



The next generation ultrasonic snow depth sensor provides precise, reliable and maintenance free measurements









Properties and benefits

- Continuous and non-contact ultrasonic snow depth measurement
- Reduced lifecycle costs
- Reliable sensor for extreme conditions
 - Robust sealed ceramic membrane
 - Correct measurement during snowfall and snow drift
 - · Protective shield against ice and snow
 - Integrated lightning protection
- >> High measurement accuracy
 - Integrated temperature compensation
 - Spectral analysis method
- >> Power-saving sensor operation
 - "Sleep-Mode" between the measurements
 - · Adjustable numbers of measurements
- Digital data output string
 - Snow depth; distance to snow
 - Distance to snow not compensated
 - Air temperature
 - Snowfall (precipitation) intensity
 - Snowfall beginning, Snow settling
 - Echo Strength; Signal quality; Status, Snow limit
- >> SDI-12, RS-485 Protocol ASCII / Modbus RTU
- >> Parameterization via COMMANDER Software

Introduction

Purpose of snow height measurements

In order to characterize the local snow cover, it is essential to know the snow height. Various factors determine the development of a snow cover: obviously weather and climate – ground and air temperature, irradiation, wind, distribution of precipitation – but also the topography and surface of the terrain. Thus, a

Measurement principle and accuracy

The USH-9 is based on ultrasonic sensor technology. It sends out several consecutive impulses and detects the signal reflected at the snow surface. From the transit time, the USH-9 directly calculates the snow-height.

Changing air temperatures strongly influence the speed of an ultrasonic signal. An integrated temperature compensation accounts for this influence and the sensor instantly returns the corrected snow-height. With this procedure a measurement accuracy of 0.1% (FS) is reached.

Thanks to interface updates and advanced sensor technology, the USH-9 surpasses the high performance of the retired model USH-8. In addition, the USH-9 is equipped with options for limit monitoring and precipitation detection.

With this feature set we provide a state-of-the-art instrument for our customers – this is reflected by a

Reliable sensor for extreme conditions

Our sensors love big challenges – for example at research stations in Antarctica, where they prove their robustness in extreme conditions: They are maintenance-free, operate in a temperature range between -40 and +60°C and thus provide continuously reliable measurements.

High-energy ultrasonic impulses of the USH-9 can cope with complex reflections as encountered by freshly fallen powder snow. Further, the USH-9 design shields

Power-saving operation

The USH-9 operates even more efficiently than its predecessor did. At a measurement interval of 15 minutes it consumes only 0.01 Ah per day. It automatically switches between measurement- and sleep-mode, the latter consuming less than 0.4 mA. This makes the USH-9 ideal for autonomous monitoring sites with solar power supply. careful selection of the measurement site is crucial to obtain representative snow-depth data.

convincing customer statement: "It is impressive what is possible with this new technology. The accuracy is breathtaking!"

- Excellent accuracy through int. temp compensation
- Acquisition of air temperature
- · Unique auxiliary data output
- Precipitation intensity
- Detection of snowfall
- · Ground surface condition (snow or snow-free)
- · Status change on different limit values

the sensor membrane from icing and precipitation does not interfere with the measurements – the advanced technology of the USH-9 offers a tool to determine the correct snow height at any time. Furthermore, the sealed ceramic membrane is extremely robust and maintenance free. This assures reliable, accurate measurements and minimum lifecycle costs.





Site selection and sensor mounting

The adequate measurement site

The selection of a suitable measurement spot is crucial for representative snow-depth measurements. The terrain at the measurement site should be flat, not exposed to wind and safe from avalanches. Slopes, dips, ridges and big rocks in the vicinity should be avoided. No steeper slopes should border the site, as snow gliding can affect the snow pack and therefore the measurement results. A slightly sloping ground is acceptable but must be accounted for by adjusting the USH-9 perpendicu-

Mounting

As the USH-9 is calibrated and pre- configured by Sommer, installation is quick and easy. Only a few application settings need to be adjusted on site, (e.g., communication interface, data protocol and zero-point). For this, the included software provides straightforward assistance.

The minimum mounting height is three meters above ground; the upper limit is ten meters. Attention: the cone-shaped measurement spot increases with mounting height. To avoid interference, two dimensions have to be considered carefully:

1) distance between sensor and ground,

2) horizontal distance between sensor and mast.

Objects protruding into the ultrasonic beam can cause interfering reflections and erroneous measurement results. Also, snowdrifts and obstacles in the vicinity of the measurement spot (e.g. building, ridge) can cause such reflections.

Easy integration into existing weather stations

The USH-9 can be integrated into existing monitoring stations through either the analog (4...20 mA) or the digital interface (SDI-12, RS-485). With the included bracket, mounting is quick and simple.

larly with the supplied bracket. Last but not least, the expected maximum snow depth at the measurement site should be estimated.





General		
Power supply	Power Supply: 9 27 VDC Power consumption: typ. 40mA; <0,4 mA (Standby); Energy consumption: 10mAh/Day (at intervall 15min)	
Operating temperature	-40 60 °C	
Housing	Dimensoins: Ø 180 mm, Lenght 320 mm Material: Anodized aluminium Weight: 1,2 kg	
Shield heating	Optional	
Protection	IP 66	
Lightning protection	Integrated (6KV rms)	
Snow depth measurement		
Measurement range	0 10 m	
Minimum distance to the maxi- mum expected snow depth	1 m	
Accuracy	0.1% (FS); max. +/- 1cm	
Resolution	1 mm	
Measurement duration	2 – 20s	
Measurement principle	Ultrasonic (Frequency 50 kHz; Angle of reflected beam +/-6°)	
Integrated compensation of the air temperature		
Temperature sensor	Integrated air-temperature sensor in self-venting radiation shield	

Temperature sensor	Integrated air-temperature sensor in self-venting radiation shield
Measurement range	-40 60 °C
Resolution	0.1°C

Interfaces	
Analogue	Snow depth or distance 4 - 20mA Signal; Resolution: 14 Bitmax. Load: 250 Ω Air temperature 4 - 20mA Signal; Resolution: 14 Bit max. Load: 250 Ω Analogue outputs can alternatively be used as status outputs for: Snow depth limit; Ground covered with snow; Snow fall or rain detection
Digital	SDI-12 : 1200Bd RS-485 : 1200Bd 115200Bd Protocol ASCII / Modbus RTU Digital output values string: Snow depth; distance to snow; distance to snow not compensated; Air temperature; Snowfall (precipitation) intensity; Echo Strength; signal quality; Status, Snow limit, Snow cover, Snowfall beginning
Packaging	

Carton (mm)	475 x 225 x 255 mm
	Weight: about 1,6 kg

Accessories (not included in the price)		
Pole arm	Pole arm with tilting function for comfortable sensor assembly and maintenance: Holder for pole Ø 114 mm, Hot-dip galvanized, Dimensions: Ø 61 mm (2"), length: 1600 mm	



