

**Model SDBS (Style S)  
Distributor**

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# Introduction

This manual describes the functions and operations of the SDBS Distributor.

## • 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 SDBS Distributor. Read them as necessary.

Manual Title	Manual No.	Description
Rack-Mounted Instruments	IM 1B4F2-01E	Describes mounting and wiring for the YS80 rack-mounted instruments.
YEW SERIES 80 Installation Manual	TI 1B4A9-01E	Describes the installation conditions of YS80 instruments.

# 1.1 Inspection

The SDBS distributor 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.

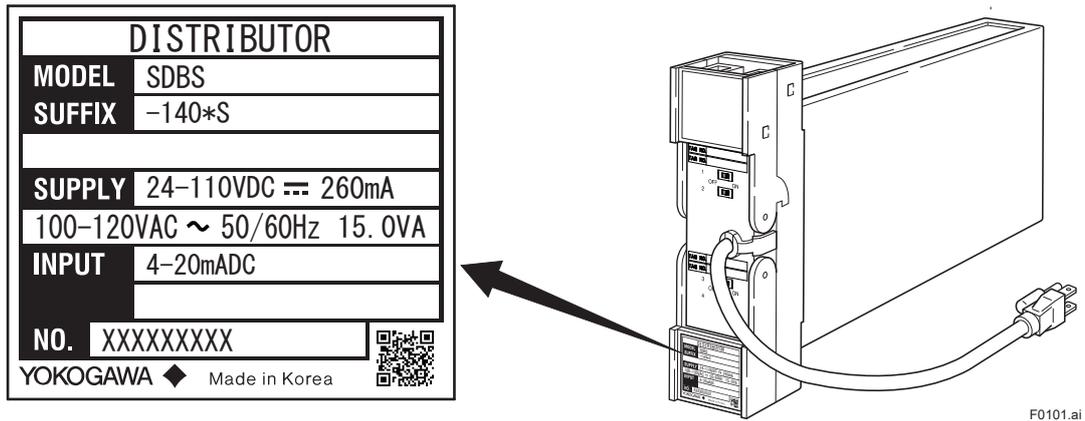


Figure 1-1 Name plate for Thermocouple Input (Description example)

## 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.

- SDBS Distributor ..... 1
- Precautions on the Use of the YS80 Series ..... 1

## Downloadable Electronic Manuals

You can download the latest manuals from the following website:

<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	
 <b>WARNING</b>	Indicates that operating the hardware or software in a particular manner may damage it or result in a system failure.
 <b>CAUTION</b>	Draws attention to information that is essential for understanding the operation and/or features of the product.
<i>Note</i>	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.
- 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 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.

# General

SDBS distributor is both designed to supply operating power to two-wire type transmitters and convert 4 to 20 mA DC current signal from these transmitters into output signals. SDBS distributor is designed for four inputs and is available in a loop isolation type. SDBS distributor have built-in current limiters allowing normal operation even when a short-circuit occurs on the transmitter side.

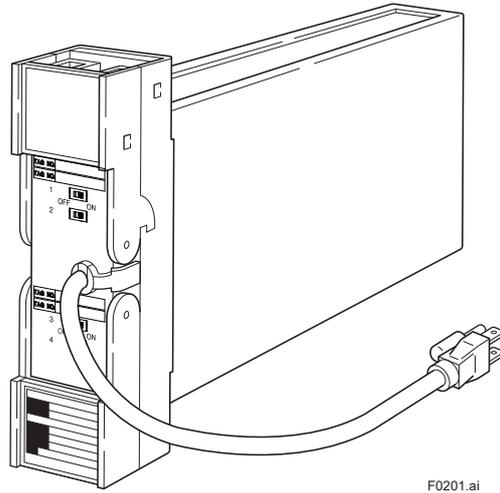


Figure 2-1 External View

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## **2.1 Standard Specifications**

Please see the General Specifications (GS 01B04T02-02E) at the end of this manual.

## 2.2 Model and Suffix Codes

Model	Suffix Codes	Option Codes	Description
SDBS			Distributor
Isolation, Inputs	-14		Loop isolation, four inputs
Suffix Codes	0		Always 0
Style Code	*S		Style S
Option Codes <sup>(*)</sup> <sup>(2)</sup>		/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: /LOCK, /REK, /TB, /A2TB, and /A2ER cannot be specified together.

\*2: /FBP, /A2TB, and /A2ER cannot be specified together.

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# Installation

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

## 3.1 External Wiring

- To prepare cables for connection to each terminal, install crimp-on solderless lugs for 4 mm screw on the end of each cable.
- Draw the internal unit out from the rack case.
- Connect the cables to the correct terminals by referring to Table 3-1.
- Replace the internal unit into the rack case after completing the wiring.
- Always replace the terminal cover after completing the wiring.



**The terminal cover cannot be replaced if the internal unit is not installed in the rack case. The terminal cover should be securely replaced because it has the function of locking the internal unit.**

Terminal arrangement



Figure 3-1 Terminal Layout

Table 3-1 Terminal Connections

Terminal Designation	Description
A	+ > Output 1 (Transmitter 1)
B	- > Output 1 (Transmitter 1)
C	+ > Output 3 (Transmitter 3)
D	- > Output 3 (Transmitter 3)
F	+ > Output 2 (Transmitter 2)
H	- > Output 2 (Transmitter 2)
J	+ > Output 4 (Transmitter 4)
K	- > Output 4 (Transmitter 4)

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

Terminal Designation	Description
1	+ > Transmitter 1 (Input 1)
2	- > Transmitter 1 (Input 1)
3	+ > Transmitter 3 (Input 3)
4	- > Transmitter 3 (Input 3)
5	+ > Transmitter 2 (Input 2)
6	- > Transmitter 2 (Input 2)
7	+ > Transmitter 4 (Input 4)
8	- > Transmitter 4 (Input 4)

### Applicable Cables

#### (1) Signal circuit wiring

- Cross-sectional area of the cable conductor: 0.5 to 0.75 mm<sup>2</sup>
- Examples of applicable cables: Signal core PVC insulated flexible cable (VSF) stranded wires (JIS C 3306); 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<sup>2</sup>
- Examples of applicable cables: 600 V PVC insulated cable (1 V) stranded wires (JIS C 3307); PVC insulated cable for electrical apparatus (KIV) stranded wires (JIS C 3316)

# Principle of Operation

The SDBS supplies power to a two-wire type transmitter through the current limiter CL and converts a 4 to 20 mA output current signal from the transmitter into a 1 to 5 V DC signal. CL prevents excessive current if a short-circuit occurs in the field wiring. Each of the four isolated loop distributor circuits in SDBS is provided with an ON/OFF switch for the transmitter.

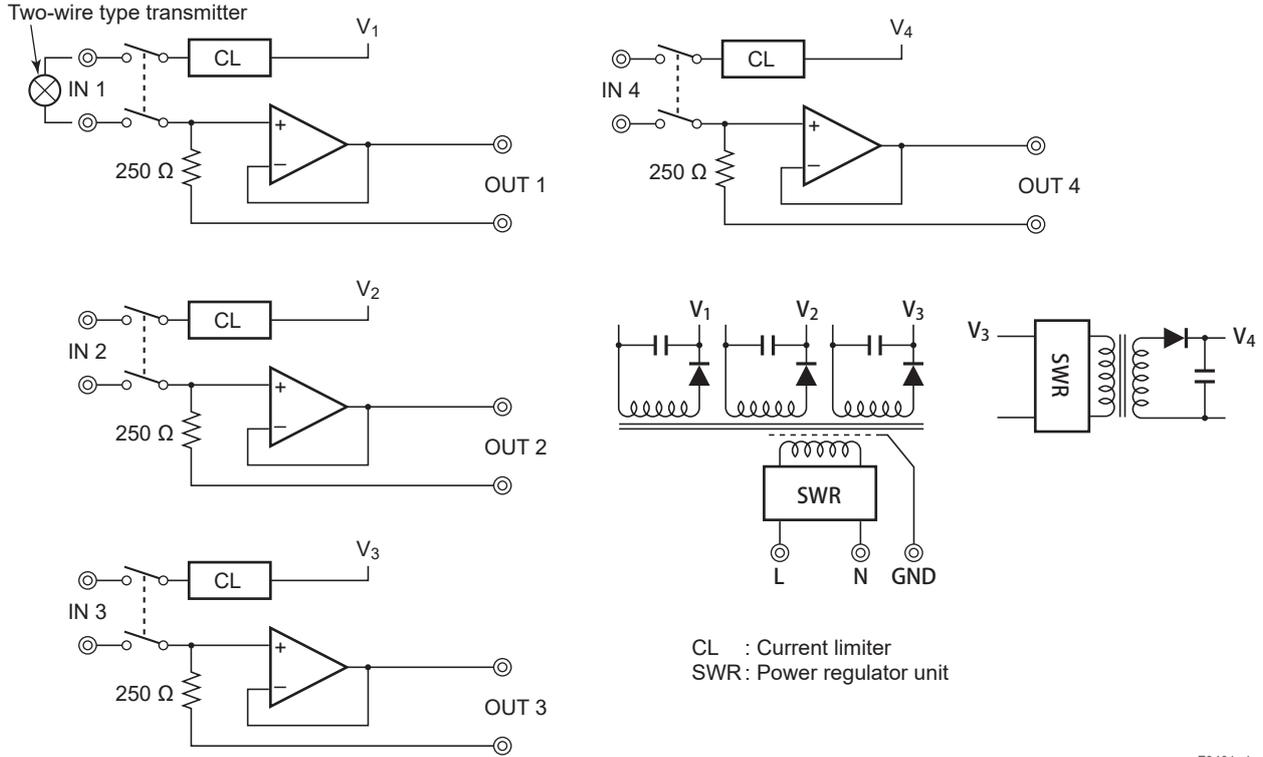


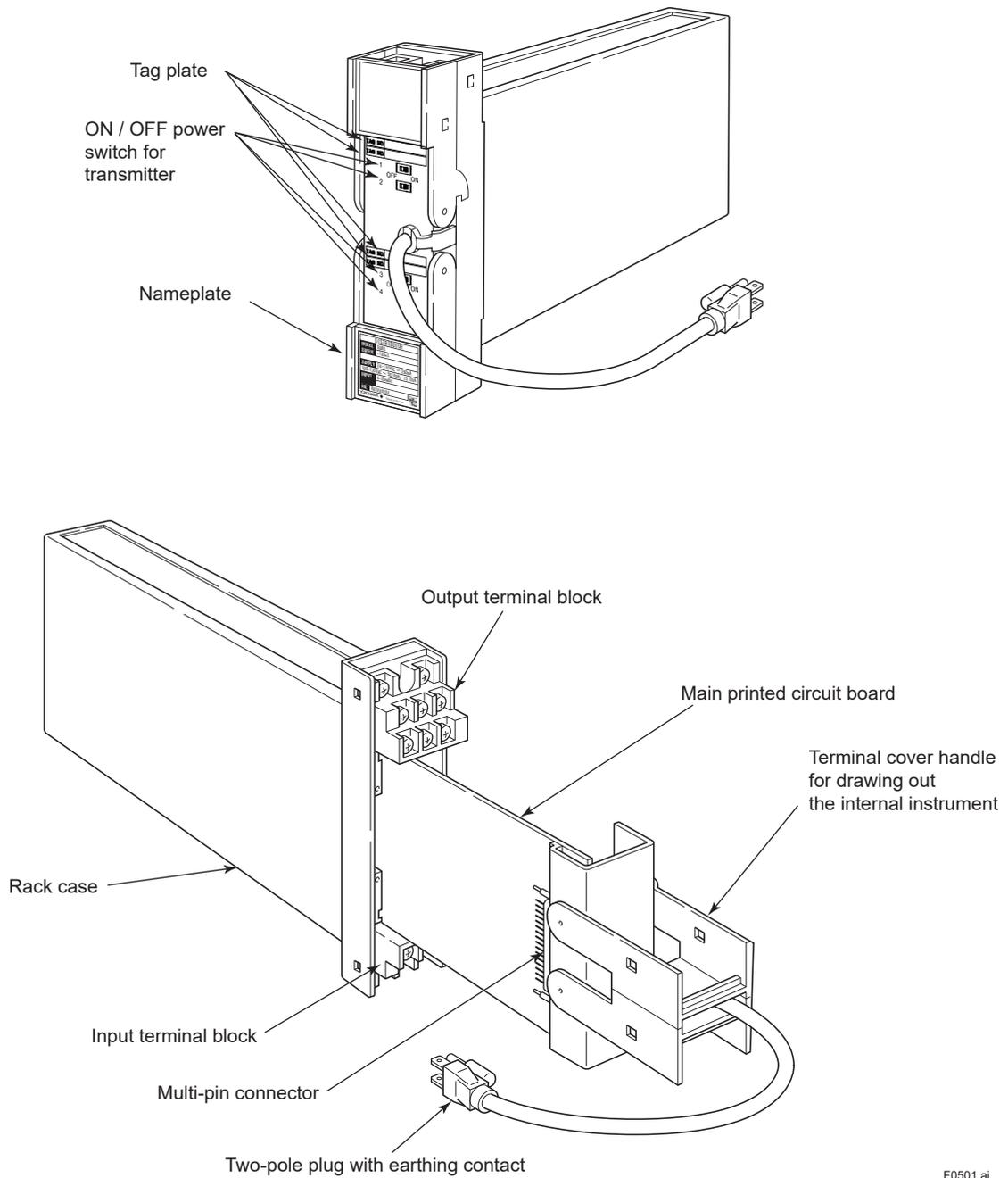
Figure 4-1. Functional Block Diagram

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# Operation

Once the installation and wiring are completed, this distributor can be placed in operation by simply turning on the power switch. This distributor does not require any adjustments, but the inspection and checks described in Section 5-2 should be made before the unit is placed in operation.

## 5.1 Names of Components



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Figure 5-1. Names of Various Components

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## 5.2 Pre-operational Checks

Inspect and check the following points before entering the unit into normal operation.

- (1) Draw the internal unit out from the rack case and insure that the specified fuse is installed in the fuse holder at the back of the internal unit.
- (2) Before sliding the internal unit back into the rack case, check that the rack case connector is securely connected to the internal unit.
- (3) Check that the wires are securely connected to the correct terminals on the terminal block.
- (4) Check that the power plug is securely connected in a power outlet with a grounding contact.
- (5) For SDBS, set the switch at the front of the distributor to the ON position. If any distributor circuit is not used, set the corresponding switch to the OFF position. To turn switches ON or OFF, use an appropriate tool. Take care not to damage the switch.

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# Maintenance

This chapter deals with simple maintenance procedures and parts replacements.

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## 6.1 Test Equipment

For efficient maintenance of this distributor, the user is advised to have the following test equipment manufactured by YOKOGAWA or its equivalents before the need for maintenance arises.

- Voltage/current standard, Yokogawa GS200 or the equivalent ..... 1 set
- Digital voltmeter, Yokogawa DM7560 or the equivalent ..... 1 set

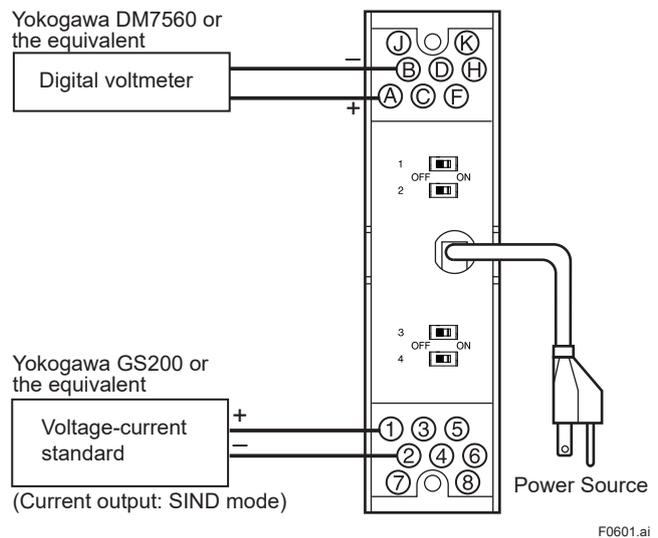
## 6.2 Calibration

- Connect the instruments as illustrated in Figure 6-1 and turn on the power switch. Allow the instruments to warm up for about 5 minutes.
- Apply inputs corresponding to 0, 25, 50, 75 and 100% of the input range and confirm that the input/output relationships shown in Table 6-1 are satisfied by reading the output at each of these points with a digital voltmeter. In the case of 4 to 20 mA DC output test, put a parallel resistance ( $250 \Omega \pm 0.05\%$ ) into terminal C-D and read in voltage number.
- Since the SDBS distributor has four built-in distributor circuits, calibrate each of these circuits by using the procedure described in (b) above.

**Table 6-1. Input/Output Characteristics**

%	Input	Output
0	4 mA	$1 \pm 0.008$ V
25	8 mA	$2 \pm 0.008$ V
50	12 mA	$3 \pm 0.008$ V
75	16 mA	$4 \pm 0.008$ V
100	20 mA	$5 \pm 0.008$ V

Circuit Number	Standard Connector Hi – Lo	Voltmeter Terminal + –
1	1 – 2	A – B
2	5 – 6	F – H
3	3 – 4	C – D
4	7 – 8	J – K



**Figure 6-1. Calibration**

## 6.3 List of Replaceable 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	L3510YB: Standard L3510YG: Option codes /TB, /FBP, or /REK L3510YU: Option code /A2TB L3510YS: 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.

# Troubleshooting

If any fault occurs in the instrument, note the symptoms. To find the fault, first wire the instruments according to Figure 6-1, apply an input signal, and check the details of the error. If the fault is difficult to find, contact your nearest Yokogawa sales staff.

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## 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

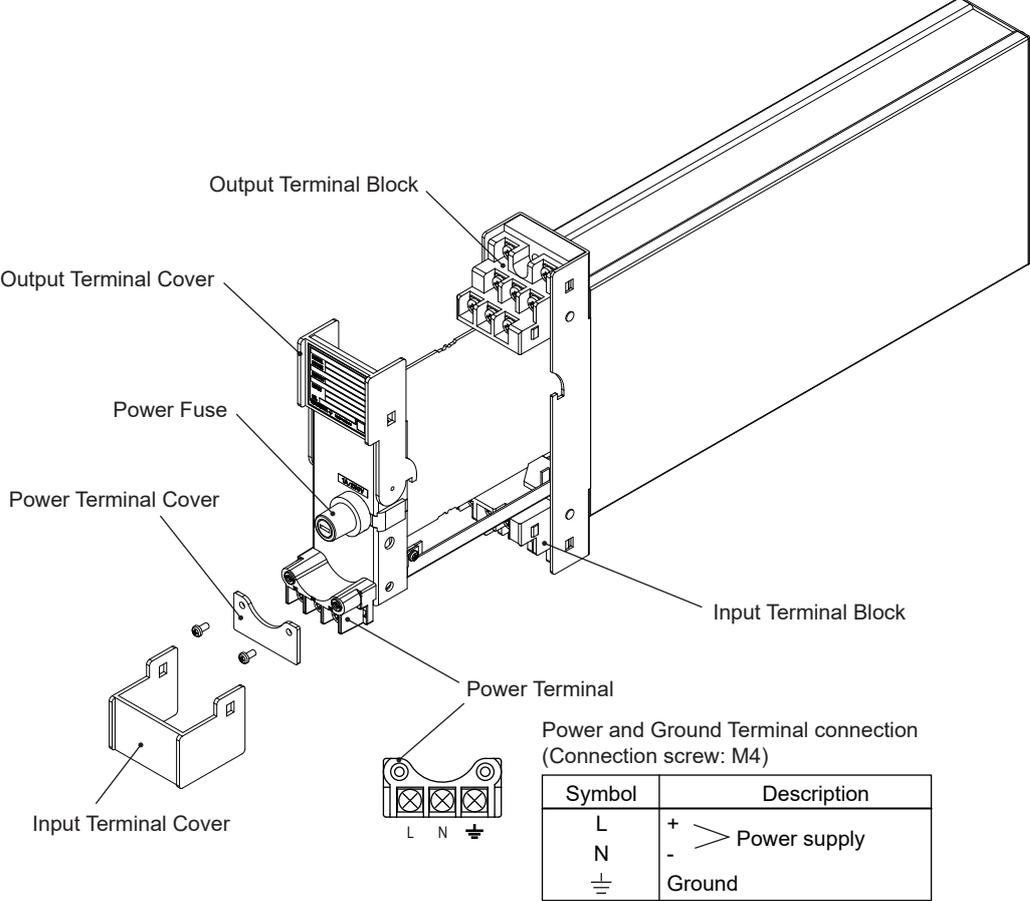


Figure 8-1 External View and Names of Components

## 8.2 Power Supply and Ground Wiring

- (1) All cable ends must be furnished with crimp-on type solderless lugs (for 4 mm screw).
- (2) Examples of applicable cables:
  - Cross-sectional area of the cable conductor: 2.0 mm<sup>2</sup>. \*
  - Applicable cable: 600 V vinyl insulated cable (IV) stranded wires, conforming to JIS C3307.
    - Vinyle sheathed 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<sup>2</sup>.
- (3) Wirings to power supply and ground terminals should be made after completion of signal terminal wirings. (To facilitate connecting input signal, 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 SDBS (Style S)  
Distributor

YEW SERIES 80

GS 01B04T02-02E

## ■ GENERAL

The Model SDBS Distributor supplies power to a two-wire transmitter and converts the 4 to 20 mA DC transmitter signal current to two 1 to 5 V DC output signals.

Isolation between input/output and distributor power supply is provided.

Current limiting (to protect against transmitter wiring short circuits) is also provided.

## ■ STANDARD SPECIFICATIONS

### Input Signals

Input: Used with 24 V DC, 4 to 20 mA, 2-wire transmitters (four points)

Leadwire Resistance (between transmitter and distributor):

$$\text{Maximum}(\Omega) = \frac{(20 - E_T) * V_B}{0.02 \text{ A}}$$

Note\*: Distributer minimum(no-load) output voltage – Maximum no-load voltage drop.

$E_T$ : Transmitter maximum on-load voltage drop

### Output Signals

Output: 1 to 5V DC (one output per input)  
Load Resistance: At least 2k  $\Omega$

### Isolation

Loop Isolation Type: Input signal is not isolated from output signal. Input signal and output signal are isolated from distributor power source - i.e. inter-loop isolation.

## ■ MOUNTING AND APPEARANCE

Mounting: Rack mounting.

### Wiring

Signal Wiring: ISO M4 size (4mm) screws on terminal block.

### Power and Ground Wiring

100 V version: JIS C 8303 two-pin plug with earthing contact (IEC A5-15, UL458)  
Cable length: 300 mm  
Power supply terminal type (option code /TB)

220 V version: CEE 7 VII (CENELEC standard) plug (option code /A2ER). Cable length: 300 mm  
Power supply terminal type (option code /A2TB)

External Dimensions: 180 (H)× 48 (W)× 300 (D)  
Depth behind panel (mm)

Weight: 1.7 kg (including rack-mounting case)



## ■ STANDARD PERFORMANCE

Accuracy:  $\pm 0.2$  % of span

Transmitter Supply Voltage(from distributor):

25.0 V DC to 25.5 V DC (provided with a current limiter to keep the current between 25 and 35 mA).

Maximum Power Consumption:

210 mA with 24 V DC supply,  
11.6 VA with 100 V AC supply,  
14.6 VA with 220 V AC supply.

## ■ POWER SUPPLY AND ISOLATION

Power Supply Rated Voltage:

100 V version:

24-110 VDC  $\Rightarrow$  , -10 % , +10 % , 260 mA

100-120 VAC  $\sim$  , -10 % , +10 % , 50/60 Hz , 15.0 VA

220 V version:

135-300 VDC  $\Rightarrow$  , -10 % , +10 % , 40 mA

200-240 VAC  $\sim$  , -10 % , +10 % , 50/60 Hz , 16.0 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 M $\Omega$ / 500 V DC

Between Power and Ground:

100 M $\Omega$ /500 V DC

Between Loops: 100 M $\Omega$ /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)

Between Loops: 500 V AC for 1 minute

## ■ NORMAL OPERATING CONDITIONS

Ambient Temperature: 0 to 50 °C

Ambient Humidity: 5 to 90 % relative humidity  
(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<sup>2</sup> or less,  
1 oct/min for 90 minutes each  
in the three axis directions

Impact: 49 m/s<sup>2</sup> 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

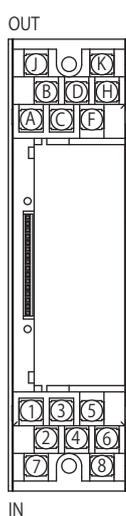
/TB: With power supply terminal

/A2TB: 220V version with power supply terminal

/A2ER: 220V version with power supply plug

## ■ TERMINAL CONNECTIONS

Terminal arrangement



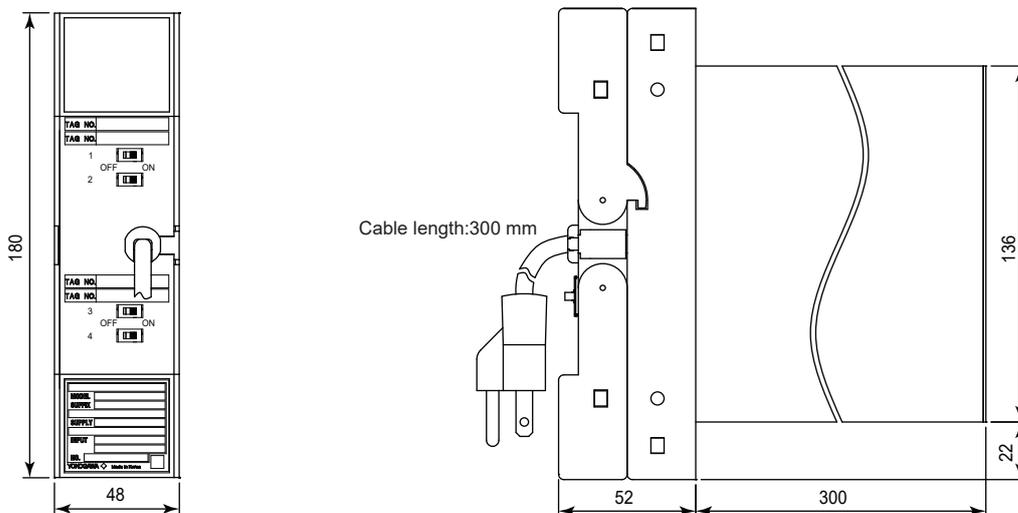
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K	- > Output 4 (Transmitter 4)

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

Terminal Designation	Description
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3	+ > Transmitter 3 (Input 3)
4	- > Transmitter 3 (Input 3)
5	+ > Transmitter 2 (Input 2)
6	- > Transmitter 2 (Input 2)
7	+ > Transmitter 4 (Input 4)
8	- > Transmitter 4 (Input 4)

## EXTERNAL DIMENSIONS

### Power supply plug type



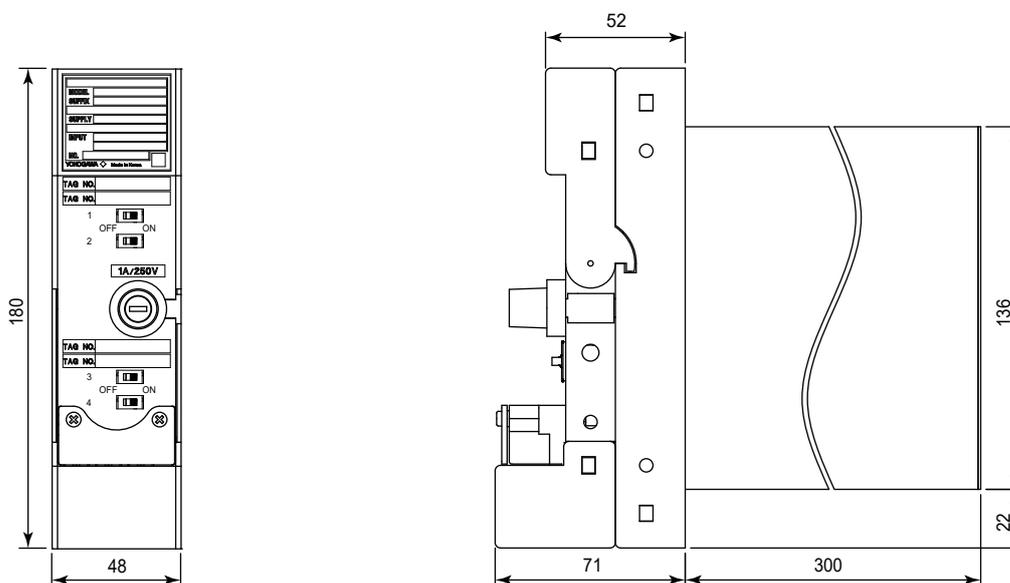
Trigonometry

Unit: mm

General tolerance =  $\pm$ (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	+ > Power supply
N	- > Power supply
⏚	Ground

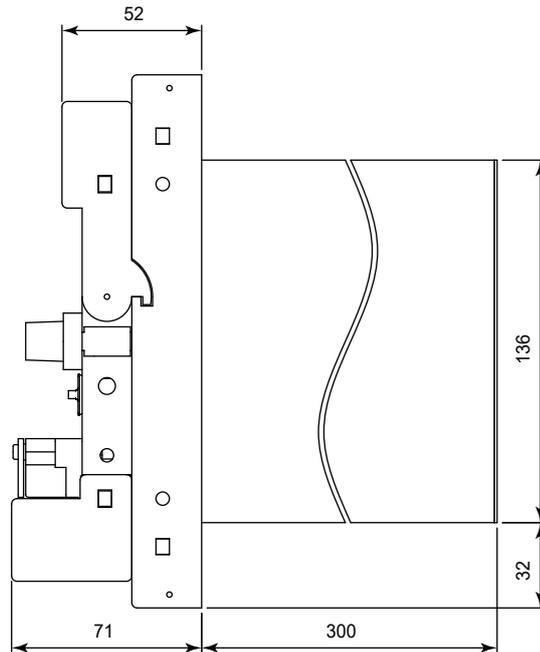
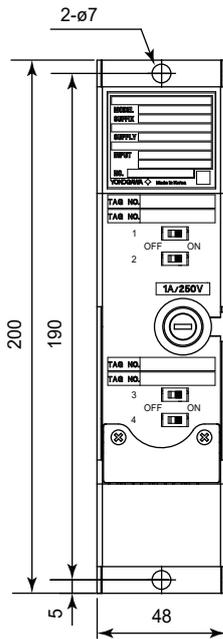
Trigonometry

Unit: mm

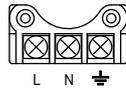
General tolerance =  $\pm$ (value of tolerance class IT18 based on JIS B 0401-2016) / 2

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Power supply terminal type(option /REK)



Power supply terminal block



Power and Ground Terminal connection (Connection screw: M4)

Symbol	Description
L	+ > Power supply
N	- > Power supply
⚡	Ground

Trigonometry  
Unit: mm

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

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## ■ MODEL AND SUFFIX CODES

Model	Suffix Codes	Option Codes	Descriptions
SDBS			Distributor (4 inputs)
Isolation, Input	-14		Loop isolation, 4 inputs
Suffix Codes	0		Always 0
Style Code	*S		Style S
Option Codes <sup>(*)</sup> <sup>(2)</sup>		/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: /LOCK, /REK, /TB, /A2TB, and /A2ER cannot be specified together.

\*2: /FBP, /A2TB, and /A2ER cannot be specified together.

## ■ ORDERING INSTRUCTIONS

Specify the following when ordering:

Model and suffix codes and option codes, if necessary.

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# Revision Information

- Title : Model SDBS (Style S) Distributor
- Manual No. : IM 01B04T02-02E

## **12th Edition/July 2002**

Renewal

## **13th Edition/May 2004**

Change of the company name.

## **14th Edition/Oct. 2019**

Change of the style number.

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