



RWS200 Product Catalog

Road Weather Station RWS200 for Roads, Rail, and Runways



Features

- Reliable and quality data for educated decision making
- Increased system reliability through centralized power management
- Local database for data storage
- Battery backup
- Fast return of investment through operational savings
- Built-in web user interface
- On-site wireless network access to ease annual maintenance
- Easy upgrade and sensor retrofit from previous versions

Vaisala Road Weather Station RWS200 is designed for the future of road weather systems and Intelligent Transportation Systems (ITS). RWS200 provides a complete road weather solution to improve road, rail, or runway winter maintenance activities in your organization.

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.

Vaisala Road Weather Station RWS200



Challenges of Road Maintenance

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.

Importance of Road Weather Stations

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 and Runway Sensors

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-invasive. 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

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

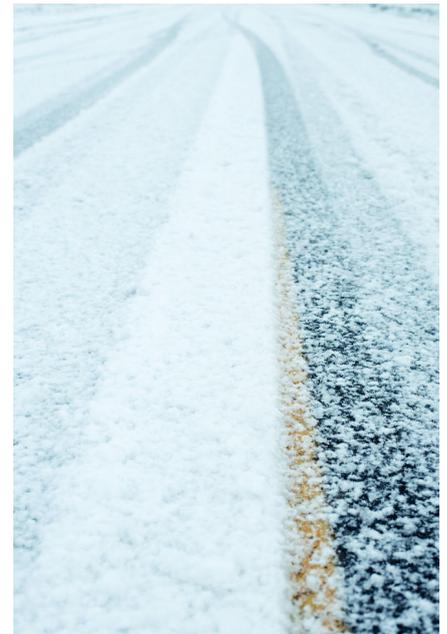
RWS200 is not just a roadside processor designed to collect, store, and transmit data from road weather sensors.

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



Global Leader in Measurement

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.

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.

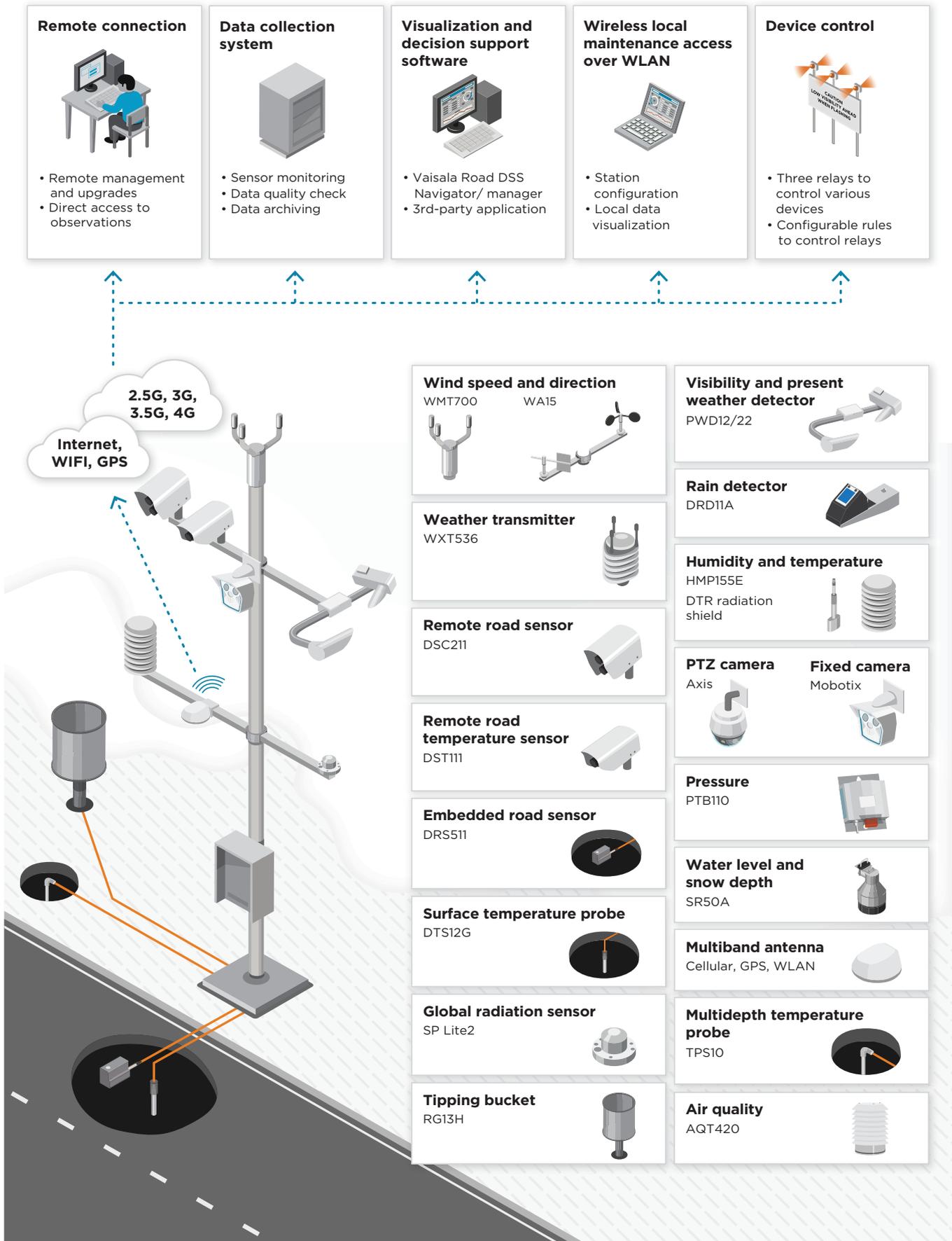
Vaisala also offers an all-in-one sensor that can measure multiple weather observations at once, but its accuracy is not as good as with dedicated sensors.

Looking Ahead

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



RWS200 System

Operating Environment

Operating temperature ¹⁾	-40 ... +60 °C (-40 ... +140 °F)
Storage temperature ²⁾	-60 ... +80 °C (-76 ... +176 °F)
Operating humidity	5 ... 100 %RH

1) *Mobotix operating temperature: -30 ... +60 °C (-22 ... +140 °F). AQT420 operating temperature: -30 ... +40 °C (-22 ... +104 °F).*
 2) *Excluding backup battery.*

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)	IEC 61326-1 (EN 61326-1)
Conducted emissions	CISPR 32 Class B (EN 55032) ¹⁾
Radiated emissions	CISPR 32 Class B (EN 55032) ¹⁾
Electrical safety	EN/UL/IEC 60950-1/-22

1) *AXIS PTZ camera and Wavetronix traffic sensor emissions: Class A*

Powering Specifications

Mains fuse (nominal)	10 A
AC (mains) power	90 ... 264 VAC, 45 ... 65 Hz 5.6 A maximum (120 VAC)
AC (mains) surge protection	Type 3 1.5 kV / 3 kA Maximum continuous voltage: 264 VAC
External power	12 ... 32 VDC (minimum 10 VDC) 15 A maximum

Internal Backup Battery

Standard backplate (BOX652, BOXALU-US, BOXSS-US)	26 Ah / 12 V
Slim backplate (BOX722)	2.6 Ah / 12 V

Average Operating Power Consumption ¹⁾

Without sensor heating	18 W
At -10 °C (+14 °F) with the following on:	102 W
• DSC211 lens heating (5 W)	
• WMT700 transducer heating (22 W)	
• PWD22 lens heating and hood heating (57 W)	

1) *With the following configuration: WR21 cellular router, DSC211, DST111, WMT700, PWD22, two DRS511s, and HMP155E.*

Communication Options

Standard communication options	2.5G/3G/4G cellular, WLAN, and Ethernet
Customer-provided communication options	Cellular, Ethernet, and serial options
User interface	Browser-based Web UI

Data Reports

Polled interfaces	DATEX II NTCIP Vaisala DTO XML Vaisala MES 14 Vaisala MES 16
Pushed interfaces	Images Vaisala DTO XML Vaisala MES 14 Vaisala MES 16
Station reports	Station summary report Event log
Road surface state	Vaisala classes EN 15518-3 classes

Standard Sensor Options

Road state, remote	DSC211
Road temperature, remote	DST111
Road state and temperature, embedded	DRS511
Subsurface temperature	DTS12G
Subsurface temperature multidepth	TPS10
Humidity and temperature	HMP155E
Visibility and present weather	PWD12/PWD22
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 Wind
Pressure	PTB110
Multiparameter	WXT536
Water level	SR50A
Snow depth	SR50A
Global radiation	SP Lite2
Fixed camera	Mobotix M16
Pan-tilt-zoom (PTZ) camera	Axis Q6052-E

Other Supported Sensors

Air quality	AQT420
Road state and temperature, embedded	FP2000
Subsurface temperature	DTS210
Multiparameter	WXT520
Fixed camera	Mobotix M12 and M15
PTZ camera	Axis Q6032-E and Q6042-E
Traffic sensor	Wavetronix SmartSensor HD ¹⁾

1) *North America only.*



Remote Road Sensor DSC211



DSC211 measures road surface state: the amounts of water, ice, and snow. DSC211 produces a calculated value of slipperiness, grip. It also includes an integrated visibility sensor that provides an optional measurement for detecting low visibility conditions. 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.

Optics and Radiation

Optical Specification

Light source	Near-infrared laser diodes
Detection of window contamination	Contamination level of the receiver window is measured

Radiation Properties

Beam divergence	0.02 radians
Pulse duration	0.5 ms
Maximum output	0.007 W
Cumulative observation uncertainty of the quantities above	10 %
Expected increase in the quantities above	10 %

Radiation Properties of Incorporated Laser Diodes

Beam divergence	0.02 radians
Pulse duration	0.5 ms
Maximum output	0.007 W
Cumulative observation uncertainty of the quantities above	10 %
Expected increase in the quantities above	10 %

Measurement Performance

Measuring distance with visibility observation disabled	2 ... 15 m (6 ft 7 in ... 49 ft 3 in)
Measuring distance with visibility observation enabled	8 ... 15 m (26 ft 3 in ... 49 ft 3 in)
Installation angle from the horizontal line	30 ... 80° (35 ... 65° recommended)
Diameter of measuring area at 10 m (33 ft)	20 cm (7.87 in)

Layer Thickness

Water layer observation range	0.00 ... 2 mm (0.00 ... 0.06 in)
Ice layer observation range	0.00 ... 2 mm (0.00 ... 0.06 in)
Snow coverage observation range	0.00 ... 10 mm (0.00 ... 0.40 in)
Snow (water equivalent) observation range	0.00 ... 1 mm (0.00 ... 0.040 in)
Resolution	0.01 mm (0.0004 in)
Accuracy for water and ice layer	±0.1 mm in the range of 0 ... 1 mm (0 ... 0.04 in)

Level of Grip

Measurement 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) ²⁾	10 ... 2000 m (33 ... 6572 ft)
Resolution	1 m (3 ft 3 in)
Accuracy (fog and snowfall)	±20 % (average)
Response time	60 s

- ¹⁾ Frost is only reported when dew point and road temperature information is available.
²⁾ Meteorological optical range

Mechanical Specifications

IP rating	IP65
Dimensions (H × W × D)	210 × 133 × 448 mm (8.27 × 5.24 × 17.64 in)
Weight	3.4 kg (7.50 lb)
Mounting	Fits on a sensor support arm with cross-section of 40 × 40 mm (1.57 × 1.57 in)

Materials

Cover	ABS plastic
Mounting bracket	POM-C
Other parts	Aluminum

Options, Spare Parts, and Accessories

Item	Order Code
DSC211 sensor (maximum 2 pcs)	DSC211RWS
Cable 10 m (32 ft 10 in)	216546
Cable 25 m (82 ft 3 in)	216547
Cable 50 m (164 ft 1 in)	DR221741Z50MSP
Cable 100 m (328 ft 1 in)	DR221741Z100MSP
Cable 150 m (492 ft 2 in)	DR221741Z150MSP
Spare hood	DRW217593SP



Remote Road Temperature Sensor DST111



DST111 provides a unique remote alternative to measuring road surface temperature. By measuring the infrared radiation emitted by the surface and applying intelligent signal processing, the sensor provides a reliable remote surface temperature measurement.

DST111 provides reliable results in conditions where most of the commercially available infrared sensors fail. At night time, when the road surface is cooling under a clear sky, conventional infrared sensors provide an error of up to $-3\text{ }^{\circ}\text{C}$ ($-26.6\text{ }^{\circ}\text{F}$) due to emissivity conditions of the road surface. DST111 compensates for this error by its unique design.

Measurement Performance

Measuring distance	2 ... 15 m (6 ft 7 in ... 49 ft)
Installation angle from the horizontal line	30 ... 85° (35 ... 65° recommended)
Measuring area	Ø 150 cm at 10 m (59.1 in at 32 ft)

Road Temperature Measurement Performance

Observation range	$-40\text{ ... }+60\text{ }^{\circ}\text{C}$ ($-40\text{ ... }+140\text{ }^{\circ}\text{F}$)
Resolution	0.1 $^{\circ}\text{C}$
Time constant	1 min
Data refresh time	30 s

Air Temperature Measurement Performance

Observation range ¹⁾	$-40\text{ ... }+60\text{ }^{\circ}\text{C}$ ($-40\text{ ... }+140\text{ }^{\circ}\text{F}$)
Resolution	0.1 $^{\circ}\text{C}$
Typical accuracy at +20 $^{\circ}\text{C}$ (+68 $^{\circ}\text{F}$)	$\pm 0.6\text{ }^{\circ}\text{C}$ ($\pm 1.1\text{ }^{\circ}\text{F}$)

¹⁾ Air temperature readings are mainly intended for the internal compensation of DST111. The accuracy is not as high as that of the HMP155 sensor with a proper solar radiation shield.

Relative Humidity Measurement Performance

Observation range ¹⁾	0 ... 98 %RH
Resolution	0.1 %RH
Typical accuracy at +20 $^{\circ}\text{C}$ (+68 $^{\circ}\text{F}$)	$\pm 3\text{ }^{\circ}\text{RH}$
Typical accuracy at +20 $^{\circ}\text{C}$ (+68 $^{\circ}\text{F}$)	$\pm 5\text{ }^{\circ}\text{RH}$
Stability	$\pm 2\text{ }^{\circ}\text{RH}$ over 2 years

¹⁾ Relative humidity readings are mainly intended for the internal compensation of DST111. The accuracy is not as high as that of the HMP155 sensor with a proper solar radiation shield.

Dew Point Measurement Performance

Observation range	$-40\text{ ... }+60\text{ }^{\circ}\text{C}$ ($-40\text{ ... }+140\text{ }^{\circ}\text{F}$)
Resolution	0.1 $^{\circ}\text{C}$

Mechanical Specifications

IP rating	IP65
Dimensions (H × W × D)	125 × 100 × 320 mm (4.92 × 3.94 × 12.60 in)
Weight	1.9 kg (4.19 lb)
Mounting	Fits on a sensor support arm with cross-section of 40 × 40 mm (1.57 × 1.57 in)

Materials

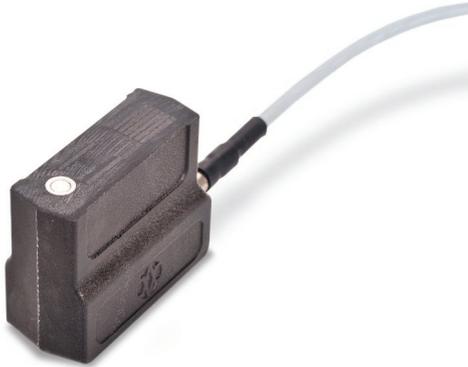
Cover	ABS plastic
Mounting bracket	POM-C
Other parts	Aluminum

Options, Spare Parts, and Accessories

Item	Order Code
DST111 sensor (maximum 2 pcs)	DST111RWS
Cable 10 m (32 ft 10 in)	216546
Cable 25 m (82 ft)	216547
Cable 50 m (164 ft 1 in)	DR221741Z50MSP
Cable 100 m (328 ft 1 in)	DR221741Z100MSP
Cable 150 m (492 ft 2 in)	DR221741Z150MSP
Spare hood	DRW218846SP



Embedded Road Sensor DRS511



Vaisala DRS511 is an embedded road and runway sensor system that takes a variety of measurements and observations of the road or runway surface.

DRS511 is embedded directly in the pavement and gathers its readings by being installed flush with the surface. The sensor design features open-end carbon fiber electrodes and optical fiber technology. These are molded into a solid sensor block consisting of an epoxy compound with properties matching the surface for thermal conductivity and emissivity.

Measurement Performance

Temperature

Observation range	-40 ... +60 °C (-40 ... +140 °F)
Accuracy	±(0.1 + 0.00167 × temperature) °C

Water Layer Thickness

Observation range	0 ... 7 mm (0 ... 0.28 in)
Accuracy	0.1 mm in the range of 0 ... 1.0 mm ¹⁾

Reported Surface States (When Used with Vaisala Weather Station)

Vaisala classes	Dry, Moist, Wet, Snowy, Icy, Frosty, 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.

Mechanical Specifications

Temperature sensors	Two Pt100 elements, 1/3 Class B DIN IEC 751
Dimensions (H × W × D) ¹⁾	DRS511AA: 75 × 84 × 30 mm, bottom 38 mm (2.95 × 3.31 × 1.18 in, bottom 1.50 in) DRS511BB for bridge applications: 50 × 84 × 30 mm, bottom 38 mm (1.97 × 3.31 × 1.18 in, bottom 1.50 in)
Weight including 50 m (165 ft) cable	3.1 kg (6.8 lb)

Materials

Epoxy compound	Araldite D, HY 956, lamp black for color
Cable tubing	Stainless steel AISI 316L
Cable	4 × (2 × 0.22 mm ² / 24 AWG and shield) PUR, high density polyethylene lead isolation
Sensing electrodes	Carbon fiber in epoxy
Optical sensor	Acrylic optical fibers

¹⁾ To make sure that the sensor remains even with the road surface, the sensor can wear up to 35 mm (1.38 in).

Options

Option	Order Code	
DRS511 road sensor (max. 4 pcs) with cable:	Road Sensor	Bridge Sensor
20 m (65 ft 7 in)	DRS511AB2	DRS511BB2
30 m (98 ft 5 in)	DRS511AB3	DRS511BB3
50 m (164 ft 1 in)	DRS511AB5	DRS511BB5
100 m (328 ft 1 in)	DRS511AB10	DRS511BB10
150 m (492 ft 2 in)	DRS511AB15	DRS511BB15
200 m (656 ft 2 in)	DRS511AB20	DRS511BB20
300 m (984 ft 3 in)	DRS511AB30	DRS511BB30

Accessories

Accessory	Order Code
Calibrator kit	DRS511
Splice kit	24051020
Type V extension cable 1524 m (5000 ft) ¹⁾	North America local content

¹⁾ Manufacturer: General Cable, cable type: filled solid cable RDUP (RUS) PE-39 AL, 6 pairs (19 AWG)



Subsurface Temperature Probe DTS12G



DTS12G Ground/Soil Temperature Probe is specially designed for automatic weather stations. It can be used to measure the temperature at different levels beneath the surface. In road weather stations it uses road depth temperature information to produce a 24-hour road surface temperature forecast.

The housing of the platinum resistance (Pt100 sensor) sensing element is made of stainless steel, and it is located in the tip part of the assembly. The cable screen attached to the sensor housing provides a good shield against electromagnetic interference (EMI).

DTS12G Specifications

Sensing element	Platinum resistance element (Pt100)
Accuracy	1/4 DIN 43760 B
Sensitivity	0.385 Ω /°C
Measurement range	-80 ... +80 °C (-112 ... +176 °F)
Housing material	Stainless steel AISI 316
Probe	Max. diameter: 9.5 mm (0.4 in) Length: 100 mm (3.9 in)
Cable	Screened multicore 4 × 0.22 mm (24 AWG) and shield Diameter: 5 mm (0.20 in)

Options

Option	Order Code
DTS12G sensor (maximum 4 pcs) 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

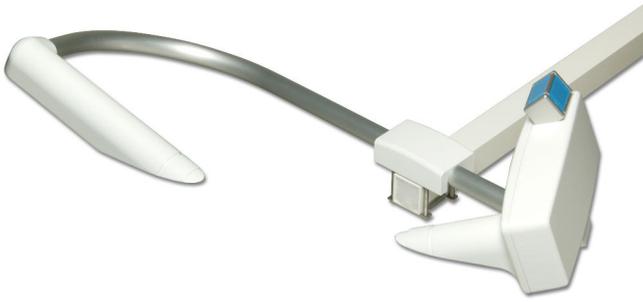
Accessories

Accessory	Order Code
Splice kit	24051020
Type V extension cable 1524 m (5000 ft) ¹⁾	North America local content

¹⁾ Manufacturer: General Cable, cable type: filled solid cable RDUP (RUS) PE-39 AL, 6 pairs (19 AWG)



Visibility and Present Weather Detector PWD12/PWD22



PWD12 and PWD22 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 according to the WMO and NWS code tables.

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.

PWD12 Measurement Performance

Operating principle	Forward scatter measurement with 45° scattering angle
Observation range of MOR	10 ... 2000 m (32 ... 6500 ft)
Accuracy	±10 % at 10 ... 2000 m (32 ... 6500 ft)
Weather type identification	4 different types of precipitation (rain, drizzle, mixed rain/snow, snow) Precipitation (unknown type) Fog (mist), haze (smoke, sand) or clear
Weather type reporting	WMO 4680 (SYNOP) and NWS code tables; 39 different codes supported from WMO 4680 code table
Precipitation detection sensitivity	0.05 mm/h (0.0020 in/h) or less, within 10 minutes
Precipitation intensity measurement	0.00 ... 999.99 mm/h (0.00 ... 39.37 in/h)
Precipitation amount measurement	0.00 ... 99.99 mm (0.00 ... 3.94 in)
Amount of new snow	0.00 ... 999 mm (0.00 ... 39.33 in)

Light Transmitter Optical Specifications

Light source	Near-infrared LED
Peak wavelength	875 nm
Reference photodiode	For light source control
Backscatter photodiode	For contamination and blockage measurement
Eye safety	Eye safe in accordance with International Standard IEC/EN 60 825-1; edition 1.2

PWD22 Measurement Performance

Operating principle	Forward scatter measurement with 45° scattering angle
Observation range of MOR	10 ... 20 000 m (32 ... 65 600 ft)
Accuracy	±10 % at 10 ... 10 000 m (32 ... 32 800 ft) ±15 % at 10 ... 20 km (2.6 ... 12 mi)
Weather type identification	7 different types of precipitation (rain, freezing rain, drizzle, freezing drizzle, mixed rain/snow, snow, ice pellets) Precipitation (unknown type) Fog (mist), haze (smoke, sand) or clear
Weather type reporting	WMO 4680 (SYNOP), 4678 (METAR) and NWS code tables; 49 different codes supported from WMO 4680 code table
Precipitation detection sensitivity	0.05 mm/h (0.0020 in/h) or less, within 10 minutes
Precipitation intensity measurement	0.00 ... 999.99 mm/h (0.00 ... 39.37 in/h)
Precipitation amount measurement	0.00 ... 99.99 mm (0.00 ... 3.94 in)
Amount of new snow	0.00 ... 999 mm (0.00 ... 39.33 in)

Light Receiver Optical Specifications

Detector	Photodiode
Optical filter/window	RG780 glass
Backscatter light source	Near-infrared LED for contamination and blockage measurement

Mechanical Specifications

IP rating	IP66
Weight	3 kg (6.61 lb)
Dimensions (H × W × L)	222 × 432 × 695 mm (8.73 × 16.99 × 27.36 in)

Options

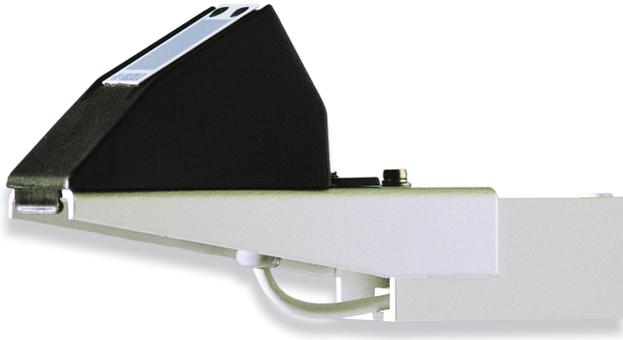
Option	Configuration Code
Present weather detector PWD22, no heating (PWD-CFG07)	DNNNN4NANNNNNN
Present weather detector PWD22, heated (PWD-CFG08)	DNHNN4NANNNNNN
Present weather detector PWD12, heated (PWD-CFG09)	CNHNN4NANNNNNN
Present weather detector PWD12, no heating (PWD-CFG10)	CNNNN4NANNNNNN

Spare Parts and Accessories

Spare Part or Accessory	Order Code
Cable 10 m (32 ft 10 in)	241767
Cable 15 m (49 ft 3 in)	217148
Cable 35 m (114 ft 10 in)	217149
Calibration kit	PWA12
Controller/Receiver	PWC22 (for PWD22) PWC12 (for PWD12)
RAINCAP sensor	PWR211SP (for PWD22) PWR111SP (for PWD12)
Hood heater set	PWH111
Transmitter	PWT11



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 weather station, 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.

Measurement Performance

Sensor	Capacitive principle, thick layer sensor RAINCAP®, with a thin glass shield Integrated heater element
Rain Detection Sensitivity	
Minimum wet area	0.05 cm ² (0.008 in ²)
Detection delay	< 0.1 ms
OFF delay (active)	< 5 min
Precipitation Type Identification	
DRD11A only	Rain
When air temperature and relative humidity are available	Rain, Sleet/Mixed, Snow
Sensor Plate	
Sensing area	7.2 cm ² (1.12 in ²)
Angle	30°

Mechanical Specifications

Weight	0.5 kg (1.1 lb)
Cable length	10 m (32 ft 10 in)
Ground wiring	Separate ground wires for signal and heater
Mounting	By one screw (M5x20 mm) to sensor support arm

Dimensions (H × W × L)

With wind shield	110 × 80 × 175 mm (4.33 × 3.15 × 6.89 in)
Without wind shield	90 × 46 × 157 mm (3.54 × 1.81 × 6.18 in)

Materials

Housing	Polypropylene
Windshield and support bracket	Aluminum
Moisture shield	Polyurethane

Options and Spare Parts

Item	Order Code
DRD11A sensor with cable 10 m (32 ft 10 in)	DRD11A-10M



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.

Measurement Performance

Precipitation	Liquid
Accuracy	2 % at 1 l/h (0.26 gal/h)
Diameter of aperture	225 mm (8.86 in)
Area of aperture	400 cm ² (62 in ²)
Rainfall capacity	Unlimited
Resolution	0.2 mm (0.008 in) 0.1 mm (0.004 in) ¹⁾

1) In standard RWS200 offering.

Mechanical Specifications

Dimensions (H × Ø) 338 × 248 mm (13.31 × 9.76 in)

Weight 2.6 kg (5.73 lb)

Material

Base, septum ring Aluminum alloy LM25

Outer ring, funnel Aluminum alloy sheet

Inlet/Outlet ports, pins Stainless steel

Tipping mechanism Injection moulded plastic

Transducer Reed switch

Output

Circuit Contact closure

Connection Screw terminal

Options

Option	Order Code	Configuration Code
Rain gauge RG13H, heated (RG13-CFG01), rainfall per pulse 0.1 mm (0.004 in), with cable 15 m (49 ft 3 in)	RG13	J1N5

Spare Parts and Accessories

Spare Part or Accessory	Order Code
Rain gauge pedestal 1140 mm (44.88 in) with installation kit	RGSTAND1140



Humidity and Temperature Sensor HMP155E



The HMP155 sensor provides reliable humidity and temperature measurements, which are crucial for dewpoint and frost point calculations. HMP155 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.

Humidity Measurement Performance

Sensor	HUMICAP®180R for typical applications HUMICAP®180C for applications with chemical purge and/or warmed probe
Observation range	0 ... 100 %RH
Response time at +20 °C (+68 °F) in still air with sintered teflon filter	63 %: 20 s 90 %: 60 s
Factory calibration uncertainty at +20 °C (+68 °F) ¹⁾	±0.6 %RH (0 ... 40 %RH) ±1.0 %RH (40 ... 97 %RH)
Accuracy (Including Non-linearity, Hysteresis, and Repeatability)	
At +15 ... +25 °C (+59 ... +77 °F)	±1 %RH (0 ... 90 %RH) ±1.7 %RH (90 ... 100 %RH)
At -20 ... +40 °C (-4 ... +104 °F)	±(1.0 + 0.008 × reading) %RH
At -40 ... -20 °C (-40 ... -4 °F)	±(1.2 + 0.012 × reading) %RH
At +40 ... +60 °C (+104 ... +140 °F)	±(1.2 + 0.012 × reading) %RH
At -60 ... -40 °C (-76 ... -40 °F)	±(1.4 + 0.032 × reading) %RH

¹⁾ Defined as ±2 standard deviation limits. Small variations possible (see also the calibration certificate).

Temperature Measurement Performance

Sensor	Pt100 RTD Class F0.1 IEC 60751
Observation range	-80 ... +60 °C (-112 ... +140 °F)
Response time for additional temperature probe in 3 m/s (7 mph) air flow	63 %: < 20 s 90 %: < 35 s
Accuracy with RS-485 Output	
At -80 ... +20 °C (-112 ... +68 °F)	±(0.176 - 0.0028 × temperature) °C
At +20 ... +60 °C (+68 ... +140 °F)	±(0.07 + 0.0025 × temperature) °C

Dewpoint Calculation Specifications

Accuracy at -20 ... +40 °C (-4 ... +104 °F)	±0.6 at 90 ... 100 %RH
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Mechanical Specifications

IP rating	IP66
Dimensions (H × W)	279 × 40 mm (10.9 × 1.6 in)
Weight	86 g (3.0 oz)
Additional T probe cable length	2 m
Connection	8-pin male M12 connector
Connection cables	3.5, 10, and 30 m
Wire size	AWG 26 (0.129 mm ²)
Service cables	USB connection cable MI70 connection cable

Materials

Filter	Sintered teflon or membrane
Housing	Polycarbonate (PC)
Additional temperature probe	Stainless steel AISI 316L
Cable	PUR

Options

Option	Order Code	Configuration Code
Humidity and temperature probe HMP155E, no heating (HMP155-CFG08)	HMP155	E1AA11A0A0 E1A0A
Humidity and temperature probe HMP155E, heated (HMP155-CFG10)	HMP155	E1AA14B1B0G 1A0A

Spare Parts and Accessories

Spare Part or Accessory	Order Code
Cable 10 m (32 ft 10 in)	220497
Cable 30 m (98 ft 5 in)	220498
DTR13 radiation shield with mounting equipment	DTR13
T-probe installation adapter for DTR13	221069
DTR503A radiation shield with mounting equipment	DTR503ASP
T-probe installation adapter for DTR503A	221072
Installation kit for Stevenson screen	221321
Humidity sensor	HUMICAP180R
Sintered teflon filter	219452SP
Membrane filter	230727SP



Wind Speed and Direction Sensor WMT700 (Ultrasonic)



Vaisala WINDCAP® Ultrasonic Wind Sensor WMT700 Series is a robust and reliable ultrasonic anemometer. It measures surface wind, which is one of the key parameters for meteorology and aviation.

WMT700 series has a durable full steel structure with welded arms, clear North indication, and onepoint, quick bayonet-style mounting. It has no moving parts, and it is resistant to contamination and corrosion.

Wind Speed Measurement Performance

Measurement range	WMT703: 0 ... 75 m/s (168 mph)
Starting threshold	0.01 m/s (0.0223 mph)
Resolution	0.01 m/s (0.0223 mph)
Response time	250 ms
Accuracy	0 ... 75 m/s (168 mph): ±0.1 m/s (0.2 mph) or 2 % of reading, whichever is greater

Wind Direction Measurement Performance

Observation range	0 ... 360°
Starting threshold	0.1 m/s (0.2 mph)
Resolution	0.01°
Response time	250 ms
Accuracy	±2°

Mechanical Specifications

IP rating	IP66 and IP67
Dimensions (H × W × Ø ¹⁾)	348 × 250 × 285 mm (13.70 × 9.84 × 11.22 in)
Weight	1.8 kg (4.0 lb)
Materials	
Body and arms, mounting kit	Stainless steel AISI 316
Transducers	Silicone
Connector housing surface	Nickel plated brass

¹⁾ Diameter of area covered by transducers.

Options

Option	Order Code	Configuration Code
WMT703 sensor, heated transducers and arms (WMT700-CFG05) ¹⁾	WMT700	3C3A0A001A1A1
WMT703 sensor, heated transducers (WMT700-CFG06)	WMT700	3C2A0A001A1A1
WMT703 sensor, no heating (WMT700-CFG07)	WMT700	3C1A0A001A1A1

¹⁾ Requires an additional power supply.

Spare Parts and Accessories

Spare Part or Accessory	Order Code
Cable 10 m (32 ft 10 in)	228260SP
Cable 15 m (49 ft 3 in)	237890SP
Cable 26 m (85 ft 4 in)	237889SP
Mounting adapter for sensor support arm and pole mast	WMT70FIXSP
Mounting bracket for sensor support arm	SENSORARMFIX60
Bird cage	WMT70BIRDKIT
Zero wind verifier	WMT70VERIFIER



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, up to 75 m/s (168 mph).

WAV151 is a counter-balanced, low-threshold, optoelectronic wind vane. Infrared LEDs and phototransistors are mounted on six orbits on each side of a 6-bit GRAY-coded disc. Turned by the vane, the disc creates changes in the code received by the phototransistors. The output code resolution is $\pm 2.8^\circ$.

Heating elements in the shaft tunnels of both the anemometer and vane keep the bearings above freezing in cold climates.

WAA151 Specifications

Measurement Performance

Sensor/Transducer type	Cup anemometer/opto-chopper
Observation range	0.4 ... 75 m/s (0.9 ... 168 mph)
Starting threshold ¹⁾	< 0.5 m/s (1.1 mph)
Distance constant	2.0 m (6 ft 7 in)
Transducer Output	
0 ... 75 m/s (0 ... 168 mph)	0 ... 750 Hz square wave
Characteristic transfer function	U_f (wind speed) = $0.328 + 0.101 \times R$ (output pulse rate)
Accuracy Within 0.4 ... 60 m/s (0.9 ... 134 mph)	
With characteristic transfer function (standard deviation)	± 0.17 m/s (0.38 mph)
With simple transfer function $U_f = 0.1 \times R$	± 0.5 m/s (1.12 mph) ²⁾
Transducer Output Level	
($I_{out} < +5$ mA)	High state > $U_{in} - 1.5$ V
($I_{out} > -5$ mA)	Low state < 2.0 V

1) Measured with the cup wheel in position least favored by flow direction. The optimum position yields a < 0.35 m/s (0.8 mph) starting threshold.

2) Typical error vs. speed with the simple transfer function used.

Mechanical Specifications

IP rating	IP65
Dimensions (H x Ø)	240 x 90 mm (9.45 x 3.54 in)
Swept radius of cup wheel	91 mm (3.58 in)
Weight	570 g (1.26 lb)
Materials	
Housing	AlMgSi, gray anodized
Cup	PA, reinforced with carbon fiber

WAV151 Specifications

Measurement Performance

Sensor/Transducer type	Optical code disc
Observation range at wind speed 0.4 ... 75 m/s (0.9 ... 168 mph)	0 ... 360°
Starting threshold	< 0.4 m/s (0.9 mph)
Resolution	$\pm 2.8^\circ$
Damping ratio	0.19
Overshoot ratio	0.55
Delay distance	0.4 m (1 ft 4 in)
Accuracy	Better than $\pm 3^\circ$
Output	6-bit parallel GRAY code
Transducer Output Level	
($I_{out} < +5$ mA)	High state > $U_{in} - 1.5$ V
($I_{out} > -5$ mA)	Low state < 1.5 V

Mechanical Specifications

IP rating	IP65
Dimensions (H x Ø)	300 x 90 mm (11.81 x 3.54 in)
Swept radius of vane	172 mm (6.77 in)
Weight	660 g (1.46 lb)
Materials	
Housing	AlMgSi, gray anodized
Vane	AlSi 12, anodized

WAC155 Specifications

Mechanical Specifications

IP rating	IP65
Weight	1.5 kg (3.3 lb)
Material	Aluminum
Mounting	To Ø 60 mm (2.36 in) pole mast
Dimensions	
Crossarm and junction box (W x H x D)	887 x 165 x 157 mm (34.9 x 6.5 x 6.18 in)
Junction box (W x H x D)	Without cable glands: 127 x 82 x 58 mm (5.00 x 3.23 x 2.28 in) With cable glands: 127 x 110 x 58 mm (5.00 x 4.33 x 2.28 in)

WAA151 Spare Parts and Accessories

Item	Order Code
Anemometer WAA151	WAA151
Service kit for wind sensors	16644WA
Cable	ZZ45036
Sensor board	1433WA
Cup assembly	7150WA
WAA151 connector	230118

WAV151 Spare Parts and Accessories

Item	Order Code
Wind vane WAV151	WAV151
Service kit for wind sensors	16644WA
Cable	ZZ45037
Sensor board	1434WA
Standard tail	6389WA
WAV151 connector	230119

WAC155 Options, Spare Parts, and Accessories

Item	Order Code
Serial transmitter WAC155, cross arm, and mounting set for Ø 60 mm (2.36 in) pole mast (heated)	WAC155
Mounting bracket for sensor support arm	SENSORARMFIX60
Cable 10 m (32 ft 10 in)	ZZ45049
Component board	WAC155CB



Pressure Sensor PTB110



Vaisala BAROCAP® Barometer PTB110 is designed both for accurate barometric pressure measurements at room temperature and 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 in many applications.

PTB110 is typically used in the Road Weather Information System (RWIS) which complements synoptic weather station networks.

Measurement Performance

Pressure range (1 hPa = 1 mbar)	500 ... 1 100 hPa
Resolution	0.1 hPa
Load resistance	10 000 Ω minimum
Load capacitance	47 nF maximum
Settling time to full accuracy after startup	1 s
Response time to full accuracy after a pressure step	500 ms
Acceleration sensitivity	Negligible
Accuracy	
Linearity ¹⁾	±0.25 hPa
Hysteresis ¹⁾	±0.03 hPa
Repeatability ¹⁾	±0.03 hPa
Pressure calibration uncertainty ²⁾	±0.15 hPa
Voltage calibration uncertainty	± 0.7 mV
Frequency calibration uncertainty	± 0.3 Hz
Accuracy at +20 °C (+68 °F) ³⁾	±0.3 hPa
Total Accuracy at	
+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

1) Defined as ±2 standard deviation limits of end-point non-linearity, hysteresis error, or repeatability error.

2) Defined as ±2 standard deviation limits of inaccuracy of the working standard including traceability to NIST.

3) Defined as the root sum of the squares (RSS) of end-point non-linearity, hysteresis error, repeatability error, and calibration uncertainty at room temperature.

Mechanical Specifications

IP rating	IP32
Dimensions (H × W × D)	97.3 × 68.4 × 28.1 mm (3.83 × 2.69 × 1.10 in)
Weight	90 g (3.2 oz)
Materials	
Housing cover	Plastic ABS/PC blend
Mounting plate	Aluminum

Options

Option	Order Code	Configuration Code
PTB110 sensor, class B calibration (PTB110-CFG02)	PTB110	1S1AA

Spare Parts and Accessories

Spare Part or Accessory	Order Code
Plastic cover	219268
DIN rail connector	219269



Weather Transmitter WXT536



WXT530 Series has a unique Vaisala solid state sensor technology. To measure wind, Vaisala WINDCAP® ultrasonic wind sensors are applied to determine horizontal wind speed and direction. Barometric pressure, temperature, and humidity measurements are combined in the PTU module using capacitive measurement for each parameter. This module is easy to change without any contact with the sensors. The precipitation measurement is based on the unique acoustic Vaisala RAINCAP® Sensor without flooding, clogging, wetting, and evaporation losses.

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

Wind Measurement Performance

Wind Speed

Observation range	0 ... 60 m/s (134 mph)
Response time	0.25 s
Available variables	Average, maximum, and minimum
Accuracy	±3 % at 10 m/s (22 mph)
Output resolution	0.1 m/s (km/h, mph, knots)

Wind Direction

Azimuth	0 ... 360°
Response time	0.25 s
Available variables	Average, maximum, and minimum
Accuracy	±3.0° at 10 m/s (22 mph)
Output resolution	1°
Averaging time	1 ... 3600 s (= 60 min), at 1 s steps, on the basis of samples taken at 4, 2, or 1 Hz rate

Barometric Pressure Measurement Performance

Observation range	600 ... 1100 hPa
Accuracy (for sensor element)	±0.5 hPa at 0 ... +30 °C (+32 ... +86 °F) ±1 hPa at -52 ... +60 °C (-60 ... +140 °F)
Output resolution	0.1 hPa / 10 Pa / 0.001 bar / 0.1 mmHg / 0.01 inHg

Air Temperature Measurement Performance

Observation range	-52 ... +60 °C (-60 ... +140 °F)
Accuracy (for sensor element) at +20 °C (+68 °F)	±0.3 °C (±0.5 °F)
Output resolution	0.1 °C (0.1 °F)

Relative Humidity Measurement Performance

Observation range	0 ... 100 %RH
Accuracy (for sensor element)	±3 %RH at 0 ... 90 %RH ±5 %RH at 90 ... 100 %RH
Output resolution	0.1 %RH

Precipitation Measurement Performance

Rainfall	Cumulative accumulation after the latest automatic or manual reset
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Collecting area	60 cm ² (9.3 in ²)
Output resolution	0.01 mm (0.001 in)
Field accuracy for daily accumulation	Better than 5 %, weather-dependent

Rain

Duration	Counting each 10-second increment whenever droplet detected
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Duration output resolution	10 s
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Intensity	Running 1-minute average in 10-second steps
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Intensity observation range	0 ... 200 mm/h (0 ... 7.87 in/h) (broader range with reduced accuracy)
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Intensity output resolution	0.1 mm/h (0.01 in/h)
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Hail

Duration	Cumulative amount of hits against collecting surface
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Duration	Counting each 10-second increment whenever hailstone detected
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Output resolution	0.1 hits/cm ² (1 hits/in ²), 1 hit
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Intensity	1-minute running average in 10-second steps
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Duration output resolution	10 s
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Intensity output resolution	0.1 hits/cm ² h (1 hits/in ² h), 1 hit/h
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Mechanical Specifications

IP rating	Without mounting kit: IP65 With mounting kit: IP66
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Weight	0.7 kg (1.54 lbs)
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Options

Option	Order Code	Configuration Code
Weather transmitter WXT536, no heating (WXT536-CFG01)	WXT530	6D1B1K1A1A1B
Weather transmitter WXT536, heated (WXT536-CFG02)	WXT530	6D1B2K1A1A1B

Spare Parts and Accessories

Spare Part or Accessory	Order Code
Mounting kit	212792
Mounting adapter for pole mast and sensor support arm	WMSFIX60
Mounting bracket for sensor support arm	SENSORARMFIX60
Vaisala Configuration Tool, USB service cable	220614
Cable 10 m (32 ft 10 in)	222288
Radiation shield	218817SP
PTU module	WXTPTUSP



Air Quality Sensor AQT420



AQT420 measures the pollution content of ambient air. Depending on the configuration, AQT420 measures the most common gaseous pollutants: nitrogen dioxide (NO₂), nitrogen oxide (NO), sulfur dioxide (SO₂), carbon monoxide (CO), and ozone (O₃) and particulate matter (PM_{2.5} and PM₁₀) in the ambient air.

Gas Measurement Performance

Gas	Range	Detection Limit	Accuracy in Field Conditions ¹⁾
NO ₂	2000 ppb	5 ppb	±25 ppb
O ₃	2000 ppb	5 ppb	±60 ppb
CO	10 000 ppb	10 ppb	±200 ppb
SO ₂	2000 ppb	5 ppb	±50 ppb
NO	2000 ppb	5 ppb	±25 ppb

1) 90 % confidence interval in comparing with reference instrument, includes T and %RH dependence in typical field conditions and sensor drift during calibration interval. Electrochemical cell replacement interval 12-24 months, depending on local conditions.

2) NO is an alternative to SO₂.

Particle Measurement Performance

Particle counter channels	PM _{2.5} and PM ₁₀
Particle diameter range	0.3 ... 10 µm (spherical equivalent)
Sampling time	60 s
Sampling interval	10 min
Sample flow rate	0.9 SLM
Measurement range	PM _{2.5} : 0 ... 2000 µg/m ³ PM ₁₀ : 0 ... 5000 µg/m ³
Measurement resolution	0.1 µg/m ³

Mechanical Specifications

Dimensions (H × W × D)	185 × 128 × 128 mm (7.28 × 5.04 × 5.04 in)
Weight	1.25 kg (2.76 lb)
Material, base module	Anodized aluminum
Material, radiation shield	Polycarbonate (PC)
Color, radiation shield	White (RAL9003)
Power and data connector	Standard 8-pin M12 male

Third-party Sensors

RWS200 supports the following third-party sensors:

Subsurface Temperature Sensors

FinMeas multidepth sensor TPS10:

www.finmeas.com

Wind Sensors

R.M. Young combined wind sensor:

www.youngusa.com

Level Sensors

Campbell Scientific 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

Precipitation Sensors

Tipping buckets

Cameras

Axis pan-tilt-zoom (PTZ) camera Q6052-E:

www.axis.com

Mobotix fixed camera M16:

www.mobotix.com

Traffic Sensors

Wavetronix SmartSensor HD:

www.wavetronix.com

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

RWS200 Data Management Unit DMU703



Vaisala Data Management Unit DMU703 is specifically designed and built to be the brains of Vaisala Road Weather Station RWS200. DMU703 handles the storage, analysis, and reporting of observation data.

DMU703 contains the algorithms that make RWS200 more than a collection of road weather sensors. The algorithms process the observation data from the atmospheric and road weather sensors and provide accurate data to support decision making.

A web user interface provides direct access to the weather station. The user interface is available locally and remotely and it is used for station setup and maintenance, as well as for viewing observation data and reports.

Computer Specifications

Processor	ARM Cortex A8
Memory	512 MB DDR3 RAM, 2 GB flash
Operating system	Linux
RTC backup battery	CR2032
Web services	HTTPS

GPS Receiver Specifications

Receiver type	50-channel GPS L1 frequency
Supported 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	SMA (female)

¹⁾ LEP, 50 % 24-hour static, -130dBm

WLAN Transmitter Specifications

Supported standards	IEEE 802.11 b, g, n
Transmit power	20 dBm, 11 Mbps, b 14.5 dBm, 54 Mbps, g 12.5 dBm, 65 Mbps, n
Acceptance	FCC (USA), IC (Canada), CE (Europe) Contains FCC ID: TFB-TIW11-01 Contains IC: 5969A-TIW1101
Antenna connector	RP-SMA (female)

Inputs and Outputs

Ethernet

Ports	ETH 0, ETH 1
Supported standard	IEEE 802.3
Physical layer	Base-T
Data rate	10/100 Mbps
Connectors	RJ45 with link LEDs

USB

Ports	4 (reserved)
Supported standard	USB 2.0
Signaling	High speed
Connectors	Standard-A

RS-232 Serial

Ports	COM 1, COM 5 (configurable)
Signals	COM 1: RXD, TXD, CTS, RTS, DTR, DSR, DCD, and RI COM 5: RXD, TXD, CTS, and RTS
Connectors	Phoenix Contact DFMC 1,5/3-ST-3,5-LR

RS-485 Serial

Ports	COM 5 (configurable), COM 6, COM 7
Signals	D+/D- for all ports COM 5 also has R+/R-
Connectors	1 × Phoenix Contact DFMC 1,5/3-ST-3,5-LR 1 × RJ45 (expansion bus)

RS-485 Serial, Isolated

Ports	COM 2, COM 3
Signals	R+/R-/T+/T-
Connectors	Phoenix Contact DFMC 1,5/3-ST-3,5-LR

Other Serial Ports

1 × CAN (reserved)	Connector: RJ45
1 × SDI-12 (reserved)	Connector: Phoenix Contact DFMC 1,5/3-ST-3,5-LR

Analog

Lines	CH A, CH B
Frequency input signal	1 Hz ... 20 kHz, 2.5 ... 14 VDC, or 10 mV ... 15 VDC
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
Connectors	Phoenix Contact DFMC 1,5/3-ST-3,5-LR

I/O Digital

Ports	4 × input, 4 × output
Input signal	0 ... 30 VDC
Output signal	Open collector, maximum load 30 VDC at 1 A
Connectors	Phoenix Contact DFMC 1,5/3-ST-3,5-LR

Mechanical Specifications

Dimensions (H × W × L)	126 × 55 × 127 mm (4.96 × 2.17 × 5.00 in)
Weight	0.4 kg (0.8 lb)
Mounting	DIN rail 35 mm (1.4 in)
Materials	
Screws, washers, DIN rail locking piece	Stainless steel AISI 316
Frame profile	Aluminum EN AW-6060 T6
Side plates	Plastic PC/ABS

Spare Parts and Accessories

Spare Part or Accessory	Order Code
DMU703-RWS unit including:	DMU703-RWSSP
• Ethernet cable 40 cm (15.75 in)	
• Phoenix Contact DFMC 1,5/3-ST-3,5-LR 6-pin cable connector (2 pc)	
• Phoenix Contact DFMC 1,5/5-ST-3,5-LR 10-pin cable connector (5 pc)	



RWS200 Digital Road Interface DRI701



DRI701 provides power to the sensors, and converts analog and frequency signals from these sensors to a message for internal system communication.

Supported Sensors

Road state sensors, embedded	2 × DRS511 / 2 × FP2000 ¹⁾
Subsurface temperature sensors	2 × DTS12G / 2 × DTS210 ²⁾
Global radiation sensor	For example, SP Lite 2 ³⁾

¹⁾ For FP2000 availability, contact Vaisala.

²⁾ DTS210 only in retrofit installations.

³⁾ The first DRI701 supports 1 global radiation sensor and 1 subsurface temperature sensor or 2 subsurface temperature sensors.

Inputs and Outputs

Operating voltage 8 ... 32 VDC

Average Power Consumption

With two DRS511 sensors 0.76 W

With two FP2000 sensors 1.06 W

Spare Parts and Accessories

Spare Part or Accessory

Order Code

- DRI701 with:
- Power cable 30 cm (11.81 in)
 - Ethernet cable 30 cm (11.81 in)

DRI701SP



RWS200 Power Management Unit PMU701



PMU701 handles the specific power requirements of the sensors, ensuring that each sensor receives steady and suitable power at all times.

PMU701 is also responsible for charging the internal backup battery supply inside the RWS200 enclosure. In case an external DC power supply is used with the road weather station, the power is routed through PMU701.

In total, PMU701 provides one external DC input, two solar panel inputs, four inputs for analog sensor communications, and fourteen inputs for serial communication, eight of which can be Ethernet-based communication.

Inputs and Outputs

Operating voltage	24 VDC (10 ... 32 VDC maximum)
Solar panel input (requires PMP701)	10 ... 32 VDC
External DC power (requires PMP701)	12 ... 28 VDC (max. range 10 ... 32 VDC)
Output power	12 V at 3 A and 24 V at 7 A
Maximum charging current	4 A / total
Nominal charging voltage	13.5 V at +25 °C (+77 °F)
Connectors	
DC INPUT	23 ... 32 V at 10 A Phoenix Contact MVSTBR 2,5HC/2-ST-5.08
BATTERY	2 separately controlled 12 V lead-acid batteries Temperature compensation Deep discharge protection Phoenix Contact MVSTBR 2,5HC/2-ST-5.08
SERVICE	RS-232 Phoenix Contact DFMC 1,5/5-ST-3,5-LR
POWER OUT C	12 V out at 1.4 A, 24 V out at 2.8 A Phoenix Contact DFMC 1,5/5-ST-3,5-LR
ETHERNET	10/100 Mbps 2 × RJ45
DMU	Serial and I/O Molex 90130-3250
TELECOM	RS-232/RS-485, DC output Phoenix Contact DFMC 1,5/10-ST-3,5-LR

External DC / Solar Panel Input Module PMP701 Specifications

Surge protection	IEC 61000-4-5: external DC input up to 6 kV (line to GND) / 6 kV (line to line)
Reverse voltage protection	Yes
Solar panel input	2 pcs Maximum 10 ... 32 VDC at 4 A/port
External DC input	1 pc Maximum 10 ... 32 VDC at 15 A
Status LED	Green for each input

Serial Input/Output Module PMS701 Specifications

Surge protection	IEC 61000-4-5
Sensor power	12 V at maximum 2 A/port
Sensor power	24 V at maximum 3 A/port
Heat output	24 V at maximum 5 A/port
Supports	RS-232 2-wire and 4-wire RS-485 Isolated 2-wire and 4-wire RS-485
Status LED	Green/Orange

Ethernet / Power over Ethernet Module PME701 Specifications

Surge protection	IEC 61000-4-5
Supported IEEE 802.3af PoE classes / module	1 × PoE class 0 (0.44 ... 12.94 W) device 1 × PoE class 3 (6.49 ... 12.95 W) device 2 × PoE class 1 (0.44 ... 3.84 W) device 2 × PoE class 2 (3.84 ... 6.49 W) device
Status LED	Ethernet link and speed built into connectors

Analog Input/Output Module PMA701 Specifications

Surge protection	IEC 61000-4-5
Sensor power	12 V at maximum 2 A/port
Sensor power	24 V at maximum 3 A/port
Status LED	Green/Red
Mechanical	Has red circuit board
Digital I/O and Differential	
Lines	2
Frequency input signal	1 Hz ... 20 kHz, 2.5 ... 14 VDC, or 10 mV ... 15 VDC
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
Connectors	Phoenix Contact DFMC 1,5/3-ST-3,5-LR

Mechanical Specifications

Dimensions (H × W × D)	126 × 224 × 142 mm (4.96 × 8.82 × 5.59 in)
Weight	1.4 kg (3.1 lb)
Materials	
Screws, washers, DIN rail locking piece	Stainless steel AISI 316
Grounding rail clamps	Stainless steel AISI 630
Frame profile	Aluminum EN AW-6060 T6
Cooling plate	Aluminum EN AW-6082 T6
Side plates	Plastic PC/ABS
Grounding rail	Copper (Cu)
Available Plug-in Module Slots	
PMP701	Maximum 1 pcs
PMA701	Maximum 2 pcs
PMS701	Maximum 7 pcs ¹⁾
PME701	Maximum 4 pcs ¹⁾

¹⁾ SERIAL/ETHERNET slots can house either PME701 or PMS701 plug-in modules.

PMU701 Plug-in Module Spare Parts

Spare Part	Order Code
External DC / Solar panel input module	PMP701SP
Analog input/output module with 10-pin cable connectors (2 pcs)	PMA701SP
Serial input/output module with 10-pin cable connectors (2 pcs)	PMS701SP
Ethernet / power over Ethernet module	PME701SP

PMU701 Spare Parts and Accessories

Spare Part or Accessory	Order Code
PMU701 unit including: <ul style="list-style-type: none"> Sensor data cable Phoenix Contact DFMC 1,5/10-ST-3,5-LR 20-pin cable connector (1 pc) 	PMU701SP
PMU701 accessories including: <ul style="list-style-type: none"> Torx screws M4×8 ISO14583 TX A4 (4 pcs) Torx screws M3×6 ISO14583 A4-60 (6 pcs) Cable shield grounding clamps SK 8 (10 pcs) (217844) Cable shield grounding clamps SK 14 (10 pcs) (237528) Hex-tapped spacers M4×55 FeZn Female/Male (2 pcs) Enclosure sensor grounding rail (DRW240852) PMU701 sensor grounding rail (DRW240399) 	PMU701ACC1SP
PMU701 accessories including: <ul style="list-style-type: none"> Cable shield grounding clamps SK 8 (10 pcs) Cable shield grounding clamps SK 14 (10 pcs) 	PMU701ACC2SP
PMU701 accessories including: <ul style="list-style-type: none"> Set of quick reference cards Cable ferrules 0.5 mm² / 10 mm (100 pcs) (237754) Phoenix Contact DFMC 1,5/1-ST-3,5-LR 2-pin cable connectors (4 pcs) Phoenix Contact DFMC 1,5/3-ST-3,5-LR 6-pin cable connectors (10 pcs) Phoenix Contact DFMC 1,5/4-ST-3,5-LR 8-pin cable connectors (10 pcs) Phoenix Contact DFMC 1,5/5-ST-3,5-LR 10-pin cable connectors (30 pcs) Phoenix Contact DFMC 1,5/8-ST-3,5-LR 16-pin cable connectors (10 pcs) Phoenix Contact DFMC 1,5/10-ST-3,5-LR 20-pin cable connectors (5 pcs) Phoenix Contact MVSTBR 2,5HC/2-ST-5.08 cable connectors (4 pcs) Narrow cover plates for empty slots (7 pcs) Wide cover plates for empty slots (3 pcs) 	PMU701ACC3SP



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.

Wireless Specifications

3G International Model (WR21-U92A-DE1-TB)

HSPA+	850/900/1700 (AWS)/1900/2100 MHz
Maximum transfer rate	5.76 Mbps up, 21 Mbps down

4G LTE International Model (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
Maximum transfer rate	50 Mbps up, 100 Mbps down

4G LTE North America Model (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
Maximum transfer rate	50 Mbps up, 100 Mbps down

Mechanical Specifications

IP rating	IP50
Enclosure material	Industrial (metal)
Dimensions (H x W x D)	32 x 131 x 100 mm (1.3 x 5.2 x 3.9 in)
Weight	0.5 kg (1.1 lb)

Spare Parts and Accessories

Spare Part or Accessory	Order Code
WR21 cellular router, 3G International ¹⁾	237829-RWSSP
WR21 cellular router, 4G LTE International ¹⁾	241542-RWSSP
WR21 cellular router, 4G LTE North America ¹⁾	241508-RWSSP
WR21 mounting bracket	ASM211746SP

¹⁾ With mounting bracket, Ethernet cable, and power cable.

Specifications

Input voltage	9 ... 30 VDC
Maximum power consumption	4.70 W
Connector	Screw-down removable terminal block
Connectors	2 x 50 Ω SMA (center pin female)

Approvals

GSM/UMTS	PTCRB, NAPRD.03, GCF-CC, R&TTE, EN 301 511
CDMA/EV-DO	CDG TIA/EIA-690, CDG TIA/EIA-98-E
Cellular carriers	Certified by most major carriers

Protocols

HTTP, HTTPS, FTP, SFTP, SSL, SMTP, iDigi SNMP, SNMP (v1/v2c/v3), SSH, Telnet and CLI for web management
 Remote management via software tool (option)
 SMS management, protocol analyzer, ability to capture PCAP for use with Wireshark
 Dynamic DNS client compatible with BIND9/No-IP/DynDNS
 Device Cloud

Routing/Failover

IP pass-through
 NAT, NATP with IP Port Forwarding
 Ethernet Bridging
 GRE
 Multicast Routing
 Routing Protocols: PPP, PPPoE, RIP (v1, v2) OSPF, SRI, BGP, IGMP routing (multicast)
 IPv6 (firmware upgradable)
 RSTP (Rapid Spanning Tree Protocol)
 IP Failover: VRRP, VRRP+TM; Automatic failover/failback to second GSM network / standby APN
 Verizon NEMO/DMNR for Primary Wireless Access

Security/VPN

Stateful inspection firewall with scripting, address and port translation
 VPN: IPsec with IKEv1, IKEv2, NAT Traversal
 SSL, SSLv2, SSLv3, FIPS 197, Open VPN client and server
 PPTP, L2TP
 5 VPN tunnels
 Cryptology: SHA-1, MD5, RSA
 Encryption: DES, 3DES and AES up to 256-bit (CBC mode for IPsec)
 Authentication: RADIUS, TACACS+, SCEP for X.509 certificates
 Content Filtering (via third party)
 MAC Address Filtering
 VLAN support
 Ethernet Port Isolation

Specialty/Legacy Protocols

RealPort®, Modbus UDP/TCP to serial, and X.25 including XOT, SNA/IP, TPAD, and PAD

Other Protocols

DHCP
 Dynamic DNS client compatible with BIND9/No-IP/Dynamic DNS
 QoS via TOS/DSCP/WRED



RWS200 Mounting Equipment and Accessories

Enclosure Options

BOX652

IP rating	IP66
Shock/Vibration	IEC 6008-2-27/IEC 60068-2-6
Size (H × W × D), incl. mounting frame, radiation shield, and cabling box	787 × 581 × 270 mm (30.98 × 22.87 × 10.62 in)
Weight after installation	Approx. 46 kg (101 lb)

BOX722

IP rating	IP66
Shock/Vibration	IEC 6008-2-27/IEC 60068-2-6
Size (H × W × D), incl. mounting frame, radiation shield, and cabling box	887 × 322 × 270 mm (34.92 × 12.67 × 10.62 in)
Weight after installation	Approx. 29 kg (64 lb)

BOXALU-US, BOXSS-US (North America Only)

IP rating	NEMA Certified Type 4X
Size (H × W × D), enclosure only	838 × 610 × 330 mm (33.00 × 24.00 × 13.00 in)
Weight after installation	BOXALU-US: Approx. 35.3 kg (77.8 lb) BOXSS-US: Approx. 55.5 kg (122.3 lb)

Backplate Only

Shock/Vibration	IEC 6008-2-27/IEC 60068-2-6
Size (H × W × D)	555 × 455 × 42 mm (21.85 × 17.91 × 1.65 in)
Weight after installation	Approx. 12.8 kg (28.2 lb)

BOX652 Spare Parts and Accessories

Spare Part or Accessory	Order Code
Enclosure BOX652 with mounting plate, locks and flanges, mounting frame, radiation shield, and cabling box	BOX652KIT
Enclosure BOX652	BOX652SP
Pressure port	1694IDM
Cabling box	ASM210466SP
Radiation shield	ASM210463SP
Rubber flange set (2 pcs)	DRFLANGE10SP
Enclosure lock set (2 pcs)	ASM210864SP
Enclosure accessories:	BOX652ACC1SP
<ul style="list-style-type: none"> Cable ties 2.5×100 mm (20 pcs) Cable tie holders FTH-13R-01 (5 pcs) DIN rail end brackets (10 pcs) Washers with EPDM gasket 6.8/16×1.5/A2/EPDM (4 pcs) Hex screws M6×16 ISO7380 A4 (2 pcs) Hex nuts M6 Wulock Fe/Zn (2 pcs) Torx screws M4×8 ISO14583 TX A4 (10 pcs) Flat washers A6.4 DIN125 A4 (4 pcs) 	

BOX722 Spare Parts and Accessories

Spare Part or Accessory	Order Code
Enclosure BOX722 with mounting plate, locks and flanges, mounting frame, radiation shield, and cabling box	BOX722KIT
Enclosure BOX722	BOX722SP
Cabling box	ASM211127SP
Radiation shield	ASM211081SP
Rubber flange set (2 pcs)	DRFLANGE10SP
Enclosure lock set (2 pcs)	ASM210864SP
Enclosure accessories:	BOX652ACC1SP
<ul style="list-style-type: none"> Cable ties 2.5×100 mm (20 pcs) Cable tie holders FTH-13R-01 (5 pcs) DIN rail end brackets (10 pcs) Washers with EPDM gasket 6.8/16×1.5/A2/EPDM (4 pcs) Hex screws M6×16 ISO7380 A4 (2 pcs) Hex nuts M6 Wulock Fe/Zn (2 pcs) Torx screws M4×8 ISO14583 TX A4 (10 pcs) Flat washers A6.4 DIN125 A4 (4 pcs) 	

BOX652 and BOX722 Mounting Kit Options

Mounting Kit	Order Code
Mounting kit for lattice tower	ASM210998
Mounting kit for 60 mm (2.36 in) pole mast (2 pcs)	APPK-SET60
Mounting kit for 75 mm (2.95 in) pole mast (2 pcs)	APPK-SET75
Mounting kit for 100 mm (3.94 in) pole mast (2 pcs)	APPK-SET100
Mounting kit for 80 ... 600 mm (3.15 ... 23.62 in) pole mast (2 pcs), excluding stainless steel band and locks ¹⁾	DRUNIV-US
Mounting kit for 80 ... 600 mm (3.15 ... 23.62 in) pole mast (2 pcs), including stainless steel band and locks	DRUNIV

¹⁾ You can use any suitable stainless steel band and locks for attaching the mounting support to the pole mast, for example, Band-It 19.1 mm (0.75 in) with Ear-Lokt buckles. If you only need the band for a few installations, use the DRUNIV mounting kit instead.

BOXALU-US and BOXSS-US Spare Parts and Accessories

Item	Code
Aluminum enclosure	BOXALU-US
Stainless steel enclosure	BOXSS-US
Backplate mounting frame	ASM211177
Mounting support for lattice towers	60030004

RWS200 Spare Parts

AC (Mains) Input Spare Parts

Item	Order Code
Mains input assembly with EU socket	ASM210483SP
Mains input assembly with US socket	ASM210483USSP
Mains input assembly with UK socket	ASM210483UKSP
Mains input assembly with FR socket	ASM210483FRSP
Phoenix Contact PLT-SEC-T3-230-P surge protector	242575SP

AC/DC Power Supply Unit Spare Parts

Item	Order Code
Phoenix QUINT-PS/1AC/24DC/10 AC/DC power supply unit with: <ul style="list-style-type: none"> Power cable to PMU701 AC wires 	234881-RWSSP

Backup Battery Spare Parts

Item	Order Code
12 V / 26 Ah battery for standard backplate (BOX652, BOXALU-US, BOXSS-US)	247257SP
Clamp for 12 V 26 Ah battery	ASM210910SP
12 V / 2.6 Ah battery for slim backplate (BOX722)	233012SP

Device Control Spare Parts

Item	Order Code
Device control spare part with: <ul style="list-style-type: none"> Pre-assembled Phoenix Contact relays (3 pcs) Wire set DIN rail Mounting screw M4x8 ECO-Fix Zn TX20 (3 pcs) 	RWS200DEVCS

PTZ Camera Spare Parts and Accessories

Item	Order Code
AXIS Q6052-E PTZ camera for countries with 50 Hz AC power	241285
AXIS T8124-E power unit 50 Hz with international power cable	241532
AXIS Q6052-E PTZ camera for countries with 60 Hz AC power	241295
AXIS T8124-E power unit 60 Hz with US power cable	241898
Mounting Kits	
AXIS T91L61 wall mount	251078
Mounting bracket kit for camera or power unit (2 pcs)	ASM211304
Lattice tower mounting clamp kit for camera or power unit (4 pcs)	ASM211305
Cabling	
Camera Ethernet PoE cable 10 m (32 ft 10 in)	CBL210362-10M
Power unit Ethernet PoE cable 3 m (9 ft 10 in)	CBL210362-3M

Robotix Options, Spare Parts, and Accessories

Item	Item Code	Order Code
Robotix M16 fixed camera with optics	253369	CAM200
Mounting frame kit	ASM211036	-
Cable Options		
10 m (32 ft 10 in)	CBL210324-10M	-
25 m (82 ft 3 in)	CBL210324-25M	-
35 m (114 ft 10 in)	CBL210324-35M	-
Mounting Kit Options		
Sensor support arm and mounting kit for lattice tower	ASM211057	
Sensor support arm and mounting kit for 63 mm (2.48 in) pole mast	DM32ARM63	
Sensor support arm and mounting kit for 75 mm (2.95 in) pole mast	DM32ARM75	
Sensor support arm and mounting kit for 102 mm (4.02 in) pole mast	DM32ARM102	
Sensor support arm and mounting kit for 80 ... 600 mm (3.15 ... 23.62 in) pole mast, excluding stainless steel band and locks	DRUNIVARM	
Sensor support arm and mounting kit for 80 ... 600 mm (3.15 ... 23.62 in) pole mast, including stainless steel band and locks	DRUNIVARM-US	
Spare Parts		
Mounting frame kit with Ethernet cable 10 m (32 ft 10 in)	MOUNTINGFRAM	EKIT-1

IR Illuminator Options, Spare Parts, and Accessories

Item	Item Code	Order Code
VARIO i4 24 W IR Illuminator (maximum 2 pcs) with cable 10 m (32 ft 10 in)	240980	CAM200
Fastening set	241641	-
Mounting frame kit (the IR illuminator can also be attached to the same mounting frame as Robotix M15 camera)	ASM211036	-

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