

# Snow monitoring



Sensors and systems for measuring snow data





## Sommer Messtechnik

Sommer Messtechnik develops and markets equipment and sensors for environmental measurement technology including system solutions for data recording, transmission and evaluation. With more than 25 years of experience Sommer is a true measurement specialist and reliable partner in meteorology, hydrology and geology for customers in both the public and private sectors as well as for research institutes and universities.

The wide product portfolio includes, for example, innovative measuring systems for analysing the snow pack, high alpine weather stations and accurate snow scales for determining the snow water equivalent. Furthermore, Sommer successfully develops and markets sensors in the

field of radar technology for the non-contact determination of the discharge of rivers and streams, equipment for mobile discharge measurement and level data loggers for water level measurements.

Services: service and maintenance assignments carried out by optimally qualified engineers, tailor-made measuring services for technical offices and civil engineers and rental of equipment and sensors. Workshops and training complete the service spectrum and our commitment to customers both nationally and internationally.

In this brochure we would like to inform you about our wide range of competences in recording various snow and weather parameters.





# USH-9

## Snow depth measurement

The USH-9 is an ultrasonic sensor for the precise, continuous, and non-contact recording of snow depths.

## Fields of application

The USH-9 is especially suitable for extreme weather conditions and so for alpine and high alpine terrain. Its high operational safety enables a permanent and reliable recording of measurement values, for which reason it is commonly used by meteorologists, avalanche warning services, ski regions, research stations and the energy sector.



## Implementation

The snow depth is an important parameter for evaluating the snow pack. It must be measured regularly as the development of the snow pack is subject to strong regional and temporal fluctuations and significantly influenced by actual weather conditions (snow or rainfall, air temperature, wind etc.). The USH-9 is a non-contact device and therefore does not compromise the snow pack. It can measure depths of up to ten metres continuously and with convenient remote data transmission if needed.

### Features and advantages

- Continuous and non-contact measurement
  - Snow depth / Snow height
  - Air Temp
  - Snow fall and Precipitation intensity
  - Ground covered with snow
- Reliable sensor for extreme environmental conditions and high alpine employment
- Robust, sealed and therefore maintenance free ceramic membrane with protective shield against ice and snow
- High level of accuracy thanks to the integrated temperature compensation and filtering of snow and rainfall using intelligent spectrum analysis
- Energy-saving operation through sleep modus, ideal for solar-powered measuring stations





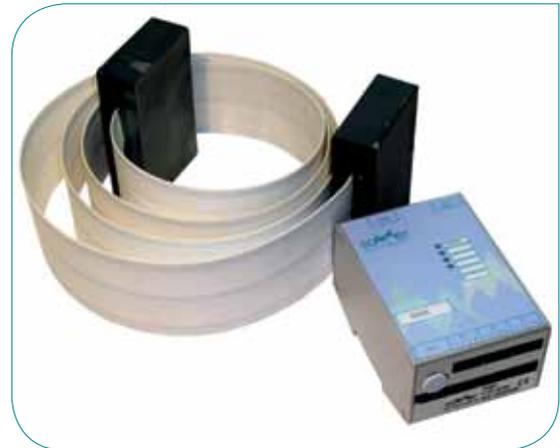
# SPA-2

## Snow-Water-Equivalent and Liquid-Water-Content

The Snow Pack Analyser System records all important parameters of the snow pack automatically and continuously making, for example, predictions about the progress of snowmelt possible..

### Fields of application

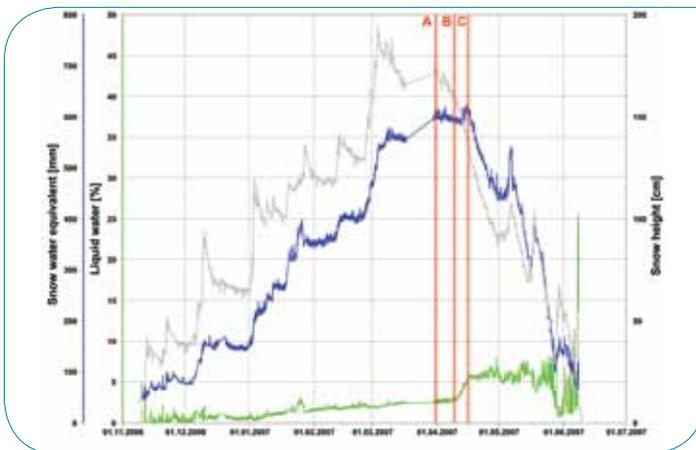
With the important data regarding snow density, liquid water content or snow water equivalent it is possible to recognize the snowmelt at an early stage. The SPA-system so constitutes a valuable measuring instrument for hydrologists and scientists but above all for hydropower



companies, flood protection authorities, water management, the agricultural sector or mining operation.

### Installation and measuring principle

The SPA-station can be operated autonomously (using solar power), the mast and the frame are set up in a suitable position on level ground. The weather and UV-resistant sensor band penetrates the snow and measures the volumes of ice, water and air content in the snow pack using impedance analysis. Data storage and remote transmission equipment mounted in a weatherproof control cabinet can be additionally provided upon customer's request.



### Features and advantages

- Recording of the snow parameters snow water equivalent (SWE), snow density, liquid water content, ice content and snow depth
- Energy-saving operation through sleep modus, ideal for solar-powered measuring stations
- Individual system configuration: information regarding the complete snow pack or about specific snow profile depths
- Recording of the progress of snowmelt and the expected quantities of water from the snow pack
- SDI-12, RS-485, RS-485 MODBUS



## SSG-2

### Snow-Water-Equivalent

The snow scales SSG is a measuring device which measures the snow water equivalent (SWE) of the snow pack with a high level of precision and reliability

### Fields of application

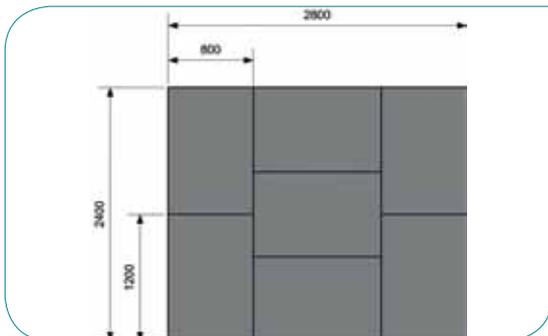
The snow water equivalent serves as an important parameter in monitoring snow and rainfall and in assessing snow quantities as well as for flood protection or water management. The snow scales is used accordingly by various environmental authorities,



weather services, hydrologists and water management.

### Assembly

The modular design of the snow scales facilitates quick and easy assembly on level ground up to an inclination of five degrees. The measurement is carried out on the centre plate, the surrounding plates serve as a stabilizing zone in order to compensate stress in the snow pack as well as to counteract the problem of ice bridges through the large surface area. The perforation of the plates prevents water accumulation, minimizes the difference in temperature between the scales and the ground and promotes uniform melting.



### Features and advantages

- Environmentally friendly: no anti-freeze is necessary
- Minimization of the ice bridging effect through an extra large measuring surface
- Minimization of the ice bridging effect through an extra large measuring surface
- Stable, durable aluminium construction
- SDI-12, RS-485, RS-485 MODBUS
- Measuring range:  
1,000 / 2,000/ 3,000 mm SWE





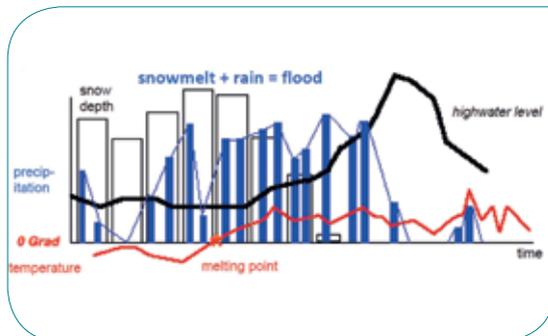
## SMA-2

### Liquid-Water-Content and Snowmelt

The Snow Melt Analyser (SMA) constitutes the ideal measuring solution for the analysis of snowmelt and for ascertaining the water run-off for flood forecasts or for water management.

#### Measuring principle

The SMA sensor combines the measurement technologies of the SPA sensor and the snow scales. The system is installed horizontally at ground level and analyses in particular the bottom layer of the snow pack as this is the most interesting layer regarding the water run-



off. An increase in the liquid water content signals the beginning of snowmelt.

#### Fields of application

water content of the snow pack also increases. If the liquid water saturation level of the snow pack is exceeded, meltwater runs off. Especially in the springtime warm weather periods and rain accelerate this process which often leads to wet snow avalanches and flooding. The SMA measures, amongst others, the liquid water content of the snow and so records the progression of the snowmelt. Therefore, it is a useful measurement

#### Features and advantages

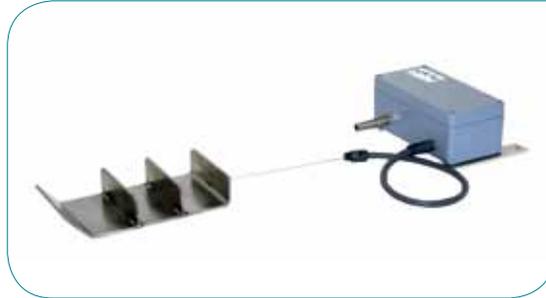
- Forecasting of the water run-off during snowmelt
- Recording of the snow parameters: snow water equivalent (SWE), snow density, liquid water content, ice content
- Early recognition of an increase in the liquid water content in the snow pack
- SDI-12, RS-485, RS-485 MODBUS
- Low energy consumption, solar-powered operation is possible



## SGE-20

### Sliding Movement of the Snow

The sensor SGE-20 enables the measurement of the sliding movement of the snow, whereby deductions can be derived regarding the association between the condition of the surface of the slope, the inclination of the slope and the snow pack.



### Fields of application

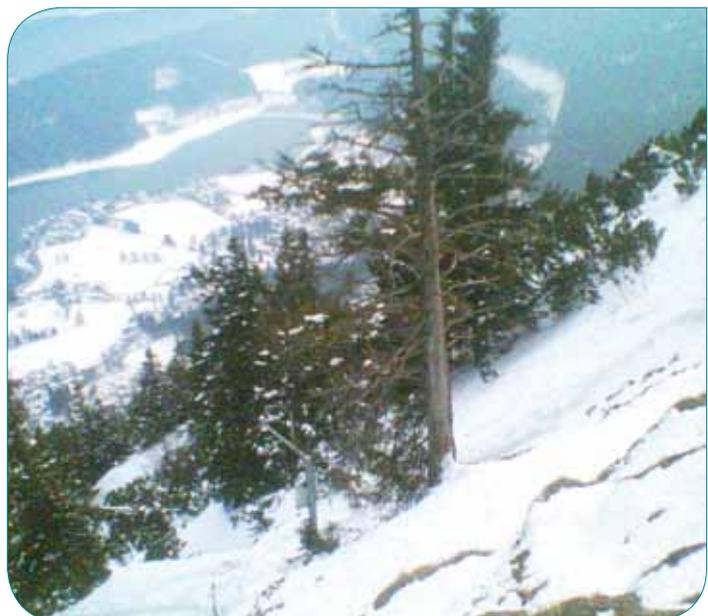
The sliding movement of the snow pack can be recorded using the SGE-20. This is a unique and precise measuring tool for research institutes, environment and forestry commissions, flood and avalanche warning services and geologists who are concerned with the condition of the slope surface. With the aid of the SGE-20, for example, plantation and other provisions for endangered slopes can be more effectively planned.

#### Features and advantages

- Environmentally friendly: no anti-freeze is necessary
- Minimization of the ice bridging effect through an extra large measuring surface
- Minimization of the ice bridging effect through an extra large measuring surface
- Stable, durable aluminium construction
- SDI-12, RS-485, RS-485 MODBUS
- Measuring range:  
1,000 / 2,000/ 3,000 mm SWE

### Measuring on steep slopes

The sensor is installed in the terrain and connected to the data logger via a sensor cable. A sensitive extensometer is situated in the sensor itself. The so-called snow slide shoe is attached to the extensometer via a robust and special wire connection. When the "shoe" slides down the slope together with and underneath the snow, the sensor measures the corresponding distance and emits an electronic signal..





# SIR

## IR - Snow Surface temperature

The infrared sensor SIR provides for the exact and non-contact measurement of the temperature of the snow surface.

### Fields of application

The infrared temperature sensor SIR is generally installed together with further sensors as part of an automatic weather station. The recorded temperatures of the snow's surface constitutes an important indicator for meteorologists, avalanche warnings, ski regions, winter sport communities, researchers or any

### Infrared temperature measurement

Depending on the temperature all materials emit a certain amount of infrared radiation. The SIR measures the emitted infrared radiation and, on this basis, calculates the surface temperature of the snow. This is a highly reliable non-contact method. Under certain conditions, for example on



clear and cloudless nights, the surface temperature of the snow can sink below the air temperature so altering the snow crystals. The SIR sensor makes it possible to recognize and measure such situations which provides useful information especially for avalanche forecasts.



### Features and advantages

- Highly sensitive infrared temperature sensor for the measurement of the snow's surface temperature
- Non-contact measurements, reliable and continuous data, optimum integration in existing systems
- Robust stainless steel sensor casing with separate zinc die-cast casing for the evaluation electronics (protection class IP 65)
- Tried and tested for operation under harsh climatic conditions



## Pt1000

### Snow temperature sensor

Highly durable platinum resistance temperature detector type Pt1000 with four-wire circuitry for installation in a radiation protected environment. The sensor can be applied in a number of different ways, whenever a very exact temperature measurement is required. The measurement range lies between



## SCA

### Snow temperature profile

The SCA sensor carries out several independent temperature measurements in the snow pack with which an exact temperature profile can be generated. The measuring points can be compared to candles with different lengths and are distributed throughout the layers within the snow pack (25, 50, 75 and 100 cm). A further measurement for the ground temperature is also carried out directly on the ground.



#### Features and advantages

- Continuous recording of the snow and ground temperatures at the individual profile depths
- Use of very exact and highly durable resistance temperature detectors (Pt100)
- Better and more exact measurement results through the layer arrangement – the detector always measures in the snow and not the air temperature
- Simple installation and exchange of the temperature candles is possible



# SNOW DRIFT

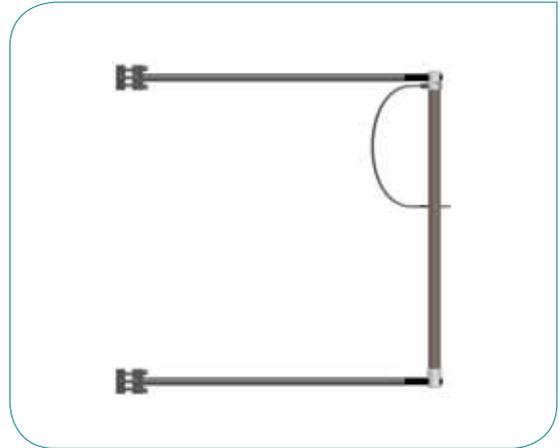
## SND - Snow Drift sensor

The SND sensor is an ultra-robust instrument to measure the intensity of solid particle fluxes and wind speed.

The SND contains a high precision acoustic sensor within a robust housing and with minimum power consumption.

The sensor consists of a cylindrical, anti-abrasion, anti-adhesion and anti-rime coated tube supported by two strong stainless steel arms.

The impact of snow drift and the friction of wind alter the acoustic pressure on the sensor tube. Due to the sensor design and the specific signal-patterns, snow drift and wind can be discriminated.



### SND application

- Monitoring of snowdrift
- Meteorology
- Avalanche forecast
- Cable car safety
- Road and railway safety monitoring
- Mining, Airports, Arctic navigation
- Protection of industrial facilities
- Science and research





### Features and advantages

- Easy installation and integration
- Maintenance free
- Very robust
- Wide temperature range
- Low power consumption
- Highly sensitive acoustic sensor
- No moving and no optical parts
- No wear and tear
- Mass flux monitoring
- SDI-12 and RS-485 communication
- Plug and play





## Data logging

### MRL - Super robust data loggers

SOMMER offers a range of reliable and multi-functional data loggers, intelligent modems and data transmission devices via cellular, radio or satellite communication. Our instruments are complemented by the SOMMER MDS data server, which offers the user live access to field data.

With the COMMANDER software and a data logger connected to a communication network the full data acquisition chain is directly at your finger tips.

All MRL data loggers share the same common features like robustness, flexibility and native SDI-12 functionality.

Each data logger model provides a specific set of features to cover a large variety of applications and requirements.

#### Common Features and advantages

- Optimised for data acquisition in remote areas with harsh environmental conditions (IP 67)
- Logger can be operated autonomously (integrated solar charge controller) by adding a solar panel and battery
- Compatible with complete SOMMER sensor family and various third-party sensors and devices
- Backlit display for easy data reading and logger configuration
- Configuration via RS-232 and Bluetooth
- Data collection with USB memory stick or via Bluetooth
- Minimum power consumption
- Reliable, robust and compact
- Weatherproof aluminium housing





## MRL-6

The MRL-6 is a small-sized data logger that provides all required functions for small monitoring tasks. It provides 16-bit analogue inputs and a SDI-12 terminal facilitates for sensor connections.



### Features and advantages

- Logger operates autonomously (with internal batteries or integrated solar charge regulator), no switch cabinet required, protection rating IP 67
- Extremely low power demand
- Suitable for small applications
- Super robust, compact, weatherproof aluminium housing

## MRL-7

The MRL-7 is the latest addition to the well-proven family of MRL data loggers. The capabilities and top features of previous MRL data loggers have been combined in the design and construction of the MRL-7. It is compact, cost effective, easily configured and supports a wide range of instruments and sensors.



### Features and advantages

- Waterproof logger with integrated data transmission using 2G / 3G modem (4G optionally)
- Integrated solar charger for internal and external batteries
- Three relay outputs
- 16 limit monitors
- Message and notification functions
- Input extension available
- RS-485 camera available
- Satellite modem available
- GPS tracking available



## AWS

Automatic weather station: robust materials and design especially for the recording of snow data in alpine and high alpine terrain.

### Fields of application

The equipment and the installed sensor technology are especially suited for operation in alpine and high alpine regions. High quality components and materials ensure continuous operation even under harsh climatic conditions and deliver reliable measurement data for meteorologists, avalanche warning services and environmental authorities as well as for the protection of important infrastructures.

### Implementation

consists of two measuring stations, a wind measuring station on the mountain crest and a snow measuring station located in a comparatively calm position. Both stations are operated automatically and include everything that is required to measure, record, log and display the data on a PC. The decentralized stations are linked with the central data system by



#### Measuring devices

- Tailor-made sensor configuration: snow depth, snow surface temperature, snow and air temperature, wind, humidity, radiation, etc.
- Integration in existing measuring networks display of the data in a web browser
- Qualified service for planning and advice regarding the installation through to the maintenance of the equipment
- Equipped with solar power for autonomous operation in high alpine regions, with data logger and remote data transmission

radio or GSM/GPRS. The measurement data are therefore available online via the Internet (web browser) at all times in the weir.





# Competence in Environmental Measurement Technology

In addition to the sale of innovative measuring solutions for the sectors snow, water, wind and climate Sommer Messtechnik also offers a wide range of professional customer services. These include project consultation for individual systems, installation and commissioning, regular maintenance work, system demonstrations as well as training and workshops for applied measuring devices and operating software.

Please contact us for a non-binding consultation or an individual offer under the telephone no. +43 5523 55989 or by email [office@sommer.at](mailto:office@sommer.at)

## Services

Outdoor measurements often require individual solutions, for which competent advice and good planning are essential. Our team of service engineers install the equipment together with you and are available for regular maintenance work. The costs are individually tailored depending on the type and scope of the services as well as the location of the measuring site.

## Workshops and Training

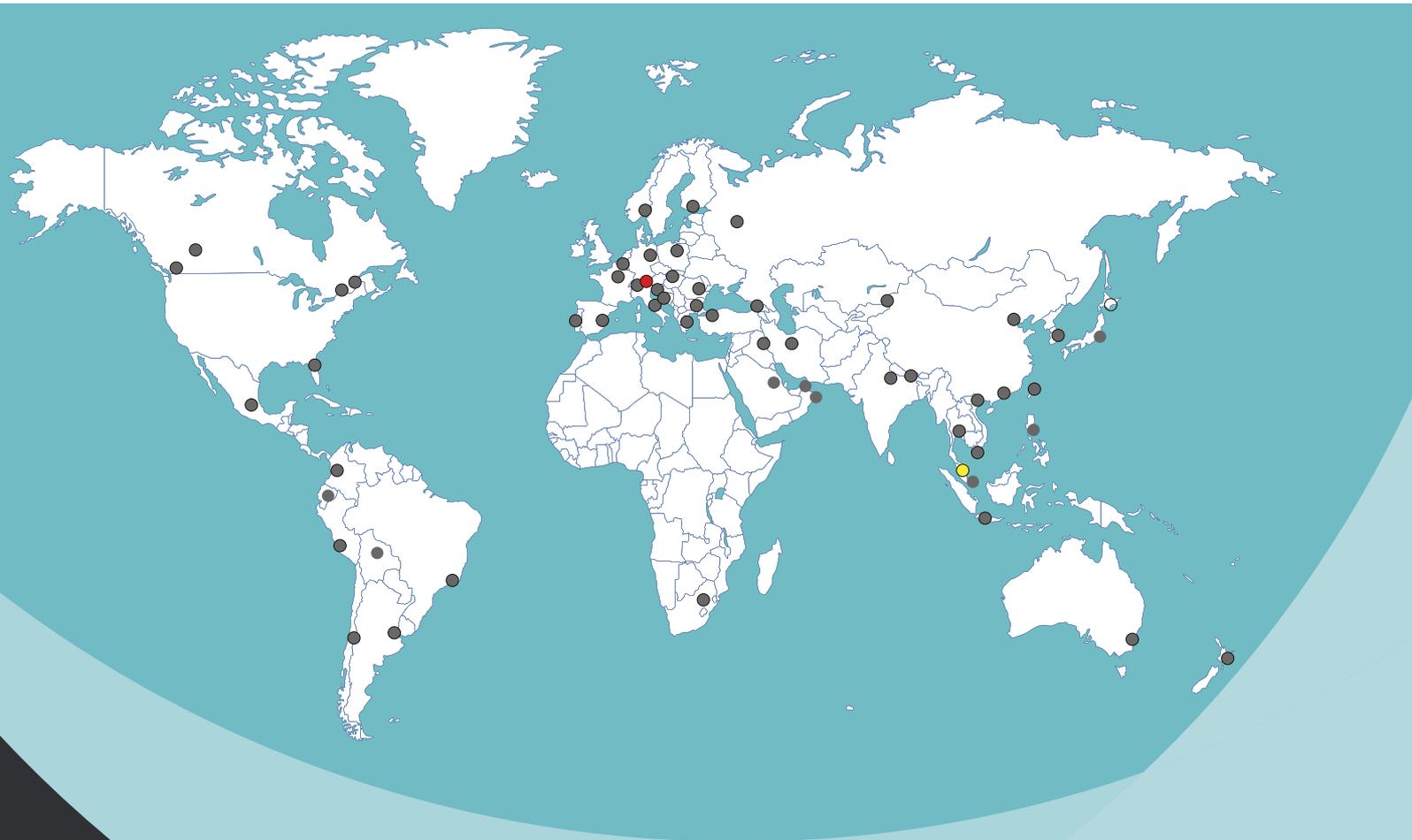
What possibilities exist for carrying out discharge measurements? What are the advantages and disadvantages and the limits of the various systems? How do I carry out measurements using the tracer dilution method? These and further hydrographic topics are highlighted in our regular workshops and training courses.

Further information as well as upcoming dates can be found on our website [www.sommer.at](http://www.sommer.at) or contact us personally and we will be pleased to provide you all details. We look forward to your contact and participation

### Our services at a glance

- Consultation for project management and planning
- Inspection and evaluation of planned measuring sites
- Technical advice and customer service
- Installation, commissioning and maintenance of the stations
- In-house testing of equipment and sensors
- Repairs and overhauls





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