TOSHIBA

Carrier

DIGITAL INPUT / OUTPUT RELAY INTERFACE

Installation Manual

Model name:

BMS-IFDD03UL

- Thank you very much for purchasing this TOSHIBA / Carrier Digital Input / Output Relay Interface.
- Please read this manual carefully beforehand for proper installation of the relay interface.

Contents

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
⚠WARNING	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.
⚠CAUTION	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	
	• **Ask an authorized dealer or qualified installation professional to install or reinstall this unit.** Inappropriate installation may result in electric shock or fire. • **Electrical work must be performed by a qualified electrician in accordance with this installation manual.** **The work must satisfy all local, national and international regulations.** Inappropriate work may result in electric shock or fire. • **Be sure to turn off all main power supply switches before starting any electrical work.** Failure to do so may result in electric shock.
	• **Do not modify the unit.** A fire or an electric shock may occur.

⚠CAUTION	
	• **Do not install this unit where flammable gas may leak.** If gas leaks and accumulates around the unit, it may cause a fire.
	• **Perform wiring correctly in accordance with specified the current capacity.** Failure to do so may result in short-circuiting, overheating or fire. • **Use predefined cable and connect them certainly. Keep the connecting terminal free from external force.** It may cause an exothermic or a fire.

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2 Introduction

■ Applications / functions / specifications

Applications

- The Digital Input / Output Relay Interface is used to control air conditioners by interlocking them with electric lock signals, and to transmit air conditioner failures to other devices.

Functions

- The Digital Input / Output Relay Interface connects non-voltage contact signals, transmits their input status to the Smart BMS Manager, and outputs signals from the contacts (open collector) according to the command from the Smart BMS Manager.

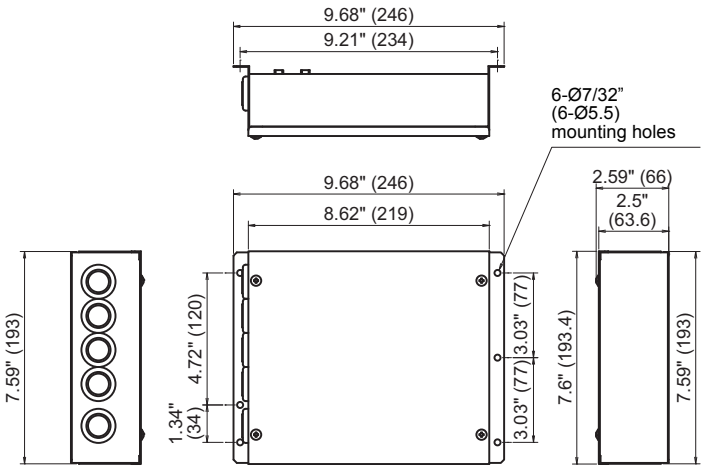
Specifications

Power supply	120 VAC, 60 Hz
Power consumption	5 W
Operating temperature / humidity	32 to 104 °F (0 to 40 °C), 10 to 90% RH (no condensation)
Storage temperature	-4 to 140 °F (-20 to +60 °C)
Chassis material	Galvanized sheet metal 0.8 t
Dimensions	2.59” (H) x 7.59” (W) x 9.68” (D) inch (66 (H) x 193 (W) x 246 (D) mm)
Mass	2.98 lb (1.35 kg)

Digital input	Input type	Photo-coupler insulation
	Input points	8 points
	Input registance	3 k ohm
	Input "ON" current	3.6 mA
Digital output	Output type	Open collector
	Output points	4 points
	Output current	Max. 35 mA (per point)
	Output voltage	Less than DC 24 V
External power supply for Digital Output		DC 12 V, 90 mA

■ External view

Unit: inch (mm)



3 Before installation

Check the following package contents.

No.	Item	Quantity	Remarks
1	Digital Input / Output Relay Interface	1	
2	Installation Manual	1	
3	Screw	4	5/32" x 0.47" (M4 x 12 mm) tapping screws
4	Pin terminal	2	
5	Cable clamp	1	

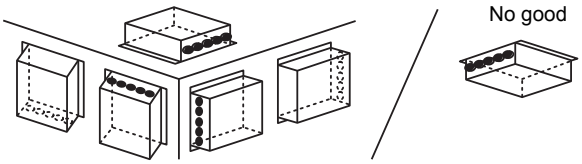
Use the following wiring materials to connect the signal lines and power lines. (locally procured)

No.	Line	Description	
1	For RS-485	Type	2-core shielded wires
		Wire size	AWG16 (1.25 mm^2), 1600 ft (500 m) max. (total length)
		Length	
2	For digital Input / Output connection	Type	2-core wire, AWG22 (0.3 mm^2), 320 ft (100 m) max.
		Wire size	
		Length	
3	For power	Type	UL, CSA approved power supply wire AWG18 (0.75 mm^2), 160 ft (50 m) max.
		Wire size	

4 Installation

■ Digital Input / Output Relay Interface installation method and orientation

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



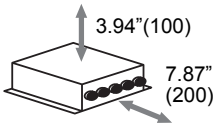
REQUIREMENT

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.



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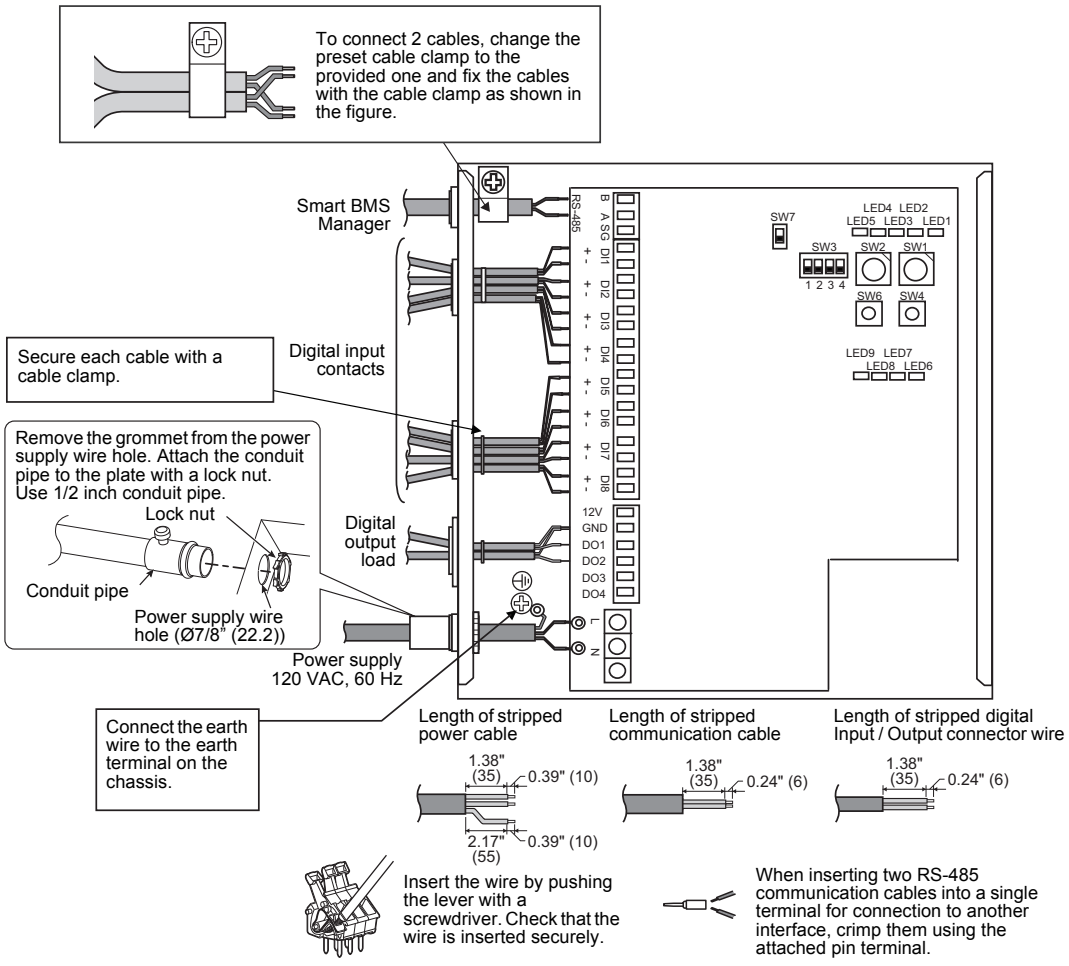
5 Connection of power cables / earth wires / communication cables

⚠ CAUTION

- The RS-485 communication cable has polarity. Connect A to A, and B to B. If connected with incorrect polarity, the unit will not work.

■ Power cables / earth wires / communication cables

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



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 of Digital Input / Output Relay Interface.

⚠ CAUTION

If an inductive load (relay coil) or a bulb is connected, a surge voltage or rush current will be generated. Take adequate measures against surge voltage or rush current.

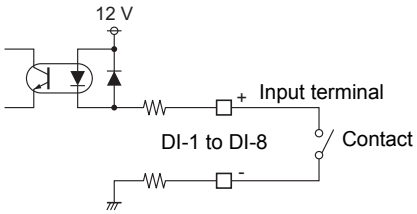
Shield earthing

- The RS-485 communication cable must be earthed on Smart BMS Manager. It does not have to be earthed on Digital Input / Output Relay Interface. The shielded wire must be crimped with closed end connector. The shielded wire end must be insulated and left open.

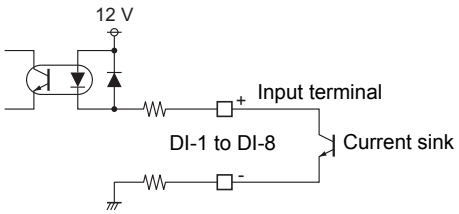
Connection of external digital inputs

- Input circuit examples are shown below (electrically isolated using a photo-coupler).

(1) Example of contact input connection



(2) Example of contact input connection



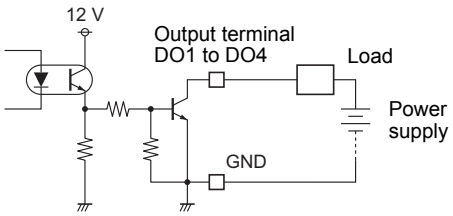
⚠ CAUTION

- Output sink current has polarity.
  When they are connected to inappropriate input terminal, the unit may not operate properly.

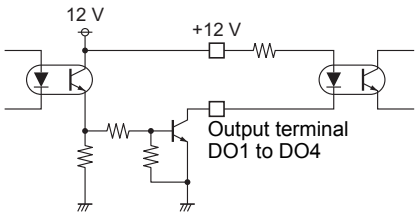
Connection of external digital outputs

- Output circuit examples are shown below (open collector output electrically isolated using a photocoupler).

(1) Example of load connection



(2) Example of load connection



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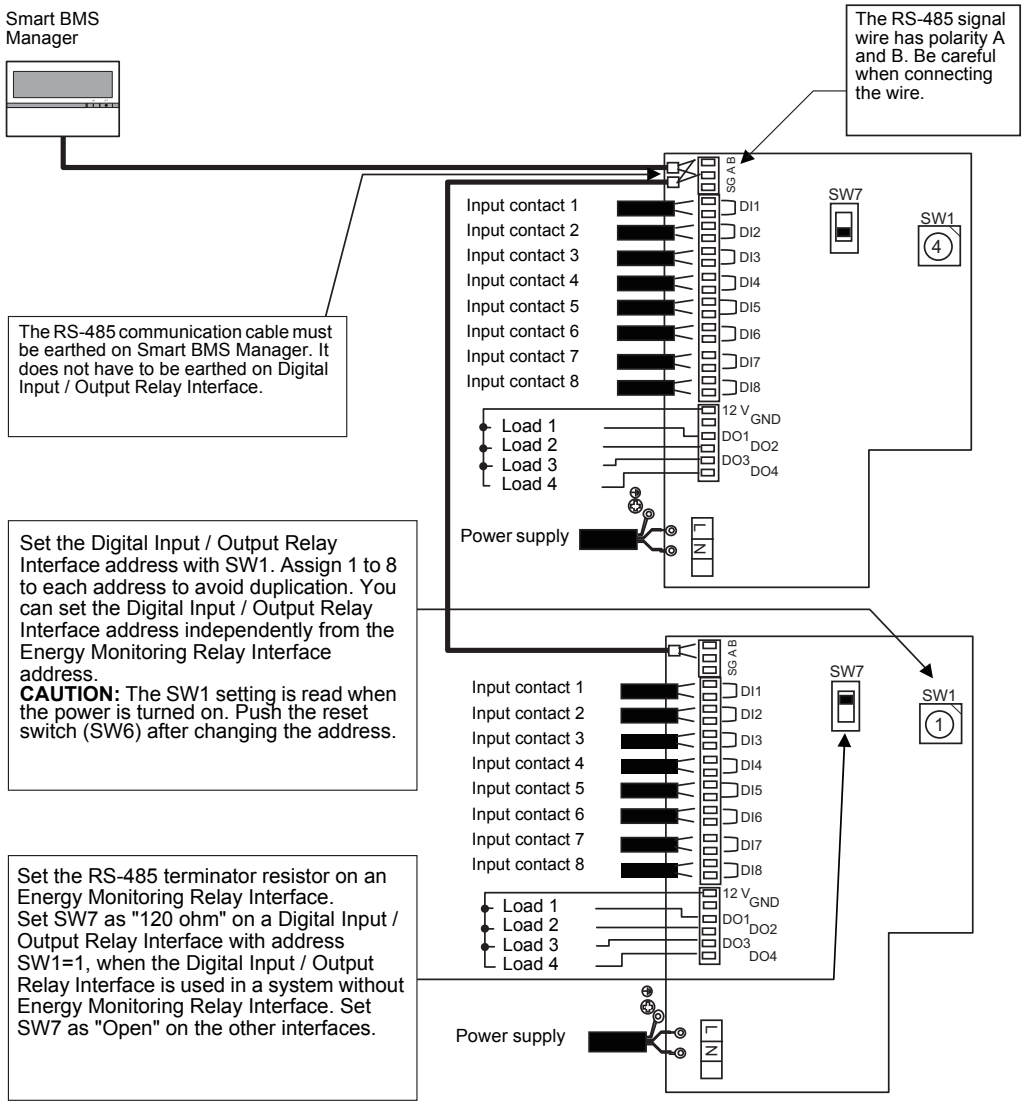
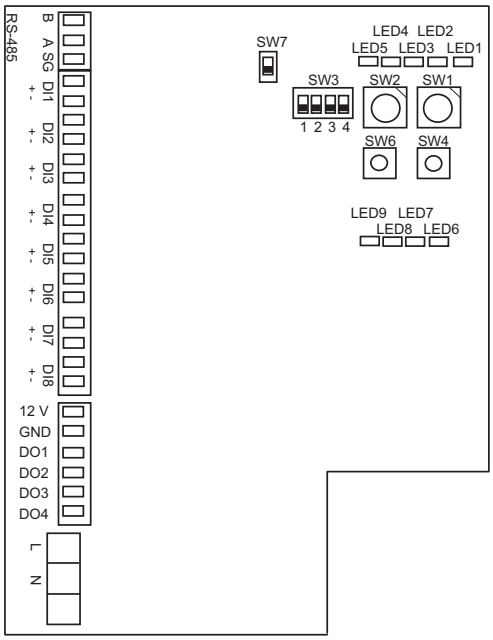
■ Connection diagram



6 Setting



SW1	Address set switch	
	1-8	Address
	0, 9-F	Not used
SW2	Operating mode set switch (0 usually)	
SW3	Test switch (all OFF usually)	
SW4	Test switch	
SW6	Reset switch	
SW7	RS-485 terminator resistor select switch	
		
	120 ohm	Open
LED1	Power indicator	
LED2	RS-485 communication status indicator	
LED3	Not used	
LED4	Test indicator	
LED5	Test indicator	
LED6 -LED9	Digital output indicator	

The following settings are necessary to use Digital Input / Output Relay Interfaces.

- SW1 Address set switch
  When two or more Digital Input / Output Relay Interfaces are used, set a different address for each unit to avoid address duplication.
  Assign addresses in ascending order.

⚠ CAUTION

- **When the SW1 setting has been changed, push the reset switch SW6. The new address setting is read.**
- **Address of Digital Input / Output Relay Interface can be set independently from Energy Monitoring Relay Interface.**

- SW2 Operation mode set switch
- SW3 Test switch
- SW4 Test switch

These switches are not used during normal operation. Set zero (0) or “all OFF”.

- SW6 Reset switch
  When performing an address setting with SW1, push this reset switch after the address setting to read the set value.
- SW7 RS-485 terminator resistor select switch
  Terminator resistor of RS-485 must be set on Energy Monitoring Relay Interface.
  When Digital Input / Output Relay Interface is used without Energy Monitoring Relay Interface, set it [120 ohm] on Digital Input / Output Relay Interface with address SW1=1 and, set it [Open] on the other Interfaces.

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7 Test run

■ Before starting test run

Turn on the power of the Digital Input / Output Relay Interface after all cable connections and settings are completed. Turn on power of the air conditioning control system.

■ Test run

Confirming external input connection

- In the test mode, when the external inputs connected to the input terminals DI-1 to DI-8 are ON, the respective LEDs will goes on so you can confirm the connection.

▼ Confirming procedure:

1 Set the operation mode switch SW2 to "3", and push the reset switch SW6 to enter the test mode.

2 Unless SW4 is pushed, the respective input status of DI-1 to DI-4 is indicated by LED2 to LED5.

3 When SW4 is pushed, the respective input status of DI-5 to DI-8 is indicated by LED2 to LED5.
(*) To return to the normal operation, reset SW2 to "zero (0)" and push SW6.

	LED2	LED3	LED4	LED5
SW4 OFF	Displays DI-1 input status.	Displays DI-2 input status.	Displays DI-3 input status.	Displays DI-4 input status.
SW4 ON	Displays DI-5 input status.	Displays DI-6 input status.	Displays DI-7 input status.	Displays DI-8 input status.

Input ON: LED lights
Input OFF: LED turns off

Checking external output connection

- In the test mode, you can set output terminals DO1 to DO4 to ON or OFF with the test switch. Their output status is indicated by each LED.

▼ Checking procedure:

1 Set the operation mode switch SW2 to "3" in the same way as the external input check, and then push the reset switch SW6 to enter the test mode.

2 When the bit of the test switch SW3 is set to ON, the external output turns ON; when set to OFF, the external output turns OFF. Bits 1 to 4 of SW3 correspond to output terminals DO1 to DO4.
The respective output status of output terminals DO1 to DO4 is indicated by LED6 to LED9.
The LEDs light with the output ON, and goes off with the output OFF.
(*)To return to normal operation, reset SW2 to "zero (0)" and push SW6.

LED6	LED7	LED8	LED9
Displays DO1 output status.	Displays DO2 output status.	Displays DO3 output status.	Displays DO4 output status.

Output ON: LED lights
Output OFF: LED turns off

Checking the RS-485 communication status

Use LED2 for checking the RS-485 communication status.
When RS-485 communication with Smart BMS Manager is normal, LED2 will blink.

LED		Normal operation	Abnormal operation
LED1	Power indicator	ON	OFF
LED2	RS-485 communication status indicator	Blinking	OFF
LED3	Not used	OFF	—
LED4	Test indicator	OFF	—
LED5	Test indicator	OFF	—