Control G24

The G24 Temperature Controller

Gammaflux®

Global Hot Runner Control Solutions

The G24 Temperature Controller

Precise

Gammaflux, the world leader in temperature and sequential valve gate controllers, introduces the next generation in temperature control: the G24. Focused on the plastics industry, Gammaflux is an expert in process optimization. The G24 is everything you would expect in a next generation control system from Gammaflux:

- Easier to Use (New Mold Wizard)
- Less Expensive
- Smaller
- Faster
- More Flexible/Standardization
- Improved Interlocks
- Mold Doctor®
- Early Material/Plastic Leak Detection
- 5 Year Warranty*

Partnership

Most Gammaflux temperature controllers are used on hot runner injection molding applications. However, they are also frequently used for controlling thermoset, liquid injection molding (LIM), reaction injection molding (RIM), injection blow molding, extrusion blow molding, blow molding conditioning stations, thermoforming, profile extrusion, sheet extrusion and other dynamic applications. Each of these processes requires a temperature controller. If the temperature controller fails, the process either stops or is crippled. When selecting a temperature control supplier, you are selecting a partner who is critical to your product and profitability.

Triangulated Control Technology®

All Gammaflux temperature controllers feature Triangulated Control Technology®. Using this unique technology, our controllers:

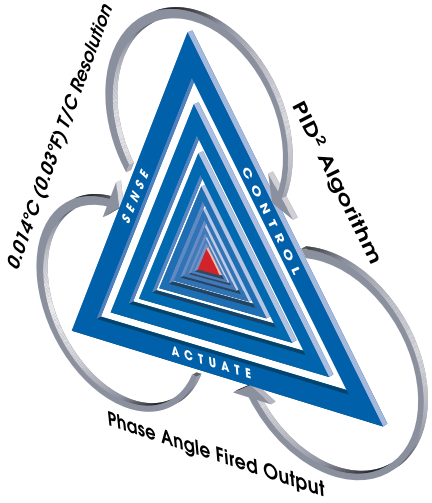
Sense – Twenty (20) times per second, Gammaflux controllers precisely measure the temperature.

Control – The proprietary self-optimizing Gammaflux PID² control algorithm adjusts if the actual temperature deviates 0.03°F (0.014°C) from set point. The second derivative (PID²) monitors the actual temperature rate of change. As a result, the output to the heater is regulated in advance of the typical proportional band to limit or eliminate over and undershoot.

Actuate – Using phase angle fired output (0.1% resolution; 1000 steps), the Gammaflux controller delivers smooth and exact power to each heater for the ultimate in temperature control.

Triangulating your process with a Gammaflux controller means achieving better temperature control, which could result in:

- Enhanced part quality
- Reduced scrap
- Improved part weight consistency
- Material savings
- Higher profit margins



Power Priority®

"Low mass", or extremely small hot runner nozzles are a unique challenge to control. To smooth the power and the melt heat history, Gammaflux created Power Priority®. Power Priority® smoothes the power output to individual zones. Users have the option to manually apply a Power Priority® set point from 1 (light) to 4 (heavy), providing unparalleled control for applications where it is most needed.

Protection

Closed loop wet heater bakeout - 120 times per second (at 60 Hz), the G24 module checks the heater for a short. If the heater is shorted, the output is adjusted within 8.3 milliseconds to protect the heater, cables and controller.

Reliability

Gammaflux products lead the market in reliability. The expected life is 10 – 15 years based on the quality of heater electrical maintenance. Some Gammaflux controllers have been in continuous operation for 25+ years.

Easier to Use (New Mold Wizard)

Best industry practices and actual operation are often not the same. The G24 is designed to be understood with 5 minutes of training, and programmable to automatically operate according to the industry's best practices. The Gammaflux New Mold Wizard effortlessly guides the user through (1) zone identification and group creation, (2) setpoint entry, (3) monitor zone configuration, (4) sophisticated mold startup functions, (5) advanced zone monitor functions, (6) heating the mold and (7) saving the menu. During this process the software automatically tunes each zone, engages the plastic leak detection alarm, sets the imminent heater failure alarm and saves everything back to the mold menu automatically after the "good parts" button is confirmed by the operator. The Wizard makes everyone a controller configuration expert.

Less Expensive

By leveraging the global electronics supply chain with new components that take the place of multiple previous components, Gammaflux has been able to reduce the price of the G24 product line in relation to existing Gammaflux products. Gammaflux, long known as the reliability and control leader in the industry, combines a competitive price with superior performance in the G24 controller.

Smaller

Each control module has a 15 or 30 amp per zone output rating. Up to 24 zones can be placed in a single control block. When compared to the Gammaflux TTC product line, this specific 128 zone controller has a 48% smaller footprint.

128 zones

96 cavity

Delta: 150 amp
Wye: 70 amp

Width: 20in / 50.8cm
Depth: 23in / 58.4cm
Height: 50.25in / 127.6cm

Faster

The G24 utilizes industrial USB connectivity for up to a 0.1 second screen update rate. Streaming real-time control numbers to the screen allows the user to better see what is happening inside the tool so they can diagnose difficult to understand issues.

More Flexible/Standardization

The standard two zone 15 amp per zone output module easily controls both tip and manifold zones making the controller easy to use across a range of molds for effortless production scheduling. The G24 is even able to control up to 30 amp zones with a 15 amp module by restricting the maximum output to 15 amps using our RMS limiting feature. Standardizing with Gammaflux allows you to pick the best manifold supplier for your specific application. Choosing a combined controller/manifold package will inevitably result in multiple control brands to support and learn.

Improved Interlocks

The tools of today are far more sophisticated and sensitive than the tools of yesteryear. Machine interlocks ensure bad parts are not produced and catastrophic damage is avoided. The G24 makes the interlocking task easier than ever with on-screen interlock signal inversion and manual testing signals to speed setup.

Mold Doctor®

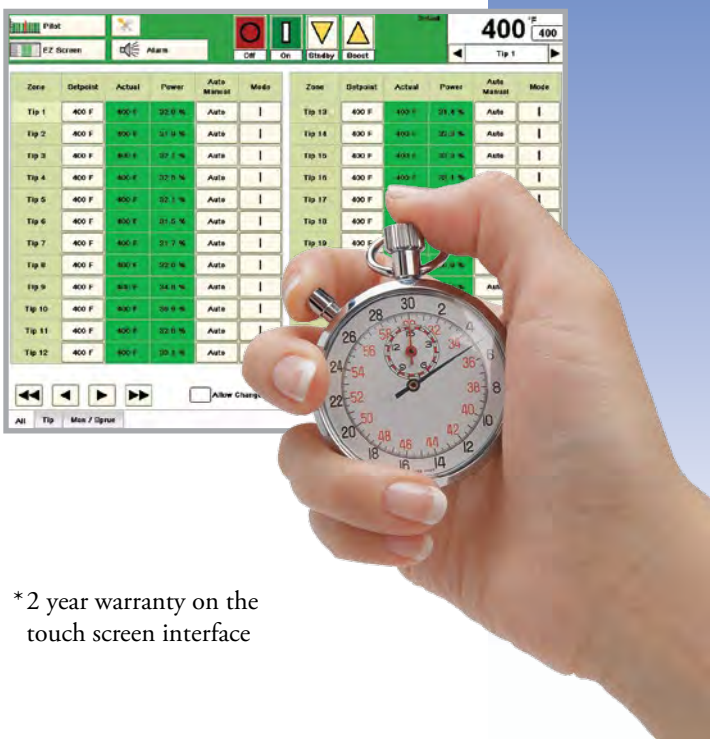
Automate your mold troubleshooting with Mold Doctor®. Elusive problems that appear suddenly and without changes to the process can be diagnosed with a quantitative thermodynamic zone analysis.

Early Leak Detection

When material/plastic leaks into the mold it occupies a former air space. Eliminating the air space creates a heat sink to the surrounding mass. In automatic mode, the controller increases the power to compensate for the loss in heat. The New Mold Wizard automatically sets the watt baseline and engages the alarm after the "good parts" part button is confirmed by the operator. Precisely measuring the actual wattage can be the difference between a short trip to the tool room or weeks of lost production.

5 Year Warranty*

Every G24 controller comes with a full 5-year warranty and is backed by the industry-leading worldwide service and support that our customers expect from Gammaflux.



*2 year warranty on the touch screen interface

G24 Easy to Use

Standard Configurations

Control Blocks
Half size control block
12 zones (15 amp per zone)
Maximum zones and circuit breaker shown for each enclosure

Control Blocks
Full size control block
24 zones (15 amp per zone) or
6 zones (30 amp per zone)
Maximum zones and circuit breaker shown for each enclosure

Options
Remote Mount Touch Screen
21 feet, 6.4 meters or 42 feet, 12.8 meters

Daisy Chain
Link multiple enclosures

M
12 zones
Delta: 50 amp
Wye: 30 amp

T1
24 zones
Delta: 100 amp
Wye: 60 amp

T1
24 zones
Delta: 150 amp
Wye: 80 amp

T2
48 zones
Delta: 100 amp
Wye: 60 amp

T2
48 zones
Delta: 200 amp
Wye: 100 amp

MS
12 zones
Delta: 50 amp
Wye: 30 amp

S1
24 zones
Delta: 100 amp
Wye: 60 amp

S2
48 zones
Delta: 100 amp
Wye: 60 amp

S2
48 zones
Delta: 200 amp
Wye: 100 amp

S3
72 zones
Delta: 200 amp
Wye: 100 amp

Standard Circuit Breakers

Enclosure	30	50	60	70	80	100	125	150	200	250	300
M or MS	D or W	Delta									
S or T short top	D or W	D or W	Wye	Delta		Delta					
S1 or T1 tall top		D or W	Wye	Delta	Wye	Delta	Delta	Delta			
S2, S3 or T2 tall top		D or W	Wye	Delta	Wye	D or W	Delta	Delta	Delta		
D tall top		D or W	Wye	D or W		D or W	D or W	D or W	D or W	Delta	Delta

Machine Mount

Compatible Enclosures
T1, T2, T3 and T4

D2

96 zones
Delta: 300 amp
Wye: 200 amp

D3

144 zones
Delta: 300 amp
Wye: 200 amp

D4

192 zones
Delta: 300 amp
Wye: 200 amp

Cable Hanger

Cable Hanger

The optional cable hanger can be added to any G24 controller. Constructed of steel this durable double sided cable holder eases controller storage and transport.

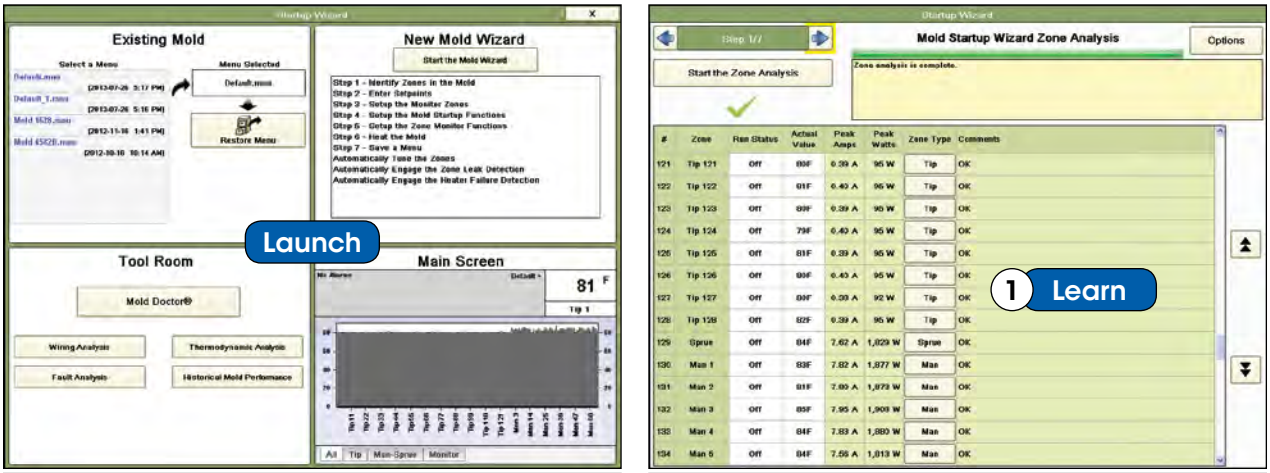
Transformers

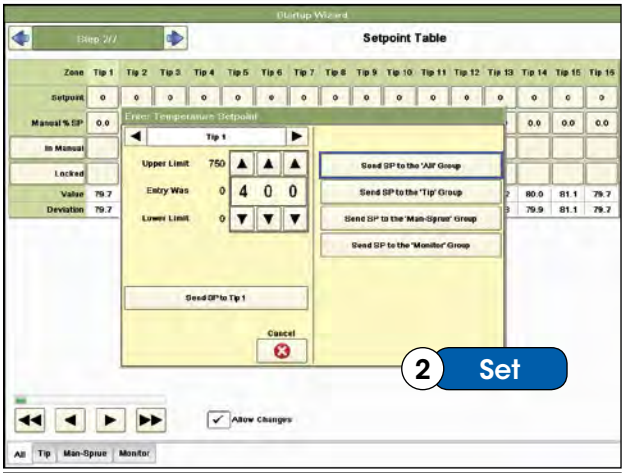
Transformers

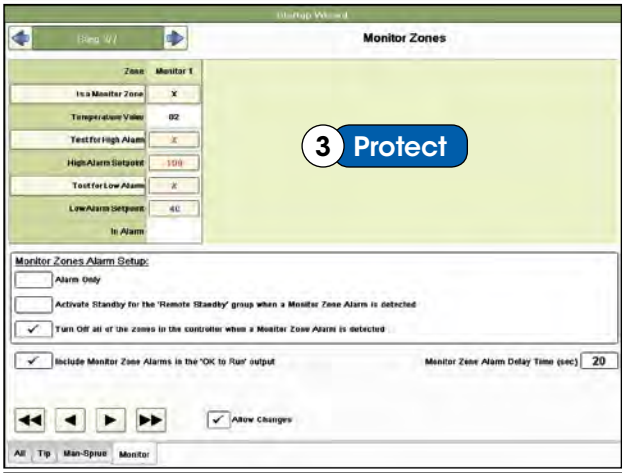
Optional 480 VAC to 240 VAC Delta/Delta three phase 2:1 step down transformers are available. The smaller transformer pod can contain a 15, 30 or 45 kva transformer. The larger transformer pod can contain a 75 or 112 kva transformer. Each transformer pod is detachable, has forced air cooling and an independent circuit breaker.

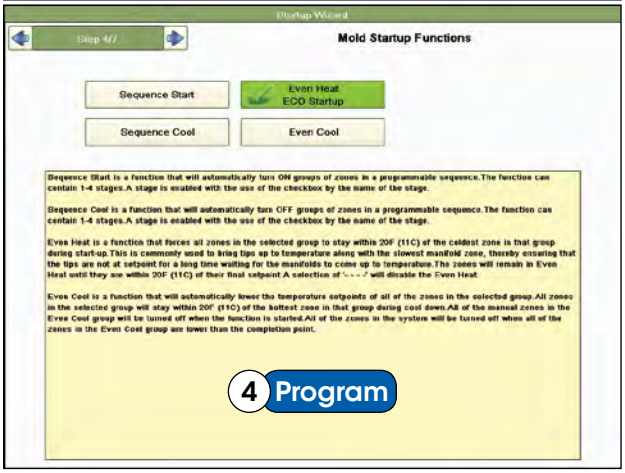
G24 Wizard

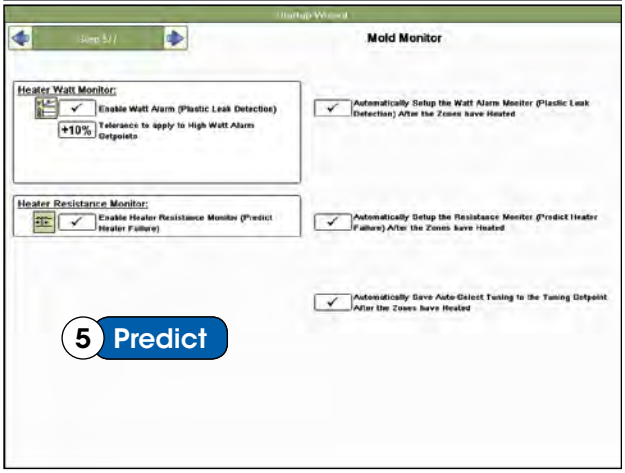
New Mold Wizard

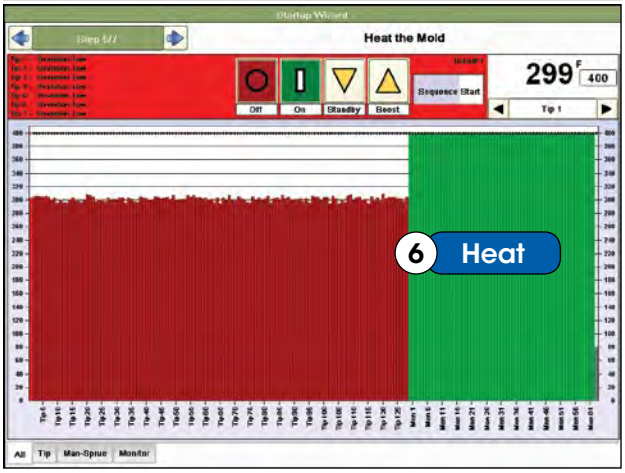


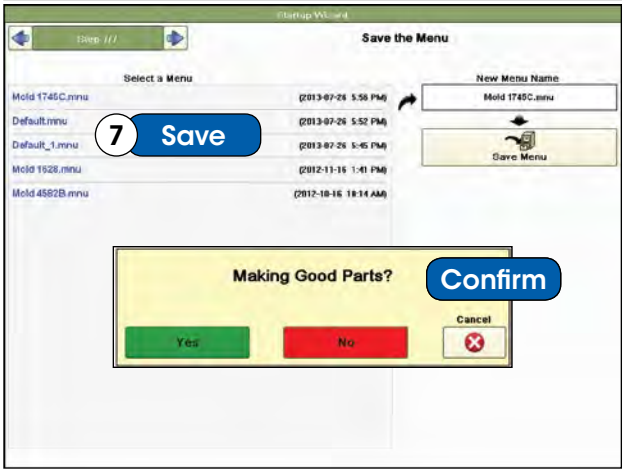












Mold Doctor®

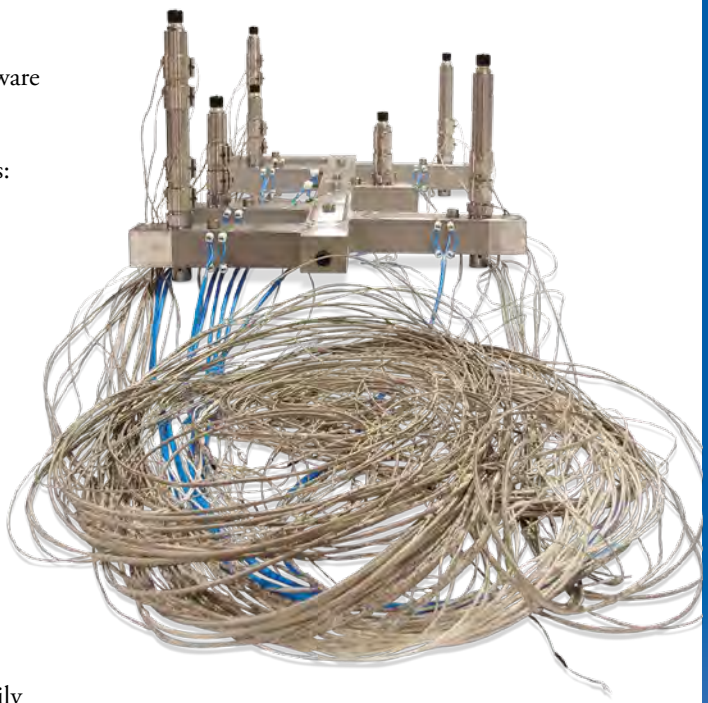
Troubleshoot Your Mold

Mold Doctor® is an off-line (tool room), advanced troubleshooting tool consisting of four diagnostic tests:

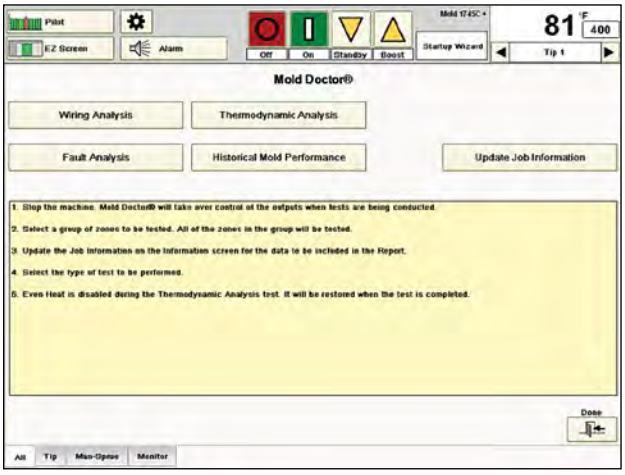
Wiring Analysis: checks the wiring of the tool. The software clearly tells the user of miswired zones and how to fix them.

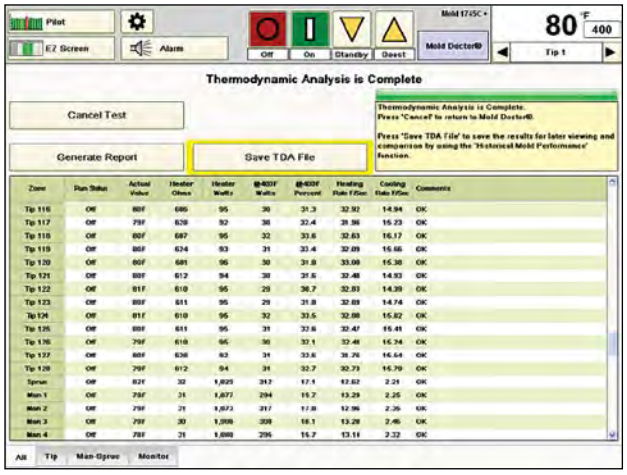
Fault Analysis: quickly identifies the following problems: thermocouple open, thermocouple reversed, thermocouple pinched, open fuse, heater short/wet, heater open, uncontrolled output and ground fault.

Thermodynamic Analysis: automatically heats all selected zones to 400° F (204° C) and cools to 330° F (165° 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 towards a 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.





Calibration

Calibrate your controllers in house quickly, easily and without a calibration technician. Establish a thermocouple source equivalent to the controller. The difference between the calibrator value and the control screen is the calibration error. The Calibration software corrects the error with an accuracy of ± 0.2° F (± 0.1° C).

G24

Faster

Faster (0.1 sec Screen Updates)

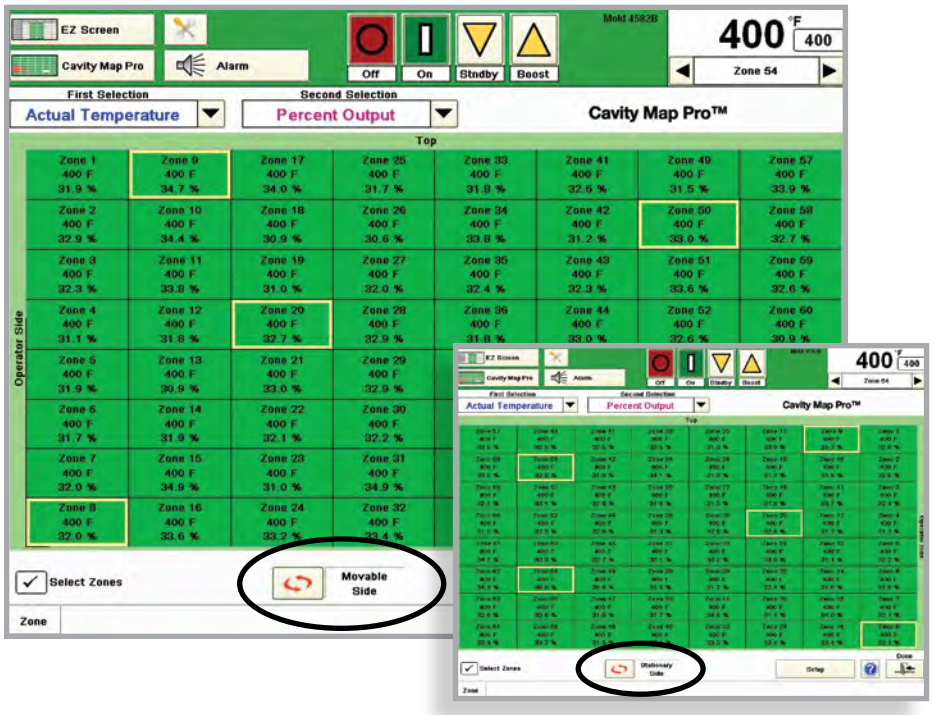
Gammavision®

Gammavision® chart recorder and statistical analysis software allows the user to record the performance of their hot runner tool, print reports to the USB drive or watch databases of production runs on-screen with our playback mode. Pause live action on the line graph and manually or automatically place injection marks on the screen for in-depth analysis.

Cavity Map Pro™

Cavity Map Pro™

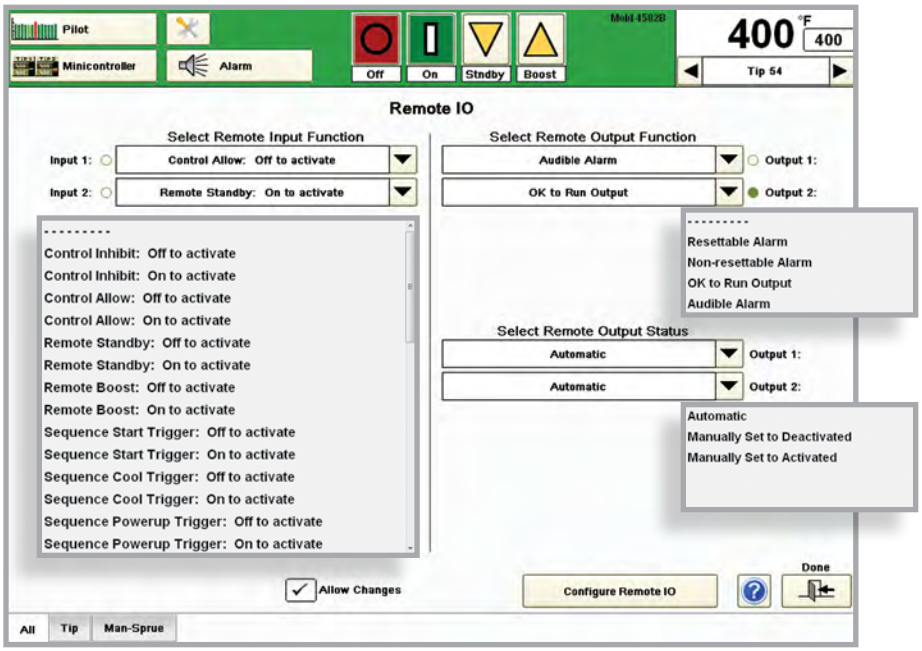
Quickly create a cavity map that is saved with the mold menu. The on-screen tools allow the user to create common tip layout patterns instantly. Select zones to study closer and flip the image to quickly identify which zone/ cavity to change or investigate.



"Lights Out" Molding

Improved Interlocks

The tools of today are far more sophisticated and sensitive than the tools of yesteryear. Machine interlocks ensure bad parts are not produced and catastrophic damage is avoided. The G24 makes the interlocking task easier than ever with on-screen interlock signal inversion and manual testing signals to speed setup.



Early Leak Detection

Leak Detection Example Picture

The photo to the right is a picture of an actual leak that was detected early by the Gammaflux watt/leak alarm. As you can see the material started leaking out the backside of the tip but did not make it to the wires. Once the wires are coated in plastic the heater, thermocouple or both will need to be replaced. Detecting leaks early not only saves money but also speeds the mold back into service.

Actual Leak Detected with Alarm

Too Late – Example

Next Generation G24

Detailed Controller Comparison

	LEC	TTC	Touch Screen Choice G24 Mini	Touch Screen Choice G24 Full
Core Description				
Temperature control	■	■	■	■
Temperature control - maximum zones	24	280	48	480
Sequential valve gate control - integrated option		■		
Sequential valve gate control - outputs		8/16/32		
5 year warranty (2 years on touch screen interface)	■	■	■	■
Modular design	■	■	■	■
Controller warm up time - instant	■	■	■	■
If interface fails – the controller still controls	■	■	■	■
Emergency interface - use a Windows® computer	XP	XP	XP or 7	XP or 7
Automatic/manual control	■	■	■	■
Zone “on”, “off” and “locked off”	■	■	■	■
Set points in tenths	■	■	■	■
Adaptive PID² control algorithm with Power Priority®	■	■	■	■
Algorithm is executed 20 times per second	■	■	■	■
Extended tuning ranges (fast/slow)	■	■	■	■
Output resolution 0.1%	■	■	■	■
Output attenuation - maximum output (1% increments)			■	■
RMS limit to module max. - control larger heaters			■	■
Phase angle firing (1000 Steps; 0.1%)	■	■	■	■
Wet heater bakeout	■	■	■	■
Power compensation in manual mode	■	■	■	■
Degree F/C	■	■	■	■
Thermocouple J/K	■	■	■	■
Thermocouple (T/C) filtering - none	■	■	■	■
T/C resolution 0.03° F (0.014° C) over full scale	■	■	■	■
T/C calibration accuracy 0.2° F (0.1° C) over full scale	■	■	■	■
Operating temperature 32-122° F (0-50° C)	■	■	■	■
Input power 180-265 VAC; 480 VAC optional	■	■	■	■
Delta/wye convertible option	■	■	■	■
Circuit breaker sized to load - TTC/G24 - 300 amp maximum	■	■	■	■
Actual Values				
Actual temperature	■	■	■	■
% Output	■	■	■	■
Deviation from set point	■	■	■	■
Amps (resolution 0.01 amps)	■	■	■	■
Volts	■	■	■	■
Watts	■	■	■	■
Kilowatt monitor (instant, average, max., min.)				■
Ohms	■	■	■	■
Alarms				
(+) High temperature (adjustable; 20° F [10° C] default)	■	■	■	■
(-) Low temperature (adjustable; 20° F [10° C] default)	■	■	■	■
Thermocouple open (remembered % output)	■	■	■	■
Thermocouple reversed	■	■	■	■
Thermocouple pinched (adjustable time)	■	■	■	■
Open fuse	■	■	■	■
Shorted heater/wet	■	■	■	■
Programmable heater short threshold (amps)			■	■
Open heater	■	■	■	■
Uncontrolled output (relay power cut off)	■	■	■	■
Heater resistance monitoring (predict failure)	■	■	■	■
Heater wattage monitoring (detect leaks) - auto calc.	■	■	■	■
Ground fault detection			■	■
Critical over temperature alarm (adjustable)	■	■	■	■
Temperature monitoring (J/K) with programmable action	■	■	■	■
Alarm history - zone alarms	■	■	■	■
Alarm history graph - zone alarms				■
Zone alarm configure - “none”, “flasher”, “flasher & contacts”			■	■
Alarm history - system and status			■	■

	LEC	TTC	Touch Screen Choice G24 Mini	Touch Screen Choice G24 Full
Operational Features				
Menu storage	▣	1000+	40	1000+
Menu "auto save" (optional)				■
Programmable groups	▣	■	■	■
Instant grouping	▣	■	■	■
Sequence Start (up to 4 stages with delay timers)	▣	■	■	■
Sequence Cool (up to 4 stages with delay timers)			■	■
Sequenced Power Up - manual activation	▣	■	■	■
Boost (selectable time/amount) - Automatic mode	■	■	■	■
Boost (selectable time/amount) - Manual mode			■	■
Trim	▣	■	■	■
Even Heat (controlled heating - 20° F [10° C] max. variance)	■	■	■	■
Even Cool (controlled cooling - 15° F [7° C] max. variance)	▣	■	■	■
Automatic set point limit	■	■	■	■
Manual set point limit	■	■	■	■
Security levels	■	■	■	■
Security level customization (4 levels)				■
On power up "on" or "off" ("ask" touch screen only)	■	■	■	■
Auto load manual remembered % output	▣	■	■	■
Operator identification	▣	■		■
Tool graphics with real time data overlay	▣	■		■
Cavity Map Pro® with "mirror" button				■
Thermocouple "rewire"		■	■	■
Copy Output		■	■	■
Standby timer until system "off"	▣	■	■	■
PDF writer	▣	■	■	■
PDF viewer - import or export files	▣	■		■
USB port	▣	■	■	■
On-line help	▣	■	■	■
Software Features				
New Mold Wizard			■	■
Maximum screen update rate (in seconds)	6	0.5	1	0.1
E-Z Screen - 5 minutes to train			■	■
Gammavision® (SPC data/graphing)	▣	■	◆	■
Pause line graph with "injection marks" (manual and automatic)			◆	■
Instant data reporting (hours)	▣ / 24	24	24	48
Data report storage (up to 1 year) - pdf format	▣	■		■
Mold Doctor® (advanced troubleshooting)	▣	■	■	■
Calibration (0.2° F [0.1° C] accuracy over full scale)	▣	■	■	■
On screen printing	▣	■	■	■
Print to USB drive			■	■
Networking (Ethernet IP) - stream .csv file - bidirectional	▣	■	■	■
Remote troubleshooting/operation	▣	■		■
Field software identification of enclosure connectors and pins				■
Time and date change during operation			■	■
Touch screen calibration during operation			■	■
On-screen keyboard for Windows® tasks			■	■
Find this module LED		■	■	■
Daisy chain enclosures	■	■	■	■
Inputs (24 VDC required)				
Standby	■	■	■	■
Material protection		■	■	■
Inhibit/Allow	■	■	■	■
Sequence Start			■	■
Sequenced power up		■	■	■
Remote boost		■	■	■
Mold ID - 63 combinations - auto menu load		■		■
Sequence Cool			■	■
Even Cool			■	■
Water flow interface			■	■
Chiller interface			■	■
Barrel temperature interface			■	■
Dryer interface			■	■
Auxiliary interface			■	■
External manifold leak detect (Airtect)			■	■
Outputs				
Resettable alarm output	■	■	■	■
Non-resettable alarm output		■	■	■
"OK to Run" output with status page		■	■	■
Audible alarm		■	■	■
Manual activation/deactivation to speed interlock setup			■	■

◆ Limited feature

▣ Touch screen or laptop required (LEC)

Windows XP® and Windows 7® are registered trademarks of Microsoft Corporation

Next Generation G24

Specifications

Performance

Thermocouple Calibration Accuracy	0.2°F (0.1°C)
Control Accuracy (steady state)	± 0.1°F (± 0.05°C)
Heater Short Detection Time	8.3 msec. or 120 times per second at 60 Hz
PID² Alogrithm Execution Time	50 msec. or 20 times per second
Tuning	Automatic, self optimizing, manual override
Manual Mode	Power compensation for incoming voltage variation
Degrees F or C	Field Selectable
Operating Range	0-932°F (0-500°C)
Output Range	0-240 VAC, Phase angle fired,1000 steps
Standby Temperature	User Selectable (0-932°F, 0-500°C)
Remote Input	24 VDC

Input

Thermocouple	Type J standard; Type K selectable
Cold Junction Compensation	Internal to enclosure
External Resistance	10 Meg. Ohms
Temp. Variation due to T/C Length	None

Electrical

Input Voltage	180-265 VAC Delta/Wye (phase voltage)
Frequency	47-53 Hz, 57-63 Hz
Ambient Temperature Range	32-122°F (0-50°C)
Humidity Range	10-95% non-condensing
Output Module Rating	240 VAC; 2 zone - 15 amps/zone 3600 watts/zone 240 VAC; 1 zone - 30 amps/zone 7200 watts/zone
Communications Electrical Standard	Industrial USB 2.0

Performance Standards

U.S., Canadian and International: *Designed to meet	CE Mark; EMC: IEC 61000 - (6-2, 6-4, 4-2, 4-3, 4-4, 4-5, 4-6, 4-11) Safety* IEC 61010, UL-508, UL-873 and CSA

Languages

English, Deutsch, Français, Czech, русский, Italiano, Español, Portuguese, 日本語, 中文, 영어

Physical

	*Height (inches/millimeters)	Width (inches/millimeters)	Depth (inches/millimeters)	*Weight (pounds/kilograms)
M enclosure	20.00/508	10.00/254	12.50/318	50.0/22.7
MS enclosure	36.50/927	23.00/584	20.00/508	75.1/34.1
T1 enclosure - short top	21.25/540	10.00/254	23.00/584	75.1/34.1
T1 enclosure - tall top	25.75/654	10.00/254	23.00/584	80.1/36.3
T2 enclosure - short top	32.00/813	10.00/254	23.00/584	130.4/59.1
T2 enclosure - tall top	36.50/927	10.00/254	23.00/584	135.4/61.4
S1/S2 enclosure - short top	35.00/889	20.00/508	23.00/584	139.4/63.2
S1/S2 enclosure - tall top	39.50/1003	20.00/508	23.00/584	144.4/65.5
S3 enclosure - tall top	50.25/1276	20.00/508	23.00/584	199.7/90.6
D2 enclosure - tall top	39.50/1003	20.00/508	23.00/584	243.6/110.5
D3 enclosure - tall top	50.25/1276	20.00/508	23.00/584	343.2/155.7
D4 enclosure - tall top	61.00/1549	20.00/508	23.00/584	442.8/200.9

Gammaflux®

Height and weight excludes screen.
Specifications subject to change without notice.

RoHS Compliant

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