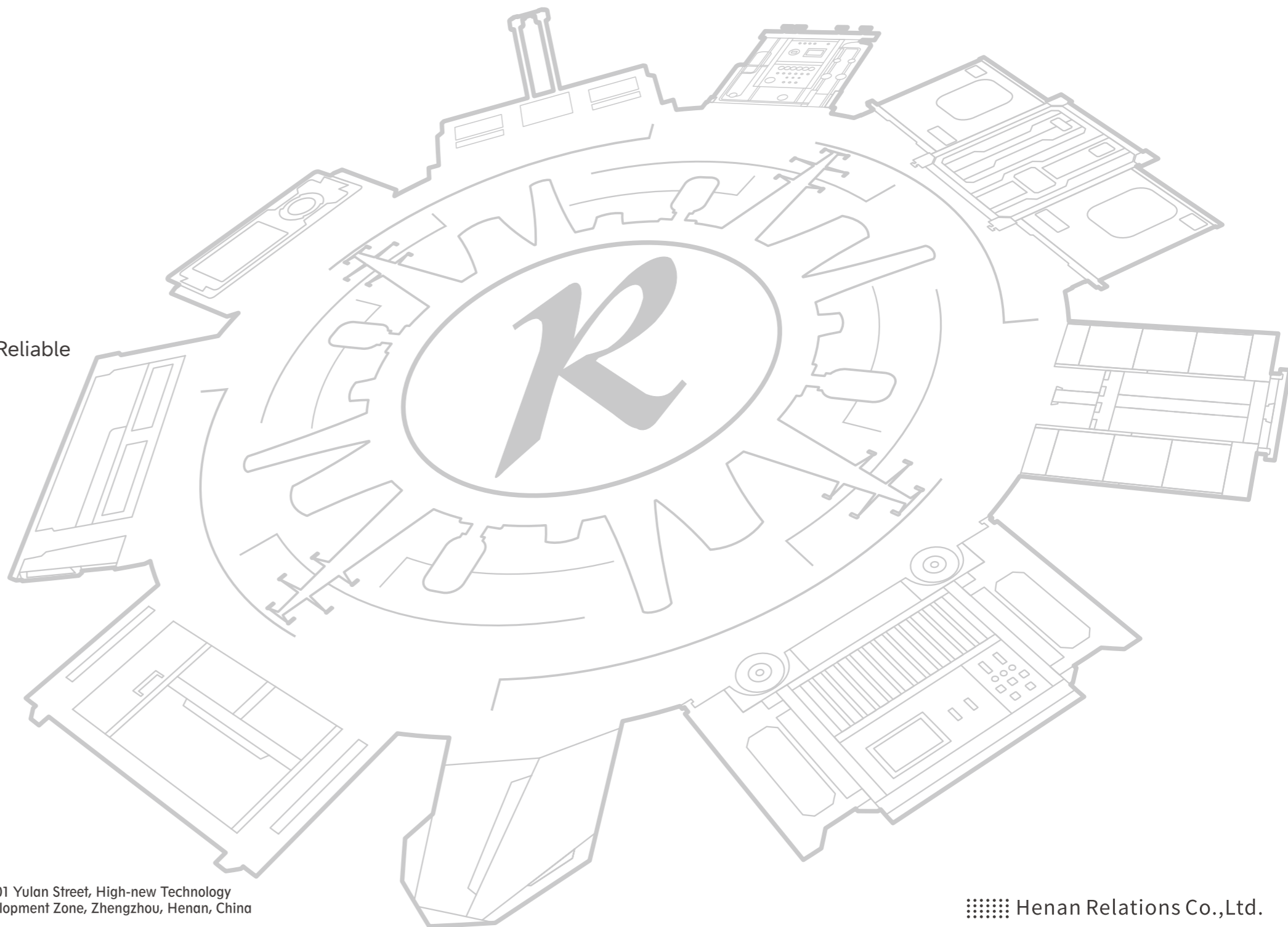


Hydrogen quality control system solution



Perceive the Future, Safe and Reliable



About Us

Henan Relations Co., Ltd. was established in 1997 with a registered capital of 59.2 million yuan. Located in the Zhengzhou National High-tech Development Zone, it has established the Rilixin Intelligent Instrument Industrial Park. Currently, it has an office, scientific research and production area of more than 70,000 square meters and has over 600 employees. It is a national-level specialized, sophisticated, distinctive and innovative "Little Giant" enterprise and a key high-tech enterprise under the National Torch Program, which is committed to the research, development, production and sales of terminal products for gas detection and treatment.

Relations closely focuses on the technical fields of safety monitoring and treatment of SF₆ in smart grids and hydrogen (H₂) in smart power plants. It has created a technical chain with intelligent gas sensors at its core and dominated by intelligent analytical instruments, intelligent gas treatment equipment, and digital management and control systems.

Relations has a thorough understanding and exploration of the existing difficulties and pain points in hydrogen safety detection. Combining its own decades of technical accumulation in hydrogen detection and market service experience, the company has launched more than a hundred hydrogen detection products in total. These specifically include intelligent hydrogen sensors, intelligent hydrogen detection instruments, hydrogen leakage monitoring devices, hydrogen control systems, hydrogen dryers, hydrogen purification and refining devices, PEM hydrogen production intelligent equipment, etc. It provides reliable guarantees for hydrogen detection and control under various complex working conditions in power plants, hydrogen production plants, hydrogen refueling stations, fuel cell systems and vehicle manufacturers, substations, nuclear power plants, petrochemical industries, and other fields. The solution for the generator hydrogen quality control system proposed by Relations Co., Ltd. has remarkable economic and social benefits, and is in line with the long-term strategic development requirements of the dual-carbon goal.



Solution for H₂ Quality Control System

Relations has been deeply engaged in the power system for more than twenty years. Focusing on the potential safety hazards of generator sets caused by the decline in hydrogen quality and the increase in windage losses, it has independently developed a complete hydrogen safety detection solution and an intelligent hydrogen quality control system. These safeguard the long-term stable, safe and efficient operation of the generator sets, and help the power generation system achieve the goals of emission reduction, cost reduction and efficiency improvement.

Working Mode of the Hydrogen Quality Control System

- The hydrogen quality control system encompasses functional modules such as hydrogen purification, hydrogen drying, automatic hydrogen replenishment, and hydrogen quality monitoring. It can achieve real-time monitoring and automatic control of the entire process from hydrogen generation, transmission to supply, replacement, operation, and evacuation.
- Users can arbitrarily combine or use the functional modules separately according to their needs.
- Depending on the situation, hard-wired or wireless communication modes can be optionally selected for information transmission.

Expected Achievements of the Hydrogen Quality Control System

- The hydrogen pressure is controlled within the rated pressure $\pm 30\text{kPa}$.
- The hydrogen purity is stably maintained above 99% for a long time.
- The humidity of hydrogen is controlled within the dew point temperature range of $(-25\sim 0)^\circ\text{C}$.
- Operation mode: The system operates in an integrated and automated manner as a whole, replacing the traditional manual hydrogen exhaust and replenishment work, reducing labor costs and labor intensity, and improving operational safety performance.

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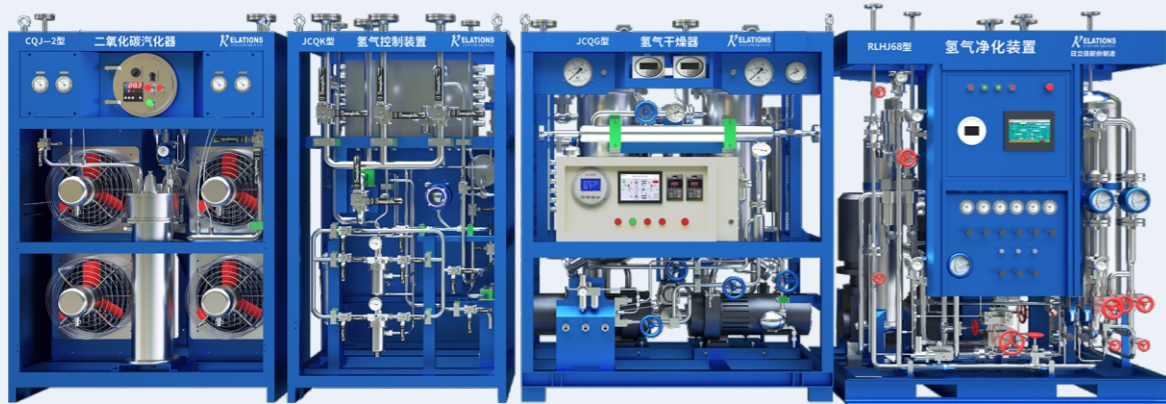
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Hydrogen Quality Control System for Generator

Good economic and social benefits and conforms to the development requirements of carbon neutrality.

- Improve the purity of hydrogen.
- Reduce windage and friction losses.
- Save energy and increase efficiency.
- Reduce operating costs.
- Ensure the safe operation of the generating unit.



The Hydrogen Quality Control System for the generator is a world-leading solution designed to monitor and control the humidity of hydrogen, improve the purity of hydrogen, reduce windage and friction losses, save energy and increase efficiency, reduce operating costs, and ensure the safe operation of the generating unit. It has good economic and social benefits and meets the development requirements of carbon neutrality.

This system is composed of modular units such as a carbon dioxide vaporizer, an integrated hydrogen control device, an integrated hydrogen dryer, a hydrogen purification device, and a hydrogen production device. All units can be arbitrarily combined for use according to on-site requirements, and can also be used independently.

Some Application Cases



Guangdong Datang
Leizhou Power Plant



Shandong Huadian
Tengzhou Power Plant



Shandong Huaneng
Huangtai Power Plant



Jiangsu Tianwan
Nuclear Power Plant



RLHJ68 Hydrogen Purification and Compensation Device

The RLHJ68 Hydrogen Purification Device is a hydrogen purification equipment that adopts patented separation technology and can separate impurity gases such as oxygen, nitrogen, and carbon dioxide from hydrogen. Aiming at the current situation of hydrogen-cooled generator sets that improve the hydrogen purity by discharging and supplementing hydrogen but are unable to maintain a high hydrogen purity on site, this device is designed and manufactured to increase the hydrogen purity to more than 99%.

Features

- High efficiency: It adopts separation components with a high separation coefficient and a high hydrogen production rate, which can separate impurities such as N₂, O₂, and CO₂. After purification, the purity of hydrogen is as high as over 99%.
- Strong stability: The gas separation components operate continuously driven by the pressure difference, featuring high reliability.
- Long lifespan: The service life can reach more than 10 years.
- Lightweight structure: It has a small volume, light weight, occupies less space, and is easy to install.
- Precise control: It automatically tracks the hydrogen purity and precisely controls the hydrogen purification process.
- Dedicated compressor: The hydrogen-dedicated magnetic coupling compressor with zero leakage is safe and reliable. With the unique treatment process for the inner wall of the cylinder, its lifespan can reach up to 10 years and it requires no maintenance for 5 years.

Technical parameters

Parameter name	Parameter value
Feed gas flow rate	50m ³ /h
Inlet gas pressure	(0.25~0.6)MPa
Purity improvement of the generator	≥99%
Power supply	380VAC
Power	9kW
Dimension	1870mm×1260mm×2165mm(L×W×H)
Weight	1500kg



RLHJ68 - 1 Hydrogen Purification and Compensation Device

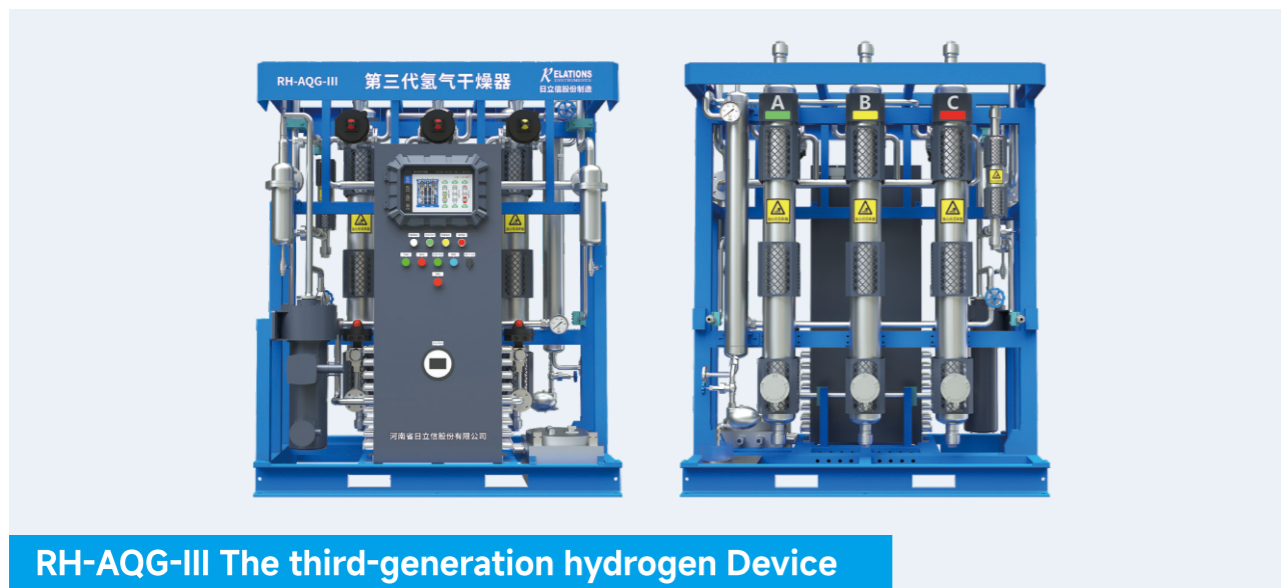
The RLHJ68-1 Hydrogen Purification and Compensation Device solves the problem of a slight decrease in hydrogen pressure caused by the discharge of impurity gases after the hydrogen purification device is put into operation. When the hydrogen pressure in the generator drops, it can automatically produce and replenish hydrogen, reducing the operation and maintenance work of hydrogen replenishment in the power plant, and ensuring that the hydrogen pressure in the generator is maintained at the rated working pressure. It conducts dynamic hydrogen replenishment inside the generator. Hydrogen is produced by using a Proton Exchange Membrane (PEM) electrolyzer, and the hydrogen is replenished as it is produced. The flow rate is (1-2) Nm³/h, the purity is 99.99%, and it can automatically maintain the hydrogen pressure inside the generator.

Features

- Automatically maintain the hydrogen pressure inside the generator;
- Easy to use: It can be used just by connecting to the water source and power supply;
- Safety design: No hydrogen storage, no pressurization, leakage detection, fault locking, open design, explosion-proof design;
- Equipped with a safe and efficient Proton Exchange Membrane (PEM) electrolyzer stack, which has the advantages of fast system response, corrosion - free operation, high - pressure tolerance, high integration, and high - purity gas output.
- Adopt the water cooling mode, which can cool the system and cool, dehumidify and dry the hydrogen purification module;
- Configure a hydrogen concentration alarm system and an online humidity monitoring system to ensure the safe operation of the equipment and the real-time monitoring of the quality of the produced hydrogen.

Technical parameters

Parameter name	Parameter value
Input voltage	380VAC
Hydrogen production flow rate	(1-2) Nm ³ /h
Hydrogen purity	>99.99%
Rated hydrogen supply pressure	Adjust according to the rated hydrogen on site.
Cooling method	Water cooling
Temperature control range of cooling water	≤15°C
Working environment	Under normal temperature and pressure conditions
Integration form	Open-frame structure



RH-AQG-III The third-generation hydrogen Device

It adopts a three-tower adsorption design. One tower is for adsorption, one tower is for regeneration, and one tower is in standby. Even if one tower malfunctions, the operation of two towers can still be maintained.

Each tower is equipped with two independent heating elements, with one in use and the other in standby. They are independently controlled and both cover the entire drying tower. The temperature control is precise and the operation is stable.

Adopt explosion-proof magnetic coupling and dual-channel circulating fans.

The air cavity of the magnetic coupling fan is an independent air cavity, which has no contact with the explosion-proof motor. There is no need for hydrogen replacement when disassembling and assembling the motor, and the fan operates with zero leakage.

Features

External installation:

There is no need to disassemble the dryer during maintenance.

dual-channel:

It provides power for the adsorption loop and the regeneration loop simultaneously.

Dual-impeller supercharging structure:

It can generate sufficient wind pressure and provide power for the hydrogen system to circulate and dehumidify during the generator shutdown or barring process.

The equipment operates the deaerator and the drying tower in series and parallel, and is capable of removing moisture and trace oxygen in hydrogen.

An intelligent heater with a multi-layer star-shaped layout structure is adopted. This ensures that the overall regeneration temperature of the drying tower is uniform, not affected by the regenerative cold air input from the fan, and improves the regeneration effect of the drying tower.

An integrated multi-flow layer heat exchange structure gas-water separator is adopted and installed vertically. The condensate water can be efficiently separated under the action of inertial collision and gravity, improving the regeneration efficiency.

Technical parameters

Parameter name	Parameter value
Hydrogen treatment capacity (NPT)	100m ³ /h
Dew point at the inlet/outlet of the hydrogen drying unit	(10/-30 ~ -15)°C
Pressure/temperature at the inlet and outlet of the cooling water	(200 ~ 1000) kPa/≤38°C
Measurement range of gas dew point / Signal output	(-40 ~ +100)°C / (4 ~ 20) mA
Inlet and outlet flanges of the hydrogen drying unit	DN40
Float-type steam trap	Automatic drainage
Supply pressure of compressed air	(0.5 ~ 0.8) MPa
Explosion-proof grade	The electrical components of the equipment meet the explosion-proof grade of IIC T4
Power supply	380VAC, 50Hz
Rated power	14kW



JCQK Integrated Hydrogen Control Device

The JCQK integrated hydrogen control device realizes the conversion and control of the processes such as the replacement, hydrogen charging, hydrogen replenishment, and hydrogen discharging of the generator, ensuring that the hydrogen pressure inside the generator is within the rated hydrogen pressure range, and conducts online monitoring of the hydrogen parameters of the generator. It adopts a cabinet type or open type design. The main components, including a positive pressure explosion-proof power distribution cabinet, hydrogen pressure regulator, pressure transmitter, differential pressure transmitter, pressure switch, hydrogen mass flowmeter, hydrogen filter, air filter, safety valve, hydrogen purity, humidity, oxygen in hydrogen, hydrogen leakage monitoring and analysis instrument, hydrogen valve, gas pipeline, etc., are integrated in one cabinet, which is convenient for installation, use and maintenance, and guarantees the safe operation of the generator.

Features

- The equipment can automatically replenish hydrogen when the generator is operating normally, and can record the cumulative and instantaneous amounts of hydrogen replenishment into the generator in real time.
- The equipment is equipped with two pressure regulating valves to meet the requirements of safe and continuous operation for the hydrogen replenishment amount of the generator.
- The equipment can monitor the hydrogen pressure inside the generator, hydrogen purity and hydrogen source pressure in real time, send the data to the DCS, and provide alarm information at the same time.
- The equipment enables single-person operation of the gas replacement work of the generator.
- During the gas replacement process of the generator, it can monitor the purity of carbon dioxide and hydrogen.
- Meanwhile, during the normal operation of the generator, it can monitor the oxygen purity inside the generator in real time.
- The equipment is equipped with a safety valve at the connection with the hydrogen source. When the hydrogen source pressure is too high, it will automatically discharge to the total hydrogen discharge pipeline of the power plant through the exhaust port of the device, ensuring the stability of the hydrogen source and the safety of the plant area.

Technical parameters

Parameter name	Parameter value
Design pressure	1.0MPa
Inlet pressure	(0.6~1)MPa
Outlet pressure	(0.3~0.6)MPa
Power supply	220VAC
Signal output	Switching value of (4~20) mA
Weight	600kg



CQ-C40-8 Rapid Replacement Device for Carbon Dioxide Vaporizer

The carbon dioxide vaporizer can completely vaporize the carbon dioxide gas in the cylinder, eliminating the potential safety hazards caused by ice blockage when carbon dioxide is directly charged into the generator and condensation inside the generator. It can significantly increase the gas charging speed and the utilization rate of the gas.

Features

- It can vaporize carbon dioxide and regulate the pressure of carbon dioxide gas during replacement.
- It can heat the carbon dioxide gas, making its temperature differ from the ambient temperature by no more than 8 degrees Celsius.
- There is a uniquely designed constant-temperature pressure regulator, which can prevent the pressure regulating valve from getting blocked by ice.
- A cylinder overturning device is used, which can ensure there is no condensation during the carbon dioxide filling process.

Technical parameters

Parameter name	Parameter value
Design pressure	>0.5MPa
Output pressure	(0.1~0.8) MPa (adjustable)
Flow rate	120m ³ /h
Power supply	Three-phase five-wire system, AC380V, 50Hz



RLW3200 Internal Cooling Water Optimization System

The RLW3200 internal cooling water optimization system adjusts the pH value of the internal cooling water by adding alkali, effectively inhibiting the corrosion of copper wire rods. It enables the three indicators of the pH value, conductivity, and copper content of the internal cooling water in the generator to meet the standards simultaneously, achieving and exceeding the national standards. This completely solves the on-site problem that the water quality of the internal cooling water in the generator is difficult to control.

Features

- The dosing treatment with a metering pump avoids the insufficient periodic alkalinity caused by the alkalization of the alkaline mixed bed and can continuously adjust the pH value of the internal cooling water in the generator.
- The specially selected resin requires no regeneration, has a long operation cycle, excellent water - treatment effects, and is maintenance - free. Under normal operation conditions, the operation cycle of the exchanger can reach up to 2 years.
- The dynamic water spraying at the water inlet results in a uniform water curtain distribution without erosion.
- Filtering and resin - capturing units are installed to build a firewall between the generator and the internal cooling water tank.
- Online monitoring of pH and conductivity at the inlet and outlet ensures the safe operation of the generator.
- It has an all - stainless - steel structure and a modular design, featuring an aesthetic appearance and convenient operation.
- The pH of the system's outlet water is between 8.0 and 9.0.
- The conductivity of the internal cooling water system is stable between 1.0 $\mu\text{s}/\text{cm}$ and 2.0 $\mu\text{s}/\text{cm}$ (at 25 °C, \leq 3.0 $\mu\text{s}/\text{cm}$ for double - water - cooled units).
- The copper ion content in the cooling water is maintained below 5 $\mu\text{g}/\text{L}$ (at 25 °C, \leq 40 $\mu\text{g}/\text{L}$ for double-water-cooled units).



WOT-3 Automatic Oxygen Addition System

The WOT-3 automatic oxygen addition system treats the boiler feed water by adding oxygen, which can transform the surface of the metal deposition layer in the thermal power system into a stable oxide protective film, making the protective layer more compact. It can effectively prevent the occurrence of flow accelerated corrosion and represents the development trend of the treatment method for boiler feed water in coal-fired units of thermal power plants.

Features

- Oxygen is added under negative pressure for low-pressure feed water, and oxygen is added under negative pressure before the condensate pump, enabling more precise control of dissolved oxygen;
- Micro-oxygen in high-pressure feed water is precisely controlled (Patent No.: ZL 2014 2 0614868.6);
- The dissolved oxygen is consumed in the economizer, and there is no oxygen in the steam, without introducing the factors of dissolved oxygen that cause the growth and peeling of the oxide scale;
- The amount of oxygen added to the feed water is precisely controlled;
- All the added oxygen is controlled to fully react and will not enter the steam system, avoiding the entry of excessive dissolved oxygen into the feed water thermal system and causing harm to the system;
- The amount of oxygen added is automatically controlled, reducing the operating cost and making the oxygen addition process safer and more effective.

Technical parameters

Parameter Name	Parameter Value
Oxygen Addition Point	Dual-channel oxygen addition
Oxygen addition outlet pressure	Up to 2 MPa at the maximum.
Control range of dissolved oxygen	(10~150) µg/L
Accuracy	± 1%F.S
Display screen	12 inches
Power supply	AC 220V 50 Hz
Cabinet body material	SUS 304
Size	1930 mm×800 mm×500 mm(L×W×H)
Weight	140 kg



HMT374E Online Intrinsically Safe Temperature and Humidity Instrument

The intrinsically safe HMT374E online temperature and humidity instrument uses a high-performance temperature and humidity sensor from Vaisala (Finland). It is used to measure the humidity of hydrogen in hydrogen-cooled generator units. It is an explosion-proof (EX) level instrument that can simultaneously measure the dew point temperature (Td) and temperature (T) in hazardous areas. The sampling system of the RLS-374G is composed of components such as a filter, a sewage discharge device, a sensor sleeve, and a flow meter. By observing the indication of the flow meter, it is possible to determine whether the measured value of the instrument represents the humidity of the hydrogen flowing in real time in the generator. This sampling system is easy to install and convenient for maintenance. It can improve the measurement stability of the instrument, ensure the normal service life of the probe, reduce the maintenance workload, and cut down on maintenance costs.

Features

- It is a designated supporting product of the generator factory.
- It adopts the intrinsically safe temperature and humidity instrument of Vaisala from Finland.
- The unique RLS-374G sampling system is waterproof and resistant to oil pollution, ensuring the service life of the probe and reducing the maintenance workload.

Technical parameters

Measurement parameters of dew point temperature (Td)

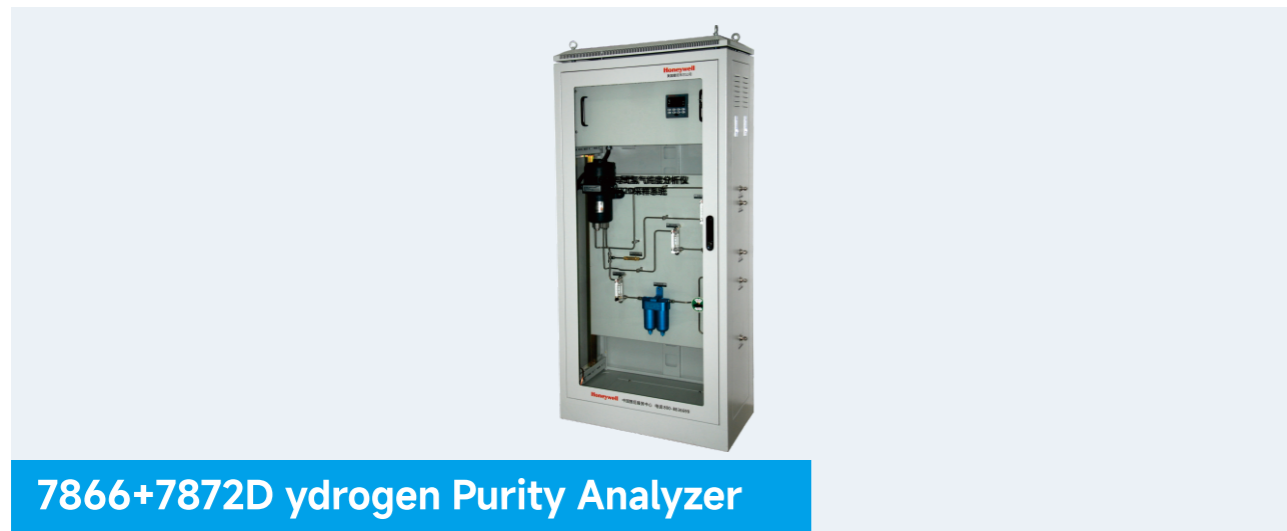
Measurement range	(-40~+100) °C
Typical accuracy	Better than ±1°C

Measurement parameters of relative humidity (RH)

Measurement range	(0~100)%RH
Accuracy	± 2%RH

Measurement parameters of temperature (T)

Measurement range	(-20~+80) °C
Typical accuracy of the electronics at +20°C	± 0.1°C



7866+7872D Hydrogen Purity Analyzer

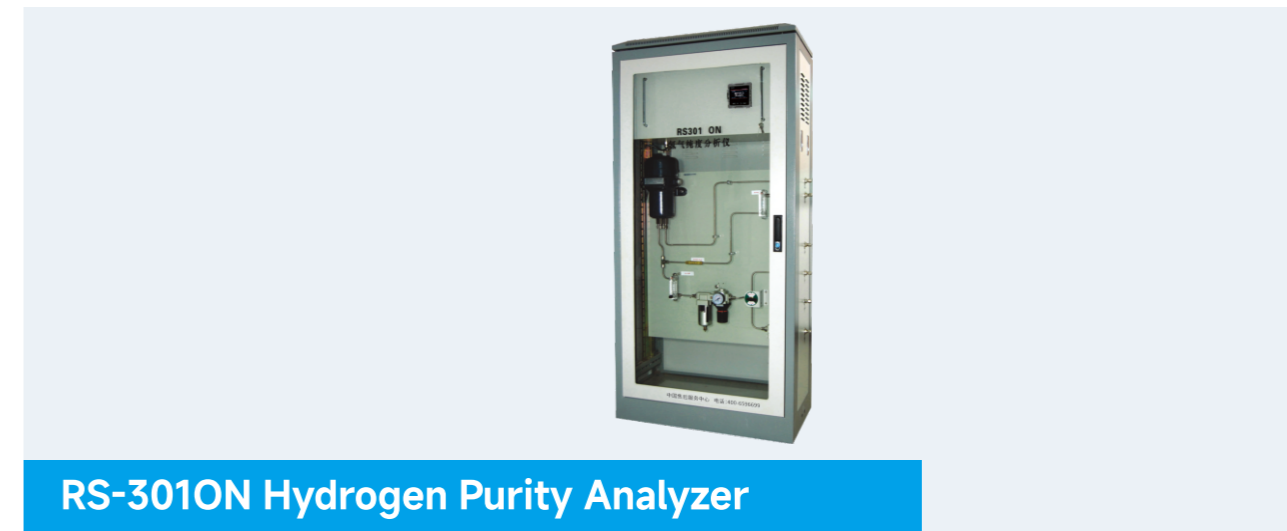
The 7866+7872D (Analyzer + Sampling System) Hydrogen Purity Analyzer uses a reliable and stable thermal conductivity principle sensor from Honeywell, a US company. It offers highly sensitive and accurate analysis of two - phase gases. It is specifically designed for monitoring the hydrogen purity in generators and the gas purity during the generator gas replacement process, and is widely used in power plants.

Features

- It is the designated supporting product of the generator factory.
- It has a wide range of temperature compensation and an explosion-proof sensing unit.
- It has an accurate sampling system, which is convenient for on-site calibration.
- It has the unique automatic sewage discharge technology and a safety bypass function.

Technical Parameters

Parameter Name	Parameter Value
Output range	(0~100) % CO ₂ in AIR; (0~100) % H ₂ in CO ₂ ; (75~100) % H ₂ in AIR
Accuracy	±2%F.S
Response time	H ₂ :63%:13s;90%:23s CO ₂ : 63%:24s;90%:45s
Output range	(4~20) mA , The maximum load is 800 Ω.
Sample gas flow rate	0.5 SCFH (1 SCFH≈ 500 ml/ min)
Explosion-proof rating	Eex dIIC T 6
Size	800mm×400mm×1660mm(L×W×H)
Weight	131kg



RS-301ON Hydrogen Purity Analyzer

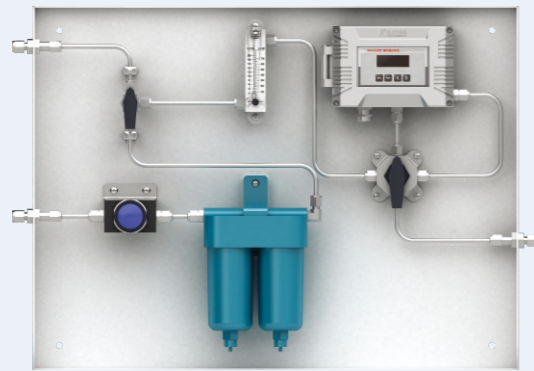
The RS-301ON Hydrogen Purity Analyzer is specifically developed to meet the actual needs of hydrogen-cooled generator sets. It determines the gas content by using the thermal conductivity principle. Its unique temperature-compensated thermal conductivity cell ensures the stability and accuracy of the instrument. The user-friendly operation interface enables users to operate and use it conveniently and without any obstacles. The hydrogen sampling device supporting the analyzer can effectively filter out the oil stains and moisture in the hydrogen, thus providing good protection for the transmitter and enabling the instrument to continuously monitor the purity of hydrogen in a long-term, stable and accurate manner.

Features

- The designated supporting product for generator manufacturers.
- It incorporates high - performance sensor technology introduced from Honeywell in the United States.
- It is equipped with a wide - range temperature compensation and explosion - proof sensing unit.
- It has an accurate sampling system, which facilitates on - site calibration.
- It features a unique automatic sewage discharge technology and a safety bypass function.

Technical Parameters

Parameter Name	Parameter Value
Output range	CO ₂ in the air: (0 ~ 100) CO ₂ in H ₂ : (0 ~ 100)% H ₂ in the air: (90~100)%
Accuracy	± 2 %F.S
Output range	(4~20)mA Maximum load: 800 Ω
Alarm relay	Contact current: 3 A
Sample gas flow rate	< 0.5 SCFH
Sampling pressure	≤ 0.1 MPa
Input voltage	AC (90~265) V, 50 Hz, power 35 W
Explosion-proof grade	Ex dIIC T 6 Gb
Size	800 mm×400 mm×1660 mm (L×W×H)
Weight	130 kg



RA1630B Oxygen Analyzer for Hydrogen

Some data shows that when the purity of hydrogen decreases by 1%, the loss increases by 11%. Therefore, increasing the purity of hydrogen means reducing the production cost. A decrease in hydrogen purity and an increase in air (mainly oxygen, nitrogen, carbon dioxide, etc.) will also pose potential hazards to the safe operation of the generator. The explosion conditions of hydrogen: When the volume content in the air is between 4.1% and 74.2% (mainly a mixture of hydrogen and oxygen), it will explode when encountering a source of ignition. The RA1630B realizes real-time monitoring of the oxygen content in the hydrogen of the hydrogen-cooled unit of the generator, effectively ensuring the safe operation of the equipment.

Features

- Intrinsically safe explosion-proof sensing unit;
- High measurement accuracy, strong anti-interference ability, and fast response speed;
- Automatic sewage discharge device;
- Realize on-site calibration;
- Sensor protection technology.

Technical Parameters

Parameter Name	Parameter Value
Measuring range	(0~2)%O ₂
Precision	± 0.03 %
Repeatability	±0.01%
Response time	20s
Analog output	(4~20) mA, maximum load 800 Ω
Working power supply	24 VDC or 220 VAC
Alarm output	DC 24 V, 1 A (Two alarm outputs, which can be programmed independently)
Explosion-proof level	Ex iaIICT 4 Ga



RS301ON-III Hydrogen Quality Analyzer

The RS301ON-II Hydrogen Quality Analyzer adopts an imported high-precision transmitter to monitor the comprehensive quality of hydrogen during the operation of the hydrogen cooling system of the generator set. It integrates the monitoring of hydrogen humidity, purity, and oxygen content, enabling online monitoring. It also has an alarm output function and a remote transmission function of analog signals (4~20) mA.

Features

- The electrical part and the sensing unit adopt an integrated explosion-proof design.
- Human-machine interaction: Explosion-proof treatment keys are used.
- An oil filtration device is installed to prevent the sensing unit from being contaminated by oil.
- It is monitored by a hydrogen purity meter under pressure in a dual-mode, improving the reliability of the data.
- The monitoring of hydrogen residue ensures the safety of the unit during maintenance.
- The explosion-proof unit can be installed independently or equipped with a sampling rack.
- The hydrogen purity and humidity are measured under pressure, reducing the hydrogen waste caused by the measurement of the emptied gas.

Technical Parameters

Parameter Name	Purity	Humidity TD	Oxygen (O ₂)	Hydrogen Residual Quantity
Detection Principle	Micro-thermal conductivity	Resistance-capacitance	Electrochemistry	Catalytic combustion
Detection Range	H ₂ /Air(90~100)%	(-80~20)°C	(0~25)%	(0~4)%Vol
	CO ₂ /H ₂ (0~100)%			
	CO ₂ /Air(0~100)%			
Maximum Allowable Error	±2%F.S	±2°C	±1%F.S	±5%F.S
Explosion-proof rating	Exd II B +H2 T5 Gb			Exd II C T6 Gb



NA1000MS Multi-channel Hydrogen Leakage Monitoring System

The NA1000MS multi-channel hydrogen leakage monitoring system is composed of the NA1000MR multi-channel alarm controller and the NA1000DII hydrogen monitoring transmitter. It is used to monitor the hydrogen content within the lower explosion limit of the hydrogen-cooled generator set. It can carry up to 16 transmitters for centralized control of multiple points. This system adopts high-performance transmitters, which are powered by the monitoring host. The gas concentration signal is converted into an electrical signal and sent to the monitoring host. The large-screen LCD color screen directly displays the hydrogen concentrations of multiple channels and the alarm situations. When the hydrogen concentration reaches the preset alarm value, the system will send out an alarm signal to remind users to take safety measures as early as possible, thus ensuring safe production.

Features

- According to the locations of different measuring points on site, sampling systems are designed specifically for the neutral point of the generator's enclosed busbar, the oil return system at the turbine-excitation end, the internal cooling water tank and other places.
- The transmitter adopts a full-metal explosion-proof housing, which complies with the explosion-proof rating of Exial CT4 Ga.
- The transmitter is more convenient to disassemble. When maintaining it, only the core components need to be replaced.

Technical Parameters

Measurement parameters of NA1000DII hydrogen monitoring transmitter

Parameter Name	Parameter Value
Detection range	(0~4)%(0~100)%LEL
Degree of accuracy	± 2 %F.S
Sampling method	Natural diffusion
Ambient temperature	(-10~50)°C
Ambient humidity	(0 ~98)%RH
Explosion-proof rating	Exia II CT 4 Ga
Operating voltage	24 VDC, power < 1W

Measurement Parameters of NA1000MR Multi-channel Alarm Controller

Parameter Name	Parameter Value
Display screen	TFT256 Color (LCD)
Input type	Channels (1 to 8): Two-wire system, (4 to 20) mA transmitters (up to 16 channels)
Voltage power consumption	24V; ≤ 0.48 W
Connection method	2-core shielded cable
Output type	Current output of 4mA to 20mA for channels 1 to 8 (up to 16 channels in total)
Output Impedance	< 750 ohm
Contact mode	Normally open
Output mode	Alarm for each of the (1 to 16) individual channels, and one alarm for the total circuit.
DC(Direct Current) voltage	1A, 30VDC or 1A, 250VAC
Alarm storage	8,000 pieces of alarm information
Operating voltage	210 VAC~230 VAC、50/60 Hz
Installation method	Wall-mounted
Size	440 mm×330 mm×130 mm(L×W×H)
Weight	9.5 kg



Online Hydrogen Leakage Monitoring Device for Inner Cooling Water Tank

The NA1000JA/S hydrogen leakage sampling device is an advanced online monitoring equipment that can accurately measure the hydrogen leakage and hydrogen content in the inner cooling water tank, and also has the function of hydrogen removal. This device consists of the NA1000MR multi-channel alarm controller, NA1000A gas detection alarm instrument, remote gas flow meter, and hydrogen removal system. The NA1000A monitors the real-time concentration of H₂ in the inner cooling water tank, and the gas flow meter collects the flow data of the exhaust gas in the water tank. Then, the data from both are uploaded to the NA1000MR multi-channel alarm controller. The NA1000MR multi-channel alarm controller calculates the hydrogen leakage amount through a precise integration algorithm, displays the real-time hydrogen concentration in the water tank, daily hydrogen leakage amount, and daily exhaust volume, and provides data storage and query for hydrogen leakage amount, as well as upload of concentration alarm signals.

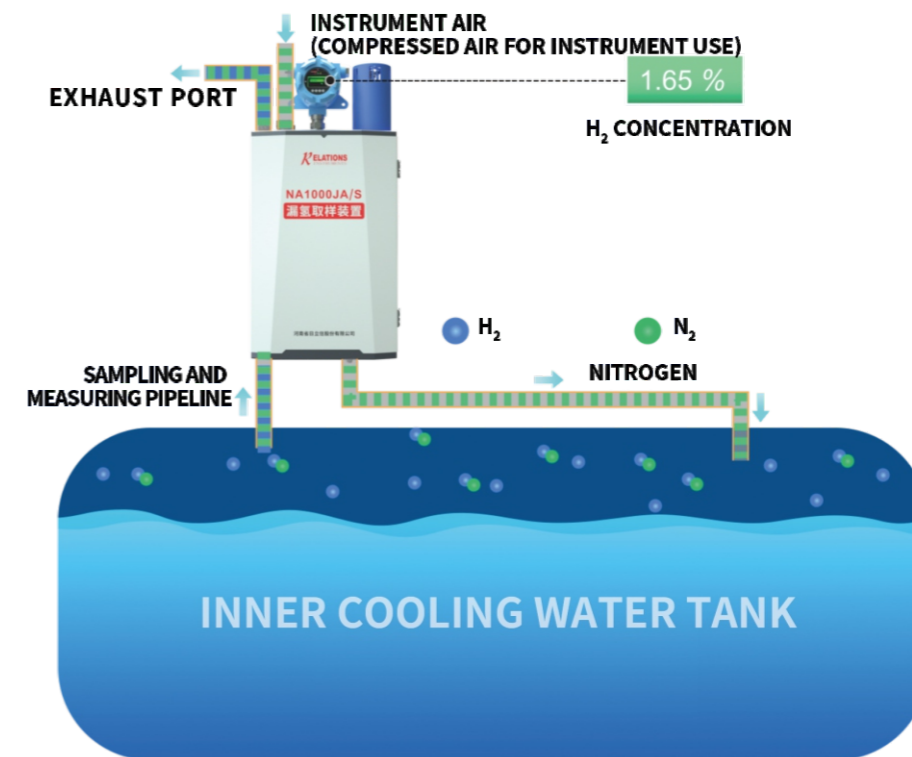
Functional Features

- The system can monitor high - concentration hydrogen, with a measuring range of (0-20)%;
- The system can collect and display the concentration data of the gas sensing unit in real - time, and display the daily hydrogen leakage and the cumulative gas discharge volume since the installation of the daily gas discharge volume instrument;
- Monitor the real - time concentration. When the H₂ concentration reaches 2% and 10%, an alarm will be issued. When the hydrogen leakage in the inner cooling water tank reaches 0.3m³ and 5m³ per day, an alarm will be issued;
- Historical data can be viewed, including the daily hydrogen leakage, and the hydrogen leakage within a certain month or certain days of a certain year;
- The data is uploaded to the DCS system, including the real - time concentration and leakage;
- The built - in nitrogen - making and hydrogen - removing system eliminates the hidden danger of hydrogen leakage.

Technical Parameters

Parameter Name	Parameter Value
Operating Voltage	12 VDC
Inlet Pressure	(0.4~0.6) MPa
Nitrogen - making Flow Rate	0.5~1L/min
Output Mode	RS-485
Ambient Humidity	(0~85)%RH
Ambient Temperature	(-10~+50)°C
Dimensions	505mm×320mm×130mm(L×W×H)
Weight	15kg

Installation Schematic Diagram





NA1000MS Gas Online Monitoring System

The NA1000MS gas online monitoring system is composed of the NA1000MR multi - channel alarm controller and the NA1000A gas detection alarm instrument. It is used to monitor the content of specific gases in ambient air. This system can be equipped with multiple detection probes for centralized control of multiple points simultaneously. The sensing unit of the NA1000A gas detection alarm instrument collects gas in the environment, especially the ammonia content in the indoor environment, through natural diffusion. After being processed by the detector, the sampling signal can not only be displayed locally, but also transmitted and driven remotely in the form of 4mA - 20mA current signals, RS485 communication signals and switch alarm signals.

Features

- Two optional power - supply methods: centralized bus - type and independent regional - type;
- High and low two - level concentration alarms for real - time gas monitoring;
- Highly sensitive anti - toxic gas sensors, automatically correcting the sensor aging curve to maintain constant alarm sensitivity;
- Automatic sensor fault identification function and high - concentration gas over - limit function for sensors;
- Power - on automatic detection function, with advanced self - diagnosis and self - repair functions, and the standard concentration value is adjustable for users to set by themselves;
- When the sensor loses its monitoring and alarm function due to aging, the detector can automatically identify and alarm, effectively avoiding false negatives.

Technical Parameters

Measurement Parameters of NA1000MR Multi - channel Alarm Controller

Parameter Name	Parameter Value
Display Color	TFT256 color
Input Type	(1-8) two-wire or three-wire (4-20)mA transmitters (expandable to 16 channels)
Uncertainty	<±0.1%F.S
Input Impedance	120 ohm
Connection Mode	12-core shielded cable
Transmission Interface	RS-485 bus, 4mA - 20mA

Connection Mode	Dual - core shielded cable bus type
Contact Mode	Normally open
Output Mode	(1 - 16) channel - by - channel alarm, 1 channel overall alarm
DC Voltage	1A、30V DC
AC Voltage	1A、250VAC
Alarm Storage	8000 alarm messages
Operating Voltage	(210~230) V DC、50/60Hz
Ambient Temperature	(-30~60) °C
Ambient Humidity	(0~85) %
Installation Method	Wall - mounted
Dimensions	395mm×390mm×130mm(L×W×H)

Measurement Parameters of NA1000A Gas Detection Alarm Instrument

Parameter Name	Parameter Value
Measured Gases	Ammonia, methane, liquefied gas, coal gas, alcohol, xylene, gasoline and other flammable gases, as well as toxic and harmful gases such as oxygen and carbon monoxide. The specific detected gases can be customized according to requirements.
Measurement Accuracy	±5%F.S
Repeatability	2%
Measuring Range	(0 - 100)ppm. Specific parameters are set according to the gas type.
Low Alarm Setting Range	(20~30) ppm
High Alarm Setting Range	(30~70) ppm
Low Alarm Point	25 ppm
High Alarm Point	50 ppm
Response Time	<30s
Sampling Method	Natural diffusion
Ambient Temperature	(-30~60)°C
Ambient Humidity	Below 85% (no condensation)
Remote Control Method	Infrared remote-control adjustment
Explosion - proof Grade	Exd II CT 6Gb
Protection Grade	IP66
Input Voltage	24VDC±25%; power 2W/channel
Communication Description	Two - wire serial RS - 485 interface, connected with shielded twisted - pair wires
Cable Used	≥0.75mm ² ×4 shielded cable



RA242J Online Precision Dew - point Meter

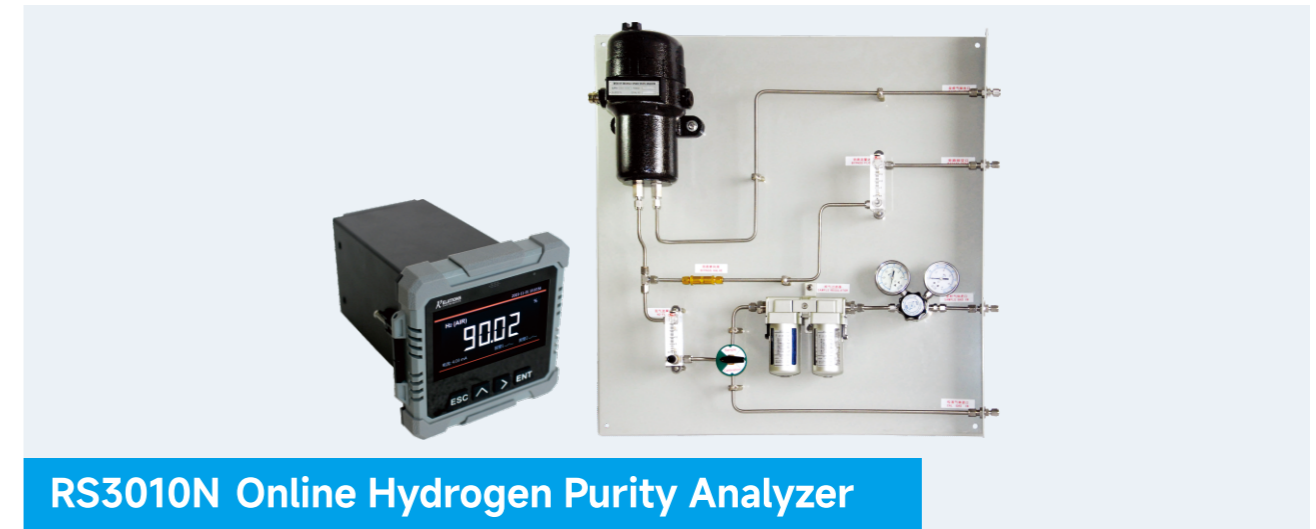
Based on a microprocessor, the RA242J utilizes advanced technologies such as the patented Drycap polyester - film sensor and automatic calibration function. It is also equipped with a precision sample gas sampling system and an intelligent digital processing, display and control unit. It features long - term high stability, a wide measuring range and rapid response. Moreover, it is resistant to condensation and dust particles, and is unaffected by oil vapor and most chemical gases, making it an ideal instrument for measurements in dry environments.

Features

- Anti - condensation, long - term stable and reliable in low - temperature dew - point measurement;
- High - pressure resistance, with temperature compensation function;
- Rapid response, simple operation, and low maintenance;
- Large - screen display with touch - screen operation.

Technical Parameters

Parameter Name	Parameter Value
Dew - point Range	(-80 ~+ 20) °C
Accuracy	Better than +1°C
Repeatability	±1°C
Analog Output	(4~20) mA
Sensor Protection	Stainless steel sintered filter
Shell Protection Grade	IP65(NEMA4)
Temperature	(-20~ 60) °C
Relative Humidity	(0~100)%RH
Pressure	(0~40)Mpa
Sample Gas Flow Rate	No influence
Power Supply Mode	AC 220 V
Explosion - proof Grade	ExdIICT 6 Gb
Weight	7.5 kg
Installation Method of Control Unit	Panel - mounted on the control cabinet, opening size: 92mm×92mm
Installation Method of Sampling System	Wall - mounted on - site, external dimensions: 500mm×400mm×70mm



RS3010N Online Hydrogen Purity Analyzer

RS3010N Online Hydrogen Purity Analyzer uses explosion-proof sensors, ensuring the sensors can work reliably even in harsh environments. The sensing components include two parts: sensor components and circuit components.

Features

- Dedicated sampling system with unique acid-base pretreatment device;
- LCD display with Chinese menu prompts.

Technical Parameters

Parameter Name	Parameter Value
Measuring Range	(90~100)% H ₂ (Air)
Accuracy	±2%F.S
Output Range	4-20 mA (corresponding to H ₂ in air: 90% - 100%) (maximum load 800Ω)
Alarm Relay	Contact current: 3A
Sample Gas Flow Rate	0.5 SCFH~1.0 SCFH(1SCFH≈ 500 ml/ min)
Sampling Pressure	(0~0.8)Mpa
Relative Humidity	90%RH (maximum)
Operating Temperature	(-10~+60)°C
Input Voltage	AC 220V, power 35W
Explosion-proof Grade	Ex d IIC T 6 Gb
Weight	50 kg
Installation Method of Control Unit	Panel - mounted on the control cabinet, opening size: 92mm×92mm
Installation Method of Sampling System	Wall - mounted on - site, external dimensions: 780mm×760mm×180mm

*Other Instructions

The pre - assembled sampling system is developed specifically for hydrogen station applications. This system includes a single - range RS3010N thermal conductivity analyzer and some other required components installed on a steel plate, which needs to be ordered separately.



RA1630 Online Oxygen Analyzer in Hydrogen

The RA1630 online oxygen analyzer in hydrogen represents the latest technology in oxygen measurement. It uses imported high-sensitivity electrochemical sensors. The intrinsically safe probe has the properties of high precision and resistance to corrosion by weak acids and weak alkalis. Therefore, it can be used for the measurement of oxygen content in many fields and is widely applied in hydrogen production stations of power plants and the detection of industrial oxygen content.

Functional Features

- Explosion-proof and intrinsically safe sensing units;
- High measurement accuracy, interference resistance, and fast response speed;
- Displayed on an LCD screen and operated with a Chinese menu;
- A dedicated acid-base pretreatment sampling system.

Technical parameters

Parameter Name	Parameter Value
Measuring Range	(0~2) %
Accuracy	±0.03%
Repeatability	±0.01%
Response Time	20s
Analog Output	4-20mA (maximum load 800 ohms)
Alarm Output	DC 24V 1A (two - way alarm output, independently programmable)
Operating Temperature	(-10~ 40) °C
Protection Level	NEM 4X,IP 66
Protection Level	Exia II CT 6 Ga
Installation Method of Control Unit	Mounted on the control cabinet in panel - mounting mode, opening size: 92mm×92mm
Installation Method of Sampling System	Wall-mounted on-site, external dimensions 600mm×450mm×120mm(L×W×H)



RA601 Hydrogen comprehensive analyzer

RA601 hydrogen comprehensive analyzer is a hydrogen analyzer designed in accordance with ergonomics. It is small and lightweight, with soft rubber on the back, making it more convenient and comfortable to carry. We strive to achieve the best in every detail to achieve the best user experience. It has functions such as large capacity data storage and USB interface, startup self-detection status abnormal reminder, charging indication, etc. Soft on/off design to avoid mis-operation. Simultaneously introducing MEMS technology, while reducing volume and weight, results in faster response speed and more accurate measurements.

RA601 hydrogen comprehensive analyzer is mainly used for measuring the purity, humidity, oxygen content of hydrogen during the normal operation of hydrogen production stations, hydrogen refueling stations, and hydrogen cooled generator units, as well as the carbon dioxide and oxygen content in the gas replacement process

Features

- Environmental pressure measurement, hydrogen pressure input, automatic conversion of humidity and pressure.
- Built in humidity drying protection device, self-calibration.
- Comparable to A4 paper size, reducing overall volume and weight.

Technical parameters

Parameter	H ₂ in O ₂	Dew point	O ₂ in H ₂
Principle	Thermal conductivity	Resistance capacitance	Electrochemistry
Range	(0~5)%	(-80 ~ 20)°C	(0~2)%
Error	2%F.S	2°C	1%F.S
Response time	≤ 40s	≤ 2min	< 60s
Power	AC/DC dual purpose, built-in lithium battery (6000mAh)>8 hours		
Dimension	242mm×282mm×104mm(L×W×H)		
Weight	4kg		



NA -8 Gas Detection Alarm

The NA-8 gas detection and alarm instrument is a device specifically designed for high-position detection of H₂. It uses a highly sensitive sensor, and the front end of the instrument is equipped with a retractable probe rod with a length of 6 meters. When held up by the staff, it can detect positions up to 8 meters high. This instrument can detect parts such as the H₂ coolers of generators, H₂ dryers, circulating fans, oil-water detectors, and the pipeline joints of the H₂ system that are out of reach for ordinary H₂ leakage detectors.

Features

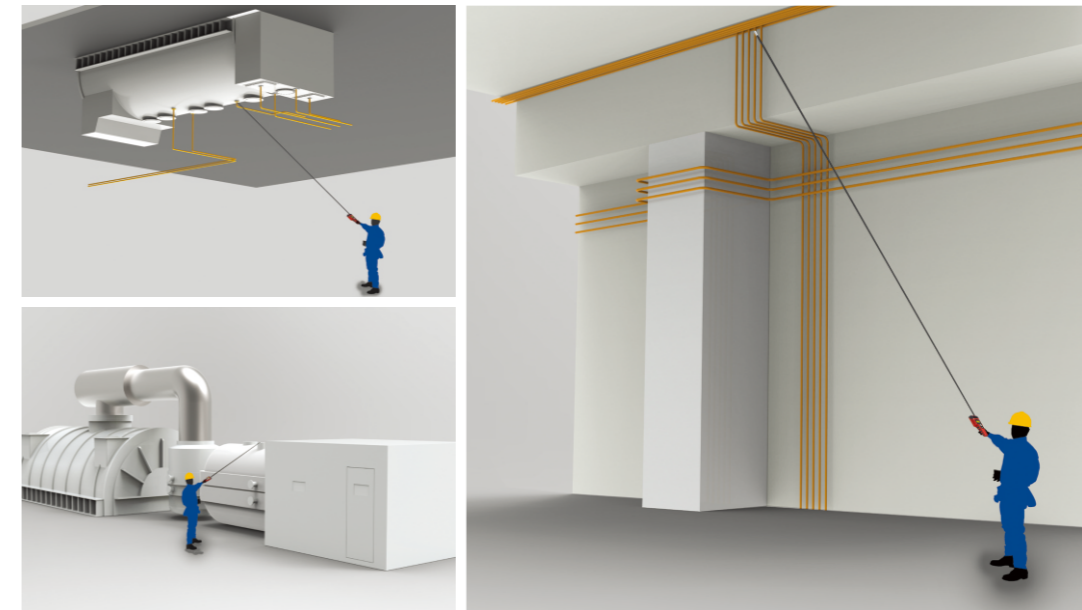
- It adopts a high - performance catalytic combustion sensor, featuring fast response, high measurement accuracy, and long service life.
 - It is equipped with a retractable probe rod, which can detect flanges, interfaces, etc. of the H₂ system at a height of 8 meters.
 - The instrument uses an OLED display. It is self - luminous, with low power consumption, high brightness, and no viewing - angle problem.
 - The concentration of the standard gas is adjustable, which is convenient for users to calibrate. The measurement data can be automatically or manually stored across the entire measuring range, and there is a retrieval and viewing function.
 - It has an over - range self - protection function, which effectively protects the sensor. The measurement data can be automatically or manually stored, and the retrieval and viewing function is available as an option.
- The whole instrument is lightweight, weighing less than 1 kg.

Technical Parameters

Parameter Name	Parameter Value
Detected Gas	Hydrogen(H ₂)
Range	(0~100) %LEL
High and Low Alarm Range	Low alarm: (10 - 25) %LEL; High alarm: (25 - 80) %LEL
Detection Method	Diffusion type
Measurement Principle	Catalytic combustion principle
Response Time(T ₉₀)	<30s
Detection Error	≤±5%F.S

Operation Mode	Touch buttons
Display Mode	OLED self - emitting display
Operating Temperature	(-20~55)°C
Ambient Humidity	(0 - 95) % Relative Humidity (no condensation)
Storage Temperature	(0 ~40) °C
Power	Powered by a rechargeable lithium-ion battery and can work continuously for >16h
Battery	3.7V lithium - ion battery with a capacity of 2200 mAh
Explosion - proof rating	Exia II CT 3 Ga
Calibration method	Calibration caps are optional, which are used for on - site calibration.
Weight	<1kg
Specifications	125 mm×66 mm×42 mm (L×W×H)

Application Cases





NA - 1+ Handheld Hydrogen Leak Detector

NA - 1+ Handheld Hydrogen Leak Detector is a hydrogen leak detection product specially developed by Henan Relations. Mainly used for hydrogen generation stations, hydrogen refueling stations, fuel cell system production workshops, hydrogen testing laboratories, and other occasions. This product adopts a dual sensor detection mode, which combines the multi range leak detection function of "small range high sensitivity" and "large range high accuracy", fully meeting the user's "one meter universal testing" needs.

This product has the advantages of high sensitivity, fast response speed, safety and reliability. Its core components combine advanced micro detection technology and intelligent algorithm technology, directly converting the hydrogen gas content in the environment into concentration values for quantitative display, making it easy for users to detect hydrogen leakage points under various complex working conditions.

Features

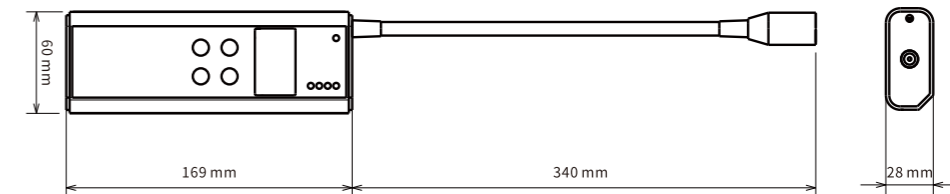
- Automatic zero correction.
- Peak detection function.
- Data storage function.
- Quick response and quick reset.
- Large capacity lithium battery power supply, battery level detection, and undervoltage prompt function.
- Adopting dual sensors, it can measure ppm level trace amounts and hydrogen leakage within the minimum explosion limit, with automatic measurement conversion.
- Segment code LCD display, auxiliary alarm threshold LED display (10ppm, 100ppm, 1000ppm, 1% vol).
- There are two alarm modes: sound and light, which can be manually silenced and emit different frequency alarm sounds under different alarm conditions.
- User password can be modified for easy operation and protection.

Technical parameters

Parameter name	Parameter value
Gas	Hydrogen
Measuring range	(0~1000)ppm;(0.1~4)%Vol
Display mode	LCD
Sampling method	Pump suction (flow: 200ml/min)

Operation method	Button
Pre-heating time	<60s
Response time	<2s
Resolution	1ppm
Error	30%@(0-1000)ppm; 5%F.S@(0.1-4)%vol
Working temperature	(-20~55)°C
Working humidity	(20~80)%RH(Non-condensation)
Storage temperature	(-20~60)°C
Battery	lithium battery (3.6~4.2)V
Standby time	≤6h
Charger	Input:(100~240)VAC,50/60Hz,0.2A;Output:5.0V400 mA
Dimension	169mm×60mm×28mm(L×W×H)
Weight	About 400g
Explosion proof	ExibICT3 Gb

Dimension: (Unit: mm)



Application

Suitable for hydrogen generation stations, refueling stations, fuel cell system production workshops, hydrogen energy bus companies, hydrogen testing laboratories, and other occasions.



Refueling station



Hydrogen bus



Fuel cell system

SF₆ Gas Recovery and Treatment Service

In order to better provide users with professional, timely and comprehensive SF₆ gas recovery and purification services, Henan Relations Co., Ltd. has put forward the concept of third-party risk-bearing service for the first time, established an SF₆ service center, and equipped it with sophisticated and standardized gas treatment equipment as well as a professional service team.

Our on-site service personnel have undergone professional training and possess the qualification certificates required for taking up their positions.

- **Professional recycling technology:** Ensures the quality of recycled SF₆ gas for reuse, and saves the cost of purchasing new gas.
 - **On-site one-stop service of recycling, purification and refilling:** Shortens the on-site maintenance time.
 - **Professional recycling equipment and team:** Reduces the capital investment of users in recycling equipment and operators.
- Mobile service:** Complies with the IEC-standard on-site recycling process, and there is no need to build a factory building, thus saving land resources.
- Rapid response:** Effectively prevents the random emission of SF₆ gas, protecting the environment and personal

The Construction of the Service Center

Taking provincial capital cities as key areas, an SF₆ service network covering the whole country will be formed to provide users with fast and convenient services.

Service mode

Outsourced Contracting Service

Province-wide: Base processing, management work, gas distribution, etc., on-site recycling, vacuum pumping, refilling, charging training, and maintenance.

Equipment Rental

The service center is responsible for the technical training of the equipment, and the renting unit shall complete the operation and daily maintenance work.

Entrusted Service

The service center is responsible for all recycling work, and the entrusting unit shall conduct supervision and necessary coordination.

Equipment Purchase

The service center provides technical training for the buyer and offers lifetime maintenance of the equipment.

On-site Centralized Treatment

For customers with a large backlog of exhausted gas in stock, the service station can achieve on-site centralized purification treatment to meet the standards for reuse.

Gas Delivery for Centralized Treatment

Customers send the exhausted gas to the nearest service station, and after centralized purification treatment, the gas will be returned to the customers.

Trade-in (Providing Qualified Recirculated Gas)

According to their needs, customers can exchange an equal amount of qualified gas from the service station with the old gas.

Emergency Service

Cooperate with customers to carry out on-site emergency treatment.

Service Effect



Case of On-site Service



The Service Site of the 1000kV UHV Zhenan Substation of State Grid



The service site of the 800kV Pu'er Converter Station of China Southern Power Grid EHV Transmission Company



The service site of the 750kV Huanghe Substation of Ningxia Electric Power Company



The service site of the 750kV Shahu Substation project in Ningxia



The service site of the 330kV Huangling Substation in Shaanxi



The service site of the Three Gorges Dam Hydropower Station in Yichang



The service site of the Chaidamu Converter Station



The service site of the 500kV Donggang Substation in Xiamen



The service site of the 500kV Tongxiang Substation in Zhejiang Province

Metrology and Testing Services

Henan Relations Metrology and Testing Co., Ltd. is a wholly-owned subsidiary established by the investment of Henan Relations Co., Ltd. Henan Relations Co., Ltd. has invested more than 10 million yuan. The company has established the quality management system of this laboratory in strict accordance with the requirements of ISO/IEC17025, CANS-CL01 accreditation criteria and related application criteria. It is a professional metrology and testing company accredited by CNAS and CMA.

Henan Relations Metrology and Testing Co., Ltd. is committed to providing professional and efficient calibration and maintenance of instruments and meters for the power industry, as well as the testing of water, coal, oil and gas. According to your needs, it can provide a variety of customized services such as on-site calibration, on-site testing, on-site disassembly and installation, etc.

Service Mode

- **Submission Inspection Service**

The instruments that need calibration should be mailed to our company. After the calibration is completed, they will be mailed back to the designated location.

- **On-site Calibration Service**

For the instruments that need on-site calibration, we can provide services such as on-site disassembly, installation, maintenance and calibration.

- **Customer Package Service**

We will sign multi-year service contracts with customers who have calibration needs, and provide one-stop metrology services, which saves time, worry and effort.

Calibration and Testing Business Areas

- Chemistry
- Thermology
- Mechanics
- Power Transformer Oil
- Sulfur Hexafluoride Gas



Metrology Certificate



On-site Maintenance Service

In order to ensure the installation rate, commissioning rate and accuracy rate of analytical instruments, and to make the operation of analytical instruments normalized, safe, guaranteed and informatized, so as to provide data guarantee for the safety of power plant equipment. Henan Relations Co., Ltd. provides the on-site (in-plant) service of professional instrument technicians.



Service Scope

- **Water Quality Chemical Analysis Instruments**
Water quality analysis instruments such as steam-water sampling racks, chemical water treatment equipment,
- **condensate polishing treatment wastewater monitoring instruments, desulfurization water quality monitoring instruments, reclaimed water monitoring instruments, etc.**
- **Hydrogen Analysis Instruments**
Including hydrogen analysis instruments in hydrogen production stations and generators.
SF₆ Recycling Base
Equipment maintenance and full life cycle management of SF₆ gas