User's
Manual

YEWSERIES 80

Model STED (Style R) mV,Temperature and Potentiometer /Voltage Converters

IM 01B04J01-02E

YOKOGAWA
Yokogawa Electric Corporation

IM 01B04J01-02E
9th Edition

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Model STED (Style R)
mV,Temperature and Potentiometer/Voltage Converters

IM 01B04J01-02E 9th Edition

CONTENTS

1. INTRODUCTION

This manual describes the functions and operations of the STED mV,Temperature, and Potentiometer/Voltage Converters.

■ 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 STED mV,Temperature, and Potentiometer/ Voltage Converters. Read them as necessary. The codes enclosed in parentheses are the document numbers.

- Rack-Mounted Instruments (IM 1B4F2-01E)
  Describes mounting and wiring for the 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 STED converter 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.

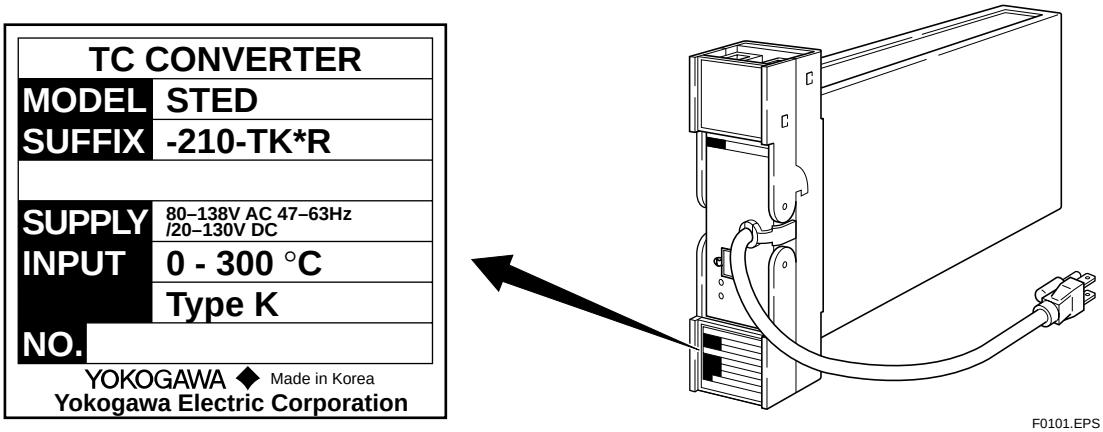

Figure 1-1 Name plate for Thermocouple Input

■ 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.

- STED mV, Temperature, and Potentiometer/Voltage Converters..... 1
- Fuse (Parts No. : S9510VK)..... 1
- Instruction 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 describe 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 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

- 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 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.

- 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.

2. GENERAL

The STED mV,Temperature and Potentiometer/Voltage Converters are used to convert mV DC, thermocouple, RTD (resistance temperature detector) or potentiometer input signals to isolated two 1 to 5 V DC signals and 4 to 20 mA DC signal.
Both thermocouple input type STED-210 and RTD input type STED-310 have built-in input linearizers as standard equipment.
Also, an upscale or downscale burnout function is provided in all types as a standard specification.

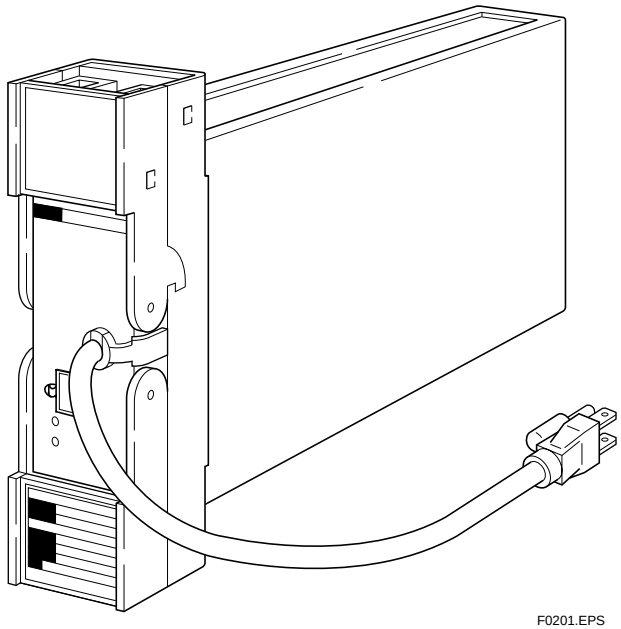

Figure 2-1 External View

2.1 Standard Specifications

Item	Description
Type of Input Signal and Standard	(1) mV DC input (For STED-1 and -7) mV DC (2) Thermocouple input (For STED-2 and -7) Type K, T, J, E, B, R, S, and N, W3, W5 (for STED-7 only) Standards: JIS, IEC, ANSI, BS, and ASTM E988 (3) RTD input (For STED-3 and -7) 3-wire system, JPt100 (JIS '89), Pt100 (JIS '89, JIS '95, DIN) Rated current: 0.5 mA DC (4) DC potentiometer input (For STED-4) 3-wire system, Rated voltage: Up to 0.5 V DC
Input Resistance	1M Ω (power on), 4k Ω (power off) (for mV DC input and thermocouple input)
Input External Resistance Input Lead Wire Resistance for Resistance Input	(1) mV DC and thermocouple input: Up to 500 Ω (2) RTD input: No greater than input span (°C) x 0.4 Ω or 10 Ω per wire, whichever is smaller (Each lead wire resistance should be equal.) (3) DC potentiometer input: Maximum 10 Ω per wire (Each lead wire resistance should be equal.)
Input Overload	Up to ±4 V DC (for mV DC input and thermocouple input)
Output Signal and Number of Output	• 1 to 5 V DC, Load resistance: At least 2k Ω, Number of output: 2 • 4 to 20 mA DC, Load resistance: Up to 750 Ω, Number of output: 1
Accuracy	(1) ± 0.5 % of span (However, for thermocouple input type, the reference junction temperature compensation accuracy is not included.) (2) Thermocouple reference junction temperature compensation accuracy • For temperatures at least 0 °C: Up to ± 0.5 % (except for types R and S - their accuracy is ± 1°C) • For temperatures less than 0 °C: Multiply accuracy for temperatures up to 0 °C by K, where $K = \frac{\text{(Thermocouple output change/°C near 0 °C)}}{\text{(Thermocouple output change/°C at measurement temperaure)}}$
Burnout Time	Less than 60 seconds
Power Supply	AC or DC (No change to instrument) 100 V version DC: 20 to130 V(polarity reversible) AC: 80 to138 V, 47 to 63 Hz 220 V version DC: 120 to 340 V(polarity reversible) AC: 138 to 264 V, 47 to 63 Hz
Power Consumption	DC: 24 V DC, 110 mA AC: 100 V AC, 7.7 VA 220 V AC, 10.5 VA
Ambient Temperature	0 to 50°C
Ambient Humidity	5 to 90% R.H. (non-condensing)
Mounting	Indoor, rack mounting
Weight	1.7 kg

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2.2 Model and Suffix Codes

Model	Suffix Codes	Description
STED	----------	mV•Temperature•Potentiometer /Voltage Converters
Input signal	-1----------	mV DC input
	-2----------	Thermocouple input
	-3----------	RTD input
	-4----------	Potentiometer input
	-7----------	Universal input
Number of inputs	1----------	One input
	0----------	Always 0
Suffix Codes	-MV---------	mV DC input
	-TK---------	Type K(IEC 584-1-1995)
"-MV" for STED-110	-TT---------	Type T(IEC 584-1-1995)
"-TK" to "-TS" for	-TJ---------	Type J(IEC 584-1-1995)
STED-210	-TE---------	Type E(IEC 584-1-1995)
"-PA" and "-PD" for	-TB---------	Type B(IEC 584-1-1995)
STED-310	-TR---------	Type R(IEC 584-1-1995)
"-RS" for STED-410	-TS---------	Type S(IEC 584-1-1995)
"-UN" for STED-710	-PA---------	JPt100(JIS '89)
	-PD---------	Pt100(ITS-90, IPTS-68)
	-RS---------	Potentiometer
	-UN---------	Universal
Style Code	*R------	Style R
Option	/A2ER	220 V power supply
	/NHR	Without case
	/TB	Power supply terminal
	/FBP	Power supply fuse bypass
	/WSW	With spring washers
	/LOCK	With special lock

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2.3 Accessories

Fuse 1A: 1

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) To prepare cables for connection to each terminal, install crimp-on solderless lugs for 4 mm screw on the end of each cable.

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

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

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

(e) The reference junction block (RJC) for STED-2 or STED-7 type should be securely installed to the screw on terminal 6.

(f) Always replace the terminal cover after completing the wiring.

NOTE

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.

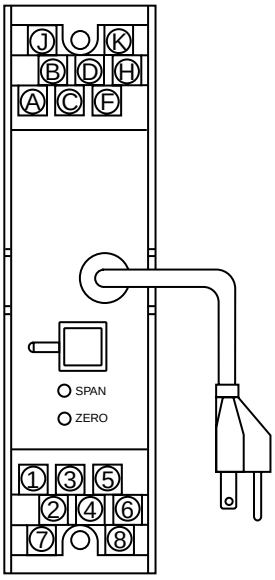

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Figure 3-1 Terminal Layout

Table 3-1 Terminal Connections

Terminal Designation	Description		
Model	STED-1 and STED-2	STED-3	STED-4
1	+ mV DC input or thermo-couple input	A	0%
2	–	B	
3			
4			
5			
6	(Reference junction block installation terminal)		
7		B RTD input	100% Potentiometer input
8			

When using STED-7 type, the input is selected from mV DC, thermocouple or RTD.

Terminal Designation	Description
A	+
B	– Output 1 (1 to 5 V DC)
C	+
D	– Output 3 (4 to 20 mA DC)
F	+
H	– Output 2 (1 to 5 V DC)
J	
K	

When not using outputs 1 to 3, the terminals remain opened.

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3.2 Applicable Cables

(1) Signal circuit wiring

- Cross-sectional area of the cable conductor: 0.5 to 0.75 mm^2
- Examples of applicable cables: Signal core PVC insulated flexible cable (VSF) stranded wires (JIS C 3306); heat-resistant vinyl-insulated cable (UL style 1007)
- Solderless lugs: All cable ends must be furnished with crimp-on solderless lugs for 4 mm screw.

(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 (1 V) stranded wires (JIS C 3307); PVC insulated cable for electrical apparatus (KIV) stranded wires (JIS C 3316)
- Solderless lugs: All cable ends must be furnished with crimp-on solderless lugs for 4 mm screw. The cable used should fulfill the amperage requirement of each instrument, and should also be small in voltage drop.

4. PRINCIPLES OF OPERATION

4.1 mV DC Input Type (STED-1 and STED-7 Types)

The mV DC input signals are converted into digital data in A/D conversion circuit. The digital data has signal processing (range conversion) in micro-processor to be Pulse Width Modulation (PWM). The Pulse Width Modulation (PWM) is converted into 1 to 5 V DC or 4 to 20 mA DC signals in output circuit after passing through optical insulation circuit.

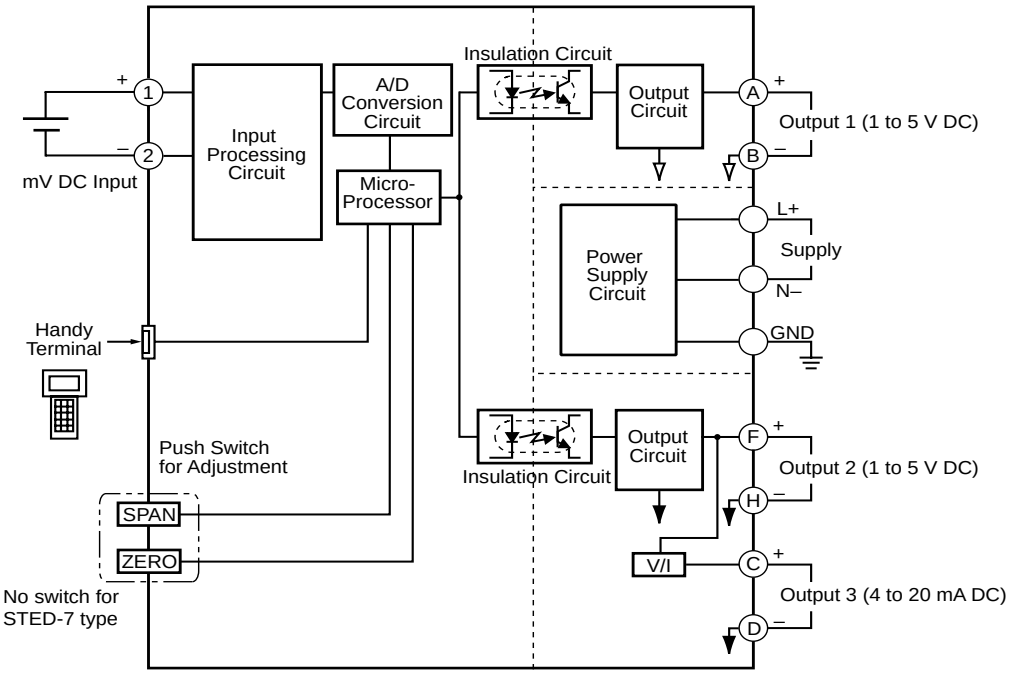

Figure 4-1 Functional Block Diagram for mV Input Type

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4.2 Thermocouple Input Type (STED-2 and STED-7 Types)

The Thermocouple input signals are converted into digital data in A/D conversion circuit. The digital data has signal processing (linearizing computation, RJC computation, and range conversion) in micro-processor to be Pulse Width Modulation (PWM). The Pulse Width Modulation (PWM) is converted into 1 to 5 V DC or 4 to 20 mA DC signals in output circuit after passing through optical insulation circuit.

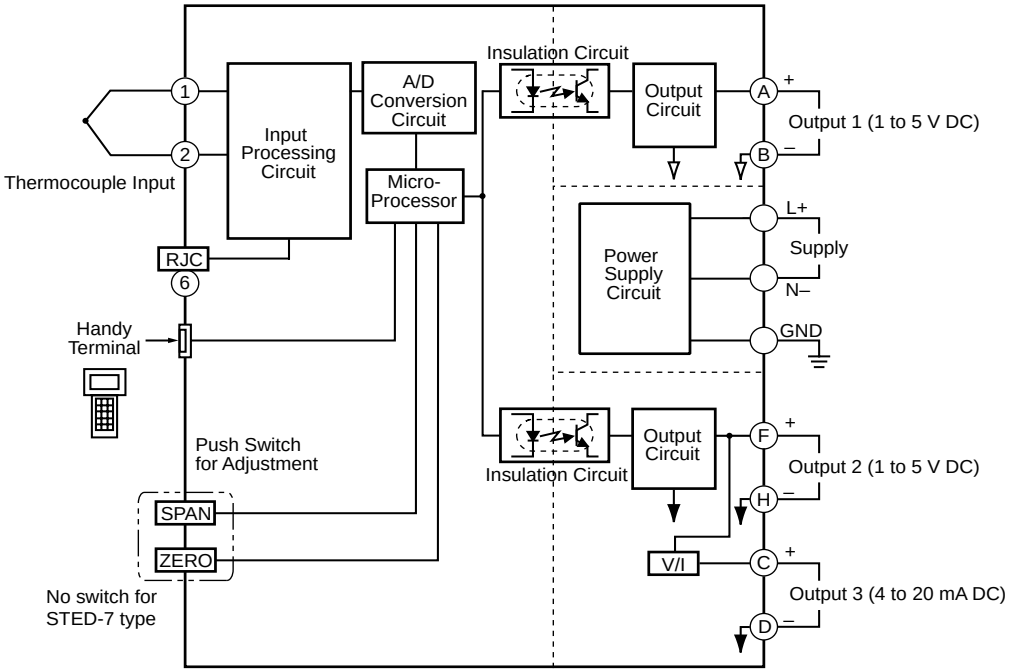

Figure 4-2 Functional Block Diagram for Thermocouple Input Type

4.3 RTD Input Type (STED-3 and STED-7 Types)

The RTD input signals are converted into digital data in A/D conversion circuit. The digital data has signal processing (linearizing computation and range conversion) in micro-processor to be Pulse Width Modulation (PWM). The Pulse Width Modulation (PWM) is converted into 1 to 5 V DC or 4 to 20 mA DC signals in output circuit after passing through optical insulation circuit.

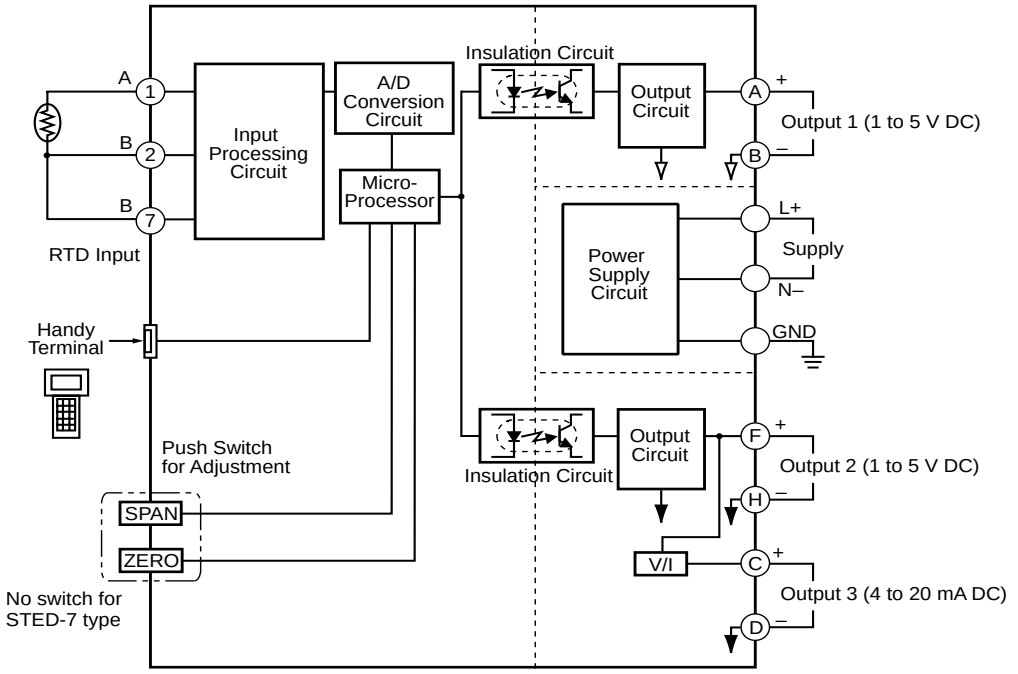

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Figure 4-3 Functional Block Diagram for RTD Input Type

4.4 Potentiometer Input Type (STED-4 Type)

The Potentiometer input signals are converted into digital data in A/D conversion circuit. The digital data has signal processing (linearizing computation and range conversion) in micro-processor to be Pulse Width Modulation (PWM). The Pulse Width Modulation (PWM) is converted into 1 to 5 V DC or 4 to 20 mA DC signals in output circuit after passing through optical insulation circuit.

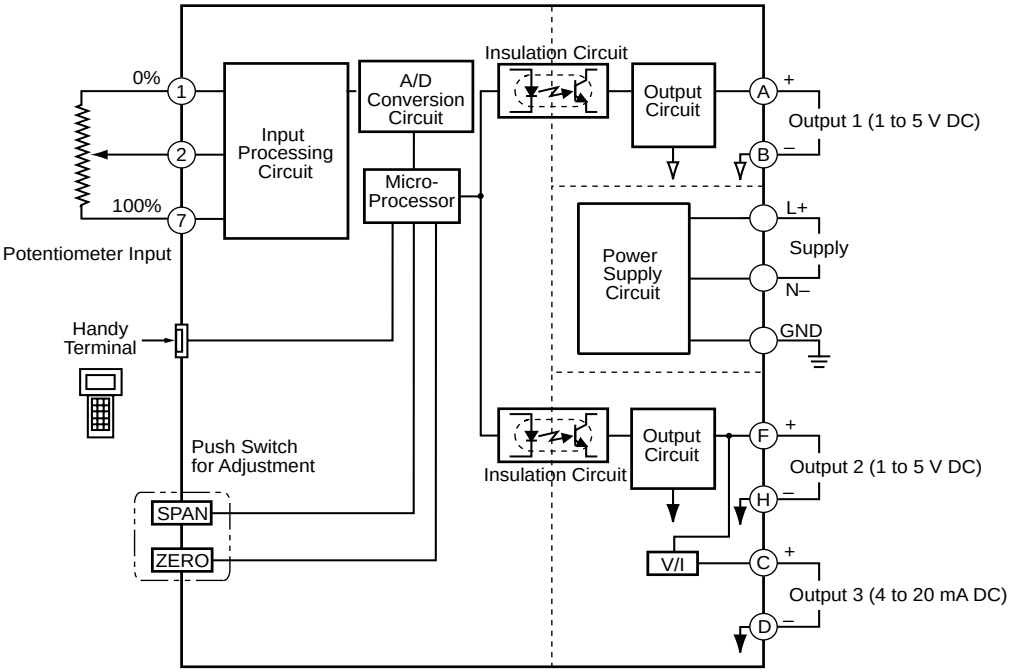

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Figure 4-4 Functional Block Diagram for Potentiometer Input Type

5. SETTING

The STED converters are made ready for operation by simply turning on the power once the installation and wiring are completed. The instrument does not require parameter settings and the like if there is no change in the specifications at order.

5.1 Names of Components

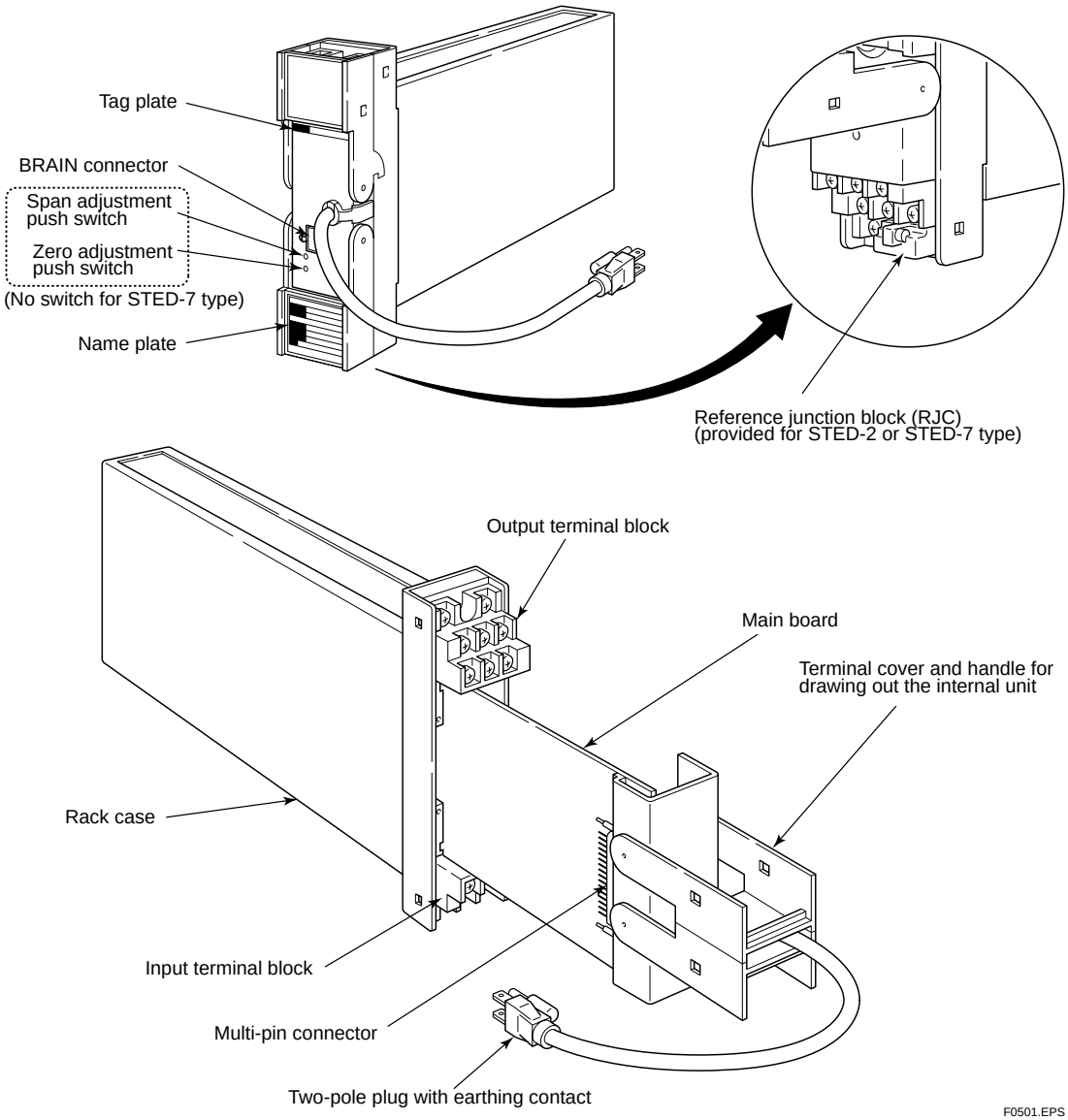

Figure 5-1 Names of Components

5.2 Setting Jumper

This instrument has the following setting jumpers:

- Reference junction compensation(JP1): ON/OFF (only for STED-2 type)
- Parameter Write Protect (JP2): ON/OFF
- Burnout (JP3, JP4): UP/DOWN/OFF (except for STED-7 type)

5.2.1 Check of Setting Jumper

NOTE

For STED-2 and STED-7 types, first remove the reference junction block ((RJC) from the terminal block, then draw the internal unit.

(a) Pull forward the terminal cover, and draw the internal unit out from the rack case.

(b) Check that the jumper on the main board of the internal unit is set to obtain the desired action.

(c) Use the tweezers to change the position of jumper.

(d) Put the internal unit back into the rack case.

(e) Replace the terminal cover.

NOTE

For STED-2 and STED-7 types, attach the reference junction block (RJC) to the terminal block, then replace the terminal cover.

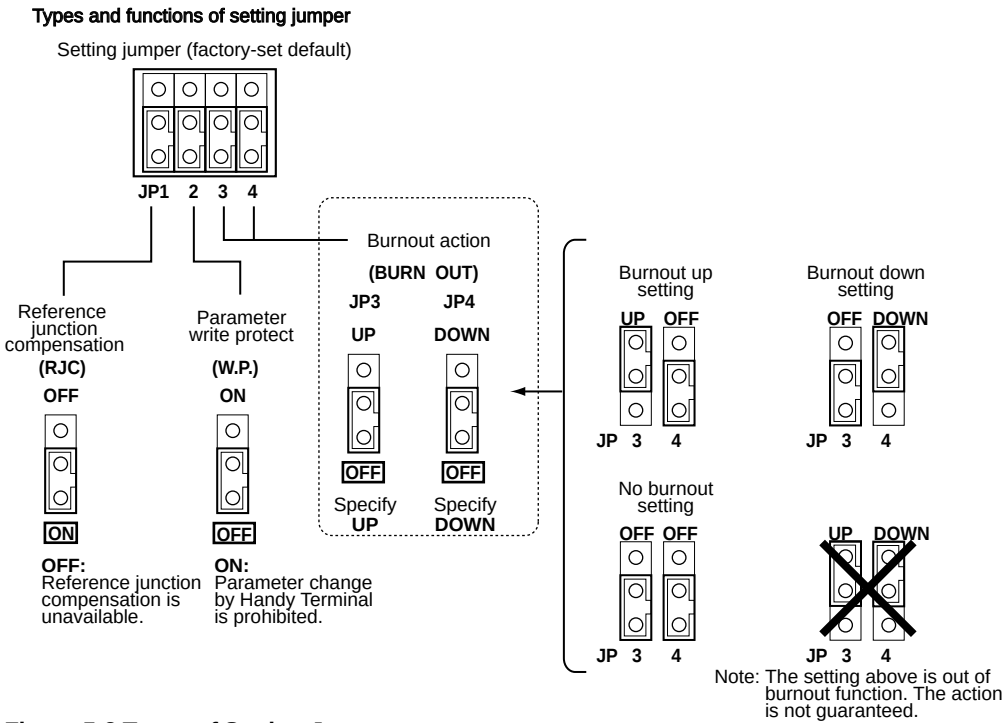

Figure 5-2 Types of Setting Jumper

5.2.2 Position of Setting Jumper

The setting jumper is on the main board of the internal unit.

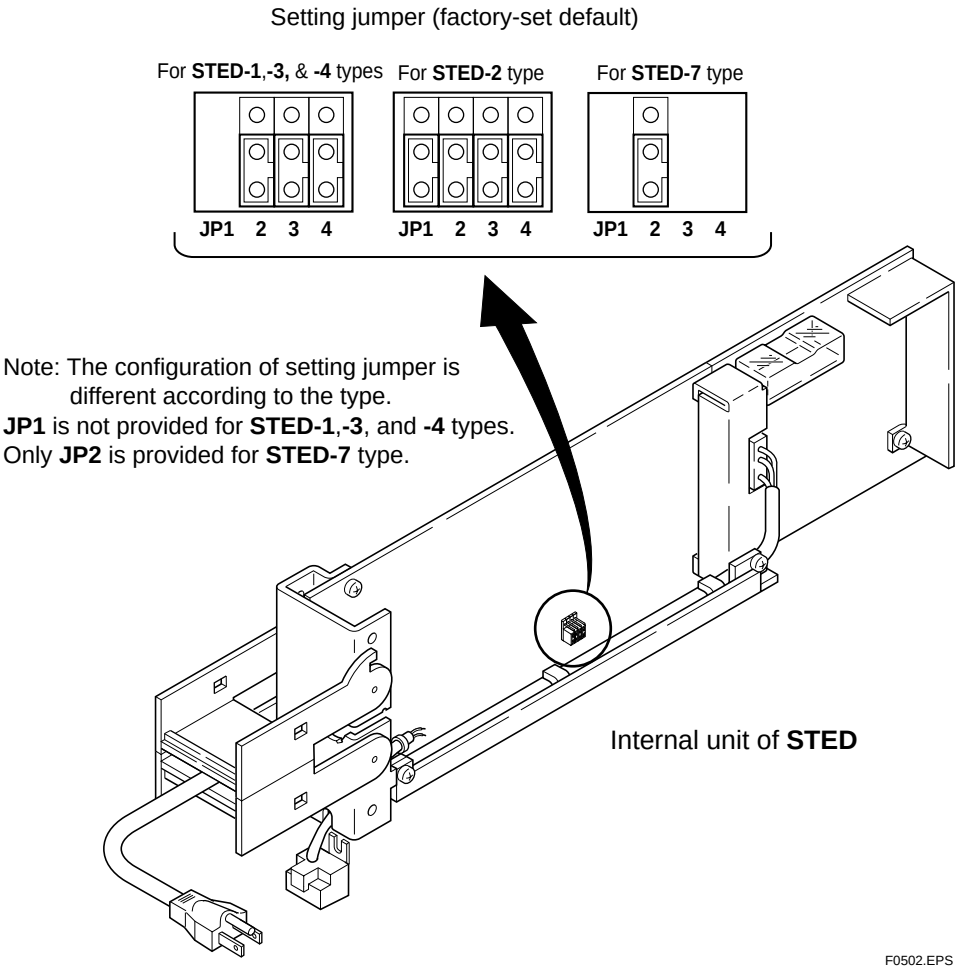

Figure 5-3 Configuration of Setting Jumper

5.3 Setting of Parameters

This instrument has BRAIN communication parameters for specifying functions and adjusting input/output. Connect JHT200 Handy Terminal (Note1) to the instrument to display or set parameters.

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

NOTE

- BRAIN communication parameters are not used for STED-1 to STED-4 types.
- For details of operation and adjusting procedures of JHT200 Handy Terminal, refer to the instruction manual “JHT200 Handy Terminal” (IM JF81-02E).

<Connection>

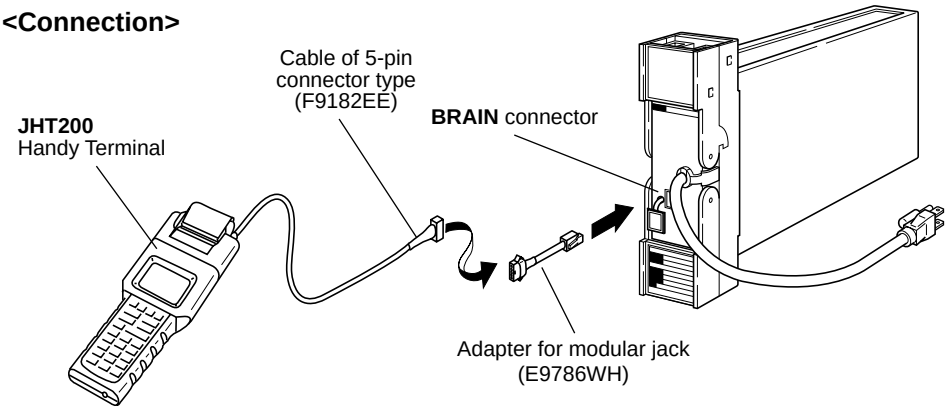

Figure 5-4 Connection

5.3.1 Configuration of Parameters

BRAIN communication parameters consist of the following parameters.

- Display (A & B parameters)
- Setting (D parameters)
- Adjustment (P parameters)
- Test (Q parameters)

5.3.2 Description of Parameters

The description of main parameters is as follows.

● Setting-related parameters

(1) D07: SENSOR TYPE1
Sets the input type for STED-7 type.

(2) D08: TC TYPE1
Sets the thermocouple input type for STED-7 type.

(3) D09: RTD TYPE1
Sets the RTD input type for STED-7 type.

(4) D13: RESIST1
Sets the total resistance for DC potentiometer input.

(5) D25: UNIT
Sets the unit for thermocouple input or RTD input.

(6) D27: INPUT1L_RNG
Sets 0% side of input range.

(7) D28: INPUT1H_RNG
Sets 100% side of input range.

(8) D31: BURN OUT1
Sets the burnout scale for STED-7 type.

(9) D33: OUT1 DR and D34: OUT2 DR
Sets the action direction for output 1 and output 2.

(10) D37: RJC
Sets available/unavailable of the reference junction temperature compensation-action for STED-7 type.

(11) D38: RJC CONST (The setting value is available when D37: RJC = OFF)
Can fix the reference junction temperature in the reference junction temperature compensation-action for STED-7 type.

● Adjustment-related parameters

(1) P01: WIRING R 1
Corrects the wiring resistance of input.

(2) P03: ZERO ADJ1
Performs zero adjustment of input.

(3) P04: SPAN ADJ1
Performs span adjustment of input.

(4) P13: OUT1 0% (Note1)
Adjusts 0% of output 1.

(5) P14: OUT1 100% (Note1)
Adjusts 100% of output 1.

(6) P15: OUT2 0% (Note1)
Adjusts 0% of output 2.

(7) P16: OUT2 100% (Note1)
Adjusts 100% of output 2.

● Test-related parameters

(1) Q02: OUT1 TEST (Note1)
Outputs the set value forcibly regardless of input condition.
Q03 has the same function.

Note1: After completing adjustment and test, press the [F4] (OK) key of the Handy Terminal to return to normal condition (release of forced output).

5.4 Parameter List

BRAIN communication parameters for STED are as follows.

No.	Symbol	Parameter Name	Setting Range	Unit	Default	Setting Type
01	MODEL	Model Name	Display	——	unfixed	Display
02	TAG NO	Tag Number	Display	——	unfixed	Display
03	SELF CHK	Self Check	GOOD/ERROR	——	unfixed	Display
<Display Parameters>						
A	DISPLAY1	Menu Name				
A01	INPUT1	Input Display	Display		unfixed	Display
A09	OUTPUT1	Output1 Display	Display	%	unfixed	Display
A10	OUTPUT2	Output2 Display	Display	%	unfixed	Display
A54	STATUS	Status Display (Note1)	0000 to FFFF	——	unfixed	Display
A55	WRT PROTECT	Parameter Write Protect	ON/OFF	——	OFF	Display
A56	REV NO	Revision number	Display	——	unfixed	Display
A58	MENU REV	Menu Revision number	Display	——	unfixed	Display
A60	SELF CHK	Self Check	GOOD/ERROR	——	unfixed	Display
B	DISPLAY2	Menu Name				
B01	INPUT1	Input Display	Display		unfixed	Display
B09	OUTPUT1	Output1 Display	Display	%	unfixed	Display
B10	OUTPUT2	Output2 Display	Display	%	unfixed	Display
B60	SELF CHK	Self Check	GOOD/ERROR	——	unfixed	Display
<Setting Parameters>						
D	SET(I/O)	Menu Name				
D01	TAG NO.1	Tag Number1	Up to 8-single-byte	——	unfixed	Alphanumeric
D02	TAG NO.2	Tag Number2	Up to 8-single-byte	——	unfixed	Alphanumeric
D03	COMMENT1	Comment1	Up to 8-single-byte	——	unfixed	Alphanumeric
D04	COMMENT2	Comment2	Up to 8-single-byte	——	unfixed	Alphanumeric
D07	SENSOR TYPE1	Sensor Type (Note2)	TC/mV/RTD	——	TC	Selection
D08	TC TYPE1	TC Type (Note10)	(Note6)	——	TYPE K	Selection
D09	RTD TYPE1	RTD Type (Note11)	(Note7)	——	Pt100-90	Selection
D13	RESIST1	Resistance (Note3)	1 to 32000	OHM	ordered	Real number
D25	UNIT1	Unit (Note4)	degC/K/degF	——	degF	Selection
D27	INPUT1 L_RNG	Input Low Range	-32000 to 32000	Note8	ordered	Real Number
D28	INPUT1 H_RNG	Input High Range	-32000 to 32000	Note8	ordered	Real Number
D31	BURN OUT1	Burn Out	OFF/UP/DOWN	——	OFF	Display(Note13)
D33	OUT1 DR	Output1 Direction	DIRECT/REVERSE	——	DIRECT	Selection
D34	OUT2 DR	Output2 Direction	DIRECT/REVERSE	——	DIRECT	Selection
D37	RJC	RJC On/Off (Note12)	ON/OFF	——	ON	Selection(Note14)
D38	RJC CONST	RJC Constant (Note10)	-20.0 to 80.0	Note15	000.0	Real Number
D60	SELF CHK	Self Check	GOOD/ERROR	——	unfixed	Display
<Adjustment Parameters>						
P	ADJUST	Menu Name				
P01	WIRING R1	Wiring Resistance (Note5)	RESET/EXECUTE	——	RESET	Selecton
P03	ZERO ADJ1	Zero Adjustment (Note5)	Display	Note9	00.00	Selection
P04	SPAN ADJ1	Span Adjustment (Note5)	Display	Note9	00.00	Selection
P13	OUT1 0%	Output1 0%	-20.0 to 20.0	%	00.00	Real Number
P14	OUT1 100%	Output1 100%	-20.0 to 20.0	%	00.00	Real Number
P15	OUT2 0%	Output2 0%	-20.0 to 20.0	%	00.00	Real Number
P16	OUT2 100%	Output2 100%	-20.0 to 20.0	%	00.00	Real Number
P60	SELF CHK	Self Check	GOOD/ERROR	——	unfixed	Display
<Test Parameters>						
Q	TEST	Menu Name				
Q02	OUT1 TEST	Output1 Test	-25.0 to 125.0	%	000.0	Real Number
Q03	OUT2 TEST	Output2 Test	-25.0 to 125.0	%	000.0	Real Number
Q60	SELF CHK	Self Check	GOOD/ERROR	——	unfixed	Display

Note 1: The condition of the instrument is displayed.
Note 2: Displayed only for STED-7 type.
Note 3: Displayed only for STED-4 type.
Note 4: Not displayed for STED-1, -4, and -7 types.
Note 5: Not displayed only for STED-4 type.
Note 6: TYPE K/E/J/T/R/S/B/N/W3/W5 (N/W3/W5 are only for STED-7 type.)
Note 7: Pt100-90/Pt100-68/JPt100
Note 8: “mV” is for mV input, “deg C, deg F or K” is for TC/RTD input, and “OHM” is for potentiometer input.
Note 9: ** RST/** INC/** HINC/** HDEC/** DEC
(**;“mV” is for mV & TC inputs, and “OHM” is for RTD and potentiometer inputs.)
Note 10: Displayed only for TC input of STED-7 type.
Note 11: Displayed only for RTD input of STED-7 type.
Note 12: Displayed only for TC input of STED-2 and -7 type.
Note 13: STED-7 displays “Selection“.
Note 14: STED-2 displays “Display“.
Note 15: Specified in D25.

6. MAINTENANCE

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

6.1 Test Equipment

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

- DC Voltage/Current Standard, Type 7651 and Type 2553…….....1 set
  (Required for mV DC and thermocouple input type equipment)
- Decade Resistance Boxes, Type 2793-01……..... 1 set
  (Required for RTD input type equipment)
- Digital Voltmeter, Type 7562…….....1 set
- Cold Junction Bottle, Type T-MJ…….....1 set
  (To be made available only as required)

6.2 Reference Table of Thermocouple and RTD

This instrument has been adjusted in accordance with the JIS thermoelectromotive force table and the resistance ratio table amended in 1995.
For the input signals used to adjust the instruments, refer to JIS C1602-1995* for the thermocouple input type and to JIS C1604-1997* for the platinum resistance temperature detector (RTD) input type.

* Identical to IEC, ANSI and BS standards.

6.3 Adjustment

6.3.1 Adjustment for STED-1 to -4 Types (One Input-only Type)

The inputs of STED-1 to -4 types are different, but the way for adjustment is the same.

(a) Connect the test equipment corresponding to each input referring to Figure 6-1 through Figure 6-4.
(b) Turn on the power while the equipment is connected to the instrument, and allow a warm-up period of about 5 minutes.
(c) Press the Zero adjustment push-switch on the front panel for 3 seconds or more to enter the adjustment mode.
(d) Apply an input equivalent to 0 % of the input range and read the output on the digital voltmeter. It should be within the range 1 V ± 0.02 V. If the error is too large, apply an input equivalent to 0 % of the input range, then press the Zero adjustment push-switch for adjustment. When pressing the push-switch for 1 second or more, the output increases in the fixed ratio. When pressing the push-switch again for 1 second or more after releasing the push-switch, the output decreases in the fixed ratio. Perform the adjustment while checking the output.
(e) Apply an input equivalent to 100 % of the input range and read the output on the digital voltmeter. It should be within the range 5 V ± 0.02 V. If the error is too large, apply an input equivalent to 100 % of the input range, then press the Span adjustment push-switch for adjustment. When pressing the push-switch for 1 second or more, the output increases in the fixed ratio. When pressing the push-switch again for 1 second or more after releasing the push-switch, the output decreases in the fixed ratio. Perform the adjustment while checking the output.

(f) Adjustable range is ± 5 % of span for mV DC/RTD/Thermocouple input and ± 10 % of span for potentiometer input.
(g) Check that the output error for 25 %, 50 %, and 75 % of input range is within the accuracy. If necessary, apply inputs equivalent to 25 %, 50 %, and 75 % of input range, then press the Zero adjustment push-switch for adjustment.
(h) This instrument is provided with 3 outputs, but the adjustment for only one of the 3 outputs is enough.

NOTE

- Do not open the terminal cover while adjusting the thermocouple input in order to maintain all terminals at the same temperature.
- When the lead wire resistance is large (when using the safety barrier such as BARD in combination with the instrument, it is equivalent to the increase of the lead wire resistance), the error of zero point may occur. Perform zero adjustment in the condition close to mounting condition.
- When performing the adjustment by current output, connect the parallel resistance (250 Ω ± 0.05 %) and check voltage.
- When performing span adjustment immediately after the zero adjustment (shorter than 1 minute), pressing the Zero adjustment push-switch for 3 seconds or more is not required.
- The adjustment mode ends if the push-switch is not pressed for 1 minute or more, then the instrument enters the normal mode.

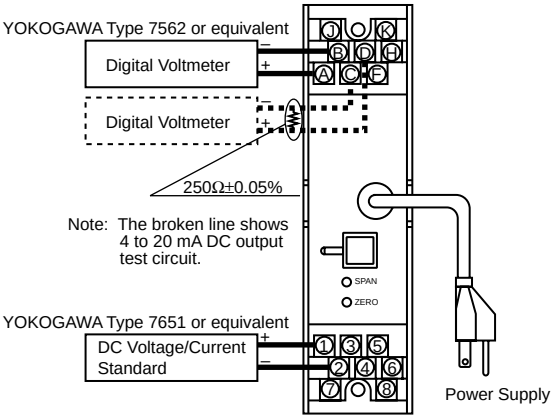

Figure 6-1 mV DC Input Converter Adjustment

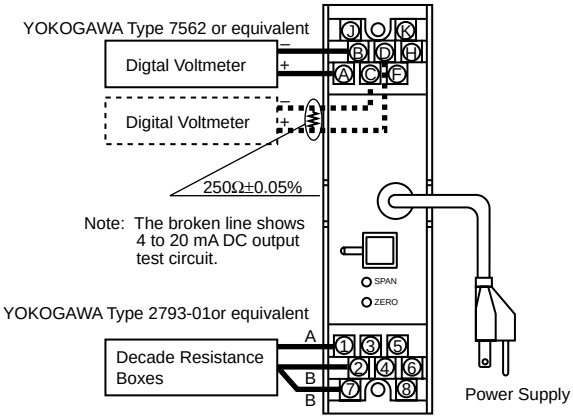

Figure 6-2 RTD Input Converter Adjustment

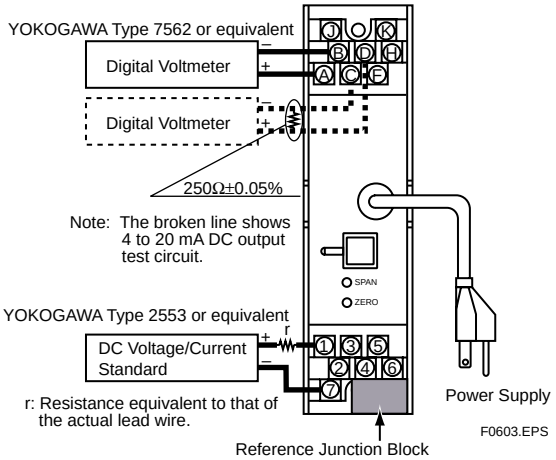

Figure 6-3 Thermocouple Input Converter Adjustment

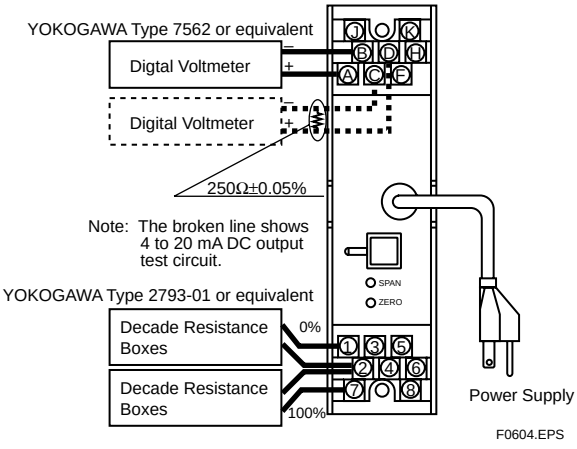

Figure 6-4 DC Potentiometer Input Converter Adjustment

6.3.2 Adjustment for STED-7 Type (Universal Type)

The adjustment for STED-7 type without Zero/Span adjustment push-switches on the front panel is to be performed using JHT200 Handy Terminal.

(a) Connect the test equipment corresponding to each input referring to Figure 6-1 through Figure 6-3.
(b) Set the parameter write protect (W.P.) of setting jumper to OFF. (refer to “5.2 Setting Jumper”.)
(c) Turn on the power while the equipment is connected to the instrument, and allow a warm-up period of about 5 minutes.
(d) Connect JHT200 Handy Terminal.

<Connection>

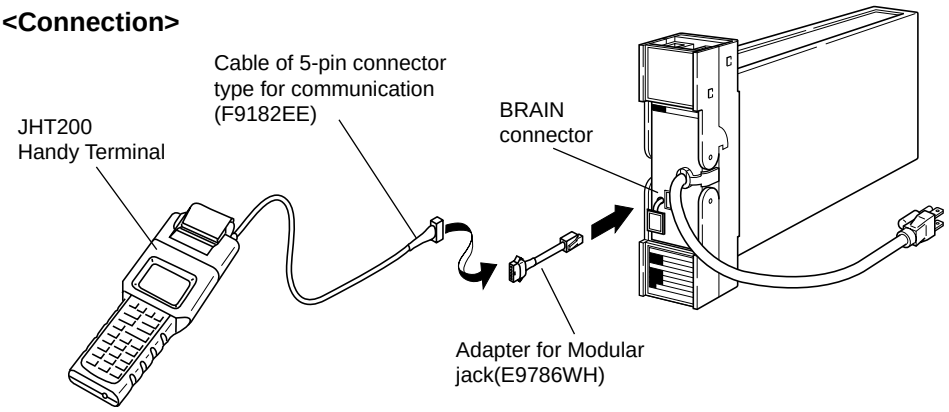

Figure 6-5 Connection

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.

(e) Call the adjustment item (P:ADJUST).
(f) P03:ZERO ADJ1 is displayed.
(g) Apply an input equivalent to 0 % of the input range. Check the input value and the input display of P03:ZERO ADJ1. If the input value does not correspond to the display value, select P03:ZERO ADJ1 to enter the adjustment mode.
Mainly select INC (addition) or DEC (subtraction) for adjustment. (Selecting RST resets the adjusted value and retrieves the factory-set default.) Selecting HINC or HDEC performs adjustment using a value ten times as large as INC or DEC.
(h) Apply an input equivalent to 100 % of the input range. Check the input value and the input display of P04:SPAN ADJ1. If the input value does not correspond to the display value, select P04:SPAN ADJ1 to enter the adjustment mode.
Mainly select INC (addition) or DEC (subtraction) for adjustment. (Selecting RST resets the adjusted value and retrieves the factory-set default.) Selecting HINC or HDEC performs adjustment using a value ten times as large as INC or DEC.
(i) After completing the adjustment, set the parameter write protect (W.P.) of setting jumper to ON. (refer to “5.2 Setting Jumper”.)

6.4 Check of Reference Junction Temperature Compensation Action

For thermocouple input, check the action of reference junction temperature compesation using the cold junction bottle. The figure of connection is shown in Figure 6-6.

NOTE

When using the cold junction bottle, install the reference junction block (RJC), then replace the terminal cover and warm up the instrument for about 15 minutes.

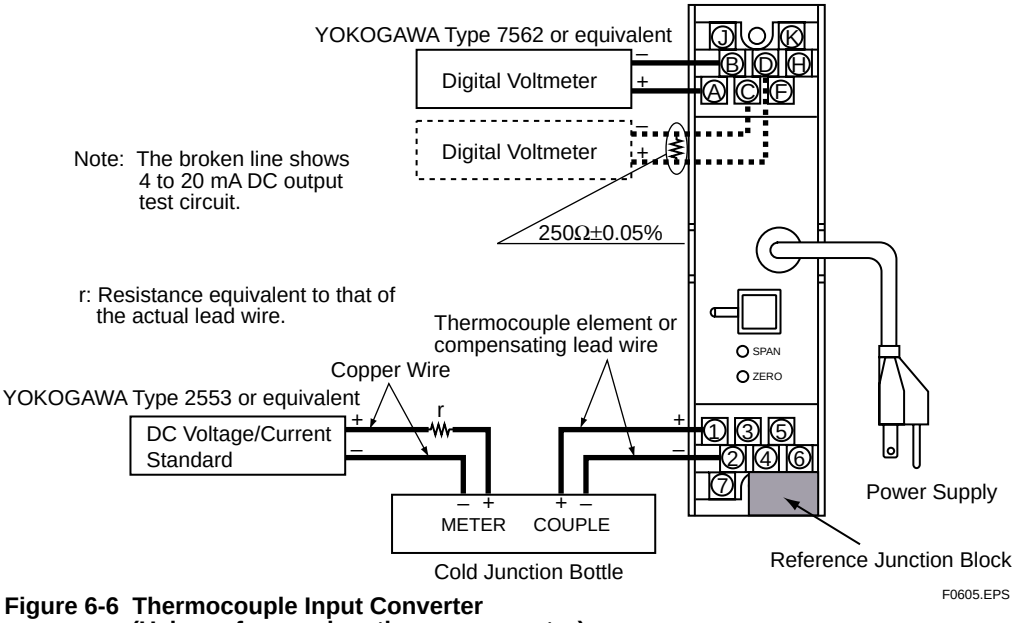

Figure 6-6 Thermocouple Input Converter (Using reference junction compensator)

6.5 Replacement of Fuse

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

NOTE

- When the fuse below, first check for the case because the fuse itself may not be responsible for the problem. Then change the fuse.
- Use the dedicatd fuse (S9510VK). Do not use a fuse for other products.

(1) Remove the fuse holder cap, then pull the fuse out in the direction shown in Figure 6-7.

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

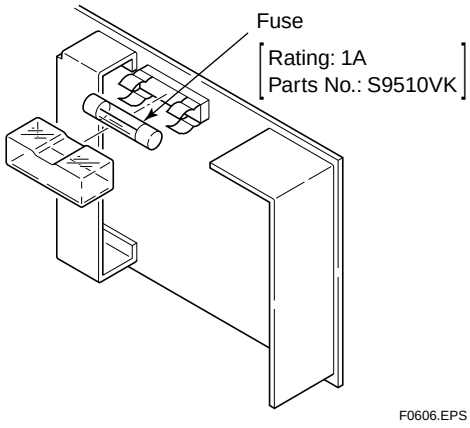

Figure 6-7 Replacement of Fuse

6.6 Replacement of Capacitor

Degradation of the aluminum electrolytic capacitor 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 for replacing the capacitor.
Do not replace the capacitor by yourself, because the parts number of power supply unit (refer to CMPL 01B04J01-02E) 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 the symptoms and follow Section 7-1 Troubleshooting Flowchart. To find the fault, first wire the instruments according to Figures 6-1 through 6-4, apply an input signal, and note the symptoms.
If the fault is difficult to find, contact your nearest Yokogawa sales staff.

7.1 Troubleshooting Flowchart

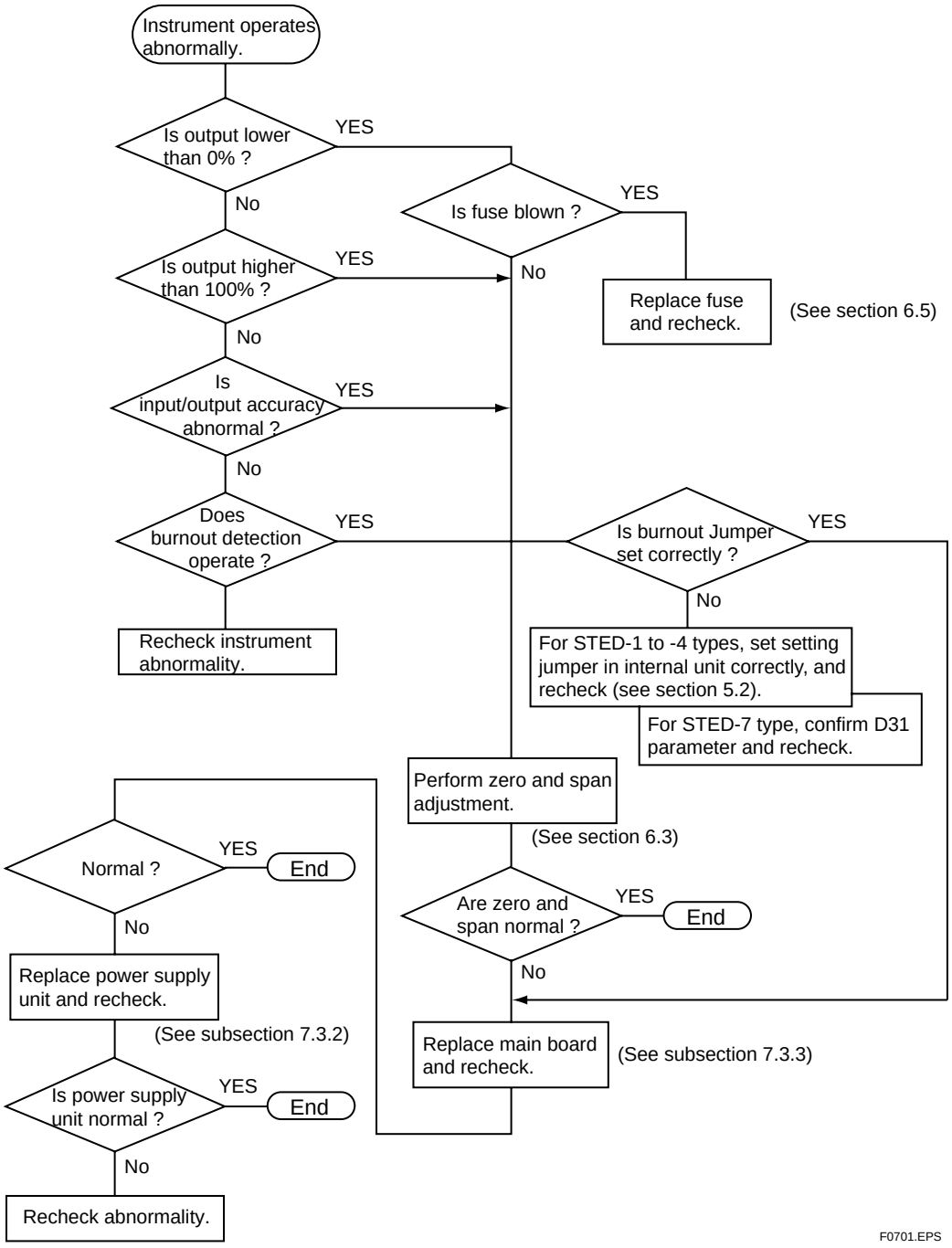


Figure 7-1 Troubleshooting Flowchart

7.2 Action in Fault Condition.

The output condition and error codes (BRAIN communication parameters) in fault condition are shown in the table below.

NOTE

- STATUS is displayed in A54 of A:DISPLAY (display), and SELF CHK is displayed in 60 of each item.
- STATUS error code is to be the addition display (hexadecimal number) when two errors or more occur.

(Note1)

STATUS	SELF CHK	Error Information(Note2)	Output Condition	Description of Error	Remedy
0001	**ERROR**	**EEPROM ERROR**	0 % or less	**EEPROM** error	Replace a main board.
0002	**ERROR**	**EEPROM SUM ERROR**	0 % or less	**EEPROM** sum check error	Reset the parameter showing an error. (Note3)
0008	**ERROR**	**INPUT OVER RANGE**	Normal action	Excessive input, out of -25 to 125 %	Set the input within the range.
0010	**ERROR**	**RANGE SET ERROR**	Normal action	Input range setting is L range ≥ H range	Check the input range setting and change it.
0040	**GOOD**	**None**	Normal action	Check power failure during operation	Write "0" to clear.
0080	**ERROR**	**RJC ERROR**	Normal action(Note4)	RJC sensor error or temperature is out of range -20 to 80 °C	Replace RJC or check terminal (ambient) temperature.

Main board error, Power supply board error, and **RAM** error other than the errors mentioned above may occur. T0701.EPS
Each output state of these errors is 0 % or less, and the error information can not be called using **JHT200** Handy Terminal.
Note1: Displays for the **BRAIN** communication parameters, ■60: **SELF CHK** and A54: **STATUS**.
Note2: Displayed when calling ■60: **SELF CHK**.
Note3: After checking the action, write "0" in **STATUS** to clear.
Note4: Compensation action in the limited reference junction temperature (-20 °C or -80 °C).

7.3 Replacement of Parts

WARNING

Nobody except members of Yokogawa service staff is allowed to replace the parts.
Never replace the parts by yourself because there is a possibility of damage to the instrument or of danger.

7.3.1 Replacement Procedure

(1) Replacement of Power Supply Unit

(2) Replacement of Main Board

NOTE

- Disassemble only those parts that disassembly is required at parts replacement.
- Disassemble the instrument carefully.
- For the input type fixed to thermocouple and universal iput type, first remove the reference junction block(RJC) form the terminal block and pull out the internal unit form the case.

7.3.2 Replacement of Power Supply Unit

(a) Pull the terminal cover (13) outward to draw the internal unit out 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).

NOTE

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

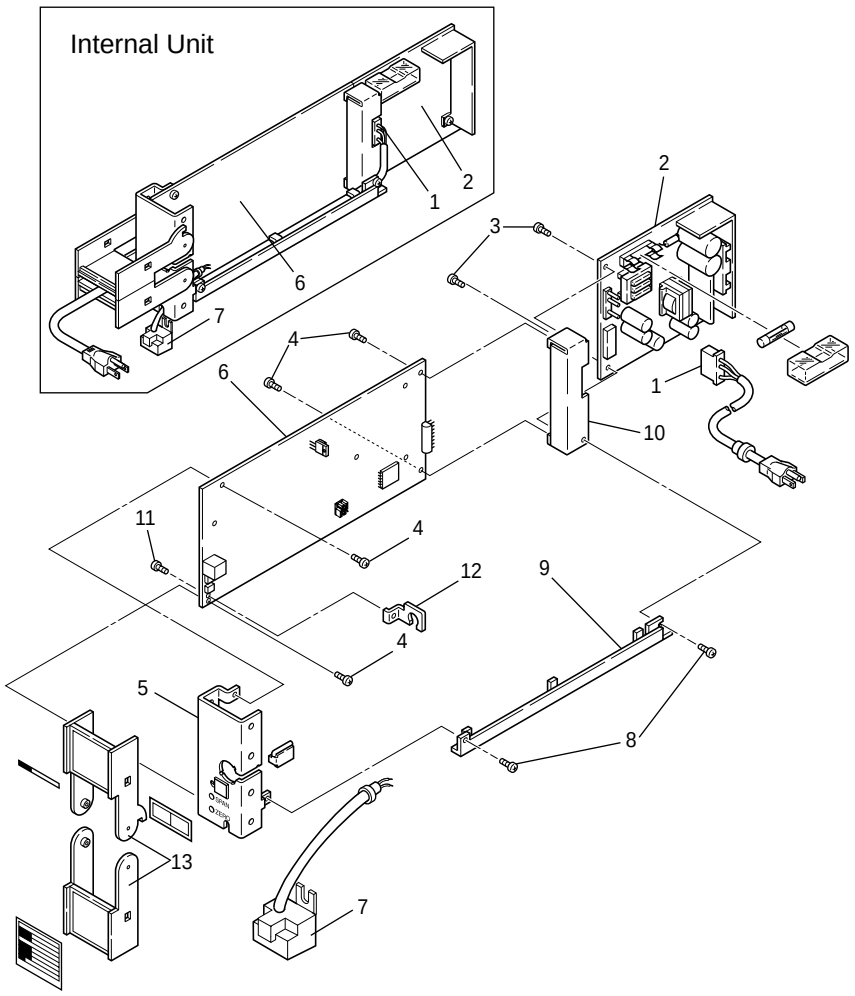


Figure 7-2 Disassembled View

Appendix /TB Power Supply Terminal Connections for Rack-mounted Instruments (Option)

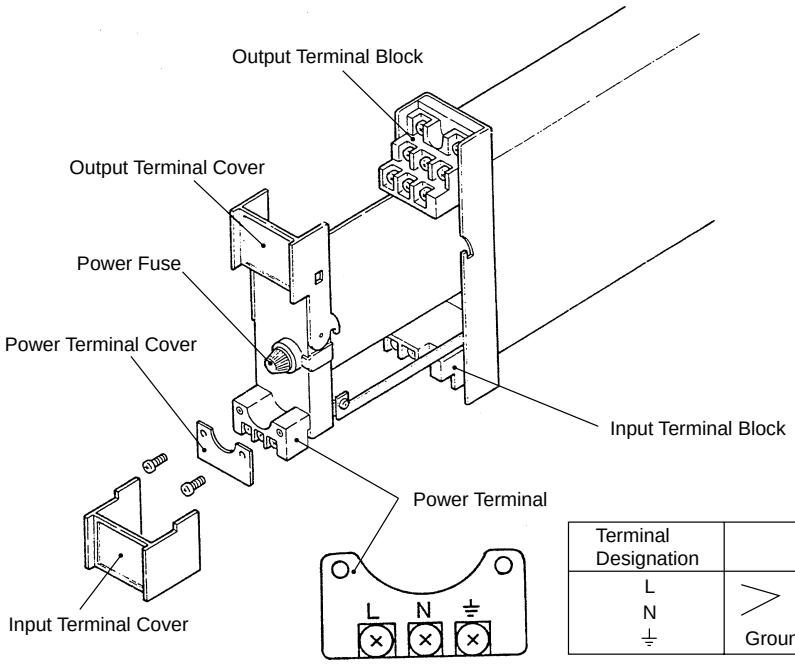
Appendix-1 GENERAL

If you specify the terminal block to which the power source is directly connected (suffix code /TB), 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.

Appendix-2 APPLICABLE INSTRUMENTS

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

Appendix-3 EXTERNAL VIEW AND NAMES OF COMPONENTS



Terminal Designation	Description
L N	AC or DC Power Supply (DC: polarity reversible)
⏚	Ground

Appendix-4 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^2. *
Applicable cable: 600 V vinyle 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 1.25mm^2.

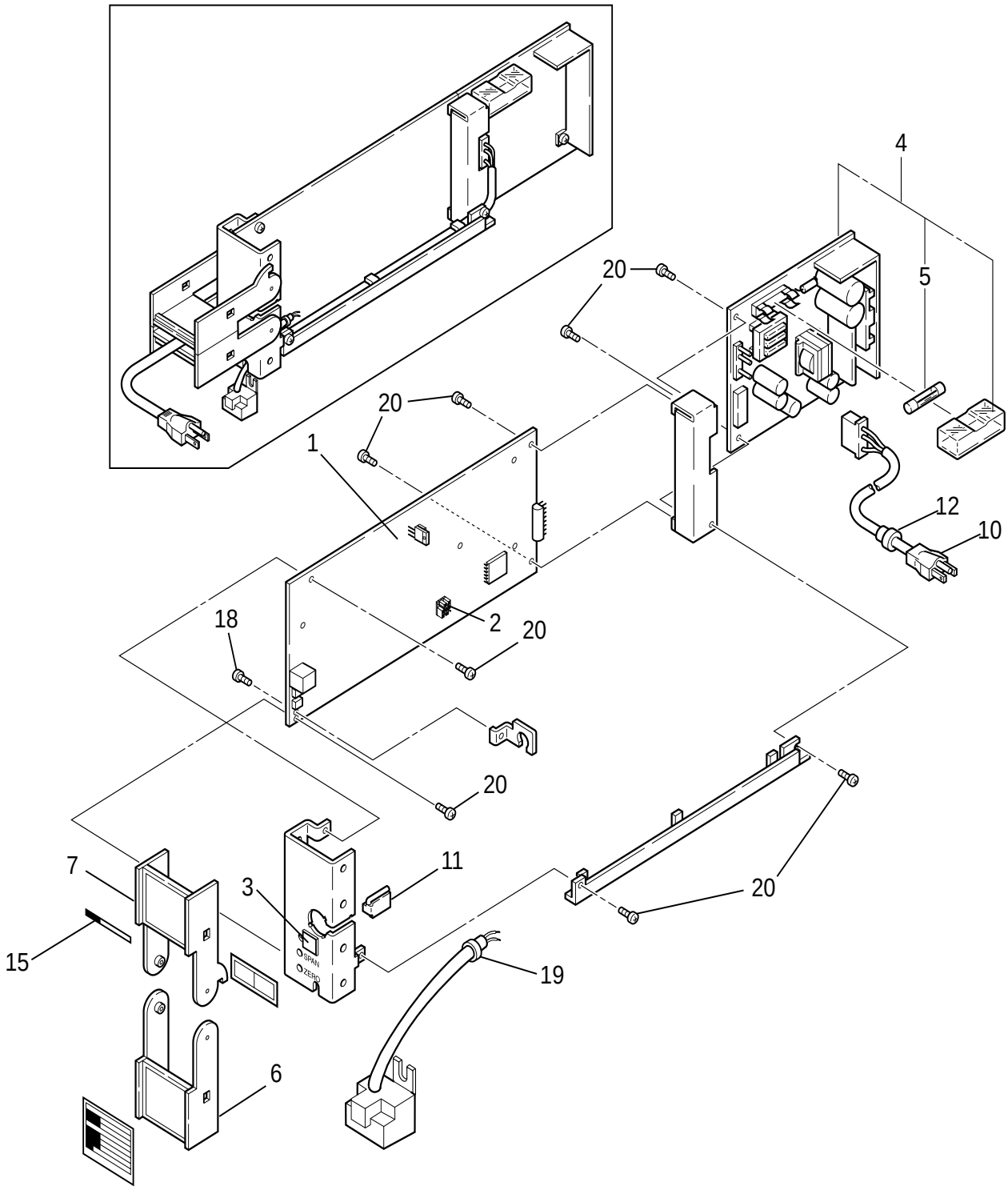
(3) Wirings to power supply and ground terminals should be made after completion of signal terminal wirings. (To facilitate connecting input signal, pull the internal unit approximately half way out of the housing. Do not remove the power terminal block.)

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

Customer Maintenance Parts List

Model STED (Style R)
mV, Temperature and Potentiometer
/Voltage Converters

YEWSERIES 80



CMPL 01B04J01-02E
9th Edition: May. 2004

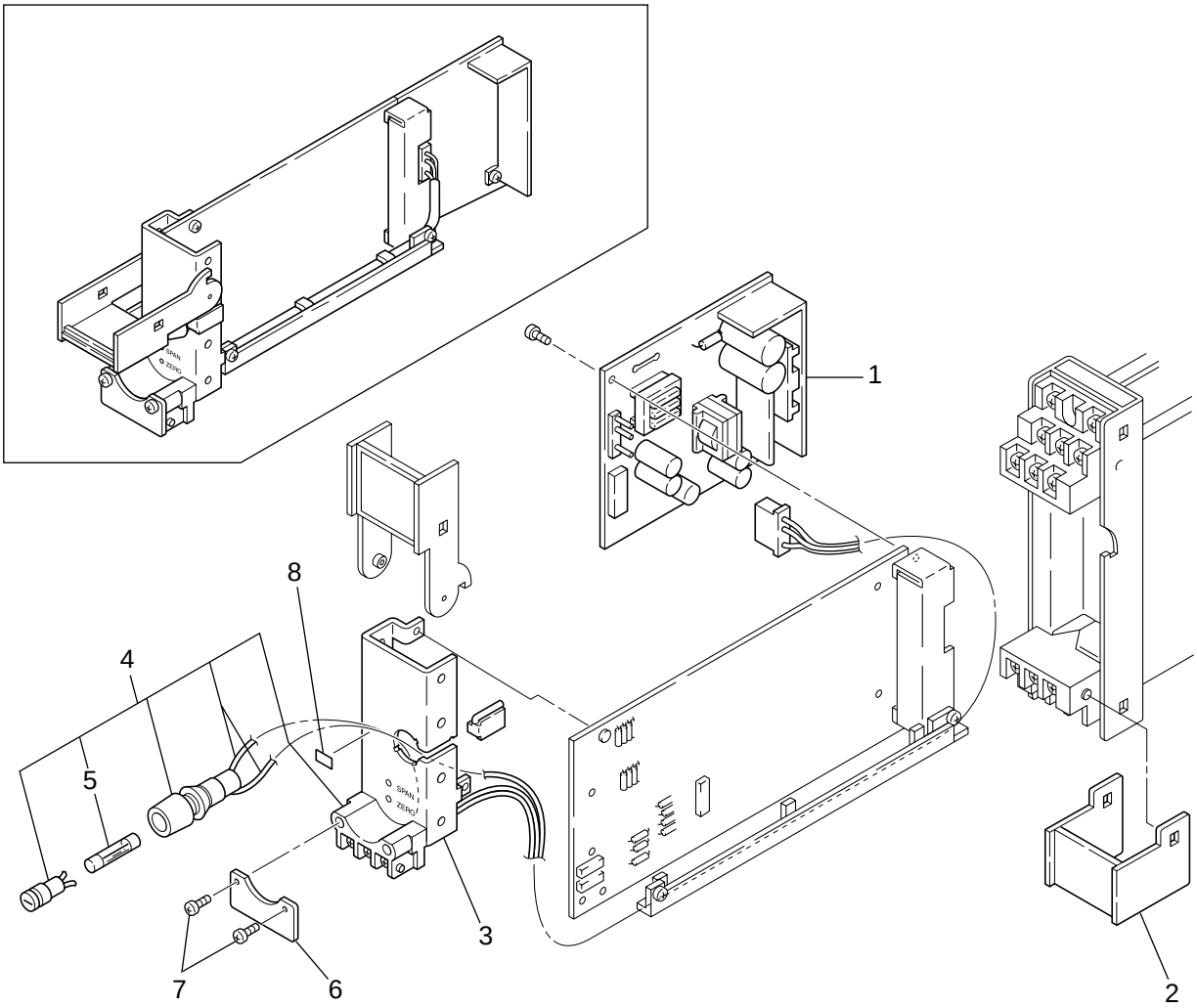
Item	Part No.	Qty (Model) STED-110	STED-210-□ *1	STED-310	STED-410	STED-710	Description
1	L3040BA	1					Main Board Assembly
	L3040BB		1				Main Board Assembly
	L3040BC			1			Main Board Assembly
	L3040BD				1		Main Board Assembly
	L3040BE					1	Main Board Assembly
2	A1211JS	1	1	1	1	1	Socket & Holder
3	L4040EA	1	1	1	1	1	Cap
4	L3040YA	1	1	1	1	1	Power Supply Unit (for 100V Version)
	L3040YR	1	1	1	1	1	Power Supply Unit (for 220V Version)
5	S9510VK	1	1	1	1	1	Fuse(1A)
6	E9713CA	1	1	1	1	1	Cover
7	E9713CK	1	1	1	1	1	Cover
10	E9713EG	1	1	1	1	1	Cable Assembly(for 100V Version)
	E9713FS	1	1	1	1	1	Cable Assembly(for 220V Version)
11	E9713CE	1	1	1	1	1	Cover
12	S9079PB	1	1	1	1	1	Bushing
15	Y9422NP	1	1	1	1	1	Tag No. Label (blank)
18	Y9306JB		1			1	Pan H.Screw, M3x6 *2
19	G9320EY		1			1	Bushing *2
20	Y9306JB	8	8	8	8	8	Pan H. Screw, M3x6

Note *1: TK, TT, TJ, TE, TR or TS in □
*2: Only for thermocouple input type.

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	

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