

# User's Manual

Model MXD  
Universal Computing Unit  
(1-input, Isolated 1-output Type)  
<with Contact I/O>

JUXTA

IM 77J04X12-01E

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Please read through this User's Manual before use for correct handling.  
Please keep this User's Manual for future reference.

**YOKOGAWA**  
Yokogawa Electric Corporation

IM 77J04X12-01E  
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## 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 ensure safe use.



**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.**

## CHECKING PRODUCT SPECIFICATIONS AND PACKAGED ITEMS

### (1) Checking the Model and Product Specifications

Check that the model and specifications indicated on the nameplate attached to the main unit are as ordered.

### (2) Packaged Items

Check that the package contains the following items:

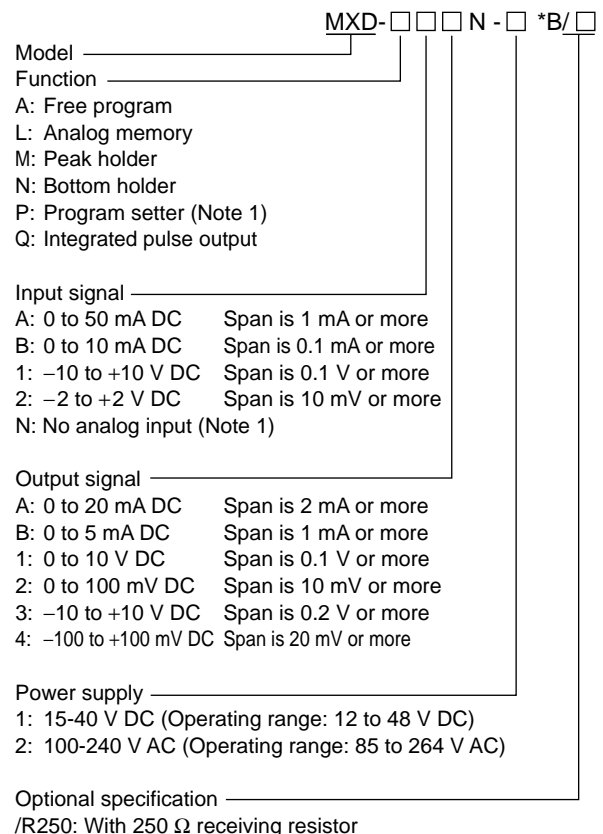
- MXD: 1
- Range label: 1
- Spacer: 1
- Receiving resistor (for current input): 1
- User's Manual (this manual: IM 77J04X12-01E): 1

\* When the optional specification "/R250" is specified, the 250  $\Omega$  receiving resistor is attached. When the optional specification "/R250" is not specified, the 100  $\Omega$  receiving resistor is attached.

## GENERAL

This plug-in type universal computing unit receives DC current or DC voltage signals, applies various computing functions to them, and then converts them into isolated DC current or DC voltage signals.

## MODEL AND SUFFIX CODES



Note 1: The input signal suffix code "N" is fixed when the program setter is selected.  
However, the analog input is adjusted and inspected by 1 to 5 V DC of the input signal suffix code "1" before shipment.

## 1. MOUNTING METHOD

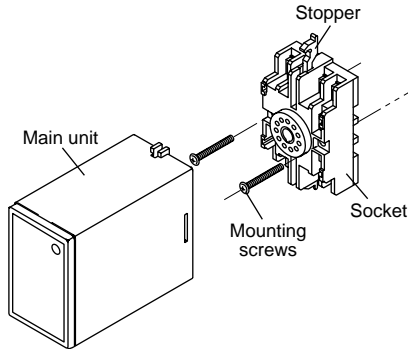


### NOTE

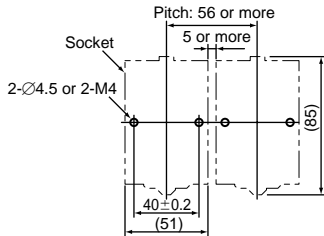
**Plug/disconnect the main unit into/from the socket vertically to the socket face. Otherwise the terminals may bend and it may cause bad contact.**

### 1.1 Wall Mounting

Unfasten the upper and lower stoppers of the computing unit to disconnect the main unit from the socket. Next, anchor the socket onto the wall with two M4 screws. Then, plug the main unit into the socket and secure the main unit with the upper and lower stoppers.



#### <Mounting Dimensions>



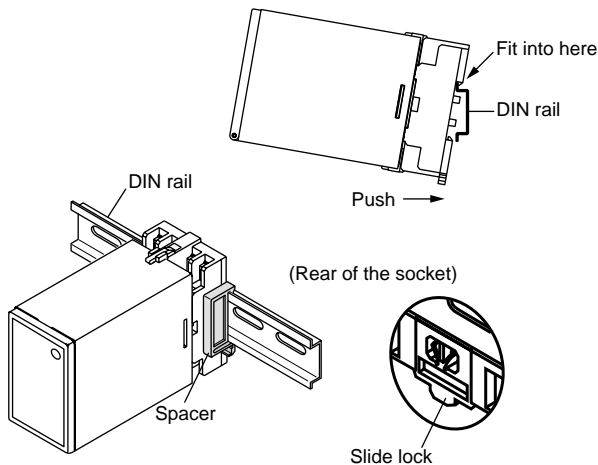
Unit: mm

#### Note:

- When mounting the computing units close together, leave a space of at least 5 mm between them.
- Use the supplied spacer to keep a space of 5 mm for DIN rail mounting.

### 1.2 DIN Rail Mounting

Locate the computing unit 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.



### 1.3 Using Ducts

Wiring ducts should be installed at least 30 mm away from the top or bottom of the main unit.

## 2. INSTALLATION LOCATIONS

- Avoid the following environments for installation locations: Areas with vibration, corrosive gases, dust, water, oil, solvents, direct sunlight, radiation, a strong electric field, and/or a strong magnetic field  
Installation altitude: 2000 m or less above sea level.
- 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 this computing unit and a field-installed device.
- Operating temperature/humidity range: 0 to 50°C/5 to 90%RH (no condensation)

## 3. EXTERNAL WIRING

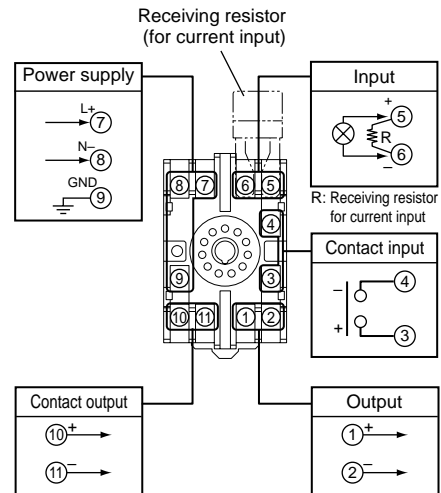


### WARNING

**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 carrying out wiring work.**

Wires are connected to the terminals of the computing unit's socket. M3.5 screw terminals are provided for the connection of external signals. Attach a crimp-on lug to each wire for connection to the terminals.

- Recommended cables: A nominal cross-sectional area of 0.5 mm<sup>2</sup> or thicker for signal cables, and that of 1.25 mm<sup>2</sup> or thicker for power cables.



### IMPORTANT

- **The power line and input/output signal lines should be installed away from noise-generating sources. Other wise accuracy cannot be guaranteed.**
- **The grounding resistance must be 100 Ω (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. 9) of the product to the ground. Do not carry out daisy-chained inter-ground terminal wiring.**
- **Use of the product ignoring the specifications may cause overheating or damage. Before turning on the power, ensure the following:**
  - Power supply voltage and input signal value applied to the product should meet the required specifications.**
  - 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.**

## Power Supply and Isolation

Power supply rated voltage:

15-40 V DC  $\ddot{=}$  or 100-240 V AC  $\sim$  50/60 Hz

Power supply input voltage:

15-40 V DC  $\ddot{=}$  ( $\pm 20\%$ ) or 100-240 V AC  $\sim$  ( $-15, +10\%$ ) 50/60 Hz

Power consumption:

24 V DC 2.3 W

100 V AC 4.6 VA, 200 V AC 6.4 VA

Insulation resistance:

100 M $\Omega$  or more at 500 V DC between input, analog output, contact output, power supply, and grounding terminals mutually. (Analog input and contact input terminals are not isolated.)

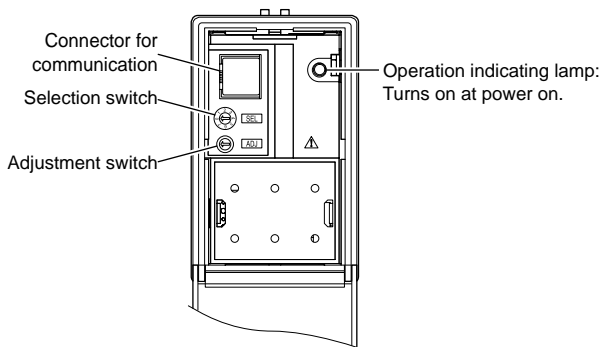
Withstand voltage:

2000 V AC for 1 minute between input, (analog output, contact output), power supply and grounding terminals mutually.

1000 V AC for 1 minute between analog output and contact output terminals.

## 4. DESCRIPTION OF FRONT PANEL

The figure below shows the computing unit of which the front panel cover is open.



### 4.1 Operation Indicating Lamp

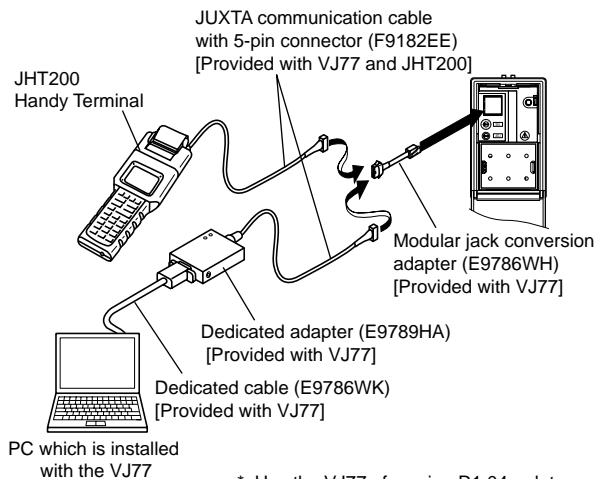
The operation indicating lamp shows the operation status, abnormalities in a setting, and adjustment operation status by the adjustment switch on the front panel.

- (1) When the lamp is lit:  
Power is turned on and the computing unit is in the normal status provided that the selection switch is set to the position "0."
- (2) When the lamp is blinking rapidly:  
The lamp repeats the rapid blinking until the internal processing is completed during output adjustment by the adjustment switch or forced contact output.
- (3) When the lamp is blinking slowly:  
The lamp repeats the slow blinking until the computing unit regains its normal status when the following abnormalities occur.
  - Abnormalities in a parameter setting
  - The selection switch is set to the positions other than "0."

### 4.2 Connector for Communication

Use the connector for communication when setting the parameters using a PC (VJ77 Parameters Setting Tool) or the Handy Terminal.

#### < How to connect with the setting tool >



\*: Use the VJ77 of version R1.04 or later.

## 4.3 Selection Switch and Adjustment Switch

The following adjustments can be performed using the switches on the front panel (selection switch and adjustment switch) without the dedicated setting tool (refer to "4.2 Connector for Communication").

The adjusted value is saved about 1 second after operating the adjustment switch. Also when the rotation direction of the adjustment switch is changed, the adjusted value becomes effective about 1 second after the change.

Position of selection switch	Item to be adjusted
0	No function
1	Output zero adjustment
2	Output span adjustment
3	No function
4	No function
5	No function
6	No function
7	Forced contact output ON/OFF

Rotation direction of adjustment switch	Adjustment operation
Clockwise	Increase of output adjusted value Forced contact output ON
Counterclockwise	Decrease of output adjusted value Forced contact output OFF

### [Adjusted volume by the adjustment switch]

One click changes about 0.005% of output range.

#### 4.3.1 Adjusting Output Using the Switches on the Front Panel

- (1) Output zero adjustment  
Turn the selection switch to "1." Then turn the adjustment switch clockwise to increase the output, or turn it counterclockwise to decrease the output.
- (2) Output span adjustment  
Turn the selection switch to "2." Then turn the adjustment switch clockwise to increase the output, or turn it counterclockwise to decrease the output.
- (3) Forced contact output  
Turn the selection switch to "7." Use the adjustment switch for adjustment.



#### NOTE

- **Be sure to set the selection switch back to the position "0" after each adjustment. Otherwise it may cause an incorrect operation or malfunction because the positions other than "0" are adjustment modes.**
- **When the selection switch is set to the positions other than "0", the setting tool can not be used for the setting.**

## 5. SETTING PARAMETERS

Set the parameters using a PC (VJ77 Parameters Setting Tool) or the Handy Terminal. Refer to "7. List of Parameters" in this manual and the User's Manual for VJ77 PC-based Parameters Setting Tool (IM 77J01J77-01E) or the User's Manual for JHT200 Handy Terminal (IM JF81-02E). Parameters are indicated inside the [ ].

### ■ Setting Input Range

Set the 0% value of input range in [D27: INPUT1 L\_RNG] and the 100% value of input range in [D28: INPUT1 H\_RNG].



#### NOTE

**Changing the input range resets the input adjusted value.**

### ■ Setting Output Range

Set the 0% value of output range in [D38: OUT1 L\_RNG] and the 100% value of output range in [D39: OUT1 H\_RNG].



#### NOTE

**Changing the output range resets the output adjusted value.**

## 6. COMPUTING FUNCTIONS

### 6.1 MXD-A Free Program

This computing unit is used to meet individual applications by programming the available commands using a PC (VJ77 Parameters Setting Tool) or the JHT200 Handy Terminal. Set the computing program in G01 to G59.

### 6.2 MXD-L Analog Memory

This computing unit carries out the analog output (Y) of the value that corresponds to the analog input (X) as an ordinary computing unit as long as the contact input (DI) is ON (SHORT).

When the contact input is OFF (OPEN), the unit holds the analog output at that time (Y) all the time.

### 6.3 MXD-M Peak Holder

This computing unit carries out the analog output (Y) of the value that corresponds to the analog input (X) as an ordinary computing unit as long as the contact input (DI) is ON (SHORT).

When the contact input is OFF (OPEN), the unit outputs the analog signal (Y) that corresponds to the peak value of subsequent analog input (X).

### 6.4 MXD-N Bottom Holder

This computing unit carries out the analog output (Y) of the value that corresponds to the analog input (X) as an ordinary computing unit as long as the contact input (DI) is ON (SHORT).

When the contact input is OFF (OPEN), the unit outputs the analog signal (Y) that corresponds to the bottom value of subsequent analog input (X).

### 6.5 MXD-P Program Setter

This computing unit resets the program, outputs and holds the starting value of the time table when the contact input (DI) is ON (SHORT). When the contact input is OFF (OPEN), the unit starts the program and outputs the analog signal (Y) according to the time table. When the program ends, the unit outputs the end value of time table and holds it until the next reset command (contact input in ON (SHORT) status) enters.

Up to 21 time tables can be set and give relationship of time vs. output.

Any number (1 to 20) of line segments of time table can be set in H43.

Set a number (1 to 20) of line segments in H43.

Set X axis (time) in H01 to H21: CONST.

X axis breakpoint H01 corresponds to Y axis breakpoint H22 and shifts orderly thereafter.

Fixed constants (H01 to H43) can be changed using the Handy Terminal.

0 to 100.0% in H01 to H21 corresponds to 0 to 1000 seconds.

0 to 100.0% in H22 to H42 corresponds to 0 to 100.0% of output.

Number of line segments 1 to 20 of time table corresponds to 100 to 2000%.

- Setting condition of time table:  
0.0% ≤ (H01 to H21) ≤ 32000% (0 to 320000 seconds)  
-6% ≤ (H22 to H42) ≤ 106%  
H01 < H02 ..... < H21  
Number of time tables: 2 to 21
- Setting resolution:  
Time: 1 second (0.1%)  
Output: 0.1%
- Setting accuracy of time table:  
(±5.0% of set value) ±1.0 second
- Number of significant digits: 4  
X axis: t<sub>0</sub> to t<sub>20</sub> (e.g. 123456 seconds unacceptable, 123400 seconds acceptable)  
Y axis: Y<sub>0</sub> to Y<sub>20</sub> (e.g. 12.34% unacceptable, 12.3%, acceptable)

### 6.6 MXD-Q Integrated Pulse Output

This computing unit outputs the integrated pulse according to the following expression.

$$DO = K1 \cdot X \cdot 10$$

where DO: Integrated pulse output (pulse/hour)

X: Input signal (%)

K1: Integration factor (no unit)

Pulse output is ON pulse of 100 ms. However, the maximum number of output pulse is 5 pulses / second. Also, the analog signal is always output as monitor of input signal (X).

Integration factor (K1) can be set in H01: CONST.

Fixed constant H01 can be changed using the Handy Terminal.

- Setting range of integration factor:  
0.01 to 18 (1% to 1800%)  
Number of significant digits: 4  
Minimum unit: 0.00001
- Computation accuracy:  
1000±2 (pulse/hour) (However, when K1 = 1, X = 100%.)
- Specification of contact output:  
Maximum permissible load: 30 V DC/200 mA
- Number of significant digits: 4  
(e.g. 1.23456 unacceptable; 12.34, 1.234, 0.01234 acceptable)

## 7. LIST OF PARAMETERS

### 7.1 MXD (except for the function suffix code "A")

Parameter Display		Item
	MODEL	Model
	TAG NO	Tag No.
	SELF CHK	Self-check result
<b>A</b>	<b>DISPLAY1</b>	<b>Display 1</b>
A01	INPUT1	Input-1
A05	OUTPUT1	Output-1
A15	DI	Digital input
A16	DO	Digital output
A54	STATUS	Status <sup>*1</sup>
A56	REV NO	REV No.
A58	MENU REV	MENU REV
A60	SELF CHK	Self-check result
<b>B</b>	<b>DISPLAY2</b>	<b>Display 2</b>
B01	INPUT1	Input-1
B05	OUTPUT1	Output-1
B15	DI	Digital input
B16	DO	Digital output
B60	SELF CHK	Self-check result
<b>D</b>	<b>SET (I/O)</b>	<b>Setting (I/O)</b>
D01	TAG NO.1	Tag No.-1
D02	TAG NO.2	Tag No.-2
D03	COMMENT1	Comment-1
D04	COMMENT2	Comment-2
D20	INP TYPE	Input type <sup>*2</sup>
D22	IN RESIST	Input resistor <sup>*2</sup>
D27	INPUT1 L_RNG	Input-1 low range
D28	INPUT1 H_RNG	Input-1 high range
D38	OUT1 L_RNG	Output-1 low range
D39	OUT1 H_RNG	Output-1 high range
D45	PRGM SELECT	Program selection
D60	SELF CHK	Self-check result
<b>H</b>	<b>CONST</b>	<b>Fixed Constant of Computing Unit</b>
H01	CONST	Fixed constant
H02	CONST	Fixed constant
⋮	⋮	⋮
H58	CONST	Fixed constant
H59	CONST	Fixed constant
H60	SELF CHK	Self-check result
<b>P</b>	<b>ADJUST</b>	<b>Adjustment</b>
P08	IN1 ZERO ADJ	Input-1 zero adjustment
P09	IN1 SPAN ADJ	Input-1 span adjustment
P26	OUT1ZERO ADJ	Output-1 zero adjustment
P27	OUT1SPAN ADJ	Output-1 span adjustment
P60	SELF CHK	Self-check result
<b>Q</b>	<b>TEST</b>	<b>Test</b>
Q03	OUT1 TEST	Forced output-1
Q12	DO1 TEST	Forced contact output-1
Q60	SELF CHK	Self-check result

\*1: The displayed status is to let the service staff know the past records of the product.

\*2: The parameters are the items to be set at the factory.

### 7.2 MXD (for the function suffix code "A")

Parameter Display		Item
	MODEL	Model
	TAG NO	Tag No.
	SELF CHK	Self-check result
<b>A</b>	<b>DISPLAY1</b>	<b>Display 1</b>
A01	INPUT1	Input-1
A05	OUTPUT1	Output-1
A11	T1	Temporary memory-1
A12	T2	Temporary memory-2
A13	T3	Temporary memory-3
A14	T4	Temporary memory-4
A15	DI	Digital input
A16	DO	Digital output
A17	LOAD	Load factor
A54	STATUS	Status <sup>*1</sup>
A56	REV NO	REV No.
A58	MENU REV	MENU REV
A60	SELF CHK	Self-check result
<b>B</b>	<b>DISPLAY2</b>	<b>Display 2</b>
B01	INPUT1	Input-1
B05	OUTPUT1	Output-1
B11	T1	Temporary memory-1
B12	T2	Temporary memory-2
B13	T3	Temporary memory-3
B14	T4	Temporary memory-4
B15	DI	Digital input
B16	DO	Digital output
B17	LOAD	Load factor
B60	SELF CHK	Self-check result
<b>D</b>	<b>SET (I/O)</b>	<b>Setting (I/O)</b>
D01	TAG NO.1	Tag No.-1
D02	TAG NO.2	Tag No.-2
D03	COMMENT1	Comment-1
D04	COMMENT2	Comment-2
D20	INP TYPE	Input type <sup>*2</sup>
D22	IN RESIST	Input resistor <sup>*2</sup>
D27	INPUT1 L_RNG	Input-1 low range
D28	INPUT1 H_RNG	Input-1 high range
D38	OUT1 L_RNG	Output-1 low range
D39	OUT1 H_RNG	Output-1 high range
D45	PRGM SELECT	Program selection
D47	CYCLE TIME	Computation cycle
D60	SELF CHK	Self-check result
<b>G</b>	<b>PROGRAM</b>	<b>Program of Computing Unit</b>
G01	PROGRAM	Program
G02	PROGRAM	Program
⋮	⋮	⋮
G58	PROGRAM	Program
G59	PROGRAM	Program
G60	SELF CHK	Self-check result
<b>H</b>	<b>CONST</b>	<b>Fixed Constant of Computing Unit</b>
H01	CONST	Fixed constant
H02	CONST	Fixed constant
⋮	⋮	⋮
H58	CONST	Fixed constant
H59	CONST	Fixed constant
H60	SELF CHK	Self-check result
<b>P</b>	<b>ADJUST</b>	<b>Adjustment</b>
P08	IN1 ZERO ADJ	Input-1 zero adjustment
P09	IN1 SPAN ADJ	Input-1 span adjustment
P26	OUT1ZERO ADJ	Output-1 zero adjustment
P27	OUT1SPAN ADJ	Output-1 span adjustment
P60	SELF CHK	Self-check result
<b>Q</b>	<b>TEST</b>	<b>Test</b>
Q03	OUT1 TEST	Forced output-1
Q12	DO1 TEST	Forced contact output-1
Q60	SELF CHK	Self-check result



## 8. MAINTENANCE

The product starts running immediately when the power is turned on; however, it needs 10 to 15 minutes of warm-up before it meets the specified performance.

### 8.1 Calibration Apparatus

- A DC voltage/current standard (Yokogawa 7651 or the equivalent)
- A digital multimeter (Yokogawa 7561 or the equivalent)
- A calibrator (Yokogawa M&C CA71 or the equivalent)
- A precision resistor of  $250\ \Omega \pm 0.01\%$ , 1 W
- Setting tool for adjustment (Refer to “4.2 Connector for Communication” in this manual.)

### 8.2 Calibration Procedure

- (1) Connect the instruments as shown below.
  - (2) Use the DC voltage/current standard and apply input signals equivalent to 0, 25, 50, 75, and 100% of input span to the computing unit.
  - (3) Check to see the output values obtained from the computation of each input are within the specified accuracy rating. “R” is used for current output.
- Use the setting tool (VJ77 Parameters Setting Tool or JHT200 Handy Terminal) or the switches on the front panel (selection switch and adjustment switch) to adjust the input/output signals.

#### Input Adjustment Procedure

- (1) Input the value equivalent to 0% value of input range.
- (2) Call the display item (A: DISPLAY1) to check the input value in A01: INPUT1.
- (3) If the adjustment is necessary, call the adjustment item (P: ADJUST).
- (4) Select P08: IN1 ZERO ADJ to enter the adjustment mode. Select EXECUTE (adjustment) for adjustment. (If RESET is selected, the adjusted value is reset to the factory-set default.)
- (5) Input the value equivalent to 100% value of input range.
- (6) Call the display item (A: DISPLAY1) to check the input value in A01: INPUT1.
- (7) If the adjustment is necessary, call the adjustment item (P: ADJUST).
- (8) Select P09: IN1 SPAN ADJ to enter the adjustment mode. Select EXECUTE (adjustment) for adjustment. (If RESET is selected, the adjusted value is reset to the factory-set default.)

#### Output Adjustment Procedure

- (1) When adjusting 0% value of output, call the adjustment item (P: ADJUST) to select P26: OUT1ZERO ADJ.
- (2) If there is a positive deviation, correct it by setting a negative value to offset the deviation. If there is a negative deviation, correct it by setting a positive value.

\*: The 100% value of output can be adjusted by the same operation as the above.

For adjustment using a setting tool, refer to the User's Manual for each setting tool and “7. List of Parameters” in this manual.

For adjustment using the switches on the front panel, refer to “4.3 Selection Switch and Adjustment Switch.”

User's Manual for VJ77 [Document No.: IM 77J01J77-01E]; however, use the VJ77 of version R1.04 or later.

User's Manual for JHT200 [Document No.: IM JF81-02E]

