Datenblätter Wetter

WIRELESS MICRO-WEATHER STATION
WMO PRECISION MICRO-CLIMATE MEASuREMENT

Freedom to measure anywhere with WMO accuracy

WMO precision for temperature and humidity

Wireless & solar powered Robust & impact resistant

MeteoHelix® micro weather stations

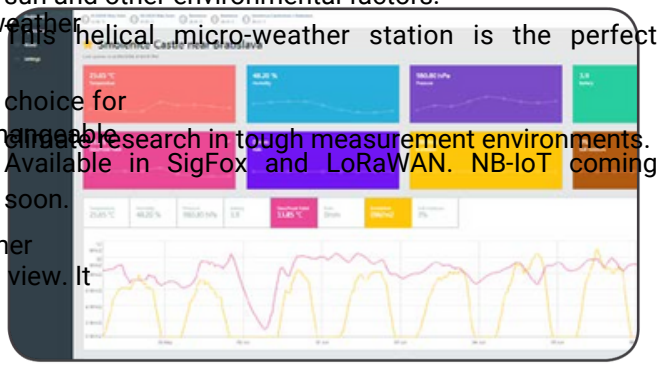
ExceedingWMOaccuracystandardshas neverbeen so easy and affordable.

Designed for measurement precision and ease of use, MeteoHelix IoT weather stations offer professional research grade accuracy meeting World Meteorological Organization standards.

Unique measurement properties of the patented double-helix design make this weather station highly resistant to long term sensor drift and sensor measurement errors from the sun and other environmental factors.

allMeteo® portal for data display and configuration.

This helical micro-weather station is the perfect choice for climate research in tough measurement environments. Available in SigFox and LoRaWAN. NB-IoT coming soon.



Professional WMO precision

Temperature, humidity,dew point, frostpoint and rain measurement

Stable long-term accuracy

3-in-1sensor tip housed inside thehelical Meteoshield® Pro offers long-term stability andlow uncertaintyofmeasurement

Accurate in all climates & weather

Housedin a Meteoshield® Pro foraccurate measurement in all weather conditions and ahigh level of protection to the sensors

Easy calibration procedure

Traceability is assured by a removablesensor tip which is interchangeable andcanbe easilycalibrated withacalibration adapter or replaced

View & export live weather data

allMeteo® Web portal enables easy world-wide view of your weather station data including data export, aPI data access and live data view. It also offers the ability to manage your fleet of weather stations.

Type	Accuracy	Stability	Resolution	Measuring range	Operating range	Response*	Meets WMO
Temperature	±0.2 °c (typical)	<0.02 °c per year	0.1 °c	-40 °c…105 °c	-40 °c…105 °c	5-30 s	yes
relative humidity	±1.5 %rH @ 25 °c hysteresis ±1 %	<0.3 %rH per year	0.2 % rH	0…100 %rH	0…100 %rH	8-40 s	yes
Dew point / frost point	(calculated)	-	0.1 °c	-40 °c…105 °c	-40 °c…105 °c	8-40 s	yes
solar irradiation	5 % of daily total	-0.6 % per year	2 W/m2	0…2000 W/m2	-40 °c…105 °c	< 1 s	no
atmospheric pressure	±1.5 hPa @25°c (750 - 1100hPa)	-1 hPa per year	0.04 hPa (mbar)	300…1100 hPa	10…1300 hPa	0.1 s	no
rain (optional reed switch input)	1% with Meteorain 200 compact	rain gauge dependent	0.1…0.5 mm rain gauge dependent	0…255 pulses per 10 minutes	rain gauge dependent	rain rates up to 500mm/hr	yes

sampling rate is 10 seconds per WMO requirements.
* τ63 % sensor response time listed is with a filter cap. Response time with filter cap will vary based on cap porosity, material and fluid (air) flow.
In applications where sensors are used in wet, dirty and dusty environments, we recommend regular inspection of filter cap cleanliness to maintain long term acc
Inspection interval should be determined by application and user experience in their application environment.

All-weather measurement accuracy meeting WMO standards

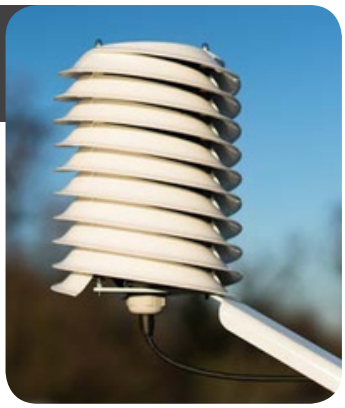
Precise for The Professional, easy To Use for everyOne

Impact resistant, mechanically strong, simple to install. Designed with open data standards.

Electrical specifications ofsensor		
Wireless communication	available versions: sigfox, loraWan, nBIoT available in late 2019	
supply voltage	solar powered with internal li Ion battery for 4+ months of operation without sun	
Power on/off	Magnetically activated on/off switch located in sensor head	
external connections	4 meter cable interface for pulse output rain gauge sensors	
Environmental rating of sensor		
Operating temperature & humidity	-27 °c to +65 °c (-40 °c in testing)	0 % to 100 % rH
IP – Protection rating	IP65W (DIn 40050) Protected from dust and weather	
General specifications		
Dimensions	Diameter = 170 mm, Height = 226 mm	
Weight (mass)	1.2 kg (2.0 kg including stainless steel holder)	

Highest levels of total measurement accuracy & lowest uncertainty in outdoor air temperature & humidity measurement per WMO standards.

A weather station inside the revolutionary MeteoShield Pro



naturally ventilated helical solar shield/screen. Double-Helix shape eliminates temperature errors from solar radiation more effectively than conventional multi-plate shields while offering unsurpassed protection from the sun, dirt, rain, snow, sand & dust. Double-helix increases clean air flow and rejects dirt particles away from the sensor, while keeping sensors cleaner than traditional multi-plate and fan aspirated shields.

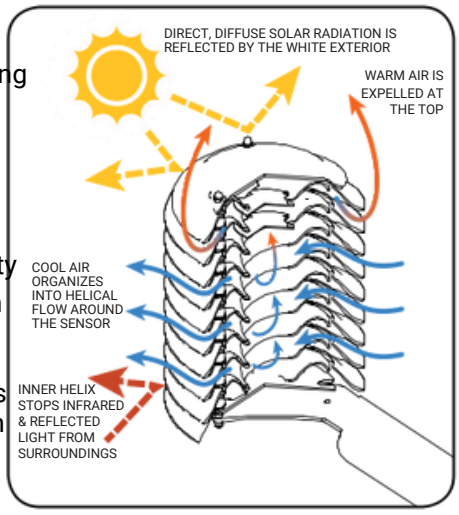
MeteoAG sensor node (expansion module) Designed for soilmoisture sensors, leaf wetness sensors, soil temperature sensors, snow tempera sensors, near ground frost sensor sensors, and n	
3 x	soil water tension sensors
3 x	volumetric water content (vWc) sensors
3 x	Temperature sensors (ground or frost)
1x	leaf wetness sensor
Output	sigfox, loraWan, (nBIoT soming soon)
GPs automatic positioning sensor coming soon	

Benefits of the MeteoShield's double-helix shape

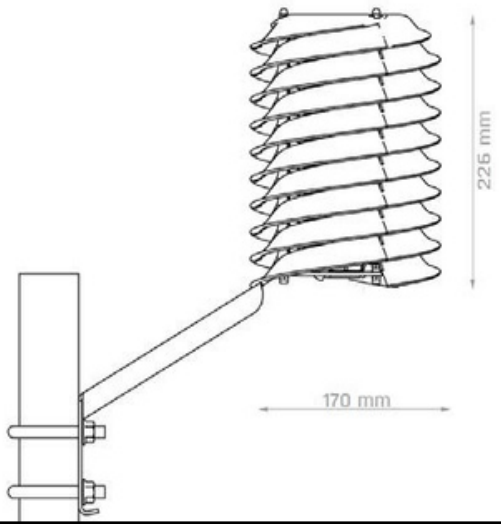
Helical radiation shield shape ventilates better than multi-plate radiation shields while maintaining better temperature sensor protection from dirt, sand, dust, rain, snow and ice.

BENEFITS:
- extending sensor life
- long-term measurement stability

MeteoHelix performs better than many fan-aspirated radiation shields especially in high-reflectivity environments such as over snow, water, pavement or in cities in smart-city applications.



MeteoHelix® IoT Pro
The professional micro-weather station

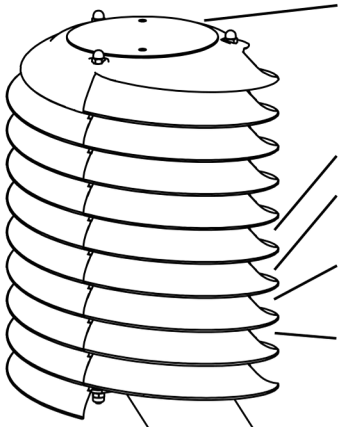


Reach your gold standard of measurement with BARANI DESIGN ISO:9001 qua

MeteoHelix IoT Pro

BARANIDESIGN

• Mounting instructions



Solar Irradiation (sunshine intensity and duration)

Air Temperature

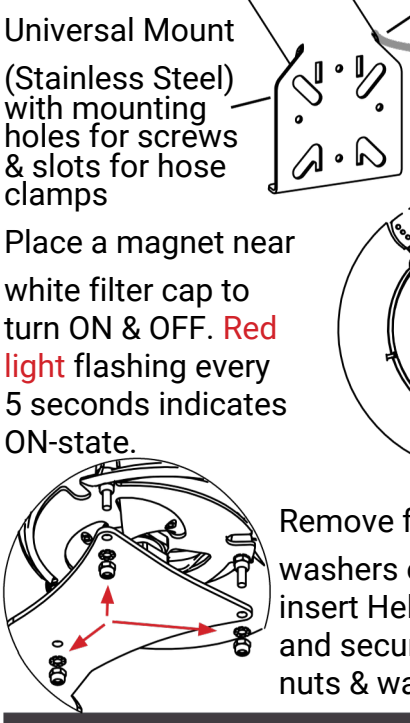
Air Relative Humidity

Air Dew Point
Air Frost Point

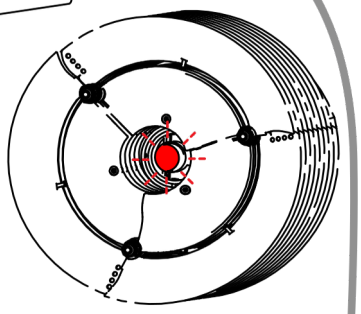
Atmospheric Pressure

Rain Gauge Cable option

Universal Mount (Stainless Steel) with mounting holes for screws & slots for hose clamps



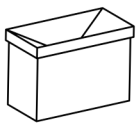
Place a magnet near white filter cap to turn ON & OFF. Red light flashing every 5 seconds indicates ON-state.

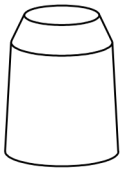


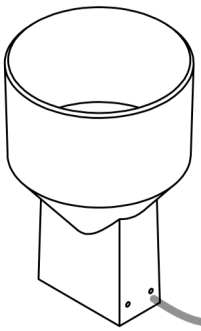
Remove flat nuts & washers on Helix by hand, insert Helix into holder and secure with the flat nuts & washers.

rain gauge options

Any rain gauge with a normally open (NO) contact type. Set gauge parameters in the allMeteo portal.







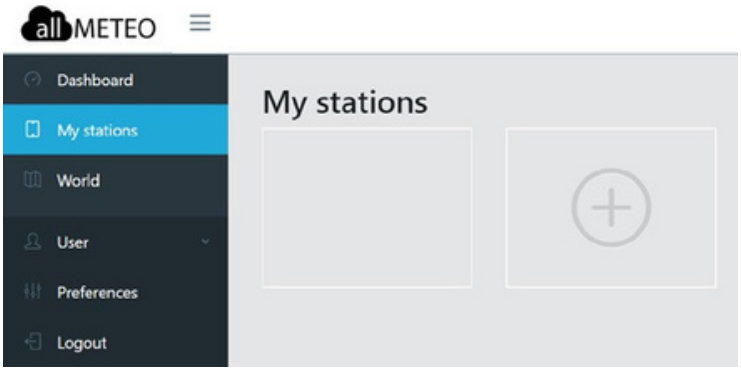
• web registration instructions

allMeteo weather map & portal for MeteoHelix iot Pro wireless weather stations

1. Go to weather.allmeteo.com in a Web browser.
2. Create your account and check for the activation email or sign in.

Once logged into your allMeteo account:

3. In the left column navigate to & click My stations
4. Click the PLUS sign to add your weather station



Dashboard displays live data tiles with past and forecasted trends. Plot allows a maximum of 2 axes types to be selected for clarity. If °C and %RH are selected, unselect °C to see %RH & Pressure (mBar) together.

For applications where all-weather measurement accuracy meeting World Meteorological Organization standards is required.

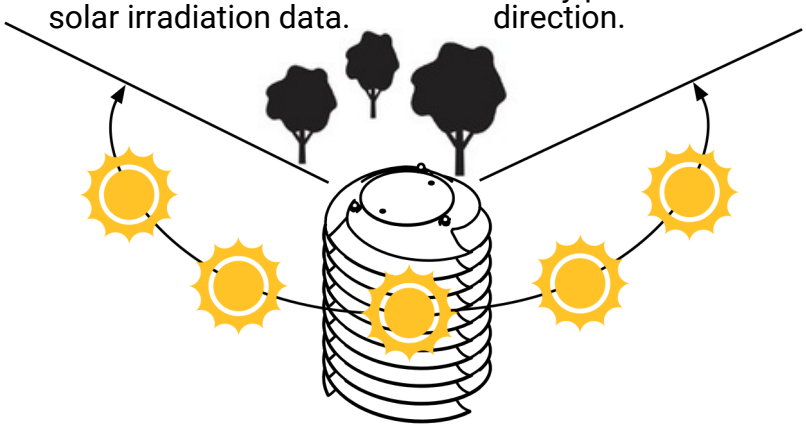
upgrade to HeLICaL teCHNoLogY

Mechanically strong, simple to install, even simpler to use and easy to connect to your application.

keeP obstructions clear of tHe sun sensor

Keep obstructions of the sun away or low obtain clean unobstructed solar irradiation data.

It is not necessary to orient the MeteoHelix in any particular direction.



1. The sun sensor requires an unobstructed view of the sun to achieve readings not affected by shadows from trees, poles or buildings.
2. Light reflections from nearby windows or light colored walls may reflect excessive light onto the solar sensor, so it is wise to mount it away from these objects to achieve highest data quality.

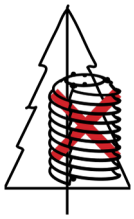
distanciate froM objects affecting air quality entering tHe Helix

1. Since the MeteoHelix very accurately measures whatever air conditions enter its spiral shape, it is important to feed it with clean air, free from the effects of obstructions. (See illustrations below.)
2. To achieve atmospheric measurements to WMO standards, it is wise to keep the MeteoHelix clear of any objects which affect the air reaching and entering the helix. (See illustrations below.)
3. The helical shape allows internal air sensors to be highly immune to the negative effects of radiating heat from buildings, asphalt or sand (including reflected light from snow, walls and water).

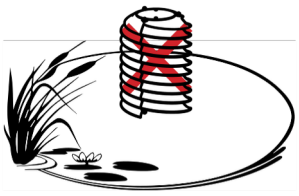
obstructions which affect air quality near a weather station

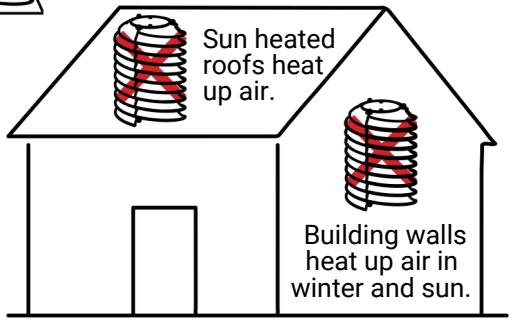
1. Ponds
2. Trees
3. Buildings
4. Roofs
5. HVAC outlets
6. Roads

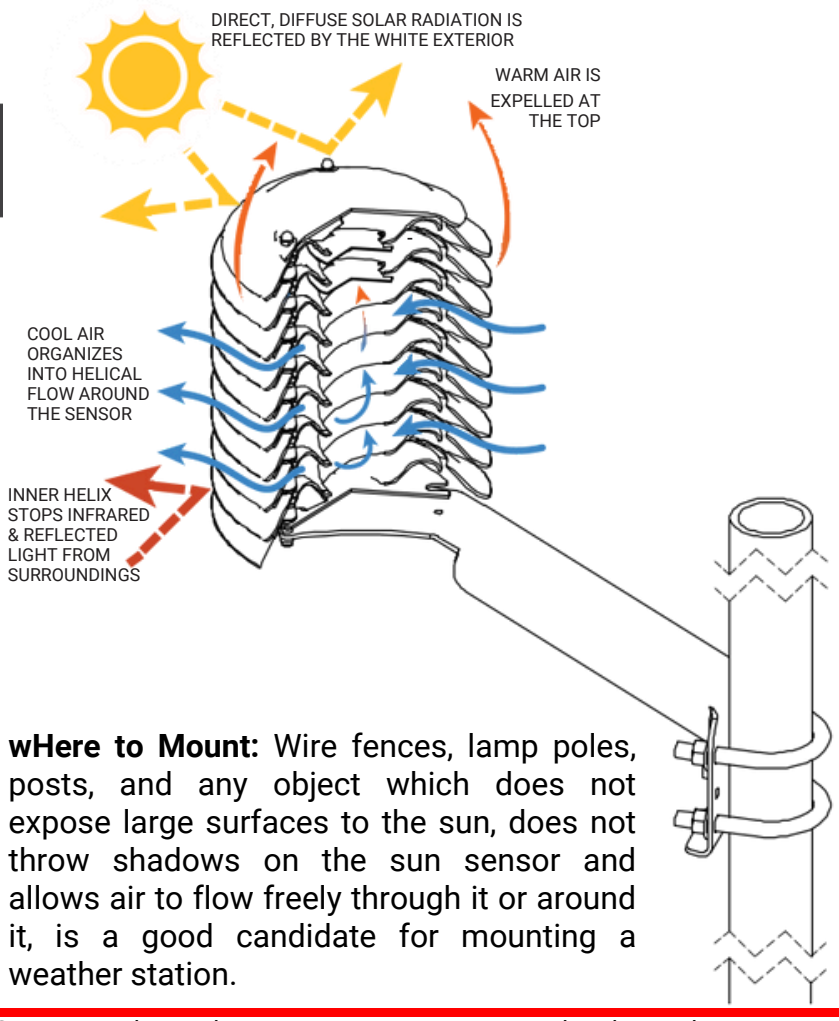
Trees shade the sun sensor.



Ponds affect humidity.







wHere to Mount: Wire fences, lamp poles, posts, and any object which does not expose large surfaces to the sun, does not throw shadows on the sun sensor and allows air to flow freely through it or around it, is a good candidate for mounting a weather station.

MeteoWind®IoT Pro

BARANIDESIGN

- Agriculture
- Airports
- coAstAl
- Hydrology
- Industrial & PIC
- IntrInsICally safe
- iot
- Meteorology
- Polar and wInter
- skI lIft & snow makIng
- smart CItIes
- weatHer statIons

wireless wind speed & direction sensor per wmo

Compact anemometer and wind direction vane sensor with ultra-low power & no dead spot. Meets all World Meteorological Organization (WMO) measurement
standards of measurement.

No wires to connect or batteries to change, no connectors to break.

Featuring SigFox
or LoRaWAN wireless Star-on-Star network technology for reliable and redundant
data transmission.

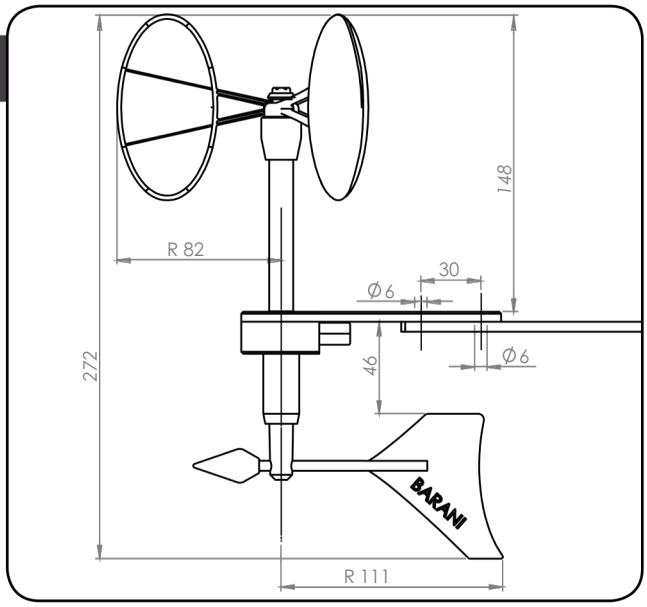
Elliptical cup design of the proven MeteoWind 2 is used to offer superb measurement
qualities in a compact and cost-effective instrument made from anodized aluminum.

Compact analog design with high dirt resistance

- Faster response than ultrasonic anemometers with < 0.3 s time constant at only 4 m/s
- Higher data availability than ultrasonic anemometers in extreme weather
- Robust dual-arm reinforced cup design with field serviceable components using standard
- Flat elliptical cup shape offers superb snow shedding and very good hail resistance
- All-metal anodized-aluminum body and wind vane design

ultra-low power for wireless applications

- Uses IoT-Wind, an open communication protocol which permits direct connection to any Internet-of-Things (IoT) application and cloud platform.
- Magnetic wind vane sensor offers better than 3° accuracy.
- Anodized aluminum body and wind vane guarantee robustness, corrosion protection and longevity.
- Patented design of flat elliptic cups offers high-linearity
- aerodynamics and superb winter snow shedding even without heating.
- High response, linearity and accuracy with a very low < 1.5 m distance constant.

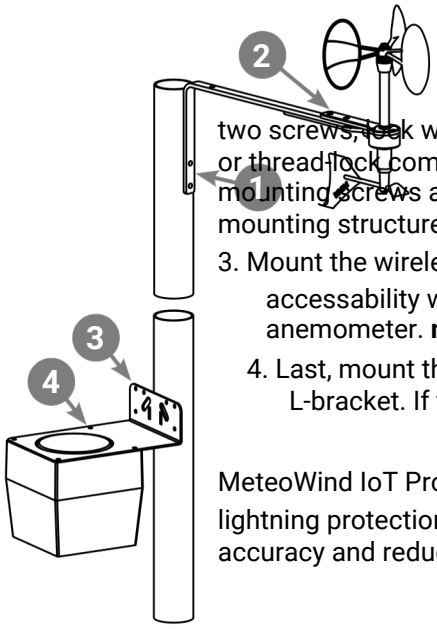


For applications where all-weather WMO accuracy and reliability is important.

WIRELESS PRECISIoN WIND SENSoR

measurement standards				
	Range	Resolution	Accuracy	Sampling rate
Wind speed Wind direction	0-85 m/s gust	0.1 m/s	< 2 % of measured value (0.3 - 50 m/s) or	2 pulses per
Linearity	0-360°	1°	2° (no dead-spot)	10 Hz /1 Hz avg. out
Tilt angle sensitivity	R2 > 0.99995			
Starting wind speed	For horizontal wind speed measurement			
Default linearity constants (Calibration equation coefficients)	<0.2 m/s			
Distance constant (Delay distance)	Defaults: Slope = 0.6335 offset = 0.3582 m/s (m/s = 0.6335 * freq(Hz) + 0.3582) internally preprogrammed into the wireless module which transmits real wind speed value			
	< 1m (est.) (per ASTM D 5096-96)			
electrical specifications				
output signal & communication	LoRaWAN or Sigfox wireless with NB-IoT coming soon			
Power consumption	350 µA (combined wind speed and wind direction and wireless transmission)			
Power and battery system	Solar charger with a Lithium-Ion battery for 4+ months of operation without sun			
environmental ratings				
operating temperature & humidity	-40 °C to + 80 °C, 0 % to 100 % RH			
Survival wind speed	>85 m/s (306 kph, 190 mph) gust			
IP – Protection rating	IP55W (DIN 40050) anemometer, IP67W wireless module with battery			
general specifications				
Heater (optional)	4 W non-regulated @ 12 Vdc or VAC, (Max continuous 12 W in temperatures < 20 °C) Heater requires an external power supply and regulator.			
Weight (mass)	Anemometer = 210 g, Wireless module with battery= 500 g			
Dimensions	Anemometer rotor diameter = Ø 164 mm, Wind vane radius =111 mm, Total height = 272 mm			
Patented / Registered	oHIM 002153882-0001, 002153882-0002, 002153882-0003			
Mounting	Two M6 screws with nuts (includes a 90° stainless steel mounting arm)			

mounting instructions for meteowind Iot Pro wireless anemometer & wind vane



1. Mount the L-bracket onto a wall, fence, post, or mast, which will be used to support the anemometer. **make sure it is pointing exactly north**.
2. Next, mount the MeteoWind Compact anemometer on the L-bracket with two screws, lock washers, and nuts. (Note: Always use lock-washers, lock-nuts or thread-lock compound because wind-induced vibrations will, over time, loosen mounting screws and nuts.) Secure the 5 meter wire along the L-bracket and mounting structure so that it does not move in the wind.
3. Mount the wireless transmitter box L-bracket as close to the ground as practical for easy accessability while staying within reach of the supplied 5 meter connection wire to the anemometer. **make sure it is pointing generally southward** to keep the solar panel in the sun.
4. Last, mount the wireless transmitter box with the solar panel facing up, using 4 screws onto the L-bracket. If the L-bracket came preassembled with the box, this step will not be necessary.

MeteoWind IoT Pro offers simple construction, mounting, and simple electronics with integrated lightning protection for high levels of reliability. Its compact body size increases anemometer accuracy and reduces snow buildup for high data availability in winter.

Reach your gold standard of measurement with BARANI DESIGN ISO:9001 qu

decentlab

DL-WRM DATASHEET

WINTERROADMAINTENANCESENSOR FOR LORAWAN®

FEATURES

LoRaWAN®enabledcombined air temperature / humidity and infrared surface temperature sensor.

High accuracy air temperature measurement: ±0.1 °C (20 … 60 °C); ±0.2 °C (-40 … 90 °C).

High accuracy air humidity measurement: ±1.5 % (0 … 80 %); ±2 % (80 … 100 %) RH.

Contactless surface temperature sensor (pyrometer).

Compatible with LoRaWAN® networks of any provider.

Place and measure: no setup required.

Configurable via command line interface and downlink command interface.

Unattended real-time monitoring for several years without replacing batteries.

Robust polycarbonate enclosure: weatherproof, impact-, UV-resistant (IP67).

Standard alkaline (C-type) batteries.

CE compliant, Radio Equipment Directive (RED) 2014/53/EU.

APPLICATIONS

Outdoor remote monitoring.

Winter roadmaintenance.

Frost alarming.

Ice alert.

Smart agriculture.

DESCRIPTION

Sensor dataare transmitted in real-time using LoRaWAN® radio technology. LoRaWAN® enables encryptedradio transmissions over long distances while consuming very little power. The user can obtain sensor data through Decentlab's data storage and visualization system, or through the user's own infrastructure. Visit www.decentlab.com for more information about Decentlab's data cloud service.

DEVICE VARIANTS

Name DL-	Variant
WRM-001	Surface temperature sensor: bare sensor head
DL-WRM-002	Surface temperature sensor featuring weather protection, mounting kit
	Other variants: contact us

DL-WRM-001

DL-WRM-002

DL-WRM-002 mounting detail

decentlab

DEVICE SPECIFICATIONS

DEVICE LOGGINGFUNCTION

Sampling interval	10 min (configurable through the user interfaces)
Data upload interval	10 min (configurable through the user interfaces)
Reported sensor data (average of samples)	Air temperature Air relative humidity Surface temperature Sensor head temperature Battery voltage

AIR TEMPERATURE SENSOR

Operating principle	Digital CMOSens® technology
Measurement range	-40 ... 125 °C
Resolution	0.01 °C
Accuracy (typical)	±0.1 °C (20 ... 60 °C) ±0.2 °C (-40 ... 90 °C)

AIR HUMIDITY SENSOR

Operating principle	Digital CMOSens® technology
Measurement range	0 ... 100 % RH
Resolution	0.01 % RH
Accuracy (typical)	±1.5 % RH (0 ... 80 % RH) ±2.0 % RH (80 ... 100 % RH)

SURFACE TEMPERATURE

Operating principle	Infrared thermometer, thermopile detector
Optical resolution	15:1
Spectral range	8 … 14 µm
Measurement range	-40 … 1030 °C (target temperature) -20 … 80 °C (sensor head temperature)
Temperature resolution	0.1 °C
Accuracy	±1.5 % or ±1.5 °C
Repeatability	±0.75 % or ±0.75 °C

RADIO / WIRELESS

Wireless technology	LoRaWAN®
Wireless security	AES-128 data encryption
LoRaWAN® device type	Class A end-device
Supported LoRaWAN® features	OTAA, ABP, ADR, adaptive channel setup
Wireless range	> 10 km (line of sight1), approx. 2 km (suburban)
RF transmit power	14 dBm (25 mW)
Effective radiated power	11.9 dBm maximum2 (without radiation shield)
Receiver sensitivity	-146 dBm 3
Frequency bands	868 MHz (EU version), 915 MHz (US, AS, AU versions)4
Antenna	Integrated omnidirectional antenna featuring a near-perfect radiation pattern2

POWER SUPPLY

Internal battery type	2 × alkaline C batteries (LR14) ≤
Power consumption (average)	0.5 mW (10 min interval) 8.0
Battery lifetime estimation5	years (10 min interval, SF7) 3.6 years (10 min interval, SF12) 14.7 years (60 min interval, SF7) 10.8 years (60 min interval, SF12)

OPERATING CONDITIONS

Surface temp. sensor head	-20 ... 80 °C 10 ... 95 % RH, non-condensing
Sensor device, radiation shield	-20 ... 50 °C 0 ... 100 % RH

1 Decentlab reports successful transmissions over 56 km distance and more
2 See Appendix A: Antenna performance
3 Specified by radio chip vendor
4 Contact us for region specific options
5 Including alkaline battery self-discharge of 3.6 % per year (conservative estimation); battery capacity: 20000 mWh.

MECHANICAL SPECIFICATIONS

Logger and radiation shield	Dimensions: 280 × 105 × 85 mm Weight: 585 g including batteries Enclosure specifications: Polycarbonate; weatherproof, impact-, UV-resistant (IP66/IP67). Pressure equalizer plug with PTFE membrane (IP68).
Surface temp. sensor head (DL-WRM-001)	Length: 87 mm, diameter: 12 mm Thread: M12 x 1 (26 mm long) Weight: 60 g including cable Protection: IP63 Cable length: 1 m
Surface temp. sensor head including weather protection (DL-WRM-002)	Length: 200 mm, diameter: 38 mm Mounting bracket: tilt 0 … 90°, mounting post max. 55 mm Weight: 185 g including cable Protection: IP63 Cable length: 1 m

OPERATING INSTRUCTIONS

Theproductusually requires no user interaction. If you open the enclosure, e.g. in order to replace the batteries, unscrew the four plastic screws and carefully open the lid.

CAUTION: Make sure the sensor unit does not drop out of the enclosure while opening! Do not touch the electronic components and sensors!

NOTE: When closing the lid, make sure the lid is fitted the right way, so that the enclosure is properly sealed: A little nose in the enclosure fits a notch in the lid and vice versa.

REPLACING BATTERIES

Insert 2 high-quality alkaline C batteries (LR14) into the battery holder on the back side of the sensor unit. The device operates until the battery voltage drops to 2.0 V. Always replace both battery cells with two identical fresh batteries.

USER BUTTON AND LEDS

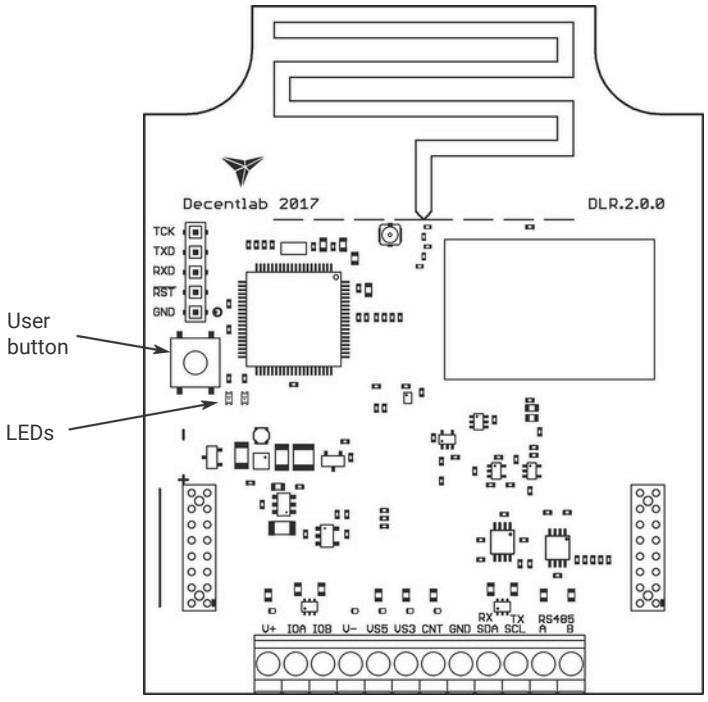


Illustration 1: Sensor unit showing the user button and LEDs. The battery holder is on the back side of the sensor unit.

OPERATING MODES

Thedevicehas four operating modes:

- Reset: System (re-)start; both LEDs fade in and out.
- Active mode (ON): Periodic measurements and data transmissions; green LED flashes for each measurement.
- Sleep mode (OFF): No measurements and data transmissions (power save mode, for shelf storage). LEDs are off.
- Test mode: Measurements and data transmissions at fastest possible rates; blue LED is on.
  NOTE: Use only momentarily, e.g. for testing the sensor or the wireless connection. The device will switch automatically to active mode after 20 minutes.

SWITCHING BETWEEN OPERATING MODES

The user button allows to switch between the operating modes as shown in Illustration 2 and Illustration 3. To perform a device reset, switch to sleep mode first (if necessary) by pushing and holding the button for 3 seconds until the LEDs flash three times; wait 3 seconds; then push and hold the button for 3 seconds until the LEDs fade in and out. To switch between active and test mode, push the button for 1 second (blue LED on / off). If the blue LED is off, the device is in active or sleep mode. If the blue LED is on, the device is in test mode.

HINT: To check whether the device is active or in sleep mode (on or off), push the button twice; if the blue LED goes on and off, the device is in active mode; otherwise, the device is in sleep mode.

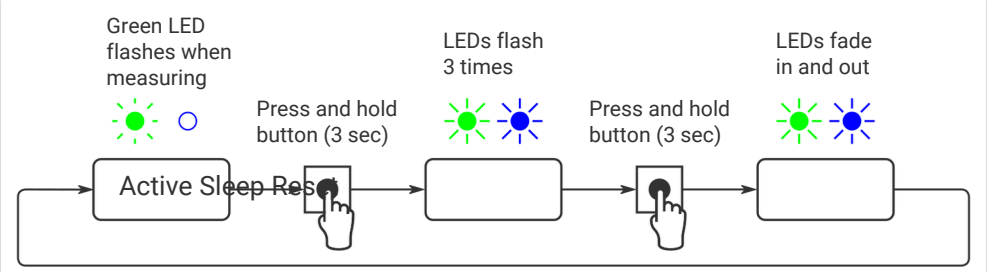


Illustration 2: Switching between active and sleep mode (switch off / on, reset).

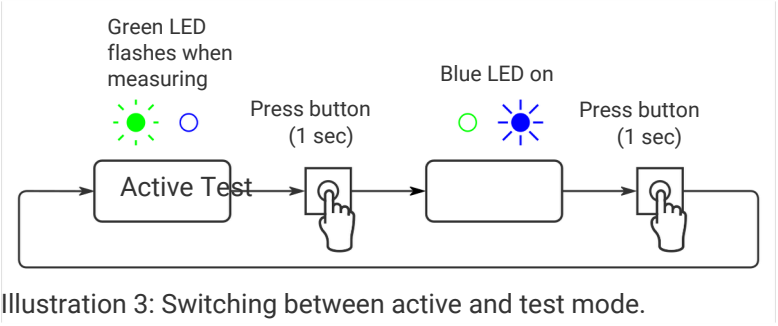


Illustration 3: Switching between active and test mode.

MEASUREMENT CYCLE (ACTIVE MODE)

During theactive mode, the device periodically reads the sensors with sampling period *TS* = 10 minutes (default, configurable). When the send period *TTX* = *n* · *TS* (default: *n* = 1, configurable) has expired, the device computes the average of the collected sensor values (at most 20 values). After a random delay of 0 … 8 seconds, the device transmits the aggregated sensor data. If the device has not yet joined the LoRaWAN® network, it will try to join until it succeeds (maximum 3 attempts per sampling period). Afterwards, it will transmit the data (TX data). Following the data transmission, two receive slots are opened (RX1 and RX2). During these time slots, the device is ready to receive data from the network (downlink messages) as defined in the LoRaWAN® specification.

As shown in the diagrams, the device is idle most of the time. During the idle time, the current consumption is extremely low.

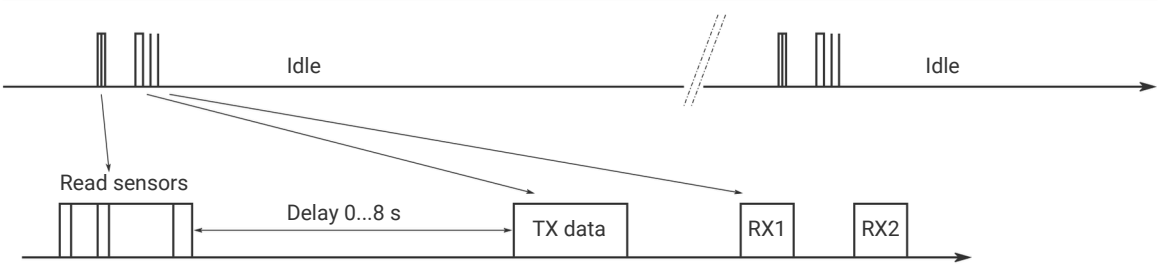


Illustration 4: Device activity during the active mode.

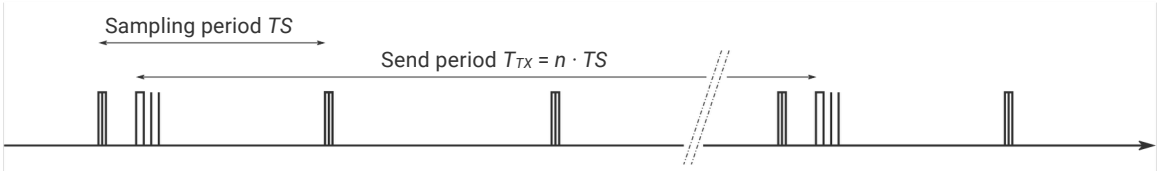


Illustration 5: Sampling period vs. send period. Default: *TS* = 10 min, T_{TX} = 1 · 10 min = 10 min.

LED SIGNALING (ACTIVE MODE)

- Read sensors: green LED flashes once.
- Data sent successfully: green LED flashes 2 times.
- Data could not be sent: green LED flashes 4 times.

DEVICE CONFIGURATION

The user can configure a rich set of device parameters, such as sampling interval, LoRaWAN® data rate, ADR settings and many more. If desired, the parameter settings can be stored permanently in the internal non-volatile memory. The user can configure the device via two interfaces:

- Command line interface: via a serial cable (UART – USB) connected to a computer.
- Downlink command interface: over the air using LoRaWAN® downlink messages.

For a full description of the command line interface and the downlink command interface, please find the specific documents on www.decentlab.com/support.

MOUNTING INSTRUCTIONS

Prefera mounting location which is protected against rain and direct sun radiation.

For best radio performance, install the device upright with the cable towards ground; ideally, in such a way that the device lid faces roughly in the direction of the next gateway. Also, the higher above ground, the better. Avoid metallic objects close to the device.

The housing includes 4 threaded bushes (M4) in a 90 × 60 mm rectangle (see Illustration 6). This enables easy installation using standard M4 bolts.

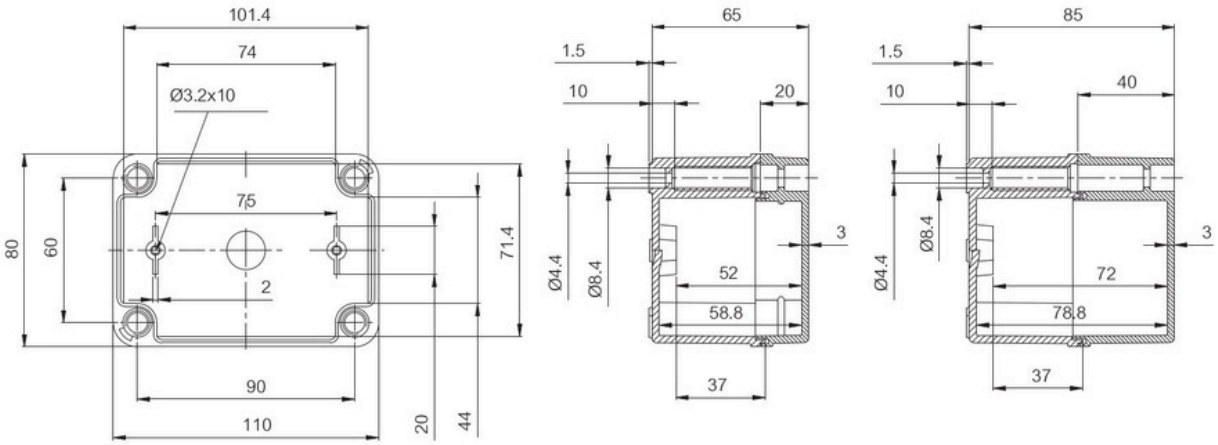


Illustration 6: Housing dimensions (in mm). Note: Drawing not including cable gland, radiation shield and sensor.

ORDERING INFORMATION

REFERENCE	DL-WRM-	DESCRIPTION
001-xxxxx	DL-WRM-	Surface temperature: bare sensor
002-xxxxx		Surface temperature: weather protection

-XXXXX	REGION (LORAWAN®)
EU868	Europe
US915	North America
AS923	Asia
AU915 Other options:	Australia, South America

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SENSOR DATA MESSAGE FORMAT

Message:

Header	Sensor 0 data (optional)	Sensor 1 data (opt.)	...	Sensor 15 data (opt.)

- Message length is variable, depending on which sensor data are included. Minimum length is 5 bytes (header only). Maximum length is 5 bytes + all sensor data (see below).
- Integers are big endian: MSB first byte, LSB last byte.

Header:

Version	Device ID	Flags

- Version: 1 byte; version = 2 for current protocol version.
- Device ID: 2 bytes; 0...65535.
- Flags: 16 bits: flag 15 | flag 14 | … | flag 0 (LSB).
- The flags indicate, if data of the respective sensors are included in the message or not:
  Flag n == 1: sensor n data included; flag n == 0: not included.

DECODER SOFTWARE

For message decoder software, please go to https://www.decentlab.com/support, where you find code examples in JavaScript and other programming languages.

DETAILS

FIELD	PARAMETER NAME	TYPE	CONVERSION	UNIT
Header	Version	uint8		
Header	Device ID	uint16		
Header	Flags			
Sensor 0	Air temperature	uint16	175 · x / 65535 − 45	°C
	Air humidity		100 · x / 65535	% RH
Sensor 0	Surface temperature	uint16	(x − 1000) / 10	°C
	Sensor head temperature		(x − 1000) / 10	°C
Sensor 1	Battery voltage	uint16	x / 1000	V
Sensor 1		uint16		
Sensor 2		uint16		
		uint16		

EXAMPLE 1 (ALL SENSOR DATA INCLUDED)

Message (hex):

021a10000764a079b104f904c40c60

02	Version	=	2 6672	
1a10	Device ID	=	0b0000000000000111	
0007	Flags	=	23.79 47.54 27.30	
64a0	Air temperature	=	22.00 3.168	deg
79b1	Air humidity	=		%
04f9	Surface temperature	=		deg
04c4	Sensor head temperature	=		deg
0c60	Battery voltage	=		V

EXAMPLE 2 (ONLY BATTERY VOLTAGE)

Message (hex):

021a1000040c60

02	Version	=	2 6672	
1a10	Device ID	=	0b0000000000000100	
0004	Flags	=	---- ---- ---- ---- 3.168	
----	Air temperature	=		deg
----	Air humidity	=		%
----	Surface temperature	=		deg
----	Sensor head temperature	=		deg
0c60	Battery voltage	=		V

DECLARATION OF CONFORMITY

We,

Decentlab GmbH
Kriesbachstrasse 30
8600 Dübendorf
Switzerland

declare under our own responsibility that the product

Reference	Name
DL-WRM-xxx-EU868	**Winter Road Maintenance Sensor for LoRaWAN®**

to which this declaration refers conforms with the relevant standards or other standards documents

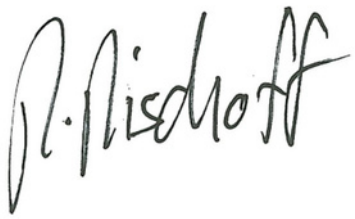
- EN 300 220-1 V3.1.1: 2017-02
- EN 300 220-2 V3.1.1: 2017-02
- EN 301 489-1 V2.2.0: 2017-03
- EN 301 489-3 V2.1.1: 2017-03

According to

- Radio Equipment Directive (RED) 2014/53/EU
- Electromagnetic Compatibility (EMC) Directive 2014/30/EU

Dübendorf, 12. September 2018

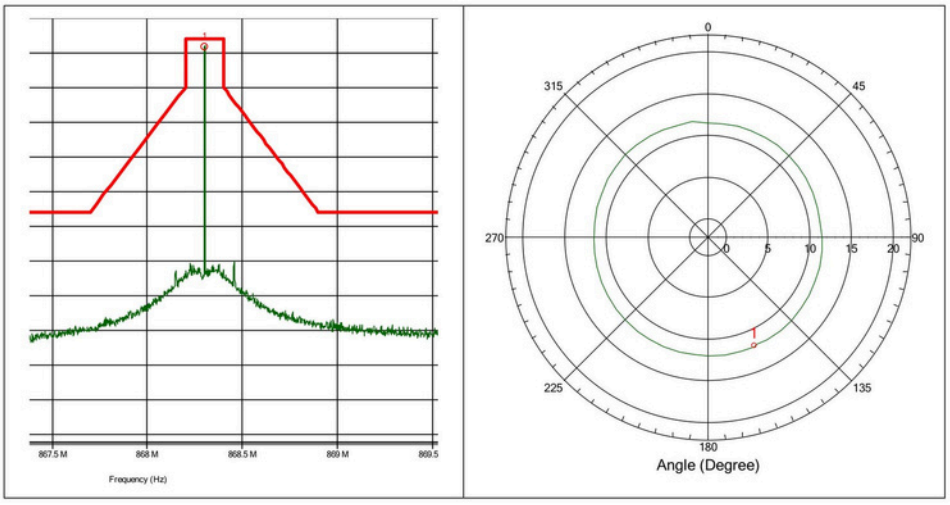
Reinhard Bischoff, Managing Director



APPENDIX A: ANTENNA PERFORMANCE

Measurement Results:

EUT	DLR1-LP8		
Test performed	Effective radiated power (ERP)		
Verdict, Test	Pass		
Modification	None		
Mode of operation	Transmitter mode		
Test date, time	13.06.2018 09:37:06		
Antenna height	1.30 m	**Antenna polarization**	Vertical
EUT position	0 to 360 Degree	**Antenna distance**	3 m
Measurement settings	Radimation Version: 2017.1.6, RBW: 1 kHz, VBW: 300 kHz, Sweep time: Auto [120 ms], Step freq: Linear: 250 Hz steps, Attenuator: Auto [10 dB], Internal preamp: 20 dB, Measure time: 10 ms, Measurement equipment: TP_RE_30M-1G_ETSI_Ver		



Detected peaks

Peak Number	Frequency	Peak	Peak Difference	Status	Angle	Height	Polarization
1	868.302 MHz	11.9 dBm	-2.14 dB	Pass	157 Degree	1.3 m	Vertical

Limits:

ETSI EN 300 220-2, Table C.1 OFB: 863 MHz to 870 MHz <= 0.1% duty cycle or polite spectrum access	**25 mW e.r.p** (14 dBm)

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DISCLAIMER

Specificationsand information in this document are subject to change without notice.

Decentlab products are notwarranted or authorized for use as critical components in medical, life-saving, or life-sustaining applications, or other applications where a failure would reasonably be expected to cause severe personal injury or death.

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