WINGMAN™ F1 PORTABLE GAS DETECTOR

Operation Manual

CALIBRATION TECHNOLOGIES
GAS DETECTION SPECIALISTS

Warning

Use this product only in the manner described in this manual. If the gas detector is used in a manner not specified by CTI, the protection provided by the gas detector may be impaired.

To ensure your personal safety, read the *Safety Information* section before operating the gas detector.

For technical support, contact:

CTI
920 N Tradewinds Pkwy
Columbia, MO 65201
phone: 866-394-5861
email: sales@ctigas.com
website: ctigas.com

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Safety Information

- This is a gas detector, not an analytical measuring device.
- Don't use the detector if it is damaged.
- Don't use the detector in classified areas where risk of explosion is possible.
- Make sure the sensor element filter is not blocked or covered.
- Powering off the detector will reset the Peak, TWA, and STEL values.
- Detector should be calibrated every 6 months.
- Bump-test daily before using the detector, making sure it alarms as intended. Calibrate the detector if the bump-test fails.
- Bump-test after the detector suffers a hard impact, is exposed to water, high levels of dust or debris, or high concentrations of ammonia gas.

General Description

The WINGMAN™ F1 portable gas detector is designed to protect personnel against ammonia gas concentrations independent of fixed detection systems.

The large, lighted, LCD display shows real time concentrations, battery life, and any current alarm conditions.

The WINGMAN™ has four preset alarms (Low, High, TWA, and STEL) providing audio, visual, and vibration feedback and can be customized.

An event log stores the last 100 events, with time and date stamp. Peak, TWA, and STEL may be viewed with a single button press.

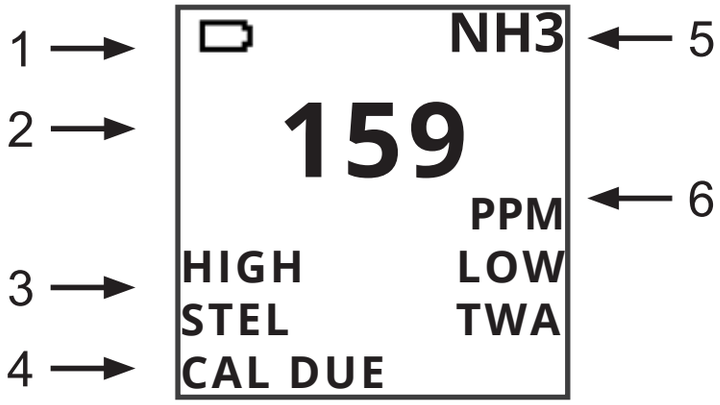
The Polycarbonate and TPE enclosure provides resistance to harsh conditions. A rugged stainless-steel alligator clip allows the WINGMAN™ to be worn on a harness or belt.

The low power consumption and 3.6V lithium battery (field replaceable) of the WINGMAN™ provides a reliable life span.

External Features

Item	Function
1	Visual alarm
2	LCD display
3	Pushbuttons
4	Alligator clip
5	Audible Alarm
6	Gas Inlet

Display Elements



Item	Function
1	Battery status
2	Gas concentration value
3	Alarm conditions
4	Silence alarms / Calibration due*
5	Target gas
6	Parts per million

*During an alarm condition, this section of the display will show ***Silence***. During normal operation, this section of the display will show ***Cal Due*** if the time since last calibration is ≥ 180 days.

Pushbuttons

⏻	Power Up Power Down Return Home	Power Up: Hold for 1 second Power Down: Hold for 3 seconds Return Home: Tap
✓	Select Next Silence	Options will change depending on which menu is active.
△ / ▽	Scroll	Press △ 1 time for Peak/TWA/STEL Press ▽ 1 time for Date/Time/SW version Press ▽ additional times to review Alarm Set Points
△ + ✓	User Options	Hold for 1 second

Powering on the Detector

To activate the detector, press and hold ⏻ for 1 second. The detector will start a self-test.

Self-Test

Once the self-test starts, it performs the following checks. Confirm that all actions occur.

1. The screen will activate with "CTi" displayed
2. All pixels of the display are turned on.
3. Visual, audio, and vibrating alarms are activated.
4. The display will change to the home screen with "OVR RNG" shown for concentration and all the alarm options highlighted.

Note: If the battery is too depleted, the detector will display REPLACE BATTERY and auto-shutdown after 4 seconds.

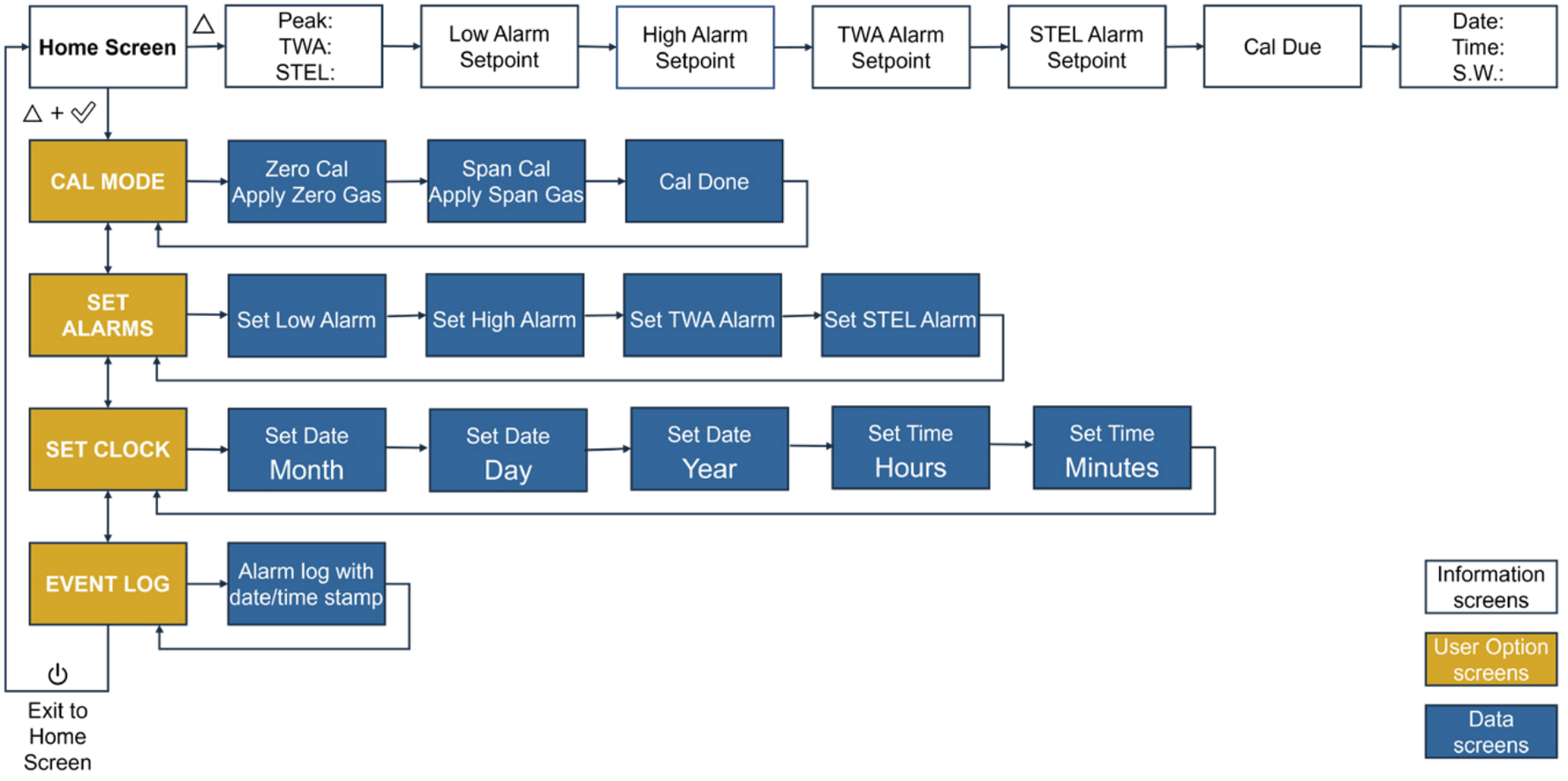
After the self-test completes, the detector begins normal operation.

Powering off the Detector

To turn off the detector, press and hold ⏻ for 3 seconds. The pushbutton may be released as soon as the "SHUTTING DOWN" message appears on display. The audible and visual alarms will beep and flash three times during the shutdown sequence.

To extend battery life, it is recommended to power detector off when not in use.

Menu Tree


Home Screen
△
Peak:
TWA:
STEL:
Low Alarm Setpoint
High Alarm Setpoint
TWA Alarm Setpoint
STEL Alarm Setpoint
Cal Due
Date:
Time:
S.W.:
△ + ✓
CAL MODE
Zero Cal
Apply Zero Gas
Span Cal
Apply Span Gas
Cal Done
SET ALARMS
Set Low Alarm
Set High Alarm
Set TWA Alarm
Set STEL Alarm
SET CLOCK
Set Date
Month
Set Date
Day
Set Date
Year
Set Time
Hours
Set Time
Minutes
EVENT LOG
Alarm log with date/time stamp
⏻
Exit to Home Screen
Information screens
User Option screens
Data screens

User Options

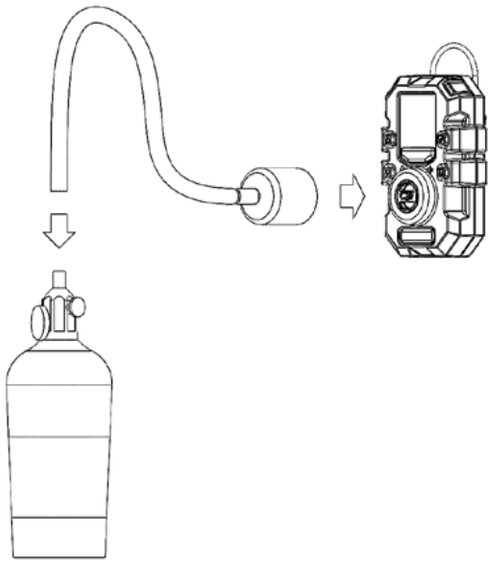
To enter the User Options menu screens from the Home screen, press and hold the
△ + ✓ keys for 1 second.

The following menus are available in the User Options:

- Calibration (CAL MODE)
- Alarms (SET ALARMS)
- Clock (SET CLOCK)
- Event Log (EVENT LOG)

While in User Options menu, exit to Home Screen by tapping ⏻.

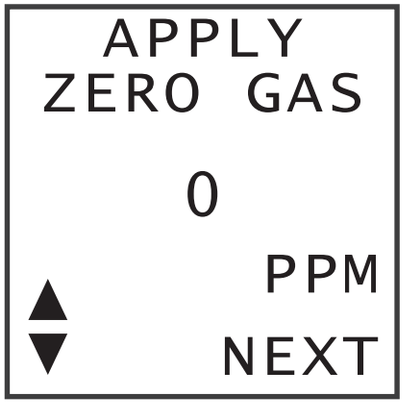
Applying Cal Cup and Hose to WINGMAN™



Calibration

Note: Before beginning calibration please ensure you have: Certified Calibration Gas, Zero Gas (optional), Cal Cup, and Tubing attached to cup.

Press the ✓ key to start calibration. Follow the steps below to calibrate the detector:



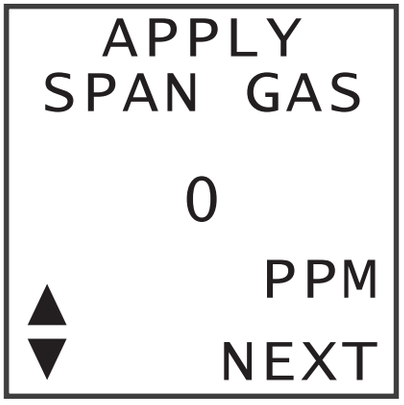
Zero Calibration

The current PPM value is displayed. If a zero calibration is necessary, follow the next steps. Otherwise, press the ✓ key to go to Span calibration.

Apply Zero Air gas at 0.3 to 1.0 L/ minute or zero the sensor in clean air for 2 minutes. Press the △ / ▽ keys until the value equals 0 ppm.

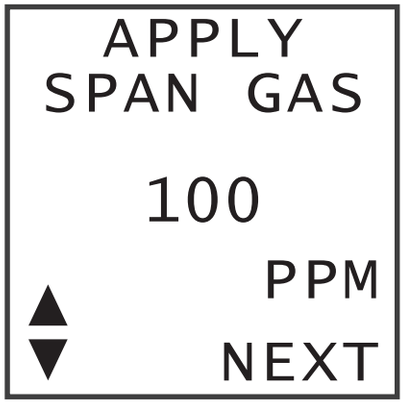
Zeroing is complete. Remove the zero calibration gas at this time. Any adjustments made (as-found/as-left) should be notated at this time.

Press the ✓ key to go to the Span calibration.



Span Calibration

The concentration of the Certified Calibration Gas should be between 10% and 100% of the full-scale range of the sensor (50-500 PPM).



Apply Certified Calibration Gas at 0.3 to 1.0 L/minute. Once the output signal has peaked (or 2 minutes maximum), press the △ / ▽ keys to change the value on display to match the value of the Certified Calibration Gas.

Spanning is complete. Remove the span calibration gas at this time. Any adjustments made (as-found / as-left) should be notated at this time. Press the ✓ key to end Span calibration.

If any zero offsets or gain adjustments were made, they display on the Cal Done screen. Press the ✓ key to go back to the main User Option menu.

Note: If the span calibration failed, check the calibration gas cylinder pressure and flow, as well as the hose and cal cup to make sure the gas is getting to the sensor element. If gas is getting to sensor element, replace the sensor element at this time.

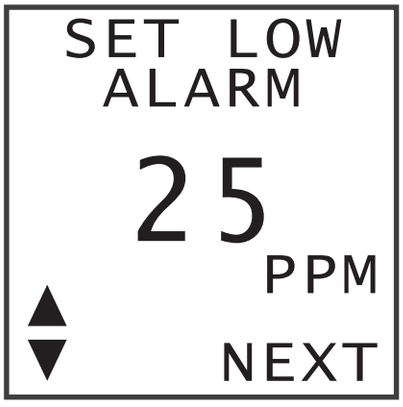
See ***Sensor Replacement*** section of this manual for instructions.

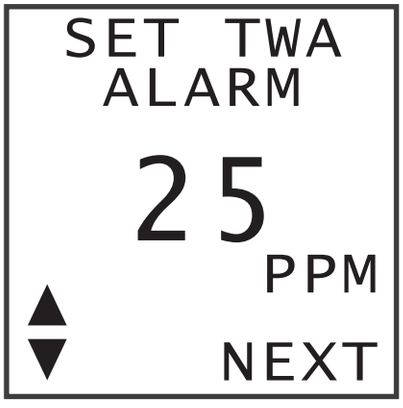
Note: TWA is based on a 8-hour time-weighted average. **STEL** (short term exposure limit) is based on a 15-minute time-weighted average

Set Alarms

Once in the Set Alarms data screens, press the △ / ▽ keys to change the value of the alarms.

Press the ✓ key to advance through the screens. (Factory default values shown)

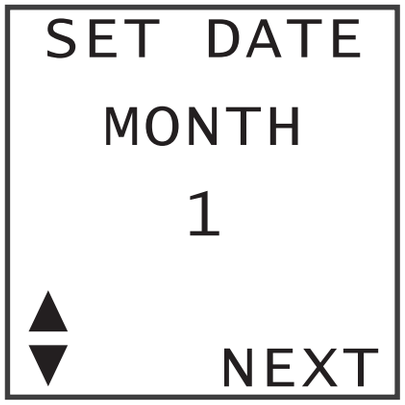


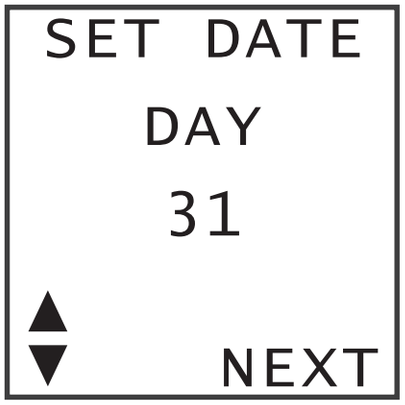


Set Clock

Set the Date

Once in the Set Clock data screens, use the △ / ▽ keys to set the Month, Day, and Year. Use the ✓ key to advance through the screens.



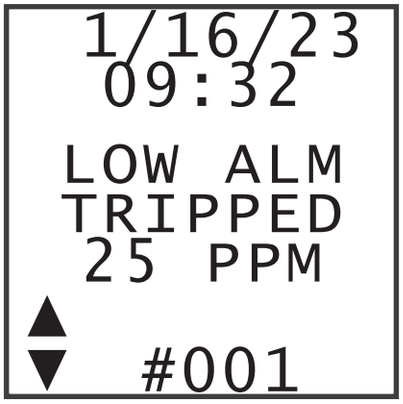


Set the Time

Use the △ / ▽ keys to set the Time (24-hour format). Use the ✓ key to advance through the screens.

Event Log

Once in the Event Log data screen, use the △ / ▽ keys to scroll through the last 100 events.



The logged events are in chronological order, starting with the most recent. Events that are logged include:

- Alarms levels (set and cleared)
- Over-range (concentration exceeds the range of the detector)
- Calibration
- Changes to menu data screens

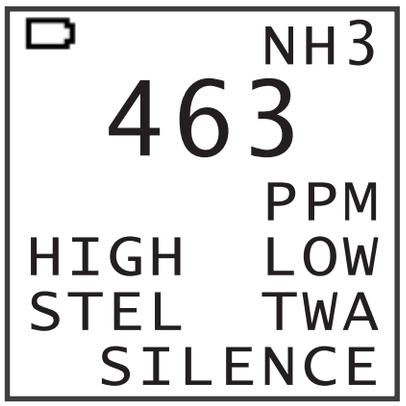
Information Screens

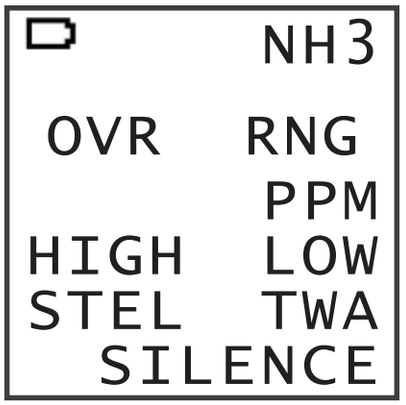
Information screens are available without entering User Options.

Use the △ / ▽ keys from home screen to scroll through the various read only information screens. These screens contain what the WINGMAN™ F1's current settings are, periodic review is recommended to ensure changes have not been made.

- Peak/STEL/TWA: Displays the Peak/STEL/TWA gas level since device was powered on.
- Low Alarm Setpoint: Displays the current setting which will trigger low alarm.
- High Alarm Setpoint: Displays the current setting which will trigger High alarm.
- TWA Alarm Setpoint: Displays current setting which will trigger a Time Weighted Average alarm.
- STEL Alarm Setpoint: Current setting which will trigger a Short Term Exposure Limit alarm.
- Cal Due: Displays date for next scheduled calibration; 180 days since last calibration.
- Date/Time/SW Ver: Current date, time and software version.

Responding to an Alarm





Alarm: During an alarm condition, the detector activates the backlight and the display shows the current gas reading.

The high alarm and STEL alarm have the same priority. A high alarm and/or STEL alarm override a low alarm and/or TWA alarm.

Silencing the alarm: Use the ✓ key to silence the buzzer and stop the vibration alarm. These alarms will activate again under the following conditions:

- 5 minutes of time with the gas concentration still above the high alarm and/or the STEL alarm.
- The gas concentration drops below any of the alarm setpoints and rises again above any of the alarm setpoints.

Alarm modes:

Low Alarm:
- Slow flash
- Slow beep
- Low alarm flashes
- Slow vibration

High Alarm:
- Fast alternating flash
- Fast beep
- High alarm flashes
- Fast vibration

TWA Alarm:
- Slow flash
- Slow beep
- TWA alarm flashes
- Slow vibration

STEL Alarm:
- Fast alternating flash
- Fast beep
- STEL alarm flashes
- Fast vibration

Low Battery Alarm:
- Beep every 5 minutes
- Battery icon flashes

Note: When gas concentration exceeds the measurable limit of sensor element "OVR RNG" will display and detector will alarm as if in High Alarm.

Maintenance

The WINGMAN™ F1 portable gas detector is designed for long life with minimal maintenance. To keep the detector in good working condition, CTI recommends the following maintenance schedule:

- To extend battery life, detector should be powered off when not in use.
- The detector is shipped with a factory calibration, within 30 days of the purchase date.
- Calibrate the detector every 6 months.
- Bump-test daily before using the detector, making sure it alarms as intended.
- Inspect the detector at regular intervals.
- Calibration should be performed with certified calibration gas. Calibration kits and replacement cylinders are available from CTI.
- All tests, calibrations and maintenance should be logged.
- Before opening for service, power down equipment. Risk of electric shock will be reduced.
- Do not operate equipment while it is open.
- Only service equipment in area known to be non-hazardous.
- The sensor filter (white permeable membrane) should be clean and white. If dirty or clogged, the filter should be cleaned with a soft brush or replaced.
- Regular cleaning of the detector should only be done with a damp, soft cloth. Do not use solvents or chemicals.
- Replacement parts are available from CTI.

Sensor Replacement

Turn off the detector before proceeding.

1. Use a small #1 Phillips head screwdriver to remove the (4) screws from the back of the detector and carefully open the case *(screws are not captive)*.
2. Unplug the sensor element from the main circuit board and discard.
3. Replace sensor filter at this time if filter looks dirty, damaged, or clogged.
4. Remove shorting clip from new sensor element, plug sensor element into the main circuit board.
5. Carefully put the case back together using all (4) screws.

Note: Ensure the sensor filter gasket and buzzer gasket are properly seated into the top half of detector housing.

Sensor Life

Typical sensor element life is 3 to 5 years. When the sensor element becomes depleted, a replacement sensor element should be obtained from CTI.

Electrochemical cells are extremely reliable, but several things can cause depletion of the chemistry within the cell including:

- A period of time.
- Continuous exposure to extreme temperature and humidity excursions
- Continuous long term exposure to ammonia.

Battery Replacement

Turn off the detector before proceeding.
Note: Use only non-rechargeable 3.6V 1/2 AA type ER14252 Li-SOCL2 battery.

Note: Properly dispose of or recycle the lithium thionyl chloride battery (Li-SOCL2).

1. Use a small #1 Phillips head screwdriver to remove the (4) screws from the back of the detector and carefully open the case *(screws are not captive).*
2. Remove the battery from the holder.
3. Insert new battery into holder.
4. Carefully put the case back together using all (4) screws.

Note: Ensure the sensor filter and buzzer gasket are properly seated into the top half of detector housing.

When the battery is removed from the detector, the clock will revert back to its default value and will need to be reset.

Removal of the battery will also reset the PEAK, TWA, and STEL values.

Troubleshooting

Problem	Possible Cause	Solution
Does not turn on.	No battery. Dead battery. Reversed battery. Defective detector.	Install battery. Replace battery. Install battery correctly. Contact CTI.
Displays more than 0 ppm in clean air.	Sensor still stabilizing. Need to re-zero. Target gas is present.	For new sensor element, allow 5 minutes to stabilize. Zero calibrate the detector in clean air or 20.9% O2. Detector working properly.
Detector does not seem to accurately measure the gas.	Calibration required. Sensor filter blocked. Sensor still stabilizing.	Calibrate the detector. Clean or replace filter. For new sensor element, allow 5 minutes to stabilize.

Service Parts

Order #	Description
SEF-NH3-EC	Replacement NH3 sensor element, 0-500 ppm
BATT-1/2AA	1/2AA, 3.6V, Lithium Thionyl Chloride Battery
CAL KIT 17L	Calibration Kit with 0.8 LPM regulator and case for 17L bottle (gas not included)
CAL KIT 34L	Calibration Kit with 0.8 LPM regulator and case for 34L bottle (gas not included)
RB17L-NH3/100	Certified Calibration Gas 100 ppm 17L bottle
RB34L-NH3/100	Certified Calibration Gas 100 ppm 34L bottle
F1-MK	Maintenance Kit for WINGMAN™ F1 includes: • Replacement Filter Gasket (x2) • Replacement Buzzer Gasket (x2) • Replacement Screws (x4) • Replacement Alligator Clip • Replacement Cal Cup

Contact CTI to order:

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920 N. Tradewinds Pkwy
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Specifications:

Detection Principle: Electrochemical
Sampling Method: Diffusion
Gases: Ammonia (NH3)
Range: 0-500 ppm
Display: LCD, HR TFT, 2.7" monochrome. LED front lighting activated by alarm condition or key press.
Alarms: Audible buzzer, red flashing LEDs, vibration, and on-screen indication of alarm conditions.
Backlighting: On during: Any alarm, while in any menu screen, or if the Enter button is pressed from the Home screen.
Event Logging: Date and time stamp for calibration, alarms (low, high, TWA, and STEL), and setting changes. Peak value held until cleared.
Deadband: 5 ppm
Response Time:
T50 = less than 30 seconds
T90 = less than 60 seconds
Accuracy: +/- 1% of full-scale, but dependent on time since last calibration.
Zero Drift: Less than 0.1% of full-scale per month, non-cumulative.
Span Drift: Application dependent, but generally less than 3% per month.
Linearity: +/- 2% of full-scale.
Repeatability: +/- 2% of full scale.
Temperature Range:
-4˚F to +122˚F (-20˚C to +50˚C) continuous.
-40˚F to +122˚F (-40˚C to +50˚C) short-term exposure (<10 minutes).
Humidity Range: 5% to 95% RH non-condensing.
Altitude: Up to 4000m
Indoor Use
Pollution Degree: 3
Enclosure: Polycarbonate with thermoplastic elastomer (TPE). Stainless steel hardware. For non-classified areas.
Dust and water Resistance: NEMA 13
Dimensions: 3.5" x 2.2 x 1.1"
Weight: 4.0 oz.
Certifications: UL 61010-1, CSA C22.2 No. 61010-1-12
Warranty: 2 years, including sensor element.

Warranty

Limited Warranty & Limitation of Liability

Calibration Technologies, LLC. (CTI) warrants this product to be free from defects in material and workmanship under normal use and service for a period of two years (including the sensor element), beginning on the date of shipment to the buyer. This warranty extends only to the sale of new and unused products to the original buyer. CTI's warranty obligation is limited, at CTI's option, to refund of the purchase price, repair, or replacement of a defective product that is returned to a CTI authorized service center within the warranty period. In no event shall CTI's liability hereunder exceed the purchase price actually paid by the buyer for the product.

This warranty does not include:

a) routine replacement of parts due to the normal wear and tear of the product arising from use;

b) any product which in CTI's opinion, has been misused, altered, neglected or damaged by accident or abnormal conditions of operation, handling or use;

c) any damage or defects attributable to repair of the product by any person other than an authorized dealer or contractor, or the installation of unapproved parts on the product.

The obligations set forth in this warranty are conditional on:

a) proper storage, operation, calibration, use, maintenance and compliance with the product manual instructions and any other applicable recommendations of CTI;

b) the buyer promptly notifying CTI of any defect and, if required, promptly making the product available for correction. No goods shall be returned to CTI until receipt by the buyer of shipping instructions from CTI; and

c) the right of CTI to require that the buyer provide proof of purchase such as the original invoice, bill of sale or packing slip to establish that the product is within the warranty period.

THE BUYER AGREES THAT THIS WARRANTY IS THE BUYER'S SOLE AND EXCLUSIVE REMEDY AND IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. CTI SHALL NOT BE LIABLE FOR ANY SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES OR LOSSES, INCLUDING LOSS OF DATA, WHETHER ARISING FROM BREACH OF WARRANTY OR BASED ON CONTRACT, TORT OR RELIANCE OR ANY OTHER THEORY.

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