

# AUTO-MATRIX™

# GX1™

The GX1™ direct digital controller (DDC) offers greater flexibility in input, output, and programmable capabilities than either the MC1™ or GC1™. The GX1 provides built-in closed-loop DDC functions for applications such as floating-set point actuation, fully modulated analog outputs, thermostatic control of digital outputs, input pulse counting, output supervision, run-time totalization, and program scheduling. Support for the SAGE Programming Language™ (SPL) enables the GX1 to perform many user-defined, custom control schemes.

## CONTROLLING CAPABILITIES

The GX1 can provide DDC for floating-setpoint actuators by using pairs of digital outputs to perform time-proportioned motor positioning. Analog outputs can be used to control electronic actuators. Each control loop may be programmed to use the high, low, or average value of any of the eight inputs, or the output of the SOLOStat™ room monitoring module, as a measured variable. The GX1 can also perform thermostatic control of any of the eight digital outputs using any of the eight analog inputs as a measured variable. For global control and coordination, the GX1 may be programmed to broadcast and receive outdoor air temperature, relative humidity, and calculated enthalpy to and from other direct digital controllers on the network, eliminating the need for redundant sensors. Utilizing a subset of SPL, the GX1 provides incredible flexibility, making it suitable for all types of user-defined custom control applications. SPL programs can be composed of hundreds of statements incorporating logic, flow control, and arbitrary arithmetic calculations. Time-critical programming may be executed by a “once-per-second” function. SPL programs can provide control blocks which respond to arbitrary Public Unitary Protocol™ (PUP) channels and attributes extending the base features of the GX1.

## INPUTS

- ▼ **Eight universal inputs:** 0 to 5VDC, 0 to 10VDC, 0 to 20mA switch selectable; 16-bit resolution
- ▼ **Thermistor type:** Precon type-3, 10k
- ▼ **Input protection:** R-C filter plus automotive-grade transient clamp device
- ▼ **Pulse counting for up to two digital inputs (25Hz)**

Each universal input may be programmed to behave as a digital, scaled-linear, or thermistor input. All ranges may be inverted for reverse-reading sensors. Digital inputs can generate alarms off-to-on and/or on-to-off and have selectable input polarity. Each analog input has programmable high- and low-alarm limits. Thermistor inputs can be configured to read either Fahrenheit or Celsius over two resolutions: -30.0 to 230.0°F (-34.0 to 110.0°C) and -30.00 to 230.00°F (-34.00 to 110.00°C).

## OUTPUTS

- ▼ **Eight digital outputs:** relay, 30VAC/VDC at 5A, Form C



- ▼ **Four analog outputs:** 0 to 10VDC at 10mA maximum, 0 to 20mA current sourcing
- ▼ **Thermostatic control of digital outputs**

Each digital output may be programmed to operate in one of four modes: on/off, pulsed on, motor-position control, or pulsed-pair on/off control. Pulse widths may be set to 100ms, and a pulse width of “0” disables pulsing. Motor-positioning outputs are enabled in pairs with the even-numbered outputs generating the “increase” pulse and the odd-numbered outputs generating the “decrease” pulse. Motor travel times in seconds may be set independently for each motor-positioning pair. A programmable calibration interval may be set for automatic recalibration of motors. For pulsed-pair outputs, the even-numbered outputs generate the “on” pulse and the odd-numbered outputs generate the “off” pulse.

The four analog outputs may be configured as 0 to 10V or 0 to 20mA outputs, and scaled to arbitrary units as either normal or reverse-acting. Analog outputs may be programmed to operate as a manually controlled output or as the output of a Proportional+Integral+Derivative (PID) control loop.

# AMERICAN AUTO-MATRIX®

## NETWORKING

While the GX1 provides stand-alone control, it is also compatible with the entire family of American Auto-Matrix (AAM) products. For stand-alone operation, the *SoloPro for Windows™* interface software can be used for initial system configuration and for monitoring or changing setpoints. Each GX1 can also be connected to the SOLOStat for zone-temperature sensing, remote-temperature setpoint adjustment, occupancy, and lighting overrides—all of which can be read by the supervisory controller. For applications where alarm detection, real-time data trending or color graphics are paramount, the GX1—via an area controller such as SF1™ or SAGE<sup>MAX</sup>™—can be networked to the *Auto-Pilot™* software that enables a PC-compatible computer to provide a user-friendly interface with a network of distributed controllers.

The GX1 networks, through direct connection to the SF1 and SAGE<sup>MAX</sup> area controllers, to higher level control systems for monitoring and control applications. Up to 128 GX1 DDC can be networked to a single SAGE<sup>MAX</sup> port.

- ▼ **Line signalling:** EIA-485
- ▼ **Wiring:** shielded, twisted pair
- ▼ **Network protection:** dual tranzorbs, PTC
- ▼ **Communications speed:** 1,200 to 38.4k baud, programmable
- ▼ **Network configuration:** multidrop up to 5,000ft. (1.5km)
- ▼ **Protocol:** Public Unitary Protocol (PUP)

## FEATURES

- ▼ UL-listed 916, Enclosed Energy Management Equipment
- ▼ UL-recognized 873, Temperature Indicating and Regulating Equipment
- ▼ complies with FCC rules Part 15, Class B Computing Device
- ▼ stand-alone or networked operation
- ▼ sensor readings every 500ms

- ▼ analog outputs updated every 500ms; digital outputs updated every 100ms
- ▼ P+I motor position control for floating-setpoint actuators
- ▼ time-of-day scheduling
- ▼ 6-KB battery backed-up RAM for programs and attributes
- ▼ battery backed-up clock/calendar for scheduling functions
- ▼ peer-to-peer operation
- ▼ up to 64 GX1 DDC per communications trunk

## SPECIFICATIONS

### Mounting

- ▼ flat surface with screws; steel shroud

### Terminations

- ▼ pluggable 0.2in. (5.08mm) terminal blocks
- ▼ RJ-11 jack

### Input Supply

- ▼ NEC class II transformer
- ▼ 24VAC, 50/60Hz, 20VA maximum, 10VA typical
- ▼ fused at 1 A for load protection

### Operating Environment

- ▼ 32 to 122°F (0 to 50°C)
- ▼ 0 to 95% RH noncondensing

### Dimensions

- ▼ overall size: 9.0 x 6.9 x 2.2in. (22.8 x 17.5 x 5.6cm)
- ▼ shipping weight: 3.1lb. (1.4kg)

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