

RWS200 Product Catalog

/ VAISALA ROAD WEATHER STATION RWS200



VAISALA

Vaisala Road Weather Station RWS200

To keep the roads safe and passable at all times, the road weather must be continuously monitored. Weather conditions such as snow and ice, heavy rains, fog, high winds, and sand storms can impact road safety in many different ways. Unfortunately, due to the expansiveness of the road network, you cannot usually observe the weather impact from your office window.

Road weather stations, also known as Road Weather Information Systems (RWIS), have been developed for several decades to collect information about road conditions. The stations not only collect data in remote locations but 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 comes

through operational savings of road maintenance activities, which improve mobility and increase safety of travelers.

Road weather stations consist of a variety of sensors that collect atmospheric and road 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 surface. They provide data on the conditions on their surface.

Remote sensors are a newer innovation that use infrared and laser technology to measure road conditions. They are installed on the side of the road. Remote sensors are easier to maintain as no traffic control or cutting of the road surface is required.

In addition, the remote 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 as a trigger for variable message signs.

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

In addition to weather information, road weather stations can collect other useful information, such as traffic data, which provides information on how the current weather conditions impact traffic.

Why RWS200?

Intelligent - The Vaisala Road Weather Station RWS200 is the key component to Vaisala road weather solutions. It has been designed with the future of road weather and Intelligent Transportation Systems (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 standard, 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. When used as part of RWS200, each sensor gains both accuracy and maintenance improvements. RWS200 supports a large range of Vaisala sensors and a selected set of third-party sensors.

Flexible - 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 needs.

The use of Ethernet communications and 3G/4G cellular network enable remote access to RWS200 and help to maintain continuous data flow to data collection systems. One of the reasons for having an onsite processor is the ability to store historical data locally if remote communication is lost.

In winter road 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.

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.

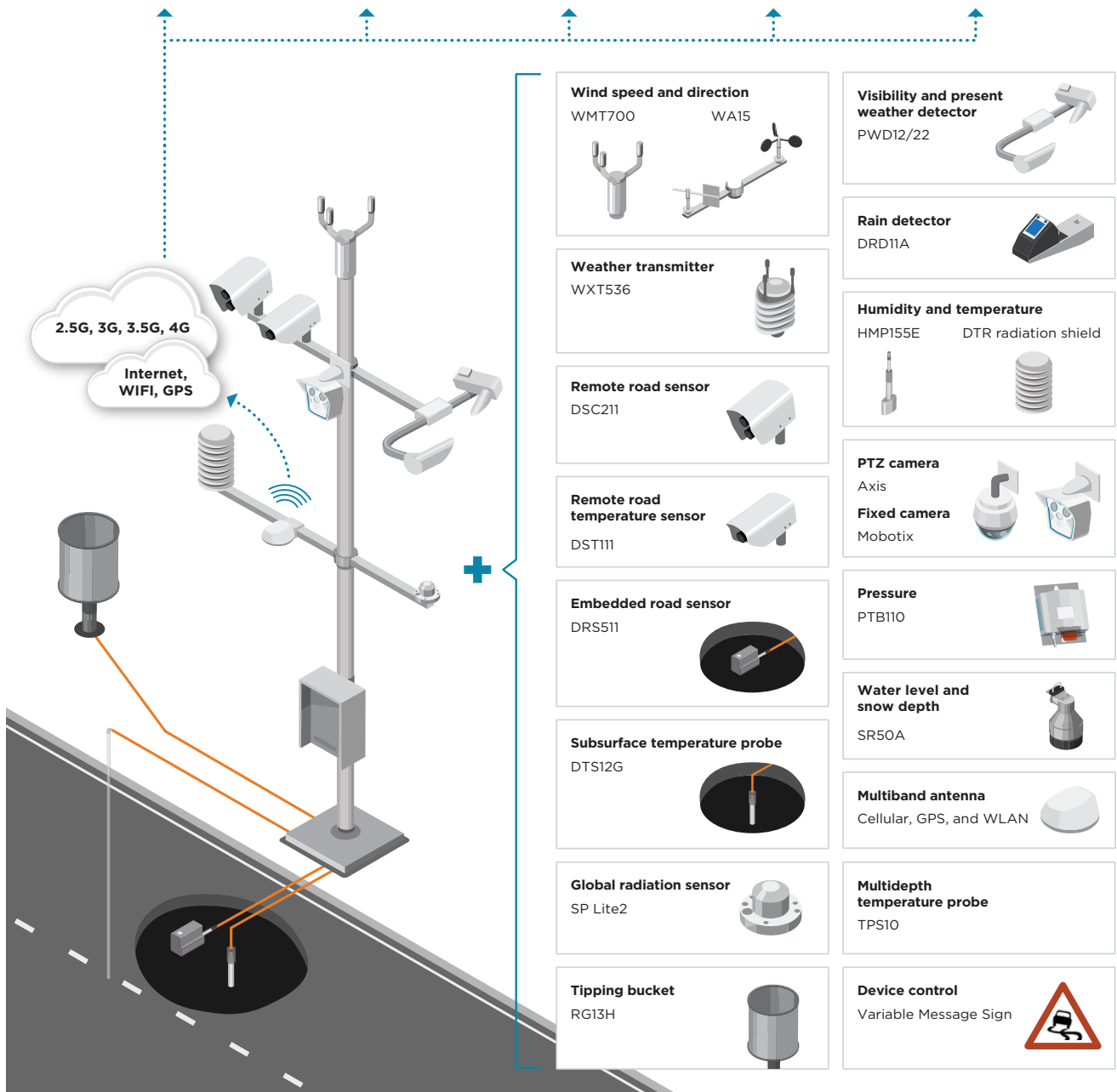
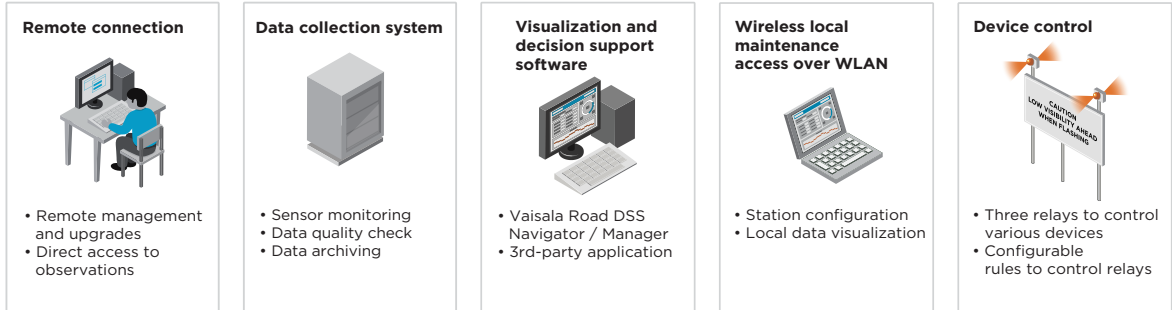
Vaisala also offers an all-in-one sensor that can measure multiple weather observations at once, but its accuracy is not as good as with dedicated sensors.

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 complete road weather intelligent transportation system.



System Components



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 24 VDC (12 ... 32 VDC)
External power	12 ... 32 VDC (min. 10 VDC) 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
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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

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 Vaisala MES 14 Vaisala MES 16 Vaisala DTO XML Vaisala observation web service DATEX II
Protocols	NTCIP
Road surface state	Vaisala classes 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	
Ingress protection rating	IP66
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	
Size (H x W x D), incl. mounting frame, radiation shield, and cabling box	787 x 581 x 270 mm (31.0 x 22.9 x 10.6 in)
Weight after installation	~46 kg (101 lb)
BOX722	
Size (H x W x D), incl. mounting frame, radiation shield, and cabling box	887 x 322 x 270 mm (34.9 x 12.9 x 10.6 in)
Weight after installation	~29 kg (64 lb)
BOXALU-US (NORTH AMERICA ONLY)	
Ingress protection rating	NEMA Certified Type 4X
Material	Aluminum 0.080" 5052 H32
Size (H x W x D)	838 x 610 x 330 mm (33.0 x 24.0 x 13.0 in)
Weight after installation	~35.3 kg (77.8 lb)
BOXSS-US (NORTH AMERICA ONLY)	
Ingress protection rating	NEMA Certified Type 4X
Material	Stainless steel 0.75" AISI 304
Size (H x W x D)	838 x 610 x 330 mm (33.0 x 24.0 x 13.0 in)
Weight after installation	~55.5 kg (122.3 lb)
NO ENCLOSURE (BACKPLATE ONLY)	
Size (H x W x D)	555 x 455 x 42 mm (21.9 x 17.9 x 1.7 in)
Weight	~12.8 kg (28.2 lb)



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.

General Specifications

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
Ingress protection rating	IP65

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.

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



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.



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
RELATIVE HUMIDITY	
Observation range	0 ... 98 %RH
Resolution	0.1 %RH
Typical accuracy at +20 °C (+68 °F)	
0 ... 90 %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

General Specifications

Communication interface	RS-485
Dimensions (H x W x D)	125 x 100 x 320 mm (4.9 x 3.9 x 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
Ingress protection rating	IP65

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



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	N.A. local content
1524 m (5000 ft)	

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.



Measuring Specifications

TEMPERATURE

Observation range	-40 °C ... +60 °C (-40 ... +140 °F)
Accuracy	$\pm(0.1 + 0.00167 \times \text{temperature})$ °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.

General Specifications

Temperature sensors	Two Pt100 elements, 1/3 Class B DIN IEC 751
Dimensions (H x W x D)	75 x 30 x 84 mm, bottom 38 mm (3.0 x 1.2 x 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 EN 61326-1, Immunity test requirements for equipment intended to be used in an industrial electromagnetic environment EN 55022 class B electromagnetic emissions FCC part 15 class B

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

 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)

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

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



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

Ingress protection 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)
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HEATING OPTIONS

No heating	0 W
Transducers heating	30 W (standard RWS200 power)
Transducers and arms heating	150 W (duplicated RWS200 power)

MATERIALS

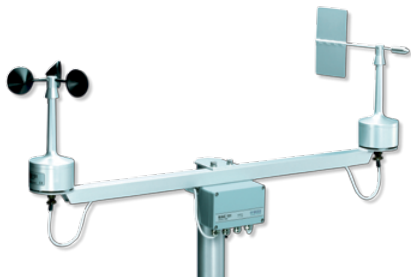
Body and arms	Stainless steel AISI 316
Transducers	Piezo ceramics covered with silicone rubber
Connector housing surface	Nickel-plated brass

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

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

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

Communication interface	RS-485
Ingress protection 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



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.



Measuring Specifications

HUMIDITY	HUMICAP®180RC (no heating) HUMICAP®180RC (warmed probe)
Observation range	0 ... 100 %RH
Response time at 20 °C (68 °F) in still air	63 % in 20 s 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

Communication interface	RS-485
Ingress protection 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
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



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.

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

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.)
Ingress protection rating	IP32
MATERIALS	
Housing cover	Plastic ABS/PC blend
Metal mounting plate	Aluminum
COMPLIANCE	
EMC (industrial environment)	EN/IEC 61326-1, Electrical equipment for measurement, control and laboratory use

Item	Part Number
PTB110 sensor (class B calibration)	PTB110IS1AA (PTB110-CFG02)

SPARE PARTS	
Plastic cover	219268
DIN rail connector	219269
Pressure port	16941DM
Cable to PMU701	CBL210271-250



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

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)

INGRESS PROTECTION RATING

Without mounting kit	IP65
With mounting kit	IP66

COMPLIANCE

EMC Emissions	IEC 61000-4-2 ... 6 CISPR 22
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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

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.

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) ±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)
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Precipitation intensity observation range	0.00 ...999.99 mm/h
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Precipitation accumulation observation range	0.00 ...99.99 mm
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Amount of new snow observation range	0.00 ...999 mm
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¹⁾ Meteorological Optical Range

²⁾ DTO XML only

General Specifications

Material	Aluminum
Dimensions (H x W x D)	167 x 695 x 404 mm (6.6 x 27.4 x 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

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) PWC22 (for PWD22)
RAINCAP sensor	PWR111SP (for PWD12) PWR211SP (for PWD22)
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 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.

Measuring Specifications

RAIN DETECTION SENSITIVITY	
Minimum wet area	0.05 cm ² (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

Sensor	Capacitive principle, thick layer sensor RAINCAP®, with a thin glass shield. Integrated heater element.
SENSOR PLATE	
Sensing area	7.2 cm ² (1.12)
Angle	30°
MATERIALS	
Housing	Polypropylene
Windshield and support bracket	Aluminum
Moisture shield	Polyurethane
DIMENSIONS (H x W x D)	
With wind shield	110 x 80 x 175 mm (4.3 x 3.1 x 6.9 in)
Without wind shield	90 x 46 x 157 mm (3.5 x 1.8 x 6.2 in)
Weight	0.5 kg (1.1 lb)

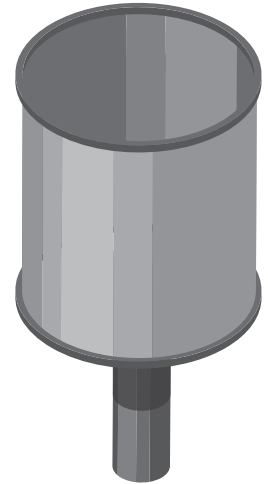
Item	Part Number
DRD11A sensor including cable 10 m (32 ft 10 in)	DRD11A-10M



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.



Measuring Specifications

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

General Specifications

Dimensions (H x Ø)	390 x 300 mm (15.35 x 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 JIN5 (RG13-CFG01)
Rain gauge pedestal 1140 mm (44.88 in) with installation kit	RGSTAND1140



Third-Party Sensors

RWS200 supports the following third-party sensors:

- Subsurface temperature multidepth sensor TPS10 <http://www.finmeas.com>
- Wind speed and direction (combined/mechanical) sensor R.M. Young www.youngusa.com
- Water level sensor Campbell SR50A <https://www.campbellsci.com>
- Snow depth sensor Campbell SR50A <https://www.campbellsci.com>
- Global radiation sensor SP Lite2 <http://www.kippzonen.com>
- Pan-tilt-zoom (PTZ) camera Axis Q6042-E www.axis.com
- Fixed camera Mobotix M15 www.mobotix.com
- Traffic sensor Wavetronix SmartSensor HD <http://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,	Stainless steel AISI 316
DIN rail locking piece	
Frame profile	Aluminum EN AW-6060 T6
Side plates	Plastic PC/ABS
Dimensions (H x W x D)	126 x 55 x 127 mm (5.0 x 2.2 x 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-ST3,5-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 One port also has DTR, DSR, DCD, RI (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 One port has also R+/R- (alternative for one RS-232 port)
Connectors	1 x Phoenix Contact DFMC 1,5/5-ST-3,5-LR and 1 x 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, or 2.5 ... 14 VAC, 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 1,5/5-ST-3,5-LR
I/O DIGITAL	4 x input and 4 x output lines
Input signal	0 ... 30 VDC, counter 0 ... 100 Hz
Output signal	Open collector, max. load 30 DC at 1A
Connectors	Phoenix Contact DFMC 1,5/5-ST-3,5-LR
OTHER SERIAL COMMUNICATION	
CAN	1 port
Connector	RJ45
SDF-12	1 port
Connector	Phoenix Contact DFMC 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 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

¹⁾ LEP, 50 % 24-hour static, -130 dBm



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 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)
Ingress protection 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



Mounting Equipment and Accessories

BOXALU-US and BOXSS-US Mounting Kits

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

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

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	ASM2111081SP
Mounting frame	ASM211107SP
Rubber flange set	DRFLANGE10SP
Enclosure lock set (2 pcs)	ASM210864SP
Enclosure accessories including:	BOX652ACC1SP
Cable ties 2.5 mm × 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)	

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	ASM210956SP
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

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:	PMU701ACC1SP
Torx screws M4×8 ISO14583 TX A4 (4 pcs)	
Torx screws M3×6 ISO14583 A4 (6 pcs)	
Cable shield grounding clamps SK 8 (10 pcs)	
Cable shield grounding clamps SK 14 (10 pcs)	
Hex-tapped spacers M4-55 FeZn Female/Male (2 pcs)	
Enclosure sensor grounding rail	
PMU701 sensor grounding rail	
PMU701 accessories including:	PMU701ACC2SP
Cable shield grounding clamps SK 8 (10 pcs)	
Cable shield grounding clamps SK 14 (10 pcs)	
PMU701 accessories including:	PMU701ACC3SP
Set of quick reference cards	
Cable ferrules 0.5 mm ² /10 mm (100 pcs)	
Phoenix Contact cable connectors:	
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)	
Cover plates: narrow (7 pcs), wide (3 pcs)	
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

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

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)	RWS200DEVCSPP

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