YRC1000 OPTIONS
INSTRUCTIONS
FOR ARC WELDING DIAGNOSIS FUNCTION

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

MOTOMAN INSTRUCTIONS

MOTOMAN-□□□ INSTRUCTIONS
YRC1000 INSTRUCTIONS
YRC1000 OPERATOR'S MANUAL (GENERAL) (SUBJECT SPECIFIC)
YRC1000 MAINTENANCE MANUAL
YRC1000 ALARM CODES (MAJOR ALARMS) (MINOR ALARMS)

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: 188614-1CD
Revision: 0
DANGER

• This manual explains the arc welding diagnosis function of the YRC1000 system. Read this manual carefully and be sure to understand its contents before handling the YRC1000. Any matter 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”.
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.

Fig. : Emergency Stop Button

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.

Fig. : Release of Emergency Stop

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**

- 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, etc., 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.

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**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>
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></td>
</tr>
<tr>
<td>Character Keys /Symbol Keys</td>
<td>The keys which have characters or symbols printed on them are denoted with [ ]. e.g. [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, e.g. [SHIFT]+[COORD].</td>
</tr>
<tr>
<td>Mode Switch</td>
<td>Mode Switch can select three kinds of modes that are denoted as follows: REMOTE, PLAY or TEACH. (The switch names are denoted as symbols)</td>
</tr>
<tr>
<td>Button</td>
<td>The three buttons on the upper side of the programming pendant are denoted as follows: START, HOLD, or EMERGENCY STOP. (The button names are denoted as symbols)</td>
</tr>
<tr>
<td>Displays</td>
<td>The menu displayed in the programming pendant is denoted with { }. e.g. {JOB}</td>
</tr>
</tbody>
</table>

![Diagram of the programming pendant keys, buttons, and displays]
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 of Arc Welding Diagnosis Function

1.1 Function Outline

This function diagnoses if the welding bead is normal or abnormal based on the data such as welding current waveforms or welding voltage waveforms. Notifying the error welding position can prevent a defective product flowing to the post process, or can indicate the place to adjust at the adjusting process.

- **Score mode**
  Score mode will comprehensively diagnose if the welding bead is normal or abnormal based on the data from welding current waveforms or welding voltage waveforms.

- **Current out-of-range mode**
  Current out-of-range will diagnose if the welding bead is normal or abnormal based on the differences between the welding current command value and the effective value.

**NOTE**

The arc welding diagnosis function is not a function to ensure product quality.

The arc welding diagnosis function will determine if the welding bead is normal or abnormal based on the data such as welding current waveforms. A normal or abnormal diagnosis may be unable to be determined depending on welding conditions or usage environment. In addition, if tack welding or welding time is short (less than 2 seconds), diagnosis will not be possible because the variation in scores will increase. It can not be used together with COMARC.
1 Outline of Arc Welding Diagnosis Function
1.1 Function Outline

Arc welding diagnosis function can be used in the following versions.
YRC1000: YAS2.71.00A-00 or later
DX200: DN.2.81.00A_00 or later
MOTOWELD-X350: 1.20-020-E or later
MOTOWELD-X500: 1.20-020-F or later
MOTOWELD-RL350: 1.00-070-A or later

(When using RL350, change to C Parameter C39 of welding power source to 100. Also, if the weld diagnosis function is enabled, the communication failure will occur if the RL350 has the above version or earlier. Please upgrade the RL350.)

The score mode cannot be used in welders other than the above. Use the current out-of-range mode.

Corresponding welding method
- DC short circuit welding
- DC pulse welding

* For short circuit welding, it is recommended to turn on the automatic correction of output voltage.
(Refer to 6.3.3 short circuit of MOTOWELD-X350 / X500 instruction manual)
2 Operation Outline

2.1 Operation Process of Arc Welding Diagnosis Function

2.1.1 JOB Setting

To use the arc welding diagnosis function, set each item after completing welding conditioning. When the welding condition, the welding speed, or the welding teaching point, etc. have been changed, make sure to set items again.

Add the bead number to the ARCON instruction in the JOB. Move the cursor to the ARCON, and press [ENTER]. The bead number is shown, and then register an arbitrary number.
When the welding diagnosis function has been enabled after upgrading, to show the bead number, perform "RESET INSTRUCTION" or change "LANGUAGE LEVEL" in the management mode.
2.1.2 Data Setting for Arc Welding Diagnosis

Set the register address of data to use the welding diagnosis on the APPLICATION CONDITION SETTING window. To show the APPLICATION CONDITION SETTING window, set the security to the management mode. Under the Main Menu, select the sub menu, {ARC WELDING} - {APPLI COND.}, and the following window appears.
Specify the register address of the following data on the APPLICATION CONDITION SETTING window.

<table>
<thead>
<tr>
<th>Name</th>
<th>Initial Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Register address for sampling welding voltage value</td>
<td>152</td>
</tr>
<tr>
<td>Register address for sampling welding current value</td>
<td>153</td>
</tr>
<tr>
<td>Register address for sampling welding feed speed value output</td>
<td>158</td>
</tr>
<tr>
<td>Register address for sampling welding feed load value output</td>
<td>159</td>
</tr>
<tr>
<td>Bead number output register address</td>
<td>166</td>
</tr>
<tr>
<td>Register address for effective current value (average) output</td>
<td>167</td>
</tr>
<tr>
<td>Register address for effective voltage value (average) output</td>
<td>168</td>
</tr>
<tr>
<td>Score output register address</td>
<td>169</td>
</tr>
<tr>
<td>Register address for welding diagnosis data 1</td>
<td>310</td>
</tr>
<tr>
<td>Register address for welding diagnosis data 2</td>
<td>311</td>
</tr>
<tr>
<td>Register address for welding diagnosis data 3</td>
<td>312</td>
</tr>
<tr>
<td>Register address for welding diagnosis data 4</td>
<td>313</td>
</tr>
<tr>
<td>Register address for welding diagnosis data 5</td>
<td>314</td>
</tr>
<tr>
<td>Register address for welding diagnosis data 6</td>
<td>315</td>
</tr>
<tr>
<td>Register address for welding diagnosis data 7</td>
<td>316</td>
</tr>
<tr>
<td>Register address for welding diagnosis data 8</td>
<td>317</td>
</tr>
<tr>
<td>Register address for welding diagnosis data 9</td>
<td>318</td>
</tr>
<tr>
<td>Register address for welding diagnosis data 10</td>
<td>319</td>
</tr>
<tr>
<td>Register address for welding diagnosis data 11</td>
<td>320</td>
</tr>
<tr>
<td>Register address for welding diagnosis data 12</td>
<td>321</td>
</tr>
<tr>
<td>Register address for welding diagnosis data 13</td>
<td>322</td>
</tr>
<tr>
<td>Register address for welding diagnosis data 14</td>
<td>323</td>
</tr>
<tr>
<td>Register address for welding diagnosis data 15</td>
<td>324</td>
</tr>
<tr>
<td>Register address for welding diagnosis data 16</td>
<td>325</td>
</tr>
<tr>
<td>Register address for welding diagnosis data 17</td>
<td>326</td>
</tr>
<tr>
<td>Register address for welding diagnosis data 18</td>
<td>327</td>
</tr>
<tr>
<td>Register address for welding diagnosis data 19</td>
<td>328</td>
</tr>
<tr>
<td>Register address for welding diagnosis data 20</td>
<td>329</td>
</tr>
</tbody>
</table>

**NOTE** When setting the register address, confirm that the register number is not duplicated.
2.1.3 Displaying / Non-displaying Arc Weld Diagnosis Window

Under the Main Menu, select the sub menu, (ARC WELDING) - (ARC WELD DIAG.), and the following window appears. To close the window, press (CLOSE).

**NOTE**
When the Arc Weld diagnosis window is being activated, the test operation and the next/back operation are invalid.
2.2 Preparation for Arc Weld Diagnosis Window

Set the Arc Weld diagnosis window settings in accordance with the following flow chart.

1. Start Arc weld diagnosis window
2. Select diagnosis mode
3. Score mode:
   - Selection of JOB
   - Selection of bead number
   - Setting threshold for determining error
   - Setting error output mode
   - Setting signal number
4. Welding
   - Confirmation of bead
     - NG
     - OK
5. Registration of basic data
6. Check the checkbox of “Start diagnosis”
7. Complete of diagnosis preparation
2.2.1 Diagnosis Mode Setting

Press {Setting} on the Arc Weld diagnosis window, the following window appears.

Select either {Score mode} or {Current out-of-range mode} as the Diagnosis mode.

**NOTE**

If the Diagnosis mode is changed, the data of the Arc Weld diagnosis window is initialized.

![Configuration window screenshot]
3 Operating Arc Weld Diagnosis Window

3.1 Selection of JOB

Move the cursor as shown below on the Arc Weld diagnosis window. Press [ENTER] to select the JOB.
3.2 Selection of Bead Number

Move the cursor as shown below on the Arc Weld diagnosis window. Press [ENTER] to select the bead number.

![Arc Weld Diagnosis Window](image)
3.3 Setting of Threshold for Determining Error

Move the cursor as shown below on the Arc Weld diagnosis window. Press [ENTER] to set the threshold for determining error.

For the score mode: The initial value is 60% or less.

For the current out-of-range mode: The initial value is other than the command current ±70 A.
3.4 Setting of Error Output Mode and Signal Number

Move the cursor as shown below on the Arc Weld diagnosis window. Press [ENTER] to set the error output mode. Next, move the cursor to the signal number to set the general output number. Select a number other than 0 for the general output number.

**Error Output Mode**

0: Disable

No error is output.

1: Alarm

After completing welding, the alarm 4297 “WELDING BEAD ERROR” is issued.

When setting the signal number (general output number), also turn ON the signal.

Set the signal number to other than 0.

2: Signal

An alarm is not issued. Turn ON the general output number set in the signal number.

Set the signal number to other than 0.
3.5 Setting of Standard Current and Standard Voltage

- **Score mode**

For the score mode, the normal welding effective value is registered as "STD. Curr" and "STD. Volt".

The registered JOB welding position is welded. After completing welding, the results are shown in "AVG. Curr" and "AVG. Volt" as follows. When the welding result is normal, press {STD. Registration}.

The confirmation dialog box, {Do you want to register the reference data?}, appears, and press {OK}.
The reference data is registered to "STD. Curr" and "STD. Volt". When multiple welding points exist, all reference data can be registered collectively.

- **Current out-of-range mode**

  For the current out-of-range mode, the welding start conditions are input as "STD. Curr" and "STD. Volt". Also, "STD. Curr" and "STD. Volt" can be changed manually. When changing the welding conditions during welding using ARCSET instruction, input the average command value, etc. of whole welding bead manually.
3.6 Changing of Standard Current and Standard Voltage

**NOTE**
When the welding condition, the welding speed, the waveform parameter, or the welding teaching point, etc. have been changed, make sure to change the reference.

- **Score mode**
  Put the cursor on the welding point to be changed, and press `{STD. Change}`.

The confirmation dialog box, `{Would you like to change the reference data?}`, appears, and press `{OK}`.

<table>
<thead>
<tr>
<th>No</th>
<th>JOB Name</th>
<th>Bead No</th>
<th>STD. Curr (A)</th>
<th>STD. Volt (V)</th>
<th>AVG. Curr (A)</th>
<th>AVG. Volt (V)</th>
<th>Signal number</th>
</tr>
</thead>
<tbody>
<tr>
<td>001</td>
<td>DIAGNOSIS</td>
<td>1</td>
<td>157</td>
<td>25.5</td>
<td>162</td>
<td>25.9</td>
<td>52</td>
</tr>
<tr>
<td>002</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>003</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>004</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>005</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>006</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>007</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>008</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>009</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The data of "AVG. Curr" and "AVG. Volt" are registered to the reference data.

Current out-of-range mode

For the current out-of-range mode, change "STD. Curr" and "STD. Volt" when changing the welding conditions. For the current out-of-range mode, manually change "STD. Curr" and "STD. Volt", or select "Bead No" again. When selecting the bead number again, the threshold for error, the output mode, and the signal number are initialized.
3.7 Enable/Disable of Diagnosis

When starting the diagnosis, check the checkbox of “Start diagnosis”.

A diagnosis can be enabled or disabled during arc interruption, such as an alarm or an emergency stop, or when restarting an arc. Press {Setting} on the Arc Weld diagnosis window. The following window will appear.
To enable a diagnosis when welding is interrupted or when an arc is restarted, select "Enable". To disable the diagnosis, select "Disable".

**NOTE**

When selecting "Enable", the data before welding interruption is deleted and the data since the welding restart is acquired.
4 Saving of Arc Welding Diagnosis Data

4.1 Saving of Arc Welding Diagnosis Data

Data displayed on the Arc Weld diagnosis window can be saved in the external memory. Data can be saved by following methods.

- Press \{[Save] (USB)\} on the Arc Weld diagnosis window to save the data.
- The data will be saved when the general IO signal is turned ON.
- The data will be saved when the specific input signal is turned ON.

### Data File Details

<table>
<thead>
<tr>
<th>Saving destination</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Set the saving destination of the data (SD or USB) on the Configuration window. Save the data to the folder specified by setting a path.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>File name</th>
<th>Details</th>
</tr>
</thead>
</table>
|           | The file is automatically created with a time-series name and not an arbitrary name. (WD0 - year/month/day - time - production counter) →WD0-YYYYMMDD-HHMMSS-C.csv  
(e.g.) July 19th 2018, 15:08:04; production counter 10 →WD0-20180719-150804-10.csv |

<table>
<thead>
<tr>
<th>File format</th>
<th>Details</th>
</tr>
</thead>
</table>
| Text file in CSV file format  
For the detail of the form, refer to chapter 5 “Saving Format of Arc Welding Diagnosis Data” |

4.2 Setting for Saving of Arc Welding Diagnosis Data (Automatic)

Press \{Setting\} on the Arc Weld diagnosis window.
4 Saving of Arc Welding Diagnosis Data
4.2 Setting for Saving of Arc Welding Diagnosis Data (Automatic)

The Configuration window appears as follows.

![Configuration Window](image)

1. Production counter

   The D variable is used in the production counter. Specify the D variable number other than 0.
   Increment the counter with the MASTER JOB, etc. When resetting the counter every day, clear the D variable specified at the starting time of the day.

![Production Counter](image)
4 Saving of Arc Welding Diagnosis Data
4.2 Setting for Saving of Arc Welding Diagnosis Data (Automatic)

② Data save signal

The process of saving data to the external memory will start when the dedicated output signal or general output signal changes from OFF to ON.

Save the data after completing all welding of one work.

<Specific input signal>

- Use this signal when backing up data with the concurrent I/O ladder such as signals from PLC or external signals. (A concurrent I/O ladder circuit for the logging data backup control can be created.)
- For the detail of the specific input signal, refer to chapter 6 “Concurrent I/O Ladder”.

<General output signal>

- Use this signal when backing up data from the robot job.
- If “0000” is specified, the general output number specification becomes invalid.
4. Saving of Arc Welding Diagnosis Data
4.2 Setting for Saving of Arc Welding Diagnosis Data (Automatic)

② AVG. Data clear signal
Use this signal when deleting the acquired effective data and newly acquiring data. The effective data will be cleared when the dedicated input signal or general input signal changes from OFF to ON.

③ Backup destination
USB or SD card can be selected as the destination. Setting the path enables folders in the media to be selectable.

The following settings cannot be specified as a backup destination.
- In case the length of the path is more than 16 bytes.
- The upper hierarchy than the selected media
- The hierarchy of SD card when a USB is selected
- The hierarchy of USB when a SD card is selected

If there is no external memory, the dialog box of “Insert a media.” appears.
4 Saving of Arc Welding Diagnosis Data
4.2 Setting for Saving of Arc Welding Diagnosis Data (Automatic)

When saving the data in the folder created in the USB, set the cursor to “USB Memory”. Press the right button of the programming pendant and a folder appears.
4 Saving of Arc Welding Diagnosis Data
4.3 Setting for Saving of Arc Welding Diagnosis Data (Manual)

A data of the arc welding diagnosis can be saved manually. Press {Save (USB)} on the Arc weld diagnosis window. In manual saving, the data is saved in the USB.

<table>
<thead>
<tr>
<th>No</th>
<th>JOB Name</th>
<th>Seed</th>
<th>STD. Curr (A)</th>
<th>STD. Volt (V)</th>
<th>AVG. Curr (A)</th>
<th>AVG. Volt (V)</th>
<th>Score (8)</th>
<th>Thresh. (8)</th>
<th>Output Enable</th>
<th>Signal number</th>
</tr>
</thead>
<tbody>
<tr>
<td>001</td>
<td>DIAGNOSIS</td>
<td>1</td>
<td>167</td>
<td>15.5</td>
<td>162</td>
<td>15.0</td>
<td>82</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<td>002</td>
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</tr>
</tbody>
</table>

NOTE

When the control power supply is disconnected, the effective data that has not been saved in the external memory will be deleted. Data received between the last time the data backup signal was received and saved to the external memory to the time when the control power supply was disconnected will also be deleted.
4.4 Retry Saving of Data

The saving in the external memory can be failed depending on the timing. If a backup fails, a retry is carried out every retry period selected as beforehand.

The retry period is decided depending on the parameter. For the detail of the parameter, refer to chapter 7 “Parameter”.

The following message is indicated for five seconds when a saving or a retry failed.

```
Saving of the arc welding diagnosis data failed.
```

When the retry for the number of specified times failed, the backup is canceled, the following message is indicated, and the specific output signal “Signal for failed retry saving of arc welding diagnosis data” (#51233) in the concurrent I/O ladder is ON. After that, when the retry is successful, the message below disappears, and the specific output signal is OFF.

```
Retry saving of the arc welding diagnosis data failed.
```
5 Saving Format of Arc Welding Diagnosis Data

5.1 Saving Data

The file format is common when saving the arc welding diagnosis data to the external memory.

1) ARCTBL DATA
   Function: Shows the type of data.
   Notation: ARCTBL DATA
   Description: Shows the arc welding diagnosis data.

2) Diagnosis MODE
   Function: Shows the diagnosis mode of the arc welding diagnosis.
   Notation: 0 or 1
   Description: 0: Score mode
               1: Current out-of-range mode

3) Production counter
   Function: Shows the production counter.
   Notation: 1, 2, 3, ....
   Description: Shows the set value of D variable.

4) DATE
   Function: Shows the starting date for the saved data.
   Notation: DATE: 2018/07/19 11:41

5) WELD
   Function: Shows the welder number.
   Notation: 1, 2, ...8

6) JOB
   Function: Shows the JOB name of the saved data.
   Notation: JOB name

7) Bead Number
   Function: Shows the bead number.
   Notation: 1, 2, ...400
   Description: Up to 400 for welder 1, Up to 200 for welder 2,
               Up to 50 for welder 8
8) Base Current
   Function: Shows the standard current.
   Notation: 0 A to 550 A

9) Base Voltage
   Function: Shows the standard voltage.
   Notation: 0 V to 50 V

10) Execution Current
    Function: Shows the average current.
    Notation: 0 A to 550 A

11) Execution Voltage
    Function: Shows the average voltage.
    Notation: 0 V to 50 V

12) Score
    Function: Shows the score.
    Notation: 0% to 100%
    Description: Shows the resemblance between reference value and effective value.
                 For the current out-of-range mode, the value is not displayed.

13) Threshold for Determining Error
    Function: Shows the threshold for determining error.
    Notation: Score mode: 0% to 100%
              Current out-of-range mode: 0 A to 100 A
    Description: Score mode: Error occurs when the score is the threshold
                 for determining error or lower.
                 Current out-of-range mode: Error occurs when other than the command
                 current ± the threshold for determining error

14) Abnormal Mode
    Function: Shows an error output.
    Notation: 0, 1, or 2 (general output number)
    Description: 0: Invalid
                 1: Alarm
                 2: Signal
6 Concurrent I/O Ladder

I/O signals for the arc welding diagnosis function are as follows.

### 6.1 Specific Input Signal

<table>
<thead>
<tr>
<th>40606</th>
<th>40605</th>
</tr>
</thead>
<tbody>
<tr>
<td>Common welder</td>
<td>Clear Signal of Arc Welding Diagnosis Data</td>
</tr>
</tbody>
</table>

- **Save Signal of Arc Welding Diagnosis Data**
  Use this signal when starting to save the arc welding diagnosis data to the external memory with the concurrent I/O ladder such as signals from PLC or external signals.
  (A concurrent I/O ladder circuit for the saving control of the arc welding diagnosis data can be created.)

- **Clear Signal of Arc Welding Diagnosis Data**
  Use this signal when deleting the acquired effective data and newly acquiring effective data.
  The data will be cleared when the signal changes from OFF to ON.
  To use this signal, add and create the circuit for controlling the clear signal of arc welding diagnosis data on concurrent I/O ladder.

### 6.2 Specific Output Signal

<table>
<thead>
<tr>
<th>51233</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signal for failed retry saving of arc welding diagnosis data.</td>
</tr>
</tbody>
</table>

- **Signal for Retry Saving of Arc Welding Diagnosis Data Failed**
  The signal is ON if the retry saving of arc welding diagnosis data has reached the specified upper limit and failed.
  The signal is OFF when the saving of the arc welding diagnosis data is retried and the data is saved properly.
7 Parameter

7.1 SC Parameter

Table 7-1: Parameter List

<table>
<thead>
<tr>
<th>Number</th>
<th>Content</th>
<th>Initial Value</th>
<th>Setting Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>S4C1082</td>
<td>Retry time for saving of the arc welding diagnosis data [unit: second]</td>
<td>60</td>
<td>10 - 3600</td>
</tr>
<tr>
<td>S4C1083</td>
<td>Retry count for saving of the arc welding diagnosis data [unit: times]</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

- **Retry Time for Saving of the Arc Welding Diagnosis Data**
  Specify the period of retry saving of the arc welding diagnosis data.

- **Retry Count for Saving of Arc Welding Diagnosis Data**
  Specify the upper limit of retry count for saving of the arc welding diagnosis data.
## 7.2 AP Parameter

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Content</th>
<th>Initial Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>AxP144</td>
<td>Starting delay time for average value calculation unit: ms</td>
<td>500</td>
</tr>
<tr>
<td>AxP145</td>
<td>System reserved</td>
<td>20</td>
</tr>
<tr>
<td>AxP146</td>
<td>Bead number output register address</td>
<td>166+20* (Welder No.-1)</td>
</tr>
<tr>
<td>AxP147</td>
<td>Register address for effective current value (average) output</td>
<td>167+20* (Welder No.-1)</td>
</tr>
<tr>
<td>AxP148</td>
<td>Register address for effective voltage value (average) output</td>
<td>168+20* (Welder No.-1)</td>
</tr>
<tr>
<td>AxP149</td>
<td>Score output register address</td>
<td>169+20* (Welder No.-1)</td>
</tr>
<tr>
<td>AxP150</td>
<td>Register address for welding diagnosis data 1</td>
<td>310+20* (Welder No.-1)</td>
</tr>
<tr>
<td>AxP151</td>
<td>Register address for welding diagnosis data 2</td>
<td>311+20* (Welder No.-1)</td>
</tr>
<tr>
<td>AxP152</td>
<td>Register address for welding diagnosis data 3</td>
<td>312+20* (Welder No.-1)</td>
</tr>
<tr>
<td>AxP153</td>
<td>Register address for welding diagnosis data 4</td>
<td>313+20* (Welder No.-1)</td>
</tr>
<tr>
<td>AxP154</td>
<td>Register address for welding diagnosis data 5</td>
<td>314+20* (Welder No.-1)</td>
</tr>
<tr>
<td>AxP155</td>
<td>Register address for welding diagnosis data 6</td>
<td>315+20* (Welder No.-1)</td>
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<tr>
<td>AxP156</td>
<td>Register address for welding diagnosis data 7</td>
<td>316+20* (Welder No.-1)</td>
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<tr>
<td>AxP157</td>
<td>Register address for welding diagnosis data 8</td>
<td>317+20* (Welder No.-1)</td>
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<tr>
<td>AxP158</td>
<td>Register address for welding diagnosis data 9</td>
<td>318+20* (Welder No.-1)</td>
</tr>
<tr>
<td>AxP159</td>
<td>Register address for welding diagnosis data 10</td>
<td>319+20* (Welder No.-1)</td>
</tr>
<tr>
<td>AxP160</td>
<td>Register address for welding diagnosis data 11</td>
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</tr>
<tr>
<td>AxP161</td>
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<td>321+20* (Welder No.-1)</td>
</tr>
<tr>
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<td>Register address for welding diagnosis data 13</td>
<td>322+20* (Welder No.-1)</td>
</tr>
<tr>
<td>AxP163</td>
<td>Register address for welding diagnosis data 14</td>
<td>323+20* (Welder No.-1)</td>
</tr>
<tr>
<td>AxP164</td>
<td>Register address for welding diagnosis data 15</td>
<td>324+20* (Welder No.-1)</td>
</tr>
<tr>
<td>AxP165</td>
<td>Register address for welding diagnosis data 16</td>
<td>325+20* (Welder No.-1)</td>
</tr>
<tr>
<td>AxP166</td>
<td>Register address for welding diagnosis data 17</td>
<td>326+20* (Welder No.-1)</td>
</tr>
<tr>
<td>AxP167</td>
<td>Register address for welding diagnosis data 18</td>
<td>327+20* (Welder No.-1)</td>
</tr>
<tr>
<td>AxP168</td>
<td>Register address for welding diagnosis data 19</td>
<td>328+20* (Welder No.-1)</td>
</tr>
<tr>
<td>AxP169</td>
<td>Register address for welding diagnosis data 20</td>
<td>329+20* (Welder No.-1)</td>
</tr>
</tbody>
</table>

**NOTE**

Welder No. (e.g. Bead number output register address)

For one welder: 169+20* (Welder No.-1) = 169 (register address)

For two welders: 169+20* (Welder No.-1) = 189 (register address)
8 Alarm / Error / Inform

8.1 Alarm List

<table>
<thead>
<tr>
<th>Alarm Number</th>
<th>Message</th>
<th>Sub Code</th>
<th>Details</th>
<th>Remedy</th>
</tr>
</thead>
</table>
| 4297         | WELDING BEAD ERROR | Welder No.*1000 + data No. (1 to 400) | Determined as welding bead failure with the welding diagnosis function. | (1) Check the welding bead.  
(2) Check the welding conditions, the welding tip, the gas flow, the position deviation of the work, or the jig, etc.  
(3) If an alarm frequently occurs while the welding bead is normal, change the threshold of the welding diagnosis function. |
YRC1000 OPTIONS
INSTRUCTIONS
FOR ARC WELDING DIAGNOSIS FUNCTION

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