PATLITE®

B95100543-2_04

USB Signal Tower/Body Unit

TYPE: **LR6-3USB□-RYG**

TYPE: **LR6-USB□**

Instruction Manual

[Web version]

■ Notice to Customer

Thank for your purchasing our PATLITE products.

- Request the installation and wiring be performed by a professional contractor if construction work is involved.
- Prior to installation, read this manual thoroughly before using this product to ensure correct use.
- Re-read this manual before conducting maintenance, inspections, repairs, and so on. If you have any questions about this product, please contact your PATLITE sales representative listed on the back of this manual.

■ To the Contractor

- Prior to installation, read this manual thoroughly to ensure it is installed correctly.
- Return this manual to the customer.

■ Table of Contents

◇ About Trademarks and Registered Trademarks

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- Company names and product names described in this document are trademarks or registered trademarks of those respective companies.

1. Before you begin

1.1 About Safety Symbols

To prevent injuries to the user and other personnel, as well as to prevent damage to assets, note the following:

◇ The following symbols classify warnings and cautions, and describe the level of harm and damage that will occur when the corresponding instructions are ignored.

⚠ WARNING	This symbol indicates, "Failure to follow the instructions may lead to death or serious injury."
⚠ CAUTION	This symbol indicates, "Failure to follow the instructions may lead to injury or property damage."

◇ The following symbols classify and describe the content of associated messages.

Prohibited	This symbol identifies "Prohibited" operations that should never be carried out.
Mandatory	This symbol identifies "Mandatory" instructions that should always be carried out.
⚠	This symbol identifies general "Caution" related information.

1.2 Safety Precautions

⚠ WARNING	
Mandatory	◇ Take the following precautions to prevent electric shock, short-circuit, or damage. ・ Always disconnect the USB power supply when wiring, assembling, or disassembling the unit. This will reduce the risk of electric shock or fire damage to the internal circuit due to a short-circuit. ・ Use this product under suitable conditions. (If a unit becomes damaged, replace it.) ◇ Request the installation and wiring be performed by a professional contractor if construction work is involved. Failure to follow these instructions could result in electric shock, fire, falls, or other. ◇ Set up safety guards, such as combining with other equipment, to prevent injuries or equipment damage caused by misuse or unforeseen operation of this product.

⚠ CAUTION	
Prohibited	◇ Avoid exposure to the buzzer sound from a close distance. Failure to follow this instruction will result in injury (hearing loss). ◇ Do not use this product with the O-ring or waterproof gasket removed. Waterproofing will be affected. Failure to follow this instruction will result in injury or equipment damage. ◇ Do not use this product near fire, in hot or humid environments, or where corrosive or flammable gas is present. Failure to follow this instruction could result in injury or equipment damage. ◇ Do not touch the connector terminals inside the unit when attaching or removing the LED unit or head cover. Failure to follow this instruction could result in equipment damage. ◇ After attaching this product to equipment, do not grab this product to assist with climbing up onto the equipment. Failure to follow this instruction will result in injury or equipment damage.
Mandatory	◇ Always use this product with the head cover securely installed to maintain dust and waterproofing performance. ◇ When removing covers or packing from the equipment, which is attached to this product, be careful not to snag the product. Failure to follow these instructions will result in equipment damage.

NOTICE

◇ Adhere to the following to maintain safe use of this product:

・ Perform periodic pre-maintenance.

◇ To prevent static electricity when working with this product, discharge the static electrical charge in your body before starting work. (You can discharge static electricity by touching your hand on grounded metal objects.)

◇ To clean this product, wipe with a soft cloth dampened with water. (Do not wipe with cleaners containing thinners, benzine, gasoline, or oil.)

◇ Adhere to the following when handling the parts of this product:

・ Do not disassemble any part other than that which can be detached from the product.

・ Do not modify the product.

・ Use only the specified replacement parts listed in this manual.

・We cannot warrant against breakdowns caused by disassembling this product, natural disasters, or handling of this product that is contrary to any warnings or precautions contained herein. Avoid using this product in ways other than those described in this manual. We cannot be held responsible for damages and injuries caused by failing to pay attention, or failing to follow precautions, during operation and maintenance.

・FCC Compliance

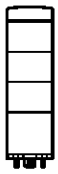
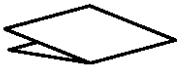
This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of FCC Rules and RSS-Gen of IC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

2. Contents

2.1 About the Contents

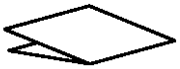
(1) USB signal tower

◇Model: LR6-3USB□-RYG

Product: 1 unit 	Instruction Manual (digest version) 
Flange nut (M4) x 3 	Cable tie x 1

(2) Body Unit

◇Model: LR6-USB□

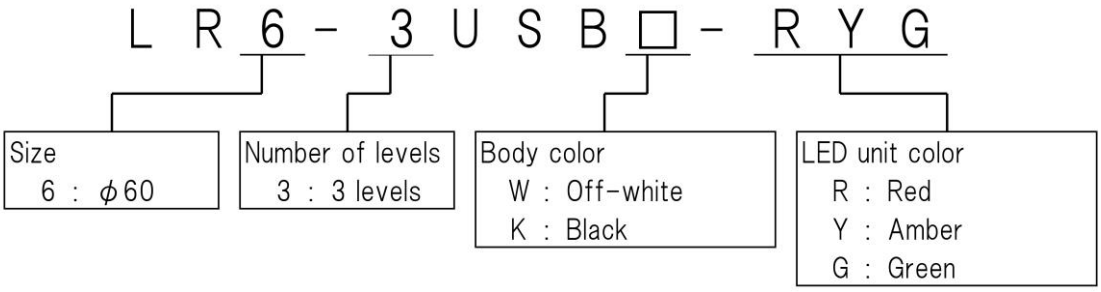
Product: 1 unit 	Instruction Manual (digest version) 
Flange nut (M4) x 3 	Cable tie x 1 

3. Models

3.1 About Models

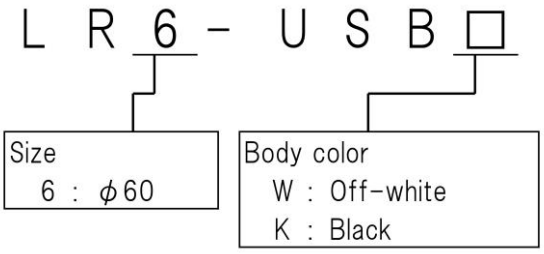
(1) USB signal tower

◇Model



(2) Body Unit

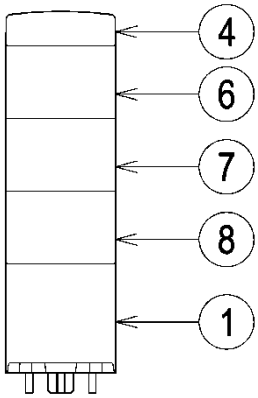
◇Model



4. Part Names and Dimensions

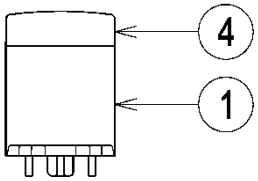
4.1 About Part Names and Dimensions

◇LR6-3USB☐-RYG



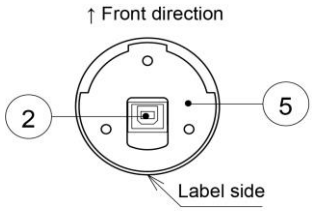
Front View

◇LR6-USB☐

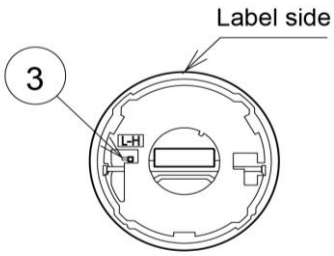


Front View

◇LR6-3USB☐-RYG/
LR6-USB☐ common



Bottom view



Top view

Number	Name	Material	Number	Name	Material
①	Body Unit	PC	⑤	Waterproof gasket	Rubber sponge
②	USB connector (Type-B)	-	⑥	LED unit R	PC
③	Volume switch	-	⑦	LED unit Y	PC
④	Head cover	PC	⑧	LED unit G	PC

5. Operation Overview

5.1 What is a USB signal tower?

A USB signal tower is a signal tower that can be controlled from a host PC via a USB connection (HID class).

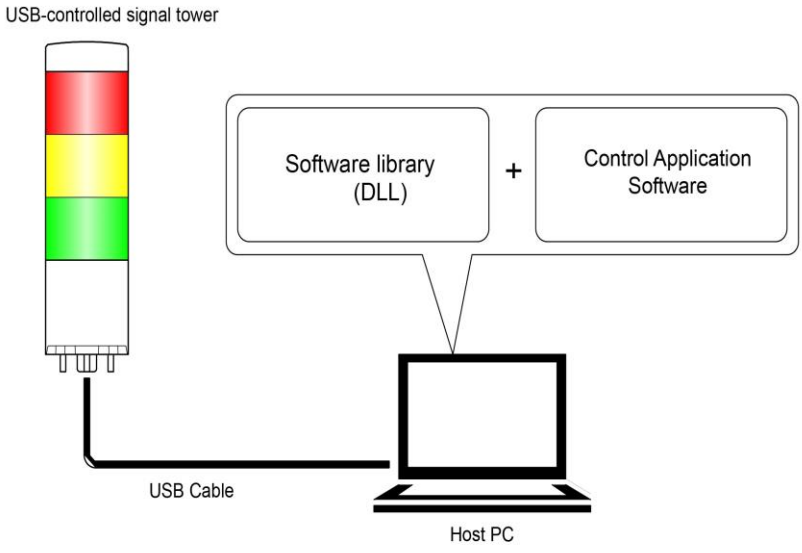
5.2 Device configuration

(1) Glossary

Term	Description
USB signal tower	This product. Consists of a body unit and LED unit.
HID class	The device class of this product. (HID = Human Interface Device)
Host PC	The computer used to control this product.
Control Application Software	Application software installed on the host PC. This software is used to control this product. It is necessary for the customer to create the software.
Software library (DLL)	Windows software library. Integrate and use with your control application software. Please download from our website. (DLL: Dynamic Link Library)

(2) Device configuration

・Configuration diagram



5.3 Function List

(1) Function Overview

Function	Description	References
USB communication function	A function for connecting and communicating with the host PC via USB cable.	-
LED unit control function	A function for the host PC to control the LED unit via USB communication. ・Control items: Light on / Light off / Pattern on	Refer to ☞ 5.3(2)①
Buzzer function	A function for the host PC to sound the buzzer built into the body unit via USB communication. ・Control items: Buzzer on / Buzzer off / Sound pattern	Refer to ☞ 5.3(2)②
Buzzer volume change function	A function for changing the buzzer volume via switch on the body unit. ・Change levels: 2 levels (H: High volume / L: Low volume) ・Default value: H	-

(2) Function Details

① LED unit control function

◇LED colors and LED unit models to control

LED color to control	Compatible LED unit model
R (Red)	LED unit (Red): LR6-E-R(Z), LED unit (Multi-color): LR6-E-MZ *
Y (Amber)	LED unit (Amber): LR6-E-Y(Z)
G (Green)	LED unit (Green): LR6-E-G(Z), LED unit (Multi-color): LR6-E-MZ *
B (Blue)	LED unit (Blue): LR6-E-B(Z), LED unit (Multi-color): LR6-E-MZ *
C (White)	LED unit (White): LR6-E-C

* LED unit (multi color): LR6-E-MZ

・There are two flashing patterns when using the LR6-E-MZ.
・The relationship between the LED color and LR6-E-MZ light color, when controlling the LR6-E-MZ, is as follows.

LED color to control	LR6-E-MZ light color
R (Red)	Red
G (Green)	Green
B (Blue)	Blue
R (Red) + G (Green)	Amber
R (Red) + B (Blue)	Purple
G (Green) + B (Blue)	Light blue
R (Red) + G (Green) + B (Blue)	White

CAUTION	
Prohibited	◇ Do not connect units other than compatible LED units. Failure to follow this instruction could result in decreased performance and equipment failure. ◇ The LED units you can mount on one body unit depend on the type of LED unit itself. Do not attach units beyond that. Failure to follow these instructions will result in equipment failure.

NOTICE

◇ The maximum number of LED units you can mount on one body unit is as follows.

・ LR6-E-☐, LR6-E-☐Z: Maximum 5 LED units.

Do not install multiple LED units of the same color.

・ LR6-E-MZ: Maximum 1 LED unit

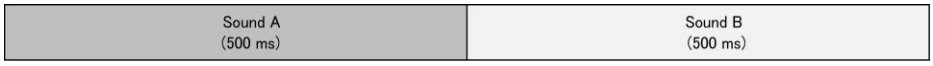
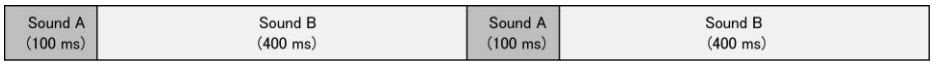
Do not attach other units.

① -1 LED unit control items

Control item	Description
Light on	Turns the LED unit on, and keeps it on.
Light off	Turns off the LED unit. This is the default state after the body unit is started.
Pattern on	Specify one of four types of LED patterns to illuminate the LED unit. Operation of LED patterns for one cycle is shown in the following timing charts.
LED pattern 1	
LED pattern 2	
LED pattern 3	
LED pattern 4	
Pattern on * When using LR6-E-MZ	Specify one of two types of LED patterns to illuminate the LED unit. Operation of LED patterns for one cycle is shown in the following timing charts.
LED pattern 1	
LED pattern 2	

② Buzzer control function

②-1 Buzzer control items

Control item	Description
Buzzer on	From 13 different sound pitches, select one for Sound A to emit the buzzer. (Sound A: Refer to ☞ ②-2) ・For the buzzer, select from continuous operation or operate for a specified number of times (1 to 15). Operating one time lasts one second.
Buzzer off	Stops the buzzer. This is the default state after the body unit is started.
Sound pattern	Specify one of four types of buzzer patterns for the buzzer. Configure the buzzer pattern by selecting two sounds (for Sound A and Sound B) from 13 different sound pitches. (Sound A, Sound B: Refer to ☞ ②-2) ・For the sound pattern, select from continuous operation or operate for a specified number of times (1 to 15). Operating one time is one cycle (1 second). Operation of buzzer patterns for one cycle is shown in the following timing charts.
Buzzer pattern 1	
Buzzer pattern 2	
Buzzer pattern 3	
Buzzer pattern 4	

②-2 Select pitch

Sound A / Sound B	
Pitch	Frequency (reference value)
(Stop)	-
A6	1760.0 Hz
B♭6	1864.7 Hz
B6	1975.5 Hz
C7	2093.0 Hz
D♭7	2217.5 Hz
D7	2349.3 Hz
E♭7	2489.0 Hz
E7	2637.0 Hz
F7	2793.8 Hz
G♭7	2960.0 Hz
G7	3136.0 Hz
A♭7	3322.4 Hz
A7	3520.0 Hz

5.4 Control Method

There are two control methods for the USB signal tower, as follows. Select the control method that conforms with the customer's device configuration and development environment.

Description	References
Control using a software library (DLL)	Refer to ☞ 7.3
Control that conforms with protocol specification	Refer to ☞ 7.4

6. Setup, Wiring, and Installation

6.1 Setting up the Main Unit

(1) Setup Item

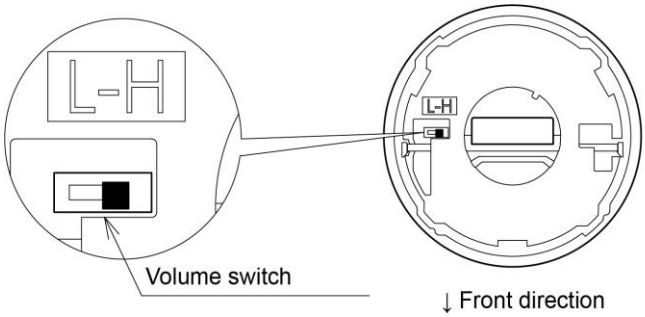
・Setup items are as follows.

Setup Item	Settings	References
Buzzer volume setting	Set the switch to define the volume level.	-

(2) Setup Process

CAUTION	
Prohibited	◇ Do not use excessive force on the volume switch. Failure to follow this instruction will result in equipment damage. ◇ Do not use sharp tipped objects with this product. Operation may become impossible as scratches develop on switches and switch contacts are interfered with.

・The volume switch for this product is on the top of the main unit.



DIP Switch

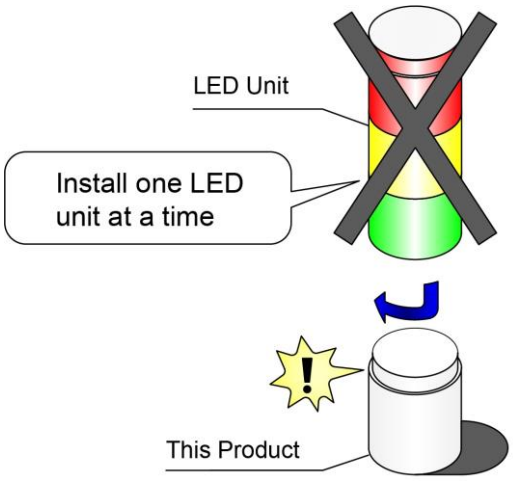
・DIP Switch Settings

Switch number	Description	Default setting
Volume switch	Change levels: 2 levels ・ H: High volume (Typ.80dB) ・ L: Low volume (Typ.70dB) Refer to ☞ "9.Specification" for details.	H

6.2 Attaching/Detaching LED Units

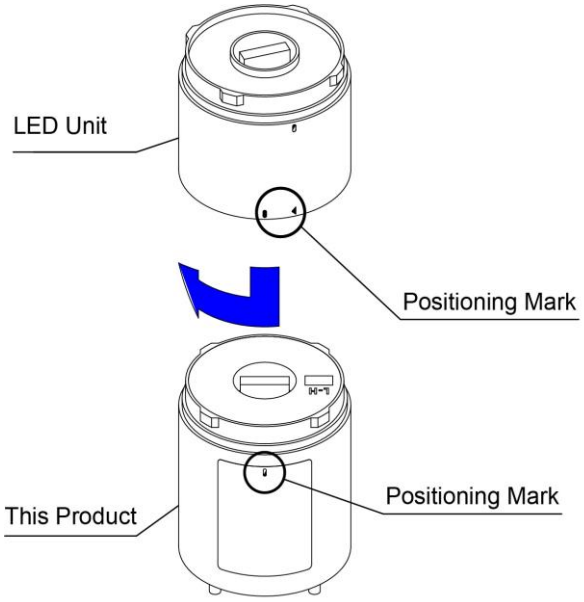
Always follow the instructions below when attaching/detaching LED units to/from this product.

WARNING	
Mandatory	◇ Before any work is done, disconnect the USB power. This will reduce the risk of electric shock or fire damage to the internal circuit due to a short-circuit.
CAUTION	
Prohibited	◇ Do not touch the connectors on the unit or this product, or the LED in LED units. Failure to follow this instruction could result in equipment damage. ◇ Do not connect units other than compatible LED units. Failure to follow this instruction could result in decreased performance and equipment failure. ◇ The LED units you can mount on one body unit depend on the type of LED unit itself. Do not attach units beyond that. Failure to follow these instructions will result in equipment failure. ◇ Do not apply excessive force to the units or this product. Failure to follow this instruction could result in equipment damage.
Mandatory	◇ Securely lock each unit when attaching. Failure to follow this instruction could result in equipment damage. ◇ Use the following method when detaching LED units. Failure to follow these instructions could result in equipment damage. ・ Attaching Units: Attach units one at a time to the body unit. ・ Detaching Units: Detach units one at a time from the body unit.
NOTICE	
◇ Before starting setup and wiring work, always read this document and instruction manuals that come bundled with any optional equipment. ◇ Non-compatible LED units cannot be connected. The maximum number of LED units you can mount on one body unit is as follows. ・ LR6-E-☐, LR6-E-☐Z: Maximum five LED units. Do not install multiple LED units of the same color. ・ LR6-E-MZ: Maximum 1 LED unit Do not attach other units.	

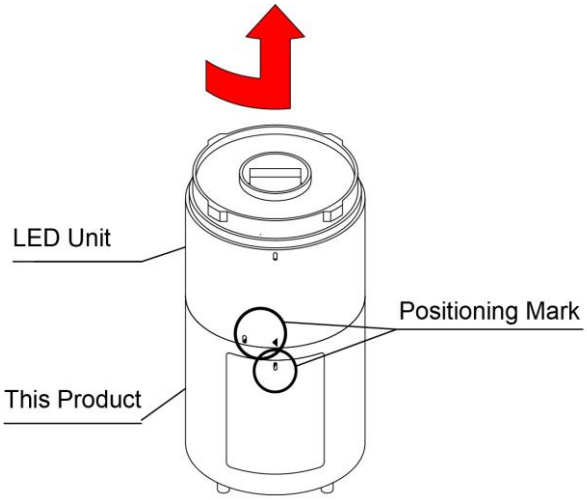
⚠ CAUTION	
Prohibited	◇ Do not detach multiple connected units (except head cover) from this product.
	◇ When attaching/detaching LED units to/from this product, attach/detach units one at a time. Failure to follow these instructions could result in equipment damage. 

(1) Attaching and Detaching LED Units

■ Mounting Method

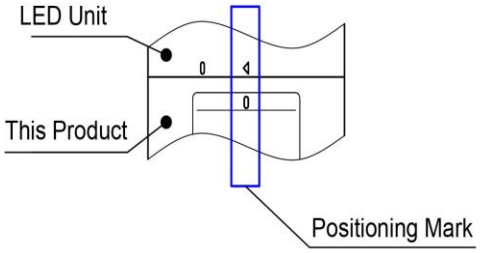


■ Detaching

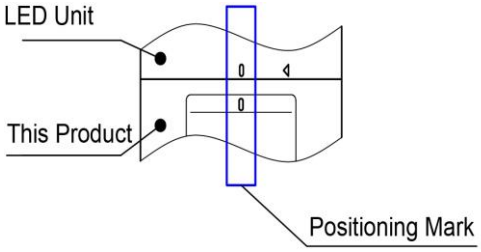


■ Positioning Mark

Locked



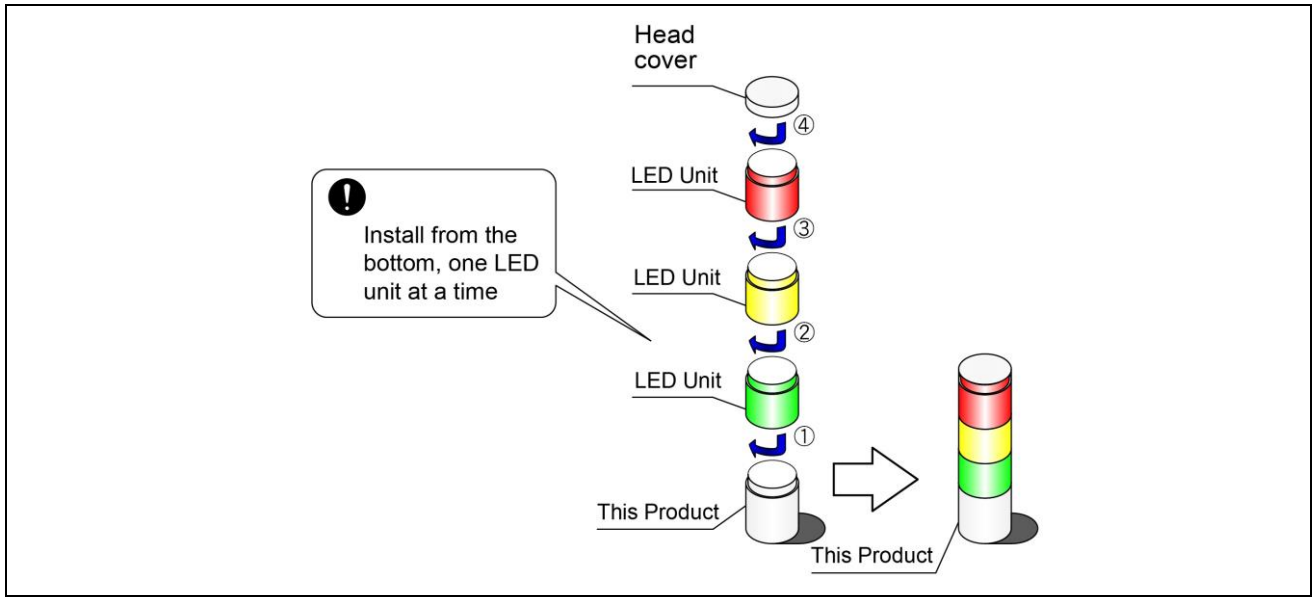
Unlocked



(2) Procedure for attaching/detaching LED units

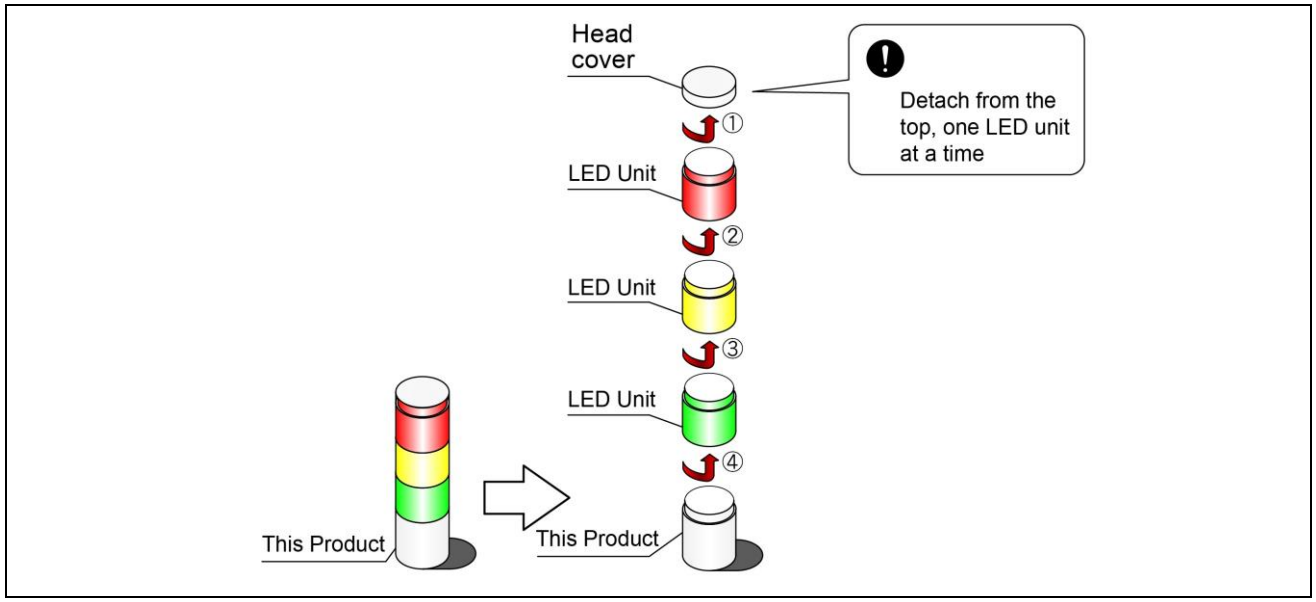
(2-1) Procedure for attaching LED units to this product

◇Attach LED units at each step in the prescribed order, from ① to ④.
◇Attach LED units one at a time.



(2-2) Procedure for detaching LED units from the body unit

◇Detach LED units in the prescribed order, from ① to ④.
◇Detach LED units one at a time.



CAUTION	
⚠	◇ If an LED unit does not attach properly to this product, confirm that the tab of the cylinder-shaped part at the top of the LED unit is fitted correctly into the groove. If the tab is outside the groove as shown in Figure 1, refer to Figure 2 on how to reposition it. Additionally, depending on how it is detached, the tab may come out of the groove (as shown in Figure 1) when detaching the LED unit from this product. If the product is attached again while the tab is still in this state, it may become damaged.

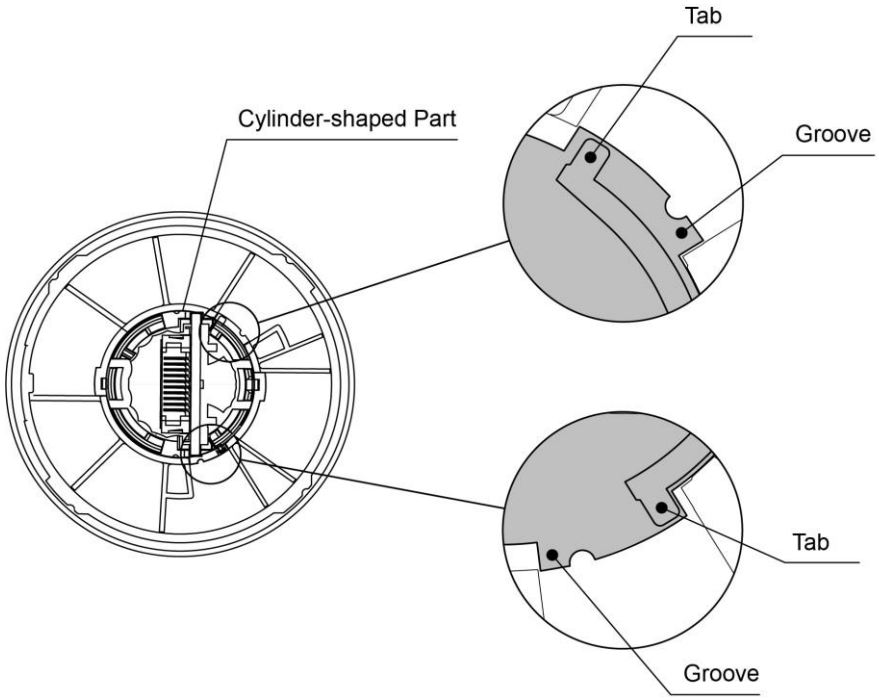


Figure 1

CAUTION

◇ If an LED unit does not attach properly to this product, follow the steps below.

- In the center of the underside of the product, turn the cylinder-shaped part counter-clockwise. (Refer to ☞ Figure 2)
- Turn the cylinder-shaped part until it snaps into place, then attach it to this product. (Refer to ☞ Figure 3)

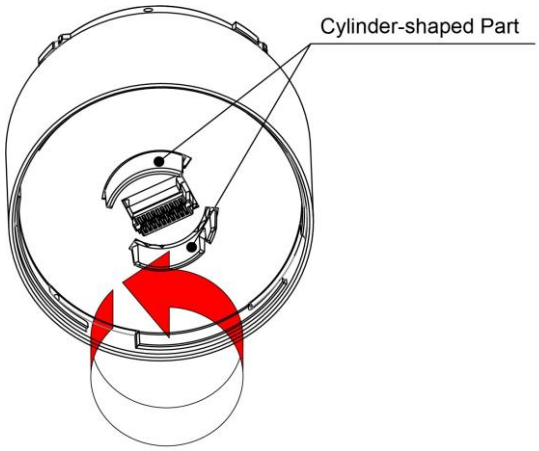


Figure 2

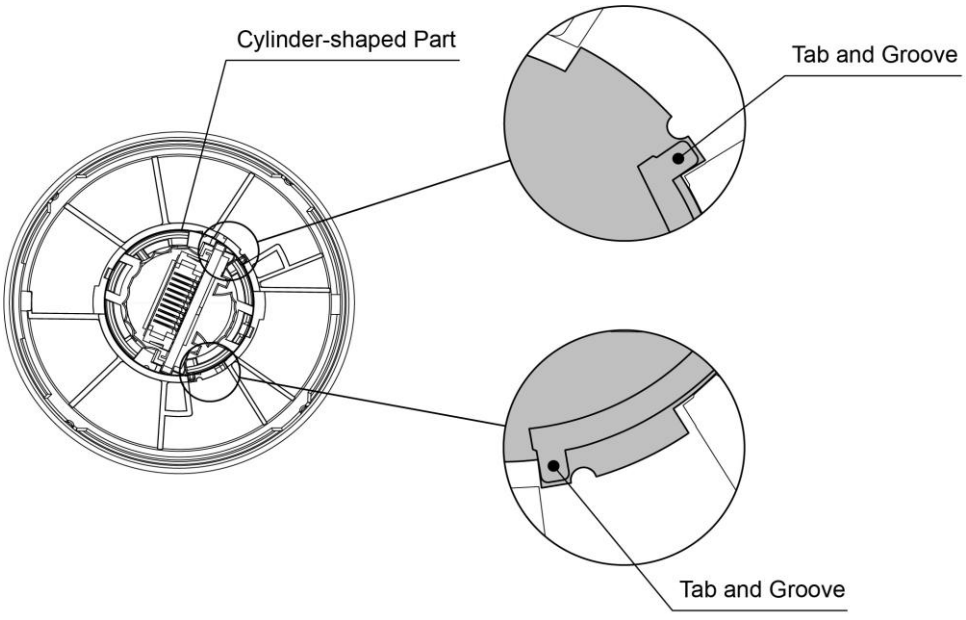


Figure 3

6.3 Installing the Body Unit and Connecting the USB Cable

CAUTION	
Prohibited	◇ When installing with pole bracket and pole, do not use in an environment where it can get wet. ◇ When connecting a USB cable, do not apply excessive force to the connector on this product. Failure to follow these instructions will result in equipment damage.
Mandatory	◇ When connecting this product to a PC, please connect directly without using a USB hub or other device. Using a USB hub or other device could cause operations to become unstable.

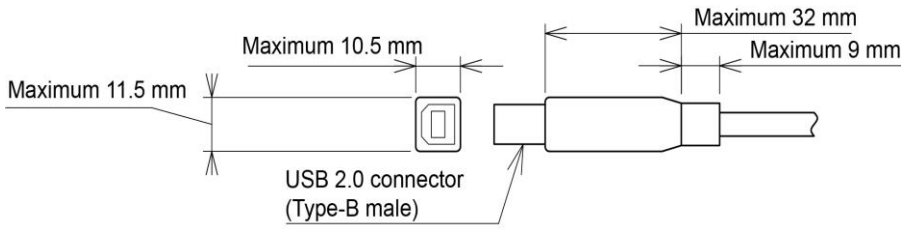
NOTICE

◇ To prevent static electricity when working with this product, discharge the static electrical charge in your body before starting work. (You can discharge static electricity by touching your hand on grounded metal objects.)

◇ You need to provide the USB cable.

◇ Use a USB cable 3 m or shorter.

◇ Adhere to the following for the shape and size of the USB cable's Type-B connector that connects to the body unit.



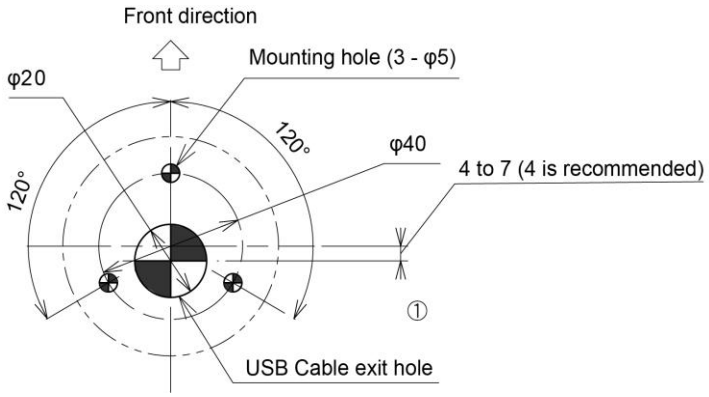
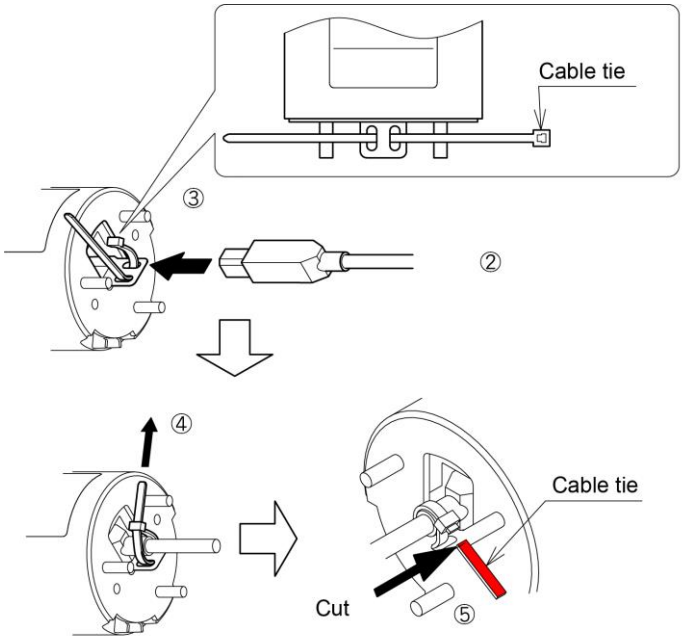
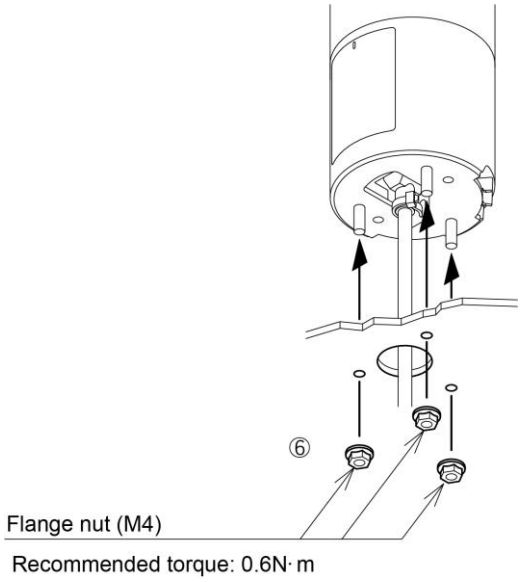
◇ The following requirements are necessary for the mounting location.

・ Minimal vibration / Sufficiently sturdy / Flat surface

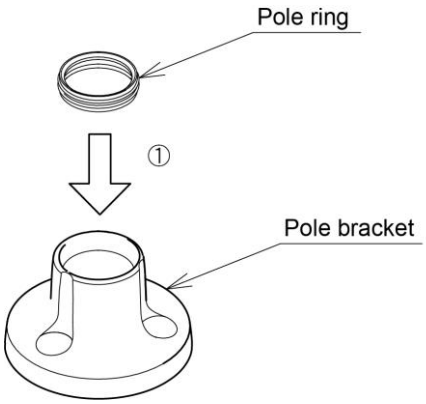
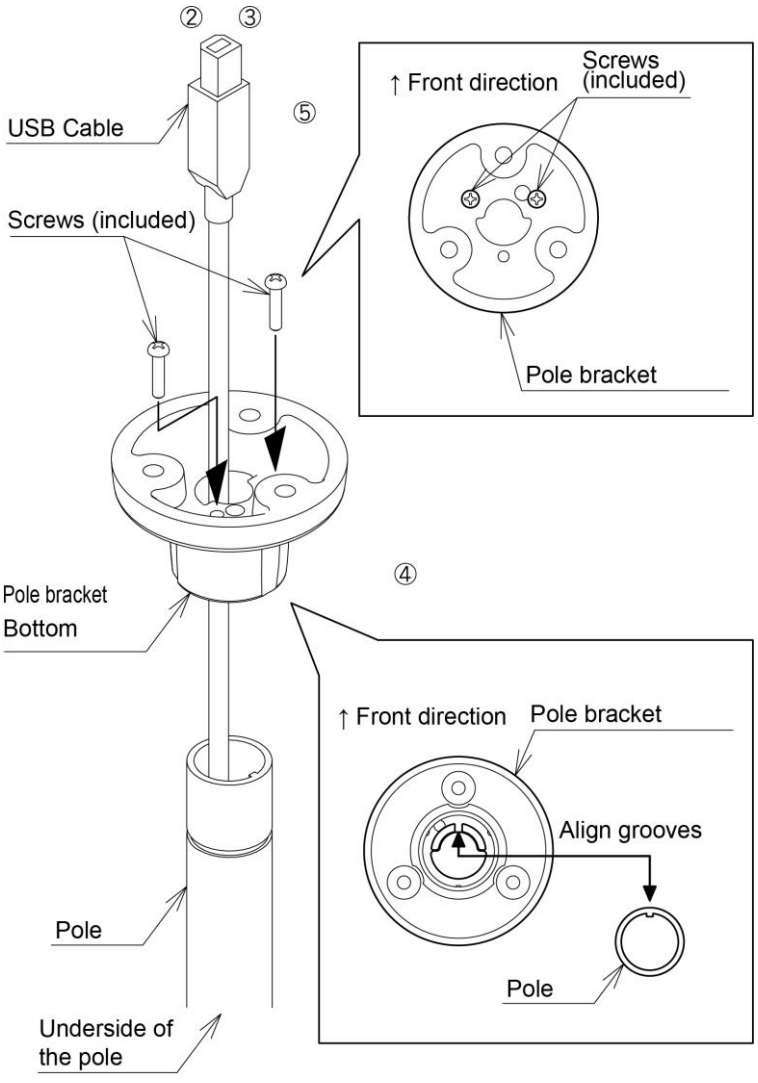
◇ Install this product in the upright position.

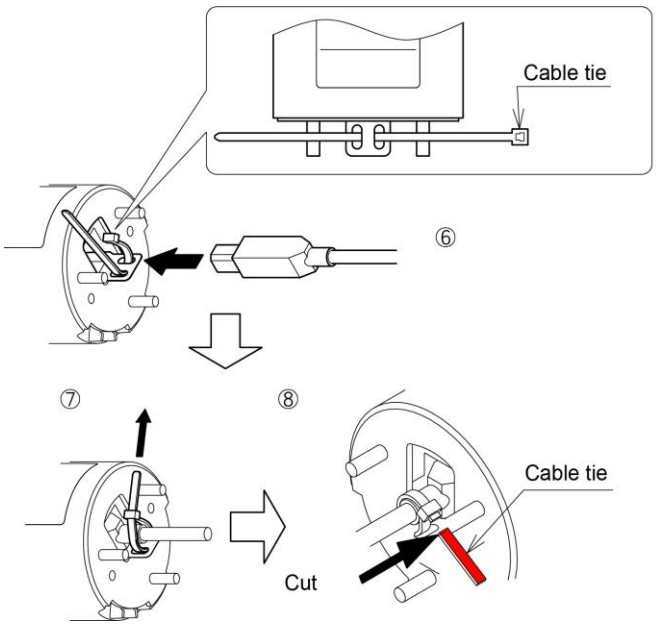
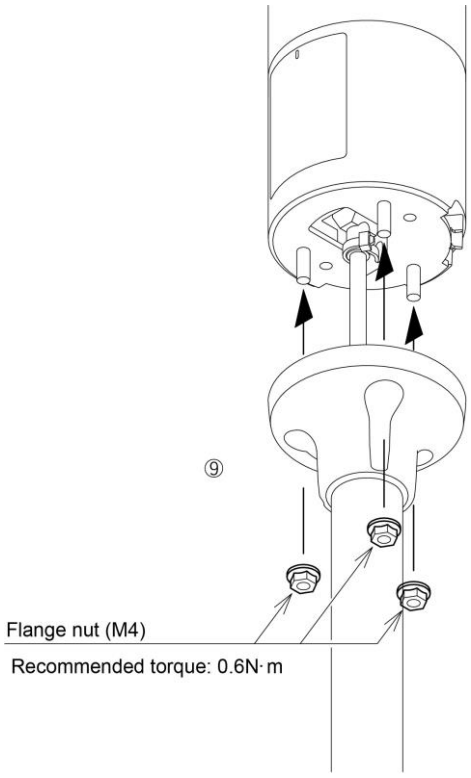
◇ Always use the following method when installing this product.

(1) Installing directly to the board surface

<table>
<tr><th>Step</th><th colspan="2">Item</th></tr>
<tr><td>1</td><td>Drill mounting holes and USB cable exit hole into the board surface in accordance with the prescribed dimensions for mounting this product.</td><td> 
</td></tr>
<tr><td>2</td><td>Pass the USB cable through the USB cable exit hole in the board surface.</td><td rowspan="4"> 
</td></tr>
<tr><td>3</td><td>Connect the USB cable to the body unit.</td></tr>
<tr><td>4</td><td>Secure the USB cable with the supplied cable tie.</td></tr>
<tr><td>5</td><td>Cut the excess cable tie with a nipper.</td></tr>
<tr><td>6</td><td>Secure this product in 3 places with the supplied nuts.
(Recommended torque: 0.6N· m)</td><td> 
</td></tr>
</table>

(2) Installing the body unit using the pole bracket (optional) and pole (optional)

Step	Item	
1	Insert the pole ring supplied with the pole bracket into the pole bracket.	
2	Pass the USB cable from the underside of the pole.	
3	Next, pass the USB cable through the bottom of the pole bracket.	
4	Insert the pole into the pole bracket, lining up the grooves.	
5	In 2 places, affix the screws included with the pole bracket, and secure the pole bracket and the pole. (Recommended torque: 1.4N· m)	

Step	Item	
6	Connect the USB cable to the body unit.	
7	Secure the USB cable with the supplied cable tie.	
8	Cut the excess cable tie with a nipper.	
9	In 3 places, affix the nuts included with the body unit, to secure the pole bracket and body unit.	

NOTICE
◇ When replacing the LU7-02S-USB with this product, replace the pole bracket and pole with the defined optional item. Also, disconnect the USB cable from the host PC, and perform replacement of this product. (The method for inserting the USB cable into the pole bracket and subsequent steps for this product is different from the installation method for the LU7-02S-USB.)

7. Control the USB Signal Tower

7.1 Purpose and precautions

(1) Purpose

・This chapter describes the software library (DLL) and USB communication protocol for controlling the USB signal tower.

(2) Precautions

CAUTION	
⚠	◇ Only the information necessary for control is described in this manual. This manual does not contain all the information about this product. ◇ Operation examples are provided for the software and related information described in this manual. You may use this information for software design assuming all responsibility. There is no assumption of responsibility for damages incurred by you or a third party as a result of using this information. ◇ The contents of this manual are subject to change without notice. ◇ There is no assumption of responsibility for inaccuracies in this manual.
⊘ Prohibited	◇ Any unauthorized copying of part or all of this manual is prohibited.

7.2 Before Design

◇ The following control methods are available for the USB signal tower:

・Control using a software library (DLL)
・Control that conforms with protocol specification

Select the control method that conforms with the customer device configuration and development environment, and then perform design.

Control Method	Characteristics	
Control using a software library (DLL)	Design details	・Create application software that controls this product using a DLL. (DLL is recognized as an HID class device, and responsible for USB communication with this product.)
	Host device	・PC (Windows®)
Control that conforms with protocol specification	Design details	・Use interrupt transfer to send data conforming to protocol specifications, and create application software recognized as a HID class device to control this product.
	Host device	・PC (Windows®, other operating systems)

7.3 Control using a software library (DLL)

(1) Overview

This section describes the method of controlling with a software library (DLL) a USB signal tower.

◇Download the software library (DLL) from our website.
◇Check the content before creating the program. Sample code can also be downloaded from our website. Check the code in conjunction with this manual.

(2) Development environment

Item	Description		Overview
Development language	C, C++, C#, VB		-
Compatible software	VisualStudio 2008® VisualStudio 2012® VisualStudio 2013®		.NET Framework 4.0 or later must be installed.
Necessary external files	Software library (DLL)	USB_PAT_Tower.dll	Library that is used to control this product.
		USB_PAT_Tower.lib	File required for handling the library using static links. (Not required if dynamic links are used.)
		USB_PAT_Tower_DLL.h	Header file in which functions belonging to the library are declared.
		USB_PAT_Definition.h	Header file in which parameters are defined.
	Windows standard	HID.dll	File installed with Windows.
		setupapi.dll	
	Other	MSVCR100.dll	When starting the application, if the message "The program can't start because MSVCR100.dll is missing" is displayed, install the Microsoft Visual C++® 2010 Redistributable Package (x86).

(3) API list

No	Function	Overview
1	UPT_Open	Starts USB communication.
2	UPT_Close	Ends USB communication.
3	UPT_SetLight	Controls the LED unit of the selected color. (Light on / light off)
4	UPT_SetTower	Controls multiple LED units.
5	UPT_SetBuz	Controls the buzzer using the selected buzzer pattern (play sound / stop).
6	UPT_SetBuzEx	Controls the buzzer using the selected buzzer pattern and pitch.
7	UPT_Reset	Turn off all LED units and stop the buzzer.
8	UPT_GetFirmVer	Gets the firmware version for which communication is in progress.
9	UPT_GetDllVer	Gets the DLL version.

(4) API details

① UPT_Open

Item	Description
Name	int UPT_Open()
Function Overview	Connects to the USB signal tower via USB communication.
Return value	If successful, returns 0. If an error occurs, a value less than 0 is returned. Refer to ☞ "7.3.(6) Error" for details.
Precautions	This function internally gets the device handle that performs USB communication. To release the device handle, it is necessary to call "UPT_Close". This function cannot get multiple device handles.

② UPT_Close

Item	Description
Name	void UPT_Close()
Function Overview	Ends USB communication with the USB signal tower.

③ UPT_SetLight

Item	Description
Name	int UPT_SetLight(BYTE color, BYTE led_state)
Function Overview	Specify the LED color and LED pattern and light up the USB signal tower and pattern. The buzzer and LED units, other than those with the defined LED color, maintain the current state.
Parameters	color: Specify the LED color to control. Refer to ☞ "7.3.(5-1) LED unit colors to be controlled" for details. led_state: Specify the LED pattern. Refer to ☞ "7.3.(5-2) LED and buzzer patterns" for details.
Return value	If successful, returns 0. If an error occurs, a value less than 0 is returned. Refer to ☞ "7.3.(6) Error" for details.
Precautions	It is necessary to call "UPT_Open" before calling this function.

Program example	int open_state, send_state;
	open_state = UPT_Open();
	
	if(open_state == 0){
	send_state = UPT_SetLight (UPT_RED, ON_STATIC);
	/* RedON */
	}
	
	UPT_Close();

④ UPT_SetTower

Item	Description
Name	int UPT_SetTower(BYTE red, BYTE yel, BYTE grn, BYTE blu, BYTE clr)
Function Overview	Specify multiple LED colors and the LED pattern, and run the pattern display on the USB signal tower.
Parameters	red, yel, grn, blu, clr: Specify the lighting pattern for each LED color. Refer to ☞ "7.3.(5-2) LED and buzzer patterns" for details. (red = red, yel = amber, grn = green, blu = blue, clr = white)
Return value	If successful, returns 0. If an error occurs, a value less than 0 is returned. Refer to ☞ "7.3.(6) Error" for details.
Precautions	It is necessary to call "UPT_Open" before calling this function.

Program example	int open_state, send_state;
	open_state = UPT_Open();
	
	if(open_state == 0){
	send_state = UPT_SetTower (PATT_KEEP, ON_STATIC, OFF_STATIC, PATT_MOVE1, PATT_MOVE2);
	/* Red=KEEP, Yellow=ON, GREEN=OFF, BLUE=MOVE1, CLEAR=MOVE2 */
	}
	
	UPT_Close();

⑤ UPT_SetBuz

Item	Description
Name	int UPT_SetBuz(BYTE buz_state, BYTE limit)
Function Overview	Specify the buzzer pattern and sound the buzzer for the USB signal tower. The current state of the LED unit is maintained. Operate the pitch using the default value. Sound A default value: D7[2349.3Hz] Sound B default value: (stop)
Parameters	buz_state: Specify the buzzer pattern. Refer to ☞ "7.3.(5-2) LED and buzzer patterns" for details. limit: If 0 is specified, it operates continuously. If you specify a value from 1 to 15, it sounds the defined number of times. Continuous operation: 0 Operate number of times: Specify from 1 to 15 Example: Sound for one second each time. If you define 15, sound for 15 seconds.
Return value	If successful, returns 0. If an error occurs, a value less than 0 is returned. Refer to ☞ "7.3.(6) Error" for details.
Precautions	It is necessary to call "UPT_Open" before calling this function.

Program example	int open_state, send_state;
	open_state = UPT_Open();
	
	if(open_state == 0){
	send_state = UPT_SetBuz (PATT_MOVE1, 1);
	/* Pattern1, One shot */
	}
	
	UPT_Close();

⑥ UPT_SetBuzEx

Item	Description
Name	int UPT_SetBuzEx(BYTE buz_state, BYTE limit, BYTE pitch1, BYTE pitch2)
Function Overview	Specify the buzzer pitch and pattern, and sound the buzzer for the USB signal tower.
Parameters	Refer to "UPT_SetBuz" for information on the buz_state and limit. pitch1: Sound A pitch2: Sound B Specify the pitch of the buzzer. Refer to ☞ "7.3.(5-3) Buzzer pitch" for details.
Return value	If successful, returns 0. If an error occurs, a value less than 0 is returned. Refer to ☞ "7.3.(6) Error" for details.
Precautions	It is necessary to call "UPT_Open" before calling this function.

Program example	int open_state, send_state;
	open_state = UPT_Open();
	
	if(open_state == 0){
	send_state = UPT_SetBuzEx (PATT_MOVE2, 0, BUZ_PITCH9, BUZ_PITCH2);
	/* Pattern2, Forever, Pitch=9&2 */
	}
	
	UPT_Close();

⑦ UPT_Reset

Item	Description
Name	int UPT_Reset()
Function Overview	Turns off all the LED units, and stops the buzzer.
Return value	If successful, returns 0. If an error occurs, a value less than 0 is returned. Refer to ☞ "7.3.(6) Error" for details.
Precautions	It is necessary to call "UPT_Open" before calling this function.

Program example	int open_state, send_state;
	open_state = UPT_Open();
	
	if(open_state == 0){
	send_state = UPT_Reset(); /* ALL OFF */
	}
	
	UPT_Close();

⑧ UPT_GetFirmVer

<table>
<tr><th>Item</th><th>Description</th></tr>
<tr><td>Name</td><td>WORD UPT_GetFirmVer()</td></tr>
<tr><td>Function Overview</td><td>Gets the firmware version for the USB signal tower that is connected.</td></tr>
<tr><td>Return value</td><td>First 8 bits = Major version
Middle 4 bits = Minor version
Last 4 bits = Revision
All are in BCD notation.
(Example: 0x0100 = Ver1.0, 0x1234 = Ver12.3.4)
If the USB signal tower is not connected, 0 is returned.
<table>
<tr><th>bit</th><th>15</th><th>14</th><th>13</th><th>12</th><th>11</th><th>10</th><th>9</th><th>8</th><th>7</th><th>6</th><th>5</th><th>4</th><th>3</th><th>2</th><th>1</th><th>0</th></tr>
<tr><td>BCD</td><td>0</td><td>0</td><td>0</td><td>1</td><td>0</td><td>0</td><td>1</td><td>0</td><td>0</td><td>0</td><td>1</td><td>1</td><td>0</td><td>1</td><td>0</td><td>0</td></tr>
<tr><td>Ver</td><td colspan="4">1</td><td colspan="4">2</td><td colspan="4">3</td><td colspan="4">4</td></tr>
</table></td></tr>
<tr><td>Precautions</td><td>It is necessary to call "UPT_Open" before calling this function.</td></tr>
<tr><td>Program example</td><td>WORD ver = UPT_GetFirmVer();
/* Get Firmware Version */</td></tr>
</table>

⑨ UPT_GetDllVer

<table>
<tr><th>Item</th><th>Description</th></tr>
<tr><td>Name</td><td>WORD UPT_GetDllVer()</td></tr>
<tr><td>Function Overview</td><td>Gets the DLL version.</td></tr>
<tr><td>Return value</td><td>First 8 bits = Major version
Middle 4 bits = Minor version
Last 4 bits = Revision
All are in BCD notation. (Example: 0x0100 = Version 1.0, 0x5678 = Version 56.7.8)
<table>
<tr><th>bit</th><th>15</th><th>14</th><th>13</th><th>12</th><th>11</th><th>10</th><th>9</th><th>8</th><th>7</th><th>6</th><th>5</th><th>4</th><th>3</th><th>2</th><th>1</th><th>0</th></tr>
<tr><td>BCD</td><td>0</td><td>1</td><td>0</td><td>1</td><td>0</td><td>1</td><td>1</td><td>0</td><td>0</td><td>1</td><td>1</td><td>1</td><td>1</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>Ver</td><td colspan="4">5</td><td colspan="4">6</td><td colspan="4">7</td><td colspan="4">8</td></tr>
</table></td></tr>
<tr><td>Program example</td><td>WORD ver = UPT_GetDllVer();
/* Get DLL Version */</td></tr>
</table>

(5) Parameters

(5-1) LED unit color to be controlled

・Specify the LED color to control using the following parameters.

Control item	Input	
LED color to control	Parameter	Value
R (Red)	UPT_RED	10
Y (Amber)	UPT_YEL	11
G (Green)	UPT_GRN	12
B (Blue)	UPT_BLU	13
C (White)	UPT_CLR	14
Associated API		
UPT_SetLight		

(5-2) LED and buzzer patterns

・Specify the LED pattern and buzzer pattern using the following parameters.

Control item		Input	
LED pattern	Buzzer pattern	Parameter	Value
Light off	Buzzer off	OFF_STATIC	0
Light on	Buzzer on (continuous)	ON_STATIC	1
LED pattern 1	Buzzer pattern 1	PATT_MOVE1	2
LED pattern 2	Buzzer pattern 2	PATT_MOVE2	3
LED pattern 3	Buzzer pattern 3	PATT_MOVE3	4
LED pattern 4	Buzzer pattern 4	PATT_MOVE4	5
Maintain current state		PATT_KEEP	9
Associated API			
UPT_SetLight, UPT_SetBuz, UPT_SetBuzEx, UPT_SetTower			

(5-3) Buzzer pitch

・Specify the Sound A and Sound B pitch using the following parameters.

Sound A / B		Input	
Pitch	Frequency (reference value)	Parameter	Value
(Stop)	-	BUZ_PITCH_OFF	20
A6	1760.0 Hz	BUZ_PITCH1	21
B♭6	1864.7 Hz	BUZ_PITCH2	22
B6	1975.5 Hz	BUZ_PITCH3	23
C7	2093.0 Hz	BUZ_PITCH4	24
D♭7	2217.5 Hz	BUZ_PITCH5	25
D7	2349.3 Hz	BUZ_PITCH6	26
E♭7	2489.0 Hz	BUZ_PITCH7	27
E7	2637.0 Hz	BUZ_PITCH8	28
F7	2793.8 Hz	BUZ_PITCH9	29
G♭7	2960.0 Hz	BUZ_PITCH10	30
G7	3136.0 Hz	BUZ_PITCH11	31
A♭7	3322.4 Hz	BUZ_PITCH12	32
A7	3520.0 Hz	BUZ_PITCH13	33
Sound A default value: D7		BUZ_PITCH_DFLT	59
Sound B default value: (stop)			
Associated API			
UPT_SetBuzEx, UPT_SetTower			

(6) Error

(6-1) Error list

Macro string	Description	Value
ERR_NOEXIST	Could not detect the USB signal tower. It is necessary to check the connection.	-1
ERR_LOCKED	The USB signal tower was detected, however, it was occupied by another program so communication could not be established.	-2
ERR_CONNECTION	A connection has not been established. It is necessary to call "UPT_Open" again.	-3
ERR_PARAM	An out-of-range value was specified for a parameter. It is necessary to check the parameter.	-4
ERR_TRANSFAIL_EVNT	Failed to send/receive message. (Failed to generate event in Windows)	-5
ERR_TRANSFAIL_TMOUT	Failed to send/receive message. (Error response from the firmware)	-6
ERR_TRANSFAIL_SEND	Failed to send/receive message. (Or other issue, such as the connection being interrupted during transmission).	-7
ERR_DLL_LINK	setupapi.dll or HID.DLL are not installed, so it is necessary to acquire these.	-8

(6-2) List of APIs that return an error

API	Errors that may be returned
UPT_Open	ERR_NOEXIST, ERR_LOCKED, ERR_DLL_LINK
UPT_SetLight	ERR_CONNECTION, ERR_PARAM, ERR_TRANSFAIL, ERR_DLL_LINK
UPT_SetBuz	
UPT_SetBuzEx	
UPT_SetTower	
UPT_Reset()	ERR_CONNECTION, ERR_PARAM
UPT_GetFirmVer	ERR_CONNECTION, ERR_PARAM

7.4 Control that conforms with protocol specification

(1) Overview

This section describes the communication details relating to communication between the host PC and USB signal tower.

◇Check the content before creating the program.

(2) USB communication settings

◇The communication settings for controlling the LED unit and buzzer are as follows.

Item	Description
Device class	Uses the HID class so that a device is recognized as a standard HID device by the host.
Transfer mode	Interrupt transfer
Transfer direction	OUT transfer only (Host⇒this product)
Number of interfaces	1 (single structure data transfer only from host to device)
Vendor ID	191A
Device ID	8003

(3) USB communication protocol

(3-1) Protocol data area

◇The protocol for signal tower control is as follows. The length is 8 bytes.

1st byte	2nd byte	3rd byte	4th byte	5th byte	6th byte	7th byte	8th byte
Command version	Command ID	Buzzer control	Buzzer Pitch	LED control			Empty
1 byte	1 byte	1 byte	1 byte	3 byte			1 byte
①	②	③	④	⑤			⑥

① Command version

1st byte
・0x00: Fixed

② Command ID

2nd byte
・0x00: Fixed

③ Buzzer control

3rd byte							
7 bit	6 bit	5 bit	4 bit	3 bit	2 bit	1 bit	0 bit
Continuous operation / Operate number of times				Buzzer pattern			
・0x0: Continuous operation ・0x1 to 0xF: Operate number of times Operate from 1 to 15 times				・0x0: Stop ・0x1: Buzzer on ・0x2: Buzzer pattern 1 ・0x3: Buzzer pattern 2 ・0x4: Buzzer pattern 3 ・0x5: Buzzer pattern 4 ・0x6 to 0xF: Maintain current settings			
Example: ・0x01 → Emit with Sound A (continuous). ・0xF5 → Emit with buzzer pattern 4, 15 times.							

④ Buzzer pitch

4th byte							
7 bit	6 bit	5 bit	4 bit	3 bit	2 bit	1 bit	0 bit
・ Sound A: Select pitch				・ Sound B: Select pitch			

◇ Set the pitch values below for Sound A and Sound B.

・ 0x0: (OFF)	・ 0x4: C7	・ 0x8: E7	・ 0xC: A♭7
・ 0x1: A6	・ 0x5: D♭7	・ 0x9: F7	・ 0xD: A7
・ 0x2: B♭6	・ 0x6: D7	・ 0xA: G♭7	・ 0xE: (*)
・ 0x3: B6	・ 0x7: E♭7	・ 0xB: G7	・ 0xF: (*)

・ (*) Operate using the default value
Sound A default value: D7[2349.3Hz]
Sound B default value: (stop)

⑤ LED unit control

5th byte		6th byte		7th byte	
R (Red)	Y (Amber)	G (Green)	B (Blue)	C (White)	(0x0 fixed)

◇ Set the LED control setting values below for LED control of R/Y/G/B/C.

・ 0x0: Off
・ 0x1: Light on
・ 0x2: LED pattern 1
・ 0x3: LED pattern 2
・ 0x4: LED pattern 3
・ 0x5: LED pattern 4
・ 0x6 to 0xF: Maintain current settings

⑥ Empty

8th byte
・0x00: Fixed

(3-2) Protocol example

◇Emit sound (continuous) with red light on, buzzer pattern 1 (Sound A:D7, Sound B:off).

1st byte	2nd byte	3rd byte	4th byte	5th byte		6th byte		7th byte		8th byte
Command version	Command ID	Buzzer control	Buzzer Pitch	LED control						Empty
				R	Y	G	B	C	Static	
0x00	0x00	0x02	0x60	0x10		0x00		0x00		0x00

◇Emit sound (4 times) with amber pattern light (LED pattern 4), buzzer pattern 2 (Sound A:C7, Sound B:E7).

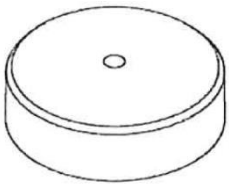
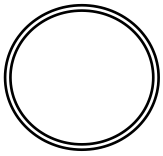
1st byte	2nd byte	3rd byte	4th byte	5th byte		6th byte		7th byte		8th byte
Command version	Command ID	Buzzer control	Buzzer Pitch	LED control						Empty
				R	Y	G	B	C	Static	
0x00	0x00	0x42	0x48	0x04		0x00		0x00		0x00

◇Turn on purple for multi-color LED unit, and stop the buzzer.

1st byte	2nd byte	3rd byte	4th byte	5th byte		6th byte		7th byte		8th byte
Command version	Command ID	Buzzer control	Buzzer Pitch	LED control						Empty
				R	Y	G	B	C	Static	
0x00	0x00	0x42	0x00	0x10		0x01		0x00		0x00

8. Replacement and Optional Parts

・Several kinds of parts are available to the customer for exchange or replacement.

Head cover 60W (Off-white)	Head cover 60K (Black)	O-ring 60
1 pieces 	1 pieces 	5 pieces 

・The following options and related parts are available for this product.

Pole bracket		Aluminum pole	
SZP-004W (Off-white) *1	SZP-004K (Black) *1	POLE-□00A21 (Silver)	POLE-□00A21K (Black)
			
Wall bracket		Mounting bracket	
SZK-003W (Off-white)	SZK-003K (Black)	SZ-016A (Silver)	SZ-010 (Silver)
			
Mounting bracket			
SZW-002W (Off-white)			
			

*1 LR6-3USB□-RYG/ LR6-USB□ are dedicated products.

9. Specifications

Model		LR6-3USB□-RYG	LR6-USB□
Rated Voltage		5V DC (USB bus power)	
Operating Voltage Range		Rated voltage ±5% *Compliant with USB2.0 standard	
Rated Current Consumption		500mA (max)	
Ambient Operating Temperature		-20°C to +50°C	
Ambient Operating Humidity		90% RH or less, no condensation	
Storage Ambient Temperature		-30°C to +60°C	
Storage Ambient Humidity		90% RH or less, no condensation	
Mounting location		Indoors	
Mounting direction		Upright	
Protection Rating		IP65 (IEC 60529), NEMA TYPE 4X,13 * Except when using pole bracket or wall bracket.	
LED unit control		Light on, pattern on (4 types)	
Buzzer	Operation	Sound on, sound pattern (4 types)	
	Frequency	13 types	
	Sound pressure	Typ.80dB (1m from the front of the buzzer aperture / at 2349.3 Hz), Sound reduction (Buzzer switch: Low): approximately -10 dB	
Mass		LR6-USB□: 140g LR6-3USB□-RYG: 320g	
Communication method		USB2.0 Full Speed	
Software library (DLL)-Supported operating systems		Windows	
Operation Unit		Volume switch x 1 Sound pressure, 2 levels (high / low)	
Conformity standards		UL 60950-1 ,CAN/CSA C22.2 No. UL60950-1-07 FCC Part 15 Subpart B Class B ICES-003 EMC directive (EN61000-6-3, EN61000-6-2, EN55032 Class B, EN55035) KC markings (KN 61000-6-2 /6-4) RoHS Directive (EN IEC 63000)	

・Specifications may change without prior notice.

PATLITE Corporation G2J

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