot Runner Systems while hot could result in damage to the mold or the Hot Runner System, or both.
- All Synventive systems work with alternating current and the operating voltage of 230V \pm 10%.
- The prescribed torque values of fittings and fasteners must be met, using a torque wrench to properly torque all fasteners to specification. See the torques indicated in the torque table (section 13).
- All parts subjected to thermal and dynamic stress shall be treated with high-temperature assembly paste (anti-seize compound) to guarantee an easy release of the connections. This especially applies to screwed connections between the manifold and the injection mold.
- Whenever installing any threaded component or fastener, always use high-temperature assembly paste (anti-seize compound).
- During assembly, avoid moisture on all surfaces.
- In case of Hot Runner Systems with Support Ring nozzles replace all sealing rings after each dismantling and before each assembly.
- After mounting a hot runner system with bridge manifold, the dowel pins with internal threads (DIN7979) must be removed. Otherwise, it may cause damage due to thermal expansion on the hot runner system.





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4.1.1 Requirements on the Injection Mold

This section defines design and technical requirements essential for the flawless operation of the Synventive HR System.

- The planned injection cavity shall be designed as instructed by Synventive to ensure suitability of fluid distribution systems and minimal heat convection. It is therefore necessary to provide sufficient mold rigidity.
- “Balancing” only applies to Synventive Hot Runner System. Effects related to runners and balanced part filling are the toolmakers responsibility.
- All dimensions specified in the customer drawing apply to the reference temperature of 20 °C (68 °F).
- The toolmaker needs to adjust the relevant parts to fit the injection mold taking into account the specific heat expansion of the following parts:
 - All nozzles, except for SR16, SR20, SR24, T16, T20 and T24 (unless otherwise noted).
 - All injection nozzle tips.
 - Support elements (center support, support pad and support pillar) supplied with extra trim stock.

NOTICE

Not designated in the PLUG’N PLAY®-Hot Runner System is an adjustment of center support and support pad with extra trim stock.

- The machine nozzle orifice diameter (machine nozzle – inlet bushing) shall be made with a tolerance of 0/-1 mm (0/- 0.04”).
- The machine nozzle shall be centered with respect to the inlet bushing. The inlet bushing shall be centered as instructed by Synventive using a centering ring and secured against lateral stress.
- If the hoses and pipes leading to the injection system actuators are not part of Synventive’s supply, the toolmaker has to prepare a space with appropriate clearance for them.
- To avoid leakage between the manifold and the nozzles, a pre-load of 0.1 mm (0.004”) is needed for nozzles SR16, SR20 and SR24.
- All modifications to the hot runner system should be carried out only in consultation with Synventive. Exception is a contour adjustment at the nozzle tip.
- To ensure a correct gate break point, it is necessary to control the temperature around the hot runner gate using a temperature control system.
- The thermal transfer losses of the Hot Runner System shall be compensated by corresponding temperature control (cooling fluid) channels. Appropriate cooling channels must be incorporated in the appropriate areas of the injection mold as specified by Synventive to ensure proper Hot Runner System operation.
- To facilitate assembly, install any threaded components using high-temperature assembly paste (anti-seize compound).
- The operating safety of our Synventive Hot Runner Systems is based on the assumption that the molds, injection molds and injection molding machines intended for them have a sufficient stability to withstand deflection and are fitted with adequate temperature control systems, which properly manage the heat loss from the Synventive Hot Runner System.
- All machined surfaces shall have a medium roughness level of Ra 1.6 at the maximum after processing. If roughness is greater, leakage may occur on the Hot Runner System, resulting in severe damage.
- Nozzle length expansion due to heating shall be taken into account at the nozzle tip face, so the nozzle tip face shall be placed so that it is opposite a piece of plastic with the minimum thickness of 0.5 – 1.0 mm (0.02 – 0.04”) during injection.



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- In the area of the inlet orifice, it is recommended to use replaceable hardened inserts with the minimum required hardness of 52 +2/-1 HRC.
- The design of all cut outs and contact surfaces shall comply with the requirements submitted by Synventive. Contact with any other surfaces will compromise proper temperature control of the Synventive Hot Runner System.
- To ensure the static stability of the Hot Runner System as a whole, use the supports supplied together with the system, or as pre-fitted.
- To ensure support of the hot runners in the nozzle area, it is necessary to screw the clamping plate and the cavity plate together with a radius of approx. 80 – 100 mm (3.15 – 3.94") using two opposite screws, min. M10 as per DIN912-12.9. Both plates must be sufficiently rigid so as to avoid flexion under clamping and injection pressure.
- When the valve pin is mated with the nozzle tip, the front geometry of the pin shall be fitted with a radius / bevel as originally specified / supplied by Synventive.
- All mating surfaces and surfaces that come into contact with plastics that are finished later (pre-chamber) shall be made with a roughness of Ra 0.8.
- All mounting threads in the manifold shall be used during installation and disassembly of the Hot Runner System from the injection mold.
- After disassembly of the Hot Runner System, the original sealing rings shall be replaced with new sealing rings as required by Synventive.
- The support pads and support elements of the hot runner body shall mate with the hardened surfaces with the minimum required hardness of 52 +2/-1 HRC. If hardened inserts are not applied, it is necessary to use a mold plate with the minimum hardness of 52 +2/-1 HRC to prevent spot deformation due to the effect of these support elements. For the hardened discs diameter we recommend 1.5 times the diameter of the thrust pads.
- Each nozzle shall be fitted with two screw connections. The screws shall be fixed in the manifold to retain tension caused by thermal expansion, i.e. preventing plate deflection.

4.1.2 Requirements on Temperature Control

- On your system it is necessary to clearly define the applicable connection points of hydraulic and coolant distribution systems to make sure that Synventive Customer Service could easily install the Hot Runner System.
- Most commonly available systems can be used for temperature control.

NOTICE

In case of any uncertainty, please contact Synventive Customer Service or Technical Support.

- The power interface between the injection mold and the temperature controller comprises of connection boxes on either the wire management channels of the system, or directly on the injection mold.

NOTICE

The connections supplied are in accordance with your specifications.

- Not more than three actuators can be connected in series in any single cooling circuit.

NOTICE

The connection of more than three actuators will result in insufficient cooling, which could lead to severe actuator damage.

- Temperature sensors are positioned to provide precise temperature control.

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NOTICE

Never relocate a temperature sensor without first contacting Synventive.

- Connection cables must never be in contact with the Hot Runner manifold.
- Synventive Hot Runner Systems shall always be operated with a single temperature control system. The use of multiple, separate control systems can cause poor temperature stability.

4.2 Table - Expansion Gap (Joint Z)

Manifold production series	Dimension (mm)	Steel	Z (mm) for ΔT (K) =				
			100	150	200	250	300
VB	37	1.2311	0.00	0.00	0.00	0.00	0.00
		1.2316	0.00	0.00	0.00	0.00	0.00
VC	37	1.2311	0.00	0.02	0.05	0.07	0.09
		1.2316	0.00	0.01	0.03	0.05	0.07
VD	43	1.2311	0.00	0.03	0.06	0.09	0.12
		1.2316	0.00	0.02	0.04	0.07	0.09
VE	50	1.2311	0.01	0.05	0.08	0.11	0.14
		1.2316	0.00	0.03	0.06	0.09	0.11
VF	65	1.2311	0.03	0.08	0.12	0.16	0.20
		1.2316	0.02	0.06	0.09	0.13	0.16
Recommended plastic			POM, PVC		PE, PP, PA, PBT, PS, ABS, PC	PEI	

NOTICE

Incorrectly adjusted support pads could result in high heat stress and plastic leakages in the injection mold (Hot Runner cutout).

Comply precisely with the dimensions specified in the customer drawing.