PulseCooling™

Process Controllers

CTO PRODUCTS, INC.

COOLING FOR INDUSTRY & TOOLING OPTIMIZATION

N8779 Hwy. X • P. O. Box 90
Watertown, WI 53094 • U.S.A.
Phone: (920) 261-2606 • Fax: (920) 261-1350
E-Mail: sales@pulsecooling.com
Visit us at: www.pulsecooling.com

MISSION STATEMENT

In 1980 **CITO** (**C**ooling for **I**ndustry and **T**ooling **O**ptimization)
Introduced **PulseCooling** to the Plastic Processing Industry.

Since then CITO has brought many new innovations to the Industry.

Our goal is to manufacture components and systems that truly improve the quality and profitability for our customers.

We provide test and training facilities and are looking forward to working with you on your existing or new projects.

CITO PRODUCTS, INC.

Horst Wieder Pres / CEO

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BENEFITS OF PulseCooling ™

The trend of the Plastic Processing Industry is geared toward higher part complexity, more cavities, thinner walls, larger molds, more difficult to process materials, tighter processing parameters, and better inspection equipment. To obtain the highest performance and meet today's expectations, PulseCooling™ technology is used to precisely meet the heating and cooling requirements of each molding cycle.

The typical installation requires a temperature sensor inserted in the core and cavity side to "read" the mold surface temperature profile, this provides the PulseCooling™ controller with vital processing information.

The injection melt heat warms the mold surface temperature - not the entire mold.

As the mold surface reaches the desired level - the PulseCooling™ controller processes the information, and commands a fast responding coolant valve to supply a calculated pulse of coolant, (or heating) at maximum flow rate directly from the tower water supply or chiller during each cycle for maximum heat removal.

Each cooling pulse equals the excess heat from each molding cycle and compensates for cycle time, melt, ambient temperature and cooling pressure (FLOW) change.

When the molding cycle is interrupted - recovery time to the mold surface is quick - since only the mold surface has to rise to set temperature - not the entire mold.

PulseCooling™ Results in Many Previously Unobtainable Benefits

1. Direct control over **MOLD SURFACE TEMPERATURE** - not just waterline
2. **QUICK WARM UP**, only the very molding surface reaches temperature, not the entire mold
3. **HIGHER PRODUCTION OUTPUT** - full flow, turbulent cooling with cold water
4. **HIGHER QUALITY PARTS** through gradient dissipation during soak period
5. **OPTIMIZING OF THE MOLDING CYCLE** - continues feed back of **mold surface** temperature
6. **ELIMINATES THERMAL DRIFT** (warp, sinks, distortion and inconsistent fill)
7. **PRECISION CONTROL OF MOLDING SURFACE TEMPERATURE**

Predictable parts through compensation and correction of:
Day and night shift changes, Partial plant shut down - (flow / pressure / temp. changes)
Water Temperature changes (chiller or tower), Cycle changes
Melt heat input variation
Ambient Temperature changes,
Water supply pressure changes,
Back pressure changes.

8. **Continuous temperature readout of MOLD SURFACE** temperature without cycle interruption
9. **INSTANT AUDIO WARNING.** Minimum down time.
10. **VERY LOW POWER CONSUMPTION (10 WATT/ZONE)** approximately $10.00/year
11. **MINIMUM WATER CONSUMPTION** - Minimum water used for each molding cycle.
12. **MINIMIZES COOLING LINE CONTAMINANT BUILD UP** - full velocity PulseCooling
13. **REDUCES HEAT LOAD** to plant cooling system
14. **ELIMINATES OVER COOLING** during cycle interruption. (rusting)
15. **NO FLOOR SPACE REQUIRED** - machine mounted - no clutter in back of machine
16. **TOTAL ADAPTATION** from smallest mold to molds with up to 2" waterlines
17. **CONSTANT QUALITY CONTROL** - parts are produced within temperature window
18. **AUTOMATIC SORTING** - Quality control. Relay contact is provided for robotic pick up
19. **ELIMINATES MOLD CONDENSATION** for low temp. molding (including blow molding)
20. **ELIMINATES MOLD DAMAGE** caused by thermal growth.(misalignment of mating surfaces)
21. **ELIMINATES MOLD JAM-UPS** (tapered shut offs due to temperature differences)
22. No heaters, motors or pumps required = **LOW MAINTENANCE**
23. **QUALITY MONITORING SOFTWARE** tracking on selected models
24. **NETWORK COMMUNICATION available** - on selected models

THERE ARE 3 ESTABLISHED METHODS USED TO COOL A MOLD

1. CONTINUOUS FLOW - FLOW REDUCTION

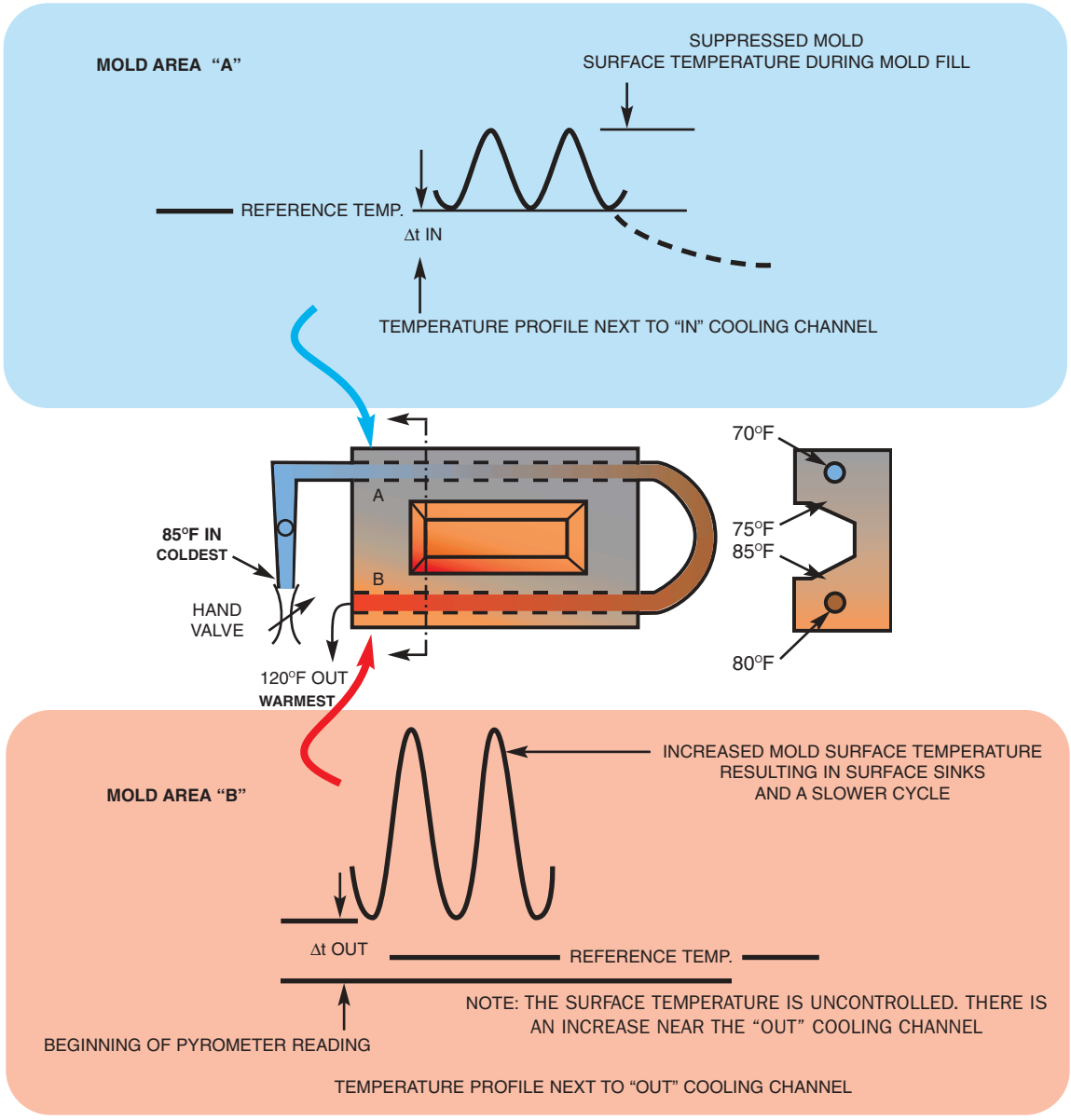
"Control" is achieved by manually reducing the flow - Quite often, molds will have several circuits; each of them being fine-tuned manually. Reducing the flow will increase the residence time of the cooling medium in the mold resulting in a thermal distortion of the molding surface.

With multi-cavity molds, the cycles have to be adjusted to the "SLOWEST" cavity (hottest). The cold inlet vs out surface area induces stress and warp in the molded part.

This method requires manual adjustments which is based on the previous cycle performance.

All adjustments are made after the fact.....

DYNAMIC TEMPERATURE OF A MOLDING CYCLE



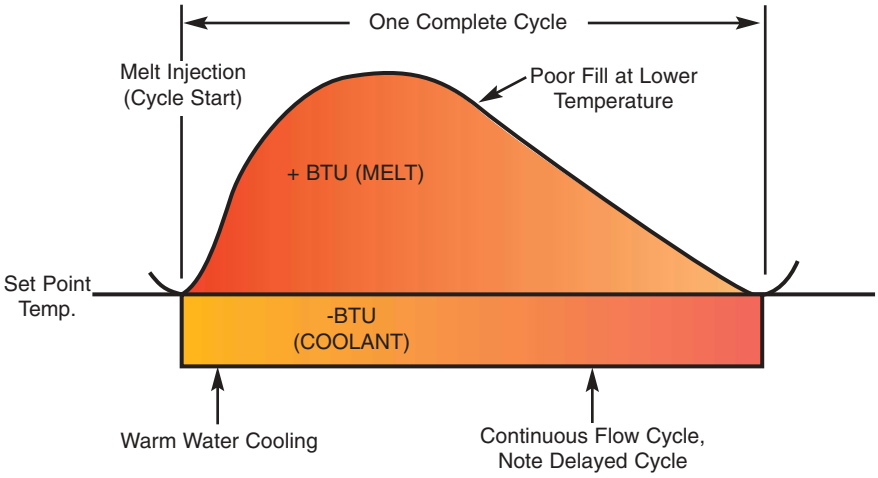
DETRIMENTAL EFFECTS OF RESTRICTED COOLANT FLOW Cold water enters the mold and gains heat during its prolonged residence time. The result is uneven part surface temperatures and distorted heat gradients. The injection melt faces a cold section in the "INLET" area and an undesirable hot-zone next to the "OUTLET" area. This uneven temperature across the mold, during mold fill, results in undesirable stress and warp in the molded part.

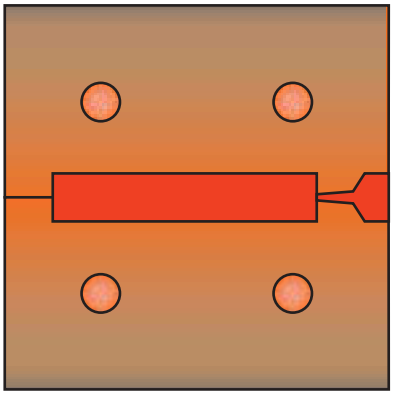
2. WARM WATER COOLING

Warm water cooling is used to prewarm the mold and to extract the excess heat - when the melt raises the mold temperature. During the warm up period - the water is warmer than the mold (-Δt). When melt is introduced into the mold a temperature difference is created between the warm cooling fluid and the mold surface. The surface temperature rises until the mold surface temperature increases to remove the excess heat. Note the uncontrolled and unpredictable surface temperature.

NOTE: NO HEAT CAN BE TRANSFERRED UNTIL A SUBSTANTIALLY HIGHER MOLD SURFACE TEMPERATURE OVERCOMES THE THERMAL RESISTANCE OF THE MOLD STEEL.

WARM WATER COOLING - TEMPERATURE INTERACTION

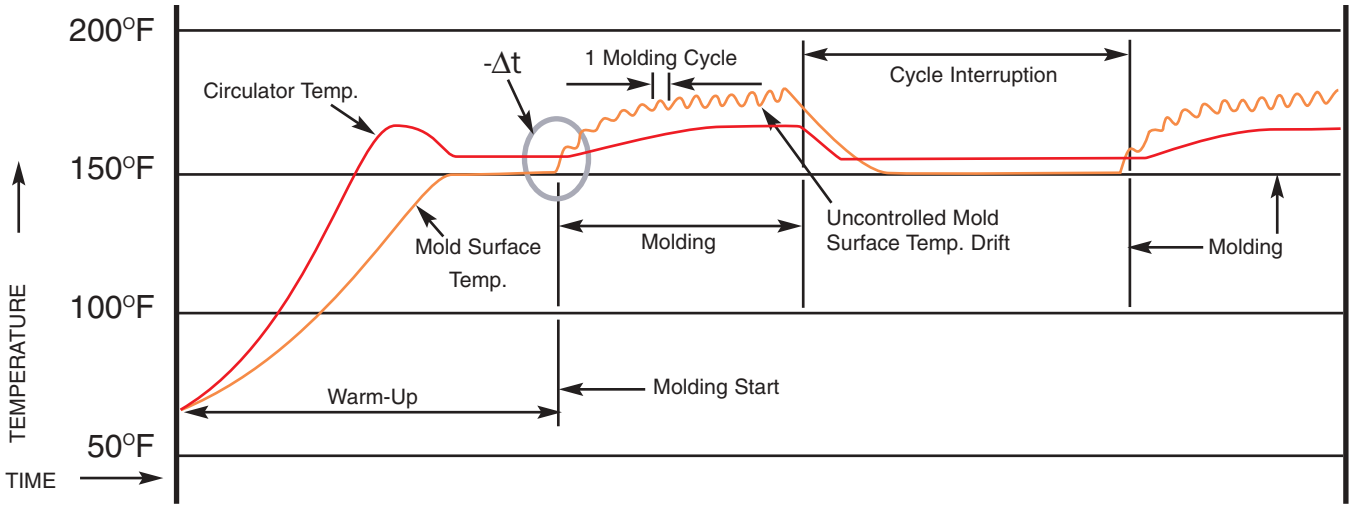




CONVENTIONAL
Continuous Flow Cooling forces and maintains heat gradients resulting in molding stress and lower quality production.

WARM WATER COOLING - HEAT INPUT / COOLING GRAPH

TYPICAL RELATIONSHIP OF COOLING MEDIUM AND MOLD SURFACE TEMPERATURE

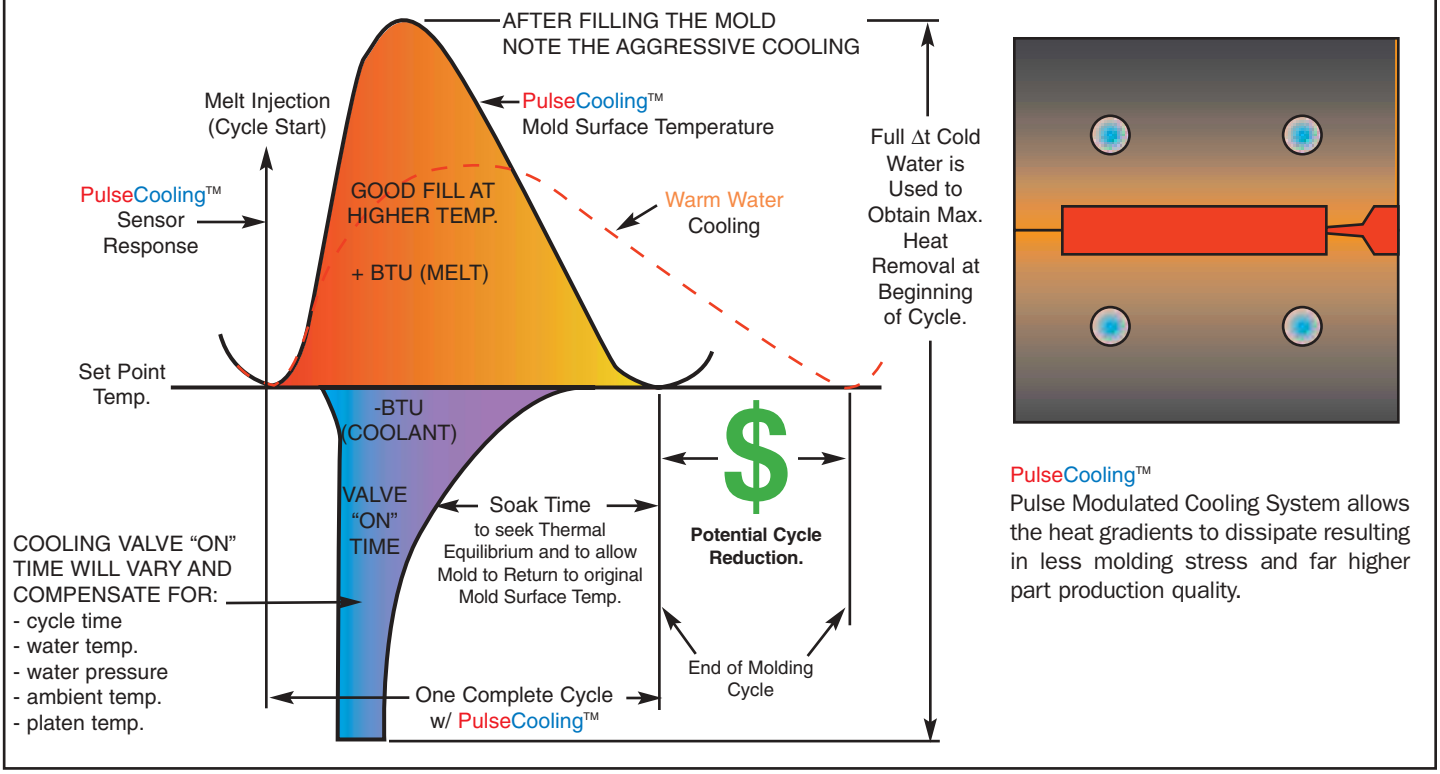


As seen in the above graph, the molding surface temperature is less than the liquid temperature. When molding is started, the mold surface temperature rises higher than the liquid temperature creating a -Δt to remove heat. **This temperature drift is uncontrolled and varies throughout the mold.**

3. PulseCooling™

A sensor is placed in the mold to “read” the molding surface temperature. The melt heat warms up the mold surface - not the entire mold. As the mold surface reaches the desired temperature - the cooling valve cools the mold with maximum flow of cold water (TURBULENT FLOW) Each cooling pulse “on” time matching the excess heat to be removed. When cycle is interrupted - mold surface will recover quickly - since only the mold surface has to reach the predetermined (SET POINT) temperature - not the entire mold.

PulseCooling™- LOW TEMPERATURE - MELT IS HEATING THE MOLDING SURFACE



PulseCooling™
Pulse Modulated Cooling System allows the heat gradients to dissipate resulting in less molding stress and far higher part production quality.

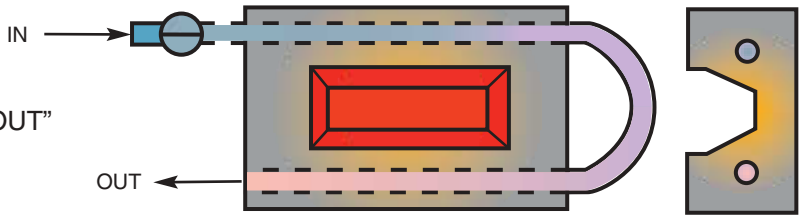
After Cooling Pulse has stopped - The cooling water - sitting dormant in the cooling channel - creating a thermal boundary layer allowing the surrounding area to warm up -
RESULTING IN A REDUCED TEMPERATURE GRADIENT ACROSS THE MOLDING SURFACE. = HIGHER QUALITY PARTS

PulseCooling™- COMPENSATE FOR UN-MATCHED PART GEOMETRY AND COOLING LAYOUT

Beginning of the cycle a Calculated pulse of water will match cooling requirement

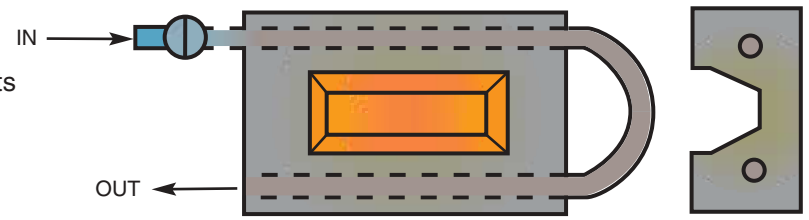
Maximum Cooling - Full flow - High Δt (cold water)
Turbulent flow for maximum heat removal

Note: Minimum temperature rise between “IN” and “OUT”
Minimum thermal distortion in the mold

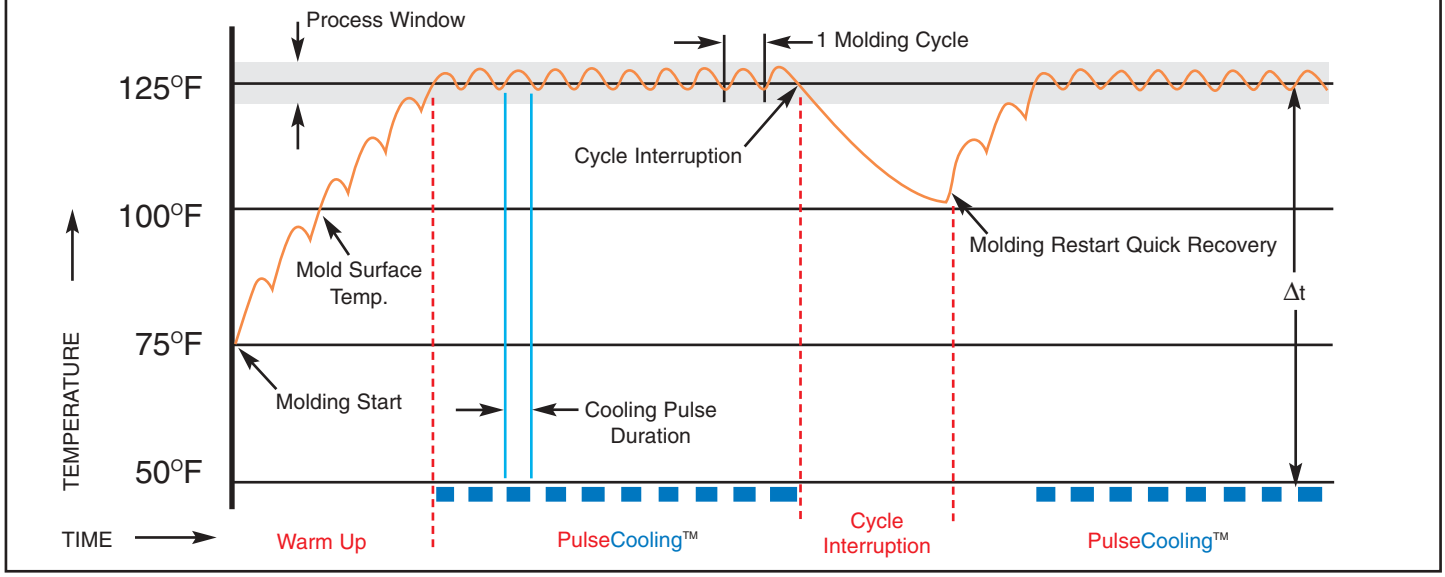


Since there are not opposing thermodynamic force during the fill the mold cavity will be more uniformly.

No flow - During cure time allowing the heat gradients to dissipate providing a more even, predictable and repeatable environment for the next shot resulting in highest quality at Maximum productivity.

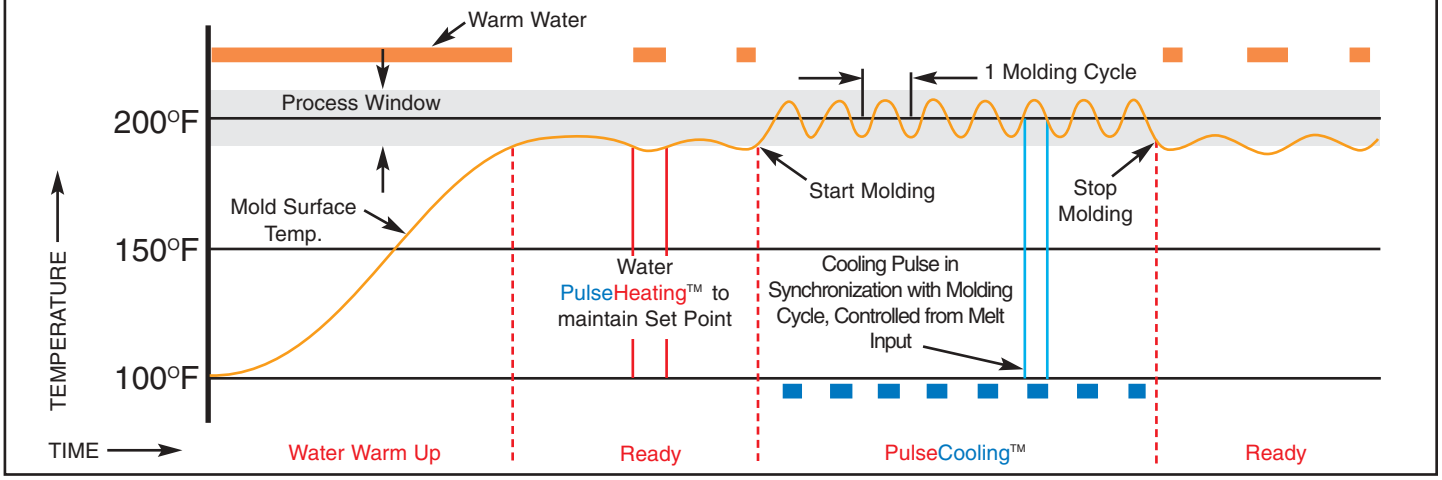


LOW TEMPERATURE MOLDING - MELT HEAT UP MOLDING SURFACE



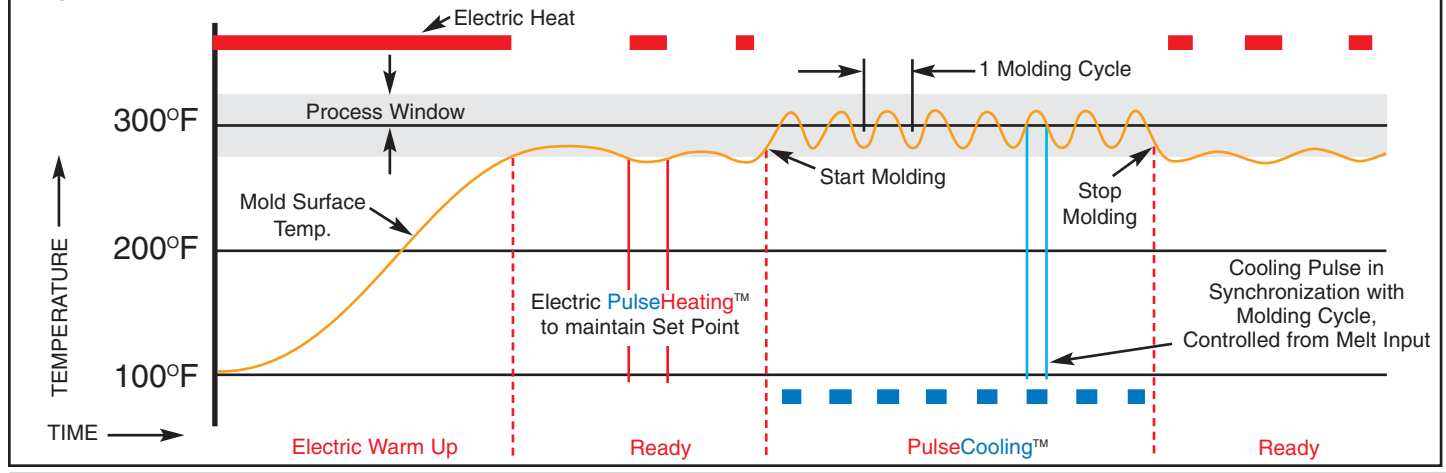
HIGH TEMPERATURE MOLDING - WATER HEAT UP THE MOLDING SURFACE - ENGINEERING RESINS

Pulse Heating with Hot Water AND - AUTOMATIC transition to PulseCooling.

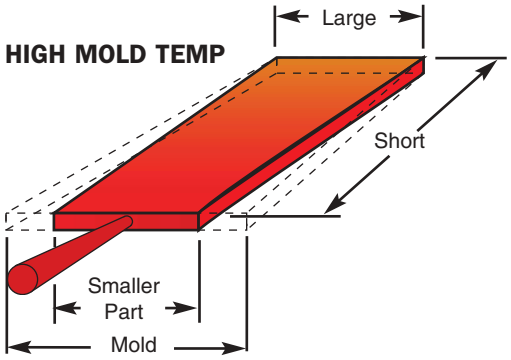


ULTRA HIGH TEMPERATURE MOLDING - ELECTRIC HEATER WARM UP THE MOLDING SURFACE

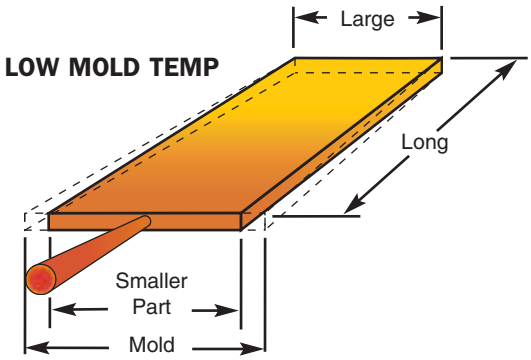
Electric Heat warm up for high temperature resins results in: A high **Δt** for efficient heat removal, quick recovery after cycle interruption.



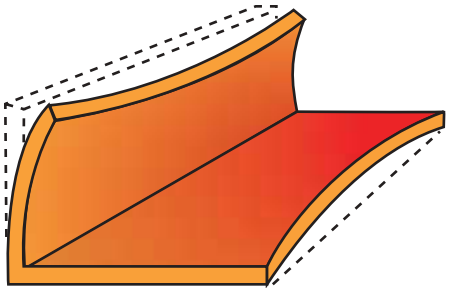
DIRECT MOLD SURFACE TEMPERATURE CONTROL = **SIZE / WARPAGE CONTROL**



FAST CYCLE = HOTTER = SMALLER PART

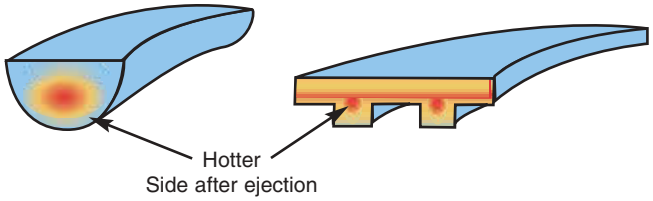


LONGER CYCLE = COLDER = LARGER PART

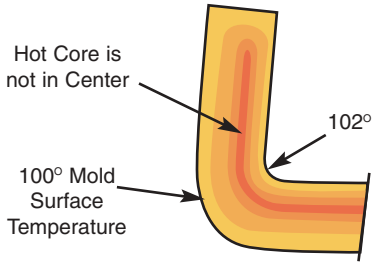


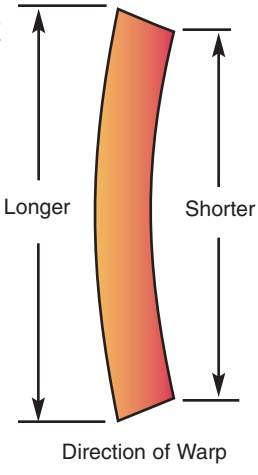
HOTTEST SURFACE AREA WILL HAVE HIGHEST POST SHRINKAGE

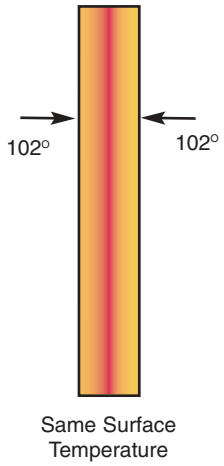
SECTION VIEWS SHOWING OFF CENTER HEAT GRADIENT

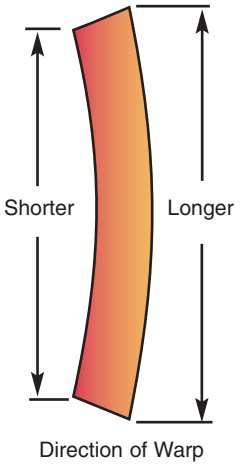


PART WILL SHRINK MORE ON HOTTER SIDE RESULTING IN WARPAGE



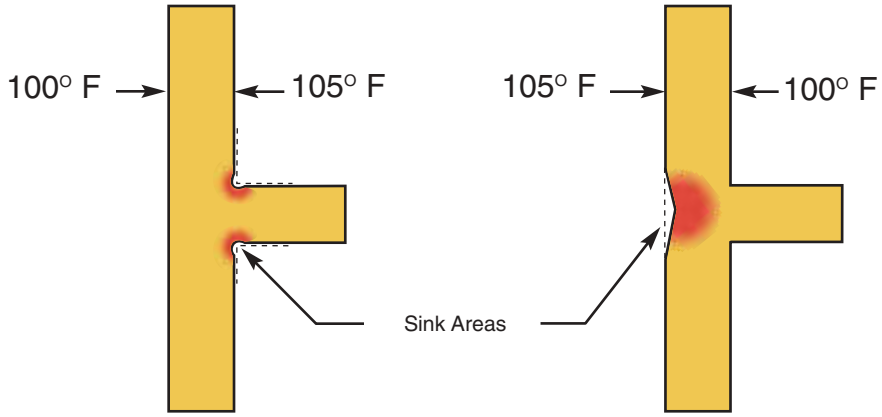






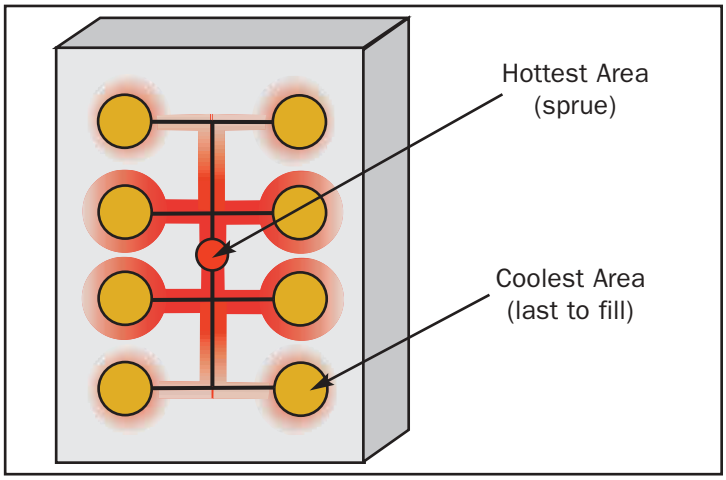
SINKS

MATERIAL DRAWS AWAY FROM WARMER AREAS RESULTING IN DEEPER SINKS



TEMPERATURE COMPENSATION - BY DESIGN

As molding temperatures, part complexity and the number of cavities increase, the problems of temperature gradients often result in a very narrow process window. This is because the melt front cools off as it is pushed to fill the farthest, thinnest, and coldest part of the mold. The result shows in incomplete fill, poor part weld and excessive stress in the part. Traditionally, hot water was circulated through a mold. The hot water provided the basic heat to fill the mold, however it did not provide consistent temperature without drifting (see graph on page 6) nor did it compensate for any heat gradient. The elevated temperatures substantially slowed the cycle in the hottest molding areas and promoted surface sinks near the center (hottest area) of the mold (see page 9).

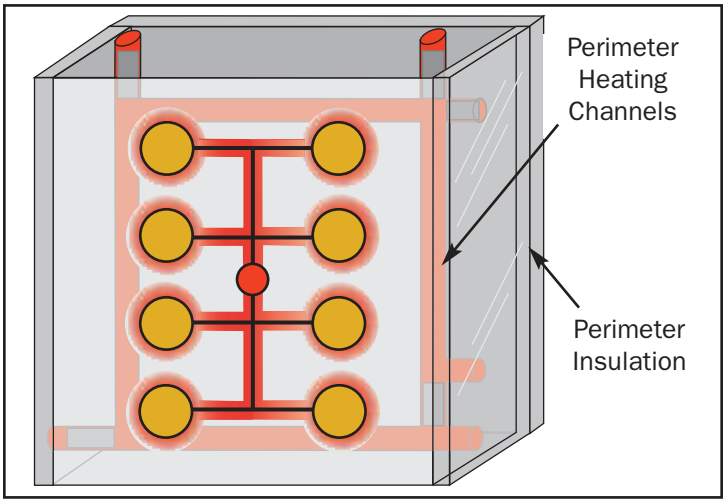


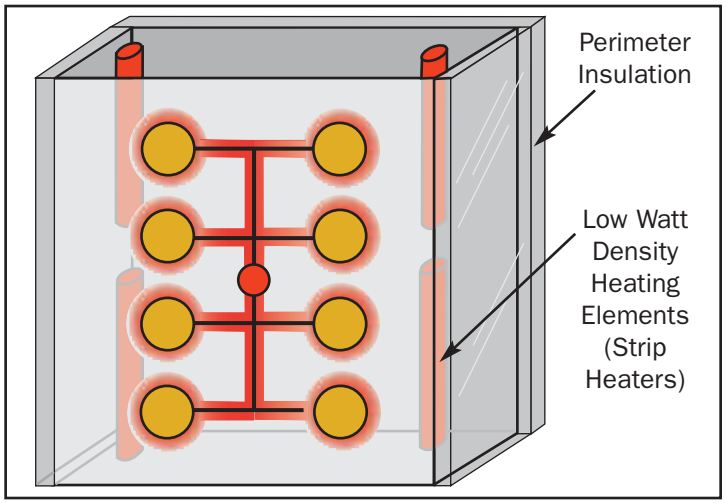
EXCESSIVE WARP - TYPICAL HEAT GRADIENT

The hottest area of the mold is where the melt passes through the sprue into the cavity, this area will require the longest time to cure.

As the melt flows the longest distance to the coldest corner of the part, the melt front will cool off - resulting the molder to increase the melt and mold temperature - thus slowing the molding cycle and increasing the post shrinkage (warp and sinks).

HEAT LOSS COMPENSATION AND BALANCE





LIQUID HEATED AND COOLED

When the mold is installed, the heaters are connected and monitored continuously with a controller. As operating temperature is reached, PulseCooling will maintain the desired set point temperature.

As the molding is started, the cooling pulse will increase in duration and frequency thus matching the heat input of the heating element and the melt. When the cycle is interrupted, the temperature is maintained at the desired level ready to continue molding.

"0" defect parts are obtained since the mold is constantly operating under controlled conditions.

ELECTRIC HEATERS - AirJet™ / LIQUID COOLED

Typically, the heating elements are connected in series since the watt density requirement is low, the heater life is practically limitless. The installation may be surface mounted or machined slots can be provided for a permanent installation.

QUESTIONS AND ANSWERS ABOUT PulseCooling™

1. How does PulseCooling™ improve cycle time? By placing a sensor into the mold and controlling the mold surface temperature. Each molding cycle is cooled with a full flow cooling pulse, timed to match the exact cooling needs of each shot of melt, with coldest water available.

2. How can PulseCooling™ produce better part quality? PulseCooling™ Controllers cool during the first part of the molding cycle - just after the melt shot is completed when most heat is present (highest delta t) The hot and cold spots (heat gradients) can dissipate (seek thermal equilibrium) this will produce a higher quality part since the shot was cured in a more uniform environment.

3. Do I use PulseCooling™ with my warm water circulator? No, the PulseCooling™ Controller uses cooling water directly from the tower water supply or chiller.

4. How can PulseCooling™ improve the cycle when I have full flow? Full flow cooling is an uncontrolled cooling method, resulting in unpredictable parts. Typically a core requires more cooling than the cavity side of the mold. cooling may be "on" continuously on the Core side - while the Cavity will be "on" a short time - just the right duration to remove the excess heat - thus maintaining the ideal mold surface and gate temperature.

5. How and where do I install a sensor for best performance? A drilled hole will accommodate one of many sensor styles, which can be easily installed. A sensor is placed near the surface on core and cavity. The PulseCooling Controller will test the mold for thermal responsiveness and "tune" itself to maintain the desired mold surface temperature. (details on installation instructions are available upon request and are included with each sensor)

6. How many zones do I need for a typical 8 to 16 cavity mold? Typically 1 for the core, 1 for the cavity and if the tool has a hot runner or hot manifold, a separate zone is recommended to control the melt viscosity, gate temperature and the mold expansion.

7. How can two zones control an 8 or more cavity mold? Each cavity receives the same amount of heat from the melt. Sensing the cooling needs of just one cavity provides the cooling information for cavities of the same size.

8. Must a mold be redesigned to use PulseCooling™? No, the PulseCooling™ Controller will enhance the performance of a poorly designed mold and will give top performance when used with a well-designed mold.

9. How can I PulseCool an existing mold without sensor holes? On an existing mold without a sensor hole you may install an "internal wet probe" into the outgoing waterline. The PulseCooling™ Controller software is designed to read the relative temperature in the waterline and thereby maintains the desired mold surface temperature.

10. Will PulseCooling™ prevent thermal expansion? Yes, by maintaining the mold temperature with continuous feed back to the PulseCooling™ Controller thermal drifting and uncontrolled expansion and mismatch of mold components is eliminated.

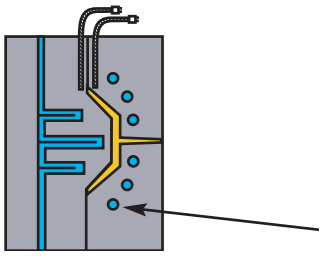
11. What can I expect from PulseCooling™, in general terms?

- Consistently better cycle
- Consistently higher parts quality
- Reduced maintenance cost
- Drastic reduction of chiller load - No Heaters / Pumps
- Fraction of operating cost
- Reduced capital investment /part produced

ALL RESULTING IN AN EXCELLENT R.O.I.

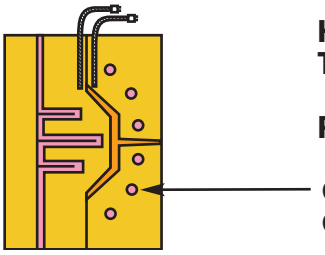
COOLING CATEGORIES

LOW TEMP - PulseCooling™ ONLY - RANGE 80-140°F COMMODITY RESINS



MELT HEAT CAN PROVIDE THE MOLDS OPERATING TEMPERATURE.
PulseCooling™ WILL REMOVE THE EXCESS HEAT.

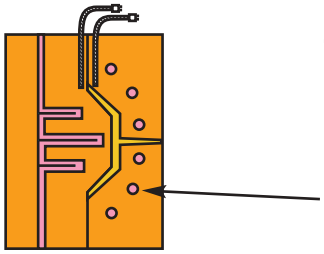
LOW / HIGH TEMP - COOLING OR HEATING - RANGE 120-200°F



HOT WATER - OR ELECTRIC HEATERS BRING THE MOLD TO THE OPERATING TEMPERATURE.

PulseCooling™ REMOVES THE EXCESS HEAT.

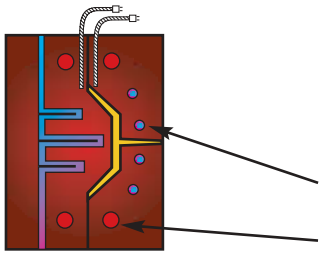
HIGH TEMP - COOLING AND HEATING - RANGE 120-280°F



HOT WATER BRINGS THE MOLD TO THE OPERATING TEMPERATURE.

PulseCooling™ REMOVES THE EXCESS HEAT.

ULTRA HIGH TEMP - RANGE 180-320°F HIGH HEAT RESINS



ELECTRIC HEATERS BRING THE MOLD TO THE OPERATING TEMPERATURE.
PulseCooling™ WILL REMOVE THE EXCESS HEAT WITH AirJet™ COOLING OR TREATED GLYCOL SOLUTION

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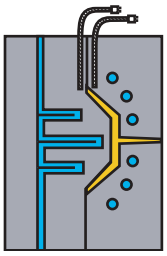


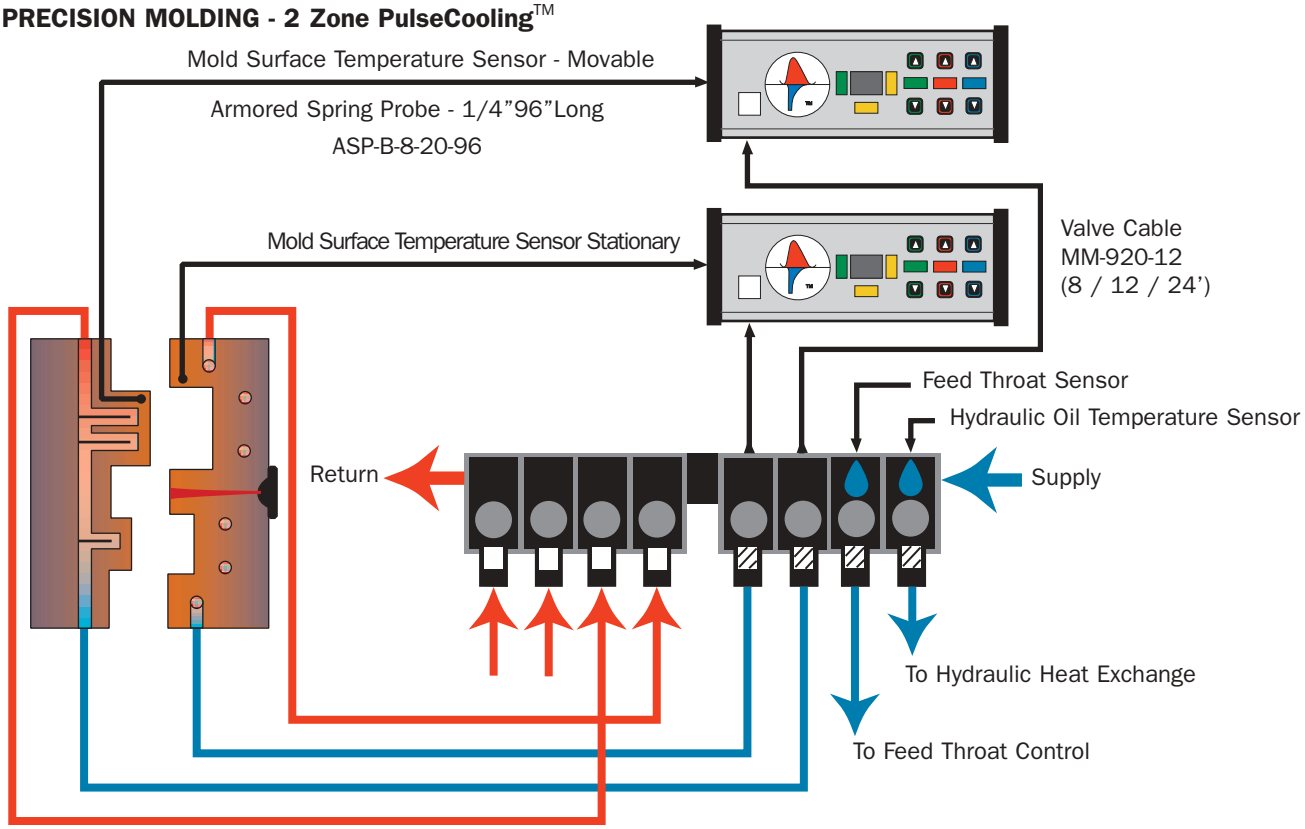
PulseCooling™ CONTROLLER
SINGLE ZONE COOLING
MODEL: DD, DM, DA

Model: DD-1204

Typically Machine Mounted
Digital set/readout PulseCooling
4 Cooling programs selections:
- Low Temperature Molding
- High Temperature Molding
- Long Cycle Molding
- Pulse Advance Molding

One sensor each feeds the temperature information to stationary/movable mold half
Each valve will PulseCool independently
Each flow indicator turbine will show the flow through each circuit
Process Window:
- Adjust Set Point
- Upper/Lower Alarm
- Turn On Water Supply/Return

PRECISION MOLDING - 2 Zone PulseCooling™



PRODUCT SPECIFICATIONS

POWER REQUIREMENT: 120vAC 25 watt standard U.S. plug with 6' cord. 240vAC 25 watt standard European DIN plug

TEMPERATURE RANGE: 32° TO 400°F (0° TO 200°C) factory select

CONTROL MODE: Heuristic - self adjusting

SET POINT AND ALARM MEMORY: Cooling perimeters and program selection

PROBE RESISTANCE: 20K ohm @ 77°F (25°C)

ALARM: 1500 to 1700 Hz - Sweeping sound

PULSE RATE: 40 TO 80 Pulse Rate

OUTPUT: 108 dB @ 3'

POWER: 10 VA

WATER VALVE: 12V dc - 1/2" through 1-1/2 -StackValve™ - 2" Single Valve

WATER VALVE PRESSURE RATING: 0 to 100 PSI (.0 TO 6.9 BAR)

PHYSICAL SPECIFICATIONS:

SIZE: 14" x 9 1/2" x 9 3/8" (36 x 24 x 29 Cm)
WEIGHT: 5.5 Lbs. (2.5 Kg)

Standard Components

1 - Armored Spring Probe	ASP-B-8-20-96
1 - Valve Connection Cable	MM-920-12

MODEL CODE

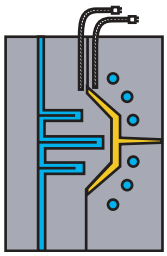
D D - 1 2 0 4

DD = DIGITAL READOUT / DIGITAL SET POINT
DM = DIGITAL MONITOR - ZONE FLOOD COOLING
DA = DIGITAL ADDRESSABLE - ZONE FLOOD COOLING

12 = 120 V
24 = 240 V

VERSION

ADDRESS LINE
0 = NONE
2 = 232
4 = 485



PulseCooling™ CONTROLLER
5 ZONE HEATING - OR - COOLING
MODEL: PC5

PRODUCT SPECIFICATIONS

POWER REQUIREMENTS: 120 VAC 60 Watt standard U.S. plug
240 VAC 60 Watt - European plug

CONTROLLER TYPE: Heuristic - self adjusting

TEMPERATURE RANGE: 32°F to 400°F

CONTROLLER OUTPUT: Up to 5 zone (heating or cooling)

OPERATOR INTERFACE: Touch Screen

SENSOR INPUT: 5 zone Machine Mounted J-Box

MOLD FILE STORAGE: Up to 8 Mold Files, Solid State Memory

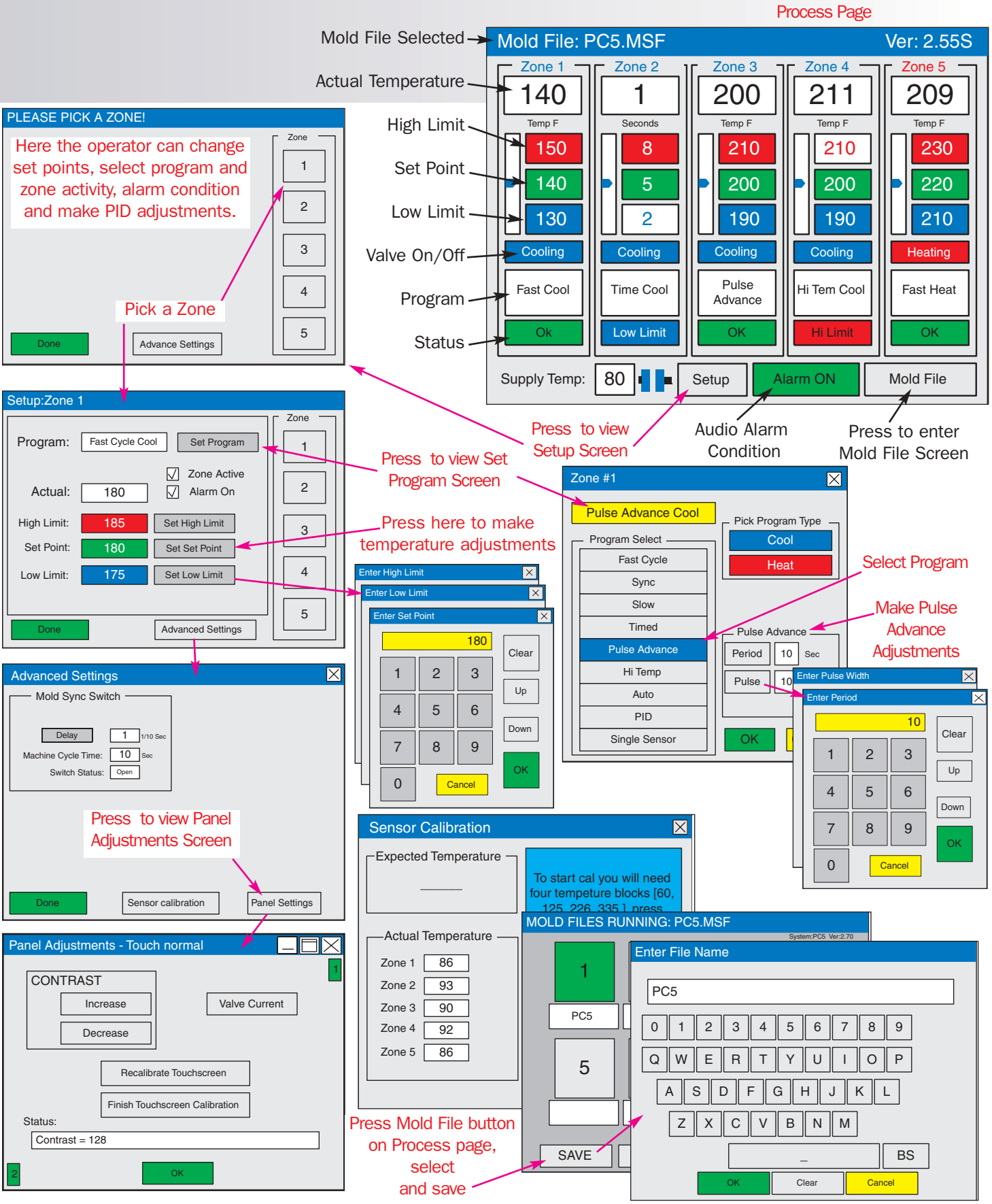
PHYSICAL SPECIFICATIONS:
CONTROLLER SIZE: 10"W x 8"H x 4"D
POST HEIGHT: 14"
OVER ALL HEIGHT: 24"
WEIGHT: 15 lbs.

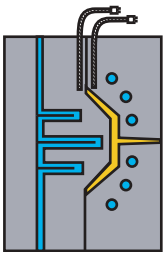
MODEL CODE

PC5 - 1 2 30 - 01

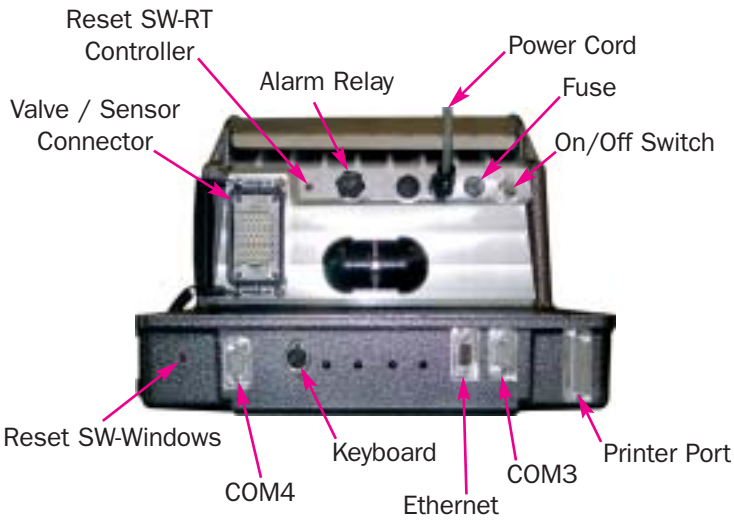
- PC5 - PulseCooling™ 5 ZONE HEAT OR COOL
- 1 2 - 12 = 120 V, 24 = 240 V
- 30 - CONN VARIATION: 30 = 30 PIN, 40 = 40 PIN
- 01 - VERSION

PulseCooling™ 5 ZONE - PC5 - SCREENS





PulseCooling™ WINDOWS CONTROLLER
MODEL: PCV - 5 ZONE COOLING - 4 ZONE HEATING
PCX - 10 ZONE COOLING - 4 ZONE HEATING



Electrical Specifications:
Voltage: 100- 250 VAC 60 Hz
Fuse: 3 amp.
Backup Power Supply: UPS 280 PnP, APC (Recommended)
Display: 12.1" Color TFT LCD
Touch Screen: Analog Resistive 12.1", Dynapro

Operator Interface Hardware:
CPU Board: Pentium, Ethernet option 10 Base-T (R45), 2 serial, 1 parallel, LCD Interface.
CPU Memory: 128 Mb SDRAM
Hard Disk Drive: 10 Gb , EIDE
Zip Drive: 100 Mb

Mold Controller Hardware:
Real Time Board: Durango
Real time I/O: CITO RT2167-D
Temperature Inputs:
Resolution: +/-1° Fahrenheit
Type: 20k Ohm Thermistor
Range: 32° F to 400° F

Software:
Operating System: Windows 98 Second Edition
Operator Interface: CITO PC with GraphTrac V3.85
Display Data Update: Once per second
Mold Controller: CITO Dedicated Software
Touch Screen: Hampshire Touchsystems V5.04a
Backup Power Supply: PowerChute Pro Windows 95 V1.1.0

Physical Specifications:
Size:10"D x 14.5W x 11H (254 mm DEEP x 386 mm WDE x 280 mm HIGH)
Weight: Approximately 18 Lbs. (8 Kg)

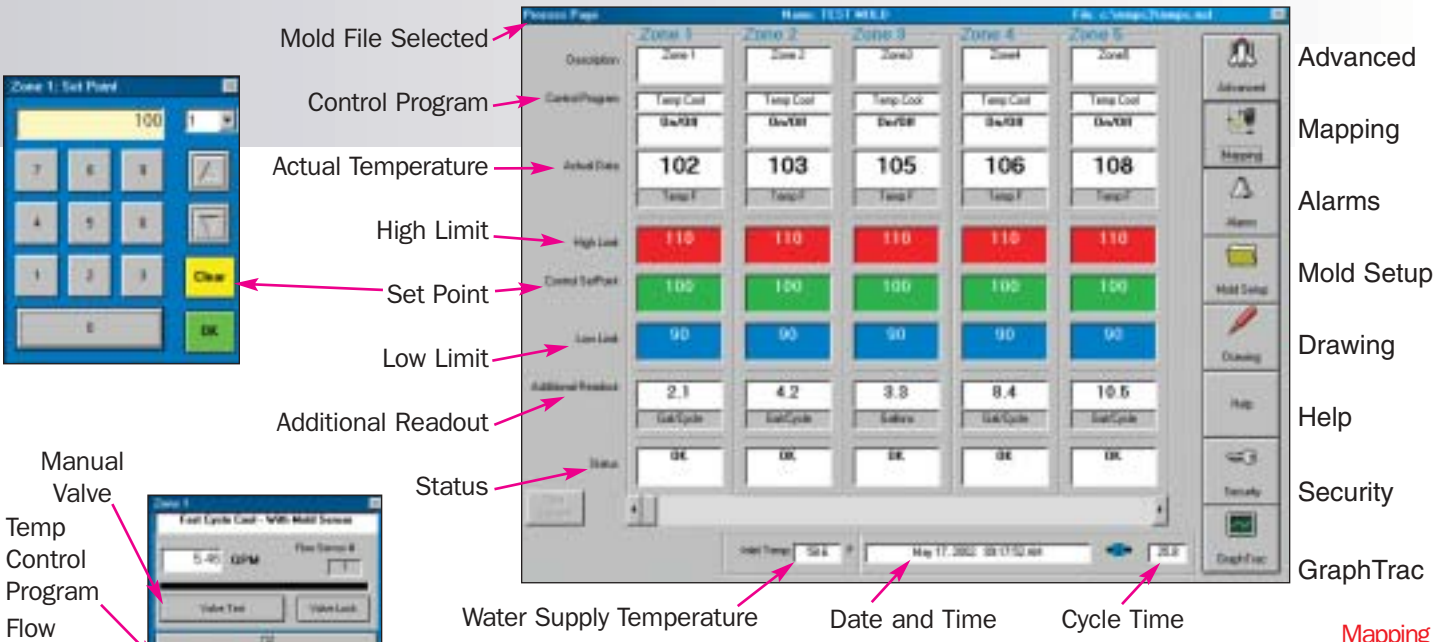
MODEL CODE

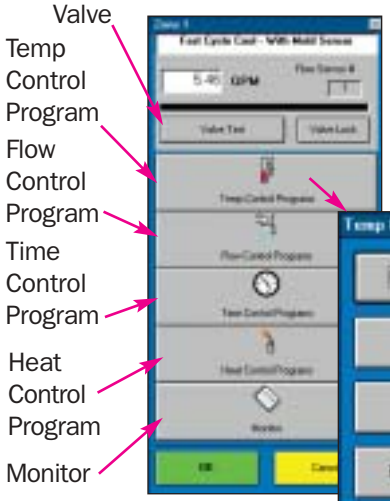
PCV - Z1- 02

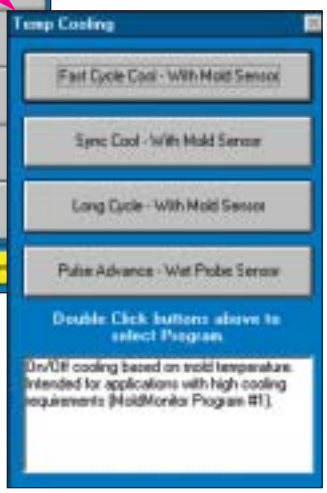
- PCV - Z1 - 02
  - PCV = PulseCooling™
    - PCV= 5 ZONE
    - PCX= 10 ZONE
  - Z1 = ZIP 100 MB
    - Z2 = ZIP 250 MB
  - 02 = VERSION

PulseCooling™ Windows Software

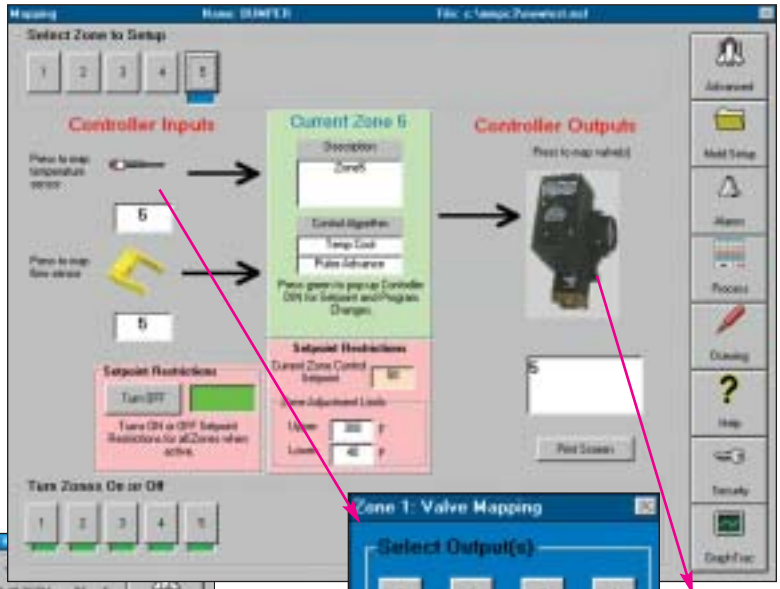
Process Page



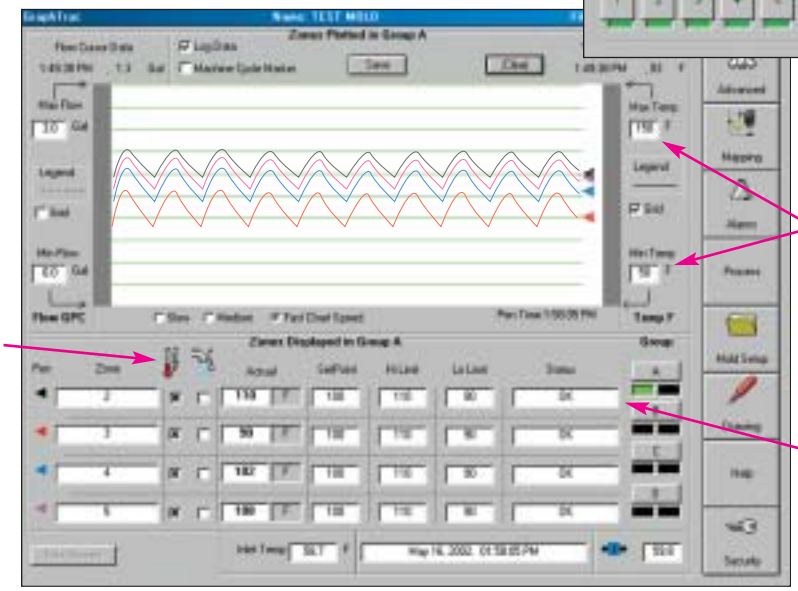


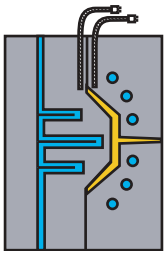


Mapping



GraphTrac





StackValve™, StackFlow™, End Caps "IN" and "OUT"
MODEL: SVA, SFA, SF

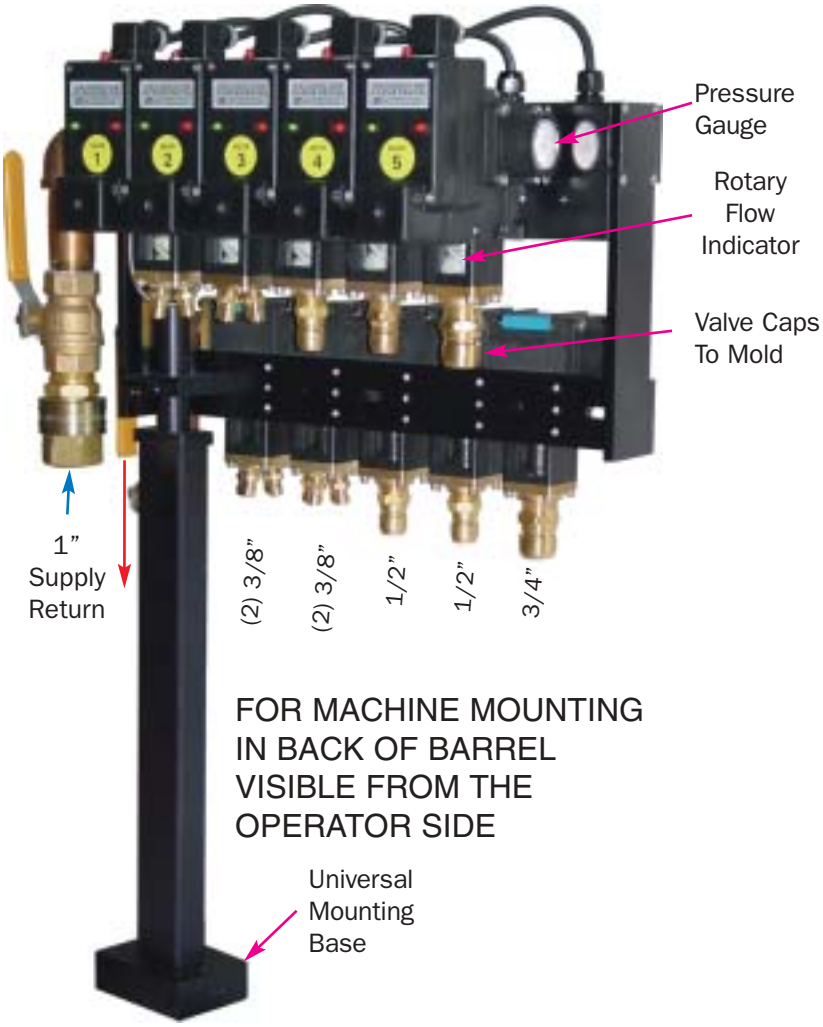
Cooling Valves - 20ºF to 140ºF

StackValve™ and StackFlow™ "IN" Endcaps

SUPPLY	1-1/2"	SF-3090
	1-1/4"	SF-3092
	1"	SF-3094
	3/4"	SF-3096
	1/2"	SF-3098

RETURN	1-1/4"	SF-3004
	1"	SF-3010
	3/4"	SF-3020
	1/2"	SF-3025
	(2) 1/2"	SF-3026
	3/8"	SF-3028
	(2)3/8"	SF-3030
	(4)3/8"	SF-3033
	1/4"	SF-3034
	(2)1/4"	SF-3036
	(4)1/4"	SF-3040
	1/8"	SF-3041
	(4)1/8"	SF-3044

VALVE SWING ARM ASS'Y - VSA
MACHINE MOUNTED



PRODUCT SPECIFICATIONS

SUPPLY/RETURN END CAPS	1-1/2"	SF-3090
	1-1/4"	SF-3092
	1"	SF-3094
	3/4"	SF-3096
	1/2"	SF-3098
VALVE CAPS:	1-1/4"	SF-3004
	1"	SF-3010
	3/4"	SF-3020
	1/2"	SF-3025
	(2) 1/2"	SF-3026
	3/8"	SF-3028
	(2) 3/8"	SF-3030
	(4) 3/8"	SF-3033
	1/4"	SF-3034
	(2) 1/4"	SF-3036
	(4)1/4"	SF-3040
	1/8"	SF-3041
	(4) 1/8"	SF-3044

PIPE THREAD TYPE: NPT / BSPT / BSPP
VALVE OPERATION: 24 Volt DC
20**°F** to 140**°F**
CONNECTOR: DIN
ELECTRIC PURGE BUTTON: Yes
POWER "ON" INDICATOR: Red LED
VALVE "ON" INDICATOR: Green LED
FLOW RATES: Up to 60 GPM
PHYSICAL SPECIFICATIONS:
SIZE: 20"W x 34"H (over all)
WEIGHT: 62 lbs.

Shown with 1" Supply / Return
2(3/8") to and from Mold Connection
2(3/8") to and from Mold Connection
1/2" to and from Mold Connection
1/2" to and from Mold Connection
3/4" to and from Mold Connection

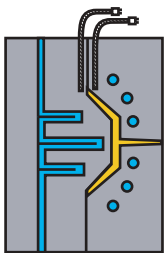
For other Combination - Specify

MODEL CODE

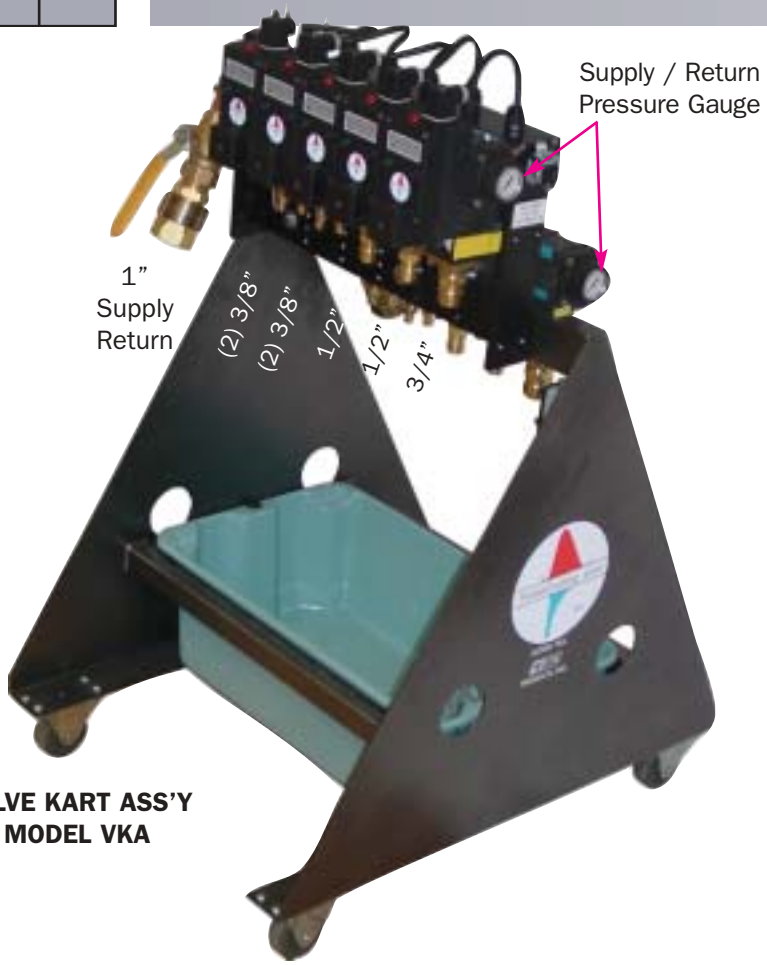
VSA - 05 - 05 - 01

VSA - VALVE SWING ARM ASS'Y
VSFA - VALVE SWING FLOW ARM
5 SUPPLY VALVES
5 RETURN VALVES
VERSION

USE WITH PC5 OR PCV CONTROLLER



VALVE KART ASS'Y
MODEL: VKA



VALVE KART ASS'Y
MODEL VKA

Shown with 1" Supply / Return
2(3/8") to and from Mold Connection
2(3/8") to and from Mold Connection
1/2" to and from Mold Connection
1/2" to and from Mold Connection
3/4" to and from Mold Connection

For other Combination - Specify

MODEL KEY CODE

VKA - XXX - 05 - 05 - 01

VKA - VALVE KART ASS'Y
VKFA - VALVE KART FLOW ASS'Y

Use with PC5, PCV, PCX

SUPPLY VALVES

RETURN VALVES

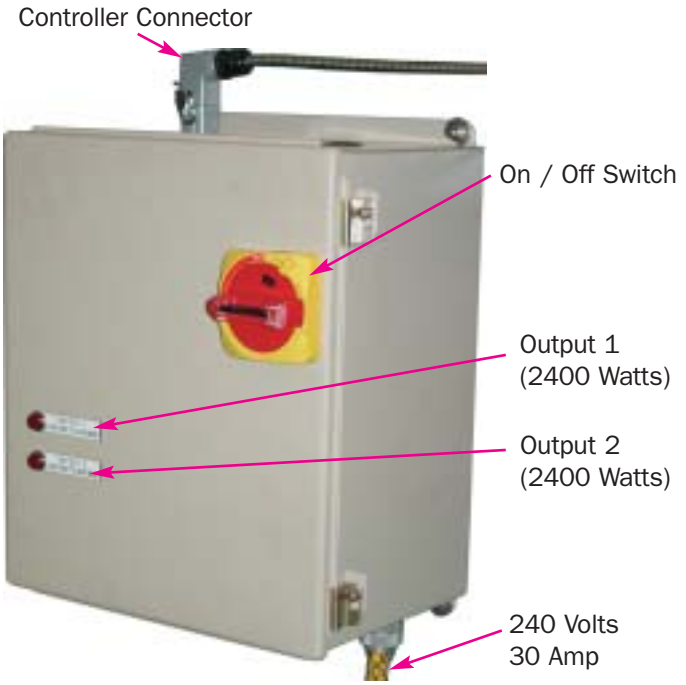
VERSION

PRODUCT SPECIFICATIONS

SUPPLY/RETURN END CAPS	1-1/2"	SF-3090
	1-1/4"	SF-3092
	1"	SF-3094
	3/4"	SF-3096
	1/2"	SF-3098
VALVE CAPS:	1-1/4"	SF-3004
	1"	SF-3010
	3/4"	SF-3020
	1/2"	SF-3025
	(2) 1/2"	SF-3026
	3/8"	SF-3028
	(2) 3/8"	SF-3030
	(4) 3/8"	SF-3033
	1/4"	SF-3034
	(2) 1/4"	SF-3036
	(4)1/4"	SF-3040
	1/8"	SF-3041
	(4) 1/8"	SF-3044

PIPE THREAD TYPE: NPT/BSPP/BSPT
VALVE OPERATION: 24 Volt DC
20°**F** to 140°**F**
CONNECTOR: DIN 4 Prong
ELECTRIC PURGE BUTTON: Yes
POWER "ON" INDICATOR: Red LED
VALVE "ON" INDICATOR: Green LED
FLOW RATES: Up to 60 GPM
PHYSICAL SPECIFICATIONS:
SIZE: 25"W x 32"H x 32"D (base)
WEIGHT: 107 lbs.

ELECTRIC ZONE HEATER - ZH-X-X-XX-01



MODEL CODE

ZH - 2 - 2 - 24 - 01

- ZH = ZONES HEATER
- 2 = NO. OF ZONES HEATING
- 2 = 1 = 120 VOLT, 2 = 240 VOLT
- 24 = 24 = 2400 WATTS PER ZONE
- 01 = VERSION

PRODUCT SPECIFICATIONS

POWER REQUIREMENTS: 240V / 30 Amp

HEATER OUTPUT: 2 Zones - 15 Amp each

PHYSICAL SPECIFICATIONS:
SIZE: 12"W x 14"H x 8"D (base)
WEIGHT: 30 lbs.

ZONE HEATERS CAN BE DESIGNED AND BUILT FOR YOUR APPLICATION, SPECIFY:

MATERIAL TO BE PROCESSED_____
MELT TEMPERATURE_____
MOLD SURFACE TEMPERATURE_____
MOLD WEIGHT:_____
DESIRED OPERATING TEMPERATURE_____
DESIRED WARM UP TIME_____
NO. OF ZONES:_____

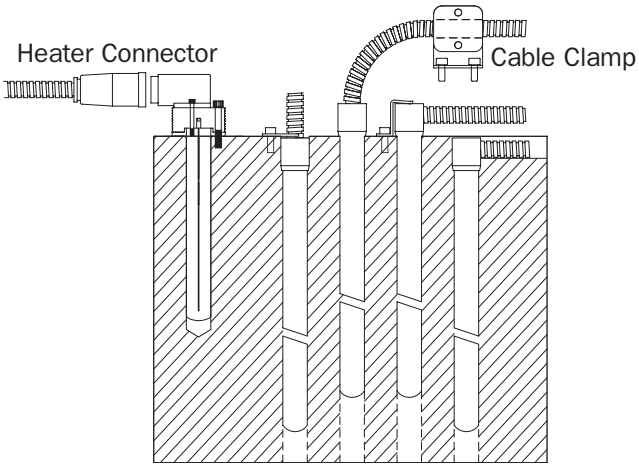
MOLD SURFACE AREA TO MOUNT HEATING ELEMENTS:
TOP_____ SIDE_____

INTERNAL MOLD HEATERS 3/4" DIA
MOVABLE_____LONG
STATIONARY_____LONG

MOLD INSULATION PLATES
PLATEN - R_____TYPE_____THICKNESS_____IN
PERIMETER - R_____TYPE_____THICKNESS_____IN

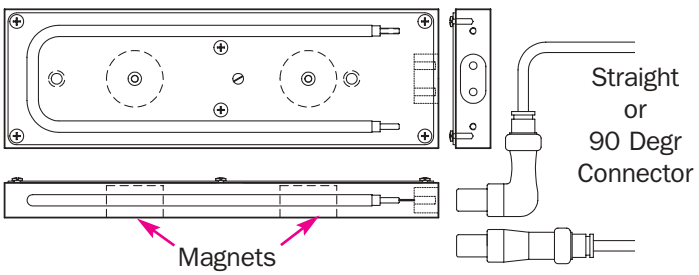
ELECTRIC HEATER

Mold Heater - Internal

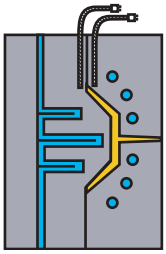


Mold Heater - External

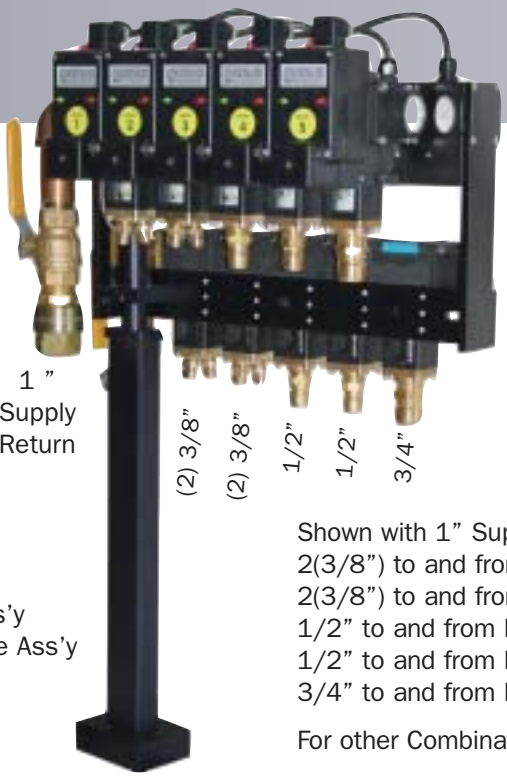
Available with Magnetic Holders and Thermostatic Control



For Custom Heaters - Contact Factory



PulseCooling™ CONTROLLER
5 ZONE COOLING
VALVE SWING ARM ASS'Y
MODEL: PC5-VSA

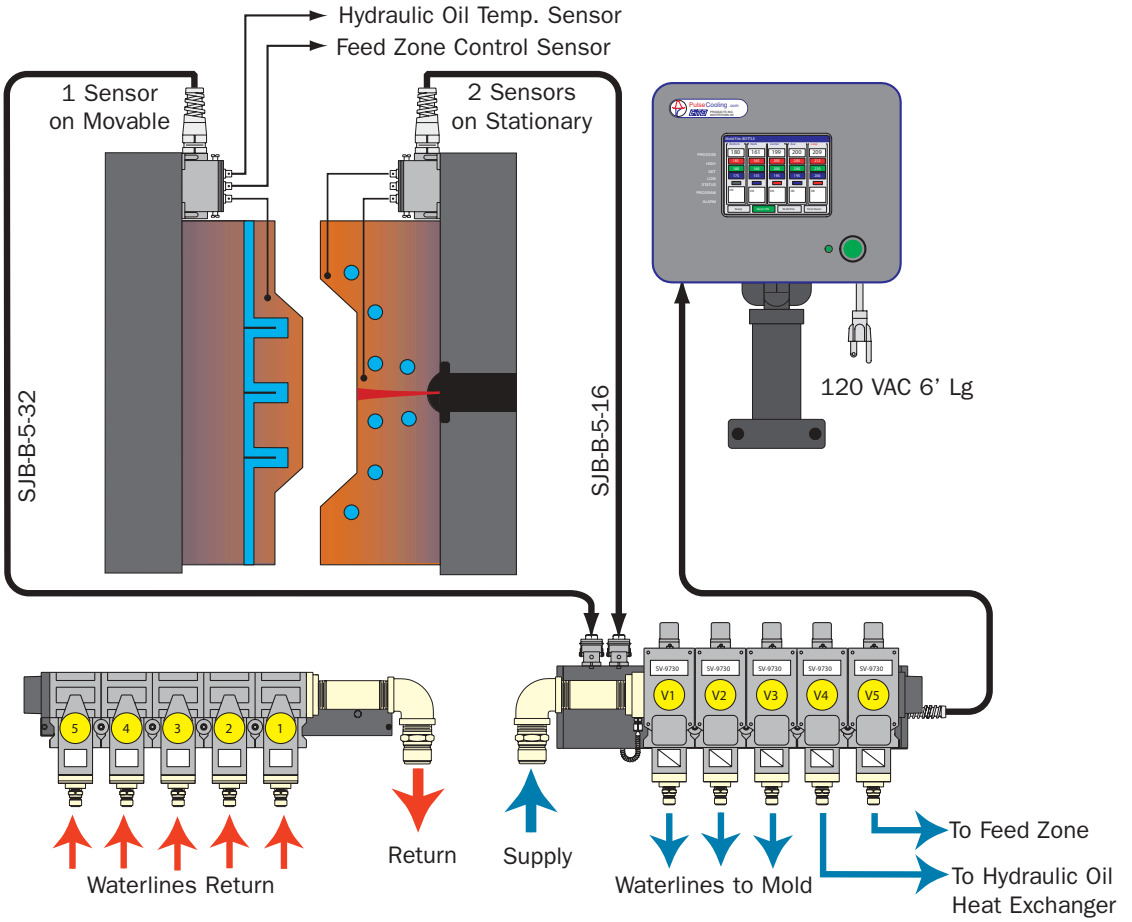


Valve Swing Arm Ass'y
5 Zone Cooling Valve Ass'y
Model: VSA

Shown with 1” Supply / Return
2(3/8”) to and from Mold Connection
2(3/8”) to and from Mold Connection
1/2” to and from Mold Connection
1/2” to and from Mold Connection
3/4” to and from Mold Connection

For other Combination - Specify

PulseCooling™
Touch Screen Controller
5 Zone Cooling
Model: PC5



MODEL PC5 - TYPICAL INSTALLATION

A typical machine mounting of the PCV or PC5 is in front for easy access

Other mounting option are available - contact factory

VALVE SWING ARM ASS'Y - MODEL PC5 - VSA - XX

Valves and waterlines are typically mounted in back of the machine on a swing arm, creating easy access no floor space required.

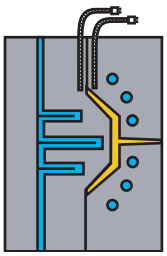
Standard Components

1 - Machine Mounting J-Box	SJB-B-5-16 (16' Lg)
1 - Machine Mounting J-Box	SJB-B-5-32 (32' Lg)
2 - Armored Spring Probe	ASP-B-8-20-96
2 - Armored Spring Probe	ASP-B-4-20-96
2 - Armored Connection Cable	ACC-BB-096
2 - Spring Bead Probe	SBP-B-6-20-12
1 - Internal Wet Probe	IWF-4-20-09-2
1 - Internal Wet Probe	IWF-4-20-12-2

MODEL CODE

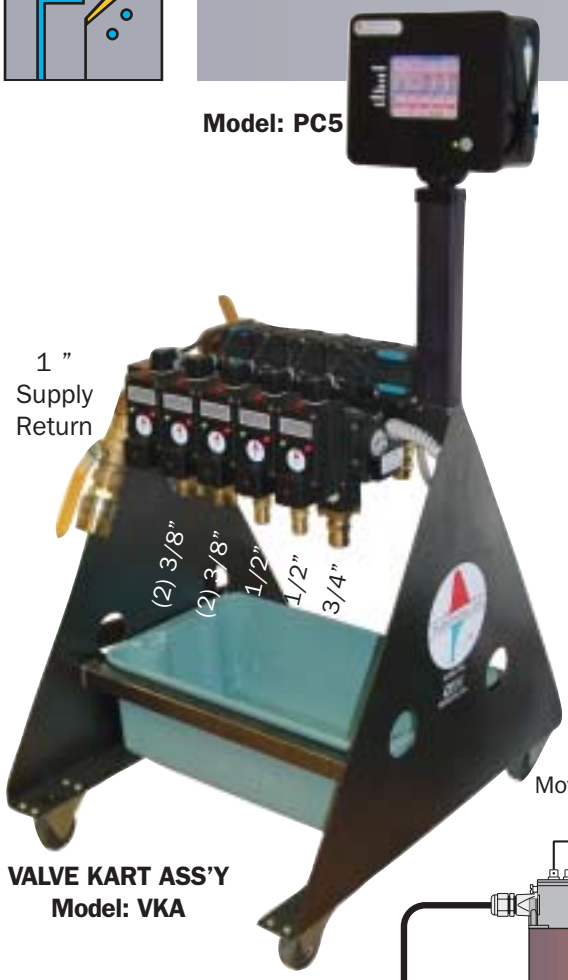
PC5 - VSA - 01

- 01 — VERSION
- VSA — VALVE SWING ARM ASS'Y
- PC5 — PulseCooling™ 5 ZONES



PulseCooling™ CONTROLLER
5 ZONE COOLING
VALVE KART ASS'Y
MODEL: PC5-VKA

Model: PC5



VALVE KART ASS'Y
Model: VKA

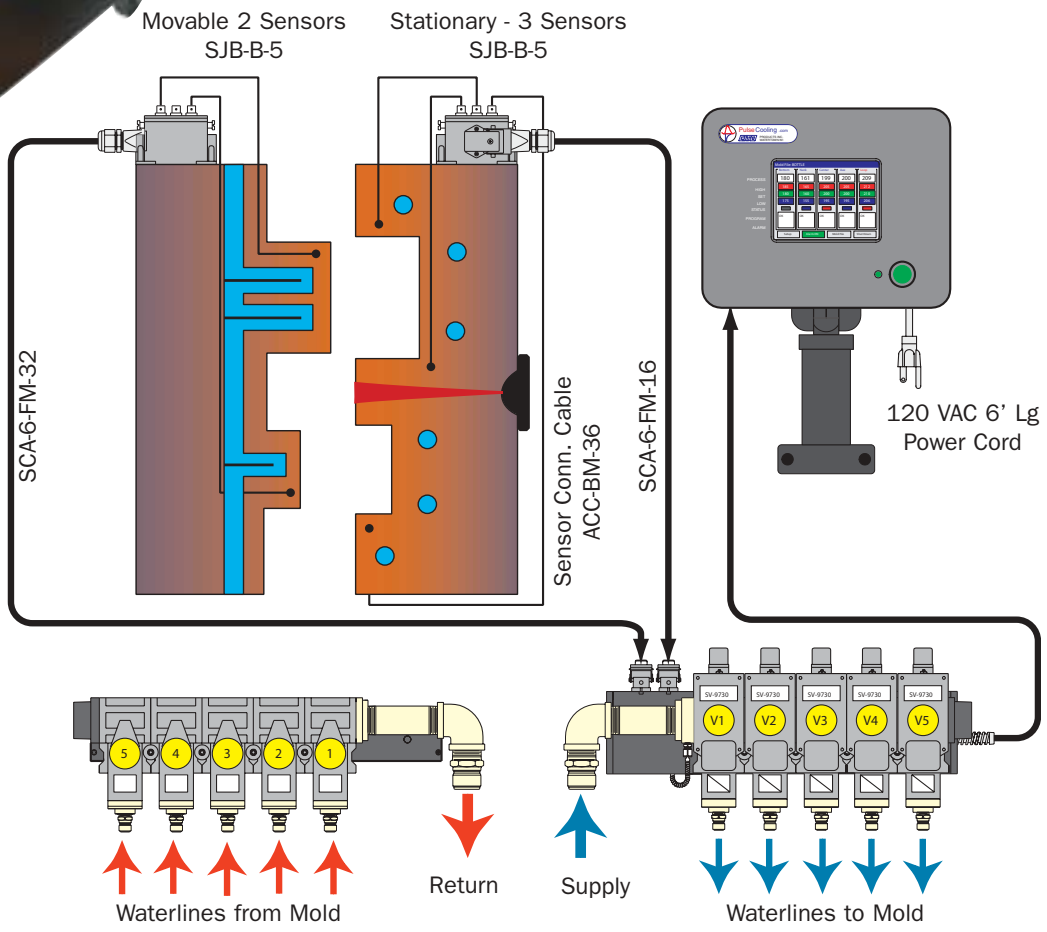
LOW TEMPERATURE MOLDING
When Melt Provides the Start Up Heat

- Precision Molding
- High Volume Molding
- Hot Runner Control
- Family Molds

Shown with 1" Supply / Return
2(3/8") to and from Mold Connection
2(3/8") to and from Mold Connection
1/2" to and from Mold Connection
1/2" to and from Mold Connection
3/4" to and from Mold Connection

For other Combination - Specify

Available with 10 Zones
Used with Model PCX Controller



Hot Runner
DVD Case Stack Mold

Multi Cavity to Large Single Cavity

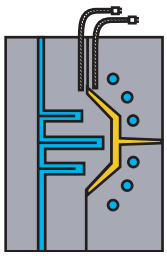
Standard Components

2 - Mold Mounting J-Box	SJB-B-5
1 - Sensor Cable Ass'y	SCA-6-FM-16 (16' Lg)
1 - Sensor Cable Ass'y	SCA-6-FM-32 (32' Lg)
2 - Armored Spring Probe	ASP-B-8-20-96
2 - Armored Spring Probe	ASP-B-4-20-96
2 - Armored Connection Cable	ACC-BB-096
2 - Spring Bead Probe	SBP-B-6-20-12
1 - Internal Wet Probe	IWF-4-20-09-2
1 - Internal Wet Probe	IWF-4-20-12-2

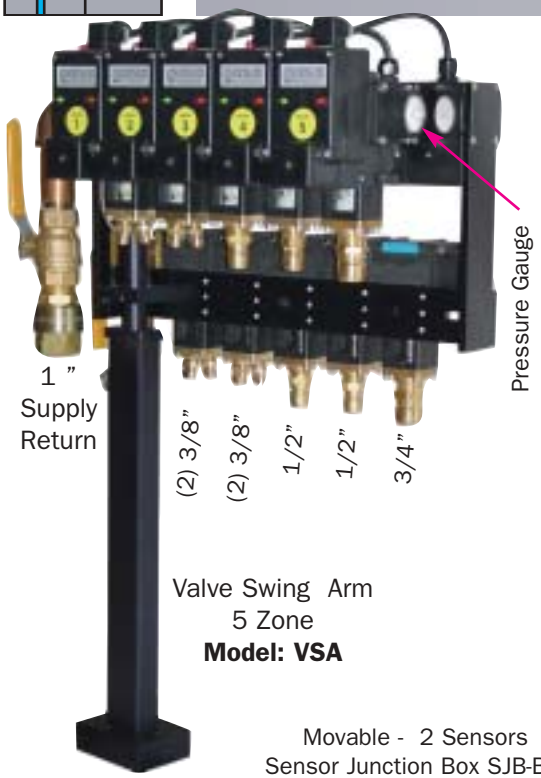
MODEL CODE

PC5 - VKA - 01

- PC5 — PulseCooling™ 5 ZONE
- VKA — VALVE KART ASS'Y
- 01 — VERSION

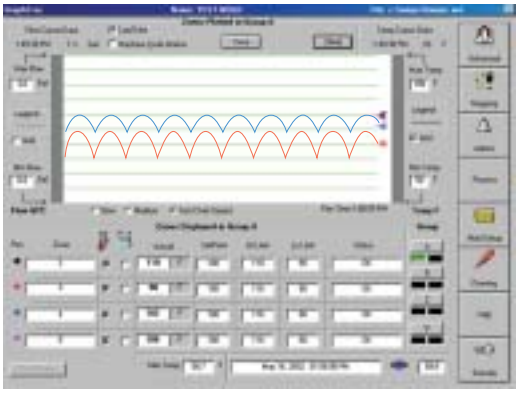


PulseCooling™ WINDOWS CONTROLLER
5 ZONE - COOLING
VALVE SWING ARM
MODEL: PCV - VSA

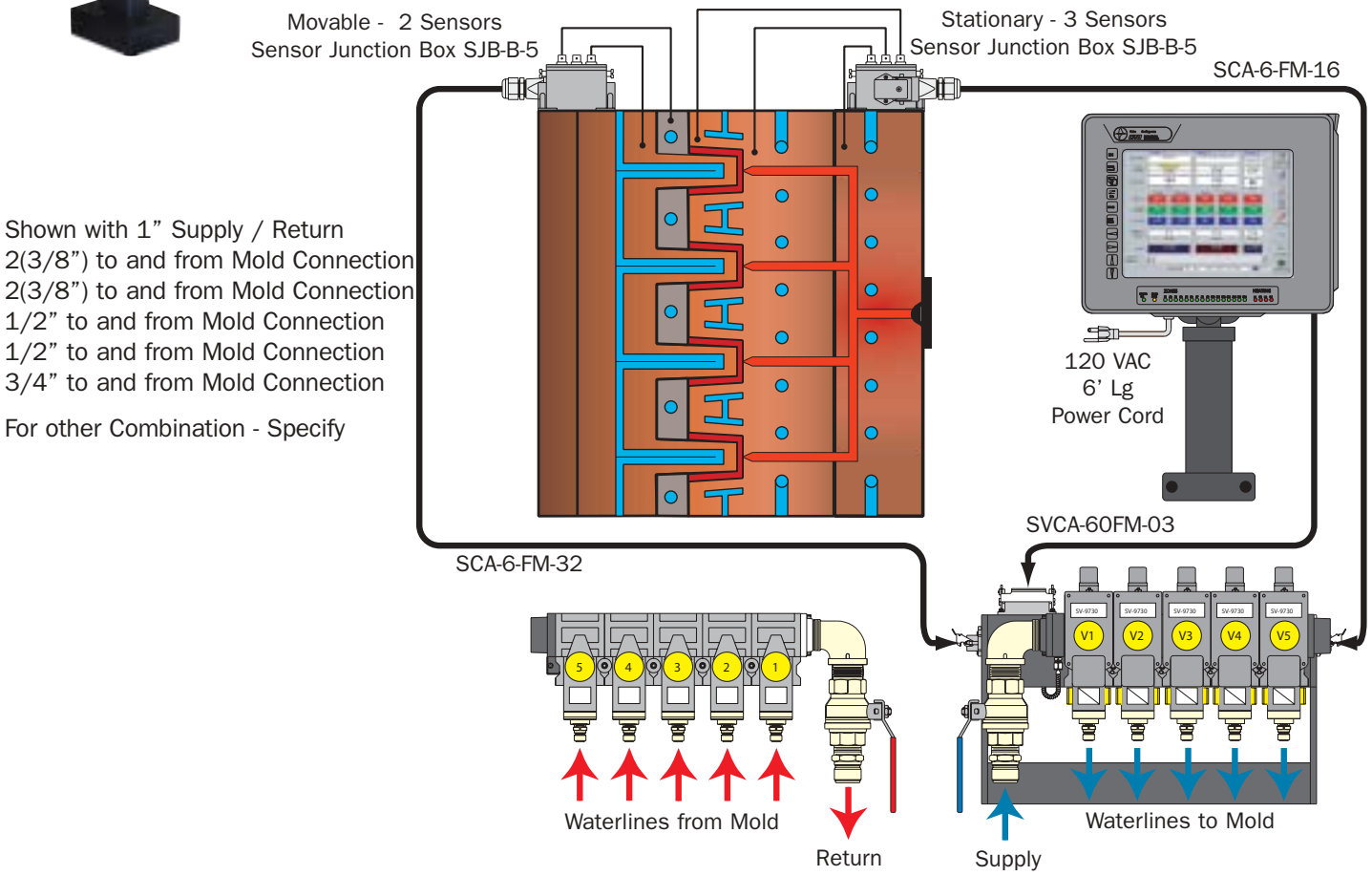


Valve Swing Arm
5 Zone
Model: VSA

PulseCooling™ Controller
5 Zone
Model: PCV



Features Include:
Windows Controller
Dynamic GraphTracking
24 hour Quality Recording
Mold Drawings on Screen
Up to 100 Mold Files
Mold Protection Δt Process Limits



Shown with 1” Supply / Return
2(3/8”) to and from Mold Connection
2(3/8”) to and from Mold Connection
1/2” to and from Mold Connection
1/2” to and from Mold Connection
3/4” to and from Mold Connection

For other Combination - Specify

Electrical Specifications:
Voltage: 100- 250 VAC 60 Hz
Fuse: 3 amp.
Backup Power Supply: UPS 280 PnP, APC (Recommended)
Display: 12.1" Color TFT LCD
Touch Screen: Analog Resistive 12.1", Dynapro

Operator Interface Hardware:
CPU Board: Pentium, Ethernet option 10 Base-T (R45), 2 serial, 1 parallel, LCD Interface.
CPU Memory: 128 Mb SDRAM
Hard Disk Drive: 10 Gb , EIDE
Zip Drive: 100 Mb

Mold Controller Hardware:
Real Time Board: Durango
Real time I/O: CITO RT2167-D
Temperature Inputs:
Resolution: +/-1° Fahrenheit
Type: 20k Ohm Thermistor
Range: 32° F to 400° F

Software:
Operating System: Windows 98 Second Edition
Operator Interface: CITO PC with GraphTrac V3.85
Display Data Update: Once per second
Mold Controller: CITO Dedicated Software
Touch Screen: Hampshire Touchsystems V5.04a
Backup Power Supply: PowerChute Pro Windows 95 V1.1.0

Physical Specifications:
Size:10"D x 14.5W x 11H
Weight: Approximately 18 Lbs. (8 Kg)

High Performance Molding
PulseCooling™ with Chiller Water

Typical 5 Zone Installation:
• **Hot Runner** • **Cavity Front and Rear** • **Core** • **Stripper Plate**

Standard Components

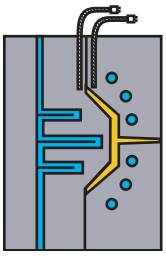
2 - Mold Mounting J-Box	SJB-B-5
1 - Sensor Cable Ass'y	SCA-6-FM-16 (16' Lg)
1 - Sensor Cable Ass'y	SCA-6-FM-32 (32' Lg)
2 - Armored Spring Probe	ASP-B-8-20-96
2 - Armored Spring Probe	ASP-B-4-20-96
2 - Armored Connection Cable	ACC-BB-096
2 - Spring Bead Probe	SBP-B-6-20-12
1 - Internal Wet Probe	IWF-4-20-09-2
1 - Internal Wet Probe	IWF-4-20-12-2

MODEL CODE

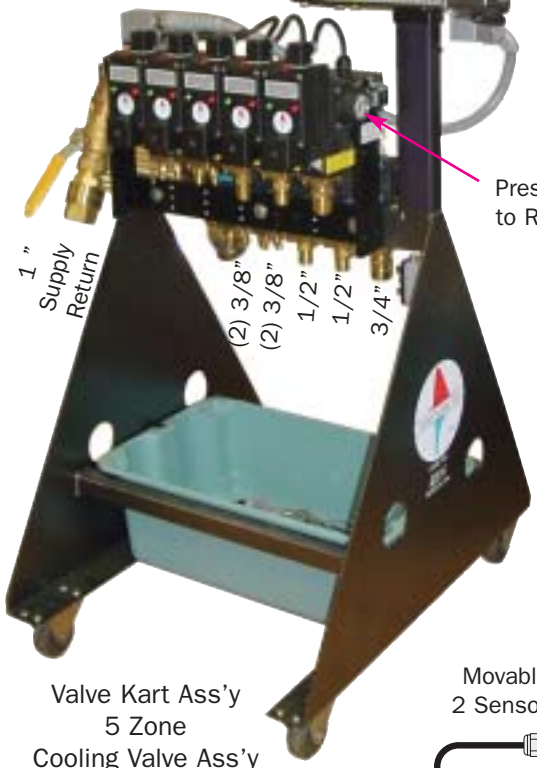
PCV - VSA - 01

VERSION
VSA - VALVE SWING ASSY
VSFA - VALVE SWING FLOW ASSY
PulseCooling™ CONTROLLER - PCV = 5 ZONE

PulseCooling™ WINDOWS CONTROLLER
5 ZONE / 10 ZONE - COOLING
KART MOUNTED VALVES
MODEL: PCV - VKA



PulseCooling™ Controller
5 Zone
Model: PCV

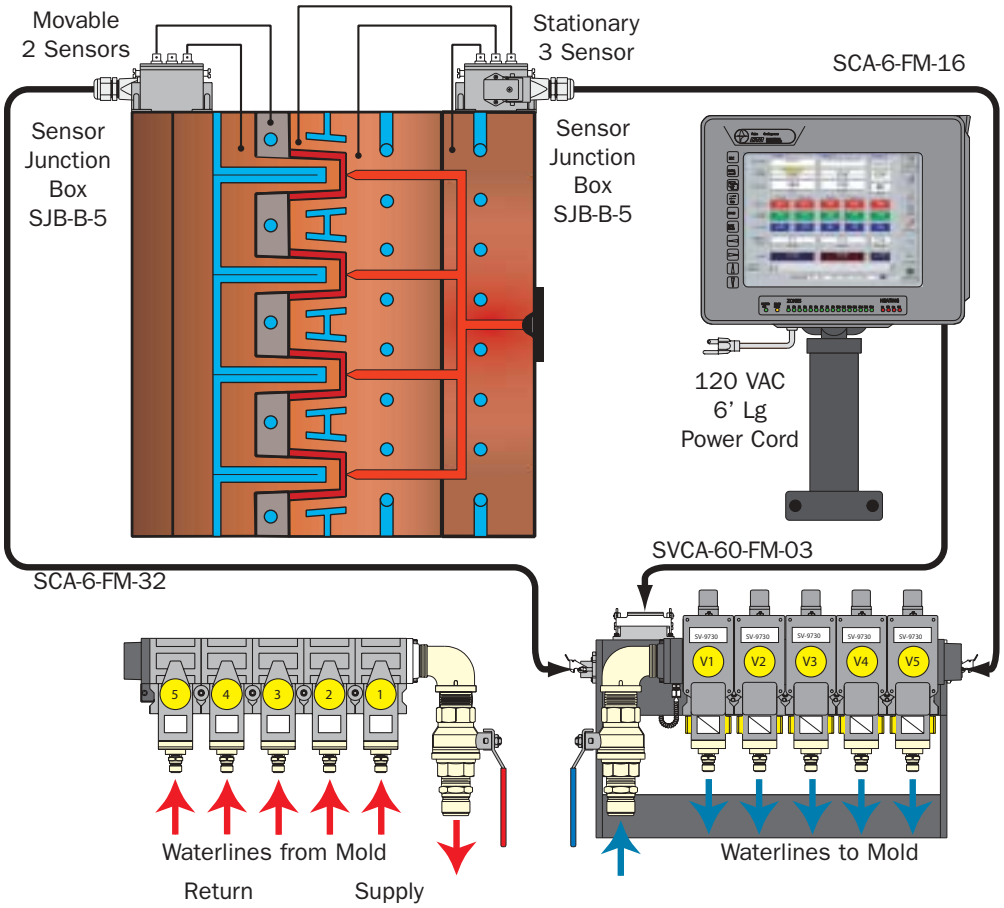


Shown with 1" Supply / Return
2(3/8") to and from Mold Connection
2(3/8") to and from Mold Connection
1/2" to and from Mold Connection
1/2" to and from Mold Connection
3/4" to and from Mold Connection

For other Combination - Specify

For Machine
Mounting, specify
Cable Length
SVCA-60-FM-XX

Valve Kart Ass'y
5 Zone
Cooling Valve Ass'y
Model: VKA



Electrical Specifications:
Voltage: 100- 250 VAC 60 Hz
Fuse: 3 amp.
Backup Power Supply: UPS 280 PnP, APC (Recommended)
Display: 12.1" Color TFT LCD
Touch Screen: Analog Resistive 12.1", Dynapro

Operator Interface Hardware:
CPU Board: Pentium, Ethernet option 10 Base-T (R45), 2 serial, 1 parallel, LCD Interface.
CPU Memory: 128 Mb SDRAM
Hard Disk Drive: 10 Gb , EIDE
Zip Drive: 100 Mb

Mold Controller Hardware:
Real Time Board: Durango
Real time I/O: CITO RT2167-D
Temperature Inputs:
Resolution: +/-1° Fahrenheit
Type: 20k Ohm Thermistor
Range: 32° F to 400° F

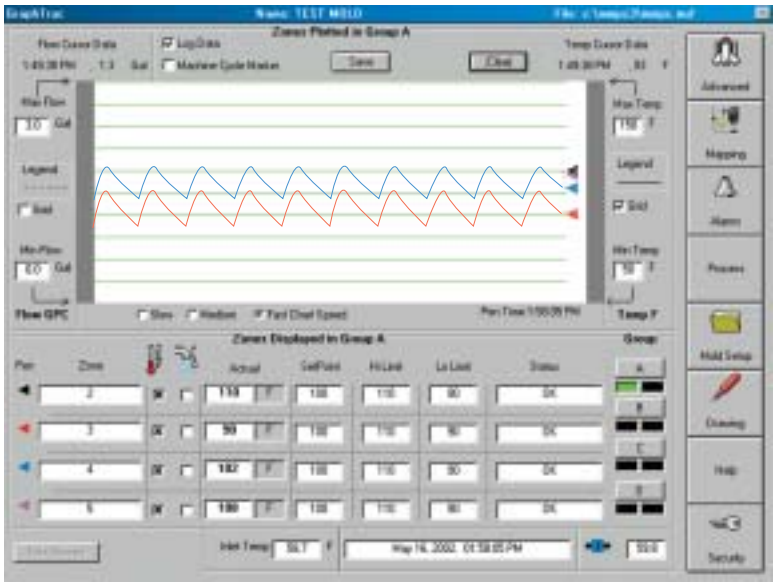
Software:
Operating System: Windows 98 Second Edition
Operator Interface: CITO PC with GraphTrac V3.85
Display Data Update: Once per second
Mold Controller: CITO Dedicated Software
Touch Screen: Hampshire Touchsystems V5.04a
Backup Power Supply: PowerChute Pro Windows 95 V1.1.0

Physical Specifications:
Size:10"D x 14.5W x 11H
Weight: Approximately 18 Lbs. (8 Kg)

Features Include:
Windows Controller
Dynamic GraphTracking
24 hour Quality Recording
Mold Drawings on Screen
Up to 100 Mold Files
Mold Protection Δt Process Limits

High Performance Molding
PulseCooling™ with Chiller Water

Typical Zoning
Hot Runner
Cavity
Core
Stripper Plate



Hot Runner / Stack Molds

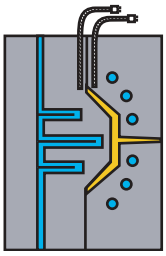
Standard Components

2 - Mold Mounting J-Box	SJB-B-5
1 - Sensor Cable Ass'y	SCA-6-FM-16 (16' Lg)
1 - Sensor Cable Ass'y	SCA-6-FM-32 (32' Lg)
2 - Armored Spring Probe	ASP-B-8-20-96
2 - Armored Spring Probe	ASP-B-4-20-96
4 - Armored Connection Cable	ACC-BB-096
6 - Spring Bead Probe	SBP-B-6-20-12
2 - Internal Wet Probe	IWF-4-20-09-2
2 - Internal Wet Probe	IWF-4-20-12-2

MODEL CODE

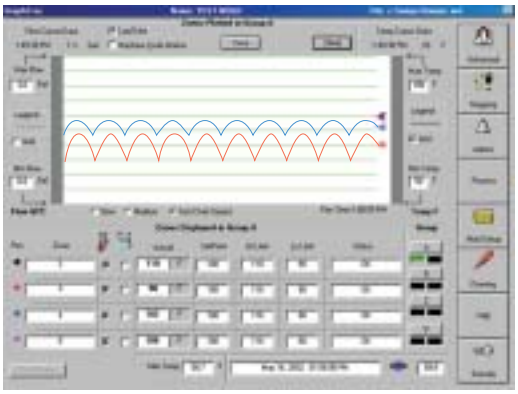
PCV - VKA - 01

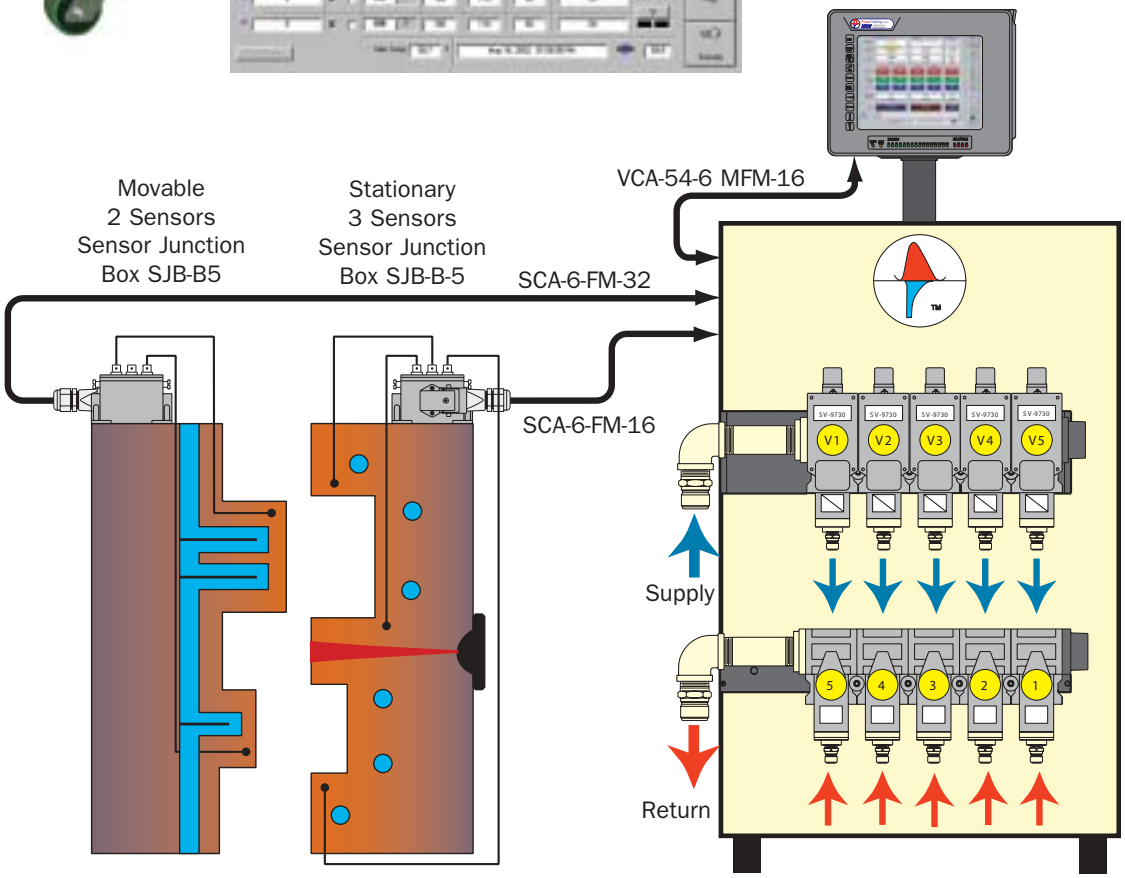
- 01 — VERSION
- VKA — VKA - VALVE KART ASS'Y; VKFA - VALVE KART FLOW ASS'Y
- PCV — PulseCooling™ CONTROLLER - PCV = 5 ZONE; PCX = 10 ZONE



PulseCooling™ WINDOWS CONTROLLER
MODEL: PC05 - 5 ZONE COOLING
PC10 - 10 ZONE COOLING
PCR10 - 10 ZONE REMOTE VALVES

Features Include:
Windows Controller
Dynamic GraphTracking
24 hour Quality Recording
Mold Drawings on Screen
Up to 1000 Mold Files
Mold Protection Δt Process Limits





PRODUCT SPECIFICATIONS
PC05 - 5 ZONE
PC10 - 10 ZONE
PCR10 - 10 ZONE - REMOTE VALVES

POWER REQUIREMENTS:
PC05 and PC10: 120 VAC 60 Hz, 5 Amp.
PCR10: 240 VAC 60 Hz, 3 Amp.

DISPLAY: 12.1" Color TFT LCD
TOUCH SCREEN: Analog Resistive 12.1"

OPERATOR INTERFACE HARDWARE:
CPU Board: Pentium
Ethernet option 10 Base-T (R45),
2 serial, 1 parallel, LCD Interface.
CPU Memory: 128 Mb SDRAM
Hard Disk Drive: 10 Gb , EIDE
Zip Drive: 100 Mb

Mold Controller Hardware:
Real Time Board: Durango
Real time I/O: CITO RT2167-D
Temperature Inputs:
Resolution: +/-1° Fahrenheit
Type: 20k Ohm Thermistor
Range: 32° F to 400° F

Software:
Operating System: Windows 98 Second Edition
Operator Interface: CITO PulseCooling™ PC with GraphTrac V3.85
Display Data Update: Once per second
Mold Controller: CITO Dedicated Software
Touch Screen: Hampshire Touchsystems V5.04a
Backup Power Supply: PowerChute Pro Windows 95 V1.1.0

- 4 MOLD INSERTS -
EACH COOLING INDEPENDENTLY
TO BALANCE AN UNBALANCED MOLD
4 Zone on Stationary
4 Zone on Movable
1 Zone on Sprue Bushing

PHYSICAL SPECIFICATIONS:

PC05: Size: 25"D x 30"W x 44"H	Weight:	360 Lbs
PC10: Size: 36"D x 32"W x 48"H	Weight:	460 Lbs
PCR10: Size: 25"D x 30"W x 44"H	Weight:	360 Lbs

Standard Components

2 - Mold Mounting J-Box	SJB-B-5
1 - Sensor Cable Ass'y	SCA-6-FM-16 (16' Lg)
1 - Sensor Cable Ass'y	SCA-6-FM-32 (32' Lg)
2 - Armored Spring Probe	ASP-B-8-20-96
2 - Armored Spring Probe	ASP-B-4-20-96
2 - Armored Connection Cable	ACC-BB-096
2 - Spring Bead Probe	SBP-B-6-20-12
1 - Internal Wet Probe	IWF-4-20-09-2
1 - Internal Wet Probe	IWF-4-20-12-2

MODEL CODE

PC05 - 0 - 05 - 111

PC = PulseCooling

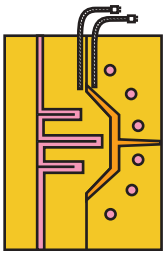
05 = 5 ZONE INTERNAL
10 = 10 ZONE INTERNAL
R10 =10 ZONE REMOTE

F = FLOW

VERSION
1 = < 10 AMP
2 = < 20 AMP

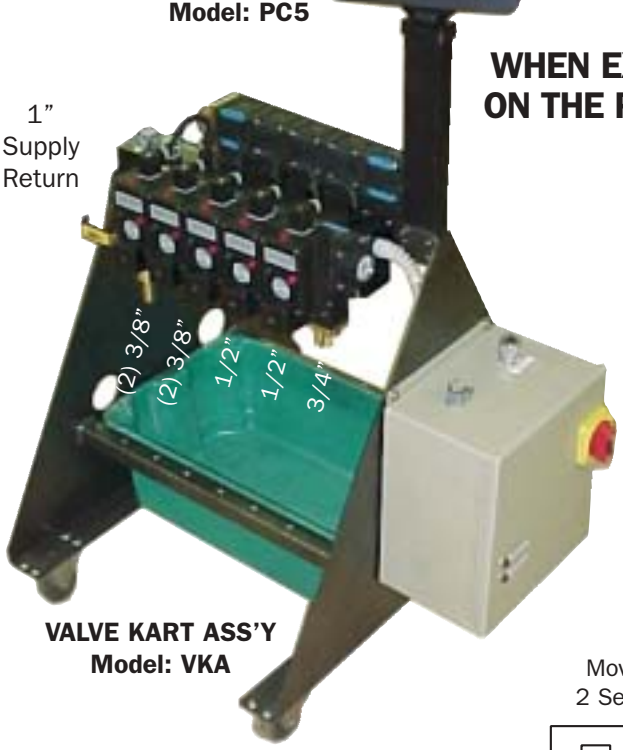
1 = 120 VOLT
2 = 240 VOLT
4 = 480 VOLT

COOLING = NO. OF ZONES



PulseCooling™ CONTROLLER
5 ZONE HEATING - OR - COOLING
VALVE KART ASS'Y - ZONE HEATER
MODEL: PC5 - VKA - ZH

Model: PC5



VALVE KART ASS'Y
Model: VKA

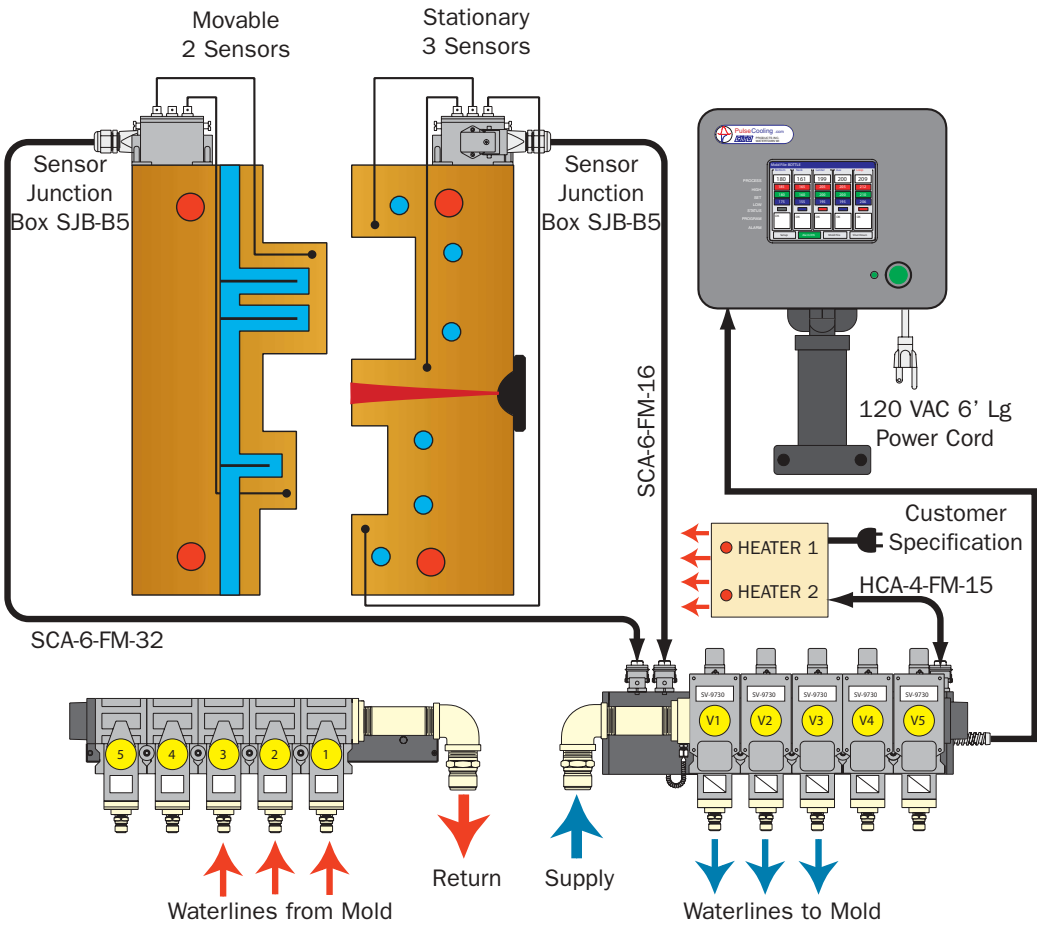
WHEN EXTERNAL HEAT MUST BE ADDED TO SECTIONS OR ON THE PERIMETER OF A MOLD - WITH ELECTRIC HEATERS

Thin Wall Molding
Off Balanced Geometry
Precision Molding
Shifting of Nit Line

ZONE HEATER
Model: ZH
For Details - See Page 21

Shown with 1" Supply / Return
2(3/8") to and from Mold Connection
2(3/8") to and from Mold Connection
1/2" to and from Mold Connection
1/2" to and from Mold Connection
3/4" to and from Mold Connection

For other Combination - Specify



Standard Components

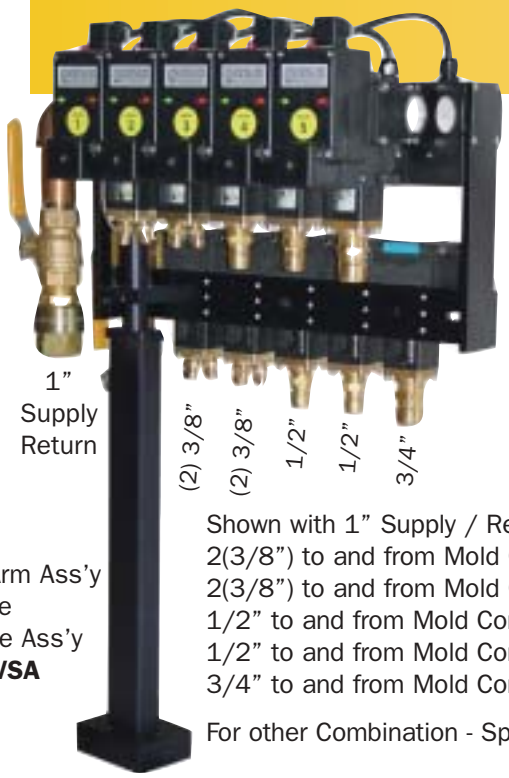
2 - Mold Mounting J-Box	SJB-B-5
1 - Sensor Cable Ass'y	SCA-6-FM-16 (16' Lg)
1 - Sensor Cable Ass'y	SCA-6-FM-32 (32' Lg)
2 - Armored Spring Probe	ASP-B-8-20-96
2 - Armored Spring Probe	ASP-B-4-20-96
2 - Armored Connection Cable	ACC-BB-096
2 - Spring Bead Probe	SBP-B-6-20-12
1 - Internal Wet Probe	IWF-4-20-09-2
1 - Internal Wet Probe	IWF-4-20-12-2

MODEL CODE

PC5 - VKA - ZH - 01

- 01 — VERSION
- ZH — ZONE HEATER
- VKA — VALVE KART ASS'Y
- PC5 — PulseCooling™ CONTROLLER 5"TOUCH SCREEN

PulseCooling™ CONTROLLER
5 ZONE HEATING - OR - COOLING
VALVE SWING ARM ASS'Y - ZONE HEATER
MODEL: PC5 - VSA - ZH



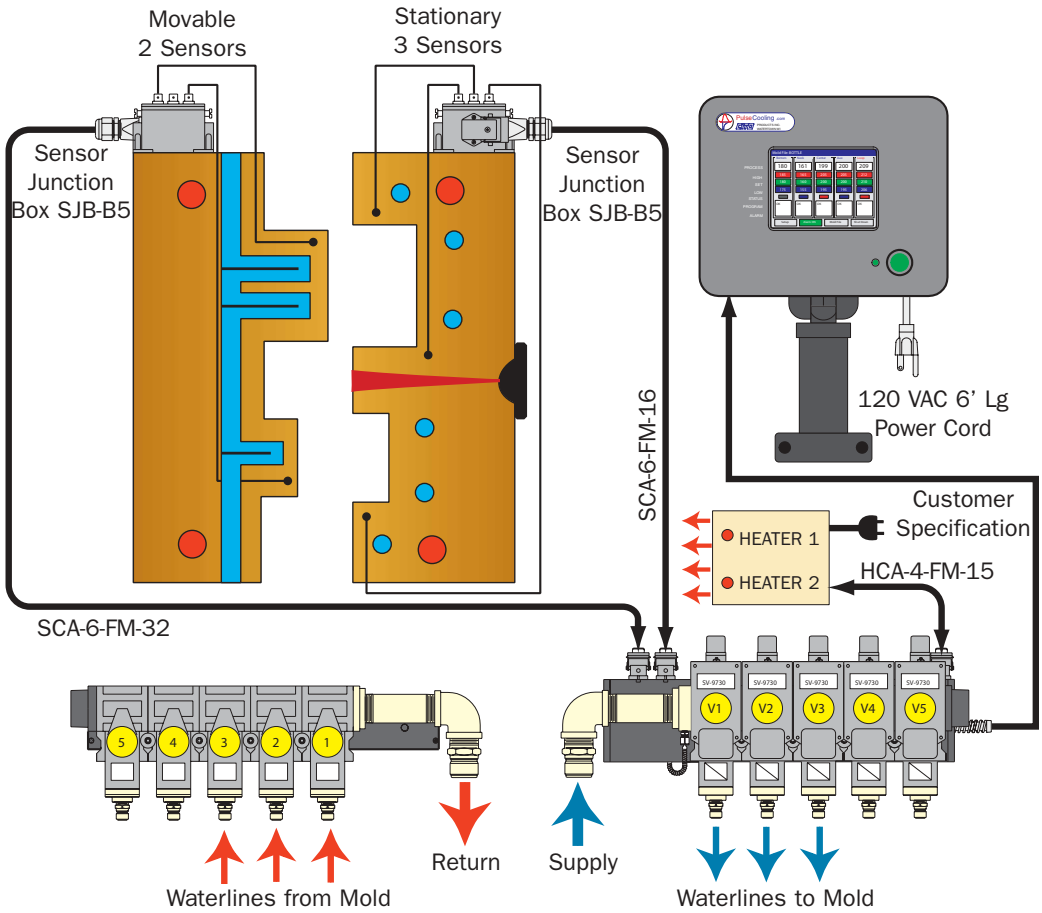
Valve Swing Arm Ass'y
5 Zone
Cooling Valve Ass'y
Model: VSA

Shown with 1" Supply / Return
2(3/8") to and from Mold Connection
2(3/8") to and from Mold Connection
1/2" to and from Mold Connection
1/2" to and from Mold Connection
3/4" to and from Mold Connection

For other Combination - Specify

Model: PC5

Zone Heater
2 Zones
Model: ZH
For Details - See Page 23



PRECISION MOLDING
WHEN EXTERNAL HEAT IS REQUIRED MACHINE MOUNTED

When External Heat is Required
When Mold Temperature Must be Ready - For Start Up
When Cycle Interruption Must be Complimented with Added Heat Input

For Electric Perimeter Heating

... And Many, Many More.

Standard Components

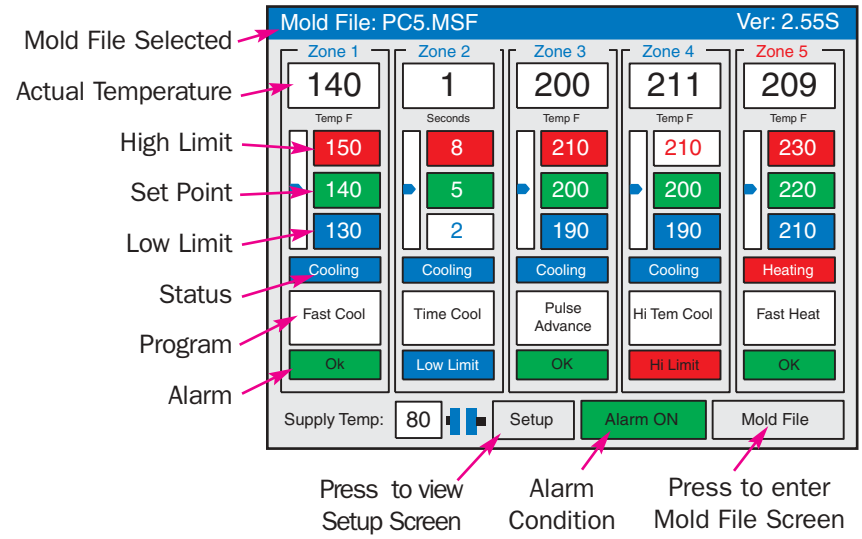
2 - Mold Mounting J-Box	SJB-B-5
1 - Sensor Cable Ass'y	SCA-6-FM-16 (16' Lg)
1 - Sensor Cable Ass'y	SCA-6-FM-32 (32' Lg)
2 - Armored Spring Probe	ASP-B-8-20-96
2 - Armored Spring Probe	ASP-B-4-20-96
2 - Armored Connection Cable	ACC-BB-096
2 - Spring Bead Probe	SBP-B-6-20-12
1 - Internal Wet Probe	IWF-4-20-09-2
1 - Internal Wet Probe	IWF-4-20-12-2

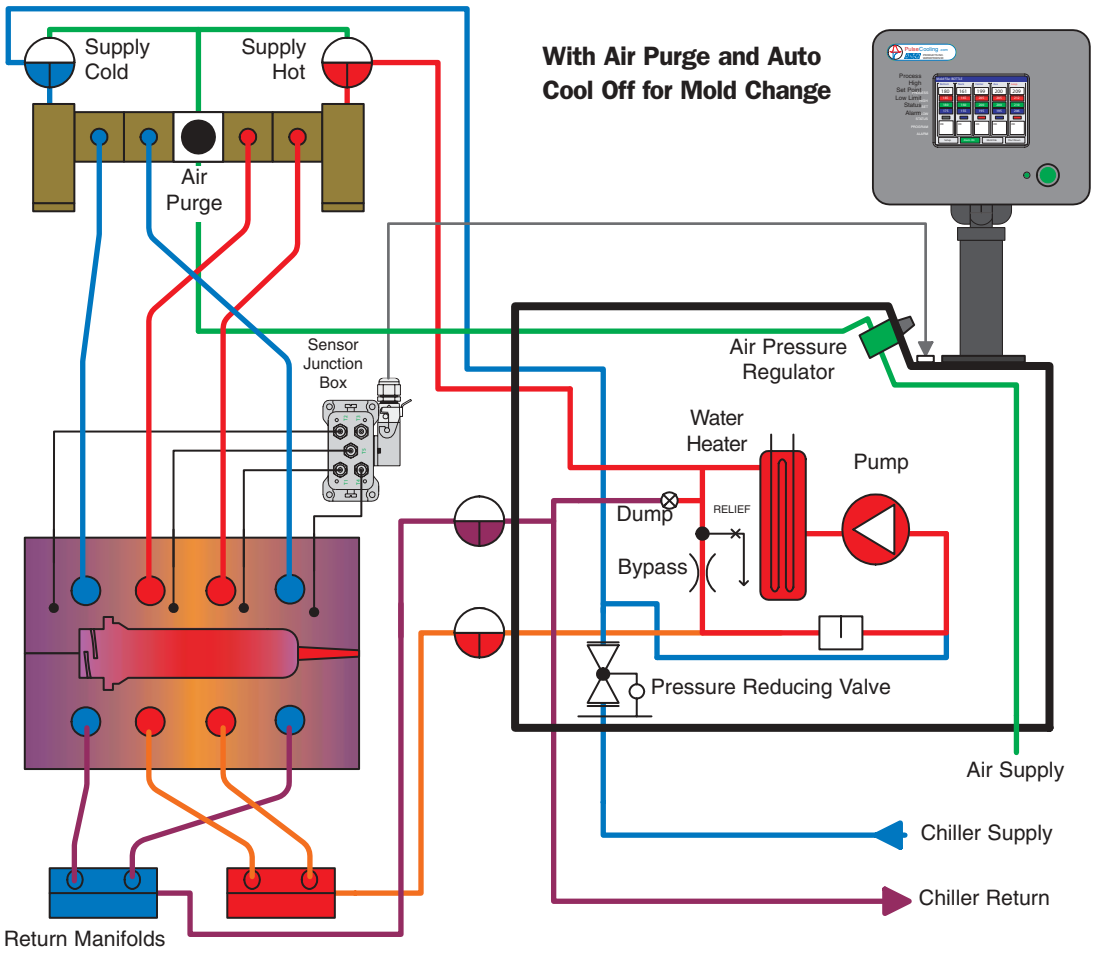
MODEL CODE

PC5 - VSA - ZH - 01

- PC5 - PulseCooling™ 5" SCREEN
- VSA - VALVE SWING ARM ASS'Y
- ZH - ZONE HEATER
- 01 - VERSION

INJECTION MOLDING & INJECTION BLOW MOLDING
PulseCooling™ CONTROLLER
2 HEATING UP TO 250 DEG F
2 COOLING TO CHILLER TEMP
MODEL: PHC4





HIGH PERFORMANCE
2 ZONE HEATING / 2 ZONE COOLING
TEMPERATURE RANGE - 30ºF - 250ºF

PRODUCT SPECIFICATIONS

MODEL	**PHC4 3 03 4 18 - 01 —— PHC4 8 12 4 24-01**
ZONES - HEATING	2 HEATING
ZONES - COOLING	2 COOLING
CONTROLLER TYPE:	DOS - TOUCH SCREEN
SOFTWARE:	CITO Dedicated Software
SENSOR ZONES:	5
VOLTAGE	480VAC 3 PHASE @60 Hz
POWER:	19 KW 30 AMP ———— 25 KW 60 AMP
PUMP HP INPUT:	3/4 (03) ———— 3(12)
HEATER OUTPUT:	18KW ———— 24KW
TEMPERATURE RANGE	32-250 DEG F
SUPPLY PIPE SIZE	1"NPT
PulseCooling SUPPLY	1"NPT
PulseCooling RETURN	1"NPT
FLOW RATE - HEATING @ 30 PSI	30 GPM
FLOW RATE - COOLING @ 20 PSI	28 GPM
COLOR:	STAINLESS STEEL PANELS
SIZE:	18.5"W 38"D 34"H
WEIGHT:	220 LBS 100 KG ———— 330 LBS 150KG

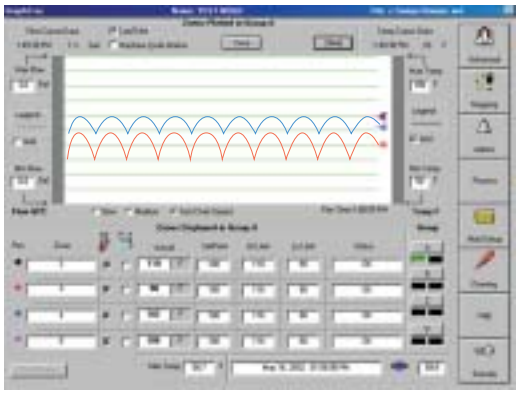
Sensors and cables per cooling schematic

MODEL CODE

PHC4 3 03 4 18-01

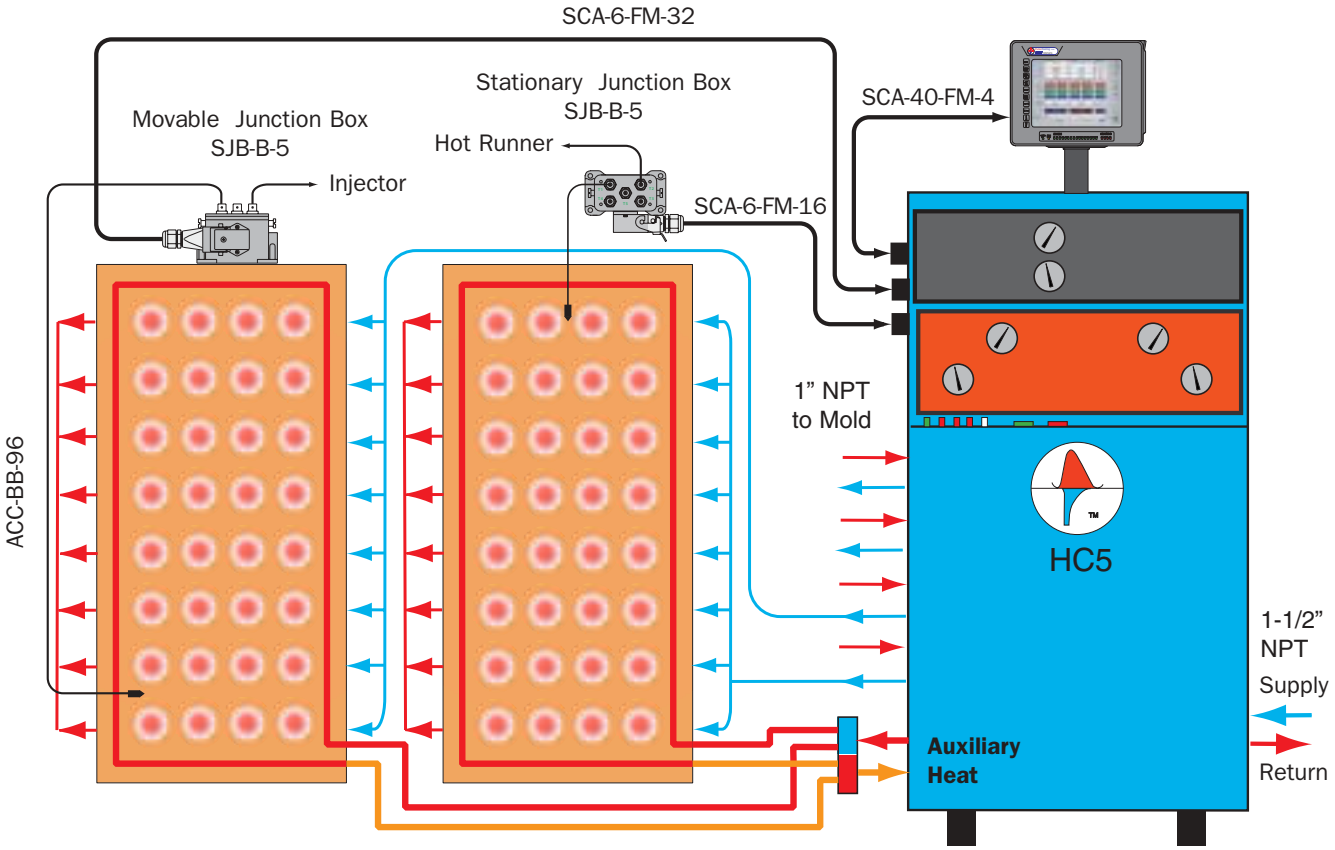
- PHC — PULSE HEATING - COOLING
- 4 — 4 = 2 ZONE HEATING 2 ZONE COOLING
- 3 — 3 = 3/8" PORT - HOT VALVE; 8 = 1"PORT - HOT VALVE
- 03 — PUMP 03 = 3/4 HP; 12 = 3 HP
- 4 — 2 = 240 VOLT; 4 = 480 VOLT
- 18 — 18 KW; 24 KW
- 01 — VERSION

PulseCooling™ WINDOWS CONTROLLER
UP TO 4 ZONE HEATING & COOLING
MODEL HC1 / 2 / 3 / 4 / 5



Features Include:

24 hour Quality Tracking
24 hour Quality Recording
Mold Drawings on Screen
Up to 1000 Mold Files
Mold Protection Δt
Process Limits with outputs
Reverse pump Protection
Auto Power Saver - Pump Shut Off



HIGH PERFORMANCE
UP TO 4 ZONE HEATING AND COOLING
30º - 240ºF

PRODUCT SPECIFICATIONS

	HC1-W 03 2 18-01	HC2-W 03 2 24-01	HC3-W 03 4 24-01	HC4-W 12 4 36-01	HC5-W 12 4 48-01
CONTROL ZONES:	LOOP ONLY	2	2	4	4
AUXILIARY OUTPUT:	YES	NO	YES	NO	YES
CONTROLLER TYPE:	WINDOWS	WINDOWS	WINDOWS	WINDOWS	WINDOWS
PUMP HP INPUT:	3/4 (03)	3/4 (03)	3/4 (03)	3 (12)	3 (12)
VOLTS:	240 (2)	240 (2)	480 (4)	480 (4)	480 (4)
HEATER OUTPUT:	18KW	24KW	24KW	36KW	48KW
SUPPLY FITTING SIZE:	(2) 1-1/2"	(2) 1-1/2"	(2) 1-1/2"	(2) 1-1/2"	(2) 1-1/2"
MOLD FITTING SIZE:	(2) 1"	(4) 1"	(6) 1"	(8) 1"	(10) 1"
SOFTWARE INTERFACE:	HC5	HC5	HC5	HC5	HC5
SENSOR ZONES:	5	5	5	5	5
GRAPHTRAC:	YES	YES	YES	YES	YES
POWER:	19KW 46AMP	25KW 61AMP	25KW 31AMP	50KW 46AMP	50KW 61AMP
COLOR:	NITRO BLUE	NITRO BLUE	NITRO BLUE	NITRO BLUE	NITRO BLUE
SIZE:	30W 40D 60H	30W 40D 60H	30W 40D 60H	30W 40D 60H	30W 40D 60H
WEIGHT:	600 LBS 272 KG	660LBS 300 KG	700 LBS 318 KG	760 LBS 345 KG	780 LBS 453 KG

Standard Components

2 - Mold Mounting J-Box	SJB-B-5
1 - Sensor Cable Ass'y	SCA-6-FM-16 (16' Lg)
1 - Sensor Cable Ass'y	SCA-6-FM-32 (32' Lg)
2 - Armored Spring Probe	ASP-B-8-20-96
2 - Armored Spring Probe	ASP-B-4-20-96
2 - Armored Connection Cable	ACC-BB-096
2 - Spring Bead Probe	SBP-B-6-20-12

MODEL CODE

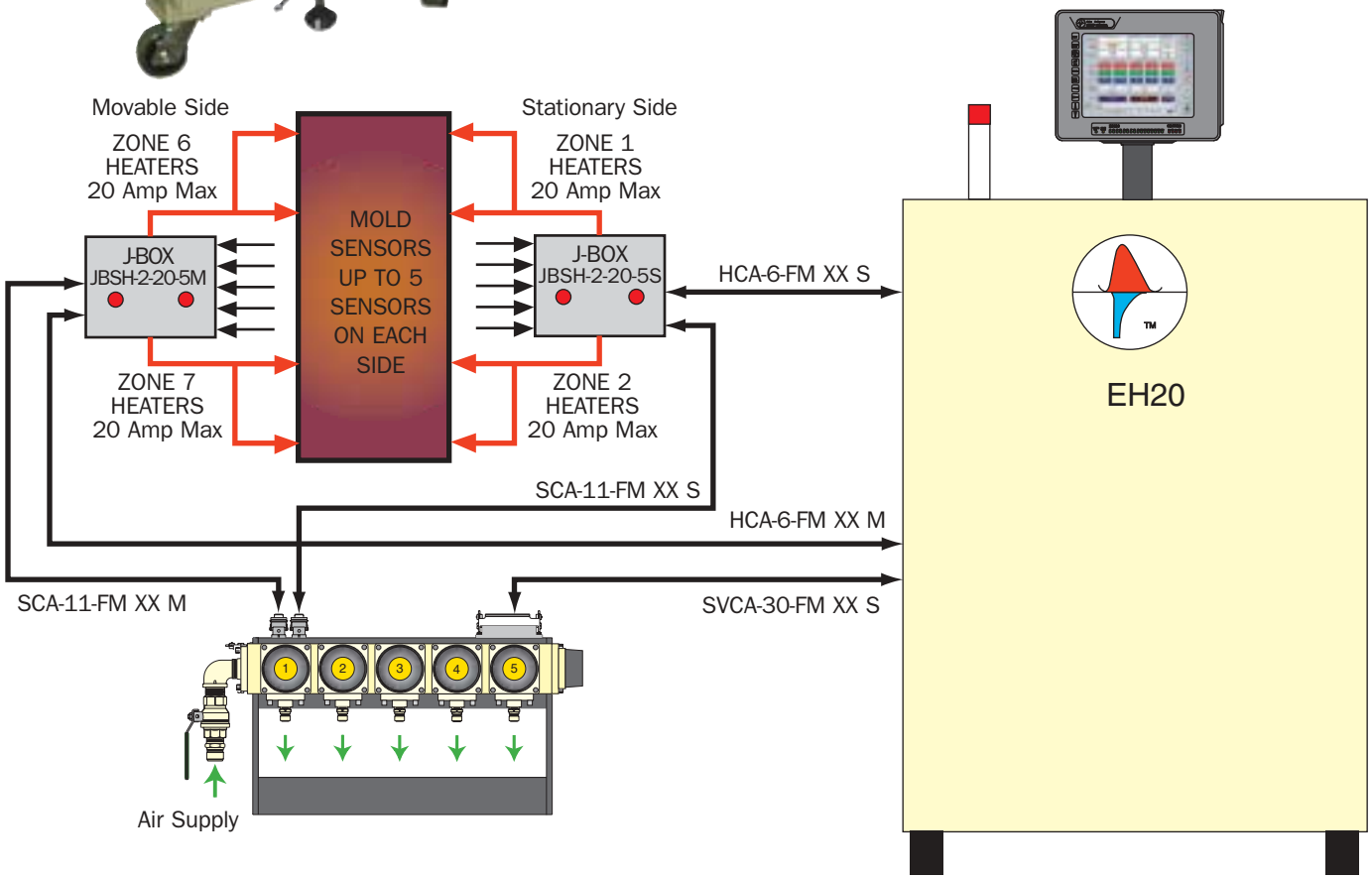
H C 5 D 03 2 - 1 8 - 01

- HC = HEAT / COOL
  - HC1 =AUXILIARY HEAT
  - HC2 = 2 ZONE
  - HC3 = 2 ZONE + AUX. HEAT
  - HC4 = 4 ZONE
  - HC5 = 4 ZONE + AUX. HEAT
- W = WINDOWS / TC12"
- D = DOS / PC5"
- PUMP HP
  - 03 = 3/4
  - 12 = 3
- 2 = 240 VOLT
- 4 = 480 VOLT
- 18 KW
- 24 KW
- 36 KW
- 48 KW
- VERSION

PulseCooling™ WINDOWS CONTROLLER
4 ZONE 20 KW HEATING
5 ZONE COOLING
MODEL: EH20

Features Include:

Windows Controller
Dynamic GraphTracking
24 hour Quality Recording
Mold Drawings on Screen
Up to 100 Mold Files
Mold Protection Δt Process Limits



ULTRA HIGH TEMPERATURE MOLDING
UP TO 320ºF

PRODUCT SPECIFICATIONS

POWER REQUIREMENTS: 480 VAC, 3-Phase, 30 KVA, 60HZ/60 amp max

HEATER OUTPUT: 4 zones, 1 heater per zone, 240 VAC 20 Amp per heater

COOLING VALVE OUTPUT: 24 VDC valves, 10 cooling zones

ELECTRONIC HARDWARE SPECIFICATIONS: Rating: PAI 4800 V, sec 240 V, 3-Phase 60 HZ, 30 KVA

OPERATOR INTERFACE HARDWARE:

CPU Board: Pentium, Ethernet option 10 Base-T (R45), 2 serial, 1 parallel, LCD Interface.
Display: 12.1" Color TFT LCD
Touch Screen: Analog Resistive 12.1", Dynapro
CPU Memory: 128 Mb SDRAM
Hard Disk Drive: 10 Gb , EIDE
Zip Drive: 100 Mb

Mold Controller Hardware:

Real Time Board: Durango
Real time I/O: CITO RT2167-D (2 per assembly)

Temperature Inputs:

Resolution: +/-1° Fahrenheit
Type: 20k Ohm Thermistor
Range: 32° F to 400° F

BACK UP POWER SUPPLY: UPS 280 PNP, APC

Software:

Operating System: Windows 98 Second Edition
Operator Interface: CITO PulseCooling™ PC with GraphTrac V3.85
Display Data Update: Once per second
Mold Controller: CITO Dedicated Software
Touch Screen: Hampshire Touchsystems V5.04a
Backup Power Supply: PowerChute Pro Windows 95 V1.1.0

BUILD TO AUTOMOTIVE INDUSTRY SPECIFICATIONS

PHYSICAL DESIGN:

Steel construction with 4" Dia. caster

COLOR: Indy Buff

SIZE: 35"D x 40"W x 76"H

WEIGHT: 750 lbs

Sensors and cables per cooling schematic

MODEL CODE

E H 20 - A - 4 - 05 - 4 - 0 1

EH10 = ELECTRIC HEAT 10 KW
EH20 = ELECTRIC HEAT 20 KW
EH58 = ELECTRIC HEAT 58 KW

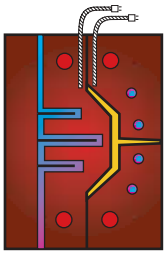
W= WATER VALVES
A= AIR VALVES

HEATING = NO. OF ZONES

COOLING = NO. OF ZONES

2 = 240 VOLT
4 = 480 VOLT

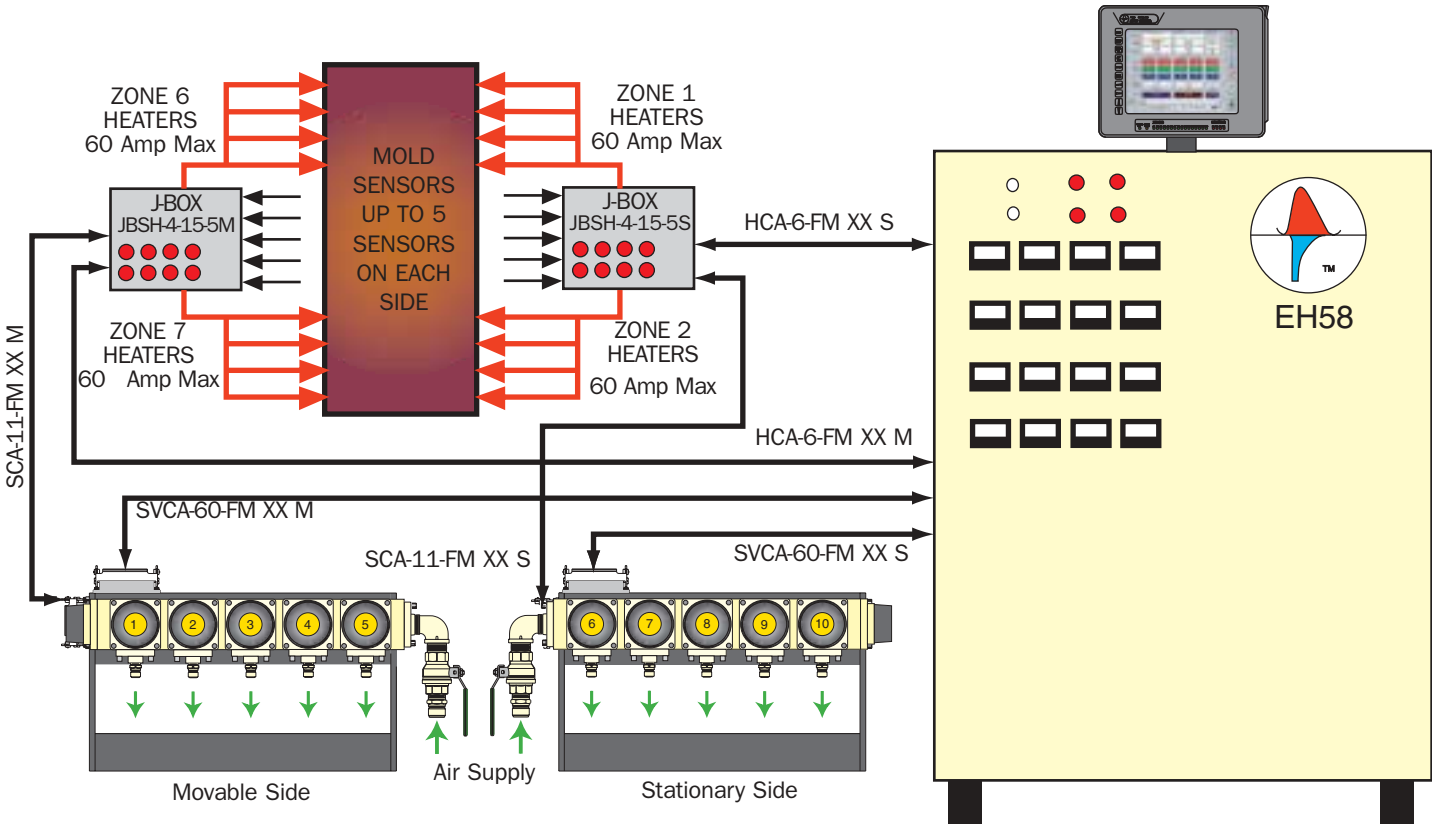
VERSION



PulseCooling™ WINDOWS CONTROLLER
4 ZONE 58 KW HEATING
10 ZONE COOLING
MODEL: EH58

Features Include:

Windows Controller
Dynamic GraphTracking
24 hour Quality Recording
Mold Drawings on Screen
Up to 100 Mold Files
Mold Protection Δt Process Limits



ULTRA HIGH TEMPERATURE MOLDING
UP TO 320ºF

PRODUCT SPECIFICATIONS

POWER REQUIREMENTS: 480 VAC, 3-Phase, 60 KVA, 60HZ/60 amp max

HEATER OUTPUT: 4 zone , 4 heaters per zone, 240 VAC 15 Amp per heater

COOLING VALVE OUTPUT: 24 VDC valves, 10 cooling zone

ELECTRONIC HARDWARE SPECIFICATIONS: Rating: PAI 4800 V, sec 240 V, 3-Phase 60 HZ, 30 KVA

OPERATOR INTERFACE HARDWARE:

CPU Board: Pentium, Ethernet option 10 Base-T (R45), 2 serial, 1 parallel, LCD Interface.
Display: 12.1" Color TFT LCD
Touch Screen: Analog Resistive 12.1", Dynapro
CPU Memory: 64 Mb SDRAM PC100
Hard Disk Drive: 10 Gb , EIDE
Zip Drive: 100 Mb

Mold Controller Hardware:

Real Time Board: CPU Board Durango, 1 Mb Flash Disk
Real Time I/O: CITO RT2167-D (3 per assembly)

Temperature Inputs:

Resolution: +/- 1° Fahrenheit
Type: 20k Ohm Thermistor
Range: 32° F to 400° F

BACK UP POWER SUPPLY: UPS 280 PNP, APC

Software:

Operating System: Windows 98 Second Edition
Operator Interface: CITO PulseCooling™ PC with GraphTrac V3.85
Display Data Update: Once per second
Mold Controller: CITO Dedicated Software
Touch Screen: Hampshire Touchsystems V5.04a
Backup Power Supply: PowerChute Pro Windows 95 V1.1.0

BUILD TO AUTOMOTIVE INDUSTRY SPECIFICATIONS

PHYSICAL DESIGN: Steel construction with 4" Dia. casters

COLOR: Indy Buff

SIZE: 35"D x 42"W x 73"H

WEIGHT: 1134 lbs

Sensors and cables per cooling schematic

MODEL CODE

E H 58 - A - 4 - 1 0 - 4 - 0 1

EH10 = ELECTRIC HEAT 10 KW
EH20 = ELECTRIC HEAT 20 KW
EH58 = ELECTRIC HEAT 58 KW

W= WATER VALVES
A= AIR VALVES

HEATING = NO. OF ZONES

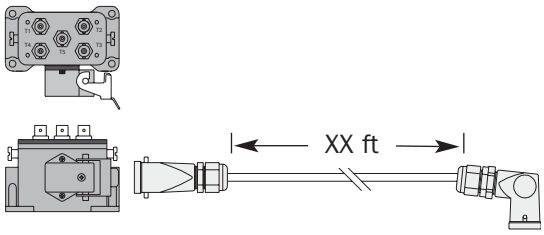
COOLING = NO. OF ZONES

2 = 240 VOLT
4 = 480 VOLT

VERSION

SENSOR SELECTION GUIDE

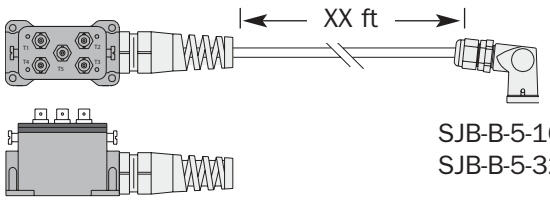
Sensor Junction Box Mold mounted



SJB-B-5

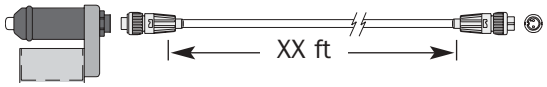
SCA-6-FM-16
SCA-6-FM-32

Sensor Junction Box Machine mounted



SJB-B-5-16
SJB-B-5-32

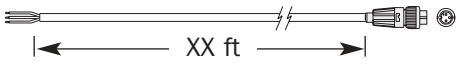
Machine Cycle Switch Ass'y MCS-R-M16



MCS-R-M

CMM-2-16

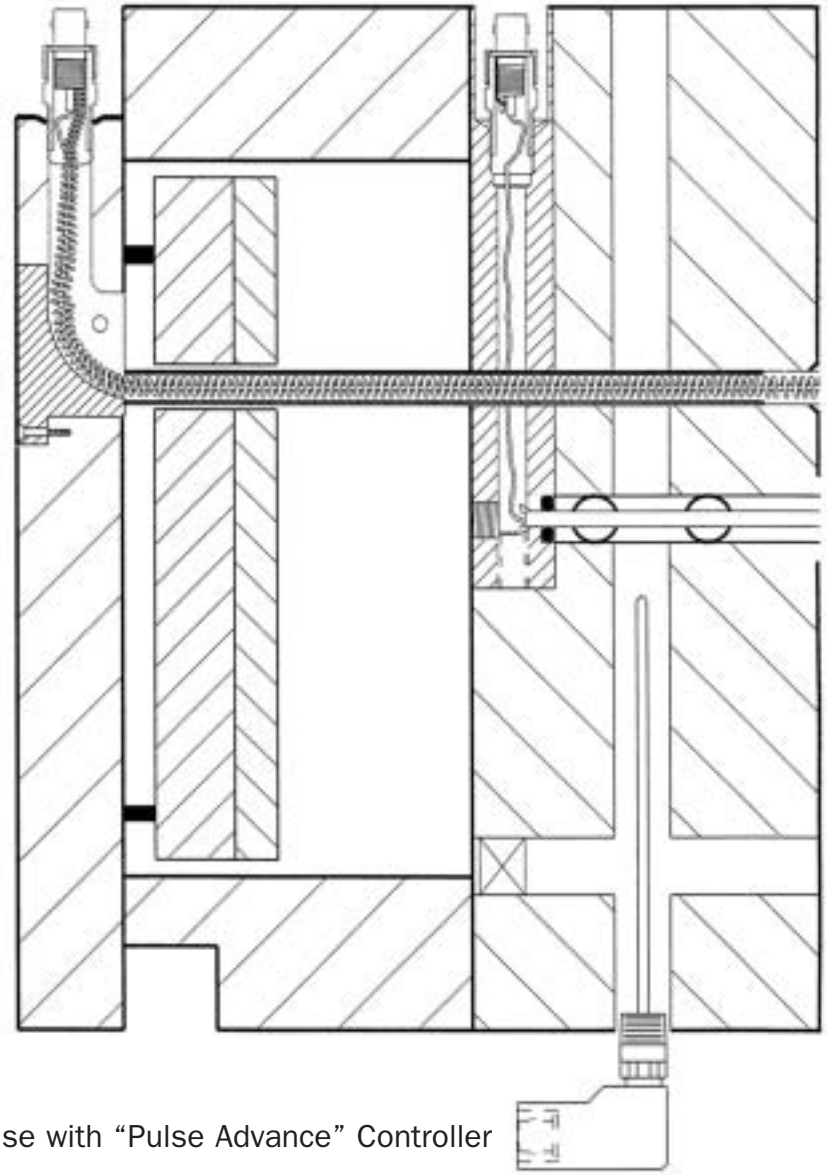
Alarm Output Cable



CMS-3-16

① 3/16" Spring Bead Probe with 3/16" sensor guide tube for 90° turns

① Rotary Core Sensor 1/8" dia. length - as requested



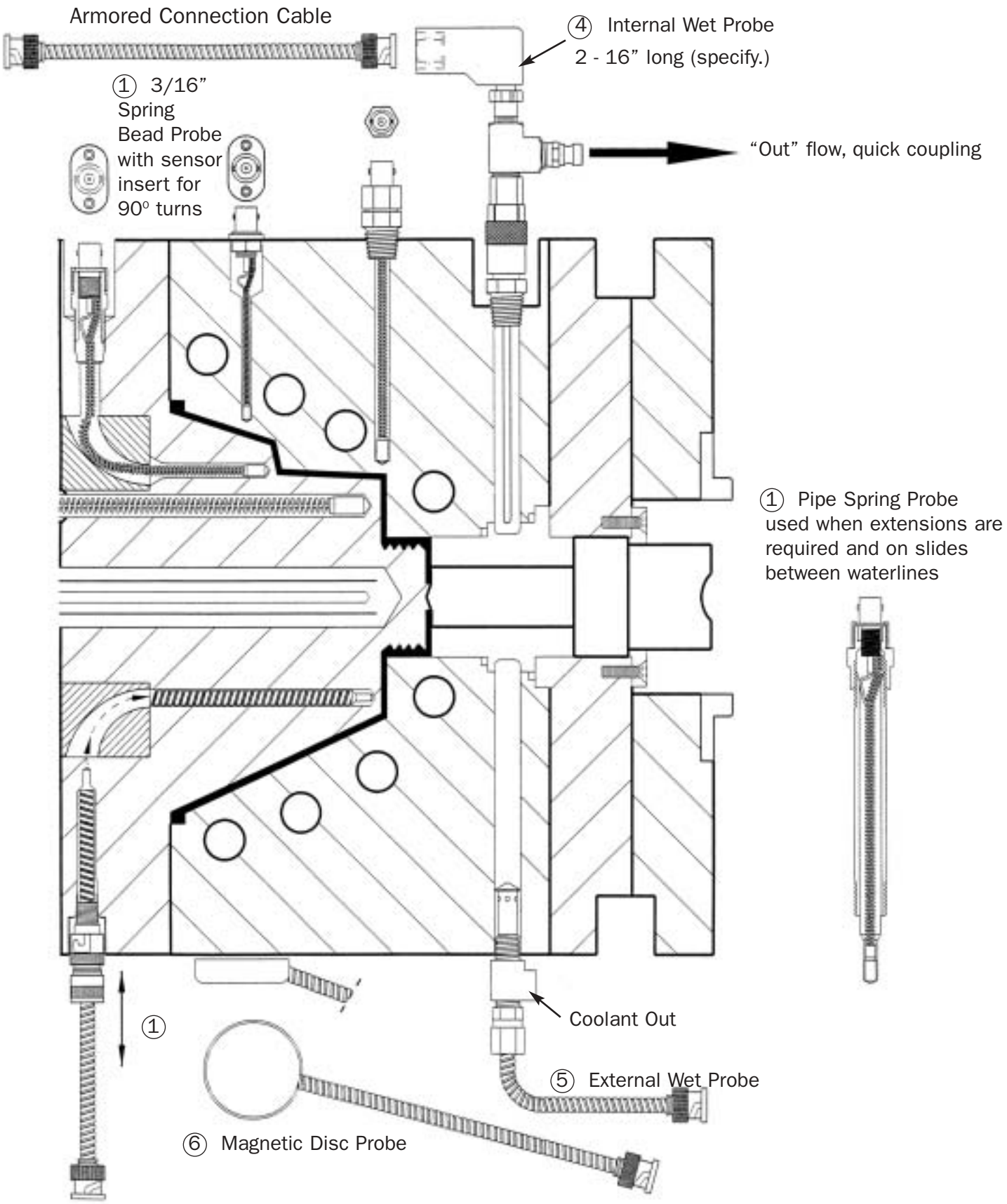
Use with "Pulse Advance" Controller

④ Internal Wet Probe Type "P"

Sensor Choice:

1st choice: - Adjacent to part surface
2nd choice: - Adjacent runner surface
3rd choice: - Adjacent sprue surface
4th choice: - Internal Wet Probe
5th choice: - External Wet Probe
6th choice: - Magnetic Disc Probe

For Sensor position and distance from part, see Sensor Installation Instruction.


Armored Connection Cable
④ Internal Wet Probe
2 - 16” long (specify.)
① 3/16” Spring Bead Probe with sensor insert for 90° turns
“Out” flow, quick coupling
① Pipe Spring Probe used when extensions are required and on slides between waterlines
Coolant Out
①
⑤ External Wet Probe
⑥ Magnetic Disc Probe

SENSOR SELECTION

1/4" Armored Spring Probe, 1/8" X .300" Long Tip

DWG. MM-1208

Installation Instructions see MM-1860

BODY DIAMETER	CABLE LENGTH	PART NO.
1/4"	48"	ASP-8-20-48
1/4"	96"	ASP-8-20-96
1/4"	144"	ASP-8-20-144

Note: To make 90° turn use with Sensor Guide Insert

1/4" Armored Spring Probe, 1/8" X 1" Long Tip

DWG. MM-1212

Installation Instructions see MM-1852

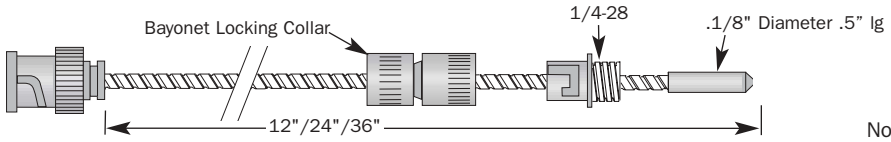
BODY DIAMETER	CABLE LENGTH	PART NO.
1/4"	48"	ASP-B-4-20-48
1/4"	96"	ASP-B-4-20-96
1/4"	144"	ASP-B-4-20-144

Note: Do not use with Sensor Guide Insert

1/8" Armored Spring Probe, 1/8" X .5" Long Tip

DWG. MM-1206

Installation Instructions see MM-1820

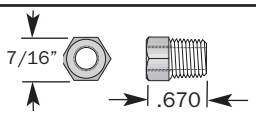


BODY DIAMETER	CABLE LENGTH	PART NO.
1/8"	12"	ASP-B-2-20-12
1/8"	24"	ASP-B-2-20-24
1/8"	36"	ASP-B-2-20-36

Note: To make 90° turn use with Sensor Guide Insert

Spring Probe Adapter 1/8" NPT 1/4-28

DWG. MM-8008-A

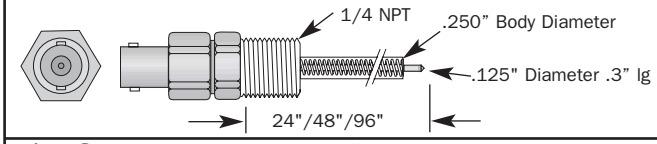


BODY DIAMETER	PART NO.
1/8"	SPA-4-2-N

1/4" Armored Spring Probe "T" Type

DWG. MM-1249

Installation Instructions see MM-1856, MM-1884/1885



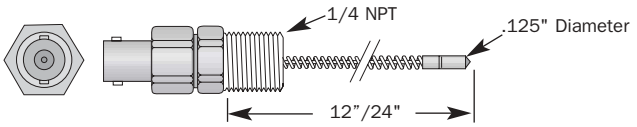
BODY DIAMETER	CABLE LENGTH	PART NO.
1/4"	12"	ASP-T-8-20-12
1/4"	24"	ASP-T-8-20-24
1/4"	36"	ASP-T-8-20-36

Use with type "BB" Connection Cable

1/8" Spring Bead Probe "T" Type

DWG. MM-1244

Installation Instructions see MM-1825/1827/1829/1882/1883



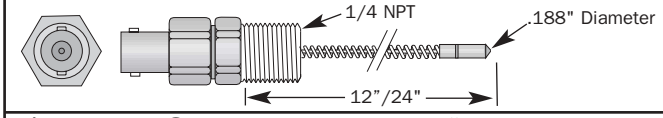
BODY DIAMETER	CABLE LENGTH	PART NO.
1/8"	12"	SBP-T-4-20-12
1/8"	24"	SBP-T-4-20-24

Use with type "BB" Connection Cable

3/16" Spring Bead Probe "T" Type

DWG. MM-1246

Installation Instructions see MM-1827/1882/1883



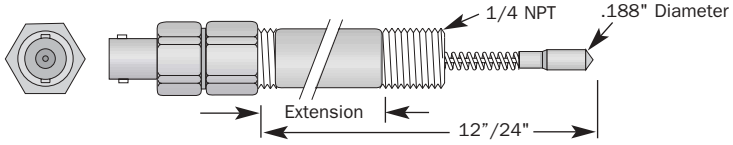
BODY DIAMETER	CABLE LENGTH	PART NO.
3/16"	12"	SBP-T-6-20-12
3/16"	24"	SBP-T-6-20-24

Use with type "BB" Connection Cable

3/16" Pipe Spring Bead Probe "P" Type

DWG. MM-1248

Installation Instructions see MM-1870

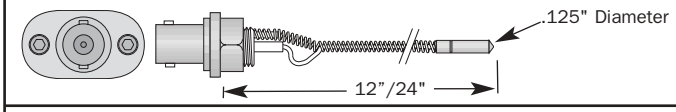


BODY DIAMETER	EXTENSION	SENSOR LENGTH	PART NO.
3/16"	4"	12"	SBP-P4-6-20-12
3/16"	6"	12"	SBP-P6-6-20-12
3/16"	8"	24"	SBP-P8-6-20-24
3/16"	10"	24"	SBP-P10-6-20-24

Use with type "BB" Connection Cable

1/8" Spring Bead Probe "B" Type Installation Instructions see MM-1825/1882/1883

DWG. MM-1240

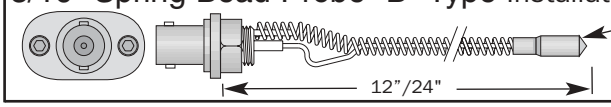


Use with type "BB" Connection Cable

DIAMETER	LENGTH	PART NO.
1/8"	12"	SBP-B-4-20-12
1/8"	24"	SBP-B-4-20-24

3/16" Spring Bead Probe "B" Type Installation Instructions see MM-1821/1882/1883

DWG. MM-1242

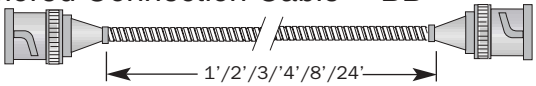


Use with type "BB" Connection Cable

DIAMETER	LENGTH	PART NO.
3/16"	12"	SBP-B-6-20-12
3/16"	24"	SBP-B-6-20-24

Armored Connection Cable - BB

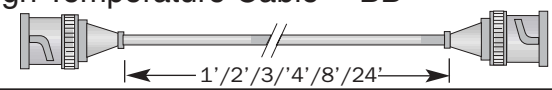
DWG. MM-1268



LENGTH	PART NO.	LENGTH	PART NO.
12"	ACC-BB-012	48"	ACC-BB-048
24"	ACC-BB-024	96"	ACC-BB-096
36"	ACC-BB-036	144"	ACC-BB-144

High Temperature Cable - BB

DWG. MM-1266

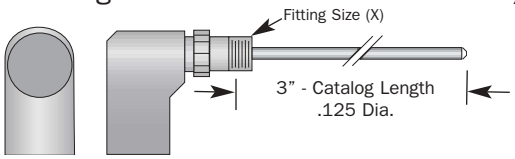


LENGTH	PART NO.	LENGTH	PART NO.
12"	HTC-BB-012	48"	HTC-BB-048
24"	HTC-BB-024	96"	HTC-BB-096
36"	HTC-BB-036	144"'	HTC-BB-144

Internal Wet Probe Type "P" Installation Instructions see MM-1814/1815

DWG. MM-1331

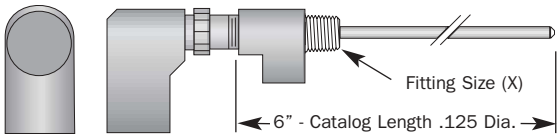
(for sensing inside cross channel waterline)



PROBE LENGTH (XX)	FITTING SIZE (X)	PART NO.
3" = 03	1/8" = 1	IWP-4-20-XX-X
6" = 06	1/4" = 2	
9" = 09	3/8" = 3	
12" = 12	1/2" = 4	Use with type "BB"
15" = 15		Connection Cable
18" = 18		

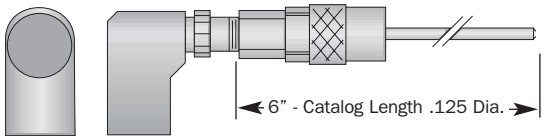
Internal Wet Probe Type "F" (for sensing inside of outgoing waterline)

DWG. MM-1362



PROBE LENGTH (XX)	FITTING SIZE (X)	PART NO.
3" = 03	1/8" = 1	IWF-4-20-XX-X
6" = 06	1/4" = 2	
9" = 09	3/8" = 3	
12" = 12	1/2" = 4	
15" = 15		
18" = 18		Use with type "BB" Connection Cable

Internal Wet Probe Type "R" (Removable)

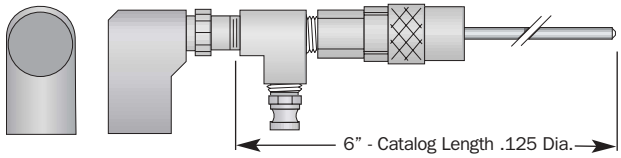


PROBE LENGTH(XX)	FITTING SIZE (X)	PART NO.
3" = 03	1/8" = 1	IWR-4-20-XX-X
6" = 06	1/4" = 2	
9" = 09	3/8" = 3	Use with type "BB"
12" = 12	1/2" = 4	Connection Cable
15" = 15	3/4" = 5	
18" = 18	1"= 6	

DWG. MM-1363

Internal Wet Probe Type "Q"(for sensing inside of outgoing waterlines)

DWG. MM-1393

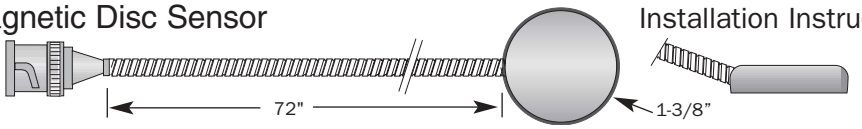


PROBE LENGTH(XX)	FITTING SIZE (X)	PART NO.
3" = 03	1/8" = 1	IWQ-4-20-XX-X
6" = 06	1/4" = 2	
9" = 09	3/8" = 3	
12" = 12	1/2" = 4	Use with type "BB"
15" = 15	3/4" = 5	Connection Cable
18" = 18	1" = 6	

Magnetic Disc Sensor

Installation Instructions see MM-1802-P3

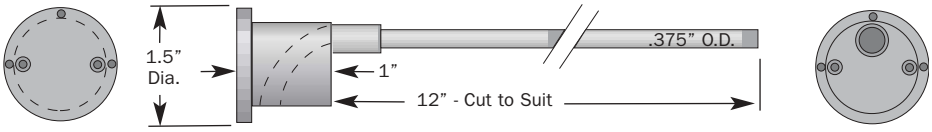
DWG. MM-1290



CABLE LENGTH	PART NO.
72"	MM-36-20-72

3/16" Sensor Guide Tube Installation Instructions see MM-1883 (Used with Spring Bead Probes only)

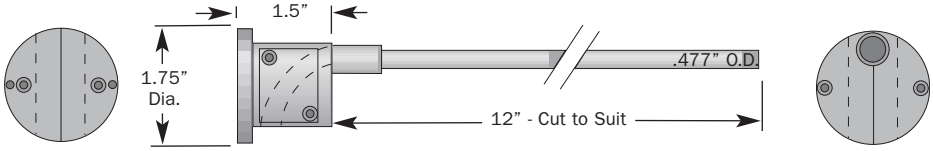
DWG. MM-8944



PART NO. SGT-6-875-12

1/4" Sensor Guide Tube Installation Instructions see MM-1884/1885 (Used with Armored Spring Probes)

DWG. MM-8948

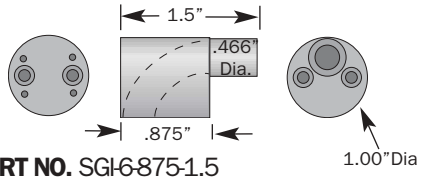


PART NO. SGT-8-1500-12

3/16" Sensor Guide Insert

DWG. MM-8942

Instructions see MM-1882
(Used with Spring Bead Probes)

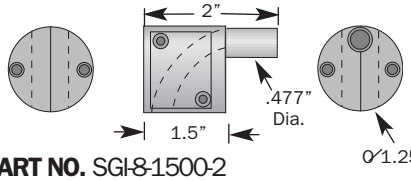


PART NO. SGI-6-875-1.5

1/4" Sensor Guide Insert

DWG. MM-8946

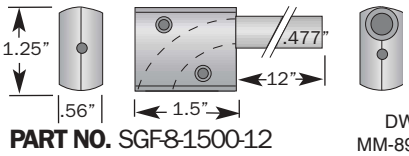
Instructions see MM-1884/1885
(Used with Armored Spring Probes)



PART NO. SGI-8-1500-2

1/4" Sensor Guide-Flat-Tube

Instructions see MM-1836
(Used with Armored Spring Bead Probes)



PART NO. SGF-8-1500-12

DWG. MM-8990

InLine™ Mold Mounted Manifolds for Water, Air and Oil.

Efficient Cooling: All Manifolds are sized to meter the flow of each circuit. The inlet port size is the same as, or longer than, all outgoing ports combined. This maintain high flow, efficient cooling.
Practical Use: You can specify model size, number and location of all outlet and inlet ports to achieve precision flow patterns for your particular application.

Excellent for fast mold changes. Standard manifolds available in **BLUE** - Supply and **RED** - Return.
BLUE - RED CITO's Trademark

InLine™ Manifolds
Number of ports: Up to 8 on any of 5 sides.
Port Sizes: 1/8", 1/4", 3/8", 1/2" and 3/4" with regard to supply size.
Each blue or red Manifolds can have up to 40 ports.
Pressure up to 2000 lbs.

InLine™ Divided Manifolds
Same quality manifolds as the InLine manifold, with the supply and return contained in one manifold.
Number of ports: Up to 8 on any one of 5 sides.
Port Sizes: 1/8", 1/4", 3/8", 1/2" and 3/4" with regard to supply size.
Pressure up to 150 lbs.

SideLine™ Manifolds
With the supply port on the side. This allow the use of the manifold where space is limited.
Number of ports: Up to 8 on any of 4 sides.
Port Sizes: 1/8", 1/4", 3/8", 1/2", 3/4" and 1"
A single SideLine divided manifold can supply flow to a maximum of 16 inlets ports and 16 outlet ports.
Pressure up to 150 lbs.

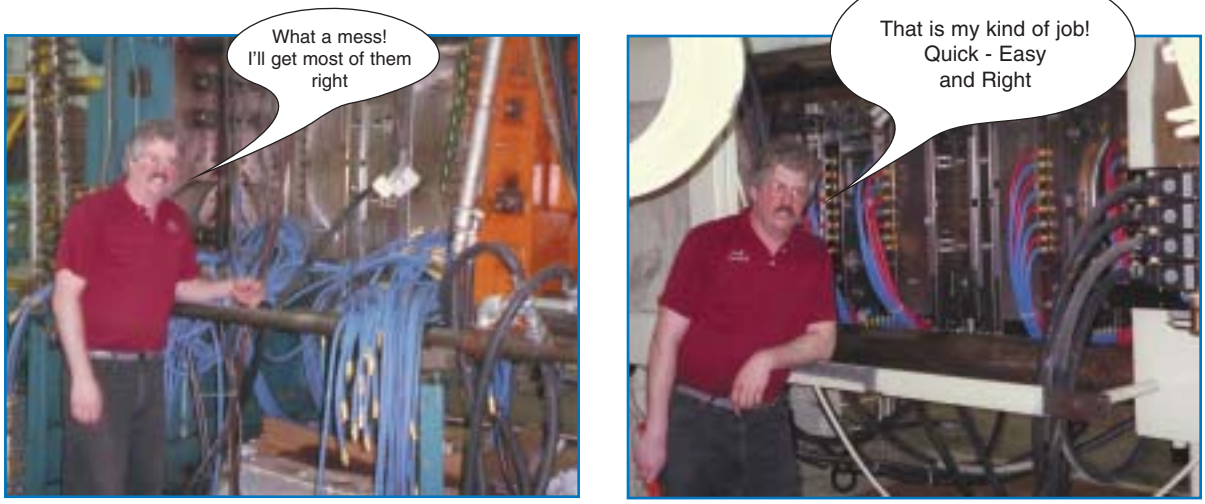
Manifolds are available in any length and hole configuration. Sizes 3/4", 1", 1-1/2" and 2".
Tread Type:
NPT (National Pipe Taper)
BSPT (British Standard Pipe taper)
BSPP (British Standard Parallel Pipe)
SAE (Society of Automotive Engineers)
For standard stock sizes see the "PulseCooling and Flow Products" Price list.

FlowReadout™ is a hand held unit for measuring flow using any **RotoFlow**™ or Stack**Flow**™ with turbine meter can be attached to any flow indicator to monitor flow rate. Flow measurements (GPM/LPM)

Recommendation for best flow rates and avoiding miss connections
Return Size Larger than Supply
Typical Supply 3/4" Coupling
Typical Return 1" Coupling

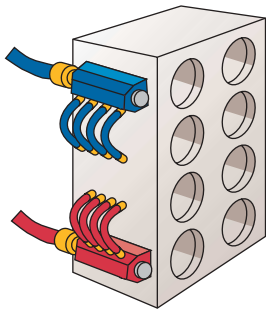
WATER FLOW VELOCITY 10 FT/ SEC
This will provide > 10 000 Reynolds Number

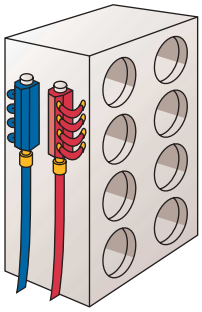
PIPE SIZE	FLOW RATE
1/8"	1.8 GPM
1/4"	3.0 GPM
3/8"	6.0 GPM
1/2"	9.6 GPM
3/4"	17 GPM
1"	28 GPM
1 1/4"	47 GPM
1 1/2"	64 GPM
2"	104 GPM
3"	229 GPM

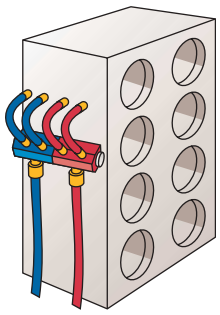


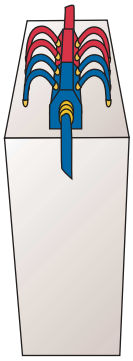
Quick Connect, External Manifolds
Offer you exceptional convenience, cost and production advantages

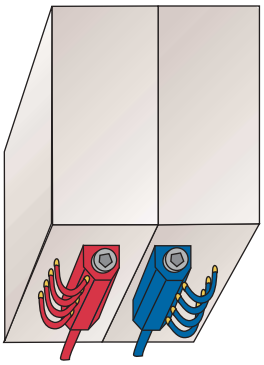
Typical Manifold Mounting Configuration
Examples shown here are only a few of the large number of possible mounting arrangements

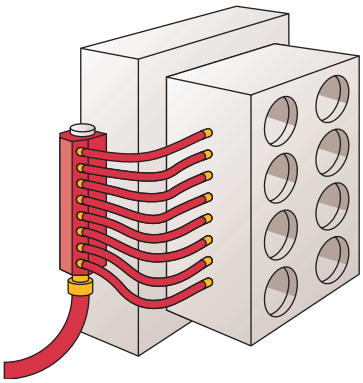

InLine™ on Mold

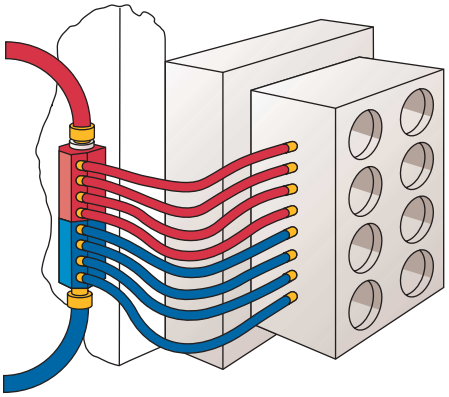

InLine™ on Mold


SideLine™ on Mold

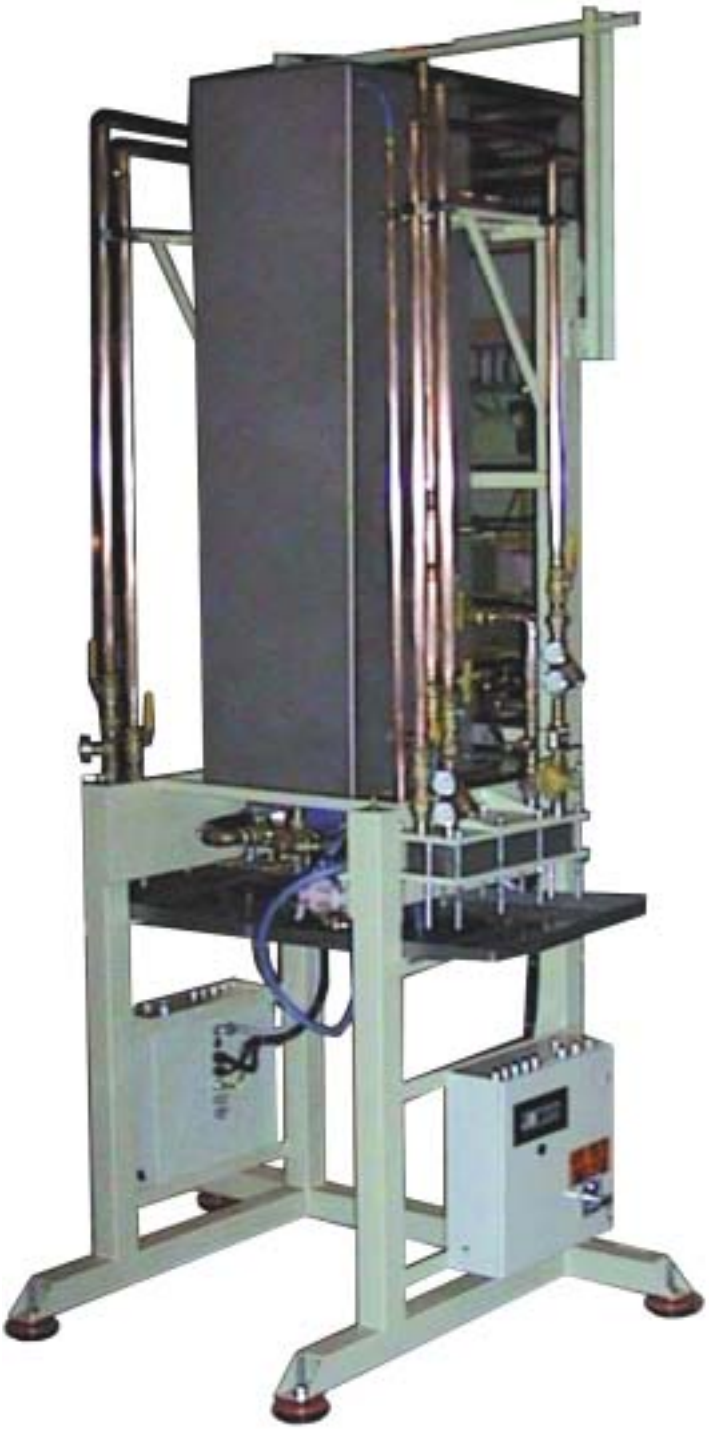

InLine™ (divided) on Mold


InLine™ on Mold as Mold support


InLine™ on Platen


SideLine™ on Machine

CLOSED LOOP CENTRAL COOLING SYSTEM - MODEL CL2



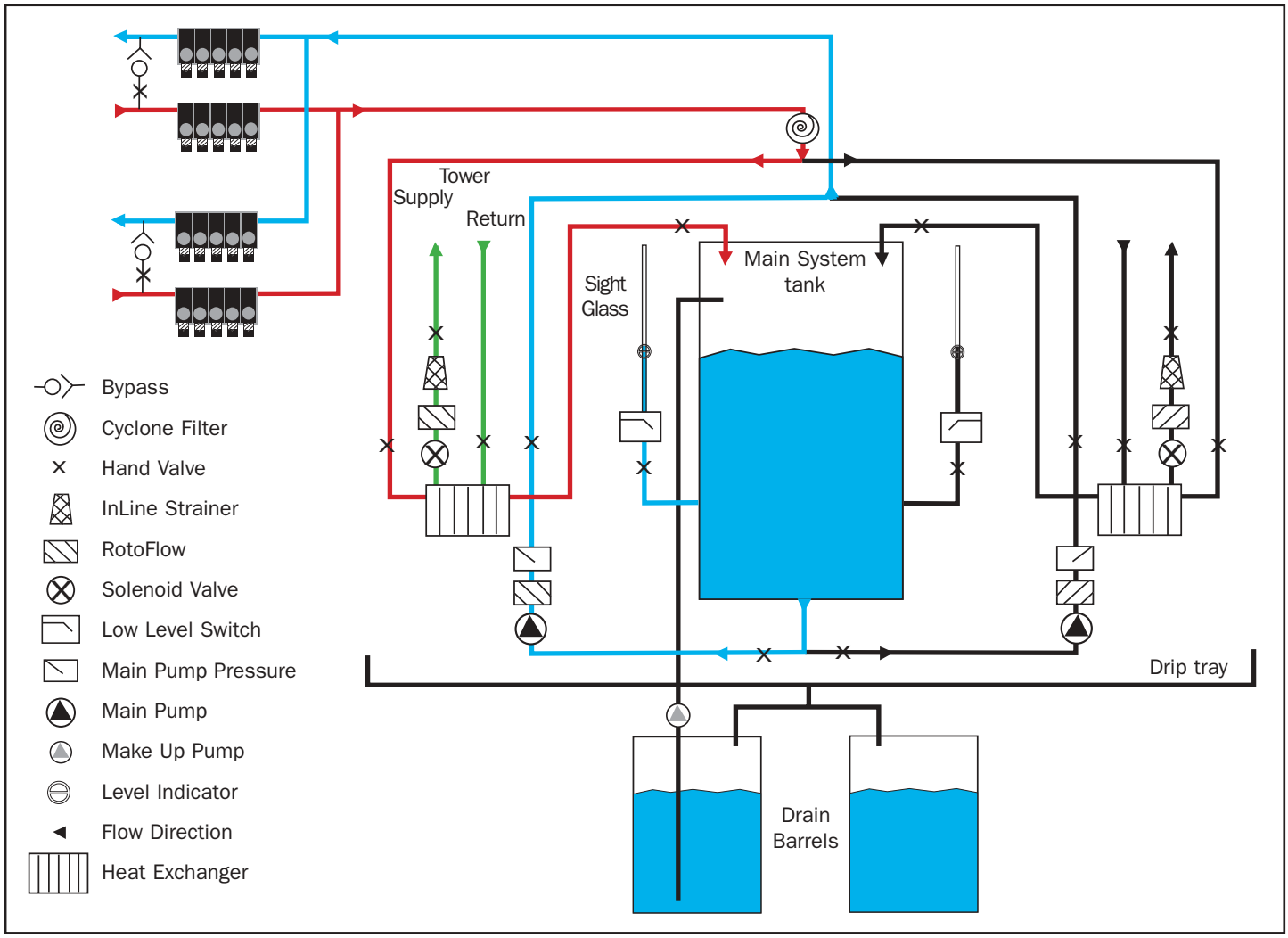
A DUAL CLOSED LOOP CENTRAL GLYCOL PUMPING SYSTEM. WITH ONE CENTRAL TANK OPEN TO ATMOSPHERE AND TWO INDEPENDENT PUMPING MODULES. ONE SERVING AS PRIMARY SOURCE THE SECOND SERVING AS A BACKUP.

EACH MODULE CONSIST OF PRESSURE PUMP, HEAT EXCHANGER, PULSE FLOW TANK TEMPERATURE CONTROL INLINE STRAINERS, FLOW METERS AND PRESSURE GAUGES.

SPECIFICATIONS:
BUILT TO CUSTOMER REQUIREMENTS

PUMPS STAINLESS STEEL CENTRIFUGAL
OUTPUT _____ PSI @_____ GPM
INPUT FITTING SIZE 1" NPT
OUTPUT FITTING SIZE 1-1/4" NPT
HP RATING 3 HP
VOLTAGE _____
AMPERAGE _____
HEAT EXCHANGER _____

CL2 SCHEMATIC



MODEL CODE

C L 2 - 5 0 - 4 0 - 4 2 1

- CL = CLOSED LOOP
- DUAL SYSTEM
- PSI
- GPM
- 1 = 120 VOLT, 2 = 240 VOLT, 3 = 380 VOLT, 4 = 480 VOLT, 5 = 580 VOLT
- VERSION
- 1 = < 10 AMP, 2 = < 20 AMP, 3 = < 30 AMP, 4 = < 60 AMP, 5 = < 100 AMP, 6 = < 150 AMP, 7 = < 200 AMP, 8 = > 200 AMP

CITO SERIAL

020 98 03

- 020 — SEQUENTIAL SERIAL NO.
- 98 — YEAR
- 03 — MONTH

PulseCooling Evaluation

Customer - Molding Operation

Company Name_____
Project Manager_____
Plant Manager_____
Purchasing Manager_____
Address_____
City_____
State_____Zip_____
Tel_____
Fax_____
E-Mail_____
_____

Tool Designer / Tool Maker

Company_____
Job N:_____
Address_____
City_____
State_____Zip_____
Tel
Fax_____
E-Mail_____
Contact_____
Project Name_____
Mold No_____

Cooling System Information

Tower Temp. - Max _____ F - Min_____C
Supply Pressure Psi_____KPa_____
Back Pressure Psi_____KPa_____
Pipe Size_____ NPT
Water Treatment_____
Chiller Temp F_____C_____
Supply Pressure Psi_____ KPa_____
Back Pressure Psi_____ KPa_____
Pipe Size_____ NPT
Glycol Solution_____%_____

Present Operating Conditions

Stationary_____Temp. SetPoint_____F
Tower - Chiller - Circulator

Movable_____Temp. Set Point_____F
Tower - Chiller - Circulator

Material_____
Supplier_____
Type_____Grade_____
Melt Temp._____Mold Temp._____
Color _____ _____%
Additive_____ _____%

Mold Information

Mold Size_____
Mold Weight_____
Mold Material_____
Insert Material_____
Cold Runner_____
Hot Runner_____
Stack Mold_____
Slides_____
Other Details_____

Mold Cooling Connection

Stationary _____in/out_____npt
Movable _____in/out_____npt
Other:_____in/out_____npt

Mold Temperature

Stationary F_____C_____
Movable Side F_____C_____
Circulator Temp. Mov. F_____C_____
Circulator Temp. Stat. F_____C_____

Processing Information

Screw Recovery Time Reserve_____Sec
O.A.Cycle Time_____
Clamp Time _____
Cure Time_____
Part drop_____
Manual Unloading_____
Sprue Picker_____
Robotic unloading_____

Quality Issues

Sink_____
Flash_____
Warp_____
Other_____

PulseCooling Cost / Performance Evaluation

HETCO - HEAT TRANSFER ANALOGY

Customer_____

Part Description_____

Part Number_____

Material_____

Type_____Grade_____

Melt Temp_____Mold Temp_____

Color_____%_____

Additive_____%_____

Manufacturer_____

Distributor

PART INFORMATION

Shot Weight_____Grams

No. of Cavities_____

Part Wall Thickness_____Average

Part Wall Thickness_____Max

Sprue Dia_____Inch

Sprue Weight_____

PRODUCTION PERIMETERS

Ambient Temp._____max_____min deg F

Injection Time_____Sec

Clamp Close Time _____Sec

Mold Open Time _____Sec

Overall Cycle _____Sec

Part Eject Temperature _____deg F

Melt Injection Temperature_____deg F

Mold Surface Temp.Mov.._____F

HEAT TRANSFER CONTROL INFO (HETCO)

Machine #_____

Tie Road Spacing_____Top_____Side

Machine Shot size

Machine Type - Hydraulic / Toggle / Electric

Operating Cost

Processing Cost_____/ HR _____/ MIN

Labor Cost_____/ HR_____/ MIN

PART DRAWING_____

Mold Drawings - Cad format_____

Mold Drawings_____

Other_____

THE REPORT FURNISHED FROM THIS DATA IS A CALCULATION OF THE MATERIAL'S HEAT TRANSMISSION TIME.
THE HEAT TRANSMISSION TIME IS BASED ON THE MATERIAL HEAT TRANSFER ABILITY AND IS USED AS A POTENTIALLY ATTAINABLE CYCLE TIME.

Note:Fill out as complete as possible

PulseCooling™

CTO PRODUCTS, INC.

COOLING FOR INDUSTRY & TOOLING OPTIMIZATION

N8779 Hwy. X • P.O. Box 90

Watertown, WI 53094 • U.S.A.

Phone: (920) 261-2606 • Fax: (920) 261-1350

E-Mail: sales@pulsecooling.com