Tower Light Series

WIRELESS TOWER LIGHT

(small size, 40 mm dia., Modbus/TCP (Ethernet), Modbus-RTU transparent 900 MHz band wireless device (parent), 1 - 5 layers)

Functions & Features

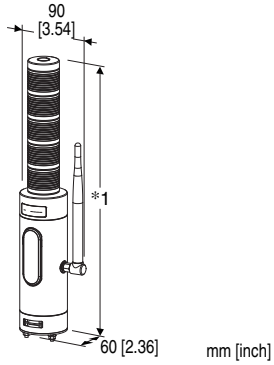
• Equipped with 900 MHz band wireless device (parent), which is RS-485 transparent type and enables Modbus-RTU protocol communication

• Converting protocols between 900 MHz band wireless Modbus-RTU (RS-485) and Ethernet Modbus/TCP, with gateway function

• Lighting, blinking and buzzer outputs possible with contact inputs, or with PC via Modbus/TCP

• Wireless device which incorporates a module conforming to FCC part 15 can be used only within the United States

• Non-directional antenna (360°horizontal)



*1. 224 mm with 1 lamp, 256 mm with 2 lamps, 288 mm with 3 lamps, 320 mm with 4 lamps, 352 mm with 5 lamps
(The illustration represents the unit with 5 layers.)

MODEL: IT40SW5F-[1][2][3][4][5][6]D2U-[7][8]

ORDERING INFORMATION

• Code number: IT40SW5F-[1][2][3][4][5][6]D2U-[7][8]
Specify a code from below for each of [1] through [8].
(e.g. IT40SW5F-5RYGBWD2U-R/Q)

• Use Ordering Information Sheet (No. ESU-2375) to select the same color for more than one layer.

• Specify the specification for option code /Q
(e.g. /C01)

* If you specify "no lamp", see the specification of IT60SW5F.

[1] LAMP LAYERS

1: 1 layer
2: 2 layers
3: 3 layers
4: 4 layers
5: 5 layers

[2] LAMP 1 COLOR

(1st layer from the top)
R: Red
Y: Amber
G: Green
B: Blue
W: White

[3] LAMP 2 COLOR

(2nd layer from the top)
R: Red
Y: Amber
G: Green
B: Blue
W: White
N: None (not available when Lamp Layers selected are 2 - 5)

[4] LAMP 3 COLOR

(3rd layer from the top)
R: Red
Y: Amber
G: Green
B: Blue
W: White
N: None (not available when Lamp Layers selected are 3 - 5)

[5] LAMP 4 COLOR

(4th layer from the top)
R: Red
Y: Amber
G: Green
B: Blue
W: White
N: None (not available when Lamp Layers selected are 4 - 5)

[6] LAMP 5 COLOR

(5th layer from the top.)
R: Red
Y: Amber
G: Green
B: Blue
W: White
N: None (not available when Lamp Layers selected are 5)

* Select "None" option for the layers other than the selected.

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MOUNTING
D: Direct mounting

DESIGN TYPE
2: Type 2
(refer to outline dimensions)

COUNTRY IN WHICH IT IS INTENDED FOR USE
U: The United States

[7] POWER INPUT
DC Power
R: 24 V DC
(Operational voltage range 24 V ±10 %, ripple 10 %p-p max.)
PoE (Power over Ethernet)
N: 37 - 57 V DC (PoE: IEEE802.3.af/at approx. 5 W)
PoE injector should be supplied by user.

[8] OPTIONS
blank: none
/Q: With options (specify the specification)

SPECIFICATIONS OF OPTION: Q
COATING (For the detail, refer to our web site.)
/C01: Silicone coating
/C02: Polyurethane coating
/C03: Rubber coating

RELATED PRODUCTS
For related products of wireless device, refer to our web site.
• LAN cable (model: ITCA)
• Mounting Pole (model: ITPL, ITB, ITP, ITW and ITS)
• Mounting Adapter (model: ITAD1, ITAM, ITAR and ITAW)
Maintenance software
Maintenance console: MH920 Console International (model: MH920CI) (OKI)
(Maintenance software is downloadable at our web site.)

GENERAL SPECIFICATIONS
Degree of protection: IP 65, vertical mounting only (bottom connectors excluded)
Connection
• Power: UL1007 AWG20
• Input: UL1007 AWG22
• Ethernet: RJ-45 Modular Jack
• Wireless communication: SMA coaxial connector
• Maintenance: Mini USB type B female connector
Housing material: Flame-resistant resin
Lens: Flame-resistant resin (transparent)
Isolation
• DC power: Power input to discrete input to Ethernet or FE1 to antenna connector
• PoE: Discrete input to Ethernet (PoE) to antenna connector
DIP SW Setting: Frequency of lamp blinking and buzzing discontinuance, buzzing volume level, output at connection failed and IP address (refer to the instruction manual)
Lamp: Red, amber, green, blue and white LEDs
on/blinking (approx. 2 Hz, 10 Hz)
Indicator LED: Power, Run and PoE (if selected)
For details, refer to the instruction manual.
Buzzing: Approx. 3.3 kHz
Interval: continuous/intermittent (approx. 2 Hz, 10 Hz)

COMMUNICATION
■ Common spec.
Modbus protocol
Protocol: Modbus/TCP
Data: RTU (Binary)
Port No.: 502
Max. number of socket connections: 8
IP address: 192.168.0.1
(factory setting; can be changed via web browser)
■ Ethernet
Communication Standard: IEEE 802.3u
Transmission: 10BASE-T, 100BASE-TX
Baud rate: 10/100 Mbps (Auto Negotiation function)
Transmission media: 10BASE-T (STP, Category 5), 100BASE-TX (STP, Category 5e)
Max. length of fieldbus segment: 100 meters
Ethernet indicator LED: Link, Link100

WIRELESS SPECIFICATIONS
Communication Standard: IEEE 802.15.4g
Frequency: 900MHz band (902 - 928 MHz)
Max. Transmission power: 20 mW
Bandwidth: 400 kHz
Modulation: GFSK
Baud rate: Max. 100 kbps
Channels: 1 to 43 ch
Security: 128bit AES
Indicator LED: 920Run, 920Link
Number of child devices: Max. 100
Protocol: Modbus-RTU
Communication module: Coordinator module incorporated (Oki Electric Industry Co., Ltd.)
Radio parameters setting: by Web browser
Max. transmission distance (optical): Approx. 1 km

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INPUT SPECIFICATIONS

■ **Discrete Input**: Dry contact, open collector NPN
Input resistance: Approx. 4.4 kΩ
Common: Negative common NPN
ON level: ≤ 5 V / ≥ 3.5 mA (Input - COM)
OFF level: ≥ 18 V DC / ≤ 1 mA (Input - COM)
Input current: ≤ 5.5 mA per point @ 24 V DC

INSTALLATION

Max. current consumption
•**DC**: Approx. 5.5 W (24 V DC)
•**PoE**: Approx. 5 W
Operating temperature: -10 to +55°C (14 to 131°F)
Operating humidity: 10 to 90 %RH (non-condensing)
Atmosphere: No corrosive gas or heavy dust
Mounting: Direct mounting
Mounting direction: Vertical
Weight: Approx. 650 g (1.43 lb)

PERFORMANCE

Insulation resistance: ≥ 100 MΩ with 500 V DC
Dielectric strength
DC: 1500 V AC @ 1 minute
(Power input to discrete input to Ethernet or FE1 to antenna connector)
PoE: 1500 V AC @ 1 minute
(Discrete input to Ethernet (PoE) to antenna connector

STANDARDS & APPROVALS

Module conforming to FCC Part 15 incorporated

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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).

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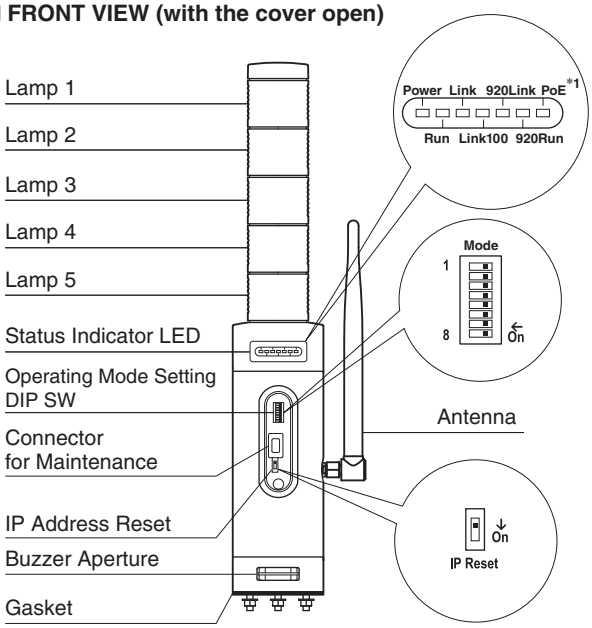
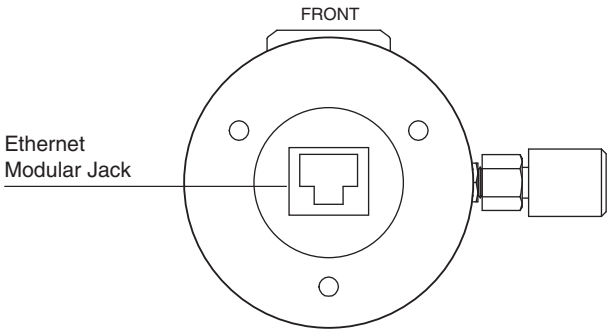
EXTERNAL VIEW

■ **FRONT VIEW (with the cover open)**



■ **BOTTOM VIEW**



*1. Equipped when PoE is selected

MODBUS FUNCTION CODES & SUPPORTED CODES

Modbus function codes are shown below.

■ **DATA AND CONTROL FUNCTION**

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

■ **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 exception codes other than the above, the codes are transferred directly to the host.

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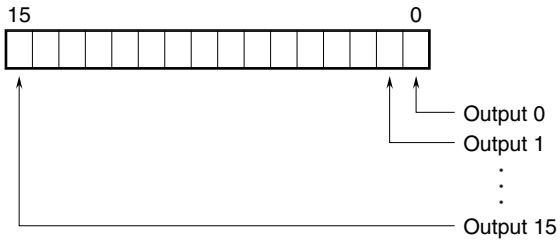
MODBUS I/O ASSIGNMENT

■ 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.

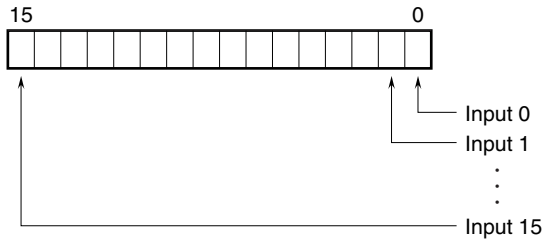
	ADDRESS	DATA TYPE	DATA
Coils (0X)	1 – 16		Digital Output (lamp, buzzer)
	17 – 32		Reserved (unused)
Inputs (1X)	1 – 16		Digital Input (lamp, buzzer)
Input Registers (3X)	----	----	Unused
Holding Registers (4X)	----	----	Unused

■ 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.

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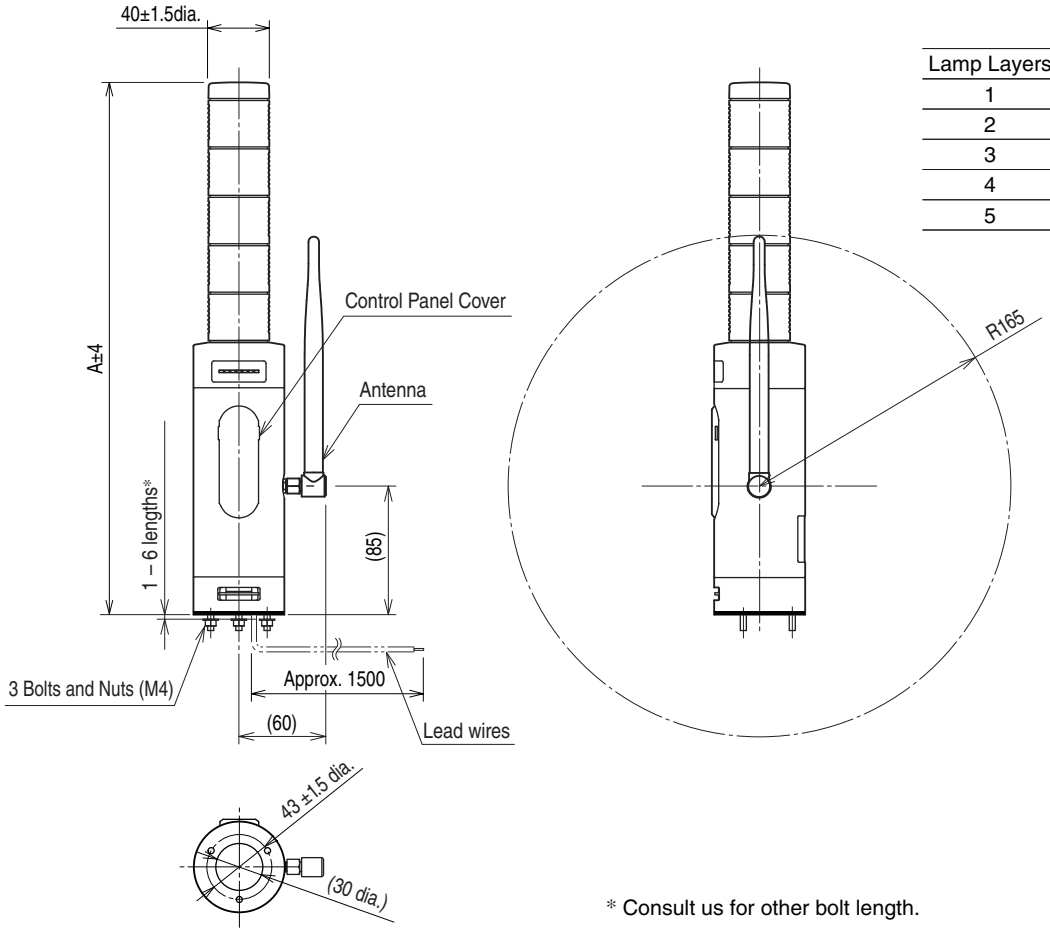
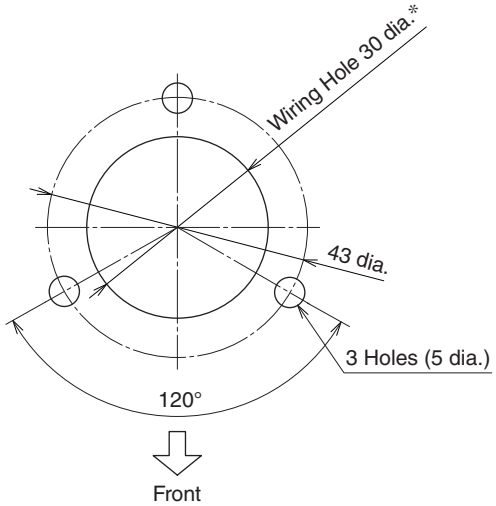
EXTERNAL DIMENSIONS unit: mm



Lamp Layers	A
1	224
2	256
3	288
4	320
5	352

* Consult us for other bolt length.

MOUNTING REQUIREMENTS unit: mm



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

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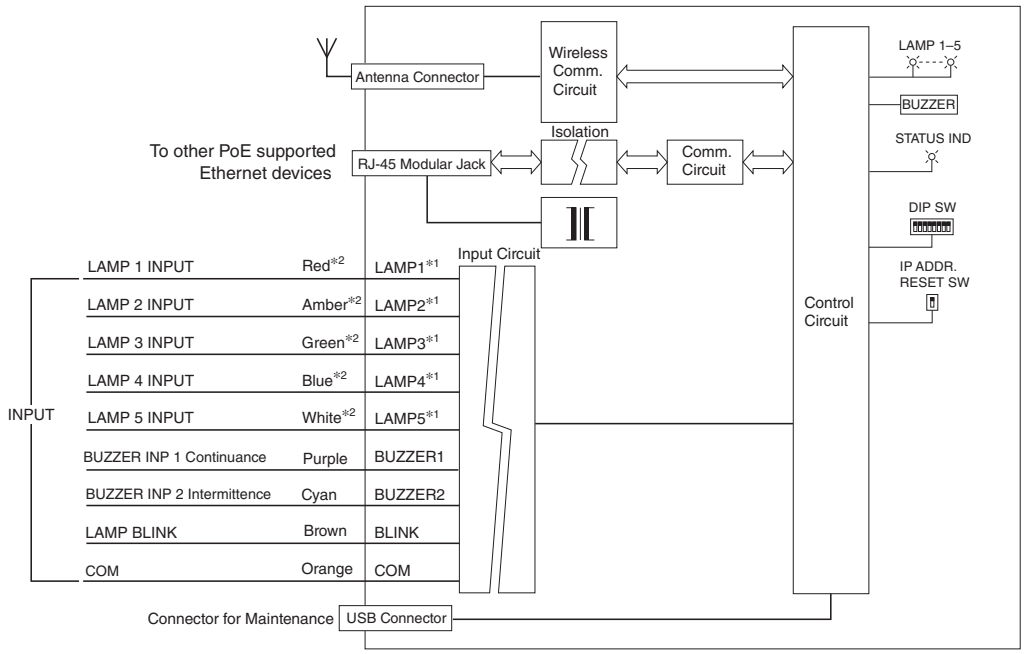
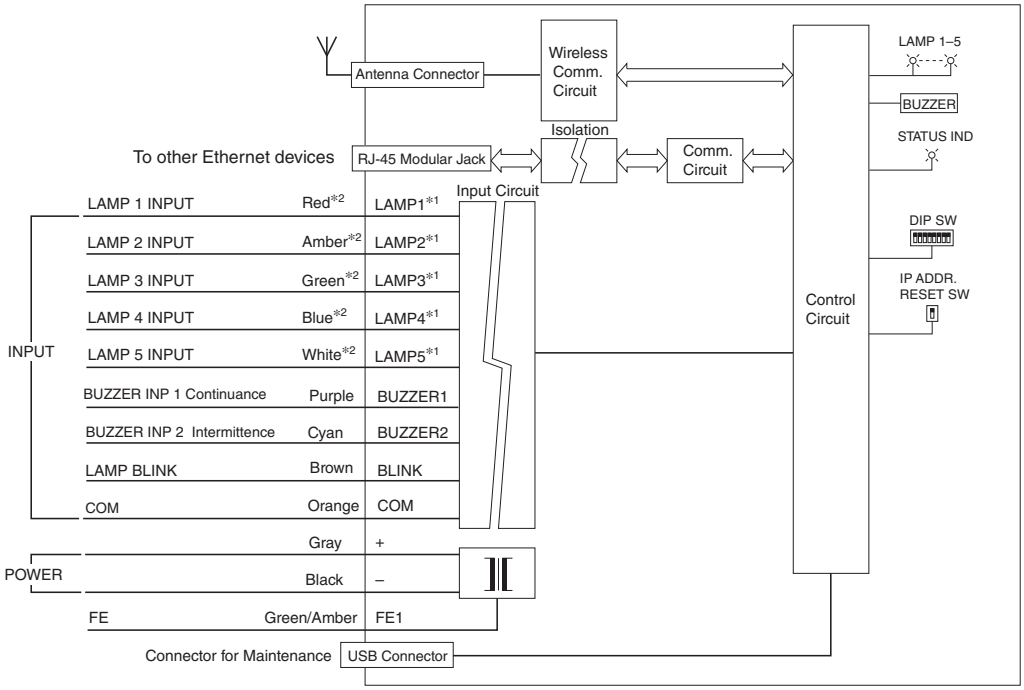
SCHEMATIC CIRCUITRY & CONNECTION DIAGRAM

■ **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.

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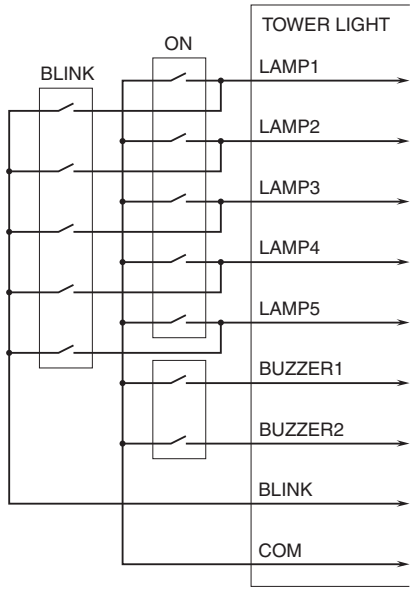
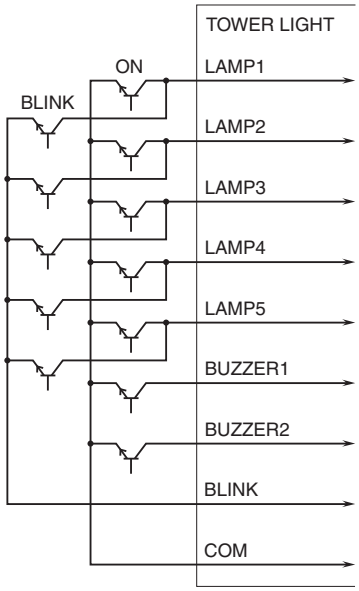
• **WIRING TO INPUT SIGNAL**

Contact input e.g.



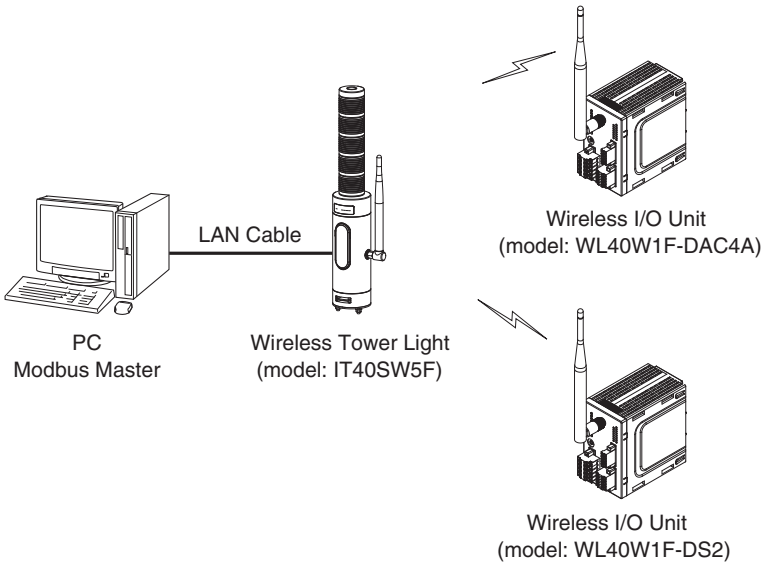
NPN input e.g.



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

SYSTEM CONFIGURATION EXAMPLES

■ **Modbus Master (PC side) communicates with child devices via wireless connection using Modbus/TCP and RTU protocols.**



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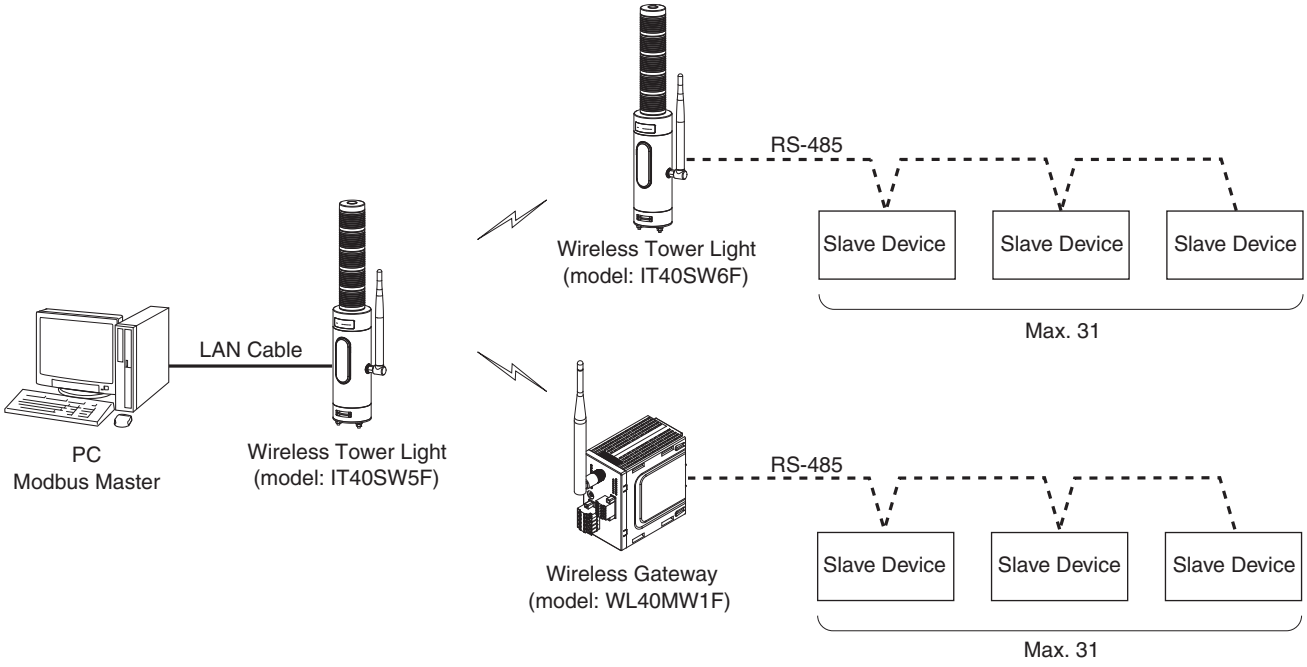
■ **Modbus Master (PC side) communicates with Slave Devices in multi drop connection on the wired side (RS-485) via wireless connectionusing Modbus/TCP and RTU protocols.**



⚠ Specifications are subject to change without notice.

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