Nitrogen Dioxide (NO₂) Single-Point Gas Detection System

DESCRIPTION
Wall-mounted gas monitor with built-in nitrogen dioxide (NO₂)/diesel fume gas sensor, accepts one analog remote device such as a secondary gas sensor, temperature or humidity sensor.

APPLICATION
To detect and control levels of nitrogen dioxide (NO₂) and other gases in a wide variety of commercial and industrial applications such as vehicle diesel exhaust in parking structures, engine repair shops, equipment rooms and ventilation systems, etc. The controller can communicate with any compatible electronic analog control, DDC/PLC control or automation system via binary and/or analog output signal.

FEATURES
- Continuous monitoring
- One (1) built-in NO₂ electrochemical sensor
- 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, 50 mA max.
- 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

<table>
<thead>
<tr>
<th>Electric</th>
<th>24 VAC/VDC, -20%/+15% 50/60 Hz, reverse polarity protected</th>
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</thead>
<tbody>
<tr>
<td>Power consumption</td>
<td>5 VA (0.2 A) w/(1) remote sensor connected</td>
</tr>
<tr>
<td>Sensor Performance</td>
<td>Nitrogen Dioxide (NO₂) Electrochemical, diffusion</td>
</tr>
<tr>
<td>Range</td>
<td>Span 0-10 or 0-20 ppm factory calibrated, 0-10 standard</td>
</tr>
<tr>
<td>Stability &amp; Resolution</td>
<td>± 0.1 ppm of reading</td>
</tr>
<tr>
<td>Repeatability</td>
<td>± 2.0 % of reading</td>
</tr>
<tr>
<td>Long term output drift</td>
<td>&lt; 2% signal loss/month</td>
</tr>
<tr>
<td>Response time</td>
<td>t&lt;sub&gt;90&lt;/sub&gt; &lt; 60 sec.</td>
</tr>
<tr>
<td>Sensor life expectancy</td>
<td>2 years, normal operating environment</td>
</tr>
<tr>
<td>Sensor coverage</td>
<td>4,000 sq.ft., max. 7,500 sq.ft. (372 m², max. 697 m²), under “ideal conditions”</td>
</tr>
<tr>
<td>Installation Location</td>
<td>Mounting height 1 to 3 ft. (0.3 to 1.0 m) above</td>
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</tbody>
</table>

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
### SPECIFICATION

<table>
<thead>
<tr>
<th>Type of Control (cont...)</th>
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<tbody>
<tr>
<td><strong>Digital input</strong></td>
<td>One (1); can be assigned to any relay (R1, R2).</td>
</tr>
<tr>
<td>- application</td>
<td>Remote audio/visual alarm reset or override function</td>
</tr>
<tr>
<td><strong>Relay outputs (R1, R2)</strong></td>
<td>(1) SPDT (R1), and (1) SPST-NC or SPST-NO (R2), jumper selectable</td>
</tr>
<tr>
<td><strong>Contact rating</strong></td>
<td>30 VAC/VDC, 0.5 A, max.</td>
</tr>
<tr>
<td>- each stage level (S1-S4)</td>
<td>Assignable to any relay</td>
</tr>
<tr>
<td>- sensor fail-safe</td>
<td>Assignable to any stage level</td>
</tr>
<tr>
<td><strong>Time delay switching</strong></td>
<td>Selectable for make and brake of each sensor point (SP1 to SP2) 0-9,999 seconds</td>
</tr>
<tr>
<td><strong>Analog output</strong></td>
<td>One (1), (0)4-20 mA, load &lt; 500 Ω; (0)2-10 VDC, load &gt; 50K Ω; jumper selectable; polarity protected, assignable to low, high or averaging of sensor inputs</td>
</tr>
<tr>
<td><strong>VDC switched output</strong></td>
<td>One (1) 24 VDC, 50 mA max</td>
</tr>
<tr>
<td><strong>Audible alarm</strong></td>
<td>83 db @ unit, enabled or disabled, selectable; assignable to stage level S1, S2, S3 or S4</td>
</tr>
<tr>
<td><strong>Alarm acknowledgment</strong></td>
<td>Menu-driven and system reset function for latched relays</td>
</tr>
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</table>

### 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 |

### Environmental

| **Permissible ambient** | 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)** | 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 mm²) Max 14 AWG (2.5 mm²) |

### Wire distance

| Max. loop resistance 450 Ω (= wire distance plus controller input resistance) |

### Weight

| 0.6 lb (0.3 kg) |

### Approvals / Listings

| **- unit rating** | NRTL Certification to STD ANSI/UL 61010-1 CE EMC-Compliance 2004/108/EWG LVD 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 |
Standard control system, ordering part number:

**SPC3-1130 - 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) NO₂ sensor/transmitter
- (1) Horn, audible alarm

**Input:**
- (1) 4-20 mA, for remote sensor

**Outputs:**
- (2) Relays, 30 VAC/VDC, 0.5 A max.;
  - 1-SPDT (R1)
  - 1-SPST-NO/NC (R2), jumper selectable
- (1) Switched 24 VDC, 50 mA max.
- (1) (0)4-20 mA or (0)2-10 VDC, selectable

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**ORDERING INFORMATION**

**SPC3-1130 - 200 US**

<table>
<thead>
<tr>
<th>Enclosures</th>
<th>Trip/Setpoints</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 Wall NEMA 4X</td>
<td>00 Factory set (for built-in sensor):</td>
</tr>
<tr>
<td>2 Standard enclosure</td>
<td>Stage (S1 to S4):</td>
</tr>
<tr>
<td></td>
<td>- S1 = Low alarm @ 2 ppm NO₂ (Relay R1)</td>
</tr>
<tr>
<td></td>
<td>- S2 = High alarm @ 5 ppm NO₂ (Relay R2)</td>
</tr>
<tr>
<td></td>
<td>- S3 = Audible alarm @ 5 ppm NO₂ (built-in horn)</td>
</tr>
<tr>
<td></td>
<td>- S4 = Remote alarm @ 5 ppm NO₂ (24 VDC switched output)</td>
</tr>
<tr>
<td>01 Special request</td>
<td></td>
</tr>
</tbody>
</table>
### USER INTERFACE & CONTROLLER

#### Keypad User Interface

- **INTEC Controls SPC3**
- **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

<table>
<thead>
<tr>
<th>Action</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exit programming mode and saves settings; return to previous level or menu</td>
<td><strong>Alarm 1</strong> “Orange LED”</td>
</tr>
<tr>
<td>Enter Main Menus; scrolls through Main Menus and Sub Menus; increase or decrease a value</td>
<td><strong>Alarm 2</strong> “Red LED”</td>
</tr>
<tr>
<td>Navigates through menus on the same level; moves cursor when inputing data</td>
<td><strong>Failure</strong> “Yellow LED”</td>
</tr>
<tr>
<td>Enter Sub Menus; accepts and stores data; silence horn (if assigned)</td>
<td><strong>Power</strong> “Green LED”</td>
</tr>
</tbody>
</table>

#### Main Page & Main Menu

- **INTEC Controls SPC3**
- **System Errors**
- **Stage Status**
- **Relay Status**
- **Sensor Readings**
- **Relay Setup**
- **SP Setup**
- **System Setup**

#### 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 INTEC and part number and changes to sensor reading display unless a system error occurs; then the error is displayed.

#### Main Menu


#### 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 maintenance after days
- Select service phone number
- Select averaging function, time and overlay, of any SP
- Set maintenance period days
- 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
  - 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

### X4 Wiring Diagram
- (+): 5 ➔ (0) 4-20 mA, or (0) 2-10 VDC***
- (-): 2 ➔ 24 VAC/VDC** -20%/15%, 50/60 Hz

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

### X4 Wiring Diagram
- (+): 5 ➔ (0) 4-20 mA
- (-): 2 ➔ (0) 4-20 mA

**Note:**
- 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

### X5 Wiring Diagram
- Digital input
- 24 VDC, 50 mA
- Relays are normally de-energized, 30 VAC/VDC 0.5 A

**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.