VENTIS™ PRO SERIES

Product Manual

The Essential Guide for Safety Teams and Instrument Operators

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INDUSTRIAL SCIENTIFIC

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Certifications

To determine the uses for which a unit is certified, always refer to its labels. Instrument certifications at the time of this document's publication are listed below (see Table 1.1).

Table 1.1 Certifications

Directive or Certifying Body (CB)	Area Classifications or Identification Numbers
Hazardous Locations	
ATEX	Equipment Group and Category II 1G, Ex ia IIC, with the protection category Ga, in the Temperature Class T4
	Equipment Group and Category II 2G, Ex d ia IIC, with the protection category Gb, in the Temperature Class T4, with IR sensor
IECEx	Class I, Zone 0, Ex ia IIC, with the protection technique Ga, in the Temperature Class T4
	Class I, Zone 1, Ex d ia IIC, with the protection technique Gb, in the Temperature Class T4, with IR sensor
UL	Class I, Division 1, Groups A, B, C, and D, in the Temperature Class T4
	Class II, Division 1, Groups E, F, and G, in the Temperature Class T4
	Class I, Zone 0, AEx ia IIC, in the Temperature Class T4
	Class I, Zone 1, AEx d ia II C, in the Temperature Class T4, with IR sensor

Table 1.1 Certifications

Directive or Certifying Body (CB)	Area Classifications or Identification Numbers
Wireless	
FCC	Identification number PHH-VPX
IC	Identification number 20727-VPX

Warnings and Cautionary Statements

Read and understand this Product Manual (manual) before operating or servicing the instrument. Failure to perform certain procedures or note certain conditions, provided below and throughout the manual, may impair the performance of this product and cause unsafe conditions.

Table 1.2 Warnings and cautionary statements

⚠	If it appears that the instrument is not working correctly, immediately contact Industrial Scientific.
⚠	Only qualified personnel should operate, maintain, and service the instrument.
⚠	Substitution of components may impair intrinsic safety, which may cause an unsafe condition.
⚠	Do not use in oxygen-enriched atmospheres. If the atmosphere becomes oxygen enriched, it may cause inaccurate readings.
⚠	Oxygen-deficient atmospheres may cause inaccurate readings.
⚠	A rapid increase in a gas reading that is followed by a declining or erratic reading may indicate an over-range condition, which may be hazardous.
⚠	Sudden changes in atmospheric pressure may cause temporary fluctuations in gas readings.
⚠	To avoid potentially inaccurate readings for some applications—monitoring for gases other than O_2, CO, CO_2, H_2S, and combustible gases [LEL/CH_4]—*only* use a leather case as a carrying case with a powered-off diffusion instrument. Remove the leather case before powering on the instrument.
⚠	Silicone and other known contaminants may damage the instrument's combustible gas sensors, which can cause inaccurate gas readings.
⚠	To support accurate readings, keep clean and unobstructed all filters, sensor ports, and water barriers.
⚠	Charge the instrument's battery in nonhazardous locations only.
⚠	Perform all instrument service tasks in nonhazardous locations only. A service task is defined as the removal, replacement, or adjustment of any part on or inside the instrument.
⚠	Do not use solvents or cleaning solutions on the instrument or its components.
⚠	This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense. The instrument complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: • This device may not cause harmful interference. • This device must accept any interference received, including interference that may cause undesired operation.

Table 1.2 Warnings and cautionary statements

	Changes or modification made that are not expressly approved by the manufacturer could void the user's authority to operate the equipment.
⚠	This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device. Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement

Product Information

Overview

The Ventis™ Pro Series instruments are portable gas monitors used for personal protection and are potentially life-saving devices.

The Ventis™ Pro4 Multi-gas Detector and Ventis™ Pro5 Multi-gas Detector have 10 and 15 compatible sensors, respectively, to monitor for oxygen, toxic gases, and combustible gases.

Depending on the installed sensors, the Ventis Pro4 and Ventis Pro5 can provide readings for up to four and five gases (and gas categories such as hydrocarbons), respectively. The instruments take readings every second and record readings-related data every ten seconds. Data are stored in the instrument data log, which has these characteristics:

- Capacity for approximately three months of readings for a unit that is on 10 hours a day and has four installed, operational sensors
- Data storage for up to 60 alarm events, 30 error events, and 250 manual calibrations and bump tests
- Downloadable using compatible accessories that are supported by iNet, DSSAC, or Accessory Software from Industrial Scientific.

Comment [NG1]: Use as the basis for other instances.

The Ventis Pro Series' multisensory alarm-warning-indicator system comprises audible, visual, and vibration signals, which can be configured for each alarm and warning, and for some indicators.

The instrument display-screen language can be set for English, French, German, or Spanish.

Ventis Pro Series instruments are iNet ready.

Key Features

These hardware features help protect and reduce damage to the instrument:

- The raised ridge can protect the sensor ports from dirt and damage when an instrument falls or is dropped.
- The display screen is recessed to help prevent scratching and other damage.
- Rails help reduce wear from docking.

These communication-enhancing features support operator safety:

- The safety team can provide instrument operators with customized on-screen messages through iNet DSSAC, or Accessory Software. The options include a message that displays during the start-up sequence and those that display during eligible gas events. A unique message can be set for each of these events for each sensor: gas alert, gas (low alarm), gas (high alarm), TWA, and STEL. These messaging options provide 26 opportunities for the safety team to communicate specific instructions to the instrument operator.
- The panic button provides instrument operators with the ability to turn on (and off) the instrument's high-level alarm to indicate he or she is in distress, someone else is in distress, or to alert others of concern about in-field circumstances.
- The man-down feature allows the instrument to sense when *it* has not moved. A man-down warning or alarm may indicate the instrument operator is unable to move or press the panic button, or that the instrument has become separated from its operator. Both the warning and alarm can be turned off by the instrument operator.
- Gas information screens can be set for operation-mode access for the instrument operator who needs to view the unit's setpoints for gas alerts, gas alarms, and calibration gas concentrations.

Several features support safety in ways that encourage operator attention and understanding, or aid in the prevention of operator misuse, however unintentional.

- The gas alert feature warns the instrument operator of the presence of gas in concentrations that may be approaching the instrument's alarm setpoints. Because the alert can be reset by the user, it serves as a form of acknowledgement, prompting the instrument operator to check the display screen for gas readings and an instructional message, and to optionally turn off the alert.
- Full-screen alarms provide easy-to-read alarm details in "large type".
- The alarm latch feature keeps an alarm on after the alarm-causing condition no longer exists. This serves to sustain alarm signals until the instrument operator unlatches the alarm, encouraging him or her to check the display screen for gas readings and an instructional message.
- When used in combination with a correct security code setting, the instrument's always-on feature can decrease the likelihood of the instrument being powered off in the field.
- Programmed iAssign™ tags can be used by the instrument operator to assign an instrument to the user-site data on his or her tag. This can help promote a sense of ownership among instrument operators, encouraging their responsible use of the equipment.
- The quick-status feature allows the instrument operator to view this information for a powered-off unit: installed sensors, available battery power, and serial number.

Specifications

Instrument

The Ventis Pro Series' physical features and operating conditions are described below in Table 1.3.

Table 1.3 Instrument specifications

Item	Description
Display	Monochrome LCD with automatic backlight
User interface buttons	Three: power button, enter button, and panic button
Case materials	Polycarbonate with static-dissipative protective rubber overmold
Alarms	Visual: two red and two blue LEDs Audible: 95 dB at a distance of 10 cm (3.94 "), typical[a] Vibration
Dimensions	104 x 58 x 36 mm (4.09 x 2.28 x 1 42 ")
Weight	200 g (7.05 oz.), typical[b]
Ingress protection	IP68 at 1.5 m (4.9') for one hour
Operating temperature range[c]	-40°C to + 50 °C (-40 °F to + 122 °F)
Operating humidity range[d]	15−95 % relative humidity (RH) noncondensing (continuous)

[a] May vary based on in-field conditions.

[b] May vary based on installed components.

[c] See also "Sensors".

[d] Operating temperatures above 50 °C (122 °F) may cause reduced instrument accuracy. Operating temperatures below -40 °C (-40 °F) may cause reduced instrument accuracy and affect display and alarm performance.

Batteries

The Ventis Pro Series instruments are compatible with two lithium-ion battery packs, one of which offers an extended run time.

Table 1.4 Battery specifications

	Battery Pack	
	Lithium-ion	Lithium-ion Extended Range
Battery lifetime	300 charge cycles	300 charge cycles
Run time[a]	12 hours	24 hours
Battery charge time[b]	up to 4 hours	up to 7.5 hours
Battery charge temperature[c]	0 − 40 °C (32 − 104 °F)	0 − 40 °C (32 − 104 °F)

[a]Approximate run time when the battery is fully charged and operating at room temperature.

[b] When a lithium-ion battery becomes deeply discharged and the instrument is docked, it can take up to an hour for the instrument display to indicate that the battery is charging.

[d]Battery charging may be suspended outside this range.

Sensors

Each instrument's compatible sensors can be installed in one or more specific locations. Figures 1.1 and 1.2 depict each sensor's allowed installation locations for Ventis Pro4 and Ventis Pro5, respectively. Table 1.5 provides the same information but in list format, which is helpful for distinguishing among sensors of the same type. For example, there are two H2S sensors that have different installation locations and part numbers.

Table 1.6 provides specifications for each sensor, which include properties, installation locations, operating conditions, and performance, accuracy, and response-time data.

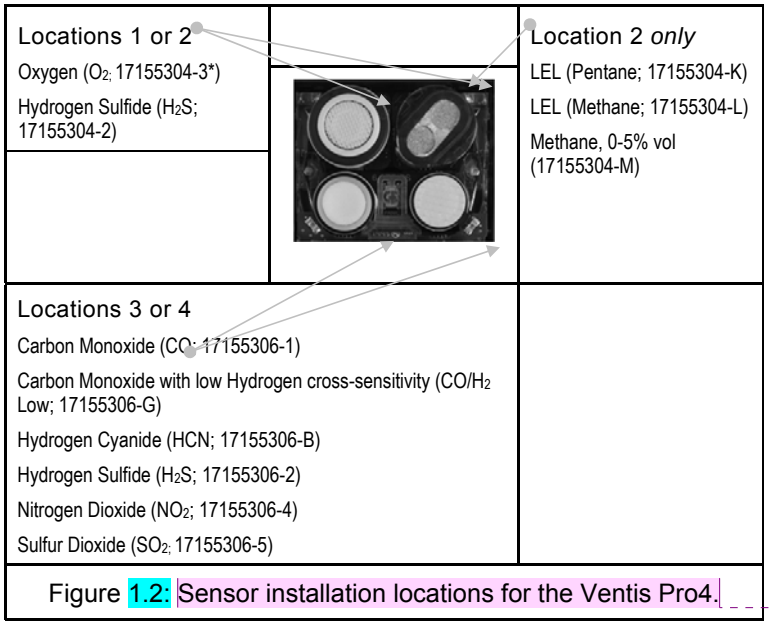
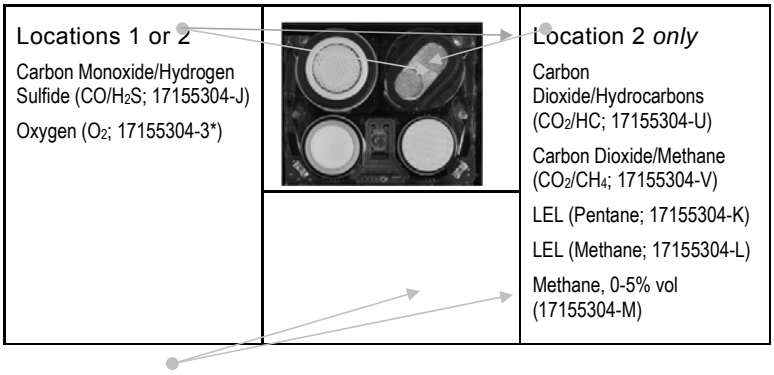


Figure 1.2: Sensor installation locations for the Ventis Pro4.

Comment [NG2]: Format



Locations 3 or 4	
Ammonia (NH_3; 17155306-6)	
Carbon Monoxide (CO; 17155306-1)	
Carbon Monoxide/Hydrogen Sulfide (CO/H_2S; 17155306-J*)	
Carbon Monoxide with low Hydrogen cross-sensitivity (CO/H_2 Low; 17155306-G)	
Hydrogen Cyanide (HCN; 17155306-B)	
Hydrogen Sulfide (H_2S; 17155306-2)	
Nitrogen Dioxide (NO_2; 17155306-4)	
Sulfur Dioxide (SO_2; 17155306-5)	

Table 1.5 Sensor compatibility and installation location

	Ventis Pro4	Ventis Pro5	Installed location	Part number
Ammonia (NH_3)	No	Yes	3 or 4	17155306-6
Carbon Dioxide/Hydrocarbons (CO_2/HC)	No	Yes	2	17155304-U
Carbon Dioxide/Methane (CO_2/CH_4)	No	Yes	2	17155304-V
Carbon Monoxide (CO)	Yes	Yes	3 or 4	17155306-1
Carbon Monoxide/Hydrogen Sulfide (CO/H_2S)	No	Yes	1 or 2	17155304-J
Carbon Monoxide/Hydrogen Sulfide (CO/H_2S)*	No	Yes	3 or 4	17155306-J
Carbon Monoxide with low Hydrogen cross-sensitivity (CO/H_2 Low)	Yes	Yes	3 or 4	17155306-G
Hydrogen Cyanide (HCN)	Yes	Yes	3 or 4	17155306-B
Hydrogen Sulfide (H_2S)	Yes	Yes	1 or 2	17155304-2
Hydrogen Sulfide (H_2S)	Yes	Yes	3 or 4	17155306-2
LEL (Methane)	Yes	Yes	2	17155304-L
LEL (Pentane)	Yes	Yes	2	17155304-K
Methane, 0-5% vol.	Yes	Yes	2	17155304-M
Nitrogen Dioxide (NO_2)	Yes	Yes	3 or 4	17155306-4
Oxygen (O_2)*	Yes	Yes	1 or 2	17155304-3
Sulfur Dioxide (SO_2)	Yes	Yes	3 or 4	17155306-5

*DualSense Technology capable.

Table 1.6 Sensor Specifications

Comment [NG3]: Data in black type provided by Scott, September15. Pink type indicate data not yet received (or is unclear as in accuracy numbers).

	Sensor Part number		
	Ammonia (NH_3) 17155306-6 DONE	Carbon Dioxide/Hydrocarbons (CO_2/HC) 17155304-U	
Properties			
Category	Toxic	Toxic/Combustible	
Technology	Electrochemical	Infrared	
DualSense™ capable	No	No	
Installation location			
Ventis Pro4	—	—	
Ventis Pro5	3 or 4	2	
Operating conditions			
Temperature range[a]	-xx to +xx °C (-x to +xxx °F)	-xx to +xx °C (-x to +xxx °F)	
RH range[a]	xx-xx%	xx-xx%	
Performance		CO_2	HC
Sensitivity			
Measurement range	0−500 ppm	x−xxx ppm	x−xxx ppm
Measurement resolution	1 ppm		
Accuracy[c]			
Calibration gas and concentration	50 ppm NH_3	xxx ppm CO	xx ppm H_2S
Accuracy at time and temperature of calibration	± 15% (0-100 ppm) ± 25% (101−500 ppm)	± xx%	± xxx% (up to xxx ppm) ± xx% (xxx−xxx ppm)
Accuracy over sensor's full temperature range	± 15%	± xx%	± xx%
Response Time			
T50	10 s	xx s	xx s
T90	20 s	xx s	xx s

Table x.x Sensor Specifications

	Sensor Part number		
	Carbon Dioxide/Methane (CO_2/CH_4) 17155304-V		Carbon Monoxide (CO) 17155306-1
Properties			
Category	Toxic and Combustible		Toxic
Technology	Infrared		Electrochemical
DualSense™ technology capable	No		No
Installation location			
Ventis Pro4	—		3 or 4
Ventis Pro5	2		3 or 4
Operating conditions			
Temperature range[a]	-xx to +xx °C (-x to +xxx °F)		-xx to +xx °C (-x to +xxx °F)
RH range[a]	xx-xx%		xx-xx%
Performance	CO_2	CH_4	
Sensitivity			
Measurement range	x−xxx ppm	x−xxx ppm	0-2000 ppm
Measurement resolution	x ppm	x ppm	1 ppm
Accuracy[c]			
Calibration gas and concentration	xxx ppm CO	xx ppm H_2S	100 ppm CO
Accuracy at time and temperature of calibration	± xx%	± xxx% (up to xxx ppm) ± xx% (xxx−xxx ppm)	± 5%
Accuracy over sensor's full temperature range	± xx%	± xx%	± 10%
Response Time			
T50	xx s	xx s	10 s
T90	xx s	xx s	20 s

Comment [NG4]: Data not included in 9/16 info from Scott.

Comment [NG5]: Check with Liz. If needed correct in all instances.

Table x.x Sensor Specifications

	Sensor (abbreviation) Part number			
	Carbon Monoxide and Hydrogen Sulfide (CO/H_2S) 17155306-J DONE		Carbon Monoxide and Hydrogen Sulfide (CO/H_2S) 17155304-J DONE	
Properties				
Category	Toxic		Toxic	
Technology	Electrochemical		Electrochemical	
DualSense™ capable	Yes		No	
Installation location				
Ventis Pro4	—		—	
Ventis Pro5	3 or 4		1 or 2	
Operating conditions				
Temperature range[a]	-xx to +xx °C (-x to +xxx °F)		-xx to +xx °C (-x to +xxx °F)	
RH range[a]	xx-xx%		xx-xx%	
Performance	CO	H_2S	CO	H_2S
Sensitivity				
Measurement range	0-1500 ppm	0−500 ppm	0-1500 ppm	0−500 ppm
Measurement resolution	1 ppm	0.1 ppm	1 ppm	0.1 ppm
Accuracy[c]				
Calibration gas and concentration	100 ppm CO	25 ppm H_2S	100 ppm CO	25 ppm H_2S
Accuracy at time and temperature of calibration	± 5%	± 7%	± 5%	± 7%
Accuracy over sensor's full temperature range	± 5%	± 10%	± 5%	± 10%
Response Time				
T50	15 s	10 s	15 s	10 s
T90	35 s	20 s	35 s	20 s

Table x.x Sensor Specifications

	Sensor (abbreviation) Part number	
	Carbon Monoxide with low Hydrogen cross-sensitivity (CO/H_2 Low) 17155306-G	Hydrogen Cyanide (HCN) 17155306-B
Properties		
Category	Toxic	Toxic
Technology	Electrochemical	Electrochemical
DualSense™ capable	No	No
Installation location		
Ventis Pro4	3 or 4	3 or 4
Ventis Pro5	3 or 4	3 or 4
Operating conditions		
Temperature range[a]	-xx to +xx °C (-x to +xxx °F)	-xx to +xx °C (-x to +xxx °F)
RH range[a]	xx-xx%	xx-xx%
Performance		
Sensitivity		
Measurement range	0−1000 ppm	0−30 ppm
Measurement resolution	1 ppm	0.1 ppm
Accuracy[c]		
Calibration gas and concentration	100 ppm CO	10 ppm HCN
Accuracy at time and temperature of calibration	± 5% (0-300 ppm) ± 15% (301-10000 ppm)	± 10%
Accuracy over sensor's full temperature range	± 15%	± 15%
Response Time		
T50	8 s	15 s
T90	12 s	50 s

Table x.x Sensor Specifications

	Sensor (abbreviation) Part number	
	Hydrogen Sulfide (H_2S) 17155304-2 DONE	Hydrogen Sulfide (H_2S) 17155306-2 DONE
Properties		
Category	Toxic	Toxic
Technology	Electrochemical	Electrochemical
DualSense™ capable	No	No
Installation location		
Ventis Pro4	1 or 2	3 or 4
Ventis Pro5	1 or 2	3 or 4
Operating conditions		
Temperature range[a]	-xx to +xx °C (-x to +xxx °F)	-xx to +xx °C (-x to +xxx °F)
RH range[a]	xx-xx%	xx-xx%
Performance		
Sensitivity		
Measurement range	0−500 ppm	0−500 ppm
Measurement resolution	0.1 ppm	0.1 ppm
Accuracy[c]		
Calibration gas and concentration	25 ppm	25 ppm
Accuracy at time and temperature of calibration	± 7%	± 7%
Accuracy over sensor's full temperature range	± 15%	± 15%
Response Time		
T50	10 s	10 s
T90	25 s	25 s

Table x.x Sensor Specifications

	Sensor (abbreviation) Part number		
	LEL (Methane) 17155304-L	LEL (Pentane) 17155304-K	Methane, 0-5% vol. 17155304-M DONE
Properties			
Category	Combustible	Combustible	Combustible
Technology	Catalytic bead	Catalytic bead	Catalytic bead
DualSense™ capable	No	No	No
Installation location			
Ventis Pro4	2	2	2
Ventis Pro5	2	2	2
Operating conditions			
Temperature range[a]	-xx to +xx °C (-x to +xxx °F)	-xx to +xx °C (-x to +xxx °F)	-xx to +xx °C (-x to +xxx °F)
RH range[a]	xx-xx%	xx-xx%	xx-xx%
Performance			
Sensitivity			
Measurement range	x−xxx ppm	x−xxx ppm	0-5% vol
Measurement resolution	x ppm	x ppm	0.01% vol
Accuracy[c]			
Calibration gas and concentration	xx ppm H_2S	xx ppm H_2S	2.5% vol
Accuracy at time and temperature of calibration	± xxx% (up to xxx ppm) ± xx% (xxx−xxx ppm)	± xxx% (up to xxx ppm) ± xx% (xxx−xxx ppm)	± 10%
Accuracy over sensor's full temperature range	± xx%	± xx%	± 10%
Response Time			
T50	xx s	xx s	xx s
T90	xx s	xx s	xx s

Table x.x Sensor Specifications

	Sensor (abbreviation) Part number		
	Nitrogen Dioxide (NO_2) 17155306-4 DONE	Oxygen (O_2) 17155304-3 DONE	Sulfur Dioxide (SO_2) 17155306-5 DONE
Properties			
Category	Toxic	Oxygen	Toxic
Technology	Electrochemical	Electrochemical	Electrochemical
DualSense™ capable	No	Yes	No
Installation location			
Ventis Pro4	3 or 4	1 or 2	3 or 4
Ventis Pro5	3 or 4	1 or 2	3 or 4
Operating conditions			
Temperature range[a]	-xx to +xx °C (-x to +xxx °F)	-xx to +xx °C (-x to +xxx °F)	-xx to +xx °C (-x to +xxx °F)
RH range[a]	xx-xx%	xx-xx%	xx-xx%
Performance			
Sensitivity			
Measurement range	0-150 ppm	0-30% vol	0-150 ppm
Measurement resolution	0.1 ppm	0.1 ppm	0.1 ppm
Accuracy[b]			
Calibration gas and concentration	25 ppm NO_2	20.9% vol O_2	10 ppm SO_2
Accuracy at time and temperature of calibration	± 5%	± 0.3% vol	± 5% (0-20 ppm) ± 11% (21-150 ppm)
Accuracy over sensor's full temperature range	± 15%	± 0.2% vol	± 10%
Response Time			
T50	10 s	5 s	10 s
T90	20 s	15 s	25 s

[a]During continuous operation.

[b]Apply when the instrument is calibrated using the stated calibration gas and concentration; accuracy is equal to the stated percentage or one unit of resolution, whichever is greater.

2

Recommended Practices

Maintenance Procedures

First Use

Wearing the Instrument

Maintenance Procedures

Maintenance procedures can be completed manually or through compatible docking stations or calibration stations supported by iNet, DSSAC, or Accessory Software from Industrial Scientific. When completed regularly, the procedures defined below help to maintain instrument functionality and support operator safety.Industrial Scientific minimum frequency recommendations for each procedure are provided in Table x.x.

Settings

Settings control how an instrument will perform. Settings also control the instrument operator's access to on-screen information and maintenance procedures.

Utilities

Self-test. The self-test is used to test the functionality of the instrument's memory operations, battery, display, and each alarm signal type (audible, visual, and vibration).

Note: The self-test does *not* verify sensor functionality (see "Bump Test") or instrument accuracy (see "Calibration").

Bump Test (or "functional test"). Bump testing checks for sensor functionality. The installed sensors are briefly exposed to (or "bumped" by) calibration gasses in concentrations that are greater than the sensors' low alarm setpoints. The exposure will cause the instrument to go into low alarm and indicate which sensors are or are not responding as expected to gas.

Note: a bump test does not measure for *accuracy* (see "Calibration").

Zero. Zeroing adjusts the sensors' "baseline" readings ("zero readings"), which become the points of comparison for subsequent readings. Always zero sensors in truly clean air or with a zero-grade-air cylinder as any gasses that are present (and relevant to the installed sensors) will be measured and displayed as zero.

Calibration. Regular calibrations help ensure the accurate measurement and display of gas concentration values. During calibration, the instrument's installed sensors are to be exposed to their set concentrations of calibration gasses. Based on the sensors' responses, the instrument will self-adjust to compensate for declining sensor sensitivity, which naturally occurs as the installed sensors are used or "consumed".

Note: During calibration, the span percentage for each sensor is displayed. This value indicates how much useful life remains: when a sensor's span percentage reaches 50%, it will no longer pass calibration.

Summary Readings. TWA, STEL, and peak readings can be set for on-demand access during instrument operation. On access, each reading can be cleared.

Recommended Practices

Industrial Scientific minimum-frequency recommendations for key procedures are summarized in Table x.x. These recommendations are provided to help support worker safety and are based on field data, safe work procedures, industry best practices, and regulatory standards. Industrial Scientific is not responsible for setting a company's safety practices and policies, which may be affected by the directives and recommendations of regulatory groups, environmental conditions, operating conditions, instrument use patterns and exposure to gas, and other factors.

Table 2.1 Industrial Scientific recommended practices

Procedure	Recommended minimum frequency
Settings	Before first use, when an installed sensor is replaced, and as needed.
Calibration[a]	Before first use and monthly thereafter.
Bump test[b]	Prior to each day's use.
Self-test[c]	Prior to each day's use.

[a]Between regular calibrations, Industrial Scientific also recommends a calibration be performed immediately following each of these incidences: the unit falls, is dropped, or experiences another significant impact; is exposed to water; fails a bump test; or has been repeatedly exposed to an over-range (positive or negative) gas concentration. A calibration is also recommended after the installation of a new (or replacement) sensor.

[b]When redundant sensors are operating on DualSense technology, bump testing these sensors may be done less frequently based on company safety policy.

[c]The instrument performs a self-test during power on. For an instrument that is set for always-on, the self-test should be manually completed before each day's use.

Note: The use of calibration gases not provided by Industrial Scientific may void product warranties and limit potential liability claims.

First Use

To prepare the Ventis Pro Series instrument for first use, qualified personnel should ensure the following are completed:

- Review the instrument settings and modify them as needed.
- Charge the battery.
- Instrument calibration.
- A bump test.

Wearing the Instrument

The unit may be worn with its factory-installed suspender clip. The suspender clip is solely intended for attachment to a garment.

The clips should be securely fastened and attached in a manner that ensures the unit's sensor ports are fully exposed to the air. No part of the unit should be covered by any garment, part of a garment, or other item that would restrict the flow of air to the sensors or impair the operator's access to the audible, visual, or vibration alarms.

Based on the U.S. Department of Labor's Occupational Safety and Health Administration (OSHA) definition of the breathing zone, it is recommended that the unit be worn within a 25.4 cm (10") radius of the nose and mouth. Refer to OSHA and to other agencies or groups as needed for additional information.

3

Instrument Basics

Unpacking the Instrument

Hardware Overview

Display Overview

Start-up and Shutdown

Unpacking the Instrument

The items that are shipped with the unit are listed below (see Table 3.1). Each item should be accounted for during the unpacking process.

Table 3.1 Package contents

Quantity	Item	Notes
1 as ordered	Ventis Pro Series Instrument	Instrument model is noted on the box label. Options: • Ventis Pro4 • Ventis Pro5
1 as ordered	Battery Pack	One of two battery types is factory installed as indicated on the box label. Options: • Rechargeable Lithium-ion • Rechargeable Extended Range Lithium-ion
1 as ordered	Ventis Charger	Universal power cord. Includes interchangeable plugs for use with US, UK, EU, and AUS receptacles.
1	Suspender clip (installed)	—
1	Calibration cup	—
1	Calibration and bump test tubing	60.96 cm (2 ') of urethane tubing; 4.762 mm (3/16 ") ID
1	*Reference Guide*	Short-form instruction for powering on and using Ventis Pro Series instruments.
1	*Final Inspection & Test Report*	Includes instrument settings[1], sensor information[1], and calibration details.

[1]At the time of shipment.

Note: If any item is missing or appears to have been damaged, contact Industrial Scientific (see "Contact Information") or a local distributor of Industrial Scientific products.

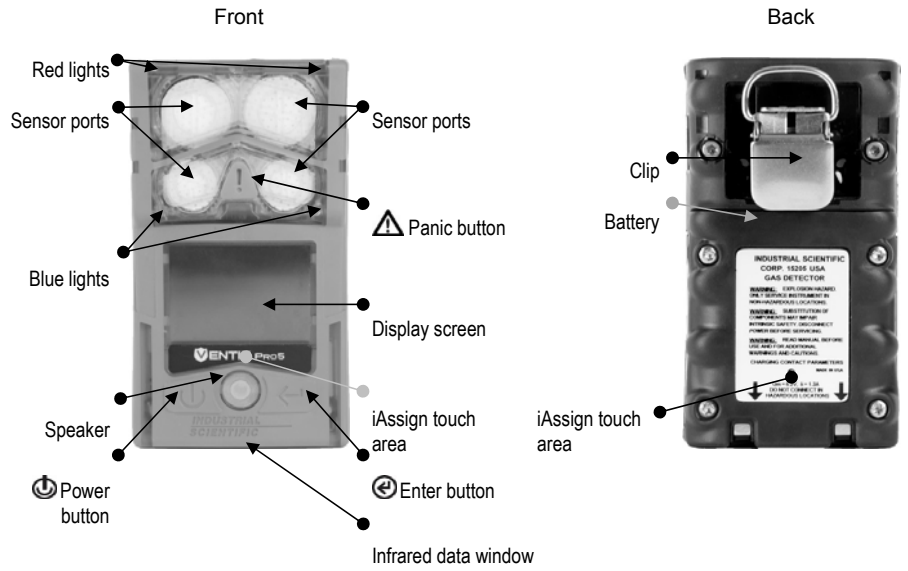
Comment [NG6]: correct term?

Comment [NG7]: term here and elsewhere

Hardware Overview ARROW PLACEMENT

The instrument's main hardware components are identified below (see table 3.2).

Table 3.2 Ventis Pro Series (Ventis Pro5 shown)



Display Overview

The instrument's easy-to-read LCD that has three main horizontal segments. From top to bottom, they are:

- Status bar
- Gas readings area
- Navigation bar

The instrument uses these areas to display icons, numbers, abbreviations, and text in combinations that allow it to clearly communicate with its user: the instrument operator in the field or the safety team members who are responsible for settings or maintenance.

Sample display screens are shown below to define the icons and other items the user can expect to see at these times:

- During operation
- During an alarm
- During maintenance
- While working in settings

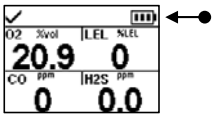
Operation

During operation the display screen's status bar communicates basic information to the instrument operator: instrument and battery status, ambient-air temperature, and the time of day.

In addition to the display of current readings, the gas readings area communicates other information about the installed sensors.

During operation, there may be information screens or maintenance utilities available to the instrument operator. If so, the bottom area of the display screen will feature the navigation bar. The action displayed on the left is controlled by the button underneath it, the power button ⏻; the action on the right is controlled by the enter button ⏎.

Table x.x.a Operation display screens and icons



Status bar

Instrument status icon

✓ The status bar checkmark indicates the instrument is operational.

Battery status (shown), temperature, and time icons

The battery's level of charge is between 67% and 100%.

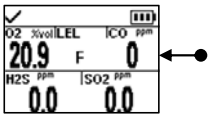
The battery's level of charge is between 34% and 66%.

The battery's level of charge is less than or equal to 33%.

The battery's level of charge is approaching a critically low level.

11:34a The time of day can be express in 24- or 12-hour format (12-hour shown).

76 F The ambient temperature reading can be set for Celsius or Fahrenheit (shown).



Gas readings area

Gas readings

Gas, unit of measure, and current reading.

Sensor status icons

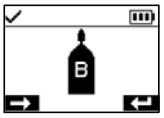
F The indicated sensor is in a general state of failure (shown).

ØF The indicated sensor failed zeroing.

CAL The indicated sensor failed calibration.

Table x.x.a Operation display screens and icons

BUMP	The indicated sensor failed bump testing.
ERR	The indicated sensor is installed in the wrong location.
—	The indicated sensor is inactive.



Navigation Bar

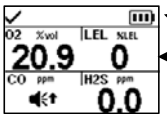
Navigation icons

→	Skip the utility.
↵	Start the utility.
Clear	Instructional text.

Alarms, Warnings, and Error Events

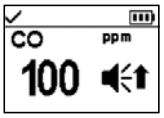
During an alarm, the gas readings area communicates the event type, details about the in-alarm sensor, and gas readings for all sensors.

Table x.x.a Event display screens and icons



Status bar

Gas readings area



Full-screen alarm format

Event icons (gas-related)

and OR	Gas present (over-range alarm)
	Gas present (high alarm; shown)
	Gas present (low alarm)
	Gas alert (warning)
STEL	Short-term exposure limit (STEL) alarm
TWA	Time-weighted average (TWA) alarm
	Alarm latched

Event type (nongas-related; full-screen icons)

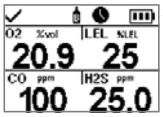
	Critical low battery
Panic Alarm	Panic alarm
MAN DOWN	Man-down alarm
ERROR 408	System error (408 shown)

Maintenance

During and after a maintenance procedure, the display screen's status bar indicates which procedure is in progress. The gas readings area will communicate information about the procedure and its results.

The navigation bar provides instruction. The action displayed on the left is controlled by the button underneath it, the power button ⏻; the action on the right is controlled by the enter button ⏎.

Table x.x.a Maintenance display screens and icons



Status bar

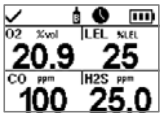
Maintenance icons

The clock icon indicates a maintenance procedure is in progress.

Bump test (shown)

Calibration

Zero



Gas readings area

Process and results

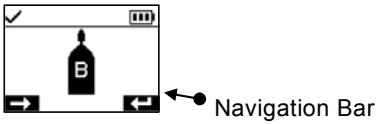
Calibration gas type, unit of measure, and concentration.

Results

✓ Passed (shown)

✕ Failed

Table x.x.a Maintenance display screens and icons

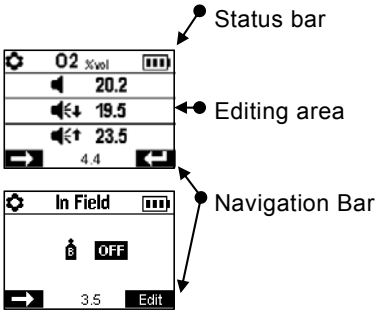


→	Cancel the utility.
↵	Start the utility (bump test shown).
⏩	Apply calibration gas.

Settings

When working in settings, the status bar indicates which setting is being reviewed. The middle of the display screen displays a current setting and functions as the editing area. The navigation bar allows the user to navigate with a setting and from setting-to-setting.

Table x.x.a Settings display screens and icons



Settings icons

→	Advance to the next display screen.
↵	Edit the settings.
Edit	Edit the setting.
🔒	Security code.
▼	Scroll.

Gas names Defined below are other icons that may appear on the display screen.	
CH4	CH4 (Methane)

CO	Carbon Monoxide
CO2	CO_2 (Carbon Dioxide)
H2S	H_2S (Hydrogen Sulfide)
HC	Hydrocarbons
HCN	Hydrogen Cyanide
LEL	Combustible gasses
NH3	NH_3 (Ammonia)
NO2	NO_2 (Nitrogen Dioxide)
O2	O_2 (Oxygen)
SO2	SO_2 (Sulfur dioxide)
Units of measure	
ppm	Parts per million
Mg/M3	Milligrams per meter cubed (German-language instruments only)
% LEL	Unit of measure for lower explosive limits. It refers to the percentage of the air which is made up of combustible gas or vapor. Lower explosive limit. It is the minimum concentration of a gas, which, if given an ignition source, is capable of producing a flash of fire.
% vol	Percent by volume refers to a defined amount of the gas in 100 parts of air. For example, normal air contains 21% vol oxygen, or 21 parts oxygen for every 100 parts of air.
Other abbreviations	
STEL	Short-term exposure limit (STEL)
TWA	Time-weighted average (TWA)
✓	Yes.
✗	No.
	Maintenance due (calibration shown)
	The down arrow indicates the readings display area is showing the number of *days since* the last maintenance procedure was completed (calibration shown).
	The up arrow indicates the readings display area is showing the number of *days until* the maintenance procedure is next due (calibration shown).

Comment [NG8]: Are these maintenance information?

	Peak readings.
	User assignment.
	Site assignment.
	Indicates that the sensor is operating on DualSense technology.
	Fault dual sense sensor
SE 1	Failures (general shown) maintenance due + zero bump and cal
	Return the instrument to Industrial Scientific.
	Security code is required.
	Data exchange may be in progress.

Power On

To power on the instrument, press and hold the power button (⏻) for approximately three seconds.

When a Ventis Pro Series instrument is powered on, the instrument performs a self-test and displays several screens. The instrument operator should observe the instrument to verify that is operating as expected and follow the on-screen prompts to prepare the instrument for use. Once the start-up process is complete, the home screen will display.

The screens displayed during start-up may vary from those shown below depending on the instrument settings. Once the start-up process is complete, the home screen will display.

Comment [NG9]: Michelle to supply new write-uo. Parse to include some text to precede home.

Table xxx Power on

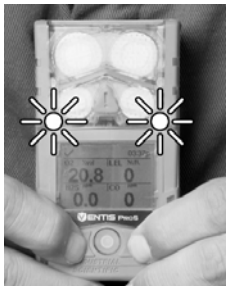
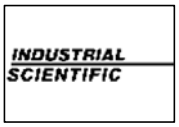
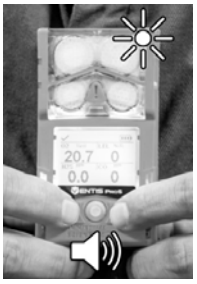
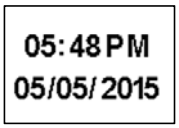
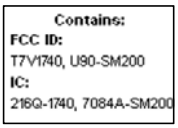
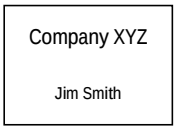
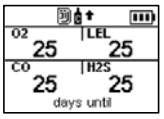
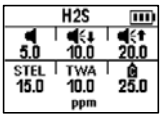
Self-test			
			
Light test The blue lights will flash followed by the red lights. Verify that all lights are functional.	Display test The display will run a self-test. Observe the screens to verify that the display is fully functional.	Alarms test The instrument will vibrate and then emit a loud beep. Verify that both signal types are functional.	If the instrument fails any part of its self-test, an error will display. If the instrument or the operator detect problems, contact Industrial Scientific or an authorized distributor for assistance.
Start-up			
			
Date and time screen If the battery has been removed or changed, the instrument operator may be prompted to set the date and time.	Instrument information	Regulatory information	Assignment information Indicates the company, person (user), and location (site) to which the instrument is currently assigned.

Table xxx Power on





Maintenance information (dock and calibration shown)

The dock information (above left) indicates maintenance is due in the future ("days until").

The calibration information (above right) indicates when the maintenance was last performed, ("days since"). Calibration information can also appear as due in the future.

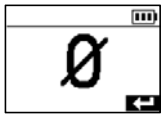
Gas information screens (H_2S shown in ppm)

A series of screens showing the settings for each sensor will display.

Top row event setpoints (left to right): gas alert, low alarm, and high alarm.

Bottom row setpoints (left to right): STEL (short-term exposure limit) alarm, TWA (time-weighted average) alarm, and calibration gas concentration.

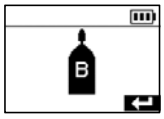
Verify that the settings are appropriate.



Zero

Start the utility: press ↵.

Skip the utility: wait approximately 15 seconds.



Bump test

Start the utility: press ↵.

Skip the utility: wait approximately 15 seconds.

Start-up message Press ↵ to acknowledge the message and continue.

Compliance check (German-language instruments only)

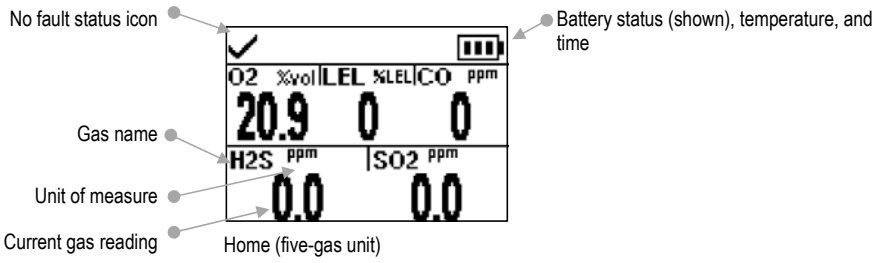
Read the question and answer it.

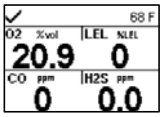
To answer yes, press ⏻.
To answer no, press ↵.

Home Screen

Text from intro revision

Comment [NG10]: Table, Figure, or Section?



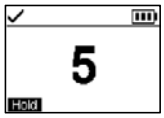
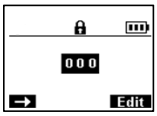


Home (four-gas unit)

Power Off

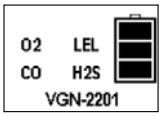
To power off the instrument, press and hold the power button (⏻). If the unit is set to remain on, it may require the entry of a security code to power off.

Table xxx Power Off

		–	–	–
Countdown	Enter security code			
To power off the instrument, press ⏻ for the full five-second countdown.	If this screen displays, press ⏎ to change the displayed value. Press ⏻ to enter the displayed value.			

Quick Status Screen

When the instrument is powered off, the installed sensors, available battery power, and instrument serial number can be viewed without powering the instrument on: press and hold the power button (⏻) and the enter button (⏎) for two seconds.



4

Settings

Guidelines

Organization

Accessing and Working in Settings

Guidelines

Ventis Pro Series instruments are highly customizable with settings that can be readily configured to suit your company's gas-monitoring environment.

Review instrument settings prior to first use as they may need to be changed to ensure compliance with company policy and applicable regulations, laws, and guidelines as issued by regulatory agencies and government or industry groups. The settings should be reviewed and changed only by qualified personnel.

Some settings can be modified manually using the instrument, as described in this Product Manual. All settings can be modified through compatible Industrial Scientific docking stations and applications ADD THE SOFTWARE NAMES.; *any changes made manually will be overridden when the instrument is docked*.

Organization

Because there are many settings available, a menu system is used to organize settings by topic. This allows the safety specialist to first choose the menu (or topic) of interest, such as alarms, then review and optionally change each available setting within that menu. There are six menus:

- Maintenance
- Start-up
- Operation
- Alarm
- Sensor
- Admin (Administration)

Table x.x, outlines the settings available within each menu.

Table X.X Settings menus and options

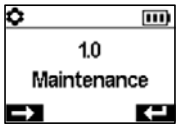
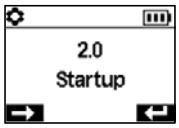
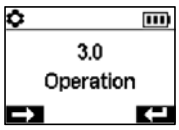
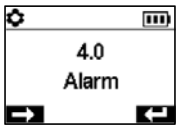
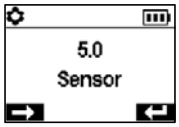
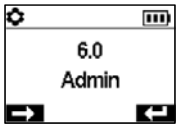
Menu	Description and available options
	The maintenance menu provides access to view status information and to perform maintenance utilities on an instrument. Available options include: • View instrument information. • View dock information. • Zero and calibrate the instrument. • Run a bump test. • View and clear instrument peaks. • View and clear TWA readings. • View and clear STEL readings. • View or set user and site assignment.
	Start-up settings are used to control the screens and functionality that should display when the instrument is powering on. Start-up options include: • Add or remove zero from instrument start-up. • Add or remove bump test from instrument start-up. • Add or remove maintenance information from instrument start-up.
	The operation settings control the screens and functionality when the instrument is in operation mode (after start-up is completed). Operation mode includes a series of informational screens and maintenance utilities. It is sometimes referred to as “in field” access. The actual screens and utilities that display can be customized using the Operation menu. For example, companies that use docking stations to run nightly maintenance utilities such as bump testing can set the instruments to not allow “in field”. Available operation settings include: • View user and site assignment. • Select whether instrument operators will see last calibration days, next calibration days, next dock days, or no information about maintenance utility schedules. • Add or remove zeroing. • Add or remove calibration. • Add or remove bump testing. • Add or remove clear peak readings. • Add or remove clear TWA readings. • Add or remove clear STEL readings. • Add or remove the gas information screen. • Add or remove the ability to edit user and site assignments. • Select a unit of measure for temperature. • Set the instrument to remain powered on at all times or set the instrument to allow the operator to power it off.
	The alarm settings can be used to control alarm preferences including alarm functionality and signal types. • Turn on or off the audio alarm. • Turn on or off the vibrating alarm. • Turn on or off the alarm latch. • Set the concentration of gases that will cause the instrument to go into alarm. • Set the TWA interval. • Set the instrument to allow the instrument to be shut down while in alarm or set the instrument

Table X.X Settings menus and options

Menu	Description and available options
	to not allow shut-down while in alarm. • Select whether the instrument should alarm while docked or should not alarm while docked. • Turn on or off the man-down alarm. • Select the amount of time the instrument will wait before the man-down alarm turns on.
	The sensor settings provide access to view and configure sensor parameters including: • View installed sensors and their locations. • View span reserve percentages. • Select between quick bump and calibration or independent bump and calibration. • Select the LEL mode, calibration gas type, and concentration. • Select a LEL correlation factor. • Set calibration gas parameters.
	The admin (administrative) settings are used to: • Set the instrument security code. • Select a confidence indicator or turn the indicator off. • Select a dock overdue indicator or turn the indicator off. • Select a calibration overdue indicator or turn the indicator off. • Select a bump overdue indicator or turn the indicator off. • Set bump test parameters.

Accessing and Working in Settings

Settings can be accessed only from the start-up sequence.

When viewing and modifying settings, the following apply:

- Only qualified personnel should adjust instrument settings. In the following text, this person is referred to as the “technician”.
- Unless otherwise noted, when no button is pressed for 60 seconds, the instrument exits the settings and reenters the start-up sequence. Press and hold the power (⏻) and enter (⏎) buttons simultaneously to reactivate the settings menu.
- The settings icon (⚙) displays in the top left corner of each screen.

Table X.X Settings access and navigation overview

Access	Access to settings may be security-code protected to help guard against unintended entry to and changing of settings.
During start-up, simultaneously press and hold ⏻ and ⏎ to access settings.	
 Enter security code	If this display screen *is* activated, the instrument settings are security-code protected; the user must enter the correct three-digit code. If this screen is *not* activated instrument’s security code is set to 000, access to instrument settings is *not* security-code protected; the first settings menu option will display. *Notes:*

Table X.X Settings access and navigation overview

If an incorrect code is entered, the instrument will exit settings and resume start-up.

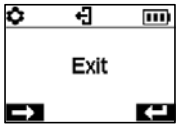
If the security code is unknown, it can be reset to 000: Enter 412, then simultaneously press and hold ⏻ and ⏎. The first settings menu option will display. Access the Admin settings to create a new security code; otherwise, the instrument will not be security-code protected.

Press ⏎ to edit the security code.

Press ⏻ to enter the displayed value.

Navigation

⏻	The power button is used to save a selection or move to the next menu or setting within a menu.
⏎	The enter button is used to take action. It can select a menu, increase a value, edit a setting, or start a utility (e.g. bump test). When editing settings When the last value in a range is reached, the display will start again with the first value. Each press will increase the value slowly; press and hold to increase the pace.
INSERT IMAGE	This display screen marks the end of the settings process. menu sequence. The technician has two choices: • Press ⏻ to return to the start of the current menu. This allows the technician to review the work just completed and make any additional adjustments. • Press ⏎ to continue to the next settings menu.



As shown below, when navigating within a menu:

- The screens are numbered: 4.3 is the third setting (alarm latch) within menu four (the alarm menu).
- The screen's navigation bar provides instruction. The action displayed on the left is controlled by the button ⏻ underneath it; the action on the right is controlled by the enter button ⏎.

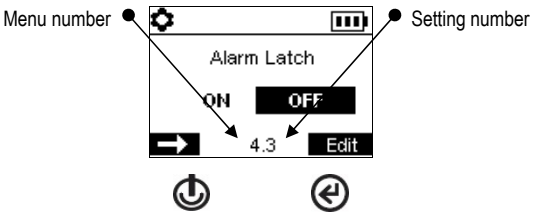
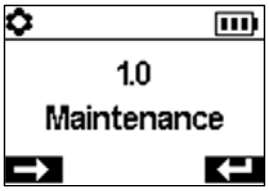
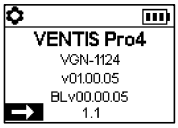
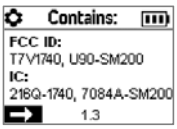


Table X.X Editing maintenance settings



Press to select the menu and view maintenance settings.

Press to continue to the next menu.

Screen	Description
Instrument Information	
	This screen displays instrument and versioning information. The information shown includes: • Instrument model • Instrument serial number • Firmware version • Boot loader version
Press to advance to the next screen.	
Regulatory Information	
	This screen displays regulatory information.
Press to advance to the next screen.	
Dock information	
	This screen displays the number of days until the instrument is next due to be docked.
Press to advance to the next screen.	
Calibration information	

Comment [NG11]: Ttile? Intro?

Comment [NG12]: Reformat for consistency.

The calibration information shown here indicates the maintenance is due in the future (↑ and “days until”). The information can also be displayed to indicate when the maintenance was last performed (↓ and “days since”).

Press ⏻ to advance to the next screen.

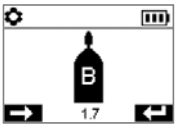
Zero initiate

This screen allows the technician to complete the zero and calibration processes. The instrument will prompt the technician to perform calibration once zeroing is complete.

Press ⏎ to zero the instrument.

Press ⏻ to advance to the next screen.

Bump test initiate

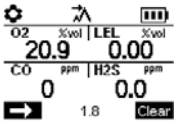


This screen allows the technician to complete the bump test process.

Press ⏎ to bump test the instrument.

Press ⏻ to advance to the next screen.

Current peak readings

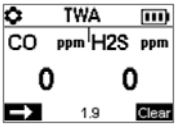


This screen allows the technician to view and clear current peak readings. Clearing the peak readings will reset the readings. Previous peak readings are not deleted. Rather, they are maintained in the data log.

Press ⏎ to clear peak readings.

Press ⏻ to advance to the next screen.

Current TWA readings

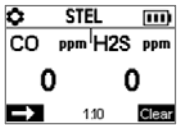


This screen allows the technician to view and clear current TWA readings. Clearing TWA readings will reset the readings to 0. Previous TWA readings are not deleted. Rather, they are maintained in the data log.

Press ⏎ to clear the TWA readings.

Press ⏻ to advance to the next screen.

Current STEL readings

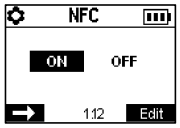


This screen allows the technician to view and clear STEL readings.

Press ⏎ to clear the STEL readings.

Press ⏻ to advance to the next screen.

Turn NFC on and off

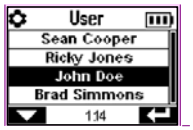


This screen allows the technician to turn near field communication (NFC) connectivity on or off. NFC is used to transfer user and site assignments from an iAssign tag to the instrument.

Press ⏎ to turn NFC on or off.

Press ⏻ to advance to the next screen.

Set current user



This screen is used to view or change the user assigned to the instrument. The five users most recently assigned to the instrument will be available for selection. If no user names appear on the display screen, the instrument is not currently assigned to a user.

Note: To assign a user not listed, use iAssign, iNet Control, DSSAC, or Accessory Software.

Comment [NG13]: Replace with newer screen.

Press ⏎ to select a user.

Press ⏻ once to assign the highlighted user to the instrument. Press ⏻ again to advance to the next screen.

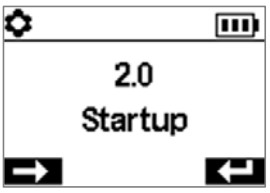
Set current site

This screen is used to view or change the site assigned to the instrument. The five sites most recently assigned to the instrument will be available for selection. If no site names appear on the display screen, the instrument is not currently assigned to a site.

Note: To assign a site not listed, use iAssign, iNet Control, DSSAC, or Accessory Software.

Press ⏎ to select a site.

Press ⏻ once to assign the highlighted site to the instrument. Press ⏻ again to advance to the next screen.

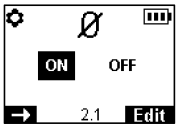


Press ⏎ to select the menu and view start-up settings.

Press ⏻ to continue to the next menu.

Screen	Description

Zero and calibration on start-up



This screen allows the technician to add or remove the zero-and-calibration utility from instrument start-up.

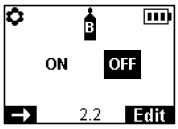
On= Zero sensors option will display during start-up.

Off= Zero sensors will not display during start-up.

Press ⏎ to add or remove zeroing from instrument start-up.

Press ⏻ to advance to the next screen.

Bump test on start-up



This screen allows the technician to add or remove the bump test utility from instrument start-up.

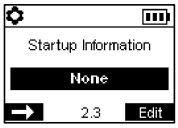
On= Bump test option will display during start-up.

Off= Bump test will not display during start-up.

Press ⏎ to add or remove bump testing from instrument start-up.

Press ⏻ to advance to the next screen.

View maintenance information



This screen allows the technician to add or remove the display of maintenance information from instrument start-up.

Values:

None

Next dock days

Next calibration days

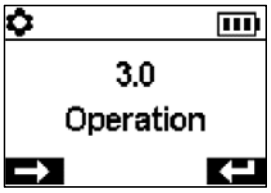
Last calibration days

Press ⏎ to turn select a calibration or dock reminder screen to display during start-up.

Press ⏻ to advance to the next screen.

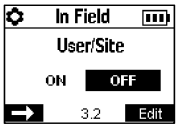
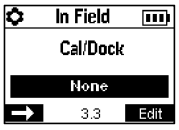
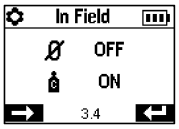
Table X.X Editing operation settings

Comment [NG14]: Ttile? Intro?

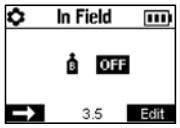


Press to select the menu and view operation settings.

Press to continue to the next menu.

Screen	Description
View assignment information	
	This screen allows the technician to grant or remove operation-mode (in field) access to view the instrument's company, user, and site assignment information. On = The assignment information screen will display. Off = The assignment information screen will not display.
Press to add or remove the assignment information screen. Press to advance to the next screen.	
View maintenance information	
	This screen allows the technician to grant or remove operation-mode (in field) access to view maintenance information. Values: None Next dock days Next calibration days Last calibration days
Press to select a maintenance screen to display. Press to advance to the next screen.	
Enable zero and calibration	
	This screen allows the technician to grant or remove operation-mode (in field) access to zero and calibrate the instrument. On = The maintenance option(s) will be accessible.. Off = The maintenance option(s) will not accessible..
Press to turn field access to zero and calibrate on or off. Press once to save the setting. Press again to advance to the next setting or screen.	

Enable bump test



This screen allows the technician to grant or remove operation-mode (in field) access to bump test the instrument.

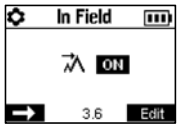
On = The bump test option will be accessible.

Off = The bump test option will not be accessible.

Press to turn access to bump test the instrument on or off.

Press to advance to the next screen.

Enable view and clear peaks



This screen allows the technician to grant or remove operation-mode (in field) access to view and clear the peak readings.

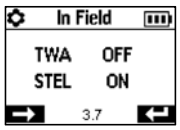
On = The view and clear options will be accessible.

Off = The view and clear options will not be accessible.

Press to turn operation-mode access to clear peaks on or off.

Press to advance to the next screen.

Enable view and clear TWA and STEL



This screen allows the technician to grant or remove operation-mode (in field) access to view and clear the unit's TWA and STEL readings.

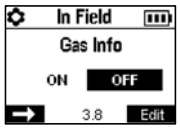
On = The selected view and clear options will be accessible.

Off = The selected view and clear options will not be accessible.

Press to turn access to view and clear the instrument's TWA and STEL readings on or off.

Press once to save the setting. Press again to advance to the next setting or screen.

View gas information



This screen allows the technician to add or remove operation-mode access (in field) to the gas information screens.

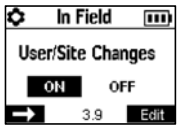
On = The gas information screens will be accessible.

Off = The gas info screens will not will be accessible

Press to turn access to the gas info screen on or off.

Press to advance to the next screen.

Allow changes to user and site assignment



This screen allows the technician to add or remove operation-mode (in field) access to edit the instrument's assigned user and site.

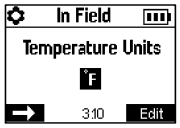
On = Allows the instrument operator to change the unit's user and site assignments using iAssign tags.

Off = Allows the instrument operator to change the unit's user and site assignments using iAssign tags.

Press to turn access to view and edit users and sites on or off.

Press to advance to the next screen.

Set temperature units



This screen allows the technician to select the unit of measure for temperature.

Values:

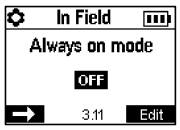
°F = Fahrenheit.

°C = Celsius.

Press to select Celsius (°C) or Fahrenheit (°F).

Press to advance to the next screen.

Enable always-on feature



This screen allows the technician to require a passcode in order to power off the instrument.

On = The always-on feature will be enabled; the instrument operator will be required to enter the instrument's security code in order to power off the instrument.

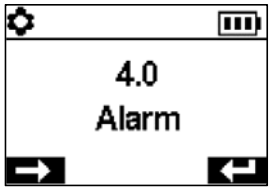
Off = The instrument operator will be able to power off the instrument.

Press to enable or disable the always-on feature.

Press to advance to the next screen.

Table X.X Editing alarm settings

Comment [NG15]: Ttile? Intro?

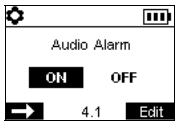


Press to select the menu and view alarm settings.

Press to continue to the next menu.

Screen	Description

Audible alarm on or off

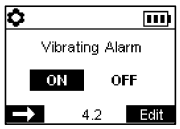


This screen allows the technician to turn the audible alarm on or off. When on, the audible alarm will be activated when the unit is in alarm.

Press to turn the audible alarm on or off.

Press to advance to the next screen.

Vibrating alarm on or off

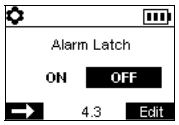


This screen allows the technician to turn the vibrating alarm on or off. When on, the vibrating alarm will be activated when the unit is in alarm.

Press ⏎ to turn the vibrating alarm on or off.

Press ⏻ to advance to the next screen.

Alarm latch on or off



This screen allows the technician to turn alarm latching on or off.

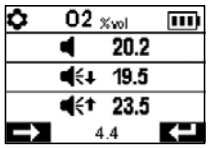
When *on*, a unit in alarm will remain in alarm until it is manually reset by the instrument operator pressing and holding the enter button (⏎).

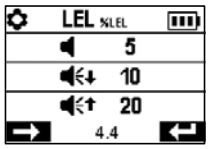
When *off*, a unit in alarm will turn off its alarm when the alarm-causing condition is no longer present.

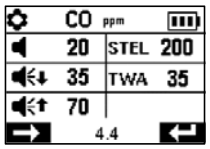
Press ⏎ to turn alarm latching on or off.

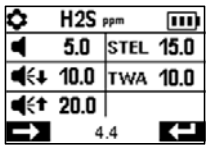
Press ⏻ to advance to the next screen.

Set sensor gas alarm levels









The set sensor alarm level screens are used to set the concentrations of gas that will cause the instrument to alarm. Three or more settings are available for each sensor.

🔈 Gas present (alert).

Gas alerts are warnings (below the low-alarm setpoint) that, when triggered, can be acknowledged and temporarily turned off. The alarm will sound again in 30 minutes if the condition persists. This setting controls the level of exposure that should trigger a gas alert; gas alerts must also be enabled using setting gas alert setting 4.9.

🔈↓ Gas present (low alarm).

This setting is used to establish the low-alarm setpoint for the sensor. When the detected gas concentration reaches this level, the instrument's low alarm will turn on.

🔈↑ Gas present (high alarm).

This setting is used to establish the high-alarm set point for the sensor. When the detected gas concentration reaches this level, the instrument's high alarm will turn on.

Toxic sensors also include STEL and TWA settings.

STEL Short-term exposure limit.

The short term exposure limit is the average exposure limit for the past 15 minutes. This setting is used to control the level of exposure that should trigger an alarm.

TWA Time-weighted average.

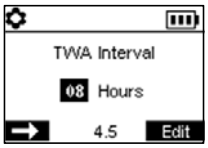
The time-weighted average is the average exposure limit over a selected amount of time, usually a full work day. This setting controls the level of exposure that should trigger an alarm; the amount of time is set using the TWA interval setting 4.5.

Value ranges vary depending on the sensor. See table x.x for detailed information.

Press ⏎ to edit an alarm set point.

Press ⏻ once to save the setting. Press ⏻ again to advance to the next setting or screen.

Set TWA interval



This screen allows the technician to set the number of hours (usually a full work day) the instrument will use to determine the time-weighted average (TWA) calculation; the level of exposure is set using the sensor gas alarms setting 4.4.

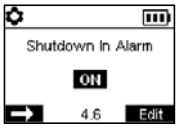
Value range: 1 – 40

Increment: 1

Press ⏎ to edit the TWA interval hours.

Press ⏻ once to advance to the next screen.

Allow shutdown in alarm



This screen allows the technician to set the instrument to allow power off of the instrument when it is in alarm.

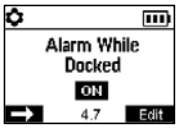
On = The instrument can be powered off while in alarm.

Off = The instrument cannot be powered off while in alarm.

Press ⏎ to turn on or off the ability to power off an instrument that is in alarm.

Press ⏻ to advance to the next screen.

Alarms off while docked



This screen allows the technician to enable or disable audible alarms when the instrument is docked.

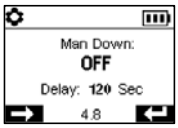
On = The audible alarms may sound while the instrument is docked. Events that may trigger the audible alarm include bump testing, calibration, and gas alarms.

Off = Audible alarms will be disabled when the unit is docked.

Press ⏎ to enable or disable alarms while the instrument is docked.

Press ⏻ to advance to the next screen.

Man-down warning and alarm



This screen allows the technician enable or disable the man-down warning and alarm feature and its alarm-delay setting.

On = The man-down *warning* will turn on when the instrument senses that it has not moved; it is manually reset by the instrument operator pressing and holding the enter button (⏎). If not reset and the lack of motion continues, the *alarm* will turn on after the selected delay setting.

Off = Neither the man-down warning nor alarm will turn on.

Delay: the amount of time the instrument should wait for movement before change its signals from a warning to a high alarm.

Value range: 30-300 seconds

Increment: 1

Press ⏎ to change the amount of time the instrument should wait for movement before activating the man down alarm.

Press ⏻ to advance to the next screen.

Gas alert

Need screen print

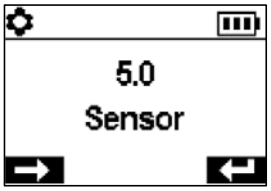
This screen allows the technician to turn on or off gas alerts. Gas alerts are warnings that can be user-acknowledged and turned off ("snoozed") for 30 minutes.

Press ⏎ to enable or disable the gas alert screen.

Press ⏻ to advance to the next screen.

Table X.X Editing sensor settings

Comment [NG16]: Ttile? Intro?

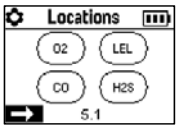


Press ⏎ to select the menu and view sensor settings.

Press ⏻ to continue to the next menu.

Screen	Description

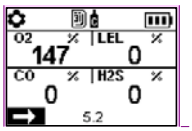
Sensor Install Location



Displays the installed sensors and their locations.

Press ⏻ to advance to the next screen.

Span reserve percentages



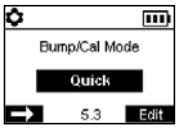
Displays the span reserve percentages for each installed sensor.

Note: A sensor will fail calibration when the span reserve percentage falls below 50%.

Comment [NG17]: This says 5.2, but isn't.

Press ⏻ to advance to the next screen.

Set bump test and calibration mode



This screen allows the technician to select between the "quick" or "independent" processes for bump test and calibration maintenance.

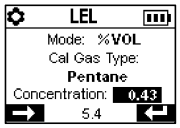
Quick = The instrument will request the application of all required gases at once. This option is well-suited when using a "blended" calibration gas cylinder—one that contains the gas concentrations required for *all* installed sensors.

Independent = The instrument will request the application of each required gas concentration one at a time (sequentially). The independent option is well-suited for applications that require the use of more than one calibration gas cylinder.

Press ⊕ to select quick or independent.

Press ⏻ to advance to the next screen.

LEL mode set



This screen allows the technician to select the LEL mode (unit of measure) and the calibration gas type and concentration.

LEL mode values:

%VOL

%LEL

Calibration gas-type values:

Pentane

Methane

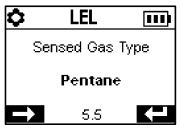
Comment [NG18]: Review for where used and not used.

Press ⊕ to edit the LEL mode or the calibration gas or concentration.

Press ⏻ once to save the setting. Press ⏻ again to advance to the next setting or screen.

LEL sensed gas type

Comment [NG19]: What does sensed gas type mean?



This screen allows the technician to select the LEL gas type.

Methane

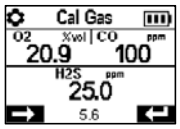
Pentane

Nonane

Press ⊕ to select an LEL gas type.

Press ⏻ to advance to the next screen.

Set calibration gas concentration



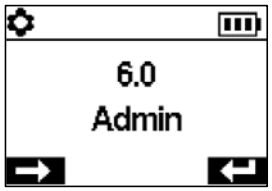
This screen allows the technician to set the calibration gas concentration for each installed non-LEL sensor.

Press ⊕ to change the calibration gas concentration.

Press ⏻ to advance to the next screen.

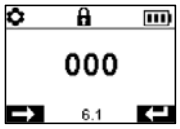
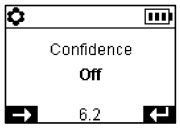
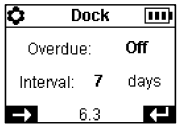
Table X.X Editing administrative settings

Comment [NG20]: Ttile? Intro?



Press ⏎ to select the menu and view administrative (admin) settings.

Press ⏻ to continue to the next menu.

Screen	Description
Set security code	
	The security code controls two things: access to a unit's settings and the ability to power off a unit that is set for always-on operation. If the security code is set to 000, entry to configuration mode is *not* security-code protected, and an always-on unit can be powered off without a security code. Any value other than 000 will enable the security code. 000 = disabled 001 to 999 = enabled
Press ⏎ to set a number for the instrument security code. Each press will increase the value by 1. Press and hold to increase the value by units of 10. Press ⏻ to save a new security code or to continue to the next screen.	
Set confidence indicator	
	This screen allows the technician to select a confidence indicator. The confidence indicator signals the instrument operator every 90 seconds that the instrument is powered on. Off = no confidence indicator will be activated Audible = enabled for audible chirp Visual = enabled for blue LED flash Both = enabled for audible chirp and blue LED flash
Press ⏎ to select a confidence indicator. Press ⏻ to advance to the next screen.	
Set dock overdue option and interval	
	This screen allows the technician to select settings for alerting the instrument operator when docking is overdue. The technician can disable the warning, or enable the warning and choose the warning type. The technician can also set the interval at which the bump test overdue warning is to be activated. Off = no docking warning will be activated Audio = enabled for audible chirp Visual = enabled for blue LED flash Both = enabled for combination audible chirp and blue LED flash

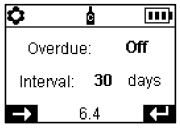
Value range: 1 to 365 days

Value increment: 1 day

Press ⏎ to select a dock warning and dock interval.

Press ⏻ once to save the setting. Press ⏻ again to advance to the next setting or screen.

Calibration overdue option and interval



This screen allows the technician to select settings for warning the instrument operator when a calibration is overdue. The technician can disable the warning, or enable the warning and choose the warning type.

The technician can also set the interval at which the calibration due alert is to be activated.

Off = no calibration warning will be activated

Audio = enabled for audible chirp

Visual = enabled for blue LED flash

Both = enabled for combination audible chirp and blue LED flash

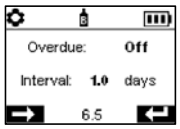
Value range: 1 to 365 days

Value increment: 1 day

Press ⏎ to select a calibration alert and calibration interval.

Press ⏻ once to save the setting. Press ⏻ again to advance to the next setting or screen.

Set bump test overdue and option



This screen allows the technician to select settings for alerting the instrument operator when a bump test is overdue. The technician can disable the warning, or enable the warning and choose the warning type.

The technician can also set the interval at which the bump test overdue warning is to be activated.

Off = no bump overdue warning will be activated

Audio = enabled for audible chirp

Visual = enabled for blue LED flash

Both = enabled for combination audible chirp and blue LED flash

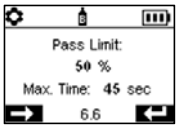
Value range: 0.5 to 30.0 days

Value increment: 0.5 days

Press ⏎ to select a bump overdue alert and bump interval.

Press ⏻ once to save the setting. Press ⏻ again to advance to the next setting or screen.

Set bump criteria (% and time)



A sensor passes a bump test when it senses the specified percentage of calibration gas (pass limit) within the specified response time setting (max time).

Pass limit range: 50 -99%

Pass level increment: 1%

Time value range: 30 to 120 seconds

Time value increment: 5 seconds

See Table 1.5 for sensor information that can aid in the setting of bump test values.

Press ⊕ to select a bump pass limit and bump time limit.

Press ⏻ once to save the setting. Press ⏻ again to advance to the next setting or screen.

Set language

This screen allows the technician to select the instrument's language from these options:

English

Spanish

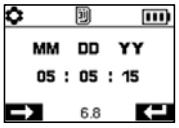
French

German

Press ⊕ to select English, Spanish, French, or German.

Press ⏻ to advance to the next screen.

Set date



The instrument's date setting is recorded in the data log and can be helpful when researching potential issues. The settings are edited in this order using these values:

Month: 00 to 12

Day: 00 to 31

Year: 2015 to 2099

Press ⊕ to set the month, day, and year.

Press ⏻ once to save the setting. Press ⏻ again to advance to the next setting or screen.

Set time

The instrument's time setting is recorded in the data log and can be helpful when researching potential issues. Its settings are edited in this order using these values:

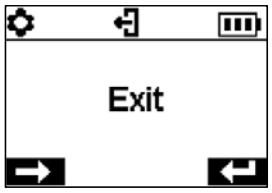
Hours: 00 to 24 (00 to 12 in the United States)

Minutes: 00 to 59

Value increment: 1

Press ⏎ to set the hour and minute.

Press ⏻ once to save the setting. Press ⏻ again to advance to the next setting or screen.

After settings are configured and before the unit's first use, calibrate the instrument (see "Zero, Calibration, and Bump Test").

4

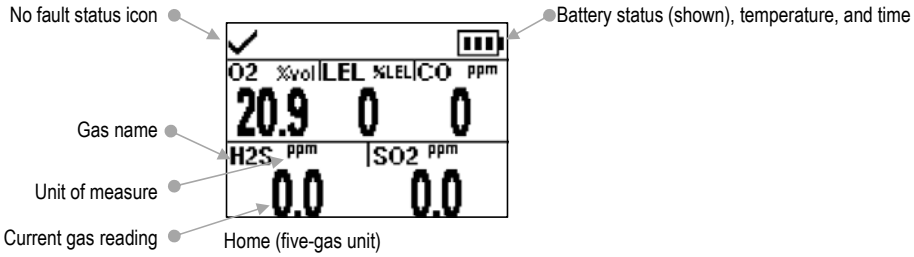
Operation

Section

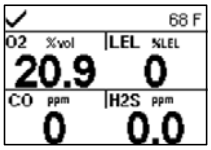
The Display Screen

After a unit has been powered on—its self-test and start-up sequence successfully completed—its gas readings information screen should display. This screen is referred to as “Home”. The Ventis Pro Series home screen will generally look like those shown below for a five-gas unit (enlarged for detail) and a four-gas unit.

Home



Home (five-gas unit)



Home (four-gas unit)

During operation, the home screen will display unless until one of these things occurs:

- The instrument is using the screen to provide information about an alarm, warning, or status item.
- The instrument operator presses, but doesn’t hold the power button (⏻).

START HERE

The Buttons

Panic Press and hold to turn on (or off) the instrument's high-level alarm.		
Power		Enter
		Reset a latched alarm.

Use this according to company policy to potentially alert others nearby of distress or

For example, trip, fall, or a potentially hazardous in-field condition (find and pick up)

How do you know when an alarm is latched? When an alarm is latched, this icon will display.

When the instrument operator presses the power button, a series of display screens can be accessed*. Some are information screens and some are "utilities". An information screen displays briefly and requires no user action. A utility gives the user an opportunity to complete a routine maintenance process such as bump testing.

- Conduct an instrument self-test. Press the power (⏻) and enter (⏎) buttons simultaneously to start the test. (See: X.X for more information.)
- Reset a latched alarm. If the instrument is in alarm and alarms are latched, press and hold the enter (⏎) button.
- Press and hold the panic button to activate a panic alarm.

*Access to operation mode display screens depends on the unit's settings.

Instruction

This is the original content

Using the Instrument

Operation Mode Maintenance Utilities and Information Screens

When an instrument operator presses the power (⏻) button while the home screen is displayed, a series of maintenance utilities and information screens may appear. This series of screens is referred to as operation mode. The screens included in an instrument's operation mode can be added or removed by configuring the instrument settings. Available screens may include:

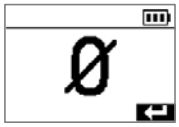
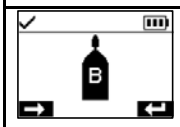
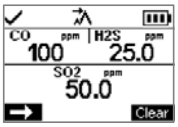
- Dock or calibration reminder
- Zero
- Calibration (accessible after a zero has been completed)
- Bump test
- View and clear peaks
- View and clear TWA
- View and clear STEL
- Gas info screens
- View user and site assignment

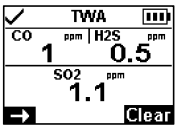
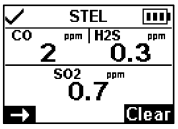
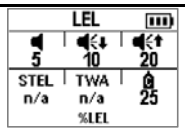
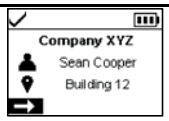
Unless otherwise noted, if a button is not pressed for 30 seconds while reviewing the operation mode screens, the instrument returns to the home screen and resumes normal operation.

Table X.X Navigating Operation Mode Screens

Screen Button	Description Button effect
⏻	To access and advance through the operation mode screens, press the power button (⏻) from the home screen.
⏎	The enter button is used to take action. It can be used to start a maintenance utility or clear readings.

The utilities and information screens are outlined below (see Table 4.2). Instructions for button use accompany each display screen.

Table X.X Operation instruction	
Screen	Description
Next dock or Next/last cal	
	Depending on the instrument's settings, the next dock, next cal, or last cal screen may display. The next dock screen displays the number of days until the instrument is next due to be docked. The calibration screen displays the number of days until the next calibration if the up arrow (↑) is featured. If the down arrow (↓) is featured, the number of days since the last calibration is displayed. When calibration days are displayed, press the enter button (⏎) to view the sensor span percentages.
When viewing the calibration screens, press ⏎ to alternate between the sensor span percentages and the days values.	
Press ⏻ to advance to the next screen.	
Initiate zero	
	If set to display, the zero screen allows the operator to zero the instrument. Once zeroing is complete, the instrument operator may be prompted to calibrate.
Press ⏎ to start the zero.	
Press ⏻ to advance to the next screen.	
Bump test	
	If set to display, the bump test allows the operator to conduct a bump test on the instrument.
Press ⏎ to start the bump test.	
Press ⏻ to advance to the next screen.	
View and clear peaks	
	If set to display, the clear peaks screen allows the operator to view and clear the instrument peaks.

Press ⏎ to clear the instrument peaks.	
Press ⏻ to advance to the next screen.	
View and clear TWA	
	If set to display, the TWA screen allows the operator to view and clear TWA readings.
Press ⏎ to clear the instrument TWA readings.	
Press ⏻ to advance to the next screen.	
View and clear STEL	
	If set to display, the STEL screen allows the operator to view and clear STEL readings.
Press ⏎ to clear the instrument STEL readings.	
Press ⏻ to advance to the next screen.	
Gas sensor info	
	If set to display, the gas info screens display the alarm setpoints, calibration gas concentration, and unit of measure used for the specified gas.
Press ⏻ to advance to the next screen.	
View User/Site	
	If set to display, this screen shows the site and user assignment associated with the instrument.
Press ⏻ to advance to the next screen.	

Wearing the Instrument

Attach the clip as shown below.

Table 2.2 Securing the garment or belt clip

Comment [NG21]: Move to Using.

Comment [NG22]: Does this need to be a table, should it be a fugure, or is it a stand-alone item.

Table 2.2 Securing the garment or belt clip

Comment [NG22]: Does this need to be a table, should it be a fugure, or is it a stand-alone item.

Suspender clip		
Lift the clip cover.	Position the garment between the clip's upper and lower teeth.	
	Press down on the clip cover to secure the clip in place.	

Comment [NG23]: Look for replacement image.

X

Maintenance

Section

Zero, Calibration, and Bump Test

Zero, calibrate, and bump test the instrument in an area known to be nonhazardous. Use certified Industrial Scientific calibration gas.

There are multiple ways to access the zeroing, calibration, and bump test maintenance utilities.

- If enabled for start-up access, bumping and zeroing will display as part of the sequence of screens that displays when the instrument is powered on. See XX for additional information.
- If enabled for operation mode access, the maintenance utilities will display as part of the sequence of screens that displays when the instrument is in use and the operator presses the power (⏻) button. See XX for additional information.
- The maintenance utilities are accessible through the maintenance menu in instrument settings. See XX for additional information.

Zeroing, calibration, and bump testing can also be completed by docking the unit.

Table 4.3 Supplies, preparation, and instruction

Supplies
Calibration cup (shipped with the unit)
Calibration tubing (shipped with the unit)
Calibration gas cylinder suitable for the installed sensors and the unit's calibration gas settings
Positive flow regulator suitable for the calibration gas cylinder

Preparation

Table 4.3 Supplies, preparation, and instruction

Holding the regulator, turn the calibration gas cylinder in a clockwise direction to tighten.

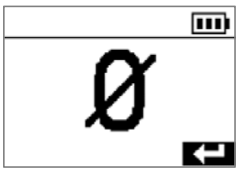
Connect either end of the calibration tubing to the regulator's nipple.

Connect the other end of the tubing to the calibration cup.

Proceed with the instruction set below for the desired task: zero, calibration, or bump test.

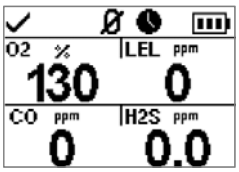
Instruction

Zero



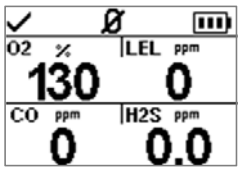
Initiate zero

At the initiate-zero screen, press ⏎ to start the zero process.

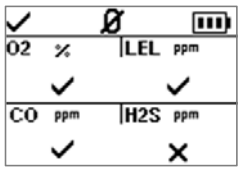


Zero in-progress

While the sensors are zeroed, the zero-in-progress screen displays.



Zero results



Zero results

After the sensors are zeroed, the zero-results screens display and an audible alert is emitted.

If the result for any sensor is an "X" for fail, press ⏻ to reactivate the initiate-zero screen. Repeat the zero process.

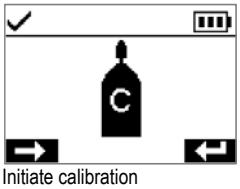
If the result for all sensors is a " ✓" for pass, the instrument will display the results screen.

Comment [HM24]: Is this correct?

Power button takes you to cal (if enabled), right button lets you restart the zero. Bako to confirm.

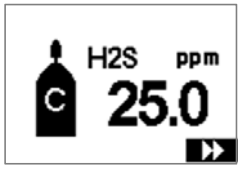
Calibration (Independent mode shown)

Place the calibration cup over the case top. Align the calibration cup tabs with the



Initiate calibration

To start the calibration process, press ⏎.



Calibration apply gas

Once the calibration is started, the apply-gas screen is activated. The expected

To start the flow of gas, turn the regulator knob in a counterclockwise direction.

Table 4.3 Supplies, preparation, and instruction

small grooves on the sides of the instrument.

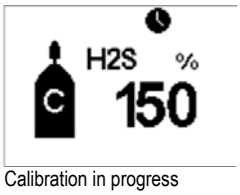
Press down to secure the cup in place; a click will sound.

To skip calibration, press ⏻.

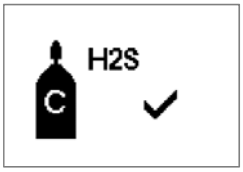
type and concentration of calibration gas is displayed.

This screen remains activated for up to 5 minutes as the unit awaits the application of calibration gas.

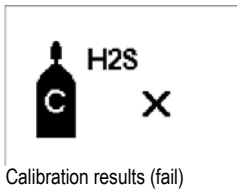
To skip calibrating the displayed gas, press ↵.



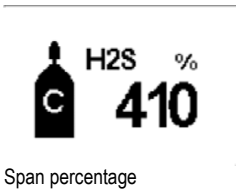
Calibration in progress



Calibration results (pass)



Calibration results (fail)



Span percentage

While the sensors are calibrated, the calibration-in-progress screen displays the span percentages.

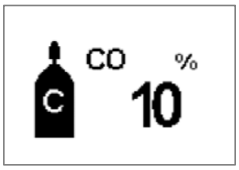
If desired, press ↵ to cancel the calibration.

If calibration is passed, two results screens are alternately activated; one indicates the pass or fail result and the other displays the span percentage.

If any sensor fails calibration, the audible, visual, and vibrating alarms turn on.

Note: A span reserve percentage* of greater than 70% indicates a “good” sensor; 50%-70% indicates “marginal” sensitivity. When the span reserve percentage is less than 50%, the sensor will not pass calibration.

* The span reserve value divided by the calibration gas concentration yields the span reserve percentage. If two sensors are operating on DualSense, the reserve value is the algorithm calculation of the DualSense Technology.



The apply-gas screen for the next sensor will display, if applicable. The expected type and concentration of calibration gas is displayed.

This screen remains activated for up to 5 minutes as the unit awaits the application of calibration gas.

To skip calibrating the

To remove the calibration cup, lift up from the cup's tabs. Set aside or store for future use.

To stop the flow of gas, turn the regulator knob in a clockwise direction and tighten.

Table 4.3 Supplies, preparation, and instruction

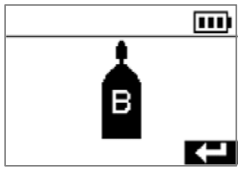
displayed gas, press ⏎.

Bump testing (Quick mode shown)

Place the calibration cup over the case top. Align the calibration cup tabs with the small grooves on the sides of the instrument.

Press down to secure the cup in place.

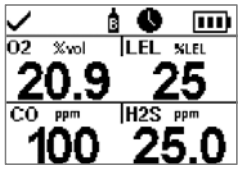
Visually inspect the calibration cup to ensure its edges along the top and sides align with the case top edges.



Initiate bump test

From the initiate bump test screen, press ⏻ to start the bump test process.

Press ⏎ to cancel the bump test.

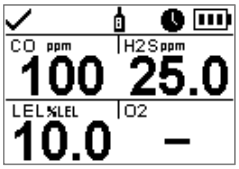


Bump test apply gas

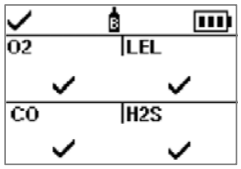
Once the bump test is started, the apply-gas screen is activated. The expected type and concentration of calibration gas are displayed.

This screen remains activated for up to 5 minutes as the unit awaits the application of calibration gas.

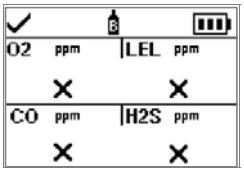
To start the flow of gas, turn the regulator knob in a counterclockwise direction.



Bump test in progress



Bump test results (pass)



Bump test results (fail)

If all sensors pass the bump test, a status screen will display.

If any sensors fail the bump test, the calibration due warning screen will be automatically activated. Calibrate the instrument.

–

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Table 4.3 Supplies, preparation, and instruction

To remove the calibration cup, lift up from the cup's tabs. Set aside or store for future use.	To stop the flow of gas, turn the regulator knob in a clockwise direction and tighten.	

5

Alarms, Warnings, and Indicators

Overview
Alarms
Warnings
Indicators
Failures and errors

Overview

Alarms notify the user of danger.

Warnings notify the user of a condition that needs attention.

Indicators notify the user of a status (e.g., confidence indicator).

Take seriously all alarms, warnings, and indicators, and respond to each according to company policy.

Alarms

The Ventis Pro Series instruments have alarms of two different intensities, high and low. Alarms are persistent: they turn off when the alarm-causing event is no longer detected; however, if the instrument's alarm latch setting is on, a tripped alarm will remain on until the user presses ⏎ to turn it off.

When all alarm signals* are on:

- The *high* alarm is bright red in color; it uses two different sounds and a vibration. It is fast-paced.
- The *low* alarm is nearly identical to the high alarm, but includes blue as well as bright red light. It is medium-paced.

*Signals (visual, audible, and vibration) vary based on instrument settings.

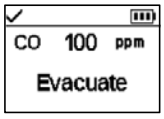
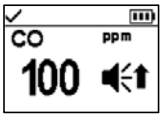
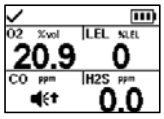
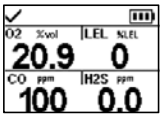
Different events can produce the same alarm. Events (defined below) are distinguished from one another through the use of icons that appear on the instrument display screen.

Table x.x Alarm events

Category and icon	Alarm level	Alarm event	Description
Gas alarms			
Or	High	Over-range (positive shown)	The detected gas concentration is outside the sensor's measuring range.
	High	Gas (high alarm)	The detected gas concentration exceeds the high-alarm setpoint.
STEL	High	STEL	The cumulative measure of a detected gas exceeds the short-term exposure limit (STEL) setpoints.
	Low	Gas (low alarm)	The detected gas concentration exceeds the low-alarm setpoint.
TWA	Low	TWA	The cumulative measure of a detected gas exceeds the time-weighted average (TWA) setpoint.
Nongas alarms			
MAN DOWN	High	Man down	The instrument has been stationary for the set period of time. To turn off the alarm, press and hold ⏎.
Panic Alarm	High	Panic	The user has pressed the instrument's panic button and held it long enough (approximately 3 seconds) to turn on the panic alarm. To turn off the alarm, press and hold ⏎.
ERROR 408	High	System	The instrument is in failure (error code 408 shown here) and is not operational.
(full screen icon)	High	Critical low battery	The instrument has shut down and is not operational.

For some alarms, the instrument's display screen provides alarm details in multiple formats, which alternate during the event. For example, a high-alarm gas event has three possible display formats as described and shown below for a CO sensor that is in a high alarm state with a current reading of 100 ppm.

Display screen formats (gas alarm[high] shown)

			
Instruction* (Evacuate shown)	Full screen alarm*	Event	Readings
If the instrument is set to provide the user with instruction, the		The icon indicates the event	Provides the current reading

instruction screen will be displayed (“Evacuate” shown here); otherwise, the full screen alarm will be shown.	type and identifies the in-alarm sensor. Current readings are provided for all other installed sensors.	for the in-alarm sensor and all other installed sensors.

Display screens are reproduced below for each event that can cause an alarm. For any event that features multiple display formats, each format is shown; they will alternate on the display screen during the alarm event.

Table x.x Alarm event display screens

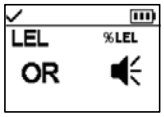
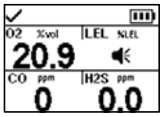
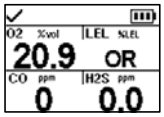
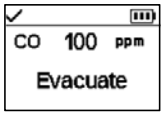
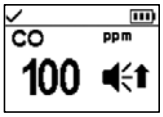
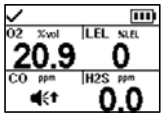
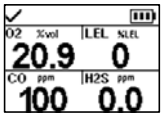
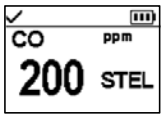
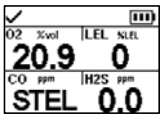
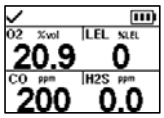
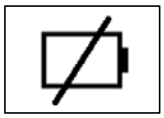
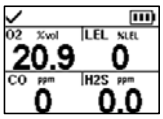
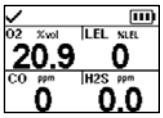
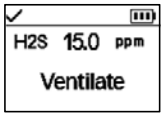
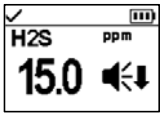
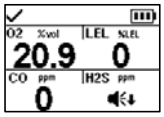
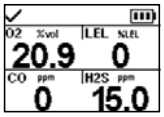
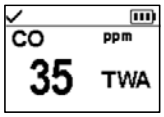
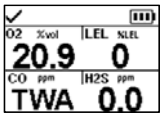
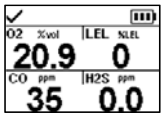
Alarm level: High				
Over-range alarm				–
Gas alarm (high)				
STEL alarm				–
Critical low battery		–	–	–
System alarm (see also “Failures and Errors”)		–	–	–
Man-down alarm				

Table x.x Alarm event display screens

		–	–
Panic			
		–	–
Alarm level: Low			
Gas alarm (low)			
			
TWA			
			–

Warnings

Warnings turn on and off repeatedly. The more urgent the warning, the shorter the time between on-off occurrences: a warning that repeats every two seconds is more urgent than a warning that repeats every thirty seconds. When all signal* settings are on, warnings appear as a short burst of blue and red light mixed with sound and a vibration.

Warnings persist until the event is resolved. In some cases an unresolved warning will cause an alarm. For example, if the man-down warning turns on and instrument operator does not turn it off, the instrument and its signals will change from warning status to alarm status. This is also true for the low-battery warning.

As with alarm events, warning events (defined below) are distinguished from one another through the use of icons that appear on the instrument display screen.

*Signals (visual, audible, and vibration) vary based on instrument settings (See "Chapter name").

Table x.x Warning events

Icon	Warning frequency	Warning event	Description
MAN DOWN	Every 2 seconds	Man-down	The instrument has not moved for the set period of time. To turn off the warning, move the instrument.
	Every 8 seconds	Gas alert	A detected gas concentration may be approaching alarm levels. To turn off the warning, press and hold ⏎.
F	Every 15 seconds	Sensor failure	One or more sensors is not working.
31 B	Every 30 seconds	Instrument maintenance overdue (bump test shown)	The instrument is in need of some form of maintenance (calibration, bump test, etc.).
	Every 60 seconds	Low battery	The instrument's battery is low; replace or charge the battery.

Display screens reproductions are shown below for each event that can cause a warning. For any event that features multiple display formats, each format is shown; they will alternate on the display screen during the event.

Table x.x Warning event display screens

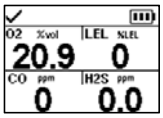
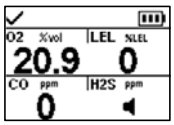
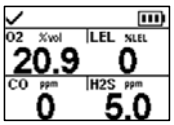
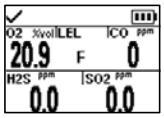
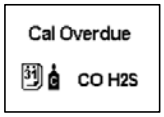
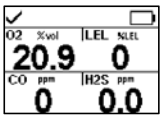
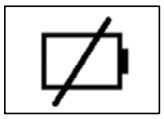
Man-down (120 second countdown to alarm shown here)		–	–
Gas alert (5.0 ppm H_2S shown here)	 	–	–
Sensor failure (LEL shown here)		–	–

Table x.x Warning event display screens

Maintenance overdue (calibration due for the CO and H_2S sensors shown here)			
	–	–	–
Low battery			
		–	–

Indicators

Most indicators turn on once, then off; only the confidence indicator persists, repeating every 90 seconds. If all signal* settings are on, indicators will look and sound like this:

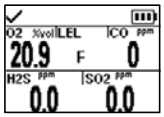
Indicator	Status	Color	Sound
User or site assignment, calibration, or bump test	Successful	Blue	Ascending
User or site assignment, calibration, or bump test	Not Successful	Red	Descending
Confidence indicator	Instrument on	Blue	Beep

*Signals (visual, audible, and vibration) vary based on instrument settings.

Failures and Errors

Some failures and errors, as shown below, are easily resolved by qualified personnel. For other errors or failures, contact Industrial Scientific.

Table x.x Sensor failures and error



The display screen reproduction shown here (left) is an example of a sensor failure screen. The “F” indicates the LEL sensor is in a general state of failure. Different abbreviations or icons are used to indicate other failures as noted below.

Icons	Cause	Recommended actions
F only	The sensor is in a general state of failure and is not operational.	Power off the instrument, then power it back on. If the failure persists, check the sensor for proper installation.

ERR	A sensor is installed in the wrong location.	Install the sensor in its correct location[a].
ØF	The sensor failed the zero process.	Repeat the zero process.
BUMP and F	The sensor failed bump testing.	Calibrate the instrument, then complete a bump test.
CAL and F	The sensor failed calibration.	Check the gas cylinder to ensure it has the required gas. Check that the calibration cup is secured to the instrument and the tubing is secure at both ends. If desired, repeat the calibration process. Calibration results indicate the sensor's span percentages. When that value is under 50%, the sensor will not pass calibration and is due for replacement.
! and gas reading	A sensor that was operating in DualSense has failed.	The remaining sensor is operating as a single sensor. Respond according to company policy.

When a sensor failure is caused by conditions other than those listed above, an error code will display. Some error codes indicate a possible installation error or compatibility issue; qualified personnel may attempt to resolve these and other errors noted below.

Table x.x Critical errors

ERROR 408

The display screen reproduction shown here (left) is an example of a critical error. The instrument is put into a state of failure until the error is resolved. The 408 code indicates a specific issue. Different codes are used to indicate various failures.

Error Code	Cause	Possible Resolution
406	A sensor is installed in the wrong location	Check the sensor type and install it in its correct location[a].
408	No sensors found	No sensors are installed or the installed sensors are not detected by the instrument. Check the installed sensor for proper installation[a], location[b], and compatibility[a].
490	Sensor detached	While the instrument was on, the sensor became disconnected. Check for a loose or dislodged sensor, or for damage to the sensor and board connector pins.
470	Incompatible battery	Check the installed battery's part number for compatibility[a] and replace it with a compatible battery.

	XXX not shown above	The error may not be customer-resolvable.	Contact Industrial Scientific for assistance from technical service team.

[a]See “Chapter name”.

[b]See “Chapter name”.

Comment [NG25]: A will reference Service chapter. Right now b will reference Chapter 1.

6

Service and Warranty

Service Instructions
Supplies
Three-dimensional Diagrams
Service Tasks
Warranty Policy
Limitation of Liability Service and Warranty

Service Instructions

While some types of service should be performed only by Industrial Scientific or an authorized service center, other service tasks can be performed by a customer. Those tasks are included here.

- Service should be performed by qualified technicians.
- Use only approved Industrial Scientific parts and accessories.
- Perform service tasks in a nonhazardous location free of hazardous gas.
- Work on a nonconductive surface in a well-lit area.
- Wear grounding straps to prevent electrostatic discharge (ESD), which can cause damage to the unit's electronics.
- Synch the instrument using iNet Control, Accessory Software, or DSSAC before removing the instrument’s battery.

When working with the adhesive-backed filters and gaskets:

- ✓ Be careful not to pierce or tear these items.
- ✓ When using tweezers, apply gentle pressure.
- ✓ Once the adhesive touches a surface, any attempt to remove or reposition the item may cause it damage.

When working with sensors and the case top's water barriers:

- ✓ Use care not to touch the white membranes on the sensors as this can contaminate the sensors.
- ✓ Use care not to damage or tear the membranes or filters.

- ✓ Use care not to separate the sensor from its membrane.

Supplies

T10 torx screwdriver (for case bottom screws)

Philips screwdriver (for suspender clip screw)

Needle-nose tweezers (for barrier and filter replacement)

Three-dimensional Diagram

Refer to the three-dimensional diagram for a disassembled view of the instrument. Use the diagram number to identify parts, part numbers, and field-replaceable items (see Table 6.1).

Figure 6.1 Disassembled Ventis Pro Series

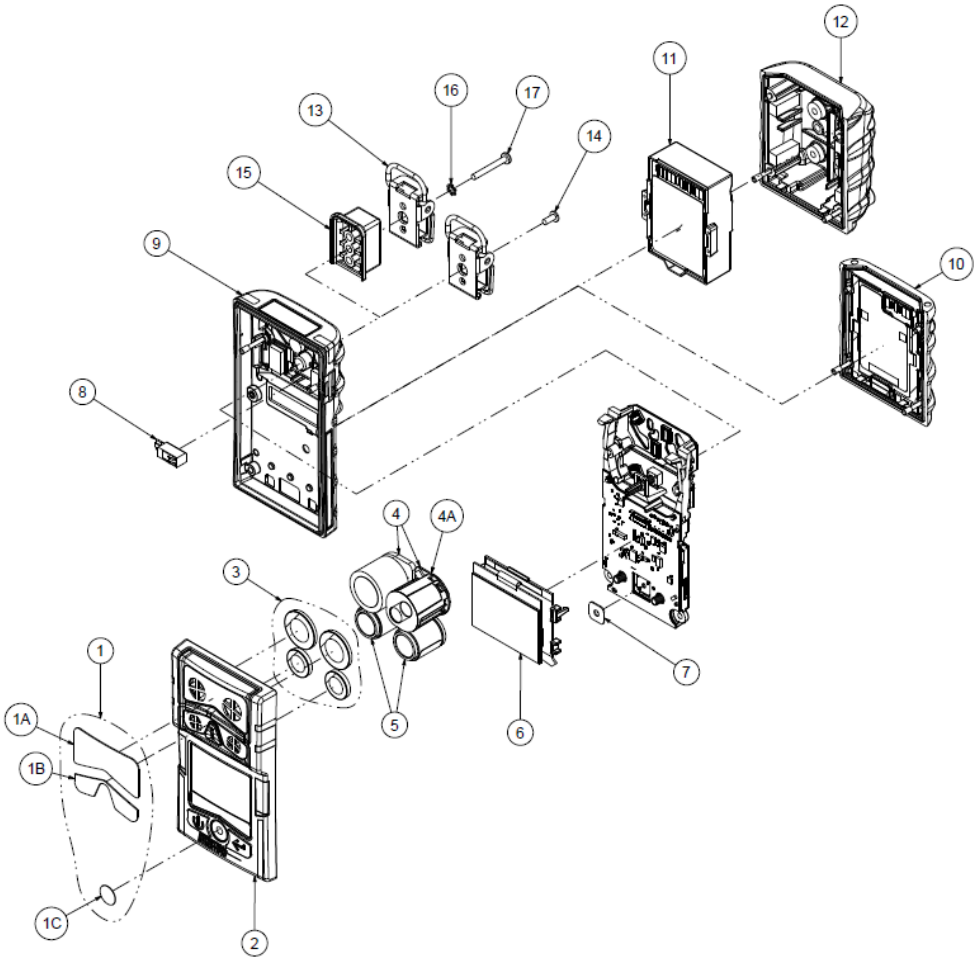


Table 6.1 Key for the Ventis Pro Series diagram

Diagram number	Part name	Field replaceable	Part number	Notes
1	Dust barrier assembly	Yes	18109435	Includes ten of each sensor dust barrier and

				ten speaker dust barriers. (Includes parts 1A, 1B, and 1C)
2	Case top assembly	Yes	17156049-XY	Includes case top, dust barrier assembly, and water barrier assembly. (Includes parts 1A, 1B, 1C, and 3) X = case cover, where 0 = Black, 1 = Orange Y = name plate, where 1 = Ventis Pro 4, 2 = Ventis Pro 5
3	Water barrier assembly	Yes	18109436	Includes a gasket and membrane for both upper and both lower sensors.
4	4-series sensors	Yes	Varies	See x.x for additional information about sensors.
4a	Hi-power sensor	Yes	Varies	
	Carbon Dioxide/Hydrocarbons (CO_2/HC)	Yes	17155304-U	Ventis Pro 5 only.
	Carbon Dioxide/Methane (CO_2/CH_4)	Yes	17155304-V	Ventis Pro 5 only.
	Carbon Monoxide/Hydrogen Sulfide (CO/H_2S)	Yes	17155304-J	Ventis Pro 5 only.
	Hydrogen Sulfide (H_2S)	Yes	17155304-2	
	LEL (Methane)	Yes	17155304-L	
	LEL (Pentane)	Yes	17155304-K	
	Methane, 0-5% vol.	Yes	17155304-M	
	Oxygen (O_2)	Yes	17155304-3	
5	6-series sensor	Yes	Varies	
	Ammonia (NH_3)	Yes	17155306-6	Ventis Pro 5 only.
	Carbon Monoxide (CO)	Yes	17155306-1	
	Carbon Monoxide/Hydrogen Sulfide (CO/H_2S) (DualSense capable)	Yes	17155306-J	Ventis Pro 5 only.
	Carbon Monoxide with low Hydrogen cross-sensitivity (CO/H_2 Low)	Yes	17155306-G	
	Hydrogen Cyanide (HCN)	Yes	17155306-B	
	Hydrogen Sulfide (H_2S)	Yes	17155306-2	
	Nitrogen Dioxide (NO_2)	Yes	17155306-4	
	Sulfur Dioxide (SO_2)	Yes	17155306-5	
6	LCD assembly with backlight	No*	—	

Comment [HM26]: Need table number.

7	Audible Alarm	No*	—	
8	Vibration alarm motor	Yes	17120080	
9	Case bottom	No*	—	
10	Rechargeable lithium-ion battery pack	Yes	17134453-0Y	Y = 1: UL, ATEX, IECEx
11	Rechargeable extended range lithium-ion battery pack	Yes	17148313-Y	Y = 1: UL, ATEX, IECEx
12	Extended life battery cover	Yes	17151184-0Y	Y = 1: UL, ATEX, IECEx
13	Suspender clip	Yes	17120528	
14	Screw (for use with installed suspender clip and single cell battery pack)	Yes	17139262	Torque: .81 newton m (115 ounce-force inch)
15	Suspender clip spacer	Yes	17152506	
16	Locking washer	Yes	17153137	
17	Screw, Phillips (for use with items 13, 15, and 16)	Yes	17152507	

*For items that are not field-replaceable, contact ISC (see "Contact Information") or a local distributor of ISC products.

Service Tasks

Table 6.2 Service tasks

⚠ Power off the unit before disassembling or performing any service task.

Note: If the instrument is without a battery for more than 60 minutes, the instrument date and time settings will be deleted. The instrument operator will be prompted to set the date and time the next time the unit is powered on. It is important that the date and time are set as they are essential to data log accuracy.

Battery replacement

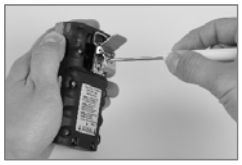
Table 6.2 Service tasks

Using a torx screwdriver, loosen all four screws from the battery pack.	Lift the battery pack away from the instrument.	Align the new battery pack with the instrument. Using a torx screwdriver, tighten each of the four screws to secure the battery. Refer to table x.x for torque values.	

Comment [HM27]: Need table number.

Clip removal and attachment

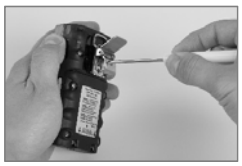
Lift the clip's cover.



Use a Philips screwdriver to access the clip's screw. Turn counterclockwise to loosen and remove the screw and washer.

Lift the clip to remove it.

To attach the clip, place the screw through the center hole of the clip back.



Guide the screwdriver through the clip's hole and into the screw head. Turn clockwise to tighten.

Refer to table x.x for torque values.

Comment [HM28]: Need table number.

Instrument disassembly

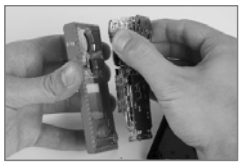
Using a torx screwdriver, loosen all four screws on the battery pack.

Lift the battery pack away from the instrument.

Using a torx screwdriver, loosen the remaining two screws from the case bottom.

Hold the case bottom near the upper screws. Lift the case top slightly to separate the top and bottom.

Continue to lift the case top straight up to remove it.



Hold the plastic sides that border the sensors near the top of circuit board assembly. Gently lift the circuit board assembly straight away from

the case top to separate the two parts.

Sensor port dust barrier replacement (sensor port dust barrier shown)

Using a finger or needle-nose tweezers, peel off the dust barrier and discard.

Place the barrier packet on the work surface.

Scrape lightly across the paper to the barrier's edge. Gently lift to expose a portion of its adhesive back. Peel the barrier from the packet.

Guide the new barrier—adhesive side down—onto the case top.

Press and hold to ensure good adhesion.

Sensor water barrier assembly replacement

Note. The sensor water-barrier assembly consists of two parts: the filter and its gasket. Replace both items at the same time.

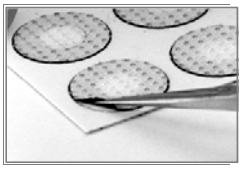
Firmly hold the clear sides of the circuit board assembly with one hand while holding the case top with the other. Gently pull the two pieces apart.

Carefully set aside the circuit board assembly with the sensors and LCD facing up.

Inside the case top, grip the gasket and underlying sensor filter with the needle-nose tweezers. Peel to remove.

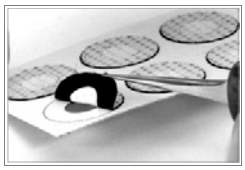
Remove any remnants of the adhesive, filter, or gasket.

Clear away any dirt, dust, or debris.



Place the filter packet on the work surface.

Using the tweezers, scrape lightly across the paper to the filter's edge; gently lift to expose a portion of the adhesive back.



Grip the filter lightly with the tweezers; peel the filter from the packet.

Guide the new filter—adhesive side down—into the filter opening.

For proper placement, take care to ensure the filter edge meets the inner edge of the filter opening.

Press and hold to ensure good adhesion.

Place the gasket packet on the work surface.

Using the tweezers, scrape lightly across the paper to the gasket ring's edge; gently lift to expose a portion of the adhesive back.

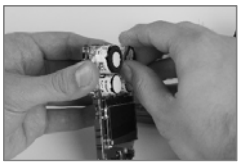
Grip the gasket ring lightly with the tweezers; peel the gasket ring from the packet.

Guide the gasket—adhesive side down—into the filter opening, placing it on top of the filter.

Ensure the gasket ring edge meets the outer edge of the filter opening and fully covers the white filter membrane.

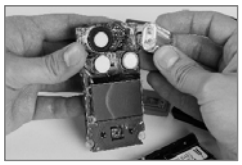
Press and hold to ensure good adhesion.

Sensor replacement (LEL shown)

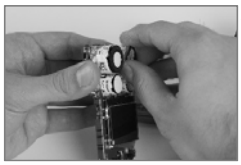


Hold the sides of the sensor firmly then pull it straight up and away from the circuit board assembly.

Set the sensor aside for future use or dispose of according to company policy.



Position the new sensor to align with its connector on the circuit board assembly.

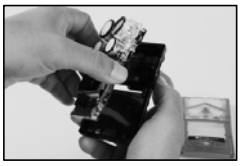
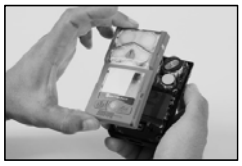


Secure the sensor in place by applying gentle pressure to the sides of the sensor case. Do not touch the sensor's white membrane.

A slight connection impact can be felt when the sensor is secured into place.

Calibrate the instrument following sensor replacement.

Instrument assembly

			
Place the circuit board assembly into the instrument's case bottom.	While holding the case bottom near the upper screw holes, lower the case top assembly onto the case bottom.	Press to secure the case top and case bottom.	Using a torx screwdriver, tighten the top two screws.
		–	–
Place the battery against the case back. Tighten the remaining four screws.	Using a torx screwdriver, tighten the screws. Refer to table x.x for torque values.		

Warranty

Industrial Scientific Corporation's Ventis™ Pro Series portable gas monitors are warranted to be free from defects in material and workmanship under normal and proper use and service for as long as the instrument is supported by Industrial Scientific Corporation.

The above warranty does not include sensors, battery packs, and internal pumps, which are warranted to be free from defects in material and workmanship for 24 months from date of shipment, except where otherwise stated in writing in Industrial Scientific literature accompanying the product.

Limitation of Liability

THE WARRANTY SET FORTH ABOVE IS STRICTLY LIMITED TO ITS TERMS AND IS IN LIEU OF ALL OTHER WARRANTIES, GUARANTEES, EXPRESS OR IMPLIED, ARISING BY OPERATION OF LAW, COURSE OF DEALING, USAGE OF TRADE OR OTHERWISE. INDUSTRIAL SCIENTIFIC MAKES NO OTHER WARRANTIES, EITHER EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE WARRANTIES OF MERCHANTABILITY OR FITNESS FOR PARTICULAR PURPOSE.

SHOULD THE PRODUCT FAIL TO CONFORM TO THE ABOVE WARRANTY, BUYER'S ONLY REMEDY AND INDUSTRIAL SCIENTIFIC'S ONLY OBLIGATION SHALL BE, AT INDUSTRIAL SCIENTIFIC'S SOLE OPTION, REPLACEMENT OR REPAIR OF SUCH NON-CONFORMING GOODS OR REFUND OF THE ORIGINAL PURCHASE PRICE OF THE NONCONFORMING GOODS.

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It shall be an express condition to Industrial Scientific's warranty that all products be carefully inspected for damage by Buyer upon receipt, be properly calibrated for Buyer's particular use, and be used, repaired, and maintained in strict accordance with the instructions set forth in Industrial Scientific's product literature. Repair or maintenance by non-qualified personnel will invalidate the warranty, as will the use of non-approved consumables or spare parts. As with any other sophisticated product, it is essential and a condition of Industrial Scientific's warranty that all personnel using the products be fully acquainted with their use, capabilities and limitations as set forth in the applicable product literature.

Buyer acknowledges that it alone has determined the intended purpose and suitability of the goods purchased. It is expressly agreed by the parties that any technical or other advice given by Industrial Scientific with respect to the use of the goods or services is given without charge and at Buyer's risk; therefore, Industrial Scientific assumes no obligations or liability for the advice given or results obtained.

7

Assignments

Comment [NG29]: Section with Michelle for image work. Oct. 20.

Introduction

iAssign Overview

iAssign Procedures

Introduction

When users and sites are assigned to Ventis Pro Series instruments, the information is saved in the instrument data log. Assignment data can provide valuable insight into exposure data and user behavior, while being useful when managing assets and investigating potential issues. Instrument assignments can be made using iNet, with accessory software, through instrument settings, and with iAssign.

How the assignment is made determines the assignment type. Ventis Pro Series instruments support two assignment types – recurring and temporary.

A recurring assignment is an assignment made using iNet Control or Accessory Software. Recurring assignments stay with the instrument when the instrument is restarted.

A temporary assignment is an assignment that is made via iAssign or through the instrument settings. Temporary assignments overwrite recurring assignments and stay with the instrument until it is restarted. Upon restart, an instrument with a temporary assignment will revert to the recurring assignment, if one is available. If there is no recurring assignment, the instrument will be unassigned.

See Settings for information about assigning a temporary user or site using the instrument settings.

iAssign Overview

iAssign technology is used to quickly connect user and site assignments to Ventis Pro Series instruments. It has three components – a smart device application, an iAssign tag, and technology that is built into the instrument. iAssign uses Near Field Communication (NFC) to move user and site data wirelessly when two enabled devices are held close together.

There are two basic steps required to use iAssign:

1. iAssign tags are programmed with an assignment using the iAssign application. The tags can then be distributed to instrument operators or installed at a location.
2. Instrument users touch a Ventis ProSeries instrument to an iAssign tag.

Sample scenario 1: Each employee receives his or her own iAssign tag which can be attached to a name badge, employee ID, or other personal item. Then, each day, the employee grabs an instrument from the shared pool at the start of his or her shift. The instrument is touched to the iAssign tag and the assignment is complete.

Sample scenario 2: The iAssign app can be used to assign the location “Tank 1” to an iAssign tag. The tag can then be installed at the entrance to Tank 1. When Ventis Pro Series instrument operators enter Tank 1, they can touch their instruments to the tag and the location assignment will be saved to the instrument.

The iAssign app can be installed on Android devices by going to www.indsci.com.

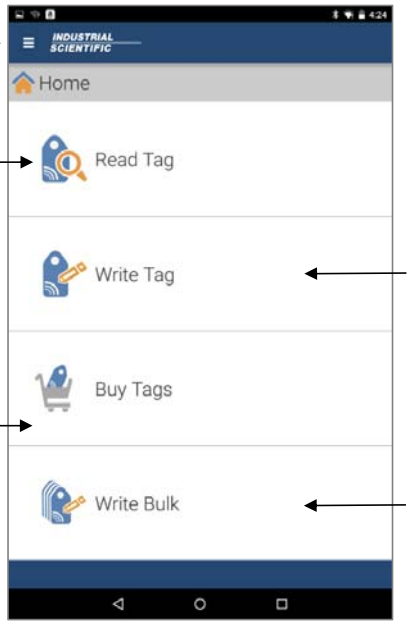
Procedures

The first screen that displays when the iAssign application is launched is its home screen. The home screen provides access to read, write, or view tag purchasing information. It also provides access to write tags through a batch process. To return to the home screen at any time, tap the menu button in the title bar.

Menu button

Read tag: Use to view the user, site, or both user and site associated with a particular tag.

Buy tags: Use to view available iAssign tags and part numbers.

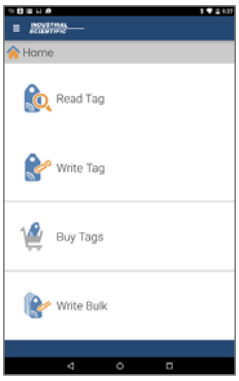


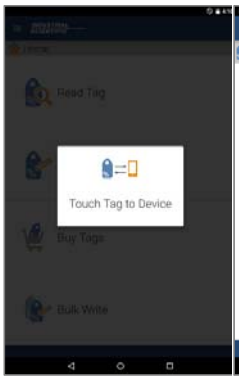
Write tag: Use to assign a user, site, or user and site to a tag.

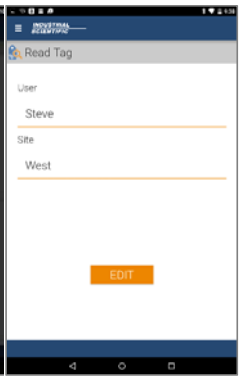
Write bulk: Use to assign large quantities of tags efficiently.

Table 1.0 iAssign Functionality

Read Tag







Select the read tag menu option.

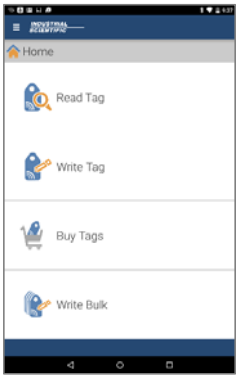
The touch tag to phone message will display. Touch the tag against the back of the device.

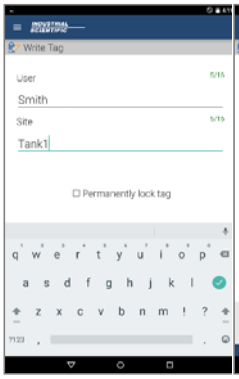
The tag information will display.

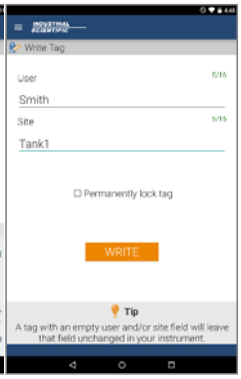
Note: If the device is unable to read the tag, a red X will display. Try reading the tag again. Verify that no objects are between the tag and the phone or tablet and that NFC is turned on for the device.

Tap the edit button to make changes to the user and or site associated with the tag (see *Write Tag*).

Write Tag







Select the write tag menu.

The write tag screen will display.

Tap in the user field to edit the user.

Tap in the site field to edit

Tap the Write button to save the user and site settings.

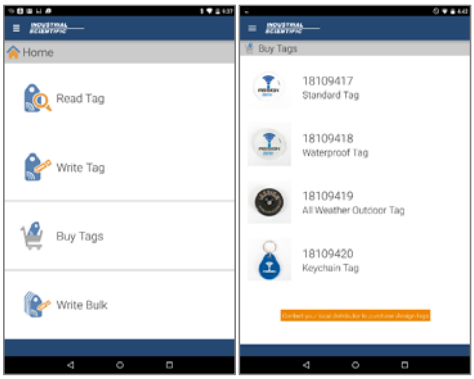
Table 1.0 iAssign Functionality

the site.

If either a user or site should not be assigned, leave the corresponding field blank.

Click the permanently lock tag check box to prevent future edits to the tag data.

Buy tags



Select the buy tags menu.

A list of available tags will display. Available tag types include:

Standard tag: A lightweight, adhesive tag that can be attached to an ID badge or other clean, flat surface.

Waterproof tag: A lightweight, adhesive tag with a waterproof coating that can be attached to an ID badge or other clean, flat surface.

All weather outdoor tag: A durable plastic tag with a center screw hole. The tag is appropriate for permanent installation indoors or out.

Keychain tag: A lightweight tag that can be attached to keys.

Write Bulk

Table 1.0 iAssign Functionality

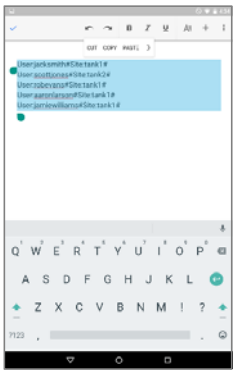
Create a file containing all necessary user and site assignments following the format:

User:johndoe#Site:tank1#

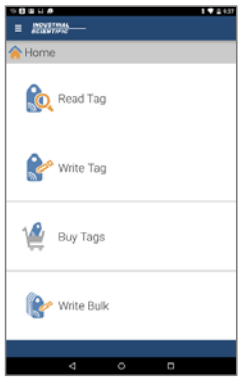
where “johndoe” is the user name and “tank1” is the location.

There are no spaces in the text string and the words “User” and “Site” must be capitalized.

The file can be created in any word processing, email, or spreadsheet software.

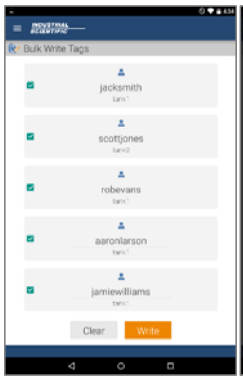


Copy the text to the device clipboard.



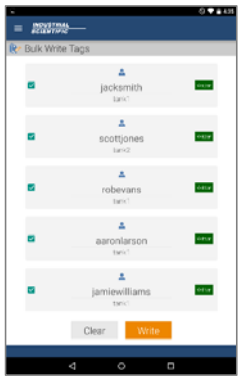
In iAssign, select the write bulk menu option.

Tap the paste button.



The contents of the file will display. Tap the write button to assign the first tag.

Touch the first tag to the back of the device. A confirmation window will appear indicating that the



Repeat touching tags to the back of the device until all assignments are complete.

Table 1.0 iAssign Functionality

assignment was successful.

Assign User, Site, or User and Site to Ventis Pro Series Instrument

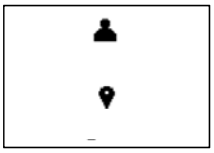
To transfer the user and site assignment data to a Ventis Pro Series instrument, touch the NFC tag to the front of the instrument. The NFC reader is behind the display.

When an assignment is successfully made, the instrument will emit an ascending tone, flash blue lights, and show the new user-site on the display screen.

Remove Assignments from a Ventis Pro Series Instrument

To remove the user and site assignment data from a Ventis Pro Series instrument, touch the same NFC tag to the front of the instrument a second time.

Alternatively, power off the instrument. Assignments made using iAssign are cleared when the instrument is powered off. To assign an instrument for an extended period of time, complete the assignment using iNet or Accessory Software.



The instrument will display a user and site screen with the assignment removed.