



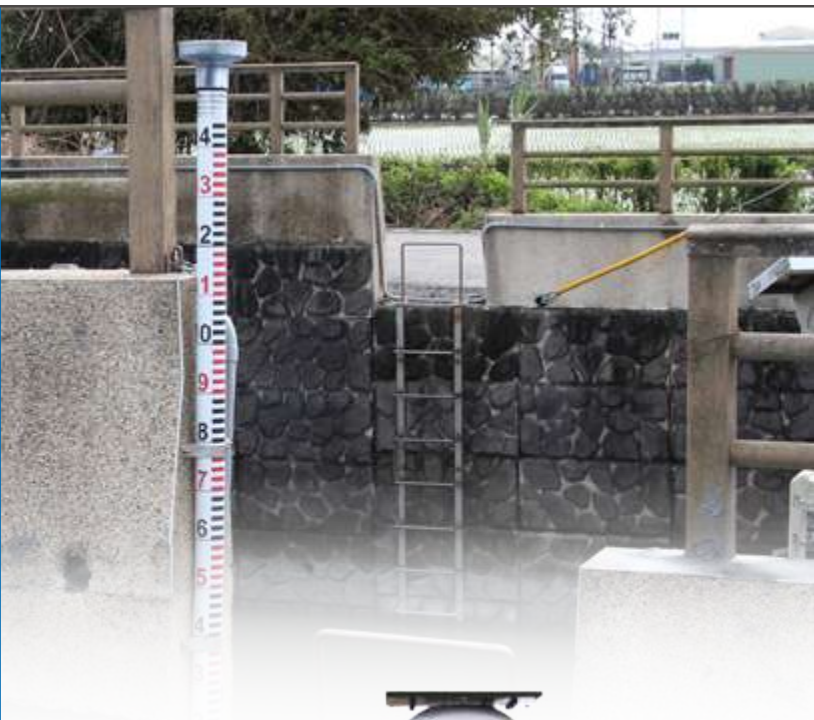
**AQUAS**  
Simple. Reliable. Intelligent.

# ROD

## Flooding Level Logger

- Level
- Rainfall
- Weather

Battery Powered . Cellular Communication .  
All-in-One Solution . Explosive Proof .



ISO9001  
Certification



With the headquarter based in Neihu Technology Park, Taipei, Taiwan, AQUAS Inc provides core technology and international marketing strategies. Supported by our own R&D department, we specialize in manufacturing advanced water quality analyzers, open channel flow meters, multiparameter loggers and controllers, etc. We support various kinds of applications such as flood precaution, sewer, drinking water, effluent, wastewater plant monitoring, surface water, ground water, water use in construction, and more intelligent water management and solution. Most of the AQUAS's products have received patents, and the related technologies are in the leading position in the world. Our products are famous as accurate, reliable, and easy to use. After more than 20 years of research and development, tens of thousands of AQUAS Online water monitoring systems have been successfully installed in cities around the world. AQUAS has been the market leader in the world in technologies such as optical water quality analyzer, radar ow meter and level meter, mobile communication, battery power supply and solid technics on robust SGS IP68 submersible enclosure. AQUAS has distributors in more than 60 countries around the world. Each of our employees will provide customers with the most efficient and high-quality services with their continuous efforts and strong faith.

The ROD series is a reliable and high performance flooding level logger. It is easily deployed across a wide range of flooding areas, such as street, tunnel, underpass, airport, etc. It supports built-in level, I/O module, cellular, barometer and RS485 modules. Ultra low power consumption allows battery or solar power to ensure 5 years of continuous operation. With robust IP68 water submersible enclosure, the product is designed for frequently flooding underground chamber, harsh temperature and humidity outdoor environment.

## Advantages



- Rugged 2" design, perfect for road mounted installation
- Ultra Low Power Consumption, up to 5 Years of Operation on Internal Battery
- Robust IP68 Water Submersible, Anti-Corrosive Enclosure
- Real-time Detects Level Status and Auto Push Flooding Notification
- Built-in High Speed Counters to Connect Rainfall Gauge to Log and Upload Data
- Auto Flash Warning Light
- Plug and Play Sensors Port, Auto Connects up to 4 Level, Flow and Weather Sensors
- Auto Delivery Incomplete Uploads to Ensure No Data Loss
- Peer to Peer Communication of Sensors and I/O for Alarm and Control Conditions of Remote Controllers
- Support FTP, MQTT, RESTful, Modbus TCP Protocols
- Simultaneously Upload Log and Alarm Files to Two Data Servers
- Standard OPC Server Software to Seamlessly Connect SCADA Software and Database
- Remote Data Collection with AQLIB Library for Windows or Linux
- Cloud Based Platform for Configuration, Operation, Monitoring, Alarm, Control and Data Analysis
- Wide Operating Temperature Range: - 40 to 85 °C (- 40 to 185 °F)

## Benefits

Borderless deployment without standard cabin, signal transmitter, communication module, power supply, surge isolation and lightning arrester

Eliminate power/networking/sensor/I/O cabling, software configuration, engineering and infrastructure cost

Seamless connection to public or private network and software solutions

Easy to install, no need for calibration and quick connect within seconds. It is Ideal for mobile operation

Low maintenance and troubleshooting. Minimizes running and operating cost

## Applications



Flooding Location



Under Pass



Tunnel



## All-in-One, Autonomous Operation

- 4G/GPRS five band 800/850/1,700/1,900/2,100 MHz cellular communication
- Satellite communication support global coverage
- WiFi TCP/IP wireless communication
- LoRa wireless communication 902-928 / 863-870 / 470-510 / 915-928 MHz
- Optimized solar power module, solar panel and rechargeable lithium battery for 5 years continuous operation



## Robust and Compact Construction

- IP68 robust water submersible housing
- Operating temperature: -40 to 85 °C
- 1500N tensile strength Kelvar reinforced cable
- Cable built-in vented tube to compensate barometer pressure



## Multiparameter Monitoring, Flexible Communication and Power Selection

- I/O module: 2 digital inputs
- Sensors port: Connect up to 4 SMR digital sensors includes level, rainfall, flow velocity, flow direction, humidity, temperature, wind direction, wind speed, solar radiation, barometer, PM2.5 ....,etc
- Multiple communication selections: cellular, satellite, WiFi, LoRa, RS485
- Power supply: external power, internal battery, solar power and external battery



## High Accuracy and Reliability

- Accuracy of pressure sensor:  $\pm 0.1\%$  FS
- Accuracy of analog input:  $\pm 0.025\%$  FS



## Easy Setup and Installation

- Bluetooth cable-free operation and configuration
- Cellular or WiFi over the air cloud configuration, log data download and firmware update
- Setup operation parameters, monitor system, I/O, sensors, battery voltage and capacity, cellular signal and calibrate sensor via AQCFG software
- Superior high gain antenna ideal used in underground chamber and outdoor environment



## Smart Functions

- Scheduled and alarm communication: data collection, SMS, alarm notification, data upload, setting download, store and forward; accelerate upload frequency while alarming

- Log: periodical, alarm
- Configurable 4 levels alarm and actions including SMS, alarm log
- Peer to peer sensors and I/O communication for auto alarm and control conditions of remote controllers
- Intelligent battery power management and charge/discharge protection
- Forecast of battery operation days and early warning of low battery to avoid unpredicted breakdown



## Auto Data Collection, Cloud Storage, WEB Operation and Monitoring

- Standard Modbus TCP protocol
- Central communication application programming library for field data collection and database integration
- Directly upload CSV format log file to end user FTP server
- Web configuration, operation, monitoring, alarm, control, Google Map display, statistical analysis, trend, bar graph and tabular report functions
- Automatic registration and synchronization of device ID, serial number, alias, location and operation settings
- User input GPS coordinates to integrate with log data
- SQL and MySQL database connection for development software development
- Seamless SCADA software and database connectivity via OPC server
- Anytime and anywhere internet operation and monitoring
- Simultaneously upload data to 2 servers to build up dual database and operation centers



## Security

- Battery is of the type proved to meet the requirements of UN38.3
- Login password access protection
- 256 bits cellular AES encryption to prevent unauthorized access
- Secure cellular communication via virtual private network (VPN)
- Support Transport Layer Security TLS1.2 to authenticate and encrypt data securely when transferred over network

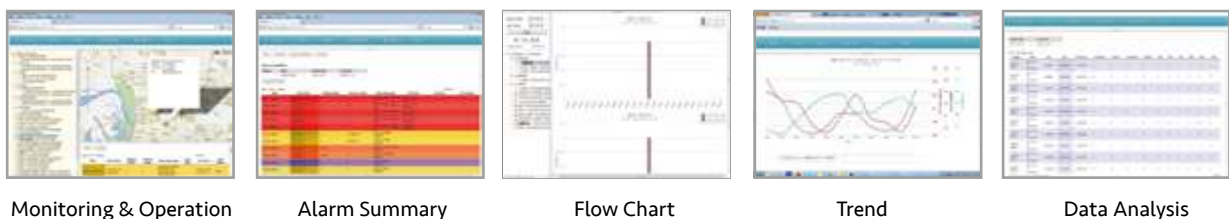
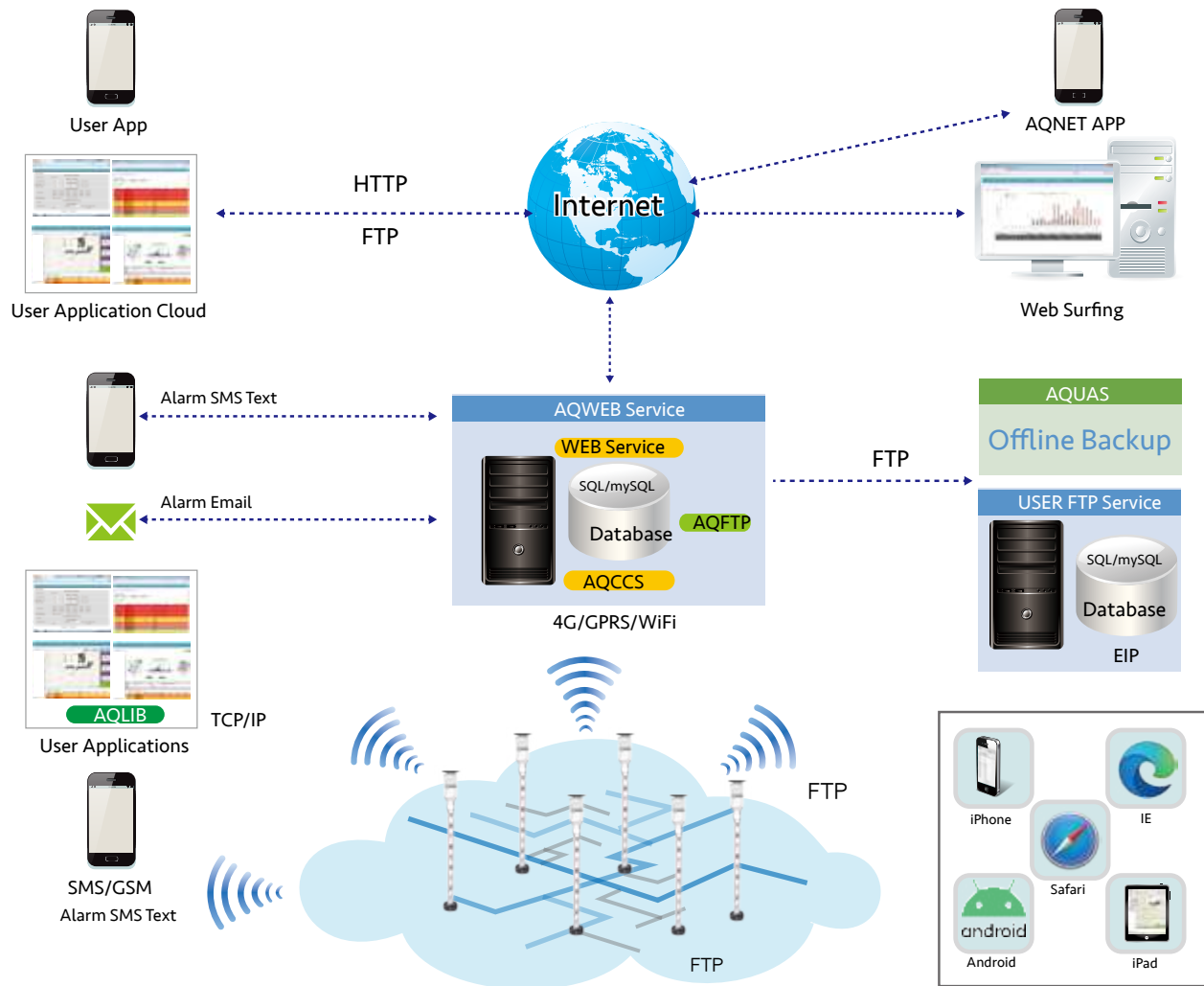
The ROD Series is fully integrated with cellular, satellite, WiFi, LoRa and RS485 communication, providing seamless connections from sensors to public or private network.

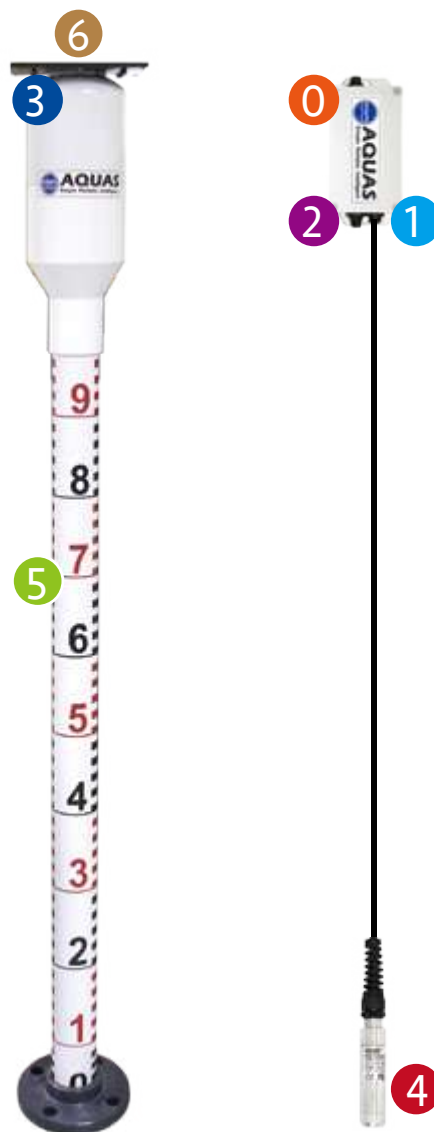
### AQWEB/AQOPC Station

- Notebook with AQCFG software for configuration
- AQWEB WEB Server software for configuration, automatic data acquisition and storage, remote monitoring, alarming, control, Google Earth fusion display, data analysis, transient pressure analysis, time series trend graph and tabular report functions
- Seamless SCADA software and database connectivity via AQOPC OPC server
- Application interface library for developing user customized software

### ROD Flood Level Logger

- Periodically sample sensors and logged with time stamp
- Borderless cellular communication
- Peer to peer communication





**0** Port 0 : System Communication and External Power

- Connect notebook with AQCFG software for System configuration and data upload/ download
- PLC/DCS/HMI Communication
- ▶ External Power
- 5 V DC±10 %, 1 A

**2** Port 2 : I/O Port

- 2 DI

**3** Alarm Lamp

**4** Level Transmitter

**5** Level Pole

**1** Port 1 : Sensors Port

Connect up to 2 SMR digital sensors or MAX multiparameter sonde such as level, temperature, conductivity, pH, dissolved oxygen, turbidity, total suspended solids,...etc.

**6** Solar Panel

- 4.5 W 6.6 VDC 500 mA.



## ► Main Unit

<b>General</b>	
CPU	32 bits
Solide State Memory	non-volatile flash, size: 16 MB ; rotating, no log or setting data loss after power failure
SD Memory	Support SD, SDHC, SDXC, MicroSD, MicroSDHC, MicroSDXC standards
Real-time Clock	crystal controlled calendar clock with leap year adjustment; accuracy: 3 seconds per month; NTP server auto time synchronization, accuracy: 1~3 sec (NTP)
Environment	protection: IP68; operating temperature: -40~85 °C, operating humidity: 0 ~100 % RH
Safety	CE, FCC, NCC
<b>System Communication Port (Port 0)</b>	
Function	System configuration, diagnosis and data upload/download
Data format	115,200 bps
Surge protection	4000 VDC
Protocol	Modbus RTU
<b>Housing</b>	
Material	POM (logger), SS316L (level sensor), PVC (pole)
Pole dimensions	Diameter: Φ 50 mm; Height: 100, 200 cm
Weight	approx.2.4 Kg (200 cm), 1.2 Kg (without pole)
Cable	Kevlar reinforced, PUR cable, 1500N tensile strength

## ► Function

Communication	data transmission; SMS alarm notification; data upload/ download (interval: 5 secs~24 hours); store and forward; FTP file transfer
Log	2000,000 records, rotating store; periodical (1 sec~24 hours); alarm
Alarm	4 level thresholds; alarm action: SMS, alarm log

## ► Power

<b>External Power</b>	
Voltage	Voltage: 5 VDC ±10%, 1A ; Surge protection: 1,500 VDC ; ESD line protection:15 KVDC
<b>Internal Battery (BAT10)</b>	
Non-rechargeable 3.6 V DC 13 AH lithium cell ; Life: 10 years	
<b>Internal Battery (BAT05-1)</b>	
Rechargeable 3.6 V DC 13 AH lithium cell ; Life: minimum 300 times charge/discharge cycles	

## ► Communication

<b>GPRS Module</b>	
Standard	GSM/GPRS
Frquency	700/850/900/1800/1900 MHz
Antenna	dBi (internal); 2 dBi (external)
SIM Card	Micro SIM (12x15 mm) ; eSIM (optional)
Protocol	Proprietary or Modbus TCP
<b>4G Module</b>	
Standard	LTE
Frequency	700/800/850/900/1800/1900/2100/2400/2600 MHz
Antenna	1 dBi (internal); 1~3 dBi (external)
SIM Card	Micro SIM (12x15mm) ; eSIM (optional)
Protocol	Proprietary or Modbus TCP
<b>Ethernet Module</b>	
Standard	802.3
Data rate	10/100 Mbps
Protocol	Proprietary or Modbus TCP
<b>WiFi Module</b>	
Standard	IEEE 802.11b
Data rate	Up to 11 M bps
Frequency	2.412~2.497 GHz
Range	up to 1 Km
Security	WPA/WPA2
Protocol	Proprietary or Modbus TCP
<b>NBLoT Module</b>	
Standard	LPWAN
Frequency	700/800/850/900 MHz
Antenna	1 dBi (internal); 1~3 dBi (external)
SIM Card	Micro SIM (12x15 mm) ; eSIM (optional)
Protocol	Proprietary or Modbus TCP

<b>Satellite Module</b>	
Standard	TNT
Frequency	UL : 1626.5~1660.5 MHz ; DL : 1525~1559 MHz ; UL : 1980~2010 MHz ; DL : 2170~2200MHz ; UL : 2000~2020 MHz ; DL : 2180~2200 MHz
Antenna	1~3 dBi
SIM Card	Micro SIM (12X15 mm) ; eSIM (optional)
Protocol	Proprietary or Modbus TCP
<b>LoRa Module</b>	
Standard	LoRaWAN
Frquency	902~928 /863~870 /470~510 / 915~928 MHz
Data rate	50 Kbps
Distance	up to 10 Km
<b>LoRa Gateway</b>	
Standard	LoRaWAN
Frquency	UL : 1626.5~1660.5 MHz ; DL : 1525~1559 MHz ; UL : 1980~2010 MHz ; DL : 2170~2200MHz ; UL : 2000~2020 MHz ; DL : 2180~2200 MHz
LAN	Ethernet, 10/100 Mbps
Cellular	4G , 700/800/850/900/1,800/1,900/2,100 MHz

<b>► Sensors Port (Port 1)</b>	
Function	Device data collection, connecting up to 4 SMR digital sensors and I/O modules
Interface	RS485, 19,200bps, 8 bits, no parity, 1 stop bit
Surge protection	1,500 VDC
Protocol	Modbus RTU

<b>► I/O Module (Port 2)</b>	
<b>Digital input</b>	
Number of channels	2 counter or state inputs
Type	dry contact single ended input
Maximum operating frequency	100 Hz
Minimum pulse width	2 msec
Surge protection	1,500 VDC

<b>Level Module</b>	
Type	hydrostatic
Measurement range	0~3 m
Accuracy	0.3 cm; 0.1 cm (optional)
Resolution	0.01% FS
Repeatability	±0.025% FS
Communication	RS485, Modbus RTU protocol

<b>Optional</b>	
<b>► Solar Panel</b>	
Type	Multi-crystalline silicon solar cell
Efficiency	20% (1,000w/m <sup>2</sup> , 25 °C )
Max Power (Pmax)	4.5 W (PAN02)
Optimal operating voltage (Vop)	Max. 6.6 VDC ±10%
Optimal operating current (Iop)	Max. 600 mA ±10%
Open circuit voltage (Voc)	6.5 VDC±10%
Short circuit current (Iss)	500 mA±10%
Operating temperature	-40~85 °C
Protection	IP67
Housing	Back - aluminum ; Front - reinforced glass
Dimension	250(W)X178(H)X2.5(D) mm (PAN02)
Weight	0.3 Kg

<b>► Bluetooth Module</b>	
Functions	System configuration, diagnosis and data upload/download
Standard	Bluetooth 4.0
Data rate	Up to 3 Mbps
Frequency	2.412~2.497 GHz
Range	Up to 10 m
Antenna	1 dBi

<b>► Battery Life (*)</b>			
<b>Cellular Communication</b>			
Battery Power	Log	Data Upload	Approximate Battery Life
3.6 V DC, 13 AH (INR)	1 hour	24 hours	2 + Years
3.6 V DC, 13 AH (IR)	1 hour	24 hours	1 + Year
3 W Solar Panel (w 13-AH(IR))	1 min	5 min	1 + Years (**)

\* Depending on the frequency of log, alarm, data upload, type and quantities of I/O modules, transmitters, analyzers, and environmental temperature  
 \*\* Continuously operating up to 14 days without sunlight

## Ordering Codes

### Communication (\*)

GPRS	1
WiFi	2
Satellite	6
4G	7
NBIoT	8
LoRa	9
5G	10

### Power

External Power	0
Internal Battery (Non-rechargeable, 3.6 VDC 13 AH)	1
Internal Battery (Rechargeable, 3.6 VDC 13 AH)	2

### Cable Length

None	000
100	100
200	200
Custom	010~999

### Pole

None	0
Included	1

### Optional

• Barometer Pressure Module • Bluetooth Module

### Consumable

- BAT05-1 3.6 VDC 13 AH Rechargeable Battery
- BAT10 3.6 VDC 13 AH Non-rechargeable Battery
- BAT11-2 S 3.6 VDC 240 AH, Rechargeable Battery

### Power

- ADP02 Adaptor
- BAT02-1 3.6VDC 13 AH Rechargeable Battery
- BAT10 3.6VDC 13 AH Non-rechargeable Battery
- BAT11-2 3.6 VDC 240 AH, Rechargeable Battery BOX

### Cable

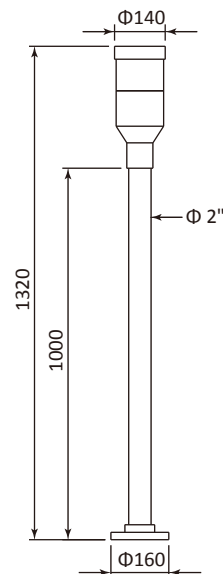
- CAB01-A External power cable (1.5 m)
- CAB03-A Device Communication cable (port1)(1.5 m)
- CAB03-B RS485 Communication cable (10 m or custom length)
- CAB03-E Device Communication cable (port0)(1.5 m)
- CAB04-A I/O Module cable (1.5 m)
- CAB04-C I/O Module cable (1.5 m)
- CAB05-E Ethernet cable (1.5 m)
- CAB06 Configuration cable (1.5 m)
- CAB12 2 port RS485 cable (20 cm)
- CAB13 solar panel power cable (20 cm)

### Software

- AQCFG Configuration and Calibration Software
- AQWEB Cloud Management Software
- AQNET Mobile Management App
- AQOPC OPC Server Software
- AQDBC Database Server Software

ROD1 —  —  —  —  —

## ► Dimensions (unit: mm)



All performances are subject to the actual performance of the products sold by the company in the market, and are only applicable to the products of the company's brand sold by the company or its designated distributors. All the above data are from the internal test of Kaifa Water Resources, and the data may be biased due to different test environments. The manufacturer reserves the right to make changes to product performance, specifications, samples or designs without notice. All information has been carefully checked for accuracy. If there is any printing omission or there may be errors in translation, the company will not be responsible for the consequences.

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