University of Hawai'i at Hilo
CENTER FOR MAUNAKEA STEWARDSHIP

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(808) 933-0734

UNIVERSITY of HAWAI'I HILO

MEMORANDUM

- Proposal rec'd: 1/5/2026
- Type (A) / B / C
- CMS MIP #366
- ED review: 2/11/2026
- EC review: 2/12/2026
- KKM review: (3YP)
- MKMB review: 3/3/2026
- MKSOA review: 3/12/2026

March 3 2026

TO: Maunakea Management Board

FROM: Greg Chun, Executive Director, CMS

SUBJECT: Informational, Request for Concurrence, Upgrade Smithsonian Submillimeter Array Environmental Monitoring

I. Project Description

The Smithsonian Submillimeter Array (SMA) requests to replace an existing weather monitoring instrument with an upgraded unit, trade name MET4. The request identifies the applicable land use as one not subject to Site Plan permitting by the Office of Conservation and Coastal Lands (OCCL), specifically, HAR §13-5-22, P-8, Structures and Land Uses, Existing (A-1) *Minor repair, maintenance, and operation to an existing structure, facility, use, land, and equipment… that involves mostly cosmetic work or like-to-like replacement of component parts, and that results in negligible change to or impact to land, or a natural and cultural resource.* In-house staff and contractors expect to complete the work by early spring 2026. The instrument may lead to improvements in SMA data collection.

II. Resources Identified

The project area is located within the following identified historic properties:

- Kūkahau'ula Traditional Cultural Property, State Inventory of Historic Places (SIHP) Site #50-10-23-21438;
- Mauna Kea Summit Region Historic District, SIHP Site #26869;
- Mauna A Wākea Traditional Cultural Property and District, SIHP Site #31382; and
- Mauna Kea Traditional Cultural Property, National Register of Historic Places (2025)

The site geology is composed of varying depths of volcanic ash, cinder, and clinkers over native Hawaiite flows. Lake Waiau, the nearest freshwater body, is over one mile from the project site, over porous and hilly terrain. Sparse lichen and/or moss may occur at the project site. No rare, threatened, or endangered plant, arthropod, or animal species have been documented at the site. Recreational visitors stop by the site, primarily at sunset for sightseeing.

III. Impacts Identified

The proposed work is limited to existing infrastructure and will not enlarge SMA's footprint, nor change or extend the permitted use of the facility. The applicant does not anticipate any impacts to any identified historic properties or cultural resources, nor to any natural (geological and hydrological), biological, recreational, or scientific resources.

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IV. Recommended Mitigation

Standard Best Management Conditions and recommended conditions will be complied with.

V. Compliance with Maunakea Comprehensive Management Plan

The request is consistent with the 2022 Comprehensive Management Plan (CMP), approved by the Board of Land and Natural Resources. In fulfillment of the CMP's community review requirements, the project underwent the following review:

- Kahu Kū Mauna (KKM) reviewed the project on January 8, 2026 as part of the Three Year Plan review. KKM had no objections and requested to be updated should SMA seek to install additional weather units.
- Environment Committee (EC), February 12, 2025. The EC requested clarification that data from the new instrument will be publicly available via the existing Mauna Kea Weather Center website; both SMA and CMS staff confirmed this.

Following MKMB review, the request will be presented to the Mauna Kea Stewardship and Oversight Authority prior to submitting a request for concurrence to the Office of Coastal and Conservation Lands (OCCL). The project will not proceed unless all applicable reviews are completed and concurrence obtained. The proposed land is also consistent with UH's General Lease for the Science Reserve (S-4191) and SMA's sublease. Further, CMS' review of project requests like this complies with the following CMP Actions:

- Natural Resources (NR)-1: *Limit threats to natural resources through management of permitted activities and uses.* The project is assessed to have no impacts to any natural resources.
- EO-7: *Continue and increase opportunities for community members to provide input to cultural and natural resources management activities on Maunakea, to ensure systematic input regarding planning, management, and operational decisions that affect natural resources, sacred materials or places, or other ethnographic resources with which they are associated*. Committee review allows for input to proposed work.
- Astronomical Resources (AR)-1: *Operate the UH Management Areas to prohibit activities resulting in negative impacts to astronomical resources*. SMA staff affirmed the device does not emit any radiofrequencies that could interfere with other observatory work.
- Permitting and Enforcement (P)-1: *Comply with all applicable federal, state, and local laws, regulations, and permit conditions related to activities in the UH Management Areas*. The project is determined to comply with all applicable regulations in the Maunakea lands.
- P-1: *Strengthen CMP implementation by recommending to the BLNR that the CMP conditions be included in any Conservation District Use Permit or other permit*. CMS recommends CMP conditions to OCCL in its concurrence review.
- P-4: *Educate management staff and users of the mountain about all applicable rules and permit regulations*. SMA staff shall maintain valid certification with the Maunakea User Orientation.

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VI. Center for Maunakea Stewardship Recommendation

CMS recommends the project proceed to MKSOA and OCCL for concurrence review and approval with the standard project conditions in the attached list, should the project be approved.

Facility Project Proposal for the UH-Managed Lands

for projects anticipated to be classified as having "Minimal Impact"

Proposals due by the 15th monthly

Please mark all that apply to your project

_Y, 2026_ Project was reviewed in a 3-Year Plan
_Y__ Project is a CMP, lease, or sublease compliance measure (e.g., keeps the site in safe working order)
_No__ Project involves heavy machinery
_No_ Project requires ground disturbance such as digging or trenching
_No_ Project will result in a change to the facility footprint
_No_ Project affects a viewplane (e.g., starline or oceanic gridline)

Facility Name

Smithsonian Astro Physical Observatory Submillimeter Array, originally permitted under Conservation District Use Permit HA 2728, TMK (3)-4-4-15:009.

Brief Descriptive Title of Project

SMA Weather Station.

Project Description

Install a new weather station atop the SMA Hanger building.

Proposed Commencement Date

Once approvals received, estimated mid-April 2026.

Proposed Completion Date

Approximately one week to complete.

Estimated Project Cost

$10K [N.B., only costs here are for the hardware, which has already been purchased.

Total size / area of proposed use

Station itself is approximately 0.1 m x 0.1 m x 1.0 m in size, to be installed on an existing mast on the SMA Hanger building on Maunakea.

Project Purpose and Need

Project aims to replace the existing weather station on the hangar roof with a unit capable of capturing more accurate measurements of ambient conditions. This new weather station, a MET4 Meteorological Measurement Systems unit (attached PDF of image of unit and technical specifications), can make high-precision measurements of fluctuations in pressure, which may induce differential refraction (i.e., astronomical seeing) across the interferometer – affecting the scientific performance of the SMA. With the improved capabilities of the new station, we expect to be able to improve the efficiency of the array and potentially recover time when atmospheric stability is generally poor (including daylight hours). After verification of performance of the new station, we expect it to fully replace the existing weather station, which can subsequently be removed.

Has professional peer-review occurred

Proposal to fund the purchase the new station underwent peer-review within SAO and was subsequently awarded funds in 2023.

Are there any related ongoing, pending, or planned projects associated with this submission?

Pending performance of this first weather station replacement, SMA may install up to four identical, additional units on its facility to further improve astronomical seeing.

Description of the Project

Location

SMA hanger rooftop.

Description of the process of completing the project

Color: White
Size: 0.1 m x 0.1 m x 1.0 m
See attached photo
https://technel.com/product/met4a/

Who will do the work?

SMA Staff

Equipment & Transportation

N/A

Measures to protect the environment and/or mitigate impacts

Impacts

N/A

Compliance with Lease, Sublease, or Comprehensive Management Plan (CMP)

The requested installation will improve SMA operations and are considered part of the necessary and "related equipment and instrumentation required to support the operation of the Smithsonian Submillimeter Array Telescope" (UH-SMA 1995 sublease).

Identify other required or associated permits

N/A

Community Benefits

Benefits to other Maunakea entities and/or global astronomy community

If a strong correlation between pressure/density fluctuations and astronomical seeing is observed, then it may be possible to use this data to predict seeing conditions and potentially correct for its affect at millimeter/submillimeter wavelengths. In addition to potential benefits for interferometers at these frequencies, the data may also prove useful for optical telescopes for weather monitoring and prediction purposes.

Benefits to the Hawaii Island community

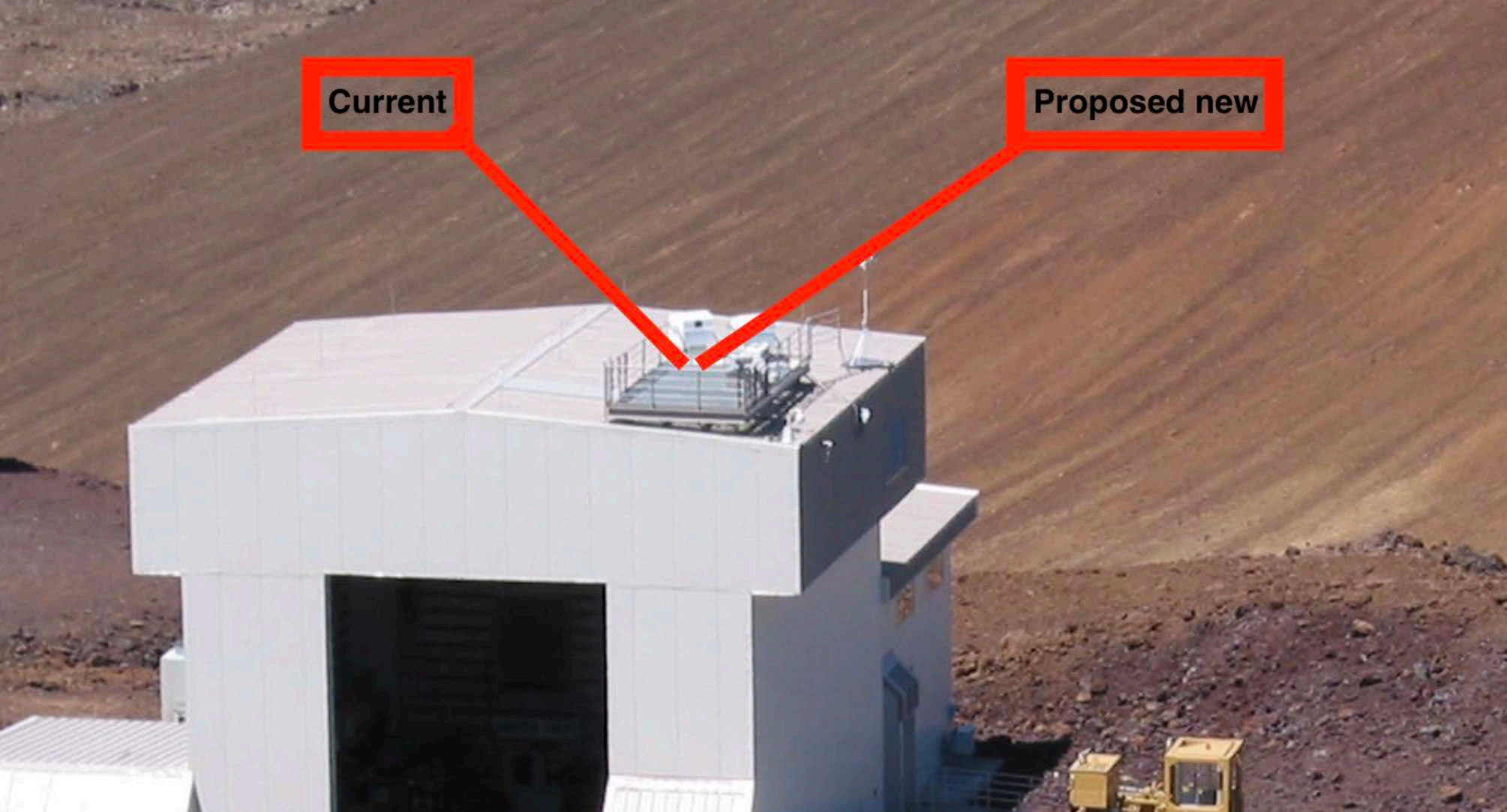
Weather station data will be shared with the public via the Maunakea Weather Center webpage, http://mkwc.ifa.hawaii.edu/current/, similar to how existing data are shared.

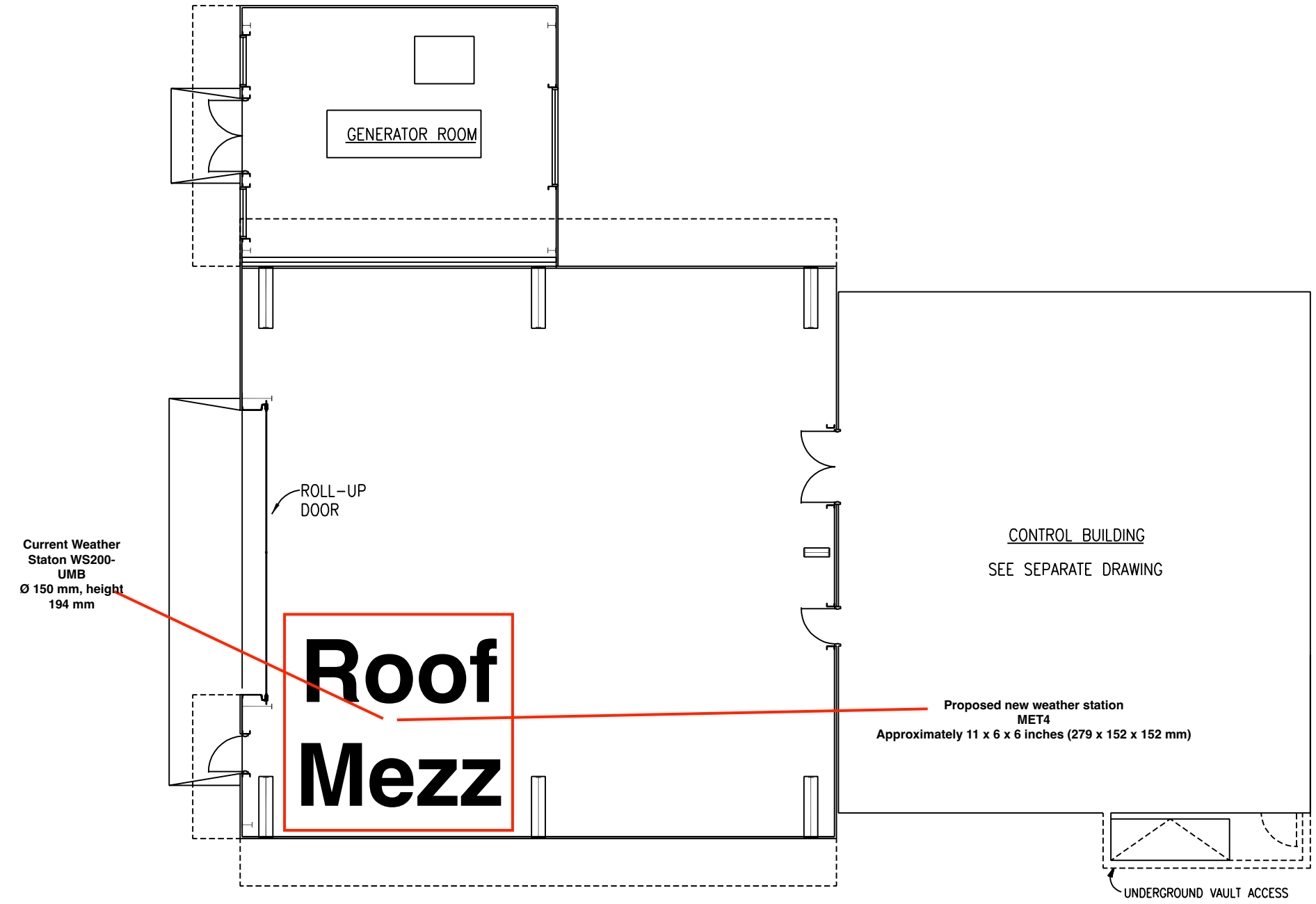
Will data, publications, or other products be free and available to the public?

Weather station data will be shared with the public, similar to how existing data are shared.

For internal use only by CMS

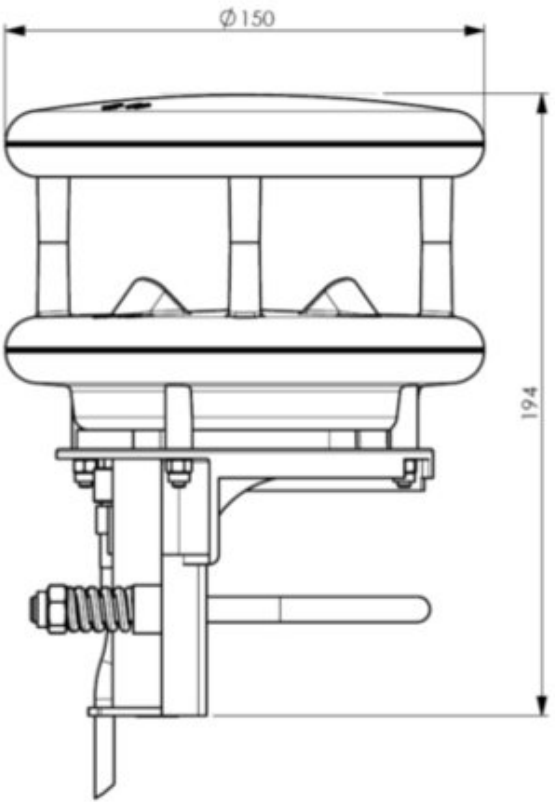
Review checklist
_Y_ Staff review and report
Concurrence Outside agency review or approval required
_Y__ Environment committee, if environmental impacts are anticipated
_3YP, 2026_ Kahu Ku Mauna, if cultural impacts are anticipated and KKM requested consultation, or the project was not included in a 5YP or 3YP
_Y_ Maunakea Management Board


Current
Proposed new



SMA ANTENNA MAINTENANCE BUILDING

WS200-UMB Smart Weather Sensor



Lufft
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WS200-UMB

Applications

Meteorological Observation
Hydro-Meteorological Monitoring
Solar Energy
Wind Energy
Road Weather Monitoring
Aviation Weather Monitoring
Railway Weather Monitoring
Building Automation

Compact Wind Sensor

Automatic wind measurement station

Intelligent measurement transducers with digital interface for environmental applications
Designed to measure: Wind direction and speed
One external temperature or rain sensor is connectable
Maintenance-free operation – no moving parts that can wear out
Open communication protocol

Two-in-one wind sensor

Two-in-one housing concept of a compact wind sensor combining measurement of wind direction and speed in one housing with only one cable connection. Built-in data pre-processing, universal interfaces and selectable output protocols.

Versatile Compatibility

Compatible with most commercially available dataloggers for solar energy or hydro-meteorological systems thanks to an open communication protocol.

Suitable for all climate zones

Due to its integrated heater, the WS200 can operate even in cold conditions with the risk of snowfall and frost.

Protocols and interfaces

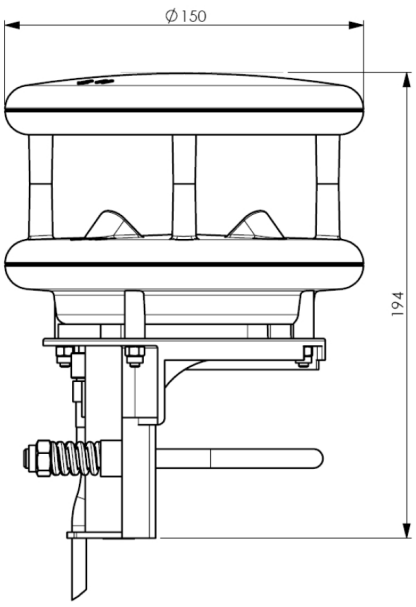
Easy integration via RS-485 with supported protocols UMB-Binary, UMB-ASCII, Modbus-RTU, Modbus-ASCII, XDR and SDI-12.

OTT HydroMet

Technical Specifications

	WS200-UMB
Article number	8371.1
Dimensions	Ø 150 mm, height 194 mm
Weight	800 g
Interface	RS-485, 2-wire, half-duplex
Supply voltage	4...32 VDC (5 ... 11 VDC; only electronics supply with limited performance)
Nominal voltage	24 VDC +/- 10 %
Power consumption	16 mA at 24 VDC, resulting in a power of approximately 0.38 W
Operating temperature	-50 ... 60 °C
Operating relative humidity	0 ... 100 % RH
Protection level housing	IP66
Mast mounting suitable for	Mast diameter 60 ... 76 mm
Wind direction	Ultrasonic
Principle	0 ... 359.9 °
Measuring range	°
Unit	< 3° RMSE > 1.0 m/s
Accuracy	0.1 °
Resolution	
Wind speed	Ultrasonic
Principle	0 ... 75 m/s
Measuring range	m/s
Unit	±0.3 m/s or 3 % (0 ...35 m/s) ±5 % (> 35 m/s) RMS
Accuracy	0.1 m/s
Resolution	

Dimensions



ME-LU-WT-ds-WS200-UMB-EN-240704


CRC
HANDBOOK of CHEMISTRY and PHYSICS
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MET4(A)

The MET4 and fan-aspirated MET4A Meteorological Measurement Systems provide high accuracy data from barometric pressure, temperature, and relative humidity sensors. These fully-integrated systems are housed in environmental enclosures allowing indoor or outdoor mounting. Installation hardware and software are included and optional interface cabling is available. The MET4 solar radiation shield protects the temperature and humidity sensors from precipitation and solar radiation.

Features and Specifications:

• Pressure Accuracy: Better than ±0.08 hPa (0.001 psi)
• Barometric Pressure Range: 500 – 1100 hPa (7 – 16 psi)
• Temperature Accuracy: Better than 0.5°C (Met4)

- Linear Transducers & Switches
- Meteorology
- Portable Pressure Sources
- Power Analyzers
- Pressure and Temperature Scanners
- Pressure Calibrators
- Pressure Controllers
- Pressure Generators
- Pressure Sensors-OEM
- Pressure Transducers – Industrial
- Pressure Transducers-Precision
- Resistance Standards
- Telemetry Instrumentation
- Thermometry Bridges

and better than 0.1°C (Met4A)
• Relative Humidity Accuracy: ±2% at 25°C
• Resolution: One-part-per billion

Paroscientific, Inc.
Precision Pressure Instrumentation

VIEW DATASHEET

Category: Meteorology
Supplier: Paroscientific

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Project approval conditions

Prepare to Start the Project

- Identify and comply with other permit requirements, such as County of Hawai'i building permits or Department of Land & Natural Resources permits (see *both*/any applicable DLNR permit and HAR §13-5-42 Standard conditions).
- Use of real-time GPS during any surveying or equipment operation requires advance written approval from CMS and the Institute for Astronomy. GPS use should be requested at least four (4) weeks prior to the proposed activity.
- Any required Best Management Practices, Communication Plans, contract scope questions, etc. must be finalized and approved by CMS prior to final approval.
- CMS will provide a final, written notice explicitly stating whether the project is approved to commence (i.e., issue a "Notice to Proceed"). The Notice to Proceed will include any additional, project-specific conditions. **No project work may commence before this time.**
- Project approval may not be transferred or assigned without prior authorization. A copy of the approval/permit must be present on-site and available for review at all times while working on UH-managed lands.
- Applicant shall comply with all actions and measures described in the proposal, including (community) benefits, CMP compliance list, and mitigation measures.

Notifications

- Applicant may request to arrange a pre-construction meeting with CMS before work commences. These meetings review orientation content, implications of project non-compliance, project-specific concerns regarding resource protection, health and safety, visitor and/or traffic impacts, etc. Meetings may be held in person or via phone, webinar, or other means.
- Notify CMS in writing via email to cmshilo@hawaii.edu at least five (5) days prior to beginning field work on UH-managed lands (Halepōhaku, Road Corridor, Maunakea Science Reserve, or Astronomy Precinct) with the following:
    - Identify the date that onsite work will commence.
    - Identify by name-of-entity all observatories, contractors, vendors, suppliers, etc. anticipated to be associated with and substantively present on UH-managed lands for the project.
    - Identify the individual(s) who will be coordinating all invasive species inspections.
    - Attest that the observatory or relevant entity will ensure compliance with all permit conditions and communicate with CMS if there is any uncertainty.
    - Notify CMS in writing of any other entities responsible for elements of compliance.
    - Attest that all individuals anticipated to be associated with the project have completed the Maunakea User Orientation.
    - CMS is not liable or responsible for delays due to inadequate or late submissions or submissions requiring verification.

Onsite Activity

General

- Use of lighting from sunset to sunrise is prohibited unless described in the project proposal and approved.
- Use of cell-phones, other than in airplane mode, is prohibited except in case of emergency.
- Placement of permanent markers, monuments, mag nails, or survey pins, etc. is not allowed without explicit prior approval from CMS (and the State if required). ALL surveyors' work must be shared with CMS in digital format with coordinate info stored in and using a common, transferrable coordinate reference system such as “State Plane Coordinates (NAD83), Hawai‘i Zone 1”.
- Allow CMS Rangers to visit and monitor activities.

Transportation and Motorized Equipment

- No use of mechanized equipment is allowed unless authorized by this permit.
- 4-wheel-drive required for travel above Halepōhaku.
- Large, heavy, non-4-wheel-drive or oversized loads must submit notification to the Maunakea Road Conditions listserv, MK-ROAD-CONDITIONS@lists.hawaii.edu, at least one day prior to transit. Loads requiring an escort on public roadways must have this escort accompany them to the final destination. Projects failing to submit notification or arrange for escort to the summit may be denied entry to Halepōhaku or above.
- During public closures of the Summit Access Road, vehicle access above Halepōhaku is limited to explicitly-marked observatory, CMS, federal, or state of Hawaii vehicles. Vehicles must be operated by approved employees or representatives on official business and possessing requisite orientation, training, safety, and rescue supplies.
- Motorized equipment, when stationary, must have a drain-pan in place suitable for catching fuel or fluid leaks.

Debris Prevention and Severe Weather Concerns

- Ensure that any debris, tools and equipment are secured to avoid becoming windblown and are properly stored at the end of each day.
- Projects occurring in the summit region must verify that temporary and permanent infrastructure and improvements can sustain 120 MPH winds and severe weather.

Environmental Concerns

- All perishable items including food, food wrappers, and containers must be removed from the site daily and properly disposed of.
- Remove and properly dispose of all waste material.
- Nēnē (*Branta sandvicensis*) may be present. If a nēnē appears within 100 feet (30.5 meters) of ongoing work, all activity shall be temporarily suspended until the animal leaves the area of its own accord. Federal law prohibits feeding or any “taking” (e.g., harassing, harming, killing) of nēnē.
- Best Management Practices for seabirds, including the endangered Hawaiian petrel (*Pterodroma sandwichensis)*
    - Use red light bulbs outside to the maximum practicable extent.
    - Fully shield outdoor bulbs so the light is only visible from below.
    - Install motion sensors or turn off lights when human activity is not occurring in the area.

    - September-December: Avoid nighttime construction.
- Best Management Practices for the endangered Hawaiian Hoary Bat *(Lasiurus cinereus semotus)*
    - No barbed-wire fencing allowed.
    - June-November: Do not trim, remove, or disturb trees over 15 feet tall.

Invasive Species Prevention

- Employ invasive species prevention best practices, including inspections of materials by a DLNR-approved biologist, as identified in the Maunakea Invasive Species Management Plan prior to entering UH-managed lands.
    - Inspections can only occur at locations where landowners have given permission (i.e. facilities, baseyards, and vendor locations).
    - Inspections shall not occur on UH-managed lands on Maunakea, at State or County parks, along public roadsides, or on Department of Hawaiian Homelands lands.

Upon Project Completion

- The project must be completed within the time frame specified in the proposal and, when applicable, as specified by DLNR. Projects that cannot be completed within this timeframe are not allowed to continue (or commence) without explicit prior written approval from CMS.
- Notify CMS in writing when field activity associated with the project is completed.
- Unless otherwise stated in the proposal, copies of all data, field notes, photos, log books, collected specimens, and other forms of documentation will be shared with CMS for future, unrestricted use by CMS or its designee. All geospatial data, metadata or applications must be in a format compatible with CMS GIS software or other industry standard identified in advance.
- Collected specimens that are not consumed in analysis will be returned to CMS unless otherwise specified.
- Provide CMS with electronic and paper copies of all publications resulting from the work. When applicable, annual, final reports must be submitted to CMS.
- When applicable, a brief, approximately 1-page, non-technical summary suitable for public outreach (school groups, community meetings, newsletter articles, etc.) must be provided to CMS within 90 days of project completion or publication. Photos and illustrations are encouraged.