User's Manual

Model VJQ8 JUXTA
Pulse to Analog Converter (Multi-function)
(Isolated Single-output and Isolated Dual-output Types)

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You can download the latest manuals from the following website:
http://www.yokogawa.com/ns/juxta/im/

Thank you for purchasing the JUXTA Signal Conditioner.
Please read through this manual before use for correct handling.

YOKOGAWA
Yokogawa Electric Corporation

IM 77J01Q08-01E
6th Edition Mar. 2017(YK)

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 usage.

This symbol is displayed on the product when it is necessary to refer to the User's Manual for information on personal and instrument safety. This symbol is displayed in the User's Manual to indicate precautions to avoid danger to the operator, such as an electric shock.

The following symbols are used only in this manual.

Note

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

CHECKING PRODUCT SPECIFICATIONS AND PACKAGE

(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:

- VJQ8: 1 unit
- Tag number label: 1 sheet
- Range label: 1 sheet
- Shunt resistor (when optional code "/R□" is specified): 1
- User's Manual (this manual): 1 copy

GENERAL

This plug-in type pulse to analog converter receives contact pulse, voltage pulse, or current pulse from the field and converts the signal into isolated DC current or voltage signals.

- Output-2 can be selected from DC voltage signal, DC current signal, communication function (RS-485), or alarm output (2 relay contacts).
- Various parameters such as input range can be set and modified using a PC (VJ77(sold separately)) or Handy Terminal (JHT200(sold separately) and the like).

MODEL AND SUFFIX CODES

Model	Suffix codes								Description
VJQ8	-0	□	□	-□	□	□	0	/□	Pulse to Analog Converter (Multi-function)
	-0								Always 0
Output configuration	1								1 output
	2								2 outputs
Power supply		6							100-240 V AC/DC (*1)
		7							15-30V DC (*2)
Transmitter Power Supply			-1						12V DC±10%
			-2						24V DC±10%
Output-1				A					4 to 20mA DC
				B					2 to 10mA DC
				C					1 to 5mA DC
				D					0 to 20mA DC
				E					0 to 16mA DC
				F					0 to 10mA DC
				G					0 to 1mA DC
				1					0 to 10mV DC
				2					0 to 100mV DC
				3					0 to 1V DC
				4					0 to 10V DC
				5					0 to 5V DC
				6					1 to 5 V DC
				7					−10 to +10V DC
				Z					(Custom Order)(*3)
Output-2					A				4 to 20mA DC
					6				1 to 5V DC
					P				Communication function (RS-485)
					T				Alarm output (2 relay contacts)
					N				None
						0			Always 0
Options									Blank: With socket
								/SN	Without socket
								/R100	With 100 Ω shunt resistor (*4)
								/R220	With 220 Ω shunt resistor (*4)
								/R510	With 510 Ω shunt resistor (*4)
								/R1000	With 1000 Ω shunt resistor (*4)
								/R2200	With 2200 Ω shunt resistor (*4)

*1 Operating range: 85-264 V
*2 Operating range: 12-36 V
*3 DC voltage signal or DC current signal
*4 Specify when current pulse input

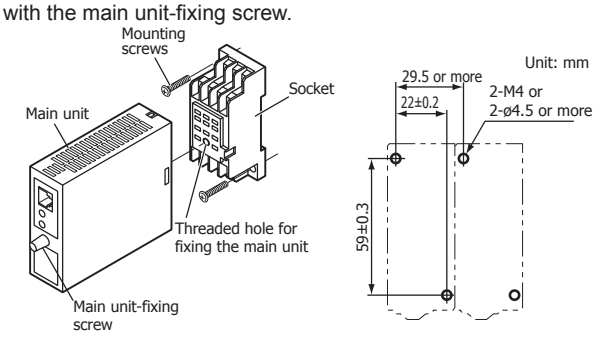
1. MOUNTING METHOD

Note

Insert/pull out the main unit into/from the socket vertically to the face of socket. Otherwise the terminals are bent and it may cause a bad contact.

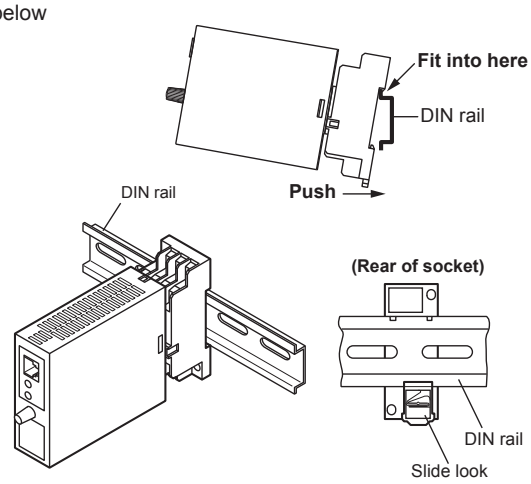
1.1 Wall Mounting

Loosen the main unit-fixing screw of the product and pull out the main unit from the socket. Fix the socket on the wall with screws. Next, insert the main unit into the socket and fasten the main unit with the main unit-fixing screw.



1.2 DIN Rail Mounting

Insert a DIN rail into the upper part of the DIN rail groove on the rear of the socket, and then slide the slide lock at the lower part of the socket upwards until the socket is fixed into position as shown below



1.3 Mounting Using

When using a multi-mounting base, see the User's Manual for VJCE (VJCE Mounting Base).

1.4 Using a Duct

When using a wiring duct, install the duct at least 30 mm away from the top and bottom faces of the main unit.

2. INSTALLATION LOCATION

- 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, altitude of more than 2000m 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 converter and a field-installed device.
- Operating temperature/humidity range: 0 to 50ºC/5 to 90%RH (no condensation)

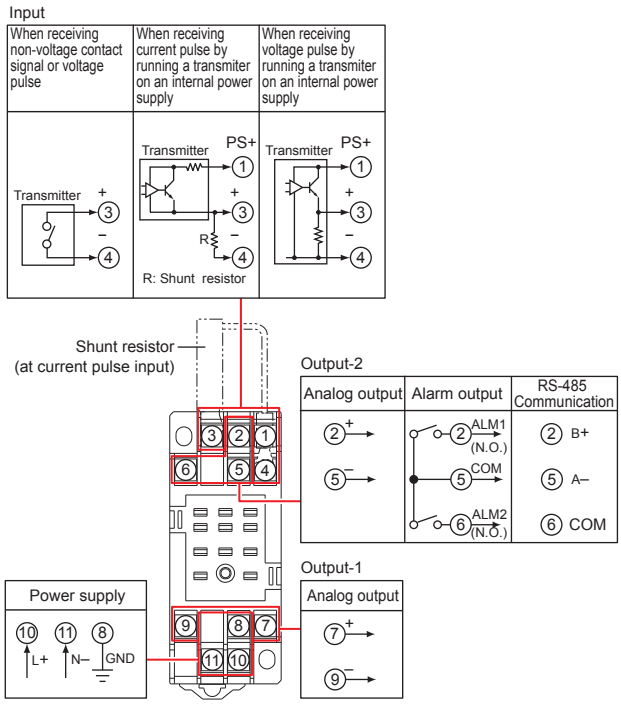
3. EXTERNAL WIRING

WARNING

Be sure to turn OFF the power supply before wiring to avoid the risk of electric shock. Use a tester or similar device to ensure that no power is being supplied to a cable to be connected.

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

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



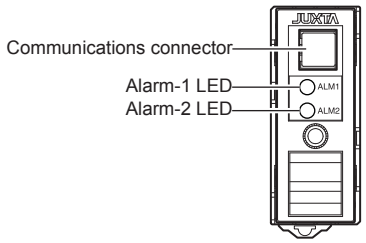
Note

- **Do not use output-2 for the single-output type.**
- **The power line and input/output signal lines should be installed away from noise-generating sources. Other wise accuracy cannot be guaranteed.**
- **Make sure to earth ground the ground terminal through minimum resistance. 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**
- **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.**
- **The use of inductance (L) loads such as auxiliary relays and solenoid valves causes malfunction or relay failure; always insert a CR filter or diode for spark-removal into the line in parallel with the load. Recommended CR**
  - C: 0.5 to 1μF against contact current 1A
  - R: 0.5 to 1Ω against contact voltage 1V
- **For 15-30 V DC ⎓ (±20%) power supply, as a safety measure, always install a circuit breaker (an IEC 60947-compatible product, 1 A, 30 V DC) in an easily accessible location near the instrument. Moreover, provide indication that the switch is a device for turning off the power to the instrument.**

4. DESCRIPTION OF FRONT PANEL

4.1 Front Panel

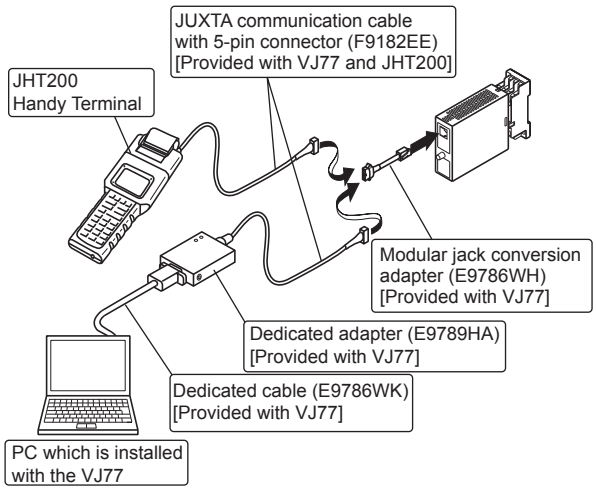
The communications connector in the front panel is used for setting up parameters through a PC (VJ77 PC-based Parameters Setting Tool) or the Handy Terminal. The ALM1 and ALM2 LEDs light up if an alarm occus (those LEDs are provided only when the output-2 is specified for alarm output.)



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

5. SETTING PARAMETERS

Set the parameters using a PC (VJ77 Parameter Setting Tool) or the Handy Terminal. Refer to **"8. 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 77J50H01-01EN). Parameters are indicated inside the **[ ]**.

5.1 Settings Related to Inputs and Outputs

5.1.1 Input Range Unit

When referring and setting the input range, select and set "Hz" or "kHz" in **[D10: UNIT]**. Select "kHz" when input range is over 32000Hz.

5.1.2 Conversion Mode

Select and set the action of the instrument from "F/V CONVERTER" (F/V conversion) or "INTEGRATOR" (pulse integrator) in **[D19: SELECT MODE]**.

F/V converter: Set when converting 0 to 100% of frequency input to 0 to 100% of analog output, and outputting it.

INTEGRATOR: Set when converting 0 to 100% of frequency in put to 0 to 100% of analog output after computing the average frequency from the pulse number integrated per sample time, and outputting it.

5.1.3 Sample Mode

Select and set "AUTO" or "MANUAL" in **[D20: SAMPLE MODE]**, when the conversion mode is set to "INTEGRATOR."

AUTO: Outputs the sample time forcibly on the provided

MANUAL: Sets the sample time within setting range.

5.1.4 Sample Time

When the sample mode is set to "MANUAL", set the sample time in numerical value in **[D21: SAMPLE TIME]**.

- Sample time setting range: 0.1 to 100 seconds, by 0.1 second When the sample mode is set to "AUTO", the sample time is forcibly decided on the following conditions.

0.1 second when F_{100} (100% input frequency) is 1kHz or more

$(1/F_{100})$ x 100 seconds when F_{100} is over 1Hz and below 1kHz

100 seconds when F_{100} is 1Hz or less.

5.1.5 Input Range

Set the 0% value of input range in **[D22: INPUT1L_RNG]**, and 100% of input range in **[D23: INPUT1H_RNG]** within the numerically specified range.

Note

In case the input range is changed after factory-ship, the instrument may not work within the rated accuracy range depending on the changed input range. Perform the adjustment following the maintenance of this instruction manual after changing the input range.

5.1.6 Input Filter

When the chattering noise is generated in input, the input filter is used to restrain the influence. Select and set "ON" in **[D50: INPUT FILTER]**, then the input filter for time constant of about 10ms will be connected.

5.1.7 Direction of Output Action

Analog output signals can be reversed. To reverse the signal from output-1, set **[D38: OUT1 DR]** to REVERSE. For output-2, set **[D39 OUT2 DR]** to REVERSE. To return the output-1 signal to normal, set D38: OUT1 DR to DIRECT. For output-2, set D39: OUT2 DR to DIRECT.

5.2 Settings Related to Communication Function

Set the following parameters when output-2 is specified for communication function. For more information on the communication function, see the Instruction Manual for VJ Series Communication Function (IM 77J1J11-01E).

5.2.1 Communication Protocol

Set the communication protocol by selecting from among PCLINK, PC-LINK WITH SUM, MODBUS ASCII, MODBUS RTU, and LADDER in **[F01: PROTOCOL]**.

5.2.2 Communication Address

Set the address number of the isolator numerically in a range of 1 to 99 in **[F02: ADDRESS]**.

5.2.3 Baud Rate

Set the baud rate by selecting from among 1200, 2400, 4800, and 9600 bps in **[F03: BAUD RATE]**.

5.2.4 Parity

Select and set NONE, EVEN, or ODD in **[F04: PARITY]**.

5.2.5 Data Length

Select and set 7 bits or 8 bits in **[F05: DATA LEN]**.

5.2.6 Stop Bit

Select and set 1 bit or 2 bits in **[F06: STOP BIT]**.

5.2.7 Input Decimal Point Position

Number of digits of decimal places (setting of D register [D0003]) can be set.

Select and set among 0 to 5 digits in **[F07: INPUT DEC PT]**.

5.3 Settings Related to Alarm Output

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

5.3.1 Alarm Setpoints

Set the alarm setpoints of alarm-1 and alarm-2 in **[E03: SET POINT1]** and **[E04: SET POINT2]** numerically.

- Setting range: A range of 0 to 100% of input range
- Setting resolution: 0.1%

5.3.2 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) and set each in **[E05: ALM1 ACTION]** (direction of alarm-1 action) or **[E06: ALM2 ACTION]** (direction of alarm-2 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.

5.3.3 Hysteresis

Set alarm-1 and alarm-2 hysteresis, in **[E09: HYSTERESIS1]** and **[E10: HYSTERESIS2]**. 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).

- Setting range: A range of 0 to 100% of input range
- Setting resolution: 0.1%

5.3.4 Alarm ON Delay and Alarm OFF Delay

Set alarm-1 and alarm-2 ON delays in **[E11: ON DELAY1]** and **[E12: ON DELAY2]** and then alarm-1 and alarm-2 OFF delays in **[E13: OFF DELAY1]** and **[E14: OFF DELAY2]**. An alarm ON delay is a delay time from the establishment of alarm condition to alarm output; an alarm OFF delay is a delay time from the establishment of return-to-normal condition to output.

- Setting range: 0 to 999 seconds
- Setting resolution: 1 second (Note that about 0.2 second will be added to set time to prevent erroneous operation.)

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

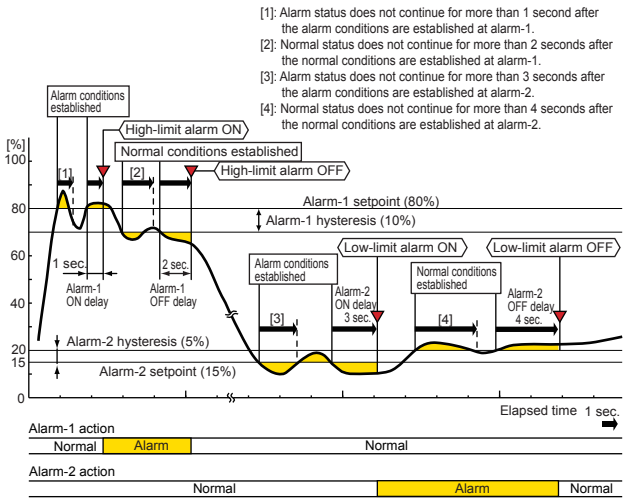
5.3.5 Direction of Relay Action

Set the direction of relay energizing in alarm-1 normal condition and alarm-2 normal condition by selecting from among NRM DEENERGIZED (de-energized under normal condition) and NRM ENERGIZED (energized under normal condition) in **[E15: RL1 ACTION]** and **[E16: RL2 ACTION]** and set them.

6. DESCRIPTION OF ALARM ACTIONS

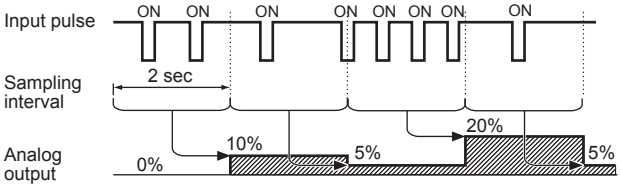
This chapter describes examples of alarm actions under the following conditions.

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 sounds if the condition where the input value is 80% or more of high-limit alarm continues for more than 1 second. After the alarm sounds, when the condition where input value is less than 70%of the high-limit alarm continues for more than 2 seconds, the status returns to normal		The alarm sounds if the condition where the input value is 15% or less of low-limit alarm continues for more than 3 seconds. After the alarm sounds, when the condition where input value is more than 20% of the low-limit alarm continues for more than 4 seconds, the status returns to normal.	



7. TIMING CHART OF PULSE INTEGRATION OPERATION

This timing chart shows an example of the integration operation where input frequency is 0 to 10 Hz and sampling time is 2 sec.



8. LIST OF PARAMETERS

	Parameter Display	Item	
	MODEL	Model	
	TAG NO	Tag no.	
	SELF CHK	Self-check result	
A	**DISPLAY1**	**Display1**	
A01	INPUT1	Input value 1	*1
A05	OUTPUT1	Output value 1	
A06	OUTPUT2	Output value 2	
A07	ALM1 STATUS	Alarm-1 status	
A08	ALM2 STATUS	Alarm-2 status	
A31	COUNTER1	Integrating counter 1	
A32	COUNTER2	Integrating counter 2	
A33	COUNTER3	Integrating counter 3	
A34	COUNTER4	Integrating counter 4	
A54	STATUS	Status	*2
A56	REV NO	Rev. no.	
A58	MENU REV	MENU REV	
A60	SELF CHK	Self-check result	
B	**DISPLAY2**	**Display2**	
B01	INPUT1	Input value 1	*1
B05	OUTPUT1	Output value 1	
B06	OUTPUT2	Output value 2	
B07	ALM1 STATUS	Alarm-1 status	
B08	ALM2 STATUS	Alarm-2 status	
B31	COUNTER1	Integrating counter 1	
B32	COUNTER2	Integrating counter 2	
B33	COUNTER3	Integrating counter 3	
B34	COUNTER4	Integrating counter 4	
B60	SELF CHK	Self-check result	
D	**SET (I/O)**	**Setting (I/O)**	*3
D01	TAG NO.1	Tag no. 1	
D02	TAG NO.2	Tag no. 2	
D03	COMMENT1	Comment 1	
D04	COMMENT2	Comment 2	
D10	UNIT	Range unit	
D13	LOW CUT	Low input cut point	
D19	SELECT MODE	Conversion mode	
D20	SAMPLE MODE	Sample mode	
D21	SAMPLE TIME	Sample time	
D22	INPUT1 L_RNG	Input low range	
D23	INPUT1 H_RNG	Input high range	
D38	OUT1 DR	Direction of output-1 action	
D39	OUT2 DR	Direction of output-1 action	
D50	INPUT FILTER	Input filter	
D60	SELF CHK	Self-check result	
E	**SET(ALM)**	**Setting (alarm output)**	*3
E03	SET POINT1	Alarm-1 setting	
E04	SET POINT2	Alarm-2 setting	
E05	ALM1 ACTION	Direction of alarm-1 action	
E06	ALM2 ACTION	Direction of alarm-2 action	
E09	HYSTERESIS1	Alarm-1 hysteresis	
E10	HYSTERESIS2	Alarm-2 hysteresis	
E11	ON DELAY1	Alarm-1 ON delay setting	
E12	ON DELAY2	Alarm-2 ON delay setting	
E13	OFF DELAY1	Alarm-1 OFF delay setting	
E14	OFF DELAY2	Alarm-2 OFF delay setting	
E15	RL1 ACTION	Direction of alarm-1 relay action	
E16	RL2 ACTION	Direction of alarm-1 relay action	
E60	SELF CHK	Self-check result	
F	**SET(COM)**	**Setting (communication)**	*3
F01	PROTOCOL	Communication protocol	
F02	ADDRESS	Address	
F03	BAUD RATE	Baud rate	
F04	PARITY	Parity	
F05	DATA LEN	Data Length	
F06	STOP BIT	Stop bit	
F07	INPUT DEC PT	Decimal point position of input	
F60	SELF CHK	Self-check result	
P	**ADJUST**	**Adjustment**	*3
P12	OUT1 0%	0% adjustment of output-1	
P13	OUT1 100%	100% adjustment of output-1	
P14	OUT2 0%	0% adjustment of output-2	
P15	OUT2 100%	100% adjustment of output-2	
P60	SELF CHK	Self-check result	

Q	TEST	Test	*3
Q02	OUT1 TEST	Forced output-1	
Q03	OUT2 TEST	Forced output-2	
Q04	ALM1 TEST	Forced output (alarm)	
Q05	ALM2 TEST	Forced output (alarm)	
Q60	SELF CHK	Self-check result	

*1 Instantaneous frequency is displayed even if conversion mode is pulse integration.

*2 The Status is displayed for service personnel to see history records.

*3 There are items not displayed depending on what output-2 is specified.

9. MAINTENANCE

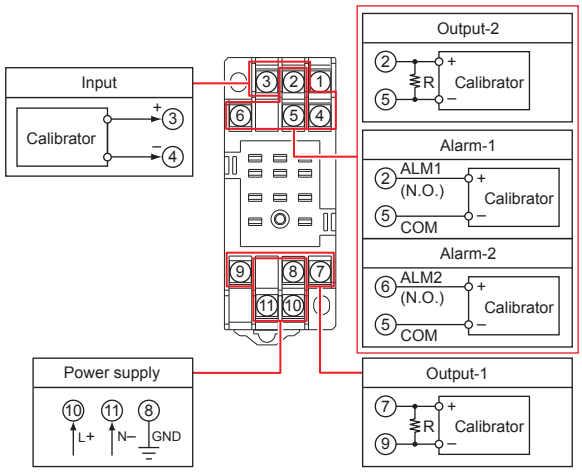
The product starts running immediately when the power is turned on; however, it needs 10 to 15 minutes of warm-up before it meets the specified performance.

9.1 Calibration Apparatus

- A calibrator (YOKOGAWA CA150 or equivalent)
- A precision resistor of 250 Ω ±0.01%, 1W
- Setting tool for adjustment (Refer to **"4.2 Connector for Communication"** in this manual.)

9.2 Calibration Procedure

1. Connect the instruments as shown below. First adjust the output-1 signal and then the output-2 signal.



R: For current output using 250 Ω precision resistor

2. Use the calibrator and apply input signals equivalent to 0, 25, 50, 75, and 100% of the input span to the product.
3. Check to see the corresponding output voltages are 0, 25, 50, 75, and 100% respectively and within the specified accuracy rating. ("R" is used for current output.)

For alarm output, check the relay action by the alarm indicator lamp or resistance of output terminals.

- Use the setting tool (VJ77 Parameter Setting Tool or JHT200 Handy Terminal) to adjust the input/output signals.

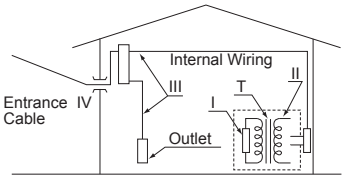
User's Manual for VJ77 [Document No.: IM 77J01J77-01E]
User's Manual for JHT200 [Document No.: IM 77J50H01-01EN]

SAFETY STANDARDS

The following will be acquired.
Safety: Approved by CAN/CSA-C22.2 No.61010-1(CSA),
approved by UL 61010-1.
Installation category: II
Pollutin degree: 2
As for the apparatus authorized, power supply voltage is limited to 15-30 VDC, and the circuit to connect is limited to a class 2.

CAUTION

This instrument is for Measurement Category I (CAT.I). Do not use it for measurements in locations falling under Measurement Categories II, III, and IV.



Measurement category		Description	Remarks
I	CAT.I	For measurements performed on circuits not directly connected to MAINS.	
II	CAT.II	For measurements performed on circuits directly connected to the low-voltage installation.	Appliances, portable equipments, etc.
III	CAT.III	For measurements performed in the building installation.	Distribution board, circuit breaker, etc.
IV	CAT.IV	For measurements performed at the source of the low-voltage installation.	Overhead wire, cable systems, etc.

An analog input signal is measurement category I (CAT.I).
Rated transient overvoltage: 1500 V (Note)

(Note) This is a reference safety standard value for Measurement Category I of IEC/CSA/UL61010-1. This value is not necessarily a guarantee of instrument performance.