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Kele KGD-12-O2 Oxygen Detector Controller and Transducer

Kele KGD-12-O2 Oxygen Detector Controller and Transducer User Manual

Contents

Kele KGD-12-O2 Oxygen Detector Controller and Transducer

Specifications

- Fan relay actuation: selectable at dIS (disabled), 18, 18.1…, 20.5% v/v and high 23.5% v/v (preset)
- Alarm relay settings: dIS (disabled), 18.5, 19, 19.5 (default), 20, 20.5, and high 23.5 % v/v (preset)
- Current Loop: 4-20 mA for 0-25% v/v O2, selectable to off (default) or on

Features

- Microcomputer-controlled system
- Field-replaceable electrochemical sensor
- 4-20mA output
- Optional calibration test kit
- Displays oxygen levels from 0-25%

Frequently Asked Questions (FAQ):
Q: What should I do if the detector displays an alarm?
A: If the detector alarm activates, evacuate the area immediately and contact technical support for assistance.

Kele KGD-12-O2
Oxygen Detector, Controller and Transducer User Instructions

Important: Keep these User Instructions for reference

GENERAL SAFETY INFORMATION

Intended Use
The Kele KGD-12-O2 is a line voltage, dual relay oxygen (O2) detector, controller and transducer. The KGD-12-O2 has selectable 4-20 mA output, buzzer and digital display options. It is an electronic detection system used to

measure the concentration of oxygen and provide feedback and automatic exhaust fan control to help maintain appropriate oxygen concentrations in commercial applications. The KGD-12-O2 is a low level meter capable of detecting from 0-25% by volume of oxygen. The KGD-12-O2 is factory calibrated and 100% tested for proper operation but can also be calibrated in the field.

List of Warnings and Cautions within these User Instructions

WARNING

- Each person using this equipment must read and understand the information in these User Instructions before use. Use of this equipment by untrained or unqualified persons, or use that is not in accordance with these User Instructions, may adversely affect product performance and result in sickness or death.
- Use only for monitoring the gas which the sensor and instrument are designed to monitor. Failure to do so may result in exposures to gases not detectable and cause sickness or death. For proper use, see supervisor or User Instructions, or call Technical Service at **877-826-9045**.
- This equipment may not function effectively below 0F or above 125F (-18C or above 52C). Using the detector outside of this temperature range may adversely affect product performance and result in sickness or death.
- This detector helps monitor for the presence and concentration level of a certain specified airborne gas. Misuse may produce an inaccurate reading, which means that critical levels of the gas being monitored may be present and could result in overexposure and cause sickness or death. For proper use, see supervisor or User Instructions, or call Technical Service at **877-826-9045**.
- High voltage terminals (120/240 VAC) are located within this detector, presenting a hazard to service technicians. Only qualified technicians should open the detector case and service the internal circuits. Ensure power is removed from the detector relays prior to servicing the unit. Failure to do so may result in sickness or death.
- Do not disassemble unit or attempt to repair or modify any component of this instrument. This instrument contains no user serviceable parts, and substitution of components may impair product performance and result in sickness or death.
- Using a certified gas with a concentration other than the one listed for this detector when conducting a calibration or calibration verification test (bump test) will produce inaccurate readings. This means that critical levels of the gas being monitored may be present and could result in overexposure and cause sickness or death. For proper use, see supervisor or User Instructions, or call Technical Service at **877-826-9045**.
- The following steps must be performed when conducting a calibration or calibration verification test (bump test) to ensure proper performance of the monitor. Failure to do so may adversely affect product performance and result in sickness or death.
- When performing a calibration or calibration verification test (bump test) only use certified calibration gas at the required concentration level. Do not calibrate with expired calibration gas.
- If the instrument cannot be calibrated, do not use until the reason can be determined and corrected.
- Do not cover or obstruct display or visual alarm
- Ensure sensor inlets are unobstructed and free of debris

USE INSTRUCTIONS AND LIMITATIONS

WARNING
Each person using this equipment must read and understand the information in these User Instructions before use. Use of this equipment by untrained or unqualified persons or use that is not in accordance with these User Instructions, may adversely affect product performance and result in sickness or death.

Use For

The Kele KGD-12-O2 Oxygen Detector provides oxygen detection and automatic ventilation control in wastewater treatment plants, factories, storage facilities and other commercial applications. The normal concentration of oxygen in the atmosphere is approximately 20.9% by volume. The OSHA minimum acceptable breathing air contains 19.5% oxygen. In the absence of adequate ventilation, the level of oxygen can be reduced surprisingly quickly by breathing, combustion and other processes. Oxygen levels may also be depleted due to dilution by other gases such as carbon dioxide, nitrogen or helium and chemical absorption by corrosion processes and similar reactions. Alternately, increased levels of oxygen may dramatically increase the flammability of any combustible matter. If oxygen levels exceed 24% volume, even materials such as clothing which might normally just smolder may burst into flame. The risk from oxygen enrichment exists where pure oxygen is stored, for example in hospitals and industrial gas manufacturing and distribution plants. The KGD-12-O2 meets the OSHA requirements for oxygen concentration. KGD-12-O2 can be used stand alone, with the Kele DVP-120 Detection and Ventilation Control Panel, other fire/security panels or building automation systems.

WARNING

Use only for monitoring the gas which the sensor and instrument are designed to monitor. Failure to do so may result in exposures to gases not detectable and cause sickness or death. For proper use, see supervisor or User Instructions, or call Technical Service at **877-826-9045**.

Do Not Use For

The KGD-12-O2 is not intended for use in hazardous locations or industrial applications such as refineries, chemical plants, etc. Do not mount the KGD-12-O2 where the normal ambient temperature is below 0°F or exceeds 125°F (below -18 C or above 52 C). The KGD-12-O2 mounts on a 4×4 electrical box supplied by the contractor. Do not install the KGD-12-O2 inside another box unless it has good air flow through it.

WARNING

This equipment may not function effectively below 0F or above 125F (-18C or above 52C). Using the detector outside of this temperature range may adversely affect product performance and result in sickness or death.

General Description

The KGD-12-O2 is a line voltage, dual relay oxygen (O2) detector and automatic ventilation controller. The KGD-12-O2 uses a microcomputer controlled, electronic system to measure the concentration of oxygen, actuate relays and provide a 4-20mA output. The KGD-12-O2 has a field replaceable, electrochemical sensor (expected life of 2+ years) and optional calibration test kit. The KGD-12-O2 is a low level meter capable of displaying from 0-25% of oxygen.

Features

- ETL Listed to UL 61010-1 and CAN/CSA C22.2 No 61010-1
- Low level meter capable of displaying from 0-25% v/v oxygen
- The KGD-12-O2 meets OSHA standards for oxygen concentration
- Selectable fan and alarm relay activation
- 5 A SPDT fan relay controls starters of exhaust fans
- 0.5 A N.O. or N.C. alarm relay connects to warning devices or control panels
- 4-20 mA Current Loop
- KGD-12-O2 mounts on a standard 4×4 electrical box and becomes cover for the box
- Supervised system: any internal detector problem will cause the fan & alarm relay to activate
- Calibration verification test kit is available. One screw allows access for calibration or gas test

Specifications

- Power: 100-240VAC (50 TO 60 HZ)

- Current: 1.0 A MAX

- Shipping Weight: 1 pound (0.45 kg)

- Size: 4 1/2 x 4 x 2 1/8 in. (11.4 X 10.2 X 5.4 cm)

- Color: Dark gray

- Connections: plugs/terminals

- Mounting box: (not included) 4×4 electric

- Fan relay: 5 A, 240 VAC, pilot duty, SPDT

- Fan relay actuation: selectable at "dIS" (disabled), 18, 18.1… , 20.2 (default), 20.3, 20.4 & 20.5% v/v and high 23.5 % v/v (preset)

- Fan Delay Settings of 0, 1, 3 (default), 5 and 10 minutes

- Fan Minimum Run Time settings are 0 (default), 3, 5, 10 or 15 minutes

- Fan relay latching or not latching (default) selectable

- Alarm relay: 0.5A 120 V, 60 VA

- Alarm relay actuation: selectable N.O. (default) or N.C.

- Alarm relay settings: "dIS" (disabled), 18.5, 19, 19.5 (default), 20, 20.5 and high 23.5 % v/v (preset)

- Current Loop: 4-20 mA for 0-25% v/v O2, selectable to off (default) or on

- Buzzer: 85 dBA at 10cm settable to on (default) or off

- Digital display: 3 digit LED selectable to on (default) or off

- Operating environ: 0°F to 125°F (-18C to 52°C).10 to 90% RH non-condensing

- Operating altitude: Up to 5,000m (16,404ft)

INSTALLATION AND OPERATING INSTRUCTIONS
The following instructions are intended to serve as a guideline for the use of the Kele KGD-12-O2 Oxygen Detector. It is not to be considered all-inclusive, nor is it intended to replace the policy and procedures for each facility. If you have any doubts about the applicability of the equipment to your situation, consult an industrial hygienist or call Technical Service at **877-826-9045**.

WARNING
This detector helps monitor for the presence and concentration level of a certain specified airborne gas. Misuse may produce an inaccurate reading, which means that critical levels of the gas being monitored may be present and could result in overexposure and cause sickness or death. For proper use, see supervisor or User Instructions, or call Technical Service at **877-826-9045**.

Location
An KGD-12-O2 is normally mounted at breathing level, about 5 feet (1.5 meters) above the floor on a wall or column in a central area where air movement is generally good. The unit, on average, can cover about 900 sq. ft. (84 sq. meters). The coverage depends on air movement within the room or facility. Extra detectors may be needed near any areas where people work or where the air is stagnant. Do NOT mount the KGD-12-O2 where the normal ambient temperature is below below 0°F or exceeds 125°F (below -18 C or above 52 C).

WARNING
High voltage terminals (120/240 VAC) are located within this detector, presenting a hazard to service technicians. Only qualified technicians should open the detector case and service the internal circuits. Ensure power is removed from the detector relays prior to servicing the unit. Failure to do so may result in sickness or death.

Except for the safety ground, all field wiring is completed via modular connectors (provided). After wiring, simply plug the modular connectors into the matching connectors on the back side of the detector.

Mains Power Connection

Mains connections should be done in accordance with National and Local Electrical Codes. Only qualified personnel should connect Mains power to any device. Kele recommends a minimum wire size of AWG18 and the wire insulator must be rated for 140°F (60°C) service. The modular connector will accept wire from 12 to 24 AWG. The safety ground wire should be secured to the ground screw of the metal electrical box. Tighten the screw and make sure the wire is snug. Ensure that the wire cannot be pulled out from under the screw.

The Line (L) and Neutral (N) wires should be stripped 1/4 in. (6.5 mm), insert the wire into the "L" and "N" wire positions of the modular Fan/Power connector and tighten the screw clamp. Ensure that the wire cannot be easily pulled from the connector. Plug the modular connection into the Fan/Power connection and ensure that it latches into the header properly.

Fan Relay Connection

All of the SPDT Fan relay terminals are available at the Fan/Power modular connector. Each Fan relay terminal normally open, common and normally closed (NO, COM and NC) can accommodate a wire size 12 to 24 AWG. To install the wiring for the relays, disconnect the connector from the header. Strip the insulation of each wire back approximately 1/4 in. (6.5 mm), insert the bare wire into the terminal and tighten the screw clamp. Ensure that the wire cannot easily be pulled from the connector. Plug the modular connection into the Fan/Power connection and ensure that it latches into the header properly.

Alarm Relay Connection

The external alarm connections (A and B) are available at the Alarm modular connector. There is no polarity for these connections. To install the wiring for the alarm contacts disconnect the connector from the header on the detector. Strip the insulation of each wire back approximately 1/4 in. (6.5 mm), insert the bare wire into the terminal and tighten the screw clamp. Ensure that the wire cannot easily be pulled from the connector. When the wires are connected seat the modular connector into the header ensuring that the latch engages.

4-20mA Signal Connection

The positive and negative 4-20mA signal connections (+ and -) are available at the 4-20mA modular connector, a 2-position connector. To install the wiring for the 4-20 mA contacts, disconnect the connector from the header on the detector. Strip the insulation of each wire back approximately 1/4 in. (6.5 mm), insert the bare wire into the terminal and tighten the screw clamp. Ensure that the wire cannot easily be pulled from the connector. When the wires are connected seat the modular connector into the header ensuring that the latch engages.
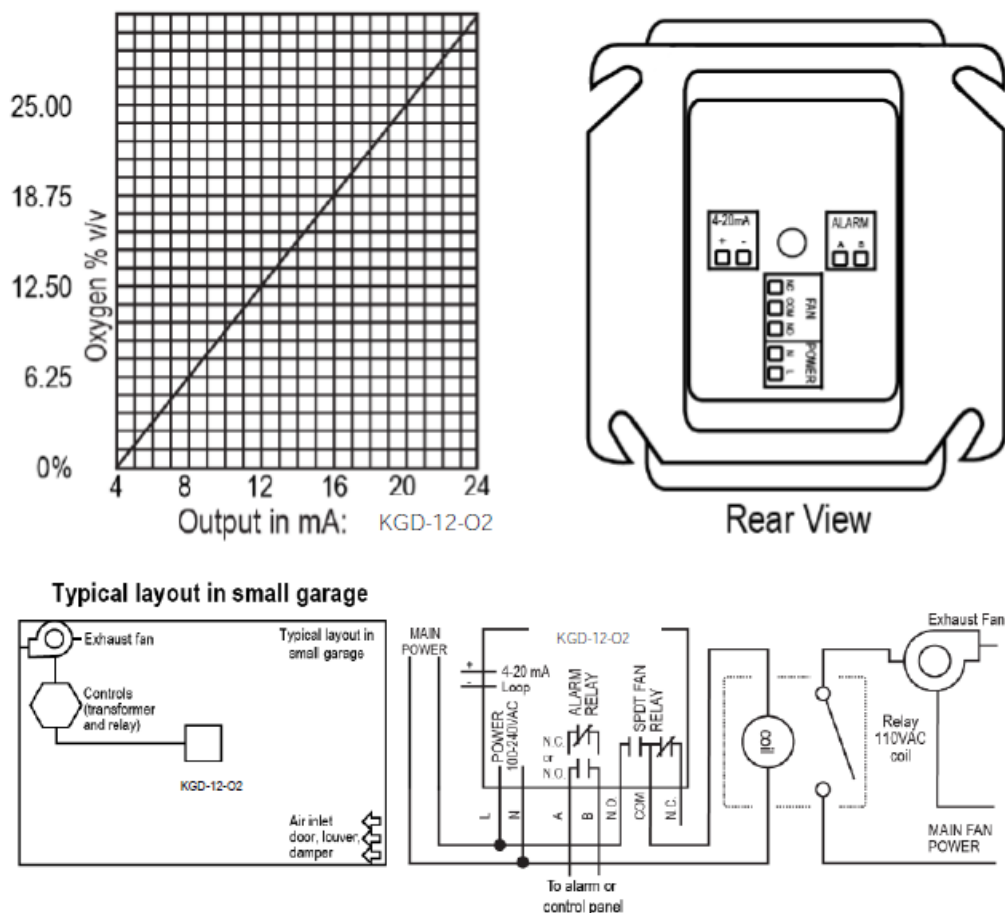
NOTE: The 4-20mA current loop outputs may be used with the Kele DVP-120 control panel or other systems. The 4-20mA signal connections to detectors should be size AWG18 (minimum) for short runs. Refer to the table for recommended wire gauges. Do not bundle detector 4-20mA signal connections with AC power cables to prevent electrical interference. If AC power connections must be bundled with the detector 4-20mA signal cables, the signal connections should be made with twisted pair of the appropriate gauge, with Kele K

an overall foil and braid shield. All shields should be terminated at the DVP-120 end of the cable only. A ground stud is provided near the bottom left corner of the DVP-120 panel.
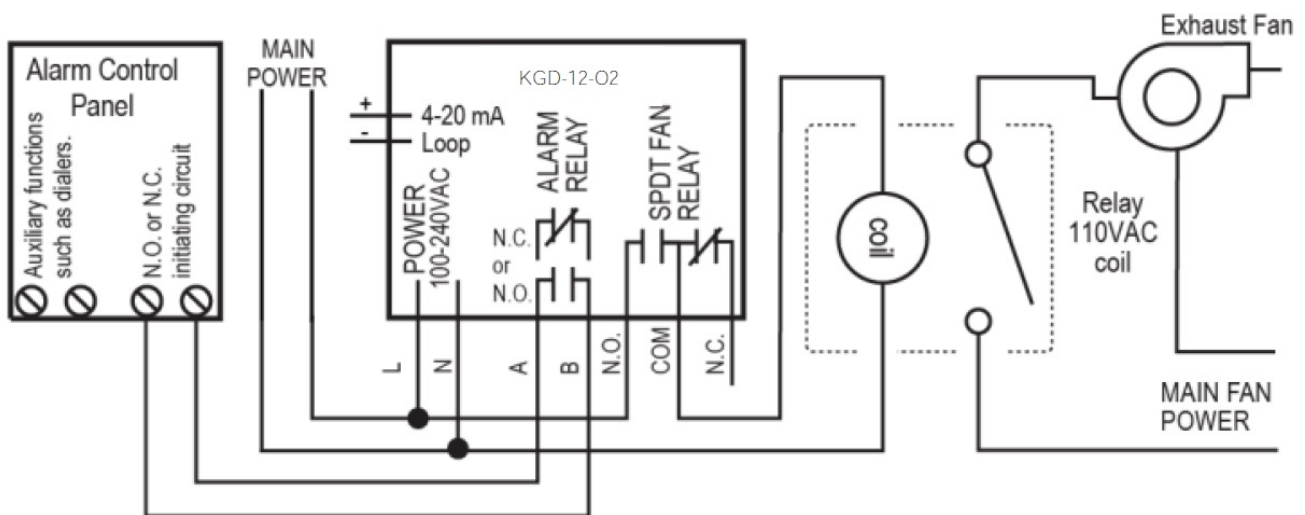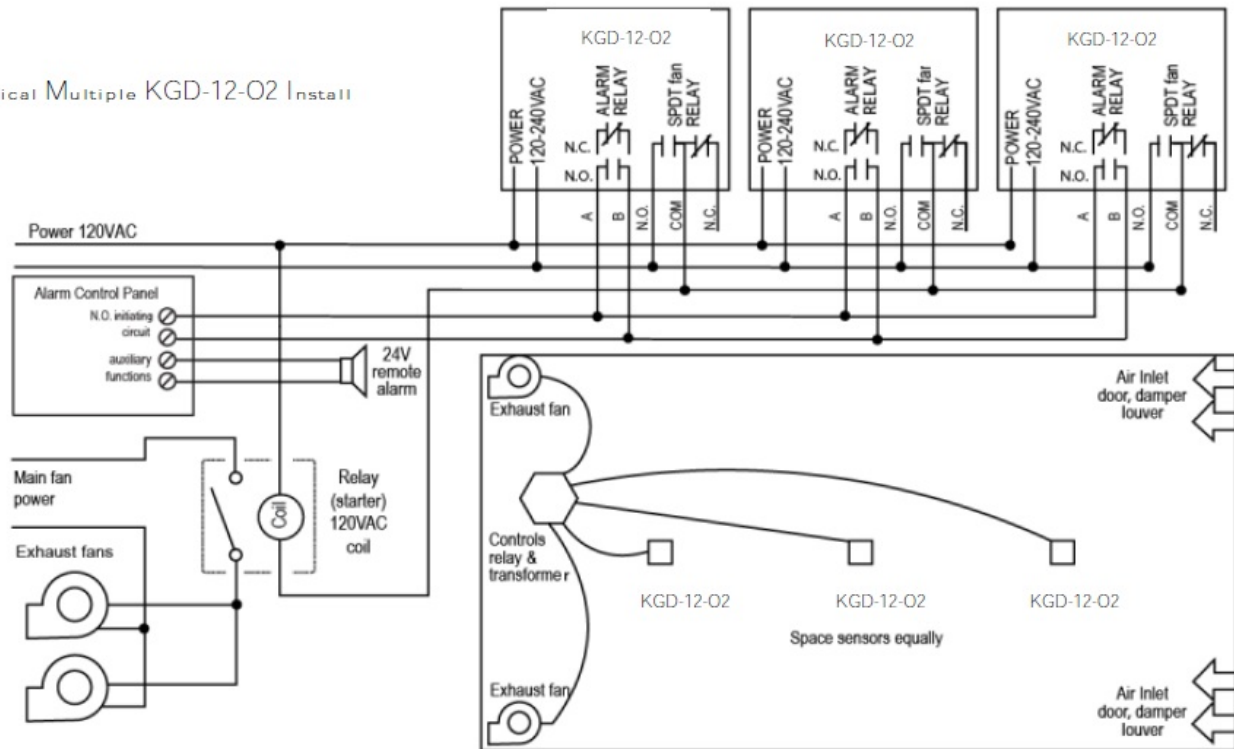
Installation

1. The KGD-12-O2 mounts on a 4" square (or 4×4) electrical box supplied by the contractor. Do not mount the KGD-12-O2 inside another box, unless it has good air flow through it.

2. There are two terminals for the dry alarm relay contacts, again with no polarity preference. The alarm relay can switch up to 0.5 A 120 V, or 60 VA. The alarm relay is activated if gas reaches or exceeds the alarm settings. See OPERATION section of these User Instructions for details on relay settings.

3. The alarm relay can be configured to normally open (default) (N.O.) or normally closed (N.C.) and will activate if the gas concentration drops below alarm set point. It will deactivate once the gas concentration exceeds the alarm set point. Note that the "disable" setting will cause the alarm relay not to engage at all.

4. The dry contact, SPDT fan relay has three terminals. The common (COM.), normally open (N.O.) and the normally closed (N.C.) contact. The fan relay can switch up to 5.0 A up to 240 VAC. See OPERATION section of these User Instructions for details on relay settings.

5. The Fan Relay can be configured for latching or non-latching (default) when activated (when the oxygen concentration drops below fan relay set point). Once latched in, power will need to be interrupted or the "TEST" button pressed to un-latch the relay condition.

6. The Fan Relay will engage if the fan setting oxygen concentration drops below the set point for longer than the Fan Relay Delay time. Unless it is configured for latching, the fan relay will disengage once both of these conditions have been met:
   - Oxygen concentration has exceeded fan setting
   - Fan Relay Run time has been exceeded Note that the "disable" fan setting will cause the fan relay to not engage. The fan relay will engage in trouble fault condition (if the Trouble Fan Setting Option is set to "On") and will disengage once trouble fault condition is cleared.

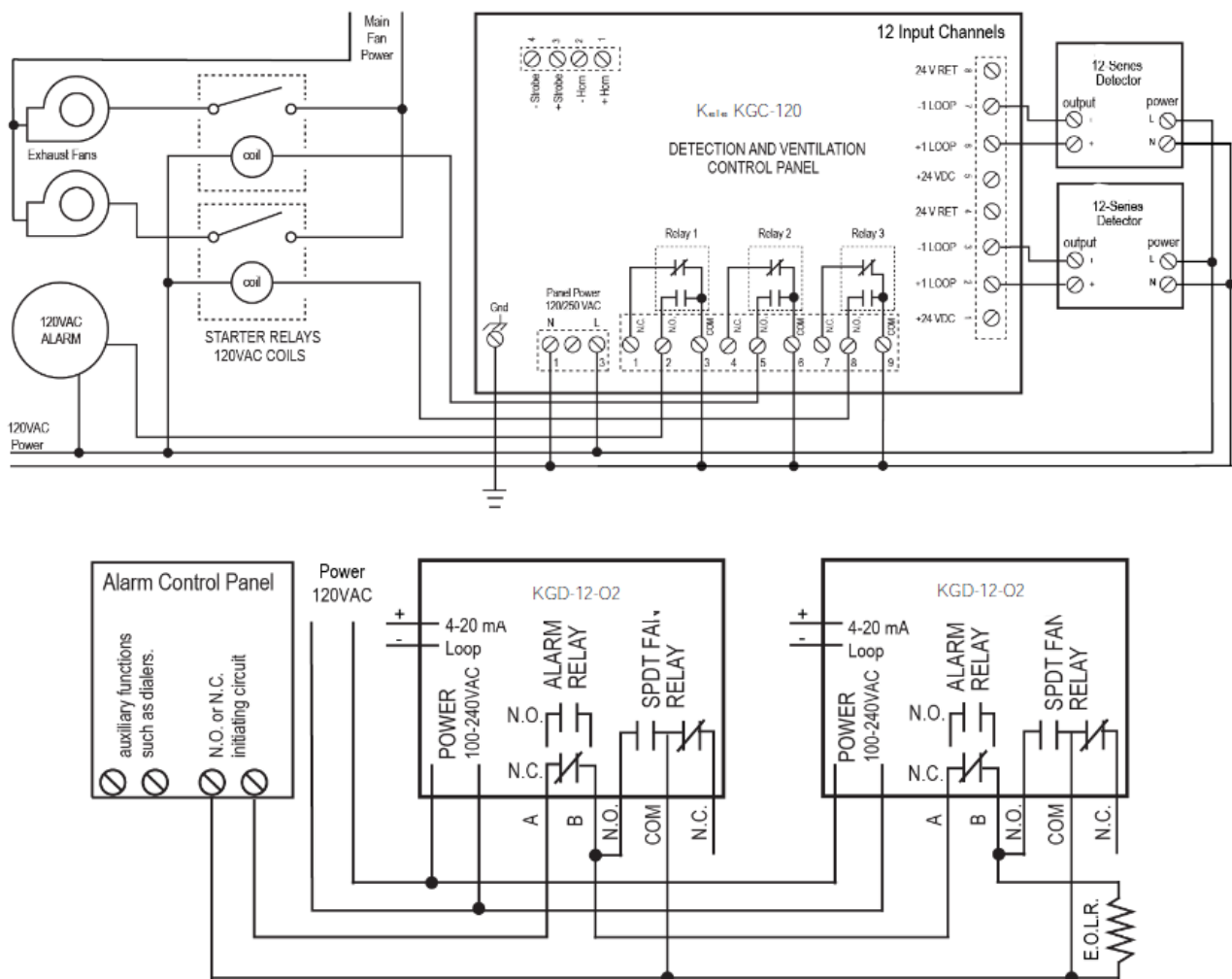7. The Current Loop is 4 mA at 0% v/v, 17.4 mA in clean air (20.9 v/v) and 20 mA at 25% v/v.

Note: Increased levels of oxygen may dramatically increase the flammability of any combustible matter. If oxygen levels rise to 23.5% v/v the Fan Relay and Alarm Relay will be activated. This is a preset function and is not selectable.

Rear View

Typical layout in small garage

Typical Multiple KGD-12-O2 Install

Power 120VAC

KGD-12-O2
POWER 120-240VAC
ALARM RELAY N.C. N.O.
SPDT fan RELAY
A B N.O. COM N.C.

KGD-12-O2
POWER 120-240VAC
ALARM RELAY N.C. N.O.
SPDT fan RELAY
A B N.O. COM N.C.

KGD-12-O2
POWER 120-240VAC
ALARM RELAY N.C. N.O.
SPDT fan RELAY
A B N.O. COM N.C.

Alarm Control Panel
N.O. initiating circuit
auxiliary functions

24V remote alarm

Main fan power

Exhaust fans

Coil

Relay (starter) 120VAC coil

Exhaust fan

Controls relay & transformer

Exhaust fan

KGD-12-O2   KGD-12-O2   KGD-12-O2

Space sensors equally

Air Inlet door, damper louver

Air Inlet door, damper louver

Alarm Control Panel

Auxiliary functions such as dialers.

N.O. or N.C. initiating circuit

MAIN POWER

KGD-12-O2

+ − 4-20 mA Loop

POWER 100-240VAC

ALARM RELAY N.C. or N.O.

SPDT FAN RELAY

L N A B N.O. COM N.C.

Coil

Exhaust Fan

Relay 110VAC coil

MAIN FAN POWER

In this application (above) the Fan or primary relay is used as a low level alarm relay. The Alarm or secondary relay is used as a supervisory relay when utilized in the normally closed configuration. The KGD-12-O2 monitors all critical functions of the unit through software diagnostics that continually test and verify its operations. If a problem is found, the unit will switch to a fail-safe/error mode or trouble condition. In this error mode the Fan* and Alarm relays will be activated indicating the trouble condition at panel and the KGD-12-O2 display will flash the error. *See the Trouble Fan Setting Option.

Power Up
The KGD-12-O2 steps through an internal self-test cycle for the first 1 minute that it is powered. The unit will execute the test cycle any time power is dropped and reapplied (i.e. power failure). During the self-test cycle the unit will display the Firmware Version number and the gas type, then count down from 60 to 0 (if the display option is "On") and finally go into normal operation. The alarm relay will be activated for 10 seconds and the fan relay for 60 seconds during the power-up cycle unless the "Power Up Test" (PUt) option is OFF. The indicator light (LED) will flash green during the self-test cycle. At the end of the 1 minute cycle, the unit will take its first sample of the air and the indicator light will turn solid green.

Operation

1. With the display function turned "On", the KGD-12-O2 will show the current concentration of O2 % v/v or "20.9" in normal air. When the O2 concentration reaches the Fan Relay setting (20.5%, for example) the display will flash back and forth between "FAn" and "20.5". With the display function turned "OFF", the display does not show the gas concentration, but will show "FAn" as long as the fan relay is activated.

2. With the display function turned "On" and the O2 concentration reaching the Alarm Relay setting, (19.5%, for example) the display will flash back and forth between "ALr" and "19.5". The buzzer will sound indicating

"Alarm" if the buzzer is turned "On". With the display function turned off the display does not show the O2 concentration but will show "ALr" when the Alarm relay is activated.

3. With the 4-20 mA function turned "On" and the O2 concentration climbing the 4-20 mA signal will ramp up corresponding to the concentration (0-25% v/v).

Default Configuration – Factory Settings

- The default Power Up Test setting is ON
- The default Display setting is ON
- The default Buzzer setting is ON
- The default Alarm Relay Setting is activation at 19.5% v/v
- The default Alarm Relay Configuration is Normally Open
- The default Fan Relay Setting is activation at 20.2% v/v
- The default Fan Relay Delay setting is 3 minutes
- The default Fan Relay Minimum Runtime setting is 0 minutes
- The default Fan Relay Latching condition is OFF
- The default Trouble Fan Setting condition is OFF
- The default 4-20mA Output setting is ON
-
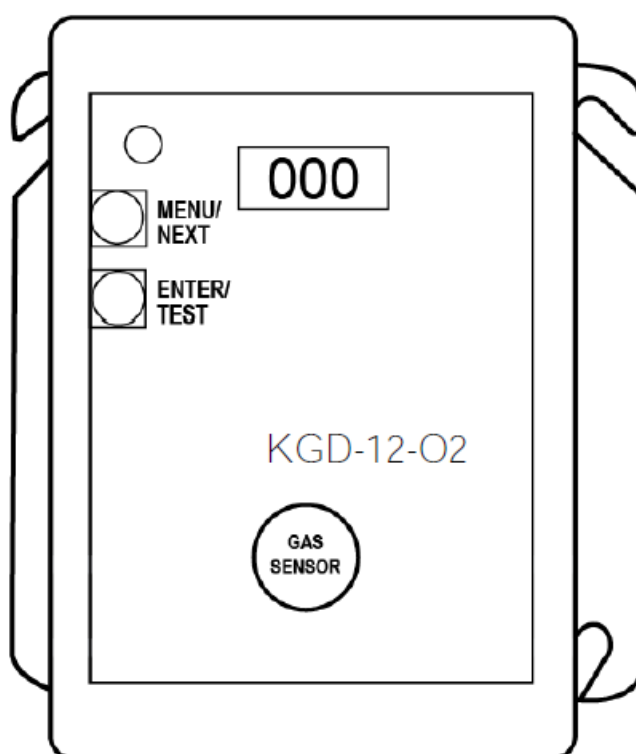
Selecting Default Configuration – "dEF"

To select the Default Configuration, in normal mode, push the Next button to get to "Con" or the Configuration menu. Then push the Enter button to enter the Con menu. The first selection is the "dEF" or Default setting. Push Enter. If it is already in Default configuration, there will be no action. If it is not already in Default configuration, "nO" will be displayed. Push Next to change it to "yES" (flashing) then push Enter to confirm the change (solid) and push Enter again to return to "dEF" in the con menu. Push Next until "End" is displayed then push Enter to get back to normal operation.

- **Selecting Power Up Test Option – "PUt"**

To select the Power Up Test Configuration, in normal mode, push the Next button to get to "Con" or the Configuration menu. Then push the Enter button to enter the Con menu. Then push the Next button to get to the second selection "PUt" or Power Up Test setting. Push Enter. If the test is "On" push Next to turn it "OFF" (flashing) then push Enter to confirm the change (solid) and push Enter again to return to "PUt" in the Con menu. Push Next until "End" is displayed then push Enter to get back to normal operation.

- **Selecting Display Option – "dSP"**

To select the Display Configuration, in normal mode, push the Next button to get to "Con" or the Configuration menu. Then push the Enter button to enter the Con menu. Then push the Next button to get to the third selection "dSP" or Display setting. Push Enter. If the display is "On" push Next to turn it "OFF" (flashing) then push Enter to confirm the change (solid) and push Enter again to return to "dSP" in the Con menu. Push Next until "End" is displayed then push Enter to get back to normal operation.

- **Selecting Buzzer Option – "bUZ"**

To select the Buzzer Configuration, in normal mode, push the Next button to get to "Con" or the Configuration menu. Then push the Enter button to enter the Con menu. The fourth selection is the "bUZ" or Buzzer setting. Push Next three times to get to "bUZ" then Enter. If the display is "On" push Next to turn it "OFF" (flashing) then push Enter to confirm the change (solid) and push Enter again to return to "bUZ" in the Con menu. Push Next until "End" is displayed then push Enter to get back to normal operation.

- **Selecting Alarm Relay Setting – "ArS"**

To select the Alarm Relay Setting, in normal mode, push the Next button to get to "Con" or the Configuration menu. Then push the Enter button to enter the Con menu. The fifth selection is the "ArS" or Alarm Relay Setting. Push Next four times to get to "ArS" then Enter. If the display is "dIS" (disabled) push Next to change it to 18.5, 19, 19.5, 20 or 20.5% v/v (flashing) then push Enter to confirm the change (solid) and push Enter again to return to "ArS" in the Con menu. Push Next until "End" is displayed then push Enter to get back to normal operation.

- **Selecting Alarm Relay Configuration – "Arc"**

To select the Alarm Relay Configuration, in normal mode, push the Next button to get to "Con" or the Configuration menu. Then push the Enter button to enter the Con menu. The sixth selection is the "Arc" or Alarm Relay Configuration. Push Next five times to get to "Arc" then Enter. If the relay is "nO" (normally open) push Next to turn it to "nC" (flashing) then push Enter to confirm the change (solid) and push Enter again to return to "Arc" in the Con menu. Push Next until "End" is displayed then push Enter to get back to normal operation.

- **Selecting Fan Relay Settings – "FrS"**

To select the Fan Relay setting, in normal mode, push the Next button to get to "Con" or the Configuration menu. Then push the Enter button to enter the Con menu. The seventh selection is the "FrS" or Fan Relay setting. Push Next six times to get to "FrS" then Enter. If the fan relay is "dIS" (disabled) push Next to change it to 18, 18.1, 18.2, 18.3, 18.4, 18.5, 18.6, 18.7, 18.8, 18.9, 19, 19.1, 19.2, 19.3, 19.4, 19.5, 19.6, 19.7, 19.8, 19.9, 20, 20.1, 20.2, 20.3, 20.4 or 20.5% v/v (flashing) then push Enter to confirm the change (solid) and push Enter again to return to "FrS" in the Con menu. Push Next until "End" is displayed then push Enter to get back to normal operation.

- **Selecting Fan Relay Delay – "Frd"**

To select the Fan Relay Delay setting, in normal mode, push the Next button to get to "Con" or the Configuration menu. Then push the Enter button to enter the Con menu. The eighth selection is the "Frd" or Fan Relay Delay. Push Next seven times to get to "Frd" then

Enter. If the delay is "0" (disabled) push Next to change it to 1, 3, 5, or 10 minutes (flashing) then push Enter to

confirm the change (solid) and push Enter again to return to "Frd" in the Con menu. Push Next until "End" is displayed then push Enter to get back to normal operation.

- **Selecting Fan Relay Run Time – "Frr"**

  To select the Fan Relay Minimum Runtime setting, in normal mode, push the Next button to get to "Con" or the Configuration menu. Then push the Enter button to enter the Con menu. The ninth selection is the "Frr" or Fan Minimum Run Time. Push Next eight times to get to "Frr" then Enter. If the runtime is "OFF" (disabled) push Next to change it to 3, 5, 10 or 15 minutes (flashing) then push Enter to confirm the change (solid) and push Enter again to return to "Frr" in the Con menu. Push Next until "End" is displayed then push Enter to get back to normal operation.

- **Selecting Fan Relay Latching Option – "FrL"**

  To select the Fan Relay Latching Option, in normal mode, push the Next button to get to "Con" or the Configuration menu. Then push the Enter button to enter the Con menu. The tenth selection is the "FrL" or Fan Relay Latching Option. Push Next nine times to get to "FrL" then Enter. If latching is "OFF" push Next to turn it to "On" (flashing) then push Enter to confirm the change (solid) and push Enter again to return to "FrL" in the Con menu. Push Next until "End" is displayed then push Enter to get back to normal operation.

- **Selecting Trouble Fan Setting Option – "tFS"**

  To select the Trouble Fan Setting Option, in normal mode, push the Next button to get to "Con" or the Configuration menu. Then push the Enter button to enter the Con menu. The eleventh selection is the "tFS" or Trouble Fan Setting Option. Push Next ten times to get to "tFS" then Enter. If Trouble Fan Setting is "OFF" push Next to turn it to "On" (flashing) then push Enter to confirm the change (solid) and push Enter again to return to "tFS" in the Con menu. Push Next until "End" is displayed then push Enter to get back to normal operation.

- **Selecting 4-20mA Output Option – "420"**

  To select the 4-20mA Output Option, in normal mode, push the Next button to get to "Con" or the Configuration menu. Then push the Enter button to enter the Con menu. The twelfth selection is the "420" or 4-20mA Output Option. Push Next eleven times to get to "420" then Enter. If the 4-20mA is "On" push Next to turn it to "OFF" (flashing) then push Enter to confirm the change (solid) and push Enter again to return to "420" in the Con menu. Push Next until "End" is displayed then push Enter to get back to normal operation.

Onboard Diagnostics

The KGD-12-O2 monitors all critical functions of the unit through software diagnostics that continuously test and verify unit operations. If a problem is found, the unit will switch to a fail-safe/error mode or trouble condition. In this error mode, the Alarm relay will be activated, the 4-20 mA current loop will go to 24 mA, the unit will display the error code, the green status indicator LED light will flash and the buzzer will chirp intermittently. The Fan relay will also engage if the Trouble Fan Setting Option is set to "On". This is a safety precaution. To clear this mode, simply turn off power to the unit for a few seconds, or push the ENTER/TEST switch (inside the unit). This will cause the unit to restart the 1 minute self-test cycle.

The 4-20 mA signal can be used for troubleshooting:

- 0 mA is most likely a connection problem
- 4-20 mA is normal gas reading range (0-25% v/v)
- 24 mA indicates a Trouble condition

Error Codes

- t01 Sensor missing

- t02 Temperature compensation failure

- t04 EEPROM bad checksum

- t10 Bad EEPROM

- t20 Bad calibration

- t40 Factory calibration failure

- t80 Read ADC failure

- t100 Under range

- t200 Sensor warranty expired

Note: For trouble codes over 080 the display will alternate between t_1 and t00 for t100 and between t_2 and t00 for t200.
If the error mode repeats frequently, check for continuous power and proper voltage. If power is not the problem and a unit has repeating error conditions, it may need to be returned to Kele for service, per these User Instructions.
If the error mode indicates "Sensor warranty expired" see the Sensor Replacement section of these User Instructions.

Sensor Poisons
The gas sensor in the detector is designed with extreme sensitivity to the environment. As a result, the sensing function may be deteriorated if it is exposed to a direct spray from aerosols such as paints, silicone vapors, etc., or to a high density of corrosive gases (such as hydrogen sulfide, sulfur dioxide) for an extended period.

MAINTENANCE

The KGD-12-O2 requires periodic maintenance. The unit uses an electrochemical sensor with a 2-3 year life expectancy that can be tested, calibrated and replaced in the field. The KGD-12-O2 replacement sensor is available through your local representative or from Kele. The detector's performance should be tested regularly by using gas as detailed in the Testing and Field Calibration sections. All Kele KGD-12-O2 Operation Manual other maintenance and repair of products manufactured by Kele are to be performed at the appropriate Kele manufacturing facility. Kele does not sanction any third-party repair facilities.

End-of-Warranty Signal
Two years after the KGD-12-O2 is installed the sensor end-of-warranty signal will be activated indicating that the . The end-of-warranty signal will cause an error code t200 "Sensor warranty expired". See Error Codes section. In addition to the end-of-warranty signal the sensor itself has a tamper proof warranty expiration sticker dated 2 years from the unit manufacture date. See the Kele Fixed Gas Detection Products Limited Warranty section.
The end-of-warranty signal can be silenced for 48 hours by pressing the "ENTER/TEST" button or by temporarily dropping power to the unit. The end-of-warranty signal provides the user an opportunity to test and/or calibrate the sensor assuring that it is still performing within acceptable parameters though the sensor is nearing the end of its 2-3 year expected life. The silence function will continue to be available for 29 days after the KGD-12-O2 initiates the initial end-of-warranty signal. After this 29 day period the KGD-12-O2 can no longer be silenced and the sensor must be replaced or the sensor life reset.

Sensor Replacement

1. Remove power to the unit

2. Remove the Philips screw on the front of the KGD-12-O2. Pull the front cover of the unit off.

3. Remove the sensor by pulling it gently from the three-pronged socket.

4. Power up the unit. The KGD-12-O2 steps through an internal self-test cycle for the first 1 minute that it is

    powered. During the self-test cycle the unit will display the Firmware Version number, then count down from 60

to 0 and finally go into normal operation. The indicator light (LED) will flash green during the self-test cycle. At the end of the 1-minute cycle, the unit will take its first sample of the air and the indicator light will turn solid green.

5. Let the new sensor stabilize for at least 20 minutes then refer to the FIELD CALIBRATION PROCEDURE section to calibrate the unit.

6. After the successful calibration is complete, reset the sensor life.

Sensor Life Reset

1. Remove the Philips screw on the front of the KGD-12-O2. Pull the front cover of the unit off.

2. To reset the sensor life (rSt), from normal or warm-up mode, press the Next button four times to get to SEn or Sensor Mode.

3. Then press the Enter button to get to "rSt" – Reset Sensor Mode.

4. Press the Enter button again to see the sensor reset status. If the sensor life has already been reset, done "don" will be displayed. If it has not already been reset, "no" will be displayed. Push Next to change it to "yES" (flashing) then push Enter to confirm the change (solid) and push Enter again to return to "rSt" in the SEn menu. Push Next until "End" is displayed then push Enter to get back to normal operation.

Note: If the sensor is reset and not replaced it is necessary to test and/or calibrate the sensor to assure that it is still performing within acceptable specifications though the sensor is nearing the end of its 2-3 year expected life. There will be no other indication of sensor performance.

WARNING

Do not disassemble unit or attempt to repair or modify any component of this instrument. This instrument contains no user serviceable parts, and substitution of components may adversely affect product performance and result in sickness or death.

CAUTION
Avoid the use of harsh cleaning materials, abrasives and other organic solvents. Such materials may permanently scratch the s urfaces and damage the display window, labels, sensor or instrument housing. High voltage terminals (100-240VAC) are located within this detector, presenting a hazard to service technicians. Only qualified technicians should open the detector case and service the internal circuits. Ensure power is removed from the detector prior to cleaning the unit. Failure to do so may result in sickness or death.
Cleaning
Cleaning of the external surfaces is best carried out using a damp cloth with a mild detergent or soap. Use a vacuum cleaner with soft brush to remove dust or contamination under the cover. Do not blow out the sensor with compressed air.

TESTING

WARNING
Using a certified gas with a concentration other than the one listed for this detector when conducting a calibration or calibration verification test (bump test) will produce inaccurate readings. This means that critical levels of the gas being monitored may be present and could result in overexposure and cause sickness or death. For proper use, see supervisor or User Instructions, or call Technical Service at **877-826-9045**.

General
All KGD-12-O2 units are factory calibrated and 100% tested for proper operation. During normal operation the green status indicator LED light will be on steady, the fan & alarm relay will be in standby mode and the 4-20 mA

output will be at 4mA (in clean air).The unit also performs a regular automatic self-test during normal operation. If the unit detects an improper voltage or inoperable component, it will default into Error mode. In this error mode, the Alarm relay will be activated, the 4-20 mA current loop will go to 24 mA, the unit will display the error code, the green status indicator LED light will flash and the buzzer will chirp intermittently. The Fan relay will also engage if the Trouble Fan Setting Option is set to "On".

Operation Test
Check that the green KGD-12-O2 status indicator LED light is illuminated continuously. If not, do not proceed with the tests. If the unit is in error mode contact your local representative or Kele technical service representative for information on resolving the problem.

1. Remove the single screw in the middle of the front cover of the KGD-12-O2.
2. Remove the front cover.
3. Observe the LED light on the front of the KGD-12-O2.
4. If the light is solid green proceed to step 6.
5. If the green status indicator LED light is off or flashing, refer to the General section above.
6. Locate the switch labeled ENTER/TEST on the left side of the printed circuit board. Press the Test switch once.
7. The KGD-12-O2 will step through a cycle test:
    - The display progresses through the bUZ (buzzer Test) Art (alarm relay test), Frt (fan relay test) then 42t (4-20 mA output test). Make sure that the settings are "On" or not disabled "diS".
    - During the first 10 seconds of the test cycle, the display will show bUZ and set off the audible buzzer
    - The alarm relay will be closed, so any devices connected to that relay will be tested.
    - The Fan relay will be activated for the next 1 minute of the test, so if the fan circuits are wired in the normal manner, the fan should run.
    - The 4-20mA output will then ramp up from 4 to 16 mA over the next 130 seconds of the test, so if the circuit is wired in the normal manner, the control panel or building automation system should respond.
    - At the end of the test cycle, the light will turn green and be on steady (Normal Operation), the fan & alarm relay will be in standby mode and the 4-20 mA output will return to 17.4 mA (in clean air).
8. When testing is completed reassemble the unit or units.

Manual Operation Test
This option gives the user the opportunity to manually initiate an individual test for each relay, the analog output and the sensor response to gas. From normal operation mode press the Next button 2 times to get to the Test Mode (tSt). Press the Enter button once to get into the Test Menu. Press the Next button to scroll through the five test options and press Enter to initiate the selected test. Note that if the relay or 4–20 mA output has been disabled, the test selection will not be displayed in the test menu.

- bUZ – Buzzer Test, 3 seconds
- Art – Alarm Relay Test, 10 seconds
- Frt – Fan Relay Test, 60 seconds
- 42t – 420 loop test, 130 seconds
- gtS – Gas Test, 3 minutes (no output to the panel during the gas test)

The display will flash during the test, or in the case of the gas test, the gas level will alternate with gtS. Once the test is complete, the display will return to steady display. To exit the test menu, press the Next button until "End" is displayed, then press Enter to return to normal mode.

Oxygen Gas Test

WARNING

The following steps must be performed when conducting a calibration or calibration verification test (bump test) to ensure proper performance of the monitor. Failure to do so may adversely affect product performance and result in sickness or death.

- When performing a calibration or calibration verification test (bump test) only use certified calibration gas at the required concentration level. Do not calibrate with expired calibration gas.
- If the instrument cannot be calibrated, do not use until the reason can be determined and corrected.
- Do not cover or obstruct display or visual alarm cover.
- Ensure sensor inlets are unobstructed and free of debris

General

The KGD-12-O2 can be bump-tested with the OX-FTK with oxygen gas, regulator and test hood, available through your local representative or from Kele.

Contents of the FTK

- OX-FTK: (1) Gas Cylinder, 17.0% v/v oxygen gas in air
- Gas regulator with about two feet of plastic tubing
- Gas test hood

FTK Information

Several detectors can be tested with one FTK. The only limitation is the amount of gas in the cylinder and the flow of the regulator. The 34 liter cylinder for example with a 0.2LPM regulator has approximately 170 minutes of continuous calibration run time. Replacement cylinders are available. The gas cylinder should be replaced when the pressure gauge on the regulator shows 25-psi or less.

Note: For optimum test results it is suggested that the unit be in clean air (green light on) and be in a low ambient air flow.

Gas Testing

Testing the Fan Relay

1. Remove the Philips screw on the front of the KGD-12-O2. Remove the front cover.
2. Open the FTK. Connect the 17.0% v/v gas cylinder to the regulator.
3. Check the pressure gauge on the regulator. If you have 25-psi or less you will need to replace the gas canister.
4. Assemble regulator, hose and test hood and place the test hood over the gas sensor.

   Note: The time to activate the Fan relay depends on the delay setting.
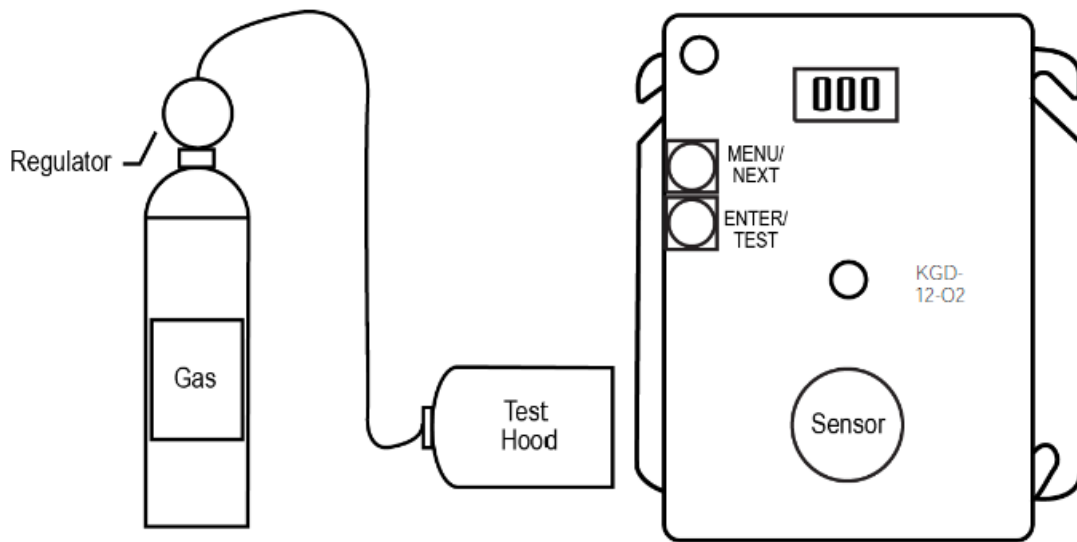
5. Turn on the regulator to start the gas flow and wait with the gas applied continuously.

6. With the display function turned "On", the KGD-12-O2 will show the current concentration of gas or "20.9" (% v/v) in clean air. When the gas concentration reaches the Fan Relay setting (20.2% v/v, for example) the display will flash back and forth between "FAn" and "20.2". With the display function turned "OFF", the display does not show the gas concentration, but will show "FAn" as long as the fan relay is activated.

   Note: If the Fan relay does not close within 2 minutes, there are five possibilities:

   - Gas cylinder is empty, check the pressure gauge. Replace the gas cylinder if 25psi or less.
   - Unit needs to be re-calibrated (go through recalibration and re-test).
   - Detector has fan relay set to disable (OFF). Set fan relay to 20.2% v/v and repeat the test.
   - Detector has fan relay delay set to 3 minutes or higher. Set fan relay to 0 minutes and repeat the test.
   - Detector needs servicing (return unit to factory for servicing).

7. Remove the gas from the sensor. Proceed to Test the Alarm relay or replace the top cover.Fan relay test is complete. Testing the Alarm Relay

Note: The gas concentration to activate the Alarm relay depends on the setting.

1. Connect the 17.0% v/v cylinder of oxygen to the regulator.
2. Check the pressure gauge. If there is 25psi or less the cylinder should be replaced.
3. Place the test hood over the gas sensor. Turn on the regulator to start the gas flow.
4. The Fan relay should activate according to the settings.
5. With the display function turned "On" and the gas concentration reaching the Alarm Relay setting, (19.5% v/v, for example) the display will flash back and forth between "ALr" and "19.5". The buzzer will sound indicating "Alarm" if the buzzer is turned "On". With the display function turned off the display does not show the gas concentration, but will show "ALr" when the Alarm relay is activated.

   Note: If the Alarm relay fails to operate within 2 minutes, there are four possibilities: a. Gas cylinder is empty, check the pressure gauge. Replace the gas cylinder if 25-psi or less.

   - Unit needs to be re-calibrated (go through recalibration and re-test).
   - Detector has Alarm relay set to disable (OFF). Set Alarm relay to 19.5% v/v and repeat the test.
   - Detector needs servicing (return unit to factory for servicing).

6. Remove the gas from the sensor after Test. Proceed to Test the 4-20mA output or replace the top cover. Alarm relay test is complete.

Testing the 4-20mA current loop

1. Connect the 17.0% v/v cylinder of oxygen to the regulator.
2. Check the pressure gauge. If there is 25-psi or less the cylinder should be replaced.
3. Place the test hood from the regulator over the gas sensor. Turn on the regulator to start the gas flow.
4. The Fan relay should activate according to the settings.
5. The Alarm relay should activate according to the settings.
6. The 4-20 mA output should decrease from 17.4 mA in clean air (20.9% v/v) to 14.9 mA at 17.0% v/v. See 4-20 mA diagram on page 8.

    Note: If the 4-20mA output does not decrease within 2 minutes, there are four possibilities:
    - Gas cylinder is empty, check the pressure gauge. Replace the gas cylinder if 25-psi or less.
    - Unit needs to be re-calibrated (go through recalibration and re-test).
    - Detector has 4-20 mA option set to "OFF". Set 4-20mA option to "On" and repeat the test.
    - Detector needs servicing (return unit to factory for servicing).
7. Remove the gas from the sensor. Re-assemble the KGD-12-O2 (make sure the LED is aligned with the front case hole). 4-20 current loop test is complete.

FIELD CALIBRATION PROCEDURE
Note: For optimum calibration results the unit must be in clean air and be in a low ambient air flow.

Calibrating the Sensor to Clean Air

1. Remove the Philips screw on the front of the KGD-12-O2. Pull the front cover of the unit off.
2. To select Calibration Mode (CAL) from normal mode, press the Next button three times to get to CAL or Calibration Mode.
3. Then press the Enter button to get to "SPn" – Calibration Span Mode. The unit will display the current oxygen reading (% v/v) alternating with SPn (blinking) indicating calibration in progress (max 165 sec).
4. If the process is successful, the display will read 20.9 alternating with PAS (blinking) Calibration complete.
5. If the process was not successful the display will read the current oxygen reading (% v/v) alternating with FAL (Fail) (blinking) Calibration Failed. If this occurs, repeat steps 2 through 4. If the sensor fails to calibrate twice contact Technical Assistance: 877-
826- 9045.
6. To return to Normal Mode press Enter and then press Next until "20.9" or the current reading is displayed, or the unit will simply time out to CAL then normal mode.
7. Re-assemble the KGD-12-O2 (make sure the LED is aligned with the front case hole). Calibration is complete.
8. See Calibration Flowchart on the inside of the housing.

KELE FIXED GAS DETECTION PRODUCTS LIMITED WARRANTY
Kele warrants the KGD-12-O2 gas detector will be free from defective materials and workmanship for a period of two (2) years from date of manufacture (indicated on the inside cover of the KGD-12-O2), provided it is maintained and used in accordance with Kele instructions and/or recommendations. If any component becomes defective during the warranty period, it will be replaced or repaired free of charge, if the unit is returned in accordance with the instructions below. This warranty does not apply to units that have been altered or had repair attempted, or that have been subjected to abuse, accidental or otherwise. The above warranty is in lieu of all other express warranties, obligations or liabilities. THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR PARTICULAR

PURPOSE ARE LIMITED TO A PERIOD OF TWO (2) YEARS FROM THE PURCHASE DATE. Kele shall not be liable for any incidental or consequential damages for breach of this or any other warranty, express or implied, arising out of or related to the use of said gas detector. Manufacturer or its agent's liability shall be limited to replacement or repair as set forth above.

Buyer's sole and exclusive remedies are return of the goods and repayment of the price, or repair and replacement of non-conforming goods or parts.

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Documents / Resources

	Kele KGD-12-O2 Oxygen Detector Controller and Transducer [pdf] User Manual KGD-12-O2 Oxygen Detector Controller and Transducer, KGD-12-O2, Oxygen Detector Controller and Transducer, Detector Controller and Transducer, Controller and Transducer, Transducer

References

- **kele.com - Building Automation Products and Solutions**
- **User Manual**