Upon receipt of the product and prior to initial operation, read these instructions thoroughly, and retain for future reference.

MOTOMAN INSTRUCTIONS

YRC1000 OPTIONS INSTRUCTIONS
JANCD-AEW02-E BOARD (For 3-Channel Analog Output)

Please have the following information available when contacting Yaskawa Customer Support:

- System
- Primary Application
- Software Version (Located on Programming Pendant by selecting: 
  {Main Menu} - {System Info} - {Version})
- Robot Serial Number (Located on robot data plate)
- Robot Sales Order Number (Located on controller data plate)

Part Number: 178957-1CD
Revision: 0
DANGER

• This manual explains the JANCD-AEW02-E board of the YRC1000 system. Read this manual carefully and be sure to understand its contents before handling the YRC1000. Any matter, including operation, usage, measures, and an item to use, not described in this manual must be regarded as "prohibited" or "improper".

• General information related to safety are described in "Chapter 1. Safety" of the YRC1000 INSTRUCTIONS. To ensure correct and safe operation, carefully read "Chapter 1. Safety" of the YRC1000 INSTRUCTIONS.

CAUTION

• In some drawings in this manual, protective covers or shields are removed to show details. Make sure that all the covers or shields are installed in place before operating this product.

• YASKAWA is not responsible for incidents arising from unauthorized modification of its products. Unauthorized modification voids the product warranty.

NOTICE

• The drawings and photos in this manual are representative examples and differences may exist between them and the delivered product.

• YASKAWA may modify this model without notice when necessary due to product improvements, modifications, or changes in specifications. If such modification is made, the manual number will also be revised.

• If your copy of the manual is damaged or lost, contact a YASKAWA representative to order a new copy. The representatives are listed on the back cover. Be sure to tell the representative the manual number listed on the front cover.
NOTES FOR SAFE OPERATION

Read this manual carefully before installation, operation, maintenance, or inspection of the YRC1000.

In this manual, the Notes for Safe Operation are classified as “DANGER”, “WARNING”, “CAUTION”, or “NOTICE”.

**DANGER**
Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury. Safety Signs identified by the signal word DANGER should be used sparingly and only for those situations presenting the most serious hazards.

**WARNING**
Indicates a potentially hazardous situation which, if not avoided, will result in death or serious injury. Hazards identified by the signal word WARNING present a lesser degree of risk of injury or death than those identified by the signal word DANGER.

**CAUTION**
Indicates a hazardous situation, which if not avoided, could result in minor or moderate injury. It may also be used without the safety alert symbol as an alternative to “NOTICE”.

**NOTICE**
NOTICE is the preferred signal word to address practices not related to personal injury. The safety alert symbol should not be used with this signal word. As an alternative to “NOTICE”, the word “CAUTION” without the safety alert symbol may be used to indicate a message not related to personal injury.

Even items described as “CAUTION” may result in a serious accident in some situations. At any rate, be sure to follow these important items.

**NOTE**
To ensure safe and efficient operation at all times, be sure to follow all instructions, even if not designated as “DANGER”, “WARNING” and “CAUTION”.

NOTE
NOTICE

- Do not use or maintain this board under the following conditions:
  - Direct sunlight
  - Excessive vibration and shock
  - High humidity
  - Proximity to a strong magnetic field source
  - Excessive dust
  - Large temperature change
  - Corrosive gas
  - Condensation

Failure to observe this instruction may result in the failure of the board.
Before operating the manipulator, make sure the servo power is turned OFF by performing the following operations. When the servo power is turned OFF, the SERVO ON LED on the programming pendant is turned OFF.

- Press the emergency stop buttons on the front door of the YRC1000, on the programming pendant, on the external control device, etc.
- Disconnect the safety plug of the safety fence. (when in the play mode or in the remote mode)

If operation of the manipulator cannot be stopped in an emergency, personal injury and/or equipment damage may result.

![Emergency Stop Button](image)

Before releasing the emergency stop, make sure to remove the obstacle or error caused the emergency stop, if any, and then turn the servo power ON.

Failure to observe this instruction may cause unintended movement of the manipulator, which may result in personal injury.

![Release of Emergency Stop](image)

Observe the following precautions when performing a teaching operation within the manipulator's operating range:

- Be sure to perform lockout by putting a lockout device on the safety fence when going into the area enclosed by the safety fence. In addition, the operator of the teaching operation must display the sign that the operation is being performed so that no other person closes the safety fence.
- View the manipulator from the front whenever possible.
- Always follow the predetermined operating procedure.
- Always keep in mind emergency response measures against the manipulator’s unexpected movement toward a person.
- Ensure a safe place to retreat in case of emergency.

Failure to observe this instruction may cause improper or unintended movement of the manipulator, which may result in personal injury.

- Confirm that no person is present in the manipulator's operating range and that the operator is in a safe location before:
  - Turning ON the YRC1000 power
  - Moving the manipulator by using the programming pendant
  - Running the system in the check mode
  - Performing automatic operations

Personal injury may result if a person enters the manipulator's operating range during operation. Immediately press an emergency stop button whenever there is a problem. The emergency stop buttons are located on the front panel of the YRC1000 and on the right of the programming pendant.

- Read and understand the Explanation of the Warning Labels before operating the manipulator.
WARNING

• Do not touch the inside of the controller cabinet for at least 5 minutes after turning the power off.

Failure to observe this warning may result in electric shock or personal injury because of the residual voltage of the condenser.

• During power on, make sure to close the door and mount the protective cover, and do not touch the board.

Failure to observe this warning may result in fire or electric shock.

• Perform the following inspection procedures prior to conducting manipulator teaching. If there is any problem, immediately take necessary steps to solve it, such as maintenance and repair.
  – Check for a problem in manipulator movement.
  – Check for damage to insulation and sheathing of external wires.

• Always return the programming pendant to the hook on the YRC1000 cabinet after use.

If the programming pendant is left unattended on the manipulator, on a fixture, or on the floor, the Enable Switch may be activated due to surface irregularities of where it is left, and the servo power may be turned ON. In addition, in case the operation of the manipulator starts, the manipulator or the tool may hit the programming pendant left unattended, which may result in personal injury and/or equipment damage.

• Wiring and installation must be performed by authorized or certified personnel.

Failure to observe this caution may result in fire or electric shock.
Definition of Terms Used Often in This Manual

The MOTOMAN is the YASKAWA industrial robot product.

The MOTOMAN usually consists of the manipulator, the controller, the programming pendant, and supply cables.

In this manual, the equipment is designated as follows.

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Manual Designation</th>
</tr>
</thead>
<tbody>
<tr>
<td>YRC1000 controller</td>
<td>YRC1000</td>
</tr>
<tr>
<td>YRC1000 programming pendant</td>
<td>Programming pendant</td>
</tr>
<tr>
<td>Cable between the manipulator and the controller</td>
<td>Manipulator cable</td>
</tr>
</tbody>
</table>

CAUTION

- Check to be sure that there is no foreign matter (metal piece, etc.) on the board.
  Failure to observe this caution may result in personal injury or equipment damage because of malfunction.
- Check to be sure that there is no problem (damage, bend, etc.) with the components of the board.
  Failure to observe this caution may result in personal injury or equipment damage because of malfunction.
- Connect the cables and connectors properly.
  Failure to observe this caution may result in fire or equipment failure.
- Make sure to properly perform the setting of the switches, etc.
  Failure to observe this caution may result in personal injury or equipment damage because of malfunction.
- Do not touch the solder surface of the board directly with a finger.
  Failure to observe this caution may result in personal injury because of solder projection, etc.

NOTICE

- Do not touch the component-mounting surface of the board directly with a finger.
  Failure to observe this caution may result in the failure of IC, etc. because of static electricity.
- Avoid shock on the board.
  Failure to observe this caution may result in the failure of the board.
Descriptions of the programming pendant keys, buttons, and displays are shown as follows:

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Manual Designation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Programming Pendant</td>
<td>Character Keys /Symbol Keys The keys which have characters or symbols printed on them are denoted with []. ex. [ENTER]</td>
</tr>
<tr>
<td>Axis Keys /Numeric Keys</td>
<td>[Axis Key] and [Numeric Key] are generic names for the keys for axis operation and number input.</td>
</tr>
<tr>
<td>Keys pressed simultaneously</td>
<td>When two keys are to be pressed simultaneously, the keys are shown with a “+” sign between them, ex. [SHIFT]+[COORD]</td>
</tr>
<tr>
<td>Displays</td>
<td>The menu displayed in the programming pendant is denoted with { }. ex. {JOB}</td>
</tr>
</tbody>
</table>

**Description of the Operation Procedure**

In the explanation of the operation procedure, the expression "Select • • • " means that the cursor is moved to the object item and [SELECT] is pressed, or that the item is directly selected by touching the screen.

**Registered Trademark**

In this manual, names of companies, corporations, or products are trademarks, registered trademarks, or brand names for each company or corporation. The indications of (R) and ™ are omitted.
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1 Outline

This instruction manual is for JANCD-AEW02-E, a 3-channel analog output board. This board can add 3 channels of analog output to the YRC1000.

1.1 System Configuration Example

![Diagram of YRC1000 controller with JANCD-AEW02-E and analog output channels Ch1, Ch2, Ch3 connected]
2 Hardware Specifications

2.1 Board Outline Drawing

![Board Outline Drawing]

2.2 Board Specifications

<table>
<thead>
<tr>
<th>Item</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Board mounting location</td>
<td>Optional-board mounting space in the YRC1000 cabinet</td>
</tr>
<tr>
<td>Number of analog output channels</td>
<td>3 channels</td>
</tr>
</tbody>
</table>
2.3 Analog Output Connector

Details of connector (view from the fitting surface of the cable connector)

1  12
13  22
23  34

Connector type: MR-34MG (soldering type) See Note 1.
MRP-34M01 (crimping type insulator) See Note 1.
MRP-M103 (crimping type contact, strip form terminal) See Note 2.
MRP-M113 (crimping type contact, loose piece terminal) See Note 2.
MR-34L+ (vertical type case)
All manufactured by Honda Tsushin Kogyo Co., Ltd.

Note 1: Use either MR-34MG or MRP-34M01.
Note 2: When using MRP-34M01, use either MRP-M103 or MRP-F113.
Note 3: The connector for the cable side is not provided. Prepare the connector.
3 Function Settings

3.1 Description of Function Setting Switches

The names of the switches to set the functions of this board and how each switch works are shown below. Make sure to perform proper settings according to the following description. For details of the settings, refer to the next page.

- S1: Sets the station of this board on the YRC1000. The setting range of the station is 1 (ST#01) to D (ST#13). 0, E, or F cannot be set.

- SW1: Sets the transfer rate. Switches between 4 Mbps and 10 Mbps. Make sure to set SW1 to 4 Mbps. 10 Mbps cannot be used. If this board’s information is not displayed on the programming pendant screen although the communication cable and power cable are connected correctly according to chapter 5.1 “I/O Module Setting”, SW1 may be set to 10 Mbps. If so, change it to 4 Mbps.

- SW2: Sets the I/O communication mode. Switches between 17 BYTE or 32 BYTE. Make sure to set SW2 to 17 BYTE. 32 BYTE cannot be used. If this board’s information is not displayed on the programming pendant screen although the communication cable and power cable are connected correctly according to chapter 5.1 “I/O Module Setting”, SW2 may be set to 32 BYTE. If so, change it to 17 BYTE.
3 Function Settings
3.2 Switch Settings

## 3.2 Switch Settings

<table>
<thead>
<tr>
<th>Switch</th>
<th>How to set</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>S1</strong></td>
<td><strong>Station setting</strong></td>
</tr>
<tr>
<td></td>
<td>Sets the station. The relations of the switch settings and the stations are shown below. Set the arrow to the number corresponding to the desired station by using a precision screwdriver (Phillips or flathead).</td>
</tr>
<tr>
<td></td>
<td>0: Not available</td>
</tr>
<tr>
<td></td>
<td>1: ST#01 (factory setting)</td>
</tr>
<tr>
<td></td>
<td>2: ST#02</td>
</tr>
<tr>
<td></td>
<td>3: ST#03</td>
</tr>
<tr>
<td></td>
<td>4: ST#04</td>
</tr>
<tr>
<td></td>
<td>5: ST#05</td>
</tr>
<tr>
<td></td>
<td>6: ST#06</td>
</tr>
<tr>
<td></td>
<td>7: ST#07</td>
</tr>
<tr>
<td></td>
<td>8: ST#08</td>
</tr>
<tr>
<td></td>
<td>9: ST#09</td>
</tr>
<tr>
<td></td>
<td>A: ST#10</td>
</tr>
<tr>
<td></td>
<td>B: ST#11</td>
</tr>
<tr>
<td></td>
<td>C: ST#12</td>
</tr>
<tr>
<td></td>
<td>D: ST#13</td>
</tr>
<tr>
<td></td>
<td>E: Not available</td>
</tr>
<tr>
<td></td>
<td>F: Not available</td>
</tr>
<tr>
<td></td>
<td>The number after ST# is the station number which is displayed on the programming pendant screen when setting the I/O module.</td>
</tr>
</tbody>
</table>

| **SW1** | **Transfer rate setting** |
|         | 1 to 2 short circuit: 4 Mbps (factory setting) |
|         | * Must be set to 4 Mbps. |
|         | 2 to 3 short circuit: 10 Mbps |
|         | * Not available |

| **SW2** | **I/O communication mode setting** |
|         | 1 to 2 short circuit: 17 BYTE (factory setting) |
|         | * Must be set to 17 BYTE. |
|         | 2 to 3 short circuit: 32 BYTE |
|         | * Not available |

### NOTE

- Do not set S1 to 0, E, or F. Also, do not set 2 or more boards to the same station. Otherwise, this board cannot be recognized correctly.
- Do not set SW1 to 10 Mbps. If it is set to 10 Mbps, this board cannot be recognized correctly.
- Do not set SW2 to 32 BYTE. If it is set to 32 BYTE, this board cannot be recognized correctly.
4 Board Installation

WARNING

• Before wiring or installation, make sure to turn the primary power supply off, and put up a warning sign. (e.g. DO NOT TURN THE POWER ON.)

Failure to observe this warning may result in electric shock or personal injury.

• Do not touch the inside of the controller cabinet for at least 5 minutes after turning the power off.

Failure to observe this warning may result in electric shock or personal injury because of the residual voltage of the capacitors.

• During power on, make sure to close the door and mount the protective cover, and do not touch the board.

Failure to observe this warning may result in fire or electric shock.

• Wiring and installation must be performed by authorized or certified personnel.

Failure to observe this caution may result in fire or electric shock.

CAUTION

• Check to be sure that there is no foreign matter (metal piece, etc.) on the board.

Failure to observe this caution may result in personal injury or equipment damage because of malfunction.

• Check to be sure that there is no problem (damage, bend, etc.) with the components of the board.

Failure to observe this caution may result in personal injury or equipment damage because of malfunction.

• Connect the cables and connectors properly.

Failure to observe this caution may result in fire or equipment failure.

• Make sure to properly perform the setting of the switches, etc.

Failure to observe this caution may result in personal injury or equipment damage because of malfunction.

• Do not touch the solder surface of the board directly with a finger.

Failure to observe this caution may result in personal injury because of solder projection, etc.
NOTICE

- Do not touch the component-mounting surface of the board directly with a finger.
  Failure to observe this caution may result in the failure of IC, etc. because of static electricity.
- Avoid shock on the board.
  Failure to observe this caution may result in the failure of the board.
4.1 Opening the Front Door of YRC1000

Install the JANCD-AEW02-E board according to the following procedure:

1. By using a flathead screwdriver, rotate the door lock on the front of the YRC1000 (one place) 90 degrees clockwise.

2. Rotate the main power supply switch to the “OFF” position and open the door gently.

4.2 Checking the Switch Setting of JANCD-AEW02-E Board

1. Check to be sure that the settings of the switches on the JANCD-AEW02-E board are correct.

2. For the switch setting, refer to chapter 3 “Function Settings”.

4.3 Installing JANCD-AEW02-E Board to YRC1000

1. Check to be sure that the main power supply is turned OFF.

2. Securely fix the JANCD-AEW02-E board to the YRC1000 by tightening the board fixing screws firmly.
4.4 Connecting Cables

1. Connect the 24 VDC power cable to CN324 of the JANCD-AEW02-E board.

2. Connect the I/O communication cable to CN320 of the JANCD-AEW02-E board. Connect the terminal connector to the unoccupied side of CN320.

3. Connect the analog output cable to CN322 of the JANCD-AEW02-E board.
4.5 Closing the Front Door of YRC1000

1. Close the door gently.

2. By using a flathead screwdriver, rotate the door lock on the front of the YRC1000 (one place) 90 degrees counterclockwise.
5 I/O Signal Allocation

5.1 I/O Module Setting

To use the JANCD-AEW02-E board on the YRC1000, the I/O module must be set according to the following procedure.

Check to be sure that the power supply of the YRC1000 is turned OFF. Then, install the JANCD-AEW02-E board all of whose switches are properly set to the inside of the YRC1000 cabinet. When installing the board, refer to chapter 4 “Board Installation”.

When setting the I/O module, set the security mode to the management mode.

When the security mode is set either to the operation mode or the editing mode, only the setting status can be referred to.

1. Press and hold [MAIN MENU], and turn on the power.
   – The main menu is displayed.

2. Select the {SYSTEM} under the main menu.
   – The Sub menu is displayed.

3. Set the security mode to the management mode.
5 I/O Signal Allocation
5.1 I/O Module Setting

4. Select {SETUP}.

5. Select {IO MODULE}.
– The current installation status of I/O modules is displayed as shown below.

– Press [ENTER] to display the other stations.
5 I/O Signal Allocation
5.1 I/O Module Setting

6. Check the installation status of I/O modules.
   – Only the currently installed I/O modules are shown. Check that the
details of each station (ST#) are the same as the installation status
of I/O modules.
   – The meanings of the columns are as follows:

<table>
<thead>
<tr>
<th>ST#</th>
<th>Station number of I/O module</th>
</tr>
</thead>
<tbody>
<tr>
<td>DI</td>
<td>Number of contact inputs ¹)</td>
</tr>
<tr>
<td>DO</td>
<td>Number of contact outputs ¹)</td>
</tr>
<tr>
<td>AI</td>
<td>Number of analog inputs ¹)</td>
</tr>
<tr>
<td>AO</td>
<td>Number of analog outputs ¹)</td>
</tr>
<tr>
<td>BOARD</td>
<td>Board type ²)</td>
</tr>
</tbody>
</table>

1 If “-” is displayed, the corresponding input or output is not
   implemented.
2 If the board type cannot be determined, “*****” is displayed
   in the BOARD column. Even so, there is no problem as
   long as the values of DI, DO, AI, and AO are normal.

   – The following combination of boards is displayed in this example.
   ST#00: JANCD-AIO01-E board
      This board is shown as ASF01 on the I/O module
display.
      (Digital input 40 points, digital output 40 points)
      This board is fixed to ST#00.
   ST#01: JANCD-AEW02-E board
      (16 contact inputs, 16 contact outputs, 3 analog outputs)
      Note that even though 16 contact inputs and 16 contact
      outputs are displayed, they cannot be used for external
devices because they are used by the system.
      Switch S1: Set to 1. (This value is the value of ST#.)
5 I/O Signal Allocation
5.1 I/O Module Setting

7. Press {ENTER}.
   - A confirmation dialog box appears.

8. Select {YES}.
   - When the mounted status of an I/O module is correct, select “YES.”
     The I/O module setting is updated, and the IO MODULE window changes to the EXTERNAL IO SETUP window.

   **NOTE**
   If the displayed details of each station (ST#) and the installation status of I/O modules are different, check the settings of cables and switches again. The following causes are possible:

   1. Wrong I/O communication setting
      The setting of SW1 or SW2 of the JANCD-AEW02-E board may be wrong. If so, the board cannot be determined correctly.

   2. Wrong station setting
      S1 may be set to 0, E, or F (not available). Also, only one optional board can be set to one station. Change the setting of S1 so that two or more boards are not set to one station.

   3. Wrong connection of the 24 VDC power cable or the I/O communication cable
      The 24 VDC power cable or the I/O communication cable may not be connected correctly. If the 24 VDC power cable is not connected to CN324 correctly, the power cannot be supplied properly.
      Check the connection of cables according to chapter 4 “Board Installation”.

   4. Failure of I/O module
      If the displayed details and the installation status are still different even after the correction above, failure of the I/O module is possible. Contact your Yaskawa representative.
5 I/O Signal Allocation

5.1 I/O Module Setting

9. The EXTERNAL IO SETUP window appears.

10. Select {AUTO} or {MANUAL} in the ALLOCATION MODE.
   – The selection menu appears after selecting {AUTO} or {MANUAL}.

   ![Selection Menu]

   **NOTE**
   If the allocation mode is changed from {MANUAL} to {AUTO}, the set allocation data is discarded. The data will be allocated by AUTO MODE again. Save the set allocation data to the external devices in advance, if needed.
5 I/O Signal Allocation

5.1 I/O Module Setting

11. Select the allocation mode to set up.
   - Select {AUTO} to allocate I/O signal allocation automatically. Select {MANUAL} to allocate I/O signal allocation manually.
   - The selected allocation mode is set up.

12. Select {DETAIL} of {EXTERNAL IO ALLOCATION}.
   - When select {AUTO}, the following procedures No.13 to 15 are not necessary. Operate the procedure from No.16.
   - When select {MANUAL}, operate the following procedures No.13 to 15 accordant with the setting manually.

   **NOTE**
   The IO allocation of the AEW board cannot be changed even if select the {MANUAL} in the allocation mode.
   The error [ERROR 8230: Cannot change the setting for AEW board.] occurs if attempt to change.
13. Select the external I/O signal number (at the change source) to be changed.
   – The select menu appears.
   – Select the {INIT} when add the AEW board to the system, which has already allocated the external I/O allocation manually.

14. Select {MODIFY], and input the external input signal number (at the change destination) to be changed. (In the setting example, enter “#20190”.)
   – The external input signal number is changed.

15. Likewise, select/modify the number of the external input signal.
   – Repeat select/modify until it becomes the desired allocation to set up.

16. Press {ENTER].
   – The allocation window of the external output signal appears.

17. Select/modify the number of the external output signal same as the external input signal.
   – Repeat select/modify until it becomes the desired allocation to set up.
5 I/O Signal Allocation
5.1 I/O Module Setting

18. Press {ENTER}.
   - Confirmation dialog appears.

19. Select {YES}.
   - The settings are confirmed, and returns to the SETUP window.
To add a board when using the AEW board

The AEW board (It is called EW board below) do not support external I/O allocation function.

As for the external I/O allocation setting to add a optional board in the system using the EW board, please refer to the following flow chart.

Add a board

The external I/O allocation is set as manual.

NO: Automatic allocation

YES: Manual allocation

Add a board other than EW board.

NO: Add the EW board

YES: Add the board other than the EW board

Set the allocation for the added board at the following windows.
- EXTERNAL IO ALLOCATION (INPUT) window
- EXTERNAL IO ALLOCATION (OUTPUT) window

Initialize the board at the EXTERNAL IO ALLOCATION (INPUT) window.
After the initialization, set the adding board again manually, and then set the allocation.

The added board is automatically allocated.

Initialize the board at the EXTERNAL IO ALLOCATION (OUTPUT) window.
After the initialization, set the adding board again manually, and then set the allocation.

Press (ENTER).
Select (YES) in the confirmation dialog to save the setting.
5 I/O Signal Allocation

5.2 I/O Module

Data transferred from the JANCD-AEW02-E board to the YRC1000 are 16 contact inputs, 16 contact outputs, and 3 analog outputs (12 bit each). The I/O data of the JANCD-AEW02-E board are allocated to the external I/O signals of the concurrent I/O signals.

When only the JANCD-AEW02-E board is installed as an optional board, the concurrent I/O of the board are allocated as shown below:

<table>
<thead>
<tr>
<th>Contact input</th>
<th>Contact output</th>
</tr>
</thead>
<tbody>
<tr>
<td>25110 to 25117: System reservation</td>
<td>35110 to 35117: System reservation</td>
</tr>
<tr>
<td>25120 to 25127: System reservation</td>
<td>35120 to 35127: System reservation</td>
</tr>
</tbody>
</table>

**Analog output**

- M560: Channel 1
- M561: Channel 2
- M562: Channel 3

The relationship between the write contents and the output voltage values of the registers M560 to M562 are shown below.

Although the register setting value is 16-bit wide, the lower 4 bits of the write content are invalid because the D/A resolution is 12 bit. (The output voltage values of the write contents ***0H to ***FH are the same.) Also, the write contents 8000H to 800FH are not used.

The allocation of the concurrent I/O is shown above, but note that only the 3 analog outputs can be used for communication between the JANCD-AEW02-E board and external devices. The contact inputs and outputs are used by the system, so they cannot be used for communications with external devices.
6 Analog Output Circuit

6.1 Output Circuit

Three output circuits (channel 1 to 3) are available.

- When connecting a load to the analog output circuit, the load resistance must be 2 kΩ or more. If the load resistance is less than 2 kΩ, abnormal output voltage or damage to the output circuit may result.
- The analog output becomes undefined when the YRC1000 is turned on or off. Use an external circuit so that there is no problem even if the analog output becomes undefined.
- Use shielded twisted-pair wires (24 to 28 AWG) for the analog output wiring, and make the wiring length as short as possible.

### Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of channels and application</td>
<td>3 channels for voltage output</td>
</tr>
<tr>
<td>Output range</td>
<td>-14 V to +14 V</td>
</tr>
<tr>
<td>Digital resolution</td>
<td>12 bit</td>
</tr>
<tr>
<td>LSB value</td>
<td>Approx. 6 mV (0.0068 V)</td>
</tr>
<tr>
<td>D/A output voltage error</td>
<td>±14 V, equal to or less than ±1%</td>
</tr>
<tr>
<td>Linearity error</td>
<td>Equal to or less than ±0.2%</td>
</tr>
<tr>
<td>Forward and reverse error</td>
<td>Equal to or less than ±1%</td>
</tr>
<tr>
<td>Ripple voltage</td>
<td>Equal to or less than ±0.1 V</td>
</tr>
<tr>
<td>Temperature drift</td>
<td>Equal to or less than ±1850 PPM/°C</td>
</tr>
<tr>
<td>For 0 V, equal to or less than ±20.5 mV (3 LSB)</td>
<td></td>
</tr>
<tr>
<td>Conversion cycle</td>
<td>Every communication cycle</td>
</tr>
<tr>
<td>Conversion time</td>
<td>Approx. 7 ms (including communication time)</td>
</tr>
<tr>
<td>External load resistance</td>
<td>Equal to or more than 2 kΩ</td>
</tr>
</tbody>
</table>

**Fig. 6-1: Example connection**

In the board

- CH*
- CH*_G
- Load (R = ≥ 2 kΩ)
- 0 V (Analog ground)
6.2 Example Connection

Note that indicates a shielded twisted-pair wire.
Specifications are subject to change without notice for ongoing product modifications and improvements.

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**YRC1000 OPTIONS**

**INSTRUCTIONS**

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