

INSTRUCTION MANUAL

WIRELESS TOWER LIGHT

(small size, 60 mm dia., Modbus/TCP (Ethernet), Modbus-RTU transparent 900MHz band wireless device (parent), 0 – 5 layers)

MODEL **IT60SW5F**

BEFORE USE

Thank you for choosing M-System. Before use, please check contents of the package you received as outlined below. If you have any problems or questions with the product, please contact M-System's Sales Office or representatives.

■ PACKAGE INCLUDES:

Tower Light(1)
Antenna(1)

■ MODEL NO.

Confirm Model No. marking on the product to be exactly what you ordered.

■ INSTRUCTION MANUAL

This manual describes necessary points of caution when you use this product, including installation, connection and basic maintenance procedures.

For information on the introduction of wireless device, refer to the 900 MHz band wireless device operating manual (EM-9085-B).

For information on the detailed setting, refer to the operating manual (EM-2431-B).

For information on Modbus specification, refer to the Modbus Protocol Reference Guide (EM-5650).

These manuals are downloadable at M-System's web site (<http://www.m-system.co.jp>).

POINTS OF CAUTION

■ POWER INPUT RATING & OPERATIONAL RANGE

- Locate the power input rating marked on the product and confirm its operational range as indicated below:
24V DC rating: 24V ±10%, approx. 7.5W
PoE: 37 – 57V DC rating, approx. 7.5W

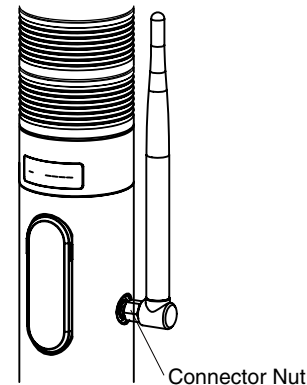
■ GENERAL PRECAUTIONS

- Before you remove the unit or mount it, turn off the power supply and input signal for safety.
- The unit must not be subjected to external force.
- Do not rub the unit with organic solvent such as paint thinner.

■ ENVIRONMENT

- Indoor use.
- Attach the antenna to the unit.
- Do not install the unit where it is subjected to continuous vibration. Do not subject the unit to physical impact.
- Environmental temperature must be within -10 to +55°C (14 to 131°F) with relative humidity within 10 to 90% RH in order to ensure adequate life span and operation.
- Mount the unit on a flat and robust plate.
- Lamps are omnidirectional.
- The buzzer sound is directional in front of the unit.
- This unit communicates by radio waves. Do not install the unit where it could be exposed to radio waves obstacles or strong electric fields.

- How to change antenna angle: Rotate the antenna after loosening the connector nut (refer to the next drawing). Tighten the nut with torque (0.98 N·m) while holding the antenna pointing to the intended direction. Otherwise, tight manually the nut, and assure it turning 10° to 15° more with a wrench.



■ INGRESS PROTECTION (IP65)

- The IP code is conformable when the unit is mounted vertically, antenna is installed and the control panel cover is locked. The compartment, where connectors are located, is not protected.
- When opening the control panel cover, avoid humidity and dust penetration. Dry and clean it if condensation is formed, and close the cover locking tightly.
- Install the antenna and tighten the connector nut tightly.
- In order to protect ingress of water or dust into the bottom compartment, mount the unit on the flat plane, and be sure that the gasket does not roll back or dust is not on the gasket.

■ WIRING

- Do not install cables close to noise sources (relay drive cable, high frequency line, etc.).
- Do not bind these cables together with those in which noises are present. Do not install them in the same duct.
- Cables to the unit must be wired indoor.
- Use an STP cable of category 5e or higher as an Ethernet cable.

■ AND

- The unit is designed to function as soon as power is supplied, however, a warm up for 10 minutes is required for satisfying complete performance described in the data sheet.

CAUTION REGARDING RADIO FREQUENCY

■ FCC NOTICE

- This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:
(1) This device may not cause harmful interference, and
(2) this device must accept any interference received, including interference that may cause undesired operation.

■ FCC CAUTION

- Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

■ NOTE

- This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.
- This transmitter must not be co-located or operated in conjunction with any other antenna or transmitter.

■ FCC RF EXPOSURE INFORMATION

- This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment and meets the FCC radio frequency (RF) Exposure Guidelines. This equipment should be installed and operated keeping the radiator at least 20 cm or more away from person's body.

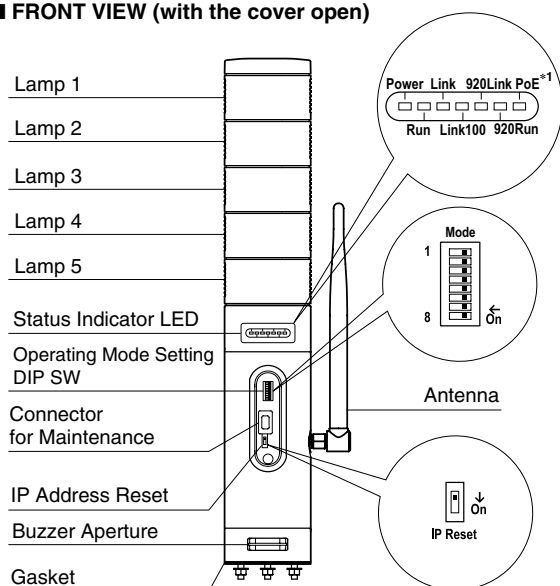
FCC ID : 2AOTF-0000005 (PoE)

FCC ID : 2AOTF-0000006 (24V DC)

Contains FCC ID: 2AKGW-1TD3016A1

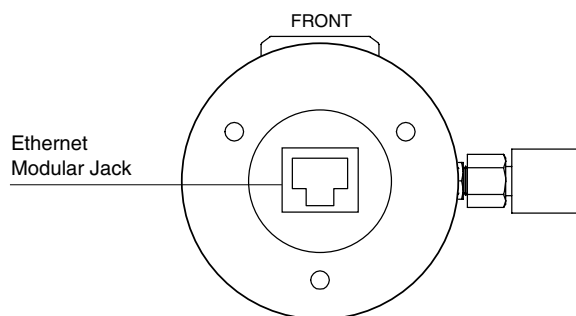
COMPONENT IDENTIFICATION

■ FRONT VIEW (with the cover open)



*1. Equipped when PoE is selected

■ BOTTOM VIEW



■ STATUS INDICATOR LED

ID	COLOR	FUNCTION
Power	Green	On when power is supplied.
		Blinks when the IP Reset SW is on.
		Off when power is not supplied or an abnormality occurs in the unit.
Run	Green	On when Modbus/TCP communication is in normal status.
		(For Modbus node address 255 only)
		Off at Modbus/TCP communication error or during no Modbus/TCP communication.
Link	Green	On when linking through 10 or 100 BASE.
		Blinks when transmitting/receiving data.
		Off when there is no link.
Link100	Green	On when linking through 100 BASE.
		Off when linking through 10 BASE or there is no link.
920Link	Green	On when wireless link is working.
		Blinks with 0.5 Hz in establishing wireless link.
		Off when wireless link stops working.
920Run	Green	On when wireless communication with child device is in normal status.
		Off at a wireless communication error or during no communication.
PoE	Green	On when power is supplied via PoE.
		Off when power is not supplied via PoE.

■ OPERATING MODE

(*) Factory setting

• Lamp Blinking Frequency: Mode-1

Mode-1	LAMP BLINKING FREQUENCY
OFF	Approx. 2 Hz (*)
ON	Approx. 10 Hz

• Buzzer Intermittent Frequency: Mode-2

Mode-2	BUZZER INTERMITTENT FREQUENCY
OFF	Approx. 2 Hz (*)
ON	Approx. 10 Hz

• Buzzer Volume: Mode-3, Mode-4

Mode-3	Mode-4	BUZZER VOLUME
OFF	OFF	Quiet (*)
OFF	ON	Middle
ON	OFF	Loud
ON	ON	Maximum

• Output at the Loss of Communication: Mode-6

Mode-6	OUTPUT AT THE LOSS OF COMMUNICATION
OFF	Reset the output (turned off) (*)
ON	Hold the output (maintains the last data received normally)

Available when 'Input Select' is set to Modbus/TCP.

• Output Logic Reverse: Mode-7

Mode-7	OUTPUT LOGIC REVERSE
OFF	Non-inverted (*)
ON	Inverted

Available when 'Input Select' is set to Discrete input. Not available with blink (BLINK) or intermittence (BUZZER2), be sure to turn it off.

• Input Select: Mode-8

Mode-8	INPUT SELECT
OFF	Modbus/TCP (*)
ON	Discrete input

Selects the input signal of lamp and buzzer control. Note: Be sure to set unused Mode-5 to OFF.

■ IP ADDRESS RESET

IP RESET SW	IP ADDRESS RESET
OFF	Operating (*)
ON	IP address returns to factory default

Note: Other network settings are also reset to default.

WEB BROWSER SETTING

With Web browser, settings shown below are available.
Refer to the operating manual (EM-2431-B) for detailed settings.

■ DEVICE INFORMATION SETTING

ITEM	SETTING RANGE	DEFAULT
User name	Up to any 32 characters	admin
Password	Up to any 32 characters	admin

■ TCP / IP SETTING

ITEM	SETTING RANGE	DEFAULT
IP address	1.0.0.0 – 223.255.255.255	192.168.0.1
Subnet mask	224.0.0.0 – 255.255.255.255	255.255.255.0
Default gateway	0.0.0.0 – 255.255.255.255	0.0.0.0

■ MODBUS / TCP SETTING

ITEM	SETTING RANGE	DEFAULT
Port	1 – 65535	502
Modbus exception response	Not return 06 (BUSY), 0B (ERROR) / Return 06 (BUSY), 0B (ERROR)	Return 06 (BUSY), 0B (ERROR)
Communication timeout	0.0 – 3200.0 (sec.)	60.0 (sec.)
Run lamp timeout	0.0 – 3200.0 (sec.)	5.0 (sec.)

■ WIRELESS SETTING

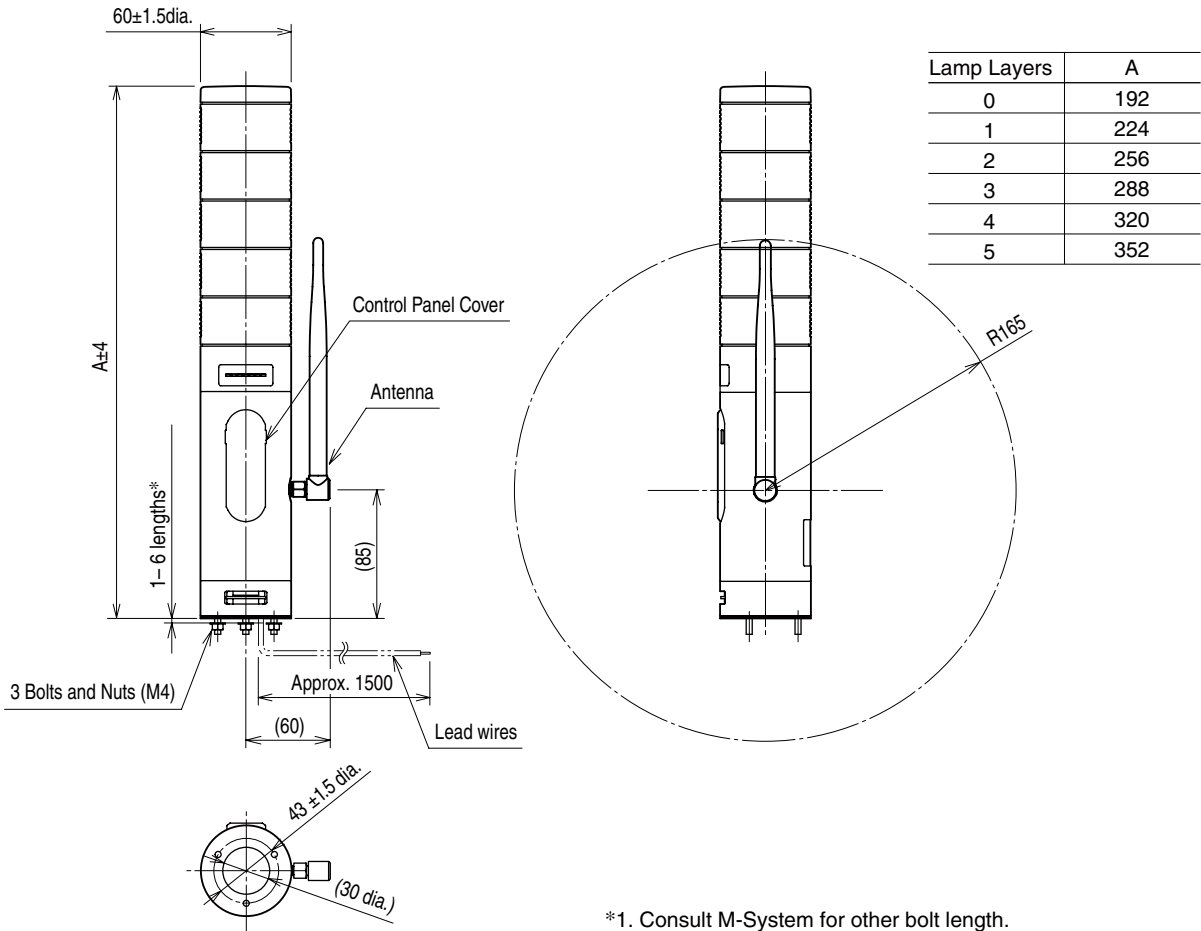
ITEM	SETTING RANGE	DEFAULT
PAN ID (group number)	0000 – FFFE (hexadecimal, 4 digits)	0000
Radio channel number	1 – 43ch	1ch
Network name	English one-byte characters within 16 characters (one-byte space, “-”, “_”, “.”, “@” are usable.)	MH920
Encryption key	0000...0 – FFFF...F (hexadecimal, 32 digits)	0000...0
Prefix	2000:0000:0000:0000 – 3FFF:FFFF:FFFF:FFFF	2000:0000:0000:0000
Transmitter power output	0.16 mW / 1 mW / 20 mW	20 mW
Device type in a network, Number of devices in a network	Child (fixed), 1 to 30 devices / Child (fixed), 31 to 60 devices / Child (fixed), 61 to 100 devices / Child (fixed) + child (moving)	Child (fixed), 1 to 30 devices
Set network quality	Standard (recommended) / Frequency of route switching and delay (higher) / Frequency of route switching and delay (highest)	Standard (recommended)
Network join mode	V3-compatible mode / Fast join mode	V3-compatible mode
Packet filtering	None / Yes (polling type)	Yes (polling type)
Filter timeout on polling	1.0 – 60.0 (sec.)	4.0 (sec.)
Setting mode of short address	Range mode: 1 device (max. multi drop number) Range mode: 1 to 4 devices (max. multi drop number) Range mode: 1 to 8 devices (max. multi drop number) Range mode: 1 to 16 devices (max. multi drop number) Range mode: 1 to 31 devices (max. multi drop number) List mode	List mode
920Run timeout	0.0 – 3200.0 (sec.)	5.0 (sec.)
Retry times before route switching	Once / Twice / Three times	Three times
Short address list setting	Short address	—
MAC address list setting	MAC address	—
Connection refusal list setting	MAC address	—

Note: For version confirmation of communication module, refer to the operation manual (EM-2431-B).

TERMINAL CONNECTIONS

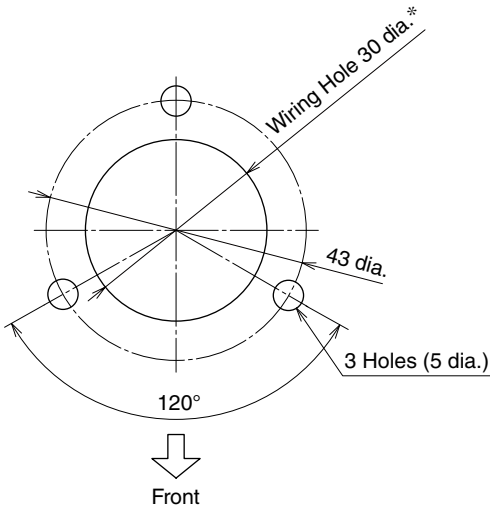
Connect the unit as in the diagram below.

EXTERNAL DIMENSIONS unit: mm



*1. Consult M-System for other bolt length.

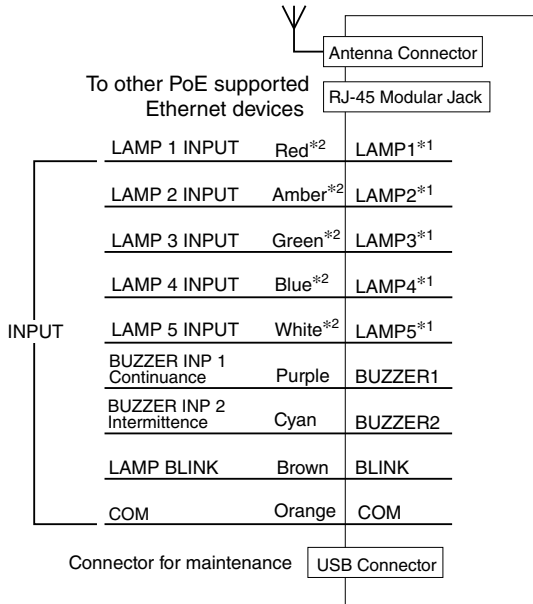
MOUNTING REQUIREMENTS unit: mm



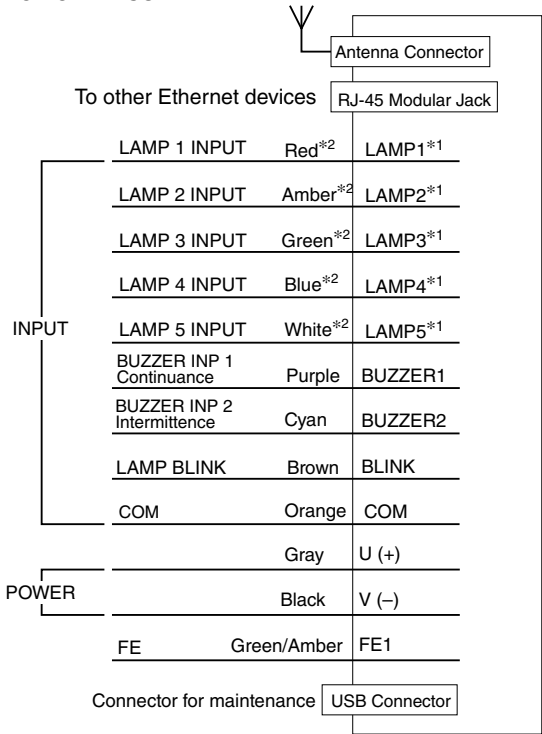
* Protect wires to prevent scratching them at the edge of the compartment.

■ CONNECTION DIAGRAM

• PoE SUPPLY



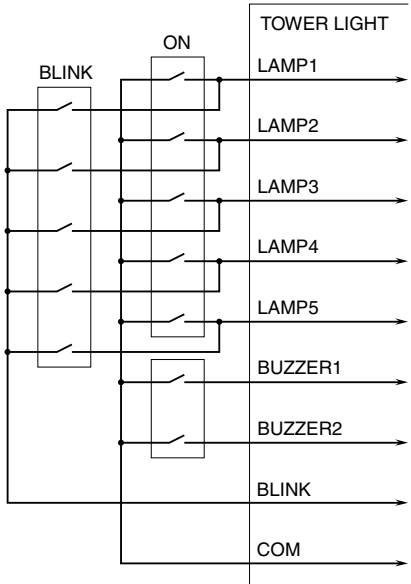
• DC POWER SUPPLY



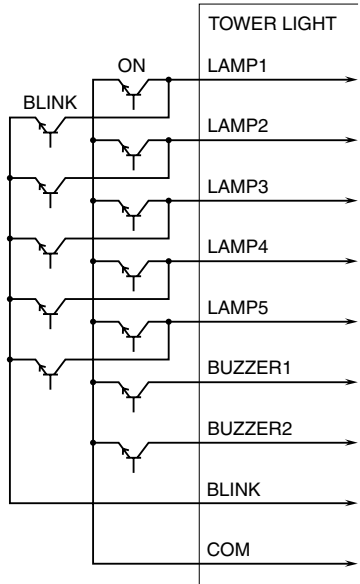
- *1. Example of 5 layers in order: red, amber, green, blue and white. Lamp and wire color are the same.
- *2. When selecting the same color for more than one layer, cable colors comply with ordering information sheet.

• WIRING TO INPUT SIGNAL

Contact input e.g.



NPN input e.g.



Note: If "On" and "Blink" are set simultaneously for a single lamp, "Blink" is disabled. At this time, if other lamps are being set to "Blink", they are also affected and work in the same manner.

CHECKING ETHERNET CONNECTION

■ PREPARATION FOR NETWORK

Prepare PC, clients and other devices for the network.

1. Connect the unit and PC with a LAN cable.
2. Set PC's IP address to 192.168.0. xxx (for example, 192.168.0.10) which does not duplicate with the unit. Then, set subnet mask to 255.255.255.0. (The unit's factory setting IP address: 192.168.0.1)

■ SETTING ON THE WEB BROWSER

1. Start the web browser. Enter the unit's IP address after http:// in address bar. For the first-time connection, enter as shown below using the factory setting IP address.
http://192.168.0.1/
Web browser (recommended): Microsoft Internet Explorer 11 or later
2. Enter user name and password. For the first time connection, enter "admin" in those fields.
3. For setting details, refer to the operating manual (EM-2431-B).

■ NETWORK CONNECTION

When the network is correctly installed and the connection is established, Link or Link100 LED turns ON or blinks.

■ CHECK TOWER LIGHT CONNECTION

Enter "ping command" from Command Prompt on the Windows as follows:

```
C:\WINDOWS>ping ***.***.***.***
(***.***.***.***: Enter IP address in decimal.)
```

```
ping ***.***.***.*** with 32 bytes of data:
Reply from ***.***.***.*** : bytes = 32 time < 10ms TTL = 64
Reply from ***.***.***.*** : bytes = 32 time < 10ms TTL = 64
Reply from ***.***.***.*** : bytes = 32 time < 10ms TTL = 64
Reply from ***.***.***.*** : bytes = 32 time < 10ms TTL = 64
```

```
Ping statistics for ***.***.***.***
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss)
```

Replies in case of normal connection are as shown above. If the connection cannot be established normally due to problems as wrong IP address, etc., other replies such as 'timeout' will be received.

MODBUS FUNCTION CODES & SUPPORTED CODES

■ DATA AND CONTROL FUNCTIONS

CODE	NAME	
01	Read Coil Status	Digital output from the slave (read/write)
02	Read Input Status	Status of digital inputs to the slave (read only)
03	Read Holding Registers	General purpose register within the slave (read/write)
04	Read Input Registers	Collected data from the field by the slave (read only)
05	Force Single Coil	Digital output from the slave (read/write)
06	Preset Single Registers	General purpose register within the slave (read/write)
15	Force Multiple Coils	Digital output from the slave (read/write)
16	Preset Multiple Registers	General purpose register within the slave (read/write)

■ EXCEPTION CODES

CODE	NAME	
01	Illegal Function	Unsupported function code
02	Illegal Data Address	Unsupported address
06	Slave Device Busy	Full request queue
11	Gateway Target Device Failed To Respond	Error response from 900 MHz band wireless device (child) or time-out

Note: When 900 MHz band wireless device (child) returns an exception code other than the above, the exception code is transmitted directly to upper devices.

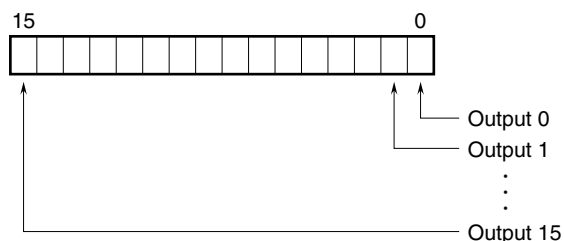
MODBUS I/O ASSIGNMENTS

MODBUS NODE ADDRESS 255

By sending Modbus query of node address 255 from Modbus/TCP master device connected to the unit, it is possible to perform I/O operations for the unit's lamps and buzzers. The unit sends a response to Modbus/TCP master device that sent the query.

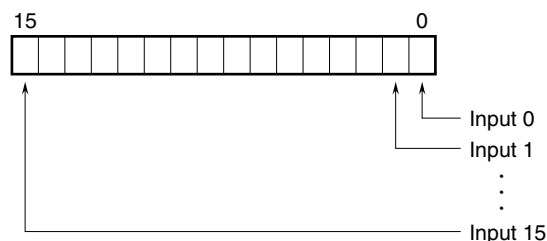
	ADDRESS	DATA TYPE	DATA
Coils (0X)	1 – 16		Digital Output (lamp, buzzer)
	17 – 32		Reserved (unused)
Inputs (1X)	1 – 16		Digital Input (lamp, buzzer)
Input Registers (3X)	----	----	Unused
Holding Registers (4X)	----	----	Unused

OUTPUT DATA



Output 0	Lamp 1	0: Off, 1: On
Output 1	Lamp 2	0: Off, 1: On
Output 2	Lamp 3	0: Off, 1: On
Output 3	Lamp 4	0: Off, 1: On
Output 4	Lamp 5	0: Off, 1: On
Output 5	Buzzer	0: Off, 1: Continuous
Output 6	–	–
Output 7	–	–
Output 8	Lamp 1	0: Off, 1: Blinking
Output 9	Lamp 2	0: Off, 1: Blinking
Output 10	Lamp 3	0: Off, 1: Blinking
Output 11	Lamp 4	0: Off, 1: Blinking
Output 12	Lamp 5	0: Off, 1: Blinking
Output 13	Buzzer	0: Off, 1: Intermittent
Output 14	–	–
Output 15	–	–

INPUT DATA



Input 0	Lamp 1	0: Off, 1: On
Input 1	Lamp 2	0: Off, 1: On
Input 2	Lamp 3	0: Off, 1: On
Input 3	Lamp 4	0: Off, 1: On
Input 4	Lamp 5	0: Off, 1: On
Input 5	Buzzer	0: Off, 1: Continuous
Input 6	–	–
Input 7	–	–
Input 8	Lamp 1	0: Off, 1: Blinking
Input 9	Lamp 2	0: Off, 1: Blinking
Input 10	Lamp 3	0: Off, 1: Blinking
Input 11	Lamp 4	0: Off, 1: Blinking
Input 12	Lamp 5	0: Off, 1: Blinking
Input 13	Buzzer	0: Off, 1: Intermittent
Input 14	–	–
Input 15	–	–

Note: If “On” (Continuous) and “Blinking” (Intermittent) are set simultaneously for a single lamp (buzzer), “Blinking” is disabled.

MODBUS NODE ADDRESSES 1 – 247

When Modbus query of Modbus node address 1 to 247 is sent from Modbus/TCP master device connected to the unit, it is transferred to a wireless device (child) that is connected to the unit via 900 MHz band wireless communication, then a response from the wireless device (child) is sent to Modbus/TCP master device that sent the query.