# Two-Channel Gas Controller

**PolyGard**
**MGC3**

## DESCRIPTION

Highly configurable, UL 2075 performance-tested and -certified, and wall-mounted gas monitor; continuously compares measured inputs to pre-defined alarm thresholds and activates internal switches/relays when thresholds are breached.

Includes inputs for two external 4-20 mA analog sensor/transmitters, one binary input, two alarm relays, two open collector outputs and one analog output. Up to four thresholds can be defined for each input.

Controller also includes a large, 2-line, 16-character LCD and four pushbuttons for an easy system configuration (with password protection) and continuous real-time measurement value display.

Four faceplate LEDs indicate power, alarms, manual relay override and sensor fault conditions.

Programmable “service date” alarm ensures reliable long-term operation.

City of Los Angeles Approved

NRTL Performance Tested & Certified
Conforms to STD
**UL 2075**

## APPLICATION

To detect and control levels of toxic and combustible gases in a wide variety of commercial and industrial applications; for example, carbon monoxide (CO) and nitrogen dioxide ($NO_2$) levels in parking structures, warehouses and repair shops, methane in boiler rooms, hydrogen in battery charging rooms, refrigerant leaks in chiller rooms, and more using IN*TEC* AT-Series gas transmitters. Analog input channels can also measure/monitor any other environmental conditions (such as temperature, relative humidity, static pressure, etc.) using industry-standard 2-wire or 3-wire 4-20 mA transmitters.

Setup options provide for selectable latching or non-latching alarms, time delays and threshold hysteresis to eliminate false trips and resets, as well as minimum relay on/off times to prevent harmful fan cycling.

The controller can communicate with most building automation, DDC, PLC or analog control systems, either via serial Modbus communications (optional) or binary/analog output signals.

## FEATURES

- *Continuous monitoring and four-stage control*
- *Two (2) remote analog inputs, 4-20 mA, overload & short-circuit protected*
- *One (1) analog output, (0)4-20 mA / (0)2-10 VDC*
  - *Selectable for lowest, highest, or average of the two analog inputs*
- *One (1) digital input*
- *Two (2) relay outputs:*
  - *(1) SPDT, (1) SPST-NO/NC*
- *One (1) 24 VDC switched output, 50 mA max.*
- *Audible Alarm*
- *Liquid Crystal Display (LCD)*
- *LED status indicators*
- *Keypad user interface*
- *Simple menu-driven programming*
- *Modular technology for easy installation & maintenance*
- *NEMA 4X (IP65) enclosure*
- *Optional Modbus Comms. (replaces analog output)*

## SPECIFICATIONS

| | |
|---|---|
| **Electric** | |
| Power Supply | 24 VAC/VDC, -20%/+15% 50/60 Hz, reverse polarity protected |
| Power Consumption | 2.5 VA (0.1 A) |
| **Type of Control** | |
| General | Four-stage (S1 to S4) control, assignable up to two (2) binary/ relay and 24 VDC / 50 mA switched outputs, i.e. low–high stage for relay output and switched 24 VDC at any stage for remote alarming |
| Stage level / setpoint | Field adjustable over full range, four (4) stages (S1 to S4) per analog input, assignable to current or mean (average) value |
| - each stage level (S1-S4) | Assignable to any relay |
| - sensor fail-safe | Assignable to any stage level |

## SPECIFICATIONS

**Type of Control (Cont...)**

| | |
|---|---|
| Stage level / setpoint (Cont...) | |
| - hysteresis/ switching differential | Selectable for each sensor point |

**Inputs/Outputs**

| | |
|---|---|
| Gas / input types | |
| - CO | Carbon Monoxide |
| - EX | Explosive (%LEL) |
| - NO | Nitrogen Oxide |
| - $NO_2$ | Nitrogen Dioxide |
| - $O_2$< | Oxygen (low alarms) |
| - $O_2$> | Oxygen (high alarms) |
| - $NH_3$ | Ammonia |
| - $CO_2$ | Carbon Dioxide |
| - $SO_2$ | Sulfur Dioxide |
| - $H_2S$ | Hydrogen Sulfide |
| - $CL_2$ | Chlorine |
| - ETO | Ethyl Alcohol |
| - VOC | Vol. Organic Compounds |
| - R4XX | Refrigerants |
| - R5XX | Refrigerants |
| - R123 | Refrigerants |
| - R134A | Refrigerants |
| - R22 | Refrigerants |
| - TEM< | Temperature (low alarms) |
| - TEM> | Temperature (high alarms) |
| - RHY | Relative Humidity |
| - PCT< | Percent (low alarms) |
| - PCT> | Percent (high alarms) |
| Analog input | Two (2) 4-20 mA, load < 55 mA / 200 Ω, reverse polarity protected |
| Analog reading | Current and mean (average) value |
| Digital input | One (1); for remote audio/visual alarm reset or relay override |
| Relay outputs (R1, R2) w/ status LEDs | (1) SPDT (R1), and (1) SPST-NC or SPST-NO (R2), jumper selectable |
| Contact rating | 30 VAC/VDC, 0.5 A, max. |
| Time delay switching | Selectable for make and break of each sensor point (SP1 to SP2) 0-9,999 seconds |
| Analog output | One (1), (0) 4-20 mA, load < 500 Ω; (0) 2-10 VDC, load > 50K Ω; jumper selectable; polarity protected, assignable to low, high or averaging of sensor inputs |
| Modbus Output (opt.) | 2-wire; RTU protocol |
| VDC switched output | One (1) 24 VDC, 50 mA max |
| Alarm acknowledgement | Menu-driven and system reset function for latched relays |
| Audible Alarm | 83 dB (A) (@ 0.6 ft), 2300 Hz |

**User Interface**

| | |
|---|---|
| Keypad type | Refer to section “Keypad User Interface” |
| Touch buttons | Four (4) |
| Status LEDs | Four (4), for system on, input-1 alarm, input-2 alarm, and sensor fault |
| Digital display | Liquid Crystal Display (LCD), two lines, 16 characters per line |
| - unit display | Menu selectable, per sensor; ppm, %v/v, %LEL, °F or %RH |

**Environmental**

| | |
|---|---|
| Permissible ambient | |
| - working temperature | 14°F to 122°F (-10°C to 50°C) |
| - storage temperature | 41°F to 86°F (5°C to 30°C) |
| - humidity | 15 to 95% RH, non-condensing |
| - working pressure | Atmospheric ± 10% |

**Physical**

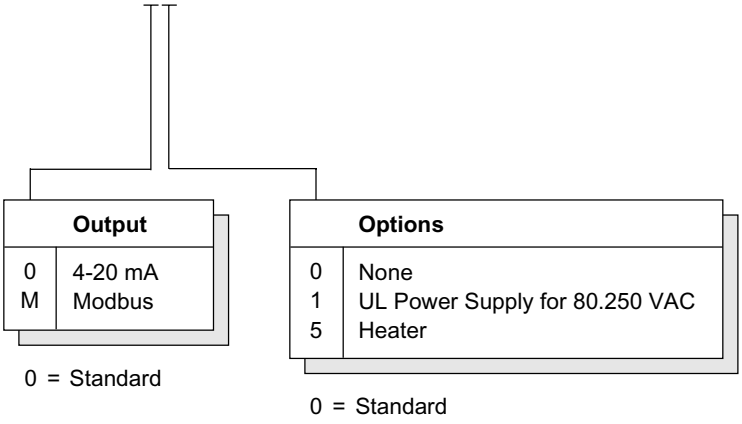
| | |
|---|---|
| Enclosure | |
| - material | Polycarbonate, UL 94 V2, fire-retardant |
| - conformity | UL 50 standards |
| - color | Light gray |
| - protection | NEMA 4X (IP65) |
| - installation | Wall (surface) mounted, or single gang electrical box |
| Dimensions (H x W x D) | 5.12 x 5.12 x 2.95 in. (130 x 130 x 75 mm) |
| Cable entry | 3 holes for 1/2 in. conduit for wall (surface) mounting and 1 hole on back side of base plate for single gang electrical box mounting |
| Wire connection | Terminal blocks, screw type for lead wire |
| Wire size | Min. 24 AWG (0.25 $mm^2$) Max 14 AWG (2.5 $mm^2$) |
| Wire distance | Max. loop resistance 450 Ω (= wire distance plus controller input resistance) |
| Weight | 0.6 lbs (0.3 kg) |

**Approvals / Listings**

| | |
|---|---|
| - unit rating | NRTL Performance Tested & Certified<br>Conforms to STD ANSI/UL 2075<br>City of Los Angeles<br>CE<br>VDI 2053, C-No. 418791<br>EMC-Compliance 2004/108/EEC<br>Low Voltage Directive 73/23/EEC |
| - relays (R1-R2) | UL Recognized, E41515<br>CSA, C22.2 No. 0, No. 14<br>(File No. LR31928) |
| - enclosure | UL Listed, E208470<br>CSA Certified, E208470 |
| **Warranty** | One year material and workmanship |

## ORDERING INFORMATION

### MGC3-02-2XX US




Example:

**MGC3 - 02-200 US,**
configuration includes:

Digital, 2-channel programmable gas controller
with menu-driven keypad user interface,
LCD & LEDs, 24 VAC/VDC, 50/60 Hz
NEMA 4X enclosure

Output: (1) 4-20 mA, (2) relays, (1) open collector
Input: (2) 4-20 mA sensor inputs;
standard setup and configuration

## OPTIONS

**Heater**

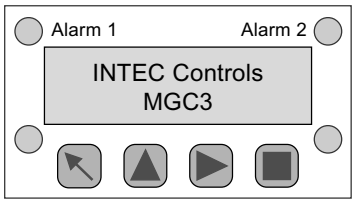
| | |
|---|---|
| - temperature control | 38°F ± 3.6°F (3°C ± 2°C) |
| - ambient temperature | ≥ -40°F/°C |
| - humidity | 15 to 95% RH, non-condensing |
| - working pressure | Atmospheric |
| - power consumption | 0.3 A; 8 VA |

**Modbus Comms.**

| | |
|---|---|
| Interface | Serial RS-485; 19200 Baud |
| Protocol | Modbus RTU |

## USER INTERFACE & CONTROLLER

### Keypad User Interface




**Alarm 1** "Orange LED" — Flashes when any stage level setpoint is exceeded; steady when any relay output is in manual override operation.

**Alarm 2** "Red LED" — Flashes when high alarm stage 2 or multiple alarm stage level setpoints are exceeded; steady when any relay output is in manual override operation

**Failure** "Yellow LED" — Flashes when system or sensor fails

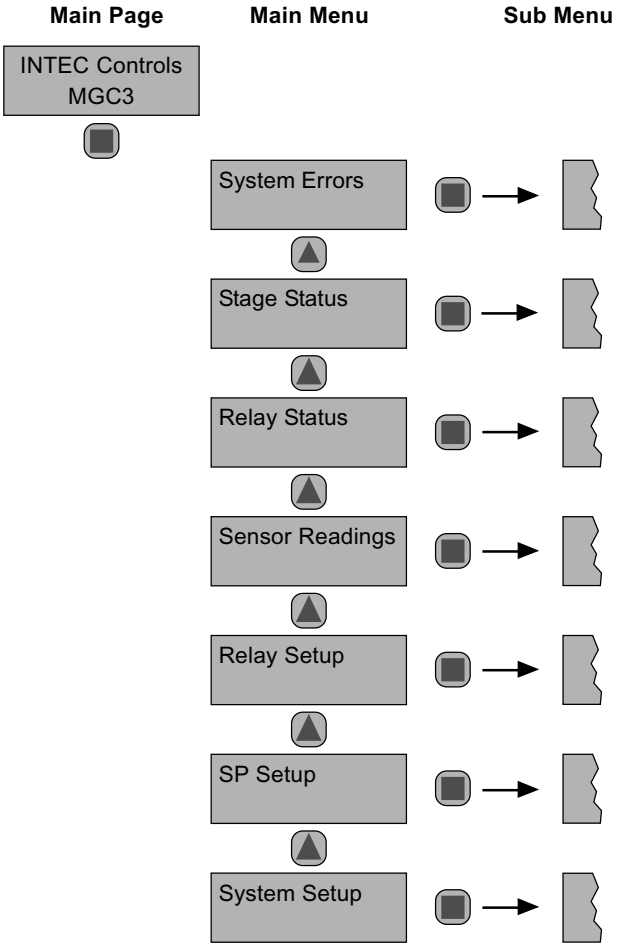
**Power** "Green LED" — Steady when power is ON

Scroll down in Main menu and Sub menus; decreases a value

Navigates through menus on the same level; moves cursor when inputing data

Exits programming and saves settings or return to previous level or menu

Enter Sub menus or stores data; horn silence (if assigned)




**System Operation**

All Programming is made via the keypad user interface in combination with the display screen. Security is provided via two password levels. The lower level password allows to override or to reset system status functions. The upper level password allows all programming and override functions.

**Main Page Display**

After powered on, displays IN*TEC* and part number and changes to sensor reading display unless a system error occurs; then the error is displayed.

**Main Menu**

Displays headings of "System Errors", "Stage Status" "Relay Status", "Sensor Readings", "Relay Setup", "SP (Sensor Point) Setup", and "System Setup".

**Sub Menu "System Errors"**

Displays errors, reset corrected errors, and historical error summary.

**Sub Menu "Stage Status"**

Displays status of each "SP" sensor point, stage level/ setpoint exceeded.

**Sub Menu "Relay Status"**

Displays status and manual control of each output relay.

**Sub Menu "Sensor Readings"**

The current and mean/average values are displayed for each "SP" sensor point with sensing type and engineering unit (ppm, %v/v, %LEL, F, %RH).

**Sub Menu "Relay Setup"**

Enter and /or change parameters of each relay.

- Assign de-energized or energized normal operation
- Select steady or flashing function
- Select horn function
- Select latching or non-latching mode
- Select digital input usage, and assign to any output relay
- Set delay ON/OFF time

**Sub Menu "SP Setup"**

Enter and/or change parameters of each sensor point.

- Activate sensor point
- Select sensor point type (gas, temperature, humidity)
- Select measuring range
- Select sensor signal
- Select stage/setpoint 1 to 4
- Select hysteresis
- Set delay ON/OFF time
- Select current or mean/average value
- Assign sensor point fault to stage level setpoint
- Assign setpoint 1 to 4 to any output relay
- Assign to analog output

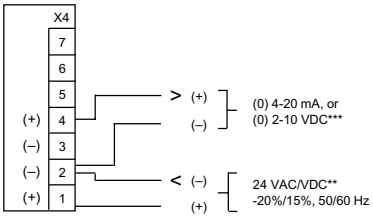
**Sub Menu "System Setup"**

Enter and/or change system parameters.

- Select service mode
- Display software version
- Set next maintenance date
- Select service phone number
- Select averaging function, time and overlay, of any SP
- Set date, time and time format
- Change customer password
- Set failure relay
- Select power ON time
- Select analog output function

## WIRING CONFIGURATION

### 24 VAC/VDC Input Power Supply, and Analog Output "AO01"

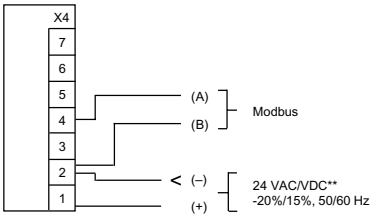



***Jumper output signal "AO01" range selectors:

V-A — Over both pins = VDC; Pins not covered = mA

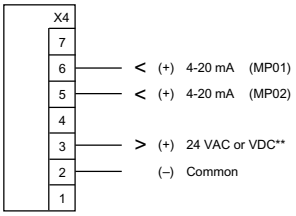
0-20% — Over both pins = 4-20 mA / 2-10 VDC; Pins not covered = 0-20 mA / 0-10 VDC

### 24 VAC/VDC Input Power Supply, and Modbus Communications

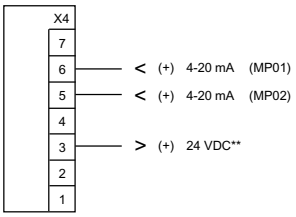



### Analog Inputs "MP01"/ "MP02"

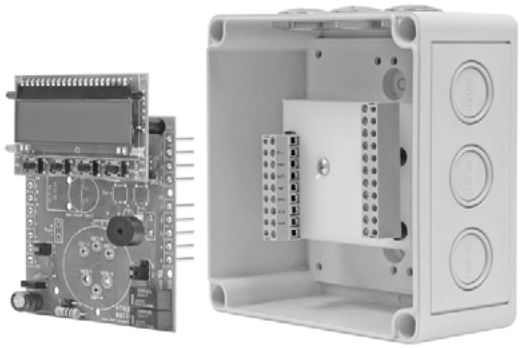
4-20 mA, 3-wire sensor/transmitter



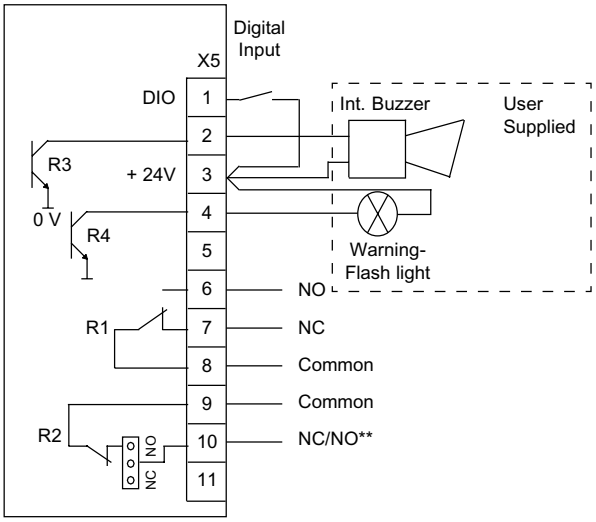

4-20 mA, 2-wire loop-powered sensor/transmitter




*Twisted, shielded wire is recommended for 2- or 3- wire configurations.*



### Binary-Relay Outputs "R01 and R02", 24 VDC switched Output "R3" and"R4", and Digital Input




R1 = SPDT, 30 VAC/DC, 0.5 A
R2 = NO/NC, 30 VAC/DC, 0.5 A
R3/R4 = Open Collector, 20 VDC, 30 mA

***/*** Caution:***

- Only the same type of power, VAC or VDC, as supplied to the unit, is available for the remote transmitter.
  i.e. When 24 VDC transmitter power is required, the unit must be powered with 24 VDC.
- 2-wire loop powered transmitter transmitter can use the internal power.
- 3-wire transmitters that allow power common to DC common can use the same power supply to power the MGC3 and the transmitter.
- 3-wire transmitters that require separate power common from DC common must use a separate power source.