SAFETY PRECAUTIONS

(Read these precautions before using this product.)
Before using this product, please read this manual and the relevant manuals carefully and pay full attention to safety to handle the product correctly.
The precautions given in this manual are concerned with this product only. For the safety precautions of the programmable controller system, refer to the MELSEC iQ-R Module Configuration Manual.
In this manual, the safety precautions are classified into two levels: "⚠️ WARNING" and "⚠️ CAUTION".

⚠️ WARNING Indicates that incorrect handling may cause hazardous conditions, resulting in death or severe injury.

⚠️ CAUTION Indicates that incorrect handling may cause hazardous conditions, resulting in minor or moderate injury or property damage.

Under some circumstances, failure to observe the precautions given under "⚠️ CAUTION" may lead to serious consequences.
Observe the precautions of both levels because they are important for personal and system safety.
Make sure that the end users read this manual and then keep the manual in a safe place for future reference.

[Design Precautions]

⚠️ WARNING

● Configure safety circuits external to the programmable controller to ensure that the entire system operates safely even when a fault occurs in the external power supply or the programmable controller. Failure to do so may result in an accident due to an incorrect output or malfunction.

1) Emergency stop circuits, protection circuits, and protective interlock circuits for conflicting operations (such as forward/reverse rotations or upper/lower limit positioning) must be configured external to the programmable controller.

2) When the programmable controller detects an abnormal condition, it stops the operation and all outputs are:
   • Turned off if the overcurrent or overvoltage protection of the power supply module is activated.
   • Held or turned off according to the parameter setting if the self-diagnostic function of the CPU module detects an error such as a watchdog timer error.

3) All outputs may be turned on if an error occurs in a part, such as an I/O control part, where the CPU module cannot detect any error. To ensure safety operation in such a case, provide a safety mechanism or a fail-safe circuit external to the programmable controller. For a fail-safe circuit example, refer to "General Safety Requirements" in the MELSEC iQ-R Module Configuration Manual.

4) Outputs may remain on or off due to a failure of a component such as a relay and transistor in an output circuit. Configure an external circuit for monitoring output signals that could cause a serious accident.

● In an output circuit, when a load current exceeding the rated current or an overcurrent caused by a load short-circuit flows for a long time, it may cause smoke and fire. To prevent this, configure an external safety circuit, such as a fuse.

● Configure a circuit so that the programmable controller is turned on first and then the external power supply. If the external power supply is turned on first, an accident may occur due to an incorrect output or malfunction.
[Design Precautions]

⚠️ WARNING

● For the operating status of each station after a communication failure, refer to manuals relevant to the network. Incorrect output or malfunction due to a communication failure may result in an accident.

● When connecting an external device with a CPU module or intelligent function module to modify data of a running programmable controller, configure an interlock circuit in the program to ensure that the entire system will always operate safely. For other forms of control (such as program modification, parameter change, forced output, or operating status change) of a running programmable controller, read the relevant manuals carefully and ensure that the operation is safe before proceeding. Improper operation may damage machines or cause accidents.

● Especially, when a remote programmable controller is controlled by an external device, immediate action cannot be taken if a problem occurs in the programmable controller due to a communication failure. To prevent this, configure an interlock circuit in the program, and determine corrective actions to be taken between the external device and CPU module in case of a communication failure.

● Do not write any data to the "system area" and "write-protect area" of the buffer memory in the module. Also, do not use any "use prohibited" signals as an output signal from the CPU module to each module. Doing so may cause malfunction of the programmable controller system. For the "system area", "write-protect area", and the "use prohibited" signals, refer to the user's manual for the module used.

● If a communication cable is disconnected, the network may be unstable, resulting in a communication failure of multiple stations. Configure an interlock circuit in the program to ensure that the entire system will always operate safely even if communications fail. Failure to do so may result in an accident due to an incorrect output or malfunction.
[Design Precautions]

⚠️ CAUTION

● Do not install the control lines or communication cables together with the main circuit lines or power cables. Keep a distance of 100mm or more between them. Failure to do so may result in malfunction due to noise.

● During control of an inductive load such as a lamp, heater, or solenoid valve, a large current (approximately ten times greater than normal) may flow when the output is turned from off to on. Therefore, use a module that has a sufficient current rating.

● After the CPU module is powered on or is reset, the time taken to enter the RUN status varies depending on the system configuration, parameter settings, and/or program size. Design circuits so that the entire system will always operate safely, regardless of the time.

● Do not power off the programmable controller or reset the CPU module while the settings are being written. Doing so will make the data in the flash ROM and SD memory card undefined. The values need to be set in the buffer memory and written to the flash ROM and SD memory card again. Doing so also may cause malfunction or failure of the module.

● When changing the operating status of the CPU module from external devices (such as the remote RUN/STOP functions), select "Do Not Open by Program" for "Opening Method" of "Module Parameter". If "Open by Program" is selected, an execution of the remote STOP function causes the communication line to close. Consequently, the CPU module cannot reopen the line, and external devices cannot execute the remote RUN function.

[Security Precautions]

⚠️ WARNING

● To maintain the security (confidentiality, integrity, and availability) of the programmable controller and the system against unauthorized access, denial-of-service (DoS) attacks, computer viruses, and other cyberattacks from external devices via the network, take appropriate measures such as firewalls, virtual private networks (VPNs), and antivirus solutions.

[Installation Precautions]

⚠️ WARNING

● Shut off the external power supply (all phases) used in the system before mounting or removing the module. Failure to do so may result in electric shock or cause the module to fail or malfunction.
[Installation Precautions]

⚠️ **CAUTION**

- Use the programmable controller in an environment that meets the general specifications in the Safety Guidelines included with the base unit. Failure to do so may result in electric shock, fire, malfunction, or damage to or deterioration of the product.
- To mount a module, place the concave part(s) located at the bottom onto the guide(s) of the base unit, and push in the module until the hook(s) located at the top snaps into place. Incorrect interconnection may cause malfunction, failure, or drop of the module.
- To mount a module with no module fixing hook, place the concave part(s) located at the bottom onto the guide(s) of the base unit, push in the module, and fix it with screw(s). Incorrect interconnection may cause malfunction, failure, or drop of the module.
- When using the programmable controller in an environment of frequent vibrations, fix the module with a screw.
- Tighten the screws within the specified torque range. Undertightening can cause drop of the screw, short circuit, or malfunction. Overtightening can damage the screw and/or module, resulting in drop, short circuit, or malfunction.
- When using an extension cable, connect it to the extension cable connector of the base unit securely. Check the connection for looseness. Poor contact may cause malfunction.
- When using an SD memory card, fully insert it into the SD memory card slot. Check that it is inserted completely. Poor contact may cause malfunction.
- Securely insert an extended SRAM cassette into the cassette connector of the CPU module. After insertion, close the cassette cover and check that the cassette is inserted completely. Poor contact may cause malfunction.
- Do not directly touch any conductive parts and electronic components of the module, SD memory card, extended SRAM cassette, or connector. Doing so can cause malfunction or failure of the module.

[Wiring Precautions]

⚠️ **WARNING**

- Shut off the external power supply (all phases) used in the system before installation and wiring. Failure to do so may result in electric shock or cause the module to fail or malfunction.
- After installation and wiring, attach a blank cover module (RG60) to each empty slot before powering on the system for operation. Also, attach an extension connector protective cover*1 to each unused extension cable connector as necessary. Directly touching any conductive parts of the connectors while power is on may result in electric shock.

*1 For details, please consult your local Mitsubishi Electric representative.
**[Wiring Precautions]**

**CAUTION**

- Individually ground the FG and LG terminals of the programmable controller with a ground resistance of 100 ohms or less. Failure to do so may result in electric shock or malfunction.
- Use applicable solderless terminals and tighten them within the specified torque range. If any spade solderless terminal is used, it may be disconnected when the terminal screw comes loose, resulting in failure.
- Check the rated voltage and signal layout before wiring to the module, and connect the cables correctly. Connecting a power supply with a different voltage rating or incorrect wiring may cause fire or failure.
- Connectors for external devices must be crimped or pressed with the tool specified by the manufacturer, or must be correctly soldered. Incomplete connections may cause short circuit, fire, or malfunction.
- Securely connect the connector to the module. Poor contact may cause malfunction.
- Do not install the control lines or communication cables together with the main circuit lines or power cables. Keep a distance of 100mm or more between them. Failure to do so may result in malfunction due to noise.
- Place the cables in a duct or clamp them. If not, dangling cable may swing or inadvertently be pulled, resulting in damage to the module or cables or malfunction due to poor contact. Do not clamp the extension cables with the jacket stripped. Doing so may change the characteristics of the cables, resulting in malfunction.
- Check the interface type and correctly connect the cable. Incorrect wiring (connecting the cable to an incorrect interface) may cause failure of the module and external device.
- Tighten the terminal screws or connector screws within the specified torque range. Undertightening can cause drop of the screw, short circuit, fire, or malfunction. Overtightening can damage the screw and/or module, resulting in drop, short circuit, fire, or malfunction.
- When disconnecting the cable from the module, do not pull the cable by the cable part. For the cable with connector, hold the connector part of the cable. For the cable connected to the terminal block, loosen the terminal screw. Pulling the cable connected to the module may result in malfunction or damage to the module or cable.
- Prevent foreign matter such as dust or wire chips from entering the module. Such foreign matter can cause a fire, failure, or malfunction.
- When a protective film is attached to the top of the module, remove it before system operation. If not, inadequate heat dissipation of the module may cause a fire, failure, or malfunction.
- Programmable controllers must be installed in control panels. Connect the main power supply to the power supply module in the control panel through a relay terminal block. Wiring and replacement of a power supply module must be performed by qualified maintenance personnel with knowledge of protection against electric shock. For wiring, refer to the MELSEC iQ-R Module Configuration Manual.
- For Ethernet cables to be used in the system, select the ones that meet the specifications in the user's manual for the module used. If not, normal data transmission is not guaranteed.
[Startup and Maintenance Precautions]

⚠️ WARNING

● Do not touch any terminal while power is on. Doing so will cause electric shock or malfunction.
● Correctly connect the battery connector. Do not charge, disassemble, heat, short-circuit, solder, or throw the battery into the fire. Also, do not expose it to liquid or strong shock. Doing so will cause the battery to produce heat, explode, ignite, or leak, resulting in injury and fire.
● Shut off the external power supply (all phases) used in the system before cleaning the module or retightening the terminal screws, connector screws, or module fixing screws. Failure to do so may result in electric shock.

[Startup and Maintenance Precautions]

⚠️ CAUTION

● When connecting an external device with a CPU module or intelligent function module to modify data of a running programmable controller, configure an interlock circuit in the program to ensure that the entire system will always operate safely. For other forms of control (such as program modification, parameter change, forced output, or operating status change) of a running programmable controller, read the relevant manuals carefully and ensure that the operation is safe before proceeding. Improper operation may damage machines or cause accidents.
● Especially, when a remote programmable controller is controlled by an external device, immediate action cannot be taken if a problem occurs in the programmable controller due to a communication failure. To prevent this, configure an interlock circuit in the program, and determine corrective actions to be taken between the external device and CPU module in case of a communication failure.
● Do not disassemble or modify the modules. Doing so may cause failure, malfunction, injury, or a fire.
● Use any radio communication device such as a cellular phone or PHS (Personal Handy-phone System) more than 25cm away in all directions from the programmable controller. Failure to do so may cause malfunction.
● Shut off the external power supply (all phases) used in the system before mounting or removing the module. Failure to do so may cause the module to fail or malfunction.
● Tighten the screws within the specified torque range. Undertightening can cause drop of the component or wire, short circuit, or malfunction. Overtightening can damage the screw and/or module, resulting in drop, short circuit, or malfunction.
● After the first use of the product, do not mount/remove the module to/from the base unit, and the terminal block to/from the module, and do not insert/remove the extended SRAM cassette to/from the CPU module more than 50 times (IEC 61131-2 compliant) respectively. Exceeding the limit may cause malfunction.
● After the first use of the product, do not insert/remove the SD memory card to/from the CPU module more than 500 times. Exceeding the limit may cause malfunction.
● Do not touch the metal terminals on the back side of the SD memory card. Doing so may cause malfunction or failure of the module.
● Do not touch the integrated circuits on the circuit board of an extended SRAM cassette. Doing so may cause malfunction or failure of the module.
● Do not drop or apply shock to the battery to be installed in the module. Doing so may damage the battery, causing the battery fluid to leak inside the battery. If the battery is dropped or any shock is applied to it, dispose of it without using.
[Startup and Maintenance Precautions]

⚠️ CAUTION
- Startup and maintenance of a control panel must be performed by qualified maintenance personnel with knowledge of protection against electric shock. Lock the control panel so that only qualified maintenance personnel can operate it.
- Before handling the module, touch a conducting object such as a grounded metal to discharge the static electricity from the human body. Failure to do so may cause the module to fail or malfunction.

[Operating Precautions]

⚠️ CAUTION
- When changing data and operating status, and modifying program of the running programmable controller from an external device such as a personal computer connected to an intelligent function module, read relevant manuals carefully and ensure the safety before operation. Incorrect change or modification may cause system malfunction, damage to the machines, or accidents.
- Do not power off the programmable controller or reset the CPU module while the setting values in the buffer memory are being written to the flash ROM in the module. Doing so will make the data in the flash ROM and SD memory card undefined. The values need to be set in the buffer memory and written to the flash ROM and SD memory card again. Doing so can cause malfunction or failure of the module.

[Disposal Precautions]

⚠️ CAUTION
- When disposing of this product, treat it as industrial waste.
- When disposing of batteries, separate them from other wastes according to the local regulations. For details on battery regulations in EU member states, refer to the MELSEC iQ-R Module Configuration Manual.

[Transportation Precautions]

⚠️ CAUTION
- When transporting lithium batteries, follow the transportation regulations. For details on the regulated models, refer to the MELSEC iQ-R Module Configuration Manual.
- The halogens (such as fluorine, chlorine, bromine, and iodine), which are contained in a fumigant used for disinfection and pest control of wood packaging materials, may cause failure of the product. Prevent the entry of fumigant residues into the product or consider other methods (such as heat treatment) instead of fumigation. The disinfection and pest control measures must be applied to unprocessed raw wood.
CONDITIONS OF USE FOR THE PRODUCT

(1) MELSEC programmable controller ("the PRODUCT") shall be used in conditions;
   i) where any problem, fault or failure occurring in the PRODUCT, if any, shall not lead to any major or serious accident;
   and
   ii) where the backup and fail-safe function are systematically or automatically provided outside of the PRODUCT for the case of any problem, fault or failure occurring in the PRODUCT.

(2) The PRODUCT has been designed and manufactured for the purpose of being used in general industries.
   MITSUBISHI ELECTRIC SHALL HAVE NO RESPONSIBILITY OR LIABILITY (INCLUDING, BUT NOT LIMITED TO ANY AND ALL RESPONSIBILITY OR LIABILITY BASED ON CONTRACT, WARRANTY, TORT, PRODUCT LIABILITY) FOR ANY INJURY OR DEATH TO PERSONS OR LOSS OR DAMAGE TO PROPERTY CAUSED BY the PRODUCT THAT ARE OPERATED OR USED IN APPLICATION NOT INTENDED OR EXCLUDED BY INSTRUCTIONS, PRECAUTIONS, OR WARNING CONTAINED IN MITSUBISHI ELECTRIC USER'S, INSTRUCTION AND/OR SAFETY MANUALS, TECHNICAL BULLETINS AND GUIDELINES FOR the PRODUCT. ("Prohibited Application")
   Prohibited Applications include, but not limited to, the use of the PRODUCT in:
   • Nuclear Power Plants and any other power plants operated by Power companies, and/or any other cases in which the public could be affected if any problem or fault occurs in the PRODUCT.
   • Railway companies or Public service purposes, and/or any other cases in which establishment of a special quality assurance system is required by the Purchaser or End User.
   • Aircraft or Aerospace, Medical applications, Train equipment, transport equipment such as Elevator and Escalator, Incineration and Fuel devices, Vehicles, Manned transportation, Equipment for Recreation and Amusement, and Safety devices, handling of Nuclear or Hazardous Materials or Chemicals, Mining and Drilling, and/or other applications where there is a significant risk of injury to the public or property.
   Notwithstanding the above restrictions, Mitsubishi Electric may in its sole discretion, authorize use of the PRODUCT in one or more of the Prohibited Applications, provided that the usage of the PRODUCT is limited only for the specific applications agreed to by Mitsubishi Electric and provided further that no special quality assurance or fail-safe, redundant or other safety features which exceed the general specifications of the PRODUCTS are required. For details, please contact the Mitsubishi Electric representative in your region.

(3) Mitsubishi Electric shall have no responsibility or liability for any problems involving programmable controller trouble and system trouble caused by DoS attacks, unauthorized access, computer viruses, and other cyberattacks.
INTRODUCTION

Thank you for purchasing the Mitsubishi Electric MELSEC iQ-R series programmable controllers. This manual describes the procedures, system configuration, and wiring of the relevant product listed below. Before using this product, please read this manual and the relevant manuals carefully and develop familiarity with the functions and performance of the MELSEC iQ-R series programmable controller to handle the product correctly. When applying the program examples provided in this manual to an actual system, ensure the applicability and confirm that it will not cause system control problems. Please make sure that the end users read this manual.

Relevant product

RJ71CN91

COMPLIANCE WITH EMC AND LOW VOLTAGE DIRECTIVES

Method of ensuring compliance

To ensure that Mitsubishi Electric programmable controllers maintain the EMC and Low Voltage Directives or other regulations when incorporated into other machinery or equipment, certain measures may be necessary. Please refer to one of the following manuals.

- MELSEC iQ-R Module Configuration Manual (SH-081262ENG)
- Safety Guidelines (IB-0800525)

Certification marks on the side of the programmable controller indicate compliance with the relevant regulations.

Additional measures

No additional measures are necessary for the compliance of this product with EMC and Low Voltage Directives.
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RELEVANT MANUALS

<table>
<thead>
<tr>
<th>Manual name [manual number]</th>
<th>Description</th>
<th>Available form</th>
</tr>
</thead>
<tbody>
<tr>
<td>MELSEC iQ-R CANopen Module User's Manual (Startup) [SH-081734ENG] (this manual)</td>
<td>Performance specifications, procedures before operation, system configuration, wiring, and communication examples of the CANopen module</td>
<td>Print book/e-Manual PDF</td>
</tr>
</tbody>
</table>

This manual does not include detailed information on the following:
• General specifications
• Applicable combinations of CPU modules and the other modules, and the number of mountable modules
• Installation
For details, refer to the following.
MELSEC iQ-R Module Configuration Manual
This manual does not include information on the module function blocks.
For details, refer to the Function Block Reference for the module used.

e-Manual refers to the Mitsubishi Electric FA electronic book manuals that can be browsed using a dedicated tool.
e-Manual has the following features:
• Required information can be cross-searched in multiple manuals.
• Other manuals can be accessed from the links in the manual.
• The hardware specifications of each part can be found from the product figures.
• Pages that users often browse can be bookmarked.
• Sample programs can be copied to an engineering tool.

TERMS

Unless otherwise specified, this manual uses the following terms.

<table>
<thead>
<tr>
<th>Term</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buffer memory</td>
<td>Memory in an intelligent function module for storing data such as setting values and monitored values. When integrated into the CPU module, this memory refers to a memory for storing data such as setting values and monitored values of the Ethernet function, and data used for data communication of the multiple CPU system function.</td>
</tr>
<tr>
<td>CAN</td>
<td>The abbreviation for Controller Area Network</td>
</tr>
<tr>
<td>CANopen</td>
<td>CAN based higher-layer protocol</td>
</tr>
<tr>
<td>CiA</td>
<td>The abbreviation for CAN in Automation. Non-profit organization for standardization of CAN protocols.</td>
</tr>
<tr>
<td>CPU module</td>
<td>A generic term for the MELSEC iQ-R series CPU module</td>
</tr>
<tr>
<td>Device</td>
<td>A device (X, Y, M, D, or others) in a CPU module</td>
</tr>
<tr>
<td>Engineering tool</td>
<td>Another term for the software package for the MELSEC programmable controllers</td>
</tr>
<tr>
<td>Global label</td>
<td>A label that is valid for all the program data when multiple program data are created in the project. There are two types of global label: a module specific label (module label), which is generated automatically by GX Works3, and an optional label, which can be created for any specified device.</td>
</tr>
<tr>
<td>Intelligent function module</td>
<td>A module that has functions other than input and output, such as an A/D converter module and D/A converter module</td>
</tr>
<tr>
<td>Label</td>
<td>A label that represents a device in a given character string</td>
</tr>
<tr>
<td>Module label</td>
<td>A label that represents one of memory areas (I/O signals and buffer memory areas) specific to each module in a given character string. For the module used, GX Works3 automatically generates this label, which can be used as a global label.</td>
</tr>
</tbody>
</table>
This chapter describes the names of each part of the RJ71CN91.

<table>
<thead>
<tr>
<th>No.</th>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>RUN LED</td>
<td>Indicates the operating status. On: Normal operation Off: Error ([1] MELSEC iQ-R CANopen Module User's Manual (Application))</td>
</tr>
<tr>
<td></td>
<td>ERR LED</td>
<td>Indicates the error status of the module. On, flashing: Error ([1] MELSEC iQ-R CANopen Module User's Manual (Application)) Off: Normal operation</td>
</tr>
</tbody>
</table>
|     | CAN RUN LED\(^1\)           | Indicates the communication status of CANopen or CAN. For details on the communication status, refer to the following.  
- In CANopen 405 mode  
  - On: Operational  
  - Flickering: LSS services in progress\(^2\)  
  - Blinking: Pre-operational  
  - Single flash: Stopped  
- In 11-bit CAN-ID Layer 2 message mode and 29-bit CAN-ID Layer 2 message mode  
  - On: Layer 2 online mode  
  - Off: Layer 2 offline mode |
|     | CAN ERR LED\(^1\)           | Indicates the communication error status of CANopen or CAN. For details on the communication error status, refer to the following.  
- On: The RJ71CN91 in the Bus OFF state  
  - Flickering: LSS services in progress\(^2\)  
  - Blinking: Setting error  
  - Double flash: A NMT guarding event or a heartbeat event has occurred  
  - Single flash: The value of 'CAN transmission error counter' (UniG35) or 'CAN reception error counter' (UniG36) has reached the warning level  
- Off: Normal operation |
|     | TX/RX LED                   | Indicates the sending/receiving status of CAN messages. On: CAN messages being sent or received Off: CAN messages not sent nor received |
| (2) | Transmission cable terminal block | A connector to connect the CAN bus cable |
| (3) | Production information marking | Shows the production information (16 digits) of the module. |
The following chart shows intervals of four flashing types (Single flash, Double flash, Blinking, and Flickering). If the flashing LED changes, the interval may not follow. (Example: When the Single flash switch to the Double flash less than one second, flash continuously three times or more per 0.2 seconds.)

<table>
<thead>
<tr>
<th></th>
<th>Single flash</th>
<th>Double flash</th>
<th>Blinking</th>
<th>Flickering</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.2s</td>
<td></td>
<td>0.2s</td>
<td>0.2s</td>
<td></td>
</tr>
<tr>
<td>1s</td>
<td></td>
<td>0.2s</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The CAN RUN LED and CAN ERR LED alternately flash while the LSS services are in progress.
This section describes the performance specifications of the RJ71CN91.

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transmission type</td>
<td>CAN bus network (RS-485, CSMA/CR)</td>
</tr>
<tr>
<td>Applicable function</td>
<td>• CANopen node</td>
</tr>
<tr>
<td></td>
<td>• CAN node</td>
</tr>
<tr>
<td>CANopen communication services that are compliant with the CiA standards</td>
<td>• CiA-301 V4.2</td>
</tr>
<tr>
<td></td>
<td>• CiA-302 V4.1</td>
</tr>
<tr>
<td></td>
<td>• CiA-305 V2.2</td>
</tr>
<tr>
<td>CANopen device/application profiles that are compliant with the CiA standards</td>
<td>Interface and device profile CIA-405 V2.0 for IEC 61131-3 programmable devices</td>
</tr>
<tr>
<td>Remote transmit request (RTR)</td>
<td>• CANopen 405 mode: Not supported for PDO</td>
</tr>
<tr>
<td></td>
<td>• 11-bit CAN-ID Layer 2 message mode and 29-bit CAN-ID Layer 2 message mode: Supported</td>
</tr>
<tr>
<td>Amount of communication data (CANopen 405 mode)</td>
<td></td>
</tr>
<tr>
<td>TPDO</td>
<td>4 words × 256</td>
</tr>
<tr>
<td>RPDO</td>
<td>4 words × 256</td>
</tr>
<tr>
<td>Frame format (11-bit CAN-ID Layer 2 message mode, 29-bit CAN-ID Layer 2 message mode)</td>
<td>The standard format (11-bit CAN-ID) or extended format (29-bit CAN-ID) can be selected.</td>
</tr>
<tr>
<td>Node ID</td>
<td>Selectable from 1 to 127</td>
</tr>
<tr>
<td>Communication method</td>
<td>Acyclic, cyclic, or event-driven</td>
</tr>
<tr>
<td>Baud rate</td>
<td>1Mbps/800kbps/500kbps/250kbps/125kbps/100kbps/50kbps/20kbps/10kbps</td>
</tr>
<tr>
<td>Maximum cable length</td>
<td>• 500m (when used at 10kbps)</td>
</tr>
<tr>
<td></td>
<td>• 2500m (when used at 20kbps)</td>
</tr>
<tr>
<td></td>
<td>• 1000m (when used at 50kbps)</td>
</tr>
<tr>
<td></td>
<td>• 600m (when used at 100kbps)</td>
</tr>
<tr>
<td></td>
<td>• 500m (when used at 125kbps)</td>
</tr>
<tr>
<td></td>
<td>• 250m (when used at 250kbps)</td>
</tr>
<tr>
<td></td>
<td>• 100m (when used at 500kbps)</td>
</tr>
<tr>
<td></td>
<td>• 50m (when used at 800kbps)</td>
</tr>
<tr>
<td></td>
<td>• 25m (when used at 1Mbps)</td>
</tr>
<tr>
<td>Connection cable</td>
<td>The CAN bus cable should conform to ISO 11898. (Page 25 Wiring Products)</td>
</tr>
<tr>
<td>Interface</td>
<td>Two-piece pluggable terminal block (Page 23 Terminal Block)</td>
</tr>
<tr>
<td>Number of write accesses to a flash ROM</td>
<td>Hundred thousand times at a maximum</td>
</tr>
<tr>
<td>Number of occupied I/O points</td>
<td>32</td>
</tr>
<tr>
<td>Internal current consumption (SVDC)</td>
<td>0.33A</td>
</tr>
<tr>
<td>External dimensions</td>
<td>Height 106mm (Base unit mounting side: 98mm)</td>
</tr>
<tr>
<td></td>
<td>Width 27.8mm</td>
</tr>
<tr>
<td></td>
<td>Depth 118.5mm</td>
</tr>
<tr>
<td>Weight</td>
<td>0.14kg</td>
</tr>
</tbody>
</table>
This chapter describes the functions of the RJ71CN91. For details on the functions, refer to the following.

MELSEC iQ-R CANopen Module User's Manual (Application)

### CANopen communications

<table>
<thead>
<tr>
<th>Function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>NMT</td>
<td>This function is used to control the CANopen network.</td>
</tr>
<tr>
<td>Node control</td>
<td>Controls the NMT state of the CANopen node from the NMT master.</td>
</tr>
<tr>
<td>NMT startup</td>
<td>When the NMT master is started up, detects NMT slaves on the CANopen network and sets parameters.</td>
</tr>
<tr>
<td>Error event control</td>
<td>When the NMT master detects an error in an NMT slave, controls the status of the NMT slave or network.</td>
</tr>
<tr>
<td>Boot-up control</td>
<td>After NMT startup, if the NMT master detects a new NMT slave, the detected NMT slave is started up.</td>
</tr>
<tr>
<td>Flying master</td>
<td>When the NMT master on the same network fails, its own node becomes the NMT master to continue the CANopen network control.</td>
</tr>
<tr>
<td>LSS</td>
<td>Sets CANopen node where node IDs and baud rate cannot be set with switches via CANopen network.</td>
</tr>
<tr>
<td>Configuration manager</td>
<td>Sets the NMT slave parameters when the NMT master starts up an NMT slave.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SDO</td>
<td>Reads from and writes to the object dictionary for any of CANopen nodes.</td>
</tr>
<tr>
<td>PDO</td>
<td>Transfers data in real time between multiple CANopen nodes. There are data transmission TPDO and data reception RPDO.</td>
</tr>
<tr>
<td>SYNC</td>
<td>Synchronizes timing of TPDO and RPDO.</td>
</tr>
<tr>
<td>TIME</td>
<td>Synchronizes the time between CANopen nodes on the network.</td>
</tr>
<tr>
<td>EMCY</td>
<td>Notifies errors found in its own node to other nodes.</td>
</tr>
<tr>
<td>Node guarding</td>
<td>Monitors the NMT slaves with the NMT master to detect errors of the NMT slaves.</td>
</tr>
<tr>
<td>Heartbeat</td>
<td>Monitors other nodes with a given CANopen node to detect errors of other nodes.</td>
</tr>
<tr>
<td>Operation setting at error occurrence</td>
<td>Sets an NMT state to which the RJ71CN91 is allowed to move when a communication error occurs.</td>
</tr>
</tbody>
</table>

### CAN communications

<table>
<thead>
<tr>
<th>Function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Layer 2 message transmission and receive</td>
<td>Used to communicate data between CAN nodes.</td>
</tr>
<tr>
<td>CPU module STOP transition message</td>
<td>When the CPU module state moved from RUN to STOP, the RJ71CN91 sends a given data to the CAN node with a Layer 2 message.</td>
</tr>
</tbody>
</table>
This chapter describes the procedures before operation.

1. Network construction
Configure the system and set the parameters which are required for start-up.
   • Wiring (Page 23 WIRING)
   • Parameter setting (MELSEC iQ-R CANopen Module User's Manual (Application))

2. Programming
Create a program. For details, refer to the following.
   Page 27 COMMUNICATION EXAMPLES

Depending on the function mode of the module, all communications may not start if the CPU module is not in RUN state. For communication status of the module depending on CPU module operating status, refer to the following.
   (MELSEC iQ-R CANopen Module User's Manual (Application))
For system configurations using the MELSEC iQ-R series modules, CPU modules that can be used with the RJ71CN91, and the number of mountable modules, refer to the following.
- MELSEC iQ-R Module Configuration Manual

### 5.1 CANopen and CAN Network Configuration

CANopen network and CAN network consist of the RJ71CN91 (1) and node (2).

- On the CANopen network, CAN node is not available. Use the CANopen node.
- On the CAN network, CANopen node is not available. Use the CAN node.
5.2 Available Software Packages

GX Works3 and CANopen Configuration Tool are required for configuring the settings of the RJ71CN91.

<table>
<thead>
<tr>
<th>Software</th>
<th>Supported version</th>
</tr>
</thead>
<tbody>
<tr>
<td>GX Works3</td>
<td>Version 1.038Q or later</td>
</tr>
<tr>
<td>CANopen Configuration Tool</td>
<td>Version 1.00A or later</td>
</tr>
</tbody>
</table>

**CANopen Configuration Tool**

For CANopen Configuration Tool, please consult your local Mitsubishi representative.

- **Operating environment, installation and uninstallation**
  For the operating environment and installation/uninstallation of CANopen Configuration Tool, refer to the following.
  - CANopen Configuration Tool Installation Instructions

- **Software license agreement**
  For the software license agreement to use CANopen Configuration Tool, refer to the following.
  - Page 46 Software License Agreement

- **Operation methods and functions**
  For operation methods and functions of CANopen Configuration Tool, refer to the following.
  - MELSEC iQ-R CANopen Module User's Manual (Application)
6 WIRING

This chapter describes the wiring for the RJ71CN91.

6.1 Terminal Block

Type of terminal block

The RJ71CN91 uses the following terminal block.

<table>
<thead>
<tr>
<th>Name</th>
<th>Model</th>
<th>Contact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transmission cable terminal block</td>
<td>MSTB2.5/5-STF-5.08AU-M</td>
<td>PHOENIX CONTACT GmbH &amp; Co. KG (<a href="http://www.phoenixcontact.com">www.phoenixcontact.com</a>)</td>
</tr>
</tbody>
</table>

Tightening torque

Tighten the terminal block screws within the following specified torque range.

<table>
<thead>
<tr>
<th>Screw type</th>
<th>Tightening torque range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Terminal block mounting screw (M2.5 screw)</td>
<td>0.20 to 0.30N·m</td>
</tr>
<tr>
<td>Wiring installation screw (M3 screw)</td>
<td>0.50 to 0.60N·m</td>
</tr>
</tbody>
</table>

Tightening work requires a 0.6×3.5mm flathead screwdriver.
Before removing the transmission cable terminal block, check that terminal block mounting screws at both ends have been completely loosen (detached from the socket) and then pull it out.
Forcibly pulling out the transmission cable terminal block with the terminal block mounting screws at both ends engaged may damage the equipment.
Check that there is no short-circuit with loosen or untwisted wires before mounting, and then completely tighten the terminal block mounting screws at both ends.

Terminal name of terminal block

Terminal name of terminal block is as follows.

<table>
<thead>
<tr>
<th>Terminal block</th>
<th>Terminal name</th>
<th>Description</th>
<th>Cable color</th>
</tr>
</thead>
<tbody>
<tr>
<td>NC</td>
<td>Signal name: CAN_V+ Extermal power supply Make a connection as required as it is not used by the RJ71CN91.</td>
<td>Red</td>
<td></td>
</tr>
<tr>
<td>CAN+</td>
<td>Signal name: CAN_H CAN_H bus line (dominant high)</td>
<td>White</td>
<td></td>
</tr>
<tr>
<td>SLD</td>
<td>Signal name: CAN_SHLD CAN shield</td>
<td>—</td>
<td></td>
</tr>
<tr>
<td>CAN-</td>
<td>Signal name: CAN_L CAN_L bus line (dominant low)</td>
<td>Blue</td>
<td></td>
</tr>
<tr>
<td>GND</td>
<td>Signal name: CAN_GND CAN ground</td>
<td>Black</td>
<td></td>
</tr>
</tbody>
</table>

The terminal block has labels attached corresponding to the cable colors. Match the cable colors with the terminal block label colors to connect the CAN bus cable.
6.2 Wiring Methods

This section describes the wiring for transmission cable terminal block of the RJ71CN91.

### Wiring for transmission cable terminal block

**Cable installation**

Insert the cable into the wire insertion opening with the wiring installation screws loosened, and then tighten the wiring installation screws at an adequate torque. After the tightening, slightly pull the cable to check that the cable has been completely clamped.

**Disconnecting cable**

Loosen the wiring installation screws for the cable to be disconnected and then pull out the cable.

### Precautions

Before connecting the CAN bus cable to the RJ71CN91, be sure to check the terminal name of the transmission cable terminal block. (Page 23 Terminal name of terminal block)

When wiring for the transmission cable terminal block, observe the following precautions. Failure to do so may cause electric shock, short-circuit, disconnection, malfunction, or damage to the RJ71CN91.

- Be sure that wire diameter of the cable is in line with the dimensions listed in this manual. (Page 25 Wiring Products)
- Twist the end of stranded wire and check that there is no loose wire.
- Do not solder the end of wire.
- Do not connect any cables more than the number specified or with a wire diameter not listed in the specification.
- Completely fix the cable to avoid a direct load to the transmission cable terminal block itself and the connection between the transmission cable terminal block and the RJ71CN91.

### Example of wiring

![Example of wiring diagram](image)

(1) Terminating resistor
6.3 Wiring Products

Application connector
Use 5-pin open style connectors.
For details on signal layout, refer to the following.
Page 23 Terminal name of terminal block

CAN bus cable
Wire the CAN bus cable that meets the following specifications.

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cable type</td>
<td>Shielded twisted pair cable</td>
</tr>
<tr>
<td>Number of pairs</td>
<td>2</td>
</tr>
<tr>
<td>Applicable standard</td>
<td>ISO11898</td>
</tr>
<tr>
<td>Wire diameter(^1)</td>
<td>0.2 to 3.3mm² (24 to 12 AWG)</td>
</tr>
<tr>
<td>Impedance</td>
<td>120Ω (95 to 140Ω)</td>
</tr>
</tbody>
</table>

\(^1\) The maximum wire diameter of the included terminal block is 2.5mm². To use the cable with wire diameter exceeding 2.5mm², use a terminal block suited for the wire diameter of a cable used.

Cable specifications of the CAN bus cable available vary depending on the cable length.

<table>
<thead>
<tr>
<th>Cable length</th>
<th>Wire diameter</th>
<th>Resistance per 1m</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 to 40m</td>
<td>0.25 to 0.34mm²</td>
<td>70mΩ</td>
</tr>
<tr>
<td>40 to 300m</td>
<td>0.34 to 0.60mm²</td>
<td>&lt; 60mΩ</td>
</tr>
<tr>
<td>300 to 600m</td>
<td>0.50 to 0.80mm²</td>
<td>&lt; 40mΩ</td>
</tr>
<tr>
<td>600 to 1000m</td>
<td>0.75 to 0.80mm²</td>
<td>&lt; 26mΩ</td>
</tr>
</tbody>
</table>

**Point**
For compatible CAN bus cables, contact CiA.
For contact information, refer to the following.
www.can-cia.org

Terminating resistor used
In the CANopen network and CAN network, CAN+ and CAN- of the both ends of the network require a terminating resistor at 120Ω (100 to 130Ω). A 121Ω 1/4W resistor comes with this product.
7 COMMUNICATION EXAMPLES

This chapter describes examples of programming and start-up for the CANopen module.

7.1 Communication Example in CANopen 405 Mode (1)

This section describes communication examples using SDO communication.

System configuration

(1) CANopen node (NMT master)
- Power supply module: R61P
- CPU module: R04CPU
- CANopen node: RJ71CN91 (start I/O number: 0000H to 001FH)

(2) CANopen node (NMT slave)
- Power supply module: R61P
- CPU module: R04CPU
- CANopen node: RJ71CN91 (start I/O number: 0000H to 001FH)

Setting details

The following table lists the setting details of CANopen nodes.

<table>
<thead>
<tr>
<th>Target node</th>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CANopen node (1)</td>
<td>Node ID</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Baud rate</td>
<td>250kbps</td>
</tr>
<tr>
<td></td>
<td>NMT type</td>
<td>NMT master</td>
</tr>
<tr>
<td></td>
<td>Heartbeat setting</td>
<td>Heartbeat consumer (3200ms)</td>
</tr>
<tr>
<td></td>
<td>TPDO1</td>
<td>CAN-ID: 0181H, send data size: 8 bytes</td>
</tr>
<tr>
<td></td>
<td>TPDO2</td>
<td>CAN-ID: 0281H, send data size: 8 bytes</td>
</tr>
<tr>
<td></td>
<td>RPDO1</td>
<td>CAN-ID: 0183H, receive data size: 1 byte</td>
</tr>
<tr>
<td></td>
<td>RPDO2</td>
<td>CAN-ID: 0283H, receive data size: 4 bytes</td>
</tr>
<tr>
<td>CANopen node (2)</td>
<td>Node ID</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Baud rate</td>
<td>250kbps</td>
</tr>
<tr>
<td></td>
<td>NMT type</td>
<td>NMT slave</td>
</tr>
<tr>
<td></td>
<td>Heartbeat setting</td>
<td>Heartbeat producer (2100ms)</td>
</tr>
<tr>
<td></td>
<td>TPDO1</td>
<td>CAN-ID: 0183H, send data size: 1 byte</td>
</tr>
<tr>
<td></td>
<td>TPDO2</td>
<td>CAN-ID: 0283H, send data size: 4 bytes</td>
</tr>
<tr>
<td></td>
<td>RPDO1</td>
<td>CAN-ID: 0181H, receive data size: 8 bytes</td>
</tr>
<tr>
<td></td>
<td>RPDO2</td>
<td>CAN-ID: 0281H, receive data size: 8 bytes</td>
</tr>
</tbody>
</table>
Parameter setting

Connect the engineering tool to the CPU module and set the parameters.

Module parameter setting

1. Set the CPU module as follows.

   ![Screen capture of project settings](image)

   1. [Project] ➔ [New]

2. Click the [Setting Change] button and set the module label to [Use].

3. Click the [OK] button to add the module labels of the CPU module.
4. Set the RJ71CN91 as follows.
   - [Navigation window] ⇒ [Parameter] ⇒ [Module Information] ⇒ Right-click ⇒ [Add New Module]

5. Write the set parameters to the CPU module. Then reset the CPU module or power off and on the system.
   - [Online] ⇒ [Write to PLC]

In the program examples, default values are used for parameters that are not shown above. For the parameters, refer to the following.

MELSEC iQ-R CANopen Module User's Manual (Application)
7 COMMUNICATION EXAMPLES
7.1 Communication Example in CANopen 405 Mode (1)

CANopen Configuration Tool setting

CANopen node (NMT master) setting

1. Start up CANopen Configuration Tool and create a project.
   ![Project] ⇒ [New]

   Select the RJ71CN91 from the above window and click the [OK] button.

2. Set the items in "CANopen Configuration" as follows.
   ![Navigator] ⇒ [CANopen Configuration]

3. Set the items in "TPDO" as follows.
   - PDO list
     ![Navigator] ⇒ [CANopen Configuration] ⇒ [CANopen node] ⇒ [Transmit PDO]
7 COMMUNICATION EXAMPLES

7.1 Communication Example in CANopen 405 Mode (1)

• PDO1

[Navigator] ⇒ [CANopen Configuration] ⇒ [CANopen node] ⇒ [Transmit PDO] ⇒ [PDO 1]

• PDO2

[Navigator] ⇒ [CANopen Configuration] ⇒ [CANopen node] ⇒ [Transmit PDO] ⇒ [PDO 2]
4. Set the items in "RPDO" as follows.

- PDO list

  [Navigator] ⇒ [CANopen Configuration] ⇒ [CANopen node] ⇒ [Receive PDO]

- PDO1

  [Navigator] ⇒ [CANopen Configuration] ⇒ [CANopen node] ⇒ [Receive PDO] ⇒ [PDO 1]

- PDO2

  [Navigator] ⇒ [CANopen Configuration] ⇒ [CANopen node] ⇒ [Receive PDO] ⇒ [PDO 2]
5. Set the items in "NMT settings" as follows.

- NMT master / slave
  - [Navigator] ⇒ [CANopen Configuration] ⇒ [CANopen node] ⇒ [NMT settings] ⇒ [NMT master / slave]

- NMT slave assignment
  - [Navigator] ⇒ [CANopen Configuration] ⇒ [CANopen node] ⇒ [NMT settings] ⇒ [NMT master / slave] ⇒ [NMT Slave assignment]

- Heartbeat
  - [Navigator] ⇒ [CANopen Configuration] ⇒ [CANopen node] ⇒ [NMT settings] ⇒ [Heartbeat]

6. Write the set parameters to the CPU module of the CANopen node (NMT master). Then reset the CPU module or power off and on the system.

- [Online] ⇒ [Download Configuration]
**CANopen node (NMT slave) setting**

1. Start up CANopen Configuration Tool and create a project.

   ![Select module window](image1)

   Select the RJ71CN91 from the above window and click the [OK] button.

2. Set the items in "CANopen Configuration" as follows.

   ![Module basic settings](image2)

   Set the items in "TPDO" as follows.

   - **PDO list**

     ![PDO list](image3)

   - **PDO1**

     ![PDO 1](image4)
7.1 Communication Example in CANopen 405 Mode (1)

- PDO2

• PDO list

  [Navigator] → [CANopen Configuration] → [CANopen node] → [Transmit PDO] → [PDO 2]

4. Set the items in "RPDO" as follows.

  • PDO list

    [Navigator] → [CANopen Configuration] → [CANopen node] → [Receive PDO]

- PDO1

• PDO list

  [Navigator] → [CANopen Configuration] → [CANopen node] → [Receive PDO] → [PDO 1]

- PDO2

• PDO list

  [Navigator] → [CANopen Configuration] → [CANopen node] → [Receive PDO] → [PDO 2]
5. Set the items in "NMT settings" as follows.
   • Heartbeat

   ![Navigator] ⇒ [CANopen Configuration] ⇒ [CANopen node] ⇒ [NMT settings] ⇒ [Heartbeat]

6. Write the set parameters to the CPU module of the CANopen node (NMT slave). Then reset the CPU module or power off and on the system.

   ![Online] ⇒ [Download Configuration]
### Program examples

#### NMT state acquisition program

Acquiring a current NMT state

<table>
<thead>
<tr>
<th>Classification</th>
<th>Label name</th>
<th>Description</th>
<th>Device</th>
</tr>
</thead>
<tbody>
<tr>
<td>Module label</td>
<td>RCN91_1.bSts_Module_Ready</td>
<td>Module READY</td>
<td>X0</td>
</tr>
<tr>
<td></td>
<td>RCN91_1.bSts_Module_Error</td>
<td>RJ71CN91 error</td>
<td>XF</td>
</tr>
<tr>
<td></td>
<td>RCN91_1.u127NMT_Error_Control_Status_D[2]</td>
<td>NMT error control status (CANopen node 3) bit1: Heartbeat enabled</td>
<td>U0G403</td>
</tr>
<tr>
<td></td>
<td>RCN91_1.u127NMT_State_D[2]</td>
<td>NMT state (CANopen node 3)</td>
<td>U0G603</td>
</tr>
</tbody>
</table>

Label to be defined: Define global labels as shown below:

<table>
<thead>
<tr>
<th>Label name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Module label RCN91_1.bSts_Module_Ready</td>
<td>Module READY</td>
</tr>
<tr>
<td>RCN91_1.bSts_Module_Error</td>
<td>RJ71CN91 error</td>
</tr>
<tr>
<td>RCN91_1.u127NMT_Error_Control_Status_D[2]</td>
<td>NMT error control status (CANopen node 3) bit1: Heartbeat enabled</td>
</tr>
<tr>
<td>RCN91_1.u127NMT_State_D[2]</td>
<td>NMT state (CANopen node 3)</td>
</tr>
</tbody>
</table>

#### SDO write request command issue program

Issuing the SDO write request command to the CANopen node with node ID of 3

<table>
<thead>
<tr>
<th>Classification</th>
<th>Label name</th>
<th>Description</th>
<th>Device</th>
</tr>
</thead>
<tbody>
<tr>
<td>Module label</td>
<td>RCN91_1.bSts_Module_Ready</td>
<td>Module READY</td>
<td>X0</td>
</tr>
<tr>
<td></td>
<td>RCN91_1.bSts_Module_Error</td>
<td>RJ71CN91 error</td>
<td>XF</td>
</tr>
<tr>
<td></td>
<td>RCN91_1.u127NMT_Error_Control_Status_D[2]</td>
<td>NMT error control status (CANopen node 3)</td>
<td>U0G403</td>
</tr>
</tbody>
</table>

Label to be defined: Define global labels as shown below:

For the module FBs used, refer to the following:

- MELSEC iQ-R CANopen Module Function Block Reference
7 COMMUNICATION EXAMPLES

7.1 Communication Example in CANopen 405 Mode (1)
Remote node start issue program

Issuing the remote node start to all remote nodes

<table>
<thead>
<tr>
<th>Classification</th>
<th>Label name</th>
<th>Description</th>
<th>Device</th>
</tr>
</thead>
<tbody>
<tr>
<td>Module label</td>
<td>RCN91_1</td>
<td>Module label of the RJ71CN91</td>
<td>——</td>
</tr>
<tr>
<td>Label to be defined</td>
<td>Define global labels as shown below:</td>
<td>Execute the write request for Request NMT (index 1F82H and subindex 01H to 80H).</td>
<td>——</td>
</tr>
</tbody>
</table>

**FB**

M+RJ71CN91_NMTRequestWrite

For the module FBs used, refer to the following.

[MELESEC iQ-R CANopen Module Function Block Reference]
Issuing the SDO read request command to the CANopen node with node ID of 3

<table>
<thead>
<tr>
<th>Classification</th>
<th>Label name</th>
<th>Description</th>
<th>Device</th>
</tr>
</thead>
<tbody>
<tr>
<td>Module label</td>
<td>RCN91_1</td>
<td>Module label of the RJ71CN91</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>RCN91_1.bSts_Module_Ready</td>
<td>Module READY</td>
<td>X0</td>
</tr>
<tr>
<td></td>
<td>RCN91_1.bSts_Module_Error</td>
<td>RJ71CN91 error</td>
<td>XF</td>
</tr>
</tbody>
</table>

Label to be defined

Define global labels as shown below:

<table>
<thead>
<tr>
<th>Label Name</th>
<th>Data Type</th>
<th>Class</th>
<th>Scope (Device/Label)</th>
</tr>
</thead>
<tbody>
<tr>
<td>bCompleted</td>
<td>Bit</td>
<td>VAR_GLOBAL</td>
<td>M1000</td>
</tr>
<tr>
<td>bConfirmed</td>
<td>Bit</td>
<td>VAR_GLOBAL</td>
<td>M1001</td>
</tr>
<tr>
<td>bSDOReadGbar</td>
<td>Bit</td>
<td>VAR_GLOBAL</td>
<td>M72</td>
</tr>
<tr>
<td>bSDOReadEND</td>
<td>Bit</td>
<td>VAR_GLOBAL</td>
<td>M71</td>
</tr>
<tr>
<td>bSDOReadOK</td>
<td>Bit</td>
<td>VAR_GLOBAL</td>
<td>M72</td>
</tr>
<tr>
<td>uReadDataLength</td>
<td>Word (Signed)</td>
<td>VAR_GLOBAL</td>
<td>D40</td>
</tr>
<tr>
<td>uReadData</td>
<td>Word (Unsigned)</td>
<td>VAR_GLOBAL</td>
<td>D41</td>
</tr>
<tr>
<td>gReadErrCode</td>
<td>Double Word (Unsigned)</td>
<td>Bit</td>
<td>X'02</td>
</tr>
<tr>
<td>bSDOReadEND</td>
<td>Bit</td>
<td>VAR_GLOBAL</td>
<td>M70</td>
</tr>
</tbody>
</table>

FB M+RJ71CN91_SDORead

Execute the SDO read.

For the module FBs used, refer to the following.

MELSEC iQ-R CANopen Module Function Block Reference
7.2 Communication Example in CANopen 405 Mode (2)

This section describes communication examples using PDO communication.

System configuration

For the system configuration, refer to the following.
Page 27 System configuration

Parameter setting

Connect the engineering tool to the CPU module and set the parameters.
For the setting of items other than these ones, refer to the following.
Page 28 Parameter setting

Module parameter setting

1. Set the item in "Basic Setting" as follows.

[Navigation window] ⇒ [Parameter] ⇒ [Module Information] ⇒ [RJ71CN91] ⇒ [Module Parameter] ⇒ [Basic Setting]

2. Set the items in "Refresh Setting" as follows.

[Navigation window] ⇒ [Parameter] ⇒ [Module Information] ⇒ [RJ71CN91] ⇒ [Module Parameter] ⇒ [Refresh Setting]
• Transfer to intelligent module

• Transfer to CPU
Program examples

TPDO data write program

Writing data to TPDO with PDO number: 1

<table>
<thead>
<tr>
<th>Classification</th>
<th>Label name</th>
<th>Description</th>
<th>Device</th>
</tr>
</thead>
<tbody>
<tr>
<td>Module label</td>
<td>RCN91_1.bSts_Module_Ready</td>
<td>Module READY</td>
<td>X0</td>
</tr>
<tr>
<td></td>
<td>RCN91_1.bSts_Module_Error</td>
<td>RJ71CN91 error</td>
<td>XF</td>
</tr>
</tbody>
</table>

Label to be defined

Define global labels as shown below:

```
<table>
<thead>
<tr>
<th>Label Name</th>
<th>Data Type</th>
<th>Class</th>
<th>Assign (Device/Label)</th>
</tr>
</thead>
<tbody>
<tr>
<td>sPDOWrite</td>
<td>Bit</td>
<td>VAG_GLOBAL</td>
<td>X500</td>
</tr>
<tr>
<td>uPDOWrite</td>
<td>Bit</td>
<td>VAG_GLOBAL</td>
<td>D501</td>
</tr>
<tr>
<td>uWriteData1</td>
<td>Word [Unsigned]</td>
<td>VAG_GLOBAL</td>
<td>D51</td>
</tr>
<tr>
<td>uWriteData2</td>
<td>Word [Unsigned]</td>
<td>VAG_GLOBAL</td>
<td>D55</td>
</tr>
<tr>
<td>uTPDO0x63</td>
<td>Word [Unsigned]</td>
<td>X500</td>
<td>D13500</td>
</tr>
</tbody>
</table>
```

```
MOV H1000 uPDOWrite [1] D51
MOV H1001 uPLOWrite [1] D52
MOV H1002 uPDOWrite [1] D53
MOV H1003 uPDOWrite [1] D54
RST bPDOWrite N M80
SET bPDOWrite N M85
```

```
BMV uWriteData1 uTPDO0x63 K4 D10000
BMV uWriteData2 uTPDO0x63 K4 D13504
RST bPDOWrite N M85
```

END
**RPDO data read program**

Reading data from RPDO with PDO number: 1

<table>
<thead>
<tr>
<th>Classification</th>
<th>Label name</th>
<th>Description</th>
<th>Device</th>
</tr>
</thead>
<tbody>
<tr>
<td>Module label</td>
<td>RCN91_1.bSts_Module_Ready</td>
<td>Module READY</td>
<td>X0</td>
</tr>
<tr>
<td></td>
<td>RCN91_1.bSts_Module_Error</td>
<td>RJ71CN91 error</td>
<td>XF</td>
</tr>
</tbody>
</table>

Label to be defined: Define global labels as shown below:
External dimensions of the RJ71CN91 is as follows.

(Unit: mm)
Appendix 2  Software License Agreement

This section describes the Software License Agreement to use CANopen Configuration Tool.

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## REVISIONS

*The manual number is given on the bottom left of the back cover.

<table>
<thead>
<tr>
<th>Revision date</th>
<th><em>Manual number</em></th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>July 2017</td>
<td>SH(NA)-081734ENG-A</td>
<td>First edition</td>
</tr>
<tr>
<td>September 2017</td>
<td>SH(NA)-081734ENG-B</td>
<td>Added or modified parts Section 5.2, 7.1, Appendix 2</td>
</tr>
<tr>
<td>March 2021</td>
<td>SH(NA)-081734ENG-C</td>
<td>Added or modified parts SAFETY PRECAUTIONS, CONDITIONS OF USE FOR THE PRODUCT</td>
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<tr>
<td>October 2021</td>
<td>SH(NA)-081734ENG-D</td>
<td>Added or modified parts SAFETY PRECAUTIONS, COMPLIANCE WITH EMC AND LOW VOLTAGE DIRECTIVES, Chapter 5, Section 7.1</td>
</tr>
</tbody>
</table>

Japanese manual number: SH-081733-D

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   If any faults or defects (hereinafter "Failure") found to be the responsibility of Mitsubishi occurs during use of the product within the gratis warranty term, the product shall be repaired at no cost via the sales representative or Mitsubishi Service Company.

   However, if repairs are required onsite at domestic or overseas location, expenses to send an engineer will be solely at the customer's discretion. Mitsubishi shall not be held responsible for any re-commissioning, maintenance, or testing on-site that involves replacement of the failed module.

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   The gratis warranty term of the product shall be for one year after the date of purchase or delivery to a designated place. Note that after manufacture and shipment from Mitsubishi, the maximum distribution period shall be six (6) months, and the longest gratis warranty term after manufacturing shall be eighteen (18) months. The gratis warranty term of repair parts shall not exceed the gratis warranty term before repairs.

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   (2) Even within the gratis warranty term, repairs shall be charged for in the following cases.

   1. Failure occurring from inappropriate storage or handling, carelessness or negligence by the user. Failure caused by the user's hardware or software design.

   2. Failure caused by unapproved modifications, etc., to the product by the user.

   3. When the Mitsubishi product is assembled into a user's device, Failure that could have been avoided if functions or structures, judged as necessary in the legal safety measures the user's device is subject to or as necessary by industry standards, had been provided.

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   Overseas, repairs shall be accepted by Mitsubishi's local overseas FA Center. Note that the repair conditions at each FA Center may differ.

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   (2) Loss in opportunity, lost profits incurred to the user by Failures of Mitsubishi products.

   (3) Special damages and secondary damages whether foreseeable or not, compensation for accidents, and compensation for damages to products other than Mitsubishi products.

   (4) Replacement by the user, maintenance of on-site equipment, start-up test run and other tasks.

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