Modular Hot Runner Installation Procedure

smart hot runner solutions

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pg | Contents

Pre-Installation

Preparation

The following information is a step by step guide showing how to successfully:

- Install a Modular Mastip Hot Runner system

→ Refer to Appendix A for a list of tools you will require for correct assembly.

Prepare a clean and clear work space.

Ensure the Manifolds, Hot Half Plates, Nozzle, Locator, and component parts are clean.

1.0 Prepare Manifold Housing Plate

1.1

Measure critical dimensions

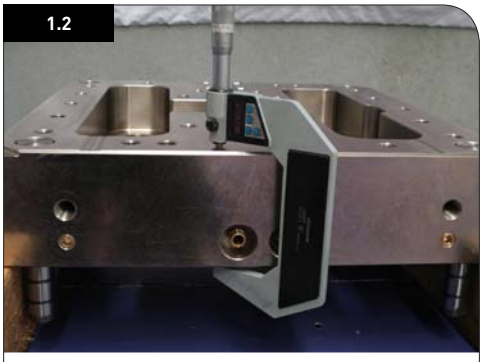
Pocket depth (B) - Measure to the nozzle seat with a depth micrometer to confirm the pocket depth. If correct, the measurement will equal the dimension given on approval drawing.
(Nozzle head height + sub manifold thickness + spacer assembly height + expansion – 0.05mm interference.) The correct value is shown on drawing appendix B.

→ Record measurements in Appendix B, Table A

Measure to the locator spot face (E) on each Sub Manifold with a depth micrometer to confirm the pocket depth. If correct, the measurement will equal the dimension given on the approval drawing.
(Locator height + manifold thickness + spacer assembly thickness + expansion – 0.05mm interference)

→ Record measurements in Appendix B

1.2

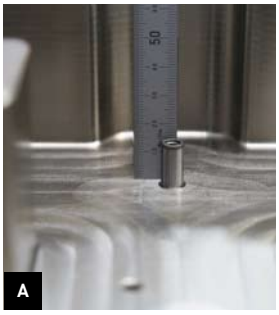


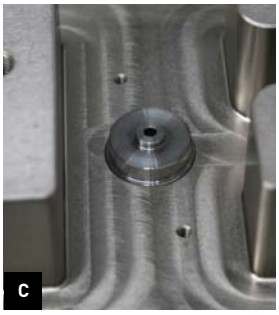
Measure plate thickness

Measure the overall thickness of the manifold housing plate with a micrometer.

→ Record measurements in Appendix B

1.3





Insert locators, nozzle dowel pins, manifold dowel pins and guide pins

A. Fit the guide pins to manifold housing plate.
B. Measure the height of the nozzle dowel pin with a steel ruler. Ensure the nozzle dowel pin protrudes into the pocket by less than the depth of the dowel slot in the nozzle head.
C. Measure the height of the manifold dowel pin with a steel ruler to make sure it protrudes into the pocket by less than the depth of the dowel slot in the manifold + clearance under the manifold. Orientate the manifold dowel pin, ensuring the flat edges of the dowel align with the width of the dowel slot in the manifold.
C. Fit the centre locators in the bottom of the manifold pocket and ensure it they are sitting flat in the bottom of the spot face. Measure to confirm.

1.4

Insert nozzle bodies

A. Insert the nozzle bodies. Be aware of the correct dowel pin orientation. Ensure the nozzle assemblies are complete (heater and thermocouples for MJ/MX to be fitted later) and the nuts are torqued.

→ Refer to MJ / MX / BX Nozzle Installation Guide

B. Check L_{HH} cold tip height on one nozzle to ensure you can proceed with assembly.

2.0 Prepare Sub Manifolds

2.1


Type A


Type B

Fit thermocouples to manifold

Fit Thermocouples (TC) to sub manifolds. Make sure there is a small air gap between the TC washer and the manifold surface when fully mounted. This will ensure the TC probe is contacting the bottom of the hole in the manifold. **Do not over tighten.**

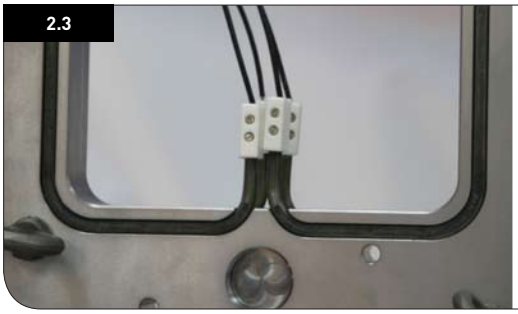
2.2

Fit nozzle side spacer assemblies if applicable

Fit the spacer assembly to the nozzle side of the manifold.
Screw the titanium spacer on top of the steel spacer.

If your system has nozzle side spacer assemblies then you must measure the counter bore depth using the same method as nozzle seats in Step 1.1

2.3

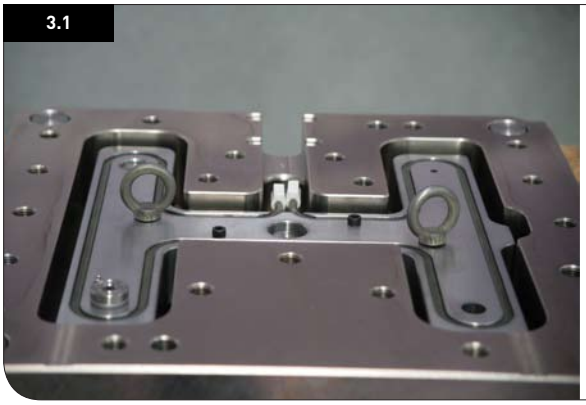


Fit ceramic terminals to manifold heater

Strip and terminate wire ends and fit them into the smaller hole of the ceramics. Then fit the ceramics to the manifold heater. Point the screws of the ceramics towards the top of the manifold.

3.0 Insert sub manifolds into manifold pocket

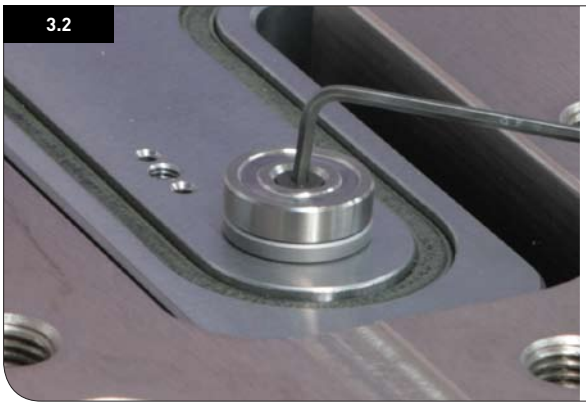
3.1



Lower the manifold into the pocket

Using the lifting holes, carefully lower the manifolds into the pocket of the manifold housing plate. Align the manifolds on the centre locators and dowels.
Feed the bottom manifold thermocouple wires through the holes in the manifold housing plate. Feed the manifold heater wires through the wire groove. Secure the manifold using the manifold hold down screws.
Finger tighten the manifold hold down screws as they are for installation only.

3.2



Spacer assemblies

Fit top spacer assemblies. Screw the spacer assembly to the sprue bush side of the manifold. Screw the titanium spacer on top of the steel spacer.

3.3

Measure cold clearance

Check the cold clearance between manifold plate and the titanium spacer is equal to the dimension given on the drawing.

→ Record measurements in Appendix B, under cold clearance for manifold housing plate.

Note: With large manifolds it might be necessary to clamp the manifold down to ensure the cold clearance measurements are correct.

4.0 Prepare Back Plate

4.1

Measure critical dimensions

Pocket depth (F2) - Measure to the bottom of the feeder manifold pocket with a depth micrometer to confirm the pocket depth. If correct the measurement will equal the dimension given on approval drawing.
(Feeder manifold thickness - sub manifold spacer - manifold housing plate cold clearance
+ feeder space assembly height + expansion - 0.05mm interference)

→ Record measurements in Appendix B

Note: If each face is spot faced then measure to the face.

4.2

Insert feeder manifold dowel pins

1) Insert the feeder manifold location dowels into the sub manifolds.
2) Measure the height of the manifold dowel pin with a steel ruler to ensure the dowel pin protrudes out of the sub manifold by less than the depth of the dowel slot in the feeder manifold + clearance. Orientate the manifold dowel pin, ensuring the flat edges of the dowel align with the width of the dowel slot in manifold.

4.3

Fit ceramic terminals to manifold heater

Strip and terminate the wire ends and fit them into the smaller hole of the ceramics.
Then fit the ceramics to the manifold heater. Point the screws of the ceramics towards the top of the manifold.

5.0 Fit Feeder Manifold to Sub Manifolds

5.1

Lower feeder manifold onto sub manifolds

Lower the feeder manifold onto the sub manifolds using the lifting holes. Align the manifold on the dowels.

5.2

Fit top spacer assemblies

Screw the spacer assembly to the sprue side of the feeder manifold. Screw the titanium spacer on top of the steel spacer.

5.3

Install sprue bush

Use anti seize and screw the sprue the sprue bush into the manifold and tighten. Slide the sprue bush heater over the sprue bush and point the heater towards the manifold heater exit. Tighten sprue bush heater.

5.4


Type A


Type B

Fit thermocouples to feeder manifold

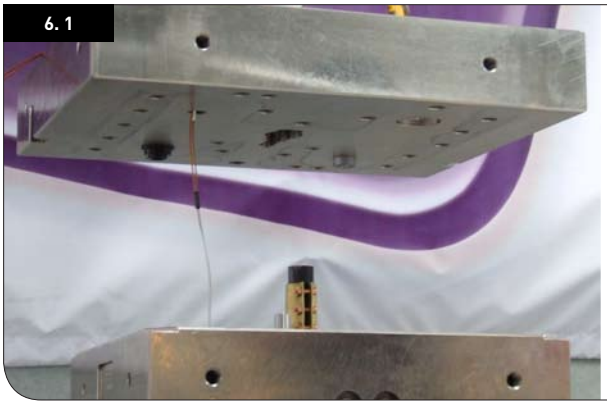
Fit thermocouple (TC) to sub manifolds. Make sure there is a small air gap between the TC washer and the manifold surface when fully mounted. This will ensure the TC probe is contacting the bottom of the hole in the manifold. **Do not over tighten.**
Ensure wires stay clear of spacers and wiring is tidy and free from any areas that will pinch or damage the cables.

5.5

Insert hot half dowel pins
Insert all hot half dowel pins into the manifold housing plate.

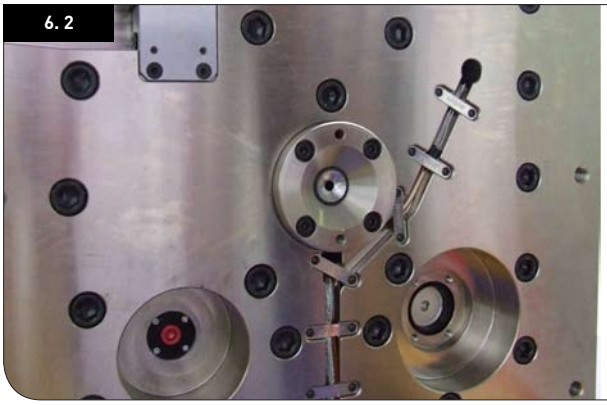
6.0 Mount back plate to manifold plate

6. 1



Lower back plate onto the manifold housing plate
Lower the back plate onto the manifold housing plate over the feeder manifold. Feed the feeder manifold thermocouple wires through the holes in the back plate. Feed the sprue bush heater cable through the locating ring hole. Lower the back plate slowly and line up the hot half dowel pin.

6. 2



Fit the back plate caps screws
Fit the back plate cap screws and torque screws evenly from the centre out. Guide the manifold thermocouple and sprue bush wires along the wire grooves to the electrical boxes. Fit the wire clips to the wire grooves and ensure the wiring is tidy and free from any areas that may pinch or damage the cables. Fit the locating ring.

6. 3

Mould Plates
Fit the name plates and caution plates using the hammer drive rivets.

6. 4

Water Plugs
Ensure all water plugs are fitted and sealing.

7.0 Nozzle Installation

7.3

Complete nozzle assemblies

→ Refer to MJ / MX / BX Nozzle Installation Technical Guides to complete the nozzle assembles.

8.0 Wiring

8.1

Fit wire clamps

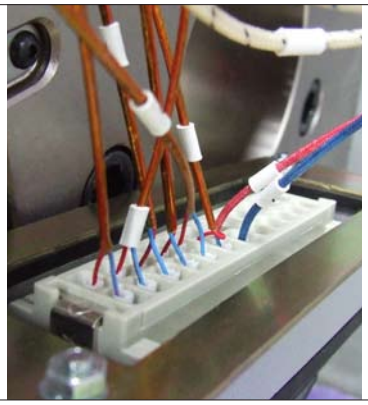
Guide all the nozzle heater and thermocouple wires to the electrical box via the wire grooves and screw the wire clamps onto the plates to retain the wires.

8.2

Electrical connectors

Fit the connector plate and boxes to the hot half plates and ensure that the latches are free to function and panels are accessible.

8.3

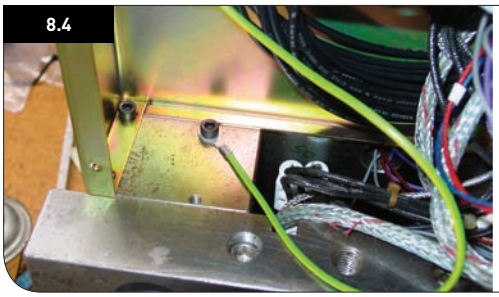


Wiring

Ensure all cables are numbered correctly and wire all zones according to the wiring diagram.

Thermocouple wires:
Red (USA: white) = +ve (low numbers in connector)
Blue (USA: red) = -ve (high numbers in connector)

8.4

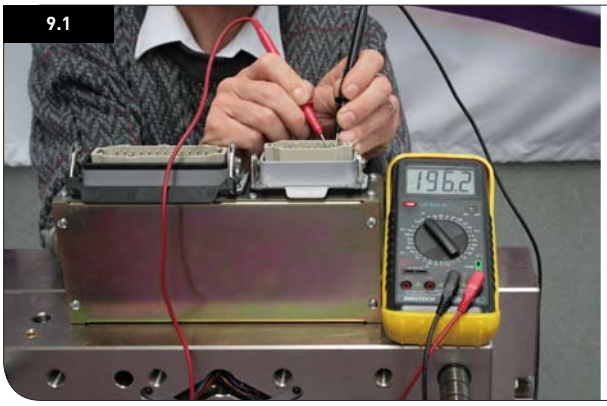


Earth Wire Connection

Ensure your power connector is properly earthed to the plates as illustrated in the photo.

9.0 Electrical test procedures and LHH

9.1



Measure Resistance (Ω) of heaters

Measure the resistance of each heater. Using a Multi Meter measure across the two pins belonging to the same zone. This is to check and confirm correct wiring and continuity between heaters.

→ Record measurements in Appendix B, Table B.

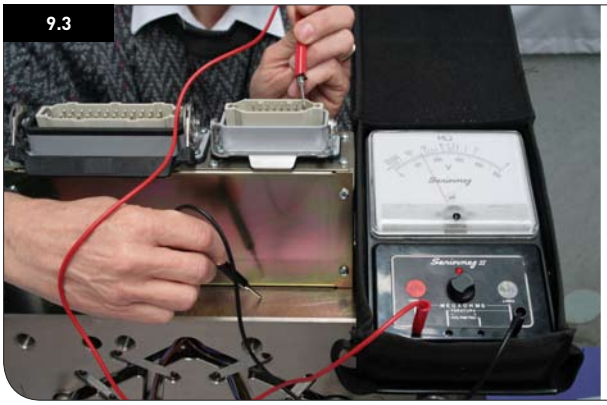
9.2

Measure Resistance (Ω) of thermocouples

Measure the resistance of each thermocouple. Using a Multi Meter measure across the two pins belonging to the same zone. This is to check and confirm correct wiring and continuity between thermocouples.
Reading must be 1-15 Ω.

→ Record measurements in Appendix B, Table B.

9.3



Measure heater insulation (MΩ)

Measure between the heater pins and the body of the hot half. Using an Insulation Meter @ 600V AC,
Mastip recommends a minimum reading of 2MΩ. This is to check and confirm no wires have been pinched and the heaters are free of moisture after shipping.

→ Record measurements in appendix B, Table B.

9.4

Connect controller unit & confirm wiring order is correct.

Connect temperature control unit to Hot Half. Switch the temperature control unit main power on.
Turn on one nozzle at a time and check the corresponding nozzle heats up. Do not heat above 50°C as this will affect the temperature reading of other zones.
Turn on manifold zone one and wait for thermocouple reading to settle. Now turn on manifold heater two. If the reading of the first thermocouple starts to rise your thermocouples are wired incorrectly. Repeat for each manifold zone.

9.5

Measure LHH

Measure cold LHH values.

→ Record measurements in Appendix B, Table A.

Repeat this procedure when the manifold and nozzles are in the hot condition.

→ Record measurements in Appendix B, Table A.

9.6

Check nozzles become rigid

Switch on manifold zones and heat to operating temperature. Check the nozzles become rigid at 40°C less than operating temperature. This will confirm manifold pocket sealing forces are correct. Check and confirm the manifold zones stabilise at set point.

→ Tick box in Appendix B, Table B as each nozzle is confirmed rigid.

9.7

Controller Temperature

Switch on all zones. Check and confirm operating temperature is reached and stabilises ±2°C.

→ Record readings in Appendix B, Table B.

Tools Required

Screwdrivers

Deep Hex Sockets

Insulating Tapes

Digital Multimeter

Side Cutters

Plastic Hammer

Heat-Shrinking Tubing

Temperature Measurement Probe

Long Nose Plier

Depth Micrometer

Cable Marker

Insulation Tester (m Ω @ 500V)

Cable Stripper

Digital Vernier

Hex Key

Outside Micrometers

Crimping Plier

Microball Set

Safety Glasses

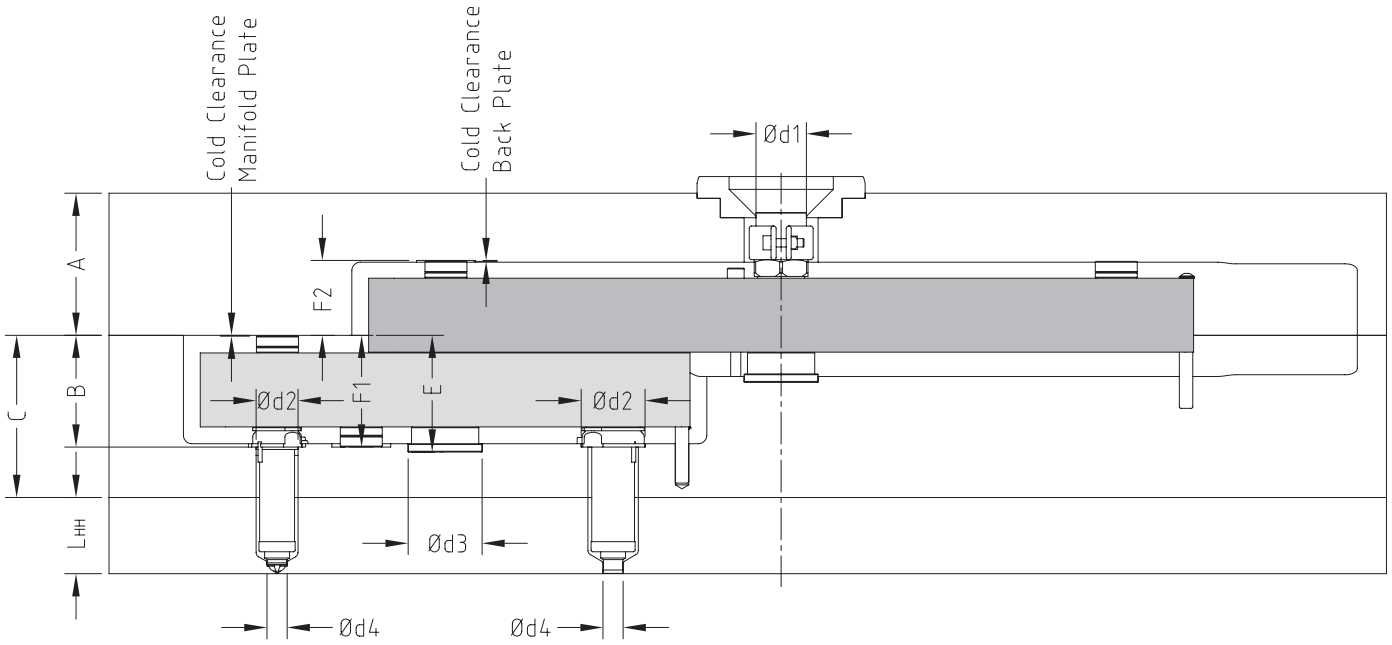
Nut Sealing Diameter Gauges *

* Custom made by Mastip

Torch

Ferrules

Quality Assurance Check sheets



Project Information	
Distributor	
Customer	
Customer Reference	
Mastip Reference	
Date	

Key	Description	Dimensions (mm)
A	Backplate Thickness	
C	Manifold Plate Thickness	
d1	Sprue Bush Clearance	
d2	Nozzle Location Ø	
d3	Locator Location Ø	
d4	Nut Location Ø	
E	Locator Spot Face Depth	
	MP Cold Clearance	
	BP Cold Clearance	

Additional Information	Value
Nozzle Cavity Material	
Nozzle Cavity Temp.	
Planned Mould Temp.	
Planned Manifold Temp.	

Key	Description	Dimensions (mm)
F1	Spacer Nozzle Side	
F1	Spacer Nozzle Side	
F1	Spacer Nozzle Side	
F1	Spacer Nozzle Side	
F2	Spacer Sprue Bush Side	
F2	Spacer Sprue Bush Side	
F2	Spacer Sprue Bush Side	
F2	Spacer Sprue Bush Side	

Quality Assurance Check sheets

Table A				
	B	LHH		d2
	Nozzle Spot Face Depth	Cold	Hot	Nozzle Location Ø
Nozzle 1				
Nozzle 2				
Nozzle 3				
Nozzle 4				
Nozzle 5				
Nozzle 6				
Nozzle 7				
Nozzle 8				
Nozzle 9				
Nozzle 10				
Nozzle 11				
Nozzle 12				
Nozzle 13				
Nozzle 14				
Nozzle 15				
Nozzle 16				
Nozzle 17				
Nozzle 18				
Nozzle 19				
Nozzle 20				
Nozzle 21				
Nozzle 22				
Nozzle 23				
Nozzle 24				
Nozzle 25				
Nozzle 26				
Nozzle 27				
Nozzle 28				
Nozzle 29				
Nozzle 30				
Nozzle 31				
Nozzle 32				

Quality Assurance Check sheets

Table B						
Zone	**Heater Resistance Ω**	**Thermocouple Resistance Ω**	**Heater Insulation MΩ**	**Wiring order**	**Nozzles locked with manifold @ op. temp - 40°C**	**Controller Temperature**
1						
2						
3						
4						
5						
6						
7						
8						
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10						
11						
12						
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31						
32						

Electrical Charts

Heater Wattage & Length		
Manifold Heater Length	Watt	Resistance Ω
300mm	450	118
325mm	500	106
350mm	550	97
375mm	600	89
400mm	650	82
425mm	700	76
450mm	750	71
475mm	750	71
500mm	800	67
525mm	850	63
550mm	900	59
575mm	950	56
600mm	1000	53
625mm	1050	51
650mm	1100	49
675mm	1150	46
700mm	1200	45
725mm	1250	43
750mm	1300	41
775mm	1300	41
800mm	1350	40
825mm	1400	38
850mm	1450	37
875mm	1500	36
900mm	1550	35
925mm	1600	34

Heater Wattage & Length		
Manifold Heater Length	Watt	Resistance Ω
950mm	1650	33
975mm	1700	32
1000mm	1750	31
1025mm	1800	30
1050mm	1850	29
1075mm	1900	28
1100mm	1950	28
1125mm	2000	27
1150mm	2050	26
1175mm	2050	26
1200mm	2100	26
1225mm	2150	25
1250mm	2200	25
1275mm	2250	24
1300mm	2300	23
1325mm	2350	23
1350mm	2400	23
1375mm	2450	22
1400mm	2500	22
1425mm	2550	21
1450mm	2600	21
1475mm	2650	20
1500mm	2700	20
1525mm	2750	20
1550mm	2800	19

Sprue Bush Heater		
Code	Watt	Resistance Ω
MANBHTC 30/20	100	534
MANBHTC 30/30	160	330
MANBHTC 30/40	200	267
MANBHTC 30/60	320	165

BX/SX Front Heater		
Code	Watt	Resistance Ω
X13045H	220	240
X13055H	230	230
X13065H	240	220
X13075H	250	212
X13095H	275	192
X13115H	300	176
X13145H	330	160
X13175H	365	145
X16045H	290	182
X16055H	310	171
X16065H	335	158
X16075H	360	147
X16095H	385	137
X16115H	410	129
X16145H	440	120
X16175H	475	111
X19055H	400	132
X19065H	435	122
X19075H	470	113
X19095H	505	105
X19115H	540	98
X19145H	575	92
X19175H	610	87
X27075H	570	93
X27095H	680	78
X27115H	780	68
X27145H	815	65
X27175H	850	62
X27225H	905	58
X27275H	960	55

SX Sprue Heater		
Code	Watt	Resistance Ω
SX24HRC	250	227
SX30HRC	290	230

MX Front Heater		
Code	Watt	Resistance Ω
MX13045HFS	225	235
MX13055HFS	250	212
MX13065HFS	250	212
MX13075HFS	290	182
MX13095HFS	330	160
MX13115HFS	400	132
MX13130HFS	470	113
MX13145HFS	470	113
MX13175HFS	550	96
MX16045HFS	290	182
MX16055HFS	330	160
MX16065HFS	330	160
MX16075HFS	400	132
MX16095HFS	470	113
MX16115HFS	550	96
MX16130HFS	550	96
MX16145HFS	620	85
MX16175HFS	700	76
MX19055HFS	400	132
MX19065HFS	470	113
MX19075HFS	470	113
MX19095HFS	550	96
MX19115HFS	620	85
MX19130HFS	620	85
MX19145HFS	700	76
MX19175HFS	850	62
Supplied for 230 V		

MJ Front Heater		
Code	Watt	Resistance Ω
55-109-075	200	264
55-109-095	230	230
55-109-115	265	230
55-109-130	295	230
55-109-145	320	228
55-109-175	370	231

Notes

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