



VISIONS 3000



Linux Rev. 2.52

**Hot Runner Temperature Control Systems
for the most difficult situations**



International Temperature Control, Inc.

2415 E. Huron Rd. P.O. Box 805 Au Gres, MI 48703 USA
Ph. (989) 876-8075 Fax (989) 876-8075 E-mail: sales@itc-controls.com

Introduction:

In today's world a hot runner temperature control system must do more than just control temperatures, it must be a management tool as well. In this regard the VISIONS 3000 Linux Rev. 2.52 provides functions which address the following:

1. Affordability / Viability
2. Precise Temperature Control - ITC's Adaptive Thermal Control System
3. Tool Diagnosis - Superior suite of diagnostic features & reports which are saved & downloadable
4. Reliability - The robust design of the VISIONS 3000 produces a system which is able to run efficiently and reliably, 24/7.
5. Validation - The VISIONS 3000 provides a base line report of tool operations for future reference
6. History - 12 months of downloadable production history
7. Database - All operational set-up functions for over 100 molds
8. Individual Heater Power Consumption Monitoring
9. Individual Heater P.I.D.
10. Minimum Cavity Set Point Temperature
11. Communications - USB & Wi-Fi Monitoring & Downloadable Reports
12. Easy to Use - Logical & Intuitive touchscreen interface
13. Water Flow Monitoring & Alarms
14. Early Heater Fault Detection
15. Early Material Leakage Detection
16. Alarms - Programmable
17. Motion Stand-by - Operator selectable based on failure
18. Graphs - 3-D Surface & Trend

Affordability / Viability

The VISIONS 3000 is the cost effective Hot Runner Temperature Control System.

- Low Cost of Ownership - Reasonable Cost, Longevity, Reliability, Usability, Advanced Features, Upgradable.
- Usability - Intuitive, easy to use & understand.
- Reliability - Visions 3000 are manufactured for Industrial Environments.
- Usable Features - Visions 3000 suite of operational & diagnostic features are second to none and intuitively easy to use.
- Accurate Control - Adaptive Thermal Control provides accuracy, energy savings, precise monitoring & protection.
- Maintainability - VISIONS 3000 is designed so everything is easily viewable & accessible.
- Technology - As updates become available they are backward compatible for a 10 year period.

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The VISIONS 3000 fulfills all these requirements and more in an easy-to-use, robust system that can take a licking & keep on ticking. An overview, of some of the many features of the VISIONS 3000 and the benefits they bring to the modern production environment are as follows:

ATC (Adaptive Thermal Control) Technology:

The VISIONS 3000 Linux Rev. 2.52 has enhanced the algorithm within the our Adaptive Thermal Control to fine tune the most troublesome of molds. Under normal operations it is carried out during the warm up process, individually tuning each heater to control within 0.5°F of set point. This is done by delivering smooth and exact power to each heater in increments which provide the smallest actual temperature deviation. For troublesome tools, the operator has the ability to select from 5 different settings which can precisely fine tune the P.I.D. operation to match the mold.

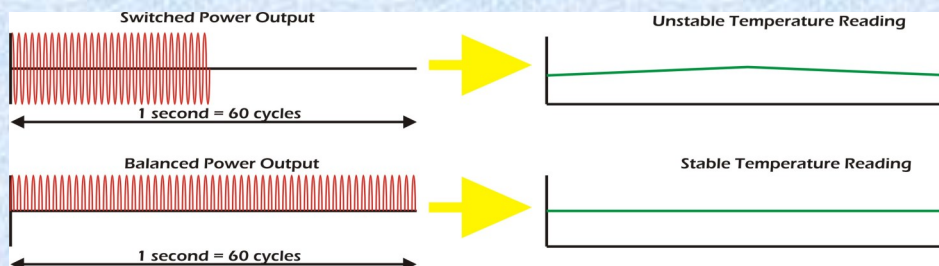
AutoTune
Very Slow
Slow
Medium
Fast
Very fast

Because of their different mass and operating characteristics, Manifolds & Nozzles zones are provided with there own unique set of algorithms. By controlling Manifolds & Nozzles independently, smooth and efficient control is possible.

Balanced Power Output:

A significant difference between the VISIONS 3000 and other systems is that we control power. It is realized that all hot runner systems control power, but with the VISIONS 3000 the primary emphasis is on power. It is power that produces heat and any temperature rise in the tool is a result of power being applied. Only with the proper control of power can temperature be controlled accurately. To understand what is happening in the tool, we need to know what the power is doing.

Proper balancing of power reduces reduce electrically generated noise. The VISIONS 3000 switches power to the load as the voltage crosses zero. In addition, the VISIONS 3000 also balances the power output by spreading the “ON” cycles over a 1 second time period. For example, a 50% output power on other systems consists of half a second with power “ON” and a half second with power “OFF”. With the VISIONS 3000, the power is “ON” on for a half a cycle and “OFF” for half a cycle. As can be seen from the graph below, this produces a considerably smoother power delivery, reducing oscillation of the heater, while increasing reliability and increasing the accuracy and stability of the control loop.



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Rev. 2.52 Linux

Balanced Power Output reduces the overall current consumed by the mold, therein reducing energy consumption and cutting cost. Using a combination of a fast, efficient tuning algorithm and a balanced power output to the heater, almost any heater is capable of being controlled to within 1 degree.

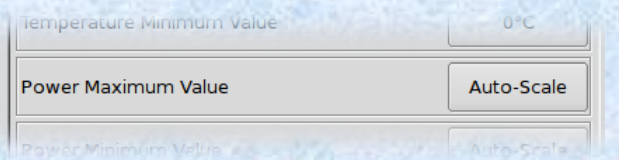
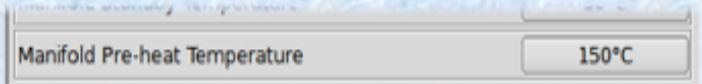
Programmable Manifold Pre-heat Start UP Groups:

The user has the ability to define the start-up sequence of the manifold heaters. This is useful for molds with a large number of heaters that exceed the maximum current available if they are all ramped together and provides the means to program the specific start-up recommendations of the hot runner manufacturer, automatically balancing the hot runner during the critical warm up phase and allowing bushings to seat into the mold better, reducing material leakage.

This feature has a trigger temperature that once the manifold zones reach this trigger temperature, power starts to be applied to the Cavity zones to achieve production temperature in the shortest period of time

Current Limits:

Power limit settings can be applied to both the Manifold and Cavity zones. These limits prevent full power from being applied to the heaters, a particular problem with small wattage bushing heaters where 100% power can increase the internal core temperature of the element 100's of degrees above the temperature actually being measured. This reduction in maximum power applied also reduces the overall power being applied to the tool, preventing current consumption exceeding supply limits.



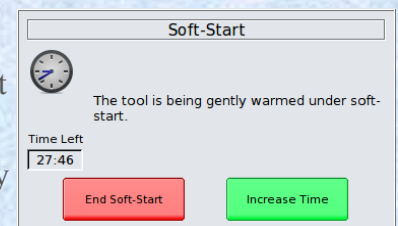
ATC Technology: These include:

1. Enhances part quality
2. Improves production rates
3. Reduces scrap
4. Provides material savings
5. Allows customization of the PID to the tool's exact needs
6. Equates to higher profit margin
7. Helps in the control of energy cost

Advanced Soft Start:

The VISIONS 3000 has different tool start strategies to satisfy the most demanding production requirements. These include:

1. Manual Soft Start – Sometimes referred to as Bake Out, this manually



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triggered, 30 minute. Low-power function removes moisture in the mold.

2. Automatic Soft Start – When the RUN function is selected, the power of all the zones are ramped from zero. Due to their increased thermal mass, the ramp rate of the Manifold zones is greater than the Cavity zones. Ramping power has significant advantages to ramping temperature – most noticeable, any thermocouple fault condition that prevents temperature increase in a zone does not prevent the complete tool from reaching production temperature.
3. Manifold Pre-Heat – It is widely recognized that heating the manifold zones before the cavity zones allows the bushings to bed into the mold preventing leakage. The Manifold Pre-Heat option enables the operator to select this function, if required, and by permitting the operator to select the trigger temperature at which the cavity zones start ramping, warm up time is kept to a minimum compared to systems that require the manifolds to reach temperature before activating the cavity zones.

Energy Savings:

In today's world of ever increasing energy costs, efficiency is a major concern. ATC (Adaptive Thermal Control) adapts power usage to the precise thermal requirements of the tool, balancing the power demand to reduce temperature oscillation in the heater, thus increasing control accuracy whilst also increasing the reliability of the heater. This offers the user the most energy efficient method of controlling temperature.

Additionally not to exceed power values can be selected for any or all zones.

Manifold & Cavity Zone Control:

Because of the differences in mass and operation of Manifolds and Cavities the VISIONS 3000 provides PID algorithms tailored to meet there specific requirements. By controlling Manifolds and Cavities independently, smooth, efficient and even control of the mold results. For exceptional mold heater requirements, manual settings of the tuning parameters are available.

Global Edit Mode:

The dialog box to the left is displayed whenever the GLOBAL hot key is pressed when the VISIONS 3000 system is in RUN MODE.

1. Permits the global editing of the Setpoint, for a selectable range of zones, This can be done for several different ranges of zones, if different increments of increase or decrease are warranted. This function automatically puts the selected zones into automatic/closed loop mode.
2. Permits the editing of Output Power to the heater for a range of zones in a manner similar to editing of the Setpoint temperature. This function will automatically put the selected zones into manual/open loop mode.
3. Permits the linking of the output from a series of selected zones to the input thermocouple sensor from a

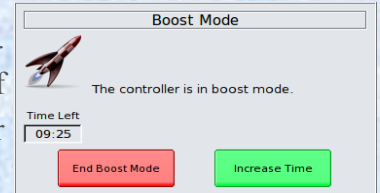
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different zone within the system.

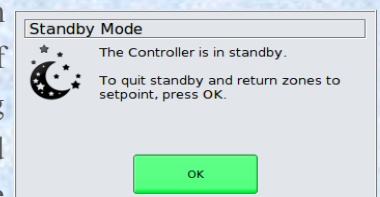
Boost:

A temporary rise in temperature normally used to clear a cold slug on start up. Boost operates on Cavity zones only. The increase in temperature (or power if the zone is in manual mode) and the time that Boost is applies are both operator settable. This function can be saved on the tool database.



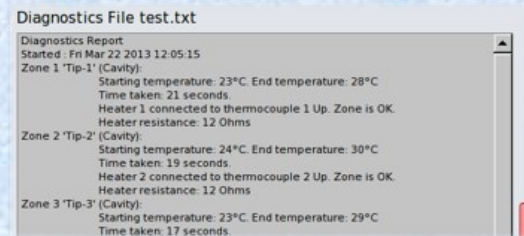
Stand-by:

Stand-by lowers the temperature of Manifolds and Nozzles to a safe range when the molding system is at idle. This process can be manual or automatic. If connected to sensors on the molding press and feedback indicates the molding operation has ceased for a period of time, VISIONS 3000 can place itself in stand-by mode, lowering the temperature to a safe range thereby preventing the degrading of plastic and saving energy. Standby operates until cancelled. This process can be saved in the tool database.



Tool Diagnosis:

The tool diagnostic function is a very important facility. In this regard the VISIONS 3000 incorporates a suite of functions especially designed to troubleshoot the mold both at start-up and during normal operations. The VISIONS 3000 applies a measured amount of power to each zone in turn for a period of 1 minute. Within this time the response in measured and the results shown on the screen.



Note; the level of power applied to manifold zones is larger because of there larger thermal mass.

Given a group of, typically, cavity zones with the same specification, an application of the same amount of power should result in the same increase in temperature in the same time on all the zones. Any deviance will be the result of a fault within the bushing (or perhaps, a misplaced thermocouple). This additional insight into the functioning of the tool is invaluable to a toolmaker for determining faults

1	-> 1 Up, 25 Sec	312 Ω	28°C
2	-> 2 Up, 20 Sec	370 Ω	28°C
3	-> 3 Up, 18 Sec	358 Ω	29°C
4	-> 5 Up, 22 Sec	367 Ω	30°C
5	-> 4 Up, 22 Sec	398 Ω	29°C
6	-> 6 Up, 21 Sec	319 Ω	31°C
7	-> 7 Up, 22 Sec	380 Ω	32°C
8	-> 8 Up, 17 Sec	68 Ω	32°C
9	Unknown	45 Ω	28°C

Self Diagnostic Capabilities:

The VISIONS 3000 Tool Diagnostic Suite performs a full set of functional tests to determine the condition of the mold, controller and machine operation and provide full protection of the tool;

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Rev. 2.52 Linux

1. Swapped heater or thermocouple wires. If one is found, the controller indicates the affected zone.
2. Heater Power Monitoring & Alarm (Amperage & Wattage) - High/Low limits set to monitor heater operation & detect possible material leakage in the manifold or disruption in the cooling system.
3. Heater Resistance Monitoring & Alarm - helps predict in advance when a heater is about to fail.
4. Thermocouple Open, Reversed Thermocouple, Cold Thermocouple, Open Fuse, Open Heater, Shorted Heater, Etc.

Tool Validation:

When initiated on a new or reconditioned tool, a full suite of diagnostic tests automatically perform functional analysis on all aspects of the tool and controller, on a zone by zone basis, providing information on any errors which may exist. The results can be stored and downloaded, providing a historical baseline for comparison checks and providing a record of tool history.

Monitor Mode:

The VISIONS 3000 Monitor Mode permits the operator full access to all the Setup and edit modes while seeing the effect on-screen with live thermocouple readings, but with **NO** power being applied to the tool. This is particularly beneficial with new tools that appear to have no errors on the tool room bench, but exhibit unusual behavior in the press.

Pro-active Diagnostics:

During normal operation, the VISIONS 3000 constantly monitors all elements to determine functionality of the tool. When the VISIONS 3000 senses a wiring or heating problem an alarm will activate with a description of the error, which is saved to the History Log.

Visual Diagnostics:

LED's visible through the front panel provide immediate indication of a the following:

1. Green LED's Two (2) on each power boards - fuse condition for each zone
2. Yellow LED One (1) on each power boards - load being applied to heater
3. Red LED's One (1) on each board - communications between boards and CPU
4. Red LED's Three (3) on end of processor rack - Power phase



Tool Motion Detection:

When a signal is provided from the molding machine indicating activity, the VISIONS 3000 activates a count

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down clock. If another signal is not received in the selected time frame, the VISIONS 3000 can be automatically placed in stand-by mode.

System Shut Down:

Selectable failures in the Hot Runner or WaterFlo operations can trigger an alarm which will shut down the molding operation stopping damage.

Solid Robust Design & Construction:

1 It is clear from looking at the VISIONS 3000 that our common sense engineering approach has produced a rugged, compact, no-nonsense system, which is designed and manufactured to stand-up to the rigors of the harsh industrial environment and operate day-in & day-out for years to come.

1. Components are of industrial grade, i.e.
2. The touchscreen is rugged enough to stand up to a harsh blow from, for example, an individual's fist.
3. The cabinet is constructed of heavy gage steel, and with a stable low center of gravity.
4. The VISIONS 3000 employs a buss bar concept which, which means fewer connection points to fail.

Maintenance:

Through every step of the design process ITC has kept a careful eye towards maintainability. To this end the VISIONS 3000 incorporates LED's that are visible through the front panel which indicate operation of all output & processing cards as well as fuses. Cards & fuses can be replaced by simply opening the front panel, pulling the card from its slot and inserting a new one, with little on no interruption of production.

Compact Foot Print:

The compact size of the VISIONS 3000 allows the system to fit into tight spaces. For example our 64-zone system is only 24" wide by 18" deep by 49" high.

History Event Log:

12 months of fully downloadable production history, alarm logs & graphs. Both hot runner & WaterFlo data is automatically stored for a period of 12 months,. This becoming an invaluable management resource for todays intensive quality and production requirements.

Data includes:

1. Individual heater power usage & temperature during the production cycle on a second by second basis.
2. All initial set-up settings.
3. All user and set-point changes made during production.

Event Log (all events) 2013-05-01

```
Wed May 1 2013 08:28:50 : Default User logged on: 'Supervisor'
Wed May 1 2013 08:28:52 : Initialising Controller Hardware
Wed May 1 2013 08:28:52 : Initialising Relay Interface (Relay Open)
Wed May 1 2013 08:28:53 : Hotrunner controller found. Communications are up.
Wed May 1 2013 10:08:31 : Entering Monitor-Mode - starting controller. User:'Sup'
Wed May 1 2013 10:08:31 : Sending setup 'test.efi' to controller.
Wed May 1 2013 10:08:32 : Entering Run-Mode (No Manifold Preheat). Starting co
Wed May 1 2013 10:09:27 : Leaving Run-Mode - entering Monitor-Mode. User:'Su
Wed May 1 2013 10:09:29 : Leaving Monitor-Mode - stopping controller. User:'Sup'
Wed May 1 2013 10:10:05 : Setup file 'Settings/8Cavities0Manifolds.efi' saved.
Wed May 1 2013 10:10:12 : Setup Changed: 'Number Of Manifolds: 0'
Wed May 1 2013 10:10:14 : Setup file '8Cavities0Manifolds.efi' saved.
Wed May 1 2013 10:10:17 : Setup Changed: 'Number Of Cavities: 8'
Wed May 1 2013 10:10:19 : Setup file '8Cavities0Manifolds.efi' saved.
Wed May 1 2013 10:10:40 : Setup file 'Settings/8Cavities0Manifolds.efi' saved.
```

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4. All Alarm activations,
5. Tool diagnostic reports and set-up files.
6. All data is time & date stamped, allowing for searches by time & date.
7. All History Event logs are viewable from the VISIONS 3000 controller and are downloadable.
8. WaterFlo (gallons/liters) per minute and water temperature (F° & C°). (OPTIONAL)

Alarm Event Log 2013-05-01

```
Wed May 1 2013 13:40:33 : User Cleared Alarms.
Wed May 1 2013 13:40:41 : *** ALARM *** Zones 1-4,7,8 are out of temperature-tolerance. Action: Alarm
Wed May 1 2013 13:40:49 : *** ALARM *** Zones 1-8 are out of temperature-tolerance. Action: Alarm
Wed May 1 2013 13:40:57 : *** ALARM *** Zones 3-8 are out of temperature-tolerance. Action: Alarm
Wed May 1 2013 13:41:13 : *** ALARM *** Zones 1-8 are out of temperature-tolerance. Action: Alarm
Wed May 1 2013 13:41:13 : *** ALARM *** Zone 2 is out of power-tolerance. Action: Alarm
Wed May 1 2013 13:41:21 : *** ALARM *** Zones 1-3,5-7 are out of temperature-tolerance. Action: Alarm
Wed May 1 2013 13:41:21 : *** ALARM *** Zones 1,2 are out of power-tolerance. Action: Alarm
Wed May 1 2013 13:41:29 : *** ALARM *** Zones 1-2,5,6 are out of temperature-tolerance. Action: Alarm
Wed May 1 2013 13:41:45 : *** ALARM CLEARED *** All Cavities are within power-tolerance.
Wed May 1 2013 13:41:45 : *** ALARM *** Zones 1-2,5 are out of temperature-tolerance. Action: Alarm
Wed May 1 2013 13:41:53 : *** ALARM *** Zones 1,2 are out of temperature-tolerance. Action: Alarm
Wed May 1 2013 13:41:56 : *** ALARM CLEARED *** All Zones are within temperature-tolerance.
Wed May 1 2013 13:26:26 : Alarm conditions cleared (Relay Closed)
```

All data is viewable from the VISIONS 3000 controller screen or downloadable to a PC or Laptop. Set up data is transferable between VISIONS 3000 controllers. Data cannot be deleted by the user and is password protected.

Tool Database:

The VISIONS 3000 system is capable of storing all tool operational settings for well in excess of 100 different & unique molds, all but eliminating the need to re-enter set-up data.

The Database function within the VISIONS 3000 permits the user to save, load and delete a multitude of different tool operational settings, each with it's own unique identifier. These tool settings consist of:

1. The value of every selectable parameter for each zone within the mold.
2. System parameters, i.e. soft start, manifold & cavity pre-heat, power limit settings, alarm conditions, etc.,
3. All zone modes and their associated values, i.e. whether the zone is turned off, linked to another, in manual or automatic modes and the value of each.
4. Settings are downloadable & transferable to any other VISIONS 3000 systems.

Individual Heater Power Consumption Monitoring:

Each Cavity heaters power consumption is constantly and individually monitored. Any increase in power demand is the first sign of a developing problem and early detection is vital in preventing avoidable scrap and tool down time of the machine.

Individual Heater Alarm Tolerance Settings:

Heaters can be allocated individual settings, to prevent global alarms being triggered by minority, problematic thermocouples. Each heater/thermocouple combination has it's own trigger point and values assigned to operate independently.

Minimum Cavity Set Point Temperature:

It is bad practice to turn off unused zones in any mold, this will create cold spots which can effect the balance

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Rev. 2.52 Linux

and flow of material within the manifold system. Its' much better to enter a low temperature that keeps the tool balanced, in a manner which won't produce defective parts in any zone. The minimum set point option allows the supervisor to enter the minimum acceptable temperature, normally around 240°F (depending on the type of material). This will prevent the operator from turning the unused zones off, in its place they will have to enter a temperature instead of turning them off.

Communications:

All data can be downloaded via USB to PC or Laptop for back up and viewing. The data can be viewed as a text file, spread sheet or in graph format, allowing for easy distribution of information. Real time off site monitoring and ITC monitoring can be implemented via Ethernet/Wi-Fi facility.



Machine Interface:

The Visions 3000 has the capability of communicating with the molding press or production equipment using conventional volt-free contacts. These signals include:

1. External triggering of: Run, Stop, Standby.
2. External triggering of Production Halt, Referred to as "Motion Standby", this feature automatically puts the VISIONS 3000 into standby mode when an "in production" signal fails. This prevents degradation of material and reduces power consumption.
3. Internal "Tool At Temperature" signal. This feature can be used to prevent production of the mold before the tool is at temperature, thus preventing short shots and tool damage.

Operator Interface:

Industrial Grade Color Touch Screen on the VISIONS 3000 Rev. 2.52 has maximizes the potential of this interface to fully utilize all the benefits and advantages of touch screen technology. Like previous VISIONS 3000 systems we utilize 4mm safety glass screen so the unit integrity is not compromised.



Remote Operator Interface:

The top box (operator interface) can be removed from the lower box (controller) and conveniently mounted near the molding machine operator.

Ease of Use:

1. Uncomplicated, straightforward menu of features equates to the easiest to understand & operate system available.
2. Start-up is easy - just enter the set-points and let it run.
3. Tool Database provides for convenient saving set-up and operation of in excess of 100 tool sets. This

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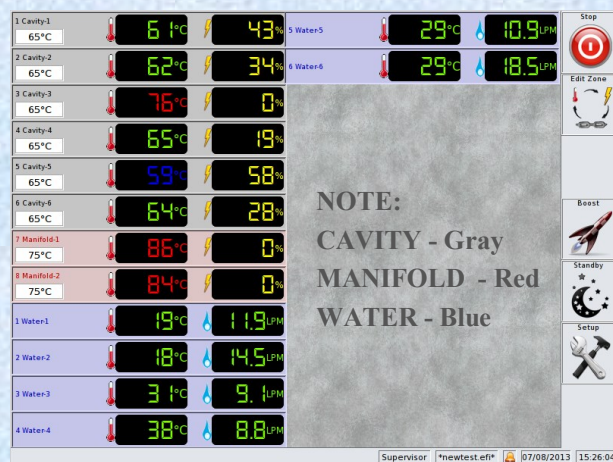
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information is transferable to other VISIONS 3000 systems.

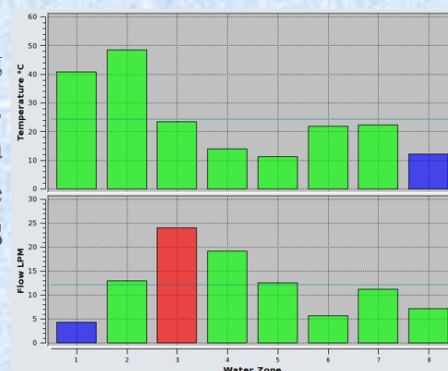
4. The remote operator interface means the display can be located near the operator.
5. Operational overview is as easy as calling up the Surface Graphs Feature, in a matter of seconds any individual can determine which if any zone or zones have any variation from baseline.
6. Control operation and fuse conditions are indicated by LED's visible through the front panel.
7. Cards can be replaced by simply opening the front panel, pulling the offending card from its slot and inserting a new one, with little or no interruption.
8. The Multi-lingual function of the VISIONS 3000 allows true international adaptability. A number of common languages are included as standard, including, Spanish, Mexican, French, Danish, German with others easily added.
9. All screens and functions are conveniently presented in a logical manner on a large (12") high brightness, color touchscreen.
10. Selectable screen modes allow users to select between increased information for each zone or higher number of zones visible on the screen for each page.

Water Flow Monitoring & Alarms: (optional feature)

The VISIONS 3000 Real Time Water Flow & Temperature Monitoring Option with Warning Alarms & 12 months of Historical Records. The Optional Smart Manifold & WaterFlo Interface is an extremely accurate (1.5% full range) Mold Water Flow Monitoring System, with the ability to Monitor, Measure, Graph & Log 12 months of Flow Rate & Temperature Data for all mold water cooling channels. Additionally A warning signal can be generated to activate an external warning device, or even disable connected equipment. WaterFlo functions are integrated to display with hot runner zones.



ITC's Precise Water Flow Monitoring is Critical for any molding operation requiring Elevated Quality, Traceability, Production Efficiency, and Reduction in Maintenance Cost. All Data is edited and viewable via the VISIONS 3000 controller. Flow sensors are precisely installed in the ITC Smart Manifold with an interface module added to the VISIONS 3000 control.



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Any critical drop in the water flow rate will trigger a safety response from the VISIONS 3000 controller. If setup, power can be cut to the tools heaters, a machine stop trigger activated and machine alarm activated. No water, no power!

The water data will also show trend changes and gradual flow reduction which is particularly useful for maintenance to monitor the condition of the water filters. Multi channel water mapping of the tool provides significant information with production and maintenance benefits. All water data and alarm activations are recorded in the downloadable data and graphs history database.

WaterFlo Alarms:

1. Open Thermocouple
2. Reversed Thermocouple
3. Temperature Over/Under Limit
4. Open Water Flow Sensor

The WaterFlo option required the addition of an ITC Smart Manifold & Interface Unit.

Heater Power/Watt Monitoring to Identify Material Leakage:

By continually monitoring the heater, the system can be set to alarm when wattage consumption falls out of a historical baseline, thereby alerting to potential material leakage into the manifold system.

Heater Resistance Monitoring to Predict Heater Failure:

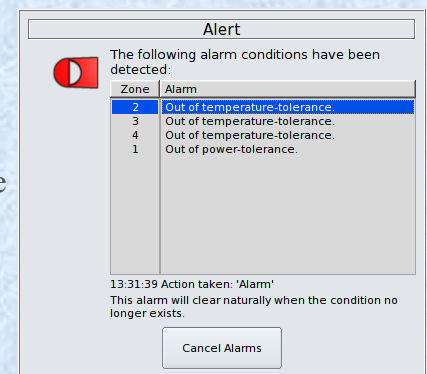
This is done by monitoring the most recent information and comparing it against a recorded baseline thereby helping the user predict in advance, a potential heater failure and avoiding expensive downtime.

Alarms:

There are various alarm triggering events within the VISIONS 3000 System, allowing management to make intelligent operational decisions, such as allowing the system to continue operation, placing the tool in standby, audible or visual alarms and/or to shut down the tool. This allows management the ability to determine a strategy for the molding operation. Alarm initiations are saved in the Event Log for 12 months.

User Defined Alarm Conditions:

Each alarm trigger, for example thermocouple faults, can be assigned a level and each level can be assigned an action, for example place the controller into standby mode.



Alarm Strategy:

An alarm strategy can be established on a per mold basis and stored in the tool Database for future recall.

- Ignore - No action taken.
- Alarm - The controller toggles the Alarm relay, which if connected will sound the external machine alarm, start the alarm indicator lamp and stop the machine. The controller continues to maintain temperatures and the Alarm Warning Dialog is placed on the screen.
- Standby - All zones are placed into standby mode , the Alarm Relay is toggled and the Alarm Warning Dialog is placed on the screen.
- Shutdown - The controller turns all zones off, the Alarm Relay is toggled and the Alarm Warning Dialog is placed on the screen.

Water Zones if fitted have there own set of Alarms.

Types of Alarms:

- Open Thermocouple - No action taken.
- Reversed Thermocouple - The temperature readings from the zone are incorrect.
- Cold Thermocouple - The temperature readings from the zone are incorrectly lower than the actual temperature.
- No-Load - The zone's heater (or connection to it) is faulty,
- Temperature Tolerance - The zone's temperature has drifted beyond a set amount from the setpoint.
- Power Tolerance (cavities only) - The zone's heater is drawing more (or less) than a set amount of power than the average power drawn by the cavities.
- Tool Motion - Controllers fitted with a machine interface can detect when the tool is moving. This alarm can be set to trigger when a minimum number of movements is not detected.

Motion Standby:

The VISIONS 3000 offers the user the ability to detect when production has stopped and take the appropriate system action. This function has three stages:

1. Detection of stopped production. This is achieved by the monitoring of the Motion Standby output from the machine to the input on the rear of the VISIONS 3000 top box. Either a simple identification of a failed signal can be detected, or a number of production cycles can be detected.
2. Display of a time countdown during which it is possible for production to be re-started.
3. Parameters can be set that will either shut the system down or place it into Standby.

Note: Monitoring of the Motion Standby input does not begin until all the zones are at temperature, and the real time clock has changed from yellow to green.

It is possible to monitor the state of the Motion Standby input by the border color of the real time clock. When

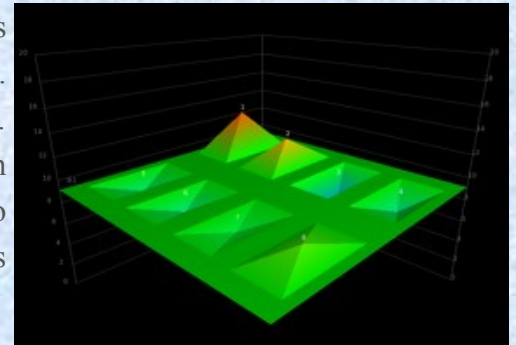
there is “NO” Motion Standby input, the real time clock border will be the same grey as the rest of the bottom border. If there is a Motion Standby input, the real time clock border will change to a dark grey.

GRAPHS:

Provide immediate at-a-glance insight into the operation of all zones on the tool by means of easy to read 3-dimensional & trend graphs.

3D Surface Graphs:

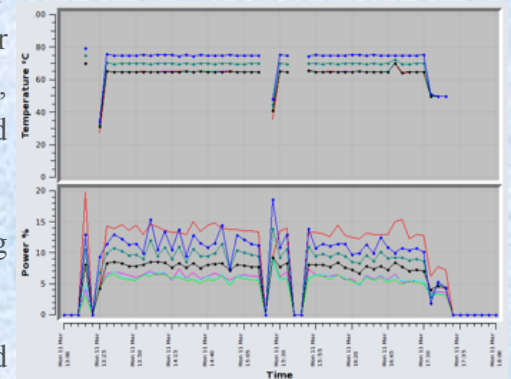
Provides immediate at-a-glance insight into the operation of all zones on the tool by means of an easy to understand 3-Dimensional graph. Peaks and Valleys point out those zones which deviate from baseline. A much faster method of determining out of tolerance conditions than other methods such as tabulated data. A time line has been added to enable production history to be searched for by specific time and dates during the previous 12 months.



Trend Graphs: A scalable display of the historic values for selected zones, showing both the measured temperature and power values for up to 8 zones. In this way, problematic zones can be identified, something that can't be done using historical analysis of only measured value.

WaterFlo function has been added to the suite of graphs, providing detailed analysis of both flow rate and temperature.

A time line has been added to enable production history to be searched for by specific time and dates during the previous 12 months.



Capable of Controlling up to 256 Zones:

Typical systems are normally under 128 zones, but the VISIONS 3000 can control tools having up to 256 zones. Each zone is normally rated 16 amps at 240vac. Low voltage zones can be supplied for compatibility with, for example, Plasting. Seiki Spear, Etc.

Slaving:

Zones with out thermocouple feedback can be linked to a zone with similar operating characteristics which has a thermocouple feedback. This function can be stored in the database.

Security:

The VISIONS 3000 has three (3) levels of password protection. Only the functions allowed by each level are

International Temperature Control, Inc.

2415 E. Huron Rd. P.O. Box 805 Au Gres, MI 48703 USA

Ph. (989) 876-8075 Fax (989) 876-8075 E-mail: sales@itc-controls.com

VISIONS 3000

Rev. 2.52 Linux

accessible and the system automatically resets back to the locked mode after a preset time interval.

Multi-Lingual:

For world wide applications the VISIONS 3000 has multi-lingual capability. The following languages are built into the system: English, Spanish, Mexican, German, Danish, French & Italian. Other languages can be easily incorporated.

Calibration:

The ease of use and maintenance philosophy of the VISIONS 3000 is carried over to calibration of the system. The input circuitry of the VISIONS 3000 has no potentiometers, removing any drift in the measurement of the thermocouple input. Parameters within the system enable an offset to be applied to easily calibrate the unit.

Under normal circumstances, a calibration check would only be required once every year.

Support/Training:

Support & training is the philosophy behind the VISIONS 3000.

As well as manuals being available for download free of charge from the website, the VISIONS 3000 is backed by a worldwide network of agents and distributors.

Viewing Modes:

For user convenience the VISIONS 3000 comes with three (3) viewing modes.

1. **Normal = Medium Density** = Displays up to 36 zones per screen = This is the normal mode of display which shows the most important information for each zone:
 - Zone Number & Name & Indicate if it a Cavity, Manifold or Water Zone
 - Sensor Errors
 - Indicate Manual mode
 - Indicate if Linked to another zone
 - Heater Load displayed in Amps, Watts or Ohms
 - Heater Percent of Power being applied



2. **Graph = Medium Density** = Displays up to 18 zones per screen = Each zone displays the same information as Normal Mode, but two timeline graphs are added to each zone. The graphs show the last hour's minute-average data for temperature and power. This data comes from the controller's history database and is updated every minute.

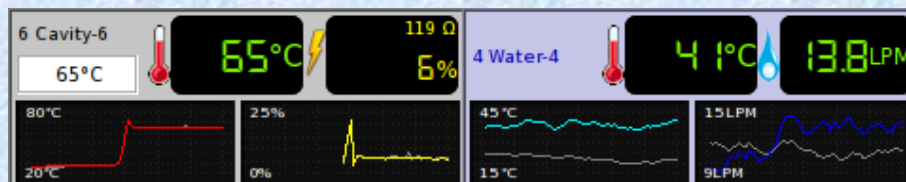
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- Zone Number & Name & Indicate if it a Cavity, Manifold or Water Zone
- Sensor Errors
- Indicate Manual mode
- Indicate if Linked to another zone
- Heater Load displayed in Amps, Watts or Ohms
- Heater Percent of Power being applied
- Power Graph in Red
- Temperature Graph in Yellow

In this example a water zone is also depicted

- Water Temperature and Water Flow Rate



3. **High Density** = If there are more than 36 zones, you have the option to view up to 124 zones per page. Although there are more zones visible at once, the zone names and load display are not available.

- Zone Number & Indicates if it a Cavity, Manifold or Water Zone
- Setpoint
- Sensor Errors
- Indicate Manual mode
- Heater Load displayed in Amps, Watts or Ohms
- Heater Percent of Power being applied

This example a water zone is also depicted

- Water Temperature and Water Flow Rate

78	OFF	T/C OPEN	0W	W1	2°C	OPEN
79	OFF	T/C OPEN	0W	W2	15°C	18.3 LPM

SYSTEM OPTIONS

International Temperature Control, Inc. can provide VISIONS 3000 hot runner temperature control system to match most requirements.

Mold Water Flow Monitoring (optional feature):

Allows for efficient balancing of a molds Hot Runner Zones & Mold Cooling Channels in one integrated system. The ITC Smart Manifold provides highly accurate water flow rate and temperature monitoring in a package with no moving parts with sensors enclosed within the manifold for protection.

Note: ITC Smart Manifold & Interface Unit required.

Valve Gate Sequencing Feature: (optional feature)

For Valve Gate applications, software built into the VISIONS 3000 as standard enable the operator to set a timing graph for the sequencing of the gates.

Note: Additional hardware is required for operation of the valve-gate. However, this 2 output card (1 for valve open, 1 for valve shut) is a standard card and operates within the standard VISIONS 3000 rack, requiring no additional special hardware or software to operate. The parameters for this feature can be saved in the tool database.

Connectors & Cables:

Standard cables & connectors are provided in a industry standard configuration. In those instances where the customer has different requirements, International Temperature Control, Inc. will provide the VISIONS 3000 with the exact type and style of connectors & cables required.

Higher Amperage Zones:

The VISIONS 3000 can be up graded from its normal 15 amp zone capacity to 30 or more amps per zone. This requires the addition of solid state switching devices, heavier wiring, connectors and cabling. Total system load must be calculated to determine the requirements of the system.

Transformer Packages:

If 240vac input power is not available to run the VISIONS 3000, a transformer package can be provided to step down from 480vac to 240vac. Packages are provided on a portable stand with proper power interruption devices, etc.

Low Voltage Heaters:

If the user's requirements are for a system which can handle heater voltages of other than 240vac, the control system can be modified to accommodate.

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System Specifications

Ambient Operating Temp:	32° to 104°F (0° to 40°C)
Ambient Storage Temperature:	-4° to 140°F (-20°C to 60°C)
Ambient Humidity:	0 to 95% RH, non-condensing.
Input Operating Voltage:	240 vac, 3-Ph + E (4 wire, 3phase and ground) Other voltages require an input supply transformer.
Operating Frequency Range:	50/60 Hz, +/- 5%
System Power Isolation:	Front door mounted breaker, rated for system capacity. Front door interlock prevents door opening without isolating power from system..
System Over Current Protection:	RCCB (Residual Current Circuit Breaker) fitted to system, rated according to system specification.
Module (Card) Mode Indication:	Red LED indication of module status: Stop, Run, Communicating.
Module (Card) Protection:	All modules keyed to prevent insertion into incorrect slot. All modules capable of being removed and replaced while under power. All modules are fully fuse protected as follows: PSU Module - Power input & output. Thermocouple Module - All inputs protected for over voltage. 1 Zone Output Module - Both legs of the output individually fused. Card protected against over current. Green LED's indicate fuse status.
Measurement Accuracy:	$\pm 1.0^{\circ}\text{ F}$ (0.5° C) for the range Control: $\pm 0.5\%$ Updated every 100mS for fast response to fast loads. Calibration: $< 0.2\%$ Of Full Scale 32° F to 932° F (0° C to 500° C)
Calibration:	Standard (using a NIST traceable thermocouple source)
Cold Junction Error:	$\pm 1.0^{\circ}\text{ F}$ (0.5° C) @ 77° (25° C) typically.
Temperature Stability:	$\pm 1.0^{\circ}\text{ F}$ (0.5° C) from ambient temperature.
Control Stability:	± 1 digit - under steady state conditions.
Zone Setting:	Zones are split into 3 groups, Cavity, Manifold and Water to enable optimum control of each of their individual characteristics. Each zone can be uniquely identified using a 4 digit label and can have a unique setpoint. Each Hot Runner zone can be set to operate in automatic mode (close loop using a thermocouple input), manual mode (open loop requiring the operator to enter the output power) or link mode (output power linked to that of another zone). Cavity Zones: Separate PID setting to Manifold. Affected by Boost function. Manifold Zones: Separate PID setting to Cavities. Not affected by Boost function. Water Zones: Are Monitored zones allowing for manual manifold & water source adjustments.
Tuning Method:	Full 3-Term, P I D Auto-Tune control for stable control of temperature over a wide range of loads. 5 additional selectable values to refine Cavity and Manifold zones. Password protected user adjustable values allow for user adjustment to the PID settings to enable stable control of the most unusual or unstable loads.
Thermocouple Inputs:	Grounded or Ungrounded "Type J" (Fe/CuNi) or "Type K" (NiCr/NiAL), software selectable. Type J standard (Others optional)

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VISIONS 3000

Rev. 2.52 Linux

	Sensor break and reverse detection with on-screen error display and user selectable alarm activation.
	Upscale failure mode automatically turns off power on thermocouple failure.
Thermocouple Input Protection:	Over voltage protection on all thermocouple inputs — See Module (Card) Protection.
Thermocouple Isolation:	Zone to Zone.
Measurement Display:	Paged display on LCD screen of zone information for all zones including: measured value, setpoint, output power, input or output error.
Display Units:	Temperature - Degrees F or C, user selectable with automatic scaling between units. Water Flow - Gallons or Litres.
Heater Outputs:	Zero cross over, ensures minimal electrical noise generation for increased temperature measurement accuracy. Proportional power switching reduces temperature oscillation in the load, improving control accuracy and heater life. 220 - 240V ac (Low voltage outputs are available on request) Cavity & Manifold zones rated at 16 Amps (Higher amperage available on request)
Heater Output Protection:	Cavity & Manifold Zones: 16A Output Cards: 16A FF Fuse on each output leg.
Heater Output Indication:	Red LED indication of output power for each zone. LED flashes in proportion to power applied to output. Off = 0%. On = 100%.
Heater Fuse Failure Indication:	Green LED indication of operational fuse for each zone. On = Fuse operational. Off = Fuse failure.
Operator Display - Standard:	800 x 600 (SVGA), Full Color Touch Screen, 12" LCD Display with backlight.
Display Protection - Standard:	LCD screen protected by toughened glass to prevent damage during industrial operation.
Output Display:	Display on LCD of output percentage/power/current — User selectable.
Load Display:	Display on LCD of load resistance, power, current — User selectable.
Display Backlight:	Automatic backlight switches off to increase lamp life. Pressing any button will reactivate lamp.
Soft Start:	Manual Bake out with reduced power for 30 minutes. Manual cancel available. Automatic Ramp of power on selecting RUN mode. Increases reliability of element heaters and reduces power required to bring tool to temperature.
Boost:	User selectable boost of cavity zones with settable time, temperature/power increase.
Standby:	User selectable standby of complete system with settable temperature/power.
Security:	User settable passwords with three levels of access and automatic timed lockout.
Graphs:	Trend Graphs - 2D display of up to 8 selected zones at a time with user adjustable scales. Surface Graphs - 3D display of up to 32 selected zones with user adjustable scales and selected zones.
History Event:	Automatically stores past 12 months of all production data, alarms, settings & graphs. All information is viewable on the VISIONS 3000 screen or downloadable.
Database:	Storage of over 100 toolsets with user selectable names. All settings are transferable to other VISIONS 3000 controllers.
Communications:	USB - Ethernet - Wi-Fi. Information can be viewed as a text file, spread sheet, or in graphic format.
Calibration Period	Recommended every 12 Months.

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