INSTRUMENTS

OWNER'S MANUAL

PAR-FAR SENSOR

Model S2-442

Rev: 8-July-2025

APOGEE INSTRUMENTS, INC. | 721 WEST 1800 NORTH, LOGAN, UTAH 84321, USA
TEL: (435) 792-4700 | FAX: (435) 787-8268 | WEB: APOGEEINSTRUMENTS.COM

Copyright © 2025 Apogee Instruments, Inc.

TABLE OF CONTENTS

Owner's Manual 1

Certificates of Compliance 3

Introduction 5

Sensor Models 6

Specifications 7

Deployment and Installation 10

Cable Connectors 11

Operation and Measurement 11

Maintenance and Recalibration 16

Troubleshooting and Customer Support 18

Return and Warranty Policy 19

CERTIFICATE OF COMPLIANCE

EU Declaration of Conformity

This declaration of conformity is issued under the sole responsibility of the manufacturer:

Apogee Instruments, Inc.
721 W 1800 N
Logan, Utah 84321
USA

for the following product(s):

Models: S2-442
Type: PAR-FAR Sensor

The object of the declaration described above is in conformity with the relevant Union harmonization legislation:

2014/30/EU	Electromagnetic Compatibility (EMC) Directive
2011/65/EU	Restriction of Hazardous Substances (RoHS 2) Directive
2015/863/EU	Amending Annex II to Directive 2011/65/EU (RoHS 3)

Standards referenced during compliance assessment:

EN 61326-1:2013	Electrical equipment for measurement, control, and laboratory use – EMC requirements
EN 63000:2018	Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances

Please be advised that based on the information available to us from our raw material suppliers, the products manufactured by us do not contain, as intentional additives, any of the restricted materials including lead (see note below), mercury, cadmium, hexavalent chromium, polybrominated biphenyls (PBB), polybrominated diphenyls (PBDE), bis (2-ethylhexyl) phthalate (DEHP), butyl benzyl phthalate (BBP), dibutyl phthalate (DBP), and diisobutyl phthalate (DIBP). However, please note that articles containing greater than 0.1 % lead concentration are RoHS 3 compliant using exemption 6c.

Further note that Apogee Instruments does not specifically run any analysis on our raw materials or end products for the presence of these substances, but we rely on the information provided to us by our material suppliers.

Signed for and on behalf of:
Apogee Instruments, October 2023

Bruce Bugbee
President
Apogee Instruments, Inc.

CE

CERTIFICATE OF COMPLIANCE

UK Declaration of Conformity

This declaration of conformity is issued under the sole responsibility of the manufacturer:

Apogee Instruments, Inc.
721 W 1800 N
Logan, Utah 84321
USA

for the following product(s):

Models: S2-442
Type: PAR-FAR Sensor

The object of the declaration described above is in conformity with the relevant UK Statutory Instruments and their amendments:

2016 No. 1091	The Electromagnetic Compatibility Regulations 2016
2012 No. 3032	The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012

Standards referenced during compliance assessment:

BS EN 61326-1:2013	Electrical equipment for measurement, control, and laboratory use – EMC requirements
BS EN 63000:2018	Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances

Please be advised that based on the information available to us from our raw material suppliers, the products manufactured by us do not contain, as intentional additives, any of the restricted materials including lead (see note below), mercury, cadmium, hexavalent chromium, polybrominated biphenyls (PBB), polybrominated diphenyls (PBDE), bis (2-ethylhexyl) phthalate (DEHP), butyl benzyl phthalate (BBP), dibutyl phthalate (DBP), and diisobutyl phthalate (DIBP). However, please note that articles containing greater than 0.1 % lead concentration are RoHS 3 compliant using exemption 6c.

Further note that Apogee Instruments does not specifically run any analysis on our raw materials or end products for the presence of these substances, but we rely on the information provided to us by our material suppliers.

Signed for and on behalf of:
Apogee Instruments, October 2023

Bruce Bugbee
President
Apogee Instruments, Inc.

UK CA

INTRODUCTION

Specific wavelengths of radiation trigger distinct plant responses. Radiation that drives photosynthesis is called photosynthetically active radiation (PAR) and is typically defined as total radiation across a wavelength range of 400 to 700 nm. PAR is almost universally quantified as photosynthetic photon flux density (PPFD), the sum of photons from 400 to 700 nm in units of micromoles per square meter per second (µmol m^{-2} s^{-1}, equal to microEinsteins m^{-2} s^{-1}). While microEinsteins and micromoles are equal (one Einstein = one mole of photons), the Einstein is not an SI unit, so expressing PPFD as µmol m^{-2} s^{-1} is preferred. Daily total PPFD is typically reported in units of moles of photons per square meter per day (mol m^{-2} d^{-1}) and is often called daily light integral (DLI).

The acronym PPF is also used and refers to the photosynthetic photon flux. The acronyms PPF and PPFD refer to the same variable. Both terms are used because there is not a universal definition of the term flux. Flux is sometimes defined as per unit area per unit time and sometimes defined as per unit time only. PPFD is used in this manual.

In addition to wavelengths within the PAR range, far-red wavelengths (those just beyond 700 nm) are of particular interest because they influence plant photosynthetic and morphogenic activity. Phytochrome pigments sensitive to varying ratios of red and far-red light provide information to the plant about the light environment, and therefore, influence growth patterns. Increasing the fraction of PAR, and specifically red radiation, relative to far-red radiation indicates less shading and generally results in more conservative vertical growth patterns. Increasing far-red radiation relative to PAR indicates more shading and results in more aggressive vertical growth patterns.

Sensors that measure PPFD are often called quantum sensors because they measure the number of incident photosynthetic photons and one photon is a single quantum of radiation. Far-red sensors are similar in that they measure incident photons, but the wavelength range is different. Far-red sensors can be thought of as quantum sensors that measure radiation just beyond 700 nm. Sensors that pair detectors to measure both PPFD and far-red photon flux density can be called PAR-FAR sensors.

The primary application of PAR-FAR sensors is monitoring plant light environments, including calculation of the far-red fraction (far-red photon flux density / sum of PPFD and far-red photon flux density), in photobiology studies (e.g., researching plant morphogenic activity).

Apogee Instruments S2 series PAR-FAR sensors consist of a cast acrylic diffuser, pair of photodetectors that measure PAR and far red wavelength ranges (400-700 nm for PAR, 700-750 nm for far-red), and signal processing circuitry mounted in an anodized aluminum housing. A cable to connect the radiometer measurement device is also included. Sensors are designed for continuous measurement in indoor and outdoor environments. S2-100 series sensors output two voltage signals, one from each photodetector, that are directly proportional to the radiation incident on a planar surface (does not have to be horizontal), where the radiation emanates from all angles of a hemisphere. The S2-442 model outputs a digital signal using Modbus RTU communication protocol over RS-232 or RS-485.

SENSOR MODELS

This manual covers the Modbus RTU communication protocol, PAR-FAR sensor model S2-442 (in bold below). Additional models are covered in their respective manuals.

Model	Signal
S2-141	Self-powered
S2-441	SDI-12
S2-442	**Modbus**

A sensor's model number and serial number are located on the bottom of the sensor. If you need the manufacturing date of your sensor, please contact Apogee Instruments with the serial number of your sensor.

SPECIFICATIONS

	S2-442
Power Supply	5.5 to 24 V DC
Average Max Current Draw	RS-232 37 mA; RS-485 quiescent 37 mA, active 42 mA
Calibration Factor (reciprocal of sensitivity)	Custom for each sensor and stored in firmware
Calibration Uncertainty	± 5 %
Output Range	Modbus
Measurement Repeatability	Less than 1 %
Long-term Drift	Less than 2 % per year
Non-linearity	Less than 1 % (up to 4000 µmol m^{-2} s^{-1}) (PAR) Less than 1 % (up to 1000 µmol m^{-2} s^{-1}) (Far-red)
Field of View	180°
Spectral Ranges	389 to 692 nm ± 5 nm (PAR) 700 to 750 nm ± 5 nm (Far-red)
Directional (Cosine) Response	± 2 % at 45°; ± 5 % at 75° zenith angle
Temperature Response	Less than 0.1 % per C
Housing	Anodized aluminum body with acrylic diffuser
IP Rating	IP68
Operating Environment	-40 to 70 C; 0 to 100 % relative humidity
Dimensions	30.5 mm diameter, 37 mm height
Mass (with 5 m of cable)	140 g
Cable	5 m of shielded, twisted-pair wire; TPR jacket (high water resistance, high UV stability, flexibility in cold conditions); pigtail lead wires; stainless steel (316), M8 connector

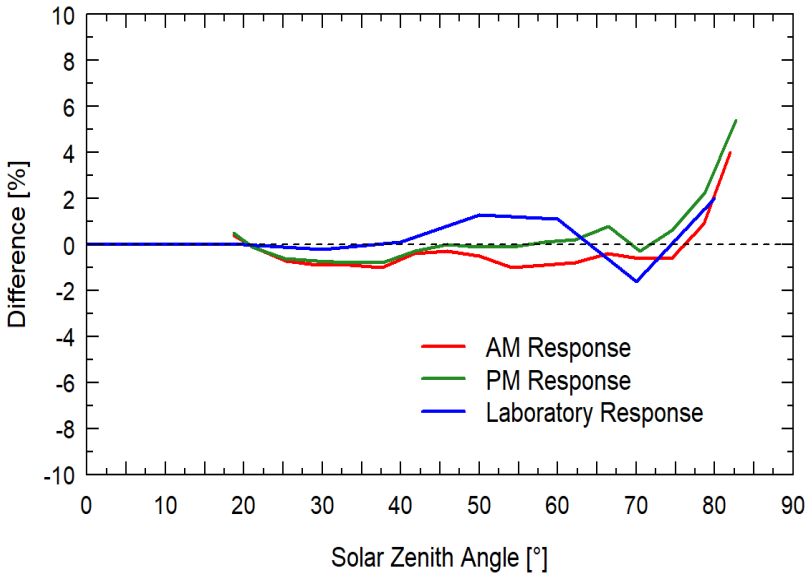
Calibration Traceability

The PAR sensor in Apogee S2 series PAR-FAR sensors are calibrated through side-by-side comparison to the mean of four transfer standard quantum sensors under a reference lamp. The transfer standard quantum sensors are calibrated with a quartz halogen lamp traceable to the National Institute of Standards and Technology (NIST).

The far-red sensor in Apogee S2 series PAR-FAR sensors are calibrated through side-by-side comparison to the mean photon flux density of four transfer standard far red radiometers under far red LEDs (735 nm peak, 710-750 nm range). The transfer standard far red sensors are calibrated against a spectroradiometer (Apogee Instruments model PS-300) under the same far red LEDs. The spectroradiometer is calibrated with a quartz halogen lamp traceable to the National Institute of Standards and Technology (NIST).

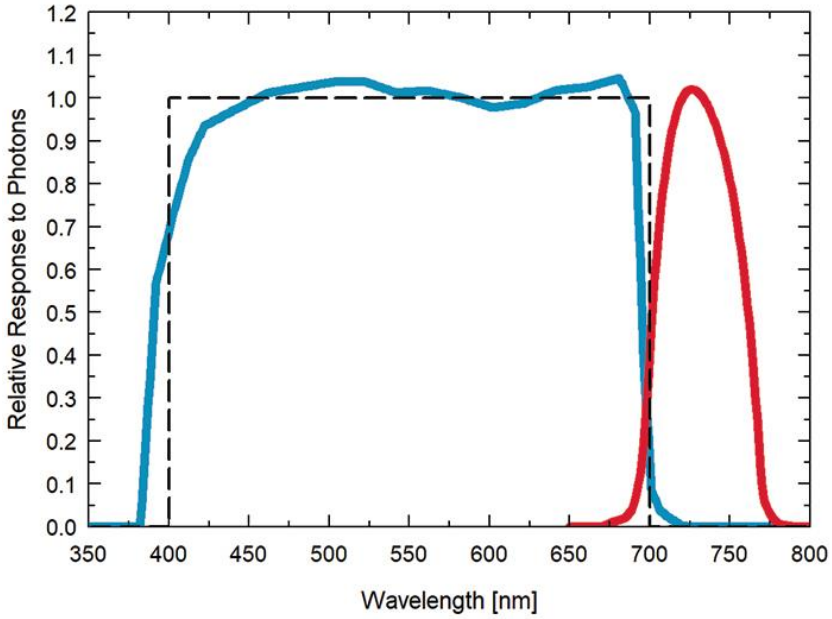
Cosine Response

Directional, or cosine, response is defined as the measurement error at a specific angle of radiation incidence. Error for Apogee S2 series PAR-FAR sensors is approximately ± 2 % and ± 5 % at solar zenith angles of 45° and 75°, respectively.



Mean directional (cosine) response of seven apogee PAR-FAR sensors. Directional response measurements were made on the rooftop of the Apogee building in Logan, Utah. Directional response was calculated as the relative difference of PAR-FAR sensors from the mean of replicate PAR detectors (LI-COR models LI-190 and LI-190R, Kipp & Zonen model PQS 1). Data were also collected in the laboratory using a reference lamp and positioning the sensor at varying angles.

Spectral Response



Spectral response of PAR detector (blue) and Far Red detector (red) compared to the defined response of plants to radiation (dashed).

DEPLOYMENT AND INSTALLATION

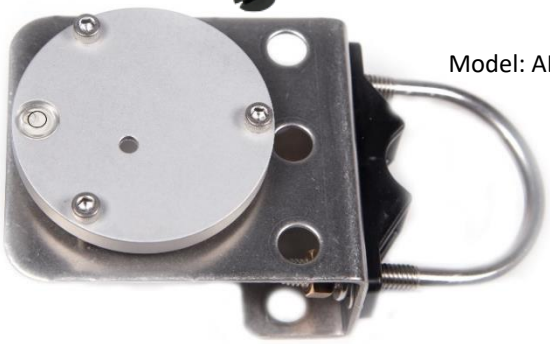
Mount the sensor to a solid surface with the nylon mounting screw provided. To accurately measure PPFD incident on a horizontal surface, the sensor must be level. An Apogee Instruments model AL-100 leveling plate is recommended for this purpose. To facilitate mounting on a cross arm, an Apogee Instruments model AM-110 mounting bracket is recommended.

Nylon Screw: 10-32 x 5/8

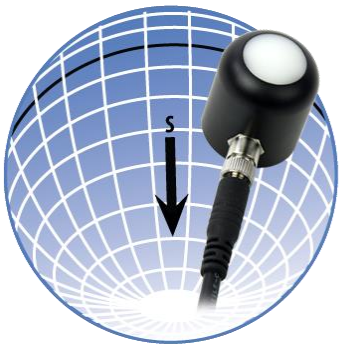
Model: AL-110

Nylon Screw: 10-32 x 5/8

Model: AL-120



To minimize azimuth error, the sensor should be mounted with the cable pointing toward true north in the northern hemisphere or true south in the southern hemisphere. Azimuth error is typically less than 0.5 %, but it is easy to minimize by proper cable orientation.



In addition to orienting the cable to point toward the nearest pole, the sensor should also be mounted such that obstructions (e.g., weather station tripod/tower or other instrumentation) do not shade the sensor. **Once mounted, the black cap should be removed from the sensor.** The black cap can be used as a protective covering for the sensor when it is not in use.

CABLE CONNECTORS

Apogee sensors offer cable connectors to simplify the process of removing sensors from weather stations for calibration (the entire cable does **not** have to be removed from the station and shipped with the sensor).

The ruggedized M8 connectors are rated IP68, made of corrosion-resistant marine-grade stainless-steel, and designed for extended use in harsh environmental conditions.

Cable connectors are attached directly to the head.

Instructions

Pins and Wiring Colors: All Apogee connectors have six pins, but not all pins are used for every sensor. There may also be unused wire colors inside the cable. To simplify datalogger connection, we remove the unused pigtail lead colors at the datalogger end of the cable.

If a replacement cable is required, please contact Apogee directly to ensure ordering the proper pigtail configuration.

A reference notch inside the connector ensures proper alignment before tightening.

Alignment: When reconnecting a sensor, arrows on the connector jacket and an aligning notch ensure proper orientation.

Disconnection for extended periods: When disconnecting the sensor for an extended period of time from a station, protect the remaining half of the connector still on the station from water and dirt with electrical tape or other method.

When sending sensors in for calibration, only send the sensor head.

Tightening: Connectors are designed to be firmly finger-tightened only. There is an o-ring inside the connector that can be overly compressed if a wrench is used. Pay attention to thread alignment to avoid cross-threading. When fully tightened, 1-2 threads may still be visible.

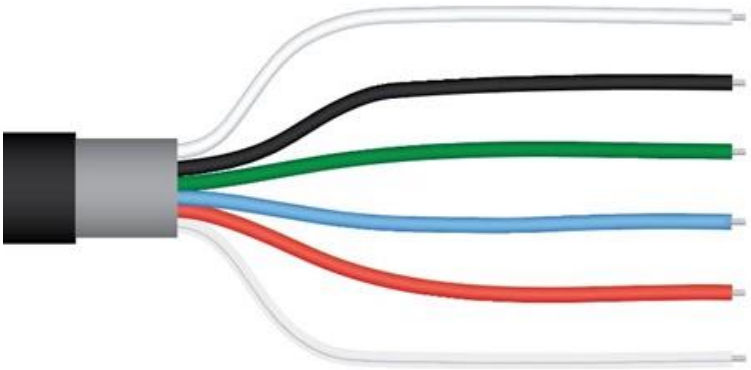
Finger-tighten firmly

WARNING: Do **not** tighten the connector by twisting the black cable or sensor head, only twist the metal connector (blue arrows).

OPERATION AND MEASUREMENT

The S2-442 PAR-FAR sensor has a Modbus output, where PPFD and far-red photon flux density are returned in digital format. Measurement of S2-442 PAR-FAR sensors requires a measurement device with a Modbus interface that supports the Read Holding Registers (0x03) function.

Wiring



White: RS-232 RX / RS-485 Positive

Black: Ground

Green: Select (Switch between RS-232 and RS-485)

Blue: RS-232 TX / RS-485 Negative

Red: Power +12 V

Clear: Shield/Ground

The Green wire should be connected to Ground to enable RS-485 communication, or it should be connected to 12 V power for RS-232 communication. Text for the White and Blue wires above refers to the port that the wires should be connected to.

Sensor Calibration

All Apogee Modbus PAR-FAR sensors model (S2-442) have sensor-specific calibration coefficients determined during the custom calibration process. Coefficients are programmed into the sensors at the factory.

Modbus Interface

The following is a brief explanation of the Modbus protocol instructions used in Apogee S2-442 PAR-FAR sensors. For questions on the implementation of this protocol, please refer to the official serial line implementation of the Modbus protocol: http://www.modbus.org/docs/Modbus_over_serial_line_V1_02.pdf (2006) and the general Modbus protocol specification: http://www.modbus.org/docs/Modbus_Application_Protocol_V1_1b3.pdf (2012). Further information can be found at: http://www.modbus.org/specs.php

Overview

The primary idea of the Modbus interface is that each sensor exists at an address and appears as a table of values. These values are called Registers. Each value in the table has an associated index, and that index is used to identify which value in the table is being accessed.

Sensor addresses

Each sensor is given an address from 1 to 247. Apogee sensors are shipped with a default address of 1. If using multiple sensors on the same Modbus line, the sensor's address will have to be changed by writing the Slave Address register.

Register Index

Each register in a sensor represents a value in the sensor, such as a measurement or a configuration parameter. Some registers can only be read, some registers can only be written, and some can be both read and written. Each register exists at a specified index in the table for the sensor. Often this index is called an address, which is a separate address than the sensor address, but can be easily confused with the sensor address.

However, there are two different indexing schemes used for Modbus sensors, though translating between them is simple. One indexing scheme is called one-based numbering, where the first register is given the index of 1, and is thereby accessed by requesting access to register 1. The other indexing scheme is called zero-based numbering, where the first register is given the index 0, and is thereby accessed by requesting access to register 0. Apogee Sensors use zero-based numbering. However, if using the sensor in a system that uses one-based numbering, such as using a CR1000X logger, adding 1 to the zero-based address will produce the one-based address for the register.

Register Format:

According to the Modbus protocol specification, Holding Registers (the type registers Apogee sensors contain) are defined to be 16 bits wide. However, when making scientific measurements, it is desirable to obtain a more precise value than 16 bits allows. Thus, several Modbus implementations will use two 16-bit registers to act as one 32-bit register. Apogee Modbus sensors use this 32-bit implementation to provide measurement values as 32-bit IEEE 754 floating point numbers.

Apogee Modbus sensors also contain a redundant, duplicate set of registers that use 16-bit signed integers to represent values as decimal-shifted numbers. It is recommended to use the 32-bit values, if possible, as they contain more precise values.

Communication Parameters:

Apogee Sensors communicate using the Modbus RTU variant of the Modbus protocol. The default communication parameters are as follows:

Slave address: 1
Baudrate: 19200
Data bits: 8
Stop bits: 1
Parity: Even
Byte Order: Big-Endian (most significant byte sent first)

The baudrate and slave address are user configurable. **Valid slave addresses are 1 to 247. Since the address 0 is reserve as the broadcast address, setting the slave address to 0 will actually set the slave address to 1.** (This will also reset factory-calibrated values and should **NOT** be done by the user unless otherwise instructed.)

Read only registers (function code 0x3).

Float Registers	
0 1	PAR calibrated output µmol
2 3	Far-red calibrated output µmol
4 5	PAR detector millivolts
6 7	Far-red detector millivolts
8 9	Ratio
10 11	Percentage Far-red
12 13	Reserved for Future Use
14 15	device status (1 means device is busy, 0 otherwise)
16 17	firmware version
Integer Registers	
44	PAR calibrated output µmol (shifted one decimal point to the left)
45	Far-red calibrated µmol (shifted one decimal point to the left)
46	PAR detector millivolts (shifted three decimal points to the left)
47	Far-red detector millivolts (shifted three decimal points to the left)
48	Ratio (shifted one decimal point to the left)
49	Percentage Far-red (shifted one decimal point to the left)
50	Reserved for Future Use
51	device status (1 means device is busy, 0 otherwise)
52	Firmware version (shifted one decimal point to the left)

Read/Write registers (function codes 0x3 and 0x10).

Float Registers	
20 21	slave address
22 23	model number*
24 25	serial number*
26 27	baudrate (0 = 115200, 1 = 57600, 2 = 38400, 3 = 19200, 4 = 9600, writes of any number other than 0, 1, 2, 3, or 4 are ignored
28 29	parity (0 = none, 1 = odd, 2 = even)
30 31	number of stopbits
32 33	PAR multiplier*
34	PAR offset*

35	
36 37	Far-red multiplier*
38 39	Far-red offset*
40 41	running average
42 43	heater status
Integer Registers	
54	slave address
55	model number*
56	serial number*
57	baudrate (0 = 115200, 1 = 57600, 2 = 38400, 3 = 19200, 4 = 9600, writes of any number other than 0, 1, 2, 3, or 4 are ignored
58	parity (0 = none, 1 = odd, 2 = even)
59	number of stopbits
60	PAR multiplier (shifted two decimal points to the left)*
61	PAR mV offset (shifted four decimal points to the left)*
62	Far-red multiplier (shifted two decimal points to the left)*
63	Far-red mV offset (shifted four decimal points to the left)*
64	running average
65	heater status

***Registers marked with an asterisk (*) cannot be written to unless a specific procedure is followed. Contact Apogee Instruments to receive the procedure for writing these registers.**

Write only registers (function code 0x10).

Integer Registers	
190	Writing to this register resets Coefficients to firmware defaults. (NOT factory calibrated values!) Slave Address = 1, Model = 442, Serial = 1000, Baud = 3, Parity = 2, Stopbits = 1, running average = 1

Packet Framing:

Apogee sensors use Modbus RTU packets and tend to adhere to the following pattern:

Slave Address (1 byte), Function Code (1 byte), Starting Address (2 bytes), Number of Registers (2 bytes), Data Length (1 byte, optional) Data (n bytes, optional)

Modbus RTU packets use the zero-based address when addressing registers.

For information on Modbus RTU framing, see the official documentation at
http://www.modbus.org/docs/Modbus_Application_Protocol_V1_1b3.pdf

Example Packets:
An example of a data packet sent from the controller to the sensor using function code 0x3 reading register address 0. Each pair of square brackets indicates one byte.

[Slave Address][Function][Starting Address High Byte][Starting Address Low Byte][No of Registers High Byte][No of Registers Low Byte][CRC High Byte][CRC Low Byte]

0x01 0x03 0x00 0x00 0x00 0x02 0xC4 0x0B

An example of a data packet sent from the controller to the sensor using function code 0x10 writing a 1 to register 26. Each pair of square brackets indicates one byte.

[Slave Address][Function][Starting Address High Byte][Starting Address Low Byte][No of Registers High Byte][No of Registers Low Byte][Byte Count][Data High Byte][Data Low Byte][Data High Byte][Data Low Byte][CRC High Byte][CRC Low Byte]

0x01 0x10 0x00 0x1A 0x00 0x02 0x04 0x3f 0x80 0x00 0x00 0x7f 0x20

MAINTENANCE AND RECALIBRATION

Blocking of the optical path between the target and detector can cause low readings. Occasionally, accumulated materials on the diffuser can block the optical path in three common ways:

1. Moisture or debris on the diffuser.
2. Dust during periods of low rainfall.
3. Salt deposit accumulation from evaporation of sea spray or sprinkler irrigation water.

Apogee Instruments PAR-FAR sensors have a domed diffuser and housing for improved self-cleaning from rainfall but active cleaning may be necessary. Dust or organic deposits are best removed using water, or window cleaner, and a soft cloth or cotton swab. Salt deposits should be dissolved with vinegar and removed with a cloth or cotton swab. **Salt deposits cannot be removed with solvents such as alcohol or acetone.** Use only gentle pressure when cleaning the diffuser with a cotton swab or soft cloth, to avoid scratching the outer surface. The solvent should be allowed to do the cleaning, not mechanical force. **Never use an abrasive material or cleaner on the diffuser**.

It is recommended that PAR-FAR sensors be recalibrated every two years. See the Apogee webpage for details regarding return of sensors for recalibration (http://www.apogeeinstruments.com/tech-support-recalibration-repairs/).

TROUBLESHOOTING AND CUSTOMER SUPPORT

Independent Verification of Functionality

If the sensor does not communicate with the datalogger, use an ammeter to check the current drain. It should be near 37 mA when the sensor is powered. Any current drain significantly greater than approximately 37 mA indicates a problem with power supply to the sensors, wiring of the sensor, or sensor electronics.

Compatible Measurement Devices (Dataloggers/Controllers/Meters)

Any datalogger or meter with RS-232/RS-485 that can read/write float or integer values.

An example datalogger program for Campbell Scientific dataloggers can be found at https://www.apogeeinstruments.com/content/PAR-Far-Sensor-Modbus.CR1.

Cable Length

All Apogee sensors use shielded cable to minimize electromagnetic interference. For best communication, the shield wire must be connected to an earth ground. This is particularly important when using the sensor with long lead lengths in electromagnetically noisy environments.

RS-232 Cable Length

If using an RS-232 serial interface, the cable length from the sensor to the controller should be kept short, no longer than 20 meters. For more information, see section 3.3.5 in this document: http://www.modbus.org/docs/Modbus_over_serial_line_V1_02.pdf

RS-485 Cable Length

If using an RS-485 serial interface, longer cable lengths may be used. The trunk cable can be up to 1000 meters long. The length of cable from the sensor to a tap on the trunk should be short, no more than 20 meters. For more information, see section 3.4 in this document: http://www.modbus.org/docs/Modbus_over_serial_line_V1_02.pdf

Using Separate Power and Communication Devices

In differential signaling, a sufficiently high or low voltage must be reached in order to be detected as a valid signal. If there is not a common ground between the power and communication source when using RS-485, those thresholds may not be met. If you experience communication issues while using this set up, bridge a ground wire between the Modbus device and the communication system.

Similarly, if there is no ground connection between devices when using RS-232, there may still be communication failures. If this occurs, establish a ground connection between the sensor and the host device.

Troubleshooting Tips

- Make sure to use the green wire to select between RS-232 and RS-485.
- Make sure that the sensor is wired correctly (refer to wiring diagram).
- Make sure the sensor is powered by a power supply with a sufficient output (e.g., 12 V).
- Make sure to use the appropriate kind of variable when reading Modbus registers. Use a float variable for float registers and an integer variable for integer registers.
- Make sure the baudrate, stop bits, parity, byte order, and protocols match between the control program and the sensor. Default values are:
    - Baudrate: 19200
    - Stop bits: 1
    - Parity: Even
    - Byte order: ABCD (Big-Endian/Most Significant Byte First)
    - Protocol: RS-232 or RS-485

RETURN AND WARRANTY POLICY

RETURN POLICY

Apogee Instruments will accept returns within 30 days of purchase as long as the product is in new condition (to be determined by Apogee). Returns are subject to a 10 % restocking fee.

WARRANTY POLICY

What is Covered
All products manufactured by Apogee Instruments are warranted to be free from defects in materials and craftsmanship for a period of four (4) years from the date of shipment from our factory. To be considered for warranty coverage an item must be evaluated by Apogee.

Products not manufactured by Apogee (spectroradiometers, chlorophyll content meters, EE08-SS probes) are covered for a period of one (1) year.

What is Not Covered
The customer is responsible for all costs associated with the removal, reinstallation, and shipping of suspected warranty items to our factory.

The warranty does not cover equipment that has been damaged due to the following conditions:

1. Improper installation, use, or abuse.

2. Operation of the instrument outside of its specified operating range.

3. Natural occurrences such as lightning, fire, etc.

4. Unauthorized modification.

5. Improper or unauthorized repair.

Please note that nominal accuracy drift is normal over time. Routine recalibration of sensors/meters is considered part of proper maintenance and is not covered under warranty.

Who is Covered
This warranty covers the original purchaser of the product or other party who may own it during the warranty period.

What Apogee Will Do
At no charge Apogee will:

1. Either repair or replace (at our discretion) the item under warranty.

2. Ship the item back to the customer by the carrier of our choice.

Different or expedited shipping methods will be at the customer's expense.

How To Return An Item
1. Please do not send any products back to Apogee Instruments until you have received a Return Merchandise Authorization (RMA) number from our technical support department by submitting an online RMA form at www.apogeeinstruments.com/tech-support-recalibration-repairs/. We will use your RMA number for tracking of the service item. Call (435) 245-8012 or email techsupport@apogeeinstruments.com with questions.

2. For warranty evaluations, send all RMA sensors and meters back in the following condition: Clean the sensor's exterior and cord. Do not modify the sensors or wires, including splicing, cutting wire leads, etc. If a connector has been attached to the cable end, please include the mating connector – otherwise the sensor connector will be removed in order to complete the repair/recalibration. ***Note:*** *When sending back sensors for routine calibration that have Apogee's standard stainless-steel connectors, you only need to send the sensor with the 30 cm section of cable and one-half of the connector. We have mating connectors at our factory that can be used for calibrating the sensor.*

3. Please write the RMA number on the outside of the shipping container.

4. Return the item with freight pre-paid and fully insured to our factory address shown below. We are not responsible for any costs associated with the transportation of products across international borders.

Apogee Instruments, Inc.
721 West 1800 North Logan, UT
84321, USA

5. Upon receipt, Apogee Instruments will determine the cause of failure. If the product is found to be defective in terms of operation to the published specifications due to a failure of product materials or craftsmanship, Apogee Instruments will repair or replace the items free of charge. If it is determined that your product is not covered under warranty, you will be informed and given an estimated repair/replacement cost.

PRODUCTS BEYOND THE WARRANTY PERIOD

For issues with sensors beyond the warranty period, please contact Apogee at techsupport@apogeeinstruments.com to discuss repair or replacement options.

OTHER TERMS

The available remedy of defects under this warranty is for the repair or replacement of the original product, and Apogee Instruments is not responsible for any direct, indirect, incidental, or consequential damages, including but not limited to loss of income, loss of revenue, loss of profit, loss of data, loss of wages, loss of time, loss of sales, accruement of debts or expenses, injury to personal property, or injury to any person or any other type of damage or loss.

This limited warranty and any disputes arising out of or in connection with this limited warranty ("Disputes") shall be governed by the laws of the State of Utah, USA, excluding conflicts of law principles and excluding the Convention for the International Sale of Goods. The courts located in the State of Utah, USA, shall have exclusive jurisdiction over any Disputes.

This limited warranty gives you specific legal rights, and you may also have other rights, which vary from state to state and jurisdiction to jurisdiction, and which shall not be affected by this limited warranty. This warranty extends only to you and cannot by transferred or assigned. If any provision of this limited warranty is unlawful, void, or unenforceable, that provision shall be deemed severable and shall not affect any remaining provisions. In case of any inconsistency between the English and other versions of this limited warranty, the English version shall prevail.

This warranty cannot be changed, assumed, or amended by any other person or agreement

APOGEE INSTRUMENTS, INC. | 721 WEST 1800 NORTH, LOGAN, UTAH 84321, USA
TEL: (435) 792-4700 | FAX: (435) 787-8268 | WEB: APOGEEINSTRUMENTS.COM

Copyright © 2023 Apogee Instruments, Inc.