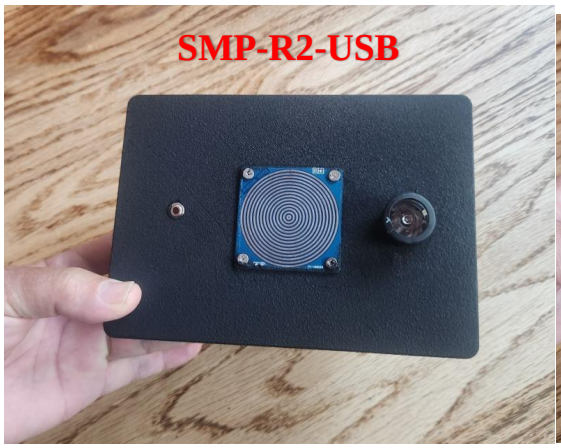
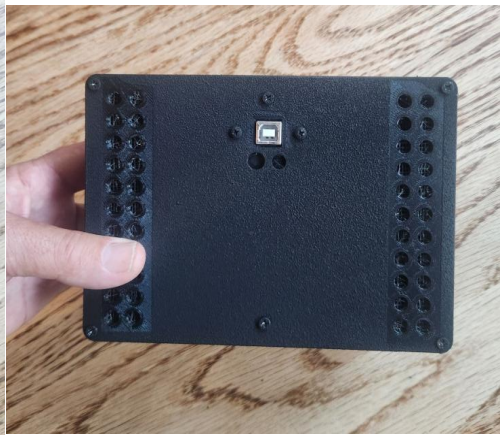
User's Manual Computerized Sky Master Pro Systems(SMP-R2-PRO & SMP-R2-USB or RF)





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User's Manual Astro-Smart

Computerized Sky Master Pro (Model SMP-PRO-R2, SMP-R2)

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A. Overview

The Astro-Smart Sky Master Pro weather stations are a cost-effective solution for astronomers to:

- Monitor and control based on the weather and sky conditions.
- Incorporate weather and environmental information and imaging data
- Trigger adjustments on sensors.
- Rain Sensor heating option to aid in false alarms from dew of to warm up to remove snow.
- 3rd party interfaces to ASCOM and SW GUI software vendors. Sequence Generator Pro, Sky Roof, Boltwood File Output and more.
- Automate observatory activity such as closing a roof or shutter when raining
    - All models have two relay options, an integrated +5V output, or a separate 12V relay unit. Either relay may be triggered to control an observatory dome, custom dome closure relay or power utility. All units support an optional GPS sensor available from Astro-Smart.
- All models have a Windows application to view, monitor and graph Sky Master Pro data, and an ASCOM driver to integrate with ASCOM compliant astronomy applications.
- All units come turn key with sky quality, clouds, brightness, rain/snow and barometer with temperature, humidity and pressure. Other options include wind speed and direction anemometer, wireless communication and GPS.

There are two available models: ***SMP-PRO-R2(Tethered System), SMP-R2(All In One System).***

The ***SMP-PRO-R2, SMP-R2*** has a complete turnkey astronomical observatory weather station system which includes sensors such as Cloud and Sky Quality Meter Sensor, Lux Sky Brightness Sensor, Rain Sensor, Wind Speed and Direction Sensor, Barometric(Pressure, Temperature and Humidity) Sensor that are housed in the R2 enclosure with one data/control cable from the R2 housing to the ***SMP-PRO-R2, SMP-R2*** . Additional options for the ***SMP-PRO-R2, SMP-R2*** include GPS Sensor, Rain sensor heating along with Relay output control to operate an Observatory Dome, Custom Dome Closure Relay or Power Utility. Custom data/control lengths between ***SMP-PRO-R2, SMP-R2*** and R2 enclosure sensor cluster are available upon request. The ***SMP-PRO-R2, SMP-R2*** can be setup with your home observatory or telescope mount for trouble-free operation controlled by the user supplied computer interface.

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The main difference between ***SMP-PRO-R2 and Non Pro R2(SMP-R2)*** family is the ***PRO*** family is a tethered product for indoor controller and outdoor sensor unit which can come with a 8 line OLED or 4 line LCD for standalone display of sensor and relay information along with remote control capabilities where the ***R*** family has the same capabilities as the ***PRO*** family with everything housed in the outdoor unit communicating to computer but with less bells and whistles found on the indoor controller tethered unit option.

Part of the non pro system there are is the new ***SMP-R2-RF*** product is a combined all in one controller and R2 sensor enclosure unit which has no need for a control cable as it uses a RF link for control cable of distances upto 650 ft from a PC or notebook controlled by Software GUI, ASCOM or 3rd party software package supporting boltwood file output. The ***SMP-R2-USB*** product is an all in one unit as well but only needs a USB cable to computer.

The imaging sensors such as the Sky Brightness Sensor is measured and displayed in LUX, while the SQM Sky Quality meter sensor is used to determine if imaging, visual or technical work is appropriate. The **SQM** features of the include a graphical reporting system on the software GUI which graphically maps **NELM(Naked Eye Limiting Magnitude) and MPSAS (Magnitude Per Square Arc Sec)** over a programmable measurement scale as low as 1 sample every 3 seconds. The Cloud Sensor is IR based and informs the user whether cloud formations or clear conditions are present necessary for imaging or visual work. The other sensors are self-explanatory and add to the overall SKY Master Product Capability.

The relay option out has two options for the ***SMP-PRO, SMP-R2*** family based on the needs of the user. If the user already has a relay output for Dome control, option 1 includes a +5V output when relay activated due to sensor readings using a 3.5mm audio jack output along with a LED output. If a relay is required, option 2 provides a +12V relay 10Amp output using a +/- AR binding posts along with LED output when activated. The basic configuration is to mount your sensor configuration to the location desired on your observatory or telescope mount. Then, connect to your PC with the USB cable and power supply provided and launch the GUI interface provided to read sensor readings and the user can let the system control when the dome should close based on user rules or sensors equipped or can be done manually by the user using the GUI interface.

Typical Configurations for the ***SMP-PRO-R2, SMP-R2*** are shown below used with a generic observatory with a role off roof or Dome control from remote computer with various sensors.

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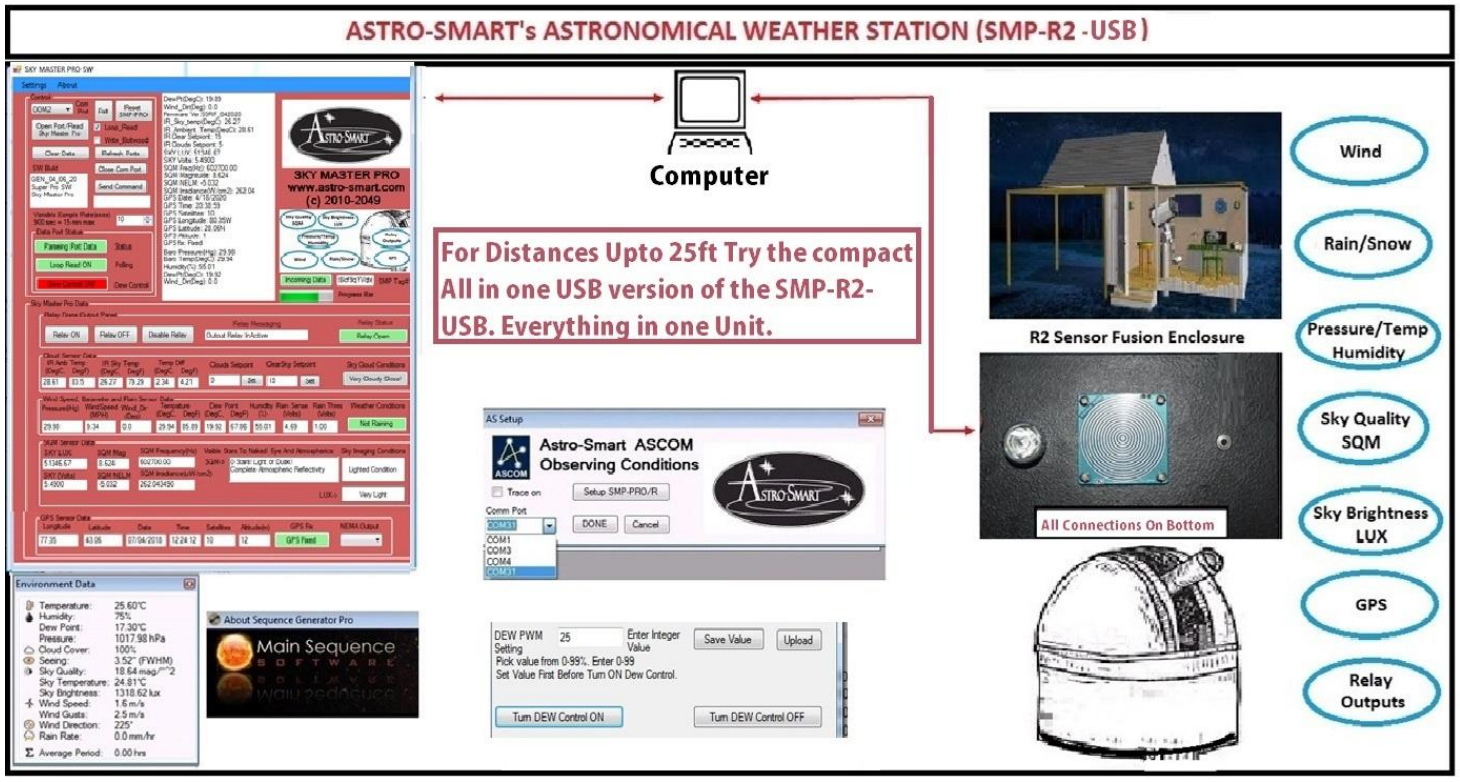
B. SMP Family Purchase Configurations.

SMP-R2-USB



The Astro-Smart **SMP family controllers** are designed to be user friendly, serviceable, elegant and reliable and include the following features shown below:

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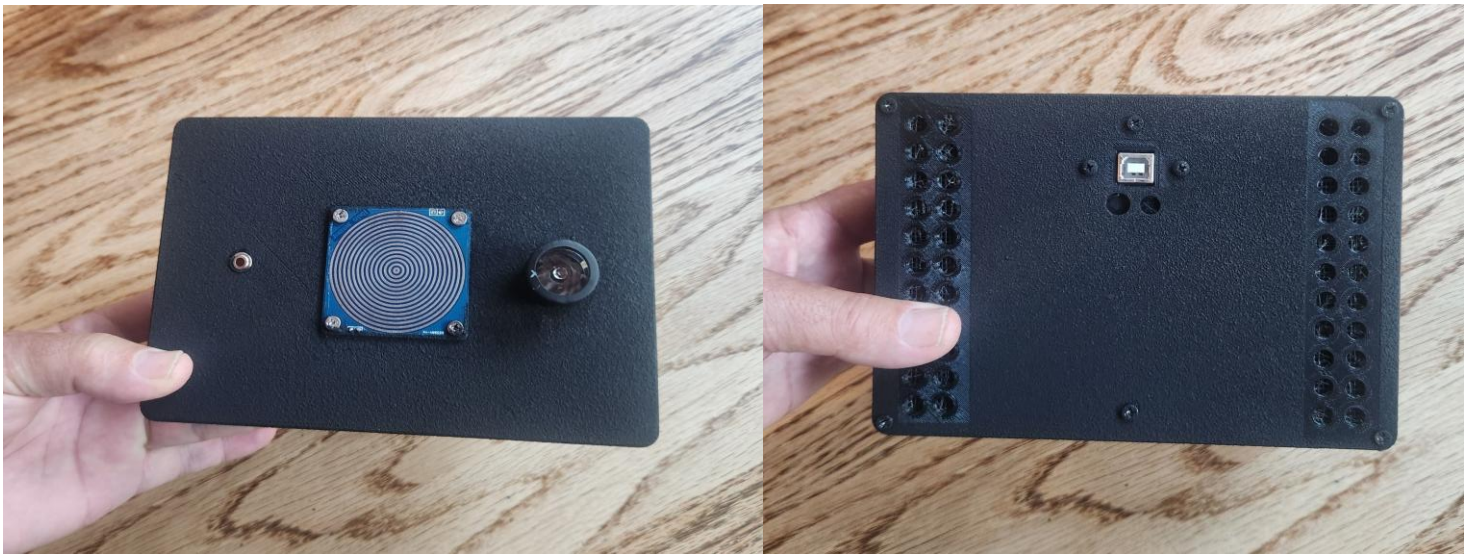
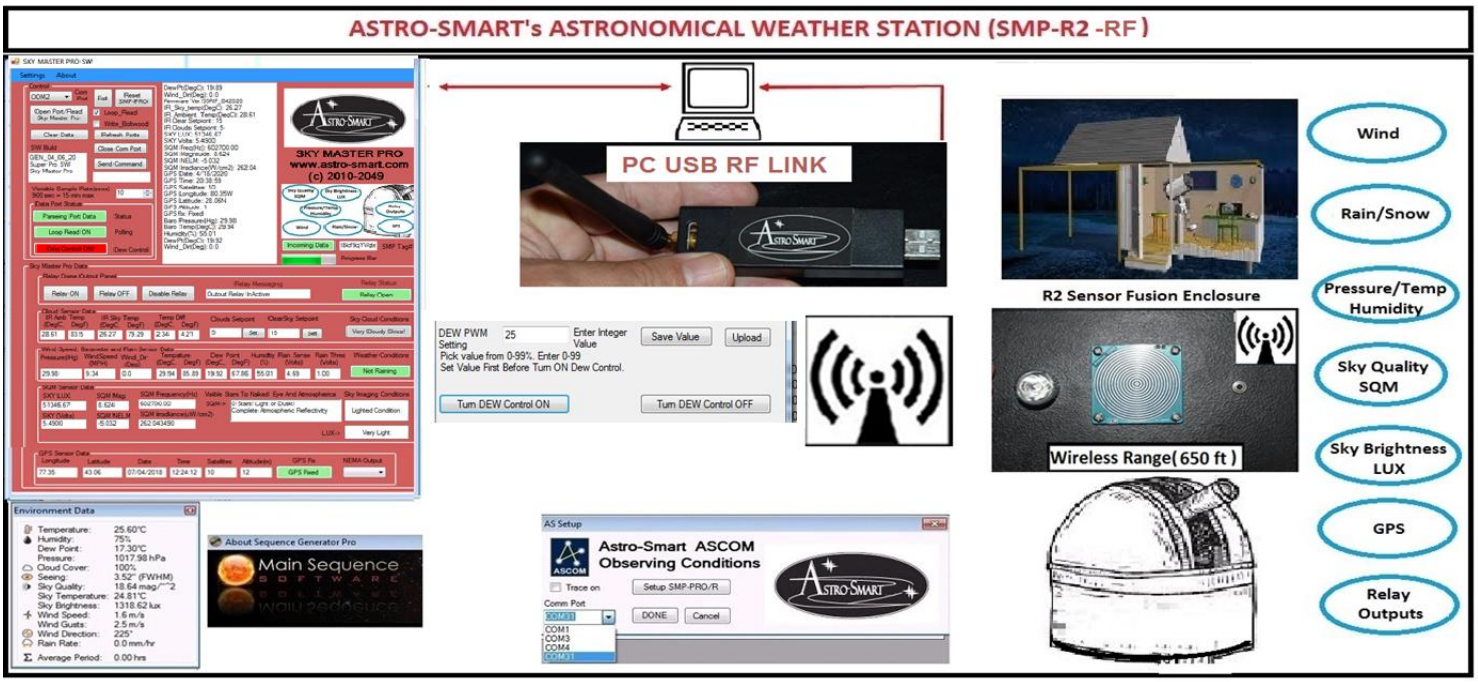
SMP-R2-USB



SMP-R2-RF



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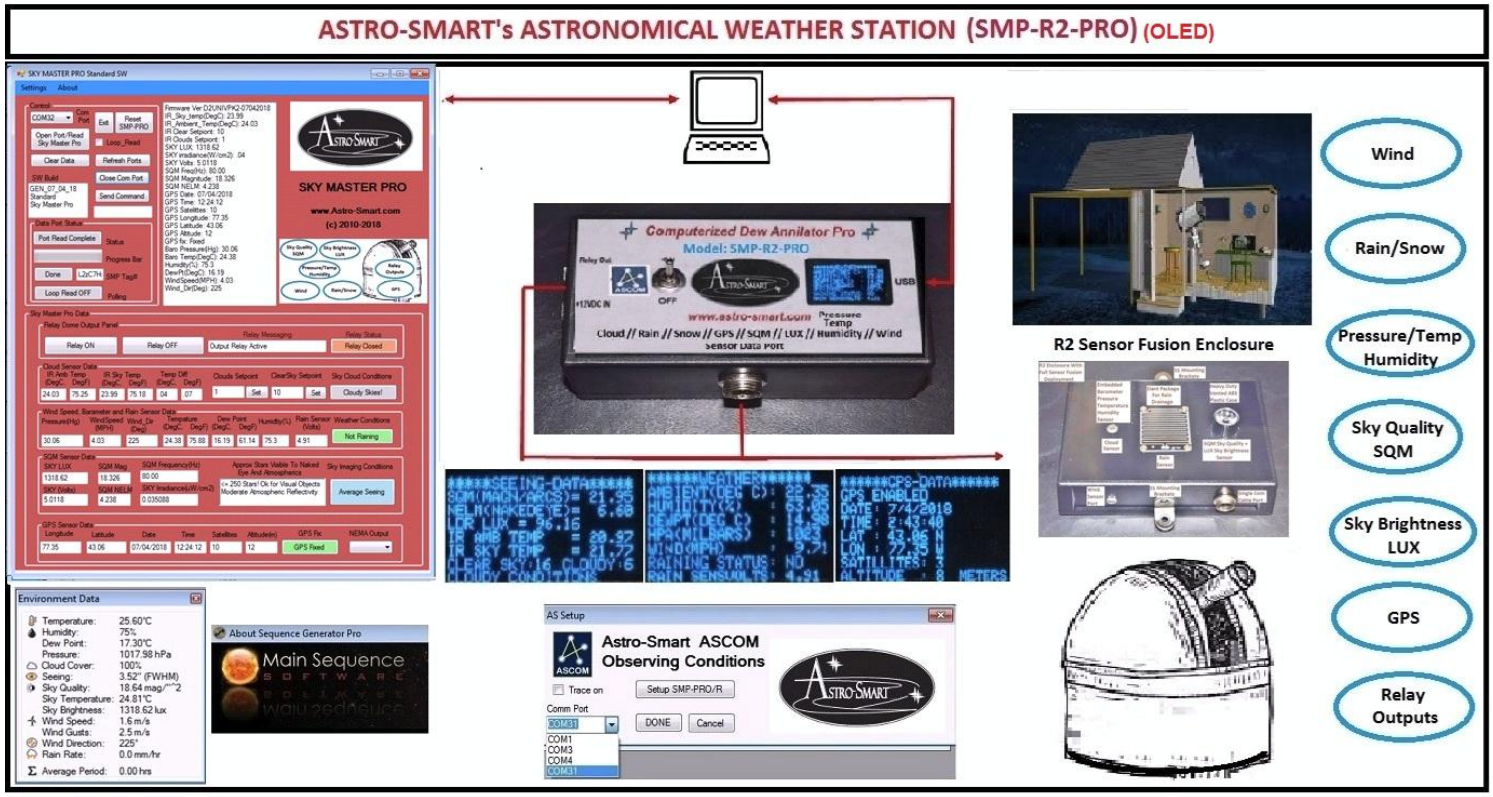
SMP-PRO-R2 (OLED)



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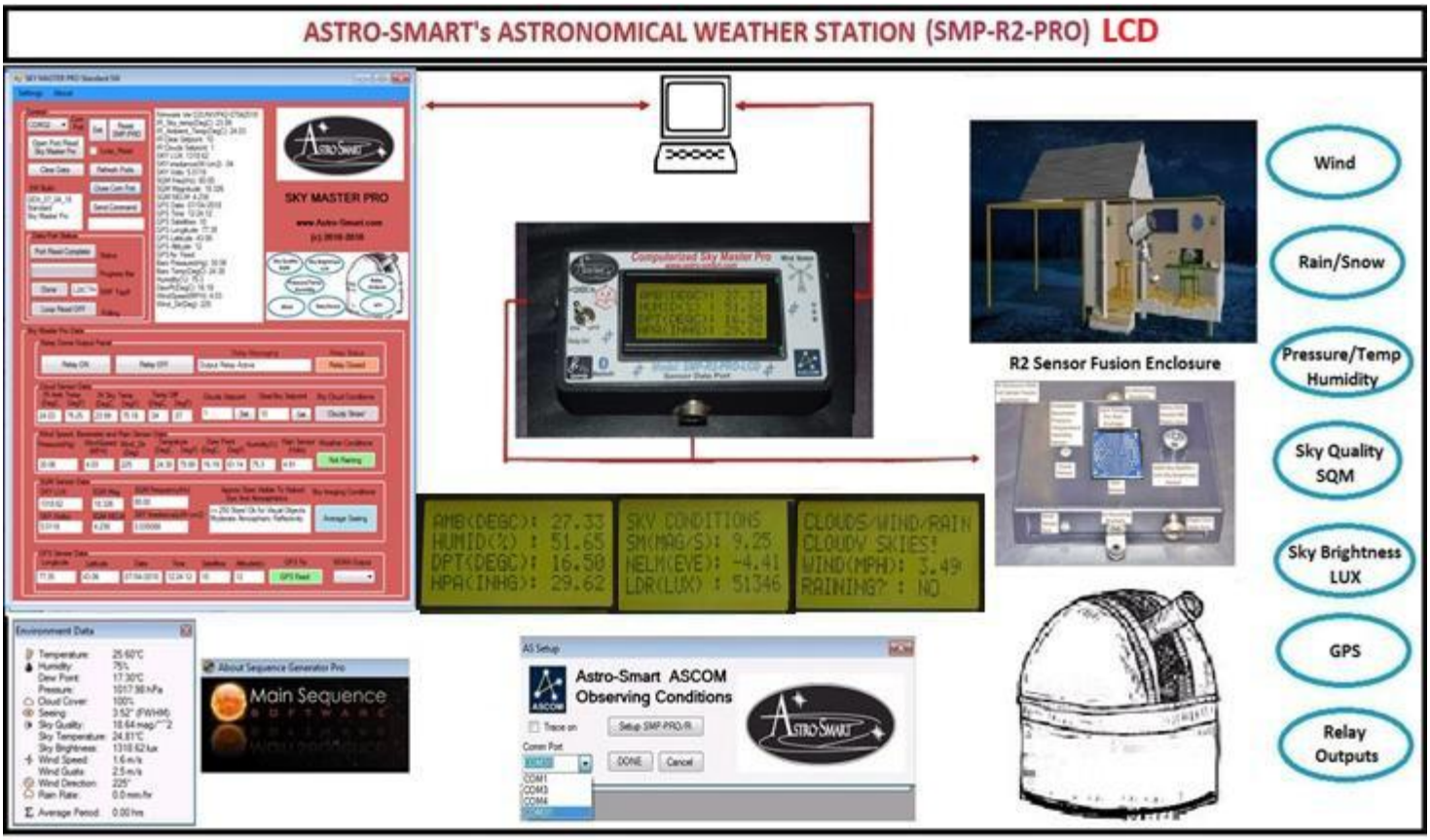
SMP-PRO-R2 (LCD)



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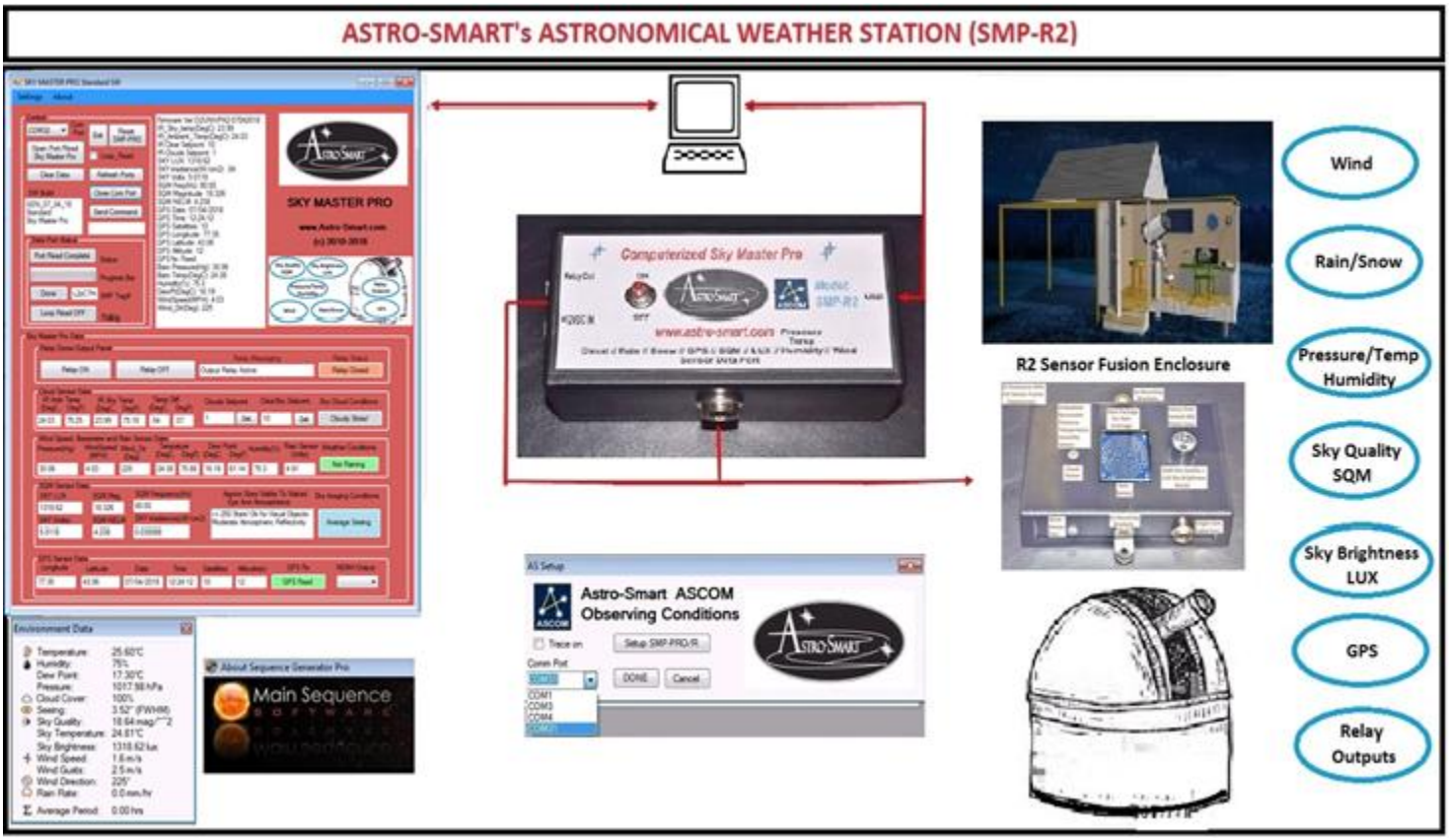
SMP-PRO-R2



The Astro-Smart **SMP family controllers** are designed to be user friendly, serviceable, elegant and reliable and include the following features shown below:

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C. Features

The Astro-Smart **SMP family controllers** has these innovative and unique features:

1. ***Worry Free Warranty Program For Life Of Product Sale.***
2. ***Full Computerized Sky Master PRO System Solution With Standalone Controllable and or USB Remote Control Software Solution GUI And ASCOM Environmental Observation Conditions Driver. Tested with Sequence Generator Pro ASCOM Environmental Observing Conditions plug in.***
3. ***Data Logging, Historical Data Graphing and Retrieval Capability with Parameter Setting Flash Storage And Retrieval. Email Alarm Event capability, dynamic sampling and Boltwood output file support. Tested with Diffraction Limited Clarity II, AAG SkyRoof .***
4. ***Alarms and Relay Control Rule Sets for Sky and Atmospheric Conditions.***
5. ***8 Line OLED Display or 4 Line LCD Display On SMP-PRO-R2***
6. ***SQM Sky Quality Meter Sensor And LUX Sky Brightness Sensor to measure Star Magnitude Per Arc Sec(MSPAS) and Naked Eye Star Magnitude(NELM). 0.2 mag/square arc sec accuracy. The LUX sky brightness sensor has a reporting range of 0.0001 to 100K LUX.***
7. ***IR Cloud Sensor to measure Cloud Sky Conditions.***
8. ***Optional Wind Speed and Direction Sensor in meters/sec or MPH +/- 5% for speed and 16 division scale wind direction accuracy for all measurements. 3.5mm jack style interface. 4 wind sensors to choose from.***
9. ***BAROMETER Pressure Sensor measurement in mbars or inch of Mercury, Temperature and Humidity Sensor to measure Atmospheric Conditions. +/- 1% accuracy for all measurements.***
10. ***Rain Sensor and Rain Sensor Heating Option. User selectable rain Voltage trigger threshold.***
11. ***Optional GPS Sensor to measure precise location(Lat,Lon,#Satellites,Date,Time and Altitude) to 1 meter displaying Geo Location Data plus NEMA output option for 3rd party programs.***
12. ***Optional Relay Output Dome Roof Control or power utility with LED indicator. Option 1. +5V to user relay on activation with 3.5mm jack style interface. Option 2. 120/240 VAC 10Amp or 12/24 VDC 10 Amp relay on activation with +/- AR terminal post style interface. User specified or standard length of sensor cable available. Can couple relay activation with rain and IR cloud sensor or just***

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rain sensor data. Tested with Interactive Astronomy SkyRoof, ASCOM Dome Hub and Boltwood Saftey Monitor for Dome and Telescope mount control.

13. ***Optional Wireless Remote control interface options available for telescope or observatory. The SMP-PRO, SMP-R interface supports Wireless Bluetooth (<200ft) and ISM (<650ft) backhauls.***

14. ***Input Requirements: 12VDC – 2Amps.***

15. ***Overvoltage, Overcurrent and Reverse current Protection.***

16. ***High quality design employs multi-layer PCB form factor and only the best quality components with conformal coatings for outdoor use.***

17. ***Price point set below development cost for such a system while providing more features.***
18. ***Dimensions SMP Family Controller (5.2"Length x 3" Width x 1.9" Height)***
19. ***Dimensions R2 Full Sensor Fusion Enclosure (6"Length x 4.5" Width x 1.3" Height). This enclosure houses all the sensors connected via communications cable to your SMP Family Controller.***

D. Contents of Box

- ***SMP-PRO-R2*** system is a tethered system with an indoor and outdoor unit using a data cable.
- R2 Enclosure for all R2 variety purchases. Cable length needs to be specified from indoor controller to R and R2 outdoor unit with turn key sensor package.
- ***SMP-R2*** system is either RF or USB which only requires one unit all in one.
- SMP-R2-RF does not require a data cable and comes with RF interface.
- SMP-R2-USB uses just one USB connection to computer.
- SMP Family Controller GUI Software, ASCOM Drivers, User manual and video tutorials.
- 12VDC / 2 Amp AC/DC Power Supply for SMP-R2-PRO family only.

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E. Hardware Installation and Operation Warnings

1. Start by determining an appropriate location to mount the R2 full sensor fusion module outdoor unit. Choose a location with a clear view of the sky. The outdoor unit can be mounted on the side of your observatory or on a 4x4 pressure treated post. When mounting the outdoor unit ensure you allow air flow to the underside of the outdoor unit for proper temperature, humidity and pressure readings.

2. If the wind option is purchased with pre drilled PVC kit, the PVC mounting package ensures enough space between the anemometer (wind speed and direction unit) and the outdoor unit. When using the wind option, mount the outdoor unit and wind unit with enough height and clearance to get clean air flow.

3. Installation of ***SMP-PRO-R2 or SMP-R2*** with chosen single data/control cable between your controller and R2 Full Sensor Fusion module. Cable length vary between 6 and 50 feet but can be custom. The R2 Full Sensor Fusion module has all sensors installed. If the wind option is purchased, the R2 has a wind plug port that can be used for connection to your wind mount. These cable lengths are standard 6 feet in length. Use the mounting clips to secure your R2 enclosure and wind sensor to the PVC mounting package or to your desired platform. After all connections are made to your R2 enclosure, plug in your power connection followed by your USB cable to your ***SMP-PRO-R2 or SMP-R2*** controller near your computer location. Then turn on the unit with power on switch. Other options are available for ***R2 family*** such as GPS(internal to unit), rain sensor heating, wind and direction sensors and wireless option. In the ***R2 family*** instance the GPS, rain sensor heating and wireless options are installed in the ***SMP-R2 family controller***. The rain sensor heating option comes with an additional power supply plugged in to the ***R2*** enclosure when heating of the rain sensor is desired. You are now ready for communicate to your system via GUI or ASCOM driver interface.

4. Relay Installation for your ***SMP-R2-PRO or SMP-R2*** unit.

    a) **Relay Output Option 1 and 2:** Mount inside. Connect from SMP-R2-PRO Relay output with 3.5mm jack 12ft cable to Relay 2 box. The relay 2 box can have any length AC run to operate an AC source such as an alarm, light, or operation of observatory door triggered by cloudy or raining conditions settable by the user.

Once, R2 enclosure is installed, then plug in USB cable to computer. Then turn on 12VDC power.

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F. Installation of the Sky Master Pro Windows Software

There are 2 versions of the SMP-PRO Windows application software. The standard version comes free with your SMP-R2 family order, which allows the user to loop read , query and control the SMP-R2 family controller with data logging capability. The optional super pro SMP-PRO software adds real time data acquisition, dynamic sampling rate, data retrieval mapping, present and historical data graphing with .log , .csv , .png data plot outputs and adds Boltwood data file output capability for third party integration applications.

Your Sky Master Pro family controller can be monitored or controlled from your computer. There are two options for monitoring your Sky Master Pro – using the Sky Master Pro Windows app, or by using the ASCOM driver. To install the Sky Master Pro Windows app: (Win XP, Win 7, Win 8, Win 10). The ASCOM driver is the same and available for use with your product no matter what Windows app you are running.

1. Install the Sky Master Pro GUI software from the provided DVD/CD. Once, installed, all logging, preset and selected com port data will be stored on your hard drive folder **C:\Sky_Master_Pro_Data**.
2. Install the Sky Master Pro software by running the setup .msi on your software DVD or download. By default, By default, the app is installed in the **C:\Program Files (x86)\Astro-Smart\Sky_Master_Pro_Standard_Setup\Astro-Smart** folder.
   For compatibility, select run as administrator control after installed before running if required but should not be necessary.
3. Once your software is installed, power up the controller first with the power toggle switch and wait a few seconds before connecting the USB cable to your computer. Note on PRO units using a display, the power button needs to be on before connecting the USB cable in order to initialize the display. Otherwise, recycle the power switch or press the reset button to see display activity. Determine the COM (serial) port used by your Sky Master Pro controller. In Windows, you can use Device Manager to display the available COM ports. Once, selected future sessions will remember what com port you selected on running the application.
4. During installation, the ASCOM driver is not installed. We'll see how to install and use this ASCOM driver in later Section.
5. You can Launch the app several ways. During install you can add a desktop shortcut along with windows menu driven app shortcut or directly from installed location on your computer at **C:\Program Files (x86)\Astro-Smart\Sky_Master_Pro_Standard_Setup\Astro-Smart\Sky_Master_Pro_Standard_SW.exe.** The app is located under the menu start button under **Sky_Master_Pro_Standard_SW.** .
6. In the Control group, select the COM port that your Sky Master Pro connects with.

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7. Click the **Open Port/Read Sky Master Pro** button. After, you press this button, check the loop data check box to collect data continually. If your Sky Master Pro successfully connects, you'll see the Data Port Status section change. The Status will update with the current action, and the Progress Bar will indicate data is being transferred. If you do not see the Data Port Status change to "Port Read Complete" verify the COM port for SMP controller is correct.
8. Specific to the ***SMP-R2-RF*** version of product, one can control DEW heating via PWM control on rain/snow sensor via the software GUI if the dew heating option is purchased. This can be seen using the pro version of software in picture below.
9. You can send email alarms based on the sensor readings such as rain, wind speed, relay and IR cloud conditions. This can be seen using the pro version of software in picture below.

Once connected, you'll screens similar to the following below:

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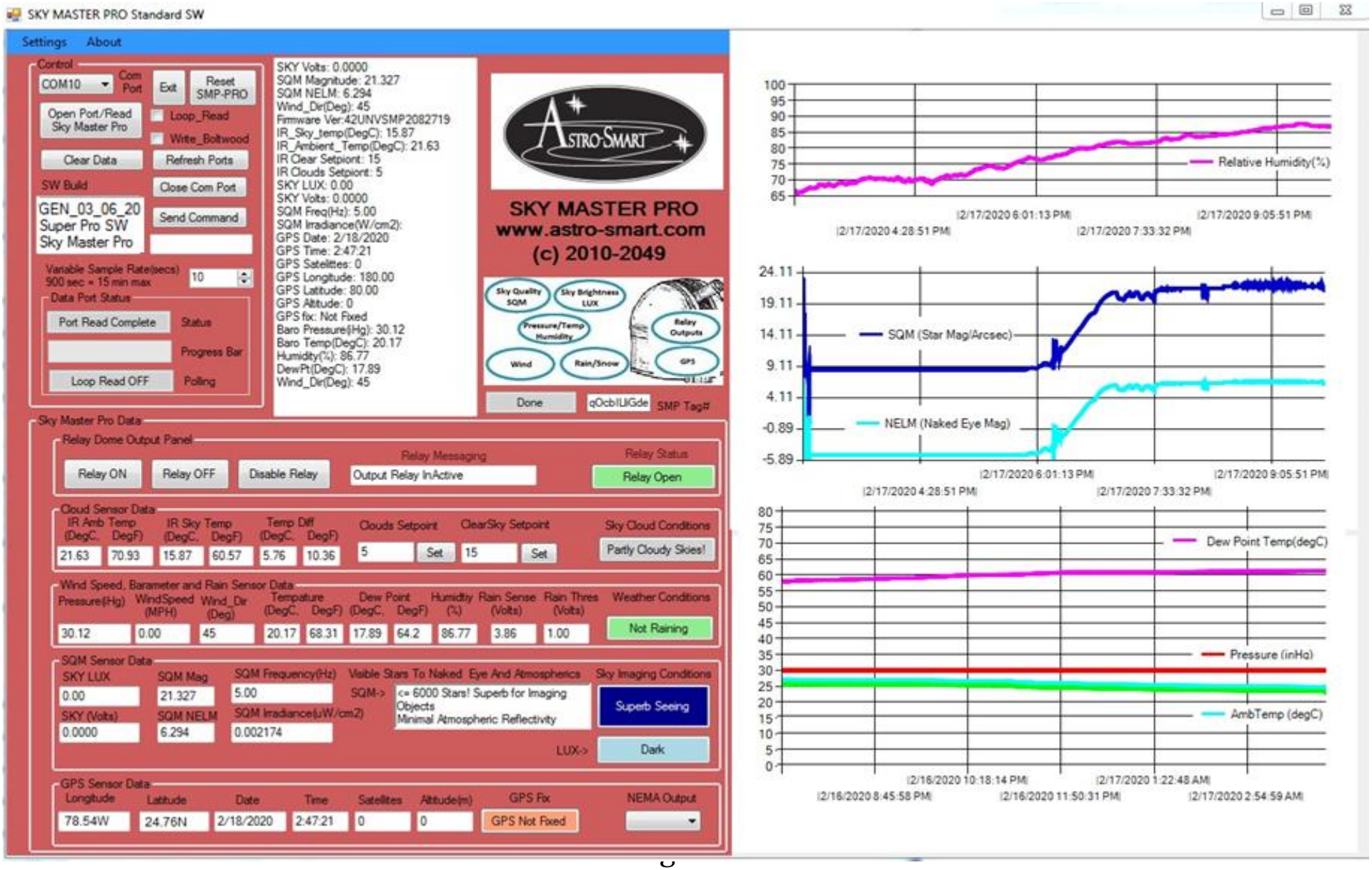

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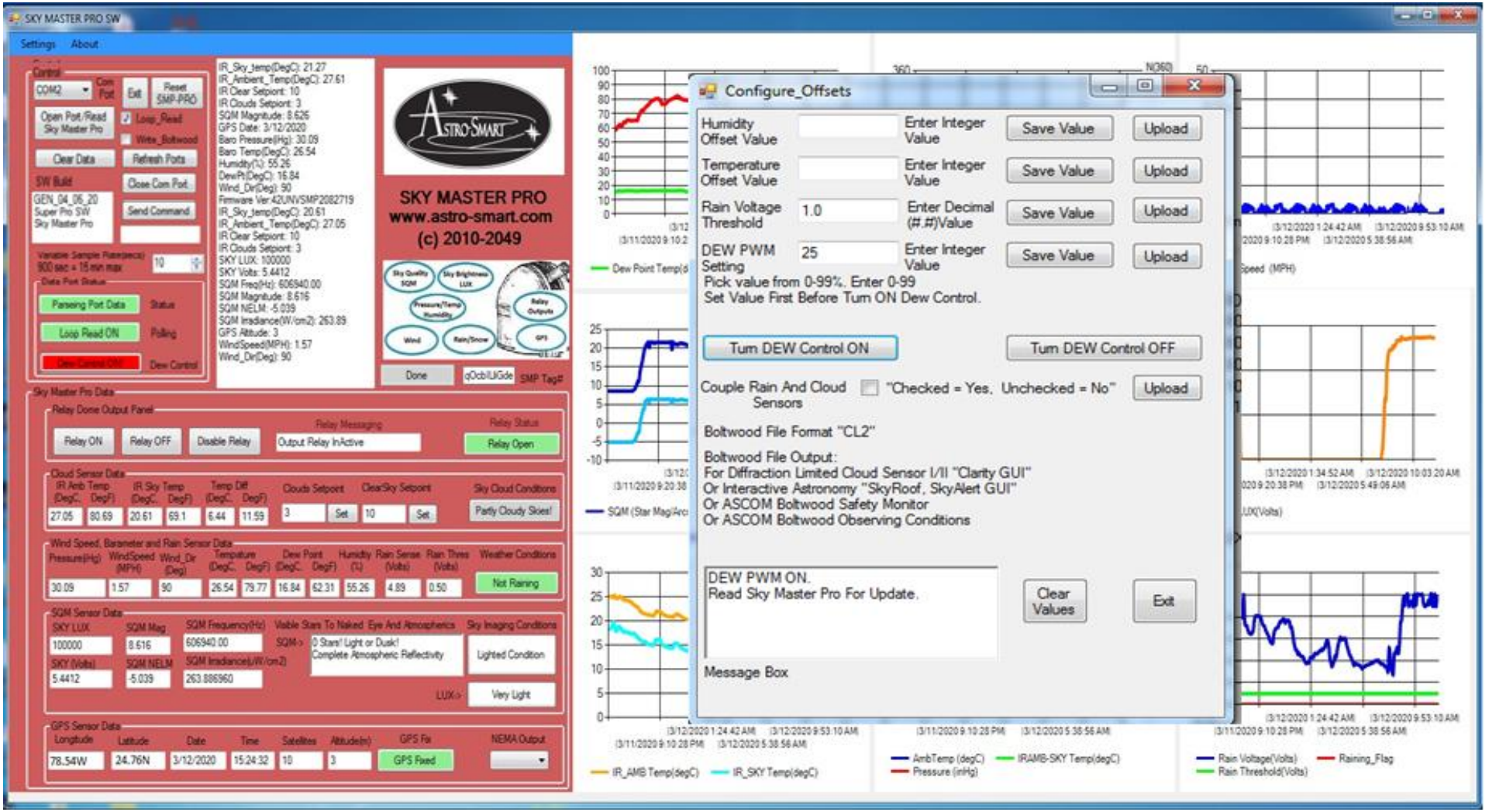

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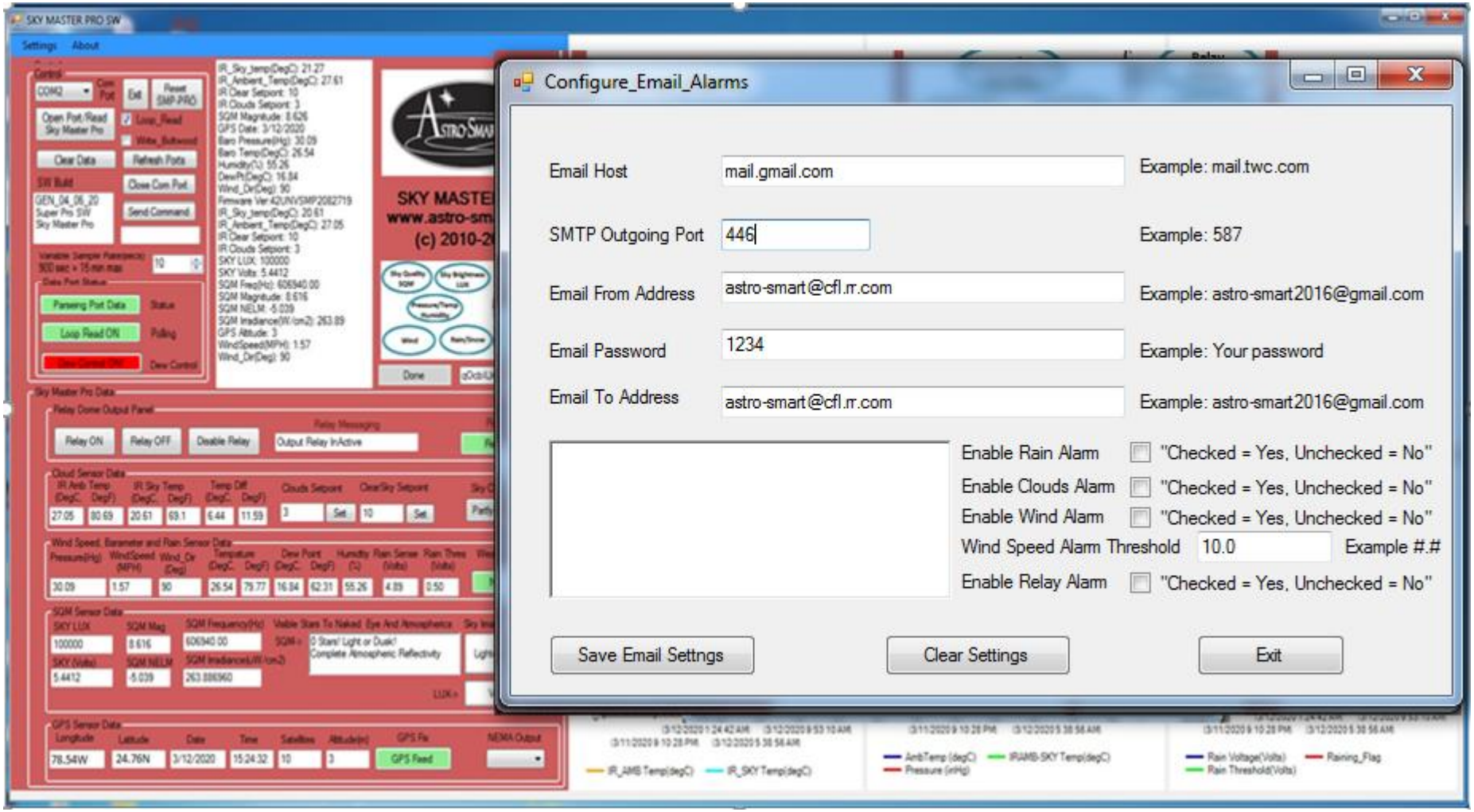

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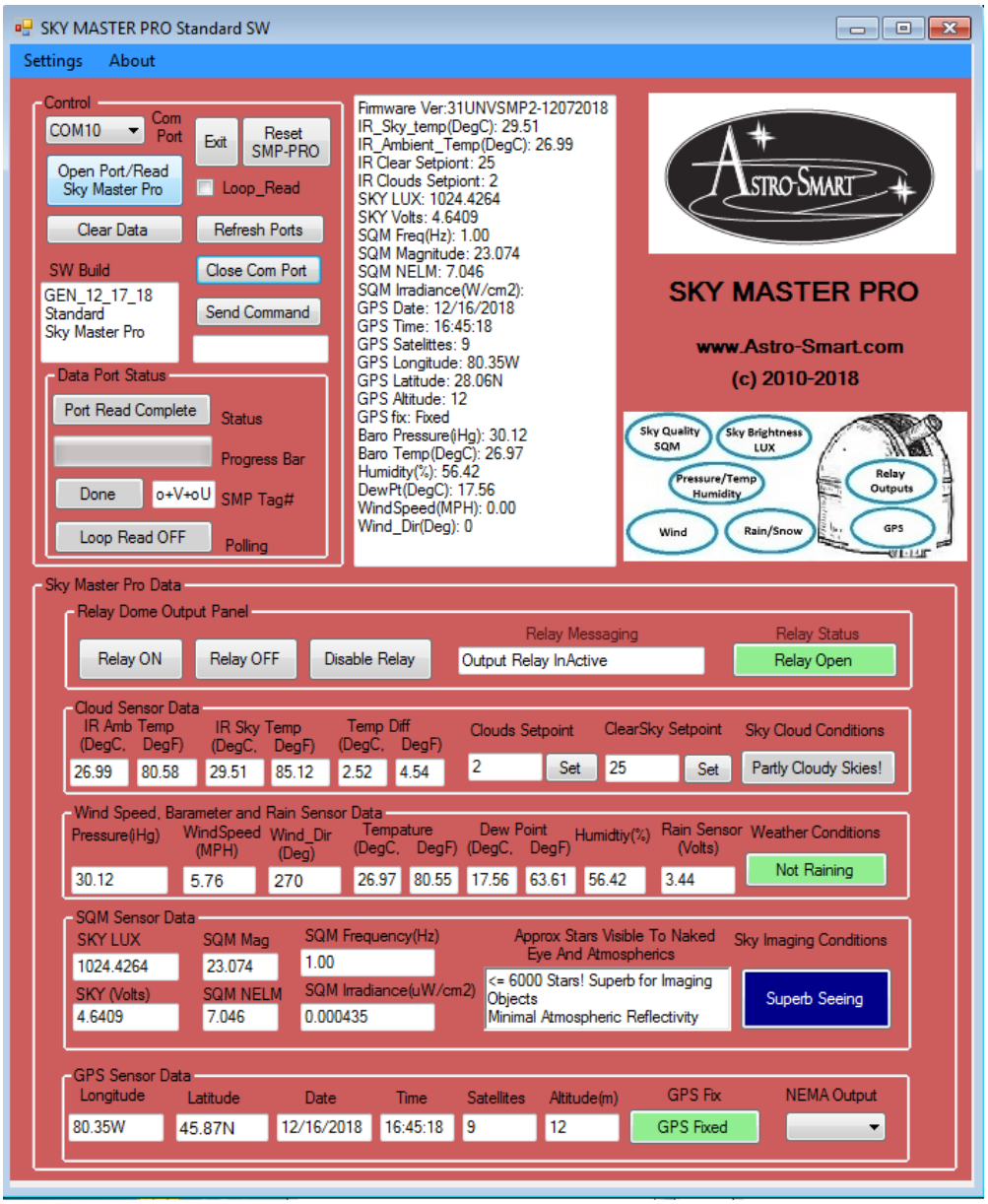

Other features of the GUI and examples can be seen by demonstration on our website to browse support pages, video tutorials of this product and others.

http://www.astro-smart.com/index.php?p=1_49_Video-Overviews

Enhancements to the software will be made based on user input on a continual basis and can be uploaded from our site for your convenience.

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G. Quick Tour Of Your PC Control Remote User Interface Summary

Your **SMP family controllers** can be monitored or controlled from your computer. Just connect the USB cable and in the device manager of your operating system, you must know what port is used when connected. The settings will be automatic and the host PC install program provided will list all available serial ports to connect. You just pick the correct one. A video tutorial is listed in the support page of our website to go thru the basic operations of this feature. Some basic features are listed below.

In the following pictures you can see the **SMP family controller** software GUI interface snapshots. The first snapshot below shows the standard GUI interface which captures all **SMP family controllers** sensor data along with formulating results of sky condition information to user and the state of open/close dome relay based on GUI set rules and sensor input. The second snapshot shows cloud sensor configuration preset saves and set points along with the ability to save a user log as per third snapshot.

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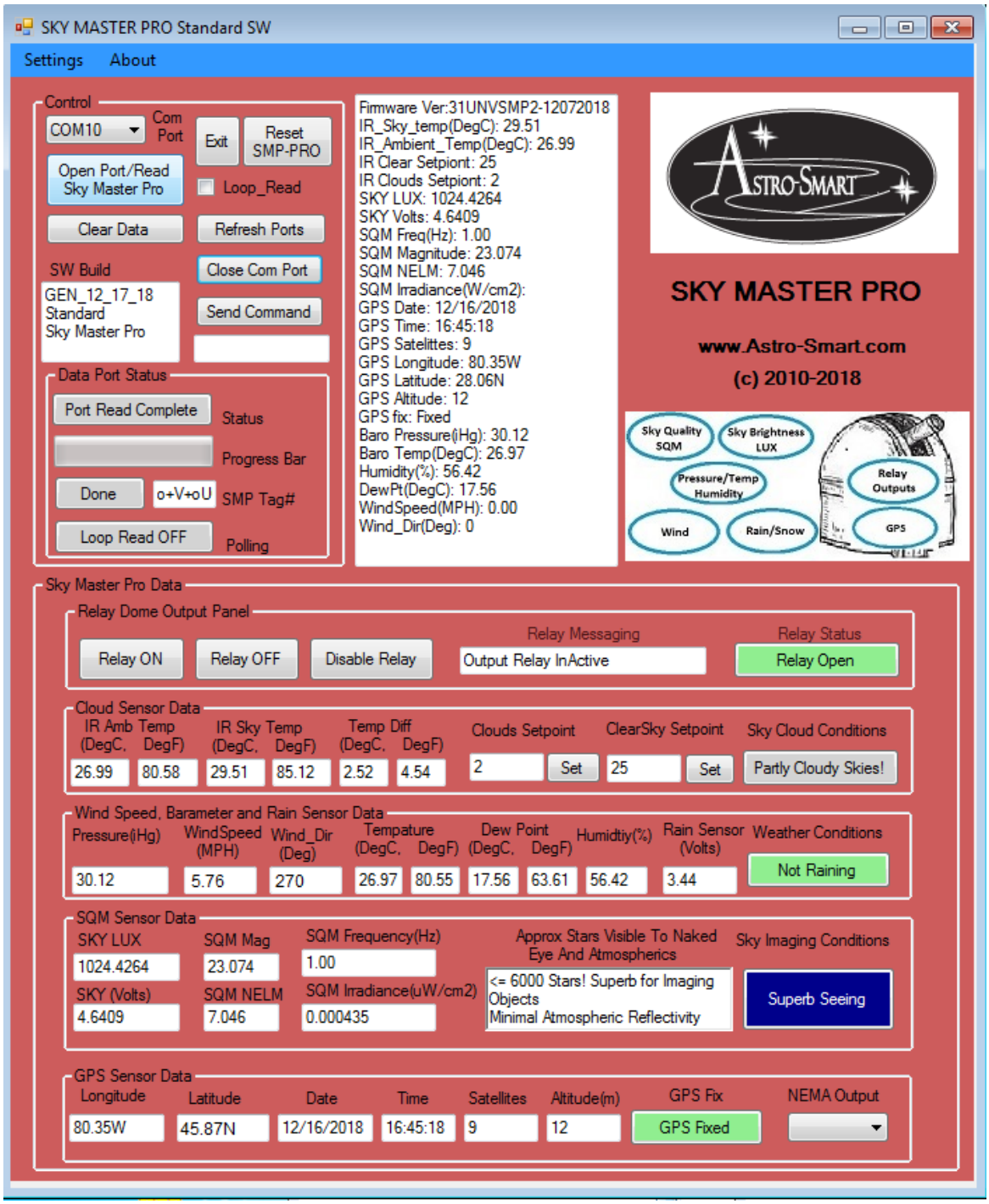

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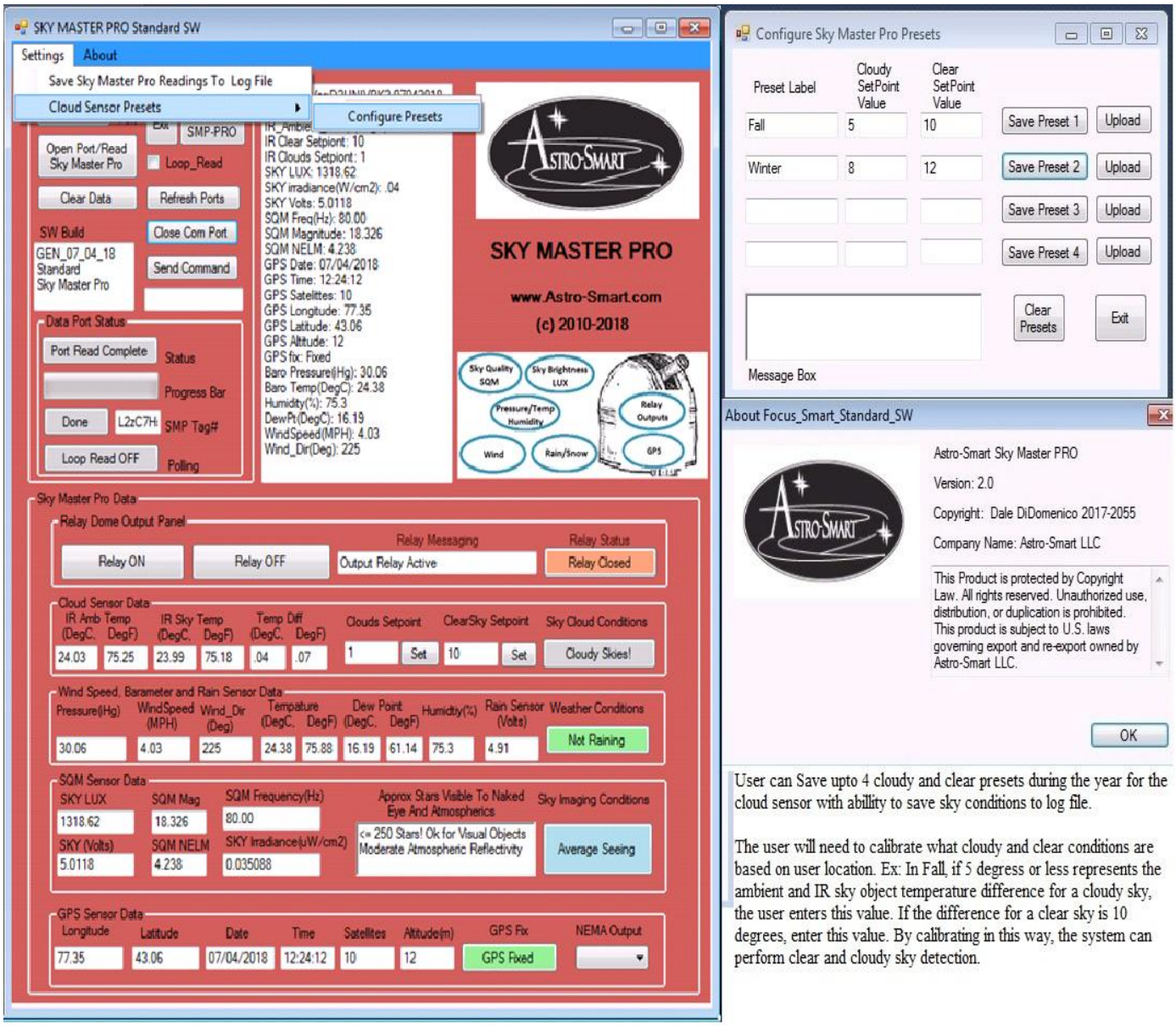

User can Save upto 4 cloudy and clear presets during the year for the cloud sensor with abillity to save sky conditions to log file.

The user will need to calibrate what cloudy and clear conditions are based on user location. Ex: In Fall, if 5 degress or less represents the ambient and IR sky object temperature difference for a cloudy sky, the user enters this value. If the difference for a clear sky is 10 degrees, enter this value. By calibrating in this way, the system can perform clear and cloudy sky detection.

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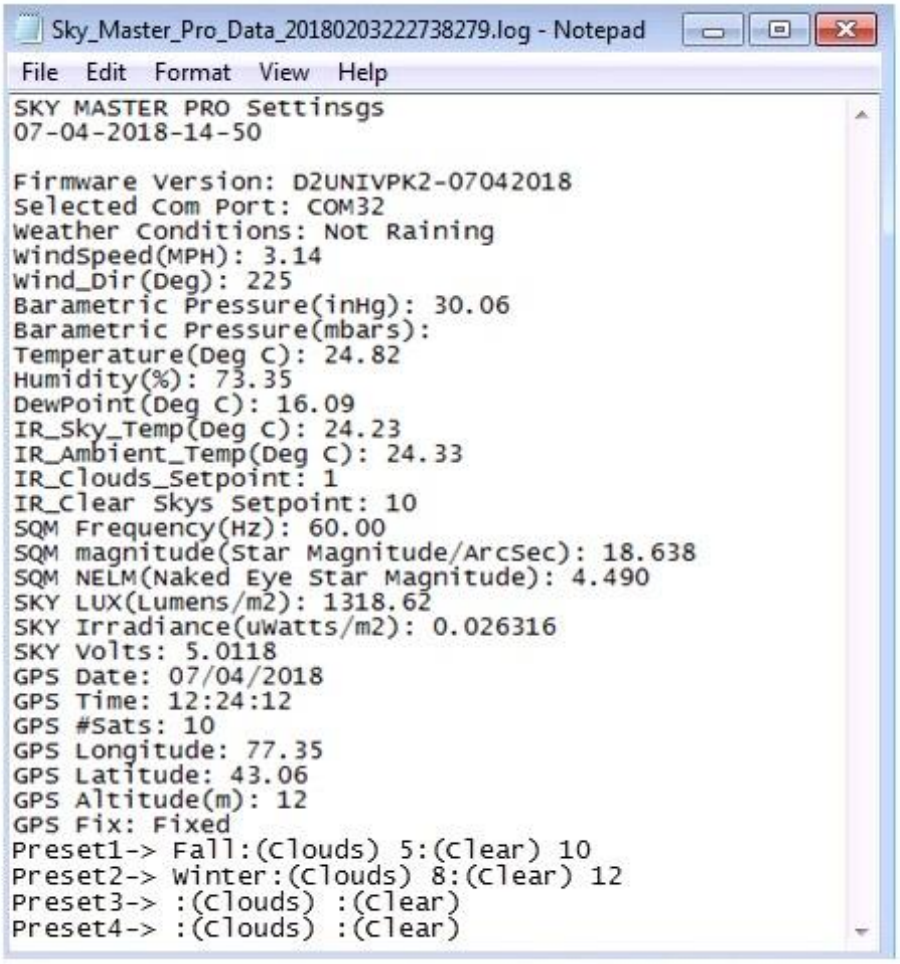

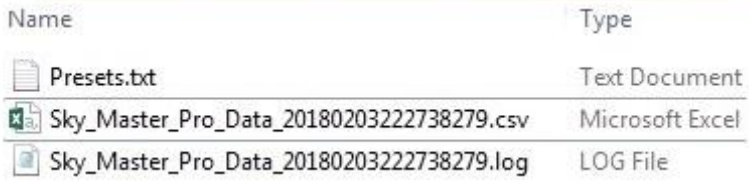

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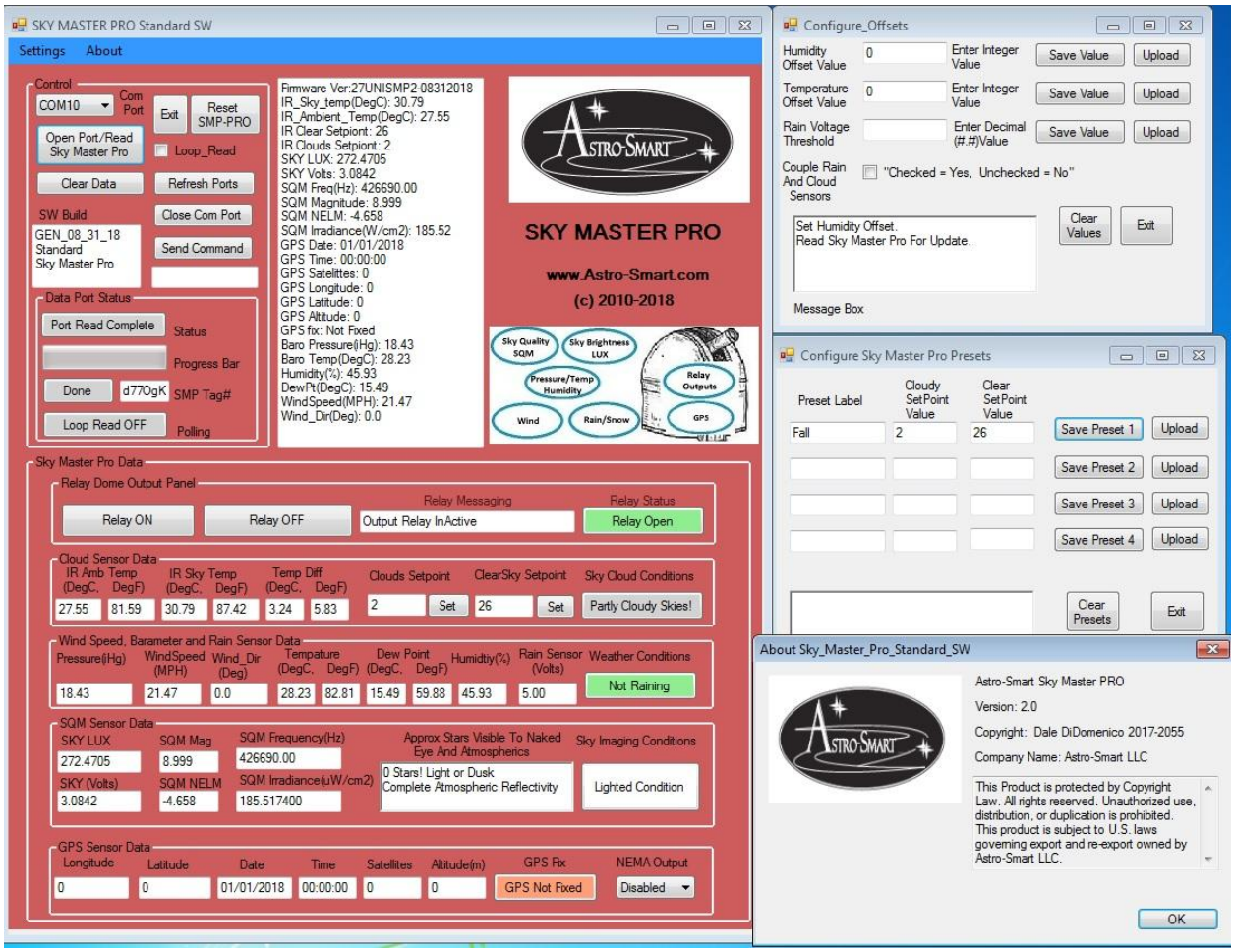

In the configuration offsets and presets tabs shown above, the user can do the following:

1. Save upto 4 presets for IR cloud data based on seasonal atmospheric changes.
2. User can change Humidity and Temperature offsets, change Rain Threshold Voltages to trip relay closure based on rain mist or drops based on calibrated threshold values set by user.
3. The user can couple Rain and Cloud Sensors to relay closure or just rain sensor data.

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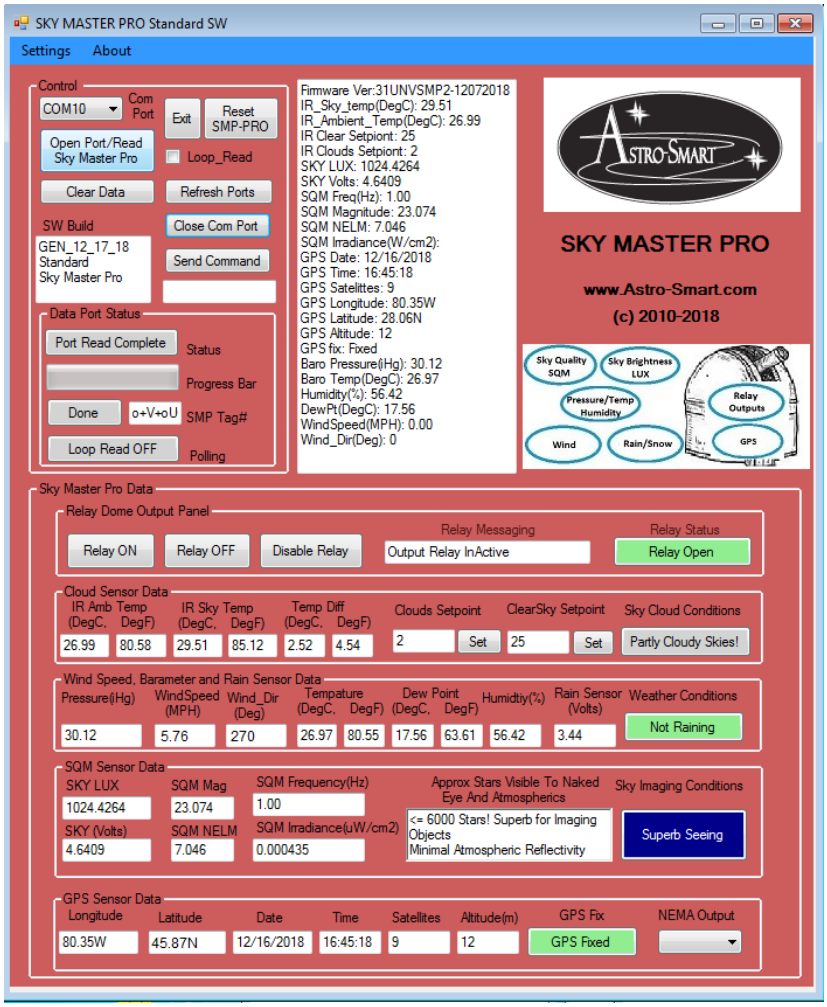
H. GUI Interface Description Summary Using the Sky Master Pro Software.

Your Sky Master Pro app is a comprehensive app that gives you near real time information from your Sky Master Pro station. Your Sky Master Pro station sensors send data to the controller on-demand, or every 8-10 seconds with the looping read function. You can use the information from your Sky Master Pro station to determine if conditions are ideal for visual astronomy or for astro-imaging. See Section I for information about using the ASCOM driver.

1. First, we'll cover basic operation and station information shown in the Sky Master Pro Windows app. We'll use the following diagram to explain the data and operation of the Sky Master Pro app.



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2. **"Settings" Menu Item** – The settings menu allows you to:
    a. Store a copy of the presets, current offsets and log file information. After selecting this command, you should see 3 files in C:\Sky_Master_Pro_Data directory. Comport.txt, Offsets.txt and Presets.txt along with a foldername with timestamp for log information. Inside this folder you will see timestamp data in excel .csv and .log files.
    b. Configure the presets, offsets and offsets and rain voltage. You must perform item a first before configuring as you will get an error for missing files read from your computer.
3. "**About**" **Menu Item** – The About menu displays a dialog indicating the software title, version, and copyright information.
4. **Control** – The control group contains buttons used to connect with your SKY MASTER PRO and display status of the connection.
    a. **COM Port** – this is the COM (Serial) port that your SKY MASTER PRO is connected to.
    b. **Exit** – This closes the Sky Master Pro app
    c. **Reset SMP Pro** – this performs a reset (reboot) of your Sky Master Pro device.
    d. **Open Port / Read Sky Master Pro** – this initiates a connection with your Sky Master Pro, and reads the current sensor data.
    e. **Loop_Read** – Enable this checkbox to have the Sky Master Pro continuously monitor the data. The Sky Master Pro data will be updated every 10 seconds.
    f. **Clear Data** – this clears the current Sky Master Pro data in the app.
    g. **Refresh Ports** – if you are unable to locate the COM Port used by your Sky Master Pro, click Refresh Ports to get the updated list of COM ports for your computer.
    h. **Close COM Port** – Click to remain in the Sky Master Pro app, but disconnect from the Sky Master Pro controller.
    i. **SW Build** – a display of the current Sky Master Pro app version information.
    j. **Send Command** – sends a direct command to your Sky Master Pro controller. Not normally needed for operation.
    k. **Boltwood File** – Enable this checkbox to save data to boltwood file format which can be read by 3rd party software packages.
5. **Data Port Status** – displays information about the current connection with the Sky Master Pro
    a. **Status –** the current state of the data port process.
    b. Progress Bar – an indicator that shows when data is being transferred from the Sky Master Pro controller.
    c. **SMP Tag# -** a unique identifier for your Sky Master Pro.
    d. **Polling** – indicates whether the system is continuously reading data from your Sky Master Pro controller.
6. **Sky Master Pro Data** – this section contains four groups. Depending on the sensors you have enabled for your Sky Master Pro, some data may not be shown, or may show zeros (0.00, or 0.0, etc).

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a. **Relay Dome Output Panel** – if you have the relay option, this allows you to control the relay and see its state.
   i. **Relay On** – a button that you can click to enable the relay (close the contacts) and disables all sensors applicable to relay.
   ii. **Relay Off** – a button that you can click to disable the relay (open the contacts) and arms all sensors applicable to relay.
   iii. **Relay Disable -** a button that you can click to disable the relay (open the contacts) and disables all sensors applicable to relay.
   iv. **Relay Messaging** – the status of the current relay output control.
   v. **Relay Status** – an indicator showing the state of the relay (Open or Closed)

b. **Cloud Sensor Data** – this section contains information about cloud temperature. Based on the difference between the ambient temperature and the sky temperature, your Sky Master Pro determines whether there is cloud cover.
   i. **IR Amb Temp** – the infrared temperature of the ambient air around your outdoor unit. The temperature is reported in °C and °F.
   ii. **IR Sky Temp** – the infrared temperature of the sky above the outdoor unit. The temperature is reported in °C and °F.
   iii. **Temp Diff** – the difference between the ambient and sky temperatures. The temperature difference is reported in °C and °F.
   iv. **Clouds Setpoint** – the current setpoint (e.g. temperature differential) which determines that it's cloudy out. The "Set" button allows you to reset the Sky Master Pro's current Cloud Setpoint.
   v. **Clear Setpoint** – the current setpoint (e.g. temperature differential) which determines that it's clear out. The "Set" button allows you to reset the Sky Master Pro's current Clear Setpoint.
   vi. **Sky Cloud Conditions** – an indicator of the current cloud conditions.

c. **Wind Speed, Barometer and Rain Sensor Data** – this section contains information about wind, barometric pressure, humidity and rain.
   i. **Pressure (Hg)** – the current barometric pressure as reported in inches of mercury.
   ii. **Wind Speed** – the current wind speed as reported in miles per hour. If you do not have a wind speed indicator, this will show 0.0.
   iii. **Wind_Dir (deg)** – the current wind direction as reported in degrees from 0 to 360 degrees with a resolution of 22 degrees reporting upto 16 different wind angles. For example, if the wind were coming from due West, the Sky Master Pro would report 270. See the below diagram for wind degrees:

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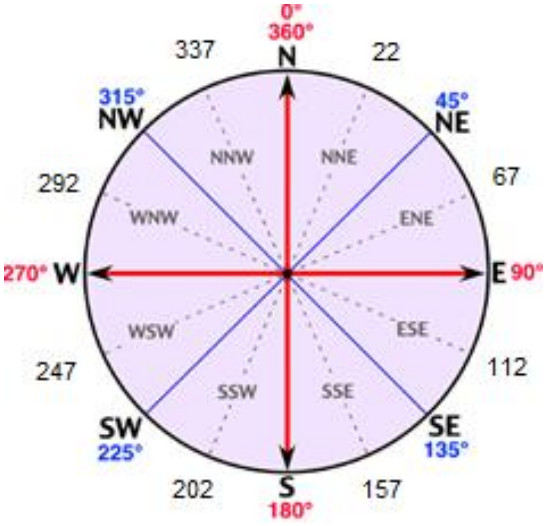

iv. **Temperature** – the current ambient temperature indicated by your outdoor unit. The temperature is reported in °C and °F.
v. **Dew Point** – the temperature at which dew begins to form on the ground or on objects exposed to the sky. The dew point is reported in °C and °F.°
vi. **Humidity** – the current relative humidity of the ambient air around your outdoor unit in %.
vii. **Rain Sensor Volts** – indicates the current flowing through the rain sensor. By default, 5 volts flow through the sensor when it is not wet. As the sensor gets wet, the voltage drops due to the increased resistance of the water on the sensor. A voltage near 0 indicates the sensor is covered completely in water – such as during a heavy downpour.
viii. **Weather Conditions** – an indication of rain, based on the rain sensor volts.

d. **SQM Sensor Data - _** SQM (or sky quality measurement) is an evaluation of the ability to see astronomical targets such as stars, planets, the milky way or faint objects such as galaxies or nebulas.
   i. **Sky LUX –** the brightness of the sky. When the Sky LUX is 0.0000 – it is nearly pitch-black skies with no moon or ambient light pollution. By comparison a LUX of 4,100 might be reported at mid-afternoon on a partly cloudy day.
   ii. **SQM Mag –** the brightness of the sky in magnitudes spread out across one square arcsecond of the sky. For example; a SQM of 20.00 is equivalent to the light of a 20th magnitude star being spread over one square arcsecond of the sky. A SQM Mag of 17 would be typical of heavy light pollution or a moonlit sky, where a SQM Mag of 22 would be typical of a very remote dark sky location on a moonless night.

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iii. **SQM Frequency (Hz) –** the frequency produced by the sensor. Bright skies produce a frequency up to 500 kHz. Dark skies produce a frequency as low as 4 Hz.
iv. **Sky (Volts)** – the voltage reported by the sensor. This value is used to calculate the displayed Sky LUX.
v. **SQM NELM** – the "naked eye limiting magnitude". This measurement is subject to the seeing abilities of the individual person observing the sky. But, for an average person with 20/20 vision, this indicates the faintest magnitude stars visible to the naked eye. For example, an NELM of 6 indicates a person could see magnitude 6 stars, but not fainter magnitude 7 stars.
vi. **SQM Irradiance** – the radiant flux as measured in µWatts per square centimeter.
vii. **Approx Stars Visible to Naked Eye and Atmospherics** – a "forecast" for how good the night skies are and how many stars may be visible.
viii. **Sky Imaging Conditions** – a "forecast" for the Seeing. Typically, good seeing produces limited star movement or scintillation from high altitude wind, clouds or moisture.

e. **GPS Sensor Data** – if equipped with a GPS, this section reports the data from the GPS sensor.
i. **Longitude** – your longitude in degrees. If no GPS is connected, it will report "0".
ii. **Latitude** – your latitude in degrees. If no GPS is connected, it will report "0".
iii. **Date** – the current date as reported by the GPS. If no GPS is connected, it will 01/01/2018.
iv. **Time** – the current time as reported by the GPS. If no GPS is connected, it will report 00:00:00.
v. **Satellites** – the number of GPS satellites currently in view and connected with the outdoor unit GPS sensor.
vi. **Altitude (m)** – the current altitude in meters as reported by the GPS sensor.
vii. **GPS fix** – an indicator that the GPS sensor has connected with enough satellites to get an accurate reading of the current latitude and longitude.
viii. **NEMA Output** – a toggle to enable or disable NEMA data stream output from the GPS sensor to be used by other computers or software.
ix.

7. A video with additional information is available at: http://www.astro-smart.com/index.php?p=1_49_Video-Overviews.

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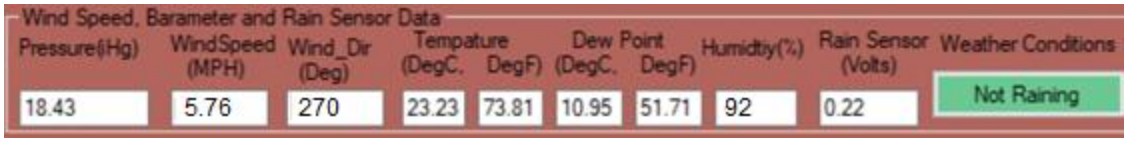
I. Configuration/Calibration of your Sky Master Pro Sensor Thresholds.

Now that you've successfully connected, it's time to calibrate and configure your Sky Master Pro's sensor thresholds. These have been done at factory but location and user preference changes may warrant new threshold settings. You'll configure and calibrate the sensor thresholds by setting the offset values for temperature, humidity , rain alarm voltage threshold and the cloud sensor clear and cloudy condition setpoints.

1. **Humidity Offset**. First, let's configure the humidity offset. Offsets are used to accurately determine the current humidity.
    a. Using a calibrated weather station, or by viewing on online weather station source that provides local weather information such as weather.gov or wunderground.net, determine your current humidity. For this example, assume that the humidity is actually 94%.
    b. Since, the Sky Master Pro has varying cable lengths for sensors that affect readings, you have the ability to calibrate with an offset, this screen shows that the Sky Master Pro is currently reporting the humidity to be 92%.



    c. To calculate the humidity offset, subtract the Sky Master Pro's reported humidity (92) in our case) from the actual humidity (94%) to get your humidity offset. In this example, the offset would be 2. Enter this number into the Humidity Offset Value. Use a negative integer if the Sky Master Pro reports a humidity that's higher than the actual humidity. Use a positive integer if the Sky Master Pro reports a lower humidity than the actual humidity.

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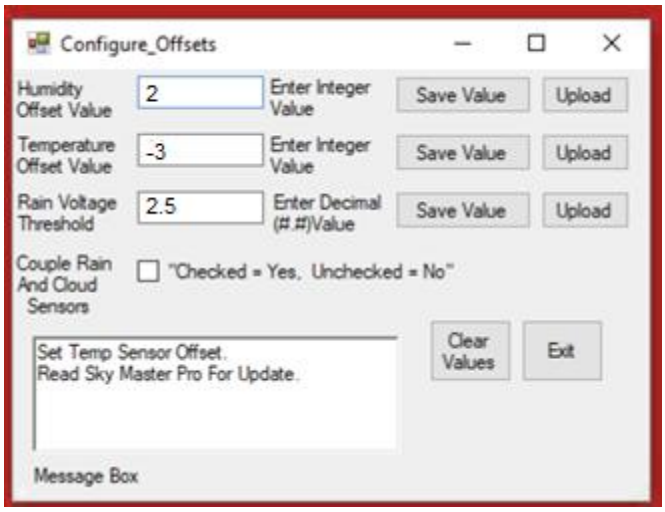

d. Click "Save Value" to save this to the C:\Sky_Master_Pro_Data\Offsets.txt file. Click "Upload" to save this to your controller. Note that the Message Box will indicate when the value is saved to the controller. You can verify the correct humidity by clicking "Open Port/Read Sky Master Pro" button and review the humidity value reported back.
e. Verify the correct humidity by clicking "Open Port/Read Sky Master Pro" button and review the reported humidity.

2. **Temperature Offset**. Just as you set the offset for humidity, you'll do the same for temperature.
   a. Using the same method you used to determine the current actual temperature in the previous step, determine the actual current temperature in °C for your location.
   b. Subtract the Sky Master Pro's reported temperature in °C from the actual temperature to get your temperature offset. Round to the nearest whole number and enter this number into the Temperature Offset Value. Use a negative integer if the Sky Master Pro reports a temperature that's higher than the actual temperature. Use a positive integer if the Sky Master Pro reports a lower temperature than the actual temperature.
   c. Click "Save Value" to save this to the C:\Sky_Master_Pro_Data\Offsets.txt file. Click "Upload" to save this to your controller. Note that the Message Box will indicate when the value is saved to the controller.
   d. Verify the correct temperature by clicking "Open Port/Read Sky Master Pro" button and review the reported temperature.

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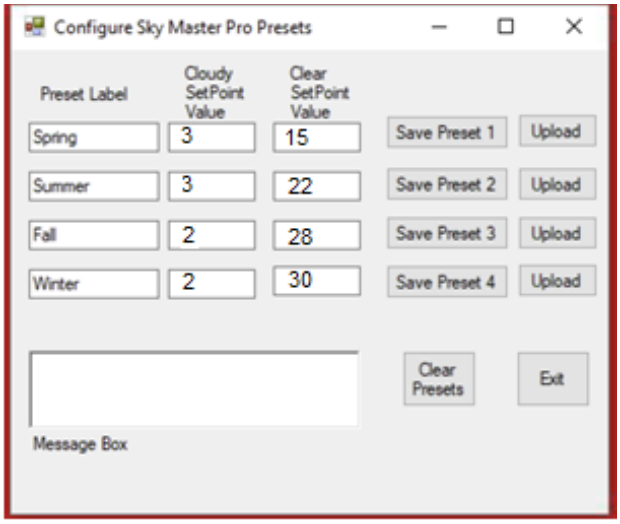
3. **Cloud Presets**. Now that your Sky Master Pro knows the correct temperature, you can configure the cloud presets. There are four cloud presets. These presets tell your Sky Master Pro the difference between the ambient temperature and the sky temperature under both clear conditions and cloudy conditions. You'll need to set a preset for each season, but to start we can configure each of the four presets to be the same. Just remember to update the values each season. I have included an example of some presets throughout the year. You'll need to capture information under a night sky – both a clear night sky and a cloudy night sky to properly configure the cloud presets.
    a. In the Sky Master Pro app, click on Settings | Cloud Sensor Presets -> Configure Presets
    b. Set each label to correspond to a season – as in the screen below. Start with the current season in the first row.



    c. Now that it's night, check the weather outside. Is it cloudy? Is it clear?

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d. **If cloudy night**, calibrate your Clouds Setpoint as per below. If it's what you would consider a really cloudy night meaning you can't see through the clouds and see stars this is a cloudy night to calibrate against. So, assuming it's a cloudy night and the GUI reports the following below, we use this data to set the Clouds Setpoint. Note the "Temp Diff" value in °C reports 3.24 deg C and my current setpoint for clouds is 2. This means the following.

i. Anything 2 deg C and below if considered cloudy in the Temp Diff between IR sky object and ambient temp reading will report "Cloudy Skys".
ii. Anything between 2 for Clouds setpoint and below 26 for Clear Skys setpoint will report "Partly Cloudy Skys".
iii. Anything > than 26 degC for Temp Diff between IR sky and ambient temp will report "Clear Skys"

So, to set this threshold for this reading you consider cloudy skys, you want to change the Clouds Setpoint to 3 or 4 in order to report "Cloudy Skys". To do this you just edit the text box for Clouds Setpoint and hit the set button. So, if your next reading shows a temp delta of 4 and your setpoint for clouds was 3, you should see a reporting of "Cloudy Skys".

e. **If Clear night,** lets set the Clear Sky Setpoint keeping in mind a clear night has absolutely no clouds, all stars are visible. As before conforming to the rules as described in c. above observe and calculate the setpoint value using the "Temp Diff" value between IR sky and ambient temperatures. Set the "**Clear** SetPoint Value" field. It's often best to add 1 to the Clear Setpoint value, and subtract 1 from the Cloudy SetPoint value. This helps account for some variability in the sky conditions and allows your Sky Master Pro to more accurately report partly cloudy conditions.
f. Click "Save Preset 1" to save these values to the C:\Sky_Master_Pro_Data\Presets.txt file
g. Once you have both your Cloudy and Clear SetPoints configured and saved to the Presets.txt file, you'll need to save it to your Sky Master Pro controller.
h. Click "Upload" to save this value in your Sky Master Pro controller.
i. Enter the same SetPoint values for the other three seasons. Save the Presets, and upload them. The four seasons are there for your future reference. By leaving the set points for each season, you can return to this screen and update your settings as the seasons change. You need to click "upload" to actually force the preset to be loaded in your controller.
j. Click "Exit"

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4. **Rain Voltage Threshold**. You configure this value to determine how sensitive the Sky Master Pro controller is to rain. This is set at factory to 2.5 volts which means any voltage below this value indicates a raining condition and will close the contacts of the relay as the default state of the controller is to use the rain sensor to close relay contacts. If you want to disable the relay from using rain sensor or cloud input, hit the relay disable button in the GUI which will instruct the controller to show rain conditions on GUI but not activate any relays. To couple relay with sensors again, either reboot the controller or hit the Relay Off button. Under dry conditions, the Rain sensor voltage shows close to 5 volts. When the sensor is wet, the voltage drops close to 0 Volts.

   For example, if the sensor was fully wet from rain, it would show a voltage less than 5 volts. For example, if at least one rain drop falls on the sensor, the high resolution of the spiral sensor should report close 1 volt or less.
   a. To determine the right threshold value, use a spray bottle to spray a fine mist of water on the sensor. It's helpful to turn on "Loop_Read" to get a frequent update of the Rain Sensor voltage. Notice the Rain sensor voltage after one spray. Repeat spraying the sensor to approximate the amount of rain you want the Sky Master Pro to consider "Raining".
   b. The rain sensor will also consider dew or frost as a threshold trigger for the rain sensor. This must be considered and potentially recalibrated upon any of these conditions occurring. Because the rain sensor is not heated, dew or frost can form on the sensor when the temperature is below the dew point or frost point. To help ensure against false rain detection, recalibrate the trigger threshold sensitivity above the voltage detected under these false alarms.
   c. Click "Save Value" to save this to the C:\Sky_Master_Pro_Data\Offsets.txt file. Click "Upload" to save this to your controller. Note that the Message Box will indicate when the value is saved to the controller.
   d. **Couple Rain and Cloud Sensors**. The rain sensor can also be coupled with rain sensor and IR cloud activity to trip. If this check box is checked in the GUI under the offset sub menu, either a rain trip threshold or a Cloudy Condition with activate the relay. Currently, the coupling of Cloud sensors means a "Cloudy Reported Condition" .

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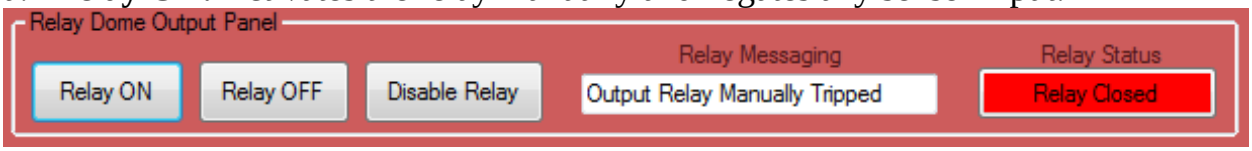
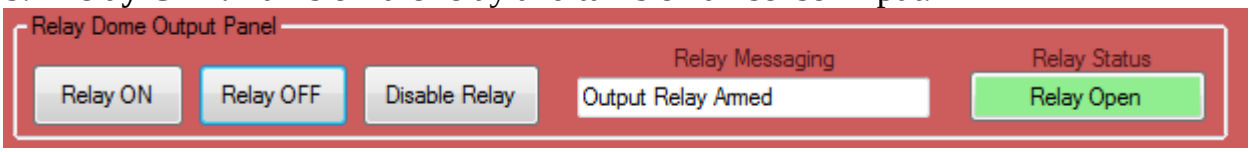
5. **Notes on Relay Use on GUI as discussed in 4**. The following is a summary of the GUI switches on regarding relay control per below.

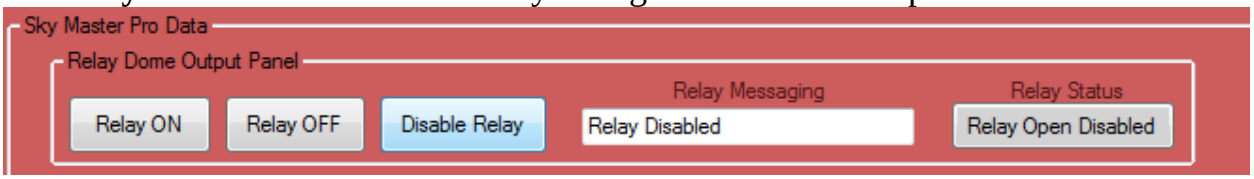
   a. **Relay ON.** Activates the relay manually and negates any sensor input.



   b. **Relay OFF.** Turns off the relay and turns on all sensor input.



   c. **Relay Disable.** Turns off the relay and ignores all sensor input.



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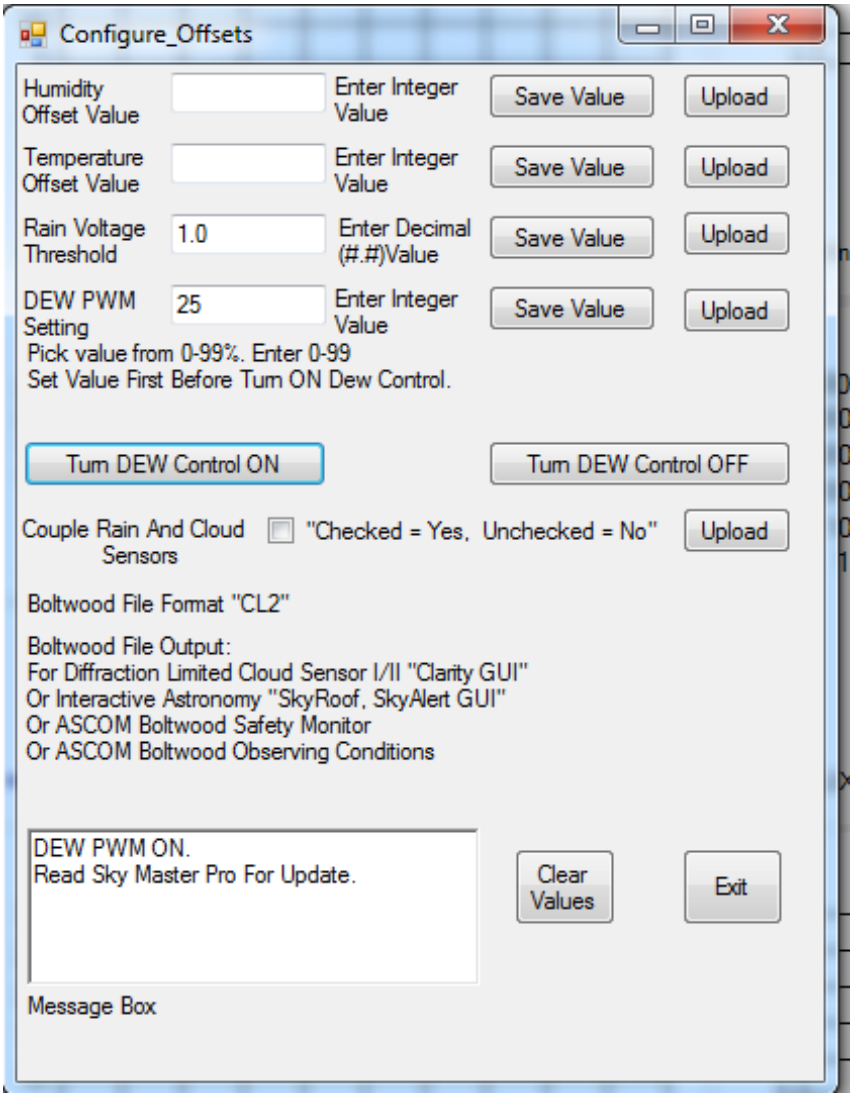
6. **Dew Control using the SMP-R2-RF version of product**.

The SMP-R2-RF product can control dew heating on rain/snow sensor using the Software GUI as shown below. Simply, store and PWM wanted for the sensor and turn it on or off during operation. The PWM % applied for heating can be from 0-100%.



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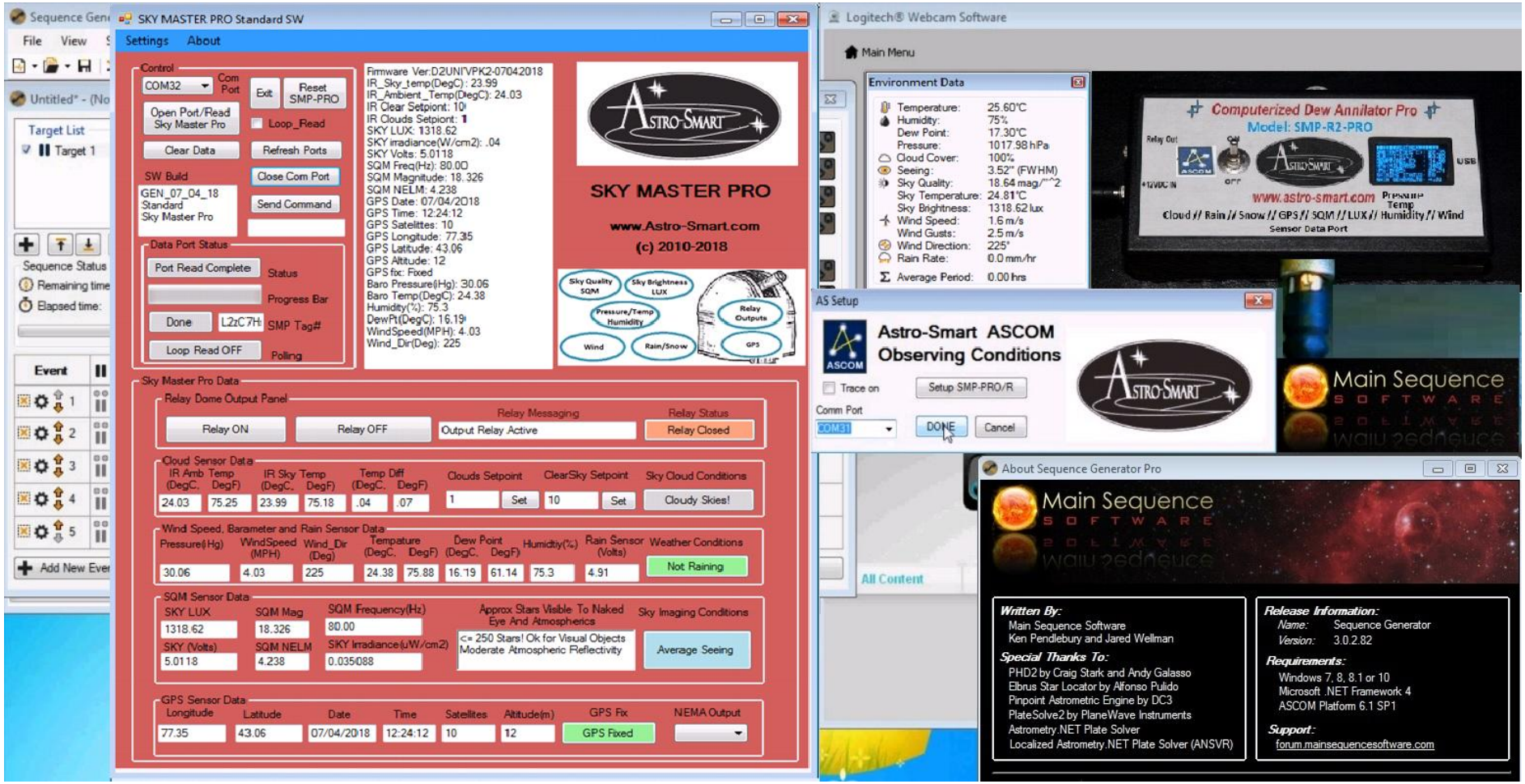
J. Astro-Smart ASCOM Software Interface With (Sequence Generator Pro).



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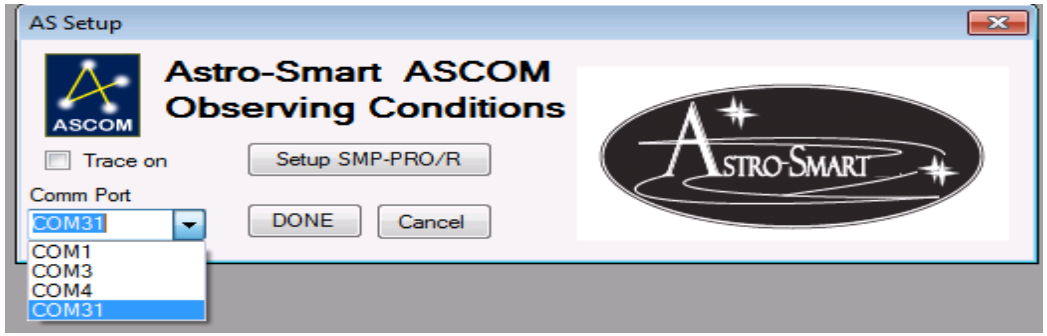
Steps to load ASCOM driver.

1. Load ASCOM setup installer on CD.
2. Select Astro-Smart Observing Conditions Driver under Sequence Generator Pro Environmental interface.
3. Select com port attached to **SMP family controller** unit and click on Done button which should close Astro-Smart configuration window.
4. Connect ASCOM driver via chain link icon next to wrench icon for Astro-Smart Driver.
5. Environmental Data should appear for **SMP family controller** unit and update every 8-10 secs.

ASCOM Example Using Sequence Generator Pro.

1. Start Sequence Generator PRo.
2. Open Environmental ASCOM interface Setup Tab.
3. Select ASCOM Astro-Smart Observing Conditions and choose the following ASCOM driver.
4. Pull down the com port and highlight the correct port the SMP-PRO/R is connected to.



5. At this point you have a few choices to either select the com port and connect to Sequence Generator Pro or enter the setup mode via SMP-Pro/R GUI for any last minute setting changes.

Case 1: Ready to Enter Sequence Generator Pro.

Select the com port and click done which will close the AS setup window. In this case, simply click the chain link icon in sequence generator pro to connect to SMP-Pro/R where environmental data should appear from the SMP-Pro/R unit and update every 8-10 secs.

Case 2: Enter Setup Mode First before entering Sequence Generator Pro.

Enter the Setup Mode which is a direct link to SMP-Pro/R GUI software. You may want to do this for any last minute checks of data reads or to set or change any cloud and clear sky delta set point settings. Here you then press Setup SMP-PRO/R button and the Focus Smart Controller Pro interface is invoked as shown below. Use this interface as described above connecting with com port, changing any settings, closing port and then Exit the application when all settings are set to your liking. This will return you to Sequence Generator Pro where you can select the com port and click Done and proceed as in case 1.

K. Other 3rd Party ASCOM And Boltwood File Software Interfaces(Sky Roof and NINA).

The Astro-Smart interface allows Boltwood File output which is very useful in control applications based on the environmental data collected from the SMP-R2 Family systems. By setting up a rule base conditions, the user can control telescope mount and dome control interfaces. The Boltwood File format uses Diffraction Limited's Clarity II format which interfaces with a variety of 3rd party interfaces for control of your observatory telescope mount, Dome controls or other switch control interfaces. Available in Super Pro Version of software.

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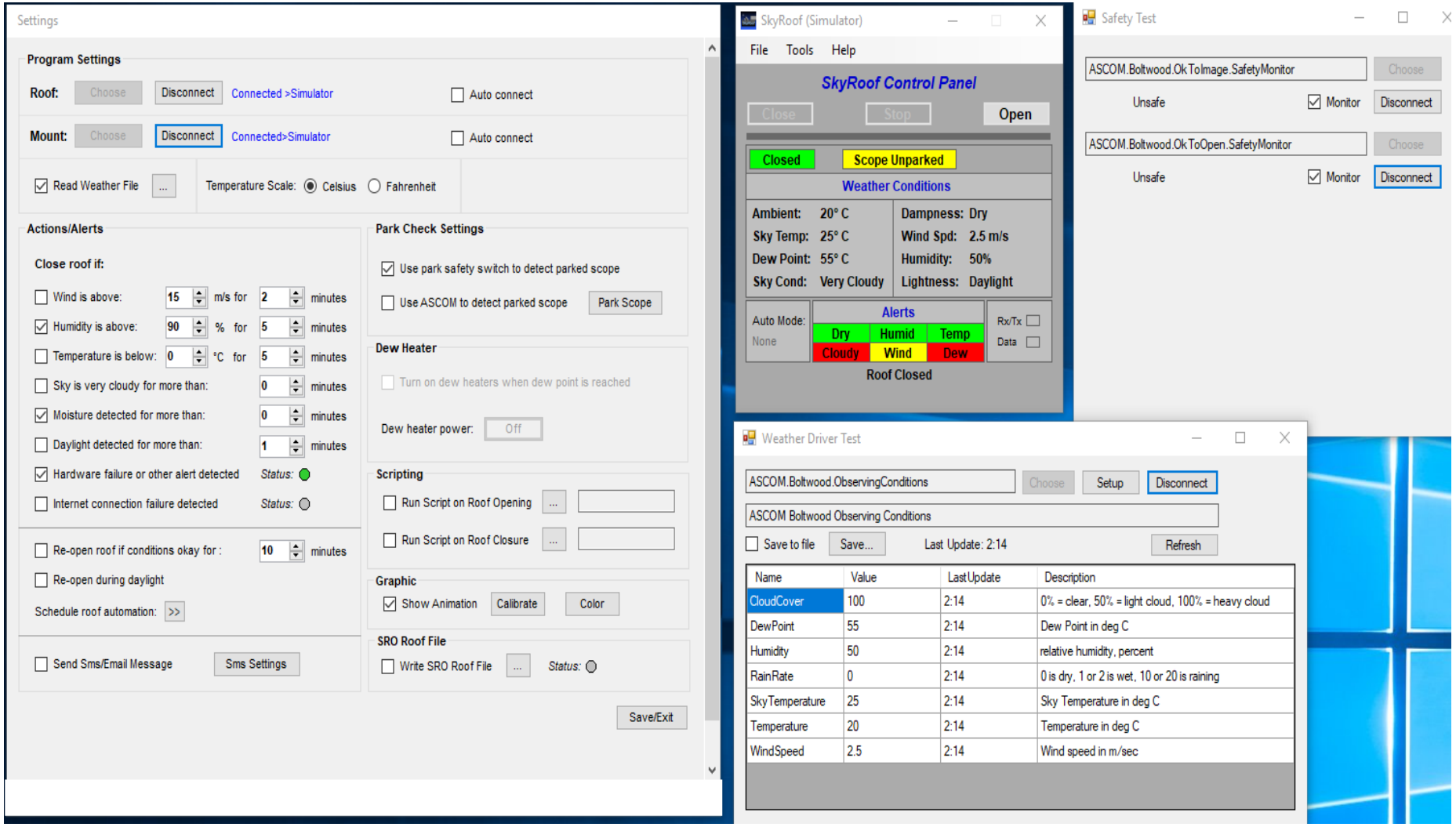

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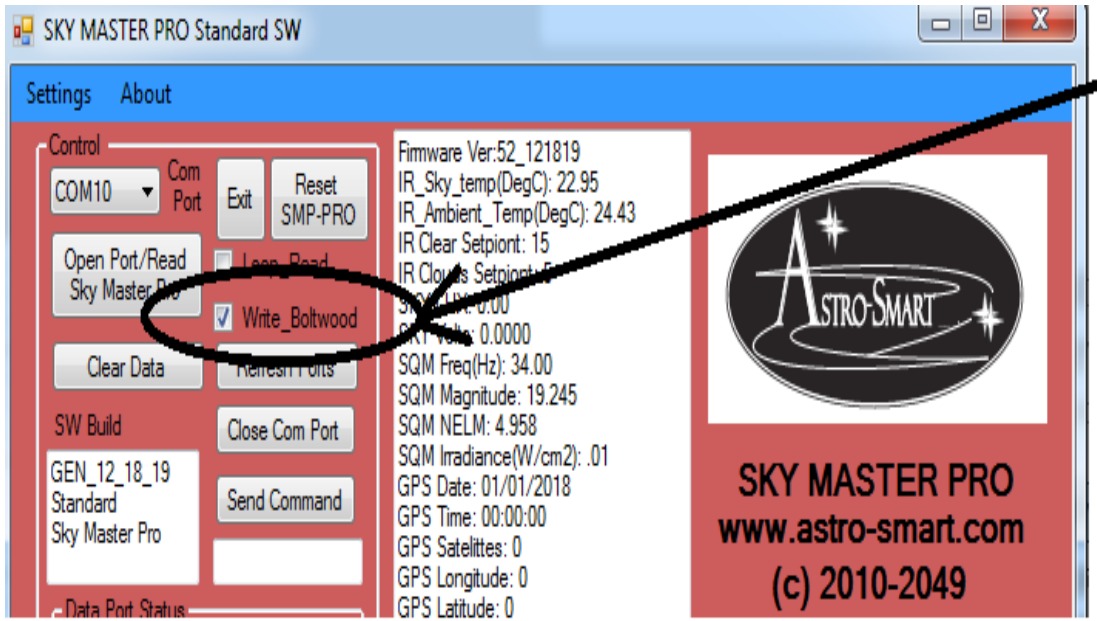

Check the CL2 Boltwood File and weather data file gets written in following path.

C:\Sky_Master_Pro_Data\Weather.txt

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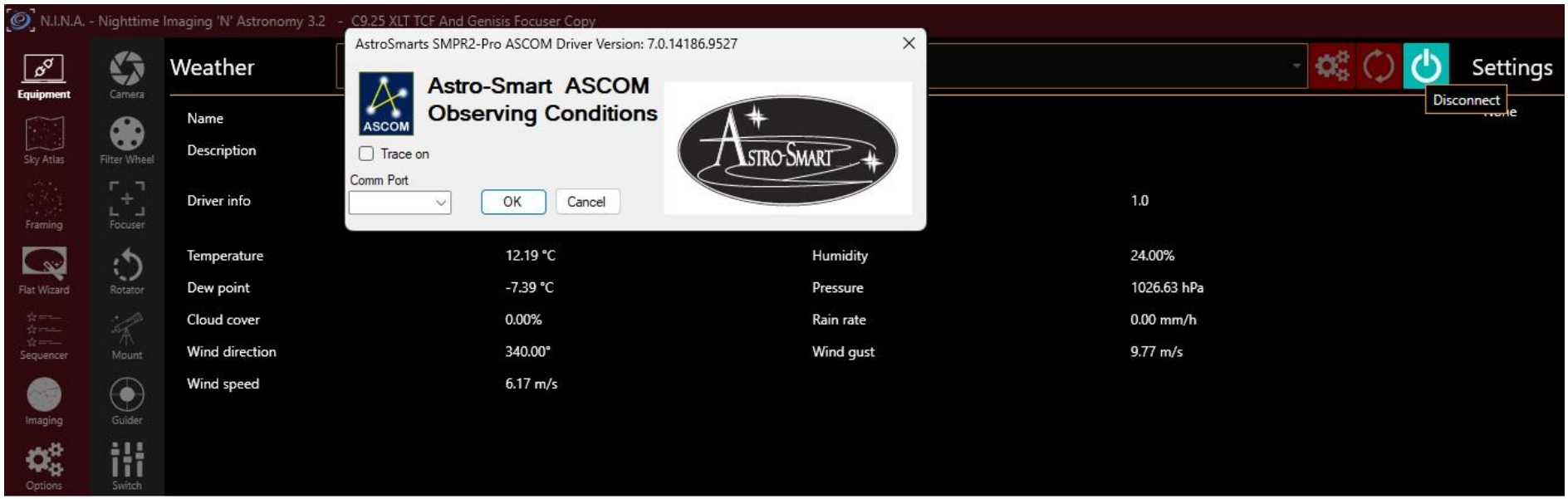

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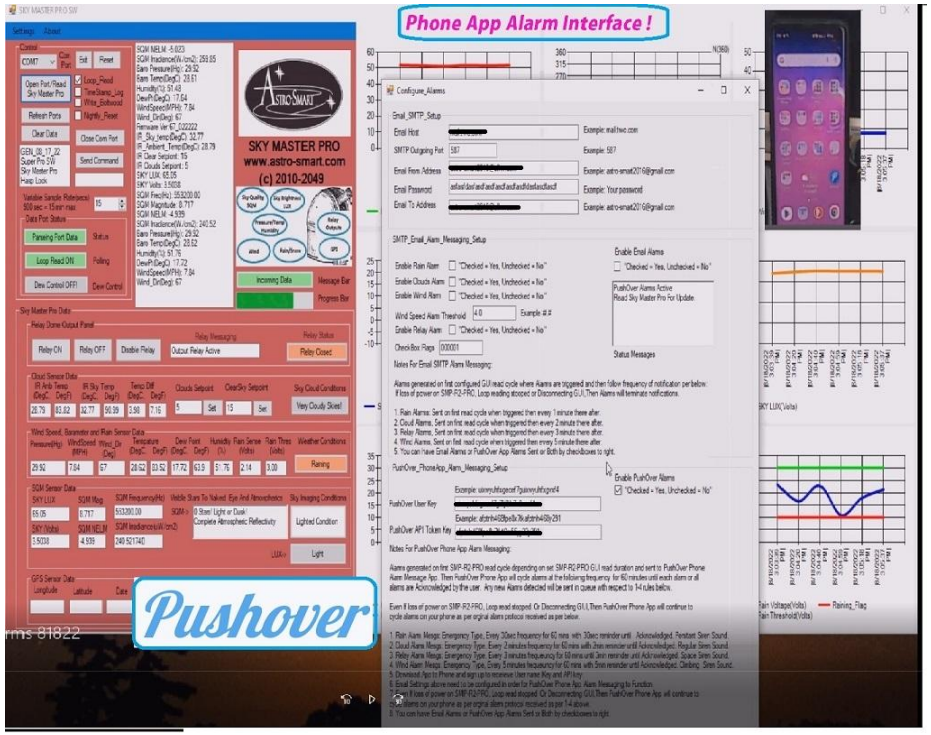
L. Cell Phone App and Email Alarm Software Interfaces(PushOver App, Email Alarms).



https://www.astro-smart.com/web_media/Video%2034%20SMPR2%20Phone%20App%20Msg%20Alarms%2081822.mp4

See Videos on Website link here. Directions are provided with purchase of SMP-R2 Core software which includes GUI, ASCOM, Email and Alarm setup.

https://astro-smart.com/support/product-video-tutorials/weather-station-videos

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M. Blue Tooth Interface.

Bluetooth Module Instructions :(SMP-R2/R systems without BT ON/OFF Switch)

Connection Steps:

1. Insert the supplied Bluetooth USB module in your computer USB Port or use your existing Bluetooth capable computer solution. The standard CSR 4.0 module provided is a Class 2 and works with all versions of windows within range of 33-50 feet. If blue tooth range maximum is required, an upgrade to Class 1 can be acquired from Astro-Smart with a range of 168 feet.
2. Open device manager on your computer and wait or verify that your Bluetooth drivers are installed. This will take a moment if your OS needs to grab them from the internet. You should see Bluetooth radio drivers and ICONs in device manager. If your computer does not automatically load the blue tooth com port drives, open the HC06 BT icon in the BT service window and click properties. Open the services tab and make sure your serial port SPP rev B box is enabled by checking the box if not already checked. This should start your computers install of the serial port BT drivers to use with your SMP-R2/R system. Now, you need to add the HC06 Bluetooth device in your SMP-R2/R system to computer serial ports in next step.
3. Open Bluetooth devices from your OS ribbon or from control panel to add this device by doing a search for Bluetooth devices. You should see HC06 or other Bluetooth devices. Select and chose Add device.
4. Now, pair the device to your computer. Select Pair Code Option and enter 1234. The device should report pairing successful and now you must wait for the drivers to create serial ports for Bluetooth, which can now be used in unison with your hardline serial port connection. If done successfully, you can open 2 SMP-R2/R SW instances to talk and control your SMP-R2/R simultaneously depending on the options installed on your SMP-R2/R system. In some cases, due to memory resource limitations on chosen SMP-R2/R options installed, simultaneous operation of USB and BT will not be possible. In this instance, only one or the other interface can be used at any given time. This will apply to SMP-R2/R systems that have a BT ON/OFF switch, Reset switch and BT LED added interfaces. The BT usage for these systems are discussed in next section.

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5. Once, Bluetooth serial ports installed, you will see 1 or 2 ports. If 1 port, then used that port. If 2 ports, one is for Incoming and the 2nd is for outgoing. Please, use the first lower incoming port when connecting with your SMP-R2/R.
6. You are now ready to use the SW program to receive and transmit data. In the SW SMP-R2/R program connect to the Bluetooth incoming serial port. Press the real time read control button and data and graphing should appear as usual when just using the serial to USB connector.
7. Now, hit the Rest SMP-PRO button on your SMP-PRO GUI interface with com port open and your SMP-PRO should reset.

Bluetooth Module Instructions :(SMP-R2/R systems with BT ON/OFF Switch)

Please, see video tutorial on this procedure as well at.

http://www.astro-smart.com/index.php?p=1_49_Video-Overviews

Connection Steps:

1. Remove Power and USB cable from your SMP-R2/R system.
2. Re-apply power to your SMP-R2/R system.
3. Turn on the BT power switch in upward position on your SMP-R2/R system located on the back-interface panel.
4. Notice the BT LED on the front panel of your SMP-R2/R system starts flashing. This indicates the BT module in your SMP-R2/R system is ready to link to your computer but not linked yet.
5. Insert the supplied Bluetooth USB module in your computer USB Port or use your existing Bluetooth capable computer solution. The standard CSR 4.0 module provided is a Class 2 and works with all versions of windows within range of 33-50 feet. If blue tooth range maximum is required, an upgrade to Class 1 can be acquired from Astro-Smart which has a range of 168 feet.
6. Open device manager on your computer and wait or verify that your Bluetooth drivers are installed. This will take a moment if your OS needs to grab them from the internet. You should see Bluetooth radio drivers and ICONs in device manager. If your computer does not automatically load the blue tooth com port drives, open the HC06 BT icon in the BT service window and click properties. Open the services tab and make sure your serial port SPP rev B

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box is enabled by checking the box if not already checked. This should start your computers install of the serial port BT drivers to use with your SMP-R2/R system. Now, you need to add the HC06 Bluetooth device in your SMP-R2/R system to your computers serial ports in next step.

7. Open Bluetooth devices from your OS ribbon or from control panel to add this device by doing a search for Bluetooth devices. You should see HC06 or other Bluetooth devices. Select and chose Add device.
8. Now, pair the device to your computer. Select Pair Code Option and enter 1234. The device should report pairing successful and now you must wait for the drivers to create serial ports for Bluetooth. If your computer does not automatically load the blue tooth com port drives, open the HC06 BT icon in the BT service window and click properties. Open the services tab and make sure your serial port SPP rev B box is enabled by checking the box if not already checked. In some cases, due to memory resource limitations on chosen SMP-R2/R options installed, simultaneous operation of USB and BT will not be possible. In this instance, only one or the other interface can be used at any given time. This will apply to SMP-R2/R systems that have a BT ON/OFF switch, Reset switch and BT LED added interfaces.
9. Once, Bluetooth serial ports installed, you will see 1 or 2 ports. If 1 port, then used that port. If 2 ports, one is for Incoming and the 2nd is for outgoing. Please, use the first lower incoming port when connecting with your SMP-R2/R.
10. You are now ready to use the SW program to receive and transmit data. In the SW SMP-R2/R program connect to the Bluetooth incoming serial port. Press the Open Port Read SMP-PRO button on the SW GUI interface.
11. If successful, data should fill in the interface as usual when just using the serial to USB connector and the BT LED on front panel should change from flashing to a solid state indicating you have a locked BT data connection with your computer.
12. Now, hit the Reset SMP-PRO button on your SMP-PRO GUI interface with com port open and your SMP-PRO should reset.
13. Troubleshooting. If data is not received, it may be necessary to hit the momentary hard line reset button on your SMP-R2/R system in which case the LCD front panel will reset its messages and your SMP-R2/R system should execute at normal. Once, the system is normally operating, try the BT software connection again in steps 10-12 above.

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N. RF Interface.

When using the SMP-R2-RF system, please note RF dongle module driver installation instructions as per below.

1. WIN7 Family OS:
   i. OS should detect all modules and no need for installation. The drivers will be recognized for the com port as either Silicon Labs CP210x or Prolific PL2303 type.
2. WIN10 Family OS:
   i. OS should detect all modules and no need for installation, which have CP210X style hardware dongles.
   ii. Dongles with Prolific PL2303 type need to install a driver provided with instructions per video link below.
   iii. https://www.youtube.com/watch?v=aWquKi_e-3A

O. Specifications

The ***SMP-PRO-R2, SMP-R2(Only If an optional accessory requires)*** requires the following:

- At a minimum of 12 Volts DC at 2 amps a 2.1 mm DC power connector on your AC/DC supply.
  - Center positive voltage, sleeve ground, sees Figure 1.

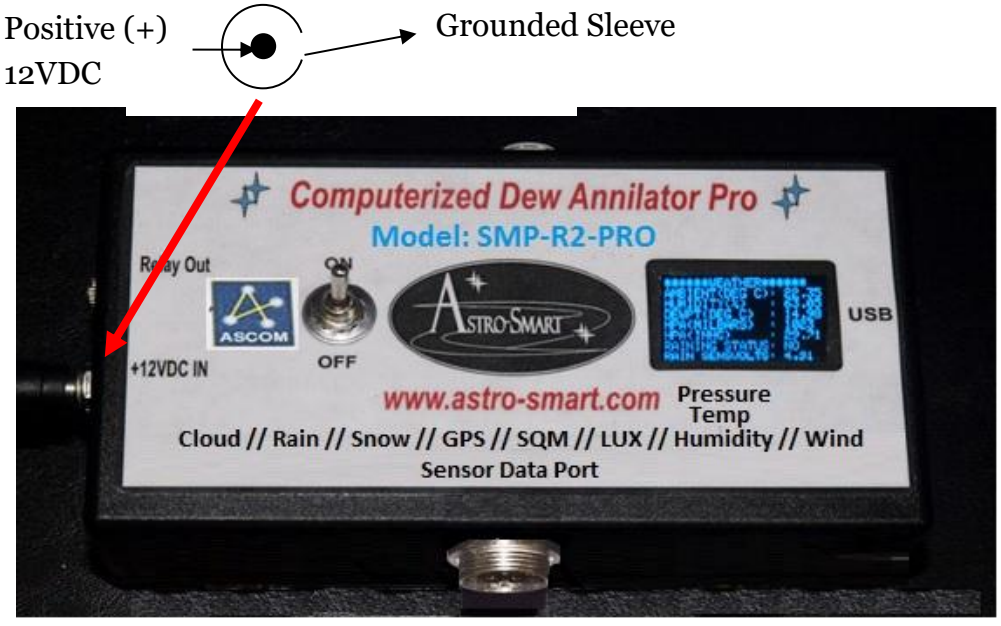

Figure 1 DC power plug

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- **Note:** Astro-Smart recommends you buy our certified tested power supplies for this product. Users can buy and connect their own power supplies to this product, but they do so at their own risk.

P. SMP-PRO-R2 Family Controllers Front Panel And Connector Diagram

- **Computerized Sky Master Pro (Model- *SMP-PRO-R2, SMP-R2*)** Configuration . See Figure 2 , 3 and 4 below.

OLED Display Data: Rolling Display With Programmable Window

Figure 2 SMP-PRO-R2(OLED) Break-Out Overview Model (2018).

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Example LCD Display Data: Rolling Display Window. 6 Panes Of Various Scrolling Sensor Data.

Figure 3 SMP-PRO-R2 (LCD) Break-Out Overview Model (2019).

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Figure 4 SMP-PRO-R2 Break-Out Overview Model (2018).

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Q. SMP-PRO-R2 and SMP-R2 Outdoor Sensor Units

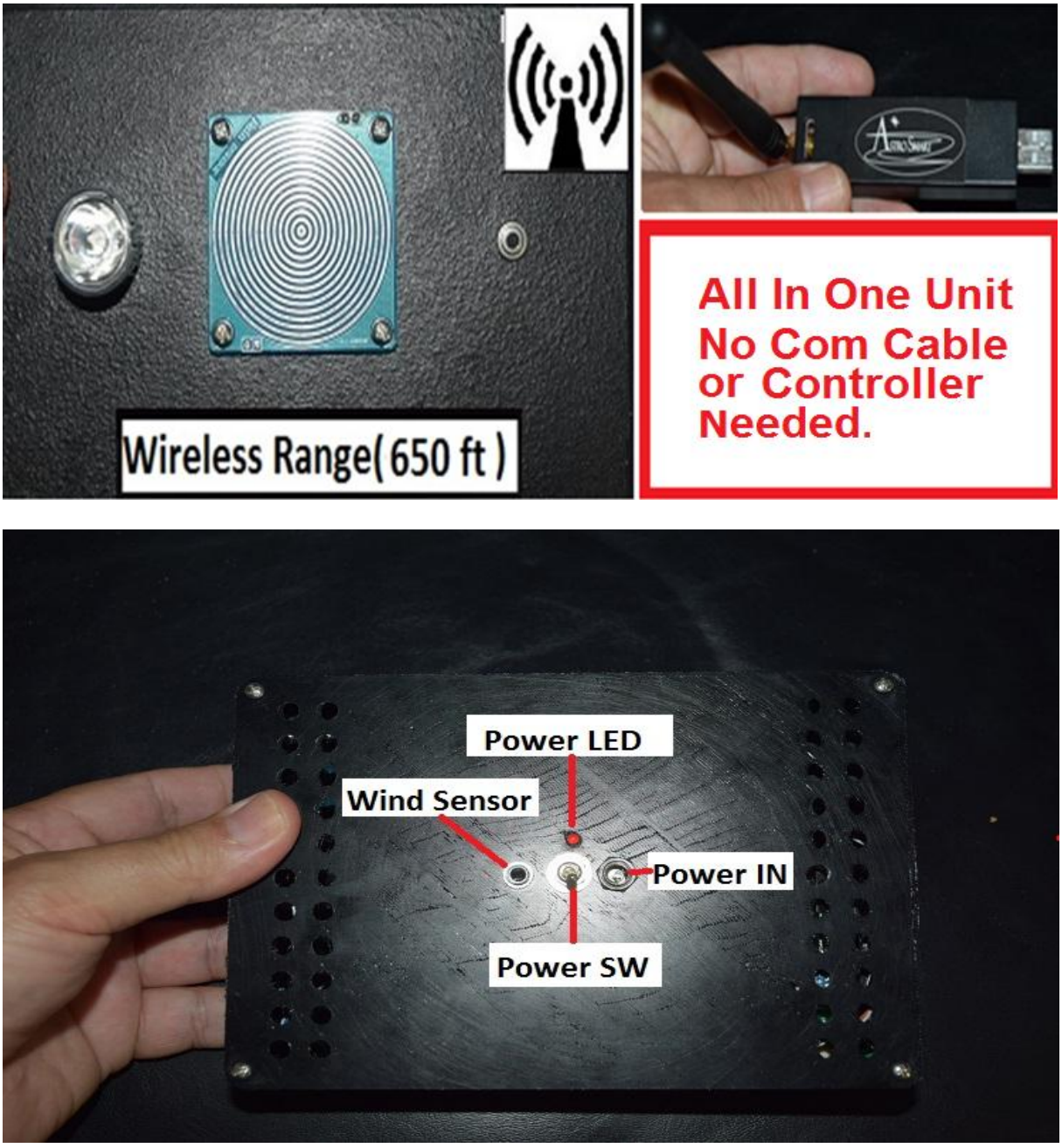

Figure 5 SMP-R2-RF All in One Break-Out Overview Model (2020).

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R. SMP-PRO-R2 Tethered Sensor Enclosure Front Panel And Connector Diagram

- **The tethered *R2 Full Sensor Fusion Enclosure* to be used with SMP-PRO-R2 Controllers above (Model- *SMP-PRO-R2*** Configuration is shown below in Figure 6 below which require the data and power link cable for connection and USB to computer.

Figure 6 SMP-PRO-R2 Outdoor Sensor Enclosure Break-Out Overview Model (2018).

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S. SMP-R2 All in One Sensor Enclosure Front Panel And Connector Diagram

- **The All in One outdoor unit *SMP-R2 Sensor Enclosure* only needs one USB cable to computer if the tethered approach is not needed. The controller and sensors are housed in one unit for outdoor use. (Model- *SMP-R2*** Configuration is shown below in Figure 7 below which require the data and power USB cable to computer.

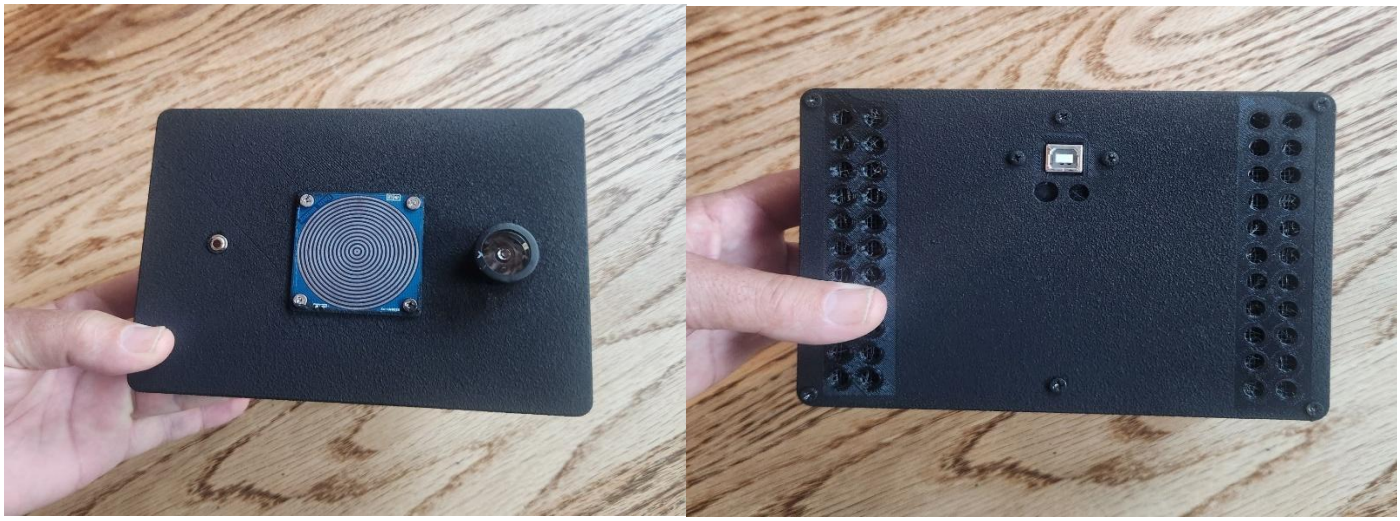

Figure 7 SMP-R2 All in One Sensor and Controller Enclosure Model (2023).

The version above now has all connections underneath the sensor housing which are protected from the elements. This cable harness can be shrouded through pipe mounting as part of PVC mounting kit option. This way the USB cable and wind sensor cable can be routed to R2 Enclosure inside the piping mounting conduit.

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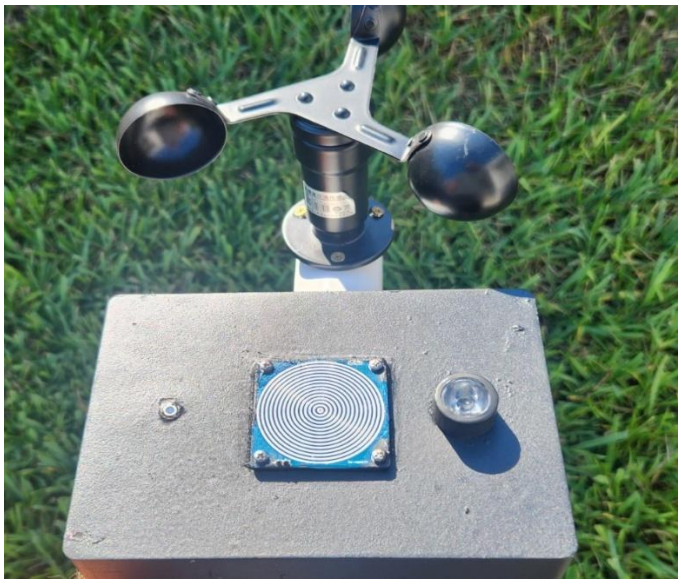
T. SMP-PRO-R2 and SMP-R2 Package and Installation Examples

Collective Pictures Of SMP-PRO-R2 and SMP-R2 Installation and Package Configuration. Example SMP-R2-USB All in one System.



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Collective Pictures Of SMP-PRO-R2 Installation and Package Configuration. Example SMP-R2-PRO-OLED Tethered System.

U. Accessories

Another convenient accessory that Astro-Smart offers for your ***SMP-PRO-R2, SMP-R2*** is the R2 full sensor fusion enclosure, which houses a 5 sensor cluster for Wind, Rain, SQM, Sky Lux Brightness, Cloud and Barometer Sensors. The R2 needs only one wire harness connection to the ***SMP-PRO-R2, SMP-R2*** controller.

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Wind Option (1)

Wind Option (2)

Wind Option (3)

Wind Option (4)

Wind Option (5)

Shown above are the (4) four wind sensor options mounted with the R2 enclosure for use with ***SMP-PRO-R2, SMP-R2*** controllers. The wind sensors plug into the R2 via wind connection port. This mounting enclosure feeds the single wire harness through PVC conduit to ***SMP-PRO-R2, SMP-R2*** with pre drilled mounting holes. Each anemometer shown above is available separately as well for other mounting option alternatives.

Another accessory for the ***SMP-PRO-R2, SMP-R2*** that Astro-Smart offers is the single data/control cable which comes in 6, 12 , 18, 25 or 50 feet in length to the R2 full sensor fusion Enclosure. Custom lengths are also available.

LUX & SQM

As part of your R2 enclosure sensor package that Astro-Smart offers for your ***SMP Family Controller*** is the SQM(Sky Quality Meter) Standard sensor (4SQMS) plus sky brightness in Lux which comes standard. This sensor informs the user of the quality of the sky conditions for imaging, visual or technical work communicating with the user GUI interface which gives the user immediate feedback on sky conditions letting the user know if imaging, visual, technical work or a poor night for setting up your telescope. The SQM standard sensor provides dual graphing of MPSAS(Magnitude per square arc second) and NELM(Naked Eye Limiting Magnitude. Sky lux brightness measuring from .0001 to 100K lux..

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As part of your R2 enclosure sensor package that Astro-Smart offers for your ***SMP Family Controller*** is the Cloud Sensor (4SMP-C). This very sensitive IR sensor informs the user of the atmospheric conditions on whether is cloudy, partly cloudy or clear for imaging, visual or technical work communicating with the user GUI interface which gives the user immediate feedback on sky cloud conditions letting the user know if imaging, visual, technical work or a poor night for setting up your telescope. This sensor package comes standard with R2 enclosure.

As part of your R2 enclosure sensor package that Astro-Smart offers for your ***SMP Family Controller*** is the Rain and Snow Sensor (4SMP-R). This sensor informs the user of rain fall when observing remotely. The rain sensor can be used for informative purposes to close your observatory until rain has abated. This sensor package comes standard with R2 enclosure.

As part of your R2 enclosure sensor package that Astro-Smart offers for your ***SMP Family Controller*** is Dew Heating Control for Rain and Snow Sensor (4SMP-R). This ad on gives the ability to add heat to the rain sensor element to abate dew false alarms. Internal Temperature of the R2 Enclosure is used for feedback. The Dew control module gives the user ability to adjust heat as well to the dew strap on rain sensor located on R2 enclosure locally near the R2 Controller with digital readout.

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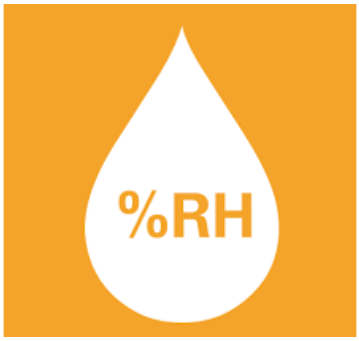

As part of your R2 enclosure sensor package that Astro-Smart offers for your ***SMP Family Controller*** is the Barometer Sensor (4SMP-B). This sensor informs the user of barometric pressure, temperature and humidity when observing remotely. This sensor package comes standard with R2 enclosure.

Another convenient accessory for your ***SMP Family Controller*** that Astro-Smart offers is the Relay Output Option 1 or 2. Option 1 is a +5V plus LED indicator activated output which is embedded in the SMP-PRO/R to a user supplied relay device. Option 2 as shown above provides a 120/240 VAC or 12VDC 10 Amp relay output for high current signaling devices for users needing a relay to drive a dome, roof or signaling device when SMP-Pro/R alarms such as raining conditions occur. This relay is sold as an option.

Another convenient accessory that Astro-Smart offers for your ***SMP Family Controller*** is the GPS Sensor (4SMP-G). This sensor informs the user of precise location(latitude, longitude, time, data, # of satellites, altitude) and supports NEMA output for 3rd party software applications when observing remotely. If ordered for the ***SMP-PRO-R2, SMP-R2*** systems, the GPS module is embedded inside the controller and is sold as an option.

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Another convenient accessory for your ***SMP Family Controller*** that Astro-Smart offers is a Display upgrade to 8 line OLED or 4 line LCD Display. Come standard with any SMP-R2 PRO purchase.

COMMUNICATION Upgrade Options:

Another convenient accessory add-on that Astro-Smart offers is the USB-3/2 7 Port Astro-Hub optional add on interface specifically designed for the ***SMP family controller***. For dedicated communication distances less than 50 feet with USB-3 equipment and 80 feet for USB-2 equipment to your computer. The Astro-Hub can be used with your ***SMP family controller*** and other telescope equipment such as cameras, focusers, mount, etc to your computer or other backhaul interface (ie ethernet or wireless options)(USB-3/2-Astro-Hub).

Another convenient accessory add-on that Astro-Smart offers is a RF Bluetooth, WIFI or ISM Wireless interface specifically designed for the ***SMP family controller***. For dedicated wireless communication distances less than (200 feet)Bluetooth, (300 feet) WIFI and (650 feet) ISM to your computer, the embedded Wireless upgrade option is right for you. You just connect with your wireless capable PC or use supplied wireless adapter and enjoy a wireless connection that's wire free unit separation. This add on gives the user ability for simultaneous use of supplied standard serial/USB port interface plus the addition of the Wireless assigned serial port which can run two remote software applications at once if desired.

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V. Astro-Smart's Product Goals:

Astro-Smart is the innovator of this elegant and convenient sky master sensor and control system *solution to your telescope mount or observatory needs.* The **Computerized Sky Master System Controller Pro(SMP) family controllers** are an economical yet superior Automation solution made available to the amateur or professional Astronomer. The **SMP family controllers** are designed for use with any make or model observatory and or telescope mount where the user needs information of the night sky.

Since, the inception of this unique product at Astro-Smart, the **SMP family controllers** was many years in the making, over long periods in astronomy using existing products on the market identifying their weaknesses and limitations making the product you see before you. The **SMP family controllers** are finally here!!! The Astro-Smart **SMP family controllers** are designed to be user friendly, serviceable, elegant and reliable. The intent is to make the product better as time progresses, so please always feel free to email me for GUI or feature recommendation updates at dale@astro-smart.com.

W.Warranty, Policies, Copyright Notice:

Life Time Warranty

All products are guaranteed to the original purchaser to be free from defects in material and workmanship for the life of the product from the date of original purchase. Simply put, once you buy a Astro-Smart product we are committed to support you for as long as you own the product including free software and firmware upgrades for the product. Warranty coverage excludes normal wear and tear, or damage caused by improper installation, any modification, abuse, misuse, improper maintenance, and unauthorized repairs or modifications to the original product. Shipper is responsible for proper packaging, shipping and insurance on applicable upgrades or repair items. . Upon receipt of returned product, Astro-Smart will assess the item/s to determine if they comply with the conditions of our warranty. Astro-Smart is not responsible for damage caused by the freight carrier, i.e.: USPS, UPS, FED EX, etc., to our product. A claim to repair or replace the

product must be initiated by the recipient. In no event shall Astro-Smart be liable for any claim for incidental or consequential damage arising out of or in connection, manufacture, delivery or use of any product offered on this website or by information received by US mail, E-mail, data files or fax.

Return Policy

Merchandise must be returned in new (mint) condition within 30 days of receipt for exchange/refund, which may be subject to 20% restocking charge (Shipper is responsible for proper packaging, shipping, and insurance.). We must receive the returned merchandise within 30 days of the date you received it. All items must be in new (mint) condition and fully functional. Returned items cannot show evidence of use or wear, dirt, or blemishes of any kind. Merchandise must be returned in its original packaging and should include all supplied materials, instructions, original accessories, hardware, and any CD software disks provided. Software purchases via email or download since released and customer custom work options are non-refundable. Astro-Smart is not responsible for lost or damaged packages. Return shipping costs are the responsibility of the customer. Any returned items must be in "as new" condition. We ask that you open and inspect your order upon receipt. No insurance or damage claims will be accepted more than 3 days after delivery. All customers MUST email Astro-Smart before returning products for warranty or repair to get an RMA# (Return Merchandise Authorization).

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