System Selection Guide

Your Complete Hot Runner Configuration Guide
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Standard Hot Runner Configuration

**KEY**
- Valve Gate Assembly
- Manifold Assembly
- Nozzle Assembly

**KEY**
- Back Plate
- Manifold Plate
- Cavity Plate*

*Supplied by Customer

Diagram showing the components of a standard hot runner system, including:
- Valve Pin Actuator
- Locating Ring
- Back Plate
- Manifold Plate
- Cavity Plate*
- Cooling Channels
A Hot Runner System maintains a molten flow of plastic from the moulding machine nozzle to the gate of a plastic injection mould.

Mastip Hot Runner System Benefits

- Efficient cycle times
- Improves part consistency and quality
- Minimised gate vestige
- Reduced injection pressure
- Valve gates allow for sequential filling and allow family part moulds
- Eliminates the cold runner that would be scrap or require re-grind
- Increased process control for fine tuning of mould and part

Hot Runner System Critical Areas of Performance

Manifold design considerations:

- Precise temperature control of the molten plastic
- Balanced flow to all cavities for even part filling
- Nozzle sizing for maintaining sufficient molten material flow
- Gate detail required to correctly fill the part and shut the gate
- No material traps or areas of flow hesitation to ensure quick colour change and prevent material degradation
- Minimum pressure drop across the Hot Runner System
- Reasonable melt residence time
- Maximum cooling of gate areas to ensure effective shut off to gates

Fully Hot Versus Semi Hot Configuration

Fully Hot advantages:

- No material wastage
- Low cycle times
- Low part stress

Semi Hot advantages:

- Reduces cold runner weight
- Reduces cost of mould
- Suitable for difficult gate locations
Selection Overview

The easiest way to select the correct hot runner system is to follow the nine steps below.

ONE
Fill in part and material details for later reference

<table>
<thead>
<tr>
<th>Part Specification</th>
<th>Value</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Part Description</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Part Weight</td>
<td></td>
<td>g</td>
</tr>
<tr>
<td>Cold runner weight (if applicable)</td>
<td></td>
<td>g</td>
</tr>
<tr>
<td>Overall size of part L x W x H</td>
<td></td>
<td>mm</td>
</tr>
<tr>
<td>Nominal Wall Thickness</td>
<td></td>
<td>mm</td>
</tr>
<tr>
<td>Minimum Wall Thickness</td>
<td></td>
<td>mm</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Gate Requirements</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cosmetic?</td>
<td>Y / N</td>
</tr>
<tr>
<td>Flat or recessed gate for label / printing?</td>
<td>Y / N</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mould Specifications</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Cavities?</td>
<td>Y / N</td>
</tr>
<tr>
<td>Hot Half Construction?</td>
<td>Y / N</td>
</tr>
</tbody>
</table>

TWO
Using the flow chart "Nozzle Range Selection" on page 10 select the required Nozzle Range.

Nozzle Range MX / BX / SX / TX / MJ

THREE
Using the flow chart "Nozzle Series Selection" on page 11 and the associated tables on page 12 select the appropriate nozzle series.

Nozzle Series 09 / 13 / 16 / 19 / 27

FOUR
Using the flow chart "Tip Grade Selection" on page 13 and the associated table select the appropriate tip grade.

Tip Grade G1 / G2 / G5

FIVE
Using the flow chart "Tip Style Selection" on page 14 and the associated table on page 15 select the appropriate tip style. For "Multi-Gate Selection" refer to page 28.

<table>
<thead>
<tr>
<th>Tip Style</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thermal Gate</td>
<td>TT / IT / OT</td>
</tr>
<tr>
<td>Tip Extension (if applicable)</td>
<td>+5 / +10</td>
</tr>
<tr>
<td>Multi-Gate</td>
<td></td>
</tr>
<tr>
<td>Tip Style</td>
<td>2A/3A/4A/1S/2S/3S/4S</td>
</tr>
<tr>
<td>Valve Gate</td>
<td></td>
</tr>
<tr>
<td>Tip Style</td>
<td>TV / 0V</td>
</tr>
</tbody>
</table>

SIX
Using the flow chart "Nut Grade Selection" on page 16 and the associated table select the appropriate nut grade.

Nut Grade H1 / H5

SEVEN
Using the flow chart "Nut Type Selection" on page 17 and the associated tables on page 18 select the appropriate nut style.

<table>
<thead>
<tr>
<th>Nut Style</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thermal Gate</td>
<td>ONT / BN / BE / SN / SX / SL / RN / RSN / YCN</td>
</tr>
<tr>
<td>Valve Gate</td>
<td></td>
</tr>
<tr>
<td>Nut Style</td>
<td>ONT / VBE / VSN</td>
</tr>
</tbody>
</table>

EIGHT
Using the flow chart "Gate Geometry Selection" on page 22 select the appropriate gate geometry.

<table>
<thead>
<tr>
<th>Gate Diameter (mm)</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>units mm</td>
<td></td>
</tr>
<tr>
<td>Gate Land (0.2mm max)</td>
<td>mm</td>
</tr>
</tbody>
</table>

NINE
Based on the number of cavities and/or the injection points required per part specify your manifold by attaching a drawing showing the required positions or using the L & R references as per the manifold section of the Technical Guide.

<table>
<thead>
<tr>
<th>Number of nozzles on manifold</th>
<th>Value</th>
</tr>
</thead>
</table>
## Nozzle Range and Series Options

<table>
<thead>
<tr>
<th>Nozzle Range</th>
<th>Nozzle Series</th>
<th>Valve Gate</th>
<th>Front Loading</th>
<th>Single Nozzle</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MJ</strong></td>
<td>09 13 16 19 27</td>
<td>✓</td>
<td>✓</td>
<td>x</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Front loading heater for Hot Half use</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Confined gate area</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Close cavity pitching</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>MX</strong></td>
<td>09 13 16 19 27</td>
<td>x</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Front loading heater for Hot Half use</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Close cavity pitching</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>BX</strong></td>
<td>09 13 16 19 27</td>
<td>x</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cost effective solution</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Special length nozzles available</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Robust heater design</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Limited single nozzle use</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>SX</strong></td>
<td>09 13 16 19 27</td>
<td>x</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dedicated single nozzle solution</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Two heaters for optimum control</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Key

- ✓ Available / Suitable
- Ø Application dependant
- x Not available / Not suitable
## System Selection Guide

### Nozzle Range and Series Options

<table>
<thead>
<tr>
<th>Nozzle Range</th>
<th>Nozzle Series</th>
<th>Valve Gate</th>
<th>Front Loading</th>
<th>Single Nozzle</th>
</tr>
</thead>
<tbody>
<tr>
<td>FlowLoc™</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Heat conducting sleeves with embedded heaters</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>Threaded base for leak-proof operation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BM</td>
<td></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>Multi-Gates manifold range</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Close cavity pitching</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Economical and robust coil heater</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SM</td>
<td></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>Multi-Gates single nozzle range</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Two heaters for maximum temperature control</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Wide moulding window</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Key**
- ✓ Available / Suitable
- ○ Application dependant
- × Not available / Not suitable

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Nozzle Range Selection

Nexus™ System

Yes

Select FlowLoc™ Range

No

Single Nozzle?

Yes

Easy fill application?

Yes

Easy fill applications¹
PP - L/t ≤ 125 MFI = ⇒ 15
PE - L/t ≤ 125 MFI = ⇒ 15
PS - L/t ≤ 75 MFI = ⇒ 15

No

Yes

Does confined gate area require MJ?

No

Front loading required?

Yes

Close cavity pitching?

No

Sensitive material?

Yes

Select MX

Select BX

No

Select SX

Notes
1. These examples are for typical applications only
2. Rigid PVC is not recommended for X Range

* Shot weight exceeds polymer in nozzle or is an engineering polymer

* To calculate average mass of polymer in nozzle:
   Nozzle flow bore diameter x nozzle length x density

Range

<table>
<thead>
<tr>
<th>Metric (mm)</th>
<th>MJ</th>
<th>MX</th>
<th>RX</th>
</tr>
</thead>
<tbody>
<tr>
<td>09</td>
<td>20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>24</td>
<td>31</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>26</td>
<td>34</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>36</td>
<td>36</td>
<td></td>
</tr>
<tr>
<td>27</td>
<td>45</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

All measurements in mm

Warning: Check nozzle is suitable for application

¹ Easy fill applications
² Sensitive materials
   POM
   EVA
   PVC Soft
Nozzle Series Selection

Select Nozzle Series

List part features

Determine maximum flow length (L/t)

Determine material characteristics

Estimate number and size of injection points

Perform fill and pressure analysis

Is pressure and fill time OK?

Yes

Use flow rate data to select nozzle

Is flow rate above 75% of nozzle capacity?

Yes

Thin wall part or filled material?

Yes

Select one series larger nozzle

No

Go to Tip Grade Selection

No

Increase number and/or size of injection points

Consider Valve Gate

Flow Rate = \( \frac{\text{Shot Weight}}{\text{Fill Time} \times \text{No Nozzles}} \)

Refer to tables on page 12 - Typical Flow Length Ratios + Nozzle Flow Rates to select appropriate nozzle series

The following may require larger flow channels:
1. Shear sensitive material
2. Thin wall construction
3. Long flow lengths
4. Filled materials

Large flow rate
Sequential filling
Smooth gate

Is Valve Gate required?

Yes

Select Actuator

No

Part weight
Overall size
Wall section
Special features

L/t ratio is the maximum length the material has to flow divided by the wall section

Refer to table on page 12 - Typical Flow Length Ratios

This is a good measure of how difficult it will be to fill the part

Material type, grade and typical L/t ratio

Use shot weight and typical L/t ratios for starting point

Flow analysis software and material grade is required to complete this stage

Part weight
Overall size
Wall section
Special features

The following may require larger flow channels:
1. Shear sensitive material
2. Thin wall construction
3. Long flow lengths
4. Filled materials

Large flow rate
Sequential filling
Smooth gate

Is Valve Gate required?

Yes

Select Actuator

No

Go to Tip Grade Selection

Part weight
Overall size
Wall section
Special features

L/t ratio is the maximum length the material has to flow divided by the wall section

Refer to table on page 12 - Typical Flow Length Ratios

This is a good measure of how difficult it will be to fill the part

Material type, grade and typical L/t ratio

Use shot weight and typical L/t ratios for starting point

Flow analysis software and material grade is required to complete this stage

Part weight
Overall size
Wall section
Special features

The following may require larger flow channels:
1. Shear sensitive material
2. Thin wall construction
3. Long flow lengths
4. Filled materials

Large flow rate
Sequential filling
Smooth gate

Is Valve Gate required?

Yes

Select Actuator

No

Go to Tip Grade Selection

Part weight
Overall size
Wall section
Special features

L/t ratio is the maximum length the material has to flow divided by the wall section

Refer to table on page 12 - Typical Flow Length Ratios

This is a good measure of how difficult it will be to fill the part

Material type, grade and typical L/t ratio

Use shot weight and typical L/t ratios for starting point

Flow analysis software and material grade is required to complete this stage

Part weight
Overall size
Wall section
Special features

The following may require larger flow channels:
1. Shear sensitive material
2. Thin wall construction
3. Long flow lengths
4. Filled materials

Large flow rate
Sequential filling
Smooth gate

Is Valve Gate required?

Yes

Select Actuator

No

Go to Tip Grade Selection

Part weight
Overall size
Wall section
Special features

L/t ratio is the maximum length the material has to flow divided by the wall section

Refer to table on page 12 - Typical Flow Length Ratios

This is a good measure of how difficult it will be to fill the part

Material type, grade and typical L/t ratio

Use shot weight and typical L/t ratios for starting point

Flow analysis software and material grade is required to complete this stage

Part weight
Overall size
Wall section
Special features

The following may require larger flow channels:
1. Shear sensitive material
2. Thin wall construction
3. Long flow lengths
4. Filled materials

Large flow rate
Sequential filling
Smooth gate

Is Valve Gate required?

Yes

Select Actuator

No

Go to Tip Grade Selection

Part weight
Overall size
Wall section
Special features

L/t ratio is the maximum length the material has to flow divided by the wall section

Refer to table on page 12 - Typical Flow Length Ratios

This is a good measure of how difficult it will be to fill the part

Material type, grade and typical L/t ratio

Use shot weight and typical L/t ratios for starting point

Flow analysis software and material grade is required to complete this stage

Part weight
Overall size
Wall section
Special features

The following may require larger flow channels:
1. Shear sensitive material
2. Thin wall construction
3. Long flow lengths
4. Filled materials

Large flow rate
Sequential filling
Smooth gate

Is Valve Gate required?

Yes

Select Actuator

No

Go to Tip Grade Selection

Part weight
Overall size
Wall section
Special features

L/t ratio is the maximum length the material has to flow divided by the wall section

Refer to table on page 12 - Typical Flow Length Ratios

This is a good measure of how difficult it will be to fill the part

Material type, grade and typical L/t ratio

Use shot weight and typical L/t ratios for starting point

Flow analysis software and material grade is required to complete this stage

Part weight
Overall size
Wall section
Special features

The following may require larger flow channels:
1. Shear sensitive material
2. Thin wall construction
3. Long flow lengths
4. Filled materials

Large flow rate
Sequential filling
Smooth gate

Is Valve Gate required?
Nozzle Flow Rates

Use the table below to select the correct nozzle series based on the flow rate required and the material category. If the material is a blend material (for example Medium-Difficult or Easy-Medium) always select the higher category to ensure the part can be filled.

### Material Specifications

<table>
<thead>
<tr>
<th>Nozzle Series</th>
<th>Material Specifications</th>
<th>Material Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>09</td>
<td>Thermal Gate Flow Rate</td>
<td>Easy</td>
</tr>
<tr>
<td></td>
<td>g/s</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>Shot Weight</td>
<td>0.5 - 15</td>
</tr>
<tr>
<td>13</td>
<td>Thermal Gate Flow Rate</td>
<td>g/s</td>
</tr>
<tr>
<td></td>
<td>Valve Gate Flow Rate</td>
<td>g/s</td>
</tr>
<tr>
<td></td>
<td>Shot Weight</td>
<td>0.5 -45</td>
</tr>
<tr>
<td>16</td>
<td>Thermal Gate Flow Rate</td>
<td>g/s</td>
</tr>
<tr>
<td></td>
<td>Valve Gate Flow Rate</td>
<td>g/s</td>
</tr>
<tr>
<td></td>
<td>Shot Weight</td>
<td>1 -200</td>
</tr>
<tr>
<td>19</td>
<td>Thermal Gate Flow Rate</td>
<td>g/s</td>
</tr>
<tr>
<td></td>
<td>Valve Gate Flow Rate</td>
<td>g/s</td>
</tr>
<tr>
<td></td>
<td>Shot Weight</td>
<td>2 -625</td>
</tr>
<tr>
<td>27</td>
<td>Thermal Gate Flow Rate</td>
<td>g/s</td>
</tr>
<tr>
<td></td>
<td>Valve Gate Flow Rate</td>
<td>g/s</td>
</tr>
<tr>
<td></td>
<td>Shot Weight</td>
<td>10 -2000</td>
</tr>
</tbody>
</table>

1. Additives, flow length and thin wall sections all reduce the effective flow rate and shot weight. To counter the reduced flow rate and shot weight select one nozzle series larger.
2. Refer to table on page 21 - Plastic Material and Tip and Nut Suitability.

For Multi-Gate Flow Rates refer to page 28.
Tip Grade Selection

Tips are manufactured in various grades designed for different applications and wear resistance.

<table>
<thead>
<tr>
<th>Tip Grade</th>
<th>Recommended use</th>
<th>Manufactured Material</th>
<th>Tip Style Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>G1</td>
<td>Default grade suitable for easy materials</td>
<td>Beryllium Copper with Nickel coating</td>
<td>TT, IT, OT, TV, OV</td>
</tr>
<tr>
<td>G2</td>
<td>Long life tip suitable for easy unfilled materials</td>
<td>Beryllium Copper tipped with Steel, Nickel coating</td>
<td>TT, IT</td>
</tr>
<tr>
<td>G5</td>
<td>Long life tip suitable for difficult and abrasive materials</td>
<td>Carbide</td>
<td>TT, IT</td>
</tr>
<tr>
<td></td>
<td></td>
<td>D2 Hard liner</td>
<td>OT, OV</td>
</tr>
</tbody>
</table>
Tip Style Selection

If gating onto a cold runner and it is suitable to follow the guidelines of "Plastic Material and Tip and Nut Suitability" on page 21, then OT is the preferred choice.

Gating direct onto part? No → Valve Gate? Yes → Use OT

Yes → Gating direct onto part? No → Valve Gate? Yes → Use OT

No → Cosmetic gate required? Yes → Is Valve Gate an option? Yes → Use TV

No → Cosmetic gate required? Yes → Is Valve Gate an option? Yes → Use TV

No → Is material sensitive to separation? Yes → Crystalline material? (i.e. narrow moulding window?) Yes → Use IT

No → Long fibre filled material? Yes → Use OT

No → Use OT

No → Use TT

Go to Nut Type Selection

Use TT
Tip Styles

Thermal Gate Tip Styles

<table>
<thead>
<tr>
<th>Style</th>
<th>Extended Torpedo Tip (TT+5)</th>
<th>Extended Torpedo Tip (TT+10)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multi Hole</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Torpedo Tip (TT)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single Hole</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Torpedo Tip (IT)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Open Tip (OT)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Valve Gate Tip Styles

<table>
<thead>
<tr>
<th>Style</th>
<th>Torpedo Tip (TV)</th>
<th>Open Tip (OV)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Axial Tip</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Side Tip</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Multi-Gate Axial Tip (A)

Multi-Gate Side Tip (S)
Nuts are manufactured in various grades designed for different applications and wear resistance.

<table>
<thead>
<tr>
<th>Nut Grade</th>
<th>Recommended use</th>
<th>Manufactured Material</th>
<th>Nut Style Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1</td>
<td>Default grade suitable for unfilled or lightly filled materials</td>
<td>Medium hardness Tool steel</td>
<td>ONT, BN, BE, SN, SL, SX, VBE, VSN</td>
</tr>
<tr>
<td>H5</td>
<td>Long life nut suitable for filled or unfilled materials</td>
<td>High hardness Vanadium tool steel</td>
<td>BN, SN, VBE</td>
</tr>
</tbody>
</table>
Nut Type Selection

If gating onto a cold runner a Sprue Nut is recommended.

- Gating direct onto part?
  - Yes: Select Bush Nut BN
  - No:
    - Yes: Select Sprue Nut SN, SX, SL
    - No: Select Open Nut (ONT)

- Is witness ring on part acceptable?
  - Yes: Select YCN Nut, Sprue Nut SN, SX or SL
  - No: Select Open Nut (ONT)

- Is gate cooling critical to cycle time?
  - Yes: Select Sprue Nut SN, SX, SL
  - No: Select Bush Nut BE

- Is a sprue required?
  - Yes: Select Sprue Nut SN, SX, SL
  - No: Select Bush Nut BE

- Is part shaped at gate area?
  - Yes: Select Sprue Nut SN, SX, SL
  - No: Select Bush Nut BE

- Crystaline material?
  - Yes: Select Bush Nut BE
  - No: Select Bush Nut BE

Go to Gate Geometry Selection
# Nut Options

<table>
<thead>
<tr>
<th>Thermal Gate Nut Types</th>
<th>Bush Nut Full Contact (BE)</th>
<th>Bush Nut (BN)</th>
<th>Dome Nut (BD)</th>
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<tbody>
<tr>
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<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Modify</td>
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<td>Δ</td>
<td>✓</td>
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</tbody>
</table>

For a Dome Nut supply R1 and K dimensions at time of order.

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<thead>
<tr>
<th></th>
<th></th>
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<table>
<thead>
<tr>
<th>Valve Bush Nut Full Contact (VBE)</th>
<th>Valve Sprue Nut (VSN)</th>
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</thead>
<tbody>
<tr>
<td>Witness</td>
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</tr>
<tr>
<td>Modify</td>
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<table>
<thead>
<tr>
<th>Valve Gate and Valve Gate Nut Types</th>
<th>Open Nut (ONT)</th>
<th>Retro Nut (ONT-R)</th>
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<tr>
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<th>Standard Nut Ød4</th>
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</table>
Nozzle Assembly Order Code for MJ and X-Range Series

Example of a Final Order Code

```
MX TT 13 075 +10 G2 H1
```

- **NOZZLE RANGE**
  - MX
  - BX
  - SX
  - TX

- **NOZZLE SERIES**
  - T
  - I
  - O
  - MJ
  - MX
  - SN
  - SL
  - SNR
  - V
  - VBE
  - VSN
  - RN
  - YCN**

- **NOZZLE TIP**
  - T (open)
  - BN
  - BE
  - SN
  - SX
  - SNR
  - V
  - VBE
  - VSN
  - RN
  - YCN**

- **NOZZLE NUT**
  - G1 H1*
  - G2 H1*
  - G5 H1*
  - G5 H5

- **NOZZLE LENGTH**
  - 09
  - 13
  - 16
  - 19

- **TIP EXTENSION (OPTIONAL)**
  - +5
  - +10

- **TIP GRADE**
  - G1 H1*
  - G2 H1*
  - G5 H1*
  - G5 H5

- **NUT GRADE**
  - G1 H1*
  - G2 H1*
  - G5 H1*
  - G5 H5

**INDICATE NUT GATE DIAMETER SEPARATELY**

* Larger gate diameters are available as standard
** Refer to page 26 for order code diagram for YCN Nut
### Tip and Nut Options

#### Key
- **✓** Available
- ******** Highest rating
- **×** Not Available

#### Tip and Nut Options

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<thead>
<tr>
<th></th>
<th>1 Not available in X13</th>
<th>2 Not available in X27</th>
<th>3 Not available in SX series</th>
<th>4 Not available in H5</th>
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</table>

#### Grades

- G1
- G2
- G5

#### Nut Style

- ONT
- BN
- BE
- SX
- SL
- SN

#### Features

- Gate Quality
- Flow Rate
- Flow Marks
- Easy
- Medium
- Difficult

<table>
<thead>
<tr>
<th>TIPS</th>
<th>Grades</th>
<th>Nut Style</th>
<th>Features</th>
<th>Plastic (Refer to page 21)</th>
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<tbody>
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System Selection Guide

Plastic Material and Tip and Nut Suitability

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<td>✓</td>
<td>✓</td>
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</tr>
</tbody>
</table>

Key: ✓ Suitable  ⊗ Application dependant  ⊗ Not suitable

Not available in G5  Only available in G2
Gate Geometry Selection

Gate Geometry

Minimal gate vestige required?

Yes

No

Use standard land (q) and gate diameter (G)

Finished

Use minimal land (q) and gate diameter (G)

For easy materials use G2 TT/IT tip

For Valve Gate the gate diameter and land does not affect gate quality

Thermal Gate Land Length (q)

<table>
<thead>
<tr>
<th>Gate land ('q') Size</th>
<th>Cosmetic Gate</th>
<th>Gate Life</th>
<th>Other Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;0.20mm</td>
<td>Not Recommended</td>
<td>Increased injection pressure, premature gate freeze off</td>
<td></td>
</tr>
<tr>
<td>0.20mm</td>
<td>*</td>
<td>****</td>
<td>Recommended for materials with high % filler</td>
</tr>
<tr>
<td>0.15mm</td>
<td>**</td>
<td>***</td>
<td>Recommended for materials with medium % filler</td>
</tr>
<tr>
<td>0.10mm</td>
<td>***</td>
<td>**</td>
<td>Good balance between gate cosmetics and life</td>
</tr>
<tr>
<td>0.05mm</td>
<td>****</td>
<td>*</td>
<td>Strong cavity steel required. Cooled inserts required near to gate</td>
</tr>
<tr>
<td>&lt;0.05mm</td>
<td>Not Recommended</td>
<td>Sharp edge breaks on first few shots, poor wear resistance</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Limited cooling at gate can result in stringing</td>
<td></td>
</tr>
</tbody>
</table>

Recommended Thermal Gate Diameter (ØG)

<table>
<thead>
<tr>
<th>Material</th>
<th>Tip Grade</th>
<th>Nozzle Series</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>09 13 16 19 27</td>
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<tr>
<td>Unfilled</td>
<td>G1/H1</td>
<td>0.8 - 1.3 0.9 - 1.4 1.1 - 1.6 1.8 - 2.5</td>
</tr>
<tr>
<td></td>
<td>G2/H1</td>
<td>0.7 – 0.8 0.7 – 1.3 0.8 – 1.4 1.0 – 1.6 1.6 – 2.5</td>
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<td>0.9 – 1.3 1.0 – 1.4 1.2 – 1.6 2.0 – 2.5</td>
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<tr>
<td>Filled</td>
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<td>1.0 – 1.4 1.2 – 1.5 1.5 – 1.8 2.4 – 2.8</td>
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<tr>
<td></td>
<td>G5/H5</td>
<td>1.4 – 1.6 1.5 – 1.7 1.7 – 2.0 2.6 – 2.8</td>
</tr>
</tbody>
</table>

It is always recommended to start with a small gate and adjust as required.
# Gating Options – MX/BX/SX/FlowLoc™ System Selection Guide

## Gating Options - MX/BX/SX/FlowLoc™

<table>
<thead>
<tr>
<th>Standard Sealing Diameter</th>
<th>Series</th>
<th>13</th>
<th>16</th>
<th>19</th>
<th>27</th>
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<tbody>
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<td></td>
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## ONT

<table>
<thead>
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<tbody>
<tr>
<td>ONT</td>
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<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>ONT +5</td>
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## SN +5

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## BN / BE

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Gating Options - YCN

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<tr>
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<tbody>
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**Axial Gate* | **Side Gate*

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**Standard Sealing Diameter**

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<tbody>
<tr>
<td>Ød4</td>
<td>10</td>
<td>12</td>
<td>15</td>
<td>23</td>
</tr>
</tbody>
</table>

* Pocket dimensions to be supplied by Mastip
YCN Nut

YCN Nut is designed for X-range nozzles, providing open flow moulding. An ideal moulding solution for indirect-feed via a cold runner. Ideal for Thermal Gate applications.

**YCN Nut**

**Features**
- Internal nut profiles to suit different materials and temperature requirements
- No high-conductivity tip insert required
- Tipless nut provides open flow moulding
- Minimises melt shear
- Lowers the overall pressure drop through the gate
- Provides a broad repeatable moulding window

**Applications**
- Moulding applications that suit open flow injection
- Cosmetic gate is not required on moulded part
- Ideal for indirect-feed via a cold runner
- Moulding applications where a moulded sprue is acceptable
- Thermal Gate applications

**Gating Options**

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<th>P4</th>
<th>N3</th>
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<tbody>
<tr>
<td>Easy material/ Low temperature</td>
<td>Gate is located 7mm forward of the heat source</td>
<td>E.g. PP, PE, ABS, ASA, SAN</td>
</tr>
<tr>
<td>Mid-Range</td>
<td>Gate is located 4mm forward of the heat source</td>
<td>E.g. PC, POM, PMMA</td>
</tr>
<tr>
<td>Difficult material/ High temperature</td>
<td>Gate is located 3mm behind the heat source</td>
<td>E.g. PA, PBT, PET, PPS PEI, PPO</td>
</tr>
</tbody>
</table>

**YCN Nut Extension**

YCN Nuts are stocked with a standard extension length

<table>
<thead>
<tr>
<th>X13</th>
<th>X16</th>
<th>X19</th>
<th>X27</th>
</tr>
</thead>
<tbody>
<tr>
<td>20mm</td>
<td>20mm</td>
<td>20mm</td>
<td>35mm</td>
</tr>
</tbody>
</table>

**Gate Diameter**

X-Range YCN Nuts are stocked with standard gate diameters according to the nozzle series, nut style and filled or unfilled material.

<table>
<thead>
<tr>
<th>Unfilled</th>
<th>X Range – YCN Nut Style</th>
</tr>
</thead>
<tbody>
<tr>
<td>Series</td>
<td>P7</td>
</tr>
<tr>
<td>13</td>
<td>Ø1.2</td>
</tr>
<tr>
<td>16</td>
<td>Ø1.4</td>
</tr>
<tr>
<td>19</td>
<td>Ø1.8</td>
</tr>
<tr>
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<td>Ø2.2</td>
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</table>

<table>
<thead>
<tr>
<th>Filled</th>
<th>X Range – YCN Nut Style</th>
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<tr>
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<td>Ø1.6</td>
</tr>
<tr>
<td>14</td>
<td>Ø1.8</td>
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<tr>
<td>19</td>
<td>Ø2.2</td>
</tr>
<tr>
<td>27</td>
<td>Ø2.7</td>
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</table>

Custom gate and taper available on request.

Standard sprue taper is 6°
YCN Nut Selection

Nozzle Order Code for X-Range YCN Nut Series

<table>
<thead>
<tr>
<th>NOZZLE RANGE</th>
<th>YCN NUT</th>
<th>NOZZLE SERIES</th>
<th>NOZZLE LENGTH</th>
<th>GATE PROFILE</th>
<th>POLYMER CLASSIFICATION</th>
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</thead>
<tbody>
<tr>
<td>BX</td>
<td>YCN</td>
<td>27</td>
<td>175</td>
<td>P4</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td>MX</td>
<td>13</td>
<td>045</td>
<td>P7</td>
<td>U (Unfilled)</td>
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<td>BX</td>
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<td>055</td>
<td>P4</td>
<td>F (Filled)</td>
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<td>SX</td>
<td>19</td>
<td>065</td>
<td></td>
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<td></td>
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<td>275</td>
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</tr>
</tbody>
</table>
Multi-Gates

Mastip’s Multi-Gate solutions are engineered specifically for challenging applications requiring close pitch gates in restricted areas where conventional gating methods aren’t possible.

**Multi-Gates**

**Features**
- Axial multi-gates allow close cavity pitching with a pitch circle diameter (PCD) from 10.00 to 22.00 with the ability to offer 2 to 4 gates per tip
- Side multi-gate allowing close cavity pitching with a gate well diameter from 22.30mm to 26.80mm with the ability to offer 1 to 4 gates per tip
- Highly conductive tip allowing for precise thermal control
- Tip flow channels designed to optimise and balance the thermal profile
- The M-Range nozzles are designed specifically for multi-gate solutions incorporating BX/SX proven technology

**Applications**
- Multiple part direct injection gating with one nozzle either in an Axial or Side gate tip style
- Side multi-gates allow internal side gating on single complex round parts that need a highly balanced fill
- Axial multi-gates allow for direct gating on single complex round parts that need a highly balanced fill
- Only polymers that are easy to process such as polyolefins with long residence times to be processed through the multi-gates

**Gate Styles**

**Axial Gate**

<table>
<thead>
<tr>
<th>2 Gates</th>
<th>3 Gates</th>
<th>4 Gates</th>
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</thead>
<tbody>
<tr>
<td>2A</td>
<td>3A</td>
<td>4A</td>
</tr>
</tbody>
</table>

**Side Gate**

<table>
<thead>
<tr>
<th>1 Gate</th>
<th>2 Gates</th>
<th>3 Gates</th>
<th>4 Gates</th>
</tr>
</thead>
<tbody>
<tr>
<td>1S</td>
<td>2S</td>
<td>3S</td>
<td>4S</td>
</tr>
</tbody>
</table>

**BM / SM Standard Gate Lengths**

<table>
<thead>
<tr>
<th>Gate</th>
<th>Nozzle</th>
<th>Series</th>
<th>L (Nozzle)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Axial</td>
<td>BM</td>
<td>27</td>
<td>75 95 115 145 175 225 275</td>
</tr>
<tr>
<td></td>
<td>SM</td>
<td>27</td>
<td>75 95 115 145 175 225 275</td>
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<tr>
<td>Side</td>
<td>BM</td>
<td>27</td>
<td>69 89 109 139 169 219 269</td>
</tr>
<tr>
<td></td>
<td>SM</td>
<td>27</td>
<td>69 89 109 139 169 219 269</td>
</tr>
</tbody>
</table>

**Multi-Gate Flow Rates**

<table>
<thead>
<tr>
<th>Nozzle Series</th>
<th>Material Specifications</th>
<th>Material (Polyolefin)</th>
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<tbody>
<tr>
<td>M27</td>
<td>Flow Rate g/s/gate 15</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Shot Weight g 0.5 - 15</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Gate Size – Axial mm 0.7 - 1.0</td>
<td>(max 70% part well thickness)</td>
</tr>
<tr>
<td></td>
<td>Gate Size – Side mm</td>
<td></td>
</tr>
</tbody>
</table>
Multi-Gates Selection

- Multi-Gate Selection
- Thermal Gate
- Polyolefin
- Axial Gate
- Side Gate
- 2-4 Gates per Axial tip*
- 1-4 Gates per Side tip*

* Number of gates required not included in flow chart, contact Mastip.
MX Nozzle Overview

MX nozzle, specifically designed for multi cavity manifold systems and hot halves.

MX FEATURES

Mould design
- Efficiently designed profile to allow closer cavity pitching
- Shares the same gate profiles as BX and SX
- Available in both thermal and valve gate options
- Consistent nozzle lengths across the range
- Ability to mould large parts with smaller nozzles due to optimum flow characteristics

Operation
- Wide moulding window
- Excellent temperature profile and thermal stability
- Operates at low moulding pressure and temperature
- Optimum cycle times due to superior thermal insulation
- Uses an advanced micro coil heater with integrated heat deflection tube

Installation and maintenance
- Front loading capability for easier servicing of tips, heaters and thermocouples
- Simple machining and installation requirements
- Improved reliability due to the use of advanced materials
- Common tip and nut options provide ready availability of spare parts
MX Nozzle Series

MX Standard Lengths

<table>
<thead>
<tr>
<th>Series</th>
<th>L (nozzle)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>45 55 65 75 95 115 130 145 175</td>
</tr>
<tr>
<td>13 Series</td>
<td>45 55 65 75 95 115 130 145 175</td>
</tr>
<tr>
<td>16 Series</td>
<td>45 55 65 75 95 115 130 145 175</td>
</tr>
<tr>
<td>19 Series</td>
<td>55 65 75 95 115 130 145 175</td>
</tr>
</tbody>
</table>

* Custom lengths available on request, BX recommended
BX Nozzle Overview

BX nozzle is designed to provide cost sensitive solutions for low to medium cavitation applications, not requiring hot half construction.

BX FEATURES

Mould Design
- Ability to easily order special length nozzles
- Shares the same gate profiles as MX and SX
- Available in both thermal and valve gate options
- Consistent nozzle lengths across the range
- Ability to mould large parts with smaller nozzles due to optimum flow characteristics

Operation
- Wide moulding window
- Excellent temperature profile and thermal stability
- Operates at low moulding pressure and temperature
- Optimum cycle times due to superior thermal insulation
- Uses an economical and robust coil heater

Installation and Maintenance
- Simple machining and installation requirements
- Improved reliability due to the use of advanced materials
- Common tip and nut options provide ready availability of spare parts

BX Standard Lengths

<table>
<thead>
<tr>
<th>Series</th>
<th>L (nozzle)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>13 Series</td>
<td>45 55 65 75 85 95 105 115 130 145 160 175 200 225</td>
</tr>
<tr>
<td>16 Series</td>
<td>45 55 65 75 85 95 105 115 130 145 160 175 200 225 250</td>
</tr>
<tr>
<td>19 Series</td>
<td>45 55 65 75 85 95 105 115 130 145 160 175 200 225 250 275 300</td>
</tr>
<tr>
<td>27 Series</td>
<td>75 85 95 105 115 130 145 160 175 200 225 250 275 300 350 400 450</td>
</tr>
</tbody>
</table>

* Custom lengths available on request
SX Nozzle Overview

With two heaters the SX nozzle is perfectly suited for all single nozzle applications.

SX FEATURES

Mould Design
- Ability to easily order special length nozzles
- Shares the same gate profiles as MX and BX
- Consistent nozzle lengths across the range
- Ability to mould large parts with smaller nozzles due to optimum flow characteristics

Operation
- Separate heater for the nozzle head for maximum temperature control
- Wide moulding window
- Excellent temperature profile and thermal stability
- Operates at low moulding pressure and temperature
- Optimum cycle times due to superior thermal insulation
- Uses economical and robust coil heaters

Installation and Maintenance
- Simple machining and installation requirements
- Improved reliability due to the use of advanced materials
- Common tip and nut options provide ready availability of spare parts

<table>
<thead>
<tr>
<th>SX Standard Lengths</th>
</tr>
</thead>
<tbody>
<tr>
<td>Series</td>
</tr>
<tr>
<td>13 Series</td>
</tr>
<tr>
<td>16 Series</td>
</tr>
<tr>
<td>19 Series</td>
</tr>
<tr>
<td>27 Series</td>
</tr>
</tbody>
</table>

* Open to suit machine nozzle size  ** Custom lengths available on request
FlowLoc™ Range Overview

FlowLoc™ Technology Range are designed to provide a secure, leak-proof solution for multi-cavity manifold systems.

FLOWLOC™ FEATURES

Design
- Available in 16, 19 and 27 Series nozzle in a variety of lengths with the ability to order special length nozzles
- Features a threaded base to attach securely to the manifold
- Available in thermal gate
- Suitable for low to high cavity applications
- Shares the same gate profiles as existing X-Range nozzles

Operation
- Incorporates advanced heating technology with embedded heaters for exceptional thermal performance
- Threaded nozzle screws directly into the manifold providing a secure, leak-proof solution
- Capable of processing a wide range of polymers including abrasive fillers
- Excellent thermal profile along the entire length of the nozzle ensures a wide moulding window
- Suitable for high pressure applications

Installation and Maintenance
- Simple installation via threaded base
- Utilises Mastip’s proven X-Range tips and nuts
- Individual components are readily available on express order from our service team

FlowLoc™ Standard Lengths

<table>
<thead>
<tr>
<th>Series</th>
<th>75</th>
<th>85</th>
<th>95</th>
<th>105</th>
<th>115</th>
<th>130</th>
<th>145</th>
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<th>250</th>
<th>275</th>
<th>300</th>
<th>350</th>
<th>400</th>
<th>450</th>
</tr>
</thead>
<tbody>
<tr>
<td>16 Series</td>
<td>75</td>
<td>85</td>
<td>95</td>
<td>105</td>
<td>115</td>
<td>130</td>
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<td>250</td>
<td>275</td>
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<td>350</td>
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<td>450</td>
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<tr>
<td>19 Series</td>
<td>75</td>
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<td>105</td>
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<td>275</td>
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<td>350</td>
<td>400</td>
<td>450</td>
</tr>
<tr>
<td>27 Series</td>
<td>75</td>
<td>85</td>
<td>95</td>
<td>105</td>
<td>115</td>
<td>130</td>
<td>145</td>
<td>160</td>
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<td>200</td>
<td>225</td>
<td>250</td>
<td>275</td>
<td>300</td>
<td>350</td>
<td>400</td>
<td>450</td>
</tr>
</tbody>
</table>

* Lengths can be customised to suit your requirements on request
MJ nozzle, specifically designed for close cavity pitching.

**MJ FEATURES**

**Mould design**
- Nozzle pocket profile for improved cooling performance and gate strength
- Optimal flow characteristics for ease of moulding
- Close cavity pitching

**Operation**
- Wide moulding window
- Excellent temperature profile and thermal stability
- Operates at low moulding pressure and temperature
- Short cycle times

**Installation and maintenance**
- Simple installation
- Front loading for ease of servicing
- Improved reliability
**MJ Nozzle Series**

**MJ Standard Lengths**

<table>
<thead>
<tr>
<th>L (nozzle)*</th>
<th>09 Series</th>
<th>75</th>
<th>95</th>
<th>115</th>
<th>130</th>
<th>145</th>
<th>175</th>
</tr>
</thead>
</table>

* Custom lengths available on request

**MJ Gating Options**

<table>
<thead>
<tr>
<th>ONT</th>
<th>ONT +5</th>
<th>ONT +10</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="ONT Diagram" /></td>
<td><img src="image2" alt="ONT +5 Diagram" /></td>
<td><img src="image3" alt="ONT +10 Diagram" /></td>
</tr>
</tbody>
</table>
VeriShot™ Single Valve Gate System

Mastip’s VeriShot™ is an extremely compact, adjustable single valve gate system. The VeriShot™ incorporates advanced heating technology for exceptional thermal performance in applications requiring high cosmetic finish, high flow rates and dimensional accuracy.

**VERISHOT™ FEATURES**

**Design**
- Available to suit TX16, TX19 & TX27 series threaded nozzles
- Compact annular design
- Reduced mould height
- Multiple gate profiles to suit a broad range of applications
- VeriShot™ functions as a locating ring for mould alignment
- Locating ring supplied in metric and imperial sizes

**Operation**
- Advanced heating technology
- Exceptional thermal performance
- Capable of processing a wide range of polymers
- Adjustable valve pin
- Incorporates superior FlowLoc™ Technology providing a secure, leak-proof solution

**Installation and Maintenance**
- Simple Installation
- Utilises proven X-Range tips and nuts

---

![Diagram of VeriShot™ Single Valve Gate System]

1. Locating Ring
2. Cap Screw M6 (metric option) or ¼ UNC (inch option)
3. Dowel Pin Ø6 x 20
4. Cap Screw M8 x 90
5. Striker Plate
6. Dowel Pin Ø5 x 28
7. Upper Manifold
8. Pin Locking Screw
9a. Valve Pin Adjustment Packers
9b. Dowel Pin Ø5 x 28
9c. Dowel Pin Ø3 x 12
9d. Dowel Pin Ø6 x 20
10. Valve Pin
11. Wear Strip Top
12. O-Ring ID 79 x 3
13. Piston
14. O-Ring ID 100 x 3
15. Wear Strip Bottom
16. O-Ring ID 79 x 3
17. Dowel Pin Ø6 x 20
18. O-Ring ID 115 x 3
19. O-Ring ID 5 x 1.5
20. Cylinder
21. Cap Screw M5 x 40
22. O-Ring ID 6 x 1.5
23. Button Cap Screw M4 x 8
24. VeriShot™ Heater
25. Dowel Pin Ø5 x 28
26. Valve Pin Seal
27. Lower Manifold
28. Dowel Pin Ø3 x 12
29. Thermocouple
30. FlowLoc™ Nozzle
VeriShot™ Single Valve Gate System

VeriShot™ Nozzle Compatibility

<table>
<thead>
<tr>
<th>Description</th>
<th>FlowLoc™ Nozzle</th>
<th>Tip</th>
<th>Supplied Pin Size</th>
<th>L (nozzle)</th>
</tr>
</thead>
<tbody>
<tr>
<td>VeriShot™ 16</td>
<td>TX16</td>
<td>OV / TV</td>
<td>Ø2.5 x 300</td>
<td>75 - 250</td>
</tr>
<tr>
<td>VeriShot™ 19</td>
<td>TX19</td>
<td></td>
<td>Ø3.0 x 400</td>
<td>75 - 300</td>
</tr>
<tr>
<td>VeriShot™ 27</td>
<td>TX27</td>
<td></td>
<td>Ø5.0 x 600</td>
<td>75 - 450</td>
</tr>
</tbody>
</table>

Note:
1. Lengths can be customised to suit your requirements on request.
2. Multiple diameter locator ring sizes now come as standard to suit your requirements.
MVG25 Headed Pin Valve Gate System

MVG25 Features

Mould Design
- Available to suit MX and BX Nozzles
- Standard minimal pitching is 55mm - can be modified to fit 43mm
- Backplates 50mm minimum
- Conical or Cylindrical shut off
- Easy machining of the pockets
- Pneumatic circuit integrated with the backplate

Moulding Benefits
- Reduced moulding pressure
- Increased moulding window
- Lower mould filling stress results in better part quality
- Reduced gate cooling requirements

Installation and Maintenance
- Easy machining and installation
- Easy seal replacement
- Valve pin height is adjustable
- Comes with Headed Pin design, with incremental adjustment
MVG25 Headed Pin Valve Gate System

<table>
<thead>
<tr>
<th>Description</th>
<th>Nozzle</th>
<th>Tip</th>
<th>Nozzle Length</th>
<th>Supplied Pin Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>MVG25-P1 Headed Pin</td>
<td>MX13</td>
<td>OV</td>
<td>45 - 175</td>
<td>Ø2.0</td>
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<td></td>
<td>MX16</td>
<td>OV / TV</td>
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<td>Ø2.5</td>
</tr>
<tr>
<td></td>
<td>BX16</td>
<td></td>
<td>45 - 250</td>
<td></td>
</tr>
</tbody>
</table>
**MVG40 FEATURES**

**Mould Design**
- Available to suit MX and BX Nozzles
- Standard minimal pitching is 75mm
  - can be modified to fit 58mm pitching
- Backplates 55mm minimum
- Conical or Cylindrical shut off
- Easy machining of the pockets
- Pneumatic circuit integrated with the backplate

**Moulding Benefits**
- Reduced moulding pressure
- Increased moulding window
- Lower mould filling stress results in better part quality
- Reduced gate cooling requirements

**Installation and Maintenance**
- Easy machining and installation
- Easy seal replacement
- Valve pin height is adjustable
- Comes with Headed Pin design, with incremental adjustment

---

**Diagram:**

1. Blanking Plate Screw
2a. Blanking Plate 2b.
3. Blanking Plate Seal
4. Pin Locking Screw
5a. Valve Pin Adjustment Packer
6. Valve Pin
6b. Valve Pin Adjustment Packers
7. Piston Main Seal
8. Piston
9. Piston Rod Seal
10. Circlip
11. Cylinder
12. Cylinder End Seal
13. Locating Spacer
14. Valve Pin Seal
## MVG40 Nozzle Compatibility

<table>
<thead>
<tr>
<th>Description</th>
<th>Nozzle</th>
<th>Tip</th>
<th>Nozzle Length</th>
<th>Supplied Pin Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>MVG40-P1 Headed Pin</td>
<td>MX13</td>
<td>OV</td>
<td>45 - 145</td>
<td>Ø2.0</td>
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<tr>
<td></td>
<td>BX13</td>
<td>OV</td>
<td>45 - 225</td>
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<td></td>
<td>MX16</td>
<td>OV / TV</td>
<td>45 - 145</td>
<td>Ø2.5</td>
</tr>
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<td></td>
<td>BX16</td>
<td>OV / TV</td>
<td>45 - 250</td>
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</tr>
<tr>
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<td>MX19</td>
<td>OV / TV</td>
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<td>BX19</td>
<td>OV / TV</td>
<td>45 - 300</td>
<td></td>
</tr>
<tr>
<td></td>
<td>BX27</td>
<td>OV / TV</td>
<td>75 - 450</td>
<td>Ø5.0</td>
</tr>
</tbody>
</table>
MVG40 Threaded Pin Valve Gate System

**MVG40 FEATURES**

**Mould Design**
- Available to suit MX and BX Nozzles
- Standard minimal pitching is 75mm - can be modified to fit 58mm pitching
- Backplates 55mm minimum
- Conical or Cylindrical shut off
- Easy machining of the pockets
- Pneumatic circuit integrated with the backplate

**Moulding Benefits**
- Reduced moulding pressure
- Increased moulding window
- Lower mould filling stress results in better part quality
- Reduced gate cooling requirements

**Installation and Maintenance**
- Easy machining and installation
- Easy pin adjustment and seal replacement while the mould remains assembled
- Comes with Threaded Pin design fully adjustable
MVG40 Threaded Pin Valve Gate System

MVG40 Threaded Pin Valve Gate System

MVG40 Nozzle Compatibility

<table>
<thead>
<tr>
<th>Description</th>
<th>Nozzle</th>
<th>Tip</th>
<th>Nozzle Length</th>
<th>Supplied Pin Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>MVG40-P2 Threaded Pin</td>
<td>MX13</td>
<td>OV</td>
<td>45 - 145</td>
<td>Ø2.0</td>
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<tr>
<td></td>
<td>BX13</td>
<td>OV</td>
<td>45 - 225</td>
<td></td>
</tr>
<tr>
<td></td>
<td>MX16</td>
<td>OV / TV</td>
<td>45 - 145</td>
<td>Ø2.5</td>
</tr>
<tr>
<td></td>
<td>BX16</td>
<td>OV / TV</td>
<td>45 - 250</td>
<td></td>
</tr>
<tr>
<td></td>
<td>MX19</td>
<td>OV / TV</td>
<td>45 - 175</td>
<td>Ø3.0</td>
</tr>
<tr>
<td></td>
<td>BX19</td>
<td>OV / TV</td>
<td>45 - 300</td>
<td></td>
</tr>
<tr>
<td></td>
<td>BX27</td>
<td>OV / TV</td>
<td>75 - 450</td>
<td>Ø5.0</td>
</tr>
</tbody>
</table>
MVG55 FEATURES

Mould Design
- Available to suit BX Nozzle in 27 Series
- Standard minimal pitching is 95mm – can be modified to fit 74mm
- Backplates 55mm minimum
- Easy machining of the pockets
- Pneumatic circuit integrated with the backplate

Moulding Benefits
- Reduced moulding pressure
- Increased moulding window
- Lower mould filling stress results in better part quality
- Reduced gate cooling requirements

Installation and Maintenance
- Easy machining and installation
- Easy seal replacement
- Valve pin height is adjustable
- Comes with Headed Pin, with incremental adjustment

Blanking Plate Screw
Blanking Plate
Blanking Plate Seal
Pin Locking Screw
Valve Pin Adjustment Packer
Valve Pin
Valve Pin Adjustment Packers
Valve Pin Adjustment Packers
Valve Pin Adjustment Packers
Piston Main Seal
Piston
Piston Rod Seal
Circlip
Cylinder
Cylinder End Seal
Locating Spacer
Valve Pin Seal
MVG55 Headed Pin Valve Gate System

MVG55 Nozzle Compatibility

<table>
<thead>
<tr>
<th>Description</th>
<th>Nozzle</th>
<th>Tip</th>
<th>Nozzle Length</th>
<th>Supplied Pin Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>MVG55-P1 Headed Pin</td>
<td>BX27</td>
<td>OV / TV</td>
<td>75 – 450</td>
<td>Ø5.0</td>
</tr>
</tbody>
</table>
MVCH Valve Gate System

MVCH FEATURES

Mould Design
- Available to suit MX 16, 19 and BX 16, 19 and 27 series
- Standard minimal pitching is 58mm
- Backplates 86mm minimum
- Easy machining of pockets
- Hydraulic actuation

Moulding Benefits
- Improved part quality
- Reduced moulding pressure
- Increased moulding window
- Lower mould filling stress results in better part quality
- Reduced gate cooling requirements

Installation and Maintenance
- Adjustable pin length
MVCH Valve Gate System

<table>
<thead>
<tr>
<th>Description</th>
<th>Stroke</th>
<th>Tip</th>
<th>Supplied Pin Size</th>
<th>Nozzle</th>
<th>L (nozzle)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MVCH2505-2.5</td>
<td>5</td>
<td>TV</td>
<td>Ø2.5</td>
<td>MX16</td>
<td>45 - 115</td>
</tr>
<tr>
<td>MVCH2510-2.5</td>
<td>10</td>
<td>OV</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MVCH2505-2.5</td>
<td>5</td>
<td>TV</td>
<td>Ø3.0</td>
<td>MX19</td>
<td>55 - 115</td>
</tr>
<tr>
<td>MVCH2510-2.5</td>
<td>10</td>
<td>OV</td>
<td></td>
<td>BX16</td>
<td>45 - 250</td>
</tr>
<tr>
<td>MVCH2505-3</td>
<td>5</td>
<td>TV</td>
<td>Ø5.0</td>
<td>BX27</td>
<td>75 - 450</td>
</tr>
<tr>
<td>MVCH2510-3</td>
<td>10</td>
<td>OV</td>
<td></td>
<td>BX19</td>
<td>45 - 300</td>
</tr>
</tbody>
</table>
Manifold Components

Exploded view of a Standard 2 Drop Hot Runner System
Selecting a Manifold Configuration

When deciding on a manifold layout it is important to consider the following:

- The number of injection points required per cavity
- The number of cavities in the mould
- Minimum distance between nozzles
- Balancing of the manifold
- Spacing of cavities to provide adequate room for cooling
- Gate and cavity
- Strength of the mould
- Sufficient steel between cavities
- Mould size versus machine platen size
- Total shot weight

For multi-cavity moulds balancing is critical to achieve consistent dimensions, cosmetic appearance and processing conditions across cavities. It is therefore strongly recommended that for multi-cavity moulds a manifold layout providing natural balancing is used.

Natural Balancing: In order to achieve natural balance, the material must flow through identical geometry from the machine nozzle to each of the gates. This means identical:

- Flow distance
- Runner diameters
- Number and angle of bends

This ensures that every gate receives material in exactly the same condition. With natural balance, the balance is inherent in the design, and is not based on a specific material or processing temperature.

Rheological balancing: Is a method of balancing by using different runner sizes to artificially provide identical pressure drop at each gate. To accurately predict this, the flow properties of the material must be known, along with the flow rate and anticipated processing temperature. Any variation from the processing conditions used during design will result in an unbalanced system.

Some drop configurations can not be naturally balanced unless the drops are on a PCD and must therefore be rheologically balanced. E.g. 3, 5, 7, 9, 10, 11, 13, 14, 15, 17-23 etc

All standard Mastip manifolds (except 3 Drop 3x1) are naturally balanced.

Refer to the Manifold Guidelines Section for standard drop configurations.
Nexus™ Systems

Mastip’s Nexus™ Pre-Assembled and Pre-Wired hot runner systems are designed for fast, simple installation out of the box without requiring any further technical assembly. Nexus™ Systems incorporates superior FlowLoc™ technology providing a secure, leak-proof solution. The FlowLoc™ range ensures an excellent thermal performance using the latest heating technology.

NEXUS™ SYSTEMS

- Fully customised to suit your application requirements
- Thermal and Valve Gate configurations
- Able to process commodity and engineering grade polymers
- Fast, simple installation out of the box
- Advanced heating technology with embedded heaters
- FlowLoc™ nozzles connect securely to manifold via threaded base
- Cylix™ Valve Cylinders mount directly to the manifold system
- Stainless steel nozzles
- Proven performance of X-Range nozzle technology
- Customised trunking for wiring
- Advanced heating technology for superior thermal performance
- Leak-proof solution via screwed in nozzles
- Accidental cold starting will not result in polymer leakage
- User-friendly maintenance
- Excellent thermal profile ensures a wide moulding window
- Unit removes easily from mould facilitating quick, easy service and maintenance
Hot Half System

All Mastip’s Hot Half solutions, from low to high cavity thermal or valve gate systems, are delivered as a complete solution to integrate seamlessly with your completed mould.

HOT HALF FEATURES

Applications
- Fully customised to suit your application requirements
- Able to process commodity and engineering grade polymers

Features
- Plates available in high quality P20 steel or 420 stainless steel
- Proven performance of X-Range nozzle technology
- Delivered fully assembled and fully wired

Benefits
- Advanced heating technology for superior thermal performance
- Easy servicing of nozzles, tips, thermocouples and heaters
- Heaters are front loading
- Excellent thermal profile ensures a wide moulding window
- 3-year leak proof guarantee
To select a Hot Runner System to match your part and material specifications consideration must be given to the following:

- Gate type
- Gate size
- Nozzle range and series
- Nozzle tip style
- Nozzle nut type

**Additional Considerations**

**Selecting Material**

There are three broad categories of materials each relating to its moulding characteristics:

- Easy
- Medium
- Difficult

When selecting material consider the following:

- Materials with large percentages of filler (for example, >15%) or very low MFI, the material classification moves up a grade (for example, easy to medium).

**Selecting a Gate Type**

The following factors must be considered when selecting a gate type:

- Shot size of part
- Material to be moulded
- Material
- Viscosity
- Additives
- Glass fibre
- Flame retardant
- Gate surface finish
- Thickness of part walls
- Longest flow length of part
- Required cycle time

When designing an injection mould, the type, size and location of the gate is one of the most important consideration for correct moulding of the part. Incorrect gate position can result in uneven filling, over packing, and dimensional instability.

Available gate types include:

- Direct gating
- Valve gating

Direct gating is the most common gate type as it offers simple construction and reliability.

→ Refer to the Nozzle Section for more information about Gate Types
Gate Size

The correct gate size ensures a good thermal gate is achieved and minimises the pressure drop across the gate while maintaining its structural integrity. Parts with very thin wall sections or very long flow lengths need a larger nozzle and gate to achieve proper filling, this may require increasing the nozzle by one to two series.

The gate sizes effects the:
- Flow rate
- Pressure drop through the system
- Cycle time
- Thermal gate shut off after filling
- Cosmetic impact of the gate on the part
- Cooling in the gate area

The gate size is dependent on the:
- Material
- Material viscosity
- Part wall thickness
- Gate cooling*

* Gate cooling is a complex variable and consideration must also be given to cycle time, gate profile, and land length.

Gate Size Variables
Working Example of a System Selection

To calculate the number and size of nozzles required to fill a part an initial estimate of the number of nozzles or injection points must be made. A good starting point is to limit the flow length / part thickness (L/t) ratio to the typical values for that type of material. → Refer table on page 12 - Typical Flow Length Ratios.

1. Part Details
   - Description: Fluorescent Light Base
   - Overall Size: 700 x 150 x 40 mm
   - Wall thickness (t): 1.5mm
   - Part Volume (V): 220ml

2. Material
   - Type: ABS
   - Grade: Cycolac T-XS 30001
   - Flame retardant: Yes
   - Specific Gravity (SG): 1.3
   - L/t for wall thickness: 96
   - Material Category: Medium - due to flame retardant move up one grade to difficult.

3. Hot Runner System Initial Estimates
   - Number of Nozzles (N): 4
   - L/t: 87.5 with 4 Nozzles

4. Hot Runner System Analysis Results
   - Injection Pressure: 93.65MPa
   - Injection Time (T): 1.36
   - Total Flow Rate (F): (V*SG)/T=(220*1.3)/1.36=210g/s
   - Flow Rate per Nozzle (F/N): 210/4=52.5g/s

Nozzle Series Selection
19 Series Nozzle is best suited due to the required flow rate of 52.5 g/sec. and the ABS material fitting the medium to difficult material category.
1. Meticom TC5100 / TC5200 Features

Features
- TC5100 accommodates 12 to 36 zones
- TC5200 has 26 to 72 zones and can accommodate up to 120 zones in a network
- The modularized design allows for easy maintenance and configuration

Benefits
- Soft Start function to protect heaters during startup
- Idle mode after power failure, to protect hot runner system and mold
- Self test on startup
- CE certified
- Easy to use touch screen interface
- Mould and module diagnostics
- Quick multi-zone setup
- Power usage display
- Synchronous heating and cooling
- Automatic heater and thermocouple detection and monitoring
Temperature Control System

Meticom TC5H Temperature Control System

**Meticom TC5H FEATURES**

- Blown Fuse
- Display function of current and output ratio
- Smart SOFT START function
- Auto/Manual Selection function
- PID Automatic Temperature Control
- Output percentage limit setting
- LCD display module
- One-key start (stop)/standby (boost) function
- Built-in alert alarm
- CE Certified
- Over-voltage protection
- Heater short-circuit protection
- Automatic detection of wire breakage of heater
- TRIAC short-circuit protection
- Detection for reverse troubleshooting sensor wiring temperatures

<table>
<thead>
<tr>
<th>TC5H</th>
<th>2 Zones</th>
<th>4 Zones</th>
<th>6 Zones</th>
<th>8 Zones</th>
<th>12 Zones</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>T5B02</td>
<td>T5B04</td>
<td>T5B06</td>
<td>T5B08</td>
<td>T5B12</td>
</tr>
<tr>
<td>Power Switch Capacity (A)</td>
<td>32</td>
<td>32</td>
<td>63</td>
<td>63</td>
<td>63</td>
</tr>
<tr>
<td>Output Connector</td>
<td>16 pins x 1</td>
<td>16 pins x 1</td>
<td>16 pins x 2</td>
<td>16 pins x 2</td>
<td>24 pins x 2</td>
</tr>
<tr>
<td>Power Cable</td>
<td>5.5mm² x 5C x 3M</td>
<td>5.5mm² x 5C x 3M</td>
<td>8mm² x 5C x 3M</td>
<td>8mm² x 5C x 3M</td>
<td>8mm² x 5C x 3M</td>
</tr>
<tr>
<td>Easy Input Switching</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Dimension W x H x D (mm)</td>
<td>179 x 204 x 329</td>
<td>281 x 204 x 329</td>
<td>383 x 204 x 329</td>
<td>485 x 204 x 329</td>
<td>587 x 204 x 329</td>
</tr>
</tbody>
</table>
Sequential Control System

G-Series GTV8 Integrated Sequential Controller

GTV8 FEATURES

- Regulation of the injection quantity from each individual gate
- Quality of the moulded part can be improved by removing or repositioning of weld lines
- Injection is performed with minimum clamping force due to the gates not all opening simultaneously
- Optimum control over part fill
- Pneumatic only
- Standard GTV8 cabinet configurations are 8 zones compact design

Technical Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mains input power</td>
<td>Single phase AC 220V (50/60 Hz)</td>
</tr>
<tr>
<td>Injection signal input power</td>
<td>24VDC, 220VAC</td>
</tr>
<tr>
<td>Solenoid output power supply</td>
<td>Signal voltage, 100mA/Zone</td>
</tr>
<tr>
<td>Operating temperature range</td>
<td>-10 °C to 50 °C</td>
</tr>
<tr>
<td>Operating modes</td>
<td>Two modes (Continuous Sequence and Intermittent Sequence)</td>
</tr>
<tr>
<td>Timer Increment</td>
<td>0.1 seconds</td>
</tr>
<tr>
<td>Timer Range</td>
<td>0 - 999 seconds</td>
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<tr>
<td>Automatic input voltage</td>
<td>Yes</td>
</tr>
<tr>
<td>Manual override</td>
<td>Yes</td>
</tr>
</tbody>
</table>