

ASM-2

The ASM-2 auxiliary sensor module is a stand-alone microprocessor based controller for monitoring auxiliary sensors. The application would include commercial unitary heating, ventilating, and air conditioning (HVAC) equipment.

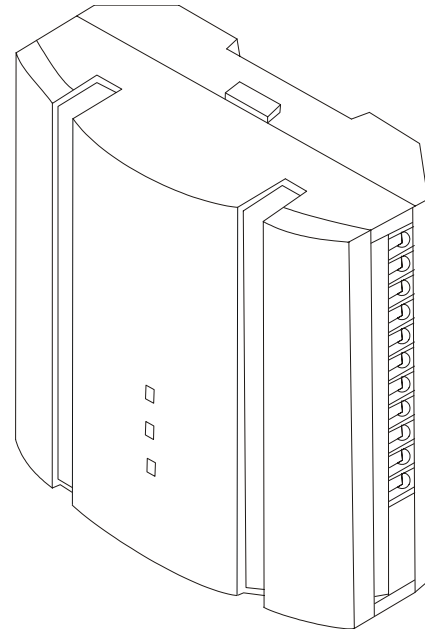
Overview

Analog inputs are provided for outdoor air temperature, outdoor air humidity, indoor air humidity, and supply water temperature. A “unit enable” digital input is provided for confirmation to water dependant systems. For energy monitoring, digital inputs for meter pulses and end-of-interval signals are also provided.

The controller is based on the LONWORKS® networking technology. The controller can be networked to a higher-level control system for monitoring and control applications.

Features

- Outside air temperature measurement
- Outside air humidity measurement
- Supply water temperature measurement
- Indoor humidity measurement
- Energy meter digital input for pulse counting
- Energy monitoring “end of period” digital input
- Network outputs to LCI for load shedding functions
- Current energy measurement
- Current daily energy consumption measurement
- Log of daily energy consumption (previous 30 days)
- Log of interval energy usage (previous 96 intervals)
- “Unit Enable” digital input
- LONWORKS interface to building automation systems.
- Automatic configuration with the LCI



Innovex Technologies
511 Braddock Avenue
Turtle Creek, PA 15145
www.innovextechnologies.com

iWorX is a trademark of Innovex Technologies
LON, LONWORKS, & LONMARK are trademarks of Echelon Corporation

Purpose of This Guide

The *iWorX ASM-2 Application Manual* provides application information for the ASM-2 Controller.

The reader should understand basic HVAC concepts, intelligent environmental control automation, and basic LONWORKS networking and communications. This Application Manual is written for:

- Users who engineer control logic
- Users who set up hardware configuration
- Users who change hardware or control logic
- Technicians and field engineers

Copyright Notice

This document copyright © 2006, Innovex Technologies. All other intellectual property rights and copyrights related to or arising from these products belong to a third party.

The confidential information contained in this document is provided solely for use by Innovex Technologies employees, licensees, and system owners, and is not to be released to, or reproduced for, anyone else. Neither is it to be used for reproduction of this control system or any of its components.

All specifications are nominal and may change as design improvements occur. Innovex Technologies shall not be liable for damages resulting from misapplication or misuse of its products.

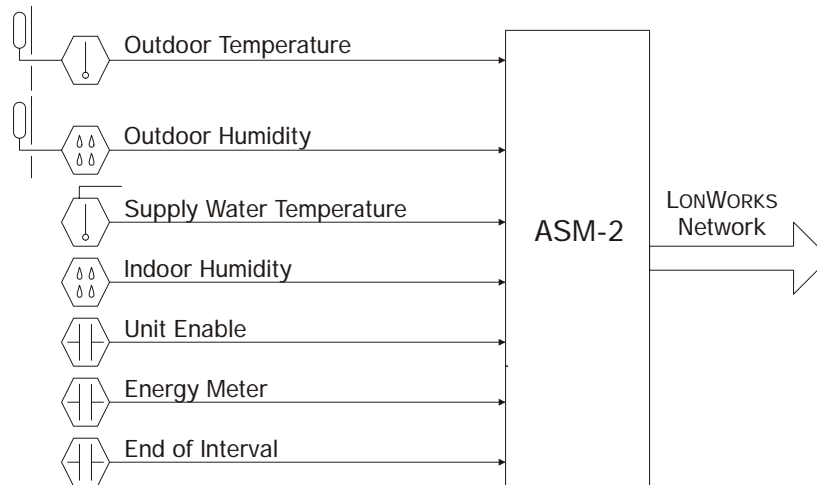
Applicable Documentation

Part Number	Description	Audience	Purpose
iWorX-ASM-INS-100	iWorX ASM Series Installation Instructions	<ul style="list-style-type: none"> – Application Engineers – Installers – Service Personnel – Start-up Technicians 	Provides instructions for setting up and using the iWorX ASM Series controllers.
iWorX-LCI1-USR-100	iWorX LCI User's Guide	<ul style="list-style-type: none"> – Application Engineers – Installers – Service Personnel – Start-up Technicians – End user 	Provides instructions for setting up and using the iWorX Local Control Interface.
Additional Documentation	<i>LonWorks FTT-10A Free Topology Transceiver User's Guide</i> , published by Echelon Corporation. It provides specifications and user instructions for the FTT-10A Free Topology Transceiver.		

Application Description

The controller provides outdoor temperature, outdoor humidity, indoor humidity, supply water temperature, energy monitoring readings, and unit enable status to other devices on the network. Figure 1 illustrates a typical controller application.

Figure 1: ASM-2 Application



An input is provided to read an outside air temperature sensor. An additional input is provided to read an outside air humidity sensor. The current values of both sensors are made available to other devices on the network. The outdoor temperature and humidity are used to calculate the outdoor enthalpy. The enthalpy is required by certain types of controllers to determine if “free cooling” is available from the economizer.

An additional input is provided to read an indoor air humidity sensor. The current value of the sensor can be used by other devices on the network as a “global” indoor humidity value, for calculating indoor enthalpy.

An input is provided to read a supply water temperature sensor. The current value of the sensor is made available to other devices on the network. The supply water temperature is required by certain types of controllers to achieve automatic summer/winter changeover.

A digital input is provided to read a contact closure for “unit enable” purposes. The ASM-2 can make the status of that contact available to other devices on the network. Typically, “unit enable” information is utilized by heat pumps to determine when the water supply is flowing.

The ASM-2 can also monitor energy consumption. One digital input accepts energy consumption pulses from a utility meter, another other accepts a timing pulse from the utility. This pulse indicates the end of an energy-monitoring period, and implicitly signals the beginning of a new period.

Sequence of Operation

This section describes the sequence of operation for the controller.

Outdoor Air Temperature

The outdoor air temperature sensor input is for a thermistor. The controller reads the sensor and converts it to a temperature once a second. The converted value is made available as a network variable output.

Outdoor Air Humidity

The outdoor air humidity sensor input is 0 to 10 volt scaled device. The controller reads the sensor and converts it to humidity once a second. The converted value is made available as a network variable output.

Supply Water Temperature

The supply water temperature sensor input is for a thermistor. The controller reads the sensor and converts it to a temperature once a second. The converted value is made available as a network variable output.

Indoor Humidity

The indoor humidity sensor input is a 0 to 10 Volt scaled device. Every second, the controller reads the sensor and converts the reading to a humidity measurement. The converted value is made available as a network variable output.

Energy Consumption Monitoring

The ASM-2 monitors pulses from the energy meter input, stores a count of them internally, and reads that count every 30 seconds. Once read, the count is stored and used to calculate a new KWh value. The count is scaled using a value programmed at the LCI. This scaling factor tells the ASM-2 how many pulses indicate 1 KWh of energy. The KWh value can be viewed on the LCI as "Current Reading". These periodic readings are accumulated until the end of an interval.

The end of the monitoring interval can be determined in two ways. The first method is to have the ASM-2 determine the length of the interval. At power up, the ASM-2 defaults to using its internal timer. The interval length for the internal timer can be programmed at the LCI.

The second method is by sensing a hardwired signal from the energy meter. The meter momentarily closes this input to indicate the end of an interval. If the ASM-2 receives a synchronization pulse on its "end of interval" input, it automatically switches over to using the external signal instead of the internal timer. If no external signal is received for more than two hours, the ASM-2 reverts to using its internal timer.

Once the end of the interval is determined, a new interval reading is then calculated using enough of the 30-second readings to form the interval. The calculation is performed on a sliding window of data, with the newest data replacing the oldest. The daily total is then updated by adding the interval value, and load shedding is calculated.

The ASM-2 provides a method for detecting if energy consumption is above a preset level. This enables the system to perform load-shedding functions. Two alarm levels are available. If energy consumption for an interval exceeds the first setting, the energy consumption alarm will be set to level one. If the alarm is at level one, consumption will be compared to the second setting. If consumption exceeds the second setting, the alarm will be set to level two. If consumption drops below the second setting, the alarm level will be dropped to one, and if it drops below the first setting the alarm level will be cleared to zero.

Unit Enable

The unit enable input is a contact input that is closed while the unit is enabled. The controller reads the input once a second. The current value is made available as a network variable output.

Automatic Configuration

The ASM-2 and iWorX Local Control Interface (LCI) use a self-configuring network management scheme requiring no external tools, binding, or LONWORKS knowledge. The LCI recognizes and configures the ASM-2 when the controller's service pin is pressed. The controller's status light flashes green until the controller is configured, and will be solid green after the controller is configured. Once the service pin has been pressed, no further action is required by the user; the controller is fully accessible to the LCI. Users may bind to SNVTs on the ASM-2 with LNS or other LONWORKS tools if they wish.

The LCI also provides network supervision of the ASM-2. The LCI periodically sends a "ping" message to the ASM-2, which elicits a response. If the response fails, an alarm is displayed on the LCI. The LCI also uses the "ping" message to refresh the occupancy mode and other system wide data.

ASM-2 Configuration

Once the ASM-2 is properly installed and recognized by the Local Control Interface (LCI), the LCI can be used to configure the settings of the controller. This section describes the commands available on the LCI for configuration of the ASM-2, and the meanings and default values for controller parameters. For more information on using the LCI, see the *iWorX LCI User's Guide*.

Setup

The Setup screen gives you access to controller settings.

Copy and Paste

Use **Copy** to place a copy of this controller's setpoints onto the clipboard. You can then **Paste** these settings onto another ASM-2 controller.

List All Settings

This screen displays the heating and cooling setpoints used by the ASM-2 controller. Use the up and down arrow keys to select a value to change, then use **-** or **+** to increase or decrease the value (or utilize **USE KEYS** to directly enter the desired value). Press **Save** to save your changes or **Back** to return to the Setup screen.

Table 1: All ASM-2 Settings

Setting	Range	Default	Description
Scaling Factor	0 to 65535 pulses/KWh	12 pulses/KWh	Number of pulses per KWh of energy consumed.
Load Level 1	0 to 65535 KWh	65535 KWh	Consumption per interval that will trigger a level one alarm. ^a
Load Level 2	0 to 65535 KWh	65535 KWh	Consumption per interval that will raise a level one alarm to level two. ^a
Reading Interval	1 to 30 minutes	15 minutes	Length of the energy consumption monitoring interval when using the internal timer.

a. Set both levels to 65535 to disable this feature.

Inputs

The Inputs screen displays the current values of the ASM-2's inputs. These values cannot be changed.

Table 2: ASM-2 Inputs

Input	Range	Description
Outside Temperature	-30 to 230 °F (-34 to 110 °C)	Temperature reported by the OAT sensor.
Outside Humidity	0.00 to 100.00%	Humidity reported by the OAH sensor.
Water Temperature	-30 to 230 °F (-34 to 110 °C)	Temperature reported by the SWT sensor.
Inside Humidity	0.00 to 100.00%	Humidity reported by the IAH sensor.
Unit Enable	Off, On	Status of the EN switch.
Current Reading	0 to 65535 KWh	Energy consumption during the last interval.
Daily Reading	0 to 65535 KWh	Running total of energy consumed today. Resets at midnight.

Troubleshooting

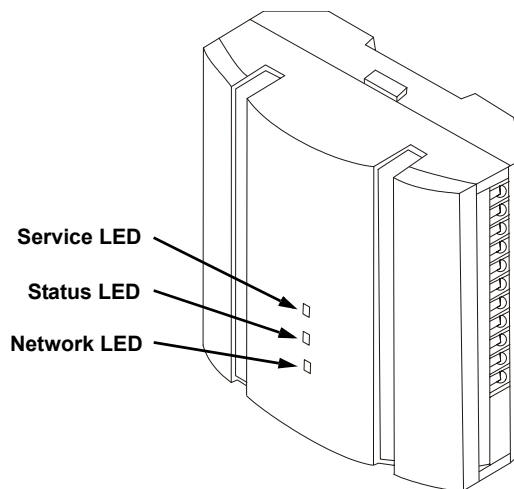
Diagnostic LEDs

The controller has 3 LED indicators. These indicators can aid in troubleshooting equipment operation problems. The following table lists the functions of the controller's LEDs in the order they appear from top to bottom on the unit.

Table 3: Controller LED Indicators.

LED	Indication
Service	– Illuminated when the service pin is pushed
Status	– Solid green when running and configured by an LCI – Flashing green when running and NOT configured by an LCI – Solid red when a fault condition exists
Network	– Yellow while the controller is transmitting data onto the FTT-10A network – Green when there is network activity – Off when there is no network activity

Figure 2: ASM-2 Controller LEDs



Troubleshooting Tips

Controller is not running and Status LED is not illuminated.

No power to controller. Verify the voltage on the controller's power connector (24 VAC).

How do I reset the controller?

The controller can be reset by the LCI, or you can cycle power to the controller. Refer to the LCI documentation for more information on resetting the controller using the LCI.

The 10K thermistor reading is at its maximum or minimum.

The input is either shorted or open.

Thermistor readings fluctuate rapidly, sometimes by several degrees.

The controller may not be properly grounded. The controller's ground (GND) pin (T28) must be connected to earth ground.

Also ensure that the controller's digital inputs are dry contacts and that no voltage is being applied or switched to the inputs.

