X-MDA-1™

Davis Instruments ISS Adapter Kit

Setup Guide

Revision 1.0

a division of....
Xytronix Research & Design, Inc.
North Logan, Utah, USA

Table of Contents

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Installation Guidelines (Read Before Installing)

- This unit must be installed by qualified personnel.
- This unit must not be installed directly outdoors.
- This unit must not be used for medical, life saving purposes, or for any purpose where its failure could cause serious injury or the loss of life.
- This unit must not be used in any way where its function or failure could cause significant loss or property damage.

Section 1: Introduction

ControlByWeb offers a range of practical industrial control products that address a broad range of general purpose applications. The simple web-browser interface provides a convenient method for remote configuration, control, and monitoring. The X-320™ product add sophisticated instrumentation capability to the ControlByWeb product line. The X-320M™ implements an application-specific user interface for meteorological stations.

Web-enabled weather stations can be costly and limited in capability. Combining the X-320M™ with the Davis Instruments Vantage Pro 2 Integrated Sensor Suite 6322C (purchased separately) yields a solution that meets cost targets while providing a sophisticated, web-enabled weather station.

Using the X-320™ with the Davis Instruments ISS 6322C provides a number of advantages including:

- Web-browser interface
- Automatic email and SMS text alerts
- Automatic external control capability
- Internet connectivity

Additional sophisticated features include:

- Additional analog sensor ports
- Frequency input port
- Data logging
- Password protection
- IP address filtered access
- NTP time synchronization
- Remote Relays – Control relays on other ControlByWeb products based on weather conditions, such as to turn off irrigation systems.
- Remote Analog – Expand sensor capability with analog sensor s on other ControlByWeb products.
- Remote Services – Allows data from multiple units to be aggregated under one server.

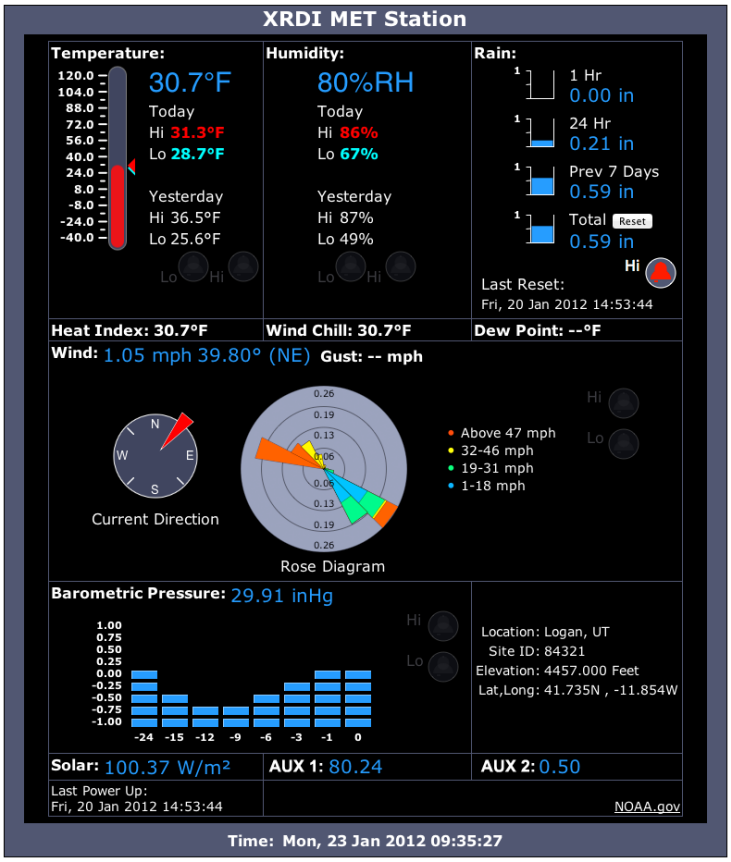

Figure 1: X-320M Status Page

1.1 X-MDA Models

X-MDA-1 – Kit

The adapter kit includes the following components

- X-MDA-1 Adapter Board
- 2x adapter cables
- 5x nylon spacers (1 extra)

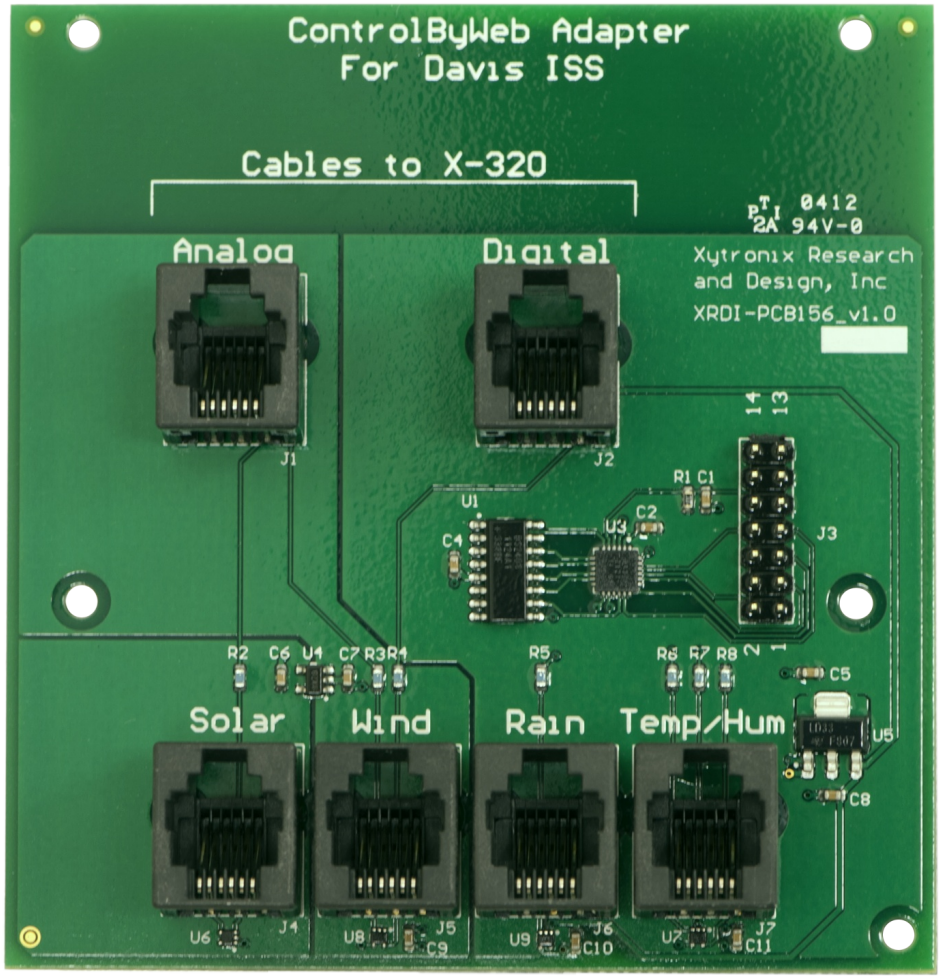

Figure 2: Davis Adapter Board

1.2 Davis Instruments Integrated Sensor Suites (ISS)

Either of the Cabled Vantage Pro sensor suites may be uses with the X-320M™. The stations are modular and may be expanded as needed. Applicable accessories are shown with each ISS.

Cabled Vantage Pro2, 6322C

The Davis Instruments Vantage Pro 2, Cable (6322C) is a required component in order to make use of the X-MDA-1. The 6322C may be purchased directly from the Davis Instruments web site, http://davisnet.com.

The 6322C includes the following sensors:

- Rain bucket
- Temperature sensor
- Humidity sensor
- Wind speed sensor
- Wind direction sensor
- Remote anemometer cable
- Mounting hardware

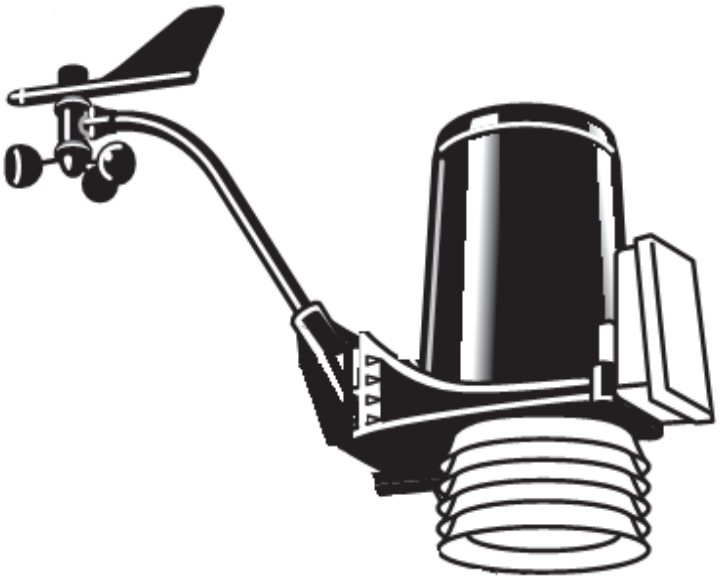

Figure 3: Davis ISS 6322C (Image courtesy of Davis Instruments.)

Additional Accessories

	Description	Part Number	Notes
1	Daytime Fan-Aspirated Radiation Shield Kit	7747	Improves temperature and humidity measurements by actively moving air through the radiation shield when it is exposed to sunlight. The fan is powered by a solar cell.
2	Solar Radiation Sensor*	6450	This solar pyranometer measures total incident energy over a period of time. Requires 6673.
3	Sensor Mounting Shelf	6673	Mounting hardware for the solar radiation sensors (6450). Holds up to 2 radiation sensors.
4	UV Radiation Sensor*	6490	Measures the sunburning portion of the UV spectrum. Requires 6673.

*The X-MDA-1 is configured for only one solar sensor. The addition of a second sensor will require that the user add cable to the sensor and wire it directly to the analog input of the X-320M™.

Vantage Pro2 Plus, 6327C

The Vantage Pro2 Plus adds both radiation sensors (UV and Solar) as well as the mounting shelf. Depending on pricing from Davis Instruments, this may be a less costly way to proceed for those interested in both radiation measurements.

Note: The X-MDA-1 is configured for only one solar sensor. The addition of a second sensor will require that the user add cable to wire the sensor directly to the X-320M™.

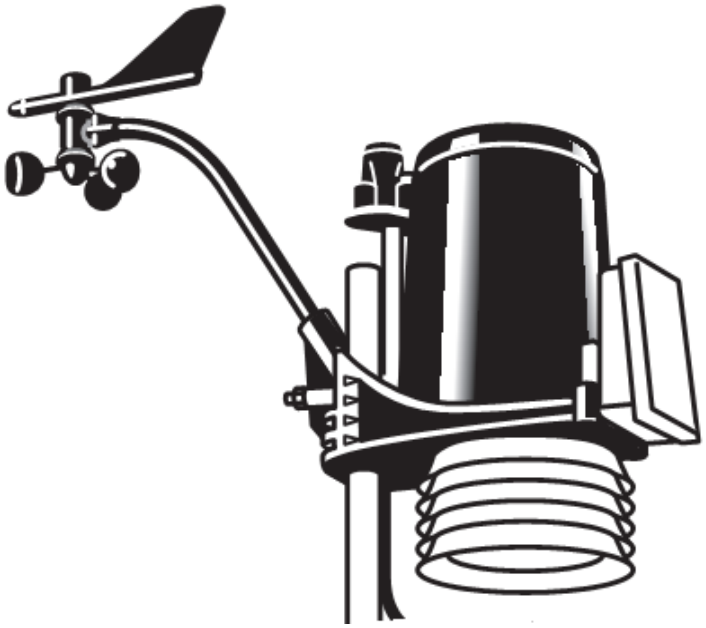

Figure 4: Davis ISS 6327C (Image courtesy of Davis Instruments.)

The 6327C includes the following:

- Rain bucket
- Temperature sensor
- Humidity sensor
- Wind speed sensor
- Wind direction sensor
- UV sensor
- Solar sensor
- Sensor mounting shelf
- Remote anemometer cable
  Mounting hardware

Accessories

	Description	Part Number	Notes
1	Daytime Fan-Aspirated Radiation Shield Kit	7747	Improves temperature and humidity measurements by actively moving air through the radiation shield when it is exposed to sunlight. The fan is powered by a solar cell.

Section 2: Installation and X-320M™ Setup

2.1 Installation Preparation

The scope of the installation instructions is restricted to the installation of the X-MDA-1 only. Please refer to the Davis Instruments installation instructions for mounting the ISS.

1. Install the Davis Instruments ISS. Ensure that all cables are routed to the ISS transmitter compartment.
2. Install the X-320M™ within 3 ft of the ISS.
3. Remove the four mounting screws that secure the ISS Transmitter board and cover.
4. Keep the screws for use later.

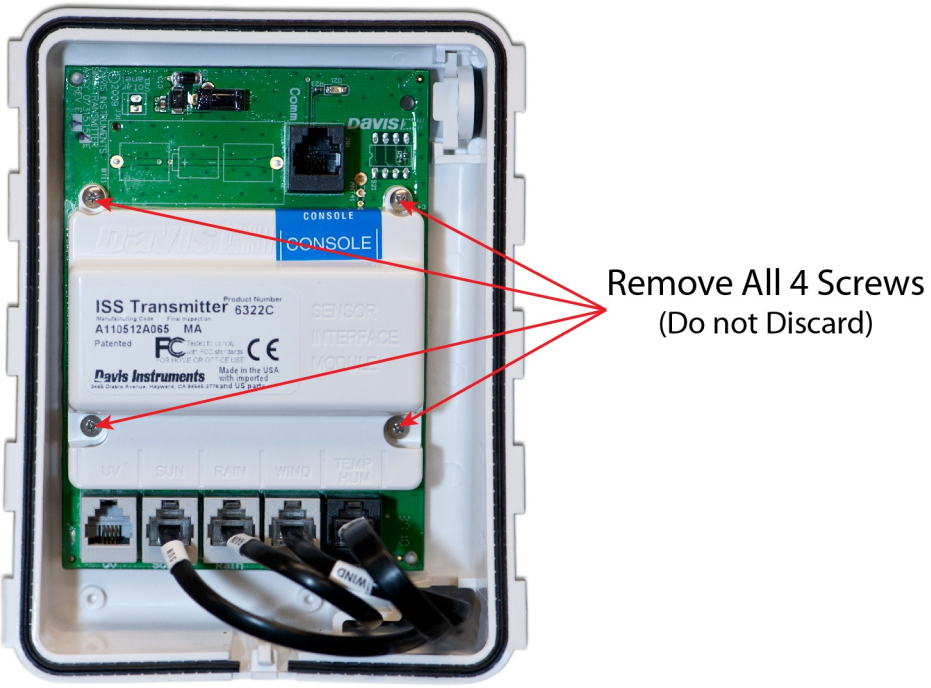

Figure 5: Davis ISS Transmitter Uninstall

2.2 X-MDA-1™ Installation

1. Place a nylon spacer over each of the screws removed previously.
2. Use the screws and spacers to install the X-MDA-1™ adapter board.
3. Connect each of the sensor cables to the respective modular connector.
4. Install the Analog and Digital cables by **running the stripped ends through the access port of the transmitter compartment,** the same port used for the Davis sensor wires.
5. Colored tape is used to differentiate each of the cables when they are attached to the X-320™.

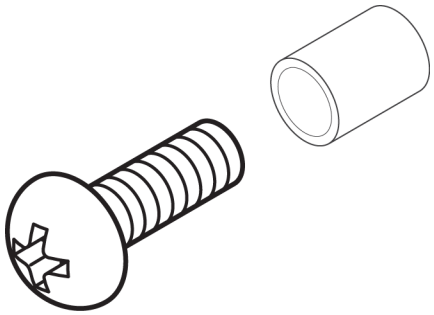

Figure 6: Spacer installation

Figure 7: X-MDA-1 Installed

6. Attach the stripped ends of the cables to the terminal block according to the following.

Analog Cable Connections (Red Tape)		
Wire Color	**X-320 Connection**	**Sensor/Function**
Blue	Ain1	Solar Sensor
Yellow	Ain2	Wind Direction
Green	Do not connect.	No Sensor
Red	+5V RF	Sensor Power
Black	Agnd	Analog Sensor Ground
White	Do not connect.	No Sensor

Digital Cable Connections (Blue Tape)		
Wire Color	**X-320 Connection**	**Sensor/Function**
Blue	D I/O1	Wind Speed
Yellow	D I/O 2	Rain Bucket
Green	Do not connect.	No Sensor
Red	5V Out	Sensor Power
Black	GND	Sensor Ground
White	Data	1-Wire Sensors (Temp, Humidity)

7. Connect the terminal block to the X-320M™.

2.3 X-320M Sensor Configuration

Please refer the X-320™ and X-320M™ manuals for set up of the network parameters, email, NTP, logging, and other general settings. The following instructions are for the use and configuration of the Davis Sensors only.

The following instructions presume that the user is familiar with the X-320 interface or can refer to the product user manual when necessary. Specific instructions, such as submitting changes or selecting tabs, are omitted; only the sensor configuration settings are given.

2.4 I/O

I/O 1 (Wind Speed)

Mode: Input

Pull-Up/Down Select: Pull-Up Resistor

Counter Options: Increment when input on

I/O 2 (Rain Bucket)

Mode: Input

Pull-Up/Down Select: Pull-Up Resistor

Counter Options: Increment when input off

2.5 Wind Speed

Sensor Connection: Rate 1

Slope: 2.25

Offset: 0.00

Avg. Period: 2 min (This is a typical setting and may be adjusted by the user.)

Units: mph

2.6 Wind Direction

Sensor Connection: Analog 2

Slope: 72

Offset: 0

Avg. Period: 2 min

Units: Degrees

2.7 Rain

Sensor Connection: Counter 2

Slope: 0.01

Offset: 0.00

Units: in

2.8 Temperature

The 1-Wire bus is used for compatible digital temperature and humidity sensors. All compatible sensors have a unique 1-Wire address. The user will need to select the correct address for the corresponding sensor for each relevant function.

Sensor Connection: 1-Wire Bus

1-Wire Address: (User selects unique sensor ID. Refer to the user manual.)

For Fahrenheit

Slope: 1.0

Offset: 0

Units: ºF

For Celsius

Slope: 0.5555

Offset: -17.7778

Units: ºC

2.9 Relative Humidity

Sensor Connection: 1-Wire Bus

1-Wire Address: (User selects unique sensor ID. Refer to the user manual.)

Slope: 1.00

Offset: 0.00

Units: %RH

2.10 Solar Radiation

Sensor Connection: Analog 2

Slope: 598.799

Offset: 0.00

Units: W/m^2

Note: Solar radiation configuration can be validated at clearskycalculator.com. The calculations assume a clear sky and should be within about 3% within one hour of solar noon.

2.11 Barometric Pressure

The following settings are for the Apogee Instruments SB-110. See Section 3 for additional information.

Sensor Connection: Analog 3
(The user may connect to any available analog port. Please refer to the user manual.)

Slope: 6.437

Offset: 3.637

Adjustment: Sea Level

Units: inHg

2.12 Soil Moisture

The following settings are for the Irrometer Soil Moisture Sensor. See Section 3 for additional information.

Sensor Connection: Analog 4

Slope: 85.35714

Offset: 0.00

Units: cb

A soil moisture levels above 239 are error indications. 247.53 (2.9 V) indicates frozen sensor. 256.07 (3.0V) indicates an open circuit. Refer to Watermark documentation for more information. Please keep in mind that the slope value may affect the error codes and direct probing of the voltage values or temporarily setting the slope to 1 may be required to verify the error state.

Section 3: Optional Sensors and Accessories

3.1 Additional Sensors

The X-320M™ is compatible with a wide variety of commercial and scientific sensors. Please contact Xytronix for a list of compatible sensors.

Barometric Pressure

The following sensor is a practical option for barometric pressure. The compact sensor contains signal conditioning built into the wire tail. It attaches directly to the X-320 terminal block.

Apogee Instruments

www.apogeeinstruments.com

SB-110

<$50

Figure 8: SB-110 (Image courtesy of Apogee Instruments.)

Soil Moisture Sensor

For agricultural and irrigation control, a soil moisture sensor can be connected to an analog input on the X-320. The Watermark Soil Moisture sensor from Irrometer comes in two versions. The version show below has been tested with the X-320.

Irrometer

www.irrometer.com

Model 200SS-V

Approximately $88

Figure 9: Watermark 200SS-V (Image courtesy of Irrometer.)

3.2 Accessories

The Vantage Pro ISS may be pole or panel mounted. System installations vary widely. The following are some accessories that may be useful in setting up a meteorological station. The listings below are provided as a reference only and do not represent an endorsement, guarantee of suitability, or compatibility. The user is advised to explore appropriate hardware to meet their specific needs.

POE Splitter

A POE splitter may be used to supply power to a remote installation of the X-320M™. The splitter is used on the X-320M™ end of the CAT5 cable. It will provide regulated power to the X-320M™. A POE power injector is required on the other end of the CAT5 cable. The DC barrel connector on the splitter will need to be removed in order to connect it to the X-320M™ power input terminals.

Unicom, Model POE-2201T

L-COM (www.l-com.com/item.aspx?id=11050)

Newark (www.newark.com/unicom-global-systems-solutions/poe-2201t/splitter-adapter/dp/68K1545?Ntt=poe-2201)

Moxa SPL-24 and SPL-24-T

http://www.icomtechinc.com/taxonomy/term/241

Tower

Both of the following tripods require a 1.25” to 1.75” O.D. mounting pole of the desired length.

Radioshack (www.radioshack.com)

Winegard, Model SW-0010, Part Number 55030420

Antennacraft Heavy-Duty 3-Foot Tripod Mount, Model 10Y203, Part Number 15-293

Enclosure

If the X-320M™ must be mounted out of doors, a water proof enclosure will be required.

Automation Direct (www.automationdirect.com)

Hubbel Wiegmann, 10x8x6 Fiberglass Enclosure w/ pull latches, Item Code HW-100806CHQR

Sub-panel, Aluminum, Fit 10x8, Item Code HW-MP1008A

Wall-Mount Kit, Item Code HW-MFGTKIT

DIN Rail

Automation Direct (www.automationdirect.com)

DIN Rail, Steel, 35mm x 7.5 mm x 15 mm long – Automation direct sells 10x 1 m lengths

DIN Rail mounting hardware

Pole Hardware

Automation Direct (www.automationdirect.com)

Royal Wholesale Electric (www.royalwholesale.com)

Integra Enclosures (www.integraenclosures.com/pole-mounting-kits.html)