User's Manual

YEWSERIES 80

Model SIND (Style S) Integrator

YOKOGAWA
Yokogawa Electric Corporation

IM 01B04M01-02E
11th Edition

Contents

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Introduction

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

● Intended Readers

This manual is intended for personnel in charge:

- Installation and wiring
- Instrumentation and setup of the function
- 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.

Manual Title	Manual No.	Description
Rack-Mounted Instruments	IM 1B4F2-01E	Describes mounting and wiring for the YS80 rack-mounted instruments.
Model VJ77 PC-based Parameters Setting Tool	IM 77J01J77-01E	Describes operation for the VJ77 parameters setting tool..
Model JHT200 Handy Terminal	IM 77J50H01-01EN	Describes operation of JHT200.

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.

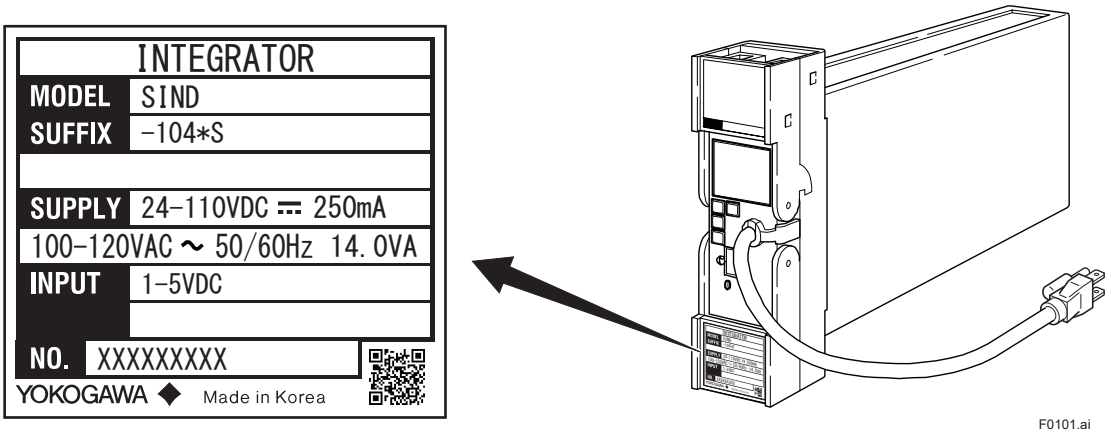

Figure 1-1 Name plate for Thermocouple Input (Description example)

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
- Precautions on the Use of the YS80 Series 1

Downloadable Electronic Manuals

You can download the latest manuals from the following website:
To view the User's Manuals, use Adobe Acrobat Reader of Adobe Systems Incorporated.

http://www.yokogawa.com/ns/ys/

1.2 Documentation Conventions

This manual uses the following notational conventions

Symbols

The following symbols are used in this manual.

Markings	
 WARNING	Indicates that operating the hardware or software in a particular manner may damage it or result in a system failure.
 CAUTION	Draws attention to information that is essential for understanding the operation and/or features of the product.
Note	Gives additional information to complement the present topic and/or describe terms specific to this document.
▶	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.

QR Code

The product has a QR Code pasted for efficient plant maintenance work and asset information management. It enables confirming the specifications of purchased products and user's manuals.
For more details, please refer to the following URL.

https://www.yokogawa.com/qr-code

QR Code is a registered trademark of DENSO WAVE INCORPORATED.

1.3 Notice

This Instruction 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

- The following safety symbols are used on the product and in this manual.

Markings	
	If this symbol is indicated on the product, the operator should refer to the explanation given in the instruction 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.

- 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.
- 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.
- Do not turn off the power of the product during adjustment and parameter setting.
- 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.
- When you replace the parts or consumables of the product, only use those specified by Yokogawa.
- If the product is to be used in systems with special requirements for human safety, such in as nuclear power and radiation related equipment, railway facilities, aircraft facilities, and medical devices, please consult with your sales representative.
- 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 Compatibility with Previous Models

■ Compatibility with style A

- Operation and settings differ from previous model (styles A). Please read this document carefully before operating the product.
- Before installing this product in a system or plant, you must check the jumper settings and parameters described in chapter 5, “Settings.” After checking settings and parameters, install the product in the system or plant, and then turn ON the power.

■ Compatibility with style R

- Operation and settings are the same as for the previous model (style R). Please read this document carefully before operating the product.
- Before installing this product in a system or plant, you must check the jumper settings and parameters described in chapter 5, “Settings.” After checking settings and parameters, install the product in the system or plant, and then turn ON the power.

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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.
A PC (VJ77) or 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.
With the VJ77 Parameter Setting Tool you can do the following:

- Read/write all parameters at once
- Save read parameters to a file
- Copy parameters to other devices of the same model and suffix code (only with style code R or S).

*1: The modular jack conversion adapter (E9786WH) is required for connecting a PC (VJ77) or 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

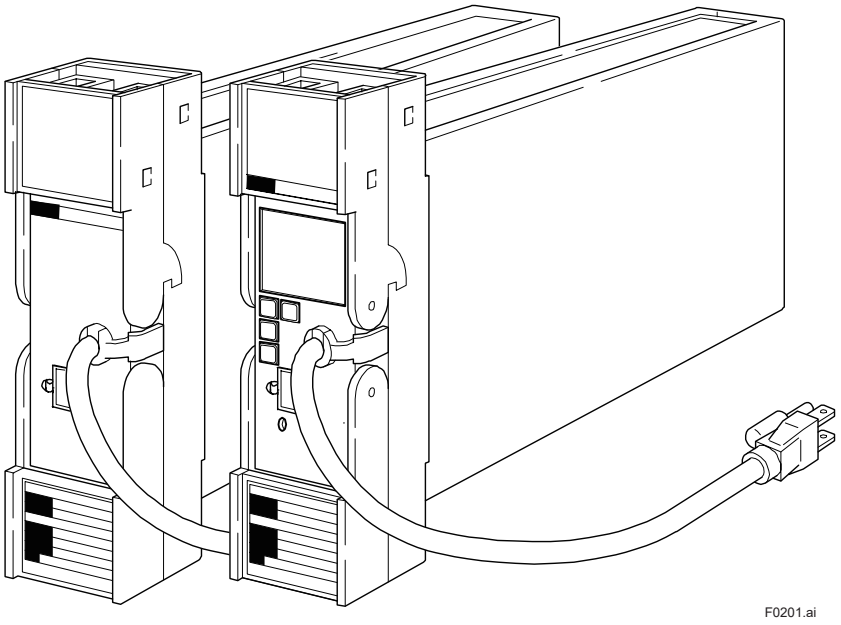


Figure 2-1 External View

2.1 Standard Specifications

Please see the General Specifications (GS 01B04M01-02E) at the end of this manual.

2.2 Model and Suffix Codes

Model	Suffix Codes		Style	Optional Suffix Codes	Description
SIND					Integrator
Output	-1				Proportional output
	-2				Square-root output (*1)
Indication setter		00			Not provided
		04			Provided
Style Code			*S		Style S
Option Codes (*2) (*3)				/NHR	Without rack case
				/FBP	Power supply fuse bypass
				/LOCK	Power supply plug with lock
				/WSW	With spring washer
				/REK	Mount to same line with EK series rack
				/TB	With power supply terminal
				/A2TB	220V version with power supply terminal
				/A2ER	220V version with power supply plug

*1: When square-root output is specified, SIND is shipped as a square-root integrating mode. This mode is changeable to proportional output type by a PC (VJ77) or the JHT200 Handy Terminal.
*2: /LOCK, /REK, /TB, /A2TB, and /A2ER cannot be specified together.
*3:/FBP, /A2TB, and /A2ER cannot be specified together.

2.3 Accessories

Integrating ratio label: 1 sheet

Installation

For details of the installation procedure and wiring precautions, refer to the instruction manual “Installation of Rack-Mounted Instruments” (IM 1B4F2-01E).

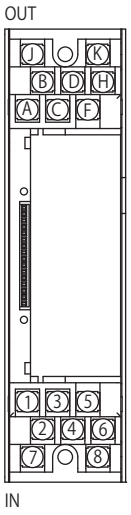
3.1 External Wiring

(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.

CAUTION

- **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 arrangement



Terminal Designation	Description	
	SICD Counter Drive Pulse	Transistor Contact
A	- SICD drive pulse-1 (*1, 3, 4)	+ Transistor contact-1 (*2, 3, 4)
B		COM
C	- SICD drive pulse-2 (*1, 3, 4)	+ Transistor contact-2 (*2, 3, 4)
D		
F	+	
H		
J		
K		

Do not connect to the output terminal when the terminal is not in use.

*1: Pulse signals can also be used to drive an electromagnetic counter of rating 24 V DC, 150 mA 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: When terminals A and C are shorted, a pulse signal with ON time of 60 ms is generated across between terminals A-C and F, and terminals A-C and B.
*4: When a counter other than SICD is used, connect a surge voltage protective diode in parallel with the counter coil.

Terminal Designation	Description
1	+ Input (1 to 5 V DC)
2	-
3	
4	
5	
6	
7	
8	

[WIRING EXAMPLE]

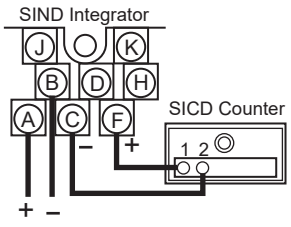


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Figure 3-1 Terminal Layout and Terminal Wiring

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.

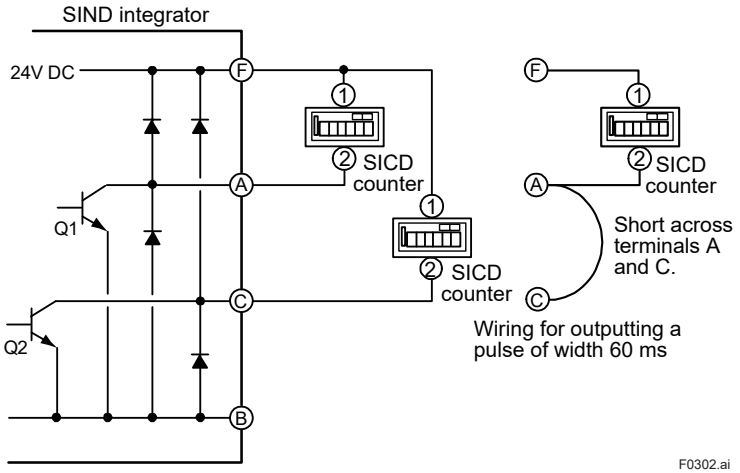

Figure 3-2 Connecting the SICD Counter

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.

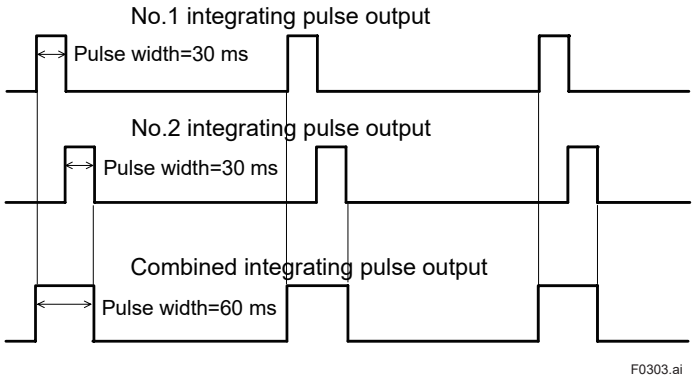

Figure 3-3 SIND Pulse Output

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.

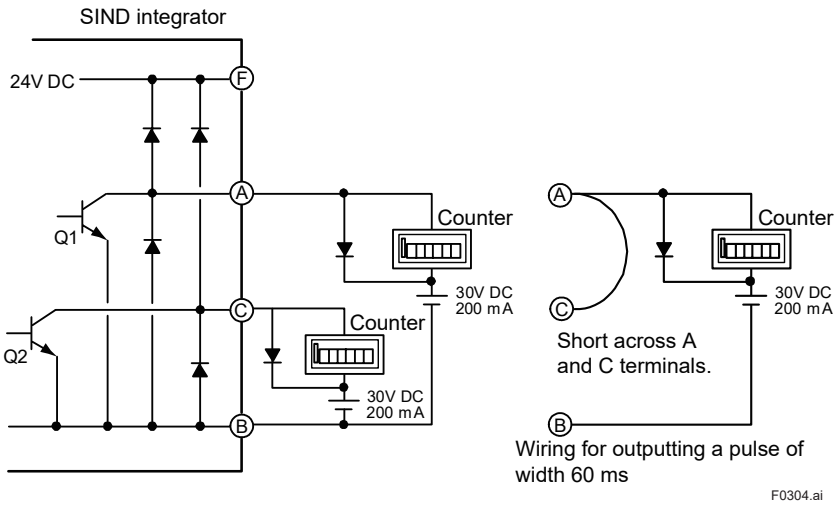

Figure 3-4 Connecting a Counter

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.

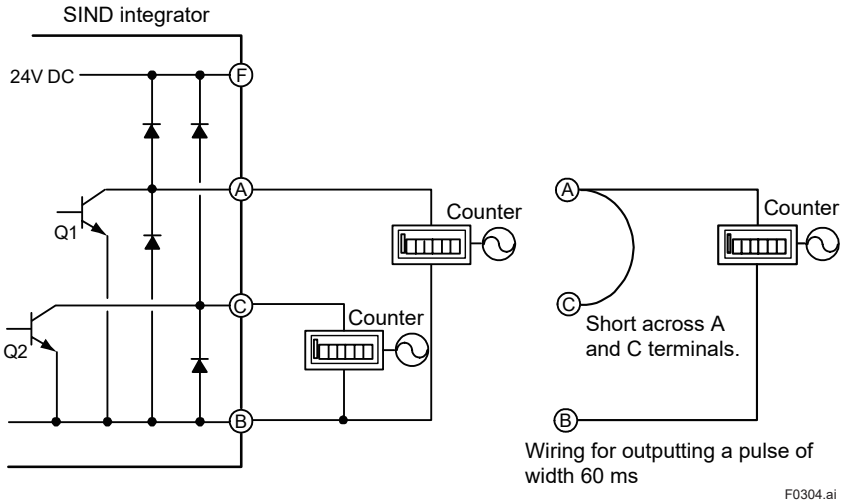

Figure 3-5 Connecting a Third-party Counter

■ Applicable Cables

(1)Signal circuit wiring
- Cross-sectional area of the cable conductor: 0.5 to 0.75 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)

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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.

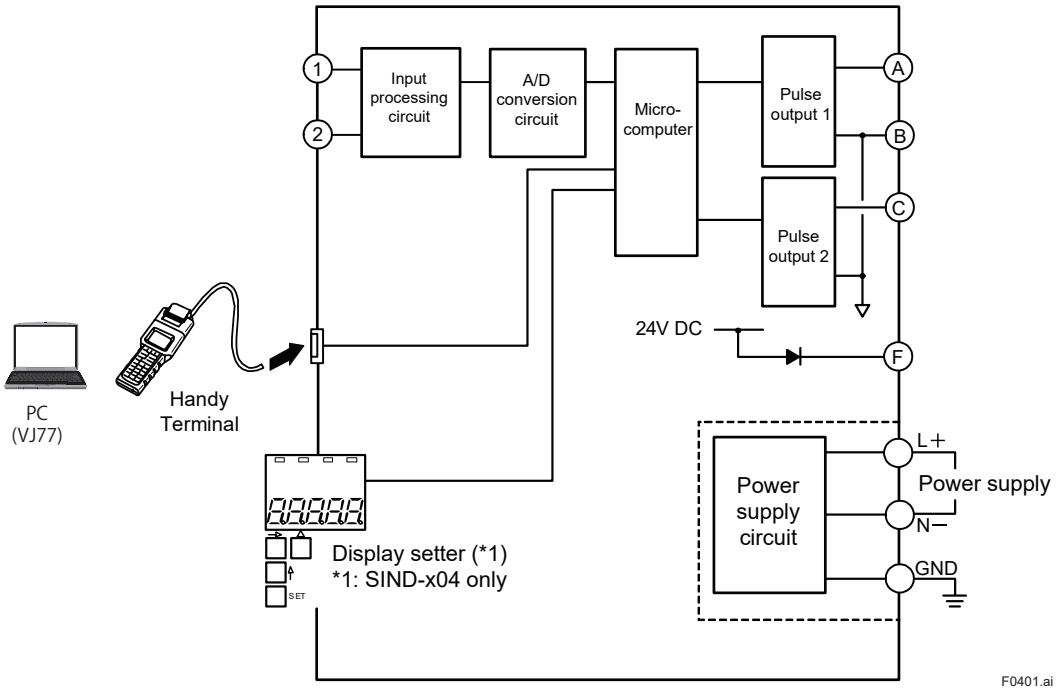


Figure 4-1 Hardware Function Block Diagram

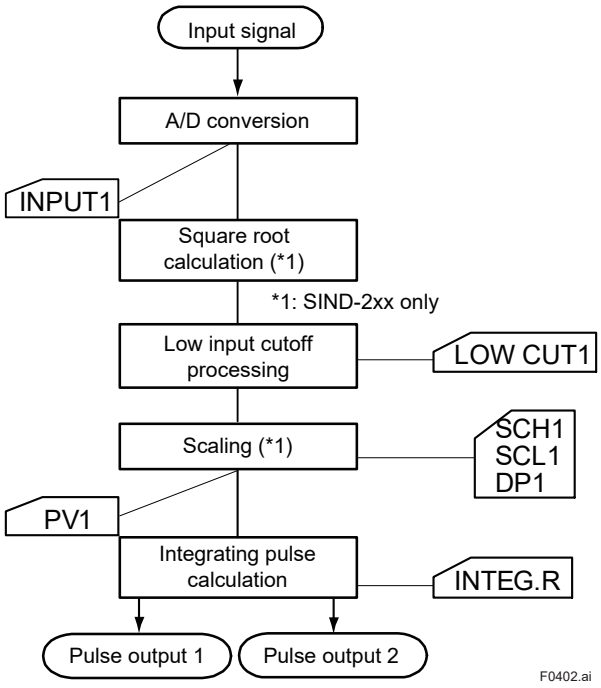


Figure 4-2 Software Function Block Diagram

The alphabet symbols in the figure are the names of parameters displayed on a PC (VJ77) or 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.

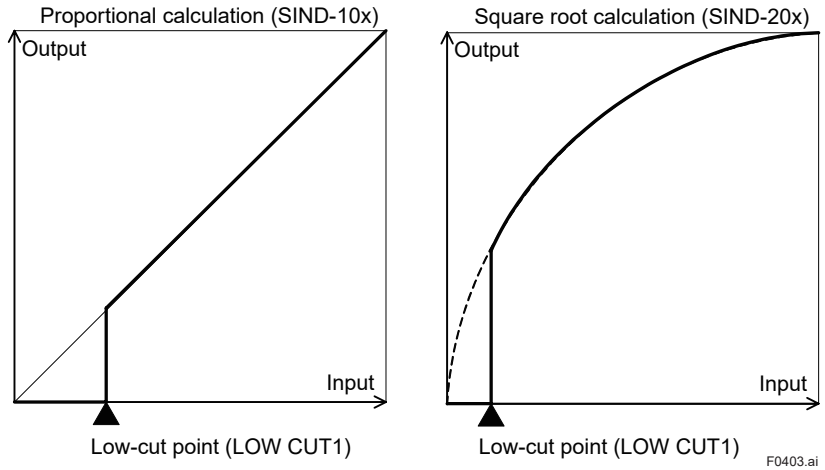


Figure 4-3 Low-cut Point

● 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

CAUTION

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).

CAUTION

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

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.

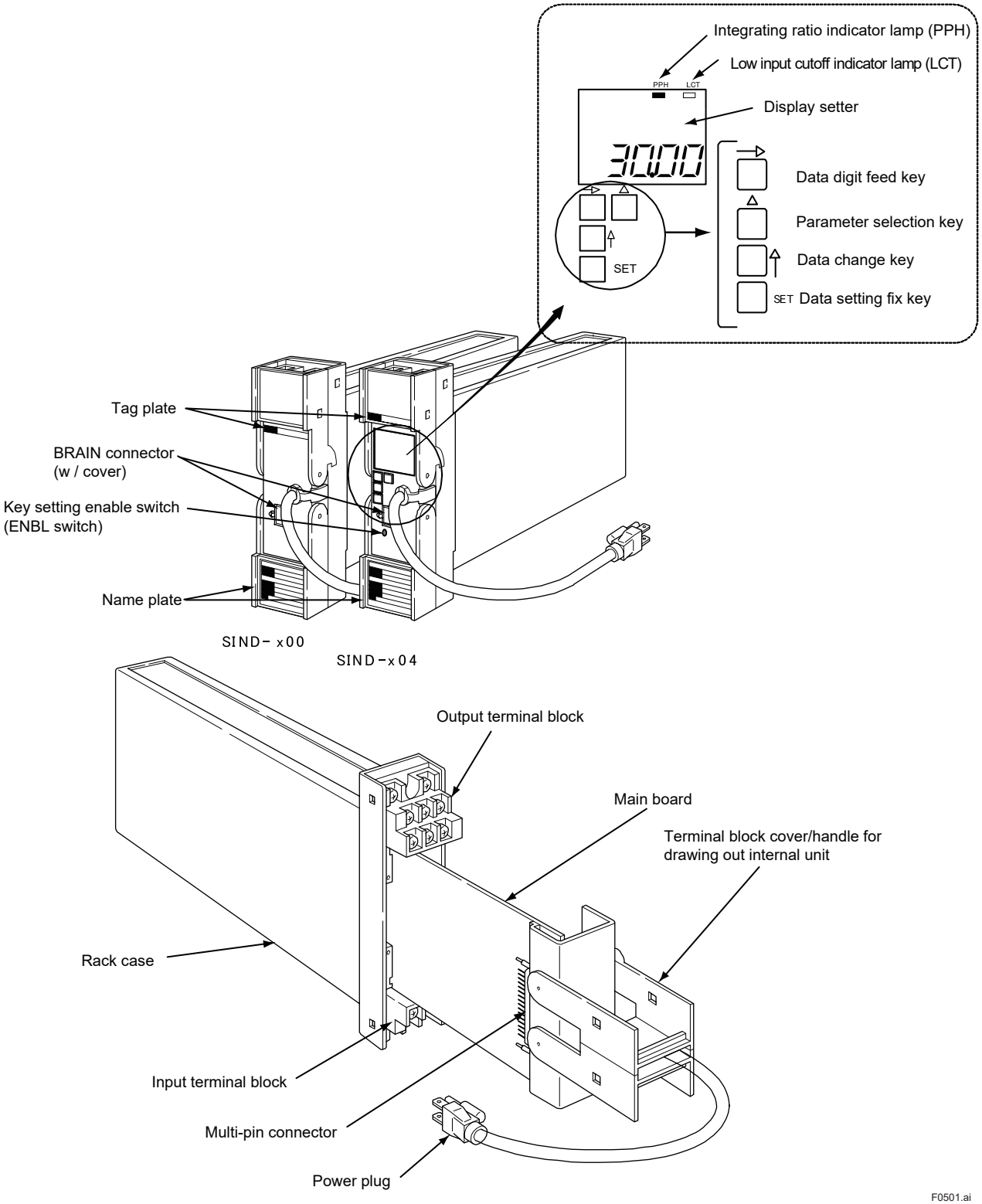


Figure 5-1 Names of Components

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 a PC (VJ77) or 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 its 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 a PC (VJ77) or the JHT200 Handy Terminal.

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

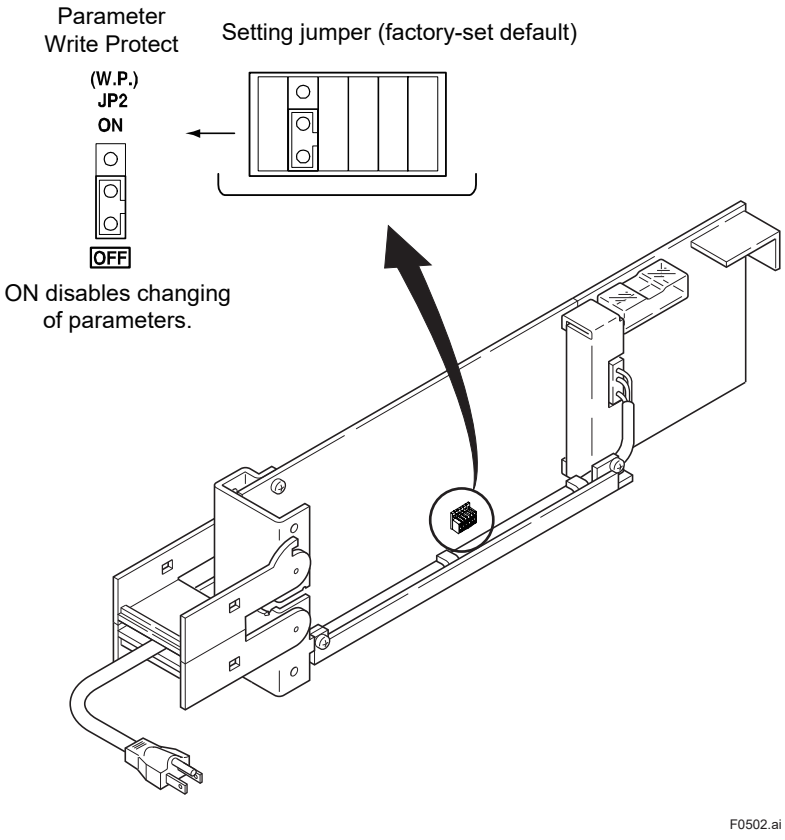


Figure 5-2 Parameter Write Protect Jumper

Operation is not guaranteed if the jumper is not set.

CAUTION

■ 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 a PC (VJ77) or the 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: The modular jack conversion adapter (E9786WH) is required for connecting the a PC (VJ77) or JHT200 Handy Terminal to the Alarm Unit.
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.

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. (For SIND-x04 only.) ● Changing of parameter setting by a PC (VJ77) or 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 a PC (VJ77) or 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
Δ	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 previous parameter.	Changes the set point.	No operation	
SET	No operation	Advances to the 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.

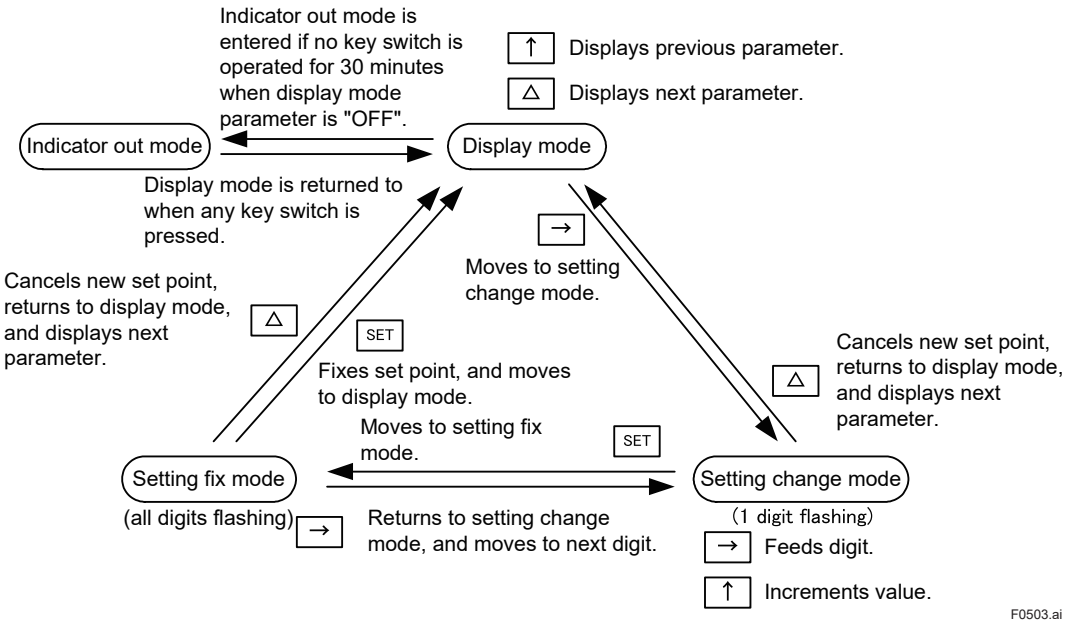
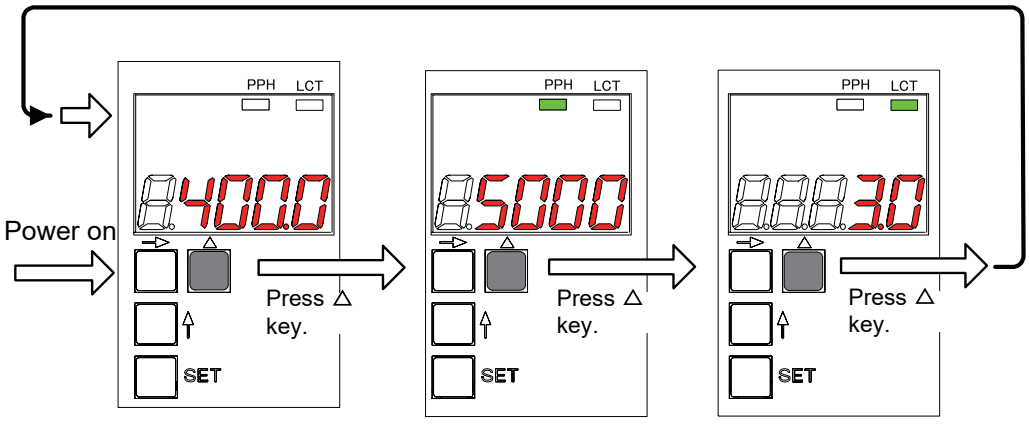


Figure 5-3 Key Switch Operations and Migration of Display States

■ Switching the Display

Each press of the Δ key switches the display data.



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

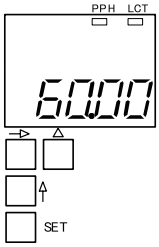
Integrating ratio set point (PPH) is displayed.
PPH lamp lit
In this example, "5000 pulses/hour"

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

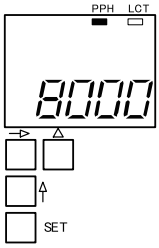
Figure 5-4 Progression of Display Screen

■ Setting Parameters

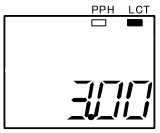
Display the desired parameter (integrating ratio or low-cut point), and follow the procedure below to change its setting.



(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.

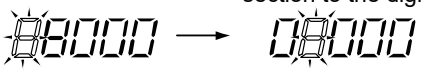


The low-cut point (3.00) is displayed.

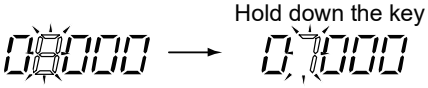
(3) Press the ENBL switch to enter setting change enable state.

(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.)

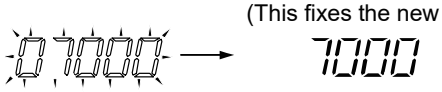


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Figure 5-5 Setting Parameters

CAUTION

- **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.**
- **Do not turn off the power of the instrument during parameter setting.**

■ Display at Power ON

The model with display setter displays REV NO. (revision number of software for SIND for about 2 seconds after power ON.

Example of display (REV NO.10)

■ 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.

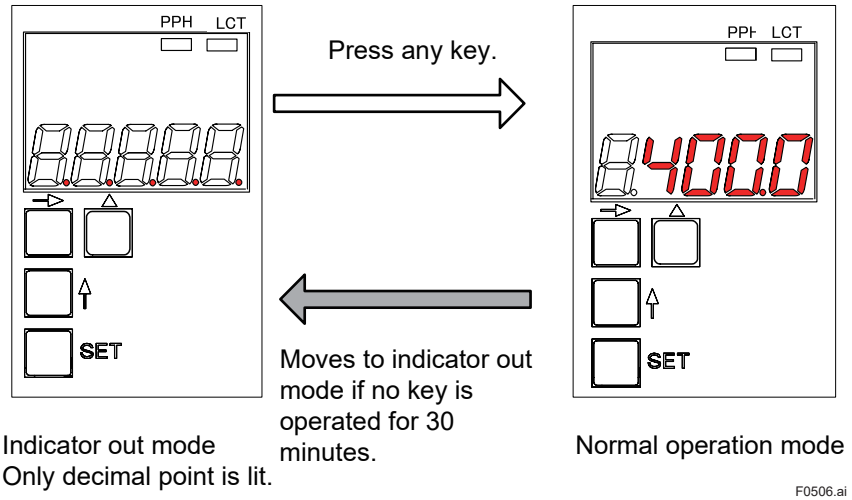

Figure 5-6 Indicator Out Mode

5.3.3 Setting of Parameters Using Handy Terminal

CAUTION

For details of operation and adjusting procedures of JHT200 Handy Terminal, refer to the instruction manual "JHT200 Handy Terminal" (IM 77J50H01-01EN).

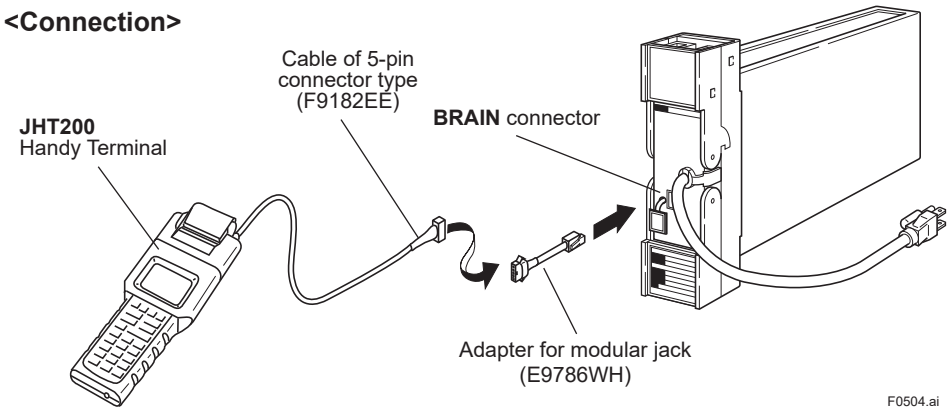

Figure 5-7 Connecting the Handy Terminal

5.3.4 Setting of Parameters Using VJ77 Parameters Setting Tool

CAUTION

For details of operation and adjusting procedures of VJ77 Parameters Setting Tool, refer to the instruction manual "Model VJ77 PC-based Parameters Setting Tool" (IM 77J01J77-01E).

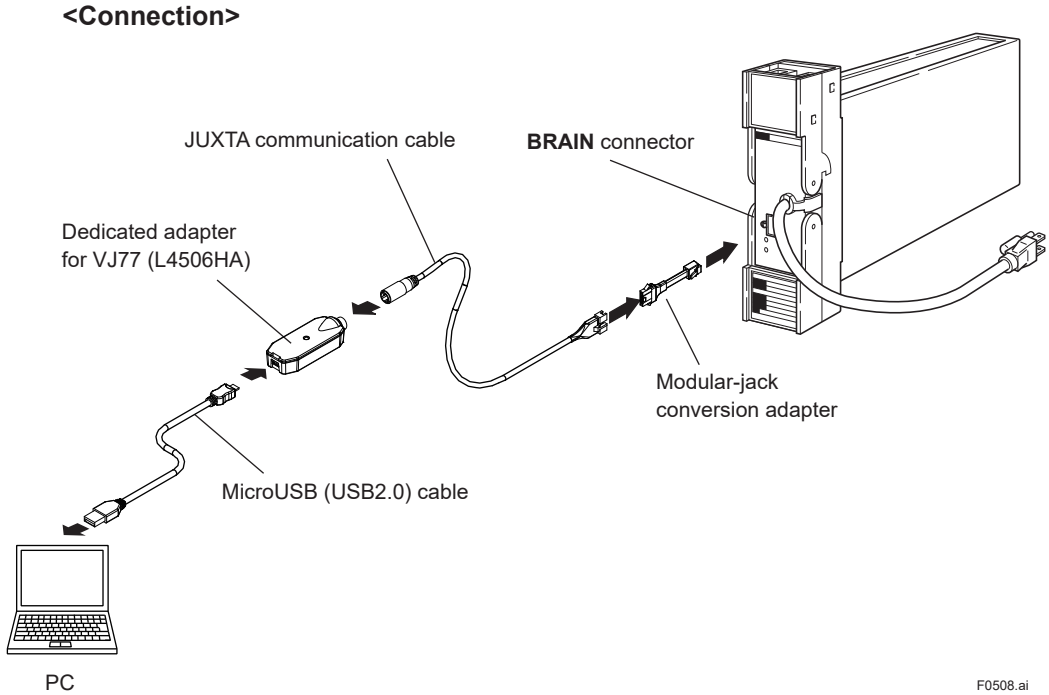

Figure 5-8 Connecting a PC (VJ77)

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 lowcut point can be displayed and set on the display setter on the front panel. Other, parameters are displayed and set using a PC (VJ77) or 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 (*1)	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 a PC (VJ77) or 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.	

*1: The device status is displayed.

No.	Parameter Name	Symbol	Description	Setting Range	Factory-set Value	Display Conditions
D	Setting Parameters	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 1 Square Root Linearization	LINEARIZE1	Specifies square root calculation ON/OFF.	OFF SQR	SQR	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	Result of self check (GOOD/ERROR) of the self check.			Displayed on all

*: Initialized when LINEARIZE1 is changed.

No.	Parameter Name	Symbol	Description	Setting Range	Factory-set Value	Display Conditions
E	Setting Alarm Parameters	SET(ALM)				
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.			

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Maintenance

This chapter describes the calibration procedures that can be done in the instrument room or service shop.

6.1 Test Equipment

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

- DC Voltage/Current Standard, Yokogawa GS200 or the equivalent……..... 1 set
- Counter, Yokogawa YS80 SICD….....1 set
- PC, VJ77 Parameters Setting Tool…….....1 set
- Handy Terminal, JHT200 (BT200)……..... 1 set
- Modular jack conversion adapter, Part No. E9786WH….....1 set

6.2 Check of I/O

A PC (VJ77) or the JHT200 Handy Terminal is required for checking I/O.
The check procedure is shown below using the JHT200 Handy Terminal as an example.

CAUTION

- **For details of operation and adjusting procedures of VJ77 Parameters Setting Tool, refer to the instruction manual "Model VJ77 PC-based Parameters Setting Tool" (IM 77J01J77-01E).**
- **For details of operation and adjusting procedures of JHT200 Handy Terminal, refer to the instruction manual "JHT200 Handy Terminal" (IM 77J50H01-01EN).**
- **Do not turn off the power of the instrument during adjustment.**

<Connection>

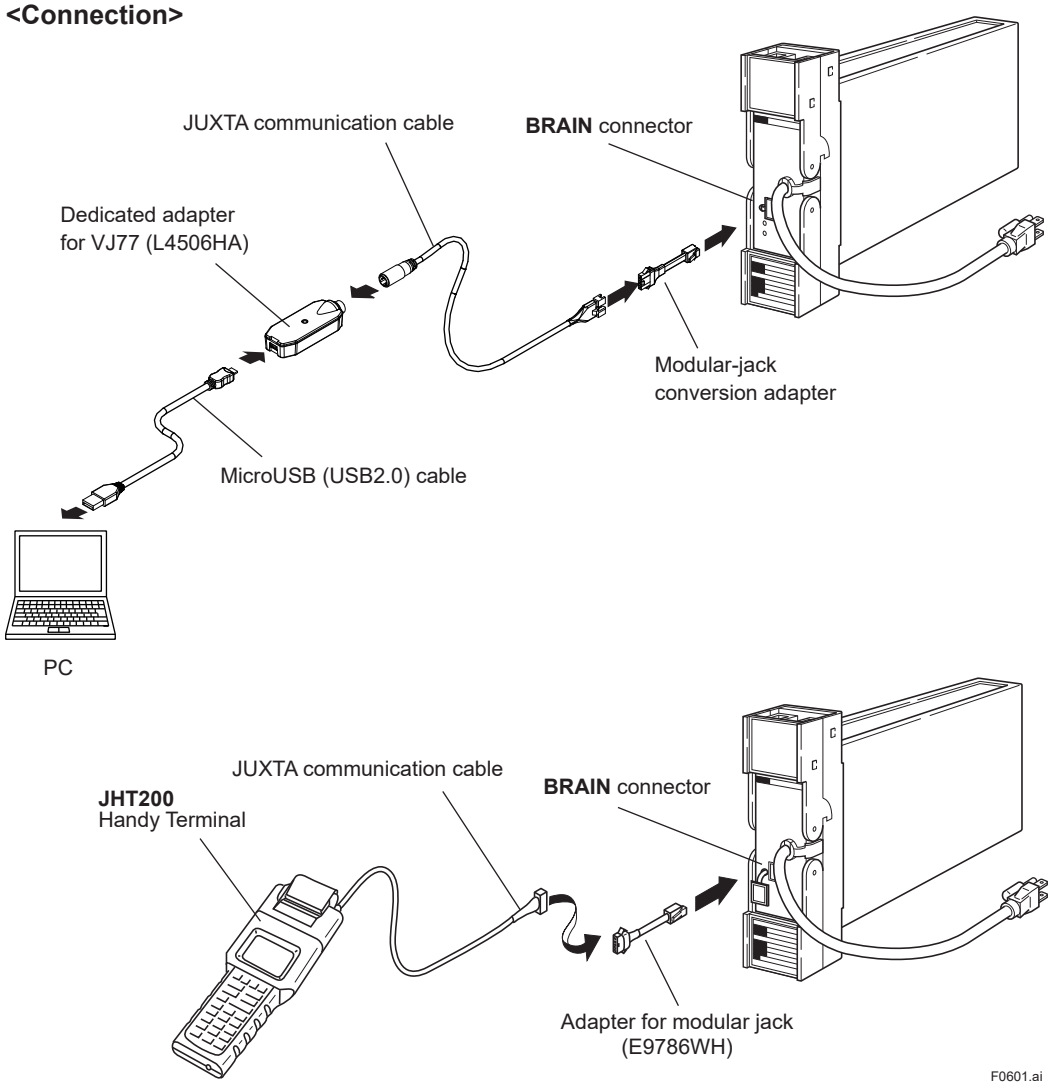


Figure 6-1 Connecting the Handy Terminal

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.

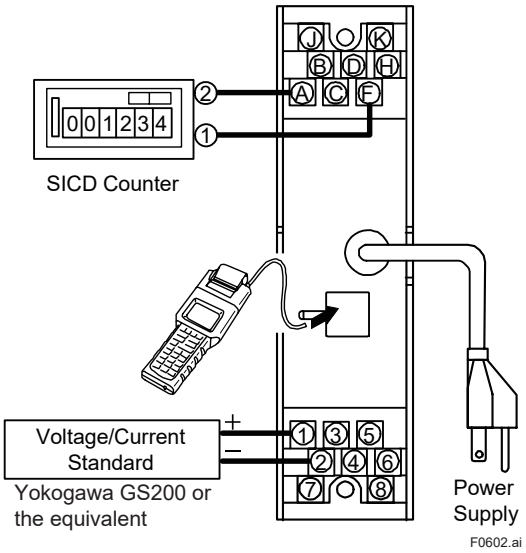


Figure 6-2 Wiring Diagram

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 List of Replaceble Parts

Contact YOKOGAWA's sales office or sales representative when replacing the spare parts.

Part Name	Part Number	Recommended replacement period	Reference
Fuse	S9510VK	Approx. 3 years	If the fuse breaks or if the replacement period elapses, please have the item replaced.
Power supply unit	L3510YA: Standard L3510YF: Option codes /TB, /FBP, or /REK L3510YT: Option code /A2TB L3510YR: Option code /A2ER	5-10 years	As the aluminum electrolytic capacitors used in the power supply unit are subject to deterioration from temperature and other operating conditions, we recommend the replacement period on the left.

Blank

Troubleshooting

If any fault occurs in the instrument, note the symptoms and follow Section 7.1.

7.1 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 a PC (VJ77) or the JHT200 Handy Terminal.
The blinking error display means failure.

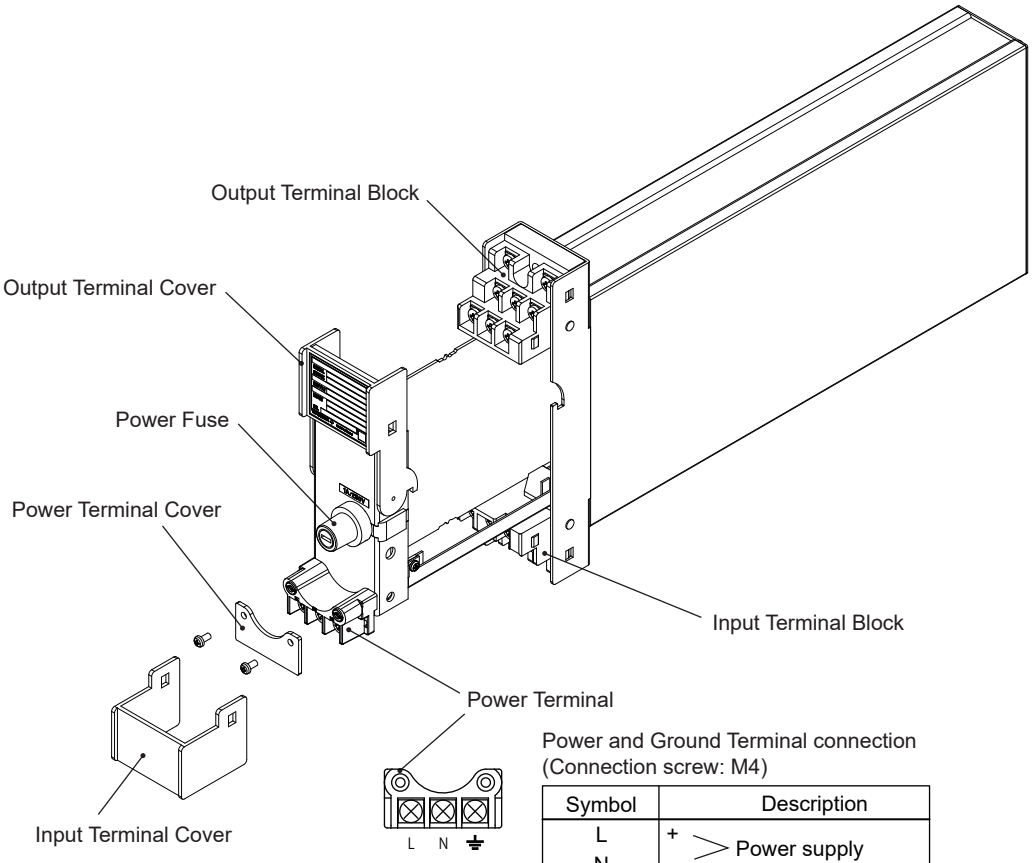
Indication on Display Setter (*1)	BRAIN Communication Parameter Display			Device Operation	Cause of Error	Remedy
	STATUS (*2)	SELF CHK	Error Information			
Out				Same state as power OFF	Hardware error	Contact YOKOGAWA's sales office or sales representative.
Out				Pulse output: OFF Key switch: Disabled Communications: Stopped	Power supply error, broken fuse	
Out				Lamp: All out Pulse output: Normal Key switch: Disabled Communications: Normal action	Display malfunction	
(AD.ER) Blinking	**1000**	**ERROR**	**AD ERROR**	Lamp: All out Pulse output: OFF Key switch: Disabled Communications: Normal action	A/D conversion error	
(EEP.ER) Blinking	**0001**	**ERROR**	**EEPROM ERROR**	Lamp: All out Pulse output: OFF Key switch: Disabled Communications: Unstable	EEPROM error	
(SU.ER) Blinking	**0002**	**ERROR**	**EEPROM SUM ERROR**	Lamp: All out Pulse output: OFF Key switch: Disabled Communications: Unstable	EEPROMSUM error (Parameter error)	
	0008	**ERROR**	**INPUT OVER RANGE**	Lamp: Normal action Pulse output: Normal Key switch: Enabled Communications: Normal action	Out of input range -25 to +125%	Set the input within the range.(*3)
	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	Apply the input greater than the low-cut point.
	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 of BRAIN communication parameter.
	0000	**GOOD**	**-**	-	-	-

*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.
*2: STATUS error code is to be the addition display (hexadecimal number) when two errors or more occur.
*3: If errors continue even when the input is within the range, the input circuit is broken. Contact YOKOGAWA's sales office or sales representative.

Power Supply Terminal Connections (Options /TB, /A2TB, and /REK)

If you specify the terminal block to which the power source is directly connected (option codes: /TB, /A2TB, and /REK), the external wiring to the terminal block is necessary; therefore, drawing out the internal unit requires previous turning off of the power source and disconnection of the wiring from the terminal block.

8.1 External View and Names of Components



Power and Ground Terminal connection
(Connection screw: M4)

Symbol	Description
L	+
N	-
⏚	Ground

Power supply

Figure 8-1 Names of Parts and Power Terminal

8.2 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 vinyle 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 1.25 mm^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.

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General Specifications

Model SIND (Style S) Integrator

YEWSERIES 80

GS 01B04M01-02E

■ 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.

A PC (VJ77) or the JHT200 Handy Terminal is used for setting the Integrator parameters. On the SIND model with display setter (SIND-□04), input indication can be displayed and integrating ratio and low input cut off can be displayed / set on the front panel.*

With the VJ77 Parameter Setting Tool you can do the following:

- *Read/write all parameters at once*
- *Save read parameters to a file*
- *Copy parameters to other devices of the same model and suffix code (only with style code R or S).*

*: The BT200 BRAIN Terminal of YOKOGAWA Electric Corporation can also be connected. The adapter for modular jack (E9786WH) is required for connecting a PC (VJ77) or the JHT200 Handy Terminal to the Integrator.

■ STANDARD SPECIFICATIONS

Input Signals

Input: 1 to 5 V DC
Number of inputs: 1
Input resistance: 1 MΩ

Output signal

Output: Transistor contact or SICD counter drive pulse (24 V DC)
Number of outputs: 2
Load current:
  Transistor contact 30 V DC, 150 mA or less
  SICD counter drive pulse 24 V DC, 150 mA or less
Integration mode: Proportional or square root
Integrating ratio range: 1 to 10000 pph
Pulse ON Time: 30 ms and 60 ms*2
*2: Number of outputs becomes 1 as two outputs are shared.
Low input cutoff:
  In proportional integration mode: Input cutoff level set to 0 to 10% of input signal.
  In square-root integration mode: Input cutoff level set to 0.3 to 10% of input signal.
BRAIN Communication Function:
  Parameters are set and functions specified by a PC (VJ77) or the JHT200 Handy Terminal*.

Indication Setting Function (SIND-□04):
  Digital indicator 5-digit 7-segment LED (1 row)
    Indication range: -19999 to +32000 (decimal point selectable)
  At input value indication LED indicator is out.
LED indicators (PPH, LCT: green)
  At integrating ratio (PPH) indication: Lit
  At low cutoff level indication (LCT): Lit
Setter Setting (→, ↑, SET, △) switches 4
  Setting enable switch 1
  Integrating ratio and low input cutoff can be set.

■ MOUNTING AND APPEARANCE

Mounting: Rack mounting
Wiring
  Signal Wiring: ISO M4 size (4 mm) screws on terminal block
  Power and Ground Wiring
    100 V version: JIS C 8303 two-pin plug with earthing contact
    Cable length: 300 mm
    Power supply terminal type (option code /TB)
    200 V version: CEE 7 VII (CENELEC standard) plug (option code /A2ER)
    Cable length: 300 mm
    Power supply terminal type (option code /A2TB)
External Dimensions (depth behind panel):
  180 (H) x 48 (W) x 300 (D) (mm)
Weight: 1.7 kg (including rack-mounting case)

GS 01B04M01-02E

10th Edition Jan. 2021(YK)

■ STANDARD PERFORMANCE

Accuracy: ±0.5% of span
Maximum Power Consumption

Integrating ratio	Power Supply		
	24 V DC	100 V AC	220 V AC
1000 pph	100 mA	7.3 VA	10.2 VA
10000 pph	190 mA	10.8 VA	13.7 VA

■ POWER SUPPLY AND ISOLATION

Power Supply Rated Voltage:
100 V version:
24-110 VDC ⎓, -10 %, +10 %, 250 mA
100-120 VAC ∼, -10 %, +10 %, 50/60 Hz, 14.0 VA
220 V version:
135-300 VDC ⎓, -10 %, +10 %, 30 mA
200-240 VAC ∼, -10 %, +10 %, 50/60 Hz, 15.0 VA
Power Supply Input Voltage: AC/DC both usage
100 V version: DC drive 20 to 130 V, no polarity
AC drive 80 to 138 V, 47 to 63 Hz
220 V version: DC drive 120 to 340 V, no polarity
AC drive 138 to 264 V, 47 to 63 Hz
Insulation Resistance
Between I/O terminals and Ground: 100 MΩ/500 V DC
Between Power and Ground: 100 MΩ/500 V DC
Dielectric Strength
Between I/O terminals and Ground:
500 V AC for 1 minute
Between Power and Ground:
1000 V AC for 1 minute (100 V version)
1500 V AC for 1 minute (220 V version)

■ NORMAL OPERATING CONDITIONS

Ambient Temperature: 0 to 50°C
Ambient Humidity: 5 to 90%RH (non-condensing)
Operating environment: Area free of hydrogen sulfide gas and other corrosive gases and dust and where the device is not exposed to sea breeze or direct sunlight.
Continuous vibration: (at 5 to 9 Hz) Half amplitude of 1.5 mm or less
(at 9 to 150 Hz) 4.9m/s^2 or less,
1 oct/min for 90 minutes each
in the three axis directions
Impact: 49 m/s^2 or less, 11 ms, 3 axes, 6 directions, 3 times each
Installation altitude: 2,000 m or less above sea level
Warm-up time: 15 minutes or more after the power is turned on

■ TRANSPORT AND STORAGE CONDITIONS

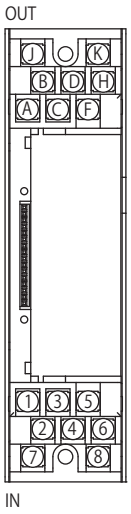
Temperature: -25 to 70°C
Temperature change rate: 20°C per hour or less
Humidity: 5 to 95%RH (no condensation)

■ OPTIONS

/NHR: Without rack case (internal unit only)
/FBP: Power supply fuse bypass
/LOCK: Power supply plug with lock
/WSW: With spring washer
/REK: Mount to same line with EK series rack
/TB: With power supply terminal
/A2TB: 220V version with power supply terminal
/A2ER: 220V version with power supply plug

■ TERMINAL CONNECTIONS

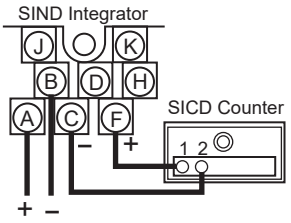
Terminal arrangement



Terminal Designation	Description	
	SICD Counter Drive Pulse	Transistor Contact
A	- SICD drive pulse-1 (*1, 3, 4)	+ Transistor contact-1 (*2, 3, 4)
B		COM
C	- SICD drive pulse-2 (*1, 3, 4)	+ Transistor contact-2 (*2, 3, 4)
D		
F	+	
H		
J		
K		

Do not connect to the output terminal when the terminal is not in use.

[WIRING EXAMPLE]



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

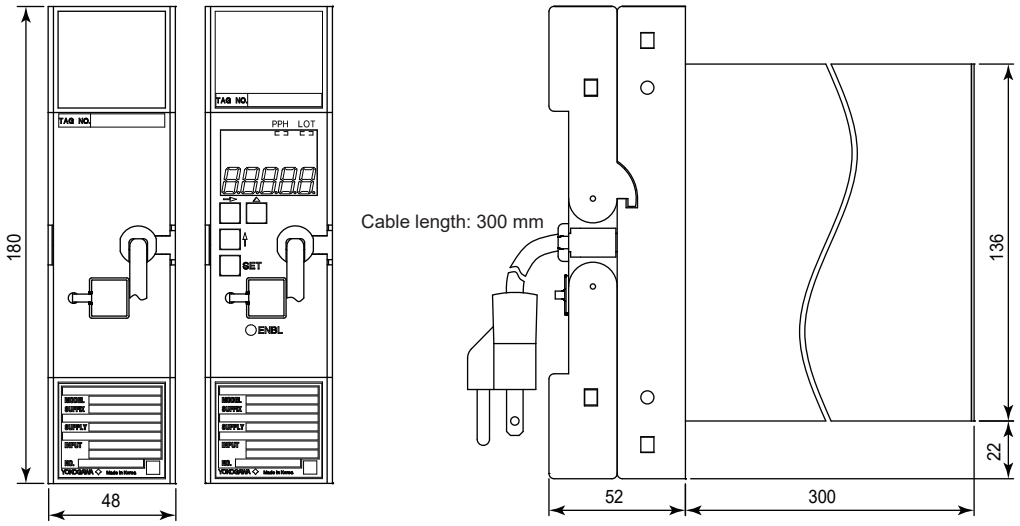
*3: When terminals A and C are shorted, a pulse signal with ON time of 60 ms is generated across between terminals A-C and F, and terminals A-C and B.

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

Terminal Designation	Description
1	+ Input (1 to 5 V DC)
2	-
3	
4	
5	
6	
7	
8	

■ EXTERNAL DIMENSIONS

Power supply plug type



Trigonometry
Unit: mm
General tolerance = ±(value of tolerance class IT18 based on JIS B 0401-2016) / 2

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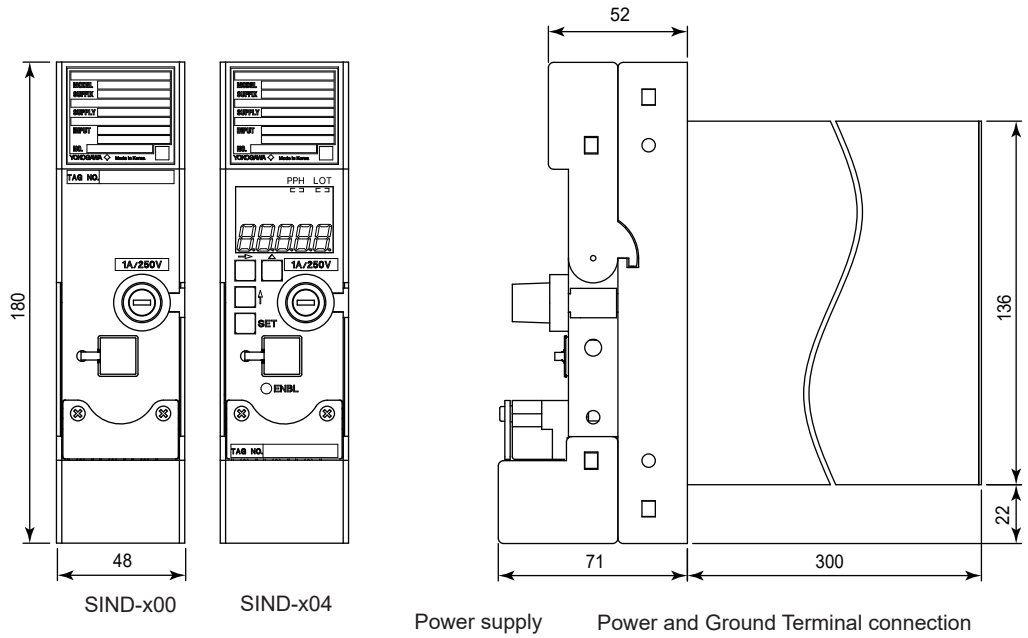
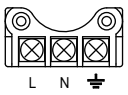
Power supply terminal type(option /TB or /A2TB)



Power supply terminal block



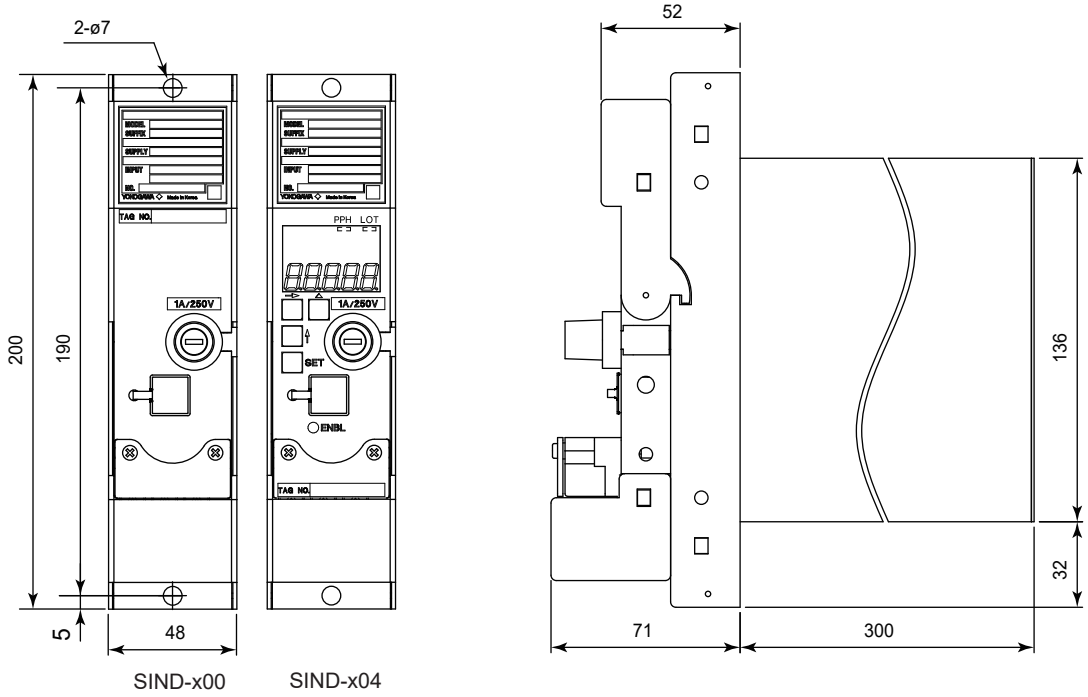
Power and Ground Terminal connection
(Connection screw: M4)

Symbol	Description
L	+
N	- > Power supply
⏚	Ground

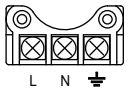
Trigonometry
Unit: mm
General tolerance = ±(value of tolerance class IT18 based on JIS B 0401-2016) / 2

F03.ai

Power supply terminal type(option /REK)



Power supply terminal block



Power and Ground Terminal connection (Connection screw: M4)

Symbol	Description
L	+
N	-
⏚	Power supply
	Ground

Trigonometry
Unit: mm
General tolerance = ±(value of tolerance class IT18 based on JIS B 0401-2016) / 2

F04.ai

■ MODEL & SUFFIX CODES

Model	Suffix Codes	Option Codes	Descriptions
SIND			Integrator
Output	-1 -2		Proportional output Square-root output (*1)
Indication setter	00 04		Not provided Provided
Style Code	*S		Style S
Option Codes (*2) (*3)		/NHR /FBP /LOCK /WSW /REK /TB /A2TB /A2ER	Without rack case Power supply fuse bypass Power supply plug with lock With spring washer Mount to same line with EK series rack With power supply terminal 220V version with power supply terminal 220V version with power supply plug

*1: When square-root output is specified, SIND is shipped as a square-root integrating mode. This mode is changeable to proportional output type by a PC (VJ77) or the JHT200 Handy Terminal.
*2: /LOCK, /REK, /TB, /A2TB, and /A2ER cannot be specified together.
*3:/FBP, /A2TB, and /A2ER cannot be specified together.

■ ACCESSORIES

Integrating ratio label: 1 sheet

■ ORDERING INSTRUCTIONS

1. Model and suffix codes and option codes, if necessary

Revision Information

- Title : Model SIND (Style S) Integrator
- Manual No. : IM 01B04M01-02E

Jul. 2002/7th
Renewal

Mar. 2003/8th
Correct

May 2004/9th
Change of the company name.

Oct. 2019/10th
Change of the style number.

Jan. 2021/11th
VJ77 parameter setting tool (R3.01 or later) support

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