WILLLOWGLEN
REMOTE TERMINAL UNIT

Control With Innovation
Willowglen 6500/7000 Series Remote Terminal Unit

Willowglen 6500/7000 Series RTU provides SCADA telemetry and control functionality in a rugged and highly reliable package.

- Configurable for both mission-critical, large IO point count applications and compact monitoring and control application utilizing just few IO points.
- Supports full suite of industry standard communication media and protocol for interfacing to intelligent electronic device (IED), PLC and master SCADA software at multiple locations simultaneously.
- Built-in operator-friendly web-based configuration tools greatly reduce engineering configuration work.
- Built-in data application, and network security features on multiple software layers starting from the OS kernel all the way to user application layer.
- Dedicated R&D division for hardware and software system design and customization to meet any customer requirement.
- We offer cost effective RTU for large scale installation such as substations automation.

System Overview
As both RTU and SCADA software manufacturer, operator can rest assured that long term support will be available.

Scalable and Customizable Architecture
Modular Architecture

6500/7000 series standard configuration comprise of:

- Rack or plate mounted CPU, Digital and Analog Input/Output Modules plus accessories
- Scalable to 8, 12 or 16 module per rack. Multiple racks can be linked via RS485 serial comms
- Customized sub-rack for small point count application
- Remote IO capable

A single CPU can support up to 4 extended rack to provide expansion up to 2000 I/O points.

Powerful CPU Module with Versatile Communications

CPU module consists powerful 32-bit ARM Cortex processor with large memory and storage capacity with functions and performance of an RTU, PLC and Data Concentrator all-in-one.

- Built-in multiple communication ports and native support for standard protocol such as IEC60870-101, IEC60870-104, DNP3, OPC and Modbus TCP/RTU. Additional protocol such as IEC60870-103, IEC61850 or other proprietary protocol can be added as part of customization.
- Runs on Linux platform, comes with built-in applications such as IEC61131-3 compliance logic programming tools, network configurations, security, data management, GPS time synchronization and full hardware and application logs and diagnostics.
- The OS features embedded programming environment allowing customized application and protocols to be easily added.
- For high reliability and availability system, two CPU can be configured to work together in fault tolerant or hot standby mode.
WebRTU Configuration & Maintenance Tool

Configuration of IO points, protocol mapping, network interface, access control, and security can be done directly or remotely using standard web browser.

- Real time display of data, system, and error log and system health.
- Portable Maintenance Tool (PMT) and RTU Programmer available for extensive maintenance, debugging and programming.

Robust Input Output Modules

Willowglenn designs and manufactures Digital Input Module (DIM), Digital Output Module (DOM), Analog Input Module (AIM), Analog Output Module (AOM), Expansion Module (EXP) and accessories.

- No additional conditioning circuit is needed at the front end interface to field devices.
- Local processing allowing it to function independently from the main CPU.
- DI module front end circuit is optically isolated.
- DO module has built in Select-Before-Operate (SBO) function and relay output.
- Built-in LED indicators for communication and channel status.
- Built-in diagnostic port for maintenance and calibration.
Compliance

Willowglen RTU modules conform to IEC and CENELAC (EN) mechanical, environmental, electrical and EMC standards. The RTU are also in compliance for railway application EN50121-4. All tests were conducted at IEC17025 certified laboratories such as TUV Sud (CANADA), SIRIM and MIMOS (Malaysia). The RTU enclosure can be designed to meet International Protection (IP) standard as required by customers.

Electrical Environment

<table>
<thead>
<tr>
<th>Standard</th>
<th>Test Description</th>
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</thead>
<tbody>
<tr>
<td>IEC 60255-5</td>
<td>Insulation Resistance Test</td>
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<tr>
<td>IEC 60255-5</td>
<td>Dielectric Withstand Test</td>
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<tr>
<td>IEC 60255-5</td>
<td>Impulse Voltage Test</td>
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<tr>
<td>IEC 61000-4-2</td>
<td>Electrostatic Discharge Test</td>
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<td>IEC 61000-4-3</td>
<td>RF Electromagnetic Field Disturbance Test</td>
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<tr>
<td>IEC 61000-4-4</td>
<td>Fast Transient Disturbance Test</td>
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<tr>
<td>IEC 61000-4-5</td>
<td>Surge Voltage Immunity Test</td>
</tr>
<tr>
<td>IEC 61000-4-6</td>
<td>Conducted RF Disturbances Test</td>
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<tr>
<td>IEC 61000-4-8</td>
<td>Power Frequency Magnetic Field Test</td>
</tr>
<tr>
<td>IEC 61000-4-12</td>
<td>Damped Oscillatory Waves Test</td>
</tr>
<tr>
<td>IEC 61000-4-16</td>
<td>Main Frequency Voltage Test</td>
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<tr>
<td>IEC 61000-4-17</td>
<td>Ripple Test on DC Power Supply</td>
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<tr>
<td>IEC 61000-4-29</td>
<td>DC Supply Interruptions Test</td>
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<tr>
<td>IEC 61010-1/ IEC 60950-1</td>
<td>Safety Standard Clause 5.5</td>
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<td>CISPR 22</td>
<td>Radiated &amp; Conducted Emission Test</td>
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Mechanical Environment

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<th>Standard</th>
<th>Test Description</th>
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<tr>
<td>IEC 60068-2-6</td>
<td>Vibration Test</td>
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<tr>
<td>IEC 60068-2-27</td>
<td>Shock Response &amp; Endurance Test</td>
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<tr>
<td>IEC 60068-2-27</td>
<td>Bump Test</td>
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Atmospheric Environment

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<tr>
<th>Standard</th>
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<tbody>
<tr>
<td>IEC 60068-2-2</td>
<td>Dry Heat Test</td>
</tr>
<tr>
<td>IEC 60068-2-78</td>
<td>Damp Heat Test (Steady)</td>
</tr>
<tr>
<td>IEC 60068-2-30</td>
<td>Damp Heat Test (Cyclic)</td>
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</tbody>
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Willowglen 6500 and 7000 series RTU is a multi-industry proven product and has been installed in Europe, Middle-East and Asia for various industry.

The RTU can be offered as standalone products or package with WillowLynx Master SCADA software. Support for industry standard protocol allows it to be easily integrated to existing systems regardless of master systems.

Willowglen also has the expertise in full system replacement, without affecting operation of existing plant and processes.
The Willowglen RTU and Master SCADA System enables smooth and smart operation of facilities and process making it easier to achieve target water volume and quality, plant efficiency, reliability while conserving energy and reducing operational cost. SCADA allows management and operation of many treatment plants and reservoirs simultaneously by integrating all plant control into an integrated control center.

- Process control from sedimentation, aeration, carbon and sand filter to final collection tank
- Monitors and controls level and pressure transducers, flowmeters, valves, pumps, dissolved oxygen temperature etc.
- Integration to plant physical security measures by integration to personnel card access, CCTV and perimeter fencing system.
SCADA systems provide for safe, reliable, and efficient operation of gas transmission systems. Advanced applications and interfaces to business systems provide the keys for highly profitable operation.

- Typical RTU installation at metering, odorizer, valve and compressor stations.

- Monitors and controls the valves, pressure transmitters, pressure regulators, temperature, heaters, flow meter and data loggers.

- At the compressor station with PLC systems, RTU can be used as data aggregator for transmission to the control center.

- Real time and archived data for pipeline modelling, forecast, short and capacity planning, survivability analysis, leak detection etc. Data can also be used for online customer billing and marketing.

- Redundant communication media guarantee uninterruptible operation at main and backup control center
Cost effective design for large scale deployment in tens of thousands substation for monitoring and controlling circuit breakers, load break switches, protection relays, EFI, disturbance recorders etc.

- Upgradable and configurable to include features for various substation configuration and smart grid systems,
- Built-in power SCADA features such as select-before-operate (SBO), sequence-of-event (SOE), GPS input for millisecond time-sync accuracy
Transportation

Willowglen RTU and its master SCADA software, Willowlynx, have been installed to run operation of major regional and metro rail lines.

- Monitor and control equipment and systems such as automated passenger announcement (PA), passenger information system (PIS), platform screen doors (PSD), environmental control systems (ECS), fire alarms, emergency blue light stations, signalling systems, UPS, passenger intrusion emergency stop systems (PIES), and many others.

- Designed for safety related application.

- Achieved Reliability, Availability, Maintainability, and Safety (RAMS) target of 99.99%.
### RTU Technical Specifications

**CPU**
- **Microprocessor**: AM335x ARM® Cortex™-A8
- **Clock frequency**: 720 MHz
- **RAM**: 512MB DRAM, 4MB SRAM
- **Flash size**: 512MB
- **SD Card**: 32GB
- **Operating system**: Linux
- **COM options**: 1 x Micro-USB RS232, 1 x RJ45 RS232, 1 x Screw terminal RS485, 2 x compact-PCI RS485
- **Ethernet**: 1 x RJ45 10/100Mbps, 1 x RJ45 10/100/1000Mbps
- **USB**: 1 x Host + 1 x OTG
- **Power consumption**: 10W/19W maximum

**I/O Module**
- **Types**: DI, DO, AI, AO
- **Microcontroller**: 8-bit 8051
- **RAM**: 1KB internal + 32KB external
- **Flash ROM**: 16KB
- **EEPROM**: 512B
- **COM options**: 1 x RJ45 RS232 at 115.2kbps
- **Operating environment**: 0°C to 70°C, 5%-95% humidity
- **Visual indication**: LEDs for RX/TX, Module Heartbeat, I/O points
- **Power requirements**: 11-30 VDC

**DI**
- **Channels**: 16/32
- **Output type**: Opto-isolated input 18-25 VDC, can function as 200Hz counter
- **Output configuration**: Dry contact up to 3kΩ
- **Relay output**: 4mA rated at 24V supply
- **Open Collector output**: Internal or external 24V 20%
- **Protection**: 0.9A self-healing fuse for system power, 1.2A self-healing fuse for input points (optional)
- **Power consumption**: 5.5W/6.5W with all contacts closed using internal loop power

**DO**
- **Channels**: 8/16
- **Output type**: Relay or open collector
- **Output configuration**: SBO (default) or normal output
- **Relay output**: Potential free SPST-N/O contacts
- **Open Collector output**: 250-400mA sinking current per channel
- **Protection**: 1A self-healing fuse for system power
- **Power consumption**: 0.75W/1.3W with all relays open, 2.75W/7.5W with all relays closed

**AI**
- **Channels**: 8/16
- **Input type**: Single ended or differential input
- **Input configuration**: 0-5V, 0-10V, ±5V, ±10V, 1-5V, 0-20mA, 4-20mA, ±5mA
- **Input resolution**: 12-bit
- **Input accuracy**: <0.1% of Full Scale at 25°C
- **Input resistance**: <0.005% or 50ppm/°C of Full Scale at 10-55°C, 2500Ω for current input, >10MO for voltage input
- **Input filter**: 2nd order Butterworth low-pass with 6Hz cutoff frequency, 72dB attenuation @ 50Hz
- **Protection**: 4A self-healing fuse for system power, 120mA self-healing fuse for input points
- **Power consumption**: 9.5W/20.7W using internal loop power

**AO**
- **Channels**: 8/16
- **Output type**: Digitally isolated, single ended
- **Output configuration**: 0-5V, 1-5V, 0-10V, 1-10V, 0-20mA, 4-20mA
- **Output resolution**: 12-bit
- **Output accuracy**: 0.1% (250Ω current mode load)
- **Output drive capability**: 0.2% (0-1kΩ current mode load)
- **Output drive capability**: <1100Ω in current mode, >3000Ω in voltage mode
- **Protection**: 4A self-healing fuse for system power, 120mA self-healing fuse for input points
- **Power consumption**: 10W/20W maximum
Kuala Lumpur based Willowglen MSC Berhad is the corporate headquarter and also the research and development division of the Willowglen Group. It is listed on the main board of Bursa Malaysia with subsidiaries in Malaysia, Singapore and Indonesia. Working together with partners in Europe and Middle East, we have the expertise to offer local and international customers a one-stop SCADA and integrated security and monitoring (ISMS) solutions.

With more than 35 years of experience, Willowglen’s capability goes beyond SCADA and its related solutions. We are continuously evolving and have recognized that being dynamic and flexible are important in adapting in a rapidly changing industry. Our operation is structured to maximize strength in R&D, engineering services, project management and maintenance support to provide high quality services expected by our customers.

**WILLOWGLEN STRENGTH AND SERVICES**

- R&D and Manufacturing
- System Design and Integration
- Project Management
- Maintenance & Support