



HYDROLOGIC RADAR LEVEL MEASURING AND MONITORING TELEMETRY SYSTEM



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1. Summary

Wireless telemetry system plays an important role in policy and strategy making on disaster prevention and reduction from ministry of water conservancy, ministry of agriculture, ministry of city construction or ministry of transport, etc. It also has important significance in study of precipitation and storm characteristics.

The system can be composed of the following parts according to user's practical requirements: water level monitoring, water surface flowing velocity monitoring, rainfall monitoring and video monitoring, etc. (also a sensor or more than one sensors with different functions can be selected according to user's concrete requirements) .

There are different kinds of monitoring systems, such as water level monitoring, surface velocity monitoring, rainfall monitoring, and video monitoring, etc. depending on functions of sensor selected for one or more functions based on requirements at working sites.

The system can acquire real-time signals from water level, flowing velocity, rainfall and video via remote terminal equipment. Via wireless GPRS or 4G wireless communication network, the acquired data are transferred to a master station where they will be received, stored, analyzed and processed to be created various data sheets, reports and charts. End users can query data from monitoring stations via their PC or mobile to realize unattended remote monitoring of water level monitoring station, or meteorological research station, etc.

2. Features:

- A. Warning messages could be sent when the water level monitored exceeds the upper or lower limit;
- B. Supervisory personnel could acquire information on rainfall, water level and flowing velocity from the system remotely;
- C. The system has the function of automatic report. In case that the GPRS network is disconnected, the acquired and collected data can be restored locally and will be automatically transmitter to the server when the GPRS network resume its normal work;
- D. Regularly collect and acquire data on water level, velocity and rainfall, etc;
- E. Regularly report the data on water level, velocity, rainfall and voltage of the battery, etc;
- F. Warning triggers the system to report the data on water level, velocity, rainfall and voltage of the battery, etc;
- G. Locally stores the data on water level, velocity, rainfall and voltage of the battery, etc;
- H. The data on water level, velocity, rainfall and voltage of the battery could be queried remotely;
- I. Exports historical data locally;



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- J. Supports the function of reporting voltage of the battery;
- K. Supports the function of photo snapshot and video selection and back transmission;

3. System composition

A. Monitoring center

- Sever
- Platform software

B. Communication

- GPRS
- 4G
- Internet

C. Terminal equipment

- a. RTU
 - b. Solar panel
 - c. Solar energy controller
 - d. Battery (note: electric supply or battery is selected by the user on request)
 - e. Lightning arrester
 - f. Lightning rod
- ### D. Sensors (optional)
- g. Radar water level transmitter
 - h. Ultrasonic water level transmitter
 - i. Rainfall gauge
 - j. Radar velocity meter
 - k. Video camera

For better understanding, please refer to the picture right.

E. Specifications of constituent equipment

- Radar water level transmitter

A variety of models of high frequency radar

Level transmitters are optional for the system (refer to the photos at right bottom at page 2 and the photos at





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right top at page 3). Users can choose one of them for their system according to their practical requirements.

Features:

High accuracy, strong anti-interference, not be affected by temperature and moisture change or wind, readily mounting due to small and compact structure, calibration via a serial port and a PC, lower consumption and small beam angle

Applications: Be suitable for measuring and monitoring water level and flow in lakes, reservoirs, rivers, open channels, irrigation ditches; Be suitable for flood prevention and warning system for city low-lying streets or tunnels.

Specifications:

Measuring range: Maximum 70m

Accuracy: +/-3mm; +/-5mm; +/-10mm

Process connection: Bracket or flange

Temperature range: -40 - +100 degree Celsius

Pressure range: ATM

Repeatability: +/-1mm

Antenna material: Stainless steel or PP

Working frequency: 26GHz

Signal output: RS485/MODBUS (6 - 24 V DC)

Enclosure protection grade: IP67/ IP66

■ Ultrasonic water level transmitter

Features: Aluminium housing, open channel flow function is optional on request, menu in both Chinese and English, with echo curve indication.

Application: Be suitable for liquids level measurement in various industries, especially in water treatment industry.

Specifications:

Measuring range: Max: 15m

Process connection: M66*2 or flange

Transducer housing material: PA66+GF30 or PVDF

Temperature range: -40 - +70 degree Celsius

Pressure: ATM





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Accuracy: +/-0.25% (full scale)

Signal output: RS485/MODBUS (6-24 V DC)

Enclosure protection grade: IP67

■ Water flow velocity meter (single camera or two cameras optional on request)

Specifications:

Power supply: 8 - 16V DC

Measuring range: 0.15 - 15m/s

Emission frequency: 24 GHz

Antenna type: planar microstrip array antenna (flat)

Antenna features: Sealed, dew-proof, condensation-proof

Distance range between the mounting position to water surface: 0.5 - 35m

Temperature range: -35 - 65 degree Celsius

Application: flowing water

Signal connection: RS485/ MODBUS (standard), or SDI-12, or customized protocol, to be compatible with various RTU both from China or abroad.

Enclosure protection grade: IP67

■ Rainfall gauge

Specifications:

Diameter of rain water tray: 200mm + 0.6mm;

Angle of raised edge: 40° - 45° ;

Resolution: 0.5mm;

Accuracy: ≤ +/- 4%;

Rain rate: 0 - 4mm/min (maximum allowable rain rate is 8mm/min);

Features: anti-blockage, insect prevention, with dust-proof measures;

■ Video camera

Specifications:

Single or two cameras are available on request;

Having the function of night vision;

Shooting direction is adjustable and at least two mounting positions are reserved;

Communication type: 485 BUS;

Working voltage: 5 - 12 V;

Working current: less than 120mA;

Image effective pixels: more than 1.3 million;





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Picture format: JPEG;

Resolution: 640×480, 800×600, 1024×768, 1280×800, or, by custom setting;

Enclosure protection grade: IP66

Working environment: be in conformity with related requirements in the standard GBT15966 - 2007 <Primary Parameter and General Specification for Hydrologic Instrument>;

■ Solar panel

Specification:

Maximum working voltage: 17 V;

Open circuit voltage: 21 V;

Rechargeable controller voltage: 3.6 - 12 V DC;

Power: ≥ 40 W;

Having automatic functions of over current, over voltage, over recharge, reverse polarity;

■ Remote control terminal

Specifications:

Be in conformity with the requirements of the standard GBT15966-2007 < Primary Parameter and General Specification for Hydrologic Instrument >;

Data transmission mode: supports GPRS/CDMA and other many data communication modes;

More than 4 data acquisition and communication interfaces;

Supports local storage of images, videos and other monitoring information;

Supports multiple functions in one station;

Supports functions as scheduled self-test report, reset, station location setting, power failure protection, real-time clock calibration and equipment testing, etc.

■ Battery and controller

Nominal power supply voltage: 12V;

Capacity >40AH;

Charge controller power supply voltage: 3.6 V - 12 V DC

Max. power current: 6A

Operating temperature range: -20℃ to +70℃

Life span: more than 3 years (25℃)

With functions of automatic protection of over current, over voltage, overcharge, reverse polarity;

■ Solar controller

Specification:





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Maximum input voltage from photovoltaic end: 75 V DC

Maximum current of continuous charge and discharge at 25 degree Celsius: 10A

Voltage of system: 12 V/ 24 V DC

Electrical protection: reverse polarity, short circuit, over current, surge, high temperature counter current prevention, etc;

Communication interface: RS485;

Working ambient temperature: -45℃- +55℃;

Working ambient moisture: 100% no condensation and dew;

Enclosure protection grade: IP65;

■ Lightning Arrester

Specifications:

Maximum continuous working current: 2 A;

Nominal discharge current: 5 KA;

Maximum discharge current: 10 KA;

Response operation voltage: 12 V;

Maximum transient over voltage: 10 KV



4. Different versions of radar level transmitter of hydrological measuring and monitoring system

In 2012, radar water level transmitters for hydrological measuring and monitoring system were developed and manufactured. Since then, the radar level transmitters for hydrological system have been constantly updated and replaced. Every year, they are manufactured in large quantity. Follows are photos of different version of the instruments shows that they were in our workshop.





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VRPWRD92H

VRPWRD95H

Version of 2012



VRPWRD92H

VRPWRD95H

Version of 2016



VRPWRD92HA

VRPWRD92H

Version of 2018



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VRPWRD95HT



VRPWRD93HE

Version of 2018

5. Practical Applications

Since 2012, large quantity of radar level transmitters for hyfrological measuring and monitoring system have been extensively in many fields, such as lakes, reservoirs, rivers, water supply canal, irrigation channels, city flood protection warning systems, etc. Follows are some photos which show the systems are used in different fields:



Lakes



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Reservoir



Fishpond



Rivers



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Water supply canal



Low-lying streets
(City flood warning protection systems)



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