DET-TRONICS®

A UTC Fire & Security Company

Instructions 95-8572

R8471J Gas Controller
for use with Model OPECL
Open Path Eclipse™ IR Gas Detector

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INSTRUCTIONS

R8471J Gas Controller for use with Model OPECL Open Path Eclipse™ IR Gas Detector

IMPORTANT

Be sure to read and understand the entire instruction manual before installing, operating or servicing the gas detection equipment.

For complete information regarding installation, operation and maintenance of the Model OPECL gas detector, refer to Model OPECL instruction manual, number 95-8556.

WARNING

Do not open the Model OPECL housing with power applied unless it is verified that no combustible gases or vapors are present. A portable gas detection instrument should be used to ensure that the area is clear of any combustible gases. Calibration or maintenance should not be performed if there is any indication of the presence of combustible gas at the sensor.

CAUTION

The wiring instructions in this manual will provide safe and proper functioning of the device under normal conditions. However, local variations in wiring codes and regulations exist, and total compliance with these ordinances cannot be guaranteed. Be certain that all wiring complies with the IEC/NEC as well as all local ordinances. If in doubt, consult the local authority having jurisdiction before wiring the system.

Section I Installation and Startup

INSTALLATION

GAS DETECTOR INSTALLATION

Follow the procedure for mounting and wiring the Model OPECL gas detector as described in the Model OPECL instruction manual 95-8556.

CONTROLLER WIRING

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 recommended for mounting the controller. The backplate is attached to the back of the rack to allow easy removal of the controller without disturbing the wiring. See Figures 1 and 2.

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

CONTROLLER POSITIONS FOR		HT:	DIM. (A)		DIM. (B)		DIM. (C)		DIM. (D)		DIM. (E)		WEIGHT	
FLAME	GAS		INCH	MM	INCH	MM	INCH	MM	INCH	MM	INCH	MM	LB	KG
8	16	4U	19.00	482.6	18.30	464.8	17.36	440.9	4.00	101.6	6.97	177.1	9.3	4.2
6	12	4U	15.06	382.6	14.36	364.7	13.42	340.9					7.6	3.5
4	8	4U	11.13	282.6	10.43	264.9	9.49	241.1					5.9	2.7
3	6	4U	9.16	232.7	8.46	214.9	7.52	191.0					5.1	2.3
2	4	4U	7.19	182.7	6.49	164.9	5.55	141.0					4.2	1.9
1	2	4U	5.22	132.6	4.52	114.8	3.58	90.9					3.1	1.4

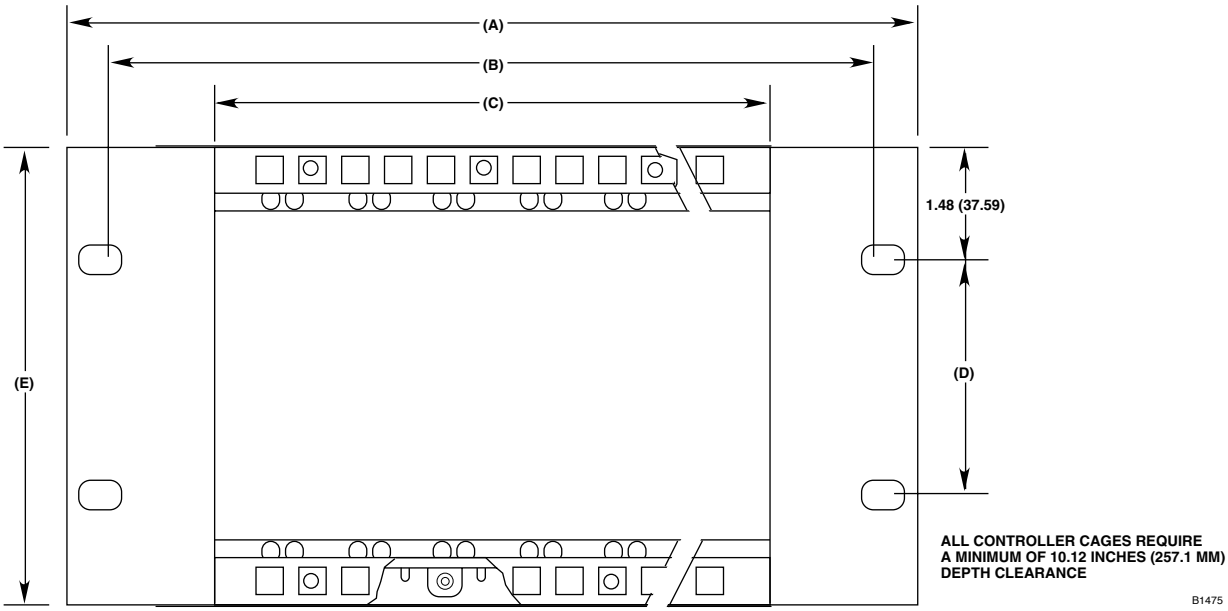


Figure 1—Dimensions of the Q4004 Mounting Rack

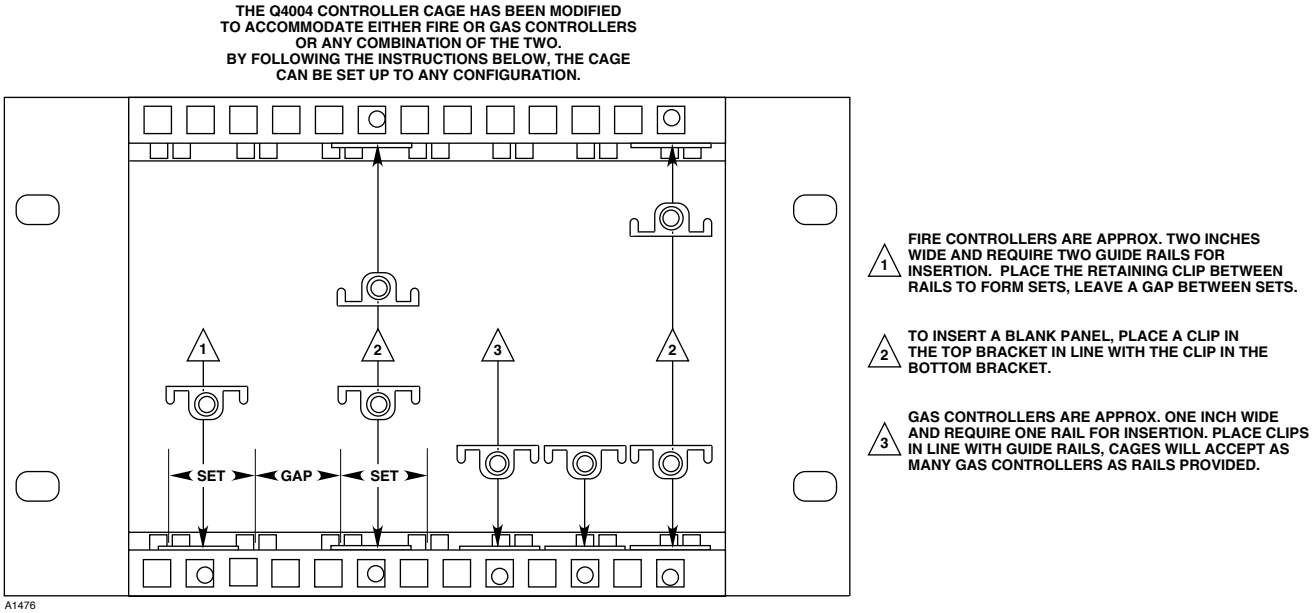


Figure 2—Clip Positioning for Q4004 Mounting Racks

Figure 3 shows the terminal configuration for the R8471J 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 system as shown in Figure 4. Note that terminal 2 is not used with a non-isolated current loop. Program the unit 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 system as shown in Figure 5 and program the unit 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.

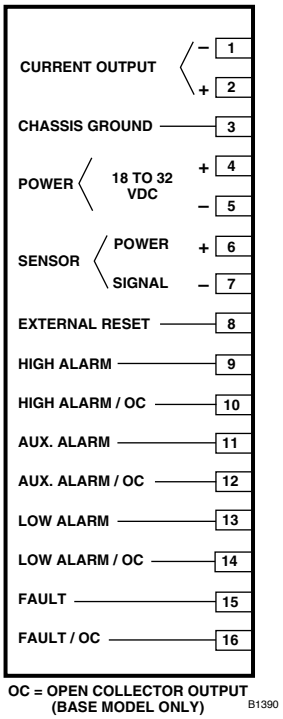


Figure 3—Terminal Configuration for R8471J Controller

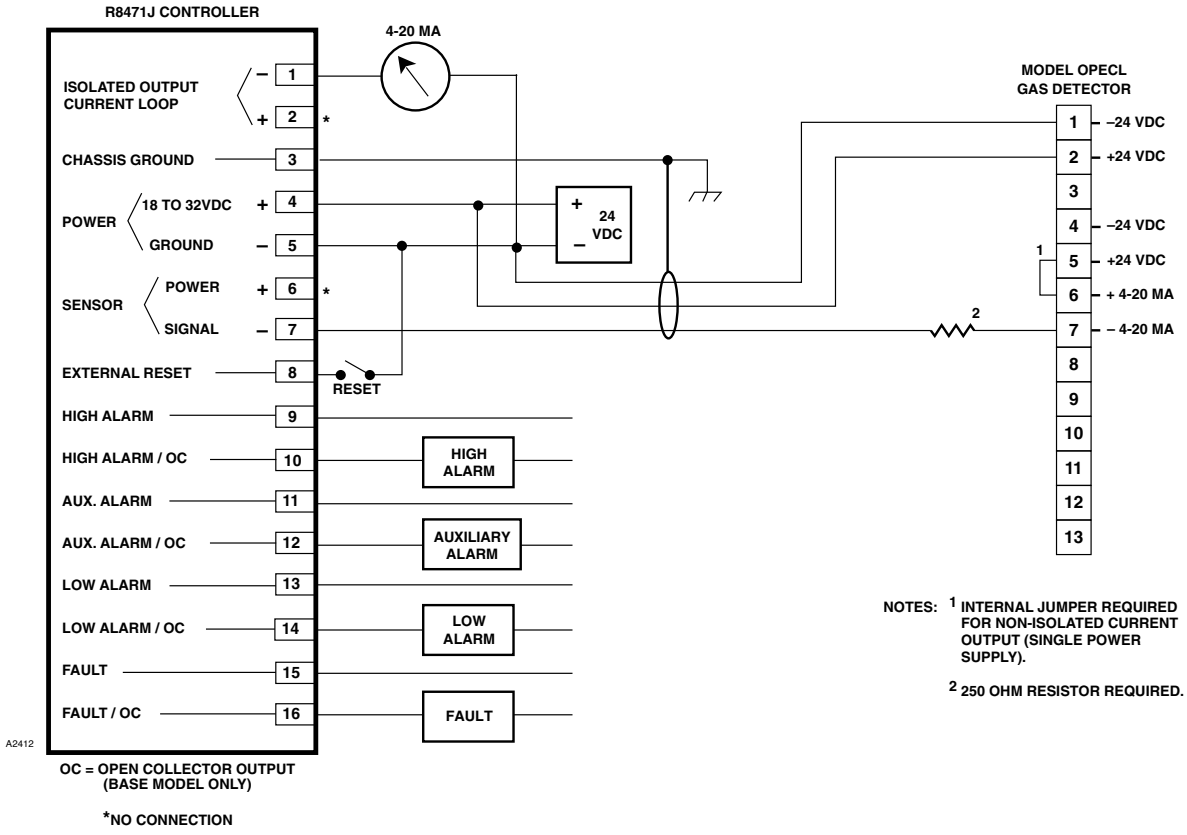


Figure 4—A Typical System with Relay Outputs and Non-Isolated Current Output

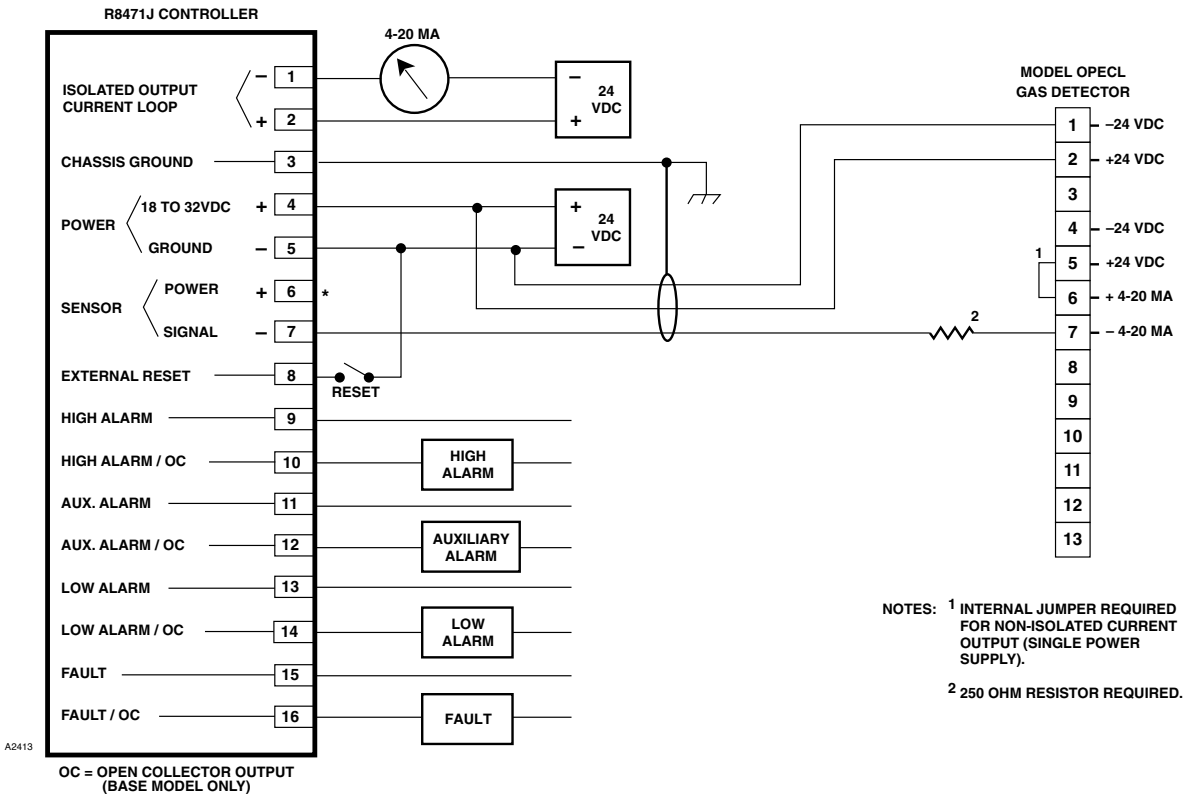


Figure 5—A Typical System with Relay Outputs and Isolated Current Output

Terminal 3 – Chassis ground. Connect the cable shield to this terminal.

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 4 – Connect to the positive (+) side of the 18 to 32 Vdc power source.

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

Terminal 6 – Make no connections to this terminal.

Terminal 7 – 4 to 20 mA dc signal input from OPECL.

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.

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.

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 6 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) properly connected across the coil at the time of installation. This will safeguard the output transistors of the controller against possible damage. Figure 6 illustrates an inductive load with a diode used for transient suppression.*

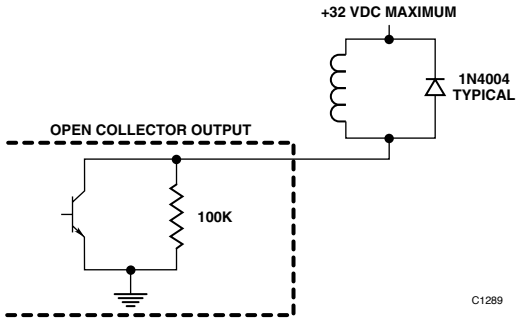
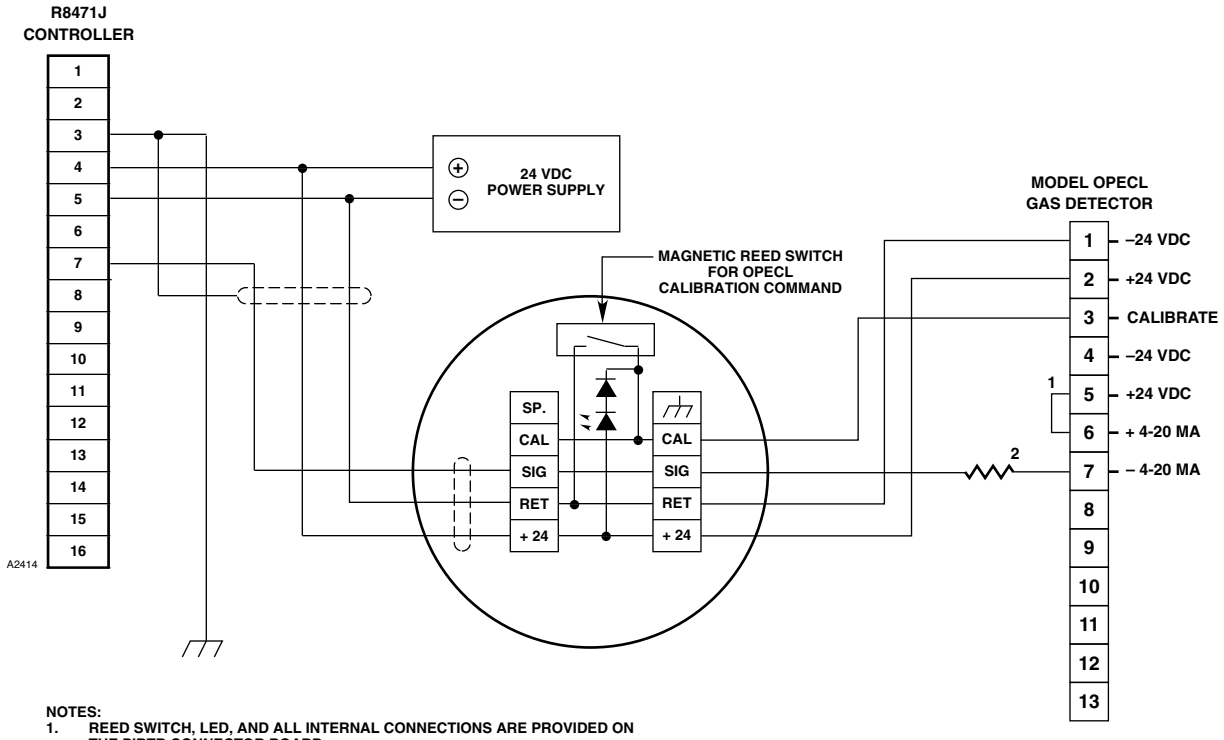


Figure 6—Open Collector Output with Inductive Load and Transient Suppression Device

MODEL PIRTB TERMINATION BOX

The Model PIRTB Termination Box allows the operator to initiate calibration of the OPECL detector from a remote location. The PIRTB provides a magnetic reed switch for initiating calibration and an LED to provide calibration feedback. Refer to Figure 7 for an illustration of an R8471J Controller wired to an OPECL IR gas detector using a Model PIRTB termination box. Refer to Figure 8 for location of the magnetic switch and LED within the PIRTB enclosure.



NOTES:
1. REED SWITCH, LED, AND ALL INTERNAL CONNECTIONS ARE PROVIDED ON THE PIRTB CONNECTOR BOARD.
2. CONDUCT OPECL CALIBRATION PROCEDURE BEFORE R8471J CONTROLLER CALIBRATION.
3. OPECL CALIBRATION INITIATION WILL CAUSE R8471J FAULT CONDITION UNTIL OPECL CALIBRATION PROCEDURE IS COMPLETED.
4. CABLE SHIELD WIRE IS TO BE CUT BACK AND TAPED OFF WITHIN PIRTB JUNCTION BOX.
5. CABLE SHIELD WIRE IS TO BE CONNECTED TO TERMINAL NO. 3 AT R8471J BACKPLATE, WHICH IS THE CONTROLLER EARTH GROUND CONNECTION.

NOTES: [1] INTERNAL JUMPER REQUIRED FOR NON-ISOLATED CURRENT OUTPUT (SINGLE POWER SUPPLY).

[2] 250 OHM RESISTOR REQUIRED.

Figure 7—R8471J Controller Wired to an OPECL IR Detector with a Model PIRTB Termination Box

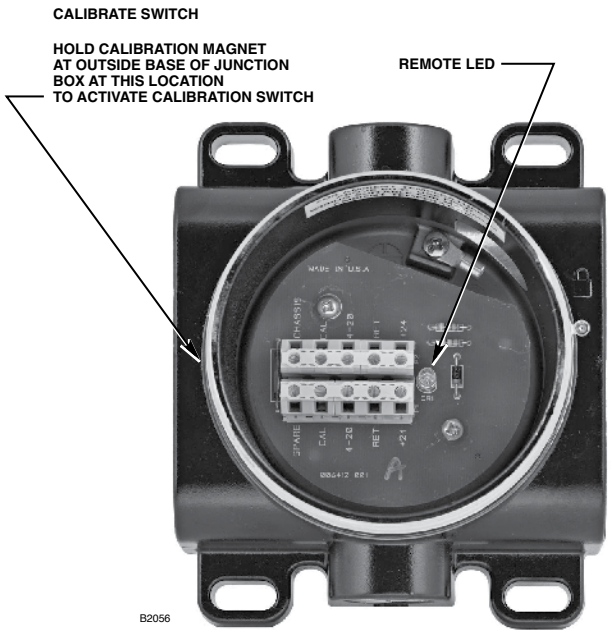


Figure 8—Location of Terminals, Reed Switch and LED within PIRTB Termination Box

CONTROLLER PROGRAMMING

Refer to Figure 9 to determine the location of programming jumpers and switches. Table 1 shows the selectable options for each relay.

NOTE

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

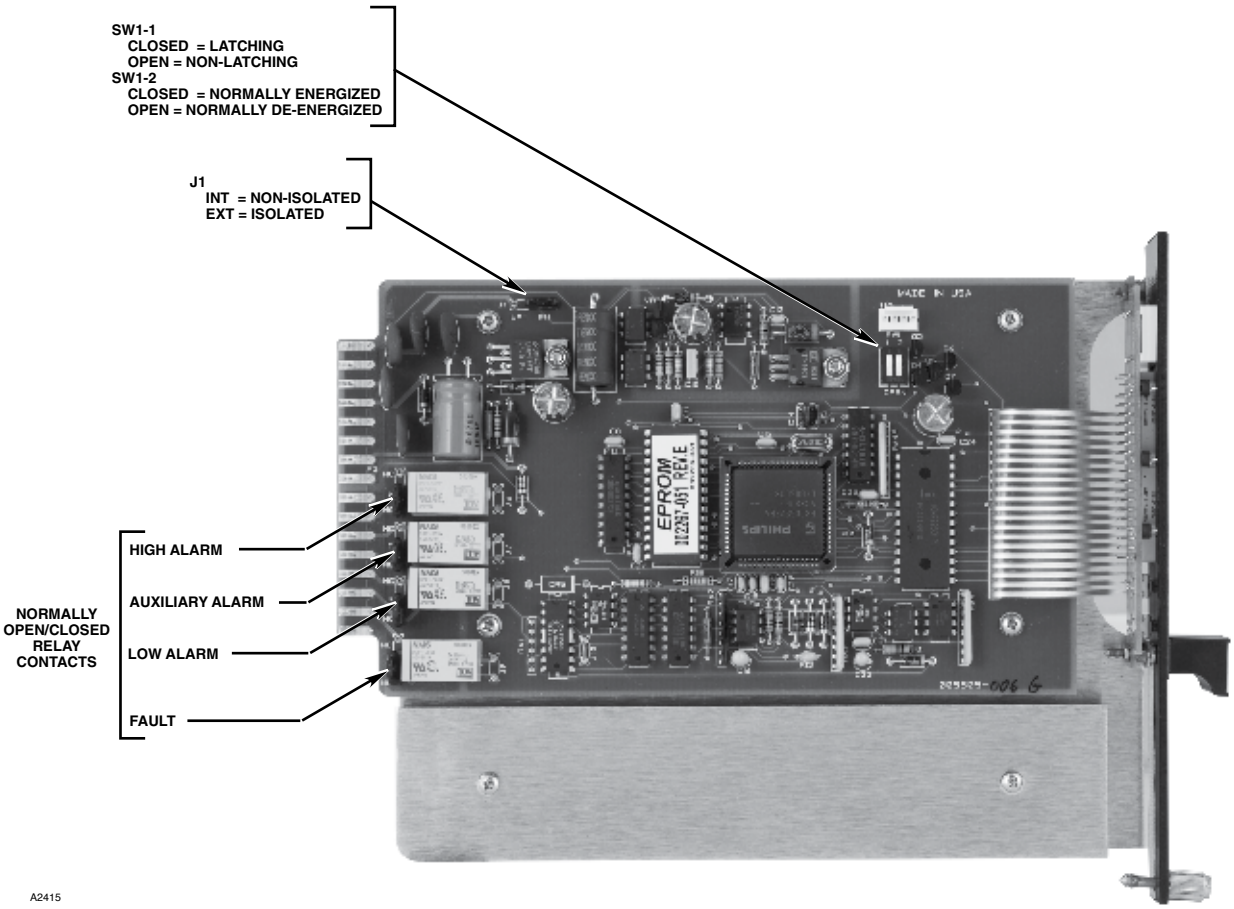


Figure 9—Programming Jumper Plugs and Switches

Table 1—Selectable Relay Options

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

Y = Yes N = No [1]Latching only

[2]Normally Energized [3]No latching option

*Relays selectable as a group.

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.

Latching/Non-Latching Relays

The Low and Auxiliary alarm relays are programmable as a group for latching or non-latching operation. The High alarm relay is always latching. 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 as a group 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.

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. For non-isolated operation, as illustrated in Figure 4, place the jumper plug in the INT (**int**ernal power source) position. Place the plug in the EXT position for an isolated circuit, as illustrated in Figure 5. 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. OPECL detector is installed as described in the OPECL manual (95-8556).

   IMPORTANT

   To ensure proper operation, the OPECL must be configured for PIR9400 Analog Fault Code. Refer to the HART section in the OPECL manual (95-8556) for more information.

2. OPECL housing covers are tightly installed.

3. All cable shields are properly grounded.

4. Conduit seals have been installed at all junction box entries (if conduit is being used).

5. OPECL to controller wiring is correct.

6. Power wiring to OPECL and 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 enclosure.

10. Proper ventilation is provided to prevent overheating of the controller.

Proceed to Startup Procedure, Setpoint Adjustment, and Calibration.

STARTUP PROCEDURE

1. Output loads that are normally actuated by the gas detection system should be secured (remove power from all output devices) to prevent undesired activation.

2. Check all external wiring for proper connection.

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 enclosure.

4. Apply power to the system.

   NOTE

   The controller has a power-up delay before beginning normal operation after power is applied to the system. 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 OPECL output to stabilize before beginning normal operation.

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

6. Perform the calibration procedure. This involves zero calibrating the OPECL using the procedure described in the OPECL manual, then calibrating the controller using the procedure described in the “Calibration” section of this manual.

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

8. After calibration is completed, restore the system output loads to ready condition.

SETPOINT ADJUSTMENT

The R8471J Controller has independent Low, High, and Auxiliary alarm setpoints, with corresponding outputs.

The calibration gas concentration in % full scale (0-5 LFL-m) is also displayed with the alarm setpoints.

The adjustment range for the alarm setpoints is as follows:

Low alarm	5 to 50% full scale	(0.25-2.5 LFL-m)
High alarm	10 to 60% full scale	(0.5-3.0 LFL-m)
Auxiliary alarm	3 to 90% full scale	(0.15-4.5 LFL-m)
Calibration gas	50% full scale	(2.5 LFL-m)

WARNING

Calibration gas concentration is set to 50% full scale (2.5 LFL-m) at the factory and must ***not*** *be changed. Other calibration gas settings can cause unreliable readings, which could result in a fire or explosion.*

The factory settings are:

Low alarm:	20% full scale	(1.0 LFL-m)
High alarm:	50% full scale	(2.5 LFL-m)
Auxiliary alarm:	50% full scale	(2.5 LFL-m)
Calibration gas:	50% full scale	(2.5 LFL-m)

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

SETPOINT DISPLAY MODE

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 begins to blink, 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 programmed auxiliary alarm setpoint.

4. Two seconds later the Auxiliary LED goes out and the CAL LED blinks. The digital display now shows the calibration gas concentration. This value must always read 50% full scale when an OPECL detector is used with the R8471J.

5. After displaying the calibration gas concentration 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 and perform the Calibration procedure.

SETPOINT ADJUSTMENT PROCEDURE

1. Determine the required alarm setpoint levels.

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. (Pushing and 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 concentration. This value should always be set at 50% when an OPECL detector is used with the R8471J.

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 concentration, 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

The OPECL IR gas detector is calibrated at the factory for detection of methane gas.

Unusual gas types and applications may require special calibration considerations. Refer to the OPECL instruction manual (95-8556) for additional information.

CALIBRATION OVERVIEW

Calibration of the R8471J/OPECL combustible gas detection system is a two step process — zero calibrate OPECL, then calibrate the controller.

NOTE

*The **OPECL** unit must always be zero calibrated **first**.*

OPECL Calibration. OPECL calibration ensures a calibrated linear 4 to 20 mA input to the controller.

OPECL calibration is totally independent of the R8471J Controller calibration. The OPECL calibration procedure can be performed by one person, with all adjustments made at the OPECL.

NOTE

During the time that the OPECL is in the calibrate mode, the R8471J indicates the status of the OPECL calibration on its digital display. The controller cannot, however, put the OPECL unit into the calibrate mode or control its calibration in any way.

Controller Calibration. After the OPECL has been zero calibrated, the operator sets the controller for factory default calibration values. The procedure is performed after the initial OPECL calibration and does not need to be repeated with each subsequent OPECL recalibration. This procedure can be performed by one person.

ZERO CALIBRATING OPECL

To zero calibrate the OPECL unit, follow the calibration procedure described in the OPECL instruction manual (95-8556).

NOTE

For best calibration results, allow the OPECL detector to operate for at least two hours to ensure a stable output before performing zero calibration.

CALIBRATING THE CONTROLLER

Factory Default Calibration

Perform the following procedure to set the R8471J Controller to the factory default calibration values.

1. 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 comes on.

3. Press the Reset button. The controller returns to the normal operating mode (after a short time delay).

4. The controller is now set for the factory default values.

CURRENT OUTPUT CALIBRATION

The controller's 4 to 20 milliampere output is calibrated at the factory, however, it can be recalibrated 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 in one of the following ways:

   — by disconnecting all loads and connecting a dc ammeter between the two 4 to 20 milliampere terminals,

   — by connecting a dc ammeter in series with the load,

   — 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 should flash slowly. The flashing Low LED indicates that the system is now generating a 4 mA output.

3. Press the Reset (increase) or Set (decrease) button to obtain a 4 mA reading on the meter. (Pressing and holding the button will cause the output to change rapidly.)

4. When no adjustments have been made for 7 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 mA reading.

5. When no adjustments have been made for 7 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.

6. When no changes have been made for 7 seconds, the controller automatically returns to the Normal operating mode and saves the data in non-volatile memory.

7. Remove the meter from the system output.

Section II
Description and Operating Characteristics

FACEPLATE DESCRIPTION

The faceplate of the controller provides LEDs for identifying status conditions, a digital display and bar graph display for indicating the OPECL input, and pushbuttons for programming, calibrating and resetting the system. See Figure 10 for the location of indicators and pushbuttons.

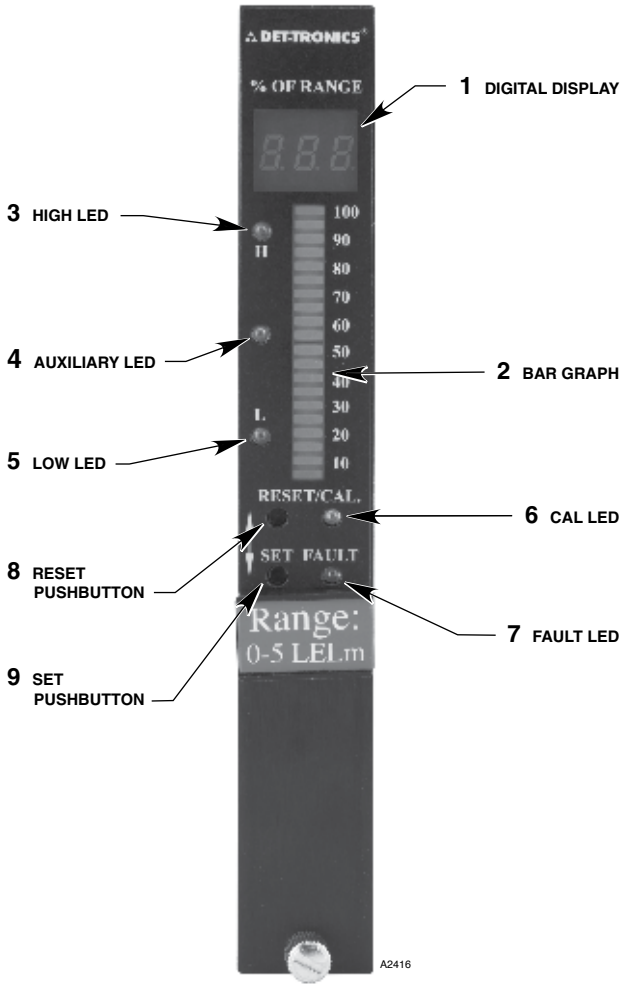


Figure 10—Controller Front Panel

1. **Digital Display** - In the Normal mode, the digital display provides a continuous reading of the input from the OPECL. An input signal less than 4 mA is displayed as a negative reading by the controller. An input signal greater than 20 mA is displayed as an over-range reading by the controller.

   In the event of a fault, the digital display identifies the nature of the fault using an alpha-numeric code. When the OPECL unit is in the calibrate mode, the display tracks the calibration procedure. In other operating modes it shows the alarm setpoints and programmed calibration gas concentration. Since this display is always lit, it also functions as a power indicator.

2. **Bar Graph Display** - In the Normal mode, the 20 segment bar graph display provides a reading of sensor input in increments of 5% full scale (each bar represents 0.25 LFL-m).

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

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.

   NOTE

   The alarm LEDs flash when the setpoint is exceeded and are on steady (until reset) when the gas level drops below the setpoint, whether the corresponding alarm output is latching or non-latching.

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

   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 concentration (in % full scale) is currently being shown on the digital display.

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.

OUTPUTS

The R8471J 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 de-energized alarm outputs are energized when their corresponding setpoints are exceeded. The fault output is normally energized and becomes de-energized upon detection of a system fault.

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 or 250 vac.

This model also includes a selectable isolated/non-isolated 4 to 20 mA dc current output for transmitting system information to other monitoring devices. The linear 4 to 20 mA output corresponds to levels from 0 to 5 LFL-m. 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.)

AUTOMATIC DIAGNOSTICS AND FAULT IDENTIFICATION

The microprocessor based controller features self-testing circuitry that continuously checks for faulty sensor or open sensor wiring, low or high input voltage, and other 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 OPECL 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 using an alpha-numeric code. Refer to the Troubleshooting section for an interpretation of the codes.

— The normally energized Fault output is de-energized.

— The dc current output drops to less than 1 mA.

NOTE

The fault code will be shown for about 2 seconds out of every 5 seconds. The gas concentration at the sensor will be displayed during the remaining time. If more than one fault should occur, the highest priority fault will be displayed.

An alarm condition will normally over-ride a fault condition unless the fault condition occurred first. However, 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 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.

CAUTION

The fault detection circuitry does not monitor the operation of external response equipment or the external wiring to these devices. It is important that these devices be checked periodically to ensure that they are operational.

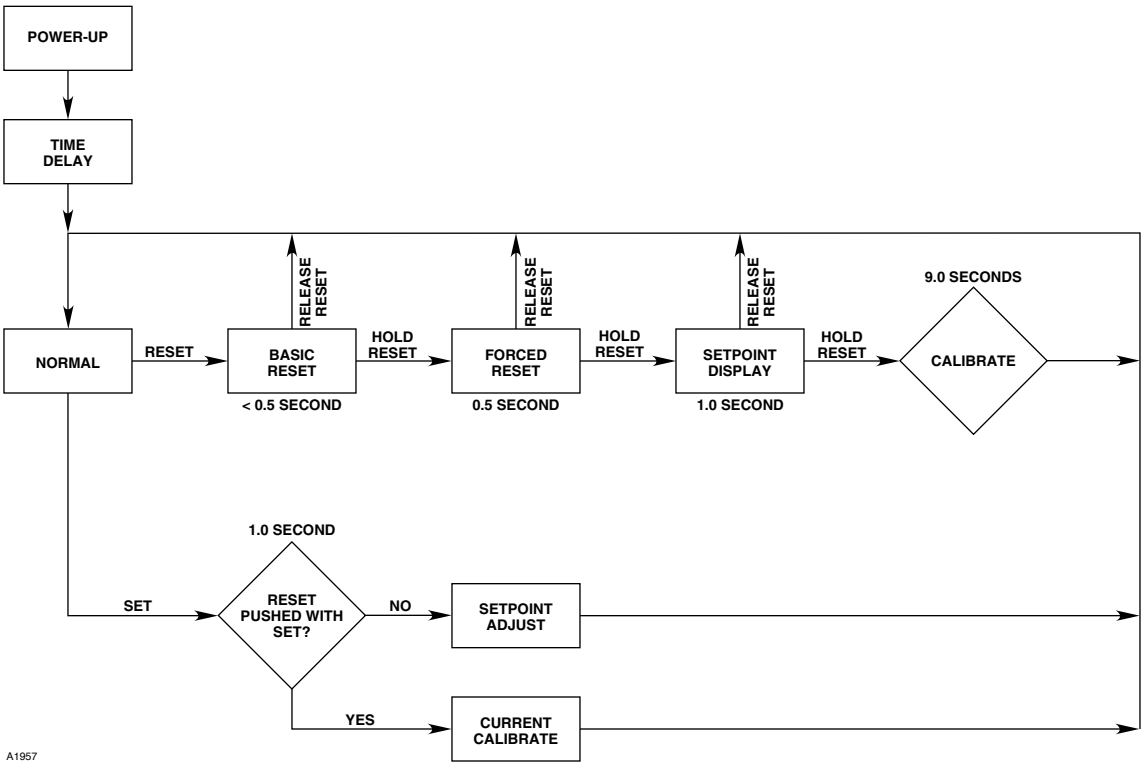


Figure 11—R8471J Controller Flow Chart

OPERATING MODES

The controller can operate in any of the following modes. See Figure 11. Operating modes other than Normal are selected by pressing the appropriate pushbutton(s) located on the controller front panel.

NORMAL

In the Normal operating mode with no alarm condition:

— Digital display is on and indicates the sensor input in % full scale (0-5 LFL-m).

— Bar graph display reads the same as the digital display.

— All LEDs are off.

— Alarm outputs are in their normal state (energized or de-energized as programmed).

— Dc current output signal level corresponds to sensor input.

— Fault output is energized.

In the Normal operating mode with a low and/or auxiliary alarm condition occurring:

— Digital display and bar graph display indicate the sensor input in % full scale (0-5 LFL-m).

— Low and/or Auxiliary LED flashes.

— Low and/or Auxiliary alarm output changes state.

— Dc current output signal level corresponds to sensor input.

— Fault output energized and LED off.

When the signal decreases below the low or auxiliary setpoint:

— Digital display, bar graph display, and 4 to 20 mA output continue to track the sensor input.

— With latching operation programmed: No change to alarm outputs.

— With non-latching operation programmed: Alarm outputs return to their normal state.

— Low and Auxiliary LEDs are on steady until reset.

In the Normal operating mode and a high alarm condition occurring:

— Same as low or auxiliary alarm, but High LED is on and high alarm output is actuated.

When the signal decreases below the high alarm setpoint:

— The high alarm is always latching and unaffected by the latching/non-latching programming for the low and auxiliary alarms. High LED is on steady until reset.

In the event of a system fault:

— The normally energized Fault output is de-energized and the Fault LED is illuminated.

RESET

The Reset mode is entered by pressing the Reset button located on the front panel of the controller.

When the Reset button is **momentarily depressed**:

With no alarms or faults occurring — all LEDs turn off and all outputs return to their normal condition (basic reset).
If an alarm or fault condition exists — the basic reset will not reset the outputs.

When the Reset button is **held for 0.5 second**:

If an alarm or fault condition exists — the LEDs turn off and the outputs return to their normal condition (forced reset).

NOTE

If an alarm or fault condition exists, the controller will return to alarm or fault status when the reset button is released.

Remote reset capability is also provided. (Remote reset performs a forced reset.)

NOTE

The remote reset performs a reset function only. It cannot be used for entering other controller operating modes.

OTHER OPERATING MODES

Setpoint Display, Setpoint Adjustment, Calibration, and 4 to 20 mA Current Output Calibration modes are also executed by pressing buttons on the controller faceplate. Refer to the appropriate sections of this manual for details.

SPECIFICATIONS

OPERATING VOLTAGE—
24 Vdc nominal, total range 18 to 32 Vdc.

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 SUPPLY VOLTAGE RIPPLE—
Should not exceed 5 volts peak-to-peak. The sum of dcV plus ripple must be ≥18 Vdc and ≤ 32 Vdc.

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—
0 to 5 LFL-m. Displayed as 0 to 100% full scale.

SOLID STATE OUTPUTS (Base model only)—
Open collector transistors with a 100K resistor from the collector to emitter with the emitter grounded, rated 100 milliamperes at 32 volts dc maximum.

RELAY CONTACTS (Premium model only)—
Selectable normally open/normally closed contacts rated 5 amperes at 30 Vdc/250 vac. See Table 1 for selectable relay options.

CURRENT OUTPUT (Premium model only)—
4 to 20 milliampere dc current, with a maximum loop resistance of 600 ohms at 24 Vdc. User-selectable isolated or non-isolated signal reference from controller input power common return.

DIMENSIONS—
See Figure 12.

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

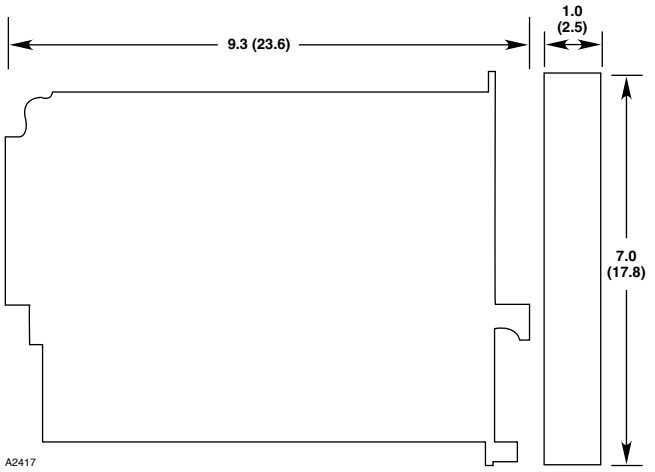


Figure 12—Controller Dimensions in Inches (Centimeters)

Section III
System Maintenance

TROUBLESHOOTING

Table 2 is intended to serve as an aid in locating the cause of a system malfunction. (Table 2 lists the faults in order of priority.)

The R8471J Controller is not designed to be repaired 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 a defect in the controller's electronics, 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 device from the mounting cage or plugging in the replacement unit.

ROUTINE MAINTENANCE

The gas detection system requires virtually no routine maintenance, except for periodic checks to assure proper system function and calibration. The frequency of these checks is determined by the requirements of the particular installation.

MANUAL CHECK OF OUTPUT DEVICES

Fault detection circuitry continuously monitors for a sensor problem, excessive negative zero drift, wiring problems, and various other problems that could prevent proper response to a dangerous level of gas. It does not monitor external response equipment or the wiring to these devices. It is important that these devices be checked initially when the system is installed, as well as periodically during the ongoing maintenance program.

CHECKOUT IN NORMAL MODE

The system must be checked periodically in the Normal mode to ensure that those items not checked by the controller diagnostic circuitry 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.

OPECL MAINTENANCE

Refer to the OPECL instruction manual (95-8556) for information regarding maintenance for the OPECL.

DEVICE REPAIR AND RETURN

Prior to returning devices or components, contact the nearest local Detector Electronics office so that an RMI (Return Material Identification) number can be assigned. A written statement describing the malfunction must accompany the returned device or component to assist and expedite finding the root cause of the failure.

Pack the unit properly. Always use sufficient packing material. Where applicable, use an antistatic bag as protection from electrostatic discharge.

NOTE

Inadequate packaging that ultimately causes damage to the returned device during shipment will result in a service charge to repair the damage incurred during shipment.

Return all equipment transportation prepaid to the factory in Minneapolis.

ORDERING INFORMATION

The OPECL Detector must be ordered separately from the controller. When ordering please specify:

R8471J Combustible Gas Controller
Specify base or premium model.

MOUNTING RACKS

A mounting rack is required for controller installation and can house gas or flame controllers in any combination. See Figures 1 and 2. Rack sizes are available to handle up to 8 flame controllers or up to 16 gas controllers.

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

Table 2—Troubleshooting Guide

Indication at Controller	Possible Cause
No faceplate indicators illuminated.	Input power failure. Check wiring to external power source.
FAULT LED on, digital display blank.	Power-up time delay (up to 5 minutes). If condition continues after 5 minutes, repeat power-up. If problem continues, replace controller.
F91 to F98 Status	Initialization failure. Repeat power-up. If successful, re-program and re-calibrate. If not, replace controller.
F92 Status	OPECL problem (during startup) - current is over 35 ma or below 0.5 mA.
F94 Status	RAM failure. Repeat power-up. If not successful, return to factory for repair.
F96 Status	Input power upon startup out of spec (should be 18 to 32 volts). Check operation of power source and power wiring. Correct problem and repeat power-up.
F97 Status	Controller type invalid. Error in data from RAM. Repeat power-up. If not successful, return to factory for repair.
F70 Status	External reset activated for over 15 seconds. Check external switch and wiring.
F60 Status	Input power out of tolerance. Check operation of power source and power wiring.
F50 Status	Internal power supply problem. Replace controller.
F40 Status	OPECL output (after startup) is over 35 mA or below 0.5 mA. Check OPECL wiring and calibration.
F41 Status	OPECL has blocked optics. Refer to OPECL manual.
F42 Status	OPECL calibration line fault.
F30 Status	Negative zero drift. Check OPECL alignment and calibration.
CAL	OPECL in calibrate mode, doing Zero calibration.
CC	OPECL in calibrate mode, successful calibration completed.

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
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