## Description

The OE330-21-WSHP Water Source Heat Pump Controller (WHP) is used for controlling individual water source heat pump units. The WHP Controller can operate stand-alone or can be connected with other WHP controllers on a communications loop. In this configuration the WHP Controller shares common data, such as outside air temperature, proof of flow etc., over a communications network. A System Manager or a personal computer with Prism software installed can be connected to the WHP Controller communications loop to provide a central operators interface to all WHP Controllers on the communications network.

WHP Controllers are designed with inputs for; Room Temperature, Room Setpoint Adjust, Discharge Air Temperature, Leaving Water Temperature or Dirty Filter Alarm, Lockout and Auxiliary Alarm.

Relay outputs provided on the WHP Controller are; Fan (Continuous or Cycling), Reversing Valve-ON/OFF, Compressor-ON/OFF, Heat Pump Reset and Auxiliary Heating or Cooling. The WHP controller also has an internal 7 day, 2 event per day, 14 Holiday event scheduling function built in.
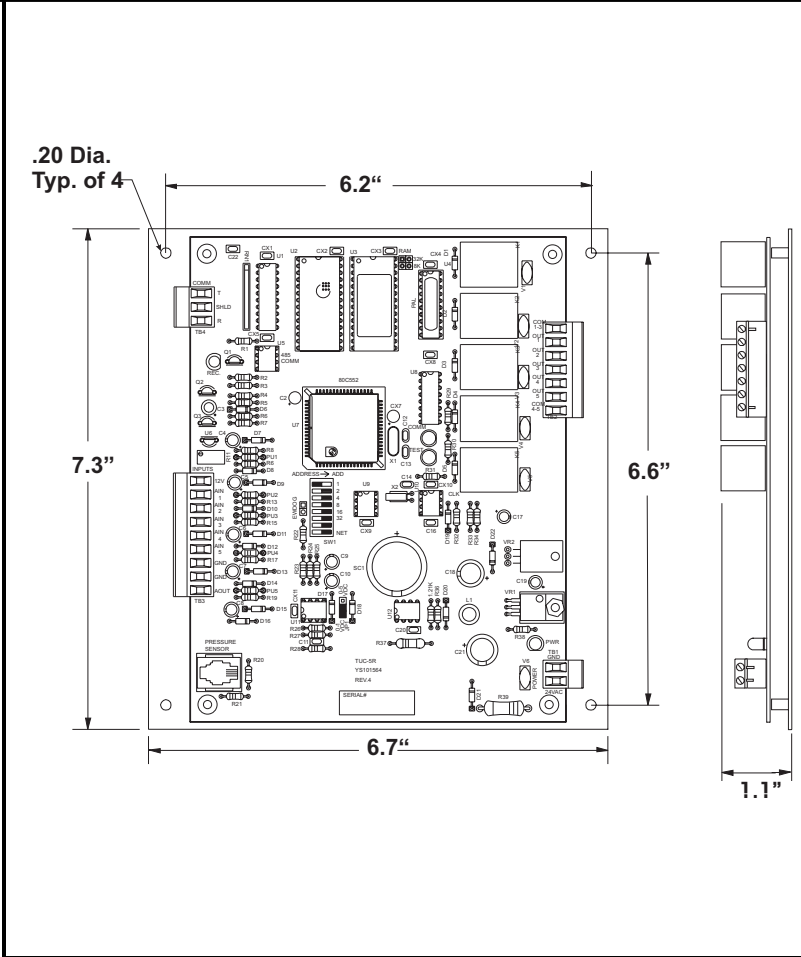
Mounting

The WHP Controller is mounted by fastening to the mounting surface with screws secured through the 4 mounting holes in the integral backplate. It is recommended that the WHP Controller is mounted indoors in an area that is not subject to extreme temperature or moisture.

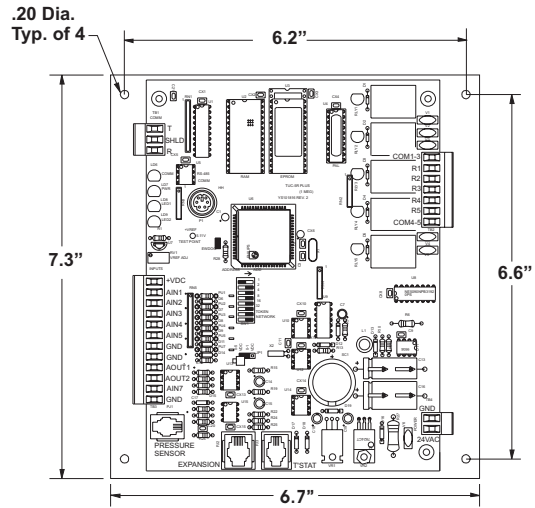| Technical Data		OE330-21-WSHP WHP Controller	
Power	24 Volt AC	Weight	1.5 lb.
Power Consumption	8 VA Maximum	Network Connection	RS-485
Operating Temp	10°F to 149°F	Protocol	HSI Open Protocol Token Passing
Operating Humidity	90% RH Non-Condensing	Communications	RS-485 - 9600 Baud
Inputs:		**Outputs:**	
Room Temperature Sensor	Type III-10 Kohm Sensor	Fan-On/OFF	24 Relay Contact Rated 2 Amps @ 24 Volt
Discharge Air Temperature Sensor	Type III-10 Kohm Sensor	Reversing Valve On/Off	24 Relay Contact Rated 2 Amps @ 24 Volt
Leaving Water Temperature Sensor	Type III-10K Ohm Sensor	Compressor On/Off	24 Relay Contact Rated 2 Amps @ 24 Volt
Dirty Filter Alarm	Binary Contact Closure	Heat Pump Reset	24 Relay Contact Rated 2 Amps @ 24 Volt
Lockout	Binary Contact Closure	Auxiliary Heating or Cooling	24 Relay Contact Rated 2 Amps @ 24 Volt
Three Year Warranty		**WattMaster reserves the right to change specifications without notice**	

Description

The OE331-21-HPLC WHP Loop Controller is used for controlling the water source heat pump supply and return water loop and its associated pump(s), heat rejection and heat addition equipment. The WHP Loop Controller can operate stand-alone or can be connected to the WattMaster WHP controllers on a local communications loop. In this configuration the WHP Loop Controller shares common data, such as outside air temperature, proof of flow etc., over a communications network. A System Manager or a personal computer with Prism software installed can be connected to the WHP Loop Controller communications loop to provide a central operators interface to all WHP Controllers on the communications network.

WHP Loop Controllers are designed with inputs for; Supply Water Temperature, Return Water Temperature, Outside Air Temperature Sensor, Manual Reset contact, Phase Loss contact, Proof Of Flow Switch or Loop Pressure Transducer Analog signal. With the addition of the 4 Analog Input 1 Analog Output Expansion board, inputs for a Request to Run contact and a Fire Alarm contact are available.

The WHP Loop controller provides relay outputs for; Compressor Enable, Main Pump, Standby Pump, Alarm Indicator. With the addition of up to (2) 4 Relay Expansion boards(s), up to 8 total stages of heating and cooling combined are available. A pump VFD and/or a proportional heating device can also be controlled with the built in Analog Outputs provided on the WHP Loop Controller board. An internal seven day schedule function is also built into the WHP Loop Controller.

Mounting

The WHP Loop Controller is fastened to the mounting surface by securing with 4 screws through the mounting holes in the integral backplate. Be sure the WHP Loop Controller is mounted indoors in an area that is not subject to extreme temperature or moisture.

WHP Loop Controller Main Board
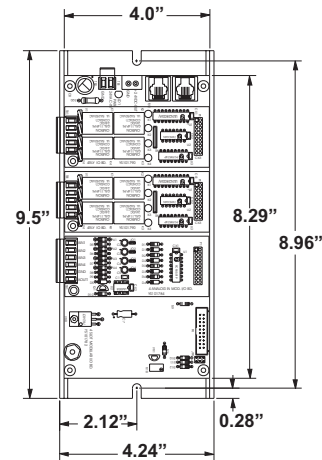

WHP Loop Controller Expansion Board

Technical Data			OE331-21-HPLC WHP Loop Controller
Power	24 Volt AC	Weight	1.5 lb.
Power Consumption	8 VA Maximum	Network Connection	RS-485
Operating Temp	10°F to 149°F	Protocol	HSI Open Protocol Token Passing
Operating Humidity	90% RH Non-Condensing	Communications	RS-485 - 9600 Baud
Inputs:		**Outputs:**	
Outside Air Temperature Sensor	Type III-10 Kohm Sensor	Compressor Enable	24 Relay Contact Rated 2 Amps @ 24 Volt
Supply Water Temperature Sensor	Type III-10 Kohm Sensor	Main Pump	24 Relay Contact Rated 2 Amps @ 24 Volt
Return Water Temperature Sensor	Type III-10K Ohm Sensor	Standby Pump	24 Relay Contact Rated 2 Amps @ 24 Volt
Manual Reset Pushbutton	Momentary Contact Closure	Alarm Indicator	24 Relay Contact Rated 2 Amps @ 24 Volt
Phase Loss	Binary Contact Closure	Pump VFD	0-10 VDC Analog Output
Proof of Flow Switch or	Binary Contact Closure	Proportional Heat	0-10 VDC Analog Output
Loop Pressure Analog Input	4-20mA Analog Input	Up to 8 Stages Heating and or Cooling with Relay Expansion Boards	24 Relay Contact Rated 2 Amps @ 24 Volt
Three Year Warranty		**WattMaster reserves the right to change specifications without notice**	

Description

The OE392-01-WSHP System Manager Operator Interface provides a direct link to enable the system operator to view the status and to adjust the setpoints of controllers on the control system communications loop. The System Manager is designed to be used with the Watt-Master WHP Control System. The System Manager is housed in an attractive beige colored plastic enclosure. The System Manager is equipped with a four line by 20 character backlighted display panel and a 20 key membrane keypad for data selection and entry. All keypad operations are simple and straight forward, utilizing non-cryptic plain English language messages. Menu driven programming allows for easy setup and operation without the need for specialized training. The System Manager also has 2 integral LED's for user notification of system alarm conditions and communications status. Protection from unauthorized users is provided by the System Manager's integral multi-level passcode authorization programming.

Mounting

The System Manager is designed for wall mounting. Mounting holes are provided to attach the System Manager to a standard handy box. It is recommended that the System Manager be mounted at approximately eye level to allow for ease of programming and reading of the display. The System Manager is typically mounted in the building manager or superintendent's office or in an equipment room. The attractive enclosure is quite suitable for mounting in any location.


Membrane Keypad

Four Line by 20 Character Backlighted Display
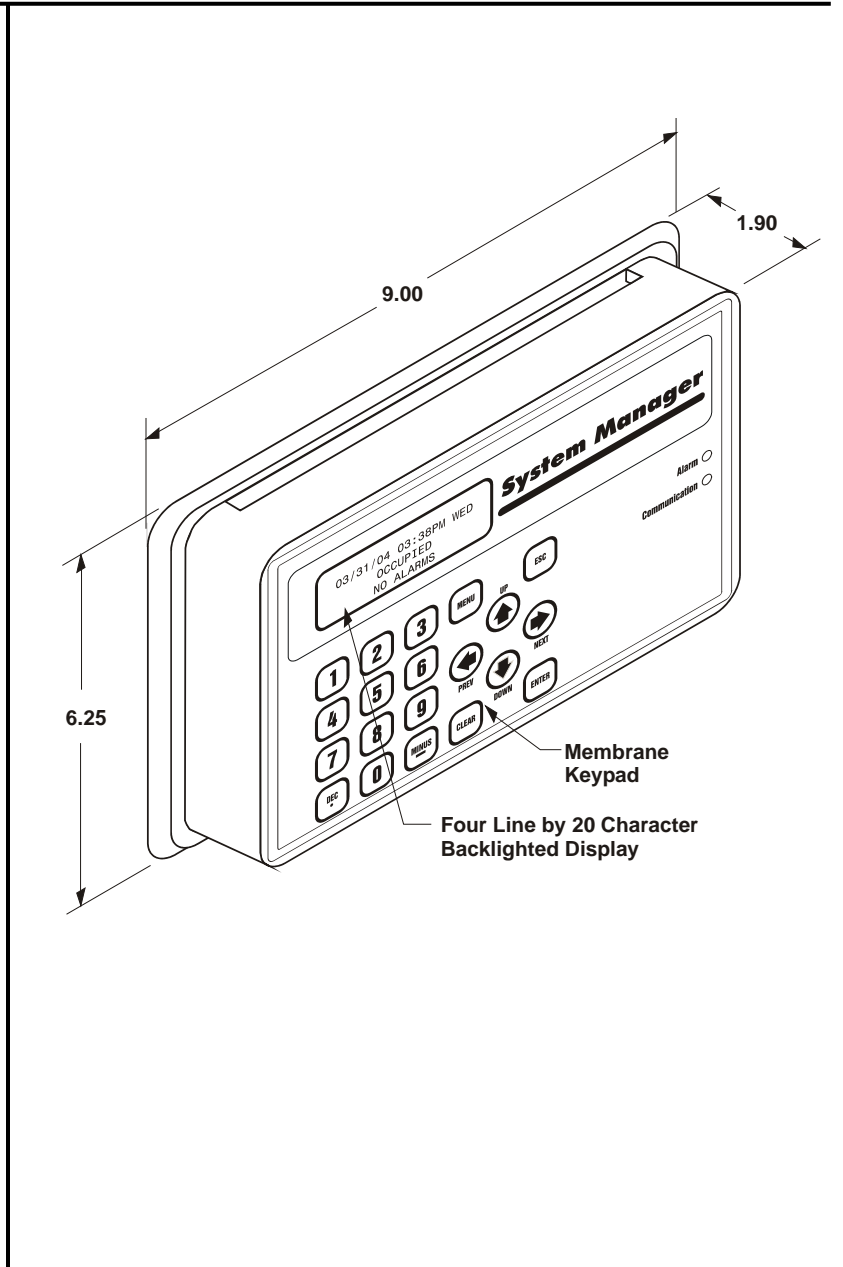
| Technical Data		OE392-01-WSHP System Manager Operator Interface	
Power	24 Volt AC/DC	Display	4 Line by 20 Character Backlighted LCD
Power Consumption	25 VA Maximum	Network Connection	RS-485
Operating Temp	10°F to 149°F	Protocol	HSI Open Protocol Token Passing
Operating Humidity	90% RH Non-Condensing	Housing Material	Plastic – Beige Color
Keypad	20 Key Membrane Type	Communications	RS-485 - 9600 Baud
3 Year Warranty		**WattMaster reserves the right to change specifications without notice**	

Description

The OE361-04 CommLink II Communications Interface allows user access to any controller connected to the controls system. The CommLink II comes packaged in an attractive beige colored plastic enclosure. The CommLink II is powered by a small wall mounted plug-in transformer that is included. Locally, an optional on-site computer may be connected to the CommLink II for direct access to system control parameters. Remote access is obtained via an optional modem which is connected with the CommLink II Communication Interface. With a modem installed, the CommLink II may be configured to call a number, if an alarm condition occurs. With the modem option the system could be dialed and monitored from a remote location by a PC. Computer and modem cables (6ft long) are provided with the CommLink II.

Mounting

If an on-site computer is to be used for direct connection and monitoring of the system, the CommLink II should be located near the computer terminal to monitor the system. If no on-site computer is to be used, locate the CommLink II near the phone line jack for ease of connection to a modem. If for any reason you use cables of greater length than those provided with the CommLink II (6 ft. long) be sure the cables that connect the CommLink II to the modem and the CommLink II to the on-site computer do not exceed twenty-five feet in length.
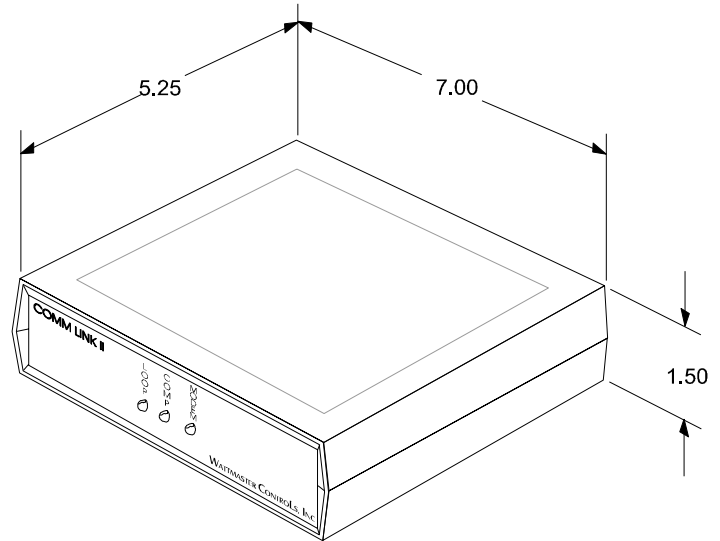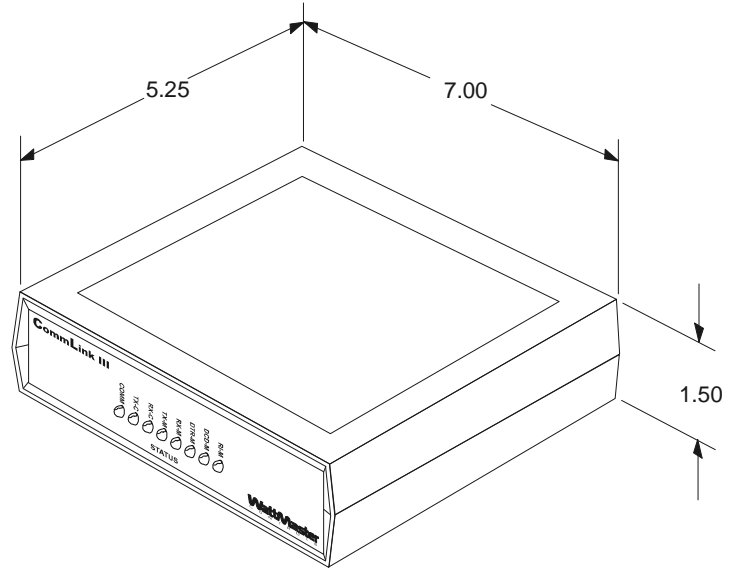

FRONT VIEW
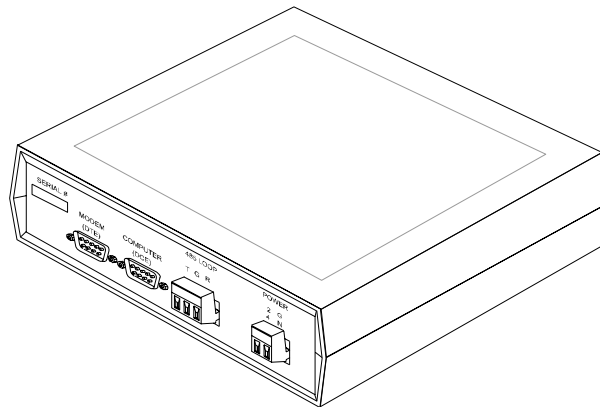
REAR VIEW

| Technical Data		OE 361-04 CommLink II Communication Interface	
Power	24 Volt AC	Computer Connection	RS-232
Plug-in Transformer	110V to 24V (Included)	Network Connection	RS-485
Power Consumption	14 VA Maximum	Protocol	HSI Open Protocol Token Passing
Operating Temperature	10°F to 140°F	Physical Connections	(2) 9 Pin/DB9 Male
Operating Humidity	90% RH Non-Condensing	Communications	RS-485 - 9600 Baud
Three Year Warranty		**WattMaster reserves the right to change specifications without notice**	

Description

The OE361-08 CommLink III Communications Interface allows computer access into the WattMaster WHP controls system and also provides communications across multiple local communications loops on the control system.

The CommLink III comes packaged in an attractive beige colored plastic enclosure. The CommLink III is powered by a small wall mounted plug-in transformer that is included. Locally, an optional on-site Personal Computer with Prism software installed may be connected to the CommLink III to provide direct access to system control parameters by using the supplied USB cable (6 ft. long).

Remote telephone access to the control system can be obtained via the optional OE419-05 Modem Kit which can be field installed inside the CommLink III Communication Interface. With the optional modem kit installed, the control system can be accessed remotely by using a Remote Link modem (purchased separately) connected to a Personal Computer with Prism software installed at the remote location and dialing the phone number of the phone line the CommLink III with modem kit is connected to. Also with the modem kit installed the CommLink III can be configured to call a pager or cell phone number, if an alarm condition occurs. A USB cable (6ft long) is provided with the CommLink III for connection to your computer.

FRONT VIEW
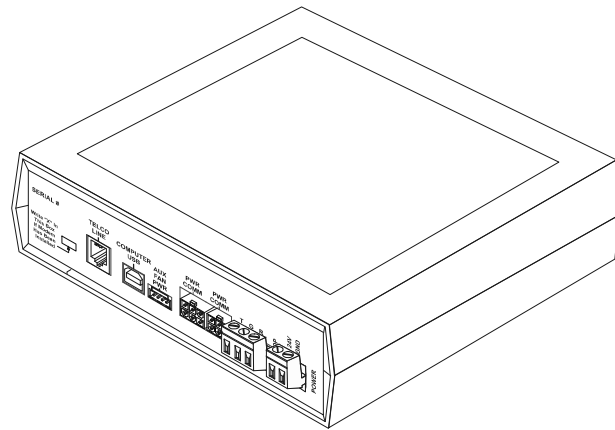
REAR VIEW

Mounting

If an on-site computer is to be used for direct connection and monitoring of the system, the CommLink III should be located near the computer terminal to monitor the system. If no on-site computer is to be used and/or you are installing the optional modem kit, locate the CommLink III near the phone line jack for ease of connection.

| Technical Data		OE361-08 CommLink III Communication Interface	
Power	24 Volt AC	Computer Connection	USB Version 1.1 or 2.0
Plug-in Transformer	110V to 24V (Included)	Network Connection	RS-485
Power Consumption	14 VA Maximum	Protocol	HSI Open Protocol Token Passing
Operating Temperature	10°F to 140°F	Cabling Included	(1) 6 Ft. Long USB Cable
Operating Humidity	90% RH Non-Condensing	Communications	RS-485 - 9600 Baud
Three Year Warranty		**WattMaster reserves the right to change specifications without notice**	

Description

The OE361-12 CommLink IV Communications Interface allows computer access into the WattMaster WHP controls system and also provides communications across multiple local communications loops on the control system.

The CommLink IV comes packaged in an attractive beige colored plastic enclosure. The CommLink IV is powered by a small plug-in transformer that is included. Locally, an optional on-site personal computer with Prism software installed may be connected to the CommLink IV to provide direct access to system control parameters. A USB cable (6 ft. long) is provided with the CommLink IV for connection to your computer.

Remote telephone access to the control system can be obtained by purchasing the optional OE419-06 Remote Link II modem. With the optional Remote Link II modem installed, the control system can be accessed remotely by using another Remote Link II modem (purchased separately) connected to a personal computer with Prism software installed at the remote location. With the Remote Link installed at the job site, the CommLink IV can be configured to call a pager or cell phone number if an alarm condition occurs.

An optional OE415-02 IP Module Kit is also available that provides an Ethernet connection to the controls system from any computer connected to your building's LAN. It can also be configured to allow access to the control system from the Internet if your Ethernet firewall is configured for this option.
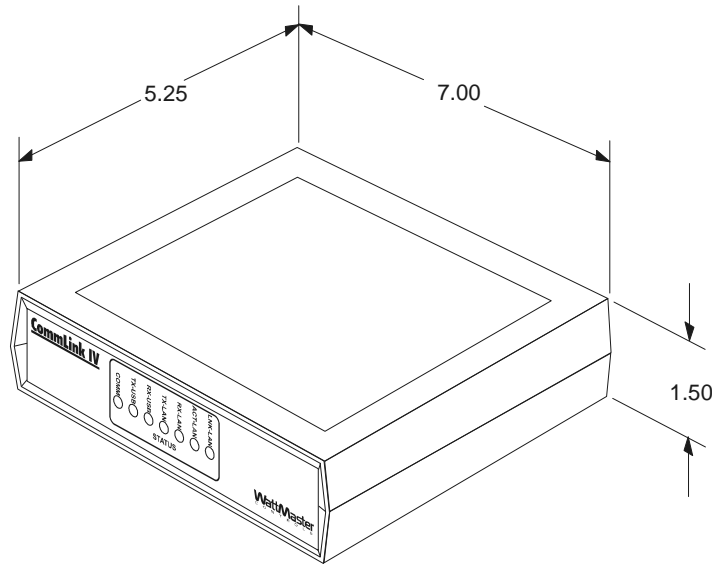
FRONT VIEW
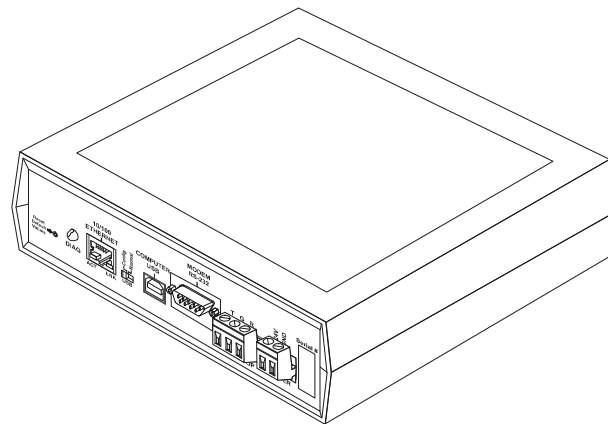
REAR VIEW

Mounting

If an on-site computer is to be used for direct connection and monitoring of the system, the CommLink IV should be located near the computer terminal to monitor the system. If no on-site computer is to be used and/or you are installing the Remote Link II option, locate the CommLink IV near the phone line jack for ease of connection.

Technical Data		OE361-12 CommLink IV Communication Interface	
Power	24 Volt AC	*Remote Link II Conn.	RS-232 Serial Port (9 pin)
Plug-in Transformer	120V to 24VAC (Included)	**Ethernet Conn.	RJ-45 Ethernet Port
Power Consumption	14 VA Maximum	Network Loop	RS-485 - 19,200 Baud
Operating Temperature	10°F to 140°F	Protocol	HSI Open Protocol Token Passing
Operating Humidity	90% RH Non-Condensing	Cabling Included	(1) 6 Ft. Long USB Cable
Computer Conn.	USB Version 1.1 or 2.0	Local Loop	RS-485 - 9600 Baud
Three Year Warranty		**WattMaster reserves the right to change specifications without notice**	
***** **This Port Is Only Used With The Optional OE419-06 Remote Link II. ** **This Port Is Only Used With The Optional OE415-02 IP Module Kit.**			

Description

The OE366 USB-Link allows computer access into the WHP controls system and also provides communications across multiple local communications loops on the control system when a CommLink Communications Interface is installed on the system.
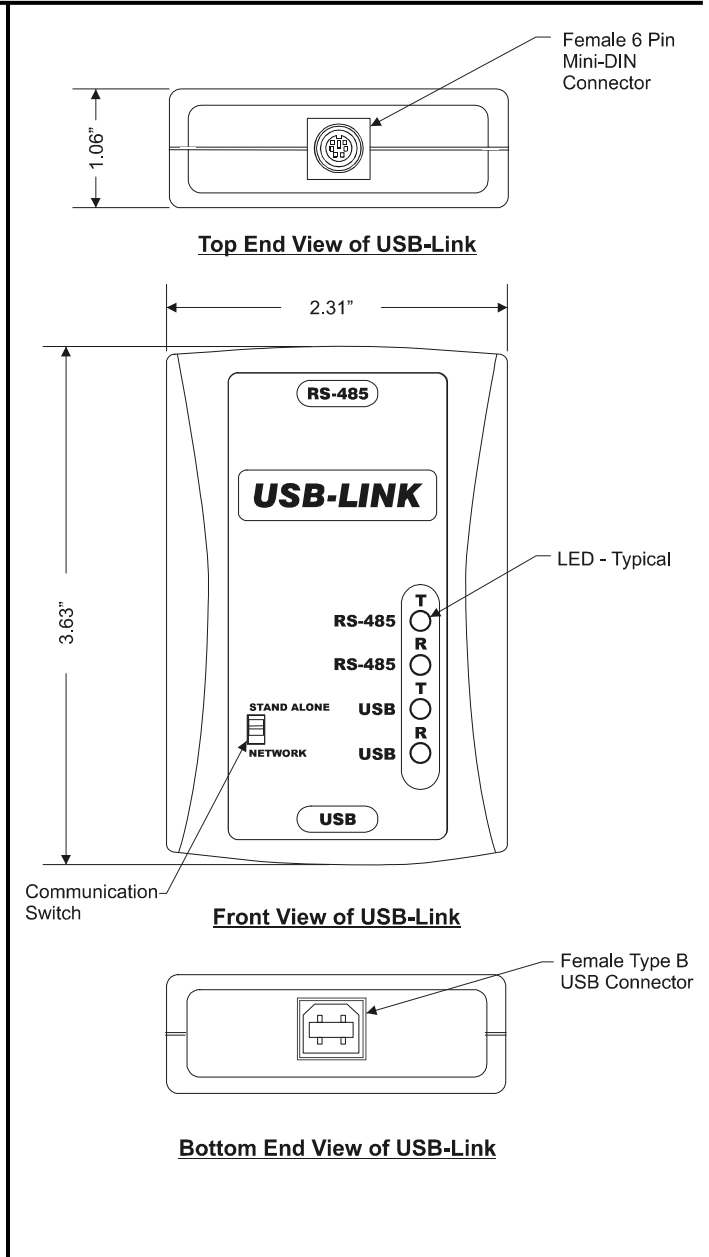
The USB-Link provides a direct link to enable the system operator to view the status and to configure and adjust the setpoints of any controller on the control system communications loop using the Prism II computer front end software.

The USB-Link is small in size and is powered by the USB port of the computer it is plugged into, making it completely portable and allowing connection to the system from any controller.

The USB-Link is supplied with a USB cable, a mini-DIN male communication cable, and two mini-DIN to terminal adapters. The communication cable allows the user to walk up to any controller that has a communication socket and plug in the USB-Link to gain access to the system. The adapters are used for boards that do not have a female mini-DIN plug connection.

To use the USB-Link, you will need a computer with an available USB 1.1 or 2.0 port with the included USB drivers installed. You will also need the Prism II computer front end software installed on the computer.

**CAUTION:** The USB-Link does not work with Prism I software. It only works with Prism II.

Top End View of USB-Link

Female 6 Pin Mini-DIN Connector

1.06"

Front View of USB-Link

RS-485

USB-LINK

RS-485
RS-485
STAND ALONE   USB
NETWORK   USB

USB

2.31"

3.63"

LED - Typical

Communication Switch

Bottom End View of USB-Link

Female Type B USB Connector

Technical Data			OE366 USB-Link
Operating Temperature	10°F to 140°F	Cabling Included	(1) 6 Ft. Long USB Cable and (1) 7 Ft. Long Communications Cable
Operating Humidity	90% RH Non-Condensing	Communications	RS-485 - 9600 Baud
Computer Connection	USB Version 1.1 or 2.0	Adapters Included	PL1019054 and PL101905 Mini-DIN Plug Adapters
Three Year Warranty		**WattMaster reserves the right to change specifications without notice**	

Description

The OE362-21 MiniLink Communication Interface is a proprietary network controller that is used to integrate multiple local communication loops into a network communications system. Network loop terminals on the Minilink are designed to be connected to the CommLink II and to other MiniLinks on the network system. Local loop terminals on the MiniLink are designed to be connected to controllers on the local loop system. The MiniLink utilizes token passing communication architecture A MiniLink is designed to serve as the local communications loop master. This means that it is responsible for sending the token to all the controllers on the local communications loop. Network communications are of the RS-485 type operating at 19,200 baud. Local communications are also of the RS-485 type and operate at 9600 baud.

Mounting

The MiniLink is provided with an integral backplate for mounting inside of a control enclosure. It is recommended that the MiniLink is mounted in the HVAC unit control enclosure, or in a control enclosure in the building equipment room. An optional factory control enclosure for the MiniLink is available.
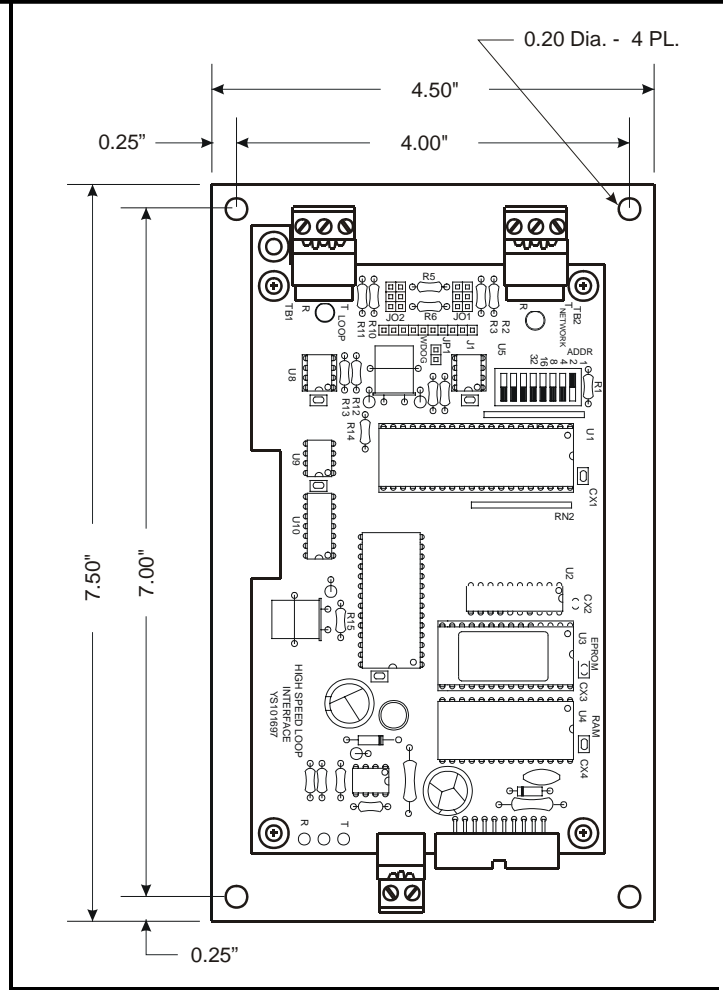

Technical Data			OE362-21 MiniLink Communication Interface
Power	24 Volt AC	Weight	0.5 lb.
Power Consumption	10 VA Maximum	Network Loop	RS-485, 19200 Baud
Operating Temp	10°F to 149°F	Local Loop	RS-485, 9600 Baud
Operating Humidity	90% RH Non-Condensing	Protocol	HSI Open Protocol Token Passing
Three Year Warranty		**WattMaster reserves the right to change specifications without notice**	

Description

The OE415 IP-Link Kit is used to provide TCP/IP Internet and/or intranet connection for Ethernet networked computer systems allowing them to communicate with the WattMaster WHP System through the Commlink. The OE415 IP-Link Kit Includes the IP-Link device with serial cable, 110/9 Volt power supply, iLan EPROM for the CommLink, WattMaster Prism software CD and documentation, Connect One firmware and documentation CD, and the IP-Link Technical Guide and installation instructions.

The TCP/IP connection provided on the IP-Link is a TCP connection on a single port number and is static in nature. Firewall and proxy servers can easily be configured to allow traffic to and from the IP-Link. The nature of the data is raw in form and comprised of packets native to WattMaster Prism software. The IP-Link device will respond to ICMP traffic (PING) for verification of proper configuration. Prism software is required in order to read and send data to the IP-Link and through the CommLink to the WattMaster WHP system. The CommLink must have the included iLan EPROM chip installed to communicate with the WattMaster WHP system. The IP-Link connects to the CommLink via the supplied RS232 DB9 Serial Cable. The IP-Link connects to the host Ethernet system by means of a 10BaseT, RJ-45 jack on the back of the IP-Link. Power is provided to the IP-Link by the 110/9 Volt Power supply furnished in the kit. The kit also contains a firmware CD used for setting up the IP-Link. Setup of the IP-Link requires a knowledgeable IT person familiar with configuring network adapters and TCP/IP systems. WattMaster Prism software is included for installation to the local intranet or remote Internet PC(s) that will be used to program and monitor the WattMaster WHP system.
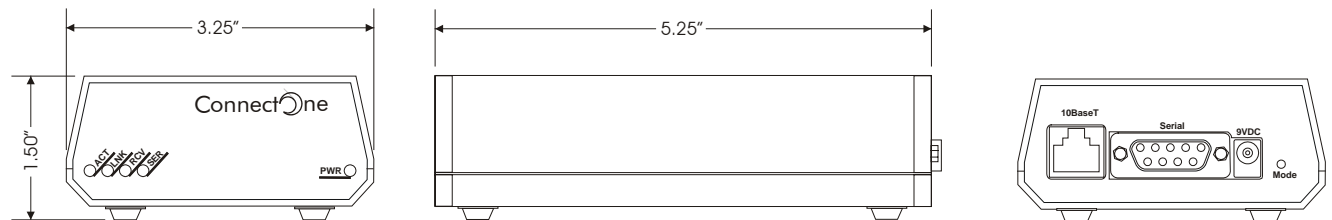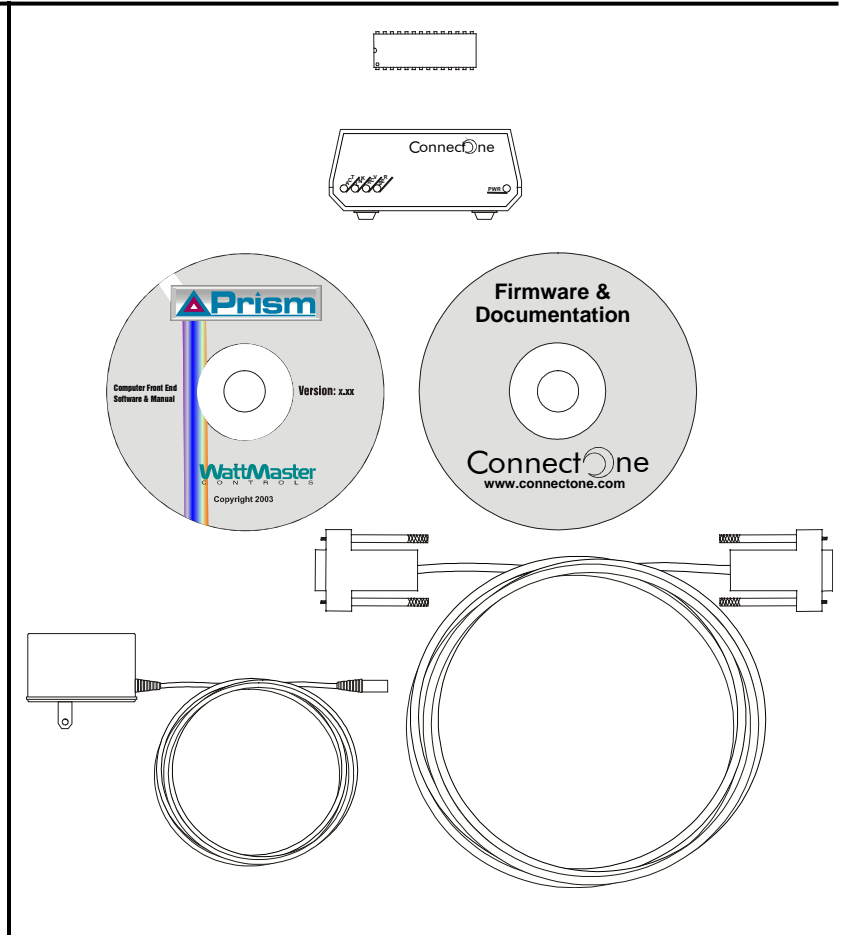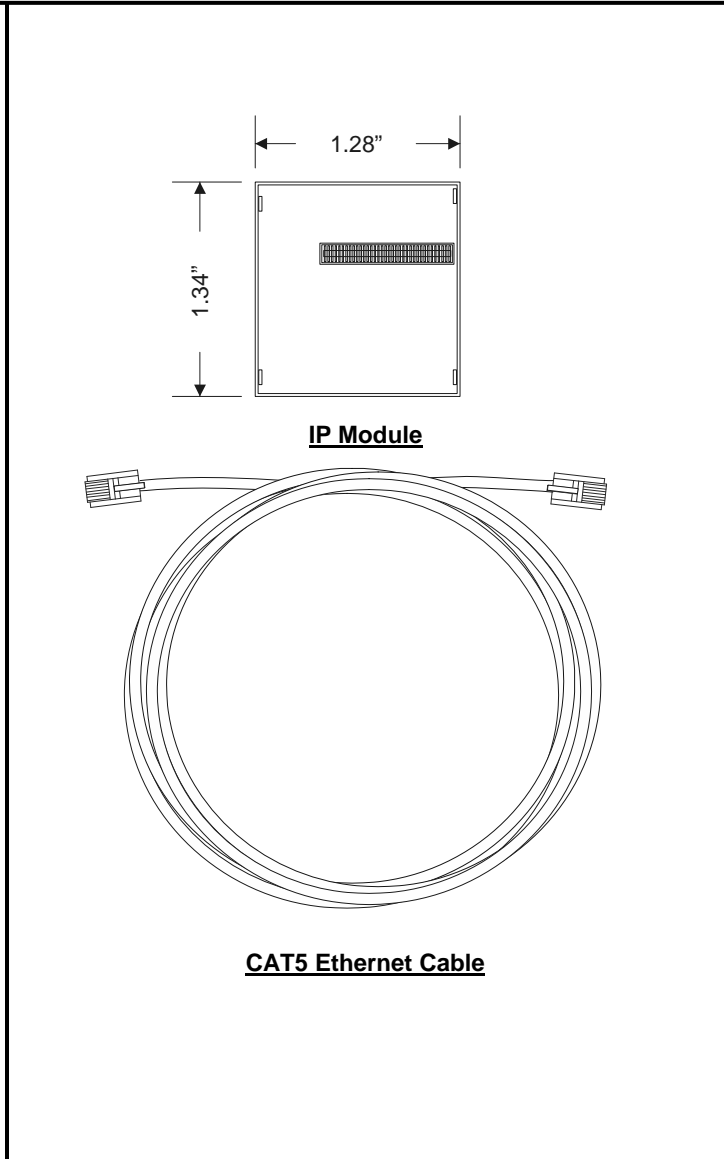
Technical Data		OE415 IP-Link Kit	
Power Supply	9 Volt VDC, 350mA	System Connection	RS-232 DB9 Female Serial Port
Power Consumption	2 Watts	Network Connection	10BaseT Ethernet – RJ-45 MDI Socket
Operating Temp	32°F to 158°F	Internet Protocols	ARP,IP,ICMP,UDP,TCP,DNS,DHCP, SMTP, POP3, MIME, HTTP
Operating Humidity	90% RH Non-Condensing	Standard Compliance	Ethernet IEEE 802.3 10BaseT
Data Rate	Up to 230 Kbps	Flow Control	Hardware (DTR, RTS, CTS, DCD) and Software
1 Year Warranty		**WattMaster reserves the right to change specifications without notice**	

Description

The OE415-02 IP Module Kit (when installed and configured in the CommLink IV communication interface) provides TCP/IP Internet and/or intranet connection for Ethernet networked computer systems allowing them to communicate with your control system. The OE415-02 IP Module Kit consists of the IP Module and a 10 ft. long CAT5 Ethernet crossover cable.

The IP Module plugs into a mating 40 pin (2 x 20) connector located on the CommLink IV circuit board. Installation is easily accomplished by removing the CommLink IV case cover screws, removing the case cover to access the circuit board, and then plugging the IP Module into its mating socket connector. Correct alignment is made easy because of the (4) slot alignment tabs located around the perimeter of the processor base. It is not possible to incorrectly align the IP Module to the socket connector because of this feature.

The TCP/IP connection provided by the IP Module installed in the CommLink IV is a TCP connection on a single port number and is static in nature. Firewall and proxy servers can easily be configured to allow traffic to and from the CommLink IV when the IP Module is installed. The nature of the data is raw in form and comprised of packets native to Prism software. The IP Module will respond to ICMP traffic (PING) for verification of proper configuration. Prism software is required in order to read and send data to the IP Module and through the CommLink IV to the control system. The IP Module connects to the host Ethernet system by means of the supplied 10 ft. long CAT 5 Ethernet crossover cable which plugs into the 10/100 Base-T, RJ-45 jack on the back of the CommLink IV and into a Ethernet router or Ethernet modem on your building's LAN. Setup of the CommLink IV with the IP Module requires a knowledgeable IT person familiar with configuring network adapters and TCP/IP systems. Prism software must be installed on the local LAN computer(s) and/or remote Internet computers that will be used to program and monitor the control system.

1.28"

1.34"

IP Module

CAT5 Ethernet Cable

Technical Data			OE415-02 IP Module Kit
Operating Temperature	10°F to 140°F	Media Access Control	CSMA/CD with ACK
Operating Humidity	90% RH Non-Condensing	Network Connection	10/100 Base-T Ethernet RJ-45 MDI Socket
Protocols Supported	ARP, UDP, TCP, Telnet, ICMP, SNMP, DHCP, BOOTP, Auto IP, HTTP, SMTP, TFTP	Flow Control	XON/XOFF (Software), CTS/RTS (Hardware), None
Network Interface	IEEE 802.3 RJ45 Ethernet 10BASE-T Or 100BASE-TX (Auto-sensing)	Management	Internal Web Server, SNMP (Read Only), Serial Login, Telnet Login, Device Installer Software
3 Year Warranty		WattMaster reserves the right to change specifications without notice	

WattMaster WHP
Control Systems

OE419-04 Remote Link

Description

The OE419-04 Remote Link is essentially a 14,400 baud modem. The Remote Link is used for achieving remote communications with all WattMaster systems. Built-in error correction (V.42/mnp 2-4) and data compression (V.42bis/mnp 5) will maximize data transfer integrity and boost average throughput up to 57.6 kbps. The Remote Link connects to the CommLink II communications interface at the WattMaster WHP control system location. A telephone line connects the Remote Link to the local phone service. By dialing the telephone number that the Remote Link is connected to, (using a modem from a remote location) the system can be monitored and controlled using the WattMaster Prism computer front end software package.

Mounting

The Remote Link should be mounted close to a serviceable telephone outlet. It connects via a serial data cable to the CommLink II communications interface and via a telephone cable to the telephone outlet jack. A molded cable for connection from the CommLink to the Remote Link is supplied with the CommLink. If an on-site computer is required, it should be connected to the CommLink at or near the location where the Remote Link is located. If for any reason you use cables of greater length than those provided with the CommLink II (6 ft. long) be sure the cables that connect the CommLink II to the Remote Link and the CommLink II to the on-site computer do not exceed twenty-five feet in length.
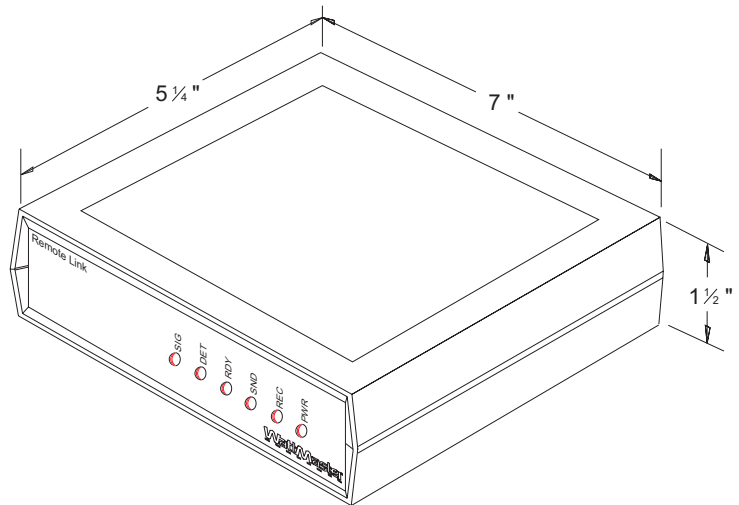
Front View
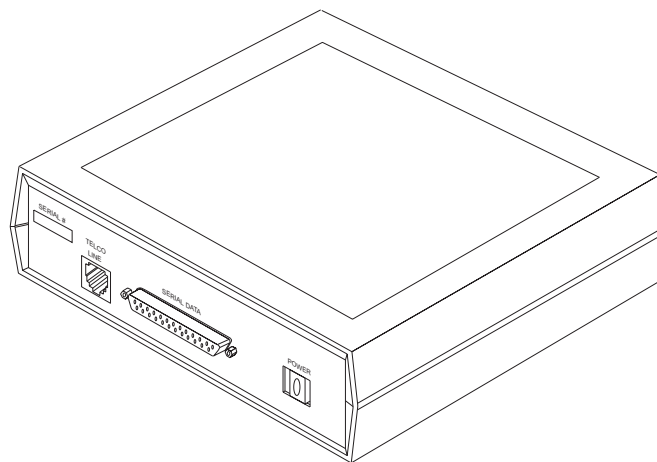
Rear View

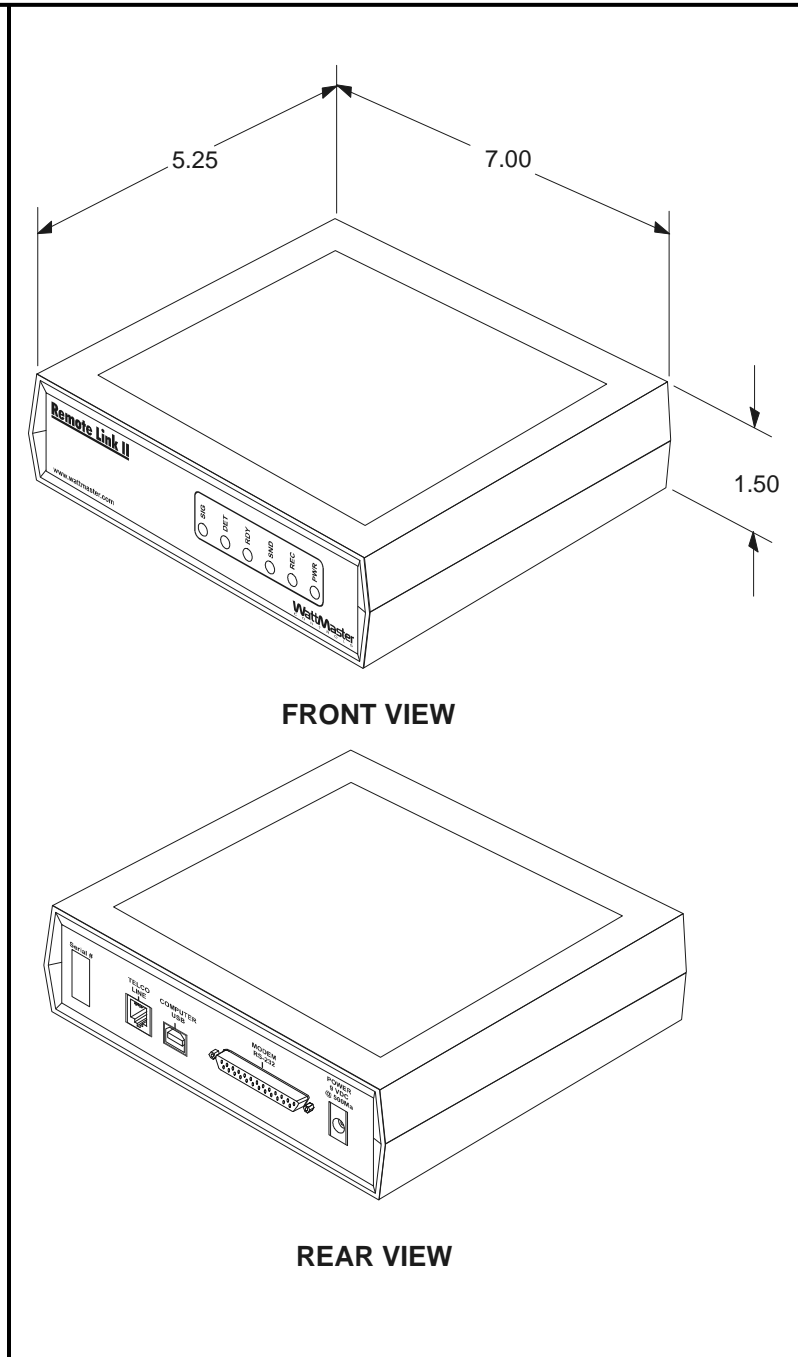| Technical Data		OE419-04 Remote Link	
Power	9 Volt DC	Computer Connection	RS-232, 25 Pin DB25 Female
Plug-in Transformer	110V to 9V (Included)	Phone Connection	RJ-11 Female
Power Consumption	500mA Maximum	Line Speed	14,400 bps
Operating Temperature	10°F to 140°F	Data Compression	V.42bis/MNP 5
Operating Humidity	90% RH Non-Condensing	Error Correction	V.42/MNP 2-4
3 Year Warranty		**WattMaster reserves the right to change specifications without notice**	

Description

The OE419-06 Remote Link II is essentially a 14,400 baud modem that connects to the CommLink IV via a serial cable. When it is used as a modem (at the remote computer location) it connects to the remote computer via a USB cable. The Remote Link II is used to provide for remote dial-up communications with the CommLink II or CommLink IV communication interfaces.

The Remote Link II connects to the CommLink II or IV communications interface at the control system location. A telephone line connects the Remote Link II to the local phone service. By dialing the telephone number at the job site that the Remote Link II is connected to (using another Remote Link II modem from a remote location), the control system can be monitored and controlled using the Prism computer front end software package.

Mounting

The Remote Link II should be mounted close to a serviceable telephone outlet. The CommLink II or CommLink IV communications interface connects to the Remote Link II with the supplied 6 ft. long serial cable.

It is recommended that a second Remote Link II be used as the dial out modem at the remote computer location. WattMaster will not support any other internal or external modems by other manufacturers. A 6 ft. long USB cable is supplied with the Remote Link II to connect to the remote computer USB port when the Remote Link II is used at the remote computer location. If an on-site computer at the job location is required, it should be connected to the CommLink II or IV at or near the location where the Remote Link II is located, for ease of connection. If you need to use a longer serial or USB cable, you will need to purchase these from an electronics supply store. Do not use any USB or serial cables longer than 25 ft.

FRONT VIEW

REAR VIEW

Technical Data		OE419-06 Remote Link II	
Power	9 VDC	Computer Connection For Remote Modem Use	6 ft. USB Cable for Use with USB Version 1.1 or 2.0 Ports
Plug-in Transformer	120 VAC to 9 VDC (Included)		
Power Consumption	500mA Maximum	Phone Connection	RJ-11 Female
Operating Temperature	10°F to 140°F	Line Speed	14,400 bps
Operating Humidity	90% RH Non-Condensing	Data Compression	V.42bis/MNP 5
CommLink Connection	6 ft. - Serial Cable	Error Correction	V.42/MNP 2-4
3 Year Warranty		WattMaster reserves the right to change specifications without notice	

Description

The OE352 – 2 Slot Modular I/O Base Board is used in conjunction with the following Modular Expansion Boards:

- O354 – 4 Analog Input & 1 Analog Output
- OE355 – 4 Analog Output
- OE356 – 4 Digital Inputs
- OE357 – 4 Relay Outputs

For easy wiring the OE352 – 2 Slot Modular I/O Base Board provides for up to (2) of the above expansion boards to be connected to it by means of an integral male/female push-in connector arrangement. Power is supplied to the Expansion Boards through this connector, simplifying installation and connection. Jumpers are also provided on the OE352 Modular I/O Base Board for addressing and configuration of the Modular Expansion Board(s).

Any combination of Modular Expansion Boards may be connected to the OE352 Modular I/O Base Board to provide the input/output capabilities required.

The main controller software used with the OE352 Modular I/O Base determines which Modular Expansion Boards may be used.

Mounting

The OE352 – 2 Slot Modular I/O Base Board is supplied mounted on a plastic Snap Track channel. The Snap Track channel has two mounting holes, which are used to field mount the board with the provided screws. The board should be mounted in close proximity to the WHP Controller board to allow for connection of the modular cable.

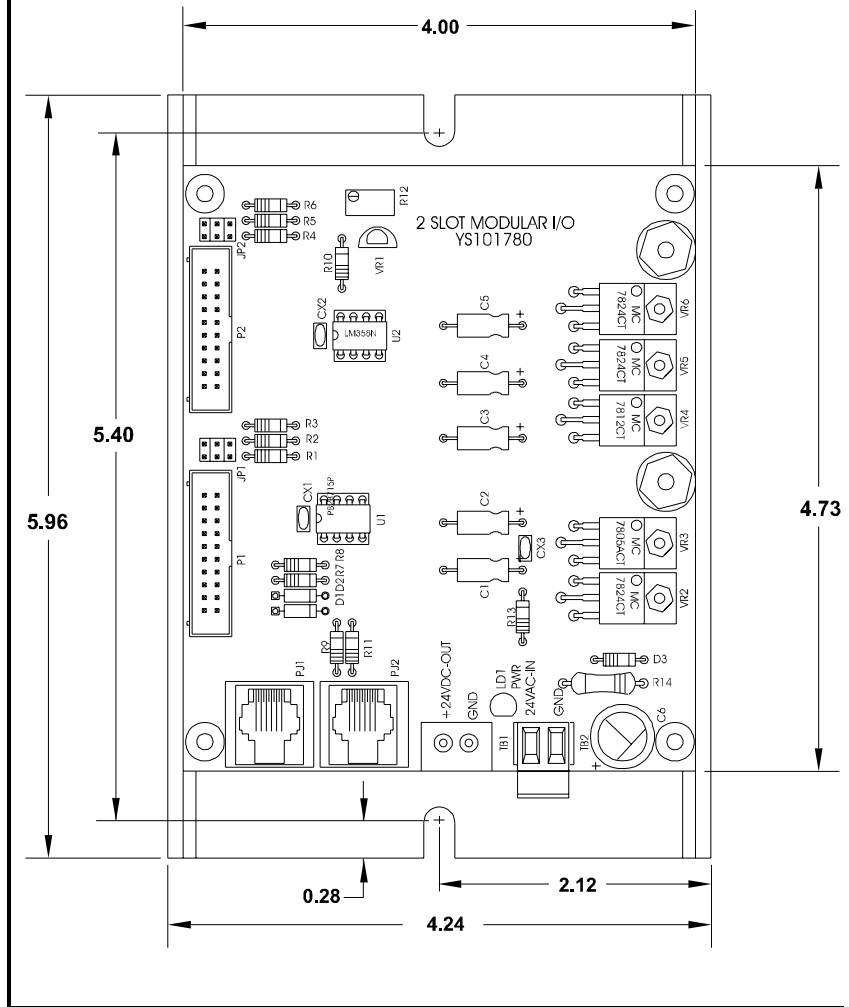| Technical Data		OE352 – 2 Slot Modular I/O Base Board	
Operating Power	24 VAC	Power Consumption	5 VA Maximum
Operating Temp	10°F to 149°F	Operating Humidity	90% RH Non-Condensing
Communications	Integral I^2 C Chip	Weight	8 oz.
Qty of Slots Provided For Modular Expansion Boards	2	Mounting Provisions	Supplied with Snap Track Base
Three Year Warranty		**WattMaster reserves the right to change specifications without notice**	

Description

The OE353 – 4 Slot Modular I/O Base Board is used in conjunction with the following Modular Expansion Boards:

- O354 – 4 Analog Input & 1 Analog Output
- OE355 – 4 Analog Output
- OE356 – 4 Digital Inputs
- OE357 – 4 Relay Outputs

For easy wiring the OE353 – 4 Slot Modular I/O Base Board provides for up to (4) of the above expansion boards to be connected to it by means of an integral male/female push-in connector arrangement. Power is supplied to the Expansion Boards through this connector, simplifying installation and connection. Jumpers are also provided on the OE353 Modular I/O Base Board for addressing and configuration of the Modular Expansion Board(s).

Any combination of Modular Expansion Boards may be connected to the OE353 Modular I/O Base Board to provide the input/output capabilities required.

The main controller software used with the OE353 Modular I/O Base determines which Modular Expansion Boards may be used.

Mounting

The OE353 – 4 Slot Modular I/O Base Board is supplied mounted on a plastic Snap Track channel. The Snap Track channel has two mounting holes, which are used to field mount the board with the provided screws. The board should be mounted in close proximity to the WHP Loop Controller board to allow for connection of the modular cable.
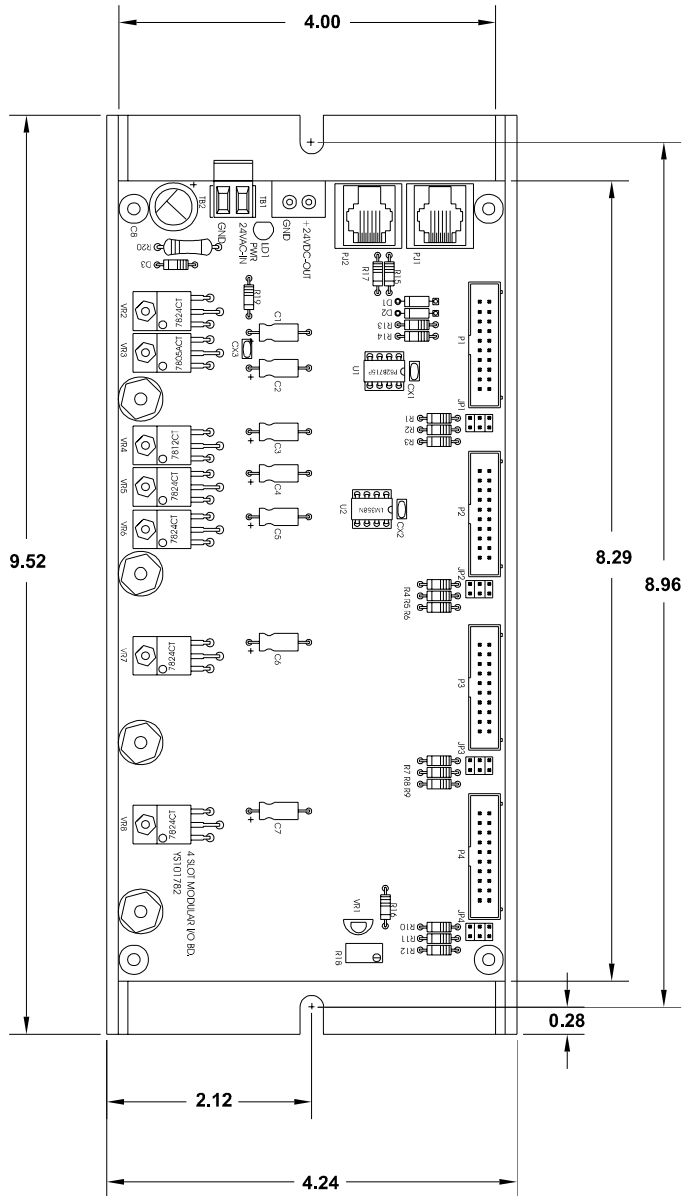
Technical Data		OE353 – 4 Slot Modular I/O Base Board	
Operating Power	24 VAC	Power Consumption	5 VA Maximum
Operating Temp	10°F to 149°F	Operating Humidity	90% RH Non-Condensing
Communications	Integral I^2 C Chip	Weight	8 oz.
Qty of Slots Provided For Modular Expansion Boards	4	Mounting Provisions	Supplied with Snap Track Base
Three Year Warranty		**WattMaster reserves the right to change specifications without notice**	

Description

The OE354 - 4 Analog Input/1 Analog Output Modular Expansion Board is used in conjunction with the OE352 - 2 Slot Modular I/O Base Board or the OE353 - 4 Slot Modular I/O Base Board. The OE354 Expansion Board provides 4 analog inputs and 1 analog output.

For easy wiring the OE354 – 4 Analog Input/1 Analog Output Modular Expansion Board connects to the OE352 or OE353 Modular I/O Base Boards by means of an integral connector arrangement. Power is supplied to the OE354 - Expansion Board through this connector, simplifying installation and connection. Jumpers are provided on the OE352 and OE353 Modular I/O Base Boards for addressing of the OE354 - Expansion Board(s).

The analog inputs have removable pull-up resistors associated with each input, which can be used for connection of thermistor type sensors or dry contact closure configuration. The pull-up resistors are removed when a voltage signal is to be used. Jumpers are provided to configure the inputs for either 0-5 Volt or 0-10 Volt operation. Input and output resolution is 0.4% or (0.04 Volts).
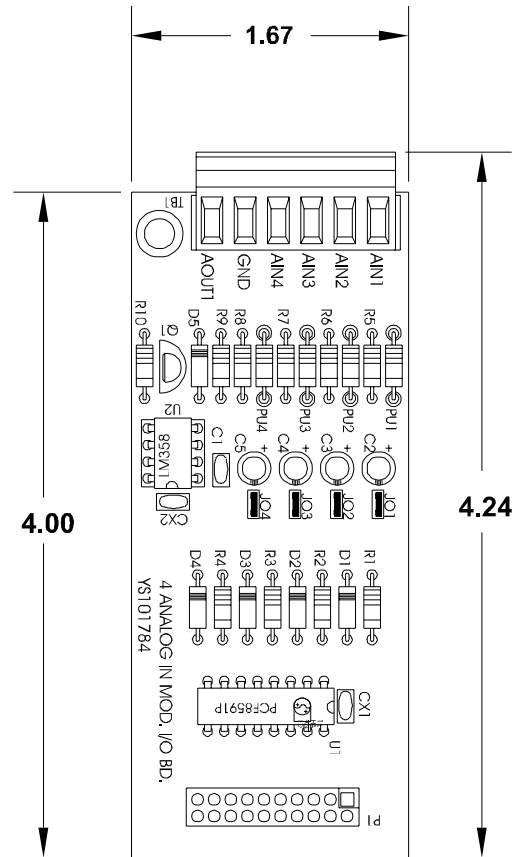
Technical Data		OE354 – 4 Analog Input/1 Analog Output Modular Expansion Board	
Operating Power	From OE352/OE353 Modular I/O Board	Power Consumption	2 VA Maximum
Operating Temp	10°F to 149°F	Operating Humidity	90% RH Non-Condensing
Communications	Integral I^2 C Chip	Weight	4 oz.
Inputs:			
Analog Input Qty.	4	Analog Input Types	10K Thermistor, Dry Contact, 0-10 or 0-5 Volt
Output:			
Analog Output Qty.	1	Analog Output Rating	0-10 VDC @ 1K Ohm
Three Year Warranty		**WattMaster reserves the right to change specifications without notice**	

Description

The OE357 - 4 Relay Output Modular Expansion Board is used in conjunction with the OE352 - 2 Slot Modular I/O Base Board or the OE353 - 4 Slot Modular I/O Base Board. The OE357 Expansion Board provides 4 relay outputs for pilot duty switching control.

For easy wiring the OE357 – 4 Relay Output Modular Expansion Board connects to the OE352 or OE353 Modular I/O Base Boards by means of an integral connector arrangement. Power is supplied to the OE357 - Expansion Board through this connector, simplifying installation and connection. Jumpers are also provided on the OE352 and OE353 Modular I/O Base Boards for addressing of the OE357 - Expansion Board(s).

The relay outputs are N.O. contacts with one common terminal. All outputs and the relay common are electrically isolated from all other circuitry on the board. All relay outputs are supplied with transient suppression devices across each set of contacts to reduce EMI and arcing. The relay output contacts are rated for pilot duty control at a maximum of 2 Amps @ 24 VAC or 24 VDC.
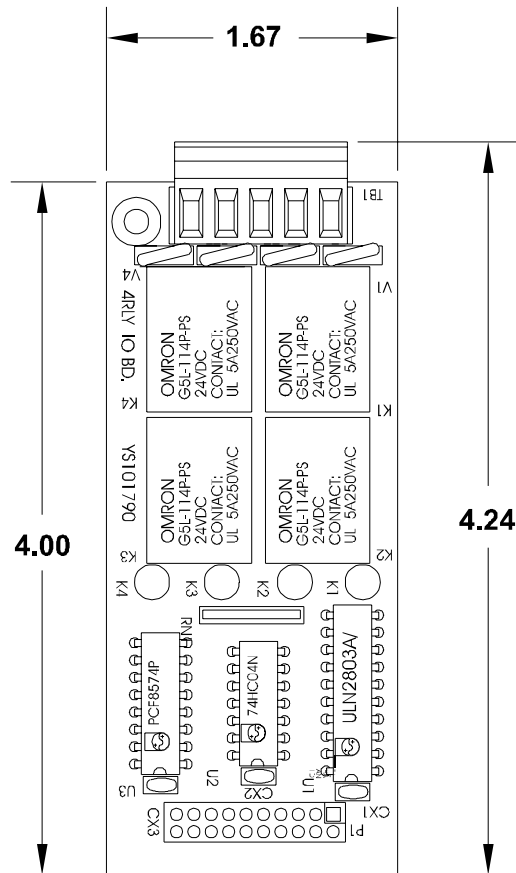
Technical Data		OE357 – 4 Relay Output Modular Expansion Board	
Operating Power	From OE352/OE353 Modular I/O Board	Power Consumption	2 VA Maximum
Operating Temp	10°F to 149°F	Operating Humidity	90% RH Non-Condensing
Communications	Integral I^2 C Chip	Weight	4 oz
Outputs:			
Relay Qty.	4	Relay Contact Rating	2 Amps @ 24 VAC
Three Year Warranty		**WattMaster reserves the right to change specifications without notice**	

Description

The OE331-21 General Purpose Controller Plus (GPC Plus) is used for controlling equipment or processes that cannot be controlled using HVAC controllers. The Prism computer front end software is used to interface with the GPC Plus controller functions. The GPC Plus Controller provides the flexibility to control, schedule and/or monitor equipment such as unit heaters, exhaust fans, motorized louvers, etc.. The GPC Plus has (6) configurable inputs which will accept signals from thermistor temperature sensors, 4-20mA or 0-5VDC transmitters or dry contact closures. An additional modular input is provided for connection of an OE271 static pressure sensor. The GPC Plus has (5) relay outputs for on/off control and (2) analog outputs. With the addition of the OE352 2 Slot Expansion Base Board and (1) OE357 4 Relay Expansion Board, (4) additional relay outputs are available providing for a maximum of (9) usable relay outputs. The GPC Plus also has (5) separate 2 event per day schedules, each with its own optimal start functions built in. In addition the GPC Plus provides lead/lag start capabilities.
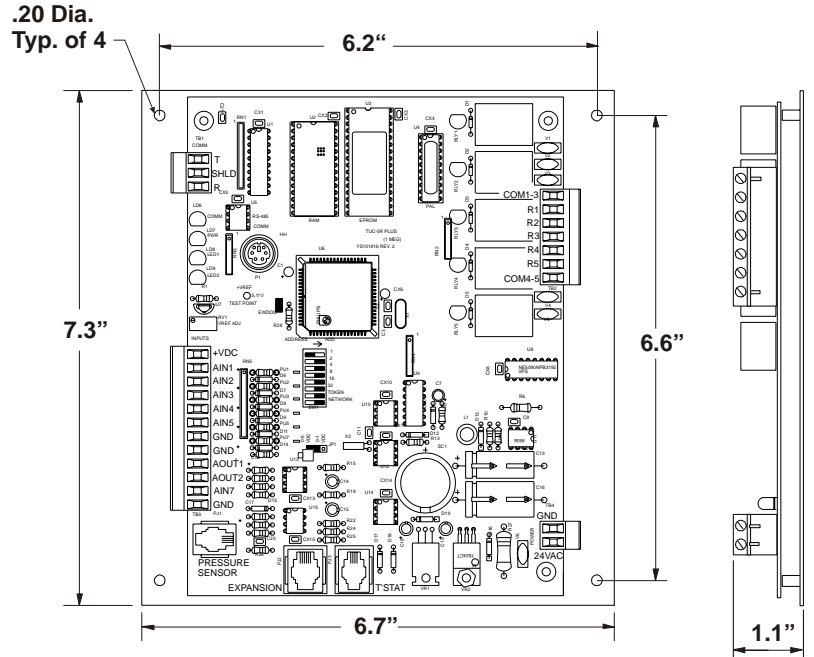
Mounting

The GPC Plus is provided with an integral backplate for mounting inside of a control enclosure. It is recommended that the GPC Plus be mounted in the HVAC unit control enclosure, or in a control enclosure in the building equipment room. An optional factory control enclosure for the GPC Plus is available.

Technical Data		OE331-21-GPCPLUS GPC Plus Controller	
Power	24 Volt AC	Weight	1.5 lb.
Power Consumption	8 VA Maximum	Network Connection	RS-485
Operating Temp	10°F to 149°F	Protocol	HSI Open Protocol Token Passing
Operating Humidity	90% RH Non-Condensing	Communications	RS-485 - 9600 Baud
Inputs:		*Outputs:*	
Types of Allowed Inputs	Type III-10kohm sensors	Total Relay Qty. On Board	5
	4-20ma sensors	Total Relay Qty. Available With Optional Expansion Board	9
	N.O. Binary Contact		
	N.C. Binary Contact	Relay Power Rating	(2 Amp @ 24 VAC)
Total Inputs Available	7	Analog Output Qty.	2
Static Pressure Inputs	1 (Modular)	Analog Output Signal	0-10 VDC
Configurable Inputs	6	Optimal Start Schedules	(5) Total - (1) for Each Schedule
Schedules Available	(5) 2 Event per day	Lead Lag Scheduling	(1) Output can be Configured
Three Year Warranty		**WattMaster reserves the right to change specifications without notice**	

Description

The GPC-17 Controller is used for controlling equipment or processes that cannot be controlled using standard HVAC Unit controllers. The WattMaster Prism computer front end software is used to interface with the GPC-17 controller functions. The GPC-17 is designed with 6 universal inputs, 7 binary outputs and 2 analog output. Each input can be configured for use with a Type III-10k ohm thermistor temperature sensor, 4-20ma sensor, 0-5 VDC sensor or a N.O. or N.C. binary contact closure. Sensor reading values can be selected for the specific input type, such as, %RH, Deg. F, RPM, etc.. If a thermistor type temperature sensor is used, a calibration option is available to offset the actual temperature in relation to the displayed reading. It also has one input configured for Duct Static Pressure and one configured for Building Pressure. The 7 binary outputs may be configured to operate based on any of the 8 sensor inputs, outdoor air temperature, the GPC-17 controller's internal schedule or an external schedule. They can also be configured to use AND/OR logic statements. A Relay Expansion Board can be connected to the GPC-17 to give it an extra 8 relay outputs. In addition to the relay outputs the GPC-17 contains two 0-10VDC analog outputs which can be configured for simple floating point or PID control. The analog output can also be configured to operate based on any of the 8 sensor inputs, outdoor air temperature, the GPC-17 controller's internal schedule or an external schedule. In addition an Analog Output Expansion Board can be connected to the GPC-17, giving it two additional analog outputs.
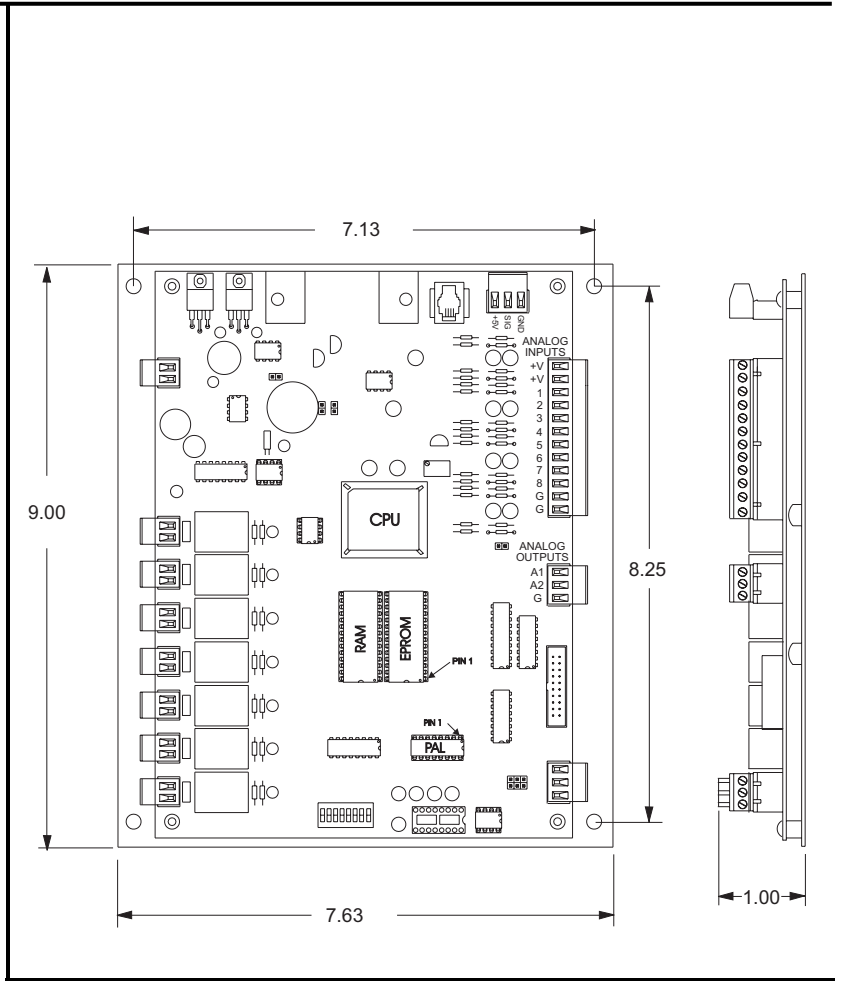
Mounting

The GPC-17 is provided with an integral backplate for mounting inside of a control enclosure. It is recommended that the GPC-17 be mounted in the HVAC unit control enclosure, or in a control enclosure in the building equipment room. An optional factory control enclosure for the GPC-17 is available.

Technical Data		OE310-21-GPC GPC-17 Controller	
Power	24 Volt AC	Weight	1.5 lb.
Power Consumption	10 VA Maximum	Network Connection	RS-485
Operating Temp	10°F to 149°F	Protocol	HSI Open Protocol Token Passing
Operating Humidity	90% RH Non-Condensing	Communications	RS-485 - 9600 Baud
Inputs:		*Outputs:*	
Types Allowed	Type III-10kohm sensors	Relay Qty.	7
	4-20ma sensors	Relay Power Rating	(2 Amp @ 24 VAC)
	N.O. Binary Contact	Analog Output Qty.	2
	N.C. Binary Contact	Analog Output Signal	0-10 VDC
Total Inputs Available	8		
Three Year Warranty		**WattMaster reserves the right to change specifications without notice**	

WattMaster WHP
Control Systems

OE331-21-KWH KWH Module

Description

The OE331-21-KWH (Kilowatt Hour) Module provides the ability to record and display KW usage and to limit demand. Using the Prism Graphical Computer Front End, a status screen displays current demand, yesterday's demand, and the peak demand values and times for both. Historical logs from the previous month and the current month are also available and can be downloaded for archiving via the PRISM software interface. A running total of power consumption is also displayed on the Status Screen. This value can be manually reset at any time allowing the user to monitor overall power consumption over long periods of time.

Analog Input #2 on the KWH Module monitors all incoming contact closures from a KW pulse meter (usually provided by the utility company) and times them to generate the current KW Demand. A user adjustable setpoint is provided to define what each pulse represents in Kilowatts Per Hour. A Demand Factoring Constant is also provided if it appears that contact bounce may be affecting the operation. The Demand Factor is simply the number of times to average the current demand reading to create the final Demand Reading. It is normally left at a value of '1' unless a problem is encountered.

Two additional setpoints are provided for the EMS Demand Limiting Broadcast. A Limit Setpoint and a Proportional Reset Range are provided so that the user can adjust when to begin shedding demand and how rapidly this occurs. Any controllers equipped to "hear" this broadcast begin spreading their heating and cooling setpoints proportionally until the maximum EMS Adjustment limit is reached. This value is also user adjustable for each individual controller so that the rate at which demand is shed can be optimally configured for special cases where not all zones can tolerate a large change in temperature.

Mounting

The KWH Module is provided with an integral backplate for mounting inside of a control enclosure. It is recommended that the KWH Module be mounted in the HVAC unit control enclosure or in a control enclosure in the building equipment room. An optional factory control enclosure for the KWH Module is available.
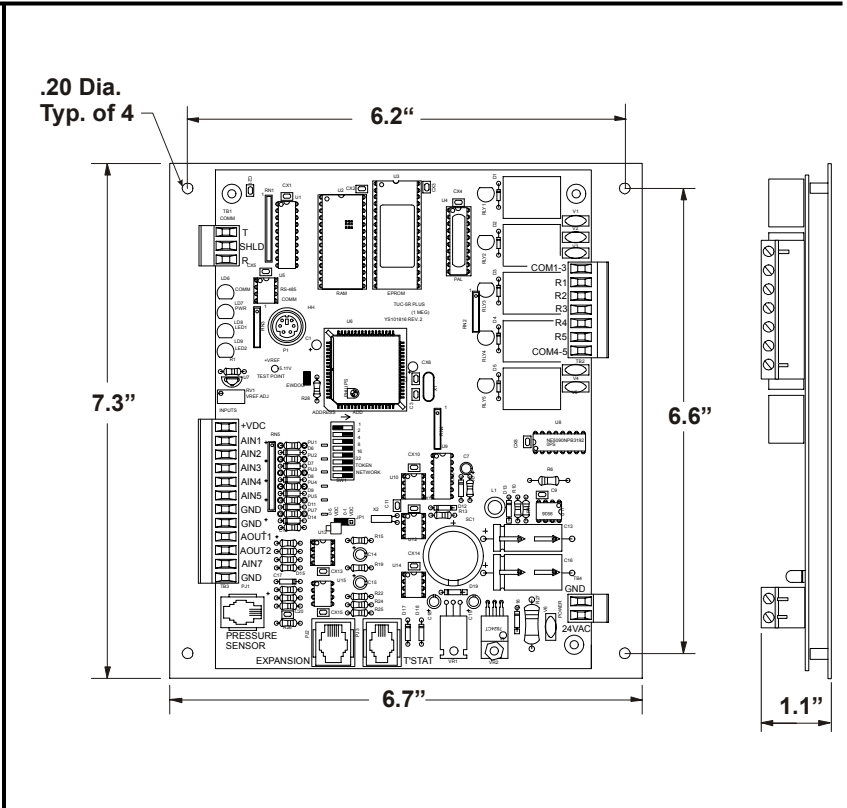
Technical Data			OE331-21-KWH KWH Module
Power	24 Volt AC	Weight	1.5 lb.
Power Consumption	8 VA Maximum	Network Connection	RS-485
Operating Temp	10°F to 149°F	Protocol	HSI Open Protocol Token Passing
Operating Humidity	90% RH Non-Condensing	Communications	RS-485 - 9600 Baud
Input Available		*Output Available*	
AIN2	Dry Contact Closure from KW Pulse Meter (By Others)	RS-485 Communications Loop	EMS Demand Limiting Broadcast
Three Year Warranty		**WattMaster reserves the right to change specifications without notice.**	

Description

The OE310-21-LP Lighting Controller allows a WattMaster WHP System to also control the building lighting systems along with the HVAC system. The Lighting Controller is provided with 7 schedules, each providing 2 start/stop events per day and 14 start/ stop holiday events. Lighting Controller schedules are designed to operate from a starting time, a contact closure or a percentage light level as sensed by a (0-1.5kohm, 0-100%) light level sensor, thus providing maximum lighting control flexibility. As an example, a lighting schedule could be programmed to allow the lighting circuit to come on at dusk, based on a light sensor and then turned off at a given time during the night based on a time schedule. With the Lighting Controller, lighting schedules may be overridden to "on" with a user provided pushbutton. This pushbutton is wired to the analog input that corresponds to the schedule number, on the Lighting Controller. Schedule override time periods are programmed from the Prism program. Lighting Controller output relays may be configured for continuous ON mode during the occupied schedule or a short pulse when the schedule starts and another short pulse when the schedule ends. Pulsed output requires an optional Expansion Relay Board and a GE™ RR-7 or RR-9 or equivalent lighting relay. The Lighting Controller may be connected to any local loop at any point on the WHP system. Prism computer front end software is used to interface with the Lighting Panel Controller functions. The Lighting Controller cannot be programmed through the System Manager operator interface.

Mounting

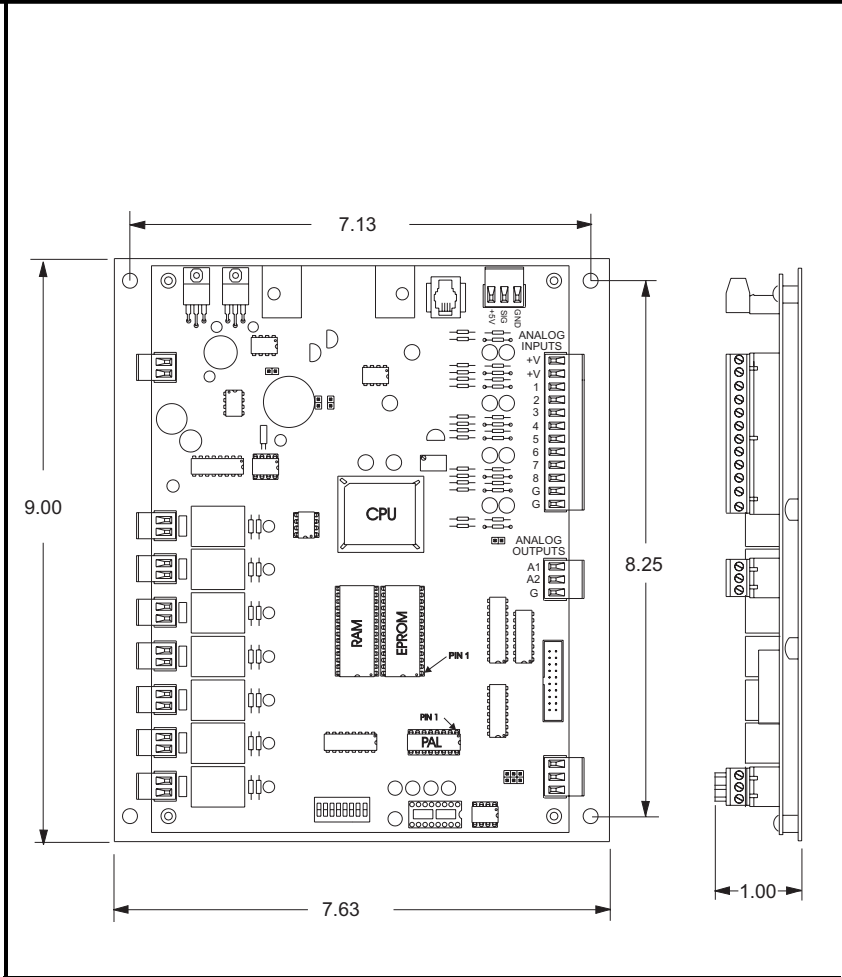The Lighting Controller is provided with an integral backplate for mounting inside of a control enclosure. It is recommended that Lighting Controller be mounted in a control enclosure in the building equipment room. An optional factory control enclosure for the Lighting Controller is available.

Technical Data		OE310-21-LP GPC-17 Controller	
Power	24 Volt AC	Weight	1.5 lb.
Power Consumption	10 VA Maximum	Network Connection	RS-485
Operating Temp	10°F to 149°F	Protocol	HSI Open Protocol Token Passing
Operating Humidity	90% RH Non-Condensing	Communications	RS-485 - 9600 Baud
Inputs:		*Outputs:*	
Types Allowed	Pushbutton Override Connected to Analog Input #8 (N.O. Binary Contact by Others) All Schedules May be Programmed to Follow or Not Follow the Override	Type Provided	Continuous Contact Closure or Start Pulse and Stop Pulse for Each of the 7 Schedules (N.O. Binary Contact)
		Relay Power Rating	2 Amp @ 24 VAC
Total Inputs Available	1	Total Outputs Available	7
Three Year Warranty		**WattMaster reserves the right to change specifications without notice**	

Description

The patented design, OE21x series Standard Room Sensor provides accurate sensing of the room temperature. Its design allows for flush wall mounting yet rejects the influence of surface and internal wall temperatures. The Standard Room Sensor is used in conjunction with the WHP Controller. Wire terminals are provided on the sensor for connection to the controller.

The Room Sensor's attractive styling and off white casing color make it suitable for most building decors. If interior decoration requires, the Room Sensor casing can also be painted or wall papered without affecting the sensor's performance. Room Sensors are available in 4 different configurations:

- OE210 Sensor Plain
- OE211 Sensor with Override
- OE212 Sensor with Setpoint Adjustment
- OE213 Sensor with Setpoint Adjustment and Override

Wiring from the WHP Controller to the Room Sensor should not be run in conduit with other AC line voltage wiring, or with any conductors carrying highly inductive loads.

Mounting

The Room Sensors are designed to be mounted on a vertical, 2" x 4" electrical box recessed in the wall. If the wall cannot be penetrated, a plastic surface mount box such as those made by Wiremold™, may be used to mount the sensor to the wall surface.

Wall Cut-Out Dimensions When Sensor Is To Be Mounted Without Handy Box (By Others)
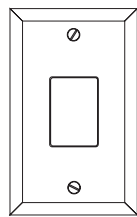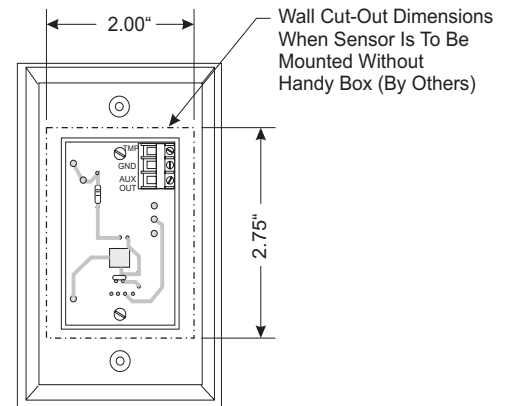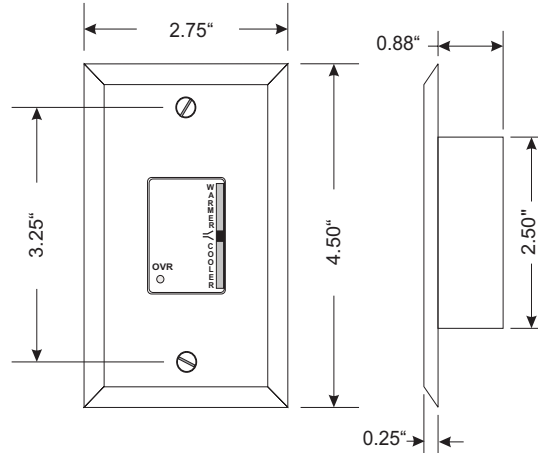
OE210
Room Sensor - Plain
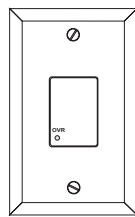
OE211
Room Sensor With Override
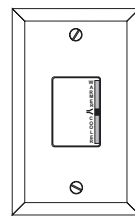
OE212
Room Sensor With Setpoint Adjust
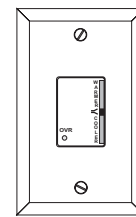
OE213
Room Sensor With Setpoint Adjust & Overide

Technical Data		OE210, OE211, OE212, OE213 Standard Room Sensor	
Sensor Element	Type III Thermistor 10k ohm @ 77º F	Mounting	Designed to be Flush Mounted to Wall using Vertical 2" x 4" Handy Box (by others)
Accuracy	±0.4º F between 40º F to 95º F	Line Loss	0.25º F max. error, using 22 AWG wire at 1000 ft
Range	-30º F to 150º F	Weight	4 oz.
3 Year Warranty		**WattMaster reserves the right to change specifications without notice**	

Description

The OE262 Water Differential Pressure Transducer is a highly accurate water differential pressure transmitter that incorporates a capacitive technology to produce a linear electronic signal proportional to the differential pressure. It is used to monitor and and send a 4 to 20 mA signal to the WHP Loop controller for control of the WHP System circulating pump. The parts and elastomer seals make this unit ideal for use in the WHP water circulating system. The NEMA 4 (IP65) case keeps the internal electronics protected from the environment.

Features

• 0.25% accuracy

• NEMA 4 (IP65) protection

• Stainless steel wetted parts

• Elastomer seals

• High proof pressure

• Current outputs

• Mounting bracket included

Mounting

The OE262 is supplied with a mounting bracket and two 6-32 x 3/8 hex head screws. Attach bracket to mounting location first, using holes or band clamp notches available on large section of the bracket. Attach transducer to bracket by using the (2) 6-32 x 3/8" hex head screws and the (2) tapped holes located on the underside of the transducer.

3.01"

2.15"

Top View

2.00"

1.94"

3.05"

1.00"

0.88 Dia. Opening For 1/2" Conduit

1/4" -18 NPT High Pressure Port

2.44"

1/4" -18 NPT Low Pressure Port

Bleed Screws

1.00"

1.50"

Side View

End View

Transducer Assembly

Mount Transducer By Securing Thru These Mounting Bracket Holes And Into Threaded Holes On Transducer With Provided 6-32 x 3/8" Hex Head Screws

Notched For Clamp Mounting To Pipe If Desired

Top View

3.00"

0.25"

0.156 Dia. Hole 4 PL For Securing Mounting Bracket To Desired Mounting Surface

0.25"

0.88"

0.52"

1.63"

2.50"

1.63"

Side View

End View

Mounting Bracket

Technical Data		OE262 - Water Differential Pressure Transducer	
Output Signal	4-20 mA	Hysteresis	0.10% Full Scale
Voltage Range	9 – 30 Volts DC	Operating Temp	0°F to 165°F
Max. Load	1000 Ohm	Operating Pressure	0 to 50 PSIG
Response Time	30 to 50 millseconds	Max. Overpressure	250 PSIG
Accuracy	± 0.25% Full Scale	Weight	14.4 Ounces
One Year Warranty		**WattMaster reserves the right to change specifications without notice**	

The OE230 Duct Sensor Threads Into The OE291 Stainless Steel Thermowell. The OE291 Thermowell Threads Into A 1/2" FPT Elbow or Tee in the Water Piping of the Water Coil at Which You wish to Measure the Water Temperature. The Pipe must be a minimum of 4" Diameter or an Extended Tee and Bushing Configuration Must be Used to Accommodate the Length of the Thermowell Assembly.

Leads Are Non-polarized. Butt Splice Leads To 24 Gauge Wire Minimum. Connect Leads To "Analog In" And "Ground" At Controller.

OE230 Temperature Sensor (Ordered Separately)

1/8"-27 NPT External Thread

1/8"-27 NPSM Internal Thread

OE291 Stainless Steel Thermowell

1/2" NPT External Thread

4.94"

5.13"

3.25"

0.5"
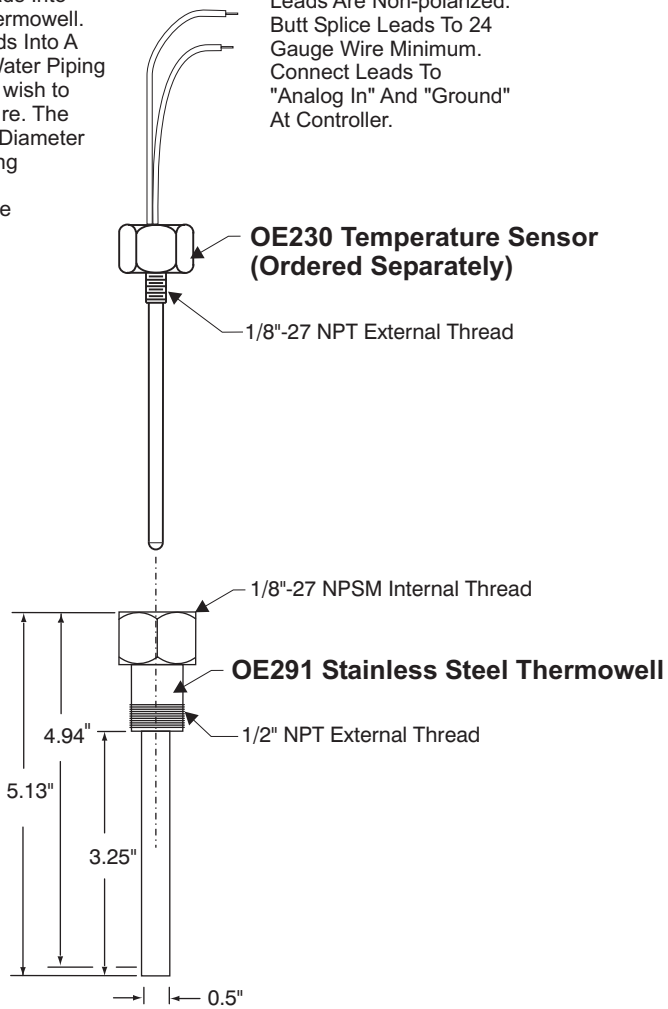
OE291 Thermowell Assembly Using OE230 Temperature Sensor

Caution!

The Duct Sensor Is Used For Sensing Entering Or Leaving Water Temperatures. Location Of The Sensors Is Very Important In Order To Obtain Accurate Temperature Readings. The Following Recommendations Should Be Followed:

Entering Water
When Used As A Supply Water Temperature Sensor The Sensor Should Be Mounted In The Supply Water Piping As Close To The Water Coil As Possible For Best Accuracy, Apply Insulation On The Outside Of The Piping Over The Sensor. This Will Help Thermal Gradients From Affecting The Sensor.

Leaving Water
When Used As A Leaving Water Temperature Sensor The Sensor Should Be Mounted In The Return Piping As Close To The Water Coil Outlet As Possible. For Best Accuracy, Apply Insulation On The Outside Of The Piping Over The Sensor. This Will Help Thermal Gradients From Affecting The Sensor.

See The Systems Installation And Operation Manual For Other Design Considerations And Recommendations Regarding Water Temperature

Temperature Sensor Resistance/Voltage Chart

Temp °F	Resistance* Ohms	Voltage @ Input*	Temp °F	Resistance* Ohms	Voltage @ Input*	Temp °F	Resistance* Ohms	Voltage @ Input*	Temp °F	Resistance* Ohms	Voltage @ Input*
-10	93333	4.620	45	21094	3.470	69	11906	2.780	84	8514	2.352
-5	80531	4.550	50	18655	3.330	70	11652	2.752	86	8153	2.297
0	69822	4.474	52	17799	3.275	71	11379	2.722	88	7805	2.242
5	60552	4.390	54	16956	3.217	72	11136	2.695	90	7472	2.187
10	52500	4.297	56	16164	3.160	73	10878	2.665	95	6716	2.055
15	45902	4.200	58	15385	3.100	74	10625	2.635	100	6047	1.927
20	40147	4.095	60	14681	3.042	75	10398	2.607	105	5453	1.805
25	35165	3.982	62	14014	2.985	76	10158	2.570	110	4923	1.687
30	30805	3.862	64	13382	2.927	78	9711	2.520	115	4449	1.575
35	27140	3.737	66	12758	2.867	80	9302	2.465	120	4030	1.469
40	23874	3.605	68	12191	2.810	82	8893	2.407	125	3656	1.369

*Chart Notes:

1. Use the resistance column to check the thermistor sensor while disconnected from the controllers (not powered).

2. Use the voltage column to check sensors while connected to powered controllers. Read voltage with meter set on DC volts. Place the "-"(minus) lead on GND terminal and the "+"(plus) lead on the sensor input terminal being investigated. If the voltage is above 5.08 VDC, the sensor or wiring is "open." If the voltage is less than 0.05 VDC, the sensor or wiring is shorted.

Notes:

1.) All Wiring To Be In Accordance With Local And National Electrical Codes And Specifications.

JOB NAME		
FILENAME		
G-OE291-T-Well.CDR		
DATE: 07/09/04		DRAWN BY: B. CREWS
PAGE	DESCRIPTION:	
1	OE291	
	Water Temperature Sensor Thermowell	

Butt Splice Or Wire Nut Wire Leads And Extend
Wire To Controller Terminals. Connect One Wire
Lead To Return Water Temperature Or Supply Water
Temperature Terminal At The Controller As Required
By Intended Use. Secure Other Wire Lead To
Ground Terminal At The Controller. See Note 3.

Secure Sensor Element And Thermal
Mastic Strip To Pipe With Supplied
Wire Tie. Be Sure To Tighten Wire Tie
Snugly To Ensure Good Thermal Contact
Between Pipe And Sensing Element.

Wire Tire
(Supplied)

Supply Or Return
Water Pipe. See Note 1 & 2.

Sensing Element
(Supplied)
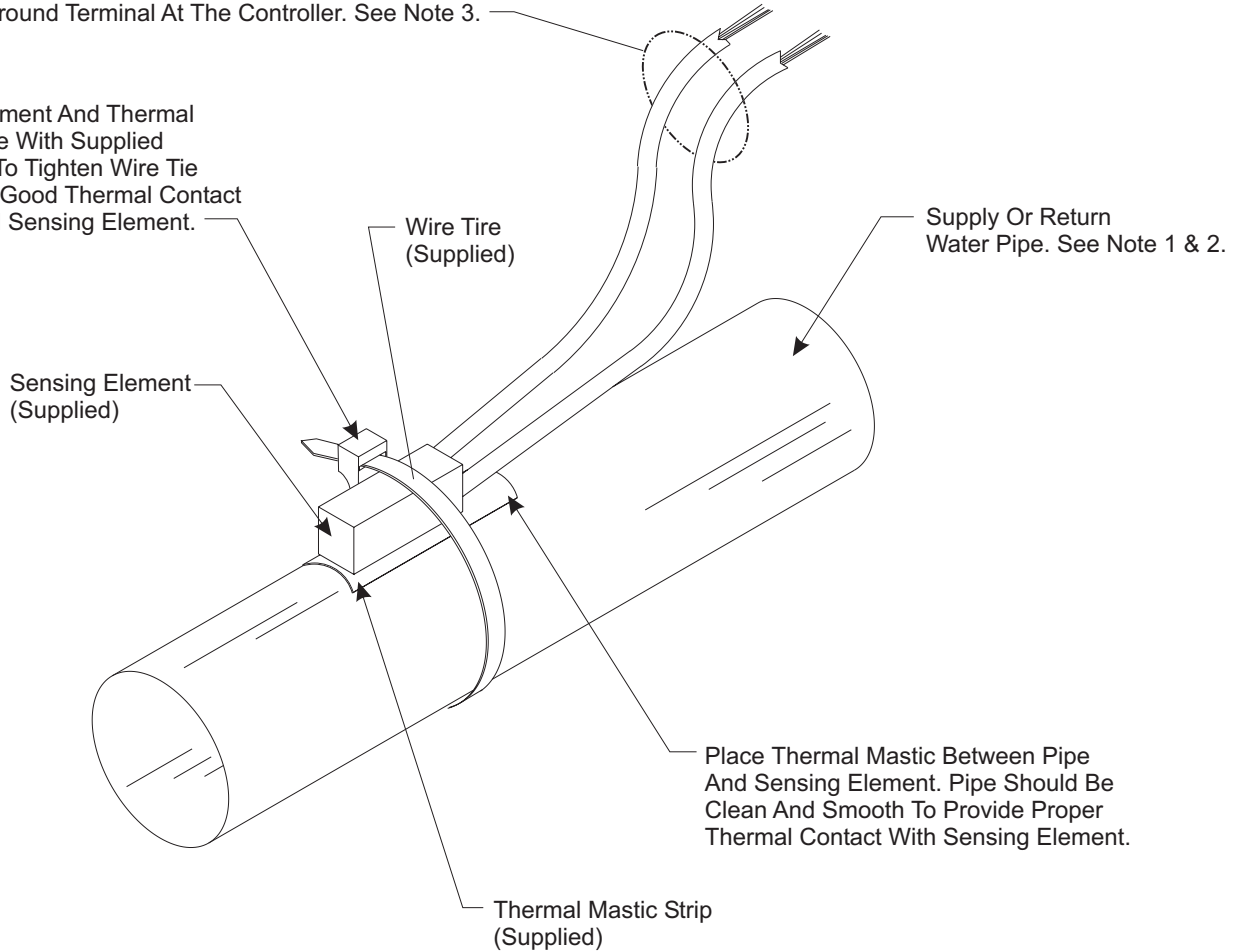
Place Thermal Mastic Between Pipe
And Sensing Element. Pipe Should Be
Clean And Smooth To Provide Proper
Thermal Contact With Sensing Element.

Thermal Mastic Strip
(Supplied)

Important Note:
For Accurate Temperature Readings
It Is Necessary To Place Insulation Over
The Sensor After Installation. This Prevents
The Ambient Temperature From Affecting
The Sensor. Insulation Should Cover The
Sensor And Extend 6" to 12" Beyond Each
End Of The Sensor.

Notes:
1.)Sensor Should Be Mounted At
Location Along Pipe Length
That Best Represents Desired
Temperature Reading.

2.)Sensing Element Shown
Mounted To Top Of Pipe. The
Sensor Element May Be Located
At Any Location Around Pipe.

3.)All Wiring To Be In Accordance
With Local And National Electrical
Codes And Specifications.

JOB NAME	
FILENAME	**WattMaster**
G-OE233-W-TempSnsr1a.CDR	C O N T R O L S
DATE: 07/09/04	DRAWN BY: B. CREWS
PAGE	DESCRIPTION:
1	OE233 - Strap-On Temperature Sensor Kit Installation

Duct Temperature Sensors
OE230 (6" Probe) & OE231 (12" Probe)

Caution!
The Duct Sensor Is Used For Sensing Supply Or Return Air Temperatures. Location Of The Sensors Is Very Important In Order To Obtain Accurate Temperature Readings. The Following Recommendations Should Be Followed:
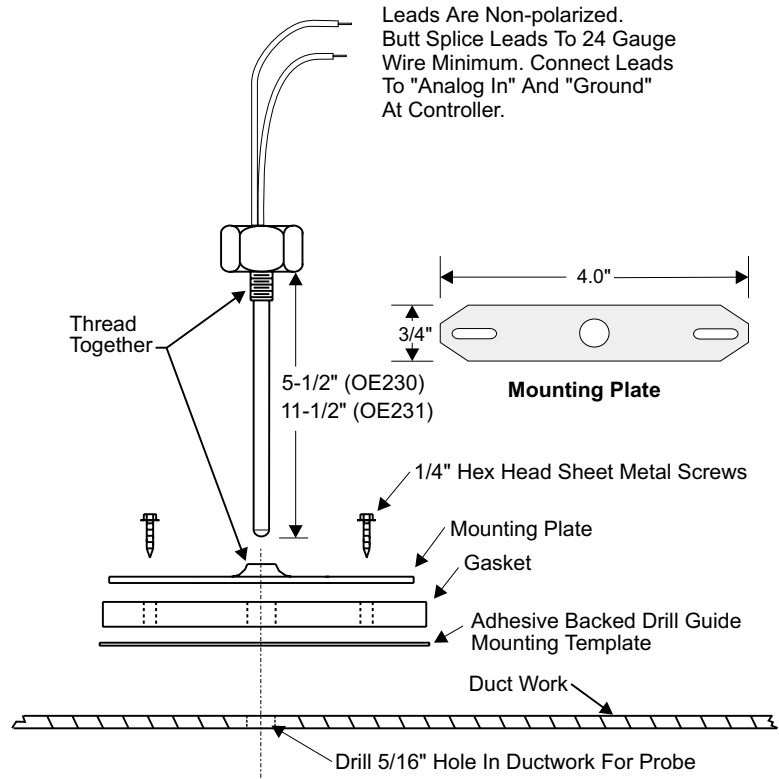
Supply Air
When Used As A Supply Air Sensor The Sensor Should Be Mounted In The Supply Air Duct As Close To The HVAC Unit As Possible And Upstream Of The Bypass Damper (If Used) For Best Results. For Best Accuracy, Apply Insulation On The Outside Of The Ductwork Over The Sensor. This Will Help Thermal Gradients From Affecting The Sensor.

Return Air
When Used As A Return Air Sensor The Sensor Should Be Mounted In The Return Air Duct As Close To The HVAC Unit As Possible And Upstream Of The Bypass Damper (If Used) For Best Results. For Best Accuracy, Apply Insulation On The Outside Of The Ductwork Over The Sensor. This Will Help Thermal Gradients From Affecting The Sensor.

See The Systems Installation And Operation Manual For Other Design Considerations And Recommendations Regarding Duct Temperature Sensor Location.

Leads Are Non-polarized. Butt Splice Leads To 24 Gauge Wire Minimum. Connect Leads To "Analog In" And "Ground" At Controller.

Thread Together

5-1/2" (OE230)
11-1/2" (OE231)

4.0"

3/4"

Mounting Plate

1/4" Hex Head Sheet Metal Screws

Mounting Plate

Gasket

Adhesive Backed Drill Guide Mounting Template

Duct Work

Drill 5/16" Hole In Ductwork For Probe

Temperature Sensor Resistance/Voltage Chart

Temp °F	Resistance* Ohms	Voltage @ Input*	Temp °F	Resistance* Ohms	Voltage @ Input*	Temp °F	Resistance* Ohms	Voltage @ Input*	Temp °F	Resistance* Ohms	Voltage @ Input*
-10	93333	4.620	45	21094	3.470	69	11906	2.780	84	8514	2.352
-5	80531	4.550	50	18655	3.330	70	11652	2.752	86	8153	2.297
0	69822	4.474	52	17799	3.275	71	11379	2.722	88	7805	2.242
5	60552	4.390	54	16956	3.217	72	11136	2.695	90	7472	2.187
10	52500	4.297	56	16164	3.160	73	10878	2.665	95	6716	2.055
15	45902	4.200	58	15385	3.100	74	10625	2.635	100	6047	1.927
20	40147	4.095	60	14681	3.042	75	10398	2.607	105	5453	1.805
25	35165	3.982	62	14014	2.985	76	10158	2.570	110	4923	1.687
30	30805	3.862	64	13382	2.927	78	9711	2.520	115	4449	1.575
35	27140	3.737	66	12758	2.867	80	9302	2.465	120	4030	1.469
40	23874	3.605	68	12191	2.810	82	8893	2.407	125	3656	1.369

*Chart Notes:
1. Use the resistance column to check the thermistor sensor while disconnected from the controllers (not powered).

2. Use the voltage column to check sensors while connected to powered controllers. Read voltage with meter set on DC volts. Place the "-"(minus) lead on GND terminal and the "+"(plus) lead on the sensor input terminal being investigated. If the voltage is above 5.08 VDC, the sensor or wiring is "open." If the voltage is less than 0.05 VDC, the sensor or wiring is shorted.

Notes:

1.)All Wiring To Be In Accordance With Local And National Electrical Codes And Specifications.

JOB NAME	
FILENAME	
G-DUCSENS1.CDR	
DATE: 04/25/02	DRAWN BY: B. CREWS
PAGE	DESCRIPTION:
1	OE230 & OE231 Duct Temperature Sensor

Gasketed Cover
CAUTION!
See Note3

Cover
Mounting
Screw - Typ.

3.00"

2.30"

2.70"

Closure Plug
CAUTION!
See Note 2

0.21" Dia. x 0.73
Lg. Slot - Typ.

4.50"

2.25"

1.13"

Mounting Tab
& Screws - Typ.

3.00"

Mounting Tab
& Screw - Typ.

Sensor Tube
CAUTION!
See Note 1

Closure Plug
CAUTION!
See Note 2

Incorrect

See Note #1

Incorrect   **Correct**

Front View   **Side View**   **Back View**

Sensor Mounting
Postion

Outside Air Sensor OE250

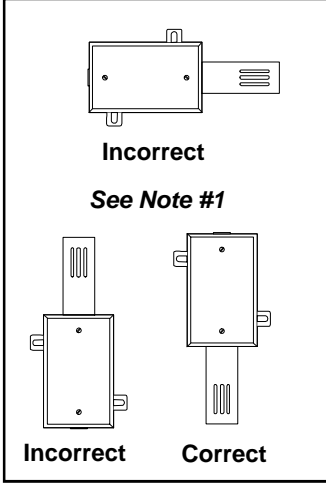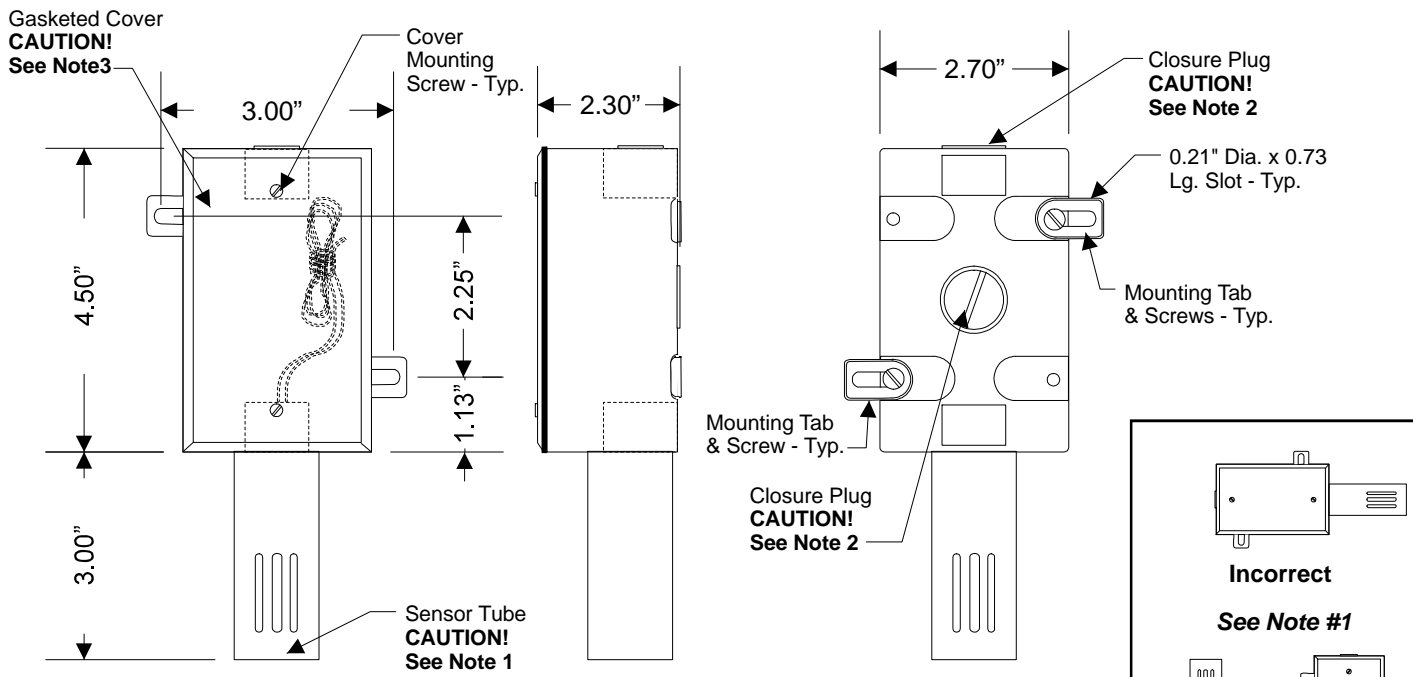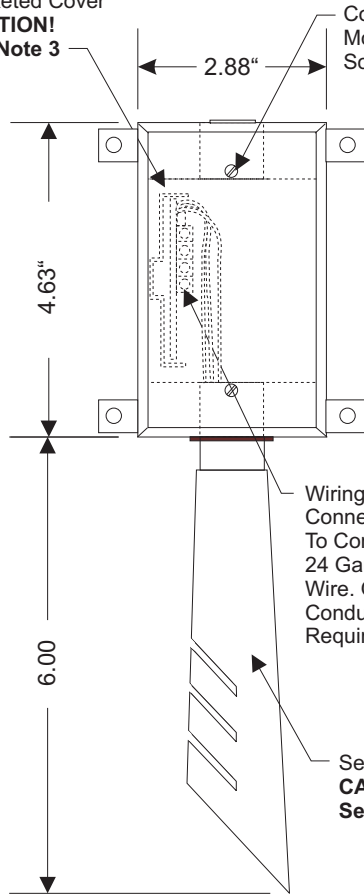| Temperature Sensor Resistance/Voltage Chart											
Temp °F	Resistance* Ohms	Voltage @ Input*	Temp °F	Resistance* Ohms	Voltage @ Input*	Temp °F	Resistance* Ohms	Voltage @ Input*	Temp °F	Resistance* Ohms	Voltage @ Input*
-10	93333	4.620	45	21094	3.470	69	11906	2.780	84	8514	2.352
-5	80531	4.550	50	18655	3.330	70	11652	2.752	86	8153	2.297
0	69822	4.474	52	17799	3.275	71	11379	2.722	88	7805	2.242
5	60552	4.390	54	16956	3.217	72	11136	2.695	90	7472	2.187
10	52500	4.297	56	16164	3.160	73	10878	2.665	95	6716	2.055
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25	35165	3.982	62	14014	2.985	76	10158	2.570	110	4923	1.687
30	30805	3.862	64	13382	2.927	78	9711	2.520	115	4449	1.575
35	27140	3.737	66	12758	2.867	80	9302	2.465	120	4030	1.469
40	23874	3.605	68	12191	2.810	82	8893	2.407			

*Chart Notes:

1. Use the resistance column to check the thermistor sensor while disconnected from the controllers (not powered).

2. Use the voltage column to check sensors while connected to powered controllers. Read voltage with meter set on DC volts. Place the "-"(minus) lead on GND terminal and the "+"(plus) lead on the sensor input terminal being investigated. If the voltage is above 5.08 VDC, then the sensor or wiring is "open." If the voltage is less than 0.05 VDC, the sensor or wiring is shorted.

Notes:

1.)The Outside Air Sensor Must Be Mounted In A Vertical Position As Shown (Sensor Tube Pointing Down). *Water Must Not Be Allowed To Stand In Sensor Tube. Rainwater Will Damage Sensor.* Sensor Must Be Located Where It Will Not Be Affected By Direct Sunlight Or Heat Producing Equipment. If Possible Mount Under Roof Eave Or Similar Protected Location. If Sensor Is Not Located As Specified, Erroneous Outside Air Temperature Readings Will Result.

2.)Unused Conduit Opening(s) Must Have Closure Plugs Installed And Must Be Coated with Sealing Compound To Provide Raintight Seal. Water Can *Damage Sensor!*

3.)Gasket Must Be Installed Under Cover Plate To Provide Raintight Seal. *Rainwater Can Damage Sensor!*

4.)All Wiring To Be In Accordance With Local And National Electrical Codes And Specifications.

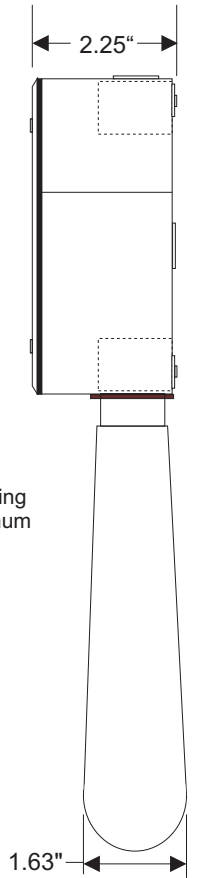| JOB NAME	
FILENAME	
G-OE250-OAS-PDWG.CDR	
DATE: 04/25/02	DRAWN BY: B. CREWS
PAGE	DESCRIPTION:
1	OE250
	Outside Air Temperature Sensor

Gasketed Cover
CAUTION!
See Note 3

Cover Mounting Screw - Typ.

2.88"

2.25"

0.19 Dia. Hole Typ.

Closure Plug
CAUTION!
See Note 2

3.19"

Mounting Bar & Screws - Typ.

4.63"

3.50"

1/2"

6.00

Wiring Terminal. Connect Wiring To Controller Using 24 Gauge Minimum Wire. Only 2 Conductors are Required.

Closure Plug
CAUTION!
See Note 2

Sensor Tube
CAUTION!
See Note 1

1.63"

See Note #1

Incorrect

Correct

Front View

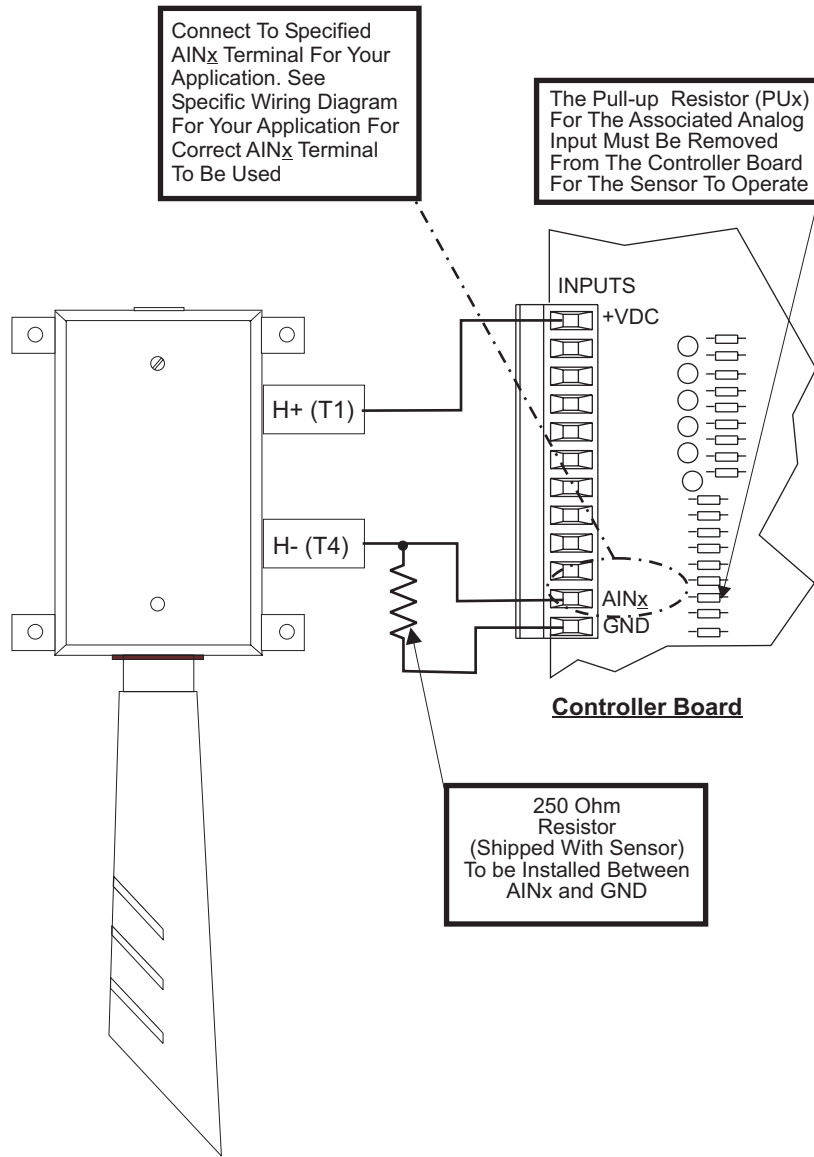**Side View**
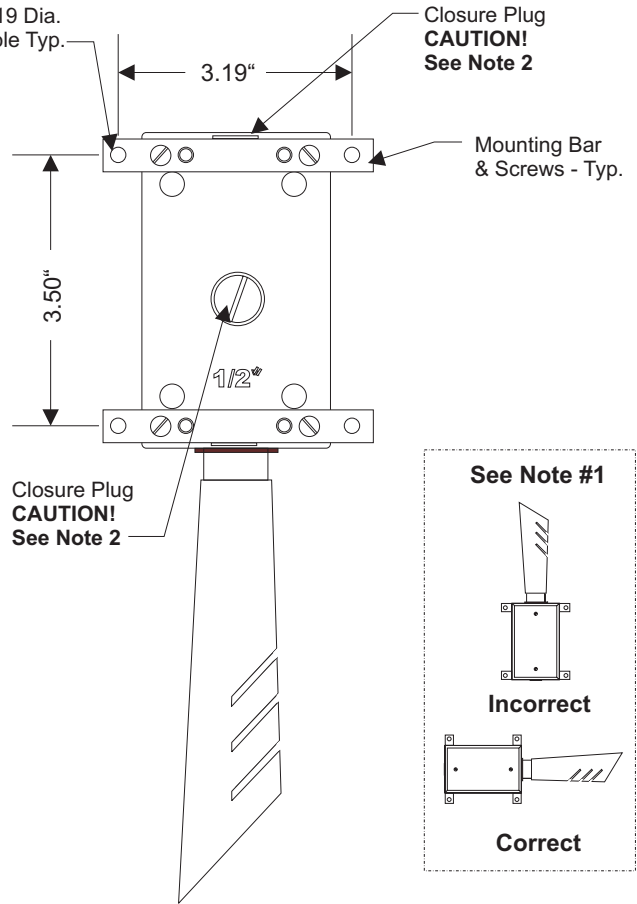
Back View
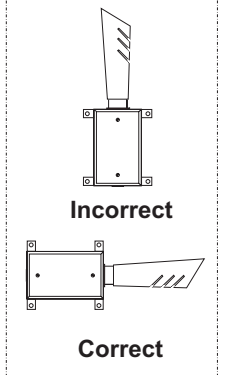
Sensor Mounting Postion

1.) The Outside Air Sensor Must Be Mounted In A Horizontal Position As Shown (Sensor Tube Pointing Left or Right with Slots Pointing Down). ***Water Must Not Be Allowed To Stand In Sensor Tube. Rainwater Will Damage Sensor.*** Sensor Must Be Located Where It Will Not Be Affected By Direct Sunlight Or Heat Producing Equipment. If Possible Mount Under Roof Eave Or Similar Protected Location. If Sensor Is Not Located As Specified, Erroneous Outside Air Humidity Readings Will Result.

2.) Unused Conduit Opening(s) Must Have Closure Plugs Installed And Must Be Coated with Sealing Compound To Provide Raintight Seal. ***Rainwater Will Damage Sensor!***

3.) Gasket Must Be Installed Under Cover Plate To Provide Raintight Seal. ***Rainwater Will Damage Sensor!***

JOB NAME		
FILENAME		
G-OA-HUMID1.CDR		
DATE: 08/24/04	DRAWN BY: B. CREWS	
PAGE	DESCRIPTION:	
1 of 2	OE265-03	
	Outside Air Humidity Sensor	

Connect To Specified
AINx Terminal For Your
Application. See
Specific Wiring Diagram
For Your Application For
Correct AINx Terminal
To Be Used

The Pull-up Resistor (PUx)
For The Associated Analog
Input Must Be Removed
From The Controller Board
For The Sensor To Operate

INPUTS

+VDC

H+ (T1)

H- (T4)

AINx
GND

Controller Board

250 Ohm
Resistor
(Shipped With Sensor)
To be Installed Between
AINx and GND

*Chart Notes:
1. Be sure that +24VDC power is being supplied to the sensor. For voltage measurement set the
   meter to DC Volts. Connect the meter between ground and the input terminal on the controller
   board that is connected to the sensor. The input on the controller board must have a 250 ohm
   resistor to ground installed and have it's associated pull-up resistor removed for the sensor to
   function properly. For current measurement set the ammeter to DC Amps and connect the
   meter's lead in series with the T1 terminal on the sensor. Use an accurate humidity
   measurement device to determine RH (relative humidity) such as an aspirating psychrometer.
   Use the Output VDC column to read the Output Voltage or the Output mA column to read the
   Output Amperage corresponding with the RH percentage measured with the psychrometer. If the
   measured voltage or amperage is within 3% of what is listed for the corresponding RH, then the
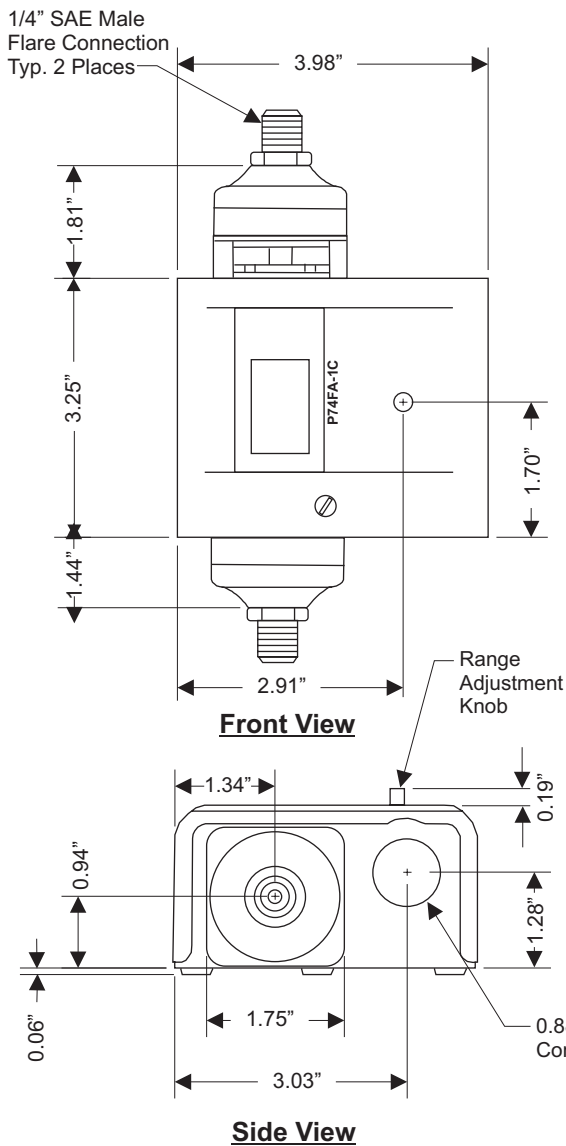   sensor is functioning properly.

Notes:

1) All Wiring To Be In Accordance With
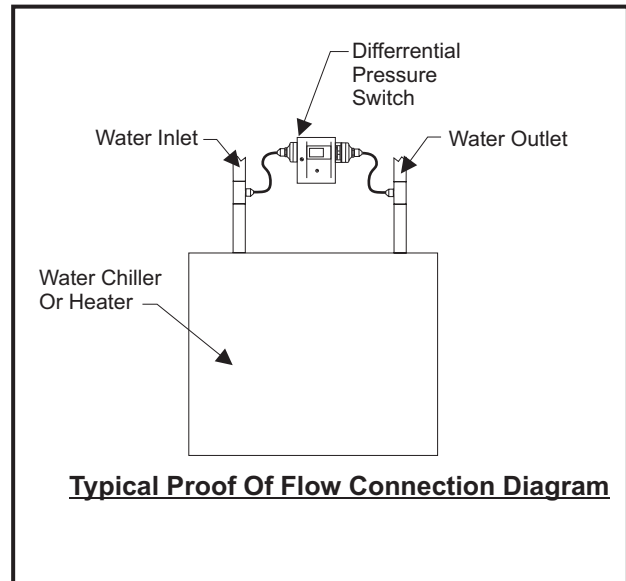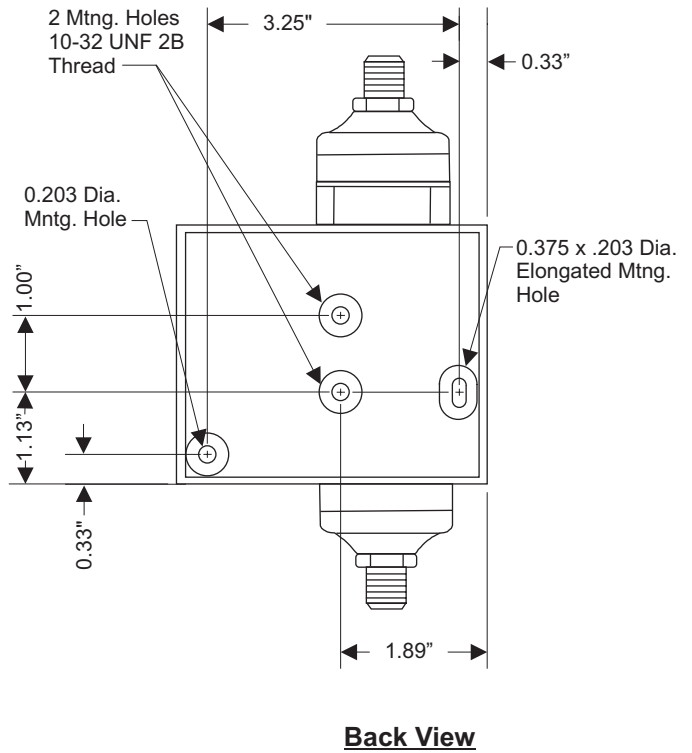   Local And National Electrical Codes
   And Specifications.

Humidity Sensor Current/Voltage Chart

RH %	Output* mA	Output VDC*	RH %	Output* mA	Output VDC*
0	4.00	1.00	55	12.80	3.20
5	4.80	1.20	60	13.60	3.40
10	5.60	1.40	65	14.40	3.60
15	6.40	1.60	70	15.20	3.80
20	7.20	1.80	75	16.00	4.00
25	8.00	2.00	80	16.80	4.20
30	8.80	2.20	85	17.60	4.40
35	9.60	2.40	90	18.40	4.60
40	10.40	2.60	95	19.20	4.80
45	11.20	2.80	100	20.00	5.00
50	12.00	3.00			

JOB NAME		
FILENAME		
G-OA-HUMID1.CDR		
DATE: 08/24/04	DRAWN BY: B. CREWS	
PAGE	DESCRIPTION:	
	OE265-03	
2 of 2	Outside Air Humidity Sensor	

1/4" SAE Male
Flare Connection
Typ. 2 Places

3.98"

1.81"

3.25"

P74FA-1C

1.70"
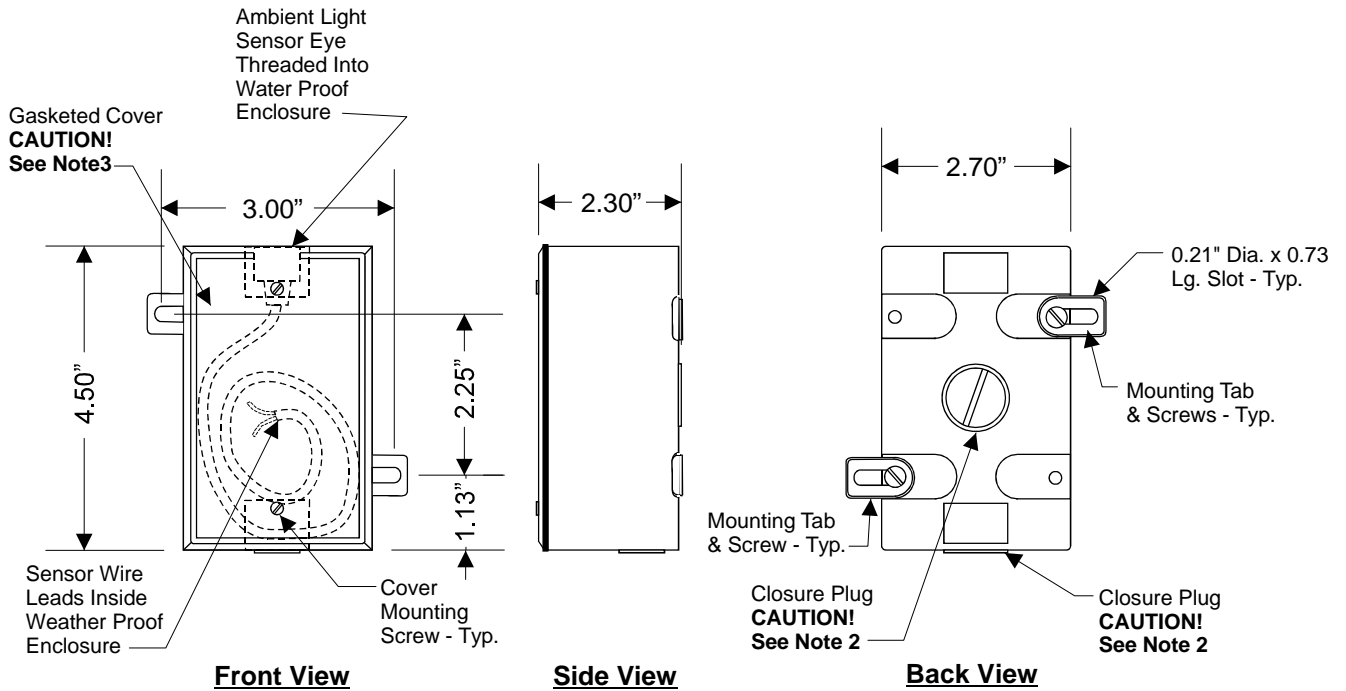
1.44"

2.91"

Front View

Note:
Differential Pressure Switch Is Supplied With A Universal
Mounting Bracket (Not Shown). Switch Can Be Mounted Using
This Bracket Or Can Be Mounted Directly To A Suitable Surface
Using The Mounting Holes Provided On The Switch Itself.

2 Mntg. Holes
10-32 UNF 2B
Thread

3.25"

0.33"

0.203 Dia.
Mntg. Hole

0.375 x .203 Dia.
Elongated Mtng.
Hole

1.00"

1.13"

0.33"

1.89"

Back View

Range
Adjustment
Knob

1.34"

0.19"

0.94"

1.28"

0.88 Dia.
Conduit Opening

0.06"

1.75"

3.03"

Side View

Switch Action	Range Pressure Differential	Switch Differential	Pressure Connections	Bellows Material	Pilot Duty Rating 120 to 270 VAC
SPDT Snap Acting	8-60 PSI	1.5 Fixed	¼" Male Flare	Brass	125 VA

Differential
Pressure
Switch

Water Inlet

Water Outlet

Water Chiller
Or Heater

Typical Proof Of Flow Connection Diagram

Notes:
1.)The sensor is designed to be mounted
near the water pressure sensing
location. Use the shortest length of
tubing that is possible with your
installation.

2.)All Wiring To Be In Accordance With
Local And National Electrical Codes
And Specifications.

Ambient Light
Sensor Eye
Threaded Into
Water Proof
Enclosure

Gasketed Cover
CAUTION!
See Note3

2.70"

0.21" Dia. x 0.73
Lg. Slot - Typ.

3.00"

2.30"

Mounting Tab
& Screws - Typ.

4.50"

2.25"

1.13"

Mounting Tab
& Screw - Typ.

Sensor Wire
Leads Inside
Weather Proof
Enclosure

Cover
Mounting
Screw - Typ.

Closure Plug
CAUTION!
See Note 2

Closure Plug
CAUTION!
See Note 2

**Front View**   **Side View**   **Back View**

Ambient Light Sensor OE259

The Ambient Light Sensor Is A Photo Sensitive Resistor Housed In A Water Proof Enclosure.
It Is Used In Conjunction With The OE310-21-LP Lighting Controller To Sense The Presence Or Absence
Of Ambient Light For The Control Of Lighting Circuits Connected To The Controller. The Sensor
Has A Resistance In Excess Of 1M Ohms In Darkness And Ranges Down To Less Than 1.5 K Ohms In
Bright Light. The Sensor Wire Connections Are Non-Polarized. See The OE310-21-LP Wiring Diagram For
Correct Wiring Connections. See Note 1 For Mounting Location Cautions.
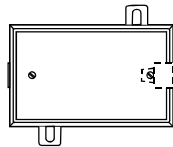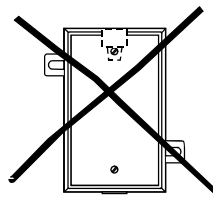
Correct Mounting Position   **Incorrect Mounting Position**

Notes:

1.)The Ambient Light Sensor Should
Be Installed Outdoors Where It Can
Sense The Ambient Light Level. Do
Not Mount In A Shady Area Or Near
Any Obstructions That Would Block
The Sensor Eye. The Ambient Light
Sensor Should Be Mounted On Its
Side In A Horizontal Position So
Water Will Not Puddle Around The
Sensor Eye.

2.)Unused Conduit Opening(s) Must
Have Closure Plugs Installed And Must
Be Coated with Sealing Compound To
Provide Raintight Seal. Water Can
Damage Sensor!

3.)Gasket Must Be Installed Under Cover
Plate To Provide Raintight Seal.
Rainwater Can Damage Sensor!

4.)All Wiring To Be In Accordance With
Local And National Electrical Codes
And Specifications.

| JOB NAME		
FILENAME		
G-OE259-AmbLightSnsr1A.CDR		
DATE: 06/17/03		DRAWN BY: B. CREWS
PAGE	DESCRIPTION:	
1	OE259	
	Ambient Light Sensor	

Description

The OE255 & OE256 CO$_2$ Sensors are used in conjunction with various other WattMaster controllers to monitor and control CO$_2$ levels in the building environment.

Some typical applications are:

- Controlling ventilation in a building where the occupancy varies frequently

- Controlling ventilation to ensure excess outside air is not causing energy waste

- To ensure good air distribution throughout building zones

The OE256 is used for monitoring room CO$_2$ levels and is designed for wall mounting in the required space. The OE255 is designed to be mounted on the return air duct of the HVAC unit and includes a aspiration box with a probe that samples air from the return air stream.
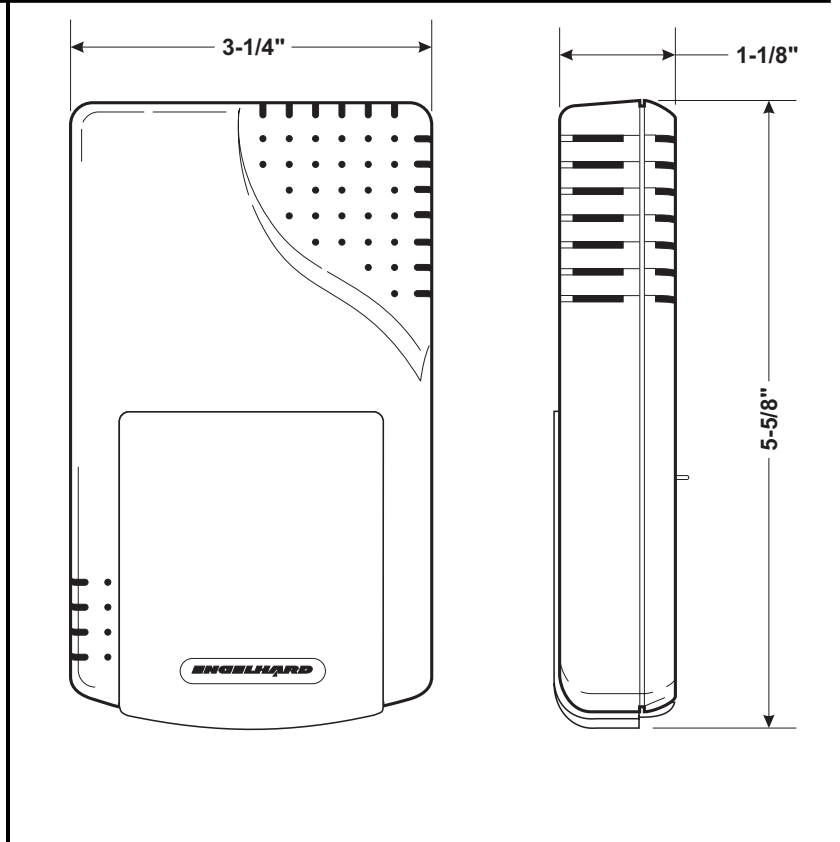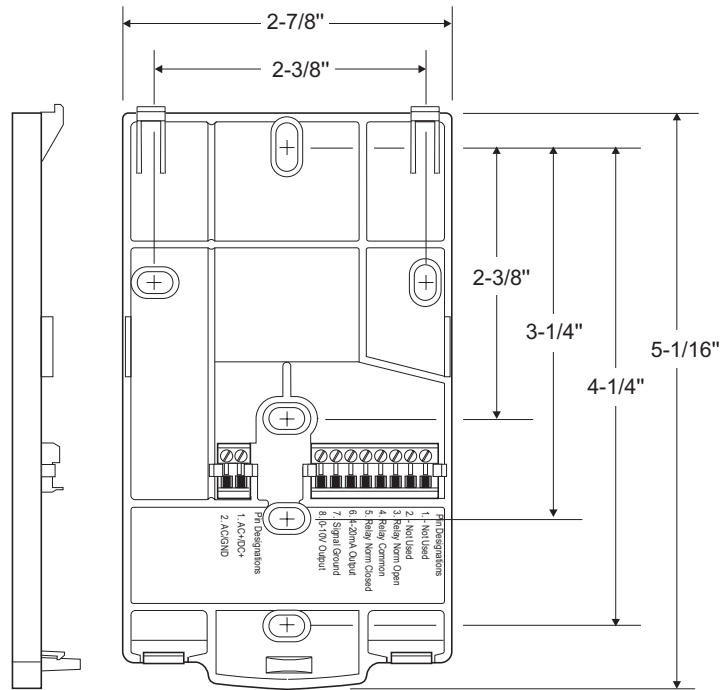

Both models use the patented dual beam Absorption Infrared™ technology. This technology provides a very accurate and stable sensor that is guaranteed to maintain its accuracy for a minimum of 5 years between calibrations. The OE255 & OE256 CO$_2$ Sensors accuracy is ± 50 ppm @1000 ppm. Annual drift is 10 ppm per year. Repeatability is ±20 ppm.
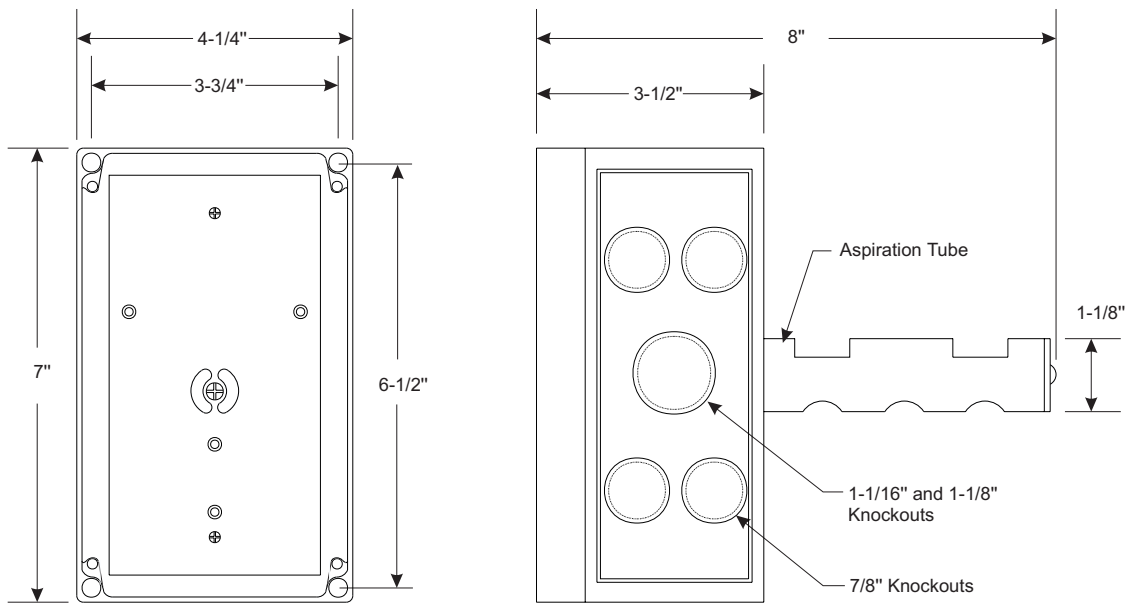
Application

Both models utilize a sub-base mounting plate with terminal blocks providing for quick and easy mounting and wiring. The OE256 wall mounted sensor's sub-base is compatible with standard junction boxes for ease of wall mounting and wiring. A locking screw secures the whole assembly to the wall. The OE255 duct mounted sensor has a enclosure with pickup probe assembly that is mounted to the ductwork. The standard sensor sub-base and housing is then attached to the enclosure to provide for secure mounting of the sensor. The OE255 also is supplied with a clear enclosure cover to seal the sensor from dust and dirt.

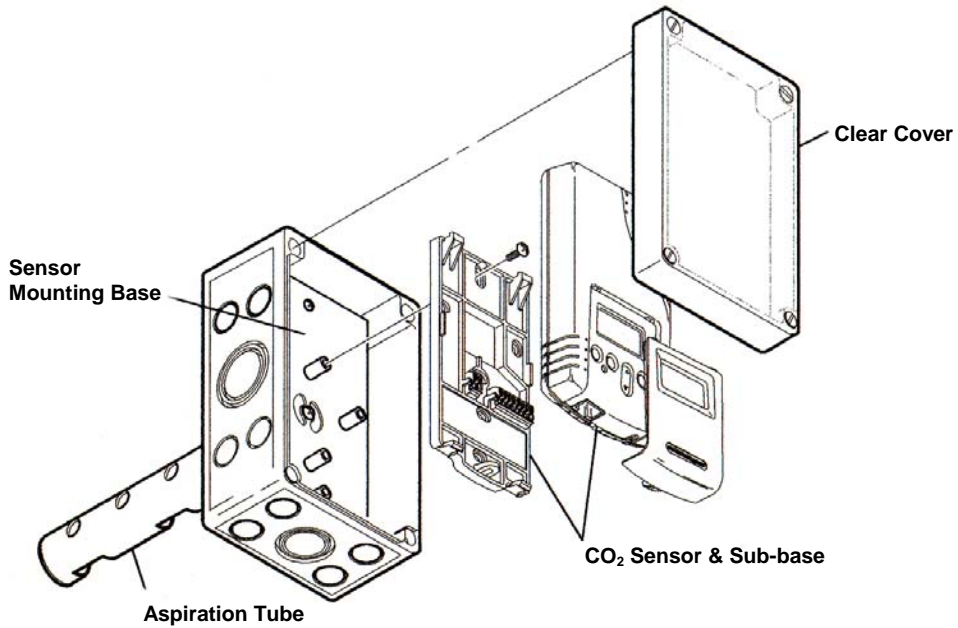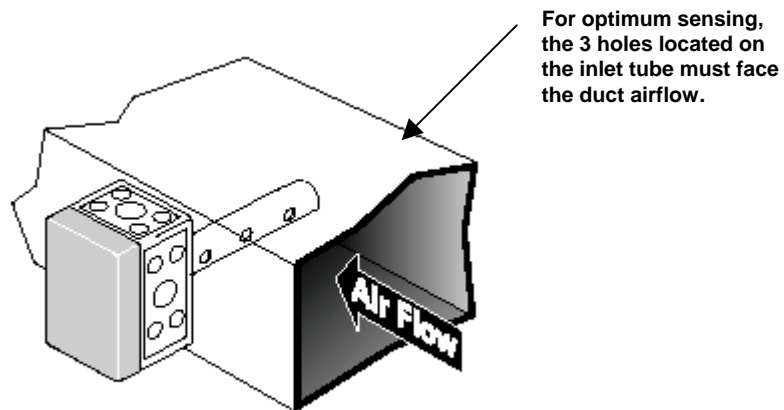| Technical Data		OE255 & OE256 – CO$_2$ Sensor	
Input Power	18-30 VAC RMS, 50/60 Hz Half Wave Rectified	Power Consumption	1.75 VA Maximum Average 2.75 VA Peak Power
Operating Temperature	32°F to 122°F	Operating Humidity	0-95% RH Non-Condensing
Sample Method	Diffusion Or Flow –through 50-100 ml/min	Measurement Range	0 to 2000 ppm (Adjustable to 10,000 ppm).
Sensitivity	±10 ppm	Resolution	±1 ppm
Analog Output	0-10 VDC 4-20 mA	Agency Certification	FCC Part 15 Class B
One Year Warranty		**WattMaster reserves the right to change specifications without notice**	

CO2 Sensor Sub-base
(Used On OE255 & OE256)

Pin Designations
1. AC/DC+
2. AC/GND

Pin Designations
1 - Not Used
2 - Not Used
3. Relay Norm Open
4. Relay Common
5. Relay Norm Closed
6. 4-20mA Output
7. Signal Ground
8. 0-10V Output

Dimensions: 2-7/8", 2-3/8", 2-3/8", 3-1/4", 4-1/4", 5-1/16"

Aspiration Box
(Included & Used With OE255 Only)

Shown W/ Cover Removed

Aspiration Tube

1-1/16" and 1-1/8" Knockouts

7/8" Knockouts

Dimensions: 4-1/4", 3-3/4", 7", 6-1/2", 8", 3-1/2", 1-1/8"

Clear Cover

Sensor Mounting Base

CO$_2$ Sensor & Sub-base

Aspiration Tube

OE255 – Duct Mounted CO$_2$ Sensor Assembly

For optimum sensing, the 3 holes located on the inlet tube must face the duct airflow.

Air Flow

OE255 – Duct Mounted CO$_2$ Sensor Mounting