



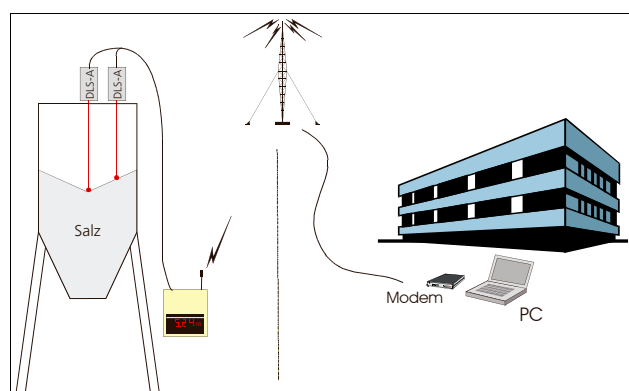
## Silo level measurement with SiloLevel1

**It is dangerous to climb up to the top of salt silo, on an icy ladder, to determine the content of the silo. We have a better solution. A cost effective alternative to existing silo level measuring systems. The system can easily be mounted on existing silos.**

In the winter months it is mandatory to have always plenty of road salt available. It is also important to deliver the right quantity of road salt to the right place at the right time. Therefore, the content of road salt in the silos, located in various communities, must always be known.

### Measuring principle

The filling level of a silo will be measured from several points of the roof top. For this measurements, laser distance devices, type DLS-AH 30 will be used. These devices are solid and reliable to operate in ambient temperatures as low as  $-40^{\circ}\text{C}$ . With three sensors a high measuring accuracy can be achieved. If less but still good measuring accuracy is sufficient, we can offer a cost effective installation with two sensors. Depending on the option decided, the measured values can be displayed with a simple display unit at the bottom of the silo; or comfortably by telecommunication to an office PC. The rather simple software SiloVis calculates the silo volume in ( $\text{m}^3$ ) or in weight (t) and displays it numerically and graphically.



Overview of a measurement system



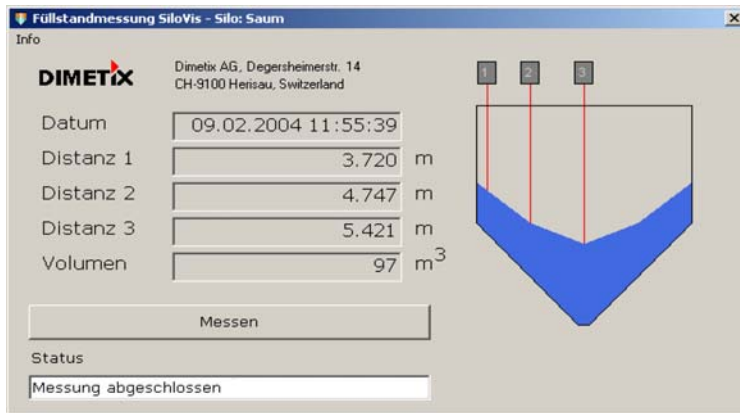
Road salt silo system in Herisau (Outer Appenzell)

Depending on the requirements of the system, the following alternatives are available:

1. Filling level control with one laser distance sensor and a display unit at the bottom of the silo. Empty space in meters or filling level in percentage can be displayed. With such a display overflowing of a silo can be prevented.
2. The filling level measurement can be made with two or three laser sensors (depending on requested measuring accuracy). With data communication, either mobile radio or telephone, access to data of filling level is available from a PC at any office location.
3. A solution which combines the alternatives 1 and 2 is also available. At the bottom of the silo, the empty space in meters or the filling level will be displayed. By data communication, mobile radio or telephone, the content of the silos can be requested from any location.



## Components of SiloLevel1



A display unit at the silo location shows the empty space in meter or the filling level in percentage.

The **SiloVis** software triggers the filling level measurement and based on the feedback calculates the silo content in m<sup>3</sup>. The filling level is being displayed graphically and the measured and calculated values are stored in a data file.



The DLS-A laser sensors measure distances within a range of 0.20 to 200 meters with an accuracy of 3.0 mm. With this kind of sensors the filling level of a silo can be determined. Depending of the measuring accuracy required, several sensors can be installed. Optional available are also sensors with a measuring accuracy of 1.5mm.

### Advantages of a remote monitoring system:

- Salt available in the silos is easier to assess
- Reliable measurement instead of rough estimate of silo content
- Easy to build-up a consumption statistic
- Physical filling level checks at various silo locations are not necessary anymore
- No dangerous climbing to the top of a silo anymore
- Overfilling of a silo can be prevented
- No more yearly cleaning of the viewing scale

### Technical data:

- Measuring accuracy of the laser sensors 3mm (Optional: 1.5 mm)
- Temperature range -40°C to 50°C

### Requirements at the silo:

- Power supply 230VAC / 2A available
- Sufficient incoming signal for radio communication at the silo location
- PC with Windows 98 or newer version
- Silo dimensions available
- Phone connection at the PC location

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