User's Manual

Model SIND (Style R) Integrator

YEWSERIES 80

IM 01B04M01-02E

YOKOGAWA
Yokogawa Electric Corporation

IM 01B04M01-02E
9th Edition

Model SIND (Style R)
Integrator

IM 01B04M01-02E 9th Edition

Contents

1. INTRODUCTION

This manual describes the functions and operations of the SIND Integrator.

■ Intended Readers

This manual is intended for personnel in charge of:

- Installation and wiring
- Instrumentation and setup of functions
- Operation and monitoring of the controller
- Maintenance of equipment

■ Related Documents

The following documents all relate to the SIND Integrator. Read them as necessary. The codes enclosed in parentheses are the document numbers.

- Rack-Mounted Instruments (IM 1B4F2-01E)
  Describes mounting and wiring for YS80 rack-mounted instruments.

- Model JHT200 Handy Terminal (IM JF81-02E)
  Describes operation of JHT200.

- YEWSERIES 80 Installation Manual (TI 1B4A9-01E)
  Describes the installation conditions of YS80 instruments.

1.1 Inspection

The SIND integrator is shipped only after stringent inspection at the factory. Visually inspect the product upon delivery to make sure it is not damaged in any way.

Store the box and inner packing material of the package in a safe place / they may be needed if there is a problem with the product and it needs to be sent back for repair.

■ Check of Model and Suffix Codes

The model and suffix codes are indicated on the Name plate attached to the front cover of the instrument. Crosscheck this information with the model and suffix codes of Section 2.2 to ensure that the product is as specified in the order.

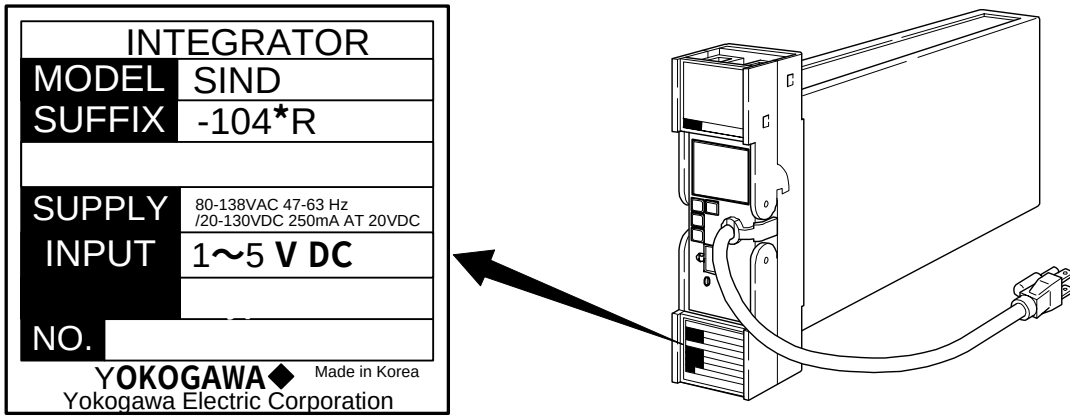

Figure 1-1 Name Plate

■ Confirmation of the Package Contents

Check the package contents against the list below. If anything is missing or damaged, immediately contact the sales office from which you purchased the product or your nearest Yokogawa representative.

- SIND Integrator..... 1
- Integrating ratio label (Parts No.:L4040JA)..... 1 sheet
- Fuse (Parts No.: S9510VK) 1
- User's Manual (This manual)..... 1

1.2 Documentation Conventions

This manual uses the following notational conventions.

■ Symbols

The following symbols are used in this manual.

WARNING

Indicates that operating the hardware or software in a particular manner may damage it or result in a system failure.

NOTE

Draws attention to information that is essential for understanding the operation and/or features of the product.

TIP

Gives additional information to complement the present topic and/or describes terms specific to this document.

See Also

Gives reference locations for further information on the topic.

■ Description of Displays

Some of the representations of product displays shown in this manual may be exaggerated, simplified, or partially omitted for reasons of convenience when explaining them.

1.3 Notice

■ This User's Manual

- This manual should be passed on to the end user. Keep at least one extra copy of the manual in a safe place.
- Read this manual carefully to gain a thorough understanding of how to operate this product before you start using it.
- This manual is intended to describe the functions of this product. Yokogawa Electric Corporation (hereinafter simply referred to as Yokogawa) does not guarantee that these functions are suited to the particular purpose of the user.
- Under absolutely no circumstances may the contents of this manual, in part or in whole, be transcribed or copied without permission.
- The contents of this manual are subject to change without prior notice.
- Every effort has been made to ensure accuracy in the preparation of this manual. Should any errors or omissions come to your attention however, please contact your nearest Yokogawa representative or sales office.

■ Protection, Safety, and Prohibition against Unauthorized Modification

- In order to protect the product and the system controlled by it against damage and ensure its safe use, make certain that all of the instructions and precautions relating to safety contained in this document are strictly adhered to. Yokogawa does not guarantee safety if products are not handled according to these instructions.
- The following safety symbols are used on the product and in this manual.

If this symbol is indicated on the product, the operator should refer to the explanation given in the user's manual in order to avoid personal injury or death to either themselves or other personnel, and/or damage to the instrument. The manual describes that the operator should exercise special care to avoid shock or other dangers that may result in injury or loss of life.

Protective ground terminal:
This symbol indicates that the terminal must be connected to ground prior to operating the equipment.

Function ground terminal:
This symbol indicates that the terminal must be connected to ground prior to operating the equipment.

AC voltage:
This symbol indicates that AC voltage is present.

DC voltage:
This symbol indicates that DC voltage is present.

- Do not turn off the power of the product during adjustment.
- Be sure to confirm the parameters referring to "5.4 Parameter List" before installing the product in a system or plant. After confirming them, install the product in a system or plant and turn on the power.
- If protection/safety circuits are to be used for the product or the system controlled by it, they should be externally installed on the product.
- When you replace the parts or consumables of the product, only use those specified by Yokogawa.
- Do not modify the product.

■ Force Majeure

- Yokogawa does not make any warranties regarding the product except those mentioned in the WARRANTY that is provided separately.
- Yokogawa assumes no liability to any party for any loss or damage, direct or indirect, caused by the use or any unpredictable defect of the product.

1.4 About Compatibility with the Conventional Model (Style A)

- The operation and function differ from the conventional model.
  Read this manual carefully to gain a thorough understanding of how to operate this product before you start using it.
- Be sure to confirm the parameters such as integrating ratio set point and setting jumper referring to "5. Setting" before installing the product in a system or plant. After confirming them, install the product in a system or plant and turn on the power.

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2. GENERAL

The SIND Integrator is a voltage-to-pulse converter that converts 1 to 5 V DC inputs to corresponding pulse frequency output. It can be used with a YS80 series SICD counter to totalize flow quantity.

Two integrating modes are available: proportional integration that directly totalizes the input, and square root integration that totalizes square-root values.

The JHT200 Handy Terminal (*1) is used for setting the SIND parameters.

On the SIND model with display setter (SIND-x04), input indication can be displayed and integrating ratio and low input cut off can be displayed / set on the front panel.

*1: The modular jack conversion adapter (E9786WH) is required for connecting the JHT200 Handy Terminal to the Integrator.
The 5 pin-connector type communication cable (F9182EE) and modular jack conversion adapter (E9786WH) is required for connecting the BT200 BRAIN Terminal of YOKOGAWA ELECTRIC Corporation

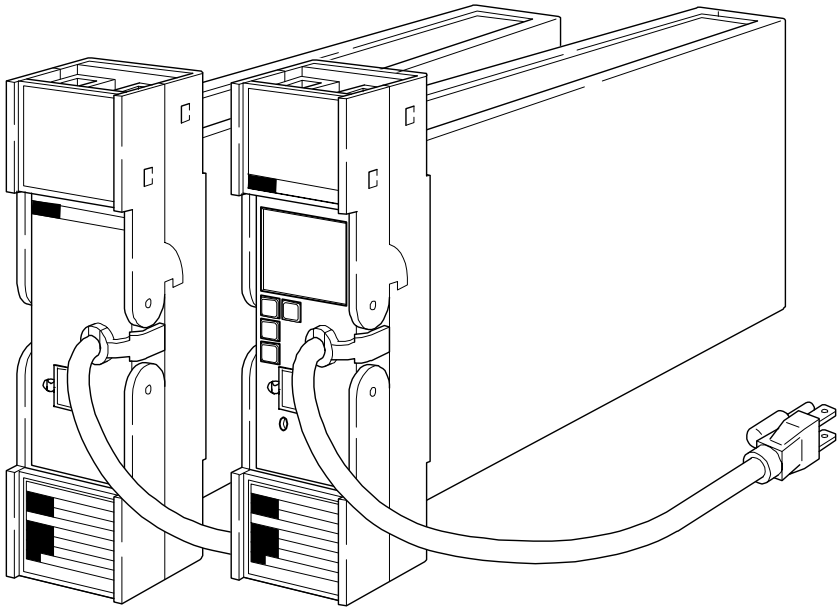

Figure 2-1 External View

2.1 Standard Specifications

The following table shows the SIND standard specifications.

Table 2-1 Standard Specifications

Item	Description
Input Signal	1 to 5 V DC Input resistance: 1MΩ 1 point
Output Signal	SICD counter drive pulse (24 V DC) or transistor contact 2 points (*1) • Pulse ON time: 30 ms or 60 ms (*1) • Load: SICD counter drive pulse 150 mA or less Transistor contact pulse 30 V DC 150 mA or less
Integrating Ratio (*2)	1 to 10,000 pph/full scale
Integration Method	Proportional integration or square root integration
Low Input Cutoff (*2)	Proportional integrating type: Cut-off point can be set within 0 to 10% of input signal. Square root integrating type: Cut-off point can be set within 0.3 to 10% of input signal.
Accuracy	±0.5% of span (at output 10% or more on a square root integrating type)
Power Voltage For both DC/AC	100 V version: With DC drive, 20 to 130 V (no polarity) With AC drive, 80 to 138 V, 47 to 63 Hz 220 V version: With DC drive, 120 to 340 V (no polarity) With AC drive, 138 to 264 V, 47 to 63 Hz
Current/Power Consumption	Integrating ratio at 1000 pph: 100 mA at 24 V DC, 7.3 VA at 100 V AC, 10.2 VA at 220 V AC Integrating ratio at 10000 pph: 190 mA at 24 V DC, 10.8 VA at 100 V AC, 13.7 VA at 220 V AC
Ambient Temperature and Ambient Humidity	0 to 50°C, 5 to 90%RH (non-condensing)
Mounting and Wiring	Mounting: Indoor, rack mounting Signal connection: M4 screw terminal connection Power supply connection: Power plug or M4 screw terminal connection
Weight	Approx. 1.7 kg (including rack and case)

*1: The time becomes 60 ms by shorting the A and C terminals. The number of outputs at this time is one.
*2: Can be set and changed on the JHT200 Handy Terminal.
On the SIND-x04, can be set and changed on the display setter.

2.2 Model and Suffix Codes

The following table shows the SIND model and suffix codes.

Table 2-2 Model and Suffix Codes

Model	Suffix Codes		Sytle	Optional Suffix Codes	Description
SIND					Integrator
Square-root integration mode	-1				Not proviced (proportional output)
	-2				Provided (square-root output)(*1)
Display setter		00			Not provided
		04			Provided
Style Code			*R		Style R
Option				/A2ER	220 V power supply
				/NHR	Without case
				/TB	Power supply terminal type

*1: When the square-root integration mode is provided, SIND is shipped as a square-root integrating model. This model can be changed to a proportional output type using the JHT200 Handy Terminal.

2.3 Accessory

Fuse 1 A: 1
Integrating ratio label: 1 sheet

NOTE

The fuse (S9510VK) is the dedicated fuse, Do not use it for other products.

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3. INSTALLATION

For details of the installation procedure and wiring precautions, refer to the technical information "YEWSERIES 80 Installation Manual" (TI 1B4A9-01E) or the instruction manual "Installation of Rack-Mounted Instruments" (IM 1B4F2-01E).

3.1 External Wiring

(a) All cable ends must furnished with crimp-on type solderless lugs (for 4mm screws).

(b) Draw out the internal unit from the rack case.

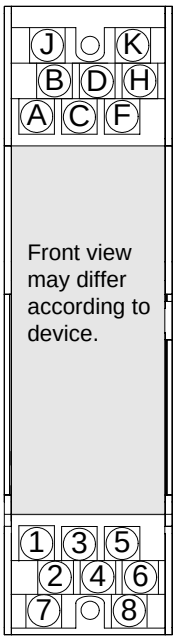
(c) Connect the cables to the correct terminals referring to Figure 3-1.

(d) Return the internal unit into the rack case after completing the wiring.

(e) Always return the terminal block cover to its original position after completing the wiring.

NOTE

- Contacts have positive/negative minus polarity. Take care not to confuse the polarity when wiring.
- Connect a surge absorber (protective diode, CR circuit, etc.) in parallel to the load.
- Do not connect loads exceeding the rated load.
- The terminal block cover cannot be returned to its original position if the internal unit is not installed correctly inside the rack case.
  Securely return the terminal block cover because it also functions as lock for the internal unit.



Terminal Designation	Description	
A B C D F H J K	- SICD drive pulse-1 (*1, 3) - SICD drive pulse-2 (*1, 3) +	+ Transistor contact-1 (*2, 3) COM + Transistor contact-2 (*2, 3)
1 2 3 4 5 6 7 8	+ - Input (1 to 5 V DC)	

*1: Pulse signals can also be used to drive an electromagnetic counter of rating (24 V DC, 150mA or less).

*2: Transistor contact output can be used to provide a pulse output signal to a computer or used to drive another counter when combined with an external power supply

*3 If a pulse ON time of 60 ms is required, short terminals A and C. This generates a pulse signal having an ON time of 60 ms across the A/C and F terminals and across the A/C and B terminals.

*4: When a counter other than SICD is used, connect a surge voltage protective diode in parallel with the counter coil.

Figure 3-1 Terminal Layout and Terminal Wiring

3.2 Connecting the SICD Counter

Up to two SICD counters can be connected. (See Figure 3-2.) If the input pulse specifications are the same as the SICD, a third-party electromagnetic counter (24 V DC, 150 mA or less) can also be connected. When a counter other than a SICD is used, connect a diode in parallel with the counter coil to prevent surge voltage.

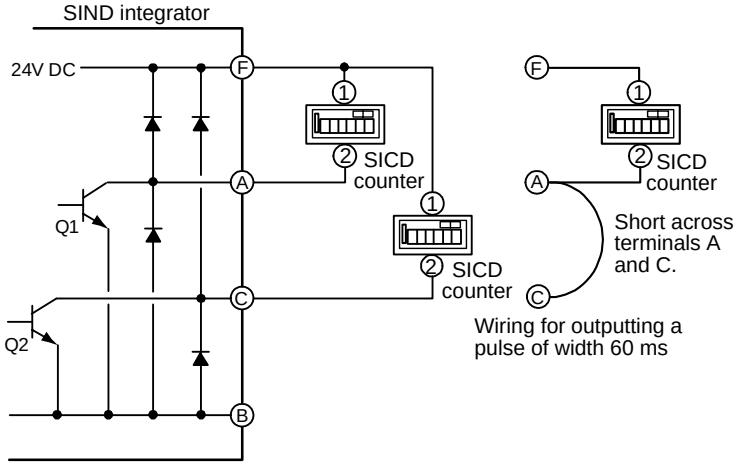


Figure 3-2 Connecting the SICD Counter

If a pulse ON time of 60 ms is required, short terminals A and C. This generates a pulse signal having an ON time of 60 ms across the A/C and F terminals (see Figure 3-2) and across the A/C and B terminals (see Figures 3-4 and 3-5).

The number of pulse outputs becomes one when the A and C terminals are shorted.

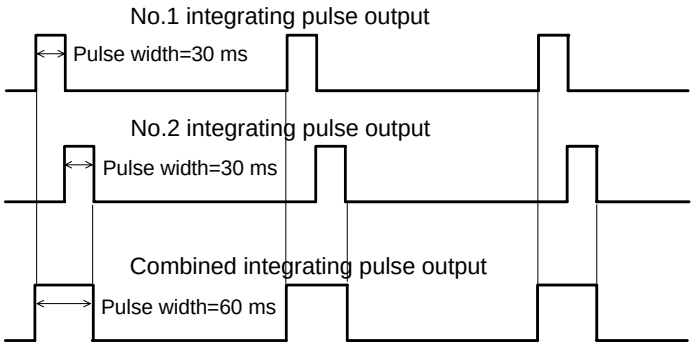


Figure 3-3 SIND Pulse Output

3.3 Connecting a Third-party Counter

A third-party counter can be driven by an external power supply, and pulse signals can be generated for output to a computer, for example.

3.3.1 Attaching an External Power Supply

Specifications of connectable counter

Applied voltage: 30 V DC or less

Minimum pulse ON/OFF time: 30 ms(*) each or less

*: Long response time (60 ms or less) counters can also be connected by shorting the A and C terminals.

When a counter other than a SICD is used, connect a diode in parallel with the counter coil to prevent surge voltage.

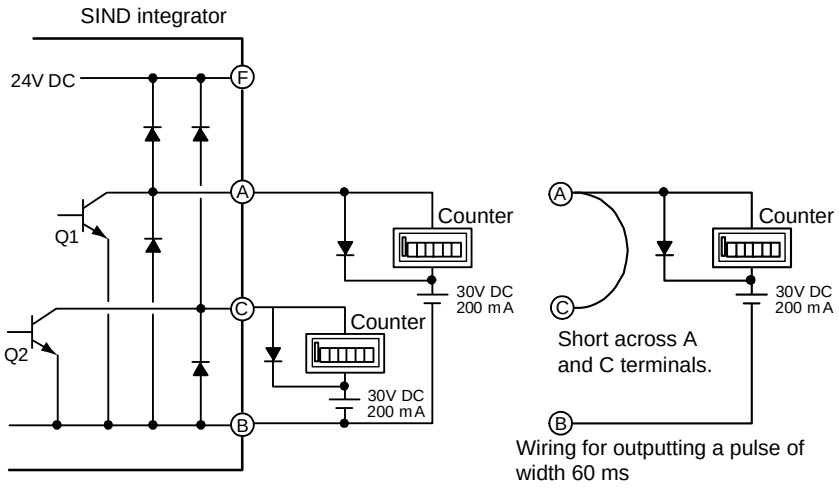


Figure 3-4 Connecting a Counter

3.3.2 Transistor input electronic counter

Electronic counters that take the open collector contact of a transistor input as their input also can be connected. (See Figure 3-5.) The number of counters that can be connected and the specifications are the same as those indicated at 3.3.1.

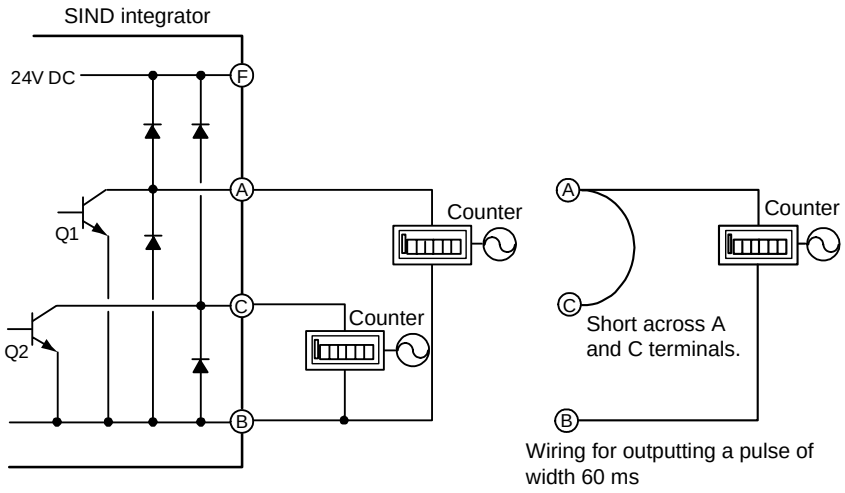


Figure 3-5 Connecting a Third-party Counter

■ Applicable Cables

(1) Signal circuit wiring

- Cross-sectional area of the cable conductor: 0.5 to 1.25 mm^2
- Examples of applicable cables: 600 V PVC insulated cable (IV) stranded wires (JIS C 3307);

  PVC insulated cable for electrical apparatus (KIV) stranded wires (JIS C 3316);

  Heat-resistant vinyl-insulated cable (UL style 1007)

(2) Power supply wiring

- Cross-sectional area of the cable conductor: 1.25 to 2.00 mm^2
- Examples of applicable cables: 600 V PVC insulated cable (IV) stranded wires (JIS C 3307)

4. PRINCIPLES OF OPERATION

4.1 Principle of Operation

Input signals are converted to digital data by the A/D conversion circuit after passing through the input processing circuit. The resulting digital data is processed (square root calculation, input scaling, integrating pulse calculation, etc.) by the microcomputer, and turns the output transistor N/OFF by the pulse output circuit.

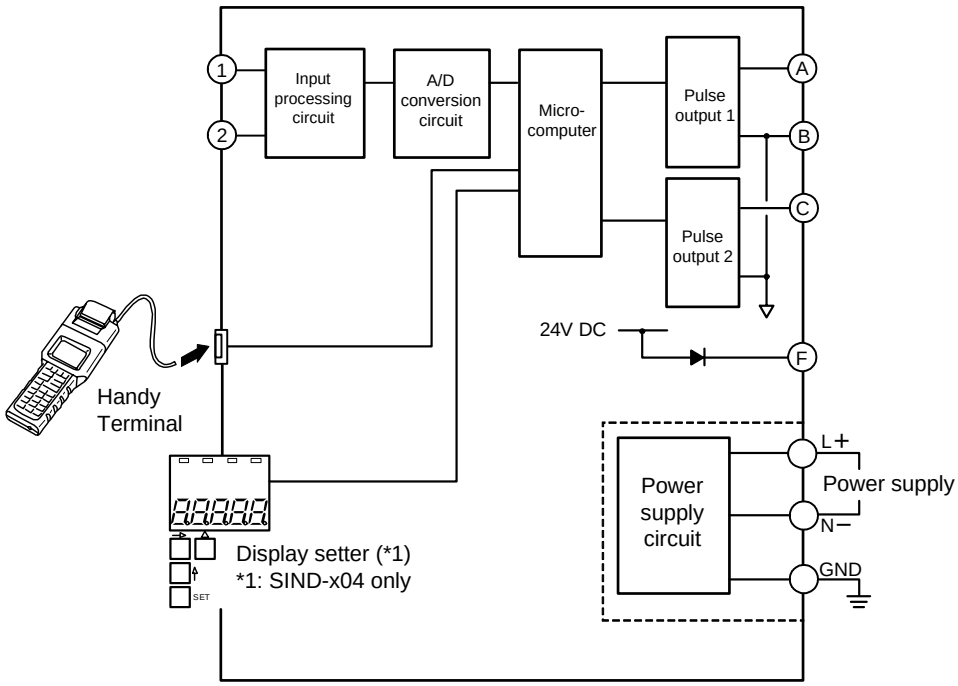


Figure 4-1 Hardware Function Block Diagram

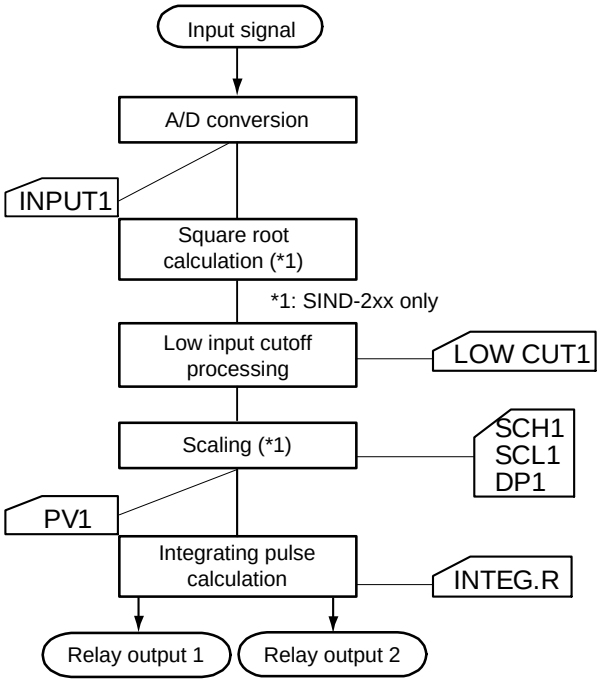


Figure 4-2 Software Function Block Diagram

The alphabet symbols in the figure are the names of parameters displayed on the Handy Terminal.

Input signals undergo A/D conversion and compensation before being converted to data at INPUT1.

On the SIND-20x, input signals also undergo square root calculation.

The low input cutoff function is provided for both square root calculation and proportional calculation (w/out square root calculation). When the input signal is at the low-cut point (LOW CUT1) or less, output of this function is 0%.

Hysteresis of the low-cut point is equivalent to 0.2% input.

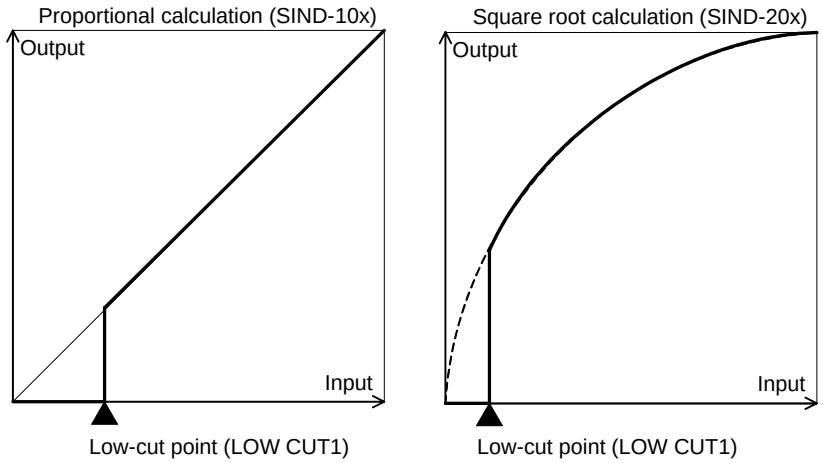


Figure 4-3 Low-cut Point

- Scaling (SCH1, SCL1, DP1):

Set three parameters (SCH1, SCL1, DP1) for displaying the signal after input calculation processing in engineering units on the display setter.

Decimal Point Position (DP1)	This is the decimal point position. At default "####.#", one digit past the decimal point is displayed.
Input Scale L (SCL1)	This is the value indicated when the input signal is 0%. (default: 0.0)
Input Scale H (SCH1)	This is the value indicated when the input signal is 100%. (default: 100.0)

For example, to display input signals 1 to 5 V as 0.00 to 30.00 (kl/h), set as follows:

DP1="###.##", SCH1=30.00, SCL1=0.00

NOTE

Reverse scaling (SCH1 < SCL1) is also possible.

A setting error occurs when SCH1 is set to equal SCL1.

- Integrating pulse calculation (INTEG.R):

Converts signals that have undergone input calculation processing (square root calculation, input low cut processing) to an integrating pulse.

The integrating ratio (1 to 10000 pulses/hour) can be specified.

The number of pulses per unit hour at 100% input (continuous) are displayed as the integrating ratio.

3750 pulses/hour are output when the integrating ratio is set to "5000" and input is 75% (input=4 V DC).

NOTE

The integrating calculation function does not work for 3 seconds after power ON.

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5. SETTING

■ Items to Confirm before Start of Operation

Before you start operation, inspect and confirm the following items:

(1) Draw out the internal unit from the rack case, and make sure that the specified fuses are properly mounted in the fuse holders at the rear of the internal unit.

(2) When inserting the internal unit into the rack case, firmly connect the multi-pin connectors for connecting the internal unit and the case.

(3) Make sure that power plugs are properly connected to the power outlet.

(4) Make sure that external wiring to the terminal block is properly connected.

5.1 Names of Components

The following shows the names of SIND components.

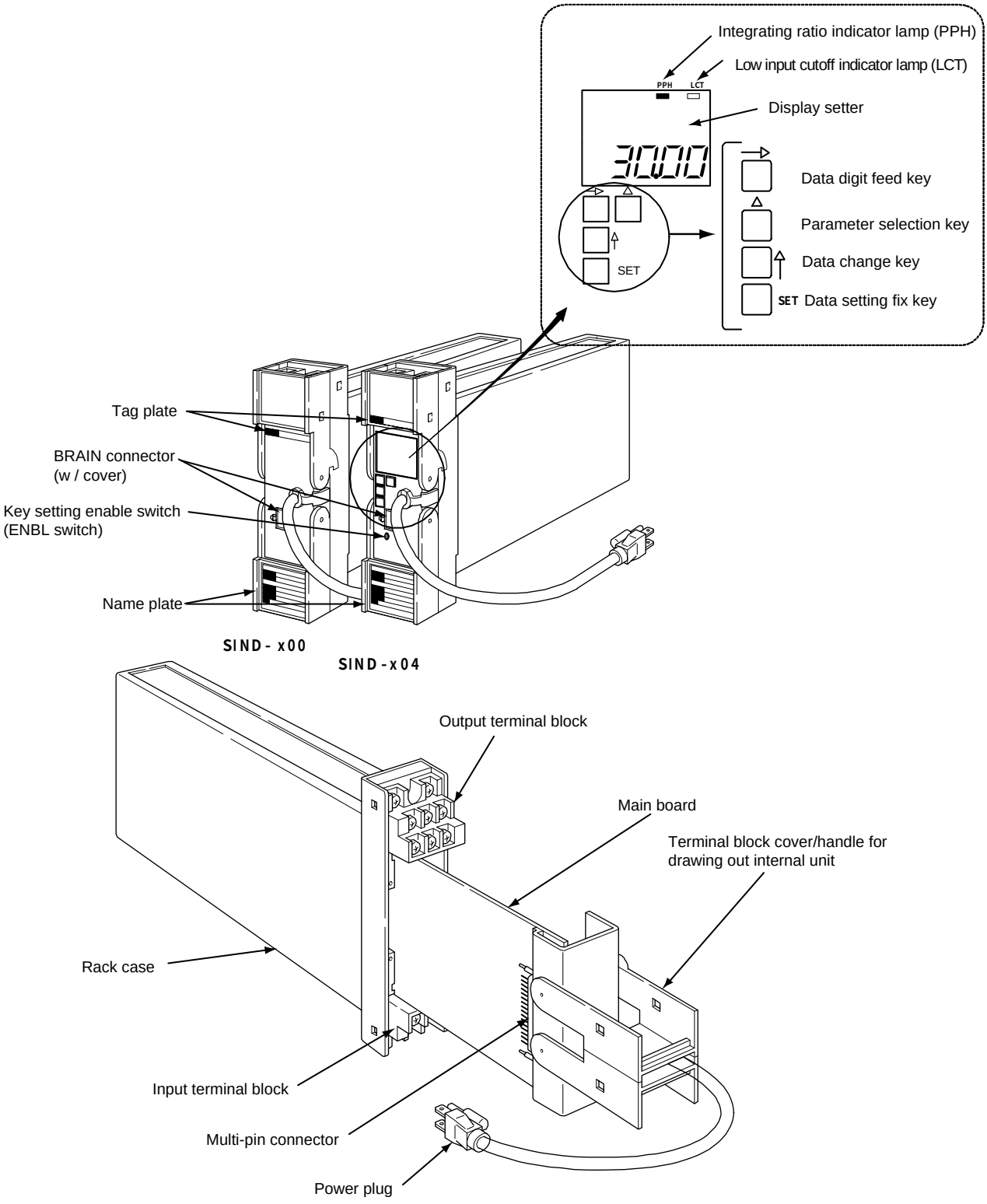


Figure 5-1 Names of Components

5.2 Setting Jumper

SIND is provided with a Parameter Write Protect (W.P.) jumper.

When this jumper is set to ON, changing of parameters by the key switches and Handy Terminal is disabled. “LOC” will be displayed on the display setter if the “→” switch is pressed with the PPH or LCT parameter displayed on the display setter. To cancel the “LOC” display and return to the previous display, press any key.

5.2.1 Check of Setting Jumper and Location

The Parameter Write Protect jumper is located on the main board of the internal unit.

Draw out the internal unit, and check the current jumper settings. Current jumper settings can also be checked on the JHT200 Handy Terminal.

Jumper Code	Jumper Name	Parameter Name
W.P.	Parameter Write Protect	A55：WRT PROTECT

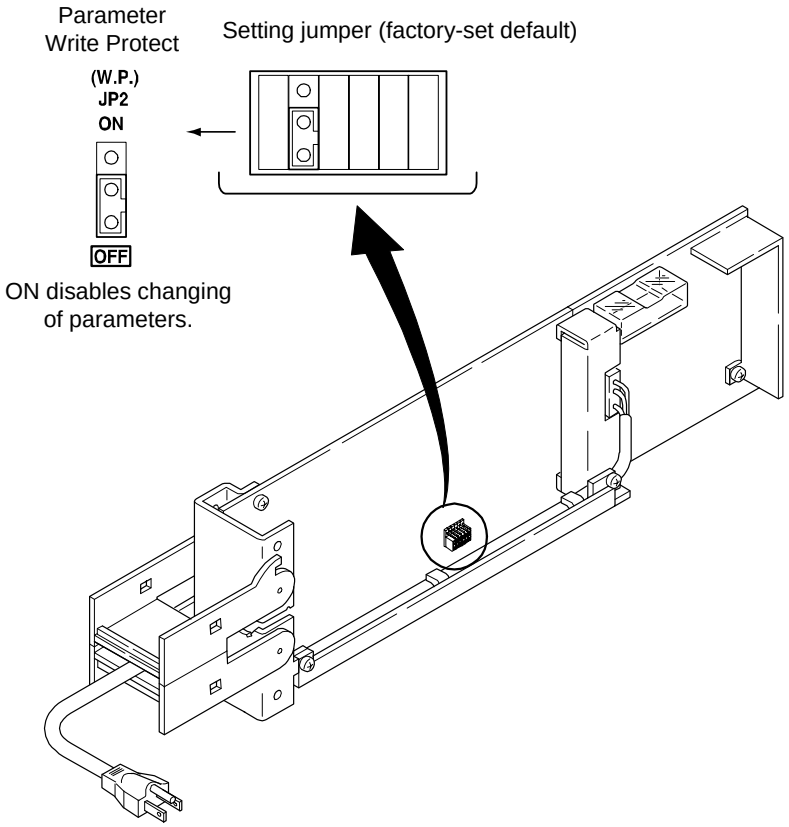


Figure 5-2 Parameter Write Protect Jumper

■ Change of Setting Jumper

Follow the procedure below to change the setting jumpers:

(a) Pull the terminal block cover toward you to draw out the internal unit from the rack case.

(b) Check the jumpers on the main board of the internal unit, and change their settings as desired. Use tweezers or another fine-tipped object to change the setting jumpers.

(c) Return the internal unit to the rack case.

(d) Return the terminal block cover to its original position.

5.3 Setting of Parameters

This instrument has BRAIN communication parameters for specifying functions and adjusting input. Connect JHT200 Handy Terminal (*1) to the instrument to display or set parameters (modular jack conversion adapter (E9786WH) is required)

On the SIND model with display setter (SIND-x04), input indication can be displayed, and integrating ratio and low input cutoff can be set / displayed and changed on the display setter.

For details on parameters, refer to the Parameter List.

*1: BT200 BRAIN Terminal of YOKOGAWA ELECTRIC Corporation can also be used.

5.3.1 Parameter Change Disable Function

The SIND is provided with a parameter change disable function for preventing parameter settings from being changed by operator error.

Table 5-1 Parameter Change Disable Function

	Disable Setting Method	Disable Cancel Method	Description of Disable Operation
Parameter Write Protect jumper	Set W.P. jumper on main board to "ON".	Set W.P. jumper on main board to "OFF".	• Changing of parameter setting by key switches. • Changing of parameter setting by Handy Terminal.
Enable switch (SIND-x04 only)	Changes cannot be made if no settings are made for 30 minutes after operating any key switch on the front panel in a setting change enable state.	Press the Enable switch.	• Changing of parameter setting by key switches.

5.3.2 Setting of Parameters Using Display Setter (SIND-x04)

On the SIND-x04, you can set change only the integrating ratio and using the display setter on the front panel.

Other parameters are changed using the JHT200 Handy Terminal.

The table below describes the relationship between key switch operations and migration of display states.

Table 5-2 Relationship between Key Switch Operations and Migration of Display States

Key Switch	Display Function			
	Display Mode	Setting Change Mode	Setting Fix Mode	Indicator Out Mode
△	Displays the next parameter.	Cancels the newly changed values, returns to the display mode, and displays the next parameter.	Cancels the newly changed values, returns to the display mode, and displays the next parameter.	This mode is entered if no key switches are operated for 30 minutes when the display mode parameter is set to "OFF". The display mode is returned to if any key switch is pressed in the indicator out mode.
→	Advances to the setting change mode when a settable or changeable parameter is displayed in the setting change enabled state. (*1)	Moves setting digit.	Returns to the setting change mode, and moves to the next digit.	
↑	Displays the next parameter.	Changes the set point.	No operation	
SET	No operation	Advances to setting fix mode.	Fixes the set point, and advances to the display mode.	
ENBL	Enters setting change enable state. Enable switch is disabled if the Parameter Write Protect jumper is set to "ON".			

*1: When the Parameter Write Protect jumper on the main board is set to "ON", the SIND will not advance to the setting change mode. In this state, "LOC" is displayed on the display setter.

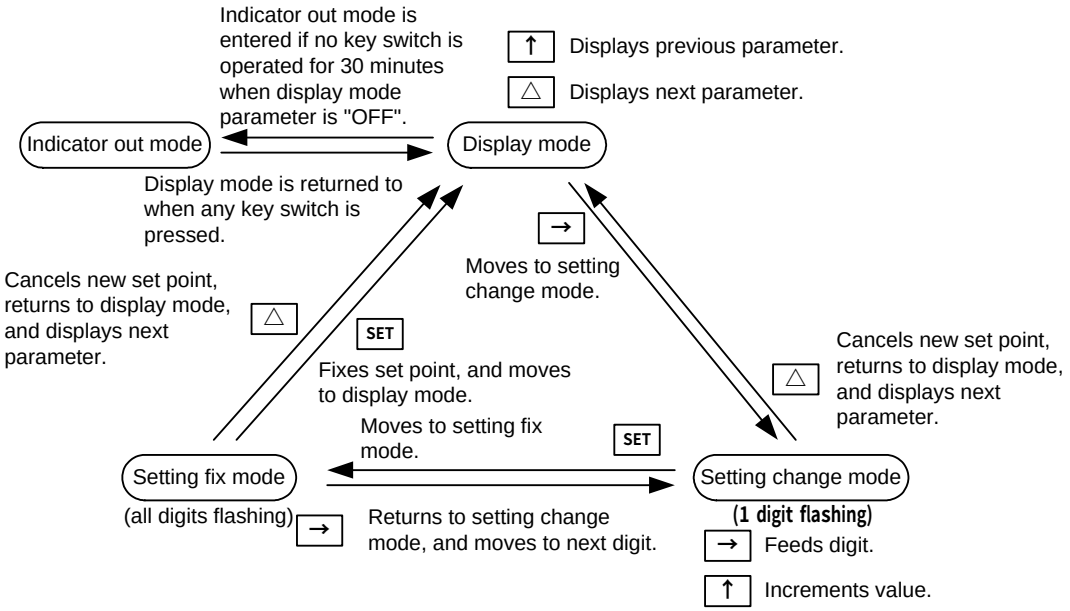
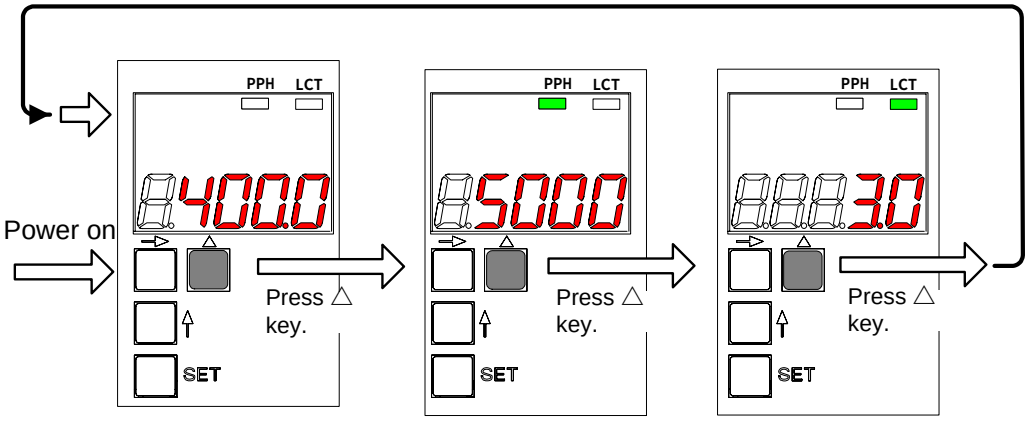


Figure 5-3 Key Switch Operations and Migration of Display States

■ Switching the Display

Each press of the △ key switches the display data.



Input value (PV1) is displayed.
PPH/LCT lamps out
In this example, "400.00 (m^3/h)"

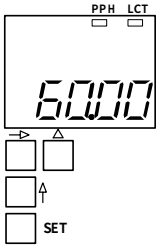
Integrating ratio set point (PPH) is displayed.
PPH lamp lit
In this example, "5000 pulses/hour"

Low-cut point (LCT) is displayed.
LCT lamp lit
In this example, "3.0%"

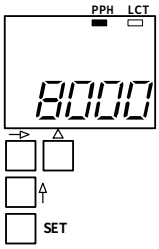
Figure 5-4 Progression of Display Screen

■ Setting Parameters

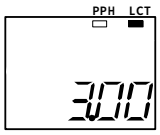
Display the desired parameter (integrating ratio or low-cut point), and follow the procedure below to change its setting.



(1) Input value (60.00) is displayed at power ON.
Press the △ key. → The PPH lamp lights, and the integrating ratio is displayed.



(2) The integrating ratio (8000) is displayed.
Press the △ key. → The LCT lamp lights, and the low-cut point is displayed.



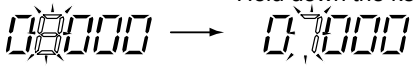
The low-cut point (3.00) is displayed.

(3) Press the ENBL switch to enter setting change enable state.

(4) Set the integrating ratio. (Change the integrating ratio to "7000" from "8000".) Make sure that the PPH lamp is lit.

Press the → key. → The uppermost digit on the display flashes. Hold down the key to move the flashing section to the digit on the right.

Press the ↑ key. → This increments the value at the flashing digit. Hold down the key to feed the value to "7".



Press the SET key. → All parameter digits flash. Pressing the SET key again causes "7000" to light. (This fixes the new parameter settings.)

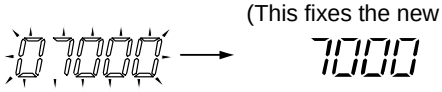


Figure 5-5 Setting Parameters

NOTE

When the Parameter Write Protect jumper on the main board is set to "ON", the SIND will not advance to the setting change mode. In this state, "LOC" is displayed on the display setter.

■ Display at Power ON

The model with display setter displays REV NO. (revision number of software for SIND for about 3 seconds after power ON.

Example of display (REV NO.2)

■ LOC Display

When "LOC" is displayed, this indicates that parameter settings cannot be changed.

(The Parameter Write Protect jumper on the main board is set to "ON".)

To cancel the "LOC" display and return to the previous display, press any key.

■ Indicator Out Mode Display

In this mode, only the decimal point is displayed on the display setter.

When the display mode parameter (DSP MODE) is set to "OFF", and no key operation is performed for 30 minutes, the SIND moves to the indicator out mode.

To cancel this mode and return to the display mode, press any key switch.

I/O signal processing and calculations are performed as usual even in the indicator out mode.

If the self check discovers an error (A/D conversion error, EEPROM error, EEPROMSUM error) in the indicator out mode, this mode is canceled, and the error is displayed. Also, the SIND does not move to the indicator out mode when an error (A/D conversion error, EEPROM error, EEPROMSUM error) occurs.

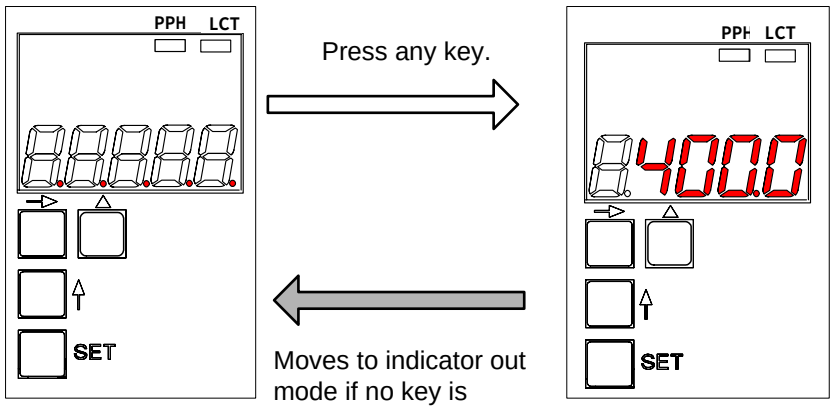


Figure 5-6 Indicator Out Mode

5.3.3 Setting Parameters Using Handy Terminal

NOTE

For details of operation and adjusting procedures of JHT200 Handy Terminal, refer to the instruction manual “JHT200 Handy Terminal” (IM JF81-02E).

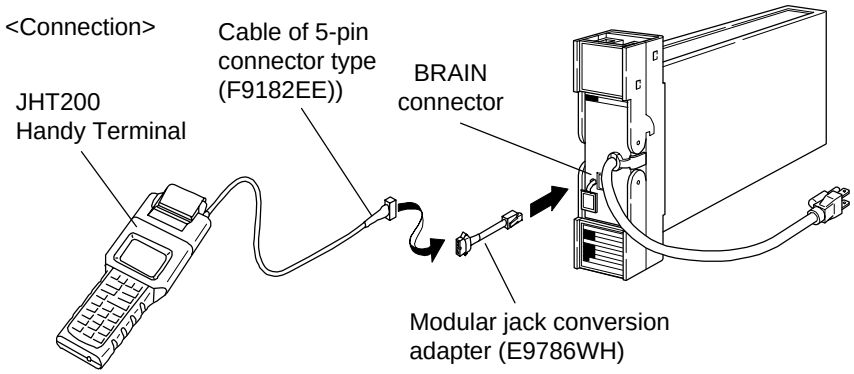


Figure 5-7 Connecting the Handy Terminal

5.4 Parameter List

BRAIN communication parameters for SIND are as follows.

On the SIND-x04, only the input value can be displayed, and integrating ratio and low-cut point can be displayed and set on the display setter on the front panel. Other, parameters are displayed and set using the Handy Terminal.

No.	Parameter Name	Symbol	Description	Display Conditions
01	Model Name	MODEL	Displays the model name.	Displayed on all
02	Tag Number	TAG NO	Displays the tag number that is set.	
03	Self Check	SELF CHK	Displays the result (GOOD/ERROR) of the self check.	
A	Display 1	DISPLAY1		
A01	Analog Input 1	INPUT1	Input value before input processing (square root or scaling) (unit: V)	Displayed on all
A03	PV1	PV1	Input value (engineering unit) after input processing (square root or scaling)	
A54	Status Display	STATUS	Displays the value added to the value (Hex) indicating the self check result. 0000: Normal 0001: EEPROM error 0002: EEPROMSUM error 0004: Low input cut state 0008: Input range exceeded 0010: Setting error 0040: Power interruption during operation 1000: A/D conversion error	
A55	Parameter Write Protect	WRT PROTECT	Displays the state of the Parameter Write Protect jumper. OFF: Setting of parameters enabled ON: Setting of parameters disabled	
A56	Rev No.	REV NO.	Displays the device software revision No.	
A58	MENU REV	MENU REV	Displays the revision No. of the parameter groups displayed on the Handy Terminal.	
A60	Self Check	SELF CHK	Displays the result (GOOD/ERROR) of the self check.	
B	Display 2	DISPLAY2		
B01	Analog Input 1	Same as A01 and A03, respectively. Note, however, that display values are updated periodically.		Displayed on all
B03	PV1			
B60	Self Check	SELF CHK	Displays the result (GOOD/ERROR) of the self check.	

No.	Parameter Name	Symbol	Description	Setting Range	Default	Display Conditions
D	Setting Parameters (I/O)	SET(I/O)				
D01	Tag Number 1	TAG NO.1	8 alphanumerics can be entered.			Displayed on all
D02	Tag Number 2	TAG NO.2	8 alphanumerics can be entered.			
D03	Comment 1	COMMENT1	8 alphanumerics can be entered.			
D04	Comment 2	COMMENT2	8 alphanumerics can be entered.			
D17	Input 2 Square Root Linearization	LINEARIZE1	Specifies square root calculation ON/OFF.	OFF SQR	OFF	Displayed on SIND-2xx
D19	Low Cut	LOW CUT1	Specifies low-cut point during integration of input 1. (*)	Proportion: 0.0 to 10.0% Square root: 0.3 to 10.0%	Proportion: 0.0 Square root: 1.0	Displayed on all
D40	Decimal Point Position	DP1	Sets the position of the decimal point for the input scale (SCH1, SCL1).	#####. ####.# ###.## ##.###	####.#	
D41	Input Scale L	SCL1	Display value at 0% input value	-9999 to 9999 (engineering unit)	0.0	
D42	Input Scale H	SCH1	Display value at 100% input value	-9999 to 9999 (engineering unit)	100.0	
D50	Integrating Ratio	INTEG.R	Sets the number of output pulses per hour.	1 to 10000 pph	9990	
D51	Display Mode	DSP MODE	Selects the display state after 30 minutes without key operation has elapsed. OFF: Only the decimal point is displayed (indicator OUT mode) ON: Regular data display	OFF ON	ON	Displayed on SIND-x04
D60	Self Check	SELF CHK	Displays the result (GOOD/ERROR) of the self check.			Displayed on all

*:Initialized when LINEARIZE1 is changed.

No.	Parameter Name	Symbol	Description	Setting Range	Default	Display Conditions
P	Adjustment Parameters	ADJUST				
P03	Zero Adjustment (Input 1)	ZERO ADJ1	Performs zero adjustment (0% side) on input 1. n.nnn V RST n.nnn V INC n.nnn V HINC n.nnn V HDEC n.nnn V DEC n.nnn indicates the current input value. Increase or decrease “n.nnn” until the target value is reached. INC/DEC : Increase/decrease “n.nnn.” HINC/HDEC : Increase/decrease “n.nnn” more rapidly than INC/DEC. RST : When a reset is made, the adjustment values return to their factory settings.			Displayed on all
P04	Span Adjustment (Input 1)	SPAN ADJ1	Performs span adjustment (100% side) on input 1. The adjustment method is the same as ZERO ADJ1.			
P60	Self Check	SELF CHK	Displays the result (GOOD/ERROR) of the self check.			
Q	Test Parameters	TEST				
Q08	Output 1 Forced Output	OUT1 TEST	Forcibly outputs the pulse of the preset value regardless of the input signal. Pressing the OK key cancels forced output.	0.0 to 125.0		Displayed on all
Q60	Self Check	SELF CHK	Displays the result (GOOD/ERROR) of the self check.			

6. MAINTENANCE

This chapter describes the simple maintenance procedures and fuse replacements that can be done in the instrument room or service shop.

6.1 Test Equipments

For efficient maintenance of this integrator, it is recommended that the user have the following test equipment manufactured by Yokogawa or their equivalent.

Device	Model Name	Number of Units	Remarks
DC voltage/current Standard	7651	1	
Counter	YS80 SICD	1	
Handy Terminal	JHT200 (BT200)	1	
Modular jack conversion adapter	Part No. E9786WH	1	

6.2 Check of I/O

The JHT200 Handy Terminal is required for checking I/O.

NOTE

- For details of operation and adjusting procedures of JHT200 Handy Terminal, refer to the instruction manual "JHT200 Handy Terminal" (IM JF81-02E).
- Do not turn off the power of the instrument during adjustment.

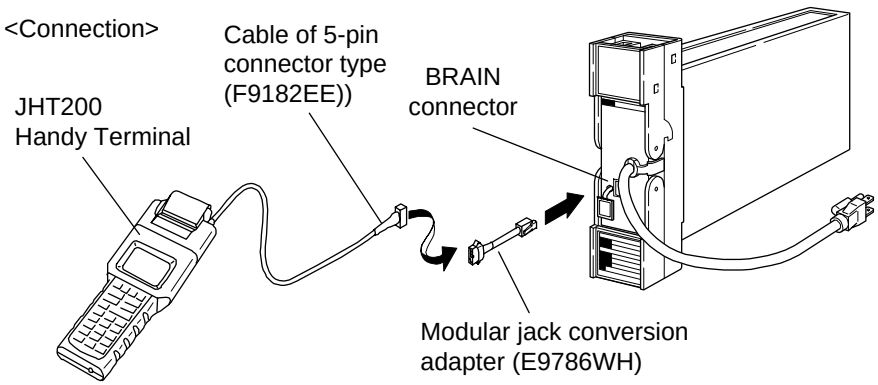


Figure 6-1 Connecting the Handy Terminal

6.2.1 Wiring

(a) Set the Parameter Write Protect (W.P.) jumper to "OFF".

(b) Connect each device referring to Figure 6-2 below.

(c) Turn on SIND with a devices connected, and allow 5 minutes for the system to warm up.

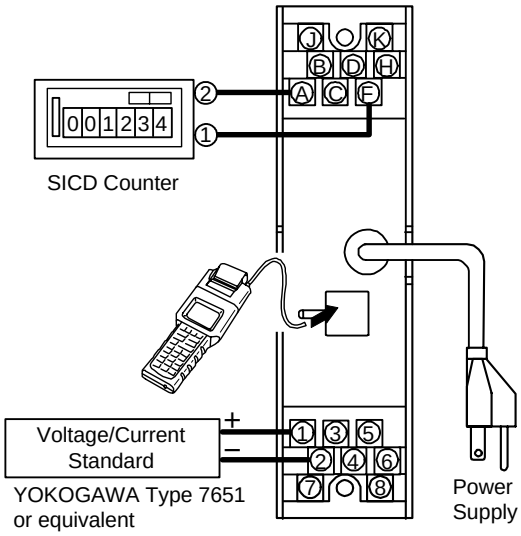


Figure 6-2 Wiring Diagram

6.2.2 Checking Procedure

(a) Set the integrating ratio (PPH) on the SIND integrator to 9000 pph.

(b) Apply a voltage of 0 V DC to the input, and reset the integration value on the SICD counter.

(c) Apply the input signal in a stepped manner for 400 seconds while monitoring the time, and integrate to 5 V DC.

(d) Make sure that the integration value on the SICD counter after 400 seconds is 995 or more or 1005 or less.

(e) If the integration value exceeds these permissible errors, call up and adjust parameters P03 and P04 (Input 1 Zero and Span Adjustments) so that the integration value on the SICD counter is within these errors.

6.3 Replacement of Fuse

When the fuse has blown or requires replacement, replace it according to the following procedure. Recommended replacement interval: About 3 years.

Before replacing a fuse, turn off the power to the instrument.

NOTE

- When a fuse has blown, check for the cause first because a fuse itself may not be responsible for the problem. Then replace the fuse.
- Use the dedicated fuse (S9510VK). Do not use a fuse for other products.

(a) Remove the fuse holder cap, then pull the fuse out in the direction shown in Figure 6-3.

(b) When installing a new fuse, use a fuse with the correct rating. Fasten the cap securely.

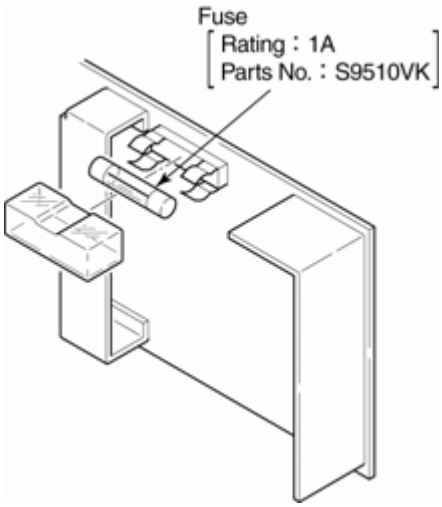


Figure 6-3 Replacement of Fuse

6.4 Replacement of Capacitor

Degradation of the aluminum electrolytic capacitor used in the power supply unit depends on operating temperature condition or operating environment.
Recommended replacement interval: 5 to 10 years.

NOTE

- Ask your nearest Yokogawa sales staff to replace the capacitor.
- Do not replace the capacitor by yourself, because the parts number of power supply unit (refer to CMPL 01B04M01-02E) and capacitor to be used are different according to the power supply specifications.

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7. TROUBLESHOOTING

If any fault occurs in the instrument, note down the symptoms, and follow Section 7.1, "Troubleshooting Flowchart."

To find the fault, first wire the instruments according to the maintenance wiring diagram, apply an input signal, and note down the symptoms.

If the fault also requires replacement of the power supply unit, main board or display, or is difficult to find, contact your nearest Yokogawa sales staff.

7.1 Troubleshooting Flowchart

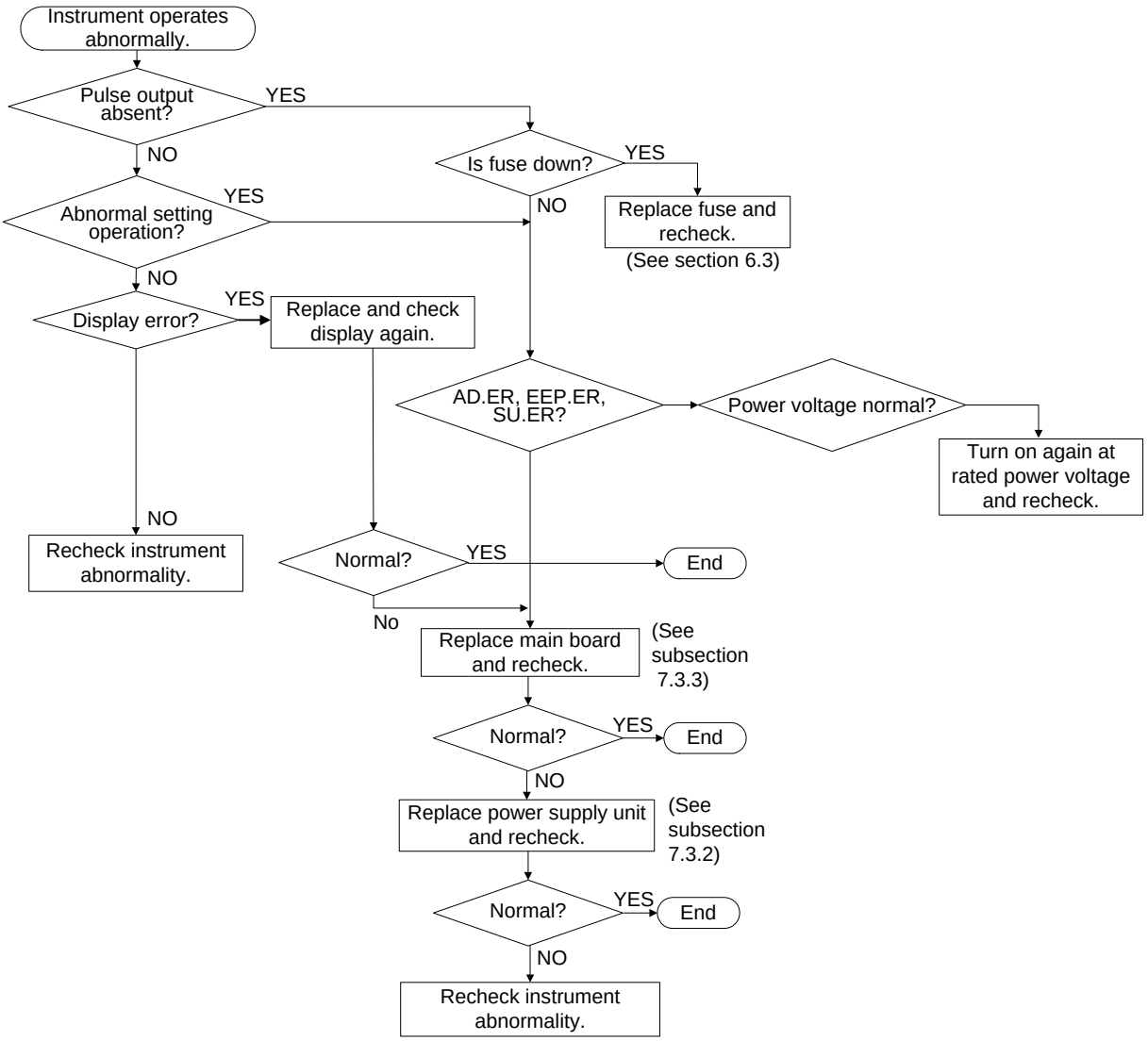


Figure 7-1 Troubleshooting Flowchart

7.2 Action in Fault Condition

The SIND has a self check function for detecting device errors on the actual SIND itself.

Details of SIND errors can be confirmed on the display setter on the front panel and in the STATUS parameter using the JHT200 Handy Terminal.

The blinking error display means failure.

Indication on Display Setter (*1)	Indication on Handy Terminal			Device Operation	Cause of Error	Remedy
	STATUS (*2)	SELF CHK	Error Information			
Out				Same state as power OFF Pulse output: OFF Key switch: Disabled Communications: Stopped	Hardware error	Replace the main board.
Out					Power supply error, broken fuse	Replace power board. Replace fuse.
Out				Lamp: All out Pulse output: Normal Key switch: Disabled Communications: Normal action	Display malfunction	Replace the display.
AdEr (AD.ER) Blinking	1000	ERROR	AD ERROR	Lamp: All out Pulse output: OFF Key switch: Disabled Communications: Unstable	A/D conversion error	Replace the main board.
EEPEr (EEP.ER) Blinking	0001	ERROR	EEPROM ERROR		EEPROM error	
SUEr (SU.ER) Blinking	0002	ERROR	EEPROM SUM ERROR	Lamp: All out Pulse output: OFF Key switch: Disabled Communications: Unstable	EEPROMSUM error (Parameter error)	Replace the main board.
	0008	ERROR	INPUT OVER RANGE	Lamp: Normal action Pulse output: Normal Key switch: Enabled Communications: Normal action	Out of input range -25 to +125%	
	0010	ERROR	RANGE SET ERROR		SCH1 and SCL1 are same values.	Set SCH1 or SCL1 again.
	0004	GOOD	LOW_CUT		Input at low-cut point or less	
	0040	GOOD	None	Lamp: Normal action Pulse output: Normal Key switch: Enabled Communications: Normal action	Power interruption during operation	Write "0000" at the STATUS display on the Handy Terminal.
	0000	GOOD	-	-	-	-

Note 1: On the SIND-x04, the error details are indicated in alphabet characters.
When two or more errors occur, high priority errors are displayed.
The table shows the errors in order of priority.

Note 2: STATUS error code is to be the addition display (hexadecimal number) when two errors or more occur.

7.3 Replacement of Parts

WARNING

Replacement of parts must be performed by Yokogawa service personnel. If customer service personnel are to replace parts, first thoroughly read this user's manual to familiarize yourself with the procedure.

7.3.1 Replacement Procedure

The following replacement procedures are described:

- Replacement of Power Supply Unit
- Replacement of Main Board
- Replacement of Display

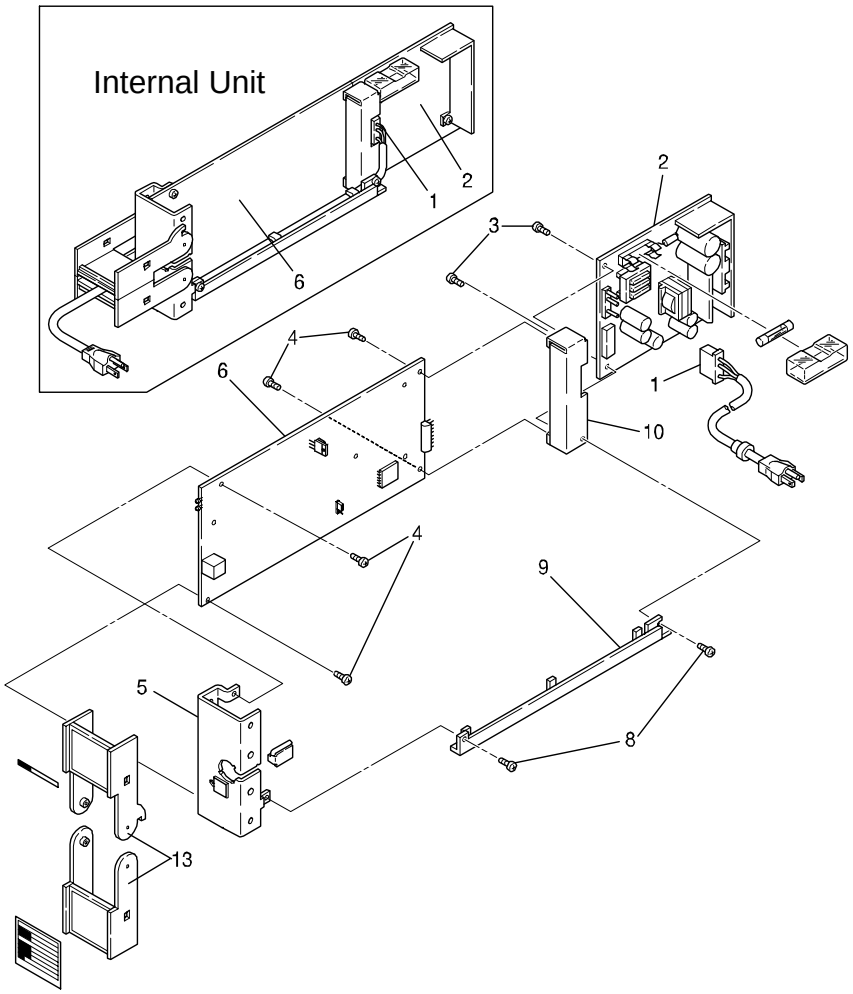


Figure 7-2 Disassembled View

NOTE

- Limit the number of disassembled parts to a minimum when disassembling the SIND during replacement of parts.
- Perform disassembly and assembly carefully.

7.3.2 Replacement of Power Supply Unit

(a) Pull the terminal cover (13) toward you to draw out the internal unit from the rack case.
(b) Unplug the connector (1) from the power supply unit (2).
(c) Remove two screws (3) to separate the power supply unit (2) from the bracket (10).
(d) Assemble the new power supply unit following steps (c) through (a).

NOTE

- Use the power supply unit for style R for replacement (refer to CMPL).
- The power supply unit of former style without compatibility cannot be used.

7.3.3 Replacement of Main Board

(a) Remove the power supply unit (2).
(Refer to Subsection 7.3.2 for operating procedure.)
(b) Remove two screws (8) to separate the bracket (9).
(c) Remove four screws (4) to separate the bracket (10) and the front bracket (5) from the main board (6).
(d) Assemble the new main board following steps (c) through (a).

7.3.4 Replacement of Display (SIND-x04 only)

(a) Remove the connector (1) from the power supply unit (2).
(b) Remove two screws (8) to separate the bracket (9).
(c) Remove two screws (4) to separate the front bracket (5) from the main board (6).
(d) Assemble the new front bracket following steps (c) through (a).

Appendix /TB Power Supply Terminal Connections (Option)

Appendix-1 GENERAL

If you specify the optional terminal block (optional suffix code /TB), the power supply is connected directly to the terminal block. So, drawing out of the internal unit requires turning off the power supply and disconnecting the wiring from the terminal block.

Appendix-2 APPLICABLE INSTRUMENTS

Model	Description
STED	mV, Temperature and Potentiometer/Voltage Converters
SKYD	Alarm Unit
SALD	mV and Temperature Alarm Unit
SDAU	Digital Alarm Unit
SPLR	Programmable Computing Unit
SIND	Integrator
SISD	Isolator
SDBT	Distributor (for 1 point)
SDBS	Distributor (for 4 points)
SDBU-21	Distributor (for 1 point)

Appendix-3 NAMES OF COMPONENTS AND POWER TERMINAL SYMBOLS

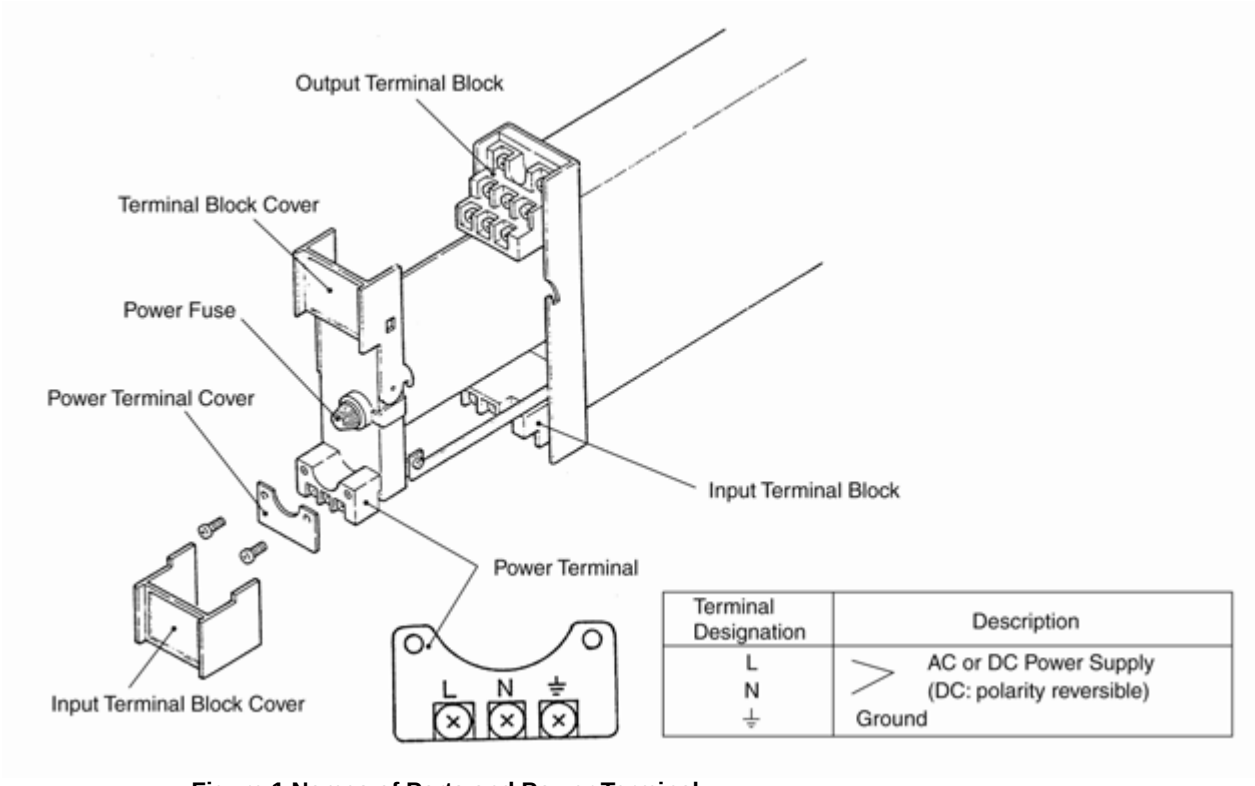


Figure 1 Names of Parts and Power Terminal

Appendix-4 POWER SUPPLY AND GROUND WIRING

(1) All cable ends must be furnished with crimp-on type solderless lugs (for 4 mm screws).

(2) Examples of applicable cables:

Cross-sectional area of the cable conductor: 2.0 mm^2 *
For the power supply, use cable having a cross-sectional area of at least 1.25 mm^2.

Applicable cable: 600 V PVC insulated cable (IV) stranded wires, conforming to JIS C3307.
PVC insulated cables for electric appliances (KIV) stranded wires, conforming to JIS C3316.

Note *: Power supply cables should be determined from the instrument power consumption. They must have conductors with cross-sectional area of at least 1.25mm^2.

(3) Wirings to power supply and ground terminals should be made after completion of signal terminal wirings.

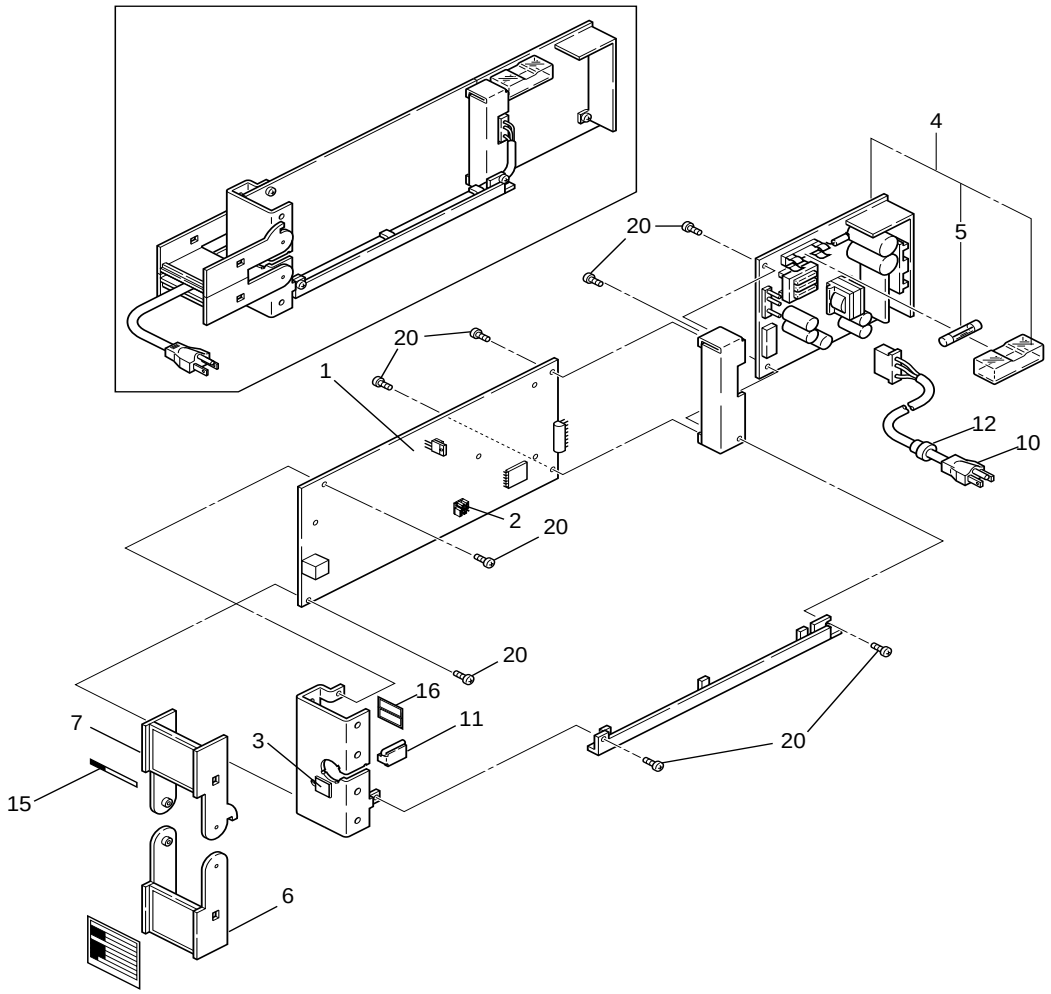
(When signal terminal wirings are made after completion of power supply wiring, pull the internal unit approximately half way out of the housing. Do not remove the power terminal block.)

(4) After completing the power supply and ground wiring, mount the power terminal cover.

Customer Maintenance Parts List

Model SIND (Style R)
Integrator

YEWSERIES 80



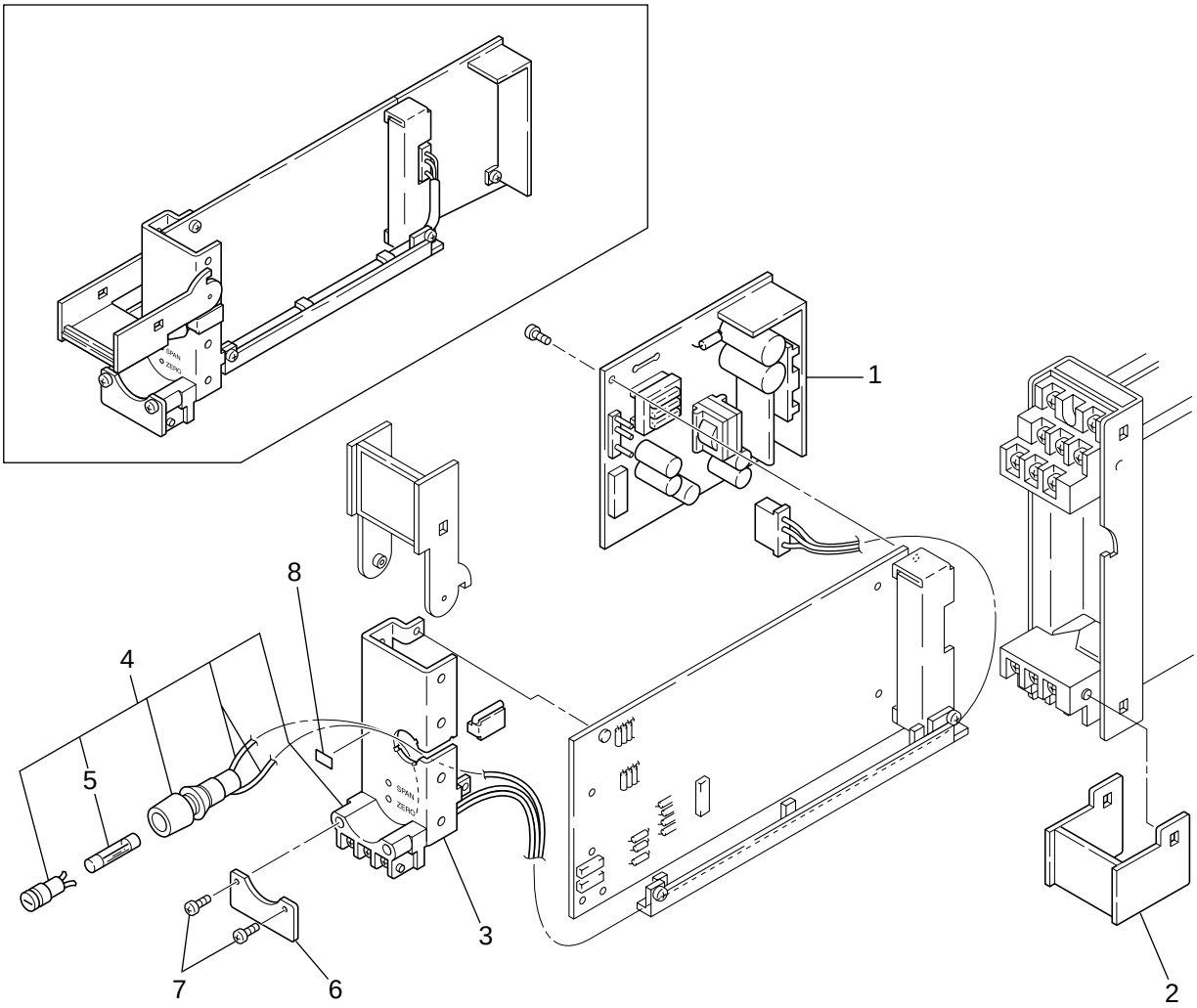
CMPL 01B04M01-02E
7th Edition: May 2004

Item	Part No.	Qty (Model) SIND-100	SIND-200		SIND-104	SIND-204	Description
1	L3040DG	1	1				Main Board Assembly
	L3040DH				1	1	Main Board Assembly
2	A1211JS	1	1		1	1	Socket & Holder
3	L4040EA	1	1		1	1	Cap
4	L3040YB	1	1		1	1	Power Supply Unit (for 100V Version)
	L3040YS	1	1		1	1	Power Supply Unit (for 220V Version)
5	S9510VK	1	1		1	1	Fuse(1A)
6	E9713CA	1	1		1	1	Cover
7	E9713CK	1	1		1	1	Cover
10	E9713EG	1	1		1	1	Cable Assembly(for 100V Version)
	E9713FS	1	1		1	1	Cable Assembly(for 220V Version)
11	E9713CE	1	1		1	1	Cover
12	S9079PB	1	1		1	1	Bushing
15	Y9422NP	1	1		1	1	Tag No. Label (blank)
16	L4040JA	1	1		1	1	Label (blank)
20	Y9306JB	8	8		8	8	Pan H. Screw, M3x6

Customer Maintenance Parts List

/TB
Power Supply Terminals
For Rack-Mounted Instruments
(Option)

YEWSERIES 80



CMPL 01B04F02-11E
8th Edition: May 2004

Item	Part No.	Qty	Descripion
1	—	1	Power Supply Unit (see Table 1)
2	E9713CJ	1	Cover
3	—	1	Bracket (see Table 2)
4	E9713ET	1	Terminal Assembly
5	S9510VK	1	Fuse (1A)
6	E9713CV	1	Cover
7	Y9306JB	2	Pan H. Screw, M3 × 6
8	E9714DM	1	Label (1A/250V)

Table 1. Power Supply Unit Part Number.

Applicable Instruments	Power Supply Unit Part No.	
Model	100 V Version	200 V Version
SPLR	E9715YH	
STED, SISD, SDBT	L3040YH	
SALD, SKYD, SIND, SDAU	L3040YJ	
SDBS, SDBU-21	E9715YK	
SPCM	E9715YL	

Table 2. Bracket Part Number.

Applicable Instruments Model	Bracket Part No.
STED-110/310/410	L4040CA
STED-210	L4040CB
STED-710	L4040CC
SISD,SIND-100/200, SDBT-21	L4040CE
SKYD-200/201/302	L4040CG
SKYD-100/101,SALD-110/310	L4040CH
SKYD-204/304	L4040CL
SKYD-104	L4040CM
SALD-210/710	L4040CQ
SALD-724	L4040CS
SALD-214/714	L4040CT
SIND-104/204	L4040CX
SDBS	E9713DR
SDBT-11	E9713DL
SDAU-xxx/TB	L4040DA
SDAU-100/RLY4/TB	L4040DB
SDAU-270/RLY4/TB	
SDAU-xxx/TB/COM	L4040DE
SDAU-100/RLY4/TB/COM	L4040DF
SDAU-270/RLY4/TB/COM	

Revision Information

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Manual No. :IM 01B04M01-02E

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Mar. 2003/8th
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