CD SERIES



NOTICE

- This product is not intended for life or safety applications.
- Do not install this product in hazardous or classified locations.
- Read and understand the instructions before installing this product.
- Turn off all power supplying equipment before working on it.
- The installer is responsible for conformance to all applicable codes.

PRODUCT IDENTIFICATION

DELUXE MODEL:



DIMENSIONS



U = 20k "D", Thermistor

CD SERIES Duct Mounted Environmental CO, Sensors

Installer's Specifications

Input Voltage	20 to 30VDC, 24AC
Analog Output	4-20mA, (clipped & capped)/0-10VDC (selectable)- CDE models
4-20m	A, (clipped & capped)/0-5VDC/0-10VDC (selectable)- CDL models
Sensor Current Draw	100mA Maximum
Operating Temperature Range	e 0° to 50°C (32° to 122°F)
Housing Material	High impact ABS plastic
CO2 Transmitter:	
Sensor Type	Non-dispersive infrared (NDIR), diffusion sampling
Measurement Range	0-2000 ppm or 0-5000 ppm, user selectable on CDL models,
	0-2000 ppm on CDE models
Accuracy	\pm 30 ppm \pm 2% of measured value*
Repeatability	± 20 ppm $\pm 1\%$ of measured value
Response Time	<60 seconds for 90% step change
RH Transmitter:	
HS Sensor Digitally profiled	thin-film capacitive (32-bit mathematics); U.S. Patent 5,844,138
Accuracy	±2% from 10 to 80% RH @ 25°C; Multi-point calibration NIST
Hysteresis	1.5% typical
Linearity	Included in Accuracy spec.
Stability	\pm 1% @ 20°C (68°F) annually, for two years
Operating Humidity Range	0 to 100% RH
Operating Temperature Range	e 10° to 35°C (50° to 95°F)
Temperature Coefficient	\pm 0.1% RH/°C above or below 25°C (typical)
Temperature (Transmitter):	
Sensor Type	Solid-state, integrated circuit
Accuracy	±0.5°C (±1°F) typical
Resolution	0.1°C (0.2°F)
Range	10° to 35°C (50° to 95°F)
Relay Contacts:	
1 Form C	1A@30VDC, resistive; 30W max.

Note: Specified accuracy with 24VDC supplied power with rising humidity. RTD/Thermistors in wall packages are not compensated for internal heating of product.

EMC Conformance: EN 61000-6-3:2001 (Amended by A11:2004) Class B, EN 61000-6-1:2001 EMC Test Methods: CISPR 22:2006, IEC 61000-4-2:2001, IEC 61000-4-3:2006, IEC 61000-4-4:2004, IEC 61000-4-6:2006, IEC 61000-4-8:2001, IEC 61000-4-11:2004

EMC Special Note: Connect this product to a DC distribution network or an AC/DC power adaptor with proper Surge protection (EN 61000-6-1:2001 specification requirements). * *Measured at NTP*

QUICK INSTALL

- Mark and drill the three holes for the duct probe as shown. The centerline must be parallel to the air flow through the duct.
- 2. Rotate the duct probe so that its widest surface is perpendicular to the air flow in the duct.
- Insert the probe and secure the sensor to the duct with sheet metal screws, making sure that the provided gasket material is compressed between the sensor housing and the air duct.
- 4. Wiring. See wiring diagrams on next page.

VERIS INDUSTRIES V

INSTALLATION GUIDE

INSTALLATION

- 1. Choose a location to mount the sensor. The centerline of the housing must be parallel to the direction of air flow in the duct.
- 2. Use the mounting diagram to drill three holes in the duct for securing the sensor.



3. Insert the probe into the hole. Rotate the housing so that the widest surface is perpendicular to the air flow..



- 4. Attach the sensor to the duct using sheet metal screws. Make sure that the gasket on the back of the housing is compressed between the housing and the duct for a secure fit.
- 5. Wire the device. See Wiring section.
- 6. Configure the system using the menu (CDL only; see Confuguration section).
- 7. Calibrate using 0 ppm CO2 gas (see Calebration section).

WIRING

- 1. Feed control wire through conduit adapter and grommeted compression fitting on the bottom of the housing.
- 2. Remove terminal blocks by pulling straight up on the green assemblies.
- 3. Connect wires as shown and push terminal blocks back in to black receptacles.
- 4. Tighten compression fitting around control wire until sealed.
- 5. Snap conduit adapter onto compression fitting.
- 6. Refer to specifications for power requirements and relay rating.
- 7. Select mA or Volt output using selector switch.



CDL Model with Temp & RH Options





CD SERIES

INSTALLATION GUIDE

CONFIGURATION - CDL ONLY

RUN MODE:

1	0	0	0		Р	Р	М		
		*			C	0	2		

*INDICATES RELAY STATUS

1	0	0	0	P	Р	М
5	0	•	0	%	R	H

CO2/RH COMBO MODEL

1	0	0	0	Р	Р	М
7	0	•	0		0	F

CO2/T COMBO MODEL

1	0	0	0	P	Р	М
X	X	•	X	X	X	X

CO2/RH/T COMBO MODEL TOGGLE %RH AND DEGREES

<u>CONFIGURATION MODE:</u>	
PRESS [ENTER] FOR CONFIGURATION MODE.	
PRESS PLUS OR MINUS TO CHANGE SETTING.	

S	Ε	T	Р	0	I	N	T
C	0	2			8	0	0

RANGE 500 TO 1500 50PPM INCREMENT

0)	E	A	D	В	A	N	D
(0	2			1	0	0

RANGE 10 TO 500 5 PPM INCREMENT

R	A	N	G	Ε			
C	0	2		X	X	X	X

OPTIONS ARE 2000 OR 5000

A	В	C		М	0	D	Ε
-		X	X	X			+

OPTIONS ARE ON, LOW, OFF SEE NEXT PAGE FOR EXPLANATION

U	N	I	T	S		
-			0	X		+

(TEMP MODELS ONLY) OPTIONS ARE *oF* or *oC*

	0	U	T	P	U	T	
-	0	-	1	0	V		+

(VOLTAGE MODE ONLY) OPTIONS: 0-10V OR 0-5V DEFAULT IS 0-10V

0	U	T	Р	U	T	
4	-	2	0	m	A	

(mA MODE ONLY)

CALIBRATION MODE:

PUSH AND HOLD PLUS AND MINUS FOR 5 SECONDS TO ENTER MODE. PRESS ARROW TO CHANGE OPTION. PUSH ENTER FOR NEXT SELECTION.

	S	E	R	Т	A	L	
X	X	X	X	X	X	X	X

DISPLAYS SERIAL NUMBER

	X	X	X		
Х	X	Х	X	X	
		VS MO	DFI NI	IMRFR	

0	F	F	S	E	T		
0	C				X	•	X

RANGE IS -5 TO 5°C 0.1°C INCREMENT

(CO₂/temp combo models)

0	F	F	S	E	T		
%	R	Η		X	X	•	Х

RANGE -10 TO 10% 0.1% INCREMENT (CO₂/RH combo models)

C	0	2		C	A	L	?
-			X	X	X		+
		0.07	iouc i				

OPTIONS ARE YES, NO



OPTIONS ARE NONE, 0, 400

W	0	R	K	Ι	N	G	
	*			5	:	0	0

Unit will automatically return to run mode when calibration is complete.

NOTE: This product is factory calibrated. The typical CO₂ sensor calibration interval is 5 years, dependent on specific site installation factors. As of the date of this document, compliance with ANSI/ASHRAE 62-2001 requires minimum on-site accuracy verification intervals of 6 months, or per the building operation and maintenance manual. Accuracy verification should be performed using a comparison to a known reference, or the CO₂ gas calibration kit available from Veris Industries as model AA01.

WARNING: CO₂ sensor calibration requires gas calibration kit. Performing calibration without gas kit will cause erroneous readings. Consult factory for calibration kit.

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CALIBRATION PROCESS: CDL MODELS

- 1. Hook up hose to plastic port located on sensing module.
- 2. Start flowing nitrogen gas (0 ppm only).
- 3. Enter Calibration mode as described on page 3.

STEP 1: Calibration Port



STEP 2: Flow Nitrogen.



STEP 3: Calibrate for 5 min. Unit will return to working display when finished.



CALIBRATION PROCESS: CDE MODELS

- 1. Hook up hose to plastic port located on sensing module.
- 2. Start flowing (Nitrogen) 0 ppm Gas (0 ppm only).
- 3. Push and hold down calibration button until the LED illuminates.
- 4. Continue flowing gas through the sensor until the LED is off estimated calibration time is 5 minutes.





Push and hold down calibration button

ABC CALIBRATION ALGORITHM

ABC (Automatic Baseline Calibration) is a patented self-calibration feature, which automatically adjusts the CO₂ sensor to compensate for drift. When ABC is enabled, the lowest reading within every 24-hour period is recorded and analyzed over a running 7 day or 28-day period. If a statistically significant amount of drift is detected, an automatic correction factor is applied. This enables the sensor to operate within specifications for the 5-year calibration interval.

NOTE: After changing the ABC settings, the unit will need to be power cycled to have ABC changes take effect.

CDL MODEL ONLY

CDL versions have optional RH and temperature sensors.

To Replace Humidity Sensor:



Observe handling precautions for static sensitive devices to avoid damage to the circuitry which would not be covered under the factory warranty.

- 1. Power down unit
- 2. Open housing on tip of duct probe
- 3. Slide old RH sensor off pins
- 4. Slide new RH sensor onto pins
- 5. Power unit back on



OUTPUT SCALING

Output scaling: 0-2000 ppm

	CO ₂ ppm	0-5 Volt Output	0-10 Volt Output	mA Output
Outside	300-500	0.75 to 1.25	1.5 to 2.5	6.4 to 8
Over Ventilated	Under 600	under 1.5	Under 3	Under 8.8
Ideal Ventilation	600-900	1.5 to 2.25	3 to 4.5	8.8 to 11.2
Under Ventilated	0ver 900	over 2.25	Over 4.5	Over 11.2

CW SERIES



NOTICE

- · This product is not intended for life or safety applications.
- Do not install this product in hazardous or classified locations.
 Read and understand the instructions before installing
- this product.
- Turn off all power supplying equipment before working on it.
 The installer is responsible for conformance to all applicable codes.

PRODUCT IDENTIFICATION

WALL ECONOMY MODELS:



CWE S

- B = 100R Platinum, RTDC = 1k Platinum, RTDD = 10k T2, Therm.E = 2.2k, Therm.F = 3k, Therm.G = 10k CPC, Therm.H = 10k T3, Therm.J = 10k Dale, Therm.
 - K = 10k w/11k shunt, Therm. M = 20k NTC, Therm. N = 1800 ohm, Therm. R = 10k US, Therm. S = 10k 3A221, Therm. T = 100k, Therm. U = 20k "D", Therm.

WALL DELUXE MODELS:



CW SERIES Wall Mounted Environmental CO₂ Sensors

Installer's Specifications

Input Voltago	20 to 20//DC 24//AC
Input Voltage	CWE: 4 20mA 0 10VDC (soloctable):
	Lv 4. 20mA (clinned and canned)/0. 5VDC (0. 10VDC (selectable))
Operating Temperature Dange	10011A 111dX. 0° to 50°C (22° to 122°C)
Uperating Temperature Range	U 10 50 C (32 10 122 F)
<u>CO₂ Transmitter:</u>	
Sensor Type	Non-dispersive infrared (NDIR), diffusion sampling
Measurement Range	CWL: 0-2000 ppm or 0-5000 ppm, user selectable;
	CWE: 0-2000 ppm
Accuracy	\pm 30 ppm \pm 2% of measured value*
Repeatability	± 20 ppm $\pm 1\%$ of measured value
Response Time	<60 seconds for 90% step change
RH Transmitter:	
HS Sensor	Digitally profiled thin-film capacitive (32-bit mathematics);
	U.S. Patent 5,844,138
Accuracy	±2% from 10 to 80% RH @ 25°C; Multi-point calibration NIST
Hysteresis	1.5% typical
Linearity	Included in Accuracy spec.
Stability	$\pm 1\%$ @ 20°C (68°F) annually for two years
Operating Humidity Range	0 to 100% RH, noncondensing
Operating Temperature Range	10° to 35°C (50° to 95°F)
Temperature Coefficient	\pm 0.1% RH/°C above or below 25°C (typical)
Temperature (Transmitter):	
Sensor Type	Solid-state, integrated circuit
Accuracy	±0.5°C (±1°F) typical
Resolution	0.1°C (0.2°F)
Range	10° to 35°C (50° to 95°F)
Relay Contacts:	
1 Fame C (an an adala suith as t	$11 \circ 2000$ (model)

<u>1 Form C (on models without setpoint slider option)</u> 1A@30VDC, resistive; 30W max. Note: Specified accuracy with 24VDC supplied power with rising humidity. RTD/Thermistors in wall

packages are not compensated for internal heating of product.

EMC Conformance: EN 61000-6-3:2001 Class B, EN 61000-6-1:2001, EN 61000-3-2:2000, EN 61000-3-3:2001

EMC Test Methods: CISPR 22:1997(Amended A9:2000, A2:2002), IEC 61000-4-2:2001, IEC 61000-4-3:2002, IEC 61000-4-4:2004, IEC 61000-4-5:2001, IEC 61000-4-6:2004, IEC 61000-4-8:2001, IEC 61000-4-11:2004.

EMC Special Note: Connect this product to a DC distribution network or an AC/DC power adaptor with proper SURGE PROTECTION (EN 61000-6-1:2001 specification requirements) * *Measured at NTP*

QUICK INSTALL

- 1. Select a mounting location away from ventilation sources. The sensor should be mounted on a vertical wall, about 4 1/2 feet above the floor.
- 2. Affix the backplate to the wall.
- 3. Wire the device. Refer to wiring diagrams on page 2.
- 4. Install Cover.

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VERIS INDUSTRIES

CW SERIES

6. Wire the backplate.

INSTALLATION GUIDE

POWER SUPPLY

٨

20-30VDC, 24VAC

CONTROL SYSTEM COMMON CO2 INPUT RH INPUT

DIMENSIONS



INSTALLATION

1. Remove the cover by pressing the tab at the top of the sensor while pulling outward from the top of the cover.



TEMP INPUT RELAY N.O. COMMON RELAY N.C. FIEMP OUTPI RH OUTPU: RELAY N.O. RELAY N.C NOMMO Note: Connector blocks and headers for optional features are not included with non-option models.

CO2, RH, Thermistor/RTD, Pushbutton Override, and Setpoint Slider Options

CO2, RH, Temperature Transmitter Options



CO2, Economy Model



2. Remove the backplate by unfastening the sensor from the bottom of the backplate and pivoting the sensor outward.

devices to avoid damage to the circuitry which would not be covered under the factory warranty.

Observe handling precautions for static sensitive

3. Punch out openings in the backplate.



4. Position the sensor vertically on the wall, 4 ½ feet above the floor.



5. Mount the backplate onto the wall using the screws provided.



All optional connector blocks are shown here for clarity.

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VERIS INDUSTRIES V

INSTALLATION GUIDE

7. Install the sensor onto the backplate.



8. Use the switch to select voltage or current output. For CWL model, see Configuration section on page 4.



9. When installation is complete, install the cover and snap into place.



ABC CALIBRATION ALGORITHM

ABC (Automatic Baseline Calibration) is a patented self-calibration feature, which automatically adjusts the CO₂ sensor to compensate for drift. When ABC is enabled, the lowest reading within every 24-hour period is recorded and analyzed over a running 7-day or 28-day period. If a statistically significant amount of drift is detected, an automatic correction factor is applied. This enables the sensor to operate within specifications for the 5-year calibration interval.

ON POSITION. *Recommended Setting.* Use the ON setting for applications where the building is unoccupied within a 24-hour timeframe. This setting runs the ABC for a 7-day average.

LOW POSITION. Use the LOW setting for buildings occupied 24 hours a day. This setting extends the ABC to a 28-day average.

OFF POSITION. Not Recommended.

Refer to Calibration Mode procedures on previous page to set desired ABC mode for CWL models.



OUTPUT SCALING

<u>CO2 - Carbon Dioxide Sensor</u>

Output scaling: 0-2000ppm

	CO2 PPM	0-5 VOLT OUTPUT	0-10 VOLT OUTPUT	mA OUTPUT
Outside	300-500	0.75 to 1.25	1.5 to 2.5	6.4 to 8
Over Ventilated	Under 600	under 1.5	Under 3	Under 8.8
Ideal Ventilation	600-900	1.5 to 2.25	3 to 4.5	8.8 to 11.2
Under Ventilated	Over 900	over 2.25	Over 4.5	Over 11.2

RH - Relative Humidity Sensor

Output scaling: 0-100%

<u>T - Temperature Transmitter</u>

Output scaling: 10° to 35°C (50° to 95°F) To determine temperature from output reading:

1) Compute Total Span from Temperature Range:

Maximum range - Minimum range = Total span ex. 10° to 35°C range » 35 - 10 = 25 Total span

2) Compute Output % of Span from Reading:

(Reading - Minimum Output) / (Maximum output - Minimum output ex. 11.10mA reading on 4-20mA output: (11.10-4)/(20-4)=7.10/16=0.444=44.4% ex. 4.44v reading on 0-10v output: (4.44-0)/(10-0)=4.44/10=0.444=44.4%

3) Compute Temperature:

(Total span x Output % of Span) + Minimum range

ex. 44.4% Output, Total Span = 45, range = 50/95: (0.444 x 45) + 50 = 20 + 50 = 70°

Example outputs for selected temperatures:

Temp	4-20mA	0-10v	0-5v
65	9.33mA	3.33v	1.67v
70	11.10mA	4.44v	2.22v
75	12.89mA	5.56v	2.78v

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CW SERIES

INSTALLATION GUIDE

CONFIGURATION - CWL ONLY

<u>RUN MODE:</u>

1	0	0	0		P	P	М
		*			C	0	2
		ن IND!	ICATES	ly MOL RELAY	JEL STATU'	ç	
						,	
1	0	0	0		P	P	М

CO₂/RH COMBO MODEL

1	0	0	0		Р	Р	М
7	0	•	0			0	F
		(0)	, /T CON	ЛВО М	ODEL		

1	0	0	0	Р	Р	М
X	X	•	X	X	X	X

CO₂/RH/T COMBO MODEL TOGGLE %RH AND DEGREES

CONFIGURATION MODE:

PRESS [ENTER] FOR CONFIGURATION MODE. PRESS PLUS OR MINUS TO CHANGE SETTING.

S	E	T	Р	0	I	N	T
C	0	2			8	0	0

RANGE 500 TO 1500 50PPM INCREMENT

D	Ε	A	D	B	A	N	D		
C	0	2			1	0	0		
RANGE 10 TO 500									

5 PPM INCREMENT

R	A	N	G	Ε			
C	0	2		X	X	X	X

OPTIONS ARE 2000 OR 5000

A	B	C		М	0	D	E
-		Х	X	X			+

OPTIONS ARE ON, LOW, OFF SEE NEXT PAGE FOR EXPLANATION

U	N	I	T	S		
-			0	Х		+

(TEMP MODELS ONLY) OPTIONS ARE °F or °C

	0	U	T	Р	U	T	
-	0	I	1	0	V		+

(VOLTAGE MODE ONLY) OPTIONS: 0-10V OR 0-5V DEFAULT IS 0-10V

	0	U	T	Р	U	T			
	4	-	2	0	m	A			
(mA MODE ONLY)									

AA01. WARNING: CO₂ sensor calibration requires gas calibration kit. Performing calibration without gas kit will cause erroneous readings. Consult factory for calibration kit.

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NOTE: This product is factory calibrated. The typical CO2

sensor calibration interval is 5 years, dependent on specific site

installation factors. As of the date of this document, compliance with ANSI/ASHRAE 62-2001 requires minimum on-site accuracy verification intervals of 6 months, or per the building operation and maintenance manual. Accuracy verification should be performed using a comparison to a known reference, or the CO₂ gas calibration kit available from Veris Industries as model

CALIBRATION MODE:

PUSH AND HOLD PLUS AND MINUS FOR 5 SECONDS TO ENTER MODE. PRESS ARROW TO CHANGE OPTION. PUSH ENTER FOR NEXT SELECTION.

	S	E	R	Ι	A	L	
X	X	X	X	X	X	X	X

DISPLAYS SERIAL NUMBER

	X	X	X		
X	X	X	X	X	

DISPLAYS MODEL NUMBER

0	F	F	S	E	T		
0	C				X	•	X

RANGE IS -5 TO 5°C, 0.1°C INCREMENT (CO₂/temp combo models)

0	F	F	S	E	T		
%	R	H		X	X	•	X

RANGE -10 TO 10%, 0.1% INCREMENT (CO₂/temp combo models)

C	0	2		C	A	L	?
_			X	X	X		+
	•	0.07					

OPTIONS ARE YES, NO



OPTIONS ARE NONE, 0, 400



Unit will automatically return to run mode when calibration is complete.

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CALIBRATION PROCESS: CWL MODELS

1. Remove cover and connect gas hose to calibration port.



- 2. Enter Calibration Mode menu per directions on page 3. Choose 0 ppm calibration gas option.
- 3. Flow Nitrogen



- **CALIBRATION PROCESS: CWE MODELS**
- 1. Remove cover and connect gas hose to calibration port.



2. Flow Nitrogen



- 3. Press and hold down the ENTER button until the green LED illuminates.
 - LED indicator Connect hose here ENTER button
- 4. Continue flowing gas until the LED goes off.

4. Calibrate for 5 minutes. Unit will return to run mode when calibration is complete.





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- 1. Introduction
- 2. General Overview
- 3. Familiarization
- 3.1 Front View
- 3.2 Soft Keys
- 3.3 Back View
- 4. Operation
- 4.1 Turning On & Off / Performing a Test / Main Display
- 4.2 Selecting Temperature Units
- 4.3 Ambient / Dew Point / Wet Bulb Temperature Display
- 4.4 Temperature / Clock Display Modes
- 4.5 Activating the Backlight
- 4.6 Setting Date and Time
- 4.7 Setting CO Alarm Level
- 5. Calculating % Outside Air
- 5.1 % Outside Air (Temperature)
- 5.2 % Outside Air (Carbon Dioxide)
- 6. Data Logging
- 7. Retrieving Logged Data
- 8. Technical Specifications
- 9. Maintenance
- 9.1 Battery Replacement
- 9.2 Service
- 10. Technical Information

1. Introduction

Thank you for purchasing TPI brand products. The TPI 1010 Indoor Air Quality (IAQ) Meter is a state of the art, easy to use tester designed to provide you with the necessary measurements to monitor and make adjustments to air handling devices. The instrument is ruggedly constructed and comes with a 3 Year unit and 2 Year sensor Guarantee.

2. General Overview

The 1010 IAQ meter uses state of the art sensors to measure humidity, carbon monoxide (CO), carbon dioxide (CO2), and temperature. The CO and CO2 sensors in your meter will need to be replaced periodically and calibration is recommended once every year.

The CO sensor is electrochemical and this type of sensor is always active once installed in the unit. Therefore the time the unit is off and not being used must be taken into account when determining sensor life. The sensors in your analyzer are warranted for two years. This warranty does not cover sensors damaged through misuse of the meter.

You should keep battery power applied to your sensors at all times.

The following guidelines will help prevent damage to your sensors:

Always store your unit in a place where the temperature does not get down to or below freezing.

Always maintain battery power to the sensors. When the batteries get low replace them as soon as possible.

Never allow foreign objects or material to enter the sensor holes, damage to the sensor may result.

Never over saturate your sensors by performing tests on equipment with gas levels beyond the capability of you analyzer.

General Overview (Continued)

This manual will guide you through the functions of the TPI 1010 which will give you many years of reliable service.

Your TPI 1010 Indoor Air Quality meter comes complete with the following standard accessories:

- TPI 1010 Instrument •
- Protective Rubber Boot (A800)
- Soft Carrying Case (A921) ٠
- USB Cable & Software (A803) ٠
- Instruction Manual

Your TPI 1010 Indoor Air Quality meter has the following optional accessories available:

- Power adapter / Battery eliminator (A804) ٠
- Magnetic strap kit to hang meter (A127) •
- Boot hook to hang meter (A103) ٠
- Replacement Software only (A802) ٠
- Replacement USB cable only (A801)

() Denotes part number

3. Familiarization

3.1 Front View



munication. **Power Adapter Socket** Location to connect power adapter.

3.2 Soft Keys

On / Off key - Used to turn the IAQ meter on or off. Press to turn on, press and hold to turn off.

Up Arrow key - Used to select and change parameters. Also used to cycle through dew point and wet bulb temperatures from the main display.



Left Arrow key - Used to select and change parameters.



Right Arrow key - Used to select and change parameters.



- Down Arrow key Used to select and change parameters.
- Enter Enter key Used to activate % outside air mode. Also used to accept parameter changes.
- MODE Mode key Used to activate and deactivate data logging mode. Press and hold to activate or deactivate logging.
- Backlight key Used to turn the display backlight on and off.
- T/C key Used to switch the bottom display between temperature / humidity and time display modes.
- Unit Unit key Used switch the bottom temperature display between Fahrenheit and Celsius modes.

Hanger Hole - Tilt Stand Battery Cover Screw Hanger Hole: Use to hang instrument for hands free operation. Can be used with A127 magnetic strap kit or A103 hook. Tilt Stand: Use to stand instrument on a table. **Batter Cover** Loosen this screw and open cover to access batteries. Screw:

3.3 Back View

4. Operation

4.1 Turning On & Off / Performing a Test / Main Display

Always: - Turn the 1010 on outside of the area to be tested. Make sure the unit is in fresh air (no carbon monoxide present) prior to turning on. This will allow the CO sensor to set to zero properly.

Press the key and the 1010 will begin a 30 second countdown. During this time the 1010 performs a self diagnostic and sets the CO sensor to zero. Once the countdown ends the 1010 will display CO2, CO, Temperature, and Humidity.

Enter the area to be tested, the measured values will be displayed.

Carbon dioxide (CO2) in parts per million (ppm) is displayed at the top, carbon monoxide (CO) in parts per million (ppm) is displayed in the middle, temperature in °F or °C (selectable), and humidity in percent are displayed at the bottom of the main display.

The battery indicator is located at the bottom left of the display. When the batteries become low they must be replaced to maintain proper operation.



If 30ppm or more CO is measured the 1010 will beep and the display will flash red as a warning. This alarm point is adjustable. Additional functions can be activated during testing. Please see next sections.

4.2 Selecting Temperature Units

Pressing the Unit key switches the temperature display between °F and °C.

4.3 Ambient / Dew Point / Wet Bulb Temperature Display

Repeatedly pressing the key from the main display cycles through dew point temperature, wet bulb temperature, and ambient temperature displays.







Ambient Temperature

Dew Point Temperature Indicated by "DP" in the display

Wet Bulb Temperature Indicated by "WB" in the display

4.4 Temperature / Clock Display Modes

Pressing the $\frac{\pi}{2}$ key from the main display cycles between temperature and clock display. To set the clock please refer to section 4.6.

4.5 Activating the Backlight

Pressing the key turns the display backlight on and off. Power consumption is much higher when the backlight is activated. The backlight will automatically turn off 30 seconds after it is activated. To conserve battery life the backlight should only be used when necessary.

4.6 Setting Date and Time

1) Starting with the 1010 turned off, press and hold down the key then

press and hold down the Wey until two beeps are heard and the time / date screen is displayed.



2)	Using	the Ar	row l	keys,	set the	year. Or	nce the	year is s	set, pres	SS Ente	ər
3)	Using 1	the Arı	row k	keys, s	set the	month.	Once th	e mont	h is set,	press	Enter
4)	Using	the Ar	row ł	keys,	set the	day. On	ce the d	lay is se	et, press	Enter	
5)	Using	the Ar	row ł	keys,	set the	hour. Or	nce the	hour is	set pres	SS Ente	r
6)	Using	the Ar	row	keys s	set the	minutes	. Once i	minutes	is set, j	press	Enter

The 1010 will return to normal operation.

4.7 Setting CO Alarm Level

The 1010 is equipped with an audible and visual alarm for carbon monoxide. The alarm level is factory set at 30ppm. When CO above this level is measured, the 1010 will beep and the display will flash red.

The alarm level is adjustable and can be set from 10ppm to 500ppm.

1) With the 1010 turned on, press and hold down the *c* and *keys* until the CO alarm screen is displayed.



Using the Arrow keys set the alarm point to the desired level. The keys select the digit and the Nonce the desired alarm point is set, press the Inter key to return to normal operation.

5. Calculating % Outside Air

HVAC systems use a combination of outside air, supply air, and return air to maintain consistent and comfortable air quality. The 1010 can calculate outside air either by measuring temperature or by measuring CO2.

The formula used to calculate % outside air is:

% Outside Air = $\frac{\text{Return Air - Supply Air}}{\text{Return Air - Outside Air}} \times 100\%$

Percent outside air can be calculated using either temperature or carbon dioxide.

5.1 % Outside Air (Temperature)

To activate % outside air mode, press the key about 2 seconds until "t-0" is displayed in the middle display area.

1) Place the sensor of the 1010 perpendicular to the "Return" air flow. When the reading stabilizes press the **Enter** key and capture the return air temperature, "t-1" is displayed.

2) Place the sensor of the 1010 perpendicular to the "Supply" air flow. When the reading stabilizes press the reading key and capture the supply air temperature, "t-2" is displayed.

3) Place the sensor of the 1010 perpendicular to the "Outside" air flow. When the reading stabilizes press the reading stabilizes pr

4) Press the **Enter** key, "t =" will be displayed and the calculated percent outside air will be displayed at the top of the display.

5) If you want to perform this measurement again, press the **Enter** key once and return to step 1.

6) To exit and return to normal operation, press and hold the **Enter** key until "C-O" is displayed. Press and hold the **Enter** key until a beep is heard and the 1010 returns to normal operation.

5.2 % Outside Air (Carbon Dioxide)

To activate % outside air mode, press the **Enter** key about 2 seconds until "t-0" is displayed in the middle display area. Press and hold the **Enter** key until "C-0" is displayed.

1) Place the sensor of the 1010 perpendicular to the "Return" air flow. When the reading stabilizes press the return air temperature, "C-1" is displayed.

2) Place the sensor of the 1010 perpendicular to the "Supply" air flow. When the reading stabilizes press the **Enter** key and capture the supply air temperature, "C-2" is displayed.

3) Place the sensor of the 1010 perpendicular to the "Outside" air flow. When the reading stabilizes press the reading stabilizes pr

4) Press the **Enter** key, "C =" will be displayed and the calculated percent outside air will be displayed at the top of the display.

5) If you want to perform this measurement again, press the **Enter** key once and return to step 1.

6) To exit and return to normal operation, press and hold the Enter key until a beep is heard and the 1010 returns to normal operation.

6. Data Logging

To activate data logging press and hold down the key until the logging setup screen is displayed. Once the logging function is activated all preciously logged data is written over.



1) INT is displayed at the top to indicate the 1010 is waiting for the logging interval to be set. The logging interval tells the 1010 how often to sample. For example, a logging interval of 10 seconds (00:10) means the 1010 will log a reading every 10 seconds. The bottom indicates the current logging interval in minutes and seconds (MM:SS) or hours and minutes (HH:MM). Flashing "SEC" in the display indicates the last two digits are seconds and a flashing "MIN" in the display indicates the last two digits are minutes. In seconds mode the time is adjustable from 1 sec to 59 min 59 sec. In the minutes mode the time is adjustable from 1 min to 23 hr 59 min. Pressing the the second s

2) Once the time mode is set press the **Enter** key and time digits will flash. Using the Arrow keys set the interval to the desired level. The **Control**

keys select the digit and the 🔨 keys increase or decrease the value.

3) Once the seconds have been entered, press the **Enter** key to move to min / hr.

4) Using the Arrow keys set the interval to the desired level. The keys select the digit and the keys increase or decrease the value.

- 5) Once the logging interval is set press the **Enter** key and the 1010 will return to the main display and "LOG" will flash indicating the logging function is active.
- 6) To deactivate data logging press and hold down the MODE key until "LOG" is no longer flashing.

For data retrieval please see the next section on how to retrieve logged data.

7. Retrieving Logged Data

To retrieve logged data the USB cable and PC software (both supplied) must be used.

Install the PC software on your PC and open it.

Connect the 1010 to the PC using the USB cable.

Click on the connect to PC button in the software window.

The software can be used to retrieve logged data and for real time monitoring.

COM port setting is:

Baud rate: 19200 Parity: None Data Bits: 8 Stop Bit: 1

8. Technical Specifications

Function CO2	Range O to 5000ppm	Accuracy 50°F~104°F: ±3% of rdg+75ppm <50°F, >104°F: ±5% of rdg+75ppm
Temperature	-5°F to 140°F -20°C to 60°C	±2°F ±1°C
Dew Point Temperature	-47°F to 135°F -44°C to 57°C	Calculation
Wet Bulb Temperature	3°F to 135°F -16°C to 57°C	Calculation
Relative Humidity	5% to 95%	±2% RH
CO	0 to 500ppm	±3ppm or ±5% of rdg whichever is greater
% Outside Air	0 to 100%	Calculation

Data Logging: Up to 10,000 samples 1 sec to 23hr 59min interval.

Display Type: 3 line with annunciators and backlight

CO Alarm: Audible and visual, selectable level (factory default 30ppm)

Operating Temperature & Humidity

CO and CO2: 14° F to 122° F (- 10° C to 50° C) All Other Function: -4° F to 140° F (- 20° C to 60° C) Humidity 15 ~ 95% non-condensing

Storage Temperature: -4°F to 140°F (-20°C to 60°C)

Power supply

3 AA battery(4.5V) AC/DC adapter 5Vout (Center positive) Battery Life: 40 hours typical without backlight

Output: Serial output via USB connection

9. Maintenance

It is recommended that the instrument be calibrated every 12 months. Please consult Test Products International for further details (800) 368-5719.

9.1 Battery Replacement

When the batteries become low they will require replacement.

- 1. Turn the meter over so the back is facing you.
- 2. Loosen the screw holding down the battery cover located under the tilt stand.
- 3. Lift the tilt stand up and remove the battery cover.
- 4. Replace the batteries (3 x AA Alkaline) and install the cover and tighten the screw.

9.2 Service

To obtain warranty and non-warranty performance or maintenance on your analyzer: - Include with the product your name, address, phone number, written description of the problem and proof of purchase date. Carefully package and return to:

TPI / Attn. Repair 9615 SW Allen Blvd. Suite 104 Beaverton, OR 97005

10. Technical Information

Notes:

% Outside Air - HVAC systems use a combination of outside air, supply air, and return air to maintain consistent and comfortable air quality. The 1010 can calculate outside air either by measuring temperature or by measuring CO2. The formula for % Outside Air is:

% Outside Air = $\frac{\text{Return Air - Supply Air}}{\text{Return Air - Outside Air}} \times 100\%$

If too little outdoor air enters a home, pollutants can accumulate to levels that can pose health and comfort concerns. Unless they are built with special mechanical means of ventilation, homes that are designed and constructed to minimize the amount of outdoor air that can 'leak' into and out of the home may have higher pollutant levels than other homes. However, because some weather conditions can drastically reduce the amount of outdoor air that enters a home pollutants can build up even in homes that are normally considered 'leaky'.

Dew Point Temperature - This is the temperature at which condensation begins

 $\ensuremath{\textbf{Wet Bulb Temperature}}$ - This is the lowest temperature evaporating water can reach

Recommended Levels by Agency

Parameter	IDPH ¹	ASHRAE ²	OSHA PEL ³	ACGIH TLV ⁴
Humidity	20% - 60%	30% - 60%	N/A	N/A
Temperature	68 - 75 (winter) 73 - 79 (summer)	68 - 75 (winter) 73 - 79 (summer)	N/A	N/A
Carbon Dioxide	1,000ppm (<800ppm preferred)	1,000ppm	5,000ppm	5,000ppm
Carbon Monoxide	9ppm	9ppm	50ppm	25ppm

N/A-Not Applicable or Not Established

¹ Illinois Department of Public Health (2009)

² American Society of Heating, Refrigerating and Air Conditioning Engineers

³ Occupational Safety and Health Administration Permissible Exposure Limit -- this level is a time-weighted average and is an enforceable standard that must not be exceeded during any eight-hour work shift of a 40-hour work week.

⁴ American Conference of Governmental Industrial Hygienist Threshold Limit Value -- this level is a recommended time-weighted average upper limit exposure concentration for a normal eight to 10-hour workday and a 40-hour work week.

Test Products International, Inc.

9615 SW Allen Blvd., Ste. 104 Beaverton, OR 97005 Tel: 503-520-9197 Fax: 503-520-1225 www.tpi-thevalueleader.com

Test Products International, Ltd.

342 Bronte Road South, Unit #9 Milton Ontario Canada L9T5B7 Tel: 905-693-8558 Fax: 905-693-0888

AA01



NOTICE

- This product is not intended for life or safety applications.
- Do not install this product in hazardous or classified locations.
- Read and understand the instructions before installing this product.
- Turn off all power supplying equipment before working on it.
- The installer is responsible for conformance to all applicable codes.

PRODUCT IDENTIFICATION

AA01

AAO1 CO, Calibration Accessory

INTRODUCTION

The AA01 CO₂ calibration accessory is designed for field calibration of any CO₂ sensor produced by Veris Industries, regardless of age. It comes complete with calibration gas, a gas regulator, tubing, and fittings, which can be configured to easily calibrate your CO₂ device.

The calibration process normally takes about 5 minutes.

In general, Veris CO₂ sensors use a time-weighting factor, which saves the lowest concentration of CO₂ measured in a selectable time period, and then use that information to calculate the ambient or base level CO₂ concentration. This calculation allows your Veris CO₂ sensor to improve its accuracy over time.

To use this instruction guide, first identify the shape of CO₂ sensor inside of your Veris device (rectangular or pear), and then turn to the appropriate section of this instruction manual for the specific instructions on how to calibrate your particular device.

When connecting the gas regulator assembly to the gas bottle, verify there is at least 10 lbs of pressure remaining in the bottle.

AA01

INSTALLATION GUIDE

FOR ANY CO, DEVICE WITH **RECTANGULAR SENSOR**

PREPARATION

- 1. Ensure unit to be calibrated is properly installed and has been operating for at least one hour.
- 2. Use only Veris Industries calibration kit model AA01. Perform zero calibration with nitrogen gas. Use a flow regulator to limit gas flow to <0.25 lpm. Exceeding this flow rate may cause calibration errors.

SETUP

- 1. Install tubing to regulator and screw regulator on gas bottle.
- 2. Remove front cover from unit and locate plastic barb fitting and menu pushbutton. A label indicating push-button functions is located inside front cover plate.



3. Attach tubing firmly to barb fitting.

CX/CWL/CDL CALIBRATION

- 1. Press ENTER button to enter configuration mode.
- 2. Press ENTER repeatedly until CO₂ CAL menu option appears on the display:

C	0	2		C	A	L	?
*	Y	E	S			N	0

- 3. Press "+" to select YES option.
- 4. Using "+/-" buttons, select ZERO calibration option. Press ENTER to continue. NOTE: AA01 kit includes nitrogen gas for zero calibration ONLY.

*	Z	E	R	0		
	S	P	A	N		

5. Verify display indicates 0 PPM gas concentration. Press ENTER to continue.

Z	Ε	R	0	G	A	S
			0	P	P	Μ

6. Display should prompt to flow gas:

F	L	0	W		G	A	S
*		S	T	A	R	T	

Open regulator valve and adjust pressure to 7 psi to generate the appropriate flow rate. Press ENTER to begin countdown timer.

C	A	L		T	Ι	М	Ε
*	4	2	0		S	E	C

7. Wait for countdown timer to reach zero and for display to indicate calibration is complete:

		D	0	N	E		
S	T	0	P		G	A	S

- 8. Close regulator valve and disconnect tubing from unit. Press ENTER to return to normal operation.
- 9. Replace sensor cover.

CDE/CWE CALIBRATION

- 1. Follow setup directions above.
- 2. Start flowing (nitrogen) 0 ppm CO₂ gas.
- 3. Push and hold down calibration button until the red LED illuminates.
- 4. Continue flowing gas through the sensor until the red LED turns off.
- 5. Follow steps 8 & 9 of the calibration directions above.

AA01

INSTALLATION GUIDE

FOR CDL/CWL DEVICE WITH PEAR-SHAPED SENSOR

- 1. Remove cover to the device.
- 2. Connect hose to plastic port located on sensing module and flow gas (Nitrogen) 0 ppm CO, gas through the sensor.





3. Push and hold plus and minus buttons for 5 seconds to enter Calibration mode. At each menu option, use the arrow to change values. Push enter for next option.

	S	E	R	I	A	L	
X	X	X	X	X	X	X	X
		X	X	X			
	x	X	X	X	x		

Displays serial number

Displays model number

0	F	F	S	Ε	T			– Ranae is -5 to 5°C .
)	C				X	•	X	0.1°C increment
)	F	F	S	E	T			Ranae is -10 to 10%
6	R	H		X	X	•	X	0.1% increment
	0	2		C	A	L	?	-
			X	X	X		+	Options are Yes/No
	A	L		G	A	S	?	
			X	X	X	X	+	Options are None, O,
	0	R	K	1	N	G		llnit will automatica
	*			5	:	0	0	mode when calibrati

NOTE: This product is factory calibrated. The typical CO₂ sensor calibration interval is 5 years, depending on specific site installation factors. As of the date of this document, compliance with ANSI/ASHRAE 62-2001 requires minimum on-site accuracy verification intervals of 6 months or per the building operation and maintenance manual. Accuracy verification should be performed using either a comparison to a known reference or the CO₂ gas calibration kit available from Veris Industries as model AA01.

WARNING: CO₂ sensor calibration requires a gas calibration kit. Performing calibration without a gas kit will cause erroneous readings. Consult factory for calibration kit.

- 4. Select 0 ppm Cal Gas option.
- 5. Continue flowing gas through the sensor. Estimated calibration time is 5 minutes. Unit returns to run mode when calibration is complete.





FOR CDE DEVICE WITH PEAR-SHAPED SENSOR

1. Connect hose to plastic port located on sensing module.



2. Start flowing (Nitrogen) 0 ppm Gas (0 ppm only).



FOR CWE DEVICE WITH PEAR-SHAPED SENSOR

1. Connect hose to plastic port located on sensing module.



2. Start flowing (Nitrogen) 0 ppm Gas (0 ppm only).



3. Push and hold down calibration button until the LED illuminates.



- Push and hold down calibration button
- Continue flowing gas through the sensor until the LED is off estimated Calibration time is 5 minutes.

3. Push and hold down calibration button until the LED illuminates.

Push and hold down calibration button



4. Continue flowing gas through the sensor until the LED is off - estimated Calibration time is 5 minutes.