No.IF41E2 2005.10

Preface

Thank you for the purchase of Communication converter IF-400. 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 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 assure 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. 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 damages or secondary damages incurred as a result of using this product, including any indirect damages.

Safety precautions (Be sure to read these precautions before using our products.)

The safety precautions are classified into two categories: “Warning” and “Caution”.
Depending on 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 qualified service personnel may handle the inner assembly.
- To prevent an electric shock, fire or damage to instrument, parts replacement may only be undertaken by Shinko or 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℃ (32 to 122℉) 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 the unit

Note: Do not install this unit near flammable material even though the case of this unit is made of flame-resistant resin.
Avoid setting this unit directly on flammable material.

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 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 ferrules with an insulation sleeve applicable to 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 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 or PLC (RS-232C or RS-422) and Digital indicating controllers (Serial communication function RS-485, option: C5). Shinko protocol and Modbus protocol are available.

The IF-400 can also be used as a repeater by connecting output side communication line of the IF-400 with the input side of another IF-400.

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

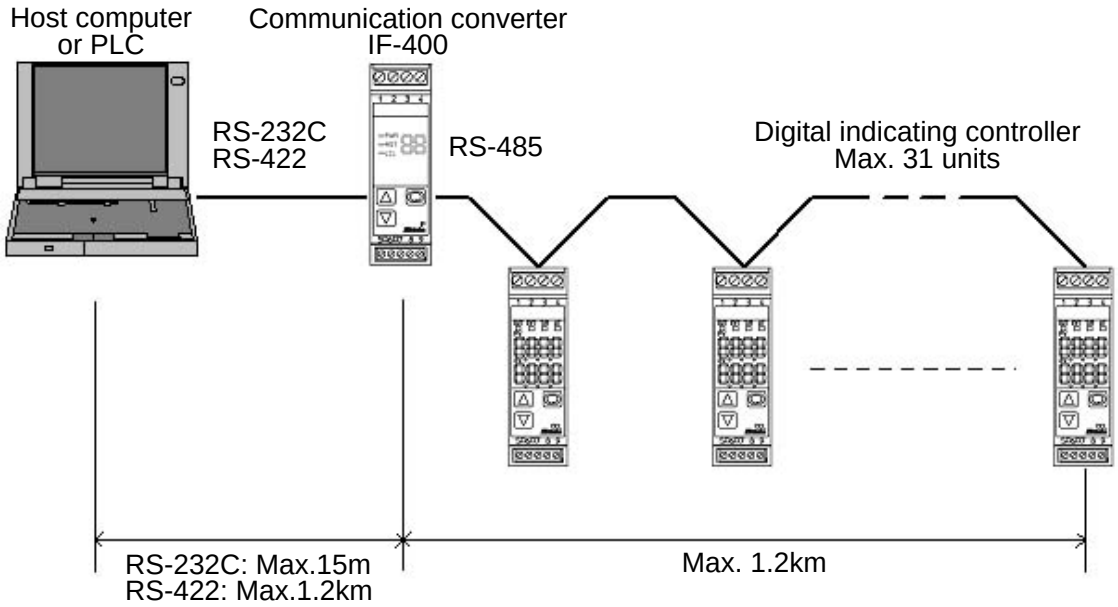
A maximum of 3 units of repeaters can be connected.

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

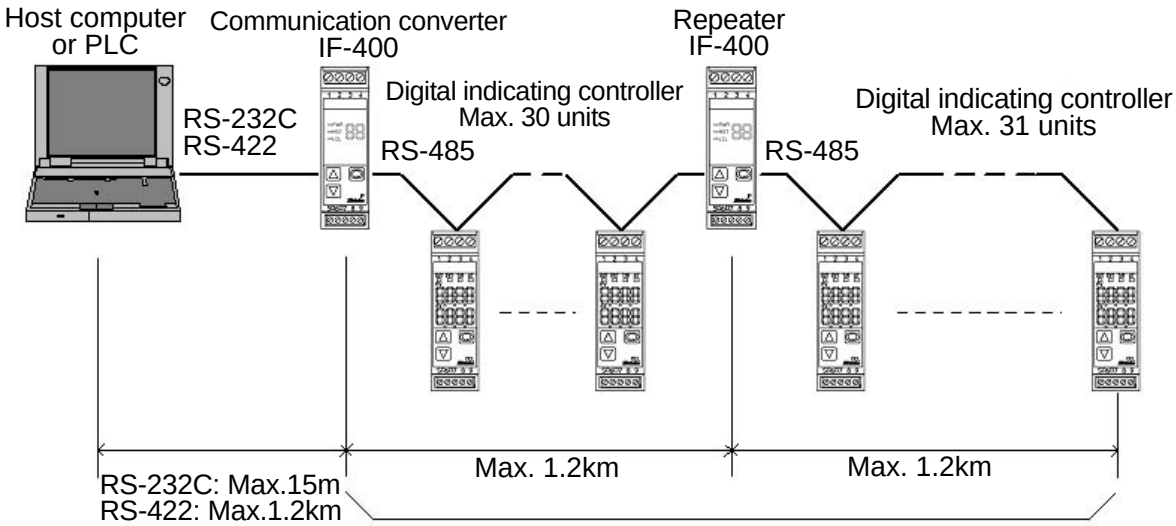
When IF-400 is used as a communication converter, a maximum of 31 units of controllers can be connected.



(Fig.1.2.1)

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 controllers can be connected.
Communication line can be extended more than 1.2km.
Up to 3 units of repeater (Communication line Max. 4.8km) can be used, therefore, up to 95 units of controllers can be connected (a maximum of 4.8km of communication line can be extended).



(Fig.1.2.2)

2. Model

2.1 Model

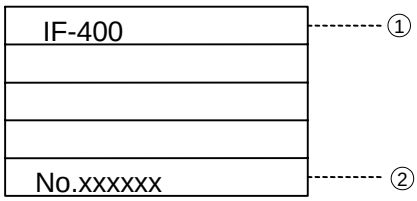
IF-400

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)

(e.g.)

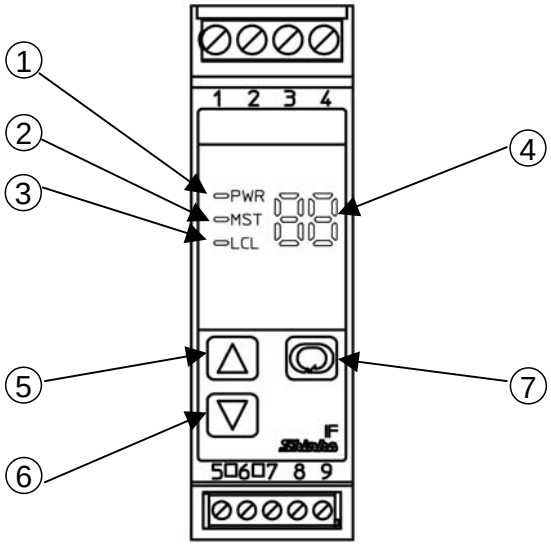


① Model: IF-400

② Serial number (only on the inner assembly)

(Fig. 2.2)

3. Name and functions of the sections



(Fig. 3)

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 output (controller) side communication line to input (host computer or PLC) side communication line.

③ **LCL (Local) indicator** (Green):
MST (Master) ⟶ LCL (Local)
Lights while data signal is transmitted from input (host computer or PLC) side communication line to output (controller) side communication line.

④ **Setting display**:
Unlit during communication mode.
Indicates the selected item during 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 value.

4. Mounting

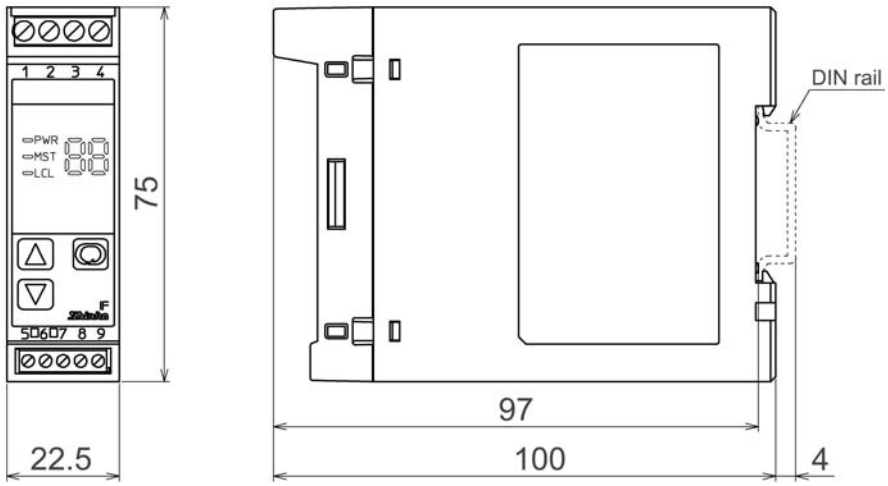
4.1 Site selection

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℃ (32 to 122℉) 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 (Unit: mm)



(Fig.4.2)

4.3 Mounting to the DIN rail

> **⚠ Caution**
>
> **Mount the DIN rail horizontally.**
> **When 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	BNL6P, BNL8P
Matsushita Electric Works, Ltd.	Fastening plate	ATA4806

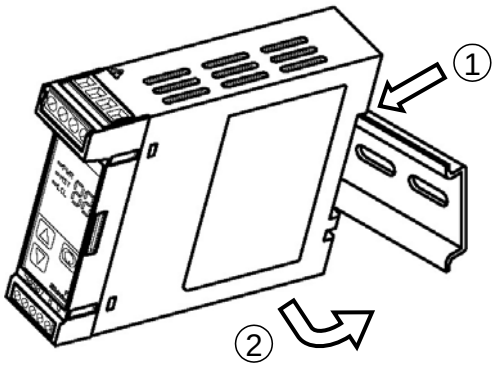
(1) Hook ① of the IF-400 on the upper side of the DIN rail. (Fig. 4-3)
(2) Making ① part of the IF-400 as a support, fit the lower part ② of the IF-400 to the DIN rail.
The IF-400 will be completely fixed to DIN rail with a “Click” sound. (Fig. 4-3)

4.4 Removal from the DIN rail

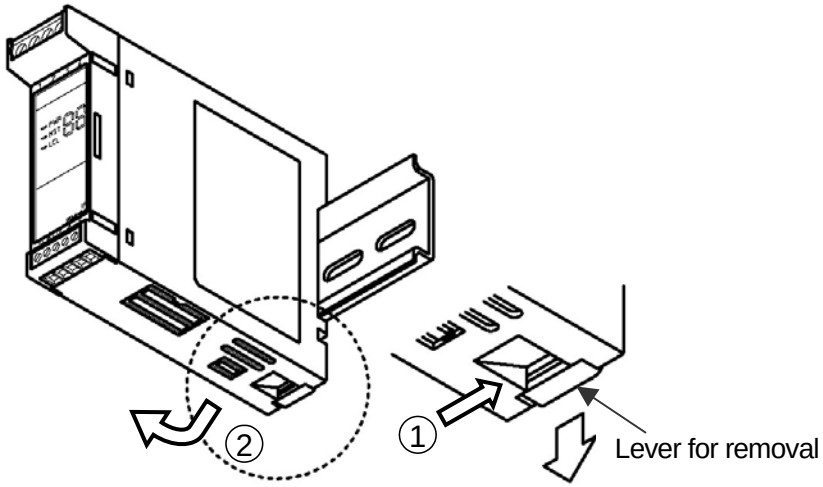
⚠ Caution

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)
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)



(Fig.4.3)



(Fig.4.4)

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 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

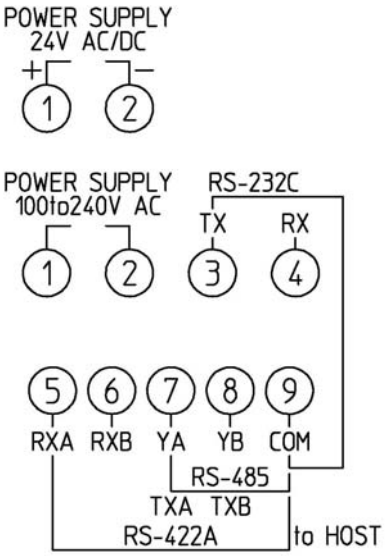
When using ferrules, use the following recommended ferrules and crimping pliers made by Phoenix Contact GMBH &CO. See (Table 5).

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

(Table 5)

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

● Terminal arrangement



No.1	COM
No.2	NC
No.3	YB(+)
No.4	YA(−)
No.5	NC
No.6	COM

(Fig.5)

- to HOST : Input (host computer or PLC) communication terminal
  RS-232C, RS-422, RS-485
- Modular jack: Output (Digital indicating controller) communication terminal
  RS-485

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.

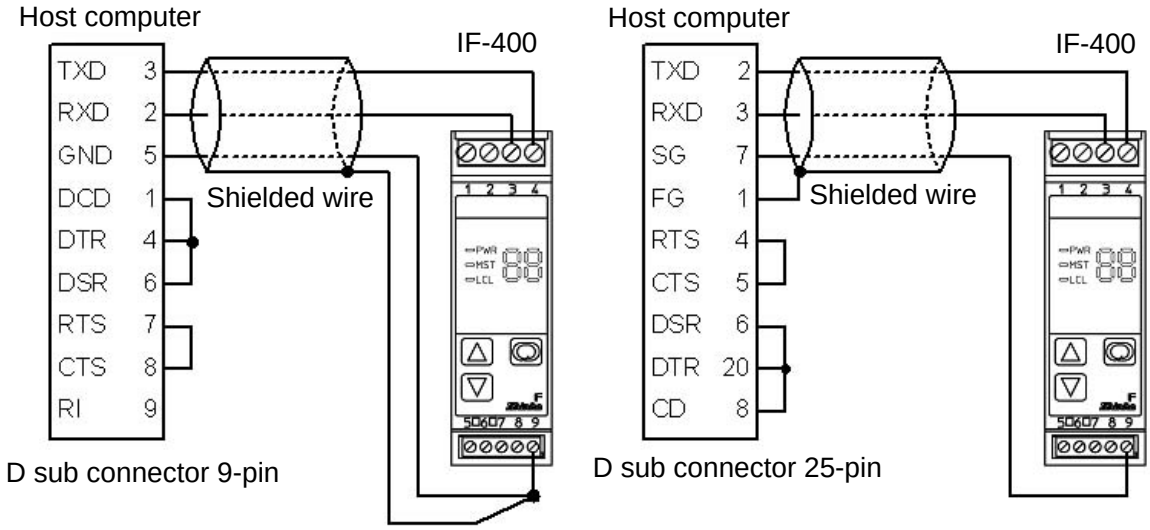
5.2 Wiring of input (host computer or PLC)

5.2.1 Wiring when using the IF-400 as a communication converter

(1) RS-232C

Use terminals 3, 4 and 9.

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

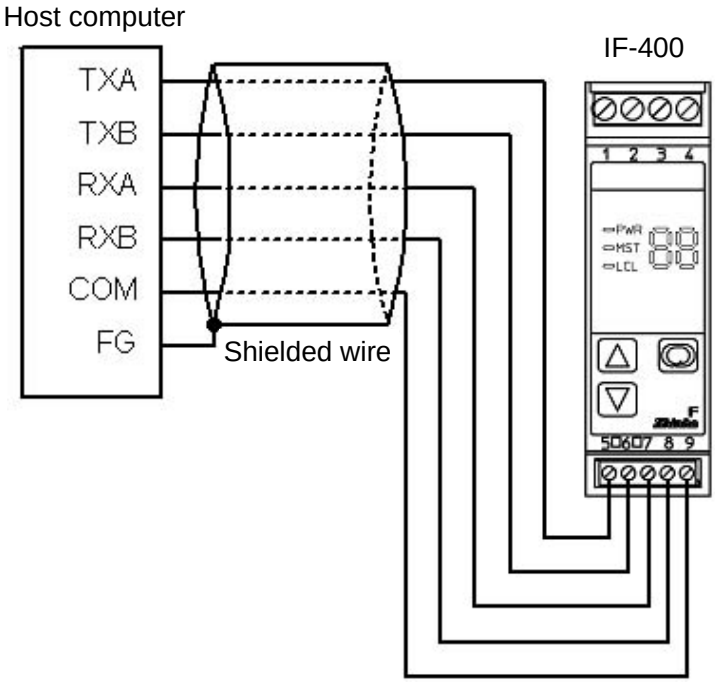


(Fig. 5.2.1-1)

(2) RS-422

Use terminals 5 through 9.

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

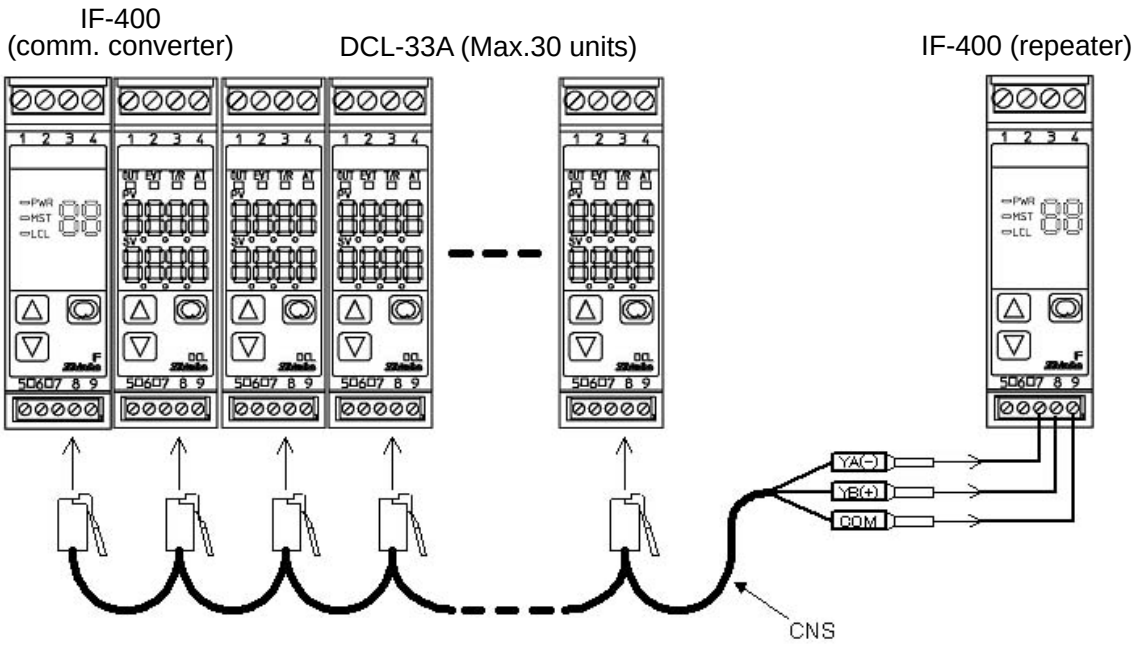


(Fig. 5.2.1-2)

5.2.2 Wiring when using the IF-400 as a repeater

(1) DCL-33A

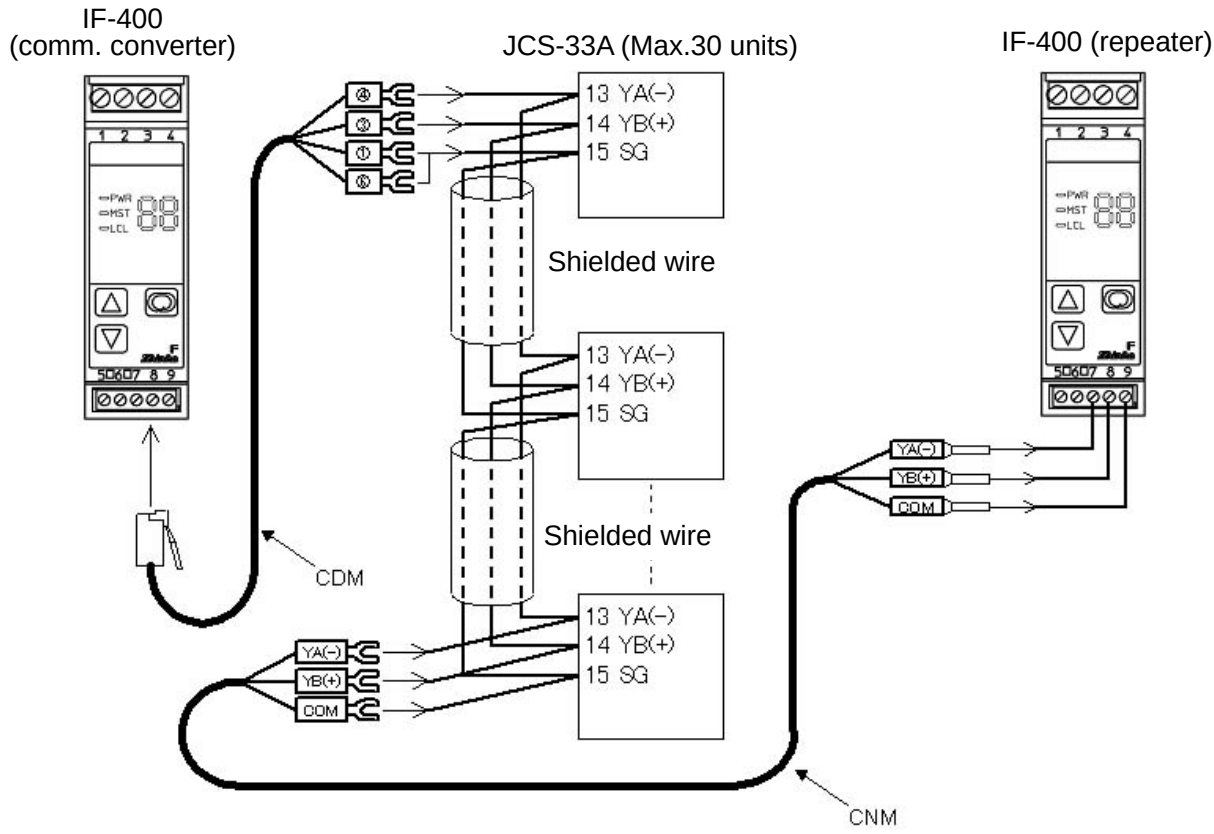
Use CNS communication cable, and connect it to terminals 7 through 9.
Cable length of CNS: 500mm
The CNS cable can be extended in units of 500mm fixed length.



(Fig.5.2.2-1)

(2) Controllers such as 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.

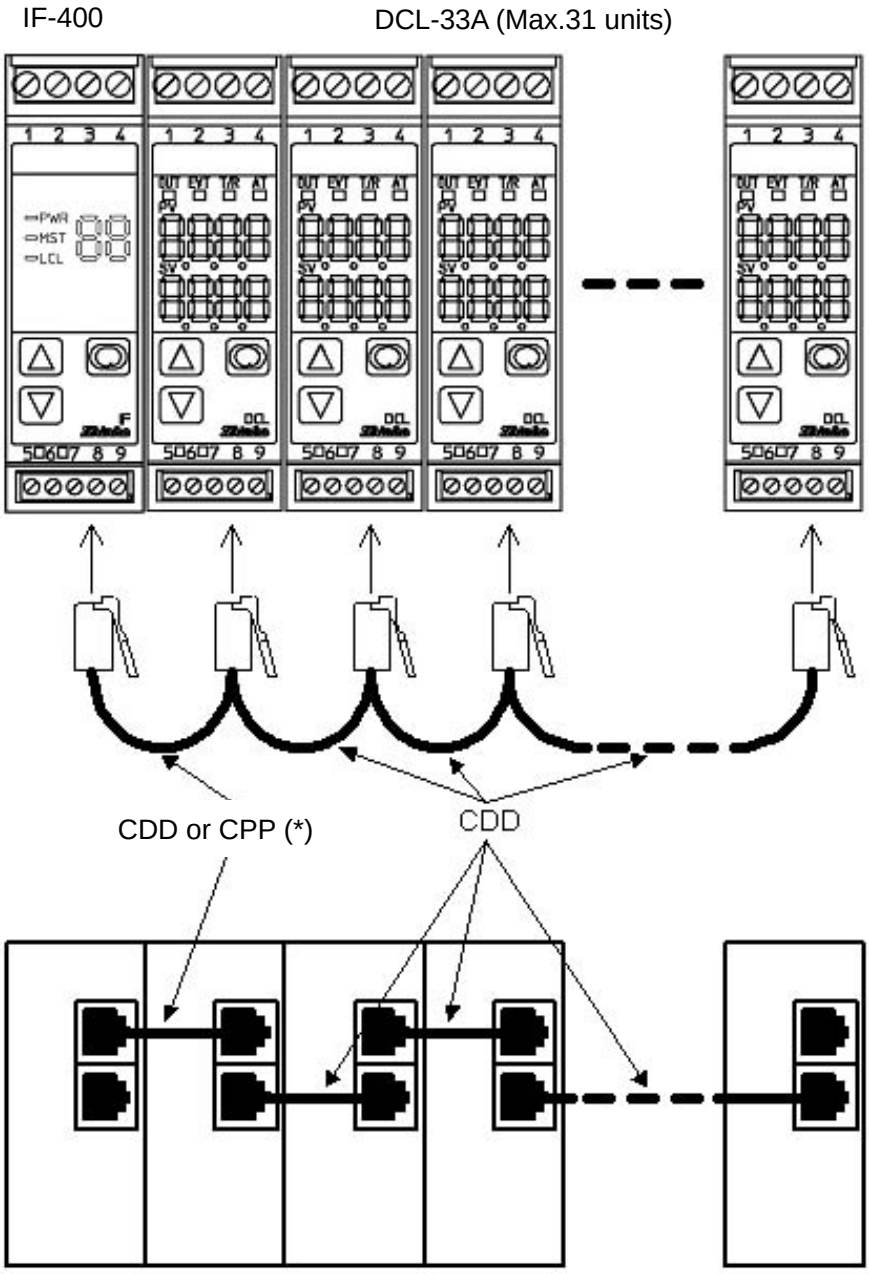


(Fig.5.2.2-2)

5.3 Wiring of output (Digital indicating controller)

5.3.1 DCL-33A

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

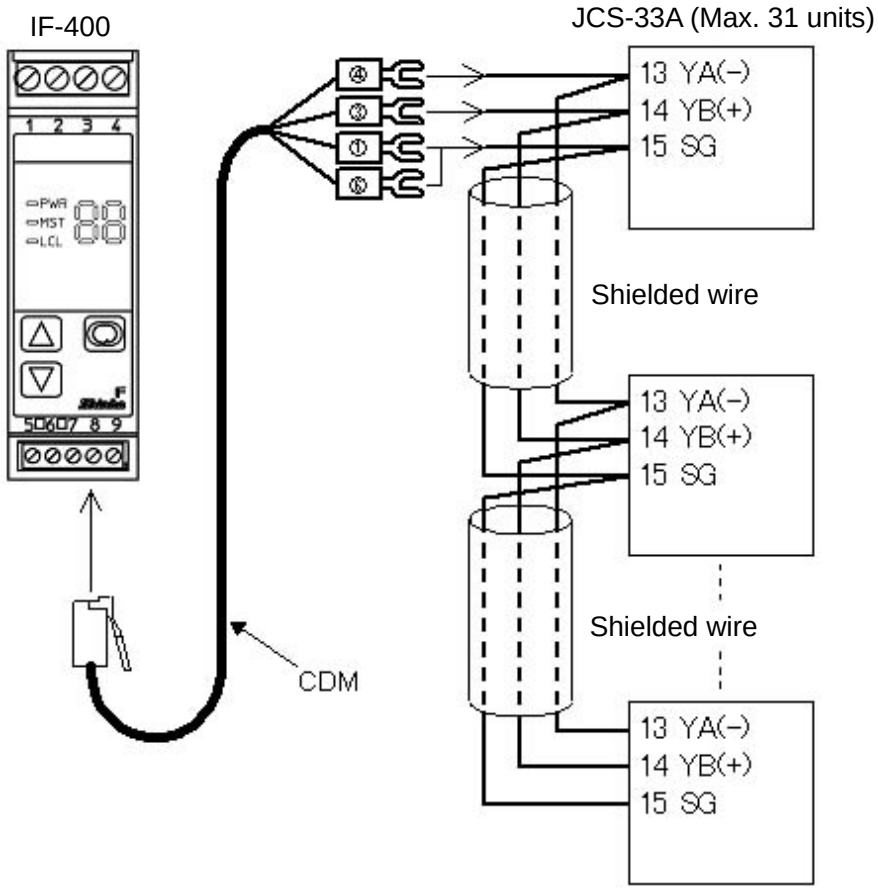


(Fig.5.3.1)

(*) 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 JC series, FC series, PC-900 which have terminal block

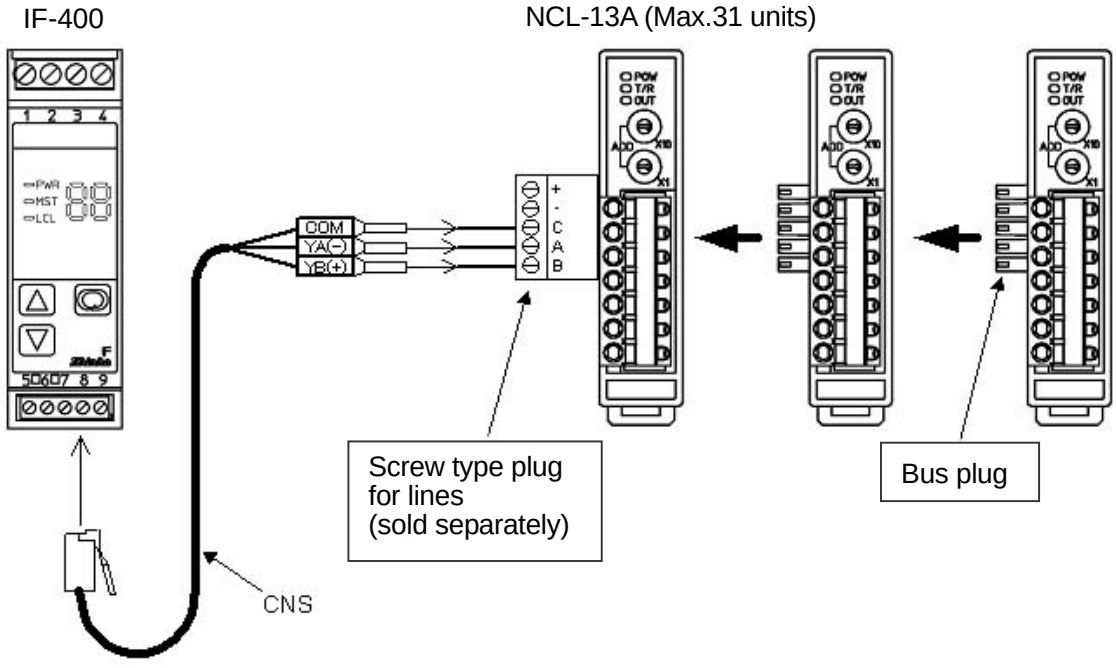
Use communication cable CDM, and plug into modular jack.
Cable length of CDM: 3000mm
The CDM cable can be extended in units of 1000mm fixed length.



(Fig.5.3.2)

5.3.3 NCL-13A

Use communication cable CNS, and plug into modular jack.
Cable length of CNS: 500mm
The CNS cable can be extended in units of 500mm fixed length.



(Fig.5.3.3)

6. Setup

Before using the IF-400, set up the Communication speed and Sending/Receiving switching period according to the users' conditions.
If the users' specification is the same as the default value of the IF-400 (Table 6), it is not necessary to set up the IF-400. Proceed to Chapter "7. Running".
(Table 6)

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

Setup item and communication line control

After detecting Start bit of the 1st character upon receiving data signal from the Input (host computer or PLC), the IF-400 switches output (controller) communication line to Sending status.
When data signal from the Input (host computer or PLC) stops, the IF-400 sets Output (controller) communication line back to Receiving status after Sending/Receiving switching period has passed (*).

After detecting Start bit of the 1st character upon receiving data signal from the Output (controller), the IF-400 switches Input (host computer or PLC) communication line to Receiving status.
When data signal from the Output (controller) stops, the IF-400 sets Input (host computer or PLC) communication line back to Receiving status after Sending/Receiving switching period has passed (*).

When communication is not performed, communication line for both Input (host computer or PLC) and Output (controller) are in data Receiving status.

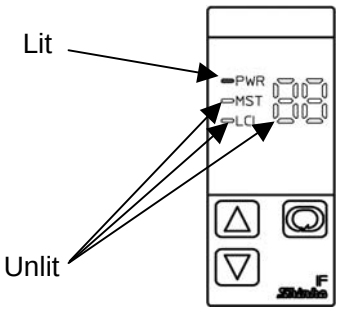
(*) Sending/Receiving switching time is determined by the selection of communication speed and Sending/Receiving switching period.
(e.g.) Communication speed: 9600bps
Sending/Receiving switching period: 1 character
If 1 character is 10 bits, then Sending/Receiving switching period will be 0.001 seconds (1ms).

Communication timing

The IF-400 performs control with the communication timing above. Therefore, if data is transmitted with a shorter interval than the Sending/Receiving switching period, normal communication cannot be performed.
Set the Sending/Receiving timing from the host computer side in order to send the next data after the Sending status of communication line is switched 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.)



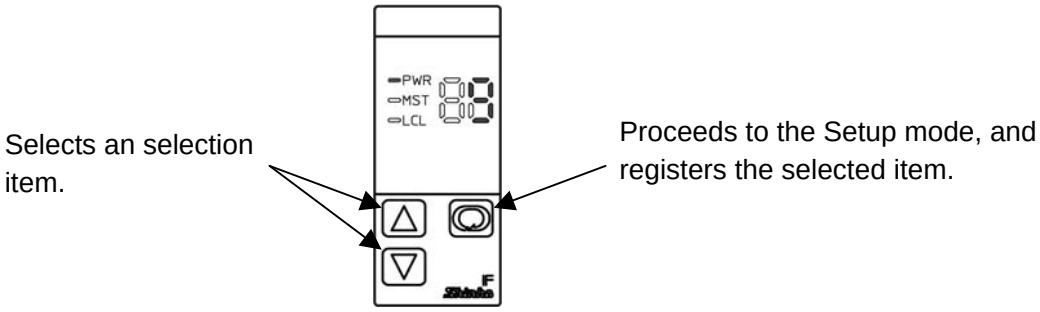
(Fig.6-1)

● **Basic setup operation**

To proceed to the setup mode, press the key.

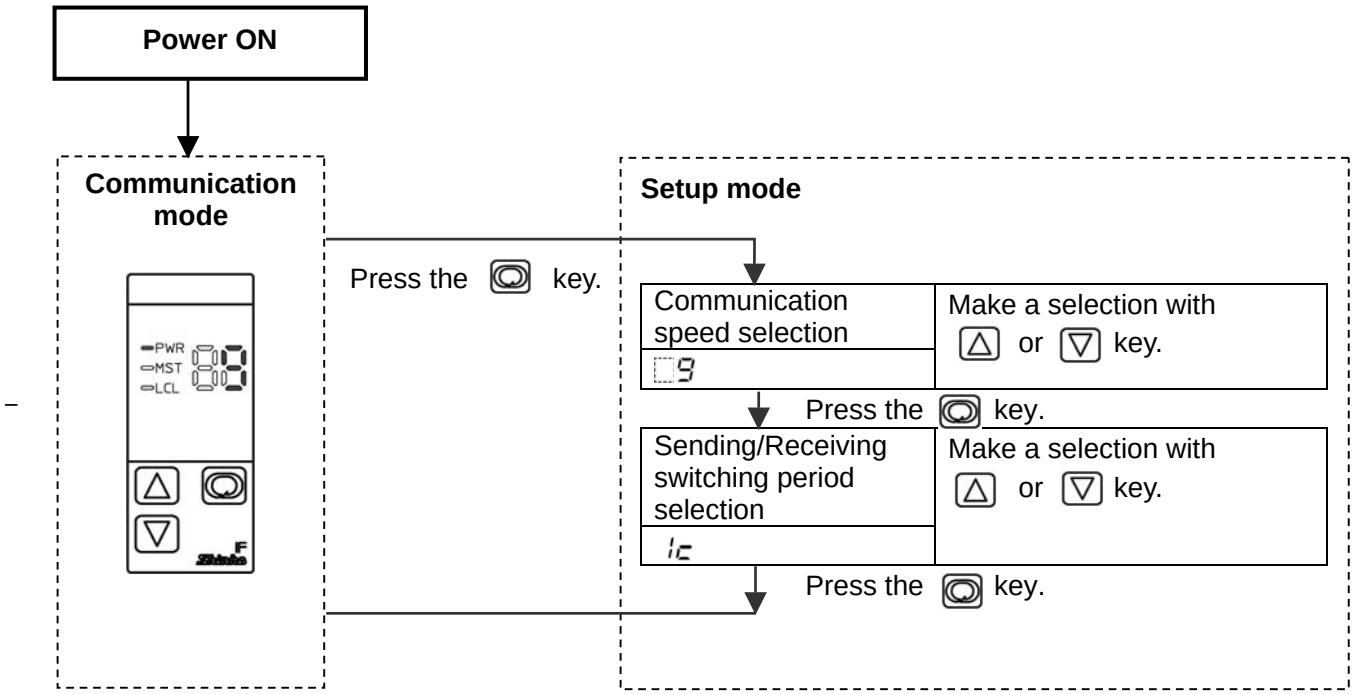
The mode will proceed to the “Communication speed selection” mode, and its characters will be indicated on the display.

Using the and keys, make a selection, 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
2	2400bps
4	4800bps
9	9600bps
19	19200bps

Sending/Receiving switching period selection

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

7. Running

Check the wiring and setup contents.
Confirm the communication between a host computer (or PLC) and digital indicating 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

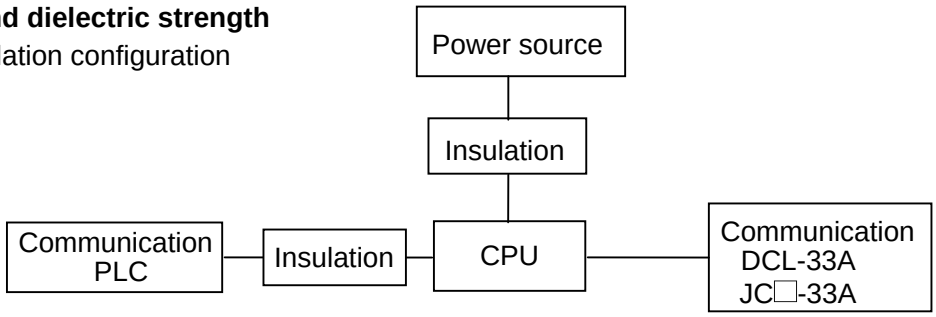
Input (host computer or PLC)
RS-232C or RS-422 (terminal)
RS-485 (terminal, when used as a repeater)
Output(Controller) RS-485 (modular jack)
Supply voltage 100 to 240V AC or 24V AC/DC, 50/60Hz
Allowable voltage fluctuation range:
100 to 240V AC: 85 to 264V AC
24V AC/DC : 20 to 28V AC/DC

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 and dielectric strength

Circuit insulation configuration



Insulation resistance 10MΩ or more, at 500V DC
Dielectric strength
Between power terminal and controller communication modular ---------- 1.5kV AC for 1 minute
Between power terminal and host computer communication terminal ----1.5kV AC for 1 minute
Between host computer communication terminal and controller communication modular -------
1.5kV AC for 1 minute

Others

Power consumption : Approx. 5VA
Ambient temperature : 0 to 50℃ (32 to 122℉)
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 properly. Refer to “6. Setup”.
Instrument number of the controller is duplicated.	Sets an instrument number for each unit of controllers individually. When using Shinko’s monitoring software, set the controllers’ instrument number from 0 (zero) in sequence, referring to the Instruction manual for the controller.

***** Inquiry *****

For any further inquiries about this unit, please contact a registered Shinko Technos agent or the retailer from which the unit was purchased.
Please remember to provide the following details in order to receive a prompt response.

(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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