

Preface


Thank you for purchasing the IF-400 Communication Converter. This manual contains instructions for the mounting, functions, operations and notes for operating the IF-400. To prevent accidents arising from the misuse of this unit, please ensure the operator receives this manual.

Notes

- This instrument should be used in accordance with the specifications described in the manual. If it is not used according to the specifications, it may malfunction or cause a fire.
- Be sure to follow the warnings, cautions and notices. If they are not observed, serious injury or malfunction may occur.
- Specifications and the contents of this instruction manual are subject to change without notice.
- Care has been taken to ensure that the contents of this instruction manual are correct, but if there are any doubts, mistakes or questions, please inform our sales department.
- This instrument is designed to be installed on a DIN rail within a control panel. If it is not, measures must be taken to ensure that power terminals or other high voltage sections cannot be touched.
- Any unauthorized transfer or copying of this document, in part or in whole, is prohibited.
- Shinko Technos CO., LTD. is not liable for any damage or secondary damage(s) incurred as a result of using this product, including any indirect damages.

Safety precautions (Be sure to read these precautions before using this product.)

The safety precautions are classified into two categories: "Warning" and "Caution".

Depending on the circumstances, procedures indicated by  Caution may have serious consequences, so be sure to follow the directions for correct usage.

Warning

Procedures which may lead to dangerous conditions and cause death or serious injury, if not carried out properly.

Caution

Procedures which may lead to dangerous conditions and cause superficial to medium injury or physical damage or may degrade or damage the product, if not carried out properly.

Warning

- To prevent an electric shock or fire, only Shinko or other qualified service personnel may handle the inner assembly.
- To prevent an electric shock, fire or damage to the instrument, parts replacement may only be undertaken by Shinko or other qualified service personnel.

Safety precautions

- To ensure safe and correct use, thoroughly read and understand this manual before using this instrument.
- This instrument is intended to be used for industrial machinery, machine tools and measuring equipment. Verify correct usage after consulting purpose of use with our agency or main office. (Never use this instrument for medical purposes with which human lives are involved.)
- External protection devices such as protection equipment against excessive temperature rise, etc. must be installed, as malfunction of this product could result in serious damage to the system or injury to personnel. Also proper periodic maintenance is required.
- This instrument must be used under the conditions and environment described in this manual. Shinko Technos Co., Ltd. does not accept liability for any injury, loss of life or damage occurring due to the instrument being used under conditions not otherwise stated in this manual.

Caution with respect to Export Trade Control Ordinance

To avoid this instrument from being used as a component in, or as being utilized in the manufacture of weapons of mass destruction (i.e. military applications, military equipment, etc.), please investigate the end users and the final use of this instrument.

In the case of resale, ensure that this instrument is not illegally exported.

1. Installation precautions



Caution

This unit is intended to be used under the following environmental conditions (IEC61010-1):

Overvoltage category II, Pollution degree 2

Ensure the mounting location corresponds to the following conditions:

- A minimum of dust, and an absence of corrosive gases
- No flammable, explosive gases
- No mechanical vibrations or shocks
- No exposure to direct sunlight, an ambient temperature of 0 to 50°C (32 to 122°F) that does not change rapidly, no icing
- An ambient non-condensing humidity of 35 to 85%RH
- No large capacity electromagnetic switches or cables through which large current flows
- No water, oil or chemicals or where the vapors of these substances can come into direct contact with the unit
- When this unit is installed inside a control panel, the ambient temperature of this unit must be kept to under 50°C. Otherwise the life of electronic components (especially electrolytic capacitors) will be shortened.

Note: Avoid setting this unit directly on or near flammable material even though the case of this unit is made of flame-resistant resin.

2. Wiring precautions



Caution

- Do not leave bits of wire in the unit, because they could cause fire, malfunction or trouble.
- Insert the connecting cable into the designated connector securely to prevent malfunction.
- Connect the wire for the AC power source with its designated terminal as described in this instruction manual.
The IF-400 will be damaged if the AC power source wire is connected to an incorrect terminal.
- When wiring terminals of the IF-400 at the terminal block, use correct fitting ferrules with an insulation sleeve for the terminal screw.
- Tighten the terminal screw within the specified torque. If excessive force is applied to the screw when tightening, the screw or case may be damaged.
- For a 24V AC/DC power source, do not confuse polarity when using direct current (DC).
- This unit does not have a built-in power switch, circuit breaker or fuse. Therefore, it is necessary to install them in the circuit near the unit externally.
(Recommended fuse: Time-lag fuse, rated voltage 250V AC, rated current 2A)

3. Running and maintenance precautions



Warning

- Do not touch live terminals. This may cause electric shock or problems in operation.
- Turn the power supply to the instrument OFF before retightening the terminal or cleaning.
Working or touching the terminal with the power switched ON may result in severe injury or death due to Electric Shock.
- Use a soft, dry cloth when cleaning the unit.
(Alcohol based substances may tarnish or deface the unit)
- As the display section is vulnerable, do not strike or scratch it with a hard object.

1. Overview

1.1 Overview

The IF-400 is a communication converter to relay communications between a host computer/PLC (RS-232C or RS-422) and controllers (Serial communication function RS-485, C5 option). Shinko protocol and Modbus protocol are available.

The IF-400 can also be used as a repeater by connecting another IF-400 unit to the controller side communication line.

The repeater will be the 31st connected unit, and up to 31 units of controller can be connected to the repeater.

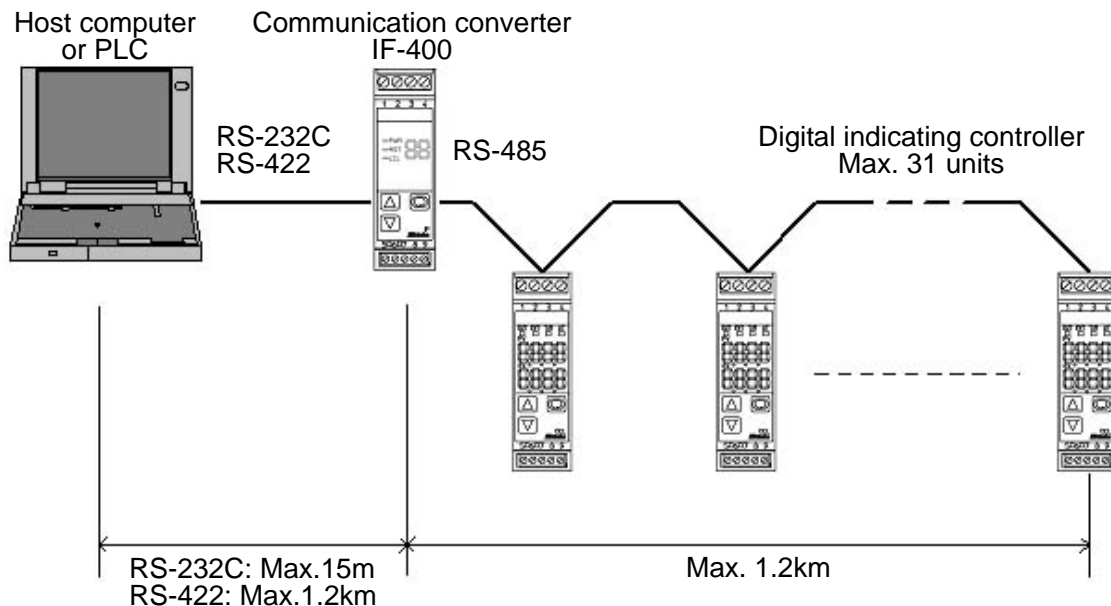
A maximum of 3 units of repeater can be connected.

Up to 95 units of controllers (Controller address is limited to 95) can be connected.

1.2 System configuration

1.2.1 When the IF-400 is used as a communication converter

When IF-400 is used as a communication converter, a maximum of 31 units of controller can be connected.

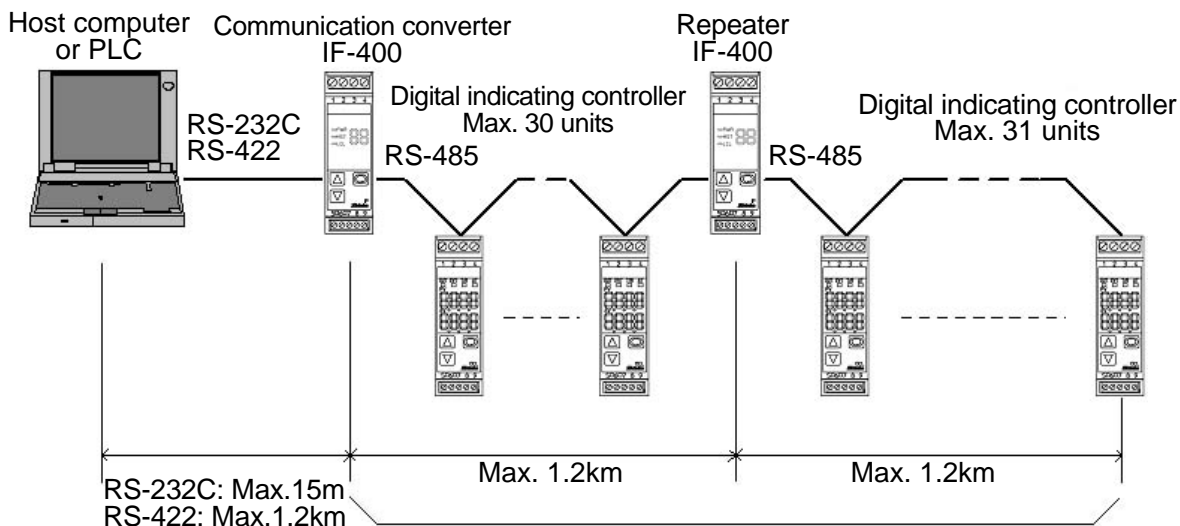


(Fig.1.2.1-1)

1.2.2 When the IF-400 is used as a repeater

When the IF-400 is used as a repeater, more than 32 units of controller can be connected. Communication line can be extended more than 1.2km.

Up to 3 units of repeater can be used, therefore, up to 95 units of controller can be connected (A maximum of 4.8km of communication line can be extended).



(Fig.1.2.2-1)

2. Model

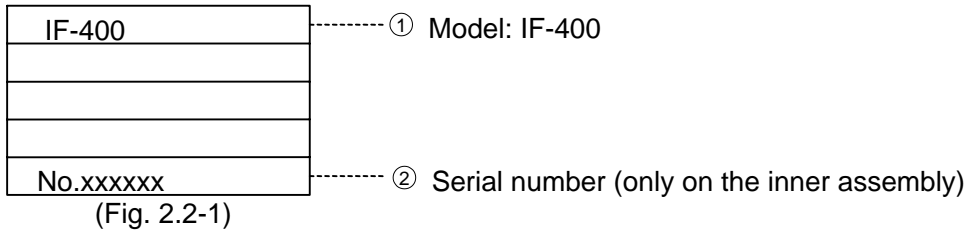
2.1 Model
IF-400

2.2 How to read the model label

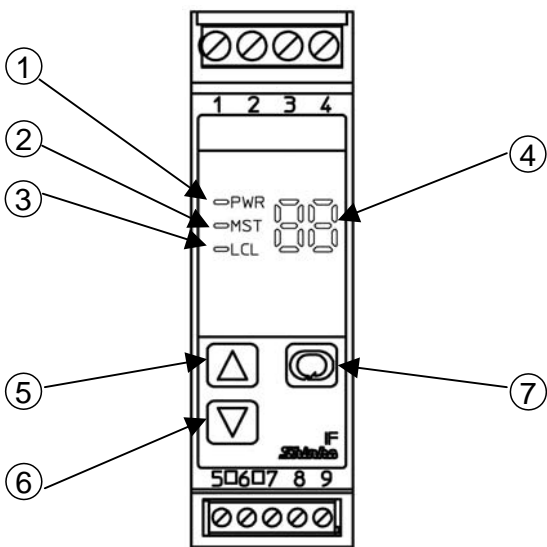
Warning

Turn the power supply to the instrument off before confirming the model labels.
Working or touching the terminal with the power switched on may result in severe injury or death due to Electric Shock.

Model labels are attached to the case and the inner assembly. (Fig. 2.2-1)
(e.g.)



3. Name and functions of the sections



(Fig. 3-1)

- ① **PWR indicator (Green):**
Lights when power supply to the instrument is switched on.
- ② **MST (Master) indicator (Green):**
LCL (Local) → MST (Master)
Lights while data signal is transmitted from the controller side communication line to the host computer/PLC side communication line.
- ③ **LCL (Local) indicator (Green):**
MST (Master) → LCL (Local)
Lights while data signal is transmitted from the host computer/PLC side communication line to the controller side communication line.
- ④ **Setting display:**
Unlit during communication mode.
Indicates the selected item in the Setup mode.
- ⑤ **Increase key:** Switches the selection item.
- ⑥ **Decrease key:** Switches the selection item.
- ⑦ **Mode key:** Switches the setting mode, and registers the selected item.

4. Mounting

4.1 Site selection

Caution

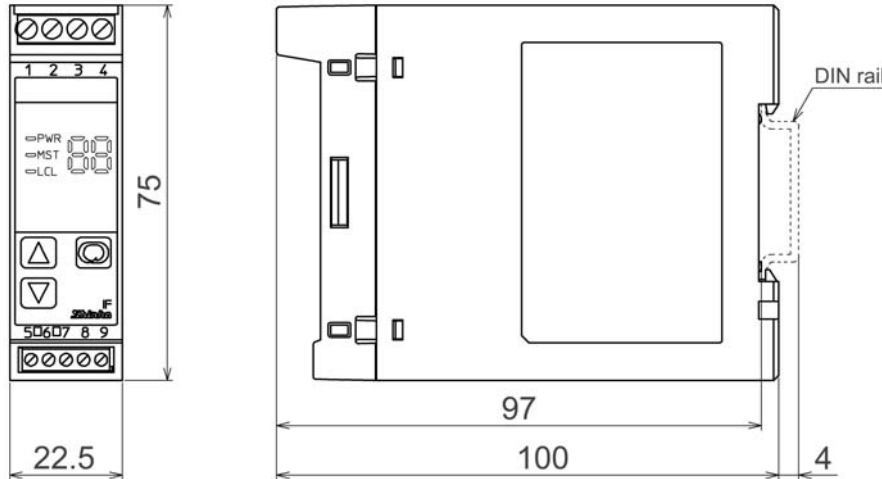
Use within the following temperature and humidity ranges.
 Temperature: 0 to 50°C (32 to 122°F), Humidity: 35 to 85%RH (No icing, no condensation)
 If the IF-400 is installed within a control panel, the ambient temperature of the IF-400 must be kept to under 50°C.
 Otherwise the life of electronic parts (especially electrolytic capacitors) of the IF-400 will be shortened.

This unit is intended to be used under the following environmental conditions (IEC61010-1):
 Overvoltage category II, Pollution degree 2

Ensure the mounting location corresponds to the following conditions:

- A minimum of dust, and an absence of corrosive gases
- No flammable, explosive gases
- No mechanical vibrations or shocks
- No exposure to direct sunlight, an ambient temperature of 0 to 50°C (32 to 122°F) that does not change rapidly
- An ambient non-condensing humidity of 35 to 85%RH
- No large capacity electromagnetic switches or cables through which large current flows
- No water, oil or chemicals or where the vapors of these substances can come into direct contact with this unit

4.2 External dimensions (Scale: mm)



(Fig.4.2-1)

4.3 Mounting to the DIN rail

Caution

Mount the DIN rail horizontally.
When the DIN rail is mounted vertically, be sure to use commercially available fastening plates at the end of the IF-400. Mount the IF-400 to the DIN rail so that the IF-400 may be fixed.
However, if the DIN rail is mounted horizontally in a position susceptible to vibration or shock, the fastening plates must be used as well.

• Recommended fastening plate

Omron Corporation	End plate	PFP-M
IDEC Corporation	Fastening plate	BNL6
Matsushita Electric Works, Ltd.	Fastening plate	ATA4806

First, hook ① of the IF-400 on the upper side of the DIN rail. (Fig. 4.3-1)

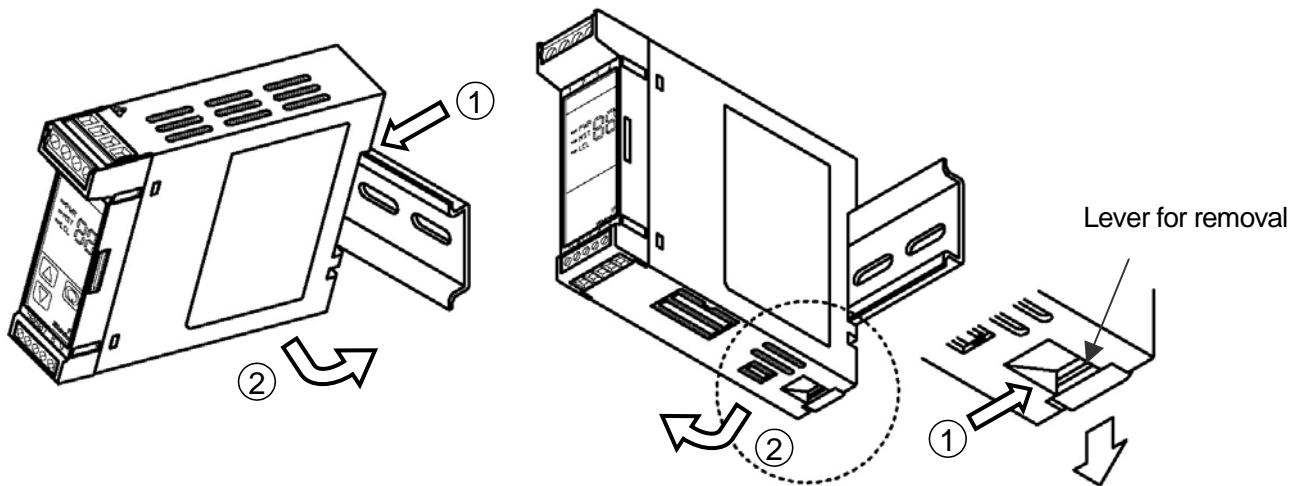
Second, making ① part of the IF-400 as a support, fit the lower part ② of the IF-400 to the DIN rail.
 The IF-400 will be completely fixed to DIN rail with a “Click” sound. (Fig. 4.3-1)

4.4 Removal from the DIN rail

Caution

A flat blade screwdriver is required for removing the IF-400 from the DIN rail.
Do not turn the screwdriver when releasing the lever for removal.
If excessive force is applied to the lever for removal, it may be damaged.

- ①: Put a flat blade screwdriver to the lever and pull down the lever with it. (Fig.4.4-1)
- ②: The lock to the DIN rail will be released.
Be careful that the unit does not drop to the ground when it is removed. (Fig.4.4-1)



(Fig.4.3-1) Mounting

(Fig.4.4-1) Removal

5. Wiring

Warning

Turn the power supply to the instrument off before wiring.
Working or touching the terminal with the power switched on may result in severe injury or death due to Electric Shock.

Caution

- Do not leave bits of wire in the instrument, because they could cause fire, malfunction or trouble.
- Insert the connecting cable into the designated connector securely to prevent malfunction.
- Connect the wire for AC power source with its designated terminal as described in this instruction manual.

The IF-400 will be damaged if the AC power source wire is connected to an incorrect terminal.

- Tighten the terminal screw with the specified torque.
If excessive force is applied to the screw when tightening, the screw or case may be damaged.
- When using a 24V DC for the power source, do not confuse polarity.
- This unit does not have a built-in power switch, circuit breaker or fuse. Therefore, it is necessary to install them in the circuit near the unit externally.

(Recommended fuse: Time-lag fuse, rated voltage 250V AC, rated current 2A)

● **Ferrules and tightening torque**

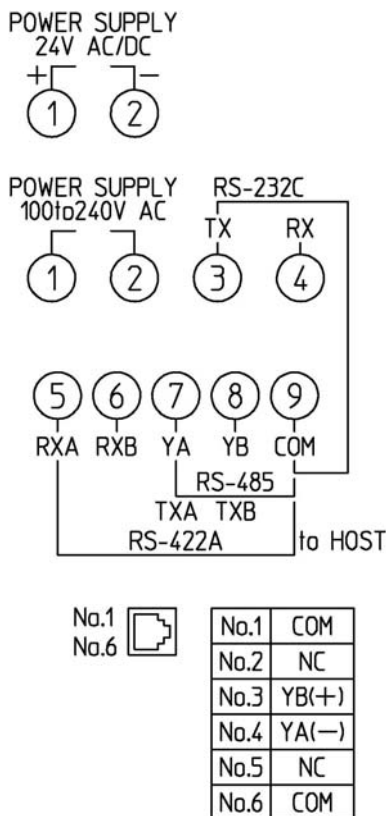
When using ferrules, use the following recommended ferrules and crimping pliers made by Phoenix Contact GMBH &CO. See (Table 5-1).

Take note that terminal screws and tightening torque differ depending on a terminal number.

(Table 5-1)

Terminal number	Terminal screw	Ferrules with insulation sleeve	Conductor cross sections	Tightening torque	Crimping pliers
1 to 4	M2.6	Al 0.25-8 YE	0.2 to 0.25mm ²	0.5 to 0.6N·m	CRIMPFOX ZA 3 CRIMPFOX UD 6
		Al 0.34-8 TQ	0.25 to 0.34mm ²		
		Al 0.5-8 WH	0.34 to 0.5mm ²		
		Al 0.75-8 GY	0.5 to 0.75mm ²		
		Al 1.0-8 RD	0.75 to 1.0mm ²		
		Al 1.5-8 BK	1.0 to 1.5mm ²		
5 to 9	M2.0	Al 0.25-8 YE	0.2 to 0.25mm ²	0.22 to 0.25N·m	
		Al 0.34-8 TQ	0.25 to 0.34mm ²		
		Al 0.5-8 WH	0.34 to 0.5mm ²		

● **Terminal arrangement**



● to HOST : Communication terminals for the Host computer/PLC RS-232C, RS-422, RS-485

● Modular jack: For controller side communication RS-485

(Fig. 5-1)

5.1 Wiring of power supply

Use terminals 1 and 2 for power supply.

When using a 24V DC for the power source, do not confuse polarity.

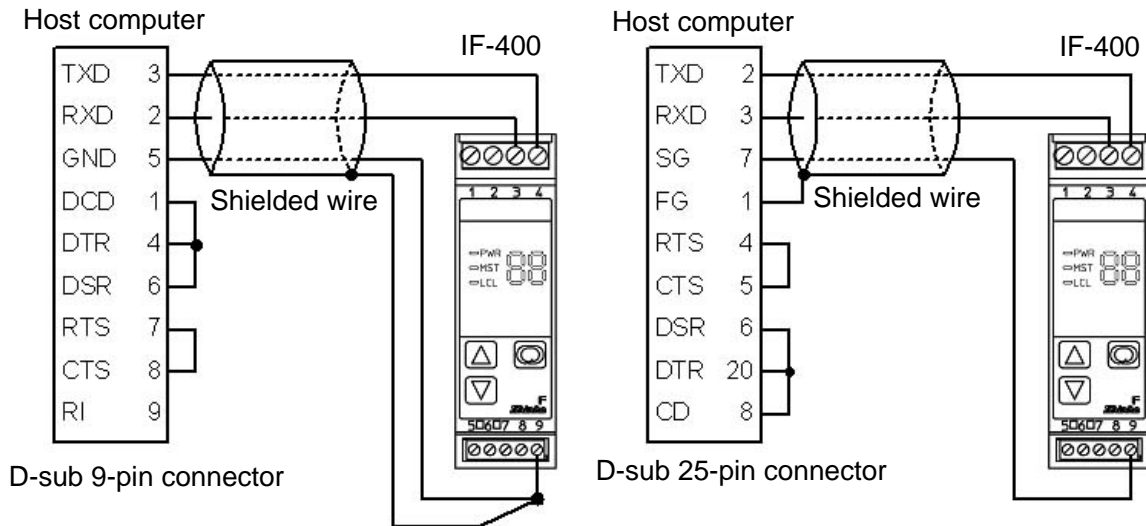
5.2 Wiring of the host computer/PLC side when using the IF-400 as a communication converter

5.2.1 RS-232C

Use terminals 3, 4 and 9.

Use CFP-C2 (D-sub 9-pin connector for the host computer side, ferrules for the IF-400 side) as a cable between host computer/PLC and the IF-400.

If host computer has only USB connector, use commercially available USB serial conversion cable (USB connector for the host computer side, D-sub 9-pin connector for CFP-C2 side) to connect the host computer and CFP-C2.

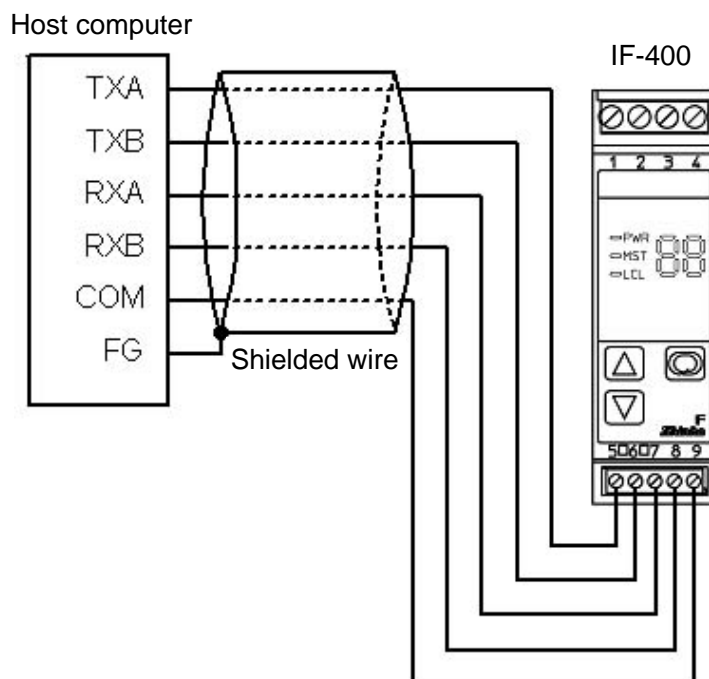


(Fig. 5.2.1-1)

5.2.2 RS-422

Use terminals 5 through 9.

Use CFP-C4 (Y terminal for the host computer, ferrules for the IF-400) as a cable between host computer/PLC and the IF-400.

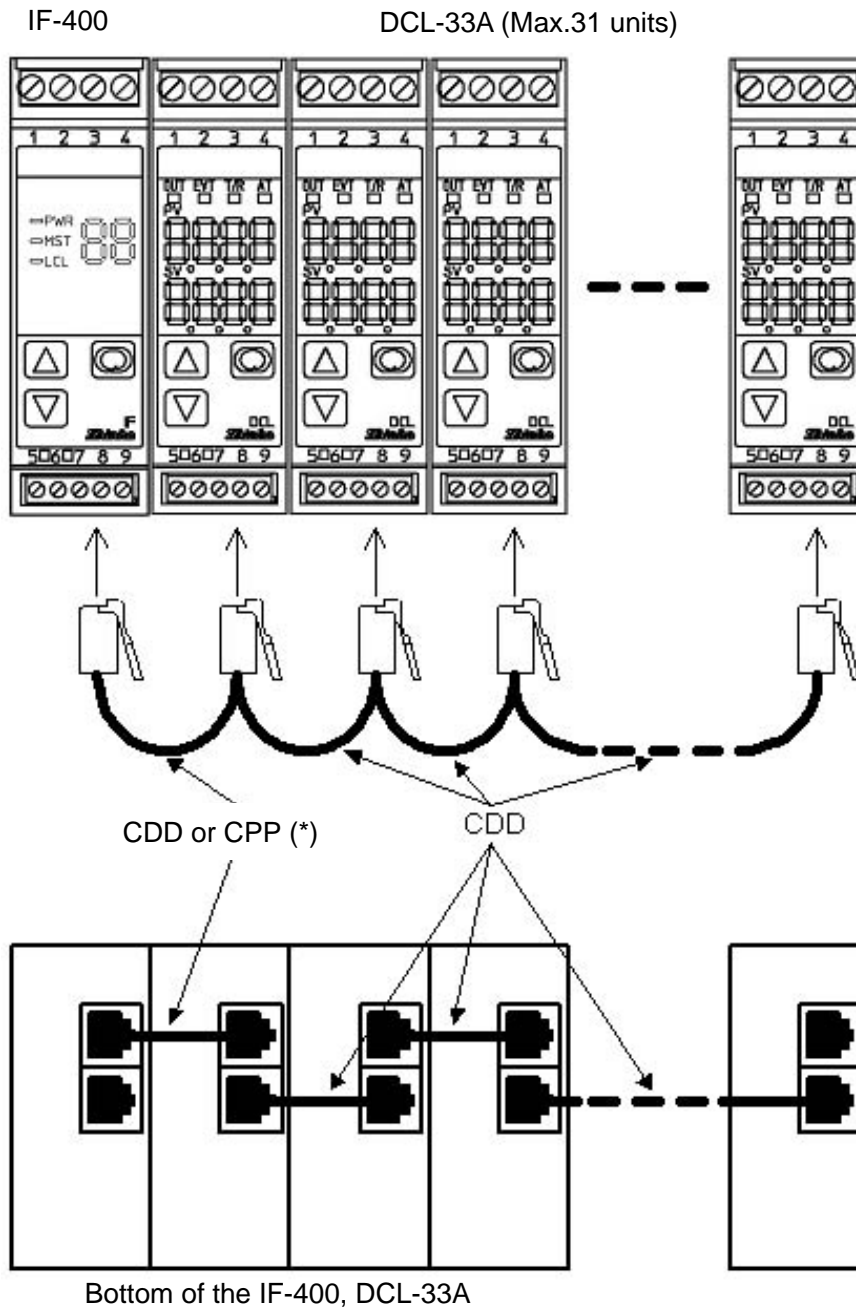


(Fig. 5.2.2-1)

5.3 Wiring of the controller side

5.3.1 DCL-33A

Use communication cable CDD or CPP, and plug into a modular jack.



(Fig.5.3.1-1)

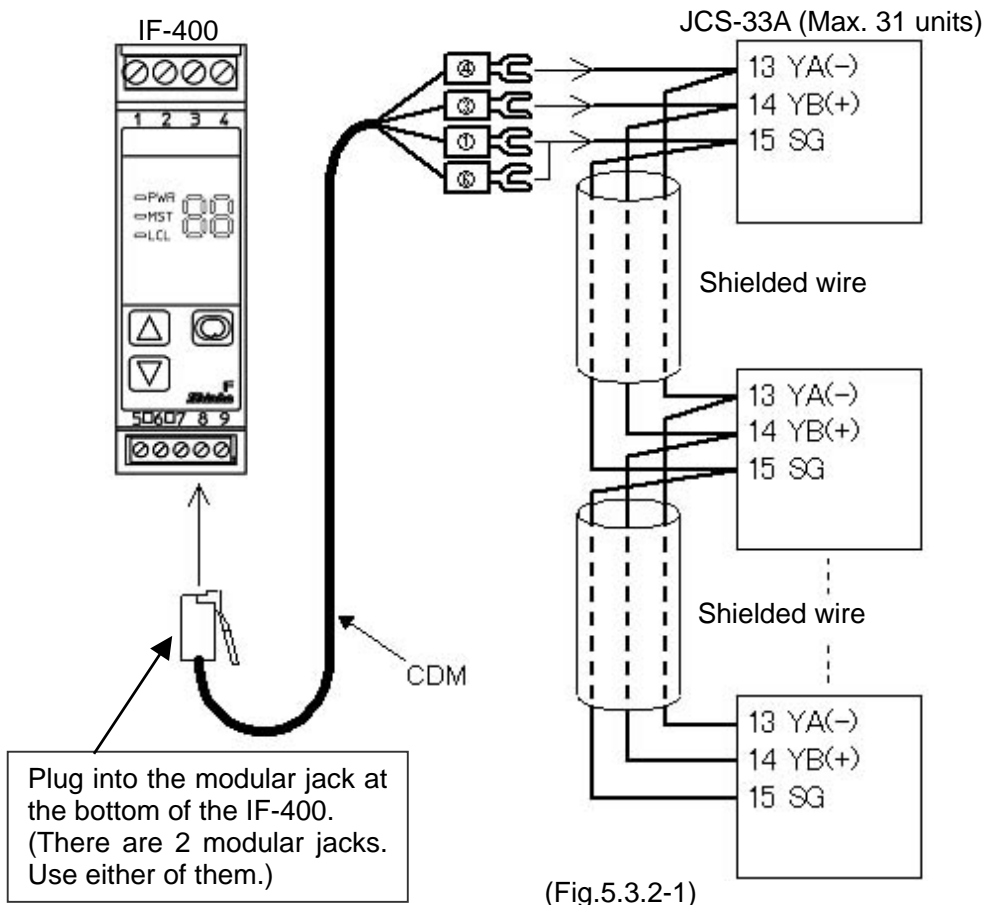
- (*) Cable length of CDD: 60mm. For distances larger than 60mm, use the CPP cable.
Cable length of CPP: 500mm.
For distances larger than 500mm, the CPP can be extended in units of 500mm fixed length.
For distances less than 500mm, the CPP can be cut down in units of 100mm fixed length.

5.3.2 Controllers such as ACS-13A, JC series, FC series, PC-900 which have terminal block

Use CDM communication cable, and plug into a modular jack.

Cable length of CDM: 3000mm

The CDM cable can be extended in units of 1000mm fixed length.

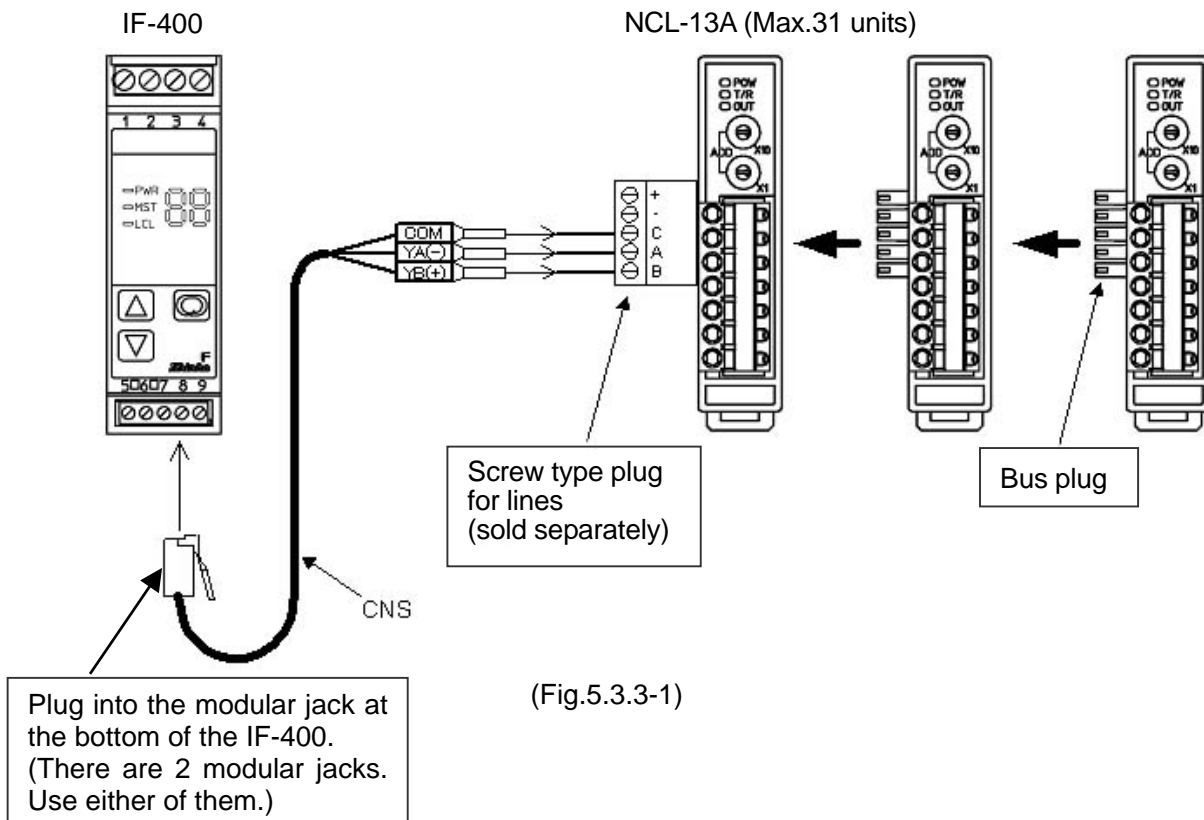


5.3.3 NCL-13A

Use CNS communication cable, and plug into a modular jack.

Cable length of CNS: 500mm

The CNS cable can be extended in units of 500mm fixed length.



5.4 Wiring of the host computer/PLC side when using the IF-400 as a repeater

When connecting more than 32 units of controllers, use the IF-400 as a repeater.

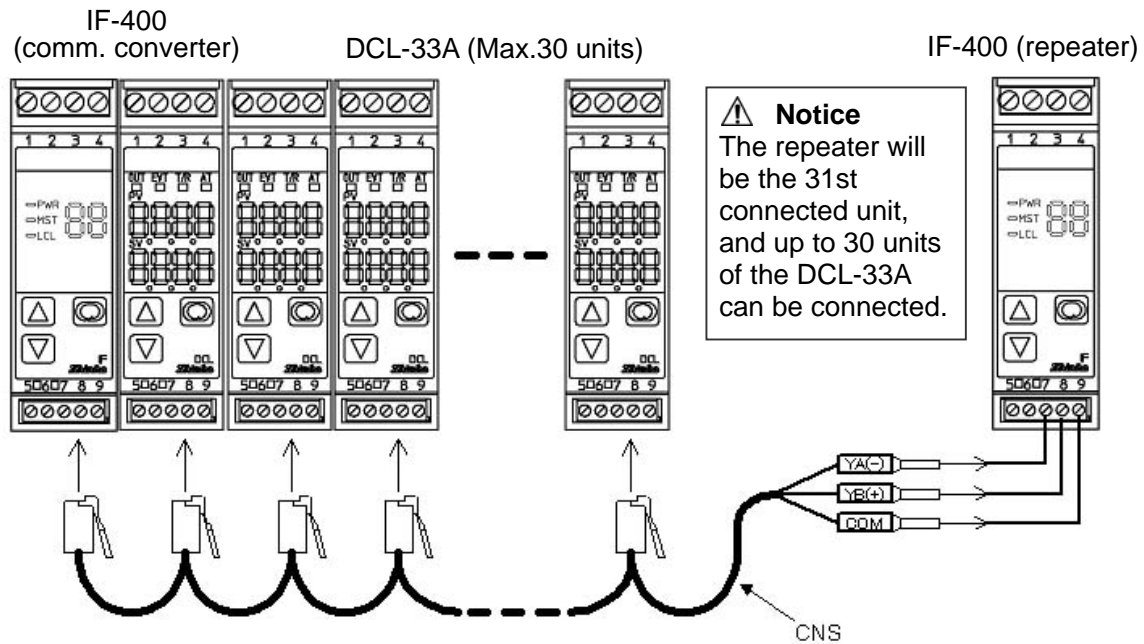
For wiring between the IF-400 and controllers, refer to Section 5.3.

5.4.1 DCL-33A

Use CNS communication cable, and connect it to terminals 7 through 9.

Cable length of CNS: 500mm

The CNS cable can be extended in units of 500mm fixed length.



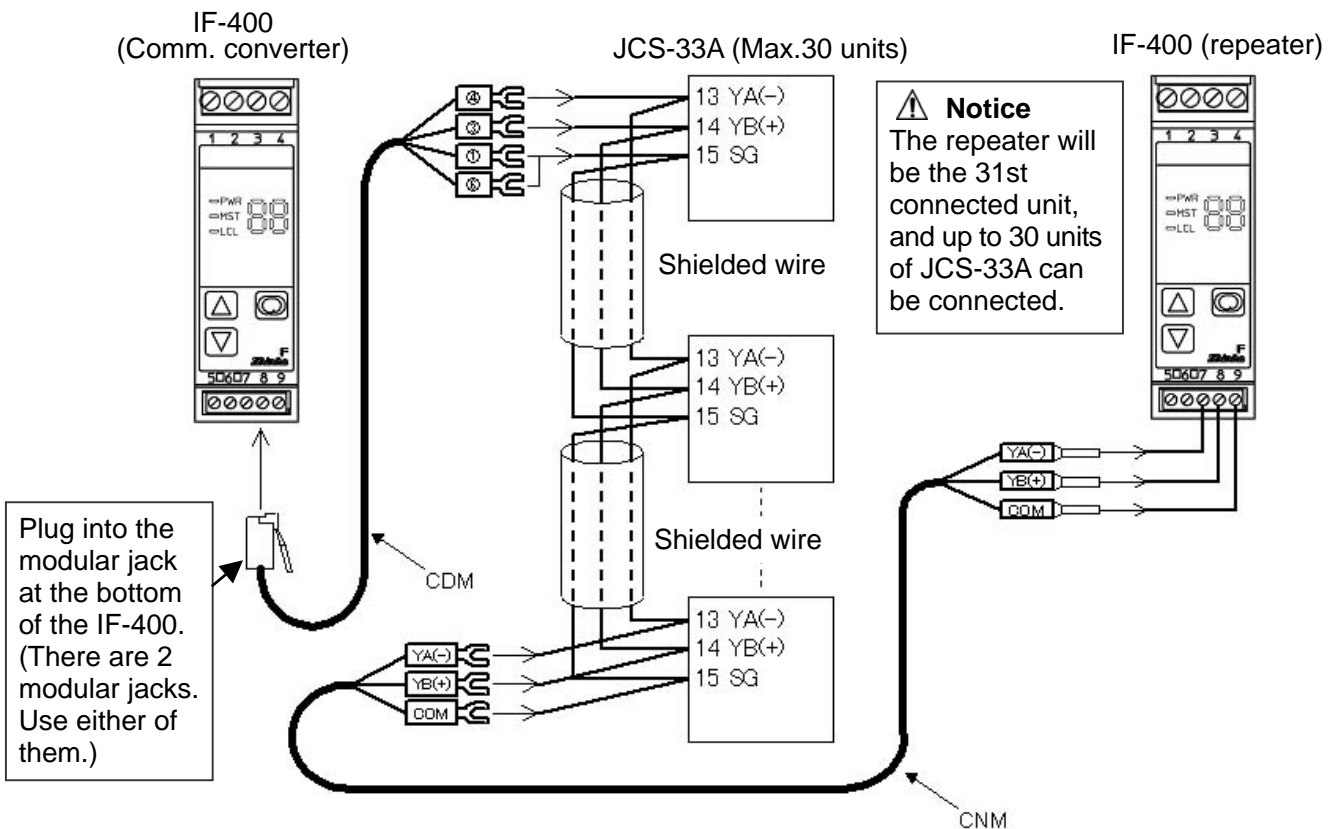
(Fig.5.4.1-1)

5.4.2 Controllers such as ACS-13A, JC series, FC series, PC-900 which have terminal block

Use CNM communication cable, and connect it to terminals 7 through 9.

Cable length of CNM: 500mm

The CNM cable can be extended in units of 500mm fixed length.



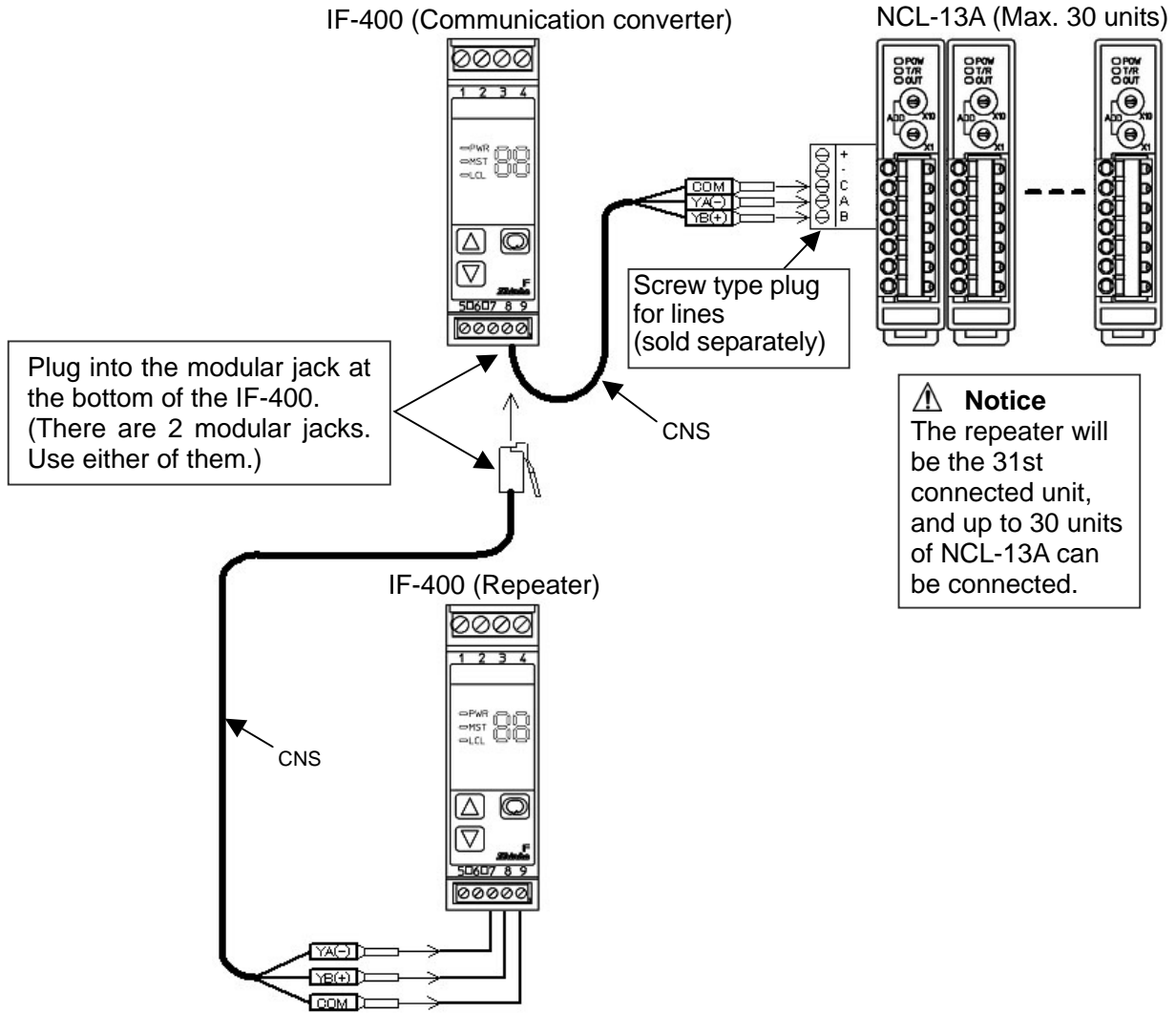
(Fig.5.4.2-1)

5.4.3 NCL-13A

Use CNS communication cable, and connect it to terminals 7 through 9.

Cable length of CNS: 500mm

The CNS cable can be extended in units of 500mm fixed length.



(Fig. 5.4.3-1)

6. Setup

Setup should occur before using the IF-400, to set the Communication speed and Sending/Receiving switching character, according to the users' conditions.

If the users' specification is the same as the default value of the IF-400 (Table 6-1), it is not necessary to set up the IF-400. Proceed to Chapter "7. Running".

(Table 6-1)

Setting item	Default value
Communication speed	9600bps
Sending/Receiving switching character	1 character

Setup items and communication line control

After detecting the Start bit of the 1st character upon receiving a data signal from the host computer/PLC, the IF-400 switches the controller communication line to Sending status.

When data signal from the host computer/PLC stops, the IF-400 sets the controller communication line back to Receiving status after Sending/Receiving switching time has passed (*).

After detecting the Start bit of the 1st character upon receiving a data signal from the controller, the IF-400 switches the host computer/PLC communication line to Receiving status.

When data signal from the controller stops, the IF-400 sets the host computer/PLC communication line back to Receiving status after Sending/Receiving switching time has passed (*).

When communication is not performed, the communication line for both host computer/PLC and controller are in data Receiving status.

(*) Sending/Receiving switching time is determined by the selection of communication speed and Sending/Receiving switching character.

(e.g.) Communication speed: 9600bps

Sending/Receiving switching character: 1 character

If 1 character is 10 bits, then Sending/Receiving switching time will be 0.001 seconds (1ms).

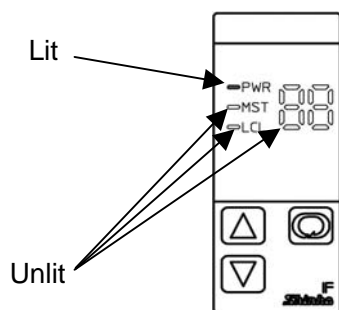
Communication timing

The IF-400 performs control within the communication time above. Therefore, if data is transmitted with a shorter interval than the Sending/Receiving switching time, normal communication cannot be performed. Set the Sending/Receiving time from the host computer side so that the next piece of data can be sent after the communication line is switched from Sending to Receiving status.

● Turn the power ON

The PWR indicator lights when power supply to the unit is switched on.

Other indicators are unlit. (See Fig. 6-1)



(Fig. 6-1)

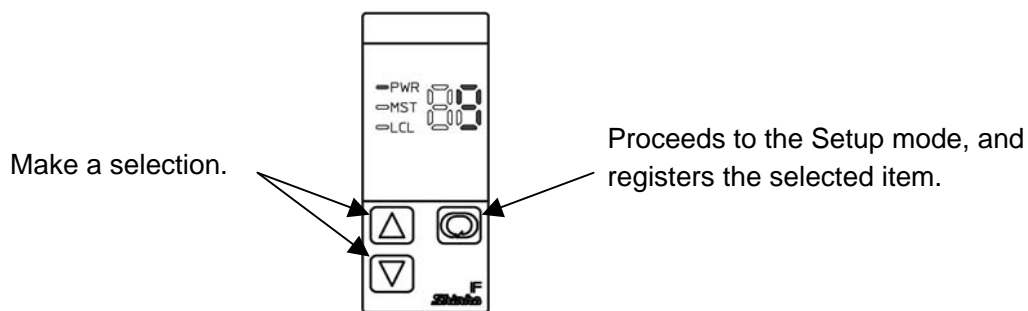
● Basic setup operation

To proceed to the setup mode, press the key.

The unit will proceed to the "Communication speed selection" mode, and its characters will be indicated on the display.

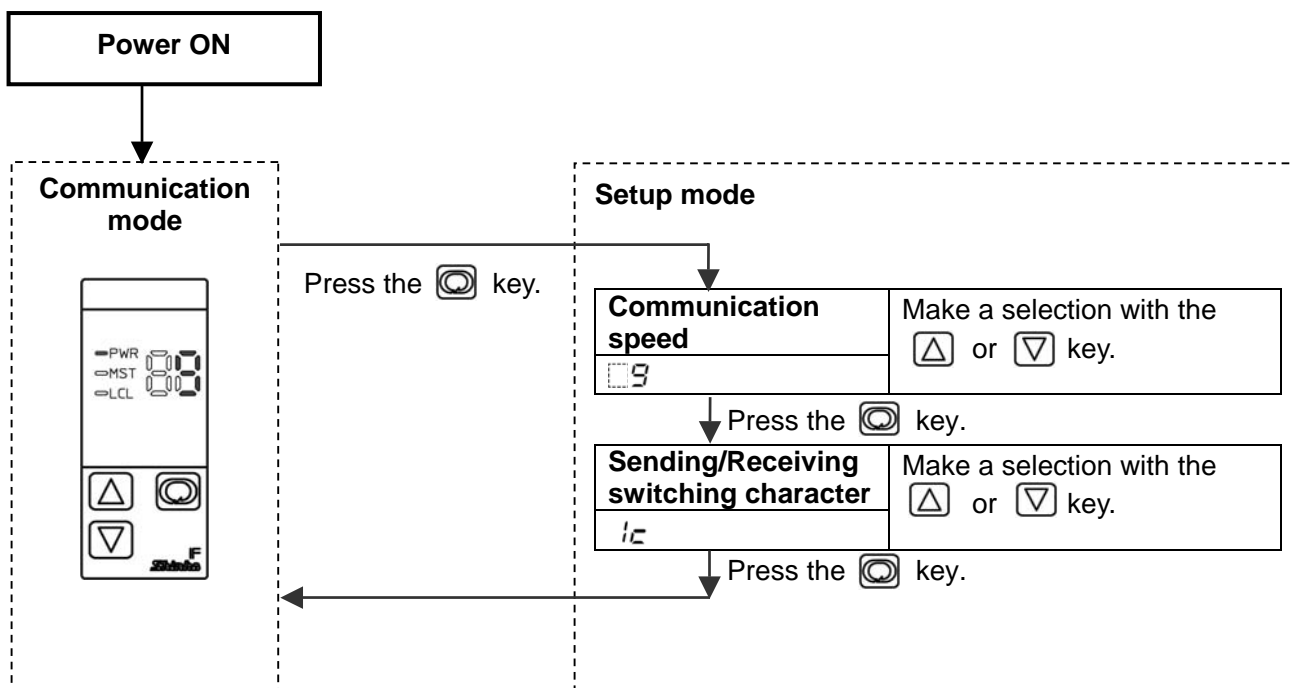
Make a selection using the and keys, and register the selected item with the key.

(See Fig. 6-2.)



(Fig. 6-2)

6.1 Operation flowchart



6.2 Contents of Setup mode

Communication speed selection

Indication	Communication speed
02	2400bps
04	4800bps
09	9600bps
19	19200bps

Sending/Receiving switching character selection

Indication	Sending/Receiving switching character
1c	1 character
2c	2 characters

7. Running

Check the wiring and setup.

Confirm the communication between a host computer/ PLC and controller.

For communication confirmation, simplified communication software and monitoring software are provided.

The monitoring software can be downloaded from Shinko website (<http://www.shinko-technos.co.jp>).

(Registration for membership is required.)

For further details, contact our dealers or us.

8. Specifications

Rating

Communication : Host computer/PLC side: RS-232C or RS-422 (terminal)
RS-485 (terminal, when used as a repeater)

Controller side: RS-485 (modular jack)

Supply voltage : 100 to 240V AC or 24V AC/DC, 50/60Hz

Allowable voltage fluctuation range:

100 to 240V AC: 85 to 264V AC

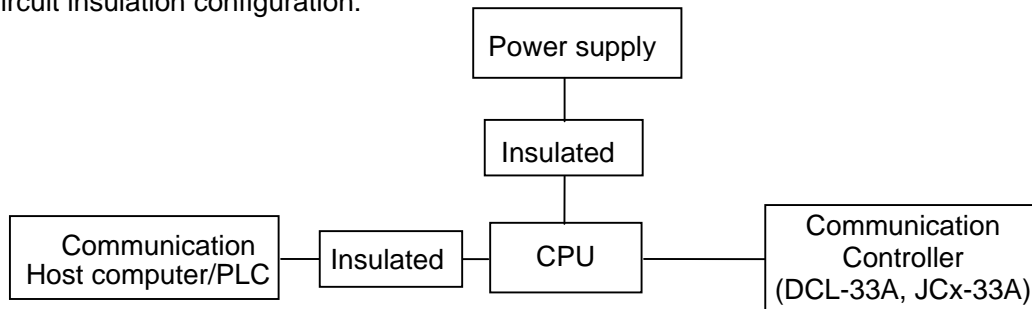
24V AC/DC : 20 to 28V AC/DC

General structure

External dimensions: 22.5 x 75 x 100 mm (W x H x D)
 Mounting : DIN rail
 Case : Flame-resistant resin, Light gray
 Panel : Membrane sheet

Insulation/Dielectric strength

Circuit insulation configuration:



Insulation resistance : 10MΩ or more, at 500V DC

Dielectric strength:

Between power terminal and controller communication modular jack ----- 1.5kV AC for 1 minute
 Between power terminal and host computer/PLC communication terminal --- 1.5kV AC for 1 minute
 Between host computer/PLC communication terminal
 and controller communication modular jack ----- 1.5kV AC for 1 minute

Others

Power consumption : Approx. 5VA
 Ambient temperature: 0 to 50°C (32 to 122°F)
 Ambient humidity : 35 to 85%RH (non-condensing)
 Weight : Approx. 150g
 Accessories : Instruction manual 1 copy

9. Troubleshooting

If any malfunctions occur, refer to the following items after checking the power supply to the IF-400, the host computer and controller.



Warning

Turn the power supply to the instrument OFF before wiring or checking.

Working with the power switched ON may result in severe injury or death due to Electric Shock.

● Communication failure

Problem	Solution
Connector or communication cable is not connected.	Connect it securely.
Imperfect contact with the connector or broken cables	Securely connect the connector. Change the cable.
The wiring of communication cable (connector) is not correct.	Wire it correctly. Refer to "5. Wiring".
Setup of the IF-400 is not correct.	Set up the unit properly. Refer to "6. Setup".
Instrument number of the controller is duplicated.	Sets an individual instrument number for each unit of controllers. When using Shinko monitoring software, set the controllers' instrument number from 0 (zero) in numerical order, referring to the Instruction manual for the controller.

***** Inquiry *****

For any inquiries about this unit, please contact our agency or the shop where you purchased the unit after checking the following.

(Example)

- Model ----- IF-400
- Serial number ----- No. xxxxxx

In addition to the above, please let us know the details of the malfunction and operating conditions.

SHINKO TECHNOS CO., LTD.
OVERSEAS DIVISION

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