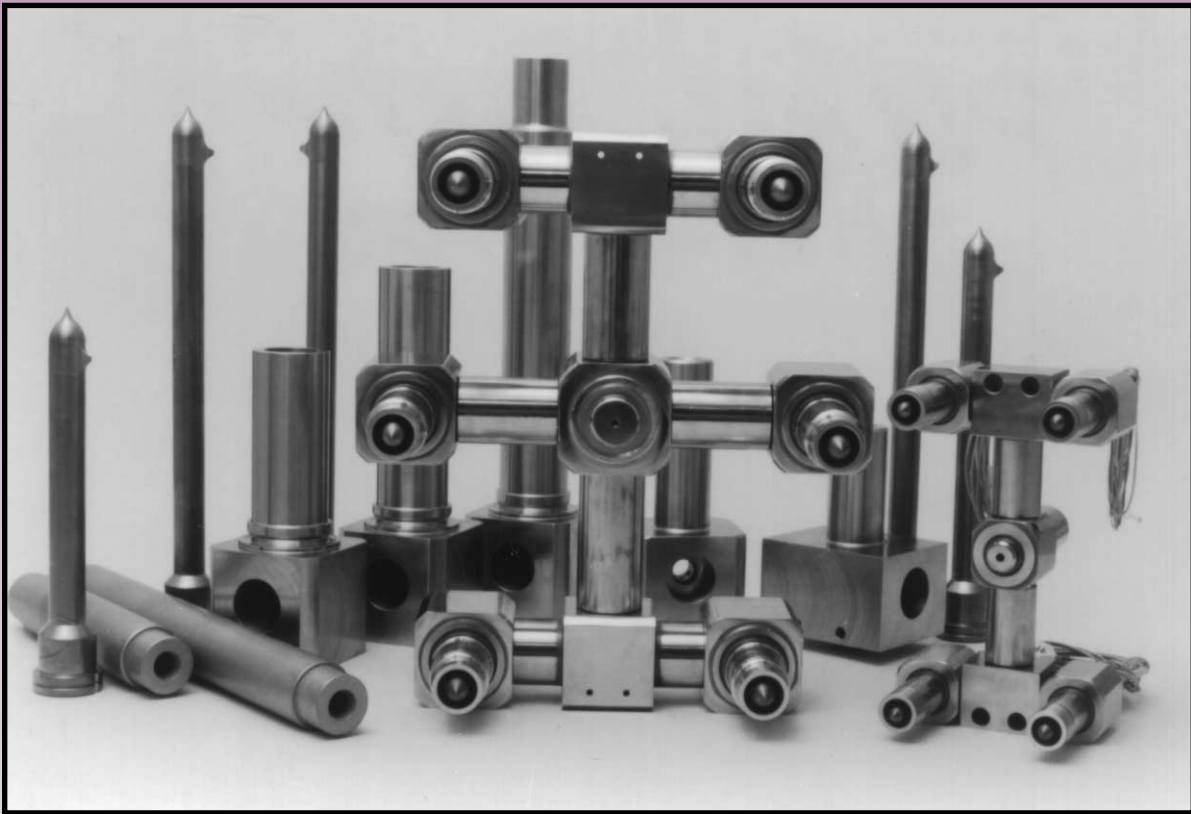


# Hot Runner System

## Runnerless Design



**Proheat**

sales@proheat.net  
techhelp@proheat.net

117 East Adam St.  
P.O. Box 48  
La Grange, KY 40031

Free: 800.626.2142  
Tel: 502.222.1402  
Fax: 502.222.0714

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# Introduction

Rama innovation delivers the highest quality modular hot runner system available. Whatever your design requirements are, Rama's system *can* and *will* work for you. These advanced precision systems are energy efficient and very suited for retrofitting and conversion into existing molds. The modular design concept allows for unlimited cavity configurations with precise control of drop location and heat zone. For a quick-quote or to place an order, please fill out one of the associated forms at the rear of this catalog and fax to Rama for an immediate price quote. This catalog has been prepared to help you easily select the layout of the best suited molding system to fit your needs.

Every mold design starts with the number of cavities and a general plan or layout. Once this has been completed and dimensions defined, you are ready to proceed.

However, before going further in the catalog, please determine the following important dimensions. These will help you decide which components will fit your requirements.

1. Drop to drop dimensions of the cavity layout to match your mold;
2. Distance(s) between drops (bushings);
3. Choice of bushings you can use;
4. Cavity plate stack-up dimensions.

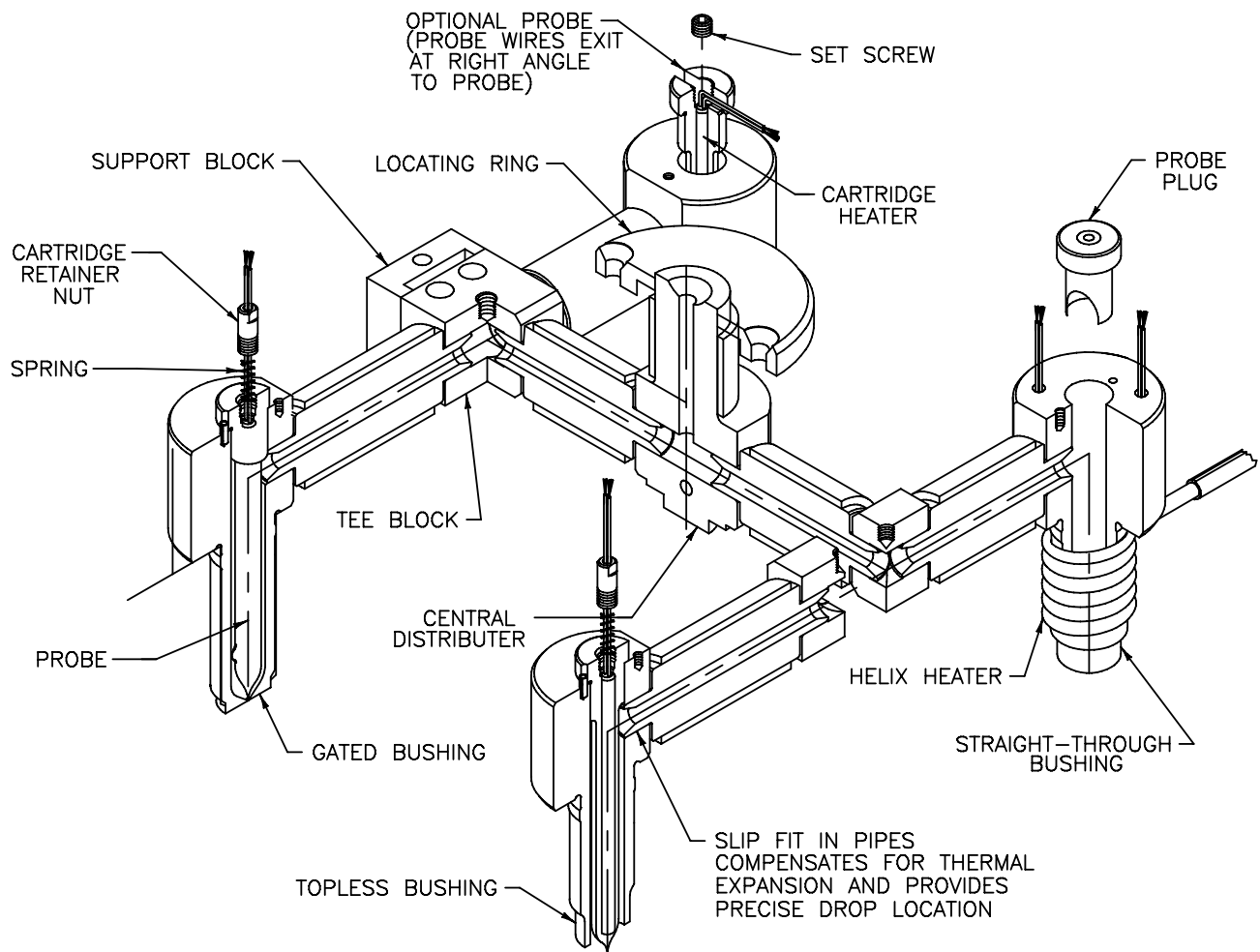
In addition, here are some critical areas to consider:

- Choice of gating will help determine the most desirable finish appearance and the least objectionable vestige location on your part.
- For large product parts it is important to have sufficient gates to match the shot weight, but remember the weld lines.
- Plates must be of sufficient thickness to accept calculated cavity pressures with safety.
- Water lines must be routed so as to avoid areas of high heat sink, which could result in the loss of heat in critical temperature zones.
- Space must be provided for power, thermocouple connections and wiring elements

Within this section you will find an isometric view of a hot runner system to help you visualize the concept. Additionally, we have prepared a cross-sectional drawing which explains "How the Plastic Flows."

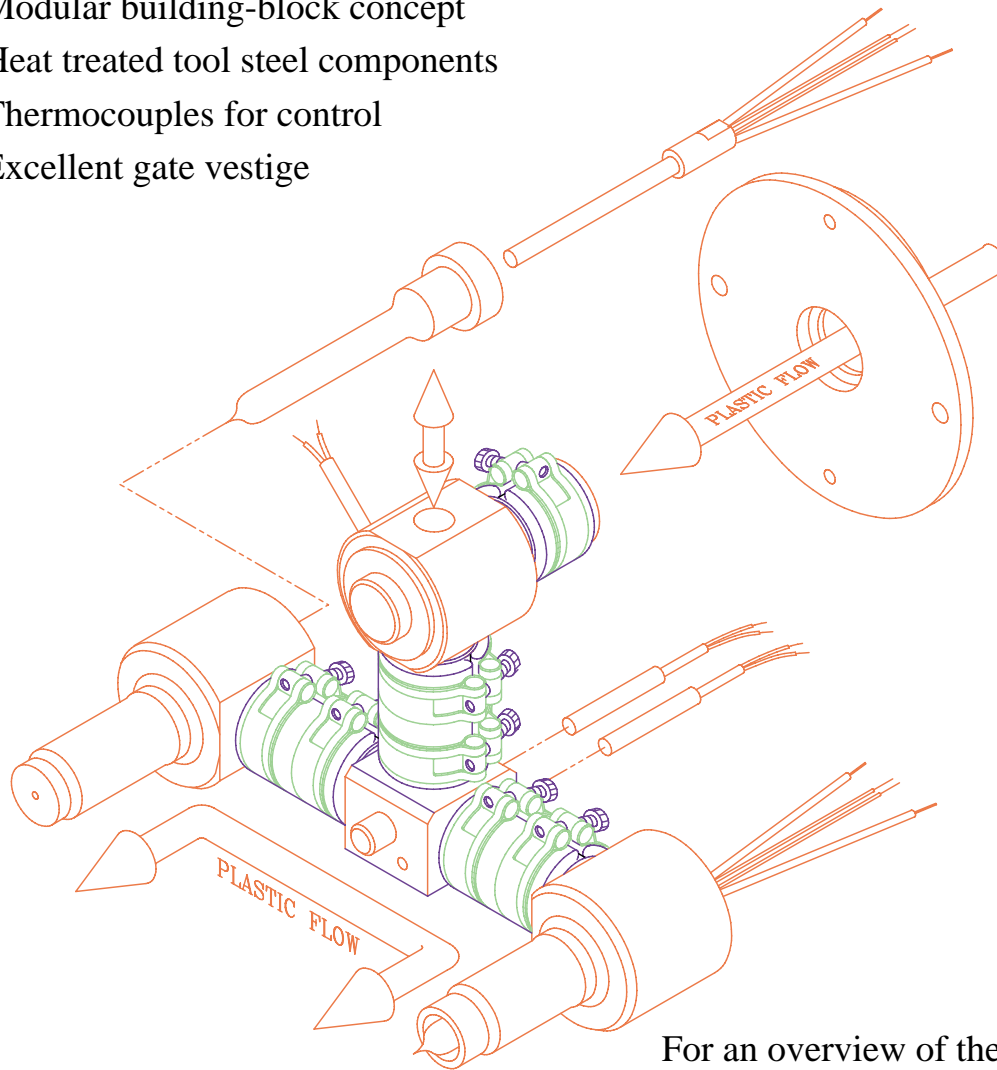
# Modular System Features

**R**ama hot runner systems are designed for simple installation, easy maintenance, precise control of drop location and heat zones and leak-proof operation. The manifold relies on a unique, modular, precision machined, reduced mass design, to provide the most energy-efficient system available in the industry. After the system is assembled, it is extremely easy to install and requires minimal stack height in the hot-side mold base plates. All of these top quality features are available at extremely competitive prices with guaranteed fast delivery.



# Modular System Features

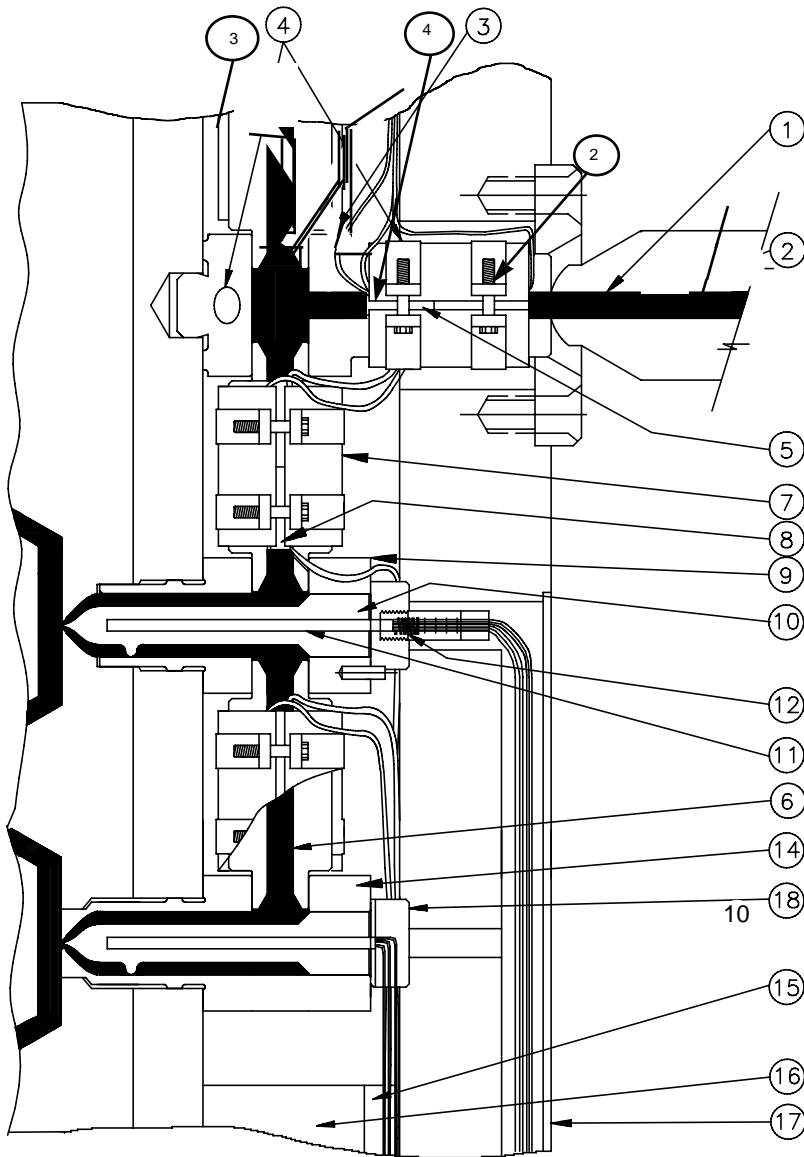
- Off the shelf designs
- Internally & externally heated
- Energy-efficient
- Probe heaters replaced with ease
- Fast and complete color changes
- Leak-proof design
- Adjustable probes
- Modular building-block concept
- Heat treated tool steel components
- Thermocouples for control
- Excellent gate vestige
- Minimum heat loss from system to mold
- Easy assembly into mold
- No “O” ring seals
- No need to calculate thermal expansion
- No centering pins to block flow
- No water effecting material flow
- No heat sink from machine nozzle



For an overview of the Rama modular hot runner system refer to this exploded view. For clarity, certain components have been omitted.

# Plastic Melt Flow Path

## How Does the Plastic Flow?



To answer this question, a hypothetical system is shown here and the flow sequence explained.

Molten plastic flows from the machine nozzle (1) into the central distributor (2) which is heated by a cartridge heater (3) and a band heater (4). The temperature is controlled by a thermocouple (5) in the central distributor or under the band heater. The plastic then flows through the standard pipes (6) which are heated externally by mica band heaters (7) and temperature controlled by a thermocouple (8).

From the standard pipes the plastic flows into the topless bushing (9) and around the probe (10) which is internally heated by a cartridge heater (11). The heater is secured in close contact with the flat bottom hole in the probe by a spring-loaded retainer (12).

As an alternate for the topless bushing, a gated bushing (14) can be used. Thermocouple and heater leadwires are positioned along a lead-wire raceway (15) cut in the spacer plate (16), leadwires for probe heaters follow a raceway cut in the top clamping plate (17).

Tests have been completed to determine the correct wattage for the mica band and the cartridge heaters used in the system. The result is a precisely controlled temperature balanced runnerless system for any standard molding resin requiring working temperatures up to 700°F.



# Design Criteria

## NEW TOOLING

RAMA prides itself on the many unusual and difficult hot runner systems it has produced for its customers over the past ten years. However, the biggest advantage in the Rama system is its standardized component construction. This provides the designer greater flexibility during the design stage and provides the moldmaker rapid turn-around in the order stage. While we are always ready and willing to work with you on any custom system or component you may require, we can save you time and money if you use the popular standard sizes and pay close attention to the following details:

1. The distance between the CD and the first drop or T-block;
2. The distance between drops;
3. The length of the bushings and probes from the top of the retainer plate to the gate: drop 'A' dimension.

## RETROFITS

RAMA'S hot runner system can be easily modified to fit existing molds:

1. Rama will supply special systems to match cavity locations in your present mold if they are non-standard.
2. To minimize added cost, try to alter plate thickness so that standard bushings (drops) can be used to feed cavities.
3. Molding conditions such as ejection, venting, cooling and weld line pattern may be affected by any retrofit. Review your design with a qualified engineer.
4. Rama's system readily converts single and multicavity 3-plate molds.

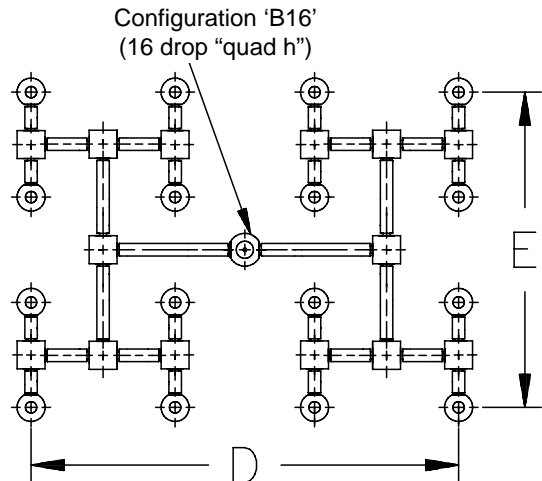
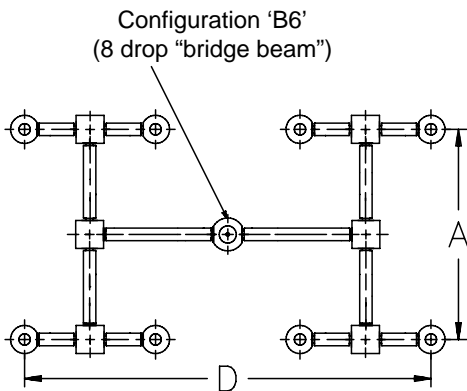
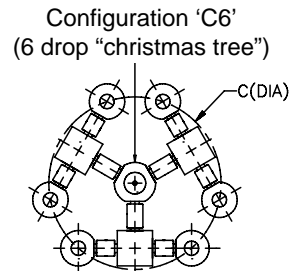
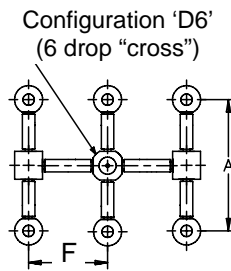
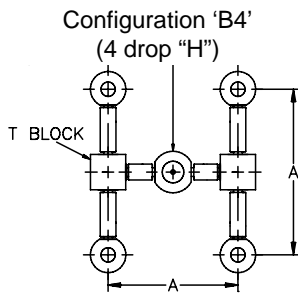
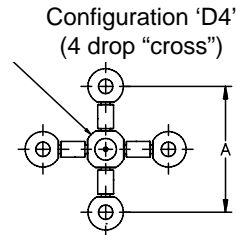
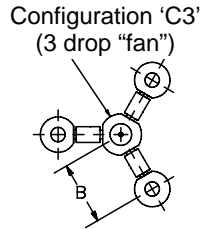
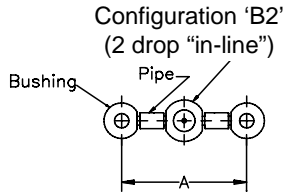
## GENERAL DESIGN CONSIDERATIONS

WHEREVER possible, install gates in hidden or non-cosmetic areas on the part. When reverse ejection is required (ejector plates mounted on the hot-side), Rama's system allows more room than most other hot runner manifolds due to its extremely low stack height.

- Select the best bushing type suited to your part requirements, i.e. gated, topless, probeless, straight-through or special/custom types.
- While you should match starting gate diameters to the specifications published by the resin supplier, the molder should decide on the ultimate gate size.
- Obtain complete material specifications prior to designing, including melt index.
- Plates must be sufficient thickness to accept calculated cavity pressures with safety.
- Waterlines must be positioned to avoid areas of high heat sink, such as around the CD or located too close to the gate. While you should avoid over cooling the gate area, bear in mind that inadequate cooling can cause drooling in some materials. This is a delicate balance and should be carefully planned.
- Space must be provided for power, T/Cs and wiring channels.

# Standard & Custom Configurations

## STANDARD - BALANCED SYSTEMS



RECOMMENDED MINIMUM DISTANCE BETWEEN DROPS  
INCHES (MM)

	Small	Medium	Large
A	2.90(73.8)	4.28(108.7)	5.78(146.8)
B	1.45(36.8)	2.14(54.4)	2.89(73.4)
C	4.25(116)	6.74(171)	9.26(235)
D	6.83(188)	10.93(277)	14.93(379)
E	8.20(223)	12.68(322)	16.68(423)
F	1.62(41)	2.37(60)	3.37(85)

Rama recommends a balanced system layout whenever possible. However, when the customer finds this is impractical, we can often times provide semi-balancing to the out-of-balance cavity by adjusting the pipe bore diameters. Also, the customer may accomplish additional balancing by varying gate sizes from one cavity to another.

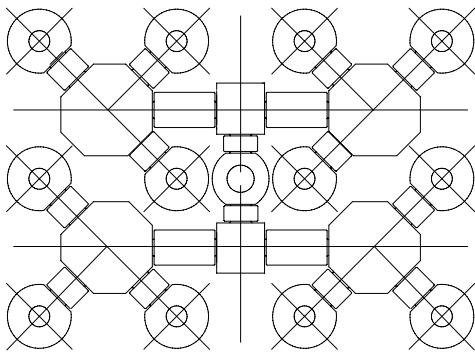


# Standard & Custom Configurations

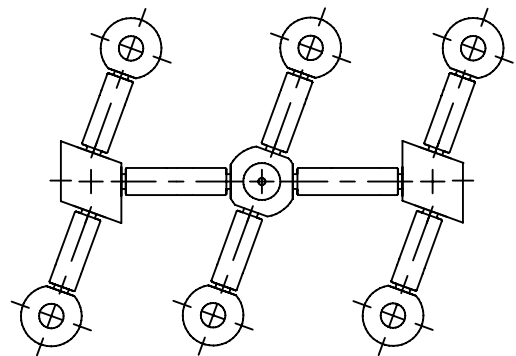
## CUSTOM & SPECIAL LAYOUTS

If you require a special layout other than those shown, please submit a drawing of your proposed cavity layout with center to center dimensions and we will let you know if it is possible or practical with the Rama system.

**Balanced 12 Drop  
with special distributor**

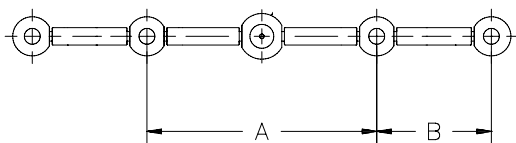


**Slant 6 Drop**



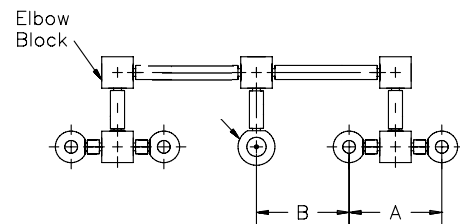
### UNBALANCED SYSTEM

**Configuration B4 (4 drop “in-line”)**



### BALANCED SYSTEM

**Configuration A4 (4 drop “in-line”)**



Rama hot runner systems have specific minimum layout dimensions. These minimums should be considered when laying out your system. (see below)

DIM	INCHES(MM)		
	SMALL	MEDIUM	LARGE
A	2.90(73.8)	4.28(108.7)	5.78(146.8)
B	1.45(36.8)	2.14(54.4)	2.89(73.4)

# Sizing the System to Your Resin

There are many factors to consider in sizing your system. Some very general guidelines are listed below for an X-configuration with an 'B' dimension (Distance between Bushing-to-Bushing) of less than 10" (254mm).

PLASTIC RESIN			SYSTEM TOTAL SHOT WEIGHT		
			Small	Medium	Large
ABS	Acrylonitrile Butadiene Styrene	CYCOLAC (Borg Warner), NOVODOUR (Bayer), RAVIKRAL (Eri), RONFALIN (DSM), UGIKRAL (CDF) ARROADUR (Arco)	50g	500g	2500g
ABS VO	ABS with flame retardant	CODABS (Codiplast), LUSTRAN (Monsanto), DOW ABS (Dow Chemical), TERLURAN (BASF)	30	300	1500
CAB		CELLIDOR (Bayer)	60	600	3000
PA6	Polyamide (Nylon) 6-66 & glass filled Nylons	AKULON (Akzo), DURETHAN (Bayer), ELVAMIDE (DuPont)	30	300	1500
PA6 30% FV		FABELNYL (Tubize Plastic), GRILON (EMS)	20	210	1050
PA11		LATAMID (Lati), MARANYL (ICI), MINLON (Du Pont)	40	380	1900
PA11 30% FV		NYLON (Celanese), NYLATRON (Palypenco)	25	230	1200
PA12		ORGAMIDE (Atochem), TECHNYL (Rhone Poulenc)	50	530	2650
PA12 30% FV		ULTRAMID (BASF), RILSAN (Atochem), GRILAMID (EMS)	30	330	1650
PA6,6		ZYTEL (DuPont)	20	170	850
PA6,6 30% FV			15	150	750
PBT	Polyester, thermoplastic & glass filled polyesters	ARNITE (Akzo), CELANEX (Celanese), ORGATOR (Ato)	15	170	850
PBT 30% FV		CRASTUNE (Ciba-Geigy), KODAPAK (Eastman Chemical)	15	135	675
PC	Polycarbonate & glass filled PC	MELINAR (ICI), KELANEX (Celanese), POCAN (Bayer)			
PC 30% FV		ULTRADUR (BASF), VALOX (General Electric)	20	195	975
PC/ABS		ALTUCHOC (Altulor), MAKROLON (Bayer), LATILON (Lati), SINJET (Eni), LEXAN (General Electric)	15	135	675
PC/PBT		BAYBLEND (Bayer)	30	320	1600
PEHD			25	250	1250
PEHD		BAYLON(Bayer), PINATHENE(Fina), LOTRENE(CDF)	45	450	2250
		LUPOLN (BASF), DOWLEX (Dow Chemical), NATENE (BP), ELTEX (Salvay), ERACLENE (Esso), ALKATHENE (ICI), HOSTALEN(Hoechst), MARLEX(Phillips)	85	850	4250
PET	Polyethylene Terephthalate	ARNITE(Akzo), HOSTAPOR(Hoechst), RYNITE(DuPont)	20	180	900
PMMA	Polymethyl Methacrylate	ALTULIT(Altulor), ACRONAL(BASF), DIAKON(ICI), PLEXIGLASS(Rohm)	65	670	3350
POM	Polyoxymethylene (Polyacetal)	ULTRAFORM(BASF), DELRIN(DuPont), LARTON (Lati)	15	150	750
		HOSTAFORM(Hoechst), KEMATAL(Celanese)			
		CELCON (Celanese)			
PP	Polypropylene	FINAPROP (Fina), NORSOPRYL (Cdf Chimie),	100	1000	5000
PP 30% TALC		LACQTENE (ATO), HOSTALEN (Hoechst), NAPRYL (B.P.)	75	750	3250
		NOVALEN (BASF), PROPATHENE (ICI)			
PSE		LASULF (Lati), SULFOVER (Doneco), MINDEL (Union Carbide)	10	65	325
PVC (Flexible)	Polyvinyl Chloride (Flexible)	CODIMEL (Codiplast), CORVIC (ICI), EKAVYL (ATO)	35	325	1750
PVC (Rigid)	Polyvinyl Chloride (Rigid)	LUCALOR (ATO), HOSTALIT (Hoechst)	25	230	1150
PUR	Polyurethane	BAYTEC (Bayer), DESMOPAN (Bayer), DESMOFLEX (Bayer)	60	580	2900
PS	Polystyrene	ARRALENE (Arco), AFCOLENE (Cdf Chimie), LACQRENE (ATO), STYRON (Dow Chemical), LASTIROL (Lati),	100	1000	5000
PS Choc		AFCOLENE (Cdf Chimie), CEDEX (CDF Chimie)	65	650	3250
		HOSTYREN (Hoechst), VESTYRON (H.M.)			
SAN	Styrene Acrylonitrile	LASTIL (Lati), LURAN (BASF), LUSTRAN (Monsanto)	60	640	3200
		TYRIL (Dow Chemical)			

Chart measurements indicate the maximum total shot weight for 4-drop system.



# Computer Aided Design (CAD)

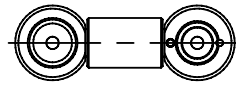
## CAD Files Available for Customer Use

Rama has CAD files available of runnerless components in DFX, IGES and AutoCad 12 drawing formats (IBM platform only). They can easily be loaded into your CAD program to assist you in designing the runnerless system for your mold assembly. A floppy disk with installation instructions will be sent upon request. If you prefer, the files may be e-mailed to your business for convenience.

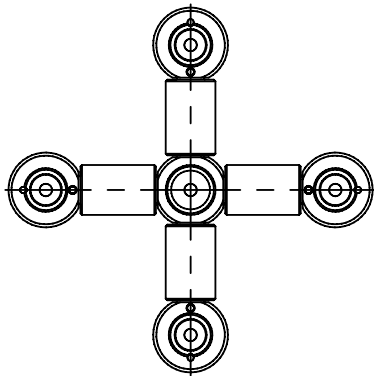
### PLAN VIEWS



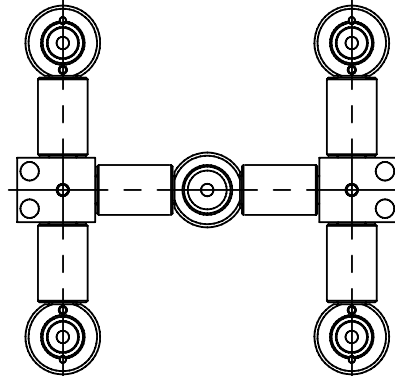
Two Drop System



One Drop System



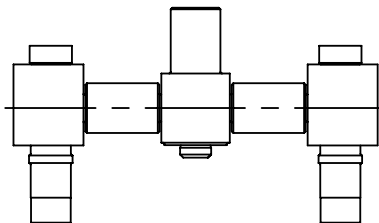
Four Drop System



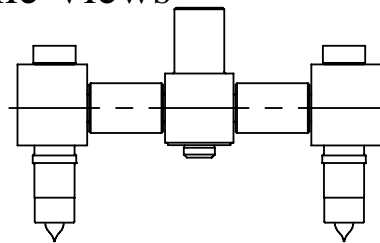
Four Drop System

### MOST COMMON CONFIGURATIONS

#### Profile Views



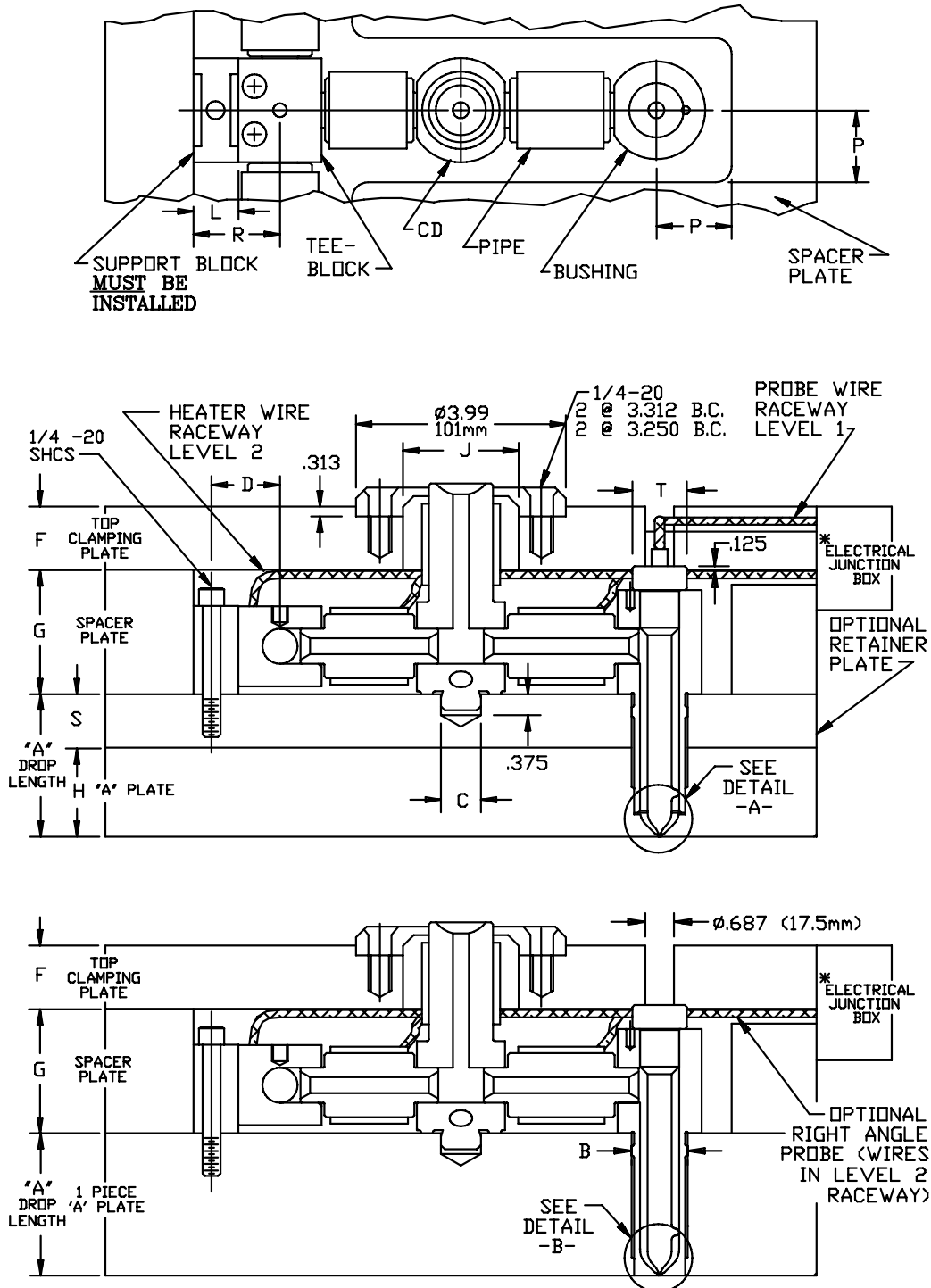
Gated Bushings



Topless Bushings

# Design & Installation Requirements

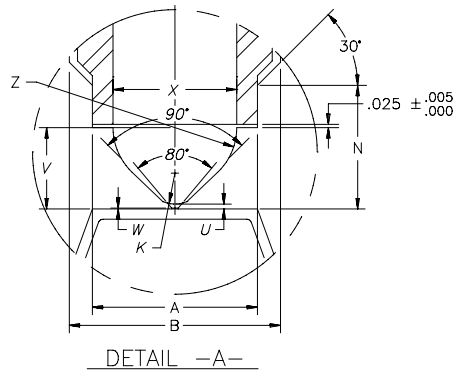
## STANDARD GATING



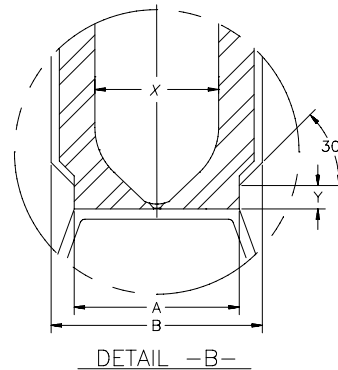
# Design & Installation Requirements

## STANDARD GATING

MACHINING DETAIL FOR  
TOPLESS BUSHINGS

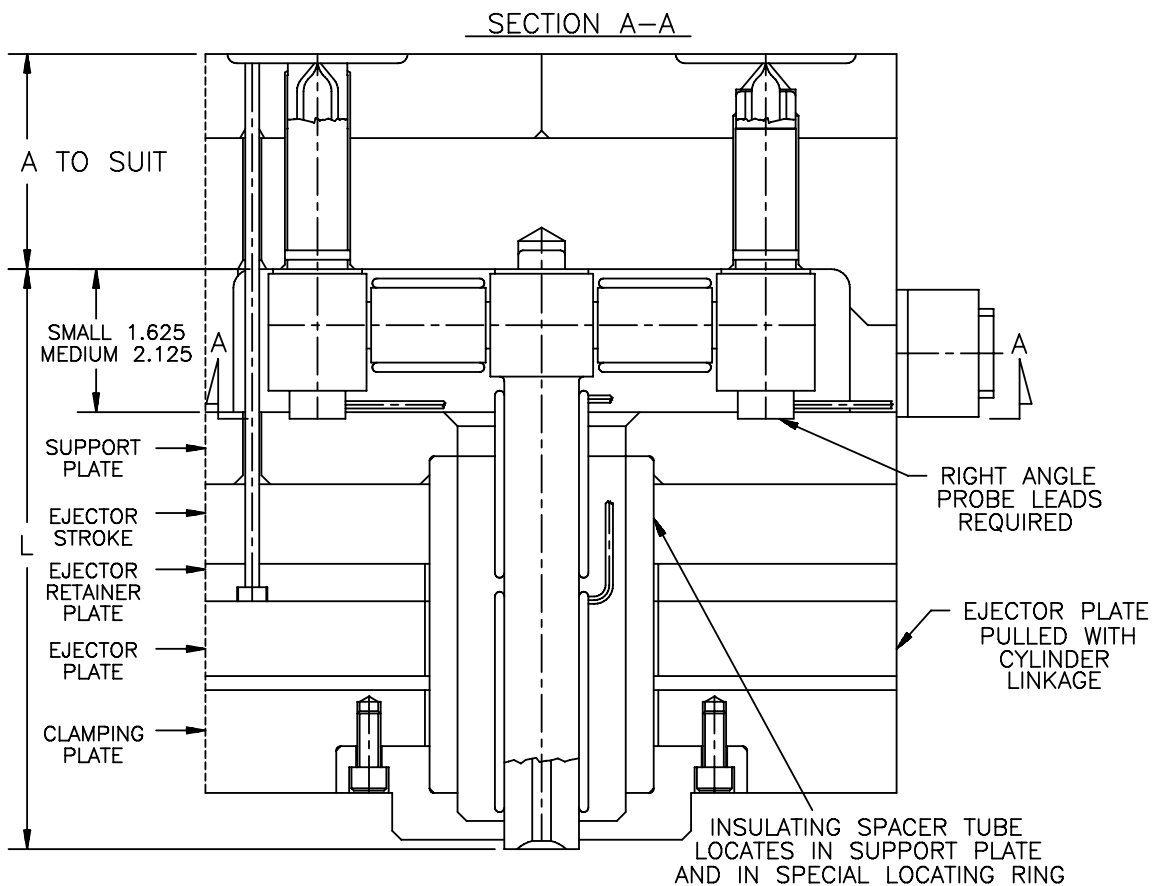
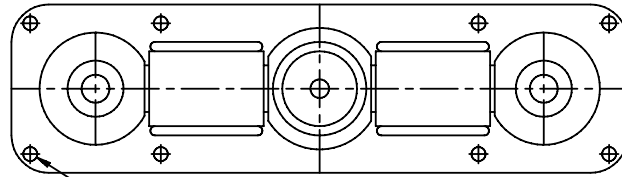


MACHINING DETAIL FOR  
GATED BUSHINGS



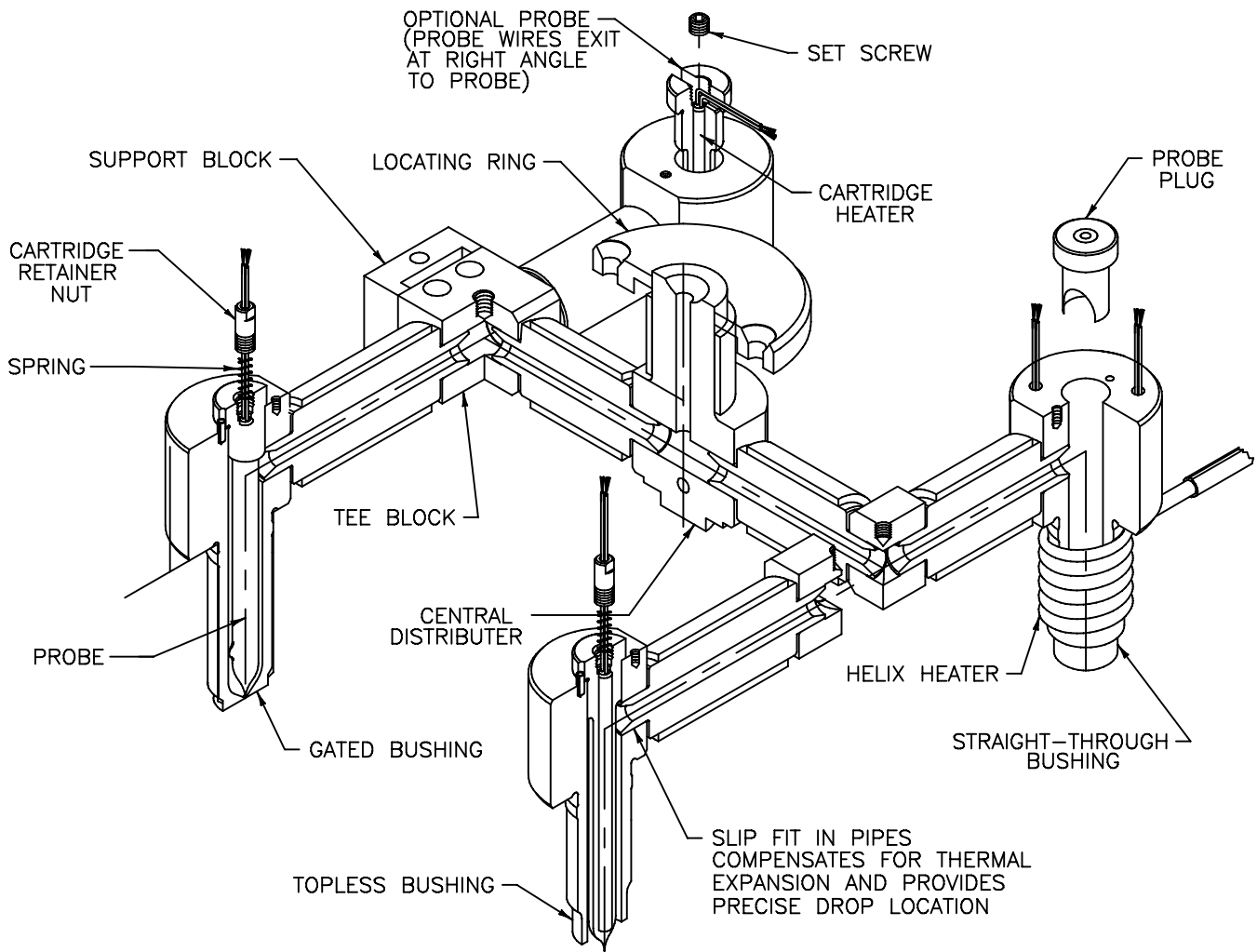
DIMENSION	FUNCTION/TOLERANCE	INCHES (MM)		
		SMALL	MEDIUM	LARGE
A	Fit hole, gated & topless bushings +.001/-0.000" (+.025/-0.000mm)	.798(20)	1.001(25)	1.688(43)
B	Clearance hole, bushings +.004/-0.000" (+.100/0.000mm)	.875(22)	1.250(31)	1.875(48)
C	Bore for CD +.005/-0.000" (+.127/-0.000mm)	.625(15)	1.001(25)	1.001(25)
D	Support block center to tee-block center	1.157(29.39)	1.375(35)	1.935(49.15)
F	Top clamping plate .875" to 10.875" (1.375" Standard)			
G	Spacer plate	1.875(48)	2.375(61)	2.875(73)
H	'A' plate (Minimum)	.833(21.2)	1.018(25.9)	1.220(31)
J	Clearance hole, band heater	2.25(58)	2.75(70)	2.75(70)
	Diameter, locating ring	3.99(101.5)	3.99(101.5)	3.99(101.5)
K	Radius for gate	.140(3.56)	.187(4.75)	.187(4.75)
L	Air gap	.625(15.88)	.75(19.05)	1.120(28.45)
N	Shoulder, topless bushing	.828(21.03)	.913(23.19)	1.115(28.32)
P	Spacer plate air gap minimum	1.469(37.31)	1.750(44.45)	2.250(57)
R	Support block	1.469(37.31)	1.750(44.45)	2.495(63.38)
S	Retainer plate 7/8" to 1-3/8" (22mm to 35mm)			
T	Probe head clearance	.875(22)	1.030(26)	1.500(38)
U	Location of gate	.036(.914)	.030(.726)	.030(.726)
V	Topless bushing	.408(10.36)	.493(12.52)	.695(17.65)
W	.005 Gate land	.005(.13)	.005(.13)	.005(.13)
X	Bushing bore	.608(15.44)	.735(18.67)	1.156(29.36)
Y	Shoulder, gated bushing	.400(10)	.100(3)	.400(10)

# Reverse Gating Method



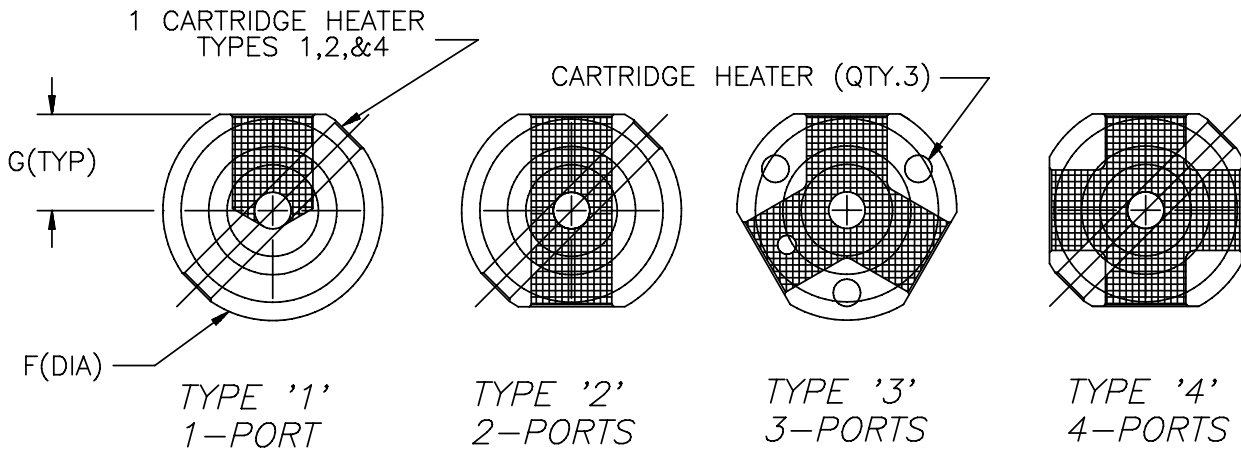
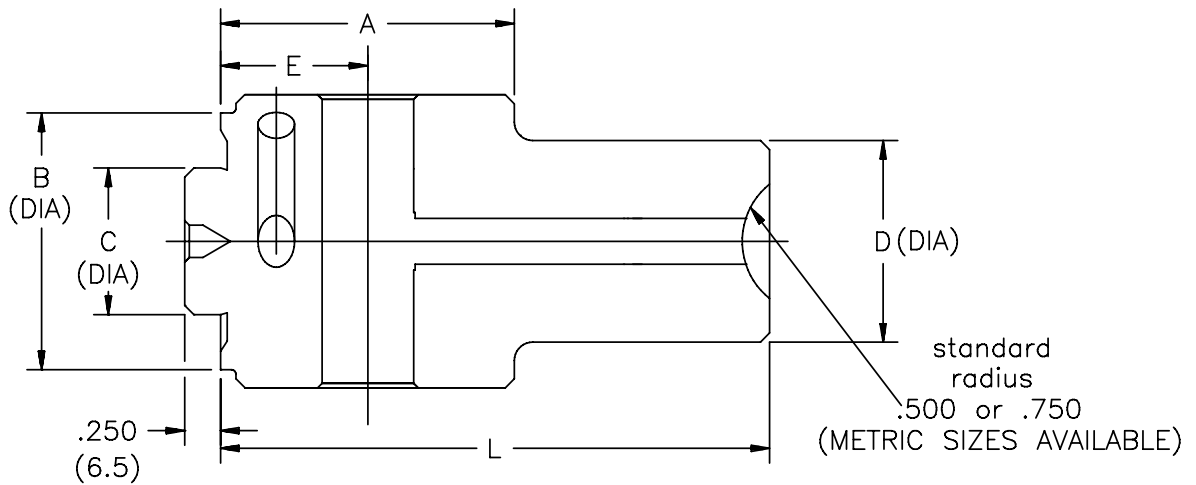
**Illustrated above is a Rama two drop system, installed with the ejector plate. The Rama hot runner system is ideally suited to this application due to its relatively low overall stack height. It requires a long reach (L dimension) central distributor, plus a surrounding insulating support tube mounted in a special locating ring. See section 3 for locating ring & space tube details.**

# Components Guide



# Central Distributor

The central distributor (CD) provides interface between the machine nozzle and the manifold. CDs are heated with RAMA®BAND and RAMA®ROD cartridge heaters. The CD is made from hardened and ground tool steel. Small, medium and large sizes listed below are standard designs and can be shipped in two to three weeks. Custom sizes require extended lead times.



DIM	INCHES(MM)		
	SMALL	MEDIUM	LARGE
A	1.438(36.53)	2.000(50.08)	2.250(57.15)
B	1.250(31.75)	1.750(44.45)	1.770(44.96)
C	0.624(15.00)	1.000(25.00)	1.000(25.00)
D	1.000(25.40)	1.375(34.93)	1.375(34.93)
E	0.750(19.05)	1.000(25.40)	1.250(31.75)
F	1.500(38.10)	2.250(57.15)	3.250(82.55)
G	0.656(16.66)	1.000(25.40)	1.375(34.93)

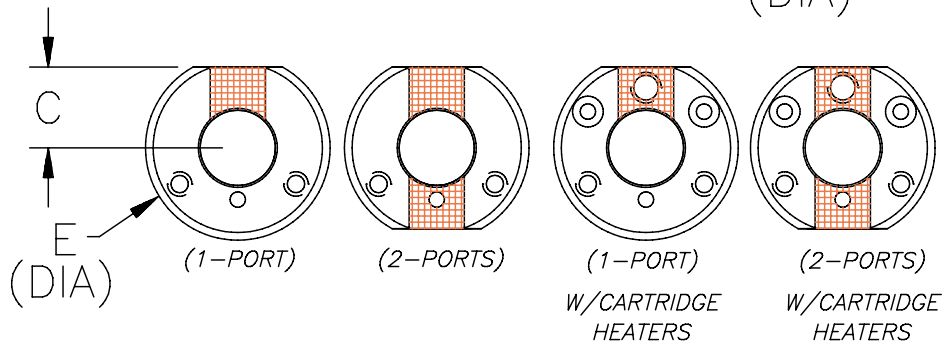
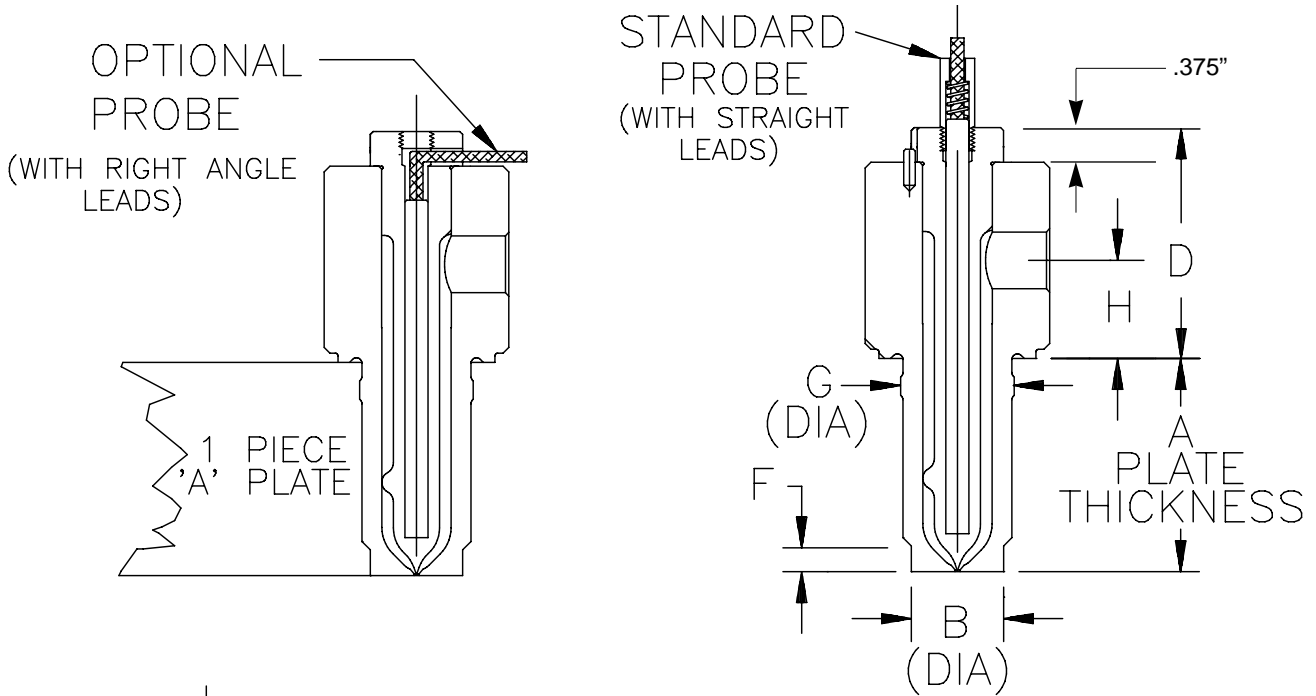
'L' DIMENSION - INCHES(MM)			
SMALL	MEDIUM	LARGE	FOR CLAMPING PLATE THICKNESS
3.750(95.25)	4.250(107.95)	4.7500(120.65)	7/8"(20)
3.875(98.43)	4.375(111.13)	4.875(123.83)	1"(25)
4.250(107.95)	4.750(120.65)	5.250(133.35)	1-3/8"(32)*
4.750(120.65)	5.250(133.35)	5.750(146.05)	1-7/8"(40)
4.875(123.70)	5.375(136.52)	5.875(149.23)	2"(50)
5.250(133.35)	5.750(146.05)	6.250(158.75)	2-3/8"(60)

\*1-3/8" Clamping plate standard



# Gated Bushing

The gated bushing is designed for use with general purpose materials and is used when a bushing witness line is acceptable. This bushing is made of hardened and ground steel. Standard gate for small and medium systems is .040" diameter. Standard diameter for large systems is .188". The customer must specify alternate gate diameters if necessary. This bushing is heated by a removable probe.

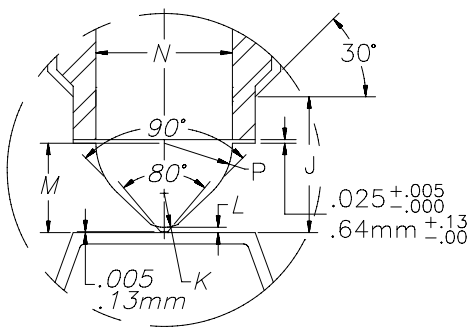
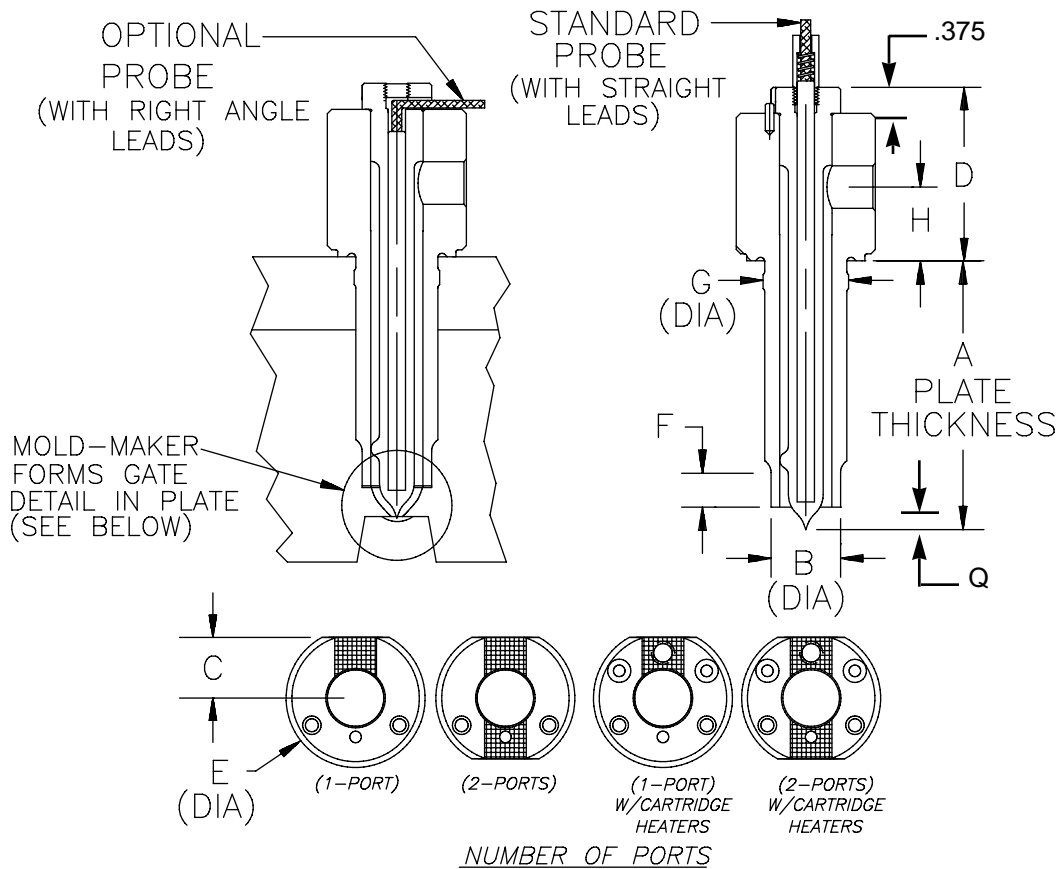


NUMBER OF PORTS

DIMENSION	INCHES(MM)		
	SMALL	MEDIUM	LARGE
B	.7968(20.00)	1.000(25.00)	1.687(43.00)
C	.656(16.66)	1.000(25.40)	1.370(37.80)
D	2.000(50.80)	2.500(63.50)	3.000(76.20)
E	1.500(38.10)	2.250(57.15)	3.250(82.55)
F	.500(12.70)	.200(5.08)	.500(12.70)
G	.875(22.00)	1.250(31.00)	1.874(48.00)
H	.750(19.05)	1.000(25.40)	1.250(31.75)

# Topless Bushing

The topless bushing permits the designer maximum flexibility in his gate design. It is used in lieu of the gated bushing when a bushing witness line is unacceptable. The bushing is made from heat-treated and ground steel. The melt temperature is maintained by a removable probe with a RAMA®ROD cartridge heater.



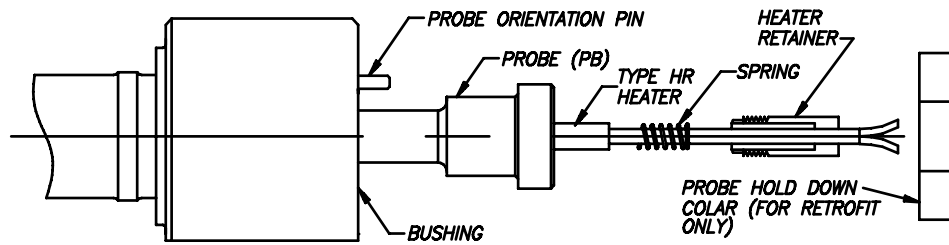
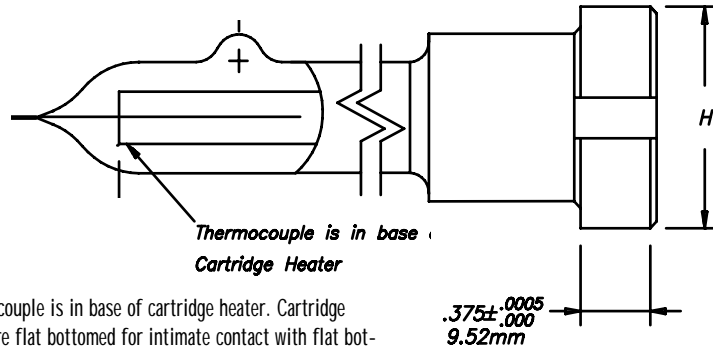
DIMENSION	INCHES(MM)		
	SMALL	MEDIUM	LARGE
B	.7968(20.00)	1.000(25.00)	1.687(43.00)
C	.656(16.66)	1.000(25.40)	1.370(37.80)
D	2.000(50.80)	2.500(63.50)	3.000(76.20)
E	1.500(38.10)	2.250(57.15)	3.250(82.55)
F	.500(12.70)	.500(12.70)	.750(19.05)
G	.875(22.00)	1.250(31.00)	1.874(48.00)
H	.750(19.05)	1.000(25.40)	1.250(31.75)
J	.828(21.03)	.913(23.19)	1.365(34.67)
K	.140(3.56)	.187(4.75)	1.87(4.75)
L	.036(.92)	.030(.73)	.030(.73)
M	.408(10.36)	.493(12.52)	.695(17.65)
N	.608(15.44)	.735(18.67)	1.156(29.36)
P	.304(7.72)	.375(9.53)	.578(14.68)
Q	.433(11.00)	.518(13.16)	.720(18.29)



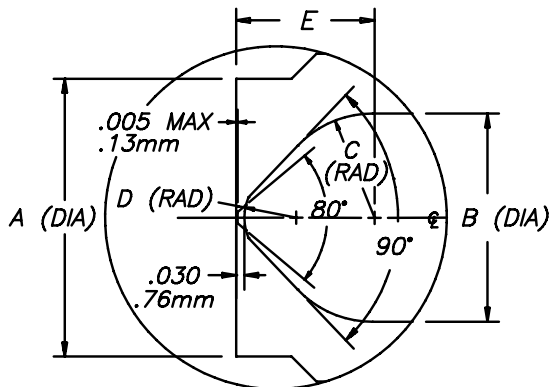
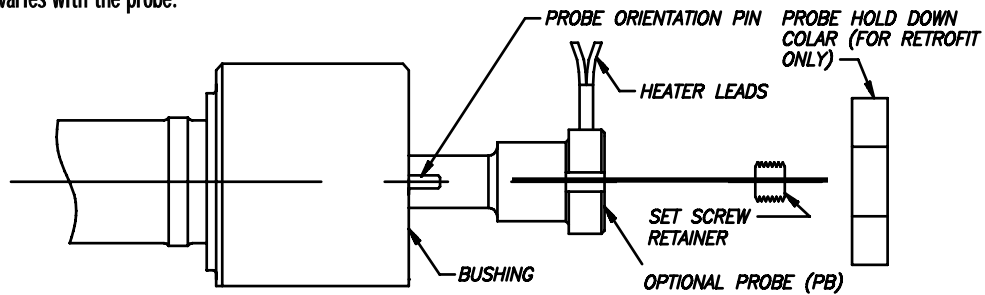
# Probes

## SMALL, MEDIUM AND LARGE PROBES

SYSTEM	DIMENSION "H" INCHES(MM)
SMALL	.85(21.59)
MEDIUM	1.00(25)
LARGE	1.43(36.32)



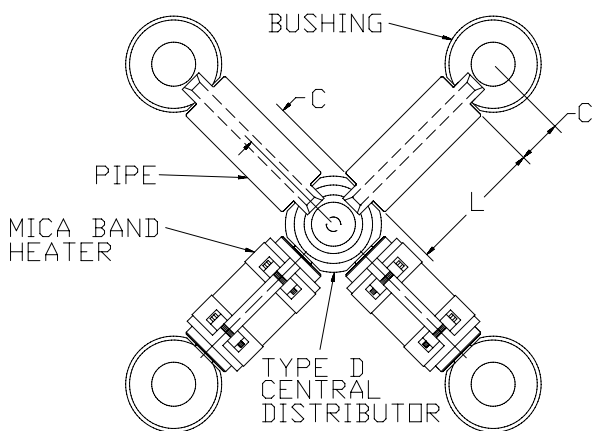
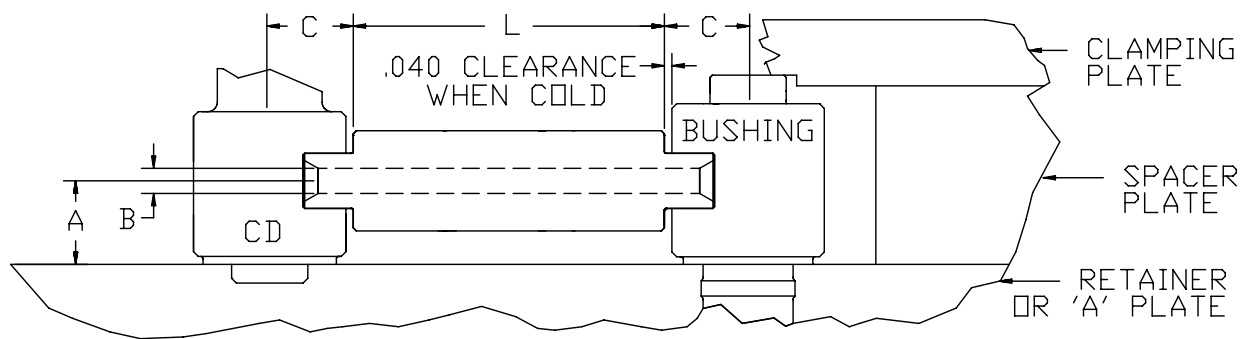
Used with Rama Type HR cartridge heater.  
Length of cartridge heater varies with the probe.



DIM	INCHES(MM)		
	SMALL	MEDIUM	LARGE
A	.7968(20.00)	1.000(25.00)	1.687(43.00)
B	.608(15.44)	.735(18.67)	1.156(29.36)
C	.304(7.72)	.375(9.53)	.578(14.68)
D	.140(3.56)	.187(4.75)	.187(4.75)
E	.408(10.36)	.493(12.52)	.695(17.65)

# Standard Pipes

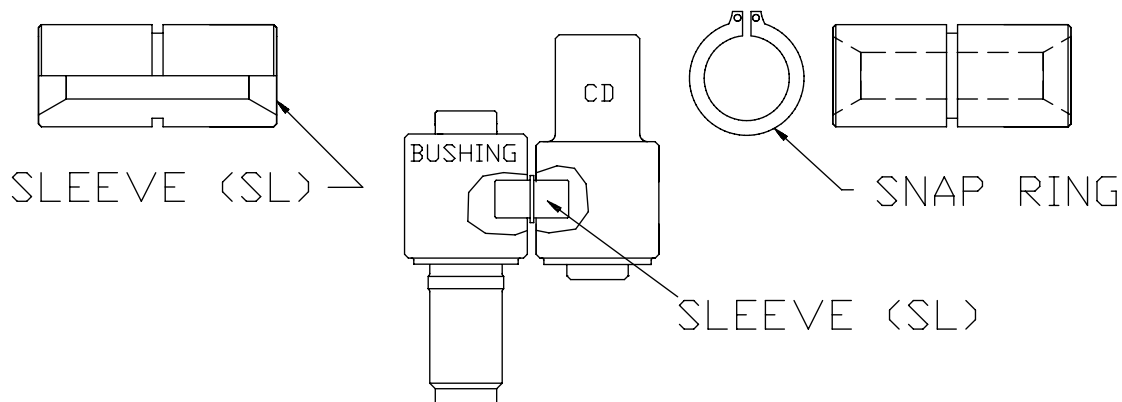
Standard pipes are heated using RAMA®BAND heaters. The pipes are made of prehardened steel. The nipples are precision ground to provide a leak-proof fit. The 'L' dimension is determined by the center to center distance from CD to bushing or bushing to bushing, minus two times the 'C' dimension.



DIM	INCHES(MM)		
	SMALL	MEDIUM	LARGE
A	.750(19.05)	1.00(25.40)	1.250(31.75)
B	.250(6.35)	.312(7.93)	.500(12.70)
C	.696(17.68)	1.04(26.42)	1.415(35.94)

SLEEVE	
SIZE	PART NUMBER
Small	1SL
Medium	2SL
Large	3SL

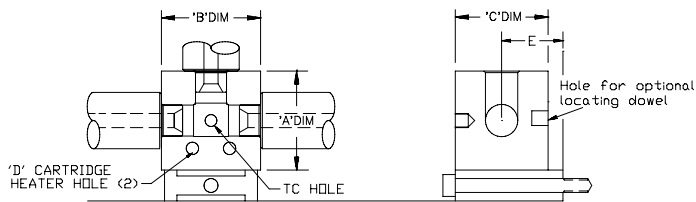
SNAP RING	
SIZE	PART NUMBER
Small	104920
Medium	104921
Large	104922



# 'T', Elbow, Cross, & Support Blocks

The blocks act as T's and elbows to connect the CD to the bushings. They are heated with RAMA®ROD cartridge heaters and are made of prehardened steel, precision ground to size. Each block must have a support block mounted as shown below for adequate support. Leaving this support block out voids the manufacturers warranty.

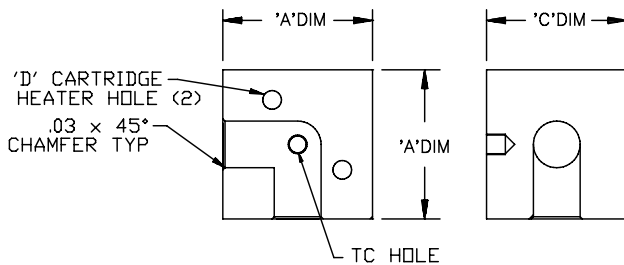
## 'T' BLOCK



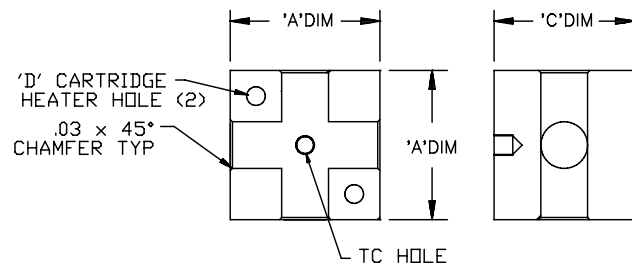
DIM	INCHES(MM)		
	SMALL	MEDIUM	LARGE
*A	1.500(38.10)	2.000(50.80)	2.750(69.85)
B	1.312(33.33)	2.000(50.80)	2.750(69.85)
C	1.375(34.93)	1.870(47.50)	2.000(50.80)
D	.373(9.47)	.373(9.47)	.373(9.47)
E	.750(12.70)	1.000(25.40)	1.375(34.93)
F	.656(16.66)	1.000(25.40)	1.375(34.93)
* 'A' Dim. = 1.312 for small cross block.			

Dimensions above for 'T', elbow & cross blocks.

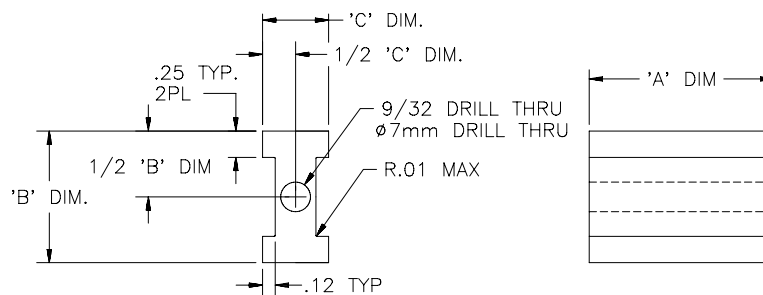
## ELBOW BLOCK



## CROSS BLOCK



## SUPPORT BLOCK



DIM	INCHES(MM)		
	SMALL	MEDIUM	LARGE
A	1.38(30.05)	1.80(45.72)	2.75(69.85)
B	1.25(31.75)	1.87(47.50)	1.85(46.99)
C	.63(16.00)	.75(19.05)	1.12(28.45)

Dimensions above for support blocks.

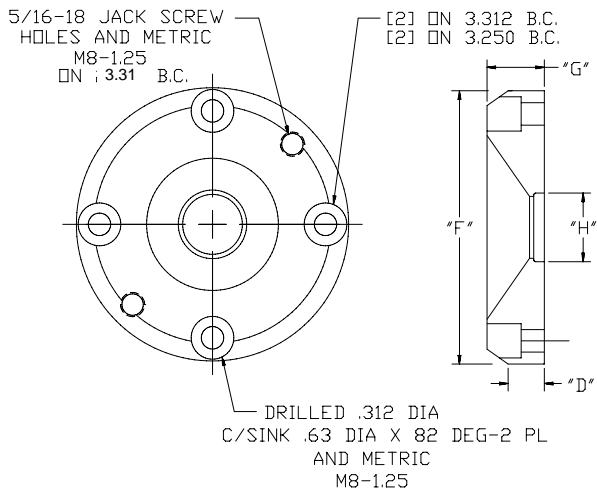
# Locating Rings

Two standard designs are offered for the multiple drop system. A standard clamp type locating ring is offered for the hot sprue bushings, as well as a 2" ID ring shown below.

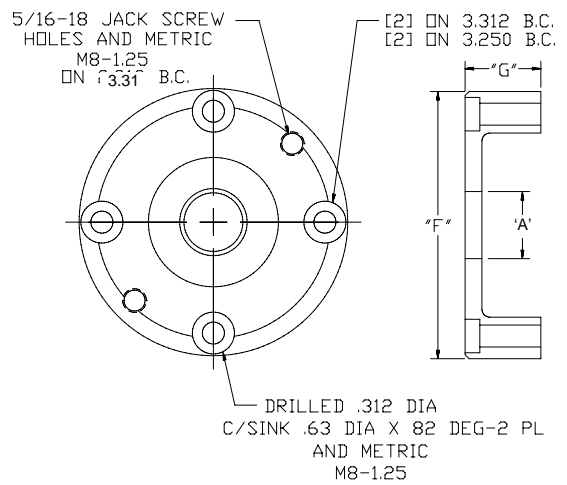
## HOT RUNNER SYSTEM LOCATING RINGS

For small, medium and large multiple drop systems, providing height to accommodate 1/4" or 1/2" insulating sheets.

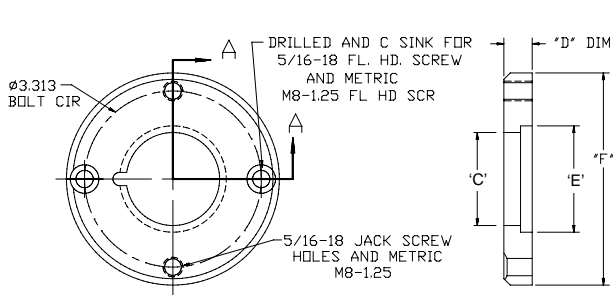
Part Number: 1LR3250 (Small)



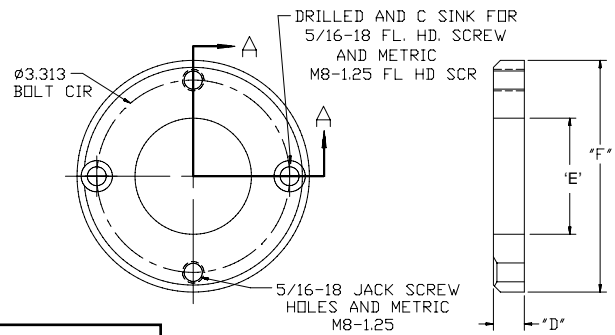
Part Number: 2LR3250 (Medium & Large)



## HOT SPRUE BUSHING LOCATING RINGS



Part Number: 4LR3313  
Metric Part Number: 4LR3313M



Part Number: 4LR3313-1  
Metric Part Number: M4LR3313-1

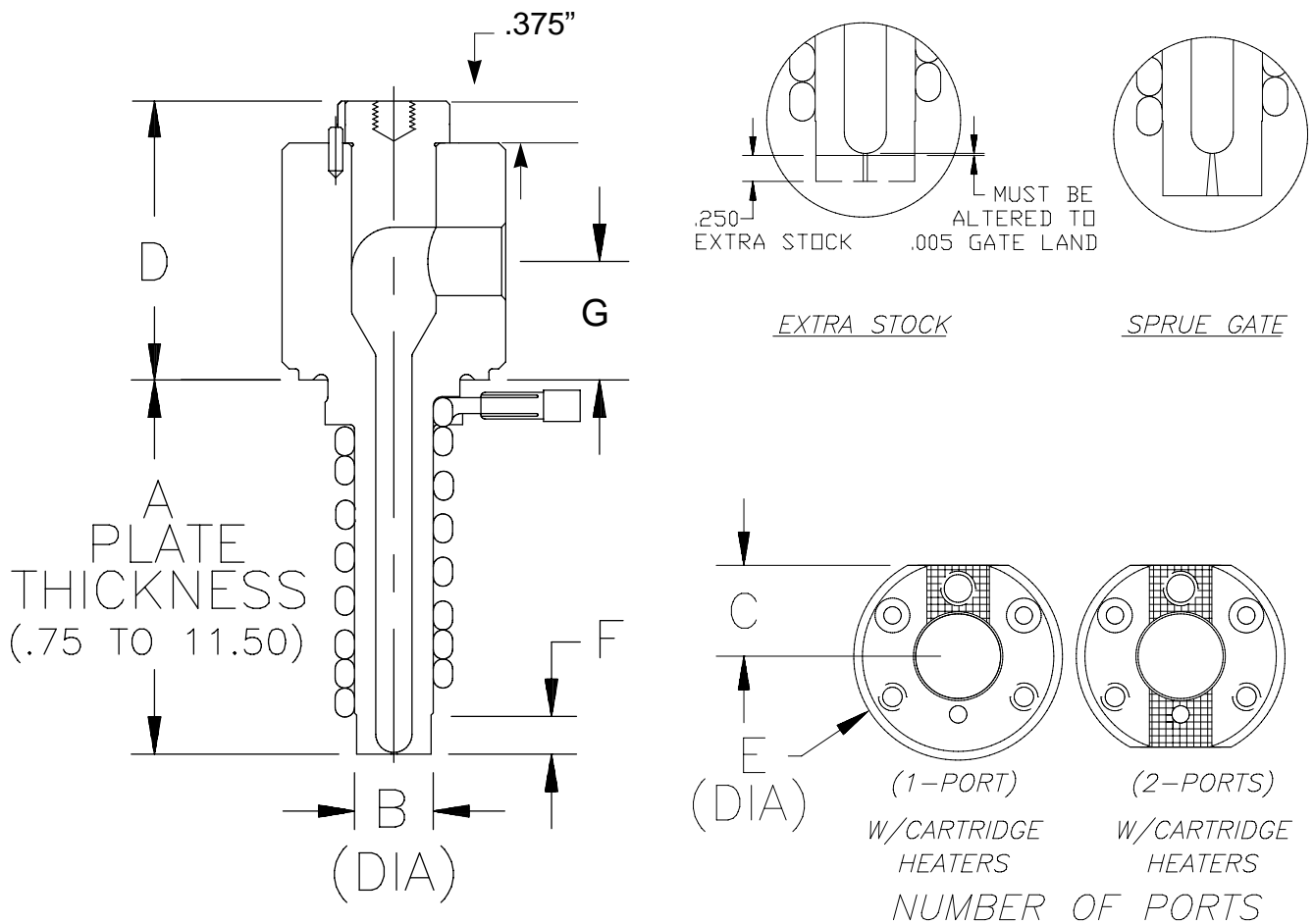
DIM	INCHES(MM)
A	1.375(34.95)
B	4.625 B.C.(117.5 B.C)
C	1.755(44.58)
D	.53(13.46)
E	2.00(50.80)
F	3.990(101.34)
G	1.12(28.45)
H	1.005(25.53)

Dimensions shown for all rings illustrated above.



# Special Straight through Gated Bushing

The probeless straight through gated bushing is ideal for use with shear sensitive resins that require no obstruction in the melt stream. It is made from heat-treated and ground steel. Standard gates for small and medium systems are .040" diameter, and .188" for large systems. Customers must specify alternate gate diameters when required. This bushing is externally heated with two RAMA®ROD cartridge heaters and Rama's rugged coiled nozzle (sprue bushing) heater. This innovative coiled nozzle heater has longer life due to special features and manufacturing methods that surpass all other coiled type heaters.



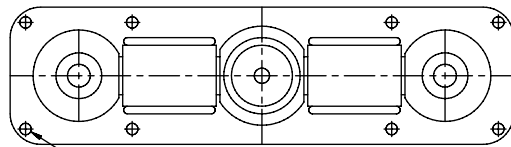
DIM	INCHES(MM)		
	SMALL	MEDIUM	LARGE
B	.500(12.70)	.750(19.05)	1.000(25.40)
C	.656(16.66)	1.000(25.40)	1.370(34.80)
D	2.000(50.80)	2.500(50.80)	3.000(76.20)
E	1.500(38.10)	2.250(57.15)	3.250(82.55)
F	.500(12.70)	.500(12.70)	.500(12.70)
G	.750(19.05)	1.000(25.40)	1.250(31.75)



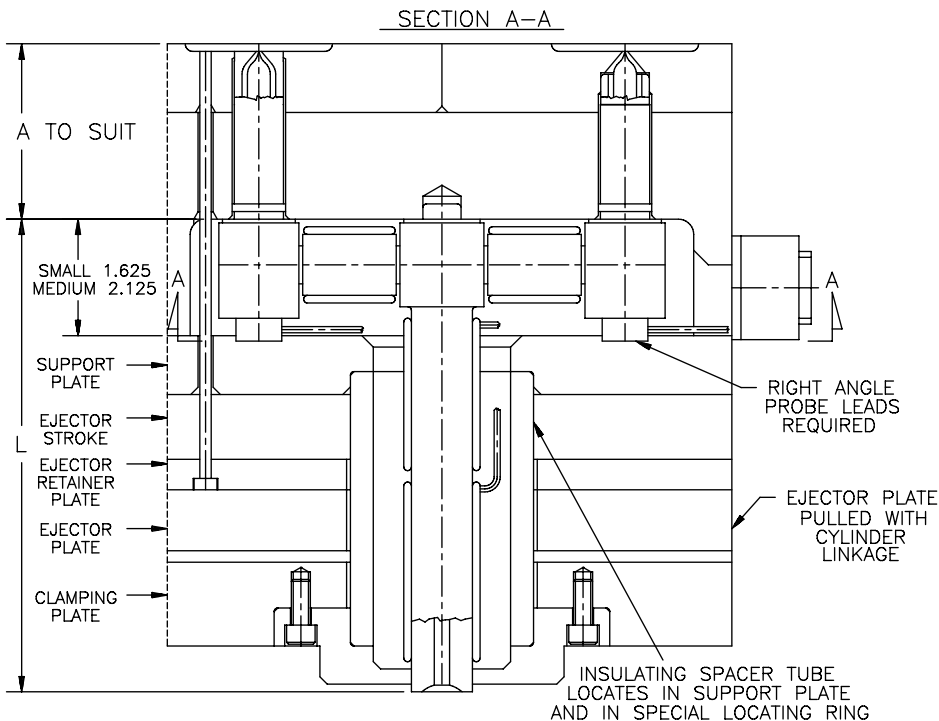
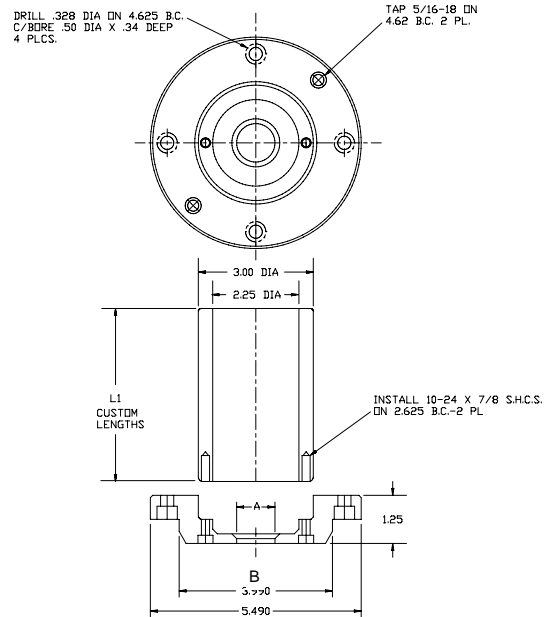
# Reverse Gating Method

A two-drop system installed with the ejector plate is shown. The Rama hot runner system is ideally suited to this application due to its relatively low overall stack height. It requires a long reach ('L' dimension) CD, plus a surrounding insulating support tube mounted in a special locating ring.

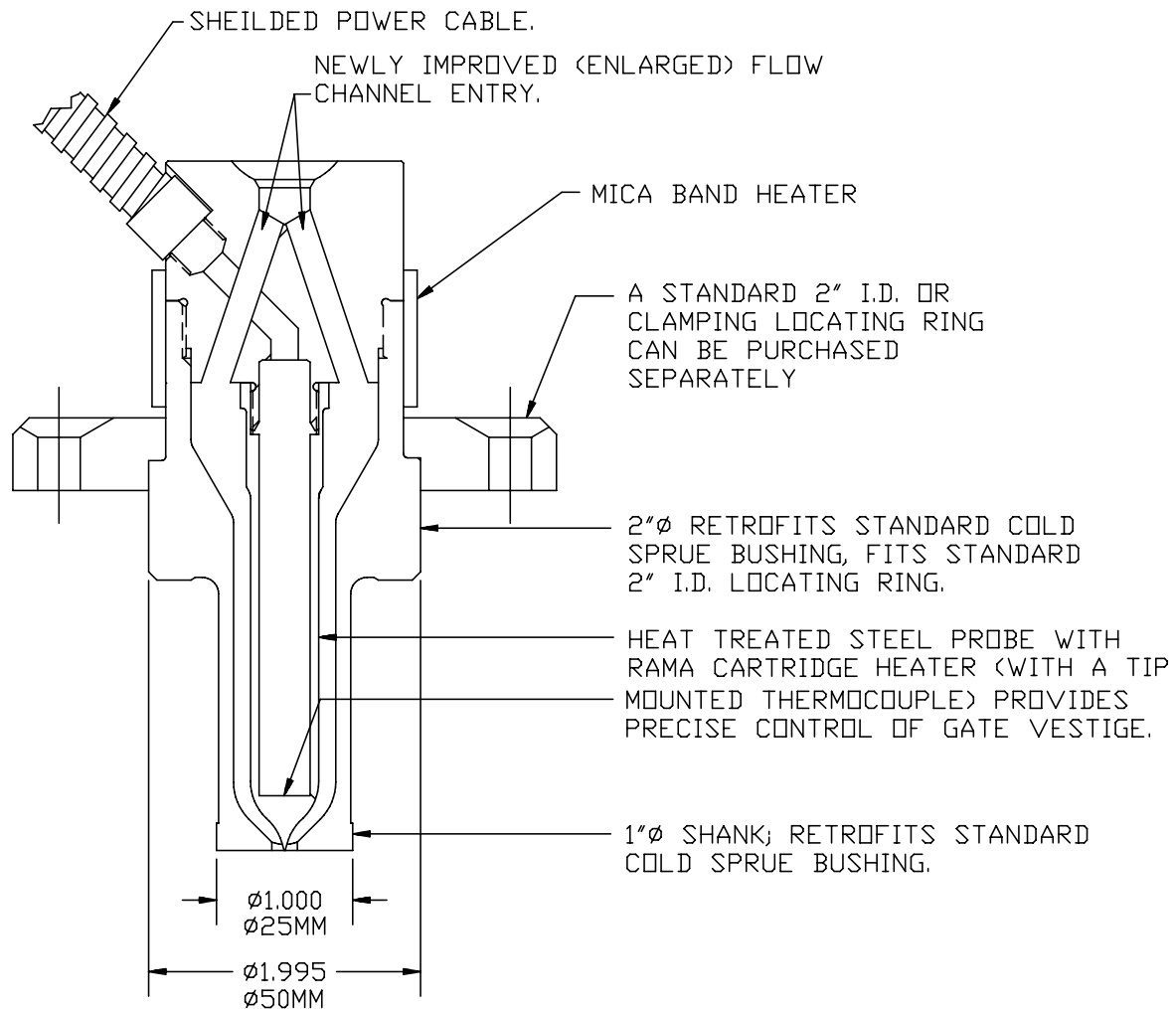
DIM	INCHES(MM)	
	SMALL	MEDIUM & LARGE
B	1.000(25.40)	1.375(34.93)



KEEP EJECTOR PINS AWAY FROM WIRING AND OUT OF MOLDING SYSTEM POCKET.



# Hot Sprue Bushing Features



Rama hot sprue bushings are designed for direct gating on parts that require excellent cosmetics and minimal gate vestige. An internal RAMA®ROD cartridge-heated probe provides constant temperature control exactly at the crucial gate area. This center heated probe requires no additional heating on the outside of the bushing and results in good air gap insulation between the bushing O.D. and the plate. A separate RAMA®BAND heater maintains even temperature at the entry port.

Rama has recently redesigned and significantly improved the performance of these bushings by enlarging and streamlining the melt flow entry

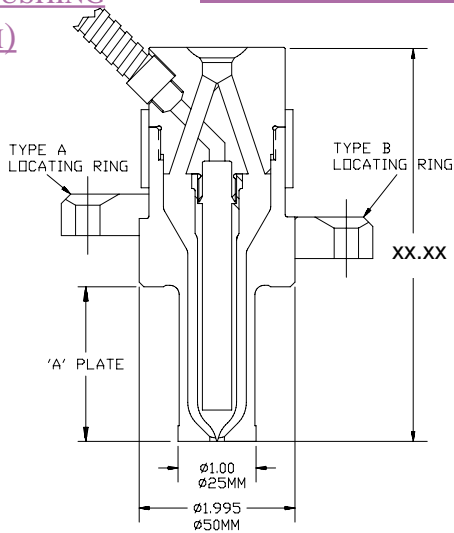
port, adding a shielded power cable, and separate clamping locating ring. More importantly, the medium sized bushing will now retrofit with a standard cold sprue bushing without any additional machining.

Rama hot sprue bushings are offered in two types: gated and topless. Standard designs are available in 'A' drop sizes from 1-3/8" to 4-7/8" including custom contoured ends, sprue gates and a variety of special gates to suit customer requirements. Our "long reach" bushings are available at up to 10" 'A' dimension and offer moldmakers a viable alternative to expensive and awkward long reach machine nozzles.



# Medium Gated & Topless Hot Sprue Bushings

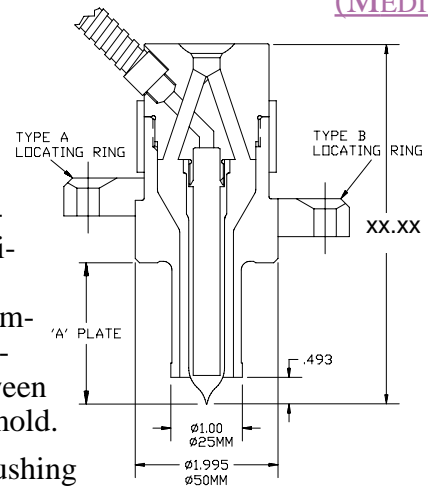
## GATED BUSHING (MEDIUM)



The medium gated hot sprue bushing is supplied with a .04" diameter gate and is available in six standard shoulder lengths and custom lengths are available up to 10".

## TOPLESS BUSHING (MEDIUM)

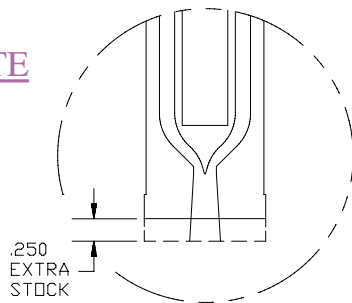
The medium topless, hot sprue bushing permits the mold designer maximum flexibility in his gate design and eliminates any witness line between bushing and mold.



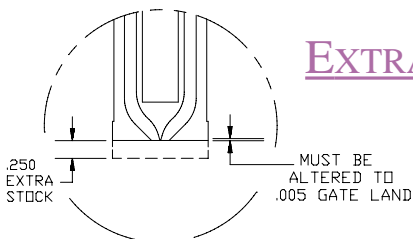
The topless bushing is available in standard shoulder lengths as shown below, and custom lengths are available up to 10". Gate configurations to be formed by mold maker.

GATED BUSHING (MEDIUM)			TOPLESS BUSHING (MEDIUM)		
PART NUMBER	PART NUMBER	'A' DIMENSION	PART NUMBER	PART NUMBER	'A' DIMENSION
1/2" RADIUS	3/4" RADIUS		1/2" RADIUS	3/4" RADIUS	
2GSBPA01375	2GSBPA01375-1	1-1/38"	2TSBPA01375	2TSBPA01375-1	1-1/38"
2GSBPA01875	2GSBPA01875-1	1-7/8"	2TSBPA01875	2TSBPA01875-1	1-7/8"
2GSBPA02375	2GSBPA02375-1	2-3/8"	2TSBPA02375	2TSBPA02375-1	2-3/8"
2GSBPA02875	2GSBPA02875-1	2-7/8"	2TSBPA02875	2TSBPA02875-1	2-7/8"
2GSBPA03875	2GSBPA03875-1	3-7/8"	2TSBPA03875	2TSBPA03875-1	3-7/8"
2GSBPA04875	2GSBPA04875-1	4-7/8"	2TSBPA04875	2TSBPA04875-1	4-7/8"

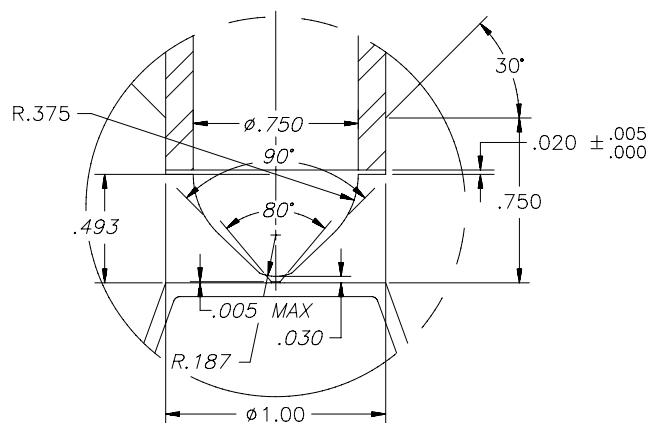
## SPRUE GATE



## EXTRA STOCK



## GATE FORM DETAIL



# Replacement Heaters & Thermocouples



## RAMA®ROD CARTRIDGE HEATERS

RAMA®ROD cartridge heaters are the highest quality heaters on the market today. Type HR heaters are stocked with 36" leads and thermocouple wires which are fully swaged into the heater. They are designed with flat end disk, teflon seal and profiled heat. Type J thermocouples are located at the end of the heater providing continuous operation up to 1600°F.



## RAMA®BAND HEATERS

RAMA®BAND heaters are computer designed and engineered to meet stringent design standards. They are made with mica insulation and wound with nickel/chromium ribbon and then enclosed in a rust resistant aluminized steel sheath allowing them to reach temperatures as high as 900°F.

## PIPE HEATER THERMOCOUPLE (TC9J36)

Pipe heater thermocouple assembly is designed to fit between the heater and the pipe. It is secured in place by tightening the pipe. It is secured in place by tightening the heater clamping band. This brazed assembly is made of copper to provide accurate and rapid temperature response. The thermocouple is a Type J with 36" leads.

## THREADED THERMOCOUPLE (TC3J72)

The TC-3 thermocouple is designed to be threaded into the T-Block. The thermocouple is a Type J and has 72" leads. Type K is also available upon request.

# Replacement Heaters

## CARTRIDGE HEATERS

SIZE	PART NUMBER	QTY	VOLT/WATT	DESCRIPTION
<b>CENTRAL DISTRIBUTOR</b>				
Small	2B1E/PCF36	1	240V/200W	1/4" Dia. • 1-1/2" lg.
Medium	2B2C/PDA36	1	240V/300W	1/4" Dia. • 2-1/4" lg.
Large	2B3C/PDU36	1	240V/400W	1/4" Dia. • 3-1/4" lg.
<b>BUSHING (STANDARD WITH OPTIONAL HEATERS &amp; STRAIGHT THROUGH)</b>				
Small	2B1E/PCF36	2	240V/200W	1/4" Dia. • 1-1/2" lg.
Medium	2B1G/PCF36	2	240V/200W	1/4" Dia. • 1-3/4" lg.
Large	3B2C/PDK36	2	240V/350W	3/8" Dia. • 2-1/4" lg.
<b>PIPE (1PIH, 2PIH, 3PIH SERIES)</b>				
Small	3B1C/PCF36	2	240V/200W	3/8" Dia. • 1-1/4" lg.
Medium	3B1C/PCF36	2	240V/200W	3/8" Dia. • 1-1/4" lg.
Large	3B1G/PCF36	2	240V/200W	3/8" Dia. • 1-3/4" lg.
<b>'T', ELBOW, CROSS BLOCK(S)</b>				
Small	*2B1C/PCF36	2	240V/200W	1/4" Dia. • 1-1/4" lg.
	3B1C/PCF36	2	240V/200W	3/8" Dia. • 1-1/4" lg.
Medium	3B1G/PCF36	2	240V/200W	3/8" Dia. • 1-3/4" lg.
Large	3B1G/PCF36	2	240V/200W	3/8" Dia. • 1-3/4" lg.
<b>PROBE (LENGTH &amp; WATTS TO SUITE PROBE)</b>				
Small	2HR series	1	240V/54W/in.	1/4" Dia.
Medium	2HR series	1	240V/54W/in.	1/4" Dia.
Large	3HR series	1	240V/80W/in.	3/8" Dia.

\* Small cross block only

## COILED NOZZLE HEATERS

Rama has a large factory stock available of replacement coiled nozzle heaters. Standard ID .500", .750", .866", .875", .984" nominal ID flattened. Standard features include internal Type J thermocouple, flat coil design, proportional profiling, 3/4" conduit or fiberglass sleeving and 36" leadwires. Replacement heaters are available for

## BAND HEATERS

### BAND HEATERS FOR PIPES & CD'S SMALL SYSTEMS

Standard 240V Heaters (36" leads)  
1" ID, 240V, 125 w/lineal inch

PART NUMBER	LENGTH	WATTS
8B6B/PBJ36	3/4"	95
8B8B/PBP36	1"	125
8B12B/PCD36	1-1/2"	190
8B16B/PCP36	2"	250
8B20B/PDD36	2-1/2"	315
8B24B/PDP36	3"	375
8B28B/PED36	3-1/2"	440

### BAND HEATERS FOR PIPES & CD'S MEDIUM & LARGE SYSTEMS

Standard 240V Heaters (36" leads)  
1-3/8" ID, 240V, 150 w/lineal inch

PART NUMBER	LENGTH	WATTS
11B6B/PBN36	3/4"	115
11B8B/PBU36	1"	150
11B10B/PCD36	1-1/4"	190
11B12B/PCK36	1-1/2"	225
11B16B/PDA36	2"	300
11B20B/PDP36	2-1/2"	375
11B24B/PEF36	3"	450
11B28B/PEU36	3-1/2"	525
11B32B/PFK36	4"	600
11B36B/PGA36	4-1/2"	675

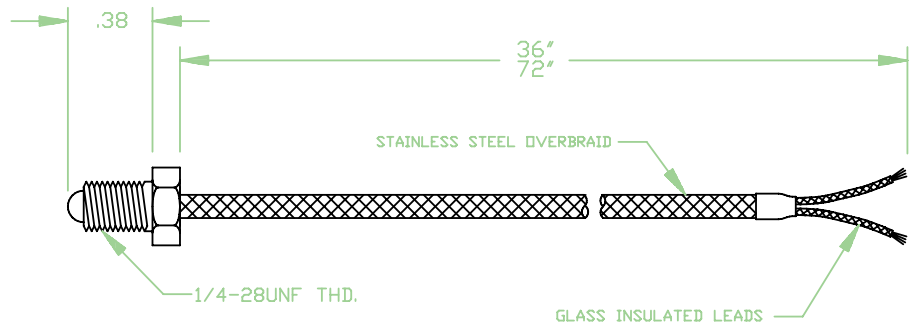
straight through gated bushings listed in section 3 of this catalog. Contact our factory for a complete listing of replacement parts. Rama supplies all of the replacement coiled nozzle heaters for our systems, as well as many competitor-built system replacement parts.



# Replacement Thermocouples

## THREADED THERMOCOUPLE

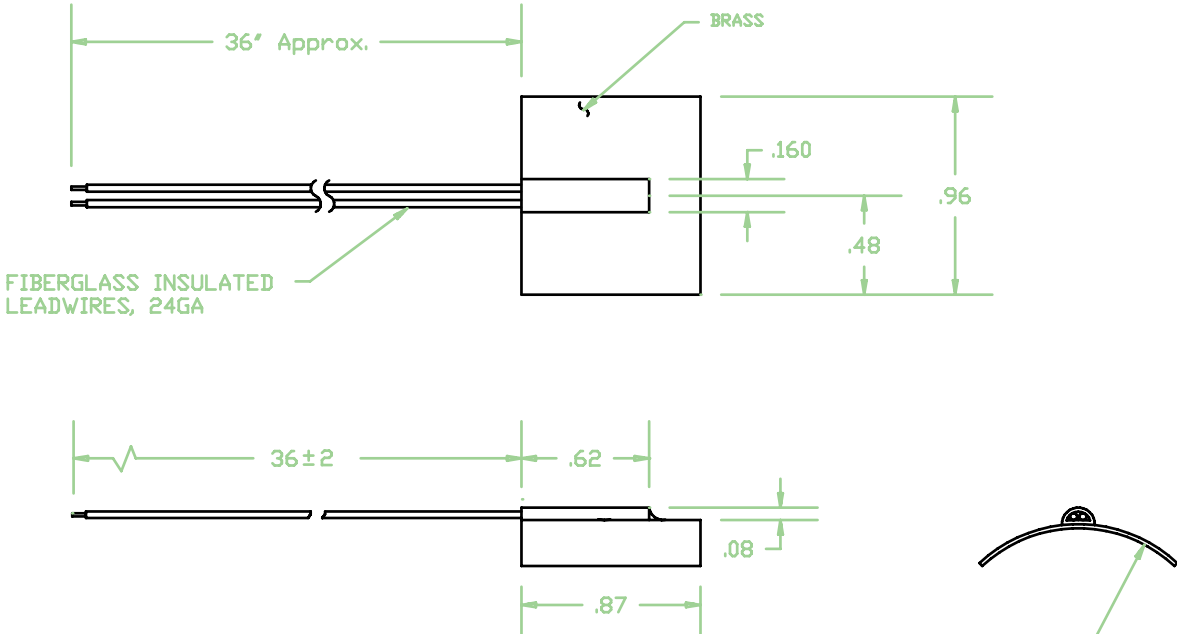
Replacement T/C for 'T', elbow and cross blocks (TC3J36 or TC3J72).



Note: Maximum operating temperature is 900°F.

## CURVED SURFACE THERMOCOUPLE

Replacement T/C for 1" and 1-3/8" pipes (TC9).



PART NUMBER	DIAMETER
TC9J36-1	1.00"
TC9J36	1.37"

Application Note: Insertion under band heaters. The raised portion should be positioned in gap area of heater.



# Disassembly and Cleaning Instructions

FIGURE 1 - Probe Tip Inspection

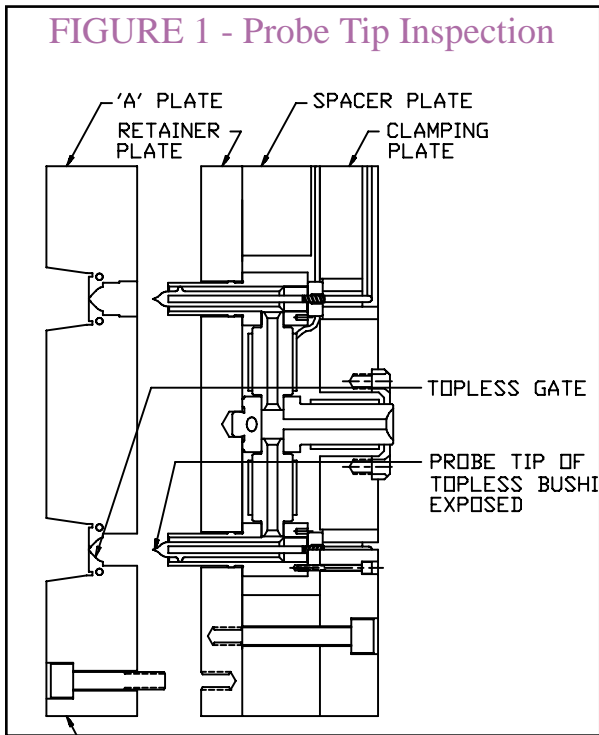
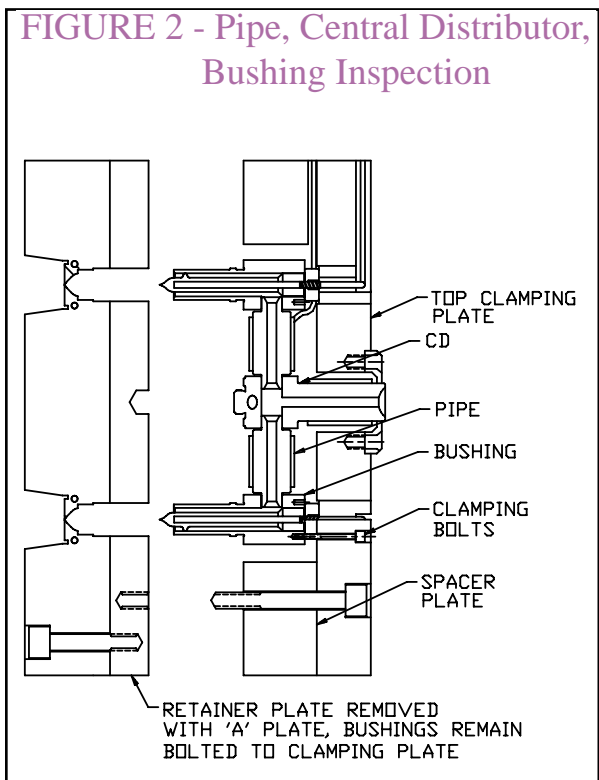


FIGURE 2 - Pipe, Central Distributor, Bushing Inspection



## TOPLESS BUSHING SYSTEMS

Planning the hot side mold plates for a topless bushing runnerless system can aid in disassembly and cleaning of the assembly. It is recommended to use a two-piece 'A' plate to make up the 'A' dimension. Using a 7/8" thick retainer plate will help locate the bushings in the manifold when disassembly and cleaning is necessary. A standard 'A' plate should be used to make up the balance of the drop dimension required.

The following methods should be followed when disassembling the system for inspection and cleaning.

### METHOD 1: PROBE TIP INSPECTION AND CLEANING

In the press or on a bench, unbolt the 'A' plate (see Figure 1) and move it away with the ejector halve. This will expose the gates and probe tips for inspection and cleaning. Reverse the procedure for reassembly.

### METHOD 2: PIPE, CENTRAL DISTRIBUTOR BUSHING INSPECTION AND CLEANING

In the press or on a bench, remove the retainer and 'A' plates (see Figure 2) and move them away with the ejector halve. In this position, the runnerless assembly will remain attached to the top clamping bolts and the components will be exposed for inspection and cleaning. Reverse the procedure for reassembly.



# Disassembly & Cleaning Instructions

## STANDARD AND STRAIGHT- THROUGH GATED BUSHING SYSTEMS

As in the toplless bushing systems, planning the hot side mold base plates can aid in the disassembly and cleaning of gated systems. It is not necessary to use a retainer plate in a runnerless gated bushing system. A one-piece 'A' plate is adequate for disassembly of gated systems when cleaning and inspection is required (see Figure 3).

The following method should be followed when disassembly is required for inspection and cleaning the upper side of the runnerless system.

In the press or on a bench, remove the top clamping plate as noted (see Figure 4). If straight-type probes are used where the wires are routed out of the top clamping plate, the leadwires must be disconnected from the terminal block. Next, remove the bushing clamping bolts and top clamping plate bolts so the top clamping plate can be disassembled. With the top clamping plate off, remove the probes and inspect the gated bushing bores.

If you selected right-angle type probes, the probe heater wires are routed in the spacer plate raceway and should be unhooked from the terminal block prior to probe removal. All other disassembly procedures should be the same as for the straight-type probes. Reverse the procedure for reassembly.

*Note:* If disassembly of the Rama runnerless system is required, consult factory for instructions.

FIGURE 3 - Gated System with a one-piece 'A' plate

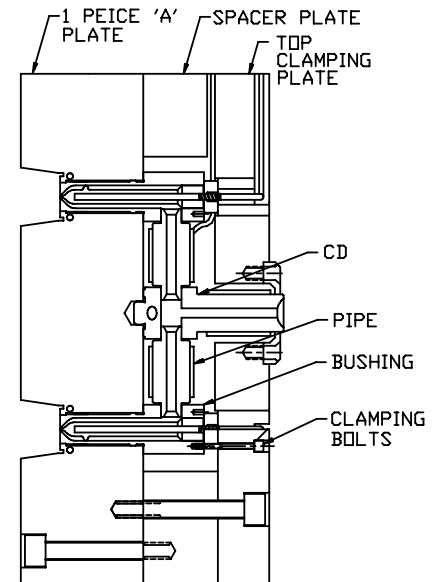
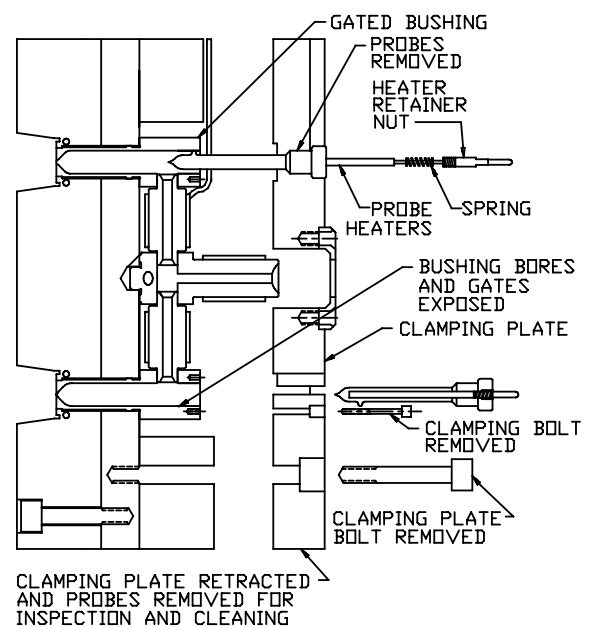


FIGURE 4 - Gated System Inspection



# Operating Instructions & Troubleshooting

Rama hot runner systems are designed for ease of operation, utilizing precision zone control and simplicity of start-up. It is recommended to use closed-loop temperature controllers with a reduced voltage start-up function to achieve optimum performance. The following steps should be followed during mold start-up.

## OPERATING INSTRUCTIONS

### A. WIRE CONTINUITY TEST

1. Check thermocouple and heater leadwires to assure they have not been pinched or damaged.
2. Perform a continuity and insulation resistance test on each heater.
3. With the mold assembled and prior to installing into the press, verify that all electrical connections have been terminated correctly to the junction box.

### B. TEMPERATURE CONTROL TESTS

1. Connect the power and thermocouple (T/C) cables to the appropriate connectors on the temperature controller and mold.
2. Verify that each zone of the controller is set in the automatic position.
3. Verify that the correct T/C is controlling the assigned zone.

### C. MACHINE VERIFICATION AND START-UP PROCEDURE

1. Verify that the nozzle and barrel are adequately heated for the material being processed and that its orifice is at least .312" (8mm) in diameter.
2. Install the mold in the press and turn the heat on. Set the temperature of the central distributor (CD), pipes and bushing to the same temperature as the nozzle. (Note: Temperature settings may require readjustment based on shot size, cycle time, etc.)
3. Purge the barrel of the machine. Turn on the back pressure fully leaving the screw in the forward position. Bring the nozzle of the molding machine in contact with the CD.

4. With the mold open and the nozzle in contact with the CD, start the screw recovery. This will extrude material into the CD, pipes and bushings and may appear at the gates. Complete screw recovery will indicate that the system is full.

The process of extruding resin into the system is best accomplished by using the maximum screw speed and back pressure. It may be necessary to reduce back pressure to achieve screw recovery.

5. Start-up the system using conventional operating procedures.

## TROUBLESHOOTING

The following are a few examples of common problems that may occur during the molding process. The solutions given are only suggestions and may require more evaluations that that stated.

### EXAMPLE 1

Problem: Material flow during injection.

Probable Cause: Cold material in the machine nozzle of the system.

SOLUTION 1: The material temperature in the barrel should be verified. With the use of a pyrometer and penetration probe, retract the machine nozzle and quickly insert the probe approximately 1/2" into barrel and note the reading. Continue to insert the probe until the tip is directly under the nozzle thermocouple, or if the nozzle is not equipped with a thermocouple, until it is in the center of the band heater. Note the difference in the two readings. Compare the readings with the supplier specifications and make adjustments to achieve a uniform temperature along the nozzle.

Next, purge the barrel and take an actual melt temperature and re-adjust as required. If the temperature varies below the recommended melt temperatures, retest the system for injection pausing. If pausing still continues, try solution 2.



# Troubleshooting & Color Changes

**SOLUTION 2:** Increase the CD temperature approximately 10% higher than the set point. (Caution: Do not exceed the capability of the material). The area of the CD may be over a heat sink which could reduce the temperature, thus causing injection pausing. If no change occurs in the process, reset the temperature to the previous setting. Repeat this process for the pipes to determine the problem. If pausing still occurs, try Solution 3.

**SOLUTION 3:** After trying Solution 2 without positive results, increase the probe temperature approximately 10% higher than the set point. If the screw starts to move, then pauses, the problem is in the probe area. If this solves the problem but the temperature is too high, check the following:

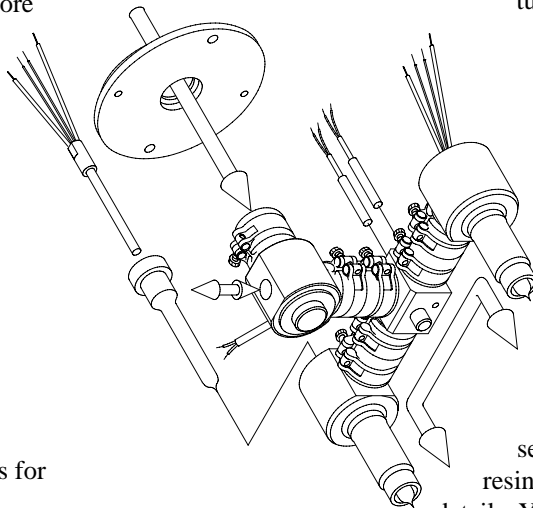
- Tip-to-gate relationship - if the tip is too close it will shut off the material flow and if it is too far back it will cause a cold slug.
- Gate land dimension - if the gate was altered, the gate land may have increased above the maximum allowable .005" thickness causing injection pause.

## EXAMPLE 2

Problem: Stringing at gate on the finished product.  
Probable Cause: Material properties.

Some materials are more prone to stringing than others. However, it can normally be controlled by using one or more of the following procedures.

- Balance the mold temperature. The system temperature should not be more than 10% hotter than the barrel temperature.
- Increase/decrease the melt or probe temperature.
- Adjust the probe to alter shear at the gate.
- Alter probe tip design or gate diameter (consult Rama engineers for details).



## COLOR CHANGE PROCEDURE

Color changes using the Rama runnerless system is quite simple. Many color changes can be made while the machine is running production, scrapping only 10 to 12 shots. Other materials may require full purging as noted in the following procedure.

1. Move back the nozzle of the machine.
  2. Switch to manual mode.
  3. Completely purge the barrel using maximum screw length and introduce the new color, increasing the barrel temperature 100°F.
  4. Turn on the heat to the system without changing set point, if the color change is to be made from a cold start-up.
  5. When the barrel and the system have stabilized, bring the nozzle to the forward position and set screw speed and back pressure to their maximum.
  6. Let the screw recover, purging the old color out of the system. Once you see material coming through the gates, increase the system temperature about 100°F.
  7. Continue extruding, using screw recovery.
  8. Once the system seems to be clean of the old color, turn the barrel temperature back to its normal set point. Continue extruding while the barrel temperature lowers.
  9. When there is an indication that the temperature is lowering, decrease the system temperature to its original set points.
  10. Continue extruding material until the system temperature has returned to required set points.
  11. Proceed to regular operation.
- Notes:* Due to colorant thermal conductivity, it may be necessary to adjust set point for the new color. Consult your resin supplier and colorant supplier for more details. You may have to reduce screw speed during operation. On a new system, it is suggested that a clear material be run first. This will aid in future color changes.

# Wiring Requirements

## RECOMMENDED WIRING PLAN FOR STANDARD BUSHING PROBE HEATERS

Shown here are typical wire slots machined in the top clamping plate to accommodate the leadwires from the bushings. The number of leadwires from the probe heaters in the bushing (which include integral thermocouples) will determine the width of the wire slots.

*Note:* If you are wiring with an optional right angle lead probe, it is routed in the same raceway (level 2) as all other wiring (see illustration below).

Strip In Photo

## RECOMMENDED WIRING PLAN FOR CENTRAL DISTRIBUTOR, T-BLOCKS, PIPES AND RIGHT ANGLE LEAD PROBES

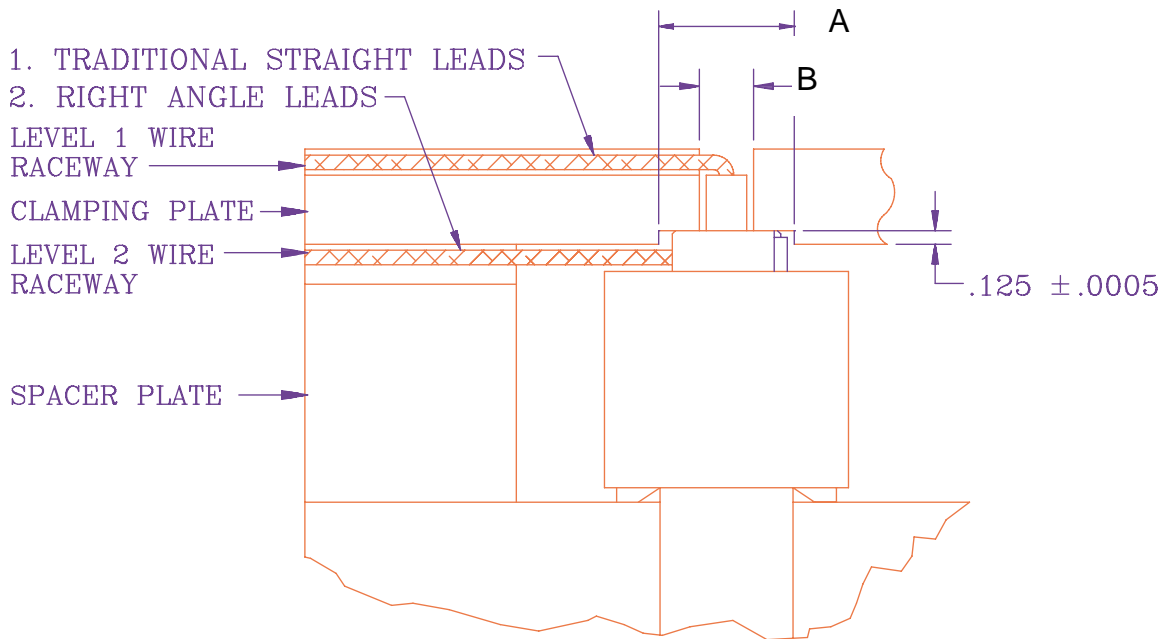
Shown here is a typical 16 drop Rama runnerless molding system with wire slots machined in the spacer plate. In this design the slots are 1" deep by 3/4" wide to accommodate all of the heater and thermocouple leadwires from the central distributor, T-blocks and pipes in the mold. Wire slots are machined toward the top of the mold. If you choose the probe with right angle leads, the wires will be routed in this same level 2 raceway.

Strip In Photo

# Probe & Bushing Hold Down Instructions

## HOLD DOWN - STANDARD METHOD

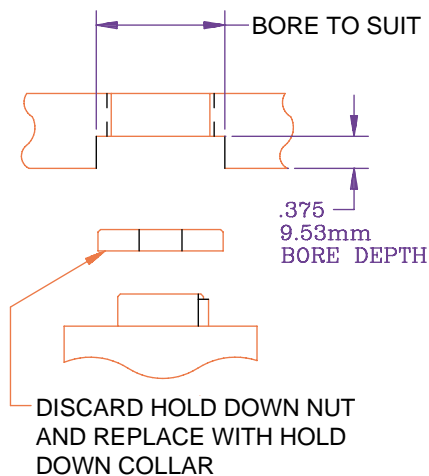
### TWO PROBE LEAD WIRE OPTIONS



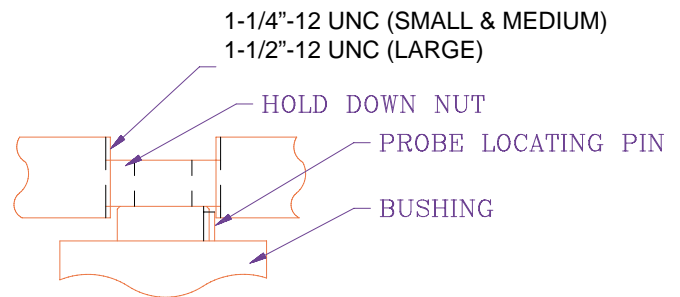
DIM	INCHES(MM)		
	SMALL	MEDIUM	LARGE
A	1.125(28.57)	1.250(31.75)	1.563(39.69)
B	.500(12.70)	.500(12.70)	.688(17.48)

## HOLD DOWN - RETROFIT METHOD

### RETROFIT TO NEW PROBE HOLD DOWN METHOD



### FORMER METHOD



# Temperature Controls

## CONTROLLER FEATURES

- Practical plug-in interchangeable modular systems.
- Systems supplied as a complete package.
- Microprocessor-based self-adjusting temperature controller.
- CompuStep® Heater Conditioning System.
- CompuCycle® Power Control System.
- Built in diagnostics.
- Automatic power cut-off when any t/c fault is detected.
- Self-regulating manual power controllers.

## SINGLE ZONE CONTROLLER

Strip In Photo

For use in hot sprue bushing or single heater applications, the compact, mobile SINGLE ZONE CONTROLLER features:

- Digital displays
- Extra large heat sinks
- Accurate, reliable operation
- Fused and grounded circuitry
- 15 Amperes
- 3600 Watts
- 120/240 Volt single phase operation, 50-60 HZ

*Note:* Cables are supplied separately.

CATALOG NUMBER	PLUG CATALOG #	PLUG DESCRIPTION
PIM1A15	AC2024F	Power In
	AC1524M	Power Out
	M2MJ	

## MAIN FRAMES

### CURRENT/VOLTAGE MONITOR

Supplied in place of the standard breaker/disconnect panel, this unit will provide the operator with the voltage supplied from each phase. It also gives the operator the ability to monitor the current drawn by one zone.

### MAIN FRAME BLANK PANEL

Must be used to cover unused zones in main frames. One panel per 15 amp zone, supplied with push-pull panel fastener.

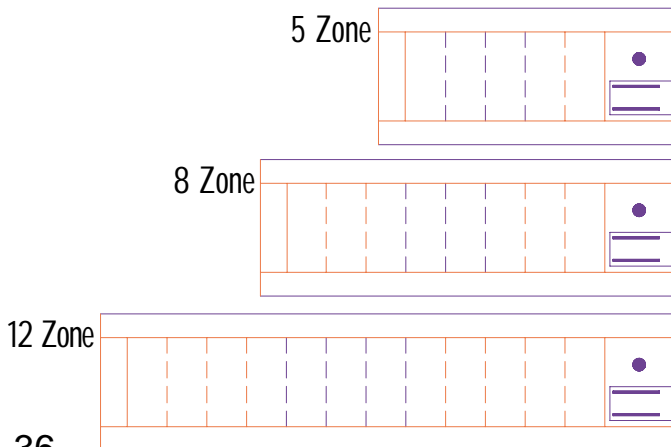
### MAIN FRAME FEATURES

- Heavy duty construction
- Box members top and bottom
- Grounded circuitry
- Lower cooling
- Upper and lower module guides for proper alignment

### EACH UNIT INCLUDES

- Heavy duty electrical contacts
- A pre-wired power distribution buss
- A power input cable

Field power changes are possible with 110-415 volt, single or three phase.



CATALOG NUMBER	ZONES
F5G	5
MF8G	8
MF12G	12
F5G*	5
MF8G*	8
MF12G*	12

\* An MFC main frame is needed when using a SAM module. The SAM takes the place of one control module.



# Control Modules

## IMP15G

Our Proportional Integral Derivative (P.I.D.) micro-processor equipped temperature controller provides the comparison calculations necessary to maintain heater temperature  $\pm 1^\circ$  F. Simplified controls allow for automatic or manual mode. A symbol display indicates Over Temp., Under Temp., No Heat, Thermocouple Open, and Thermocouple Reversed. Each IMP has the exclusive CompuStep™ heater startup system and CompuCycle™ power control. Built in diagnostics and communications via the SAM module makes this one of the most sophisticated units on the market.

Strip In Photo

## SAM

Our Standby-Heat Alarm and Communications Module automatically sets all IMP equipped zones for standby heat (nights and/or weekends). SAM also provides both audible and visual alarms for over and under temperature conditions. A front panel output connector provides optional relay control for a variety of uses including automatic machine shutdown, remote warning devices, or control of auxiliary equipment.

Strip In Photo

## AIM

The AIM Temperature Control Module represents the state-of-the-art in hot runner temperature control technology. Virtually every feature a molder could want is contained in the module, which has been designed to operate independently or with the ACM communication module. The AIM utilizes the same CompuCycle™ and CompuStep™ features as found in the IMP modules. CompuStep™ provides gradual phase angle fired voltage during warmup. CompuCycle™ utilizes zero crossover power to improve response time, reduce thermal fatigue, and prolong heater life.

Strip In Photo



# Power & Thermocouple Cables

Strip In Photo

Strip In Photo

Strip In Photo

## THERMOCOUPLE CONNECTORS

- Three sizes offered for maximum utility
- Can be mounted on mold surface, in mold pocket or on a terminal box for maximum versatility
- Supplied with color coded screw terminals for wiring ease
- Wiring diagram included on connector shell
- Gasketed and water resistant
- Keyed so it cannot be inserted improperly or mistaken for mold power connector
- Has large contact area for efficient thermocouple voltage transfer

## POWER & THERMOCOUPLE (T/C) CABLES

- Shipped complete, with all connectors attached
- Standard lengths of 10 ft. (3.3m) or 20 ft. (6.6m)
- Retaining latches integral with standard cable assemblies
- Special connectors & cables available, price on request

## STANDARD POWER CONNECTORS

- Supplied with numbered 6" leads (pre-stripped) and with ground lead
- Can be mounted on mold surface, in mold pocket or on a terminal box for maximum versatility
- Standard mold power connectors are the same size differing only in the number of contacts

POWER CABLES		
10FT (3.3M)	20FT (6.6M)	ZONES
MPC5C10	MPC5C20	5
MPC8C10	MPC8C20	8
MPC12C10	MPC12C20	12
THERMOCOUPLE CABLES		
TC5C10	TC5C20	5
TC8C10	TC8C20	8
TC12C10	TC12C20	12
HIGH POWER CABLES		
MPCH23C10	MPCH23C20	2-3
MPCH5C10	MPCH5CCO	5

THERMOCOUPLE CONNECTORS			
ZONES	5	8	12
PART NO.	MTC5	MTC8	MTC12

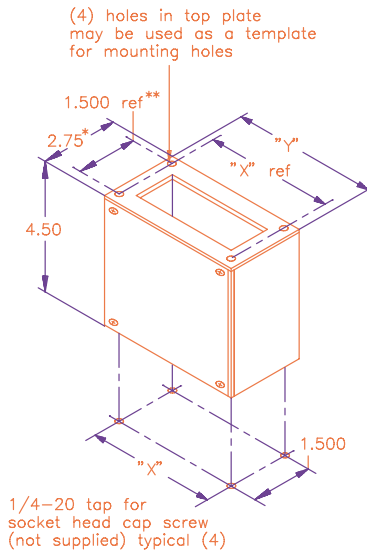
POWER CONNECTORS					
ZONES	5	8	12	2-3	5
AMPS	15	15	15	30	30
PART No.	PIC5	PIC8	PIC12	PICH23	PICH5



# Power & Thermocouple Boxes

## FEATURES

- Most economical and practical means of mounting connectors on the mold
- Single or combination connector terminal boxes available
- Constructed of extremely heavy gauge steel
- Heavily plated or irridited to resist corrosion
- Pre-punched, threaded and ready to accept connectors
- Connector mounting hardware supplied
- Side plate easily removed for wiring or servicing
- Water resistant when used with RTV sealant



### STANDARD SINGLE POWER BOX

CATALOG #.	X	Y
PIC-512-TB	4.250	4.875
PICH-23-TB	4.990	5.14
PICH-5-TB	6.052	6.676

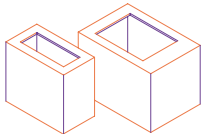
### SINGLE THERMOCOUPLES (T/C) Box

MTC-5-TB	4.250	4.875
MTC-8-TB	4.990	5.614
MTC-12-TB	6.052	6.676

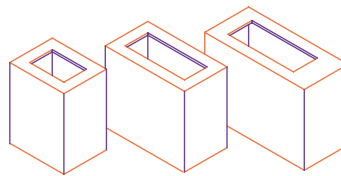
### COMBINATION THERMOCOUPLES & POWER BOX

PTC-5-TB	8.031	8.655
PTC-8-TB	8.843	9.467
PTC-12-TB	9.906	10.530
PTCH-23-TB	9.906	10.530
PTCH-5-TB	10.437	11.061

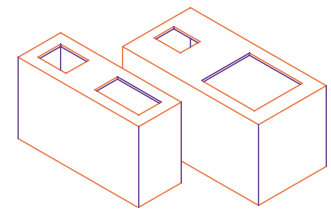
*Note:* Overall dimensions shown include allowances for hardware. \* 2.75 dimension is 4.50 for PICH-5-TB and PTCH-5-TB. \*\* 1.500 dimension is 3.250 for PICH-5-TB and PTCH-5-TB.



Standard Single Power Box



Standard Thermocouple Box



Combination Thermocouple & Power Box

## FLOOR STAND

- Constructed of heavy gauge structural steel
- Welded construction with capped ends
- Adjustable vertical and horizontal cross braces
- Swivel type casters with locks
- Does not depend on main frame for strength
- Will support the heaviest frames with ease

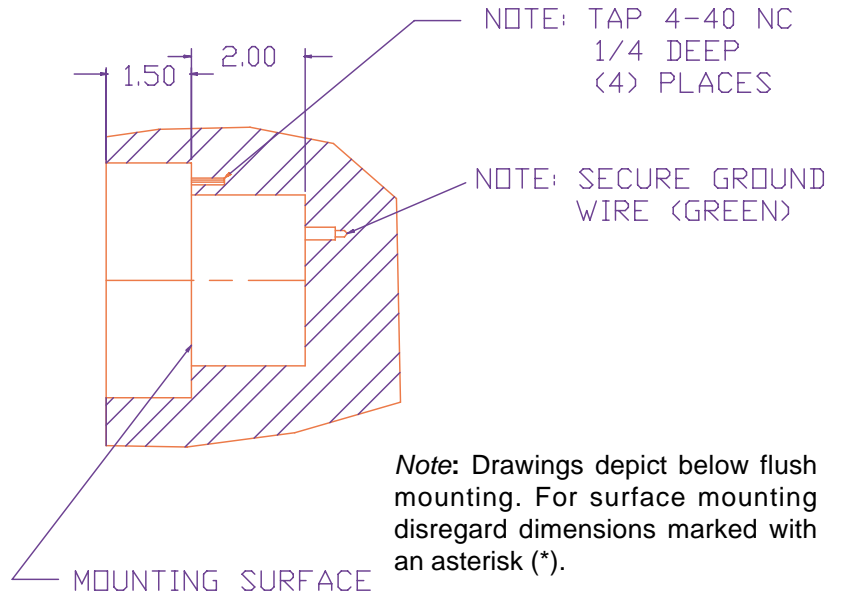
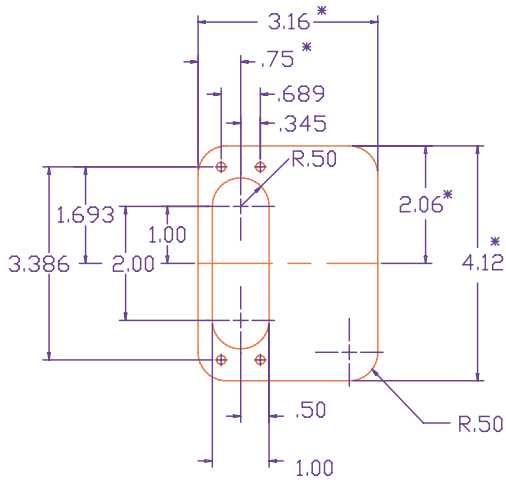
Part No. MFS5812 (4-48 zone capacity)

## INSULATED CRIMP CONNECTORS

Connections to heater wires are easily made with these insulated "crimp" connectors. Crimp connectors are supplied with main frame packages and can also be ordered separately. Part No. HWCC1 15 amps. Replacement fuses: 15 amps, part no. ABC15.

# Mold Pocket Layouts

## BELOW-FLUSH AND SURFACE MOUNTING OF STANDARD POWER CONNECTORS

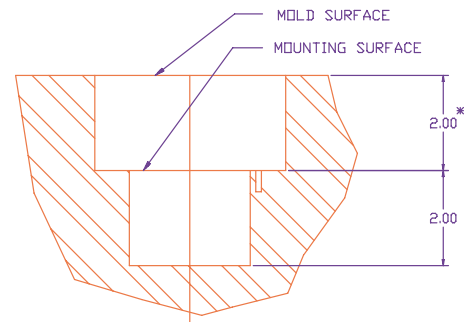
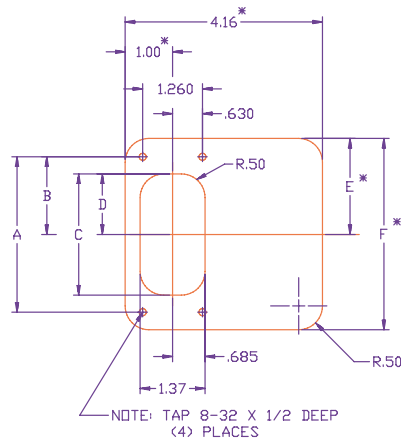


**TOLERANCES**

.00.....	± .010
.000.....	± .005

*Note:* Drawings depict below flush mounting. For surface mounting disregard dimensions marked with an asterisk (\*).

## BELOW-FLUSH AND SURFACE MOUNTING OF THERMOCOUPLE CONNECTORS



DIMENSION	CATALOG NUMBER - INCHES(MM)		
	MTC5	MTC8	MTC12
A	3.268(83.01)	4.055(103.00)	5.118(130.00)
B	1.634(41.50)	2.028(51.51)	2.560(65.02)
C	2.55(64.77)	3.34(84.84)	4.40(111.76)
D	1.275(32.39)	1.670(42.42)	2.200(55.88)
E	2.00(50.80)	2.40(60.96)	2.93(74.42)
F	4.00(101.60)	4.80(121.92)	5.86(148.84)

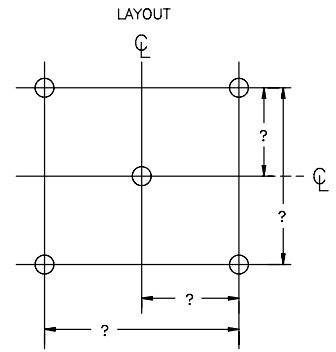


# Quick-Quote Fax Hot Runner System

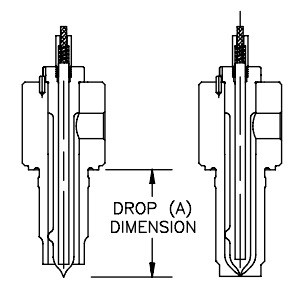
Contact Name: \_\_\_\_\_  
 Company: \_\_\_\_\_  
 Address: \_\_\_\_\_  
 City/State/Zip: \_\_\_\_\_  
 Phone: \_\_\_\_\_ Fax: \_\_\_\_\_

Please fax form to  
 Proheat at  
 (502) 222-0714 Questions?  
 Call us at (800) 626-2142

1. Number of drops(gates): \_\_\_\_\_
2. Drop 'A' Dimension: \_\_\_\_\_
3. Cavity-to-cavity centers: \_\_\_\_\_
4. Type of bushing required:  Topless  Gated
5. Nozzle Radius:  500  .750  Other
6. Resin Material: \_\_\_\_\_
7. Fill time (in seconds): \_\_\_\_\_
8. Type of probe leads  Straight  Right Angle
9. Total shot weight: \_\_\_\_\_
10. System size:  Small  Medium  Large
11. Central distributor height: \_\_\_\_\_

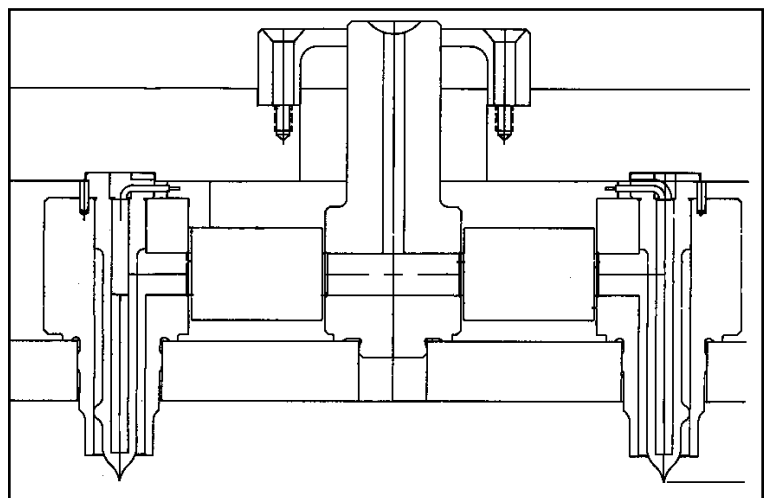


TYPE BUSHING REQUIRED



NOZZLE RADIUS 1/2"  3/4"  FLAT

Please write any notes or comments below.



For a more detailed quote that includes hot-side base mold plates with your manifold installed and wired up to match your Rama controller, send us your mold design prints showing the mold base size, base MFG/catalog number or customer base drawings, along with number of zones in controller, voltage and any special requirements.



# Order Form Hot Runner System

Contact Name: \_\_\_\_\_  
Company: \_\_\_\_\_  
Address: \_\_\_\_\_  
City/State/Zip: \_\_\_\_\_  
Phone: \_\_\_\_\_ Fax: \_\_\_\_\_

Please fax form to  
Proheat at  
(502) 222-0714  
Questions?  
Call us at (800) 626-2142

1. Material : \_\_\_\_\_

2. Average Melt Temperature: \_\_\_\_\_

3. Shot Size: \_\_\_\_\_

4. System size:

Small     Medium     Large

5. Number of control zones required: \_\_\_\_\_

6. Thermocouple Type:  J     K

7. Should Rama supply a controller?

Yes     No

8. Clamping Plate Thickness:

7/8"     1.0"     1-3/8"     1-7/8"

2.0"     2-3/8"     Other \_\_\_\_\_

9. Machine Nozzle Radius:

.500"     .750"     Other \_\_\_\_\_

10. Type of probe leads:

Straight     Right Angle

11. Drop Length - 'A' plate thickness

(if more than one list):

A= \_\_\_\_\_ B= \_\_\_\_\_ C= \_\_\_\_\_ D= \_\_\_\_\_

12. Type of Gate:  Topless     Gated

Other \_\_\_\_\_ Gate Diameter: \_\_\_\_\_

13. Should Rama supply the hot half mold plates?     Yes     No

14. Do you have mold prints available?

Yes     No

15. Mold base manufacturer: \_\_\_\_\_

Catalog # \_\_\_\_\_

16. Mold base size:

Width • \_\_\_\_\_ Length • \_\_\_\_\_ Height • \_\_\_\_\_

17. Should Proheat install and wire the system in hot half mold?  Yes     No

Please sketch your configuration below.

See list of standard configurations included in this manual for minimum drop to drop lengths.



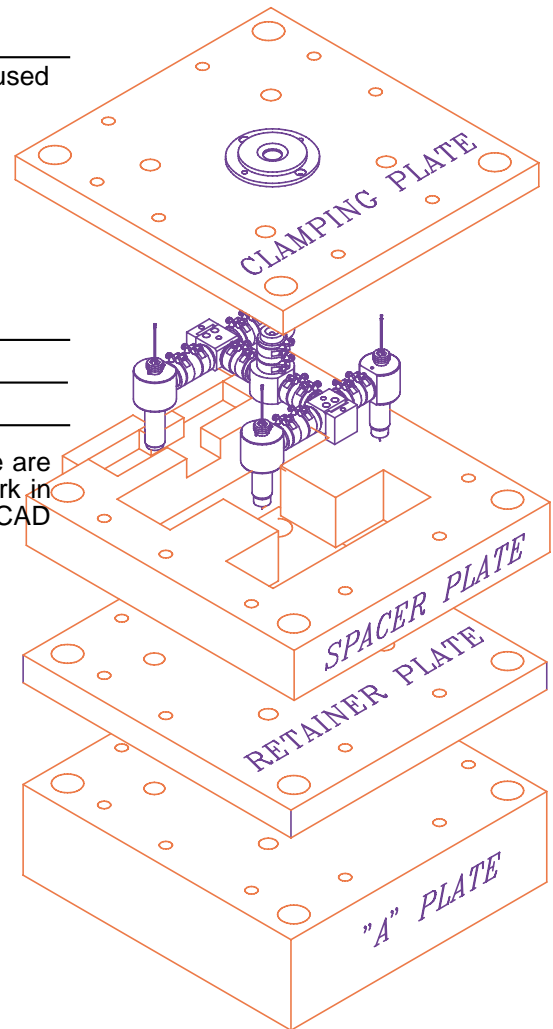
# Quick-Quote Fax Hot Side Mold Base

Contact Name: \_\_\_\_\_  
 Company: \_\_\_\_\_  
 Address: \_\_\_\_\_  
 City/State/Zip: \_\_\_\_\_  
 Phone: \_\_\_\_\_ Fax: \_\_\_\_\_

Please fax form to  
 Proheat at  
 (502) 222-0714  
 Questions?  
 Call us at (800) 626-2142

1. Clamping plate thickness: \_\_\_\_\_
  2. Spacer plate thickness: \_\_\_\_\_  
 Standards are 1-7/8" for small, 2-3/8" for medium and 2.875" for large systems or call out the custom thickness required
  3. Optional retainer plate thickness: \_\_\_\_\_  
 Standard thickness is 7/8". This plate is optional and is usually used with the topless bushing only.
  5. 'A' plate thickness:
    - 1 piece construction (without a retainer plate)
    - 2 piece (with a retainer plate)
  6. Overall base dimensions:  
 Width: \_\_\_\_\_ Length: \_\_\_\_\_ Height: \_\_\_\_\_
- Stock base: Manufacturer: \_\_\_\_\_  
 Catalog #: \_\_\_\_\_

If you are making a custom base, include prints of the base we are to match. If you prefer to perform some or all of the above work in house, Rama can provide telephone assistance and supply CAD files for your designers use.



**T**o offer complete hot runner systems, Rama has formed nationwide strategic alliances with America's leading mold base builders for the manufacture of its hot side mold base plates. These plates are designed and manufactured to your exact specifications, insuring that each Rama system is precision matched to the mold base of your choice, meeting each of your exact requirements. When you order a complete system, you will receive the manifold fully installed in the hot side mold base plates, completely wired and electrically tested. All you do is bolt and run!