Lufft
an OTT HydroMet brand

PRECISELY MEASURING SNOW DEPTH

OVERVIEW | Technologies and Areas of Application

OTT HydroMet

INTRODUCTION

Precise determination of snow depth is a central indicator for many global weather application decisions. OTT HydroMet sensors have become the standard for meteorological measurements in climate research, flood and avalanche risk detection, and winter sport/traffic safety assessments.

With thousands of installed instruments on every continent, both the Lufft SHM 31 and its predecessor model, the SMH 30, have established themselves as the standard for precisely measuring the depth of snow. Its powerful laser sensor measures the density of snow from above, without the need for contact; it is designed to be safe for eyes (class-2 laser) and, thanks to its built-in heating module, it requires no maintenance.

However, its distinct quality is found in its millimetre-precise measurement of layers of snow – regardless of prevailing weather conditions. In this way, the Lufft SHM 31 offers the optimal requirements for reliably collecting highly precise measurement data and processing it in the course of further methods.

THE LUFFT SHM 31:
PRECISE, ROBUST, DURABLE, MAINTENANCE-FREE

INCREDIBLE PRECISION
The Lufft SHM 31 laser-based, optoelectronic snow depth sensor is capable of measuring snow depths over large distances with millimetre accuracy. This is possible thanks to its visible, eye-safe laser distance sensor that quickly measures layers of snow up to 15 meters deep. By assessing signal strengths, the SHM 31 can also act as a detector for ground coverings.

MAINTENANCE-FREE
The SHM 31's laser sensor is equipped with built-in heating modules that protect it against the buildup of ice. The use of screen and zone heating makes maintenance unnecessary, as it is not necessary to exchange desiccants nor carry out calibrations at certain intervals. This facilitates reductions in personnel costs and frees them up for deployment elsewhere.

MAXIMUM ROBUSTNESS
The SHM 31's laser sensor is protected by a compactly designed enclosure that is highly resilient against even extreme weather and climate conditions, such as sudden cold snaps or snowstorms.

LONG DEPLOYMENT LIFE
The endurance of the measurement module and other individual components has been improved on those of the preceding Lufft SHM 30 model in the further development of the Lufft SHM 31. These optimizations have removed the need for maintenance and ensure an incredibly long deployment life.

INTEGRABILITY
The SHM 31 optimally combines with the OTT netDL 1000 data logger and a Lufft WS100 present weather sensor for recording snowfall.

GROUND SURFACE DIFFERENTIATIONS
In contrast to ultrasound sensors, the Lufft SHM 31's laser sensor makes it possible to differentiate between different types of ground substances, such as snow, grass or sand.

SIMPLE INSTALLATION
The optionally available wall and mast clamps allow the SHM 31 to be easily installed on intended support masts. The 360° lock ring with 10° increments allows the sensor's tilt to be roughly set, and this can be verified on command during operation.

Highly Developed Laser Technology for Maximum Precision

The Lufft SHM 31’s snow depth sensor uses precise laser technology for range finding. It does so by emitting laser pulses at a previously defined intensity. The light is scattered by the measurement object and compared against a reference signal to result in the highly precise measurement of the distance to the object. By evaluating the signal strengths, this method can also be used to differentiate between different types of surface (with differing reflectivity), such as snow, sand or grass.

LASER AND ULTRASOUND COMPARISON

Measurement Principle	Advantages	Disadvantages
Laser snow depth sensors use highly modulated light to measure distances. The reflected light is compared against a reference signal and the density of the snow (or other material) is calculated by microprocessors.	Laser sensors return highly precise and incredibly reliable measurement results (regardless of weather or environmental conditions) that are precise to within a few millimetres. The fact that they operate without the need for maintenance means that their higher purchasing costs are usually quickly returned. Moreover, their “optical” technology offers users an extended scope of function, such as for different ground coverings.	Devices that use lasers to measure distances are generally more expensive to purchase than ultrasound measurement sensors. They also use comparatively more electricity.
Range finders based on ultrasound technology transmit sound waves at a specific frequency and then capture the returning echo. The interval between the transmission and the captured echo is then used to determine the distance to the nearest obstacle.	Ultrasound range finders are comparatively cheaper to purchase. Their energy consumption is lower than that of laser technology.	The large dispersion angle of 30 degrees increases their susceptibility to interference from obstacles present in the field of measurement. This results in a lower precision that ranges over several centimetres. Influences such as air temperature, wind gusts and air humidity can also contribute to distortions. Moreover, ultrasound devices require regular inspection of their desiccants, their transducers regular maintenance and their proper functioning regular verification.

APPLICATIONS

Meteorology (Weather Services)

Together with its predecessor, the Lufft SHM 31 has been the standard device for snow depth measurements by weather stations and comparable meteorological facilities since the 2010s. This is particularly true for the European (snow) regions, as well as for many other countries and regions around the world. Appreciated above all else is the high degree of accuracy that the devices offer in combination with their exceptional robustness. This is found in the high stability they provide in the face of weather and climate-related factors and which ensures that measurement data isn't distorted by such factors.

Source: Elsis, Lithuania

APPLICATIONS

Climatology

Climate researchers need highly precise measurement data for their research and studies in order to be able to make valid statements regarding climatological changes resulting from global climate change. Snow depths in the polar regions are a central parameter for long-term climatological observations. The Lufft SHM 31 offers the ideal conditions for this.

References:
Alfred-Wegener-Institut
Météo-France, Climatological Department
DLR (Centre of Rural Services)

APPLICATIONS

Winter Sports

Both public and private operators of winter sport regions rely on precise and reliable snowfall (depth) measurement data for their decision-making. This impacts the operation of ski lifts (i.e. opening or closing pistes), as well as for accurately assessing flood and avalanche threats. The maintenance-free operation of the Lufft SHM 31 also contributes to a reduction in personnel costs.

References:
Amt der steiermärkischen Landesregierung; Hochwasser- und Lawinenprävention (Provincial Government of Styria, Austria; Department of Flood and Avalanche Prevention)
Use in World Cup Skiing, e.g. Adelboden, Switzerland

APPLICATIONS

Road Weather Monitoring

Snow and ice reduce the manoeuvrability of vehicles and heavily increase the risk of accidents, regardless of the route of transportation. Accordingly, snow regions spend up to 30% of their road maintenance budgets on winter services.

Providing road weather stations with the best possible support in road weather decision-making requires precise and resilient measurement equipment. The Lufft SHM 31 offers both: millimetre-precise reliability and high robustness in the face of adverse weather conditions.

Quelle: Wind, Türkei

Additional Areas of Application

1

The Lufft SHM 31 can assist prevention anywhere where essential functionality is limited or rendered completely useless by snow or ice formation, such as in the case of swivel-mounted solar panels or satellite dishes.

2

- Depth measurement is also not limited to snow or ice as a medium. The Lufft SHM 31 can also be used for depth measurement and inspection in silos that store granulated materials.

3

Building automation services in large residential areas or apartment buildings. In such applications, the Lufft SHM 31 can provide the necessary signals when snow and ice needs removing from pathways.

Unmatched Flexibility for Reliable Weather and Climate Measurements

Lufft is a well-established and proven OTT HydroMet brand for meteorological monitoring solutions. Both road maintenance professionals and weather services around the world rely on Lufft sensors and solutions.

OTT HydroMet delivers superior customer outcomes by providing decision-makers with vital insights they trust. Our exceptional technical expertise and solutions seamlessly integrate hardware, software, and services across an unmatched range of environmental monitoring applications.

Resources

Optical Sensors Guide

Optical sensors combine contactless measurements, easy installation, and great versatility. Learn more about our tried and tested optical sensors validated by recent case studies in the guide.

Meteorological Microlibrary

Our continuously updated knowledge center holds something for everybody working in and related to the meteorological industry. If you look for inspiration from experts and their applications all over the world, or if you are in need of scientific and technical knowledge for your specific project, this Meteorological Microlibrary is for you.

OTT HydroMet Blog

Observing the elements is key to better understanding our planet. This blog tells the manifold stories of experts working in environmental monitoring with help of our sensors and solutions.

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