OWNER'S MANUAL

µCACHE

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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: µCache
Type: **Bluetooth®** Memory Module
Bluetooth SIG Declaration ID: D048051

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, March 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: µCache
Type: **Bluetooth®** Memory Module
Bluetooth SIG Declaration ID: D048051

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

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Bruce Bugbee
President
Apogee Instruments, Inc.

INTRODUCTION

The µCache AT-100 makes precision environmental measurements using Apogee's analog sensors. The measurements are sent wirelessly to a mobile device via Bluetooth®. The Apogee Connect mobile app interfaces with the µCache to collect, display, and export data.

The µCache has an M8 connector that is used to connect to an analog sensor. For a list of currently supported sensors, please click here https://www.apogeeinstruments.com/microcache-bluetooth-memory-module/.

The µCache app includes manual and automatic data logging features and can also make live data measurements when connected to a mobile device. The mobile app displays the data and allows the user to record samples in the app and download and export them.

Data logging is set up in sampling and logging intervals. A connection via Bluetooth® with the mobile app is required to configure and collect data, but the µCache makes and stores measurements without a Bluetooth® connection. The µCache has a large memory capacity of ~400,000 entries or ~9 months of 1-minute data.

The µCache is powered by a 2/3 AA battery. Battery life is highly dependent on average daily time connected over Bluetooth® and the sampling interval. As soon as you notice the low battery indicator, replace the battery to avoid bad data.

The µCache housing has a button and LED to manage Bluetooth® connectivity and provide visual status feedback.

SENSOR MODELS

This manual covers the Apogee µCache (model number AT-100).



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

SPECIFICATIONS

	µCache
Communication Protocol	Bluetooth® Low Energy (Bluetooth 4.0+)
Bluetooth® Range	~45 m (line-of-sight)
Data Logging Capability	Averaging Interval: 1-60 minutes Sampling Interval: ≥ 1 second
Data Log Capacity	Over 400,000 Entries (~9 months at a 1-minute logging interval)
Time Accuracy	± 30 seconds per month at 0° C ~ 70° C
Battery Type	2/3 AA 3.6 Volt Lithium Battery
Battery Life*	~1 year w/ 10-second sampling interval and an average of 5 minutes daily connected time ~2 years w/ 60-second sampling interval and an average of 5 minutes daily connected time
Operating Environment	-40 to 85 C
Dimensions	66 mm length, 50 mm width, 18 mm height
Weight	52 g
IP Rating	IP67
Connector Type	M8
ADC Resolution	24 bits

* Battery Life is primarily impacted by sampling interval and amount of time connected to a mobile app.

QUICK START GUIDE

Quick Start Guide

1. Download Apogee Connect from the App store or Google Play store
2. Open App and hit the "+"
3. Press green button on µCache unit and hold for 3 seconds
4. When µCache is recognized in the app, click on its name "uc###"
5. Select the sensor model you are connecting
6. Calibration: If directed to enter a custom calibration number, refer to the calibration sheet that came with the sensor. If the calibration number is already filled in, do not change this number
7. Click "Add"
8. Your sensor is now added and reading in real-time

Further Instructions

Bluetooth® Connection

1. Open the Apogee Connect mobile app. To add a µCache to the app for the first time, tap on the + icon in the upper corner.
2. A 1 second button press on the µCache will make it discoverable by the app for 30 seconds. The µCache light will start blinking blue, and the device name will show up on the screen. Tap on the device name (e.g., "microCache 1087") to connect to the µCache.
3. Select your sensor model and specify custom calibration factors if necessary. You can also rename the µCache you want. Hit ENTER.
4. Your µCache is now shown on the app's main display with live readings. Click on the µCache to see graphical output & set up logging
5. Subsequent connections can be made by a 1 second press on the µCache and it will automatically connect.

Please note: If logging is enabled, the µCache does not automatically turn off when the µCache is not in use (e.g., sensor is disconnected). To turn off the µCache, disable logging through the app while connected, or do a 10 second button press. Three white flashes mean logging is disable and the µCache is off.

LED Status Indication

A 1 second button press gives a status indication of the µCache with the following LED blinks:

○ (white)	Not Connected, Not Data Logging, Good Battery
● (blue)	Connected
● (green)	Data Logging Active
● (red)	Low Battery
● ● ●	Critically Low Battery
	Note: As soon as you notice the low battery indicator, replace the battery to avoid bad data.

A 10 second button press turns logging on and off:

● ● ●	Data Logging On
○○○	Data Logging Off

1 second button press, the LED will blink as follows:

● ● ● ●...	Discoverable (Blinks every two seconds for up to 30 seconds.)
● ● ●	Connected (Three quick blinks when a connection is established.)

Logging Instructions

Begin Logging

1. Click on the "Settings" gear icon
2. Scroll down and toggle on the "Logging Enabled" button
3. Set the Logging interval (this determines how often a data point is recorded)
4. Set the Sampling interval (this determines how many readings are averaged to create the data point referred to in step 3)
    a. *Note: Shorter logging and sampling intervals can reduce battery life. Faster sampling intervals have the most effect. For example, 15-minute logging with 5 minute sampling is adequate for most greenhouse lighting applications and the battery life is approx. a year. One second sampling can shorten the battery life to approx. one week*
5. Click the green Save button
6. Scroll down to the bottom and hit Match Current Time

Collect Logs

1. If disconnected, reconnect the µCache by pressing the green button for 3 seconds
2. Click on "Collect Logs" icon
3. Select "Append to existing" to add to an existing dataset already on your phone, or "Create New" to start creating a new data set
4. Confirm Start and End date match the range of data you want to download
5. Click "Collect Logs"
6. Once all the Logs are collected, the graphs will automatically fill in on the dashboard. Data sets are also available to export from your phone via email, etc.

Live Data Averaging

For use in live meter mode. Live data averaging smooths out fluctuations in the sensor signal. This is particular useful for Quantum Light Pollution sensors (SQ-640 series) and other sensors that detect subtle trends.

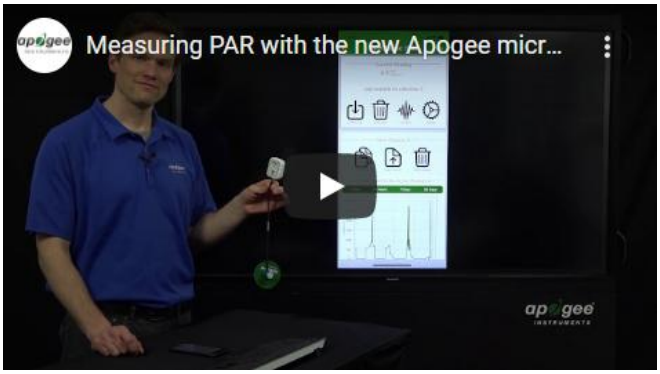
Dark Threshold

Dark threshold is the amount of light accepted before the dark section of a photoperiod is considered disrupted. This is useful for measuring photoperiods, especially with light sensitive plants.

Included in the µCache packages

All AT-100's come with a µCache unit, a battery, and a complimentary sensor base.

Instructional Videos on using the Apogee Connect App





https://www.apogeeinstruments.com/apogee-microcache-support/#videos

CABLE CONNECTORS

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

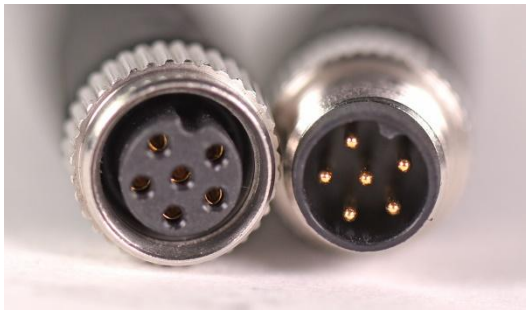


The µCache has an M8 connector that is used to connect to an analog sensor.

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 the sensor, arrows on the connector jacket and an aligning notch ensure proper orientation.

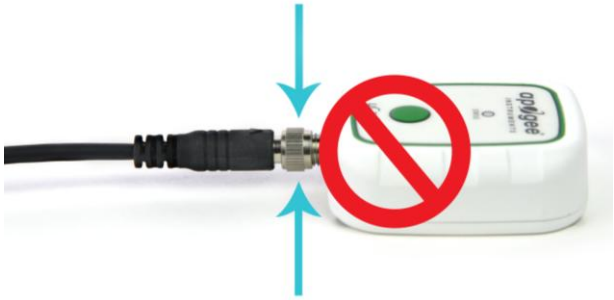
Disconnection for extended periods: When disconnecting the sensor for an extended period of time from a µCache, protect the remaining half of the connector still on the µCache from water and dirt with electrical tape or other method.



When sending sensors in for calibration, only send the short end of the cable and half the connector.

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.

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



Finger-tighten firmly

DEPLOYMENT AND INSTALLATION

To get the best data, you likely will want to mount your sensor at a fixed angle. There are also wand accessories for select sensors to create a handheld spot-checking setup. Please see the manual for the sensor in your µCache package to learn about the mounting accessory options. Product manuals can be found at https://www.apogeeinstruments.com/product-manuals/

See the mounting accessories for the µCache itself below.

Note: Do **not** let the µCache dangle.





AM-402
µCache
Suction Cup





AM-401
µCache Strap

Remember that while some sensors are fully potted and submersible**, the µCache should not be submerged.** If submerging the attached sensor, the µCache should be kept in a safe, dry place. The suction cup accessory provides an easy way to mount the device on the outside of an aquarium.

MAINTENANCE AND RECALIBRATION

µCache Maintenance

Make sure that the latest version of software is installed for the mobile app and the latest version of firmware is installed on the µCache. Use the app store for your operating system to confirm that you are using the latest version of Apogee Connect. The firmware version can be checked in the Settings page in the app while connected to the µCache.

The µCache unit should be kept clean and free of debris.

If the housing is opened for any reason, extra care should be taken to ensure that the gasket and seating are clean and the interior stays free of moisture. The screws must be tightened until firm to create a weather-tight seal.

Steps to Replace the µCache Battery

1. Use a Philips screwdriver to remove the screws from the battery cover.
2. Remove the battery cover.
3. Remove the used battery.
4. Place a fresh battery in its place aligning the positive terminal with the + label on the board.
5. Make sure the gasket and seating are clean.
6. Replace the battery cover.
7. Use a Philips screwdriver to replace the screws.

Note: As soon as you notice the low battery indicator, replace the battery to avoid bad data.

Symptoms of a low battery:

1. Noisy, inconsistent data
2. The low battery warning starts to appear. When this warning appears, change the battery immediately.

Sensor Maintenance and Recalibration

Moisture or debris on the diffuser is a common cause of low readings. The sensor has a domed diffuser and housing for improved self-cleaning from rainfall, but materials can accumulate on the diffuser (e.g., dust during periods of low rainfall, salt deposits from evaporation of sea spray or sprinkler irrigation water) and partially block the optical path. 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 soft cloth or cotton swab. **Never use an abrasive material or cleaner on the diffuser.**

Although Apogee sensors are very stable, nominal accuracy drift is normal for all research-grade sensors. To ensure maximum accuracy, we generally recommend sensors are sent in for recalibration every two years, although you can often wait longer according to your particular tolerances.

See individual sensor product manuals for more sensor-specific maintenance and recalibration information.

TROUBLESHOOTING AND CUSTOMER SUPPORT

Cable Length

When the sensor is connected to a measurement device with high input impedance, sensor output signals are not changed by shortening the cable or splicing on additional cable in the field. Tests have shown that if the input impedance of the measurement device is greater than 1 mega-ohm there is negligible effect on the calibration, even after adding up to 100 m of cable. All Apogee sensors use shielded, twisted-pair cable to minimize electromagnetic interference. For best measurements, 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.

Modifying Cable Length

See Apogee webpage for details on how to extend sensor cable length:

(http://www.apogeeinstruments.com/how-to-make-a-weatherproof-cable-splice/).

FAQs

See Apogee FAQ webpage for more troubleshooting support:

https://www.apogeeinstruments.com/microcache-bluetooth-micro-logger-faqs/

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

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