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## **2.4 GHz Band Wireless unit**

**SWL31-ETMC**

**SWL31-R4ML**

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# **User's Manual (Detailed Version)**

Thank you for purchasing our 2.4 GHz Wireless unit (hereinafter called "Wireless unit").  
For using the Wireless unit correctly and safely, at first please read this manual carefully  
before using it to understand sufficiently its functions and performance.

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### **Cautions**

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1. Do not copy this user's manual without permission.
2. Please note that descriptions in this manual may be changed without prior notification.

**mitsubishi** **ELECTRIC SYSTEM & SERVICE**

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# 1. SAFETY PRECAUTIONS

**(Please be sure to read them before using the product.)**

Please carefully read this manual before using the product and pay full attention to safety in order to handle the product correctly.

Precautions given in this manual relate only to this product.

In this "1. SAFETY PRECAUTIONS," the safety precautions are ranked as "WARNING" and "CAUTION."



Indicates that incorrect handling may cause hazardous conditions, resulting in death or severe injury.



Indicates that incorrect handling may cause hazardous conditions, resulting in moderate or minor injury or only material damage.

Note that the CAUTION level may lead to serious consequences according to the circumstances. Be sure to follow the instructions of both levels since they are important to personal safety.

Please be sure to pass this manual on to the end users.

In addition, please keep it in a safe place so that you can read it when needed.

## [WIRING PRECAUTIONS]



### WARNING

- Be sure to block the power supply externally for all phases before wiring, otherwise an electric shock or product damage may occur.



### CAUTION

- Check the rated voltage and terminal layout of the product and correctly execute wiring for the terminal block. A wrong rated power supply or wrong wiring may cause fires or breakdowns.
- Be careful not to let foreign matter such as sawdust or wire chips get inside the product. Fires, breakdowns and malfunctions may occur.

## [DESIGN PRECAUTIONS]



### WARNING

- An external safety circuit shall be installed to this product so that the whole system operates at the safety side, even if an abnormality of an external power supply has an abnormality, or a breakdown of this product. Erroneous output and malfunctions may cause an accident.
  - (1) Interlock circuits for conflicting operations such as forward/backward rotation or for machine damage prevention such as upper/lower limits shall be configured outside of the product.
  - (2) If this product detects a communication abnormality, it will stop operation and set all outputs to OFF/HOLD. In addition, if an input/output control section has an abnormality which cannot be detected by the microcomputer within this product, all outputs may be turned on. In such case, an external fail-safe circuit or mechanism shall be installed for this product so that the machine operates at the safe side.
  - (3) Outputs may be set to on or off at all times depending on a breakdown of an output circuit transistor etc. For output signals which may cause serious accidents, an external monitoring circuit shall be installed.
- A fuse or other safety circuits shall be installed externally since smoke/fires may occur if a load current which is higher than the rated current or an over current by a load short circuit flows continuously for a long time.
- A circuit of the external power supply for input/output circuits shall be configured so that the power supply is turned on after the power supply for this product is turned on. If the external power supply is turned on first, erroneous output or malfunctions may cause an accident.



### CAUTION

- Control wires and power supply cables shall not be bundled with the main circuit and power wires or be laid close to them. Separate them by 100 mm (3.9 in) or more. Noise may cause malfunction.
- An output circuit with a margin in the rated current shall be selected, because large currents (ten times greater than normal ones) may flow when the output is set to ON from OFF on control of lamp load or others at the output circuit.

## [INSTALLATION PRECAUTIONS]



### CAUTION

- This product shall be used with the environmental specifications described in this user's manual. If it used in an environment outside of the environmental specification range, electric shocks, fires, malfunctions, product damage, or degradation may occur.
- Do not directly touch the conductive section of this product. Malfunctions and breakdowns may occur.
- When installing the wireless unit, avoid the area around the processing machine. Noise and other factors may cause communication problems.
- The combination of antenna and wireless unit has been certified to comply with technical standards, so please do not combine it with an antenna of a different compatible model or an antenna made by another company.

## [STARTING/MAINTENANCE PRECAUTIONS]



### WARNING

- Do not touch terminals while the product is energized. An electric shock may occur.
- Be sure to block power supply externally for all phases before cleaning.  
If all phases are not blocked, an electric shock may occur.  
Tightening screws too much may damage the product causing it to fall.



### CAUTION

- Do not disassemble or modify the product. Breakdowns, malfunctions, injuries, or fires may occur. Also, that is prohibited by the Radio Law.

## [DISPOSAL PRECAUTIONS]



### CAUTION

- When this product is disposed of, it shall be handled as industrial waste.



### 警語

經型式認證合格之低功率射頻電機，非經許可，公司、商號或使用者均不得擅自變更頻率、加大功率或變更原設計之特性及功能。

低功率射頻電機之使用不得影響飛航安全及干擾合法通信；經發現有干擾現象時，應立即停用，並改善至無干擾時方得繼續使用。

前項合法通信 指依電信法規定作業之無線電通信。低功率射頻電機須忍受合法通信或工業、科學及醫療用電波輻射性電機設備之干擾。

## 2. CHECKING PACKAGE

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Open the package and check the package to see if the set you have ordered is included.

Set model name

- (1) SWL31-ETMC
- (2) SWL31-R4ML

No.	Item name	Set Contents	
		(1)	(2)
1	2.4 GHz Band Wireless unit SWL31-ETMC (Master Station)	1	—
2	2.4 GHz Band Wireless unit SWL31-R4ML (Slave Station)	—	1
3	DIN Rail Mounting Attachment DRT-1	1	1
4	Attachment Fixing Screws (Pan Tapping Screws M3 x 8)	1	1
5	User's Manual (Hardware Version)	1	1

※Antennas must be purchased separately, refer to 3. Antenna (sold separately)

## 3. Antenna (sold separately)

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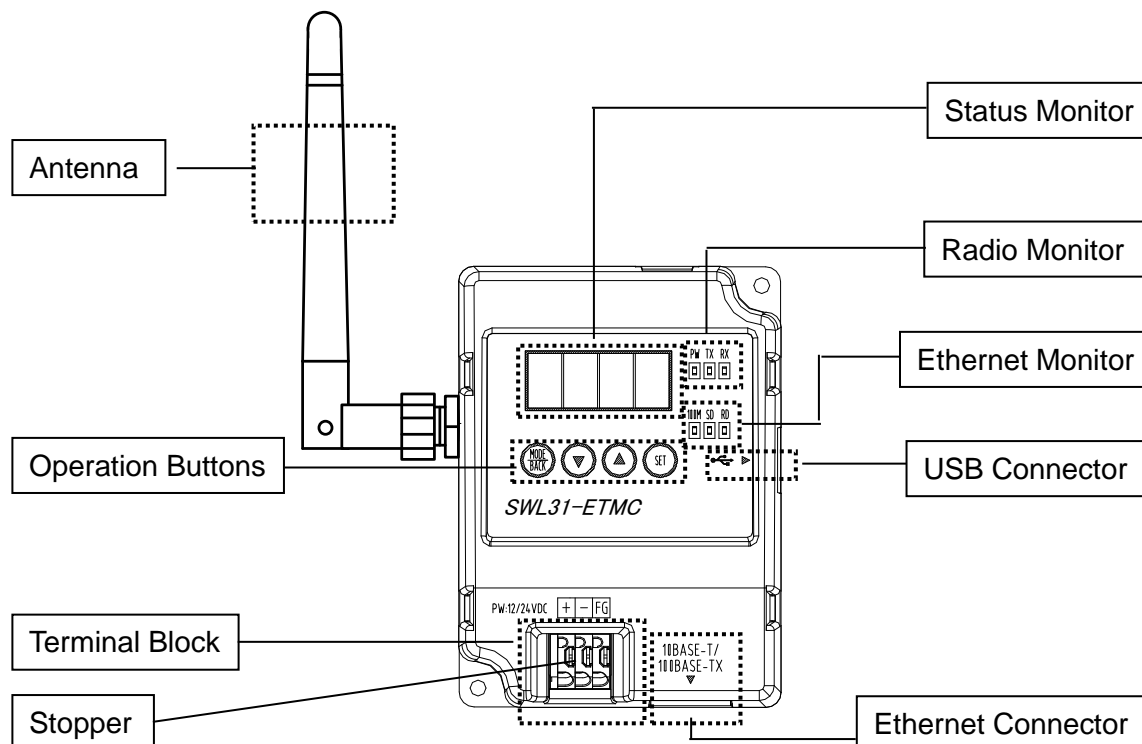
- (1) SWL31-ANP
- (2) SWL31-ANT

No.	Item name	
1	Pencil Type Antenna	SWL31-ANP
2	Flange Head Type Antenna (Cord 2 m (78.7 in)) ※	SWL31-ANT

※If you buy Flange Head Type Antenna, you will get Flange Head Type Antenna Fixture Set

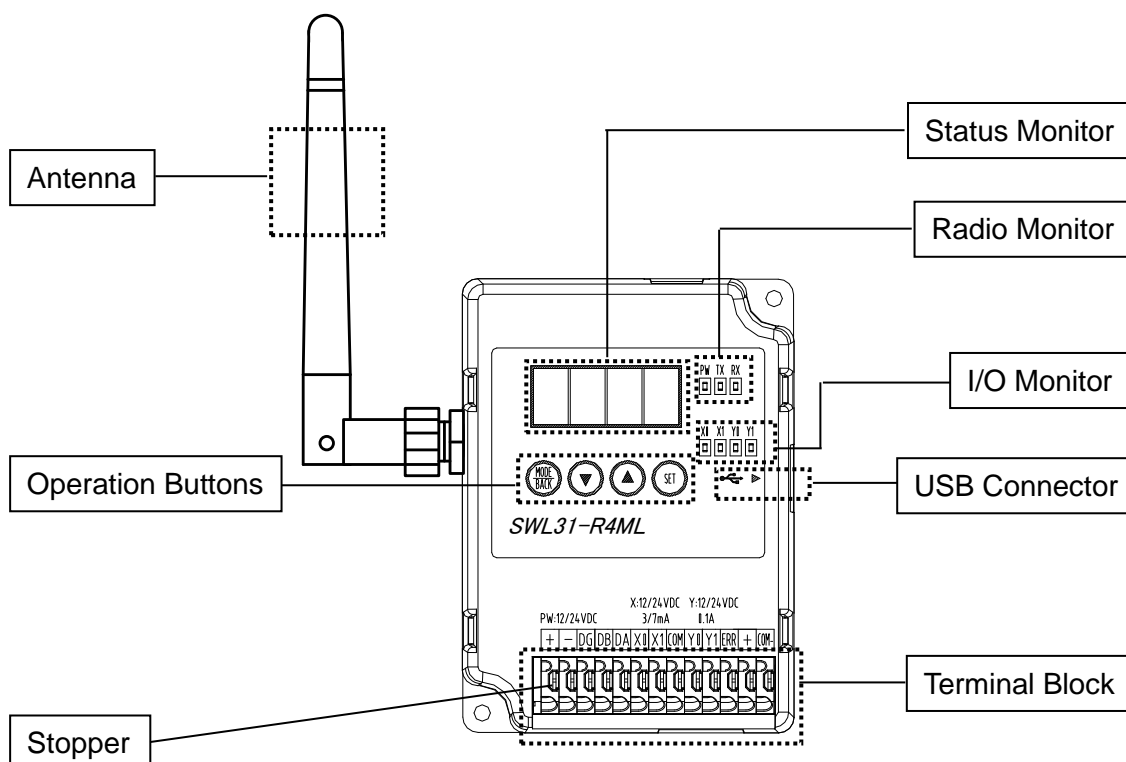
## 4. NAME/FUNCTION OF EACH SECTION

- SWL31-ETMC (Master Station)



Category	Name	Explanation
Antenna		A pencil type or flange head type (antenna)
Radio Monitor	PW	Lighting-on: Power on, normal communications Blinking: Power on, error occurred, parameter setting mode activated Lighting-off: Power off
	TX	Lighting-on while radio data are transmitted
	RX	Lighting-on while radio data are received
Status Monitor (Seven Segment)		Various displays with operation modes <ul style="list-style-type: none"> <li>In Normal Mode <ul style="list-style-type: none"> <li>Normal communication: The channel number is displayed.</li> <li>Error occurred: The error number is displayed.</li> </ul> </li> <li>In Parameter Setting Mode: The parameter number is displayed.</li> <li>In Radio Wave Intensity Mode: The Received signal strength level is displayed.</li> </ul>
Ethernet Monitor	100M	Lighting-on during 100BASE-TX communications
	SD	Lighting-on during data transmission
	RD	Lighting-on during data reception
Operation Buttons	MODE/BACK	Operation mode switching and hierarchy transfer in Parameter Setting Mode
	▼ (Down key)	Parameter no./value increase/decrease in Parameter Setting Mode
	▲ (Up key)	
	SET	Hierarchy transfer in Parameter Setting Mode
Terminal Block		Refer to Section 13-9 Terminal Block Specification.
Stopper		Press the stopper to insert an electric wire and leave it to fix the wire.
Ethernet Connector		A PLC is connected with an Ethernet cable for communications.
USB Connector		A PC is connected to the USB connector for using the Setting Utility (SWL31-UT1).

- SWL31-R4ML (Slave Station and Relay Station)



Category	Name	Explanation
Antenna		A pencil type or flange head type (antenna)
Radio Monitor	PW	Lighting-on: Power on, normal communications Blinking: Power on, error occurred, parameter setting mode activated Lighting-off: Power off
	TX	Lighting-on while radio data are transmitted
	RX	Blinking while radio link is connected
Status Monitor (Seven Segment)		Various displays with operation modes <ul style="list-style-type: none"> <li>In Normal Mode <ul style="list-style-type: none"> <li>Normal communication: The channel number is displayed.</li> <li>Error occurred: The error number is displayed.</li> </ul> </li> <li>In Parameter Setting Mode: The parameter number is displayed.</li> <li>In Radio Wave Intensity Mode: The Received signal strength level is displayed.</li> </ul>
I/O Monitor	X0, X1	Lighting-on when X0 or X1 signal is input to the terminal block
	Y0, Y1	Lighting-on when Y0 or Y1 signal is output from the terminal block
Operation Buttons	MODE/BACK	Operation mode switching and hierarchy transfer in Parameter Setting Mode
	▼ (Down key)	Parameter no./value increase/decrease in Parameter Setting Mode
	▲ (Up key)	
	SET	Hierarchy transfer in Parameter Setting Mode
Terminal Block		Refer to Section 13-9 Terminal Block Specification.
Stopper		Press the stopper to insert an electric wire and leave it to fix the wire.
USB Connector		A PC is connected to the USB connector for using the Setting Utility (SWL31-UT1).



## 5. WIRELESS UNIT INSTALLATION ENVIRONMENT

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- Installation Environment

Install the Wireless unit avoiding the following environments.

- A place with direct sun light
- A place with extremely high humidity
- A place with corrosive or inflammable gases
- A place with intense electric field or ferromagnetic field occurrence

- Request on Installing Wireless unit

The Wireless unit transmits/receives data using radio waves. For using it with stable communication status, install it paying attention on the following.

- Install the antennas of the units which communicate parallel to each other as much as possible.
- Place metallic plates and concrete walls away from the antenna as far as possible (0.3 m (11.8 in) at least).
- Install the antenna at a place 1.5 m (59.1 in) or higher from the floor to prevent impact from moving objects (including human bodies).
- When communications are checked with a temporal installation, the unit shall be installed on a control board or others which the unit is actually to be installed because communications are affected by the environment near the fixing part such as metal and concrete. (If the Wireless unit is installed in a metallic control board, install the flange head antenna outside of the board.)
- The Wireless unit and antenna are indoor types.

If they are used outdoors, place them avoiding water (rain, fog, snow, etc.) and direct sun light in a nonmetallic container such as a plastic case for outdoors.

Impact of water on the communication distance is assumed for electric wave characteristics.

In addition, if the plastic case has a metallic plate embedded, it shall not be used because it will be an obstruction and significantly affect the communication distance.

## 6. SYSTEM CONFIGURATION

The system configuration example for the SWL31 Radio Series is described below.

The I/O addresses of the slave stations and extension units are closely allocated in the order of smaller registered station numbers.

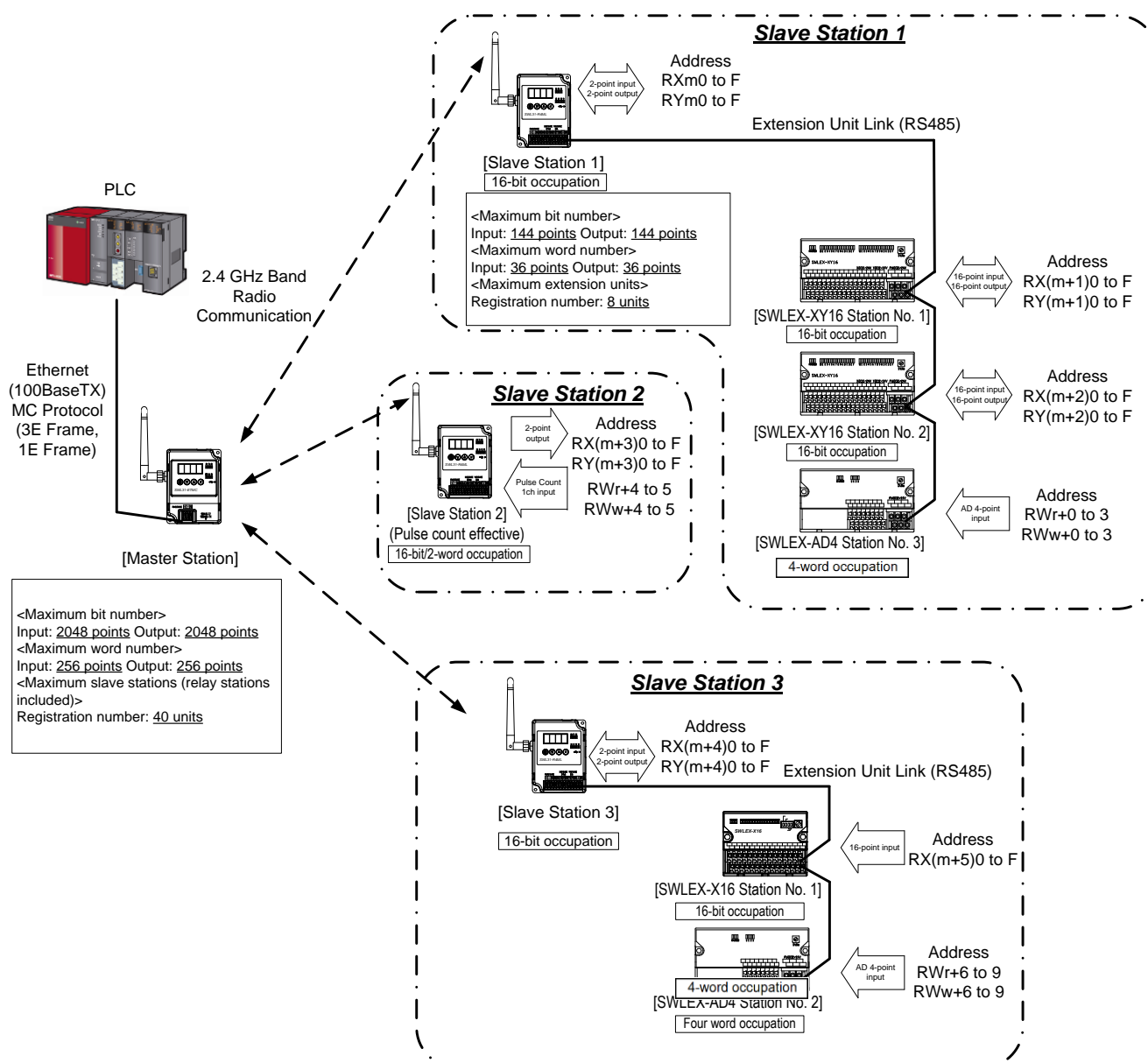
The bit I/O leading addresses' RXm and RYm depend on the parameters of the master station.

The word I/O leading addresses' RWr and RWw depend on the parameters of the master station.

\* Refer to the I/O Correspondence Table in the next page.

\* For the details of the parameter setting, refer to "2.4 GHz Band Wireless unit Setting Utility (SWL31-UT1) User's Manual."

Refer to the figure below for the maximum bit points, word points, number of slave stations registered, and number of extension units registered.



## I/O Correspondence Table

### • Slave Station 1

Slave station/extension unit input signal name		PLC device assignment (remote input)	PLC device assignment (remote output)		Slave station/extension unit output signal name
X0	Slave Station 1	RXm0	RYm0	Slave Station 1	Y0
X1		RXm1	RYm1		Y1
—		RXm2	RYm2		—
⋮		⋮	⋮		⋮
—	Input 16 Points/Output 16 Points Extension Unit Station No. 1	RXmF	RYmF	Input 16 Points/Output 16 Points Extension Unit Station No. 1	—
X0		RX(m+1)0	RY(m+1)0		Y0
X1		RX(m+1)1	RY(m+1)1		Y1
⋮		⋮	⋮		⋮
XE	Input 16 Points/Output 16 Points Extension Unit Station No. 2	RX(m+1)E	RY(m+1)E	Input 16 Points/Output 16 Points Extension Unit Station No. 2	YE
XF		RX(m+1)F	RY(m+1)F		YF
X0		RX(m+2)0	RY(m+2)0		Y0
X1		RX(m+2)1	RY(m+2)1		Y1
⋮	Input 16 Points/Output 16 Points Extension Unit Station No. 2	⋮	⋮	Input 16 Points/Output 16 Points Extension Unit Station No. 2	⋮
XE		RX(m+2)E	RY(m+2)E		YE
XF		RX(m+2)F	RY(m+2)F		YF
CH1		RWw+0	RWw+0	Analog Input Extension Unit Station No. 3	—
CH2	Analog Input Extension Unit Station No. 3	RWw+1	RWw+1		—
CH3		RWw+2	RWw+2		—
CH4		RWw+3	RWw+3		—

16 bits occupied by one slave station (I/O data: 2 bits)  
System area: 14 bits

16 bits occupied by one extension unit of input 16 points and output 16 points

Four words occupied by one extension unit of analog input 4ch

### • Slave Station 2

Slave station/extension unit input signal name		PLC device assignment (remote input)	PLC device assignment (remote input)		Slave station/extension unit output signal name
—	Slave Station 2	RX(m+3)0	RY(m+3)0	Slave Station 2	Y0
—		RX(m+3)1	RY(m+3)1		Y1
—		RX(m+3)2	RY(m+3)2		—
⋮		⋮	⋮		⋮
—	Pulse Count Value	RX(m+3)F	RY(m+3)F	Count Value Reset	—
CH1		RWw+4	RWw+4		Reset
—		RWw+5	RWw+5		—
—		—	—		—

Two words occupied by pulse count 1ch input

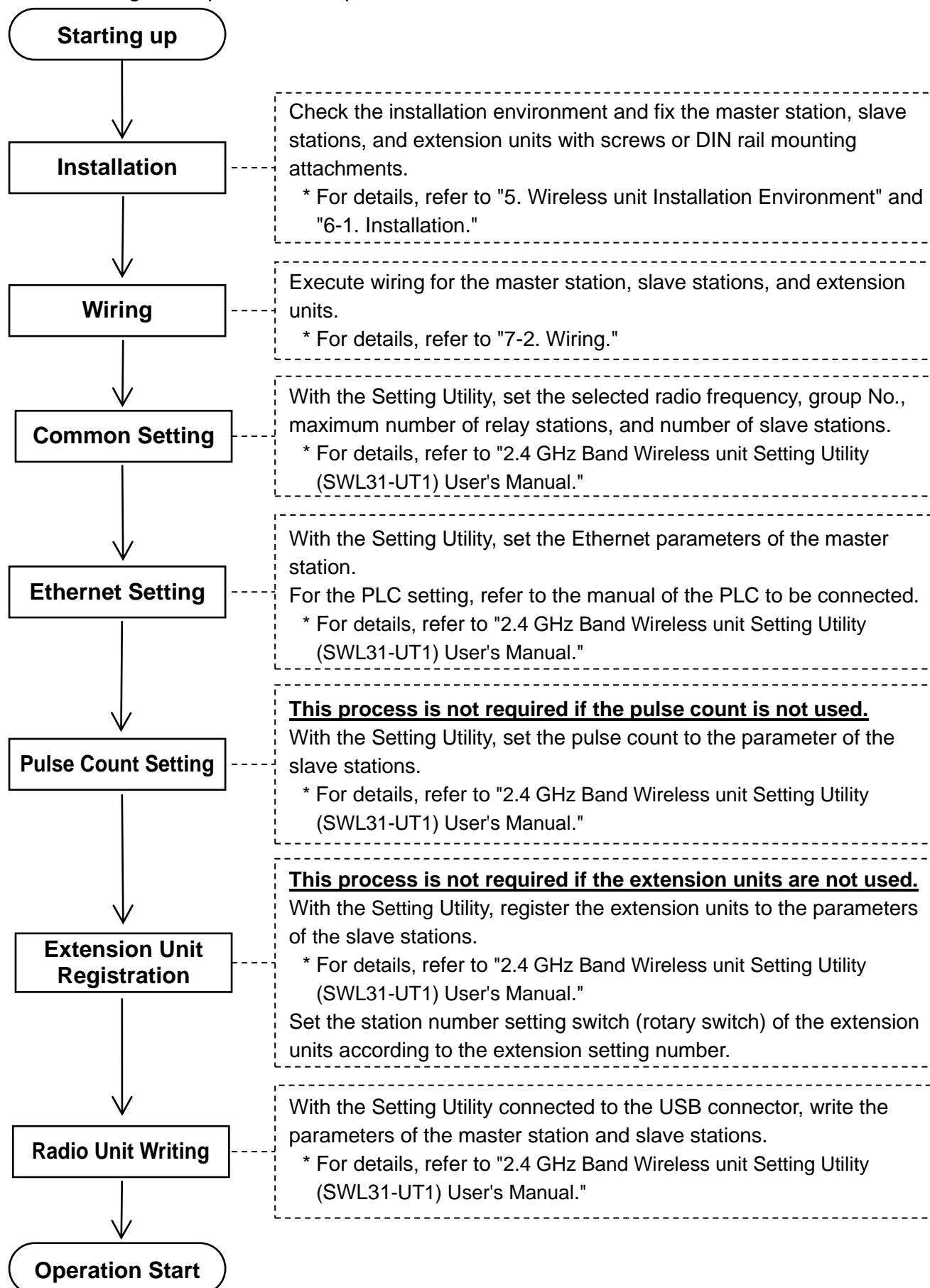
### • Slave Station 3

Slave station/extension unit input signal name		PLC device assignment (remote input)	PLC device assignment (remote input)		Slave station/extension unit output signal name
X0	Slave Station 3	RX(m+4)0	RY(m+4)0	Slave Station 3	Y0
X1		RX(m+4)1	RY(m+4)1		Y1
—		RX(m+4)2	RY(m+4)2		—
⋮		⋮	⋮		⋮
—	Input 16 Points Extension Unit Station No. 1	RX(m+4)F	RY(m+4)F	Input 16 Points Extension Unit Station No. 1	—
X0		RX(m+5)0	RY(m+5)0		—
X1		RX(m+5)1	RY(m+5)1		—
⋮		⋮	⋮		⋮
XE	Input 16 Points Extension Unit Station No. 1	RX(m+5)E	RY(m+5)E	Input 16 Points Extension Unit Station No. 1	—
XF		RX(m+5)F	RY(m+5)F		—
CH1	Analog Input Extension Unit Station No. 2	RWw+6	RWw+6	Analog Input Extension Unit Station No. 2	—
CH2		RWw+7	RWw+7		—
CH3		RWw+8	RWw+8		—
CH4		RWw+9	RWw+9		—

16 bits occupied by one extension unit of input 16 points

## 7. INSTALLATION PROCEDURE

The following is the procedure required to install the Wireless unit.

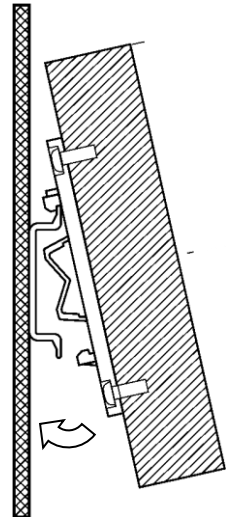
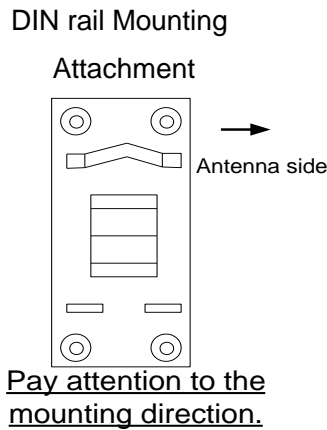
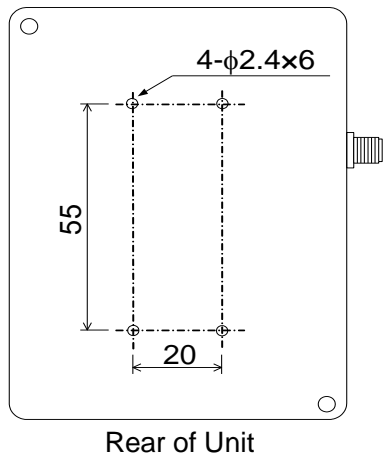


## 7-1. Installation

The unit can be installed to the DIN rails (35 mm (1.38 in) with the DIN rail mounting attachment or installed with screws. (SWL31-ETMC and SWL31-R4ML can be installed with the same installation method.)

### (1) Installing to the DIN rail

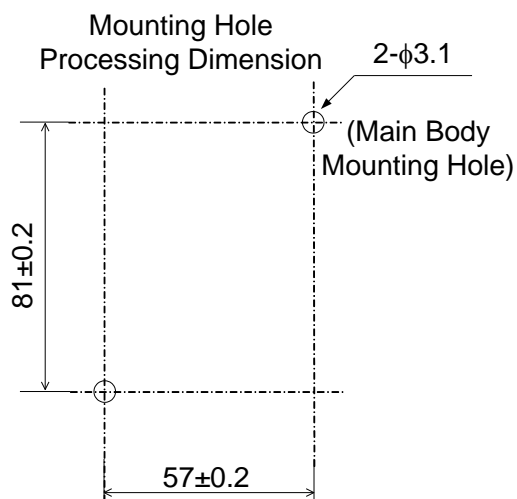
DIN rail Mounting Attachment Hole



- 1) Install the DIN rail mounting attachment to the rear of the Radio Unit with the M3 tapping screws (\*1). (Screw tightening torque: 30 to 42 N·cm)
- 2) Hook the claw (upper side) of the DIN rail mounting attachment to the DIN rail.
- 3) Push the claw (lower side) until a clicking sound is heard.

\*1: Use only the tapping screws packed together. If not, racing or damage may occur.

### (2) Screwing



Fix the unit with two screws.

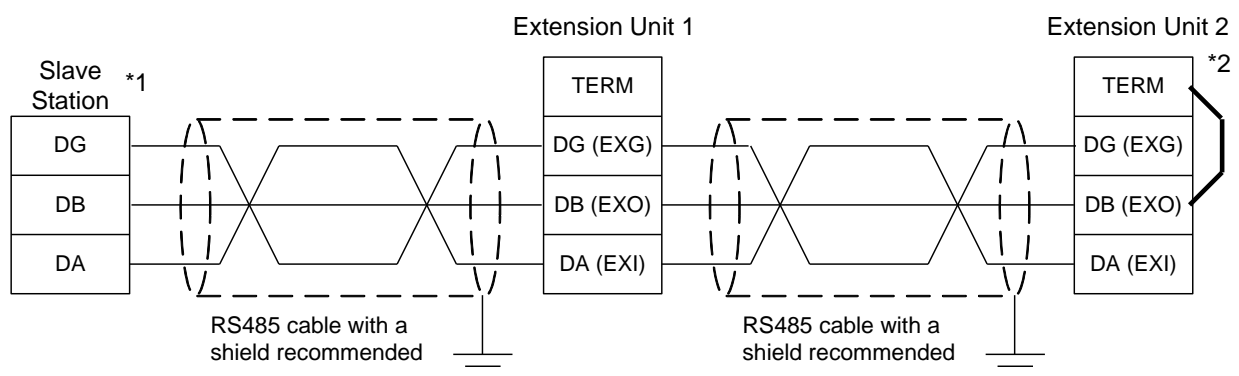
## 7-2. Wiring

For the terminal layout and conforming electric wire size, refer to "13-9. Terminal Block Specification."

\* To prevent induction noise, lay the power line and the signal line away from each other as far as possible. (It is recommended that they are away from each other 100 mm (3.94 in) or more.)

- Wiring Master Station
  - (1) Connect the unit power supply.
  - (2) Connect the FG terminal to the ground.
- Wiring Slave Station
  - (1) Connect the unit power supply.
  - (2) Connect the extension link.
  - (3) Connect the I/O signal line.
  - (4) Connect the error signal line.
- Wiring Extension Unit (SWLEX-X16/SWLEX-XY16/SWLEX-AD4)
  - (1) Connect the unit power supply.
  - (2) Connect the signal line.
  - (3) Connect the link cable to the slave station and extension unit.
    - \* Extension unit link maximum communication distance: 1000 m (3280 ft)
    - \* For connection locations, refer to the figure below.

### [Wiring Extension Unit Link]

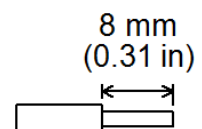


\*1: A terminal resistor is implemented within the slave station.

\*2: Connect TERM to DB (EXO) of the extension unit connected to the terminal to use a terminal resistor within the unit.

### [Screw-less Terminal Block Connection Method]

- Peel 8 mm (0.31 in) of the electric wire end as in the figure on the right.
- Insert the electric wire pressing the stopper with a screwdriver.
- Leave the screwdriver from the stopper to fix the electric wire.



## 8. CHECKING RADIO COMMUNICATIONS

Temporarily install the Wireless units to check the radio wave status with the Radio Wave Intensity Display Mode.

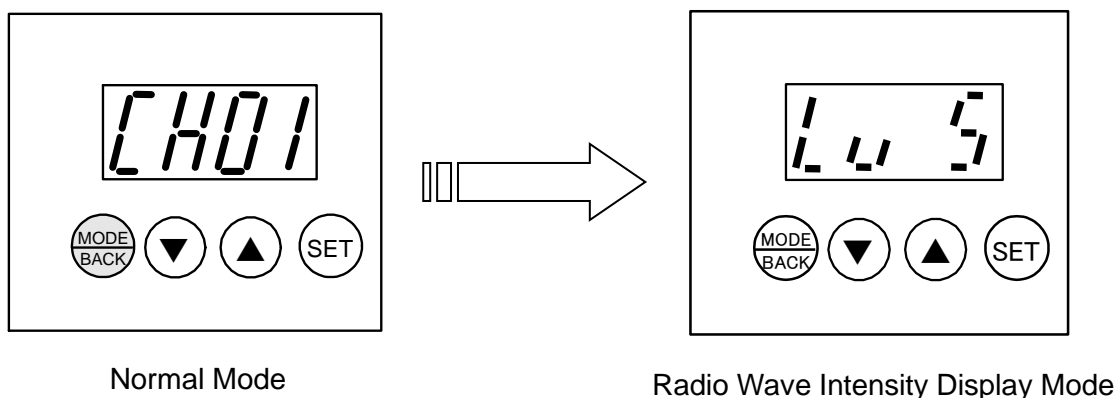
The radio wave intensity is displayed only on the slave stations.

(Do not install them permanently when the radio wave status is not good. The installation locations must be changed.)

- Operation

Refer to "9. Parameter Operation Method for Button Setting" and press the [MODE/BACK] key several times to enter the Radio Wave Intensity Display Mode.

Pressing the [MODE/BACK] key in the Radio Wave Intensity Display Mode enters the Normal Mode.



- Display

"Lv \*" (Received signal strength level. A numeral from 0 to 5 is displayed on \*.) is displayed on the status monitor.

Adjust the installation location for the Received signal strength level to be three or higher at all times as an indication of the radio wave status.

Received signal strength level

Display	Estimated radio wave condition
Lv 5	Strong (Recommended use level)
Lv 4	
Lv 3	Medium(Usable level)
Lv 2	Weak(*1) (Not recommended for use)
Lv 1	
Lv 0	

\*1:If the signal strength is low, change the installation location or add a relay station

## 9. ABOUT SETTING UTILITY

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Parameters of this product can be set from a PC with the Setting Utility.

For the details of the Setting Utility, refer to

**"2.4 GHz Band Wireless unit Setting Utility (SWL31-UT1) User's Manual"**

of our publication.



## 10. BUTTON SETTING PARAMETER LIST

The button setting parameters of this product are as follows. Check and set parameters as needed.

\* Parameters of this product can also be set from a PC with the Setting Utility.

For details, refer to "2.4 GHz Band Wireless unit Setting Utility (SWL31-UT1) User's Manual."

For details of the button operation, refer to the "11. Button Operation Method" section.

### ● Master Station Parameters [P1\*\*] (Host Station Radio Parameters and Host Station Ethernet Parameters)

Parameter	Detail	Default	Variable range	Remarks	Read/Write
P101_b	Information of system bit points	0	0 to 2048 *1	Display of bit points used by the whole system	R
P101_d	Information of system word points	0	0 to 256 *1	Display of word points used by the whole system	R
P103	Group No.	0	0 to 15	Radio communication group No.	R/W
P107_F	Selectable wavenumber	1	1	Selectable wavenumber	R
P107_C1	Selected frequency	1	1 to 15	1: 2.405 GHz, 2: 2.410 GHz, 3: 2.415 GHz 4: 2.420 GHz, 5: 2.425 GHz, 6: 2.430 GHz 7: 2.435 GHz, 8: 2.440 GHz, 9: 2.445 GHz 10: 2.450 GHz, 11: 2.455 GHz, 12: 2.460 GHz 13: 2.465 GHz, 14: 2.470 GHz, 15: 2.475 GHz	R/W
P108	Radio Output Power	4	0 to 4	0: 0.6 mW (-2 dBm), 1: 1.6 mW (2 dBm) 2: 2.5 mW (4 dBm), 3: 4.0 mW (6 dBm) 4: 6.3 mW (8 dBm)	R/W
P109	Maximum No. of Relay Stages	1	0 to 3 *2	0: No relay, 1: 1-stage relay 2: 2-stage relay, 3: 3-stage relay	R/W
P110	Data Handling on Error	2	0 to 3	0: Clear *3, 1: Hold 2: Bit clear/word hold *3 3: Word clear/bit hold *3	R/W
P111	Radio Timeout Time	000.0	000.0 to 999.9 *4	Time from radio transmission to radio timeout error generation Example: 10 sec. for 10.0 set	R/W
P121_Ad12	MAC Address	****	Fixed	MAC Address	R
P121_Ad34		****	Fixed	***.*** : ***.*** : ***.***	R
P121_Ad56		****	Fixed	Ad12 Ad34 Ad56	R
P122_iP1	Host Station IP Address	192	0 to 255	IP Address	R/W
P122_iP2		168	0 to 255	192 : 168 : 10 : 2 (Default value)	R/W
P122_iP3		10	0 to 255	iP1 iP2 iP3 iP4	R/W
P122_iP4		2	0 to 255		R/W
P122_Pt	Host Station TCP Port No.	C000	0000 to FFFF	Host Station TCP Port No.	R/W
P123_Sb1	Subnet Mask	255	128 to 255	Subnet Mask	R/W
P123_Sb2		255	0 to 255	255 : 255 : 255 : 0	R/W
P123_Sb3		255	0 to 255	Sb1 Sb2 Sb3 Sb4	R/W
P123_Sb4		0	0 to 254		R/W
P198	Radio Test Mode	0	0 to 1	0: Invalid, 1: Valid *5	R/W
P199	Software Version	v*. **	Fixed	—	R

\*1: The total of [P201\_b to P240\_b] and [P201\_d to P240\_d] is automatically calculated and displayed.

\*2: When 21 slave stations are registered for one master station, [1] or more shall be set. For the star communication (no relay), up to 1:20 communications are available.

\*3: If the power of the master station is off or the LAN cable is disconnected, the data will not be cleared.

\*4: When 000.0 is set, the timeout time is automatically calculated.

\*5: This shall be set to Valid when the radio wave intensity is checked only with the Wireless units without the Ethernet communications. If the Radio Test Mode is valid, the radio communications will be executed regardless of the Ethernet communications.

● Master Station Parameters [P2\*\*] and [P3\*\*] (Slave Station Registration Parameters)

Parameter	Detail	Default	Variable range	Remarks	Read/Write
P201_id1	Slave Station 1 Unit ID	0000	0000 to FFFF	Slave Station 1 unit ID ****.****.****.**** id1 id2 id3 id4	R/W
P201_id2		0000	0000 to FFFF		R/W
P201_id3		0000	0000 to FFFF		R/W
P201_id4		0000	0000 to FFFF		R/W
P201_b	Slave Station 1 Bit Points	0	0 to 144 *1	Slave Station 1 bit points (extension units included)	R/W
P201_d	Slave Station 1 Word Points	0	0 to 36 *2	Slave Station 1 word points (extension units included)	R/W
P201_C	Slave Station 1 Relay Setting	0	0 to 1	0: Normal station, 1: Relay-dedicated station	R/W
P201_r	Slave Station 1 Reserve Setting	0	0 to 1	0: Used station, 1: Reserved station	R/W
P201_rT	For Manufacturer Setting	1	0 to 5	For Manufacturer Setting	R/W
P202_id1	Slave Station 2 Unit ID	0000	0000 to FFFF	Slave Station 2 unit ID ****.****.****.**** id1 id2 id3 id4	R/W
P202_id2		0000	0000 to FFFF		R/W
P202_id3		0000	0000 to FFFF		R/W
P202_id4		0000	0000 to FFFF		R/W
P202_b	Slave Station 2 Bit Points	0	0 to 144 *1	Slave Station 2 bit points (extension units included)	R/W
P202_d	Slave Station 2 Word Points	0	0 to 36 *2	Slave Station 2 word points (extension units included)	R/W
P202_C	Slave Station 2 Relay Setting	0	0 to 1	0: Normal station, 1: Relay-dedicated station	R/W
P202_r	Slave Station 2 Reserve Setting	0	0 to 1	0: Used station, 1: Reserved station	R/W
P202_rT	For Manufacturer Setting	1	0 to 5	For Manufacturer Setting	R/W
-	-	-	-	-	-
P240_id1	Slave Station 40 Unit ID	0000	0000 to FFFF	Slave Station 40 unit ID ****.****.****.**** id1 id2 id3 id4	R/W
P240_id2		0000	0000 to FFFF		R/W
P240_id3		0000	0000 to FFFF		R/W
P240_id4		0000	0000 to FFFF		R/W
P240_b	Slave Station 40 Bit Points	0	0 to 144 *1	Slave Station 40 bit points (extension units included)	R/W
P240_d	Slave Station 40 Word Points	0	0 to 36 *2	Slave Station 40 word points (extension units included)	R/W
P240_C	Slave Station 40 Relay Setting	0	0 to 1	0: Normal station, 1: Relay-dedicated station	R/W
P240_r	Slave Station 40 Reserve Setting	0	0 to 1	0: Used station, 1: Reserved station	R/W
P240_rT	For Manufacturer Setting	1	0 to 5	For Manufacturer Setting	R/W
P398	Points Lock *3	0	0 to 1	0: Locked, 1: Lock released	R/W
P399	No. of Slave Stations Registered *4	0	0 to 40	Display of No. of slave stations registered	R

\*1: The bit points change for every 16 points.

\*2: The word points change for every 2 points.

\*3: When multiple slave stations are registered, to prevent address assignment change, the bit points [P2\*\*\_b] and the word points [P2\*\*\_d] cannot be changed for other than the last station number. Changing the value of [P398] to 1 releases the lock.

\*4: It is automatically displayed from the status of [P201\_b to P240\_b]. (The value 0 is assumed to be unregistered.)

The number of reservation registered stations includes reserved stations.

● Master Station Parameters [P4\*\*] (Communication Destination Ethernet Parameters)

Parameter	Detail	Default	Variable range	Remarks	Read/Write
P401_iP1	Partner Station IP Address	192	0 to 255	IP Address of Ethernet partner 192 : 168 : 10 : 3 (Default value) iP1 iP2 iP3 iP4	R/W
P401_iP2		168	0 to 255		R/W
P401_iP3		10	0 to 255		R/W
P401_iP4		3	0 to 255		R/W
P401_Pt	Port Number	C100	0 to FFFF	Partner's TCP/IP port number (Hexadecimal)	R/W
P402	Network Number	00	00 to FF	*1 (Hexadecimal)	R/W
P403	PC Number	FF	00 to FF	*1 (Hexadecimal)	R/W
P404	Request Destination I/O Station No.	3FF	0000 to FFFF	*1 (Hexadecimal)	R/W
P405	Request Destination Unit Station No.	00	00 to FF	*1 (Hexadecimal)	R/W
P406	CPU Monitoring Timer	16	0 to 3600	*1 (Decimal)	R/W
P407_dv	Bit Input Device Type	0	0, 10	0: X, 10: D *2,*3	R/W
P407_st	Bit Input Start Number	1000	0000 to 1FFF	For X device (Hexadecimal)	R/W
			0000 to 9255	For D device (Decimal)	
P408_dv	Bit Output Device Type	0	0,10	0: Y, 10: D *2,*3	R/W
P408_st	Bit Output Start Number	1000	0000 to 1FFF	For X device (Hexadecimal)	R/W
			0000 to 9255	For D device (Decimal)	
P409_dv	Word Input Device Type	10	10	10: D	R/W
P409_st	Word Input Start Number	300	0000 to 8000	Device start number (Decimal)	R/W
P410_dv	Word Output Device Type	10	10	10: D	R/W
P410_st	Word Output Start Number	600	0000 to 8000	Device start number (Decimal)	R/W
P411	Ethernet Timeout Time	0100	0100 to 9999	Setting of Ethernet reception waiting time [ms] *4	R/W
P412	Ethernet Protocol	0	0 to 1	0: MC protocol 3E frame (Q Series) 1: MC protocol 1E frame (FX Series)	R/W

\*1: P402 to P405 are MC protocol-related parameters. If communications are unavailable with the default setting, refer to "MELSEC-Q/L MELSEC Communication Protocol Reference Manual" and "Model: MC-PROTOCOL-R," manuals by Mitsubishi Electric, and check the details.

\*2: If you use the PLC of Q Series or FX Series, "X device" or "D device" shall be selected respectively.

\*3: If P412 is set to 0, D device cannot be selected.

\*4: If communications are unavailable with the Ethernet partner even after Ethernet timeout time [ms] x 3 passes, the error code "EG" will be generated.

● Master Station Parameter Reset Setting [Pr\*\*]

Parameter	Detail	Default	Variable range	Remarks	Read/Write
Pr01	[P1**] Parameter Reset	0	0 to 1	0: Invalid 1: [P1**] is set back to the default.	R/W
Pr02	[P2**] Parameter Reset	0	0 to 1	0: Invalid 1: [P2**] is set back to the default.	R/W
Pr04	[P4**] Parameter Reset	0	0 to 1	0: Invalid 1: [P4**] is set back to the default.	R/W
Pr0E	[PE**] Error History Reset	0	0 to 1	0: Invalid 1: The error history [PE**] is cleared.	R/W
Pr99	All Parameters Reset	0	0 to 1	0: Invalid 1: All parameters and error history are set back to the default.	R/W

● Slave Station Parameters [P1\*\*] (Host Station Radio Parameters)

Parameter	Detail	Default	Variable range	Remarks	Read/Write
P101_b	Information of Bit Points	16	16 to 144 *1	Bit points (extension units included)	R
P101_d	Information of Word Points	0	0 to 36 *2	Word points (extension units included)	R
P102_id1	Unit ID	****	Fixed	Unit ID ****.****.****.**** id1 id2 id3 id4	R
P102_id2		****	Fixed		R
P102_id3		****	Fixed		R
P102_id4		****	Fixed		R
P103	Group No.	0	0 to 15	Radio communication group No.	R/W
P107_F	Selectable wavenumber	1	1	Selectable wavenumber	R
P107_C1	Selected frequency	1	1 to 15	1: 2.405 GHz, 2: 2.410 GHz, 3: 2.415 GHz 4: 2.420 GHz, 5: 2.425 GHz, 6: 2.430 GHz 7: 2.435 GHz, 8: 2.440 GHz, 9: 2.445 GHz 10: 2.450 GHz, 11: 2.455 GHz, 12: 2.460 GHz 13: 2.465 GHz, 14: 2.470 GHz, 15: 2.475 GHz	R/W
P108	Radio Output Power	4	0 to 4	0: 0.6 mW (-2 dBm), 1: 1.6 mW (2 dBm) 2: 2.5 mW (4 dBm), 3: 4.0 mW (6 dBm) 4: 6.3 mW (8 dBm)	R/W
P109	Maximum No. of Relay Stages	1	0 to 3 *3	0: No relay, 1: 1-stage relay 2: 2-stage relay, 3: 3-stage relay	R/W
P110	Data Handling on Error	0	0 to 1	0: Clear, 1: Hold	R/W
P111	Radio Timeout Time	000.0	000.0 to 999.9 *4	Time from radio transmission to radio timeout error generation Example: 10 sec. for 10.0 set	R/W
P112	Error Terminal Output	2	0 to 2	0: LIVE signal, 1: a contact signal 2: b contact signal	R/W
P113	Relay-dedicated Station Setting	0	0 to 1	0: Normal station, 1: Relay-dedicated station	R/W
P131	Pulse Count Valid Setting	0	0 to 2	0: Pulse count function invalid 1: Pulse count function (ch1) valid 2: Pulse count function (ch1, ch2) valid	R/W
P132_PL1	Pulse Count Digit	8	1 to 8	Pulse count ch1 digit No. Setting	R/W
P132_PL2	No. Setting	8	1 to 8	Pulse count ch2 digit No. Setting	R/W
P199	Software Version	v*. **	Fixed	—	R

\*1: It is automatically calculated and displayed from the number of I/O extension units registered of the host station (16 points) + extension units registered [P501\_Un to P508\_Un].

\*2: It is automatically calculated and displayed from the number of analog input extension units registered of the host station (2 points/number of pulse count channels [P131]) + extension units registered [P501\_Un to P508\_Un].

\*3: When 21 slave stations are registered for one master station, [1] or more shall be set. For the star communication (no relay), up to 1:20 communications are available.

\*4: When 000.0 is set, the timeout time is automatically calculated. A value with a margin shall be set so that an error is not generated in a normal status.

● Slave Station Parameters [P5\*\*] (Extension Unit Parameters)

Parameter	Detail	Default	Variable range	Remarks	Read/Write
P501_Un	Extension 1 Unit Registration	0	0 to 1, 11	0: Unregistered, 1: I/O extension unit registered 11: Analog input extension unit registered	R/W
P501_r	Extension 1 Reserve Setting	0	0 to 1	0: Used station, 1: Reserved station	R/W
P501_o	Data Handling on Extension 1 Error	2	0 to 2	0: Clear, 1: Hold 2: Adjusted to slave station [P110] setting	R/W
P501_ch1	Extension 1 Analog Channel Setting	—	—	Refer to the analog input parameter [P5**_ch*].	—
P501_ch2		—	—		—
P501_ch3		—	—		—
P501_ch4		—	—		—
P508_Un	Extension 8 Unit Registration	0	0 to 1, 11	0: Unregistered, 1: I/O extension unit registered 11: Analog input extension unit registered	R/W
P508_r	Extension 8 Reserve Setting	0	0 to 1	0: Used station, 1: Reserved station	R/W
P508_o	Data Handling on Extension 8 Error	2	0 to 2	0: Clear, 1: Hold 2: Adjusted to slave station [P110] setting	R/W
P508_ch1	Extension 8 Analog Channel Setting	—	—	Refer to the analog input parameter [P5**_ch*].	—
P508_ch2		—	—		—
P508_ch3		—	—		—
P508_ch4		—	—		—
P510	No. of Extension Units Registered	0	0 to 8	The number of extension units registered to P501 to P508 is automatically calculated.	R

● Analog Input Parameters [P5\*\*\_ch\*] (Analog Input Parameters)

Parameter	Detail	Default	Variable range	Remarks	Read/Write
US	AD Conversion Permission	0	0 to 1	AD conversion permission for each channel 0: Not permitted, 1: Permitted	R/W
rA	Input Range	0	0 to 4	Input range setting 0: 0 V to 10 V, 1: 0 to 5 V, 2: 1 to 5 V 3: 0 to 20 mA, 4: 4 to 20 mA	R/W
Av	Sampling/Average Setting	0	0 to 3	Sampling/average processing setting 0: Sampling processing 1: Count average processing 2: Time average processing 3: Transfer average processing	R/W
Ti	Average Count/Time Setting	0	0 to 32	Count average/transfer average: 0 to 32 times Time average: 0 to 32 x 10 ms (Invalid for sampling processing)	R/W

● Slave Station Parameter Reset Setting [Pr\*\*]

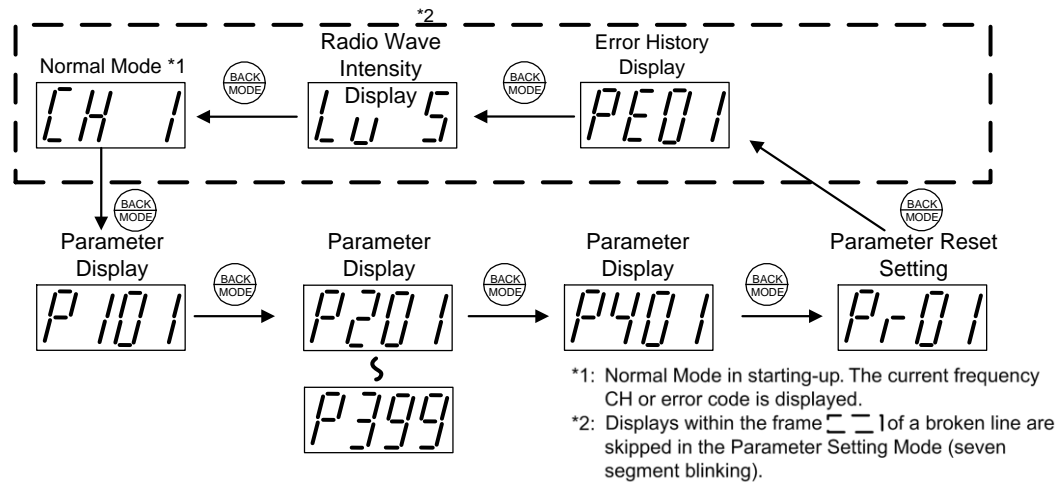
Parameter	Detail	Default	Variable range	Remarks	Read/Write
Pr01	[P1**] Parameter Reset	0	0 to 1	0: Invalid 1: [P1**] is set back to the default.	R/W
Pr05	[P5**] Parameter Reset	0	0 to 1	0: Invalid 1: [P5**] is set back to the default.	R/W
Pr0E	[PE**] Error History Reset	0	0 to 1	0: Invalid 1: The error history [PE**] is cleared.	R/W
Pr99	All Parameters Reset	0	0 to 1	0: Invalid 1: All parameters and error history are set back to the default.	R/W

## 11. BUTTON OPERATION METHOD

### • Parameter Group Display Change

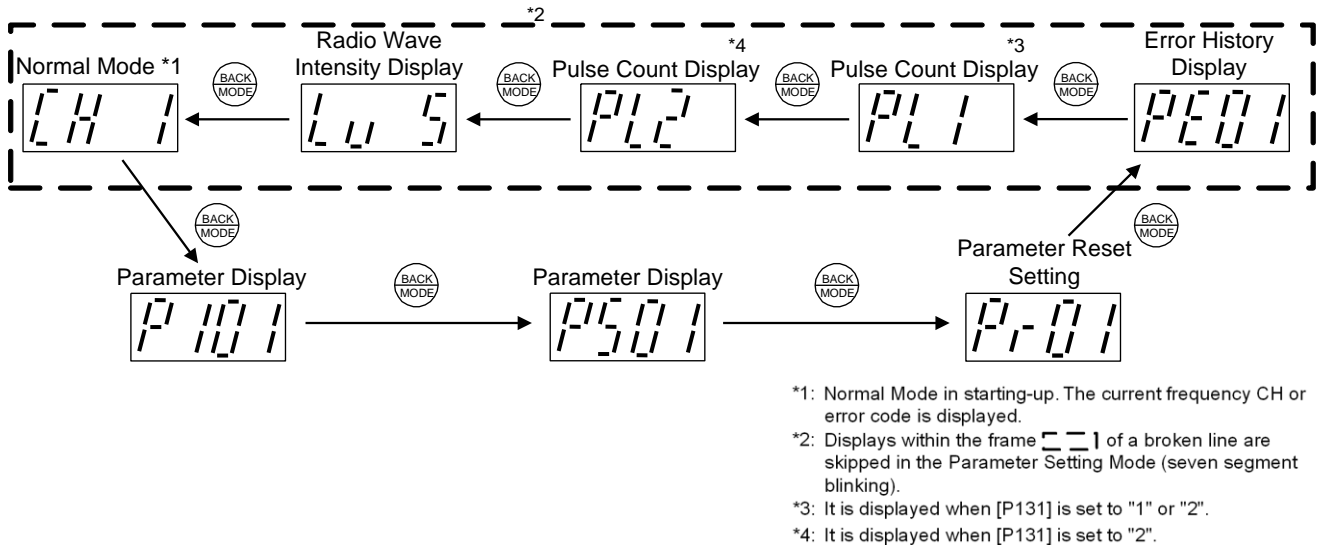
#### (1) For Master Station

Every time the [MODE/BACK] key is pressed, the parameter group changes as follows.



#### (2) For Slave Station

Every time the [MODE/BACK] key is pressed, the parameter group changes as follows.



- **About Parameter Change**

If the [SET] key is pressed for two sec. or the forth digit of 4-digit parameter is determined with the [SET] key while the parameter value of the parameter number to be changed is displayed, the parameter value display will be changed from lighting to blinking and **the mode will be switched to the Parameter Setting Mode.**

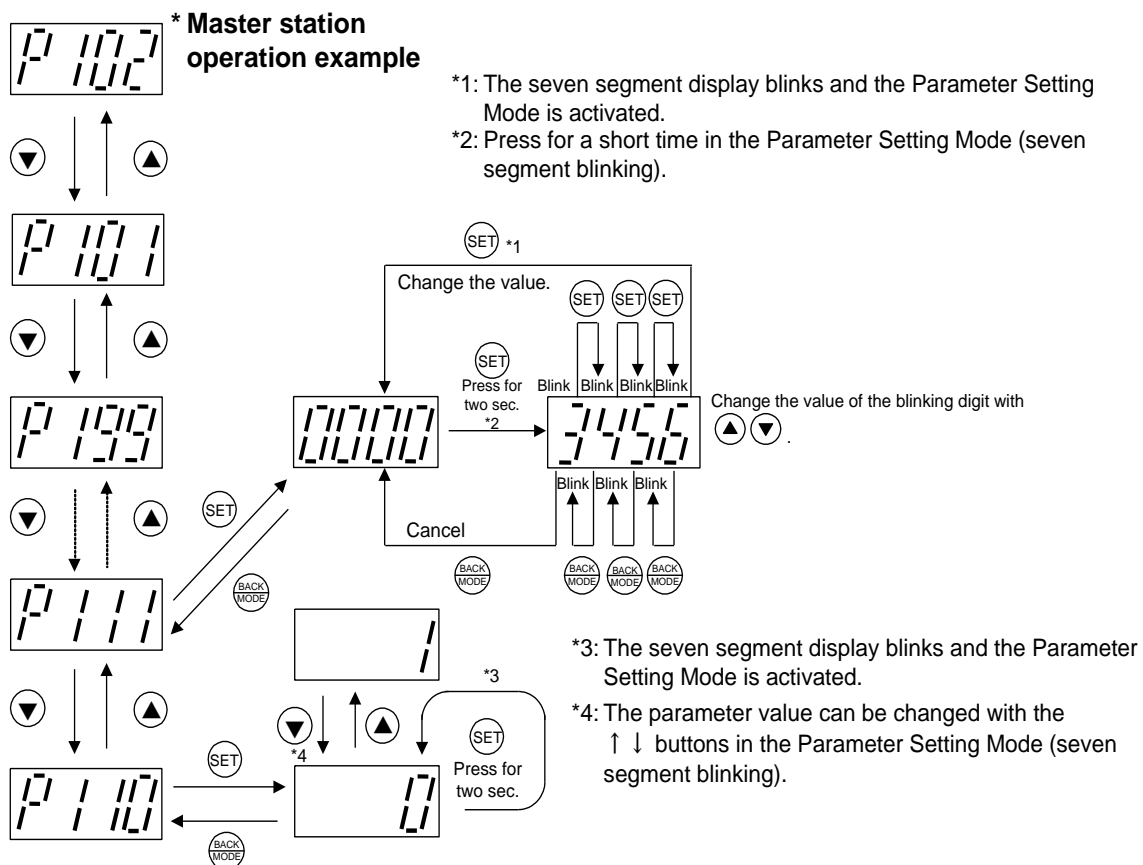
\* Pressing the [MODE/BACK] key for two sec. enables the changed parameter. If other parameters are to be changed successively, switch the parameter number, change the parameter value, and finally press the [MODE/BACK] key for two seconds.

**!!! Caution !!!**

Do not turn off the power of the radio unit in the Parameter Setting Mode. Otherwise, all the changed parameters will be invalid and the setting will change back to the parameter values before changing.

- **Parameter Value Change (1) (Single Parameter)**

Single parameters (without sub-parameters) can be changed with the operation below.



Pressing the [MODE/BACK] key for two sec. determines the parameter value and the Normal Mode is restored. (\*1, \*3, \*4)



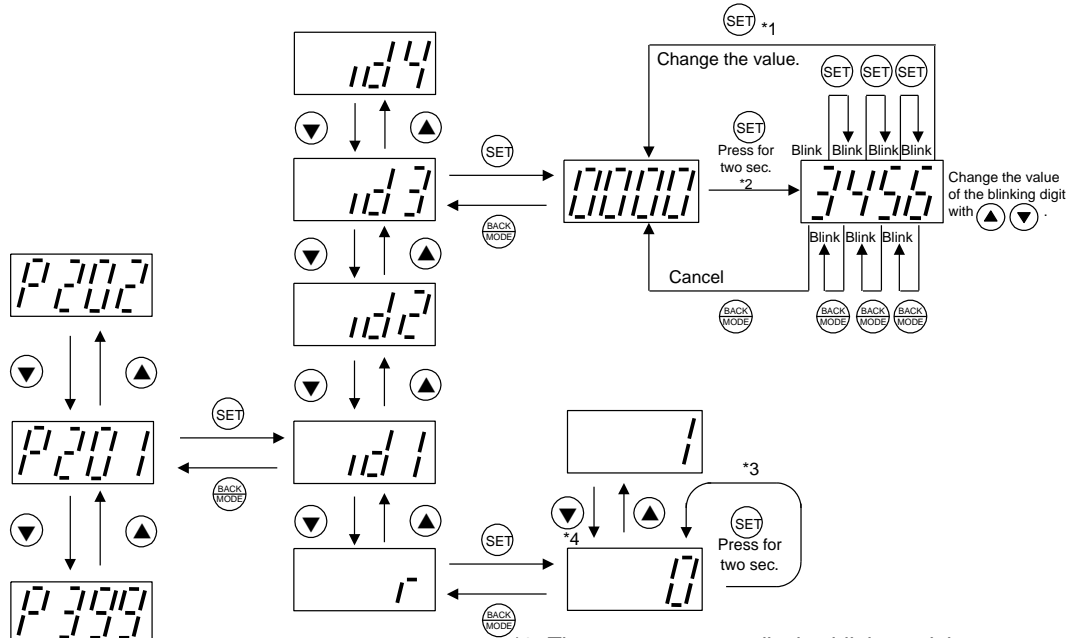
- **Parameter Value Change (2) (With Sub-parameter)**

Parameters (with sub-parameters) values can be changed with the operation below.

### \* Master station operation example

\*1: The seven segment display blinks and the Parameter Setting Mode is activated.

\*2: Press for a short time in the Parameter Setting Mode (seven segment blinking).



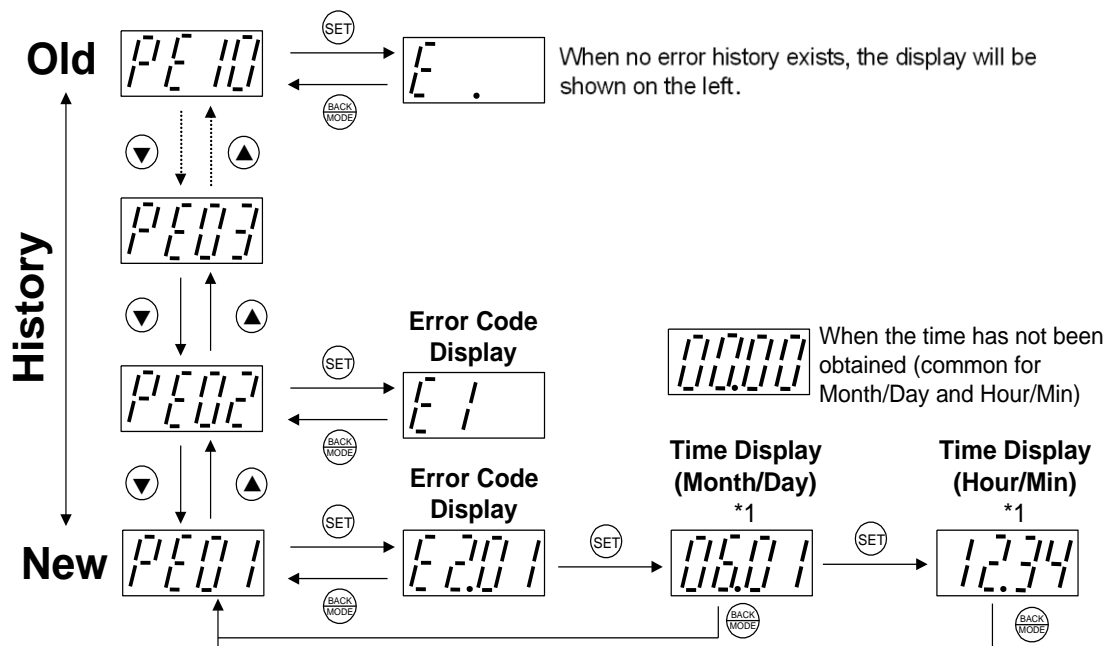
\*3: The seven segment display blinks and the Parameter Setting Mode is activated.

\*4: The parameter value can be changed with the  
 ↑ ↓ buttons in the Parameter Setting Mode  
 (seven segment blinking).

Pressing the [MODE/BACK] key for two sec. determines the parameter value and the Normal Mode is restored. (\*1, \*3, \*4)

- **Error History Display**

The error history of the past ten cases can be checked with the operation below.

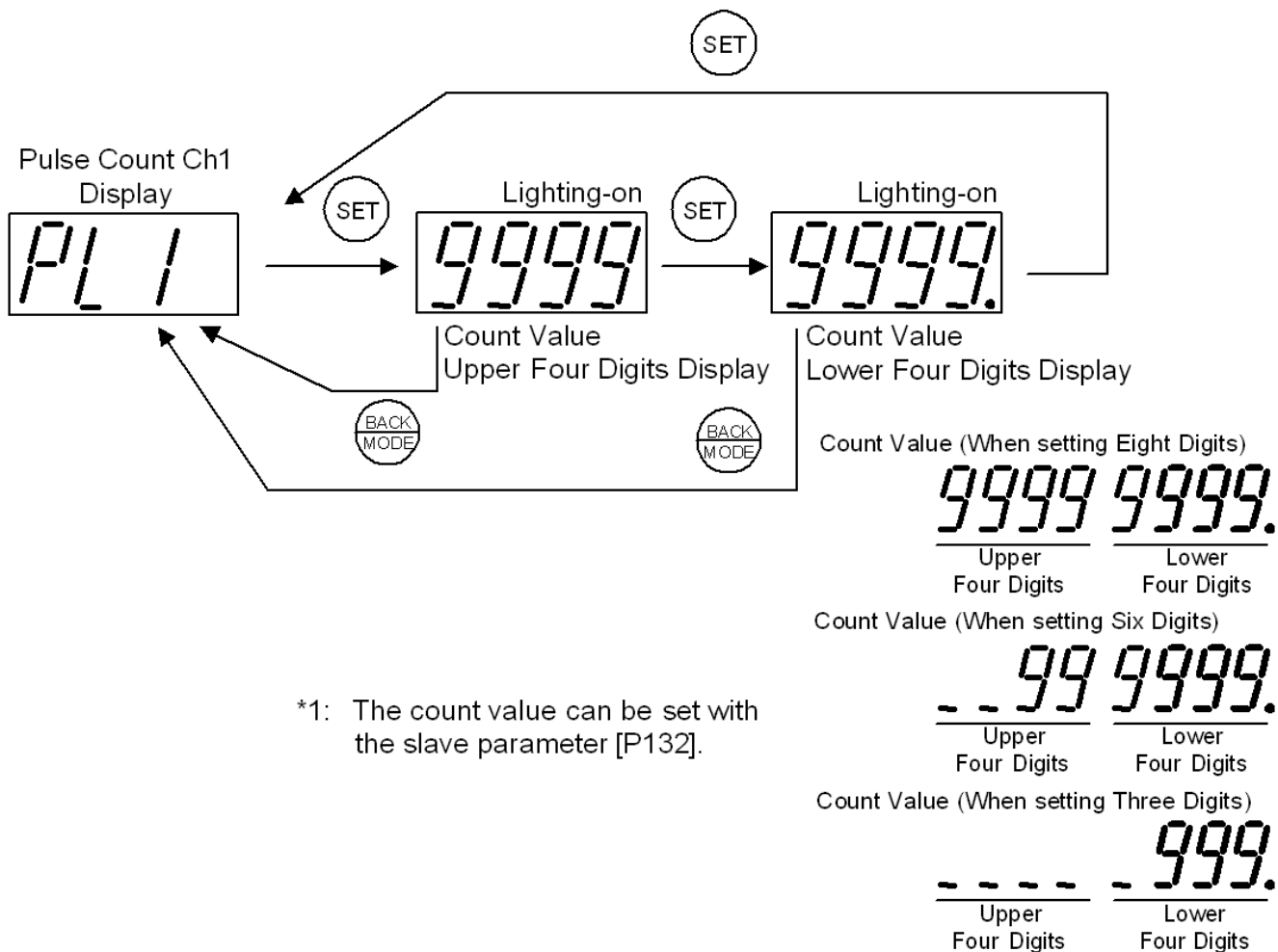


The latest error is displayed after "PE01".

\*1: The time setting with the PLC is required for the time display.

- **Pulse Count Value Display**

The pulse count value can be checked with the operation below.  
(The value is displayed for [P131] = 1 or 2)

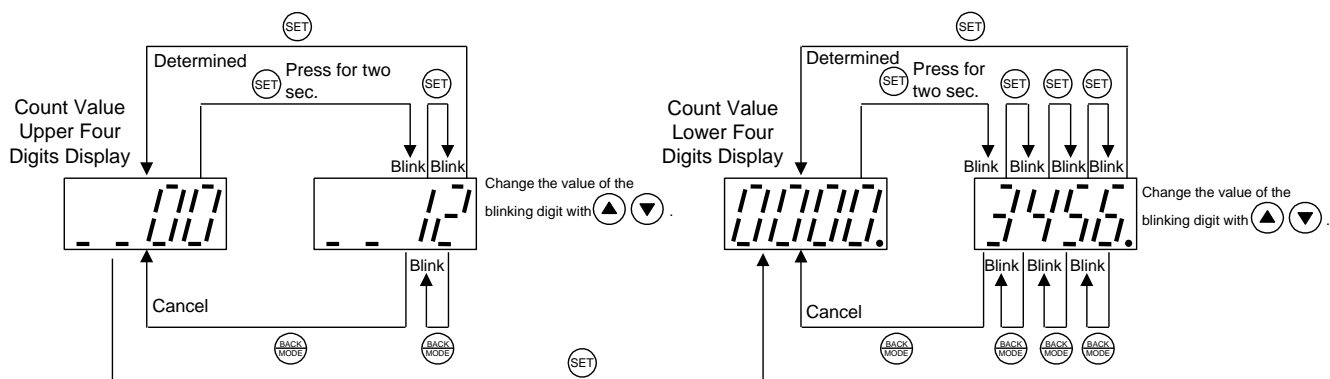


\*1: The count value can be set with the slave parameter [P132].

- **Pulse Count Default Setting**

When a value other than 0 is to be set (when the value is adjusted to the meter value or other cases), the following procedure shall be used.

Example: For Count Value when setting Six Digits



## 12. ERROR CODE LIST

- Error Code of Master Station

Display	Error name	Error detail	Handling method
[EL ]	Ethernet Communication Error	Communication with an Ethernet partner is unavailable even after a certain time passes.	Check the items below. <ul style="list-style-type: none"> <li>• Is the power of the partner unit on?</li> <li>• Is an Ethernet cable connected?</li> </ul>
[EG ]			Check the items below. <ul style="list-style-type: none"> <li>• Is the Ethernet setting of the partner unit consistent with the Ethernet setting of the master station?</li> <li>• Is an Ethernet cable connected from "HUB to the partner unit" when the HUB relays between the partner unit and master station?</li> </ul>
[E1.**] *** is the station no. of the target slave station.	Radio Communication Timeout Error	Communication with a slave station is unavailable even after a certain time passes.	Check the items below. <ul style="list-style-type: none"> <li>• Is the frequency consistent with the slave station?</li> <li>• Is the group no. consistent with the slave station?</li> <li>• Is the unit ID setting correct?</li> </ul> ⇒ Write the setting to the master station and slave station using the same setting data in the Setting Utility (SWL31-UT1). <ul style="list-style-type: none"> <li>• Is the power of the slave station on?</li> <li>• Are other Wireless units using the same frequency within the same area?</li> </ul>

• Error Code of Slave Station

Display	Error name	Error detail	Handling method
[E1 ]	Radio Communication Timeout Error	Communication with a master station is unavailable even after a certain time passes.	<p>Check the items below.</p> <ul style="list-style-type: none"> <li>• Is the frequency consistent with the master station?</li> <li>• Is the group no. consistent with the master station?</li> <li>• Is the unit ID setting of the master station correct?</li> </ul> <p>⇒ Write the setting to the master station and slave station using the same setting data in the Setting Utility (SWL31-UT1).</p> <ul style="list-style-type: none"> <li>• Is the power of the master station on?</li> <li>• Are other Wireless units using the same frequency within the same area?</li> </ul>
[E5 ]	Inconsistent Points Error	The points of the slave station and master station are inconsistent.	<p>Check the items below.</p> <ul style="list-style-type: none"> <li>• Is the points setting consistent with the master station?</li> </ul> <p>⇒ Write the setting to the master station and slave station using the same setting data in the Setting Utility (SWL31-UT1).</p>
[EL.**]  "***" is the station no. of the target extension unit.	Extension Unit Communication Error	Communication with an extension unit is unavailable even after a certain time passes.	<p>Check the items below.</p> <ul style="list-style-type: none"> <li>• Is the extension unit registered to the slave station?</li> <li>• Is the extension unit type correct?</li> </ul> <p>⇒ Check the extension unit setting of the slave station using the Setting Utility (SWL31-UT1).</p> <ul style="list-style-type: none"> <li>• Is the power supplied to the extension unit?</li> <li>• Is the extension link wiring correct?</li> <li>• Is the setting of the extension unit station no. (rotary switch) correct?</li> </ul>

## 13. SPECIFICATIONS

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### 13-1. General Specifications

Item	Specifications	
Target Unit	SWL31-ETMC (Master Station)	SWL31-R4ML (Slave Station)
Operating Ambient Temperature	0 to +55 degrees C	
Operating Ambient Humidity	5 to 95%RH (No condensation)	
Storage Ambient Temperature	-10 to +65 degrees C	
Storage Ambient Humidity	5 to 95%RH (No condensation)	
Rated operational Voltage	12/24 V DC (10.2 to 26.4 V DC)	
Current Consumption	60 mA or lower (For 24 V DC)	55 mA or lower (For 24 V DC)
Rated Power	1.5 W	1.4 W
Noise Resistance	Noise voltage: 500 Vp-p, Noise width: 1 $\mu$ s by a noise simulator with noise frequency of 45 Hz	
Vibration Resistance	Frequency: 10 to 150 Hz Acceleration: 9.8 m/s <sup>2</sup> No. of sweeps: Ten times each in X, Y and Z direction	
Shock Resistance	Acceleration: 147 m/s <sup>2</sup> No. of shocks: Three times each in X, Y and Z direction	
Operating Atmosphere	No dust or corrosive gas *1	
Weight	Approx. 130 g (with a pencil type antenna equipped)	

\*1: The special corrosion proof coating cannot be supported since the radio characteristics change.

## 13-2. Communication Specifications

### (1) Radio Communication

Item	Specifications
Target Unit	SWL31-ETMC (Master Station) and SWL31-R4ML (Slave Station)
Communication Method	Polling system
Communication Topology	Mesh *2
Maximum No. of Relay Units	3 units *3
Operation Usage Frequency Band	ISM 2.4 GHz frequency band 2.405 GHz to 2.475 GHz (5.0 MHz interval)
No. of Frequency Channels	15 ch
Antenna Power	6.3 mW or lower
Communication Speed	250 kbps
Communication distance *1	Indoors: Maximum. 60 m(197 ft)(prospect), Outdoors: Maximum. 300 m(984 ft) (prospect)
Response Time *1	<ul style="list-style-type: none"> <li>• For one slave station: Approx. 50 ms + 150 ms</li> <li>• For n units of slave station: Approx. 50 ms x n units + 150 ms</li> </ul>

\*1: The values are ones obtained when no relay unit exists. Also, they depend on surrounding environments such as obstacles.

\*2: For the overview of Mesh, refer to "13-3. About Mesh Communication."

\*3: For the overview of the Maximum No. of Relay Units, refer to "13-4. About Maximum No. of Relay Units."

### (2) Ethernet Communication

Item	Specifications
Target Unit	SWL31-ETMC (Master Station)
Interface	Ethernet (100BASE-TX, TCP/IP, and others, Connector: RJ-45) MC Protocol (3E frame client) MC Protocol (1E frame client)
Maximum Bit Number	Input 2048 points, Output 2048 points (system area included)
Maximum Word Number	Input 256 points, Output 256 points
Max No. of Slave Stations Connected	40 units (depends on the no. of extension units connected)

### (3) RS485 Communication

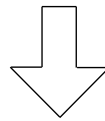
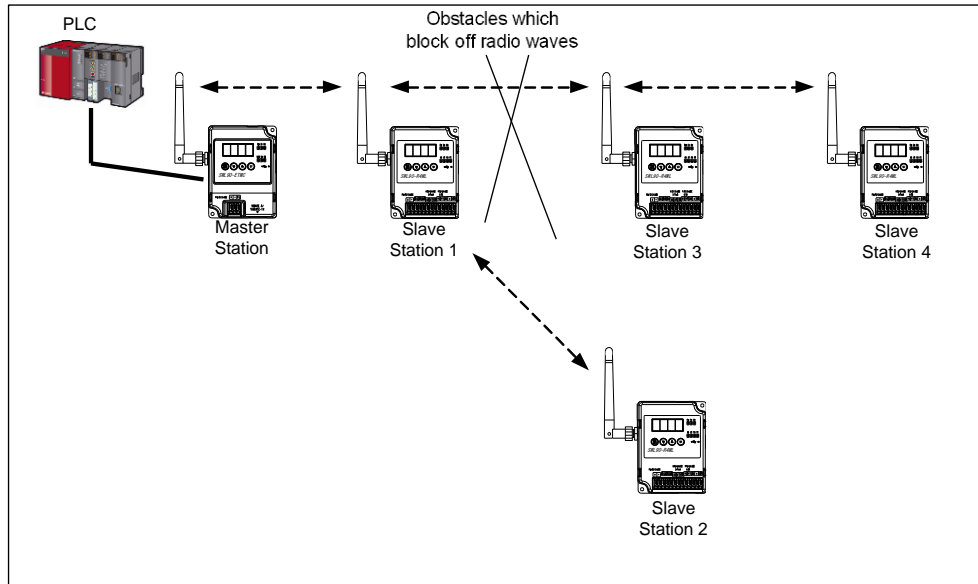
Item		Specifications
Target Unit		SWL31-R4ML (Slave Station)
Max No. of Extension Units Connected		8 units
Extension Link	Interface	RS-485
	Communication Speed	76.8 kbps
	Maximum Communication Distance	1000 m(3280 ft)

### 13-3. Mesh Communication

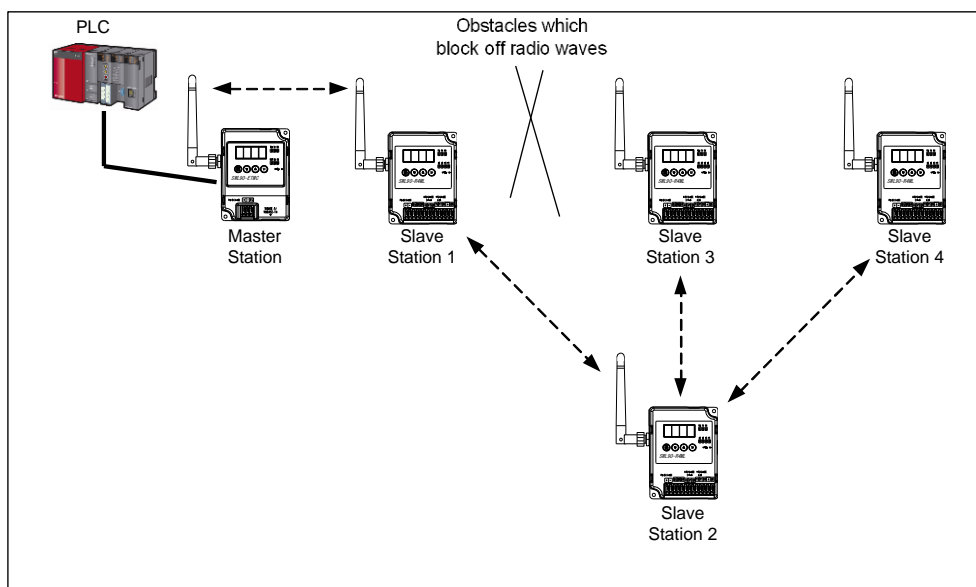
The optimum route between the master station and each slave station is automatically detected on starting-up. The setting is easy since the relay setting is not required.

Even if a part of a route is disconnected, an alternative route is automatically searched for; therefore a network with high reliability can be established.

Radio environment changes



Automatically searches for an alternative route



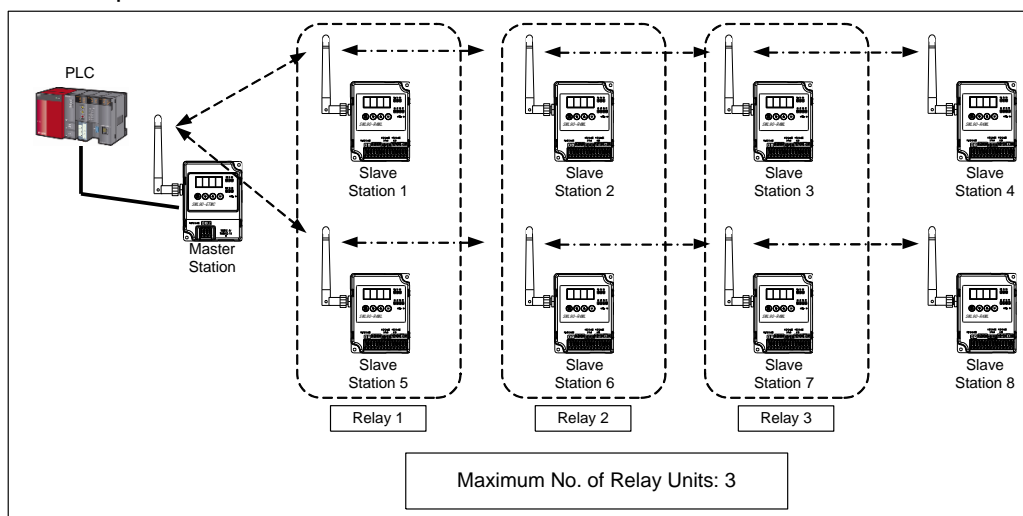
- **Notes on Mesh Communication**

If the radio communication environment is unstable and the radio communication fails continuously, the input/output signal communication may be unavailable for a certain time (one minute or longer) due to a route search. The system shall be established so that even when the communication is unavailable, the units operate on the safe side.

## 13-4. The Maximum Number of Relay Units

The maximum number of units which can relay communications between the master station and the terminal slave station is defined as the maximum number of relay units.

"Configuration Example"



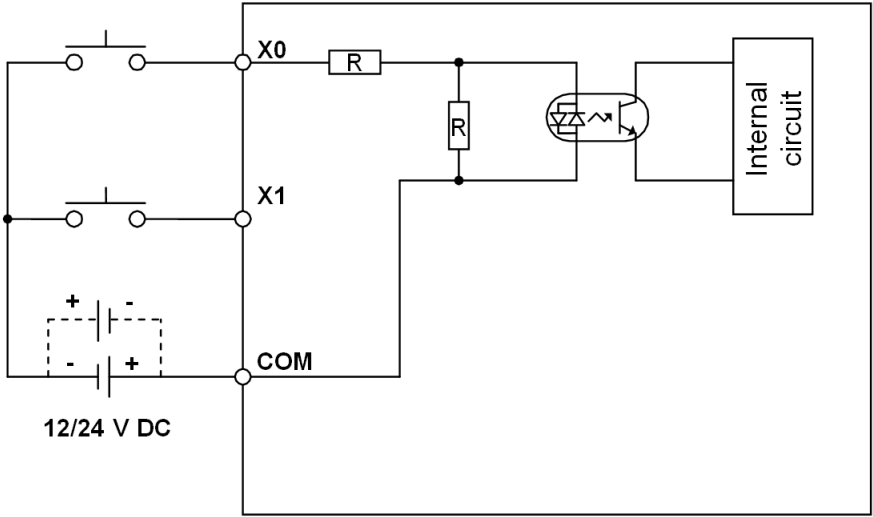
## 13-5. Slave Station Interface Specifications

Item	Specifications
Target Unit	SWL31-R4ML (Slave Station)
Number of Bits Occupied (Only Slave Station)	Input: 16 bits/per unit Output: 16 bits/per unit
Number of Words Occupied (Only Slave Station)	Input: Max four words/per unit *1 Output: Max four words/per unit *1
Max No. of Bits Occupied (Extension Units Included)	Input: 144 points (system area included) Output: 144 points (system area included)
Max No. of Words Occupied (Extension Units Included)	Input: 36 points Output: 36 points
I/O Interface	Input 2 points/Output 2 points + Error output 1 point (Input 2 points can be switched to the pulse count 2ch/1ch.)
Pulse Count Function	Maximum two channels available 0 to 99999999 8 digits (Memory retention available at power failure) ( A ring counter)

\*1: Words are occupied when the pulse count function is used. (Two word occupation per channel)



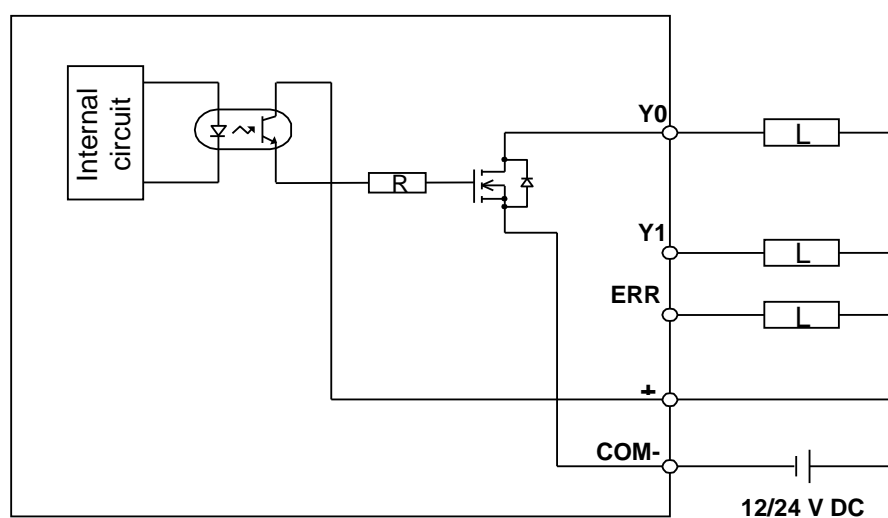
## 13-6. Input Specifications

Item		Specifications
Target Unit		SWL31-R4ML (Slave Station)
Input Type		DC input (a plus common/minus common shared type)
Input Points		2 points
Insulation Method		Photocoupler insulation
Rated Input Voltage		12/24 V DC (+10/-15%, Ripple rate 5% or less)
Rated Input Current		Approx. 3 mA for 12 V DC, Approx. 7 mA for 24 V DC
ON Voltage/ON Current		8 V or higher/2 mA or higher
OFF Voltage/OFF Current		4 V or lower/1 mA or lower
Input Resistance		Approx. 3.3 k $\Omega$
Response Time	OFF→ON	200 ms or less (One master and One slave station communication: no relay)
	ON→OFF	200 ms or less (One master and One slave station communication: no relay)
Common Type		2 points per common
Operation Display		ON display (LED)
<u>External Connection Diagram</u>  <p>The diagram illustrates the external connection for the input points. Two switches, labeled X0 and X1, are connected to a common terminal labeled COM. A DC voltage source of 12/24 V is connected to the COM terminal. The circuit includes two resistors, both labeled R, and a photocoupler symbol. The photocoupler is connected to an internal circuit block. The connection for X0 goes through resistor R to the photocoupler. The connection for X1 goes through resistor R to the photocoupler. The COM terminal is connected to the other side of the photocoupler and the internal circuit.</p>		

## 13-7. Output Specifications

Item		Specifications
Target Unit		SWL31-R4ML (Slave Station)
Output Type		Transistor output (sync type)
Output Points		3 points (error output signal 1 point included)
Insulation Method		Photocoupler insulation
Rated Load Voltage		12/24 V DC (+10/-15%)
Maximum Load Current		0.1 A/1 point, 0.3 A/1 common (error output signal 1 point included)
Response Time	OFF→ON	200 ms or less (One master and One slave station communication: no relay)
	ON→OFF	200 ms or less (One master and One slave station communication: no relay)
Surge Killer		Zener diode
Fuse		None
External Power Supply	Voltage	12/24 V DC (+10/-15%) (Ripple rate 5% or less)
	Current	10 mA (for 24 V DC)
Common Type		3 points per common (error output signal 1 point included)

### External Connection Diagram



## 13-8. Pulse Count Specifications

### (1) Pulse Count Input Basic Specifications

Item		Specifications
Number of Channels		2ch/1ch * Selectable with the parameter
Input Voltage Specifications		12/24 V DC
Minimum Input Pulse Width		30 Hz (ON: 16.7 ms, OFF: 16.7 ms) * When the machine contact output is used, the chattering time shall be considered.
Counter Type		Ring counter type
Number of Digits		1 to 8 digits
Default Setting		The count value can be set with other than 0 with the operation buttons of the slave station.
Reset Method	External Reset	Turning on the input terminal (X1) of the slave station resets the count. * <b>When 2ch is used, the external reset is unavailable.</b>
	Internal Reset	Commanding internal reset from the sequence program to the master station resets the count.

Note: If the pulse count is used the master station parameter for the word data of the PLC shall be set to Hold not to be cleared (to zero) at radio error.

### (2) Terminal Layout Specifications of Pulse Count Input

List of Functions and Corresponding Addresses Based on Terminal Names

#### 1) When one channel is used

Terminal name	Function	Corresponding address *1
X0	Pulse input ch1	RWr+0 to 1
X1	Pulse count value ch1 external reset *2	RWr+0 to 1

#### 2) When two channels are used

Terminal name	Function	Corresponding address *1
X0	Pulse input ch1	RWr+0 to 1
X1	Pulse input ch2 *2	RWr+2 to 3

\*1: For the case where the leading address of the remote register (input) assigned to the slave station is RWr

\*2: If a signal is input to X1, the external reset control will operate to set 0 to the counter value.

### (3) Address Assignment Specifications of Pulse Count Input

List of Functions and Corresponding Terminal Names Based on Addresses

#### 1) When one channel is used

Address *3	Function	Corresponding terminal name
RWr+0 to 1	Pulse count value ch1 monitoring	X0 (pulse input) X1 (external reset)
RWw+0 to 1	Pulse count value ch1 internal reset control *4	—
	Vacant	—

#### 2) When two channels are used

Address *3	Function	Corresponding terminal name
RWr+0 to 1	Pulse count value ch1 monitoring	X0 (ch1 pulse input)
RWr+2 to 3	Pulse count value ch2 monitoring	X1 (ch2 pulse input)
RWw+0	Pulse count value ch1 internal reset control *4	—
RWw+1	Vacant	—
RWw+2	Pulse count value ch2 internal reset control *4	—
RWw+3	Vacant	—

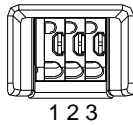
\*3: For the case where the leading address of the remote register (input) assigned to the slave station is RWr. For the case where the leading address of the remote register (output) assigned to the slave station is RWw.

\*4: If values other than 0 are set, the internal reset control will operate to set 0 to the counter value.

## 13-9. Terminal Block Specifications

- Master Station (SWL31-ETMC)

[Terminal Block Diagram]



[Terminal Layout]

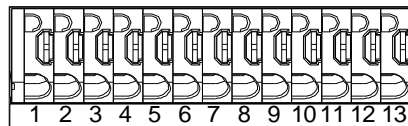
Item	Terminal no.	Silk notation	Specifications
Unit Power Supply +	1	+	Unit power supply (12 to 24 V DC)
Unit Power Supply -	2	-	
FG Terminal	3	FG	FG connection terminal

[Terminal Specifications]

Item	Specifications
Conforming Electric Wire Size	Single wire: $\phi 0.8$ mm(0.03 in) (AWG20), twisted wire $0.5$ mm <sup>2</sup> (AWG20), strand diameter $\phi 0.18$ mm(0.007 in) or more
Standard Peeling Length	8 mm(0.31 in)
Recommended Conforming Tool	Flathead screwdriver Shaft diameter $\phi 3$ mm(0.11 in), cutting edge width 2.6 mm(0.1 in)

- Slave Station (SWL31-R4ML)

[Terminal Block Diagram]



[Terminal Layout]

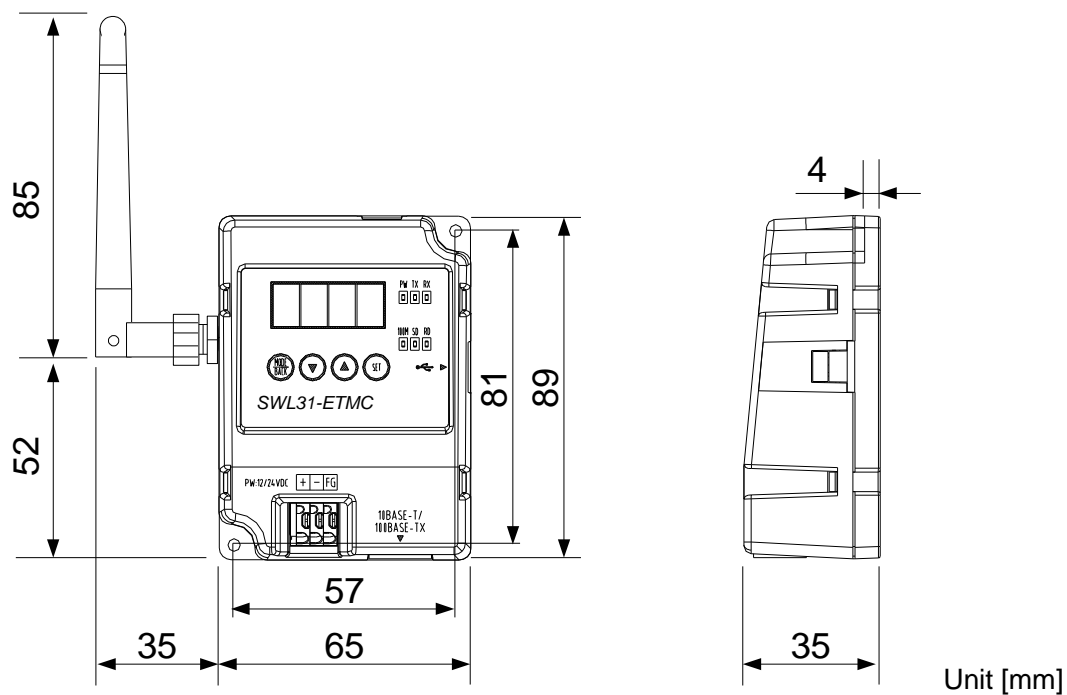
Item	Terminal no.	Silk notation	Specifications
Unit Power Supply +	1	+	Unit power supply (12 to 24 V DC)
Unit Power Supply -	2	-	
Extension Unit Link DG	3	DG	Extension link communication (RS485)
Extension Unit Link DB	4	DB	
Extension Unit Link DA	5	DA	
Input Signal X0	6	X0	Refer to 13-6. Input Specifications.
Input Signal X1	7	X1	
Input Signal Common COM	8	COM	
Output Signal Y0	9	Y0	Refer to 13-7. Output Specifications.
Output Signal Y1	10	Y1	
Error Output Signal	11	ERR	
Gate Power Supply +	12	+	
Output Signal Common COM -	13	COM-	

[Terminal Specifications]

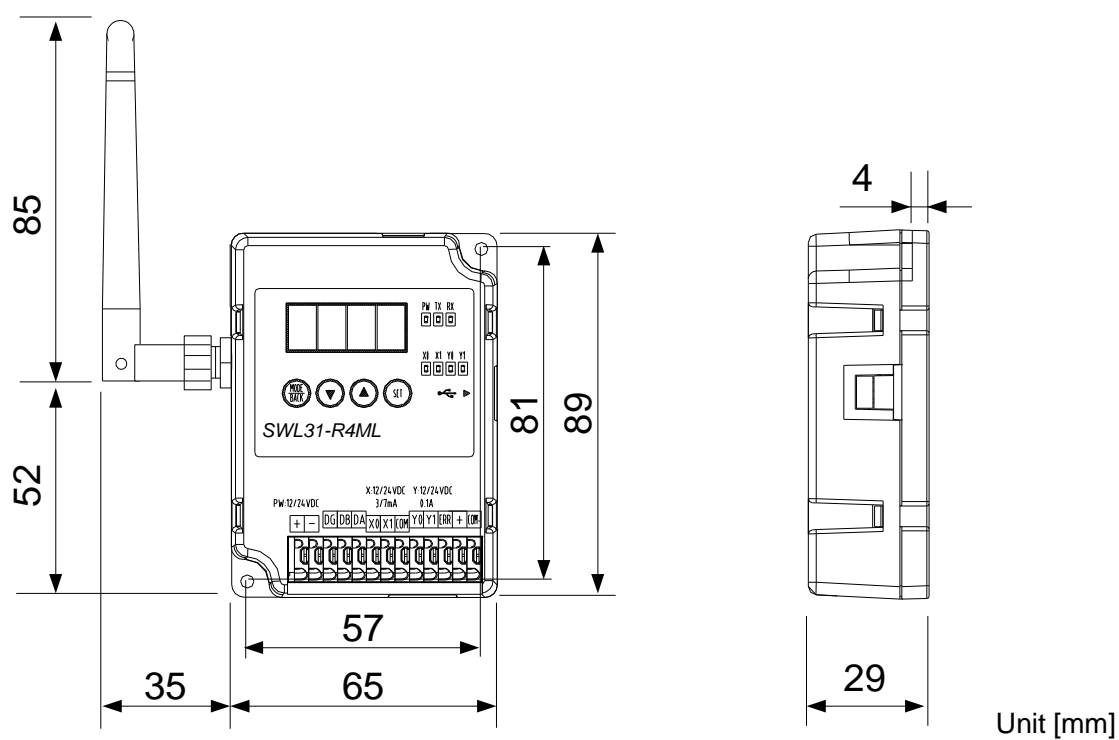
Item	Specifications
Conforming Electric Wire Size	Single wire: $\phi 0.8$ mm(0.03 in) (AWG20), twisted wire $0.5$ mm <sup>2</sup> (AWG20), strand diameter $\phi 0.18$ mm(0.007 in) or more
Standard Peeling Length	8 mm(0.31 in)
Recommended Conforming Tool	Flathead screwdriver Shaft diameter $\phi 3$ mm(0.11 in), cutting edge width 2.6 mm(0.1 in)

## 13-10. Appearance Specifications

- Master Station (SWL31-ETMC)



- Slave Station (SWL31-R4ML)



## 14. AUTHENTICATION STANDARDS

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Available countries	Wireless certification standard
Japan	ARIB STD-33/T66
China	— *
Taiwan	NCC
Thailand	NBTC
Vietnam	MIC
USA	FCC part 15B
	FCC Part 15C
	FCC ID
Canada	ICES 003
	RSS 210
	IC ID
Australia	AS/NZS 4268
new Zealand	AS/NZS 4268

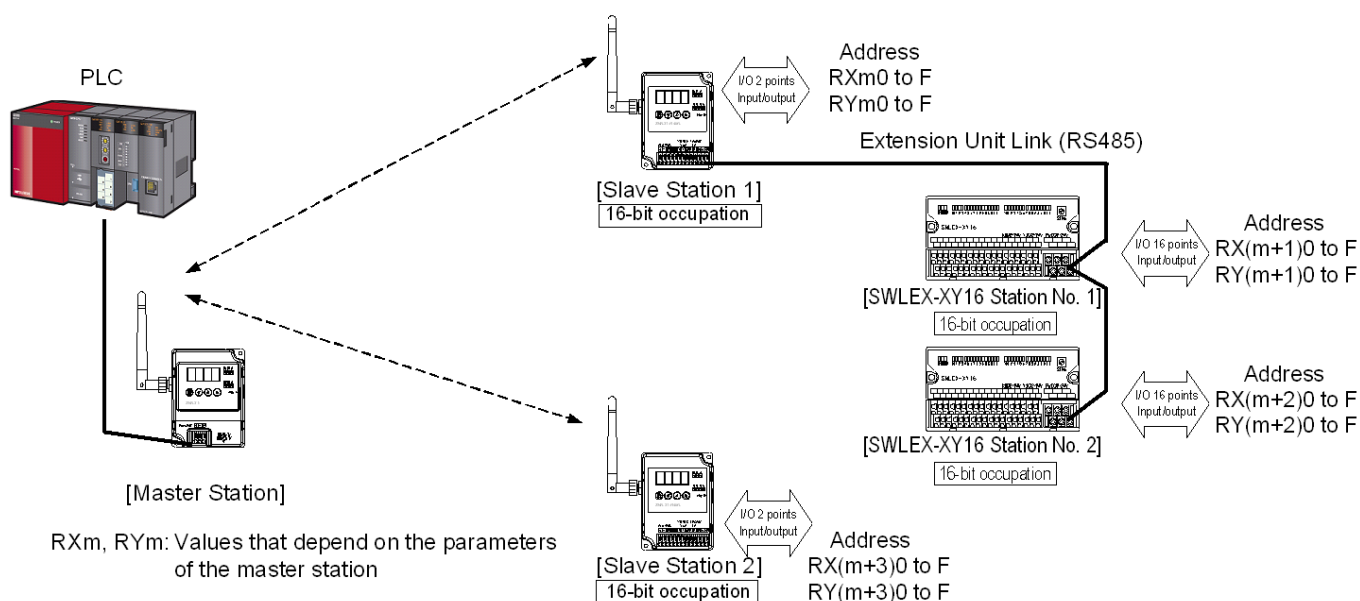
\* Not subject to CCC certification, SRRC certification not required

## 15. FUNCTIONS REALIZED WITH SYSTEM AREA

- Functions which to be enabled using the system area
  - The PLC can detect radio communication timeout errors of each slave station.
  - The PLC can detect communication errors of each extension unit.

They are explained based on the following configuration example, address assignment and situation example.

- Configuration Example



- Address Assignment

#### RXm0 to F

Slave Station 1 Input Data		System Area				*1 Slave Station 1 One-time Communication Failure	*2 Slave Station 1 Communication Error Flag	*3 Extension 1 Communication Error Flag	Extension 2 Communication Error Flag	Extension 3 Communication Error Flag	Extension 4 Communication Error Flag	Extension 5 Communication Error Flag	Extension 6 Communication Error Flag	Extension 7 Communication Error Flag	Extension 8 Communication Error Flag
0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F

#### RYm0 to F

Slave Station 1 Output Data		System Area													
0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F

#### RX(m+3)0 to F

Slave Station 2 Input Data		System Area				Slave Station 2 One-time Communication Failure	Slave Station 2 Communication Error Flag	Extension 1 Communication Error Flag	Extension 2 Communication Error Flag	Extension 3 Communication Error Flag	Extension 4 Communication Error Flag	Extension 5 Communication Error Flag	Extension 6 Communication Error Flag	Extension 7 Communication Error Flag	Extension 8 Communication Error Flag
0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F

#### RY(m+3)0 to F

Slave Station 2 Output Data		System Area													
0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F

- Error Flag Specifications

\*1: When the slave station 1 communication fails once

⇒ RXm6 will be turned on. If the radio communication succeeds in the next cycle, it will be set back to off.

\*2: When the slave station 1 radio wave environment is not good and transmission/reception does not succeed even after the radio timeout time or longer time elapses

⇒ RXm7 to F will be turned on. If the radio communication succeeds in the next cycle, they will be set back to off.

(If a communication abnormality occurs in the slave station, correct transmission of information of the extension unit will be unavailable; therefore, the extension communication error flag will be turned on simultaneously.)

\*3: When a communication error occurs in the extension unit station no. 1 connected to the slave station 1

⇒ RXm8 will be turned on.



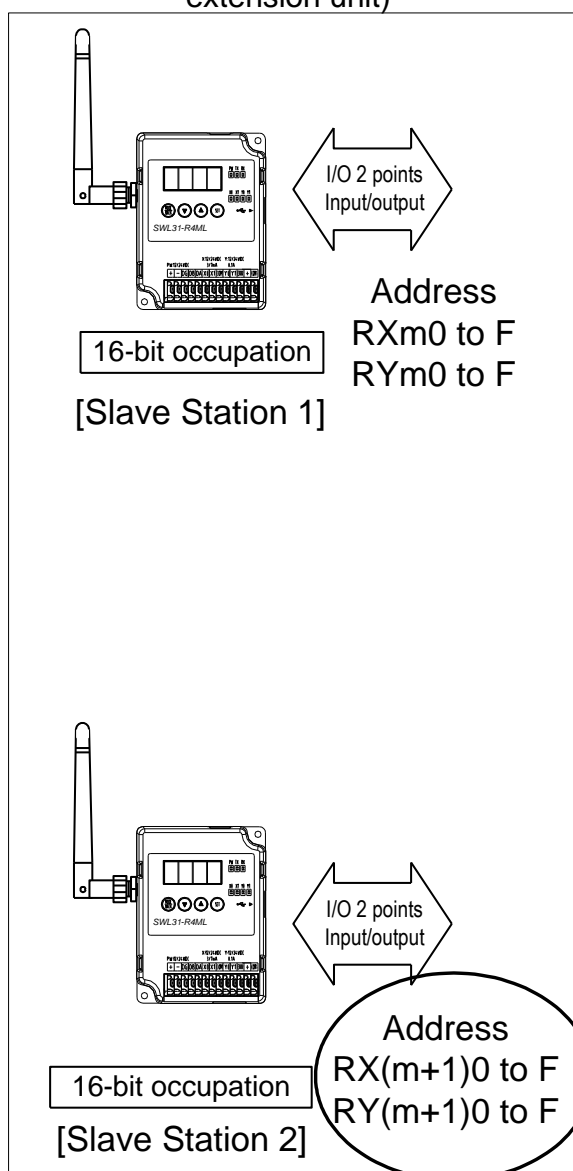
## 16. ADDRESS ASSIGNMENT CHANGE WHEN EXTENSION UNIT ADDED TO RADIO SLAVE STATION

When the extension unit is added to the slave station or when the unit is deleted without using the reserve setting, address assignment change may cause operation of unexpected units. Be sure to check the address assignment before operation.

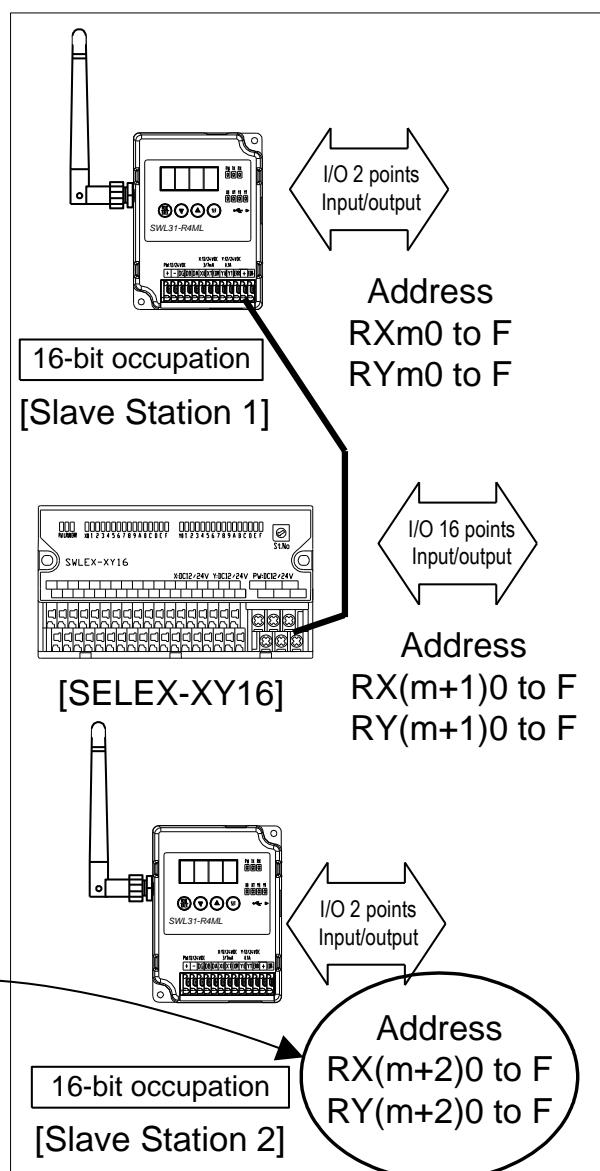
\* Refer to the following configuration diagram. When the extension unit is added to the slave station 1, displacement occurs in the address assignment for the slave station 2.

System before change

(Example: Two slave stations and no extension unit)



One extension unit added to Slave Station 1



RXm, RYm: Values that depend on the parameters of the master station

## WARRANTY

Please confirm the following product warranty details before starting to use the product.

### Gratis Warranty Term and Gratis Warranty Range

If any faults or defects (hereinafter "failures") found to be the responsibility of Mitsubishi Electric System & Service Co., Ltd. occur during use of the product within the gratis warranty term, the product will be replaced with an alternative one at no cost via the dealer of your purchase.

However, if domestic and overseas business trips are required, expenses to dispatch an engineer shall be charged for.

In addition, on-site adjustment/trial operation will not be included in our responsibility.

#### ■ Gratis Warranty Term

The gratis warranty term of the product shall be for one year after the date of purchase or delivery to a designated place.

Note that after manufacture and shipment from Mitsubishi, the maximum distribution period shall be six months, and the longest gratis warranty term after manufacturing shall be eighteen months. The gratis warranty term of repair parts shall not exceed the gratis warranty term before repairing them.

#### ■ Gratis Warranty Range

- (1) The range shall be limited to normal use within the usage state, usage methods, usage environment, etc. which follow the conditions and precautions. given in the instruction manual, caution labels on the product, etc.
- (2) Even within the gratis warranty term, the cases below will be excluded from the warranty range.
  - 1) Failure occurring from inappropriate storage, handling, carelessness, negligence, etc. by the customer.
  - 2) Failure caused by unapproved modifications, repairs, etc. to the product by the customer.
  - 3) Failure caused by usage methods other than the original usage method of the product or by a usage method which exceeds the industry standards.
  - 4) Failure that could have been avoided if cables, accessories and equipment specified in the instruction manual and others. had been normally maintained or replaced.
  - 5) Failure caused by reasons unpredictable by scientific technology standards at time of shipment by us.
  - 6) Failure caused by external irresistible forces such as fires etc. and failure caused by force majeure such as earthquakes, lightning, storm, flood damage, etc. which are not within our responsibility.
  - 7) Any other failure found not to be our responsibility or recognized by the customer as outside of our responsibility

### Onerous Warranty Term after Discontinuation of Production

Mitsubishi shall accept onerous product repairs for seven years after production of the product is discontinued.

Product or alternative product supply is not possible after production is discontinued.

### Exclusion of Chance Loss and Secondary Loss from Warranty Liability

Regardless of the gratis warranty term, Mitsubishi shall not be liable for compensation for damages arising from any cause found not to be the responsibility of Mitsubishi, chance losses and lost profits incurred by the customer due to the failure of Mitsubishi products, damage and secondary damage caused by special reasons regardless of Mitsubishi's expectations, compensation for accidents, and compensation for damage to products other than Mitsubishi products and other duties.

### Changes in Product Specifications

The specifications given in the catalogs, specifications, technical documents and others are subject to change without prior notice.

### Product Application

#### ■ Use Condition

In using Mitsubishi products, the usage conditions shall be that the application will not lead to a major accident even if any problem or fault should occur in our products and that backup and other measures are taken.

#### ■ Application Exceptions

- (1) Our products have been designed and manufactured for applications in general industries and other industries. Applications in which the public could be affected significantly such as in nuclear power plants and other power plants, public transportation such as railroad and aviation, and applications in which a special quality assurance system is required such as for vehicle equipment, medical machinery, equipment for recreation and amusement, safety equipment, incineration systems, and facilities which comply with the regulations of government agencies and individual industries will be excluded from the applications.
- (2) Applications in which human life or assets could be greatly affected and for which a particularly high reliability is required in terms of safety and control systems will be excluded from the applications.
- (3) However, even with the applications above, if the user approves that the application is to be limited and a special quality is not required, application shall be possible.

Ethernet is a trademark of FUJIFILM Business Innovation Corp. MC Protocol is an abbreviation of MELSEC Communication Protocol. MELSEC is a trademark of Mitsubishi Electric Corporation.
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**MITSUBISHI ELECTRIC SYSTEM & SERVICE**  
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