User's Manual

IM 77J01U07-01E

Model VJU7
Universal Temperature Converter
(Isolated Single-output and
Isolated Dual-output Types)

JUXTA

1. CAUTIONARY NOTES FOR SAFE USE OF THE PRODUCT

This user's manual should be carefully read before installing and operating the product. The following symbol is used on the product and in this manual to eusure safe use.

WARNING

This symbol is displayed on the product when it is necessary to refer to the user's manual for information on personnel and instrument safety. This symbol is displayed in the user's manual to indicate precautions for avoiding danger to the operator, such as an electric shock.

The following symbols are used only in this manual.

IMPORTANT

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

NOTE

Draws attention to essential information for understanding the operations and/or functions of the product.

2. CHECKING PRODUCT SPECIFICATIONS AND PACKAGED ITEMS

(1) Model and Specifications Check
Check that the model and specifications indicated on the nameplate attached to the side face of the main unit are as ordered.

(2) Contents of the Package
Check that the package contains the following items:

- VJU7: 1
- User's manual (this manual: IM 77J01U07-01E): 1

Accessories:

- Tag number label: 1 sheet
- Range label: 1 sheet
- RJC sensor (when /RJCN is not specified for the optional specification): 1

3. GENERAL

This plug-in type Universal Temperature Converter receives thermocouple, RTD or mV signal and converts it into isolated DC voltage or current signal.

- Settings of the input type (thermocouple, RTD or mV) and measurement range can be changed within the specified ranges.
- One of DC voltage signal, DC current signal, communication function (RS-485) and alarm output (2 relay contacts) can be selected for the output-2 signal.

Keep this manual in a safe place.

4. MODEL AND SUFFIX CODES

VJU7-0□□-□□□0/□

Model

Number of outputs
1: 1 output
2: 2 outputs

Power supply
6: 100-240 V AC/DC (Operating range: 85 to 264 V)
7: 15-30 V DC (Operating range: 12 to 36 V)

Input signal
U: Thermocouple, RTD, mV signal

Output-1 signal
A: 4 to 20 mA DC
6: 1 to 5 V DC
Z: (Custom Order) DC current or voltage signal

Output-2 signal
A: 4 to 20 mA DC
6: 1 to 5 V DC
P: Communication function (RS-485)
T: Alarm output (2 relay contacts)
N: No output-2 signal

Optional specification
Blank: With socket
/SN: Without socket
/RJCN: Without RJC sensor

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IM 77J01U07-01E

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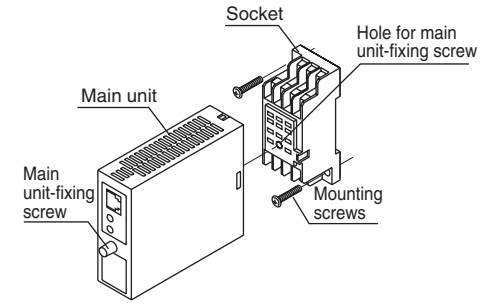
5. MOUNTING METHODS

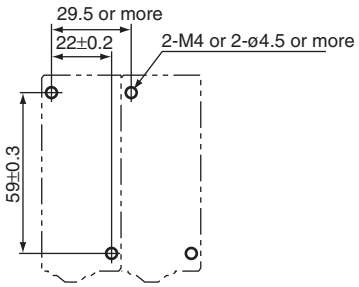
5.1 Wall Mounting

Loosen the main unit-fixing screw to disconnect the main unit from the socket. Next, anchor the socket onto the wall with screws. Then, plug the main unit into the socket and secure the main unit with the main unit-fixing screw.



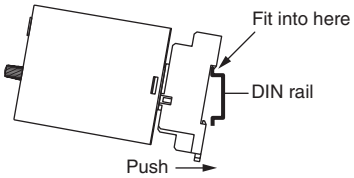
<Mounting Dimensions>

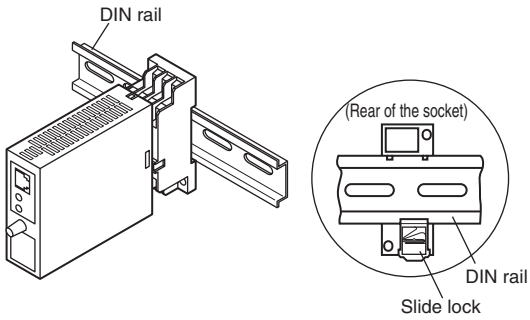
Unit: mm



5.2 DIN Rail Mounting

Locate the VJU7 so that the DIN rail fits into the upper part of the DIN-rail groove at the rear of the socket, and fasten the socket using the slide lock at the lower part of the socket.





5.3 Mounting Using a Multi-mounting Base

For mounting using a multi-mounting base, see the user's manual for VJCE (VJ Mounting Base).

5.4 Using a Duct

Wiring duct should be installed at least 30 mm away from the top and bottom faces of the main unit.

6. INSTALLATION LOCATIONS

- Avoid the following environments for installation locations: Areas with vibrations, corrosive gases, dust, water, oil, solvents, direct sunlight, radiation, a strong electric field, and/or a strong magnetic field.
- If there is any risk of a surge being induced into the power line and/or signal lines due to lightning or other factors, a dedicated lightning arrester should be used as protection for both the product and a field-installed device.

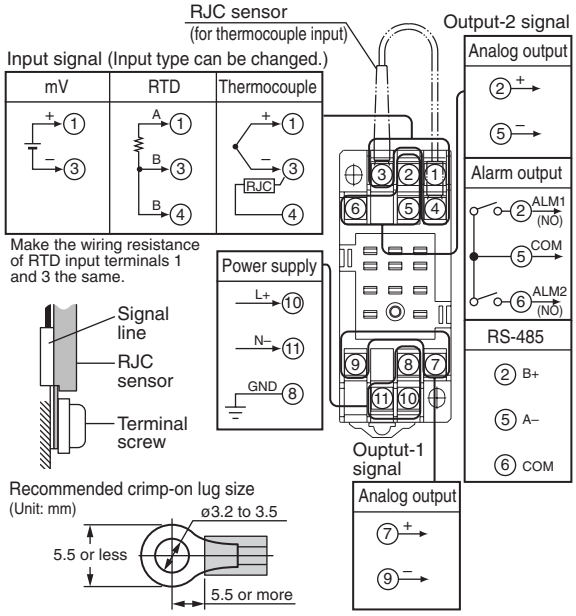
7. EXTERNAL WIRING

WARNING

To avoid the risk of an electric shock, turn off the power supply and use a tester or similar device to ensure that no power is supplied to a cable to be connected, before carring out wiring work.

Wiring should be connected to the terminals on the socket of the VJU7. The terminals for external connections are of M3 screws. Use crimp-on lugs for connections to the terminals.

- Be sure to use a compensating lead wire for thermocouple input.
  Recommended cables: A nominal cross-sectional area of 0.5 mm² or thicker for output signal cable, a nominal cross-sectional area of 1.25 mm² or thicker for power cable and shielded twisted-pair cable (AWG24) for communication cable.



IMPORTANT

- ***Connect the RJC sensor at the correct position as shown above. Otherwise tempratures cannot be measured carrectly.***
- ***Conect the RJC sensor so that it overlaps the input signal line.***
- ***Handle the RJC sensor lead wire care to prevent disconnection.***

- ***Use of the product ignoring the specifications may cause overheating or damage. Before turning on the power, ensure the following:***
  (a)Power supply voltage and input signal value applied to the product should meet the required specifications.
  (b)The external wiring to the terminals and wiring to ground are as specifications.
- ***Do not operate the product in the presence of flammable or explosive gases or vapors. To do so is highly dangerous.***
- ***The product is sensitive to static electricity; exercise care in operating it. Before you operate the product, touch a nearby metal part to discharge static electricity.***
- ***If an inductance (L) load such as auxiliary relays or solenoid valves is used, always insert a spark killer for diminishing sparks, such as a CR filter or a diode in parallel with the inductance load. Otherwise a malfunction or relay failure may occur. Refer to the following guidelines for a capacitor and resistor:***
  Capacitor : 0.5 to 1 mF with respect to a contact current of 1 A
  Resistor: 0.5 to 1 W with respect to a contact voltage of 1 V
- ***The power line and input/output signal lines should be installed away from noise-generating sources. Otherwise accuracy cannot be guaranteed.***
- ***The grounding resistance must be 100 W (JIS Class D grounding). The length and thickness of the grounding cable should be as short and thick as possible. Directly connect the lead from the ground terminal (terminal no. 8) of the product to the ground. Do not carry out daisy-chained inter-ground terminal wiring.***

8. DESCRIPTION OF FRONT PANEL ND CONNECTION OF SETTING OOLS

8.1 Front Panel

The communications connector on the front panel is used for setting up parameters using a PC (VJ77 PC-based Parameters Setting Tool) or the Handy Terminal (JHT200). The alarm indicator lamps for alarm 1 and alarm 2 light up if an alarm occurs. (The alarm indicator lamps are added only when the alarm output is specified for the output-2 signal.)

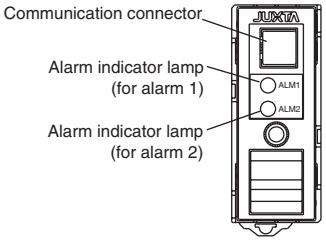


Fig. 8.1 Front Panel

8.2 Connecting the Setting Tools

Connect the modular jack conversion adapter (E9786WH) to the JUXTA communication cable with 5-pin connector (F9182EE) and then connect this adapter to the communication connector of JUXTA.

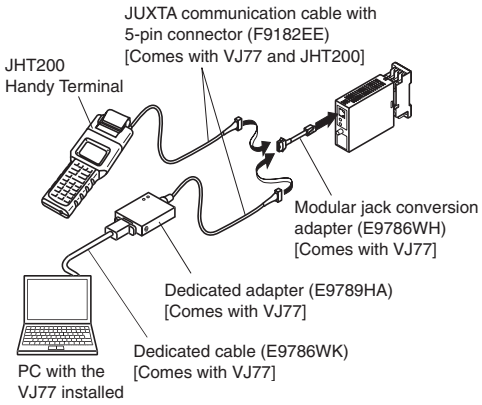


Fig. 8.2 Connecting the Setting Tools

Note: The modular jack conversion adapter does not come with the JHT200 Handy Terminal. It is sold separately.

9. SETTING PARAMETERS

Set the parameters using a PC (VJ77 PC-based Parameters Setting Tool) or the Handy Terminal (JHT200). Refer to the list of parameters in this manual and the user's manual for VJ77 PC-based Parameters Setting Tool (IM 77J01J77-01E) or JHT200 Handy Terminal (IM JF81-02E).

NOTE

For the input sensor type, input type and temperature unit, the default values of the input range, alarm setpoints and others are pre-defined according to the values to be selected. Set the parameters as follows.

1. Settings related to inputs: Set the parameters in order starting with (1).
(1) Input sensor type
(2) Input type
(3) Temperature unit for temperature input
(4) Input hard range
(5) Input range

2. Before setting the parameters related to alarm output and making the adjustments such as wiring resistance correction and output correction, set the parameters described in 1 above.
If setting the parameters (1) to (3) in 1 above after setting the parameters related to alarm output or making the adjustment, the setpoint will be changed or the adjustment will be reset to the default.

9.1 Settings Related to Input and Output

9.1.1 Input Sensor Type and Input Type

Select the input sensor type in D07: SENSOR TYPE. Select TC for thermocouple input, mV for mV input and RTD for RTD input. When you have selected TC in D07, select the TC type to use in D08: TC TYPE. When you have selected RTD in D07, select the RTD type to use in D09: RTD TYPE. Furthermore, for thermocouple or RTD input, select the temperature unit in D15: UNIT.

9.1.2 Input Hard Range

Select the input hard range from among AUTO, HIGH, MIDDLE and LOW in D17: SELECT RANGE. In general, select AUTO.

- AUTO: Sets the most appropriate input hard range automatically with respect to the input range to be set.
- HIGH: For RTD input, for a span of 130 Ω or more in an input range of 0 to 520 Ω based on the reference resistane table.
- MIDDLE: For thermocouple or mV input, for a span of 27.5 mV or more in an input range of 10 to 100 mV converted into thermoelectromotive force. For RTD input, for a span of 38.5 Ω or more in an input range of 0 to 176 Ω based on the reference resistane table.
- LOW: For thermocouple or mV input, for a span of 10 mV or more in an input range of -2.5 to 25 mV converted into thermoelectromotive force.

NOTE

The conditions for the input hard range (HIGH, MIDDLE and LOW) are specified for operations within the range of accuracy rating. The input range may be set to a range not meeting these conditions, but take note of accuracy limitations. Similar accuracy limitations exist even when AUTO is selected. For more information on accuracy limitations, see the general specifications of VJU7 (GS 77J01U07-01E).

9.1.3 Input Range

Set the 0% value of input range in D22: INPUT1 L_RNG and the 100% value of input range in D23: INPUT1 H_RNG numerically within the following specified range.

Input type	Operation guaranteed range
Thermocouple input	
Type K (CA)	-200 to 1200 °C
Type T (CC)	-200 to 350 °C
Type E (CRC)	-200 to 800 °C
Type J (IC)	0 to 750 °C
Type R	0 to 1600 °C
Type S	0 to 1600 °C
Type B	600 to 1700 °C
Type N	-200 to 1200 °C
Type W3 *1	0 to 2000 °C
Type W5 *2	0 to 2000 °C
RTD input	
Pt100 (ITS-90)	-200 to 660 °C
Pt100 (IPTS-68)	-200 to 660 °C
JPt100 (JIS'89)	-200 to 510 °C
Pt50 (JIS'81)	-200 to 649 °C
mV input	
mV signal	-10 to 100 mV DC

*1: W97Re3-W75Re25 (tungsten 97% rhenium 3%-tungsten 75% rhenium 25%)
The abbreviation of ASTM E988.
*2: W95Re5-W74Re26 (tungsten 95% rhenium 5%-tungsten 74% rhenium 26%)
The abbreviation of ASTM E988.

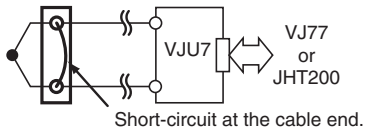
9.1.4 Direction of Output Action

When output 1 and output 2 are analog outputs, the outputs can be reversed. Set the direction of output action in D38: OUT1 DR (output 1) and in D39: OUT2 DR (output 2). Select REVERSE for reverse action and DIRECT for direct action.

9.1.5 Wiring Resistance Correction

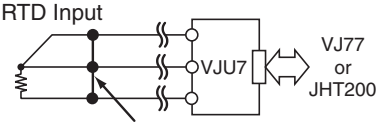
When an error occurs due to the influence of the input wiring resistance, the wiring resistance can be corrected automatically. Apply a stable input as shown below and select EXECUTE in P01: WIRING R. The correction is also required when the direction of burnout action is changed from UP (DOWN) to DOWN (UP) or the wiring for input is changed.

Thermocouple Input



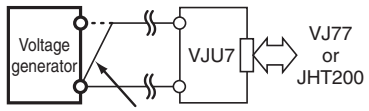
Short-circuit at the cable end.

RTD Input



Short-circuit at the cable end.

mV Input



Two signal lines are connected to the same terminal of one side.

9.2 Settings Related to Communication Function

Set the following parameters when the communication function is specified for the output 2.
For more information on communication functions, see the user's manual for VJ Series Communication Functions (IM 77J01J11-01E).

9.2.1 Communication Protocol

Select the communication protocol from among PCLINK, PCLINK WITH SUM, MODBUS ASCII, MODBUS RTU and LADDER in F01: PROTOCOL.

9.2.2 Communication Address

Set the address number of the converter numerically in a range of 1 to 99 in F02: ADDRESS.

9.2.3 Baud Rate

Select the baud rate from among 1200, 2400, 4800 and 9600 bps in F03: BAUD RATE.

9.2.4 Parity

Select the parity from among NONE, EVEN and ODD in F04: PARITY.

9.2.5 Data Length

Select the data length from among 7 bits and 8 bits in F05: DATA LEN.

9.2.6 Stop Bit

Select the stop bit from among 1 bit and 2 bits in F06: STOP BIT.

9.2.7 Decimal Point Position

Number of decimals of input value (setting of D register [D0003]) can be set. Select the number of decimals from among 0 to 5 in F07: INPUT DEC PT.

9.3 Settings Related to Alarm Output

Set the following parameters when the alarm output is specified for the output 2.

9.3.1 Alarm Setpoint

Set the alarm-1 setpoint and alarm-2 setpoint numerically in E01: SET POINT1 and E02: SET POINT2 for thermocouple input and RTD input or in E03: SET POINT1 and E04: SET POINT2 for mV input. Set them in [°C] for temperature input or in [%] for mV input.

- Setting range: 0 to 100% of input range
- Setting resolution: 0.1°C (for thermocouple input and RTD input), 0.1% (for mV input)

9.3.2 Direction of Alarm Action

Select the direction of alarm-1 action and that of alarm-2 action from among HIGH ALM (high-limit alarm) and LOW ALM (low-limit alarm) in E05: ALM1 ACTION and E06: ALM2 ACTION.

- To activate alarm status when input signal ≥ alarm setpoint, select HIGH ALM.
- To activate alarm status when input signal ≤ alarm setpoint, select LOW ALM.

9.3.3 Hysteresis

Set the alarm-1 hysteresis and alarm-2 hysteresis numerically in E07: HYSTERESIS1 and E08: HYSTERESIS2 for thermocouple input and RTD input or in E09: HYSTERESIS1 and E10: HYSTERESIS2 for mV input.

Hysteresis is a value added to the alarm setpoint in order for an alarm status to be released (to normal) after the alarm status has been activated. The alarm status will be released in the following conditions, depending on the direction of alarm action.

* When HIGH ALM (high-limit alarm) is set: Alarm is released when input signal < (alarm setpoint - hysteresis).

* When LOW ALM (low-limit alarm) is set: Alarm is released when input signal > (alarm setpoint + hysteresis).

Set them in [°C] for temperature input or in [%] for mV input.

- Setting range: 0 to 100% of input range
- Setting resolution: 0.1°C (for thermocouple input and RTD input), 0.1% (for mV input)

9.3.4 Alarm ON Delay and Alarm OFF Delay

Set the alarm-1 ON delay and alarm-2 ON delay numerically in E11: ON DELAY1 and E12: ON DELAY2. Set the alarm-1 OFF delay and alarm-2 OFF delay numerically in E13: OFF DELAY1 and E14: OFF DELAY2.

An alarm ON delay is a delay time from the establishment of alarm conditions to its output; an alarm OFF delay is a delay time from the establishment of return-to-normal conditions to its output.

- Setting range: 0 to 999 seconds
- Setting resolution: 1 second (However, about 0.2 second is to be added to the set time to prevent wrong operation.)

For example, when an alarm ON delay is set to 1 second, alarm output is generated if alarm status continues for 1 second or more after the input value exceeds the alarm setpoint. Furthermore, when an alarm OFF delay is set to 2 seconds, alarm output is released if normal condition continues for 2 seconds or more after the input value has returned to normal from the alarm status.

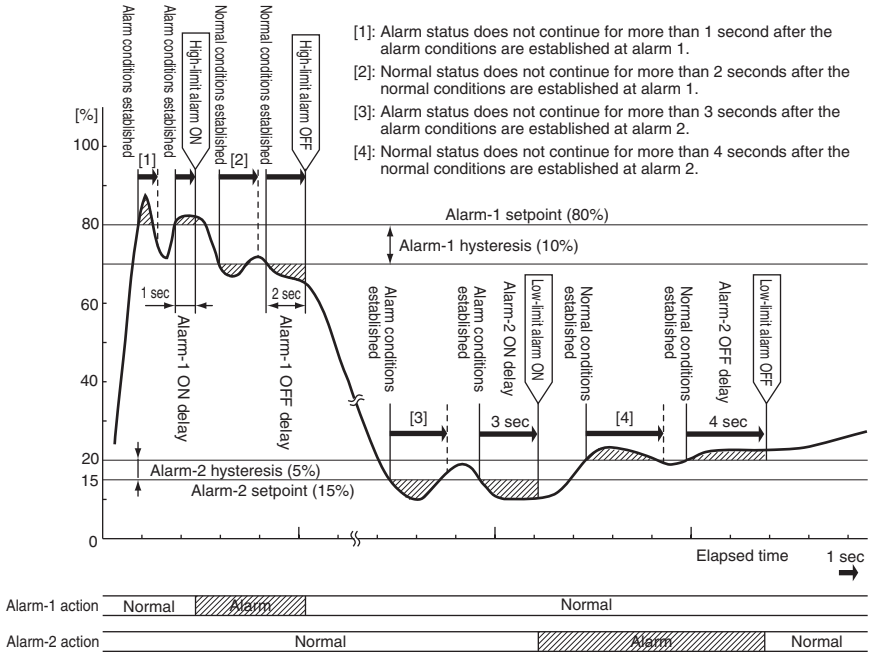
9.3.5 Direction of Relay Action

Select the direction of relay energizing in alarm-1 normal condition and alarm-2 normal condition from among NRM DE-ENERGIZED (de-energized under normal condition) and NRM ENERGIZED (energized under normal condition) in E15: RL1 ACTION and E16: RL2 ACTION.

10. DESCRIPTION OF ALARM ACTIONS

This chapter describes examples of alarm actions under the following conditions.

Item	Alarm 1		Alarm 2	
	Parameter	Setpoint	Parameter	Setpoint
Direction of alarm action	E05 : ALM1 ACTION	High-limit alarm	E06 : ALM2 ACTION	Low-limit alarm
Alarm setting	E03 : SET POINT1	80%	E04 : SET POINT2	15%
Hysteresis	E09 : HYSTERESIS1	10%	E10 : HYSTERESIS2	5%
Alarm ON delay	E11 : ON DELAY1	1 sec	E12 : ON DELAY2	3 sec
Alarm OFF delay	E13 : OFF DELAY1	2 sec	E14 : OFF DELAY2	4 sec
Description of alarm actions	The alarm is output if the condition where the input value is 80% or more of high-limit alarm continues for 1 second or more. After the alarm is output, when the condition where the input value is less than 70% of high-limit alarm continues for 2 seconds or more, the status returns to normal.		The alarm is output if the condition where the input value is 15% or less of low-limit alarm continues for 3 seconds or more. After the alarm is output, when the condition where the input value is more than 20% of low-limit alarm continues for 4 seconds or more, the status returns to normal.	



11. LIST OF PARAMETERS

No.	Item	Display	No.	Item	Display
01	Model	MODEL			
02	Tag No.	TAG NO			
03	Self-check result	SELF CHK			
Display items					
A	**Display 1**	**DISPLAY1**	**B**	**Display 2**	**DISPLAY2**
A01	Input value	INPUT1	B01	Input value	INPUT1
A05	Output value 1	OUTPUT1	B05	Output value 1	OUTPUT1
A06	Output value 2	OUTPUT2	B06	Output value 2	OUTPUT2
A07	Alarm-1 status	ALM1 STATUS	B07	Alarm-1 status	ALM1 STATUS
A08	Alarm-2 status	ALM2 STATUS	B08	Alarm-2 status	ALM2 STATUS
A54	Status	STATUS (*1)	B60	Self-check result	SELF CHK
A56	Rev No.	REV NO			
A58	Menu Rev	MENU REV			
A60	Self-check result	SELF CHK			
Setting items (*2) (*3)					
D	**Setting (I/O)**	**SET(I/O)**	**E**	**Setting (alarm output)**	**SET(ALM)**
D01	Tag no.1	TAG NO.1	E01	Alarm-1 setting	SET POINT1
D02	Tag no.2	TAG NO.2	E02	Alarm-2 setting	SET POINT2
D03	Comment 1	COMMENT1	E03	Alarm-1 setting	SET POINT1
D04	Comment 2	COMMENT2	E04	Alarm-2 setting	SET POINT2
D07	Input sensor type	SENSOR TYPE	E05	Direction of alarm-1 action	ALM1 ACTION
D08	Thermocouple type	TC TYPE	E06	Direction of alarm-2 action	ALM2 ACTION
D09	RTD type	RTD TYPE	E07	Alarm-1 hysteresis	HYSTERESIS1
D15	Unit	UNIT	E08	Alarm-2 hysteresis	HYSTERESIS2
D17	Input hard range selection	SELECT RANGE	E09	Alarm-1 hysteresis	HYSTERESIS1
D22	Input low range	INPUT1 L_RNG	E10	Alarm-2 hysteresis	HYSTERESIS2
D23	Input high range	INPUT1 H_RNG	E11	Alarm-1 ON delay setting	ON DELAY1
D30	Burnout	BURN OUT	E12	Alarm-2 ON delay setting	ON DELAY2
D38	Direction of output-1 action	OUT1 DR	E13	Alarm-1 OFF delay setting	OFF DELAY1
D39	Direction of output-2 action	OUT2 DR	E14	Alarm-2 OFF delay setting	OFF DELAY2
D60	Self-check result	SELF CHK	E15	Direction of alarm-1 relay action	RL1 ACTION
			E16	Direction of alarm-2 relay action	RL2 ACTION
			E60	Self-check result	SELF CHK
			F	**Setting (communication)**	**SET(COM)**
			F01	Communication protocol	PROTOCOL
			F02	Address	ADDRESS
			F03	Baud rate	BAUD RATE
			F04	Parity	PARITY
			F05	Data length	DATA LEN
			F06	Stop bit	STOP BIT
			F07	Decimal point position	INPUT DEC PT
			F60	Self-check result	SELF CHK
Adjusting items (*3)			***Test items*** (*3)		
P	**Adjustment**	**ADJUST1**	**Q**	**Test**	**TEST**
P01	Wiring resistance correction	WIRING R	Q01	ON/OFF of RJC	RJC
P02	Zero adjustment of input 1	ZERO ADJ1	Q02	Forced output 1	OUT1 TEST
P03	Span adjustment of input 1	SPAN ADJ1	Q03	Forced output 2	OUT2 TEST
P12	0% adjustment of output 1	OUT1 0%	Q04	Forced output (alarm 1)	ALM1 TEST
P13	100% adjustment of output 1	OUT1 100%	Q05	Forced output (alarm 2)	ALM2 TEST
P14	0% adjustment of output 2	OUT2 0%	Q60	Self-check result	SELF CHK
P15	100% adjustment of output 2	OUT2 100%			
P60	Self-check result	SELF CHK			

*1 : The status is displayed for service personnel to see history records.
*2 : Some items are not displayed depending on the selected input sensor type or output-2 specification.
*3 : To call the parameter setting items D, E, F, P and Q using the JHT200 Handy Terminal, execute the following operation:

Press [F1] → [ ] → [ENTER] keys.

D, E, F, P or Q key enters [ ] above.

12. MAINTENANCE

The product enters the operable status as soon as the power is turned on, but requires 10 to 15 minutes of warm-up to meet the performance requirements.

12.1 Calibration Apparatus

- Calibrator (Yokogawa Meters & Instruments' CA71 or equivalent): 1
- Temperature sensor (Yokogawa Meters & Instruments' B9108WA or equivalent): 1
- Digital Multimeter (Yokogawa's 7561 or equivalent): 1
- Precision resistor of 250 Ω ±0.01%, 1 W: 1
- Setting tool for adjustment (Refer to "8.2 Connecting the Setting Tools" in this manual.)

12.2 Calibration Procedure

(1) Connect the instruments as shown in Fig.12.1.
First adjust the output-1 signal and then the output-2 signal.

(2) Produce the input signal equivalent to 0, 25, 50, 75 and 100% of the input span from the calibrator. Check that the converter's output signals show voltages corresponding to 0, 25, 50, 75 and 100% within the rated accuracy range.
If the output signal is out of the rated accuracy range, adjust the output signal level using the VJ77 PC-based Parameters Setting Tool or JHT200 Handy Terminal.
Refer to the user's manual for VJ77 PC-based Parameters Setting Tool (IM 77J01J77-01E) or for JHT200 Handy Terminal (IM JF81-02E).

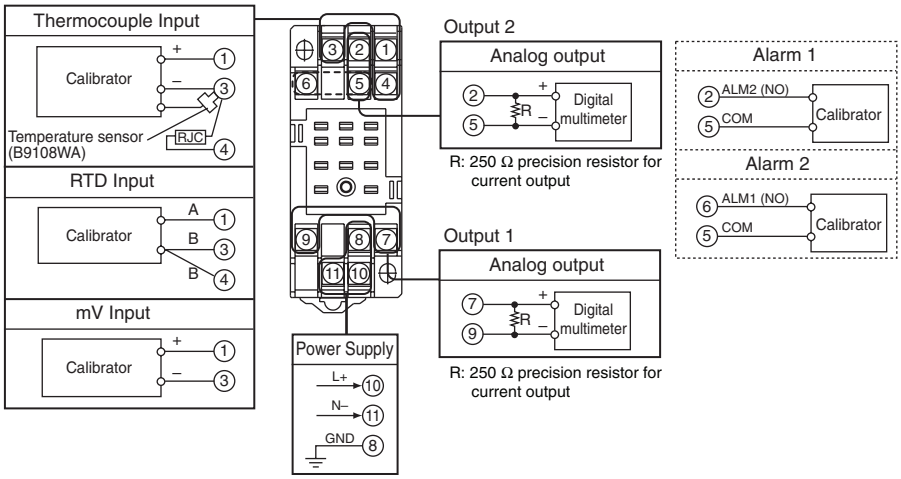


Fig. 12.1