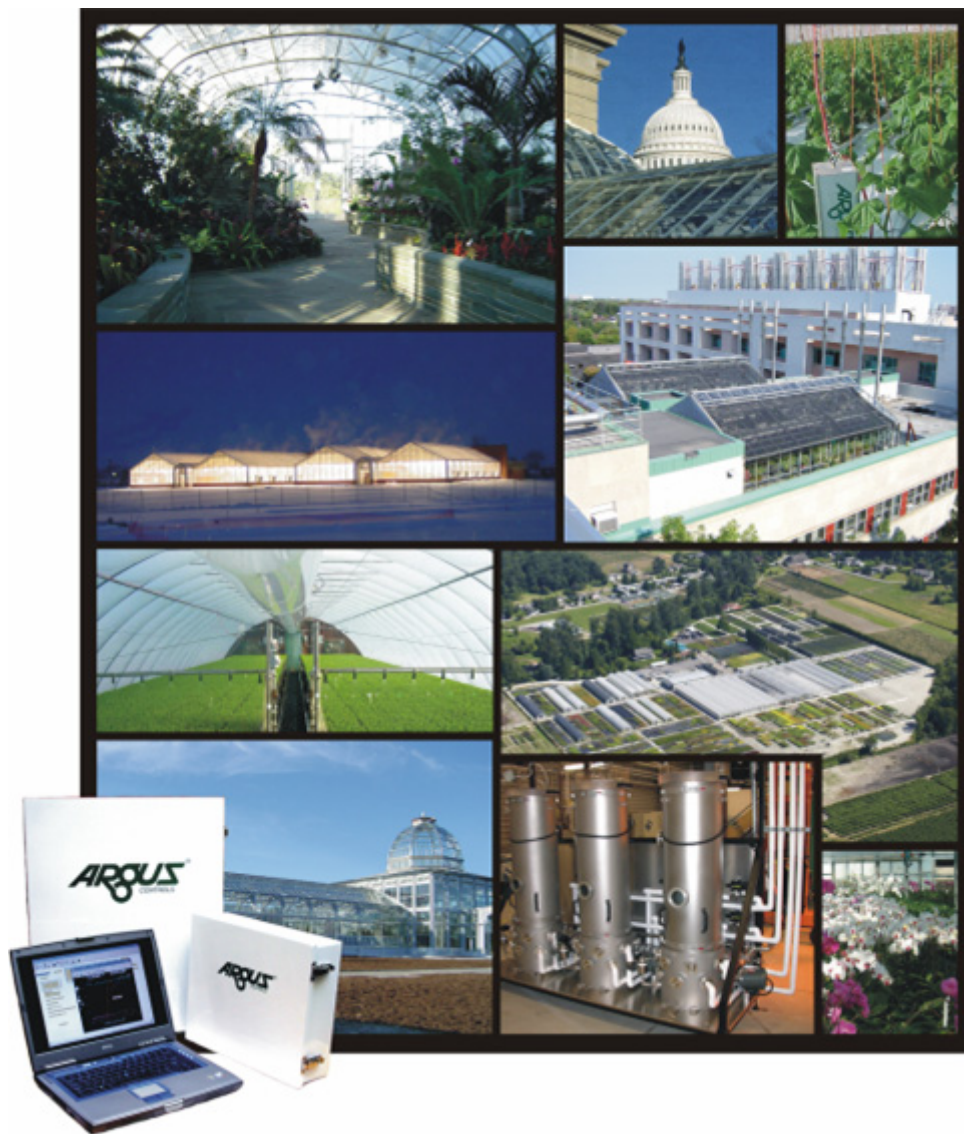


Omni Sensor

Operator's Guide



July 28, 2017

Omni Sensor Operator's Guide

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OMNI Sensor Guide

ABOUT THIS MANUAL

This manual describes the features, installation, and operation of **Argus Omni** sensors.

Where to Find Additional Information

This guide covers the basic components and configuration of the **Argus Omni** sensors.

Detailed wiring diagrams, data sheets, and other documents are supplied with the equipment. Please refer to them for installation.

For additional assistance please contact **Argus Support** at 1-888-667-2091 (toll-free in Canada and the U.S.) or 604-536-9100.

You may also contact us by fax at 604-538-4728 or e-mail us at argus@arguscontrols.com.

You can also check the **Argus Web site** (www.arguscontrols.com) for answers to frequently asked questions, troubleshooting tips, and the latest product information.

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INTRODUCTION

Omni sensors were developed to resolve many issues relating to the measurement of the most common climate parameters used in horticultural production.

In particular, the Omni sensor applies our very successful strategy of heating the RH sensor in high humidity environments to protect it from condensation induced errors and damage.

Compared to unheated solid-state RH sensors, this technique offers **extraordinary accuracy and sensor life** over the range of humidity common in horticultural environments.

Omni sensors are available in a range of models and features:

Model:	Temperature	Relative Humidity	PAR Light	CO ₂	On-Board Display
SEN-OSM/CO2	Yes	Yes	Yes	Yes	Yes
SEN-OSM/C	Yes	Yes	Yes		Yes
SEN-OSM/CAL*	Yes	Yes	YEs		Yes
SEN-OSM/RHT	Yes	Yes			
SEN-OSM/T	Yes				

* The SEN-OSM/CAL is the same as the "/C", but uses single point calibration accurate to +/-0.1°C (at 20°C)



Omni sensors are compact and easily interchangeable measuring stations for indoor applications including greenhouses and growth chambers.

A simple 2-wire cable is used to connect them to any available Titan I/O module, and since the communications cable also supplies the power, there is no need for an additional power source.

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The Omni sensor uses a single digital channel on a Titan I/O module ***leaving all the analog inputs available for other uses.***

By comparison, an equivalent number of analog sensors for the ***SEN-OSM/CO2*** model would require 6 analog inputs!

Until now, PAR light and CO₂ measurement were often left out of standard horticultural zone monitoring solutions because of the cost and the difficulty of providing these measurements.

Along with state-of-the-art high accuracy temperature and humidity measurement systems, the Omni sensor is the first of its kind to include models that incorporate PAR light readings and CO₂ measurement.

FEATURES OF THE OMNI SENSOR

All Models

Compact Size

The Omni sensor is small and lightweight making it suitable for installation in almost any horticultural application, including most growth chambers.

Easy and Inexpensive to Install

Wiring can span quite long distances of up to 1000 feet and consists of simple two conductor cable. This is very easy to install, and much less expensive than the 8 – 12 conductor cabling required for conventional sensor systems with the same functionality.

No external power source is required.

Plug-in Connection

A simple “plug and twist lock” waterproof connection system (IP-67) makes installation and service or calibration swaps very easy.

Simplified Troubleshooting

Most problems are limited to the 2-conductor cable, which is relatively easy to test, troubleshoot, or replace, or to the Omni sensor itself, which can simply be replaced if any part of its functionality or calibration accuracy is suspect.

Omni sensors can be tested elsewhere on-site or returned to the factory for automated calibration checks, re-calibration, or repair as needed.

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Precision Temperature Measurement

Operating Range:

- **SEN-OSM/T (v 4.0):** - 40°C to 85°C
- **SEN-OSM/RHT (v 4.0):** - 40°C to 85°C
- **SEN-OSM/C (v 4.0):** 0°C to 50°C
- **SEN-OSM/CAL (v 4.0):** 0°C to 50°C
- **SEN-OSM/CO2 (v 4.0):** 0°C to 50°C

Typical Accuracy:

- -10°C to +85°C: +/-0.3°C.
- -10°C to -40°C: from +/-0.3°C (at -10°C) to +/-0.7°C (at -40°C).

Temperature and **RH** sensors are designed to work acceptably even if the built-in fan has failed, reducing the need for immediate fan replacement.

Precision Humidity Measurement

Operating Range: 0 - 100% RH, non-condensing.

The Omni sensor provides relative humidity measurements with typical accuracies of:

- 0 - 80% RH: +/- 2% RH;
- 80 - 100% RH: +/- 3% RH.

Recommended humidity operating range is **20% to 80% RH** (non-condensing) over **-10 °C to 60 °C**. Prolonged operation beyond these ranges may result in a shift of sensor reading, with slow recovery time.

Aspirated Sensing Enclosure

A low-powered DC fan provides sensor aspiration to offset any solar heating of the sensor enclosure.

For all models with humidity sensors, **the blower is programmed to automatically shut down in very high humidity(>98%) to reduce the risk of aspirating fog or mist that could damage or contaminate the sensors or blower fan.**

In most situations very high humidity only occurs under low (solar) radiation conditions when aspiration is of little benefit.

OMNI Sensor Guide

Enhanced Lightning Protection

Enhanced lightning protection is provided built-in transient voltage suppression at both the Omni sensor and the I/O Module. A supplied **Input Protection Board (IPB/OMNI)** mounts onto the I/O module providing current-to-frequency conversion and built-in transient voltage protection.

Redundancy Options

Up to **two Omni sensors** can be connected to a Titan I/O module, while **four** can be added to an I/O Plus module. This provides an option for a backup sensor in applications demanding high reliability and availability as well as the option for sampling from more than one location in a monitored zone. Since the Omni sensor does not use any of the analog inputs on a Titan I/O module, it is also possible to add analog instrumentation including backup temperature and humidity sensors.

If required, redundant I/O Modules and Titan Controllers can also be employed in keeping with the mission critical nature of each application.

SEN-OSM/C & SEN-OSM/CO2 Models

Reasonable Cost (for a High End Sensor Package)

These models are priced competitively with high end aspirated measuring systems but with the added benefits a user interface and display, a PAR light sensor, an integrated CO₂ sensor option.

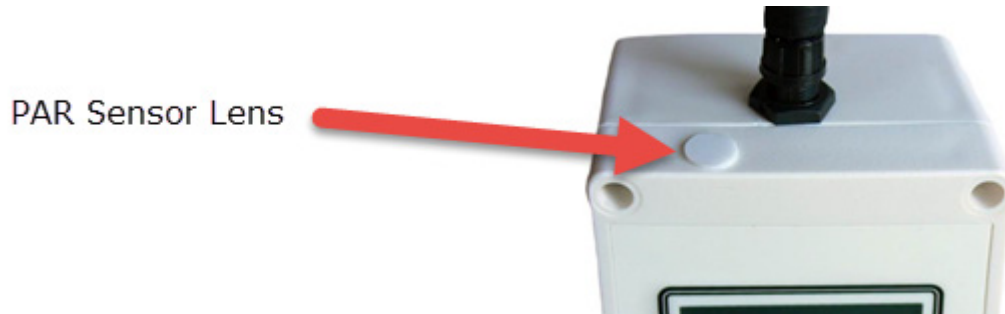
On-Board Display

The Omni sensor features a 2 line x 16 character reflective LCD display to provide an accurate readout of the measured values at the mounting location.

The keypad interface also provides a calibration pathway for field or site calibration of CO₂ measurements.

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PAR Light Measurement



Many growers depend on the proper management of light to regulate growth (photoperiod) and to drive growth.

We incorporated a PAR (photosynthetic active radiation) measurement system into the Omni sensor because of the importance of light measurement and the relatively low cost for Argus to include this feature in an already installed and powered, 'smart' sensor system.

It is not intended to replace a high cost, high accuracy scientific instrument such as the LiCOR Quantum sensor, but it is capable of providing quite accurate information, if properly mounted in the greenhouse or growth chamber.

It is particularly well suited for managing photoperiod, calculating **Daily Light Integrals (DLI)**, and is capable of confirming proper performance of lighting systems and blackout curtain systems at the Omni sensor mounting location (remember, the Omni sensor cannot 'see' the entire greenhouse).

Omni sensor PAR measurements are calibrated to be the most accurate for direct sunlight or sunlight through transparent glazing.

Man-made light sources, overhead infra-red heaters, non-transparent (colored) glazing materials, and diffused light through leaf canopies affects PAR accuracy.

The PAR readings from the Omni sensor are sufficiently accurate for most crop growth management requirements but, as stated earlier, care must be taken with the sensor location, plant canopy shading, and mounting orientation for the best results.

Since the Omni sensor is primarily an aspirated temperature/RH system it must be placed at the most optimal location for these measurements.

For many crops including potted plants and bedding plants the sensor can usually be positioned for optimum performance of all sensor readings.

The light sensor should be exposed and level, just above the plant canopy, and the temperature and humidity measurements taken from the air intake at the bottom of the Omni sensor should be just at the top of the crop.

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However, for true in-canopy mounting locations such as tall vegetable crops, the readings from the light sensor may be less useful.

Therefore, if accurate light measurement is important in these situations, a second Omni sensor (perhaps a 'T' or 'RHT' model) or a dedicated PAR light sensor mounted at the best location for light measurements may be required.

SEN-OSM/CO₂

CO₂ Measurement Option

CO₂ measurement is an easily added plug-in upgrade for the SEN-OSM/C, greatly reducing the cost as compared to previous technologies (much less than half the cost).

CO₂ sensor checking and reading calibration procedures are also much easier than previously possible.

Advancements in long term stability and reading calibration have made it practical for much wider application of CO₂ measurement and CO₂ enrichment for all plant production systems.

The Argus CO₂ sensor has excellent environmental protection to minimize the risk of sensor contamination. This protection slows the response time of the CO₂ sensor which is both a blessing and a curse. The sensor does not respond to short exposure to CO₂ sources (like operators breathing CO₂ all over the sensor while they look at the LCD readings).

The sensor has a T63 (response time constant) of 180 seconds meaning it takes 180 seconds to produce a value that is 63.2% of a step-wise change in the CO₂.

Greenhouses and growth chambers do not normally experience large 'step-wise' changes in CO₂ levels.

Since they typically move up and down gradually over many minutes or hours in response to ventilation and enrichment strategies (and to a lesser extent assimilation and respiration), the CO₂ sensor accurately tracks these changes.

OMNI Sensor Guide

MAXIMIZING OMNI LIFESPAN

The Omni sensor is a highly accurate measurement system with sensitive electronics. To protect your instrument and ensure the longest, most trouble-free service:

- Do not drill into the Omni enclosure.
- Do not spray directly with water.
- Remove and store in a safe place (or bag securely) when spraying pesticides/fertilizers/chemicals.
- Not recommended for environments with propagation mist systems (call Argus for alternatives).
- Not recommended for environments above **85% RH** for **extended periods** of time.

RECOMMENDED APPLICATIONS

Omni sensors are suitable for a wide a range of monitoring and climate control applications and they are fully integrated with the Argus Titan Control system.

They can be used in place of stand-alone sensors and other types of aspirated sensing units.

Although there are some situations where they can't match the required accuracy or sampling speeds of specialized instrumentation, they are more than capable of serving the general monitoring and control needs for typical:

- Greenhouses.
- Growth chambers.
- Propagation zones.
- Storage rooms.
- Work spaces.
- Tank rooms.
- Mechanical rooms.
- Coolers.
- Corridors.
- Warehouses.

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NOT Recommended

Unprotected Outdoor and Extremely Wet Locations

While Omni sensors are designed to withstand the occasional dousing from hoses etc. they are mainly intended for indoor use.

The exception to this rule is the Omni RHT, which can be installed outdoors.

Locations Containing Large Amounts of Free Water Droplets

Omni sensors perform very well in high humidity environments. However, like all aspirated sensors they must not be positioned where they are continually exposed to air containing large quantities of suspended moisture droplets from fogs or mists. There are two reasons for this:

- 1) Free water droplets can damage the fan electronics and other electronic components in the aspirated air path.
- 2) Free water droplets wet the filter and the walls of the aspirated chamber. This results in inaccurate temperature and humidity readings due to evaporation and evaporative cooling until this water has evaporated.

Locations Subject to Freezing Temperatures (Omni/C and /CO2 models)

Any location subject to freezing temperatures for both the Omni C and the CO₂ Models.

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INSTALLATION

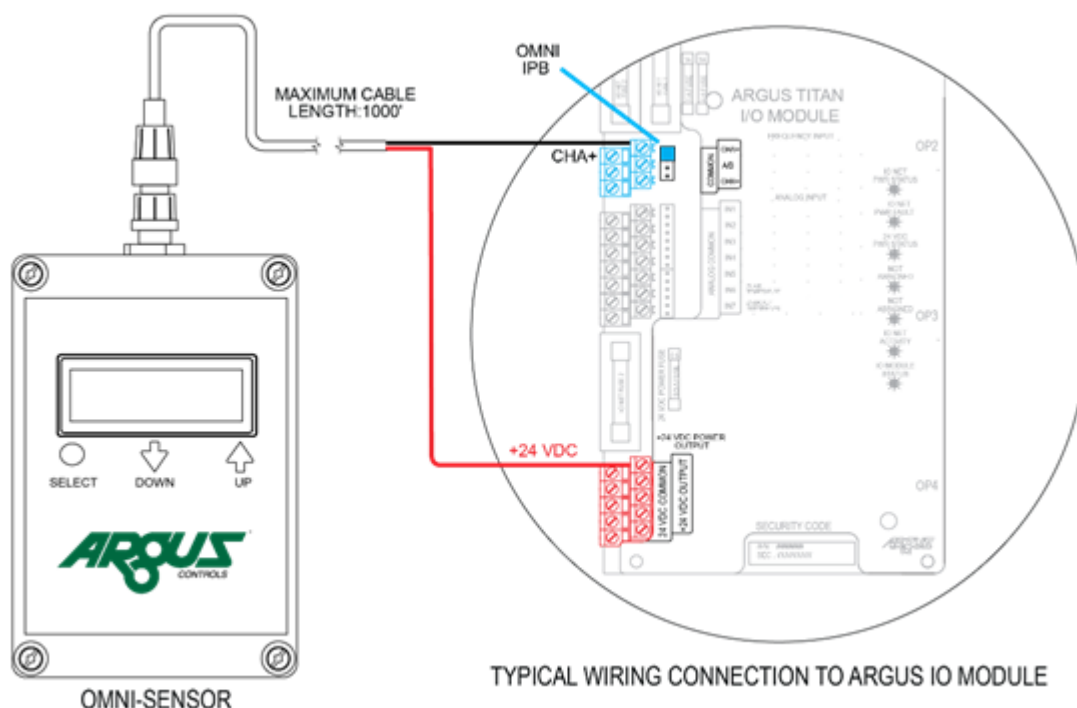
We recommend you first mount and connect your Omni sensor(s) to the Argus Titan system before setting up the software in the Argus Operator program.

By performing the wiring part first you can ensure the sensor is operating (since the fan should start running and the display readings are viewable on /C and /CO2 models as soon as it is powered up. This also gives the Omni sensor some time to warm-up and stabilize while you set up the software on the PC.

Hardware Installation

The Omni sensor must be connected to a **Titan I/O or I/O Plus Module**. Up to **two Omni sensors** can be connected to a single I/O Module (four on I/O Plus module), using the digital input channels built into each module.

These inputs are also used for other measurement purposes such as water flow-meters, so they may not always be available. Usually there is at least one I/O or I/O Plus Module in or near the target zone so all you have to do is locate it and run the supplied cabling to it from the Omni sensor mounting location.



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Typical wiring example. For installation, refer to the supplied wiring diagrams and instructions supplied with the sensor.

Installing the Omni RHT Outside

- 1) Invert the cable entrance from the top of the enclosure to the bottom (see “Connecting the Cable to the Omni Sensor” on page 21).
- 2) Select a sheltered mounting location (pole, post, or wall), or location that is least likely to expose the module to direct rain.
- 3) Mount the Omni RHT onto a pole, post, or wall using the supplied mounting tabs (see “Inverting the Cable Entry” on page 20).

OMNI SENSOR MOUNTING AND CABLE RUN

Locating the Omni Sensor

You first need to decide on a good representative location to mount the sensor.

The best mounting location depends to some extent on your objectives and often involves some compromises since a single location must 'speak' for the entire monitored area.

Also, the best place to monitor temperature and humidity may not be the best place to measure light.

The reverse is also true. CO₂ measurements are generally less affected by mounting location, so long as you avoid placing the sensor directly in the path of any supplemental CO₂ discharge points.

For aspirated temperature or humidity measurements of bench and floor grown crops, we normally recommend mounting the sensor at or just above the crop height.

This also gives good light sensor performance since the crop cannot shade the light sensor.

For taller crops such as tomatoes and cucumbers we usually recommend you place the sensor in the canopy. Unfortunately this causes some light sensor shading, reducing the accuracy of the light measurements.

Avoid locations where drafts, fog nozzles, sprinklers, nearby heat pipes, unit heaters, or the shadows cast from posts or overhead obstructions causes non-representative sampling errors.

In greenhouses, it is impossible to completely avoid structural shading, but the sensor can usually be located where this is minimized, while still providing representative readings for temperature, humidity and optional CO₂.

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Running the Cable



We recommend that the installer neatly coil and **leave all spare cable at the sensor end**, facilitating future sensor relocation within the immediate area.

This allows the grower to optimize sensor location as crops or conditions change.

The supplied communications cable is strong and well protected with a UL-approved Sun/UV-resistant jacket.

Even so, it is always a good practice to keep it protected from mechanical damage by running it along the underside of structural members or attaching it with black (UV resistant) tie wraps to existing conduit runs.

Better still, pull the cable into conduit if the mounting location is permanent. Try to make sure it won't get snagged or tripped over.

Make sure it enters the underside of the I/O Module enclosure using a suitable drip loop. If the distance involved requires more cable you can splice an additional length of the same type of cable* **to the I/O Module end of the run.**

Consult Argus if the cable run is more than 1000 feet.

* Cable can be ordered in custom lengths or you can extend it yourself using 2-conductor, twisted pair, 18-22 gauge, UL-approved cable. Use Sun/UV-resistant cable if it is exposed to light.

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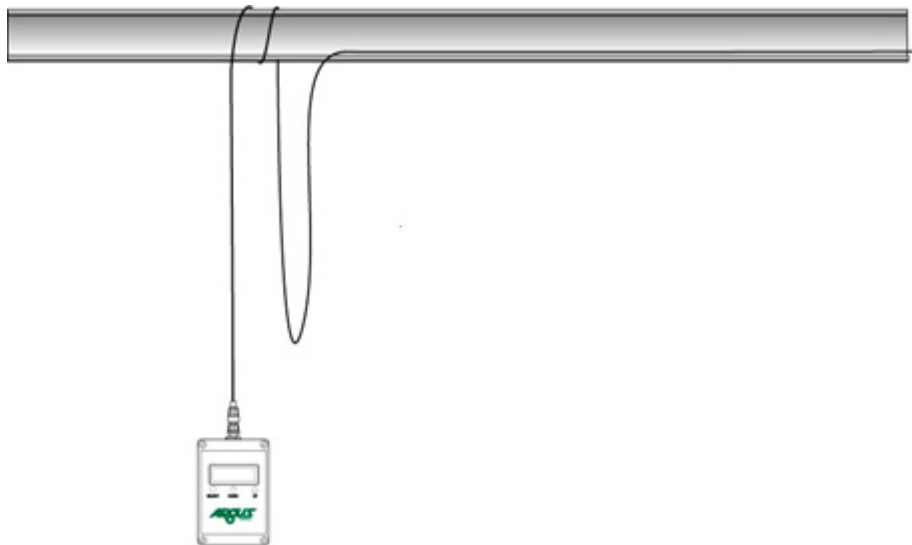
Hanging the Omni Sensor

The sensor is designed to be suspended from its own communications cable. Simply find something overhead to hang the wire from at your desired location.

We recommend looping it over a horizontal beam if one is available, so that it can be easily repositioned as required.

Leave some slack so that the sensor can be raised and lowered as appropriate.

If hanging the cable is not practical you can use the included mounting tabs to attach the sensor to a pole, post, or wall (see the next page).

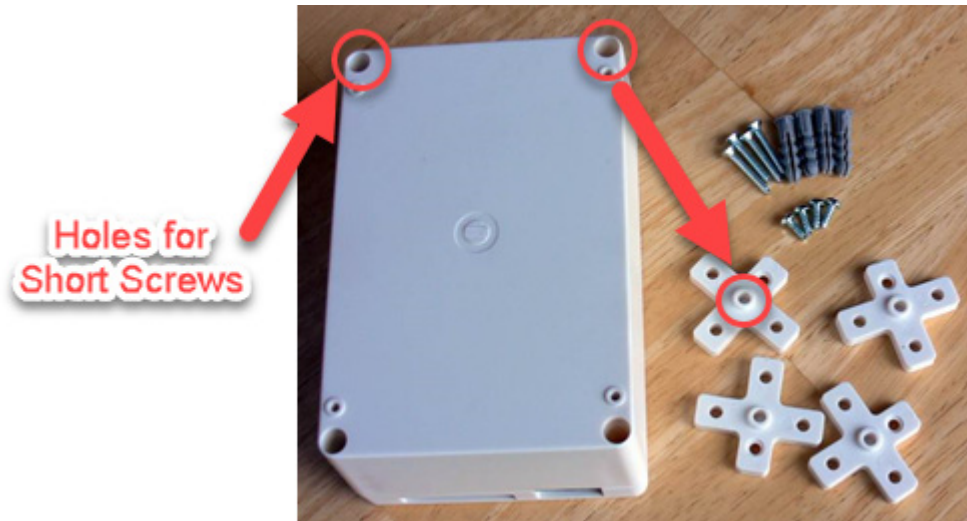


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Pole, Post, and Wall Mounting

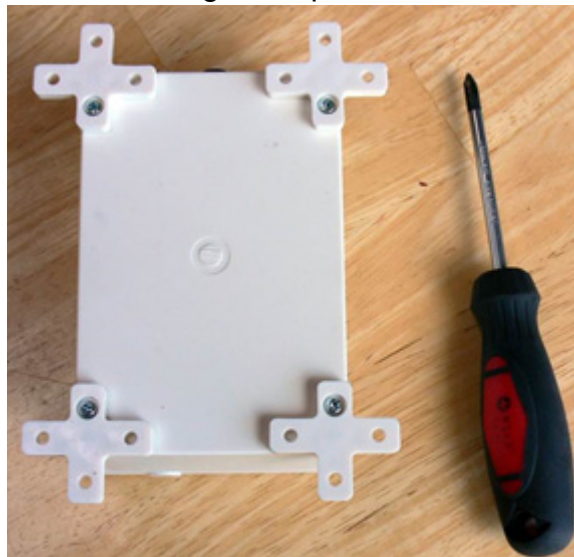
A set of four mounting tabs is included with each sensor module for mounting the module to a flat surface. This makes it possible to mount the sensor onto walls, poles, or posts that have a suitable flat surface or a mounting plate attached.

The raised dimple on each tab fits into the hole on the back of the module like a Lego piece, and the short leg of the tab is aligned over the pre-drilled screw hole:



Above: Mounting tab kit

Below: Tabs installed. **Make sure to use the short screws for fastening the tabs to the module!** The long ones are for mounting to the post or wall.



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Inverting the Cable Entry

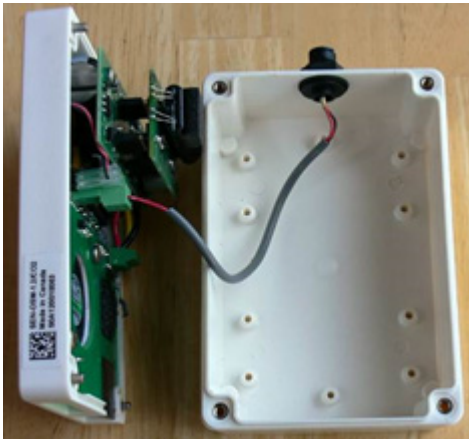
If you are mounting the Omni sensor outdoors (RHT models only) or onto a wall or post you can change the cable entrance from the top of the enclosure to the bottom by removing the 4 screws affixing the face plate and rotating the back 180 degrees.

This orients the cable connector downwards when you are holding the Omni sensor upright. This has the added advantage of eliminating any shadow effects on the light sensor from the cable.



Above: Face plate screws

Below: Face plate removed from the back and inverted so that the cable now exits the bottom of the module.



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Connecting the Cable to the Omni Sensor

The supplied cable has a push in, quarter-turn, water resistant connector. The connector uses an internal key slot to ensure proper seating and wiring polarity. Make sure the key and the slot are lined up and insert the connector cap into the receptacle on the Omni sensor housing.

Push the slip connector fully down and turn one quarter turn clockwise to lock.



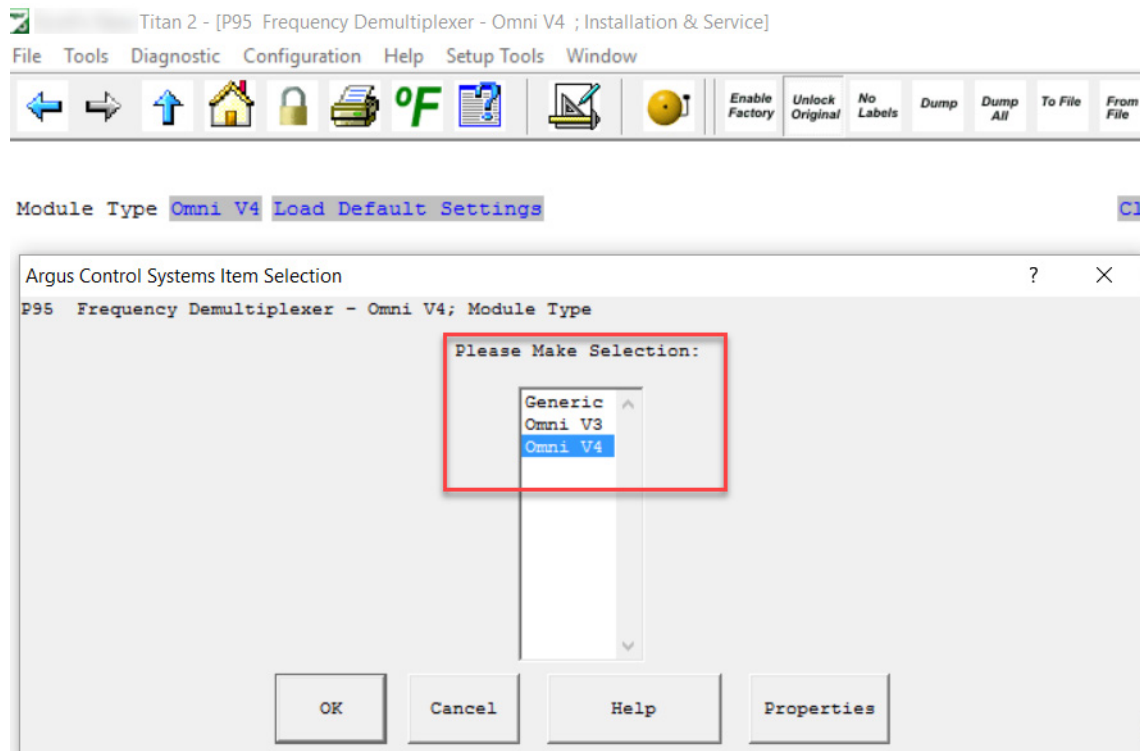
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REPLACING EXISTING OLDER OMNI SENSORS (V1-V3)

Version 4 Omni sensors require new firmware that includes features to enable re-configuring the Controller settings with minimal effort.

There is a new Module Type setting at the top of the **Frequency Demultiplexer's Installation and Service** screen.

To update the firmware, select **Omni V4** and **Load Default Settings** when you are installing the Omni sensor:



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I/O AND I/O PLUS MODULE CONNECTIONS

If the Omni sensor is part of a custom installation, consult the wiring diagrams for the project. If you are adding an Omni sensor on your own, select an unused counter/timer channel on an existing I/O module or a dedicated OMNI input on an I/O Plus module and follow the instructions below.

The instructions below provide some general points for connecting the wires and the supplied **Input Protection** board. However, you should always refer to your custom wiring diagrams for additional information and warnings. Check with Argus if you are not sure.

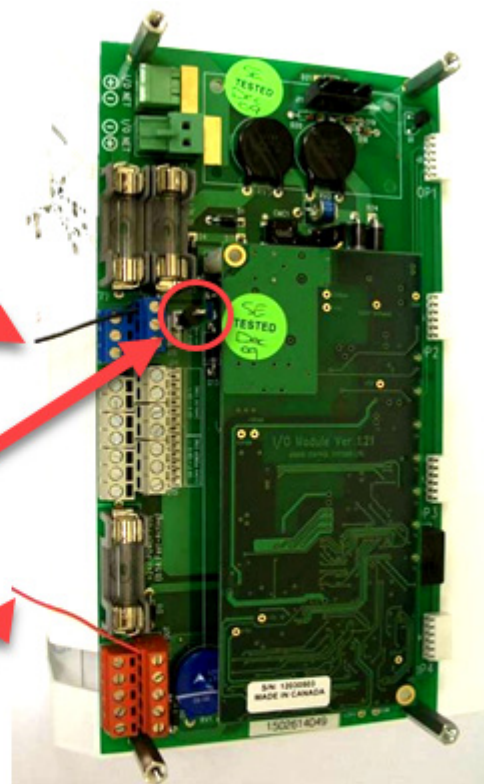
Once you have led the cable into the I/O module enclosure you need to do the following:

I/O Module

1. Connect the black wire to your selected counter-timer channel (CHA+ or CHB+) on the Blue Terminal Block (refer to the drawings for the Omni Sensor).

2. Plug in the input protection board (IPB/OMNI). It has a blue mark on the end (refer to your drawings for the Omni Sensor for the correct channel and see the notes on the next page).

3. Connect the Red wire from the Omni Sensor to the 24 VDC+ Output on the red Terminal Block.



Wiring Connections
for a Version 1.3 I/O
Module Backplane

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Once you have led the cable into the I/O module enclosure you need to do the following:

I/O Plus Module



The I/O Plus module has **4 dedicated Omni inputs** while the I/O module only has **2**.

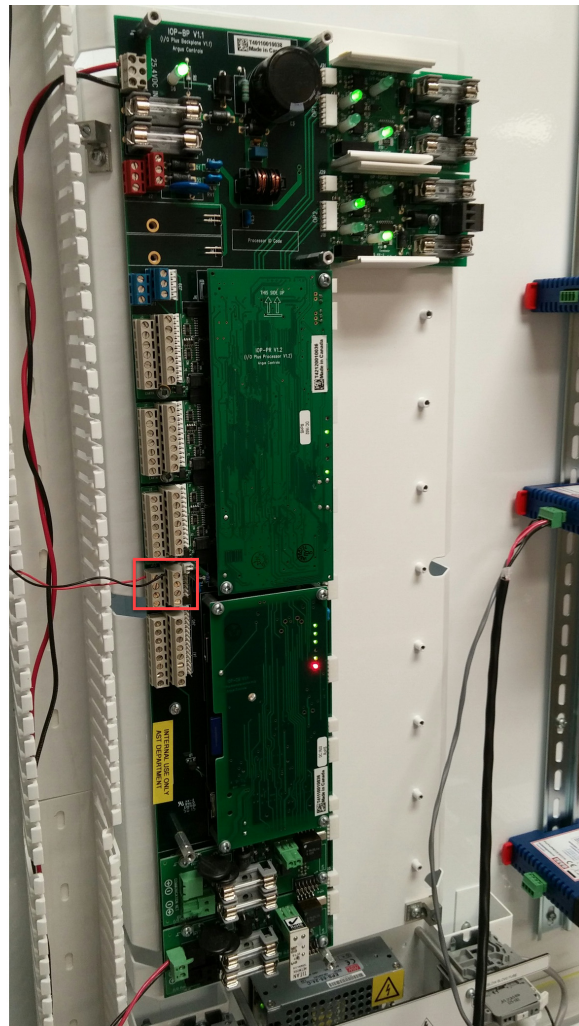
You can connect to the 4 Omni inputs, or if they are taken, you can connect to the frequency inputs and the 24VDC input.

1. Connect the black and red wires to the OMNI inputs on the I/O Plus module.

The Black wire connects to the top bar OM1-OM4 (counter-timer channel)

The Red wire connects to the bottom bar, the +24VDC.

The blue colored IPB connects to the input.



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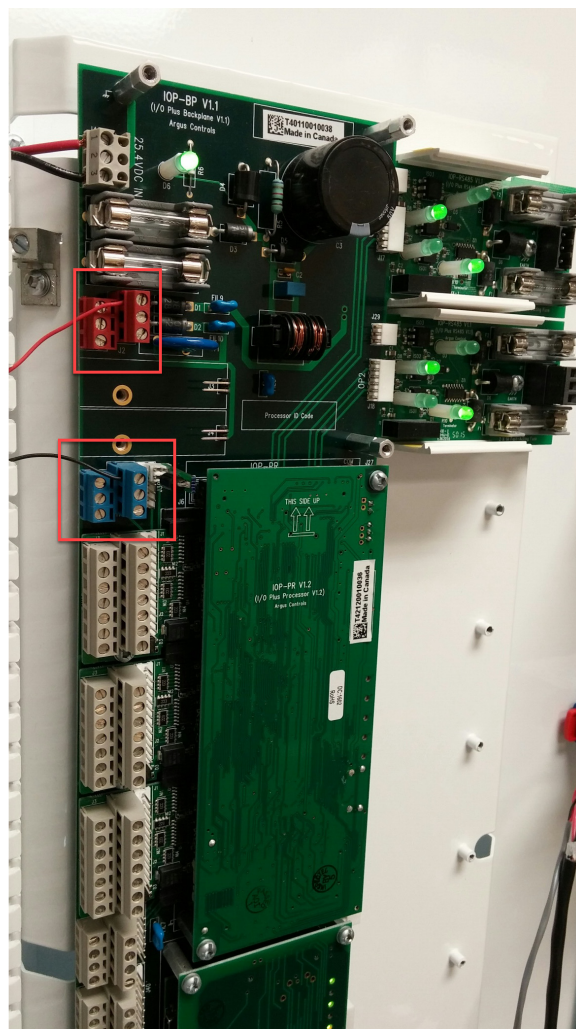
OR

1a. Connect the Red wire to the 24VDC input and the Black wire to the Frequency inputs.

Connect the Red wire to the red colored 24VDC input as displayed.

Connect the Black wire to the blue colored Frequency inputs as displayed (FRQ1, FRQ2, or FRQ3).

The IPB connects to the input.



Once the above steps are completed and the I/O or I/O Plus module is powered up, you should hear the fan running and see readings displayed on the unit. If not, check the wiring connections to the I/O or I/O Plus module and ensure the **IPB** (Input Protection Board) is plugged in to correct the jumper pins.



It may take several minutes for the (optional) CO₂ sensor to begin displaying readings and a further few minutes for the sensor to warm up and deliver readings within the accuracy specification.

Please see the next page for some important additional installation notes.

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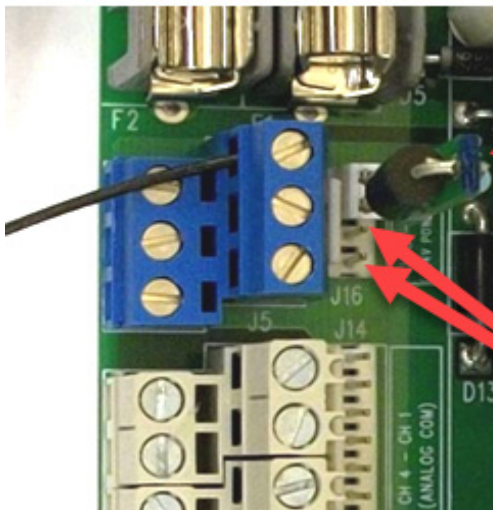
I/O Module Installation Notes

Installing the Input Protection Board (IPB)

The **IPB** provides current-to-voltage conversion and built-in transient voltage protection. The current is pulsed at varying frequencies indicating the sensor values. There are 4 jumper pins located behind the blue digital counter/timer inputs terminal block

The top pair are for CHA and the bottom pair are for CHB. Plug the IPB onto the appropriate pair of jumpers as per your supplied wiring diagrams or the digital input channel that you have selected for the Omni sensor.

The photo below shows an **Input Protection Board** installed on CHA and the black wire from the Omni sensor terminated to the CHA+ terminal block:



IPB (Input Protection Board) on CHA Jumper Pins. There should be a blue strip at the top edge of the board to distinguish it from other Input Protection Boards.

Empty CHB Jumper Pins

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SOFTWARE INSTALLATION

Let Argus know ahead of time when you are installing the Omni sensor. We can then schedule a time for setting up the sensor in the software once the installation is completed.

When your Omni sensor is connected to the I/O module and running, please call us for assistance.



If your Omni sensor was shipped as part of a new control system the software may already be fully configured. If you are adding on an Omni sensor to an existing system, the software needs to be set up accordingly. If the Omni sensor is replacing existing sensors, the new readings need to be appropriately mapped in the software to the control applications that use them.

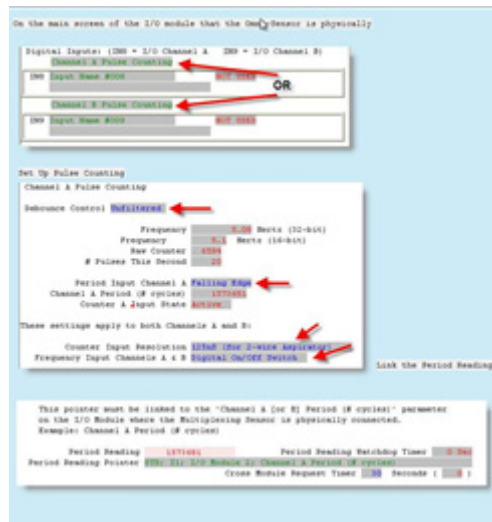
Once the software is set up it does not require any day to day operator changes. Briefly, here's how it works:

A special program on the Argus Titan system called the **Frequency Demultiplexer** program is used to obtain readings from the Omni sensor. This program is normally embedded into an **Omni sensor Group** that is added from the **Argus Operator** program.

Once it is set up, you'll find it associated with the zone you are monitoring and other I/O Module readings.

The group screens also contain basic instructions for setting up the input channel on the I/O Module and linking it to the **Frequency Demultiplexer** program (again, all the set-up is normally performed by Argus).

Basic instructions included in the software for Omni sensor setup:



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All readings from the Omni sensor are sent in a sequential stream of digital data along the 2-wire cable to the I/O module.

The **Frequency Demultiplexer** program (running on the Titan Controller that manages the I/O Module where the Omni sensor is connected) interprets and filters this data and produces separate reading values that are then mapped to the program used for monitoring and control.

OPERATING THE OMNI SENSOR

The following information applies only to **SEN-OSM/C** and **SEN-OSM/CO2** models. Models **SEN-OSM/RHT** and **SEN-OSM/T** do not have onboard displays or keypads so all readings are viewed from the Argus Operator program.

Display Readout

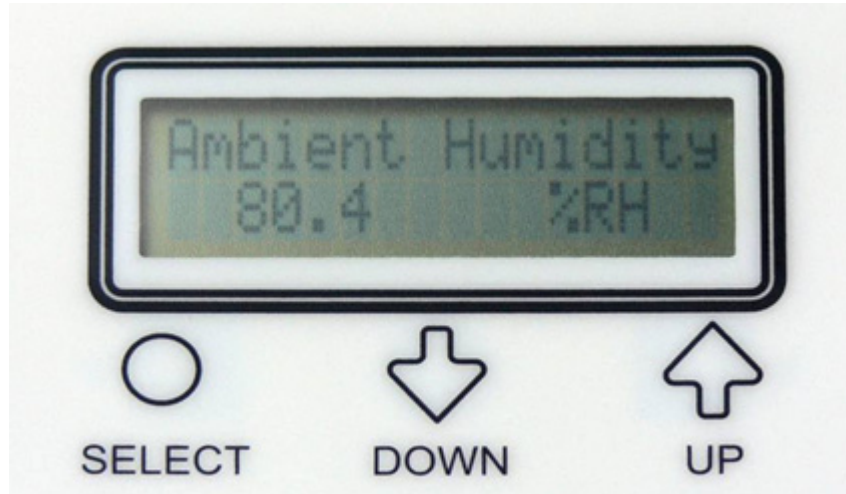
In its normal display mode, the Omni sensor sequentially displays the:

- Ambient Temperature.
- Ambient Humidity.
- Visible Light.
- PAR light.
- Light Energy.
- Dew Point Temperature.
- Absolute Humidity.
- Mixing Ratio.
- CO₂ (if equipped with an optional CO₂ sensor).

These readings scroll continuously until any one of the keys is selected.

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Using the Keys



There are three keys on the keypad:

- **Select** – Selects a displayed value, and confirms a setting change.
- **Down** – Scroll down through the list or numerically down when setting a calibration value or password.
- **Up** - Scroll up through the list or numerically up when setting a calibration value or password.

Pressing any of these keys halts scrolling of the readings, freezing the display on a single value until the up or down arrows are pressed to manually scroll through the list of parameters. In this manual display mode, there are several additional parameters that can be viewed.

Starting from the top of the list (press the up arrow until the display reads **Beginning of Menu List**).



There is no tactile or audible feedback on these keys. Pay close attention to the LCD display; the parameter displayed changes with every press of a key.

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The editable parameters are displayed in **blue** below:

- **Humidity #1** - Value for sensor #1 (used by Argus technicians).
- **Humidity #2** - Value for sensor #2 (used by Argus technicians).
- **Temperature #1** - Value for sensor #1 (used by Argus technicians).
- **Temperature #2** - Value for sensor #2 (used by Argus technicians).
- **20°C Calibration** - Select to perform a single point calibration of the two temperature sensors.
- **Ambient Temperature** – Air temperature measured at the bottom of the air inlet on the Omni sensor.
- **Ambient Humidity** – Calculated ambient humidity.
- **Carbon Dioxide** – Value is only displayed if a CO₂ sensor is installed. It is the current CO₂ reading after any CO₂ offset adjustments.
- **CO₂ Multiplier** - Value is only displayed if a CO₂ sensor is installed. You can use it for calibrating the CO₂ sensor against a reference source. As a general rule, do not change this setting unless you are very sure your calibration CO₂ values are accurate. This setting is normally used by Argus technicians for factory calibration.
- **CO₂ Offset** – Value is only displayed if a CO₂ sensor is installed. You can use it for calibrating the CO₂ sensor against a reference source. As a general rule, don't change this offset unless you are very sure your calibration CO₂ values are accurate. This setting is normally used by Argus technicians for factory calibration
- **Visible Raw** - Value from the visible light sensor. It is lower than the actual light levels due to the lens attenuation.
- **Lux Multiplier** - Value is used it for calibrating the light sensor against a reference source. It compensates for the lens attenuation. As a general rule, do not change this setting unless you are very sure your calibration light values are accurate. This setting is normally used by Argus Technicians for factory calibration. **Default is 6.95.**
- **Visible Light** - The visible light after applying the **Lux Multiplier**.

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- **PAR Multiplier** - Value is used it for converting the light sensor's lux reading to PAR. Normally it uses sunlight as a reference. As a general rule, do not change this setting unless you are very sure your calibration light values are accurate. This setting is normally used by Argus technicians for factory calibration. **Default is 0.0196.**
- **PAR Light** – The calculated **PAR Light** value.
- **W/m² Multiplier** - Value is used it for converting the light sensor's lux reading to Light Energy. Normally it uses sunlight as a reference. As a general rule, do not change this setting unless you are very sure your calibration light values are accurate. This setting is normally used by Argus technicians for factory calibration. **Default is 0.0100.**
- **Light Energy** - The calculated **Light** value.
- **Dew Point Temperature** - Calculated temperature below which moisture condenses out of the air, it is based on the current humidity and temperature.
- **Absolute Humidity** - Amount of moisture in grams per cubic meter of air.
- **Mixing Ratio** - In grams per kilogram.
- **Change Password** – Protects the Omni sensor from unauthorized settings changes. Select this to change the password (you must first enter the existing password and then your new password). If you forget the password, you can read it on the operator settings screen for this Omni sensor (where only authorized users may access this information)
- **Fan Turned Off** – Value displays only when the fan has been shut down to protect the Omni sensor from the risk of damage by fog or mist particles that are often present in high humidity conditions. The fan shuts off when the measured humidity is greater than **98.0%** The fan automatically turns on again when the humidity falls below **98%**
- **Voltage Reading** – Diagnostic value reads **Normal** above 3.3 Volts and **Bad** below 2.47 V. **Contact Argus Support** if this reads **BAD**. This is a measurement of an internal voltage, not the supply voltage.
- **Memory Debug** – Diagnostic value for service and troubleshooting
- **Sign Off (Exit)** – Cancels password access and returns the unit to normal scrolling mode.



If left alone the Omni sensor automatically cancels password access and return to the normal scrolling mode after 510 seconds.

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Entering a Password



Each Omni sensor has a password to prevent unauthorized changes to the calibration settings. You can access the readings on the unit without a password, but to make any changes such as performing a humidity sensor test, or entering a CO₂ offset value you need to enter the password.



The **default** Factory password is: ↑0↑0↑0↓9

Change this password to one of your own to protect against unauthorized access. See “Changing the Password” on page 36.

There are four registers to the password. Each register is adjusted by using the **UP** or **Down** arrows to select a value between ↑9 (**UP 9**) and ↓9 (**DOWN 9**). Use the **SELECT** key to move to the next register. The blinking cursor indicates which register you are currently on.

Once a password has been entered it remains in effect until eight minutes of keypad inactivity has been registered. This enables you to make multiple changes without needing to constantly reenter the password.

Unless a password has been entered within the past eight minutes, you are challenged to enter the password before you can make any changes on the unit. Once a password has been correctly entered, a blinking cursor indicates that you can now make changes to a selected parameter.

If the password is incorrect, the password entry screen is displayed again. After a change has been made to the password, of any other parameter you must confirm it with the **Select** key or cancel it with an **Arrow** key.

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There are seven parameters that can be adjusted:

- 1) **20°C Calibration** - Select to perform a single point calibration of the two temperature sensors.

Always consult **Argus Support** before using this setting, as it is an Argus factory item.



This calibration must be performed in steady state conditions.

To use, enter the current ambient temperature from your precision meter reading and press **Select**, then confirm the setting to initiate calibration.

Calibration will not occur if:

- The Humidity is > 75% (the heaters may have been on)
 - The entered reference Temperature is not in the range of 18 to 26C
 - The difference between the reference temperature and the raw temperature is more than +/- 1.00C (manufacturer's specification states it should not be more than +/- 0.40C)
- 2) **CO₂ Multiplier** - Value is only displayed if a CO₂ sensor is installed. You can use it for calibrating the CO₂ sensor against a reference source. As a general rule, do not change this setting unless you are very sure your calibration CO₂ values are accurate. This setting is normally used by Argus technicians for factory calibration.
 - 3) **CO₂ Offset** – Value is only displayed if a CO₂ sensor is installed. You can use it for calibrating the CO₂ sensor against a reference source.

As a general rule, do not change this offset unless you are very sure your calibration CO₂ values are accurate. This is normally used by Argus technicians for factory calibration.

Omni sensors factory-supplied with CO₂ may already have a value entered.

- 4) **Lux Multiplier** - Value is used it for calibrating the light sensor against a reference source. It compensates for the lens attenuation. As a general rule, do not change this setting unless you are very sure your calibration light values are accurate. This setting is normally used by Argus Technicians for factory calibration. **Default is 6.95.**

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- 5) **PAR Multiplier** - Value is used it for converting the light sensor's lux reading to PAR. Normally it uses sunlight as a reference. As a general rule, do not change this setting unless you are very sure your calibration light values are accurate. This setting is normally used by Argus technicians for factory calibration. **Default is 0.0196.**
- 6) **W/m² Multiplier** - Value is used it for converting the light sensor's lux reading to Light Energy. Normally it uses sunlight as a reference. As a general rule, do not change this setting unless you are very sure your calibration light values are accurate. This setting is normally used by Argus technicians for factory calibration. **Default is 0.0100.**
- 7) **Change Password** – Select to change the password (you must first enter the existing password and then your new password). If you forget the password, you can read it on the operator settings screen for this Omni sensor (where only authorized users may access this information)

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Changing the Password

You must be signed in with the existing password before you can change it to a new password.

The password can only be changed from the Omni sensor keypad although it can be viewed from the Argus Operator program once the Omni sensor has been configured in the software.

On the Omni sensor (assuming you are currently signed out):

- 1) Use the **UP/DOWN** keys to stop auto-scrolling and locate the **Change Password** parameter.
- 2) First you must enter the current password:
 - Press the **SELECT** key once. The cursor blinks on the arrow symbol for the first of the four registers.
 - Use the **UP or DOWN** keys to set the first register to the desired numeric value *and* arrow direction.
 - Press the **SELECT** key once to complete the first register setting and move to the next register. The cursor should now be blinking on the arrow symbol for the second register
 - Continue setting the rest of the registers in the same fashion until they match the existing password.
- 3) If the password is entered correctly, the screen displays **Change Password** with a blinking cursor on the first **UP/Down** arrow. **You are now changing the password.**
Use the same steps as the password entry above to set your new password.
- 4) Once entered, you must **Confirm** the new password by pressing the **SELECT** key or **Cancel** the operation by pressing an **Up** or **Down** Key.

If you ever forget the current password you can read it from **Argus Operator Program** (once the Omni sensor is configured in the program). The password is located on the Factory screen of the Omni sensor application: **Installation and Setup / Frequency Demultiplexer (Beta) / Password:**

Password 1 Up 0 Password 2 Up 0 Password 3 Up 0 Password 4 Down 9

If you have more than one Omni sensor connected, ensure you select the correct one. Each can have its own unique password for added security.

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Setting the CO₂ Offset

- 1) Use the **UP/DOWN** keys to scroll to the CO₂ Offset parameter.
- 2) Press the **SELECT** key.
- 3) Enter your password for this Omni sensor when prompted.
- 4) Once you are 'signed on', the CO₂ Offset parameter displays a blinking cursor to the left of the display. If your password entry was **incorrect**, the CO₂ Offset parameter is displayed without a blinking cursor and you need to repeat step 2 or check back on your PC to view the correct password for this Omni sensor
- 5) Use the **UP** or **DOWN** arrows to enter a negative or positive offset value. Each time you press an arrow key it increments the offset by 10 ppm. (finer offset resolution is of no use, given the size of the stated measurement errors)
- 6) Press the **SELECT** key when you are done.
- 7) Press the **SELECT** once again to **Confirm** the setting change, or press an **UP/DOWN** key to **Cancel**.

As long as you remain signed on you can make additional adjustments to this or other editable parameters by simply selecting the parameter.

Selecting the **SIGN OFF** parameter exits password mode. You need to enter the password once again if you wish to make any further setting adjustments.

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CALIBRATION

The only sensor that can be field calibrated is the CO₂ sensor. Although this should seldom be necessary, it is possible to perform an offset calibration against a reference source if one is available.

For example, if you know for certain that the air being sampled is exactly 410 ppm and the unit is reading 440 ppm then you could enter an offset of -30 ppm. In practice this is very difficult to accomplish with any degree of accuracy in the field.

Even if you have a superior CO₂ sensor to use as a reference, you must ensure that they are both sampling a uniform air mass with an absolutely stable CO₂ concentration for at least a few minutes.

The only way to accomplish this with any certainty is in a sealed chamber.

The manufacturer's specifications for the CO₂ sensor are +/- 50ppm plus 2% of the reading value. This makes even an uncalibrated sensor good enough for most horticultural applications.

Evaluating the Need for Calibration

The Omni sensor contains several high accuracy sensing systems. These sensors are difficult to field calibrate for the following reasons:

- 1) The Omni sensor is located in a constantly changing environment. Accurate calibration requires extreme stability during the calibration test, and this is just not possible in most field installations.
- 2) Omni sensors are, for the most part, calibrated to a very high standard of accuracy using reference sensors that cost hundreds or thousands of dollars. Few Argus users have access to reference sensors of comparable accuracy
- 3) Omni sensors have good long term stability, so they are less likely to drift out of calibration (with the possible exception of the optional CO₂ sensor).

For these reasons, **you should not attempt to field calibrate these sensors.**

Although the sensors can fail or become contaminated, resulting in incorrect readings, typically these errors cannot be 'calibrated out' and sensor replacement is required.

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Correct Omni sensor operation can be confirmed by:

- 1) First, review the historical and current readings for each sensor. Compare these values to your expectations based on other sensors in similar situations or on your understanding of the environment you are measuring.
 - a) Do the recent sensor measurement values agree with historical measurements taken by the same sensor in the same location and operating conditions?
 - b) How do sensor measurements compare to other sensors located in similar situations and conditions?

If you are not satisfied with the results of these comparisons, you can use the following procedure to quickly test all sensors:

- 2) Conduct this test under steady state conditions when the measured values are in the area of most interest to you (conduct this test at different times for different sensor systems in the Omni sensor).
 - a) **Temperature:** Close to the normal operating temperature.
 - b) **Humidity:** Close to your normal dehumidification setting (for example, 85%).
 - c) **PAR light:** Near solar noon on a bright day, or under your standard, warmed-up HID lights.



Light output degrades as lamps age, so take that into account when comparing to historical data.

- d) **CO₂:** Check calibration when exposed to outdoor ambient CO₂ levels or at night when readings are most stable.
- 3) Quickly remove the power/communications cable from your Omni sensor and re-connect it to a spare, factory calibrated, 'known-to-be-good' Omni sensor and mount this sensor in the same location as the suspect Omni sensor.

This quick sensor transfer should cause little or no disruption to your control system behavior. (You might lose CO₂ sensor readings for a couple of minutes as the new unit warms up).

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- 4) Allow readings to stabilize for a minute or two (longer for the CO₂ sensor to warm-up and stabilize), and then compare the readings from the new Omni sensor to the original sensor readings.

See if the differences are explainable. If not, or if the differences are large, swap the original Omni sensor back in and see if it returns to pre-test values.

If it does, (thus confirming a significant difference between the original sensor and the reference sensor) consider returning the original Omni sensor for factory calibration or sensor replacement, as needed.

If, however, the differences are small, it is likely that the sensors are reading correctly and you may continue using the original Omni sensor.

Keep your 'reference' sensor in a clean dry place for future use and as an emergency backup to your operational Omni sensors.



Small differences are explained by claimed calibration accuracies (errors) plus your inability to accurately control ambient conditions during this type of field testing.

Temperature readings within a few 10ths of a degree, RH readings within a few percent, light readings within 10% of reading, and CO₂ readings within ~100 PPM are all within the normal range for this type of quick check and are not an indication that the sensor needs replacement.

Replacing Filters

A **replaceable filter** is included with v4 Omni sensors. This sensor should be inspected regularly. The inspection interval depends on the amount of dust and other particles in the sampled environment. When you first install the sensor you should check it every few weeks to determine an appropriate inspection and replacement interval.



You should temporarily disconnect the power to the Omni sensor when changing the filter to avoid aspirating any dust accumulated in the filter material back into the unit as it is removed.

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- 1) The filter replacement port is located on the side of the unit. It is covered with an adhesive label:



- 2) Remove the label to access the filter:



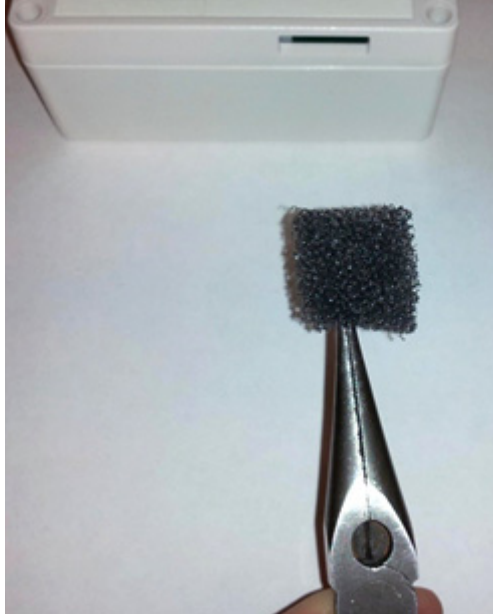
- 3) Use a pair of needle nose pliers or tweezers to remove the filter:



- 4) Wipe or blow away any accumulated dust visible in the filter port.

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- 5) Clean the existing filter or insert a new one:



- 6) Replace the adhesive cover:



- 7) Reconnect the sensor cable.

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TROUBLESHOOTING

Here are some general troubleshooting suggestions. Contact **Argus Support** if you are unable to resolve a problem with your Omni sensor.

All Models

Issue:	Readings are showing 'FAILED' in the Argus Operator program.
Cause:	There may be a loose or broken wiring connection or a configuration problem with the unit. Check to see if the fan is running on the Omni sensor. There may also be a more general problem with the Titan System or the I/O Communications Networks, in which case there should be communications alarms active on your system. In this case the readings probably display as: ***** The Omni sensor may not be set up correctly in the Argus Operator program software. In particular, it may not be linked to the correct I/O module digital channel, or the settings for that channel may be incorrect. Contact Argus Support for assistance.
Issue:	Reading performance seems to be sluggish.
Cause:	Can you hear the fan operating fan operating? If the fan has stopped, the temperature, humidity and CO₂ sensor response performance is slower. Contact Argus Support for assistance. Note that the fan stops automatically or go into intermittent operation if very high humidity is detected, This is to minimize the chance of aspirating free water into the unit. Is the filter plugged? When was the last time you cleaned it? If you can hear the fan running but cannot feel much air blowing from the unit the filter may be plugged. Clean or replace as necessary.

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SEN-OSM/C & SEM-OSM/CO₂ Models

Issue:	I can see good readings on the Omni sensor display but they are showing 'FAILED' in the Argus Operator program.
Cause:	There may be a more general problem with the Titan Control System or the I/O Communications Networks, in which case there should be communications alarms active on your system. In this case the readings probably display as: ***** The Omni sensor may not be set up correctly in the Argus Operator Program software. In particular, it may not be linked to the correct I/O module digital channel, or the settings for that channel may be incorrect. Contact Argus Support for assistance.
Issue:	So I breathed into the unit and the CO₂ reading didn't change.
Solution:	Stop breathing into the unit! It's not a good way to test the CO₂ sensor. The CO₂ sensor samples only once every 15 seconds and the sensing element is very heavily filtered from direct air flow to reduce contamination. Therefore the unit can take several minutes to adjust to a change in CO₂ levels. This is normally a good thing because it lets you examine the current readings without affecting them much as you breathe 50,000 ppm of CO₂ all around the Omni sensor. It may be a problem if you expect to use the CO₂ readings in a tight feedback control loop (all Argus CO₂ dosing control applications take this into account). Regardless of the responsiveness of the sensor, we administer CO₂ on a pulse-width-modulated basis that is adjusted for the process lags in the both the dispersal of the CO₂ itself and the sensor responsiveness).
Issue:	No readings at all on the Omni sensor display.
Cause:	There is likely a problem with the wiring. Check all connections and check that the Input Protection Board is installed on the correct jumper as in the photo under "I/O and I/O Plus Module Connections" on page 23. Check if the fan is operating on the unit. Check for the correct wiring polarity.

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Issue:	The Omni sensor is displaying readings but the fan has stopped.
Cause	The humidity might be too high. The Omni sensor automatically shuts down the fan if the relative humidity exceeds 98% RH to protect the internal components from water or mist damage. The fan shuts off if the temperature is below -10°C and remains off until above -7.5°C or if above 98% RH. The readings are still quite accurate without the fan running. Try scrolling through the list of readings with the UP/Down keys. If you see a message that says 'Fan Turned Off' then Omni sensor has intentionally shut down the fan and there is no problem at all (you may however, have a high humidity problem unless this is a propagation zone!). If the fan stops and the locally displayed humidity is well below 98% RH, then the fan has likely failed. Contact Argus Support for additional help.
Issue:	Readings aren't the same on the Omni sensor and the PC
Cause:	If the readings are wildly different and you have more than one Omni sensor then perhaps you are not looking at the correct unit or there has been a mix-up during the software configuration (you might be seeing readings from a different zone). One way to sort this out is to unplug the sensor and see if the readings fail after a few seconds. If they don't then you are likely looking at the wrong Omni sensor's readings. Contact Argus Support for assistance to sort out your wiring or configuration problems. If the readings are only a bit different this is because the readings are more heavily integrated on the PC and may have had some additional filtering applied (such as a light offset to 'zero-out' very low light levels). Because all sensor measurements are multiplexed on the same digital wire, the readings arrive sequentially, one at a time. Each sample is then averaged with a few of the previous samples to calculate a current value. This effectively tunes out any noise or lost samples, producing much more stable results for monitoring and control purposes.
Issue:	Whoops! I accidentally changed the Lux Multiplier, PAR Multiplier, or W/m² Multiplier.
Solution:	If you cannot find the original calibration values with your paperwork for the Omni sensor, please contact Argus Support for them.
Issue:	I can't see any readings for CO₂
Solution:	The CO ₂ reading and CO ₂ offset calibration value is only displayed if your Omni sensor is equipped with an on-board CO ₂ sensor. If you think it is supposed to be there then there could be a problem with the CO ₂ sensor, the connection to the main Omni sensor processor, or the Omni sensor processor itself. Please contact Argus Support for assistance.

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OMNI SENSOR SPECIFICATIONS

SEN-OSM/T (v4.0)

Dimensions	4.9" x 3.3" x 2.1" (HxWxD)
Power Requirements	Power is provided by the connected I/O Module via the 2-wire connection.
Cabling	Factory cable is provided separately. Standard lengths are 15', 30', and 60'. Custom lengths are also available. Cables can also be extended using 2-conductor non-shielded 18-24 AWG UV-resistant cable. A blue Omni sensor Input Protection Board is provided with each sensor and must be installed on the I/O Module input as shown. Wiring details are provided with each unit.
Temperature Sensor	One solid-state digital sensor. Typical Accuracy: +/-0.3°C over -10°C to +85°C; +/-0.7°C when below -10°C
Max Operating Range	-40 °C to +50 °C. Note: Aspiration Fan turns off below -10°C or >98%RH.

SEN-OSM/RHT (v4.0)

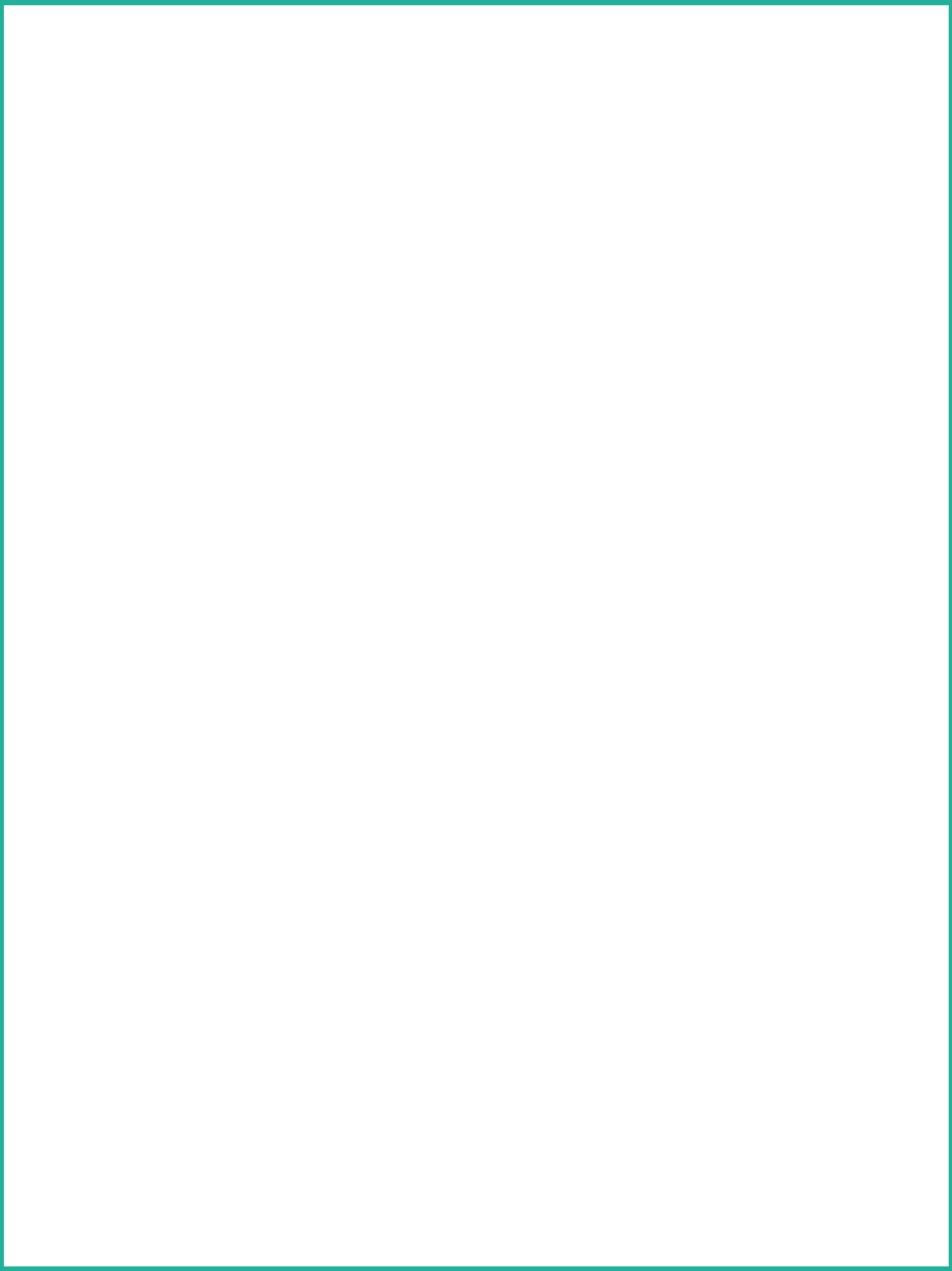
Dimensions	4.9" x 3.3" x 2.1" (HxWxD)
Power Requirements	Power is provided by the connected I/O Module via the 2-wire connection.
Cabling	Factory cable is provided separately. Standard lengths are 15', 30', and 60'. Custom lengths are also available. Cables can also be extended using 2-conductor non-shielded 18-24 AWG UV-resistant cable. A blue Omni sensor Input Protection Board is provided with each sensor and must be installed on the I/O Module input as shown. Wiring details are provided with each unit.
Temperature Sensors	2 solid-state digital sensors. Typical Accuracy: +/-0.3°C Range -10°C to +85°C.
Humidity Sensor	Range: 0-100% non-condensing Typical Accuracy at 30°C: 0 - 80%RH: +/-2%; 80 - 100%RH: +/-3%
Max Operating Range	-40°C to +50°C Note: Aspiration Fan turns off below -10°C or >98%RH.

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SEN-OSM/C, SEN-OSM/CAL & SEN-OSM/CO2

Dimensions	4.9" x 3.3" x 2.1" (HxWxD)
Power Requirements	Power is provided by the connected I/O Module via the 2-wire connection.
Cabling	Factory cable is provided separately. Standard lengths are 15', 30', and 60'. Custom lengths are also available. Cables can also be extended using 2-conductor non-shielded 18-24 AWG UV-resistant cable. A blue Omni sensor Input Protection Board is provided with each sensor and must be installed on the I/O Module input as shown. Wiring details are provided with each unit.
Display	2 line, 16 characters reflective. 0 – 50 °C operating range
Temperature Sensors	2 solid-state digital sensors. Typical Accuracy: +/-0.3°C Range: -10°C to +85°C. 'CAL' Version: +/-0.1°C at 20°C.
Humidity Sensor	Range: 10 -100% non-condensing Typical Accuracy: 0 - 80%RH: +/- 2%; 80 - 100%RH +/-3% at 30°C
Light Sensor	PAR (Photosynthetically Active Radiation). Readings are in µmols. The sensor is calibrated to outdoor sunlight as a quantum light sensor. This sensor is intended for general use only.
CO₂ (SEN-OMNI/CO2 only)	0-2000 ppm dual element NDIR (Non Dispersive Infra-Red) sensor with an accuracy of +/- 100 ppm + 2% of measuring value. Sensor is self-calibrating to compensate for aging of the sensor elements.
Max Operating Range	0 °C to +50 °C Note: Aspiration Fan turns off below -10°C or >98%RH.

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