UMB-Technology

A Passion for Precision

www.umb-technology.info

Lufft

The Sky's the Limit

UMB

- Compact design
- Easy commissioning
- RS232 or RS485 data transfer
- Easy software updates
- Free configuration software

UMB-Sensor Overview

	WS600-UMB	WS501-UMB	WS500-UMB	WS400-UMB	WS301-UMB	WS300-UMB	WS200-UMB
Temperature	•	•	•	•	•	•	
Rel. humidity	•	•	•	•	•	•	
Precipitation type	•			•			
Precipitation intensity	•			•			
Air pressure	•	•	•	•	•	•	
Wind direction	•	•	•				•
Wind speed	•	•	•				•
Electronic Compass	•	•	•				•
Radiance (solar radiation)		•			•		
Visibility							
Snow hight							

UMB Technology

The UMB (Universal Measurement Bus) system is a new technology for recording environmental data. Whether in the form of a standard weather station or road ice warning equipment, the modular system excels due to easy commissioning, free firmware updates and data transfer over RS232, RS485 or CDMA/GPRS modem. UMB offers flexibility, modularity and web-based visualization and polling software.

The UMB sensor library provides a comprehensive range of environmental sensors for recording temperature, relative humidity, precipitation, visibility and road conditions. The new WS series compact weather stations in particular, are outstanding due to their unrivaled price-performance ratio. The top-of-the-range model, WS600-UMB, incorporates sensors for temperature, humidity, precipitation, air pressure, wind direction and wind speed.

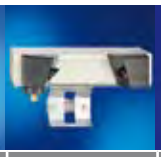
The electrical connection for all UMB sensors is made via a standard plug connector system. This keeps installation and service costs to a minimum. Third party sensors and existing analog sensors can be integrated into the UMB system using the ANACON-UMB module.

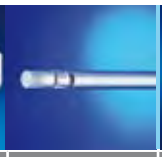
All UMB sensors can be polled by means of a standard protocol. Once data polling has been incorporated for one sensor, additional sensors can be added by way of easy parameterization of the data polling system.

Channel-oriented sensor data polling delivers a large number of computed variables in metric and US format, hence there is no need for conversion by the user. Sensors can be configured, equipment tested and firmware updated with the free configuration software (UMBConfig-Tool).

In addition Lufft offers a variety of software packages from data retrieval via weather stations (COLLECTOR) to web visualization (SmartView3).

Protocol Overview: Data Output Standards		
	UMB-MODULE	**LCOM**
European measurement units	•	•
American measurement units	•	•
TLS data types	•	•
TLS protoccol		•
TLSoIP		•
NTCIP protocol		•
MSSI protocol		•
Synop		in preparation





VENTUS-UMB	V200A-UMB	R2S-UMB	VS20-UMB	8160.TFF10/ ANACON	Snow Depth/ ANACON	CMP3 Pyranometer	ARS31-UMB	IRS31-UMB	IRS21 / IRS21 CON
				•			The active sensor calculates the freeze point by means of cooling and heating cycles (PELTIER element built in)	Road conditions, surface temperature, 2 depth temperatures, water film, ice %, freezing temperature	Road conditions, surface temperature, 2 depth temperatures, water film, freezing temperature
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Lufft's high-quality networks for measuring emissions consist of gas measurements, dust particle measurements, as well as meteorological measurements.

Precision with UMB

The WS500 and WS600 deliver all meteorological measured data for Lufft's high-quality measuring networks. By means of the digital interface, they can be perfectly integrated into the measured data architecture of the entire system. When it comes to road traffic meteorology ("Green ITS"), quality is playing a more and more important role: In the future, traffic guidance and air pollution will depend on each other. This can only be realized with precise measured data, especially in large cities.

Source: Dr. Holger Gerwig Umweltbundesamt Langen

WS600-UMB – Temperature, Relative Humidity, Precipitation, Air Pressure, Wind, Electronic Compass

From the WS product family of professional intelligent measurement transducers with digital interface for environmental applications.

Integrated design with ventilated radiation protection for measuring:

- Air temperature
- Relative humidity
- Precipitation intensity
- Precipitation type
- Precipitation quantity
- Air pressure
- Wind direction
- Wind speed

Relative humidity is measured by means of a capacitive sensor element; a precision NTC measuring element is used to measure air temperature.

Precipitation is measured by a 24 GHz Doppler radar, which measures the drop speed of an individual drop of rain/snow.

Precipitation quantity and intensity are calculated from the correlation between drop size and speed.

The difference in drop speed determines the type of precipitation (rain/snow).

Maintenance-free measurement offers a major advantage over the common tipping spoon and tipping bucket processes.

Ultrasonic sensor technology is used to take wind measurements.

Measurement output can be accessed by the following protocolls:
ASCII, UMB, SDI12, MODBUS

WS600-UMB Compact Weather Station			Order No.
WS600-UMB EU, USA, Canada			**8370.U01**
WS600-UMB UK			**8370.U02**
Technical Data	Dimensions	Ø approx. 150 mm, height approx. 345 mm	
	Weight	approx. 2.2 kg	
Temperature	Principle	NTC	
	Measuring range	–50 … 60 °C	
	Accuracy	±0.2 °C (–20 °C … +50 °C), otherwise ±0.5 °C (>–30 °C)	
Relative humidity	Principle	Capacitive	
	Measuring range	0 … 100 % RH	
	Accuracy	±2 % RH	
Precipitation intensity	Resolution	0.01 mm	
	Measuring range	Drop size 0.3 … 5 mm	
	Reproducibility	typ. > 90 %	
Precipitation type	Rain/snow		
Air pressure	Principle	MEMS capacitive	
	Measuring range	300 … 1200 hPa	
	Accuracy	±1.5 hPa	
Wind direction	Principle	Ultrasonic	
	Measuring range	0 … 359.9 °	
	Accuracy	±3 °	
Wind speed	Principle	Ultrasonic	
	Measuring range	0 … 60 m/s	
	Accuracy	± 0.3 m/s or ±3 % (0 … 35 m/s)	
General Information	Heating	40 VA at 24 VDC	
	Protection type housing	IP66	
	Interface	RS485, 2-wire, half-duplex	
	Op. power consumption	24 VDC +/-10 % <4 VA (without heating)	
	Operating humidity range	0 … 100 %	
	Op. temperature range	–50 … 60 °C	
Accessories	Surge protection		**8379.USP**
	Power supply 24V/4A		**8366.USV1**
	UMB Interface converter ISOCON		**8160.UISO**
	Digital-analog-converter		**8160.UDAC**

All in One

Aspirated temperature/ humidity measurement

Maintenance-free operation

Open communication protocol:
- ASCII
- UMB
- SDI12
- MODBUS
- Analoge outputs in combination with 8160.UDAC

WS500-UMB – Temperature, Air Pressure, Relative Humidity, Wind, Electronic Compass

From the WS product family of professional intelligent measurement transducers with digital interface for environmental applications.

Integrated design with ventilated radiation protection for measuring:

- Air temperature
- Relative humidity
- Air pressure
- Wind direction
- Wind speed

Relative humidity is measured by means of a capacitive sensor element; a precision NTC measuring element is used to measure air temperature.

Maintenance-free measurement offers a major advantage.

Measurement output can be accessed by the following protocolls:
ASCII, UMB, SDI12, MODBUS

WS500-UMB Compact Weather Station			Order No.
WS500-UMB			**8373.U01**
Technical Data	Dimensions	Ø approx. 150 mm, height approx. 290 mm	
	Weight	approx. 1.3 kg	
Temperature	Principle	NTC	
	Measuring range	-50 … 60 °C	
	Accuracy	±0.2 °C (–20 °C … +50 °C), otherwise ±0.5 °C (> -30 °C)	
Relative humidity	Principle	Capacitive	
	Measuring range	0 … 100 % RH	
	Accuracy	±2 % RH	
Air pressure	Principle	MEMS Capacitive	
	Measuring range	300 … 1200 hPa	
	Accuracy	±1.5 hPa	
Wind direction	Principle	Ultrasonic	
	Measuring range	0 … 359.9 °	
	Accuracy	±3 °	
Wind speed	Principle	Ultrasonic	
	Measuring range	0 … 60 m/s	
	Accuracy	±0.3 m/s or ±3 % (0 … 35 m/s)	
General Information	Heating	20 VA at 24 VDC	
	Protection type housing	IP66	
	Interface	RS485, 2-wire, half-duplex	
	Op. power consumption	24 VDC +/-10 % <4 VA (without heating)	
	Operating humidity range	0 … 100 %	
	Op. temperature range	–50 … 60 °C	
Accessories	Surge protection		**8379.USP**
	Power supply 24V/4A		**8366.USV1**
	UMB Interface converter ISOCON		**8160.UISO**
	Traverse for R25 + WS500		**8367.TRAV**
	Digital-analog-converter		**8160.UDAC**

Ultrasonic wind sensor

Maintenance-free operation

Open communication protocol:
- ASCII
- UMB
- SDI12
- MODBUS
- Analoge outputs in combination with 8160.UDAC

WS501-UMB – Temperature, Relative Humidity, Radiation, Air Pressure, Wind, Electronic Compass

From the WS product family of professional intelligent measurement transducers with digital interface for environmental applications.

Integrated design with ventilated radiation protection for measuring:

- Air temperature
- Relative humidity
- Air pressure
- Wind direction
- Wind speed
- Solar Radiation

Relative humidity is measured by means of a capacitive sensor element; a precision NTC measuring element is used to measure air temperature.

The world renowned technology of Kipp+Zonen CMP3 is integrated.

Ultrasonic sensor technology is used to take wind measurements.

Measurement output can be accessed by the following protocolls:
ASCII, UMB, SDI12, MODBUS

WS501-UMB Compact Weather Station			Order No.
WS501-UMB EU, USA, Canada			**8375.U01**
Technical Data	Dimensions	Ø approx. 150 mm, height 345 mm	
	Weight	approx. 2.2 kg	
Temperature	Principle	NTC	
	Measuring range	–50 … 60 °C	
	Accuracy	±0.2 °C (–20 °C … +50 °C), otherwise ±0.5 °C (> –30 °C)	
Relative humidity	Principle	Capacitive	
	Measuring range	0 … 100 % RH	
	Accuracy	±2 % RH	
Radiation	Response time (95%)	18s	
	Non-stability (change/year)	±1 %	
	Non-linearity (0 to 1,000 W/m²)	±2.5 %	
	Directional error (at 80° with 1,000 W/m²)	±20 W/m²	
	Temperature dependence of sensitivity	±5 % (–10 to +40 °C)	
	Tilt error (at 1000 W/m²)	±3 %	
	Spectral range (50% points)	300 to 2,800 nm	
	Typical signal output for atmospheric applications	0 … 20 mV	
	Operating temperature	–40 … 80 °C	
	Maximum irradiance	1,500 W/m²	
Air pressure	Principle	MEMS capacitive	
	Measuring range	300 … 1200 hPa	
	Accuracy	±1.5 hPa	
Wind direction	Principle	Ultrasonic	
	Measuring range	0 … 359.9 °	
	Accuracy	±3 °	
Wind speed	Principle	Ultrasonic	
	Measuring range	0 … 60 m/s	
	Accuracy	± 0.3 m/s or ±3 % (0 … 35 m/s)	
General Information	Heating	40 VA at 24 VDC	
	Protection type housing	IP66	
	Interface	RS485, 2-wire, half-duplex	
	Operating power consumption	24VDC +/-10% <4VA (without heating)	
	Operating humidity range	0 … 100 %	
	Operating temperature range	–50 … 60 °C	
Accessories	Surge protection		**8379.USP**
	Power supply 24V/4A		**8366.USV1**
	UMB Interface converter ISOCON		**8160.UISO**
	Digital-analog-converter		**8160.UDAC**

All in One

Aspirated temperature/ humidity measurement

Maintenance-free operation

Open communication protocol:
- ASCII
- UMB
- SDI12
- MODBUS
- Analoge outputs in combination with 8160.UDAC

WS400-UMB – Temperature, Relative Humidity, Precipitation, Air Pressure

From the WS product family of professional intelligent measurement transducers with digital interface for environmental applications.

Integrated design with ventilated radiation protection for measuring:

- Air temperature
- Relative humidity
- Precipitation intensity
- Precipitation type
- Precipitation quantity
- Air pressure

Relative humidity is measured by means of a capacitive sensor element; a precision NTC measuring element is used to measure air temperature.

Precipitation is measured by a 24 GHz Doppler radar, which measures the drop speed of an individual drop of rain/snow.

Precipitation quantity and intensity are calculated from the correlation between drop size and speed.

The difference in drop speed determines the type of precipitation (rain/snow). Maintenance-free measurement offers a major advantage over the common tipping spoon and tipping bucket processes.

Measurement output can be accessed by the following protocolls:
ASCII, UMB, SDI12, MODBUS

WS400-UMB Compact Weather Station			Order No.
WS400-UMB EU, USA, Canada			**8369.U01**
WS400-UMB UK			**8369.U02**
Technical Data	Dimensions	Ø approx. 150 mm, height approx. 280 mm	
	Weight	approx. 2 kg	
Temperature	Principle	NTC	
	Measuring range	–50 … 60 °C	
	Accuracy	±0.2 °C (–20 °C … +50 °C), otherwise ±0.5 °C (> -30 °C)	
Relative humidity	Principle	Capacitive	
	Measuring range	0 … 100 % RH	
	Accuracy	±2 % RH	
Precipitation intensity	Resolution	0.01 mm	
	Measuring range	Measuring range drop size 0.3 … 5 mm	
	Reproducibility	typ. > 90 %	
Precipitation type	Rain/snow		
Air pressure	Principle	MEMS Capacitive	
	Measuring range	300 … 1200 hPa	
	Accuracy	±1.5 hPa	
General Information	Heating	20 VA at 24 VDC	
	Protection type housing	IP66	
	Interface	RS485, 2-wire, half-duplex	
	Op. power consumption	24 VDC +/-10 % < 4 VA (without heating)	
	Operating humidity range	0 … 100 %	
	Op. temperature range	–50 … 60 °C	
Accessories	Surge protection		**8379.USP**
	Power supply 24 V/4 A		**8366.USV1**
	UMB Interface converter ISOCON		**8160.UISO**
	Digital-analog-converter		**8160.UDAC**

Radar-based precipitation detection

Aspirated temperature/humidity measurement

Open communication protocol:
- ASCII
- UMB
- SDI12
- MODBUS
- Analoge outputs in combination with 8160.UDAC

WS300-UMB – Temperature, Air Pressure, Relative Humidity

From the WS product family of professional intelligent measurement transducers with digital interface for environmental applications.

Integrated design with ventilated radiation protection for measuring:

- Air temperature
- Relative humidity
- Air pressure

Relative humidity is measured by means of a capacitive sensor element;
a precision NTC measuring element is used to measure air temperature.

Measurement output can be accessed by the following protocolls:
ASCII, UMB, SDI12, MODBUS

WS300-UMB Compact Weather Station			Order No.
WS300-UMB			**8372.U01**
Technical Data	Dimensions	Ø approx. 150 mm, height approx. 225 mm	
	Weight	approx. 0.8 kg	
Temperature	Principle	NTC	
	Measuring range	–50 … 60 °C	
	Accuracy	±0.2 °C (–20 °C … +50 °C), otherwise ±0.5 °C (>–30 °C)	
Relative humidity	Principle	Capacitive	
	Measuring range	0 … 100 % RH	
	Accuracy	±2 % RH	
Air pressure	Principle	MEMS Capacitive	
	Measuring range	300 … 1200 hPa	
	Accuracy	±1.5 hPa	
General Information	Interface	RS485, 2-wire, half-duplex	
	Protection type housing	IP66	
	Op. power consumption	24 VDC +/-10 % <4 VA	
	Operating humidity range	0 … 100 %	
	Op. temperature range	–50 … 60 °C	
Accessories	Surge protection		**8379.USP**
	Power supply 24 V/4 A		**8366.USV1**
	UMB Interface converter ISOCON		**8160.UISO**
	Digital-analog-converter		**8160.UDAC**

Aspirated temperature/humidity measurement

Open communication protocol:
- ASCII
- UMB
- SDI12
- MODBUS
- Analoge outputs in combination with 8160.UDAC

WS301-UMB – Temperature, Relative Humidity, Radiation, Air Pressure

From the WS product family of professional intelligent measurement transducers with digital interface for environmental applications.

Integrated design with ventilated radiation protection for measuring:

- Air temperature
- Relative humidity
- Solar radiation
- Air pressure

Relative humidity is measured by means of a capacitive sensor element; a precision NTC measuring element is used to measure air temperature.

The world renowned technology of Kipp+Zonen CMP3 is integrated.

Measurement output can be accessed by the following protocolls:
ASCII, UMB, SDI12, MODBUS

WS301UMB Compact Weather Station			Order No.
WS301-UMB EU, USA, Canada			**8374.U01**
Technical Data	Dimensions	Ø approx. 150mm, height 280mm	
	Weight	approx. 2 kg	
Temperature	Principle	NTC	
	Measuring range	–50 … 60 °C	
	Accuracy	±0.2 °C (–20 °C … +50 °C), otherwise ±0.5 °C (> -30 °C)	
Relative humidity	Principle	Capacitive	
	Measuring range	0 … 100 % RH	
	Accuracy	±2 % RH	
Radiation	Response time (95%)	18s	
	Non-stability (change/year)	±1 %	
	Non-linearity (0 to 1,000 W/m²)	±2.5 %	
	Directional error (at 80° with 1,000 W/m²)	±20 W/m²	
	Temperature dependent of sensitivity	±5 % (–10 to +40 °C)	
	Tilt error (at 1000 W/m²)	±3 %	
	Spectral range (50% points)	300 to 2,800 nm	
	Typical signal output for atmospheric applications	0 … 20mV	
	Operating temperature	–40 … 80 °C	
	Maximum irradiance	1,500 W/ m²	
Air pressure	Principle	MEMS Capacitive	
	Measuring range	300 … 1200 hPa	
	Accuracy	±1.5 hPa	
General Information	Heating	20 VA at 24 VDC	
	Protection type housing	IP66	
	Interface	RS485, 2-wire, half-duplex	
	Op. power consumption	24VDC +/-10% <4VA (without heating)	
	Operating humidity range	0 … 100 %	
	Op. temperature range	–50 … 60 °C	
Accessories	Surge protection		**8379.USP**
	Power supply 24 V/4 A		**8366.USV1**
	UMB Interface converter ISOCON		**8160.UISO**
	Digital-analog-converter		**8160.UDAC**

KIPP & ZONEN SINCE 1830

All in One

Aspirated temperature/ humidity measurement

Maintenance-free operation

Open communication protocol:
- ASCII
- UMB
- SDI12
- MODBUS
- Analoge outputs in combination with 8160.UDAC

WS200-UMB – Ultrasonic Wind Sensor, Electronic Compass

From the WS product family of professional intelligent measurement transducers with digital interface for environmental applications.

Integrated design for measuring:

- Wind direction
- Wind speed

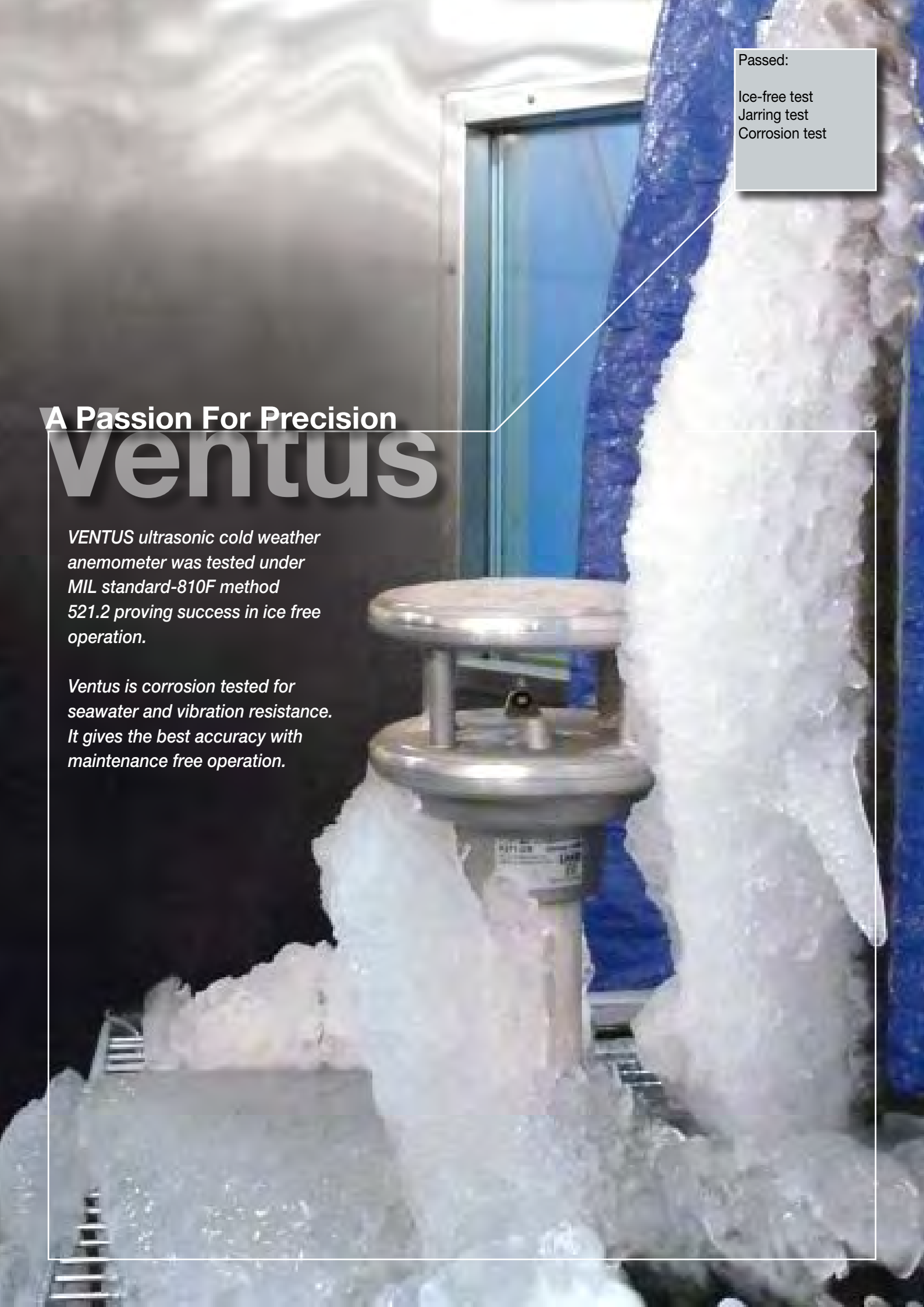
Ultrasonic sensor technology is used to take wind measurements.

Measurement output can be accessed by the following protocolls:
ASCII, UMB, SDI12, MODBUS

WS200-UMB Compact Weather Station			Order No.
WS200-UMB			**8371.U01**
Technical Data	Dimensions	Ø approx. 150 mm, height approx. 200 mm	
	Weight	approx. 0.8 kg	
Wind direction	Principle	Ultrasonic	
	Measuring range	0 … 359.9 °	
	Accuracy	±3 °	
Wind speed	Principle	Ultrasonic	
	Measuring range	0 … 60 m/s	
	Accuracy	±0.3 m/s or ±3 % (0 … 35 m/s)	
General Information	Heating	20 VA at 24 VDC	
	Protection type housing	IP66	
	Interface	RS485, 2-wire, half-duplex	
	Op. power consumption	24 VDC +/-10 % <4 VA (without heating)	
	Operating humidity range	0 … 100 %	
	Op. temperature range	–50 … 60 °C	
Accessories	Surge protection		**8379.USP**
	Power supply 24 V/4 A		**8366.USV1**
	UMB Interface converter ISOCON		**8160.UISO**
	Digital-analog-converter		**8160.UDAC**

Ultrasonic wind measurement

Open communication protocol:
- ASCII
- UMB
- SDI12
- MODBUS
- Analoge outputs in combination with 8160.UDAC



Passed:

Ice-free test
Jarring test
Corrosion test

A Passion For Precision

Ventus

VENTUS ultrasonic cold weather anemometer was tested under MIL standard-810F method 521.2 proving success in ice free operation.

Ventus is corrosion tested for seawater and vibration resistance. It gives the best accuracy with maintenance free operation.

VENTUS – Ultrasonic Wind Sensor Metal Housing, 240 W-Heater

Extremely precise and maintenance-free measurement of wind velocity and wind direction, as well as calculation of acoustic virtual temperature.

Belongs to Lufft's WS family of professional intelligent sensors with digital and analog interfaces.

The ultrasonic wind sensor is designed without mechanical parts as known with traditional "cups and vane".

The digital or analog output delivers instantaneous, average, min or max value with flexible measuring rate. The VENTUS is heated in case of critical ambient conditions. Made for cold climates!

Recommended for:

- Wind turbines
- Marine/ships
- Meteorology
- Building automation

The following outputs/protocols are available:

- NMEA
- ASCII
- UMB
- MODBUS (ASCII, RTU)
- SDI12
- 4 … 20 mA, 0...10V, frequency (analog)

VENTUS-UMB Wind Sensor			Order No.
VENTUS-UMB			**8371.UM**
Technical Data	Dimensions	Ø approx. 150 mm, height approx. 200 mm	
	Weight	approx. 1.7 kg	
Wind direction	Principle	Ultrasonic	
	Measuring range	0.1 … 359.9 °	
	Resolution	0.1 °	
	Accuracy	± 2 ° RMSE > 1.0 m/s	
	Start-up threshold	0.1 m/s	
	Measuring rate	60 partial measurements/ 15 measurements per second	
	Measurement output rate	1-10 seconds adjustable – default 10 s	
Wind speed	Principle	Ultrasonic	
	Measuring range	0 … 75 m/s	
	Resolution	0.1 m/s	
	Accuracy (0...65m/s)	±0.2 m/s or ± 2 % of reading, whichever is greater	
	Start-up threshold	0.1 m/s	
	Measuring rate	60 partial measurements/ 15 measurements per second	
	Measurement output rate	1-10 seconds adjustable – default 10 s	
	Unit	m/s; km/h; mph; kts	
Virtual temperature	Principle	Ultrasonic	
	Measuring range	–50 … +70 °C	
	Resolution	0.1 °K	
	Accuracy	± 2.0 K (without heater and without sun exposure)	
	Measuring rate	60 partial measurements/ 15 measurements per second	
	Measurement output rate	1-10 seconds adjustable – default 10 s	
Air pressure	Principle	MEMS Capacitive	
	Measuring range	300 … 1200 hPa	
	Accuracy	±1.5 hPa	
Data output digital	Interface	RS485 semi-/full duplex, isolated	
	Baudrate	1200 - 57600	
	Meas. rate instant. value	1-10 s	
	Measuring rate Avg (arithmetic, vector)	1-10 min	
	Status	Heating, sensor failure	
Data output analog	Only semi-duplex mode		
	Output signal	4 … 20 mA, 0...10V frequency (instantaneous, avg, min, max)	
	Load	max. 300 Ohm	
	Resolution	16 Bit	
General Information	Operating temperature	–40 … +60 °C (with heating)	
	Bus operation	Up to 32 devices	
	Operating voltage electronics	24 VDC ±10 % or 24 VDC/1.2 VA	
	with heating	24 VDC, max. 240 VA (140 W + 100 W)	
	Connection	8-pole plug	
	Housing material	Aluminum, seawater-proof	
	Protection	IP65	
	Pole diameter	50 mm/2"	
	Factory certificate	yes	
Accessories	Surge protection		**8379.USP-V**
	Power supply 24 V/10 A		**8366.USV2**
	UMB Interface converter ISOCON		**8160.UISO**
	Connection cable, 15 m incl. connector		**8371.UK015**
	Connection cable, 50 m incl. connector		**8371.UK050**
	Connector		**8371.UST1**

Jarring test	According to IEC 60945
Corrosion test	According to MIL-STD-810 Method 509.3
Ice-free test	According to MIL-STD-810F Method 521.2

The operation of a wind power plant is not possible without reliable wind-related information. Environmental influences – strong winds, icing, reduced visibility control actions that must be optimized immediately. Lufft has the right "meteorological" product range for such an application, with its broad range of intelligent sensors with long-term stability.

Maintenance-free

Measuring

V200A – Ultrasonic Wind Sensor Plastic Housing, 30 W-Heater, Electronic Compass

Extremely precise and maintenance-free measurement of wind velocity and wind direction as well as calculation of acoustic virtual temperature.

Belongs to Lufft's WS family of professional intelligent sensors with digital and analog interfaces.

The ultrasonic wind sensor is designed without mechanical parts as known with traditional "cups and vanes".

The digital or analog output delivers instantaneous, average, min or max value with flexible measuring rate. The V200A is heated to remove frost and ice formation from the sensor.

Recommended for:

- Meteorology
- Building automation

The following outputs/protocols are available:

- NMEA
- ASCII
- UMB
- MODBUS (ASCII, RTU)
- SDI12
- 4 … 20 mA, 0...10V, frequency (analog)

V200A-UMB Ultrasonic Wind Sensor			Order No.
V200A-UMB			**8371.UA01**
Technical Data	Dimensions	Ø approx. 150 mm, height approx. 200 mm	
	Weight	approx. 0.8 kg	
Wind direction	Principle	Ultrasonic	
	Measuring range	0 … 359.9 °	
	Resolution	0.1 ° (standard)	
	Accuracy	< 3 ° RMSE from 1.0 m/s	
	Start-up Threshold	0.3 m/s	
	Measuring rate	60 partial measurements/ 15 measurements per second	
	Measurement output rate	1-10 seconds adjustable – default 10 s	
Wind speed	Principle	Ultrasonic	
	Measuring range	0 … 75 m/s	
	Resolution	0.1 m/s	
	Accuracy (0...60m/s)	±0.3 m/s or 3 % (0 … 35 m/s) of reading, whichever is greater ±5 % (> 35 m/s) RMSE	
	Start-up threshold	0.3 m/s	
	Measuring rate	60 partial measurements/ 15 measurements per second	
	Measurement output rate	1-10 seconds adjustable – default 10 s	
	Unit	m/s; km/h; mph; kts	
Virtual temperature	Principle	Ultrasonic	
	Measuring range	–50 °C … +70 °C	
	Resolution	0.1 °K	
	Accuracy	± 2.0 K (without heater and without sun exposure)	
	Measuring rate	60 partial measurements/ 15 measurements per second	
	Measurement output rate	1-10 seconds adjustable – default 10 s	
Air pressure	Principle	MEMS Capacitive	
	Measuring range	300 … 1200 hPa	
	Accuracy	±1.5 hPa	
Data output digital	Interface	RS485 semi-/full duplex, isolated	
	Baudrate	1200 - 57600	
	Meas. rate instant. value	1-10 s	
	Measuring rate Avg (arithmetic, vector), Min, Max	1-10 min	
	Status	Heating, sensor failure	
Data output analog	Only semi-duplex mode		
	Output signal	4 … 20 mA, 0...10V frequency (instantaneous, avg, min, max)	
	Load	max. 300 Ohm	
	Resolution	16 Bit	
General Information	Operating temperature	–40 … +60 °C (with heating)	
	Bus operation	Up to 32 devices	
	Operating voltage electronics	24 VDC ±10 % or 24 VDC/1,2 VA	
	with heating	24 VDC, max. 20 VA	
	Connection	8-pole plug	
	Housing material	Plastic	
	Protection	IP65	
	Pole diameter	50 mm/2"	
	Factory certificate	yes	
Accessories	Surge protection		**8379.USP-V**
	Power supply 24 V/4 A		**8366.USV1**
	UMB Interface converter ISOCON		**8160.UISO**
	Connection cable, 15 m incl. connector		**8371.UK015**
	Connection cable, 50 m incl. connector		**8371.UK050**
	Connector		**8371.UST1**

New arrivals:

WS501-UMB with integrated pyranometer

NIRS31 non-invasive road condition and road surface temperature sensor

Sensors of the Highest Quality

It is difficult to believe that rain density can be measured, that a sensor can record the speed of precipitation and the size of the rain drops. In such cases, high-tech sensors can be extremely precise and meticulous in detail. When it is a matter of traffic safety, then Lufft Measuring Technology knows no excuses!

R2S-UMB – Precipitation Sensor (Present Weather Detector)

The drop speed is captured with a 24-GHz-Doppler radar.

The precipitation quantity and intensity is calculated from the correlation between drop size and speed.

The type of precipitation (rain, snow, sleet, freezing rain, hail) is detected from the difference in drop speed.

The measurement data is available for further processing in the form of a standard protocol (Lufft UMB protocol).

R2S-UMB Precipitation Sensor			Order No.
R2S-UMB EU, USA, Canada			**8367.U01**
R2S-UMB UK			**8367.U02**
Technical Data	Resolution liquid precipitation	0.01 … 0.1 … 1.0 mm/m²	
	Power supply	20 … 28 VDC	
	Power consumption without heating	2 VA	
	Heating power/24V	30 VA	
	Op. temperature range	–30 … 70 °C	
	Op. humidity range	0 … 100 %	
	Protection	IP67	
	Interface	RS485 semiduplex wire, UMB protocol, pulse and frequency interface	
	Cable length	10 m	
	Measuring range hail	5.1 … approx. 30 mm	
	Type of precipitation	Rain, snow, sleet, freezing rain, hail	
Precipitation	Principle	Doppler-Radar	
	Reproducibility	typ. > 90 %	
	Measuring range drop size	0.3 … 5 mm	
Accessories	UMB Interface converter ISOCON		**8160.UISO**
	Power supply 24 V/4 A		**8366.USV1**
	Protection shield for R2S ISOCON		**8367.SCHIRM**
	Traverse for R2S + WS500		**8367.TRAV**
	Surge protection		**8379.USP**
	Digital-analog-converter		**8160.UDAC**

Maintenance-free
Fast response time
Present weather detector
Resolution 0.01 mm

IRS31-UMB – Intelligent Road Sensor

Passive road sensor IRS31-UMB is flushmounted in the road. The two part housing design allows the combined sensor/electronics unit to be removed for maintenance or calibration at any time.

The following variables are recorded:

- **Road surface temperature**
- **Water film height up to 4 mm**
- **Freezing temperature for different de-icing materials**
- **Road condition (dry/damp/wet/ice or snow/residual salt/freezing rain)**

Optional:

- **2 additional depth temperatures, e.g. at 5 cm and 30 cm**

The sensors are addressable and can be networked.

The measurement data is available for further processing in the form of a standard protocol (Lufft UMB protocol).

IRS31-UMB Intelligent Road Sensor			Order No.
IRS31-UMB 50 m cable length			**8510.U050**
IRS31-UMB 100 m cable length			**8510.U100**
IRS31-UMB 50 m cable length, 2 depth temperature sensors			**8510.U052**
IRS31-UMB 100 m cable length, 2 depth temperature sensors			**8510.U102**
Technical Data	Dimensions	Ø 120 mm, height 50 mm	
	Weight	approx. 800 g or 900 g	
	Detectable road conditions	Dry/damp/wet/ice or snow/residual salt content/freezing wetness	
	Storage temperature	–40 … 70 °C	
	Rated current	< 200 mA	
	Interface	RS485, Baudrate: 2400 … 38400 bit/s (Standard: 19200)	
	Protection	IP68	
	Op. power consumption	9 … 14 VDC, typical 12 V	
	Plug	CAGE CLAMP, WAGO (cross-section < 0,5 mm²)	
	Op. temperature range	–40 … 70 °C	
	Operating humidity range	0 … 100 % RH	
	Road dampness	Unit: dry/damp/wet	
	Slippery road conditions	Unit: no ice/snow, snow, freezing rain, ice	
Road surface temp./below-ground temp.	Principle	NTC	
	Measuring range	–40 … 70 °C	
	Accuracy	±0.2 °C (–10 … 10 °C), otherwise ±0.5 °C	
	Resolution	0.1	
Freezing point	Measuring range	–20 … 0 °C	
	Accuracy	±1 °C for t > –10 °C	
	Resolution	0.1	
Water film height	Principle	Radar	
	Measuring range	0 … 4 mm	
	Accuracy	±(0.1 mm + 20 % of measurement)	
	Resolution	0.01 mm	
Accessories	UMB Interface converter ISOCON		**8160.UISO**
	Spare part cap IRS31-UMB		**8510.DEC**
	Surge protection		**8379.USP**
	Digital-analog-converter		**8160.UDAC**

Order No. 8510.DEC

Replaceable sensor electronics

Polling via RS485 interface

Low energy consumption (solar operation)

Radar principle to measure water film

ARS31-UMB – Intelligent Road Sensor

The active ARS31-UMB sensor is installed flush with the road/runway surface and calculates the freezing temperature by means of active cooling and heating of the sensor surface.

The freezing temperature measurement is independent of mixture.

The two-section housing design allows the combined sensor/electronics unit to be removed for maintenance purposes at any time, in just a few minutes.

In conjunction with the interface converter 8160.UISO, the sensor can be built intonew and existing UMB networks.

Passive sensor IRS31-UMB and active sensor ARS31-UMB can be combined without difficulty.

The sensors are addressable and can be networked.

ARS31-UMB Intelligent Road Sensor			Order No.
ARS31-UMB 50 m cable length			**8610.U050**
Technical Data	Dimensions	Ø 120 mm, height 50 mm	
	Weight	approx. 900 g	
	Storage temperature	–40 … 70 °C	
	Protection type	IP68	
	Op. power consumption	9 … 36 V VDC	
	Plug	CAGE CLAMP, WAGO (cross-section < 0,5 mm²)	
	Op. temperature range	–40 … 70 °C	
	Operating humidity range	0 … 100 % RH	
	Power consumption	approx. 30 W	
	Interface	RS485, baud rate: 2,400 … 38,400 bit/s (default: 19,200)	
Freezing point	Measuring range	–40 … 0 °C	
	Accuracy	±0.5 °C RMSE for Tg > –15 °C, or ±1.5 °C RMSE for Tg < –15 °C	
	Resolution	0.1	
Accessories	UMB Interface converter ISOCON		**8160.UISO**
	Spare part cap ARS31-UMB		**8610.DEC**
	Surge protector		**8379.USP**
	Digital-analog-converter		**8160.UDAC**

Replaceable sensor/electronics

Mixture-independent measurement

NIRS31-UMB – non invasive measurements using optical principle

Lufft road sensors use optical measuring principles. Without a need to install the embedded sensors, these non-intrusive multi-sensor-systems have integrated microprocessors to identify all road and runway conditions.

The measurement principle (optical / spectroscopical): Water absorbs certain wave lengths differently. If there is a water layer on a runway or a highway, then the spectral characteristics are changed.

Measurement of surface conditions such as wet ice, snow, or frost.

Dependent on the requirements of any traffic-related weather network, there is a need for embedded and/or non-invasive/ non-intrusive sensing equipment. Luffts NIRS31-UMB adds to Lufft series of pavement sensors an intelligent sensor which is part of the pole or part of bridge surpassing the motorway. Mainly on bridges, which do not allow in all cases embedded sensors, the NIRS31-UMB is an alternative of Luffts IRS31-UMB. Microclimates, who need frequent asphalt reconstruction, prefer non-invasive technology as well to reduce the maintenance costs.

The typical distance between the surface measurement spot and the sensor is 6...15 meters. In addition to the well-known measurements in winter-related road networks **-waterfilm -surface temperature -freeze point temperature** the sensor delivers the new information „friction“. Whenever the quantity of ice particles increase on the measured spot, the friction reading will be changed and herewith can be used for on-time treatments. Non-invasive sensors cannot measure depth temperature(s).

Measurement output can be accessed by the following protocolls:
UMB, SDI12

UMB-Config-Tool Software for:
- Configuration of sensors
- Onsite calibration
- Real-time date of sensor
- Firmware-Update for UMB sensors and UMB-modules
- Analoge outputs in combination with 8160.UDAC

NIRS31-UMB Non Invasive Sensor			Order No.
- Measurement of surface conditions such as wetness, ice, snow, or frost. - Measurement of water film height - Measurement of ice percentage in water and determination of freeze temperature - Measurement of friction - Fully integrated surface temperature measurement (pyrometer) an option - Electric Isolation of RS485 interface for network with other UMB sensors - Easy to mount - Firmware-Updates via UMB-technology			**8710.U01**
Technical Data	Dimensions	H. ca. 425 mm, W. ca. 225mm, D. ca. 285mm	
	Weight	10 kg	
Storage conditions	Ambient air temperature	-40°C ... +70°C	
	Ambient rel. humidity:	< 95% RH, non condensing	
Operating conditions	Operating voltage	24VDC +/- 10% (22 – 30VDC)	
	Power consumption	approx. 50VA	
	Temperature	-40°C...+60°C	
	Protection type	IP65	
Layer thickness	Water, Snow, Ice		
	Principle	Optical	
	Measurement range	0...2mm (snow 0 ... 10 mm)	
	Resolution	0.01 mm	
Surface temperature (optional)	Principle	Pyrometer	
	Measurement range	-40 ... +70 °C	
	Accuracy	±0.8°C	
	Resolution	0.1 °C	
Surface conditions	Dry, Damp, Wet, Critical Wetness, Snow, Ice		
Friction	Measurment range 0...1 (critical ... dry)		
Accessories	Surge protection		**8379.USP**
	Power supply 24 V/4 A		**8366.USV1**
	UMB Interface converter ISOCON		**8160.UISO**
	Digital-analog-converter		**8160.UDAC**

Night Vision Camera
High Resolution Color Pictures

Camera = ”Virtual eye on site“ in conjunction with measurement data.

Images of road condition day and night in real time with infrared spotlight (option) and GPRS transmission. Creates trust and visually illustrates measurement data, Recommended especially in conjunction with ice warning systems to limit patrols to the greatest possible extent.

Night Vision Camera			Order No.
Night Vision Camera, high resolution, 3 Mega pixel			**9983.10**
Night Vision Camera, VGA resolution			**9983.20**
Technical Data	Indoor/Outdoor	Dual lens outdoor, weather-proof (IP65), –30 … +60 °C	
	Lenses	Wide Angle (43 mm, F 2.0	
	Resolution	VGA (640 x 480 pixels each), color + B/W	
	Sensitivity Color	1 lux (t=1/60s) 0.05 lux (t=1/1s)	
	Interfaces	Ethernet 10/100 Mbps, RS232	
	Power Supply	PoE or MX30V	
Accessories	Infrared spotlight LED		**9984.00**
	Surge protection		**8379.USP-RJ45**

Quality

for Long-Term Visibility

In fog, a visibility of more than 500 meters is not a problem as an impact on traffic is not expected. However, extremely precise measurements have to be taken within the low measurement ranges. The level of danger is at its highest when visibility drops below 50 metres, which is why in such cases speed limits of 40-60 km/h are displayed on dynamic or variable message signs. Nevertheless, traffic limitations are imposed as soon as visibility drops to 250 metres. Fog is precisely detected within a range of 10 to 2,000 metres with the visibility sensor VS20.

VS20-UMB – Visibility Sensor

- Measures visibility up to 2000 m
- Ideal for road traffic applications
- Analog output 4...20 mA
- Digital UMB protocol (RS485 interface)
- Calibration device available (optional)

The VS20 is configured via the software UMB-Config:

- **Reading / Changing of the current configuration**
- **Calibration**
- **Polling of the current measurement values**
- **The software allows configurations to be loaded and stored**

The measurement data is available for further processing in the form of a standard protocol (Lufft UMB protocol).

VS20-UMB Visibility Sensor			Order No.
VS20-UMB			**8366.U50**
Technical Data	Output signal	4 … 20 mA/20 … 4 mA	
	Interface	RS485 semi-duplex wire, UMB protocol	
	Protection	IP66	
	Weight	approx. 4 kg	
	Dimensions	360 x 180 x 80 mm	
	Op. temperature range	–40 … 60 °C	
	Power supply	typ. 24 VDC (22 … 28 VDC) 3 W	
	Included in delivery	Connection cable	
	Value update	1 minute	
	Cable length	10 m	
Visibility	Principle	Forward scattered light procedure	
	Measuring range	10 … 2000 m	
	Unit	m	
	Accuracy	±10 m or ±10 %, highest value applies	
Accessories	UMB Interface converter ISOCON		**8160.UISO**
	Connecting cable		**8366.UKAB10**
	Calibration kit visibility		**8366.UKAL1**
	Power supply 24 V/4 A		**8366.USV1**
	Surge protection		**8379.USP**

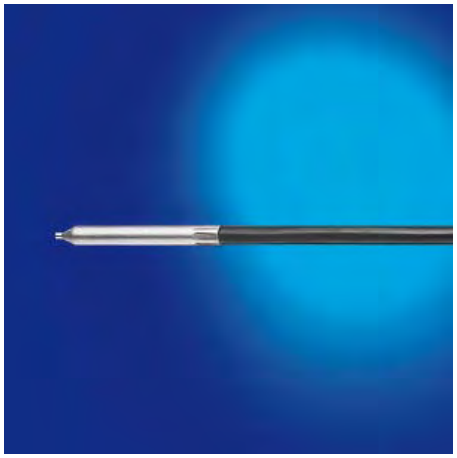
10 … 2000 m measurement range

Calibration kit (optional)

Forward light scattering technique

Temperature, Humidity, Snow Height

Temperature probe			Order No.
Temperature probe			**8160.TF**
Technical Data	Dimensions	Length 50 mm, Ø 6 mm	
	Output signal	Resistance	
	Dimensions	370 g	
	Cable length	10 m	
	Protection	IP68	
	Plug	COMBICON Phoenix, gold contacts	
	Op. temperature range	–50 … 150 °C	
	Operating humidity range	0 … 100 % RH	
Temperature	Principle	Pt100	
	Measuring range	–50 … 150 °C	
Accessories	Fixing bracket incl. sensor protection		**8160.METEO**



Temperature/relative humidity probe			Order No.
Temperature/relative humidity probe 10 m cable length			**8160.TFF10**
Temperature/relative humidity probe 50 m cable length			**8160.TFF50**
Technical Data	Dimensions	Length 185 mm, Ø 16 mm	
	Output signal	Resistance, frequency	
	Operating voltage	6 … 15 V	
	Operating current	approx. 10 mA	
	Weight	400 g	
	Protection	IP54	
	Plug	COMBICON Phoenix	
	Op. temperature range	–30 … 70 °C	
	Operating humidity range	0 … 100 % RH	
Relative humidity	Principle	Capacitive	
	Measuring range	0 … 100 % RH	
	Accuracy	±2 % RH	
Temperature	Principle	Pt1000	
	Measuring range	–30 … 70 °C	
	Accuracy	±0.2 °C	
Accessories	Measuring head for 8160.TFF10 and 8160.TFF50		**8160.HC**
	Radiation shield		**8150.SCHUW**
	Fixing bracket incl. sensor protection		**8160.METEO**

Snow depth sensor			Bestell-Nr.
A compact laser sensor for determining snow depths			**8365.10**
Technical Data	Dimensions	302mm x 130mm x 234mm	
	Weight	approx. 3.3kg	
	Snow depth	0...15m (0...50ft)	
	Accuracy	< ±5mm	
	Programmable measuring interval	10...600s	
	Time to measure	0.16...6s	
	Distance range	0.1...15m	
	Data interfaces Interfaces modes RS232 analog	RS232, analog output 2.4...38,4kBaud, 8N1 Format 4...20mA	
	Power consumption	0.5...1W (without heating) <12W (with heating,@-40°C)	
	Power supply	10...30VDC (without heating) 15...24VDC (with heating)	
	Laser classification	Class 2 (EN 60825-1:2007)	
	International protection	IP65	
	Temperature range	-40...+50°C	
	Relative humidity	0...100%	
	Heating activity	<0°C programmable	
Accessoires	Cable extensions		
	Signal interface	RS422	
	Signal input	Heater off	

Wind (Ultrasonic)

VENTUS-UMB Wind Sensor with factory certificate			Order No.
VENTUS-UMB			**8371.UM**
Technical Data	Dimensions	Ø approx. 150 mm, height app. 200 mm	
	Weight	approx. 1.7 kg	
Wind direction	Principle	Ultrasonic	
	Measuring range	0 … 359.9 °	
	Accuracy	± 2 ° RMSE > 1.0 m/s	
Wind speed	Principle	Ultrasonic	
	Measuring range	0 … 75 m/s	
	Accuracy (0...65m/s)	± 0.2 m/s or ± 2 % of reading, whichever is greater	
Virtual Temperature	Principle	Ultrasonic	
	Measuring range	–50 … +70 °C	
	Resolution	0.1 °K	
	Accuracy	± 2.0 ° (without heater and without sun exposure)	
	Measuring rate	60 partial measurements/ 15 measurements per second	
Air pressure	Principle	MEMS Capacitive	
	Measuring range	300 … 1200 hPa	
	Accuracy	±1.5 hPa	
General Information	Operating temperature	–40 … +60 °C (with heating)	
	Bus operation	Up to 32 devices	
	Operating voltage electronics	24 VDC ±10 % or 24 VDC/1.2 VA	
	with heating	24 VDC, max. 240 VA (140 W + 100 W)	
	Connection	8 pole Plug	
	Housing material	Aluminum, seawater-proof	
	Protection	IP 65	
	Pole diameter	50 mm/2“	
Accessories	see page 13		

V200A-UMB Ultrasonic Wind Sensor with factory certificate			Order No.
V200A-UMB			**8371.UA01**
Technical Data	Dimensions	Ø approx. 150 mm, height ap. 200 mm	
	Weight	approx. 0.8 kg	
Wind direction	Principle	Ultrasonic	
	Measuring range	0 … 359.9 °	
	Accuracy	< 3 ° RMSE from 1.0 m/s	
Wind speed	Principle	Ultrasonic	
	Measuring range	0 … 75 m/s	
	Resolution	0.1 m/s	
	Accuracy (0...60m/s)	± 0.3 m/s or 3 % (0 … 35 m/s) of reading, whichever is greater ±5 % (> 35 m/s) RMSE	
Virtual Temperature	Principle	Ultrasonic	
	Measuring range	–50 °C … +70 °C	
	Resolution	0.1 °K	
	Accuracy	± 2.0 ° (without heater and without sun exposure)	
	Measuring rate	60 partial measurements/ 15 measurements per second	
	Measurement output rate	1-10 seconds adjustable – default 10 s	
Air pressure	Principle	MEMS Capacitive	
	Measuring range	300 … 1200 hPa	
	Accuracy	±1.5 hPa	
General Information	Operating temperature	–40 … +60 °C (with heating)	
	Bus operation	Up to 32 devices	
	Op. voltage electronics	24 VDC ±10 % or 24 VDC/1,2 VA	
	with heating	24 VDC, max. 20 VA	
	Connection	8 pole Plug	
	Housing material	Plastic	
	Protection	IP65	
	Pole diameter	50 mm/2“	
Accessories	see page 15		

Precipitation (Tipping Bucket)

Rain gauge			Order No.
Rain gauge 0.1 mm unheated			**8353.13**
Rain gauge 0.1 mm heated			**8353.13H**
Technical Data	Dimensions	Ø 190 mm, Height 292 mm	
	Connection type	Open cable ends	
	Collecting area	200 cm²	
	Resolution	0.1 mm (tipping bucket)	
	Weight	approx. 4 kg	
	Mounting type	On mast, Ø 60 mm	
	Operating temp. range, rain gauge unheated	0 … 70 °C	
	Operating temp. range, rain gauge heated	–30 … 70 °C	
	Heating	42 V/AC, 170 VA	
Accessories	Power supply for heated probe 8353.13H		**8353.SV1**
	Stand, height 1 m for 8353.13		**8353.FUS2**
	Stand, height 1 m for 8353.13H		**8353.FUS3**

Rain gauge			Order No.
Rain gauge 0.1 mm unheated			**8353.12**
Rain gauge 0.1 mm heated			**8353.12H**
Technical Data	Dimensions	Ø 190 mm, height 292 mm	
	Connection type	Open cable ends	
	Collecting area	200 cm²	
	Resolution	0,1 mm (tipping bucket)	
	Weight	approx. 3 kg	
	Mounting type	On mast, Ø 60 mm	
	Operating temp. range, rain gauge unheated	0 … 70 °C	
	Operating temp. range, rain gauge heated	–20 … 70 °C	
	Heating	24 VDC 150 W	
Accessories	Power supply for heated probe 8353.12H		**8366.USV2**
	Stand, height 1 m for 8353.12		**8353.FUS2**
	Stand, height 1 m for 8353.12H		**8353.FUS3**

Rain gauge			Order No.
Rain gauge 0.2 mm unheated			**8353.04**
Technical Data	Dimensions	Ø165 mm, height 255 mm	
	Connection type	Open cable ends	
	Collecting area	200 cm²	
	Resolution	0.2 mm (tipping bucket)	
	Dimensions	380 g	
	Mounting type	On mast, Ø 50 mm	

Air Pressure, Wind

Air Pressure Sensor			Order No.
Air Pressure Sensor			**8355.03**
Technical Data	Dimensions	100 mm x 65mm x 41 mm	
	Connection type	Cable clips	
	Output signal	4 … 20 mA	
	Operating voltage	7 … 15 VDC	
	Operating current	<= 4 mA	
	Weight	approx. 360 g	
	Protection	IP54	
	Op. temperature range	–40 … 60 °C	
	Max. burden	< (UB –7 V)/20 mA	
	Operating humidity range	0 … 95 % RH (non-condensing)	
Absolute pressure	Principle	Capacitive ceramic	
	Measuring range	0 … 1200 hPa	
	Accuracy	±1.5 hPa, for 0 °C < T < 40 °C and 600 hPa < Pabs < 1100 hPa	
Absolute pressure	Principle	Capacitive ceramic	
	Measuring range	0 … 1200 hPa	
	Accuracy	±2.0 hPa, for –20 °C < T < 45 °C and 600 hPa < Pabs < 1100 hPa	
Absolute pressure	Principle	Capacitive ceramic	
	Measuring range	0 … 1200 hPa	
	Accuracy	±3.0 hPa, for –40 °C < T < 60 °C and 600 hPa < Pabs < 1100 hPa	
Absolute pressure	Principle	Capacitive ceramic	
	Measuring range	0 … 1200 hPa	
	Accuracy	±0.5 hPa, for T = 20 °C and 600 hPa < Pabs < 1100 hPa	

Wind sensor			Order No.
Wind sensor unheated			**8368.01**
Wind sensor heated			**8368.02**
Technical Data	Dimensions	Traverse 1 m	
	Start-up value	0.9 m/s	
	Connection type	Open cable ends	
	Weight	2.5 kg	
	Cable length	10 m	
	Protection	IP65	
	Wind direction	2 ° open at south	
	Op. temperature range	–30 … 70 °C	
Wind speed	Principle/Measuring range	Generator/0.9 … 50 m/s	
Wind direction	Principle/Measuring range	Potentiometer/0 … 358 °	
Accessories	Power supply for heated sensors		**8161.SV4**

Wind sensor			Order No.
Wind sensor unheated			**8368.03**
Wind sensor heated			**8368.04**
Technical Data	Dimensions	165x115mm	
	Start-up value	0.9 m/s	
	Connection type	Open cable ends	
	Weight	500 g	
	Cable length	10 m	
	Protection type wind sensor unheated	IP54	
	Protection type wind sensor heated	IP65	
	Op. temperature range	–30 … 70 °C	
	Heating	20 W, 12 V/24 VDC	
Wind speed	Principle	Generator	
	Measuring range	0.9 … 50 m/s	
Accessories	Power supply for heated probes		**8161.SV4**

Pyranometer Radiation

CMP11 Pyranometer Radiation			Order No.
CMP11			**8346.CMP11**
Technical Data	ISO Classification	Secondary standard	
	Response time (95 %)	5 s	
	Zero offsets thermal radiation (200 W/m²)	±8 W/m²	
	Zero offsets Temperature change (5 K/hr)	±2 W/m²	
	Non-stability (change/year)	±0.5 %	
	Non-linearity (0 to 1,000 W/m²)	±0.2 %	
	Directional error (at 80 ° with 1,000 W/m²)	±10 W/m²	
	Temperature dependence of sensitivity	±1 % (–10 to +40 ° C)	
	Tilt error (at 1,000 W/m²)	±0.2 %	
	Sensitivity	7 to 14 µV/W/m²	
	Impedance	10 to 100 Ohm	
	Level accuracy	0.1 °	
	Operating temperature	–40 to +80 ° C	
	Spectral range (50 % points)	285 to 2,800 nm	
	Typical signal output for atmospheric applications	0 to 15 mV	
	Maximum irradiance	4,000 W/m²	
	Expected daily uncertainty	±2 %	
	Standard cable length	10 m	
Radiation	Unit	W/m²	
Accessories	Transmitter 4 … 20 mA		**8346.AMP**
	Mounting fixture for 8346.CMP6 und 8346.CMP11		**8346.M02**

CMP3 Pyranometer Radiation			Order No.
CMP3			**8346.CMP3**
Technical Data	ISO Classification	Second Class	
	Response Time (95 %)	18 s	
	Zero offsets thermal radiation (200 W/m²)	±15 W/m²	
	Zero offsets Temperature change (5 K/hr)	±5 W/m²	
	Non-stability (change/year)	±1 %	
	Non-linearity (0 to 1,000 W/m²)	±2.5 %	
	Directional error (at 80 ° with 1,000 W/m²)	±20 W/m²	
	Temperature dependence of sensitivity	±5 % (–10 to +40 ° C)	
	Tilt error (at 1,000W/m²)	±3 %	
	Sensitivity	5 to 20 µV/W/m²	
	Impedance	20 to 200 Ohm	
	Level accuracy	1 °	
	Operating temperature	–40 to +80 ° C	
	Spectral range (50 % points)	300 to 2,800 nm	
	Typical signal output for atmospheric applications	0 to 20 mV	
	Maximum irradiance	2,000 W/m²	
	Expected daily uncertainty	±10 %	
	Standard cable length	10 m	
Radiation	Unit	W/m²	
Accessories	Transmitter 4 … 20 mA		**8346.AMP**
	Mounting fixture for 8346.CMP3 und 8346.SPLITE2		**8346.M01**

CMP6 Pyranometer Radiation			Order No.
CMP6			**8346.CMP6**
Technical Data	ISO Classification	First Class	
	Response time (95 %)	18 s	
	Zero offsets thermal radiation (200 W/m²)	±8 W/m²	
	Zero offsets Temperature change (5 K/hr)	±4 W/m²	
	Non-stability (change/year)	±1 %	
	Non-linearity (0 to 1,000 W/m²)	±1 %	
	Directional error (at 80 ° with 1,000 W/m²)	±20 W/m²	
	Temperature dependence of sensitivity	±4 % (–10 to +40 ° C)	
	Tilt error (at 1,000 W/m²)	±1 %	
	Sensitivity	5 to 20 µV/W/m²	
	Impedance	20 to 200 Ohm	
	Level accuracy	0.1 °	
	Operating temperature	–40 to +80 ° C	
	Spectral range (50 % points)	285 to 2800 nm	
	Typical signal output for atmospheric applications	0 to 20 mV	
	Maximum irradiance	2,000 W/m²	
	Expected daily uncertainty	±5 %	
	Standard cable length	10 m	
Radiation	Unit	W/m²	
Accessories	Transmitter 4 … 20 mA		**8346.AMP**
	Mounting fixture for 8346.CMP6 and 8346.CMP11		**8346.M02**

SP LITE2 Silicon Pyranometer Radiation			Order No.
SP LITE2			**8346.SPLITE2**
Technical Data	Response time (95 %)	< 1 ms	
	Non-stability (change/year)	< 2 %	
	Non-linearity (0 to 1,000 W/m²)	< 1 %	
	Directional error (at 80 ° with 1,000 W/m²)	< 50 W/m²	
	Temperature dependence (-30 to +70 ° C)	–0,15 %/ ° C	
	Sensitivity	60 to 100 µV/W/m²	
	Operating temperature	–30 … 70 ° C	
	Spectral range (50 % points)	400 to 1,100 nm	
	Typical signal output for atmospheric applications	0 to 100 mV	
	Maximum irradiance	2,000 W/m²	
	Standard cable length	5 m	
	Impedance	50 Ohm	
	Detector	Silicon photo-diode	
Radiation	Unit	W/m²	
Accessories	Mounting rod for 8346.CMP3 and 8346.SPLITE2		**8346.M01**

UMB-Modules

Common features of all UMB modules

- Galvanic isolation between sensor supply and communication
- Host communication via RS232 (PC / GPRS-modem), RS485 (EAK)
- Small housing with top hat rail mounting and bus-connection
- Firmware update via RS232
- Common power supply (24V) for UMB modules and (heated) sensors
- Online data-transfer (no memory)
- Network with up to 32 modules

ISOCON-UMB communication module for all UMB sensors

- Communication-watchdog for reliable sensor function (reset)
- Overvoltage protection for all interfaces
- LED indication for operation mode

ANACON-UMB 2-channel universal transmitter

2 analog inputs, 24 bit resolution for voltage, current and resistance LED indication for operation mode for following Lufft-sensors:

- Temperature / humidity sensor
- Combined wind / air pressure sensor
- Ultrasonic wind sensor 4…20 mA
- Precipitation gauge (tipping bucket)

Other inputs:
Digital signals (e.g. door contact)

IRS21CON-UMB communication module for Lufft road sensor IRS21

- Converts the IRS21 protocol into UMB protocol
- Controls the galvanic isolated power supply for IRS21
- Overvoltage protection for all interfaces
- LED indication for operation mode

UMB-Modules			Order No.
ISOCON-UMB			**8160.UISO**
ANACON-UMB			**8160.UANA**
IRS21CON-UMB			**8410.UISO**
Operating conditions	Power supply	12…26 VDC	
	Power consumption	< 100 mA	
	Ambient temperature	–30 °C… +60 °C	
	Relative humidity	< 95 % RH	
	Protection	IP20	
	Module width	23 mm	
	RS232 Plug	DSUB9	
	Sensor connector	Screw type	
Storage conditions	Ambient temperature	–40 °C…+70 °C	
	Relative humidity	< 95 % RH	
Accessories	Power supply 24 V/4 A		**8366.USV1**
	GPRS/GSM modem with camera connection		**8160.MOD-VIOLA**
	Night vision camera, 3 Mega pixel		**9983.10**
	Night vision camera, VGA		**9983.20**

Compact design
Easy commissioning
RS232 or RS485 data transfer
Easy software updates
Free configuration software

DACON8-UMB = 8 channel digital-analog converter for all Lufft UMB sensors

The Lufft-DACON8-UMB (Digital-Analog-Converter) converts up to 8 channels into analog output signals. The converter can be used with one or a combination of different UMB sensors .

The Lufft-DACON8-UMB uses the UMB protocol of the sensors to read the data and converts the digital data into voltage or current output.

In case of having only one Lufft UMB sensor, the combination of the sensor and DACON8-UMB works without any other interface inbetween.

If the Lufft DACON8-UMB has to convert data of more than one Lufft UMB sensor, then every UMB sensor needs a Lufft ISOCON between the sensor itself and the DACON8-UMB, and must be connected to the RS485-bus.

In case there are more than 8 channels requested by the application, the DACON8-UMB application can work with more than one converter. It is necessary to use one converter per DACON8-UMB.

DACON8-UMB (Digital/Analog converter)			Order No.
DACON8-UMB			**8160.UDAC**
Technical data	Current:	0 or 4-20 mA	
	Voltage	0 or 2-10 V	
	Accuracy	max. 0,5% over the whole range	
	Maximum load/	300 Ω	
	Resolution	16 bits	
	UMB Channels	adjustable	
	Max channels	8	
	Update rate	1-10 seconds	
	Only one DACON8-UMB per bus		

Compact design
Easy commissioning
Easy software updates
Free configuration software

LCOM – Lufft-Communicator

The LCOM (Lufft-Communicator) is an industrial PC with the Windows-CE operating system. The following interfaces are available for communication purposes:

- USB
- CDMA modem (RS232)
- Partyline modem (RS232)
- UMB bus (RS485)

Conversion to the following standard protocols can be made in combination with the UMB technology:

TLS
NTCIP
TLS over IP with GPRS (Asfinag)
MSSI (Asfinag)
Synop (in planning)

The equipment is configured and measurement data presented on the built-in 7 inch touch screen display.
A service PC is no longer required.

Remote access is available for software uploads and data analysis on the LCOM and UMB modules over the GPRS modem.

LCOM Lufft Communicator			Order No.
LCOM			**8510.EAK**
Operating Conditions	Power supply	20…28 VDC	
	Power consumption	10 VA	
	Ambient temperature	–30 °C… +60 °C	
	Relative humidity	< 90 % RH	
	Protection	IP20	
	Dimensions	230 mm x 130 mm x 50 mm	
	USB Interface	USB2.0B	
	GPRS modem interface	RS232 on Wago Cage Clamp	
	Party line modem interface	RS232 on Wago Cage Clamp	
	UMB bus interface	RS485 on Wago Cage Clamp	
	Display size	7 inch	
	Display resolution	800 x 480 pixel	
Storage conditions	Ambient temperature	–30 °C…+60 °C	
	Relative humidity	< 95 % RH	
Accessories	Power supply 24 V/4 A		**8366.USV1**
	GPRS Modem		**8510.GPRS**
	Night vision camera, 3 Mega pixel		**9983.10**
	Night vision camera, VGA		**9983.20**

Modem – Viola, GRPS

Dual-Modem	Order No.
GPRS/GSM modem with camera port	**8160.MOD-VIOLA**
Modem for UMB and camera, “dual use”	

GPRS Modem	Order No.
GPRS Modem	**8510.GPRS**

Fold-Over mast, hot-dip galvanized			Order No.
Fold-Over mast			**8357.450**
Technical Data	Dimensions	Length 450cm	
Accessories	Metal box, small, for 8357.450 Dimensions 120 mm height x 360 mm wide x 80 mm deep		**8357.CAS1**
	Cabinet, large Dimensions 600 mm height x 400 mm wide x 210 mm deep		**8357.CAS2**
	Cabinet UMB, for Lufft pole 8357.450 8357.CAS3 (incl. mounting rails, wiring channel, plug socket, connecting terminal, protective switch, bag for connection diagram) Dimensions 600 mm high x 400 mm wide x 210 mm deep		**8357.CAS3**
	Cabinet UMB for other poles (incl. mounting rails, wiring channel, plug socket, connecting terminal, protective switch, bag for connection diagram) Dimensions 600 mm high x 400 mm wide x 210 mm deep		**8160.CAS4**
	Lockable tilt device		**8357.450V**
	4 fixed anchor dowel pins		**8357.450D**
	Switch for door contact		**8160.UDC**
	Fault current protective switch		**8160.UFI**
	Arresting cable		**8357.450UAC**
	Cables between sensors and weather case are “non-visible”		

UMB
Configuration Examples

Community Weather Station

Data collection on polling server · Communication via wireless modem (CDMA/GPRS)

UMB modules 24V power supply and GPRS modem

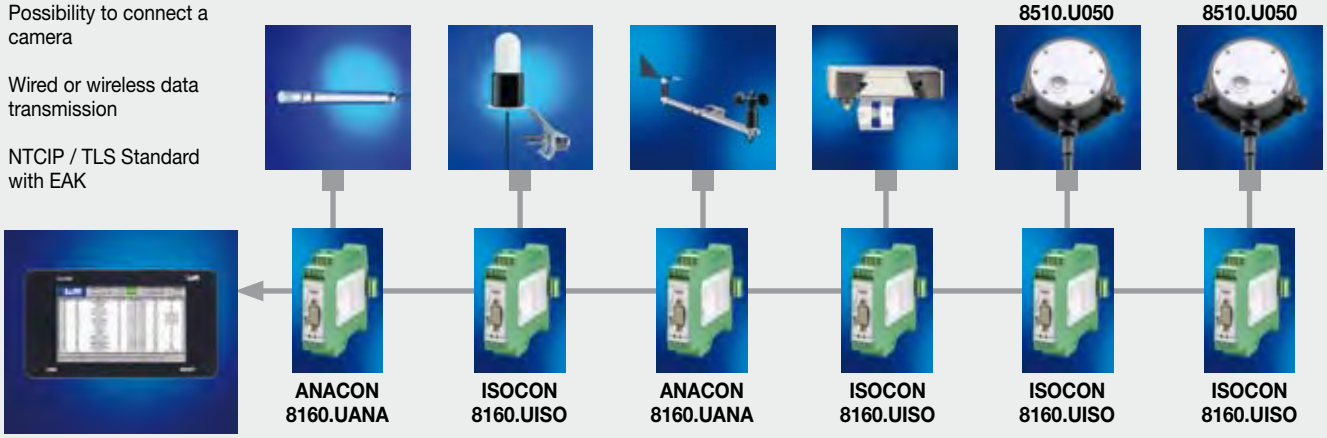
Standard GMA/ARWIS configuration

Data collection on site (EAK)

Possibility to connect a camera

Wired or wireless data transmission

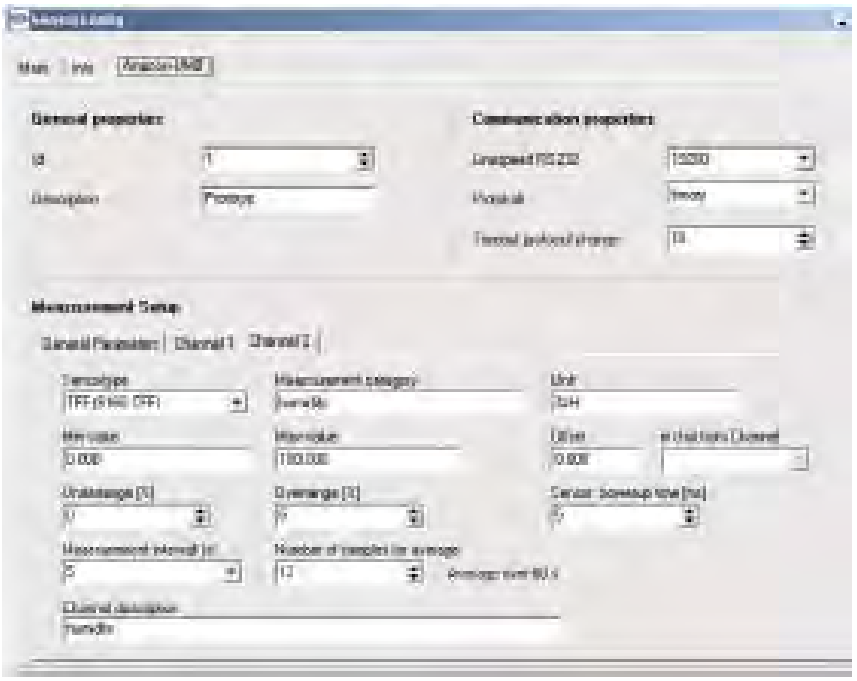
NTCIP / TLS Standard with EAK



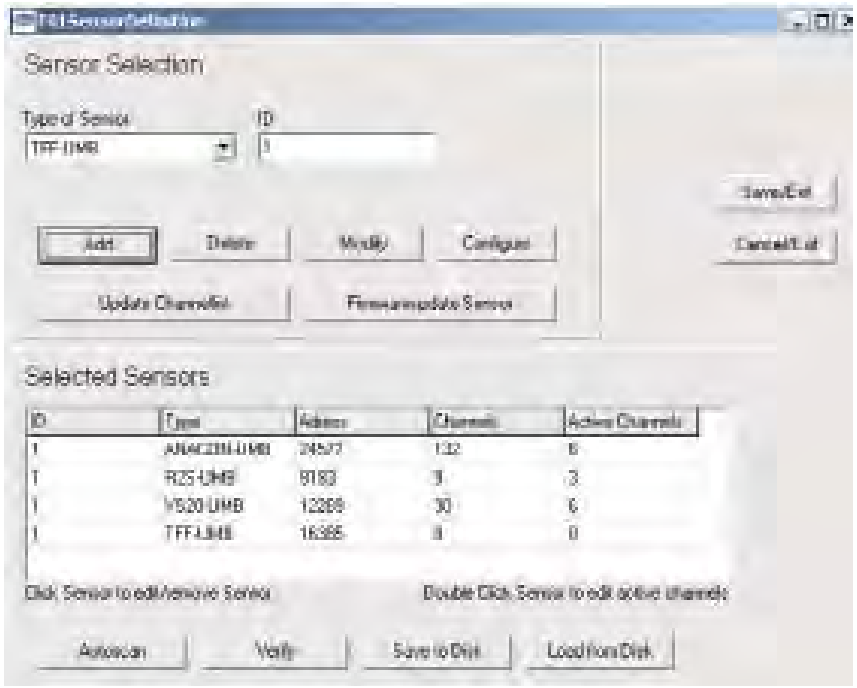
UMB
Configuration Software

Functions
- Configuration of sensors
- On-site calibration of sensors
- Indication of current measurement values
- Firmware update for UMB-sensors and UMB-modules

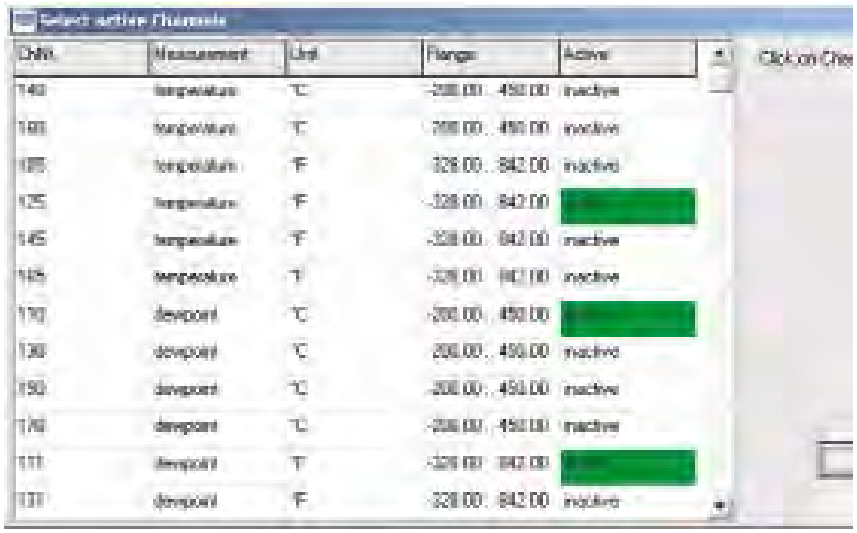
Coming soon
- Multi Hyphenlingual user interface
- ”trace function”, interface recorder



Configuration of analog sensors



Selection list of sensors



Selection list of sensor channels (temporary data request)

Software Collector / SmartView3

Functions:
Web based visualization and data collection software for Lufft dataloggers/ transmitters

Storage of data in database

Flexible export and import functions for integration of external/third party software/data (CSV and XML)

Simultaneous data collection via unlimited communication modules (e.g.modems)

Integration of webcam pictures (via TCP / IP-FTP)

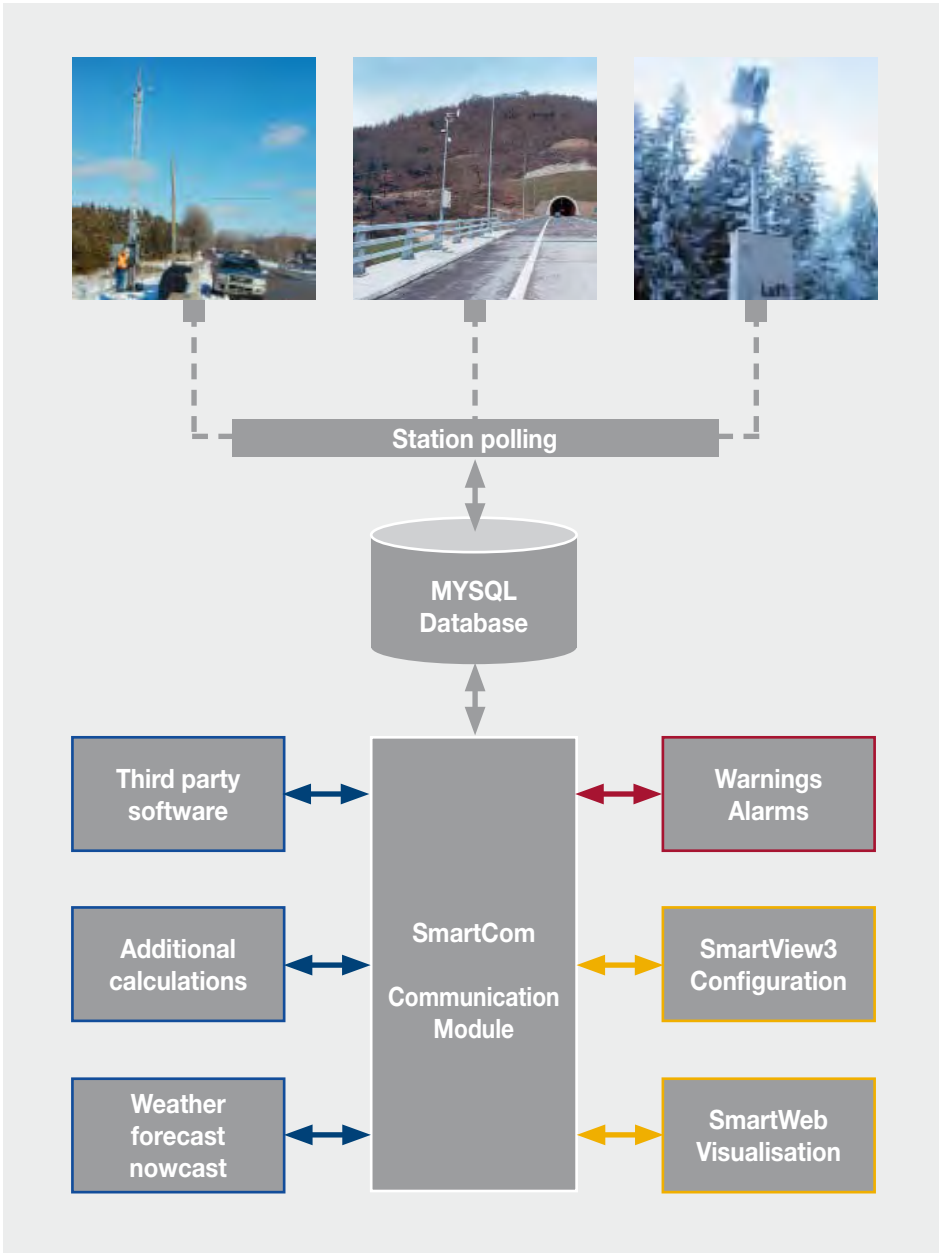
Basis version Collector
(Collector for up to 5 stations)
Order No.: 8160.COLLECT05

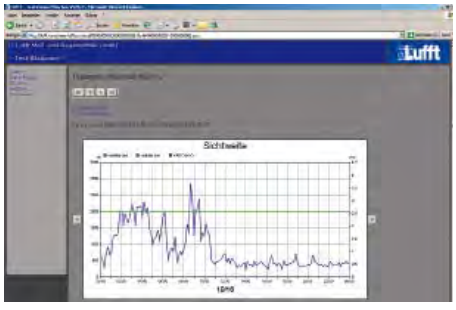
Unlimited version Collector
(unlimited quantity of stations)
Order No.: 8160.COLLECT

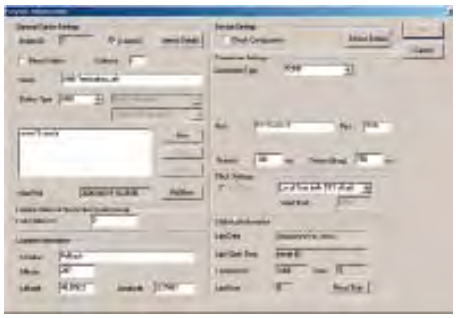
SmartView3 incl. Collector
up to 5 stations
Order No.: 8040.SV05

SmartView3 incl. Collector
unlimited
(Web visualization)
Order No.: 8040.SV300

New functions:
- Extremely flexible alarming (SMS, email, voicemail)
- 24 hr. forecast module







Good to know

Road surface temperature: The sensor measures the ”sun temperature” 2 mm below the surface. The most important temperature measurement for ice warning systems.

Road depth temperature - Depth 1: The sensor measures at a depth of, for example, 5 cm below the road surface. Typically the road surface temperature graph follows a similar path with a time delay.

Road depth temperature - Depth 2: The sensor measures at a depth of, for example, 30 cm below the road surface. Compared to the road surface temperature the measurement changes very slowly. After a long cold phase the measurement is often below 0 °C, critical road conditions can arise even when the weather changes from ”dry/cold” to ”warm/humid” and the air temperature is above typical freezing temperature.

Freezing temperature: The sensor measures the proportion of salt in the water and calculates the freezing temperature. This is the value at which the soluble liquid on the surface freezes (icing).

Water film: The sensor measures the water film height in micrometers. Aquaplaning usually occurs between measurements from 0.7 to 700 micrometers. The higher the water film, the higher the concentration the de-icer must be to prevent freezing. The freezing point is dependent on the concentration of the de-icer and the actual water film height.

Salt concentration: The sensor measures the proportion of salt in the water and calculates the freezing temperature. The salt concentration is equivalent to the freezing temperature.

Road condition: The sensor measures whether the road surface is dry, damp or wet. Dryness, dampness or wetness is determined in accordance with the measured water film height (see above). The sensor also determines critical road conditions (slippery).

Precipitation quantity: The sensor measures and recalculates the precipitation intensity every minute. Typically, this is output as ”amount per hour”, e.g. 6.8 mm/h = 6.8 [l/m^2]/h. hour and the sensor has a very fast response time, the intensity is generally recalculated every 10 minutes.

Precipitation type: The sensor differentiates between the following typical types of precipitation (also described as ”present weather”):

- **Drizzle**
- **Rain**
- **Sleet**
- **Hail**
- **Snow**

Measurement comparison R2S and „Tipping bucket“

Time interval: **60min.**
Polling intervall: **1min**

Device:

Resolution NM R2S
0,01mm
Reaction point NM R2S
0,01mm
Reaction point NI R2S
0,6mm/h (0,01mmx60min)

Legend:

R2S / Radar sensor Lufft
TP / Tipping bucket
NM / Precipitation quantity
NI / Precipitation intensity

The table shows the difference of measurement resolutions between R2S and a tipping bucket. The R2S has 10 times better resolution than any reed-contact based tipping bucket rain gauge.

This is why 1-minutes-measurements can differ. Whereas the tipping bucket needs a minimum amount of 0.1 mm rainfall to generate a measurement, the R2S only needs 0.01 mm rain fall per measurement interval.

Zeitstempel / time stamp	NM R2S in mm	NI R2S in mm/h	NM TP in mm
00:00:00	0,03	1,80	0,00
00:01:00	0,01	0,60	0,00
00:02:00	0,00	0,00	0,00
00:03:00	0,00	0,00	0,00
00:04:00	0,02	1,20	0,00
00:05:00	0,01	0,60	0,00
00:06:00	0,04	2,40	0,10
00:07:00	0,00	0,00	0,00
00:08:00	0,00	0,00	0,00
00:09:00	0,00	0,00	0,00
00:10:00	0,03	1,80	0,00
00:11:00	0,07	4,20	0,10
00:12:00	0,12	7,20	0,10
00:13:00	0,08	4,80	0,10
00:14:00	0,03	1,80	0,00
00:15:00	0,01	0,60	0,00
00:16:00	0,00	0,00	0,00
00:17:00	0,00	0,00	0,00
00:18:00	0,00	0,00	0,00
00:19:00	0,00	0,00	0,00
00:20:00	0,13	7,80	0,10
00:21:00	0,17	10,20	0,20
00:22:00	0,18	10,80	0,20
00:23:00	0,09	5,40	0,10
00:24:00	0,07	4,20	0,00
00:25:00	0,08	4,80	0,10
00:26:00	0,14	8,40	0,20
00:27:00	0,10	6,00	0,10
00:28:00	0,03	1,80	0,00
00:29:00	0,01	0,60	0,00
00:30:00	0,00	0,00	0,00
00:31:00	0,00	0,00	0,00
00:32:00	0,00	0,00	0,00
00:33:00	0,00	0,00	0,00
00:34:00	0,00	0,00	0,00
00:35:00	0,00	0,00	0,00
00:36:00	0,00	0,00	0,00
00:37:00	0,00	0,00	0,00
00:38:00	0,00	0,00	0,00
00:39:00	0,02	1,20	0,00
00:40:00	0,05	3,00	0,10
00:41:00	0,07	4,20	0,00
00:42:00	0,13	7,80	0,20
00:43:00	0,18	10,80	0,20
00:44:00	0,16	9,60	0,10
00:45:00	0,09	5,40	0,10
00:46:00	0,05	3,00	0,10
00:47:00	0,03	1,80	0,00
00:48:00	0,01	0,60	0,00
00:49:00	0,00	0,00	0,00
00:50:00	0,00	0,00	0,00
00:51:00	0,00	0,00	0,00
00:52:00	0,00	0,00	0,00
00:53:00	0,06	0,00	0,10
00:54:00	0,00	0,00	0,00
00:55:00	0,00	0,00	0,00
00:56:00	0,00	0,00	0,00
00:57:00	0,00	0,00	0,00
00:58:00	0,00	0,00	0,00
00:59:00	0,00	0,00	0,00
Summe	2,30	134,40	2,30

Standard-Certificate for all UMB-Sensors

Inspection certificate
DIN EN 10204/3.1

ZERTIFIZIERT
DIN ISO 9001
NR 70100 322
CERTIFIED

Lufft

Compact Weather Station

Model Type	**WS200-UMB**
Serial Number	**092.0810.0811.019**

This is to certify, that this Lufft product has been tested according to the TQM of the G. LUFFT Mess- und Regeltechnik GmbH manual in accordance with DIN EN ISO 9001. Ordering specifications are complied with. Execution of instruments / systems as well as testing of accuracy was carried out following LUFFT quality assurance procedures. Quality inspection was successfully passed.

Wind Direction and Speed

Angular Deviation

	2,0 m/s	5,0 m/s	10,0 m/s	20,0 m/s	50,0 m/s	*Status*
RMSE	0,6°	0,5°	0,4°	0,6°	0,7°	✓

Wind Speed Deviation

	2,0 m/s	5,0 m/s	10,0 m/s	20,0 m/s	50,0 m/s	*Status*
RMS	2,0 m/s	5,0 m/s	10,0 m/s	20,0 m/s	50,1 m/s	✓

Date	Inspector	Quality Management
08.11.2010	i. A. Martin Wyrambik	i. A. Helmut Hager

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Managing Director
Dipl.-Wirtsch.-Ing. Klaus Hirzel
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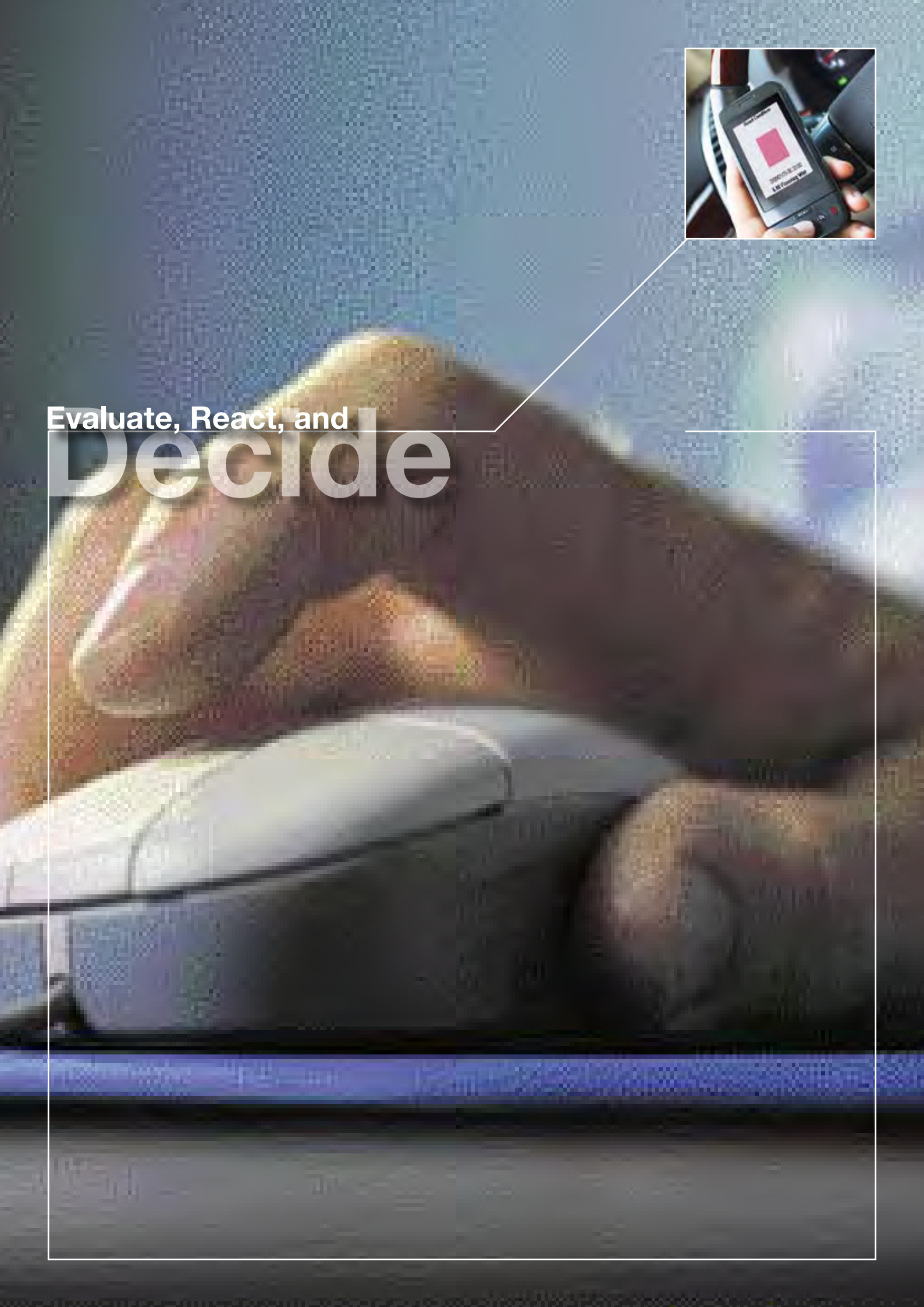


Evaluate, React, and Decide

Measurements

Please note:

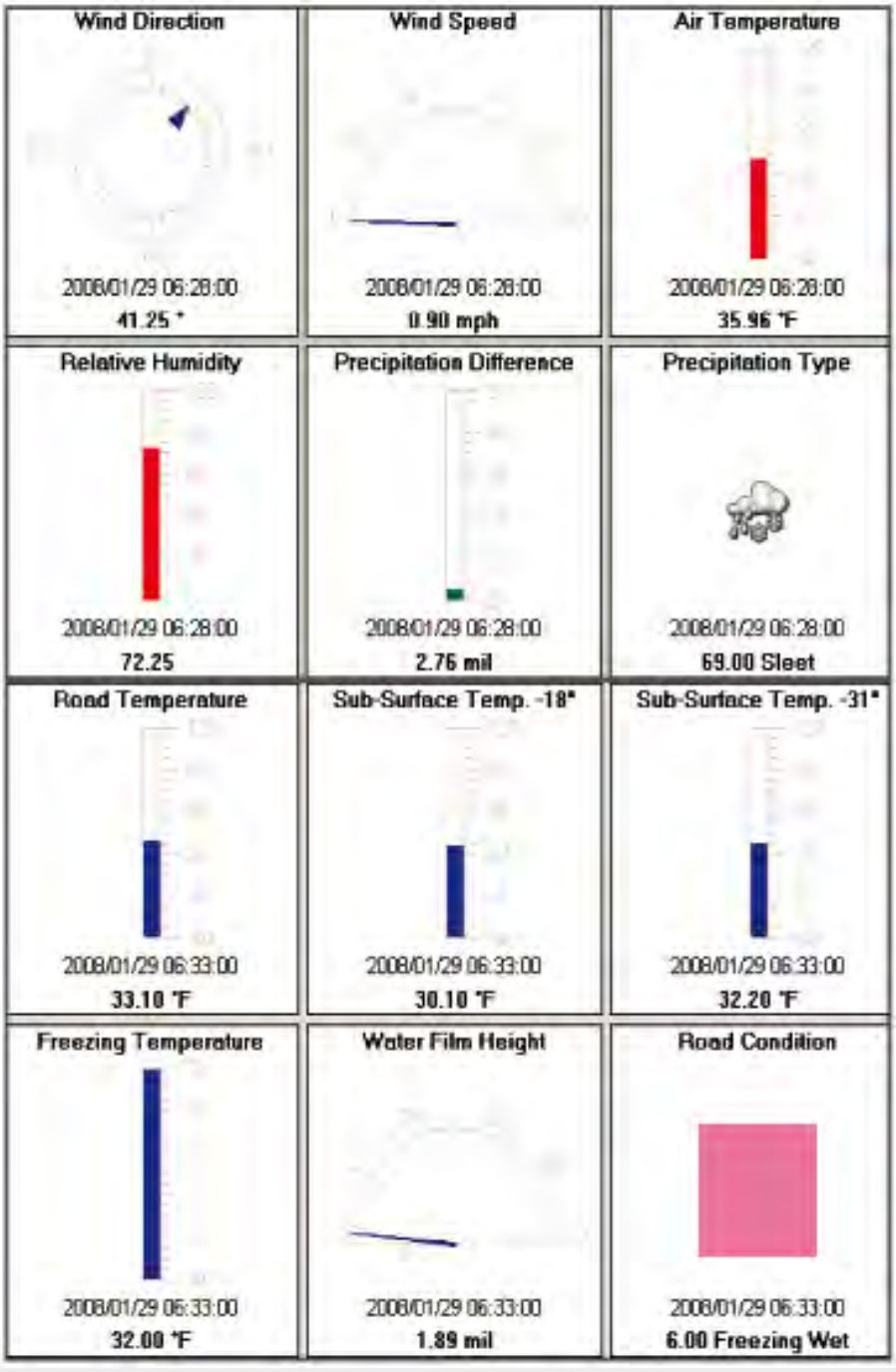
- Road surface temperature below 0 degrees Celsius and below dew point causes frost.

- Liquid precipitation (rain) on frozen ground causes black ice (subsurface road temperature below 0 degrees Celsius).

Integration of a camera image into the visualization

Graphic displays (day and week charts)

Measurement data in tabular form



SmartView3 Functions Overview

Functions Overview of SmartView 1.5.6 (as of April 2009)				
	Collector (Basic)	**Collector (Unlimited)**	**Full (up to 5 stations)**	**Full (Unlimited)**
Data transfer				
Quantity of weather stations	max. 5	unlimited	max. 5	unlimited
Types of stations				
Station type Opus200 (on-and offline)	□	□	□	□
Station type Opus2 (on-and offline)	□	□	□	□
Station type UMB (online)	□	□	□	□
Station type HP100 (offline)	□	□	□	□
Read sensor configurations	all types	all types	all types	all types
Change sample and storage rate and memory mode (Min/Max/ave)	for OPUS200	for OPUS200	for OPUS200	for OPUS200
Station type “import”	□	□	□	□
Station type “TLSoIP”	□	□	□	□
Station type “Boschung TLS”	□	□	□	□
Transfer camera picture via FTP	□	□	□	□
Transfer camera picture via HTTP	□	□	□	□
Connections				
Direct (RS232)	□	□	□	□
TCP/IP (Station with COM Server or CDMA/GPRS Modem with fixed IP address or DynDNS support)	□	□	□	□
Modem (TAPI)	□	□	□	□
PPP (camera picture only)	□	□	□	□
Intervals				
Fixed (e. g. every 20 minutes)	□	□	□	□
No transfer at special night periods (e. g. not between 10.00 p. m. and 5.00 a. m.)	□	□	□	□
Special times	□	□	□	□
Modem poll				
Max quantity of modems	unlimited	unlimited	unlimited	unlimited
“Modem Pools” (poll stations with dedicated modems)	□	□	□	□
Recalculation of values				
Re-scale data before storing in the database	□	□	□	□
Mapping of data before storing in the database (e. g. change of road conditions codes)	□	□	□	□
Clock synchronization				
Synchronization of device clock (datalogger) through PC clock device clock can be UTC or local time (with or without summertime adjustment)	□	□	□	□
Calculation channel				
Calculation of sensor data as “calculation channel” according to delivered raw data. Immediately: scale of raw data for a configurable coefficient, generation of sum/average/minimum value/maximum value for a specific period of time, mapping of the values	□	□	□	□
Logic sensor types				
Same presentation of channels of different stations such as OPUS200 and OPUS208 and UMB	□	□	□	□

Functions Overview of SmartView 1.5.6 (as of April 2009)				
	Collector (Basic)	**Collector (Unlimited)**	**Full (up to 5 stations)**	**Full (Unlimited)**
Backup/archive of data				
Time-controlled automatic backup of full database	□	□	□	□
Time-controlled deletion of old data in database (including backup of data before deletion starts)	□	□	□	□
Time-controlled compression of data in the database including backup before compression starts (reduction of data down to one value per hour/day)	□	□	□	□
Time-controlled deletion of “old” camera pictures in the database (including backup of data before deletion starts)	□	□	□	□
Restore of backup-data - including deletion of compressed data before restoring process starts (if the backup is the result of a data compression)	□	□	□	□
Automatic transfer of backup-file onto a server via FTP	□	□	□	□
User access administration				
Administration of users / functions and user groups	□	□	□	□
Admission to functions for users/groups	□	□	□	□
Create/delete stations	□	□	□	□
Edit/view configuration of a station	□	□	□	□
Create/delete website			□	□
Change configuration of website			□	□
Edit/view configuration of website			□	□
Create/change user	□	□	□	□
Change configuration data of software	□	□	□	□
Export/Import				
Manual Export/Import			□	□
Automatic Export/Import			□	□
Export of configurable values of one or more stations in one file			□	□
Export in “CSV” format incl. parameter settings			□	□
Import in “CSV” format incl. parameter settings			□	□
Export in “XML” format incl. parameter settings			□	□
Scale of data for export (e. g. recalculation of m/s into km/h)			□	□
Mapping of data for export (e. g. recalculation of road conditions codes)			□	□
Scale of import-data before storing the data in the database			□	□
Mapping of import-data before storing the data in the database			□	□
Configuration of export/import jobs (mainly for plan disease calculations)			□	□
Different export-import modules such as disease calculation models, dew point calculation, road forecast (24h)			□	□
External software modules for Export/Import				
External software module for the dew point and vaporation pressure calculation			□	□
External software for the combined road condition calculation			□	□

SmartView3 Functions Overview

Functions Overview of SmartView 1.5.6 (as of April 2009)	Collector (Basic)	Collector (Unlimited)	Full (up to 5 stations)	Full (Unlimited)
External modules for agricultural applications				
Apple Scab *(Venturia inequalis)*	□	□	□	□
Onion: Downey Mildew *(Peronospora destructor)*	□	□	□	□
Onion: Neck Rot *(Bortytis squamosa)*	□	□	□	□
Carrot Alternariosis *(Alternaria dauci, A. radicina)*	□	□	□	□
Potato: Late Blight *(Phytophtora infestans)*	□	□	□	□
Fire Blight *(Erwinia amyloflora)*	□	□	□	□
Strawberry: Grey mould *(Botrytis cinera)*	□	□	□	□
Beetroot: Leaf Spot *(Cercospora spp.)*	□	□	□	□
Grape Vine Downey Mildew *(Plasmopara viticola)*	□	□	□	□
Grape Vine Powdery Mildew *(Unicula necator)*	□	□	□	□
Bortytis Bunch Rot *(Botrytis cinerea)*	□	□	□	□
Seljaninov Hydrothermal Coefficient	□	□	□	□
Calculation channels				
Internal calculation of sensor data as “calculation channel” according to imported raw data. Scale of raw data for a configurable coefficient, generation of sum/average/minimum value/maximum value for a specific period of time; differential calculation with previous value; mapping of the values in a configurable table			□	□
Control of automatic import/export				
Export if new data has been stored			□	□
Time-controlled export (e. g. every 5 minutes)			□	□
Flexible definition of time-interval for export based on start-uptime			□	□
Export and execution of a software program			□	□
Export and automatic transfer of a file via FTP			□	□
Export and execution of a software program and import of the calculated result (e. g. disease model calculation)			□	□
FTP transfer of files before import starts			□	
Time-controlled FTP transfer of files including “Wildcard” support			□	□
Automatic deletion of files transferred via FTP after transfer has been finished			□	□
Import of files including “Wildcard” support			□	□
Automatic deletion of import files after import has been finished			□	□
Visualization of data as “website”				
Indication of station‘s status (last data transfer, transfer success) in a table			□	□
Indication of station‘s status (last data transmission, transfer success) on a static map			□	□
Indication of (selected) sensor data in a “pop-up” window by “scroll over” with the mouse on a station, on the static map			□	□
Indication of status-information and current values of stations on “stations-page” per station			□	□
Indication of camera-picture on “stations-page” of a station			□	□
Graphic indication of the current value on the “station page” in the form of an analog-instrument			□	□
Indication of reports (day/month/year) with sum/average and extreme values during the report period of time, on the “station page”			□	□
Automatic generation of “data pages” to indicate the data in the given time interval, day/week/month/year (diagram and table)			□	□

Functions Overview of SmartView 1.5.6 (as of July 2010)				
	Collector (Basic)	**Collector (Unlimited)**	**Full (up to 5 stations)**	**Full (Unlimited)**
Visualization of data as “website”, *continued*				
Selectable “data pages” including current values from sensors of different stations and different storage intervals (day/week/month/year) on one page			□	□
Selectable line and status (bar) diagrams on “data-pages”; line diagrams with up to 4 different Y-axes (units). Scale of line diagrams manually or automatically-no other periods.			□	□
Indication of reports (depending on configured period for the station pages) with average/sum and extreme values on the period of time, on the station page			□	□
Management of “pages-archive” for data pages (historic measurements)			□	□
Automatic transfer of admission rights on to website/ webserver (cia .htaccess – function has to be active on web-server)			□	□
Automatic erasure of archive pages prior to configured period of time			□	□
Free configuration of text elements for data pages and stations pages			□	□
Archive of pictures			□	□
Easy configuration of stations pages and data pages via templates			□	□
Overview-table with current readings of all stations			□	□
Configuration of time-offsets for stations in different time zones			□	□
Warnings and alarms				
Configuration of high and low threshold per sensor; generation of warnings/alarms if value is out of limits			□	□
Alarm message if station cannot be polled			□	□
Alarm message if import file cannot be used			□	□
In case of alarms, generation of email message (station could not be polled, sensor delivers error, sensor delivers error value/import, sensor delivers error / import, sensor delivers alarm value) to one or more destination addresses			□	□
Warning/alarm based on a condition value (road state)			□	□
SMS messages including alarm/warning contents to one or multiple destinations			□	□
Warning/alarm in case of violating selected thresholds			□	□
Selectable time frames for SMS alarms transmissions			□	□
Configuration of minimum time intervals between alarm messages			□	□
Configuration of time to repeat alarm messages			□	□

References

Siemens AG, Munich
Weiss Elektronik, Trier
Dambach AG, Gaggenau
North Bavaria Highways Directorate
Schleswig-Holstein State Highways Office
Federal State of Salzburg
Federal State of Upper Austria
Federal State of Carinthia
New York State
Sagem, Hungary
Telvent, Spain

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Storage and Transfer

Representation and Evaluation

Qualification and Calibration

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