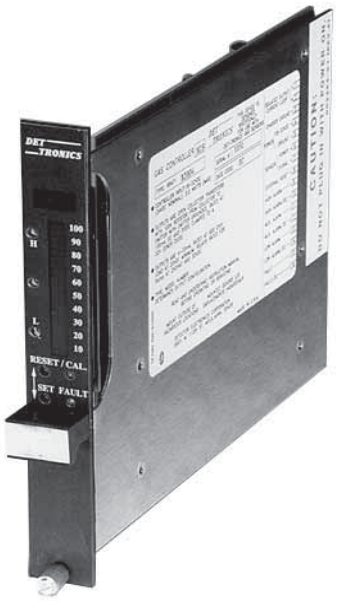
DET-TRONICS®
A UTC Fire & Security Company

Instructions 95-8529

Toxic Gas Controllers
R8471D/F/G Chlorine/Sulfur Dioxide/Nitrogen Dioxide



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DET-TRONICS®

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INSTRUCTIONS

Toxic Gas Controllers

R8471D Chlorine

R8471F Sulfur Dioxide

R8471G Nitrogen Dioxide

Section I
General Information

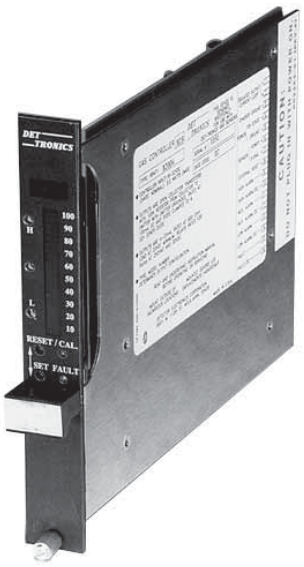
DESCRIPTION

The R8471D, R8471F and R8471G Gas Controllers are designed for use with Det-Tronics Electrochemical Sensors for the detection of specific toxic gases in the atmosphere. Sensor/controller combinations are available for the detection of Chlorine, Sulfur Dioxide, and Nitrogen Dioxide. Refer to Table 1 for details.

The single channel, rack mounted controller provides a continuous reading of the sensor input. Controller response includes actuation of solid state or optional relay outputs for direct control of field response devices, a full array of faceplate indicators, as well as an optional 4 to 20 milliampere output for transmitting system information to other equipment. Three independent alarm outputs with field selectable setpoints are provided.

FEATURES

- Digital display, bar graph display, and high intensity LEDs indicate important system status information.
- Three independent alarm outputs with field selectable setpoints.
- Base model is furnished with solid state alarm and fault outputs.
- Premium model is furnished with relay outputs and a 4 to 20 ma output.



- Current output is selectable for isolated/non-isolated operation.
- Microprocessor based controller is easily field programmable.
- Rack compatible with Det-Tronics R7400 Series flame controllers and other R8471 Series gas controllers.

Table 1—Controllers and Sensors for Detection of Toxic Gases

Gas Detected	Range	Controller	Sensor
Chlorine	0 - 10	R8471D	C7067E
Sulfur Dioxide	0 - 100	R8471F	C7068E
Nitrogen Dioxide	0 - 20	R8471G	C7069E

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SPECIFICATIONS

SENSOR

RANGE—
Cl_2: 0 to 10 PPM
SO_2: 0 to 100 PPM.
NO_2: 0 to 20 PPM..

RESPONSE TIME—
Cl_2: T20 in ≤ 0.9 minutes, T50 in ≤ 2.2 minutes
SO_2: T20 in ≤ 30 seconds, T50 in ≤ 5 minutes.
NO_2: T20 in ≤ 30 seconds, T50 in ≤ 5 minutes.

ZERO STABILITY—
< 1 PPM per month.

CROSS SENSITIVITY—
See Tables 2 to 4.

TEMPERATURE RANGE—
-4°F to +122°F (-20°C to +50°C).

HUMIDITY RANGE—
15 to 90% RH.

PRESSURE RANGE—
Atmospheric ±10%.

VOLTAGE REQUIREMENTS—
12 to 32 vdc, 24 vdc nominal (across sensor).

POWER REQUIREMENTS—
0.25 to 0.8 watt, 0.5 watt nominal (at full scale output).

MAXIMUM LOOP RESISTANCE—
300 ohms at 18 vdc, 600 ohms at 24 vdc, 1000 ohms at 32 vdc.

ENCLOSURE MATERIAL—
Cl_2: Aluminum
SO_2/NO_2: Stainless Steel.

Table 2—Cross Sensitivity of Cl_2 Sensor to 100 ppm Concentrations

Gas	Signal in ppm
Carbon Monoxide (CO)	0
Hydrogen Sulfide (H_2S)	≈-2.0
Sulphur Dioxide (SO_2)	<-.05
Nitric Oxide (NO)	0
Nitrogen Dioxide (NO_2)	≈10.5
Hydrogen (H_2)	0
Hydrogen Cyanide (HCN)	<0.1
Hydrogen Chloride (HCl)	≈0.1
Ethylene (C_2H_2)	0

DIMENSIONS—
See Figure 1 for dimensions of the sensor and Figure 2 for dimensions of the junction box.

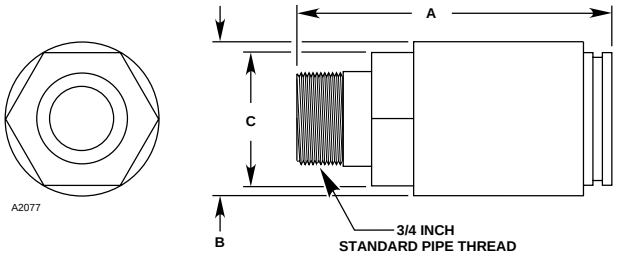
HAZARDOUS LOCATION RATING—
The C7067E (Cl_2) is designed to meet FM and CSA intrinsic safety requirements for Class I, Div. 1, Groups A, B, C and D; and BASEEFA/CENELEC EEx ia IIC T6.
The C7068E (SO_2) and C7069E (NO_2) are designed to meet FM and CSA requirements for Class I, Div. 1, Groups C and D.

Table 3—Cross Sensitivity of SO_2 Sensor

Gas	Concentration	Expected Signal
Carbon Monoxide (CO)	300 ppm	<5
Hydrogen Sulfide (H_2S)	15 ppm	0
Nitric Oxide (NO)	35 ppm	0
Chlorine (Cl_2)	1 ppm	-0.5
Hydrogen (H_2)	200 ppm	0
Hydrogen Cyanide (HCN)	10 ppm	<5
Hydrogen Chloride (HCl)	5 ppm	0
Ethylene (C_2H_4)	100 ppm	0
Methanol	saturated vapor	4

Table 4—Cross Sensitivity of NO_2 Sensor

Gas	Concentration	Expected Signal
Carbon Monoxide (CO)	300 ppm	0
Hydrogen Sulfide (H_2S)	15 ppm	-3
Sulfur Dioxide (SO_2)	5 ppm	0
Nitric Oxide (NO)	35 ppm	0
Chlorine (Cl_2)	1 ppm	1
Hydrogen (H_2)	200 ppm	0
Hydrogen Cyanide (HCN)	10 ppm	0
Hydrogen Chloride (HCl)	5 ppm	0
Ethylene (C_2H_4)	100 ppm	0
Methanol	saturated vapor	17



SENSOR	A	B	C
Cl2	5.0 (12.7)	2.2 (5.6)	1.1 (2.8)
S02/N02	3.75 (9.6)	2.0 (5.0)	1.75 (4.5)

Figure 1—Sensor Dimensions in Inches (Centimeters)

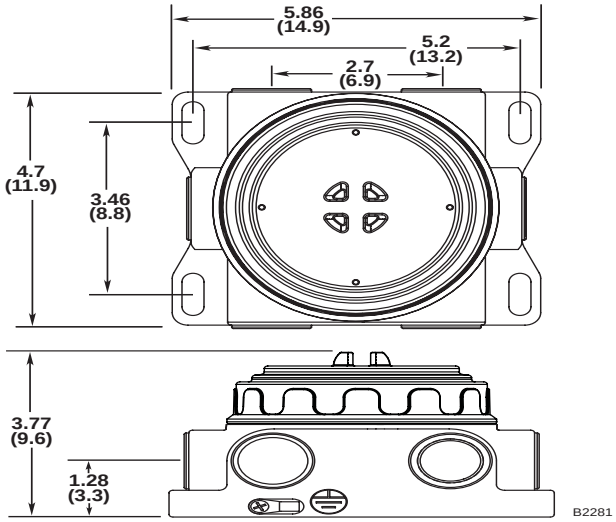


Figure 2—Junction Box Dimensions in Inches (Centimeters)

SENSOR STORAGE LIFE—
6 months when stored in the original factory container at a temperature between 32°F and 68°F (0°C to 20°C) and a relative humidity between 15 and 90 percent.

CONTROLLER

OPERATING VOLTAGE—
24 vdc. Can operate in the range of 18 to 32 vdc.

NOTE

When an I.S. barrier is used, the input voltage (measured at the controller) must be between 23 and 26.6 vdc to ensure proper operation of the sensor and barrier.

POWER CONSUMPTION (CONTROLLER ONLY)—
Base model: 0.7 watt nominal, 1.3 watts maximum (25 ma nominal, 50 ma maximum at 24 vdc.)
Premium model: 1.2 watts nominal, 3.5 watts maximum (50 ma nominal, 145 ma maximum at 24 vdc.)

Maximum startup current is 0.6 amperes for 10 milliseconds. Power supplies with fold back current limiting are not recommended.

MAXIMUM RIPPLE—
Not to exceed 5 volts peak-to-peak.

TEMPERATURE RANGE—
Operating: +32°F to +140°F (0°C to +60°C)
Storage: -49°F to +185°F (-45°C to +85°C).

OPERATING RANGE—
Cl_2: 0 to 10 ppm.
SO_2: 0 to 100 ppm.
NO_2: 0 to 20 ppm.

SOLID STATE OUTPUTS (BASE MODEL ONLY)—
The outputs are open collector transistors, rated 100 milliamperes at 32 volts dc maximum.

RELAY CONTACTS (PREMIUM MODEL ONLY)—
SPST relays with selectable normally open/normally closed contacts, rated 5 amperes at 30 vdc/250 vac.

CURRENT OUTPUT (PREMIUM MODEL ONLY)—
4 to 20 milliamperes, with a maximum external loop resistance of 600 ohms at 20 to 32 vdc, selectable for isolated or non-isolated operation.

DIMENSIONS—
See Figure 3.

SHIPPING WEIGHT (APPROXIMATE)—
2.0 pounds (0.9 kilogram).

SYSTEM APPROVAL—
The R8471 Controller, base and premium model in 3U and 4U height, has been tested and approved by FMA. It can be used with any FMA approved sensing device capable of generating a 4 to 20 ma input. FMA approval of the R8471 Controller, however, does not include or imply approval of input devices such as sensors or transmitters, or devices connected to the controller outputs. To maintain FMA system approval, all equipment connected to the controller must be FMA approved.

NOTE

Ensure sensor hazardous (classified) location rating is applicable for the intended use.

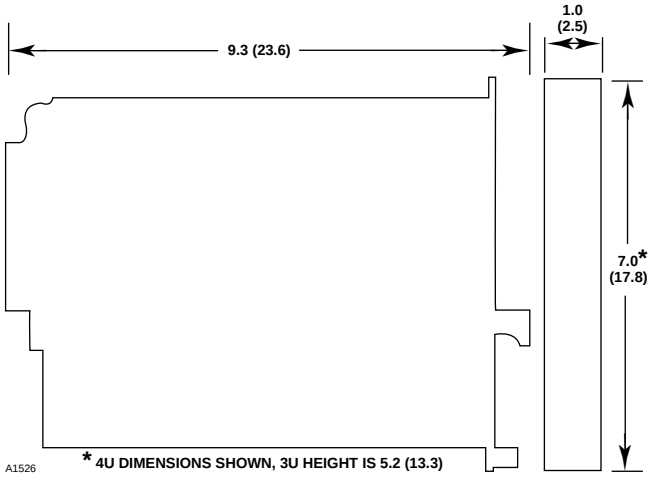


Figure 3—Controller Dimensions in Inches (Centimeters)

SYSTEM OPERATION

SENSOR

The sensor consists of a housing and a field replaceable electrochemical sensor cell. The sensor output is a 4 to 20 ma signal that corresponds to gas levels from 0 to 100% full scale.

The C7067E Sensor (Cl_2) is intrinsically safe (when used with an approved intrinsically safe barrier) and is designed for use in Class I, Division 1, Groups A, B, C and D locations.

The explosion proof C7068E (SO_2) and C7069E (NO_2) Sensors are designed for use in Class I, Division 1, Groups C and D locations.

CONTROLLER

Faceplate Description

The controller faceplate provides LEDs for identifying system status conditions, a digital display and bar graph display for indicating the sensor input, and pushbuttons for programming, calibrating and resetting the system. See Figure 4 for the location of indicators and pushbuttons.

1. **Digital Display** - The digital display provides a continuous reading in ppm of the sensor input in both the Normal and Calibrate modes. In the event of a fault, it identifies the nature of the fault using an alpha-numeric code. In other operating modes it shows the alarm setpoints and programmed calibration gas time (the length of time that the gas is applied to the sensor during calibration). A negative zero drift condition is indicated by a minus (-) sign in the left hand digit. Since the digital display is always lit when power is applied, it also functions as a power indicator (except during the power-up time delay, when the Fault LED is on and the digital display is off).

2. **Bar Graph Display** - The 20 segment bar graph display corresponds to the sensor input.

NOTE

The alarm LEDs flash when the setpoint is reached or exceeded and are on steady (until reset) when the gas level drops below the setpoint.

3. **High Alarm LED** - Flashes in response to a sensor signal that exceeds the high setpoint.

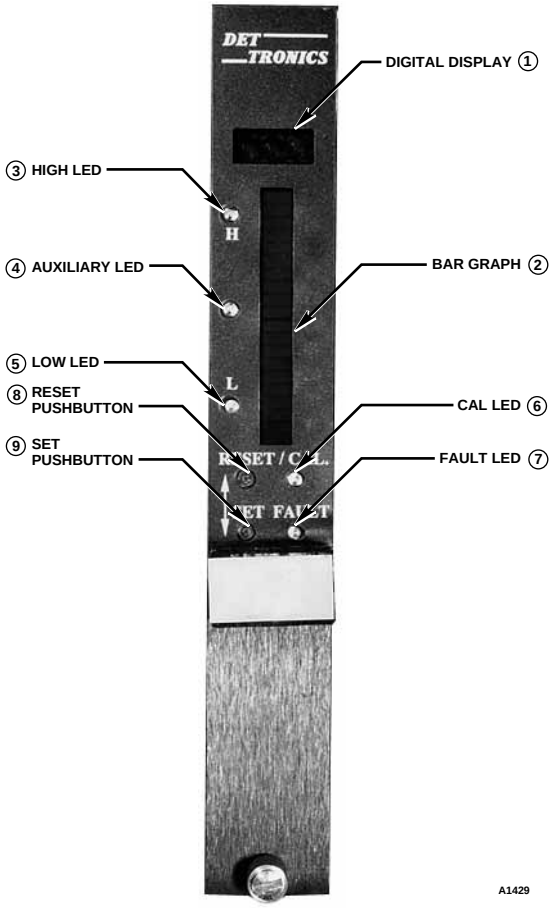


Figure 4—Controller Front Panel

4. **Auxiliary Alarm LED** - Flashes in response to a sensor signal that exceeds the auxiliary setpoint.

5. **Low Alarm LED** - Flashes in response to a sensor signal that exceeds the low setpoint.

6. **CAL LED** - Illuminated while the controller is in the calibrate mode.

7. **FAULT LED** - Flashes upon detection of a system fault and is on steady during the power-up time delay.

8. **RESET Pushbutton** - Used for various system programming and calibration functions as well as for resetting the controller.

9. **SET Pushbutton** - Used for various system programming and calibration functions.

Setpoints

The controller has three independent alarm outputs (low, high and auxiliary), with field selectable setpoints.

The programmed calibration gas time is displayed and adjusted along with the alarm setpoints.

The alarm setpoints and calibration gas time can be checked and/or changed using pushbuttons located on the front panel of the controller.

The alarm setpoint and calibration time adjustment ranges for the R8471D (Cl_2) controller are:

Low alarm: 0.5 to 5 ppm
High alarm: 1 to 9 ppm
Auxiliary alarm: 0.5 to 9 ppm
Calibration time: 16 seconds to 8 minutes

The alarm setpoint and calibration time adjustment ranges for the R8471F (SO_2) controller are:

Low alarm: 5 to 50 ppm
High alarm: 10 to 90 ppm
Auxiliary alarm: 5 to 90 ppm
Calibration time: 16 seconds to 8 minutes

The alarm setpoint and calibration time adjustment ranges for the R8471G (NO_2) controller are:

Low alarm: 1 to 10 ppm
High alarm: 2 to 18 ppm
Auxiliary alarm: 1 to 18 ppm
Calibration time: 16 seconds to 8 minutes

See “Setpoint Adjustment” section of this manual for complete information.

Table 5—Selectable Relay Options

Relay	Selectable Normally Open/Closed	Selectable Normally Energized/ De-Energized	Selectable Latch/ Non-Latch
Low	Y	Y[1]	Y[1]
High	Y	Y[1]	N[2]
Auxiliary	Y	Y[1]	Y[1]
Fault	Y	N[3]	N[4]

Y = Yes N = No
[1]Selectable as a group, not individually [2]Latching only
[3]Normally energized only [4]No latching option

Outputs

The controller is available in a Base version and a Premium version. The differences between the two models are the output configuration and programming options.

Base Model - The base controller is furnished with open collector transistor outputs (rated 100 milliamperes at 32 volts dc) for the Low alarm, High alarm, Auxiliary alarm, and Fault circuits. The normally “off” alarm outputs are turned “on” (transistor conducts, collector is pulled to ground) when their corresponding setpoints are reached. The fault output is normally on and turns off upon detection of a system fault.

The low alarm, auxiliary alarm, and fault outputs are non-latching. The high alarm output is latching.

Premium Model - The premium model is furnished with a set of four relays in place of the four solid state outputs. The relays have SPST contacts rated 5 amperes at 30 vdc/250 vac.

This model also includes a selectable isolated/non-isolated 4 to 20 ma current output for transmitting system information to other devices. The linear 4 to 20 ma output corresponds to gas levels from 0 to 100% full scale. If a system fault is detected, the output drops to less than 1.0 ma. The current output can be calibrated in the field to ensure maximum accuracy. (Refer to the “Calibration” section of this manual for details.)

Programming Options (Premium model only) - Each of the four relays is field selectable for either normally open or normally closed contacts using jumper plugs located on the printed circuit board inside the controller. (See Table 5.)

The alarm relays are also switch programmable for either normally energized or normally de-energized operation (programmable as a group only, not individually). The fault relay is normally energized.

The low and auxiliary alarm relays are switch programmable for either latching or non-latching operation. The high alarm relay is always latching and the Fault relay is non-latching. Latching relays are reset using either the RESET pushbutton on the front panel of the controller or an external reset switch.

The 4 to 20 ma circuit is selectable for isolated or non-isolated operation.

Automatic Diagnostics and Fault Identification

The microprocessor based controller features self-testing circuitry that continuously checks for problems that could prevent proper system response. When power is applied, the microprocessor automatically tests memory. In the Normal operating mode, it continuously monitors the input signal from the sensor to ensure proper functioning. In addition, a "watchdog" timer is maintained to ensure that the program is running correctly. If a fault should occur:

– The Fault LED flashes.

– The digital display identifies the nature of the fault (for 2 out of every 5 seconds) using a prioritized alpha-numeric fault code. Refer to Table 6 for an interpretation of the codes.

– The normally energized Fault output is de-energized.

– The current output drops to less than 1.0 ma.

An alarm condition will normally over-ride a fault condition unless the fault condition occurred first. F10 and F2X will not over-ride an alarm. Faults that affect the actual function of the controller (F50, F60, F70, F9X) may impair the ability of the controller to maintain an alarm output.

All faults automatically reset except the F9X, F20, and F10 faults. After the fault condition has been corrected, the fault output automatically switches to the normal (energized) state, the dc current output returns to normal, and the Fault LED turns off. Clearing F9X faults requires removing operating power from the controller for approximately one second. Press RESET to clear an F20 or F10 fault.

Over-Range Condition

In the event of an over-range condition, the digital display flashes as long as the over-range condition exists. The user must exercise caution if an over-range reading is indicated, since a dangerous condition could exist. The hazardous area should be checked to determine the actual level of gas present.

Table 6—System Status Codes

Status	Condition
F9X	Initialization failure. (Subcodes are as follows.)
F91	EPROM sumcheck failure.
F92	System failure during startup - current too high or too low.
F93	Watchdog timer failure.
F94	RAM failure.
F95	Internal 5 volt power supply failure during startup.
F96	External 24 volt power supply failure during startup.
F97	Controller type invalid. Error in data from RAM.
F98	Watchdog timer reset the controller.
F70	External reset button has been activated for 15 seconds or longer. Self-clearing when button is released.
F60	External 24 vdc power input is not in the 18 to 32 vdc range.
F50	Internal 5 volt power supply is not in the 4.75 to 5.25 volt range.
F40	Sensor fault (after startup). Input is above 35 ma or below 2 ma.
F30	Negative zero drift. Sensor input is –9% full scale or lower.
F2X	Calibration error. (Subcodes are as follows.)
F20	General calibration fault, or calibration aborted due to a higher priority fault.
F21	Time ran out while waiting for the user to apply gas to the sensor.
F22	Sensor input is too low. The sensor cannot generate enough offset to get an accurate calibration. Replace sensor.
F23	Sensor is too sensitive for the controller to read 100% full scale. Replace sensor.
F24	Zero gas level too high, or sensor zero input over limit.
F10	Sensor reaching end of life. Consider replacing the sensor within the next two calibration periods.

Section II
System Installation

INSTALLATION

GENERAL WIRING REQUIREMENTS

NOTE

The wiring procedures in this manual are intended to ensure proper functioning of the device under normal conditions. However, because of the many variations in wiring codes and regulations, total compliance to these ordinances cannot be guaranteed. Be certain that all wiring complies with applicable regulations that relate to the installation of electrical equipment in a hazardous area. If in doubt, consult the NEC manual or equivalent before wiring the system.

The use of shielded cable is highly recommended for optimum RFI/EMI protection.

Moisture can have a detrimental effect on the performance of electronic devices. Therefore, it is important to take proper precautions during installation to ensure that moisture will not come in contact with the electrical connections or components of the system.

If the installation does not use wiring conduit, the use of properly installed water-tight glands is required to prevent the entry of moisture into the device enclosure.

When conduit is used, the use of conduit seals is required. In addition to preventing the passage of gases or flames through the conduit, seals can prevent damage to electrical components caused by condensation within the conduit.

To provide maximum effectiveness, conduit seals should be used in conjunction with conduit drains and breathers. In most applications, alternate changes in temperature and barometric pressure can cause “breathing”, which allows the entry and circulation of moist air throughout the conduit. In most applications, joints in the conduit system and its components are not tight enough to prevent this “breathing”. Moisture in the air can condense at the base of vertical conduit runs and equipment enclosures, and can build up over a period of time. This can be detrimental to electronic devices. To eliminate this condition, explosion-proof drains should be installed to bleed off accumulated water.

Conduit seals must be watertight and explosion-proof and are to be installed even if they are not required by local wiring codes. A seal must be located as close to the junction box as possible. In no case should this seal be located more than 18 inches (46 cm) from the junction box. When an explosion-proof installation is required, an additional seal may be needed at any point where the conduit enters a non-hazardous area. Always observe the requirements of local codes.

When pouring a seal, the use of a fiber dam is required to assure proper formation of the seal. The seals should never be poured in temperatures that are below freezing, since the water in the sealing compound will freeze and the compound will not dry properly. Contamination problems can then result when temperatures rise above the freezing point and the compound thaws.

The shielding of the cable should be stripped back to permit the seal to form around the individual leads, rather than around the outside of the shield. This will prevent any siphoning action through the inside of the shield. The shield should not be cut.

In applications where the wiring cable is installed in conduit, the conduit must not be used for wiring to other electrical equipment.

SENSOR INSTALLATION AND WIRING

The maximum distance between the sensor and controller is limited by the resistance of the connecting wiring, which is a function of the gauge of the wire being used. Table 7 shows the maximum wiring distance allowed for a given wire size.

1. Determine the best mounting locations for the sensors. Whenever practical, sensors should be placed where they are easily accessible for calibration.

2. The sensor junction box can be mounted to a wall or post. The junction boxes should be electrically connected to earth ground.

   To ensure proper operation, the sensor should be pointing down.

3. Remove the cover from the junction box.

   NOTE

   Do not apply power to the system with the junction box cover removed without first verifying that no hazardous conditions exist.

4. Remove the cap from the sensor base. See Figure 5.

Table 7—Maximum Wiring Distances - Sensor to Controller

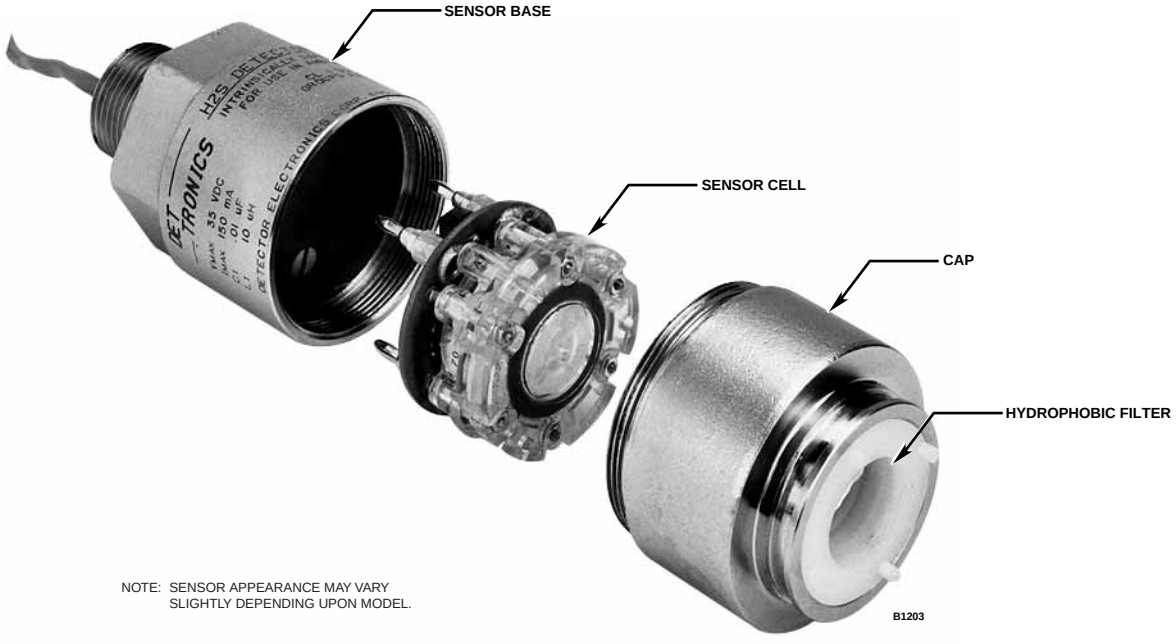
Wire Size (MM^2)	Wire Size (AWG)	Maximum Sensor to Controller Distance	
		Feet	Meters
0.38	22	2200	670
0.56	20	3500	1050
0.96	18	5700	1750
1.3	16	9000	2800
2.1	14	14200	4300

5. Remove the sensor cell from its packaging. Determine proper orientation, then **carefully** plug it into the sensor base.

   NOTE

   Handle the sensor cell carefully. To avoid possible damage, observe the proper procedures for handling electrostatic sensitive devices. See form 75-1005 for additional information.

6. Be sure that the O-ring is in good condition, then place the cap back on the sensor base. Tighten only until snug. **Do not over tighten**.



NOTE: SENSOR APPEARANCE MAY VARY SLIGHTLY DEPENDING UPON MODEL.

Figure 5—Exploded View of Sensor

7. Attach the sensor to the junction box. Do **not** over tighten.

NOTE

Coat the sensor threads with an appropriate grease to ease installation. Also lubricate the junction box cover threads. The recommended lubricant is a silicone free polyalphaolefin grease, available from Detector Electronics. If catalytic combustible sensors are present, **do not** *use a silicone based grease.*

8. Connect the sensor wires to the sensor terminal block inside the junction box. (See Figure 6.) Connect the controller wiring to the controller terminal block inside the junction box.

   Connect the shield to earth ground at the controller end only. Under normal conditions, the other end of the shield should not be connected at the sensor junction box.

   The wiring code is:
   Red lead = "+/power"
   Black lead = "-/signal"
   Green lead = Chassis (earth) ground

   In order to maintain the intrinsically safe rating of the C7067E chlorine sensor, it must be wired through an approved I.S. barrier. See Figure 7.

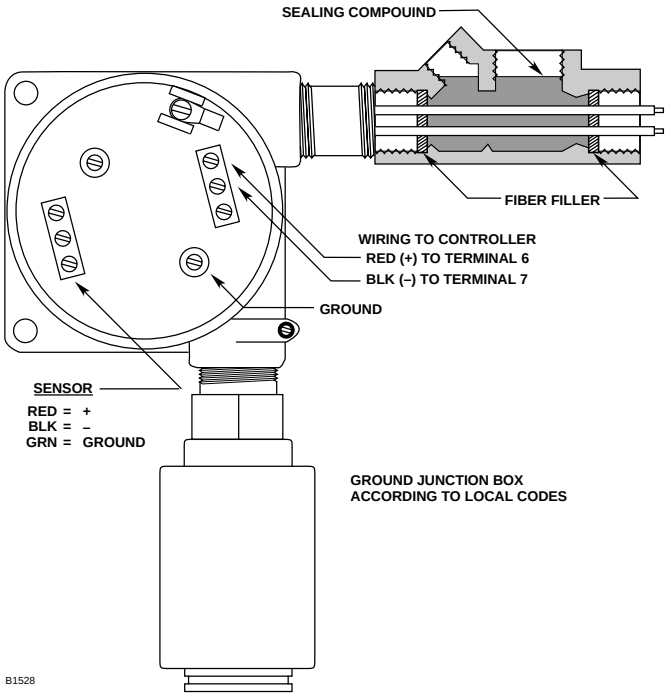


Figure 6—Sensor Wiring

NOTE

When an I.S. barrier is used, the input voltage (measured at the controller) must be between 23 and 26.6 vdc to ensure proper operation of the sensor and barrier.

9. Check the sensor wiring to ensure proper connections, then pour the conduit seals and allow them to dry (if conduit is being used).

10. Place the cover back on the junction box.

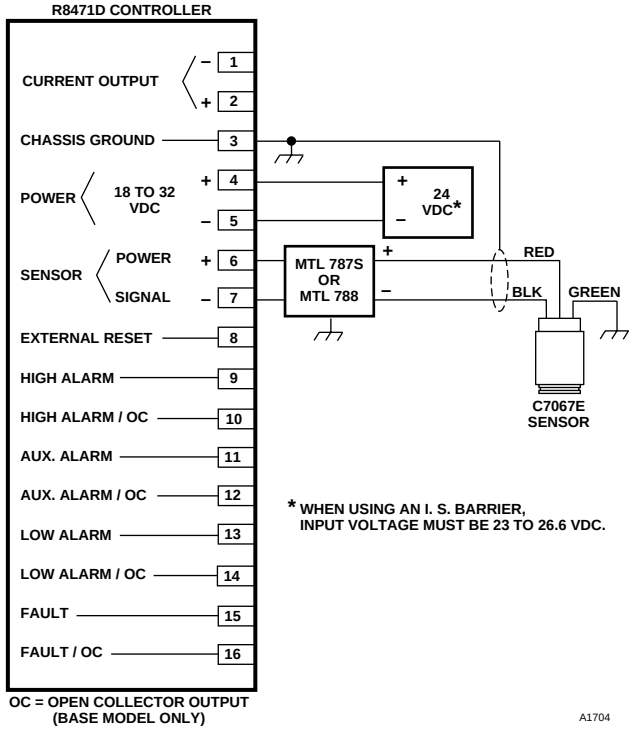


Figure 7—R8471D Controller and C7067E Sensor Used with I.S. Barrier

CONTROLLER WIRING

NOTE

The controller contains semiconductor devices that are susceptible to damage by electrostatic discharge. An electrostatic charge can build up on the skin and discharge when an object is touched. Therefore, use caution when handling, taking care not to touch the terminals or electronic components. For more information on proper handling, refer to Service Memo form 75-1005.

Field Wiring Connector

The controller is furnished with a field wiring connector backplate that incorporates pressure type screw terminals for connecting the external wiring and a circuit board edge connector for attaching to the controller.

The use of a mounting rack is required for mounting the controller. The backplate should be attached to the back of the rack using the mounting screws provided to allow easy removal of the controller without disturbing the wiring. See Figures 8 and 9.

CONTROLLER POSITIONS FOR:		HT:	DIM. (A)		DIM. (B)		DIM. (C)		DIM. (D)		DIM. (E)	
FIRE	GAS		INCH	MM	INCH	MM	INCH	MM	INCH	MM	INCH	MM
8	16	4U	19.00	482.6	18.30	464.8	17.36	440.9	4.00	101.6	6.97	177.1
6	12	4U	15.06	382.6	14.36	364.7	13.42	340.9	↓	↓	↓	↓
4	8	4U	11.13	282.6	10.43	264.9	9.49	241.1				
3	6	4U	9.16	232.7	8.46	214.9	7.52	191.0				
2	4	4U	7.19	182.7	6.49	164.9	5.55	141.0				
1	2	4U	5.22	132.6	4.52	114.8	3.58	90.9				
	16	3U	19.00	482.6	18.30	464.8	17.36	440.9	2.25	57.15	5.22	132.6
	12	3U	15.06	382.6	14.36	364.7	13.42	340.9	↓	↓	↓	↓
	8	3U	11.13	282.6	10.43	264.9	9.49	241.1				
	6	3U	9.16	232.7	8.46	214.9	7.52	191.0				
	4	3U	7.19	182.7	6.49	164.9	5.55	141.0				
	2	3U	5.22	132.6	4.52	114.8	3.58	90.9				

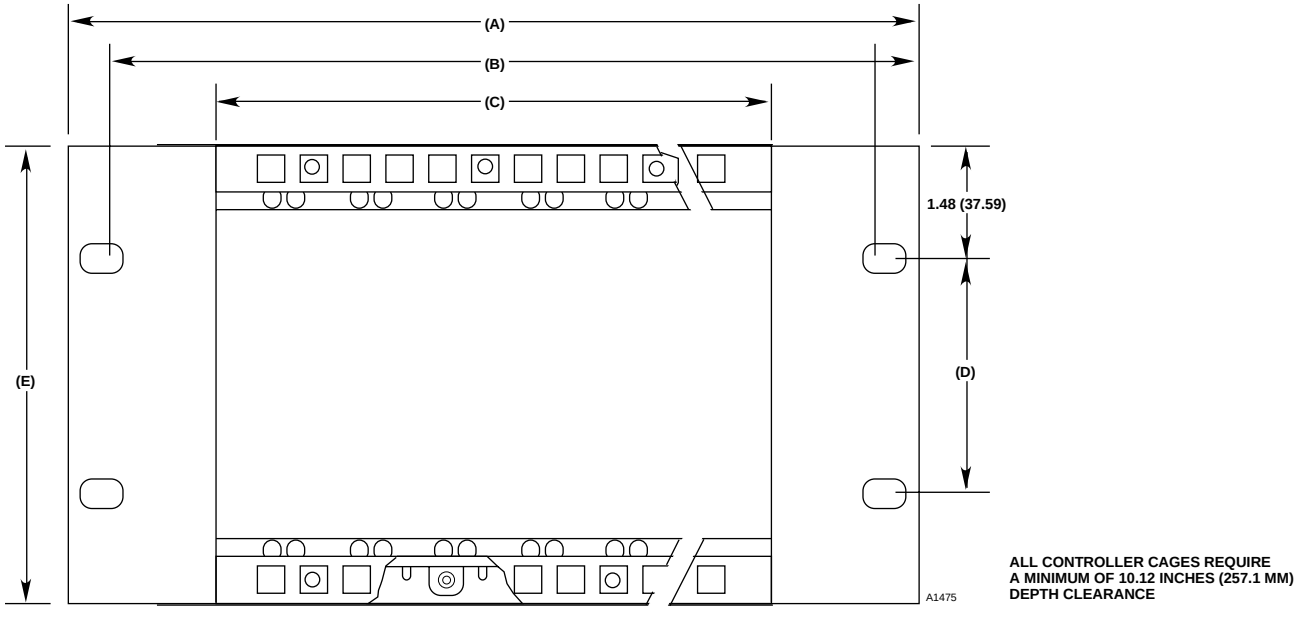


Figure 8—Dimensions of Mounting Rack

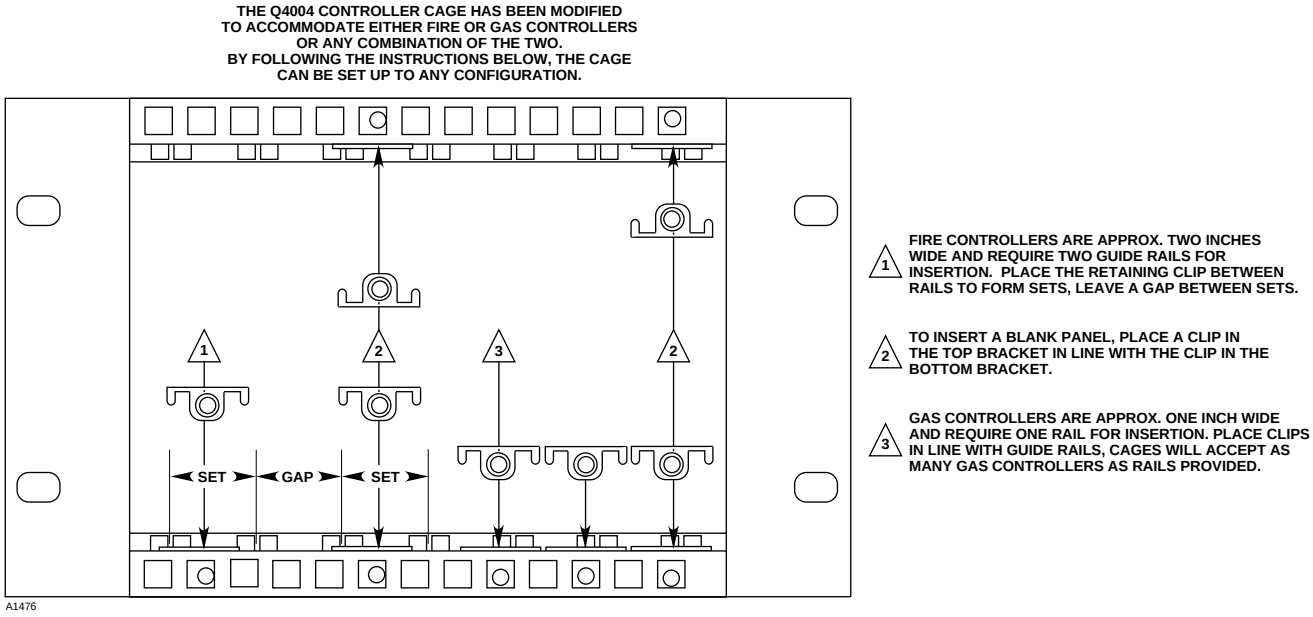


Figure 9—Clip Positioning for Mounting Racks

The controller is designed for installation in a non-hazardous area.

Figure 10 shows the terminal configuration for the controller.

Terminals 1 and 2 – 4 to 20 ma dc output.

Non-Isolated Current Output - If the 4 to 20 ma current loop is to be non-isolated, wire the current loop as shown in Figure 11. Note that terminal 2 is not used with a non-isolated current loop. Program the controller for a non-isolated current loop as described in the “Controller Programming” section of this manual.

Isolated Current Output - If an isolated current loop is desired, wire the current loop as shown in Figure 12 and program the controller for an isolated current loop as described in the “Controller Programming” section of this manual. Note that this wiring scheme requires an external power source for the isolated current output.

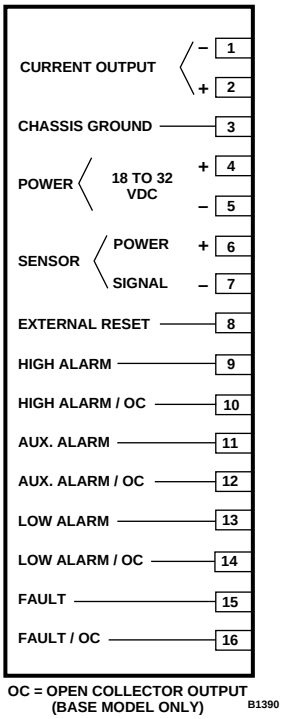


Figure 10—Controller Terminal Configuration

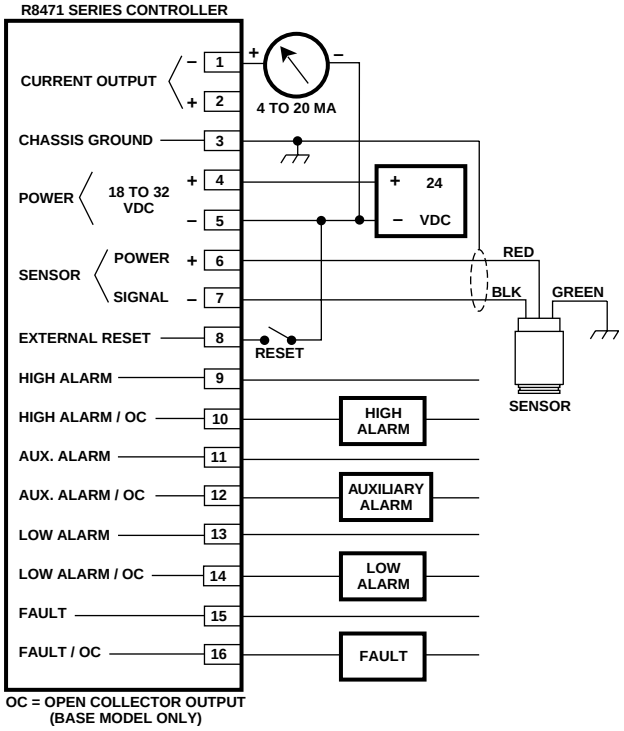


Figure 11—A Typical System - Controller with Relay Outputs and Non-Isolated Current Output

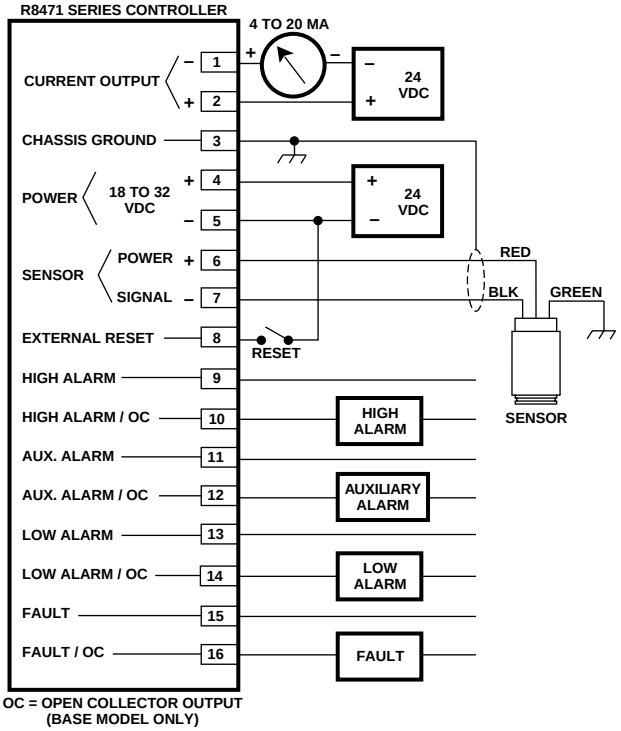


Figure 12—A Typical System - Controller with Isolated Current Output

Terminal 3 – Connect to chassis (earth) ground. Ground the cable shield at this terminal.

Terminal 4 – Connect to the positive (+) side of the 24 vdc power source.

Terminal 5 – Connect to the negative (-) side of the dc power source.

NOTE

If local wiring codes permit and if a ground fault monitoring system is not being used, the minus side of the dc power source can be connected to chassis (earth) ground. Alternatively, a 0.47 microfarad, 100 volt capacitor can be installed (terminal 5 to ground) for best immunity against electromagnetic interference.

Terminal 6 – Connect to the red (+) lead of the sensor.

Terminal 7 – Connect to the black (-) lead of the sensor.

Terminal 8 – A normally open momentary closure switch can be connected between this terminal and the negative (-) side of the power source for remote reset.

Terminals 9 and 10 – High Alarm Output.

Terminals 11 and 12 – Auxiliary Alarm Output.

Terminals 13 and 14 – Low Alarm Output.

Terminals 15 and 16 – Fault Output.

Base Controller – Connections to open collector transistor outputs are made at terminals 10, 12, 14, and 16. Terminals 9, 11, 13, and 15 are not used. See Figure 13 for an example of a typical connection to an open collector transistor output.

NOTE

External equipment that can generate transients when switching (such as relays) ***must have a transient suppression device*** *(diode) connected across the coil at the time of installation. (Note proper polarity of the diode.) This will safeguard the output transistors of the controller against possible damage. Figure 13 illustrates an inductive load with a diode used for transient suppression.*

Premium Controller – The relay outputs (terminals 9 to 16) are programmed for the desired operation using the procedure described in the "Controller Programming" section of this manual.

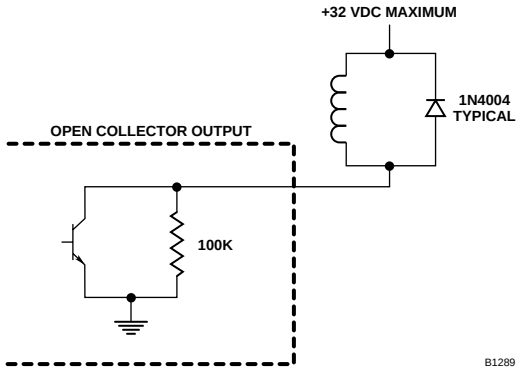


Figure 13—Open Collector Output with Inductive Load and Transient Suppression Device

CONTROLLER PROGRAMMING

Refer to Figure 14 to determine the location of programming jumpers and switches. Table 5 shows the selectable options for each relay.

IMPORTANT

*All jumper plugs **must be installed**. The controller outputs will not function properly if a jumper plug is missing.*

Normally Open/Closed Relays

The four relays are individually programmed for either normally open or normally closed contacts. This is accomplished by placing a jumper plug on the appropriate pair of pins. Each relay has a set of three pins. For normally open operation, place the plug on the NO and center pins. For normally closed operation, place it on the NC and center pins. The pin groups are identified as follows:

J2 – High Alarm
J3 – Auxiliary Alarm
J4 – Low Alarm
J5 – Fault

The controller is programmed at the factory for normally open relay contacts.

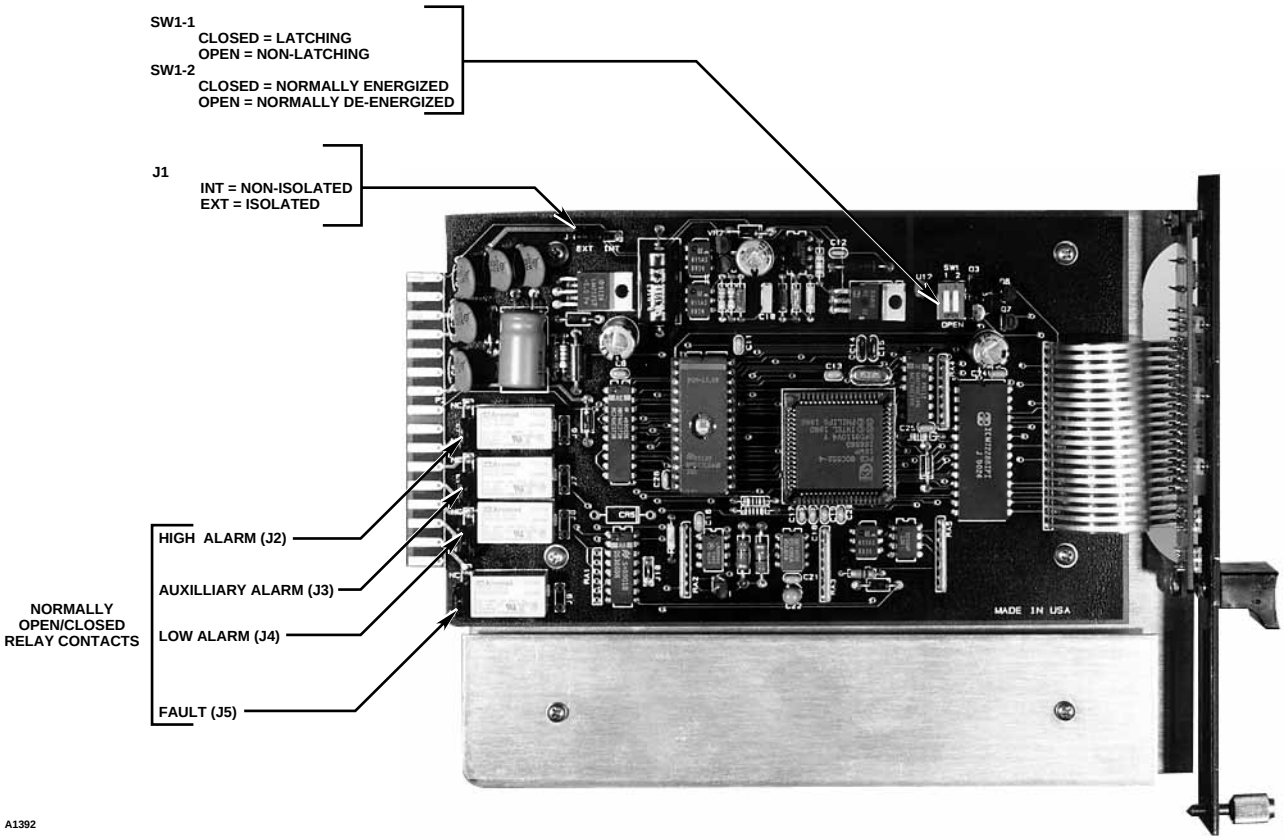


Figure 14—Programming Jumper Plugs and Switches

Latching/Non-Latching Relays

The Low and Auxiliary alarm relays are programmable for latching or non-latching operation. The High alarm relay is always latching (to ensure that a high alarm condition cannot go unnoticed). Latching relay operation is programmed using rocker switch 1 at SW1 (SW1-1). For latching operation, place the switch in the closed position. For non-latching operation, place it in the open position. This switch is set at the factory for non-latching relay operation.

Normally Energized/De-Energized Relays

The three alarm relays are programmable for normally energized (fail-safe) or normally de-energized operation. This is accomplished by setting rocker switch 2 at SW1 (SW1-2). For normally energized alarm relays, place the switch in the closed position. For normally de-energized operation, place it in the open position. This switch is set at the factory for normally de-energized operation.

The Fault relay is always normally energized, regardless of the setting of SW1-2.

NOTE

If the switch positions of SW1 are changed while power is applied, power must be cycled for the change to take effect.

4 to 20 ma Output

Isolated or non-isolated operation of the 4 to 20 ma output is selected using a jumper plug at J1. (See Figure 14 for location of jumper plug.) For non-isolated operation, as illustrated in Figure 11, place the jumper plug in the INT (internal power source) position. Place the plug in the EXT position for an isolated circuit (external power source), as illustrated in Figure 12. The jumper is set at the factory for non-isolated operation.

INSTALLATION CHECKLIST

The following checklist is provided as a means of double checking the system to be sure that all phases of system installation are complete and have been performed correctly.

1. Junction boxes are mounted securely and sensors are pointing down.
2. All cable shields are properly grounded.
3. All junction box covers are tightly installed.
4. Explosion-proof conduit seals have been installed at all junction box entries (if conduit is being used).
5. Sensor to controller wiring is correct.
6. Power wiring to the controller is installed and power source is operational.
7. External loads are properly connected to the controller.
8. Controller is programmed as desired. Record this information for future reference.
9. Controller is properly installed in the mounting rack.
10. Proper ventilation is provided to prevent overheating of the controller.

Proceed to System Startup, Setpoint Adjustment, and Calibration.

Section III
System Startup

STARTUP PROCEDURE

1. Output loads that are controlled by the system should be secured (remove power from all output devices) to prevent actuation.

2. Check all external wiring. Be sure that the sensor has been wired properly.

3. Before installing the controller in the mounting rack, inspect it to verify that it has not been physically damaged in shipment. Check the jumper plugs and rocker switches on the controller for proper programming, then slide the controller fully into the mounting rack.

4. Apply power to the system.

   NOTE

   When power is applied to the system, the controller enters a time delay mode before beginning normal operation. During this time the outputs are inhibited, the FAULT LED is illuminated, and the current output indicates a fault condition. This delay allows time for the sensor output to stabilize before normal operation is begun. The controller will remain in the time delay mode up to five minutes or until the sensor output is within normal range (no fault or alarm conditions exist). At the end of the time delay, the controller automatically enters the Normal operating mode.

5. Put the controller in the Setpoint Display mode to determine the present alarm setpoints and calibration gas time. If changes are required, perform the Setpoint Adjustment procedure.

6. Perform the calibration procedure.

7. Check the 4 to 20 ma current loop for proper calibration and adjust as required.

8. Remove mechanical blocking devices (if used) and restore power to the output loads.

SETPOINT ADJUSTMENT

To check the present levels, use the "Setpoint Display Mode" described below. To **change** the values, use the "Setpoint Adjustment Procedure."

NOTE

In the Setpoint Display or Setpoint Adjust mode, a flashing alarm LED identifies the particular setpoint currently being indicated on the digital display. A flashing CAL LED indicates that the programmed calibration gas time is currently being shown on the digital display.

SETPOINT DISPLAY MODE

NOTE

In the Setpoint Display and Setpoint Adjust modes, the digital display indicates the calibration gas time in increments of 16 seconds. To determine the total calibration gas time indicated by the display, the reading indicated on the display must be multiplied by 16 seconds. To determine the number that should be used for programming the controller for the correct calibration time, determine the desired calibration time in minutes (five minutes is recommended), then multiply by 60 seconds, then divide by 16. For example, to program the controller for a calibration time of five minutes:

5 minutes X 60 seconds = 300 seconds

300 seconds ÷ 16 seconds = 18.75 units

Programming the controller for a reading of "19" produces a calibration time of five minutes and four seconds.

1. To enter the Setpoint Display mode, press and hold the Reset button until the Low LED begins to blink (approximately one second). Release the Reset button. The low alarm setpoint will be shown for two seconds on the digital display.

   NOTE

   The Reset button should be released as soon as the controller has entered the Setpoint Display mode (after one second). If the button is still depressed at the end of the Setpoint Display mode (9 seconds), the controller will automatically enter the Calibrate mode. If the operator is not prepared to perform a calibration, a calibration fault will occur. Recycle power to the controller to exit the calibrate mode without affecting the calibration settings.

2. At the end of the two second interval, the Low LED goes out, the High LED blinks, and the digital display shows the high alarm setpoint.

3. Two seconds later the High LED goes out and the Auxiliary LED blinks. The digital display now shows the auxiliary alarm setpoint.

4. Two seconds later the Auxiliary LED goes out and the CAL LED blinks. The digital display now shows the programmed calibration gas time.

5. After displaying the calibration gas time for two seconds, the controller automatically leaves the Setpoint Display mode and returns to the Normal operating mode.

6. If adjustments to the setpoints are required, perform the Setpoint Adjustment procedure. When the setpoint levels are acceptable, record this information for future reference.

SETPOINT ADJUSTMENT PROCEDURE

1. Determine the required alarm setpoint levels and calibration gas time.

2. Press and hold the Set button for one second, then release. The digital display indicates the present low alarm setpoint and the Low LED blinks. Press the Reset button to increase the reading or the Set button to decrease the reading. (Holding the button will cause the reading to change rapidly.)

3. When no changes to the setpoint level have been made for 5 seconds, the Low LED goes out, the High LED blinks, and the digital display shows the high alarm setpoint. Press the appropriate button (detailed in step 2 above) to obtain the desired reading on the digital display.

4. When no changes to the setpoint level have been made for 5 seconds, the High LED goes out, the Auxiliary LED blinks, and the digital display shows the auxiliary alarm setpoint. Press the appropriate button to obtain the desired reading on the digital display.

5. When no changes have been made for 5 seconds, the Auxiliary LED goes out, the CAL LED blinks, and the digital display indicates the calibration gas time. Press the appropriate button to obtain the desired reading on the digital display.

6. When no changes have been made for 5 seconds, the controller automatically returns to the Normal operating mode.

7. Record the new values for future reference.

NOTE

The alarm setpoints, calibration gas time, and calibration data are stored in non-volatile memory and are retained in the event of a power loss. However, if power is interrupted while performing the Setpoint Adjustment or Calibration procedure, the entire procedure must be repeated when power is restored.

CALIBRATION

SENSOR RESPONSE CHARACTERISTICS

In order to ensure that the gas detector will provide maximum protection, it is important to understand the operating characteristics of the sensor being used. This is particularly true in the case of electrochemical Cl_2, SO_2 or NO_2 sensors, since their response is different than that of other gas sensors.

Figure 15 shows the response curve of a typical sensor that has not been exposed to gas for 30 days or longer.

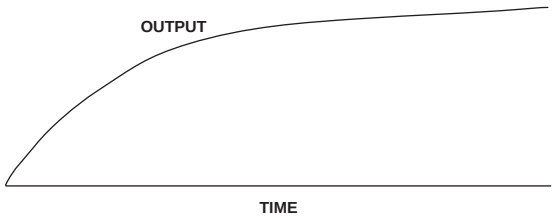


Figure 15—Response Curve of a Typical Sensor

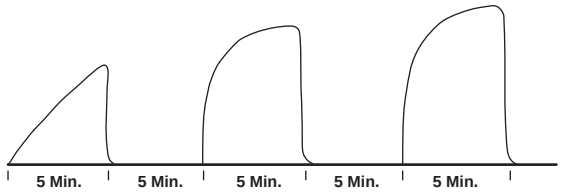


Figure 16—Sensor Response to Repeated Exposures to Gas

Figure 16 shows the response of a typical sensor to repeated exposures to gas. Upon repeated exposures to gas, the sensor quickly responds to the same level as the previous exposure, and then continues to produce an increase in response at a much slower rate. Note that the shape of the sensor response curve in Figure 16 would be very similar to that of Figure 15 if the exposures to clean air were eliminated.

Because of this inherent characteristic of the sensors, it is necessary to modify the standard operating practices as well as the calibration procedure to ensure optimum sensor performance.

Frequency of Calibration — To ensure correct calibration, the sensor must be free of gas for at least 30 days prior to calibration. Unlike other sensors, over-calibration results in a longer response time.

Calibration Gas Concentration — Unlike other sensors, the calibration gas concentration is not field selectable. A gas concentration equal to 50% full scale must be used for the span calibration:

5 ppm for Cl_2 sensors
50 ppm for SO_2 sensors
10 ppm for NO_2 sensors.

Calibration Time — Unlike other sensors, the length of time that the calibration gas is applied to the sensor is field selectable.

The length of time that the calibration gas (50% full scale) is applied to the sensor during calibration determines the speed of response of the sensor. A calibration time of 5 minutes is recommended and will produce satisfactory results in most applications. Applying the calibration gas for a shorter period of time shortens the response time. Applying the calibration gas for a longer period of time typically results in a slower speed of response.

Alarm Condition — If an alarm condition occurs, the sensor must not be calibrated immediately after the alarm. The sensor must be free of gas for 30 days before a proper calibration can be performed. The operator must choose one of the following options:

- Operate the sensor for 30 days and then calibrate.
- Test the sensor to verify correct operation (without calibrating) by applying gas to the sensor and checking for the proper controller response.
- Replace the sensor cell with one that has been free of gas for at least 30 days, then calibrate.

Failed Calibration Attempt (Assuming sensor is not defective) — If the calibration is not performed successfully on the first attempt, do not attempt a second calibration. A successful calibration can be performed only if the sensor has not seen gas for at least 30 days. As an alternative, the sensor can be removed from service and replaced by a sensor that has not seen gas for at least 30 days. Perform a normal calibration on the replacement sensor. The original sensor can be returned to service after 30 days.

Summary

The following guidelines are important and must be adhered to carefully to ensure that the sensor operates properly and that safety is not compromised.

- Electrochemical Cl_2, SO_2 and NO_2 sensors should be used in leak detection applications, i.e. “on/off” or “gas present/not present.” Use of these sensors in applications that require a high degree of accuracy or stability is not recommended.
- The sensor must be free of gas for 30 days before a proper calibration can be performed.
- A 50% full scale gas concentration must be used for calibration.
- Sensor response time is determined by the length of time that gas is applied to the sensor. (A span calibration time of 5 minutes is recommended.)
- If a calibration is not successful, do not attempt to repeat the calibration. Either wait 30 days before calibrating, or replace the sensor cell and then calibrate.
- Do not calibrate after an alarm condition. The sensor must be free of gas for 30 days to ensure a proper calibration.

CALIBRATION PROCEDURE

NOTE

While in the Calibrate mode, all controller outputs are inhibited, the CAL LED is illuminated, and the current output goes to a preset level (adjustable from 0 to 20 ma, with a default value of 4.0 ma).

Calibration typically requires two people, one person at the controller and another at the sensor. The actual calibration adjustments are made automatically by the microprocessor in the controller.

NOTE

An accumulation of contaminants on the screen or hydrophobic filter can block the flow of gas to the sensor, adversely affecting its performance. Before starting the calibration, the operator should examine the sensor screen or filter (if used). A dirty hydrophobic filter should be replaced. The hydrophobic filter should be clean and squarely seated in the housing. The hydrophobic filter should not be used with the Cl_2 sensor.

1. Be certain that the controller is properly programmed for the calibration gas time. Reprogram the controller if required.

NOTE

The recommended calibration time is five minutes. Shorter calibration times are acceptable based on the discretion of the operator.

2. Check the gauge on the gas cylinder to be sure that there is enough gas for a 5 minute calibration. If the cylinder runs out before 5 minutes, an improper calibration will result.

IMPORTANT

Sensors must be calibrated with a gas concentration that is equal to 50% full scale value: 5 ppm for Cl_2 sensors, 50 ppm for SO_2 sensors, 10 ppm for NO_2 sensors.

3. Be sure that only clean air is present at the sensor. (The microprocessor begins taking zero readings immediately upon entering the Calibrate mode.) If the possibility of background gases exists, purge the sensor with clean air to ensure accurate calibration.

4. To enter the calibrate mode, depress and hold the Reset button until the CAL LED is illuminated **and** the digital display starts to flash (approximately 9 seconds).

5. When the Zero calculations are complete (30 seconds minimum), the digital display stops flashing and reads “00”.

6. Apply the calibration gas to the sensor. The digital display starts to flash, and the value indicated on the display rises. The bar graph display also indicates the level of gas at the sensor, but does not flash.

7. When the microprocessor has completed the Span adjustment, the digital display stops flashing.

NOTE

If the sensor output stabilizes before the end of the programmed calibration time, the controller will accept the span value and exit the Calibrate mode early.

8. Remove the calibration gas. When the gas level falls below the lowest alarm setpoint, the controller automatically exits the Calibrate mode. All outputs and indicators return to normal operation.

If the operator fails to complete the calibration, if the sensitivity of the sensor has deteriorated to the extent that calibration cannot be successfully completed, or if the 10 minute calibration time limit expires before completion of the calibration, a calibration fault (“F2X” status) will be generated and the controller will automatically revert back to the former calibration settings.

If the microprocessor determines that the sensor cell is approaching the end of its useful life, “F10” will be indicated on the digital display. This does not indicate a system malfunction, but is intended simply to make the operator aware of this condition. A successful calibration can still be performed. Press Reset after completing calibration to clear the display.

IMPORTANT

If a calibration attempt should fail for any reason, do not repeat the calibration. Either wait 30 days before calibrating, or replace the sensor cell with one that has been free of gas for at least 30 days and then calibrate.

CURRENT OUTPUT CALIBRATION

The 4 to 20 milliampere output is calibrated at the factory to provide a degree of accuracy that is satisfactory for most applications. However, the highest level of accuracy can be obtained by performing the following procedure.

1. A dc current meter capable of measuring 4 to 20 milliamperes must be connected to the current loop output. This can be accomplished by connecting a dc ammeter in series with the load or by connecting a digital dc voltmeter across a known load resistance and calculating the current flow using the formula:

   I = voltage/load resistance.

2. Press and **hold** the Set button, then **immediately** press the Reset button. (The Reset button must be pressed within one second of pressing the Set button.) Release both buttons. The Low LED flashes slowly while the system generates a 4 ma output.

3. Press the Reset (increase) or Set (decrease) button to obtain a 4.0 ma reading on the meter. (Holding the button will cause the output to change rapidly.)

4. When no adjustments have been made for 5 seconds, the controller automatically switches to a 20 ma output. This is indicated by a flashing High LED. Press the appropriate button to obtain a 20.0 ma reading.

5. When no adjustments have been made for 5 seconds, the controller generates the current output level for the calibrate mode. This is indicated by a flashing CAL LED. Press the appropriate button to obtain the desired current output level for the calibrate mode. (The default level is 4.0 ma.)

6. When no changes have been made for 5 seconds, the system automatically returns to the Normal operating mode and saves the data in non-volatile memory.

7. Remove the meter from the system output and reconnect the outputs for normal operating conditions.

Section IV
System Maintenance

ROUTINE MAINTENANCE

OUTPUT DEVICES

All external equipment that is connected to the controller should be maintained according to the manufacturer's recommendations.

CHECKOUT IN NORMAL MODE

The system should be checked periodically in the Normal mode to ensure that those items not checked by the controller diagnostic circuitry (such as output relays) are functioning properly.

CAUTION

Be sure to secure all output devices that are actuated by the system to prevent unwanted activation of this equipment, and remember to place these same output devices back into service when the checkout is complete.

SENSOR CELL REPLACEMENT

NOTE

Verify that no hazardous conditions exist or remove power from the sensor prior to replacing the sensor cell (unless an I.S. barrier is used with an intrinsically safe sensor).

To replace the sensor cell:

1. If the controller will remain powered during sensor cell replacement, enter the sensor replacement mode before replacing the cell.

   NOTE

   The sensor replacement mode inhibits all controller outputs to allow replacement of the sensor cell without removing power from the controller. In addition, this mode automatically sets the factory default values for sensor calibration. Alarm setpoints and calibration time are not affected.

   CAUTION

   *Upon entering the Sensor Replacement mode, all previously entered sensor calibration information is lost. Sensor **calibration must be performed**, even if the sensor cell was not replaced.*

   To enter the Sensor Replacement mode, press and hold the Reset button for approximately 9 seconds until the digital display begins flashing and the CAL LED is illuminated. Release the Reset button.

2. Press the Set button. The FAULT LED also comes on. The controller is now in the Sensor Replacement mode.

3. Remove the cap from the sensor base. See Figure 5. (There is no need to remove the sensor housing from the junction box.)

4. Remove and discard the old sensor cell. Check for corrosion or contamination on the terminals on the sensor base, and clean if necessary.

5. Determine proper orientation for the new cell, then **carefully** plug it in.

   NOTE

   Handle the sensor cell carefully. To avoid possible damage, observe the normally accepted procedures for handling electrostatic sensitive devices. See form 75-1005 for additional information.

6. Be sure that the O-ring on the sensor housing is in good condition, then place the cap back on the sensor base. Tighten only until snug. **Do not over tighten.**

7. If power was removed prior to replacing the sensor cell, re-apply power. Allow time for the unit to warm up and stabilize, then calibrate.

   NOTE

   If power was removed from the controller during the sensor cell replacement procedure, the controller will automatically return to the Normal mode when power is restored (after a time delay). To prevent the possibility of alarms, allow the system to warm up in the sensor replacement mode. The sensor replacement mode can be entered during the power-up time delay by holding the Reset button for 7 seconds.

Press Reset to exit the Sensor Replacement mode. The controller will automatically enter the Normal mode.

A Recommended Test Form is supplied at the back of this manual for recording maintenance performed on the system.

TROUBLESHOOTING

Table 8 is intended to serve as an aid in locating the cause of a system malfunction. If the problem cannot be corrected, contact the factory for assistance.

NOTE

Record all faults on the Fault Record Sheet at the back of this manual.

Table 8—Troubleshooting Guide

Problem	Possible Cause
No faceplate indicators illuminated.	1. Wiring to external power source. 2. Input power failure.
FAULT LED on, digital display blank.	1. Power-up time delay (up to 5 minutes). 2. If condition continues after 5 minutes, repeat power-up. If problem continues, replace controller.
F91 to F98 Status	1. Initialization failure. Repeat power-up. If successful, re-program and re-calibrate. If not, replace controller.
F92 Status	1. Sensor failure (during startup) - current is over 35 ma or below 2 ma.
F94 Status	1. RAM failure. Repeat power-up. If not successful, return to factory for repair. Do not press RESET button. If RESET is pressed, recalibrate and check setpoints.
F96 Status	1. Input power problem (should be18 to 32 volts). Check operation of power source and power wiring.
F97 Status	1. Controller type invalid. Error in data from RAM. Repeat power-up. If not successful, return to factory for repair. Do not press RESET button. If RESET is pressed, recalibrate and check setpoints.
F70 Status	1. External reset activated for over 15 seconds. Check external switch and wiring.
F60 Status	1. Input power out of tolerance. Check operation of power source and power wiring.
F50 Status	1. Internal power supply problem. Replace controller.
F40 Status	1. Sensor output (after startup) is over 35 ma or below 2 ma. Check sensor/ transmitter wiring and calibration. 2. Faulty sensor. Replace and calibrate. 3. Faulty transmitter. Replace and calibrate.
F30 Status	1. Negative zero drift. Calibrate sensor. 2. Faulty sensor. Replace and calibrate. 3. Faulty transmitter. Replace and calibrate.
F20, F21 Status	1. Calibration error. Re-calibrate.
F22, F23 Status	1. Sensor sensitivity out of tolerance. Calibrate transmitter.If problem continues, replace sensor and calibrate.
F24 Status	1. Wrong gas for zero calibration. 2. Background gas affecting the zero calibration. 3. Sensor zero input over limit, re-calibrate transmitter.
F10 Status	1. Sensor reaching end of life - no problem at present time. Be prepared to replace sensor at next calibration (calibration attempt may fail).

REPLACEMENT PARTS

The controller is not designed to be repaired by the customer in the field. If a problem should develop, first carefully check for proper wiring, programming and calibration. If it is determined that the problem is caused by an electronic defect, the device must be returned to the factory for repair.

NOTE

When replacing a controller, be sure that the jumper plugs and rocker switches of the replacement are the same as the original. Remove power before removing the controller from the mounting cage or plugging in the replacement unit.

ORDERING INFORMATION

Sensors must be ordered separately from the controller. When ordering please specify:

R8471D Cl_2 Controller
R8471F SO_2 Controller
R8471G NO_2 Controller

Specify base or premium model, 3U or 4U height.

MOUNTING RACKS

A mounting rack is required for controller installation. 3U racks are used with gas controllers only. 4U racks can house gas or flame controllers in any combination. See Figures 8 and 9.

SENSOR/TRANSMITTER

Part Number	Description
005931-001	C7067E (Cl_2) Sensor Housing with 3/4 inch entry
005931-002	C7067E (Cl_2) Sensor Housing with 20 mm entry
005932-001	Electrochemical Sensor Cell for C7067E (Cl_2)
006398-001	C7068E (SO_2) Sensor Housing with 3/4 inch entry
006398-002	C7068E (SO_2) Sensor Housing with 20 mm entry
006400-001	Electrochemical Sensor Cell for C7068E (SO_2)
006394-001	C7069E (NO_2) Sensor Housing with 3/4 inch entry
006394-002	C7069E (NO_2) Sensor Housing with 20 mm entry
006395-001	Electrochemical Sensor Cell for C7069E (NO_2)

CALIBRATION EQUIPMENT

Part Number	Description
227115-013	Cl_2 Calibration Kit, includes regulator, hose, calibration cup, and two cylinders of calibration gas (5 ppm).
227115-012	SO_2 Calibration Kit, includes regulator, hose, calibration cup, and two cylinders of calibration gas (50 ppm).
227115-011	NO_2 Calibration Kit, includes regulator, hose, calibration cup, and two cylinders of calibration gas (10 ppm).

REPLACEMENT PARTS

Part Number	Description
227117-006	Replacement cylinder of gas for Cl_2 calibration kit (5 ppm)
227117-008	Replacement cylinder of gas for SO_2 calibration kit (50 ppm)
227117-010	Replacement cylinder of gas for NO_2 calibration kit (10 ppm)

For assistance in ordering a system to meet the needs of a specific application, please contact:

Detector Electronics Corporation
6901 West 110th Street
Minneapolis, Minnesota 55438 USA
Operator: (952) 941-5665 or (800) 765-FIRE
Customer Service: (952) 946-6491
Fax: (952) 829-8750
Web site: www.det-tronics.com
E-mail: detronics@detronics.com

Recommended Test Form

Detector Number	Detector Location	Date Installed	Date Checked	Date Calibrated	Remarks

Fault Record Sheet

Date	Time	Detector Affected	System Status	Operator	Comments

X3301 Multispectrum
IR Flame Detector

PointWatch Eclipse®
IR Combustible Gas Detector

Eagle Quantum Premier®
Safety System

Eagle Logic Solver
Safety System

Detector Electronics Corporation
6901 West 110th Street
Minneapolis, MN 55438 USA

T: 952.941.5665 or 800.765.3473
F: 952.829.8750
W: http://www.det-tronics.com
E: detronics@detronics.com

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