Wireless I/O System for IoT

900 MHz ISM Band  Multi-hop Technology  FCC Part 15 Compliant

INTERNET LEVEL

INETRNET

ADSL / Optical Line

ISP

Cloud Server

INTERNET

ISP

ISP

Ethernet

Ethernet

LEVEL

LEVEL

LEVEL

LEVEL

ROUTE

REMOTE I/O LEVEL

Multi-hop Technology

900 MHz ISM Band

FCC Part 15 Compliant Wireless Modules for use in the US

INTERNET

ISP

ISP

ISP

ISP

LEVEL

LEVEL

LEVEL

LEVEL

ROUTE

REMOTE I/O LEVEL
WHAT IS 900 MHz BAND WIRELESS COMMUNICATION
M-System Wireless I/O System employs a licence-free 900 MHz ISM band module. Compared with 2.4 GHz / 5 GHz wireless LANs and other wireless networks dedicated for instrumentation using higher frequency bands, the 900 MHz band ensures stable communication quality for a long distance transmission, suitable for telemetering, multiplex transmission systems and data logging applications with various sensors/devices including low-speed moving entities. Modbus-RTU transparent devices can easily replace existing wired ones, and various industry standard sensors/devices can be added to the network.

MULTI-HOP TECHNOLOGY
Multi-hop wireless communication is a wireless network conveying data through a number of wireless communication devices in a “bucket-brigade” manner. Relaying paths are automatically switched to an alternative one when one section of the connection is weak. Up to 100 child stations connect to a single parent station. The communications distance between stations can be up to 0.62 miles (1 km), thus making it possible to construct a wireless network in a wide range.

WIRELESS SPECIFICATIONS

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communication standard</td>
<td>IEEE 802.15.4g</td>
</tr>
<tr>
<td>Frequency</td>
<td>900 MHz band (902 to 928 MHz)</td>
</tr>
<tr>
<td>Max. transmission power</td>
<td>20 mW</td>
</tr>
<tr>
<td>Band width</td>
<td>400 kHz</td>
</tr>
<tr>
<td>Modulation</td>
<td>GFSK</td>
</tr>
<tr>
<td>Baud rate</td>
<td>Max. 100 kbps</td>
</tr>
<tr>
<td>Channels</td>
<td>1 to 43 ch</td>
</tr>
<tr>
<td>Security</td>
<td>128 bit AES</td>
</tr>
<tr>
<td>Indicator LEDs</td>
<td>920Run, 920Link, 920ERR (child devices)</td>
</tr>
<tr>
<td>Number of child devices</td>
<td>Max. 100</td>
</tr>
<tr>
<td>Protocol</td>
<td>Modbus-RTU</td>
</tr>
<tr>
<td>Communication module</td>
<td>Coordination module (parent) and router module (child) by Oki Electric Industry Co., Ltd.</td>
</tr>
<tr>
<td>Radio parameters setting</td>
<td>Web browser (parent), Configuration software (child)</td>
</tr>
<tr>
<td>Max. transmission distance</td>
<td>Approx. 0.62 miles (1 km)</td>
</tr>
</tbody>
</table>
### Wireless Gateway

**Model: WL40EW2F**
- Converting Modbus/TCP protocol into the 900 MHz band radio protocol and vice versa.

### Wireless Tower Light

**Model: IT40SW5F / IT50SW5F / IT60SW5F**
- Converting Modbus/TCP protocol into the 900 MHz band radio protocol and vice versa.
- Lighting, blinking and buzzer outputs possible with contact inputs or with PC via Modbus /TCP.

### Wireless Gateway

**Model: WL40MW1F**
- Converting Modbus-RTU protocol into the 900 MHz band radio protocol and vice versa.

### Wireless I/O Unit

**Model: WL40W1F-DAC4A**
- Converting Modbus-RTU protocol into the 900 MHz band radio protocol and vice versa.
- Direct sensor input converted into 900 MHz band radio protocol.

**Model: WL40W1F-DS2**
- 4-20 mA active input x 2

### Wireless Tower Light

**Model: IT40SW6F / IT50SW6F / IT60SW6F**
- Converting Modbus-RTU protocol into the 900 MHz band radio protocol and vice versa.
- Lighting, blinking and buzzer outputs possible with contact inputs or via wireless communication.

### Wireless Remote I/O

**Model: R3-NMW1F**
- Converting Modbus-RTU protocol into the 900 MHz band radio protocol and vice versa.
- Wide selection of R3 Series I/O modules can be freely combined.

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⚠️ Signal strength site survey is required before introducing wireless modules.

### Related Products — Modbus Remote I/O

Selectable among various housing styles, network protocols and I/O variations with full isolation between channels.

#### R3 Series

**Multi-channel, Mixed Signal Remote I/O**
- Wide selection of I/O modules including DC, AC, temperature, strain gauge, pulse trains, AC power, etc.
- 4 isolated to 16 non-isolated analog inputs per module
- Max. 64 discrete I/O per module
- Selections of AC power, CT and VT modules suitable for energy monitoring applications

#### R7M Series

**Expandable, Compact Remote I/O**
- Palm-top size compact module can handle 4 analog input, 2 analog output or 16 discrete signals
- 8 or 16 discrete input/output module can be attached to the base module
- 1500 Vac isolation

#### 53U / L53U

**Multi Power Monitor and Transducer**
- Single-phase 2-wire and 3-wire, three-phase 3-wire and 4-wire systems
- Modbus communication and Ao/Do combinations selectable
- Up to 31st harmonic distortion measurement
- Software lock
- 1/4 DIN panel size with IP50 protection (53U)

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www.m-system.com
## Web browser based IoT components

<table>
<thead>
<tr>
<th></th>
<th>DL8 Web Data Logger</th>
<th>DL30 Web Data Logger</th>
<th>TR30-G Tablet Recorder</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Features</strong></td>
<td>The Web Data Logger is an Internet-of-things (IoT) terminal incorporating versatile functions, including a remote monitoring function, data logging function, and event reporting function, available through a website screen.</td>
<td>The Web Data Logger is a data logger of onsite-installation type incorporating versatile functions, including a remote monitoring function, data logging function, and event reporting function, available through a website screen as well as a report creation function.</td>
<td>The Tablet Recorder is a data recorder that displays collected and accumulated trend data on a website screen using a tablet or PC via an IP network, such as a Wireless LAN network.</td>
</tr>
<tr>
<td><strong>Function</strong></td>
<td>Data logging (only time and value)</td>
<td>Data logging (only time and value)</td>
<td>Trend</td>
</tr>
<tr>
<td><strong>Memory</strong></td>
<td>SD card</td>
<td>Main memory + SD card</td>
<td>Main memory + SD card</td>
</tr>
<tr>
<td><strong>Data format</strong></td>
<td>CSV</td>
<td>CSV</td>
<td>Main memory: Binary (.TRD)/SD: .TRD or .CSV selectable</td>
</tr>
<tr>
<td><strong>Number of channels</strong></td>
<td>Max. 32</td>
<td>Max. 64</td>
<td>Max. 120</td>
</tr>
<tr>
<td><strong>Storing cycle</strong></td>
<td>1 sec. to 1 day</td>
<td>1 sec. to 1 day</td>
<td>5 to 50 msec. (16 pens)/100 msec. to 10 sec. (32 pens)/1 min. to 1 hour (120 pens)</td>
</tr>
<tr>
<td><strong>Report form</strong></td>
<td>NO</td>
<td>Daily / monthly / yearly report automatically generated in CSV format and stored in SD card</td>
<td>NO</td>
</tr>
<tr>
<td><strong>Web server</strong></td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td><strong>E-mail</strong></td>
<td>YES</td>
<td>YES; E-mailing can be enabled/disabled by specifying business hours and holidays in a calendar.</td>
<td>YES</td>
</tr>
<tr>
<td><strong>Modbus/TCP</strong></td>
<td>Master/slave + Output control + I/O mapping</td>
<td>Master/slave + Output control + I/O mapping</td>
<td>Master/slave</td>
</tr>
<tr>
<td><strong>FTP</strong></td>
<td>Server/client</td>
<td>Server/client; Report form files can be attached to mails.</td>
<td>Server/client</td>
</tr>
<tr>
<td><strong>Main applications</strong></td>
<td>Abnormality notification; data logging at field site; RTU for IoT</td>
<td>Data logging at field site with preformatted report sending function; RTU for IoT</td>
<td>Wireless data recording; RTU for IoT</td>
</tr>
<tr>
<td><strong>Available I/O type and number</strong></td>
<td>Ai x 32 (16-bit analog)/Pi x 32 (32-bit analog and pulse)/Do x 64/Ao x 3</td>
<td>Ai x 64 (16-bit analog)/Pi x 64 (32-bit analog and pulse)/MA x 256 (analog function)/MD x 256 (digital function)/Do x 128/Ao x 64</td>
<td>Ai x 64 (16-bit analog)/Pi x 32 (32-bit analog and pulse)/Oi x 32 (function)/Do x 64</td>
</tr>
<tr>
<td><strong>Arithmetic functions</strong></td>
<td>NO</td>
<td>YES</td>
<td>YES</td>
</tr>
</tbody>
</table>