Module type controller SRJ

SSR unit **J-CVM**

Installation Manual

IMS01X02-E3

Thank you for purchasing this RKC product. In order to achieve maximum performance and ensure proper operation of the instrument, carefully read all the instructions in this manual. Please place the manual in a convenient location for easy reference.
This manual describes the mounting, wiring, operating and specifications only.

For detailed function, refer to separate **SRJ Instruction Manual (IMS01X03-E□)**.
The manual can be downloaded from the official RKC website:
https://www.rkcinst.co.jp/english/download-center/

■ Product check

J-CVM Installation Manual (IMS01X02-E3) 1
SSR output connector
[Supplied for the SSR output section with a connector (delivered installed on the J-CVM)] ... 8
Strain relief plate [Supplied for the SSR output section with a connector] 8

■ Safety precautions

⚠ WARNING

- To prevent injury to persons, damage to the instrument and the equipment, a suitable external protection device shall be required.
- All wiring must be completed before power is turned on to prevent electric shock, fire or damage to the instrument and the equipment.
- This instrument must be used in accordance with the specifications to prevent fire or damage to the instrument and the equipment.
- This instrument is not intended for use in locations subject to flammable or explosive gases.
- Do not touch high-voltage connections such as power supply terminals, etc. to avoid electric shock.
- RKC is not responsible if this instrument is repaired, modified or disassembled by other than factory-approved personnel. Malfunction may occur and warranty is void under these conditions.

⚠ CAUTION

- This product is intended for use with industrial machines, test and measuring equipment. (It is not designed for use with medical equipment and nuclear energy plant.)
- This is a Class A instrument. In a domestic environment, this instrument may cause radio interference, in which case the user may be required to take additional measures.
- Be sure to provide an appropriate surge control circuit respectively for the following:
  – If input/output or signal lines within the building are longer than 30 meters.
  – If input/output or signal lines leave the building, regardless the length.
- This instrument is designed for installation in an enclosed instrumentation panel. All high-voltage connections such as power supply terminals must be enclosed in the instrumentation panel to avoid electric shock to operating personnel.
- All precautions described in this manual should be taken to avoid damage to the instrument or equipment.
- If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.
- All wiring must be in accordance with local codes and regulations.
- To prevent instrument damage as a result of failure, protect the power line and the input/output lines from high currents with a suitable overcurrent protection device with adequate breaking capacity such as a fuse, circuit breaker, etc.
- A malfunction in this product may occasionally make control operations impossible or prevent alarm outputs, resulting in a possible hazard. Take appropriate measures in the end use to prevent hazards in the event of malfunction.
- Prevent metal fragments or lead wire scraps from falling inside instrument case to avoid electric shock, fire or malfunction.
- For proper operation of this instrument, provide adequate ventilation for heat dissipation.
- Turn off the power supply before cleaning the instrument.
- Do not use a volatile solvent such as paint thinner to clean the instrument. Deformation or discoloration may occur. Use a soft, dry cloth to remove stains from the instrument.

NOTICE

- This manual assumes that the reader has a fundamental knowledge of the principles of electricity, process control, computer technology and communications.
- The figures, diagrams and numeric values used in this manual are only for explanation purpose.
- RKC is not responsible for any damage or injury that is caused as a result of using this instrument, instrument failure or indirect damage.
- RKC is not responsible for any damage and/or injury resulting from the use of instruments made by imitating this instrument.
- Periodic maintenance is required for safe and proper operation of this instrument. Some components have a limited service life, or characteristics that change over time.
- Every effort has been made to ensure accuracy of all information contained herein. RKC makes no warranty, expressed or implied, with respect to the accuracy of the information. The information in this manual is subject to change without prior notice.
- No portion of this document may be reprinted, modified, copied, transmitted, digitized, stored, processed or retrieved through any mechanical, electronic, optical or other means without prior written approval from RKC.
- Various symbols are used on the equipment, and they have the following meaning.

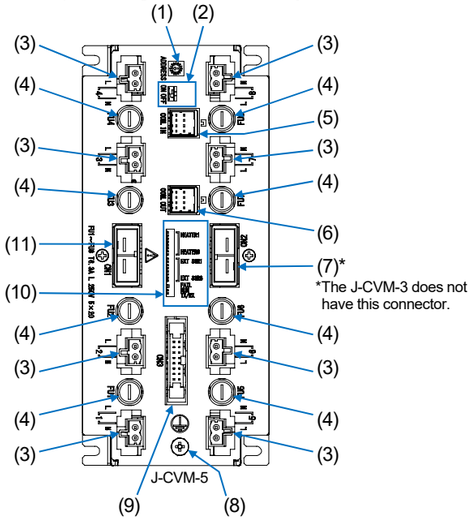
⏚ : Protective earth (PE) terminal

⚠ : Safety precaution

This symbol is used where the instruction manual needs to be consulted for the safety of both the operator and the equipment. Carefully read the cautions in this manual before using the instrument.
This symbol denotes caution for the connectors. Be sure to read "**3. WIRING**" in the installation manual before using the product.

1. PARTS DESCRIPTION

The J-CVM is an SSR output unit designed for heater control system.



*The J-CVM-3 does not have this connector.

(1)	Address setting switch	(8)	Protective earth (PE) terminal
(2)	Termination resistor setting switch	(9)	Transistor output for external SSR drive connector CN3
(3)	Heater output connectors 1 to 8	(10)	Indication lamps
(4)	Fuses FU1 to FU8	(11)	Heater power connector CN1
(5)	Power/Communication connector COM. IN		
(6)	Power/Communication connector COM. OUT		
(7)	Heater power connector CN2 (Only J-CVM-5)		

For the connector, refer to the **3.2 Connector Configurations**.

■ Indication lamps

HEATER1 to HEATER8	HEATER1 to HEATER8 [Green]	Lights when heater outputs are turned on.
	EXT SSR1 to EXT SSR8 [Green]	Lights when transistor outputs (for external SSR drive) are turned on.
EXT SSR1 to EXT SSR8	FAIL [Red]	Lights when instrument error.
	RUN [Green]	Flashes during normal operation. Lights when self-diagnostic error occurs.
FAIL RUN TX/RX	TX/RX [Orange]	Flashing during unit communication data send and receive.

■ Setting switches

● Address setting switch

When connecting more than one J-CVM on the same communication line, set each address of J-CVM by using Address setting switch to avoid overlapping addresses. Overlapped communication addresses may cause instrument failure or malfunction.

The data changes become valid when the power is turned on again.

ADDRESS

Set the address for the J-CVM. Assign the temperature input channels corresponding to the heater outputs (HEATER1 to HEATER8).
Setting range: 0 to F (Decimal numbers: 0 to 15) [8 to F: Unused]
Factory set value: 0

Set value	Temperature input channel numbers to be assigned	Set value	Temperature input channel numbers to be assigned
0	CH1 to CH8	4	CH33 to CH40
1	CH9 to CH16 *	5	CH41 to CH48 *
2	CH17 to CH24	6	CH49 to CH56
3	CH25 to CH32 *	7	CH57 to CH64 *
		8 to F	Do not set this one

* Assignable only for the J-TI-A

● Termination resistor setting switch

ON OFF

Set the termination resistor for the J-CVM.

Setting	Termination resistor
OFF	Termination resistor OFF (If the J-CVM is other than a termination* via communication)
ON	Termination resistor ON (If the J-CVM is a termination* via communication)

* The most distant J-CVM from the J-TI. [Factory set value: OFF]

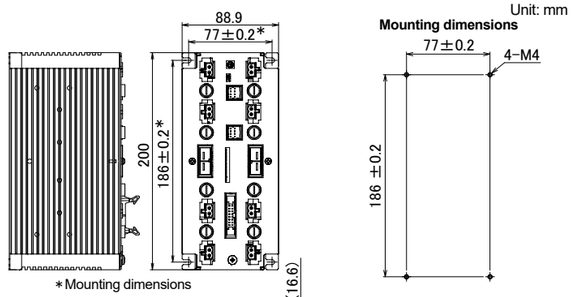
2. MOUNTING

⚠ WARNING

To prevent electric shock or instrument failure, always turn off the power before mounting or removing the instrument.

2.1 Dimensions

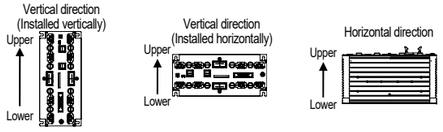
Unit: mm



Mounting depth:
Space (bending length of each cable) for connecting cables must be considered when installing.

J-CVM-5 is used in the figures for explanation, but the same dimensions also apply to J-CVM-3.

Mount this instrument in the direction shown below.



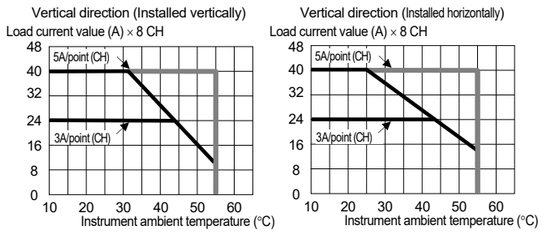
2.2 Mounting Cautions

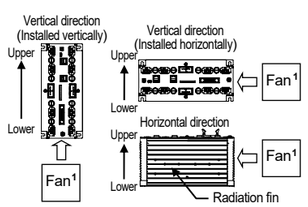
(1) This instrument is intended to be used under the following environmental conditions. **(IEC 61010-1)** [POLLUTION DEGREE 2]

(2) Use this instrument within the following environment conditions:

- Allowable ambient temperature: –10 to +55 °C
  (Allowable load current decreases according to the ambient temperature around the instrument as shown in the following derating curve. Ensure that the ambient temperature does not exceed 55 °C.)

[Derating curve]





[1] External fan:
Max. airflow: 1.38 m³/minute
Size: 90 × 90 mm
300 mm from the Main unit of the J-CVM to the external fan.

[2] The J-CVM-5 (Allowable load current: 5 A per channel) does not satisfy the UL requirements when it is used without an external fan. To comply with UL's requirements, this instrument must be forced air cooled by the external fan.

- Allowable ambient humidity: 5 to 95 %RH
  (Absolute humidity: MAX.W.C 29 g/m³ dry air at 101.3 kPa)
- Installation environment conditions: Indoor use, Altitude up to 2000 m

(3) Avoid the following conditions when selecting the mounting location:

- Rapid changes in ambient temperature which may cause condensation.
- Corrosive or inflammable gases.
- Direct vibration or shock to the mainframe.
- Water, oil, chemicals, vapor or steam splashes.
- Excessive dust, salt or iron particles.
- Excessive induction noise, static electricity, magnetic fields or noise.
- Direct air flow from an air conditioner.
- Exposure to direct sunlight.
- Excessive heat accumulation.

(4) Mount this instrument in the panel considering the following conditions:

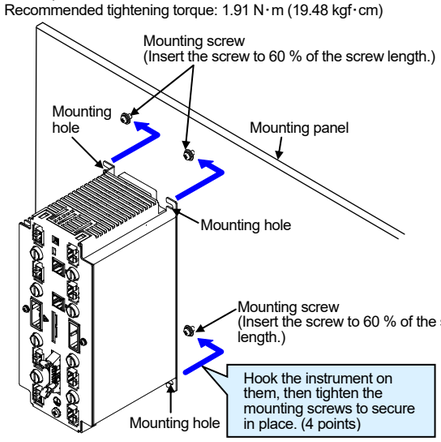
- During the control operation, the radiation fin becomes hot (100 °C or less). For safety reasons always install the fin inside the instrumentation panel or the control panel to avoid accidental contact by the operator.
- Secure at least 200 mm spacing above and below and at least 50 mm spacing on the left and the right of the instrument for wiring, maintenance and environmental reason.
- Do not mount this instrument directly above the equipment that generates large amount of heat (heaters, transformers, thyristor units, large-wattage resistors.)
- In order to improve safety and the immunity to withstand noise, mount this instrument as far away as possible from high voltage equipment, power lines, and rotating machinery.

High voltage equipment:	Do not mount within the same panel.
Power lines:	Separate at least 200 mm.
Rotating machinery:	Separate as far as possible.

(5) In case this instrument is connected to a supply by means of a permanent connection, a switch or circuit-breaker shall be included in the installation. This shall be in close proximity to the equipment and within easy reach of the operator. It shall be marked as the disconnecting device for the equipment.

2.3 Mounting Procedures

1. Refer to the external and mounting dimensions and make 4 holes for screws on the mounting panel.
2. Turn in the mounting screw into the mounting hole (4 points) to 60% of the screw length. Hook the mounting hole of the instrument on the inserted mounting screw.
3. Ensure that the instrument is installed horizontally, and tighten the mounting screw to secure in place.
   Recommended tightening torque: 1.91 N·m (19.48 kgf·cm)



The customer needs to provide the mounting screws.
M4 size pan-head screws with captive washer and spring washer
(Length: 8 mm or longer) ..... 4 pcs

Recommended thickness of the mounting panel: 1.2 mm or more
(Choose a panel material of right strength and right thickness).

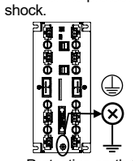
3. WIRING

⚠ WARNING

To prevent electric shock or instrument failure, do not turn on the power until all wiring is completed. Make sure that the wiring is correct before applying power to the instrument.

3.1 Wiring Cautions

- If there is electrical noise in the vicinity of the instrument that could affect operation, use a noise filter.
  – Shorten the distance between the twisted power supply wire pitches to achieve the most effective noise reduction.
  – Always install the noise filter on a grounded panel. Minimize the wiring distance between the noise filter output and the instrument power supply terminals to achieve the most effective noise reduction.
  – Do not connect fuses or switches to the noise filter output wiring as this will reduce the effectiveness of the noise filter.
- Power supply wiring must be twisted and have a low voltage drop.
- The heater power supply is not provided with an overcurrent protection device. For safety install an overcurrent protection device (such as a fuse) with adequate breaking capacity close to each heater power connector.
  – Fuse type: Fast-blow fuse (IEC certified and UL approved)
  – Fuse rating: Rated voltage: 250 V AC Rated current: 30 A
- Connect the protective earth (PE) terminal of the J-CVM to ground to prevent electric shock.



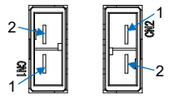
  – Ground no other devices to the location where you ground this instrument.
  – Avoid sharing earth lines with electric motors, motorized equipment, and other equipment that uses large amounts of electrify.
  – In the earth system, be careful to earth each point and not to create an earth loop.
  – Use wire of at least 8.0 mm² for earth lines.
  – Screw size: M4 × 8 (Binding head screw with toothed washer)
  Recommended tightening torque: 1.2 N·m (12.24 kgf·cm)

3.2 Connector Configuration

To obtain a connection connector and a cable (sold separately), contact RKC sales office or the agent.

■ Heater power connector (CN1, CN2)

Used to connect the heater power supply.
Number of connectors: J-CVM-3: 1 pcs (Maximum load current: 3 A/point)
J-CVM-5: 2 pcs (Maximum load current: 5 A/point)
Power supply voltage: 35 to 264 V AC (50/60 Hz) [Including power supply voltage variation]
(Rating: 100 to 240 V AC)
Recommended receptacle housing: D-5000 Series 2P (X type) 1-179958-2 (TE Connectivity)
Tab header (J-CVM side): D-5000 Series 2P Horizontal Type (X type) 1-353079-2 (TE Connectivity)



J-CVM-3: No CN2

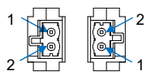
Pin No.	Description
1	Heater power L
2	Heater power N

Wire tensile strength: 0.5 N (0.05 kgf) or more

W-CF-P02-AC heater power supply cable (RKC product) can be used as heater power supply cable (sold separately).
Cable type: W-CF-P02-AC-□□□□□ (RKC product, Sold separately)
[□□□□□: cable length]

■ Heater output connector (1 to 8)

Used to connect the heater outputs.
Male headers (J-CVM side):
721-432/001-000 (WAGO)
Output current: J-CVM-3: 3 A max.
J-CVM-5: 5 A max.
Output voltage: 33.5 to 264 V AC

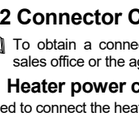


Pin No.	Description
1	L
2	N

For a safety operation of the units, customers must choose from any one of the following connectors when a female connector is required.
721-2102/037-000, 721-102/037-000 or 2721-102/037-000 (WAGO)

The connector pins (male header pins) on the SSR output section without a connector are bare and accessible. Always install a female connector to prevent electric shock even if the output is not used.

The SSR output section with a connector is supplied with the following connector at the time of shipment.
Female connectors: 721-2102/037-000-L1L2 (WAGO)
2-conductor spring clamps with locking lever 2 pole
- Connection method: CAGE CLAMP®
- Conductor size
  Solid: 0.2 to 2.5 mm²
  Fine-stranded: 0.2 to 2.5 mm²
  0.25 to 1.5 mm²
  (with ferrule and plastic collar)
  0.25 to 2.5 mm²
  (with ferrule, without plastic collar)
- AWG: 24 to 12
- Strip length: 9 to 10 mm/0.35 to 0.39 in
- Operating tools: 3.5 × 0.5 mm blade
  (WAGO 210-720 screwdriver)
  A small screwdriver can be used for wiring.
- Wire tensile strength: 1 N (0.1 kgf) or more
- Avoid whisker wiring (exposed wiring).
- Use the supplied Strain relief plate if needed.



Assignment of temperature input channels corresponding to the heater outputs (HEATER1 to HEATER8) can be done on the address setting switch.

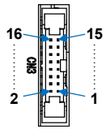
● Fuse FU1 to FU8

Fuse holders FU1 to FU8 contain a fuse for HEATER1 to HEATER8.

Fuse type: 5 × 20 mm Fast-blow fuse
Fuse rating: Rated voltage: 250 V AC
Rated current: 6.3 A
Recommended fuse model type:
021806.3MXP (Littelfuse) [Time-lag fuse]
021606.3MXP (Littelfuse) [Fast-blow fuse]

■ Transistor output for external SSR drive connector (CN3)

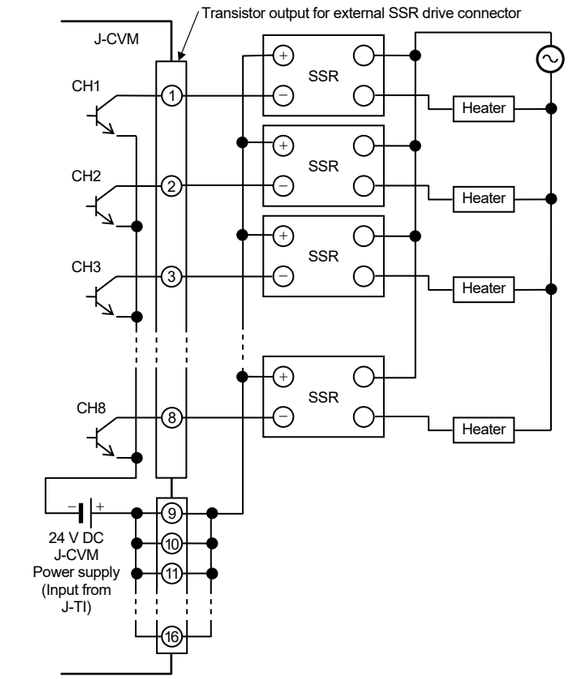
Used to connect the transistor outputs for external SSR drive.
Recommended socket: HIF3MAW-16D-2.54 (HIROSE ELECTRIC)
Pin header (J-CVM side): HIF3MAW-16PA-2.54DS (HIROSE ELECTRIC)



Pin No.	Description	Pin No.	Description
1	CH1	9	+24 V
2	CH2	10	+24 V
3	CH3	11	+24 V
4	CH4	12	+24 V
5	CH5	13	+24 V
6	CH6	14	+24 V
7	CH7	15	+24 V
8	CH8	16	+24 V

Wire tensile strength: 4 N (0.4 kgf) or more

● Transistor output for external SSR drive wiring example



W-CF-S01-AC output cable for transistor (RKC product) can be used as connecting cable (sold separately).
Cable type: W-CF-S01-AC-□□□□□ (RKC product, Sold separately)
[□□□□□: cable length]

Temperature input channel numbers, which are assigned to transistor outputs for external SSR (EXT SSR1 to EXT SSR8), are set through communication "Transistor output selection."
For RKC communication: Identifier VP
For Modbus communication: Address 0280 to 028F (HEX), 640 to 655 (DEC)
Set the temperature input channel numbers to CH1 to CH8 (address 0 to 7 of the J-CVM) at "Selection of transistor output" of the J-TI master (address 0, 4, 8, C).

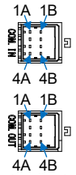
Set value	Temperature input channel numbers to be assigned
0	No assignment
1	CH1 to CH8
2	CH9 to CH16 (Assignable only for the J-TI-A)
3	CH17 to CH24
4	CH25 to CH32 (Assignable only for the J-TI-A)
5	CH33 to CH40
6	CH41 to CH48 (Assignable only for the J-TI-A)
7	CH49 to CH56
8	CH57 to CH64 (Assignable only for the J-TI-A)

Factory set value: 0 (No assignment)

For the communication data, refer to the **SRJ Instruction Manual (IMS01X03-E□)**.

■ Power/Communication connector (COM. IN, COM. OUT)

COM. IN: Used to connect the J-TI master or J-CVM. (Power supply from J-TI)
COM. OUT: Connector for adding more J-CVM. (Power supply to other J-CVM)
Recommended receptacle housing: D-2100 Series 8P (X type) 1-1318119-4 (TE Connectivity)
Tab header (J-CVM side): D-2100 Series 8P Horizontal Type (X type) 1376009-1 (TE Connectivity)



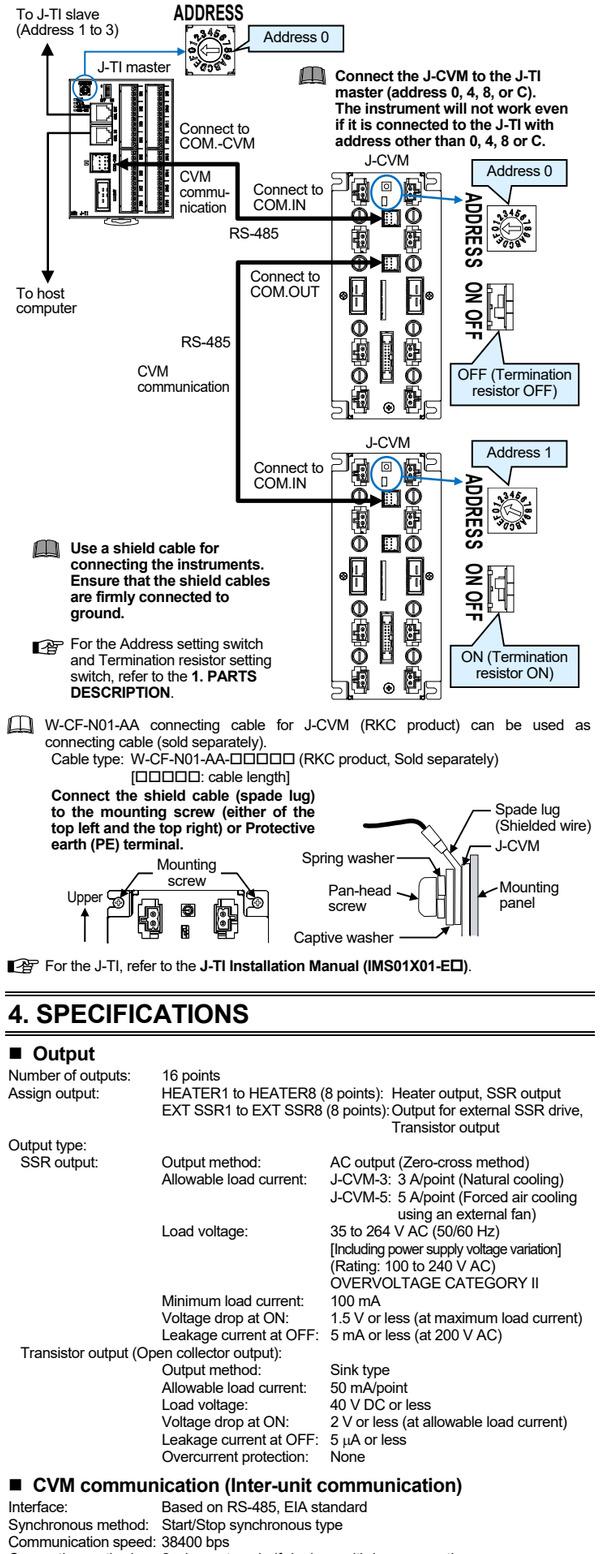
Wire tensile strength:
2 N (0.2 kgf) or more

Power/RS-485

Pin No.	Description
1A	Signal ground SG (GND)
2A	RS-485 Send/Receive data T/R (A)
3A	RS-485 Send/Receive data T/R (B)
4A	24 V DC (+)
1B	GND
2B	GND
3B	24 V DC (+)
4B	24 V DC (+)

● Connection between J-TI and J-CVM

Example: When connecting two J-CVM to the J-TI master (address 0)
(When temperature input channels CH1 to CH16 are assigned to the heater outputs)



Connect the J-CVM to the J-TI master (address 0, 4, 8, or C). The instrument will not work even if it is connected to the J-TI with address other than 0, 4, 8 or C.

Use a shield cable for connecting the instruments. Ensure that the shield cables are firmly connected to ground.

For the Address setting switch and Termination resistor setting switch, refer to the **1. PARTS DESCRIPTION**.

W-CF-N01-AA connecting cable for J-CVM (RKC product) can be used as connecting cable (sold separately).
Cable type: W-CF-N01-AA-□□□□□ (RKC product, Sold separately)
[□□□□□: cable length]

Connect the shield cable (spade lug) to the mounting screw (either of the top left and the top right) or Protective earth (PE) terminal.

For the J-TI, refer to the **J-TI Installation Manual (IMS01X01-E□)**.

4. SPECIFICATIONS

■ Output

Number of outputs: 16 points
Assign output: HEATER1 to HEATER8 (8 points): Heater output, SSR output
EXT SSR1 to EXT SSR8 (8 points): Output for external SSR drive, Transistor output
Output type:
SSR output:
Output method: AC output (Zero-cross method)
Allowable load current: J-CVM-3: 3 A/point (Natural cooling)
J-CVM-5: 5 A/point (Forced air cooling using an external fan)
Load voltage: 35 to 264 V AC (50/60 Hz)
[Including power supply voltage variation]
(Rating: 100 to 240 V AC)
OVERVOLTAGE CATEGORY II
Minimum load current: 100 mA
Voltage drop at ON: 1.5 V or less (at maximum load current)
Leakage current at OFF: 5 mA or less (at 200 V AC)
Transistor output (Open collector output):
Output method: Sink type
Allowable load current: 50 mA/point
Load voltage: 40 V DC or less
Voltage drop at ON: 2 V or less (at allowable load current)
Leakage current at OFF: 5 μA or less
Overcurrent protection: None

■ CVM communication (Inter-unit communication)

Interface: Based on RS-485, EIA standard
Synchronous method: Start/Stop synchronous type
Communication speed: 38400 bps
Connection method: 2-wire system, half-duplex multi-drop connection
Protocol: Special communication
Maximum connections: 8 units (Up to eight J-CVM can be connected to a single J-TI master.)

■ Self-diagnostic function

Self-diagnostic items	Communication at error	Error displays	Instrument status
Stack overflow	Normal operation	RUN lamp lights [green]	All output OFF (Self-diagnostic error)
Communication error			
Wrong rotary switch setting			
Internal RAM error	Communication: Stop	FAIL lamp lights [red]	All output OFF (Instrument abnormality)
Power supply voltage monitoring			
Watchdog timer error			

For the solution, refer to the **SRJ Instruction Manual (IMS01X03-E□)**.

■ General specifications

● Instrument power supply

Power supply voltage: 20.4 to 26.4 V DC [Including power supply voltage variation]
(Rating 24 V DC)
Current consumption (at maximum load):
When transistor output is not used:
210 mA max. (at 24 V DC)/Unit
When eight J-CVM is connected: 1.68 A max. (at 24 V DC)
When transistor output is used:
610 mA max. (at 24 V DC)/Unit
When eight J-CVM is connected: 4.88 A max. (at 24 V DC)
Rush current: 12.6 A or less

● Power supply connector for load

Power supply voltage: 35 to 264 V AC (50/60 Hz) [Including power supply voltage variation]
(Rating 100 to 240 V AC)
Current consumption (at maximum load):
J-CVM-3: 3 A/point
J-CVM-5: 5 A/point

Insulation resistance:

	①	②
① Protective earth (PE), Heat sink		
② Heater power supply, Heater output	20 MΩ or more at 500 V DC	
③ Communication, Transistor output for external SSR drive, Instrument power supply	20 MΩ or more at 500 V DC	20 MΩ or more at 500 V DC

Withstand voltage:

Time: 1 min	①	②
① Protective earth (PE), Heat sink		
② Heater power supply, Heater output	1500 V AC	
③ Communication, Transistor output for external SSR drive, Instrument power supply	1500 V AC	2300 V AC

Power failure: A power failure of 20 ms or less will not affect the control action.
Memory backup: Backed up by non-volatile memory.
Number of writing: Approx. 1,000,000 times
Data storage period: Approx. 10 years
Weight: J-CVM-3/C: Approx. 1450 g
(SSR output section with a connector)
J-CVM-5/C: Approx. 1460 g
(SSR output section with a connector)

5. MODEL CODE

■ Suffix code

J-CVM-□/□
(1) (2)

(1) Maximum load current
3: 3 A
Heater power connector: 1, SSR output (Heater output): 8 channels
5: 5 A
Heater power connector: 2, SSR output (Heater output): 8 channels

(2) Connector for SSR output section (Heater output)
N: None
C: SSR output section with a connector

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