



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

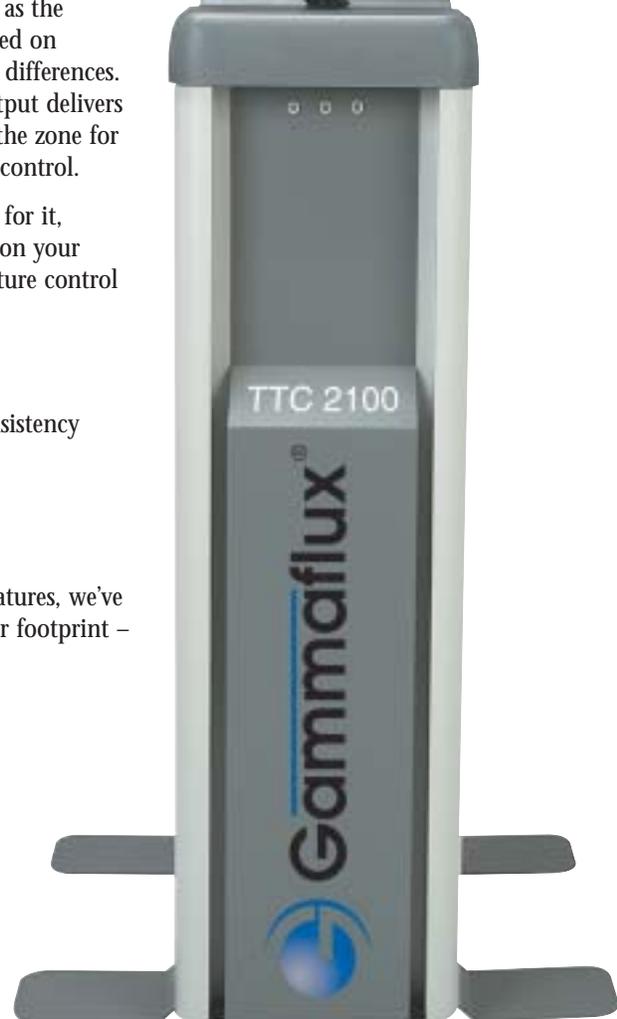
Gammaflux's proprietary PID² control algorithm detects changes in the temperature trend before a significant temperature deviation occurs to make the best control decision. Precise thermocouple input resolution allows the algorithm to respond to minute changes in each zone's temperature. The industry's 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.





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.



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.

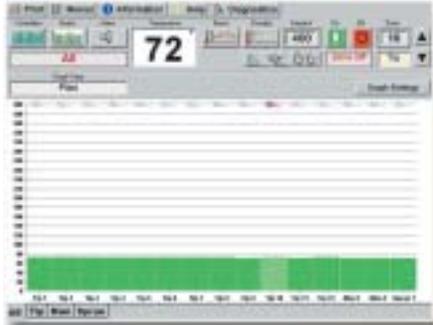




Ease of Use

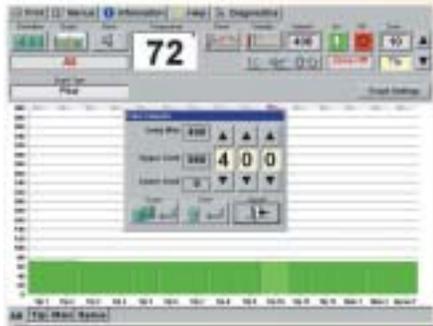
Start Up

Initial power up screen



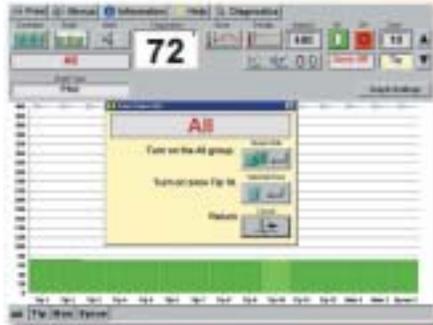
Select a group to change

Enter set point by zone or by group



Select a group to change

Turn "ON" by zone or by group

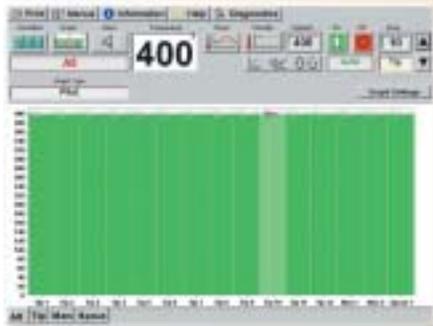


Monitor alarms and control progress



No alarms. Ready to run

Controller holding set point noted by green color



Viewing the Process

Mini controllers

Display:

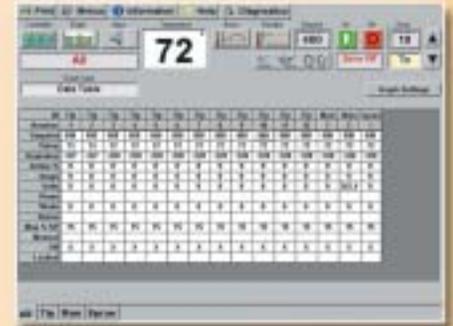
- Zone name
- Temperature
- Set point
- % output
- Amps by zone
- Zone Status



Data table

Displays:

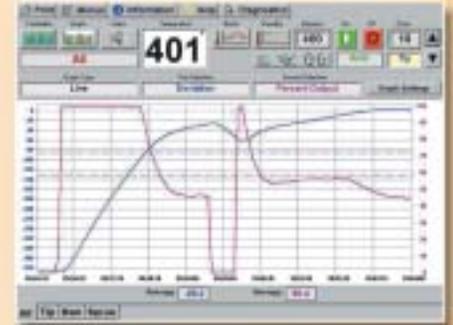
All zone information



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®

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.

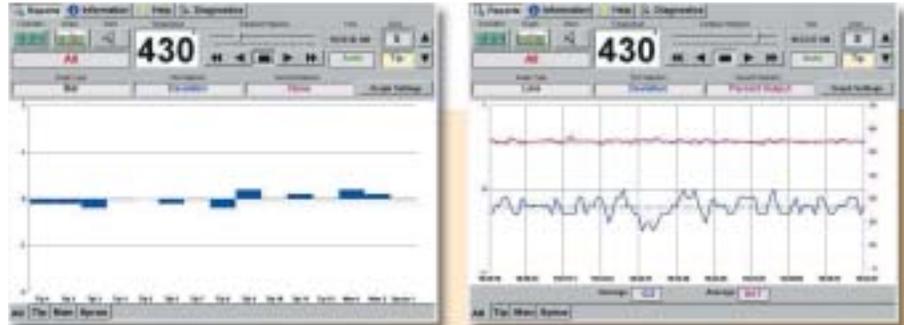
On-line analysis

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	Temp Average	Std Dev	Temp Range	Temp Min	Temp Max	Dev High	Dev Low	Avg Percent	Avg Current	Avg Watts	Avg Resist
Tip 1	399.8	0.08	0.4	399.8	400.0	0	0	52.84	0.22	52.8	1090
Tip 2	399.8	0.05	0.3	399.7	400.0	0	0	38.58	0.19	45.8	1263
Tip 3	399.8	0.08	0.4	399.6	400.0	0	0	42.39	0.21	90.4	1142
Tip 4	399.8	0.05	0.3	399.7	400.0	0	0	45.49	0.20	48.8	1200
Tip 5	399.8	0.11	0.4	399.7	400.1	0	0	57.40	0.23	55.2	1043
Tip 6	399.8	0.13	0.4	399.6	400.0	0	0	43.80	0.21	90.4	1142
Tip 7	399.8	0.09	0.4	399.7	400.1	0	0	49.67	0.23	55.2	1043
Tip 8	399.8	0.10	0.4	399.6	400.0	0	0	48.38	0.21	90.4	1142
Tip 9	400.0	0.11	0.4	399.8	400.2	0	0	60.80	0.24	37.6	1066
Tip 10	400.0	0.07	0.4	399.8	400.2	0	0	42.74	0.25	90.8	960
Tip 11	400.0	0.09	0.4	399.8	400.2	0	0	50.87	0.21	90.4	1142
Tip 12	400.0	0.10	0.4	399.8	400.2	0	0	63.47	0.25	90.8	960
Man 1	400.0	0.07	0.4	399.8	400.2	0	0	60.01	0.27	94.8	888
Man 2	400.0	0.09	0.4	399.8	400.2	0	0	73.07	0.27	94.8	888
Sprue 1	400.0	0.34	1.0	399.3	400.8	0	0	90.75	0.32	28.8	2000

Zone setpoint report

Displays critical zone set up information

Zone setpoint change report

Displays zone changes with a time stamp

Zone	Temp	Setpoint	Alarm	Level	Zone	Temp	Setpoint	Alarm	Level
Tip 1	399.8	400.0	0	0	Tip 1	399.8	400.0	0	0
Tip 2	399.8	400.0	0	0	Tip 2	399.8	400.0	0	0
Tip 3	399.8	400.0	0	0	Tip 3	399.8	400.0	0	0
Tip 4	399.8	400.0	0	0	Tip 4	399.8	400.0	0	0
Tip 5	399.8	400.0	0	0	Tip 5	399.8	400.0	0	0
Tip 6	399.8	400.0	0	0	Tip 6	399.8	400.0	0	0
Tip 7	399.8	400.0	0	0	Tip 7	399.8	400.0	0	0
Tip 8	399.8	400.0	0	0	Tip 8	399.8	400.0	0	0
Tip 9	400.0	400.0	0	0	Tip 9	400.0	400.0	0	0
Tip 10	400.0	400.0	0	0	Tip 10	400.0	400.0	0	0
Tip 11	400.0	400.0	0	0	Tip 11	400.0	400.0	0	0
Tip 12	400.0	400.0	0	0	Tip 12	400.0	400.0	0	0
Man 1	400.0	400.0	0	0	Man 1	400.0	400.0	0	0
Man 2	400.0	400.0	0	0	Man 2	400.0	400.0	0	0
Sprue 1	400.0	400.0	0	0	Sprue 1	400.0	400.0	0	0

Zone	Temp	Setpoint	Alarm	Level	Zone	Temp	Setpoint	Alarm	Level
Tip 1	399.8	400.0	0	0	Tip 1	399.8	400.0	0	0
Tip 2	399.8	400.0	0	0	Tip 2	399.8	400.0	0	0
Tip 3	399.8	400.0	0	0	Tip 3	399.8	400.0	0	0
Tip 4	399.8	400.0	0	0	Tip 4	399.8	400.0	0	0
Tip 5	399.8	400.0	0	0	Tip 5	399.8	400.0	0	0
Tip 6	399.8	400.0	0	0	Tip 6	399.8	400.0	0	0
Tip 7	399.8	400.0	0	0	Tip 7	399.8	400.0	0	0
Tip 8	399.8	400.0	0	0	Tip 8	399.8	400.0	0	0
Tip 9	400.0	400.0	0	0	Tip 9	400.0	400.0	0	0
Tip 10	400.0	400.0	0	0	Tip 10	400.0	400.0	0	0
Tip 11	400.0	400.0	0	0	Tip 11	400.0	400.0	0	0
Tip 12	400.0	400.0	0	0	Tip 12	400.0	400.0	0	0
Man 1	400.0	400.0	0	0	Man 1	400.0	400.0	0	0
Man 2	400.0	400.0	0	0	Man 2	400.0	400.0	0	0
Sprue 1	400.0	400.0	0	0	Sprue 1	400.0	400.0	0	0

Alarm summary report

Display zone alarms with a time stamp

Zone	Temp	Setpoint	Alarm	Level	Zone	Temp	Setpoint	Alarm	Level
Tip 1	399.8	400.0	0	0	Tip 1	399.8	400.0	0	0
Tip 2	399.8	400.0	0	0	Tip 2	399.8	400.0	0	0
Tip 3	399.8	400.0	0	0	Tip 3	399.8	400.0	0	0
Tip 4	399.8	400.0	0	0	Tip 4	399.8	400.0	0	0
Tip 5	399.8	400.0	0	0	Tip 5	399.8	400.0	0	0
Tip 6	399.8	400.0	0	0	Tip 6	399.8	400.0	0	0
Tip 7	399.8	400.0	0	0	Tip 7	399.8	400.0	0	0
Tip 8	399.8	400.0	0	0	Tip 8	399.8	400.0	0	0
Tip 9	400.0	400.0	0	0	Tip 9	400.0	400.0	0	0
Tip 10	400.0	400.0	0	0	Tip 10	400.0	400.0	0	0
Tip 11	400.0	400.0	0	0	Tip 11	400.0	400.0	0	0
Tip 12	400.0	400.0	0	0	Tip 12	400.0	400.0	0	0
Man 1	400.0	400.0	0	0	Man 1	400.0	400.0	0	0
Man 2	400.0	400.0	0	0	Man 2	400.0	400.0	0	0
Sprue 1	400.0	400.0	0	0	Sprue 1	400.0	400.0	0	0

SPC report

Display average temperature and standard deviations by zone in 15 minute intervals

Zone	Temp	Setpoint	Alarm	Level	Zone	Temp	Setpoint	Alarm	Level
Tip 1	399.8	400.0	0	0	Tip 1	399.8	400.0	0	0
Tip 2	399.8	400.0	0	0	Tip 2	399.8	400.0	0	0
Tip 3	399.8	400.0	0	0	Tip 3	399.8	400.0	0	0
Tip 4	399.8	400.0	0	0	Tip 4	399.8	400.0	0	0
Tip 5	399.8	400.0	0	0	Tip 5	399.8	400.0	0	0
Tip 6	399.8	400.0	0	0	Tip 6	399.8	400.0	0	0
Tip 7	399.8	400.0	0	0	Tip 7	399.8	400.0	0	0
Tip 8	399.8	400.0	0	0	Tip 8	399.8	400.0	0	0
Tip 9	400.0	400.0	0	0	Tip 9	400.0	400.0	0	0
Tip 10	400.0	400.0	0	0	Tip 10	400.0	400.0	0	0
Tip 11	400.0	400.0	0	0	Tip 11	400.0	400.0	0	0
Tip 12	400.0	400.0	0	0	Tip 12	400.0	400.0	0	0
Man 1	400.0	400.0	0	0	Man 1	400.0	400.0	0	0
Man 2	400.0	400.0	0	0	Man 2	400.0	400.0	0	0
Sprue 1	400.0	400.0	0	0	Sprue 1	400.0	400.0	0	0



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

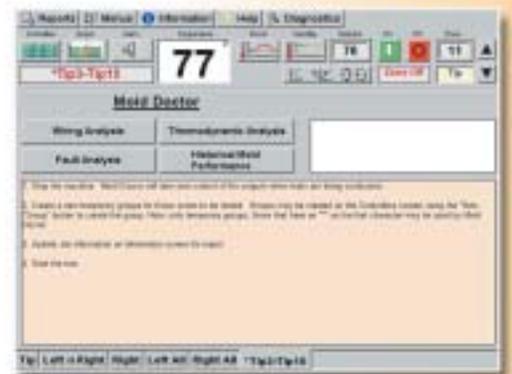
Mold Doctor® is an off-line advanced troubleshooting tool consisting of four diagnostic tests; wiring analysis, fault analysis, thermodynamic analysis and historical mold performance.

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

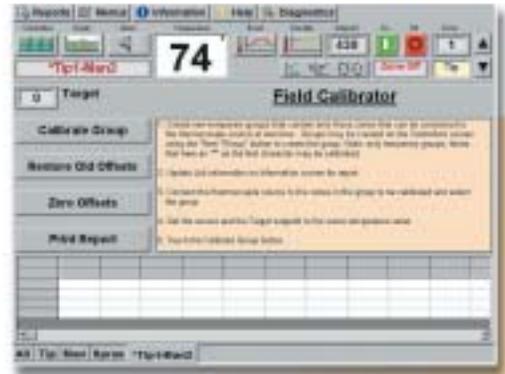
Calibrate your Gammaflux controllers in house

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 $\pm 0.2^{\circ}$ F or $\pm 0.1^{\circ}$ 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

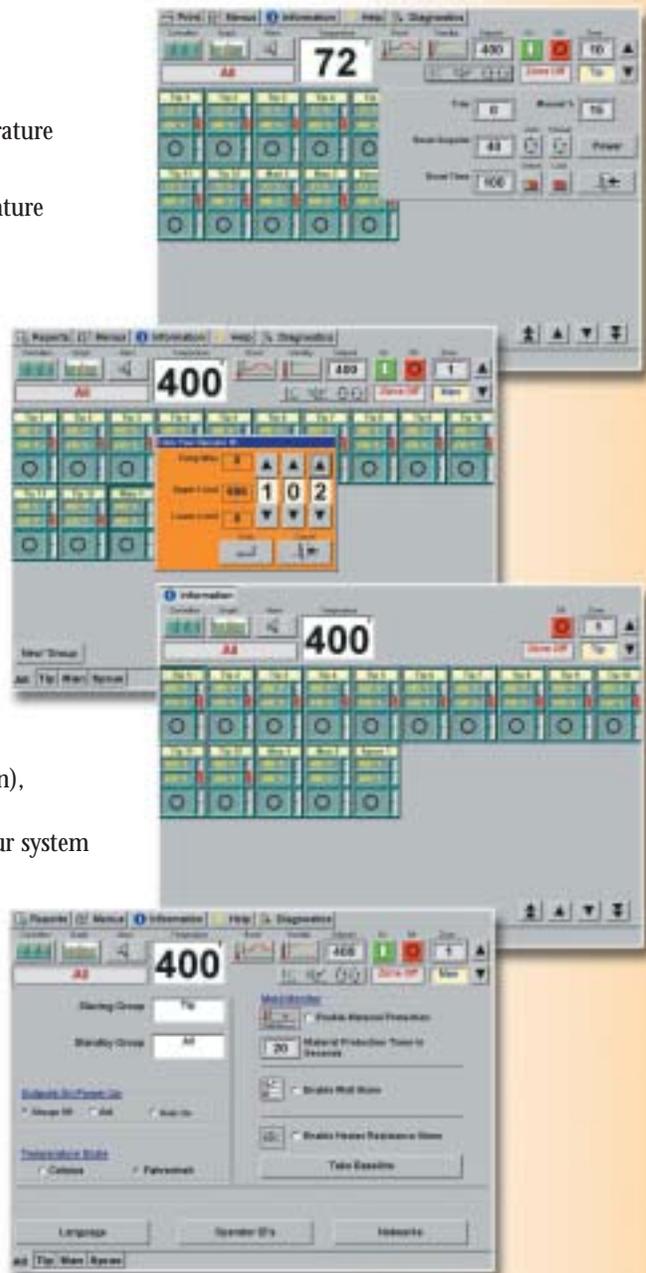
The TTC controller has four security levels; monitor (shown), operator, supervisor and engineer. For simplicity, only the functions allowed in each level are displayed. Customize your system by setting up zone groups and establish operating limits.

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 Highlights



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 ² 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 Meg. Ohms
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
-----------------------------------	--

*Designed to meet

Physical Specifications

	Height		Width		Depth		Weight	
	(inches)	(millimeters)	(inches)	(millimeters)	(inches)	(millimeters)	(pounds)	(kilograms)
Single heat sink	35	889	9.3	237	20	508	85	39
Dual heat sink	40	1016	19.0	483	20	508	150	68
Quad heat sink	45	1143	26.0	661	30	762	200	91
Panel mount single heat sink	32	813	19	482	7	178	75	34

*Single excludes coasters. All exclude screen.

Specifications subject to change without notice



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 tinkle
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
Standard current measurement

Value

Smaller footprint
Attractive Price

Global Headquarters

Gammaflux L.P.
113 Executive Drive
Sterling, VA 20166, USA
Toll - Free (800) 284-4477, or
Tel. +1-(703) 471-5050
Fax +1-(703) 689-2131
eMail info@gammaflux.com
www.gammaflux.com

European Headquarters

Gammaflux Europe GmbH
Bahnstr. 9a
D-65205 Wiesbaden-Erbenheim,
Germany
Tel. +49-(0)-611-973430
Fax +49-(0)-611-9734325
eMail info@gammaflux.de
www.gammaflux.de

Far East Headquarters

Gammaflux Far East
Penguin Mura B202
Nishi Kiwa-ku, Osawa
Yamaguchi, Ube 755-0151
Japan
Tel./Fax +81-(836) 54-4369
eMail gammafluxjpn@
gammaflux.com