# Combustible Single-Point Gas Detection System

**PolyGard**
**SPC3-3300**

## DESCRIPTION

Wall-mounted gas monitor with built-in combustible gases and vapor sensor, accepts one analog remote device such as a secondary gas sensor, temperature or humidity sensor.

## APPLICATION

To detect and control levels of combustible gases, vapors, and other gases in a wide variety of commercial and industrial applications such as Combustible gas level in boiler rooms (i.e. Methane), dry cell battery rooms (i.e. Hydrogen), gas/fuel spill locations (i.e. Gasoline, Hexane), laboratories and industries (i.e. Butane, Propane), etc. The controller can communicate with any compatible electronic analog control, DDC/PLC control or automation system via binary and/or analog output signal.

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

## FEATURES

- *Continuous monitoring*
- *One (1) built-in combustible catalytic bead sensor*
- *Performance tested sensor to UL 2075*
- *Easy plug-in sensor*
- *One (1) remote analog input, 4-20 mA*
- *One (1) digital input*
- *Two (2) relay outputs:*
  *- Four stage control*
  *- Fail-safe assignable*
- *One (1) analog output, (0)4-20 mA / (0)2-10 VDC*
  *- Selectable for low, high, or averaging*
- *One (1) 24 VDC switched output*
- *Liquid Crystal Display (LCD)*
- *LED status indicators*
- *Accepts toxic or combustible gas, refrigerant, temperature or humidity secondary remote sensor input*
- *Built-in horn*
- *Keypad user interface*
- *Simple menu-driven programming*
- *Modular technology*
- *Overload & short-circuit protected*
- *NEMA 4X enclosure*
- *Easy maintenance*

## SPECIFICATIONS

**Electric**

| | |
|---|---|
| Power supply | 24 VAC/VDC, -20%/+15%<br>50/60 Hz,<br>reverse polarity protected |
| Power consumption | 5 VA (0.2 A) w/ (1) remote sensor connected |

**Sensor Performance**

| | |
|---|---|
| Gas detected | Combustible gases and vapors; refer to "Ordering Information" table |
| Sensor element | Catalytic bead (pellistor), diffusion |
| Range | 0-100% LEL; |
| Accuracy | ± 1 % of reading |
| Repeatability | ± 2 % of reading |
| Long term zero point drift | < 0.5 % $LEL_{methane}$/month |
| Long term sensitivity drift | < 2 % $LEL_{methane}$/month |
| Response time | $t_{90}$ < 10 sec.methane |
| Sensor life expectancy | 3 yrs. normal operating environment |
| Sensor coverage | Dependent on the target gas |

**Installation Location**

| | |
|---|---|
| Mounting height | Dependent on the target gas |

| Combustible Gases/Vapors | | % v/v* |
|---|---|---|
| Acetone | $(CH_3)_2CO$ | 2.6 |
| Ammonia | $NH_3$ | 15.0 |
| Benzene | $C_6H_6$ | 1.2 |
| Ethylene | $C_2H_4$ | 2.3 |
| Ethyl Acetate | $CH_3COOC_2H_5$ | 2.2 |
| Ethyl Alcohol | $C_2H_5OH$ | 3.3 |
| Hydrogen | $H_2$ | 4.0 |
| Isopropyl Alcohol | $(CH_3)_2CHOH$ | 2.2 |
| Jet A | - | 1.4 |
| JP8 | - | 0.9 |
| Methane | $CH_4$ | 5.0 |
| Methanol | $CH_3OH$ | 6.7 |
| Methyl Ethyl Ketone | $C_4H_8O$ | 1.9 |
| n-Butane | $C_4H_{10}$ | 1.8 |
| n-Heptane | $C_7H_{16}$ | 1.05 |
| n-Hexane | $C_6H_{14}$ | 1.1 |
| n-Octane | $C_8H_{18}$ | 0.95 |
| n-Pentane | $C_5H_{12}$ | 1.4 |
| Propane | $C_3H_8$ | 2.1 |
| Toluene | $C_7H_8$ | 1.2 |

* x% v/v = 100% LEL
LEL = Lower Explosive Limit
v/v = Volume by Volume

## SPECIFICATION

| | |
|---|---|
| **Type of Control** | |
| General | Four-stage (S1 to S4) control, assignable up to two (2) binary/ relay, horn/audible alarm, and 24 VDC / 50 mA switched outputs, i.e. low-high stage for relay output, horn / audible alarm and switched 24 VDC at any stage for remote alarming |
| Analog input | One (1) 4-20 mA, for additional remote sensor, load < 55 mA / 200 Ω, reverse polarity protected |
| Analog reading | Current and mean (average) value |
| Stage level / setpoint | Field adjustable over full range, four (4) stages (S1 to S4) per analog input, assignable to current or mean (average) value |
| - hysteresis/ switching differential | Selectable for each sensor point |
| Digital input | One (1); can be assigned to any relay (R1, R2). |
| - application | Remote audio/visual alarm reset or override function |
| 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. |
| - each stage level (S1-S4) | Assignable to any relay |
| - sensor fail-safe | Assignable to any stage level |
| Time delay switching | Selectable for make and brake 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 |
| VDC switched output | One (1) 24 VDC, 50 mA max |
| Audible alarm | 83 db @ unit, enabled or disabled, selectable; assignable to stage level S1, S2, S3 or S4 |
| Alarm acknowledgment | Menu-driven and system reset function for latched relays |
| **User Interface** | |
| Keypad type | Refer to illustration “Keypad User Interface” |
| Touch buttons | Four (4) |
| Status LED’s | Four (4), for system on, stage status, and failure |
| Digital display | Liquid Crystal Display (LCD), two lines, 16 characters per line, 1 digit resolution |
| - unit display | Menu selectable, per sensor; ppm, %v/v, %LEL, °F or %RH |

(▲) Performance tested with Methane and Propane gases

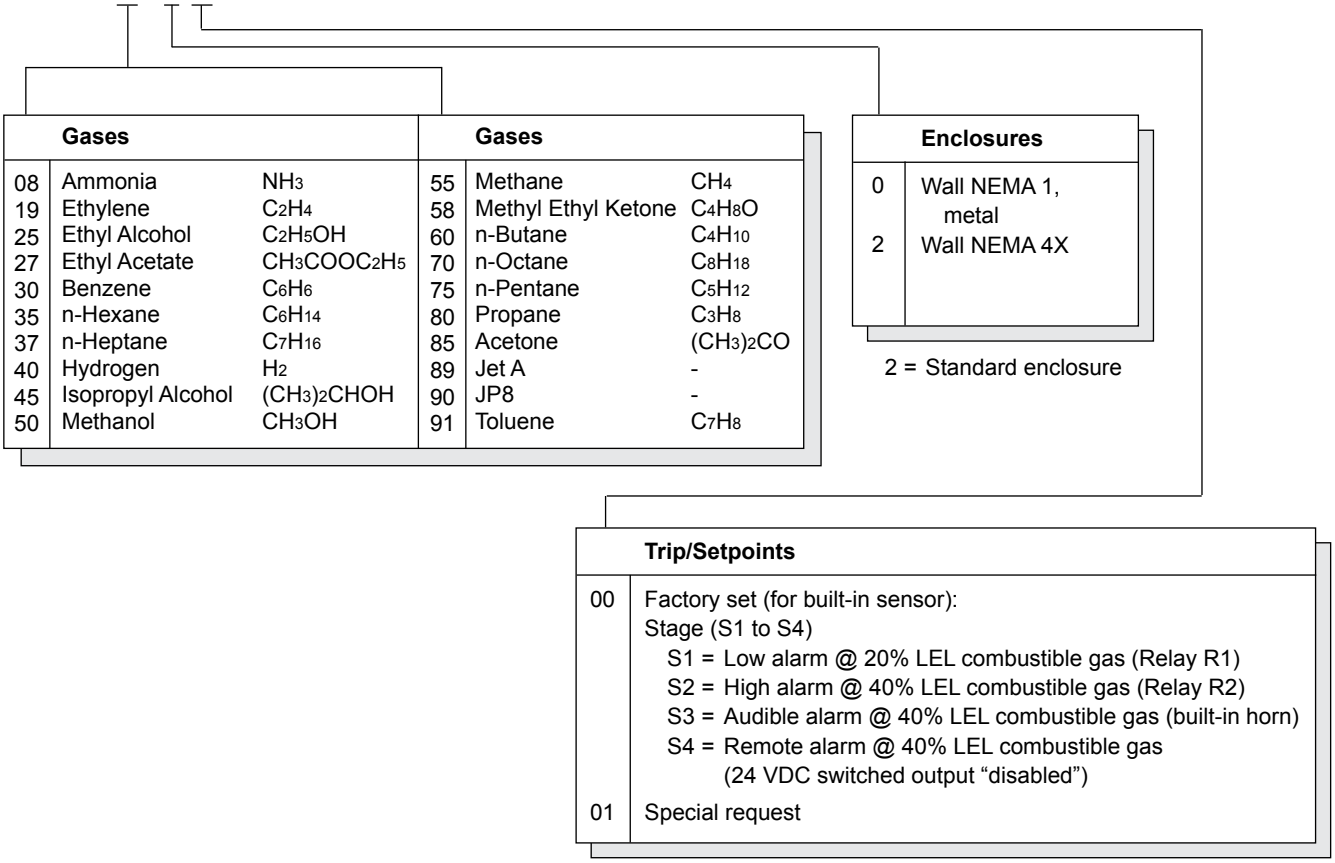
| | |
|---|---|
| **Environmental** | |
| Permissible ambient | |
| - working temperature | 14°F to 122°F (-10°C to 50°C) |
| - storage temperature | 23°F to 86°F (-5°C to 30°C) |
| - humidity | 15 to 95% RH, non-condensing |
| - working pressure | Atmospheric ± 10% |
| **Physical** | |
| Enclosure (panel) | |
| - material | Polycarbonate, UL 94-HB, 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 Perf Tested & Certified Conforms to STD ANSI/UL 2075 CE EMV-Compliance 2004/108/EWG Low voltage directive 73/23/EWG |
| - 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, 12 months normal exposure for sensor element |

## OPTIONS

| | |
|---|---|
| **Enclosure Metal, wall-mount** | |
| - material | Galvanized steel w/zinc coating, corrosion resistant |
| - color | Light gray |
| - protection | NEMA 1, general purpose |
| - installation | Wall (surface) mounted, or single gang electrical box |
| Dimensions (H x W x D) | 5.59 x 5.59 x 2.48 in. (142 x 142 x 63 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 |

## ORDERING INFORMATION

### SPC3-3300 - 2 00 US



| Gases | | | Gases | | |
|---|---|---|---|---|---|
| 08 | Ammonia | $NH_3$ | 55 | Methane | $CH_4$ |
| 19 | Ethylene | $C_2H_4$ | 58 | Methyl Ethyl Ketone | $C_4H_8O$ |
| 25 | Ethyl Alcohol | $C_2H_5OH$ | 60 | n-Butane | $C_4H_{10}$ |
| 27 | Ethyl Acetate | $CH_3COOC_2H_5$ | 70 | n-Octane | $C_8H_{18}$ |
| 30 | Benzene | $C_6H_6$ | 75 | n-Pentane | $C_5H_{12}$ |
| 35 | n-Hexane | $C_6H_{14}$ | 80 | Propane | $C_3H_8$ |
| 37 | n-Heptane | $C_7H_{16}$ | 85 | Acetone | $(CH_3)_2CO$ |
| 40 | Hydrogen | $H_2$ | 89 | Jet A | - |
| 45 | Isopropyl Alcohol | $(CH_3)_2CHOH$ | 90 | JP8 | - |
| 50 | Methanol | $CH_3OH$ | 91 | Toluene | $C_7H_8$ |

| Enclosures | |
|---|---|
| 0 | Wall NEMA 1, metal |
| 2 | Wall NEMA 4X |

2 = Standard enclosure

| Trip/Setpoints | |
|---|---|
| 00 | Factory set (for built-in sensor):<br>Stage (S1 to S4)<br>S1 = Low alarm @ 20% LEL combustible gas (Relay R1)<br>S2 = High alarm @ 40% LEL combustible gas (Relay R2)<br>S3 = Audible alarm @ 40% LEL combustible gas (built-in horn)<br>S4 = Remote alarm @ 40% LEL combustible gas (24 VDC switched output “disabled”) |
| 01 | Special request |

Standard control system, ordering part number:

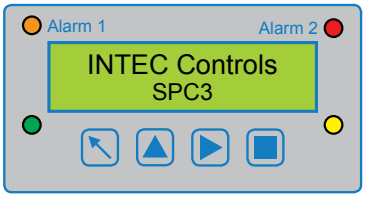
**SPC3 - 3355 - 200 US,**
configuration includes:

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

Built-in: (1) Combustible gas sensor/transmitter for Methane ($CH_4$)
(1) Horn, audible alarm
Input: (1) 4-20 mA, for remote sensor
Outputs: (2) Relays, 30 VAC/VDC 0.5 A;
1-SPDT (R1) and
1-SPST-NO/NC (R2),
jumper selectable
(1) Switched 24 VDC, 50 mA
(1) (0)4-20 mA or (0)2-10 VDC, selectable

## USER INTERFACE & CONTROLLER

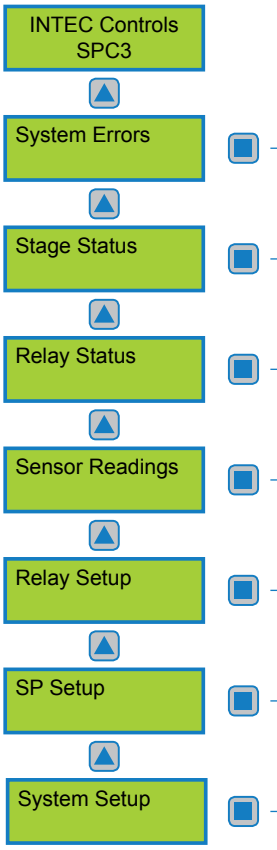
### Keypad User Interface




| | |
|---|---|
| **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

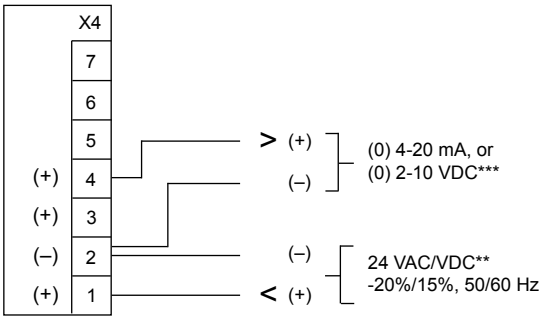
### Sub Menu "System Setup"

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

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

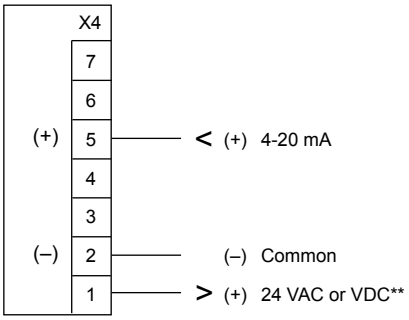



***Jumper output signal "AO01" range selectors:

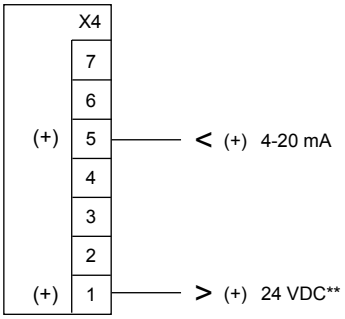
| | | |
|---|---|---|
| V-A | Over both pins | = VDC |
| | Pins not covered | = mA |
| 0-20% | Over both pins | = 4-20 mA / 2-10 VDC |
| | Pins not covered | = 0-20 mA / 0-10 VDC |

### Optional 4-20 Remote AT-...V3 Series Sensor/Transmitter Input "SP02"

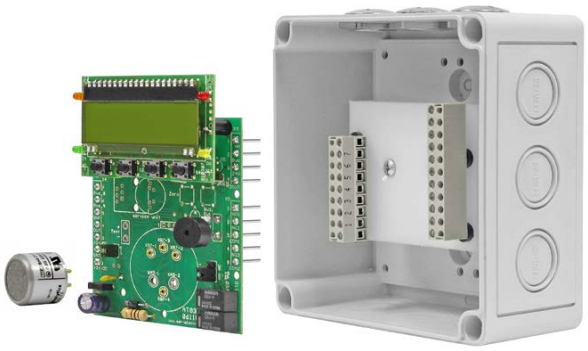
4-20 mA, 3-wire sensor/transmitter



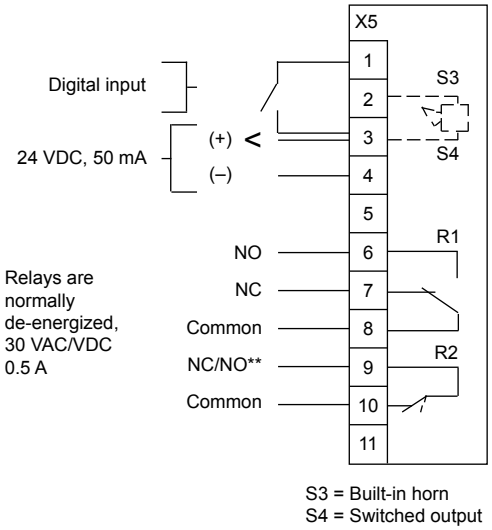

4-20 mA, 2-wire loop-powered sensor/transmitter




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



### Binary-Relay Outputs "R01 and R02", 24 VDC switched Output "S4", and Digital Input




S3 = Built-in horn
S4 = Switched output

**Jumper SPST relay (R2) NC/NO selector:

| | | |
|---|---|---|
| NC | Covers top two pins | = SPST-NC |
| NO | Covers bottom two pins | = SPST-NO |

***/*** Attention:***

- 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 SPC3 and the transmitter.
- 3-wire transmitters that require separate power common from DC common must use a separate power source.