Panasonic

# KR20
# WIRELESS UNIT
# User's Manual

ARCT1F441E-4 DRAFT

2011.01 | panasonic-electric-works.net/sunx

Panasonic Electric Works SUNX

# Safety Precautions

In order to prevent from injury and accident, please keep the following condition.

Before setup, operation, maintenance, check, read and understand this manual to make proper use of the product.

In this manual, the level of the safety notes are divided as “WARNING” and “CAUTION”

## ⚠WARNING

**If critical situations that could lead to user’s death or serious injury is assumed by mishandling of the product:**

- Always take precautions to ensure the overall safety of your system, so that the whole system remains safe in the event of failure of this product or other external factor.
- Do not use this product in areas with inflammable gas. It could lead to an explosion.
- Exposing this product to excessive heat or open flames could cause damage to the lithium battery or other electronic parts.
- Do not use this product at a hospital and the place with the electric medical equipment (pacemakers etc.)It might influence the electric medical equipment due to the radio disturbance and it could cause an accident.

## ⚠CAUTION

**If critical situations that could lead to user’s injury or only property damage is assumed by mishandling of the product.**

- To prevent abnormal exothermic heat or smoke generation, use this product at the values less than the maximum of the characteristics and performance that are assured in these specifications.
- Do not dismantle or remodel the product. It could lead to abnormal exothermic heat or smoke generation.
- Do not touch the terminal while turning on electricity. It could lead to an electric shock.
- Use the external devices to function the emergency stop and interlock circuit.
- Connect the wires or connectors securely. The loose connection might cause abnormal exothermic heat or smoke generation.
- Do not allow foreign matters such as liquid, flammable materials, metals to go into the inside of the product. It might cause exothermic heat or smoke generation.
- Do not undertake construction (such as connection and disconnection) while the power supply is on.
- Do not bring it close to sensor for disaster prevention such as smoke, heat, gas leak etc. The sensor may malfunction.

# Copyright and Trademark

## ■Usable countries

**This product can be used in following countries.**

Japan, Europe (Austria, Belgium Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Lithuania, Malta, Netherlands, Norway, Portugal, Poland, Slovakia, Slovenia, Spain, Sweden, Switzerland, and UK (England) ), China, Thailand, Singapore, USA(only AKR2002)

**In following country, pay attention to each restriction.**

**[France]**

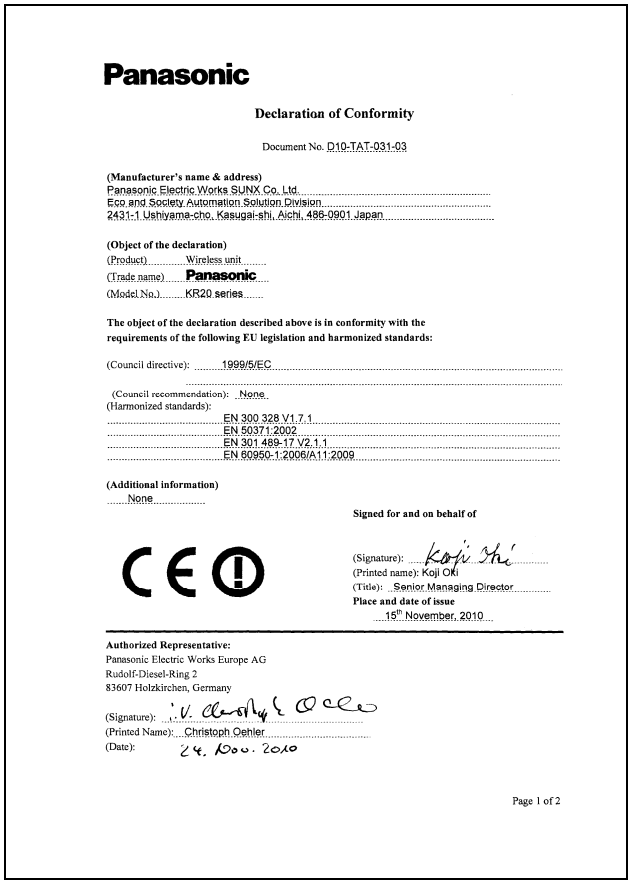
It is not permitted to use outdoor. Use it indoor only.

## ■About compliance for EN standard

**In order to comply with EN standard, use this product in following condition.**

- When installing this product to wall, install it on a DIN rail.
- Use power supply cord that is less than 3m.
- For communication cable (RS232C or RS485), use shielded cable, and connect one end of shield wire to ground. And use ferrite core (correspond to TDK: ZCAT2035-0930) in the communication cable (RS232C or RS485) of wireless unit side. (Turn numbers: 2T)

## ■Declaration of Conformity



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Declaration of Conformity

Document No. D10-TAT-031-03

**(Manufacturer's name & address)**
Panasonic Electric Works SUNX Co. Ltd.
Eco and Society Automation Solution Division
2431-1 Ushiyama-cho, Kasugai-shi, Aichi, 486-0901 Japan

**(Object of the declaration)**
(Product) Wireless unit
(Trade name) Panasonic
(Model No.) KR20 series

**The object of the declaration described above is in conformity with the requirements of the following EU legislation and harmonized standards:**

(Council directive): 1999/5/EC

(Council recommendation): None
(Harmonized standards):
EN 300 328 V1.7.1
EN 50371:2002
EN 301 489-17 V2.1.1
EN 60950-1:2006/A11:2009

**(Additional information)**
None

**Signed for and on behalf of**

(Signature): Koji Oki
(Printed name): Koji Oki
(Title): Senior Managing Director
**Place and date of issue**
15th November, 2010

**Authorized Representative:**
Panasonic Electric Works Europe AG
Rudolf-Diesel-Ring 2
83607 Holzkirchen, Germany

(Signature): i.V. Christoph Oehler
(Printed Name): Christoph Oehler
(Date): 24. Nov. 2010

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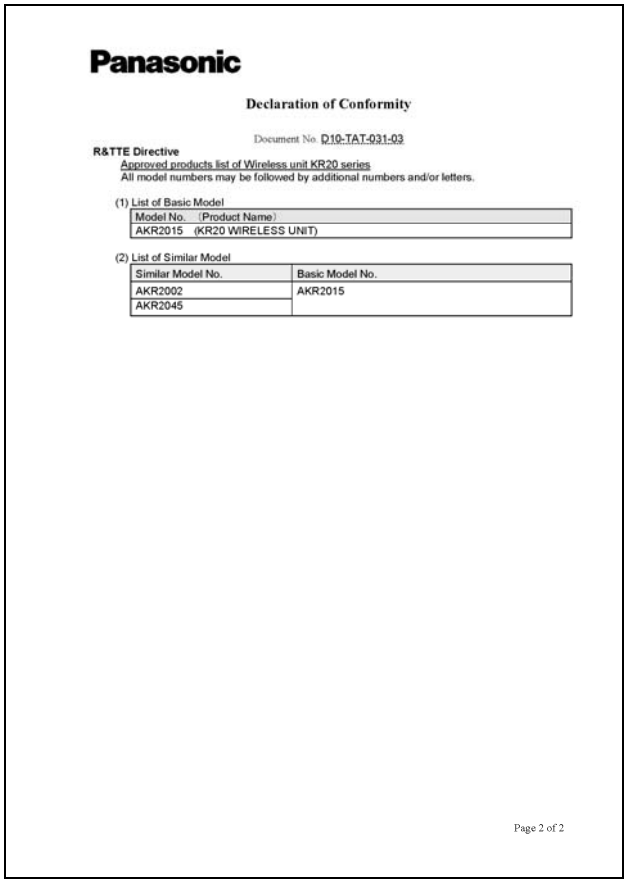

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Declaration of Conformity

Document No. D10-TAT-031-03

**R&TTE Directive**
Approved products list of Wireless unit KR20 series
All model numbers may be followed by additional numbers and/or letters.

(1) List of Basic Model

| Model No. (Product Name) |
|---|
| AKR2015 (KR20 WIRELESS UNIT) |

(2) List of Similar Model

| Similar Model No. | Basic Model No. |
|---|---|
| AKR2002 | AKR2015 |
| AKR2045 | |

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## ■Federal Communication Commission Interference Statement

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 Caution:**
You are cautioned that changes or modifications not expressly approved by the party responsible for compliance could void your 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.

## ■FCC Radiation Exposure Statement

This device complies with FCC RF radiation exposure limits set forth for an uncontrolled environment. The antenna used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter.

## Introduction

Thank you very much indeed for purchasing “KR20 WIRELESS UNIT”.

In this manual, we explain the setting of working and operating procedures.

Please use it correctly after understanding the content enough.

# Table of Contents

# Chapter 1

# Overview of KR20 WIRELESS UNIT

# 1.1 Overview

**This is the wireless unit that can be communicating with terminal equipment via 2.4GHz SS radio (not necessary the license).**
**It is appropriate to a communication system for monitoring temperature, electric power and so on.**

## 1.1.1 Features

### Appropriate to high-speed data communication

It is appropriate for the high-speed data communication with 134kbps wireless communication speed.

### Appropriate to save wiring and to save construction

Reduce cost for layout change of equipment and machines and for cost of cable construction in the place where it is difficult to wire.

### No distinction between Master and Slave

It is possible to distinguish between Master and Slave by setting of the Unit No.; therefore you can purchase without caring difference of master and slave.

### RS485 type is provided

By using RS485 type, heretofore, RS232C-RS485 converter has been needed to connect with RS485 communication equipment, but the converter is not needed and it is possible to connect to RS485 communication equipment directly.

### The main unit and also setting tool can be easily operated

For 1:1 topology (1 unit of master and 1 unit of slave), it is possible to start communication by setting the main units only. And in 1:N topology (one unit of master and multiple unit of slaves), we prepare setting tool (Control Configurator KR) that is easy to set and operate. This software loads the test functions so that it is convenient when installing wireless units. In addition, it is possible to download this software from our company's web site.

### Wireless repeater function

Communication distance between master and slave is 250m*. It is possible to elongate the communication distance by repeater function that is loaded in this unit. (It is possible to set max 8 units between master and slave) * But straight distance with a good view.

### Maximum connectable numbers of terminal equipment are 254

For RS485 type, it is possible to connect max 99 units of slave to one unit of master, and to connect 31 terminal equipment to one unit of slave. Total connectable numbers of terminal equipment are 254. In I/O type, it is possible to connect totally 99 units of slaves and terminal equipment.

### I/O communication and serial communication (RS232C) are possible at the same time

For I/O type, it is possible to perform serial communication (RS232C) with performing input/output (I/O) communication at the same time.

### For 1:N topology, all models can be used in mixture

For 1:N topology, when MEWTOCOL is used, RS485 type and I/O type can be used in mixture.

 **Reference:** <1.1.2 Communication style>
<5.7.5 MEWTOCOL communication example (Mixed I/O type and RS485 type)>

# 1.1.2 Communication style

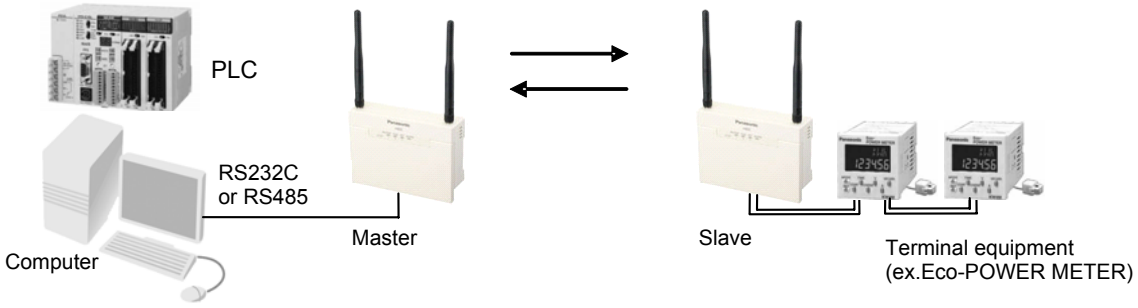
3 kinds of communication system are possible.

## 1:1 topology

・It is the system with 1 unit of master and 1 unit of slave.
・In serial communication, the communication protocol (serial communication protocol) of the connected equipment is not specified.
(Except the case that communication between terminals is executed with start character ">". Refer to the note.)
・Setting only the main unit can make it usable.

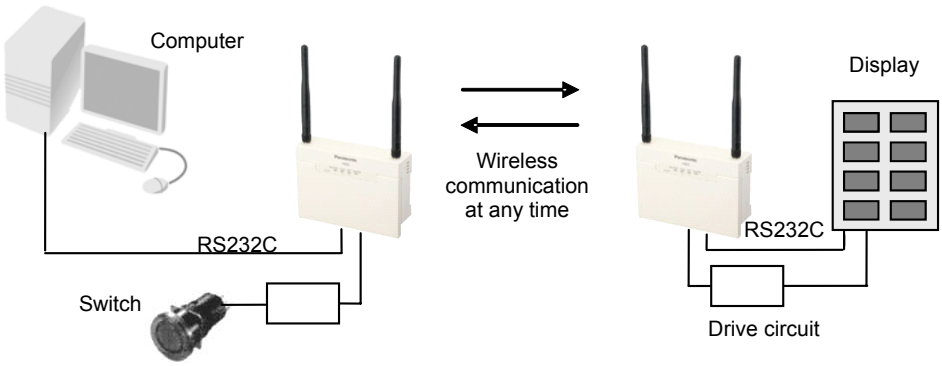
**Note: When communication between terminals is executed with start character ">", it is impossible to communicate correctly, because it is identified the command for wireless unit.Change start character by setting tool. It is necessary to change not only master but also slaves.**

**■RS485 type**




・For RS485 type, wireless communication is performed only when received external data communication. (Event)

**■I/O type**




・For I/O type, it always performs wireless communication from master to slave. (Polling) Due to this, it outputs the communication error when wireless communication is cut off continuously. (Communication error is output after about 30 sec. with no communication.)

・For I/O type, input signal is communicated to the output terminal of the same number of the connected slave. (Example: Input for IN1 in master is output to OUT1 in slave, input for IN2 in slave is output to OUT2 in master.)

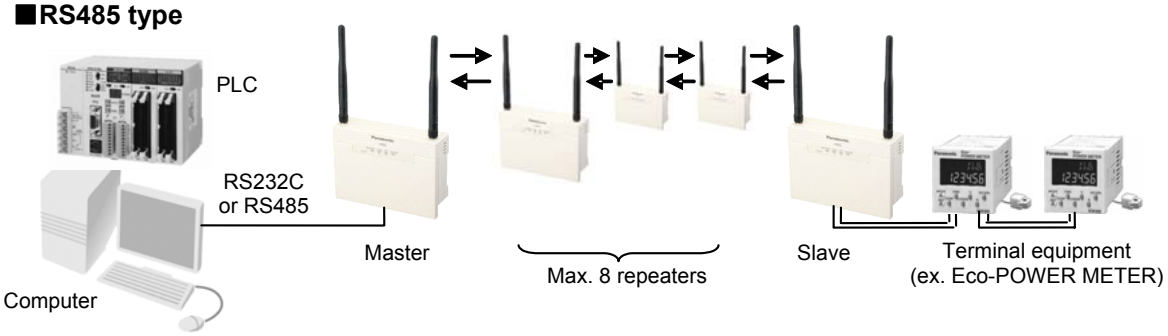
## 1:1 topology with repeaters

・It is the system with 1 unit of master and 1 unit of slave and repeaters between master and slave.
・Max. 8 repeater stages are possible (between master and slave)
In serial communication, the communication protocol (serial communication protocol) of the connected equipment is not specified.
(Except the case that communication between terminals is executed with start character ">". Refer to the note.)
・It is set by using setting tool.

**Note: 1.When the repeater stages are increased, the communication time will be long. Consider about the response time. And wireless unit used as a repeater cannot connect terminal equipment.**

**2. When communication between terminals is executed with start character ">", it is impossible to communicate correctly, because it is identified the command for wireless unit.Change start character by setting tool. It is necessary to change not only master but also slaves.**

**■RS485 type**



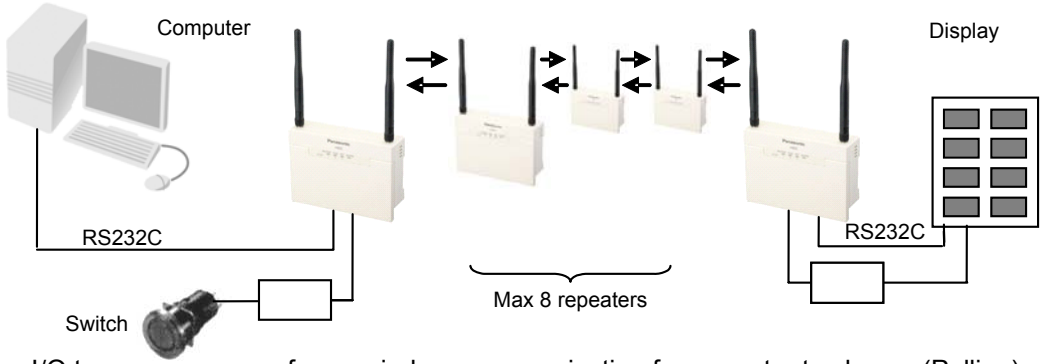

・For RS485 type, wireless communication is performed only when received data communication from the upper. (Event)

・In the setting tool, select from the below communication protocols.

| Communication protocol name in the setting tool | Contents |
|---|---|
| [DATA] 1:1 topology with repeaters | RS485 type For 1:1 topology with repeaters |

※Initial [DATA] shows that it is for RS485 type.

**■I/O type**




・For I/O type, it always performs wireless communication from master to slaves. (Polling)
Due to this, it outputs the communication error when wireless communication is cut off continuously. (Communication error is output after about 30 sec. with no communication.)
・For I/O type, input signal is communicated to output terminal of the same number of the connected slave.
(Example: Input for IN1 in master is output to OUT1 in terminal in slave, not to repeaters.)

・In the setting tool, select from the below communication protocols.

| Communication protocol name in the setting tool | Contents |
|---|---|
| [I/O]1:1 topology with repeaters | I/O type For 1:1 topology with repeaters |

※Initial [I/O] shows that it is for I/O type.

**Reference:** <9.2 Reference> About timeout period of master

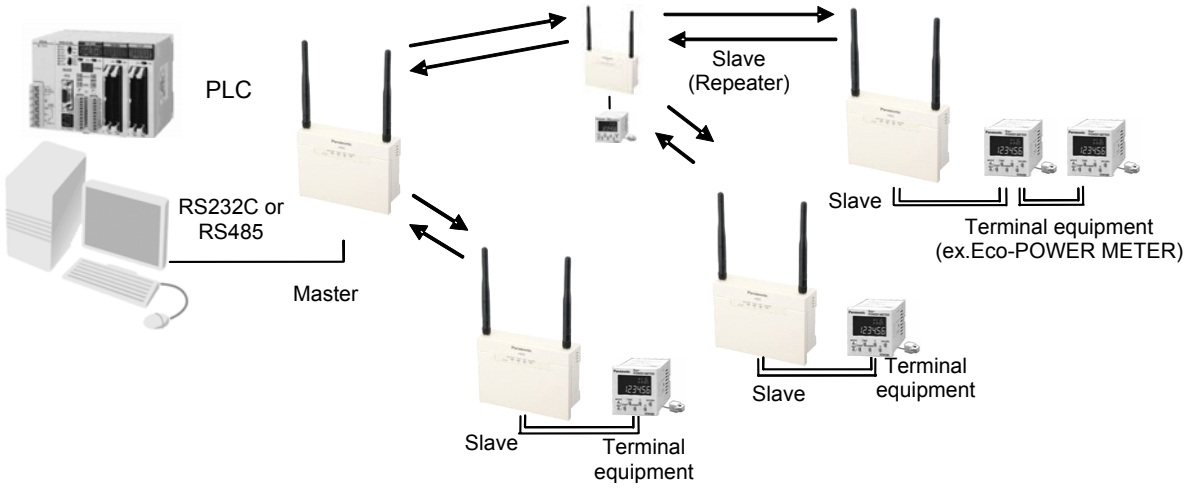
## 1:N topology

・It is the system with 1 unit of master and multiple units of slaves and repeaters. It is possible to connect the terminal equipment to the wireless units that are used as repeater.
・In serial communication, communication protocol (serial communication protocol) of connected equipment can be used only the prepared protocol.
・It is set by using setting tool.

**Note: When the repeater stages are increased, the communication time will be long. Consider about the response time.**

**Reference:** <1.3.1 Communication restrictions for wired side>

**■RS485 type**




・For RS485 type, wireless communication is performed only when receiving data communication from the upper. (Event)

・In the setting tool, select from the below communication protocols.

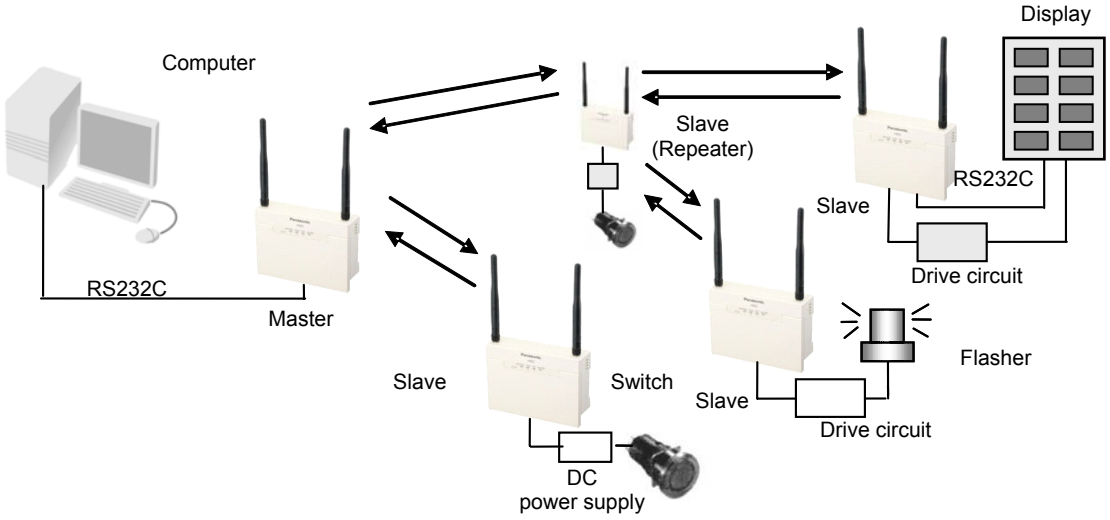
| Communication protocol name in the setting tool | Contents |
|---|---|
| [DATA]MEWTOCOL | RS485 type for our company's MEWTOCOL communication (1:N) |
| [DATA]MODBUS ASCII | RS485 type for MODBUS ASCII communication (1:N) |
| [DATA]MODBUS RTU | RS485 type for MODBUS RTU communication (1:N) |
| [DATA]GT Series Original | RS485 type for our company's GT programmable display general purpose communication (Dedicated protocol) |
| [DATA]Message Runner Original | RS485 type for our company's Message runner general purpose protocol communication (Dedicated protocol) |

※Initial [DATA] shows that it is for RS485 type.

**Note：In master setting of setting tool, select the communication protocol, but you can't use 1:N topology other than above protocols.**

**Reference：** <9.2 Reference> About timeout period of master

■**I/O type**




・For 1:N topology of I/O type, it is impossible to control I/O of slave by using I/O of master. Sending the commands from the computer or PLC that is connected in the upper level controls I/O of master and slaves. (Except [I/O] 1:N topology for report)

・For 1:N topology of I/O type, wireless units are located as same as the MEWTOCOL accepting equipment. Therefore when equipment for MEWTOCOL is connected to slave, it is necessary to change the unit number.

・For 1:N topology of I/O type, you can select either “Event” that perform the wireless communication when there is the data communication from upper level, or “Polling” that always perform the wireless communication in series from a master to slaves that is connected.

・For Event, even if the input signal is input from the upper level to the slave as long as information on the slave is not inquired, information is not transmitted. It is possible to communicate at the shortest time if communicate only when it is necessary. Please select this system if you use data communication mainly, and want to use the output signal possibly.

・For Polling, master has I/O information of all slaves, therefore, if you often use I/O communication than data communication, please select this system. But, it takes time to check the state of all slaves if there are a lot of slaves. For polling, it outputs communication error when wireless communication is cut off. (Communication error is output after about 3 times of polling time. But it is less than 30 sec., it outputs after 30 sec.)

・For 1:N topology for report function, basic performance is the Polling of 1:N topology, but it is the communication protocol that can reflect the input of slaves to the output of master, without connecting the computer or PLC in the upper level. And, the input to the master can be reflected to the output of the same number of all slaves. It is the most suitable function for trouble report or report reset application of equipment. In addition, it can’t perform I/O communication and data communication at the same time, please use only I/O communication.

・In the setting tool, select from the below communication protocols.

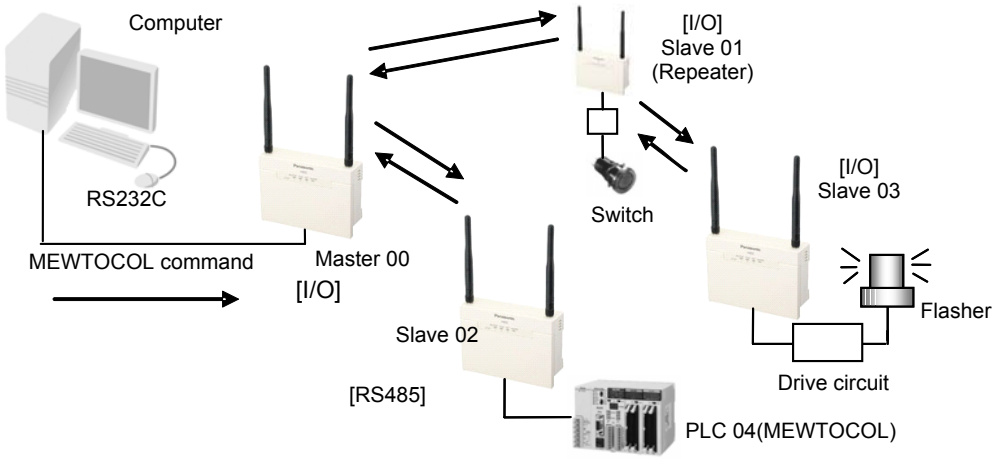
| Communication protocol name in the setting tool | Contents |
|---|---|
| [I/O]MEWTOCOL(Event) | I/O type for MEWTOCOL communication(1:N topology Event) |
| [I/O]MEWTOCOL(Polling) | I/O type for MEWTOCOL communication (1:N topology Polling) |
| [I/O]1:N topology for report | I/O type for 1:N topology for report (trouble report application) |

※Initial [I/O] shows that it is for I/O type.
※Supported MEWTOCOL-COM commands for I/O type are Read contact area (RC) and Write contact area (WC)

**Note: Communication protocol is selected by setting tool, but you can’t use 1:N topology other than above protocols.**

**Reference**: <9.2 Reference> About time out period of master
<5.7.4 MEWTOCOL communication example>
<5.8 “1:N topology for report” function with I/O type>

**■I/O type, RS485type mixed**




・It is impossible to control I/O of slave by I/O of master. By sending the commands from the computer or PLC that is connected in the upper level, it controls I/O of master and slaves.

・For 1:N topology of I/O type, wireless units are located as same as the equipment for MEWTOCOL. Therefore when the equipment for MEWTOCOL is connected to the slave, it is necessary to change the unit number.

・Even if the input signal is input from the upper level to the slave as long as information on the slave is not inquired, information is not transmitted.

・In the setting tool, select from the below communication protocols.

| Communication protocol name in the setting tool | Contents |
|---|---|
| [I/O]MEWTOCOL(Event) | I/O type for MEWTOCOL communication(1:N topology Event) It supports the mixture with RS485 type |

※Initial [I/O] shows that it is for I/O type.
※Supported MEWTOCOL-COM commands for I/O type are Read contact area (RC) and Write contact area (WC).

**Note**: **In master setting of setting tool, select communication protocol, but you can’t use 1:N topology other than above protocols.**

**Reference:** <9.2 Reference data> About timeout period of master
<5.7.5 MEWTOCOL communication example (I/O type, RS485 type mixed)>

# 1.2 Product constructions

### Main unit

| Model No. | Product name | Remarks |
|---|---|---|
| AKR2002 | KR20 WIRELESS UNIT RS485 type | RS232C and RS485 |
| AKR2015 | KR20 WIRELESS UNIT I/O type | 8 inputs, 8 outputs(NPN) and RS232C |
| AKR2045 | KR20 WIRELESS UNIT I/O type | 6 inputs, 6 outputs(PNP) and RS232C |

※Power supply cable (1m) using for the main unit is attached.
※Antenna is not attached, select from the options.

### Setting tool

| Model No. | Product name | Remarks |
|---|---|---|
| — | Configurator KR | Setting tool for<br>KR Wireless unit<br>Possible to download from<br>http://panasonic-electric-works.net/sunx/<br>Use Ver 1.20 or later for KR20. |

### Options

| Model No. | Product name | Remarks |
|---|---|---|
| AKR2802 | Standard Antenna | 2 pieces |
| AKR2803 | Antenna with cable | 2 pieces, cable length: 2m |
| AKR2804 | Antenna extension cable | Special order<br>2 pieces, cable length: 2m |
| AFPG805 | Power supply cable (for FPΣ) | 1 piece, cable length: 1m |

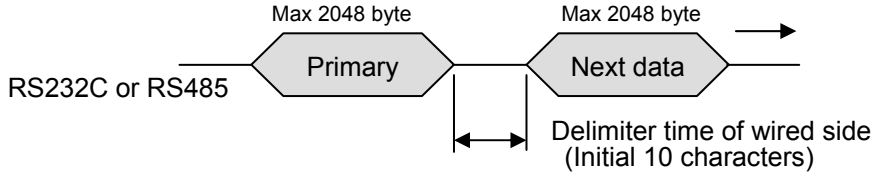
※2 pieces of antenna or antenna extension cable are necessary for 1 main unit.
※When an antenna extension cable is used, the communication distance will become short.
※For mounting an antenna with cable, a double-faced tape and a magnet are attached.

# 1.3 Restrictions

## 1.3.1 Communication restrictions for wired side

### Delimiter time of data by wired side

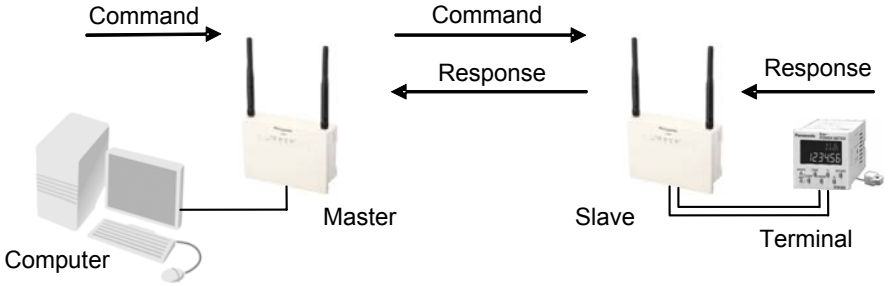
Wireless unit doesn't determine an end of wired data by control code such as "CR", and determine by a blank time.
At initial setting, if there is the blank time for 10 characters, it is determined as the end of wired data and wireless unit starts wireless communication. Therefore the data with blank more than the time will be interrupted. Moreover, if the blank time between primary data and next data is less than the time, two data are judged as one datum, and it is not likely to send correctly.




### Connecting direction of master and slave

### (1:1 topology with repeaters, 1:N topology)

Please let the master side as command sending side, and the slave side as response sending side because it is a communication procedure for requiring the command response. Cannot communicate in inverse combination. And cannot use in communication system that both master side and slave side sends the command.




### Sequences of command and response

When using sequence of sending successive command, make the sequence that it send the next command after receiving a response to the former command. When timeout period is set, it is necessary to consider wireless communication time. Wireless communication time may become long according to the surrounding communication environment, therefore there is a possibility that collision of command and response is occurred when it send the next command after a fixed time from the former command.

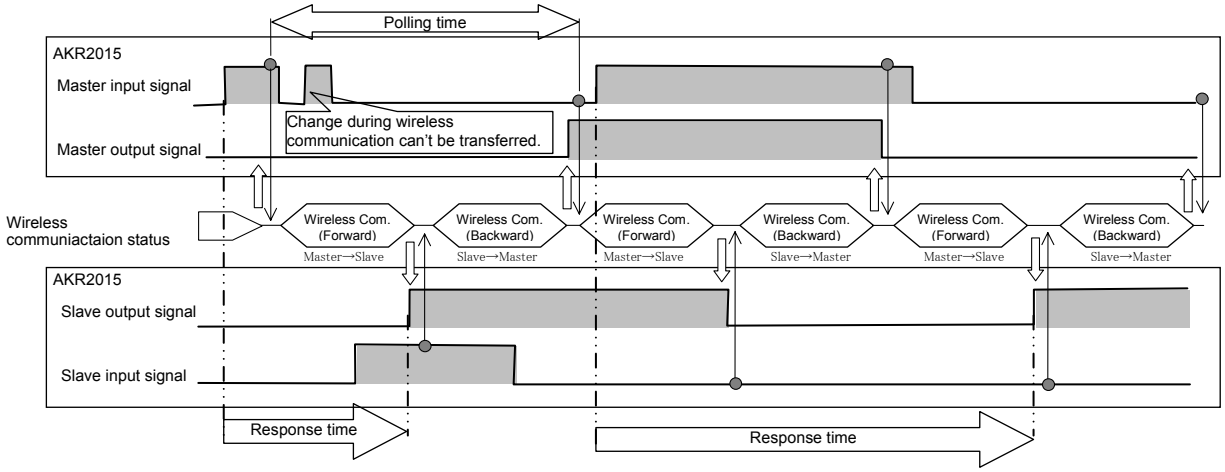
### Communication protocol for 1:N topology

| Communication protocol name | RS485 type | I/O type | Restrictions | Remarks |
|---|---|---|---|---|
| MEWTOCOL (Panasonic Electric Works Co., Ltd.) | Available | Available | ・Data that is sent at once don't exceed 2048byte<br>・It is possible to extend the timeout period | *1 |
| MODBUS ASCII | Available | — | | |
| MODBUS RTU | Available | — | | |
| GT Series Original (Panasonic Electric Works Co., Ltd.) | Available | — | | Cannot transfer the screen |
| Message Runner Original (Panasonic Electric Works Co., Ltd.) | Available | — | | Cannot transfer the screen |

*1:Now, it is not assured to operate by using PLC software.
*2:For other than the above communication protocol, please use as 1:1 topology or 1:1 topology with repeater.

### Input signal time

For 1:1 topology and 1:1 topology with repeater of I/O type, input signal and output signal are not always monitored, and only monitored when immediately before transmitting, and then communicate the information. Therefore, if the input signal is shorter than the polling time, it may not communicate to the output. To communicate reliably it is necessary to keep the input signal longer than the polling time.




*1 : Polling time is the time cycle that transmit continuously from master to the slave.
*2 : Response time is the time from the signal is input to the input terminal to the signal is output from the output terminal of other.

**Reference:** <9.2 Reference> I/O polling time

# 1.3.2 Functions Restrictions

### Setting functions

| Item | | | Main unit | Setting tool |
|---|---|---|---|---|
| Setting | Registering slave unit (Unit No. setting) | | Available | Available |
| | Deleting the registration of the slave | | Not available | Available |
| | Change of communication channel | | Available | Not available |
| | Serial communication condition | | Available | Not available |
| | Select of the communication style | 1:1 topology setting | Available | Available |
| | | 1:1 topology with repeater setting | Not available | Available |
| | | 1:N topology setting | Not available | Available |
| | Setting of the master unit (Unit No., Name, Communication protocol) | | Not available | Available |
| | Routing setting (Slave unit, Terminal equipment) | | Not available | Available |
| | Name setting of the slave unit and the terminal equipment | | Not available | Available |
| | Save the setting contents | | Not available | Available |
| | Initialize | | Available | Not available |
| | Flow control setting | | Not available | Available |

### Test function and Utility

| Item | | Main unit | Setting tool |
|---|---|---|---|
| Test function and utility | Confirmation of COM port connection | Not available | Available |
| | Confirmation of status | Not available | Available |
| | Communication test | Available ※1 | Available |
| | Field intensity monitor | Available ※2 | Available |
| | Read log | Not available | Available |
| | Remote reset | Not available | Available |

※1:Communication test is simple test by indicator LEDs.
※2:Field intensity monitor is simple monitoring by indicator LEDs.

# 1.4 Setting tool

## 1.4.1 What is setting tool?

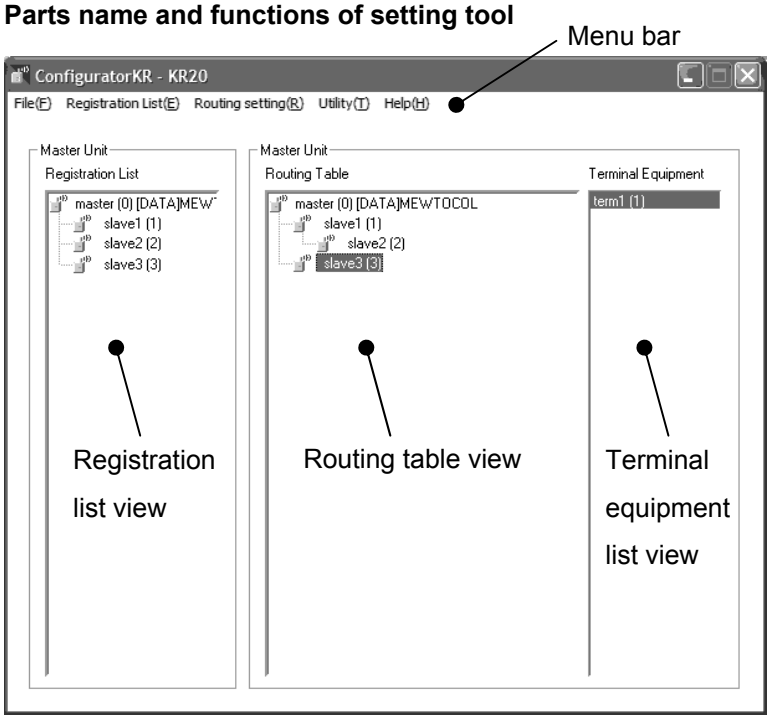
**Setting tool: Configurator KR**

Configurator KR is the operating setting tool for KR wireless unit. It is possible to do the routing setting of master and slave, various test that is convenient for installing, back up of master setting and so on.

It is possible to download from our company's web site (http://panasonic-electric-works.net/sunx/).

In KR20, please use Ver1.20 or later.

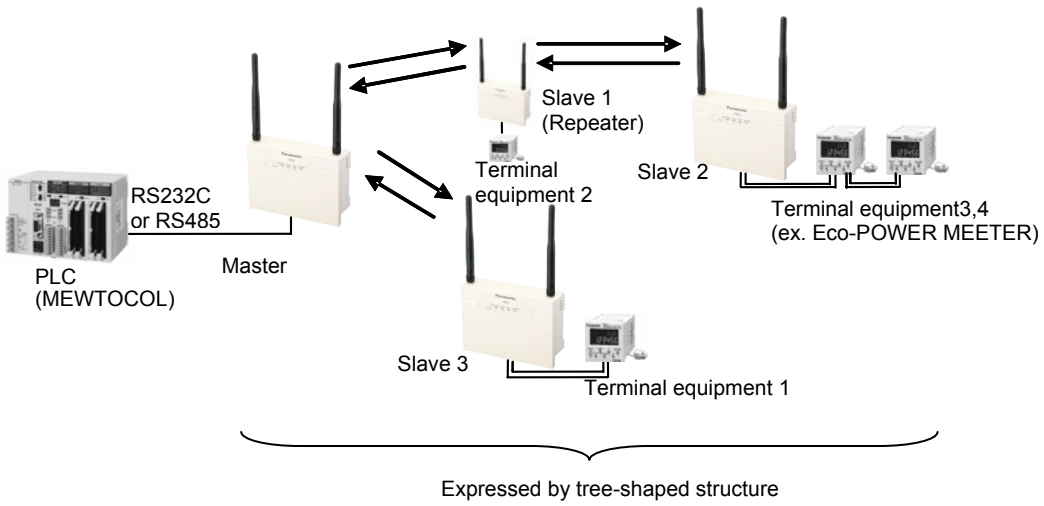
**Parts name and functions of setting tool**




**[Routing setting]**

Routing setting that is set by setting tool is setting the route of data communication from master to slave, from slave to terminal equipment when doing wireless communication. In setting tool, the locations of wireless units and terminal equipment are expressed by tree-shaped structure.

State of routing table view and terminal equipment list view of setting tool display above indicates the following location figure. (Terminal equipment list view indicate that terminal equipment1 is connected to slave3)



**Registration list view**
Slave list that is registered to master is indicated. To indicate the list, execute “Transfer From Main Unit”

**Routing table view**
Route from master to slave is indicated by tree-shaped structure. Name and Unit No. (number in grouping symbol) are indicated in addition.
The left side of tree is upper level (the top level is master), the right side is lower level. And mid-slave transfers the data to slave of right side by using repeater function. (In example, slave1 transfers data to slave2)

**Terminal equipment list view**
Terminal equipment that is connected to slave is indicated. By clicking slave in routing table view, terminal equipment that is connected to the slave appears. (In example, slave3 is clicked)

# 1.4.2 System requirements

| | |
|---|---|
| **Software name** | Configurator KR |
| **OS** | Windows®2000 / Windows®XP / Windows®Vista |
| **Available hard disk space** | More than 5MB |
| **Recommended CPU** | Pentium 300MHz or more |
| **Recommended system RAM** | More than 128MB (According to OS) |
| **Recommended screen resolution** | 800 x 600 or more |
| **Recommended color quality** | High Color (16bit) or more |

# 1.4.3 Applicable cable

### Type of computer and applicable cable (RS232C cable)

| Type of computer | Connector of computer side | Connector of wireless unit side | Specification | Recital |
|---|---|---|---|---|
| DOS/V | DSUB 9-pin female | DSUB 9-pin female | straight type | Purchase commercial item.<br>Popular name :<br>For DOS/V RS232C cable straight 9 pin type * |

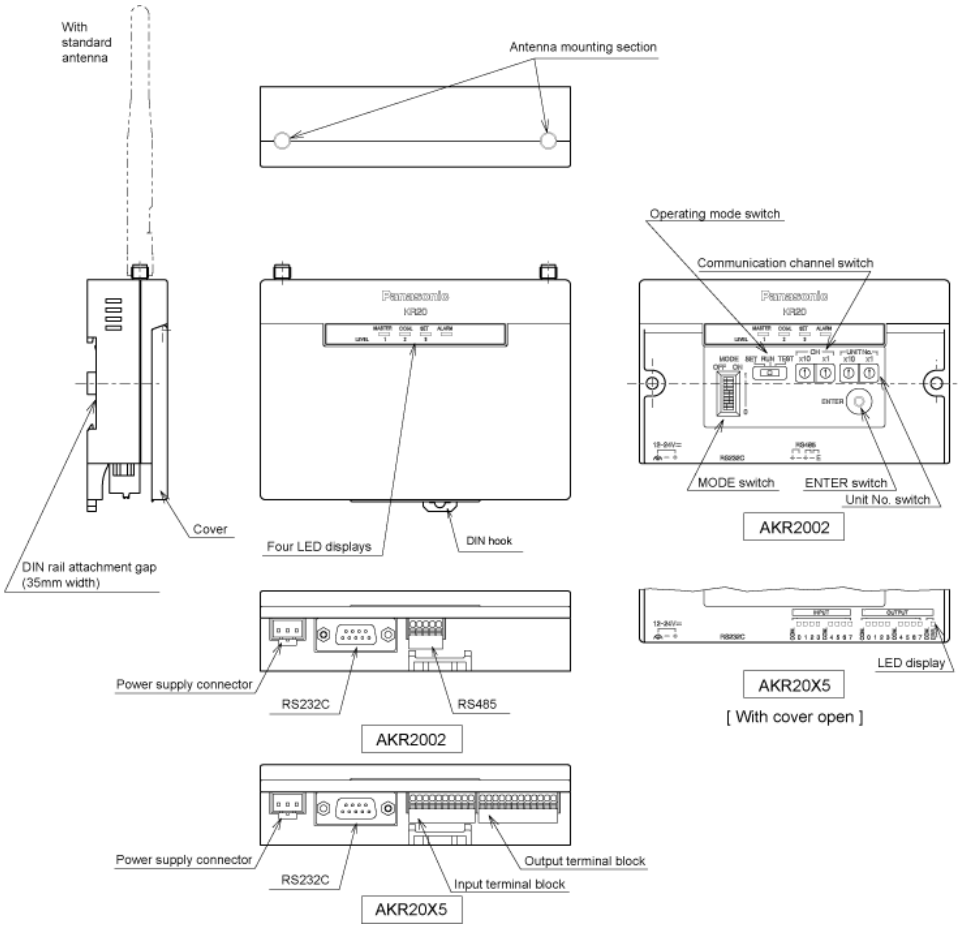
Note1) It is impossible to use setting tool via RS485 port of wireless unit.
Note2) It is recommended to use shielded cable.
Note3) To connect wireless unit to computer that has no serial port, USB/RS232C converter is needed besides above cable.
* When using DSUB 9-pin female-female straight cable, connect computer and main unit directly. If using male-female straight cable, use attached gender changer in main unit.

# Chapter 2

# Parts Name and Functions

# 2.1 Parts name and functions

## ■ RS485 type, I/O type




**Antenna mounting section**

Antenna to send/receive by wireless is mounted here. Please connect the 2 antennas (standard antennas or antennas with cable) not to loosen the both, and adjust them angling with the good radio waves condition. Enough communication performance cannot be exerted by only 1 antenna. If the antenna with cable is used, install them in good radio waves condition with same direction and separate them as much as possible. (By separating them greater than or equal to 30cm, communication condition becomes better.)

**Cover**

After setting of inside switches, make sure to close cover to prevent from entering dust.

**Power supply connector**

Use the attached power supply cable.

**RS232C connector (DSUB 9-pin)**

Use this when communicate with RS232C equipment or using setting tool.

**Reference:** <2.2 Wiring>

**RS485 terminal block (Terminal block 5-pin)**

Use this when communicating with RS485 equipment

**Reference:** <2.2 Wiring>

**Input terminal block (Terminal block 10-pin)**
For communication of input signal

**Reference:** <2.2 Wiring>

**Output terminal block (Terminal block 12-pin)**
For communication of output signal

**Reference:** <2.2 Wiring>

**Switches (operating mode switch, communication channel switch, Unit No. switch, MODE, ENTER)**
For setting of main unit

**Reference:** <2.3 Switches>

**Indicator LEDs**
The state of the main unit is indicated. For I/O type, the state of input/output is indicated.

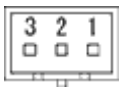
**Reference:** <2.4 Indicator LEDs>

# 2.2 Wiring

## 2.2.1 Power supply connector

Power supply connector　3-pin terminal layouts

| Pin No. | Signal name | Line color |
|---|---|---|
| 1 | 12-24V DC | Brown |
| 2 | GND | Blue |
| 3 | FG | Green |



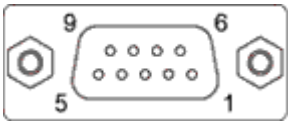

・Use the attached power supply cable.
・If you need the power supply cable for repairs, please purchase “Power supply cable for FPΣ (AFPG805)”.
・Make power supply on/off by taking out and putting in the connector.

## 2.2.2 RS232C connector

■Interface specifications

DSUB 9-pin terminal layouts

| Pin No. | Signal name | Input/Output |
|---|---|---|
| 1 | - | - |
| 2 | RD | Output |
| 3 | SD | Input |
| 4 | - | - |
| 5 | SG | Signal GND |
| 6 | - | - |
| 7 | RS | Input |
| 8 | CS | Output |
| 9 | - | No connection |




1,4 and 6 are connected internally.

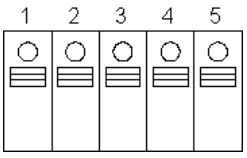
・In case without flow control, use DSUB 9 pin female-female straight cable to connect to the computer.　If using male-female straight cable, use attached gender changer in main unit. (when using setting tool etc.)
・In case with flow control or connection with other equipment, refer to chapter 10.

**Reference:** <1.4.3 Applicable cable> <Chapter 10 Dimensions/Connection drawings>

## 2.2.3 RS485 terminal block (only AKR2002)

Terminal block 5 pin terminal layouts

| Pin No. | Signal name | input/output |
|---|---|---|
| 1 | + | RS485 (+) |
| 2 | - | RS485 (-) |
| 3 | + | RS485 (+) |
| 4 | - | RS485 (-) |
| 5 | E | |




・1 and 3, 2 and 4 are connected internally.
・Shielded twisted-pair cable (connectable range: AWG26-20, cross-section area: 0.14-0.5mm$^2$) is recommended. (stripped wire length is 9mm)
・When using the shielded cable, the grounding connection should have a resistance of less than 100 ohms, and grounded one end.
・Connect between each unit by extending wiring in the transmission line. Cannot use branch connection.
・At terminal unit, “E” terminal (No.5) should be shorted with “–“ terminal (No.4). (Terminator connection)

**Notes：1.In serial communication, it is impossible to use RS232C and RS485 at the same time.**

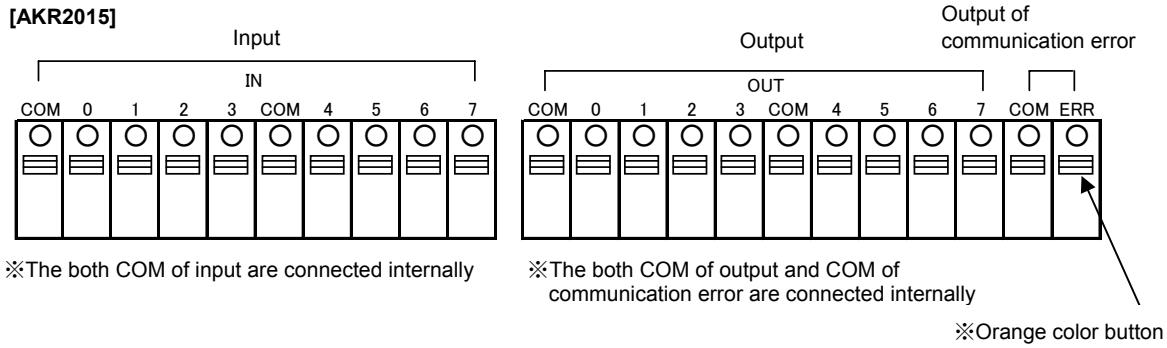
**2.Be careful not to add static electricity to the metallic part of signal terminal. Especially, do not touch signal terminal when connecting wires.**

# 2.2.4 I/O terminal block (only AKR20X5)

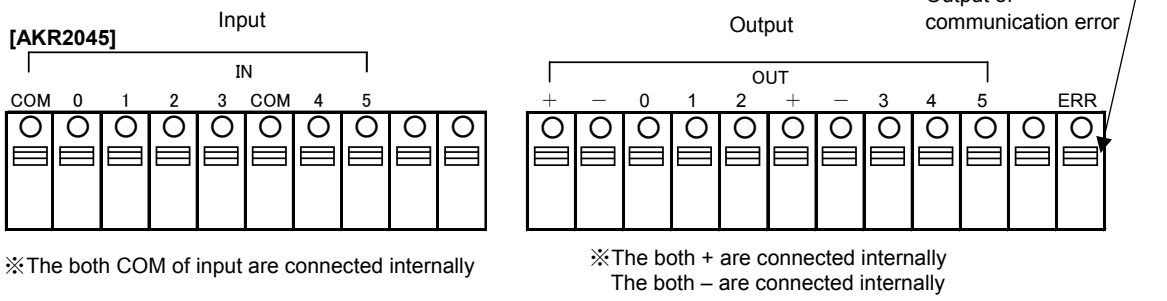
Terminal block10,12 pin terminal layouts

**Input terminal block / Output terminal block**

**[AKR2015]**




**[AKR2045]**




・Shielded cable (connectable range:AWG26-20, cross-section area:0.14-0.5mm$^2$) is recommended. Select the diameter that there is margin in the current capacity. (stripped wire length is 9mm)

・When using shielded cable, the grounding connection should have a resistance of less than 100 ohms, and grounded one end.

・Connect the wire with pushing the orange color button.

● About output of communication error

・In communication style that always perform wireless communication (1:1 topology, 1:1 topology with repeaters, 1:N topology polling, 1:N topology for report), it outputs the communication error when wireless communication is cut off continuously.

・Output of communication error and ALARM indication are lighted up at the same time.

・Output of communication error and ALARM indication are turned of the light if wireless communication is restarted correctly.

・When output of communication error is output, it is possible to select by MODE switch either “Turn off output signal (OUT0-7 or OUT0-5) coercively” or ”Keep state of output that before communication error is output”

**Reference:** <2.3 Switches> MODE switch

・Timing that communication error is output is indicated in below list.

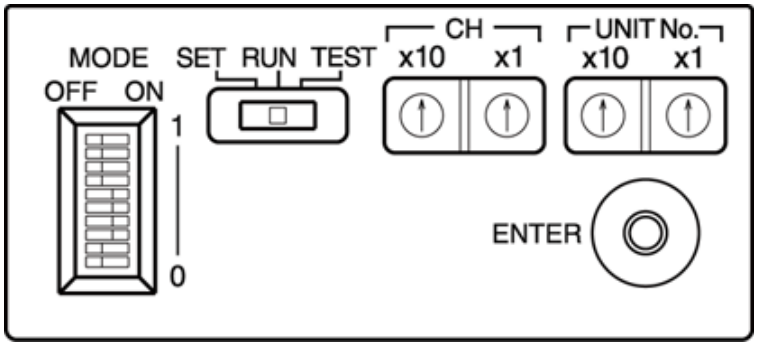
| Communication style | Timing that communication error is output (Time after wireless communication stopped) |
|---|---|
| 1:1topology | 30 sec. with no communication |
| 1:1 topology with repeaters | 30 sec. with no communication |
| 1:N topology (Polling) | More than 3 times of polling time with no communication (30 sec. if 3 times of the time is less or equal to 30 sec.) |
| 1:N topology (Event) | No output of communication error |

※Polling: Master unit performs wireless communication with slave unit automatically in series. (Polling time is time that master unit communicate to all slave units)

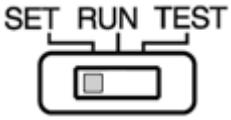
Event: It performs wireless communication only when upper level of master unit sends command.

 **Reference:** <9.1 Specifications> Input specification, Output specification, Circuit diagram

# 2.3 Switches



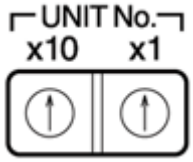

### Operating mode switch




| Setting position of switch | Function |
|---|---|
| SET | During registering slave unit, Initializing, using setting tool |
| RUN | During operating, using setting tool (partically reined) |
| TEST | During using communication test, field intensity monitor by main unit |

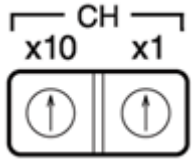
Change of operating mode switch becomes effective soon.
It is possible to use in RUN mode with setting tool, software version 1.20 or later.

### Unit No. switch




Set Unit No. of wireless unit. Change it by precision slotted screwdriver carefully.
Set first digit “x1”, and second digit “x10”.
Set Unit No. of master unit “00”, slave unit “00-99”

### Communication channel switch




Change communication channel (00-F5). Change it by precision slotted screwdriver carefully. It is possible to select 89 group of group channel in addition to 76ch (00-4B) of fixed channel.
Group channel has function that connectable channel is selected automatically from multiple fixed channels. When using repeater, use fixed channel.
When using group channel, channel in the same communication area is lessened and communication time becomes long.
Refer to specifications about usable frequency.

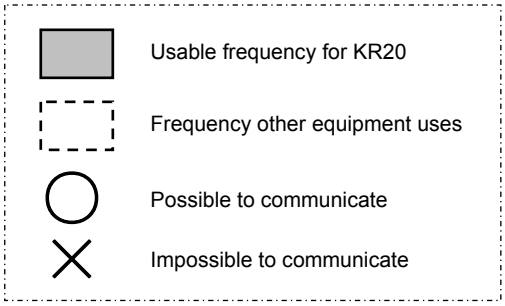
**Reference**: <9.1 Specifications>

**Refer to following example about group channel.**

Following example is supposed that in case of other equipment uses the same frequency, as this product's after this product is installed and running.

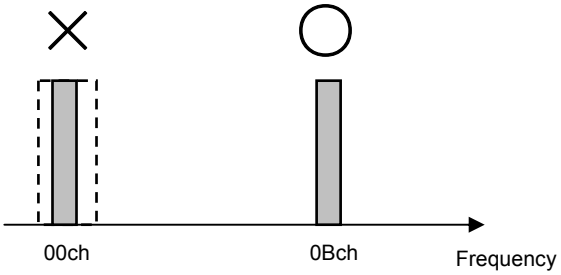
Use this after confirming the vacancy channels by main unit or field intensity monitor in setting tool.

1. [When using fixed channel 00ch]

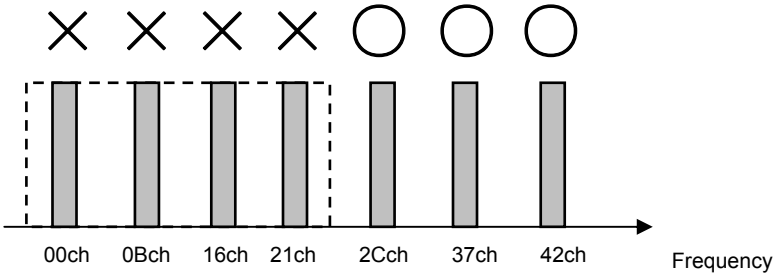

In case of using fixed channel 00ch, if other equipment uses the same frequency as 00ch, 00ch is blocked and it might not be able to communicate.

2. [When using group channel 60ch]




In case of using group channel 60ch (00ch, 0Bch:fixed channel), if other equipment uses the same frequency as 00ch, 00 ch is blocked but it automatically selects 0Bch that is in good radio condition, and possible to communicate.

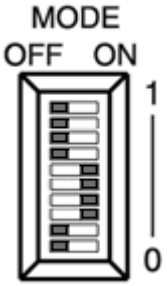
3. [When using group channel E0ch]




In case of using group channel E0ch (above 00-42ch:fixed channel), if other equipment uses the same frequency as 00 to 21ch, 00 to 21 ch are blocked but it automatically selects frequency from 2C-42ch that is in good radio condition, and possible to communicate.
In place where wireless LAN is used, approx 20 channels are blocked as ex.3, but it is possible to communicate without interference by using group channel.

As showed in above example, it is possible to avoid interference by using group channel because it can connect if there is only 1 channel in good radio condition. When using group channel, it searches the vacancy channel and then starts communication. So it takes time to change channels and communication time becomes longer. The communication time becomes long increasing of the channels: fixed channel -> 2ch group -> 3ch group ->… -> 11ch group.

## MODE switch




Setting of 1:N topology is Available/Not available, Change of RS232C or RS485, Data holding Available/Not available, Setting of communication conditions are set.
Change it by precision slotted screwdriver carefully.

| SW No. | Function | | ON/ OFF | Contents |
|---|---|---|---|---|
| 1 | Setting of 1:N topology by setting tool Available/Not available | | OFF | Not available (1:1 topology) |
| | | | ON | Available (1:1 topology with repeaters and 1:N topology) |
| 2 | RS485 type | Select of serial communication | OFF | RS232C |
| | | | ON | RS485 |
| | I/O type | Data holding | OFF | Not available (Turn off output when communication error occurs) |
| | | | ON | Available (Hold output when communication error occurs) |
| 3 | Transmission speed | | - | 1200bit/s 2400bit/s 4800bit/s 9600bit/s<br>19200bit/s 38400bit/s 57600bit/s 115200bit/s |
| 4 | | | | |
| 5 | | | | |
| 6 | Data Length | | OFF | 7bit |
| | | | ON | 8bit |
| 7 | Parity | | OFF | No parity |
| | | | ON | Available |
| 8 | Parity Odd/Even | | OFF | Even |
| | | | ON | Odd |
| 9 | Function | | OFF | Function not available (generally) |
| | | | ON | Function available |
| 0 | Permission of registration overwriting | | OFF | Not available of registration overwriting |
| | | | ON | Permission of registration overwriting |

※Stop bit is fixed with 1 bit.

Factory setting
■RS485 type

| 1:N topology setting by setting tool | Selection of serial communication | Transmission speed | Data length | Parity | Function | Registration overwriting |
|---|---|---|---|---|---|---|
| Not available | RS232C | 19200bit/s | 8bit | Odd | Not available | Not available |

※Stop bit is fixed with 1 bit.

■I/O type

| 1:N topology setting by setting tool | Data holding | Transmission speed | Data length | Parity | Function | Registration overwriting |
|---|---|---|---|---|---|---|
| Not available | Not available | 19200bit/s | 8bit | Odd | Not available | Not available |

※Stop bit is fixed with 1 bit.

**Notes: 1. To make settings of each switch available, it is necessary to turn on power supply again, or to change the operation mode switch.**

**2. For data holding function of I/O type, when output of communication error is output, it is possible to select "Turn off output signal (OUT0-7 or OUT0-5) coercively" or "Keep state of output that before communication error is output"**

| Communication style | Timing that communication error is output (Time after wireless communication stopped) |
|---|---|
| 1:1 topology | 30 sec. with no communication |
| 1:1 topology with repeaters | 30 sec. with no communication |
| 1:N topology (Polling) | More than 3 times of polling time with no communication (30 sec. if 3 times of the time is less or equal to 30 sec.) |

※Polling: Master unit performs wireless communication with slave unit automatically in series. (Polling time is time that master unit communicate to all slave units)

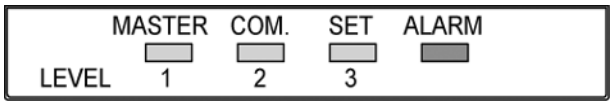
※Event: It performs wireless communication only when upper level of master unit sends command.

## ENTER switch


It functions as inputting the setting of each function.

# 2.4 Indicator LEDs

## ■Status LED




### MASTER
・It lights up if unit is master unit. For slave unit, it is always turned off.

### COM.
・It lights up when turns power supply on.
・It blinks when it is performing serial communication and wireless communication, it means that it is communicating.

### SET
・When operating mode switch is in SET mode, it means that it is performing registration of slave unit or initialization.
・It blinks when it is performing registration of slave unit and initialization, if complete them it changes from blinking to lighting.

### ALARM
・It puts the light off when it is operating normally.
・It blinks when urging attention, and it lights up when error occurred.

**Note: When operating mode is in TEST mode, <MASTER>, <COM.>, <SET> are functioned as LEVEL indication (1, 2, 3).**

**Basic indicator LEDs**

| State \ LED | MASTER (1) | COM. (2) | SET (3) | ALARM |
|---|---|---|---|---|
| Extinction | Slave unit | Not energization | - | Normal |
| Blink | - | Communicating | Setting *1 | Alarm*2 |
| Lights up | Master unit | Energization | Setup completed*1 | Error |

*1:When registrating slave unit and initialize, operating mode is in SET mode.
*2:It blinks when operating mode is in SET mode and MODE switch No.9 is ON. (Alarm for initialization)

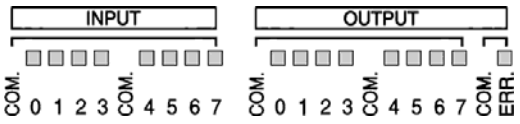
**Indicator LEDs for test mode**

| State \ LED | MASTER (1) | COM. (2) | SET (3) | ALARM |
|---|---|---|---|---|
| Extinction | 1 Blink:Field intensity (intensity of radio wave)is low<br>1,2 Blink: Field intensity (intensity of radio wave)is mid<br>1,2,3 Blink: Field intensity (intensity of radio wave) is high | | | Communication test |
| Blink | | | | Field intensity monitor |
| Lights up | | | | Error |

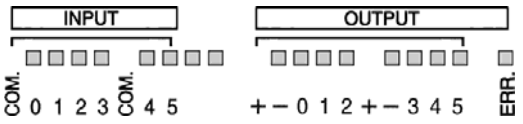
*When operating communication test, blinking 1,2,3 is good condition. (Radio wave level is high)
When operating field intensity monitor, blinking only ALARM, or 1 is good condition (No radio wave in surrounding)

## ■I/O terminal block LED (only I/O type)

[AKR2015]



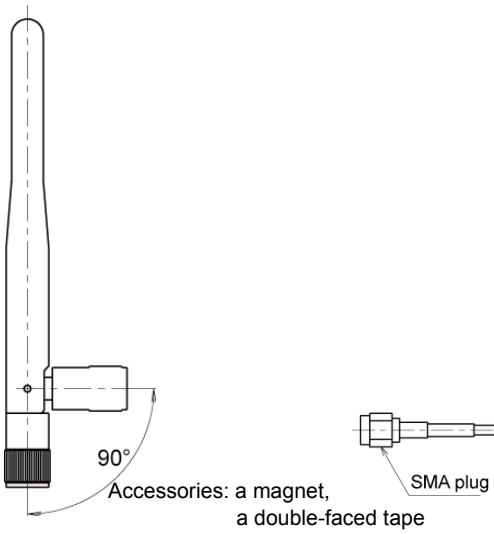

[AKR2045]



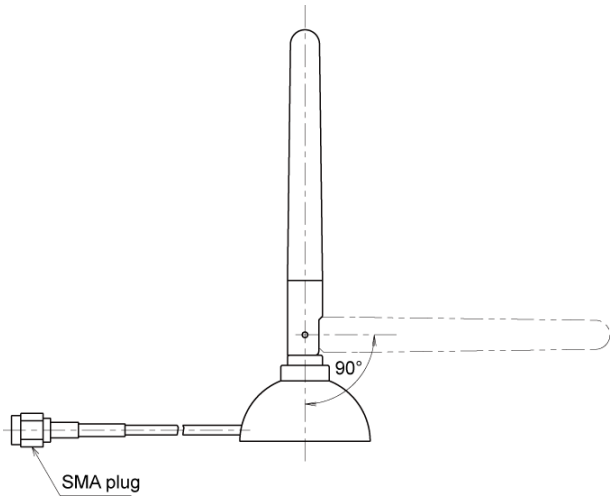
# 2.5 Antenna

## ■Usable antenna

| Part No. | Product name | Remarks |
|---|---|---|
| AKR2802 | Standard Antenna | 2 pieces |
| AKR2803 | Antenna with cable | 2 pieces, cable length: 2m |




AKR2802




AKR2803

## ■Cautions for connection to main unit

- When connecting antenna mounting section, grasp the connector of the antenna, and connect it surely.
- To bring out communication performance, connect 2 antennas necessarily.

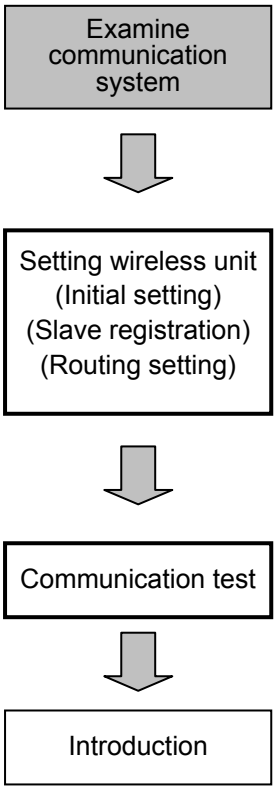
## ■Cautions for installing antennas

- Connect 2 antennas necessarily, and install it vertically against ground.
- When installing antennas, separate them from metallic plate. If install antennas in metallic operator control panel, wireless performance is degraded. When install in metallic operator control panel, use antennas with cable necessarily, and install them outside of operator control panel.
- To fix antennas with cable, use double-faced tape or magnet. But the other side should be metallic plate for magnet.
- When using antennas with cable and antenna extension cables, adjust bending radius of cable to 50mm or more. And do not bend the vicinity of the connector root (about 40mm).
- Standard antenna and antenna with cable are indoor type. When use in outdoor, give waterproof measures as putting in a plastic case etc.
- It is possible to bend about 90 degrees at the top of antenna. Adjust the angle according to radio wave condition.
- When use antennas with cable, install them in good radio waves condition with same direction and separate them as much as possible. (By separating them greater than or equal to 30cm, communication condition becomes better.)
- Install antennas of different group 2m or more apart. They influence each other, and communication error might increase.
- When using antenna extension cable, radio wave is attenuated. By using 1 antenna extension cable, communication distance shortens by about 30%. Therefore, operate it after completing confirming beforehand. By using them in both master unit and slave unit, the distance becomes half.

# Chapter 3

# Initial Settings

# 3.1 Flow to introduce

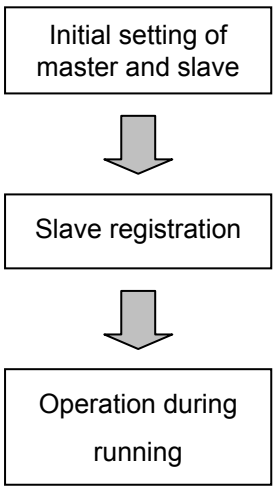



Examine about communication system such as communication style (1:1 topology, 1:1 topology with repeaters, 1:N topology), number of connected equipment, layout and so on.
Consider the communication data amount, response time and mounting conditions at the same time.

According the examined result, set wireless units to be required. (Read chapter 3 to chapter 5.)
When introducing 1:1 topology, it's set by only the main unit.
When introducing 1:1 topology with repeaters or 1:N topology, it's set by using setting tool.

After completing all settings, proceeds the communication test by using each test functions in setting tool. (Read chapter 6.)
If the communication test is good, proceed test operation with the actual equipment.

## 3.1.1 Flow to introduce "1:1 topology"




Set Unit No., communication channel and MODE switches.
For 1:1 topology, No.1 of MODE switch should be set to OFF.

**Reference:** <3.2 Initial Setting of Wireless unit>

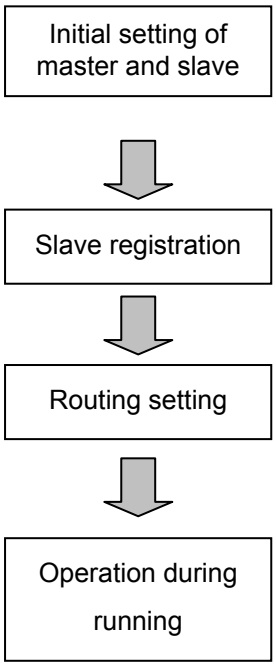
Register slave at the master. Slave's Unit No. should be registered as "01". When operating mode switch is set to RUN, it can communicate.

**Reference:** <Chapter 4 Register Slave>

Set as the actual running conditions.

**Reference:** <5.2 Setting and operation of "1:1 topology">

## 3.1.2 Flow to Introduce “1:1 topology with repeaters”




Set Unit No., communication channel and MODE switches.
With 1:1 topology with repeaters, MODE switch No.1 should be set to ON.

**Reference:** <3.2 Initial setting of wireless unit>

Register slave at the master. All slaves’ registration is necessary.

**Reference:** <4. Register slave>

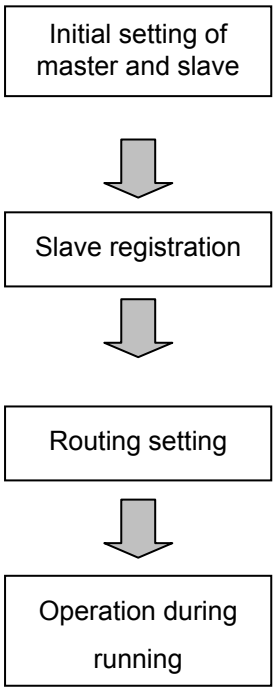
Set master setup and set routing setting of slaves and terminal equipment. Configurator KR (setting tool) is necessary to set.

**Reference:** <5.3.2 Routing setting>

Set as the actual running conditions.

**Reference:** <5.3.3 Operation during running>

## 3.1.3 Flow to introduce “1:N topology”




Set Unit No., communication channel and MODE switches.
With 1:N topology, MODE switch No.1 should be set to ON.

**Reference:** <3.2 Initial setting of wireless unit>

Register slave at the master. All slaves’ registration is necessary.

**Reference:** <4. Register slave>

Set master setup and set routing setting of slaves and terminal equipment. Configurator KR (setting tool) is necessary to set.

**Reference:** <5.4.2 Routing setting>

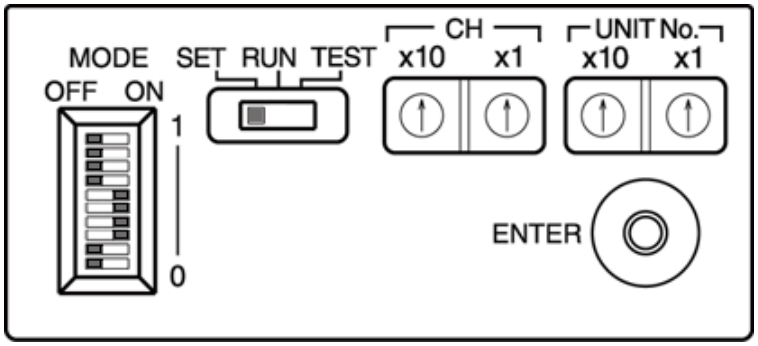
Set as the actual running conditions.

**Reference:** <5.4.3 Operation during running>

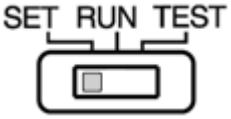
# 3.2 Initial setting of wireless unit

This is the explanation about the setting of the main unit of wireless unit.

**Factory setting is as below figures.**




## 3.2.1 Setting of operating mode




※At factory setting, it's set to "SET"

When setting by the main unit, it should be set to "SET".
When transferring setting such as "transfer to main unit" and so on by using setting tool, be sure to set to "SET".
Other items such as "transfer from main unit", "communication test" are available in RUN mode. (Available with software version 1.20 or later.)

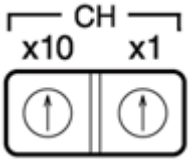
**Usage restriction in RUN mode**

| Item | | Usage availability |
|---|---|---|
| File | Transfer to Master Unit | Not available |
| | Transfer from Main Unit | Available |
| Registration list | Addition (Addition of slave registration) | Not available |
| | Delete (Delete slave registration) | Not available |
| Utility | Confirmation of COM port connection | Available |
| | Confirmation of status | Available |
| | Communication test | Available |
| | Field intensity monitor | Available |
| | Read log | Available |
| | Initialize Log | Not available |
| | Remote reset | Available |
| | Flow control setting | Not available |

*It is not available with software version 1.20 or less.
*Use it in SET mode for "Not available".

**Note: When setting, all wireless unit, master and slave, should be set to "SET".**
**After completing setting, set to "RUN" to start operation.**
**When using test functions, set to "TEST".**

## 3.2.2 Setting of communication channel

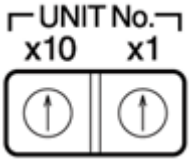



※At factory setting, it's set to "00".

Select the communication channel from "00～F5".
Adding to the fixed channel, 76ch(00～4B), 89 group channel can be selected.
Group channel is the function that it selects connectable channel from several fixed channels automatically. When using repeater function, use with the fixed channels.
When using group channel, settable channel numbers are decreased in the same communication area and the communication time is longer.
Master, slaves, repeaters in the same wireless system should be set to the same channel.
Setting of communication channel will be available when turning power on again or changing operating mode switch.

**Note: When using several channels in the same communication area, check there are no influences each other. It differs from the mounting conditions; max 15 channels are used as a standard. Do not use adjoining channels and use channel that separates 5 or more (recommended).**

## 3.2.3 Setting of Unit No. (Master, Slave)

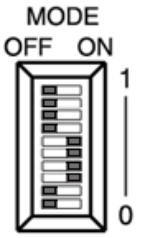



※At factory setting, it's set to "00".

Set Unit No. for master to "00", for slaves and repeaters to "01～99".
With 1:1 topology, be sure to set it for slave to "01". If not, it cannot communicate.

**Note: Within the same wireless system (same master), do not set the same Unit No. for several slaves. In addition, there is the function to prevent double registration for slave. (Slave double registration) Refer to <4. Register slave> in detail.**

## 3.2.4 Setting of MODE switches




※At factory setting, it's set as left figures.

Set the setting of available/not available by 1:N topology setup, switch RS232C/RS485, Available/Not available of data holding, communication conditions.

・When setting of 1:1 topology, you can use as same as the setting during operation.
・When setting of 1:1 topology with repeaters or 1:N topology, select RS232C for serial communication selection. It is required to use setting tool.

| SW No. | Functions | | ON/OFF | Description | During setting | During operation |
|---|---|---|---|---|---|---|
| 1 | 1:N topology setup Available/Not available by setting tool | | OFF | Not available (1:1 topology) | Setting during operation | |
| | | | ON | Available (1:1 topology with repeaters and 1:N topology) | | |
| 2 | RS485 type | Serial communication selection | OFF | RS232C | RS232C | Setting during operation |
| | | | ON | RS485 | | |
| | I/O type | Data holding | OFF | Not available (OFF output when communication error) | Setting during operation | |
| | | | ON | Available (Hold output when communication error) | | |
| 3 | Transmission speed | | - | 1200bit/s 2400bit/s 4800bit/s 9600bit/s<br>19200bit/s 38400bit/s 57600bit/s 115200bit/s | Setting during operation | |
| 4 | | | | | | |
| 5 | | | | | | |
| 6 | Data length | | OFF | 7 bit | | |
| | | | ON | 8 bit | | |
| 7 | Parity | | OFF | Not available | | |
| | | | ON | Available | | |
| 8 | Parity Odd/Even | | OFF | Even | | |
| | | | ON | Odd | | |
| 9 | Function | | OFF | Function not available (normal) | Initializing slave registration | OFF |
| | | | ON | Function available | | |
| 0 | Permission of registration overwriting | | OFF | Not available of registration overwriting | | |
| | | | ON | Permission of registration overwriting | | |

**Note: When initializing or overwriting, set the function and overwrite registration permission. Refer to <4. Register slave> in detail.**

**When starting operation, switch the switches using at setting to the settings during operation. Especially at serial communication selection, note that when using RS485 during operation.**

## 3.2.5 Setting of serial communication conditions

According to <3.2.4 Setting of MODE switches>,
Set switches No.3 to 8 according to serial communication conditions of connected equipment.

**Note: If communication conditions of connected equipment are except the above, it can't communicate with it. When using setting tool, communication conditions of main unit and computer are changed automatically, therefore keeping settings of operation is no problem.**

# 3.3 Install setting tool software

Install the setting tool software (Configurator KR) (You need to register at our members.)

**How to install**

1.Open **http://panasonic-electric-works.net/sunx/**
**[FA Equipment] -> [FA Components] -> [Communication Devices]**
**-> [KR20 Wireless unit]**
Click **[Software]** on tab.

2.Click **[Download]** at [How to install]

[Data download] window is appeared, input ID and Password and click [Download]

Note) If you have not registered yet, register at our members (free of charge).

Save exe file to computer and start installing.
During installing, there are no special procedures. Install it according to the instructions.

Note) In order to connect computer, installed this software, and wireless unit, connection cable is needed. Prepare cables according to the using environment.

 **Reference:** <1.4 setting tool>

# 3.4 Start wireless unit

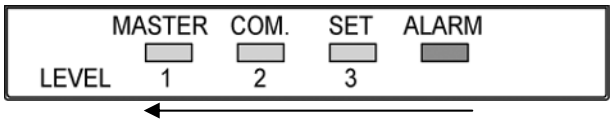
### Before turning power supply on

Please check and confirm the below before turning power supply on.
1. Wiring is correct and it's connected surely
2. Power supply is supplied within the range of allowable voltage

**Reference:** For wiring <2.2 Wiring>
For power supply voltage <9. Specifications>
For handling when wiring, power supply <7. Cautions for Mounting>

## 3.4.1 Power supply ON/OFF

Main unit doesn't have power switch. Switch ON or OFF by connecting DC power supply side.
When turning power supply on, LED lights on as flowing from right to left.




LED lights on as flowing from right to left.

**■Operating mode switch**

Turn power supply on with "SET" for setting, with "RUN" for starting operation, with "TEST" for using main unit's test functions.

# Chapter 4

# Register Slave

# 4.1 Register slave

## 4.1.1 Register slave

In order to communicate master and slave, master recognizes slaves by registering slave to the master. This process is necessary for all communication style, 1:1 topology, 1:1 topology with repeaters, 1:N topology.
According to the procedures in this chapter, register slaves at the master.

At registration, slave is registered to master one by one by using only main unit or slaves are registered by using the setting tool (Configurator KR).
Max. 99 slaves can be registered to one master.

**Notes: 1. Do not register slave that is registered, to another master. (Master double registration) It might cause malfunctions.**

**2. "Be sure to register slave on the table before mounting." You need to confirm LEDs of both master and slave.**

**3. Slave can't be registered via repeaters.**

**4. During slave registration by main unit, do not execute serial communication nor I/O communication. It can't register correctly.**

**5. Numbers of registration slave and Unit No. should be set as same as routing setting.**

**Reference:** < Help in setting tool (Configurator KR) >

## 4.1.2 Prepare master and slave

Prepare all using wireless unit, master, slaves, and repeaters on the table.

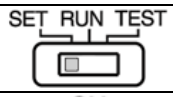
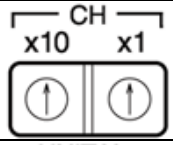
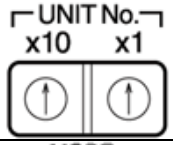
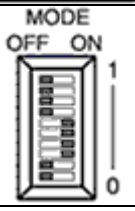
**Note: When you use used wireless unit as another master or slave, initialize it once before using. If software version is different each other, communication might not work well. Check the version by setting tool. If it is different, please consult us.**

**Reference:** <5.9 Initialization>
<6.3.2 Confirmation of COM port connection> Main unit version check by setting tool

# 4.2 Register slave by main unit

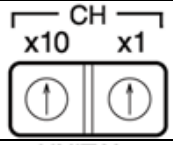
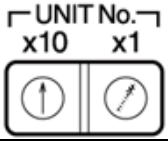
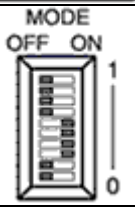
## 4.2.1 Procedures for slave registration

### ■ Setting of master

| | | |
|---|---|---|
| Operating mode switch |  | Be sure to set to “SET”. |
| Communication channel |  | Select from “00～4B” *1 |
| Unit No. switch |  | Be sure to set to “00”.<br>At factory setting, Unit No. is set to “00”. |
| MODE switch |  | Any settings<br>Refer to <3.2.4 Setting of MODE switch> |

*1:Communication channel can be set to fixed channel(00～4Bch). If it is set to group channel, error is occurred.
And if it is set to channel used in the other communication, error might be occurred. We recommend you to check vacant channel beforehand by field intensity monitor.

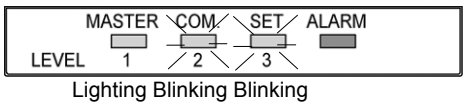
### ■ Setting of slave

| | | |
|---|---|---|
| Operation mode switch |  | Be sure to set to “SET”. |
| Communication channel |  | Select same channel as master |
| Unit No. switch |  | Set to “01～99”.<br>At factory setting, Unit No. is set to “00”. |
| MODE switch |  | Be sure to set No.9 to OFF. Except it, any settings are OK. Refer to <3.2.4 Setting of MODE switch> |

## ■ Procedures for registration

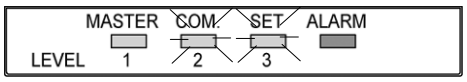
1) Put all wireless units to register on the table and make each switch above setting.
2) Turn power supply of wireless unit used as master and used as slave on.
3) Press <ENTER> switch continuously (approx. 3sec) in wireless unit for registering as slave.
4) LED is blinking as below

Master




Lighting Blinking Blinking

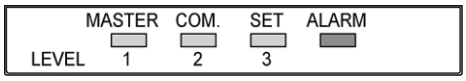
Slave




Blinking Blinking

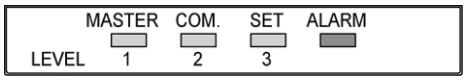
5) Registration is completed when LED lights as below.

Master




Lighting Lighting Lighting

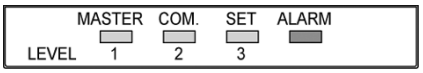
Slave




Lighting Lighting

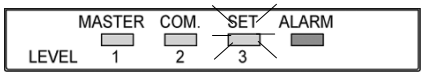
**Note: In case of MODE switch No.9 of slave is set to ON, pay attention that by pressing <ENTER> switch continuously, slave is initialized. When it is impossible to register, LEDs indicate as below.**

Master




Lighting Lighting Lighting Flashing

Slave




Lighting Blinking Lighting

Below causes are supposed. After checking this, try to register again.

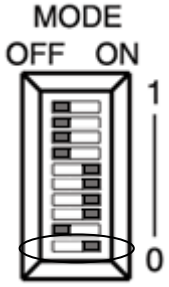
| Cause | Troubleshooting |
|---|---|
| Power supply of master is turned off | Turn power supply of master on |
| Setting of master or slave is wrong. | Check the settings |
| After setting of master or slave, it doesn't turn power supply on again. | Turn the power supply on again or change operating mode switch (SET->RUN->SET) |
| Same Unit No. is already registered at master. | Register with another No. or Overwrite Refer to <4.2.2 Overwrite registration> |
| Another wireless unit is using the same channel. | Change communication channel |
| Executing serial communication or I/O communication | Remove communication connector |
| Communication condition is unstable due to distance between master and slave. | Do it on the table. |
| Communication channel is not set to 00～4B. | Be sure to set to 00～4B |
| Antenna comes off | Mount antenna |

# 4.2.2 Overwrite registration

When another slave is registered with the same Unit No., which is already registered at the master, set it to “permission of registration overwriting” before registration.

Example) After registration of slave “01” at master “00”, you want to register another wireless unit as a slave of “01” (same). In this case, overwriting is necessary. (Such as exchanging the slave)

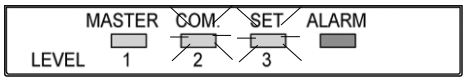
Proceed overwrite registration according to the below procedures.
1) Set each switch as to the previous page and set MODE switch No.0 (Permission of registration overwriting) of master to ON.



Master

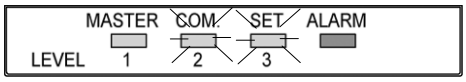
2) Turn the power supply of wireless unit used as master and used as slave on.
3) Press <ENTER> switch of wireless unit to register as slave continuously (approx.3sec).
4) LED is blinking as below.

Master



Lighting Blinking Blinking

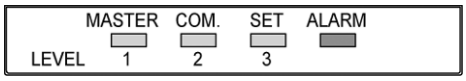
Slave



Blinking Blinking

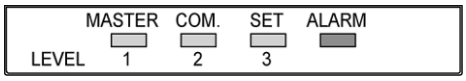
5) Registration is completed when LED lights as below.

Master



Lighting Lighting Lighting

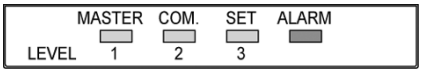
Slave



Lighting Lighting

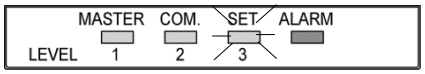
**Note: When it is impossible to overwrite registration, LED indicates as below.**

Master



Lighting Lighting Lighting Flashing

Slave



Lighting Blinking Lighting

Below causes are supposed. After checking this, try to register again.

| Cause | Troubleshooting |
|---|---|
| Power supply of master is turned off | Turn power supply of master on |
| Setting of master or slave is wrong. | Check the settings<br>(MODE switch No.0 should be set to ON.) |
| After setting of master or slave, it doesn’t turn power supply on again. | Turn the power supply on again<br>or change operating mode switch<br>(SET->RUN->SET) |
| Another wireless unit is using the same channel. | Change communication channel |
| Executing serial communication or I/O communication | Remove communication connector |
| Communication condition is unstable due to distance between master and slave. | Put slaves and master on the same table when registration. |
| Communication channel is not set to 00～4B. | Be sure to set to 00～4B |
| Antenna comes off | Mount antenna |

**Note: If the previous slave registered with the Unit No. is left in the same communication area and turn the power supply on, it causes malfunction of communication system. Turn the power supply off or change Unit No. When it is used with another Unit No., initialize before using.**

**Reference:** <5.9 Initialization>

## 4.2.3 Change Unit No. of slave

**Once slave is registered to master, the slave doesn't work as another Unit No. even if changing Unit No. switch.**

In case of changing to another vacant Unit No., you can register slave by main unit (Refer to <4.2.1 Procedures for slave registration>). At that time, master deletes registered information of slaves automatically.

Example) After registration of slave (slave1) "01" at master"00", if the slave Unit No. is changed to "05" and the slave is registered again, master deletes "01" and the slave (slave1) is registered as "05". (When there are mistakes at setting of slave Unit No.)

Before changing Unit No.

| Slave registration info. in Master | |
|---|---|
| Unit No. | Slave name |
| 01 | slave 1 |
| 02 | slave 2 |
| 03 | slave 3 |
| 04 | (vacant) |
| 05 | (vacant) |
| … | … |
| 99 | (vacant) |

After changing Unit No.

| Slave registration info. in Master | |
|---|---|
| Unit No. | Slave name |
| 01 | (vacant) ← deleted and vacant |
| 02 | slave 2 |
| 03 | slave 3 |
| 04 | (vacant) |
| 05 | slave 1 ← change 01 to 05 |
| … | … |
| 99 | (vacant) |

※Slave name is set by setting tool.

**Note: If Unit No. to change is not vacant and other has been registered, it is error. Register again with another Unit No. or overwrite registration.**

**Reference**: <4.2.1 Procedures for slave registration > <4.2.2 Overwrite registration>

## 4.2.4 Delete slave registration individually

Main unit doesn't have a function that slave registration information in master individually is deleted.
In order to delete individually, delete slave in registration list by setting tool.
It is no problem because there is no influence by information of slave that is not used in master.

**Note: When using slave to be deleted the registration, initialize before using.**

**Reference**: About Initialization <5.9 Initialization>
About registration list <Help in setting tool (Configurator KR)>

# 4.2.5 Delete all slave registration

## ■ When you want to delete all registration information

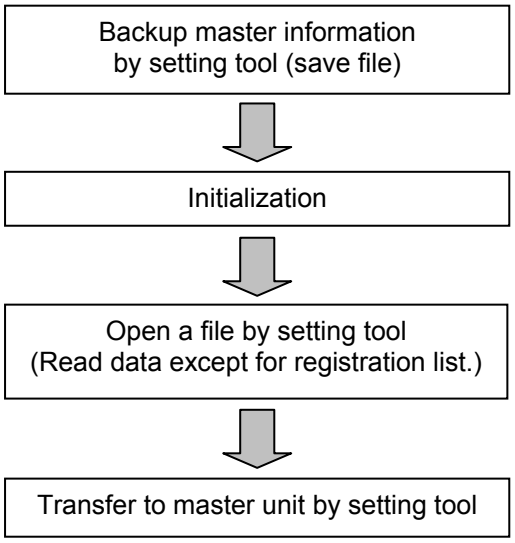
In case of deleting all registration information of slave in master, initialize master.
However, be careful that all setting including the settings by setting tool such as routing information is deleted.

**Note: Initialization makes all information, including routing setting, slave registration and so on, delete. (Factory setting)**

**Reference**: About initialization <5.9 Initialization>

## ■ When you want to delete only slave registration

When you want to keep routing information and so on, backup by setting tool before initializing and you can transfer routing information and so on to master again.




**Note**: **Be sure to backup by setting tool before initialization of master.**

**Reference**: About Initialization <5.9 Initialization>
For edit file <Help in setting tool (Configurator KR)>

# 4.3 Register slave by setting tool

Slave registration is also possible by setting tool.
Setting way of master and slave are same as slave registration by main unit.
※Instead of pressing <ENTER> switch continuously, slave registration is started by setting tool.

In this chapter, only registration procedures are explained.
For how to use setting tool, refer to Help in setting tool (Configurator KR)
To boot setting tool, click on the Windows［Start］button and then select “Programs”, “Panasonic-EW SUNX Control”, “Configurator”, “Configurator KR”, and “Configurator KR” on the displayed Windows menu, in that order.

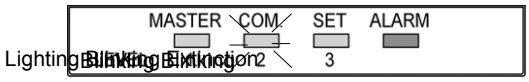
**Reference**: <Help in setting tool (Configurator KR)>

## 4.3.1 Procedures for slave registration by setting tool

### ■ Procedures for registration

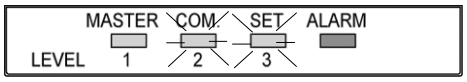
1) Set switches as same as <4.2.1 Register slave by main unit>
2) Connect computer and wireless unit used as master via RS232C cable.
3) Turn power supply of wireless unit used as master and used as slave on with operating mode switch “SET”.
4) Boot setting tool
5) Execute “Master unit setup”,”Routing setting”, ”Transfer to master unit” and “Transfer from main unit” by setting tool.
6) Execute “Addition of registration list (Addition of slave registration)” by setting tool.
7) LED is blinking as below.

Master



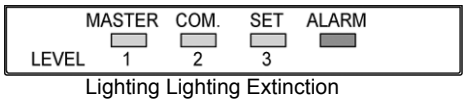
Lighting Blinking Extinction Blinking Blinking

Slave



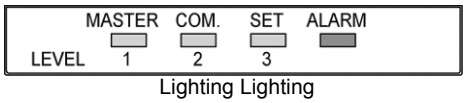

8) Registration is completed when LED lights as below.

Master



Lighting Lighting Extinction

Slave



Lighting Lighting

## 4.3.2 Delete slave registration information by master

### ■ Procedures for delition

1) Connect computer and master with RS232C cable.
2) Power supply of master on with operating mode switch “SET”.
3) Boot setting tool.
4) Execute “Transfer from main unit” and “Delete registration list (Delete slave registration)”
5) Above this, slave registration information is deleted, but slave has the information to be registered at master. Therefore initialize slave to delete the registration information in slave.

**Reference**: <5.9 Initialization>

# Chapter 5

# Setting and Operation

# 5.1 Setting and operation

In this chapter, procedures for setting and operation of each communication system are explained concretely.

**Before reading this chapter, execute the necessary wireless units initial setting and slave registration.**

**Reference**: <Chapter 3 Initial setting/ Chapter 4 Resister slave>

**Setting and operation are executed by main unit or by setting tool (Configurator KR).**

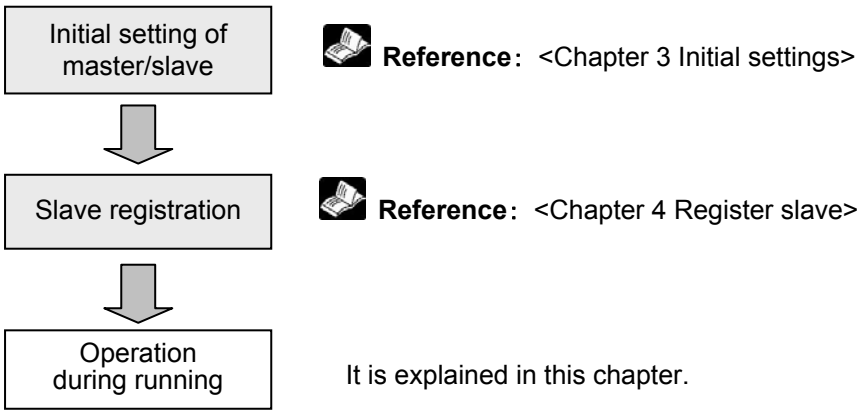
**Reference**: <Help in setting tool (Configurator KR)>

# 5.2 Setting and operation of “1:1 topology”

## 5.2.1 Setting contents

### Setting flow

According to the below flow it’s set. In this part it is assumed that setting of master and slave, slave registration are completed. If not yet, refer to chapter 3 and 4 first.



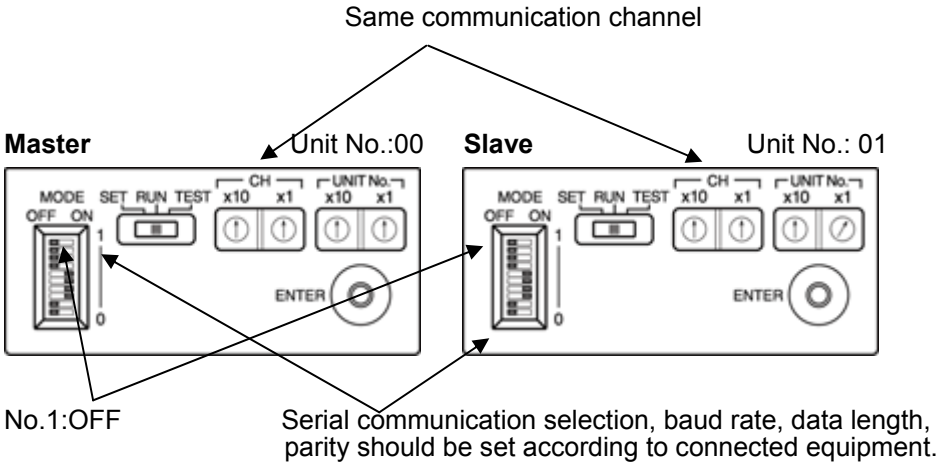

## 5.2.2 Operation during running

**(1) Check again if the settings of switches in master and slave are correct or not.**

- Unit No. of master is set to “00”, Unit No. of slave is set to “01”.
- Communication channels of master and slave are same.
- MODE switch No.1 in master and slave are set to OFF.
  No.2: Serial communication selection (RS232C/RS485) or data holding (available/not available)
  No.3 to 8: Set baud rate, data length and parity according to the connected equipment.

**(2) Set operating mode switch in master and slave to “RUN”.**

**(3) Turn power supply of master and slave on.**

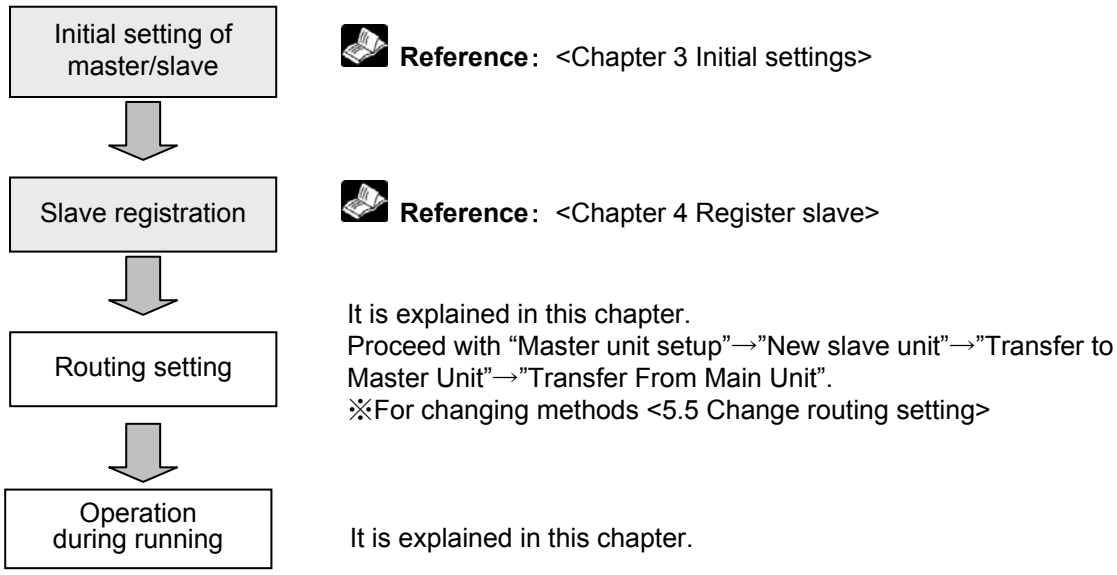



# 5.3 Setting and operation of "1:1 topology with repeaters"

## 5.3.1 Setting contents

### Setting flow

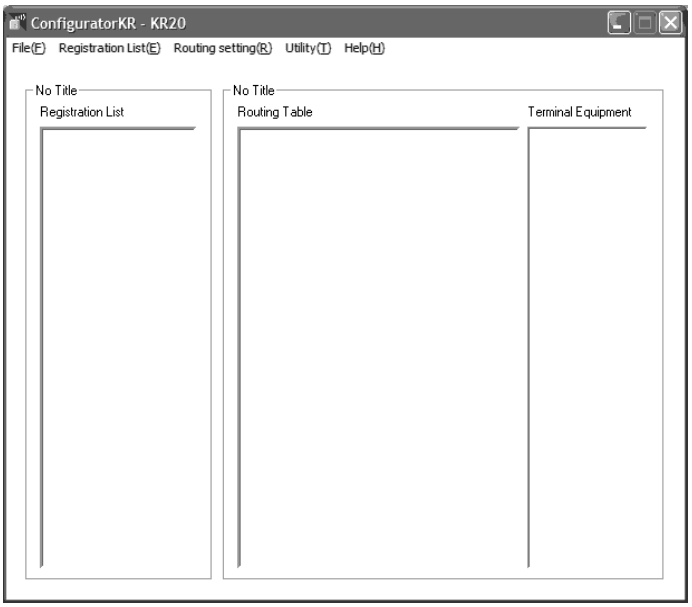
According to the below flow it's set. In this part it is assumed that setting of master and slave, slave registration are completed. If not yet, refer to chapter 3 and 4 first.



# 5.3.2 Routing setting

**(1) Connect computer and master with RS232C cable.**
(RS485 type: MODE switch No.2 is set to OFF)
**(2) Turn power supply of master unit on with operating mode switch “SET”.**
**(3) Boot setting tool.**
Click on the Windows [Start] button and then select "All Programs", "Panasonic-EW SUNX Control", "Configurator", "Configurator KR", and "Configurator KR" on the displayed Windows menu, in that order.

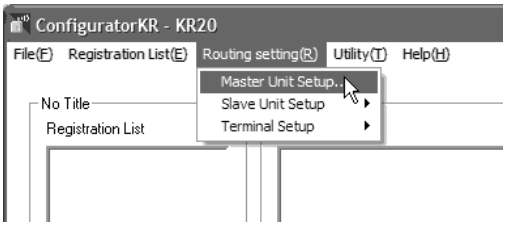
After selecting and click OK, below window is displayed.



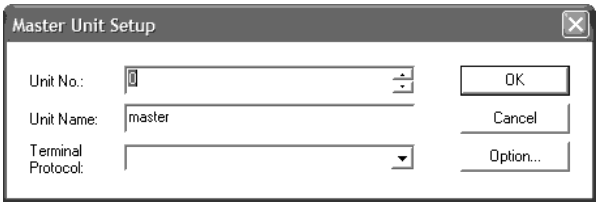

※From the left, there are 3 areas of “Registration list view”, “Routing table view” and “Terminal equipment list view”.

## Setting of master

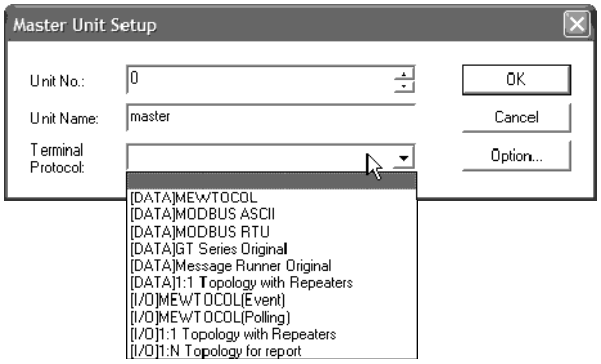
**(4) Select [Routing Setting]->[Master Unit Setup] in menu to set master.**




Master unit setup window is opened.



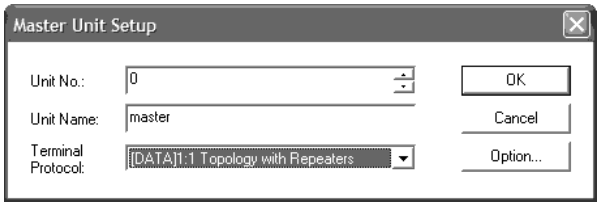

**Input Unit No. and name.**
Unit No. is "00" by default.
(but as a matter of convenience, it is possible to change if necessary. However, if set it except for "00", slave unit should be registered first.)
For naming, it is possible to use alphabet and numbers up to 8 letters.




**For the protocol, select "[DATA]1:1 topology with repeaters" with RS485 type and select "[I/O]1:1 topology with repeaters" with I/O type.**

| Communication protocol name in setting tool | Description |
|---|---|
| [DATA]1:1 topology with repeaters | For RS485 type 1:1 topology with repeaters |
| [I/O]1:1 topology with repeaters | For I/O type 1:1 topology with repeaters |

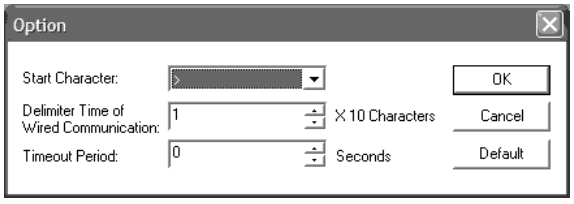
**Reference: For timeout period of Master <9.2 Reference>**



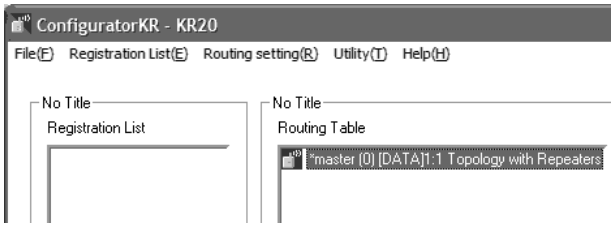
(RS485 type)

**Normally, option is not necessary. In below cases, change it.**

- When communication between terminals is executed with start character ">".
  (With setting as this, it might cause malfunctions.)
- When 10-characters delimiter time of communication between terminals (time from complete communication to start next communication) is too short. In order to settle the communication, set delimiter time of wired communication to 10 characters or more. (Example: When using "KW4M Eco-Poer Meter", set it 50-characters.)
- Timeout period is too short.
  When it is set to "0", master calculate to decide timeout period automatically. When radio wave environment is bad such as repeating retry because repeaters and data amount is big, extending timeout period makes communication possible.



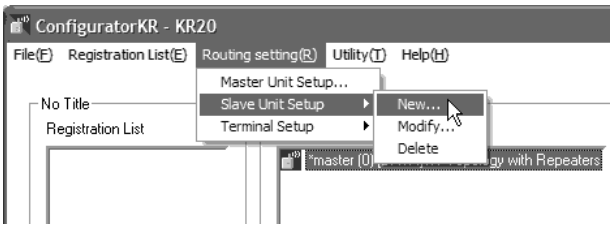

Input and master is displayed in the routing table view.
Initial asterisk (＊) of name means that it is not reflected to master unit. (0) after name means Unit No. 0. (After completing transfer to master unit and transfer from master unit, ＊ is cleared.



## Create new slave unit

### (5) Add slave as repeater at master

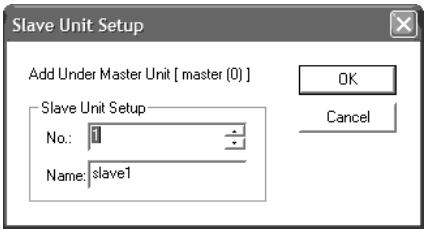
Click master unit on the routing table and select “Routing Setting” -> ”Slave Unit Setup” -> ”New”




**Input slave’s Unit No. and name**

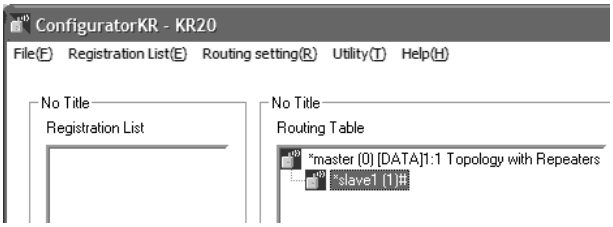
Select from 01 to 99 for Unit No.

For naming, it is possible to use alphabet and numbers up to 8 letters.



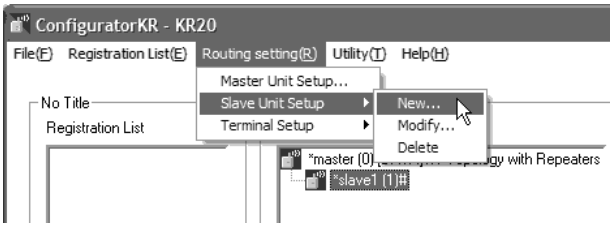

“slave 1” is added in lower right of master unit if click “OK”

Initial asterisk (＊) of name means that it is not reflected to master unit. (1) after name means Unit No. 1. Sharp (＃) indicates that terminal equipment is not set. (After entering terminal, ＃ is cleared and after completing transfer to master and transfer from master, ＊ is cleared.)




### (6) Add another slave to repeater slave.

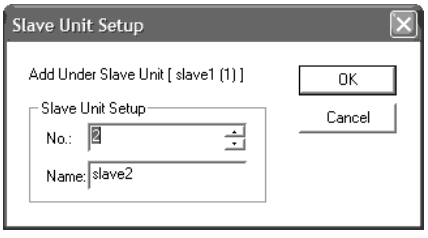
Click ‘slave’ and select “Routing setting” ->”Slave Unit Setup” -> ”New” in menu.



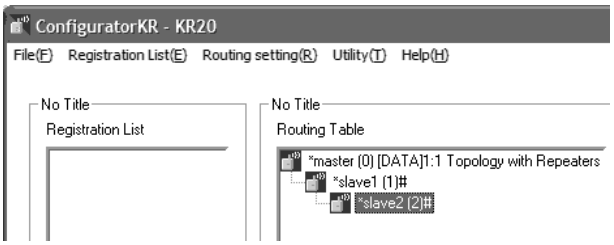

**Input slave’s Unit No. and name.**

Select from Unit No. within the range of 01-99 that is not used.

For naming, it is possible to use alphabet and numbers up to 8 letters.



“slave 2” is added in lower right of “slave 1” if click “OK”
Initial asterisk (＊) of name means that it is not reflected to master unit. (2) after name means Unit No. 2. Sharp (＃) indicates that terminal is not set. (After entering terminal, ＃ is cleared and after completing transfer to master unit and transfer from master unit, ＊ is cleared.)




Upper slave works as repeater for lower slave.
In this case, “slave 1” has repeater function to “slave 2”.

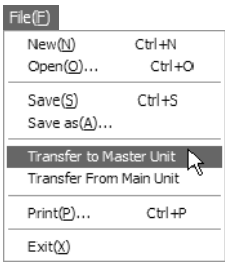
In case of increasing repeater, repeat this procedures. Max. 8 repeaters can be added.
The slave added last is the objective slave (slave connected to terminal equipment).

**Note：For 1:1 topology with repeaters, terminal registration is not necessary.**

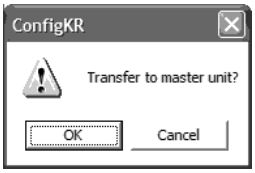
## Transfer to Master Unit

**(7) Above setting has not been reflected to master unit. In order to reflect to master unit, execute “Transfer to Master Unit”.**

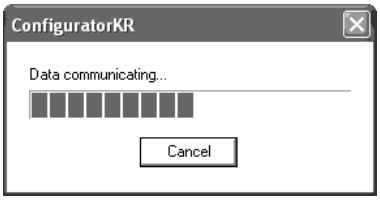
Select “File”→”Transfer to Master Unit” in menu.




When the below dialog is displayed, click “OK”.




Below dialog is displayed during data communication.

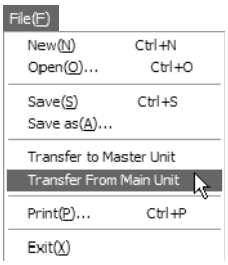



In case of completing to transfer to master unit correctly, return to main window.

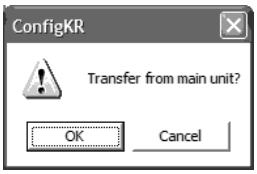
## Transfer from Main Unit

**(8) In order to check whether it is written in master correctly or not, execute "Transfer from Master Unit".**

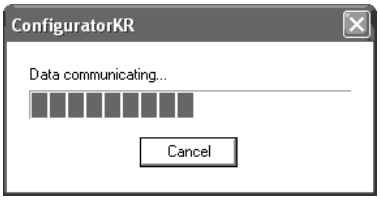
Select "File"→"Transfer from Main Unit" in menu.



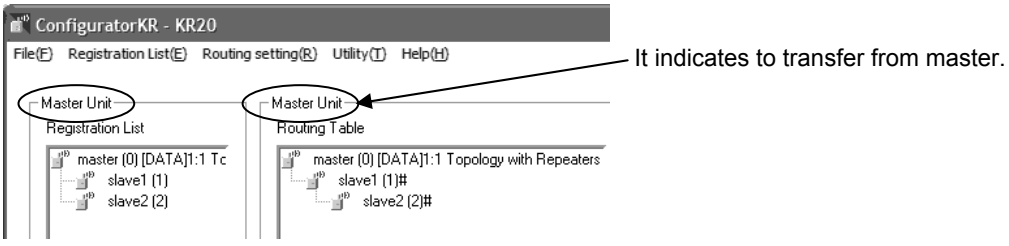

When the below dialog is displayed, click "OK".




Below dialog is displayed during data communication.




After completing to transfer from main unit correctly, the information is displayed in the registration list view, routing table view and terminal list view. Setup name in registration list and routing table view are changed from "No Title" to "master". And initial asterisk (＊) of name, displayed before transferring, is cleared and back of mark is changed from blue to white if it is reflected to master main unit.



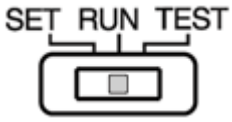

**Note: If all wireless units in routing table view is indicated with white, it completes setup. If there are some slaves with blue, it indicates that there are slaves that are not in registration list. Register the slaves.**

# 5.3.3 Operation during running

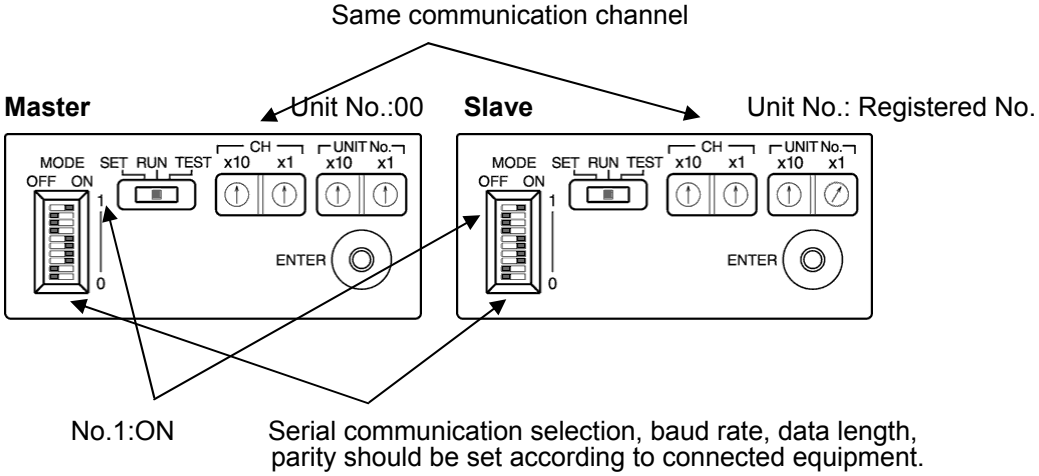
**(1) Check again if the settings of switches in master and slave are correct or not.**

・Unit No. of master is set to “00”, Unit No. of slave is set to the registered Unit No.
・Communication channels of master and slave are same.
・MODE switch No.1 in master and slave are set to ON.
No.2: serial communication selection (RS232C/RS485), or data holding (available/not available)
No.3～8: set baud rate, data length and parity according to the connected equipment.

**(2) Set operating mode switch of master and slave to “RUN”.**




**(3) Turn power supply of master and slave on.**

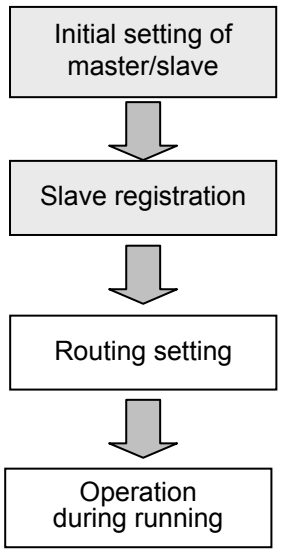


# 5.4 Setting and operation of “1:N topology”

## 5.4.1 Setting contents

### Setting flow

According to the below flow it’s set. In this part it is assumed that setting of master and slave, slave registration are completed. If not yet, refer to chapter 3 and 4 first.




**Reference**: <Chapter 3 Initial settings>

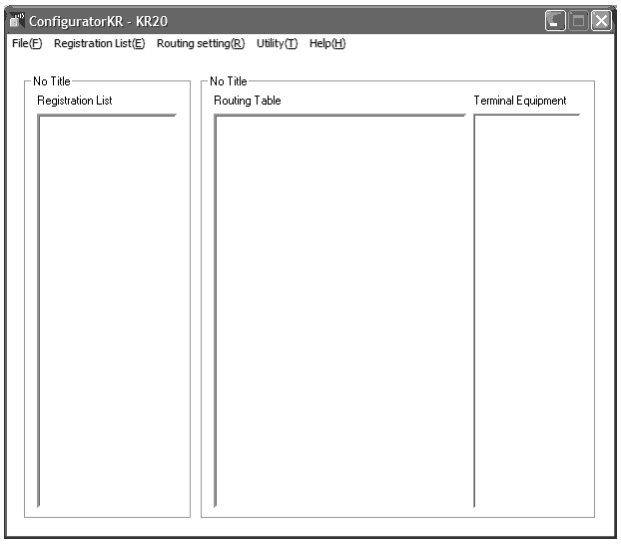
**Reference**: <Chapter 4 Register slave>

It is explained in this chapter.
Proceed with “Master setup” -> “New slave unit” -> “Transfer to Master Unit” -> “Transfer From Main Unit”.
*For changing methods <5.5 Change routing setting>

It is explained in this chapter.

## 5.4.2 Routing setting

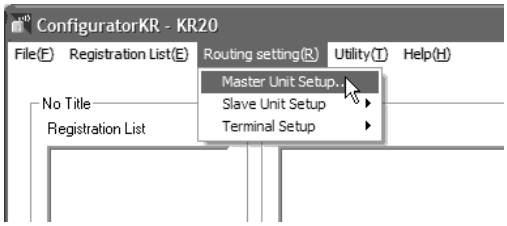
**(1) Connect computer and master with RS232C cable.** (RS485 type: MODE switch No.2 is set to OFF)
**(2) Turn power supply of master unit on with operating mode switch “SET”.**
**(3) Boot setting tool.**
Click on the Windows [Start] button and then select "All Programs", "Panasonic-EW SUNX Control", "Configurator", "Configurator KR", and "Configurator KR" on the displayed Windows menu, in that order.



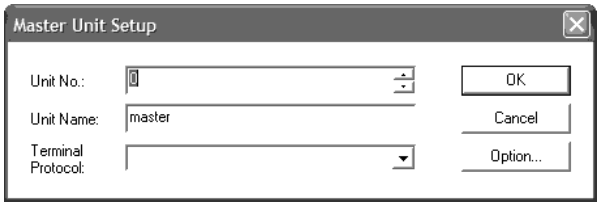

*From the left, there are 3 areas of “Registration list view”, “Routing table view” and “Terminal list view”.

## Master Unit Setup

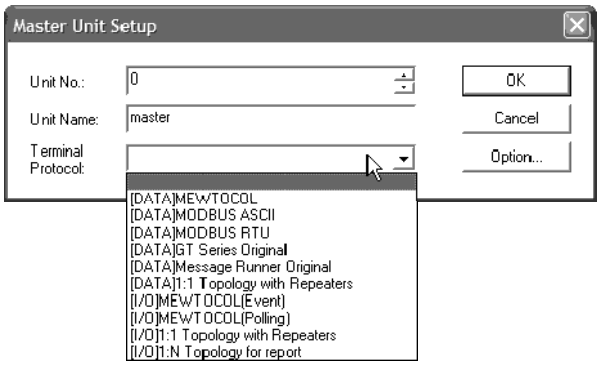
**(4) Select "Routing Setting"->"Master Unit Setup" in menu to set master.**




Master unit setup window is opened.




**Input Unit No. and name.**
Basically, specify "0" for Unit No.
(If several masters are in RS485 communication line, it is necessary to change Unit No. In this case, there are some restrictions such as that slave registration is completed.)
For naming, it is possible to use alphabet and numbers up to 8 letters.



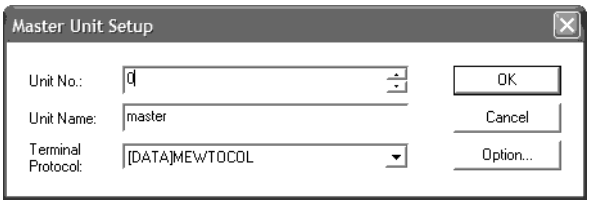

**For the protocol, select "[DATA] XXXXX" with RS485 type and select "[I/O] XXXXX" with I/O type. Any other protocol is not used with "1:N topology".**

| Communication protocol name in setting tool | Description |
|---|---|
| [DATA] MEWTOCOL | RS485 type for our company's MEWTOCOL communication (1:N) |
| [DATA] MODBUS ASCII | RS485 type for MODBUS ASCII (1:N) |
| [DATA] MODBUS RTU | RS485 type for MODBUS RTU (1:N) |
| [DATA] GT Series Orignal | RS485 type for our company's GT programmable display general purpose communication (Dedicated protocol) |
| [DATA] Message Runner Original | RS485 type for our company's Message runner general purpose protocol communication (Dedicated protocol) |
| [I/O] MEWTOCOL (Event) | I/O type for MEWTOCOL communication(1:N topology Event) |
| [I/O] MEWTOCOL (Polling) | I/O type for MEWTOCOL communication (1:N topology Polling) |
| [I/O] 1:N topology for report | I/O type for 1:N topology for report (trouble report application) |

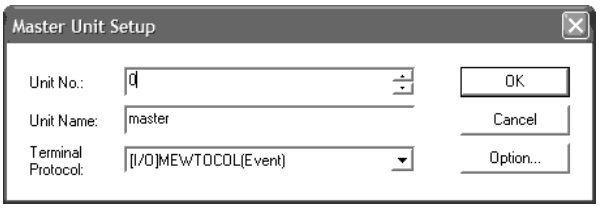
- For 1:N topology of I/O type, you can select either "Event" that perform the wireless communication when there is the data communication from upper level, or "Polling" that always perform the wireless communication in series from a master to slaves that is connected.
- For Event, even if the input signal is input from the upper level to the slave as long as information on the slave is not inquired, information is not transmitted. It is possible to communicate at the shortest time if communicate only when it is necessary. Please select this system if you use data communication mainly, and want to use the output signal possibly.

・For Polling, master has I/O information of all slaves, therefore, if you often use I/O communication than data communication, please select this system. But, it takes time to check the state of all slaves if there are a lot of slaves. Master automatically communicates to all slaves including repeaters.
・For polling, it outputs communication error when wireless communication is cut off. (Communication error is output after about 3 times of polling time. But it is less than 30 sec., it outputs after 30 sec.)
・Data communication is impossible with “[I/O] 1:N topology for report”, therefore setting of timeout period is not available.

**Reference**: For timeout period of Master <9.2 Reference>



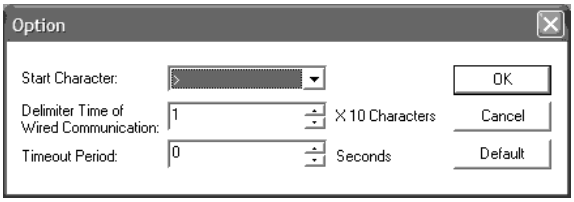
(RS485 type)



(I/O type)

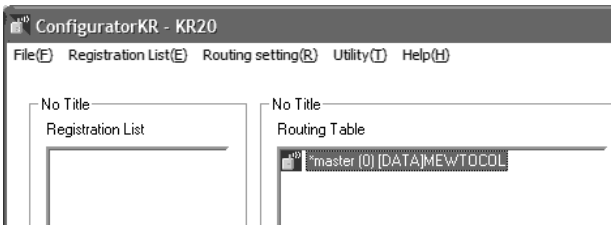
**Normally, option is not necessary. In below cases, change it.**

・When communication between terminals is executed with start character “>” (With setting as this, it might cause malfunctions.)
・When 10-characters delimiter time of communication between terminals (time from complete communication to start next communication) is too short. (Example: When using "KW4M Eco-Power Meter", set it 50-characters.)
・Timeout period is too short.
When it is set to “0”, master calculates to decide timeout period automatically. When radio wave environment is bad such as repeating retry because repeaters and data amount is big, extending timeout period makes communication possible.




**Input and master is displayed in the routing table view.**

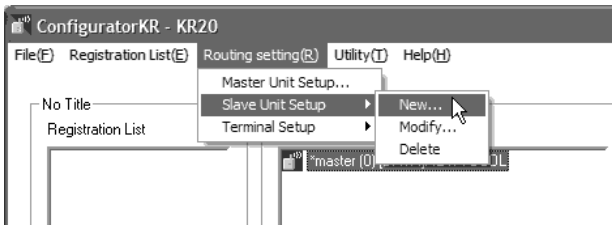
Initial asterisk (＊) of name means that it is not reflected to master unit. (0) after name means unit No. 0. (After completing transfer to master and transfer from master, ＊ is cleared.



## Create new slave unit

### (5) Add slave at master

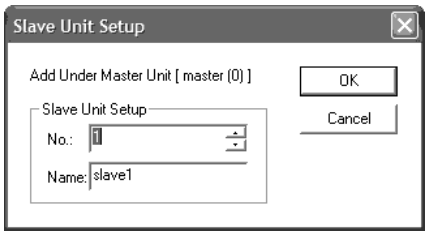
Click one master in routing table and select “Routing Setting” -> “Slave Unit Setup” -> “New”.




**Input slave’s Unit No. and name**

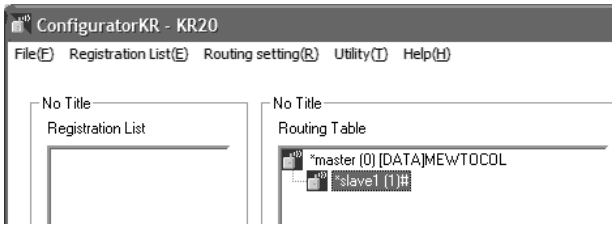
Select from 01 to 99 for Unit No.

For naming, it is possible to use alphabet and numbers up to 8 letters.



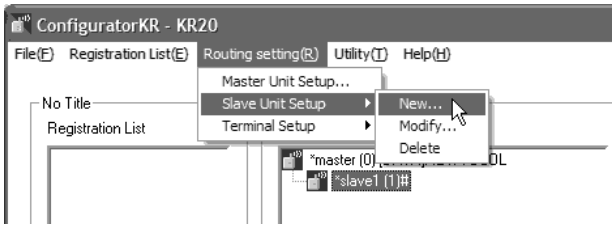

“slave 1” is added in lower right of master unit if click “OK”.

Initial asterisk (＊) of name means that it is not reflected to master unit. (1) after name means Unit No. 1. Sharp (＃) indicates that terminal is not set. (After entering terminal, ＃ is cleared and after completing transfer to master and transfer from master, ＊ is cleared.)




### (6) Add another slave to slave.

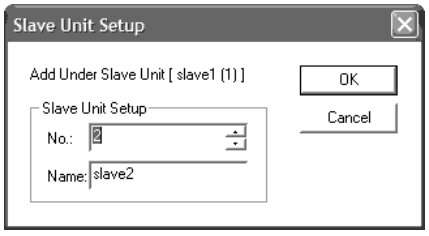
Click one slave in routing table and select “Routing Setting” -> “Slave Unit Setup” -> “New” in menu.



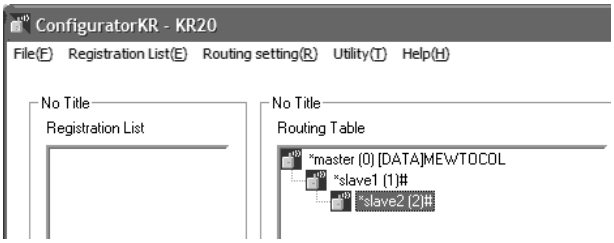

**Input slave’s Unit No. and name.**

Select from 01 to 99 and unused number.

For naming, it is possible to use alphabet and numbers up to 8 letters.

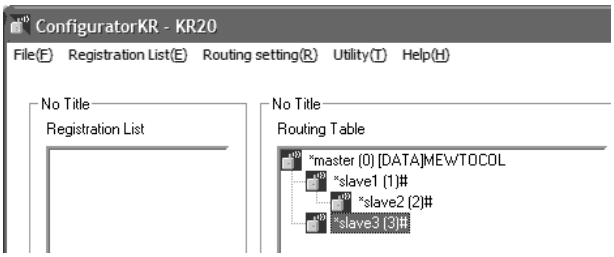


“slave 2” is added in lower right of “slave 1” if click “OK”.
Initial asterisk (＊) of name means that it is not reflected to master unit. (2) after name means Unit No. 2. Sharp (＃) indicates that terminal is not set. (After entering terminal, ＃ is cleared and after completing transfer to master and transfer from master, ＊ is cleared.)




Upper slave works as repeater for lower slave.
In this case, “slave 1” has repeater function to “slave 2”.
Therefore, upper slave can transfer data to both a terminal connected itself and another slave.

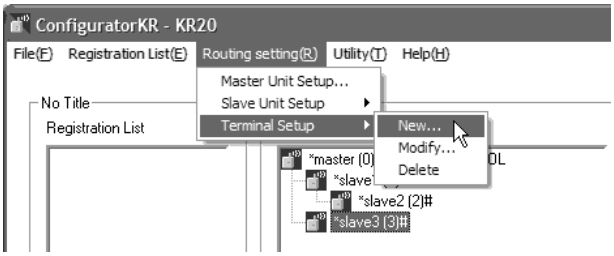
**(7) Add another slave to master.**
Click one master in routing table as same as (5), and select “Routing Setting” -> “Slave Unit Setup” -> “New”.
It is added as below.



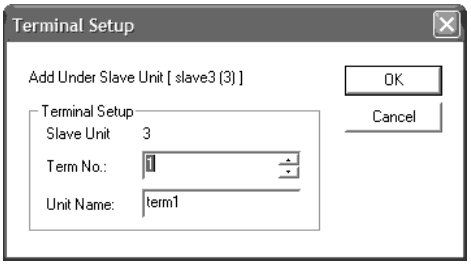

Adding slaves by this way makes 1:N topology system.
At 1:N topology, only slaves’ routing setting is not enough to specify a terminal is connected to which slave. Deciding a relation of terminal equipment and slave makes master communicate to terminal automatically.

## Create new terminal equipment

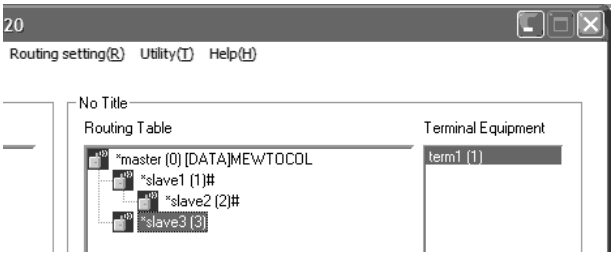
**(8) Register terminal equipment to a slave.**
Click one slave that is connected to terminal equipment in routing table and select “Routing setting” -> “Terminal Setup” -> “New”.




**Input terminal’s Unit No. and name.**
Input Unit No. that is specified to communicate with the upper level protocol. Select from 01 to 254. For naming, it is possible to use alphabet and numbers up to 8 letters.



“term1” is added in termial equipment list view.
When at least 1 terminal is set, ＃ after slave in routing table view is cleared. (“slave 3”)



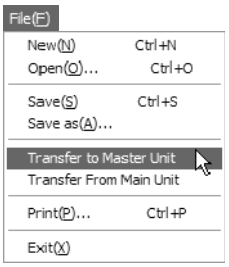

With same way, add all connected terminal equipment to slave to the terminal list.
The slave that works as only repeater is not necessary to register.

**Note: When using I/O type, at 1:N topology**
**Slave is located as same position as equipment with MEWTOCOL protocol.**
**If equipment with MEWTOCOL protocol is connected to slave, Unit No. of terminal equipment and slave should be set to different No.**

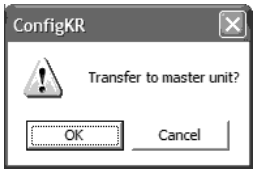
## Transfer to Master Unit

**(9) Above setting has not been reflected to master unit. In order to reflect to master unit, execute “Transfer to Master Unit”.**

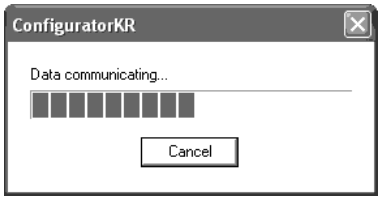
Select “File” -> “Transfer to Master Unit” in menu.




When the below dialog is displayed, click ‘OK’.




Below dialog is displayed during data communication.

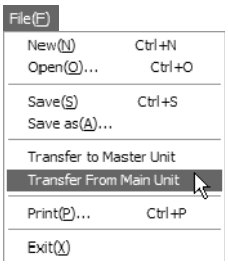



After completing to transfer to master correctly, it returns to main window.

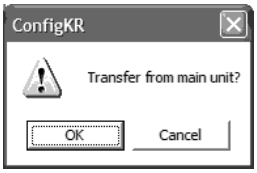
## Transfer from Main Unit

**(10) In order to check whether it is written in master correctly or not, execute "Transfer from Main Unit".**

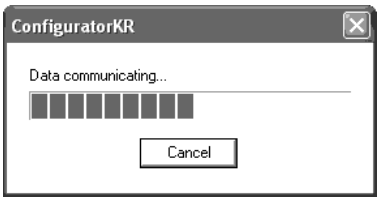
Select "File" -> "Transfer from Main Unit" in menu.



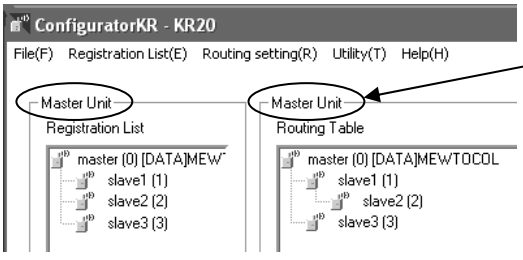

When the below dialog is displayed, click 'OK'.




Below dialog is displayed during data communication.




After completing to transfer from main unit correctly, the information is displayed in the registration list view, routing table view and terminal list view. Setup name in registration list and routing table view is changed from "No Title", when at start, to "master". And initial asterisk (＊) of name, displayed before transferring, is cleared and back of mark is changed from blue to white if it reflects to master main unit.




It indicates transferring from master.

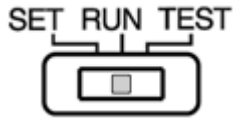
**Note: If all wireless units in routing table view are indicated with white, it completes setup. If there are some slaves with blue, it indicates that there are slaves that are not in registration list. Register the slaves.**

# 5.4.3 Operation during running

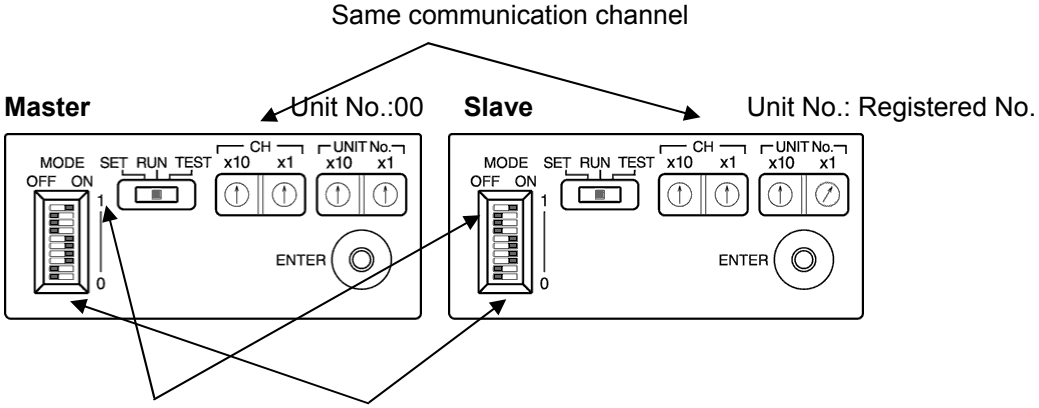
**(1) Check again if the settings of switches in master and slave are correct or not.**

・Unit No. of master set to “00”, Unit No. of slave is set to the registered No.
・Communication channels of master and slave are same.
・MODE switch No.1 in master and slave are set to ON.
No.2: serial communication selection (RS232C/RS485), or data holding (available/not available)
No.3～8: set baud rate, data length and parity according to the connected equipment.

**(2) Set operating mode switch in master and slave to <RUN>.**




**(3) Turn power supply of master and slave on.**



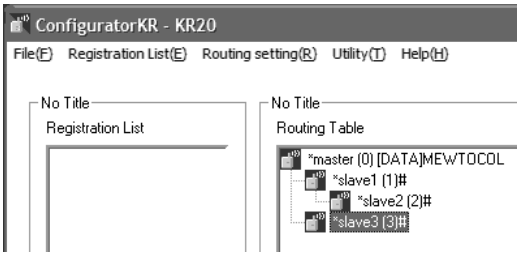

No.1:ON

Serial communication selection, baud rate, data length, parity should be set according to connected equipment.

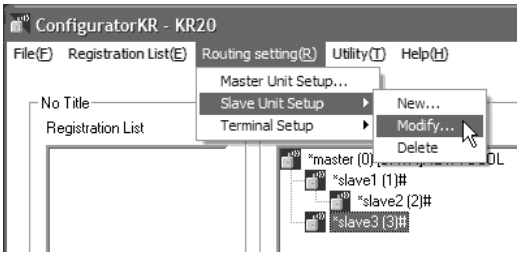
# 5.5 Change routing setting

This is the explanation about changing routing setting at 1:1 topology with repeater and 1:N topology.

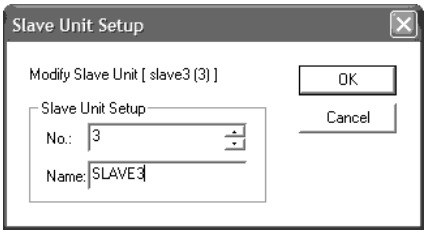
## 5.5.1 Modify slave unit



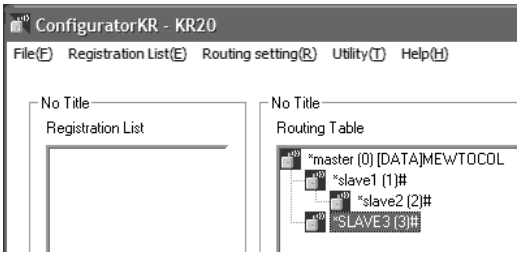

**(1) Click one slave to modify in routing table and select "Routing setting" -> "Slave unit setup" -> "Modify".**



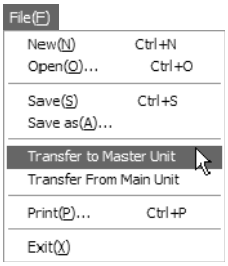

You can modify slave's Unit No. and name.
Select from 01 to 99 for Unit No.
For naming, it is possible to use alphabet and numbers up to 8 letters.
For example, "slave3" will be modified to "SLAVE3".




Click 'OK' and "slave3" is modified to "SLAVE 3" in lower right of master.
Initial asterisk (＊) of name means that it is not reflected to master unit.
"(3)" after name means Unit No. 3. Sharp (＃) indicates that terminal is not set. (After entering terminal, ＃ is cleared and after completing transfer to master and transfer from master, ＊ is cleared.)

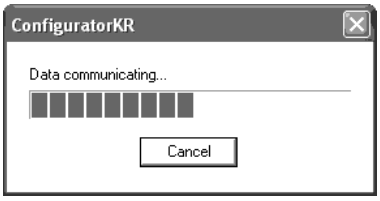


**(2) Above setting has not been reflected to master unit. In order to reflect to master unit, select “File” -> “Transfer to Master Unit” in menu.**



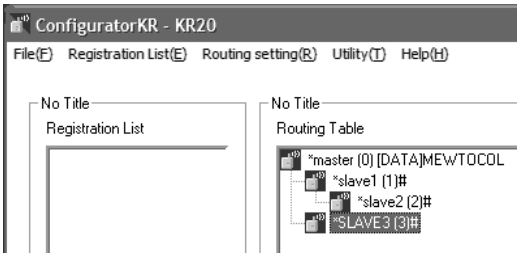

When the below dialog is displayed, click ‘OK’.


Below dialog is displayed during data communication.

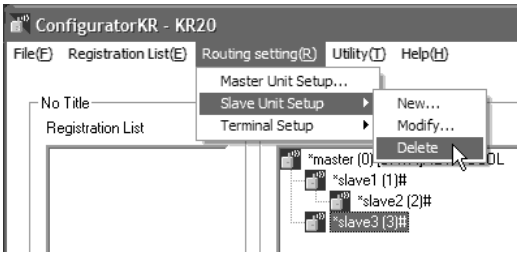



After completing to transfer to master unit correctly, it returns to main window.

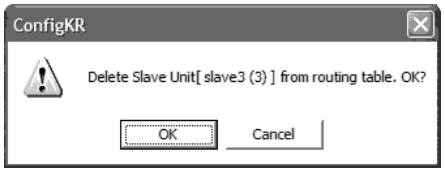
# 5.5.2 Delete slave unit



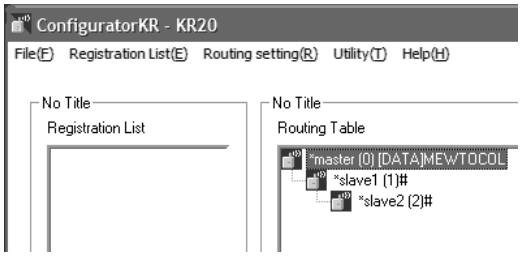

**(1) Click one slave to delete in routing table and select “Routing setting” -> “Slave unit setup” -> “Delete”.**



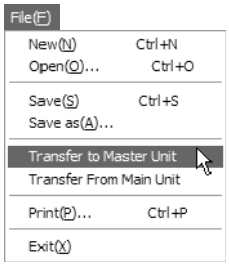
When the below dialog is displayed, if it is OK, click ‘OK’.




In the routing table, “slave 3” in lower right of master is deleted.

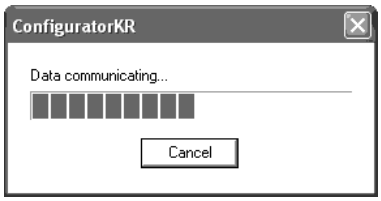



**(2) Above setting has not been reflected to master unit. In order to reflect to master unit, select “File” -> “Transfer to Master Unit” in menu.**




When the below dialog is displayed, click ‘OK’.

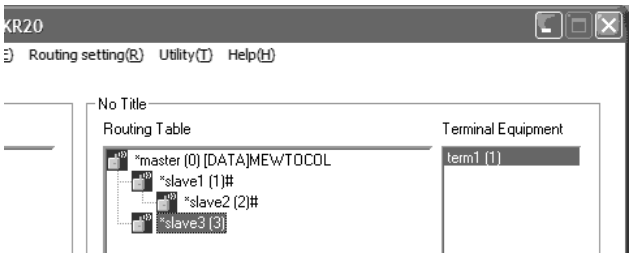

Below dialog is displayed during data communication.



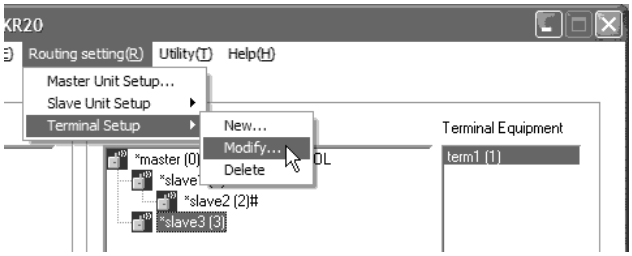

After completing to transfer to master correctly, it returns to main window.

**Note: If another slaves are connected in lower of deleted slave, all lower slaves are deleted.**

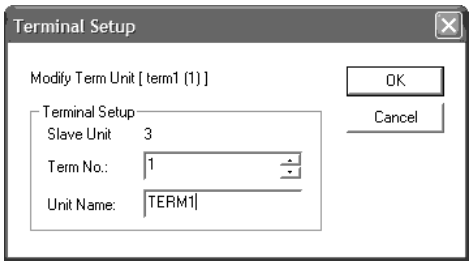
# 5.5.3 Modify terminal equipment



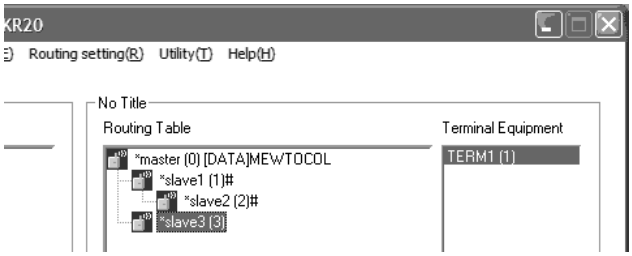

**(1) Click one terminal to modify in termianl list view after selecting one slave in routing table. And select “Routing setting” -> “Terminal setup” -> “Modify” in menu.**



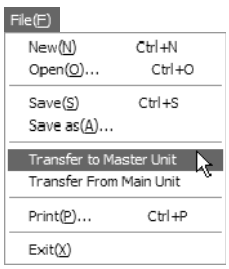

Modify Unit No. and name of terminal equipment.
Input Unit No. that is specified in protocol for communication with upper level. Select within the range of 01-254.
For naming, it is possible to use alphabet and numbers up to 8 letters.
In this case, modify “term1” to “TERM1”.



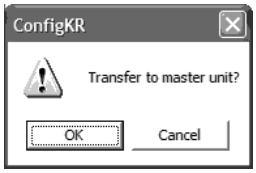

In the termianl list view, “term1” is modified to “TERM1”.



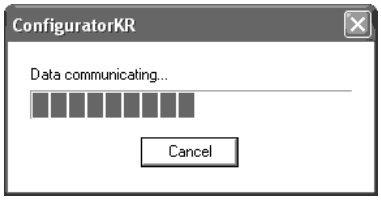

**(2) Above setting has not been reflected to master unit. In order to reflect to master unit, select “File” -> “Transfer to Master Unit” in menu.**



When the below dialog is displayed, click “OK”.



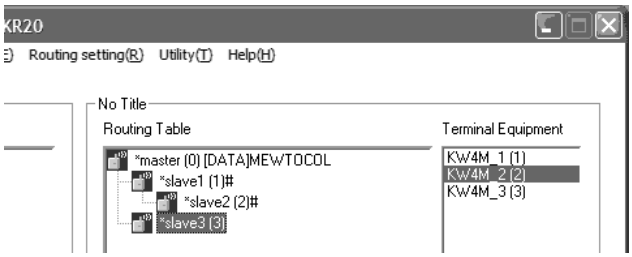

Below dialog is displayed during data communication.



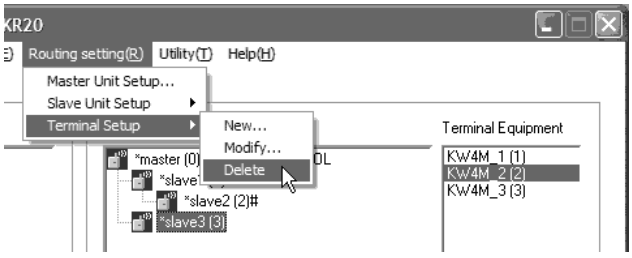

After completing to transfer to master correctly, it returns to main window.

**Note: When using I/O type, at 1:N topology**
**Slave is located as same position as equipment with MEWTOCOL protocol.**
**If equipment with MEWTOCOL protocol is connected to slave, Unit No of terminal equipment and slave should be set to different No.**

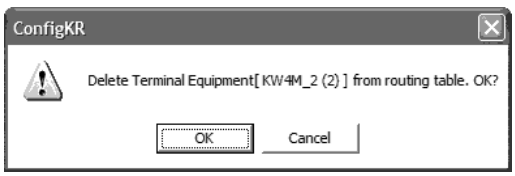
## 5.5.4 Delete terminal equipment



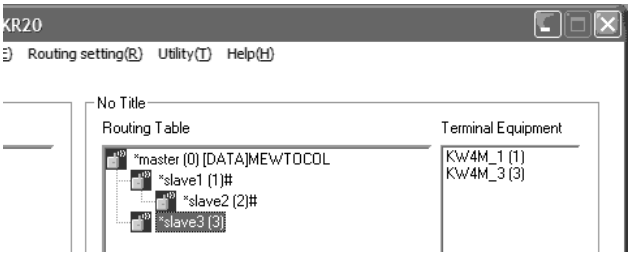

**(1) Click one terminal to delete in terminal list view after selecting one slave in routing table. And select “Routing Setting” -> “Terminal Setup” -> “Delete” in menu.**



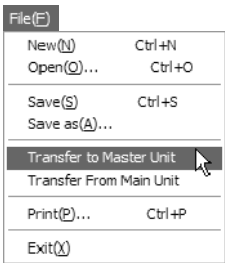

When the below dialog is displayed, if it is OK, click “OK”.



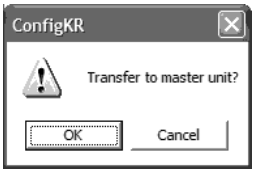
In the terminal list, “KW4M_2” was deleted.



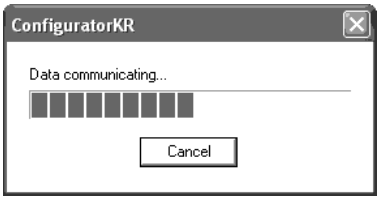

**(2) Above setting has not been reflected to master unit. In order to reflect to master unit, select “File” -> “Transfer to Master Unit” in menu.**




When the below dialog is displayed, click “OK”.




Below dialog is displayed during data communication.




In case of completing to transfer to master unit correctly, return to main window.

# 5.6 Save setting contents

This is the explanation about saving setup in master such as master setup and routing setting to computer for 1:1 topology with repeater and 1:N topology.

## 5.6.1 Setting files

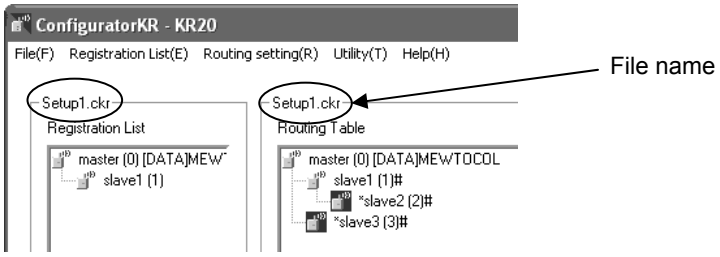
In setting file, master's operating information such as slave registration information (registration list) and routing setting. Routing setting can be made without connecting wireless unit. Therefore saved file in computer, it was saved beforehand, can transfer to master.
In addition, saving the setting file in computer makes recovery, when changing master, easy. (Slave registration is necessary again.)

**Note: Slaves' operation setup information is not saved, it has no function to recover slave. When changing slave, register slave to master by overwrite (same Unit No.), and it can use immediately. (Old slave will be deleted from master registration.)**

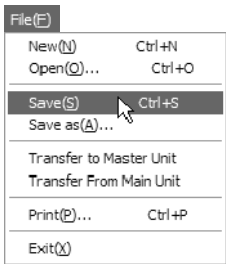
## 5.6.2 Save setting files

### In case of saving as same name

Setting file in registration list view and routing table view are overwritten.
(For example, it displays the file information saved as "Setup1.ckr".)



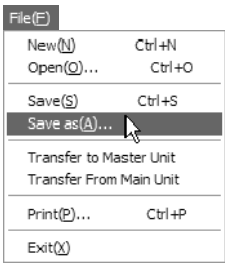

(1) Select "File" -> "Save" in menu.
It overwrites.



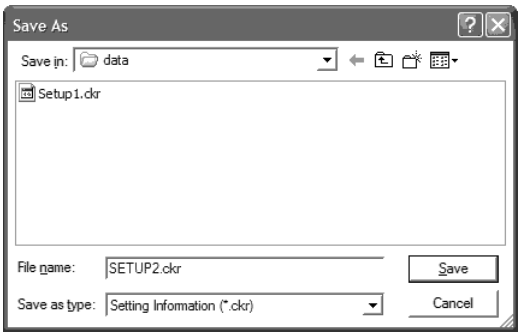

**Note: In the below cases, the file name will be changed to "No Title" (new).**
- **Setting name in registration list view is different from that in routing table view.**
- **Excute "Transfer from Main Unit". (Setting name is "master".)**

### In case of saving as another name

(1) Select “File” -> “Save as” in menu.

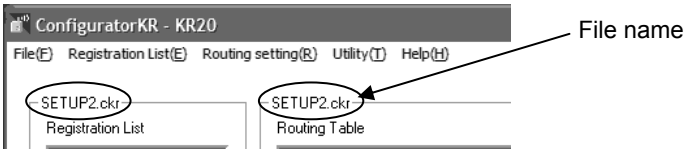



Saving dialog is displayed.




(2) Input file name and click “Save”.
It saves with the specified file name.

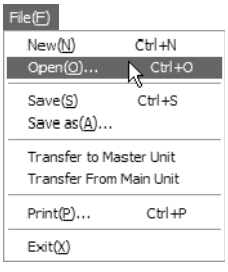
In this time, file name is displayed in registration list and routing table.



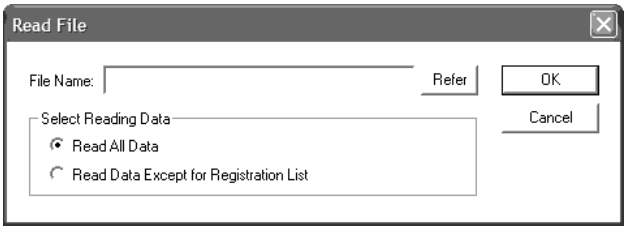

# 5.6.3 Open a setting file

This is the explanation to open setting file.
Open setting file and saved information is appeared in main window.

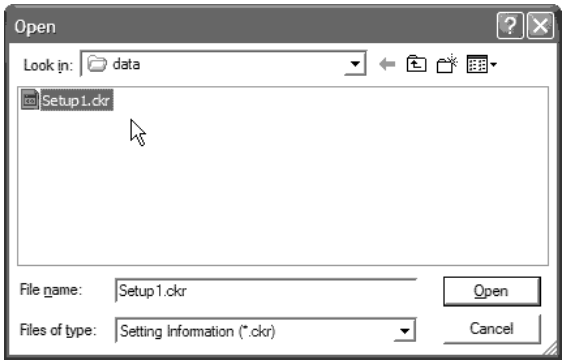
(1) Select “File” -> “Open” in menu.




(2) Below dialog is displayed and specify file name or input file name.



(3) Click “Refer” and dialog to open file is displayed.
Open file name to read in.




Select reading data from 2 types.

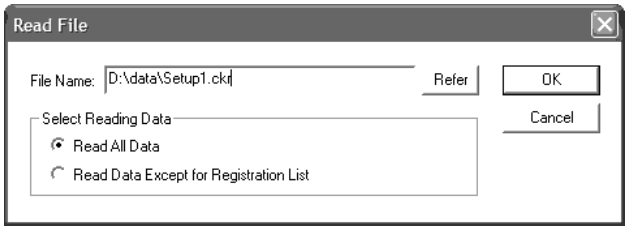
## Read All Data

Slave’s registration list and routing setting are read and displayed. Normally, select this.

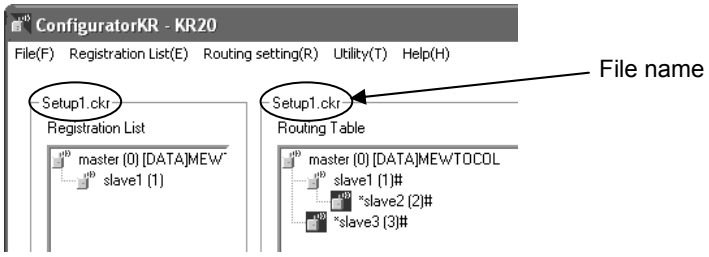
## Read Data Except for Registration List

Slave’s registration list is not read. Reading data is displayed only in routing setting.
When only routing setting is copied, use this.

**[Copy only routing setting]**
It reads registration list from master, and file is read with this setting. (In main window, registration list is displayed read from master and routing setting is displayed read from setting file.)
After that, by executing “Transfer to Master Unit” or “Save as”, it is possible to make setting file of master with copied routing setting.



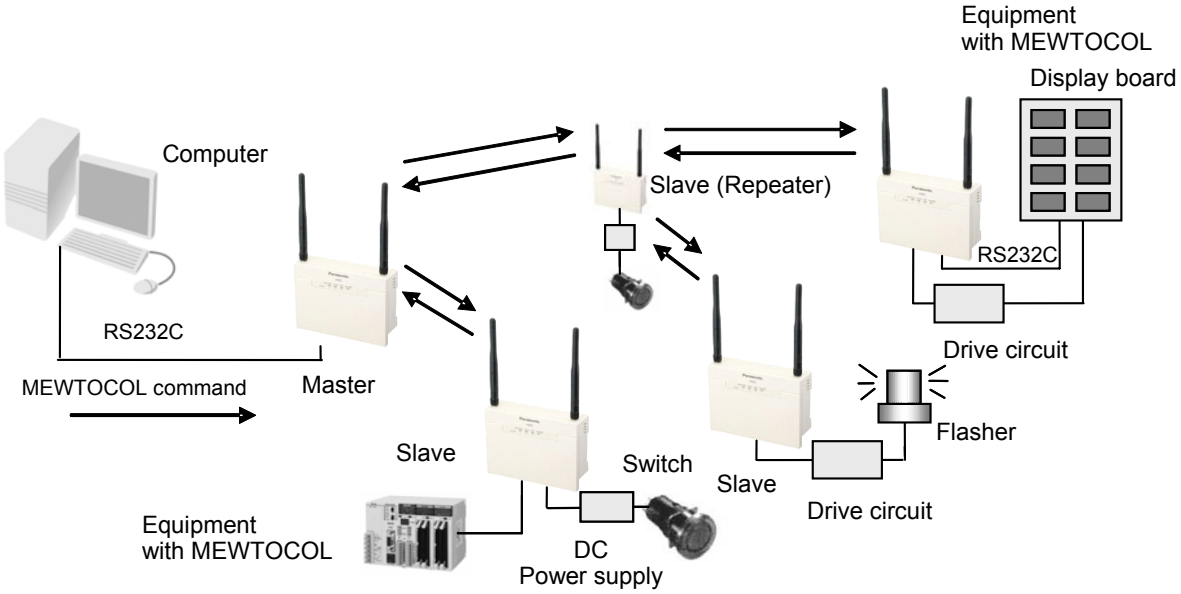

Setting file information is displayed in main window.
Setting file name “setup 1.ckr” is also displayed on the top of registration list view and routing table view.




**Note: Last main window in the display will be deleted. If the last setting information is necessary to save, save it first and open.**

# 5.7 MEWTOCOL communication with I/O type

For 1:N topology with I/O type, using master's I/O can not control slave's I/O. In order to control I/O of master and slave, connect computer or PLC in the upper level and control by command from upper level. (except [I/O] 1:N topology for report)
In this case, wireless unit is located in the same as equipment with MEWTOCOL protocol.
And transferring data to equipment with MEWTOCOL protocol connected to slave can execute via slave by registering as terminal using setting tool.

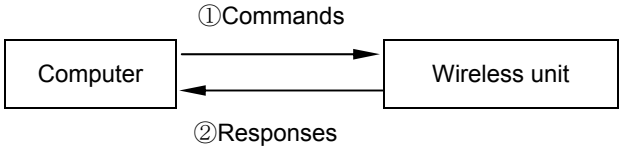



This chapter explains about the overview of MEWTOCOL-COM that can be used for KR20 wireless unit.

## 5.7.1 Overview of MEWTOCOL-COM

### ■ Command and response functions

The computer sends commands (instructions) to Wireless unit, and receives responses in return. This enables the computer and Wireless unit to converse with each other, so that various kinds of information can be obtained and provided.




### ■ Command and response formats

(Host computer) Command message *Only single-frame for data frame.

| Header | Des-tination | Text | Check code | Termi-nator |
|---|---|---|---|---|

(To next command)

(Wireless unit)

| Header | Source | Text | Check code | Termi-nator |
|---|---|---|---|---|

Normal response message

**●Control codes**

| Name | Character | ASCII code | Explanation |
|---|---|---|---|
| Header | % | 25H | Indicates the beginning of a message. |
| Command | # | 23H | Indicates that the data comprises a command message. |
| Normal response | $ | 24H | Indicates that the data comprises a normal response message. |
| Error response | ! | 21H | Indicates that the data comprises a response message when an error occurs. |
| Terminator | CR | 0DH | Indicates the end of a message. |

※Expansion header "＜" is not supported.

**●Destination and source AD (H), (L)**

Two-digit decimal 01 to 99 (ASCII codes)
Command messages contain a unit number for wireless unit that receives the message.
When FF (ASCII codes) is used, the transmission is a global transmission, but it is not supported in wireless unit.

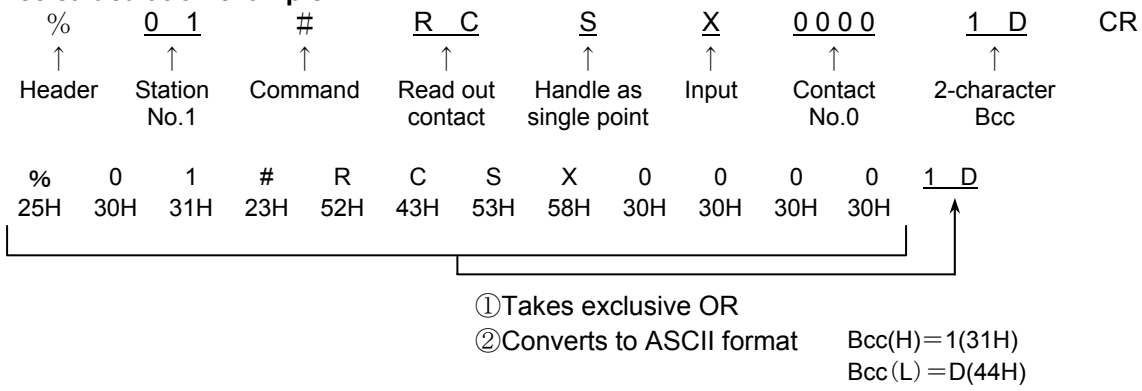
**●Block check code Bcc (H), (L)**

Two- digit hexadecimal 00 to FF (ASCII codes)
These are codes (horizontal parity) that are used to detect errors in the transmitted data.
If "**" is entered instead of "Bcc", however, messages can be transmitted without the Bcc. In this case, the Bcc is included with the response
◇Error code Err (H), (L)
Two- digit hexadecimal 00 to FF (ASCII codes)
These indicate the content if an error occurs.

**●Bcc (Block Check Code)**

・The Bcc is a code that carries out an error check using horizontal parity, to improve the reliability of the data being sent.
・The Bcc uses an exclusive OR from the header (%) to the final character of the text, and converts the 8- bit data into a 2-character ASCII code.

**Bcc caluculation example**




# 5.7.2 Command

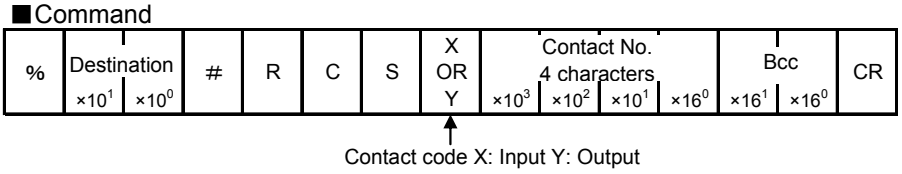
Wireless unit has 2 kinds of commands.

| Command name | Code | Explanation |
|---|---|---|
| Read contact area | RC<br>(RCS)<br>(RCP)<br>(RCC) | Reads contact conditions ON or OFF<br>・Specify 1 point<br>・Specify several points<br>・Specify area by word |
| Write contact area | WC<br>(WCS)<br>(WCP)<br>(WCC) | Makes contact ON or OFF<br>・Specify 1 point<br>・Specify several points<br>・Specify area by word。 |

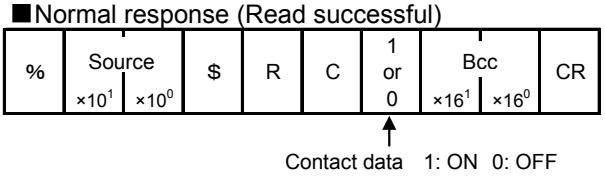
## [RCS]: Read contact area (Single point)

This reads the on and off status for only one contact.

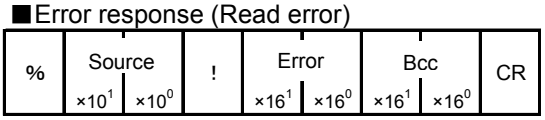
■Command




■Normal response (Read successful)



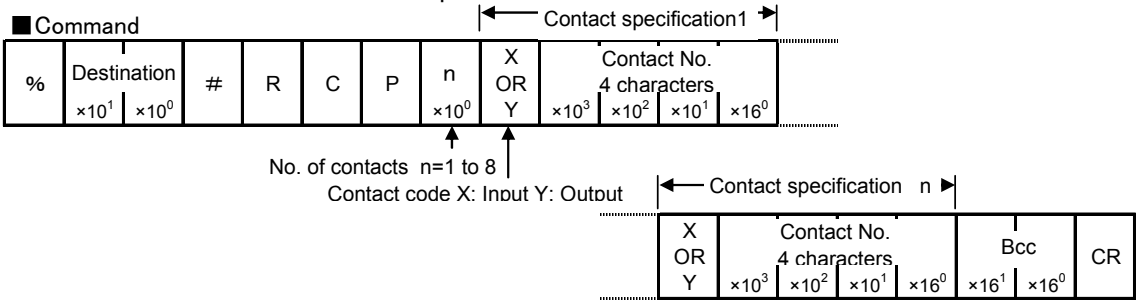

■Error response (Read error)



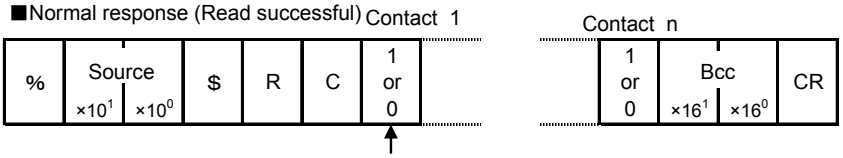

## [RCP]: Read contact area (Plural points)

This reads the on and off status for multiple contacts.

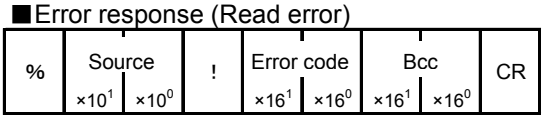
■Command




■Normal response (Read successful)



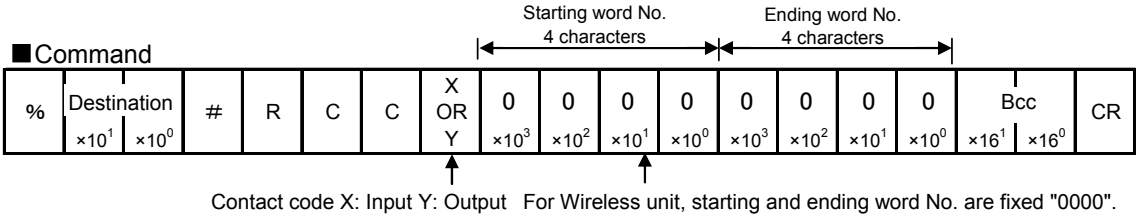

■Error response (Read error)



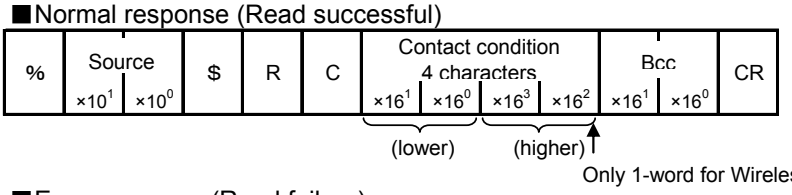

## [RCC]: Read contact area (Word units block)

Read out contact condition, ON or OFF of points by word unit
(Contact conditions are read out for each word with hexadecimal numbers.)

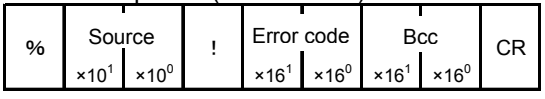
■Command




■Normal response (Read successful)



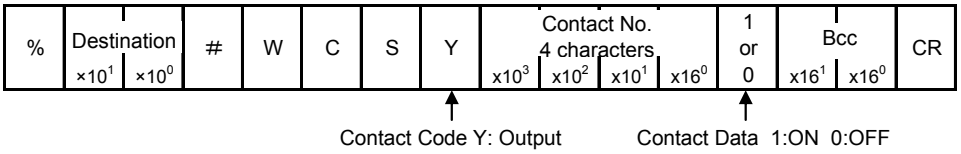

■Error response (Read failure)



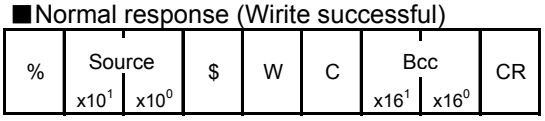
## [WCS]: Write contact area (Single-point)

ON or OFF only one contact.

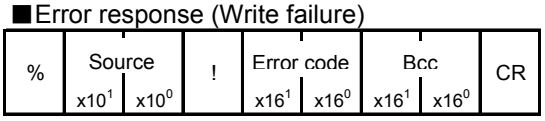
■Command




■Normal response (Wirite successful)



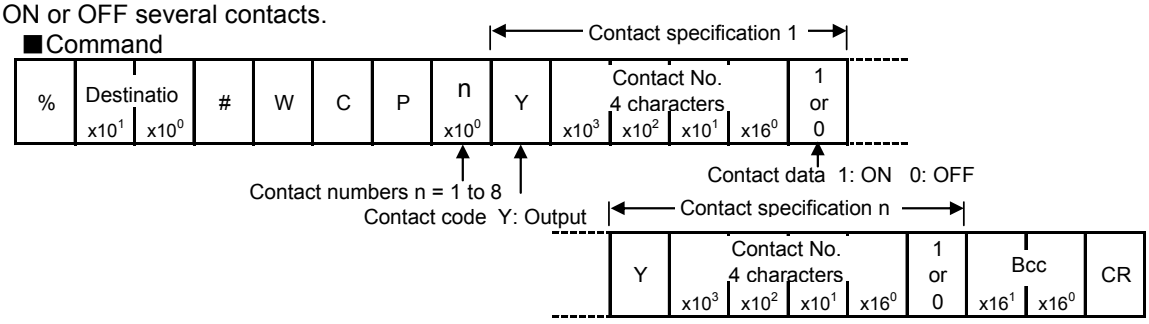

■Error response (Write failure)



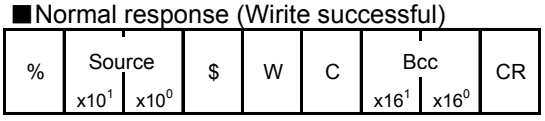

## [WCP]: Write contact area (Several points)

ON or OFF several contacts.

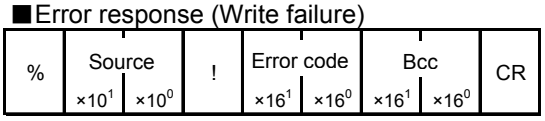
■Command




■Normal response (Wirite successful)



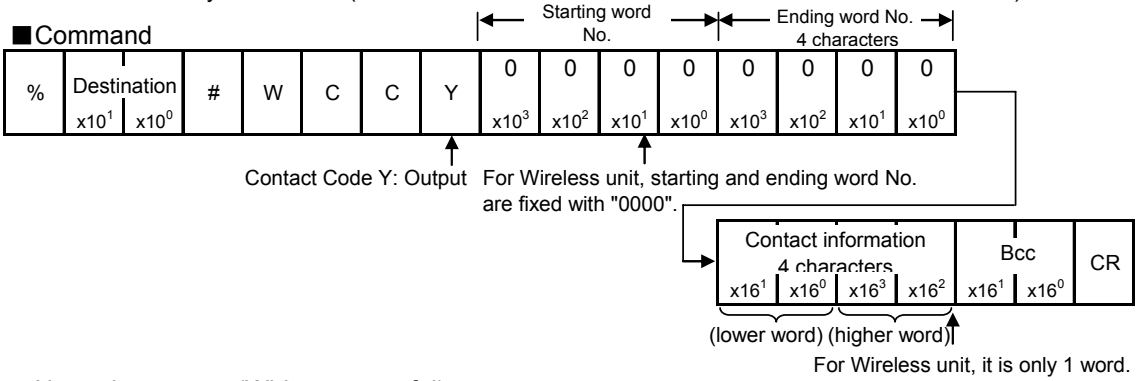

■Error response (Write failure)



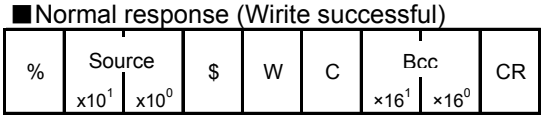

## [WCC]: Write contact area (word block)

ON or OFF contact by word block. (Write contact information for each word block with hexadecimal.)

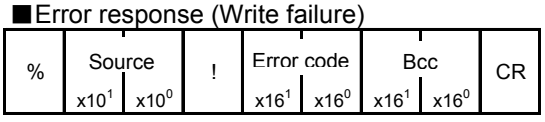
■Command




■Normal response (Wirite successful)




■Error response (Write failure)



# 5.7.3 Error codes

**●Basic procedure errors**

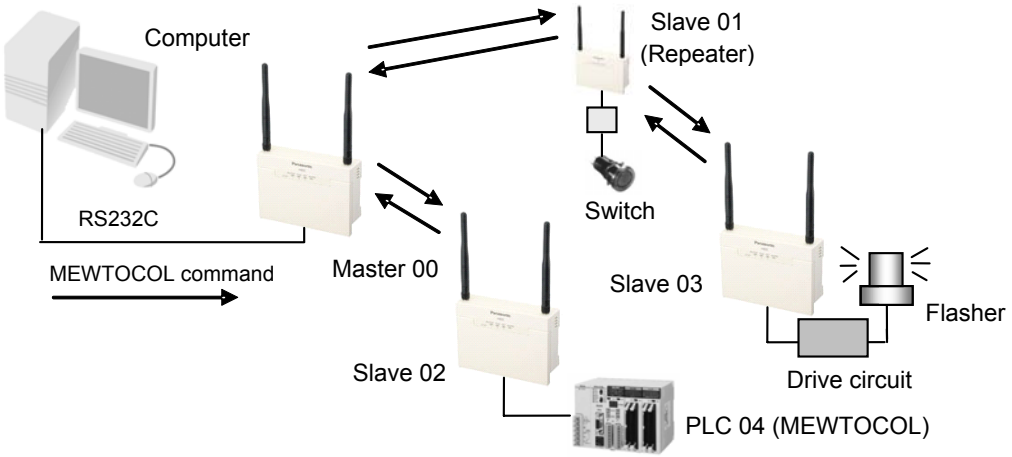
| Error code | Error name | Explanation |
|---|---|---|
| 40H | Bcc error | ・A Bcc error occurred in the command data. |
| 41H | Format error | ・A command message was sent that does not fit the transmission format. |
| 42H | No support error | ・A command was sent that is not supported. |

**●Application error**

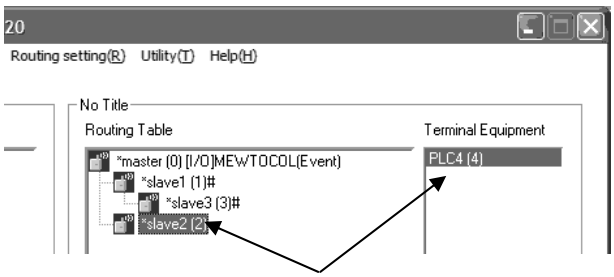
| Error code | Error name | Explanation |
|---|---|---|
| 60H | Parameter error | ・The data code is not “X” and “Y”. |
| 61H | Data error | ・Word No. is specified without decimal.（0000F etc.）<br>・The starting word No. is bigger than the ending word No.<br>・Writing data has a code that is not hexadecimal. |

# 5.7.4 MEWTOCOL communication example

This is the using example of wireless unit I/O type using MEWTCOL-COM command/response.
Set the master to “[I/O] MEWTOCOL (event)” by setting tool.
(*Event is the system that wireless communication is performed only when received data communication from the upper.)




Routing setting for the above system by setting tool




PLC No.4 as terminal of slave No.2

**Note: For wireless unit I/O type, this is located as same as the equipment for MEWTOCOL. Therefore when the equipment for MEWTOCOL is connected to the slave, it is necessary to change the unit number. If the same Unit No. is set, it doesn’t work correctly.**

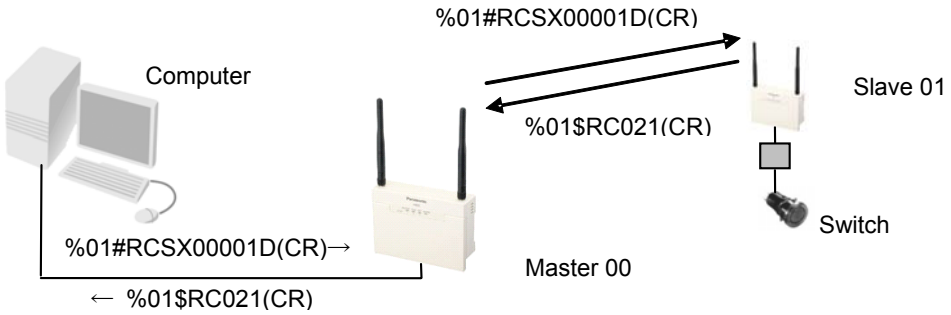
**●Read out the ON or OFF condition of input terminal 0 (switch) of slave1**

・Send command from upper computer

%01#RCSX00001D(CR)　　※Hereinafter (CR) shows CR code.

・Response from slave 1

%01$RC021(CR) ・・・Input 0 is set to OFF



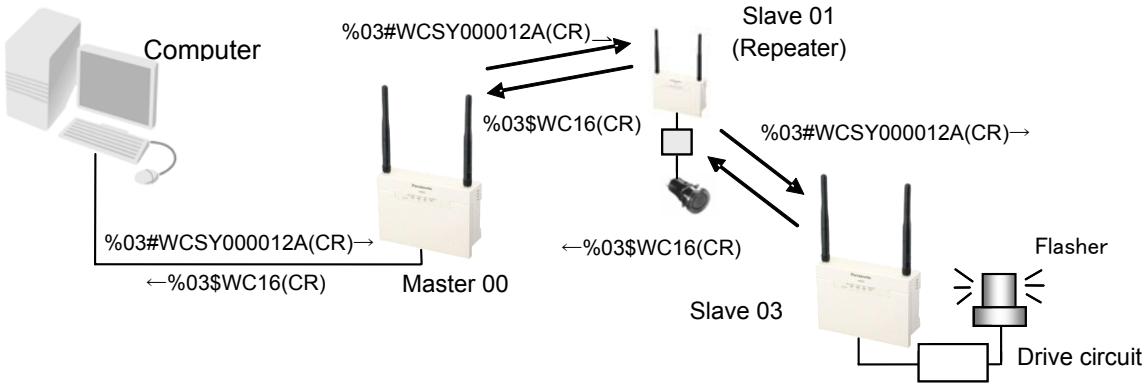

**●Set output terminal 0 (flasher) of slave3 to ON**

・Send command from upper computer

%03#WCSY000012A(CR)

・Response from slave 3

%03$WC16(CR) ・・・ White OK



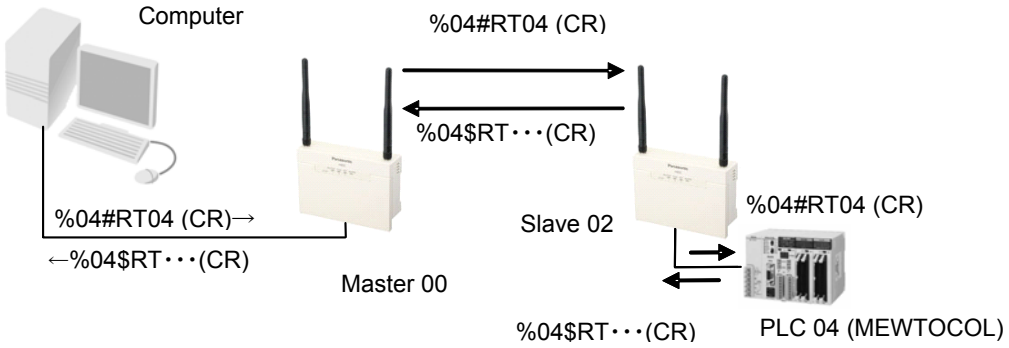

**●Send MEWTOCOL command to PLC4**

・Send command from upper computer

%04#RT04 (CR)

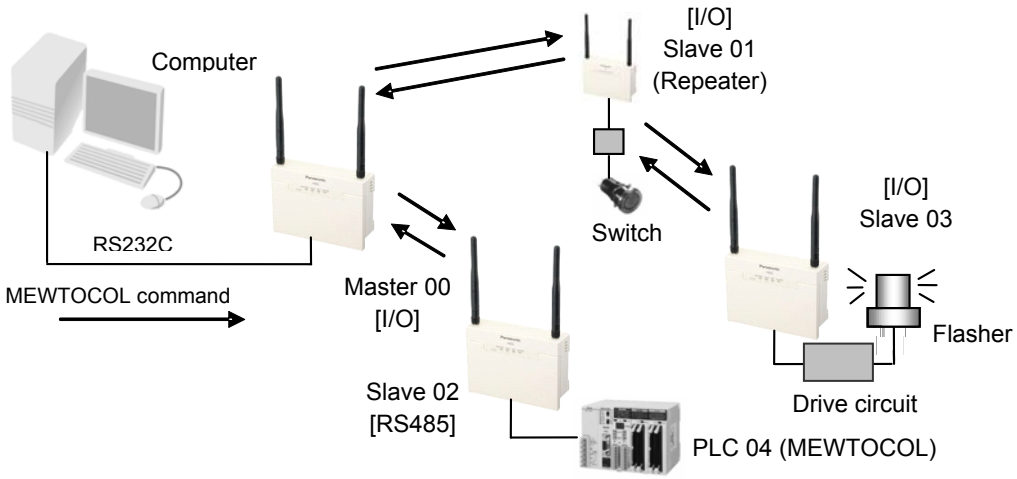
・Response from PLC4

%04$RT・・・(CR)

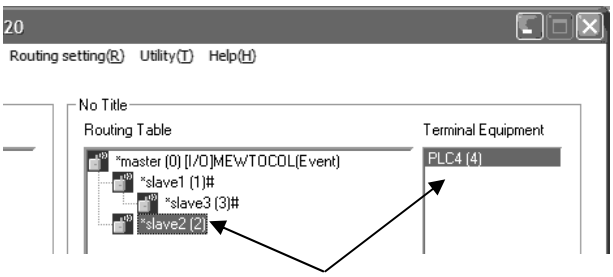


# 5.7.5 MEWTOCOL communication example (Mixed I/O type and RS485 type)

This is the using example of I/O type and RS485 type are mixed
Set the master to"[I/O] MEWTOCOL (event)" by setting tool.
(*Event is the system that wireless communication is performed only when received data communication from the upper.)




Routing setting for the above system by setting tool

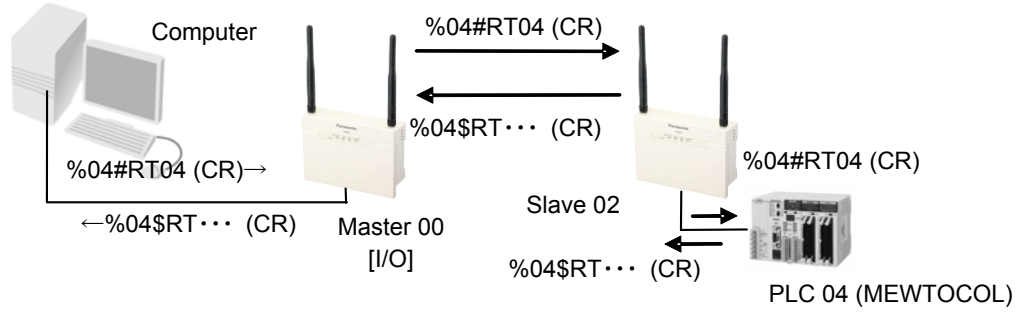



PLC No.4 as terminal of slave No.2

**Notes: 1. Set different Unit No. to the slave and the terminal. If not, it doesn't work correctly.**
**2. Do not send MEWTOCOL command to the unis of RS485 type. RS485 type doesn't send correct response.**

**●Send MEWTOCOL command to PLC4**

・Send command from upper computer
%04#RT04 (CR) *Hereinafter (CR) shows CR code.
・Response from PLC4
%04$RT・・・(CR)

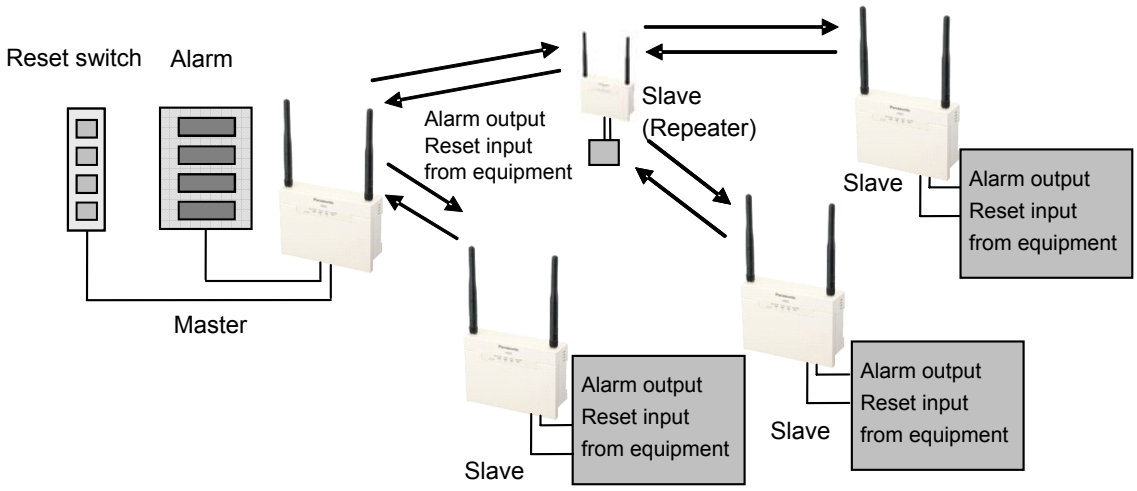



**Reference:** <6.3.2 Confirmation of COM port connection> Check version of main unit

# 5.8 “1:N topology for report” function with I/O type

For 1:N topology with I/O type, command from upper level master controls I/O of master and slave. With this “1:N topology for report” function, input from slave can be reflected to output from master without connectiong computer or PLC at upper level of master. And input to master can be reflected to output of slave’s same number.

<Example of alarm system using I/O unit>




This chapter explains about the overview of “1:N topology for report” fuction.

## 5.8.1 Overview of “1:N topology for report” function

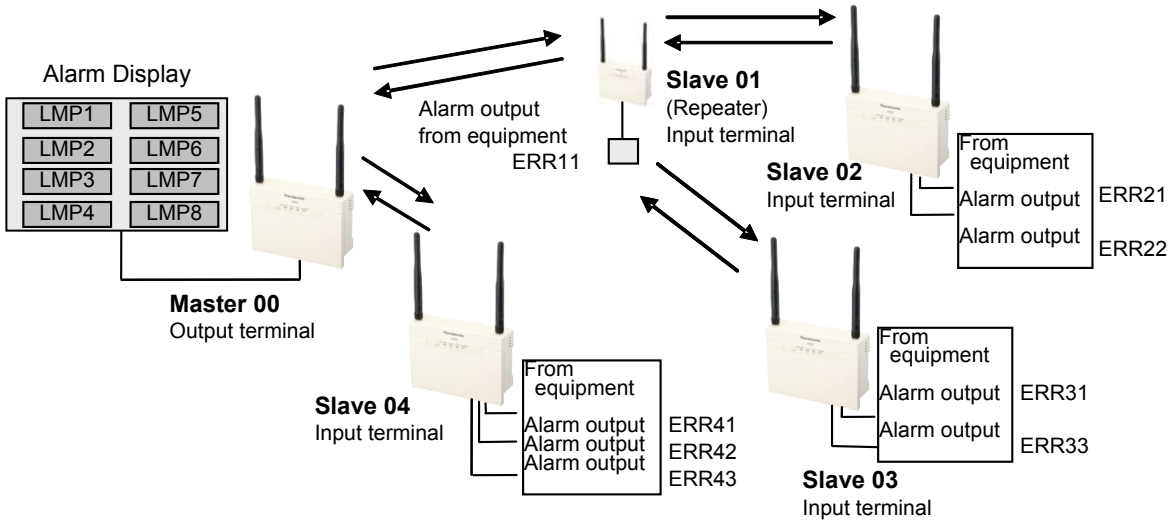
### Basic operation

・Master communicates with all slaves that is registered and set the routing setting in turn. (1:N topology Polling)
・Master output uses OR of input terminal with same terminal number as output terminal in master with routing setting of slave.
For example, master’s output terminal OUT0 uses OR of input terminal IN0 in slave No.1, IN0 in slave No.2, ・・・・・・・, IN0 in slave No.8.
Therefore, if one input terminal in slave is connected only 1 point, you can specify the slave with input change.
・Master input is reflected to terminal with same number in all slaves.
(It is not reflected as simultaneous report. It is reflected from next wireless communication after input change.)
・I/O communication and data communication cannot execute together.
Use only with I/O communication.
・Total input points is allocated max. 8-input.
・Even if you use repeater function, be sure to use I/O type. Slaves working as repeater can be polling I/O information.

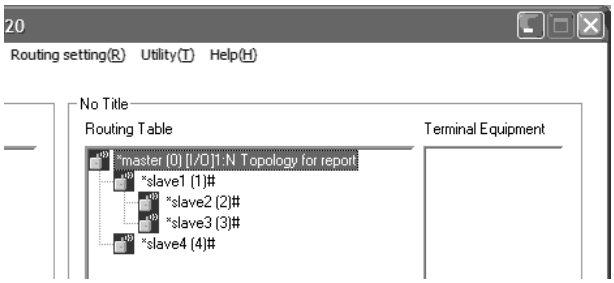
# 5.8.2 “1:N topology for report” using example 1

This is the example using master’s output terminal and slave’s input terminal.
Set master to “[I/O] 1:N topology for report” by using setting tool.

**●Report system of central display for alarm by 4 type of equipment, that output numbers are different.**




Routing setting of above system by setting tool

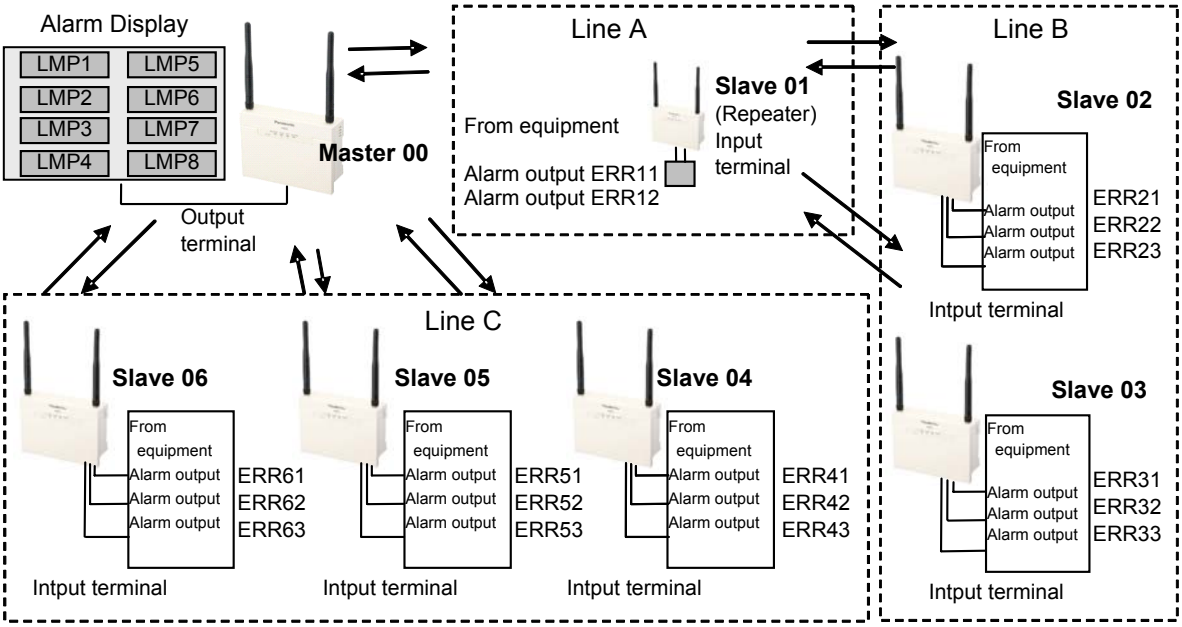



In the above system, slave’s one input terminal should be connected only 1 point as below table.
“-“ shows that it is not connected. For example, only ERR11 of slave 01 is connected input 0. Like this case 2 or more inputs should not be connected to same terminal, any other allocation is OK.
If all slaves have only 1 input, max 8 slaves’s input information can be output from master.

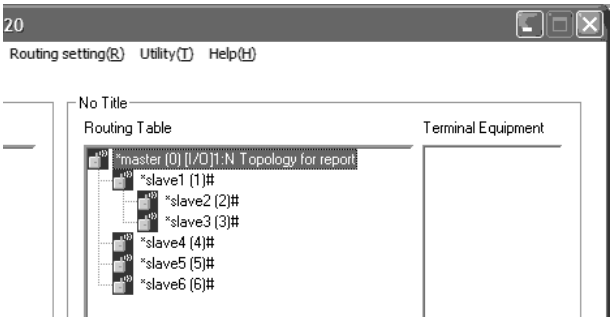
| Terminal | | Master 00 | | Terminal | | Slave01 | Slave 02 | Slave 03 | Slave 04 |
|---|---|---|---|---|---|---|---|---|---|
| Output | 0 | LMP1 | ← | Input | 0 | ERR11 | - | - | - |
| | 1 | LMP2 | ← | | 1 | - | ERR21 | - | - |
| | 2 | LMP3 | ← | | 2 | - | ERR22 | - | - |
| | 3 | LMP4 | ← | | 3 | - | - | ERR31 | - |
| | 4 | LMP5 | ← | | 4 | - | - | ERR32 | - |
| | 5 | LMP6 | ← | | 5 | - | - | - | ERR41 |
| | 6 | LMP7 | ← | | 6 | - | - | - | ERR42 |
| | 7 | LMP8 | ← | | 7 | - | - | - | ERR43 |

**Notes: ・In order to transfer input to the other unit, signal should be input over polling time.**
**・When signal is input to slave, it reflects to master at polling timing.**
**It delays for polling time.**

**●Report system of central display for alarm by each line**




Routing setting of above system by setting tool




When line A has 2 inputs, line B has 3 inputs (ERR21 and ERR31 are common. ERR22 and ERR32 are common.) , line C has 3 inputs (ERR41,ERR51 and ERR61 are common. ERR42, ERR52 and ERR62 are common. ERR43, ERR53 and ERR63 are common.), connect as below.
"-" shows that it is not connected.
2 or more inputs are allocated to same terminal number, when at least 1 signal input, output to master. Slave's number to be connected to same terminal number is max. 99.

| Terminal | | Master 00 |
|---|---|---|
| Output | 0 | LMP1 |
| | 1 | LMP2 |
| | 2 | LMP3 |
| | 3 | LMP4 |
| | 4 | LMP5 |
| | 5 | LMP6 |
| | 6 | LMP7 |
| | 7 | LMP8 |

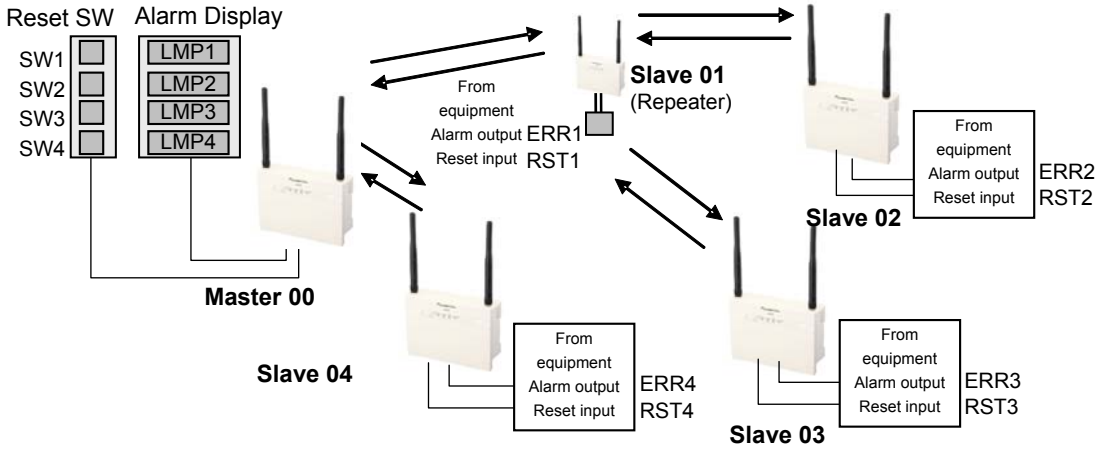
| Terminal | | Slave 01 | Slave 02 | Slave 03 | Slave 04 | Slave 05 | Slave 06 |
|---|---|---|---|---|---|---|---|
| Input | 0 | ERR11 | - | - | - | | |
| | 1 | ERR12 | - | - | - | | |
| | 2 | - | ERR21 | ERR31 | - | | |
| | 3 | - | ERR22 | ERR32 | - | | |
| | 4 | - | ERR23 | ERR33 | - | | |
| | 5 | - | - | - | ERR41 | ERR51 | ERR61 |
| | 6 | - | - | - | ERR42 | ERR52 | ERR62 |
| | 7 | - | - | - | ERR43 | ERR53 | ERR63 |

**Notes: ・In order to transfer input to the other unit, signal should be input over polling time.**
**・When signal is input to slave, it reflects to master at polling timing.**
**It delays for polling time.**

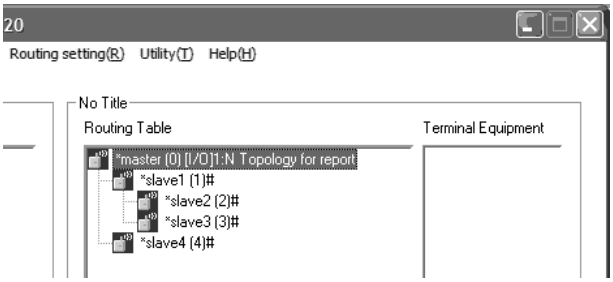
# 5.8.3 “1:N topology for report” using example 2

This it the esample using input terminal and output terminal in both master and slave.
Set master to “[I/O] 1:N topology for report” by using setting tool.

**●Report system of central display for alarm by 4 types of equipment and reset alarm by 4 types of equipment.**




Routing setting of above system by setting tool




In the above system, slave’s one input terminal should be connected only 1 point as below table. And if you want to reset alarm individually, output terminal should be connected not to exist same output from other slaves.
“-“ shows that it is not connected. For example, only ERR1 of slave 01 is connected input 0. Like this case 2 or more inputs should not be connected to same terminal, any other allocation is OK. Same as this, 2 or more inputs to master should not be connected to same terminal, any other allocation is OK.

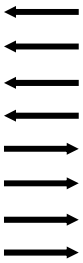
| Terminal | | Master 00 |
|---|---|---|
| Output | 0 | LMP1 |
| | 1 | LMP2 |
| | 2 | LMP3 |
| | 3 | LMP4 |
| Input | 0 | SW1 |
| | 1 | SW2 |
| | 2 | SW3 |
| | 3 | SW4 |

| Terminal | | Slave 01 | Slave 02 | Slave 03 | Slave 04 |
|---|---|---|---|---|---|
| Input | 0 | ERR1 | - | - | - |
| | 1 | - | ERR2 | - | - |
| | 2 | - | - | ERR3 | - |
| | 3 | - | - | - | ERR4 |
| Output | 0 | RST1 | - | - | - |
| | 1 | - | RST2 | - | - |
| | 2 | - | - | RST3 | - |
| | 3 | - | - | - | RST4 |

*Input teminal 4 to 7 and output terminal 4 to 7 are vacant.

**Notes:・In order to transfer input to the other unit, signal should be input over polling time.**
**・When signal is input to slave, it reflects to master at polling timing. It delays for polling time.**
**・When reset alarm, signal should be input until disappearing the alarm display with checking the display. (max. double of polling time.)**

If you want to reset all alarm by only switch 1, connect as below.
But it is not reset simultaneously, it resets one by one in turn. Input time to switch 1 will be longer.



| Terminal | | Master 00 |
|---|---|---|
| Output | 0 | LMP1 |
| | 1 | LMP2 |
| | 2 | LMP3 |
| | 3 | LMP4 |
| Input | 0 | SW1 |
| | 1 | - |
| | 2 | - |
| | 3 | - |

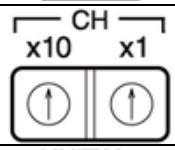
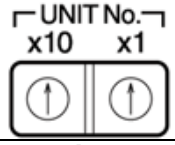
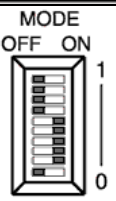
| Terminal | | Slave 01 | Slave 02 | Slave 03 | Slave 04 |
|---|---|---|---|---|---|
| Input | 0 | ERR1 | - | - | - |
| | 1 | - | ERR2 | - | - |
| | 2 | - | - | ERR3 | - |
| | 3 | - | - | - | ERR4 |
| Output | 0 | RST1 | RST2 | RST3 | RST4 |
| | 1 | - | - | - | - |
| | 2 | - | - | - | - |
| | 3 | - | - | - | - |

*Input teminal 4 to 7 and output terminal 4 to 7 are vacant.

# 5.9 Initialization

When you'd like to return the inner memory to default setting at factory shipment, initialize it.
After initialization, in master, slave registration and routing setting information data will be deleted.
And in slave, its Unit No. setting, registered, is deleted.

### Setting of wireless unit

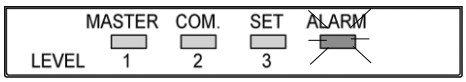
| | | |
|---|---|---|
| Operating mode switch |  | Be sure to set to "SET". |
| Communication channel |  | Select from "00～F5". ※1 |
| Unit No. switch |  | Any settings are OK. |
| MODE switch |  | Be sure to set No.9 ON. Except it, any settings are OK. Refer to <3.2.4 Setting of MODE switch> |

※1: At initialization, it doesn't communicate by wireless. Therefore any communication channel setting is OK.

### Procedures for initialization

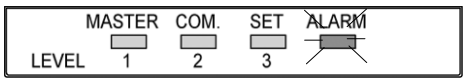
(1) Set all switches as above.
(2) Turn power supply of wireless unit to initialize on.
(Blinking "ALARM" means it is the state to prepare for initialization.)

Master




Lighting Lighting Blinking

Slave

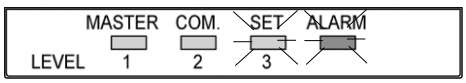



Lighting Blinking

(3) Press <ENTER> switch continuously (approx. 3 sec).

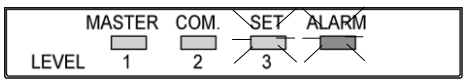
(4) LED is blinking as below.

Master




Lighting Lighting Blinking Blinking

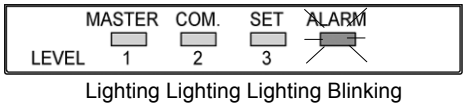
Slave




Lighting Blinking Blinking

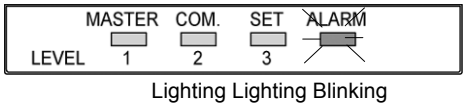
(5) Initialization is completed when LED lights as below.
(Blinking "ALARM" means that MODE switch No.9 is kept to ON.)

Master




Lighting Lighting Lighting Blinking

Slave




Lighting Lighting Blinking

(6) After completing the initialization, be sure to set MODE switch No.9 to OFF. After that, turn power supply on again or change operating mode switch.

**Notes: 1. After initializing master, all slave registrations are deleted. Do not forget to set No.9 to OFF.**
**2. When initializing, do not execute serial communication or I/O communication.**

# Chapter 6

# Test and Utilities

# 6.1 Test and utilities

In this chapter, various test functions and utilities are explained.
There are some test functions working only the main unit and some test functions and utilities by using setting tool.
Before reading this chapter, see the below tables to prepare.

### Main unit test functions

| Items | Overview | Required | Required setting |
|---|---|---|---|
| Communication test | Check communication of 1:1 topology | Master, Slave | Operating mode: <TEST><br>MODE switch: No.9 <ON/OFF> |
| Field intensity monitor | Check vacancy of radio wave | Main unit(Any) | |

### Test functions and utilities by setting tool

| Items | Overview | Required | | Required setting |
|---|---|---|---|---|
| Configuration | Select COM port | Main unit (Any) | computer, setting tool, RS232C cable | Operating mode: <SET> or <RUN>*<br>COM port: <RS232C> |
| Confirmation of COM port connection | Test of connection between computer and wireless unit<br>Check version of main unit | | | |
| Confirmation of status (Connected wireless unit) | Check wireless unit's status directly | | | |
| Confirmation of status (Slave) | Check wireless unit's status by wireless | Master, Slave | | Operating mode of master and slave: <SET> or <RUN>*<br>Master COM port: <RS232C><br>Routing setting |
| Communication test | Check communication of 1:N topology | | | |
| Field intensity monitor | Check vacancy of radio wave for each channel | Main unit (Any) | | Operating mode: <SET> or <RUN>*<br>COM port: <RS232C> |
| Read log | Read out error log in main unit | | | |
| Remote reset | Reset software of main unit | | | |
| Flow control | Set flow control available/not available | Main unit (All) | | Operating mode: <SET><br>COM port: <RS232C> |

*It is possible to use in RUN mode with setting tool, software version 1.20 or later.

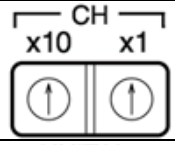
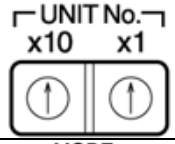
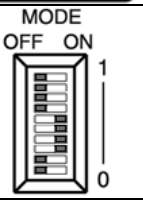
 **Reference:** <Help in setting tool (Configurator KR)>

# 6.2 Test functions of main unit

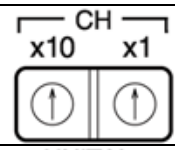
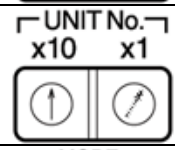
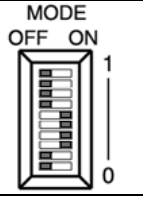
## 6.2.1 Communication test

You can check if it can communicate between master and slave or not beforehand.
Slave's level meter shows the field intensity, it is convenient when examining the place to mount wireless units. Slave registration is not necessary for this function.

### Master's setting

| | | |
|---|---|---|
| Operating mode switch |  | Be sure to set to <TEST>. |
| Communication channel |  | Select from "00～F5". *1 |
| Unit No. switch |  | Be sure to set to "00".<br>At factory setting, Unit No, is set to "00". |
| MODE switch |  | Any settings<br>Refer to <3.2.4 Setting of MODE switch> |

### Slave's setting

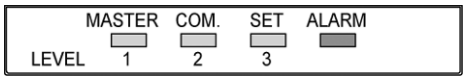
| | | |
|---|---|---|
| Operating mode switch |  | Be sure to set to <TEST>. |
| Communication channel |  | Select same channel as master. |
| Unit No. switch |  | Be sure to set to "01".<br>At factory setting, Unit No, is set to "00". |
| MODE switch |  | Be sure tp set No.9 to OFF. Except it, any settings are OK.<br>Refer to <3.2.4 Setting of MODE switch> |

*1 Do not use communication channel of 4C～5F, 81～8F, A6～AF, BB～CF, D7～DF, EA～EF and F6～FF. Refer to Chapter 9 "Attachment Using frequency".

## Procedures for communication test

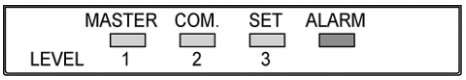
(1) Set all switches as above.
(2) Power supply of master and slave on.

Master




Lighting Lighting

Slave

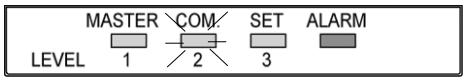



Lighting

(3) Press <ENTER> switch to start communication test.
LED is blinking as level meter.
In the actual system, use with the field intensity that indicates a. or b.

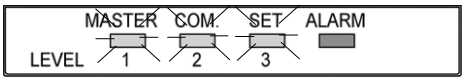
a. When radio wave condition is good.

Master




Lighting Blinking

Slave

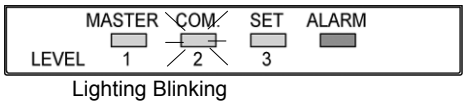



Blinking Blinking Blinking

(3 LEDs are blinking.)

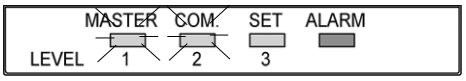
b. When radio wave condition is not bad.

Master




Lighting Blinking

Slave

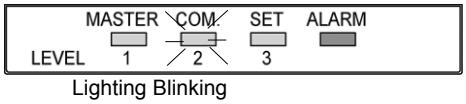



Blinking Blinking

(2 LEDs are blinking.)

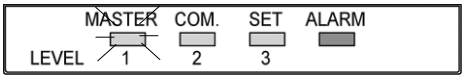
c. When it is communicationg but radio wave condition is weak.

Master




Lighting Blinking

Slave

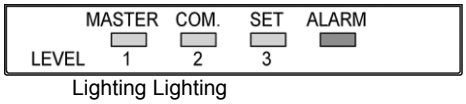



Blinking

(1 LED is blinking.)

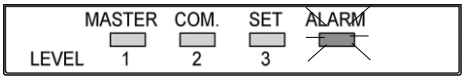
d. When an radio wave does not reach at all.

Master




Lighting Lighting

Slave




Lighting Blinking

(4) Press <ENTER> again to stop communication test.

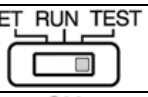
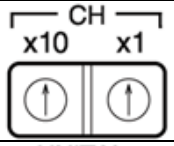
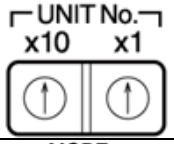
**Note: When communication doesn't work well even if master and slave are near, the below causes are supposed. Check them and take communication test again.**

| Causes | Troubleshooting |
|---|---|
| Power supply of master is OFF. | Turn the power supply of master on. |
| Settings of master or slave are not correct. | Check the settings. |
| After setting master and slave, it doesn't turn power supply on again. | Turn the power supply on again.<br>or<br>Change operating mode switch.<br>(TEST→RUN→TEST) |
| Another wireless unit is using the same frequency. | Change communication channel. |
| Antenna is removed. | Connect antenna surely. |

# 6.2.2 Field intensity monitor

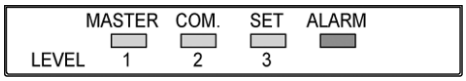
You can check if other wireless unit uses the communication channel that you want to use or not.
It is convenient when examining the communication channel of wireless unit.
It monitors simply by using rough time period in this function. When you need measuring correctly, use a commercial spectrum analyzer.

### Wireless unit's setting

| | | |
|---|---|---|
| Operation mode switch |  | Be sure to set to <TEST>. |
| Communication channel |  | Select communication channel to check from "00～4B"<br>It can not test correctly if selecting others. |
| Unti No. switch |  | Any settings |
| MODE switch |  | Be sure tp set No.9 to ON. Except it, any settings are OK.<br>Refer to <3.2.4 Setting of MODE switch> |

### Procedures for field intensity monitor

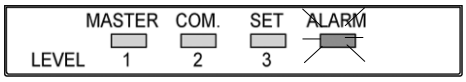
(1) Set all switches as above.
(2) Power supply of wireless unit on.



Lighting

(3) Press <ENTER> switch to start field intensity monitor.
LED is blinking as level meter after flashing <SET>.
Max of field intensity value is kept therefore, if it received only once, it can notice there is radio wave.
In the actual system, no other radio wave is desired. Use with the field intensity that indicates a. or b. If it is other condition, change communication channel and check again.

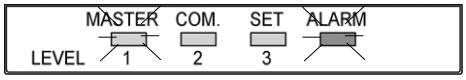
a. When there is no radio wave.



("ALARM" LED is blinking.)

Extinction Blinking
Extinction Extinction

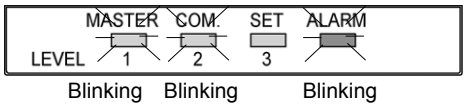
b. When field intensity is weak. (When there is little radio wave.)



(1 green LED is blinking.)

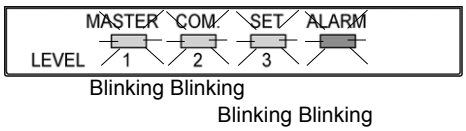
Blinking Blinking

c. When field intensity is not bad. (When there is radio wave.)




(2 green LEDs are blinking.)

d. When field intensity is strong. (When there is a strong radio wave.)




(3 LEDs are blinking.)

* In order to distinguish from the communication test, “ALARM” is blinking when it executes field intensity monitor.

(4) Press <ENTER> switch again to stop the feild intensity monitor.

**Note: LED level meter shows maximum value of field intensity during monitoring, not instantaneous value.**

# 6.3 Test functions and utilities by setting tool

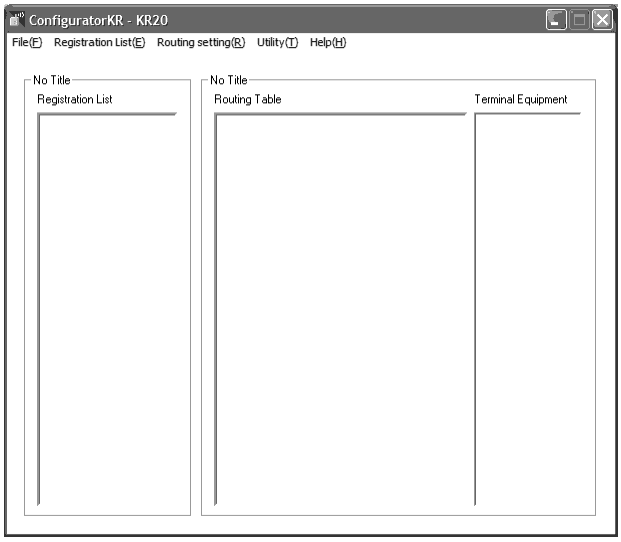
This chapter is the explanation about test functions and utilities by setting tool.
Refer to Help in setting tool (Configurator KR) for detail.

**Reference:** <Help in setting tool (Configurator KR)>

### How to boot the setting tool software

(1) Connect computer and wireless unit with RS232C cable. (RS485 type: MODE switch No.2 is set to OFF.)
(2) Turn power supply of master unit on with operating mode switch “SET” or “RUN”.
It is possible to use in RUN mode with setting tool, software version 1.20 or later.
(3) Boot setting tool.
Click on the Windows [Start] button and then select "All Programs", "Panasonic-EW SUNX Control", "Configurator", "Configurator KR", and "Configurator KR" on the displayed Windows menu, in that order.

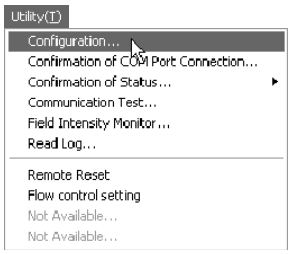
Below window is displayed.



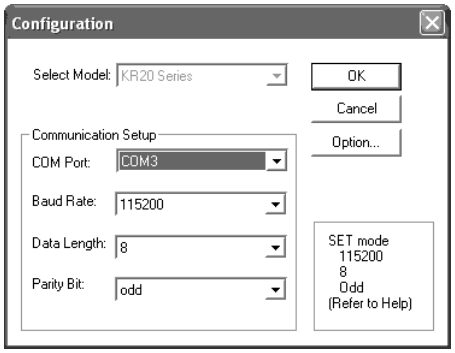

*From the left, there are 3 areas of “Registration list view”, “Routing table view” and “Terminal equipment list view”.

## 6.3.1 Configuration

It sets the model of wireless unit and the communication settings with computer.
Set the communication condition of computer according to the communication condition of the wireless unit.
(1) Select “Utility” -> “Configuration” in menu.



Configuration dialog is displayed.




## COM port

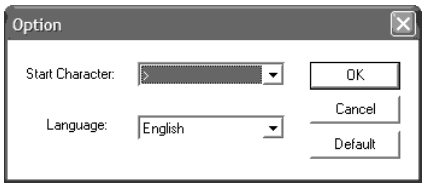
Select computer's COM port.

## Baud rate, Data length, Parity

Select communication settings of computer.
SET mode:
Set baud rate, data length, parity to 115200bit/s, 8bit, Odd.
RUN mode:
Set communication settings according to the main unit.
But it is impossible to "transfer to main unit" in RUN mode. In order to transfer setting to main unit, set to "SET" mode.

**Normally, option is not necessary. In below cases, change it.**

・When start character of communication protocol of upper and terminal equipment is ">".
・When you want to change the displayed language of setting tool.



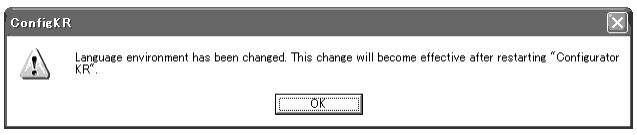

## Start Character

It is setting of start character of original data at communication between wireless unit and computer.
Initial is set to ">" and normally it is not necessary to change.
When start character of communication protocol of upper and terminal equipment is ">", it may cause malfunctions. Change to different character.

## Language

It is possible to change the displayed language of setting tool.
English, Japanese and Simplified Chinese are available.
Select language from "English", "Japanese" and "Simplified Chinese" in pulldown menu.

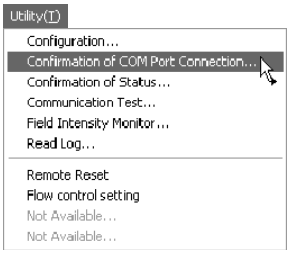
Below dialog is displayed, click "OK".



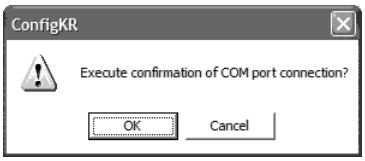

Once exit Configurator KR and restart configurator KR again. Then language will be changed.

# 6.3.2 Confirmation of COM port connection

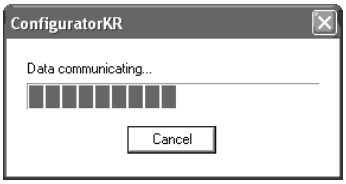
You can check if computer and wireless unit (master or slave) are connected correctly or not.
(1) Select “Utility” -> “Confirmation of COM port connection” in menu.



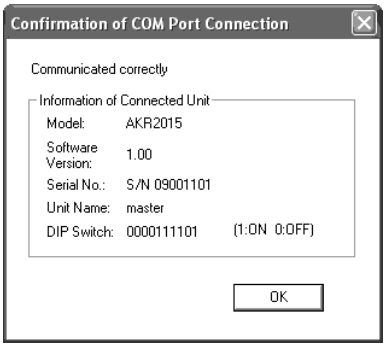

(2) When the below dialog is displayed, click ‘OK’.




Below dialog is displayed during data communication.




After completing communication correctly, it displays model No., software versioin, serial No., name and MODE switch (DIPSW) conditions of connected wireless unit.

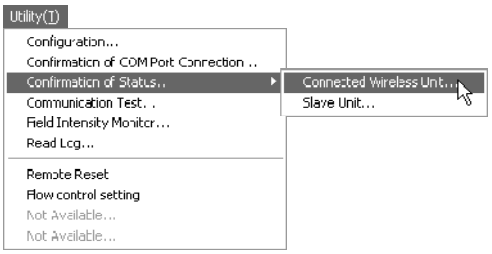



# 6.3.3 Confirmation of status

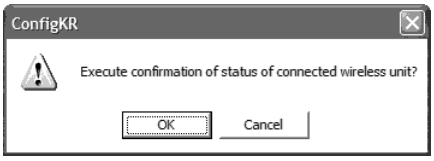
You can read out the present status of wireless unit (master or slave) connected to computer.

### Confirmation of status of connected wireless unit

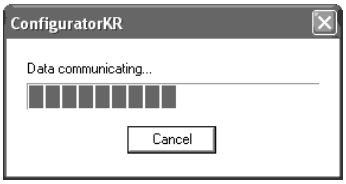
(1) Select “Utility” -> “Confirmation of status” -> “Connected wireless unit”.



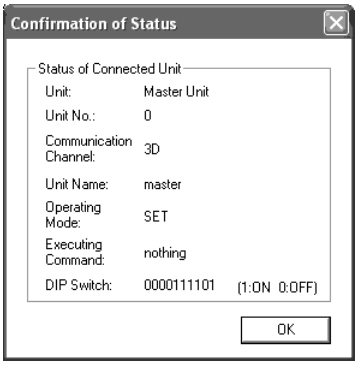

(2) When the below dialog is displayed, click ‘OK’.




Below dialog is displayed during data communication.




After completing the communication correctlly, it displays distinction of master or slave, Unit No., communication channel, name, operating mode, executing command, MODE switch (DIPSW) conditions of connected wireless unit.

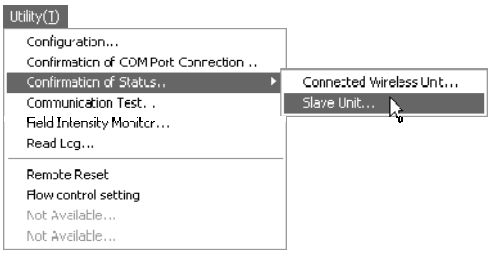



## Status of slave unit

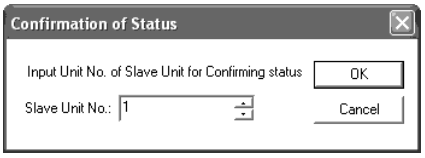
During connecting master to computer, slave’s status can be confirmed via wireless communication from master to slave. You can check the actual routing setting.

(1) Select “File” -> “Tranfer From Main Unit” in menu.
Keep the display of slave registration list and routing setting in main window.
Set operating mode switch of master and slave to <SET> or <RUN> and turn the power supply on.

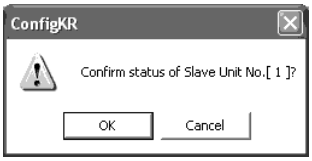
(2) Select “Utility” -> “Confirmation of status” -> “Slave” in menu.



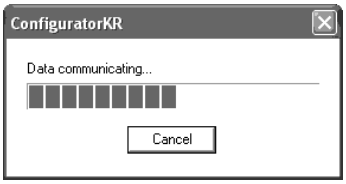

Input Unit No. existed in the routing view.



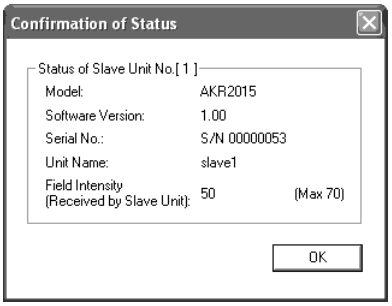

When the below dialog is displayed, click ‘OK’.




Below dialog is displayed during data communication.




After completing the communication correctly, it displays slave’s model No., Software version, Serial No., Name and field intensity level.

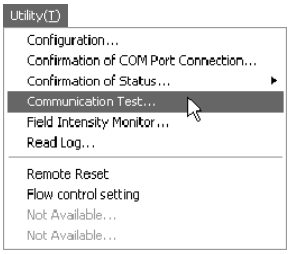



# 6.3.4 Communication test

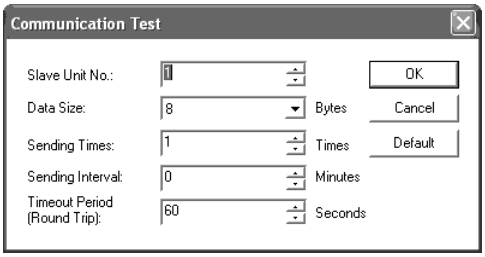
You can check the communication conditions from master to objecteive slave including repeaters beforehand. You can know an approximate return period to communicate, it can be used as reference in order to set timeout period at upper level.

(1) Select “file” -> “Tranfer From Main Unit” in menu.
Keep the display of slave registration list, routing setting in main window.
Set operating mode swithes of master and slave to <SET> or <RUN> and turn the power supply on.

(2) Select “Utility” -> “Communication test” in menu.




(3) Dialog to select test conditions is displayed, input conditions of communication test.




## Slave Unit No.

Select slave for communication test. Slaves without routing setting and slave registration cannot be tested.

## Data size

Set data size for communication test.
Select from 8,16,32,64,128,256,512,1024,2016 bytes.

## Command sending times

Set the times of serial sending the data.
Input with the range of 1 to 255.

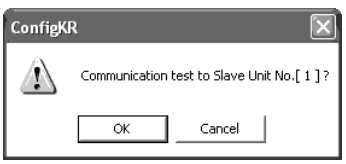
## Sending interval

Set the interval of sending data continuously.
It shows the time from returning response to computer to sending next data.
Input with the range of 0 (at once) to 255 minutes.

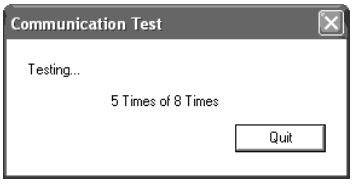
## Timeout period (Round trip)

It shows the period to get response from slave after sending data from computer.
Input with the range of 1 to 999 seconds. Normally, there is no problem with default

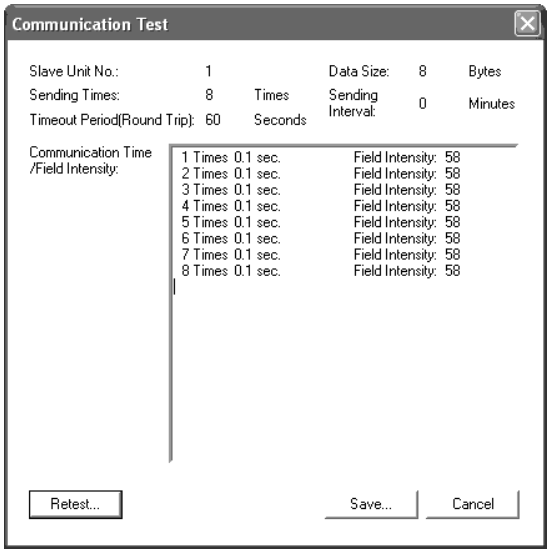
(4) When the below dialog is displayed, click ‘OK’.




Below dialog is displayed during data communication.
It indicates sending numbers(all) and present sending numbers.



After completing communication correctly, it displays test conditions, time period of communication test (Round trip), and field intensity level.
Communication condition is better with the higher value for field intensity. (Max. 70)




LED display and feild intensity for communication test by main unit

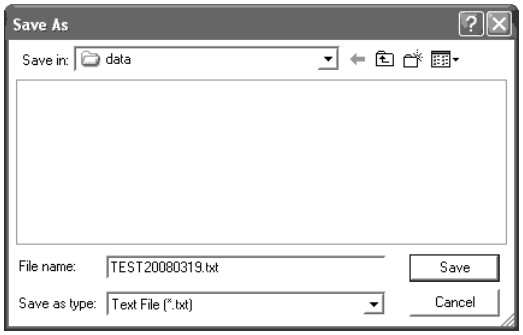
| LED display | Feild intensity |
|---|---|
| LEVEL1 | to 29 |
| LEVEL2 | 30 to 42 |
| LEVEL3 | 43 to 70 |

## Retest

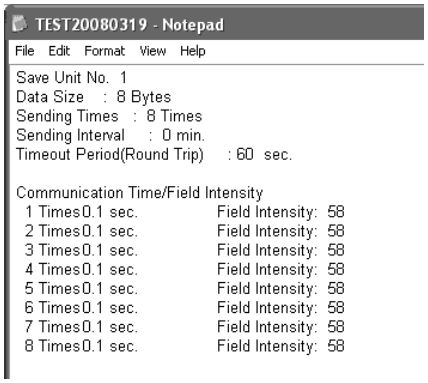
Return to dialog for test condition.
Test result is not saved, save first if it is necessary.

## Save

Test result can be saved with text file. Input file name and click “Save”.
After saving, it returns to display of test result.



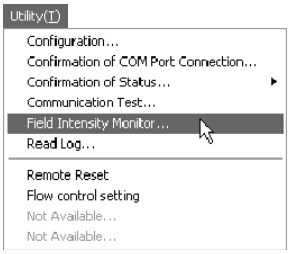

(5) It is possible to open the saved file by Notepad etc.



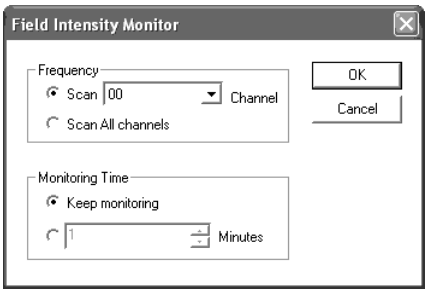
# 6.3.5 Field intensity monitor

You can check vacancy of communication channel by using wireless unit as simplified field intensity monitor. When signal is received, the communication channel is using. If using another channel, you can avoid interference. We recommend checking it before mounting.

(1) Select “Utility” -> “Field intensity monitor” in menu.




(2) Dialog to select monitor conditions is displayed, input conditions.



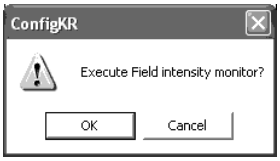

## Frequency

Select one of below 2 method (Scan specified channel, Scan all channels.) In case of selecting scan specified channel continuously.
In case of selecting scan all channel, it is possible to monitor with changing 00-4B

## Monitoring time

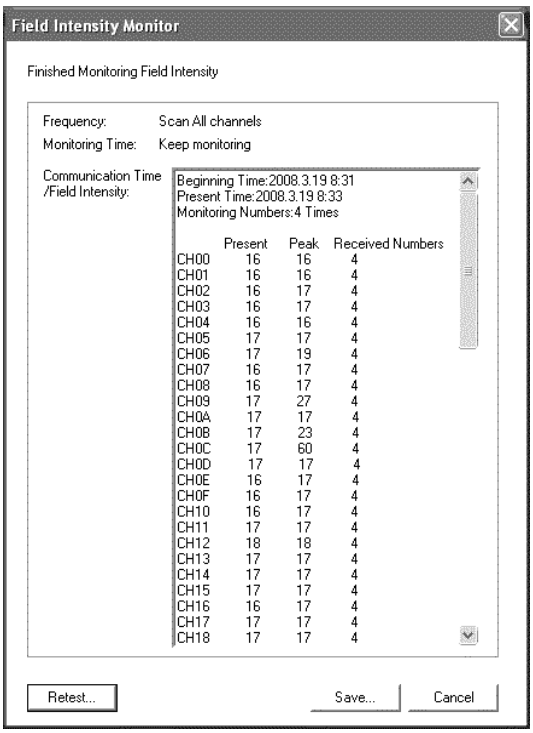
Select “Keep monitoring” or “Monitoring in specified time”.
Input with the range of 1 to 32767 minutes for time period.
In both ways, it can stop monitoring.

(3) When the below dialog is displayed, click “OK”.




Field intensity level during monitoring is displayed.
Present value is the value of last monitoring, peak value is the maximum value during monitoring.

When stop monitoring, click “Stop”. Monitoring result until the time is displayed.
Communication channel is vacant when feild intensity level is low. (Around 16 means vacant.)



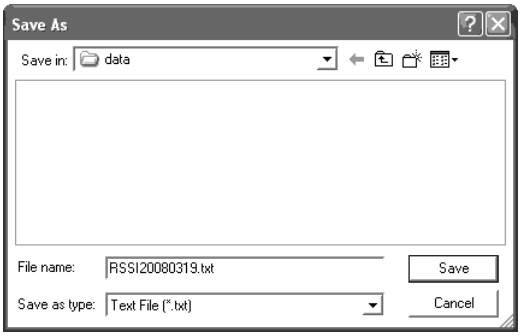

When it is lower than 16, you can think there is little radio wave for interference.
(There is an individual difference.)

## Retest

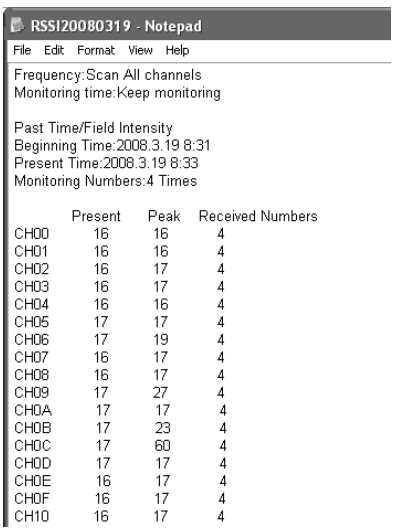
It returns to dialog to set monitor conditions.
Monitor result is not saved, save it first if it is necessary.

## Save

Monitor result can be saved with text file. Input file name and click “Save”.
After saving, it returns to display of monitor result.

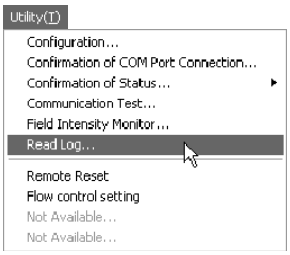



(4) It is possible to open the saved file by Notepad etc.

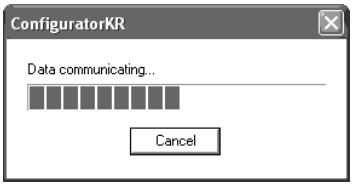


# 6.3.6 Read log

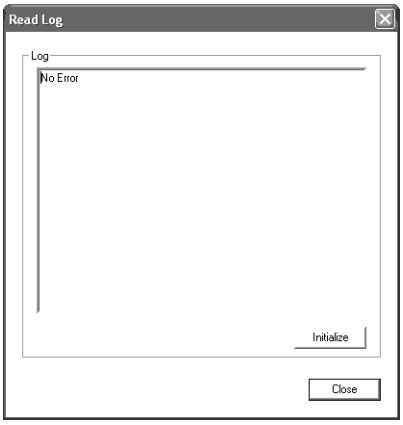
You can read out communication error log (record) in wireless unit. Reading out log takes about 1 minute. (In case of baud rate 115200bit/s)
(1) Select “Utility” -> “Read log” in menu.




(2) Below dialog is displayed during data communication.
It takes about 1 minute, wait for a while. (In case of baud rate 115200bit/s)




If communication error happened, errors are listed in log window.
Main unit doesn’t have clock function, therefore happenning time is not recorded.
Upper level shows newer error.




## Log

"Error codes" of error happened in wireless unit is displayed.
Number in the (  ) shows the unit that error was happened.
Refer to "Error Codes table" in Help for error contents.

**Reference:** Error codes <Help in setting tool (Configurator KR)>

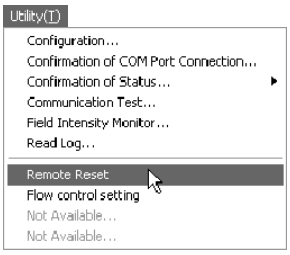
## Initialize Log

All log recorded in wireless unit are initialized. Once initializing, it can not recover.
(It is impossible to initialize the log in RUN mode)

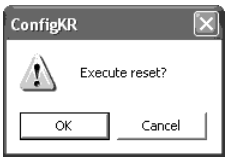
# 6.3.7 Remote reset

Set connected wireless unit in the state of powered on.
This function is used instead of that power supply on again when setting of switches.

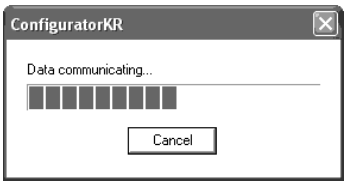
(1) Select “Utility” -> “Remote Reset” in menu.




(2) When the below dialog is displayed, click “OK”.



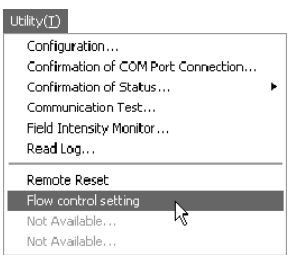

Below dialog is displayed during sending reset command.




(3) After resetting correctly, the below dialog is displayed. Click “OK”.

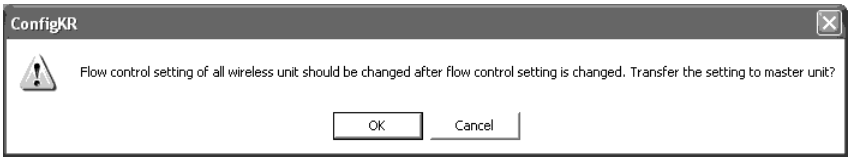

# 6.3.8 Flow control setting

Set flow control available or not available.
(1) Select “Utility” -> “Flow control setting” in menu.

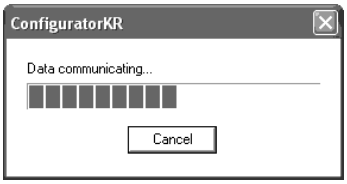



(2) Select flow control "Available", when below dialog is displayed. It is not necessary to set, if flow control is not necessary.
(Click "cancel" to return the setting before flow control setting.)
After selecting, click "OK".

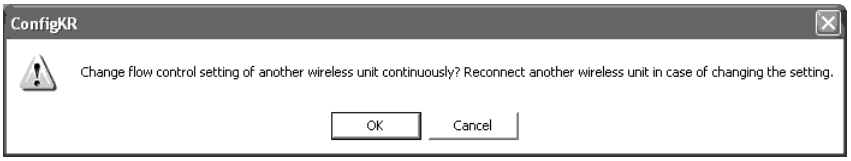

(3) When the below dialog is displayed, click “OK”.




(4) Below dialog is displayed during data communication.




(5) After resetting correctly, the below dialog is displayed.




(6) It is necessary to set flow control setting to all wireless unit that is necessary to flow control..
Connect to other wireless unit that is not set flow control.
After connecting, click "OK".


(7) Return to display of flow control setting again, click "OK".
Then repeat (3) to (5) operation to all wireless unit. After completing the setting, click "Cancel" in (5) or (6) stage.

**Note: 1.If it sets "Available" for flow control, it can't communicate with setting tool in RUN mode.**
**2.If initialize it, the flow control setting returns to "Not available" (at factory shipment)**

# Chapter 7

# Cautions for Mounting

# 7.1 Cautions for mounting

In order to avoid factors of breakdown or malfunctions, read and understand the below contents before using. For installing, use within the range of general specifications. Especially notice and keep the below conditions.

## 7.1.1 Environment for using

1) Use in the place where the ambient temperature is the range of -10 to +50 degree C and the ambient humidity is the range of 30 to 85%RH (at 25 degree C non-condensing)

2) Do not use the unit in the following environments.
   - Where inflammable or corrosive gas might be produced. Where the unit will be exposed to excessive airborne dust or metal particles. Where the unit will be exposed to water, oil or chemicals.
   - Where direct vibration or shock might be transmitted to the unit, and where the unit will be exposed to direct sunlight and where water might wet the unit.
   - Where high-voltage line, high-voltage device, power line, power supply device or the device with sending part such as amateur radio are existed, or large switching surge is occurred. (Keep input/output line away from power/high-voltage line at least 100mm or more.)
   - Where organic solvents such as benzene, paint thinner, alcohol, or strong alkaline solutions such as ammonia or caustic soda might adhere to the product
   - High altitude where exceed 2000m.
   - This product is not waterproof specification. When use in outdoor, give waterproof measures as putting in a plastic case etc.

## 7.1.2 Power supply

1) Use twisted wire for power supply cable.

2) Separate power supply from power supply for devices and make the protective circuit. (Fuse etc.)

3) Against the superimposed noise on power supply line, we recommend to reduce the noise by using insulated transformer or noise filter.

4) When grounding, make it dedicated and the grounding connection should have a resistance of less than 100 ohms. Do not share a ground with other earth line.

5) Make power supply on/off by taking out and putting in the connector.

## 7.1.3 Mounting

1) Do not bring it close to a radio and television. It may cause poor reception.

2) Where the place there is a broadcasting station or radio station and radio wave from there is strong, this unit may not be able to use.
3) This unit uses 2.4GHz-width wave to transmit data, if some devices using the same frequency are existed, interference might occur and not be able to communicate.
4) In order to make the wireless performance better, pay attention to the below items.
   - Mount the unit as high as possible.
   - Connect 2 of the antenna and the mounting direction is vertical for the ground.
   - Antenna should be keep away from metal board. If antennas are mounted inside the control board, the wireless performance will decrease.
   - Keep away from the place or line that noise might occur.
   - Mount in the place where radio wave condition is good refer to field intensity monitor.
   - When you use several channels in the same communication area, check if there is no influence each other.

5) When mounting the unit to DIN rail, hook the upper part and push DIN hook. When removing it, pull out with minus driver until locking DIN hook. And fastening plate (ATA4806) is recommended prevent from moving.

## 7.1.4 To prevent from interference with the other wireless station (Japan only)

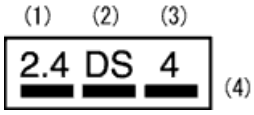
In the frequency band using this unit, in-plant radio station (license is necessary.) using at industrial such as microwave oven, science, medical machinery and a production line in factory to identify mobile object, specified low power radio station (license is not necessary.) and amateur radio station (license is necessary.) are managed.

1) Before using this unit, please confirm that in-plant radio station to identify mobile object, specified low power radio station and amateur radio station are not managed.

2) When some cases of harmful electric wave interference occurred from this unit to an in-plant radio station to identify mobile object, change the using frequency immediately or stop discharging the electric wave. After that please contact the following address to consult measures to avoid interference (for example, setting of partition).

3) When any other troubles such as harmful electric wave interference occurred from this unit to a specified low power radio station or an amateur radio station, please contact us.

■Actual indication
It indicates on the back of cover.




(1) 2.4: 2.4GHz band electric wave is used.

(2) DS: Modulation method is direct sequence type.

(3) 4 : Intended interference distance is 40m.

(4) Bar: All bands are used and possible to avoid the band of machine to identify mobile object.

■Actual indication in case of mounting outdoor (Japan Only)
When you manage this unit or equipment, mounted this unit as outdoor fixed station, the following contents should be indicated on the position where it is easy to see such as the wireless equipment itself or the case.

(1) Indication of that this is " Wireless unit of 2.4GHz low power data communication system"

(2) Indication of the possessor name or system provider name

(3) Indication of the telephone number, e-mail address or homepage address

*Please put the attached label "Caution for using wireless unit" near the setting place.

## 7.1.5 Wiring input/output lines

1) Select diameter of wire for input/output line with considering current capacity.
2) Input line should be keep away from output line.
3) Input/output line should keep at least 100mm away from power supply line and high-voltage line.

## 7.1.6 Handling

1) When mounting, (wiring, adjustment etc.), be careful not to add static electricity to connector, switch and antenna.

2) Do not press switch or push button strongly, or it might be damaged.

# Chapter 8

# Troubleshooting

# 8.1 ALARM indication

This is the explanation about wireless unit ALARM indication.
ALARM indication means the below cautions and error according to the operating mode.

In case of operating mode is “TEST”, it has another meanings not cautions or error. Please refer to ＜6.2 Test functions of main unit＞.

**Reference**: <6.2 Test functions of main unit>

## ■ When operating mode is “SET”

| ALARM indication | Meaning | Troubleshooting |
|---|---|---|
| **Light for a moment** | Command error when command not for wireless unit is input | Delete this data by wireless unit. In case of operating mode is “SET”, wire communication can be used with only setting tool. In order to do normal communication, set to “RUN”. |
| | Communication error with setting tool | Refer to dialog by setting tool. |
| **Blinking** | Cautions to show during initializing mode (MODE switch No.9 is ON.) | Set MODE switch No.9 OFF and turn power on again. |
| **When slave registration Blinking** | Error to indicate failure of slave registration | Refer to ＜Chapter 4 Resister slave＞ about how to register slave |
| **When initializing Blinking** | Cautions to show during initializing mode | Check with ＜5.9 Initialization＞ |

## ■ When operating mode is “RUN”

| ALARM indication | Meaning | Troubleshooting |
|---|---|---|
| **Light for a moment** | Communication error and data are deleted | Refer to <8.2 Troubleshooting> |
| **Lighting continuously** | Error to show that slave isn’t registered. | Register slave |
| | Error to show that routing setting is not set. | Set routing setting |
| | With 1:1 topology, MODE switch No.1 is ON. | When 1:1 topology, set MODE switch No.1 to OFF. |
| | With I/O type, When outputing communication error (Lighting communication error LED) | It can’t communicate by wireless communication. Check power supply, communication setting, mounting place, radio wave conditions and so on of both sides. |

※When operating mode is “RUN”, error contents can be read out by using setting tool.

**Note: When it lights for a moment, it keeps communication, however, when it lights continuously, it can’t communicate.**

**Reference**: <6.3.6 Read log> <Help in setting tool (Configurator KR)>

# 8.2 Troubleshooting

## ■ First of all

(1) Are power supplys of all using wireless units as master and slave turn on?
(2) Are the settings of switches set correctly?
(Operation mode switch, Communication channel switch, Unit No.switch, MODE switch)
(3) Are wiring and connector connected correctly?
(RS232C, RS485)

## ■ When turn power supply on

| Trouble contents | Cause | Troubleshooting |
|---|---|---|
| **No LED lights on** | Power supply is OFF. | Turn power supply on. |
| | Power supply voltage is different. | Check power supply. (12 to 24VDC) |
| **When operating mode is set to "RUN", ALARM lights.** *1 | Slave is not registered. | Register all slaves to use communication at master. |
| | Routing setting is not set. | For 1:1 topology with repeaters or 1:N topology, set the routing setting. |
| **At 1:1 topology, slave is registered, but when operating mode is set to "RUN", ALARM lights.** | MODE switch No.1 is set to ON. (1:N topology available) | Set MODE switch No.1 of master and slave to OFF. |

*1: When operating mode is set to "RUN" at the time of purchasing, ALARM always lights.

## ■ Slave registration, setup

| Trouble contents | Cause | Troubleshooting |
|---|---|---|
| **Slave registration is impossible.** | Operating mode isn't set to "SET". | Set operating mode to "SET" both master and slave. |
| | MODE switch No.9 is set to ON. | When No.9 is set to ON, it is the mode to initialize. Be sure to set to OFF before registration. |
| | After setting switches, it doesn't turn power supply on again. | Turn the power supply on again.<br>or<br>Change operating mode switch.<br>(SET→RUN→SET) |
| | <ENTER> switch isn't pressed continuously. | Press <ENTER> switch of slave continuously (approx.3 sec). |
| | Same Unit No. is already registered at master. | Register with another Unit No.<br>or<br>Overwrite. |
| | Another wireless unit is using the same channel. | Change communication channel. |
| | Executing serial communication or I/O communication | Remove communication connector |
| | Radio wave doesn't reach. | Do on the table.<br>Check antenna if it is mounted correctly or not. |
| **Wireless unit that was registered as master or slave isn't used as another master or slave.** | When changing wireless unit such as change master and slave, initialization is necessary. | Initialize it first and register again. |

## ■ Wireless communication and Wire communication

| Trouble contents | Cause | Troubleshooting |
|---|---|---|
| **Wireless communication is not possible.** | Operating mode isn't set to "RUN". | Set operating mode of master and slave to "RUN". |
| | Channel is different from it of slaves. | Set communication channel of all slaves same as master's. |
| | Slave isn't registered at master. | Register slave at master by using main unit or setting tool. |
| | Slave is not powered on. | Power on slave. |
| | Slave is mounted in the place where radio wave doesn't reach. | Move master or slave near in order to reach radio wave. |
| | There are master or slave using the same channel. Or another wireless unit is using the same frequency. | Change communication channel.<br>or<br>Move the mounting place. |
| | Surrounding radio wave environment is not good. | Change the mounting place to the place where is a little noise or where is far from the object to be shielded wave such as iron plate. |
| | Antenna is removed or connector is loosened. | Connect antenna surely. |
| **Wire communication is not possible.**<br>(When wire communication is not possible, wireless communication is not possible too.) | COM port of wired side is different. | Check the setting of RS232C and RS485. Especially for RS485, MODE switch No.2 should be set to ON. |
| | Communication setup of wired side is different. | Adjust the communication settings of serial communication to the connected equipment. |
| | Data size is over 2048 bytes. | Make data size sends in one time under 2048 bytes. |
| | It times out at the upper side. | Extend timeout period of the upper side. |
| | Flow control setting is wrong. It sets to "Available" for flow control, nevertheless it sets "Not available" for connected equipment's flow control. | Adjust flow control setting to the setting of connected equipment. |
| **Data in RS485 communication is wrong.** | Command collides to response. | Send next command after receiving response. Adjust time out period in case of no response. |

## ■ Setting Tool

| Trouble contents | Cause | Troubleshooting |
|---|---|---|
| **Communication with wireless unit is not possible.** | Setting is not complied with operating mode switch of the main unit. | When the operation switch set to "SET", set to 115200bit/s, 8bit, Odd.<br>When it sets to "RUN", set to same as setting of the main unit. |
| | COM port is different. | When computer has several COM ports, select the COM port connecting wireless unit by using setting tool "configuration". |
| | "Start character" is changed at "Master unit setup" on main unit. | By using setting tool "Configuration setup", set start character same as main unit's start character.<br>Start character of main unit can be checked in communication error message. |
| **Operating button doesn't work correctly. Help is not started.** | OS version is not supported. | Refer to <1.4.2 System requirement> |

# Chapter 9

# Specifications

# 9.1 Specifications

## ■ General specifications

| Item | Specification | |
|---|---|---|
| | RS485 type | I/O type |
| Rated voltage | 12 to 24V DC | |
| Operating voltage range | 10.8 to 26.4V DC | |
| Current consumption | 150mA or less (During sending) | 200mA or less (During sending) |
| Input current | 23A (when 24V DC) | |
| Ambient temperature | -10 to +50℃ | |
| Storage temperature | -20 to +70℃ | |
| Ambient humidity | 30 to 85%RH (at 25℃, non-condensing) | |
| Storage humidity | 30 to 85%RH (at 25℃, non-condensing) | |
| Breakdown voltage (initial) | 500V AC for 1 min (Between power terminal and FG/DSUB connector) | 500V AC for 1 min (Between power terminal and FG/DSUB connector Between power terminal and input/output terminal Between input terminal and output terminal) |
| Insulation resistance (initial) | 100MΩ or more (at 500VDC mega) (Between power terminal and FG/DSUB connector) | 100MΩ or more (at 500VDC) (Between power terminal and FG/DSUB connector Between power terminal and input/output terminal Between input terminal and output terminal) |
| Vibration resistance | 10 to 55Hz 1cycle/min. Double amplitude of 0.75 mm, 10min. on 3 axes | |
| Shock resistance | 98m/s$^2$ or more, 4 times on 3 axes | |
| Noise immunity | 1000V［p-p］with pulse width 50ns, 1μs (based on in-house measurements) (Power terminal) | |
| Overcurrent protection of power supply | Fuse (Rated current: 3.15A) | |
| Weight | Approx. 160g | |

## ■ Wireless specifications

| Item | Specifications | | |
|---|---|---|---|
| | RS485 type | I/O type | |
| Wave type | Direct sequence spread spectrum (DS-SS) | | |
| Transmission distance | Approx. 250m outdoors (straight, obstacle-free distance), Approx. 50m indoors | | |
| Wave output | 6mW/MHz or less | | |
| Frequency | 2403.328MHz to 2480.128MHz | | |
| Number of channels | 76ch (Select with cummunication channel switch) *1 | | |
| Number of channels in same transmission area | 15 channels recommended (when select fixed channel) *2 | | |
| Transmission speed | 134kbps | | |
| Communication style | 1:N topology (N: 99 units max.) | | |
| Relay function | 8 repeaters (Between master and slave) | | |
| Response time | — | OFF→ON | Max. 80ms *3 |
| | | ON→OFF | |

## ■ Serial communication specifications (RS232C) *5

| Item | Specifications |
|---|---|
| Interface | Conforming to RS232C |
| Transmission distance | 15m |
| Transmission speed | 1200,2400,4800,9600,19200,38400,57600,11520 bit/s<br>(Selectable with MODE switch) |
| Communication method | Half-duplex |
| Synchronous system | Synchronous communication method |
| Transmission format | Stop bit: 1bit, Parity: Not available/Available (odd/even), Data length: 7bit/8bit |
| Data buffer | 2048 bytes (Max. data byte size for send and receive 1 time) *4 |

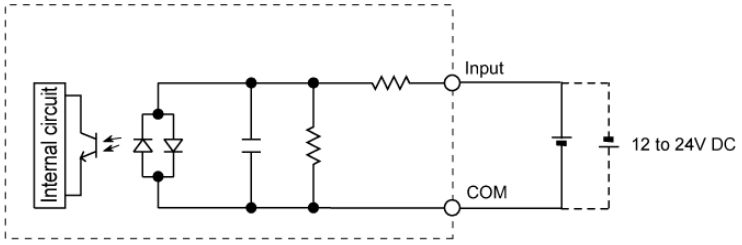
## ■ Serial communication specifications (RS485) (only AKR2002) *4

| Item | Specifications |
|---|---|
| Interface | Conforming to RS485 |
| Transmission distance | 1200m |
| Transmission speed | 1200,2400,4800,9600,19200,38400,57600,11520 bit/s<br>(Selectable with MODE switch) |
| Communication method | Half-duplex |
| Synchronous system | Synchronous communication method |
| Transmission format | Stop bit: 1bit, Parity: Not available/Available (odd/even), Data length: 7bit/8bit |
| Data buffer | 2048 bytes (Max. data byte size for send and receive 1 time) |
| Ending resistance | Approx. 120Ω (built-in) (Terminal “E” and terminal “–“ are shorted when ending.) |
| Number of connected unit | Max. 31 |

## ■ Input specifications (only AKR20X5)

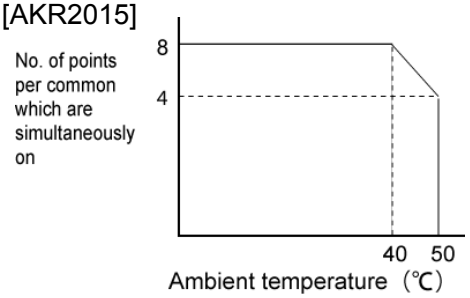
| Item | Specifications | |
|---|---|---|
| | AKR2015 (Output NPN type) | AKR2045 (Output PNP type) |
| Insulation method | Optical coupler | |
| Rated input voltage | 12 to 24V DC (voltage input) | |
| Operating voltage range | 10.8 to 26.4V DC | |
| Rated input current | Approx. 3mA / when 12V, Approx. 6mA / when 24V | |
| Points per common *5 | 8 points common<br>(Either positive or negative of input power supply can be connected.) | 6 points common<br>(Either positive or negative of input power supply can be connected.) |
| Input impedance | Approx. 4kΩ | |
| Operation indicator | LED display (green) | |

Circuit diagram

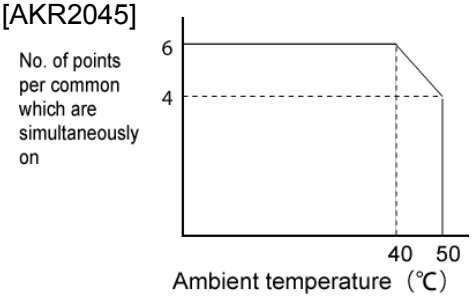



・Restriction of input number of simultaneously ON
Input number should be in the range of the blow according to the ambient temperature.

[AKR2015]




[AKR2045]

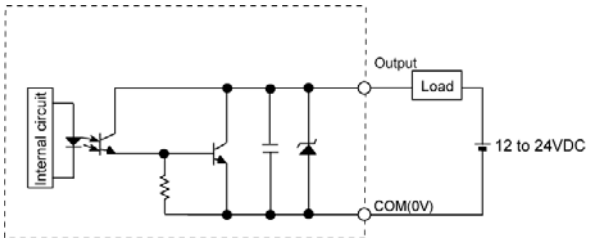


## ■ Output specifications (only AKR20X5)

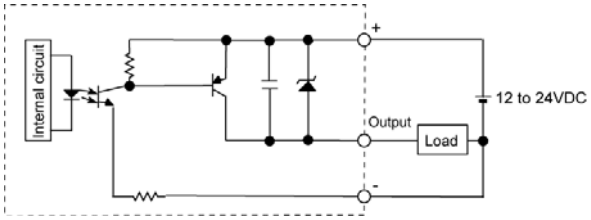
| Item | | Specifications | |
|---|---|---|---|
| | | AKR2015 (Output NPN type) | AKR2045 (Output PNP type) |
| Insulation method | | Optical coupler | |
| Output type | | Open collector (NPN) | Open collector (PNP) |
| Rated load type | | 12 to 24V DC | |
| Allowable load voltage range | | 10.8 to 26.4V DC | |
| Max. load current | | 0.3A | |
| Max. inrush current | | 1.5A | |
| Points per common *5 | | 9 points/common (Signal output, Communication error output) | 7 point/common (Signal output, Communication error output) |
| Off state leakage current | | 1 $\mu$ A or less | |
| On state voltage drop | | 1.5V DC or less | |
| External power supply (+, － terminal) | Voltage | － | 10.8 to 26.4V DC |
| | Current | － | Max. 60mA |
| Surge absorber | | Zener diode | |
| Operation indicator | | LED display | |

Circuit diagram

[AKR2015]

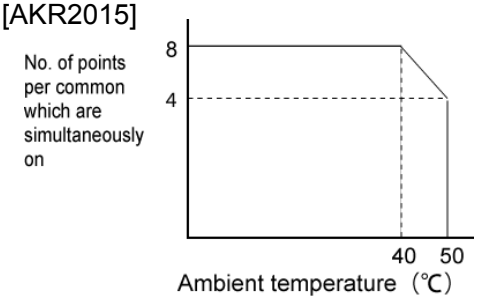



[AKR2045]

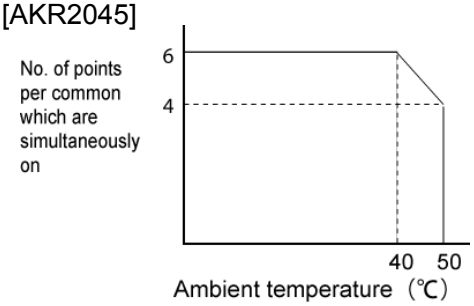



・Restriction of output number of simultaneously ON (signal output)
Output number should be in the range of the blow according to the ambient temperature.

[AKR2015]




[AKR2045]




*1 Adding to the fixed channel, 76ch(00～4B), 89 group channel can be selected.
Group channel is the function that it selects connectable channel from several fixed channels automatically. When using repeater function, use with the fixed channel.
When using group channel, settable channel numbers are decreased in the same communication area and the communication time becomes longer.

*2 It is different according to the mounting conditions, when several channels are used in the same communication area, communication error might occur due to interference radio wave.

*3 There are no error without serial communication at 1:1 topology.
Response time: Time from input signal to input terminal to output from output terminal in connected equipment
When input signal is shorter than response time, there is a possibility not to transfer to output side.

*4 RS232C and RS485 are not used in the same time.

*5 In case simultaneously ON of input and output, input number and output number are restricted according to the ambient temperature.

## ■ Functions specifications

| Item | Specifications | |
|---|---|---|
| | RS485 type | I/O type |
| Setting function | • Operating mode change (SET, RUN, TEST)<br>• Communication channel change (CH switch)<br>• Unit No. change (UNIT No. switch)<br>• Serial communication setup (MODE switch)<br>• Slave registration<br>• Initializing (Factory setting) | |
| | — | • Data holding (When communication error) |
| Test function | • Communication test: 3-stage LED display<br>(With setting tool, it can do various communication tests such as changing data amount, including repeaters and so on. And it can measure an approximate communication time.)<br>• Field intensity monitor: 3-stage LED display<br>(With setting tool, it can display and record a field intensity of each channel by numeric value.) | |
| LED display | • Distinguish master or slave (MASTER)<br>• On communication, Power on (COM.)<br>• On setting, Complete setting (SET)<br>• Error, Alarm, Caution (ALARM)<br>• Level indication (1,2,3: when using test function) | |
| | — | • I/O operating display (16 or 12 points + 1 point of communication error) |

## Attachment ) Using frequency

・Fixed channel: 76ch

・Group channel: 89 group

It selects connectable channel from several foxed channels automatically.

When repeater function is used, use with the fixed channel.

The settable channel numbers is decreased in same communication area, and the communication time becomes longer.

| Communication style | Usable communication channel | |
|---|---|---|
| | Fixed channel | Group channel |
| 1:1 topology | 00 to 4Bch | All channel |
| 1:1 topology with repeaters | 00 to 4Bch | Disabled |
| 1:N topology | 00 to 4Bch | All channel only with no repeaters |

**Fixed channels**

| Ch No. | CH ×10 | CH ×1 | Frequency [MHz] |
|---|---|---|---|
| 00 | 0 | 0 | 2403.328 |
| 01 | 0 | 1 | 2404.352 |
| 02 | 0 | 2 | 2405.376 |
| 03 | 0 | 3 | 2406.400 |
| 04 | 0 | 4 | 2407.424 |
| 05 | 0 | 5 | 2408.448 |
| 06 | 0 | 6 | 2409.472 |
| 07 | 0 | 7 | 2410.496 |
| 08 | 0 | 8 | 2411.520 |
| 09 | 0 | 9 | 2412.544 |
| 0A | 0 | A | 2413.568 |
| 0B | 0 | B | 2414.592 |
| 0C | 0 | C | 2415.616 |
| 0D | 0 | D | 2416.640 |
| 0E | 0 | E | 2417.664 |
| 0F | 0 | F | 2418.688 |
| 10 | 1 | 0 | 2419.712 |
| 11 | 1 | 1 | 2420.736 |
| 12 | 1 | 2 | 2421.760 |
| 13 | 1 | 3 | 2422.784 |
| 14 | 1 | 4 | 2423.808 |
| 15 | 1 | 5 | 2424.832 |
| 16 | 1 | 6 | 2425.856 |
| 17 | 1 | 7 | 2426.880 |
| 18 | 1 | 8 | 2427.904 |
| 19 | 1 | 9 | 2428.928 |
| 1A | 1 | A | 2429.952 |
| 1B | 1 | B | 2430.976 |
| 1C | 1 | C | 2432.000 |
| 1D | 1 | D | 2433.024 |
| 1E | 1 | E | 2434.048 |
| 1F | 1 | F | 2435.072 |

| Ch No. | CH ×10 | CH ×1 | Frequency [MHz] |
|---|---|---|---|
| 20 | 2 | 0 | 2436.096 |
| 21 | 2 | 1 | 2437.120 |
| 22 | 2 | 2 | 2438.144 |
| 23 | 2 | 3 | 2439.168 |
| 24 | 2 | 4 | 2440.192 |
| 25 | 2 | 5 | 2441.216 |
| 26 | 2 | 6 | 2442.240 |
| 27 | 2 | 7 | 2443.264 |
| 28 | 2 | 8 | 2444.288 |
| 29 | 2 | 9 | 2445.312 |
| 2A | 2 | A | 2446.336 |
| 2B | 2 | B | 2447.360 |
| 2C | 2 | C | 2448.384 |
| 2D | 2 | D | 2449.408 |
| 2E | 2 | E | 2450.432 |
| 2F | 2 | F | 2451.456 |
| 30 | 3 | 0 | 2452.480 |
| 31 | 3 | 1 | 2453.504 |
| 32 | 3 | 2 | 2454.528 |
| 33 | 3 | 3 | 2455.552 |
| 34 | 3 | 4 | 2456.576 |
| 35 | 3 | 5 | 2457.600 |
| 36 | 3 | 6 | 2458.624 |
| 37 | 3 | 7 | 2459.648 |
| 38 | 3 | 8 | 2460.672 |
| 39 | 3 | 9 | 2461.696 |
| 3A | 3 | A | 2462.720 |
| 3B | 3 | B | 2463.744 |
| 3C | 3 | C | 2464.768 |
| 3D | 3 | D | 2465.792 |
| 3E | 3 | E | 2466.816 |
| 3F | 3 | F | 2467.840 |

| Ch No. | CH ×10 | CH ×1 | Frequency [MHz] |
|---|---|---|---|
| 40 | 4 | 0 | 2468.864 |
| 41 | 4 | 1 | 2469.888 |
| 42 | 4 | 2 | 2470.912 |
| 43 | 4 | 3 | 2471.936 |
| 44 | 4 | 4 | 2472.960 |
| 45 | 4 | 5 | 2473.984 |
| 46 | 4 | 6 | 2475.008 |
| 47 | 4 | 7 | 2476.032 |
| 48 | 4 | 8 | 2477.056 |
| 49 | 4 | 9 | 2478.080 |
| 4A | 4 | A | 2479.104 |
| 4B | 4 | B | 2480.128 |
| 4C | 4 | C | ↑ |
| 4D | 4 | D | ↑ |
| 4E | 4 | E | ↑ |
| 4F | 4 | F | ↑ |
| 50 | 5 | 0 | ↑ |
| 51 | 5 | 1 | ↑ |
| 52 | 5 | 2 | ↑ |
| 53 | 5 | 3 | ↑ |
| 54 | 5 | 4 | ↑ |
| 55 | 5 | 5 | ↑ |
| 56 | 5 | 6 | ↑ |
| 57 | 5 | 7 | ↑ |
| 58 | 5 | 8 | ↑ |
| 59 | 5 | 9 | ↑ |
| 5A | 5 | A | ↑ |
| 5B | 5 | B | ↑ |
| 5C | 5 | C | ↑ |
| 5D | 5 | D | ↑ |
| 5E | 5 | E | ↑ |
| 5F | 5 | F | ↑ |

**Group channels (2CH)**

| Ch No. | CH ×10 | CH ×1 | Fixed channel No. |
|---|---|---|---|
| 60 | 6 | 0 | 00、0B |
| 61 | 6 | 1 | 01、0C |
| 62 | 6 | 2 | 02、0D |
| 63 | 6 | 3 | 03、0E |
| 64 | 6 | 4 | 04、0F |
| 65 | 6 | 5 | 05、10 |
| 66 | 6 | 6 | 06、11 |
| 67 | 6 | 7 | 07、12 |
| 68 | 6 | 8 | 08、13 |
| 69 | 6 | 9 | 09、14 |
| 6A | 6 | A | 0A、15 |
| 6B | 6 | B | 16、21 |
| 6C | 6 | C | 17、22 |
| 6D | 6 | D | 18、23 |
| 6E | 6 | E | 19、24 |
| 6F | 6 | F | 1A、25 |

| Ch No. | CH ×10 | CH ×1 | Fixed channel No. |
|---|---|---|---|
| 70 | 7 | 0 | 1B、26 |
| 71 | 7 | 1 | 1C、27 |
| 72 | 7 | 2 | 1D、28 |
| 73 | 7 | 3 | 1E、29 |
| 74 | 7 | 4 | 1F、2A |
| 75 | 7 | 5 | 20、2B |
| 76 | 7 | 6 | 2C、37 |
| 77 | 7 | 7 | 2D、38 |
| 78 | 7 | 8 | 2E、39 |
| 79 | 7 | 9 | 2F、3A |
| 7A | 7 | A | 30、3B |
| 7B | 7 | B | 31、3C |
| 7C | 7 | C | 32、3D |
| 7D | 7 | D | 33、3E |
| 7E | 7 | E | 34、3F |
| 7F | 7 | F | 35、40 |

| Ch No. | CH ×10 | CH ×1 | Fixed channel No. |
|---|---|---|---|
| 80 | 8 | 0 | 36、41 |
| 81 | 8 | 1 | ↑ |
| 82 | 8 | 2 | ↑ |
| 83 | 8 | 3 | ↑ |
| 84 | 8 | 4 | ↑ |
| 85 | 8 | 5 | ↑ |
| 86 | 8 | 6 | ↑ |
| 87 | 8 | 7 | ↑ |
| 88 | 8 | 8 | ↑ |
| 89 | 8 | 9 | ↑ |
| 8A | 8 | A | ↑ |
| 8B | 8 | B | ↑ |
| 8C | 8 | C | ↑ |
| 8D | 8 | D | ↑ |
| 8E | 8 | E | ↑ |
| 8F | 8 | F | ↑ |

**Group channels (3CH)**

| Ch No. | CH ×10 | CH ×1 | Fixed channel No. |
|---|---|---|---|
| 90 | 9 | 0 | 00、07、0E |
| 91 | 9 | 1 | 01、08、0F |
| 92 | 9 | 2 | 02、09、10 |
| 93 | 9 | 3 | 03、0A、11 |
| 94 | 9 | 4 | 04、0B、12 |
| 95 | 9 | 5 | 05、0C、13 |
| 96 | 9 | 6 | 06、0D、14 |
| 97 | 9 | 7 | 15、1D、25 |
| 98 | 9 | 8 | 16、1E、26 |
| 99 | 9 | 9 | 17、1F、27 |
| 9A | 9 | A | 18、20、28 |
| 9B | 9 | B | 19、21、29 |
| 9C | 9 | C | 1A、22、2A |
| 9D | 9 | D | 1B、23、2B |
| 9E | 9 | E | 1C、24、2C |
| 9F | 9 | F | 2D、34、3B |

| Ch No. | CH ×10 | CH ×1 | Fixed channel No. |
|---|---|---|---|
| A0 | A | 0 | 2E、35、3C |
| A1 | A | 1 | 2F、36、3D |
| A2 | A | 2 | 30、37、3E |
| A3 | A | 3 | 31、38、3F |
| A4 | A | 4 | 32、39、40 |
| A5 | A | 5 | 33、3A、41 |
| A6 | A | 6 | ↑ |
| A7 | A | 7 | ↑ |
| A8 | A | 8 | ↑ |
| A9 | A | 9 | ↑ |
| AA | A | A | ↑ |
| AB | A | B | ↑ |
| AC | A | C | ↑ |
| AD | A | D | ↑ |
| AE | A | E | ↑ |
| AF | A | F | ↑ |

**Group channels (4CH)**

| Ch No. | CH ×10 | CH ×1 | Fixed channel No. |
|---|---|---|---|
| B0 | B | 0 | 00、0B、16、21 |
| B1 | B | 1 | 01、0C、17、22 |
| B2 | B | 2 | 02、0D、18、23 |
| B3 | B | 3 | 03、0E、19、24 |
| B4 | B | 4 | 04、0F、1A、25 |
| B5 | B | 5 | 05、10、1B、26 |
| B6 | B | 6 | 06、11、1C、27 |
| B7 | B | 7 | 07、12、1D、28 |
| B8 | B | 8 | 08、13、1E、29 |
| B9 | B | 9 | 09、14、1F、2A |
| BA | B | A | 0A、15、20、2B |
| BB | B | B | ↑ |
| BC | B | C | ↑ |
| BD | B | D | ↑ |
| BE | B | E | ↑ |
| BF | B | F | ↑ |

| Ch No. | CH ×10 | CH ×1 | Fixed channel No. |
|---|---|---|---|
| C0 | C | 0 | ↑ |
| C1 | C | 1 | ↑ |
| C2 | C | 2 | ↑ |
| C3 | C | 3 | ↑ |
| C4 | C | 4 | ↑ |
| C5 | C | 5 | ↑ |
| C6 | C | 6 | ↑ |
| C7 | C | 7 | ↑ |
| C8 | C | 8 | ↑ |
| C9 | C | 9 | ↑ |
| CA | C | A | ↑ |
| CB | C | B | ↑ |
| CC | C | C | ↑ |
| CD | C | D | ↑ |
| CE | C | E | ↑ |
| CF | C | F | ↑ |

**Group channels (6CH)**

| Ch No. | CH ×10 | CH ×1 | Fixed channel No. |
|---|---|---|---|
| D0 | D | 0 | 00、07、0E、15、1C、23 |
| D1 | D | 1 | 01、08、0F、16、1D、24 |
| D2 | D | 2 | 02、09、10、17、1E、25 |
| D3 | D | 3 | 03、0A、11、18、1F、26 |
| D4 | D | 4 | 04、0B、12、19、20、27 |
| D5 | D | 5 | 05、0C、13、1A、21、28 |
| D6 | D | 6 | 06、0D、14、1B、22、29 |
| D7 | D | 7 | ↑ |
| D8 | D | 8 | ↑ |
| D9 | D | 9 | ↑ |
| DA | D | A | ↑ |
| DB | D | B | ↑ |
| DC | D | C | ↑ |
| DD | D | D | ↑ |
| DE | D | E | ↑ |
| DF | D | F | ↑ |

**Group channels (7CH)**

| Ch No. | CH ×10 | CH ×1 | Fixed channel No. |
|---|---|---|---|
| E0 | E | 0 | 00、0B、16、21、2C、37、42 |
| E1 | E | 1 | 01、0C、17、22、2D、38、43 |
| E2 | E | 2 | 02、0D、18、23、2E、39、44 |
| E3 | E | 3 | 03、0E、19、24、2F、3A、45 |
| E4 | E | 4 | 04、0F、1A、25、30、3B、46 |
| E5 | E | 5 | 05、10、1B、26、31、3C、47 |
| E6 | E | 6 | 06、11、1C、27、32、3D、48 |
| E7 | E | 7 | 07、12、1D、28、33、3E、49 |
| E8 | E | 8 | 08、13、1E、29、34、3F、4A |
| E9 | E | 9 | 09、14、1F、2A、35、40、4B |
| EA | E | A | ↑ |
| EB | E | B | ↑ |
| EC | E | C | ↑ |
| ED | E | D | ↑ |
| EE | E | E | ↑ |
| EF | E | F | ↑ |

**Group channels (11CH)**

| Ch No. | CH ×10 | CH ×1 | Fixed channel No. |
|---|---|---|---|
| F0 | F | 0 | 00、07、0E、15、1C、23、2A、31、38、3F、46 |
| F1 | F | 1 | 01、08、0F、16、1D、24、2B、32、39、40、47 |
| F2 | F | 2 | 02、09、10、17、1E、25、2C、33、3A、41、48 |
| F3 | F | 3 | 03、0A、11、18、1F、26、2D、34、3B、42、49 |
| F4 | F | 4 | 04、0B、12、19、20、27、2E、35、3C、43、4A |
| F5 | F | 5 | 05、0C、13、1A、21、28、2F、36、3D、44、4B |
| F6 | F | 6 | ↑ |
| F7 | F | 7 | ↑ |
| F8 | F | 8 | ↑ |
| F9 | F | 9 | ↑ |
| FA | F | A | ↑ |
| FB | F | B | ↑ |
| FC | F | C | ↑ |
| FD | F | D | ↑ |
| FE | F | E | ↑ |
| FF | F | F | ↑ |

※Do not use 4C to 5F, 81 to 8F, A6 to AF, BB to CF, D7 to DF, EA to EF, F6 to FF of communication channel.

# 9.2 Reference

## ■ Data communication time (Measured value by communication test with setting tool *1) AKR2015

| Number of repeater | Data amount [bytes] | Communication time [sec] *2 | Number of repeater | Data amount [bytes] | Communication time [sec] *2 |
|---|---|---|---|---|---|
| 0 (No repeaters) | 8 | 0.1 | 5 | 8 | 0.3 |
| | 16 | 0.1 | | 16 | 0.3 |
| | 32 | 0.1 | | 32 | 0.3 |
| | 64 | 0.1 | | 64 | 0.4 |
| | 128 | 0.1 | | 128 | 0.5 |
| | 256 | 0.2 | | 256 | 0.7 |
| | 512 | 0.2 | | 512 | 1.0 |
| | 1024 | 0.4 | | 1024 | 1.7 |
| | 2016 | 0.7 | | 2016 | 3.0 |
| 1 | 8 | 0.1 | 6 | 8 | 0.3 |
| | 16 | 0.1 | | 16 | 0.3 |
| | 32 | 0.1 | | 32 | 0.4 |
| | 64 | 0.1 | | 64 | 0.4 |
| | 128 | 0.2 | | 128 | 0.5 |
| | 256 | 0.2 | | 256 | 0.8 |
| | 512 | 0.4 | | 512 | 1.2 |
| | 1024 | 0.7 | | 1024 | 1.9 |
| | 2016 | 1.2 | | 2016 | 3.5 |
| 2 | 8 | 0.1 | 7 | 8 | 0.4 |
| | 16 | 0.2 | | 16 | 0.4 |
| | 32 | 0.2 | | 32 | 0.4 |
| | 64 | 0.2 | | 64 | 0.5 |
| | 128 | 0.2 | | 128 | 0.6 |
| | 256 | 0.4 | | 256 | 0.9 |
| | 512 | 0.5 | | 512 | 1.3 |
| | 1024 | 0.9 | | 1024 | 2.2 |
| | 2016 | 1.6 | | 2016 | 3.9 |
| 3 | 8 | 0.2 | 8 | 8 | 0.4 |
| | 16 | 0.2 | | 16 | 0.4 |
| | 32 | 0.2 | | 32 | 0.5 |
| | 64 | 0.2 | | 64 | 0.5 |
| | 128 | 0.3 | | 128 | 0.7 |
| | 256 | 0.5 | | 256 | 1.0 |
| | 512 | 0.7 | | 512 | 1.5 |
| | 1024 | 1.2 | | 1024 | 2.5 |
| | 2016 | 2.1 | | 2016 | 4.4 |
| 4 | 8 | 0.2 | | | |
| | 16 | 0.2 | | | |
| | 32 | 0.3 | | | |
| | 64 | 0.3 | | | |
| | 128 | 0.4 | | | |
| | 256 | 0.5 | | | |
| | 512 | 0.9 | | | |
| | 1024 | 1.4 | | | |
| | 2016 | 2.5 | | | |

*1: In case that baud rate between computer and wireless unit is 115200bit/s, and communication channel is fixed channel (00 to 4Bch).

*2: Communication time: the average time from when sending above data by setting tool to when receiving response by end slave.

**Note: These data is for your reference. It is not guaranteed the communication time.**

## I/O polling time (In case of no serial communication) (Measured value) AKR2015

| Communication style | Number of repeater stage | Polling time |
|---|---|---|
| 1:1 topology | — | 25ms |
| 1:1 topology with repeaters | 1 | 60ms |
| | 2 | 90ms |
| | 3 | 130ms |
| | 4 | 170ms |
| | 5 | 210ms |
| | 6 | 260ms |
| | 7 | 310ms |
| | 8 | 360ms |

※Polling time: Time cycle when master transmit continuously (polling) to slave
※Response time is max. 1.5 times of polling time
Response time: Time from signal input to input terminal to output to the connected output terminal
※The above table shows the case without serial communication nor communication error.
※In case the communication channels are fixed channels (00 to 4Bch)

**Note: These data is for your reference. It is not guaranteed the response time. Polling time, response time at 1:N topology (polling) may be different according to the system. Please check with the actual system.**

## ■ Timeout period of master

- At 1:1 topology with repeaters and 1:N topology, when no response is sent from slave or terminal, master stops waiting for response and move to next action. The time from to start communication to move next action is named timeout period.
- Timeout period differs according to data size or number of relay stage. Master doesn't receive serial communication until pass the timeout period. Consider timeout period by upper equipment.

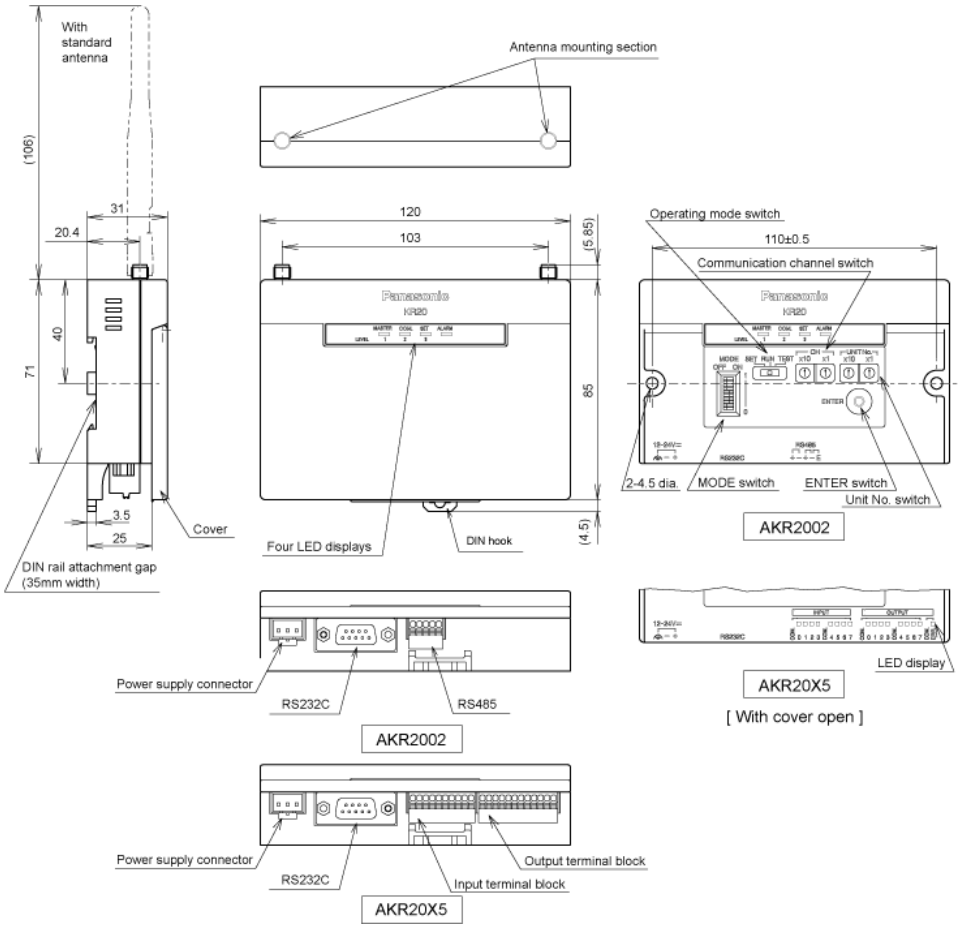
| Repeater stages | Data size [Bytes] | No response from objective slave [s] | No response from terminal [s] | Repeater stages | Data size [Bytes] | No response from objective slave [s] | No response from terminal [s] |
|---|---|---|---|---|---|---|---|
| 0 (No repeater) | 8 | 0.5 | 1.0 | 5 | 8 | 1.5 | 2.0 |
| | 16 | 0.5 | 1.0 | | 16 | 1.5 | 2.0 |
| | 32 | 0.5 | 1.0 | | 32 | 1.5 | 2.0 |
| | 64 | 0.5 | 1.0 | | 64 | 1.5 | 2.0 |
| | 128 | 0.5 | 1.0 | | 128 | 1.5 | 2.0 |
| | 256 | 0.6 | 1.1 | | 256 | 2.0 | 2.5 |
| | 512 | 0.7 | 1.2 | | 512 | 2.5 | 3.0 |
| | 1024 | 1.0 | 1.5 | | 1024 | 3.5 | 4.0 |
| | 2048 | 1.6 | 2.1 | | 2048 | 5.4 | 5.9 |
| 1 | 8 | 0.7 | 1.2 | 6 | 8 | 1.7 | 2.2 |
| | 16 | 0.7 | 1.2 | | 16 | 1.7 | 2.2 |
| | 32 | 0.7 | 1.2 | | 32 | 1.7 | 2.2 |
| | 64 | 0.7 | 1.2 | | 64 | 1.7 | 2.2 |
| | 128 | 0.7 | 1.2 | | 128 | 1.7 | 2.2 |
| | 256 | 0.9 | 1.4 | | 256 | 2.3 | 2.8 |
| | 512 | 1.1 | 1.6 | | 512 | 2.8 | 3.3 |
| | 1024 | 1.5 | 2.0 | | 1024 | 4.0 | 4.5 |
| | 2048 | 2.4 | 2.9 | | 2048 | 6.2 | 6.7 |
| 2 | 8 | 0.9 | 1.4 | 7 | 8 | 1.9 | 2.4 |
| | 16 | 0.9 | 1.4 | | 16 | 1.9 | 2.4 |
| | 32 | 0.9 | 1.4 | | 32 | 1.9 | 2.4 |
| | 64 | 0.9 | 1.4 | | 64 | 1.9 | 2.4 |
| | 128 | 0.9 | 1.4 | | 128 | 1.9 | 2.4 |
| | 256 | 1.2 | 1.7 | | 256 | 2.6 | 3.1 |
| | 512 | 1.4 | 1.9 | | 512 | 3.2 | 3.7 |
| | 1024 | 2.0 | 2.5 | | 1024 | 4.5 | 5.0 |
| | 2048 | 3.1 | 3.6 | | 2048 | 7.0 | 7.5 |
| 3 | 8 | 1.1 | 1.6 | 8 | 8 | 2.1 | 2.6 |
| | 16 | 1.1 | 1.6 | | 16 | 2.1 | 2.6 |
| | 32 | 1.1 | 1.6 | | 32 | 2.1 | 2.6 |
| | 64 | 1.1 | 1.6 | | 64 | 2.1 | 2.6 |
| | 128 | 1.1 | 1.6 | | 128 | 2.1 | 2.6 |
| | 256 | 1.4 | 1.9 | | 256 | 2.8 | 3.3 |
| | 512 | 1.8 | 2.3 | | 512 | 3.5 | 4.0 |
| | 1024 | 2.5 | 3.0 | | 1024 | 4.9 | 5.4 |
| | 2048 | 3.9 | 4.4 | | 2048 | 7.7 | 8.2 |
| 4 | 8 | 1.3 | 1.8 | | | | |
| | 16 | 1.3 | 1.8 | | | | |
| | 32 | 1.3 | 1.8 | | | | |
| | 64 | 1.3 | 1.8 | | | | |
| | 128 | 1.3 | 1.8 | | | | |
| | 256 | 1.7 | 2.2 | | | | |
| | 512 | 2.1 | 2.6 | | | | |
| | 1024 | 3.0 | 3.5 | | | | |
| | 2048 | 4.7 | 5.2 | | | | |

# Chapter 10

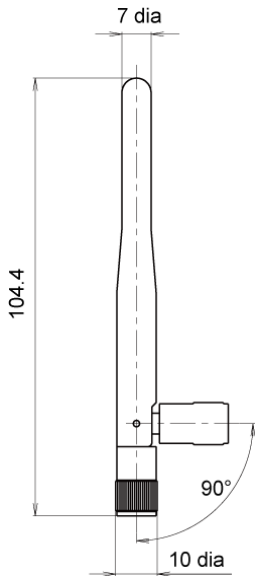
# Dimensions/ Connection drawings

# 10.1 Dimensions

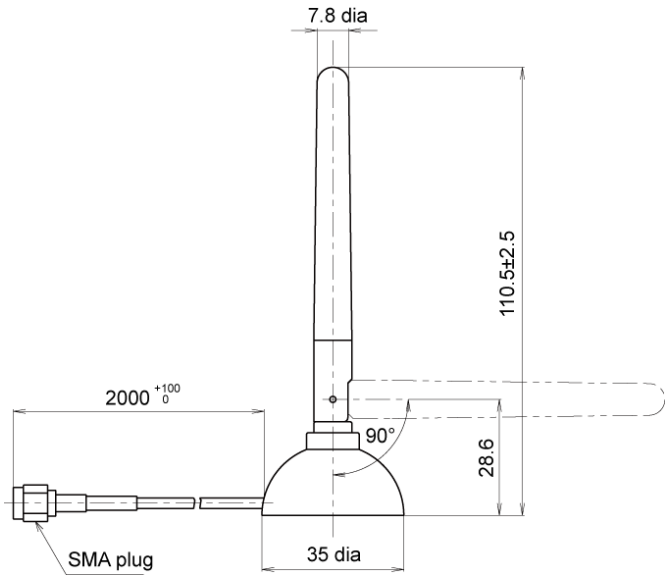
## ■ AKR2002 / AKR20X5




## ■ AKR2802




## ■ AKR2803




(unit:mm)

# 10.2 Connect to computer

## ■ Connecting cable wiring

### ● Without flow control

・When using setting tool, DUB 9-pin female-female straight cable can be used. If using male-female straight cable, use attached gender changer in main unit.
・When you make cable by yourself, refer to the below wiring diagrams.

| D-SUB 9-pin female | | D-SUB 9-pin female | |
|---|---|---|---|
| Pin No. | Signal name | Pin No. | Signal name |
| 1 | - | 1 | CD |
| 2 | RD | 2 | RD |
| 3 | SD | 3 | SD |
| 4 | - | 4 | ER |
| 5 | SG | 5 | SG |
| 6 | - | 6 | DR |
| 7 | RS | 7 | RS |
| 8 | CS | 8 | CS |
| 9 | - | 9 | CI |

### ● With flow control

・When you know there is flow control, refer to the below wiring diagrams.

| D-SUB 9-pin female | | D-SUB 9-pin female | |
|---|---|---|---|
| Pin No. | Signal name | Pin No. | Signal name |
| 1 | - | 1 | CD |
| 2 | RD | 2 | RD |
| 3 | SD | 3 | SD |
| 4 | - | 4 | ER |
| 5 | SG | 5 | SG |
| 6 | - | 6 | DR |
| 7 | RS | 7 | RS |
| 8 | CS | 8 | CS |
| 9 | - | 9 | CI |

### ● With/ without flow control

・When you don’t know there is flow control or not, refer to the below wiring diagrams.

| D-SUB 9-pin female | | D-SUB 9-pin female | |
|---|---|---|---|
| Pin No. | Signal name | Pin No. | Signal name |
| 1 | - | 1 | CD |
| 2 | RD | 2 | RD |
| 3 | SD | 3 | SD |
| 4 | - | 4 | ER |
| 5 | SG | 5 | SG |
| 6 | - | 6 | DR |
| 7 | RS | 7 | RS |
| 8 | CS | 8 | CS |
| 9 | - | 9 | CI |

# 10.3 Connect to PLC (RS232C)

## 10.3.1 Connect to Web Datalogger Unit / FPΣ control unit

**In order to connect wireless unit, attach communication cassette to Web Datalogger Unit (DLU) and FP sigma control unit.**

**Usable communication cassette (RS232C communication type)**

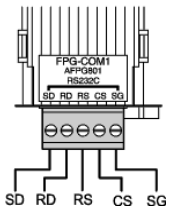
| Name | Model No. | Order No. |
|---|---|---|
| FPΣ communication cassette (RS232C 1CH type) | FPG-COM1 | AFPG801 |
| FPΣ communication cassette (RS232C 2CH type) | FPG-COM2 | AFPG802 |
| FPΣ communication cassette (RS485 1CH/RS232C 1CH type) | FPG-COM4 | AFPG806 |

### ■ Connecting cable wiring diagram

● AFPG801

D-SUB 9-pin female

| Pin No. | Signal name | Pin name |
|---|---|---|
| 3 | SD | SD |
| 2 | RD | RD |
| 7 | RS | RS |
| 8 | CS | CS |
| 5 | SG | SG |

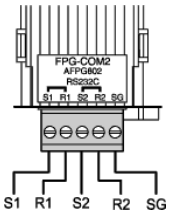



(Terminals without print are no connection.)

● AFPG802

D-SUB 9-pin female

| Pin No. | Signal name | Pin name |
|---|---|---|
| 3 | SD | S1 |
| 2 | RD | R1 |
| 7 | RS | S2 |
| 8 | CS | R2 |
| 5 | SG | SG |

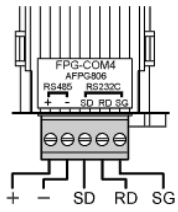



(Terminals without print are no connection.)

● AFPG806

D-SUB 9-pin female

| Pin No. | Signal name | Pin name |
|---|---|---|
| 3 | SD | + |
| 2 | RD | − |
| 7 | RS | SD |
| 8 | CS | RD |
| 5 | SG | SG |




(Terminals without print are no connection.)

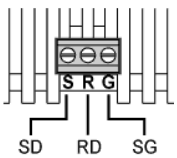
## 10.3.2 Connect to FP0 control unit

**Only RS232C port type among FP0 control unit can be connected.**

### ■ Connecting cable wiring diagram

D-SUB 9-pin female

| Pin No. | Signal name | Pin Name |
|---|---|---|
| 3 | SD | SD |
| 2 | RD | RD |
| 7 | RS | SG |
| 8 | CS | |
| 5 | SG | |




(Terminals without print are no connection.)

# 10.3.3 Connect to FP2 unit

## ■ Connecting cable wiring diagram

D-SUB 9-pin female

| Pin No. | Signal name |
|---|---|
| 1 | - |
| 2 | RD |
| 3 | SD |
| 4 | - |
| 5 | SG |
| 6 | - |
| 7 | RS |
| 8 | CS |
| 9 | - |

D-SUB 9-pin male

| Pin No. | Signal name |
|---|---|
| 1 | FG |
| 2 | SD |
| 3 | RD |
| 4 | RS |
| 5 | CS |
| 6 | - |
| 7 | SG |
| 8 | - |
| 9 | ER |

# 10.3.4 Connect to FP-X control unit

**In order to connect wireless unit, attach communication cassette to FP-X control unit.**

**Usable communication cassette (RS232C communication type)**

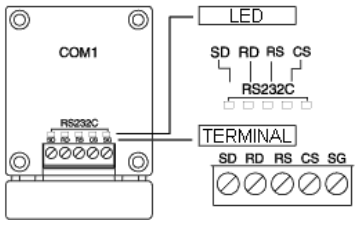
| Name | Model No. |
|---|---|
| FP-X COM1 communication cassette (RS232C 1CH type) | AFPX-COM1 |
| FP-X COM2 communication cassette (RS232C 2CH type) | AFPX-COM2 |
| FP-X COM4 communication cassette(RS485 1CH/RS232C 1CH type) | AFPX-COM4 |

## ■ Connecting cable wiring diagram

● AFPX-COM1

D-SUB 9-pin female

| Pin No. | Signal name | Pin name |
|---|---|---|
| 3 | SD | SD |
| 2 | RD | RD |
| 7 | RS | RS |
| 8 | CS | CS |
| 5 | SG | SG |

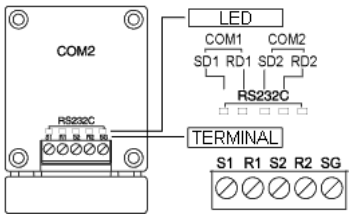



(Terminals without print are no connection.)

● AFPX-COM2

D-SUB 9-pin female

| Pin No. | Signal name | Pin name |
|---|---|---|
| 3 | SD | S1 |
| 2 | RD | R1 |
| 7 | RS | S2 |
| 8 | CS | R2 |
| 5 | SG | SG |

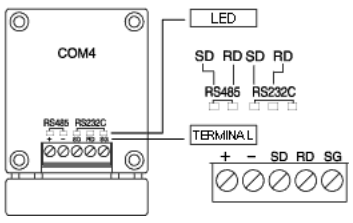



(Terminals without print are no connection.)

● AFPX-COM4

D-SUB 9-pin female

| Pin No. | Signal name | Pin name |
|---|---|---|
| 3 | SD | + |
| 2 | RD | − |
| 7 | RS | SD |
| 8 | CS | RD |
| 5 | SG | SG |




(Terminals without print are no connection.)

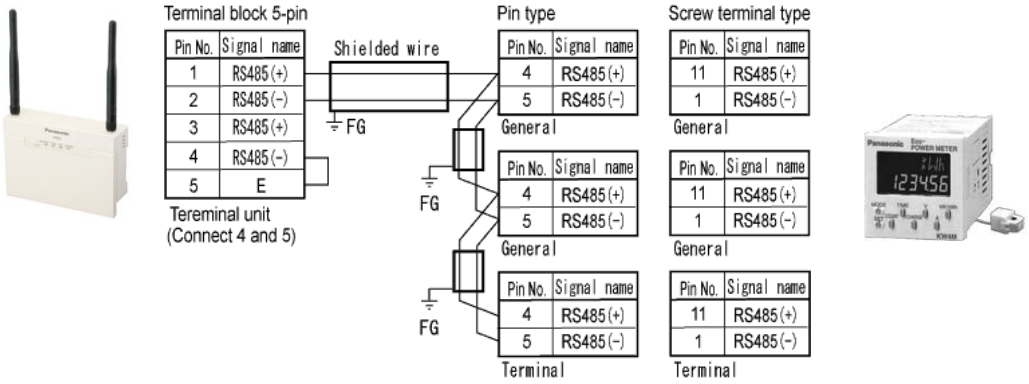
# 10.4 Connect to terminal equipment

## 10.4.1 Connect to Eco-POWER METER (RS485)

● Connect Eco-Power meter to slave.

### ■ RS485 type Connecting cable wiring diagram

・Wireless unit's terminal 1 and 3, terminal 2 and 4 are connected inside.
・With a terminal station of wireless unit, "E" terminal (No.5) and "－" terminal (No.4) should be shorted. (Terminator connection)
・Use a shielded twisted-pair cable (AWG20: size 0.5mm$^2$ or more) for cable.
・When using the shielded cable, the grounding connection should have a resistance of less than 100 ohms, and grounded one end.
・Be sure to connect with daisy chain for the transmission line. Do not use a splitter.

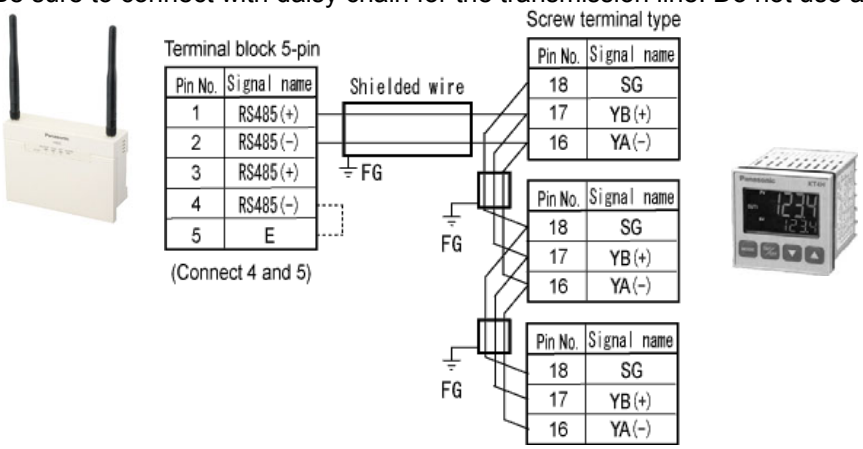



## 10.4.2 Connect to KT4H temperature controller (RS485)

● Connect KT4H Temperature controller to slave.

### ■ RS485 type Connecting cable wiring diagram

・Wireless unit's terminal 1 and 3, terminal 2 and 4 are connected inside.
・When the distance between KT4H temperature controller and wireless unit, "E" terminal (No.5) and "－" terminal (No.4) should be shorted. (Terminator connection)
・Use a shielded twisted-pair cable (AWG20: size 0.5mm$^2$ or more) for cable.
・When using the shielded cable, the grounding connection should have a resistance of less than 100 ohms, and grounded one end.
・Be sure to connect with daisy chain for the transmission line. Do not use a splitter.



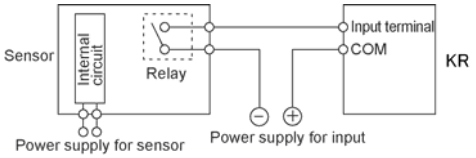
# 10.5 Wiring input/output lines

## 10.5.1 Wire input side

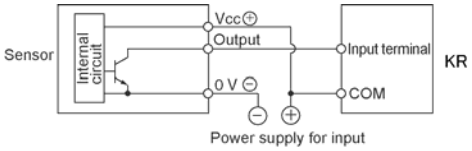
Do not add exceeded voltage over rated input voltage to input terminal.

### ■ Connection with photoelectronic sensor, nearby sensor

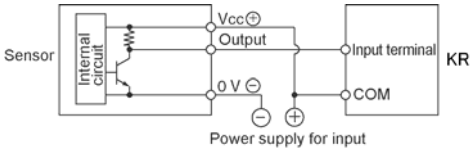
**Relay output type**



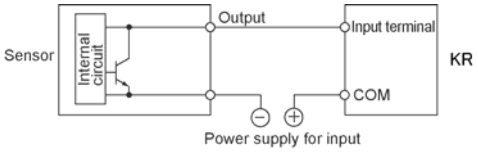

**NPN open collector output type**



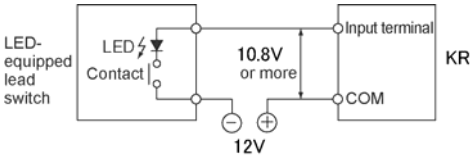

**Voltage output type**




**2-wire system output type**

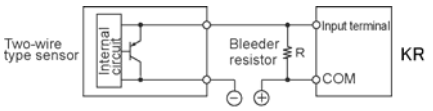



### ■ Cautions for using reed switch with LED




Even if serial LED is in input contact such as reed switch with LED, add voltage over ON voltage to input terminal. Especially, pay attention that when several switches are connected in series.

### ■ Cautions for using 2-wire system sensor




I : Sensor's leakage current (mA)
R : Bleeder resistor (kΩ)

The off voltage of the input is 2.4 V, therefore, select the value of bleeder resistor "R" so that the voltage between the COM terminal and the input terminal will be less than 2.4 V.
The input impedance is 5.6 kΩ.

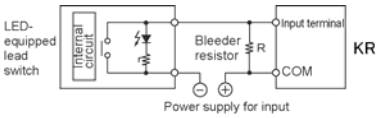
$$I \times \frac{5.6R}{5.6R + R} \leqq 2.4 \quad \text{Therefore,} \quad R \leqq \frac{13.44}{5.6I - 2.4} \ (k\Omega)$$

The wattage W of the resistor is: $W = \frac{(\text{Power supply voltage})^2}{R}$

In the actual selection, use a value that is 3 to 5 times the value of W.

When using 2-wire system photoelectronic sensor or nearby sensor, and if input doesn't become OFF due to leakage current, connect a bleeder resistor as the left.

### ■ Cautions for using limit switch with LED




r : Internal resistor of limit switch (kΩ)
R : Bleeder resistor (kΩ)

The off voltage of input is 2.4 V, therefore when the power supply voltage is 24 V, select the bleeder resistor "R" so that

The current will be greater than $I = \frac{24 - 2.4}{r}$

The resistance R of the bleeder resistor is: $R \leqq \frac{13.44}{5.6 \times I - 2.4} \ (k\Omega)$

The wattage W of the resistor is $W = \frac{(\text{Power supply voltage})^2}{R} \times (3 \text{ to } 5 \text{ times})$

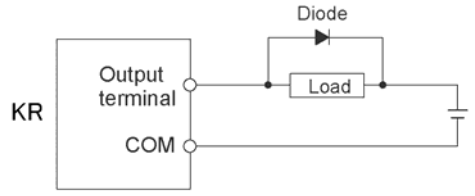
When using limit switch with LED, and if input doesn't become OFF due to leakage current, connect a bleeder resistor as the left.

# 10.5.2 Wire output side

Do not connect a load over maximum switching capacity to output terminal.

## ■ Protective circuit for inductive load

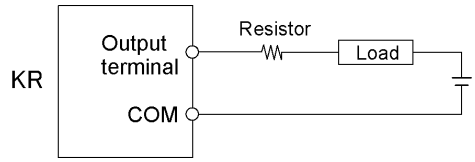
For inductive load, make a protective circuit parallel to load.

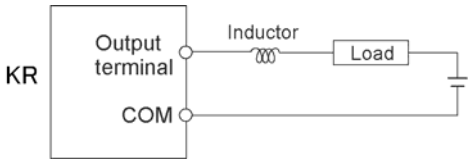



Diode:
Reverse voltage: 3 times the load voltage
Averag rectified torward current: Load current or more

## ■ Cautions for using capacitative load

For connecting load with large rush current, make a protective circuit as below in order to reduce the influences.



# Revision History

| Issue Date | Manual no. | Content of revision |
|---|---|---|
| March, 2008 | ARCT1F441E-1 | First edition |
| October, 2008 | ARCT1F441E-2 | Change company name |
| June, 2009 | ARCT1F441E-3 | Available to use the setting tool in RUN mode.<br>Add 6.3.8 Flow control setting. |
| Janualy, 2011 | ARCT1F441E-4 | Change company name<br>A usable country is added. |
| | | |

Please contact .....


Panasonic Electric Works SUNX Co., Ltd.

■Head Office: 2431-1 Ushiyama-cho, Kasugai-shi, Aichi, 486-0901, Japan
■Telephone: +81-568-33-7861
■Facsimile: +81-568-33-8591
panasonic-electric-works.net/sunx





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Specifications are subject to change without notice.