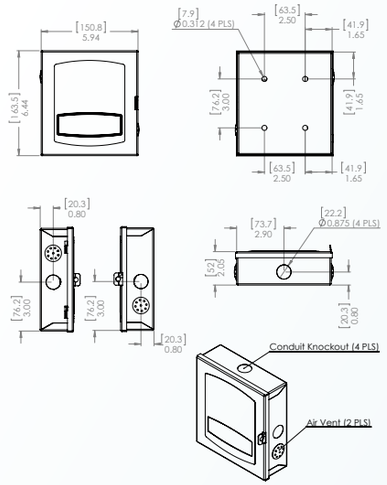
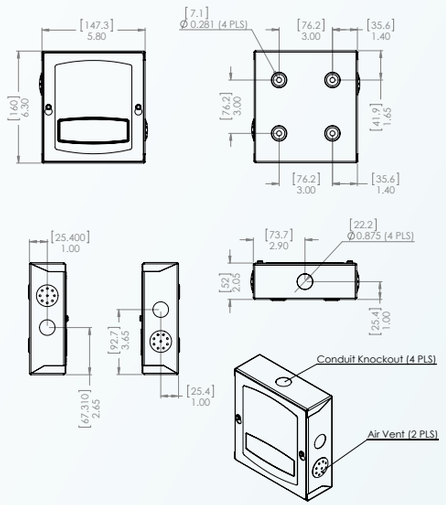
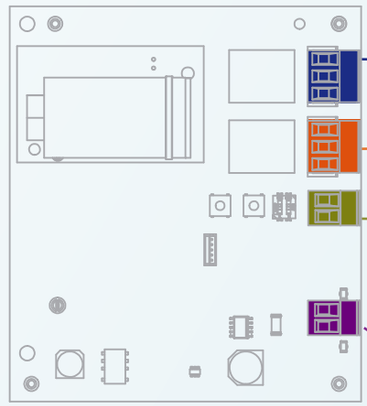
K-O2 Wiring and Calibration Instructions



K-O2-Hx (hinged cover)



K-O2-Sx (screw cover)



WARNING AND ALARM RELAYS

When relay NOT activated: COM <-> NC
When relay activated: COM <-> NO

Mechanical installation

- Mount about 5' above floor in unobstructed location.
- Do not obstruct or paint-over vents
- For vertical mounting status LED must be in lower left or right corner. Horizontal mounting can be in any orientation.

Electrical installation

- Always install in accordance with local and national electrical codes. If in doubt about the code requirements of your application, consult a licensed electrician.
- Both K-O2 enclosure styles have standard ½" conduit knock-outs on all sides for power and signal wiring. **Do not use the vent openings for wiring.**

Power connection

- The K-O2 Series of sensors can be powered from 20 to 30 Volts AC or DC. The operating power is connected to the two-position screw terminal connector marked "24 VAC/DC"

Alarm Settings

WARNING /VENTILATION AND ALARM CONDITIONS

Two, 10 Amp, 120/277 VAC rated, dry-contact, SPDT relays activate during warning/ventilation and alarm conditions: refer to (Section 3.2 of the Kele K-O2 manual) for wiring information.

When the concentration of oxygen falls below its configured warning/ventilation threshold, the WARNING/VENTILATION relay output is activated. When the concentration falls below the alarm threshold, the controller's ALARM relay is also activated. When the oxygen concentration rises above the alarm threshold, the ALARM relay is deactivated; when it rises above the ventilation threshold the WARNING/VENTILATION relay is also deactivated.

SETTING VENTILATION AND ALARM THRESHOLDS

The four, factory-preset pairs of ventilation and alarm levels are shown in Table 6. Each setting determines both the controller's warning/ventilation and alarm thresholds.
The active threshold values are selected by setting the two DIP switches on the main board as shown in the first column of Table 6.

Dip switch Setting	OXYGEN % Warn	Alarm
	19.8	19.5
	20.0	19.5
	20.3	20.0
	20.5	20.0

Table 6

K-O2 Calibration

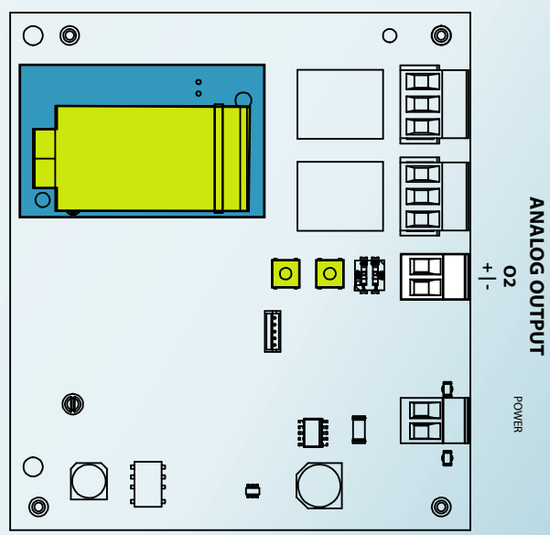


FIGURE 9: Location of SPAN & ZERO Controls

SENSOR CALIBRATION

For best performanc the sensor requires calibration at the specified calibration interval to ensure its accuracy is maintained over its life.

Calibration is a two-step process that provides the sensor module with oxygen-free (or zero) gas, and then a specific concentration (or span) gas. Two calibration buttons (ZERO and SPAN) are provided on the main board as shown in Figure 9.

CALIBRATION GASES

Pure nitrogen zero gas and a precise mixture of oxygen and nitrogen (see Table 9) are required to calibrate the oxygen sensor.
An orificed calibration adapter is recommended to ensure that the sensor is completely immersed in the calibration gas without applying higher than ambient pressure to it.
A complete calibration kit that includes all the required accessories in a convenient carrying case is available from from Kele.

Type	Mixture (by volume)	Recommended Accuracy	Comments
Zero gas	Pure nitrogen		if supplied from liquid source beware of cooling the sensor.
Span gas	20.9% oxygen balance nitrogen	± 0.1 % oxygen	Calibration gas inaccuracy adds directly to sensor's specified accuracy error.

TABLE 9: Required Calibration Gases

ZERO CALIBRATION PROCEDURE

The Zero calibration procedure below MUST be done before the Span calibration.
The progress and status of the calibration process is indicated by the color and flash-state of the front cover status LED (see Table 8).
Apply the nitrogen (zero) calibration gas to the sensor using a calibration adapter, following the instructions for the calibration kit being used.
Ensure that gas is flowing to the sensor, then press and hold the 'ZERO' button (see Figure 9) for 3 seconds until the front cover LED starts blinking YELLOW, indicating that gas sampling is in progress.

Blinking Yellow	During gas sampling period that starts immediately when calibration is initiated.
Blinking Green	Successful sampling. Waiting for user to confirm cal gas removal.
Blinking Red	Failed calibration attempt. Waiting for user to acknowledge with either a re-try or and exit.
Green/Yellow	During ambient equilibration period after successful calibration. New calibration is applied.
Red/Yellow	During ambient equilibration period after failed sampling. Old calibration is unchanged.

TABLE 8: Meaning of status LED blink patterns during calibration.

1. Ensure that the calibration adapter remains correctly seated and calibration gas continues to flow for the 2 minute sampling period.
2. At the end of the sampling period, the sensor's status LED blinks GREEN if the sampling was successful or RED if not.
3. If successful (blinking GREEN):
   - The gas sampling completed successfully. Turn off the calibration gas flow, remove the calibration adapter then press and hold the 'ZERO' calibration button until the LED blinks GREEN/YELLOW indicating that the calibration gas has been removed, the calibration has been applied and the unit is in standby for two minutes while the sensor re-equilibrates to the ambient atmosphere before normal operation resumes. The calibration is complete when the status LED returns to steady GREEN.

OR

4. If NOT successful (blinking RED):
   - The most likely cause of zero calibration sampling failure is insufficient gas flow or leaks around the calibration adapter failing to completely immerse the sensor in nitrogen. Verify that calibration gas is still flowing at the required rate (typically about 0.2 liters per minute) and the calibration adapter is properly positioned.
   - The calibration sampling can be re-started while the LED is blinking RED by again pressing and holding the 'ZERO' button until the LED blinks YELLOW, then return to step 1 above.
   - To exit the zero calibration routine preserving the original calibration: turn off the calibration gas flow and remove the calibration adapter, then press and quickly release the 'ZERO' button. The status LED will blink RED/YELLOW indicating that the calibration gas has been removed, the original calibration has been kept and the unit is in standby for two minutes while the sensor re-equilibrates to the ambient atmosphere before normal operation resumes. The original calibration is completely restored when the status LED returns to steady GREEN.

SPAN CALIBRATION PROCEDURE

The Zero calibration procedure in MUST be done before the Span calibration.
The progress and status of the calibration process is indicated by the color and flash-state of the front cover status LED (see Table 8).

1. Apply the SPAN calibration gas to the sensor using a calibration adapter, following the instructions for the calibration kit being used. Ensure that gas is flowing to the sensor, then press and hold the 'SPAN' button (see Figure 9) for 3 seconds until the status LED starts blinking YELLOW, indicating that gas sampling is in progress.
2. Ensure that the calibration adapter covers the sensor completely for the 2 minute sampling period. At the end of the sampling period, the sensor's status LED blinks GREEN if the sampling was successful or RED if not.
3. If successful (blinking GREEN): The sampling completed successfully. Turn off the calibration gas flow, remove the calibration adapter then press and hold the 'SPAN' calibration button until the LED blinks GREEN/YELLOW indicating that the calibration gas has been removed, the new calibration has been applied and the unit is in standby for two minutes while the sensor re-equilibrates to the ambient atmosphere before normal operation resumes. The calibration is complete when the status LED returns to steady GREEN.

OR

4. If NOT successful (blinking RED):
   The most likely causes of span gas sampling failure are:
   - Insufficient gas flow or leaks around the calibration adapter not completely immersing the sensor in the calibration gas. Verify that calibration gas cylinder has not run-out and the calibration adapter is properly positioned.
   - The oxygen concentration in the calibration gas is NOT between 20.8 and 21.0 percent (by volume).

The calibration sampling can be re-started while the LED is blinking RED by again pressing and holding the 'SPAN' button until the LED blinks YELLOW, then go to step 1 above.
To exit the span calibration preserving the original calibration, press and quickly release the 'SPAN' calibration button. The status

LED will blink RED/YELLOW indicating that the calibration gas has been removed, the original calibration will be preserved and the unit is in standby for two minutes while the sensor re-equilibrates to the ambient atmosphere before normal operation resumes. The calibration is complete when the status LED returns to steady GREEN.

Mechanical	
Chassis Construction	Industrial strength, 18 Ga. Gray powder-coated steel. Pad-lockable hinged or screw-on cover style available.
Weight	2.0 lbs
Operating Temperature	-20 to 50°C
Operating Humidity	15 – 90 %RH, non-condensing
Storage Temperature	-20 to 20°C (to minimize sensor degradation)
Case Dimensions (H x W x D)	Lockable hinge cover: 6.4" x 5.9" x 2.4" (163.5 x 150.8 x 60.7 mm) Screw cover: 6.3" x 5.8" x 2.1" (160.0 x 147.3 x 52.0 mm)
Sensor Vents	Natural ventilation through 18, 0.1" (2.54 mm) diameter vents
External Indicators	Tri-color LED indicates operational status of sensor.
Knockouts	4 trade ½" knockouts (1 per side)

Electrical	
Operating Power Voltage	14 – 30 VAC (RMS) or DC Isolated power supply; separate transformer not required.
Power Consumption	< 5W
Control Relays	2 separate SPDT line-voltage-capable relays for warning/ventilation and alarm outputs. UL-rated: 10 Amps max at 120/277 VAC (RMS) or 30 VDC.
Concentration Reporting Output	Isolated, powered 4 – 20 mA current loop output. 4 mA output => 0 % concentration. 20 mA => 25% Maximum loop resistance: 510Ω
Termination	Pluggable screw-terminals for use with 12 AWG or thinner wire

Oxygen Sensor (O2)	
Sensor Type	Galvanic cell
Measurement Range	0 – 25%
Analog Output Range	4-20mA (corresponds to 0 to 25%)
Accuracy	±0.2% (Typical)
Calibration Interval	6 Months
Sensor Life	5 or 10 Years (Typical)
Recommended calibrated Field-Replaceable Sensor	KMOD-O2-25 (5 years) or KMOD-O2-50 (10 years)
Calibration Kit	UCK-3 kit

Kele Manual

Kele **K-O2 Series Oxygen Monitor**

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