Two-Channel Gas Controller

PolyGard
MGC3

City of Los Angeles Approved

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

Modbus

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.

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
- 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	(2) 4-20 mA, 200 Ω load, overload and short-circuit 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 acknowledgment	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 “User Interface & Controller”
Touch buttons	Four (4)
Status LEDs	Four (4), for system on, alarm-1, alarm-2, 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 lb (0.3 kg)

SPECIFICATIONS

Approvals / Listings

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

OPTIONS

Heater

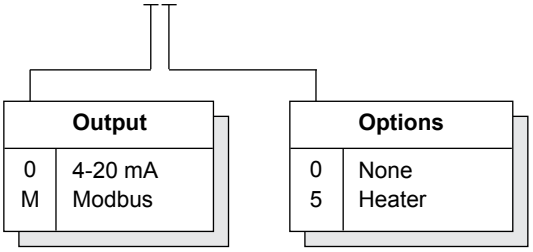
- temperature control	38°F ± 3.6°F (3°C ± 2°C)
- ambient temperature	≥ -40°F/°C
- humidity	15 to 95% RH, non-condensing
- working pressure	Atmospheric
- power consumption	0.3 A; 8 VA

Modbus Communications

Interface	Serial RS-485; 19200 Baud
Protocol	Modbus RTU

ORDERING INFORMATION

MGC3-02-2XX US



0 = Standard

0 = Standard

Example:

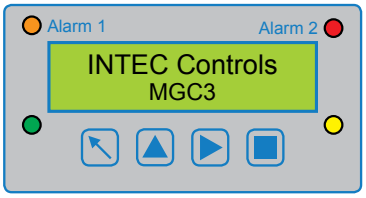
MGC3 - 02-200 US,
configuration includes:

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

USER INTERFACE & CONTROLLER

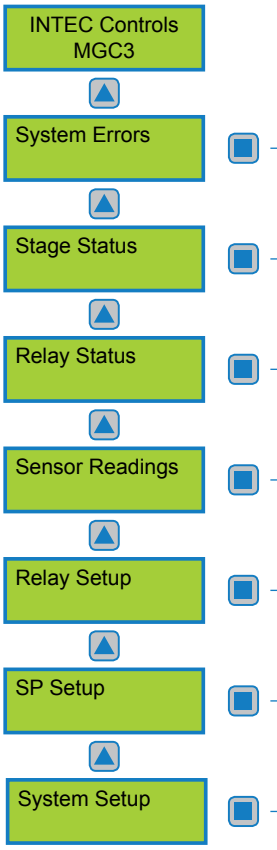
Keypad User Interface



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

	Exit programming mode and saves settings; return to previous level or menu
	Enter Main Menus; scrolls through Main Menus and Sub Menus; increase or decrease a value
	Navigates through menus on the same level; moves cursor when inputing data
	Enter Sub Menus; accepts and stores data; silence horn (if assigned)

Main Page & Main Menu



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 (1234) allows to override or to reset system status functions. The upper level password (9001) 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"

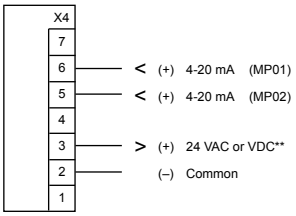
Enter and/or change system parameters.

- 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

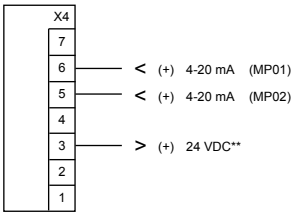
WIRING CONFIGURATION

Analog Inputs "MP01"/ "MP02"
without Modbus

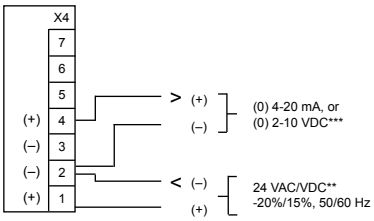
4-20 mA, 3-wire sensor/transmitter



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



24 VAC/VDC Input Power Supply,
without Modbus

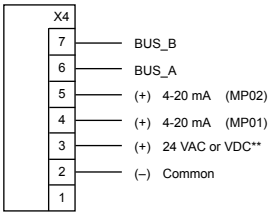


***Jumper output signal "AO01" range selectors:

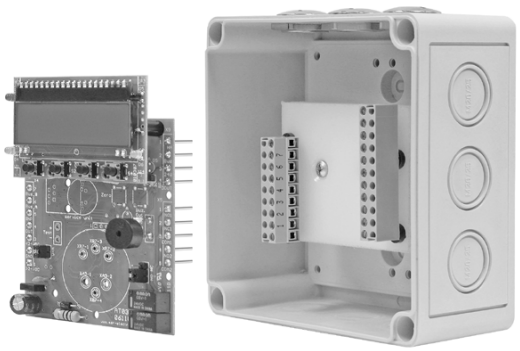
Over both pins = VDC
Pins not covered = mA

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

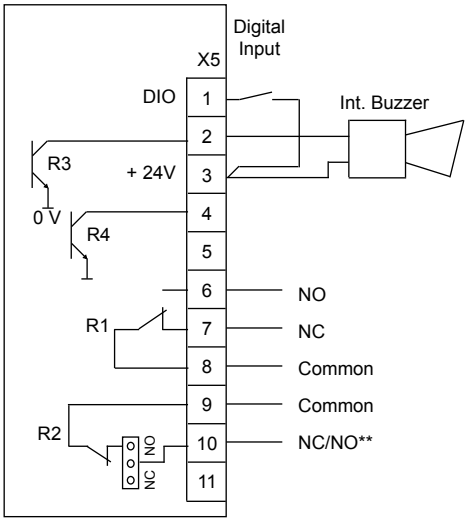
24 VAC/VDC Input Power Supply,
with Modbus Communications



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...30 VDC, 50 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 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.