# RWS200 Product Catalog

## / Vaisala Road Weather Station RWS200

For Roads, Rail, and Runways

VAISALA

# Vaisala Road Weather Station RWS200

To keep the roads and runways safe and passable at all times, the pavement and atmospheric weather must be continuously monitored.

Weather conditions such as snow and ice, heavy rains, fog, high winds, and sand storms can impact road and runway safety in many different ways. Unfortunately, you cannot usually observe the weather impact from your office window so it is important to have a reliable tool for information gathering.

Road weather stations, also known as Road Weather Information Systems (RWIS), have been developed for several decades to collect information about road and runway conditions. The stations not only collect data in remote locations but also provide a quantitative measurement to weather, which in the past was typically done with the human eye.

Over the years, several studies and research have been done to prove that road weather technology provides a significant return on your investment. This largely comes through operational savings of road maintenance and Intelligent Transportation Systems (ITS) activities, which improve mobility and increase safety of travelers.

Road weather stations consist of a variety of sensors that collect atmospheric and road or runway condition data. The sensor selection depends on your needs.

Pavement sensors come in two types, embedded and remote (or non-intrusive). Embedded sensors are placed into the road or runway surface. They provide data on the conditions on their surface.

Non-invasive sensors are a newer innovation using infrared and laser technology to measure road conditions. They are installed on the side of the road. Non-invasive sensors are easier to install and maintain, as no traffic control or cutting of the road surface is required. This also provides additional safety by taking the workers out of the roadway.

In addition, the non-invasive road state sensor provides a value of grip that gives decision makers a quantitative reading of the current road slipperiness. This grip value can be used for a variety of decision-making tools, such as performance indexes or a trigger for variable message signs.

Atmospheric sensors enhance the performance of the algorithms when determining the road and runway surface conditions. They also provide additional information that can be critical to the overall traveling environment. This kind of information can be, for example, alert of heavy rain.

## Why RWS200?

**Intelligent -** The Vaisala Road Weather Station RWS200 is the key component to Vaisala road weather and runway condition solutions. It has been designed with the future of road weather and ITS in mind.

RWS200 is intelligent: it contains several sophisticated algorithms that bring in raw data from the road state sensors. By using other atmospheric observations, RWS200 can produce more accurate surface state analysis.

RWS200 is equipped with smart power management. The full-featured RWS200 comes with a backup battery. When main power is lost, RWS200 detects the change and begins shutting down operations that drain the most power. This ensures that in an environment where power is not always stable, RWS200 continues to provide observations and access to the system as long as battery power is available.

Vaisala sensors are sold around the world for many different applications, both separately and with Vaisala weather stations. RWS200 supports a large range of Vaisala sensors and a selected set of third-party sensors.

**Scalable -** What if you do not want or need a full-feature, complete weather station? What if you need a supplemental station that collects only a couple of observations? RWS200 is scalable, allowing you to add the features that you need to match the requirements at each location. You can choose from different enclosures, various sensor options, or use a selected set of existing retrofit sensors, if you want.

If you need to upgrade the station later on, you can add new sensors or update the station software to add new features. This allows you to fully benefit from the future improvements in sensor and communication technology, and ensure your return of investment.

**Reliable -** RWS200 is not just a roadside processor designed to collect, store, and transmit data from road weather sensors. RWS200 provides a complete road weather solution to improve road, rail, or runway winter maintenance

activities in your organization. RWS200 features a configurable graphical user interface for a variety of data viewing and maintenance needs.

The use of Ethernet communications and 3G/4G cellular network enable remote access to RWS200 and continuous data flow to data collection systems. However, one of the reasons for having an onsite processor is the ability to store historical data locally for at least two weeks. Observation data is not lost even if remote communication is lost.

In winter road and runway maintenance, accurate and reliable data must be trustworthy and available when you need to make decisions.

## Value of Vaisala

Vaisala is a global leader in environmental and industrial measurement. Building on 80 years of experience, Vaisala provides observations for a better world. We are a reliable partner for customers around the world, offering a comprehensive range of innovative observation and measurement products and services.

Whether you are upgrading a legacy Vaisala road weather station, replacing another manufacturer's equipment, or adding a new weather site, Vaisala Road Weather Station RWS200 is worth the investment.

RWS200 is reliable, sustainable, expandable, and upgradable. It provides remote access for maintenance and for viewing the observations. You can also integrate RWS200 to your data collection system using the various interfaces it offers.

RWS200 comprises of high quality components that have been specifically designed for and tested in harsh conditions. Each RWS200 system is thoroughly tested before it leaves the Vaisala factory. A comprehensive documentation set, including the test reports, is delivered with each RWS200.

## Road Specific Design

Vaisala offers a wide variety of sensors for every weather observation. The sensors available for RWS200 were carefully chosen to make sure that they fit the demanding conditions that exist alongside the roadway. The ability to have the right sensor for your local conditions greatly increases the accuracy of observations that are necessary for critical decisions.

Vaisala also offers an all-in-one sensor that can measure multiple weather observations at once, but its accuracy is not as good as with dedicated sensors.

Vaisala is consistently the leader in introducing new road specific sensors. The remote sensors provide a level of decision support unique in the road weather market. Vaisala continues to innovate and develop new and exciting road weather sensors and solutions.

Our quality sensors, decision support software, and expert consultation make the Vaisala Road Weather Station RWS200 more than just a remote processor – it is a complete road weather station for intelligent transportation systems.

# System Components

**Remote connection**

- Remote management and upgrades
- Direct access to observations

**Data collection system**

- Sensor monitoring
- Data quality check
- Data archiving

**Visualization and decision support software**

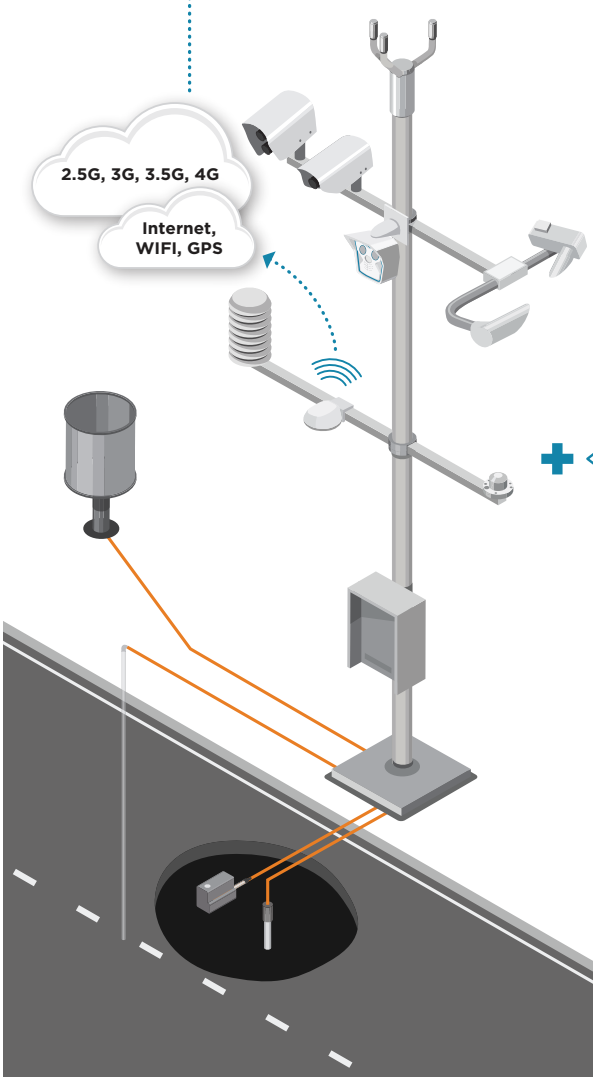
- Vaisala Road DSS Navigator / Manager
- 3rd-party application

**Wireless local maintenance access over WLAN**

- Station configuration
- Local data visualization

**Device control**


- Three relays to control various devices
- Configurable rules to control relays




**Wind speed and direction**

WMT700 WA15

**Weather transmitter**

WXT536

**Remote road sensor**

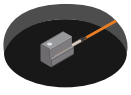
DSC211

**Remote road temperature sensor**

DST111

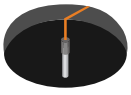
**Embedded road sensor**

DRS511



**Subsurface temperature probe**

DTS12G

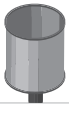


**Global radiation sensor**

SP Lite2

**Tipping bucket**

RG13H

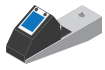


**Visibility and present weather detector**

PWD12/22

**Rain detector**

DRD11A



**Humidity and temperature**

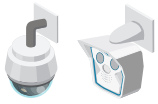
HMP155E DTR radiation shield

**PTZ camera**

Axis

**Fixed camera**

Mobotix



**Pressure**

PTB110

**Water level and snow depth**

SR50A

**Multiband antenna**

Cellular, GPS, and WLAN

**Multidepth temperature probe**

TPS10

**Device control**

Variable Message Sign

# RWS200 System

## General

| | |
|---|---|
| Operating temperature range | -40 ... +60 °C (-40 ... +140 °F) [1] |
| Storage temperature range | -60 ... +80 °C (-76 ... +176 °F) |
| Humidity range | 5 ... 100 %RH |
| POWERING OPERATING RANGE | |
| AC (mains) power | 90 ... 264 VAC, 45 ... 65 Hz<br>24 VDC (12 … 32 VDC) |
| External power | 12 ... 32 VDC (min. 10 VDC)<br>12 or 24 VDC |
| INTERNAL BATTERY | |
| Standard backplate (BOX652, BOXALU-US, BOXSS-US) | 26 Ah/12 V |
| Slim backplate (BOX722) | 2.6 Ah/12 V |
| Mains fuse | 10 A |
| COMPLIANCE | |
| Vibration | IEC 60068-2-6 |
| Rough handling | IEC 60068-2-31 |
| Shock | IEC 60068-2-27 |
| Cold | IEC 60068-2-1 |
| Dry heat | IEC 60068-2-2 |
| Damp heat | IEC 60068-2-78 |
| Corrosion and salt mist | VDA 621-415 |
| EMC (industrial environment) | EN/IEC 61326-1 |
| Conducted emissions | CISPR22/EN 5502/Class B [2] |
| Radiated emissions | CISPR22/EN 5502/Class B [2] |
| Electrical safety | EN/UL/IEC 60950-1/-22, cETLus |

[1] Operating temperature range for Mobotix M15 camera: -30 ... +60 °C (-22 ... +140 °F)

[2] Axis PTZ camera and Wavetronix traffic sensor are Class A.

## Standard Sensor Options

| | |
|---|---|
| Road state, remote | DSC211 |
| Road temperature, remote | DST111 |
| Road state and temperature, embedded | DRS511/FP2000 |
| Subsurface temperature | DTS12G |
| Subsurface temperature multidepth | TPS10 |
| Humidity and temperature | HMP155E |
| Visibility and present weather | PWD12/22 |
| Rain | DRD11A |
| Tipping bucket | RG13H |
| Wind speed and direction (ultrasonic) | WMT700 |
| Wind speed and direction (mechanical) | WA15 (WAC155) |
| Wind speed and direction (combined/ mechanical) | R.M.Young |
| Pressure | PTB110 |
| Multiparameter | WXT536 |
| Water level | Campbell SR50A |
| Snow depth | Campbell SR50A |
| Global radiation | SP Lite2 |
| Pan-tilt-zoom (PTZ) camera | Axis Q6042-E |
| Fixed camera | Mobotix M15 |
| SUPPORTED SENSORS AND EQUIPMENT | |
| Subsurface temperature | DTS210 |
| PTZ camera | Axis Q6032-E |
| Fixed camera | Mobotix M12 |
| Traffic sensor | Wavetronix SmartSensor HD |

## Protocols and Data Reports

| | |
|---|---|
| Data message inputs/outputs | Images<br>Vaisala MES 14<br>Vaisala MES 16<br>Vaisala DTO XML<br>Vaisala observation web service<br>DATEX II |
| Protocols | NTCIP |
| Road surface state | Vaisala classes<br>EN15518-3 classes |
| STATION REPORTS | |
| Station summary report | HTML |
| Event log | CSV |

## Standard Communication Options

| | |
|---|---|
| Communication | 2.5G/3G/4G cellular, wireless LAN, and LAN |
| Customer-provided communication | LAN, cellular, or serial |
| User interface | Browser-based Web UI |

## Enclosure Options

| | |
|---|---|
| BOX652 AND BOX722 | |
| Enclosure, mounting frame base, cabling box, nuts, washers | Stainless steel AISI 316 |
| Self-clinching screw | Stainless steel AISI 304 |
| Backplate | Fe/Zn |
| Radiation shield | Aluminum EN AW-5754 |
| Gaskets, rubber plugs, flange set | Rubber (EPDM, Fermasil) |
| BOX652 | |
| IP rating | IP66, NEMA Certified Type 4X |
| Size (H × W × D), incl. mounting frame, radiation shield, and cabling box | 787 × 581 × 270 mm<br>(31.0 × 22.9 × 10.6 in) |
| Weight after installation | ~46 kg (101 lb) |
| BOX722 | |
| IP rating | IP66 |
| Size (H × W × D), incl. mounting frame, radiation shield, and cabling box | 887 × 322 × 270 mm<br>(34.9 × 12.9 × 10.6 in) |
| Weight after installation | ~29 kg (64 lb) |
| BOXALU-US (NORTH AMERICA ONLY) | |
| IP rating | NEMA Certified Type 4X |
| Material | Aluminum 0.080" 5052 H32 |
| Size (H × W × D) | 838 × 610 × 330 mm<br>(33.0 × 24.0 × 13.0 in) |
| Weight after installation | ~35.3 kg (77.8 lb) |
| BOXSS-US (NORTH AMERICA ONLY) | |
| IP rating | NEMA Certified Type 4X |
| Material | Stainless steel 0.75" AISI 304 |
| Size (H × W × D) | 838 × 610 × 330 mm<br>(33.0 × 24.0 × 13.0 in) |
| Weight after installation | ~55.5 kg (122.3 lb) |
| NO ENCLOSURE (BACKPLATE ONLY) | |
| Size (H × W × D) | 555 × 455 × 42 mm<br>(21.9 × 17.9 × 1.7 in) |
| Weight | ~12.8 kg (28.2 lb) |

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# Sensors

## Remote Road Sensor DSC211

The spectroscopic measuring principle of DSC211 enables accurate measurement of the amounts of water, ice, and snow. In addition, DSC211 provides a calculated value of slipperiness, grip, to indicate the condition of the road.

DSC211 is a very sensitive instrument providing an accurate measurement of the presence of ice crystals well before they cause the road to become slippery. Therefore, the winter maintenance engineer is able to react to all those weather elements that create a hazardous driving surface and require appropriate remedy.

In addition, the optional visibility measurement offers a useful, compact, and extremely cost-effective way to measure the meteorological optical range (MOR). The visibility measurement extends the capabilities of DSC211 to detect low visibility conditions – without any external hardware.

### Measuring Specifications

| | |
|---|---|
| MEASURING DISTANCE | |
| With visibility observation disabled | 2 ... 15 m (7 ... 50 ft) |
| With visibility observation enabled | 8 ... 15 m (26 ... 50 ft) |
| Installation angle from the horizontal line | 30 ... 80° (35 … 65° recommended) |
| LAYER THICKNESS | |
| Water layer observation range | 0.00 ... 2 mm (0.06 in) |
| Ice layer observation range | 0.00 ... 2 mm (0.06 in) |
| Snow coverage | 0.00 ... 10 mm (0.40 in) |
| Water equivalent | 0.00 ... 1 mm (0.04 in) |
| Resolution | 0.01 mm |
| Accuracy (water and ice layer) | ±0.1 mm in the range of 0 ... 1 mm |
| LEVEL OF GRIP | |
| Observation range | 0.01 ... 1.00 |
| Reporting range | 0.09 ... 0.82 |
| Resolution | 0.01 units |
| REPORTED SURFACE STATES | |
| Vaisala classes | Dry, Moist, Wet, Frost [1], Snow, Ice, Slush |
| EN 15518-3 classes | Dry, Moist, Wet, Streaming water, Slippery |
| VISIBILITY (OPTIONAL) | |
| Observation range (MOR) | 10 ... 2000 m (33 ... 6572 ft) |
| Resolution | 1 m |
| Accuracy (fog and snowfall) | ±20 % (average) |
| Response time | 60 s |

[1] Frost is only reported when dewpoint and road temperature information is available.

### General Specifications

| | |
|---|---|
| Operating temperature | -40 … +60 °C (-40 ... +140 °F) |
| Storage temperature | -55 … +60 °C (-67 ... +140 °F) |
| Operating humidity | 0 ... 100 %RH |
| Communication interface | RS-485 |
| Dimensions (H × W × D) | 210 × 133 × 448 mm (8.3 × 5.2 × 17.6 in) |
| Weight | 3.4 kg (7.5 lb) |
| OPTICAL SPECIFICATIONS | |
| Light source | Near-infrared laser diodes |
| Detection of window contamination | Contamination level of the receiver window is measured |
| Eye safety | Eye safety in accordance with EN/IEC 60825-1 |
| MATERIALS | |
| Cover | Plastic ABS |
| Mounting bracket | POM-C |
| Other parts | Aluminum |
| COMPLIANCE | |
| EMC (industrial environment) | EN/IEC 61326-1 |
| Vibration | IEC 60068-2-6 |
| IP rating | IP65 |

| Item | Part Number |
|---|---|
| DSC211 sensor | DSC211RWS |
| CABLE OPTIONS | |
| 10 m (32 ft 10 in) | 216546 |
| 25 m (82 ft 3 in) | 216547 |
| 50 m (164 ft 1 in) | DR221741Z50MSP |
| 100 m (328 ft 1 in) | DR221741Z100MSP |
| 150 m (492 ft 2 in) | DR221741Z250MSP |
| Visibility measurement | DSCVIS |
| Spare hood | DRW217593SP |

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# Remote Road Temperature Sensor DST111

The DST111 sensor provides a remote alternative to measuring road surface temperature. By measuring the infrared radiation emitted by the surface and applying intelligent signal processing, DST111 provides a reliable remote surface temperature measurement. The sensor has a faster response time than traditional road temperature sensors and therefore provides a good option for special locations, such as bridges.

## General Specifications

| | |
|---|---|
| Operating temperature | -40 … +60 °C (-40 …+140 °F) |
| Storage temperature | -55 … +60 °C (-67 …+140 °F) |
| Operating humidity | 0 …100 %RH |
| Communication interface | RS-485 |
| Dimensions (H × W × D) | 125 × 100 × 320 mm (4.9 × 3.9 × 12.6 in) |
| Weight | 1.9 kg (2 lb) |
| MATERIALS | |
| Cover | Plastic ABS |
| Mounting bracket | POM-C |
| Other parts | Aluminum |
| COMPLIANCE | |
| EMC (industrial environment) | EN/IEC 61326-1 |
| Vibration | IEC 60068-2-6 |
| IP rating | IP65 |

## Measuring Specifications

| | |
|---|---|
| Measuring distance | 2 …15 m (7 …50 ft) |
| Installation angle from the horizontal line | 30 …85° (35 … 65° recommended) |
| ROAD TEMPERATURE | |
| Observation range | -40 …+60 °C (-40 …+140 °F) |
| Resolution | 0.1 °C |
| AIR TEMPERATURE | |
| Observation range | -40 …+60 °C (-40 …+140 °F) |
| Resolution | 0.1 °C |
| Typical accuracy [1)] | ±0.6 °C (±1.1 °F) |
| RELATIVE HUMIDITY | |
| Observation range | 0 …98 %RH |
| Resolution | 0.1 %RH |
| Typical accuracy [1)] | |
| 0 …90 %RH | ±3 %RH |
| 90 …98 %RH | ±5 %RH |
| Stability | ±2 %RH over 2 years |
| DEWPOINT | |
| Observation range | -40 …+60 °C (-40 …+140 °F) |
| Resolution | 0.1 °C |

[1)] At +20 °C (+68 °F)

| Item | Part Number |
|---|---|
| DST111 sensor | DST111RWS |
| CABLE OPTIONS | |
| 10 m (32 ft 10 in) | 216546 |
| 25 m (82 ft 3 in) | 216547 |
| 50 m (164 ft 1 in) | DR221741Z50MSP |
| 100 m (328 ft 1 in) | DR221741Z100MSP |
| 150 m (492 ft 2 in) | DR221741Z250MSP |
| Spare hood | DRW218846SP |

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# Embedded Road Sensor DRS511

The DRS511 sensor, when connected to RWS200, forms a part of a complete remote processing system for ice warnings and predictions. The durable design of the sensor withstands the heavy stress of traffic, allowing the sensor to be installed in the wheel track. Vaisala's unique measurement technologies enable accurate analysis of road state, snow and ice coverage detection, water-film thickness, amount of de-icing chemicals, and depression of freezing point.

## General Specifications

| | |
|---|---|
| Operating temperature | –40 ...+60 °C (–40 ...+140 °F) |
| Temperature sensors | Two Pt100 elements, 1/3 Class B DIN IEC 751 |
| Dimensions (H × W × D) | 75 × 30 × 84 mm, bottom 38 mm (3.0 × 1.2 × 3.3 in, bottom 1.5 in) |
| Weight, including 50 m/165 ft cable | 3.1 kg (6.8 lb) |
| MATERIALS | |
| Epoxy compound | Araldit D, HY 956, lamp black for color |
| Sensing electrodes | Carbon fiber in epoxy |
| Optical sensor | Acrylic optical fibers |
| COMPLIANCE | |
| EMC | Directive 2014/35/EU<br>EN 61326-1, Immunity test requirements for equipment intended to be used in an industrial electromagnetic environment<br>EN 55022 class B electromagnetic emissions<br>FCC part 15 class B |

## Measuring Specifications

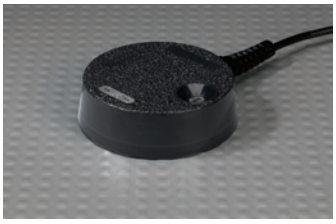
| | |
|---|---|
| TEMPERATURE | |
| Observation range | -40 °C ... +60 °C (-40 ...+140 °F) |
| Accuracy | ±(0.1 + 0.00167 × temperature) °C |
| WATER LAYER THICKNESS | |
| Observation range | 0.00 ... 7.00 mm (0.3 in) |
| Resolution | 0.01 mm |
| Accuracy [1] | ±0.1 mm in the range of 0.0 ... 1.0 mm |
| REPORTED SURFACE STATES | |
| Vaisala classes | Dry, Moist, Wet, Snow, Icy, Frosty [2], Moist and chemical, Wet and chemical |
| EN 15518-3 classes | Dry, Moist, Wet, Streaming water, Slippery |

[1] Applies to an even layer of water on the sensor. The detection accuracy of the average water layer thickness on the road depends on sensor installation, pavement material, and water impurities.
[2] Requires dewpoint temperature information.

| Item | Part Number |
|---|---|
| DRS511 SENSOR WITH CABLE | |
| 20 m (65 ft 7 in) | DRS511AB2 |
| 30 m (98 ft 5 in) | DRS511AB3 |
| 50 m (164 ft 1 in) | DRS511AB5 |
| 100 m (328 ft 1 in) | DRS511AB10 |
| 150 m (492 ft 2 in) | DRS511AB15 |
| 200 m (656 ft 2 in) | DRS511AB20 |
| 300 m (984 ft 3 in) | DRS511AB30 |
| DRS511 BRIDGE SENSOR WITH CABLE | |
| 20 m (65 ft 7 in) | DRS511BB2 |
| 30 m (98 ft 5 in) | DRS511BB3 |
| 50 m (164 ft 1 in) | DRS511BB5 |
| 100 m (328 ft 1 in) | DRS511BB10 |
| 150 m (492 ft 2 in) | DRS511BB15 |
| 200 m (656 ft 2 in) | DRS511BB20 |
| 300 m (984 ft 3 in) | DRS511BB30 |
| Calibration kit | DRC511 |
| Splice kit | 24051020 |
| Type V extension cable 1524 m (5000 ft) | N.A. local content |

CE as system component

# Embedded Road Sensor FP2000



The FP2000 sensor monitors the condition of the road surface and determines if there is water or a chemical solution on the road. The data is used for maintenance operations during critical winter periods and throughout the year.

Available in North America only.

## Measuring Specifications

| | |
|---|---|
| Temperature observation range | -51 … +80 °C (-60 ...+176 °F) |
| Water depth observation range | 0.3 ... 12.7 mm (0.01 … 0.5 in) |
| Operating temperature | -40 … +80 °C (-40 ...+176 °F) |

| Item | Part Number |
|---|---|
| FP2000 SENSOR (GRAY) WITH CABLE | |
| 91.44 m (300 ft) | 76420300 |
| 152.40 m (500 ft) | 76420500 |
| FP2000 SENSOR (BLACK) WITH CABLE | |
| 91.44 m (300 ft) | 76421300 |
| 152.40 m (500 ft) | **76421500** |
| Splice kit | 24051020 |
| Type V extension cable 1524 m (5000 ft) | N.A. local content |

# Subsurface Temperature Probe DTS12G

The DTS12G probe is specifically designed for outdoor use and for automatic weather stations. The water-tight, weather-resistant design ensures reliable temperature measurements in extreme conditions. It can be used to measure the temperature at different levels beneath the surface. The probe is used in road weather stations to utilize information on road depth temperature for producing the 24-hour road surface temperature forecast.

## Measuring Specifications

| | |
|---|---|
| Temperature observation range | -80 ... +80 °C (-112 ... 176 °F) |
| Accuracy | 1/4 DIN 43760 B |

## General Specifications

| | |
|---|---|
| Sensing element | Platinum resistance element (Pt100) |
| Housing material | Stainless steel AISI 316 |
| Probe | Maximum Ø 9.5 mm (0.4 in), length 100 mm (3.9 in) |

| Item | Part Number |
|---|---|
| DTS12G SENSOR WITH CABLE | |
| 10 m (32 ft 10 in) | DTS12G1 |
| 20 m (65 ft 7 in) | DTS12G2 |
| 30 m (98 ft 5 in) | DTS12G3 |
| 50 m (164 ft 1 in) | DTS12G5 |
| 100 m (328 ft 1 in) | DTS12G10 |
| 120 m (393 ft 8 in) | DTS12G12 |
| 150 m (492 ft 2 in) | DTS12G15 |
| 200 m (656 ft 2 in) | DTS12G20 |
| Splice kit | 24051020 |
| Type V extension cable 1524 m (5000 ft) | N.A. local content |

# Visibility and Present Weather Detector PWD12/22

The PWD12 and PWD22 sensors identify precipitation type by accurately estimating the water content of precipitation with a capacitive device (Vaisala RAINCAP® sensor element) and combining this information with optical forward scatter and temperature measurements. These three independent measurements are processed through sophisticated algorithms in order to produce an accurate evaluation of the weather type. The weather-proof design of the PWD sensors provides accurate measurement results and reduces the need for maintenance.

The PWD sensors' ability to detect precipitation and identify precipitation type gives the road authority valuable information for the short-range planning of road maintenance operations. PWD22's ability to detect freezing precipitation makes it possible to issue warnings when the weather presents safety hazards for road and air traffic. Both models also include visibility measurements ranging from 0 m up to 2000 or 20 000 m (6562 or 65 617 ft), depending of the selected model.

## General Specifications

| | |
|---|---|
| Operating temperature | -40 … +60 °C (-40 ... +140 °F) |
| Storage temperature | -40 … +60 °C (-40 ... +140 °F) |
| Operating humidity | Up to 100 %RH |
| Material | Aluminum |
| Dimensions (H × W × D) | 167 × 695 × 404 mm (6.6 × 27.4 × 15.9 in) |
| Weight | 3 kg (6.6 lb) |
| LIGHT TRANSMITTER | |
| Light source | Near-infrared light emitting diode |
| Peak wavelength | 875 nm |
| Reference photodiode | For light source control |
| Backscatter photodiode | For contamination and blockage observation |
| Eye safety | Eye safe in accordance with International Standard EN/IEC 60825-1; edition 1.2 |
| LIGHT RECEIVER | |
| Detector | Photodiode |
| Optical filter/window | RG780 glass |
| Backscatter light source | Near-infrared LED for contamination and blockage observation |

## Measuring Specifications

| | |
|---|---|
| OBSERVATION RANGE OF MOR [1] | |
| PWD12 | 10 ... 2000 m (32 ... 6562 ft) |
| PWD22 | 10 ... 20 000 m (32 ... 65 617 ft) |
| ACCURACY | |
| PWD12 | ±10 % at 10 ... 2000 m (32 ... 6562 ft) |
| PWD22 | ±10 % at 10 ... 10 000 m (32 ... 32 808 ft)<br>±15 % at 10 ... 20 km (2.6 … 12 mi) |
| Instrument consistency | +5 % |
| Precipitation detection sensitivity | 0.05 mm/h or less, within 10 minutes |
| PRECIPITATION TYPE IDENTIFICATION | |
| PWD12 | Rain, Drizzle, Mixed rain/snow, Snow |
| PWD22 | Rain, Freezing rain, Drizzle, Freezing drizzle, Mixed rain/snow, Snow |
| Present weather type reporting | WMO code table 4680 [2], NWS (National Weather Service, USA) |
| Precipitation intensity observation range | 0.00 ... 999.99 mm/h |
| Precipitation accumulation observation range | 0.00 ... 99.99 mm |
| Amount of new snow observation range | 0.00 ... 999 mm |

[1] Meteorological Optical Range
[2] DTO XML only

| Item | Part Number |
|---|---|
| PWD22 sensor (no heating) | PWDDNNNN4NANNNNNN (PWD-CFG07) |
| PWD22 sensor (heated) | PWDDNHNN4NANNNNNN (PWD-CFG08) |
| PWD12 sensor (no heating) | PWDCNNNN4NANNNNNN (PWD-CFG010) |
| PWD12 sensor (heated) | PWDCNHNN4NANNNNNN (PWD-CFG09) |
| Calibration kit | PWA12 |
| CABLE OPTIONS | |
| 10 m (32 ft 10 in) | 241767 |
| 15 m (49 ft 3 in) | 217148 |
| 35 m (114 ft 10 in) | 217149 |
| SPARE PARTS | |
| Controller/Receiver | PWC12 (for PWD12)<br>PWC22 (for PWD22) |
| RAINCAP sensor | PWR111SP (for PWD12)<br>PWR211SP (for PWD22) |
| Hood heater set | PWH111 |
| Transmitter | PWT11 |

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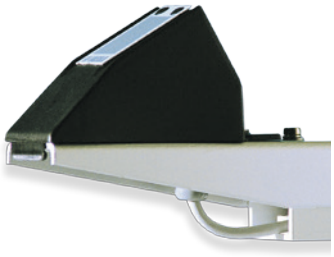
# Rain Detector DRD11A



The DRD11A sensor offers fast and accurate precipitation detection and estimation about the intensity in the scale of low-mid-high. DRD11A has an in-built heating element for keeping the detection plate always ready for precipitation identification. The sensor requires periodical cleaning but is otherwise maintenance-free.

In the system, DRD11A provides rain on/off, intensity, and accumulation information. When air temperature and relative humidity observations are available, the system capabilities increase to also recognizing snow and sleet.

| Item | Part Number |
|---|---|
| DRD11A sensor including cable 10 m (32 ft 10 in) | DRD11A-10M |

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## Measuring Specifications

| | |
|---|---|
| RAIN DETECTION SENSITIVITY | |
| Minimum wet area | 0.05 cm² (0.008 sq in) |
| Detection delay | < 0.1 ms |
| OFF-delay (active) | < 5 min |
| PRECIPITATION TYPE IDENTIFICATION | Rain |
| When air temperature and relative humidity are available | Rain, Sleet/Mixed, Snow |

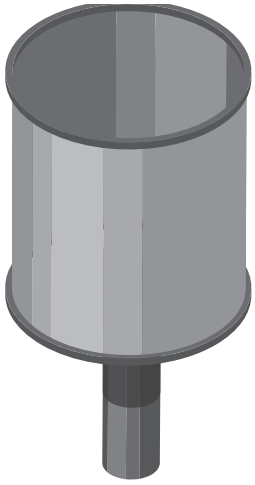
## General Specifications

| | |
|---|---|
| Operating temperature | -15 … +55 °C (+5 ... +131 °F) |
| Storage temperature | -40 ... +65 °C (-40 ... +149 °F) |
| Sensor | Capacitive principle, thick layer sensor RAINCAP®, with a thin glass shield. Integrated heater element. |
| SENSOR PLATE | |
| Sensing area | 7.2 cm² (1.12 ) |
| Angle | 30° |
| MATERIALS | |
| Housing | Polypropylene |
| Windshield and support bracket | Aluminum |
| Moisture shield | Polyurethane |
| DIMENSIONS (H × W × D) | |
| With wind shield | 110 × 80 × 175 mm (4.3 × 3.1 × 6.9 in) |
| Without wind shield | 90 × 46 × 157 mm (3.5 × 1.8 × 6.2 in) |
| Weight | 0.5 kg (1.1 lb) |

# Rain Gauge RG13H

RG13H uses a pulse-based tipping-bucket mechanism to produce a contact closure every time it receives a predetermined small quantity of rainfall (0.1 mm / 0.004 in).

RG13H provides accurate measurements. It is a robust system component that is suitable for remote and unattended locations.



## Measuring Specifications

| | |
|---|---|
| Sensitivity (rainfall per pulse) | 0.1 mm (0.004 in) |
| Accuracy | 2 % (at 1 l/h) |

## General Specifications

| | |
|---|---|
| Operating temperature | -20 ...+85 °C (-4 ... +185°F) |
| Dimensions (H × Ø) | 390 × 300 mm (15.35 × 11.81 in) |
| Weight | 2.6 kg (5.73 lb) |

| Item | Part Number |
|---|---|
| RG13H sensor (heated) including cable 10 m (32 ft 10 in) | RG13 J1N5 (RG13-CFG01) |
| Rain gauge pedestal 1140 mm (44.88 in) with installation kit | RGSTAND1140 |

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# Humidity and Temperature Sensor HMP155E

The HMP155E sensor provides reliable humidity and temperature measurements, which are crucial for dewpoint and frost point calculations. HMP155E is also available with a patented warmed probe, which is specifically designed for demanding outdoor applications where humidity is near saturation. A proper radiation shield is vital for reliable measurements. DTR503A is suitable for most installations but in areas with a risk of high level of pollution and for the warmed probe sensor, DTR13 is recommended because of its special surface finishing which resists contamination well.

| Item | Part Number |
|---|---|
| HMP155E sensor with warmed T-probe | HMP155 E1AA14B1B0G1A0A (HMP155E-CFG10) |
| DTR13 radiation shield | DTR13 |
| T-probe installation adapter | 221069 |
| Spare filter (membrane) | 230727SP |
| HMP155E sensor (no heating) | HMP155E1AA11A0A0E1A0A (HMP155-CFG08) |
| DTR503A radiation shield | DTR503A |
| Spare filter (sintered teflon) | 219452SP |
| CABLE OPTIONS | |
| 10 m (32 ft 10 in) | 220497 |
| 30 m (98 ft 5 in) | 220498 |

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## Measuring Specifications

| | |
|---|---|
| HUMIDITY | HUMICAP®180RC (no heating)<br>HUMICAP®180RC (warmed probe) |
| Observation range | 0 ... 100 %RH |
| Response time at 20 °C (68 °F) in still air | 63 % in 20 s<br>90 % in 60 s |
| Accuracy at -20 … +40 °C (-4 … +104 °F) [1)] | ±(1.0 + 0.008 × reading) %RH |
| AIR TEMPERATURE | Pt100 RTD Class F 0.1 IEC 60751 |
| Observation range | -80 ...+60 °C (-112 ...+140 °F) |
| Accuracy at -80 ...+20 °C (-112 ...+68 °F) | ±(0.176 - 0.0028 × temperature) °C |
| Accuracy at +20 ...+60 °C (+68 ...+140 °F) | ±(0.07 + 0.0025 × temperature) °C |
| DEWPOINT CALCULATION | |
| Accuracy at -20 … +40 °C (-4 … +104 °F) | ±0.6 at 90 … 100 %RH |

[1)] Including non-linearity, hysteresis, and repeatability.

## General Specifications

| | |
|---|---|
| Operating temperature for humidity measurement | -80 … +60 °C (-112 ...+140 °F) |
| Storage temperature | -80 … +60 °C (-112 ...+140 °F) |
| Operating humidity | 0 … 100 %RH |
| Communication interface | RS-485 |
| IP rating | IP66 |
| Weight | 86 g (3.0 oz) |
| MATERIALS | |
| Filter | Sintered teflon or membrane |
| Housing | Plastic PC |
| Additional T-probe | Stainless steel AISI 316L |
| COMPLIANCE | |
| EMC (industrial environment) | EN/IEC 61326-1, EN 55022 |

# Wind Speed and Direction Sensor WMT700 (Ultrasonic)

The WMT700 sensor is a robust and reliable ultrasonic anemometer. It measures surface wind speed and direction without any moving parts, which means minimal maintenance needs. WMT700 has a durable full steel structure, clear north indication, and one-point, quick bayonet-style mounting. It measures accurately and produces reliable data in demanding wind conditions and climates.

| Item | Part Number |
|---|---|
| WMT700 sensor (no heating) | C1A0A001A1A1 (WMT700-CFG07) |
| WMT700 sensor (heated transducers) | C2A0A001A1A1 (WMT700-CFG06) |
| WMT700 sensor (heated transducers and arms) | C3A0A001A1A1 (WMT700-CFG05) |
| Mounting kit for sensor support arm | SENSORARMFIX60 |
| Mounting adapter for sensor support arm and pole mast | WMT70FIXSP |
| CABLE OPTIONS | |
| 10 m (32 ft 10 in) | 227568SP |
| 15 m (49 ft 3 in) | 237890SP |
| 26 m (85 ft 4 in) | 237889SP |
| Bird cage | WMT70BIRDKIT |
| Zero wind verifier | WMT70VERIFIER |

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## Measuring Specifications

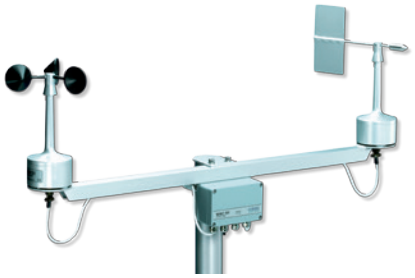
| | |
|---|---|
| WIND SPEED | |
| Observation range | 0 ... 75 m/s (167.8 mph) |
| Resolution | 0.01 m/s |
| Accuracy at 0 ... 75 m/s | ±0.1 m/s or 2 % of reading, whichever is greater |
| Accuracy at 75 ... 90 m/s | ±5% of reading |
| WIND DIRECTION | |
| Observation range | 0 ... 360° |
| Resolution | 0.01° |
| Accuracy | ±2° |

## General Specifications

| | |
|---|---|
| Operating temperature | -55 ... +70 °C (-67 ... 158 °F) |
| Storage temperature | -60 ... +80 °C (-76 ... +176 °F) |
| Operating humidity | 0 ... 100 %RH |
| IP rating | IP66 and IP67 |
| Dimensions (H × W × D) | 350 × 250 × 285 mm (13.8 × 9.8 × 11.2 in) |
| Weight | 1.8 kg (4.0 lb) |
| HEATING OPTIONS | |
| No heating | 0 W |
| Transducers heating | 30 W (standard RWS200 power) |
| Transducers and arms heating | 150 W (duplicated RWS200 power) |
| MATERIALS | |
| Body and arms | Stainless steel AISI 316 |
| Transducers | Piezo ceramics covered with silicone rubber |
| Connector housing surface | Nickel-plated brass |
| COMPLIANCE | |
| EMC | IEC61000-4-2 ... 6; CISPR22 |
| Environmental | IEC 60068-2-1,2,6/34,30,31,67,78 IEC 60529;VDA 621-415 |

# Wind Speed and Direction Sensor WA15 (Mechanical)

The WA15 wind set consists of Vaisala Anemometer WAA151, Vaisala Wind Vane WAV151, and Vaisala Serial Transmitter WAC155. WAA151 is a fast response, low-threshold anemometer. Three lightweight, conical cups mounted on the cup wheel, provide excellent linearity over the entire operating range. WAV151 is a counter-balanced, low-threshold, optoelectronic wind vane. Both have low measurement starting threshold for accurate wind measurements.



## WAA151 Measuring Specifications

| | |
|---|---|
| Observation range | 0.4 ... 75 m/s (0.9 … 167.8 mph) |
| Starting threshold | <0.5 m/s (1.1 mph) |
| Accuracy (standard deviation) | ±0.17 m/s |

## WAA151 General Specifications

| | |
|---|---|
| Operating temperature | -55 … +60 °C (-67 ... +140 °F) |
| Storage temperature | -60 … +70 °C (-76 ... +158 °F) |
| Operating humidity | 0 ... 100 %RH |
| Dimensions (H × Ø) | 240 × 90 mm (9.4 × 3.5 in) |
| Weight | 0.6 kg (1.3 lb) |
| MATERIALS | |
| Housing | AlMgSi, gray anodized |
| Cup | PA, reinforced with carbon fiber |
| COMPLIANCE | |
| Wind tunnel tests | ASTM standard method D5366-90 |
| Exploratory vibration test | MIL-STD-167-1 |
| Humidity test | MIL-STD-810E, Method 507.3 |
| Salt fog test | MIL-STD-810E, Method 509.3 |
| EMC | EN/IEC 61326-1:1997 + Am1:1998; Am2:2001; Generic Environment |

## WAV151 Measuring Specifications

| | |
|---|---|
| Observation range | 0 ... 360° |
| Starting threshold | <0.4 m/s (0.9 mph) |
| Resolution | ±2.8° |
| Accuracy | Better than ±3° |

## WAV151 General Specifications

| | |
|---|---|
| Operating temperature | -50 … +55 °C (-58 ... +131 °F) |
| Storage temperature | -60 … +70 °C (-76 ... +158 °F) |
| Operating humidity | 0 ... 100 %RH |
| Dimensions (H × Ø) | 300 × 90 mm (11.8 × 3.5 in) |
| Weight | 0.7 kg (1.5 lb) |
| MATERIALS | |
| Housing | AlMgSi, gray anodized |
| Vane | AISI 12, anodized |
| COMPLIANCE | |
| Wind tunnel tests | ASTM standard method D5366-93 (for starting threshold, distance constant, transfer function) |
| Exploratory vibration test | MIL-STD-167-1 |
| Humidity test | MIL-STD-810E, Method 507.3 |
| Salt fog test | MIL-STD-810E, Method 509.3 |
| EMC | EN61326-1:1997 + Am1:1998; Am2:2001; Generic Environment |

## WAC155 General Specifications

| | |
|---|---|
| Operating temperature | -55 … +60 °C (-67 ... +140 °F) |
| Storage temperature | -60 … +70 °C (-76 ... +158 °F) |
| Operating humidity | 0 ... 100 %RH |
| Communication interface | RS-485 |
| IP rating | IP65 |
| MATERIALS | |
| Cross arm | Aluminum, anodized |
| Transmitter | Aluminum, painted gray |
| DIMENSIONS | |
| Cross arm with sensor plates | 887 mm (34.9 in) |
| Transmitter with cable glands (H) | 165 mm (6.5 in) |
| Weight | 1.5 kg (3.3 lb) |

| Item | Part Number |
|---|---|
| WA15 sensor set including: | WA15 |
| Serial transmitter, cross arm, and mounting set for Ø 60 mm (2.36 in) pole mast | WAC155 |
| Wind direction sensor (wind vane) | WAV151 |
| Wind speed sensor (anemometer) | WAA151 |
| Cable 10 m (32 ft 10 in) | ZZ45049 |
| Anemometer WAA151 cable | ZZ45036 |
| Wind vane WAV151 cable | ZZ45037 |
| Mounting kit for sensor support arm | SENSORARMFIX60 |

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# Pressure Sensor PTB110

The PTB110 barometer is designed for general environmental pressure monitoring over a wide temperature range. The excellent long-term stability of the barometer minimizes or even removes the need for field adjustment.


PTB110 is typically used in RWIS which complements synoptic weather station networks.

| Item | Part Number |
|---|---|
| PTB110 sensor (class B calibration) | PTB1101S1AA (PTB110-CFG02) |
| SPARE PARTS | |
| Plastic cover | 219268 |
| DIN rail connector | 219269 |
| Pressure port | 16941DM |
| Cable to PMU701 | CBL210271-250 |

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## Measuring Specifications

| | |
|---|---|
| Pressure ranges (1 hPa = 1 mbar) | 500 ... 1100 hPa |
| Resolution | 0.1 hPa |
| TOTAL ACCURACY | |
| +15 ...+25 °C (+59 … +77 °F) | ±0.3 hPa |
| 0 ...+40 °C (+32 … +104 °F) | ±0.6 hPa |
| -20 ...+45 °C ( 4 … +113 °F) | ±1.0 hPa |
| -40 ...+60 °C (-40 … +140 °F) | ±1.5 hPa |
| Long-term stability | ±0.1 hPa/year |

## General Specifications

| | |
|---|---|
| Operating temperature | -40 … +60 °C (-40 ...+140 °F) |
| Storage temperature | -40 … +60 °C (-40 ...+140 °F) |
| Operating humidity | Non-condensing |
| Pressure fitting | Barbed fitting for 1/8 in |
| Minimum pressure limit | 0 hPa abs |
| Maximum pressure limit | 2 000 hPa abs |
| Weight | 90 g (3.2 oz.) |
| IP rating | IP32 |
| MATERIALS | |
| Housing cover | Plastic ABS/PC blend |
| Metal mounting plate | Aluminum |
| COMPLIANCE | |
| EMC (industrial environment) | EN/IED 61326-1, Electrical equipment for measurement, control and laboratory use |

# Weather Transmitter WXT536

The WXT536 weather transmitter measures barometric pressure, humidity, precipitation, temperature, and wind speed and direction. To measure wind speed and direction, WXT536 has the Vaisala WINDCAP® sensor that uses ultrasound to determine horizontal wind speed and direction.

The WXT536 precipitation measurement is based on the unique, maintenance-free Vaisala RAINCAP®. WXT536 measures accumulated rainfall, rain intensity, and duration of the rain – all in real time. The WXT536 is immune to flooding, clogging, wetting, and evaporation losses in the rain measurement.

WXT536 reports precipitation as hail or rain. When WXT536 is used with DRD11A, the system capabilities increase to recognize also snow and sleet.

## General Specifications

| | |
|---|---|
| Operating temperature | -52 ...+60 °C (-60 ...+140 °F) |
| Storage temperature | -60 ...+70 °C (-76 ...+158 °F) |
| Relative humidity | 0 ... 100 %RH |
| MATERIALS | |
| Radiation shield, top, and bottom parts | Polycarbonate, 20 % glass fiber |
| Precipitation sensor plate | Stainless steel AISI 316 |
| Dimensions (H × W) | 238 mm × 115 mm (9.35 × 4.52 in) |
| Weight | 0.7 kg (1.54 lb) |
| IP RATING | |
| Without mounting kit | IP65 |
| With mounting kit | IP66 |
| COMPLIANCE | |
| EMC | IEC 61000-4-2 … 6 |
| Emissions | CISPR 22 |

## Measuring Specifications

| | |
|---|---|
| BAROMETRIC PRESSURE | |
| Observation range | 600 ... 1100 hPa |
| Resolution | 0.1 hPa / 0.1 mmHg / 0.01 inHg |
| Accuracy | |
| At 0 … +30 °C (+32 … +86 °F) | ±0.5 hPa |
| At -52 … +60 °C (-60 ...+140 °F) | ±1 hPa |
| AIR TEMPERATURE | |
| Observation range | -52 … +60 °C (-60 … +140 °F) |
| Resolution | 0.1 |
| Accuracy (for sensor element) at +20 °C (+68 °F) | ±0.3 °C (±5 °F) |
| WIND SPEED | |
| Observation range | 0 … 60 m/s (134 mph) |
| Resolution | 0.1 m/s (knots, mph) |
| Accuracy | ±3 % at 10 m/s |
| WIND DIRECTION | |
| Observation range | 0 … 360° |
| Resolution | 1° |
| Accuracy | ±3.0° |
| RELATIVE HUMIDITY | |
| Observation range | 0 … 100 %RH |
| Resolution | 0.1 %RH |
| Accuracy at 0 ... 90 %RH | ±3 %RH |
| Accuracy at 90 ... 100 %RH | ±5 %RH |
| PRECIPITATION | |
| Field accuracy for daily accumulation | Better than 5 %, weather dependent [1] |
| Intensity observation range | 0 ... 200 mm/h |
| PRECIPITATION TYPE IDENTIFICATION | |
| Without DRD11A | Rain, Hail |
| With DRD11A | Rain, Sleet/Mixed, Snow |

[1] Due to the nature of the phenomenon, deviations caused by spatial variations may exist in precipitation readings, especially in a short time scale. The accuracy specification does not include possible wind-induced errors.

| Item | Part Number |
|---|---|
| WXT536 sensor (no heating) | 6D1B1K1A1A1B (WXT536-CFG01) |
| WXT536 sensor (heated) | WXT536-CFG01 (WXT536-CFG02) |
| Mounting kit | 212792 |
| Mounting adapter for pole mast and sensor support arm | WMSFIX60 |
| Mounting bracket for sensor support arm | SENSORARMFIX60 |
| Cable 10 m (32 ft 10 in) | 222288 |
| SPARE PARTS | |
| Radiation shield | 218817SP |
| PTU module | WXTPTUSP |

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# Third-Party Sensors

RWS200 supports the following third-party sensors:

## Subsurface Temperature Sensors

FinMeas multidepth sensor TPS10:
www.finmeas.com

## Precipitation Sensors

Tipping buckets

## Wind Sensors

R.M. Young combined wind sensor:
www.youngusa.com

## Level Sensors

Campbell water level and snow depth sensor SR50A:
www.campbellsci.com

## Global Radiation Sensors

For example, Kipp & Zonen global radiation sensor SP Lite2:
www.kippzonen.com

## Cameras

Axis pan-tilt-zoom (PTZ) camera Q6042-E:
www.axis.com
Mobotix fixed camera M15:
www.mobotix.com

## Traffic Sensors

Wavetronix SmartSensor HD:
www.wavetronix.com

For more information on the third-party sensors, see the manufacturer documentation.

# Weather Station Electronics

## Data Management Unit DMU703

DMU703 is the heart of RWS200. It takes care of all the necessary calculations, includes all the necessary algorithms, and provides an in-built database for local data storage. The system is operated through a web browser using an intuitive graphical user interface. Local maintenance access is taken through a wired Ethernet connection or an integrated WLAN connection. Each DMU703 contains an in-built GPS to provide accurate system time synchronization.

### General

| | |
|---|---|
| Operating temperature | -40 ... +60 °C (-40 ... 140 °F) |
| Storage temperature | -60 ... +80 °C (-58 ... +176 °F) |
| Humidity | 5 ... 93 %RH non-condensing |
| MATERIALS | |
| Screws, washers, DIN rail locking piece | Stainless steel AISI 316 |
| Frame profile | Aluminum EN AW-6060 T6 |
| Side plates | Plastic PC/ABS |
| Dimensions (H × W × D) | 126 × 55 × 127 mm (5.0 × 2.2 × 5.0 in) |
| Weight | 0.4 kg (0.88 lb) |
| COMPLIANCE | |
| Vibration | IEC 60068-2-6 |
| Rough handling | IEC 60068-2-31 |
| Shock | IEC 60068-2-27 |
| Dry heat | IEC 60068-2-2 |
| Damp heat | IEC 60068-2-78 |
| Corrosion and salt mist | VDA 621-415 |
| EMC (industrial environment) | EN/IEC 61326-1 |
| Conducted emissions | CISPR22/EN 55022/Class B |
| Radiated emissions | CISPR22/EN 55022/Class B |
| Electrical safety | EN/UL/IEC 60950-1/-22 |
| OTHER DETAILS | |
| Processor | ARM Cortex A8 |
| Memory | 512 MB DDR3 RAM, 2 GB flash |
| RTC backup battery | CR1220 |
| Web services | HTTPS |

### Power

| | |
|---|---|
| Powering | 8 ... 32 VDC |
| Connector | Phoenix Contact DFMC1,5/5-ST-3,5-LR |
| Power consumption | Max. 3 W |
| LEDs | Status |

### Connections

| | |
|---|---|
| ETHERNET | 2 ports |
| Standard | IEEE 802.3 |
| Physical layer | Base-T |
| Data rate | 10/100 Mbps |
| Connectors | RJ-45 with link LEDs |
| RS-232 SERIAL | 2 ports |
| Signals | RXD, TXD, CTS, RTS for both ports<br>One port also has DTR, DSR, DCD, RI<br>(alternative for one RS-485 port) |
| Connector | Phoenix Contact DFMC 1,5/5-ST-3,5-LR |
| RS-485 SERIAL | 3 ports |
| Signals | D+/D- for all three ports<br>One port has also R+/R-<br>(alternative for one RS-232 port) |
| Connectors | 1 × Phoenix Contact DFMC 1,5/5-ST-3,5-LR<br>and 1 × RJ45 (expansion bus) |
| RS-485 SERIAL – ISOLATED | 2 ports |
| Signals | R+/R-/T+/T |
| Connectors | Phoenix Contact DFMC1,5/5-ST-3,5-LR |
| ANALOG INPUTS | 2 lines |
| Frequency input signal | 1 Hz ... 20k Hz,<br>or 2.5 ... 14 VAC,<br>or 10 mV ... 15 VAC |
| Excitation voltage signal | 0 ... 12 VDC at 20 mA |
| Fast input high signal | 0 ... 1.8 VDC, 12-bit ADC |
| Fast input low signal | 0 ... 1.8 VDC, 12-bit ADC |
| Single-ended/Differential measurement mode | Ground |
| Connector | Phoenix Contact DFMC<br>1,5/5-ST-3,5-LR |
| I/O DIGITAL | 4 × input and 4 × output lines |
| Input signal | 0 ... 30 VDC, counter 0 ... 100 Hz |
| Output signal | Open collector, max. load<br>30 DC at 1A |
| Connectors | Phoenix Contact DFMC<br>1,5/5-ST-3,5-LR |
| OTHER SERIAL COMMUNICATION | |
| CAN | 1 port |
| Connector | RJ45 |
| SDI-12 | 1 port |
| Connector | Phoenix Contact DFMC<br>1,5/5-ST-3,5-LR |
| GPS | |
| Receiver type | 50-channel GPS L1 frequency |
| Standards | SBAS: WAAS, EGNOS, MSAS |
| Time-to-first-fix | Cold/Warm start 26 s |
| Horizontal position accuracy [1)] | 2.5 m (8.2 ft) |
| Antenna connector | Female SMA |
| WLAN | |
| Standards | IEEE 802.11 b, g, n |
| Transmit power | 20 dBm, 11 Mbps, b<br>14.5 dBm, 54 Mbps, g<br>12.5 dBm, 65 Mbps, n |
| Acceptance | FCC (USA), IC (Canada),<br>CE (Europe) |
| | Contains FCC ID: TFB-TIWI1-01<br>Contains IC: 5969A-TIWI101 |
| Antenna connector | RP-SMA |

[1)] LEP, 50 % 24-hour static, -130 dBm

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# Cellular Router WR21


The Digi TransPort® WR21 cellular router provides primary and backup connectivity including 2.5G/3G/4G networks, LTE, GSM: EDGE, HSPA, HSPA+ and CDMA: 1xRTT, EV-DO. The connection allows data transmission and access to the browser-based user interface.

## General

| | |
|---|---|
| Operating temperature range | -35 ... +75 °C (-31 ... 167 °F) |
| Operating humidity range | 20 ... 95 % non-condensing |
| Dimensions (H × W × D) | 32 × 131 × 100 mm (1.3 × 5.2 × 3.9 in) |
| Weight | 0.5 kg (1.1 lb) |
| IP rating | IP50 |
| ETHERNET | |
| Ports | 2 |
| COMPLIANCE | |
| Electrical safety | UL 60950, CSA 22.2 No. 60950, EN 60950 |
| Emissions/Immunity | CE, FCC Part 15 Class B, EN55024, AS/NZS CISPR22, EN55022 Class B |

## Wireless Interfaces

| | |
|---|---|
| HSPA+ (WR21-U92A-DE1-TB) | |
| HSPA+ | 850/900/1700 (AWS)/1900/2100 MHz |
| Max. transfer rate | 5.76 Mbps up, 21 Mbps down |
| LTE – EMEA/GLOBAL (WR21-L12A-DE1-TA) | |
| LTE | 800/850/900/1800/1900/2100/2600 MHz |
| 3G fallback to | 850/900/1900/2100 MHz |
| 2G fallback to | 850/900/1800/1900 MHz |
| Max. transfer rate | 50 Mbps up, 100 Mbps down |
| LTE – NORTH AMERICA (WR21-L52A-DE1-TA) | |
| Multicarrier | Verizon, AT&T, Sprint |
| LTE | 700/850/1700(AWS)/1900 MHz |
| 2G/3G GSM fallback to | 850/900/1700AWS/1800/1900/2100 MHz |
| 2G/3G CDMA fallback to | 800/1900 MHz |
| Max. transfer rate | 50 Mbps up, 100 Mbps down |

CE

# Mounting Equipment and Accessories

## BOX652 and BOX722 Mounting Kits

| Item | Part Number |
|---|---|
| Mounting kit for | |
| Lattice towers | ASM210998 |
| Ø 60 mm (2.4 in) pole masts (2 pcs) | APPK-SET60 |
| Ø 75 mm (3.0 in) pole masts (2 pcs) | APPK-SET75 |
| Ø 100 mm (3.9 in) pole masts (2 pcs) | APPK-SET100 |
| Mounting kit for Ø 80 ... 600 mm (3.2 ... 23.6 in) pole masts (2 pcs) | |
| Excluding stainless steel band and locks | DRUNIV-US |
| Including stainless steel band and locks | DRUNIV |

## BOXALU-US and BOXSS-US Mounting Kits

| Item | Part Number |
|---|---|
| Mounting kit for lattice towers | 60030004 |
| Backplate mounting frame | ASM211177 |

## Sensor Support Arm Mounting Kits

| Item | Part Number |
|---|---|
| Sensor support arm and mounting kit for | |
| Lattice towers | ASM211057 |
| Ø 63 mm (2.5 in) pole masts (2 pcs) | DM32ARM63 |
| Ø 75 mm (3.0 in) pole masts (2 pcs) | DM32ARM75 |
| Ø 102 mm (4.0 in) pole masts (2 pcs) | DM32ARM102 |
| Sensor support arm and mounting kit for Ø 80 ... 600 mm (3.2 ... 23.6 in) pole masts (2 pcs) | |
| Excluding stainless steel band and locks | DRUNIVARM-US |
| Including stainless steel band and locks | DRUNIVARM |

# Spare Parts

## Powering Spare Parts

| Item | Part Number |
|---|---|
| Phoenix AC/DC power supply unit including power cable to PMU701 and AC wires | 234881-RWSSP |
| AC mains DIN rail assembly for standard backplate with | |
| EUR socket | ASM210483SP |
| UK socket | ASM210483UKSP |
| FR socket | ASM210483FRSP |
| US socket | ASM210483USSP |
| Phoenix Contact PLT-SEC-T3-230-P surge protector | 242575SP |
| 12 V 26 Ah VRLA battery for standard backplate (BOX652, BOXALU-US, and BOXSS-US) | 215050SP |
| Battery clamp for 26 Ah battery | ASM210910SP |
| 12 V 2.6 Ah VRLA battery for slim backplate (BOX722) | 233012SP |

## Enclosure Spare Parts

| Item | Part Number |
|---|---|
| BOX652 | |
| Enclosure | BOX652SP |
| Radiation shield | ASM210463SP |
| Cabling box | ASM210466SP |
| Mounting frame | ASM210961SP |
| BOX722 | |
| Enclosure | BOX722SP |
| Radiation shield | ASM211127SP |
| Cabling box | ASM211081SP |
| Mounting frame | ASM211107SP |
| Rubber flange set | DRFLANGE10SP |
| Enclosure lock set (2 pcs) | ASM210864SP |
| Enclosure accessories including:<br>Cable ties 2.5 mm × 100 mm (20 pcs)<br>Cable tie holders FTH-13R-01 (5 pcs)<br>DIN rail end brackets (10 pcs)<br>Washers with EPDM gasket 6.8/16×1.5/A2/EPDM (4 pcs)<br>Hex screws M6×16 ISO7380 A4 (2 pcs)<br>Hex nuts M6 Wulock Fe/Zn (2 pcs)<br>Torx screws M4×8 ISO14583 TX A4 (10 pcs)<br>Flat washers A6.4 DIN125 A4 (4 pcs) | BOX652ACC1SP |

## Communication Equipment Spare Parts

| Item | Part Number |
|---|---|
| Digi TransPort® WR21 cellular router with mounting kit: | |
| 3G International (WR21-U92A-DE1-TB) | 237829-RWSSP |
| 4G International (WR21-L12A-DE1-TA) | 241542-RWSSP |
| 4G LTE North America (WR21-L52A-DE1-TA) | 241508-RWSSP |
| Mounting kit including power cable, Ethernet cable, and mounting bracket | ASM211746SP |
| Mobile Mark LTM401 antenna with fixed cables 4.5 m (15 ft) and mounting kit | 236774SP |
| Mobile Mark LTM401 antenna with fixed cables 10 m (32 ft 10 in) and mounting kit | 243834 |

## DMU703 Spare Parts

| Item | Part Number |
|---|---|
| Data management unit DMU703 including Ethernet cable | DMU703SP |
| DMU703 accessories including RJ45 Ethernet cables (4 pcs) and grounding cables (3 pcs) | DMU703ACC1SP |
| Internal cable set | CBL210267SP |

## DRI701 Spare Parts

| Item | Part Number |
|---|---|
| Road sensor interface card DRI701 including power cable, Ethernet cable, and 6-pin (2 pcs), 8-pin (1 pc), 16-pin (2 pcs) cable connectors | DRI701SP |

## PMU701 Spare Parts

| Item | Part Number |
|---|---|
| Power management unit PMU701 including sensor data cable and 20-pin cable connector | PMU701SP |
| Cable assembly (from TELECOM connector to WR21 cellular router, PTB110, and DRI701) | CBL210509SP |
| PMU701 accessories including:<br>Torx screws M4×8 ISO14583 TX A4 (4 pcs)<br>Torx screws M3×6 ISO14583 A4 (6 pcs)<br>Cable shield grounding clamps SK 8 (10 pcs)<br>Cable shield grounding clamps SK 14 (10 pcs)<br>Hex-tapped spacers M4-55 FeZn Female/Male (2 pcs)<br>Enclosure sensor grounding rail<br>PMU701 sensor grounding rail | PMU701ACC1SP |
| PMU701 accessories including:<br>Cable shield grounding clamps SK 8 (10 pcs)<br>Cable shield grounding clamps SK 14 (10 pcs) | PMU701ACC2SP |
| PMU701 accessories including:<br>Set of quick reference cards<br>Cable ferrules 0.5 mm²/10 mm (100 pcs)<br>Phoenix Contact cable connectors:<br>2-pin (4 pcs), 6-pin (10 pcs), 8-pin (10 pcs), 10-pin (30 pcs), 16-pin (10 pcs), 20-pin (5 pcs), MVSTBR (4 pcs)<br>Cover plates: narrow (7 pcs), wide (3 pcs) | PMU701ACC3SP |
| Analog input/output plug-in module including 10-pin cable connectors (2 pcs) | PMA701SP |
| 2-channel Ethernet/power over Ethernet plug-in module | PME701SP |
| External DC / Solar panel plug-in module | PMP701SP |
| 2-channel serial input/output plug-in module including 10-pin cable connectors (2 pcs) | PMS701SP |

## Device Control Spare Parts

| Item | Part Number |
|---|---|
| Device control spare part including pre-assembled relays (3 pcs), wire set, DIN rail, and mounting screw (3 pcs) | RWS200DEVCSP |

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