PulseCooling™

Operation Manual

StackPulse Controller™

CITO-FP-PRICE-22-0628

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Introduction

The SPC - StackPulse Controller™ is the newest addition to the PulseCooling in process temperature controls. The SPC has embedded microchip technology for compactness, longevity and high performance.

DESCRIPTION OF STACKPULSE CONTROLLER™

The StackPulse Controller™ controls the mold surface, not just the water line. Now you can have a Real Time read out and direct precision control of the mold surface temperature.

PRINCIPLE OF OPERATION

As heat is induced into the mold, with the melt, at the start of the cycle, the temperature increase of the mold surface is detected by a sensor and stored for reference in the StackPulse Controller. The microprocessor converts this into a cooling pulse, which is a timed injection of coolant, occurring at the beginning of each cycle, immediately after the mold has been filled. The coolant injection (-BTU) exactly matches the melt (+BTU) thus compensating for all variables that can influence part quality. This cooling technology will results in the highest quality parts quality at the best possible cycle time with a minimum of water consumption and energy use.

Remember, high quality molding is the result of what happens in the machine and the mold, not in the inspection after the molding is completed.

ADVANTAGES OF PULSE MODULATED COOLING

INCREASED PRODUCTION
Use of cold water provides a high temperature differential between mold surface and coolant. This high delta t results in efficient mold cooling with a improved cycle.

HIGHER QUALITY PRODUCTION
During the OFF period of the pulse modulated cooling cycle, the mold will seek thermal equilibrium. This heat gradient dissipation results in consistent quality molded parts.

AUTOMATED PRODUCTION
After the operator chooses and sets the mold surface temperature, the StackPulse Controller™ will determine the cooling requirements of each molding cycle, and automatically repeat the selected temperature. Each cooling pulse will compensate changes in cycle time, melt temperature, cycle interruption, water pressure, ambient temperature and platen temperatures changes.

PROCESS LIMITS WARNING
A visual alarm warns if the process temperature is above or below the selected limits.

COOLING FLUID SOURCE
The StackPulse Controller™ valve is supplied with cold process water from tap, tower or chiller.

WATER CONSUMPTION
A Minimum amount of water is used; since the maximum of BTU is absorbed from the cold process water, and during the off pulse period the dormant water will absorb heat. This reduces the total amount of water used. Thus more Process water is available for the area with the greatest demand of cooling.

ADVANCED FEATURES
Additional features such as maximum and minimum temperature alarms can be displayed. The measured values can be displayed in either English or Metric units. All selections are done digitally on the keyboard.

PulseCooling™ results in many 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 quality output - full flow - full velocity cooling with cold water
4. Higher quality parts through gradient dissipation during soak period
5. Allows processor to optimize the molding cycle (visual feed back of mold temperature)
6. Eliminates thermal drift (warpage, sinks, distortion and inconsistent fill)
7. Precision control of molding surface temperature results in predictable
   Parts through compensation and correction of:

   Ambient temperature changes

   Water supply pressure changes

   Backpressure changes

   Water temperature changes (chiller or tower)

   Cycle changes (manual operation)

   Platen and machine temperature changes

   Day and night shift changes

   Partial plant shut down - (flow / pressure / temp. changes)
8. Continuous temperature readout of MOLD SURFACE temperature without cycle interruption
9. Instant audio warning. Minimum down time-Avoids subsequent problems (material degradation)
10. Very low power consumption (10 WATT/ZONE) approximately $10.00/year
11. Minimum water consumption - Uses no more cooling water than necessary for each molding cycle
12. Minimizes cooling line contaminant build up due to full velocity pulse cooling
13. Does not add unnecessary heat load to plant cooling system
14. No floor space required - machine mounted - no clutter in back of machine
15. Total interchangeability from smallest mold to molds with up to 2" waterlines
16. Constant quality control assures parts are produced within predetermined temperature window
17. Automatic sorting of parts for quality control - Relay contact is provided for robotic pick up
18. Eliminates mold condensation for low temperature molding (including blow molding)
19. Eliminates mold damage caused by thermal growth .000 00633"/"/degree F
    (Misalignment of telescoping, shuts off and mating surfaces)
20. Eliminates mold jam ups (tapered shut offs due to temperature differences)
21. No heaters, motors or pumps required = NO MAINTENANCE
22. Two Way communication - for PC and machine downloading available

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?**
   During the first part of the molding cycle - just after the melt shot is completed when most heat is present (highest delta t) and shuts off the flow when cycle is near the end. 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 condition.
3. **Do I use PulseCooling™ with my warm water circulator?**
   No, the PulseCooling™ uses cooling water directly from the central chiller or tower. There is no heat added to the cooling circuit – as in a typical warm water cooling. Pulse modulated cooling principle does not destroy the cooling efficiency by adding heat to the cooling circuits.
4. **How can the 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 then 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 for high quality parts.
5. **How many zones do I need for a typical 8 or 16 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. Typically a sensor is installed for the core, one 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.
6. **Must a mold be redesigned to use the PulseCooling™?**
   No - the PulseCooling™ will enhance the performance of a poorly designed mold and will give top performance when used with a well-designed mold.
7. **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 (detail information on sensor choice and placement is available upon request).
   A sensor is placed near the surface on core and cavity. PulseCooling™ will test the mold for thermal responsivenessand "tune" itself to maintain the desired mold surface temperature.
8. **How can PulseCooling™ be applied to 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™ software is designed to read the relative temperature in the waterline and thereby maintains the desired mold surface temperature.
9. **Will a PulseCooling™ prevent mold damage from thermal expansion?**
   Yes, by maintaining the mold temperature with continuous feedback to the PulseCooling™ thermal drift – thus steel expansion is eliminated.
10. **What can I expect from a PulseCooling™ in general terms?**
    - Consistently better parts
      - Consistently better cycle
        - Reduced maintenance cost
          - Drastic reduction of chiller load
            - Fraction of operating cost
              - Reduced capital investment

ALL RESULTING IN AN EXCELLENT R.O.I.

For independent test results contact factory – Sales Department
For more detail information visit us at www.pulsecooling.com

StackPulse Controller™ Specifications

Unit

Power: 24 VAC, 60 Hz. or 24 VDC
Current Draw: 500 mA

Display Repeatability: +/- 1 digit
Display Units: English or Metric

Temperature Inputs

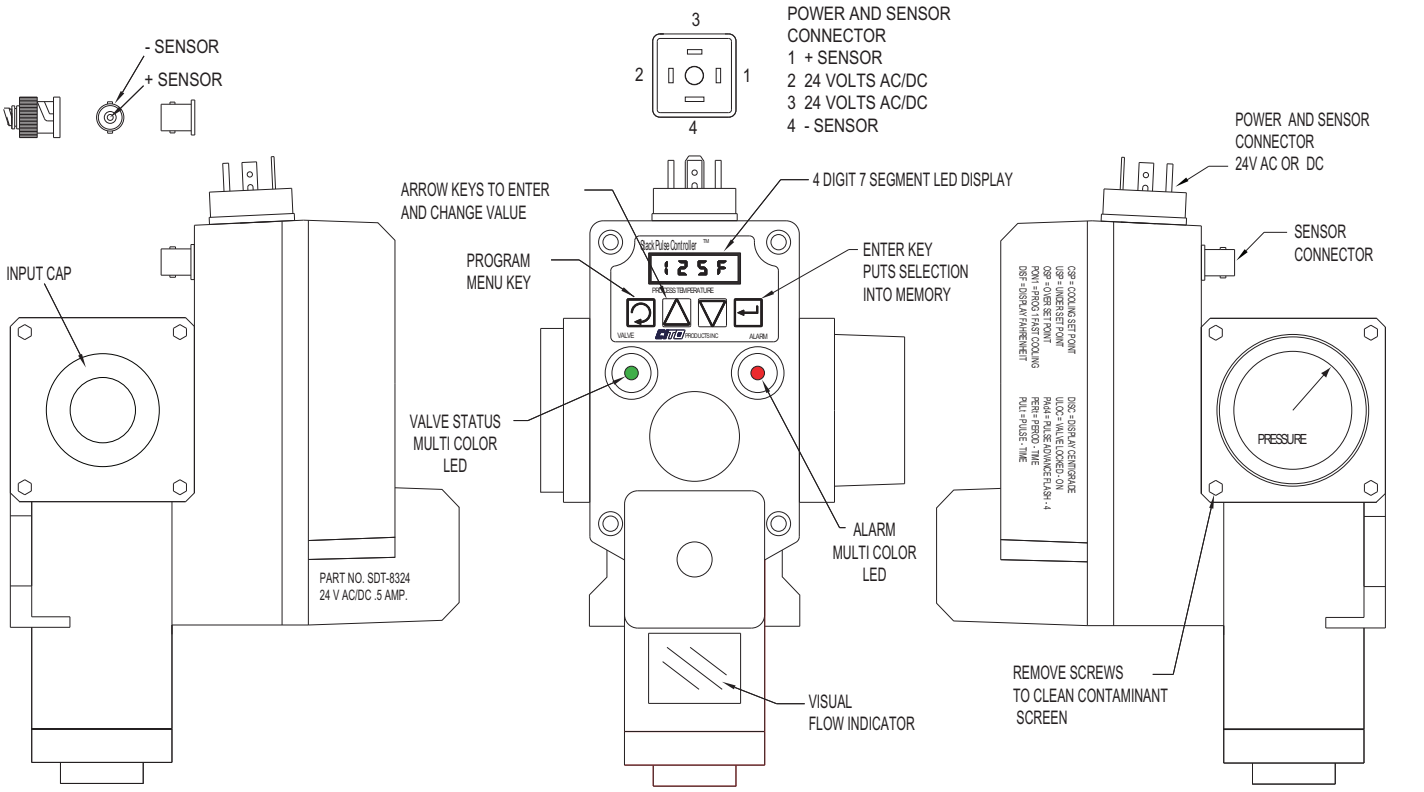
Sensor Type: Thermistor
Temperature Accuracy: +/- 1 °F

Temperature Range: 32° F to 200°F
0°C to 93.33°C
Input Sample Rate: Once per 200 ms
Display Update: Once per second
Probe Status: Continuously monitored
EEE4 = Open
EEE5 = Shorted

NOTE:
When using DC Power Supply
- Connect Pin#2 and Pin#4 (GND Symbol) together to 24 VDC Ground
- Pin#3 connect 24 VDC Positive
- Pin#1 - No Connection

Product Description

StackPulse Controller™

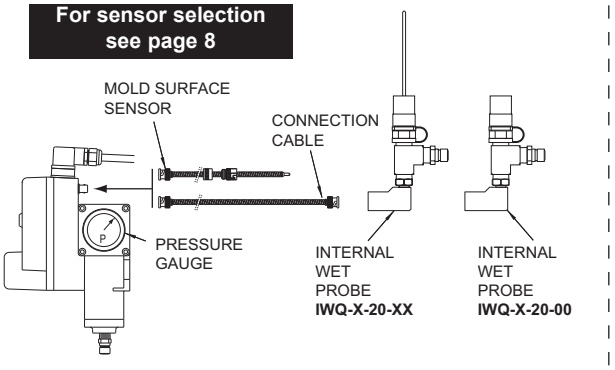


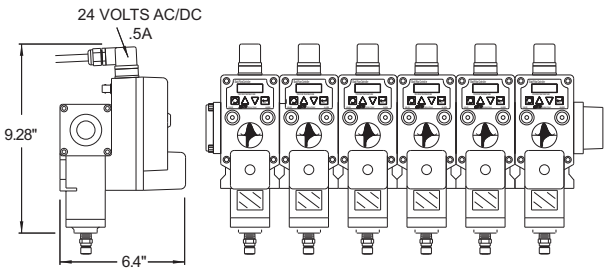
Note: Input CAP may be reversed with pressure gauge.

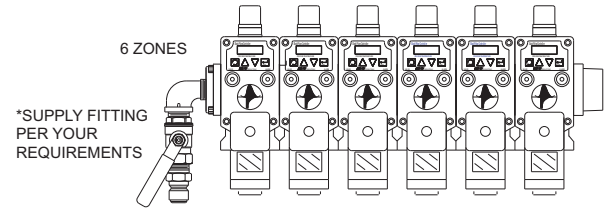
StackPulse Controller™ - Surface Mount - 24 VOLT ACDC

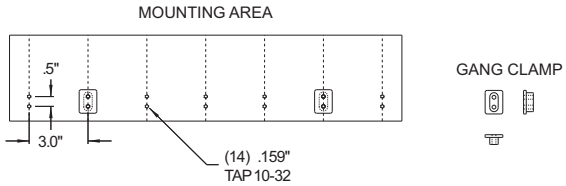
NOTE: *Order Sensors, Manifold w/Hand Valves, and In/Out Fittings separately*

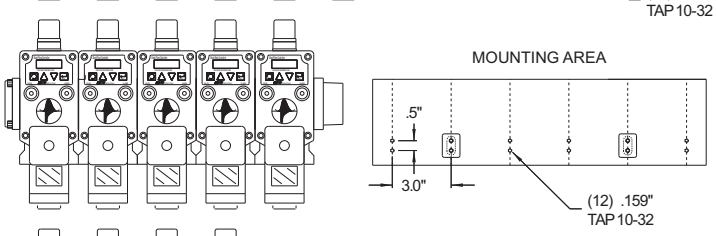
For sensor selection see page 8

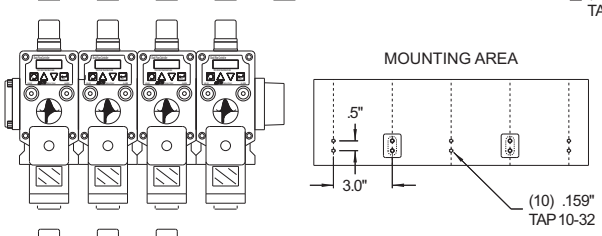


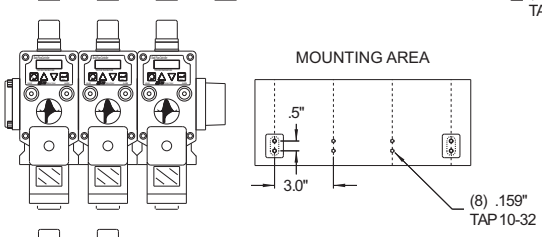


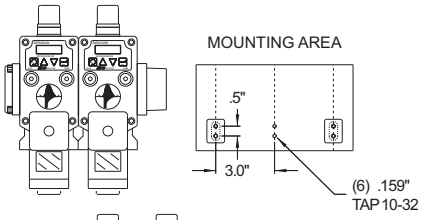


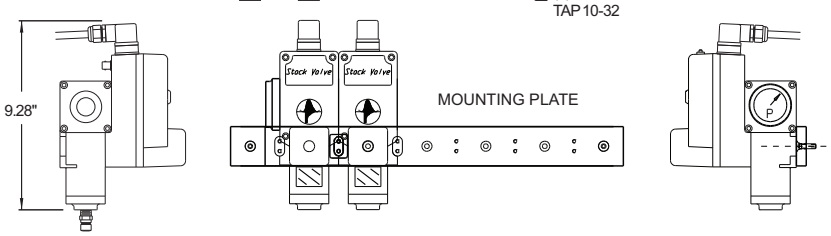












Any Port Combination

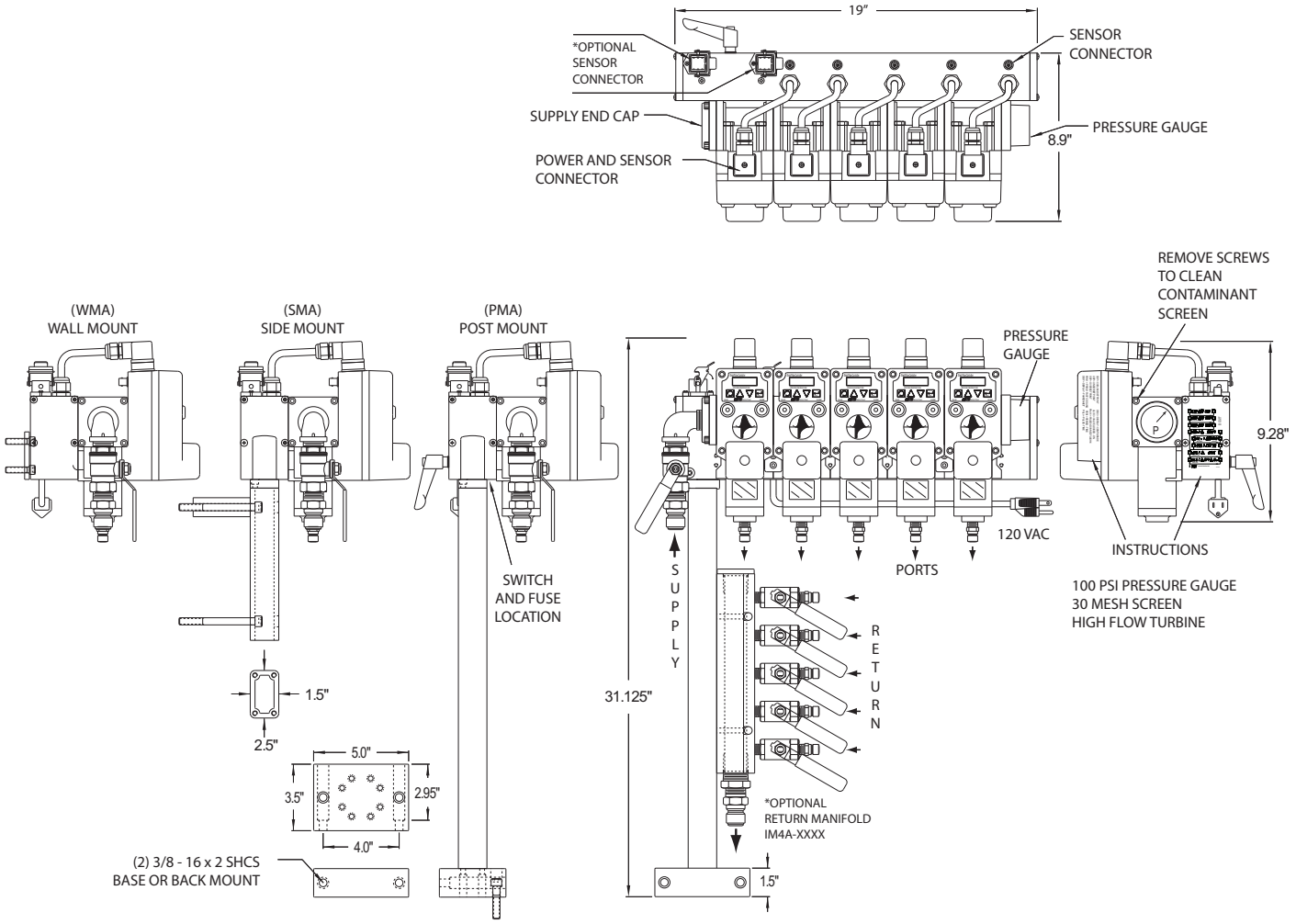
Supply	Out Ports
1/2"	1/8"
3/4"	1/8" (4)
1"	1/4"
1-1/4"	1/4" (2)
1-1/2"	1/4" (4)
	3/8"
	3/8" (2)
	3/8" (4)
	1/2"
	1/2" (2)
	3/4"
	1"
	1-1/4"

Specify Manifold w/Hand Valves, and In/Out Fittings separately

SSC - X - X X X

- SSC: **S**tack **S**urface **C**ontroller
- X: # Zones 1 - 6
- X X X: Serial #

StackPulse Controller™ - 120 / 240 VOLT AC



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	3/8"
	3/8" (2)
	3/8" (4)
	1/2"
	1/2" (2)
	3/4"
	1"
	1-1/4"

Specify Manifold w/Hand Valves, and In/Out Fittings separately

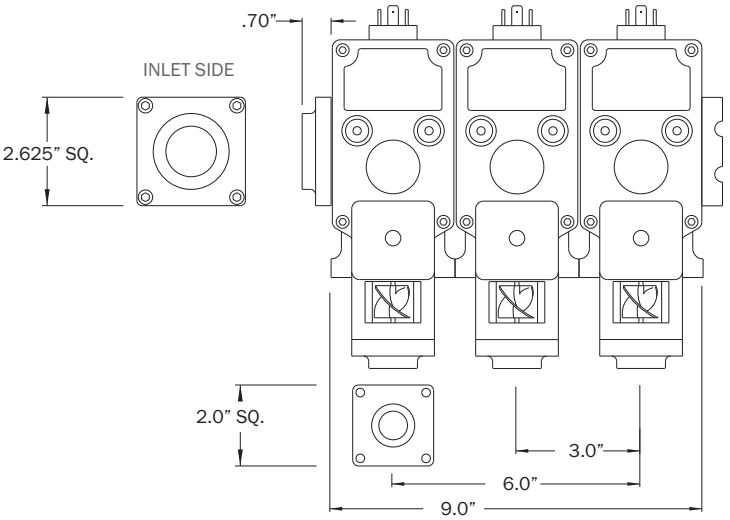
S P A - X - X - XXX

- **S** = **S**tack
- **P** = Post Mount
- **A** = **A**ssy
- # Zones 1 - 6
- **VOLTAGE**
  - X = NONE
  - 1 = 120V AC
  - 2 = 240V AC
  - 4 = 24V AC
- 001 (Serial #)

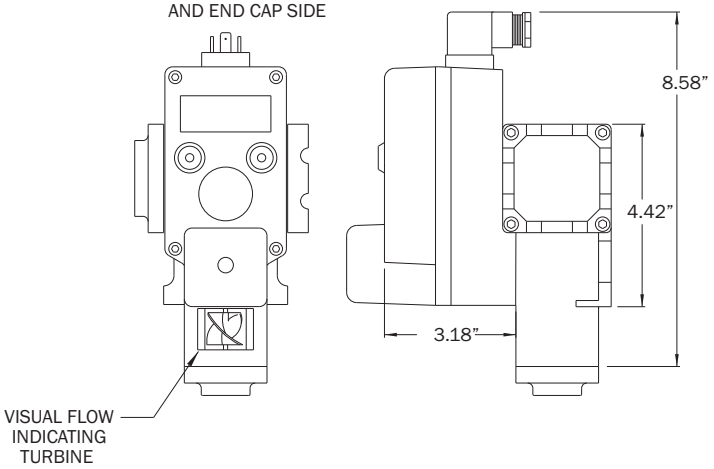
REQUEST QUOTE

StackPulse Controller™ Dimensions

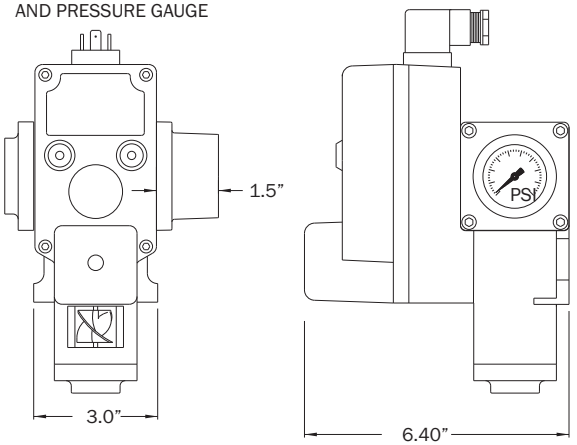
STACKVALVE WITH DIN CONNECTOR



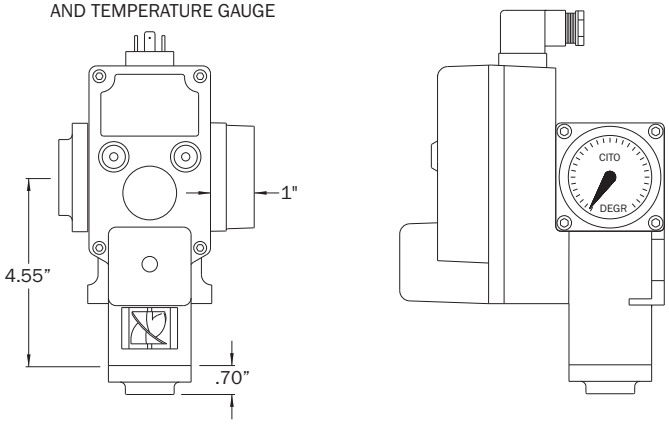
SINGLE VALVE WITH FLOW INDICATOR AND END CAP SIDE



SINGLE VALVE WITH FLOW INDICATOR AND PRESSURE GAUGE

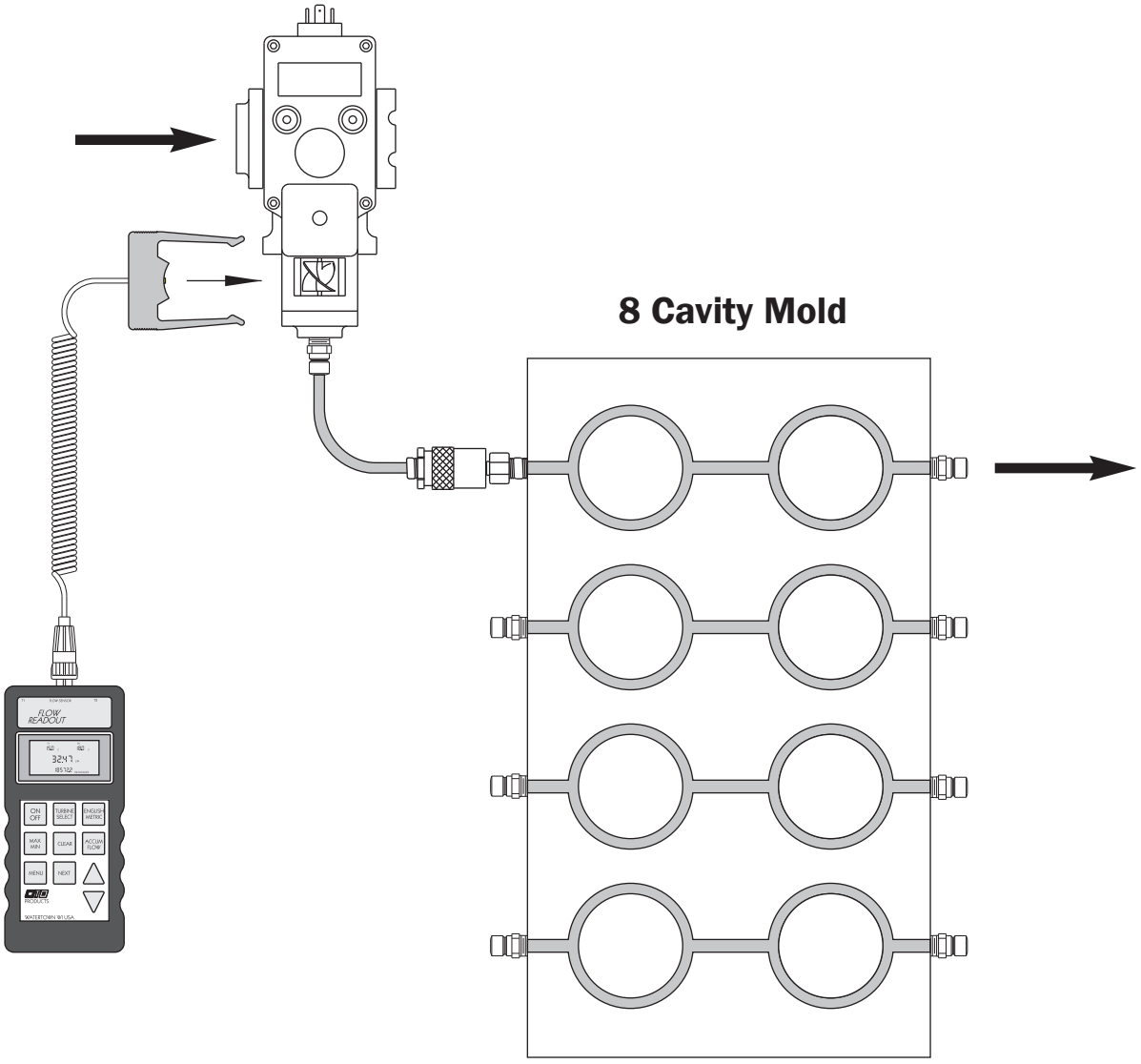


SINGLE VALVE WITH FLOW INDICATOR AND TEMPERATURE GAUGE



Flow Test-Mold Cooling Channel

1. Connect StackValve™ to a water connection
2. Read flow rate through each cooling circuit
3. Flow rate should not vary - if cooling passages are the same.



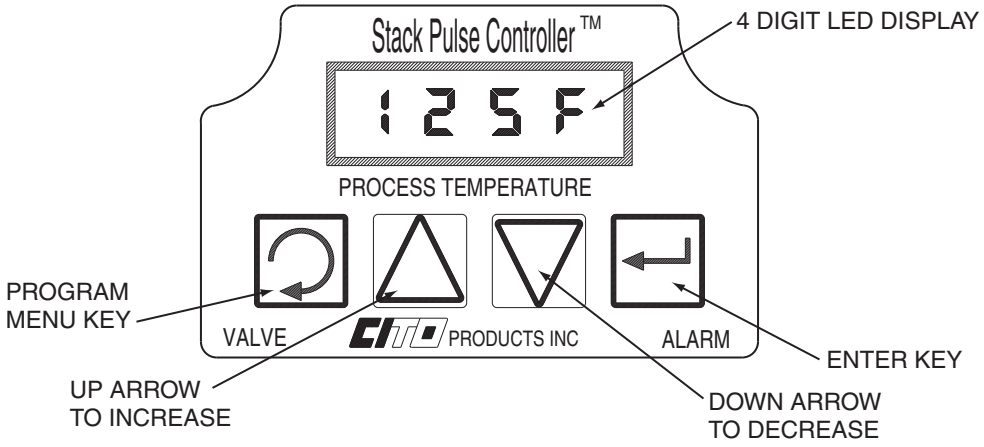
NOTE: The flow rate is pressure dependent. The following flow rates should be obtained through a cooling channel 10" long — @ Δp (pressure in/out) of 10 psi

@ 10 psi Δp
1/8" DIA 2.5 GPM
1/4" DIA 5.0 GPM
3/8" DIA 12 GPM
1/2" DIA 20 GPM

Display Basics

Full display shown during start up and shut down.

StackPulse Controller™ Display



CSP = COOLING SET POINT
USP = UNDER SET POINT
OSP = OVER SET POINT
PON1 = PROG 1 FAST COOLING
DISF = DISPLAY FAHRENHEIT

DISC = DISPLAY CENTIGRADE
ULOC = VALVE LOCKED - ON
PAd4 = PULSE ADVANCE FLASH - 4
PERt = PEROD - TIME
PULt = PULSE - TIME

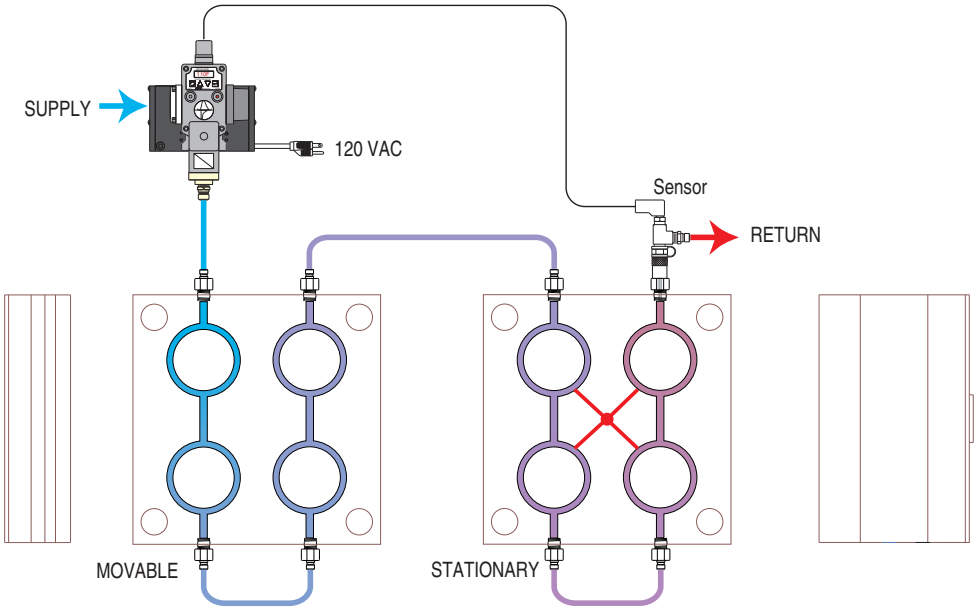
Mold Connection Diagrams

To obtain the highest performance from your StackPulse Controller the sensor should be placed close to the molding part. See CITO Mold Surface Temperature sensor installation on page 22.

Single Zone - Series Connection

Advantages:
Low cost, simple control, low water consumption.

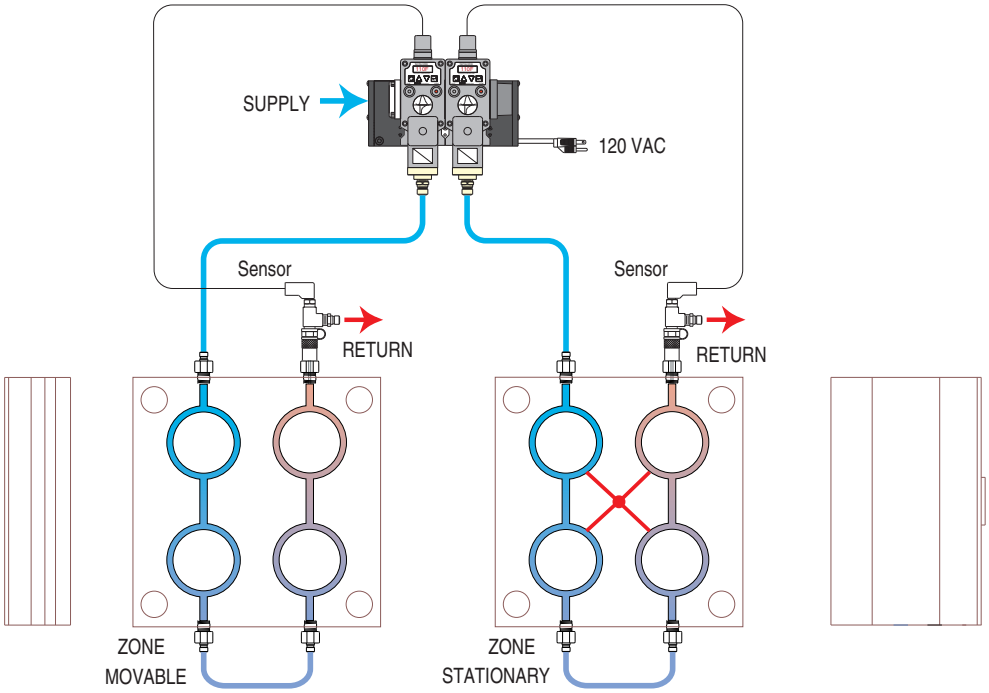
Disadvantage:
No direct control of movable and stationary



Two Zone - Series Connection

Advantages:
Direct control of movable and stationary

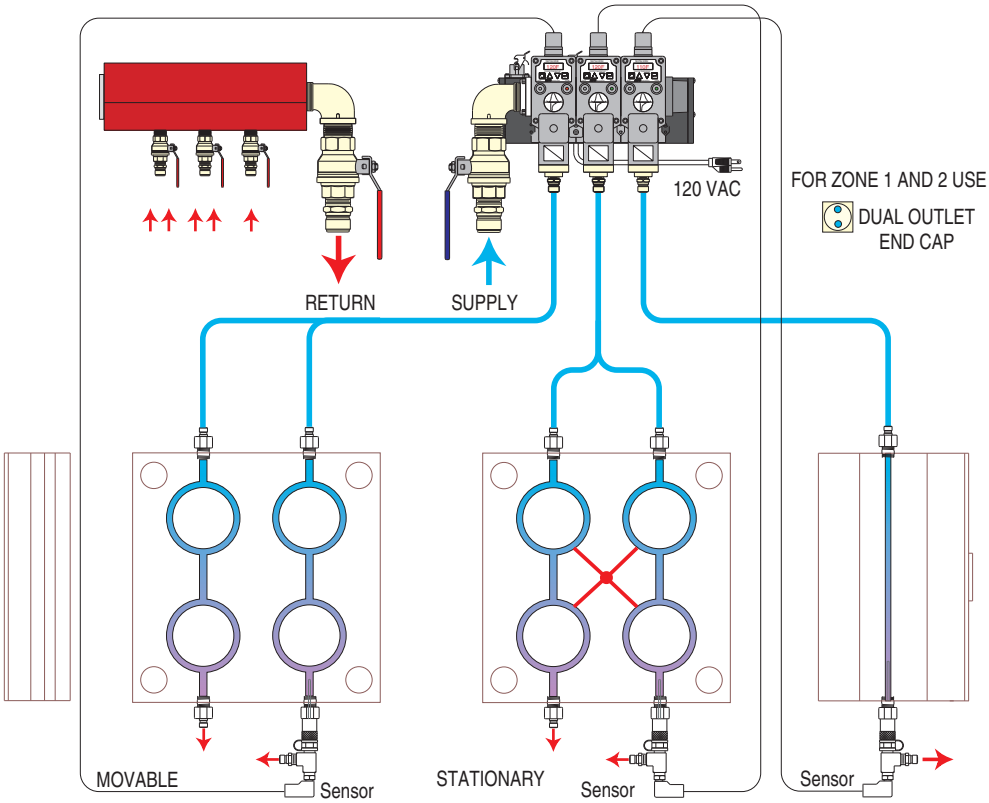
Disadvantage:
High water consumption



Three Zone - Parallel - Series Connection

Advantages:
Direct control of movable, stationary and hot runner.

Highest reynolds number obtained



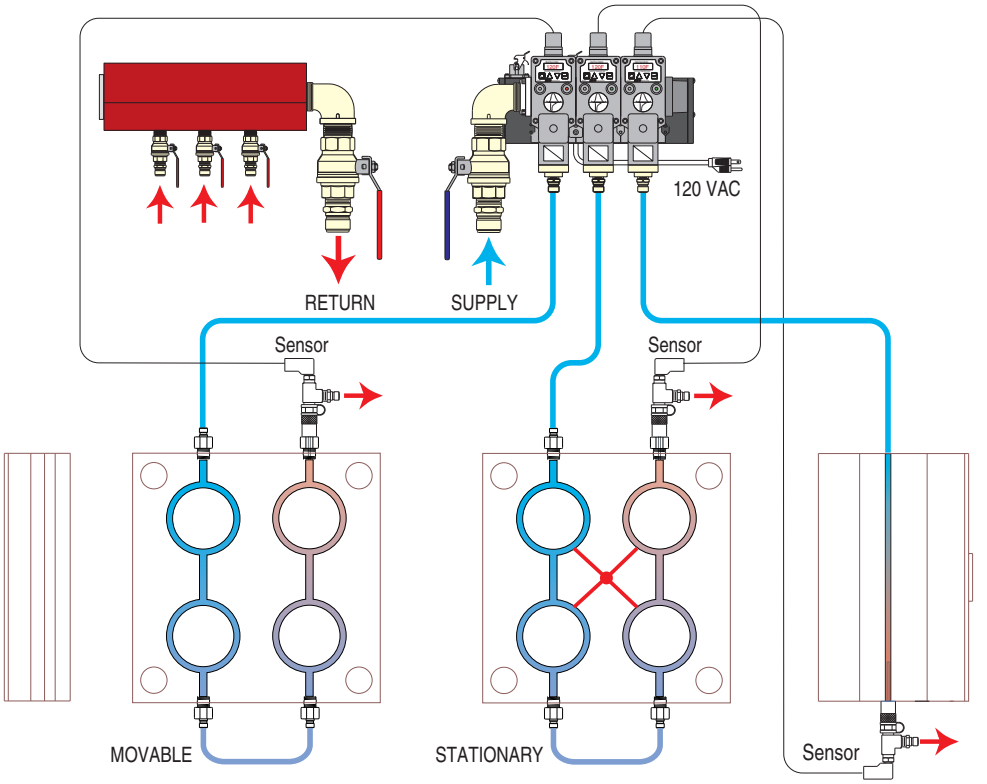
Three Zone - Series Connection

Advantages:
Low water consumption
One supply and Return per mold half.
Direct control of movable, stationary and hot runner.

Apply when limited cooling water is available

This will minimize the pressure drop on the water supply thus maintain a higher flow velocity thus cool efficiently.

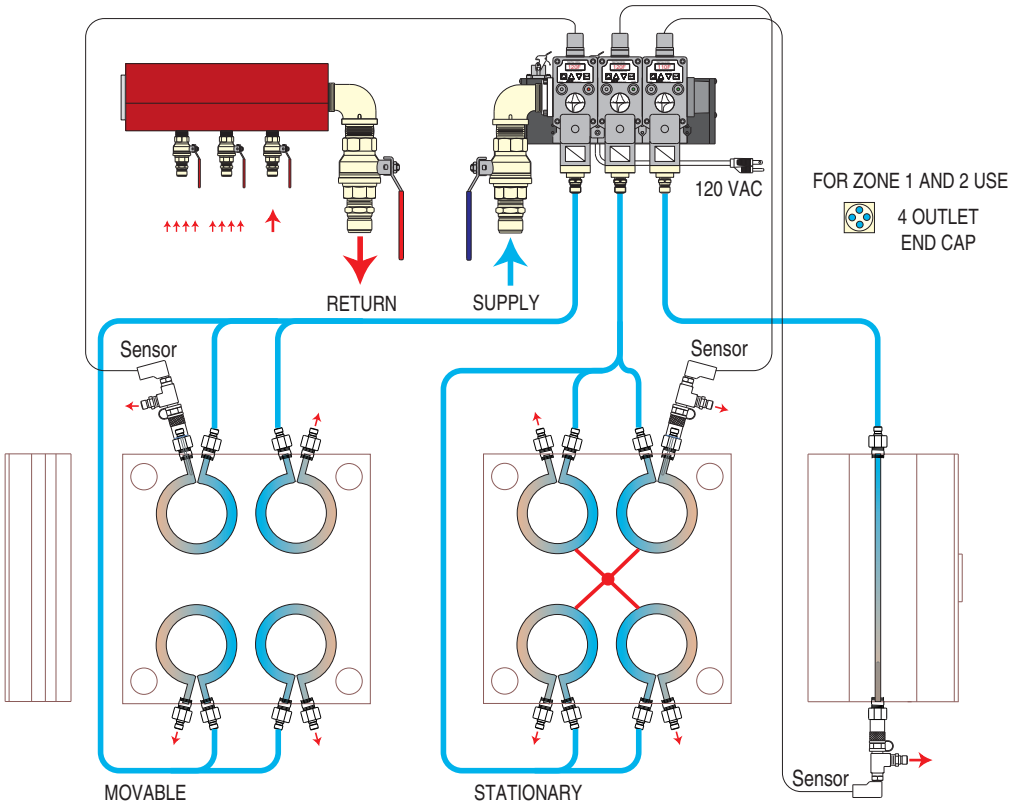
Check part temperature and final part size for post shrinkage between the first and last cavity to cool



Three Zone Parallel Connection

Advantages:
Direct control of movable, stationary and hot runner.

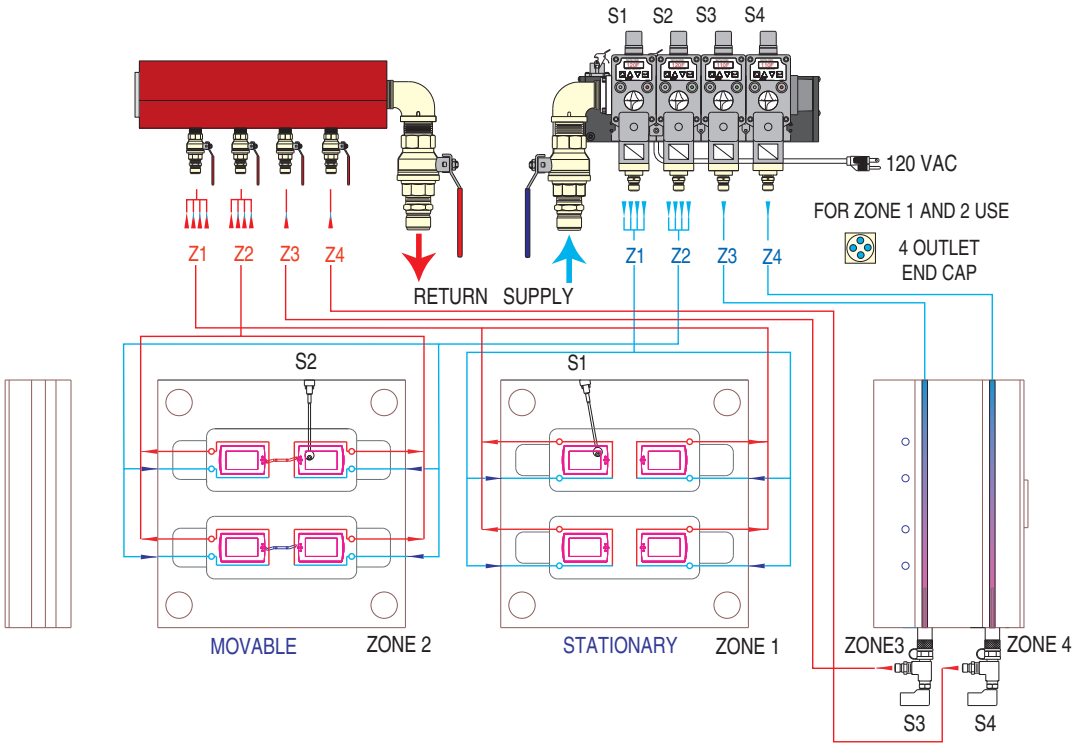
Disadvantage:
High water consumption.



Four Zone Parallel Connection

Advantages:
Direct control of movable, stationary, hot runner and mounting plate.

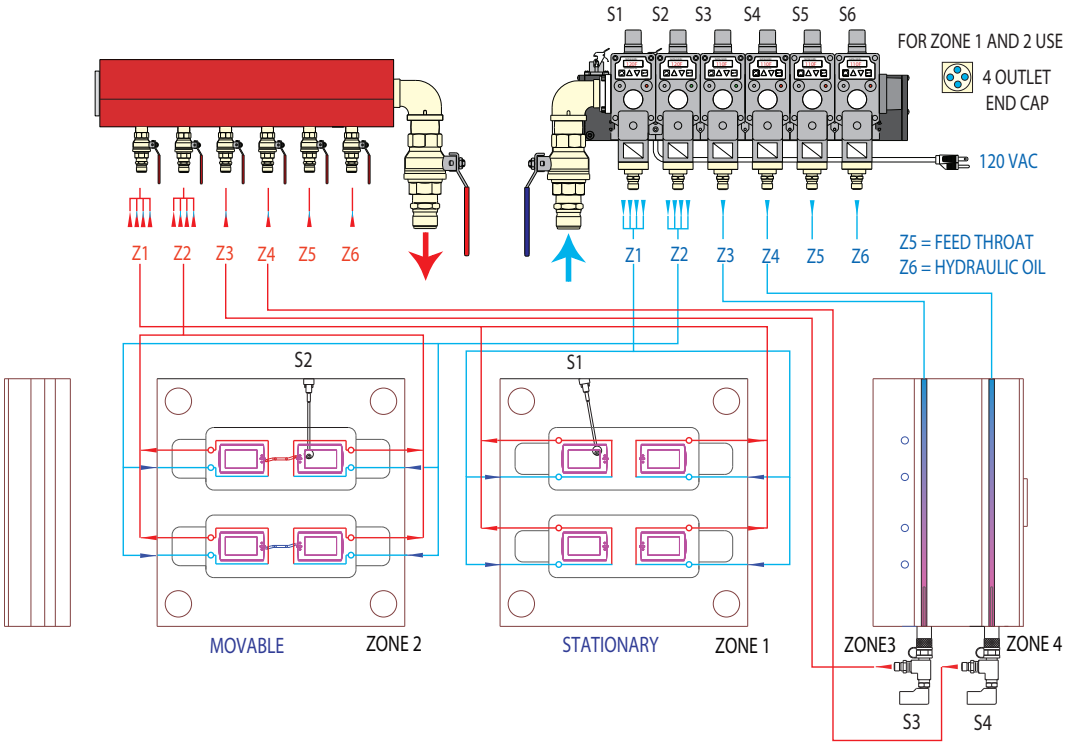
Disadvantage:
High water consumption



Six Zone Parallel Connection

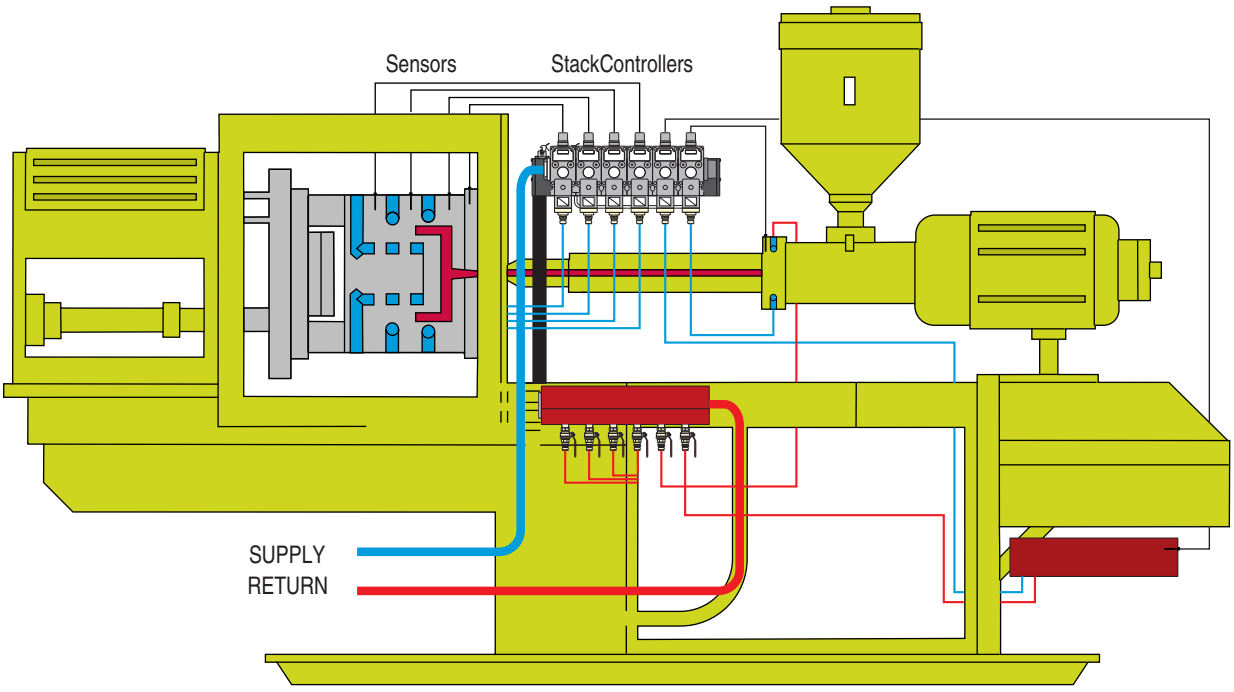
Advantages:
Total control of stationary, movable, hot runner, mounting plate, feed throat, and hydraulic oil.

Disadvantage:
High water consumption.



Typical StackPulse Controller Machine Installation

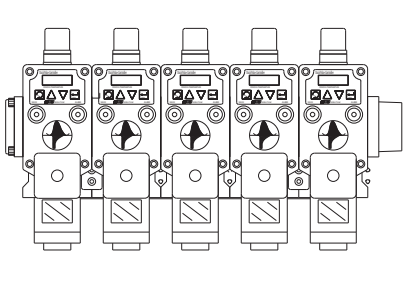
Mold temperature control
Feed Throat Control
Hydraulic Oil temperature Control



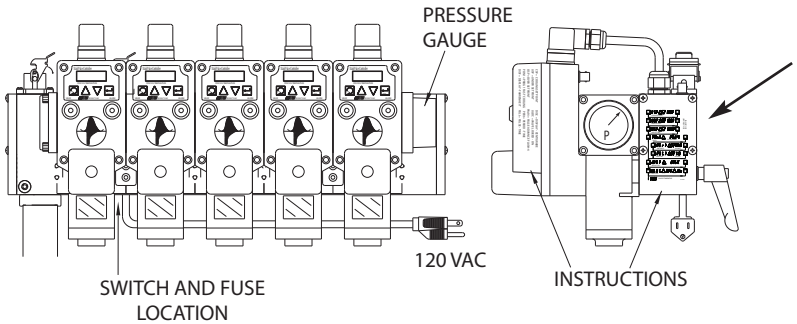
Quick Start Instructions

1. Mount the StackPulse Controller (SPC) in an easily accessible location.
2. Install sensor(s) in tool (see sensor placement guide on page 22).
3. Connect mold sensor(s) to sensor connector located in the back of the StackPulse Controller(s) or to the sensor connector in the StackPulse Controller Buss or Sensor Junction Box. For multiple zones, verify that corresponding sensor are connected to the correct SPC.
4. Connect power to unit 24 Volts AC or DC or 120 VAC for SPC with Buss Housing.
5. Make all water connections as per plan.
6. Turn unit On. Unit goes through start up routine first, then temperature will be displayed.
7. Load correct mold setup.
8. Begin production, when mold temperatures are within limits and parts have a good appearance and the required dimensional qualities.
9. Wait 10 to 15 minutes to assure stable operating conditions and everything is functioning properly.

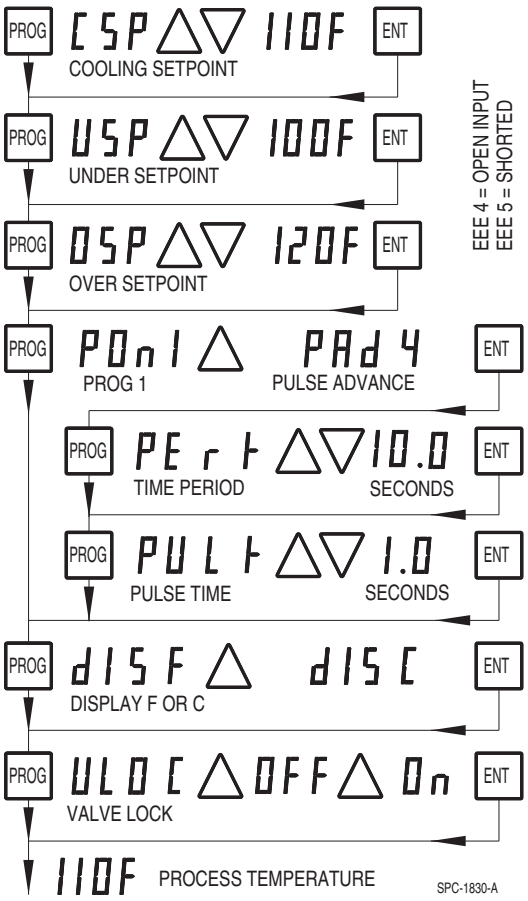
SPC 24Volts AC/DC



SPC 120 / 240 VAC



MENU SELECTION



Program Menu Selection

1. After pressing PROG Button display will toggle menu position and current value.

2. Press PROG button again toggles to the next position. To change hold ARROW key the longer you hold the faster the change

3. To set COOLING SET POINT, press PROG, display reads CSP = COOLING SETPOINT, to change press **UP ARROW** or **DOWN ARROW,** display value 115F, to raise set point hold **UP ARROW** key for 3 seconds, value will increment up. To lower hold **DOWN ARROW** key for 3 seconds, value will increment down. To enter new value in memory, press the ENTER key; Value is now in memory, display reads CSP.

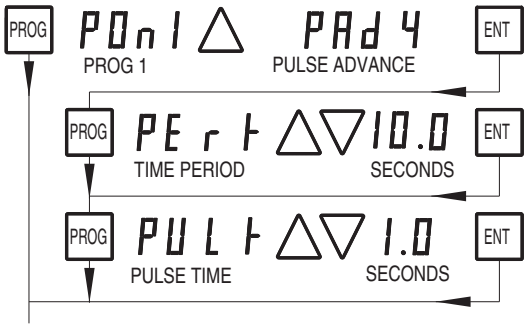
4. To set UNDER SET POINT, press PROG, display reads USP = UNDER SETPOINT, to change press **UP ARROW** or **DOWN ARROW,** display value 105F, to raise set point hold **UP ARROW** key for 3 seconds, value will increment up. To lower hold **DOWN ARROW** key for 3 seconds, value will increment down. To enter new value in memory, press the ENTER key; Value is now in memory, display reads USP.

5. To set OVER SET POINT, press PROG, display reads OSP = OVER SETPOINT, to change press **UP ARROW** or **DOWN ARROW,** display value 125F, to raise set point hold **UP ARROW** key for 3 seconds, value will increment up. To lower hold **DOWN ARROW** key for 3 seconds, value will increment down. To enter new value in memory, press the ENTER key; Value is now in memory, display reads OSP.

6. To select a FAST COOLING Program, press PROG, display reads POn1 = FAST COOLING, to save new program in memory, press the ENTER key. Value is now in memory, display reads Pon1

7. To select a PULSE ADVANCE Program, press PROG, display reads PAd4 = PULSE ADVANCE, to save new program in memory, press the ENTER key. Value is now in memory, display reads PAd4.

   7.1 To set PERIOD TIME, press PROG, display reads PErt = PERIOD TIME, to change press **UP ARROW** or **DOWN ARROW,** display value 14 S, to raise PERIOD TIME hold **UP ARROW** key for 3 seconds, value will increment up. To lower hold **DOWN ARROW** key for 3 seconds, value will increment down. To enter new value in memory, press the ENTER key. Value is now in memory, display reads PErt.



   7.2 To set PULSE TIME, press PROG, display reads PULt = PULSE TIME, to change press **UP ARROW** or **DOWN ARROW,** display value 00.5 S, to raise PERIOD TIME hold **UP ARROW** key for 3 seconds, value will increment up. To lower hold **DOWN ARROW** key for 3 seconds, value will increment down. To enter new value in memory, press the ENTER key. Value is now in memory, display reads PULt.

8. To select English or Metric display units. Press PROG, display reads dISF = FAHRENHEIT or dISC = CENTIGRADE, to change press **UP ARROW** or **DOWN ARROW**. To enter new value in memory, press the ENTER key. Value is now in memory, display reads dISF or dISC.

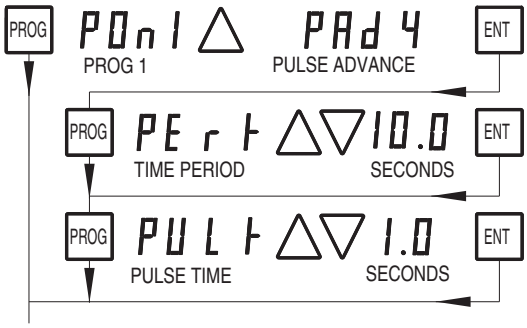
9. For Manual Activation Valve, Press PROG, display reads ULOC = VALVE LOCKED ON, to change press **UP ARROW** or **DOWN ARROW**, display reads On or OFF. To keep the valve lock On, press the ENTER key. Value is now in memory, display reads ULOC.

Cooling Program Selection

After pressing PROG Button display will toggle menu position and current value.

To select a FAST COOLING Program, press PROG, display reads POn1 = FAST COOLING, to save new program in memory, press the ENTER key. Value is now in memory, display reads Pon1

To select a PULSE ADVANCE Program, press PROG, display reads PAd4 = PULSE ADVANCE, to save new program in memory, press the ENTER key. Value is now in memory, display reads PAd4.



To set PERIOD TIME, press PROG, display reads PErt = PERIOD TIME, to change press **UP ARROW** or **DOWN ARROW,** display value 14 S, to raise PERIOD TIME hold **UP ARROW** key for 3 seconds, value will increment up. To lower hold **DOWN ARROW** key for 3 seconds, value will increment down. To enter new value in memory, press the ENTER key. Value is now in memory, display reads PErt.

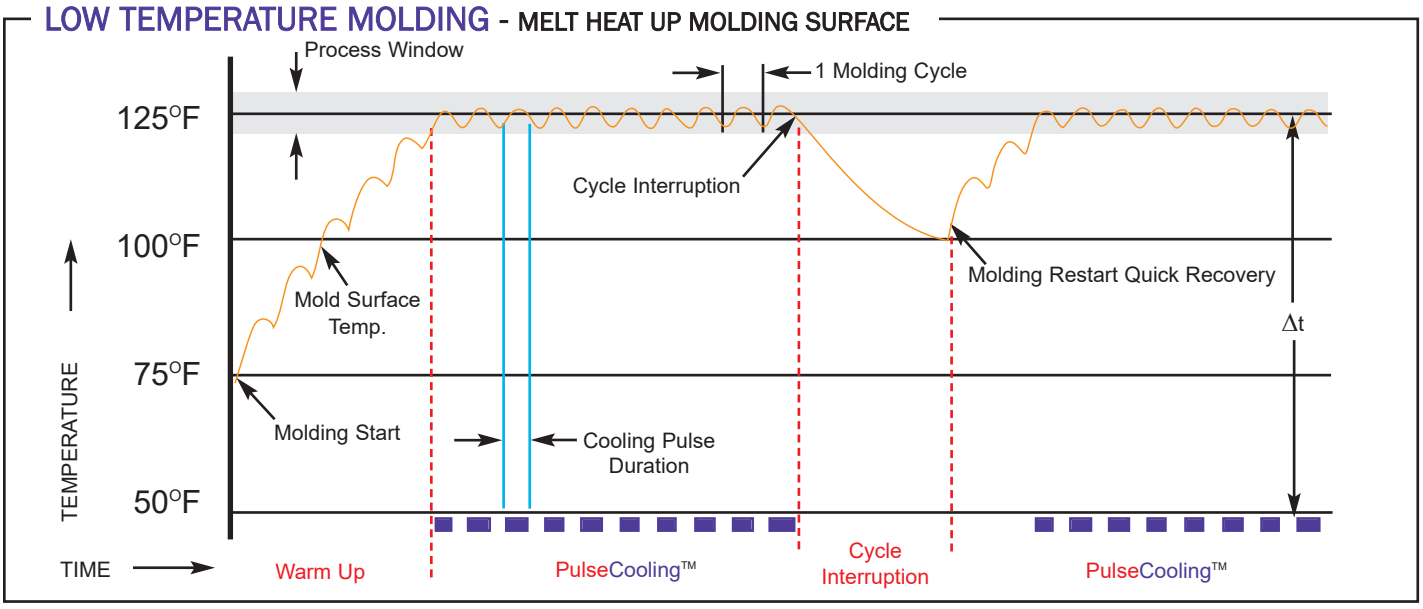
To set PULSE TIME, press PROG, display reads PULt = PULSE TIME, to change press **UP ARROW** or **DOWN ARROW,** display value 00.5 S, to raise PERIOD TIME hold **UP ARROW** key for 3 seconds, value will increment up. To lower hold **DOWN ARROW** key for 3 seconds, value will increment down. To enter new value in memory, press the ENTER key. Value is now in memory, display reads PULt.

Fast Cooling Program

Fast Cooling is used for low temperature mold applications with high cooling requirements. It would be described as a “Direct Response Program”.

Fast Cooling will respond to the dynamic temperature wave of the melt. The cooling valve will be “ON” at full flow the temperature is above setpoint. The cooling valve “ON” time is until the mold temperature falls below the set point temperature, at which time the StackPulse Controller will then turn the valve “OFF” stopping the flow of cooling water to the zone.

Sensor Installation: The sensor must be installed in accordance to the installation recommendation to “read” the dynamics of mold surface temperature. This program may be used with the internal wet probe when installed directly in back of the molding surface.



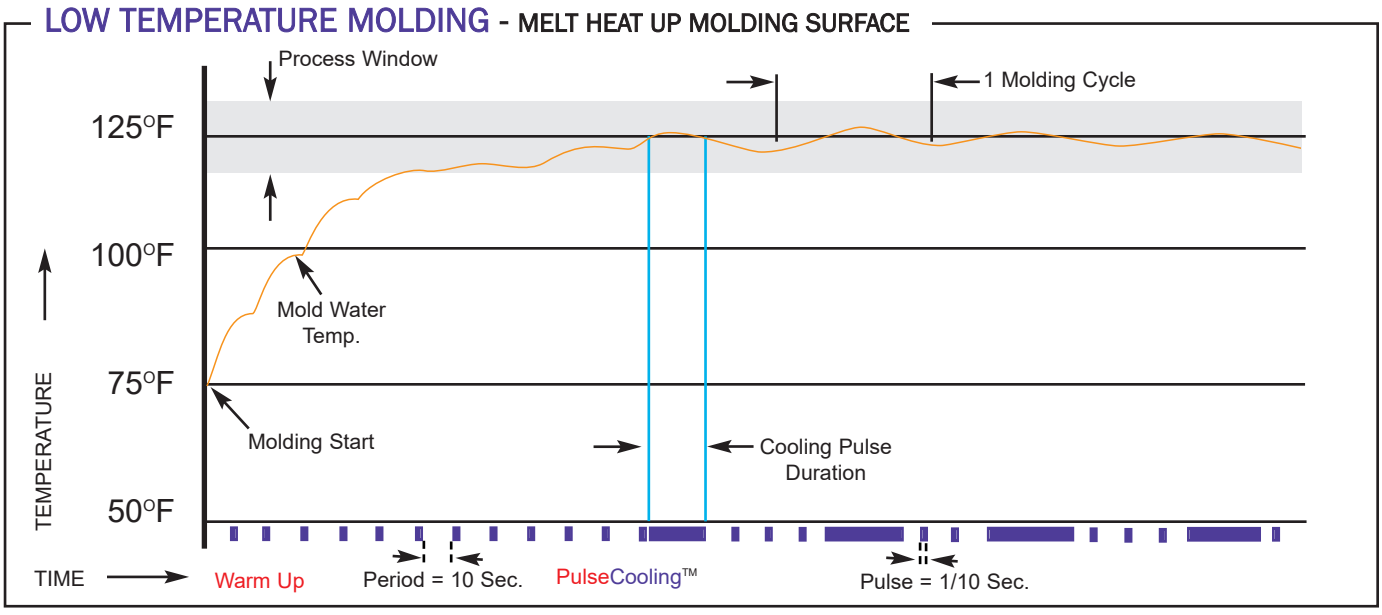
Pulse Advanced Program

Pulse Advance will accommodate tools to unable to have sensors installed to “read” the mold surface temperature. An “Internal or External Wet Probe” is installed in the outgoing water line. These probe will sense the outgoing temperature of the water, thus receiving the information on the amount of heat the water is picking up going through the mold.

The controller will advance the standing warmed-up water to the sensor. Every 10 seconds (default period setting) the program delivers a 1/10 of a second cooling pulse (minimum pulse setting). When the water temperature exceeds the control set point the program will turn the valve “ON” and flush out the excess heat.
You will see a sudden drop in temperature reading, as long the mold is been flushed.
The program selection setting has fields where you can adjust how often cooling pulses will occur by adjusting the “period setting”. The length of the pulse can be adjusted by changing the “pulse setting”.

NOTE: On large molds, the sample pulse duration has to be sufficiently long to advance the water to reach the sensor. On small molds the pulse duration has to be short to avoid over cooling the mold.

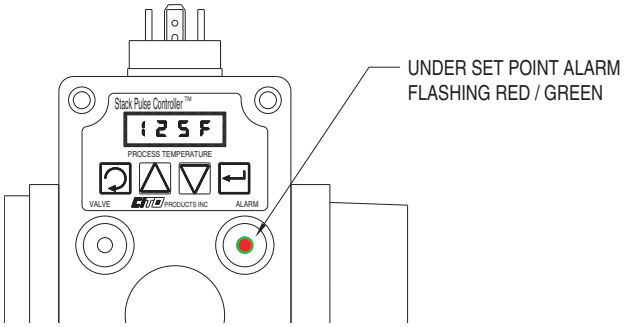
Sensor Installation: The sensor must be installed in the outgoing water line.



Process Alarms

Under Set Point Alarm

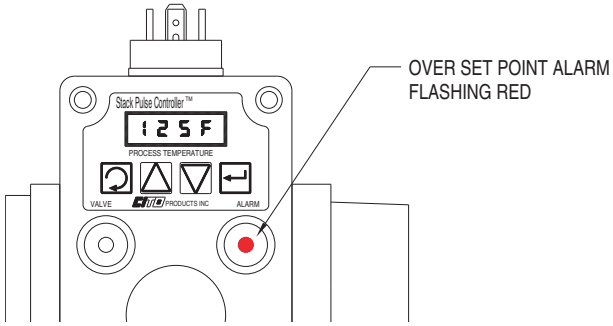
To set UNDER SET POINT, press PROG, display reads USP = UNDER SETPOINT, to change press **UP ARROW** or **DOWN ARROW,** display value 105F, to raise set point hold **UP ARROW** key for 3 seconds, value will increment up. To lower hold **DOWN ARROW** key for 3 seconds, value will increment down. To enter new value in memory, press the ENTER key; Value is now in memory, display reads USP.



Testing Under Temperature Alarm: Run Under set point alarm down below to the actual temperature; Under temperature alarm light should flash RED and GREEN.

Over Set Point Alarm

To set OVER SET POINT, press PROG, display reads OSP = OVER SETPOINT, to change press **UP ARROW** or **DOWN ARROW,** display value 125F, to raise set point hold **UP ARROW** key for 3 seconds, value will increment up. To lower hold **DOWN ARROW** key for 3 seconds, value will increment down. To enter new value in memory, press the ENTER key; Value is now in memory, display reads OSP.



Testing Over Temperature Alarm: Run Over set point alarm above the actual temperature; Over temperature alarm light should flash RED.

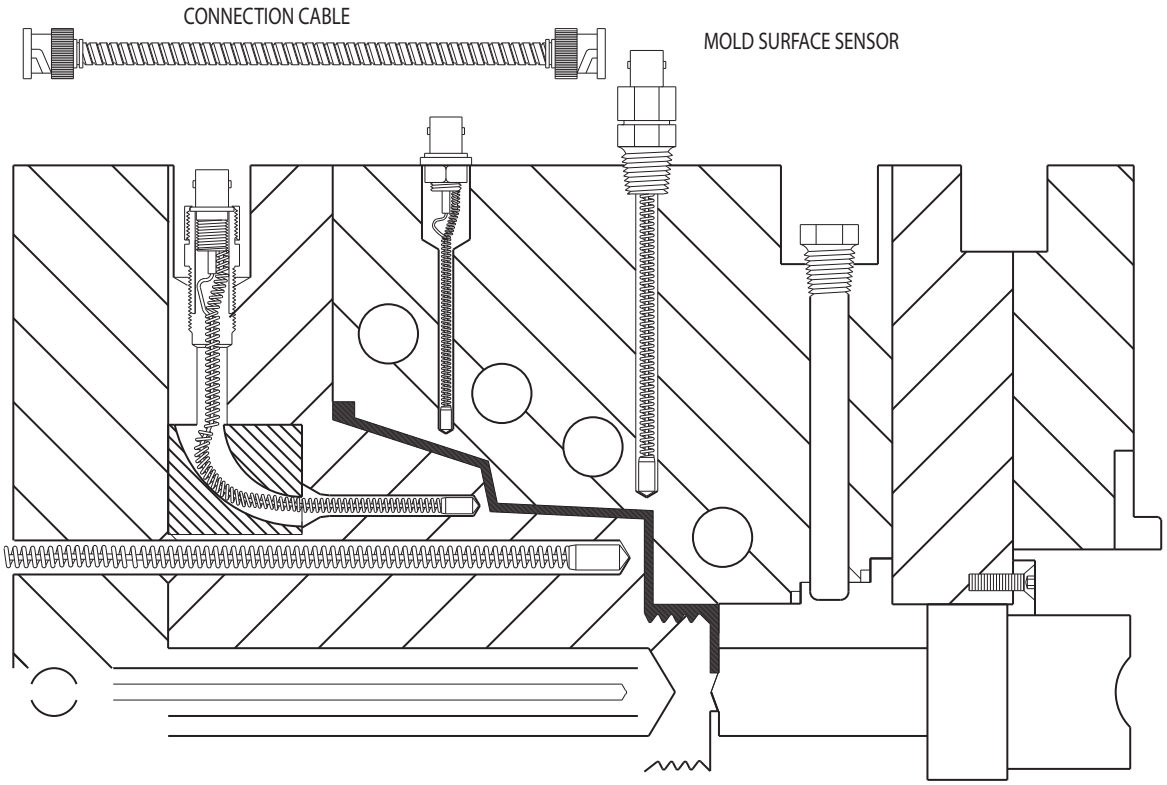
Temperature Sensor

SPC temperature sensor are thermistors-based sensors. Those are sensor that change their resistance as the temperature changes. As the temperature goes up their internal resistance goes down and as their temperature goes down their resistance goes up. Their resistance is 20, 000 ohms at 77 Fahrenheit.

Mold Surface Temperature Sensor

The SPC temperature controllers use primarily two basic sensor configurations. The most common is mounted or placed directly into the mold steel. Those sensor read mold temperature directly and can determine small changes in mold steel temperature immediately upon occurrence.

For best performance the sensor is directly into the mold steel. These sensors read the thermodynamics of molding cycle and respond directly to it's cooling requirements.



Mold Water Temperature Sensor

The second is called a " Wet Probe". Those sensors measure the temperature rise in the water as the water is picking up the energy coming out of the mold. From this information gained, the control algorithms can accurately control the mold surface temperature.

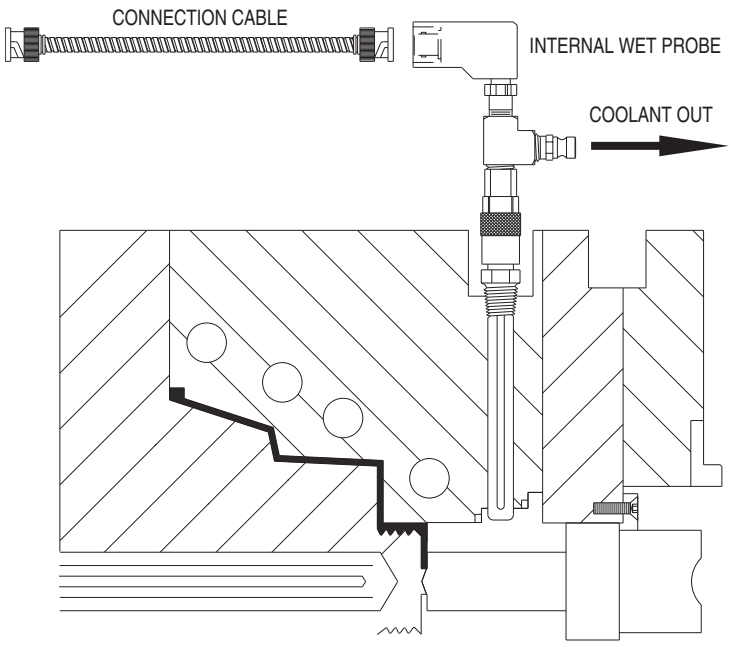
The " Internal or External Wet Probe" is used for mold trial or on existing mold or when a "Mold Surface Sensor" can not be installed.

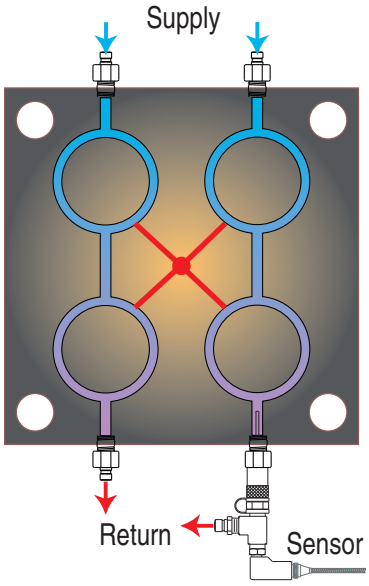
There is a direct relationship between water temperature inside cooling channel and mold surface temperature. To compensate for the heat gradient the temperature set point has to be lower then the desired mold surface temperature.

The temperature sensor is placed away from the part surface.

The StackPulse Controller must be set to the Pulse Advance Program (PAd4) . The Advance Period should be aprox. 1.5 x the overall cycle (default value is 10 sec.)

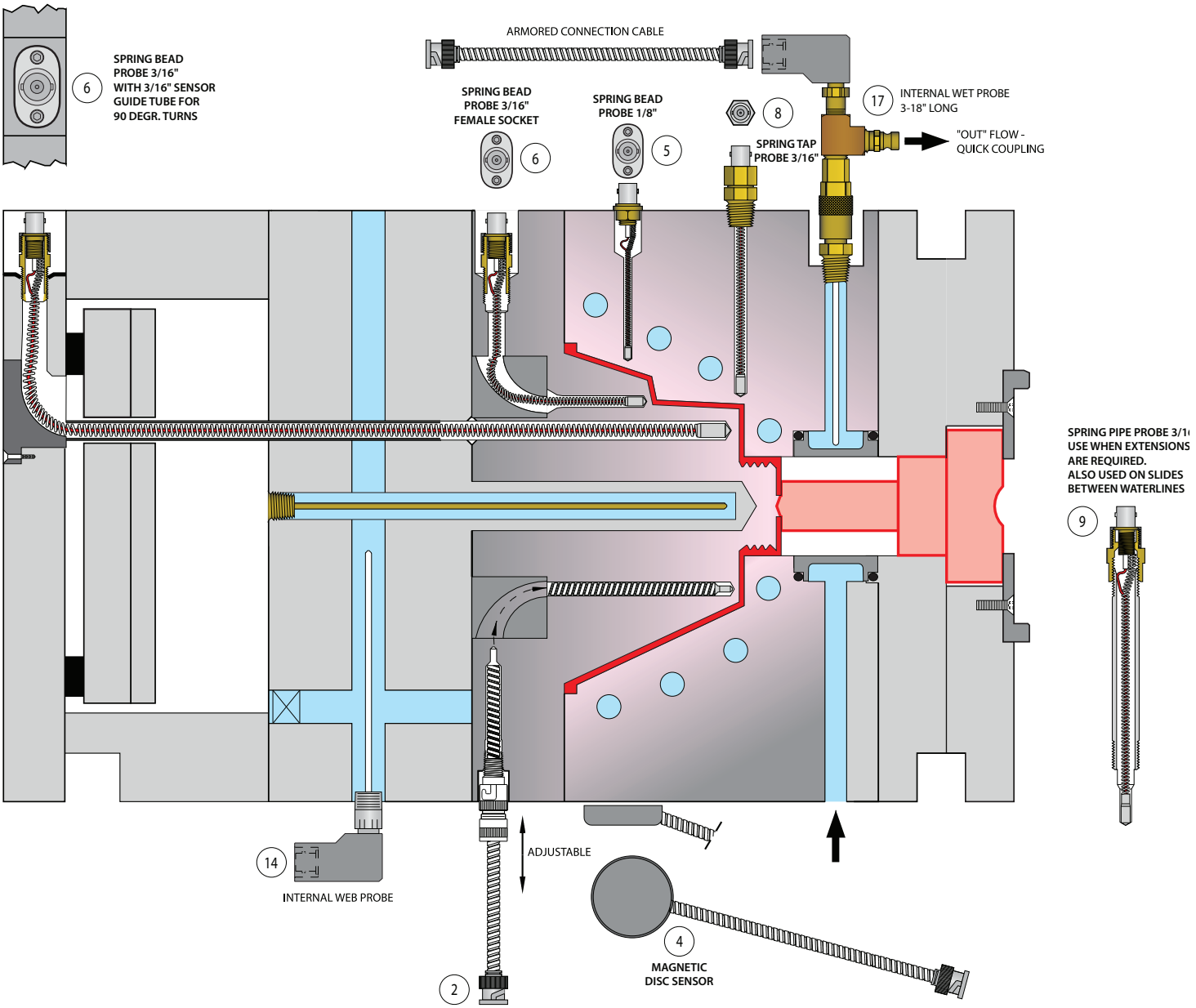
The Pulse Period should sufficiently short, not over cool the mold and long enough to move the warm "standing" water to the sensor so the cooling channel can be flushed of its excess heat.





Sensor Selection

This wide selection enables you to customize any of your existing molds with Internal Wet Probes.



Sensor Selection Guide

1 ARMORED MINI PROBE 1/8", 1/8" x .5" LONG TIP

DWG.AMP-1200
DWG.AMP-1220

AMP-2-20-006 (1/8" DIA 6" LONG)
AMP-2-20-012 (1/8" DIA 12" LONG)
AMP-2-20-024 (1/8" DIA 24" LONG)
AMP-2-20-048 (1/8" DIA 48" LONG)
AMP-2-20-096 (1/8" DIA 96" LONG)
AMP-2-20-144 (1/8" DIA 144" LONG)

2 ARMORED SPRING PROBE 1/4", 1/8" x.3" LONG TIP

DWG.ASP-1200
DWG.ASP-1220

ASP-4-20-036 (1/4" DIA 36" LONG)
ASP-4-20-048 (1/4" DIA 48" LONG)
ASP-4-20-060 (1/4" DIA 60" LONG)
ASP-4-20-072 (1/4" DIA 72" LONG)
ASP-4-20-096 (1/4" DIA 96" LONG)
ASP-4-20-120 (1/4" DIA 120" LONG)
ASP-4-20-144 (1/4" DIA 144" LONG)

3 ARMORED LONG PROBE 1/4", 1/8" x 1" LONG TIP

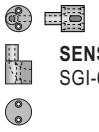
DWG.ALP-1200
DWG.ALP-1220

ALP-4-20-036 (1/4" DIA 36" LONG)
ALP-4-20-048 (1/4" DIA 48" LONG)
ALP-4-20-060 (1/4" DIA 60" LONG)
ALP-4-20-072 (1/4" DIA 72" LONG)
ALP-4-20-096 (1/4" DIA 96" LONG)
ALP-4-20-120 (1/4" DIA 120" LONG)
ALP-4-20-144 (1/4" DIA 144" LONG)

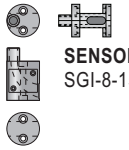
10 ARMORED CONNECTION CABLE

DWG.ACC-1200

(2) ACC-BB-012 (12" LONG)
ACC-BB-024 (24" LONG)
ACC-BB-036 (36" LONG)
ACC-BB-048 (48" LONG)
ACC-BB-060 (60" LONG)
ACC-BB-096 (96" LONG)
ACC-BB-120 (120" LONG)
ACC-BB-144 (144" LONG)



18 SENSOR GUIDE INSERT 3/16"
SGI-6-875-1.5



20 SENSOR GUIDE INSERT 1/4"
SGI-8-1500-2

5 SPRING BEAD PROBE 1/8"

DWG.SBP-1102
DWG.SBP-1202

SBP-2-20-12
SBP-2-20-24

6 SPRING BEAD PROBE 3/16"

DWG.SBP-1103
DWG.SBP-1203

SBP-3-20-12
SBP-3-20-24

7 SPRING TAP PROBE 1/8" - 1/4" NPT

DWG.STP-1202

STP-2-20-12
STP-2-20-24

8 SPRING TAP PROBE 3/16" - 1/4" NPT

DWG.STP-1203

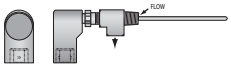
STP-3-20-12
STP-3-20-24

9 SPRING PIPE PROBE 3/16" - 1/4" NPT

DWG.SPP-1200

SPP-3-P4-20-12 (12" LONG)
SPP-3-P4-20-24 (24" LONG)
SPP-3-P6-20-12 (12" LONG)
SPP-3-P6-20-24 (24" LONG)
SPB-3-P8-20-12 (12" LONG)
SPB-3-P8-20-24 (24" LONG)

15 INTERNAL WET PROBE - 90 Degree Ports



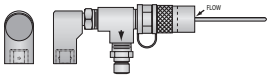
DWG.IWS-1800
DWG.IWS-1820
DWG.IWS-1840

IW9-4-20-00 (0" LONG, 1/4" FITTING)
IW9-4-20-03 (3" LONG, 1/4" FITTING)
IW9-4-20-04 (4" LONG, 1/4" FITTING)
IW9-4-20-06 (6" LONG, 1/4" FITTING)
IW9-4-20-09 (9" LONG, 1/4" FITTING)
IW9-4-20-12 (12" LONG, 1/4" FITTING)

IW9-6-20-00 (0" LONG, 3/8" FITTING)
IW9-6-20-03 (3" LONG, 3/8" FITTING)
IW9-6-20-04 (4" LONG, 3/8" FITTING)
IW9-6-20-06 (6" LONG, 3/8" FITTING)
IW9-6-20-09 (9" LONG, 3/8" FITTING)
IW9-6-20-12 (12" LONG, 3/8" FITTING)

IW9-8-20-00 (0" LONG, 1/2" FITTING)
IW9-8-20-03 (3" LONG, 1/2" FITTING)
IW9-8-20-04 (4" LONG, 1/2" FITTING)
IW9-8-20-06 (6" LONG, 1/2" FITTING)
IW9-8-20-09 (9" LONG, 1/2" FITTING)
IW9-8-20-12 (12" LONG, 1/2" FITTING)

17 INTERNAL WET PROBE (QUICK CHANGE)



DWG.IWS-1800
DWG.IWS-1820
DWG.IWS-1840

IWQ-4-20-00 (0" LONG, 1/4" FITTING)
IWQ-4-20-03 (3" LONG, 1/4" FITTING)
IWQ-4-20-04 (4" LONG, 1/4" FITTING)
IWQ-4-20-06 (6" LONG, 1/4" FITTING)
IWQ-4-20-09 (9" LONG, 1/4" FITTING)
IWQ-4-20-12 (12" LONG, 1/4" FITTING)

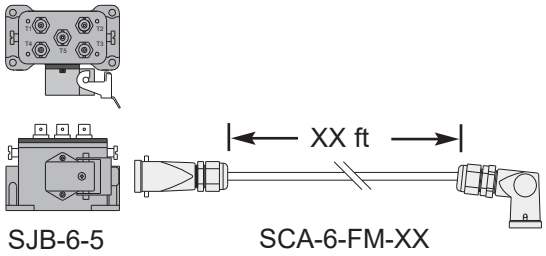
IWQ-6-20-00 (0" LONG, 3/8" FITTING
IWQ-6-20-03 (3" LONG, 3/8" FITTING)
IWQ-6-20-04 (4" LONG, 3/8" FITTING)
IWQ-6-20-06 (6" LONG, 3/8" FITTING)
IWQ-6-20-09 (9" LONG, 3/8" FITTING)
IWQ-6-20-12 (12" LONG, 3/8" FITTING)

IWQ-8-20-00 (0" LONG, 1/2" FITTING)
IWQ-8-20-03 (3" LONG, 1/2" FITTING)
IWQ-8-20-04 (4" LONG, 1/2" FITTING)
IWQ-8-20-06 (6" LONG, 1/2" FITTING)
IWQ-8-20-09 (9" LONG, 1/2" FITTING)
IWQ-8-20-12 (12" LONG, 1/2" FITTING)

Sensor Junction Box

The StackPulse Controller uses mold or platen mounted Junction Boxes to provide an easy sensor connection.
Stationary mold halve may have sensor connected to zone 1 and 2; 3, 4, 5 should not be connected.
Movable may have sensor connected to sensor 3, 4, and 5 ; 1 and 2 should not be connected.

Never connect 2 sensors to the same zone; A low reading will indicate this error.



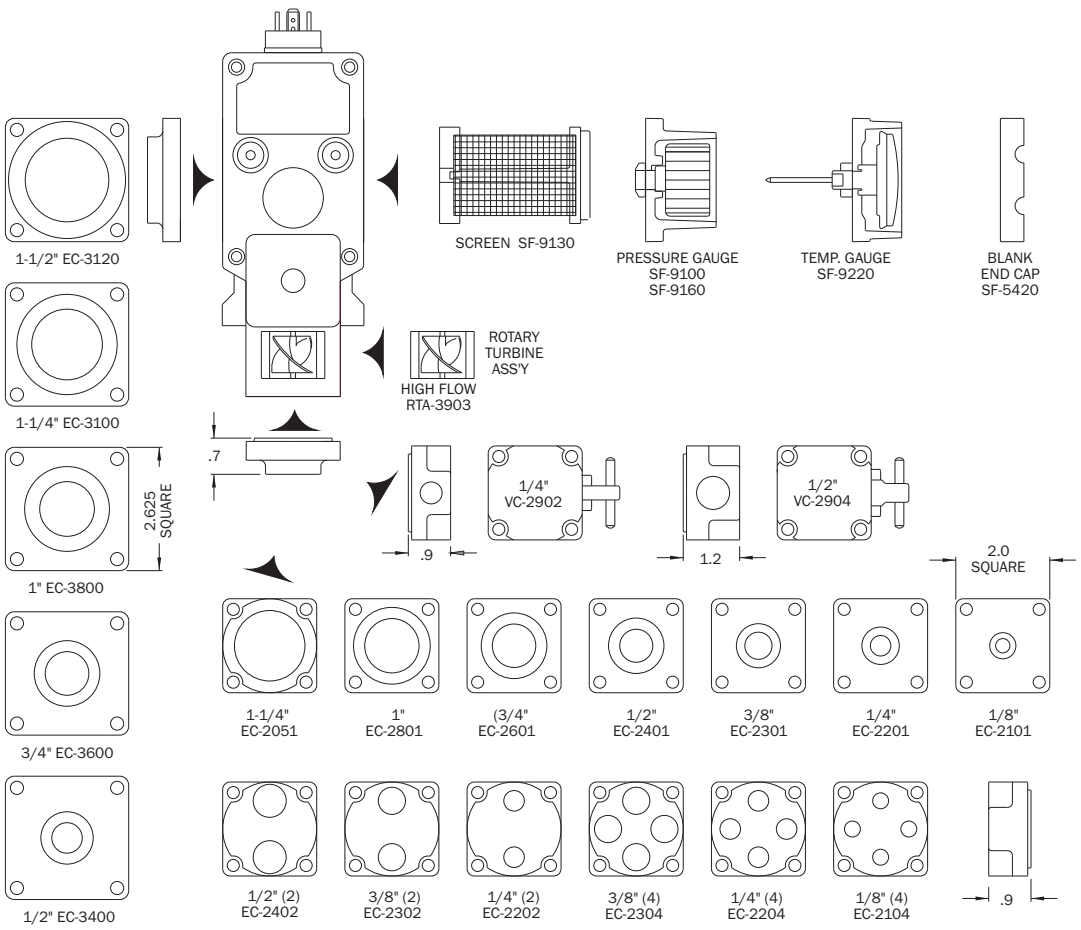
Endcaps

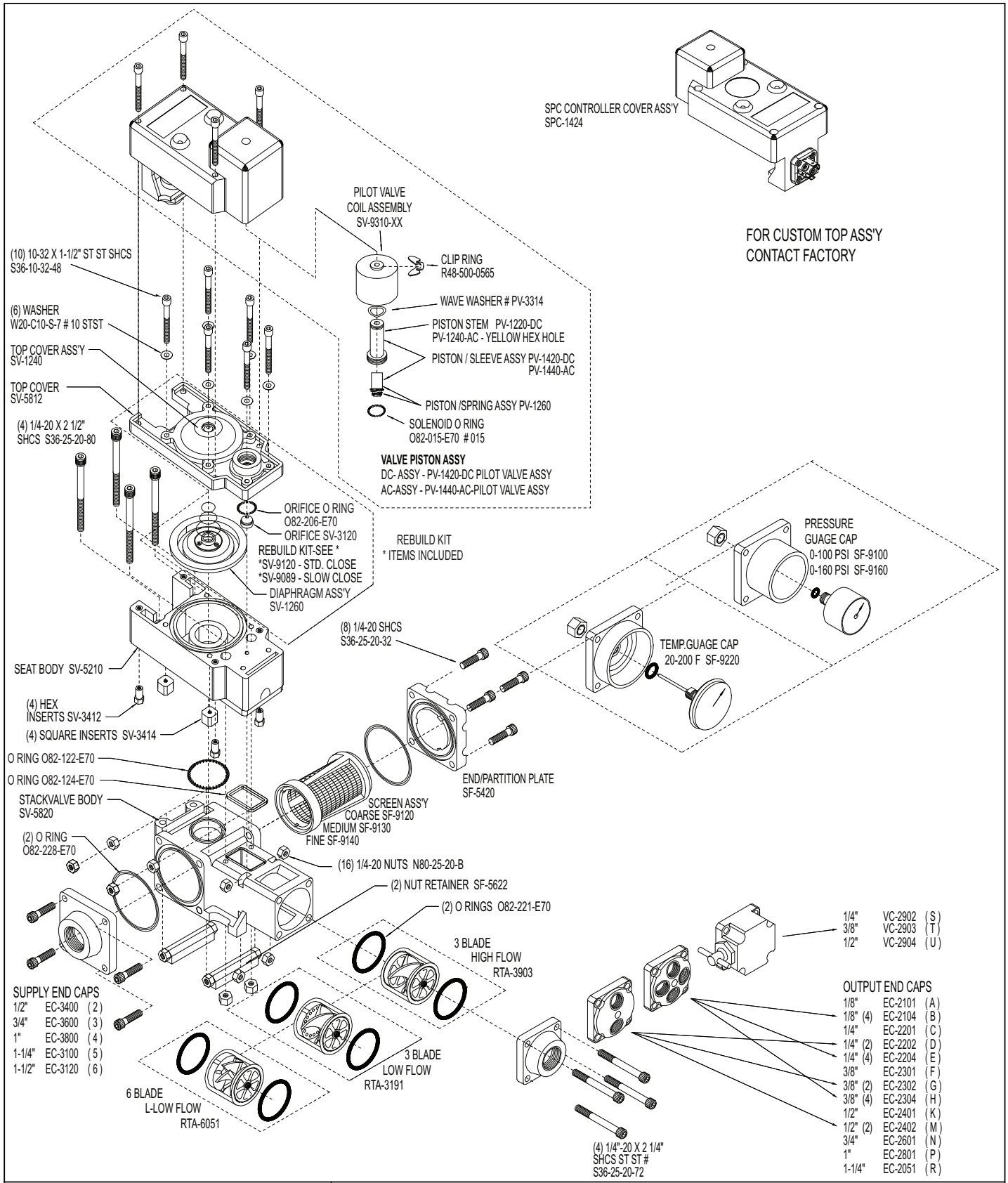
Supply

1/2”	(2)	EC-3400
3/4”	(3)	EC-3600
1”	(4)	EC-3800
1-1/4”	(5)	EC-3100
1-1/2”	(6)	EC-3120

Return

1/8”	(A)	EC-2101
1/8” (4)	(B)	EC-2104
1/4”	(C)	EC-2201
1/4” (2)	(D)	EC-2202
1/4” (4)	(E)	EC-2204
3/8”	(F)	EC-2301
3/8” (2)	(G)	EC-2302
3/8” (4)	(H)	EC-2304
1/2”	(K)	EC-2401
1/2” (2)	(M)	EC-2402
3/4”	(N)	EC-2601
1”	(P)	EC-2801
1-1/4”	(R)	EC-2051

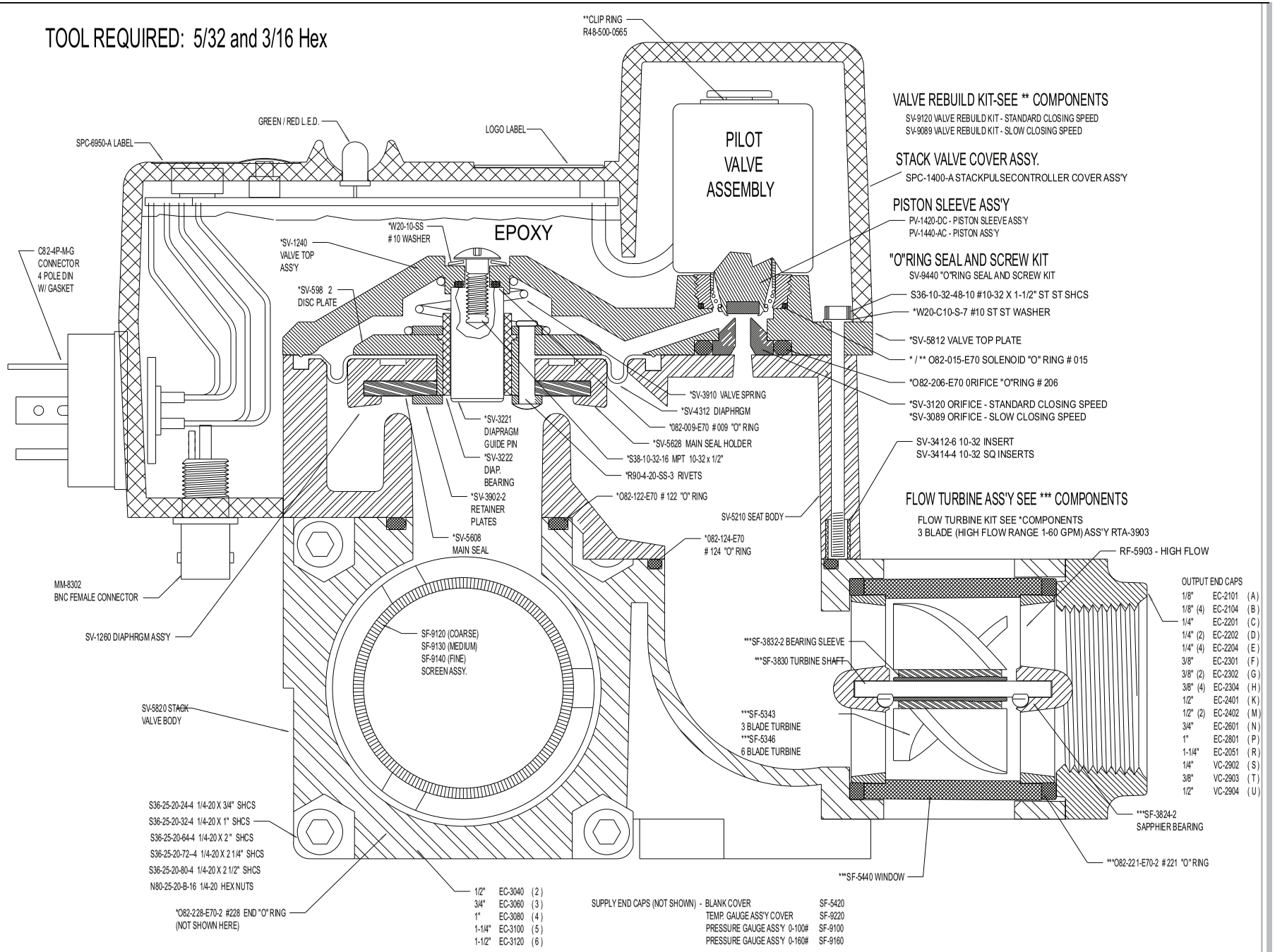




CITO PRODUCTS INC
N8779 HWY X WATERTOWN WI 53094 USA
TEL 920-261-2606 FAX 920-261-1350

STACKPULSE CONTROLLER ASSEMBLY

TOOL REQUIRED: 5/32 and 3/16 Hex



CITO PRODUCTS INC.

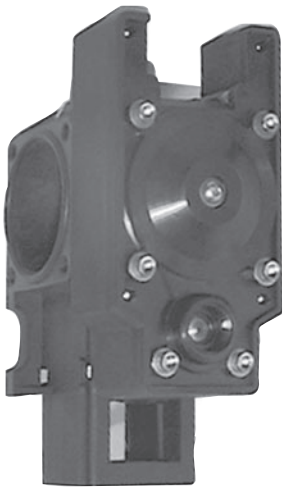
N8779 HWY X WATERTOWN WI. 53094
TEL 920-261-2606 FAX 920-261-1350

STACKPULSE CONTROLLER X - SECTION

Replacement Parts

StackValve™ Digital Top for StackPulse Controller™
COVER WITH PILOT VALVE ASS'Y

	PART NO.	CONNECTOR	SENSOR	PURGE	VOLT	AMP
	SDT-2624	X-ALL	YES	NO	24V ACDC	.3A
	SDT-3824	MICRO - 12mm	YES	NO	24V ACDC	.3A
	SDT-4824	MINI - 20mm	YES	NO	24V ACDC	.3A
	SDT-5124	DIN	YES	NO	24V ACDC	.3A



Module without End Components

StackValve™, Stack Controller™ and StackPulse Controller™ use the same valve body
Valve Module (without end components)

INCLUDES:
(2) "O" RINGS 082-228-E70
(2) "O" RING 082-221-E70
Diaphram Ass'y SV-1260

StackValve™ Body SV-1000

End - Partition Plate

SF-5420

End Temperature Cap

20° to 200° F SF-9220

End Pressure Cap - (EP-100)
0 to 100 PSI SF-9100

End Pressure Cap - (EP-160)
0 to 160 PSI SF-9160

Replacement Parts

Diaphragm Rebuild Kit - StackValve™, StackController™, StackPulse Controller™

Valve Guide and Diaphragm Assembly

Standard Closing Speed	SV-9120
Slow Closing Speed (Blue Instruction Sheet)	SV-9089

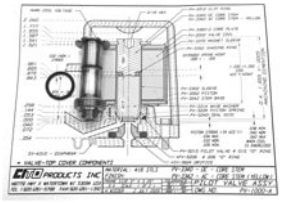
Pilot Valve Assembly for StackValve™, StackController™, StackPulseController™

DC

Pilot Valve Assembly - Standard Closing	PV-1420-DC
Pilot Valve Assembly - Slow Closing	PV-1422-DC

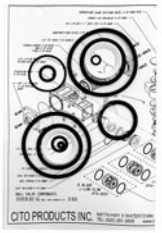
AC (Yellow Dot in Hex)

Pilot Valve Assembly - Standard Closing	PV-1440-AC
Pilot Valve Assembly - Slow Closing	PV-1442-AC



Seals for StackFlow™

Seals for StackFlow Hand Valve	SF-9442



Seals for End cap - StackValve™, StackController™ StackFlow™

SF-5228 - 20

Seals for Window - StackValve™, StackController™, Rotoflow™, StackFlow™

SF-5221 - 60

Screen Assembly

20 Mesh Coarse	SF-9120
30 Mesh Medium	SF-9130
40 Mesh Fine	SF-9140

Window Assembly for StackFlow™, StackValve™, StackController™, Rotoflow™
(Includes: (2) SF-5221-E "O" RINGS)

Flow Window Ass'y	FWA-0903

Rotary Flow Turbine for StackFlow™, StackValve™, StackController™, StackPulse Controller™, Rotoflow™ (Includes: (2) SF-5221-E "O" RINGS)

High Flow	3 Blade	1-60 GPM	RTA-3903
Low Flow	3 Blade	.5-10 GPM	RTA-3191
L-Low Flow	6 Blade	.2-3.4 GPM	RTA-6051
		REVERSE FLOW	
High Flow Rev.	3 Blade	1-60 GPM	RTA-3903-R
Low Flow Rev.	3 Blade	.5-10 GPM	RTA-3191-R
L-Low Flow Rev.	6 Blade	.2-3.4 GPM	RTA-6051-R

Trouble Shooting Guide

Your **StackPulse Controller™** have been designed to provide years of trouble free operation and service. However, in the event a problem does arise check the following:

Over Temperature Alarm

If the Alarm light flash RED for OVER Temperature: **CAUTION !!!** Do not turn up the setpoint just to avoid this alarm indication. The light flashing red to indicate cooling problem. Increase the cooling time or shut the job down until the cooling problem can be determinate. Turning up the setpoint to stop this light indication may result in defective finished parts.

1.- If the water is turned On, check to see if there is enough flow through the tool.

2.- Check water StackPulse Controller for proper operation and flow.

3.- Check to see if the cooling water is the correct temperature.

4.- If the actions above does not work, slow the cycle time of the tool down to allow more cure time for adequate cooling.

Under Temperature Alarm

If the Alarm light flash RED/GREEN for UNDER Temperature: **CAUTION!!!** Do not turn down the setpoint just to avoid this alarm indication. The red flashing light to indicate cooling problem. Decreasing the cooling time or shut the job down until the cooling problem can be determinate. Turning down the setpoint to stop this light indication may result in defective finished parts.

1.- If the cycle has been interrupted; nozzle froze off, runner stuck in mold, one cavity froze of, etc.. Those conditions could indicate a drop in BTU thus resulting in the activation of the alarm.

2.- Chiller water getting cold enough to trigger alarm setpoint (wet probe).

3.- If over cooling every few cycles check program mode of operation and change if necessary.

Sensor Alarm

EEE4; Sensor Open or input less than 32F (0 C) Degrees.

EEE5; Sensor Shorted or input higher than 400F (200 C) Degrees.

Sensor Test

The StackPulse Controller unit utilizes thermistor sensor, which are resistive devices. Typical resistance reading would be 20, 000 Ohms at 77 Degree F. The resistance will go up as the temperature gets colder, and the resistance will go down if the temperature is warmer. If you are experiencing problems with sensor please go through the following steps to attempt to resolve the problems.

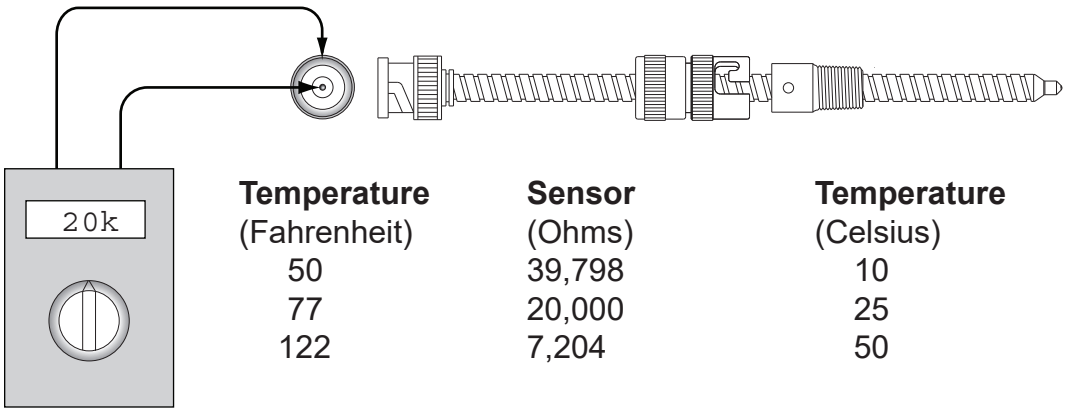
1. Check to assure the sensor is connected to the correct control zone.
2. Check to assure that the sensor is properly seated into mold sensor cavity. Use heat transfer compound to assure proper conduction.
3. Check sensor alarms:

- **Sensor Open:** Indicates that there is no sensor connected or the sensor connection has been interrupted. (EEE4 in Display)

- **Sensor Short:** Indicates the sensor wires are shorted together. Check for crushed sensor or a damaged cable. (EEE5 in Display)

Sensor Checking

1. Locate sensor in question on the mold and at the StackPulse Controller or Junction Box.
2. Unplug sensor from StackPulse Controller or Junction Box.
3. Test sensor with a resistance measuring meter and verify if it is functioning correctly (see next figure).
4. Make sure that sensor is properly seated all the way down into the mold cavity. Always use heat transfer compound on sensor tip.
5. Check sensor for physical damage or loose connection.
6. Check StackPulse Controller or Junction Box and Cables for damage.



Temperature (Fahrenheit)	Sensor (Ohms)	Temperature (Celsius)
50	39,798	10
77	20,000	25
122	7,204	50

Read out problem:

- Check for loose cable connections

Turbine Problems

- Turbine does not turn freely— clean turbine

If you send the units to the service department please have the following information included:
- Model Number of **StackPulse Controller™**
- Serial Number of **StackPulse Controller™**
- Written detailed explanation of difficulties encountered
- Condition of turbine
- Condition of water system

This information will assist our service technicians in solving any possible problems you may be experiencing.

Material Compatibility

Components of StackPulse Controller™:

End Caps	360 Brass
Turbine	Acetal
Turbine Bearing	Bronze
Turbine Bearing Shaft	Tungsten Carbide
End Thrust Bearing	Sapphire
Body Housing	Nylon 6/6 50% Fiberglass
Hardware	Stainless Steel
OPERATING RANGE:	25°-160° F

Mold Surface Temperature Sensor

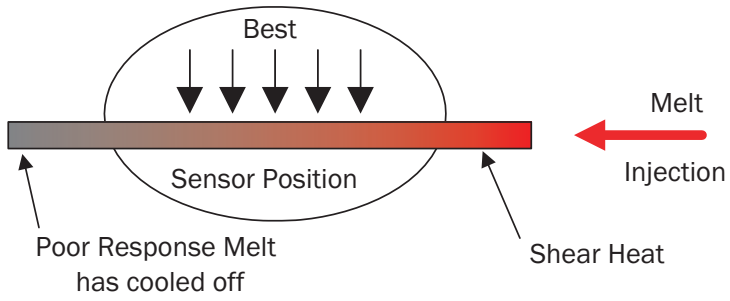
ZONING WILL OPTIMIZE THE MOLD PERFORMANCE
AND WIDEN THE PROCESS WINDOW

A MOLDING CYCLE IS LIMITED BY THE SLOWEST ZONE OR AREA

EACH MOLD SECTION HAS VARIOUS HEAT LOADS
(HOT / COLD AREAS)

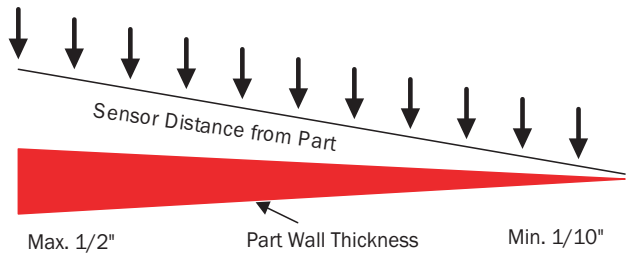
STATIONARY (CAVITY)	Hot Runner Sprue Cooling Center Zone of Mold End Zone of Mold High Heat Load Areas Critical Areas – Sink / Warp / Dimensions Perimeter Heating or Cooling
MOVABLE (CORE)	Center Zone of Mold End Zone of Mold Slides Thick Mold Sections Mold Perimeters Heating or Cooling

SENSOR LOCATION – IN MOLD



Place sensor near center of part

SENSOR DISTANCE FROM PART SURFACE

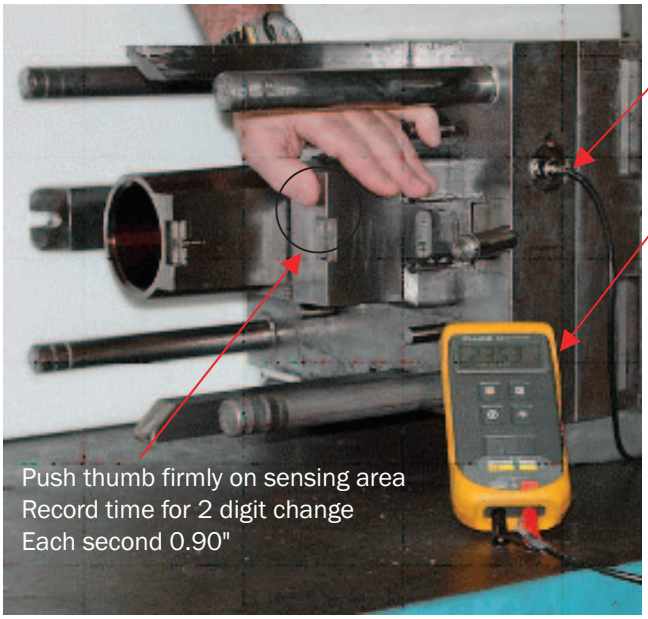


Approximately same as wall thickness away from part

- Sensor shall be placed in center of part in the most accesable spot
- Avoid area next to gate
- Avoid area near end of fill
- When sensor are installed in a core – Do not go up into the Core – Place Sensor near the base of the Core
- The Sensor shall be the same distance away from the molding surface as the part wall thickness
- On a thin wall part distance shall be no less than .100" from part surface
- On a thick wall part the sensor shall be no farther away than .500"

ON GAS ASSIST MOLDING
The material in contact with the molding surface shall be considered "WALL" thickness

Sensor Position and Distance from Surface

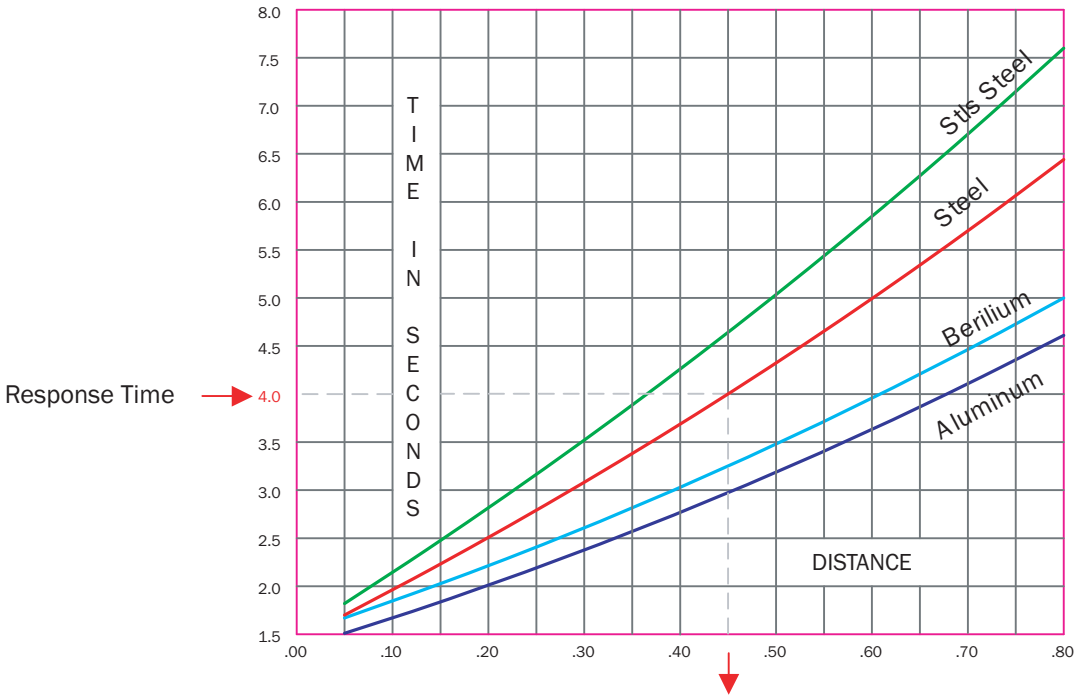


Sensor connection

1/100 Resolution Ohm @ 77°F = 20 K
As temperature increases
resistance will go down

1. Connect sensor to 2 digit Ohm meter
2. Wait to get a stable reading
3. Rub thumb over surface where sensor is located
4. Check the time it takes to change by 0.02 Ohm.
   Note: As temperature increases resistance will decrease.

5. Select time on graph (vertical bar)
6. Select mold material
7. Follow horizontal line to intercepting location
8. Read distance on graph (horizontal bar)
9. Reading will be sensor distance from molding surface
10. Repeat reading in 2 min.



4 sec. Response Time = .45” From Surface

D:\CITO STAND AR D\3-CITO-DES IGN-K IT\SEN-POS-PDF

DISCLAIMER: ALL PERFORMANCE SPECIFICATIONS ARE BASED ON CLEAN PROCESS WATER. EVERY EFFORT HAS BEEN MADE TO MAKE PRODUCT AS RELIABLE AS POSSIBLE. CONTAMINATION MAY LODGE IN TURBINE AND CHANGE FLOW RATE.
CITO DOES NOT GUARANTEE PERFORMANCE UNDER VARIOUS ABNORMAL FIELD CONDITIONS.

WARRANTY

We warrant our products to be free from defects in material and workmanship for a period of one year from the date of purchase.

Our liability under this warranty is limited to the repair or replacement of the product, after careful inspection by Cito Products, Inc. This warranty does not cover obvious abuse or misuse of the product.

Responsibility as to the intended use and suitability of the products rests entirely with the user.

SAFETY PRECAUTIONS TO OBSERVE WHEN USING THESE PRODUCTS

1. All care should be taken not to touch the sensor probe sheath while measuring extremely high or low temperatures, or toxic materials.

2. Shock hazards exist when sensor probes are exposed to voltages greater than 36vDC or 36v peak AC.
   Do not use where the measurement surface exceeds this voltage level.

3. No attempt should be made to measure temperatures exceeding the range of the sensor probe being used. Personal injury or sensor damage could occur.

4. Do not use any of these products inside of a microwave oven.

5. All care should be taken not to bend the sensor probe sharply. The wire may be damaged, causing the sensor to fail.

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