

For commercial use

## Modbus interface

Model name:

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**BMS-IFMB1280U-E**

- Thank you very much for purchasing this TOSHIBA Modbus interface.
  - Please read this manual carefully beforehand for proper installation of the Modbus interface.



# Contents

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# 1 Precautions for safety



- Read these “Precautions for Safety” carefully before installation.
- The precautions described below include important items regarding safety. Observe them without fail. Understand the following details (indications and symbols) before reading the body text, and follow the instructions.
- After the installation work has been completed, perform a test run to check for any problems. Explain how to use and maintain the unit to the customer.
- Ask customer to keep this Manual at accessible place for future reference.

Indication	Meaning of Indication
 <b>WARNING</b>	Text set off in this manner indicates that failure to adhere to the directions in the warning could result in serious bodily harm (*1) or loss of life if the product is handled improperly.
 <b>CAUTION</b>	Text set off in this manner indicates that failure to adhere to the directions in the caution could result in serious bodily injury (*2) or damage (*3) to property if the product is handled improperly.



- \*1: Serious bodily harm indicates loss of eyesight, injury, burns, electric shock, bone fracture, poisoning, and other injuries which leave aftereffect and require hospitalization or long-term treatment as an outpatient.
- \*2: Bodily injury indicates injury, burns, electric shock, and other injuries which do not require hospitalization or long-term treatment as an outpatient.
- \*3: Damage to property indicates damage extending to buildings, household effects, domestic livestock, and pets.

Symbols	Meaning of Symbols
	“  ” Indicates prohibited items. The actual contents of the prohibition are indicated by a picture or text placed inside or next to the graphic symbol.
	“  ” Indicates compulsory (mandatory) items. The actual contents of the obligation indicated by a picture or text placed inside or next to the graphic symbol.

## WARNING

	<ul style="list-style-type: none"> <li>• <b>Ask an authorized dealer or qualified installation professional to install or reinstall this unit.</b> Inappropriate installation may result in electric shock or fire.</li> <li>• <b>Electrical work must be performed by a qualified electrician in accordance with this installation manual.</b> <b>The work must satisfy all local, national and international regulations.</b> Inappropriate work may result in electric shock or fire.</li> <li>• <b>Be sure to turn off all main power supply switches before starting any electrical work.</b> Failure to do so may result in electric shock.</li> </ul>
	<ul style="list-style-type: none"> <li>• <b>Do not modify the unit.</b> A fire or an electric shock may occur.</li> </ul>

## CAUTION

	<ul style="list-style-type: none"> <li>• <b>Do not install this unit where flammable gas may leak.</b> If gas leaks and accumulates around the unit, it may cause a fire.</li> </ul>
	<ul style="list-style-type: none"> <li>• <b>Perform wiring correctly in accordance with specified the current capacity.</b> Failure to do so may result in short-circuiting, overheating or fire.</li> <li>• <b>Use predefined cable and connect them certainly. Keep the connecting terminal free from external force.</b> It may cause an exothermic or a fire.</li> </ul>

## 2 Introduction

### ■ Applications / Functions / Specifications

#### Applications

- The Modbus interface is used to connect air conditioners “with TU2C-LINK Uh Line (hereinafter, referred to as Uh Line) installed” and TCB-IFCG1TLE to Modbus\* system.

#### Functions

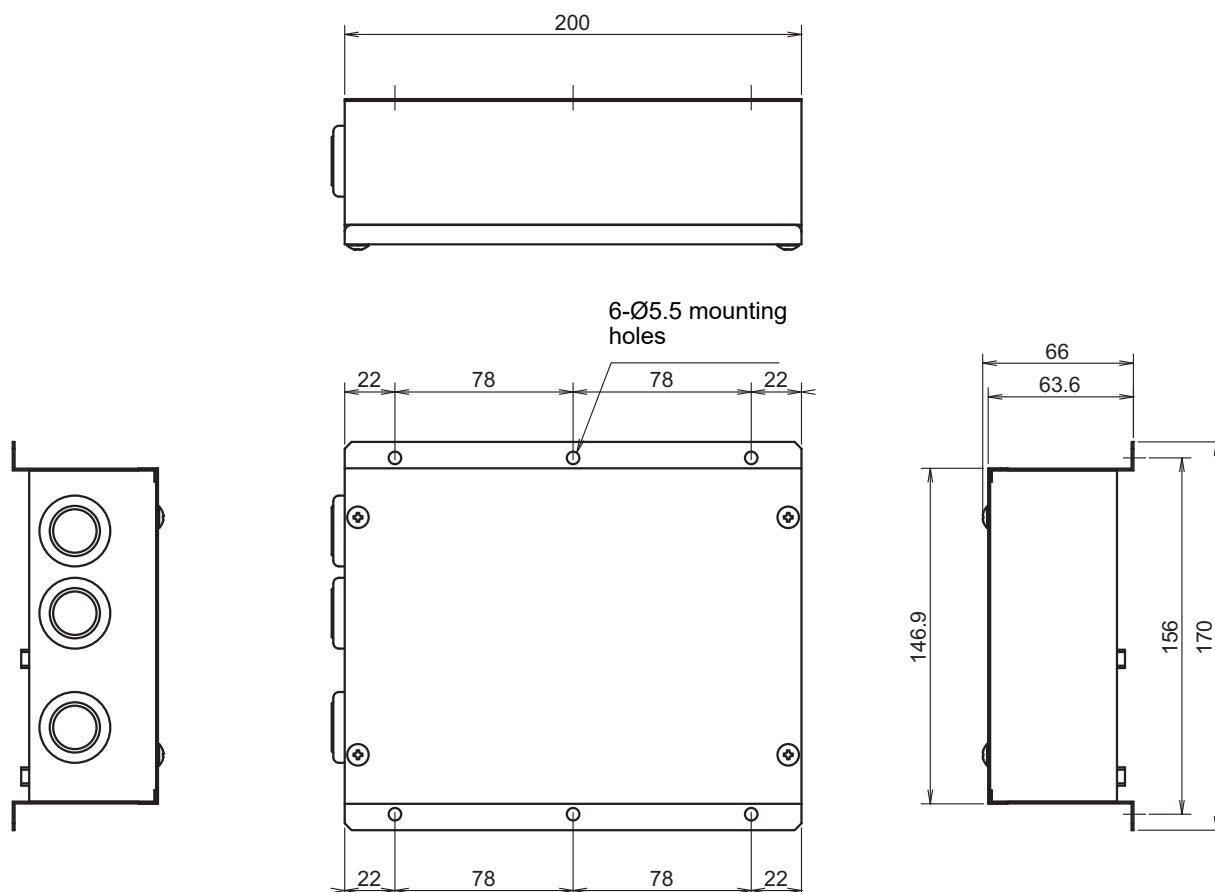
- The Modbus interface converts signals between Uh Line and Modbus Master.

#### Specifications

Power supply	220 - 240 VAC, 50/60 Hz
Power consumption	3 W
Operating temperature / humidity	0 to 40 °C, 10 to 90 % RH (no condensation)
Storage temperature	-20 to +60 °C
Chassis material	Galvanized sheet metal 0.8 t (no coating)
Dimensions	66 (H) x 170 (W) x 200 (D) mm
Mass	1.1 kg

\* Note) “Modbus” is a registered trade mark of Schneider Electric SA.

### ■ External view



# 3 Before installation

Check the following package contents.

No.	Item	Quantity	Remarks
1	Modbus interface	1	
2	Installation Manual	1	
3	Screw	4	M4 x 12 mm tapping screws
4	Cable clamp	1	

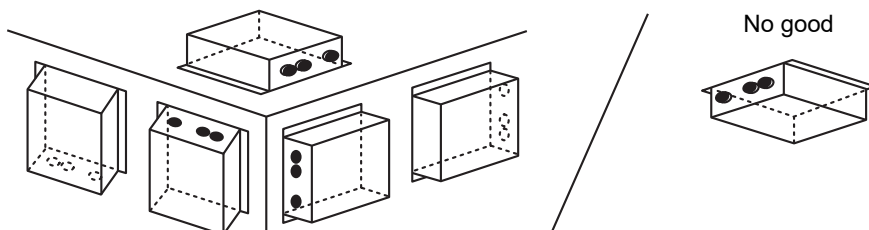
Use the following wiring materials to connect the communication cables and power cables. (locally procured)

No.	Line	Description	
1	For Uh Line	Type	2-core shielded wires
		Wire size	1.25 mm <sup>2</sup> , 1000 m max.
		Length	2.00 mm <sup>2</sup> , 2000 m max. (total length including air conditioner area)
2	For RS-485	Type	2-core shielded wires
		Wire size	1.25 mm <sup>2</sup> , 500 m max.
		Length	(total length)
3	For power	Type	H07 RN-F or 245IEC66
		Wire size	0.75 mm <sup>2</sup> , 50 m max.

# 4 Installation

## ■ Modbus interface installation method and orientation

There are five installation methods for this Modbus interface as shown below: surface mount and wall mounts. Use the attached screws.



### REQUIREMENT

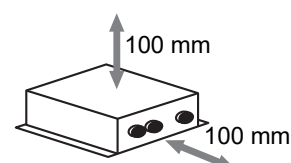
Do not install the unit in any of the following places.

- Humid or wet place
- Dusty place
- Place exposed to direct sunlight
- Place where there is a TV set or radio within one meter
- Place exposed to rain (outdoors, under eaves, etc.)

## ■ Installation space and maintenance space

A side space for connecting through cable inlets and an upper space for maintenance must be reserved before installation.

The other sides can be adjacent to surrounding objects.



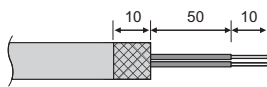
# 5 Connection of power cables / earth wires / communication cables

## ⚠ CAUTION

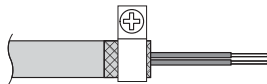
- The RS-485 communication cables have polarity. Connect A(+) to A(+), and B(-) to B(-). If connected with incorrect polarity, the unit will not work.
- The Uh Line communication cable have no polarity.

Connect power cables, earth wires, and communications cables to the specified terminals on the terminal block.

Length of stripped RS-485 communication cable (not shielded wire ends)

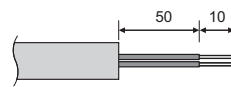


Clamping RS-485 communication cable (address 1)

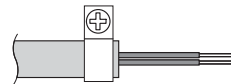


The RS-485 communication cable must be earthed on address 1 (Modbus interface address SW=1) Modbus interface. Fix the shielded wire of RS-485 communication cable with metal cable clamp and screw it to the chassis to earth it.

Length of stripped RS-485 (Shielded wire ends) and Uh Line communication cable

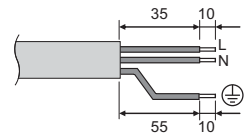


Clamping communication cable

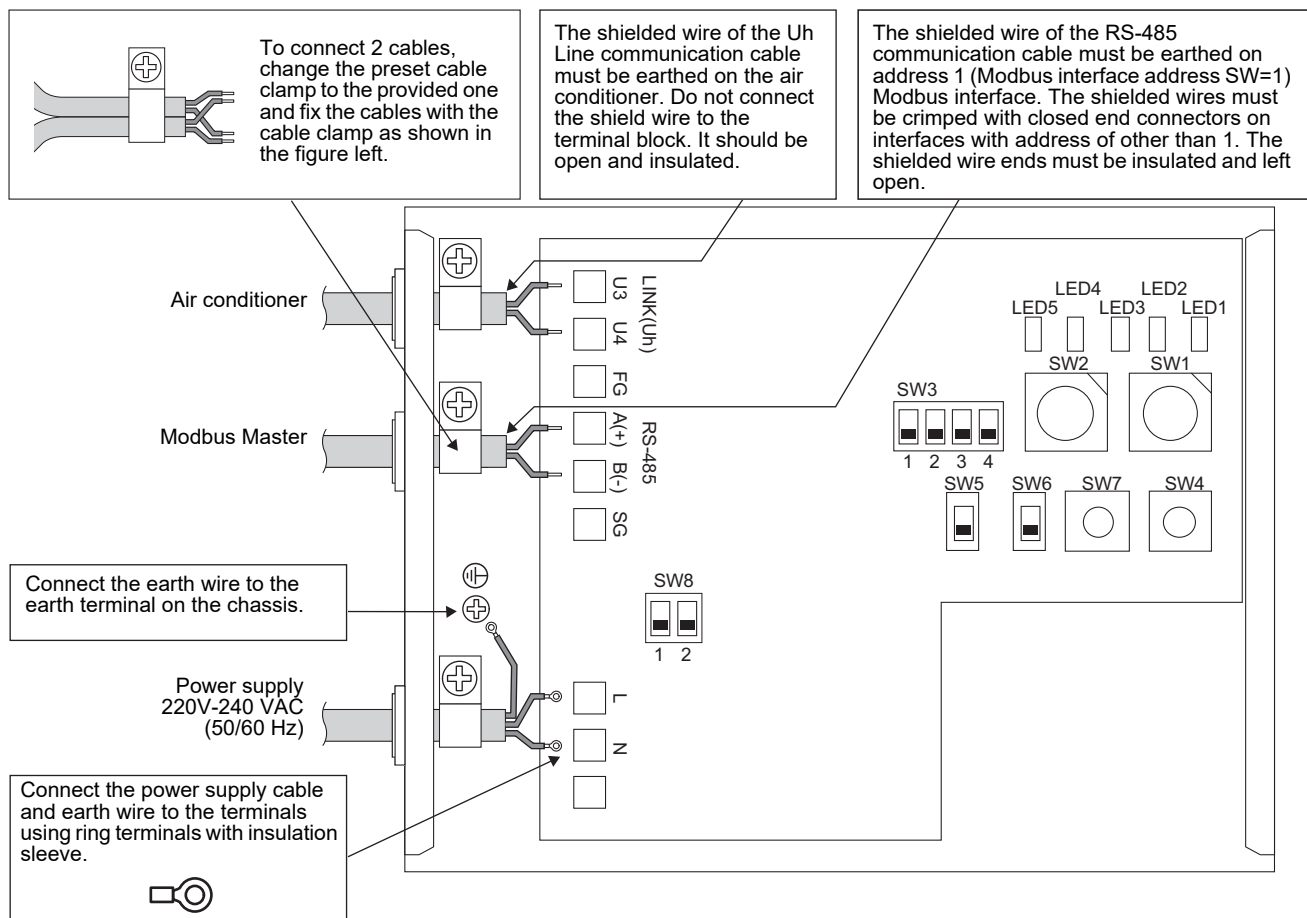


Do not connect the shield wire to the earth. It should be open and insulated.

Length of stripped power cable



The shielded wires must be crimped with closed end connectors on interfaces with address of other than 1 and not shielded wire ends.



## REQUIREMENT

### Disconnect the appliance from the main power supply.

This appliance must be connected to the main power supply by a circuit breaker or switch with a contact separation of at least 3 mm.

Fasten the screws to the terminal with torque of 0.5 Nm.

## ■ Wiring connection

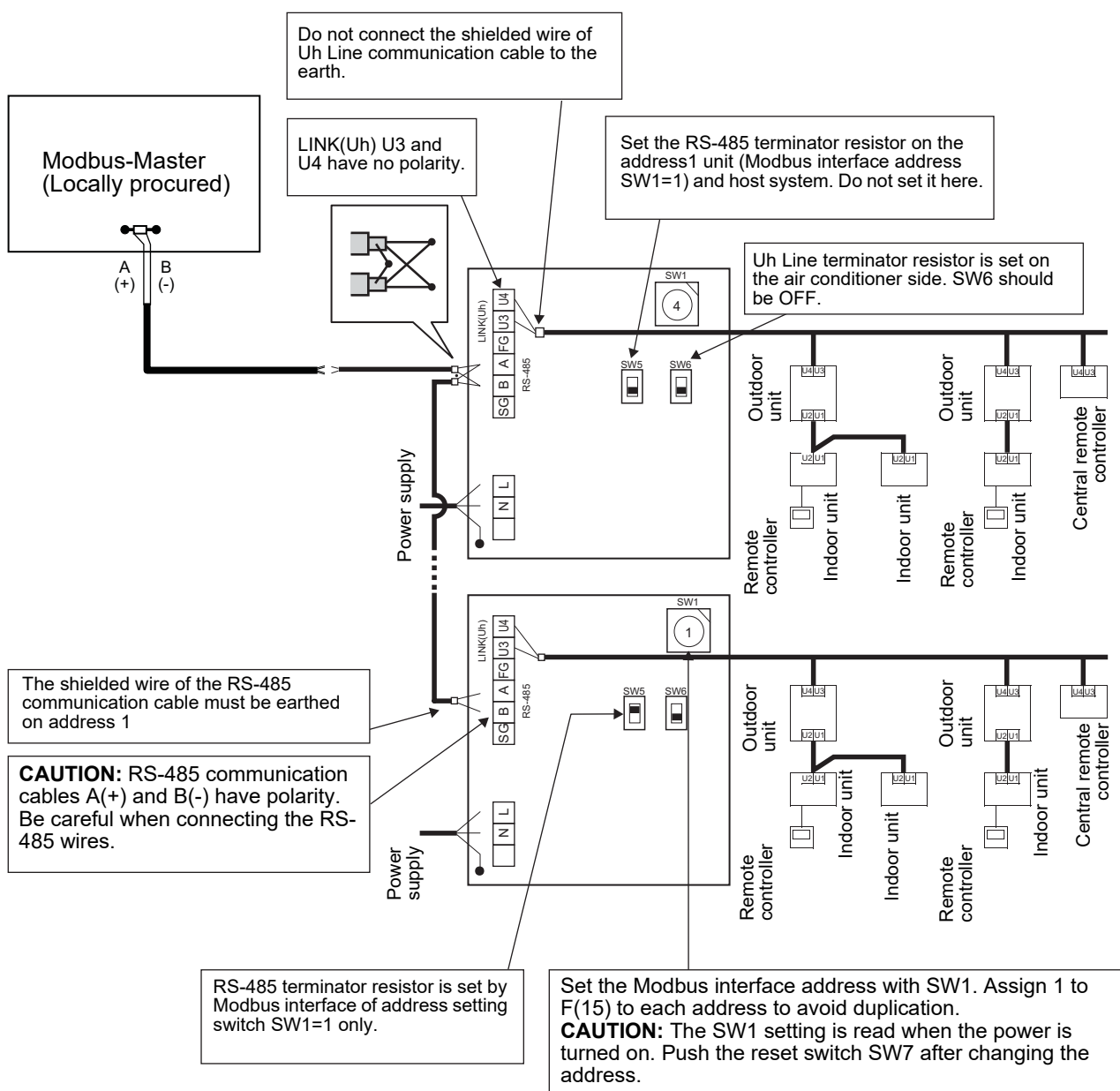
The following describes a connection example when two or more Modbus interface units are used.

### Terminator resistor setting (See “6 Setting” for the setting method.)

- Set the RS-485 terminator resistor to “120 ohm” for address1 (Modbus interface address SW1=1) Modbus interface unit, and set to “open” for other units.
- Set the Uh Line terminator resistor to “open” as it is set on the air conditioner side.

### Shield earthing

- The shielded wire of the RS-485 communication cable must be earthed on address 1 (Modbus interface address SW=1) Modbus interface. Fix the shielded wire of RS-485 communication cable with metal cable clamp and screw it to the chassis to earth it. The shielded wires must be crimped with closed end connectors on interfaces with address of other than 1. The shielded wire ends must be insulated and left open.
- Do not connect the shield wire to the terminal block. It should be open and insulated. The shielded wire of the Uh Line communication cable must be earthed on the air conditioner.





## 6 Setting

The following settings are necessary to use Modbus interface.

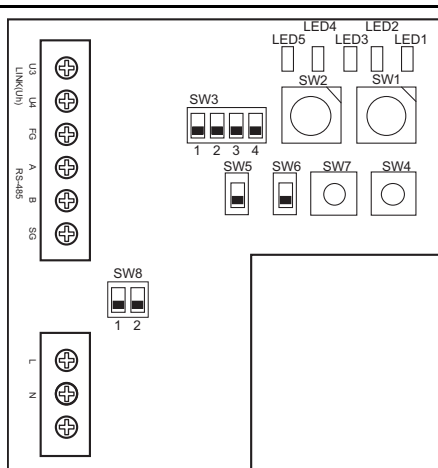
- **SW1** Sets the Modbus slave addresses of the Modbus interface.  
A single Modbus interface uses three Modbus slave addresses.  
(One address for the current interface and two addresses for potential interfaces.)  
When two or more Modbus interfaces are used for a single line RS-485 bus, set the addresses as indicated in the table below.  
Assign address numbers in ascending order, from smallest to largest.

Modbus interface	Address
No.1	1
No.2	4
No.3	7
No.4	10
No.5	13

### CAUTION

- For the Modbus interface whose address SW1=1, perform terminator resistor setting.
- When the SW1 setting has been changed, press the reset switch SW7. The new address setting is read.
- When the setting of bit3 and bit4 of SW3 has been changed, press the reset switch SW7. The new set value is read.

- SW2 Test switch Not used during operation. Set these switches to zero (0) or "all OFF".
- SW3 Test switch
  - Bit1: Central controller ID setting mode switch
  - Bit2: Switches the LED5 display for test runs.
  - Bit3, 4: RS-485 baud rate setting (9600/19200/38400) bps.
- SW4 Test switch Not used during operation.
- SW5 RS-485 terminator resistor select switch  
Set "120 ohm" only when the Modbus interface address SW=1, and set "open" for other Modbus interfaces.
- SW6 Uh Line terminator resistor select switch  
The Uh Line terminator resistor is set on the air conditioner side. Set SW6 to "open".
- SW7 Reset switch  
When performing an address setting with SW1, push this reset switch after the address setting to read the set value.
- SW8 Test switch (Not used during operation. All OFF usually)



SW1	Modbus interface address set switch	
	1-F	Modbus interface address
	0	Not used
SW2	Test switch (0 usually)	
SW3	Bit1: Uh Line communication setting mode switch. OFF: Normal circumstance; ON: Central controller ID setting mode Bit2: Switches the LED5 display for test runs. OFF RS-485 communication status indicator. ON Uh Line communication status indicator. Bit3, 4: RS-485 baud rate setting (9600/19200/38400) bps. 3 OFF, 4 OFF 9600 bps, 3 ON, 4 OFF 19200 bps, 3 OFF, 4 ON 38400 bps, 3 ON, 4 ON 19200 bps.	
SW4	Test switch	
SW5	RS-485 terminator resistor select switch	<div>ON</div> 120 ohm <div>ON</div> Open
SW6	Uh Line terminator resistor select switch	<div>ON</div> 100 ohm <div>ON</div> Open
SW7	Reset switch	
SW8	Test switch (all OFF usually)	
LED1	Power indicator	
LED2	RS-485 communication status indicator	
LED3	Uh Line communication status indicator	
LED4	Uh Line communication error indicator	
LED5	Test indicator	

#### REQUIREMENT

- **RS-485 terminator resistor select switch SW5.**  
Set "120 ohm" only when the Modbus interface address SW=1, and set "open" for other Modbus interfaces.
- **The Uh Line terminator resistor is set on the air conditioner side. Set SW6 to "open".**

## ■ Central controller ID setting mode

The central controller ID setting mode changes the central controller ID of the Modbus interface. (central controller ID at the time of factory shipping is central controller ID 20.)

The central controller ID number indicates the Uh Line address and communication priority for the Uh Line compatible central control device.

Change the central controller ID in the following cases.

- If using Modbus interface with a central control device not compatible with Uh Line, set the central controller ID as “old controller.”

### (1) Transition to central controller ID setting mode

- If setting the Modbus slave address with SW1, make a note of the SW1 value before performing central controller ID setting operations.
- Turn on bit1 of SW3.

### (2) Verification of central controller ID

- If SW1 is set to 0, central controller ID is displayed by LED2 to LED5.

○=ON, ●=OFF

Central controller ID	LED5	LED4	LED3	LED2
Central controller ID7	●	●	●	○
Central controller ID8	●	●	○	●
Central controller ID9	●	●	○	○
Central controller ID10	●	○	●	●
Central controller ID11	●	○	●	○
Central controller ID12	●	○	○	●
Central controller ID13	●	○	○	○
Central controller ID14	○	●	●	●
Central controller ID15	○	●	●	○
Central controller ID16	○	●	○	●
Central controller ID17	○	●	○	○
Central controller ID18	○	○	●	●
Central controller ID19	○	○	●	○
Central controller ID20 (initial value)	○	○	○	●
Old controller	○	○	○	○

## (3) Change of central controller ID

- Change SW1 to 1-F and press SW4.
- If using Modbus interface with a central control device not compatible with Uh Line, set as “old controller.”

Central controller ID	SW1
Central controller ID7	1
Central controller ID8	2
Central controller ID9	3
Central controller ID10	4
Central controller ID11	5
Central controller ID12	6
Central controller ID13	7
Central controller ID14	8
Central controller ID15	9
Central controller ID16	A
Central controller ID17	B
Central controller ID18	C
Central controller ID19	D
Central controller ID20 (initial value)	E
Old controller	F

**NOTE**

Because the Uh Line compatible central control device uses high-order central controller ID, setting of central controller ID1 to ID6 cannot be done with Modbus interface.

## (4) Conclusion of central controller ID setting mode

- Turn off bit1 of SW3.
- Return the SW1 value to that of the Modbus slave address.

**IMPORTANT**

Immediately after the power is turned on for the Modbus interface, the SW1 value is the Modbus slave address. When the power is turned on, if the SW1 value is that of the central controller ID or is 0, the Modbus interface will not operate properly.

When concluding the central controller ID setting mode, be sure to return the SW1 value to that of the Modbus slave address.

# 7 Test run check

## ■ Before starting test run

- Set the indoor unit central control address so that it does not match any other indoor unit addresses.
- Be sure to press the reset switch SW7 on the Modbus interface when the indoor unit central control address setting has been changed or added.

## ■ Test run

- (1) Check the communication status between Modbus interface and indoor unit or TCB-IFCG1TLE with LED5.  
Check that the communication between Modbus interface and each indoor unit or TCB-IFCG1TLE connected is normally performed by selecting an indoor unit or TCB-IFCG1TLE using SW1 to SW3.

Confirming procedure:

- Set bit2 of SW3 to "ON" during normal operation.
- Set the central control address of the target indoor unit with SW1 and SW2. Set SW1 and SW2 according to the "Indoor unit central control address and SW1/SW2 setting" table below.
- Communication status is displayed by LED5.

Communication status with indoor unit	LED5	Remarks
Normal	Lighting	
Error	Blinking	Communication with the indoor unit was established previously, but is disabled currently.
Invalid indoor unit	Light off	Communication with the indoor unit has never been established.

- The protocol for communication with an indoor unit is displayed by LED4.

Protocol for communication with indoor unit	LED4	Note
In communication via Uh Line	On	When Modbus interface is performing communication with the relevant indoor unit via Uh Line.
In communication based on old communication protocol	Blinking	When Modbus interface is performing communication with the relevant indoor unit based on old communication protocol.

(Example) Check the communication status of indoor unit with a central control address of 41.  
Set bit2 of SW3 to "ON", SW2 to "2" and SW1 to "8".

Indoor unit or TCB-IFCG1TLE central control address and SW1/SW2 setting

Indoor unit central control address	SW2	SW1	Indoor unit central control address	SW2	SW1	Indoor unit central control address	SW2	SW1	Indoor unit central control address	SW2	SW1
1	0	0	17	1	0	33	2	0	49	3	0
2	0	1	18	1	1	34	2	1	50	3	1
3	0	2	19	1	2	35	2	2	51	3	2
4	0	3	20	1	3	36	2	3	52	3	3
5	0	4	21	1	4	37	2	4	53	3	4
6	0	5	22	1	5	38	2	5	54	3	5
7	0	6	23	1	6	39	2	6	55	3	6
8	0	7	24	1	7	40	2	7	56	3	7
9	0	8	25	1	8	41	2	8	57	3	8
10	0	9	26	1	9	42	2	9	58	3	9
11	0	A	27	1	A	43	2	A	59	3	A
12	0	B	28	1	B	44	2	B	60	3	B

Indoor unit central control address	SW2	SW1	Indoor unit central control address	SW2	SW1	Indoor unit central control address	SW2	SW1	Indoor unit central control address	SW2	SW1
13	0	C	29	1	C	45	2	C	61	3	C
14	0	D	30	1	D	46	2	D	62	3	D
15	0	E	31	1	E	47	2	E	63	3	E
16	0	F	32	1	F	48	2	F	64	3	F
65	4	0	81	5	0	97	6	0	113	7	0
66	4	1	82	5	1	98	6	1	114	7	1
67	4	2	83	5	2	99	6	2	115	7	2
68	4	3	84	5	3	100	6	3	116	7	3
69	4	4	85	5	4	101	6	4	117	7	4
70	4	5	86	5	5	102	6	5	118	7	5
71	4	6	87	5	6	103	6	6	119	7	6
72	4	7	88	5	7	104	6	7	120	7	7
73	4	8	89	5	8	105	6	8	121	7	8
74	4	9	90	5	9	106	6	9	122	7	9
75	4	A	91	5	A	107	6	A	123	7	A
76	4	B	92	5	B	108	6	B	124	7	B
77	4	C	93	5	C	109	6	C	125	7	C
78	4	D	94	5	D	110	6	D	126	7	D
79	4	E	95	5	E	111	6	E	127	7	E
80	4	F	96	5	F	112	6	F	128	7	F

(2) Perform the communication status checking between Modbus interface and Modbus Master.

Check that the communication with Modbus Master is normally performed.

When bit2 of SW3 is set to "OFF", the communication status with the Modbus Master is displayed by LED5.

Communication status with Modbus Master	LED5	Remarks
Normal reception	Lighting	Lights for one second
Error	Light off	A communication error occurred or no data has been received.

## ■ LED indication during normal operation

LED		Description
LED1	Power indicator	Lights while the power is on.
LED2	RS-485 communication status indicator	Blinks during RS-485 communication.
LED3	Uh Line communication status indicator	Blinks during Uh Line communication.
LED4	Uh Line communication error indicator	Lights temporarily when Uh Line is busy.
LED5	TEST indicator	Used in the test mode.

**Manufacturer / Importer**

Name of manufacturer ( 制造商 )

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