SVGC G24

The G24 Controller

Sequential Valve Gate Controller

Plastic Processing

* Injection Molding
  - Flow Front Control

Gammaflux®
Global Hot Runner Control Solutions

Precise G24

Sequential Valve Gate Control (SVGC)

Manufacturers of large, complex or difficult to fill parts often turn to Sequential Valve Gate Control (SVGC) to solve molding issues. All SVGC applications have hot runner manifold or melt delivery systems feeding individual nozzles. Using SVGC the processor has the ability to selectively open or close each valve gate nozzle individually to precisely control the material flow. The most common pin actuation methods are pneumatic or hydraulic. Filling the part in a sequence or selectively shutting off individual cavities could have the following benefits:

- Knit line control
- Improved cosmetics
- Stronger parts
- Less warpage
- Lighter weight parts
- Dimension improvement
- Cavity fill balancing
- Family mold balancing
- Reduced injection pressure
- Reduced machine tonnage

Optimization

Through extensive input from processors, Gammaflux created a next generation SVGC system that provides a clearer understanding of the sequence to ease process adjustments for the best possible part, shot after shot. One of our graphical screens is shown below, the green portion of the bar indicates that the valve gate is open, the red portion shows that valve gate is closed to easily visualize and adjust the flow.

Speed / Accuracy / Repeatability

All SVGC applications rely on speed, accuracy and repeatability to produce the best possible part, shot after shot. The 8, 16 or 24 valve gate output version monitors each of the digital and analog inputs every millisecond (1 mSec or 1/1000 of a second). As a result the Gammaflux SVGC has the ability to open or close each valve gate every millisecond.

Hot Runner Temperature / SVGC Combination

Gammaflux, long known for hot runner control innovation and superior performance, can provide hot runner temperature control, water / process monitoring, SVGC and machine optimization interlocks in one enclosure with one interface and one menu for process simplification. The full range of SVGC hardware is available as a combined or stand alone system.

Calibration

Each linear analog input, typically screw position or pressure, is easily calibrated on the screen for maximum resolution and accuracy. Set points can be entered in up to four (4) digits [9999 adjustment increments]. The inputs can be calibrated to only read a very fine portion of the total range if more set point clarity is required.

Programmable Alarms (Closed Loop Monitoring)

The controller can be programmed to alarm if the event happens too early or too late based on historical sequences. This time based alarm is selectable and can provide valuable quality control information for a historically open loop control application. Using the Bad Part Fast Reject (BPFR) output the processor can move the robot to an inspection station if the sequence relative timing deviates significantly.

System Rules

Nine (9) system rules clearly define the capabilities and safety requirements demanded by the system during the sequence.

1. Each output can be opened and closed three (3) times during the sequence. Four independent sequences are available.
2. The "sequence" does not start until the "cycle start" input is activated. This starts the timer, one per sequence.
3. When cycle start is activated, the controller will force all outputs closed before starting the sequence.
4. During the "sequence" and after the first valve is opened at least one output must be open at all times. If a close is prevented, it is indicated by a yellow box (summary page). That opportunity to close is lost and the gate will only close if another close event is programmed and can be satisfied.
5. The "sequence" is over and the timer stops timing when the last event has occurred.
6. If the "sequence" does not finish (last event completed), the controller will not restart the "sequence" or the timer with the next "cycle start". To restart one of the following must occur; loss of enable or e-stop or toggle between the maintenance and sequence mode. It is recommended to toggle "enable" on cycle to prevent this potential programming issue.
7. The sequence of each gate is independent of the others.
8. Each event in the sequence of a gate must occur before the next event is considered by the SVGC.
9. The activation of the "e-stop" input or the loss of the "enable" input causes all gates to immediately go to the closed states and ends the cycle, regardless of sequence programming. "E-stop" or "loss of enable" drops the "okay to run" signal to the machine.

Warning: At "injection" all valve gates can be programmed to be closed, which may cause damage. Typically one or more outputs are opened with the first stage of the sequence.

Customer Input Requirements

Provide "enable" input - allows valve gates to open/close

Provide "cycle start" input - starts the timer, one per sequence

Valve Gate Actuation

Single solenoid – 24 VDC to open, 0 VDC to close [normal acting]
– 0 VDC to open, 24 VDC to close [reverse acting]

Dual solenoid - toggle 24 VDC to open/close

Customer provides valve stack with solenoids

Customer provides hydraulic power pack if needed

Architecture

6 module limit – 2 block configuration

8 outputs or inputs per module

Multiple Independent Sequences

Sequence 2, 3 or 4 each need a dedicated digital input board for "enable", "cycle start" or other digital inputs

Next Generation Flow Front Control

Advanced triggering
* Open/close each output 3 times
* Up to 4 independent sequences
* Registers; trigger based on another event, open/close, across sequences
* "And", "Or" programmable logic
* Mold movement trigger (core, slide, eject)
* Single or dual solenoid, field selectable [normal or reverse acting - field selectable]

Real time updates on-screen
* Highlighted box to indicate active step

Advanced Alarms
* "Okay to Run" alarm / machine interlock
* BPFR output (Bad Part Fast Reject)
* Solenoid output open fuse alarm

Each output fused at 6 amps

M Enclosure

SVGC only (M enclosure, 2 module limit)

8 or 16 outputs
[20 amp; 24 VDC power supply maximum]

4-12 digital inputs (24 VDC) (10-32 VDC range)
[enable, e-stop, cycle start, mold close, switch over or user defined]

2 analog linear inputs (0-10 VDC or 0-20 mA)
[position, cavity pressure or user defined]
[optional isolated 24 VDC power supply, excitation voltage]

4 connectors on rear of enclosure
[digital inputs, analog inputs, digital outputs, alarm / machine interlocks]

Scan Rate 1 mSec

S3 Enclosure Example

Temperature (2 blocks) and SVGC (1 block)

8, 16, 24 or 32 SVGC outputs (1 block maximum, 4 module limit)
[40 amp; 24 VDC power supply maximum]

4-28 digital inputs (24 VDC) (10-32 VDC range)
[enable, e-stop, cycle start, mold close, switch over or user defined]

2 analog linear inputs (0-10 VDC or 0-20 mA)
[position, cavity pressure or user defined]
[optional isolated 24 VDC power supply, excitation voltage]

5 connectors on rear of enclosure (SVGC portion)
[digital inputs, analog inputs, digital outputs {2}, alarm / machine interlocks]

Scan Rate 1 mSec (8, 16 or 24 outputs)

Scan Rate 2 mSec (32 outputs)

S2 Enclosure Example

SVGC only (2 blocks, 6 module limit)

8, 16, 24, 32, 40 or 48 SVGC outputs (2 blocks maximum)
[100 amp {two 40 amp, one 20 amp}
24 VDC power supply maximum]

4-44 digital inputs (24 VDC) (10-32 VDC range)
[enable, e-stop, cycle start, mold close, switch over or user defined]

2 analog linear inputs (0-10 VDC or 0-20 mA)
[position, cavity pressure or user defined]
[optional isolated 24 VDC power supply, excitation voltage]

6 connectors on rear of enclosure
[digital inputs, analog inputs, digital outputs {3}, alarm / machine interlocks]

Scan rate 1 mSec (8, 16 or 24 outputs)

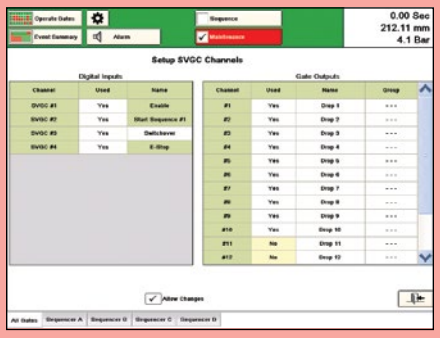
Scan rate 2 mSec (32, 40 or 48 outputs)

G24 Specifications

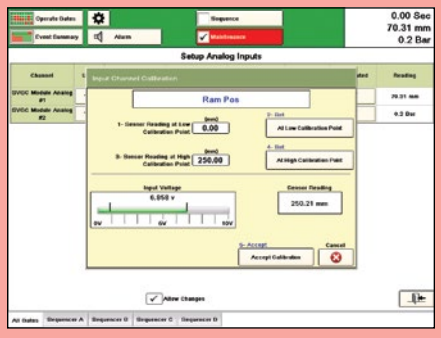
Start Up Guide

Version 1.0
English

Maintenance Mode

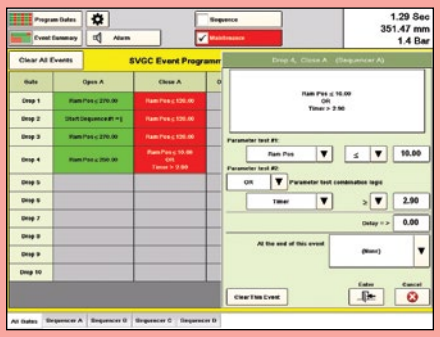


1. Connect inputs and outputs
2. Press "⚙" - "Setup SVGC Channels" - "Allow Changes"
   * Mark used inputs and outputs



3. Press "⚙" - "Setup Analog Inputs" - "Allow Changes"
   * Calibrate analog inputs

4. Press "Operate Gates" - "Allow Changes"
   * Open/close valve gates (test)

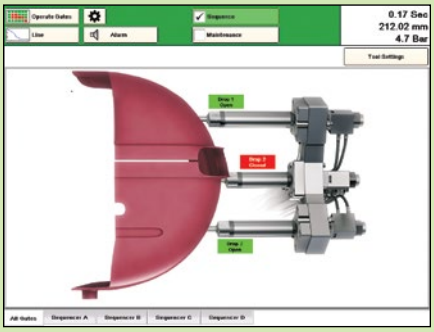


5. Press "Program Gates" - "Edit Events"
   * Program sequence

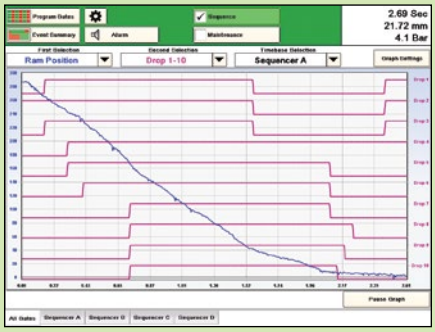
6. Press "Event Summary"
   * Review sequence

Sequence Mode

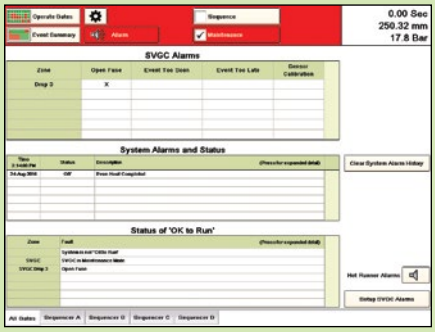
7. Change to "Sequence" mode - Press "Event Summary"
   * Yellow box indicates "close prevented"



8. Press "Tool Graphic"
   * View sequence



9. Press "Line Graph"
   * View sequence



10. Press "Alarm"
    * View alarms

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