

Battery & Solar Powered Cellular/WiFi/Ethernet RTU & Data Logger

En-Guard PRO RTU



The **En-Guard PRO** is a highly reliable, cost-effective remote terminal unit / data logger for data collection, data logging, alarming and control applications.

Housed in a robust IP68 water submersible, aluminum alloy enclosure, capable to be operated at extreme operating temperature, the PRO is ideally to be used in outdoor locations, such as underground chambers, hydrants, manholes, meter vaults, pump and PRV stations, storage tanks, etc.

The PRO is ultra low power consumption RTU and powered by internal battery for up to 5 years continuous operation.

The RS485 port is able to connect up to 8 digital transmitters including pressure, differential pressure, level, free chlorine, PH, ORP, temperature, conductivity, resistivity, dissolved oxygen, turbidity, salinity, suspended solid, ammonium, humidity and barometer, analog input, digital input, digital output, vibration wire input, valve position, inclinometer, vibration...etc. It is also able to connect to Modbus RTU devices, such as flow meters or PLC.



Features:

Wide Variety of Communication Options

- 3G/GPRS/CDMA five band 800/850/1700/1900/2100 MHz global coverage cellular communication
- License-free 2.4 GHz WiFi network communication
- Ethernet
- RS-485

Battery and Solar Powered Options

- Internal battery for up to 5 years continuous operation
- Optional solar panel, external rechargeable Lithium battery

Robust and Extreme Operating Temperature

- IP68 submersible to 5 meters of water
- Operating temperature: -30 to 85 °C;
operating humidity: 0~100% RH

Wide Variety of I/O Options

- Optional I/O modules: 4 digital inputs, 2 relay outputs, 4 analog inputs, 2 analog outputs
- Optional SMR I/O modules up to 16 digital/analog inputs or relay outputs
- Optional RS485 communication module for data collection, up to 8 SMR digital transmitters and 2 serial devices such as flow meters or PLCs
- Up to 2 pressure modules

High Accuracy

- Accuracy of pressure sensor: up to $\pm 0.1\%$ FS
- Accuracy of analog inputs: $\pm 0.025\%$ FS
- Pressure module with temperature compensation

Transient Pressure Detection and Logging

- 1,000,000 data values of log
- 0.01 sec transient pressure auto detection and alarming for water hammer, pipeline rupture, leakage, sudden change in demand, negative pressure, pump and valve malfunction, faulty operation, etc.
- 0.01 sec high speed transient pressure wave logging

Auto Data Collection, Logging, Event Alarming and Control

- Automatic registration and synchronization of device ID, serial number, alias, location and operation settings
- Automatic GPS locating, time synchronization and coordinates logging with process data
- Scheduled and on-demand communication: data collection, data transmission, SMS, alarm notification, wakeup standby, data upload/download, store and forward
- Log: event, alarm, transient pressure

- Configurable alarm (HH, H, L, LL) and actions including, SMS, alarm log and control outputs
- Programmable control functions: IF_THEN_ELSE, PID, Set Point, time table, alarm, manual ON/OFF
- Peer to peer communication for I/O and data exchange

Cloud Data Storage, WEB Operation and Monitoring

- Web configuration, operation, monitoring, alarm, control, Google Map display, statistical analysis, transient pressure analysis, trend, bar graph and tabular report functions
- Central communication server and application programming library for field device data collection and central communication integration
- SQL and mySQL database connection for development of application software
- Seamless SCADA software and database connectivity via OPC server
- Anytime and anywhere internet operation and monitoring

Security

- Login password access protection
- 128 bits cellular and WiFi encryption to prevent unauthorized access
- Security cable and lock
- GPS location deviation anti-theft alarm

Quick Installation

- Quick coupling SS316 pressure coupler
- IP68 quick coupling connector for system communication, remote I/O module and RS485 port

Easy Setup

- Operation parameters setup, monitoring system, I/O, battery capacity, cellular/WiFi/GPS signal and calibrate sensor via En-Guard CFG software

Battery & Solar Powered Cellular/WiFi RTU & Data Logger



En-Guard ECO RTU

The **En-Gard ECO** is compact version RTU, comparing to En-Guard PRO, ECO is only equipped with most commonly used interfaces which are sufficient for majority of water monitoring applications. The ECO is housed in a robust IP68 water submersible, engineering plastic enclosure, capable to be operated at extreme operating temperature. The ECO is ultra low power consumption RTU as well, powered by internal battery for up to 5 years continuous operation.

The RS485 port is able to connect up to 8 digital transmitters including pressure, differential pressure, level, free chlorine, PH, ORP, temperature, conductivity, resistivity, dissolved oxygen, turbidity, salinity, suspended solid, ammonium, humidity and barometer, analog input, digital input, digital output, vibration wire input, valve position, inclinometer, vibration...etc. It is also able to connect to Modbus RTU devices, such as flow meters or PLC.



Features:

Wide Variety of Communication Options

- 3G/GPRS/CDMA five band 800/850/1700/1900/2100 MHz global coverage cellular communication
- License-free 2.4 GHz WiFi network communication
- RS-485 interface

Battery and Solar Powered Options

- Internal battery for up to 5 years continuous operation
- Optional solar panel, external rechargeable Lithium battery

Robust and Extreme Operating Temperature

- IP68 submersible to 5 meters of water
- Operating temperature: -30 to 85 °C;
operating humidity: 0~100% RH

Wide Variety of I/O Options

- Optional I/O modules: 2 digital inputs, 2 analog inputs
- Optional SMR I/O modules up to 4 digital/analog inputs
- Optional RS485 communication module for data collection, up to 2 SMR digital transmitters and 1 Modbus device such as flow meters or PLCs
- Optional pressure modules

High Accuracy

- Accuracy of pressure sensor: up to $\pm 0.1\%$ FS
- Accuracy of analog inputs: $\pm 0.025\%$ FS
- Pressure module with temperature compensation

Transient Pressure Detection and Logging

- 1,000,000 data values of log
- 0.01 sec transient pressure auto detection and alarming for water hammer, pipeline rupture, leakage, sudden change in demand, negative pressure, pump and valve malfunction, faulty operation, etc.
- 0.01 sec high speed transient pressure wave logging

Auto Data Collection, Logging, Event Alarming and Control

- Automatic registration and synchronization of device ID, serial number, alias, location and operation settings
- Automatic GPS locating, time synchronization and coordinates logging with process data
- Scheduled and on-demand communication: data collection, data transmission, SMS, alarm notification, wakeup standby, data upload/download, store and forward
- Log: event, alarm, transient pressure
- Configurable alarm (HH, H, L, LL) and actions including, SMS, alarm log and control outputs
- Programmable control functions: IF_THEN_ELSE, PID, Set Point, time table, alarm, manual ON/OFF
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Cloud Data Storage, WEB Operation and Monitoring

- Web configuration ,operation, monitoring, alarm, control, Google Map display, statistical analysis, transient pressure analysis, trend, bar graph and tabular report functions
- Central communication server and application programming library for field device data collection and central communication integration
- SQL and mySQL database connection for development of application software
- Seamless SCADA software and database connectivity via OPC server
- Anytime and anywhere internet operation and monitoring

Security

- Login password access protection
- 128 bits cellular and WiFi encryption to prevent unauthorized access
- Security cable and lock
- GPS location deviation anti-theft alarm

Quick Installation

- Quick coupling SS316 pressure coupler
- IP68 quick coupling connector for system communication, remote I/O module and RS485 port

Easy Setup

- Operation parameters setup, monitoring system, I/O, battery capacity, cellular/WiFi/GPS signal and calibrate sensor via En-Guard CFG software



En-Guard PRO, ECO Applications:

- Flow leakage analysis
- District metering and water loss measurement
- Water distribution network pressure management
- Water distribution network modeling and calibration
- Water distribution network water quality monitoring
- Real time pipeline break detection
- High speed surge pressure tracking and statistics
- Reservoir and water tank capacity monitoring and analysis
- Groundwater level and water quality monitoring and data logging
- Storm drainage network monitoring
- Sewer overflow and wastewater quality monitoring
- River and flood monitoring
- Water and waste water treatment process monitoring and data logging
- Reservoir and river water quality monitoring
- Water pump optimal control management
- Rainfall monitoring and alarming

Specification for PRO & ECO:

	PRO	ECO
General	<p>CPU: 32 bits Memory: type: solid state, non-volatile flash; Size: 16 MB; rotating, no log or setting data loss after power failure Real-time Clock: type: crystal controlled calendar clock with leap year adjustment; accuracy: 10 seconds per month; GPS and NTP server auto time synchronization, accuracy: 1 ms (GPS), 1~3 sec (NTP) Environment: protection: IP68, continuous submersible to 5 meters of water; operating temperature: -30~85 °C; operating humidity: 0~100% RH</p>	<p>CPU: 32 bits Memory: type: solid state, non-volatile flash; Size: 16 MB; rotating, no log or setting data loss after power failure Real-time Clock: type: crystal controlled calendar clock with leap year adjustment; accuracy: 10 seconds per month; GPS and NTP server auto time synchronization, accuracy: 1 ms (GPS), 1~3 sec (NTP) Environment: protection: IP68, continuous submersible to 5 meters of water; operating temperature: -30~85 °C; operating humidity: 0~100% RH</p>
GSM / GPRS Module	<p>Standard: GSM/GPRS Frquency: 850/900/1800/1900 MHz Antenna: 3 dBi</p>	<p>Standard: GSM/GPRS Frquency: 850/900/1800/1900 MHz Antenna: 1 dBi(internal); 2 dBi(external)</p>
3G Module	<p>Standard: UMTS/HSPA+/AWS Frequency: 800/850/1700/1900/2100 MHz Antenna: 3 dBi</p>	<p>Standard: UMTS/HSPA+/AWS Frequency: 800/850/1700/1900/2100 MHz Antenna: 1 dBi(internal); 2 dBi(external)</p>
CDMA Module	<p>Standard: CDMA/CDMA 2000 Frequency: 800/1900 MHz Antenna: 3 dBi</p>	<p>Standard: CDMA/CDMA 2000 Frequency: 800/1900 MHz Antenna: 3 dBi</p>
WiFi Module	<p>Standard: IEEE 802.11b Data rate: Up to 11 M bps Frequency: 2.412~2.497 GHz Modulation: direct sequence spread spectrum(DSSS) Supported topologies: Star Max. transmitter power output: 18 dbm Receive sensitivity: -83~-92 dBm Range: up to 1 Km Antenna: 3 dBi (external) Security: WPA/WPA2</p>	<p>Standard: IEEE 802.11b Data rate: Up to 11 M bps Frequency: 2.412~2.497 GHz Modulation: direct sequence spread spectrum(DSSS) upported topologies: Star Max. transmitter power output: 18 dbm Receive sensitivity: -83~-92 dBm Range: up to 1 Km Antenna: 2 dBi(internal); 3 dBi(external) Security: WPA/WPA2</p>
GPS Module	<p>Frequency: 1575.42 MHz Position accuracy: 2.5 m Time accuracy: 300 nsec Antenna: 28±2 dBi(internal); 28±3 dBi(external)</p>	<p>Frequency: 1575.42 MHz Position accuracy: 2.5 m Time accuracy: 300 nsec Antenna: 28±2 dBi(internal); 28±3 dBi(external)</p>
Barometer Module	<p>Pressure Range: 10~ 1300 mbar Operating temperature: -30 ~ 85 °C Accuracy:± 0.0015 Kg/cm2 Resolution: 24 bits</p>	<p>Pressure Range: 10~ 1300 mbar Operating temperature: -30 ~ 85 °C Accuracy:± 0.0015 Kg/cm2 Resolution: 24 bits</p>
LCD Display Module	<p>2.4" with back light Display: sensor and transmitter values, I/O status, system and communication status, unit 3 numbers: 9 digits,41/2 digits,11/2 digits Dimensions: 60(W) x 34(H)</p>	<p>2.4" with back light Display: sensor and transmitter values, I/O status, system and communication status, unit 3 numbers: 9 digits,41/2 digits,11/2 digits Dimensions: 60(W) x 34(H)</p>

Specification for PRO & ECO:

	PRO	ECO
Housing	<p>Material: Aluminum alloy Dimensions: 220(W)×230(H)×85(D) mm Weight: approx. 3 Kg</p>	<p>Material: Engineering ABS plastics with polycarbonate Dimensions: Φ 110 x120 mm Weight: approx. 900 g</p>
Power	<p>External Power Voltage: 9-18 V DC ±10%, 1.5 A Surge protection: 4000 VDC Isolation: 1000 VDC ESD line protection: 15 KVDC</p> <p>Internal Battery Non-rechargeable 3.6 VDC 28 AH lithium cell Life: 5 years continuous operation (every 15 min data logging, alarm sampling and twice data upload daily, depending on mode of use; 1 year continuous operation (every 5 min data logging, alarm sampling and every 60 min data upload, depending on mode of use)</p> <p>Internal Battery Rechargeable 3.6 VDC 10 AH lithium cell Life: minimum 300 charge/discharge cycles, 1.5 years continuously operation (every 15 min data logging, alarm sampling and twice data upload daily, depending on mode of use)</p> <p>Solar Power Type: 6 VDC, 3 W rechargeable 10 AH lithium cell Life: minimum 300 charge/discharge cycles, 3 years continuously operation (every 10 min data logging, alarm sampling and data upload, depending on mode of use)</p> <p>External Battery Box: Rechargeable 3.6 VDC 60 AH lithium cell Life: minimum 300 times charge/discharge cycles, 1 year continuous operation (every 5 min data logging, alarm sampling and every 60 min data upload, depending on mode of use)</p>	<p>External Power Voltage: 9-18 V DC ±10%, 1.5 A Surge protection: 4000 VDC Isolation: 1000 VDC ESD line protection: 15 KVDC</p> <p>Internal Battery Non-rechargeable 3.6 VDC 28 AH lithium cell Life: 5 years continuous operation (every 15 min data logging, alarm sampling and 4 times data upload daily, depending on mode of use); 1 year continuous operation (every 5 min data logging, alarm sampling and every 60 min data upload, depending on mode of use)</p> <p>Internal Battery Rechargeable 3.6 VDC 10 AH lithium cell Life: minimum 300 charge/discharge cycles, 1.5 years continuously operation (every 15 min data logging, alarm sampling and 4 times data upload daily, depending on mode of use)</p> <p>Solar Power Type: 6 VDC, 3 W rechargeable 10 AH lithium cell Life: minimum 300 charge/discharge cycles, 3 years continuously operation (every 5 min data logging, alarm sampling and data upload, depending on mode of use)</p> <p>External Battery Box: Rechargeable 3.6 VDC 60 AH lithium cell Life: minimum 300 times charge/discharge cycles, 1 year continuous operation (every 5 min data logging, alarm sampling and every 30 min data upload, depending on mode of use)</p>
System Configuration Port	<p>RS232 System configuration and data upload/ download 115,200bps, 8 bits, no parity, 1 stop bit Surge protection: 4000 VDC Protocol: Modbus RTU or proprietary device drivers</p>	<p>RS485 System configuration and data upload/download 115,200 bps, 8 bits, no parity, 1 stop bit Surge protection: 4000 VDC Protocol: Modbus RTU or proprietary device drivers</p>

Specification for PRO & ECO:

	PRO	ECO
Device	RS485 Module	RS485 module
Communication Port	Device data collection, connecting up to 8 SMR digital transmitters and 2 serial devices 19200bps, 8 bits, no parity, 1 stop bit Surge protection: 4000 VDC Isolation: 1000 VDC Protocol: Modbus RTU or proprietary device drivers	Device data collection, connecting up to 2 SMR digital transmitters and 1 Modbus RTU serial device 19,200bps, 8 bits, no parity, 1 stop bit Surge protection: 4000 VDC Protocol: Modbus RTU or proprietary device drivers
Pressure Module	Measurement range: 0~1/5/10/15/20/35 Kgf/cm ² Operating temperature: -30 ~ 125 °C Accuracy: ± 0.25% FS or ± 0.1% FS Resolution: 0.05% FS Repeatability: ±0.025% FS Stability (annual): ±0.1 % FS Overload: 3 X Burst: 4 X Connection: 1/8" quick fit coupler Housing: SS316	Measurement range: 0~1/5/10/15/20/35 Kgf/cm ² Operating temperature: -30 ~ 125 °C Accuracy: ± 0.25% FS or ± 0.1% FS Resolution: 0.05% FS Repeatability: ±0.025% FS Stability (annual): ±0.1 % FS Overload: 3 X Burst: 4 X Connection: 1/8" quick fit coupler Housing: SS316
Differential Pressure Module	Measurement range: 0~0.05/0.25/0.5/1/5/20 Kgf/cm ² Operating temperature: -30-125 °C Accuracy: ± 0.1% FS Resolution: 0.05% FS Repeatability: ±0.025% FS Stability(annual): ±0.1 % FS Overload: 3 X Burst: 4 X Connection: 1/8" quick fit coupler Housing: SS316	
Ethernet Module	Data rate: 10/100 Mbps Surge protection: 1500 V DC Protocol: Modbus TCP	
I/O Module A	<p>Digital inputs</p> <p>Number of channels: 4 (2 counter or state inputs and 2 state inputs) Type: 3.5-12 VDC or dry contact single ended input Maximum operating frequency: 1 KHz Minimum pulse width: 10 msec Surge protection: 4000 VDC</p> <p>Digital outputs</p> <p>Number of channels: 2 Type: relay, 2 poles Load: 0.5 A 125 V AC; 1 A 30 VDC Maximum operating frequency: 20 Hz Surge protection: 4000 VDC</p>	<p>Digital inputs</p> <p>number of channels: 2 counter or state inputs Type: 3.5-12 VDC or dry contact single ended input Maximum operating frequency: 1 KHz Minimum pulse width: 10 msec Surge protection: 4000 VDC</p> <p>Analog inputs</p> <p>Number of channels: 2 Resolution: 15 bits Accuracy: 0.025% FS Signals: 0~1 VDC, 0~10 VDC, 4~20 mA Surge protection: 4000 VDC</p>

Specification for PRO & ECO:

	PRO	ECO
I/O Module B	<p>Digital inputs Number of channels: 2 counter or state inputs Type: 3.5-12 VDC or dry contact single ended input Maximum operation frequency: 1 KHz Minimum pulse width: 10 msec Surge protection: 4000 VDC Isolation: 1000 VDC</p> <p>Analog inputs Number of channels: 4 Resolution: 15 bits Accuracy: 0.025% FS Signals: 0~1 V DC, 0~10 VDC, 4~20 mA Surge protection: 4000 VDC</p>	
I/O Module C	<p>Digital inputs Number of channels: 4 (2 counter or state inputs, 2 state inputs) Type: 3.5-12 VDC or dry contact single ended input Maximum operating frequency: 1 KHz Minimum pulse width: 10 msec Surge protection: 4000 VDC</p>	
I/O Module D	<p>Digital inputs Number of channels: 4 (2 counter or state inputs and 2 state inputs) Type: 3.5-12 VDC or dry contact single ended input Maximum operating frequency: 1 KHz Minimum pulse width: 10 msec Surge protection: 4000 VDC</p> <p>Digital outputs Number of channels: 2 Type: relay, 2 poles Load: 0.5 A 125 VAC; 1 A 30 VDC Maximum operating frequency: 20 Hz Surge protection: 4000 VDC</p> <p>Analog inputs Number of channels: 2 Resolution: 15 bits; Accuracy: 0.025% FS Signals: 0~1 VDC, 0~10 VDC, 4~20 mA</p>	
I/O Module A	<p>Surge protection: 4000 VDC</p> <p>Analog outputs Number channels: 2 Resolution: 12 bits Accuracy: 0.1% FS Signals: 4~20 mA Surge protection: 4000 VDC Load resistor: 50 or 500 ohms</p>	

Specification for PRO & ECO:

	PRO	ECO
I/O		
Module E	<p>Digital inputs</p> <p>Number of channels: 4 (2 counter or state inputs, 2 state inputs)</p> <p>Type: 3.5-12 VDC or dry contact single ended input</p> <p>Maximum operating frequency: 1 KHz</p> <p>Minimum pulse width: 10 msec</p> <p>Surge protection: 4000 VDC</p> <p>Digital outputs</p> <p>Number of channels: 1</p> <p>Type: ± 12 VDC snap shot output (0.5 sec) for solenoid control</p> <p>Load: 1 A 12 VDC</p> <p>Operating frequency: 10 Hz</p> <p>Surge protection: 4000 VDC</p> <p>Analog inputs</p> <p>Number of channels: 2</p> <p>Resolution: 15 bits</p> <p>Accuracy: 0.025% FS</p> <p>Signals: 0~1 VDC, 0~10 VDC, 4~20 mA</p> <p>Surge protection: 4000 VDC</p>	