

MWU Series
UHF RF-ID Light Module
User's Manual
Ver.1.3.

AIOI-Systems Co., Ltd.

Introduction.

This manual describes the functions, settings, operation, warnings, and precautions for the MWU series Light Module.
Please read before use.

To use this equipment safely

In order to use this equipment properly and safely, please be sure to observe the following safety precautions when operating this equipment. IOI Systems assumes no responsibility or warranty for any damage resulting from use contrary to these precautions.

■ How to read the symbols

In this manual, the items to be observed for safe use of the equipment are indicated and classified as follows.



DANGER

Indicates a potentially hazardous situation which, if ignored and mishandled, could result in death or serious injury.



Warning

Mishandling by ignoring this warning sign can cause injury.



Caution

Mishandling by ignoring this warning sign can cause damage to the device.



The symbols represent "cautions" that you should be aware of.



The symbols represent "instructions" that must be carried out.



The symbols indicate "prohibited" activities.



Symbols represent "information" necessary for a better understanding of



The symbol indicates "handling prohibited" for non-service personnel.



The symbol indicates that grounding is required for installation.

Indicates chapters to be referenced and other manual references.

Expressions used in this manual have the following meanings

Definition of expression

Abbreviation	meaning
LM	Light Module
E-JB	Ethernet Junction Box
JB	Junction Box
BCR/F	Barcode Reader Interface
Signal Light I/F	Signal Light interface
BD	Batch Display

■ General precautions



Caution

- It is very important to take necessary steps to prevent other devices from getting damaged if there is damage to this device.
- Be aware that AIOI Systems cannot guarantee the functions and performance of this product if it is modified or misused by not following the standards shown in this specification.
- Do not disassemble or tamper with the device because the device may malfunction or be damaged.
- To avoid possible damage, make sure that water or other liquids do not get on the device.
- Use within the environmental conditions specified for this device. However, even when used within the specified environmental conditions, a sudden temperature change that causes condensation can damage the device.
- Do not drop or hit the device. Also, if excess force is likely to be applied to the wiring, investigate ways to protect it. Otherwise, this device and other devices may be damaged.
- Do not operate the device in a combustible, explosive, or steamy area. It is very dangerous to use this device in this type of environment.
- If this device is used in conjunction with other devices, make sure the existing operating conditions and environment are suitable before combining it with other devices.

■ Precaution for installation and maintenance



Caution

- When setting up this device, power at the junction box must be OFF.
- Do not short-circuit wires and terminals.
- When installing the device, always ground it to prevent electric shock.
- Check the wiring to be sure it is correct before supplying power to the unit.
- This device should be only handled by Customer Service personnel of AIOI Systems or people in charge.
- When supplying power to the device, a protection circuit should be used before connecting, such as a switch breaker and electricity leakage breaker.
- Check the voltage to be sure it is correct before supplying power to the unit.
- The device is an electronic device. Therefore, when installing various devices, investigate the installation environment (primary electrical noise, driver type noise, static electricity discharge noise, etc.). These noises may cause system malfunction or damage.
- When installing the device, do not leave debris from cutting cables, etc. on the print-circuit board. Otherwise, they may cause the device malfunction or damage.
- Use of unspecified or unadjusted antenna or use of unspecified coaxial cable can cause radio interference to other electronic devices.

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1. Outline

UHF RF-ID Light Module is a module that integrates a display and response device that can be controlled by the MWU series. It features a [CONFIRM] button with a large location lamp, response switch, and RF-ID reader integrated, and has a segment display, [Fn] key, and [Select Minus] key, depending on each model. The segment display method, key input method, and lamp lighting method can be set according to the application.

Light Module can support picking, seeding, inventory, etc. by receiving work instruction commands from the controller connected to the control PC. The Light Module judges the work status using the [CONFIRM] button, [Fn] key, and [SELECT MINUS] key, and returns the judgment results to the controller.



Caution

Be sure to confirm that the connected equipment is within the specification conditions indicated in this equipment specification.

1.1. Product Appearance

UHF RF-IDLight Module



MWU2060SFU

UHF-TAG



TAG008]

1.2. UHF RF-ID Light Module part number system

(Example.)

Item No.	MWU	20	6	0	S	F	U	-	01
	(1)	(2)	(3)	(4)	(5)	(6)	(7)		(8)

(1)	MWU (Series name)	MWU Series
(2)	20 (Type)	Light Module
(3)	5(Number of Light Module digits)	6: Six digits
(4)	0 (Light Module type)	0: Duct type
(5)	S (Select minus key)	S: with select minus key Unnamed: No select minus key
(6)	F (Light Module coloration)	R: Red G: Green B: Blue Bi: Bicolor 3-color support (red, green, yellow) F: Full color 7 colors available (red, green, blue, yellow, purple, light blue, and white)
(7)	U(with UHF RF-ID reader function)	U: with UHF RF-ID reader function
(8)	-01(additional number)	

*As of January 24, 2022

1.3. UHF-TAG part numbering system

item's stock number	name	figure
TAG008	Bracelet Shape UHF RF-UHF-TAG* (UHF-UHF-TAG*)	

*UHF EPC data cannot be specified.

What is UHF EPC?

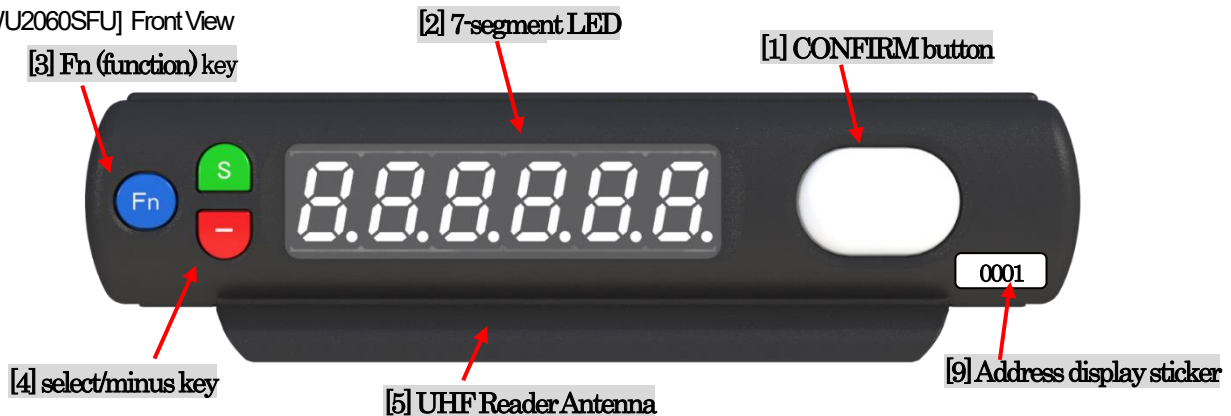


EPC stands for [Electronic Product Code] and is an abbreviation for the GS1 identification code to be written on internationally standardized RFID tags.

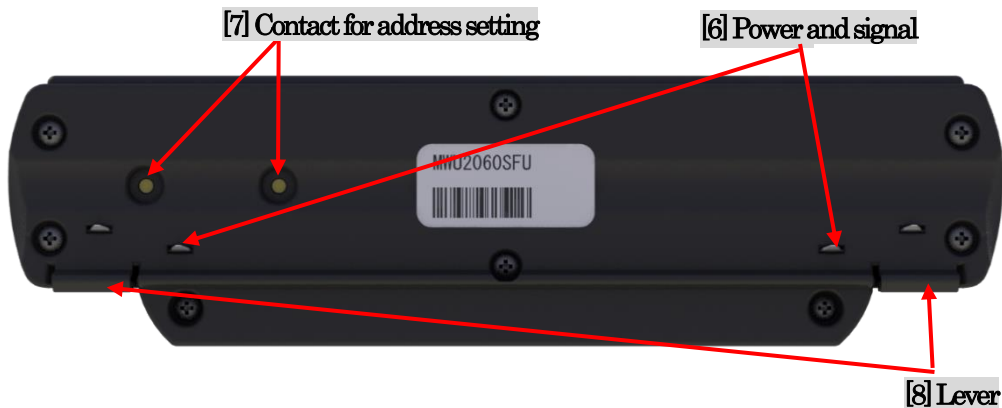
The identification code indicates "what" the data inside the RFID tag represents. It is an international rule for data to be written on RFID tags in accordance with GS1, a *standardization organization represented by the JAN code, and is the common language of RFID tags.

1.4. Functions and Names

[MWU2060SFU] Front View



[MWU2060SFU] Rear View



[1] CONFIRM button

This is an illuminated switch that combines a location lamp and a confirmation completion switch in one unit.

Location lamps can be lit, flashing, or blinking at high speed by commands from the controller. It emits light in seven colors: red, green, yellow, blue, white, light blue, and purple.

[2] 7-segment LED display

Displays data (numerical values and some letters and symbols) for work instructions or confirmation.

- Standard lights up red and flashes.

[3] Fn (function) key

It can be used in the following ways

*Cancel mode (default)

- This key is used to reply that the indicated work could not be completed (cancellation of work).
- This key cannot reply to an undo by simply pressing the Fn key. To reply to an undo, press the Fn key and then the CONFIRM button.

*Decrement mode

- It can be used as a decrement key instead of cancel mode by command from PC. For details, please refer to the separate "TW Series Command Reference".
- To return the decrement contents as in cancel mode, press the Fn key and then the CONFIRM key.

[4] Select minus key *Not available for MWU2000F type

- Change the display data (numerical values) and display the data returned to the controller on the 7-segment LED display.

- Each press of the SELECT key moves the 7-segment dot. The minus key can be used to change the numerical value of the 7 segments at the position of the dot.
- The changed data is returned by pressing the CONFIRM key as well as the Fn key.
- Simultaneous pressing of the SELECT and MINUS keys returns to the original displayed data.

[5] UHF Reader Antenna

It has a built-in antenna that scans UHF TAGs.

[6] Power and signal supply Pin

By fitting into the duct base, it penetrates into the AI cable and receives power and signals.



Caution

The tip is sharp. Please be careful not to touch it as it may cause injury.

Do not apply force to this pin, as damage to it will cause poor contact with the power and signal supply.

[7] Contact for addresser

Contact section for use with maintenance tool and address setter (MWU2706).

[8] Lever

Lever for mounting and dismounting the Light Module.

[9] Address seals

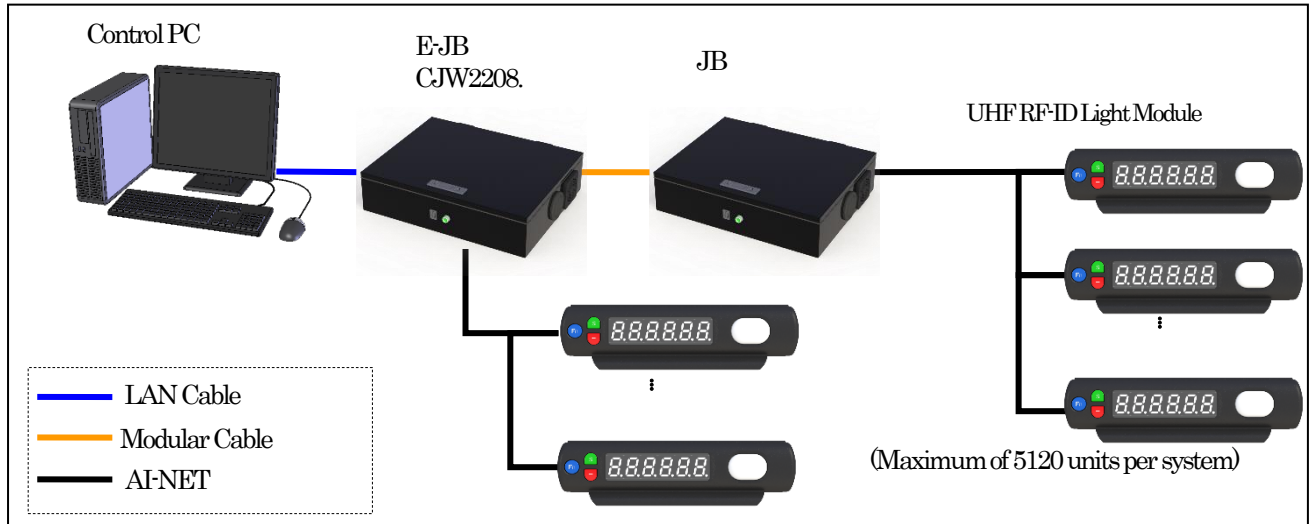
A sticker showing the address of the Light Module.

2. Operating Procedure

This section describes the process from initial setup to connection and operation check.

2.1. Connection Configuration

Example of connection configuration diagram



Basic functions of RF-ID Light Module

- Location lamp/buzzer can be controlled (Notify workers of item location)
- Any alphanumeric characters can be displayed on the 7-segment display (display of number of picks/item code, etc.)
- Report "Work Completed" and "Worker's EPC". (normal completion/missing items/quantity correction)



UHF RF-IDLight Module can be used with Ethernet controllers version 8.x or later.

2.2. Address configuration

Light Module is a device with a single address.

The address is recorded in memory after the address setting command is dispatched while the CONFIRM button is held down.

addressable range

address	mode (musical mode, mode of probability distribution, state of physical system)
0000	No. 0 Light Module *1
0001 to 7999	Normal setting range
8001-8999	Display mode range *2
8000,9000 to 9999	Do not use.

If the address setting is not indicated, the factory default address is set to "9000". Caution

Note: The factory default setting has been changed to "9000" starting with the MVU20X0SX product. The factory default setting for MVU20X0SX and earlier is "0000".

*1  **3.3.7** No. 0 Light Module

*2 Address range from 8000 to 8999, cannot be obtained by pressing and moving the CONFIRM button.
It can be used only to indicate that the light is on, without operating the CONFIRM button.

When using this device, a system-compatible address must be set.
It is recommended that the address be set before installation.
Please use the following method to set the address.



0 Set by the address setting machine.

WU2706 User's Manual

The "address setting command" is dispatched and set by the controller.

MWU Series Command Manual

0 Set by the address setting function of the indicator *MVU20X0SX type only

2.3. Connection method

The Light Module supplies power and signals from a junction box.

The Light Module is installed on shelves, etc. with a dedicated Duct Base and AI cable.



Caution

When making connections, please do so with the junction box power turned off.

Turn on the JB power supply after confirming that there are no wiring errors or shorts in the connection terminals.

2.3.1. How to connect the junction box

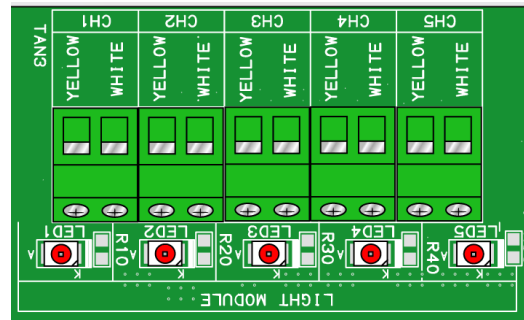
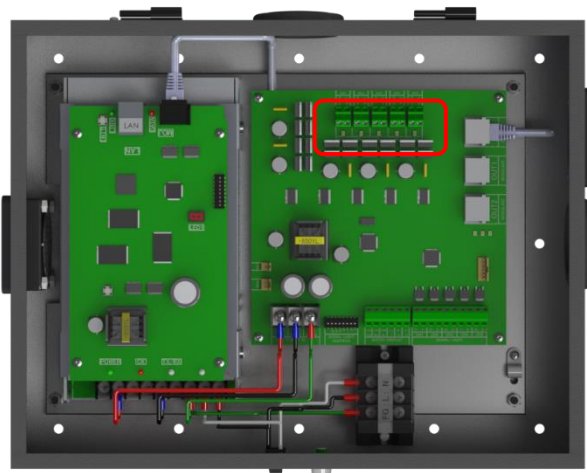
Duct base wiring connects to CH1 through CH5.

CH1 has a maximum of 32 Light Modules.

Use cables of 1.25sq or larger.

The wiring length should not exceed 30 m.

The number of connectable Light Modules may decrease depending on current consumption and wiring connection length.



Terminal name

Channel Name	Terminal name	Connection details
CH1	YELLOW terminal	Connect one side of the two CH1 wires to the indicator (duct). Connect one side of the two wires of CH1 to the indicator (duct).
	WHITE terminal	Connect one side of the two CH1 wires to the indicator (duct). Connect one side of the two wires of CH1 to the indicator (duct).
CH2	YELLOW terminal	Connect one side of the two CH2 wires to the indicator (duct). Connect one side of the two CH2 wires to the indicator (duct).
	WHITE terminal	Connect one side of the two CH2 wires to the indicator (duct). Connect one side of the two CH2 wires to the indicator (duct).
CH3	YELLOW terminal	Connect one side of the two CH3 wires to the indicator (duct). Connect one side of the two CH3 wires to the indicator (duct).
	WHITE terminal	Connect one side of the two CH3 wires to the indicator (duct). Connect one side of the two CH3 wires to the indicator (duct).
CH4	YELLOW terminal	Connect one side of the two wires of CH4 to the indicator (duct). Connect one side of the two wires of CH4 to the indicator (duct).
	WHITE terminal	Connect one side of the two wires of CH4 to the indicator (duct). Connect one side of the two wires of CH4 to the indicator (duct).
CH5	YELLOW terminal	Connect one side of the two CH5 wires to the indicator (duct). Connect one side of the two wires of CH5 to the indicator (duct).
	WHITE terminal	Connect one side of the two CH5 wires to the indicator (duct). Connect one side of the two wires of CH5 to the indicator (duct).

*The connection of each channel terminal does not depend on the polarity of the connection, so it will work as long as the two wires are connected.

*Common wiring with terminals with different channel names is not allowed.

*When using yellow-white cables, connect them according to the terminal names for wiring arrangement.

*Conduct a continuity test between one side of the 2-core cable and FG and between the other side of the 2-core cable and FG using an insulation resistance tester for the 2-core cable to be connected to each channel, and connect the cable to the terminals after confirming that it is 50 MΩ or higher (measurement voltage 100 V or higher).

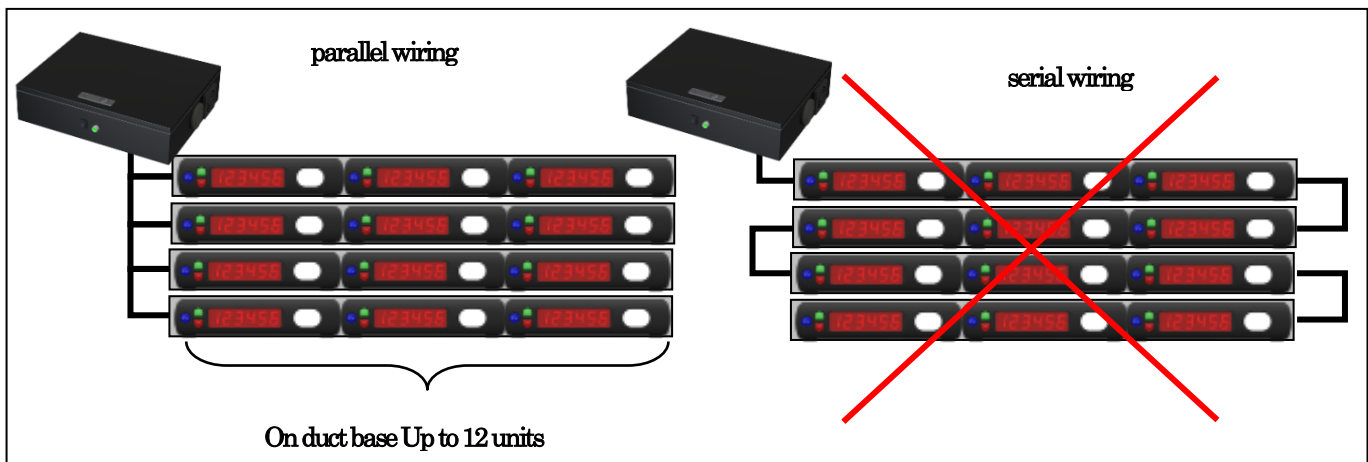
Terminal Rating

(data) item	rated value (engineering)
Terminal Screws	M2.6 ± screw
Appropriate Driver	φ2.5 x 0.35
Recommended tightening torque	0.63N·m
Strip the wire sheathing.	7-9mm
appropriate wire	AWG24~14※

※ Our recommended cables are Al cables. Only Al cables should be used for duct base wiring.

Wiring to the Light Module is done with Al-cable.

If many Light Modules are connected on one cable, the current load on the cable will increase, and voltage drop due to cable resistance will occur.



2.3.2. How to install on duct base

For detailed installation instructions, please refer to the installation manual.

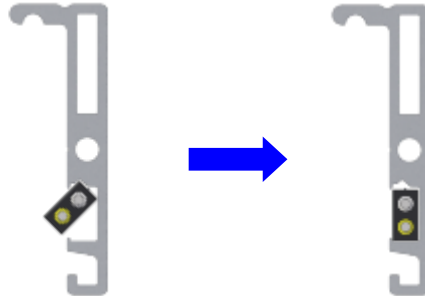
参考  MWU Series Construction Manual



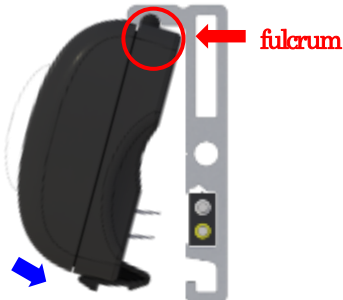
Caution

When making connections, please do so with the junction box power turned off.
Turn on the junction box power supply after confirming that there are no wiring errors or shorts (between 2 wires or between FGs) at the connection terminals.

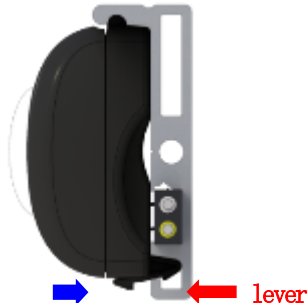
Insert into AI cable after installation of duct base.



Install the indicator at the sponsor section on the duct base and insert it in the direction of the arrow.



Finally, when the lever locks the Light Module into the duct, the installation is complete.



Caution: When inserted at an angle, the contact part may be damaged.

How to remove

When removing the display unit, press upward while holding down the left and right levers.



2.4. How to use UHF-TAG

The RF-ID Light Module brings the UHF-TAG close to the UHF Reader antenna and reads the EPC data of the UHF-TAG.

The reading distance can be determined from the special menu "F2" (3.3.5 Special Menu The reading distance can be changed in the special menu "F2" (see 3.3.5 Special menu).



2.5. Operation check

The method of operation check is described below using our check software [Flowlight]. [Flowlight] can check the communication of UHF RF-ID Light Module.

Please refer to the following manual for more information on this section.

Flowlight User's Manual



When performing communication inspection of RF-IDLight Module, please use FlowLight Ver. 1.7 or later.

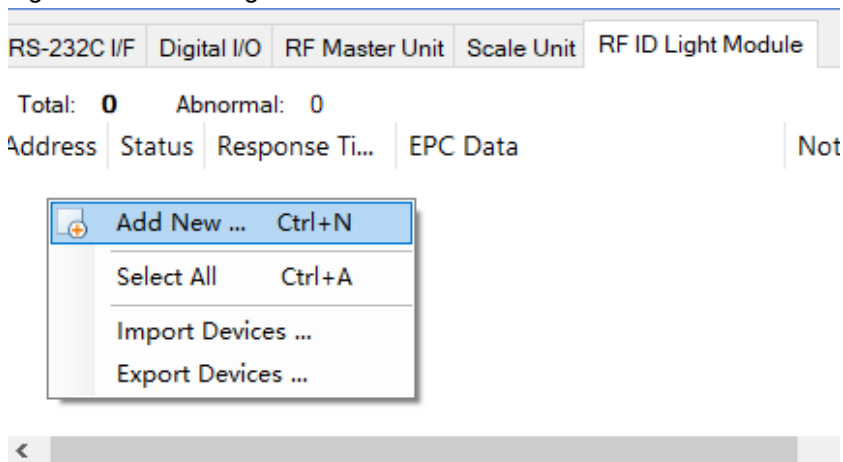
(1) Start Flowlight

Turn on power to the controller and junction box and start Flowlight.

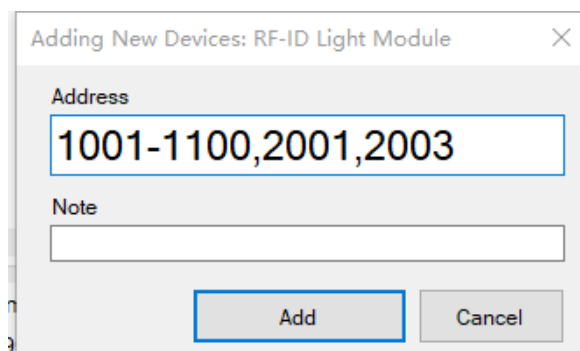
After startup, connect to the controller.

(2) Address Registration

Right click on the RF IDLight Module tab and select Add New.



Enter the address in the Add Device field. *Separate addresses with a hyphen if they are sequential numbers, or with a comma if multiple addresses are to be entered.



The address is displayed.

Light Module	6-digit Light Module	Signal Light	Batch Display	RS-232C I/F	Digital I/O	RF Master Unit	Scale Unit	RF ID Light Module
Total: 102	Abnormal: 0							
Address	Status	Response Ti...	EPC Data	Note				
1091								
1092								
1093								
1094								
1095								
1096								
1097								
1098								
1099								
1100								
2001								
2003								

(3) Communication test

Right-click on the address and select "Select All" and then "Work Instructions" to light up the registered Light Module.

Light Module	6-digit Light Module	Signal Light	Batch Display	RS-232C I/F	Digital I/O	RF Master Unit	Scale Unit	RF ID Light Module
Total: 102	Abnormal: 0							
Address	Status	Response Ti...	EPC Data	Note				
1091								
1092								
1093								
1094								
1095								
1096								
1097								
1098								
1099								
1100								
2001								
2003								

(4) Press CONFIRM button + Read EPC

By pressing the CONFIRM button and reading the TAG, the RF-IDLight Module turns off and becomes normal.

Press the CONFIRM button + read EPC for all Light Modules to confirm that the operation is normal.

Please check.

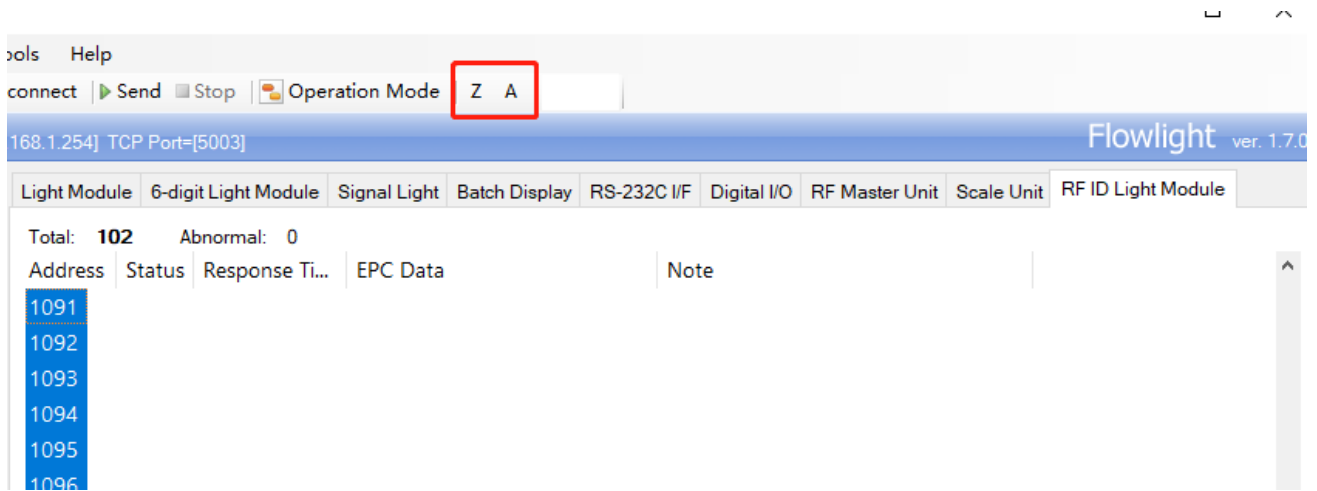
If there is an abnormal device, check the abnormal address.

Light Module	6-digit Light Module	Signal Light	Batch Display	RS-232C I/F	Digital I/O	RF Master Unit	Scale Unit	RF ID Light Module
Total: 5	Abnormal: 1							
Address	Status	Response Time	EPC Data	Note				
1001	01-Abnormal	09:40:23.973						
1003	00-Normal	09:40:36.755	5441473030382D585800...					
1002	00-Normal	09:40:39.124	5441473030382D585800...					
1004	00-Normal	09:40:37.737	5441473030382D585800...					
1005	00-Normal	09:40:43.474	5441473030382D585800...					

(5) Address confirmation

When the A command is issued, all Light Modules are put into maintenance mode, and the address can be checked by pressing the CONFIRM button. (Only for the type with digits)

All Light Modules will turn off when the Z command is sent.



3. How to operate

This section describes the basic operation of Light Module.
Please refer to the following manual for control commands.

TW Series Command Reference Manual

TW Series Controller User's Manual

3.1. UHF RF-IDLight Module Features

Feature	Details	reference
CONFIRM button control	The lamp on the CONFIRM button lights up, flashes, or blinks rapidly to inform the operator of the location. The full-color type has seven colors, and the bi-color type has three colors, making it possible to sort workers by color and give them instructions on what to do.	16
Display control of 7-segment display	Displays "picking quantity," "item code," "location," etc. in numerals and some alphabetic characters.	18
cancel operation	Cancellation of work will be reported to the upper application by operating the Fn key.	20
Forced Cancel Operation	When a UHF-TAG is lost, press and hold the Fn key (for about 5 seconds) to report it to a higher-level application as a forced cancellation.	20
Quantity correction operation*1	The numeric display on the 7-segment display can be corrected by operating the S and - keys. It also reports the changes made to the higher-level application. It is possible to correct and report the confirmed information in inventory work, etc.	21 22
Buzzer operation	The built-in buzzer can be turned on and off to notify the operator of the location with an audible buzzer sound.	
Work Completion Report Worker EPC reporting	By pressing the CONFIRM button + reading the EPC, "work completed," "canceled," and "quantity corrected" are reported to the upper application. The read EPC data is also reported to the host application.	16
poka-protection operation	By specifying the EPC data to be read, it is possible to inform the user of EPC data differences as a poka repellent.	42
maintenance mode	When a maintenance command (A command) is sent from the application, the Light Module enters the maintenance mode. By pressing the CONFIRM button, the set address can be confirmed.	19
error indication	If a problem occurs with the RF-ID reader, the error is indicated on the 7-segment display.	32
RF-ID detection distance setting	Adjust the output of the RF-ID reader to adjust the detection distance.	29 30

*1 S-keyed type RF-IDLight Module only

3.2. basic operation

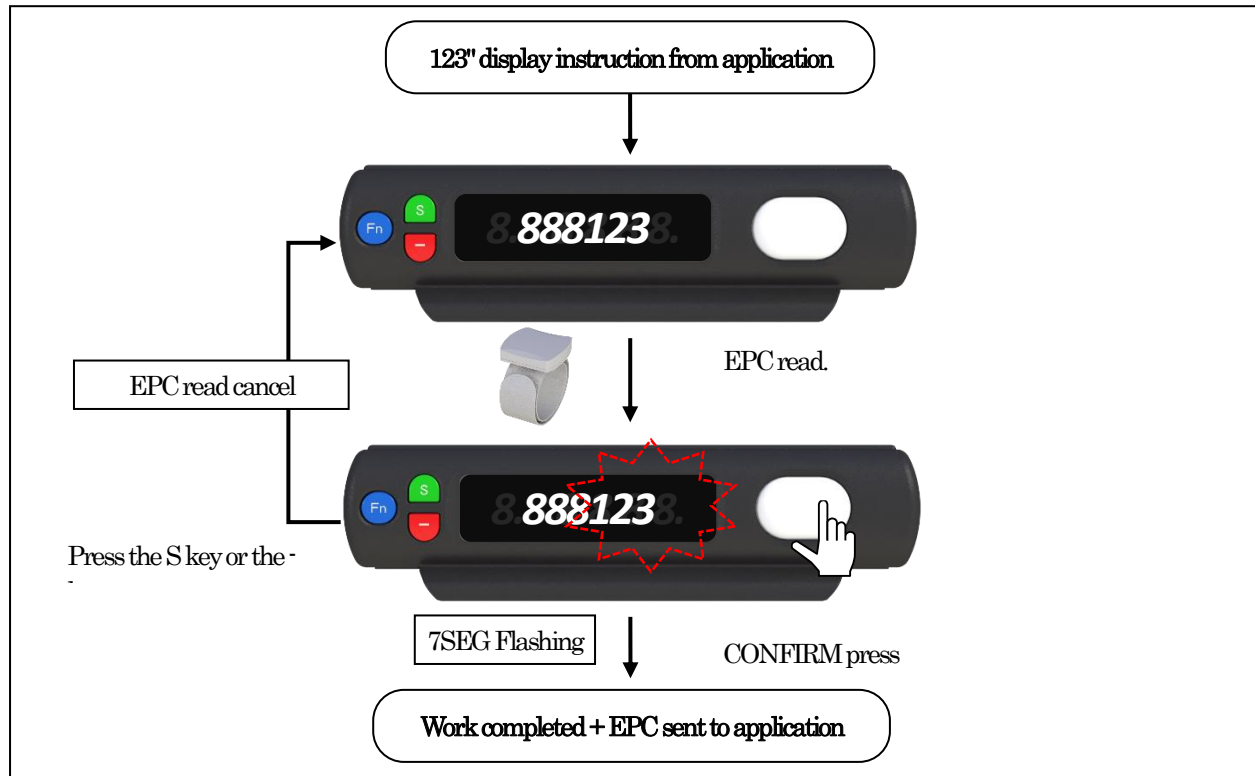
3.2.1. CONFIRM button +UHF RF-ID reader

The CONFIRM button is a large illuminated switch and RF-ID reader.

The application can specify the lighting color for the Light Module by the combination of LED0, LED1, and LED2.

The LED emission state can be selected from lighting, blinking, fast blinking, and off.

By reading the UHF-TAG, the RF-IDLight Module completes the work and reports the work completion + EPC information to the host application.



If UHF RF-IDLight Module cannot recognize the UHF-TAG, it cannot send the completion to the application.

CONFIRM button lighting color

LED0	LED1	LED2	variety	Lighting image
		✓	Red	
	✓		Green	
✓			Blue	
	✓	✓	Orange	
✓		✓	Purple	
✓	✓		Light blue	
✓	✓	✓	White	

3.2.2. About 7-segment displays

The numbers are displayed with work instructions from the application.

displayable character

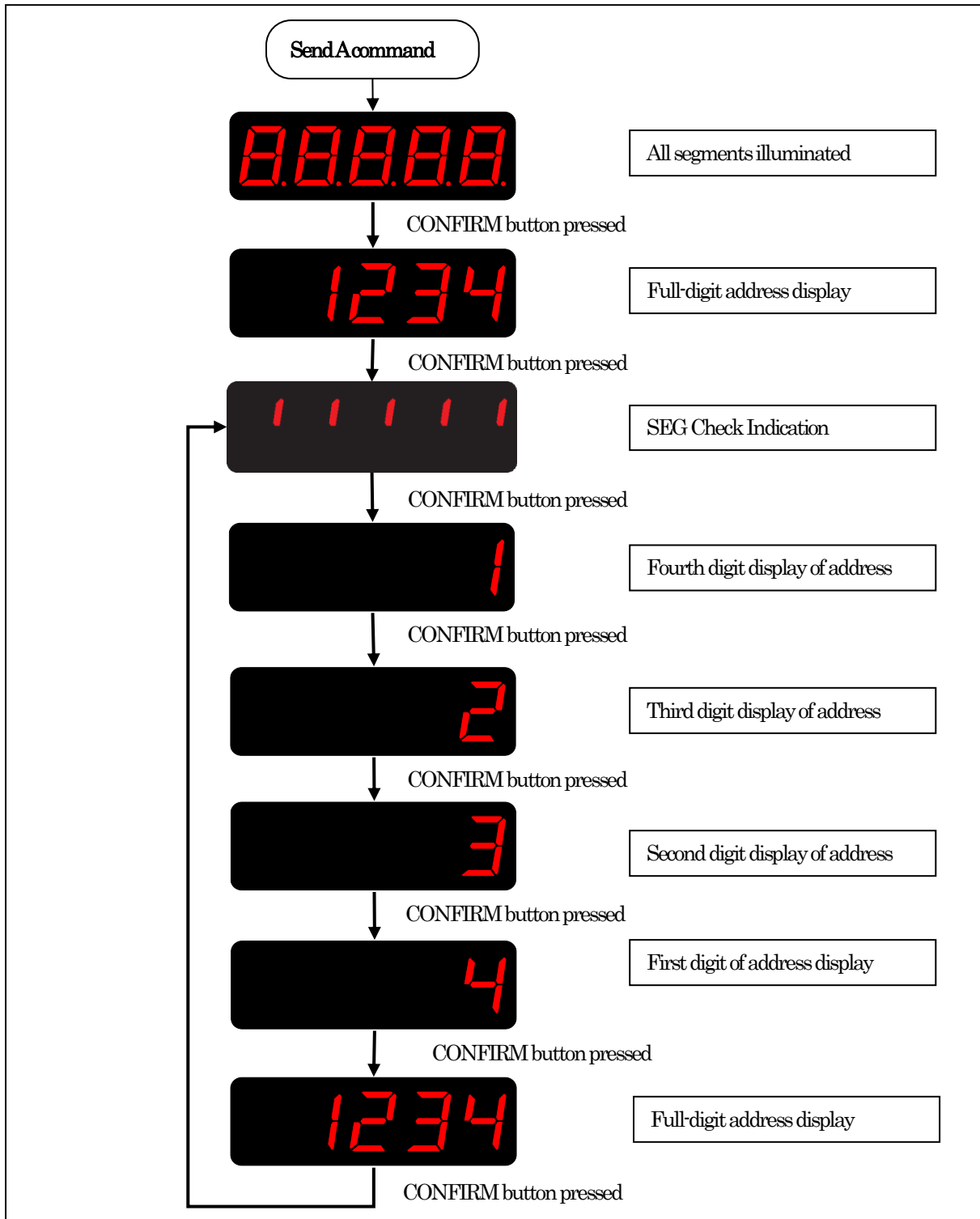
		UPPER 4 BITS															
LOWER 4 BIT		0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
	0																
	1																
	2																
	3																
	4																
	5																
	6																
	7																
	8																
	9																
	A																
	B																
	C																
	D																
	E																
	F																

3.2.3. Maintenance mode (A command)

A command from the application and when the controller is put into maintenance mode, the Light Module lights up the 7-segment display and the CONFIRM button.

Lighting operation at A command

When the *A command is lit, the CONFIRM button can be pressed without using the UHF-TAG.

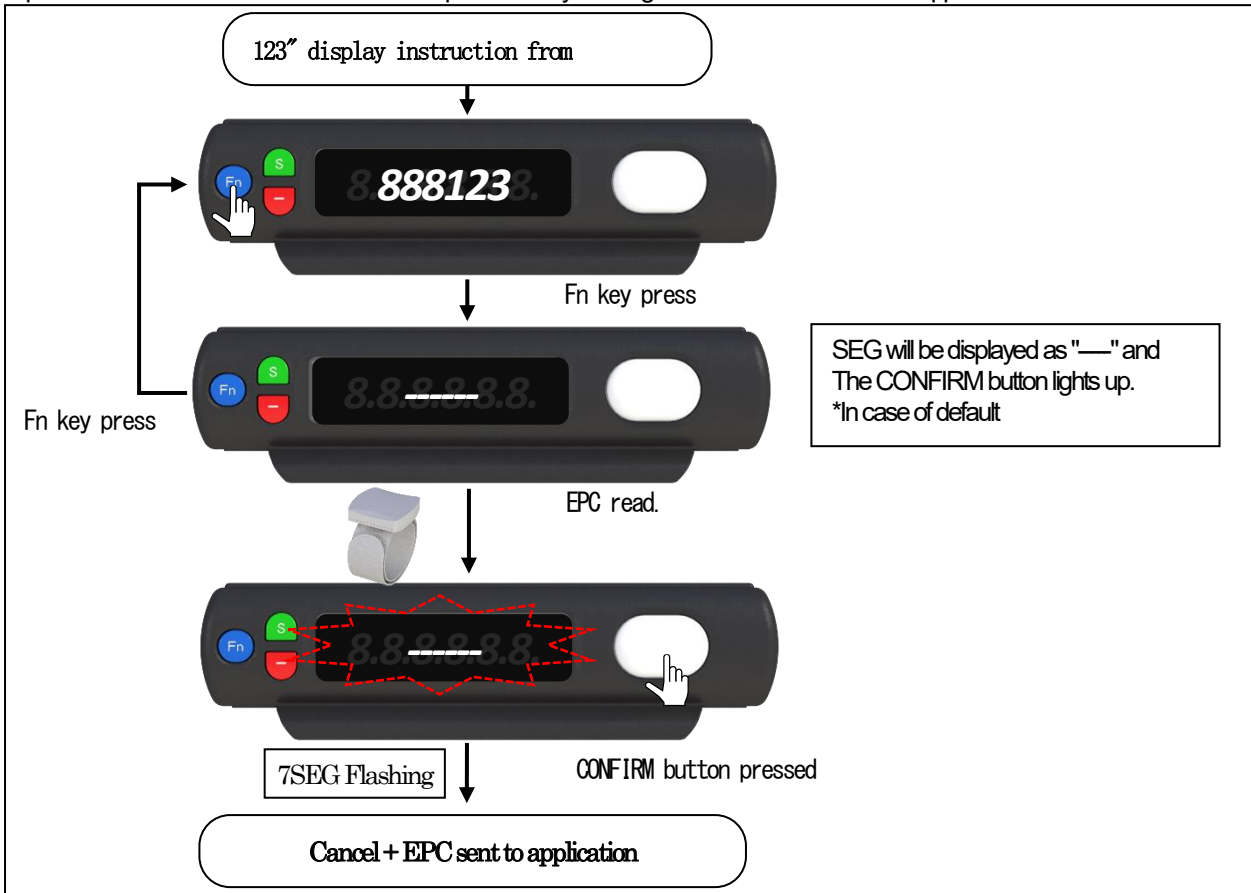


3.2.4. Fn key operation (default)

This key is used to reply to cancel the work if the indicated work cannot be completed due to lack of goods.

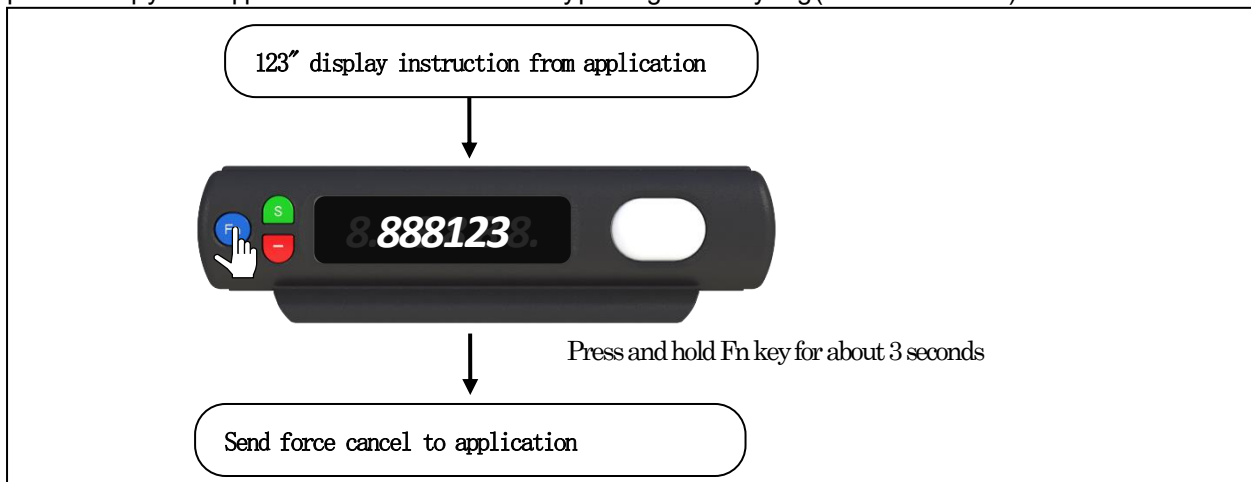
This key cannot return an undo just by pressing the Fn key. In order to return an undo, press the Fn key and then press the CONFIRM button to read the EPC.

Operation other than work cancellation can be performed by sending mode commands from the application.



force cancel

If the UHF-TAG is lost during the work process and the work cannot be completed, or if the product with UHF-TAG is not in stock, it is possible to reply to the application as a forced cancellation by pressing the Fn key long (for about 3 seconds).

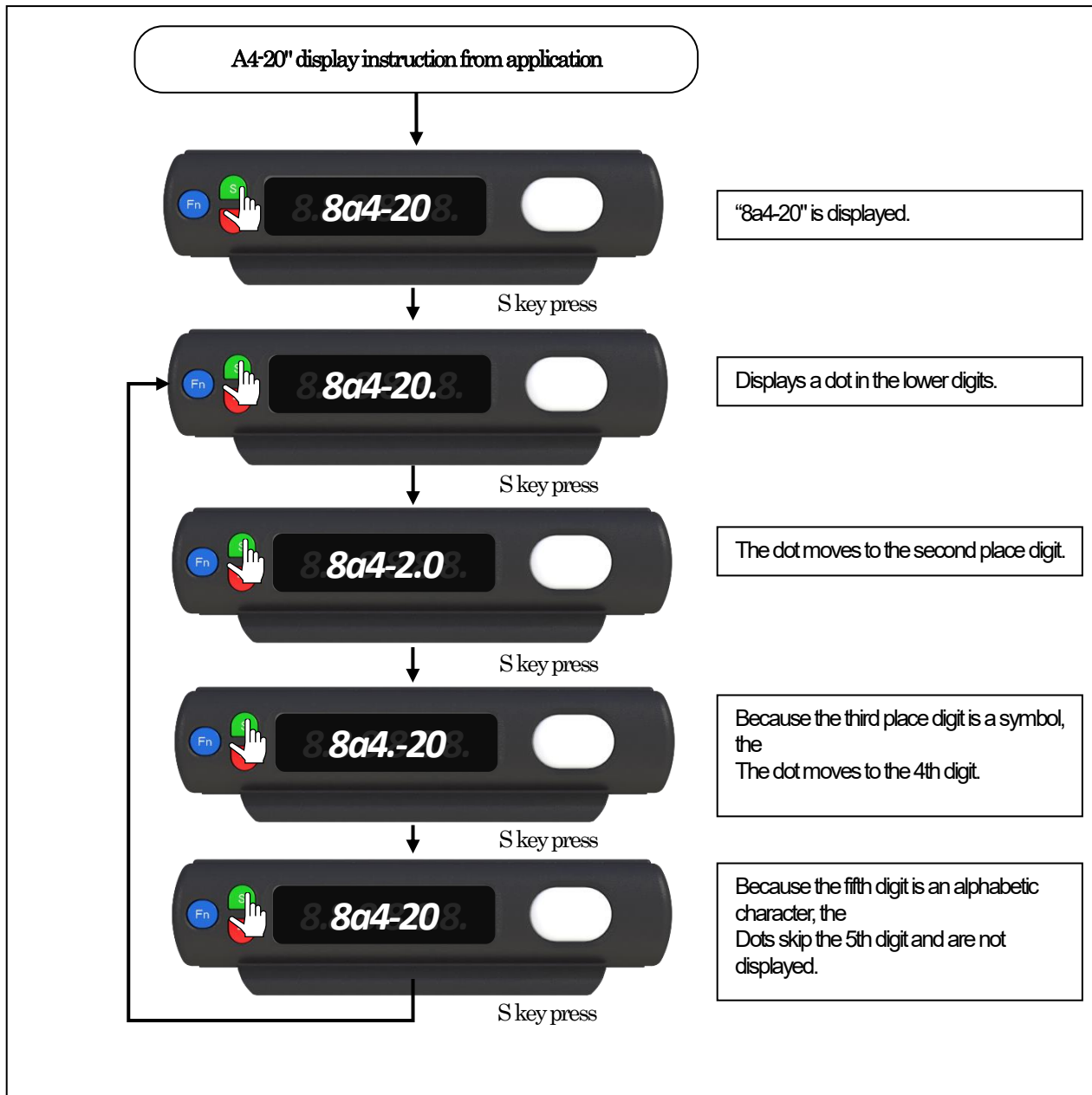


Force Cancel can be operated even if the Fn key is disabled in the application.

3.2.5. S key operation (default)

Negative processing can be done when the negative quantity of the indicated number is returned to the application to process the missing items.

For models with fewer than 5 digits, such as 3-digit displays, leave the invisible upper digits blank (20h).

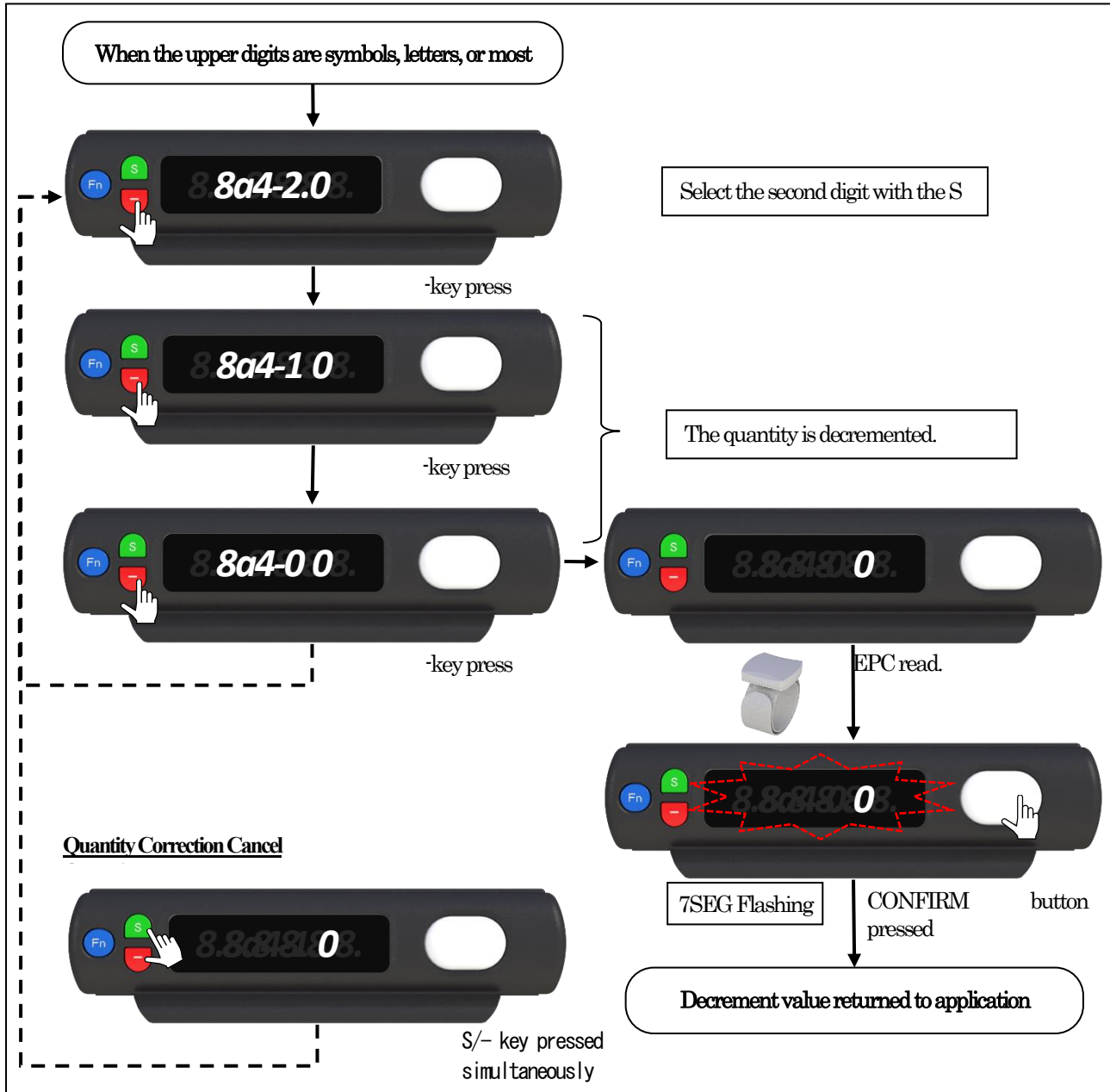


3.2.6. Decrement operation (default)

When sending back to the application a value that has been subtracted from the displayed number due to shortage processing, etc., the application performs the subtraction processing.

The decimated value is returned to the application by pressing the CONFIRM button after the decimated value is displayed.

To return to the initial indication display, press the S key and the - key simultaneously.



***Caution**

The UHF RF-IDLight Module's decrement operation differs in specification from the standard Light Module.



In the standard Light Module, if the upper digits are displayed as non-numeric, they cannot be corrected to a number greater than the first number displayed.

3.3. Optional Features

This function can be used with the "MWU20X0SX" product. It cannot be used with the conventional "MWU20X0PX" product.

3.3.1. Quantity correction prohibited digit setting

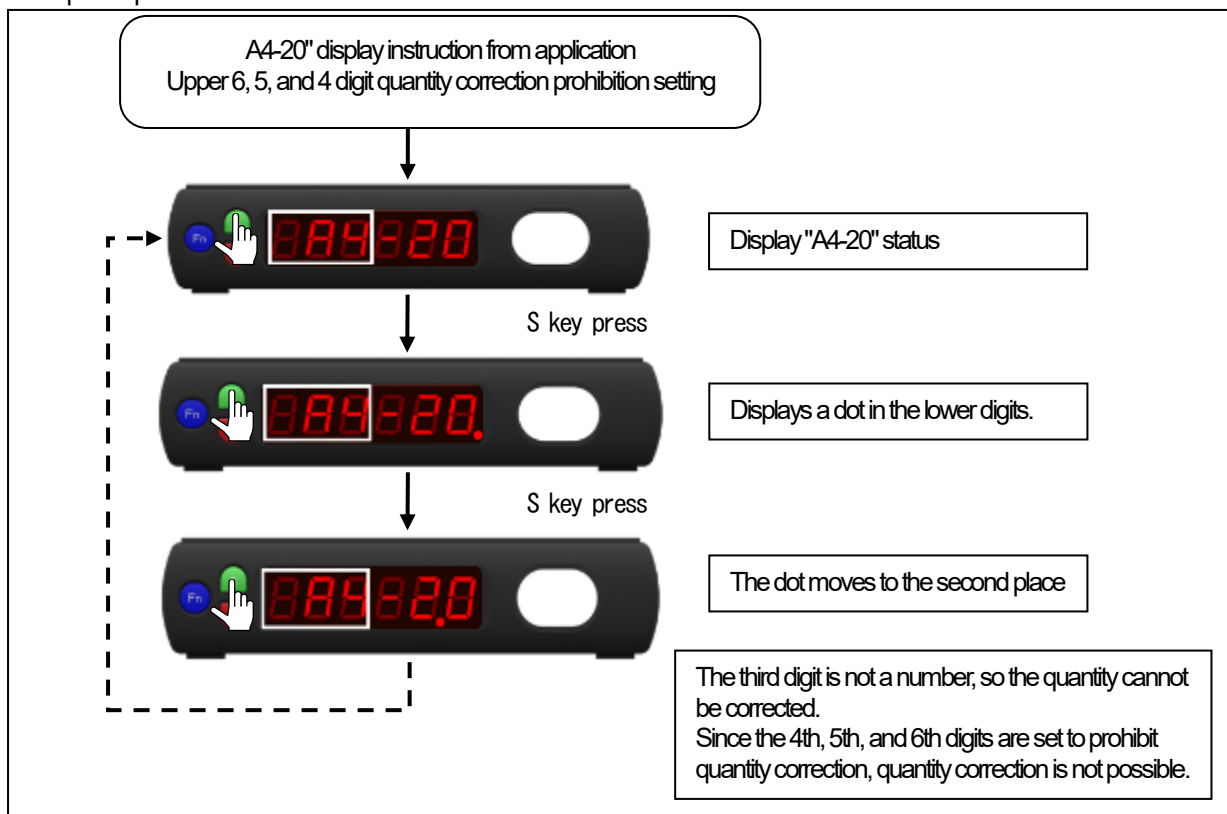
Ame command can be used to specify the digits for which quantity correction is prohibited.

Command format

A	m	e	[1] Address	[2]	[3]
---	---	---	-------------	-----	-----

No.	item name	Contents	attention (heed)								
[1]	Address	display unit address	Specifiable range 1 to 7999								
[2]	Configuration	d7d0 <table><tr><td>0</td><td>1</td><td>1</td><td>1</td><td colspan="4">[a]</td></tr></table> [a] Quantity correction prohibition setting	0	1	1	1	[a]				
0	1	1	1	[a]							
[3]	Quantity Correction Prohibited Setting	d71010: Use quantity correction prohibition <table><tr><td>0</td><td>1</td><td>[a]</td><td>[b]</td><td>[c]</td><td>[d]</td><td>[e]</td><td>[f]</td></tr></table> 0: Quantity can be corrected 1: Quantity cannot be corrected [a]: 6 digits [b]: 5 digits [c]: 4 digits [d]: 3 digits [e]: 2 digits [f]: 1 digit	0	1	[a]	[b]	[c]	[d]	[e]	[f]	
0	1	[a]	[b]	[c]	[d]	[e]	[f]				

Example of operation



3.3.2. Space quantification settings

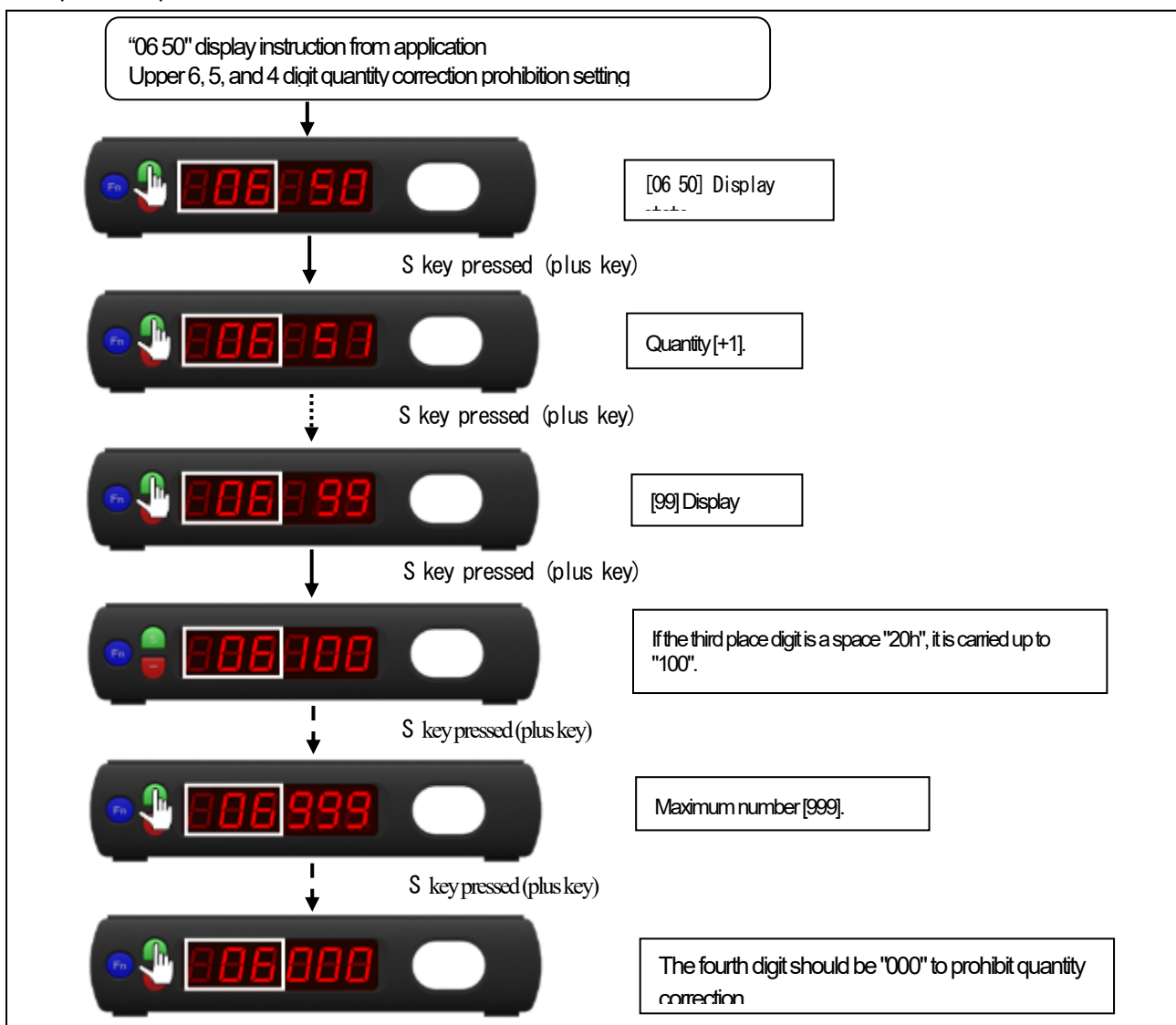
The Ama command allows spaces to be treated as numbers, which can also be used in Mode Array columns.

Command format

A	m	a	[1] Address	[2]
---	---	---	-------------	-----

No.	item name	Contents	attention (heed)
[1]	Address	display unit address	Specified range 1 to 7999
[2]	Quantity Correction Key Settings	d7 0 1 [d] [c] [b] [a] d0 [b] Quantity correction mode 00: Conventional use 01: Space is a numerical value * [a] Quantity correction key 00: Dignum 01: Not used 10: +/- DigNum is equivalent to the [S]SET key and the [-] minus key. Valid only when *[a] is set to +/-.	

Example of use operation



3.3.3. +/- Individual +/- key inhibit settings

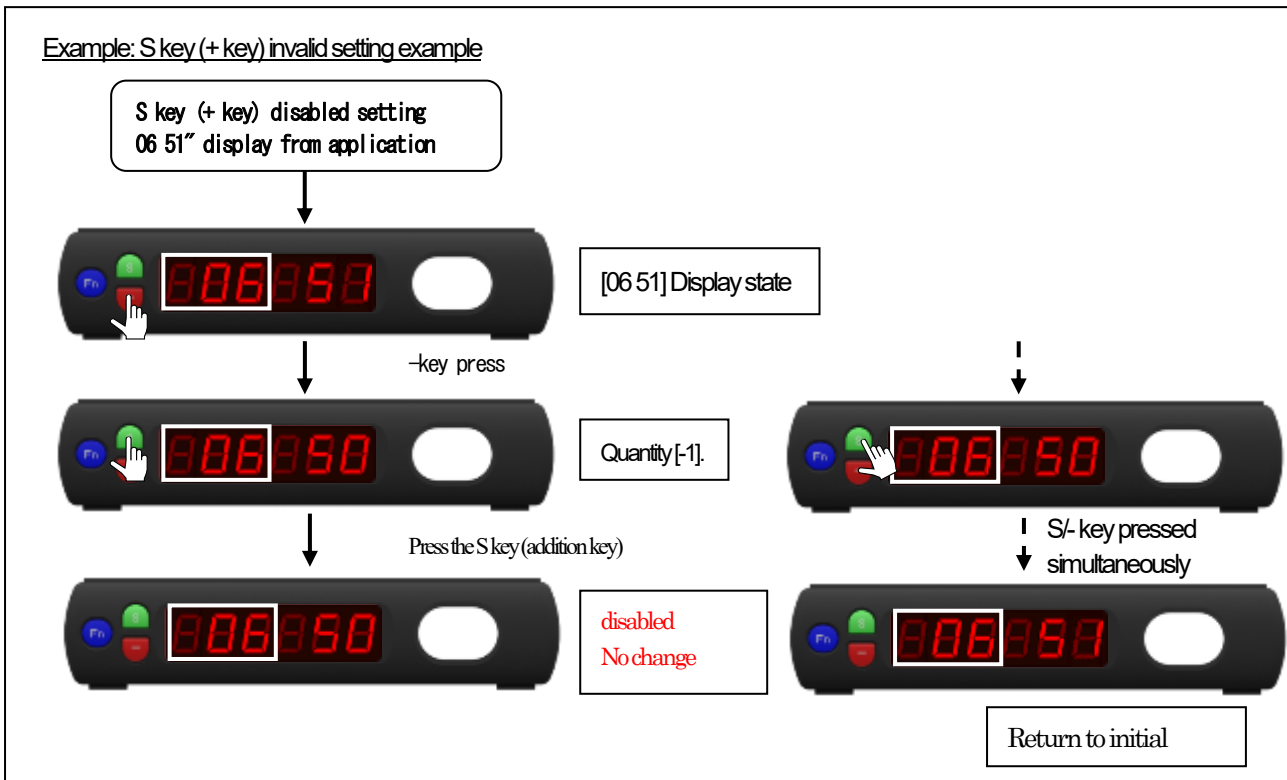
+ The + and - keys can be disabled individually.

This allows control of "can only subtract" and "can only add".

A	m	a	[1] Address	[2]
---	---	---	-------------	-----

No.	item name	Contents	attention (heed)						
[1]	Address	display unit address	Specified range 1 to 7999						
[2]	Quantity Correction Key Settings	d7 d0 <table><tr><td>0</td><td>1</td><td>[d]</td><td>[c]</td><td>[b]</td><td>[a]</td></tr></table> [a] Quantity correction key 00: Dignum 01: Not used 10: +/- 11: No change [b] Quantity correction mode 00: Conventional use 01: Space is a numerical value * [c] S key (+) [d] -key 0: Used* 1: Not used	0	1	[d]	[c]	[b]	[a]	DigNum is equivalent to the [S]SET key and the [-] minus key. Valid only when *[a] is set to +/-.
0	1	[d]	[c]	[b]	[a]				

Usage example:..



3.3.4. address configuration function

Display unit alone can be used to set the address of the display unit. *Only for MWU20X0SX type



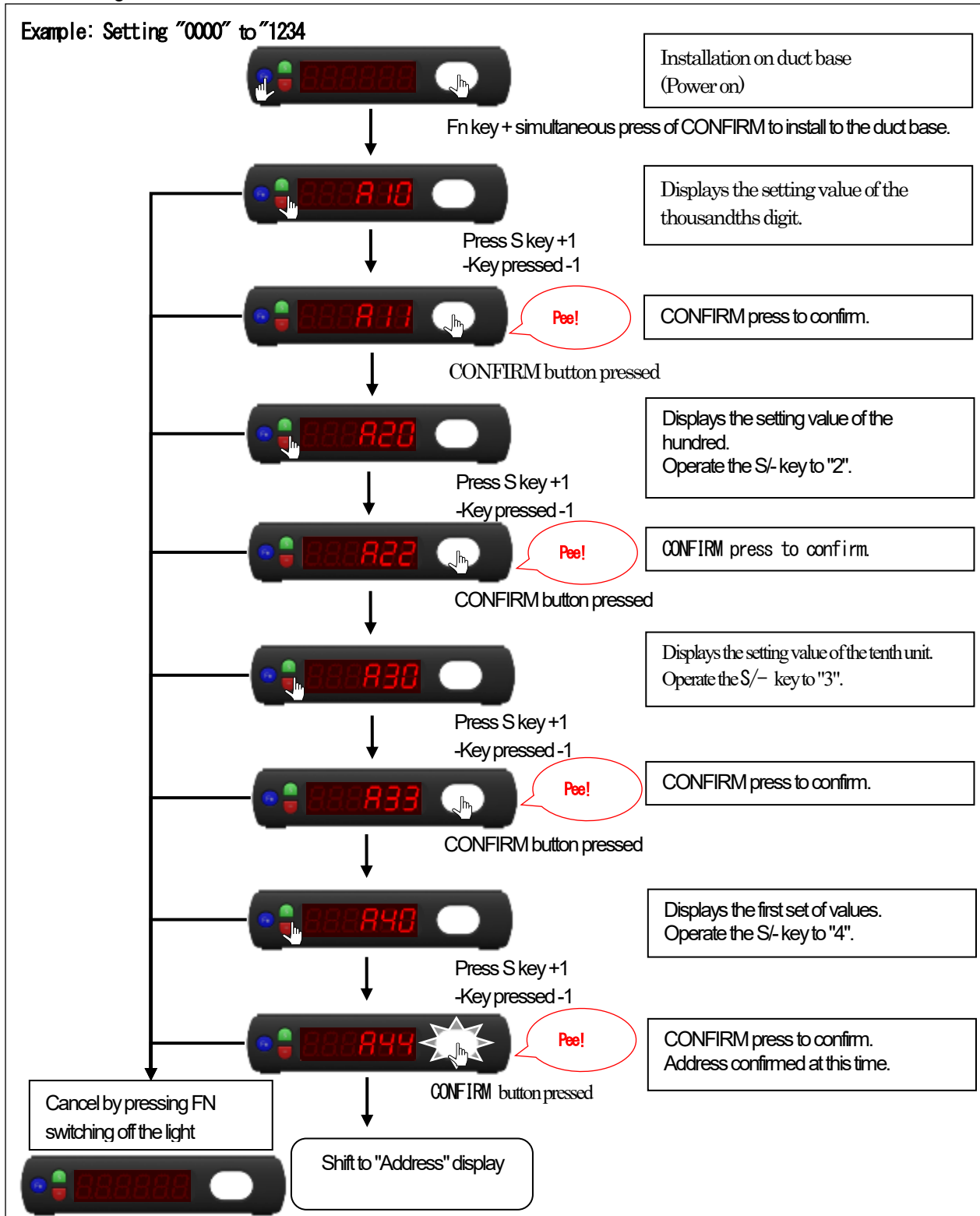
Caution

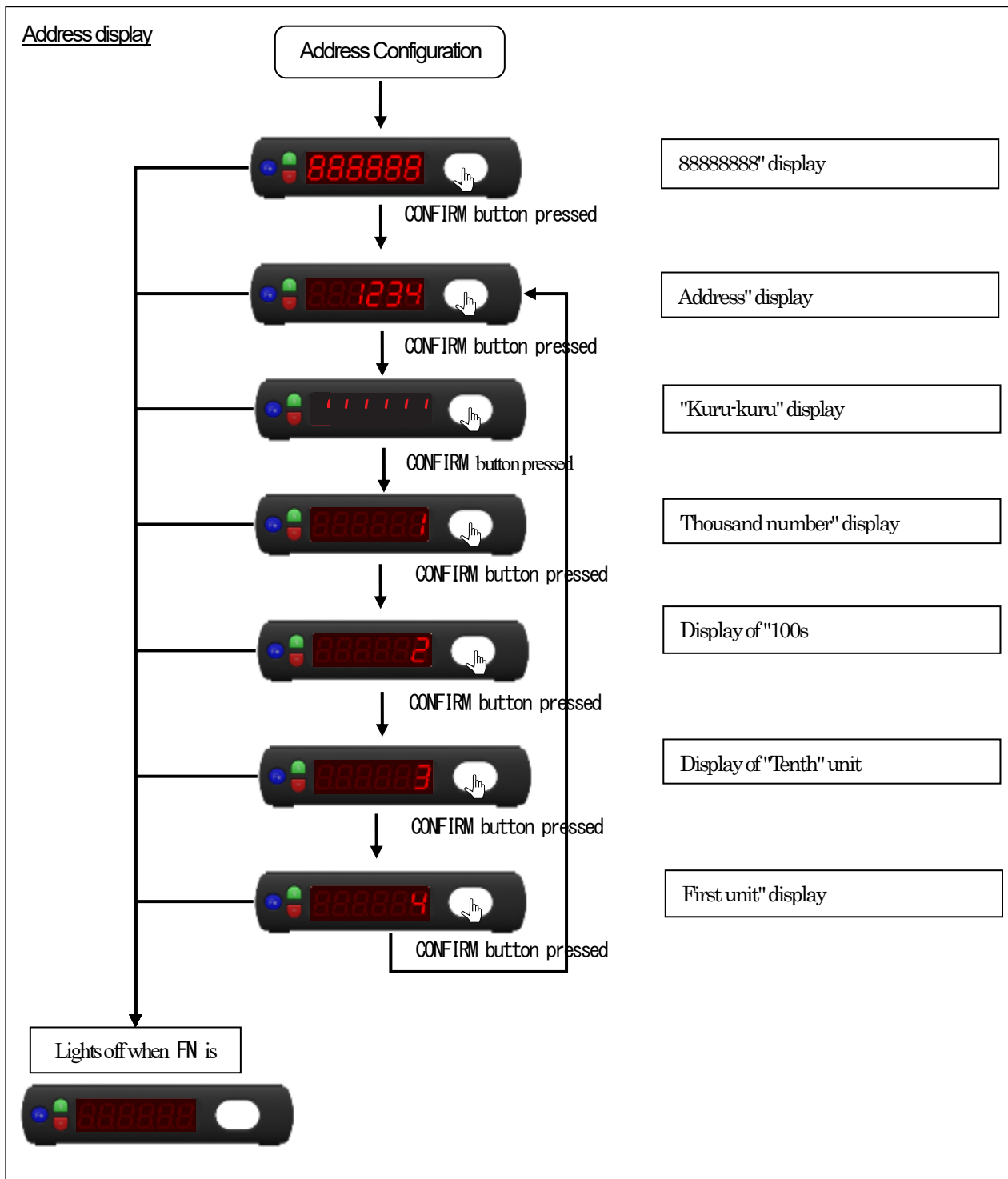
When setting the address of the display unit, the system must be interrupted before doing so.

Address setting during system operation may cause other display units to malfunction.

MWU Series UHF RF-IDLight Module User's Manual

Example: Setting "0000" to "1234"

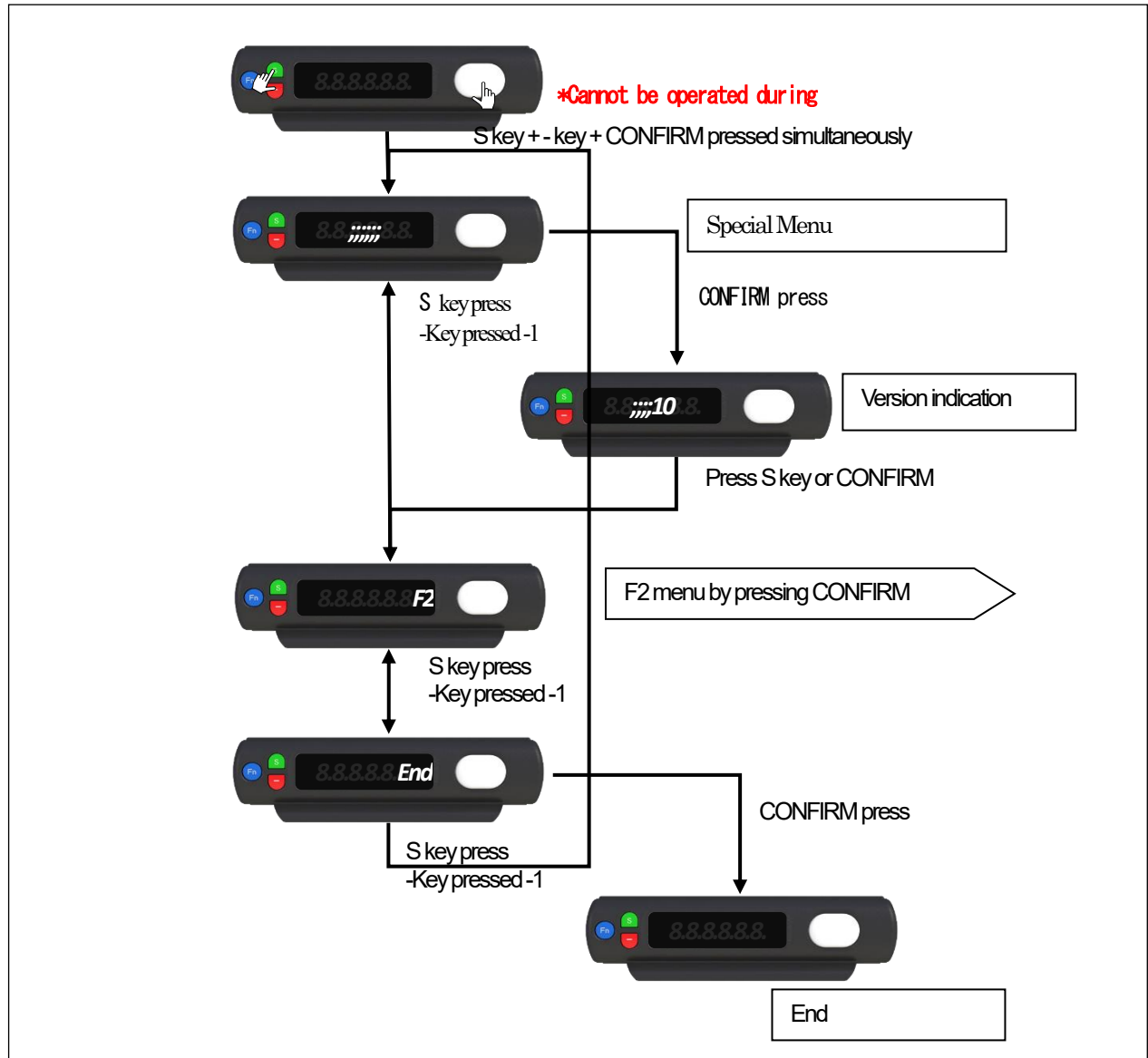




3.3.5. Special Menu

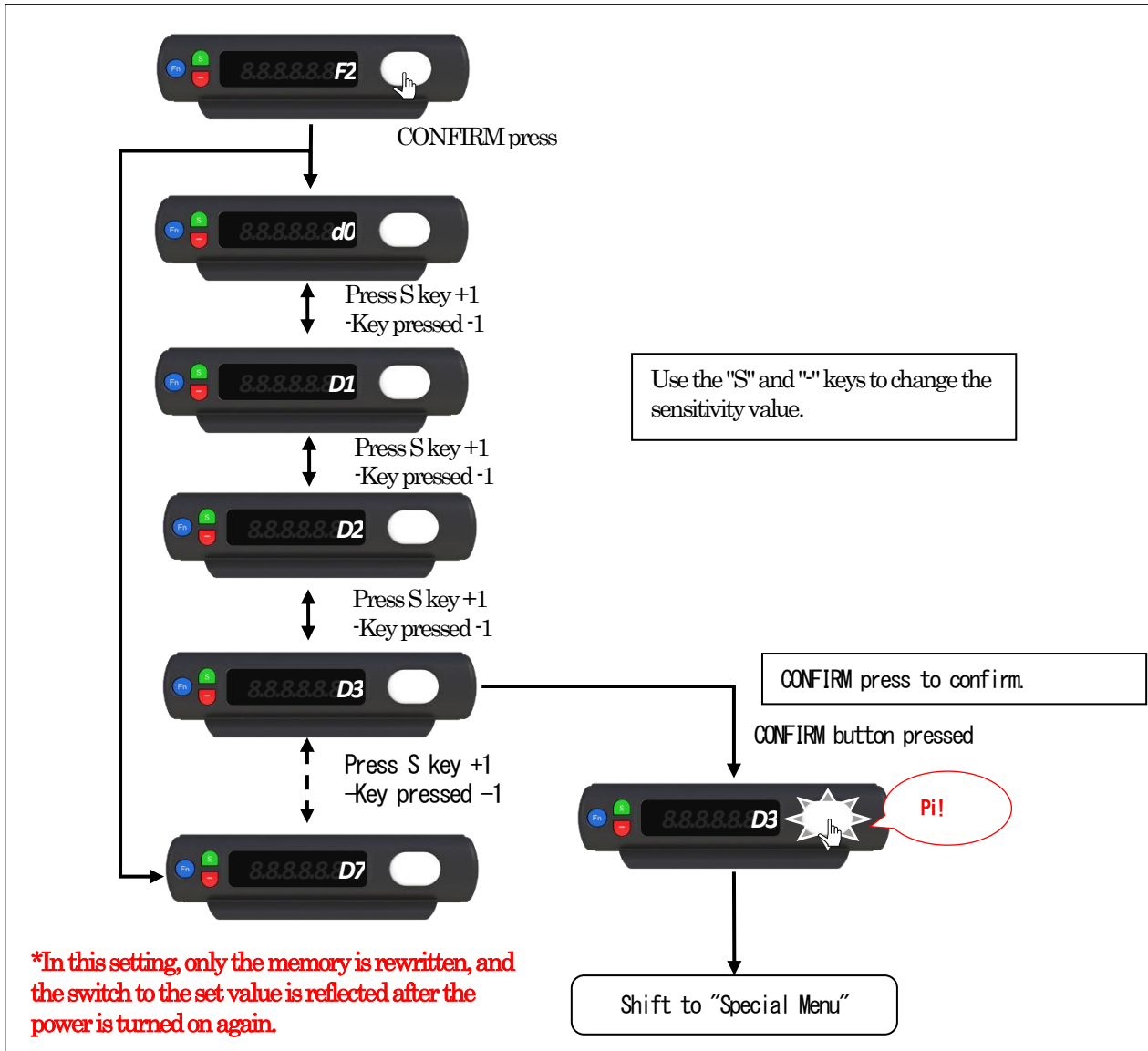
UHF-RF-ID indicator settings can be changed in the special menu.

Special Menu Operation Method



3.3.6. F2 menu

Adjust the RF-ID sensing distance in the "F2" menu.



Set value table

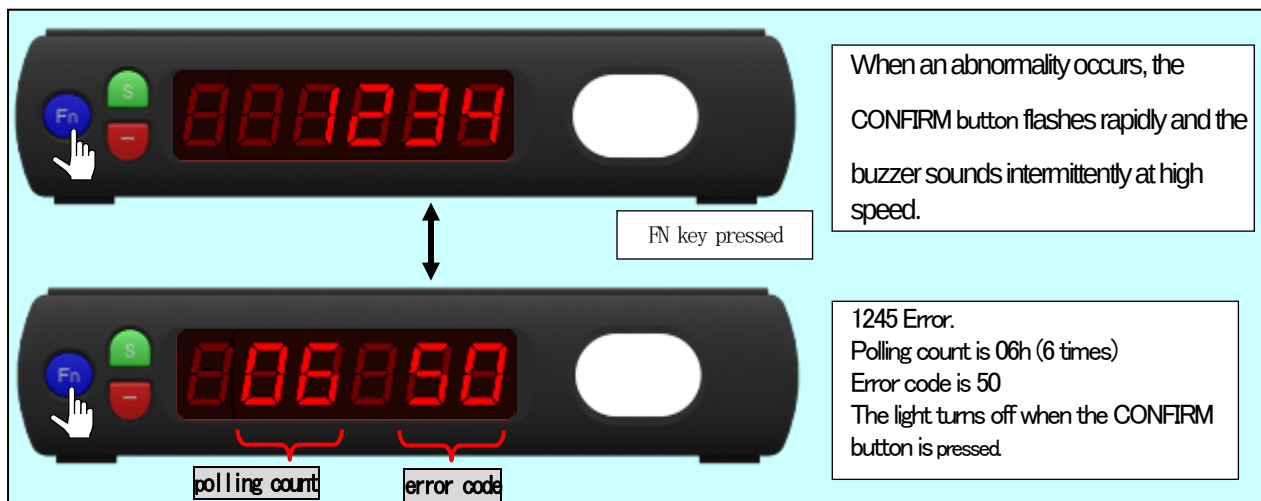
set value (e.g. of a function, parameter, etc.)	Approximate distance [mm]	remarks
d0	50	
d1	150	
d2	200	
d3	250	
d4	300	default
d5	400	
d6	500	
d7	600	

**This is a reference distance. Distance may increase or decrease depending on the installation environment and type of UHF TAG.*

3.3.7. No. 0 Light Module

No. 0 Light Module is a 6-digit type LM set to address 0. When you connect it to JB, you can see the error code when an error occurs.

When the controller receives a work instruction or BCR I/F open from the PC, it monitors the address and outputs the address and error code to No. 0 Light Module if the address is determined to be abnormal.



No. 0 Light Module Code Table .:

code	Contents	processing
01	power failure	Check ducts, cables and sockets
02	BCC error after retry	Check the rails and FG in the duct pipe for shot occurrence
07	Two or more work commands are directed to the same Light Module (duplicate instructions)	If LM lights up, check the application
	Work instruction commands are not received.	If LM does not light, check ducts, cables and ducts
50	No response (no connection or failure)	Replace Light Module
51	No response (due to framing or overrun errors)	Check for FGs and shorts

Connection method

Connect to JB. Can also be connected to channels that are set to unused.

Make sure that the address of Light Module No. 0 is always No. 0.

Operating Instructions:.

When some abnormality occurs on the line, it is indicated on the No. 0 Light Module. The buzzer sounds intermittently at high speed and the LED blinks at high speed.

First, the address of the LM where the error occurred is displayed. Pressing the FN key in this state displays the polling count and error code. Press the FN key again to return to the address display. Pressing the CONFIRM button clears the display.

No. 0 Light Module cannot hold the error information of multiple indicators. In other words, it displays only the error information of the most recently occurred display unit. Therefore, if Light Module 0 continues to beep, beep, ..., even after clearing the error information by pressing the CONFIRM button, there is a possibility that multiple display unit errors have occurred, so monitor Light Module 0 for a while. Please monitor the Light Module 0 for a while.

polling count

The number of times the controller has monitored the corresponding LM since the work instruction was given, expressed as a two-digit hexadecimal number.

Normally, a value of 06h or less indicates that an error has occurred in the initial stage of monitoring and that normal communication with LM has never been established; a value greater than 06h indicates that normal communication was established but an error occurred during the process.

The display is in hexadecimal from 00h (0) to FFh (255); if the value exceeds FFh (255), it remains "FF".

3.4. UHF RF-IDLight Module abnormal display operation

The UHF RF-IDLight Module monitors the status of the UHF RF-ID reader and displays error messages on a 7-segment display.

3.4.1. Error indication

When an error occurs in the RF-ID reader section, "..." is displayed on the 7-segment display.

It also returns RF-ID anomalies when work instructions are sent from the application.



If "...!" appears in the display section, the RF-ID reader in the Light Module may be damaged.

If "...!" is displayed after power-on, replace the equipment.

In addition to the status of communication errors, check the status of RF-IDs during start-up inspections and during work.

4. Control Method

This section describes the basic control of the UHF RF-IDLight Module.

TW Series Command Reference Manual

TW Series Controller User's Manual

4.1. Precautions for using the UHF RF-IDLight Module

The following points should be considered when creating an application with the UHF RF-IDLight Module



The UHF-TAG may be difficult to read due to its shape.
 UHF RF-IDLight Module can only read the unique ID (EPC).
 Read and write operations for the designated block are not available.
 When used to identify a worker, the application should convert the unique ID (EPC) and link it to the worker.
 The unique ID (EPC) cannot be specified at the time of delivery; if the ID-TAG needs to be replaced due to loss or damage of the ID-TAG, the unique ID (EPC) of the new ID-TAG must be associated in the application.

4.2. Supported commands

The UHF RF-IDLight Module can be controlled by the following commands.

List of supported commands

Commands for UHF RF-ID indicator only

header	Contents	remarks
SC001	EPC data specification work instruction command	*Note. Controller version 8.E or later
SC002	Work instruction command (no EPC data specified)	*Note. Controller version 8.E or later
Am8	Designation of poka repellent operation mode	

Other common commands

header	Contents	remarks
Z	initialization	
Z1	initialization	
Mega	Operation mode specification	
Am*1	Operation mode setting	
FP1	Displayed data can be specified after pressing Fn key Work instructions by block	
FP5	Overwritable Display data can be specified after Fn key is pressed Work instructions by block	
FP2	Mode Row Correspondence Module Display	
D	End of work instructions	
A	Maintenance designation	
Az	Module status inquiry	
Ac	Module addressing	
t	Report from Controller	

4.3. Commands for UHF RF-ID indicator only

4.3.1. EPC data specification work instruction command

This is a control command to specify a UHF TAG (EPC) when performing picking operations and to perform operations only with the specified UHF TAG (EPC). (See 4.3.1 EPC data specification work instruction command (See section 4.3.1.))

(1) Designation of operation mode, work instructions, and EPC data

S	C	0	0	1	[1]	[2]	[3]	[4] Block No.	[5] Mode Array	[6] Address	[7] Display Data	[9] EPC Data
---	---	---	---	---	-----	-----	-----	---------------------	----------------	-------------	------------------	--------------

(2) Designation of operation mode, work instruction, display data designation after Fn key is pressed, and EPC data designation

S	C	0	0	1	[1]	[2]	[3]	[4] Block No.	[5] Mode Array	[6] Address	[7] Display Data	[8] Display Data After Pressing Fn	[9] EPC Data
---	---	---	---	---	-----	-----	-----	---------------------	----------------	-------------	------------------	---------------------------------------	--------------

(3) Operation mode designation, work instructions, EPC data designation, EPC Mask designation

S	C	0	0	1	[1]	[2]	[3]	[4] Block No.	[5] Mode Array	[6] Address	[7] Display Data	...		
												...	[9] EPC Data	[10] EPC Mask Data

(4) Designation of operation mode, work instruction, designation of display data after pressing Fn key, designation of EPC data,

S	C	0	0	1	[1]	[2]	[3]	[4] Block No.	[5] Mode Array	[6] Address	[7] Display Data	[8] Display Data After Pressing Fn	...
										...	[9] EPC Data	[10] EPC Mask Data	

EPC Mask

No.	Item	Details	Note
[1]	Action Type	1 : Work instructions 2 : Display Instructions 5 : Overlapable work instructions	
[2]	Designation of display data after pressing the Fn key	00 : Not specified 06 : Specified number of characters 6 characters	00 : [8] is omitted
[3]	Mask Data Flag	0 : EPC Mask No data 1 : EPC Mask Data available	0 : [10] is omitted
[4]	Block No.	block number	Specifiable range is 01 to 99
[5]	Mode Array	See "Mode Row." Variable length, optional	If mode column is omitted, continue from [Address].
[6]	Address	Light Module Address	Specifiable range is 0001 to 7999 *Not available as a wildcard
[7]	Display Data	Display Data	Always specify 6 characters
[8]	Display Data After Pressing Fn	Data displayed after Fn key is pressed	Specify the number of characters specified in [2] (6 characters)
[9]	RF-ID EPC Data	Specify the EPC data to be read in ASCII (0 to 9, A to F, a to f). (24 bytes)	
[10]	EPC Mask Data	ASCII (0-9, A to A) data to be masked bit by bit. F,a-f). (24 bytes) <Example EPC data : 123456789ABCDEF012345678 Mask data : FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF000000 Valid data : 123456789ABCDEF012345678	Can be specified in bits [About EPC Mask] EPC Mask

[About EPC Mask]

EPC data contains a mixture of multiple data such as product codes, product information, serials, etc.

When only the product code needs to be matched, set the EPC Mask to specify the partial match location in the EPC Data.

<Example

For EPC data 123456789ABCDEF123456789

Mask data FFFFFFFFFFFFFFFFFFFFFFFF0000 is specified.

Valid data 123456789ABCDEE123450000 - 123456789ABCDEE12345FFFF

MSB

EPC:95bit

LSB

EPC:0bit

Data(HEX)	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	1	2	3	4	5	6	7	8	9
Mask(HEX)	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	0	0	0	0

Data(BIN)	0001	0010	0011	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1110	1111	0001	0010	0011	0100	0101	0110	0111	1000	1001
Mask(BIN)	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	0000	0000	0000	0000

coincident bit

For EPC data 123456789ABCDEF123456789

Mask data FFFFFFFFFFFFFFFFFFC000 is specified.

Valid data 123456789ABCDEE123454000 to 123456789ABCDEE123457FFF

	MSB EPC:95bit																LSB EPC:0bit							
Data(HEX)	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	1	2	3	4	5	6	7	8	9
Mask(HEX)	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	C	0	0	0

Data(BIN)	0001	0010	0011	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1110	1111	0001	0010	0011	0100	0101	0110	0111	1000	1001
Mask(BIN)	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1100	0000	0000	0000



How to generate EPC Mask

MSB

EPC:95bit

Data(HEX)

1

2

3

4

5

6

7

8

9

A

B

C

D

E

F

1

2

3

4

5

6

7

8

9

LSB

EPC:0bit

Data(BIN)

0

0

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0

1

0

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0

1

0

1

0

4.3.2. Operation instruction command (no EPC data specified)

This control command is intended to obtain the UHF TAG (EPC) when performing picking operations.

(See 4.3.2 Operation instruction command (no EPC data specified) (See also)

- (1) Designation of operation mode and work instructions

S	C	0	0	2	[1]	[2]	[3] Block No.	[4] Mode Array	[5] Address	[6] Display Data
---	---	---	---	---	-----	-----	---------------------	----------------	-------------	------------------

- (2) Designation of operation mode, work instruction, and display data after Fn key is pressed

S	C	0	0	2	[1]	[2]	[3] Block No.	[4] Mode Array	[5] Address	[6] Display Data	[7] Display Data After Pressing Fn
---	---	---	---	---	-----	-----	---------------------	----------------	-------------	------------------	---------------------------------------

No.	item name	Contents	attention (heed)
[1]	operation class	1 : Work instructions 2 : Display Instructions 5 : Overlapable work instructions	
[2]	Designation of display data after pressing the Fn key	00 : Not specified 06 : Specified number of characters 6 characters	00 : [8] is omitted
[3]	Block No.	block number	Specifiable range is 01 to 99
[4]	Mode Array	See "Mode Row." Variable length, optional	If mode column is omitted, continue from [Address].
[5]	Address	Light Module Address	Specifiable range is 0001 to 7999 *Not available as a wildcard
[6]	Display Data	Display Data	Always specify 6 characters
[7]	Display Data After Pressing Fn	Data displayed after Fn key is pressed	Specify the number of characters specified in [2] (6 characters)

4.3.3. UHF RF-ID indicator dedicated mode setting command

The Am8 command can be used to set the UHF RF-ID indicator poka-protection operation and ID-TAG reading operation. It can also be set in the Mode Array column.

The settings made by this command will return to Default when the initialization command "Z" is received.

(See 4.5.3 UHF RF-ID indicator dedicated mode setting (Am8 command)) (See section 4.5.3.)

Command format

A	m	8	[1] Address	[2] [3]
---	---	---	-------------	---------

No.	item name	Contents	attention (heed)								
[1]	Address	Light Module address*.	Specifiable range 1 to 7999 *Set the Light Module address. It is not the sensor address.								
[2]	requirement d7 <table><tr><td>0</td><td>1</td><td>0</td><td>0</td><td>[a]</td><td>[b]</td><td>[c]</td><td>[d]</td></tr></table> d0	0	1	0	0	[a]	[b]	[c]	[d]	[a] EPC to CONFIRM operation *1 0: Not used 1: Use -Default. [b] Fixed to "0" to be unused bits [c] Fixed to "0" to be unused bits [d] Fixed to "0" to be unused bits	*1 EPC to CONFIRM operation: In this mode, the CONFIRM button cannot be pressed until after the EPC has been scanned.
0	1	0	0	[a]	[b]	[c]	[d]				
[3]	Notification/Action Settings d7 <table><tr><td>0</td><td>1</td><td>0</td><td>0</td><td>[a]</td><td>[b]</td><td>[c]</td><td>[d]</td></tr></table> d0	0	1	0	0	[a]	[b]	[c]	[d]	[a] Poka repellent action *4 0: Not used 1: Use -Default. [b] Fixed to "0" to be unused bits [c] Fixed to "0" to be unused bits [d] Fixed to "0" to be unused bits	*4 Poka-awarding action: If the Light Module is not working, no poka repellent action is performed.
0	1	0	0	[a]	[b]	[c]	[d]				

4.4. Operation response

In the UHF RF-IDLight Module, the EPC read by the RF-ID reader is added to the work completion information.

Converts the acquired 96-bit EPC data into a 24-byte ASCII string and outputs it.

Form

t	[1]Address	[2]Status	:	4	[3]Data Length	<	[4]Display Data	[5]St	[6]EPC Data	~	>
---	------------	-----------	---	---	----------------	---	-----------------	-------	-------------	---	---

No.	item name	Contents		supplement
[1]	Address	address		
[2]	Status	00	normal termination	In case of module abnormality, "." and after are omitted. *If Status is "30", refer to Module Status
		01	module abnormality	
		10	cancel	
		30	Module Specific Status	
[3]	Data Length	0033		Fixed value (1+6+1+24+1=33) BCD ASCII
[4]	Display Data	Quantity correction, fixed 6 digits in ASCII		Fill in "-" 2Dh when there is no correction
[5]	Module Status	0	normal	Fill all EPC data to 0 in case of RW error or cancellation
		1	RW abnormality	
		2	force cancel	
[6]	EPC Data	Acquired EPC data (24-digit fixed) Fixed 24 digits in ASCII		If multiple acquisitions, the first one acquired



In systems using the UHF RF-IDLight Module, the "t" response is not sent back in a repeatable manner in order to simplify the reply process in the application.

The "t" response will always be "t" response for each address*1.

*1 If Status is a module error, "." and after may be omitted and a repeatable reply may be sent.

4.4.1. Example of working response

(1) Normal completion

t	[1]Address	[2]Status	:	4	[3]Data Length	<	[4] Display Data	[5]	[6] EPC Data	>
t	0 1 0 1	0 0	3Ah	4	0 0 3 3	3Ch	- - - - - -	0	1 2 3 4 5 6 7 8 9 A B C D E F 1 2 3 4 5 6 7 8 9	3Eh

Description.

- [1] Light Module address "0101
- [2] Status "00" Normal completion
- [3]. Data Length "0033" [4
- [4] Display Data "—"
- [4]. EPC acquisition succeeded
- [5] EPC "123456789ABCDEF123456789" in UHF-TAG

(2) Quantity correction Normal completion

t	[1]Address	[2]Status	:	4	[3]Data Length	<	[4] Display Data	[5]	[6] EPC Data	>
t	0 1 0 1	0 0	3Ah	4	0 0 3 3	3Ch	1 2 3 4 5 5	0	1 2 3 4 5 6 7 8 9 A B C D E F 1 2 3 4 5 6 7 8 9	3Eh

Description.

- [1] Light Module address "0101
- [2] Status "00" Normal completion
- [3]. Data Length "0033" [4
- [4] Correction of quantity to "123455
- [5]. EPC acquisition succeeded
- [6] EPC "123456789ABCDEF123456789" in UHF-TAG

(3) Completion of missing items

t	[1]Address	[2]Status	:	4	[3]Data Length	<	[4] Display Data	[5]	[6] EPC Data	>
t	0 1 0 1	1 0	3Ah	4	0 0 3 3	3Ch	- - - - - -	1	1 2 3 4 5 6 7 8 9 A B C D E F 1 2 3 4 5 6 7 8 9	3Eh

Description.

- [1] Light Module address "0101
- [2] Status "00" Normal completion
- [3]. Data Length "0033" [4
- [4] Correction of quantity to "—"
- [5]. EPC acquisition succeeded
- [6] EPC "123456789ABCDEF123456789" in UHF-TAG

(4) Forced cancellation completed

[illegible]

Description.

- [1] Light Module address "0101
- [2] Status "00" Normal completion
- [3]. Data Length "0033" [4
- [4] Correction of quantity to "—
- [5] Force Cancel
- [6] UHF-TAG の EPC 「000000000000000000000000」

(5) RF-ID anomaly completion

[illegible]

Description.

- [illegible]

4.5. Operation of UHF RF-IDLight Module

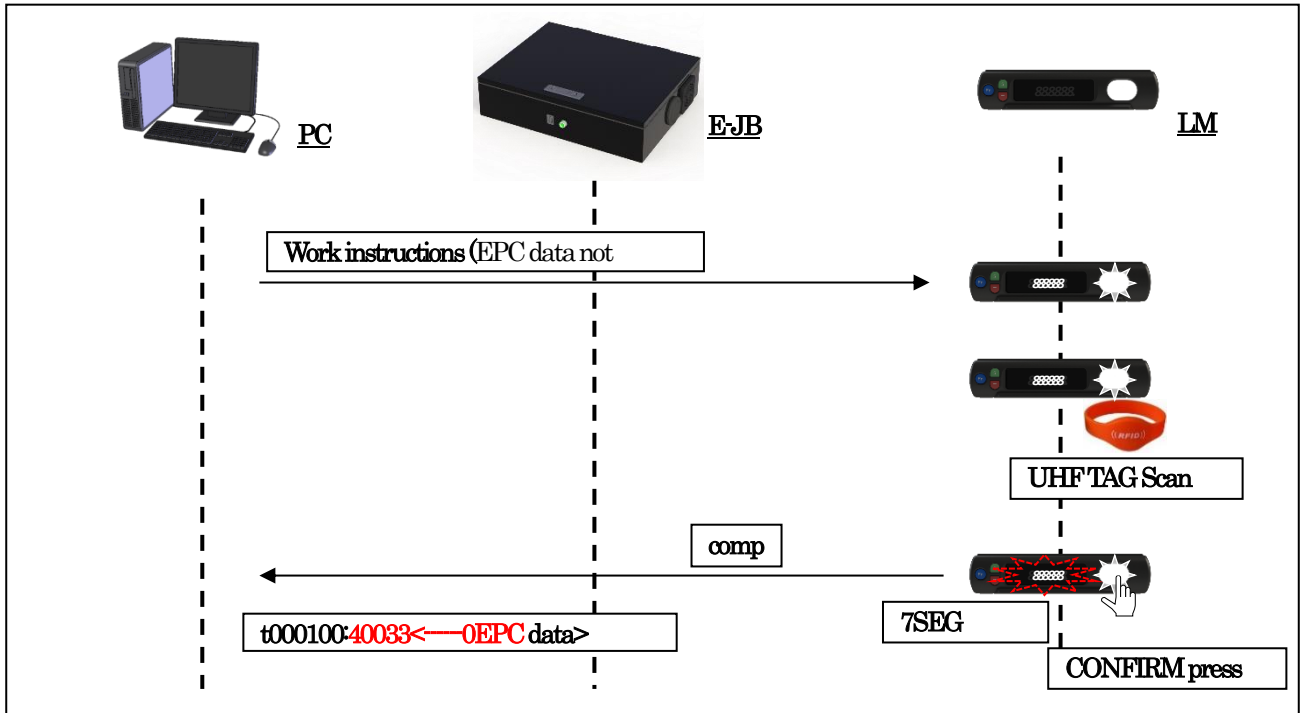
The RF-IDLight Module must read the UHF-TAG to complete the work.

The following describes the operation of the RF-ID.

4.5.1. Basic operation (SC002 command: no EPC data specified)

This control command is intended to obtain the UHF TAG (EPC) when performing picking operations.

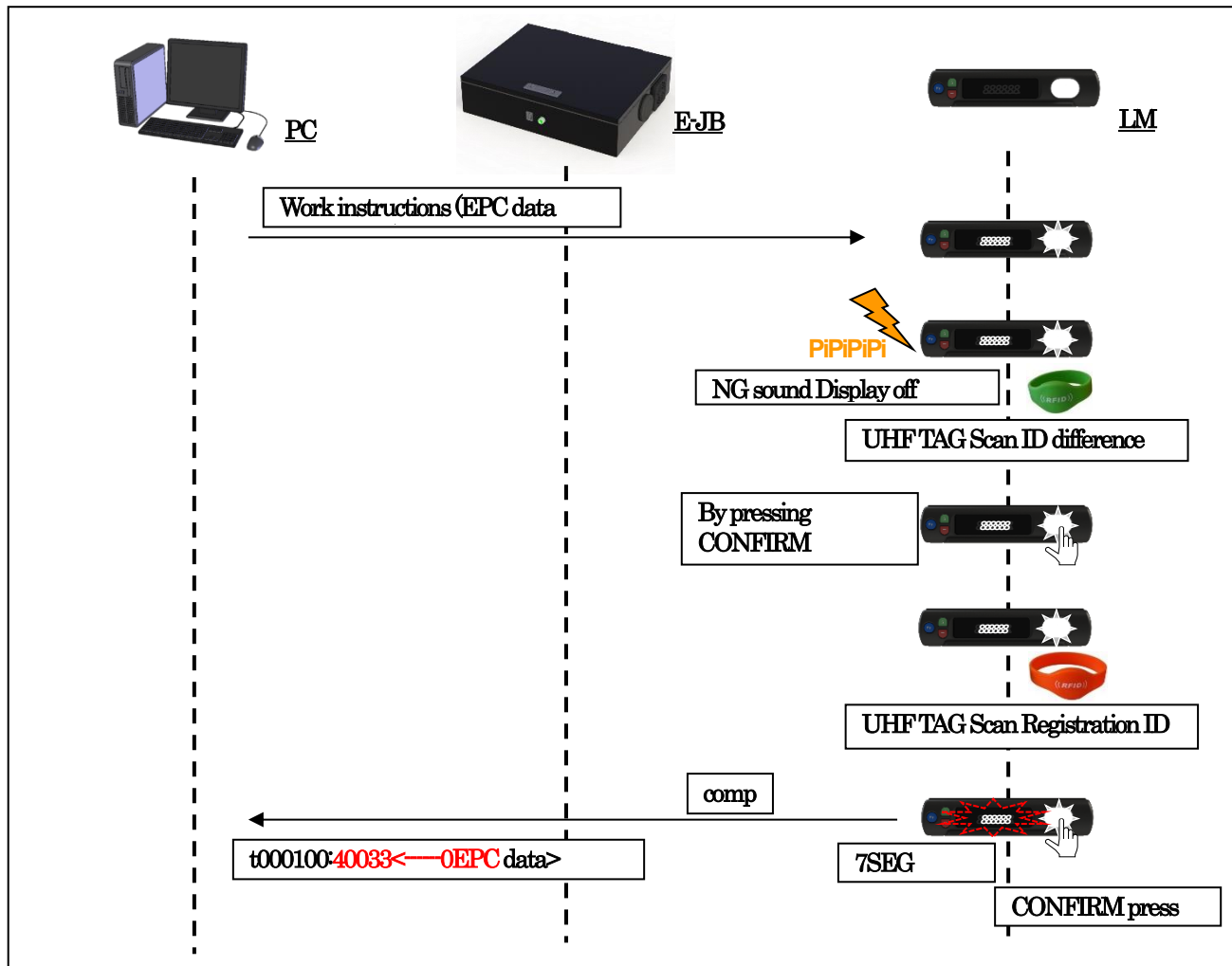
The work can be completed by acquiring the UHF TAG (EPC), and the acquired EPC data is notified to the application.



When the UHF-TAG is recognized, the 7 segments blink, and the EPC data is returned to the host application by pressing the CONFIRM button.

4.5.2. Basic operation (SC001 command: EPC specified)

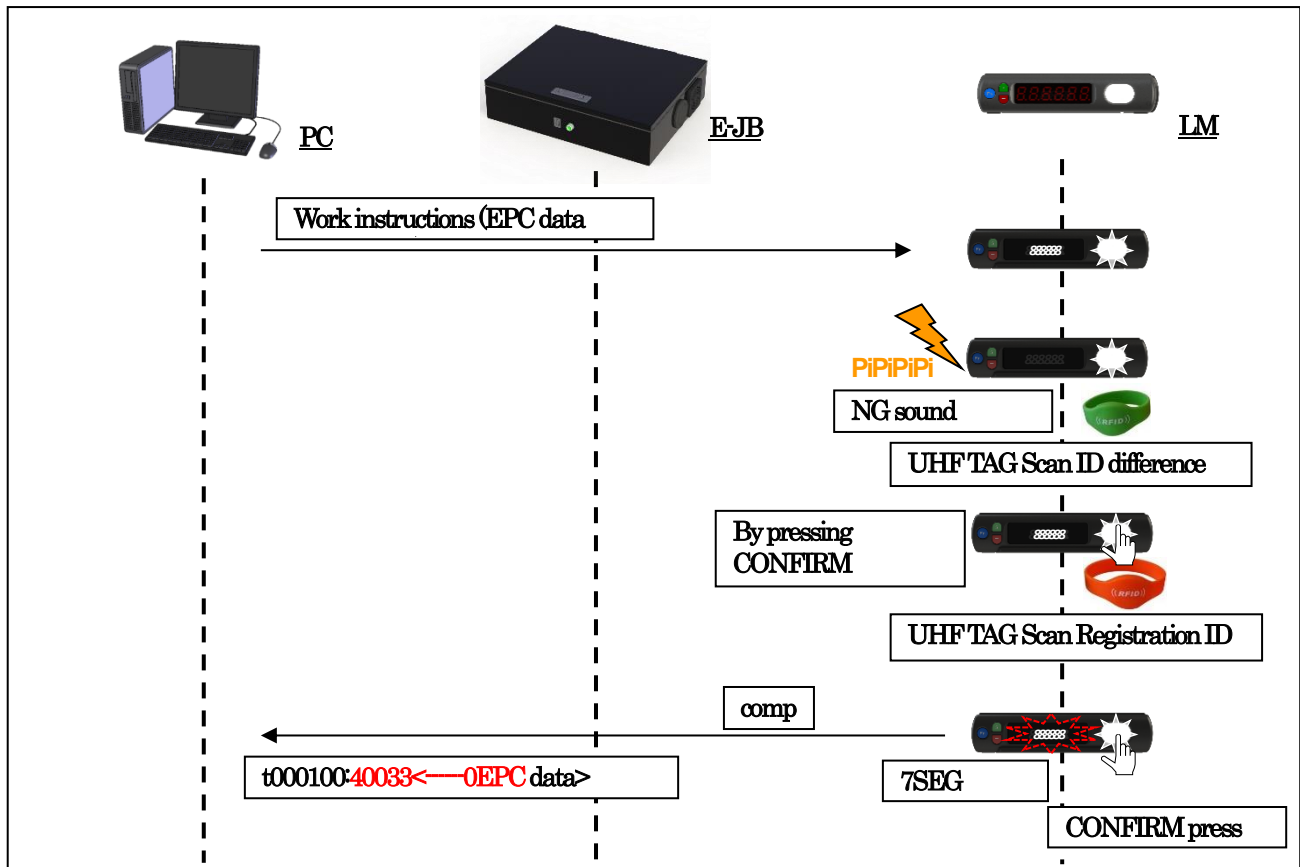
This is a control command to specify a UHF TAG (EPC) for picking operations and to work only with the specified UHF TAG (EPC). Partial matches can also be specified by setting the EPC Mask.



4.5.3. UHF RF-ID indicator dedicated mode setting (Am8 command)

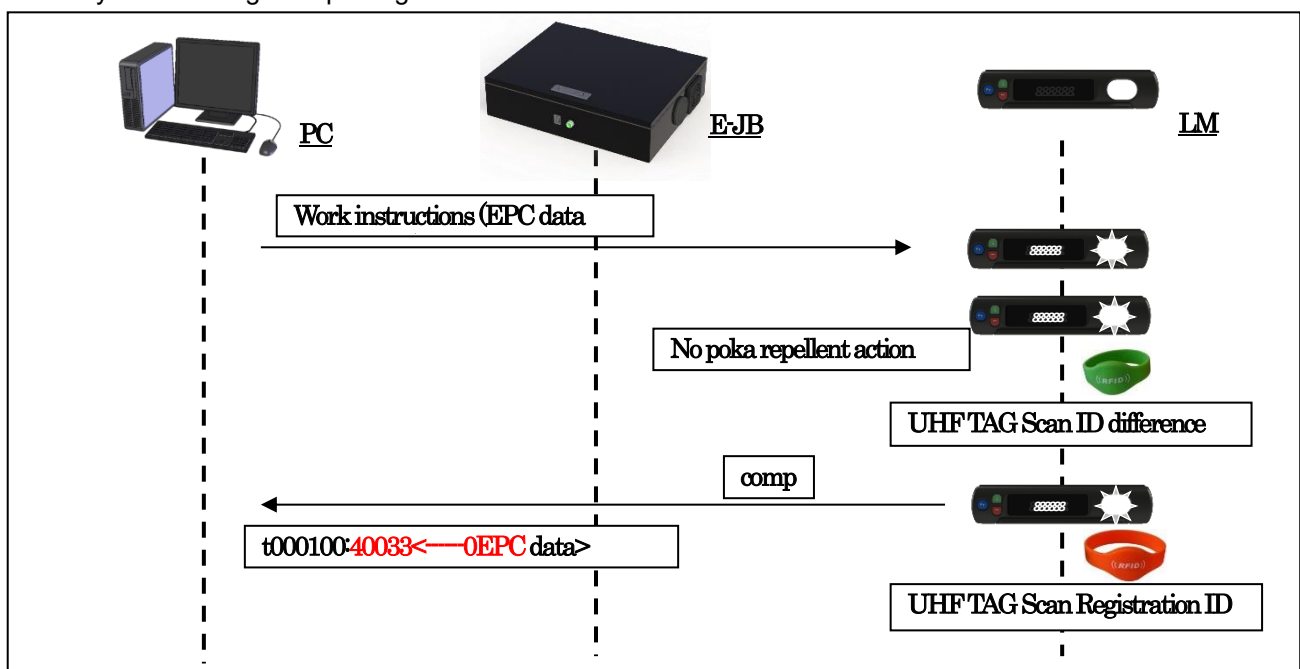
Poka-awarding operation and completion operation can be set.

(1) With poka repellent action and EPC to CONFIRM operation



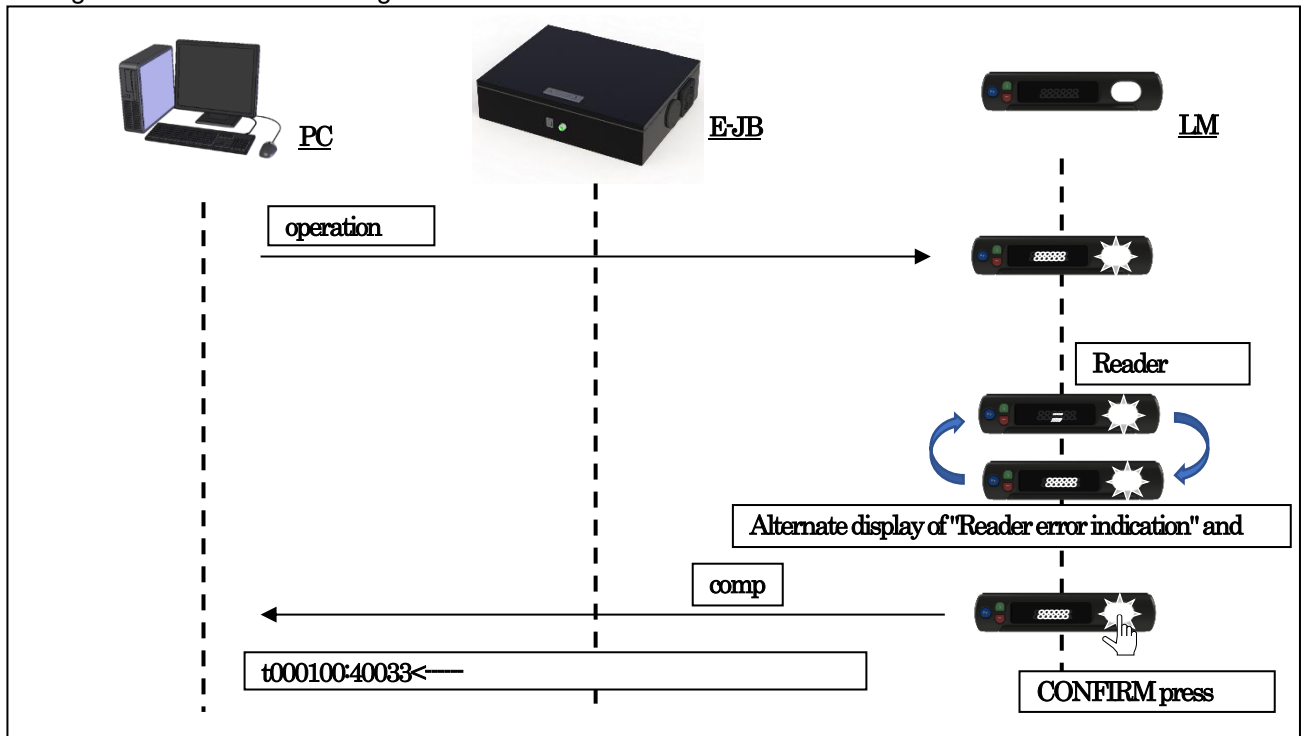
(2) Without poka repellent action and without EPC to CONFIRM operation

If EPC→CONFIRM operation is not used, the quantity display will be turned off as it is completed the moment the TAG is read, so it is necessary to turn on the light after pressing the button.



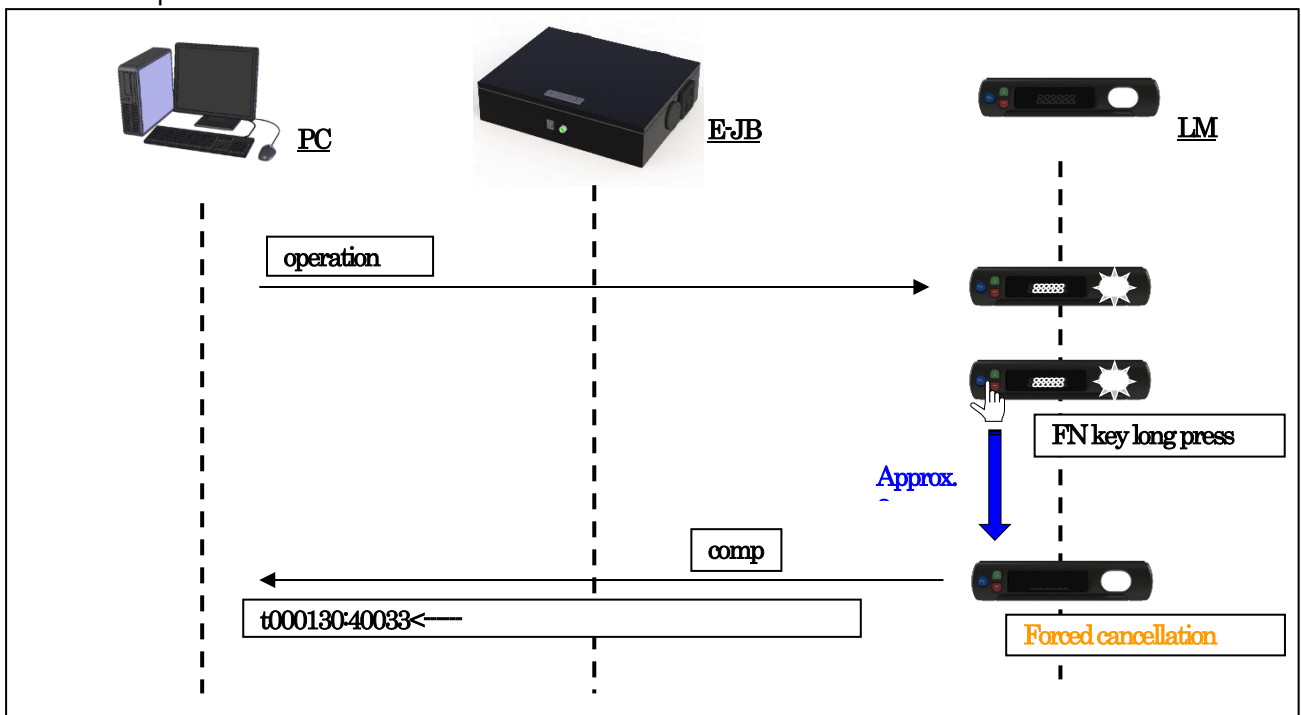
4.5.4. UHF RF-ID Reader Abnormal

If the UHF RF-ID Reader is damaged or otherwise unable to communicate, the UHF RF-ID Light Module alternately displays a "" error message and a work instruction message.



4.5.5. Forced Cancel Operation

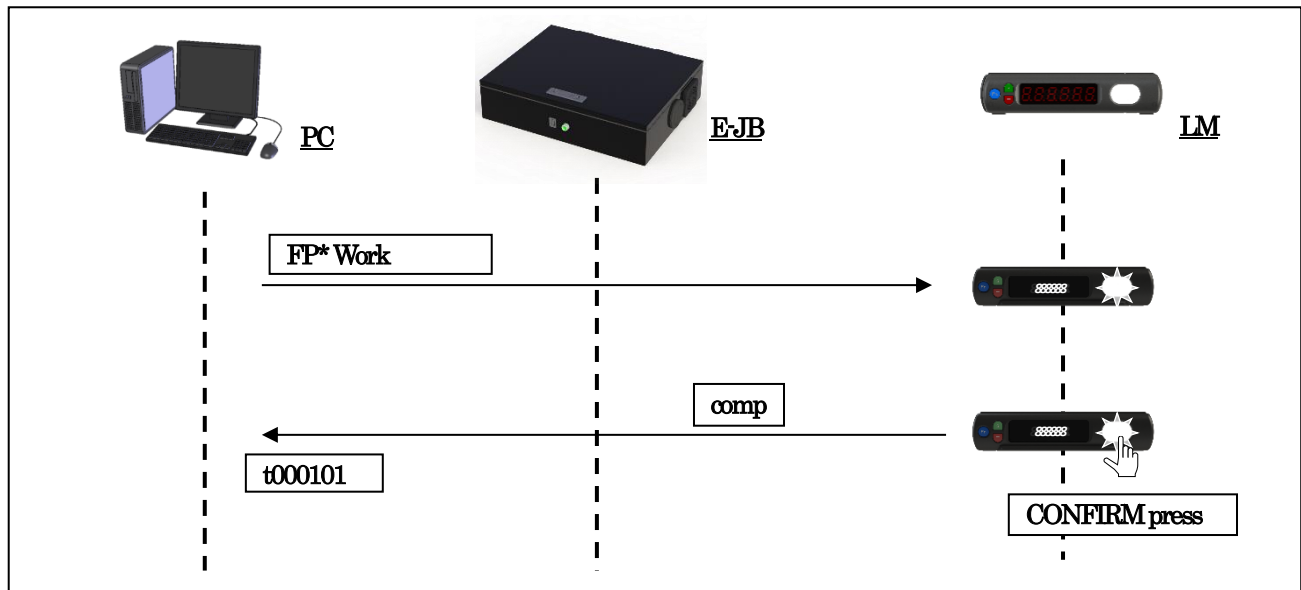
The UHF RF-IDLight Module will reply to the upper application as a forced cancellation when the Fn key is pressed and held for about 3 seconds to complete the work.



4.5.6. Control by display unit control command (FP* command control)

The UHF RF-IDLight Module can also be controlled by FP* commands.

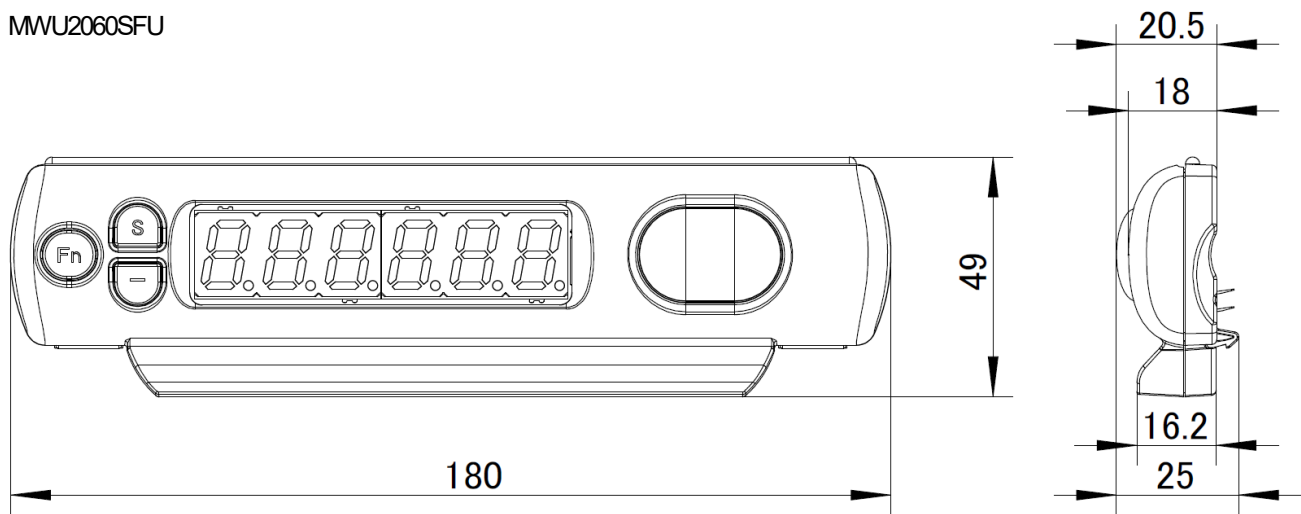
When controlled by the FP* command, the RF-ID Reader does not operate, and the operation is the same as that of a general Light



Module.

5. Dimensions

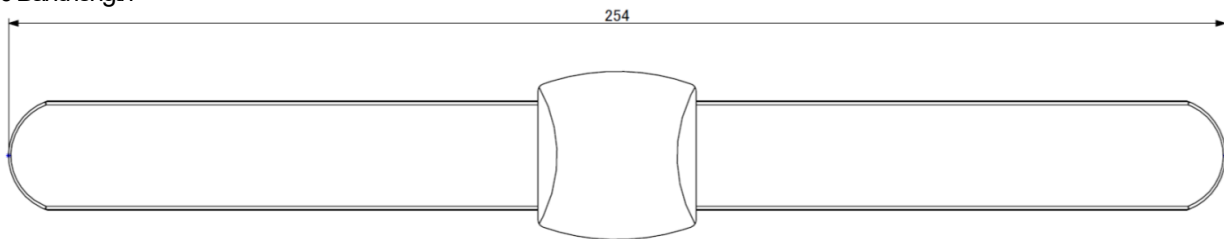
MWU2060SFU



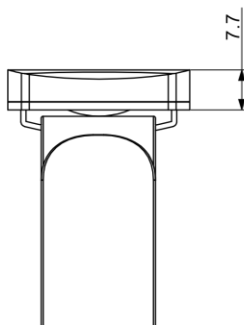
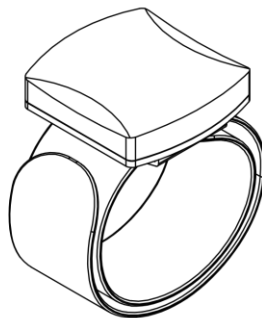
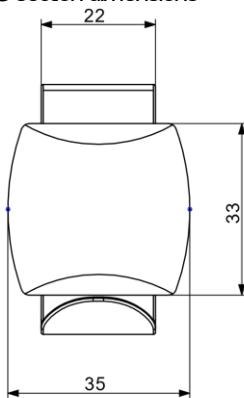
External dimensions [mm]: 180 (W) x 49 (D) x 28 (H) *(H) includes duct

TAG008]

0 Band length



0TAG section dimensions



6. Light Module Specifications

6.1. UHF RF-IDLight Module Common Specifications

Light Module Specifications

Number of units connected	Maximum number of units connected per system: 5,120 units*1
Wiring cable length	Light Module signal line 1.25sq cable up to 30m*2
Power consumption	270mA
JB Number of 1-channel connections	Maximum number of connected units per channel: 32 *2
configurable address	0001 to 7999
External dimensions	180 × 49 × 20.5 mm
weight	85 g
Temperature and humidity conditions	0 to 35° C, 20 to 80% (with no condensation)
keystroke guarantee	More than 1 million times*3
Static electricity resistance	±8kV *4

*1This is the maximum for one controller. Select the number of systems in consideration of communication response.

*2The maximum number may decrease depending on the current consumption of the Light Module and the cable wiring length.

*3The guaranteed value is at a pushing force of 10 N. The number of cycles may decrease or the product may be damaged when pushed with a pushing force of 10 N or more.

*4Ground the shelf side where the Light Module will be installed.

RF-ID Reader Specifications

frequency (esp. of waveforms)	840 to 960MHz *5
aerial power	15 to 20 dBm (1 to 100 mW)
RF-ID Standard	ISO/IEC 18000-6 Type-C (EPC C1G2)
Supported UHF-TAG	ISO/IEC 18000-6 Type-C (EPC C1G2) compliant tag
reading distance	50 to 500mm *6

*5 The range varies depending on the country of shipment.

*6 Reading distance varies depending on the installation environment.

UHF-TAG Specifications

frequency (esp. of waveforms)	920MHz
RF-ID Standard	ISO/IEC 18000-6 Type-C (EPC C1G2) compliant tag
reading distance	50 to 500 mm *6
type	Bracelet type
External dimensions	35 × 33 × 7.7
band length	254 mm
weight	34 g
Unique ID (EPC)	96bit *7

Converted to 24-byte ASII by *7 controller.

7. Troubleshooting

7.1. UHF RF-IDLight Module

Phenomenon	Cause	Check point
No lights on	Wrong address.	Confirm the address by using the A command from the control PC (power on by turning DIP switch 1 of the controller ON). If there is no instruction to set the address, the default value is "0000".
	Power supply pin is damaged.	Remove the Light Module and check if the PIN is bent.
	Short circuit between cable wires.	Check the lamp of the JB CH to which you are connecting. If the light is off, check the wiring and turn on the power again.
Lights up but becomes abnormal	Duplicate addresses Duplicate with another address	Send lighting instructions only to the address of the abnormality and make sure that there are no multiple lights on.
	Number of Light Module connections exceeded	Check the wiring length and the total number of units connected at the CH and confirm that they do not exceed the number of units in the connection calculation formula.
	Damage to Light Module	Please check by reading out the address in the address setting. If readout is not possible, replace the device.
CONFIRM button lights up when power is turned on I can't press the switch.	CONFIRM button is pressed	Lights up when the power is turned on with the CONFIRM button pressed. Make sure the switch is not in the depressed position. If the Light Module becomes abnormal, replace the equipment.
	Key invalidation command is sent from the application.	Please check the application specifications.
Lights up when an abnormality occurs.	It is the No. 0 address indicator.	If the Light Module address is set to "0000", the Light Module enters the maintenance mode, and when an error occurs, the address and error code of the error will be displayed.
On 7-segment display Display "...".	Damaged RF-ID reader	Replace the equipment.

[Note: The specifications of the MWU series and the contents of this manual are subject to change without notice. No part of the manual may be copied or reproduced in any form or by any means without written permission from IOI Systems, Inc.

[Contact] If you have any questions or comments about the MWU series specifications or manuals, or if you have any questions about application program development, please contact our System Development Support Department by fax or e-mail. info.1@hello-aioi.com

FCC Statement

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

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.

Note : This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates,uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

FCC Radiation Exposure Statement:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment . This equipment should be installed and operated with minimum distance 20cm between the radiator and your body.

MWU Series UHF RF-ID Light ModuleUser's Manual Ver.1.3.

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