



The ITC Mold Water Flow Monitoring System.

For those who need factual, up to the minute and historical information on how their mold water cooling system is functioning



SMARTMANIFOLD
BY INTERNATIONAL TEMPERATURE CONTROL

with

Waterflo

Technology

ITC

Mold Water Flow Monitoring System

Why Intelligent Mold Water Flow Monitoring ?

Accurate up to the minute mold water flow monitoring is for those who need:

- Highly Accurate Flow Velocity monitoring for Each Channel
- Ability to compare the Water Temperature of Each Channel against Input Water Temperature
- Ability to Monitor Actual Main “in” & “Out” Water Pressure - (Optional)
- Logging of Historical Data
- Ability to Detect Long & Short Term Trends via Graphs & Data
- High Quality - Dimensionally Stable Parts
- Improve Cycle Time
- Immediately Know & Alarm if Flow or Temperature Changes
- Real time Maintenance Alerts
- How each individual channel is operating in relation to others
- Quicker Mold Changes
- Monitor Water Pressure In/Out (OPTIONAL)



This is now the time to replace your do nothing water manifold. Instead of just sitting there looking pretty, the *ITC Smart Manifold* actually does important work, by providing critical information which is then used to improve operational efficiency of the molding process.

For the first time, ITC offers Injection Molders an affordable and precise solution for monitoring flow rate and temperature within each channel of a tools cooling system. The *ITC Smart Manifold* has been meticulously engineered and designed to provide exceptional accuracy. This is only possible by the exclusive design and exacting manufacturing of the manifold extrusion, which allows for proper placement of advanced vortex sensors.

The *ITC Waterflo* mold water cooling monitoring system will precisely digitally monitor all flow channels within the mold, record data for both flow rate and temperature for each individual channel.

Often overlooked by many molders; the efficiency of each cooling circuit is critical to a stable molding process and the production of high quality, dimensionally stable parts. The *ITC Waterflo* mold water cooling monitoring system can protect you mold and improve quality while also improving cycle time by quickly identifying cooling problems and alerting the user to various common cooling channel problems such as:

- No Water flow from the water chiller/heater
- Blocked waterways
- Scale / rust build up
- Inconspicuous / minor leaks
- Incorrect setting of the water chiller / heater
- Faulty water chiller / heater operation
- Monitors differences between system in and out water pressure
- Incorrect piping

The heart of the ITC Mold Water Flow Monitoring System is the *ITC Smart Manifold with Waterflo* Technology which has been painstakingly engineered to provide un-matched accuracy in the monitoring of flow velocity and water temperature.

- No moving parts to wear out - Long trouble free service life
- Sensors are protected by being enclosed within the manifold
- Small foot print allows for locating in the most convenient location.
- Advanced vortex sensor is retained by a simple clip for easy removal and replacement
- Advanced sensor accurately reads both flow rate and temperature
- Multiple *ITC Smart Manifolds* can be daisy-chained together for seamless control



Software / Control

The ITC Intelligent *Waterflo* Monitoring System uses a remote touch screen that monitors and displays the real flow and temperature for each channel. The system can also be set up to monitor water in/out pressure. The information can be displayed either graphically or in text format. The data is stored internally, time & date stamped for tractability. By displaying the data in a graphical format, the operator can spot trends in deteriorating performance for any channel. The data can be read via an Ethernet connection or downloaded onto a USB stick.

Warning and alarm limits can be set for both flow rate and temperature for all monitored channels individually. Should a channel deviate from settings, then both an on screen warning and a potential free alarm signal can be fed directly to an ancillary device - such as an alarm tower to warn that the flow has deviated from the tolerance setting

The system is capable of storing multiple tool set-ups, which can then be quickly called up when the tool is changed.



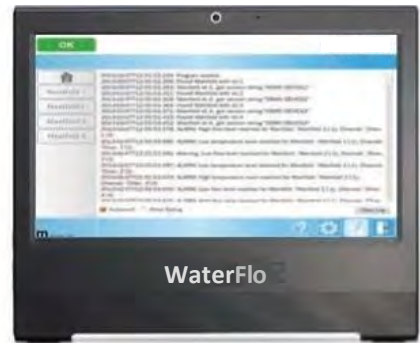
Simple Overview

The user can see an immediate overview of cooling channel status “at a glance” on a single screen with instant display status alarms should the flow / temperature go outside tolerance settings



Historical Data

Recording Historical data means a performance log for each channel in the *ITC Smart Manifold* is stored in the systems memory, allowing the user to track performance and identify problems



Event Log

Alarm Errors, warnings and operator changes are all stored with a time and date stamp and can be reviewed at any time

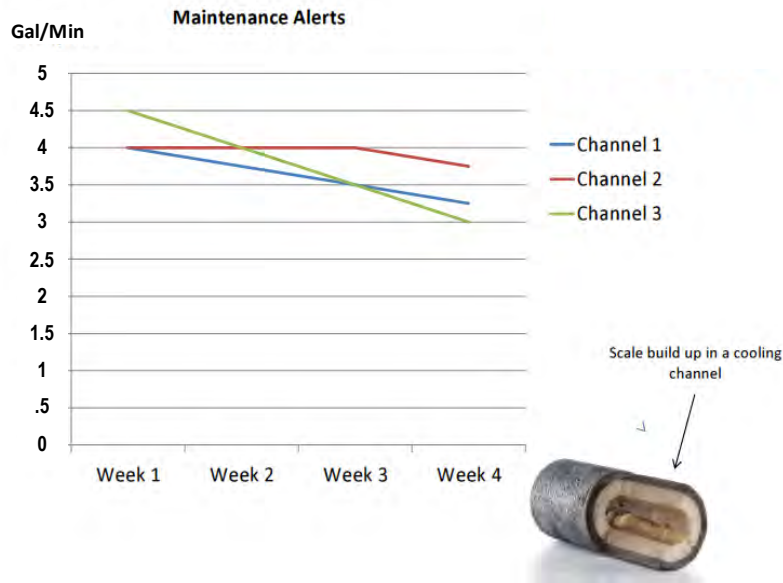
Validation

Until now it has been both difficult and / or very expensive to measure the flow rate and temperature of the coolant in each water channel of the tool. Although a process may be fully validated and a process window found during the operational qualification, up to now it has been impossible to know if the process is actually running at these settings.

A 100° F setting on the mold chiller / heater DOES NOT guarantee that all channels within the tool are actually running at this temperature or with ANY given indication of flow rate. There may be a partial blockage in a water circuit, or a build-up of scale in another water channel, or even an incorrectly piped tool, resulting in no flow at all for any particular channel. In all of these instances the mold chiller / heater will still show that the coolant is at the correct temperature, both inside your process window and as per your control plan, but the reality is that the tool is not operating at that temperature. The ability to precisely monitor and record both actual temperature and flow rate, allows the operator to make intelligent decisions as the process demands, thus giving increased confidence in the process.

All the other equipment (Injection molding machine, hot runner control, etc.) in the molding process will give you feedback about the process, allowing for intelligent decision making. But even though the Water Cooling System is one of the most important control characteristics in any molding process, until now it has been impossible to tell what is actually happening inside the cooling channels.

As any good process engineer will tell testify, it is not what the machine is told to do that is important; it is what the machine is actually doing that matters.



Hardware

SENSOR:



The *ITC Smart Manifold* is equipped with very compact sensors that are capable of reading both flow rate & temperature. The sensor is based on the vortex flow measurement principal, which uses a bluff body in the middle of the flow path to create a small eddy current (vortices) and the pressure of this current is measured to determine the flow through a given cross sectional area.

The sensors have no moving parts; this, combined with a large flow path, make it ideally suited to mold cooling, even when using heavily contaminated water.



The sensors are integrated directly into the manifold thereby keeping size to a minimum; the *ITC Smart Manifold* has been designed to create a fixed linear flow path that is essential for accurate flow measurement.

The sensors are available with two flow ranges to suit the application (4 gpm/15 lpm & 10 gpm/40 lpm) (220° F / 105° C). Sensors are held in place with a simple clip which makes replacement effortless therefore keeping maintenance very simple.

INTERFACE UNIT;

The system is equipped with a interface unit which allows multiple manifolds to be seamlessly monitored and facilitate true “plug and play” with a simple connection to the touch screen, power supply & alarm signals. The module is also equipped with USB and Ethernet ports.

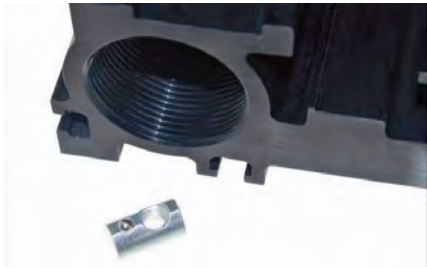


ITC SMART MANIFOLD:

The *ITC Smart Manifolds* are available with 4, 8 or 12 channel arrangements. Multiple manifolds can be “daisy chained” together to accommodate additional flow channels. The system is designed to automatically identify additional *ITC Smart Manifolds* and display them on the screen. This means the system can be expanded in the future.

The compact slim line design of the manifold enables it to be mounted in the smallest space possible next to the machine. platens or the mold, keeping the pipe runs to the minimum.

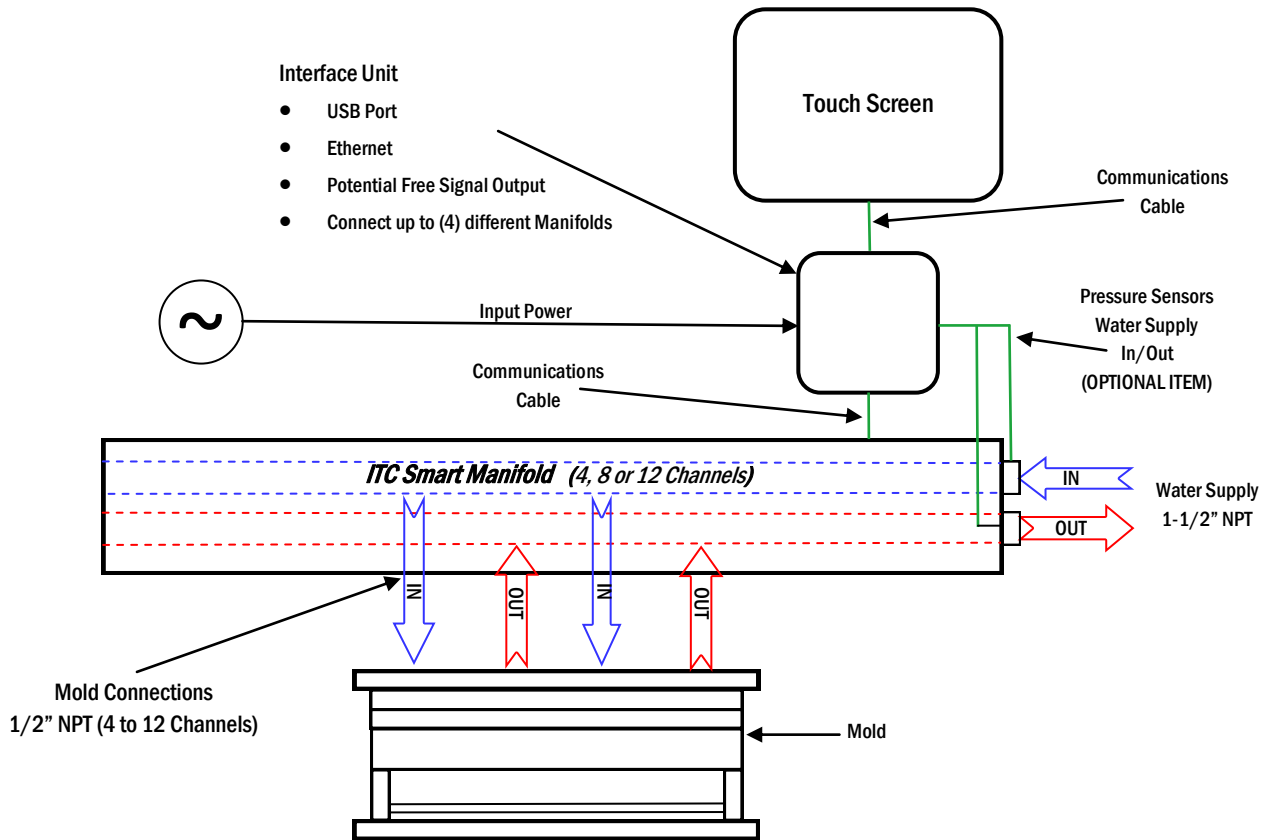




The custom aluminum extrusion is black anodized to resist corrosion. The extrusion is designed to specifically accommodate a linear flow path for each sensor, which is very important for accurate measurement. There are Integrated extruded slots on two faces to allow for “roll-in” t-nuts enabling simple and flexible mounting.

The *ITC Smart Manifold* has 1-1/2” flow in & out ports on both ends of the manifold. This allows maximum flexibility when connecting the water supply. There are 1/2” ports on the individual channels for both “in” and “return” lines.

OPTIONAL - Pressure Sensors are available on the water supply In/Out ports.



What are the Options:

Currently there is a range of outdated methods for distributing and monitoring the water flow around the cooling circuit.

- Aluminum Manifolds - Recently there has been a trend towards these simple manifolds, mounted on either the platen or mold. These provide a distribution benefit only, but do nothing else.

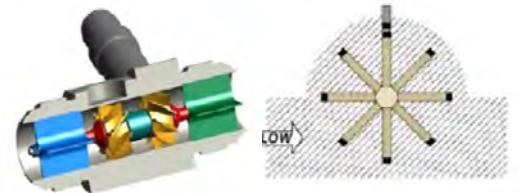
- Flow Regulators - They may be cost effective, but suffer from inherent problems:

- ⇒ Read flow rate only - do not read temperature
- ⇒ Historically inaccurate - do not give true readings
- ⇒ Bulky / delicate and have to be located away from the mold
- ⇒ Easily broken & become hard to read



- Impeller Type - There are several types of impeller flow meters:

- ⇒ Read flow only - do not read temperature
- ⇒ Mounted inside the flow line
- ⇒ Restrict flow
- ⇒ Can be bulky and sit unprotected - vulnerable to outside damage
- ⇒ Not reliable & prone to failure
- ⇒ Not easy to maintain or replace
- ⇒ Contaminates in the water stream will disrupt the operation of the impeller
- ⇒ Moving parts which wear out



- Ultrasonic - There are several types of ultrasonic sensors

- ⇒ Read flow only - do not read temperature
- ⇒ Mounted on the outside of the flow line
- ⇒ Do not restrict flow
- ⇒ Bubbles and air within the water flow disrupt readings
- ⇒ Require two sensors on each line - one to look up-stream & one to look down-stream
- ⇒ Can be bulky adding to the overall manifold foot print and sit un-protected to damage from outside sources



- Temperature Sensors

- ⇒ Separate temperature sensors are required
- ⇒ Protrude into the flow path & prone to outside damage
- ⇒ As a separate item, there bulk adds to the overall footprint of the manifold



The combination of these separate flow & temperature sensors make for an awkward and bulky manifold which does not provide the accurate information necessary for efficient operations.

Now comes the ITC Smart Manifold & Waterflo Technology with its well developed approach:

- ⇒ A single sensor reads both water velocity and temperature
- ⇒ Operates on the Vortex principal which provides exceptional accuracy for both flow & temperature
- ⇒ Sensors sit entirely within the manifold providing protection from outside sources as well as significantly smaller slim-line manifold footprint
- ⇒ Provides precise up to the minute data on temperature & flow rate
- ⇒ Historical graphs indicate rust/scale build up as well as minor leaks
- ⇒ Alarms when there is no water flow from the chiller/heater or blocked waterways
- ⇒ Provides information on a channel by channel basis, which allows for intelligent decision making, not just guestimates



Technical Specifications:

ITC Smart Manifold	
Manifold Feed	1-1/2" NPT
Manifold Ports	1/2" NPT
Number of Ports	4/8/12 Standard (other sizes on request)
Valves (optional)	Color coded ball valves per channel (optional)
Operating Temperature (max)	32° F - 195° F (0° - 90° C)
Operating Pressure (max)	140 PSI
Temperature Sensing	Per Channel (return)
Flow Sensing	Per Channel (return)
Temperature Sensing Main Inlet	Yes (optional)
Power Supply	12 - 24 Vdc

Sensor	
Sensor Type	Vortex
Range (flow)	Series 1 = 4 gal/min (15 liters/min) Series 2 = 10 gal/min (40 liters/min)
Accuracy (flow)	1.5% full scale
Range (temperature)	32° - 220° F (0° - 105° C)
Resolution (temperature)	.5°
Accuracy (temperature)	+/- 1.5% full scale
Sensor Signal	+/- 0.35 - 3.5Vdc
Output Signal	Voltage
Response Time	< 1 sec.
Power Supply	5 Vdc
Burst Pressure	200 PSI @ 100° F

<i>Waterflo</i> Control	
Display	15" Touch Screen
Control	15" Touch Screen
Communications Ports	Ethernet / USB
Communications System	ASCII (USB) / HTML
Protocols	USB Serial / TCP/IP
Storage (log & settings)	Internal (optional) / USB (optional)
Remote Access via internet/network	Yes (optional)
Number of Channels (flow and temperature)	12 zones per Manifold / Manifolds Expandable
Number of Manifolds	Multiple (daisy chained plug & play)
Display Units (flow)	Gallons / Liters
Display Units (temperature)	°F / °C
Warning Limits	10% of Alarm limits (optional)
Alarm Limits	User definable per channel (optional)
Alarm Output	Potential free output warning / alarm
Power Supply	12 - 24 Vdc

Item #	Item Description
WF-SM4-1	Water Flow - Smart Manifold - 4 Channel - 4 gpm
WF-SM4-2	Water Flow - Smart Manifold - 4 Channel - 10 gpm
WF-SM8-1	Water Flow - Smart Manifold - 8 Channel - 4 gpm
WF-SM8-2	Water Flow - Smart Manifold - 8 Channel - 10 gpm
WF-SM10-1	Water Flow - Smart Manifold - 12 Channel - 4 gpm
WF-SM10-2	Water Flow - Smart Manifold - 12 Channel - 10 gpm
WF-CN	Mold Water Flow System - Control Network
WF-IOPS	Water Flow - In/Out Pressure - Optional

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