YRC1000micro OPTIONS
EtherCAT COMMUNICATION FUNCTION
INSTRUCTIONS
FOR INpact MADE BY HMS, Inc.

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

MOTOMAN INSTRUCTIONS
MOTOMAN-□□□ INSTRUCTIONS
YRC1000micro INSTRUCTIONS
YRC1000micro OPERATOR'S MANUAL
YRC1000micro MAINTENANCE MANUAL
YRC1000micro 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: 185701-1CD
Revision: 1
DANGER

• This manual explains the INpact board for EtherCAT (manufactured by HMS, Inc.) of the YRC1000micro system. Read this manual carefully and be sure to understand its contents before handling the YRC1000micro. 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 YRC1000micro INSTRUCTIONS. To ensure correct and safe operation, carefully read “Chapter 1. Safety” of the YRC1000micro 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 YRC1000micro.

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”.
<table>
<thead>
<tr>
<th>NOTICE</th>
</tr>
</thead>
</table>
| • Do not use or keep the board in the following environmental conditions.  
  – Where exposed to direct sunshine  
  – Where vibration or impact occurs  
  – Where high humidity exists  
  – Where a strong magnetic field exists  
  – Where much dust exists  
  – Where a sudden change in the temperature occurs  
  – Where corrosive gases occur  
  – Where condensation occurs  
• Improper usage of the board may damage 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 button on the programming pendant or 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 YRC1000micro 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 button is located on the right of the programming pendant.

• Read and understand the Explanation of the Warning Labels before operating the manipulator.
### DANGER

- In the case of not using the programming pendant, be sure to supply the emergency stop button on the equipment. Then before operating the manipulator, check to be sure that the servo power is turned OFF by pressing the emergency stop button.

  Connect the external emergency stop button to the 2-12 pin and 3-13 pin of the Safety connector (Safety).

- Upon shipment of the YRC1000micro, this signal is connected by a jumper cable in the dummy connector. To use the signal, make sure to supply a new connector, and then input it.

  If the signal is input with the jumper cable connected, it does not function, which may result in personal injury or equipment damage.

### 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, 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.

  - Return the programming pendant to a safe place 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.

- 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.
Definition of Terms Used Often in This Manual

The MOTOMAN is the YASKAWA industrial robot product.

The MOTOMAN usually consists of the manipulator, the YRC1000micro controller, manipulator cables, the YRC1000micro programming pendant (optional), and the YRC1000micro programming pendant dummy connector (optional).

In this manual, the equipment is designated as follows:

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Manual Designation</th>
</tr>
</thead>
<tbody>
<tr>
<td>YRC1000micro controller</td>
<td>YRC1000micro</td>
</tr>
<tr>
<td>YRC1000micro programming pendant</td>
<td>Programming pendant (optional)</td>
</tr>
<tr>
<td>Cable between the manipulator and the controller</td>
<td>Manipulator cable</td>
</tr>
<tr>
<td>YRC1000micro programming pendant dummy connector</td>
<td>Programming pendant dummy connector (optional)</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 [].</td>
</tr>
<tr>
<td></td>
<td>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</td>
</tr>
<tr>
<td></td>
<td>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 “+”</td>
</tr>
<tr>
<td></td>
<td>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,</td>
</tr>
<tr>
<td></td>
<td>PLAY or TEACH.</td>
</tr>
<tr>
<td></td>
<td>(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</td>
</tr>
<tr>
<td></td>
<td>follows: START, HOLD, or EMERGENCY STOP.</td>
</tr>
<tr>
<td></td>
<td>(The button names are denoted as symbols)</td>
</tr>
<tr>
<td>Displays</td>
<td>The menu displayed in the programming pendant is denoted with { }.</td>
</tr>
<tr>
<td></td>
<td>e.g. {JOB}</td>
</tr>
</tbody>
</table>

*The button/switch names are denoted as symbols.*
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.

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This manual describes the INpact board for EtherCAT (manufactured by HMS Inc.) to be used in the YRC1000micro. The application of the INpact board allows the general-purpose I/O data exchange between a EtherCAT device and the YRC1000micro.

### 1.1 System Configuration

The following diagram shows an example of the configuration of a system with an INpact board used in EtherCAT slave.

*NOTE*

Use EtherCAT cable of category 5 (100BASE-TX) or more, that is completely shielded and that has no breakage.

Ground the shield of the cable on both sides.

Ex.

- YRC1000micro side ↔ Switching HUB side
- PLC side ↔ Switching HUB side
- Switching HUB side ↔ EtherCAT Slave side

(Ground the shield on device side as close as possible to the device (100 mm or less recommended)).

Ground the shield with a metal P type clip or U type clip.

Example of connection with P type clip

Example of connection with U type clip
2 Hardware Specifications

2.1 Board External View
2.2 Board Specifications

<table>
<thead>
<tr>
<th>Items</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interface to the external device</td>
<td>EtherCAT</td>
</tr>
<tr>
<td>Board mounting position</td>
<td>Option PCI Express slot on the YRC1000micro</td>
</tr>
<tr>
<td>Error indicator</td>
<td>LED display</td>
</tr>
<tr>
<td>Number of transmission I/O points</td>
<td>Maximum number of I/O points for INpact: Input: 992 points; Output: 992 points</td>
</tr>
</tbody>
</table>

**Note on Transmission I/O Points**

1. Input points and output points cannot be configured individually.

2. YRC1000micro has 1024 inputs and 1024 outputs prepared for the I/O board. Of these, 8 inputs and 8 outputs are pre-allocated. In addition, 8 I/O points per channel are required for INpact communication status. The remaining number of I/O points are available for transmission. The number must be a multiple of 32.

2.3 Communication Specifications

<table>
<thead>
<tr>
<th>Items</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transmission speed</td>
<td>10Mbps/100Mbps</td>
</tr>
<tr>
<td>Transmission media</td>
<td>EtherCAT cable</td>
</tr>
</tbody>
</table>
3 Mounting the INpact Board

**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, 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.
3 Mounting the INpact Board

1. Remove the fixing screw (22 screws) of the top board, and remove the top board.

*Fig. 3-1: Removing the Top Board of the YRC1000micro*
3. Mounting the INpact Board

2. Mount the INpact board, and securely tighten the INpact board with screws.

Fig. 3-2: Mounting the INpact board

3. Connect the EtherCAT cable with the connector on the INpact board.

4. Reassemble the top board.

WARNING

Do not remove the top board of the YRC1000 micro whenever it is used, except for maintenance. And securely tighten the all fixing screws. Failure to observe this instruction may cause the ingress of dust, dirt, or water, which may result in electric shock and/or mechanical failure.
4 I/O Signal Allocation

4.1 Setting of Option Board and I/O Module

In order to use the INpact board in the YRC1000micro, perform the setting of the option board and I/O module in the following manner.

1. Turn ON the power supply while pressing {MAIN MENU}.
   - The Maintenance mode starts.
2. Set the security mode to the “Management Mode”.
3. Select {SYSTEM} under the main menu.
   - The sub menu appears.

Set the option board and I/O module in the management mode.
In the operation mode and the editing mode, the settings are for reference only.
4. I/O Signal Allocation
4.1 Setting of Option Board and I/O Module

4. Select {SETUP}.
   – The SETUP display appears.

5. Select “OPTION BOARD”.
   – The OPTION BOARD display appears.
6. Select “INpact”.
   - The INpact setup display appears.
   - Set the following items:
     - “INPACT”: whether to use the INpact board or not
     - “IO SIZE”: the I/O size (dword)

   - Explanation of Setup Items
   (1) INPACT
       Sets whether to use the INpact board or not. Set “USED”.
   (2) IO SIZE (dword)
       Sets the I/O size (in dwords) reserved for I/O.
       The maximum setting value of the I/O size is 31 dwords (992 points).
   (3) SECURITY
       Reserved parameter. It can not be used.
   (4) Memorised FIELDBUS
       EtherCAT is displayed. It can not be changed.
   (5) FIRMWARE
       Reserved parameter. It can not be used.
4 I/O Signal Allocation
4.1 Setting of Option Board and I/O Module

7. Press [ENTER].
   – The confirmation dialog box appears.

8. Select {YES}.
   – The IO MODULE display appears.
   The message, “Select 'Safety Board FLASH Reset'.” appears, however, do not perform 'Safety Board FLASH Reset' this time, but perform the settings continuously.
9. Press [ENTER].
   – The rest of the IO MODULE display appears, and “INpact” is displayed.
   – The I/O points is displayed under “DI/DO” according to the I/O size in dword that is set on the “OPTION BOARD” display.

10. Press [ENTER].
    – The confirmation dialog box appears.

The DI/DO points can be found using the following equation;

\[
\text{DI/DO points} = (\text{IO size (dword)} \times 32) + 8
\]

“+ 8”: the I/O points for status
11. Select {YES}.
   – Select {YES} if the display corresponds to the current mounted status of the I/O modules. The I/O module setting is updated, and the IO MODULE window changes to the EXTERNAL IO SETUP window.

12. The EXTERNAL IO SETUP window appears.

13. Select “AUTO” or “MANUAL” in the ALLOCATION MODE.
   – The selection menu appears after selecting “AUTO” or “MANUAL”.

   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.
14. 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.

15. Select “DETAIL” of “EXTERNAL IO ALLOCATION”.
   – When select “AUTO”, the following procedures No.16 to 18 are not necessary. Operate the procedure from No.19.
   – When select “MANUAL”, operate the following procedures No.16 to 18 accordant with the setting manually.
16. Select the external I/O signal number (at the change source) to be changed. (In the setting example, select “#20030”.)

- The select menu appears.

17. 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.

18. Likewise, select/modify the number of the external input signal.

- Repeat select/modify until it becomes the desired allocation to set up.
19. Press [ENTER].
   - The allocation window of the external output signal appears.

20. 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.

21. Press [ENTER].
   - Confirmation dialog appears.

22. Select {YES}.
   - The settings are confirmed, and returns to the SETUP window.
23. Set the security mode to the “SAFETY MODE”.

24. Select {FILE} - {INITIALIZE}.
   
   - The INITIALIZE window appears.

25. Select “Safety Board FLASH Reset”.
   
   - The confirmation dialog box appears.

26. Select (YES).
   
   - The setting is completed after beep sound.
4.2 Transmission Data

The data to be transferred from the INpact board to the inside of the YRC1000micro is not only the I/O data from the external device connected to the EtherCAT, but also the status of the INpact board.

Therefore, inside the YRC1000micro, 8 points (1 byte) each for input and output are reserved for the INpact board status, beside the area for the digital data. The output area, however, cannot be used.

The transmission data from the INpact board are allocated to the external I/O signals of concurrent I/O.

Where an INpact board is mounted as an optional I/O board, the concurrent I/O allocation of the board is shown in the following table.

The I/O area: 20010 to 20017 and 30010 to 30017 is reserved for the standard I/O board of the YRC1000micro.
### 4.2 Transmission Data

#### 4.2.1 YRC1000micro I/O Allocation example

Note 1) The following example is for the standard setting. When change the allocation of the external output signal or the concurrent ladder program, the allocation changes in accordance with the changes.

Note 2) As for the input data/output data of ASF30 (standard I/O), refer to “YRC1000micro INSTRUCTIONS (RE-CTO-A222)” for more details.

<table>
<thead>
<tr>
<th>ASF30 (standard I/O)</th>
<th>I/O Input</th>
<th>External input signal</th>
<th>User input signal</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>20010 to 20017</td>
<td>None (allocated on the system)</td>
<td>Input data</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>I/O Output</th>
<th>External output signal</th>
<th>User output signal</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>30010 to 30017</td>
<td>None (allocated on the system)</td>
<td>Output data</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>INpact (EtherCAT)</th>
<th>I/O Input</th>
<th>External input signal</th>
<th>User input signal</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>20020 to 20027</td>
<td>00020 to 00027 (IN0009 to IN0016)</td>
<td>Board status 1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20030 to 20037</td>
<td>00030 to 00037 (IN0017 to IN0024)</td>
<td>Input data (1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20040 to 20047</td>
<td>00040 to 00047 (IN0025 to IN0032)</td>
<td>Input data (2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20050 to 20057</td>
<td>00050 to 00057 (IN0033 to IN0040)</td>
<td>Input data (3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20060 to 20067</td>
<td>00060 to 00067 (IN0041 to IN0048)</td>
<td>Input data (4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20070 to 20077</td>
<td>00070 to 00077 (IN0049 to IN0056)</td>
<td>Input data (5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20080 to 20087</td>
<td>00080 to 00087 (IN0057 to IN0064)</td>
<td>Input data (6)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20090 to 20097</td>
<td>00090 to 00097 (IN0065 to IN0072)</td>
<td>Input data (7)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20100 to 20107</td>
<td>00100 to 00107 (IN0073 to IN0080)</td>
<td>Input data (8)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20110 to 20117</td>
<td>00110 to 00117 (IN0081 to IN0088)</td>
<td>Input data (9)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20120 to 20127</td>
<td>00120 to 00127 (IN0089 to IN0096)</td>
<td>Input data (10)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20130 to 20137</td>
<td>00130 to 00137 (IN0097 to IN0104)</td>
<td>Input data (11)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20140 to 20147</td>
<td>00140 to 00147 (IN0105 to IN0112)</td>
<td>Input data (12)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20150 to 20157</td>
<td>00150 to 00157 (IN0113 to IN0120)</td>
<td>Input data (13)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20160 to 20167</td>
<td>00160 to 00167 (IN0121 to IN0128)</td>
<td>Input data (14)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20170 to 20177</td>
<td>00170 to 00177 (IN0129 to IN0136)</td>
<td>Input data (15)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20180 to 20187</td>
<td>00180 to 00187 (IN0137 to IN0144)</td>
<td>Input data (16)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>I/O Output</th>
<th>External output signal</th>
<th>User output signal</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>30020 to 30027</td>
<td>10020 to 10027 (OT0009 to OT0016)</td>
<td>Board status 1)</td>
<td></td>
</tr>
<tr>
<td>30030 to 30037</td>
<td>10030 to 10037 (OT0017 to OT0024)</td>
<td>Output data (1)</td>
<td></td>
</tr>
<tr>
<td>30040 to 30047</td>
<td>10040 to 10047 (OT0025 to OT0032)</td>
<td>Output data (2)</td>
<td></td>
</tr>
<tr>
<td>30050 to 30057</td>
<td>10050 to 10057 (OT0033 to OT0040)</td>
<td>Output data (3)</td>
<td></td>
</tr>
<tr>
<td>30060 to 30067</td>
<td>10060 to 10067 (OT0041 to OT0048)</td>
<td>Output data (4)</td>
<td></td>
</tr>
<tr>
<td>30070 to 30077</td>
<td>10070 to 10077 (OT0049 to OT0056)</td>
<td>Output data (5)</td>
<td></td>
</tr>
<tr>
<td>30080 to 30087</td>
<td>10080 to 10087 (OT0057 to OT0064)</td>
<td>Output data (6)</td>
<td></td>
</tr>
<tr>
<td>30090 to 30097</td>
<td>10090 to 10097 (OT0065 to OT0072)</td>
<td>Output data (7)</td>
<td></td>
</tr>
</tbody>
</table>
The status of the INpact board (the first 8 points of the allocation area) is indicated as follows. The value “xxx” of the allocated input signals in the table indicates the first number of the INpact board allocated number. In the table above, where the allocation numbers are 20020 to 20027, “xxx” would be “002”.

<table>
<thead>
<tr>
<th>Signal</th>
<th>Contents</th>
</tr>
</thead>
<tbody>
<tr>
<td>2xxx0 to 2xxx5</td>
<td>Reserved for the manufacture. The user cannot use these signals.</td>
</tr>
<tr>
<td>2xxx6</td>
<td>Indicates the EtherCAT communication status. Normal:0  Error:1</td>
</tr>
<tr>
<td>2xxx7</td>
<td>Indicates the operation status of the INpact board. Normal:0  Error:1</td>
</tr>
</tbody>
</table>
4.2 Transmission Data

4.2.2 The Alarm when Communication Error Occurs Using the Board Status

When the INpact board detects an error of the EtherCAT communication, by using the CIO ladder program allows to occur the alarm.

The examples of the method are described below.

There are three alarms of the occurrence alarms.

- INpact BOARD ERROR
- EtherCAT COMMUNICATION ERROR
- UNSENT SLAVES in EtherCAT

As for the user alarm registration, refer to “Chap. 13.7 I/O Messages and I/O Alarms” in "YRC1000micro OPTIONS INSTRUCTIONS FOR Concurrent I/O (RE-CKI-A469)" for more details.

■ Register the User Alarm

1. Change the security mode to the Management Mode.
2. Select the {I/O ALARM} from the {IN/OUT} in the main menu.
3. The I/O alarm (user) window appears.

4. Move the cursor over the desired No. to register, and press [SELECT].
   - The window changes to the character string entry window.
4 I/O Signal Allocation
4.2 Transmission Data

5. Enter the I/O alarm name.

6. Press [ENTER].
   – The entered alarm is registered.

7. Register the other alarms.
   – Repeat the same procedures to register the alarm to use.
# 4 I/O Signal Allocation

## 4.2 Transmission Data

### IO Allocation and the Ladder Program

#### External input signal

<table>
<thead>
<tr>
<th>Signal</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>20026</td>
<td>EtherCAT communication error</td>
</tr>
<tr>
<td>20027</td>
<td>INpact board operation error</td>
</tr>
</tbody>
</table>

#### System input signal

<table>
<thead>
<tr>
<th>Signal</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>40012</td>
<td>User alarm request</td>
</tr>
<tr>
<td>40220</td>
<td>User alarm code d0</td>
</tr>
<tr>
<td>40221</td>
<td>User alarm code d1</td>
</tr>
<tr>
<td>40222</td>
<td>User alarm code d2</td>
</tr>
<tr>
<td>40223</td>
<td>User alarm code d3</td>
</tr>
<tr>
<td>40224</td>
<td>User alarm code d4</td>
</tr>
<tr>
<td>40225</td>
<td>User alarm code d5</td>
</tr>
</tbody>
</table>

#### Assistant relay

<table>
<thead>
<tr>
<th>Signal</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>70017</td>
<td>Control power ON completed</td>
</tr>
<tr>
<td></td>
<td>(Normality ON)</td>
</tr>
</tbody>
</table>
The figure of the ladder
Inpact board is provided with 4 LEDs for circuit board status indication. These LEDs indicate the following conditions.

STAT LED

<table>
<thead>
<tr>
<th>LED</th>
<th>Status</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Off</td>
<td>Init</td>
<td>Interface in INIT state</td>
</tr>
<tr>
<td>Green</td>
<td>Operational</td>
<td>Interface in OPERATIONAL state</td>
</tr>
<tr>
<td>Green flashing</td>
<td>Pre- operational</td>
<td>Interface in PRE-OPERATIONAL state</td>
</tr>
<tr>
<td>Green single flash</td>
<td>Safe- operational</td>
<td>Interface in SAFE-OPERATIONAL state</td>
</tr>
<tr>
<td>Flickering</td>
<td>Boot</td>
<td>Interface in BOOT state</td>
</tr>
<tr>
<td>Red</td>
<td>If ERR LED also red: fatal error</td>
<td>Internal error forces interface to passive state</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Turn OFF and ON the YRC1000micro main power to start the system again</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Check the connection of the Inpact board and the YRC1000micro PCI Express slot</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Replace the Inpact board</td>
</tr>
</tbody>
</table>
### 5 Error Indication

#### ERR LED

<table>
<thead>
<tr>
<th>LED</th>
<th>Status</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Off</td>
<td>Not initialized</td>
<td>Interface in setup or NW_INIT state</td>
</tr>
<tr>
<td>Red blinking</td>
<td>Invalid configuration</td>
<td>State change received from master not possible due to invalid register of object settings</td>
</tr>
<tr>
<td>Red single flash</td>
<td>Unsolicited state change</td>
<td>Slave device application has changed the state autonomously</td>
</tr>
<tr>
<td>Red double flash</td>
<td>Application watchdog timeout</td>
<td>Sync manager watchdog timeout</td>
</tr>
</tbody>
</table>
| Red               | Application controller error | Interface in EXCEPTION state  
• Turn OFF and ON the YRC1000micro main power to start the system again  
• Check the connection of the Inpact board and the YRC1000micro PCI Express slot  
• Replace the Inpact board |

#### LED U1 and U2

<table>
<thead>
<tr>
<th>LED U1</th>
<th>LED U2</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Off</td>
<td>Off</td>
<td>Boot manager start (before start)</td>
</tr>
<tr>
<td>Green flashing</td>
<td>Green</td>
<td>Application firmware active</td>
</tr>
</tbody>
</table>
| Other than the above | Other than the above | Boot manager initialized or Error in boot up sequence  
• Turn OFF and ON the YRC1000micro main power to start the system again  
• Check the connection of the Inpact board and the YRC1000micro PCI Express slot  
• Replace the Inpact board |
YRC1000micro OPTIONS
EtherCAT COMMUNICATION FUNCTION
INSTRUCTIONS
FOR INpact MADE BY HMS, Inc.

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MANUAL NO.
HW1485111  37/37

April 2019 18-08