Global Hot Runner Control Solutions

Hot Runner Temperature Control Systems

GLC 2k

Global Hot Runner Control Solutions

Gammaflux®
An Advanced Hot Runner Temperature Controller for Global Markets

The new GAMMAFLUX GLC 2K Hot Runner Temperature Controller system is a compact, industry hardened and attractively styled controller based upon single zone integrity using microprocessor based temperature control modules. This new product is affordably priced yet features the same Gammaflux quality you have come to expect over the years.

The modular enclosure packaging of the GLC 2K allows for a very small “footprint” of 19” width by 8” height by 15” depth (483mm X 203mm X 381mm). Each compact enclosure can accommodate up to 12 microprocessor controller modules, each rated at 15 amperes. Each control module uses the Gammaflux proprietary PIDD control algorithm. This algorithm is time tested and proven on hot runner systems around the world. Expansion up to three enclosures by “linking” the base modular package together provides a maximum of 36 zones per system.

Customer input to the design process has yielded a system with all options “built-in” and a system housing that is easy to install, configure in the field and access for routine service.

To meet the needs of international markets, the GLC 2K accommodates field selection of Type J or Type K thermocouples, °F or °C temperature configuration, and either delta or wye style of main input power.

Designed for Ease of Use – Worldwide

Each 12 zone GLC 2K controller includes a unique operator’s interface featuring Icons to identify the control functions, process values and alarm status, in a simple and easy to understand format. These Icons allow for the application of the GLC 2K on a global basis. All hot runner set up and mold performance and monitoring information is accomplished by using the operators interface panel located on the front of the enclosure. GLC 2K users can even program their temperature deviation alarm band to meet their specific process or material requirements. Control zone identification can be created in whatever format the user wants (alpha, numeric, etc.)

Eight mold status alarms for each zone are located on the operators panel interface for quick and easy identification of any mold process disturbance. The alarm status center continuously monitors all thermocouples, heater power and the mold temperatures. There is no scrolling required to access any of the alarm functions.

This standardized product package has also been designed to meet the growing trend for quick delivery and in field flexibility on a global basis. The GLC 2K represents a product that is as close to an “off-the-shelf” control system as is possible – but unlike other off-the-shelf systems, it can be easily customized to meet each molder’s unique requirements.
Also included on the operators panel interface is a 12 zone “Quick Glance” LED array showing the performance of each zone. If all indicator segments in this section of the operator’s panel are green, it is a quick and easy way for the operator to know immediately that the controller is operating within performance specifications. Any red segment is an indication that there is an upset to the process.

**System Supports Diagnostic Software**

The GLC 2K supports digital communication via either an RS-232 or RS-485 interface. The product has even been developed to work with Euromap 17 communications protocol and to utilize the GammaVision supervisory software package. GammaVision provides data gathering and reporting, as well as industry-standard Gammaflux software packages such as Field Calibrator™ and a special version of Mold Doctor for applications diagnostics.

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**GLC 2K Features:**

- Compact and modular controller enclosures capable of up to 36 zones of control
- Single zone integrity
- “Quick Glance” zone status feature
- User defined zone identification
- Each zone rated for up to 15 Amps
- GAMMAFLUX proprietary PIDD control algorithm with automatic tuning range selection
- Adaptive Tuning on start-up and additional Selective Ranges for wide range of load response
- Automatic and Manual operating modes
- Thermocouple Open Automatic Standby
- Open, Shorted and Reversed Thermocouple alarms
- Deviation high and low Temperature alarms
- Programmable Deviation Band for Temperature alarms
- Open and Shorted heater alarms
- Open fuse alarm
- °F or °C display
- User selectable Type J or Type K thermocouples
- Programmable Automatic Slaved Power Up
- Remote Communications via RS-232 or RS-485
- Supports Euromap 17 communications protocol
- Menus-4 internal with additional available with the GammaVision software package
- Delta or Wye input power options
- Alarm Relay Output on an HBE-6 connector
- Internal Cold Junction Compensation
- Automatic Soft Start
- User defined zone Groups
- User defined Trim Function
- User defined Boost Function
- Remote and Local Auto-Standby Function
- Remote Control Inhibit
- Special Mold Doctor software package for applications diagnostics
- In field Temperature Calibration with GammaVision
## GLC 2K Specifications

### Performance Specifications:

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calibration Accuracy</td>
<td>$1 \degree F/0.5 \degree C$</td>
</tr>
<tr>
<td>Control Accuracy</td>
<td>$\pm 1 \degree F/\pm 0.5 \degree C$</td>
</tr>
<tr>
<td>Power Response Time</td>
<td>8.5 milliseconds @ 60 Hz</td>
</tr>
<tr>
<td>Control Algorithm</td>
<td>Proprietary PIDD with automatic tuning range selection</td>
</tr>
<tr>
<td>Degrees F or C</td>
<td>Field Selectable</td>
</tr>
<tr>
<td>Type J or K T/C</td>
<td>Field Selectable</td>
</tr>
<tr>
<td>Operating Range</td>
<td>0-932 °F/0-500 °C</td>
</tr>
<tr>
<td>Output Voltage</td>
<td>0-265 VAC</td>
</tr>
<tr>
<td>Line Voltage Maximum</td>
<td>265 Volts</td>
</tr>
<tr>
<td>Line Voltage Minimum</td>
<td>160 Volts</td>
</tr>
<tr>
<td>Frequency</td>
<td>47-53 Hz, 57-63 Hz</td>
</tr>
<tr>
<td>Ambient Temperature Range</td>
<td>0-45 °C/32-131 °F</td>
</tr>
<tr>
<td>Humidity Range</td>
<td>10-95% non condensing</td>
</tr>
</tbody>
</table>

### Input Specifications:

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thermocouple</td>
<td>Type J or K user selectable and applied system wide (grounded T/C's only)</td>
</tr>
<tr>
<td>Cold Junction Compensation</td>
<td>Internal to enclosure</td>
</tr>
</tbody>
</table>

### Load Output Specifications:

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage</td>
<td>Line Voltage range is 160 Volts to 265 Volts</td>
</tr>
<tr>
<td>Current</td>
<td>15 Amperes per zone maximum/ minimum is .25 Amperes</td>
</tr>
<tr>
<td>Single Triac</td>
<td>One side of load switched</td>
</tr>
<tr>
<td>Phased Angle Control</td>
<td>• Short Circuit protection and alarm</td>
</tr>
<tr>
<td></td>
<td>• Open Circuit detection and alarm</td>
</tr>
<tr>
<td></td>
<td>• Open Fuse detection and alarm</td>
</tr>
<tr>
<td></td>
<td>• Adaptive Bake out</td>
</tr>
</tbody>
</table>

Both sides of the Line are fused in Delta Systems
Both sides of the line switched with On/Off switch in Delta Systems

### Operator Interface Specifications:

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flat membrane interface</td>
<td>with Rocker power on/off switch</td>
</tr>
<tr>
<td>Icon based function/key identification</td>
<td></td>
</tr>
<tr>
<td>Fault indicator lights for:</td>
<td>• T/C Open, Reverse and Short</td>
</tr>
<tr>
<td></td>
<td>• Shorted Heater</td>
</tr>
<tr>
<td></td>
<td>• Open Fuse and Open Heater</td>
</tr>
<tr>
<td></td>
<td>• Deviation High and Low Alarm Indication</td>
</tr>
</tbody>
</table>

### Auxiliary/Remote Interface Specifications:

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single interface</td>
<td>configurable as RS-232 or RS-485 via jumpers</td>
</tr>
<tr>
<td>Remote Standby Input</td>
<td></td>
</tr>
<tr>
<td>Remote Control Inhibit Input</td>
<td>from Injection Molding Machine</td>
</tr>
<tr>
<td>External Alarm Contact</td>
<td></td>
</tr>
</tbody>
</table>

### Product Design Standards:

- CE Approved
- Designed to UL and CSA

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TTC Family
Global Hot Runner Control Solutions
Redefining Temperature Control

The next step in the evolution of hot runner temperature control systems.

The best temperature controller on the market is now more flexible, compact and affordable than ever before. Introducing the new TTC family of temperature control systems - combining proven Gammaflux performance and value with innovative new features to help you perfect your process. In each new TTC system, you’ll find the qualities that set Gammaflux apart - PID² adaptive control, phase angle firing, and industry leading diagnostics - as well as enhancements that deliver:

Superior reliability

Gammaflux products lead the market in reliability. And now, the TTC provides even more reasons to depend on Gammaflux; for example, a new, selectable “hot start” feature that maintains the set point in the event of a temporary loss of input power.

Ease of use

Wherever you operate in the world, startup is easy: just enter set points and turn the power on. Standard features such as wet heater bakeout, slaved power-up (selectable) and sequenced power up go into action automatically. Plus, the new TTC family of systems is designed for global use, with expanded language conversion options, universally accepted icons, improved global input power flexibility, and security levels that increase or decrease operator options and complexity.

Tighter control

The Gammaflux TTC 2100 and 2200 combine the following features to provide the industry’s tightest temperature control:

- PID² control algorithm
- Thermocouple input resolution
- Fast response time
- Continuous tuning
- Phase angle fired output

Gammaflux’s proprietary PID² control algorithm detects changes in the temperature trend before a significant temperature deviation occurs to make the best control decision. Precise thermocouple input resolution allows the algorithm to respond to minute changes in each zone’s temperature. The industry’s fastest response time immediately addresses any control disturbance to minimize the temperature fluctuation. Continuous tuning adjusts the algorithm to the heater load as the thermodynamics change based on internal, ambient or cooling differences. Finally, phase angle fired output delivers smooth and exact power to the zone for the ultimate in temperature control.

Please do not take our word for it, try a Gammaflux controller on your application. Better temperature control could potentially mean:

- Better part quality
- Less scrap
- Improved part weight consistency
- Material savings
- Higher profit margins

More value

Along with a host of new features, we’ve given the new TTC a smaller footprint - and an attractive price.
An expandable architecture allows custom configurations

The TTC’s expandable architecture lets you customize the system to your specific operation and applications. For example, the back plate of the TTC enclosure can accommodate most connectors you specify. A wide array of options are available—call or e-mail Gammaflux for a complete list.

A completely modular design for easy maintenance

The new TTC has a modular design for quick control card addition and replacement. Plus, the system is easy to troubleshoot by telephone, reducing downtime and field maintenance visits.

The flexibility to deliver smooth, accurate control—globally

Unlike most hot runner temperature controllers, the TTC system offers true global input power flexibility. So whether your operations are in the U.S. or halfway around the world, you can confidently put the best in temperature control to work.

Meet the new TTC family of Gammaflux products. From left to right: TTC2100-2, for up to 128 zones of control; TTC2200-1 (Panel Mount), for seamless integration into any molding machine's control panel; and the TTC2100-1 for up to 64 zones of control.
## Ease of Use

<table>
<thead>
<tr>
<th>Start Up</th>
<th>Viewing the Process</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Initial power up screen</strong></td>
<td><strong>Mini controllers</strong></td>
</tr>
<tr>
<td>Select a group to change</td>
<td>Display:</td>
</tr>
<tr>
<td>Enter set point by zone or by group</td>
<td>• Zone name</td>
</tr>
<tr>
<td>Select a group to change</td>
<td>• Temperature</td>
</tr>
<tr>
<td>Turn “ON” by zone or by group</td>
<td>• Set point</td>
</tr>
<tr>
<td>Monitor alarms and control progress</td>
<td>• % output</td>
</tr>
<tr>
<td>No alarms. Ready to run</td>
<td>• Amps by zone</td>
</tr>
<tr>
<td>Controller holding set point noted by green color</td>
<td>• Zone Status</td>
</tr>
</tbody>
</table>

**Mini controllers**
Display:
- Zone name
- Temperature
- Set point
- % output
- Amps by zone
- Zone Status

**Data table**
Displays:
All zone information

**Line graph**
Displays:
Two zone variables, dual scaling

**Tool graphic**
Displays:
Custom .bmp/.wmf file with real time zone data overlay, one selectable variable

**Alarm screen**
Displays:
Active alarms or alarm history
Gammavision® chart recorder and statistical analysis software allows the user to record the performance of the hot runner tool. Print to the screen for instant reporting or watch the action on-line with our “playback” mode.

### Bar graph
Playback selected group display one or two variables

### Line graph
Playback selected zone display one or two variables

### Data summary report
Statistical analysis of control by zone:
- Temperature average
- Standard deviation
- Temperature range
- Temperature minimum
- Temperature maximum
- Deviation alarms
- Average percent output
- Average current (amps)
- Average watts
- Average resistance (ohms)

### Zone setpoint report
Displays critical zone set up information

### Zone setpoint change report
Displays zone changes with a time stamp

### Alarm summary report
Displays zone alarms with a time stamp

### SPC report
Display average temperature and standard deviations by zone in 15 minute intervals
Mold Monitor

Preventive Diagnostics

Mold Monitor is a set of on-line advanced software routines consisting of three preventative diagnostic tools; material protection, heater resistance and heater wattage monitoring.

Material Protection - establish a signal between the molding machine and the Gammaflux TTC controller. Each time the signal is received a timer starts counting down. If the programmable timer counts down to zero the software puts the TTC controller into standby. Guard against material degradation and prevent unnecessary scrap.

Heater Resistance Monitoring - twice an hour the heater resistance monitor compiles the last 30 minutes of heater resistance information by zone after a baseline has been established. The most recent heater resistance information is compared against the recorded baseline. The heater resistance alarm watches the life of the heater and helps the user predict in advance when a heater is about to fail. Predict downtime and maximize press time by avoiding unexpected heater failures.

Heater Wattage Monitoring - create upper and lower wattage alarm limits by zone to help see inside your mold. The heater wattage monitor alarms after ten consecutive watt readings exceed the user defined watt band. Many times heaters are grouped together in a system to save control dollars. Wiring these heaters in parallel prevents the open heater diagnostic from alerting the user that one of a group of heaters has failed. The watt band however, can be set to alarm if the watt reading falls below a certain limit. Prevent hard to diagnose processing problems caused by a cold spot in your process.

Diagnosing that material has leaked into your hot runner manifold system is very difficult and often occurs too late with the appearance of degraded material in your part. Prevent this problem by monitoring the watt consumption by zone. If the wattage consumption rises it may be caused by material that has leaked into the manifold system which is now transferring the heat to the mold steel or is encasing the thermocouple.

Mold Doctor®

Troubleshoot Your Mold

Mold Doctor® is an off-line advanced troubleshooting tool consisting of four diagnostic tests; wiring analysis, fault analysis, thermodynamic analysis and historical mold performance.

Wiring analysis - checks the wiring of the tool. The software clearly tells the user of miswired zones and how to fix them.

Fault analysis - quickly identify the following problems: thermocouple open, thermocouple reversed, thermocouple pinched, open fuse, heater open, heater wet and heater short.

Thermodynamic analysis - this test automatically heats all selected zones to 200°F (93°C) then to 400°F (204°C) and finally cools to 300°F (149°C). During the heating and cooling process Mold Doctor® records critical information and reports to the user. Compare like zones against one another, major differences in the four key areas (resistance, power consumption, heating and cooling rates) will point you toward the solution. Once the tool is qualified, save a thermodynamic analysis as your known “good parts” baseline. Future problems will be easy to diagnose using the historical mold performance tool.

Historical mold performance - allows the user to easily compare a known “good” thermodynamic analysis baseline to the current “suspect” thermodynamic analysis. Intuitively troubleshoot your mold with hard data.
**Field Calibrator**

Calibrate your Gammaflux controllers in house

QS or ISO audits? No Problem. Calibrate your controllers in house quickly, easily and without a calibration technician.

While in engineer level security, locate the Field Calibrator button under the diagnostics tab.

- Create a temporary group of zones to be calibrated
- Enter job information, for your internal records
- Establish a thermocouple source equivalent to the zones
- Enter the calibration target temperature
- Press the calibrate group button

The software automatically determines the calibration offset changes needed to correct the zones reading. Field Calibrator has an accuracy of ±0.2º F or ±0.1º C.

**Features**

**Boost** – temporarily raises a zone or group of zones temperature (typically tips) to clear a cold slug on start up.

**Standby** – lowers a group of zones to the standby temperature while the process is idle. User selectable or automatic with a remote input.

**Trim** – permanent, automatic set point change for the zone or zones selected. Temperatures set at different levels will change the same amount.

**Operator Identification**

Create an authorized users list with individual user codes. The user must enter their operator identification number prior to any change to the control system. View/print changes by operator on demand.

**Security Levels/Operating Limits**

The TTC controller has four security levels; monitor (shown), operator, supervisor and engineer. For simplicity, only the functions allowed in each level are displayed. Customize your system by setting up zone groups and establish operating limits.

**Languages**

Dansk Deutsch English Español Français Italiano Vlaams

Other languages easily available using the Windows NT® operating system based language translator and character sets.

Windows NT is a registered trademark of Microsoft Corporation.
Since 1966 GAMMAFLUX has been the premier manufacturer of temperature control systems for hot runner injection molders. In addition to producing the most advanced temperature control and tool fault detection systems in the marketplace, GAMMAFLUX technology is available in a variety of temperature controllers that can accommodate any budget.

## TTC 2100 & 2200

### Performance Specifications

- **Thermocouple Calibration Accuracy:** 0.2°F (0.1°C)
- **Control Accuracy:** ±1°F (+0.5°C)
- **Power Response Time:** 8.5 msec. or one half line cycle at 60 Hz
- **Process Sampling:** 50 msec. or 20 times per second
- **Control Algorithm:** Proprietary PID with added autotuning features
- **Degrees F or C:** Field selectable
- **Operating Range:** 0-999°F (0-500°C)
- **Output Voltage:** 0-240 VAC, phase angle fired
- **Standby Temperature:** User selectable (0-999°F, 0-500°C)
- **Interlocking Features:** 22 - 132 VAC/VDC Input to Activate

### Input Specifications

- **Thermocouple:** Type J standard; Type K selectable (grounded thermocouples only)
- **Cold Junction Compensation:** Internal to enclosure
- **External Resistance:** 10 MΩ ± 0.05%
- **Temp. Variation Due To T/C Length:** None

### Electrical

- **Input Voltage:** 160-265 VAC Delta, 160-265 VAC Wye
- **Frequency:** 47-53 Hz, 57-63 Hz
- **Ambient Temperature Range:** 32-115°F (0-45°C)
- **Humidity Range:** 10-95% non-condensing
- **Output Module Rating:**
  - 240V: 4 zone - 3 Amps/zone 720 Watts/zone
  - 2 zone - 15 Amps/zone 3600 Watts/zone
  - 1 zone - 30 Amps/zone 7200 Watts/zone

### Communications Electrical Standard:

- RS-485, ProfiBus, networkable

### Performance Standards

- **U.S., Canadian and International:** CE Mark
- **I.E.C.:** 801-1, 801-2, 801-3, 801-4

- **Safety UL-508, UL-873 and CSA

### TTC 2100 Highlights

- **Reliability:** Improved global input power flexibility
  - Optional “hot start” feature, maintains set point if input power is lost temporarily
- **Ease of Use:**
  - Inclusion of Asian character sets for expanded language conversion
  - Expanded use of universally accepted Icons
  - Security levels increase or decrease operator options and complexity
    - (monitor, operator, supervisor and engineer levels)
- **Control:**
  - Enhanced control algorithms
- **Features:**
  - Expandable architecture
  - Flexible packaging
    - (panel mount design for in machine control)
  - Relay power cut off to prevent runaway zones and operator tickle
  - Expanded software features
    - On screen printing
    - Instant data collection for up to the last 24 hours, including summary reporting
    - Group tab creation - view all zones or only the zones in each group
    - Instant grouping
    - Tool graphics with real time zone data overlay
    - “Find this module” LED
  - Expanded input and output options
    - Inputs
      - Machine cycle/material protection
      - Safe to run from machine
      - Ramp soak input
      - Auto boost
    - Outputs
      - Global temperature exceeded shunt trip
      - Safe to run from the controller

### Physical Specifications

<table>
<thead>
<tr>
<th></th>
<th>Height (inches/millimeters)</th>
<th>Width (inches/millimeters)</th>
<th>Depth (inches/millimeters)</th>
<th>Weight (pounds/kilograms)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single heat sink</td>
<td>35</td>
<td>889</td>
<td>9.3</td>
<td>20</td>
</tr>
<tr>
<td>Dual heat sink</td>
<td>40</td>
<td>1016</td>
<td>19.0</td>
<td>20</td>
</tr>
<tr>
<td>Quad heat sink</td>
<td>45</td>
<td>1143</td>
<td>26.0</td>
<td>30</td>
</tr>
<tr>
<td>Panel mount single heat sink</td>
<td>32</td>
<td>813</td>
<td>19.4</td>
<td>7</td>
</tr>
</tbody>
</table>

*Designed to meet

*Single excludes coasters. All exclude screen.

Specifications subject to change without notice.