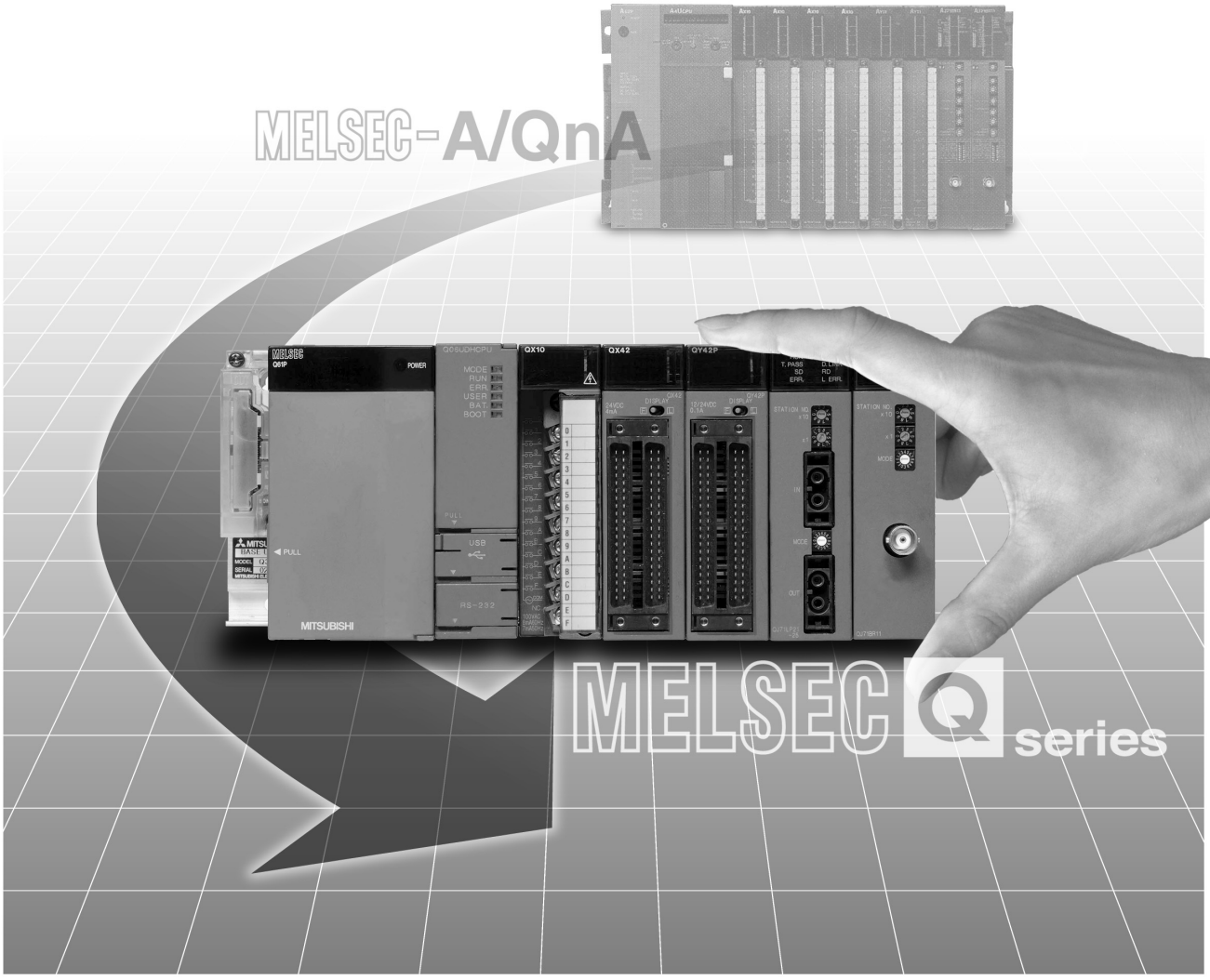
MITSUBISHI

Mitsubishi Programmable Controller

# Transition from MELSEC-A/QnA (Large Type) Series to Q Series Handbook

## (Intelligent Function Modules)




Jun. 2013 Edition

# ● 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.

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) Configure external safety circuits, such as an emergency stop circuit, protection circuit, and protective interlock circuit for forward/reverse operation or upper/lower limit positioning.

(2) When the programmable controller detects the following problems, it will stop calculation and turn off all output in the case of (a).
In the case of (b), it will hold or turn off all output according to the parameter setting.
Note that the AnS series module will turn off the output in either of cases (a) and (b).

| | Q series module | A series module |
|---|---|---|
| (a) The power supply module has over current protection equipment and over voltage protection equipment. | Output OFF | Output OFF |
| (b) The CPU module self-diagnosis functions, such as the watchdog timer error, detect problems. | Hold or turn off all output according to the parameter setting. | Output OFF |

Also, 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 LOADING AND INSTALLATION in the QCPU User's Manual (Hardware Design, Maintenance and Inspection).

(3) Outputs may remain on or off due to a failure of an output module relay or transistor.
Configure an external circuit for monitoring output signals that could cause a serious accident.

## [Design Precautions]

### ⚠WARNING

- In an output module, 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.

- For the operating status of each station after a communication failure, refer to relevant manuals for each network.
  Failure to do so may result in an accident due to an incorrect output or malfunction.

- When changing data of the running programmable controller from a peripheral connected to the CPU module or from a personal computer connected to an intelligent function module or special function module, configure an interlock circuit in the sequence program to ensure that the entire system will always operate safely.
  For program modification and operating status change, read relevant manuals carefully and ensure the safety before operation.
  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 sequence program, and determine corrective actions to be taken between the external device and CPU module in case of a communication failure.

### ⚠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.

- When a device such as a lamp, heater, or solenoid valve is controlled through an output module, a large current (approximately ten times greater than normal) may flow when the output is turned from off to on.
  Take measures such as replacing the module with one having 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.

## [Installation Precautions]

### ⚠CAUTION

- Use the programmable controller in an environment that meets the general specifications in the QCPU User's Manual (Hardware Design, Maintenance and Inspection).
  Failure to do so may result in electric shock, fire, malfunction, or damage to or deterioration of the product.

- To mount the module, while pressing the module mounting lever located in the lower part of the module, fully insert the module fixing projection(s) into the hole(s) in the base unit and press the module until it snaps into place.
  Incorrect mounting 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 incorrect input or output.

- When using a memory card, fully insert it into the memory card slot.
  Check that it is inserted completely.
  Poor contact may cause malfunction.

- Shut off the external power supply (all phases) used in the system before mounting or removing a module. Failure to do so may result in damage to the product. A module can be replaced online (while power is on) on any MELSECNET/H remote I/O station or in the system where a CPU module supporting the online module change function is used.
  Note that there are restrictions on the modules that can be replaced online, and each module has its predetermined replacement procedure.
  For details, refer to the relevant sections in the QCPU User's Manual (Hardware Design, Maintenance and Inspection) and in the manual for the corresponding module.

- Do not directly touch any conductive part of the module.
  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 wiring.
  Failure to do so may result in electric shock or damage to the product.

- After wiring, attach the included terminal cover to the module before turning it on for operation.
  Failure to do so may result in electric shock.

### ⚠CAUTION

- Individually ground the FG and LG terminals of the programmable controller with a ground resistance of 100Ω 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 terminal 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 a 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.

- Tighten the terminal screws within the specified torque range.
  Undertightening can cause short circuit, fire, or malfunction.
  Overtightening can damage the screw and/or module, resulting in drop, short circuit, or malfunction.

- Prevent foreign matter such as dust or wire chips from entering the module.
  Such foreign matter can cause a fire, failure, or malfunction.

- A protective film is attached to the top of the module to prevent foreign matter, such as wire chips, from entering the module during wiring.
  Do not remove the film during wiring.
  Remove it for heat dissipation before system operation.

- Mitsubishi 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 methods, refer to the QCPU User's Manual (Hardware Design, Maintenance and Inspection).

## [Startup and Maintenance Precautions]

### ⚠WARNING

- Do not touch any terminal while power is on. Doing so will cause electric shock.

- Correctly connect the battery connector.
  Do not charge, disassemble, heat, short-circuit, or solder the battery, or throw it into the fire.
  Doing so will cause the battery to produce heat, explode, or ignite, 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 or module fixing screws.
  Failure to do so may result in electric shock.
  Undertightening the terminal screws can cause short circuit or malfunction.
  Overtightening can damage the screw and/or module, resulting in drop, short circuit, or malfunction.

### ⚠CAUTION

- Before performing online operations (especially, program modification, forced output, and operating status change) for the running CPU module from the peripheral device connected, read relevant manuals carefully and ensure the safety.
  Improper operation may damage machines or cause accidents.

- 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 a module. Failure to do so may cause the module to fail or malfunction.
  A module can be replaced online (while power is on) on any MELSECNET/H remote I/O station or in the system where a CPU module supporting the online module change function is used.
  Note that there are restrictions on the modules that can be replaced online, and each module has its predetermined replacement procedure.
  For details, refer to this manual and the online module change section in the manual of the module compatible with online module change.

- 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 more than 50 times (IEC 61131-2 compliant) respectively.
  Exceeding the limit of 50 times may cause malfunction.

- 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.

- 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.

## [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-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection).

## [Transportation Precautions]

**⚠CAUTION**

- When transporting lithium batteries, follow the transportation regulations.
  (Refer to QCPU User's Manual (Hardware Design, Maintenance and Inspection) for details of the controlled models.)

# ●CONDITIONS OF USE FOR THE PRODUCT●

(1) Mitsubishi 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 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'S USER, 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 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 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 representative in your region.

**REVISIONS**

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

| Print Date | * Handbook Number | Revision |
|---|---|---|
| Apr., 2005 | L(NA)-08046ENG-A | First edition |
| Oct., 2005 | L(NA)-08046ENG-B | Addition<br>Appendix 1<br>Partial correction<br>Contents, Appendix 1 → Appendix 2 |
| Oct., 2008 | L(NA)-08046ENG-C | Model addition<br>Q64DAN, Q64RD-G, Q68RD3-G, Q68TD-G-H01<br>Model change<br>QD62 → QD62-H01, QD62-H02, Q62DA → Q62DAN,<br>Q68DAV → Q68DAVN, Q68DAI → Q68DAIN<br>Partial correction<br>Term revision (whole), SAFETY PRECAUTIONS, Chapter 3 (whole),<br>Chapter 4 (whole), Section 6.1 to Section 6.3, Section 7.1, Section 9.1.2,<br>Section 9.1.4, Appendix 2.1 to Appendix 2.3 |
| Jul., 2011 | L(NA)-08046ENG-D | Model addition<br>Q68AD-G, Q68TD-G-H02<br>Partial addition<br>CONDITIONS OF USE FOR THE PRODUCT, Section 2.4, Section 2.6,<br>Section 2.8<br>Partial correction<br>Term revision (whole), SAFETY PRECAUTIONS, Chapter 3 (whole),<br>Chapter 4 (whole), Section 5.1.1, Section 5.2.1, Section 6.1, Section 6.2.1,<br>Section 7.1, Section 7.4.1, Section 7.4.4, Section 7.5.1, Section 7.5.4,<br>Chapter 9, Appendix 2.1, Appendix 2.3<br>Partial deletion<br>Chapter 9 (External dimensions) |
| Mar., 2013 | L(NA)-08046ENG-E | Model addition<br>QD73A1<br>Model change<br>QD75P□ → QD75P□N, QD75D□ → QD75D□N<br>Addition<br>Section 7.6<br>Partial correction<br>Section 2.4.4, Section 2.6.1, Section 2.8.1, Section 3.1, Section 4.6.1,<br>Section 6.1, Section 6.3.4, Section 7.1, Section 7.2, Section 7.4 |
| | | |

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

| Print Date | * Handbook Number | Revision |
|---|---|---|
| Jun., 2013 | L(NA)-08046ENG-F | Partial correction<br>Section 4.1, Section 6.2.1, Section 6.3.1, Section 7.1, Section 7.4.4, Section 7.5.4, Section 7.6.4, Section 7.6.6 |
| | | |

Japanese Handbook Version L-08045-H

# CONTENTS

## APPENDICES App - 1 to App - 5

- For the products shown in handbooks for transition, catalogues, and transition examples, refer to the manuals for the relevant products and check the detailed specifications, precautions for use, and restrictions before replacement.
  For the products manufactured by Mitsubishi Electric Engineering Co., Ltd., Mitsubishi Electric System & Service Co., Ltd., and other companies, refer to the catalogue for each product and check the detailed specifications, precautions for use, and restrictions before use.
  The manuals and catalogues for our products, products manufactured by Mitsubishi Electric Engineering Co., Ltd., and Mitsubishi Electric System & Service Co., Ltd. are shown in Appendix of each handbook for transition.

- Products shown in this handbook are subject to change without notice.

# 1 INTRODUCTION

## 1.1 Advantages of Transition to Q Series

**Advantage 1)Advanced performance of equipments**

In addition to the processing performance improvement for Q series CPU, the processing speed for Q series intelligent function module is also increased, so that the equipment capability to improve is possible.

**Advantage 2)Compact control panel and space saving**

As the Q series needs only 1/4 mounting area of the A series, it is possible to create more compact control panel.

**Advantage 3)Improved operating efficiency for programming and monitor**

Q series intelligent function module prepares the following utility package (GX Configurator-o) sold separately.

(Example)

- GX Configurator-AD Analog input module setting/monitoring tool
- GX Configurator-DA Analog output module setting/monitoring tool
- GX Configurator-TI Temperature input module setting/monitoring tool
- GX Configurator-CT High speed counter module setting/monitoring tool
- GX Configurator-QP Positioning module setting/monitoring tool

Using the utility package is not a must. However, the utility package allows not only for the followings to do, but also reduces sequence programs.

- Initial setting is possible without a program
- The auto refresh setting allows to read/write buffer memory data of intelligent function module automatically from/to the CPU device memory.
- Checking of the setting status or operating status of intelligent function module is simplified.

## 1.2 Precautions for Transition from Large-sized A/QnA Series to Q Series

(1) Be sure to confirm its functions, specifications and instructions by referring the manual of the corresponding Q series module prior to use.

(2) Be sure to check the operation of whole system before the actual operation.

# 2 ANALOG INPUT MODULE REPLACEMENT

## 2.1 List of Analog Input Module Alternative Models for Replacement

| Production discontinuation | | Transition to Q series | |
|---|---|---|---|
| Product | Model | Model | Remarks (Restrictions) |
| Analog input module | A616AD | Q68ADV<br>Q68ADI | 1) External wiring : Cable size is changed.<br>2) Number of slots : Changed (2 modules are required.)<br>3) Program : Occupied I/O points, I/O signals and buffer memory address are changed.<br>4) Performance specifications change:<br>8CH/module, input signals (Either V or I input)<br>5) Function specifications: Not changed |
| | A68AD | Q68ADV<br>Q68ADI | 1) External wiring : Cable size is changed.<br>2) Number of slots : Not changed<br>3) Program : Occupied I/O points, I/O signals and buffer memory address are changed.<br>4) Performance specifications change:<br>Input signals (Either V or I input) and I/O characteristics<br>5) Function specifications: Not changed |
| | | Q68AD-G*1 | 1) External wiring : Cable size is changed. (Terminal block wiring → connector wiring)<br>2) Number of slots : Not changed<br>3) Program : Occupied I/O points, I/O signals and buffer memory address are changed.<br>4) Performance specifications change:<br>Conversion speed ((the maximum of 2.5ms/channel) → sampling cycle (10ms/channel) + response speed (20ms)) and I/O characteristics<br>5) Function specifications: Changed (Non-insulation → insulation between channels) |
| | A68AD-S2 | Q68ADV<br>Q68ADI | 1) External wiring : Cable size is changed.<br>2) Number of slots : Not changed<br>3) Program : Occupied I/O points, I/O signals and buffer memory address are changed.<br>4) Performance specifications change:<br>Input signals (Either V or I input) and I/O characteristics<br>5) Function specifications: Not changed |
| | | Q68AD-G*1 | 1) External wiring : Cable size is changed. (Terminal block wiring → connector wiring)<br>2) Number of slots : Not changed<br>3) Program : Occupied I/O points, I/O signals and buffer memory address are changed.<br>4) Performance specifications change:<br>Conversion speed ((the maximum of 2.5ms/channel) → sampling cycle (10ms/channel) + response speed (20ms)) and I/O characteristics<br>5) Function specifications: Changed (Non-insulation → insulation between channels) |

| Production discontinuation | | Transition to Q series | |
|---|---|---|---|
| Product | Model | Model | Remarks (Restrictions) |
| Analog input module | A68ADN | Q68ADV<br>Q68ADI | 1) External wiring : Cable size is changed.<br>2) Number of slots : Not changed<br>3) Program : Occupied I/O points, I/O signals and buffer memory address are changed.<br>4) Performance specifications change: Input signals (Either V or I input) and increase in current consumption<br>5) Function specifications: Not changed |
| | | Q68AD-G*1 | 1) External wiring : Cable size is changed. (Terminal block wiring → connector wiring)<br>2) Number of slots : Not changed<br>3) Program : Occupied I/O points, I/O signals and buffer memory address are changed.<br>4) Performance specifications change: Conversion speed ((20ms/channel) → sampling cycle (10ms/channel) + response speed (20ms))<br>5) Function specifications: Changed (Non-insulation → insulation between channels) |

*1 The Q68AD-G cannot be mounted on the Q series large type base unit (Q3□BL, Q6□BL, Q55BL).

## Point

The existing wiring for the A/QnA series modules can be connected directly to the Q series modules using the renewal tool (conversion adaptor) manufactured by Mitsubishi Electric Engineering Co., Ltd.

| Product | MELSEC-A/QnA series module | MELSEC-Q series module | Conversion adaptor |
|---|---|---|---|
| Analog input module | A68AD | Q68ADV | ERNT-AQT68AD |
| | | Q68ADI | |
| | A68AD-S2 | Q68ADV | |
| | | Q68ADI | |
| | A68ADN | Q68ADV | ERNT-AQT68ADN |
| | | Q68ADI | |

For MELSEC-A/QnA (large type) Series to Q Series transition related products manufactured by Mitsubishi Electric Engineering Co., Ltd. or Mitsubishi Electric System & Service Co., Ltd., contact your local sales office or representative.

## 2.2 A616AD

### 2.2.1 Performance comparison

<table>
<tr><th colspan="2">Item</th><th>A616AD</th><th></th></tr>
<tr><td rowspan="2">Analog input</td><td>Voltage</td><td>-10 to 0 to +10VDC (Input resistance value: 1MΩ)</td><td></td></tr>
<tr><td>Current</td><td>-20 to 0 to +20mADC (Input resistance value: 250Ω)</td><td></td></tr>
<tr><td colspan="2">Digital output</td><td>16-bit signed binary (Data part: 12 bit)<br>(-48 to 4047, -2048 to 2047)<br>Setting is enabled for each channel.</td><td></td></tr>
<tr><td colspan="2">I/O characteristics maximum resolution</td><td>
<table>
<tr><th>Input</th><th>Analog input range</th><th>Maximum resolution</th><th>Digital output value</th></tr>
<tr><td rowspan="5">Voltage (V)</td><td>0 to +10</td><td>2.5mV (1/4000)</td><td rowspan="5">0 to 4000<br>-2000 to 2000</td></tr>
<tr><td>0 to +5</td><td>1.25mV (1/4000)</td></tr>
<tr><td>+1 to +5</td><td>1.0mV (1/4000)</td></tr>
<tr><td>-10 to +10</td><td>5.0mV (1/4000)</td></tr>
<tr><td>-5 to +5</td><td>2.5mV (1/4000)</td></tr>
<tr><td rowspan="5">Current (mA)</td><td>0 to +20</td><td>10μA (1/2000)</td><td>0 to 2000<br>-2000 to 0</td></tr>
<tr><td>0 to +20</td><td>5μA (1/4000)</td><td rowspan="2">0 to 4000<br>-2000 to 2000</td></tr>
<tr><td>+4 to +20</td><td>4μA (1/4000)</td></tr>
<tr><td>-20 to +20</td><td>20μA (1/2000)</td><td>1000 to 3000<br>-1000 to 1000</td></tr>
<tr><td>-20 to +20</td><td>10μA (1/4000)</td><td>0 to 4000<br>-2000 to 2000</td></tr>
</table>
</td><td></td></tr>
<tr><td colspan="2">Overall accuracy</td><td>When using A616AD only 0 to 10V, -10 to 10V<br>-5V to 5V, -20 to 20mA<br>} Range: ±0.3%<br>(Digital value ±12)<br><br>0 to 5V, 1 to 5V<br>0 to 20mA, 4 to 20mA<br>} Range: ±0.6%<br>(Digital value ±24)<br><br>When using combination with any of A60MX, A60MXR, A60MXRN, the accuracy of each range of A616AD is ±0.3% (Digital output value ±12).</td><td></td></tr>
</table>

○: Compatible, △: Partial change required, ×: Incompatible

<table>
<tr><th></th><th>Q68ADV</th><th>Q68ADI</th><th>Compatibility</th><th>Precautions for replacement</th></tr>
<tr><td></td><td>-10 to 10VDC<br>(Input resistance value: 1MΩ)</td><td>-</td><td rowspan="2">△</td><td rowspan="2">The voltage/current cannot be mixed for one module.</td></tr>
<tr><td></td><td>-</td><td>0 to 20mADC<br>(Input resistance value: 250Ω)</td></tr>
<tr><td></td><td colspan="2">16-bit signed binary<br>(Normal resolution mode: -4096 to 4095,<br>High resolution mode: -12288 to 12287, -16384 to 16383)</td><td>△</td><td>A616AD can set the data format to [-2048 to 2047]. However, Q68ADV/I cannot set. When using the conversion data of Q68ADV/I in [-2048 to 2047], convert with sequence program.</td></tr>
<tr><td></td><td colspan="2">
<table>
<tr><th colspan="2" rowspan="2">Analog input range</th><th colspan="2">Normal resolution mode</th><th colspan="2">High resolution mode</th></tr>
<tr><th>Digital output value</th><th>Maximum resolution</th><th>Digital output value</th><th>Maximum resolution</th></tr>
<tr><td rowspan="5">Voltage</td><td>0 to 10V</td><td rowspan="3">0 to 4000</td><td>2.5mV</td><td>0 to 16000</td><td>0.625mV</td></tr>
<tr><td>0 to 5V</td><td>1.25mV</td><td rowspan="2">0 to 12000</td><td>0.416mV</td></tr>
<tr><td>1 to 5V</td><td>1.0mV</td><td>0.333mV</td></tr>
<tr><td>-10 to 10V</td><td rowspan="2">-4000 to 4000</td><td>2.5mV</td><td>-16000 to 16000</td><td>0.625mV</td></tr>
<tr><td>User range settings</td><td>0.375mV</td><td>-12000 to 12000</td><td>0.333mV</td></tr>
<tr><td rowspan="3">Current</td><td>0 to 20mA</td><td rowspan="2">0 to 4000</td><td>5μA</td><td rowspan="2">0 to 12000</td><td>1.66μA</td></tr>
<tr><td>4 to 20mA</td><td>4μA</td><td>1.33μA</td></tr>
<tr><td>User range settings</td><td>-4000 to 4000</td><td>1.37μA</td><td>-12000 to 12000</td><td>1.33μA</td></tr>
</table>
</td><td>△</td><td>When using A616AD in [-5 to + 5V] range, Q68ADV can obtain equivalent resolution or more than A616AD by setting in [-10 to 10V] range/high resolution mode or user range.<br>When using A616AD in [-20 to +20mA] range, use Q68ADI in user range.</td></tr>
<tr><td></td><td colspan="2">
<table>
<tr><th colspan="2" rowspan="3">Analog input range</th><th colspan="3">Normal resolution mode</th><th colspan="3">High resolution mode</th></tr>
<tr><th colspan="2">Ambient temperature 0 to 55°C</th><th rowspan="2">Ambient temperature 25±5°C</th><th colspan="2">Ambient temperature 0 to 55°C</th><th rowspan="2">Ambient temperature 25±5°C</th></tr>
<tr><th>With temperature drift compensation</th><th>Without temperature drift compensation</th><th>With temperature drift compensation</th><th>Without temperature drift compensation</th></tr>
<tr><td rowspan="5">Voltage</td><td>0 to 10V</td><td rowspan="9">±0.3%<br>(±12 digits)</td><td rowspan="9">±0.4%<br>(±16 digits)</td><td rowspan="9">±0.1%<br>(±4 digits)</td><td>±0.3%<br>(±48 digits)</td><td>±0.4%<br>(±64 digits)</td><td>±0.1%<br>(±16 digits)</td></tr>
<tr><td>-10 to 10V</td><td rowspan="8">±0.3%<br>(±36 digits)</td><td rowspan="8">±0.4%<br>(±48 digits)</td><td rowspan="8">±0.1%<br>(±12 digits)</td></tr>
<tr><td>0 to 5V</td></tr>
<tr><td>1 to 5V</td></tr>
<tr><td>User range settings</td></tr>
<tr><td rowspan="4">Current</td><td>0 to 20mA</td></tr>
<tr><td>4 to 20mA</td></tr>
<tr><td>User range settings</td></tr>
</table>
</td><td>○</td><td>A616AD is the accuracy in respect to the full scale, and Q68ADV/I is the accuracy in respect to maximum digital output value.</td></tr>
</table>

| Item | A616AD | |
|---|---|---|
| Maximum conversion speed | When using only A616AD: 1<br>When using a combination with A60MX: 1<br>When using a combination with A60MXR:<br>1 (Sampling processing time),<br>7.0 (Direct access processing)<br>When using a combination with A60MXRN:<br>1 (Sampling processing time),<br>7.0 (Direct access processing)<br>[Unit: ms/channel] | |
| Absolute maximum input | Voltage: ±15V<br>Current: ±30mA | |
| Analog input points | 16 channels/module | |
| Maximum number of writes for $E^2$PROM | - | |
| Isolation method | Between the input terminal and programmable controller: photocoupler isolation<br>Between channels: non-isolated (1MΩ resistor isolation) | |
| Dielectric withstand voltage | - | |
| Insulation resistance | - | |
| Occupied I/O points | 32 points<br>(I/O assignment: special 32 points) | |
| Connected terminal | 38-point terminal block | |
| Applicable wire size | 0.75 to 2$mm^2$<br>(Applicable tightening torque: 39 to 59N•cm) | |
| Applicable solderless terminal | V1.25-3, V1.25-YS3A, V2-S3, V2-YS3A | |
| Internal current consumption (5VDC) | 1A | |
| Weight | 0.85kg | |

○: Compatible, △: Partial change required, ×: Incompatible

| | Q68ADV | Q68ADI | Compatibility | Precautions for replacement |
|---|---|---|---|---|
| | 80μs/channel (When there is temperature drift compensation, the time calculated by adding 160μs will be used regardless of the number of channels used.) | | ○ | The conversion speed of Q68ADV/I to A616AD has become quick. And then, on Q68ADV/I, the noise that did not import on A616AD can be imported as analog signal. In this case, use the averaging processing function to remove the effect of noise. |
| | ±15V | ±30mA | ○ | |
| | 8 channels/module | | △ | Consider replacement with multiple Q68ADV/I. |
| | Max. 100,000 times | | ○ | |
| | Between the I/O terminal and programmable controller power supply: photocoupler isolation<br>Between channels: non-isolated | | ○ | |
| | Between the I/O terminal and programmable controller power supply: 500VAC, for 1 minute | | ○ | |
| | Between the I/O terminal and programmable controller power supply: 500VDC, 20MΩ or more | | ○ | |
| | 16 points<br>(I/O assignment: intelligent 16 points) | | △ | I/O occupied points has changed to 16 points. |
| | 18-point terminal block | | × | Wiring change is required. |
| | 0.3 to 0.75mm$^2$ | | × | |
| | R1.25-3 (A solderless terminal with sleeve can not be used.) | | × | |
| | 0.64A | 0.64A | ○ | |
| | 0.19kg | 0.19kg | ○ | |

### 2.2.2 Function comparison

○: With functions, -: Without functions

| Item | Description | A616AD | Q68ADV/I | Precautions for replacement |
|---|---|---|---|---|
| A/D conversion enable/ disable | Specifies whether to enable or disable the A/D conversion for each channel.<br>By disabling the conversion for the channels that are not used, the sampling time can be shortened. | - | ○ | |
| Sampling processing | The A/D conversion for analog input values is performed successively for each channel, and the digital output value is output upon each conversion. | ○ | ○ | The sampling processing time changes depending on the number of channels used (number of channels set to A/D conversion enable) and whether, with or without the temperature drift compensation function.<br>(a) Without temperature drift compensation function (processing time) = (number of channels used) × 80 (μs /1 channel)<br>(b) With temperature drift compensation function (processing time)= (number of channels used) × 80 (μs /1 channel) +160μs |
| Direct access processing | Sequence program separately from normal sampling processing can specify channels to carry out the A/D conversion, and outputting the direct access request can perform direct A/D conversion of specified channels.<br>When inputting channel specification with sampling processing and direct access processing simultaneously, the direct access request is prioritized. | ○ | - | Q68ADV/I does not have [Direct access processing] function. |
| Averaging processing | For each channel, A/D conversion values are averaged for the set number of times or set amount of time, and the average value is output as a digital value.<br>The setting range is as shown below:<br>Averaging processing by the number of times: 4 to 62500<br>Averaging processing by time: 2 to 5000ms | - | ○ | |
| Maximum and minimum values hold function | The maximum and minimum values of the digital output values are retained in the module. | - | ○ | |
| Temperature drift compensation function | Errors arising from changes in the ambient temperature of the module are automatically compensated to improve conversion accuracy.<br>The temperature drift compensation function can be performed at (A/D conversion time for all channels) + 160μs. | - | ○ | |
| Resolution mode | The resolution settings of 1/4000, 1/12000 or 1/16000 can be selected according to the application.<br>The resolution mode setting is applicable to all channels. | - | ○ | |
| Online module change | A module change is made without the system being stopped. | - | ○ | The CPUs corresponding to online module replacement are process CPU and redundant CPU modules. |

### 2.2.3 I/O signal comparison to programmable controller CPU

Sequence program change is required as the I/O signals differ.
For details of the I/O signals or sequence program, refer to the Analog-Digital Converter Module User's Manual.

| A616AD | | | | Q68ADV/I | | | |
|---|---|---|---|---|---|---|---|
| Device No. | Signal name | Device No. | Signal name | Device No. | Signal name | Device No. | Signal name |
| X0 | Watchdog timer error | Y0 | Not used | X0 | Module READY | Y0 | Not used |
| X1 | A/D conversion READY | Y1 | | X1 | Temperature drift compensation flag | Y1 | |
| X2 | Error flag | Y2 | | X2 | Not used | Y2 | |
| X3 | Not used | Y3 | | X3 | | Y3 | |
| X4 | | Y4 | | X4 | | Y4 | |
| X5 | | Y5 | | X5 | | Y5 | |
| X6 | | Y6 | | X6 | | Y6 | |
| X7 | | Y7 | | X7 | | Y7 | |
| X8 | | Y8 | | X8 | High resolution mode status flag | Y8 | |
| X9 | | Y9 | | X9 | Operating condition setting completed flag | Y9 | Operating condition setting request |
| XA | | YA | | XA | Offset/gain setting mode flag | YA | User range write request |
| XB | | YB | | XB | Channel change completed flag | YB | Channel change request |
| XC | | YC | | XC | Not used | YC | Not used |
| XD | | YD | RFRP, RTOP instruction for interlock signal when A616AD is used in remote I/O station | XD | Maximum value/ minimum value reset completed flag | YD | Maximum value/ minimum value reset request |
| XE | | YE | | XE | A/D conversion completed flag | YE | Not used |
| XF | | YF | | XF | Error flag | YF | Error clear request |
| X10 | | Y10 | Not used | | | | |
| X11 | | Y11 | | | | | |
| X12 | | Y12 | | | | | |
| X13 | | Y13 | | | | | |
| X14 | | Y14 | | | | | |
| X15 | | Y15 | | | | | |
| X16 | | Y16 | | | | | |
| X17 | | Y17 | | | | | |
| X18 | | Y18 | Direct access request signal | | | | |
| X19 | | Y19 | Not used | | | | |
| X1A | | Y1A | | | | | |
| X1B | | Y1B | | | | | |
| X1C | | Y1C | | | | | |
| X1D | RFRP, RTOP instruction for interlock signal when A616AD is used in remote I/O station | Y1D | | | | | |
| X1E | | Y1E | | | | | |
| X1F | | Y1F | | | | | |

### 2.2.4 Buffer memory address comparison

Sequence program change is required as the assignment of buffer memory differs.
For details of the buffer memory or sequence program, refer to the Analog-Digital Converter Module User's Manual.

| A616AD | | | | Q68ADV/I | | |
|---|---|---|---|---|---|---|
| Address (Dec.) | Name | | Read/write | Address (Dec.) | Name | Read/write |
| 0 | For direct access | INPUT designation | R/W | 0 | A/D conversion enable/disable | R/W |
| 1 | | MX. CH. designation | | 1 | CH1 Time/count averaging setting | |
| 2 | | Digital output value | R | 2 | CH2 Time/count averaging setting | |
| 3 | Sampling period designation | | R/W | 3 | CH3 Time/count averaging setting | |
| 4 | Data format selection | | | 4 | CH4 Time/count averaging setting | |
| 5 | Error code storage | | | 5 | CH5 Time/count averaging setting | |
| 6 | Faulty multiplexer module CNT. No. storage | | | 6 | CH6 Time/count averaging setting | |
| 7 | System area (Not used) | | - | 7 | CH7 Time/count averaging setting | |
| 8 | | | | 8 | CH8 Time/count averaging setting | |
| 9 | | | | 9 | Averaging processing specification | |
| 10 | | | | 10 | A/D conversion completed flag | R |
| 11 | | | | 11 | CH1 Digital output value | |
| 12 | | | | 12 | CH2 Digital output value | |
| 13 | | | | 13 | CH3 Digital output value | |
| 14 | | | | 14 | CH4 Digital output value | |
| 15 | Conversion enable/disable designation | A616AD | R/W | 15 | CH5 Digital output value | |
| 16 | | INPUT 0 A60MX, A60MXR | | 16 | CH6 Digital output value | |
| 17 | | INPUT 1 A60MX, A60MXR | | 17 | CH7 Digital output value | |
| 18 | | INPUT 2 A60MX, A60MXR | | 18 | CH8 Digital output value | |
| 19 | | INPUT 3 A60MX, A60MXR | | 19 | Error code | |
| 20 | | INPUT 4 A60MX, A60MXR | | 20 | Setting range (CH1 to CH4) | |
| 21 | | INPUT 5 A60MX, A60MXR | | 21 | Setting range (CH5 to CH8) | |
| 22 | | INPUT 6 A60MX, A60MXR | | 22 | Offset/gain setting mode Offset specification | R/W |
| 23 | | INPUT 7 A60MX, A60MXR | | 23 | Offset/gain setting mode Gain specification | |
| 24 | Set data setting request | | | 24 | System area (Not used) | - |
| 25 | System area (Not used) | | - | 25 | | |
| 26 | | | | 26 | | |
| 27 | | | | 27 | | |
| 28 | | | | 28 | | |
| 29 | | | | 29 | | |
| 30 | | | | 30 | CH1 Maximum value | R |
| 31 | | | | 31 | CH1 Minimum value | |
| 32 | | | | 32 | CH2 Maximum value | |
| 33 | | | | 33 | CH2 Minimum value | |
| 34 | | | | 34 | CH3 Maximum value | |
| 35 | | | | 35 | CH3 Minimum value | |
| 36 | | | | 36 | CH4 Maximum value | |
| 37 | | | | 37 | CH4 Minimum value | |
| 38 | | | | 38 | CH5 Maximum value | |
| 39 | | | | 39 | CH5 Minimum value | |
| 40 | | | | 40 | CH6 Maximum value | |
| 41 | | | | 41 | CH6 Minimum value | |
| 42 | | | | 42 | CH7 Maximum value | |
| 43 | | | | 43 | CH7 Minimum value | |
| 44 | | | | 44 | CH8 Maximum value | |
| 45 | | | | 45 | CH8 Minimum value | |

| A616AD | | | Q68ADV/I | | |
|---|---|---|---|---|---|
| Address (Dec.) | Name | Read/write | Address (Dec.) | Name | Read/write |
| 46 | System area (Not used) | - | 46 | System area (Not used) | - |
| 47 | | | 47 | | |
| 48 | INPUT channel digital output value | R | 48 | | |
| to | | | to | | |
| 63 | | | 63 | | |
| 64 | System area (Not used) | - | 64 | | |
| to | | | to | | |
| 157 | | | 157 | | |
| 158 | | | 158 | Mode switching setting | R/W |
| 159 | | | 159 | | |
| 160 | | | 160 | System area (Not used) | - |
| to | | | to | | |
| 201 | | | 201 | | |
| 202 | | | 202 | CH1 Industrial shipment settings offset value | R/W |
| 203 | | | 203 | CH1 Industrial shipment settings gain value | |
| 204 | | | 204 | CH2 Industrial shipment settings offset value | |
| 205 | | | 205 | CH2 Industrial shipment settings gain value | |
| 206 | | | 206 | CH3 Industrial shipment settings offset value | |
| 207 | | | 207 | CH3 Industrial shipment settings gain value | |
| 208 | | | 208 | CH4 Industrial shipment settings offset value | |
| 209 | | | 209 | CH4 Industrial shipment settings gain value | |
| 210 | | | 210 | CH5 Industrial shipment settings offset value | |
| 211 | | | 211 | CH5 Industrial shipment settings gain value | |
| 212 | | | 212 | CH6 Industrial shipment settings offset value | |
| 213 | | | 213 | CH6 Industrial shipment settings gain value | |
| 214 | | | 214 | CH7 Industrial shipment settings offset value | |
| 215 | | | 215 | CH7 Industrial shipment settings gain value | |
| 216 | | | 216 | CH8 Industrial shipment settings offset value | |
| 217 | | | 217 | CH8 Industrial shipment settings gain value | |
| 218 | | | 218 | CH1 User range settings offset value | |
| 219 | | | 219 | CH1 User range settings gain value | |
| 220 | | | 220 | CH2 User range settings offset value | |
| 221 | | | 221 | CH2 User range settings gain value | |
| 222 | | | 222 | CH3 User range settings offset value | |
| 223 | | | 223 | CH3 User range settings gain value | |
| 224 | | | 224 | CH4 User range settings offset value | |
| 225 | | | 225 | CH4 User range settings gain value | |
| 226 | | | 226 | CH5 User range settings offset value | |
| 227 | | | 227 | CH5 User range settings gain value | |
| 228 | | | 228 | CH6 User range settings offset value | |
| 229 | | | 229 | CH6 User range settings gain value | |
| 230 | | | 230 | CH7 User range settings offset value | |
| 231 | | | 231 | CH7 User range settings gain value | |
| 232 | | | 232 | CH8 User range settings offset value | |
| 233 | | | 233 | CH8 User range settings gain value | |
| 234 | | | | | |
| to | | | | | |
| 255 | | | | | |
| 256 | MX. CH. channel digital output value | R | | | |
| to | | | | | |
| 383 | | | | | |

## 2.3 A68AD (Upgrade to Q68ADV, Q68ADI)

### 2.3.1 Performance comparison

<table>
<tr><th colspan="2">Item</th><th>A68AD</th><th></th></tr>
<tr><td rowspan="2">Analog input</td><td>Voltage</td><td>-10 to 0 to +10VDC<br>(Input resistance value: Hardware version K or later: 1MΩ, Hardware version J or earlier: 30kΩ)</td><td></td></tr>
<tr><td>Current</td><td>+4 to +20mADC (Input resistance value: 250Ω)<br>*Usable current input: -20 to 0 to +20mA</td><td></td></tr>
<tr><td colspan="2">Digital output</td><td>16-bit signed binary (-2048 to +2047)</td><td></td></tr>
<tr><td colspan="2">I/O characteristics</td><td><table><tr><th>Analog input</th><th>Digital output</th></tr><tr><td>+10V</td><td>+2000</td></tr><tr><td>+5V or +20mA</td><td>+1000</td></tr><tr><td>0V or +4mA</td><td>±0</td></tr><tr><td>-5V or -12mA</td><td>-1000</td></tr><tr><td>-10V</td><td>-2000</td></tr></table></td><td></td></tr>
<tr><td colspan="2">Maximum resolution</td><td>Voltage: 5mV (1/2000)<br>Current: 20μA (1/1000)</td><td></td></tr>
<tr><td colspan="2">Overall accuracy (Accuracy in respect to maximum digital output value)</td><td>±1% (±20)</td><td></td></tr>
<tr><td colspan="2">Maximum conversion speed</td><td>Max. 2.5ms/channel</td><td></td></tr>
<tr><td colspan="2">Absolute maximum input</td><td>Voltage: ±15V<br>current: ±30mA</td><td></td></tr>
</table>

○: Compatible, △: Partial change required, ×: Incompatible

<table>
<tr><th></th><th>Q68ADV</th><th>Q68ADI</th><th>Compatibility</th><th>Precautions for replacement</th></tr>
<tr><td></td><td>-10 to 10VDC<br>(Input resistance value: 1MΩ)</td><td>-</td><td rowspan="2">△</td><td rowspan="2">The voltage/current cannot be mixed for one module.</td></tr>
<tr><td></td><td>-</td><td>0 to 20mADC<br>(Input resistance value: 250Ω)</td></tr>
<tr><td></td><td colspan="2">16-bit signed binary<br>(Normal resolution mode: -4096 to 4095,<br>High resolution mode: -12288 to 12287, -16384 to 16383)</td><td>○</td><td></td></tr>
<tr><td></td><td colspan="2"><table>
<tr><th colspan="2" rowspan="2">Analog input range</th><th colspan="2">Normal resolution mode</th><th colspan="2">High resolution mode</th></tr>
<tr><th>Digital output value</th><th>Maximum resolution</th><th>Digital output value</th><th>Maximum resolution</th></tr>
<tr><td rowspan="5">Voltage</td><td>0 to 10V</td><td rowspan="3">0 to 4000</td><td>2.5mV</td><td>0 to 16000</td><td>0.625mV</td></tr>
<tr><td>0 to 5V</td><td>1.25mV</td><td rowspan="2">0 to 12000</td><td>0.416mV</td></tr>
<tr><td>1 to 5V</td><td>1.0mV</td><td>0.333mV</td></tr>
<tr><td>-10 to 10V</td><td rowspan="2">-4000 to 4000</td><td>2.5mV</td><td>-16000 to 16000</td><td>0.625mV</td></tr>
<tr><td>User range settings</td><td>0.375mV</td><td>-12000 to 12000</td><td>0.333mV</td></tr>
<tr><td rowspan="3">Current</td><td>0 to 20mA</td><td rowspan="2">0 to 4000</td><td>5μA</td><td rowspan="2">0 to 12000</td><td>1.66μA</td></tr>
<tr><td>4 to 20mA</td><td>4μA</td><td>1.33μA</td></tr>
<tr><td>User range settings</td><td>-4000 to 4000</td><td>1.37μA</td><td>-12000 to 12000</td><td>1.33μA</td></tr>
</table></td><td>△</td><td>As concept of gain value is changed, refer to [Analog-Digital Converter Module User's Manual] and then, confirm the I/O characteristics.</td></tr>
<tr><td></td><td colspan="2"><table>
<tr><th colspan="2" rowspan="3">Analog input range</th><th colspan="3">Normal resolution mode</th><th colspan="3">High resolution mode</th></tr>
<tr><th colspan="2">Ambient temperature 0 to 55°C</th><th rowspan="2">Ambient temperature 25±5°C</th><th colspan="2">Ambient temperature 0 to 55°C</th><th rowspan="2">Ambient temperature 25±5°C</th></tr>
<tr><th>With temperature drift compensation</th><th>Without temperature drift compensation</th><th>With temperature drift compensation</th><th>Without temperature drift compensation</th></tr>
<tr><td rowspan="5">Voltage</td><td>0 to 10V</td><td rowspan="8">±0.3%<br>(±12 digits)</td><td rowspan="8">±0.4%<br>(±16 digits)</td><td rowspan="8">±0.1%<br>(±4 digits)</td><td>±0.3%<br>(±48 digits)</td><td>±0.4%<br>(±64 digits)</td><td>±0.1%<br>(±16 digits)</td></tr>
<tr><td>-10 to 10V</td><td rowspan="7">±0.3%<br>(±36 digits)</td><td rowspan="7">±0.4%<br>(±48 digits)</td><td rowspan="7">±0.1%<br>(±12 digits)</td></tr>
<tr><td>0 to 5V</td></tr>
<tr><td>1 to 5V</td></tr>
<tr><td>users range settings</td></tr>
<tr><td rowspan="3">Current</td><td>0 to 20mA</td></tr>
<tr><td>4 to 20mA</td></tr>
<tr><td>users range settings</td></tr>
</table></td><td>○</td><td></td></tr>
<tr><td></td><td colspan="2">80μs/channel<br>(When there is temperature drift compensation, the time calculated by adding 160 μs will be used regardless of the number of channels used.)</td><td>○</td><td>The conversion speed of Q68ADV/I to A68AD has become quick. And then, on A68AD, the noise that did not import on Q68ADV/I can be imported as analog signal. In this case, use the averaging processing function to remove the effect of noise.</td></tr>
<tr><td></td><td>±15V</td><td>±30mA</td><td>○</td><td></td></tr>
</table>

| Item | A68AD | |
|---|---|---|
| Analog input points | 8 channels/module | |
| Maximum number of writes for $E^2$PROM | - | |
| Isolation method | Between the input terminal and programmable controller power supply: photocoupler isolation<br>Between channels: non-isolated | |
| Dielectric withstand voltage | - | |
| Insulation resistance | - | |
| Occupied I/O points | 32 points<br>(I/O assignment: special 32 points) | |
| Connected terminal | 38-point terminal block | |
| Applicable wire size | 0.75 to 2$mm^2$<br>(Applicable tightening torque: 39 to 59N•cm) | |
| Applicable solderless terminal | V1.25-3, V1.25-YS3A, V2-S3, V2-YS3A | |
| Internal current consumption (5VDC) | Hardware version K or later: 0.39A<br>Hardware version J or earlier: 0.9A | |
| Weight | Hardware version K or later: 0.3kg<br>Hardware version J or earlier: 0.6kg | |

○: Compatible, △: Partial change required, ×: Incompatible

| | Q68ADV | Q68ADI | Compatibility | Precautions for replacement |
|---|---|---|---|---|
| | 8 channels/module | | ○ | |
| | Max. 100,000 times | | ○ | |
| | Between the I/O terminal and programmable controller power supply: photocoupler isolation<br>Between channels: non-isolated | | ○ | |
| | Between the I/O terminal and programmable controller power supply: 500VAC, for 1 minute | | ○ | |
| | Between the I/O terminal and programmable controller power supply: 500VDC, 20MΩ or more | | ○ | |
| | 16 points<br>(I/O assignment: intelligent 16 points) | | △ | I/O occupied points has changed to 16 points. |
| | 18-point terminal block | | × | Wiring change is required. |
| | 0.3 to 0.75mm$^2$ | | × | |
| | R1.25-3 (A solderless terminal with sleeve can not be used.) | | × | |
| | 0.64A | 0.64A | △ | The recalculation of internal current consumption [5VDC] is required. |
| | 0.19kg | 0.19kg | ○ | |

### 2.3.2 Function comparison

○ : With functions, -: Without functions

| Item | Description | A68AD | Q68ADV/I | Precautions for replacement |
|---|---|---|---|---|
| A/D conversion enable/disable | Specifies whether to enable or disable the A/D conversion for each channel.<br>By disabling the conversion for the channels that are not used, the sampling time can be shortened. | ○ | ○ | |
| Sampling processing | The A/D conversion for analog input values is performed successively for each channel, and the digital output value is output upon each conversion. | ○ | ○ | The sampling processing time changes depending on the number of channels used (number of channels set to A/D conversion enable) and whether, with or without the temperature drift compensation function.<br>(a) Without temperature drift compensation function (processing time) = (number of channels used) × 80 (μs /1 channel)<br>(b) With temperature drift compensation function (processing time)= (number of channels used) × 80 (μs /1 channel) + 160μs |
| Averaging processing | For each channel, A/D conversion values are averaged for the set number of times or set amount of time, and the average value is output as a digital value. | ○ | ○ | The setting range of average time and count differ.<br>Refer to [Analog-Digital Converter Module User's Manual] and then, confirm the specifications. |
| Maximum and minimum values hold function | The maximum and minimum values of the digital output values are retained in the module. | - | ○ | |
| Temperature drift compensation function | Errors arising from changes in the ambient temperature of the module are automatically compensated for to improve conversion accuracy.<br>The temperature drift compensation function can be performed at (A/D conversion time for all channels) + 160μs. | - | ○ | |
| Resolution mode | The resolution settings of 1/4000, 1/12000 or 1/16000 can be selected according to the application.<br>The resolution mode setting is applicable to all channels. | - | ○ | |
| Online module change | A module change is made without the system being stopped. | - | ○ | Replaceable modules during online are a process CPU and a redundant CPU. |

### 2.3.3 I/O signal comparison to programmable controller CPU

Sequence program change is required as the I/O signals differ.
For details of the I/O signals or sequence program, refer to the Analog-Digital Converter Module User's Manual.

| A68AD | | | | Q68ADV/I | | | |
|---|---|---|---|---|---|---|---|
| Device No. | Signal name | Device No. | Signal name | Device No. | Signal name | Device No. | Signal name |
| X0 | Watchdog timer error | Y0 | Not used | X0 | Module READY | Y0 | Not used |
| X1 | A/D conversion READY | Y1 | | X1 | Temperature drift compensation flag | Y1 | |
| X2 | Not used | Y2 | | X2 | Not used | Y2 | |
| X3 | | Y3 | | X3 | | Y3 | |
| X4 | | Y4 | | X4 | | Y4 | |
| X5 | | Y5 | | X5 | | Y5 | |
| X6 | | Y6 | | X6 | | Y6 | |
| X7 | | Y7 | | X7 | | Y7 | |
| X8 | | Y8 | | X8 | High resolution mode status flag | Y8 | |
| X9 | | Y9 | | X9 | Operating condition setting completed flag | Y9 | Operating condition setting request |
| XA | | YA | | XA | Offset/gain setting mode flag | YA | User range write request |
| XB | | YB | | XB | Channel change completed flag | YB | Channel change request |
| XC | | YC | | XC | Not used | YC | Not used |
| XD | | YD | | XD | Maximum value/ minimum value reset completed flag | YD | Maximum value/ minimum value reset request |
| XE | | YE | | XE | A/D conversion completed flag | YE | Not used |
| XF | | YF | | XF | Error flag | YF | Error clear request |
| X10 | | Y10 | | | | | |
| X11 | | Y11 | | | | | |
| X12 | | Y12 | | | | | |
| X13 | | Y13 | | | | | |
| X14 | | Y14 | | | | | |
| X15 | | Y15 | | | | | |
| X16 | | Y16 | | | | | |
| X17 | | Y17 | | | | | |
| X18 | | Y18 | | | | | |
| X19 | | Y19 | | | | | |
| X1A | | Y1A | | | | | |
| X1B | | Y1B | | | | | |
| X1C | | Y1C | | | | | |
| X1D | | Y1D | | | | | |
| X1E | | Y1E | | | | | |
| X1F | | Y1F | | | | | |

### 2.3.4 Buffer memory address comparison

Sequence program change is required as the assignment of buffer memory differs.
For details of the buffer memory or sequence program, refer to the Analog-Digital Converter Module User's Manual.

| A68AD | | | Q68ADV/I | | |
|---|---|---|---|---|---|
| Address (Dec.) | Name | Read/write | Address (Dec.) | Name | Read/write |
| 0 | Number of channels | R/W | 0 | A/D conversion enable/disable | R/W |
| 1 | Averaging processing specification | | 1 | CH1 Time/count averaging setting | |
| 2 | CH1 Averaging time, count | | 2 | CH2 Time/count averaging setting | |
| 3 | CH2 Averaging time, count | | 3 | CH3 Time/count averaging setting | |
| 4 | CH3 Averaging time, count | | 4 | CH4 Time/count averaging setting | |
| 5 | CH4 Averaging time, count | | 5 | CH5 Time/count averaging setting | |
| 6 | CH5 Averaging time, count | | 6 | CH6 Time/count averaging setting | |
| 7 | CH6 Averaging time, count | | 7 | CH7 Time/count averaging setting | |
| 8 | CH7 Averaging time, count | | 8 | CH8 Time/count averaging setting | |
| 9 | CH8 Averaging time, count | | 9 | Averaging processing specification | |
| 10 | CH1 Digital output value | R | 10 | A/D conversion completed flag | R |
| 11 | CH2 Digital output value | | 11 | CH1 Digital output value | |
| 12 | CH3 Digital output value | | 12 | CH2 Digital output value | |
| 13 | CH4 Digital output value | | 13 | CH3 Digital output value | |
| 14 | CH5 Digital output value | | 14 | CH4 Digital output value | |
| 15 | CH6 Digital output value | | 15 | CH5 Digital output value | |
| 16 | CH7 Digital output value | | 16 | CH6 Digital output value | |
| 17 | CH8 Digital output value | | 17 | CH7 Digital output value | |
| 18 | System area (Not used) | - | 18 | CH8 Digital output value | |
| 19 | | | 19 | Error code | |
| 20 | | | 20 | Setting range (CH1 to CH4) | |
| 21 | | | 21 | Setting range (CH5 to CH8) | |
| 22 | | | 22 | Offset/gain setting mode Offset specification | R/W |
| 23 | | | 23 | Offset/gain setting mode Gain specification | |
| 24 | | | 24 | System area (Not used) | - |
| 25 | | | 25 | | |
| 26 | | | 26 | | |
| 27 | | | 27 | | |
| 28 | | | 28 | | |
| 29 | | | 29 | | |
| 30 | | | 30 | CH1 Maximum value | R |
| 31 | | | 31 | CH1 Minimum value | |
| 32 | | | 32 | CH2 Maximum value | |
| 33 | | | 33 | CH2 Minimum value | |
| 34 | Write data error code | R/W | 34 | CH3 Maximum value | |
| | | | 35 | CH3 Minimum value | |
| | | | 36 | CH4 Maximum value | |
| | | | 37 | CH4 Minimum value | |
| | | | 38 | CH5 Maximum value | |
| | | | 39 | CH5 Minimum value | |
| | | | 40 | CH6 Maximum value | |
| | | | 41 | CH6 Minimum value | |
| | | | 42 | CH7 Maximum value | |
| | | | 43 | CH7 Minimum value | |
| | | | 44 | CH8 Maximum value | |
| | | | 45 | CH8 Minimum value | |

| Q68ADV/I | | |
|---|---|---|
| **Address (Dec.)** | **Name** | **Read/write** |
| 46 to 157 | System area (Not used) | - |
| 158 to 159 | Mode switching setting | R/W |
| 160 to 201 | System area (Not used) | - |
| 202 | CH1 Industrial shipment settings offset value | R/W |
| 203 | CH1 Industrial shipment settings gain value | |
| 204 | CH2 Industrial shipment settings offset value | |
| 205 | CH2 Industrial shipment settings gain value | |
| 206 | CH3 Industrial shipment settings offset value | |
| 207 | CH3 Industrial shipment settings gain value | |
| 208 | CH4 Industrial shipment settings offset value | |
| 209 | CH4 Industrial shipment settings gain value | |
| 210 | CH5 Industrial shipment settings offset value | |
| 211 | CH5 Industrial shipment settings gain value | |
| 212 | CH6 Industrial shipment settings offset value | |
| 213 | CH6 Industrial shipment settings gain value | |
| 214 | CH7 Industrial shipment settings offset value | |
| 215 | CH7 Industrial shipment settings gain value | |
| 216 | CH8 Industrial shipment settings offset value | |
| 217 | CH8 Industrial shipment settings gain value | |
| 218 | CH1 User range settings offset value | |
| 219 | CH1 User range settings gain value | |
| 220 | CH2 User range settings offset value | |
| 221 | CH2 User range settings gain value | |
| 222 | CH3 User range settings offset value | |
| 223 | CH3 User range settings gain value | |
| 224 | CH4 User range settings offset value | |
| 225 | CH4 User range settings gain value | |
| 226 | CH5 User range settings offset value | |
| 227 | CH5 User range settings gain value | |
| 228 | CH6 User range settings offset value | |
| 229 | CH6 User range settings gain value | |
| 230 | CH7 User range settings offset value | |
| 231 | CH7 User range settings gain value | |
| 232 | CH8 User range settings offset value | |
| 233 | CH8 User range settings gain value | |

## 2.4 A68AD (Upgrade to Q68AD-G)

### 2.4.1 Performance comparison

<table>
<tr><th colspan="2">Item</th><th>A68AD</th><th></th></tr>
<tr><td rowspan="2">Analog input</td><td>Voltage</td><td>-10 to 0 to +10VDC<br>(Input resistance value: Hardware version K or later: 1MΩ, Hardware version J or earlier: 30kΩ)</td><td></td></tr>
<tr><td>Current</td><td>+4 to +20mADC (Input resistance value: 250Ω)<br>*Usable current input: -20 to 0 to +20mA</td><td></td></tr>
<tr><td colspan="2">Digital output</td><td>16-bit signed binary (-2048 to +2047)</td><td></td></tr>
<tr><td colspan="2">I/O characteristics</td><td><table><tr><th>Analog input</th><th>Digital output</th></tr><tr><td>+10V</td><td>+2000</td></tr><tr><td>+5V or +20mA</td><td>+1000</td></tr><tr><td>0V or +4mA</td><td>±0</td></tr><tr><td>-5V or -12mA</td><td>-1000</td></tr><tr><td>-10V</td><td>-2000</td></tr></table></td><td></td></tr>
<tr><td colspan="2">Maximum resolution</td><td>Voltage: 5mV (1/2000)<br>Current: 20μA (1/1000)</td><td></td></tr>
<tr><td colspan="2">Overall accuracy (Accuracy in respect to maximum digital output value)</td><td>±1% (±20)</td><td></td></tr>
<tr><td colspan="2">Maximum conversion speed</td><td>Max. 2.5ms/channel</td><td></td></tr>
<tr><td colspan="2">Response time</td><td>-</td><td></td></tr>
<tr><td colspan="2">Absolute maximum input</td><td>Voltage: ±15V<br>current: ±30mA</td><td></td></tr>
</table>

○: Compatible, △: Partial change required, ×: Incompatible

<table>
<tr><th></th><th>Q68AD-G</th><th>Compatibility</th><th>Precautions for replacement</th></tr>
<tr><td></td><td>-10 to 10VDC<br>(Input resistance value: 1MΩ or more)</td><td rowspan="2">○</td><td rowspan="2"></td></tr>
<tr><td></td><td>0 to 20mADC<br>(Input resistance value: 250Ω)</td></tr>
<tr><td></td><td>16-bit signed binary<br>(Normal resolution mode: -4096 to 4095,<br>High resolution mode: -12288 to 12287, -16384 to 16383)</td><td>○</td><td></td></tr>
<tr><td></td><td>
<table>
<tr><th rowspan="2">Input</th><th rowspan="2">Analog input range</th><th colspan="2">Normal resolution mode</th><th colspan="2">High resolution mode</th></tr>
<tr><th>Digital output value</th><th>Maximum resolution</th><th>Digital output value</th><th>Maximum resolution</th></tr>
<tr><td rowspan="6">Voltage</td><td>0 to 10V</td><td rowspan="3">0 to 4000</td><td>2.5mV</td><td rowspan="2">0 to 12000</td><td>0.625mV</td></tr>
<tr><td>0 to 5V</td><td>1.25mV</td><td>0.416mV</td></tr>
<tr><td>1 to 5V</td><td>1.0mV</td><td>0.333mV</td></tr>
<tr><td>1 to 5V<br>(Expanded mode)</td><td>-1000 to 4500</td><td>1.0mV</td><td>-3000 to 13500</td><td>0.333mV</td></tr>
<tr><td>-10 to 10V</td><td rowspan="2">-4000 to 4000</td><td>2.5mV</td><td>-16000 to 16000</td><td>0.625mV</td></tr>
<tr><td>Users range setting</td><td>0.375mV</td><td>-12000 to 12000</td><td>0.333mV</td></tr>
<tr><td rowspan="4">Current</td><td>0 to 20mA</td><td rowspan="2">0 to 4000</td><td>5μA</td><td rowspan="2">0 to 12000</td><td>1.66μA</td></tr>
<tr><td>4 to 20mA</td><td>4μA</td><td>1.33μA</td></tr>
<tr><td>4 to 20mA<br>(Expanded mode)</td><td>-1000 to 4500</td><td>4μA</td><td>-3000 to 13500</td><td>1.33μA</td></tr>
<tr><td>Users range setting</td><td>-4000 to 4000</td><td>1.37μA</td><td>-12000 to 12000</td><td>1.33μA</td></tr>
</table>
</td><td>△</td><td>As concept of gain value is changed, refer to Q68AD-G [User's Manual] and then, confirm the I/O characteristics.</td></tr>
<tr><td></td><td>±0.1%<br>Normal resolution mode: ±4digit<br>High resolution mode (0 to 10V, -10 to 10V): ±16digit<br>High resolution mode (Other than the above ranges): ±12digit<br>Temperature coefficient: ±71.4ppm/°C (0.00714%/°C)</td><td>○</td><td></td></tr>
<tr><td></td><td>10ms/channel<br>(Sampling cycle)</td><td rowspan="2">△</td><td rowspan="2">The conversion speed of Q68AD-G to A68AD has become slow. If fast conversion speed is required for control, the Q64AD is recommended.</td></tr>
<tr><td></td><td>20ms</td></tr>
<tr><td></td><td>Voltage: ±15V<br>current: ±30mA</td><td>○</td><td></td></tr>
</table>

| Item | A68AD | |
|---|---|---|
| Analog input points | 8 channels/module | |
| Maximum number of writes for $E^2$PROM | - | |
| Isolation method | Between the input terminal and programmable controller power supply: photocoupler isolation<br>Between channels: non-isolated | |
| Dielectric withstand voltage | - | |
| Insulation resistance | - | |
| Occupied I/O points | 32 points<br>(I/O assignment: special 32 points) | |
| Connected terminal | 38-point terminal block | |
| Applicable wire size | 0.75 to 2$mm^2$<br>(Applicable tightening torque: 39 to 59N•cm) | |
| Applicable solderless terminal | V1.25-3, V1.25-YS3A, V2-S3, V2-YS3A | |
| Internal current consumption (5VDC) | Hardware version K or later: 0.39A<br>Hardware version J or earlier: 0.9A | |
| Weight | Hardware version K or later: 0.3kg<br>Hardware version J or earlier: 0.6kg | |

○: Compatible, △: Partial change required, ×: Incompatible

| | Q68AD-G | Compatibility | Precautions for replacement |
|---|---|---|---|
| | 8 channels/module | ○ | |
| | Up to 50,000 times | ○ | |
| | Between the I/O terminal and programmable controller power supply:<br>transformer isolation<br>Between channels: transformer isolation | ○ | |
| | Between the I/O terminal and programmable controller power supply:<br>500VACrms, for 1 minute<br>Between analog input channels: 1000VACrms, for 1 minute | ○ | |
| | Between the I/O terminal and programmable controller power supply:<br>500VDC, 10MΩ or more<br>Between analog input channels: 500VDC, 10MΩ or more | ○ | |
| | 16 points<br>(I/O assignment: intelligent 16 points) | △ | I/O occupied points has changed to 16 points. |
| | 40-pin connector | × | Wiring change is required. |
| | Within 0.3mm$^2$ | × | |
| | - | × | |
| | 0.46A | △ | The recalculation of internal current consumption [5VDC] is required. |
| | 0.16kg | ○ | |

## 2.4.2 Function comparison

○ : With functions, -: Without functions

| Item | Description | A68AD | Q68AD-G | Precautions for replacement |
|---|---|---|---|---|
| A/D conversion enable/disable | Specifies whether to enable or disable the A/D conversion for each channel. By disabling the conversion for the channels that are not used, the sampling time can be shortened. | ○ | ○ | |
| Sampling processing | The A/D conversion for analog input values is performed successively for each channel, and the digital output value is output upon each conversion. | ○ | ○ | |
| Averaging processing | For each channel, A/D conversion values are averaged for the set number of times or set amount of time, and the average value is output as a digital value. | ○ | ○ | The setting range of average time and count differ. Refer to Q68AD-G [User's Manual] and then, confirm the specifications. |
| | Moving average takes the average of the specified number of digital output values measured per sampling time. | - | ○ | |
| Primary delay filter | A digital output value is smoothed according to the preset time constant. | - | ○ | |
| Maximum and minimum values hold function | The maximum and minimum values of the digital output values are retained in the module. | - | ○ | |
| Resolution mode | The resolution can be switched according to the application. The resolution mode is batch-set for all the channels.*1 | - | ○ | |
| Input signal error detection function | The voltage/current outside the setting range is detected. | - | ○ | |
| Warning output function | (1) Process alarm<br>A warning is output if a digital output value falls outside the setting range.<br>(2) Rate alarm<br>A warning is output if the varying rate of a digital output value falls outside the preset varying rate range. | - | ○ | |
| Scaling function | Conversion of A/D conversion values to preset percentage values and loading into the buffer memory is available. Programming steps for the scaling can be eliminated. | - | ○ | |
| Online module change | A module change is made without the system being stopped. | - | ○ | Replaceable modules during online are a process CPU and a redundant CPU. |

*1 For the A68AD, the resolution for voltage is 1/2000 and that for current is 1/1000 (fixed).
For the Q68AD-G, the resolution for voltage and current is 1/4000 in the normal resolution mode, while the resolution for the voltage from -10 to 10V is 1/16000 and the resolution for the voltage in other ranges and current is 1/12000 in the high resolution mode.

### 2.4.3 I/O signal comparison to programmable controller CPU

Sequence program change is required as the I/O signals differ.
For details of the I/O signals or sequence program, refer to the Channel Isolated Analog-Digital Converter Module, Channel Isolated Analog-Digital Converter Module (With Signal Conditioning Function) User's Manual.

| A68AD | | | | Q68AD-G | | | |
|---|---|---|---|---|---|---|---|
| Device No. | Signal name | Device No. | Signal name | Device No. | Signal name | Device No. | Signal name |
| X0 | Watchdog timer error | Y0 | Not used | X0 | Module READY | Y0 | Not used |
| X1 | A/D conversion READY | Y1 | | X1 | Not used | Y1 | |
| X2 | Not used | Y2 | | X2 | | Y2 | |
| X3 | | Y3 | | X3 | | Y3 | |
| X4 | | Y4 | | X4 | | Y4 | |
| X5 | | Y5 | | X5 | | Y5 | |
| X6 | | Y6 | | X6 | | Y6 | |
| X7 | | Y7 | | X7 | High resolution mode status flag | Y7 | |
| X8 | | Y8 | | X8 | Warming output signal | Y8 | |
| X9 | | Y9 | | X9 | Operating condition setting completed flag | Y9 | Operating condition setting request |
| XA | | YA | | XA | Offset/gain setting mode flag | YA | User range write request |
| XB | | YB | | XB | Channel change completed flag | YB | Channel change request |
| XC | | YC | | XC | Input signal error detection signal | YC | Not used |
| XD | | YD | | XD | Maximum value/ minimum value reset completed flag | YD | Maximum value/ minimum value reset request |
| XE | | YE | | XE | A/D conversion completed flag | YE | Not used |
| XF | | YF | | XF | Error flag | YF | Error clear request |
| X10 | | Y10 | | | | | |
| X11 | | Y11 | | | | | |
| X12 | | Y12 | | | | | |
| X13 | | Y13 | | | | | |
| X14 | | Y14 | | | | | |
| X15 | | Y15 | | | | | |
| X16 | | Y16 | | | | | |
| X17 | | Y17 | | | | | |
| X18 | | Y18 | | | | | |
| X19 | | Y19 | | | | | |
| X1A | | Y1A | | | | | |
| X1B | | Y1B | | | | | |
| X1C | | Y1C | | | | | |
| X1D | | Y1D | | | | | |
| X1E | | Y1E | | | | | |
| X1F | | Y1F | | | | | |

### 2.4.4 Buffer memory address comparison

Sequence program change is required as the assignment of buffer memory differs.
For details of the buffer memory or sequence program, refer to the Channel Isolated Analog-Digital Converter Module, Channel Isolated Analog-Digital Converter Module (With Signal Conditioning Function) User's Manual.

| A68AD | | | Q68AD-G | | |
|---|---|---|---|---|---|
| Address (Dec.) | Name | Read/write | Address (Dec.) | Name | Read/write |
| 0 | Number of channels | R/W | 0 | A/D conversion enable/disable | R/W |
| 1 | Averaging processing specification | | 1 | CH1 Average time/Average number of times/ Moving average/Time constant settings | |
| 2 | CH1 Averaging time, count | | 2 | CH2 Average time/Average number of times/ Moving average/Time constant settings | |
| 3 | CH2 Averaging time, count | | 3 | CH3 Average time/Average number of times/ Moving average/Time constant settings | |
| 4 | CH3 Averaging time, count | | 4 | CH4 Average time/Average number of times/ Moving average/Time constant settings | |
| 5 | CH4 Averaging time, count | | 5 | CH5 Average time/Average number of times/ Moving average/Time constant settings | |
| 6 | CH5 Averaging time, count | | 6 | CH6 Average time/Average number of times/ Moving average/Time constant settings | |
| 7 | CH6 Averaging time, count | | 7 | CH7 Average time/Average number of times/ Moving average/Time constant settings | |
| 8 | CH7 Averaging time, count | | 8 | CH8 Average time/Average number of times/ Moving average/Time constant settings | |
| 9 | CH8 Averaging time, count | | 9 | System area (Not used) | - |
| 10 | CH1 Digital output value | R | 10 | A/D conversion completed flag | R |
| 11 | CH2 Digital output value | | 11 | CH1 Digital output value | |
| 12 | CH3 Digital output value | | 12 | CH2 Digital output value | |
| 13 | CH4 Digital output value | | 13 | CH3 Digital output value | |
| 14 | CH5 Digital output value | | 14 | CH4 Digital output value | |
| 15 | CH6 Digital output value | | 15 | CH5 Digital output value | |
| 16 | CH7 Digital output value | | 16 | CH6 Digital output value | |
| 17 | CH8 Digital output value | | 17 | CH7 Digital output value | |
| 18 | System area (Not used) | - | 18 | CH8 Digital output value | |
| 19 | | | 19 | Error code | |
| 20 | | | 20 | Setting range (CH1 to CH4) | |
| 21 | | | 21 | Setting range (CH5 to CH8) | |
| 22 | | | 22 | Offset/gain setting mode Offset specification | R/W |
| 23 | | | 23 | Offset/gain setting mode Gain specification | |
| 24 | | | 24 | Averaging process specification (CH1 to CH4) | |
| 25 | | | 25 | Averaging process specification (CH5 to CH8) | |
| 26 | | | 26 | System area (Not used) | - |
| 27 | | | 27 | | |
| 28 | | | 28 | | |
| 29 | | | 29 | | |
| 30 | | | 30 | CH1 Maximum value | R |
| 31 | | | 31 | CH1 Minimum value | |
| 32 | | | 32 | CH2 Maximum value | |
| 33 | | | 33 | CH2 Minimum value | |
| 34 | Write data error code | R/W | 34 | CH3 Maximum value | |
| | | | to | | |
| | | | 44 | CH8 Maximum value | |
| | | | 45 | CH8 Minimum value | |

| Q68AD-G | | |
|---|---|---|
| Address (Dec.) | Name | Read/write |
| 46 | System area (Not used) | - |
| 47 | Input signal error detection extended/input signal error detection setting | R/W |
| 48 | Warning output setting | |
| 49 | Input signal error detection flag | R |
| 50 | Warning output flag (Process alarm) | |
| 51 | Warning output flag (Rate alarm) | |
| 52 | System area (Not used) | - |
| 53 | Scaling enable/disable setting | R/W |
| 54 | CH1 Scaling value | R |
| to | | |
| 61 | CH8 Scaling value | |
| 62 | CH1 Scaling lower limit value | R/W |
| 63 | CH1 Scaling upper limit value | |
| to | | |
| 76 | CH8 Scaling lower limit value | |
| 77 | CH8 Scaling upper limit value | |
| to | | |
| 86 | CH1 Process alarm lower lower limit value | |
| 87 | CH1 Process alarm lower upper limit value | |
| 88 | CH1 Process alarm upper lower limit value | |
| 89 | CH1 Process alarm upper upper limit value | |
| to | | |
| 114 | CH8 Process alarm lower lower limit value | |
| 115 | CH8 Process alarm lower upper limit value | |
| 116 | CH8 Process alarm upper lower limit value | |
| 117 | CH8 Process alarm upper upper limit value | |
| 118 | CH1 Rate alarm warning detection period | |
| to | | |
| 125 | CH8 Rate alarm warning detection period | |
| 126 | CH1 Rate alarm upper limit value | |
| 127 | CH1 Rate alarm lower limit value | |
| to | | |
| 140 | CH8 Rate alarm upper limit value | |
| 141 | CH8 Rate alarm lower limit value | |
| 142 | CH1 Input signal error detection setting value/CH1 Input signal error detection lower limit setting value | |
| to | | |
| 150 | CH1 Input signal error detection upper limit setting value | |
| to | | |
| 158 | Mode switching setting | R/W |
| 159 | | |
| to | | |
| 200 | Save data classification setting | R/W |
| 201 | System area (Not used) | - |
| 202 | CH1 Factory default offset value | R/W |
| 203 | CH1 Factory default gain value | |
| to | | |
| 232 | CH8 Factory default offset value | |
| 233 | CH8 Factory default gain value | |

## 2.5 A68AD-S2 (Upgrade to Q68ADV, Q68ADI)

### 2.5.1 Performance comparison

<table>
<tr><th colspan="2">Item</th><th>A68AD-S2</th><th></th></tr>
<tr><td rowspan="2">Analog input</td><td>Voltage</td><td>-10 to 0 to +10VDC<br>(Input resistance value: Hardware version K or later: 1MΩ, Hardware version J or earlier: 30kΩ)</td><td></td></tr>
<tr><td>Current</td><td>+4 to +20mADC (Input resistance value: 250Ω)<br>*Usable current input: -20 to 0 to 20mA</td><td></td></tr>
<tr><td colspan="2">Digital output</td><td>16-bit signed binary (-2048 to +2047)</td><td></td></tr>
<tr><td colspan="2">I/O characteristics</td><td><table><tr><th>Analog input</th><th>Digital output</th></tr><tr><td>+10V</td><td>+2000</td></tr><tr><td>+5V or +20mA</td><td>+1000</td></tr><tr><td>0V or +4mA</td><td>±0</td></tr><tr><td>-5V or -12mA</td><td>-1000</td></tr><tr><td>-10V</td><td>-2000</td></tr></table></td><td></td></tr>
<tr><td colspan="2">Maximum resolution</td><td>Voltage: 5mV (1/2000)<br>Current: 20μA (1/1000)</td><td></td></tr>
<tr><td colspan="2">Overall accuracy (Accuracy in respect to maximum digital output value)</td><td>Within ±1% (±20)</td><td></td></tr>
</table>

○: Compatible, △: Partial change required, ×: Incompatible

<table>
<tr><th></th><th>Q68ADV</th><th>Q68ADI</th><th>Compatibility</th><th>Precautions for replacement</th></tr>
<tr><td></td><td>-10 to 10VDC<br>(Input resistance value: 1MΩ)</td><td>-</td><td rowspan="2">△</td><td rowspan="2">The voltage/current cannot be mixed for one module.</td></tr>
<tr><td></td><td>-</td><td>0 to 20mADC<br>(Input resistance value: 250Ω)</td></tr>
<tr><td></td><td colspan="2">16-bit signed binary<br>(Normal resolution mode: -4096 to 4095,<br>High resolution mode: -12288 to 12287, -16384 to 16383)</td><td>○</td><td></td></tr>
<tr><td></td><td colspan="2"><table>
<tr><th colspan="2" rowspan="2">Analog input range</th><th colspan="2">Normal resolution mode</th><th colspan="2">High resolution mode</th></tr>
<tr><th>Digital output value</th><th>Maximum resolution</th><th>Digital output value</th><th>Maximum resolution</th></tr>
<tr><td rowspan="5">Voltage</td><td>0 to 10V</td><td rowspan="3">0 to 4000</td><td>2.5mV</td><td>0 to 16000</td><td>0.625mV</td></tr>
<tr><td>0 to 5V</td><td>1.25mV</td><td rowspan="2">0 to 12000</td><td>0.416mV</td></tr>
<tr><td>1 to 5V</td><td>1.0mV</td><td>0.333mV</td></tr>
<tr><td>-10 to 10V</td><td rowspan="2">-4000 to 4000</td><td>2.5mV</td><td>-16000 to 16000</td><td>0.625mV</td></tr>
<tr><td>User range settings</td><td>0.375mV</td><td>-12000 to 12000</td><td>0.333mV</td></tr>
<tr><td rowspan="3">Current</td><td>0 to 20mA</td><td rowspan="2">0 to 4000</td><td>5μA</td><td rowspan="2">0 to 12000</td><td>1.66μA</td></tr>
<tr><td>4 to 20mA</td><td>4μA</td><td>1.33μA</td></tr>
<tr><td>User range settings</td><td>-4000 to 4000</td><td>1.37μA</td><td>-12000 to 12000</td><td>1.33μA</td></tr>
</table></td><td>△<br><br>○</td><td>As concept of gain value is changed, refer to [Analog-Digital Converter Module User's Manual] and then, confirm the I/O characteristics.</td></tr>
<tr><td></td><td colspan="2"><table>
<tr><th colspan="2" rowspan="3">Analog input range</th><th colspan="3">Normal resolution mode</th><th colspan="3">High resolution mode</th></tr>
<tr><th colspan="2">Ambient temperature 0 to 55°C</th><th rowspan="2">Ambient temperature 25±5°C</th><th colspan="2">Ambient temperature 0 to 55°C</th><th rowspan="2">Ambient temperature 25±5°C</th></tr>
<tr><th>With temperature drift compensation</th><th>Without temperature drift compensation</th><th>With temperature drift compensation</th><th>Without temperature drift compensation</th></tr>
<tr><td rowspan="5">Voltage</td><td>0 to 10V</td><td rowspan="9">±0.3%<br>(±12 digits)</td><td rowspan="9">±0.4%<br>(±16 digits)</td><td rowspan="9">±0.1%<br>(±4 digits)</td><td>±0.3%<br>(±48 digits)</td><td>±0.4%<br>(±64 digits)</td><td>±0.1%<br>(±16 digits)</td></tr>
<tr><td>-10 to 10V</td><td rowspan="8">±0.3%<br>(±36 digits)</td><td rowspan="8">±0.4%<br>(±48 digits)</td><td rowspan="8">±0.1%<br>(±12 digits)</td></tr>
<tr><td>0 to 5V</td></tr>
<tr><td>1 to 5V</td></tr>
<tr><td>User range settings</td></tr>
<tr><td rowspan="4">Current</td><td>0 to 20mA</td></tr>
<tr><td>4 to 20mA</td></tr>
<tr><td>User range settings</td></tr>
</table></td><td>○</td><td></td></tr>
</table>

| Item | A68AD-S2 | |
|---|---|---|
| Maximum conversion speed | Max. 2.5ms/channel | |
| Absolute maximum input | Voltage: ±15V<br>Current: ±30mA | |
| Analog input points | 8 channels/module | |
| Maximum number of writes for $E^2$PROM | - | |
| Isolation method | Between the input terminal and programmable controller power supply: photocoupler isolation<br>Between channels: non-isolated | |
| Dielectric withstand voltage | - | |
| Insulation resistance | - | |
| Occupied I/O points | 32 points<br>(I/O assignment: special 32 points) | |
| Connected terminal | 38-point terminal block | |
| Applicable wire size | 0.75 to 2$mm^2$<br>(Applicable tightening torque: 39 to 59N•cm) | |
| Applicable solderless terminal | V1.25-3, V1.25-YS3A, V2-S3, V2-YS3A | |
| Internal current consumption (5VDC) | Hardware version K or later: 0.39A<br>Hardware version J or earlier: 0.9A | |
| Weight | Hardware version K or later: 0.3kg<br>Hardware version J or earlier: 0.6kg | |

○: Compatible, △: Partial change required, ×: Incompatible

| | Q68ADV | Q68ADI | Compatibility | Precautions for replacement |
|---|---|---|---|---|
| | 80μs/channel<br>(When there is temperature drift compensation, the time calculated by adding 160 μs will be used regardless of the number of channels used.) | | ○ | The conversion speed of Q68ADV/I to A68AD-S2 has become quick. And then, on A68AD-S2, the noise that did not import on Q68ADV/I can be imported as analog signal. In this case, use the averaging processing function to remove the effect of noise. |
| | ±15V | ±30mA | ○ | |
| | 8 channels/module | | ○ | |
| | Max. 100,000 times | | ○ | |
| | Between the I/O terminal and programmable controller power supply:<br>photocoupler isolation<br>Between channels: non-isolated | | ○ | |
| | Between the I/O terminal and programmable controller power supply:<br>500VAC, for 1 minute | | ○ | |
| | Between the I/O terminal and programmable controller power supply:<br>500VDC, 20MΩ or more | | ○ | |
| | 16 points<br>(I/O assignment: intelligent 16 points) | | △ | I/O occupied points has changed to 16 points. |
| | 18-point terminal block | | × | Wiring change is required. |
| | 0.3 to 0.75mm$^2$ | | × | |
| | R1.25-3 (A solderless terminal with sleeve can not be used.) | | × | |
| | 0.64A | 0.64A | △ | The recalculation of internal current consumption [5VDC] is required. |
| | 0.19kg | 0.19kg | ○ | |

## 2.5.2 Function comparison

○ : With functions, -: Without functions

| Item | Description | A68AD-S2 | Q68ADV/I | Precautions for replacement |
|---|---|---|---|---|
| A/D conversion enable/disable | Specifies whether to enable or disable the A/D conversion for each channel.<br>By disabling the conversion for the channels that are not used, the sampling time can be shortened. | ○ | ○ | |
| Sampling processing | The A/D conversion for analog input values is performed successively for each channel, and the digital output value is output upon each conversion. | ○ | ○ | The sampling processing time changes depending on the number of channels used (number of channels set to A/D conversion enable) and whether, with or without the temperature drift compensation function.<br>(a) Without temperature drift compensation function (processing time) = (number of channels used) × 80 (μs /1 channel)<br>(b) With temperature drift compensation function (processing time)= (number of channels used) × 80 (μs /1 channel) + 160μs |
| Averaging processing | For each channel, A/D conversion values are averaged for the set number of times or set amount of time, and the average value is output as a digital value. | ○ | ○ | The setting range of average time and count differ.<br>Refer to [Analog-Digital Converter Module User's Manual] and then, confirm the specifications. |
| Maximum and minimum values hold function | The maximum and minimum values of the digital output values are retained in the module. | - | ○ | |
| Temperature drift compensation function | Errors arising from changes in the ambient temperature of the module are automatically compensated for to improve conversion accuracy.<br>The temperature drift compensation function can be performed at (A/D conversion time for all channels) + 160μs. | - | ○ | |
| Resolution mode | The resolution settings of 1/4000, 1/12000 or 1/16000 can be selected according to the application.<br>The resolution mode setting is applicable to all channels. | - | ○ | |
| Online module change | A module change is made without the system being stopped. | - | ○ | Replaceable modules during online are a process CPU and a redundant CPU. |

### 2.5.3 I/O signal comparison to programmable controller CPU

Sequence program change is required as the I/O signals differ.
For details of the I/O signals or sequence program, refer to the Analog-Digital Converter Module User's Manual.

| A68AD-S2 | | | | Q68ADV/I | | | |
|---|---|---|---|---|---|---|---|
| Device No. | Signal name | Device No. | Signal name | Device No. | Signal name | Device No. | Signal name |
| X0 | Watchdog timer error | Y0 | Not used | X0 | Module READY | Y0 | Not used |
| X1 | A/D conversion READY | Y1 | | X1 | Temperature drift compensation flag | Y1 | |
| X2 | Not used | Y2 | | X2 | Not used | Y2 | |
| X3 | | Y3 | | X3 | | Y3 | |
| X4 | | Y4 | | X4 | | Y4 | |
| X5 | | Y5 | | X5 | | Y5 | |
| X6 | | Y6 | | X6 | | Y6 | |
| X7 | | Y7 | | X7 | | Y7 | |
| X8 | | Y8 | | X8 | High resolution mode status flag | Y8 | |
| X9 | | Y9 | | X9 | Operating condition setting completed flag | Y9 | Operating condition setting request |
| XA | | YA | | XA | Offset/gain setting mode flag | YA | User range write request |
| XB | | YB | | XB | Channel change completed flag | YB | Channel change request |
| XC | | YC | | XC | Not used | YC | Not used |
| XD | | YD | | XD | Maximum value/ minimum value reset completed flag | YD | Maximum value /minimum value reset request |
| XE | | YE | | XE | A/D conversion completed flag | YE | Not used |
| XF | | YF | | XF | Error flag | YF | Error clear request |
| X10 | | Y10 | | | | | |
| X11 | | Y11 | | | | | |
| X12 | | Y12 | | | | | |
| X13 | | Y13 | | | | | |
| X14 | | Y14 | | | | | |
| X15 | | Y15 | | | | | |
| X16 | | Y16 | | | | | |
| X17 | | Y17 | | | | | |
| X18 | | Y18 | | | | | |
| X19 | | Y19 | | | | | |
| X1A | | Y1A | | | | | |
| X1B | | Y1B | | | | | |
| X1C | | Y1C | | | | | |
| X1D | | Y1D | | | | | |
| X1E | | Y1E | | | | | |
| X1F | | Y1F | | | | | |

### 2.5.4 Buffer memory address comparison

Sequence program change is required as the assignment of buffer memory differs.
For details of the buffer memory or sequence program, refer to the Analog-Digital Converter Module User's Manual.

| A68AD-S2 | | | Q68ADV/I | | |
|---|---|---|---|---|---|
| Address (Dec.) | Name | Read/write | Address (Dec.) | Name | Read/write |
| 0 | Used channel specification | R/W | 0 | A/D conversion enable/disable | R/W |
| 1 | Averaging processing specification | | 1 | CH1 Time/count averaging setting | |
| 2 | CH1 Averaging time, count | | 2 | CH2 Time/count averaging setting | |
| 3 | CH2 Averaging time, count | | 3 | CH3 Time/count averaging setting | |
| 4 | CH3 Averaging time, count | | 4 | CH4 Time/count averaging setting | |
| 5 | CH4 Averaging time, count | | 5 | CH5 Time/count averaging setting | |
| 6 | CH5 Averaging time, count | | 6 | CH6 Time/count averaging setting | |
| 7 | CH6 Averaging time, count | | 7 | CH7 Time/count averaging setting | |
| 8 | CH7 Averaging time, count | | 8 | CH8 Time/count averaging setting | |
| 9 | CH8 Averaging time, count | | 9 | Averaging processing specification | |
| 10 | CH1 Digital output value | R | 10 | A/D conversion completed flag | R |
| 11 | CH2 Digital output value | | 11 | CH1 Digital output value | |
| 12 | CH3 Digital output value | | 12 | CH2 Digital output value | |
| 13 | CH4 Digital output value | | 13 | CH3 Digital output value | |
| 14 | CH5 Digital output value | | 14 | CH4 Digital output value | |
| 15 | CH6 Digital output value | | 15 | CH5 Digital output value | |
| 16 | CH7 Digital output value | | 16 | CH6 Digital output value | |
| 17 | CH8 Digital output value | | 17 | CH7 Digital output value | |
| 18 | System area (Not used) | - | 18 | CH8 Digital output value | |
| 19 | | | 19 | Error code | |
| 20 | | | 20 | Setting range (CH1 to CH4) | |
| 21 | | | 21 | Setting range (CH5 to CH8) | |
| 22 | | | 22 | Offset/gain setting mode Offset specification | R/W |
| 23 | | | 23 | Offset/gain setting mode Gain specification | |
| 24 | | | 24 | System area (Not used) | - |
| 25 | | | 25 | | |
| 26 | | | 26 | | |
| 27 | | | 27 | | |
| 28 | | | 28 | | |
| 29 | | | 29 | | |
| 30 | | | 30 | CH1 Maximum value | R |
| 31 | | | 31 | CH1 Minimum value | |
| 32 | | | 32 | CH2 Maximum value | |
| 33 | | | 33 | CH2 Minimum value | |
| 34 | Write data error code | R/W | 34 | CH3 Maximum value | |
| 35 | A/D conversion completed flag | R | 35 | CH3 Minimum value | |
| | | | 36 | CH4 Maximum value | |
| | | | 37 | CH4 Minimum value | |
| | | | 38 | CH5 Maximum value | |
| | | | 39 | CH5 Minimum value | |
| | | | 40 | CH6 Maximum value | |
| | | | 41 | CH6 Minimum value | |
| | | | 42 | CH7 Maximum value | |
| | | | 43 | CH7 Minimum value | |
| | | | 44 | CH8 Maximum value | |
| | | | 45 | CH8 Minimum value | |

| Q68ADV/I | | |
|---|---|---|
| **Address (Dec.)** | **Name** | **Read/write** |
| 46 to 157 | System area (Not used) | - |
| 158 to 159 | Mode switching setting | R/W |
| 160 to 201 | System area (Not used) | - |
| 202 | CH1 Industrial shipment settings offset value | R/W |
| 203 | CH1 Industrial shipment settings gain value | |
| 204 | CH2 Industrial shipment settings offset value | |
| 205 | CH2 Industrial shipment settings gain value | |
| 206 | CH3 Industrial shipment settings offset value | |
| 207 | CH3 Industrial shipment settings gain value | |
| 208 | CH4 Industrial shipment settings offset value | |
| 209 | CH4 Industrial shipment settings gain value | |
| 210 | CH5 Industrial shipment settings offset value | |
| 211 | CH5 Industrial shipment settings gain value | |
| 212 | CH6 Industrial shipment settings offset value | |
| 213 | CH6 Industrial shipment settings gain value | |
| 214 | CH7 Industrial shipment settings offset value | |
| 215 | CH7 Industrial shipment settings gain value | |
| 216 | CH8 Industrial shipment settings offset value | |
| 217 | CH8 Industrial shipment settings gain value | |
| 218 | CH1 User range settings offset value | |
| 219 | CH1 User range settings gain value | |
| 220 | CH2 User range settings offset value | |
| 221 | CH2 User range settings gain value | |
| 222 | CH3 User range settings offset value | |
| 223 | CH3 User range settings gain value | |
| 224 | CH4 User range settings offset value | |
| 225 | CH4 User range settings gain value | |
| 226 | CH5 User range settings offset value | |
| 227 | CH5 User range settings gain value | |
| 228 | CH6 User range settings offset value | |
| 229 | CH6 User range settings gain value | |
| 230 | CH7 User range settings offset value | |
| 231 | CH7 User range settings gain value | |
| 232 | CH8 User range settings offset value | |
| 233 | CH8 User range settings gain value | |

## 2.6 A68AD-S2 (Upgrade to Q68AD-G)

### 2.6.1 Performance comparison

<table>
<tr><th colspan="2">Item</th><th>A68AD-S2</th><th></th></tr>
<tr><td rowspan="2">Analog input</td><td>Voltage</td><td>-10 to 0 to +10VDC<br>(Input resistance value: Hardware version K or later: 1MΩ, Hardware version J or earlier: 30kΩ)</td><td></td></tr>
<tr><td>Current</td><td>+4 to +20mADC (Input resistance value: 250Ω)<br>*Usable current input: -20 to 0 to 20mA</td><td></td></tr>
<tr><td colspan="2">Digital output</td><td>16-bit signed binary (-2048 to +2047)</td><td></td></tr>
<tr><td colspan="2">I/O characteristics</td><td><table><tr><th>Analog input</th><th>Digital output</th></tr><tr><td>+10V</td><td>+2000</td></tr><tr><td>+5V or +20mA</td><td>+1000</td></tr><tr><td>0V or +4mA</td><td>±0</td></tr><tr><td>-5V or -12mA</td><td>-1000</td></tr><tr><td>-10V</td><td>-2000</td></tr></table></td><td></td></tr>
<tr><td colspan="2">Maximum resolution</td><td>Voltage: 5mV (1/2000)<br>Current: 20μA (1/1000)</td><td></td></tr>
<tr><td colspan="2">Overall accuracy (Accuracy in respect to maximum digital output value)</td><td>Within ±1% (±20)</td><td></td></tr>
</table>

○: Compatible, △: Partial change required, ×: Incompatible

<table>
<tr><th></th><th>Q68AD-G</th><th>Compatibility</th><th>Precautions for replacement</th></tr>
<tr><td></td><td>-10 to 10VDC<br>(Input resistance value: 1MΩ or more )</td><td rowspan="2">○</td><td rowspan="2"></td></tr>
<tr><td></td><td>0 to 20mADC<br>(Input resistance value: 250Ω)</td></tr>
<tr><td></td><td>16-bit signed binary<br>(Normal resolution mode: -4096 to 4095,<br>High resolution mode: -12288 to 12287, -16384 to 16383)</td><td>○</td><td></td></tr>
<tr><td></td><td>
<table>
<tr><th rowspan="2">Input</th><th rowspan="2">Analog input range</th><th colspan="2">Normal resolution mode</th><th colspan="2">High resolution mode</th></tr>
<tr><th>Digital output value</th><th>Maximum resolution</th><th>Digital output value</th><th>Maximum resolution</th></tr>
<tr><td rowspan="6">Voltage</td><td>0 to 10V</td><td rowspan="3">0 to 4000</td><td>2.5mV</td><td>0 to 16000</td><td>0.625mV</td></tr>
<tr><td>0 to 5V</td><td>1.25mV</td><td rowspan="2">0 to 12000</td><td>0.416mV</td></tr>
<tr><td>1 to 5V</td><td>1.0mV</td><td>0.333mV</td></tr>
<tr><td>1 to 5V<br>(Expanded mode)</td><td>-1000 to 4500</td><td>1.0mV</td><td>-3000 to 13500</td><td>0.333mV</td></tr>
<tr><td>-10 to 10V</td><td rowspan="2">-4000 to 4000</td><td>2.5mV</td><td>-16000 to 16000</td><td>0.625mV</td></tr>
<tr><td>Users range setting</td><td>0.375mV</td><td>-12000 to 12000</td><td>0.333mV</td></tr>
<tr><td rowspan="4">Current</td><td>0 to 20mA</td><td rowspan="2">0 to 4000</td><td>5μA</td><td rowspan="2">0 to 12000</td><td>1.66μA</td></tr>
<tr><td>4 to 20mA</td><td>4μA</td><td>1.33μA</td></tr>
<tr><td>4 to 20mA<br>(Expanded mode)</td><td>-1000 to 4500</td><td>4μA</td><td>-3000 to 13500</td><td>1.33μA</td></tr>
<tr><td>Users range setting</td><td>-4000 to 4000</td><td>1.37μA</td><td>-12000 to 12000</td><td>1.33μA</td></tr>
</table>
</td><td>△</td><td>As concept of gain value is changed, refer to Q68AD-G [User's Manual] and then, confirm the I/O characteristics.</td></tr>
<tr><td></td><td>±0.1%<br>Normal resolution mode: ±4 digits<br>High resolution mode (0 to 10V, -10 to 10V): ±16 digits<br>High resolution mode (Other than the above ranges): ±12 digits<br>Temperature coefficient: ±71.4ppm/°C (0.00714%/°C)</td><td>○</td><td></td></tr>
</table>

| Item | A68AD-S2 | |
|---|---|---|
| Maximum conversion speed | Max. 2.5ms/channel | |
| Response time | - | |
| Absolute maximum input | Voltage: ±15V<br>Current: ±30mA | |
| Analog input points | 8 channels/module | |
| Maximum number of writes for $E^2$PROM | - | |
| Isolation method | Between the input terminal and programmable controller power supply: photocoupler isolation<br>Between channels: non-isolated | |
| Dielectric withstand voltage | - | |
| Insulation resistance | - | |
| Occupied I/O points | 32 points<br>(I/O assignment: special 32 points) | |
| Connected terminal | 38-point terminal block | |
| Applicable wire size | 0.75 to 2$mm^2$<br>(Applicable tightening torque: 39 to 59N•cm) | |
| Applicable solderless terminal | V1.25-3, V1.25-YS3A, V2-S3, V2-YS3A | |
| Internal current consumption (5VDC) | Hardware version K or later: 0.39A<br>Hardware version J or earlier: 0.9A | |
| Weight | Hardware version K or later: 0.3kg<br>Hardware version J or earlier: 0.6kg | |

○: Compatible, △: Partial change required, ×: Incompatible

| | Q68AD-G | Compatibility | Precautions for replacement |
|---|---|---|---|
| | 10ms/channel<br>(Sampling cycle) | △ | The conversion speed of Q68AD-G to A68AD has become slow. If fast conversion speed is required for control, the Q64AD is recommended. |
| | 20ms | | |
| | Voltage: ±15V<br>current: ±30mA | ○ | |
| | 8 channels/module | ○ | |
| | Up to 50,000 times | ○ | |
| | Between the I/O terminal and programmable controller power supply:<br>transformer isolation<br>Between channels: transformer isolation | ○ | |
| | Between the I/O terminal and programmable controller power supply:<br>500VACrms, for 1 minute<br>Between analog input channels: 1000VACrms, for 1 minute | ○ | |
| | Between the I/O terminal and programmable controller power supply:<br>500VDC, 10MΩ or more<br>Between analog input channels: 500VDC, 10MΩ or more | ○ | |
| | 16 points<br>(I/O assignment: intelligent 16 points) | △ | I/O occupied points has changed to 16 points. |
| | 40-pin connector | × | Wiring change is required. |
| | Within 0.3mm$^2$ | × | |
| | - | × | |
| | 0.46A | △ | The recalculation of internal current consumption [5VDC] is required. |
| | 0.16kg | ○ | |

## 2.6.2 Function comparison

○ : With functions, -: Without functions

| Item | Description | A68AD-S2 | Q68AD-G | Precautions for replacement |
|---|---|---|---|---|
| A/D conversion enable/disable | Specifies whether to enable or disable the A/D conversion for each channel. By disabling the conversion for the channels that are not used, the sampling time can be shortened. | ○ | ○ | |
| Sampling processing | The A/D conversion for analog input values is performed successively for each channel, and the digital output value is output upon each conversion. | ○ | ○ | |
| Averaging processing | For each channel, A/D conversion values are averaged for the set number of times or set amount of time, and the average value is output as a digital value. | ○ | ○ | The setting range of average time and count differ. Refer to Q68AD-G [User's Manual] and then, confirm the specifications. |
| | Moving average takes the average of the specified number of digital output values measured per sampling time. | - | ○ | |
| Primary delay filter | A digital output value is smoothed according to the preset time constant. | - | ○ | |
| Maximum and minimum values hold function | The maximum and minimum values of the digital output values are retained in the module. | - | ○ | |
| Resolution mode | The resolution can be switched according to the application. The resolution mode is batch-set for all the channels.*1 | - | ○ | |
| Input signal error detection function | The voltage/current outside the setting range is detected. | - | ○ | |
| Warning output function | (1) Process alarm<br>A warning is output if a digital output value falls outside the setting range.<br>(2) Rate alarm<br>A warning is output if the varying rate of a digital output value falls outside the preset varying rate range. | - | ○ | |
| Scaling function | Conversion of A/D conversion values to preset percentage values and loading into the buffer memory is available. Programming steps for the scaling can be eliminated. | - | ○ | |
| Online module change | A module change is made without the system being stopped. | - | ○ | Replaceable modules during online are a process CPU and a redundant CPU. |

*1 For the A68AD-S2, the resolution for voltage is 1/2000 and that for current is 1/1000 (fixed).
For the Q68AD-G, the resolution for voltage and current is 1/4000 in the normal resolution mode, while the resolution for the voltage from -10 to 10V is 1/16000 and the resolution for the voltage in other ranges and current is 1/12000 in the high resolution mode.

### 2.6.3 I/O signal comparison to programmable controller CPU

Sequence program change is required as the I/O signals differ.
For details of the I/O signals or sequence program, refer to the Channel Isolated Analog-Digital Converter Module, Channel Isolated Analog-Digital Converter Module (With Signal Conditioning Function) User's Manual.

| A68AD-S2 | | | |
|---|---|---|---|
| Device No. | Signal name | Device No. | Signal name |
| X0 | Watchdog timer error | Y0 | Not used |
| X1 | A/D conversion READY | Y1 | |
| X2 | Not used | Y2 | |
| X3 | | Y3 | |
| X4 | | Y4 | |
| X5 | | Y5 | |
| X6 | | Y6 | |
| X7 | | Y7 | |
| X8 | | Y8 | |
| X9 | | Y9 | |
| XA | | YA | |
| XB | | YB | |
| XC | | YC | |
| XD | | YD | |
| XE | | YE | |
| XF | | YF | |
| X10 | | Y10 | |
| X11 | | Y11 | |
| X12 | | Y12 | |
| X13 | | Y13 | |
| X14 | | Y14 | |
| X15 | | Y15 | |
| X16 | | Y16 | |
| X17 | | Y17 | |
| X18 | | Y18 | |
| X19 | | Y19 | |
| X1A | | Y1A | |
| X1B | | Y1B | |
| X1C | | Y1C | |
| X1D | | Y1D | |
| X1E | | Y1E | |
| X1F | | Y1F | |

| Q68AD-G | | | |
|---|---|---|---|
| Device No. | Signal name | Device No. | Signal name |
| X0 | Module READY | Y0 | Not used |
| X1 | Not used | Y1 | |
| X2 | | Y2 | |
| X3 | | Y3 | |
| X4 | | Y4 | |
| X5 | | Y5 | |
| X6 | | Y6 | |
| X7 | High resolution mode status flag | Y7 | |
| X8 | Warming output signal | Y8 | |
| X9 | Operating condition setting completed flag | Y9 | Operating condition setting request |
| XA | Offset/gain setting mode flag | YA | User range write request |
| XB | Channel change completed flag | YB | Channel change request |
| XC | Input signal error detection signal | YC | Not used |
| XD | Maximum value/ minimum value reset completed flag | YD | Maximum value/ minimum value reset request |
| XE | A/D conversion completed flag | YE | Not used |
| XF | Error flag | YF | Error clear request |

### 2.6.4 Buffer memory address comparison

Sequence program change is required as the assignment of buffer memory differs.
For details of the I/O signals or sequence program, refer to the Channel Isolated Analog-Digital Converter Module, Channel Isolated Analog-Digital Converter Module (With Signal Conditioning Function) User's Manual.

| A68AD-S2 | | | Q68AD-G | | |
|---|---|---|---|---|---|
| Address (Dec.) | Name | Read/write | Address (Dec.) | Name | Read/write |
| 0 | Used channel specification | R/W | 0 | A/D conversion enable/disable | R/W |
| 1 | Averaging processing specification | | 1 | CH1 Average time/Average number of times/ Moving average/Time constant settings | |
| 2 | CH1 Averaging time, count | | 2 | CH2 Average time/Average number of times/ Moving average/Time constant settings | |
| 3 | CH2 Averaging time, count | | 3 | CH3 Average time/Average number of times/ Moving average/Time constant settings | |
| 4 | CH3 Averaging time, count | | 4 | CH4 Average time/Average number of times/ Moving average/Time constant settings | |
| 5 | CH4 Averaging time, count | | 5 | CH5 Average time/Average number of times/ Moving average/Time constant settings | |
| 6 | CH5 Averaging time, count | | 6 | CH6 Average time/Average number of times/ Moving average/Time constant settings | |
| 7 | CH6 Averaging time, count | | 7 | CH7 Average time/Average number of times/ Moving average/Time constant settings | |
| 8 | CH7 Averaging time, count | | 8 | CH8 Average time/Average number of times/ Moving average/Time constant settings | |
| 9 | CH8 Averaging time, count | | 9 | System area (Not used) | - |
| 10 | CH1 Digital output value | R | 10 | A/D conversion completed flag | R |
| 11 | CH2 Digital output value | | 11 | CH1 Digital output value | |
| 12 | CH3 Digital output value | | 12 | CH2 Digital output value | |
| 13 | CH4 Digital output value | | 13 | CH3 Digital output value | |
| 14 | CH5 Digital output value | | 14 | CH4 Digital output value | |
| 15 | CH6 Digital output value | | 15 | CH5 Digital output value | |
| 16 | CH7 Digital output value | | 16 | CH6 Digital output value | |
| 17 | CH8 Digital output value | | 17 | CH7 Digital output value | |
| 18 | System area (Not used) | - | 18 | CH8 Digital output value | |
| 19 | | | 19 | Error code | |
| 20 | | | 20 | Setting range (CH1 to CH4) | |
| 21 | | | 21 | Setting range (CH5 to CH8) | |
| 22 | | | 22 | Offset/gain setting mode Offset specification | R/W |
| 23 | | | 23 | Offset/gain setting mode Gain specification | |
| 24 | | | 24 | Averaging process specification (CH1 to CH4) | |
| 25 | | | 25 | Averaging process specification (CH5 to CH8) | |
| 26 | | | 26 | System area (Not used) | - |
| 27 | | | 27 | | |
| 28 | | | 28 | | |
| 29 | | | 29 | | |
| 30 | | | 30 | CH1 Maximum value | R |
| 31 | | | 31 | CH1 Minimum value | |
| 32 | | | 32 | CH2 Maximum value | |
| 33 | | | 33 | CH2 Minimum value | |
| 34 | Write data error code | R/W | 34 | CH3 Maximum value | |
| 35 | A/D conversion completed flag | R | to | | |
| | | | 44 | CH8 Maximum value | |
| | | | 45 | CH8 Minimum value | |

| Q68AD-G | | |
|---|---|---|
| Address (Dec.) | Name | Read/write |
| 46 | System area (Not used) | - |
| 47 | Input signal error detection extended/input signal error detection setting | R/W |
| 48 | Warning output setting | |
| 49 | Input signal error detection flag | R |
| 50 | Warning output flag (Process alarm) | |
| 51 | Warning output flag (Rate alarm) | |
| 52 | System area (Not used) | - |
| 53 | Scaling enable/disable setting | R/W |
| 54 | CH1 Scaling value | R |
| to | | |
| 61 | CH8 Scaling value | |
| 62 | CH1 Scaling lower limit value | R/W |
| 63 | CH1 Scaling upper limit value | |
| to | | |
| 76 | CH8 Scaling lower limit value | |
| 77 | CH8 Scaling upper limit value | |
| to | | |
| 86 | CH1 Process alarm lower lower limit value | |
| 87 | CH1 Process alarm lower upper limit value | |
| 88 | CH1 Process alarm upper lower limit value | |
| 89 | CH1 Process alarm upper upper limit value | |
| to | | |
| 114 | CH8 Process alarm lower lower limit value | |
| 115 | CH8 Process alarm lower upper limit value | |
| 116 | CH8 Process alarm upper lower limit value | |
| 117 | CH8 Process alarm upper upper limit value | |
| 118 | CH1 Rate alarm warning detection period | |
| to | | |
| 125 | CH8 Rate alarm warning detection period | |
| 126 | CH1 Rate alarm upper limit value | |
| 127 | CH1 Rate alarm lower limit value | |
| to | | |
| 140 | CH8 Rate alarm upper limit value | |
| 141 | CH8 Rate alarm lower limit value | |
| 142 | CH1 Input signal error detection setting value/CH1 Input signal error detection lower limit setting value | |
| to | | |
| 150 | CH1 Input signal error detection upper limit setting value | |
| to | | |
| 158 | Mode switching setting | R/W |
| 159 | | |
| to | | |
| 200 | Save data classification setting | R/W |
| 201 | System area (Not used) | - |
| 202 | CH1 Factory default offset value | R/W |
| 203 | CH1 Factory default gain value | |
| to | | |
| 232 | CH8 Factory default offset value | |
| 233 | CH8 Factory default gain value | |

## 2.7 A68ADN (Upgrade to Q68ADV, Q68ADI)

### 2.7.1 Performance comparison

<table>
<tr><th colspan="2">Item</th><th>A68ADN</th><th></th></tr>
<tr><td rowspan="2">Analog input</td><td>Voltage</td><td>-10 to 0 to +10VDC (Input resistance value: 1MΩ)</td><td></td></tr>
<tr><td>Current</td><td>-20 to 0 to +20mADC (Input resistance value: 250Ω)</td><td></td></tr>
<tr><td colspan="2">Digital output</td><td>16-bit signed binary<br>When 1/4000 is set: -4096 to +4095<br>When 1/8000 is set: -8192 to +8191<br>When 1/12000 is set: -12288 to +12287</td><td></td></tr>
<tr><td colspan="2">I/O characteristics</td><td>
<table>
<tr><th rowspan="2">Analog input</th><th colspan="3">Digital output value<br>(When gain 5V/20mA, offset 0V/0mA)</th></tr>
<tr><th>1/4000</th><th>1/8000</th><th>1/12000</th></tr>
<tr><td>+10V</td><td>+4000</td><td>+8000</td><td>+12000</td></tr>
<tr><td>+5V or +20mA</td><td>+2000</td><td>+4000</td><td>+6000</td></tr>
<tr><td>0V or 20mA</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>-5V or -20mA</td><td>-2000</td><td>-4000</td><td>-6000</td></tr>
<tr><td>-10V</td><td>-4000</td><td>-8000</td><td>-12000</td></tr>
</table>
(Factory-set: gain...5V, offset...0V)
</td><td></td></tr>
<tr><td colspan="2">Maximum resolution</td><td>
<table>
<tr><td></td><td>1/4000</td><td>1/8000</td><td>1/12000</td></tr>
<tr><td>Voltage input</td><td>2.5mV</td><td>1.25mV</td><td>0.83mV</td></tr>
<tr><td>Current input</td><td>10μA</td><td>5μA</td><td>3.33μA</td></tr>
</table>
</td><td></td></tr>
<tr><td colspan="2">Overall accuracy<br>(Accuracy in respect to maximum digital output value)</td><td>
<table>
<tr><td></td><td>1/4000</td><td>1/8000</td><td>1/12000</td></tr>
<tr><td>±1%</td><td>±40</td><td>±80</td><td>±120</td></tr>
</table>
</td><td></td></tr>
</table>

○: Compatible, △: Partial change required, ×: Incompatible

<table>
<tr><th></th><th>Q68ADV</th><th>Q68ADI</th><th>Compatibility</th><th>Precautions for replacement</th></tr>
<tr><td></td><td>-10 to 10VDC<br>(Input resistance value: 1MΩ)</td><td>-</td><td rowspan="2">△</td><td rowspan="2">The voltage/current cannot be mixed for one module.</td></tr>
<tr><td></td><td>-</td><td>0 to 20mADC<br>(Input resistance value: 250Ω)</td></tr>
<tr><td></td><td colspan="2">16-bit signed binary<br>(Normal resolution mode: -4096 to 4095,<br>High resolution mode: -12288 to 12287, -16384 to 16383)</td><td>○</td><td></td></tr>
<tr><td></td><td colspan="2"><table>
<tr><th colspan="2" rowspan="2">Analog input range</th><th colspan="2">Normal resolution mode</th><th colspan="2">High resolution mode</th></tr>
<tr><th>Digital output value</th><th>Maximum resolution</th><th>Digital output value</th><th>Maximum resolution</th></tr>
<tr><td rowspan="5">Voltage</td><td>0 to 10V</td><td rowspan="3">0 to 4000</td><td>2.5mV</td><td>0 to 16000</td><td>0.625mV</td></tr>
<tr><td>0 to 5V</td><td>1.25mV</td><td rowspan="2">0 to 12000</td><td>0.416mV</td></tr>
<tr><td>1 to 5V</td><td>1.0mV</td><td>0.333mV</td></tr>
<tr><td>-10 to 10V</td><td rowspan="2">-4000 to 4000</td><td>2.5mV</td><td>-16000 to 16000</td><td>0.625mV</td></tr>
<tr><td>User range settings</td><td>0.375mV</td><td>-12000 to 12000</td><td>0.333mV</td></tr>
<tr><td rowspan="3">Current</td><td>0 to 20mA</td><td rowspan="2">0 to 4000</td><td>5μA</td><td rowspan="2">0 to 12000</td><td>1.66μA</td></tr>
<tr><td>4 to 20mA</td><td>4μA</td><td>1.33μA</td></tr>
<tr><td>User range settings</td><td>-4000 to 4000</td><td>1.37μA</td><td>-12000 to 12000</td><td>1.33μA</td></tr>
</table></td><td>△<br><br>○</td><td>As concept of gain value is changed, refer to [Analog-Digital Converter Module User's Manual] and then, confirm the I/O characteristics.</td></tr>
<tr><td></td><td colspan="2"><table>
<tr><th colspan="2" rowspan="3">Analog input range</th><th colspan="3">Normal resolution mode</th><th colspan="3">High resolution mode</th></tr>
<tr><th colspan="2">Ambient temperature 0 to 55°C</th><th rowspan="2">Ambient temperature 25±5°C</th><th colspan="2">Ambient temperature 0 to 55°C</th><th rowspan="2">Ambient temperature 25±5°C</th></tr>
<tr><th>With temperature drift compensation</th><th>Without temperature drift compensation</th><th>With temperature drift compensation</th><th>Without temperature drift compensation</th></tr>
<tr><td rowspan="5">Voltage</td><td>0 to 10V</td><td rowspan="8">±0.3%<br>(±12 digits)</td><td rowspan="8">±0.4%<br>(±16 digits)</td><td rowspan="8">±0.1%<br>(±4 digits)</td><td>±0.3%<br>(±48 digits)</td><td>±0.4%<br>(±64 digits)</td><td>±0.1%<br>(±16 digits)</td></tr>
<tr><td>-10 to 10V</td><td rowspan="7">±0.3%<br>(±36 digits)</td><td rowspan="7">±0.4%<br>(±48 digits)</td><td rowspan="7">±0.1%<br>(±12 digits)</td></tr>
<tr><td>0 to 5V</td></tr>
<tr><td>1 to 5V</td></tr>
<tr><td>User range settings</td></tr>
<tr><td rowspan="3">Current</td><td>0 to 20mA</td></tr>
<tr><td>4 to 20mA</td></tr>
<tr><td>User range settings</td></tr>
</table></td><td>○</td><td></td></tr>
</table>

| Item | A68ADN | |
|---|---|---|
| Maximum conversion speed | 20ms/channel | |
| Absolute maximum input | Voltage: ±15V<br>Current: ±30mA | |
| Analog input points | 8 channel/module | |
| Maximum number of writes for $E^2$PROM | - | |
| Isolation method | Between the input terminal and programmable controller power supply: photocoupler isolation<br>Between channels: non-isolated | |
| Dielectric withstand voltage | Between the I/O terminal and programmable controller power supply: 500VAC, for 1 minute | |
| Insulation resistance | Between the I/O terminal and programmable controller power supply: 500VDC, 5MΩ or more | |
| Occupied I/O points | 32 points<br>(I/O assignment: special 32 points) | |
| Connected terminal | 38-point terminal block | |
| Applicable wire size | 0.75 to 2$mm^2$<br>(Applicable tightening torque: 39 to 59N•cm) | |
| Applicable solderless terminal | V1.25-3, V1.25-YS3A, V2-S3, V2-YS3A | |
| Internal current consumption (5VDC) | 0.4A | |
| Weight | 0.51kg | |

| | Q68ADV | Q68ADI | Compatibility | Precautions for replacement |
|---|---|---|---|---|
| | 80μs/channel<br>(When there is temperature drift compensation, the time calculated by adding 160 μs will be used regardless of the number of channels used.) | | ○ | The conversion speed of Q68ADV/I to A68ADN has become quick. And then, on Q68ADV/I, the noise that did not import on A68ADN can be imported as analog signal.<br>In this case, use the averaging processing function to remove the effect of noise. |
| | ±15V | ±30mA | ○ | |
| | 8 channels/module | | ○ | |
| | Max. 100,000 times | | ○ | |
| | Between the I/O terminal and programmable controller power supply: photocoupler isolation<br>Between channels: non-isolated | | ○ | |
| | Between the I/O terminal and programmable controller power supply: 500VAC, for 1 minute | | ○ | |
| | Between the I/O terminal and programmable controller power supply: 500VDC, 5MΩ or more | | ○ | |
| | 16 points<br>(I/O assignment: intelligent 16 points) | | △ | I/O occupied points has changed to 16 points. |
| | 18-point terminal block | | × | Wiring change is required. |
| | 0.3 to 0.75mm$^2$ | | × | |
| | R1.25-3 (A solderless terminal with sleeve can not be used.) | | × | |
| | 0.64A | 0.64A | △ | The recalculation of internal current consumption [5VDC] is required. |
| | 0.19kg | 0.19kg | ○ | |

## 2.7.2 Function comparison

○ : With functions, -: Without functions

| Item | Description | A68ADN | Q68ADV/I | Precautions for replacement |
|---|---|---|---|---|
| A/D conversion enable/disable | Specifies whether to enable or disable the A/D conversion for each channel. By disabling the conversion for the channels that are not used, the sampling time can be shortened. | ○ | ○ | |
| Sampling processing | The A/D conversion for analog input values is performed successively for each channel, and the digital output value is output upon each conversion. | ○ | ○ | The sampling processing time changes depending on the number of channels used (number of channels set to A/D conversion enable) and whether, with or without the temperature drift compensation function.<br>(a) Without temperature drift compensation function (processing time) = (number of channels used) × 80 (μs /1 channel)<br>(b) With temperature drift compensation function (processing time)= (number of channels used) × 80 (μs /1 channel) + 160μs |
| Averaging processing | For each channel, A/D conversion values are averaged for the set number of times or set amount of time, and the average value is output as a digital value. | ○ | ○ | The setting range of average time and count differ. Refer to [Analog-Digital Converter Module User's Manual] and then, confirm the specifications. |
| Maximum and minimum values hold function | The maximum and minimum values of the digital output values are retained in the module. | - | ○ | |
| Temperature drift compensation function | Errors arising from changes in the ambient temperature of the module are automatically compensated for to improve conversion accuracy. The temperature drift compensation function can be performed at (A/D conversion time for all channels) + 160μs. | - | ○ | |
| Resolution mode | The resolution can be switched according to the application. The resolution mode is batch-set for all the channels.*1 | ○ | ○ | |
| Online module change | A module change is made without the system being stopped. | - | ○ | Replaceable modules during online are a process CPU and a redundant CPU. |

*1 For the A68ADN, the resolution for voltage and current can be set to 1/4000, 1/8000, or 1/12000.
For the Q68ADV/I, the resolution for voltage and current is 1/4000 in the normal resolution mode, while the resolution for the voltage from -10 to 10V is 1/16000 and the resolution for the voltage in other ranges and current is 1/12000 in the high resolution mode.

### 2.7.3 I/O signal comparison to programmable controller CPU

Sequence program change is required as the I/O signals differ.
For details of the I/O signals or sequence program, refer to the Analog-Digital Converter Module User's Manual.

| A68ADN | | | | Q68ADV/I | | | |
|---|---|---|---|---|---|---|---|
| Device No. | Signal name | Device No. | Signal name | Device No. | Signal name | Device No. | Signal name |
| X0 | Watchdog timer error | Y0 | Not used | X0 | Module READY | Y0 | Not used |
| X1 | A/D conversion READY | Y1 | | X1 | Temperature drift compensation flag | Y1 | |
| X2 | Error flag | Y2 | | X2 | Not used | Y2 | |
| X3 | Not used | Y3 | | X3 | | Y3 | |
| X4 | | Y4 | | X4 | | Y4 | |
| X5 | | Y5 | | X5 | | Y5 | |
| X6 | | Y6 | | X6 | | Y6 | |
| X7 | | Y7 | | X7 | | Y7 | |
| X8 | | Y8 | | X8 | High resolution mode status flag | Y8 | |
| X9 | | Y9 | | X9 | Operating condition setting completed flag | Y9 | Operating condition setting request |
| XA | | YA | | XA | Offset/gain setting mode flag | YA | User range write request |
| XB | | YB | | XB | Channel change completed flag | YB | Channel change request |
| XC | | YC | | XC | Not used | YC | Not used |
| XD | | YD | RFRP, RTOP instruction for interlock signal when A68ADN is used in remote I/O station | XD | Maximum value/ minimum value reset completed flag | YD | Maximum value/ minimum value reset request |
| XE | | YE | | XE | A/D conversion completed flag | YE | Not used |
| XF | | YF | | XF | Error flag | YF | Error clear request |
| X10 | | Y10 | Not used | | | | |
| X11 | | Y11 | | | | | |
| X12 | | Y12 | Error reset | | | | |
| X13 | | Y13 | Not used | | | | |
| X14 | | Y14 | | | | | |
| X15 | | Y15 | | | | | |
| X16 | | Y16 | | | | | |
| X17 | | Y17 | | | | | |
| X18 | | Y18 | | | | | |
| X19 | | Y19 | | | | | |
| X1A | | Y1A | | | | | |
| X1B | | Y1B | | | | | |
| X1C | | Y1C | | | | | |
| X1D | RFRP, RTOP instruction | Y1D | | | | | |
| X1E | for interlock signal when | Y1E | | | | | |
| X1F | A68ADN is used in remote I/O station | Y1F | | | | | |

### 2.7.4 Buffer memory address comparison

Sequence program change is required as the assignment of buffer memory differs.
For details of the buffer memory or sequence program, refer to the Analog-Digital Converter Module User's Manual.

| A68ADN | | | Q68ADV/I | | |
|---|---|---|---|---|---|
| Address (Dec.) | Name | Read/write | Address (Dec.) | Name | Read/write |
| 0 | A/D conversion enable/disable setting | R/W | 0 | A/D conversion enable/disable | R/W |
| 1 | Averaging processing specification | | 1 | CH1 Time/count averaging setting | |
| 2 | CH1 Averaging time, count | | 2 | CH2 Time/count averaging setting | |
| 3 | CH2 Averaging time, count | | 3 | CH3 Time/count averaging setting | |
| 4 | CH3 Averaging time, count | | 4 | CH4 Time/count averaging setting | |
| 5 | CH4 Averaging time, count | | 5 | CH5 Time/count averaging setting | |
| 6 | CH5 Averaging time, count | | 6 | CH6 Time/count averaging setting | |
| 7 | CH6 Averaging time, count | | 7 | CH7 Time/count averaging setting | |
| 8 | CH7 Averaging time, count | | 8 | CH8 Time/count averaging setting | |
| 9 | CH8 Averaging time, count | | 9 | Averaging processing specification | |
| 10 | CH1 Digital output value | R | 10 | A/D conversion completed flag | R |
| 11 | CH2 Digital output value | | 11 | CH1 Digital output value | |
| 12 | CH3 Digital output value | | 12 | CH2 Digital output value | |
| 13 | CH4 Digital output value | | 13 | CH3 Digital output value | |
| 14 | CH5 Digital output value | | 14 | CH4 Digital output value | |
| 15 | CH6 Digital output value | | 15 | CH5 Digital output value | |
| 16 | CH7 Digital output value | | 16 | CH6 Digital output value | |
| 17 | CH8 Digital output value | | 17 | CH7 Digital output value | |
| 18 | Write data error code | | 18 | CH8 Digital output value | |
| 19 | A/D conversion completed flag | | 19 | Error code | |
| 20 | Resolution setting | R/W | 20 | Setting range (CH1 to CH4) | |
| | | | 21 | Setting range (CH5 to CH8) | |
| | | | 22 | Offset/gain setting mode<br>Offset specification | R/W |
| | | | 23 | Offset/gain setting mode<br>Gain specification | |
| | | | 24 | System area (Not used) | - |
| | | | 25 | | |
| | | | 26 | | |
| | | | 27 | | |
| | | | 28 | | |
| | | | 29 | | |
| | | | 30 | CH1 Maximum value | R |
| | | | 31 | CH1 Minimum value | |
| | | | 32 | CH2 Maximum value | |
| | | | 33 | CH2 Minimum value | |
| | | | 34 | CH3 Maximum value | |
| | | | 35 | CH3 Minimum value | |
| | | | 36 | CH4 Maximum value | |
| | | | 37 | CH4 Minimum value | |
| | | | 38 | CH5 Maximum value | |
| | | | 39 | CH5 Minimum value | |
| | | | 40 | CH6 Maximum value | |
| | | | 41 | CH6 Minimum value | |
| | | | 42 | CH7 Maximum value | |
| | | | 43 | CH7 Minimum value | |
| | | | 44 | CH8 Maximum value | |
| | | | 45 | CH8 Minimum value | |

| Q68ADV/I | | |
|---|---|---|
| **Address (Dec.)** | **Name** | **Read/write** |
| 46 to 157 | System area (Not used) | - |
| 158 to 159 | Mode switching setting | R/W |
| 160 to 201 | System area (Not used) | - |
| 202 | CH1 Industrial shipment settings offset value | R/W |
| 203 | CH1 Industrial shipment settings gain value | |
| 204 | CH2 Industrial shipment settings offset value | |
| 205 | CH2 Industrial shipment settings gain value | |
| 206 | CH3 Industrial shipment settings offset value | |
| 207 | CH3 Industrial shipment settings gain value | |
| 208 | CH4 Industrial shipment settings offset value | |
| 209 | CH4 Industrial shipment settings gain value | |
| 210 | CH5 Industrial shipment settings offset value | |
| 211 | CH5 Industrial shipment settings gain value | |
| 212 | CH6 Industrial shipment settings offset value | |
| 213 | CH6 Industrial shipment settings gain value | |
| 214 | CH7 Industrial shipment settings offset value | |
| 215 | CH7 Industrial shipment settings gain value | |
| 216 | CH8 Industrial shipment settings offset value | |
| 217 | CH8 Industrial shipment settings gain value | |
| 218 | CH1 User range settings offset value | |
| 219 | CH1 User range settings gain value | |
| 220 | CH2 User range settings offset value | |
| 221 | CH2 User range settings gain value | |
| 222 | CH3 User range settings offset value | |
| 223 | CH3 User range settings gain value | |
| 224 | CH4 User range settings offset value | |
| 225 | CH4 User range settings gain value | |
| 226 | CH5 User range settings offset value | |
| 227 | CH5 User range settings gain value | |
| 228 | CH6 User range settings offset value | |
| 229 | CH6 User range settings gain value | |
| 230 | CH7 User range settings offset value | |
| 231 | CH7 User range settings gain value | |
| 232 | CH8 User range settings offset value | |
| 233 | CH8 User range settings gain value | |

## 2.8 A68AD (Upgrade to Q68AD-G)

### 2.8.1 Performance comparison

<table>
<tr><th colspan="2">Item</th><th>A68ADN</th><th></th></tr>
<tr><td rowspan="2">Analog input</td><td>Voltage</td><td>-10 to 0 to +10VDC (Input resistance value: 1MΩ)</td><td></td></tr>
<tr><td>Current</td><td>-20 to 0 to +20mADC (Input resistance value: 250Ω)</td><td></td></tr>
<tr><td colspan="2">Digital output</td><td>16-bit signed binary<br>When 1/4000 is set: -4096 to +4095<br>When 1/8000 is set: -8192 to +8191<br>When 1/12000 is set: -12288 to +12287</td><td></td></tr>
<tr><td colspan="2">I/O characteristics</td><td>
<table>
<tr><td rowspan="2">Analog input</td><td colspan="3">Digital output value<br>(When gain 5V/20mA, offset 0V/0mA)</td></tr>
<tr><td>1/4000</td><td>1/8000</td><td>1/12000</td></tr>
<tr><td>+10V</td><td>+4000</td><td>+8000</td><td>+12000</td></tr>
<tr><td>+5V or +20mA</td><td>+2000</td><td>+4000</td><td>+6000</td></tr>
<tr><td>0V or 20mA</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>-5V or -20mA</td><td>-2000</td><td>-4000</td><td>-6000</td></tr>
<tr><td>-10V</td><td>-4000</td><td>-8000</td><td>-12000</td></tr>
</table>
(Factory-set: gain...5V, offset...0V)
</td><td></td></tr>
<tr><td colspan="2">Maximum resolution</td><td>
<table>
<tr><td></td><td>1/4000</td><td>1/8000</td><td>1/12000</td></tr>
<tr><td>Voltage input</td><td>2.5mV</td><td>1.25mV</td><td>0.83mV</td></tr>
<tr><td>Current input</td><td>10μA</td><td>5μA</td><td>3.33μA</td></tr>
</table>
</td><td></td></tr>
<tr><td colspan="2">Overall accuracy<br>(Accuracy in respect to maximum digital output value)</td><td>
<table>
<tr><td></td><td>1/4000</td><td>1/8000</td><td>1/12000</td></tr>
<tr><td>±1%</td><td>±40</td><td>±80</td><td>±120</td></tr>
</table>
</td><td></td></tr>
</table>

○: Compatible, △: Partial change required, ×: Incompatible

<table>
<tr><th></th><th>Q68AD-G</th><th>Compatibility</th><th>Precautions for replacement</th></tr>
<tr><td></td><td>-10 to 10VDC<br>(Input resistance value: 1MΩ or more)</td><td rowspan="2">○</td><td rowspan="2"></td></tr>
<tr><td></td><td>0 to 20mADC<br>(Input resistance value: 250Ω)</td></tr>
<tr><td></td><td>16-bit signed binary<br>(Normal resolution mode: -4096 to 4095,<br>High resolution mode: -12288 to 12287, -16384 to 16383)</td><td>○</td><td></td></tr>
<tr><td></td><td>
<table>
<tr><th rowspan="2">Input</th><th rowspan="2">Analog input range</th><th colspan="2">Normal resolution mode</th><th colspan="2">High resolution mode</th></tr>
<tr><th>Digital output value</th><th>Maximum resolution</th><th>Digital output value</th><th>Maximum resolution</th></tr>
<tr><td rowspan="6">Voltage</td><td>0 to 10V</td><td rowspan="3">0 to 4000</td><td>2.5mV</td><td>0 to 16000</td><td>0.625mV</td></tr>
<tr><td>0 to 5V</td><td>1.25mV</td><td rowspan="2">0 to 12000</td><td>0.416mV</td></tr>
<tr><td>1 to 5V</td><td>1.0mV</td><td>0.333mV</td></tr>
<tr><td>1 to 5V<br>(Expanded mode)</td><td>-1000 to 4500</td><td>1.0mV</td><td>-3000 to 13500</td><td>0.333mV</td></tr>
<tr><td>-10 to 10V</td><td rowspan="2">-4000 to 4000</td><td>2.5mV</td><td>-16000 to 16000</td><td>0.625mV</td></tr>
<tr><td>Users range setting</td><td>0.375mV</td><td>-12000 to 12000</td><td>0.333mV</td></tr>
<tr><td rowspan="4">Current</td><td>0 to 20mA</td><td rowspan="2">0 to 4000</td><td>5μA</td><td rowspan="2">0 to 12000</td><td>1.66μA</td></tr>
<tr><td>4 to 20mA</td><td>4μA</td><td>1.33μA</td></tr>
<tr><td>4 to 20mA<br>(Expanded mode)</td><td>-1000 to 4500</td><td>4μA</td><td>-3000 to 13500</td><td>1.33μA</td></tr>
<tr><td>Users range setting</td><td>-4000 to 4000</td><td>1.37μA</td><td>-12000 to 12000</td><td>1.33μA</td></tr>
</table>
</td><td>△</td><td>As concept of gain value is changed, refer to Q68AD-G [User's Manual] and then, confirm the I/O characteristics.</td></tr>
<tr><td></td><td>±0.1%<br>Normal resolution mode: ±4 digits<br>High resolution mode (0 to 10V, -10 to 10V): ±16 digits<br>High resolution mode (Other than the above ranges): ±12 digits<br>Temperature coefficient: ±71.4ppm/°C (0.00714%/°C)</td><td>○</td><td></td></tr>
</table>

| Item | A68ADN | |
|---|---|---|
| Maximum conversion speed | 20ms/channel | |
| Response time | - | |
| Absolute maximum input | Voltage: ±15V<br>Current: ±30mA | |
| Analog input points | 8 channels/module | |
| Maximum number of writes for $E^2$PROM | - | |
| Isolation method | Between the input terminal and programmable controller power supply: photocoupler isolation<br>Between channels: non-isolated | |
| Dielectric withstand voltage | Between the I/O terminal and programmable controller power supply: 500VAC, for 1 minute | |
| Insulation resistance | Between the I/O terminal and programmable controller power supply: 500VDC, 5MΩ or more | |
| Occupied I/O points | 32 points<br>(I/O assignment: special 32 points) | |
| Connected terminal | 38-point terminal block | |
| Applicable wire size | 0.75 to 2$mm^2$<br>(Applicable tightening torque: 39 to 59N•cm) | |
| Applicable solderless terminal | V1.25-3, V1.25-YS3A, V2-S3, V2-YS3A | |
| Internal current consumption (5VDC) | 0.4A | |
| Weight | 0.51kg | |

○: Compatible, △: Partial change required, ×: Incompatible

| | Q68AD-G | Compatibility | Precautions for replacement |
|---|---|---|---|
| | 10ms/channel (Sampling cycle) | ○ | |
| | 20ms | | |
| | Voltage: ±15V<br>current: ±30mA | ○ | |
| | 8 channels/module | ○ | |
| | Up to 50,000 times | ○ | |
| | Between the I/O terminal and programmable controller power supply: transformer isolation<br>Between channels: transformer isolation | ○ | |
| | Between the I/O terminal and programmable controller power supply: 500VACrms, for 1 minute<br>Between analog input channels: 1000VACrms, for 1 minute | ○ | |
| | Between the I/O terminal and programmable controller power supply: 500VDC, 10MΩ or more<br>Between analog input channels: 500VDC, 10MΩ or more | ○ | |
| | 16 points<br>(I/O assignment: intelligent 16 points) | △ | I/O occupied points has changed to 16 points. |
| | 40-pin connector | × | Wiring change is required. |
| | Within 0.3mm$^2$ | × | |
| | - | × | |
| | 0.46A | △ | The recalculation of internal current consumption [5VDC] is required. |
| | 0.16kg | ○ | |

### 2.8.2 Function comparison

○ : With functions, -: Without functions

| Item | Description | A68ADN | Q68AD-G | Precautions for replacement |
|---|---|---|---|---|
| A/D conversion enable/disable | Specifies whether to enable or disable the A/D conversion for each channel. By disabling the conversion for the channels that are not used, the sampling time can be shortened. | ○ | ○ | |
| Sampling processing | The A/D conversion for analog input values is performed successively for each channel, and the digital output value is output upon each conversion. | ○ | ○ | |
| Averaging processing | For each channel, A/D conversion values are averaged for the set number of times or set amount of time, and the average value is output as a digital value. | ○ | ○ | The setting range of average time and count differ. Refer to Q68AD-G [User's Manual] and then, confirm the specifications. |
| | Moving average takes the average of the specified number of digital output values measured per sampling time. | - | ○ | |
| Primary delay filter | A digital output value is smoothed according to the preset time constant. | - | ○ | |
| Maximum and minimum values hold function | The maximum and minimum values of the digital output values are retained in the module. | - | ○ | |
| Resolution mode | The resolution can be switched according to the application. The resolution mode is batch-set for all the channels.*1 | ○ | ○ | |
| Input signal error detection function | The voltage/current outside the setting range is detected. | - | ○ | |
| Warning output function | (1) Process alarm<br>A warning is output if a digital output value falls outside the setting range.<br>(2) Rate alarm<br>A warning is output if the varying rate of a digital output value falls outside the preset varying rate range. | - | ○ | |
| Scaling function | Conversion of A/D conversion values to preset percentage values and loading into the buffer memory is available. Programming steps for the scaling can be eliminated. | - | ○ | |
| Online module change | A module change is made without the system being stopped. | - | ○ | Replaceable modules during online are a process CPU and a redundant CPU. |

*1 For the A68ADN, the resolution for voltage and current can be set to 1/4000, 1/8000, 1/12000.
For the Q68AD-G, the resolution for voltage and current is 1/4000 in the normal resolution mode, while the resolution for the voltage from -10 to 10V is 1/16000 and the resolution for the voltage in other ranges and current is 1/12000 in the high resolution mode.

### 2.8.3 I/O signal comparison to programmable controller CPU

Sequence program change is required as the I/O signals differ.
For details of the I/O signals or sequence program, refer to the Channel Isolated Analog-Digital Converter Module, Channel Isolated Analog-Digital Converter Module (With Signal Conditioning Function) User's Manual.

| A68ADN | | | | Q68AD-G | | | |
|---|---|---|---|---|---|---|---|
| Device No. | Signal name | Device No. | Signal name | Device No. | Signal name | Device No. | Signal name |
| X0 | Watchdog timer error | Y0 | Not used | X0 | Module READY | Y0 | Not used |
| X1 | A/D conversion READY | Y1 | | X1 | Not used | Y1 | |
| X2 | Error flag | Y2 | | X2 | | Y2 | |
| X3 | Not used | Y3 | | X3 | | Y3 | |
| X4 | | Y4 | | X4 | | Y4 | |
| X5 | | Y5 | | X5 | | Y5 | |
| X6 | | Y6 | | X6 | | Y6 | |
| X7 | | Y7 | | X7 | High resolution mode status flag | Y7 | |
| X8 | | Y8 | | X8 | Warming output signal | Y8 | |
| X9 | | Y9 | | X9 | Operating condition setting completed flag | Y9 | Operating condition setting request |
| XA | | YA | | XA | Offset/gain setting mode flag | YA | User range write request |
| XB | | YB | | XB | Channel change completed flag | YB | Channel change request |
| XC | | YC | | XC | Input signal error detection signal | YC | Not used |
| XD | | YD | RFRP, RTOP instruction for interlock signal when A68ADN is used in remote I/O station | XD | Maximum value/ minimum value reset completed flag | YD | Maximum value/ minimum value reset request |
| XE | | YE | | XE | A/D conversion completed flag | YE | Not used |
| XF | | YF | | XF | Error flag | YF | Error clear request |
| X10 | | Y10 | Not used | | | | |
| X11 | | Y11 | | | | | |
| X12 | | Y12 | Error reset | | | | |
| X13 | | Y13 | Not used | | | | |
| X14 | | Y14 | | | | | |
| X15 | | Y15 | | | | | |
| X16 | | Y16 | | | | | |
| X17 | | Y17 | | | | | |
| X18 | | Y18 | | | | | |
| X19 | | Y19 | | | | | |
| X1A | | Y1A | | | | | |
| X1B | | Y1B | | | | | |
| X1C | | Y1C | | | | | |
| X1D | RFRP, RTOP instruction for interlock signal when A68ADN is used in remote I/O station | Y1D | | | | | |
| X1E | | Y1E | | | | | |
| X1F | | Y1F | | | | | |

### 2.8.4 Buffer memory address comparison

Sequence program change is required as the assignment of buffer memory differs.
For details of the I/O signals or sequence program, refer to the Channel Isolated Analog-Digital Converter Module, Channel Isolated Analog-Digital Converter Module (With Signal Conditioning Function) User's Manual.

| A68ADN | | | Q68AD-G | | |
|---|---|---|---|---|---|
| Address (Dec.) | Name | Read/write | Address (Dec.) | Name | Read/write |
| 0 | A/D conversion enable/disable setting | R/W | 0 | A/D conversion enable/disable | R/W |
| 1 | Averaging processing specification | | 1 | CH1 Average time/Average number of times/ Moving average/Time constant settings | |
| 2 | CH1 Averaging time, count | | 2 | CH2 Average time/Average number of times/ Moving average/Time constant settings | |
| 3 | CH2 Averaging time, count | | 3 | CH3 Average time/Average number of times/ Moving average/Time constant settings | |
| 4 | CH3 Averaging time, count | | 4 | CH4 Average time/Average number of times/ Moving average/Time constant settings | |
| 5 | CH4 Averaging time, count | | 5 | CH5 Average time/Average number of times/ Moving average/Time constant settings | |
| 6 | CH5 Averaging time, count | | 6 | CH6 Average time/Average number of times/ Moving average/Time constant settings | |
| 7 | CH6 Averaging time, count | | 7 | CH7 Average time/Average number of times/ Moving average/Time constant settings | |
| 8 | CH7 Averaging time, count | | 8 | CH8 Average time/Average number of times/ Moving average/Time constant settings | |
| 9 | CH8 Averaging time, count | | 9 | System area (Not used) | - |
| 10 | CH1 Digital output value | R | 10 | A/D conversion completed flag | R |
| 11 | CH2 Digital output value | | 11 | CH1 Digital output value | |
| 12 | CH3 Digital output value | | 12 | CH2 Digital output value | |
| 13 | CH4 Digital output value | | 13 | CH3 Digital output value | |
| 14 | CH5 Digital output value | | 14 | CH4 Digital output value | |
| 15 | CH6 Digital output value | | 15 | CH5 Digital output value | |
| 16 | CH7 Digital output value | | 16 | CH6 Digital output value | |
| 17 | CH8 Digital output value | | 17 | CH7 Digital output value | |
| 18 | Write data error code | | 18 | CH8 Digital output value | |
| 19 | A/D conversion completed flag | | 19 | Error code | |
| 20 | Resolution setting | R/W | 20 | Setting range (CH1 to CH4) | |
| | | | 21 | Setting range (CH5 to CH8) | |
| | | | 22 | Offset/gain setting mode Offset specification | R/W |
| | | | 23 | Offset/gain setting mode Gain specification | |
| | | | 24 | Averaging process specification (CH1 to CH4) | |
| | | | 25 | Averaging process specification (CH5 to CH8) | |
| | | | 26 | System area (Not used) | - |
| | | | 27 | | |
| | | | 28 | | |
| | | | 29 | | |
| | | | 30 | CH1 Maximum value | R |
| | | | 31 | CH1 Minimum value | |
| | | | 32 | CH2 Maximum value | |
| | | | 33 | CH2 Minimum value | |
| | | | 34 | CH3 Maximum value | |
| | | | to | | |
| | | | 44 | CH8 Maximum value | |
| | | | 45 | CH8 Minimum value | |

| Q68AD-G | | |
|---|---|---|
| Address (Dec.) | Name | Read/write |
| 46 | System area (Not used) | - |
| 47 | Input signal error detection extended/input signal error detection setting | R/W |
| 48 | Warning output setting | |
| 49 | Input signal error detection flag | R |
| 50 | Warning output flag (Process alarm) | |
| 51 | Warning output flag (Rate alarm) | |
| 52 | System area (Not used) | - |
| 53 | Scaling enable/disable setting | R/W |
| 54 | CH1 Scaling value | R |
| to | | |
| 61 | CH8 Scaling value | |
| 62 | CH1 Scaling lower limit value | R/W |
| 63 | CH1 Scaling upper limit value | |
| to | | |
| 76 | CH8 Scaling lower limit value | |
| 77 | CH8 Scaling upper limit value | |
| to | | |
| 86 | CH1 Process alarm lower lower limit value | |
| 87 | CH1 Process alarm lower upper limit value | |
| 88 | CH1 Process alarm upper lower limit value | |
| 89 | CH1 Process alarm upper upper limit value | |
| to | | |
| 114 | CH8 Process alarm lower lower limit value | |
| 115 | CH8 Process alarm lower upper limit value | |
| 116 | CH8 Process alarm upper lower limit value | |
| 117 | CH8 Process alarm upper upper limit value | |
| 118 | CH1 Rate alarm warning detection period | |
| to | | |
| 125 | CH8 Rate alarm warning detection period | |
| 126 | CH1 Rate alarm upper limit value | |
| 127 | CH1 Rate alarm lower limit value | |
| to | | |
| 140 | CH8 Rate alarm upper limit value | |
| 141 | CH8 Rate alarm lower limit value | |
| 142 | CH1 Input signal error detection setting value/CH1 Input signal error detection lower limit setting value | |
| to | | |
| 150 | CH1 Input signal error detection upper limit setting value | |
| to | | |
| 158 | Mode switching setting | R/W |
| 159 | | |
| to | | |
| 200 | Save data classification setting | R/W |
| 201 | System area (Not used) | - |
| 202 | CH1 Factory default offset value | R/W |
| 203 | CH1 Factory default gain value | |
| to | | |
| 232 | CH8 Factory default offset value | |
| 233 | CH8 Factory default gain value | |

# 3 ANALOG OUTPUT MODULE REPLACEMENT

## 3.1 List of Analog Output Module Alternative Models for Replacement

| Production discontinuation | | Transition to Q series | |
|---|---|---|---|
| Product | Model | Model | Remarks (Restrictions) |
| Analog output module | A616DAI | Q68DAIN | 1) External wiring : Cable size is changed.<br>2) Number of slots : Changed (2 modules are required.)<br>3) Program : The number of occupied I/O points, I/O signals, and buffer memory addresses are changed.<br>4) Performance specifications change: 8CH/module<br>5) Functional specifications: Not changed |
| | A616DAV | Q68DAVN | 1) External wiring : Cable size is changed.<br>2) Number of slots : Changed (2 modules are required.)<br>3) Program : The number of occupied I/O points, I/O signals, and buffer memory addresses are changed.<br>4) Performance specifications change: 8CH/module<br>5) Functional specifications: Not changed |
| | A62DA | Q62DAN | 1) External wiring : Cable size is changed.<br>2) Number of slots : Not changed<br>3) Program : The number of occupied I/O points, I/O signals, and buffer memory addresses are changed.<br>4) Performance specifications change: Output current (minus current not applicable), I/O characteristics<br>5) Functional specifications: Not changed |
| | | Q64DAN | 1) External wiring : Cable size is changed.<br>2) Number of slots : Not changed<br>3) Program : The number of occupied I/O points, I/O signals, and buffer memory addresses are changed.<br>4) Performance specifications change: Output current (minus current not applicable), I/O characteristics<br>5) Functional specifications: Not changed |
| | A62DA-S1 | Q62DAN | 1) External wiring : Cable size is changed.<br>2) Number of slots : Not changed<br>3) Program : The number of occupied I/O points, I/O signals, and buffer memory addresses are changed.<br>4) Performance specifications change: Not changed<br>5) Functional specifications: Not changed |
| | | Q64DAN | 1) External wiring : Cable size is changed.<br>2) Number of slots : Not changed<br>3) Program : The number of occupied I/O points, I/O signals, and buffer memory addresses are changed.<br>4) Performance specifications change: 4CH/module<br>5) Functional specifications: Not changed |
| | A68DAI-S1 | Q68DAIN | 1) External wiring : Cable size is changed.<br>2) Number of slots : Not changed<br>3) Program : The number of occupied I/O points, I/O signals, and buffer memory addresses are changed.<br>4) Performance specifications change: Increase in current consumption<br>5) Functional specifications: Not changed |

| Production discontinuation | | Transition to Q series | |
|---|---|---|---|
| Product | Model | Model | Remarks (Restrictions) |
| Analog output module | A68DAV | Q68DAVN | 1) External wiring : Cable size is changed.<br>2) Number of slots: : Not changed<br>3) Program : The number of occupied I/O points, I/O signals, and buffer memory addresses are changed.<br>4) Performance specifications change: Increase in current consumption<br>5) Functional specifications: Not changed |

## Point

The existing wiring for the A/QnA series modules can be connected directly to the Q series modules using the renewal tool (conversion adaptor) manufactured by Mitsubishi Electric Engineering Co., Ltd.

| Product | MELSEC-A/QnA series module | MELSEC-Q series module | Conversion adaptor |
|---|---|---|---|
| Analog output module | A62DA | Q62DAN | ERNT-AQT62DA |
| | A62DA-S1 | | |
| | A68DAV | Q68DAVN | ERNT-AQT68DA |
| | A68DAI | Q68DAIN | |
| | A68DAI-S1 | | |

For contact information for inquiries on the renewal tool manufactured by Mitsubishi Electric Engineering Co., Ltd., refer to Section 2.1.

## 3.2 A616DAI

### 3.2.1 Performance comparison

| Item | A616DAI | |
|---|---|---|
| Digital input | 16-bit signed binary<br>(Data part: 12 bits)<br>Setting range: 0 to 4095 | |
| Analog output | 0 to 20mADC<br>(External load resistance value: 0Ω to 600Ω) | |
| I/O characteristics | <table><tr><th>Digital input</th><th>Analog output</th></tr><tr><td>+4000</td><td>+20mA</td></tr><tr><td>+2000</td><td>+12mA</td></tr><tr><td>0</td><td>4mA</td></tr></table> | |
| Digital value resolution | 1/4000 | |
| Overall accuracy<br>(Accuracy at maximum analog output value) | 0.6% (±120μA)<br>When ambient temperature is 25°C: ±0.3% (±60μA) | |
| Sampling period | 1.5 + 0.5 × (D/A number of conversion enabled channels) ms | |
| Conversion time | 0.5ms<br>(Time required for conversion from 0 to 20mA/20mA to 0mA) | |
| Absolute maximum output | - | |
| No. of analog output channels | 16 channels/module | |
| Number of writes to $E^2$PROM | - | |
| Output short protection | - | |

○: Compatible, △: Partial change required, ×: Incompatible

<table>
<tr><th></th><th>Q68DAIN</th><th>Compatibility</th><th>Precautions for replacement</th></tr>
<tr><td></td><td>16-bit signed binary<br>(Normal resolution mode: -4096 to 4095,<br>High resolution mode: -12288 to 12287)</td><td>○</td><td></td></tr>
<tr><td></td><td>0 to 20mADC<br>(External load resistance value: 0Ω to 600Ω)</td><td>○</td><td></td></tr>
<tr><td></td><td rowspan="2"><table>
<tr><td colspan="2" rowspan="2">Analog output range</td><td colspan="2">Normal resolution mode</td><td colspan="2">High resolution mode</td></tr>
<tr><td>Digital input value</td><td>Maximum resolution</td><td>Digital input value</td><td>Maximum resolution</td></tr>
<tr><td rowspan="3">Current</td><td>0 to 20mA</td><td rowspan="2">0 to 4000</td><td>5μA</td><td rowspan="2">0 to 12000</td><td>1.66μA</td></tr>
<tr><td>4 to 20mA</td><td>4μA</td><td>1.33μA</td></tr>
<tr><td>User range settings</td><td>-4000 to 4000</td><td>1.5μA</td><td>-12000 to 12000</td><td>0.83μA</td></tr>
</table></td><td>○</td><td></td></tr>
<tr><td></td><td>○</td><td></td></tr>
<tr><td></td><td>Ambient temperature 25±5°C: within ±0.1% (±20μA)<br>Ambient temperature 0 to 55°C: within ±0.3% (±60μA)</td><td>○</td><td></td></tr>
<tr><td></td><td>-</td><td rowspan="2">○</td><td rowspan="2"></td></tr>
<tr><td></td><td>80μs/channel</td></tr>
<tr><td></td><td>21mA</td><td>○</td><td></td></tr>
<tr><td></td><td>8 channels/module</td><td>△</td><td>Consider replacement with multiple Q68DAIN.</td></tr>
<tr><td></td><td>Max. 100,000 times</td><td>○</td><td></td></tr>
<tr><td></td><td>Available</td><td>○</td><td></td></tr>
</table>

| Item | | A616DAI | |
|---|---|---|---|
| Isolation method | | Between the output terminal and programmable controller power supply: photocoupler isolation<br>A616DAI channels: non-isolation | |
| Dielectric withstand voltage | | - | |
| Insulation resistance | | - | |
| Number of occupied I/O points | | 32 points<br>(I/O assignment: special 32 points) | |
| Connected terminal | | 38-point terminal block | |
| Applicable wire size | | 0.75 to 2mm$^2$ | |
| Applicable solderless terminal | | V1.25-3, V1.25-YS3A, V2-S3, V2-YS3A | |
| Internal current consumption (5VDC) | | 0.3A | |
| External power supply | Voltage | +15VDC/-15VDC | |
| | Current consumption | +15VDC, 0.53A<br>-15VDC, 0.125A | |
| | Inrush current | - | |
| Weight | | 0.69kg | |

○: Compatible, △: Partial change required, ×: Incompatible

| | Q68DAIN | Compatibility | Precautions for replacement |
|---|---|---|---|
| | Between the I/O terminal and programmable controller power supply: photocoupler isolation<br>Between output channels: non-isolation<br>Between external power supply and analog output: transformer isolation | ○ | |
| | Between the I/O terminal and programmable controller power supply: 500VAC, for 1 minute | ○ | |
| | Between the I/O terminal and programmable controller power supply: 500VDC, 20MΩ or more | ○ | |
| | 16 points<br>(I/O assignment: intelligent 16 points) | △ | The number of occupied I/O points has changed to 16 points. |
| | 18-point terminal block | × | Wiring change is required. |
| | 0.3 to 0.75mm$^2$ | × | |
| | FG terminal: R1.25-3, 1.25-YS3, RAV1.25-3, V1.25-YS3A<br>Terminals other than FG: R1.25-3<br>(Sleeved solderless terminal cannot be used.) | × | |
| | 0.38A | △ | The recalculation of internal current consumption (5VDC) is required. |
| | 24VDC +20%, -15%<br>Ripple, spike 500mV$_{P-P}$ or less | × | As the external power supply has changed from ±15V to 24V, its change is required. |
| | 0.27A | | |
| | 2.5A 230μs or less | | |
| | 0.20kg | ○ | |

### 3.2.2 Functional comparison

○: With functions, -: Without functions

<table>
<tr><th>Item</th><th>Description</th><th>A616DAI</th><th>Q68DAIN</th><th>Precautions for replacement</th></tr>
<tr><td>D/A conversion enable/ disable function</td><td>Specifies whether to enable or disable the D/A conversion for each channel.<br>By disabling the D/A conversion for the channels that are not used, the conversion speed can be shortened.</td><td>○</td><td>○</td><td></td></tr>
<tr><td>D/A output enable/ disable function</td><td>Specifies whether to output the D/A conversion value or the offset value for each channel.<br>The conversion speed stays constant regardless of whether D/A output is enabled or disabled.</td><td>○</td><td>○</td><td>On Q68DAIN, the output enable/disable is set with Y signal (CH☐ Output enable/ disable flag).</td></tr>
<tr><td>Synchronous output function</td><td>Obtains analog output synchronized with the programmable controller CPU.<br>The analog output will be updated after Synchronous output request (YD) is set to ON and the time specified as "programmable controller CPU processing time + 120μs" has elapsed.<br>However, the analog output will be fixed to CH1, and other channels (CH2 to CH8) cannot be used.<br>When the module is mounted on a remote I/O station, the analog output will not be synchronized because of a link scan delay if the synchronous output function is specified.</td><td>-</td><td>○</td><td></td></tr>
<tr><td>Analog output HOLD/ CLEAR function</td><td>Retains an analog value that was output when the programmable controller CPU is in the STOP status or an error occurs.</td><td>○</td><td>○</td><td>1) Refer to ("Analog output status combination list" in the Digital-Analog Converter Module User's Manual to check the execution status of output.<br>2) For the Q68DAIN, this function is set with the intelligent function module switch setting.</td></tr>
<tr><td>Analog output test while the programmable controller CPU is in the STOP status</td><td>Outputs the analog value converted from a digital value when CH☐ Output enable/disable flag is forcibly turned on while the programmable controller CPU is in the STOP status.
<table>
<tr><td rowspan="2">Setting combination</td><td>D/A conversion enable/disable</td><td colspan="2">Enable</td><td colspan="2">Disable</td></tr>
<tr><td>CH☐ Output enable/disable flag</td><td>Enable</td><td>Disable</td><td>Enable</td><td>Disable</td></tr>
<tr><td colspan="2">Analog output test</td><td>Allowed</td><td>Not allowed</td><td colspan="2">Not allowed</td></tr>
</table></td><td>-</td><td>○</td><td></td></tr>
<tr><td>Resolution mode</td><td>Switches the resolution mode according to the application.<br>The resolution can be selected from 1/4000 or 1/12000.<br>The resolution mode is batch-set for all channels.</td><td>-</td><td>○</td><td></td></tr>
<tr><td>Online module replacement</td><td>Replaces a module without stopping the system.</td><td>-</td><td>○</td><td>Replaceable modules during online are the Process CPU and the Redundant CPU.</td></tr>
</table>

### 3.2.3 I/O signal comparison to programmable controller CPU

Sequence program change is required as the I/O signals differ.
For details of the I/O signals and sequence program, refer to the Digital-Analog Converter Module User's Manual.

| A616DAI | | | | Q68DAIN | | | |
|---|---|---|---|---|---|---|---|
| Device No. | Signal name | Device No. | Signal name | Device No. | Signal name | Device No. | Signal name |
| X0 | Watchdog timer error flag | Y0 | Not used | X0 | Module READY | Y0 | Not used |
| X1 | D/A conversion READY flag | Y1 | | X1 | Not used | Y1 | CH1 Output enable/ disable flag |
| X2 | Error flag | Y2 | | X2 | | Y2 | CH2 Output enable/ disable flag |
| X3 | Not used | Y3 | | X3 | | Y3 | CH3 Output enable/ disable flag |
| X4 | | Y4 | | X4 | | Y4 | CH4 Output enable/ disable flag |
| X5 | | Y5 | | X5 | | Y5 | CH5 Output enable/ disable flag |
| X6 | | Y6 | | X6 | | Y6 | CH6 Output enable/ disable flag |
| X7 | | Y7 | | X7 | | Y7 | CH7 Output enable/ disable flag |
| X8 | | Y8 | | X8 | High resolution mode status flag | Y8 | CH8 Output enable/ disable flag |
| X9 | | Y9 | | X9 | Operating condition setting completion flag | Y9 | Operating condition setting request |
| XA | | YA | | XA | Offset/gain setting mode status flag | YA | User range write request |
| XB | | YB | | XB | Channel change completion flag | YB | Channel change request |
| XC | | YC | | XC | Setting value change completion flag | YC | Setting value change request |
| XD | | YD | RFRP, RTOP instruction interlock signal | XD | Synchronous output mode flag | YD | Synchronous output request |
| XE | | YE | | XE | Not used | YE | Not used |
| XF | | YF | | XF | Error flag | YF | Error clear request |
| X10 | | Y10 | Not used | | | | |
| X11 | | Y11 | | | | | |
| X12 | | Y12 | | | | | |
| X13 | | Y13 | | | | | |
| X14 | | Y14 | | | | | |
| X15 | | Y15 | | | | | |
| X16 | | Y16 | | | | | |
| X17 | | Y17 | | | | | |
| X18 | | Y18 | | | | | |
| X19 | | Y19 | | | | | |
| X1A | | Y1A | | | | | |
| X1B | | Y1B | Output enable batch flag | | | | |
| X1C | | Y1C | Not used | | | | |
| X1D | RFRP, RTOP instruction interlock signal | Y1D | | | | | |
| X1E | | Y1E | | | | | |
| X1F | | Y1F | | | | | |

### 3.2.4 Buffer memory address comparison

Sequence program change is required as the assignment of buffer memories differs.
For details of the buffer memories and sequence program, refer to the Digital-Analog Converter Module User's Manual.

| A616DAI | | | Q68DAIN | | |
|---|---|---|---|---|---|
| Address (decimal) | Name | Read/write | Address (decimal) | Name | Read/write |
| 0 | D/A conversion enable/disable channel | R/W | 0 | D/A conversion enable/disable | R/W |
| 1 | Analog output enable/disable channel | | 1 | CH1 Digital value | |
| 2 | System area (Not used) | - | 2 | CH2 Digital value | |
| 3 | | | 3 | CH3 Digital value | |
| 4 | | | 4 | CH4 Digital value | |
| 5 | | | 5 | CH5 Digital value | |
| 6 | | | 6 | CH6 Digital value | |
| 7 | | | 7 | CH7 Digital value | |
| 8 | | | 8 | CH8 Digital value | |
| 9 | | | 9 | System area (Not used) | - |
| 10 | | | 10 | | |
| 11 | | | 11 | CH1 Setting value check code | R |
| 12 | | | 12 | CH2 Setting value check code | |
| 13 | | | 13 | CH3 Setting value check code | |
| 14 | | | 14 | CH4 Setting value check code | |
| 15 | | | 15 | CH5 Setting value check code | |
| 16 | CH0 Digital value | R/W | 16 | CH6 Setting value check code | |
| 17 | CH1 Digital value | | 17 | CH7 Setting value check code | |
| 18 | CH2 Digital value | | 18 | CH8 Setting value check code | |
| 19 | CH3 Digital value | | 19 | Error code | |
| 20 | CH4 Digital value | | 20 | Setting range (CH1 to CH4) | |
| 21 | CH5 Digital value | | 21 | Setting range (CH5 to CH8) | |
| 22 | CH6 Digital value | | 22 | Offset/gain setting mode<br>Offset specification | R/W |
| 23 | CH7 Digital value | | 23 | Offset/gain setting mode<br>Gain specification | |
| 24 | CH8 Digital value | | 24 | Offset/gain adjusted value specification | |
| 25 | CH9 Digital value | | 25 | System area (Not used) | - |
| 26 | CHA Digital value | | 26 | | |
| 27 | CHB Digital value | | 27 | | |
| 28 | CHC Digital value | | 28 | | |
| 29 | CHD Digital value | | 29 | | |
| 30 | CHE Digital value | | 30 | | |
| 31 | CHF Digital value | | 31 | | |
| 32 | System area (Not used) | - | 32 | | |
| to | | | to | | |
| 47 | | | 47 | | |

| A616DAI | | | Q68DAIN | | |
|---|---|---|---|---|---|
| Address (decimal) | Name | Read/write | Address (decimal) | Name | Read/write |
| 48 | CH0 Setting value check code | R/W | 48 | System area (Not used) | - |
| 49 | CH1 Setting value check code | | 49 | | |
| 50 | CH2 Setting value check code | | 50 | | |
| 51 | CH3 Setting value check code | | 51 | | |
| 52 | CH4 Setting value check code | | 52 | | |
| 53 | CH5 Setting value check code | | 53 | | |
| 54 | CH6 Setting value check code | | 54 | | |
| 55 | CH7 Setting value check code | | 55 | | |
| 56 | CH8 Setting value check code | | 56 | | |
| 57 | CH9 Setting value check code | | 57 | | |
| 58 | CHA Setting value check code | | 58 | | |
| 59 | CHB Setting value check code | | 59 | | |
| 60 | CHC Setting value check code | | 60 | | |
| 61 | CHD Setting value check code | | 61 | | |
| 62 | CHE Setting value check code | | 62 | | |
| 63 | CHF Setting value check code | | 63 | | |
| | | | to | | |
| | | | 157 | | |
| | | | 158 | Mode switching setting | R/W |
| | | | 159 | | |
| | | | 160 | System area (Not used) | - |
| | | | to | | |
| | | | 201 | | |
| | | | 202 | CH1 Industrial shipment settings offset value | R/W |
| | | | 203 | CH1 Industrial shipment settings gain value | |
| | | | 204 | CH2 Industrial shipment settings offset value | |
| | | | 205 | CH2 Industrial shipment settings gain value | |
| | | | 206 | CH3 Industrial shipment settings offset value | |
| | | | 207 | CH3 Industrial shipment settings gain value | |
| | | | 208 | CH4 Industrial shipment settings offset value | |
| | | | 209 | CH4 Industrial shipment settings gain value | |
| | | | 210 | CH5 Industrial shipment settings offset value | |
| | | | 211 | CH5 Industrial shipment settings gain value | |
| | | | 212 | CH6 Industrial shipment settings offset value | |
| | | | 213 | CH6 Industrial shipment settings gain value | |
| | | | 214 | CH7 Industrial shipment settings offset value | |
| | | | 215 | CH7 Industrial shipment settings gain value | |
| | | | 216 | CH8 Industrial shipment settings offset value | |
| | | | 217 | CH8 Industrial shipment settings gain value | |
| | | | 218 | CH1 User range settings offset value | |
| | | | 219 | CH1 User range settings gain value | |
| | | | 220 | CH2 User range settings offset value | |
| | | | 221 | CH2 User range settings gain value | |
| | | | 222 | CH3 User range settings offset value | |
| | | | 223 | CH3 User range settings gain value | |
| | | | 224 | CH4 User range settings offset value | |
| | | | 225 | CH4 User range settings gain value | |
| | | | 226 | CH5 User range settings offset value | |
| | | | 227 | CH5 User range settings gain value | |
| | | | 228 | CH6 User range settings offset value | |
| | | | 229 | CH6 User range settings gain value | |
| | | | 230 | CH7 User range settings offset value | |
| | | | 231 | CH7 User range settings gain value | |
| | | | 232 | CH8 User range settings offset value | |
| | | | 233 | CH8 User range settings gain value | |

## 3.3 A616DAV

### 3.3.1 Performance comparison

<table>
<tr><th>Item</th><th colspan="4">A616DAV</th><th></th></tr>
<tr><td>Digital input</td><td colspan="4">16-bit signed binary (Data part: 12 bits)<br>Setting range: -4096 to 4095</td><td></td></tr>
<tr><td>Analog output</td><td colspan="4">When output voltage range setting is 10V:<br>-10V to 0V to +10V<br>(External load resistance value: 2kΩ to 1MΩ)<br>When output voltage range setting is 5V:<br>-5V to 0V to +5V<br>(External load resistance value: 2kΩ to 1MΩ)</td><td></td></tr>
<tr><td>I/O characteristics</td><td colspan="4"><table><tr><td rowspan="2">Digital input</td><td colspan="2">Analog output</td></tr><tr><td>5V setting</td><td>10V setting</td></tr><tr><td>+4000</td><td>+5V</td><td>+10V</td></tr><tr><td>+2000</td><td>+2.5V</td><td>+5V</td></tr><tr><td>0</td><td>0V</td><td>0V</td></tr><tr><td>-2000</td><td>-2.5V</td><td>-5V</td></tr><tr><td>-4000</td><td>-5V</td><td>-10V</td></tr></table></td><td></td></tr>
<tr><td>Digital value resolution</td><td colspan="4">1/4000</td><td></td></tr>
<tr><td rowspan="3">Overall accuracy<br>(accuracy at maximum analog output value)</td><td>Output voltage range setting</td><td>10V</td><td>5V</td><td></td><td></td></tr>
<tr><td>Ambient temperature (0 to 55°C )</td><td>±0.6% (±60mV)</td><td>±0.6% (±30mV)</td><td></td><td></td></tr>
<tr><td>Ambient temperature (25°C )</td><td>±0.3% (±30mV)</td><td>±0.3% (±15mV)</td><td></td><td></td></tr>
<tr><td>Sampling period</td><td colspan="4">1.5 + 0.5 × (D/A number of conversion enabled channels) ms</td><td></td></tr>
<tr><td>Conversion time</td><td colspan="4">0.5ms<br>(Time required for conversion from -10 to +10V/+10 to -10V)</td><td></td></tr>
<tr><td>Absolute maximum output</td><td colspan="4">15V</td><td></td></tr>
<tr><td>No. of analog output channels</td><td colspan="4">16 channels/module</td><td></td></tr>
<tr><td>Number of writes to $E^2$PROM</td><td colspan="4">-</td><td></td></tr>
<tr><td>Output short protection</td><td colspan="4">-</td><td></td></tr>
<tr><td>Isolation method</td><td colspan="4">Between the output terminal and programmable controller power supply: photocoupler isolation<br>A616DAV channels: non-isolation</td><td></td></tr>
<tr><td>Dielectric withstand voltage</td><td colspan="4">-</td><td></td></tr>
<tr><td>Insulation resistance</td><td colspan="4">-</td><td></td></tr>
<tr><td>Number of occupied I/O points</td><td colspan="4">32 points<br>(I/O assignment: special 32 points)</td><td></td></tr>
<tr><td>Connected terminal</td><td colspan="4">38-point terminal block</td><td></td></tr>
<tr><td>Applicable wire size</td><td colspan="4">0.75 to 2mm$^2$</td><td></td></tr>
<tr><td>Applicable solderless terminal</td><td colspan="4">V1.25-3, V1.25-YS3A, V2-S3, V2-YS3A</td><td></td></tr>
<tr><td>Internal current consumption (5VDC)</td><td colspan="4">0.38A</td><td></td></tr>
</table>

○: Compatible, △: Partial change required, ×: Incompatible

<table>
<tr><th></th><th>Q68DAVN</th><th>Compatibility</th><th>Precautions for replacement</th></tr>
<tr><td></td><td>16-bit signed binary<br>(Normal resolution mode: -4096 to 4095,<br>High resolution mode: -12288 to 12287, -16384 to 16383)</td><td>○</td><td></td></tr>
<tr><td></td><td>-10 to 10VDC (External load resistance value: 1kΩ to 1MΩ)</td><td>○</td><td></td></tr>
<tr><td></td><td>
<table>
<tr><th colspan="2" rowspan="2">Analog output range</th><th colspan="2">Normal resolution mode</th><th colspan="2">High resolution mode</th></tr>
<tr><th>Digital input value</th><th>Maximum resolution</th><th>Digital input value</th><th>Maximum resolution</th></tr>
<tr><td rowspan="4">Voltage</td><td>0 to 5V</td><td rowspan="2">0 to 4000</td><td>1.25mV</td><td rowspan="2">0 to 12000</td><td>0.416mV</td></tr>
<tr><td>1 to 5V</td><td>1.0mV</td><td>0.333mV</td></tr>
<tr><td>-10 to 10V</td><td rowspan="2">-4000 to 4000</td><td>2.5mV</td><td>-16000 to 16000</td><td>0.625mV</td></tr>
<tr><td>User range settings</td><td>0.75mV</td><td>-12000 to 12000</td><td>0.333mV</td></tr>
</table>
</td><td>○</td><td>When using A616DAVN in [-5 to + 5V] range, Q68DAV can obtain equivalent resolution or more than A616DAV by setting in [-10 to 10V] range/ high resolution mode or user range.</td></tr>
<tr><td></td><td></td><td>○</td><td></td></tr>
<tr><td></td><td rowspan="3">Ambient temperature 25±5°C: Within ±0.1% (±10mV)<br>Ambient temperature 0 to 55°C: Within ±0.3% (±30mV)</td><td rowspan="3">○</td><td rowspan="3"></td></tr>
<tr><td></td></tr>
<tr><td></td></tr>
<tr><td></td><td>-</td><td rowspan="2">○</td><td rowspan="2"></td></tr>
<tr><td></td><td>80μs/channel</td></tr>
<tr><td></td><td>±12V</td><td>○</td><td></td></tr>
<tr><td></td><td>8 channels/module</td><td>△</td><td>Consider replacement with multiple Q68DAVN.</td></tr>
<tr><td></td><td>Max. 100,000 times</td><td>○</td><td></td></tr>
<tr><td></td><td>Available</td><td>○</td><td></td></tr>
<tr><td></td><td>Between the I/O terminal and programmable controller power supply:<br>photocoupler isolation<br>Between output channels: non-isolation<br>Between external power supply and analog output: transformer isolation</td><td>○</td><td></td></tr>
<tr><td></td><td>Between the I/O terminal and programmable controller power supply:<br>500VAC, for 1 minute</td><td>○</td><td></td></tr>
<tr><td></td><td>Between the I/O terminal and programmable controller power supply:<br>500VDC, 20MΩ or more</td><td>○</td><td></td></tr>
<tr><td></td><td>16 points<br>(I/O assignment: intelligent 16 points)</td><td>△</td><td>The number of occupied I/O points has changed to 16 points.</td></tr>
<tr><td></td><td>18-point terminal block</td><td>×</td><td rowspan="3">Wiring change is required.</td></tr>
<tr><td></td><td>0.3 to 0.75mm$^2$</td><td>×</td></tr>
<tr><td></td><td>FG terminal: R1.25-3, 1.25-YS3, RAV1.25-3, V1.25-YS3A<br>Terminals other than FG: R1.25-3<br>(Sleeved solderless terminal cannot be used.)</td><td>×</td></tr>
<tr><td></td><td>0.38A</td><td>○</td><td></td></tr>
</table>

| Item | | A616DAV | |
|---|---|---|---|
| External power supply | Voltage | +15VDC / -15VDC | |
| | Current consumption | +15VDC, 0.2A<br>-15VDC, 0.17A | |
| | Inrush current | - | |
| Weight | | 0.65kg | |

○: Compatible, △: Partial change required, ×: Incompatible

| | Q68DAVN | Compatibility | Precautions for replacement |
|---|---|---|---|
| | 24VDC +20%, -15%<br>Ripple, spike 500mV$_{P-P}$ or less | × | As the external power supply has changed from ±15V to 24V, its change is required. |
| | 0.20A | | |
| | 2.5A, 230μs or less | | |
| | 0.20kg | ○ | |

### 3.3.2 Functional comparison

○ : With functions, -: Without functions

<table>
<tr><th>Item</th><th>Description</th><th>A616DAV</th><th>Q68DAVN</th><th>Precautions for replacement</th></tr>
<tr><td>D/A conversion enable/disable function</td><td>Specifies whether to enable or disable the D/A conversion for each channel. By disabling the D/A conversion for the channels that are not used, the conversion speed can be shortened.</td><td>○</td><td>○</td><td></td></tr>
<tr><td>D/A output enable/ disable function</td><td>Specifies whether to output the D/A conversion value or the offset value for each channel.<br>The conversion speed stays constant regardless of whether D/A output is enabled or disabled.</td><td>○</td><td>○</td><td>On Q68DAVN, the output enable/disable is set with Y signal (CH□ Output enable/ disable flag).</td></tr>
<tr><td>Synchronous output function</td><td>Obtains analog output synchronized with the programmable controller CPU.<br>The analog output will be updated after Synchronous output request (YD) is set to ON and the time specified as "programmable controller CPU processing time + 120μs" has elapsed.<br>However, the analog output will be fixed to CH1, and other channels (CH2 to CH8) cannot be used.<br>When the module is mounted on a remote I/O station, the analog output will not be synchronized because of a link scan delay if the synchronous output function is specified.</td><td>-</td><td>○</td><td></td></tr>
<tr><td>Analog output HOLD/ CLEAR function</td><td>Retains an analog value that was output when the programmable controller CPU is in the STOP status or an error occurs.</td><td>○</td><td>○</td><td>1) Refer to ("Analog output status combination list" in the Digital-Analog Converter Module User's Manual to check the execution status of output.<br>2) For the Q68DAVN, this function is set with the intelligent function module switch setting.</td></tr>
<tr><td>Analog output test while the programmable controller CPU is in the STOP status</td><td>Outputs the analog value converted from a digital value when CH□ Output enable/disable flag is forcibly turned on while the programmable controller CPU is in the STOP status.
<table>
<tr><td rowspan="2">Setting combination</td><td>D/A conversion enable/disable</td><td colspan="2">Enable</td><td colspan="2">Disable</td></tr>
<tr><td>CH□ Output enable/disable flag</td><td>Enable</td><td>Disable</td><td>Enable</td><td>Disable</td></tr>
<tr><td colspan="2">Analog output test</td><td>Allowed</td><td>Not allowed</td><td colspan="2">Not allowed</td></tr>
</table></td><td>-</td><td>○</td><td></td></tr>
<tr><td>Resolution mode</td><td>Switches the resolution mode according to the application.<br>The resolution can be selected from 1/4000, 1/12000, or 1/ 16000.<br>The resolution mode is batch-set for all channels.</td><td>-</td><td>○</td><td></td></tr>
<tr><td>Online module replacement</td><td>Replaces a module without stopping the system.</td><td>-</td><td>○</td><td>Replaceable modules during online are the Process CPU and the Redundant CPU.</td></tr>
</table>

### 3.3.3 I/O signal comparison to programmable controller CPU

Sequence program change is required as the I/O signals differ.
For details of the I/O signals and sequence program, refer to the Digital-Analog Converter Module User's Manual.

| A616DAV | | | | Q68DAVN | | | |
|---|---|---|---|---|---|---|---|
| Device No. | Signal name | Device No. | Signal name | Device No. | Signal name | Device No. | Signal name |
| X0 | Watchdog timer error flag | Y0 | Not used | X0 | Module READY | Y0 | Not used |
| X1 | D/A conversion READY flag | Y1 | | X1 | Not used | Y1 | CH1 Output enable/ disable flag |
| X2 | Error flag | Y2 | | X2 | | Y2 | CH2 Output enable/ disable flag |
| X3 | Not used | Y3 | | X3 | | Y3 | CH3 Output enable/ disable flag |
| X4 | | Y4 | | X4 | | Y4 | CH4 Output enable/ disable flag |
| X5 | | Y5 | | X5 | | Y5 | CH5 Output enable/ disable flag |
| X6 | | Y6 | | X6 | | Y6 | CH6 Output enable/ disable flag |
| X7 | | Y7 | | X7 | | Y7 | CH7 Output enable/ disable flag |
| X8 | | Y8 | | X8 | High resolution mode status flag | Y8 | CH8 Output enable/ disable flag |
| X9 | | Y9 | | X9 | Operating condition setting completion flag | Y9 | Operating condition setting request |
| XA | | YA | | XA | Offset/gain setting mode status flag | YA | User range write request |
| XB | | YB | | XB | Channel change completion flag | YB | Channel change request |
| XC | | YC | | XC | Setting value change completion flag | YC | Setting value change request |
| XD | | YD | RFRP, RTOP instruction interlock signal | XD | Synchronous output mode flag | YD | Synchronous output request |
| XE | | YE | | XE | Not used | YE | Not used |
| XF | | YF | | XF | Error flag | YF | Error clear request |
| X10 | | Y10 | Not used | | | | |
| X11 | | Y11 | | | | | |
| X12 | | Y12 | | | | | |
| X13 | | Y13 | | | | | |
| X14 | | Y14 | | | | | |
| X15 | | Y15 | | | | | |
| X16 | | Y16 | | | | | |
| X17 | | Y17 | | | | | |
| X18 | | Y18 | | | | | |
| X19 | | Y19 | | | | | |
| X1A | | Y1A | | | | | |
| X1B | | Y1B | Output enable batch flag | | | | |
| X1C | | Y1C | Not used | | | | |
| X1D | RFRP, RTOP instruction interlock signal | Y1D | | | | | |
| X1E | | Y1E | | | | | |
| X1F | | Y1F | | | | | |

### 3.3.4 Buffer memory address comparison

Sequence program change is required as the assignment of buffer memories differs.
For details of the buffer memories and sequence program, refer to the Digital-Analog Converter Module User's Manual.

| A616DAV | | | Q68DAVN | | |
|---|---|---|---|---|---|
| Address (decimal) | Name | Read/write | Address (decimal) | Name | Read/write |
| 0 | D/A conversion enable/disable channel | R/W | 0 | D/A conversion enable/disable | R/W |
| 1 | Analog output enable/disable channel | | 1 | CH1 Digital value | |
| 2 | System area (Not used) | - | 2 | CH2 Digital value | |
| 3 | | | 3 | CH3 Digital value | |
| 4 | | | 4 | CH4 Digital value | |
| 5 | | | 5 | CH5 Digital value | |
| 6 | | | 6 | CH6 Digital value | |
| 7 | | | 7 | CH7 Digital value | |
| 8 | | | 8 | CH8 Digital value | |
| 9 | | | 9 | System area (Not used) | - |
| 10 | | | 10 | | |
| 11 | | | 11 | CH1 Setting value check code | R |
| 12 | | | 12 | CH2 Setting value check code | |
| 13 | | | 13 | CH3 Setting value check code | |
| 14 | | | 14 | CH4 Setting value check code | |
| 15 | | | 15 | CH5 Setting value check code | |
| 16 | CH0 Digital value | R/W | 16 | CH6 Setting value check code | |
| 17 | CH1 Digital value | | 17 | CH7 Setting value check code | |
| 18 | CH2 Digital value | | 18 | CH8 Setting value check code | |
| 19 | CH3 Digital value | | 19 | Error code | |
| 20 | CH4 Digital value | | 20 | Setting range (CH1 to CH4) | |
| 21 | CH5 Digital value | | 21 | Setting range (CH5 to CH8) | |
| 22 | CH6 Digital value | | 22 | Offset/gain setting mode<br>Offset specification | R/W |
| 23 | CH7 Digital value | | 23 | Offset/gain setting mode<br>Gain specification | |
| 24 | CH8 Digital value | | 24 | Offset/gain adjusted value specification | |
| 25 | CH9 Digital value | | 25 | System area (Not used) | - |
| 26 | CHA Digital value | | 26 | | |
| 27 | CHB Digital value | | 27 | | |
| 28 | CHC Digital value | | 28 | | |
| 29 | CHD Digital value | | 29 | | |
| 30 | CHE Digital value | | 30 | | |
| 31 | CHF Digital value | | 31 | | |
| 32 | System area (Not used) | - | 32 | | |
| to | | | to | | |
| 47 | | | 47 | | |

| A616DAV | | | Q68DAVN | | |
|---|---|---|---|---|---|
| Address (decimal) | Name | Read/write | Address (decimal) | Name | Read/write |
| 48 | CH0 Setting value check code | R/W | 48 | System area (Not used) | - |
| 49 | CH1 Setting value check code | | 49 | | |
| 50 | CH2 Setting value check code | | 50 | | |
| 51 | CH3 Setting value check code | | 51 | | |
| 52 | CH4 Setting value check code | | 52 | | |
| 53 | CH5 Setting value check code | | 53 | | |
| 54 | CH6 Setting value check code | | 54 | | |
| 55 | CH7 Setting value check code | | 55 | | |
| 56 | CH8 Setting value check code | | 56 | | |
| 57 | CH9 Setting value check code | | 57 | | |
| 58 | CHA Setting value check code | | 58 | | |
| 59 | CHB Setting value check code | | 59 | | |
| 60 | CHC Setting value check code | | 60 | | |
| 61 | CHD Setting value check code | | 61 | | |
| 62 | CHE Setting value check code | | 62 | | |
| 63 | CHF Setting value check code | | 63 | | |
| | | | to | | |
| | | | 157 | | |
| | | | 158 | Mode switching setting | R/W |
| | | | 159 | | |
| | | | 160 | System area (Not used) | - |
| | | | to | | |
| | | | 201 | | |
| | | | 202 | CH1 Industrial shipment settings offset value | R/W |
| | | | 203 | CH1 Industrial shipment settings gain value | |
| | | | 204 | CH2 Industrial shipment settings offset value | |
| | | | 205 | CH2 Industrial shipment settings gain value | |
| | | | 206 | CH3 Industrial shipment settings offset value | |
| | | | 207 | CH3 Industrial shipment settings gain value | |
| | | | 208 | CH4 Industrial shipment settings offset value | |
| | | | 209 | CH4 Industrial shipment settings gain value | |
| | | | 210 | CH5 Industrial shipment settings offset value | |
| | | | 211 | CH5 Industrial shipment settings gain value | |
| | | | 212 | CH6 Industrial shipment settings offset value | |
| | | | 213 | CH6 Industrial shipment settings gain value | |
| | | | 214 | CH7 Industrial shipment settings offset value | |
| | | | 215 | CH7 Industrial shipment settings gain value | |
| | | | 216 | CH8 Industrial shipment settings offset value | |
| | | | 217 | CH8 Industrial shipment settings gain value | |
| | | | 218 | CH1 User range settings offset value | |
| | | | 219 | CH1 User range settings gain value | |
| | | | 220 | CH2 User range settings offset value | |
| | | | 221 | CH2 User range settings gain value | |
| | | | 222 | CH3 User range settings offset value | |
| | | | 223 | CH3 User range settings gain value | |
| | | | 224 | CH4 User range settings offset value | |
| | | | 225 | CH4 User range settings gain value | |
| | | | 226 | CH5 User range settings offset value | |
| | | | 227 | CH5 User range settings gain value | |
| | | | 228 | CH6 User range settings offset value | |
| | | | 229 | CH6 User range settings gain value | |
| | | | 230 | CH7 User range settings offset value | |
| | | | 231 | CH7 User range settings gain value | |
| | | | 232 | CH8 User range settings offset value | |
| | | | 233 | CH8 User range settings gain value | |

## 3.4 A62DA (Replacement to the Q62DAN)

### 3.4.1 Performance comparison

<table>
<tr><th>Item</th><th>A62DA</th><th></th></tr>
<tr><td>Digital input</td><td>Maximum setting value<br>Voltage: ±2000<br>Current: ±1000</td><td></td></tr>
<tr><td>Analog output</td><td>Voltage: -10 to 0 to +10VDC<br>(External load resistance value: 500Ω to 1MΩ)<br>Current: +4 to +20mADC<br>(External load resistance value: 0Ω to 600Ω)<br>*Current output is usable by -20 to +20mA.</td><td></td></tr>
<tr><td>I/O characteristics</td><td><table><tr><td rowspan="2">Digital input</td><td colspan="2">Analog output</td></tr><tr><td>Voltage</td><td>Current</td></tr><tr><td>+2000</td><td>+10V</td><td>-</td></tr><tr><td>+1000</td><td>+5V</td><td>+20mA</td></tr><tr><td>0</td><td>0V</td><td>+4mA</td></tr><tr><td>-1000</td><td>-5V</td><td>-12mA</td></tr><tr><td>-2000</td><td>-10V</td><td>-</td></tr></table></td><td></td></tr>
<tr><td>Maximum resolution</td><td>Voltage: 5mV (1/2000)<br>Current: 20μA (1/1000)</td><td></td></tr>
<tr><td>Overall accuracy<br>(accuracy at maximum analog output value)</td><td>±1%<br>(voltage: ±0.1V, current: ±0.2mA)</td><td></td></tr>
<tr><td>Maximum conversion speed</td><td>Within 15ms/2 channels<br>(same time for one channel)<br>Note) Time from when the digital input is written to when the specified analog voltage (current) is reached</td><td></td></tr>
<tr><td>Absolute maximum output</td><td>Voltage: ±12V<br>Current: ±28mA<br>Note) Max. output voltage and current restricted by output protection circuit</td><td></td></tr>
<tr><td>Number of analog output points</td><td>2 channels/module</td><td></td></tr>
<tr><td>Number of writes to $E^2$PROM</td><td>-</td><td></td></tr>
<tr><td>Output short protection</td><td>-</td><td></td></tr>
</table>

○: Compatible, △: Partial change required, ×: Incompatible

<table>
<tr><th></th><th>Q62DAN</th><th>Compatibility</th><th>Precautions for replacement</th></tr>
<tr><td></td><td>16-bit signed binary<br>Normal resolution mode: -4096 to 4095<br>High resolution mode: -12288 to 12287, -16384 to 16383</td><td>△</td><td>According to the I/O conversion characteristics used, make the output range setting and offset/gain setting of the Q62DAN.</td></tr>
<tr><td></td><td>Voltage: -10 to 10VDC<br>(External load resistance value: 1kΩ to 1MΩ)<br>Current: 0 to 20mADC<br>(External load resistance value: 0Ω to 600Ω)</td><td>○</td><td>The minus current cannot be output.</td></tr>
<tr><td></td><td>
<table>
<tr><th colspan="2" rowspan="2">Analog output range</th><th colspan="2">Normal resolution mode</th><th colspan="2">High resolution mode</th></tr>
<tr><th>Digital input value</th><th>Maximum resolution</th><th>Digital input value</th><th>Maximum resolution</th></tr>
<tr><td rowspan="4">Voltage</td><td>0 to 5V</td><td rowspan="2">0 to 4000</td><td>1.25mV</td><td rowspan="2">0 to 12000</td><td>0.416mV</td></tr>
<tr><td>1 to 5V</td><td>1.0mV</td><td>0.333mV</td></tr>
<tr><td>-10 to 10V</td><td rowspan="2">-4000 to 4000</td><td>2.5mV</td><td>-16000 to 16000</td><td>0.625mV</td></tr>
<tr><td>User range settings</td><td>0.75mV</td><td>-12000 to 12000</td><td>0.333mV</td></tr>
<tr><td rowspan="3">Current</td><td>0 to 20mA</td><td rowspan="2">0 to 4000</td><td>5 μA</td><td rowspan="2">0 to 12000</td><td>1.66μA</td></tr>
<tr><td>4 to 20mA</td><td>4μA</td><td>1.33μA</td></tr>
<tr><td>User range settings</td><td>-4000 to 4000</td><td>1.5 μA</td><td>-12000 to 12000</td><td>0.83μA</td></tr>
</table>
</td><td>△</td><td>According to the I/O conversion characteristics used, make the output range setting and offset/gain setting of the Q62DAN.</td></tr>
<tr><td></td><td>Ambient temperature 25±5°C: within ±0.1%<br>(voltage: ±10mV, current: ±20μA)<br>Ambient temperature 0 to 55°C: within ±0.3%<br>(voltage: ±30mV, current: ±60μA)</td><td>○</td><td></td></tr>
<tr><td></td><td>80μs/channel</td><td>○</td><td></td></tr>
<tr><td></td><td>Voltage: ±12V<br>Current: 21mA</td><td>△</td><td>The minus current cannot be output.</td></tr>
<tr><td></td><td>2 channels/module</td><td>○</td><td></td></tr>
<tr><td></td><td>Max. 100,000 times</td><td>○</td><td></td></tr>
<tr><td></td><td>Available</td><td>○</td><td></td></tr>
</table>

| Item | | A62DA | |
|---|---|---|---|
| Isolation method | | Between the output terminal and programmable controller power supply: photocoupler isolation<br>(Between channels: non-isolation) | |
| Dielectric withstand voltage | | - | |
| Insulation resistance | | - | |
| Number of occupied I/O points | | 32 points<br>(I/O assignment: special 32 points) | |
| Connected terminal | | 20-point terminal block | |
| Applicable wire size | | 0.75 to 2mm$^2$<br>(Applicable tightening torque: 39 to 59N•cm) | |
| Applicable solderless terminal | | V1.25-3, V1.25-YS3A, V2-S3, V2-YS3A | |
| Internal current consumption (5VDC) | | 0.6A | |
| External power supply | Voltage | 21.6 to 26.4VDC | |
| | Current consumption | 0.35A | |
| | Inrush current | 2.4A | |
| Weight | | 0.5kg | |

○: Compatible, △: Partial change required, ×: Incompatible

| | Q62DAN | Compatibility | Precautions for replacement |
|---|---|---|---|
| | Between the I/O terminal and programmable controller power supply: photocoupler isolation<br>Between output channels: non-isolation<br>Between external power supply and analog output: transformer isolation | ○ | |
| | Between the I/O terminal and programmable controller power supply: 500VAC, for 1 minute | ○ | |
| | Between the I/O terminal and programmable controller power supply: 500VDC, 20MΩ or more | ○ | |
| | 16 points<br>(I/O assignment: intelligent 16 points) | △ | The number of occupied I/O points has changed to 16 points. |
| | 18-point terminal block | × | Wiring change is required. |
| | 0.3 to 0.75mm$^2$ | × | |
| | R1.25-3<br>(Sleeved solderless terminal cannot be used.) | × | |
| | 0.33A | ○ | |
| | 24VDC +20%, -15%<br>Ripple, spike 500m$V_{P-P}$ or less | ○ | |
| | 0.15A | ○ | |
| | 2.5A, 250μs or less | ○ | |
| | 0.19kg | ○ | |

### 3.4.2 Functional comparison

○ : Available, - : Not available

| Item | Description | A62DA | Q62DAN | Precautions for replacement |
|---|---|---|---|---|
| Analog output HOLD/CLEAR function | Retains an analog value that was output when the programmable controller CPU is in the STOP status or an error occurs. | - | ○ | |
| D/A conversion enable/disable function | Specifies whether to enable or disable the D/A conversion. | - | ○ | |
| D/A output enable/disable function | Specifies whether to output the D/A conversion value or the offset value. | ○ | ○ | The Q62DAN specifies whether to enable or disable output for each channel. |
| Synchronous output function | Obtains analog output synchronized with the programmable controller CPU. | - | ○ | |
| Analog output test while the programmable controller CPU is in the STOP status | Outputs the analog value converted from a digital value when CH□ Output enable/ disable flag is forcibly turned on while the programmable controller CPU is in the STOP status. | - | ○ | |
| Resolution mode | Switches the resolution mode according to the application.<br>The resolution can be selected from 1/4000, 1/12000, or 1/16000.<br>The resolution mode is batch-set for all channels. | - | ○ | |
| Online module replacement | Replaces a module without stopping the system. | - | ○ | Replaceable modules during online are the Process CPU and the Redundant CPU. |

### 3.4.3 I/O signal comparison to programmable controller CPU

Sequence program change is required as the I/O signals differ.
For details of the I/O signals and sequence program, refer to the Digital-Analog Converter Module User's Manual.

| A62DA | | | | Q62DAN | | | |
|---|---|---|---|---|---|---|---|
| Device No. | Signal name | Device No. | Signal name | Device No. | Signal name | Device No. | Signal name |
| X0 | Watchdog timer error | Y0 | Not used | X0 | Module READY | Y0 | Not used |
| X1 | D/A conversion READY | Y1 | | X1 | Not used | Y1 | CH1 Output enable/ disable flag |
| X2 | Not used | Y2 | | X2 | | Y2 | CH2 Output enable/ disable flag |
| X3 | | Y3 | | X3 | | Y3 | Not used |
| X4 | | Y4 | | X4 | | Y4 | |
| X5 | | Y5 | | X5 | | Y5 | |
| X6 | | Y6 | | X6 | | Y6 | |
| X7 | | Y7 | | X7 | | Y7 | |
| X8 | | Y8 | | X8 | High resolution mode status flag | Y8 | |
| X9 | | Y9 | | X9 | Operating condition setting completion flag | Y9 | Operating condition setting request |
| XA | | YA | | XA | Offset/gain setting mode status flag | YA | User range write request |
| XB | | YB | | XB | Channel change completion flag | YB | Channel change request |
| XC | | YC | | XC | Setting value change completion flag | YC | Setting value change request |
| XD | | YD | | XD | Synchronous output mode flag | YD | Synchronous output request |
| XE | | YE | | XE | Not used | YE | Not used |
| XF | | YF | | XF | Error flag | YF | Error clear request |
| X10 | | Y10 | | | | | |
| X11 | | Y11 | | | | | |
| X12 | | Y12 | | | | | |
| X13 | | Y13 | | | | | |
| X14 | | Y14 | | | | | |
| X15 | | Y15 | | | | | |
| X16 | | Y16 | | | | | |
| X17 | | Y17 | | | | | |
| X18 | | Y18 | CPU selection signal | | | | |
| X19 | | Y19 | Sign of CH1 digital input | | | | |
| X1A | | Y1A | Sign of CH2 digital input | | | | |
| X1B | | Y1B | Output enable | | | | |
| X1C | | Y1C | Not used | | | | |
| X1D | | Y1D | | | | | |
| X1E | | Y1E | | | | | |
| X1F | | Y1F | | | | | |

### 3.4.4 Buffer memory address comparison

Sequence program change is required as the assignment of buffer memory differs.
For details of the buffer memories and sequence program, refer to the Digital-Analog Converter Module User's Manual.

| A62DA | | | Q62DAN | | |
|---|---|---|---|---|---|
| Address (decimal) | Name | Read/write | Address (decimal) | Name | Read/write |
| 0 | CH1 Digital value | R/W | 0 | D/A conversion enable/disable | R/W |
| 1 | CH2 Digital value | | 1 | CH1 Digital value | |
| 2 | CH1 Voltage setting value check code | | 2 | CH2 Digital value | |
| 3 | CH2 Voltage setting value check code | | 3 | System area (Not used) | - |
| 4 | CH1 Current setting value check code | | 4 | | |
| 5 | CH2 Current setting value check code | | 5 | | |
| | | | to | | |
| | | | 10 | | |
| | | | 11 | CH1 Setting value check code | R |
| | | | 12 | CH2 Setting value check code | |
| | | | 13 | System area (Not used) | - |
| | | | to | | |
| | | | 18 | | |
| | | | 19 | Error code | R |
| | | | 20 | Setting range (CH1 to CH2) | |
| | | | 21 | System area (Not used) | - |
| | | | 22 | Offset/gain setting mode<br>Offset specification | R/W |
| | | | 23 | Offset/gain setting mode<br>Gain specification | |
| | | | 24 | Offset/gain adjusted value specification | |
| | | | 25 | System area (Not used) | - |
| | | | to | | |
| | | | 157 | | |
| | | | 158 | Mode switching setting | R/W |
| | | | 159 | | |
| | | | 160 | System area (Not used) | - |
| | | | to | | |
| | | | 199 | | |
| | | | 200 | Pass data classification setting | R/W |
| | | | 201 | System area (Not used) | - |
| | | | 202 | CH1 Industrial shipment settings offset value | R/W |
| | | | 203 | CH1 Industrial shipment settings gain value | |
| | | | 204 | CH2 Industrial shipment settings offset value | |
| | | | 205 | CH2 Industrial shipment settings gain value | |
| | | | 206 | CH1 User range settings offset value | |
| | | | 207 | CH1 User range settings gain value | |
| | | | 208 | CH2 User range settings offset value | |
| | | | 209 | CH2 User range settings gain value | |

## Memo

## 3.5 A62DA (Replacement to the Q64DAN)

### 3.5.1 Performance comparison

<table>
<tr><th>Item</th><th>A62DA</th><th></th></tr>
<tr><td>Digital input</td><td>Maximum setting value<br>Voltage: ±2000<br>Current: ±1000</td><td></td></tr>
<tr><td>Analog output</td><td>Voltage: -10 to 0 to +10VDC<br>(External load resistance value: 500Ω to 1MΩ)<br>Current: +4 to +20mADC<br>(External load resistance value: 0Ω to 600Ω)<br>*Current output is usable by -20 to +20mA.</td><td></td></tr>
<tr><td>I/O characteristics</td><td><table><tr><td rowspan="2">Digital input</td><td colspan="2">Analog output</td></tr><tr><td>Voltage</td><td>Current</td></tr><tr><td>+2000</td><td>+10V</td><td>-</td></tr><tr><td>+1000</td><td>+5V</td><td>+20mA</td></tr><tr><td>0</td><td>0V</td><td>+4mA</td></tr><tr><td>-1000</td><td>-5V</td><td>-12mA</td></tr><tr><td>-2000</td><td>-10V</td><td>-</td></tr></table></td><td></td></tr>
<tr><td>Maximum resolution</td><td>Voltage: 5mV (1/2000)<br>Current: 20μA (1/1000)</td><td></td></tr>
<tr><td>Overall accuracy<br>(accuracy at maximum analog output value)</td><td>±1%<br>(voltage: ±0.1V, current: ±0.2mA)</td><td></td></tr>
<tr><td>Maximum conversion speed</td><td>Within 15ms/2 channels<br>(same time for one channel)<br>Note) Time from when the digital input is written to when the specified analog voltage (current) is reached</td><td></td></tr>
<tr><td>Absolute maximum output</td><td>Voltage: ±12V<br>Current: ±28mA<br>Note) Max. output voltage and current restricted by output protection circuit</td><td></td></tr>
<tr><td>Number of analog output points</td><td>2 channels/module</td><td></td></tr>
<tr><td>Number of writes to $E^2$PROM</td><td>-</td><td></td></tr>
<tr><td>Output short protection</td><td>-</td><td></td></tr>
</table>

○: Compatible, △: Partial change required, ×: Incompatible

<table>
<tr><th></th><th>Q64DAN</th><th>Compatibility</th><th>Precautions for replacement</th></tr>
<tr><td></td><td>16-bit signed binary<br>(Normal resolution mode: -4096 to 4095,<br>High resolution mode: -12288 to 12287, -16384 to 16383)</td><td>△</td><td>According to the I/O conversion characteristics used, make the output range setting and offset/gain setting of the Q64DAN.</td></tr>
<tr><td></td><td>Voltage: -10 to 10VDC<br>(External load resistance value: 1kΩ to 1MΩ)<br>Current: 0 to 20mADC<br>(External load resistance value: 0Ω to 600Ω)</td><td>○</td><td>The minus current cannot be output.</td></tr>
<tr><td></td><td>
<table>
<tr><th colspan="2" rowspan="2">Analog output range</th><th colspan="2">Normal resolution mode</th><th colspan="2">High resolution mode</th></tr>
<tr><th>Digital input value</th><th>Maximum resolution</th><th>Digital input value</th><th>Maximum resolution</th></tr>
<tr><td rowspan="4">Voltage</td><td>0 to 5V</td><td rowspan="2">0 to 4000</td><td>1.25mV</td><td rowspan="2">0 to 12000</td><td>0.416mV</td></tr>
<tr><td>1 to 5V</td><td>1.0mV</td><td>0.333mV</td></tr>
<tr><td>-10 to 10V</td><td rowspan="2">-4000 to 4000</td><td>2.5mV</td><td>-16000 to 16000</td><td>0.625mV</td></tr>
<tr><td>User range settings</td><td>0.75mV</td><td>-12000 to 12000</td><td>0.333mV</td></tr>
<tr><td rowspan="3">Current</td><td>0 to 20mA</td><td rowspan="2">0 to 4000</td><td>5 μA</td><td rowspan="2">0 to 12000</td><td>1.66μA</td></tr>
<tr><td>4 to 20mA</td><td>4μA</td><td>1.33μA</td></tr>
<tr><td>User range settings</td><td>-4000 to 4000</td><td>1.5 μA</td><td>-12000 to 12000</td><td>0.83μA</td></tr>
</table>
</td><td>△</td><td>According to the I/O conversion characteristics used, make the output range setting and offset/gain setting of the Q64DAN.</td></tr>
<tr><td></td><td>Ambient temperature 25±5°C: within ±0.1%<br>(voltage: ±10mV, current: ±20μA)<br>Ambient temperature 0 to 55°C: within ±0.3%<br>(voltage: ±30mV, current: ±60μA)</td><td>○</td><td></td></tr>
<tr><td></td><td>80μs/channel</td><td>○</td><td></td></tr>
<tr><td></td><td>Voltage: ±12V<br>Current: 21mA</td><td>△</td><td>The minus current cannot be output.</td></tr>
<tr><td></td><td>4 channels/module</td><td>○</td><td></td></tr>
<tr><td></td><td>Max. 100,000 times</td><td>○</td><td></td></tr>
<tr><td></td><td>Available</td><td>○</td><td></td></tr>
</table>

| Item | | A62DA | |
|---|---|---|---|
| Isolation method | | Between the output terminal and programmable controller power supply: photocoupler isolation<br>(Between channels: non-isolation) | |
| Dielectric withstand voltage | | - | |
| Insulation resistance | | - | |
| Number of occupied I/O points | | 32 points<br>(I/O assignment: special 32 points) | |
| Connected terminal | | 20-point terminal block | |
| Applicable wire size | | 0.75 to 2mm$^2$<br>(Applicable tightening torque: 39 to 59N•cm) | |
| Applicable solderless terminal | | V1.25-3, V1.25-YS3A, V2-S3, V2-YS3A | |
| Internal current consumption (5VDC) | | 0.6A | |
| External power supply | Voltage | 21.6 to 26.4VDC | |
| | Current consumption | 0.35A | |
| | Inrush current | 2.4A | |
| Weight | | 0.5kg | |

○: Compatible, △: Partial change required, ×: Incompatible

| | Q64DAN | Compatibility | Precautions for replacement |
|---|---|---|---|
| | Between the I/O terminal and programmable controller power supply: photocoupler isolation<br>Between output channels: non-isolation<br>Between external power supply and analog output: transformer isolation | ○ | |
| | Between the I/O terminal and programmable controller power supply: 500VAC, for 1 minute | ○ | |
| | Between the I/O terminal and programmable controller power supply: 500VDC, 20MΩ or more | ○ | |
| | 16 points<br>(I/O assignment: intelligent 16 points) | △ | The number of occupied I/O points has changed to 16 points. |
| | 18-point terminal block | × | Wiring change is required. |
| | 0.3 to 0.75mm$^2$ | × | |
| | R1.25-3<br>(Sleeved solderless terminal cannot be used.) | × | |
| | 0.34A | ○ | |
| | 24VDC +20%, -15%<br>Ripple, spike 500mV$_{P-P}$ or less | ○ | |
| | 0.24A | ○ | |
| | 2.5A, 260μs or less | ○ | |
| | 0.20kg | ○ | |

### 3.5.2 Functional comparison

○ : Available, - : Not available

| Item | Description | A62DA | Q64DAN | Precautions for replacement |
|---|---|---|---|---|
| Analog output HOLD/CLEAR function | Retains an analog value that was output when the programmable controller CPU is in the STOP status or an error occurs. | - | ○ | |
| D/A conversion enable/disable function | Specifies whether to enable or disable the D/A conversion. | - | ○ | |
| D/A output enable/disable function | Specifies whether to output the D/A conversion value or the offset value. | ○ | ○ | The Q64DAN specifies whether to enable or disable output for each channel. |
| Synchronous output function | Obtains analog output synchronized with the programmable controller CPU. | - | ○ | |
| Analog output test while the programmable controller CPU is in the STOP status | Outputs the analog value converted from a digital value when CH□ Output enable/ disable flag is forcibly turned on while the programmable controller CPU is in the STOP status. | - | ○ | |
| Resolution mode | Switches the resolution mode according to the application.<br>The resolution can be selected from 1/4000, 1/12000, or 1/16000.<br>The resolution mode is batch-set for all channels. | - | ○ | |
| Online module replacement | Replaces a module without stopping the system. | - | ○ | Replaceable modules during online are the Process CPU and the Redundant CPU. |

### 3.5.3 I/O signal comparison to programmable controller CPU

Sequence program change is required as the I/O signals differ.
For details of the I/O signals and sequence program, refer to the Digital-Analog Converter Module User's Manual.

| A62DA | | | | Q64DAN | | | |
|---|---|---|---|---|---|---|---|
| Device No. | Signal name | Device No. | Signal name | Device No. | Signal name | Device No. | Signal name |
| X0 | Watchdog timer error | Y0 | | X0 | Module READY | Y0 | Not used |
| X1 | D/A conversion READY | Y1 | | X1 | | Y1 | CH1 Output enable/ disable flag |
| X2 | | Y2 | | X2 | | Y2 | CH2 Output enable/ disable flag |
| X3 | | Y3 | | X3 | Not used | Y3 | CH3 Output enable/ disable flag |
| X4 | | Y4 | | X4 | | Y4 | CH4 Output enable/ disable flag |
| X5 | | Y5 | | X5 | | Y5 | |
| X6 | | Y6 | | X6 | | Y6 | |
| X7 | | Y7 | | X7 | | Y7 | Not used |
| X8 | | Y8 | | X8 | High resolution mode status flag | Y8 | |
| X9 | | Y9 | | X9 | Operating condition setting completion flag | Y9 | Operating condition setting request |
| XA | | YA | Not used | XA | Offset/gain setting mode status flag | YA | User range write request |
| XB | | YB | | XB | Channel change completion flag | YB | Channel change request |
| XC | | YC | | XC | Setting value change completion flag | YC | Setting value change request |
| XD | Not used | YD | | XD | Synchronous output mode flag | YD | Synchronous output request |
| XE | | YE | | XE | Not used | YE | Not used |
| XF | | YF | | XF | Error flag | YF | Error clear request |
| X10 | | Y10 | | | | | |
| X11 | | Y11 | | | | | |
| X12 | | Y12 | | | | | |
| X13 | | Y13 | | | | | |
| X14 | | Y14 | | | | | |
| X15 | | Y15 | | | | | |
| X16 | | Y16 | | | | | |
| X17 | | Y17 | | | | | |
| X18 | | Y18 | CPU selection signal | | | | |
| X19 | | Y19 | Sign of CH1 digital input | | | | |
| X1A | | Y1A | Sign of CH2 digital input | | | | |
| X1B | | Y1B | Output enable | | | | |
| X1C | | Y1C | | | | | |
| X1D | | Y1D | Not used | | | | |
| X1E | | Y1E | | | | | |
| X1F | | Y1F | | | | | |

### 3.5.4 Buffer memory address comparison

Sequence program change is required as the assignment of buffer memory differs.
For details of the buffer memories and sequence program, refer to the Digital-Analog Converter Module User's Manual.

| A62DA | | | Q64DAN | | |
|---|---|---|---|---|---|
| Address (decimal) | Name | Read/write | Address (decimal) | Name | Read/write |
| 0 | CH1 Digital value | R/W | 0 | D/A conversion enable/disable | R/W |
| 1 | CH2 Digital value | | 1 | CH1 Digital value | |
| 2 | CH1 Voltage setting value check code | | 2 | CH2 Digital value | |
| 3 | CH2 Voltage setting value check code | | 3 | CH3 Digital value | |
| 4 | CH1 Current setting value check code | | 4 | CH4 Digital value | |
| 5 | CH2 Current setting value check code | | 5 | System area (Not used) | - |
| | | | to | | |
| | | | 10 | | |
| | | | 11 | CH1 Setting value check code | R |
| | | | 12 | CH2 Setting value check code | |
| | | | 13 | CH3 Setting value check code | |
| | | | 14 | CH4 Setting value check code | |
| | | | 15 | System area (Not used) | - |
| | | | to | | |
| | | | 18 | | |
| | | | 19 | Error code | R |
| | | | 20 | Setting range (CH1 to CH4) | |
| | | | 21 | System area (Not used) | - |
| | | | 22 | Offset/gain setting mode<br>Offset specification | R/W |
| | | | 23 | Offset/gain setting mode<br>Gain specification | |
| | | | 24 | Offset/gain adjusted value specification | |
| | | | 25 | System area (Not used) | - |
| | | | to | | |
| | | | 157 | | |
| | | | 158 | Mode switching setting | R/W |
| | | | 159 | | |
| | | | 160 | System area (Not used) | - |
| | | | to | | |
| | | | 199 | | |
| | | | 200 | Pass data classification setting | R/W |
| | | | 201 | System area (Not used) | - |
| | | | 204 | CH2 Industrial shipment settings offset value | R/W |
| | | | 205 | CH2 Industrial shipment settings gain value | |
| | | | 206 | CH3 Industrial shipment settings offset value | |
| | | | 207 | CH3 Industrial shipment settings gain value | |
| | | | 208 | CH4 Industrial shipment settings offset value | |
| | | | 209 | CH4 Industrial shipment settings gain value | |
| | | | 210 | CH1 User range settings offset value | |
| | | | 211 | CH1 User range settings gain value | |
| | | | 212 | CH2 User range settings offset value | |
| | | | 213 | CH2 User range settings gain value | |
| | | | 214 | CH3 User range settings offset value | |
| | | | 215 | CH3 User range settings gain value | |
| | | | 216 | CH4 User range settings offset value | |
| | | | 217 | CH4 User range settings gain value | |

## Memo

## 3.6 A62DA-S1 (Replacement to the Q62DAN)

### 3.6.1 Performance comparison

<table>
<tr><th colspan="2">Item</th><th>A62DA-S1</th><th></th></tr>
<tr><td colspan="2">Digital input</td><td>0 to +4000</td><td></td></tr>
<tr><td colspan="2">Analog output</td><td>Voltage: 0 to +10VDC (External load resistance value: 500Ω to 1MΩ)<br>Current: +4 to +20mADC (External load resistance value: 0Ω to 600Ω)<br>*Current output is usable by 0 to +20mA.</td><td></td></tr>
<tr><td colspan="2">I/O characteristics</td><td><table>
<tr><th>Output range</th><th>Digital input</th><th>Analog output</th></tr>
<tr><td rowspan="2">0 to 10V</td><td>+ 4000</td><td>+ 10V</td></tr>
<tr><td>0</td><td>0V</td></tr>
<tr><td>0 to 5V</td><td>+ 4000</td><td>+ 5V or + 20mA</td></tr>
<tr><td>0 to 20mA</td><td>0</td><td>0V or 0mA</td></tr>
<tr><td>1 to 5V</td><td>+ 4000</td><td>+ 5V or + 20mA</td></tr>
<tr><td>4 to 20mA</td><td>0</td><td>+ 1V or + 4mA</td></tr>
</table></td><td></td></tr>
<tr><td rowspan="2">Maximum resolution</td><td>Voltage</td><td>1 to 5V: 1mV (1/4000)<br>0 to 5V: 1.25mV (1/4000)<br>0 to 10V: 2.5mV (1/4000)</td><td></td></tr>
<tr><td>Current</td><td>4 to 20mA: 4μA (1/4000)<br>0 to 20mA: 5μA (1/4000)</td><td></td></tr>
<tr><td colspan="2">Overall accuracy<br>(accuracy at maximum analog output value)</td><td>(Refer to *1.)</td><td></td></tr>
<tr><td colspan="2">Maximum conversion speed</td><td>Within 15ms/2 channels (same time for one channel)<br>Note) Time from when the digital input is written to when the specified analog voltage (current) is reached</td><td></td></tr>
<tr><td colspan="2">Absolute maximum output</td><td>Voltage: 0 to +12V<br>Current: 0 to +28mA<br>Note) Max. output voltage and current restricted by output protection circuit</td><td></td></tr>
<tr><td colspan="2">Number of analog output points</td><td>2 channels/module</td><td></td></tr>
<tr><td colspan="2">Number of writes to $E^2$PROM</td><td>-</td><td></td></tr>
<tr><td colspan="2">Output short protection</td><td>-</td><td></td></tr>
</table>

*1 Indicates accuracy at the maximum analog output value of the A62DA-S1.

| Output range / Temperature range | 1 to 5V | 0 to 5V | 0 to 10V | 4 to 20mA | 0 to 20mA |
|---|---|---|---|---|---|
| 25℃(within ±0.5%) | ±25mV | ±25mV | ±50mV | ±0.1mA | ±0.1mA |
| 0 to 55℃(within ±1%) | ±50mV | ±50mV | ±100mV | ±0.2mA | ±0.2mA |

○: Compatible, △: Partial change required, ×: Incompatible

<table>
<tr><th></th><th>Q62DAN</th><th>Compatibility</th><th>Precautions for replacement</th></tr>
<tr><td></td><td>16-bit signed binary<br>Normal resolution mode: -4096 to 4095,<br>High resolution mode: -12288 to 12287, -16384 to 16383</td><td>○</td><td></td></tr>
<tr><td></td><td>Voltage: -10 to 10VDC (External load resistance value: 1kΩ to 1MΩ)<br>Current: 0 to 20mADC (External load resistance value: 0Ω to 600Ω)</td><td>○</td><td></td></tr>
<tr><td></td><td>
<table>
<tr><th colspan="2" rowspan="2">Analog output range</th><th colspan="2">Normal resolution mode</th><th colspan="2">High resolution mode</th></tr>
<tr><th>Digital input value</th><th>Maximum resolution</th><th>Digital input value</th><th>Maximum resolution</th></tr>
<tr><td rowspan="4">Voltage</td><td>0 to 5V</td><td rowspan="2">0 to 4000</td><td>1.25mV</td><td rowspan="2">0 to 12000</td><td>0.416mV</td></tr>
<tr><td>1 to 5V</td><td>1.0mV</td><td>0.333mV</td></tr>
<tr><td>-10 to 10V</td><td>-4000 to 4000</td><td>2.5mV</td><td>-16000 to 16000</td><td>0.625mV</td></tr>
<tr><td>User range settings</td><td>0.75mV</td><td>-12000 to 12000</td><td>0.333mV</td></tr>
<tr><td rowspan="3">Current</td><td>0 to 20mA</td><td rowspan="2">0 to 4000</td><td>5 μA</td><td rowspan="2">0 to 12000</td><td>1.66μA</td></tr>
<tr><td>4 to 20mA</td><td>4μA</td><td>1.33μA</td></tr>
<tr><td>User range settings</td><td>-4000 to 4000</td><td>1.5μA</td><td>-12000 to 12000</td><td>0.83μA</td></tr>
</table>
</td><td>○</td><td></td></tr>
<tr><td></td><td>Ambient temperature 25±5°C: within ±0.1%<br>(voltage: ±10mV, current: ±20μA)<br>Ambient temperature 0 to 55°C: within ±0.3%<br>(voltage: ±30mV, current: ±60μA)</td><td>○</td><td></td></tr>
<tr><td></td><td>80μs/channel</td><td>○</td><td></td></tr>
<tr><td></td><td>Voltage: ±12V<br>Current: 21mA</td><td>○</td><td></td></tr>
<tr><td></td><td>2 channels/module</td><td>○</td><td></td></tr>
<tr><td></td><td>Max. 100,000 times</td><td>○</td><td></td></tr>
<tr><td></td><td>Available</td><td>○</td><td></td></tr>
</table>

| Item | | A62DA-S1 | |
|---|---|---|---|
| Isolation method | | Between the output terminal and programmable controller power supply: photocoupler isolation<br>(Between channels: non-isolation) | |
| Dielectric withstand voltage | | - | |
| Insulation resistance | | - | |
| Number of occupied I/O points | | 32 points<br>(I/O assignment: special 32 points) | |
| Connected terminal | | 20-point terminal block | |
| Applicable wire size | | 0.75 to 2mm$^2$<br>(Applicable tightening torque: 39 to 59N•cm) | |
| Applicable solderless terminal | | V1.25-3, V1.25-YS3A, V2-S3, V2-YS3A | |
| Internal current consumption (5VDC) | | 0.6A | |
| External power supply | Voltage | 21.6 to 26.4VDC | |
| | Current consumption | 0.35A | |
| | Inrush current | 2.4A | |
| Weight | | 0.5kg | |

○: Compatible, △: Partial change required, ×: Incompatible

| | Q62DAN | Compatibility | Precautions for replacement |
|---|---|---|---|
| | Between the I/O terminal and programmable controller power supply: photocoupler isolation<br>Between output channels: non-isolation<br>Between external power supply and analog output: transformer isolation | ○ | |
| | Between the I/O terminal and programmable controller power supply: 500VAC, for 1 minute | ○ | |
| | Between the I/O terminal and programmable controller power supply: 500VDC, 20MΩ or more | ○ | |
| | 16 points<br>(I/O assignment: intelligent 16 points) | △ | The number of occupied I/O points has changed to 16 points. |
| | 18-point terminal block | × | Wiring change is required. |
| | 0.3 to 0.75mm$^2$ | × | |
| | R1.25-3<br>(Sleeved solderless terminal cannot be used.) | × | |
| | 0.33A | ○ | |
| | 24VDC +20%, -15%<br>Ripple, spike 500mV$_{P-P}$ or less | ○ | |
| | 0.15A | ○ | |
| | 2.5A, 250μs or less | ○ | |
| | 0.19kg | ○ | |

### 3.6.2 Functional comparison

○ : Available, - : Not available

| Item | Description | A62DA-S1 | Q62DAN | Precautions for replacement |
|---|---|---|---|---|
| Analog output HOLD/CLEAR function | Retains an analog value before Output enable signal turns off when the Output enable signal is off. | ○ | ○ | 1) Refer to ("Analog output status combination list" in the Digital-Analog Converter Module User's Manual to check the execution status of output.<br>2) For the Q62DAN, this function is set with the intelligent function module switch setting. |
| D/A conversion enable/disable function | Specifies whether to enable or disable the D/A conversion. | - | ○ | |
| D/A output enable/disable function | Specifies whether to output the D/A conversion value or the offset value. | ○ | ○ | The Q62DAN specifies whether to enable or disable output for each channel. |
| Synchronous output function | Obtains analog output synchronized with the programmable controller CPU. | - | ○ | |
| Analog output test while the programmable controller CPU is in the STOP status | Outputs the analog value converted from a digital value when CH□ Output enable/ disable flag is forcibly turned on while the programmable controller CPU is in the STOP status. | - | ○ | |
| Resolution mode | Switches the resolution mode according to the application.<br>The resolution can be selected from 1/4000, 1/12000, or 1/16000.<br>The resolution mode is batch-set for all channels. | - | ○ | |
| Online module replacement | Replaces a module without stopping the system. | - | ○ | Replaceable modules during online are the Process CPU and the Redundant CPU. |

### 3.6.3 I/O signal comparison to programmable controller CPU

Sequence program change is required as the I/O signals differ.
For details of the I/O signals and sequence program, refer to the Digital-Analog Converter Module User's Manual.

| A62DA-S1 | | | | Q62DAN | | | |
|---|---|---|---|---|---|---|---|
| Device No. | Signal name | Device No. | Signal name | Device No. | Signal name | Device No. | Signal name |
| X0 | Watchdog timer error | Y0 | | X0 | Module READY | Y0 | Not used |
| X1 | D/A conversion READY | Y1 | | X1 | | Y1 | CH1 Output enable/ disable flag |
| X2 | | Y2 | | X2 | | Y2 | CH2 Output enable/ disable flag |
| X3 | | Y3 | | X3 | Not used | Y3 | |
| X4 | | Y4 | | X4 | | Y4 | |
| X5 | | Y5 | | X5 | | Y5 | |
| X6 | | Y6 | | X6 | | Y6 | Not used |
| X7 | | Y7 | | X7 | | Y7 | |
| X8 | | Y8 | | X8 | High resolution mode status flag | Y8 | |
| X9 | | Y9 | | X9 | Operating condition setting completion flag | Y9 | Operating condition setting request |
| XA | | YA | | XA | Offset/gain setting mode status flag | YA | User range write request |
| XB | | YB | Not used | XB | Channel change completion flag | YB | Channel change request |
| XC | | YC | | XC | Setting value change completion flag | YC | Setting value change request |
| XD | Not used | YD | | XD | Synchronous output mode flag | YD | Synchronous output request |
| XE | | YE | | XE | Not used | YE | Not used |
| XF | | YF | | XF | Error flag | YF | Error clear request |
| X10 | | Y10 | | | | | |
| X11 | | Y11 | | | | | |
| X12 | | Y12 | | | | | |
| X13 | | Y13 | | | | | |
| X14 | | Y14 | | | | | |
| X15 | | Y15 | | | | | |
| X16 | | Y16 | | | | | |
| X17 | | Y17 | | | | | |
| X18 | | Y18 | | | | | |
| X19 | | Y19 | | | | | |
| X1A | | Y1A | | | | | |
| X1B | | Y1B | Output enable | | | | |
| X1C | | Y1C | | | | | |
| X1D | | Y1D | Not used | | | | |
| X1E | | Y1E | | | | | |
| X1F | | Y1F | | | | | |

### 3.6.4 Buffer memory address comparison

Sequence program change is required as the assignment of buffer memory differs.
For details of the buffer memories and sequence program, refer to the Digital-Analog Converter Module User's Manual.

| A62DA-S1 | | | Q62DAN | | |
|---|---|---|---|---|---|
| Address (decimal) | Name | Read/write | Address (decimal) | Name | Read/write |
| 0 | CH1 Digital value | R/W | 0 | D/A conversion enable/disable | R/W |
| 1 | CH2 Digital value | | 1 | CH1 Digital value | |
| 2 | CH1 Upper limit check code | | 2 | CH2 Digital value | |
| 3 | CH1 Lower limit check code | | 3 | System area (Not used) | - |
| 4 | CH2 Upper limit check code | | 4 | | |
| 5 | CH2 Lower limit check code | | 5 | | |
| | | | to | | |
| | | | 10 | | |
| | | | 11 | CH1 Setting value check code | R |
| | | | 12 | CH2 Setting value check code | |
| | | | 13 | System area (Not used) | - |
| | | | to | | |
| | | | 18 | | |
| | | | 19 | Error code | R |
| | | | 20 | Setting range (CH1 to CH2) | |
| | | | 21 | System area (Not used) | - |
| | | | 22 | Offset/gain setting mode<br>Offset specification | R/W |
| | | | 23 | Offset/gain setting mode<br>Gain specification | |
| | | | 24 | Offset/gain adjusted value specification | |
| | | | 25 | System area (Not used) | - |
| | | | to | | |
| | | | 157 | | |
| | | | 158 | Mode switching setting | R/W |
| | | | 159 | | |
| | | | 160 | System area (Not used) | - |
| | | | to | | |
| | | | 199 | | |
| | | | 200 | Pass data classification setting | R/W |
| | | | 201 | System area (Not used) | - |
| | | | 202 | CH1 Industrial shipment settings offset value | R/W |
| | | | 203 | CH1 Industrial shipment settings gain value | |
| | | | 204 | CH2 Industrial shipment settings offset value | |
| | | | 205 | CH2 Industrial shipment settings gain value | |
| | | | 206 | CH1 User range settings offset value | |
| | | | 207 | CH1 User range settings gain value | |
| | | | 208 | CH2 User range settings offset value | |
| | | | 209 | CH2 User range settings gain value | |

## Memo

## 3.7 A62DA-S1 (Replacement to the Q64DAN)

### 3.7.1 Performance comparison

<table>
<tr><th colspan="2">Item</th><th>A62DA-S1</th><th></th></tr>
<tr><td colspan="2">Digital input</td><td>0 to +4000</td><td></td></tr>
<tr><td colspan="2">Analog output</td><td>Voltage: 0 to +10VDC (External load resistance value: 500Ω to 1MΩ)<br>Current: +4 to +20mADC (External load resistance value: 0Ω to 600Ω)<br>*Current output is usable by 0 to +20mA.</td><td></td></tr>
<tr><td colspan="2">I/O characteristics</td><td><table>
<tr><th>Output range</th><th>Digital input</th><th>Analog output</th></tr>
<tr><td rowspan="2">0 to 10V</td><td>+ 4000</td><td>+ 10V</td></tr>
<tr><td>0</td><td>0V</td></tr>
<tr><td>0 to 5V</td><td>+ 4000</td><td>+ 5V or + 20mA</td></tr>
<tr><td>0 to 20mA</td><td>0</td><td>0V or 0mA</td></tr>
<tr><td>1 to 5V</td><td>+ 4000</td><td>+ 5V or + 20mA</td></tr>
<tr><td>4 to 20mA</td><td>0</td><td>+ 1V or + 4mA</td></tr>
</table></td><td></td></tr>
<tr><td rowspan="2">Maximum resolution</td><td>Voltage</td><td>1 to 5V: 1mV (1/4000)<br>0 to 5V: 1.25mV (1/4000)<br>0 to 10V: 2.5mV (1/4000)</td><td></td></tr>
<tr><td>Current</td><td>4 to 20mA: 4μA (1/4000)<br>0 to 20mA: 5μA (1/4000)</td><td></td></tr>
<tr><td colspan="2">Overall accuracy<br>(accuracy at maximum analog output value)</td><td>(Refer to *1.)</td><td></td></tr>
<tr><td colspan="2">Maximum conversion speed</td><td>Within 15ms/2 channels (same time for one channel)<br>Note) Time from when the digital input is written to when the specified analog voltage (current) is reached</td><td></td></tr>
<tr><td colspan="2">Absolute maximum output</td><td>Voltage: 0 to +12V<br>Current: 0 to +28mA<br>Note) Max. output voltage and current restricted by output protection circuit</td><td></td></tr>
<tr><td colspan="2">Number of analog output points</td><td>2 channels/module</td><td></td></tr>
<tr><td colspan="2">Number of writes to $E^2$PROM</td><td>-</td><td></td></tr>
<tr><td colspan="2">Output short protection</td><td>-</td><td></td></tr>
</table>

*1 Indicates accuracy at the maximum analog output value of the A62DA-S1.

| Temperature range \ Output range | 1 to 5V | 0 to 5V | 0 to 10V | 4 to 20mA | 0 to 20mA |
|---|---|---|---|---|---|
| 25℃(within ±0.5%) | ±25mV | ±25mV | ±50mV | ±0.1mA | ±0.1mA |
| 0 to 55℃(within ±1%) | ±50mV | ±50mV | ±100mV | ±0.2mA | ±0.2mA |

○: Compatible, △: Partial change required, ×: Incompatible

<table>
<tr><th></th><th>Q64DAN</th><th>Compatibility</th><th>Precautions for replacement</th></tr>
<tr><td></td><td>16-bit signed binary<br>(Normal resolution mode: -4096 to 4095,<br>High resolution mode: -12288 to 12287, -16384 to 16383)</td><td>○</td><td></td></tr>
<tr><td></td><td>Voltage: -10 to 10VDC (External load resistance value: 1kΩ to 1MΩ)<br>Current: 0 to 20mADC (External load resistance value: 0Ω to 600Ω)</td><td>○</td><td></td></tr>
<tr><td></td><td>
<table>
<tr><th colspan="2" rowspan="2">Analog output range</th><th colspan="2">Normal resolution mode</th><th colspan="2">High resolution mode</th></tr>
<tr><th>Digital input value</th><th>Maximum resolution</th><th>Digital input value</th><th>Maximum resolution</th></tr>
<tr><td rowspan="4">Voltage</td><td>0 to 5V</td><td rowspan="2">0 to 4000</td><td>1.25mV</td><td rowspan="2">0 to 12000</td><td>0.416mV</td></tr>
<tr><td>1 to 5V</td><td>1.0mV</td><td>0.333mV</td></tr>
<tr><td>-10 to 10V</td><td>-4000 to 4000</td><td>2.5mV</td><td>-16000 to 16000</td><td>0.625mV</td></tr>
<tr><td>User range settings</td><td>0.75mV</td><td>-12000 to 12000</td><td>0.333mV</td></tr>
<tr><td rowspan="3">Current</td><td>0 to 20mA</td><td rowspan="2">0 to 4000</td><td>5 μA</td><td rowspan="2">0 to 12000</td><td>1.66μA</td></tr>
<tr><td>4 to 20mA</td><td>4μA</td><td>1.33μA</td></tr>
<tr><td>User range settings</td><td>-4000 to 4000</td><td>1.5μA</td><td>-12000 to 12000</td><td>0.83μA</td></tr>
</table>
</td><td>○</td><td></td></tr>
<tr><td></td><td>Ambient temperature 25±5°C: within ±0.1%<br>(voltage: ±10mV, current: ±20μA)<br>Ambient temperature 0 to 55°C: within ±0.3%<br>(voltage: ±30mV, current: ±60μA)</td><td>○</td><td></td></tr>
<tr><td></td><td>80μs/channel</td><td>○</td><td></td></tr>
<tr><td></td><td>Voltage: ±12V<br>Current: 21mA</td><td>○</td><td></td></tr>
<tr><td></td><td>4 channels/module</td><td>○</td><td></td></tr>
<tr><td></td><td>Max. 100,000 times</td><td>○</td><td></td></tr>
<tr><td></td><td>Available</td><td>○</td><td></td></tr>
</table>

| Item | | A62DA-S1 | |
|---|---|---|---|
| Isolation method | | Between the output terminal and programmable controller power supply: photocoupler isolation<br>(Between channels: non-isolation) | |
| Dielectric withstand voltage | | - | |
| Insulation resistance | | - | |
| Number of occupied I/O points | | 32 points<br>(I/O assignment: special 32 points) | |
| Connected terminal | | 20-point terminal block | |
| Applicable wire size | | 0.75 to 2mm$^2$<br>(Applicable tightening torque: 39 to 59N•cm) | |
| Applicable solderless terminal | | V1.25-3, V1.25-YS3A, V2-S3, V2-YS3A | |
| Internal current consumption (5VDC) | | 0.6A | |
| External power supply | Voltage | 21.6 to 26.4VDC | |
| | Current consumption | 0.35A | |
| | Inrush current | 2.4A | |
| Weight | | 0.5kg | |

○: Compatible, △: Partial change required, ×: Incompatible

| | Q64DAN | Compatibility | Precautions for replacement |
|---|---|---|---|
| | Between the I/O terminal and programmable controller power supply: photocoupler isolation<br>Between output channels: non-isolation<br>Between external power supply and analog output: transformer Isolation | ○ | |
| | Between the I/O terminal and programmable controller power supply: 500VAC, for 1 minute | ○ | |
| | Between the I/O terminal and programmable controller power supply: 500VDC, 20MΩ or more | ○ | |
| | 16 points<br>(I/O assignment: intelligent 16 points) | △ | The number of occupied I/O points has changed to 16 points. |
| | 18-point terminal block | × | Wiring change is required. |
| | 0.3 to 0.75mm$^2$ | × | |
| | R1.25-3<br>(Sleeved solderless terminal cannot be used.) | × | |
| | 0.34A | ○ | |
| | 24VDC +20%, -15%<br>Ripple, spike 500mV$_{P-P}$ or less | ○ | |
| | 0.24A | ○ | |
| | 2.5A, 260μs or less | ○ | |
| | 0.20kg | ○ | |

### 3.7.2 Functional comparison

○ : Available, - : Not available

| Item | Description | A62DA-S1 | Q64DAN | Precautions for replacement |
|---|---|---|---|---|
| Analog output HOLD/CLEAR function | Retains an analog value before Output enable signal turns off when the Output enable signal is off. | ○ | ○ | 1) Refer to ("Analog output status combination list" in the Digital-Analog Converter Module User's Manual to check the execution status of output.<br>2) For the Q64DAN, this function is set with the intelligent function module switch setting. |
| D/A conversion enable/disable function | Specifies whether to enable or disable the D/A conversion. | - | ○ | |
| D/A output enable/disable function | Specifies whether to output the D/A conversion value or the offset value. | ○ | ○ | The Q64DAN specifies whether to enable or disable output for each channel. |
| Synchronous output function | Obtains analog output synchronized with the programmable controller CPU. | - | ○ | |
| Analog output test while the programmable controller CPU is in the STOP status | Outputs the analog value converted from a digital value when CH□ Output enable/ disable flag is forcibly turned on while the programmable controller CPU is in the STOP status. | - | ○ | |
| Resolution mode | Switches the resolution mode according to the application.<br>The resolution can be selected from 1/4000, 1/12000, or 1/16000.<br>The resolution mode is batch-set for all channels. | - | ○ | |
| Online module replacement | Replaces a module without stopping the system. | - | ○ | Replaceable modules during online are the Process CPU and the Redundant CPU. |

### 3.7.3 I/O signal comparison to programmable controller CPU

Sequence program change is required as the I/O signals differ.
For details of the I/O signals and sequence program, refer to the Digital-Analog Converter Module User's Manual.

| A62DA-S1 | | | | Q64DAN | | | |
|---|---|---|---|---|---|---|---|
| Device No. | Signal name | Device No. | Signal name | Device No. | Signal name | Device No. | Signal name |
| X0 | Watchdog timer error | Y0 | Not used | X0 | Module READY | Y0 | Not used |
| X1 | D/A conversion READY | Y1 | | X1 | Not used | Y1 | CH1 Output enable/ disable flag |
| X2 | Not used | Y2 | | X2 | | Y2 | CH2 Output enable/ disable flag |
| X3 | | Y3 | | X3 | | Y3 | CH3 Output enable/ disable flag |
| X4 | | Y4 | | X4 | | Y4 | CH4 Output enable/ disable flag |
| X5 | | Y5 | | X5 | | Y5 | Not used |
| X6 | | Y6 | | X6 | | Y6 | |
| X7 | | Y7 | | X7 | | Y7 | |
| X8 | | Y8 | | X8 | High resolution mode status flag | Y8 | |
| X9 | | Y9 | | X9 | Operating condition setting completion flag | Y9 | Operating condition setting request |
| XA | | YA | | XA | Offset/gain setting mode status flag | YA | User range write request |
| XB | | YB | | XB | Channel change completion flag | YB | Channel change request |
| XC | | YC | | XC | Setting value change completion flag | YC | Setting value change request |
| XD | | YD | | XD | Synchronous output mode flag | YD | Synchronous output request |
| XE | | YE | | XE | Not used | YE | Not used |
| XF | | YF | | XF | Error flag | YF | Error clear request |
| X10 | | Y10 | | | | | |
| X11 | | Y11 | | | | | |
| X12 | | Y12 | | | | | |
| X13 | | Y13 | | | | | |
| X14 | | Y14 | | | | | |
| X15 | | Y15 | | | | | |
| X16 | | Y16 | | | | | |
| X17 | | Y17 | | | | | |
| X18 | | Y18 | | | | | |
| X19 | | Y19 | | | | | |
| X1A | | Y1A | | | | | |
| X1B | | Y1B | Output enable | | | | |
| X1C | | Y1C | Not used | | | | |
| X1D | | Y1D | | | | | |
| X1E | | Y1E | | | | | |
| X1F | | Y1F | | | | | |

### 3.7.4 Buffer memory address comparison

Sequence program change is required as the assignment of buffer memory differs.
For details of the buffer memories and sequence program, refer to the Digital-Analog Converter Module User's Manual.

| A62DA-S1 | | | Q64DAN | | |
|---|---|---|---|---|---|
| Address (decimal) | Name | Read/write | Address (decimal) | Name | Read/write |
| 0 | CH1 Digital value | R/W | 0 | D/A conversion enable/disable | R/W |
| 1 | CH2 Digital value | | 1 | CH1 Digital value | |
| 2 | CH1 Voltage upper limit check code | | 2 | CH2 Digital value | |
| 3 | CH2 Voltage lower limit check code | | 3 | CH3 Digital value | |
| 4 | CH1 Current upper limit check code | | 4 | CH4 Digital value | |
| 5 | CH2 Current lower limit check code | | 5 to 10 | System area (Not used) | - |
| | | | 11 | CH1 Setting value check code | R |
| | | | 12 | CH2 Setting value check code | |
| | | | 13 | CH3 Setting value check code | |
| | | | 14 | CH4 Setting value check code | |
| | | | 15 to 18 | System area (Not used) | - |
| | | | 19 | Error code | R |
| | | | 20 | Setting range (CH1 to CH4) | |
| | | | 21 | System area (Not used) | - |
| | | | 22 | Offset/gain setting mode<br>Offset specification | R/W |
| | | | 23 | Offset/gain setting mode<br>Gain specification | |
| | | | 24 | Offset/gain adjusted value specification | |
| | | | 25 to 157 | System area (Not used) | - |
| | | | 158 159 | Mode switching setting | R/W |
| | | | 160 to 199 | System area (Not used) | - |
| | | | 200 | Pass data classification setting | R/W |
| | | | 201 | System area (Not used) | - |
| | | | 202 | CH1 Industrial shipment settings offset value | R/W |
| | | | 203 | CH1 Industrial shipment settings gain value | |
| | | | 204 | CH2 Industrial shipment settings offset value | |
| | | | 205 | CH2 Industrial shipment settings gain value | |
| | | | 206 | CH3 Industrial shipment settings offset value | |
| | | | 207 | CH3 Industrial shipment settings gain value | |
| | | | 208 | CH4 Industrial shipment settings offset value | |
| | | | 209 | CH4 Industrial shipment settings gain value | |
| | | | 210 | CH1 User range settings offset value | |
| | | | 211 | CH1 User range settings gain value | |
| | | | 212 | CH2 User range settings offset value | |
| | | | 213 | CH2 User range settings gain value | |
| | | | 214 | CH3 User range settings offset value | |
| | | | 215 | CH3 User range settings gain value | |
| | | | 216 | CH4 User range settings offset value | |
| | | | 217 | CH4 User range settings gain value | |

## Memo

## 3.8 A68DAI(-S1)

### 3.8.1 Performance comparison

<table>
<tr><th colspan="2">Item</th><th>A68DAI (-S1)</th></tr>
<tr><td colspan="2">Digital input</td><td>(1)16-bit signed binary<br>(2)Setting range:<br><table><tr><th>Set resolution</th><th>Setting range</th></tr><tr><td>1/4000</td><td>0 to 4000</td></tr><tr><td>1/8000</td><td>0 to 8000</td></tr><tr><td>1/12000</td><td>0 to 12000</td></tr></table></td></tr>
<tr><td colspan="2">Analog output</td><td>0 to 20mADC<br>(External load resistance value: 0Ω to 600Ω)</td></tr>
<tr><td colspan="2">I/O characteristics</td><td><table><tr><th rowspan="2"></th><th colspan="3">Digital value resolution</th><th rowspan="2">*Analog output value</th></tr><tr><th>1/4000</th><th>1/8000</th><th>1/12000</th></tr><tr><td rowspan="3">Digital input value</td><td>4000</td><td>8000</td><td>12000</td><td>+20mA</td></tr><tr><td>2000</td><td>4000</td><td>6000</td><td>+12mA</td></tr><tr><td>0</td><td>0</td><td>0</td><td>+4mA</td></tr></table>*When offset value 4mA, gain value 20mA settings</td></tr>
<tr><td rowspan="3">Maximum resolution of analog value</td><td>1/4000</td><td>5.0μA</td></tr>
<tr><td>1/8000</td><td>2.5μA</td></tr>
<tr><td>1/12000</td><td>1.6μA</td></tr>
<tr><td colspan="2">Overall accuracy (accuracy at maximum analog output value)</td><td>±1.0% (±200μA)</td></tr>
<tr><td colspan="2">Conversion speed</td><td>Within 40ms/8 channels (same time for one channel)<br>Note) Time from when the digital input is written to when the specified analog value is reached</td></tr>
<tr><td colspan="2">Absolute maximum output</td><td>0 to +28mA<br>Note) Max. output current restricted by output protection circuit</td></tr>
<tr><td colspan="2">Number of analog output points</td><td>8 channels/module</td></tr>
</table>

○: Compatible, △: Partial change required, ×: Incompatible

<table>
<tr><th></th><th>Q68DAIN</th><th>Compatibility</th><th>Precautions for replacement</th></tr>
<tr><td></td><td>16-bit signed binary<br>(Normal resolution mode: -4096 to 4095,<br>High resolution mode: -12288 to 12287)</td><td>○</td><td></td></tr>
<tr><td></td><td>0 to 20mADC<br>(External load resistance value: 0Ω to 600Ω)</td><td>○</td><td></td></tr>
<tr><td></td><td>
<table>
<tr><th colspan="2" rowspan="2">Analog output range</th><th colspan="2">Normal resolution mode</th><th colspan="2">High resolution mode</th></tr>
<tr><th>Digital input value</th><th>Maximum resolution</th><th>Digital input value</th><th>Maximum resolution</th></tr>
<tr><td rowspan="3">Current</td><td>0 to 20mA</td><td rowspan="2">0 to 4000</td><td>5μA</td><td rowspan="2">0 to 12000</td><td>1.66μA</td></tr>
<tr><td>4 to 20mA</td><td>4μA</td><td>1.33μA</td></tr>
<tr><td>User range settings</td><td>-4000 to 4000</td><td>1.5μA</td><td>-12000 to 12000</td><td>0.83μA</td></tr>
</table>
</td><td>○</td><td></td></tr>
<tr><td></td><td>Ambient temperature 25±5°C: within ±0.1% (±20μA)<br>Ambient temperature 0 to 55°C: within ±0.3% (±60μA)</td><td>○</td><td></td></tr>
<tr><td></td><td>80μs/channel</td><td>○</td><td></td></tr>
<tr><td></td><td>21mA</td><td>○</td><td></td></tr>
<tr><td></td><td>8 channels/module</td><td>○</td><td></td></tr>
</table>

| Item | | A68DAI (-S1) | |
|---|---|---|---|
| Number of writes to $E^2$PROM | | - | |
| Output short protection | | - | |
| Isolation method | | Between the output terminal and programmable controller power supply: photocoupler isolation<br>(Between channels: non-isolation) | |
| Dielectric withstand voltage | | - | |
| Insulation resistance | | - | |
| Number of occupied I/O points | | 32 points<br>(I/O assignment: special 32 points) | |
| Connected terminal | | 38-point terminal block | |
| Applicable wire size | | 0.75 to 2$mm^2$ (Applicable tightening torque: 39 to 59N•cm) | |
| Applicable solderless terminal | | V1.25-3, V1.25-YS3A, V2-S3, V2-YS3A | |
| Internal current consumption (5VDC) | | 0.15A | |
| External power supply | Voltage | 21.6 to 26.4VDC | |
| | Current consumption | 0.4A | |
| | Inrush current | - | |
| Weight | | 0.65kg | |

○: Compatible, △: Partial change required, ×: Incompatible

| | Q68DAIN | Compatibility | Precautions for replacement |
|---|---|---|---|
| | Max. 100,000 times | ○ | |
| | Available | ○ | |
| | Between the I/O terminal and programmable controller power supply: photocoupler isolation<br>Between output channels: non-isolation<br>Between external power supply and analog output: transformer isolation | ○ | |
| | Between the I/O terminal and programmable controller power supply: 500VAC, for 1 minute | ○ | |
| | Between the I/O terminal and programmable controller power supply: 500VDC, 20MΩ or more | ○ | |
| | 16 points<br>(I/O assignment: intelligent 16 points) | △ | The number of occupied I/O points has changed to 16 points. |
| | 18-point terminal block | × | Wiring change is required. |
| | 0.3 to 0.75mm$^2$ | × | |
| | FG terminal: R1.25-3, 1.25-YS3, RAV1.25-3, V1.25-YS3A<br>Terminals other than FG: R1.25-3<br>(Sleeved solderless terminal cannot be used.) | × | |
| | 0.38A | △ | The recalculation of internal current consumption (5VDC) is required. |
| | 24VDC +20%, -15%<br>Ripple, spike 500mVp-p or less | ○ | |
| | 0.27A | | |
| | 2.5A, 230μs or less | - | |
| | 0.20kg | ○ | |

### 3.8.2 Functional comparison

○: Available, - : Not available

<table>
<tr><th>Item</th><th>Description</th><th>A68DAI (-S1)</th><th>Q68 DAIN</th><th>Precautions for replacement</th></tr>
<tr><td>D/A conversion enable/ disable function</td><td>Specifies whether to enable or disable the D/A conversion for each channel.</td><td>○</td><td>○</td><td>On Q68DAIN, by disabling the D/A conversion for the channels that are not used, the conversion speed can be shortened.</td></tr>
<tr><td>D/A output enable/disable function</td><td>Specifies whether to output the D/A conversion value or the offset value for each channel.<br>The conversion speed stays constant regardless of whether D/A output is enabled or disabled.</td><td>○</td><td>○</td><td>On Q68DAIN, the output enable/ disable is set with Y signal (CH□ Output enable/disable flag).</td></tr>
<tr><td>Synchronous output function</td><td>Obtains analog output synchronized with the programmable controller CPU.<br>The analog output will be updated after Synchronous output request (YD) is set to ON and the time specified as "programmable controller CPU processing time + 120μs" has elapsed.<br>However, the analog output will be fixed to CH1, and other channels (CH2 to CH8) cannot be used.<br>When the module is mounted on a remote I/O station, the analog output will not be synchronized because of a link scan delay if the synchronous output function is specified.</td><td>-</td><td>○</td><td></td></tr>
<tr><td>Analog output HOLD/ CLEAR function</td><td>Retains an analog value that was output when the programmable controller CPU is in the STOP status or an error occurs.</td><td>○</td><td>○</td><td>1) On Q68DAIN, the setting of HOLD/CLEAR is carried out for each channel.<br>2) For the Q68DAIN, this function is set with the intelligent function module switch setting.<br>3) Refer to ("Analog output status combination list" in the Digital-Analog Converter Module User's Manual to check the execution status of output.</td></tr>
<tr><td>Analog output test while the programmable controller CPU is in the STOP status</td><td>Outputs the analog value converted from a digital value when CH□ Output enable/disable flag is forcibly turned on while the programmable controller CPU is in the STOP status.
<table>
<tr><td rowspan="2">Setting combination</td><td>D/A conversion enable/disable</td><td colspan="2">Enable</td><td colspan="2">Disable</td></tr>
<tr><td>CH□ Output enable/disable flag</td><td>Enable</td><td>Disable</td><td>Enable</td><td>Disable</td></tr>
<tr><td colspan="2">Analog output test</td><td>Allowed</td><td>Not allowed</td><td colspan="2">Not allowed</td></tr>
</table></td><td>-</td><td>○</td><td></td></tr>
<tr><td>Resolution mode</td><td>Switches the resolution mode according to the application.<br>The resolution can be selected from 1/4000 or 1/12000.<br>The resolution mode is batch-set for all channels.</td><td>○</td><td>○</td><td></td></tr>
<tr><td>Online module replacement</td><td>Replaces a module without stopping the system.</td><td>-</td><td>○</td><td>Replaceable modules during online are the Process CPU and the Redundant CPU.</td></tr>
</table>

### 3.8.3 I/O signal comparison to programmable controller CPU

Sequence program change is required as the I/O signals differ.
For details of the I/O signals and sequence program, refer to the Digital-Analog Converter Module User's Manual.

| A68DAI (-S1) | | | | Q68DAIN | | | |
|---|---|---|---|---|---|---|---|
| Device No. | Signal name | Device No. | Signal name | Device No. | Signal name | Device No. | Signal name |
| X0 | Watchdog timer error flag | Y0 | Not used | X0 | Module READY | Y0 | Not used |
| X1 | D/A conversion READY flag | Y1 | | X1 | Not used | Y1 | CH1 Output enable/ disable flag |
| X2 | Error flag | Y2 | | X2 | | Y2 | CH2 Output enable/ disable flag |
| X3 | Not used | Y3 | | X3 | | Y3 | CH3 Output enable/ disable flag |
| X4 | | Y4 | | X4 | | Y4 | CH4 Output enable/ disable flag |
| X5 | | Y5 | | X5 | | Y5 | CH5 Output enable/ disable flag |
| X6 | | Y6 | | X6 | | Y6 | CH6 Output enable/ disable flag |
| X7 | | Y7 | | X7 | | Y7 | CH7 Output enable/ disable flag |
| X8 | | Y8 | | X8 | High resolution mode status flag | Y8 | CH8 Output enable/ disable flag |
| X9 | | Y9 | | X9 | Operating condition setting completion flag | Y9 | Operating condition setting request |
| XA | | YA | | XA | Offset/gain setting mode status flag | YA | User range write request |
| XB | | YB | | XB | Channel change completion flag | YB | Channel change request |
| XC | | YC | | XC | Setting value change completion flag | YC | Setting value change request |
| XD | | YD | Interlock signal for the RFRP and RTOP instructions when the A68DAI(-S1) is used in remote I/O station | XD | Synchronous output mode flag | YD | Synchronous output request |
| XE | | YE | | XE | Not used | YE | Not used |
| XF | | YF | | XF | Error flag | YF | Error clear request |
| X10 | | Y10 | D/A conversion output enable flag | | | | |
| X11 | | Y11 | | | | | |
| X12 | | Y12 | | | | | |
| X13 | | Y13 | | | | | |
| X14 | | Y14 | | | | | |
| X15 | | Y15 | | | | | |
| X16 | | Y16 | | | | | |
| X17 | | Y17 | | | | | |
| X18 | | Y18 | Error reset flag | | | | |
| X19 | | Y19 | Not used | | | | |
| X1A | | Y1A | | | | | |
| X1B | | Y1B | | | | | |
| X1C | | Y1C | | | | | |
| X1D | Interlock signal for the RFRP and RTOP instructions when the A68DAI(-S1) is used in remote I/O station | Y1D | | | | | |
| X1E | | Y1E | | | | | |
| X1F | | Y1F | | | | | |

### 3.8.4 Buffer memory address comparison

Sequence program change is required as the assignment of buffer memory differs.
For details of the buffer memories and sequence program, refer to the Digital-Analog Converter Module User's Manual.

| A68DAI(-S1) | | | Q68DAIN | | |
|---|---|---|---|---|---|
| Address (decimal) | Name | Read/write | Address (decimal) | Name | Read/write |
| 0 | D/A conversion enable/disable channel | R/W | 0 | D/A conversion enable/disable | R/W |
| 1 | CH1 Digital value | | 1 | CH1 Digital value | |
| 2 | CH2 Digital value | | 2 | CH2 Digital value | |
| 3 | CH3 Digital value | | 3 | CH3 Digital value | |
| 4 | CH4 Digital value | | 4 | CH4 Digital value | |
| 5 | CH5 Digital value | | 5 | CH5 Digital value | |
| 6 | CH6 Digital value | | 6 | CH6 Digital value | |
| 7 | CH7 Digital value | | 7 | CH7 Digital value | |
| 8 | CH8 Digital value | | 8 | CH8 Digital value | |
| 9 | Resolution of digital value | | 9 | System area (Not used) | - |
| 10 | CH1 Setting value check code | R | 10 | | |
| 11 | CH2 Setting value check code | | 11 | CH1 Setting value check code | R |
| 12 | CH3 Setting value check code | | 12 | CH2 Setting value check code | |
| 13 | CH4 Setting value check code | | 13 | CH3 Setting value check code | |
| 14 | CH5 Setting value check code | | 14 | CH4 Setting value check code | |
| 15 | CH6 Setting value check code | | 15 | CH5 Setting value check code | |
| 16 | CH7 Setting value check code | | 16 | CH6 Setting value check code | |
| 17 | CH8 Setting value check code | | 17 | CH7 Setting value check code | |
| | | | 18 | CH8 Setting value check code | |
| | | | 19 | Error code | |
| | | | 20 | Setting range (CH1 to CH4) | |
| | | | 21 | Setting range (CH5 to CH8) | |
| | | | 22 | Offset/gain setting mode<br>Offset specification | R/W |
| | | | 23 | Offset/gain setting mode<br>Gain specification | |
| | | | 24 | Offset/gain adjusted value specification | |
| | | | 25 | System area (Not used) | - |
| | | | to | | |
| | | | 157 | | |
| | | | 158 | Mode switching setting | R/W |
| | | | 159 | | |
| | | | 160 | System area (Not used) | - |
| | | | to | | |
| | | | 201 | | |
| | | | 202 | CH1 Industrial shipment settings offset value | R/W |
| | | | 203 | CH1 Industrial shipment settings gain value | |
| | | | 204 | CH2 Industrial shipment settings offset value | |
| | | | 205 | CH2 Industrial shipment settings gain value | |
| | | | 206 | CH3 Industrial shipment settings offset value | |
| | | | 207 | CH3 Industrial shipment settings gain value | |
| | | | 208 | CH4 Industrial shipment settings offset value | |

| Q68DAIN | | |
|---|---|---|
| Address (decimal) | Name | Read/write |
| 209 | CH4 Industrial shipment settings gain value | |
| 210 | CH5 Industrial shipment settings offset value | |
| 211 | CH5 Industrial shipment settings gain value | |
| 212 | CH6 Industrial shipment settings offset value | |
| 213 | CH6 Industrial shipment settings gain value | |
| 214 | CH7 Industrial shipment settings offset value | |
| 215 | CH7 Industrial shipment settings gain value | |
| 216 | CH8 Industrial shipment settings offset value | |
| 217 | CH8 Industrial shipment settings gain value | |
| 218 | CH1 User range settings offset value | |
| 219 | CH1 User range settings gain value | |
| 220 | CH2 User range settings offset value | |
| 221 | CH2 User range settings gain value | R/W |
| 222 | CH3 User range settings offset value | |
| 223 | CH3 User range settings gain value | |
| 224 | CH4 User range settings offset value | |
| 225 | CH4 User range settings gain value | |
| 226 | CH5 User range settings offset value | |
| 227 | CH5 User range settings gain value | |
| 228 | CH6 User range settings offset value | |
| 229 | CH6 User range settings gain value | |
| 230 | CH7 User range settings offset value | |
| 231 | CH7 User range settings gain value | |
| 232 | CH8 User range settings offset value | |
| 233 | CH8 User range settings gain value | |

## 3.9 A68DAV

### 3.9.1 Performance comparison

<table>
<tr><th colspan="2">Item</th><th>A68DAV</th></tr>
<tr><td colspan="2">Digital input</td><td>(1)16-bit signed binary<br>(2)Setting range:<br><table><tr><th>Setting resolution</th><th>Setting range</th></tr><tr><td>1/4000</td><td>-4000 to 4000</td></tr><tr><td>1/8000</td><td>-8000 to 8000</td></tr><tr><td>1/12000</td><td>-12000 to 12000</td></tr></table></td></tr>
<tr><td colspan="2">Analog output</td><td>-10 to 0 to 10VDC<br>(External load resistance value: 2kΩ to 1MΩ)</td></tr>
<tr><td colspan="2">I/O characteristics</td><td><table><tr><th rowspan="2"></th><th colspan="3">Digital value resolution</th><th rowspan="2">*Analog output value</th></tr><tr><th>1/4000</th><th>1/8000</th><th>1/12000</th></tr><tr><td rowspan="5">Digital input value</td><td>4000</td><td>8000</td><td>12000</td><td>+10V</td></tr><tr><td>2000</td><td>4000</td><td>6000</td><td>+5V</td></tr><tr><td>0</td><td>0</td><td>0</td><td>0V</td></tr><tr><td>-2000</td><td>-4000</td><td>-6000</td><td>-5V</td></tr><tr><td>-4000</td><td>-8000</td><td>-12000</td><td>-10V</td></tr></table>*When offset value 0V, gain value 10V settings</td></tr>
<tr><td rowspan="3">Maximum resolution of analog value</td><td>1/4000</td><td>2.5mV</td></tr>
<tr><td>1/8000</td><td>1.25mV</td></tr>
<tr><td>1/12000</td><td>0.83mV</td></tr>
<tr><td colspan="2">Overall accuracy (accuracy at maximum analog output value)</td><td>±1.0% (±100mV)</td></tr>
<tr><td colspan="2">Conversion speed</td><td>Within 40ms/8 channels (same time for one channel)<br>Note) Time from when the digital input is written to when the specified analog value is reached</td></tr>
<tr><td colspan="2">Absolute maximum output</td><td>-12 to +12V<br>Note) Max. output voltage restricted by output protection circuit</td></tr>
<tr><td colspan="2">Number of analog output points</td><td>8 channels/module</td></tr>
<tr><td colspan="2">Number of writes to $E^2$PROM</td><td>-</td></tr>
<tr><td colspan="2">Output short protection</td><td>-</td></tr>
<tr><td colspan="2">Isolation method</td><td>Between the output terminal and programmable controller power supply: photocoupler isolation<br>(Between channels: non-isolation)</td></tr>
<tr><td colspan="2">Dielectric withstand voltage</td><td>-</td></tr>
<tr><td colspan="2">Insulation resistance</td><td>-</td></tr>
<tr><td colspan="2">Number of occupied I/O points</td><td>32 points<br>(I/O assignment: special 32 points)</td></tr>
<tr><td colspan="2">Connected terminal</td><td>38-point terminal block</td></tr>
<tr><td colspan="2">Applicable wire size</td><td>0.75 to 2mm$^2$<br>(Applicable tightening torque: 39 to 59N•cm)</td></tr>
<tr><td colspan="2">Applicable solderless terminal</td><td>V1.25-3, V1.25-YS3A, V2-S3, V2-YS3A</td></tr>
<tr><td colspan="2">Internal current consumption (5VDC)</td><td>0.15A</td></tr>
</table>

○: Compatible, △: Partial change required, ×: Incompatible

<table>
<tr><th></th><th>Q68DAVN</th><th>Compatibility</th><th>Precautions for replacement</th></tr>
<tr><td></td><td>16-bit signed binary<br>(Normal resolution mode: -4096 to 4095,<br>High resolution mode: -12288 to 12287, -16384 to 16383)</td><td>○</td><td></td></tr>
<tr><td></td><td>-10 to 10VDC (External load resistance value: 1kΩ to 1MΩ)</td><td>○</td><td></td></tr>
<tr><td></td><td>
<table>
<tr><th colspan="2" rowspan="2">Analog output range</th><th colspan="2">Normal resolution mode</th><th colspan="2">High resolution mode</th></tr>
<tr><th>Digital input value</th><th>Maximum resolution</th><th>Digital input value</th><th>Maximum resolution</th></tr>
<tr><td rowspan="4">Voltage</td><td>0 to 5V</td><td rowspan="2">0 to 4000</td><td>1.25mV</td><td rowspan="2">0 to 12000</td><td>0.416mV</td></tr>
<tr><td>1 to 5V</td><td>1.0mV</td><td>0.333mV</td></tr>
<tr><td>-10 to 10V</td><td rowspan="2">-4000 to 4000</td><td>2.5mV</td><td>-16000 to 16000</td><td>0.625mV</td></tr>
<tr><td>User range settings</td><td>0.75mV</td><td>-12000 to 12000</td><td>0.333mV</td></tr>
</table>
</td><td>○</td><td></td></tr>
<tr><td></td><td>Ambient temperature 25±5°C: within ±0.1% (±10mV)<br>Ambient temperature 0 to 55°C: within ±0.3% (±30mV)</td><td>○</td><td></td></tr>
<tr><td></td><td>80μs/channel</td><td>○</td><td></td></tr>
<tr><td></td><td>±12V</td><td>○</td><td></td></tr>
<tr><td></td><td>8 channels/module</td><td>○</td><td></td></tr>
<tr><td></td><td>Max. 100,000 times</td><td>○</td><td></td></tr>
<tr><td></td><td>Available</td><td>○</td><td></td></tr>
<tr><td></td><td>Between the I/O terminal and programmable controller power supply:<br>photocoupler isolation<br>Between output channels: non-isolation<br>Between external power supply and analog output: transformer isolation</td><td>○</td><td></td></tr>
<tr><td></td><td>Between the I/O terminal and programmable controller power supply:<br>500VAC, for 1 minute</td><td>○</td><td></td></tr>
<tr><td></td><td>Between the I/O terminal and programmable controller power supply:<br>500VDC, 20MΩ or more</td><td>○</td><td></td></tr>
<tr><td></td><td>16 points<br>(I/O assignment: intelligent 16 points)</td><td>△</td><td>The number of occupied I/O points has changed to 16 points.</td></tr>
<tr><td></td><td>18-point terminal block</td><td>×</td><td rowspan="3">Wiring change is required.</td></tr>
<tr><td></td><td>0.3 to 0.75mm$^2$</td><td>×</td></tr>
<tr><td></td><td>FG terminal: R1.25-3, 1.25-YS3, RAV1.25-3, V1.25-YS3A<br>Terminals other than FG: R1.25-3<br>(Sleeved solderless terminal cannot be used.)</td><td>×</td></tr>
<tr><td></td><td>0.38A</td><td>△</td><td>The recalculation of internal current consumption (5VDC) is required.</td></tr>
</table>

| Item | | A68DAV | |
|---|---|---|---|
| External power supply | Voltage | 21.6 to 26.4VDC | |
| | Current consumption | 0.2A | |
| | Inrush current | - | |
| Weight | | 0.6kg | |

○: Compatible, △: Partial change required, ×: Incompatible

| | Q68DAVN | Compatibility | Precautions for replacement |
|---|---|---|---|
| | 24VDC +20%, -15%<br>Ripple, spike 500mVp-p or less | ○ | |
| | 0.20A | | |
| | 2.5A, 230μs or less | | |
| | 0.20kg | ○ | |

### 3.9.2 Functional comparison

○: Available, - : Not available

<table>
<tr><th>Item</th><th>Description</th><th>A68DAV</th><th>Q68DAVN</th><th>Precautions for replacement</th></tr>
<tr><td>D/A conversion enable/ disable function</td><td>Specifies whether to enable or disable the D/A conversion for each channel.</td><td>○</td><td>○</td><td>On Q68DAVN, by disabling the D/A conversion for the channels that are not used, the conversion speed can be shortened.</td></tr>
<tr><td>D/A output enable/ disable function</td><td>Specifies whether to output the D/A conversion value or the offset value for each channel.<br>The conversion speed stays constant regardless of whether D/A output is enabled or disabled.</td><td>○</td><td>○</td><td>On Q68DAVN, the output enable/ disable is set with Y signal (CH□ Output enable/disable flag).</td></tr>
<tr><td>Synchronous output function</td><td>Obtains analog output synchronized with the programmable controller CPU.<br>The analog output will be updated after Synchronous output request (YD) is set to ON and the time specified as "programmable controller CPU processing time + 120μs" has elapsed.<br>However, the analog output will be fixed to CH1, and other channels (CH2 to CH8) cannot be used.<br>When the module is mounted on a remote I/O station, the analog output will not be synchronized because of a link scan delay if the synchronous output function is specified.</td><td>-</td><td>○</td><td></td></tr>
<tr><td>Analog output HOLD/ CLEAR function</td><td>Retains an analog value that was output when the programmable controller CPU is in the STOP status or an error occurs.</td><td>○</td><td>○</td><td>1) On Q68DAVN, the setting of HOLD/CLEAR is carried out for each channel.<br>2) For the Q68DAVN, this function is set with the intelligent function module switch setting.<br>3) Refer to ("Analog output status combination list" in the Digital-Analog Converter Module User's Manual to check the execution status of output.</td></tr>
<tr><td>Analog output test while the programmable controller CPU is in the STOP status</td><td>Outputs the analog value converted from a digital value when CH□ Output enable/disable flag is forcibly turned on while the programmable controller CPU is in the STOP status.
<table>
<tr><td rowspan="2">Setting combi nation</td><td>D/A conversion enable/disable</td><td colspan="2">Enable</td><td colspan="2">Disable</td></tr>
<tr><td>CH□ Output enable/disable flag</td><td>Enable</td><td>Disable</td><td>Enable</td><td>Disable</td></tr>
<tr><td colspan="2">Analog output test</td><td>Allowed</td><td>Not allowed</td><td colspan="2">Not allowed</td></tr>
</table></td><td>-</td><td>○</td><td></td></tr>
<tr><td>Resolution mode</td><td>Switches the resolution mode according to the application.<br>The resolution can be selected from 1/4000, 1/12000, or 1/16000.<br>The resolution mode is batch-set for all channels.</td><td>○</td><td>○</td><td></td></tr>
<tr><td>Online module replacement</td><td>Replaces a module without stopping the system.</td><td>-</td><td>○</td><td>Replaceable modules during online are the Process CPU and the Redundant CPU.</td></tr>
</table>

### 3.9.3 I/O signal comparison to programmable controller CPU

Sequence program change is required as the I/O signals differ.
For details of the I/O signals and sequence program, refer to the Digital-Analog Converter Module User's Manual.

| A68DAV | | | | Q68DAVN | | | |
|---|---|---|---|---|---|---|---|
| Device No. | Signal name | Device No. | Signal name | Device No. | Signal name | Device No. | Signal name |
| X0 | Watchdog timer error flag | Y0 | Not used | X0 | Module READY | Y0 | Not used |
| X1 | D/A conversion READY flag | Y1 | | X1 | Not used | Y1 | CH1 Output enable/ disable flag |
| X2 | Error flag | Y2 | | X2 | | Y2 | CH2 Output enable/ disable flag |
| X3 | Not used | Y3 | | X3 | | Y3 | CH3 Output enable/ disable flag |
| X4 | | Y4 | | X4 | | Y4 | CH4 Output enable/ disable flag |
| X5 | | Y5 | | X5 | | Y5 | CH5 Output enable/ disable flag |
| X6 | | Y6 | | X6 | | Y6 | CH6 Output enable/ disable flag |
| X7 | | Y7 | | X7 | | Y7 | CH7 Output enable/ disable flag |
| X8 | | Y8 | | X8 | High resolution mode status flag | Y8 | CH8 Output enable/ disable flag |
| X9 | | Y9 | | X9 | Operating condition setting completion flag | Y9 | Operating condition setting request |
| XA | | YA | | XA | Offset/gain setting mode status flag | YA | User range write request |
| XB | | YB | | XB | Channel change completion flag | YB | Channel change request |
| XC | | YC | | XC | Setting value change completion flag | YC | Setting value change request |
| XD | | YD | Interlock signal for the RFRP and RTOP instructions when the A68DAV is used in remote I/O station | XD | Setting value change completion flag | YD | Synchronous output request |
| XE | | YE | | XE | Not used | YE | Not used |
| XF | | YF | | XF | Error flag | YF | Error clear request |
| X10 | | Y10 | D/A conversion output enable flag | | | | |
| X11 | | Y11 | | | | | |
| X12 | | Y12 | | | | | |
| X13 | | Y13 | | | | | |
| X14 | | Y14 | | | | | |
| X15 | | Y15 | | | | | |
| X16 | | Y16 | | | | | |
| X17 | | Y17 | | | | | |
| X18 | | Y18 | Error reset flag | | | | |
| X19 | | Y19 | Not used | | | | |
| X1A | | Y1A | | | | | |
| X1B | | Y1B | | | | | |
| X1C | | Y1C | | | | | |
| X1D | Interlock signal for the RFRP and RTOP instructions when the A68DAV is used in remote I/O station | Y1D | | | | | |
| X1E | | Y1E | | | | | |
| X1F | | Y1F | | | | | |

### 3.9.4 Buffer memory address comparison

Sequence program change is required as the assignment of buffer memory differs.
For details of the buffer memories and sequence program, refer to the Digital-Analog Converter Module User's Manual.

| A68DAV | | | Q68DAVN | | |
|---|---|---|---|---|---|
| Address (decimal) | Name | Read/write | Address (decimal) | Name | Read/write |
| 0 | D/A conversion enable/disable channel | R/W | 0 | D/A conversion enable/disable | R/W |
| 1 | CH1 Digital value | | 1 | CH1 Digital value | |
| 2 | CH2 Digital value | | 2 | CH2 Digital value | |
| 3 | CH3 Digital value | | 3 | CH3 Digital value | |
| 4 | CH4 Digital value | | 4 | CH4 Digital value | |
| 5 | CH5 Digital value | | 5 | CH5 Digital value | |
| 6 | CH6 Digital value | | 6 | CH6 Digital value | |
| 7 | CH7 Digital value | | 7 | CH7 Digital value | |
| 8 | CH8 Digital value | | 8 | CH8 Digital value | |
| 9 | Resolution of digital value | | 9 | System area (Not used) | |
| 10 | CH1 Setting value check code | R | 10 | | |
| 11 | CH2 Setting value check code | | 11 | CH1 Setting value check code | R |
| 12 | CH3 Setting value check code | | 12 | CH2 Setting value check code | |
| 13 | CH4 Setting value check code | | 13 | CH3 Setting value check code | |
| 14 | CH5 Setting value check code | | 14 | CH4 Setting value check code | |
| 15 | CH6 Setting value check code | | 15 | CH5 Setting value check code | |
| 16 | CH7 Setting value check code | | 16 | CH6 Setting value check code | |
| 17 | CH8 Setting value check code | | 17 | CH7 Setting value check code | |
| | | | 18 | CH8 Setting value check code | |
| | | | 19 | Error code | |
| | | | 20 | Setting range (CH1 to CH4) | |
| | | | 21 | Setting range (CH5 to CH8) | |
| | | | 22 | Offset/gain setting mode<br>Offset specification | R/W |
| | | | 23 | Offset/gain setting mode<br>Gain specification | |
| | | | 24 | Offset/gain adjusted value specification | |
| | | | 25 | System area (Not used) | - |
| | | | to | | |
| | | | 157 | | |
| | | | 158 | Mode switching setting | R/W |
| | | | 159 | | |
| | | | 160 | System area (Not used) | - |
| | | | to | | |
| | | | 201 | | |
| | | | 202 | CH1 Industrial shipment settings offset value | R/W |
| | | | 203 | CH1 Industrial shipment settings gain value | |
| | | | 204 | CH2 Industrial shipment settings offset value | |
| | | | 205 | CH2 Industrial shipment settings gain value | |
| | | | 206 | CH3 Industrial shipment settings offset value | |
| | | | 207 | CH3 Industrial shipment settings gain value | |
| | | | 208 | CH4 Industrial shipment settings offset value | |

| Q68DAVN | | |
|---|---|---|
| Address (decimal) | Name | Read/write |
| 209 | CH4 Industrial shipment settings gain value | |
| 210 | CH5 Industrial shipment settings offset value | |
| 211 | CH5 Industrial shipment settings gain value | |
| 212 | CH6 Industrial shipment settings offset value | |
| 213 | CH6 Industrial shipment settings gain value | |
| 214 | CH7 Industrial shipment settings offset value | |
| 215 | CH7 Industrial shipment settings gain value | |
| 216 | CH8 Industrial shipment settings offset value | |
| 217 | CH8 Industrial shipment settings gain value | |
| 218 | CH1 User range settings offset value | |
| 219 | CH1 User range settings gain value | |
| 220 | CH2 User range settings offset value | |
| 221 | CH2 User range settings gain value | R/W |
| 222 | CH3 User range settings offset value | |
| 223 | CH3 User range settings gain value | |
| 224 | CH4 User range settings offset value | |
| 225 | CH4 User range settings gain value | |
| 226 | CH5 User range settings offset value | |
| 227 | CH5 User range settings gain value | |
| 228 | CH6 User range settings offset value | |
| 229 | CH6 User range settings gain value | |
| 230 | CH7 User range settings offset value | |
| 231 | CH7 User range settings gain value | |
| 232 | CH8 User range settings offset value | |
| 233 | CH8 User range settings gain value | |

## Memo

# 4 TEMPERATURE INPUT MODULE REPLACEMENT

## 4.1 List of Temperature Input Module Alternative Models for Replacement

| Production discontinuation | | Transition to Q series | |
|---|---|---|---|
| Product | Model | Model | Remarks (Restrictions) |
| Temperature input module | A616TD<br>A60MXT(N) | Q64TD | 1) External wiring : Cable size is changed.<br>2) Number of slots : Changed (4 modules are required when one A616TD and one A60MXT(N) are used.)<br>3) Program : The number of occupied I/O points, I/O signals, and buffer memory addresses are changed.<br>4) Performance specifications change: 4CH/module<br>5) Functional specifications: Not changed |
| | | Q68TD-G-H02<br>Q68TD-G-H01 | 1) External wiring : Connector wiring and cable size are changed.<br>2) Number of slots : Changed (2 modules are required when one A616TD and one A60MXT(N) are used.)<br>3) Program : The number of occupied I/O points, I/O signals, and buffer memory addresses are changed.<br>4) Performance specifications change: 8CH/module<br>5) Functional specifications: The disconnection detection function is equipped (only in the Q68TD-G-H02). Transformer isolation is provided between channels. |
| | A68RD3N | Q64RD | 1) External wiring : Cable size is changed.<br>2) Number of slots: : Changed (2 modules are required.)<br>3) Program : The number of occupied I/O points, I/O signals, and buffer memory addresses are changed.<br>4) Performance specifications change: 4CH/module<br>5) Functional specifications: Not changed |
| | | Q64RD-G | 1) External wiring : Cable size is changed.<br>2) Number of slots : Changed (2 modules are required.)<br>3) Program : The number of occupied I/O points, I/O signals, and buffer memory addresses are changed.<br>4) Performance specifications change: 4CH/module<br>5) Functional specifications: RTD Ni100-compliant and transformer isolation is provided between channels. |
| | | Q68RD3-G | 1) External wiring : Connector wiring and cable size are changed.<br>2) Number of slots : Not changed<br>3) Program : The number of occupied I/O points, I/O signals, and buffer memory addresses are changed.<br>4) Performance specifications change: Resolution and conversion speed<br>5) Functional specifications: 32-bit output is not available. RTD Ni100-compliant and transformer isolation is provided between channels. |
| | A68RD4N | Q64RD | 1) External wiring : Cable size is changed.<br>2) Number of slots : Changed (2 modules are required.)<br>3) Program : The number of occupied I/O points, I/O signals, and buffer memory addresses are changed.<br>4) Performance specifications change: 4CH/module<br>5) Functional specifications: Not changed |
| | | Q64RD-G | 1) External wiring : Cable size is changed.<br>2) Number of slots : Changed (2 modules are required.)<br>3) Program : The number of occupied I/O points, I/O signals, and buffer memory addresses are changed.<br>4) Performance specifications change: 4CH/module<br>5) Functional specifications: RTD Ni100-compliant and transformer isolation is provided between channels. |

## 4.2 A616TD (Replacement to the Q64TD)

### 4.2.1 Performance comparison

#### (1) Performance comparison list

| Item | | A616TD (When using the A60MXT and A60MXTN together) | |
|---|---|---|---|
| Temperature sensor input | | -200 to 1800°C | |
| Output | Digital output value | 16-bit signed binary<br>(0 to 4000) (Data part: 12 bits) | |
| | Detected temperature value | 16-bit signed binary<br>(-2000 to 18000: value up to the first decimal place × 10) | |
| Applicable thermocouple | | Refer to Section 4.2.1 (2). | |
| Measured temperature range accuracy | | Refer to Section 4.2.1 (2). | |
| Overall accuracy | | Refer to the table in Section 4.2.1 (2).<br>Measured temperature range accuracy ±0.5°C | |
| Maximum conversion speed | | 50ms/channel | |
| Isolation method | | Between the input terminal and programmable controller power supply: photocoupler isolation<br>Between channels: non-isolation (1MΩ resistor isolation) | |
| Number of temperature sensor input points | | 15 points/module (A60MXT, A60MXTN)<br>(The A60MXT and A60MXTN can be mounted up to seven in total to one A616TD.) | |
| Number of occupied I/O points | | 32 points<br>(I/O assignment: special 32 points) | |
| External connection system | | 38-point terminal block | |
| Applicable wire size | | 0.75 to 2mm$^2$<br>(Applicable tightening torque: 39 to 59N•cm) | |
| Applicable solderless terminal | | V1.25-3, V1.25-YS3A, V2-S3, V2-YS3A | |
| Internal current consumption (5VDC) | | 1.0A | |
| Weight | | 0.85kg | |

*1 Calculate the accuracy in the following method.
(Accuracy) = (Conversion accuracy) + (Temperature characteristics) × (Operating ambient temperature variation) + (Cold junction compensation accuracy)
An operating ambient temperature variation indicates a deviation of the operating ambient temperature from the 25±5°C range.

○: Compatible, △: Partial change required, ×: Incompatible

<table>
<tr><th></th><th>Q64TD</th><th>Compatibility</th><th>Precautions for replacement</th></tr>
<tr><td></td><td>-270 to 1820°C</td><td>○</td><td></td></tr>
<tr><td></td><td>16-bit signed binary (Scaling value)</td><td>○</td><td></td></tr>
<tr><td></td><td>16-bit signed binary<br>(-2700 to 18200: value up to the first decimal place × 10)</td><td>○</td><td></td></tr>
<tr><td></td><td>Refer to Section 4.2.1 (2).</td><td>△</td><td>As the applicable thermocouples and thermocouple compliance standards differ, refer to Section 4.2.1 (2) to check the specifications, and use the thermocouple that can be used with the Q64TD.</td></tr>
<tr><td></td><td>Refer to Section 4.2.1 (2).</td><td>△</td><td rowspan="2">As they depend on the applicable thermocouple and measured temperature range, refer to Section 4.2.1 (2) to check the specifications.</td></tr>
<tr><td></td><td>*1</td><td>○</td></tr>
<tr><td></td><td>40ms/channel</td><td>○</td><td></td></tr>
<tr><td></td><td><table>
<tr><th>Isolated area</th><th>Isolation method</th><th>Dielectric withstand voltage</th><th>Insulation resistance</th></tr>
<tr><td>Between thermocouple input and earth</td><td>Transformer isolation</td><td rowspan="2">1780VrmsAC/3 cycles (altitude 2000m)</td><td>500VDC 100MΩ or more</td></tr>
<tr><td>Between thermocouple input channels</td><td>Transformer isolation</td><td>500VDC 10MΩ or more</td></tr>
<tr><td>Between cold junction compensation input (Pt100) and ground</td><td>Non-isolation</td><td>-</td><td>-</td></tr>
</table></td><td>○</td><td></td></tr>
<tr><td></td><td>4 channels/module</td><td>×</td><td>Consider replacement with multiple Q64TD.</td></tr>
<tr><td></td><td>16 points<br>(I/O assignment: intelligent 16 points)</td><td>△</td><td>The number of occupied I/O points has changed to 16 points.</td></tr>
<tr><td></td><td>18-point terminal block</td><td>×</td><td rowspan="3">Wiring change is required.</td></tr>
<tr><td></td><td>0.3 to 0.75mm$^2$</td><td>×</td></tr>
<tr><td></td><td>1.25-3, R1.25-3<br>(Sleeved solderless terminal cannot be used.)</td><td>×</td></tr>
<tr><td></td><td>0.50A</td><td>○</td><td></td></tr>
<tr><td></td><td>0.25kg</td><td>○</td><td></td></tr>
</table>

### (2) Applicable thermocouple and measured temperature range accuracy

| A616TD | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| JIS | ANSI | DIN | BS | Measurement range number | 1 | 2 | 3 | 4 |
| | | | | Allowable input voltage range [mV] | -12.5 to 12.5 | 0 to 25 | 0 to 50 | 0 to 100 |
| B | B | - | PtRh30-PtRh6 | Measured temperature range [°C] | 100 to 1500 | 100 to 1800 | 100 to 1800 | 100 to 1800 |
| | | | | Accuracy at 25°C [%] | - | ±0.5 | - | - |
| | | | | Temperature drift [%/°C] | | ±0.013 | | |
| R | R | - | PtRh13-Pt | Measured temperature range [°C] | 0 to 1000 | 0 to 1700 | 0 to 1700 | 0 to 1700 |
| | | | | Accuracy at 25°C [%] | - | ±0.4 | - | - |
| | | | | Temperature drift [%/°C] | | ±0.011 | | |
| S | S | PtRh-Pt | PtRh10-Pt | Measured temperature range [°C] | 0 to 1200 | 0 to 1700 | 0 to 1700 | 0 to 1700 |
| | | | | Accuracy at 25°C [%] | - | ±0.4 | - | - |
| | | | | Temperature drift [%/°C] | | ±0.011 | | |
| K | K | NiCr-Ni | NiCr-NiAl | Measured temperature range [°C] | -200 to 250 | 0 to 500 | 0 to 1000 | 0 to 1300 |
| | | | | Accuracy at 25°C [%] | ±0.4 | ±0.3 | ±0.3 | ±0.5 |
| | | | | Temperature drift [%/°C] | ±0.011 | ±0.01 | ±0.01 | ±0.013 |
| E | E | - | NiCr-CuNi | Measured temperature range [°C] | -200 to 150 | 0 to 300 | 0 to 600 | 0 to 1000 |
| | | | | Accuracy at 25°C [%] | ±0.4 | ±0.3 | ±0.3 | ±0.4 |
| | | | | Temperature drift [%/°C] | ±0.011 | ±0.01 | ±0.01 | ±0.011 |
| J | J | - | Fe-CuNi | Measured temperature range [°C] | -200 to 200 | 0 to 400 | 0 to 800 | 0 to 1200 |
| | | | | Accuracy at 25°C [%] | ±0.4 | ±0.3 | ±0.3 | ±0.4 |
| | | | | Temperature drift [%/°C] | ±0.011 | ±0.01 | ±0.01 | ±0.011 |
| T | T | - | Cu-CuNi | Measured temperature range [°C] | -200 to 200 | 0 to 400 | 0 to 400 | 0 to 400 |
| | | | | Accuracy at 25°C [%] | ±0.5 | ±0.3 | - | - |
| | | | | Temperature drift [%/°C] | ±0.013 | ±0.01 | | |
| - | - | Fe-CuNi | - | Measured temperature range [°C] | -100 to 200 | 0 to 400 | 0 to 800 | 0 to 900 |
| | | | | Accuracy at 25°C [%] | - | ±0.3 | ±0.3 | ±0.5 |
| | | | | Temperature drift [%/°C] | | ±0.01 | ±0.01 | ±0.013 |
| - | - | Cu-CuNi | - | Measured temperature range [°C] | -100 to 200 | 0 to 400 | 0 to 600 | 0 to 600 |
| | | | | Accuracy at 25°C [%] | - | ±0.3 | ±0.4 | - |
| | | | | Temperature drift [%/°C] | | ±0.01 | ±0.011 | |

| Q64TD | | | | | |
|---|---|---|---|---|---|
| JIS | Specifications | | | | |
| B | Measured temperature range [°C] | 0 to 600 | 600 to 800 | 800 to 1700 | 1700 to 1820 |
| | Conversion accuracy at 25±0.5°C [°C] | - | ±3.0 | ±2.5 | - |
| | Temperature characteristics [°C] | | ±0.4 | ±0.4 | |
| R | Measured temperature range [°C] | -50 to 0 | 0 to 300 | 300 to 1600 | 1600 to 1760 |
| | Conversion accuracy at 25±0.5°C [°C] | - | ±2.5 | ±2.0 | - |
| | Temperature characteristics [°C] | | ±0.4 | ±0.3 | |
| S | Measured temperature range [°C] | -50 to 0 | 0 to 300 | 300 to 1600 | 1600 to 1760 |
| | Conversion accuracy at 25±0.5°C [°C] | - | ±2.5 | ±2.0 | - |
| | Temperature characteristics [°C] | | ±0.4 | ±0.3 | |
| K | Measured temperature range [°C] | -270 to -200 | -200 to 0 | 0 to 1200 | 1200 to 1370 |
| | Conversion accuracy at 25±0.5°C [°C] | - | Larger value of ±0.5°C, or ±0.5% of measured temperature | Larger value of ±0.5°C, or ±0.25% of measured temperature | - |
| | Temperature characteristics [°C] | | Larger value of ±0.06°C, or ±0.2% of measured temperature | Larger value of ±0.06°C, or ±0.02% of measured temperature | |
| E | Measured temperature range [°C] | -270 to -200 | -200 to 0 | 0 to 900 | 900 to 1000 |
| | Conversion accuracy at 25±0.5°C [°C] | - | Larger value of ±0.5°C, or ±0.5% of measured temperature | Larger value of ±0.5°C, or ±0.25% of measured temperature | - |
| | Temperature characteristics [°C] | | Larger value of ±0.06°C, or ±0.15% of measured temperature | Larger value of ±0.06°C, or ±0.02% of measured temperature | |
| J | Measured temperature range [°C] | -210 to -40 | -40 to 750 | 750 to 1200 | - |
| | Conversion accuracy at 25±0.5°C [°C] | - | Larger value of ±0.5°C, or ±0.25% of measured temperature | - | - |
| | Temperature characteristics [°C] | - | Larger value of ±0.06°C, or ±0.02% of measured temperature | - | - |
| T | Measured temperature range [°C] | -270 to -200 | -200 to 0 | 0 to 350 | 350 to 400 |
| | Conversion accuracy at 25±0.5°C [°C] | - | Larger value of ±0.5°C, or ±0.5% of measured temperature | Larger value of ±0.5°C, or ±0.25% of measured temperature | - |
| | Temperature characteristics [°C] | - | Larger value of ±0.06°C, or ±0.1% of measured temperature | Larger value of ±0.06°C, or ±0.02% of measured temperature | - |
| N | Measured temperature range [°C] | -270 to -200 | -200 to 0 | 0 to 1250 | 1250 to 1300 |
| | Conversion accuracy at 25±0.5°C [°C] | - | Larger value of ±0.5°C, or ±0.5% of measured temperature | Larger value of ±0.5°C, or ±0.25% of measured temperature | - |
| | Temperature characteristics [°C] | - | Larger value of ±0.06°C, or ±0.2% of measured temperature | Larger value of ±0.06°C, or ±0.02% of measured temperature | - |

### 4.2.2 Functional comparison

○ : Available, - : Not available

| Item | Description | A616TD | Q64TD | Precautions for replacement |
|---|---|---|---|---|
| Temperature conversion function | Imports temperature data. | ○ | ○ | |
| Conversion enable/disable function | Sets whether to enable/disable a conversion per channel. | ○ | ○ | |
| Disconnection detection function | Detects a disconnection of the connected thermocouple of each channel. | ○ | ○ | On Q64TD, the channel set conversion enable automatically performs the disconnection detection. |
| Temperature conversion value storage | Stores imported temperature data in the buffer memory. | ○ | ○ | |
| Input type selection function | Sets an input type for each channel. | ○ | ○ | For the Q64TD, this function is set with the intelligent function module switch setting. |
| Warning output function | Outputs a warning when the temperature exceeds the set temperature range. | - | ○ | |
| Temperature conversion system | Processes the detected temperature by specified method. | - | ○ | |
| Scaling function | Converts a measured temperature value into a percent value (%) in set width. | - | ○ | |
| Pt100 cold junction compensation enable/disable setting function | Sets whether the cold junction compensation using the Pt100 attached to the terminal is performed or not. | - | ○ | |
| Offset/gain setting function | Performs linear correction by individually compensating any given 2 points (offset value/gain value) within the effective range. | - | ○ | |
| Error correction function | For all input ranges, the function allows compensating the temperature measurement value by part of the compensation value the errors compensation value. | ○ | - | Perform the error correction by the offset/gain setting of the Q64TD. |
| Online module replacement | Replaces a module without stopping the system. | - | ○ | Replaceable modules during online are the Process CPU and the Redundant CPU. |

### 4.2.3 I/O signal comparison to programmable controller CPU

Sequence program change is required as the I/O signals differ.
For details of the I/O signals and sequence program, refer to the Thermocouple Input Module/Channel Isolated Thermocouple/Micro Voltage Input Module User's Manual.

| A616TD | | | | Q64TD | | | |
|---|---|---|---|---|---|---|---|
| Device No. | Signal name | Device No. | Signal name | Device No. | Signal name | Device No. | Signal name |
| X0 | Watchdog timer error | Y0 | Not used | X0 | Module READY | Y0 | Not used |
| X1 | A/D conversion READY | Y1 | | X1 | CH1 Offset/gain setting status signal | Y1 | CH1 Offset setting request |
| X2 | Error flag | Y2 | | X2 | CH2 Offset/gain setting status signal | Y2 | CH1 Gain setting request |
| X3 | Disconnection error detection | Y3 | | X3 | CH3 Offset/gain setting status signal | Y3 | CH2 Offset setting request |
| X4 | Digital output value out-of-range detection | Y4 | | X4 | CH4 Offset/gain setting status signal | Y4 | CH2 Gain setting request |
| X5 | Detected temperature value out-of-range detection | Y5 | | X5 | Not used | Y5 | CH3 Offset setting request |
| X6 | Not used | Y6 | | X6 | | Y6 | CH3 Gain setting request |
| X7 | | Y7 | | X7 | | Y7 | CH4 Offset setting request |
| X8 | | Y8 | | X8 | | Y8 | CH4 Gain setting request |
| X9 | | Y9 | | X9 | Operating condition setting completion signal | Y9 | Operating condition setting request |
| XA | | YA | | XA | Offset/gain setting mode status flag | YA | User range write request |
| XB | | YB | | XB | Not used | YB | Not used |
| XC | | YC | | XC | Disconnection detection signal | YC | |
| XD | | YD | Interlock signal for the RFRP and RTOP instructions when the A616TD is used in remote I/O station | XD | Warning output signal | YD | |
| XE | | YE | | XE | Conversion completion flag | YE | |
| XF | | YF | | XF | Error flag | YF | Error clear request |
| X10 | | Y10 | Detected temperature value LED display request signal | | | | |
| X11 | | Y11 | Not used | | | | |
| X12 | | Y12 | | | | | |
| X13 | | Y13 | | | | | |
| X14 | | Y14 | | | | | |
| X15 | | Y15 | | | | | |
| X16 | | Y16 | | | | | |
| X17 | | Y17 | | | | | |
| X18 | | Y18 | | | | | |
| X19 | | Y19 | | | | | |
| X1A | | Y1A | | | | | |
| X1B | | Y1B | | | | | |
| X1C | | Y1C | | | | | |
| X1D | Interlock signal for the RFRP and RTOP instructions when the A616TD is used in remote I/O station | Y1D | | | | | |
| X1E | | Y1E | | | | | |
| X1F | | Y1F | | | | | |

### 4.2.4 Buffer memory address comparison

Sequence program change is required as the assignment of buffer memory differs.
For details of buffer memories and sequence programs, refer to the Thermocouple Input Module/ Channel Isolated Thermocouple/Micro Voltage Input Module User's Manual.

| A616TD | | | | Q64TD | | |
|---|---|---|---|---|---|---|
| Address (hex) | Name | | Read/write | Address (hex) | Name | Read/write |
| 00 | Data format selection | | R/W | 00 | Conversion enable/disable setting | R/W |
| 01 | Error code storage | | | 01 | CH1 Time/count averaging setting | |
| 02 | Error occurrence A60MX□CONNECT No. storage | | | 02 | CH2 Time/count averaging setting | |
| 03 | Thermocouple type setting error channel number storage | | | 03 | CH3 Time/count averaging setting | |
| 04 | Current sampling period storage | | R | 04 | CH4 Time/count averaging setting | |
| 05 to 0E | System area (Not used) | | - | 05 to 08 | System area (Not used) | - |
| 0F | Conversion enable/ disable specification | A616TD | R/W | 09 | Averaging processing selection | R/W |
| 10 to 17 | | Multiplexer module | | 0A | Conversion completion flag | R |
| 18 | Setting data set request | | | 0B | CH1 Measured temperature value | |
| 19 to 1F | System area (Not used) | | - | 0C | CH2 Measured temperature value | |
| 20 to 27 | Disconnection detection enable/disable specification | | R/W | 0D | CH3 Measured temperature value | |
| 28 to 2F | System area (Not used) | | - | 0E | CH4 Measured temperature value | |
| 30 to 3F | Digital output value temperature setting | | R/W | 0F to 12 | System area (Not used) | - |
| 40 to 47 | Disconnection detection channel number storage | | | 13 | Error code | R |
| 48 to 4F | System area (Not used) | | - | 14 | Setting range | |
| 50 to 57 | Digital output value out-of-range Channel number storage | | R/W | 15 to 2E | System area (Not used) | - |
| | | | | 2F | Warning output enable/disable setting | R/W |
| 58 to 5F | System area (Not used) | | - | 30 | Warning output flag | R |
| 60 to 67 | Detected temperature value out-of-range Channel number storage | | R/W | 31 | Disconnection detection flag | |
| | | | | 32 | CH1 Scaling value | |
| 68 to 6F | System area (Not used) | | - | 33 | CH2 Scaling value | |
| 70 to 7F | INPUT channel Digital output value storage | | R | 34 | CH3 Scaling value | |
| | | | | 35 | CH4 Scaling value | |
| 80 to FF | Error correction value setting | | R/W | 36 to 3D | System area (Not used) | |
| 100 to 17F | Thermocouple type setting | | | 3E | CH1 Scaling range lower limit value | R/W |
| 180 to 1FF | MX CH.channel Digital output value storage | | R | 3F | CH1 Scaling range upper limit value | |
| | | | | 40 | CH2 Scaling range lower limit value | |
| 200 to 27F | MX CH.channel Detected temperature value storage | | | 41 | CH2 Scaling range upper limit value | |
| | | | | 42 | CH3 Scaling range lower limit value | |
| | | | | 43 | CH3 Scaling range upper limit value | |
| | | | | 44 | CH4 Scaling range lower limit value | |
| | | | | 45 | CH4 Scaling range upper limit value | |
| | | | | 46 to 4D | System area (Not used) | - |
| | | | | 4E | CH1 Scaling width lower limit value | R/W |
| | | | | 4F | CH1 Scaling width upper limit value | |
| | | | | 50 | CH2 Scaling width lower limit value | |
| | | | | 51 | CH2 Scaling width upper limit value | |
| | | | | 52 | CH3 Scaling width lower limit value | |
| | | | | 53 | CH3 Scaling width upper limit value | |
| | | | | 54 | CH4 Scaling width lower limit value | |
| | | | | 55 | CH4 Scaling width upper limit value | |
| | | | | 56 | CH1 Warning output lower/lower limit value | |
| | | | | 57 | CH1 Warning output lower/upper limit value | |

| Q64TD | | |
|---|---|---|
| Address (hex) | Name | Read/write |
| 58 | CH1 Warning output upper/lower limit value | R/W |
| 59 | CH1 Warning output upper/upper limit value | |
| 5A | CH2 Warning output lower/lower limit value | |
| 5B | CH2 Warning output lower/upper limit value | |
| 5C | CH2 Warning output upper/lower limit value | |
| 5D | CH2 Warning output upper/upper limit value | |
| 5E | CH3 Warning output lower/lower limit value | |
| 5F | CH3 Warning output lower/upper limit value | |
| 60 | CH3 Warning output upper/lower limit value | |
| 61 | CH3 Warning output upper/upper limit value | |
| 62 | CH4 Warning output lower/lower limit value | |
| 63 | CH4 Warning output lower/upper limit value | |
| 64 | CH4 Warning output upper/lower limit value | |
| 65 | CH4 Warning output upper/upper limit value | |
| 66 to 75 | System area (Not used) | - |
| 76 | CH1 Offset temperature setting value | R/W |
| 77 | CH1 Gain temperature setting value | |
| 78 | CH2 Offset temperature setting value | |
| 79 | CH2 Gain temperature setting value | |
| 7A | CH3 Offset temperature setting value | |
| 7B | CH3 Gain temperature setting value | |
| 7C | CH4 Offset temperature setting value | |
| 7D | CH4 Gain temperature setting value | |
| 7E to 9D | System area (Not used) | - |
| 9E to 9F | Mode switching setting | R/W |
| A0 | CH1 Factory default offset value | |
| A1 | CH1 Factory default gain value | |
| A2 | CH1 User range settings offset value | |
| A3 | CH1 User range settings gain value | |
| A4 | CH1 User range settings thermal (L) | |
| A5 | EMF offset value (H) | |
| A6 | CH1 User range settings thermal (L) | |
| A7 | EMF gain value (H) | |
| A8 | CH2 Factory default offset value | |
| A9 | CH2 Factory default gain value | |
| AA | CH2 User range settings offset value | |
| AB | CH2 User range settings gain value | |
| AC | CH2 User range settings thermal (L) | |
| AD | EMF offset value (H) | |
| AE | CH2 User range settings thermal (L) | |
| AF | EMF gain value (H) | |
| B0 | CH3 Factory default offset value | |
| B1 | CH3 Factory default gain value | |

| Q64TD | | |
|---|---|---|
| Address (hex) | Name | Read/write |
| B2 | CH3 User range settings offset value | R/W |
| B3 | CH3 User range settings gain value | |
| B4 | CH3 User range settings thermal(L) EMF offset value(H) | |
| B5 | | |
| B6 | CH3 User range settings thermal(L) EMF gain value(H) | |
| B7 | | |
| B8 | CH4 Factory default offset value | |
| B9 | CH4 Factory default gain value | |
| BA | CH4 User range settings offset value | |
| BB | CH4 User range settings gain value | |
| BC | CH4 User range settings thermal(L) EMF offset value(H) | |
| BD | | |
| BE | CH4 User range settings thermal(L) EMF gain value(H) | |
| BF | | |
| C0 to | System area (Not used) | - |

## Memo

## 4.3 A616TD (Replacement to the Q68TD-G-H02, Q68TD-G-H01)

### 4.3.1 Performance comparison

#### (1) Performance comparison list

| Item | | A616TD (When using the A60MXT and A60MXTN together) | |
|---|---|---|---|
| Temperature sensor input | | -200 to 1800°C | |
| Output | Digital output value | 16-bit signed binary<br>(0 to 4000) (Data part: 12 bits) | |
| | Detected temperature value | 16-bit signed binary<br>(-2000 to 18000: value up to the first decimal place × 10) | |
| Applicable thermocouple | | Refer to Section 4.3.1 (2). | |
| Measured temperature range accuracy | | Refer to Section 4.3.1 (2). | |
| Overall accuracy | | Refer to the table in Section 4.3.1 (2).<br>Measured temperature range accuracy ±0.5°C | |
| Maximum conversion speed | | 50ms/channel | |
| Isolation method | | Between the input terminal and programmable controller power supply: photocoupler isolation<br>Between channels: non-isolation (1MΩ resistor isolation) | |
| Disconnection detection | | Available | |
| Number of temperature sensor input points | | 15 points/module (A60MXT, A60MXTN)<br>(The A60MXT and A60MXTN can be mounted up to seven in total to one A616TD.) | |
| Number of occupied I/O points | | 32 points<br>(I/O assignment: special 32 points) | |
| External connection system | | 38-point terminal block | |
| External device connector (sold separately) | | - | |
| Applicable wire size | | 0.75 to 2mm$^2$<br>(Applicable tightening torque: 39 to 59N•cm) | |
| Applicable solderless terminal | | V1.25-3, V1.25-YS3A, V2-S3, V2-YS3A | |
| Internal current consumption (5VDC) | | 1.0A | |
| Weight | | 0.85kg | |

○: Compatible, △: Partial change required, ×: Incompatible

<table>
<tr><th></th><th colspan="2">Q series</th><th>Compatibility</th><th>Precautions for replacement</th></tr>
<tr><th></th><th>Q68TD-G-H02</th><th>Q68TD-G-H01*1</th><th></th><th></th></tr>
<tr><td></td><td colspan="2">-270 to 1820°C</td><td>○</td><td></td></tr>
<tr><td></td><td colspan="2">16-bit signed binary (Scaling value)</td><td>○</td><td></td></tr>
<tr><td></td><td colspan="2">16-bit signed binary<br>(-2700 to 18200: value up to the first decimal place × 10)</td><td>○</td><td></td></tr>
<tr><td></td><td colspan="2">Refer to Section 4.3.1 (2).</td><td>△</td><td>As they depend on the applicable thermocouple and thermocouple standard, refer to Section 4.3.1 (2) and check the specifications. Use the thermocouple that can be used on the Q68TD-G-H02/H01.</td></tr>
<tr><td></td><td colspan="2">Refer to Section 4.3.1 (2).</td><td>△</td><td rowspan="2">As they depend on the applicable thermocouple and measured temperature range, refer to Section 4.3.1 (2) to check the specifications.</td></tr>
<tr><td></td><td colspan="2">*2</td><td>○</td></tr>
<tr><td></td><td>640ms/8 channels*3</td><td>320ms/8 channels*3</td><td>○</td><td></td></tr>
<tr><td></td><td colspan="2"><table>
<tr><th>Isolated area</th><th>Isolation method</th><th>Dielectric withstand voltage</th><th>Insulation resistance</th></tr>
<tr><td>Between thermocouple input and programmable controller power supply</td><td>Transformer isolation</td><td>AC500Vms/1min</td><td rowspan="2">DC500V 10MΩ or more</td></tr>
<tr><td>Between thermocouple input channels</td><td>Transformer isolation</td><td>AC1000Vrms/1min</td></tr>
<tr><td>Between cold junction compensation input (Pt100) and programmable controller power supply</td><td>Non-isolation</td><td>-</td><td>-</td></tr>
</table></td><td>○</td><td></td></tr>
<tr><td></td><td>Available<br>(all the channels are independent)</td><td>Not available</td><td>×</td><td>The Q68TD-G-H01 has the disconnection monitor function.</td></tr>
<tr><td></td><td colspan="2">8 channels + channels connected to Pt100/module</td><td>×</td><td>Consider replacement with multiple Q68TD-G-H02/H01.</td></tr>
<tr><td></td><td colspan="2">16 points<br>(I/O assignment: intelligent 16 points)</td><td>△</td><td>The number of occupied I/O points has changed to 16 points.</td></tr>
<tr><td></td><td colspan="2">40-pin connector</td><td>×</td><td rowspan="4">Wiring change is required.</td></tr>
<tr><td></td><td colspan="2">A6CON4</td><td>×</td></tr>
<tr><td></td><td colspan="2">0.3mm$^2$ (22 AWG) or less</td><td>×</td></tr>
<tr><td></td><td colspan="2">-</td><td>×</td></tr>
<tr><td></td><td>0.65A</td><td>0.49A</td><td>○</td><td></td></tr>
<tr><td></td><td>0.22kg</td><td>0.18kg</td><td>○</td><td></td></tr>
</table>

*1 Restrictions on mountable slot position apply to the Q68TD-G-H01.
For details, refer to the user's manual for the Q68TD-G-H01/H02.

*2 Calculate the accuracy in the following method.
(Accuracy) = (Conversion accuracy) + (Temperature characteristics) × (Operating ambient temperature variation) + (Cold junction compensation accuracy)
An operating ambient temperature variation indicates a deviation of the operating ambient temperature from the 25±5°C range.

*3 A measured temperature value is stored in the buffer memory at every 320ms/640ms, regardless of the number of conversion enable channels.

### (2) Applicable thermocouple and measured temperature range accuracy

| A616TD | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| JIS | ANSI | DIN | BS | Measurement range number | 1 | 2 | 3 | 4 |
| | | | | Allowable input voltage range [mV] | -12.5 to 12.5 | 0 to 25 | 0 to 50 | 0 to 100 |
| B | B | - | PtRh30-PtRh6 | Measured temperature range [°C] | 100 to 1500 | 100 to 1800 | 100 to 1800 | 100 to 1800 |
| | | | | Accuracy at 25°C [%] | - | ±0.5 | - | - |
| | | | | Temperature drift [%/°C] | | ±0.013 | | |
| R | R | - | PtRh13-Pt | Measured temperature range [°C] | 0 to 1000 | 0 to 1700 | 0 to 1700 | 0 to 1700 |
| | | | | Accuracy at 25°C [%] | - | ±0.4 | - | - |
| | | | | Temperature drift [%/°C] | | ±0.011 | | |
| S | S | PtRh-Pt | PtRh10-Pt | Measured temperature range [°C] | 0 to 1200 | 0 to 1700 | 0 to 1700 | 0 to 1700 |
| | | | | Accuracy at 25°C [%] | - | ±0.4 | - | - |
| | | | | Temperature drift [%/°C] | | ±0.011 | | |
| K | K | NiCr-Ni | NiCr-NiAl | Measured temperature range [°C] | -200 to 250 | 0 to 500 | 0 to 1000 | 0 to 1300 |
| | | | | Accuracy at 25°C [%] | ±0.4 | ±0.3 | ±0.3 | ±0.5 |
| | | | | Temperature drift [%/°C] | ±0.011 | ±0.01 | ±0.01 | ±0.013 |
| E | E | - | NiCr-CuNi | Measured temperature range [°C] | -200 to 150 | 0 to 300 | 0 to 600 | 0 to 1000 |
| | | | | Accuracy at 25°C [%] | ±0.4 | ±0.3 | ±0.3 | ±0.4 |
| | | | | Temperature drift [%/°C] | ±0.011 | ±0.01 | ±0.01 | ±0.011 |
| J | J | - | Fe-CuNi | Measured temperature range [°C] | -200 to 200 | 0 to 400 | 0 to 800 | 0 to 1200 |
| | | | | Accuracy at 25°C [%] | ±0.4 | ±0.3 | ±0.3 | ±0.4 |
| | | | | Temperature drift [%/°C] | ±0.011 | ±0.01 | ±0.01 | ±0.011 |
| T | T | - | Cu-CuNi | Measured temperature range [°C] | -200 to 200 | 0 to 400 | 0 to 400 | 0 to 400 |
| | | | | Accuracy at 25°C [%] | ±0.5 | ±0.3 | - | - |
| | | | | Temperature drift [%/°C] | ±0.013 | ±0.01 | | |
| - | - | Fe-CuNi | - | Measured temperature range [°C] | -100 to 200 | 0 to 400 | 0 to 800 | 0 to 900 |
| | | | | Accuracy at 25°C [%] | - | ±0.3 | ±0.3 | ±0.5 |
| | | | | Temperature drift [%/°C] | | ±0.01 | ±0.01 | ±0.013 |
| - | - | Cu-CuNi | - | Measured temperature range [°C] | -100 to 200 | 0 to 400 | 0 to 600 | 0 to 600 |
| | | | | Accuracy at 25°C [%] | - | ±0.3 | ±0.4 | - |
| | | | | Temperature drift [%/°C] | | ±0.01 | ±0.011 | |

| Q68TD-G-H02, Q68TD-G-H01 | | | | |
|---|---|---|---|---|
| Applicable thermocouple type | Measured temperature range*1 | Conversion accuracy (at operating ambient temperature 25±5°C) | Temperature characteristics (per operating ambient temperature variation of 1°C) | Maximum temperature error at ambient temperature of 55°C |
| B | 0 to 600°C | ------*3 | ------*3 | ------*3 |
| | 600 to 800°C*2 | ±3.0°C | ±0.4°C | ±13.0°C |
| | 800 to 1700°C*2 | ±2.5°C | | ±12.5°C |
| | 1700 to 1820°C | ------*3 | ------*3 | ------*3 |
| R | -50 to 0°C | ------*3 | ------*3 | ------*3 |
| | 0 to 300°C*2 | ±2.5°C | ±0.4°C | ±12.5°C |
| | 300 to 1600°C*2 | ±2.0°C | ±0.3°C | ±9.5°C |
| | 1600 to 1760°C | ------*3 | ------*3 | ------*3 |
| S | -50 to 0°C | ------*3 | ------*3 | ------*3 |
| | 0 to 300°C*2 | ±2.5°C | ±0.4°C | ±12.5°C |
| | 300 to 1600°C*2 | ±2.0°C | ±0.3°C | ±9.5°C |
| | 1600 to 1760°C | ------*3 | ------*3 | ------*3 |
| K | -270 to -200°C | ------*3 | ------*3 | ------*3 |
| | -200 to 0°C*2 | Larger value of ±0.5°C or ±0.5% of measured temperature | Larger value of ±0.06°C or ±0.2% of measured temperature | ±11.0°C |
| | 0 to 1200°C*2 | Larger value of ±0.5°C or ±0.25% of measured temperature | Larger value of ±0.06°C or ±0.02% of measured temperature | ±9.0°C |
| | 1200 to 1370°C | ------*3 | ------*3 | ------*3 |
| E | -270 to -200°C | ------*3 | ------*3 | ------*3 |
| | -200 to 0°C*2 | Larger value of ±0.5°C or ±0.5% of measured temperature | Larger value of ±0.06°C or ±0.15% of measured temperature | ±8.5°C |
| | 0 to 900°C*2 | Larger value of ±0.5°C or ±0.25% of measured temperature | Larger value of ±0.06°C or ±0.02% of measured temperature | ±6.75°C |
| | 900 to 1000°C | ------*3 | ------*3 | ------*3 |
| J | -210 to -40°C | ------*3 | ------*3 | ------*3 |
| | -40 to 750°C*2 | Larger value of ±0.5°C or ±0.25% of measured temperature | Larger value of ±0.06°C or ±0.02% of measured temperature | ±5.625°C |
| | 750 to 1200°C | ------*3 | ------*3 | ------*3 |
| T | -270 to -200°C | ------*3 | ------*3 | ------*3 |
| | -200 to 0°C*2 | Larger value of ±0.5°C or ±0.5% of measured temperature | Larger value of ±0.06°C or ±0.1% of measured temperature | ±6.0°C |
| | 0 to 350°C*2 | Larger value of ±0.5°C or ±0.25% of measured temperature | Larger value of ±0.06°C or ±0.02% of measured temperature | ±2.625°C |
| | 350 to 400°C | ------*3 | ------*3 | ------*3 |
| N | -270 to -200°C | ------*3 | ------*3 | ------*3 |
| | -200 to 0°C*2 | Larger value of ±0.5°C or ±0.5% of measured temperature | Larger value of ±0.06°C or ±0.2% of measured temperature | ±11.0°C |
| | 0 to 1250°C*2 | Larger value of ±0.5°C or ±0.25% of measured temperature | Larger value of ±0.06°C or ±0.02% of measured temperature | ±9.375°C |
| | 1250 to 1300°C | ------*3 | ------*3 | ------*3 |

*1 If a value entered from the thermocouple is outside the measured temperature range given in the table, it is handled as the maximum/minimum value of the measured temperature range.

*2 The accuracy only in the temperature ranges of Class 1 to 3 (shaded areas) in JIS C1602-1995 apply.
Also, a warm-up (power distribution) period of 30 minutes is required to satisfy with the accuracy.

*3 A temperature can be measured; however, the accuracy is not guaranteed.

### 4.3.2 Functional comparison

○ : Available, △ : Partial change required, - : Not available

| Item | Description | A616TD | Q68TD-G-H02/H01 | Precautions for replacement |
|---|---|---|---|---|
| Temperature conversion function | Imports temperature data. | ○ | ○ | |
| Conversion enable/disable function | Sets whether to enable/disable a conversion per channel. | ○ | ○ | |
| Disconnection detection function | Detects a disconnection of the connected thermocouple of each channel. | ○ | △ | The Q68TD-G-H01 does not have the disconnection detection function. Use the disconnection monitor function instead. |
| Temperature conversion value storage | Stores imported temperature data in the buffer memory. | ○ | ○ | |
| Input type selection function | Sets an input type for each channel. | ○ | ○ | For the Q68TD-G-H02/H01, this function is set with the intelligent function module switch setting. |
| Warning output function | Outputs a warning when the temperature exceeds the set temperature range. | - | ○ | |
| Temperature conversion system | Processes the detected temperature by specified method. | - | ○ | |
| Scaling function | Converts a measured temperature value into a percent value (%) in set width. | - | ○ | |
| Pt100 cold junction compensation enable/disable setting function | Sets whether the cold junction compensation using the Pt100 attached to the terminal is performed or not. | - | ○ | |
| Offset/gain setting function | Performs linear correction by individually compensating any given 2 points (offset value/gain value) within the effective range. | - | ○ | |
| Error correction function | For all input ranges, the function allows compensating the temperature measurement value by part of the compensation value the errors compensation value. | ○ | - | Perform the error correction by the offset/gain setting of the Q68TD-G-H02/H01. |
| Online module replacement | Replaces a module without stopping the system. | - | ○ | Replaceable modules during online are the Process CPU and the Redundant CPU. |

### 4.3.3 I/O signal comparison to programmable controller CPU

Sequence program change is required as the I/O signals differ.
For details of the I/O signals and sequence program, refer to the Thermocouple Input Module/Channel Isolated Thermocouple/Micro Voltage Input Module User's Manual.

| A616TD | | | | Q68TD-G-H02, Q68TD-G-H01 | | | |
|---|---|---|---|---|---|---|---|
| Device No. | Signal name | Device No. | Signal name | Device No. | Signal name | Device No. | Signal name |
| X0 | Watchdog timer error | Y0 | Not used | X0 | Module READY | Y0 | Not used |
| X1 | A/D conversion READY | Y1 | | X1 | Not used | Y1 | |
| X2 | Error flag | Y2 | | X2 | | Y2 | |
| X3 | Disconnection error detection | Y3 | | X3 | | Y3 | |
| X4 | Digital output value out-of-range detection | Y4 | | X4 | | Y4 | |
| X5 | Detected temperature value out-of-range detection | Y5 | | X5 | | Y5 | |
| X6 | Not used | Y6 | | X6 | | Y6 | |
| X7 | | Y7 | | X7 | | Y7 | |
| X8 | | Y8 | | X8 | | Y8 | |
| X9 | | Y9 | | X9 | Operating condition setting completion flag | Y9 | Operating condition setting request |
| XA | | YA | | XA | Offset/gain setting mode status flag | YA | User range write request |
| XB | | YB | | XB | Channel change completion flag | YB | Channel change request |
| XC | | YC | | XC | Q68TD-G-H02: Disconnection detection signal<br>Q68TD-G-H01: Disconnection status monitor signal | YC | Not used |
| XD | | YD | Interlock signal for the RFRP and RTOP instructions when the A616TD is used in remote I/O station | XD | Warning output signal | YD | |
| XE | | YE | | XE | Conversion completion flag | YE | |
| XF | | YF | | XF | Error flag | YF | Error clear request |
| X10 | | Y10 | Detected temperature value LED display request signal | | | | |
| X11 | | Y11 | Not used | | | | |
| X12 | | Y12 | | | | | |
| X13 | | Y13 | | | | | |
| X14 | | Y14 | | | | | |
| X15 | | Y15 | | | | | |
| X16 | | Y16 | | | | | |
| X17 | | Y17 | | | | | |
| X18 | | Y18 | | | | | |
| X19 | | Y19 | | | | | |
| X1A | | Y1A | | | | | |
| X1B | | Y1B | | | | | |
| X1C | | Y1C | | | | | |
| X1D | Interlock signal for the RFRP and RTOP instructions when the A616TD is used in remote I/O station | Y1D | | | | | |
| X1E | | Y1E | | | | | |
| X1F | | Y1F | | | | | |

### 4.3.4 Buffer memory address comparison

Sequence program change is required as the assignment of buffer memory differs.
For details of buffer memories and sequence programs, refer to the Thermocouple Input Module/ Channel Isolated Thermocouple/Micro Voltage Input Module User's Manual.

| A616TD | | | | Q68TD-G-H02, Q68TD-G-H01 | | |
|---|---|---|---|---|---|---|
| Address (hex) | Name | | Read/write | Address (hex) | Name | Read/write |
| 00 | Data format selection | | R/W | 00 | Conversion enable/disable setting | R/W |
| 01 | Error code storage | | | 01 to 08 | CH1 to CH8 Time/count/moving average/ time constant setting | |
| 02 | Error occurrence A60MX□CONNECT No. storage | | | 09 | System area (Not used) | - |
| 03 | Thermocouple type setting error channel number storage | | | 0A | Conversion completion flag | R |
| 04 | Current sampling period storage | | R | 0B to 12 | CH1 to CH8 Measured temperature value | |
| 05 to 0E | System area (Not used) | | - | 13 | Error code | |
| 0F | Conversion enable/ disable specification | A616TD | R/W | 14 to 15 | CH1 to CH8 Setting range (Thermocouple type) | |
| 10 to 17 | | Multiplexer module | | 16 | Setting range (Offset/gain setting ) | |
| 18 | Setting data set request | | | 17 | System area (Not used) | - |
| 19 to 1F | System area (Not used) | | - | 18 to 19 | CH1 to CH8 Averaging processing selection | R/W |
| 20 to 27 | Disconnection detection enable/disable specification | | R/W | 1A | Offset/gain setting mode (Offset specification) | |
| 28 to 2F | System area (Not used) | | - | 1B | Offset/gain setting mode (Gain specification) | |
| 30 to 3F | Digital output value temperature setting | | R/W | 1C | CH1 Offset temperature setting value | |
| 40 to 47 | Disconnection detection channel number storage | | | 1D | CH1 Gain temperature setting value | |
| 48 to 4F | System area (Not used) | | - | to | | |
| 50 to 57 | Digital output value out-of-range Channel number storage | | R/W | 2B | CH8 Gain temperature setting value | R/W |
| | | | | 2C | System area (Not used) | - |
| 58 to 5F | System area (Not used) | | - | 2D | Q68TD-G-H02:Cold junction compensation setting state | R |
| | | | | | Q68TD-G-H01: System area | - |
| 60 to 67 | Detected temperature value out-of-range Channel number storage | | R/W | 2E | Warning output enable/disable setting | R/W |
| | | | | 2F | Warning output flag (Process alarm) | R |
| 68 to 6F | System area (Not used) | | - | 30 | Warning output flag (Rate alarm) | |
| 70 to 7F | INPUT channel Digital output value storage | | R | 31 | Q68TD-G-H02:Disconnection detection flag | |
| | | | | | Q68TD-G-H01:Disconnection status monitor flag | |
| | | | | 32 to 39 | CH1 to CH8 Scaling value | |
| 80 to FF | Error correction value setting | | R/W | 3A | Scaling valid/invalid setting | R/W |
| 100 to 17F | Thermocouple type setting | | | 3B to 3D | System area (Not used) | - |
| 180 to 1FF | MX CH.channel Digital output value storage | | R | 3E | CH1 Scaling range lower limit value | R/W |
| | | | | 3F | CH1 Scaling range upper limit value | |
| 200 to 27F | MX CH.channel Detected temperature value storage | | | to | | |
| | | | | 4D | CH8 Scaling range upper limit value | R/W |
| | | | | 4E | CH1 Scaling width lower limit value | |
| | | | | 4F | CH1 Scaling width upper limit value | |
| | | | | to | | |
| | | | | 5D | CH8 Scaling width upper limit value | R/W |
| | | | | 5E | CH1 Process alarm lower/lower limit value | |
| | | | | 5F | CH1 Process alarm lower/upper limit value | |
| | | | | 60 | CH1 Process alarm upper/lower limit value | |

| Q68TD-G-H02, Q68TD-G-H01 | | |
|---|---|---|
| **Address (hex)** | **Name** | **Read/write** |
| 61 | CH1 Process alarm upper/upper limit value | R/W |
| to | | |
| 7D | CH8 Process alarm upper/upper limit value | R/W |
| 7E to 85 | CH1 to CH8 Rate alarm warning detection period | |
| 86 | CH1 Rate alarm upper limit value | |
| 87 | CH1 Rate alarm lower limit value | |
| to | | |
| 95 | CH8 Rate alarm lower limit value | R/W |
| 96 to 9D | System area | - |
| 9E to 9F | Mode switching setting | R/W |
| A0 to A3 | System area (Not used) | - |
| A4 to A5 | Q68TD-G-H02:Conversion setting for disconnection detection | R/W |
| | Q68TD-G-H01:Disconnection state conversion setting | |
| A6 to AD | Q68TD-G-H02:Conversion setting value for disconnection detection | |
| | Q68TD-G-H01:Conversion setting value for disconnection state | |
| AE to BD | System area (Not used) | - |
| BE | CH1 Factory default offset value | R/W |
| BF | CH1 Factory default gain value | |
| C0 | CH1 User range settings offset value | |
| C1 | CH1 User range settings gain value | |
| C2 | CH1 User range settings thermal EMF offset value (L) | |
| C3 | CH1 User range settings thermal EMF offset value (H) | |
| C4 | CH1 User range settings thermal EMF gain value (L) | |
| C5 | CH1 User range settings thermal EMF gain value (H) | |
| to | | |
| FC | CH8 User range settings thermal EMF gain value (L) | R/W |
| FD | CH8 User range settings thermal EMF gain value (H) | |

## Memo

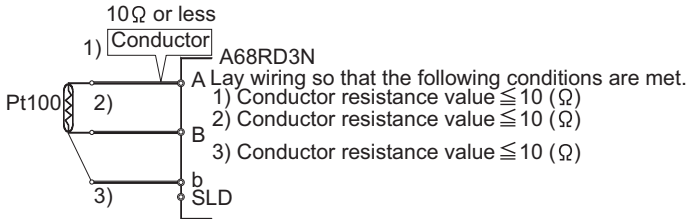
## 4.4 A68RD3N (Replacement to the Q64RD)

### 4.4.1 Performance comparison

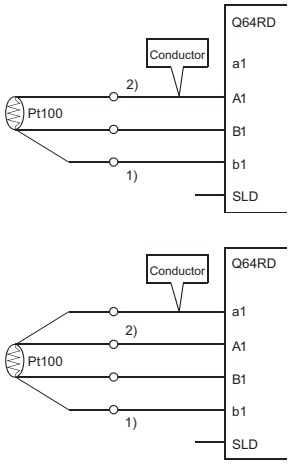
| Item | | A68RD3N | |
|---|---|---|---|
| Measuring method | | 3-wire type | |
| Output (temperature conversion value) | | 16-bit signed binary<br>-1800 to 6000<br>Value up to the first decimal place × 10<br>32-bit signed binary<br>-180000 to 600000<br>Value up to the third decimal place × 1000 | |
| Applicable platinum RTD | | Pt100<br>(JIS C1604-1997, IEC 751-am2, JIS C1604-1989, DIN 43760-1980)<br>JPt100<br>(JIS C1604-1981) | |
| Measured temperature range | Pt100 | -180 to 600°C<br>(27.10 to 313.71Ω) | |
| | JPt100 | -180 to 600°C<br>(25.80 to 317.28Ω) | |
| Accuracy | | ±1%<br>(accuracy at full scale) | |
| Resolution | | 0.025°C | |
| Conversion speed | | 40ms/channel | |
| Number of analog input points | | 8 channels/module | |
| Output current for temperature detection | | 1mA | |
| Isolation method | | Between platinum RTD input and programmable controller power supply: photocoupler isolation<br>Between platinum RTD input and channel: non-isolation | |
| Dielectric withstand voltage | | Between platinum RTD input and programmable controller power supply: 500VAC, for 1 minute | |
| Disconnection detection | | Detected per channel | |
| Number of occupied I/O points | | 32 points<br>(I/O assignment: special 32 points) | |
| External connection system | | 38-point terminal block | |
| Applicable wire size | | 0.75 to 2mm$^2$ | |
| Applicable solderless terminal | | V1.25-3, V1.25-YS3A, V2-S3, V2-YS3A | |

○: Compatible, △: Partial change required, ×: Incompatible

| | Q64RD | Compatibility | Precautions for replacement |
|---|---|---|---|
| | 3/4-wire type | ○ | |
| | 16-bit signed binary<br>-2000 to 8500<br>Value up to the first decimal place × 10<br>32-bit signed binary<br>-200000 to 850000<br>Value up to the third decimal place × 1000 | ○ | |
| | Pt100<br>(JIS C 1604-1997, IEC751 1983)<br>JPt100<br>(JIS C 1604-1981) | △ | As the compliance standards for the applicable platinum RTD differ, change the platinum RTD to the one that can be used with the Q64RD. |
| | -200 to 850°C | ○ | |
| | -180 to 600°C | | |
| | Ambient temperature 0 to 55°C: ±0.25%<br>(accuracy relative to maximum value)<br>Ambient temperature 25±5°C: ±0.08%<br>(accuracy relative to maximum value) | ○ | |
| | 0.025°C | ○ | |
| | 40ms/channel | ○ | |
| | 4 channels/module | △ | Consider replacement with multiple Q64RD. |
| | 1mA | ○ | |
| | <table><tr><th>Isolated area</th><th>Isolation method</th><th>Dielectric withstand voltage</th><th>Insulation resistance</th></tr><tr><td>Between platinum RTD input and programmable controller power supply</td><td>Photocoupler isolation</td><td>1780VrmsAC/3 cycles (altitude 2000m)</td><td rowspan="2">10MΩ or more using 500VDC insulation resistance tester</td></tr><tr><td>Between platinum RTD input and channel</td><td>Non-isolation</td><td>-</td></tr></table> | ○ | |
| | Detected per channel | ○ | |
| | 16 points<br>(I/O assignment: intelligent 16 points) | △ | The number of occupied I/O points has changed to 16 points. |
| | 18-point terminal block | × | Wiring change is required. |
| | 0.3 to 0.75mm$^2$ | × | |
| | 1.25-3, R1.25-3<br>(Sleeved solderless terminal cannot be used.) | × | |

| Item | A68RD3N | |
|---|---|---|
| Cables between module and platinum RTD | Make sure that the conductor resistance value between the Pt100 and A68RD3N is 10Ω or less per conductor.<br>All channels become the same specifications.<br>  | |
| Internal current consumption (5VDC) | 0.94A | |
| Weight | 0.43kg | |

○: Compatible, △: Partial change required, ×: Incompatible

| | Q64RD | Compatibility | Precautions for replacement |
|---|---|---|---|
| | The conductor resistance value must meet the condition of 1) + 2) ≤ 2kΩ or less.<br>(In the case of 3-conductor type, the difference between 1) and 2) in the conductor resistance value must be 10Ω or less.)<br>  <br> | ○ | |
| | 0.60A | ○ | |
| | 0.17kg | ○ | |

### 4.4.2 Functional comparison

○ : Available, - : Not available

| Item | Description | A68RD3N | Q64RD | Precautions for replacement |
|---|---|---|---|---|
| Conversion enable/disable specification of each channel | Enables/disables a detection of temperature. | ○ | ○ | |
| Sampling/averaging processing selection | Processes the detected temperature by specified method. | ○ | ○ | The setting ranges of time and count averages differ. Refer to the RTD Input Module/ Channel Isolated RTD Input Module User's Manual to check the specifications. |
| Detected temperature value storage | Stores temperature data in the buffer memory. | ○ | ○ | |
| Disconnection detection | Detects a disconnection of connected platinum RTD or a cable. | ○ | ○ | |
| Specification of platinum RTD type | Specifies a platinum RTD type used. | ○ | ○ | |
| Range switching function | Switches the measured temperature range. | - | ○ | |
| Warning output function | Outputs a warning when the temperature exceeds the set temperature range. | - | ○ | |
| Scaling function | Converts a measured temperature value into a percent value (%) in set width. | - | ○ | |
| Error correction function | Corrects an error in temperature conversion value. | ○ | ○ | Perform the error correction by the offset/gain setting of the Q64RD. |
| Online module replacement | Replaces a module without stopping the system. | - | ○ | Replaceable modules during online are the Process CPU and the Redundant CPU. |

### 4.4.3 I/O signal comparison to programmable controller CPU

Sequence program change is required as the I/O signals differ.
For details of the I/O signals and sequence program, refer to the RTD Input Module/Channel Isolated RTD Input Module User's Manual.

| A68RD3N | | | | Q64RD | | | |
|---|---|---|---|---|---|---|---|
| Device No. | Signal name | Device No. | Signal name | Device No. | Signal name | Device No. | Signal name |
| X0 | Watchdog timer error flag | Y0 | Not used | X0 | Module READY | Y0 | Not used |
| X1 | READY flag | Y1 | | X1 | CH1 Offset/gain setting status signal | Y1 | CH1 Offset setting request |
| X2 | Write data error flag | Y2 | | X2 | CH2 Offset/gain setting status signal | Y2 | CH1 Gain setting request |
| X3 | CH1: Disconnection detection flag | Y3 | | X3 | CH3 Offset/gain setting status signal | Y3 | CH2 Offset setting request |
| X4 | CH2: Disconnection detection flag | Y4 | | X4 | CH4 Offset/gain setting status signal | Y4 | CH2 Gain setting request |
| X5 | CH3: Disconnection detection flag | Y5 | | X5 | Not used | Y5 | CH3 Offset setting request |
| X6 | CH4: Disconnection detection flag | Y6 | | X6 | | Y6 | CH3 Gain setting request |
| X7 | CH5: Disconnection detection flag | Y7 | | X7 | | Y7 | CH4 Offset setting request |
| X8 | CH6: Disconnection detection flag | Y8 | | X8 | | Y8 | CH4 Gain setting request |
| X9 | CH7: Disconnection detection flag | Y9 | | X9 | Operating condition setting completion signal | Y9 | Operating condition setting request |
| XA | CH8: Disconnection detection flag | YA | | XA | Offset/gain setting mode status flag | YA | User range write request |
| XB | Not used | YB | | XB | Not used | YB | Not used |
| XC | | YC | | XC | Disconnection detection signal | YC | |
| XD | | YD | Interlock signal for the RFRP and RTOP instructions when the A68RD3N is used in remote I/O station | XD | Warning output signal | YD | |
| XE | | YE | | XE | Conversion completion flag | YE | |
| XF | | YF | | XF | Error flag | YF | Error clear request |
| X10 | | Y10 | Not used | | | | |
| X11 | | Y11 | | | | | |
| X12 | | Y12 | Error code reset flag | | | | |
| X13 | | Y13 | Not used | | | | |
| X14 | | Y14 | | | | | |
| X15 | | Y15 | | | | | |
| X16 | | Y16 | | | | | |
| X17 | | Y17 | | | | | |
| X18 | | Y18 | | | | | |
| X19 | | Y19 | | | | | |
| X1A | | Y1A | | | | | |
| X1B | | Y1B | | | | | |
| X1C | | Y1C | | | | | |
| X1D | Interlock signal for the RFRP and RTOP instructions when the A68RD3N is used in remote I/O station | Y1D | | | | | |
| X1E | | Y1E | | | | | |
| X1F | | Y1F | | | | | |

### 4.4.4 Buffer memory address comparison

Sequence program change is required as the assignment of buffer memory differs.
For details of the buffer memories and sequence program, refer to the RTD Input Module/Channel Isolated RTD Input Module User's Manual.

| A68RD3N | | | Q64RD | | |
|---|---|---|---|---|---|
| Address (decimal) | Name | Read/write | Address (decimal) | Name | Read/write |
| 0 | Conversion enable/disable specification | R/W | 0 | Conversion enable/disable specification | R/W |
| 1 | Averaging processing selection | | 1 | CH1 Time/count averaging setting | |
| 2 | CH1 Averaging time/count | | 2 | CH2 Time/count averaging setting | |
| 3 | CH2 Averaging time/count | | 3 | CH3 Time/count averaging setting | |
| 4 | CH3 Averaging time/count | | 4 | CH4 Time/count averaging setting | |
| 5 | CH4 Averaging time/count | | 5 | System area (Not used) | - |
| 6 | CH5 Averaging time/count | | 6 | | |
| 7 | CH6 Averaging time/count | | 7 | | |
| 8 | CH7 Averaging time/count | | 8 | | |
| 9 | CH8 Averaging time/count | | 9 | Averaging processing selection | R/W |
| 10 | CH1 Detected temperature value (16bit) | R | 10 | Conversion completion flag | R |
| 11 | CH2 Detected temperature value (16bit) | | 11 | CH1 Measured temperature value (16bit) | |
| 12 | CH3 Detected temperature value (16bit) | | 12 | CH2 Measured temperature value (16bit) | |
| 13 | CH4 Detected temperature value (16bit) | | 13 | CH3 Measured temperature value (16bit) | |
| 14 | CH5 Detected temperature value (16bit) | | 14 | CH4 Measured temperature value (16bit) | |
| 15 | CH6 Detected temperature value (16bit) | | 15 | System area (Not used) | - |
| 16 | CH7 Detected temperature value (16bit) | | 16 | | |
| 17 | CH8 Detected temperature value (16bit) | | 17 | | |
| 18 | CH1 Detected temperature value (L) | | 18 | | |
| 19 | (32bit) (H) | | 19 | Error code | R |
| 20 | CH2 Detected temperature value (L) | | 20 | Setting range | |
| 21 | (32bit) (H) | | 21 | System area (Not used) | - |
| 22 | CH3 Detected temperature value (L) | | 22 | | |
| 23 | (32bit) (H) | | 23 | | |
| 24 | CH4 Detected temperature value (L) | | 24 | | |
| 25 | (32bit) (H) | | 25 | | |
| 26 | CH5 Detected temperature value (L) | | 26 | | |
| 27 | (32bit) (H) | | 27 | | |
| 28 | CH6 Detected temperature value (L) | | 28 | | |
| 29 | (32bit) (H) | | 29 | | |
| 30 | CH7 Detected temperature value (L) | | 30 | | |
| 31 | (32bit) (H) | | 31 | | |
| 32 | CH8 Detected temperature value (L) | | 32 | | |
| 33 | (32bit) (H) | | 33 | | |
| 34 | Write data error code | R/W | 34 | | |
| 35 | Conversion completion flag | R | 35 | | |
| 36 | Specification of platinum RTD type | R/W | 36 | | |
| | | | 37 | | |
| | | | 38 | | |
| | | | 39 | | |
| | | | 40 | | |
| | | | 41 | | |
| | | | 42 | | |
| | | | 43 | | |
| | | | 44 | | |
| | | | 45 | | |
| | | | 46 | | |
| | | | 47 | Warning output enable/disable setting | R/W |

| Q64RD | | |
|---|---|---|
| Address (decimal) | Name | Read/write |
| 48 | Warning output flag | R |
| 49 | Disconnection detection flag | |
| 50 | CH1 Scaling value | |
| 51 | CH2 Scaling value | |
| 52 | CH3 Scaling value | |
| 53 | CH4 Scaling value | |
| 54 | CH1 Measured temperature value (L) | |
| 55 | (32bit) (H) | |
| 56 | CH2 Measured temperature value (L) | |
| 57 | (32bit) (H) | |
| 58 | CH3 Measured temperature value (L) | |
| 59 | (32bit) (H) | |
| 60 | CH4 Measured temperature value (L) | |
| 61 | (32bit) (H) | |
| 62 | CH1 Scaling range lower limit value (L) | R/W |
| 63 | (H) | |
| 64 | CH1 Scaling range upper limit value (L) | |
| 65 | (H) | |
| 66 | CH2 Scaling range lower limit value (L) | |
| 67 | (H) | |
| 68 | CH2 Scaling range upper limit value (L) | |
| 69 | (H) | |
| 70 | CH3 Scaling range lower limit value (L) | |
| 71 | (H) | |
| 72 | CH3 Scaling range upper limit value (L) | |
| 73 | (H) | |
| 74 | CH4 Scaling range lower limit value (L) | |
| 75 | (H) | |
| 76 | CH4 Scaling range upper limit value (L) | |
| 77 | (H) | |
| 78 | CH1 Scaling width lower limit value | |
| 79 | CH1 Scaling width upper limit value | |
| 80 | CH2 Scaling width lower limit value | |
| 81 | CH2 Scaling width upper limit value | |
| 82 | CH3 Scaling width lower limit value | |
| 83 | CH3 Scaling width upper limit value | |
| 84 | CH4 Scaling width lower limit value | |
| 85 | CH4 Scaling width upper limit value | |
| 86 | CH1 Warning output lower (L) | |
| 87 | lower limit value (H) | |
| 88 | CH1 Warning output lower (L) | |
| 89 | upper limit value (H) | |
| 90 | CH1 Warning output upper (L) | |
| 91 | lower limit value (H) | |
| 92 | CH1 Warning output upper (L) | |
| 93 | upper limit value (H) | |
| to | | |
| 116 | CH4 Warning output upper (L) | R/W |
| 117 | upper limit value (H) | |
| 118 | CH1 Offset temperature setting value (L) | |
| 119 | (H) | |
| 120 | CH1 Gain temperature setting value (L) | |
| 121 | (H) | |
| to | | |

| Q64RD | | |
|---|---|---|
| **Address (decimal)** | **Name** | **Read/write** |
| 132 | CH4 Gain temperature setting value (L) | R/W |
| 133 | (H) | |
| 134 to 157 | Not used | - |
| 158 | Mode switching setting | R/W |
| 159 | | |
| 160 | 3-conductor type CH1 Factory default offset value | |
| to | | |
| 254 | 4-conductor type CH4 User range (L) | R/W |
| 255 | settings gain resistance value (H) | |

## Memo

## 4.5 A68RD3N (Replacement to the Q64RD-G)

### 4.5.1 Performance comparison

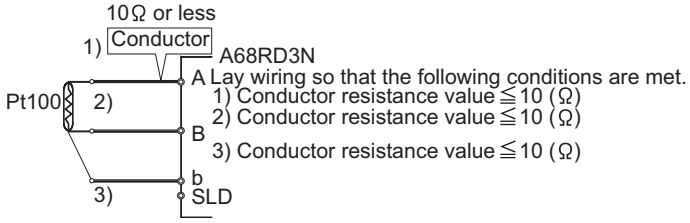
| Item | | A68RD3N | |
|---|---|---|---|
| Measuring method | | 3-wire type | |
| Output (temperature conversion value) | | 16-bit signed binary<br>-1800 to 6000<br>Value up to the first decimal place × 10<br>32-bit signed binary<br>-180000 to 600000<br>Value up to the third decimal place × 1000 | |
| Applicable RTD | | Pt100<br>(JIS C1604-1997, IEC 751-am2, JIS C1604-1989, DIN 43760-1980)<br>JPt100<br>(JIS C1604-1981) | |
| Measured temperature range | Pt100 | -180 to 600°C<br>(27.10 to 313.71Ω) | |
| | JPt100 | -180 to 600°C<br>(25.80 to 317.28Ω) | |
| | Ni100 | - | |
| Accuracy | | ±1%<br>(accuracy at full scale) | |
| Resolution | | 0.025°C | |
| Conversion speed | | 40ms/channel | |
| Number of analog input points | | 8 channels/module | |
| Output current for temperature detection | | 1mA | |
| Isolation method | | Between platinum RTD input and programmable controller power supply: photocoupler isolation<br>Between platinum RTD input and channel: non-isolation | |
| Dielectric withstand voltage | | Between platinum RTD input and programmable controller power supply: 500VAC, for 1 minute | |
| Disconnection detection | | Detected per channel | |
| Number of occupied I/O points | | 32 points<br>(I/O assignment: special 32 points) | |
| External connection system | | 38-point terminal block | |
| Applicable wire size | | 0.75 to 2mm$^2$ | |
| Applicable solderless terminal | | V1.25-3, V1.25-YS3A, V2-S3, V2-YS3A | |

○: Compatible, △: Partial change required, ×: Incompatible

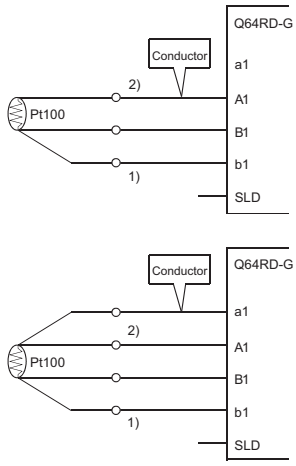
| | Q64RD-G | Compatibility | Precautions for replacement |
|---|---|---|---|
| | 3/4-wire type | ○ | |
| | 16-bit signed binary<br>-2000 to 8500<br>Value up to the first decimal place × 10<br>32-bit signed binary<br>-200000 to 850000<br>Value up to the third decimal place × 1000 | ○ | |
| | Pt100<br>(JIS C 1604-1997, IEC751 1983)<br>JPt100<br>(JIS C 1604-1981)<br>Ni100<br>(DIN 43760 1987) | △ | As the compliance standards for the applicable RTD differ, change the RTD to the one that can be used with the Q64RD-G. |
| | -200 to 850°C | ○ | |
| | -180 to 600°C | | |
| | -60 to 180°C | | |
| | *1 | ○ | |
| | 0.025°C | ○ | |
| | 40ms/channel | ○ | |
| | 4 channels/module | △ | Consider replacement with multiple Q64RD-G. |
| | 1mA | ○ | |
| | <table><tr><th>Isolated area</th><th>Isolation method</th><th>Dielectric withstand voltage</th><th>Insulation resistance</th></tr><tr><td>Between RTD input and programmable controller power supply</td><td>Photocoupler isolation</td><td>1780VrmsAC/3 cycles (altitude 2000m)</td><td rowspan="2">10MΩ or more using 500VDC insulation resistance tester</td></tr><tr><td>Between RTD input and channel</td><td>Transformer isolation</td><td>-</td></tr></table> | ○ | |
| | Detected per channel | ○ | |
| | 16 points<br>(I/O assignment: intelligent 16 points) | △ | The number of occupied I/O points has changed to 16 points. |
| | 18-point terminal block | × | Wiring change is required. |
| | 0.3 to 0.75mm$^2$ | × | |
| | 1.25-3, R1.25-3<br>(Sleeved solderless terminal cannot be used.) | × | |

*1 Indicates accuracy of the Q64RD-G (accuracy at the maximum value in the selection range).

| Accuracy | | Specifications |
|---|---|---|
| Reference accuracy | | Within 0.04% |
| Temperature coefficient | Pt100/JPt100 (-20 to 120°C) | ±70ppm/°C (±0.0070%/°C) |
| | Pt100/JPt100 (0 to 200°C) | ±65ppm/°C (±0.0065%/°C) |
| | Pt100/JPt100 (-200 to 850°C) | ±50ppm/°C (±0.0050%/°C) |
| | Ni100Ω (-60 to 180°C) | ±70ppm/°C (±0.0070%/°C) |

| Item | A68RD3N | |
|---|---|---|
| Cable between module and RTD | Make sure that the conductor resistance value between the Pt100 and A68RD3N is 10Ω or less per conductor.<br>All channels become the same specifications.<br>  | |
| Internal current consumption (5VDC) | 0.94A | |
| Weight | 0.43kg | |

○: Compatible, △: Partial change required, ×: Incompatible

| | Q64RD-G | Compatibility | Precautions for replacement |
|---|---|---|---|
| | The conductor resistance value must meet the condition of 1) + 2) ≤ 2kΩ or less.<br>(In the case of 3-conductor type, the difference between 1) and 2) in the conductor resistance value must be 10Ω or less.)<br>  <br> | ○ | |
| | 0.62A | ○ | |
| | 0.20kg | ○ | |

### 4.5.2 Functional comparison

○ : Available, - : Not available

| Item | Description | A68RD3N | Q64RD-G | Precautions for replacement |
|---|---|---|---|---|
| Conversion enable/disable specification of each channel | Enables/disables a detection of temperature. | ○ | ○ | |
| Sampling/averaging processing selection | Processes the detected temperature by specified method. | ○ | ○ | The setting ranges of time and count averages differ. Refer to the RTD Input Module/ Channel Isolated RTD Input Module User's Manual to check the specifications. |
| Detected temperature value storage | Stores temperature data in the buffer memory. | ○ | ○ | |
| Disconnection detection | Detects a disconnection of the connected RTD or cable. | ○ | ○ | |
| Specification of RTD type | Specifies a RTD type used. | ○ | ○ | |
| Range switching function | Switches the measured temperature range. | - | ○ | |
| Warning output function | Outputs a warning when the temperature exceeds the set temperature range. | - | ○ | |
| Scaling function | Converts a measured temperature value into a percent value (%) in set width. | - | ○ | |
| Error correction function | Corrects an error in temperature conversion value. | ○ | ○ | Perform the error correction by the offset/gain setting of the Q64RD-G. |
| Online module replacement | Replaces a module without stopping the system. | - | ○ | Replaceable modules during online are the Process CPU and the Redundant CPU. |

### 4.5.3 I/O signal comparison to programmable controller CPU

Sequence program change is required as the I/O signals differ.
For details of the I/O signals and sequence program, refer to the RTD Input Module/Channel Isolated RTD Input Module User's Manual.

| A68RD3N | | | | Q64RD-G | | | |
|---|---|---|---|---|---|---|---|
| Device No. | Signal name | Device No. | Signal name | Device No. | Signal name | Device No. | Signal name |
| X0 | Watchdog timer error flag | Y0 | Not used | X0 | Module READY | Y0 | Not used |
| X1 | READY flag | Y1 | | X1 | CH1 Offset/gain setting status signal | Y1 | CH1 Offset setting request |
| X2 | Write data error flag | Y2 | | X2 | CH2 Offset/gain setting status signal | Y2 | CH1 Gain setting request |
| X3 | CH1: Disconnection detection flag | Y3 | | X3 | CH3 Offset/gain setting status signal | Y3 | CH2 Offset setting request |
| X4 | CH2: Disconnection detection flag | Y4 | | X4 | CH4 Offset/gain setting status signal | Y4 | CH2 Gain setting request |
| X5 | CH3: Disconnection detection flag | Y5 | | X5 | Not used | Y5 | CH3 Offset setting request |
| X6 | CH4: Disconnection detection flag | Y6 | | X6 | | Y6 | CH3 Gain setting request |
| X7 | CH5: Disconnection detection flag | Y7 | | X7 | | Y7 | CH4 Offset setting request |
| X8 | CH6: Disconnection detection flag | Y8 | | X8 | | Y8 | CH4 Gain setting request |
| X9 | CH7: Disconnection detection flag | Y9 | | X9 | Operating condition setting completion signal | Y9 | Operating condition setting request |
| XA | CH8: Disconnection detection flag | YA | | XA | Offset/gain setting mode status flag | YA | User range write request |
| XB | Not used | YB | | XB | Not used | YB | Not used |
| XC | | YC | | XC | Disconnection detection signal | YC | |
| XD | | YD | Interlock signal for the RFRP and RTOP instructions when the A68RD3N is used in remote I/O station | XD | Warning output signal | YD | |
| XE | | YE | | XE | Conversion completion flag | YE | |
| XF | | YF | | XF | Error flag | YF | Error clear request |
| X10 | | Y10 | Not used | | | | |
| X11 | | Y11 | | | | | |
| X12 | | Y12 | Error code reset flag | | | | |
| X13 | | Y13 | Not used | | | | |
| X14 | | Y14 | | | | | |
| X15 | | Y15 | | | | | |
| X16 | | Y16 | | | | | |
| X17 | | Y17 | | | | | |
| X18 | | Y18 | | | | | |
| X19 | | Y19 | | | | | |
| X1A | | Y1A | | | | | |
| X1B | | Y1B | | | | | |
| X1C | | Y1C | | | | | |
| X1D | Interlock signal for the RFRP and RTOP instructions when the A68RD3N is used in remote I/O station | Y1D | | | | | |
| X1E | | Y1E | | | | | |
| X1F | | Y1F | | | | | |

### 4.5.4 Buffer memory address comparison

Sequence program change is required as the assignment of buffer memory differs.
For details of the buffer memory and sequence program, refer to the RTD Input Module/Channel Isolated RTD Input Module User's Manual.

| A68RD3N | | | Q64RD-G | | |
|---|---|---|---|---|---|
| Address (decimal) | Name | Read/write | Address (decimal) | Name | Read/write |
| 0 | Conversion enable/disable specification | R/W | 0 | Conversion enable/disable setting | R/W |
| 1 | Averaging processing selection | | 1 | CH1 Time/count/moving averaging setting | |
| 2 | CH1 Averaging time/count | | 2 | CH2 Time/count/moving averaging setting | |
| 3 | CH2 Averaging time/count | | 3 | CH3 Time/count/moving averaging setting | |
| 4 | CH3 Averaging time/count | | 4 | CH4 Time/count/moving averaging setting | |
| 5 | CH4 Averaging time/count | | 5 | System area (Not used) | - |
| 6 | CH5 Averaging time/count | | to | | |
| 7 | CH6 Averaging time/count | | | | |
| 8 | CH7 Averaging time/count | | 8 | | |
| 9 | CH8 Averaging time/count | | 9 | Averaging processing selection | R/W |
| 10 | CH1 Detected temperature value (16bit) | R | 10 | Conversion completion flag | R |
| 11 | CH2 Detected temperature value (16bit) | | 11 | CH1 Measured temperature value (16bit) | |
| 12 | CH3 Detected temperature value (16bit) | | 12 | CH2 Measured temperature value (16bit) | |
| 13 | CH4 Detected temperature value (16bit) | | 13 | CH3 Measured temperature value (16bit) | |
| 14 | CH5 Detected temperature value (16bit) | | 14 | CH4 Measured temperature value (16bit) | |
| 15 | CH6 Detected temperature value (16bit) | | 15 | System area (Not used) | - |
| 16 | CH7 Detected temperature value (16bit) | | to | | |
| 17 | CH8 Detected temperature value (16bit) | | | | |
| 18 | CH1 Detected temperature value(L) | | 18 | | |
| 19 | (32bit)(H) | | 19 | Error code | R |
| 20 | CH2 Detected temperature value (L) | | 20 | Setting range 1 | |
| 21 | (32bit) (H) | | 21 | Setting range 2 | |
| 22 | CH3 Detected temperature value (L) | | 22 | System area (Not used) | - |
| 23 | (32bit) (H) | | 23 | | |
| 24 | CH4 Detected temperature value (L) | | 24 | | |
| 25 | (32bit) (H) | | 25 | | |
| 26 | CH5 Detected temperature value (L) | | 26 | | |
| 27 | (32bit) (H) | | 27 | | |
| 28 | CH6 Detected temperature value (L) | | 28 | | |
| 29 | (32bit) (H) | | 29 | | |
| 30 | CH7 Detected temperature value (L) | | 30 | | |
| 31 | (32bit) (H) | | 31 | | |
| 32 | CH8 Detected temperature value (L) | | 32 | | |
| 33 | (32bit) (H) | | 33 | | |
| 34 | Write data error code | R/W | 34 | | |
| 35 | Conversion completion flag | R | 35 | | |
| 36 | Specification of platinum RTD type | R/W | 36 | | |
| | | | 37 | | |
| | | | 38 | | |
| | | | 39 | | |
| | | | 40 | | |
| | | | 41 | | |
| | | | 42 | | |
| | | | 43 | | |
| | | | 44 | | |
| | | | 45 | | |
| | | | 46 | | |
| | | | 47 | Warning output enable/disable setting | R/W |

| Q64RD-G | | |
|---|---|---|
| Address (decimal) | Name | Read/write |
| 48 | Warning output flag | R |
| 49 | Disconnection detection flag | |
| 50 to 53 | CH1 to CH4 Scaling value | |
| 54 | CH1 Measured temperature value (L) | |
| 55 | (32bit) (H) | |
| to | | |
| 60 | CH4 Measured temperature value (L) | R |
| 61 | (32bit) (H) | |
| 62 | CH1 Scaling range lower limit value (L) | R/W |
| 63 | (H) | |
| 64 | CH1 Scaling range upper limit (L) | |
| 65 | value (H) | |
| to | | |
| 76 | CH4 Scaling range upper limit (L) | R/W |
| 77 | value (H) | |
| 78 | CH1 Scaling width lower limit value | |
| 79 | CH1 Scaling width upper limit value | |
| to | | |
| 85 | CH4 Scaling width upper limit value | R/W |
| 86 | CH1 Warning output lower (L) | |
| 87 | lower limit value (H) | |
| 88 | CH1 Warning output lower (L) | |
| 89 | upper limit value (H) | |
| 90 | CH1 Warning output upper (L) | |
| 91 | lower limit value (H) | |
| 92 | CH1 Warning output upper (L) | |
| 93 | upper limit value (H) | |
| to | | |
| 116 | CH4 Warning output upper (L) | R/W |
| 117 | upper limit value (H) | |
| 118 | CH1 Offset temperature setting (L) | |
| 119 | value (H) | |
| 120 | CH1 Gain temperature setting (L) | |
| 121 | value (H) | |
| to | | |
| 132 | CH4 Gain temperature setting (L) | R/W |
| 133 | value (H) | |
| 134 | Extended averaging processing selection | |
| 135 to 147 | System area (Not used) | - |
| 148 | Conversion setting for disconnection detection | R/W |
| 149 | System area (Not used) | - |

| Q64RD-G | | |
|---|---|---|
| Address (decimal) | Name | Read/write |
| 150 | CH1 Conversion setting value for (L) | R/W |
| 151 | disconnection detection (H) | |
| to | | |
| 156 | CH4 Conversion setting value for (L) | R/W |
| 157 | disconnection detection (H) | |
| 158 | Mode switching setting | |
| 159 | | |
| 160 | 3-conductor type CH1 Factory (L) | |
| 161 | default offset value (H) | |
| 162 | 3-conductor type CH1 Factory (L) | |
| 163 | default gain value (H) | |
| 164 | 3-conductor type CH1 User range (L) | |
| 165 | settings offset value (H) | |
| 166 | 3-conductor type CH1 User range (L) | |
| 167 | settings gain value (H) | |
| 168 | 3-conductor type CH1 User range (L) | |
| 169 | settings offset resistance value (H) | |
| 170 | 3-conductor type CH1 User range (L) | |
| 171 | settings gain resistance value (H) | |
| 172 | 4-conductor type CH1 Factory (L) | |
| 173 | default offset value (H) | |
| 174 | 4-conductor type CH1 Factory (L) | |
| 175 | default gain value (H) | |
| 176 | 4-conductor type CH1 User range (L) | |
| 177 | settings offset value (H) | |
| 178 | 4-conductor type CH1 User range (L) | |
| 179 | settings gain value (H) | |
| 180 | 4-conductor type CH1 User range (L) | |
| 181 | settings offset resistance value (H) | |
| 182 | 4-conductor type CH1 User range (L) | |
| 183 | settings gain resistance value (H) | |
| to | | |
| 254 | 4-conductor type CH4 User range (L) | R/W |
| 255 | settings gain resistance value (H) | |

## Memo

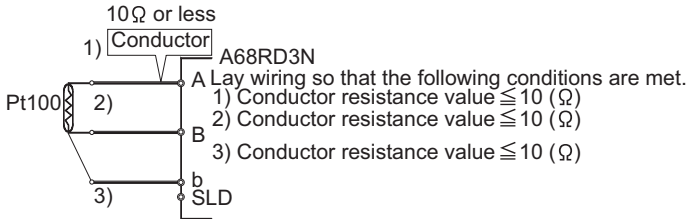
## 4.6 A68RD3N (Replacement to the Q68RD3-G)

### 4.6.1 Performance comparison

| Item | | A68RD3N | |
|---|---|---|---|
| Measuring method | | 3-wire type | |
| Output (temperature conversion value) | | 16-bit signed binary<br>-1800 to 6000<br>Value up to the first decimal place × 10<br>32-bit signed binary<br>-180000 to 600000<br>Value up to the third decimal place × 1000 | |
| Applicable RTD | | Pt100<br>(JIS C1604-1997, IEC 751-am2, JIS C1604-1989, DIN 43760-1980)<br>JPt100<br>(JIS C1604-1981) | |
| Measured temperature range | Pt100 | -180 to 600°C<br>(27.10 to 313.71Ω) | |
| | JPt100 | -180 to 600°C<br>(25.80 to 317.28Ω) | |
| | Ni100 | - | |
| Accuracy | | ±1%<br>(accuracy at full scale) | |
| Resolution | | 0.025°C | |
| Conversion speed | | 40ms/channel | |
| Number of analog input points | | 8 channels/module | |
| Output current for temperature detection | | 1mA | |
| Isolation method | | Between platinum RTD input and programmable controller power supply: photocoupler isolation<br>Between platinum RTD input and channel: non-isolation | |
| Dielectric withstand voltage | | Between platinum RTD input and programmable controller power supply: 500VAC, for 1 minute | |
| Disconnection detection | | Detected per channel | |
| Number of occupied I/O points | | 32 points<br>(I/O assignment: special 32 points) | |
| External connection system | | 38-point terminal block | |
| External device connector (sold separately) | | - | |
| Applicable wire size | | 0.75 to 2mm$^2$ | |
| Applicable solderless terminal | | V1.25-3, V1.25-YS3A, V2-S3, V2-YS3A | |

○: Compatible, △: Partial change required, ×: Incompatible

| | Q68RD3-G | Compatibility | Precautions for replacement |
|---|---|---|---|
| | 3-wire type | ○ | |
| | 16-bit signed binary<br>-2000 to 8500<br>Value up to the first decimal place × 10 | △ | 32-bit output is not available. |
| | Pt100<br>(JIS C 1604-1997, IEC751 1983)<br>JPt100<br>(JIS C 1604-1981)<br>Ni100<br>(DIN 43760 1987) | △ | As the compliance standards for the applicable RTD differ, change the RTD to the one that can be used with the Q68RD3-G. |
| | -200 to 850°C | ○ | |
| | -180 to 600°C | | |
| | -60 to 180°C | | |
| | *1 | ○ | |
| | 0.1°C | △ | The resolution reduces. |
| | 320ms/8 channels | △ | The conversion speed is fixed at 320ms, regardless of the number of enable channels. |
| | 8 channels/module | ○ | |
| | 1mA | ○ | |
| | <table><tr><th>Isolated area</th><th>Isolation method</th><th>Dielectric withstand voltage</th><th>Insulation resistance</th></tr><tr><td>Between RTD input and programmable controller power supply</td><td>Transformer isolation</td><td>500VACrms /minute</td><td rowspan="2">10MΩ or more using 500VDC insulation resistance tester</td></tr><tr><td>Between RTD input and channel</td><td>Transformer isolation</td><td>1000VACrms /minute</td></tr></table> | ○ | |
| | Detected per channel | ○ | |
| | 16 points<br>(I/O assignment: intelligent 16 points) | △ | The number of occupied I/O points has changed to 16 points. |
| | 40-pin connector | × | Wiring change is required. |
| | A6CON4 | × | Prepare the A6CON4 separately. |
| | 0.3 $mm^2$ | × | |
| | - | × | |

| Item | A68RD3N | |
|---|---|---|
| Cables between module and RTD | Make sure that the conductor resistance value between the Pt100 and A68RD3N is 10Ω or less per conductor.<br>All channels become the same specifications.<br>  | |
| Internal current consumption (5VDC) | 0.94A | |
| Weight | 0.43kg | |

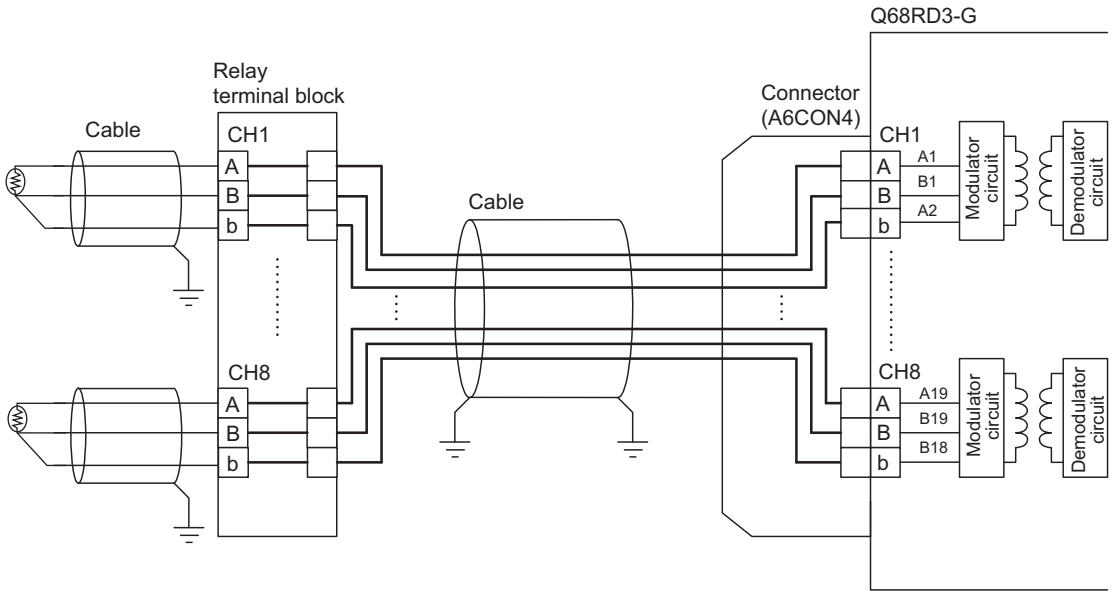
○: Compatible, △: Partial change required, ×: Incompatible

| | Q68RD3-G | Compatibility | Precautions for replacement |
|---|---|---|---|
| | *2 | △ | Install a relay terminal block outside. |
| | 0.54A | ○ | |
| | 0.20kg | ○ | |

*1 Accuracy of the Q68RD3-G for each RTD type is as follows.

| Conversion accuracy | | Specifications |
|---|---|---|
| Pt100 | -200 to 850°C*1 | ±0.8°C (Ambient temperature: 25±5°C), ±2.4°C (Ambient temperature: 0 to 55°C) |
| | -20 to 120°C*1 | ±0.3°C (Ambient temperature: 25±5°C), ±1.1°C (Ambient temperature: 0 to 55°C) |
| | 0 to 200°C*1 | ±0.4°C (Ambient temperature: 25±5°C), ±1.2°C (Ambient temperature: 0 to 55°C) |
| JPt100 | -180 to 600°C*1 | ±0.8°C (Ambient temperature: 25±5°C), ±2.4°C (Ambient temperature: 0 to 55°C) |
| | -20 to 120°C*1 | ±0.3°C (Ambient temperature: 25±5°C), ±1.1°C (Ambient temperature: 0 to 55°C) |
| | 0 to 200°C*1 | ±0.4°C (Ambient temperature: 25±5°C), ±1.2°C (Ambient temperature: 0 to 55°C) |
| Ni100 | -60 to 180°C*1 | ±0.4°C (Ambient temperature: 25±5°C), ±1.2°C (Ambient temperature: 0 to 55°C) |

*2 Connect cables between the Q68RD3-G and RTD using a relay terminal block as shown below.



### 4.6.2 Functional comparison

○ : Available, - : Not available

| Item | Description | A68RD3N | Q68RD3-G | Precautions for replacement |
|---|---|---|---|---|
| Conversion enable/disable specification of each channel | Enables/disables a detection of temperature. | ○ | ○ | |
| Sampling/averaging processing selection | Processes the detected temperature by specified method. | ○ | ○ | The setting ranges of time and count averages differ. Refer to the RTD Input Module/ Channel Isolated RTD Input Module User's Manual to check the specifications. |
| Detected temperature value storage | Stores temperature data in the buffer memory. | ○ | ○ | |
| Disconnection detection | Detects a disconnection of the connected RTD or cable. | ○ | ○ | |
| Specification of RTD type | Specifies a RTD type used. | ○ | ○ | |
| Range switching function | Switches the measured temperature range. | - | ○ | |
| Warning output function | Outputs a warning when the temperature exceeds the set temperature range. | - | ○ | |
| Scaling function | Converts a measured temperature value into a percent value (%) in set width. | - | ○ | |
| Error correction function | Corrects an error in temperature conversion value. | ○ | ○ | Perform the error correction by the offset/gain setting of the Q68RD3-G. |
| Online module replacement | Replaces a module without stopping the system. | - | ○ | Replaceable modules during online are the Process CPU and the Redundant CPU. |

### 4.6.3 I/O signal comparison to programmable controller CPU

Sequence program change is required as the I/O signals differ.
For details of the I/O signals and sequence program, refer to the RTD Input Module/Channel Isolated RTD Input Module User's Manual.

| A68RD3N | | | | Q68RD3-G | | | |
|---|---|---|---|---|---|---|---|
| Device No. | Signal name | Device No. | Signal name | Device No. | Signal name | Device No. | Signal name |
| X0 | Watchdog timer error flag | Y0 | Not used | X0 | Module READY | Y0 | Not used |
| X1 | READY flag | Y1 | | X1 | Not used | Y1 | |
| X2 | Write data error flag | Y2 | | X2 | | Y2 | |
| X3 | CH1: Disconnection detection flag | Y3 | | X3 | | Y3 | |
| X4 | CH2: Disconnection detection flag | Y4 | | X4 | | Y4 | |
| X5 | CH3: Disconnection detection flag | Y5 | | X5 | | Y5 | |
| X6 | CH4: Disconnection detection flag | Y6 | | X6 | | Y6 | |
| X7 | CH5: Disconnection detection flag | Y7 | | X7 | | Y7 | |
| X8 | CH6: Disconnection detection flag | Y8 | | X8 | | Y8 | |
| X9 | CH7: Disconnection detection flag | Y9 | | X9 | Operating condition setting completion flag | Y9 | Operating condition setting request |
| XA | CH8: Disconnection detection flag | YA | | XA | Offset/gain setting mode status flag | YA | User range write request |
| XB | Not used | YB | | XB | Channel change completion flag | YB | Channel change request |
| XC | | YC | | XC | Disconnection detection signal | YC | Not used |
| XD | | YD | Interlock signal for the RFRP and RTOP instructions when the A68RD3N is used in remote I/O station | XD | Warning output signal | YD | |
| XE | | YE | | XE | Conversion completion flag | YE | |
| XF | | YF | | XF | Error flag | YF | Error clear request |
| X10 | | Y10 | Not used | | | | |
| X11 | | Y11 | | | | | |
| X12 | | Y12 | Error code reset flag | | | | |
| X13 | | Y13 | Not used | | | | |
| X14 | | Y14 | | | | | |
| X15 | | Y15 | | | | | |
| X16 | | Y16 | | | | | |
| X17 | | Y17 | | | | | |
| X18 | | Y18 | | | | | |
| X19 | | Y19 | | | | | |
| X1A | | Y1A | | | | | |
| X1B | | Y1B | | | | | |
| X1C | | Y1C | | | | | |
| X1D | Interlock signal for the RFRP and RTOP instructions when the A68RD3N is used in remote I/O station | Y1D | | | | | |
| X1E | | Y1E | | | | | |
| X1F | | Y1F | | | | | |

### 4.6.4 Buffer memory address comparison

Sequence program change is required as the assignment of buffer memory differs.
For details of the buffer memory and sequence program, refer to the RTD Input Module/Channel Isolated RTD Input Module User's Manual.

| A68RD3N | | | Q68RD3-G | | |
|---|---|---|---|---|---|
| Address (decimal) | Name | Read/write | Address (decimal) | Name | Read/write |
| 0 | Conversion enable/disable specification | R/W | 0 | Conversion enable/disable setting | R/W |
| 1 | Averaging processing selection | | 1 | CH1 Time/count/moving average/time constant setting | |
| 2 | CH1 Averaging time/count | | 2 | CH2 Time/count/moving average/time constant setting | |
| 3 | CH2 Averaging time/count | | 3 | CH3 Time/count/moving average/time constant setting | |
| 4 | CH3 Averaging time/count | | 4 | CH4 Time/count/moving average/time constant setting | |
| 5 | CH4 Averaging time/count | | 5 | CH5 Time/count/moving average/time constant setting | |
| 6 | CH5 Averaging time/count | | 6 | CH6 Time/count/moving average/time constant setting | |
| 7 | CH6 Averaging time/count | | 7 | CH7 Time/count/moving average/time constant setting | |
| 8 | CH7 Averaging time/count | | 8 | CH8 Time/count/moving average/time constant setting | |
| 9 | CH8 Averaging time/count | | 9 | System area (Not used) | - |
| 10 | CH1 Detected temperature value (16bit) | R | 10 | Conversion completion flag | R |
| 11 | CH2 Detected temperature value (16bit) | | 11 | CH1 Measured temperature value | |
| 12 | CH3 Detected temperature value (16bit) | | 12 | CH2 Measured temperature value | |
| 13 | CH4 Detected temperature value (16bit) | | 13 | CH3 Measured temperature value | |
| 14 | CH5 Detected temperature value (16bit) | | 14 | CH4 Measured temperature value | |
| 15 | CH6 Detected temperature value (16bit) | | 15 | CH5 Measured temperature value | |
| 16 | CH7 Detected temperature value (16bit) | | 16 | CH6 Measured temperature value | |
| 17 | CH8 Detected temperature value (16bit) | | 17 | CH7 Measured temperature value | |
| 18 | CH1 Detected temperature value (L) | | 18 | CH8 Measured temperature value | |
| 19 | (32bit) (H) | | 19 | Error code | |
| 20 | CH2 Detected temperature value (L) | | 20 | Setting range 1 (Input type CH1-4) | |
| 21 | (32bit) (H) | | 21 | Setting range 2 (Input type CH5-8) | |
| 22 | CH3 Detected temperature value (L) | | 22 | Setting range 3 (Offset/gain setting) | |
| 23 | (32bit) (H) | | 23 | System area (Not used) | - |
| 24 | CH4 Detected temperature value (L) | | 24 | Averaging processing selection (CH1-CH4) | R/W |
| 25 | (32bit) (H) | | 25 | Averaging processing selection (CH5-CH8) | |
| 26 | CH5 Detected temperature value (L) | | 26 | Offset/gain setting mode (Offset specification) | |
| 27 | (32bit) (H) | | 27 | Offset/gain setting mode (Gain specification) | |
| 28 | CH6 Detected temperature value (L) | | 28 | CH1 Offset temperature setting value | |
| 29 | (32bit) (H) | | 29 | CH1 Gain temperature setting value | |
| 30 | CH7 Detected temperature value (L) | R | 30 | CH2 Offset temperature setting value | |
| 31 | (32bit) (H) | | 31 | CH2 Gain temperature setting value | |
| 32 | CH8 Detected temperature value (L) | | 32 | CH3 Offset temperature setting value | |
| 33 | (32bit) (H) | | 33 | CH3 Gain temperature setting value | |
| 34 | Write data error code | R/W | 34 | CH4 Offset temperature setting value | |
| 35 | Conversion completion flag | R | 35 | CH4 Gain temperature setting value | |
| 36 | Specification of platinum RTD type | R/W | 36 | CH5 Offset temperature setting value | |
| | | | 37 | CH5 Gain temperature setting value | |
| | | | 38 | CH6 Offset temperature setting value | |
| | | | 39 | CH6 Gain temperature setting value | |

| Q68RD3-G | | |
|---|---|---|
| Address (decimal) | Name | Read/write |
| 40 | CH7 Offset temperature setting value | R/W |
| 41 | CH7 Gain temperature setting value | |
| 42 | CH8 Offset temperature setting value | |
| 43 | CH8 Gain temperature setting value | |
| 44 to 45 | System area (Not used) | - |
| 46 | Warning output enable/disable setting | R/W |
| 47 | Warning output flag (Process alarm) | R |
| 48 | Warning output flag (Rate alarm) | |
| 49 | Disconnection detection flag | |
| 50 to 57 | CH1 to CH8 Scaling value | |
| 58 | Scaling valid/invalid setting | R/W |
| 59 to 61 | System area (Not used) | - |
| 62 | CH1 Scaling range lower limit value | R/W |
| 63 | CH1 Scaling range upper limit value | |
| to | | |
| 77 | CH8 Scaling range upper limit value | R/W |
| 78 | CH1 Scaling width lower limit value | |
| 79 | CH1 Scaling width upper limit value | |
| to | | |
| 93 | CH8 Scaling width upper limit value | R/W |
| 94 | CH1 Process alarm lower/lower limit value | |
| 95 | CH1 Process alarm lower/upper limit value | |
| 96 | CH1 Process alarm upper/lower limit value | |
| 97 | CH1 Process alarm upper/upper limit value | |
| to | | |
| 125 | CH8 Process alarm upper/upper limit value | R/W |
| 126 to 133 | CH1 to CH8 Rate alarm warning detection period | |
| 134 | CH1 Rate alarm upper limit value | |
| 135 | CH1 Rate alarm lower limit value | |
| to | | |
| 149 | CH8 Rate alarm lower limit value | R/W |
| 150 to 157 | System area (Not used) | - |
| 158 to 159 | Mode switching setting | R/W |
| 160 to 163 | System area (Not used) | - |
| 164 | Conversion setting for disconnection detection (CH1-CH4) | R/W |
| 165 | Conversion setting for disconnection detection (CH5-CH8) | |
| 166 to173 | CH1 to CH8 Conversion setting value for disconnection detection | |
| 174 to 189 | System area | - |
| 190 | CH1 Factory default offset value | R/W |
| 191 | CH1 Factory default gain value | |
| 192 | CH1 User range settings offset value | |
| 193 | CH1 User range settings gain value | |
| 194 | CH1 User range settings offset (L) | |
| 195 | resistance value (H) | |
| 196 | CH1 User range settings gain (L) | |
| 197 | resistance value (H) | |
| to | | |
| 253 | CH8 User range settings gain resistance value (H) | R/W |

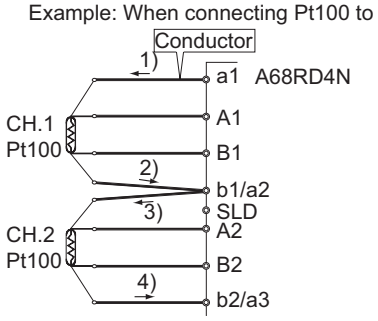
## 4.7 A68RD4N (Replacement to the Q64RD)

### 4.7.1 Performance comparison

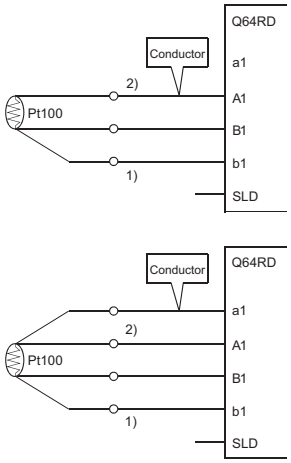
| Item | | A68RD4N | |
|---|---|---|---|
| Measuring method | | 4-wire type | |
| Output (temperature conversion value) | | 16-bit signed binary<br>-1800 to 6000<br>Value up to the first decimal place × 10<br>32-bit signed binary<br>-180000 to 600000<br>Value up to the third decimal place × 1000 | |
| Applicable platinum RTD | | Pt100<br>(JIS C1604-1997, IEC 751-am2, JIS C1604-1989, DIN 43760-1980)<br>JPt100<br>(JIS C1604-1981) | |
| Measured temperature range | Pt100 | -180 to 600°C<br>(27.10 to 313.71Ω) | |
| | JPt100 | -180 to 600°C<br>(25.80 to 317.28Ω) | |
| Accuracy | | ±1%<br>(accuracy at full scale) | |
| Resolution | | 0.025°C | |
| Conversion speed | | 40ms/channel | |
| Number of analog input points | | 8 channels/module | |
| Output current for temperature detection | | 1mA | |
| Isolation method | | Between platinum RTD input and programmable controller power supply: photocoupler isolation<br>Between platinum RTD input and channel: non-isolation | |
| Dielectric withstand voltage | | Between platinum RTD input and programmable controller power supply: 500VAC, for 1 minute | |
| Disconnection detection | | Batch-detected at all channels | |
| Number of occupied I/O points | | 32 points<br>(I/O assignment: special 32 points) | |
| External connection system | | 38-point terminal block | |
| Applicable wire size | | 0.75 to 2mm$^2$ | |
| Applicable solderless terminal | | V1.25-3, V1.25-YS3A, V2-S3, V2-YS3A | |

○: Compatible, △: Partial change required, ×: Incompatible

<table>
<tr><th></th><th>Q64RD</th><th>Compatibility</th><th>Precautions for replacement</th></tr>
<tr><td></td><td>3/4-wire type</td><td>○</td><td></td></tr>
<tr><td></td><td>16-bit signed binary<br>-2000 to 8500<br>Value up to the first decimal place × 10<br>32-bit signed binary data<br>-200000 to 850000<br>Value up to the third decimal place × 1000</td><td>○</td><td></td></tr>
<tr><td></td><td>Pt100<br>(JIS C 1604-1997, IEC751 1983)<br>JPt100<br>(JIS C 1604-1981)</td><td>△</td><td>As the compliance standards for the applicable platinum RTD differ, change the platinum RTD to the one that can be used with the Q64RD.</td></tr>
<tr><td></td><td>-200 to 850°C</td><td rowspan="2">○</td><td rowspan="2"></td></tr>
<tr><td></td><td>-180 to 600°C</td></tr>
<tr><td></td><td>Ambient temperature 0 to 55°C: ±0.25%<br>(accuracy relative to maximum value)<br>Ambient temperature 25±5°C: ±0.08%<br>(accuracy relative to maximum value)</td><td>○</td><td></td></tr>
<tr><td></td><td>0.025°C</td><td>○</td><td></td></tr>
<tr><td></td><td>40ms/channel</td><td>○</td><td></td></tr>
<tr><td></td><td>4 channels/module</td><td>△</td><td>Consider replacement with multiple Q64RD.</td></tr>
<tr><td></td><td>1mA</td><td>○</td><td></td></tr>
<tr><td></td><td rowspan="2"><table>
<tr><th>Isolated area</th><th>Isolation method</th><th>Dielectric withstand voltage</th><th>Insulation resistance</th></tr>
<tr><td>Between platinum RTD input and programmable controller power supply</td><td>Photocoupler isolation</td><td>1780VrmsAC/3 cycles (altitude 2000m)</td><td rowspan="2">10MΩ or more using 500VDC insulation resistance tester</td></tr>
<tr><td>Between platinum RTD input and channel</td><td>Non-isolation</td><td>-</td></tr>
</table></td><td rowspan="2">○</td><td rowspan="2"></td></tr>
<tr><td></td></tr>
<tr><td></td><td>Detected per channel</td><td>○</td><td></td></tr>
<tr><td></td><td>16 points<br>(I/O assignment: intelligent 16 points)</td><td>△</td><td>The number of occupied I/O points has changed to 16 points.</td></tr>
<tr><td></td><td>18-point terminal block</td><td>×</td><td rowspan="3">Wiring change is required.</td></tr>
<tr><td></td><td>0.3 to 0.75mm$^2$</td><td>×</td></tr>
<tr><td></td><td>1.25-3, R1.25-3<br>(Sleeved solderless terminal cannot be used.)</td><td>×</td></tr>
</table>

| Item | A68RD4N | |
|---|---|---|
| Cable between module and platinum RTD | Set the total resistance value of a conductor where the current runs to 70Ω or less.<br>Example: When connecting Pt100 to CH1 and CH2<br>  <br>Lay wiring so that the following condition is met.<br>1) + 2) + 3) + 4) ≦ 70 (Ω)<br>← indicates the direction of current. | |
| Internal current consumption (5VDC) | 0.41A | |
| Weight | 0.43kg | |

○: Compatible, △: Partial change required, ×: Incompatible

| | Q64RD | Compatibility | Precautions for replacement |
|---|---|---|---|
| | The conductor resistance value must meet the condition of 1) + 2) ≤ 2kΩ or less.<br>(In the case of 3-conductor type, the difference between 1) and 2) in the conductor resistance value must be 10Ω or less.)<br>  <br> | ○ | |
| | 0.60A | △ | The recalculation of internal current consumption (5VDC) is required. |
| | 0.17kg | ○ | |

### 4.7.2 Functional comparison

○ : Available, - : Not available

| Item | Description | A68RD4N | Q64RD | Precautions for replacement |
|---|---|---|---|---|
| Conversion enable/disable specification of each channel | Enables/disables a detection of temperature. | ○ | ○ | |
| Sampling/averaging processing selection | Processes the detected temperature by specified method. | ○ | ○ | The setting ranges of time and count averages differ. Refer to the RTD Input Module/ Channel Isolated RTD Input Module User's Manual to check the specifications. |
| Detected temperature value storage | Stores temperature data in the buffer memory. | ○ | ○ | |
| Disconnection detection | This function detects connected platinum RTD or cable breakage. | ○ | ○ | For the Q64RD, a disconnection is detected per channel. |
| Specification of platinum RTD type | Specifies a platinum RTD type used. | ○ | ○ | |
| Range switching function | Switches the measured temperature range. | - | ○ | |
| Warning output function | Outputs a warning when the temperature exceeds the set temperature range. | - | ○ | |
| Scaling function | Converts a measured temperature value into a percent value (%) in set width. | - | ○ | |
| Error correction function | Corrects an error in temperature conversion value. | ○ | ○ | Perform the error correction by the offset/gain setting of the Q64RD. |
| Online module replacement | Replaces a module without stopping the system. | - | ○ | Replaceable modules during online are the Process CPU and the Redundant CPU. |

### 4.7.3 I/O signal comparison to programmable controller CPU

Sequence program change is required as the I/O signals differ.
For details of the I/O signals and sequence program, refer to the RTD Input Module/Channel Isolated RTD Input Module User's Manual.

| A68RD4N | | | | Q64RD | | | |
|---|---|---|---|---|---|---|---|
| Device No. | Signal name | Device No. | Signal name | Device No. | Signal name | Device No. | Signal name |
| X0 | Watchdog timer error flag | Y0 | Not used | X0 | Module READY | Y0 | Not used |
| X1 | READY flag | Y1 | | X1 | CH1 Offset/gain setting status signal | Y1 | CH1 Offset setting request |
| X2 | Write data error flag | Y2 | | X2 | CH2 Offset/gain setting status signal | Y2 | CH1 Gain setting request |
| X3 | Σ disconnection detection flag (CH1 to CH8) | Y3 | | X3 | CH3 Offset/gain setting status signal | Y3 | CH2 Offset setting request |
| X4 | Not used | Y4 | | X4 | CH4 Offset/gain setting status signal | Y4 | CH2 Gain setting request |
| X5 | | Y5 | | X5 | Not used | Y5 | CH3 Offset setting request |
| X6 | | Y6 | | X6 | | Y6 | CH3 Gain setting request |
| X7 | | Y7 | | X7 | | Y7 | CH4 Offset setting request |
| X8 | | Y8 | | X8 | | Y8 | CH4 Gain setting request |
| X9 | | Y9 | | X9 | Operating condition setting completion signal | Y9 | Operating condition setting request |
| XA | | YA | | XA | Offset/gain setting mode status flag | YA | User range write request |
| XB | | YB | | XB | Not used | YB | Not used |
| XC | | YC | | XC | Disconnection detection signal | YC | |
| XD | | YD | Interlock signal for the RFRP and RTOP instructions when the A68RD4N is used in remote I/O station | XD | Warning output signal | YD | |
| XE | | YE | | XE | Conversion completion flag | YE | |
| XF | | YF | | XF | Error flag | YF | Error clear request |
| X10 | | Y10 | Not used | | | | |
| X11 | | Y11 | | | | | |
| X12 | | Y12 | Error code reset flag | | | | |
| X13 | | Y13 | Not used | | | | |
| X14 | | Y14 | | | | | |
| X15 | | Y15 | | | | | |
| X16 | | Y16 | | | | | |
| X17 | | Y17 | | | | | |
| X18 | | Y18 | | | | | |
| X19 | | Y19 | | | | | |
| X1A | | Y1A | | | | | |
| X1B | | Y1B | | | | | |
| X1C | | Y1C | | | | | |
| X1D | Interlock signal for the RFRP and RTOP instructions when the A68RD4N is used in remote I/O station | Y1D | | | | | |
| X1E | | Y1E | | | | | |
| X1F | | Y1F | | | | | |

### 4.7.4 Buffer memory address comparison

Sequence program change is required as the assignment of buffer memory differs.
For details of the buffer memory and sequence program, refer to the RTD Input Module/Channel Isolated RTD Input Module User's Manual.

| A68RD4N | | | Q64RD | | |
|---|---|---|---|---|---|
| Address (decimal) | Name | Read/write | Address (decimal) | Name | Read/write |
| 0 | Conversion enable/disable specification | R/W | 0 | Conversion enable/disable specification | R/W |
| 1 | Averaging processing selection | | 1 | CH1 Time/count averaging setting | |
| 2 | CH1 Averaging time/count | | 2 | CH2 Time/count averaging setting | |
| 3 | CH2 Averaging time/count | | 3 | CH3 Time/count averaging setting | |
| 4 | CH3 Averaging time/count | | 4 | CH4 Time/count averaging setting | |
| 5 | CH4 Averaging time/count | | 5 | System area (Not used) | - |
| 6 | CH5 Averaging time/count | | 6 | | |
| 7 | CH6 Averaging time/count | | 7 | | |
| 8 | CH7 Averaging time/count | | 8 | | |
| 9 | CH8 Averaging time/count | | 9 | Averaging processing selection | R/W |
| 10 | CH1 Detected temperature value (16bit) | R | 10 | Conversion completion flag | R |
| 11 | CH2 Detected temperature value (16bit) | | 11 | CH1 Measured temperature value (16bit) | |
| 12 | CH3 Detected temperature value (16bit) | | 12 | CH2 Measured temperature value (16bit) | |
| 13 | CH4 Detected temperature value (16bit) | | 13 | CH3 Measured temperature value (16bit) | |
| 14 | CH5 Detected temperature value (16bit) | | 14 | CH4 Measured temperature value (16bit) | |
| 15 | CH6 Detected temperature value (16bit) | | 15 | System area (Not used) | - |
| 16 | CH7 Detected temperature value (16bit) | | 16 | | |
| 17 | CH8 Detected temperature value (16bit) | | 17 | | |
| 18 | CH1 Detected temperature value (L) | | 18 | | |
| 19 | (32bit) (H) | | 19 | Error code | R |
| 20 | CH2 Detected temperature value (L) | | 20 | Setting range | |
| 21 | (32bit) (H) | | 21 | System area (Not used) | - |
| 22 | CH3 Detected temperature value (L) | | 22 | | |
| 23 | (32bit) (H) | | 23 | | |
| 24 | CH4 Detected temperature value (L) | | 24 | | |
| 25 | (32bit) (H) | | 25 | | |
| 26 | CH5 Detected temperature value (L) | | 26 | | |
| 27 | (32bit) (H) | | 27 | | |
| 28 | CH6 Detected temperature value (L) | | 28 | | |
| 29 | (32bit) (H) | | 29 | | |
| 30 | CH7 Detected temperature value (L) | | 30 | | |
| 31 | (32bit) (H) | | 31 | | |
| 32 | CH8 Detected temperature value (L) | | 32 | | |
| 33 | (32bit) (H) | | 33 | | |
| 34 | Write data error code | R/W | 34 | | |
| 35 | Conversion completion flag | R | 35 | | |
| 36 | Specification of platinum RTD type | R/W | 36 | | |
| | | | 37 | | |
| | | | 38 | | |
| | | | 39 | | |
| | | | 40 | | |
| | | | 41 | | |
| | | | 42 | | |
| | | | 43 | | |
| | | | 44 | | |
| | | | 45 | | |
| | | | 46 | | |
| | | | 47 | Warning output enable/disable setting | R/W |

| Q64RD | | |
|---|---|---|
| Address (decimal) | Name | Read/write |
| 48 | Warning output flag | R |
| 49 | Disconnection detection flag | |
| 50 | CH1 Scaling value | |
| 51 | CH2 Scaling value | |
| 52 | CH3 Scaling value | |
| 53 | CH4 Scaling value | |
| 54 | CH1 Measured temperature value (L) | |
| 55 | (32bit) (H) | |
| 56 | CH2 Measured temperature value (L) | |
| 57 | (32bit) (H) | |
| 58 | CH3 Measured temperature value (L) | |
| 59 | (32bit) (H) | |
| 60 | CH4 Measured temperature value (L) | |
| 61 | (32bit) (H) | |
| 62 | CH1 Scaling range lower limit value (L) | R/W |
| 63 | (H) | |
| 64 | CH1 Scaling range upper limit value (L) | |
| 65 | (H) | |
| 66 | CH2 Scaling range lower limit value (L) | |
| 67 | (H) | |
| 68 | CH2 Scaling range upper limit value (L) | |
| 69 | (H) | |
| 70 | CH3 Scaling range lower limit value (L) | |
| 71 | (H) | |
| 72 | CH3 Scaling range upper limit value (L) | |
| 73 | (H) | |
| 74 | CH4 Scaling range lower limit value (L) | |
| 75 | (H) | |
| 76 | CH4 Scaling range upper limit value (L) | |
| 77 | (H) | |
| 78 | CH1 Scaling width lower limit value | |
| 79 | CH1 Scaling width upper limit value | |
| 80 | CH2 Scaling width lower limit value | |
| 81 | CH2 Scaling width upper limit value | |
| 82 | CH3 Scaling width lower limit value | |
| 83 | CH3 Scaling width upper limit value | |
| 84 | CH4 Scaling width lower limit value | |
| 85 | CH4 Scaling width upper limit value | |
| 86 | CH1 Warning output lower/lower (L) | |
| 87 | limit value (H) | |
| 88 | CH1 Warning output lower/upper (L) | |
| 89 | limit value (H) | |
| 90 | CH1 Warning output upper/lower (L) | |
| 91 | limit value (H) | |
| 92 | CH1 Warning output upper/upper (L) | |
| 93 | limit value (H) | |
| to | | |
| 116 | CH4 Warning output upper/upper (L) | R/W |
| 117 | limit value (H) | |
| 118 | CH1 Offset temperature setting (L) | |
| 119 | value (H) | |
| 120 | CH1 Gain temperature setting (L) | |
| 121 | value (H) | |
| to | | |
| 132 | CH4 Gain temperature setting (L) | R/W |
| 133 | value (H) | |

| Q64RD | | |
|---|---|---|
| **Address (decimal)** | **Name** | **Read/write** |
| 134 to 157 | Not used | - |
| 158 | Mode switching setting | R/W |
| 159 | | |
| 160 | 3-conductor type<br>CH1 Factory default offset value | |
| to | | |
| 254 | 4-conductor type CH4 User range (L)<br>settings gain resistance value (H) | R/W |
| 255 | | |

## Memo

## 4.8 A68RD4N (Replacement to the Q64RD-G)

### 4.8.1 Performance comparison

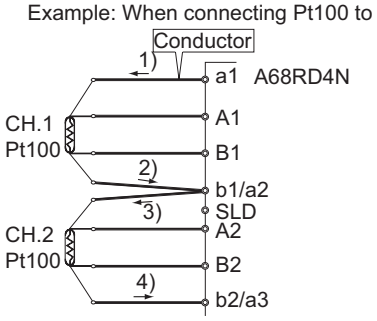
| Item | | A68RD4N | |
|---|---|---|---|
| Measuring method | | 4-wire type | |
| Output (temperature conversion value) | | 16-bit signed binary<br>-1800 to 6000<br>Value up to the first decimal place × 10<br>32-bit signed binary<br>-180000 to 600000<br>Value up to the third decimal place × 1000 | |
| Applicable RTD | | Pt100<br>(JIS C1604-1997, IEC 751-am2, JIS C1604-1989, DIN 43760-1980)<br>JPt100<br>(JIS C1604-1981) | |
| Measured temperature range | Pt100 | -180 to 600°C<br>(27.10 to 313.71Ω) | |
| | JPt100 | -180 to 600°C<br>(25.80 to 317.28Ω) | |
| | Ni100 | - | |
| Accuracy | | ±1%<br>(accuracy at full scale) | |
| Resolution | | 0.025°C | |
| Conversion speed | | 40ms/channel | |
| Number of analog input points | | 8 channels/module | |
| Output current for temperature detection | | 1mA | |
| Isolation method | | Between platinum RTD input and programmable controller power supply: photocoupler isolation<br>Between platinum RTD input and channel: non-isolation | |
| Dielectric withstand voltage | | Between platinum RTD input and programmable controller power supply: 500VAC, for 1 minute | |
| Disconnection detection | | Batch-detected at all channels | |
| Number of occupied I/O points | | 32 points<br>(I/O assignment: special 32 points) | |
| External connection system | | 38-point terminal block | |
| Applicable wire size | | 0.75 to 2mm$^2$ | |
| Applicable solderless terminal | | V1.25-3, V1.25-YS3A, V2-S3, V2-YS3A | |

○: Compatible, △: Partial change required, ×: Incompatible

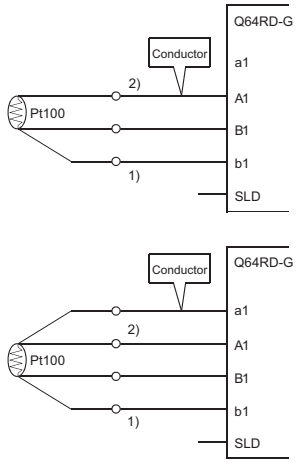
<table>
<tr><th></th><th>Q64RD-G</th><th>Compatibility</th><th>Precautions for replacement</th></tr>
<tr><td></td><td>3/4-wire type</td><td>○</td><td></td></tr>
<tr><td></td><td>16-bit signed binary<br>-2000 to 8500<br>Value up to the first decimal place × 10<br>32-bit signed binary data<br>-200000 to 850000<br>Value up to the third decimal place × 1000</td><td>○</td><td></td></tr>
<tr><td></td><td>Pt100<br>(JIS C 1604-1997, IEC751 1983)<br>JPt100<br>(JIS C 1604-1981)<br>Ni100<br>(DIN 43760 1987)</td><td>△</td><td>As the compliance standards for the applicable RTD differ, change the RTD to the one that can be used with the Q64RD-G.</td></tr>
<tr><td></td><td>-200 to 850°C</td><td rowspan="3">○</td><td rowspan="3"></td></tr>
<tr><td></td><td>-180 to 600°C</td></tr>
<tr><td></td><td>-60 to 180°C</td></tr>
<tr><td></td><td>*1</td><td>○</td><td></td></tr>
<tr><td></td><td>0.025°C</td><td>○</td><td></td></tr>
<tr><td></td><td>40ms/channel</td><td>○</td><td></td></tr>
<tr><td></td><td>4 channels/module</td><td>△</td><td>Consider replacement with multiple Q64RD-G.</td></tr>
<tr><td></td><td>1mA</td><td>○</td><td></td></tr>
<tr><td></td><td rowspan="2"><table>
<tr><th>Isolated area</th><th>Isolation method</th><th>Dielectric withstand voltage</th><th>Insulation resistance</th></tr>
<tr><td>Between RTD input and programmable controller power supply</td><td>Photocoupler isolation</td><td>1780VrmsAC/3 cycles (altitude 2000m)</td><td rowspan="2">10MΩ or more using 500VDC insulation resistance tester</td></tr>
<tr><td>Between RTD input and channel</td><td>Transformer isolation</td><td>-</td></tr>
</table></td><td rowspan="2">○</td><td rowspan="2"></td></tr>
<tr><td></td></tr>
<tr><td></td><td>Detected per channel</td><td>○</td><td></td></tr>
<tr><td></td><td>16 points<br>(I/O assignment: intelligent 16 points)</td><td>△</td><td>The number of occupied I/O points has changed to 16 points.</td></tr>
<tr><td></td><td>18-point terminal block</td><td>×</td><td rowspan="3">Wiring change is required.</td></tr>
<tr><td></td><td>0.3 to 0.75mm$^2$</td><td>×</td></tr>
<tr><td></td><td>1.25-3 R1.25-3<br>(Sleeved solderless terminal cannot be used.)</td><td>×</td></tr>
</table>

*1 Indicates accuracy of the Q64RD-G (accuracy at the maximum value in the selection range).

| Accuracy | | Specifications |
|---|---|---|
| Reference accuracy | | Within 0.04% |
| Temperature coefficient | Pt100/JPt100 (-20 to 120°C) | ±70ppm/°C (±0.0070%/°C) |
| | Pt100/JPt100 (0 to 200°C) | ±65ppm/°C (±0.0065%/°C) |
| | Pt100/JPt100 (-200 to 850°C) | ±50ppm/°C (±0.0050%/°C) |
| | Ni100Ω (-60 to 180°C) | ±70ppm/°C (±0.0070%/°C) |

| Item | A68RD4N | |
|---|---|---|
| Cable across module - platinum resistance thermometer | Set the total resistance value of a conductor where the current runs to 70Ω or less.<br>Example: When connecting Pt100 to CH1 and CH2<br>  <br><br>Lay wiring so that the following condition is met.<br>1) + 2) + 3) + 4) ≦ 70 (Ω)<br>← indicates the direction of current. | |
| Internal current consumption (5VDC) | 0.41A | |
| Weight | 0.43kg | |

○: Compatible, △: Partial change required, ×: Incompatible

| | Q64RD-G | Compatibility | Precautions for replacement |
|---|---|---|---|
| | The conductor resistance value must meet the condition of 1) + 2) ≤ 2kΩ or less.<br>(In the case of 3-conductor type, the difference between 1) and 2) in the conductor resistance value must be 10Ω or less.)<br>  <br> | ○ | |
| | 0.62A | △ | The recalculation of internal current consumption (5VDC) is required. |
| | 0.20kg | ○ | |

### 4.8.2 Functional comparison

○ : Available, - : Not available

| Item | Description | A68RD4N | Q64RD-G | Precautions for replacement |
|---|---|---|---|---|
| Conversion enable/disable specification of each channel | Enables/disables a detection of temperature. | ○ | ○ | |
| Sampling/averaging processing selection | Processes the detected temperature by specified method. | ○ | ○ | The setting ranges of time and count averages differ. Refer to the RTD Input Module/ Channel Isolated RTD Input Module User's Manual to check the specifications. |
| Detected temperature value storage | Stores temperature data in the buffer memory. | ○ | ○ | |
| Disconnection detection | Detects a disconnection of the connected RTD or cable. | ○ | ○ | For the Q64RD-G, a disconnection is detected per channel. |
| Type specification of RTD | Specifies a RTD type used. | ○ | ○ | |
| Range switching function | Switches the measured temperature range. | - | ○ | |
| Warning output function | Outputs a warning when the temperature exceeds the set temperature range. | - | ○ | |
| Scaling function | Converts a measured temperature value into a percent value (%) in set width. | - | ○ | |
| Error correction function | Corrects an error in temperature conversion value. | ○ | ○ | Perform the error correction by the offset/gain setting of the Q64RD-G. |
| Online module replacement | Replaces a module without stopping the system. | - | ○ | Replaceable modules during online are the Process CPU and the Redundant CPU. |

### 4.8.3 I/O signal comparison to programmable controller CPU

Sequence program change is required as the I/O signals differ.
For details of the I/O signals and sequence program, refer to the RTD Input Module/Channel Isolated RTD Input Module User's Manual.

| A68RD4N | | | | Q64RD-G | | | |
|---|---|---|---|---|---|---|---|
| Device No. | Signal name | Device No. | Signal name | Device No. | Signal name | Device No. | Signal name |
| X0 | Watchdog timer error flag | Y0 | Not used | X0 | Module READY | Y0 | Not used |
| X1 | READY flag | Y1 | | X1 | CH1 Offset/gain setting status signal | Y1 | CH1 Offset setting request |
| X2 | Write data error flag | Y2 | | X2 | CH2 Offset/gain setting status signal | Y2 | CH1 Gain setting request |
| X3 | Σ disconnection detection flag (CH1 to CH8) | Y3 | | X3 | CH3 Offset/gain setting status signal | Y3 | CH2 Offset setting request |
| X4 | Not used | Y4 | | X4 | CH4 Offset/gain setting status signal | Y4 | CH2 Gain setting request |
| X5 | | Y5 | | X5 | Not used | Y5 | CH3 Offset setting request |
| X6 | | Y6 | | X6 | | Y6 | CH3 Gain setting request |
| X7 | | Y7 | | X7 | | Y7 | CH4 Offset setting request |
| X8 | | Y8 | | X8 | | Y8 | CH4 Gain setting request |
| X9 | | Y9 | | X9 | Operating condition setting completion signal | Y9 | Operating condition setting request |
| XA | | YA | | XA | Offset/gain setting mode status flag | YA | User range write request |
| XB | | YB | | XB | Not used | YB | Not used |
| XC | | YC | | XC | Disconnection detection signal | YC | |
| XD | | YD | Interlock signal for the RFRP and RTOP instructions when the A68RD4N is used in remote I/O station | XD | Warning output signal | YD | |
| XE | | YE | | XE | Conversion completion flag | YE | |
| XF | | YF | | XF | Error flag | YF | Error clear request |
| X10 | | Y10 | Not used | | | | |
| X11 | | Y11 | | | | | |
| X12 | | Y12 | Error code reset flag | | | | |
| X13 | | Y13 | Not used | | | | |
| X14 | | Y14 | | | | | |
| X15 | | Y15 | | | | | |
| X16 | | Y16 | | | | | |
| X17 | | Y17 | | | | | |
| X18 | | Y18 | | | | | |
| X19 | | Y19 | | | | | |
| X1A | | Y1A | | | | | |
| X1B | | Y1B | | | | | |
| X1C | | Y1C | | | | | |
| X1D | Interlock signal for the RFRP and RTOP instructions when the A68RD4N is used in remote I/O station | Y1D | | | | | |
| X1E | | Y1E | | | | | |
| X1F | | Y1F | | | | | |

### 4.8.4 Buffer memory address comparison

Sequence program change is required as the assignment of buffer memory differs.
For details of the buffer memory and sequence program, refer to the RTD Input Module/Channel Isolated RTD Input Module User's Manual.

| A68RD4N | | | Q64RD-G | | |
|---|---|---|---|---|---|
| Address (decimal) | Name | Read/write | Address (decimal) | Name | Read/write |
| 0 | Conversion enable/disable specification | R/W | 0 | Conversion enable/disable setting | R/W |
| 1 | Averaging processing selection | | 1 | CH1 Time/count/moving average/time constant setting | |
| 2 | CH1 Averaging time/count | | 2 | CH2 Time/count/moving average/time constant setting | |
| 3 | CH2 Averaging time/count | | 3 | CH3 Time/count/moving average/time constant setting | |
| 4 | CH3 Averaging time/count | | 4 | CH4 Time/count/moving average/time constant setting | |
| 5 | CH4 Averaging time/count | | 5 | System area | - |
| 6 | CH5 Averaging time/count | | to | | |
| 7 | CH6 Averaging time/count | | | | |
| 8 | CH7 Averaging time/count | | 8 | | |
| 9 | CH8 Averaging time/count | | 9 | Averaging processing selection | R/W |
| 10 | CH1 Detected temperature value (16bit) | R | 10 | Conversion completion flag | R |
| 11 | CH2 Detected temperature value (16bit) | | 11 | CH1 Measured temperature value (16bit) | |
| 12 | CH3 Detected temperature value (16bit) | | 12 | CH2 Measured temperature value (16bit) | |
| 13 | CH4 Detected temperature value (16bit) | | 13 | CH3 Measured temperature value (16bit) | |
| 14 | CH5 Detected temperature value (16bit) | | 14 | CH4 Measured temperature value (16bit) | |
| 15 | CH6 Detected temperature value (16bit) | | 15 | System area (Not used) | - |
| 16 | CH7 Detected temperature value (16bit) | | to | | |
| 17 | CH8 Detected temperature value (16bit) | | | | |
| 18 | CH1 Detected temperature value (L) | | 18 | | |
| 19 | (32bit) (H) | | 19 | Error code | R |
| 20 | CH2 Detected temperature value (L) | | 20 | Setting range 1 | |
| 21 | (32bit) (H) | | 21 | Setting range 2 | |
| 22 | CH3 Detected temperature value (L) | | 22 | System area (Not used) | - |
| 23 | (32bit) (H) | | 23 | | |
| 24 | CH4 Detected temperature value (L) | | 24 | | |
| 25 | (32bit) (H) | | 25 | | |
| 26 | CH5 Detected temperature value (L) | | 26 | | |
| 27 | (32bit) (H) | | 27 | | |
| 28 | CH6 Detected temperature value (L) | | 28 | | |
| 29 | (32bit) (H) | | 29 | | |
| 30 | CH7 Detected temperature value (L) | | 30 | | |
| 31 | (32bit) (H) | | 31 | | |
| 32 | CH8 Detected temperature value (L) | | 32 | | |
| 33 | (32bit) (H) | | 33 | | |
| 34 | Write data error code | R/W | 34 | | |
| 35 | Conversion completion flag | R | 35 | | |
| 36 | Specification of platinum RTD type | R/W | 36 | | |
| | | | 37 | | |
| | | | 38 | | |

| Q64RD-G | | |
|---|---|---|
| Address (decimal) | Name | Read/write |
| 39 | System area (Not used) | - |
| 40 | | |
| 41 | | |
| 42 | | |
| 43 | | |
| 44 | | |
| 45 | | |
| 46 | | |
| 47 | Warning output enable/disable setting | R/W |
| 48 | Warning output flag | R |
| 49 | Disconnection detection flag | |
| 50 to 53 | CH1 to CH4 Scaling value | |
| 54 | CH1 Measured temperature (L) | |
| 55 | value (32bit) (H) | |
| to | | |
| 60 | CH4 Measured temperature (L) | R |
| 61 | value (32bit) (H) | |
| 62 | CH1 Scaling range lower limit value (L) | R/W |
| 63 | (H) | |
| 64 | CH1 Scaling range upper limit value (L) | |
| 65 | (H) | |
| to | | |
| 76 | CH4 Scaling range upper limit (L) | R/W |
| 77 | value (H) | |
| 78 | CH1 Scaling width lower limit value | |
| 79 | CH1 Scaling width upper limit value | |
| to | | |
| 85 | CH4 Scaling width upper limit value | R/W |
| 86 | CH1 Warning output lower lower (L) | |
| 87 | limit value (H) | |
| 88 | CH1 Warning output lower upper (L) | |
| 89 | limit value (H) | |
| 90 | CH1 Warning output upper lower (L) | |
| 91 | limit value (H) | |
| 92 | CH1 Warning output upper upper (L) | |
| 93 | limit value (H) | |
| to | | |
| 116 | CH4 Warning output upper upper (L) | R/W |
| 117 | limit value (H) | |
| 118 | CH1 Offset temperature setting value (L) | |
| 119 | (H) | |
| 120 | CH1 Gain temperature setting value (L) | |
| 121 | (H) | |
| to | | |
| 132 | CH4 Gain temperature setting value (L) | R/W |
| 133 | (H) | |
| 134 | Extended averaging processing selection | |
| 135 to 147 | System area (Not used) | - |
| 148 | Conversion setting for disconnection detection | R/W |
| 149 | System area (Not used) | - |
| 150 | CH1 Conversion setting value for (L) | R/W |
| 151 | disconnection detection (H) | |

| Q64RD-G | | |
|---|---|---|
| Address (decimal) | Name | Read/write |
| to | | |
| 156 | CH4 Conversion setting value for (L) | R/W |
| 157 | disconnection detection (H) | |
| 158 | Mode switching setting | |
| 159 | | |
| 160 | 3-conductor type CH1 Factory default (L) | |
| 161 | offset value (H) | |
| 162 | 3-conductor type CH1 Factory default (L) | |
| 163 | gain value (H) | |
| 164 | 3-conductor type CH1 User range (L) | |
| 165 | settings offset value (H) | |
| 166 | 3-conductor type CH1 User range (L) | |
| 167 | settings gain value (H) | |
| 168 | 3-conductor type CH1 User range (L) | |
| 169 | settings offset resistance value (H) | |
| 170 | 3-conductor type CH1 User range (L) | |
| 171 | settings gain resistance value (H) | |
| 172 | 4-conductor type CH1 Factory default (L) | |
| 173 | offset value (H) | |
| 174 | 4-conductor type CH1 Factory default (L) | |
| 175 | gain value (H) | |
| 176 | 4-conductor type CH1 User range (L) | |
| 177 | settings offset value (H) | |
| 178 | 4-conductor type CH1 User range (L) | |
| 179 | settings gain value (H) | |
| 180 | 4-conductor type CH1 User range (L) | |
| 181 | settings offset resistance value (H) | |
| 182 | 4-conductor type CH1 User range (L) | |
| 183 | settings gain resistance value (H) | |
| to | | |
| 254 | 4-conductor type CH4 User range (L) | R/W |
| 255 | settings gain resistance value (H) | |

## Memo

# 5 MULTIPLEXER REPLACEMENT

## 5.1 A60MX

As regarding A60MX non-isolated multiplexer module, consider replacement using multiple Q68ADV/I.

### 5.1.1 Performance comparison

<table>
<tr><th colspan="2">Item</th><th colspan="3">A60MX</th><th></th></tr>
<tr><td rowspan="2">Analog input</td><td>Voltage</td><td colspan="3">-10 to 0 to +10VDC (Input resistance value: 1MΩ)</td><td></td></tr>
<tr><td>Current</td><td colspan="3">-20 to 0 to +20mADC (Input resistance value: 250Ω)</td><td></td></tr>
<tr><td colspan="2">Analog output voltage</td><td colspan="3">-10 to 0 to +10VDC</td><td></td></tr>
<tr><td rowspan="16" colspan="2">I/O characteristics</td><td colspan="2">Analog input range</td><td rowspan="2">Analog output voltage (V)</td><td rowspan="2"></td></tr>
<tr><td>Voltage (V)</td><td>Current (mA)</td></tr>
<tr><td>0 to +10</td><td>0 to +20</td><td rowspan="5">0 to +10</td><td rowspan="5"></td></tr>
<tr><td>0 to + 5</td><td>0 to +20</td></tr>
<tr><td>+ 1 to + 5</td><td>+ 4 to +20</td></tr>
<tr><td>-10 to +10</td><td>-20 to +20</td></tr>
<tr><td>- 5 to + 5</td><td>-20 to +20</td></tr>
<tr><td>0 to +10</td><td>0 to +20</td><td rowspan="2">0 to + 5</td><td rowspan="2"></td></tr>
<tr><td>0 to + 5</td><td>0 to +20</td></tr>
<tr><td>+ 1 to + 5</td><td>+ 4 to +20</td><td>+ 1 to + 5</td><td></td></tr>
<tr><td>-10 to +10</td><td>-20 to +20</td><td rowspan="2">-10 to +10</td><td rowspan="2"></td></tr>
<tr><td>- 5 to + 5</td><td>-20 to +20</td></tr>
<tr><td>-10 to +10</td><td>-20 to +20</td><td rowspan="2">- 5 to + 5</td><td rowspan="2"></td></tr>
<tr><td>- 5 to + 5</td><td>-20 to +20</td></tr>
</table>

○ : Compatible, △ : Partial change required, ×: Incompatible

<table>
<tr><th></th><th>Q68ADV</th><th>Q68ADI</th><th>Compatibility</th><th>Precautions for replacement</th></tr>
<tr><td></td><td>-10 to 10VDC<br>(Input resistance value: 1MΩ)</td><td>-</td><td rowspan="2">△</td><td rowspan="2">The voltage/current cannot be mixed for one module.</td></tr>
<tr><td></td><td>-</td><td>0 to 20mADC<br>(Input resistance value: 250Ω)</td></tr>
<tr><td></td><td colspan="2">-</td><td>-</td><td></td></tr>
<tr><td></td><td colspan="2"><table>
<tr><th colspan="2" rowspan="2">Analog input range</th><th colspan="2">Normal resolution mode</th><th colspan="2">High resolution mode</th></tr>
<tr><th>Digital output value</th><th>Maximum resolution</th><th>Digital output value</th><th>Maximum resolution</th></tr>
<tr><td rowspan="5">Voltage</td><td>0 to 10V</td><td rowspan="3">0 to 4000</td><td>2.5mV</td><td>0 to 16000</td><td>0.625mV</td></tr>
<tr><td>0 to 5V</td><td>1.25mV</td><td rowspan="2">0 to 12000</td><td>0.416mV</td></tr>
<tr><td>1 to 5V</td><td>1.0mV</td><td>0.333mV</td></tr>
<tr><td>-10 to 10V</td><td rowspan="2">-4000 to 4000</td><td>2.5mV</td><td>-16000 to 16000</td><td>0.625mV</td></tr>
<tr><td>User range settings</td><td>0.375mV</td><td>-12000 to 12000</td><td>0.333mV</td></tr>
<tr><td rowspan="3">Current</td><td>0 to 20mA</td><td rowspan="2">0 to 4000</td><td>5μA</td><td rowspan="2">0 to 12000</td><td>1.66μA</td></tr>
<tr><td>4 to 20mA</td><td>4μA</td><td>1.33μA</td></tr>
<tr><td>User range settings</td><td>-4000 to 4000</td><td>1.37μA</td><td>-12000 to 12000</td><td>1.33μA</td></tr>
</table></td><td>△</td><td>When using A616AD in [-5 to + 5V] range, Q68ADV can obtain equivalent resolution or more than A616AD by setting in [-10 to 10V] range/high resolution mode or user range.<br>When using A616AD in [-20 to +20mA range, use Q68ADI in user range.</td></tr>
</table>

| Item | | A60MX | |
|---|---|---|---|
| Overall accuracy | | ±0.3% (Digital output value ±12) | |
| Absolute maximum input | Voltage | ±15V | |
| | Current | ±30mA | |
| Analog input points | | 16 channels/module | |
| Multiplexer element | | IC relay | |
| Isolation method | | Between the input terminal and programmable controller: photocoupler isolation<br>Between channels: non-isolated (1MΩ resistor isolation) | |
| Occupied I/O points | | 16 points (treated as empty slots)<br>(0 point setting is possible by I/O assignment.) | |
| Connected terminal | | 38-point terminal block | |
| Applicable wire size | | 0.75 to 2mm$^2$<br>(Applicable tightening torque: 39 to 59N•cm) | |
| Applicable solderless terminal | | V1.25-3, V1.25-YS3A, V2-S3, V2-YS3A | |
| Internal current consumption (5VDC) | | 0.65A | |
| Weight | | 0.55kg | |

○: Compatible, △: Partial change required, ×: Incompatible

<table>
<tr><th colspan="2">Q68ADV</th><th colspan="2">Q68ADI</th><th>Compatibility</th><th>Precautions for replacement</th></tr>
<tr><td colspan="2"><table>
<tr><td rowspan="2" colspan="2">Analog input range</td><td colspan="3">Normal resolution mode</td><td colspan="3">High resolution mode</td></tr>
<tr><td colspan="2">Ambient temperature 0 to 55°C</td><td rowspan="2">Ambient temperature 25±5°C</td><td colspan="2">Ambient temperature 0 to 55°C</td><td rowspan="2">Ambient temperature 25±5°C</td></tr>
<tr><td>With temperature drift compensation</td><td>Without temperature drift compensation</td><td>With temperature drift compensation</td><td>Without temperature drift compensation</td></tr>
<tr><td rowspan="5">Voltage</td><td>0 to 10V</td><td rowspan="8">±0.3% (±12 digits)</td><td rowspan="8">±0.4% (±16 digits)</td><td rowspan="8">±0.1% (±4 digits)</td><td>±0.3% (±48 digits)</td><td>±0.4% (±64 digits)</td><td>±0.1% (±16 digits)</td></tr>
<tr><td>-10 to 10V</td><td rowspan="7">±0.3% (±36 digits)</td><td rowspan="7">±0.4% (±48 digits)</td><td rowspan="7">±0.1% (±12 digits)</td></tr>
<tr><td>0 to 5V</td></tr>
<tr><td>1 to 5V</td></tr>
<tr><td>Users range settings</td></tr>
<tr><td rowspan="3">Current</td><td>0 to 20mA</td></tr>
<tr><td>4 to 20mA</td></tr>
<tr><td>Users range settings</td></tr>
</table></td><td>○</td><td>A60MX is the accuracy in respect to the full scale, and Q68ADV/I is the accuracy in respect to maximum digital output value.</td></tr>
<tr><td colspan="2">±15V</td><td>-</td><td rowspan="2">○</td><td></td></tr>
<tr><td colspan="2">-</td><td>±30mA</td><td></td></tr>
<tr><td colspan="2">8 channels/module</td><td colspan="2">△</td><td>Consider replacement with multiple Q68ADV/I.</td></tr>
<tr><td colspan="2">-</td><td colspan="2">-</td><td></td></tr>
<tr><td colspan="2">Between the I/O terminal and programmable controller power supply:<br>photocoupler isolation<br>Between channels: non-isolated</td><td colspan="2">○</td><td></td></tr>
<tr><td colspan="2">16 points<br>(I/O assignment: intelligent 16 points)</td><td colspan="2">△</td><td>Q68ADV/I cannot set to 0 point with I/O assignment.</td></tr>
<tr><td colspan="2">18-point terminal block</td><td colspan="2">×</td><td rowspan="3">Wiring change is required.</td></tr>
<tr><td colspan="2">0.3 to 0.75mm$^2$</td><td colspan="2">×</td></tr>
<tr><td colspan="2">R1.25-3 (A solderless terminal with sleeve can not be used.)</td><td colspan="2">×</td></tr>
<tr><td colspan="2">0.64A</td><td>0.64A</td><td>○</td><td></td></tr>
<tr><td colspan="2">0.19kg</td><td>0.19kg</td><td>○</td><td></td></tr>
</table>

## 5.2 A60MXRN

As regarding A60MXRN non-isolated multiplexer module, consider replacement using multiple Q64AD-GH.

### 5.2.1 Performance comparison

<table>
<tr><th colspan="2">Item</th><th colspan="3">A60MXRN</th><th></th></tr>
<tr><td rowspan="2">Analog input</td><td>Voltage</td><td colspan="3">-10 to 0 to +10VDC (Input resistance value: 1MΩ)</td><td></td></tr>
<tr><td>Current</td><td colspan="3">-20 to 0 to +20mADC (Input resistance value: 250Ω)</td><td></td></tr>
<tr><td colspan="2">Analog output voltage</td><td colspan="3">-10 to 0 to +10VDC</td><td></td></tr>
<tr><td colspan="2" rowspan="15">I/O characteristics</td><td colspan="2">Analog input range</td><td rowspan="2">Analog output voltage (V)</td><td rowspan="15"></td></tr>
<tr><td>Voltage (V)</td><td>Current (mA)</td></tr>
<tr><td>0 to +10</td><td>0 to +20</td><td rowspan="5">0 to +10</td></tr>
<tr><td>0 to + 5</td><td>0 to +20</td></tr>
<tr><td>+ 1 to + 5</td><td>+ 4 to +20</td></tr>
<tr><td>-10 to +10</td><td>-20 to +20</td></tr>
<tr><td>- 5 to + 5</td><td>-20 to +20</td></tr>
<tr><td>0 to +10</td><td>0 to +20</td><td rowspan="2">0 to + 5</td></tr>
<tr><td>0 to + 5</td><td>0 to +20</td></tr>
<tr><td>+ 1 to + 5</td><td>+ 4 to +20</td><td>+ 1 to + 5</td></tr>
<tr><td>-10 to +10</td><td>-20 to +20</td><td rowspan="2">-10 to +10</td></tr>
<tr><td>- 5 to + 5</td><td>-20 to +20</td></tr>
<tr><td>-10 to +10</td><td>-20 to +20</td><td rowspan="2">- 5 to + 5</td></tr>
<tr><td>- 5 to + 5</td><td>-20 to +20</td></tr>
<tr><td colspan="2">Overall accuracy</td><td colspan="3">±0.3% (Digital output value ±12)</td><td></td></tr>
<tr><td rowspan="2">Absolute maximum input</td><td>Voltage</td><td colspan="3">±15V</td><td></td></tr>
<tr><td>Current</td><td colspan="3">±30mA</td><td></td></tr>
<tr><td colspan="2">Analog input points</td><td colspan="3">16 channels/module</td><td></td></tr>
<tr><td colspan="2">Multiplexer element</td><td colspan="3">Photo MOS relay</td><td></td></tr>
<tr><td colspan="2">Isolation method</td><td colspan="3">Between the input terminal and programmable controller: photocoupler isolation<br>Between channels: photo MOS relay isolation</td><td rowspan="2"></td></tr>
<tr><td colspan="2">Between channels dielectric withstand voltage</td><td colspan="3">400VDC (accuracy guarantee 400VDC)</td></tr>
<tr><td colspan="2">Occupied I/O points</td><td colspan="3">16 points (treated as empty slots)<br>(0 point setting is possible by I/O assignment.)</td><td></td></tr>
<tr><td colspan="2">Connected terminal</td><td colspan="3">38-point terminal block</td><td></td></tr>
<tr><td colspan="2">Applicable wire size</td><td colspan="3">0.75 to 2mm$^2$<br>(Applicable tightening torque: 39 to 59N•cm)</td><td></td></tr>
<tr><td colspan="2">Applicable solderless terminal</td><td colspan="3">V1.25-3, V1.25-YS3A, V2-S3, V2-YS3A</td><td></td></tr>
<tr><td colspan="2">Internal current consumption (5VDC)</td><td colspan="3">0.35A</td><td></td></tr>
<tr><td colspan="2">Weight</td><td colspan="3">0.56kg</td><td></td></tr>
</table>

○: Compatible, △: Partial change required, ×: Incompatible

<table>
<tr><th></th><th>Q64AD-GH</th><th>Compatibility</th><th>Precautions for replacement</th></tr>
<tr><td></td><td>-10 to 0 to +10VDC (Input resistance value: 1MΩ)</td><td>○</td><td></td></tr>
<tr><td></td><td>0 to 20mADC (Input resistance value: 250Ω)</td><td>△</td><td>The minus current cannot be input.</td></tr>
<tr><td></td><td>-</td><td>-</td><td></td></tr>
<tr><td></td><td>
<table>
<tr><th rowspan="2">Input</th><th rowspan="2">Analog input range</th><th colspan="2">Maximum resolution</th><th>Digital output value (32bit)</th><th>Digital output value (16bit)</th></tr>
<tr><th>32bit</th><th>16bit</th></tr>
<tr><td rowspan="6">Voltage</td><td>0 to 10V</td><td>156.3μV</td><td>312.6μV</td><td rowspan="4">0 to 64000</td><td rowspan="4">0 to 32000</td></tr>
<tr><td>0 to 5V</td><td>78.2μV</td><td>156.4μV</td></tr>
<tr><td>1 to 5V</td><td>62.5μV</td><td>125.0μV</td></tr>
<tr><td>User range settings (Uni-polar)</td><td>47.4μV</td><td>94.8μV</td></tr>
<tr><td>-10 to 10V</td><td>156.3μV</td><td>312.6μV</td><td rowspan="2">-64000 to 64000</td><td rowspan="2">-32000 to 32000</td></tr>
<tr><td>User range settings (Bi-polar)</td><td>47.4μV</td><td>94.8μV</td></tr>
<tr><td rowspan="3">Current</td><td>0 to 20mA</td><td>312.5nA</td><td>625.0nA</td><td rowspan="3">0 to 64000</td><td rowspan="3">0 to 32000</td></tr>
<tr><td>4 to 20mA</td><td>250.0nA</td><td>500.0nA</td></tr>
<tr><td>User range settings (Uni-polar)</td><td>151.6nA</td><td>303.2nA</td></tr>
</table>
</td><td>△</td><td>When using a range of -5 up to +5 (with A60MX), With Q64AD-GH, equivalent or more resolution value can be obtained by setting at a range of -10 up to 10V/high resolution mode, or user range.<br>When using a range of -20 up to +20mA (with A60MX), negative current can not be converted with Q64AD-GH.<br>Use conversion devices to convert into a input range.</td></tr>
<tr><td></td><td>
<table>
<tr><td>Reference accuracy</td><td>±0.05%<br>Digital output value (32bit) ±32 digits<br>Digital output value (16bit) ±16 digits</td></tr>
<tr><td>Temperature coefficient</td><td>±71.4ppm/°C (0.00714%/°C)</td></tr>
</table>
</td><td>○</td><td>A60MXRN is the accuracy in respect to the full scale, and Q64AD-GH is the accuracy in respect to maximum digital output value.</td></tr>
<tr><td></td><td>±15V</td><td>○</td><td></td></tr>
<tr><td></td><td>±30mA</td><td>○</td><td></td></tr>
<tr><td></td><td>4 channels/module</td><td>△</td><td>Consider replacement with multiple Q64AD-GH.</td></tr>
<tr><td></td><td>-</td><td>-</td><td></td></tr>
<tr><td></td><td>
<table>
<tr><th>Specific isolated area</th><th>Isolation method</th><th>Dielectric withstand voltage</th><th>Insulation resistance</th></tr>
<tr><td>Between the I/O terminal and programmable controller power supply</td><td>Photocoupler isolation</td><td rowspan="2">1780VrmsAC/3 cycles (Altitude 2000m)</td><td rowspan="2">500V DC, 10MΩ or more</td></tr>
<tr><td>Between analog channels</td><td>Transformer isolation</td></tr>
</table>
</td><td>○</td><td></td></tr>
<tr><td></td><td>16 points<br>(I/O assignment: intelligent 16 points)</td><td>△</td><td>Q64AD-GH cannot set to 0 point with I/O assignment.</td></tr>
<tr><td></td><td>18-point terminal block</td><td>×</td><td rowspan="3">Wiring change is required.</td></tr>
<tr><td></td><td>0.3 to 0.75mm$^2$</td><td>×</td></tr>
<tr><td></td><td>R1.25-3 (A solderless terminal with sleeve can not be used.)</td><td>×</td></tr>
<tr><td></td><td>0.89A</td><td>△</td><td>The recalculation of internal current consumption [5VDC] is required.</td></tr>
<tr><td></td><td>0.2kg</td><td>○</td><td></td></tr>
</table>

## 5.3 A60MXR

As regarding A60MXR non-isolated multiplexer module, consider replacement using multiple Q64AD-GH.

### 5.3.1 Performance comparison

| Item | | A60MXR | | |
|---|---|---|---|---|
| Analog input | Voltage | -10 to 0 to +10VDC (Input resistance value: 1MΩ) | | |
| | Current | -20 to 0 to +20mADC (Input resistance value: 250Ω) | | |
| Analog output voltage | | -10 to 0 to +10VDC | | |
| I/O characteristics | | Analog input range | | Analog output voltage (V) |
| | | Voltage (V) | Current (mA) | |
| | | 0 to +10 | 0 to +20 | 0 to +10 |
| | | 0 to + 5 | 0 to +20 | |
| | | + 1 to + 5 | + 4 to +20 | |
| | | -10 to +10 | -20 to +20 | |
| | | - 5 to + 5 | -20 to +20 | |
| | | 0 to +10 | 0 to +20 | 0 to + 5 |
| | | 0 to + 5 | 0 to +20 | |
| | | + 1 to + 5 | + 4 to +20 | + 1 to + 5 |
| | | -10 to +10 | -20 to +20 | -10 to +10 |
| | | - 5 to + 5 | -20 to +20 | |
| | | -10 to +10 | -20 to +20 | - 5 to + 5 |
| | | - 5 to + 5 | -20 to +20 | |
| Overall accuracy | | ±0.3% (Digital output value ±12) | | |
| Absolute maximum input | Voltage | ±15V | | |
| | Current | ±30mA | | |
| Analog input points | | 16 channels/module | | |
| Multiplexer element | | Mercury plunger relay | | |
| Isolation method | | Between the input terminal and programmable controller: photocoupler isolation<br>Between channels: mercury plunger relay isolation | | |
| Between channels dielectric withstand voltage | | 500VDC (accuracy guarantee 500VDC) | | |
| Occupied I/O points | | 16 points (treated as empty slots)<br>(0 point setting is possible by I/O assignment.) | | |
| Connected terminal | | 38-point terminal block | | |
| Applicable wire size | | 0.75 to 2mm$^2$<br>(Applicable tightening torque: 39 to 59N•cm) | | |
| Applicable solderless terminal | | V1.25-3, V1.25-YS3A, V2-S3, V2-YS3A | | |
| Internal current consumption (5VDC) | | 0.5A | | |
| Weight | | 0.6kg | | |

○: Compatible, △: Partial change required, ×: Incompatible

<table>
<tr><th></th><th>Q64AD-GH</th><th>Compatibility</th><th>Precautions for replacement</th></tr>
<tr><td></td><td>-10 to 0 to +10VDC (Input resistance value: 1MΩ)</td><td>○</td><td></td></tr>
<tr><td></td><td>0 to 20mADC (Input resistance value: 250Ω)</td><td>△</td><td>The minus current cannot be input.</td></tr>
<tr><td></td><td>-</td><td>-</td><td></td></tr>
<tr><td></td><td>
<table>
<tr><th rowspan="2">Input</th><th rowspan="2">Analog input range</th><th colspan="2">Maximum resolution</th><th rowspan="2">Digital output value (32 bits)</th><th rowspan="2">Digital output value (16 bits)</th></tr>
<tr><th>32 bits</th><th>16 bits</th></tr>
<tr><td rowspan="6">Voltage</td><td>0 to 10V</td><td>156.3μV</td><td>312.6μV</td><td rowspan="4">0 to 64000</td><td rowspan="4">0 to 32000</td></tr>
<tr><td>0 to 5V</td><td>78.2μV</td><td>156.4μV</td></tr>
<tr><td>1 to 5V</td><td>62.5μV</td><td>125.0μV</td></tr>
<tr><td>User range settings (Uni-polar)</td><td>47.4μV</td><td>94.8μV</td></tr>
<tr><td>-10 to 10V</td><td>156.3μV</td><td>312.6μV</td><td rowspan="2">-64000 to 64000</td><td rowspan="2">-32000 to 32000</td></tr>
<tr><td>User range settings (Bi-polar)</td><td>47.4μV</td><td>94.8μV</td></tr>
<tr><td rowspan="3">Current</td><td>0 to 20mA</td><td>312.5nA</td><td>625.0nA</td><td rowspan="3">0 to 64000</td><td rowspan="3">0 to 32000</td></tr>
<tr><td>4 to 20mA</td><td>250.0nA</td><td>500.0nA</td></tr>
<tr><td>User range settings (Uni-polar)</td><td>151.6nA</td><td>303.2nA</td></tr>
</table>
</td><td>△</td><td>With A60MXR, equivalent or more resolution value can be obtained by setting at the analog inputs, range of -10 up to 10V/high resolution mode, and User range while the analog inputs are used at the range of -5 up to 5V on Q64AD-GH.<br>When using a range of -20 up to +20mA (with A60MXR), negative current can not be converted with Q64AD-GH.<br>Use conversion devices to convert into a input range.</td></tr>
<tr><td></td><td>
<table>
<tr><td>Reference accuracy</td><td>±0.05%<br>Digital output value (32bit) ±32 digits<br>Digital output value (16bit) ±16 digits</td></tr>
<tr><td>Temperature coefficient</td><td>±71.4ppm/°C (0.00714%/°C)</td></tr>
</table>
</td><td>○</td><td>A60MXR is the accuracy in respect to the full scale, and Q64AD-GH is the accuracy in respect to maximum digital output value.</td></tr>
<tr><td></td><td>±15V</td><td rowspan="2">○</td><td rowspan="2"></td></tr>
<tr><td></td><td>±30mA</td></tr>
<tr><td></td><td>4 channels/module</td><td>△</td><td>Consider replacement with multiple Q64AD-GH.</td></tr>
<tr><td></td><td>-</td><td>-</td><td></td></tr>
<tr><td></td><td>
<table>
<tr><th>Specific isolated area</th><th>Isolation method</th><th>Dielectric withstand voltage</th><th>Insulation resistance</th></tr>
<tr><td>Between the I/O terminal and programmable controller power supply</td><td>Photocoupler isolation</td><td rowspan="2">1780VrmsAC/3 cycles (Altitude 2000m)</td><td rowspan="2">500VDC, 10MΩ or more</td></tr>
<tr><td>Between analog channels</td><td>Transformer isolation</td></tr>
</table>
</td><td>○</td><td></td></tr>
<tr><td></td><td>16 points<br>(I/O assignment: intelligent 16 points)</td><td>△</td><td>Q64AD-GH cannot set to 0 point with I/O assignment.</td></tr>
<tr><td></td><td>18-point terminal block</td><td>×</td><td rowspan="3">Wiring change is required.</td></tr>
<tr><td></td><td>0.3 to 0.75mm$^2$</td><td>×</td></tr>
<tr><td></td><td>R1.25-3 (A solderless terminal with sleeve can not be used.)</td><td>×</td></tr>
<tr><td></td><td>0.89A</td><td>△</td><td>The recalculation of internal current consumption [5VDC] is required.</td></tr>
<tr><td></td><td>0.2kg</td><td>○</td><td></td></tr>
</table>

# 6 HIGH-SPEED COUNTER MODULE REPLACEMENT

## 6.1 List of High-Speed Counter Module Alternative Models for Replacement

| Production discontinuation | | Transition to Q series | |
|---|---|---|---|
| Product | Model | Model | Remarks (Restrictions) |
| High-speed counter module | AD61 | QD62-H01*1 | 1) External wiring : Terminal block wiring → Connector wiring<br>Cable size is changed.<br>2) Number of slots : Not changed<br>3) Counting speed : Not changed<br>4) Counting range : 24-bit unsigned binary (0 to 16777215) →<br>32-bit signed binary (–2147483648 to 2147483647)<br>Review the program.<br>5) Program : Occupied I/O points, I/O signals and buffer memory address are changed.<br>6) Performance specifications change: Not changed<br>7) Function specifications: Not changed |
| | AD61-S1 | QD62-H02*1 | 1) External wiring : Terminal block wiring → Connector wiring<br>Cable size is changed.<br>2) Number of slots : Not changed<br>3) Counting speed : Not changed<br>4) Counting range : 24-bit unsigned binary (0 to 16777215) →<br>32-bit signed binary (–2147483648 to 2147483647)<br>Review the program.<br>5) Program : Occupied I/O points, I/O signals and buffer memory address are changed.<br>6) Performance specifications change: Not changed<br>7) Function specifications: Not changed |

*1 The QD62-H01 is a module dedicated for replacing the AD61 with the Q series module.
The QD62-H02 is a module dedicated for replacing the AD61-S1 with the Q series module.
Both of them have same input filter system with the AD61 and AD61-S1.

## Point

1) Action to the replaced module
Input filter system of the AD61 and AD61-S1 is the same as that of the QD62-H01 and QD62-H02.
Therefore, utilizing pulse generator such as existing encoder is possible.

2) Counting range of the counter
Counting range of the AD61 and AD61-S1 differs from that of the QD62-H01 and QD62-H02.
To make the counting range same as that of the module before replacement, review the program.
AD61, AD61-S1: 0 to 16, 777, 215 (24-bit unsigned binary)
QD62-H01, QD62-H02: - 2,147, 483, 648 to 2, 147, 483, 647 (32-bit signed binary)

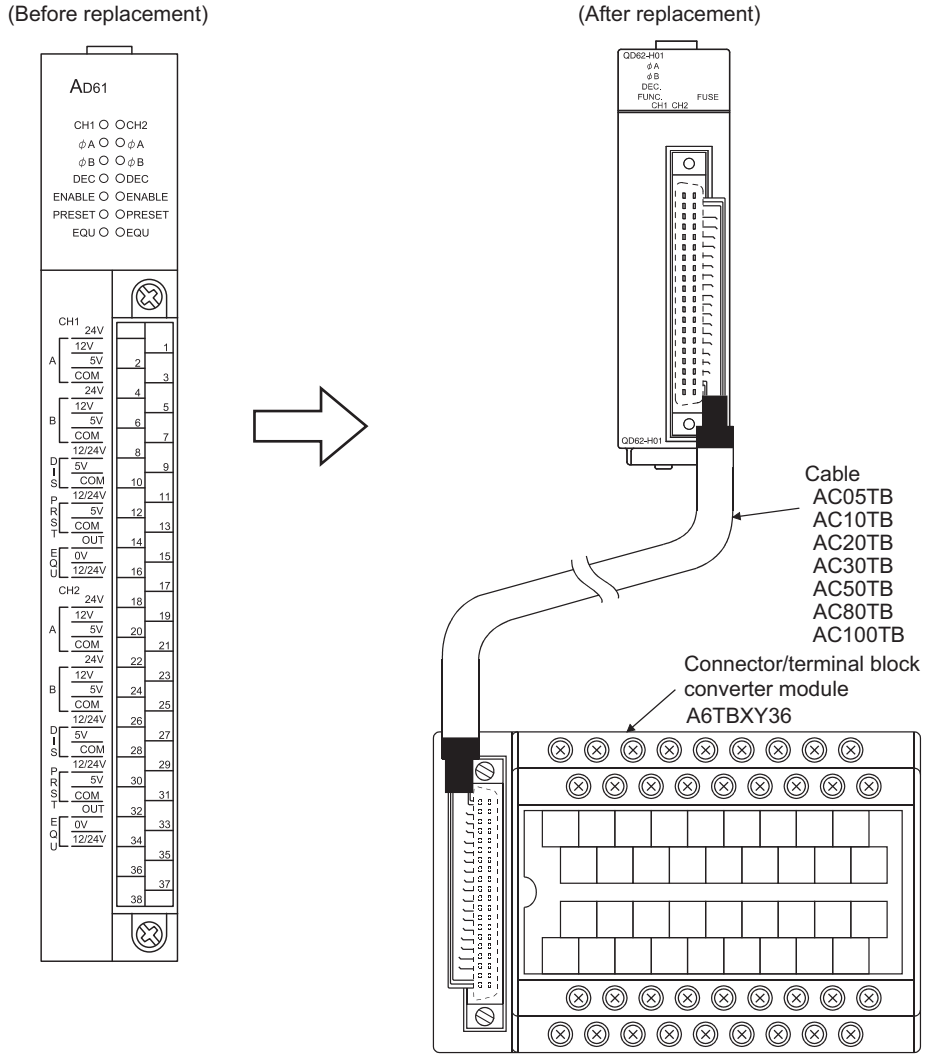
3) Wiring to the module
External wiring method of the AD61 and AD61-S1 differs from that of the QD62-H01 and QD62-H02.
AD61, AD61-S1: Wiring using a terminal block
QD62-H01, QD62-H02: Wiring using a connector
If utilizing I/O signal wire with solderless terminal of the AD61 or AD61-S1 to the system after replacement, take action such as use of the connector/terminal block converter module.

(a) Using the renewal tool (a conversion adaptor)
The existing wiring for AD61 and AD61-S1 can be connected directly to the Q series modules using the renewal tool, a conversion adaptor, manufactured by Mitsubishi Electric Engineering Co., Ltd.

| Product | MELSEC-A/QnA series module | MELSEC-Q series module | Conversion adaptor |
|---|---|---|---|
| High-speed counter module | AD61 | QD62 | ERNT-AQTD61 |
| | | QD62-H01 | |
| | AD61-S1 | QD62-H02 | |

For contact information for inquiries on the renewal tool manufactured by Mitsubishi Electric Engineering Co., Ltd., refer to Section 2.1.

(b) Using the connector/terminal block converter module
(Replacing the AD61 with the QD62-H01)



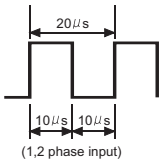

For wiring of the connector/terminal block converter module, refer to the following manual.
High-Speed Counter Module User's Manual (SH-080036)

* This manual is for the QD62(E/D); however, the QD62-H01/H02 use the same wiring method.
For replacement with the QD62-H01/H02, refer to this manual.

## 6.2 AD61

### 6.2.1 Performance comparison

○: Compatible, △: Partial change required, ×: Incompatible

| Item | | | AD61 | | QD62-H01 | | Compat-ibility | Precautions for replacement |
|---|---|---|---|---|---|---|---|---|
| Occupied I/O points | | | 32 points (I/O assignment: special 32 points) | | 16 points (I/O assignment: intelligent 16 points) | | △ | *1 |
| Number of channels | | | 2 channels | | | | ○ | |
| Counting speed switch settings | | | - | | 50KPPS | | ○ | Set "2" at the intelligent function module switch setting. |
| Performance specifications of 1 channels | Count input signal | Phase | 1-phase input, 2-phase input | | | | ○ | |
| | | Signal level (ϕA, ϕB) | 5VDC<br>12VDC<br>24VDC } 2 to 5mA | | | | ○ | |
| | Counter | Counting speed (Max.) | 1-phase input | 50KPPS | 1-phase input | 50KPPS | ○ | *2 |
| | | | 2-phase input | 50KPPS | 2-phase input | 50KPPS | | |
| | | Counting range | 24-bit unsigned binary (0 to 16,777,215) | | 32-bit signed binary (-2147483648 to 2147483647) | | △ | On QD62-H01, as the value is used with 32-bit signed binary values, change of sequence program is required. |
| | | Type | UP/DOWN preset counter + ring counter function | | | | ○ | |
| | | Minimum count pulse width (set input rise time to 5μs or less. Duty ratio: 50%) |  | | | | ○ | |
| | Magnitude comparison between CPU and AD61/QD62-H01 | Comparison range | 24-bit unsigned binary | | 32-bit signed binary | | ○ | |
| | | Comparison result | Set value < count value<br>Set value = count value<br>Set value > count value | | | | ○ | |
| | External input | Preset | 12/24VDC, 3/6mA<br>5VDC, 5mA | | 5/12/24VDC, 2 to 5mA | | △ | On QD62-H01, as the external input specifications differ, confirm the external devices specifications. |
| | | Count disable | 12/24VDC, 3/6mA<br>5VDC, 5mA | | - | | | |
| | | Function start | - | | 5/12/24VDC, 2 to 5mA | | | |
| | External output | Coincidence output | Transistor (open collector) output 12/24VDC, 0.5A | | Transistor (sink type) output 2 points/channel 12/24VDC, 0.5A/point, 2A/common | | ○ | |
| Internal current consumption (5VDC) | | | 0.3A | | 0.3A | | ○ | |
| Weight | | | 0.5kg | | 0.11kg | | ○ | |

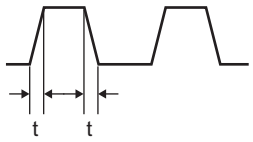
*1 I/O numbers of the modules mounted to the right of the QD62-H01 change, because the number of I/O occupied points for the AD61 are different from the QD62-H01. Set the start I/O number for the module mounted to the right of the QD62-H01 to the same number for the module before the replacement in the I/O assignment tab of the Q parameter setting window. The program for the module before the replacement can be used.

*2 The rise/fall time of a pulse affects the counting speed. Countable counting speeds are as follows.
Counting a pulse greater than t = 50μs may result in a miscount.

• For the AD61 and QD62-H01 (common for 1-phase input and 2-phase input)

| Rise/fall time | Common to 1-phase input and 2-phase input |
|---|---|
| t = 5μs | 50KPPS |
| t = 50μs | 5KPPS |

t= 5μs: 50KPPS
t=50μs: 5KPPS



### 6.2.2 Function comparison

○: With functions, -: Without functions

| Item | Description | AD61 | QD62-H01 | Precautions for replacement |
|---|---|---|---|---|
| Preset function | Changes the counter present value to a specified value. | ○ | ○ | |
| Disable function | Terminates counting. | ○ | ○ | |
| Ring counter function | Repeatedly executes counting between user's setting values. | ○ | ○ | On QD62-H01, the setting is carried out using intelligent function module switch setting. |
| Linear counter function | If the count exceeds the range, this function detects an overflow. | - | ○ | |
| Coincidence output function | Outputs signals when user's setting and the present values are matched. | ○ | ○ | No.1 and No.2 coincidence output points can be set for each channel. |
| Coincidence detection interrupt function | Generates an interrupt signal to the programmable controller CPU when coincidence is detected. | - | ○ | |
| Latch counter function | Latches the present value at the time a signal is input. | - | ○ | |
| Sampling counter function | Counts the pulse that was input during the sampling time set. | - | ○ | |
| Periodic pulse counter function | The function allows storing the present value in the periodic pulse count present value and the previous value in the periodic pulse count previous value for each period time set. | - | ○ | |

### 6.2.3 I/O signal comparison to programmable controller CPU

Sequence program change is required as the I/O signals differ.
For details of the I/O signals or sequence program, refer to the High-Speed Counter Module User's Manual.

| AD61 | | | | QD62-H01 | | | |
|---|---|---|---|---|---|---|---|
| Device No. | Signal name | Device No. | Signal name | Device No. | Signal name | Device No. | Signal name |
| X0 | CH1 Counter value greater | Y0 | Not used | X0 | Module READY | Y0 | CH1 Coincidence signal No.1 reset command |
| X1 | CH1 Counter value coincidence | Y1 | | X1 | CH1 Counter value large (Point No.1) | Y1 | CH1 Preset command |
| X2 | CH1 Counter value less | Y2 | | X2 | CH1 Counter value coincidence (Point No.1) | Y2 | CH1 Coincidence signal enable command |
| X3 | CH1 External preset request detection | Y3 | | X3 | CH1 Counter value small (Point No.1) | Y3 | CH1 Down count command |
| X4 | CH2 Counter value greater | Y4 | | X4 | CH1 External preset request detection | Y4 | CH1 Count enable command |
| X5 | CH2 Counter value coincidence | Y5 | | X5 | CH1 Counter value large (Point No.2) | Y5 | CH1 External preset detection reset command |
| X6 | CH2 Counter value less | Y6 | | X6 | CH1 Counter value coincidence (Point No.2) | Y6 | CH1 Counter function selection start command |
| X7 | CH2 External preset request detection | Y7 | | X7 | CH1 Counter value small (Point No.2) | Y7 | CH1 Coincidence signal No.2 reset command |
| X8 | Not used | Y8 | | X8 | CH2 Counter value large (Point No.1) | Y8 | CH2 Coincidence signal No.1 reset command |
| X9 | | Y9 | | X9 | CH2 Counter value coincidence (Point No.1) | Y9 | CH2 Preset command |
| XA | | YA | | XA | CH2 Counter value small (Point No.1) | YA | CH2 Coincidence signal enable command |
| XB | | YB | | XB | CH2 External preset request detection | YB | CH2 Down count command |
| XC | | YC | | XC | CH2 Counter value large (Point No.2) | YC | CH2 Count enable command |
| XD | | YD | | XD | CH2 Counter value coincidence (Point No.2) | YD | CH2 External preset detection reset command |
| XE | | YE | | XE | CH2 Counter value small (Point No.2) | YE | CH2 Counter function selection start command |
| XF | | YF | | XF | Fuse broken detection flag | YF | CH2 Coincidence signal No.2 reset command |
| X10 | | Y10 | CH1 Coincidence signal reset command | | | | |
| X11 | | Y11 | CH1 Preset command | | | | |
| X12 | | Y12 | CH1 Coincidence signal output enable command | | | | |
| X13 | | Y13 | CH1 Down count command | | | | |
| X14 | | Y14 | CH1 Count enable | | | | |
| X15 | | Y15 | CH1 Present value read request | | | | |
| X16 | | Y16 | CH1 External preset detection reset command | | | | |
| X17 | | Y17 | CH2 Coincidence signal reset command | | | | |
| X18 | | Y18 | CH2 Preset command | | | | |
| X19 | | Y19 | CH2 Coincidence signal output enable command | | | | |
| X1A | | Y1A | CH2 Down count command | | | | |
| X1B | | Y1B | CH2 Count enable | | | | |
| X1C | | Y1C | CH2 Present value read request | | | | |
| X1D | | Y1D | CH2 External preset detection reset command | | | | |
| X1E | | Y1E | Not used | | | | |
| X1F | | Y1F | | | | | |

### 6.2.4 Buffer memory address comparison

Sequence program change is required as the assignment of buffer memory differs.
For details of the buffer memory or sequence program, refer to the High-Speed Counter Module User's Manual.

| AD61 | | | |
|---|---|---|---|
| Address (Dec.) | | Name | Read/write |
| CH1 | CH2 | | |
| 1 | 33 | Preset value write (Lower and middle) | W |
| (2) | (34) | Preset value write (Upper) | |
| 3 | 35 | Mode register | R/W |
| 4 | 36 | Present value read (Lower and middle) | R |
| (5) | (37) | Present value read (Upper) | |
| 6 | 38 | Set value read/write (Lower and middle) | R/W |
| (7) | (39) | Set value read/write (Upper) | |

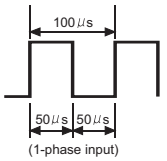
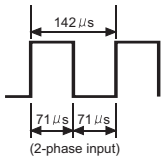
Address in parentheses in the above table indicates the upper 8 bits of 24-bit data.

| QD62-H01 | | | | |
|---|---|---|---|---|
| Address (Dec.) | | Name | | Read/write |
| CH1 | CH2 | | | |
| 0 | 32 | Preset value setting | (L) | R/W |
| 1 | 33 | | (H) | |
| 2 | 34 | Present value | (L) | R |
| 3 | 35 | | (H) | |
| 4 | 36 | Coincidence output point set No.1 | (L) | R/W |
| 5 | 37 | | (H) | |
| 6 | 38 | Coincidence output point set No.2 | (L) | |
| 7 | 39 | | (H) | |
| 8 | 40 | Overflow detection flag | | R |
| 9 | 41 | Counter function selection setting | | R/W |
| 10 | 42 | Sampling/periodic setting | | |
| 11 | 43 | Sampling/periodic counter flag | | R |
| 12 | 44 | Latch count value | (L) | |
| 13 | 45 | | (H) | |
| 14 | 46 | Sampling count value | (L) | |
| 15 | 47 | | (H) | |
| 16 | 48 | Periodic pulse count previous value | (L) | |
| 17 | 49 | | (H) | |
| 18 | 50 | Periodic pulse count present value | (L) | |
| 19 | 51 | | (H) | |
| 20 | 52 | Ring counter minimum value | (L) | R/W |
| 21 | 53 | | (H) | |
| 22 | 54 | Ring counter maximum value | (L) | |
| 23 | 55 | | (H) | |
| 24 | 56 | System area (Not used) | - | - |
| to | to | | | |
| 31 | 63 | | | |

## 6.3 AD61S1

### 6.3.1 Performance comparison

○: Compatible, △: Partial change required, ×: Incompatible

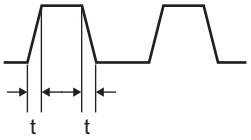
| Item | | | AD61S1 | | QD62-H02 | | Compat-ibility | Precautions for replacement |
|---|---|---|---|---|---|---|---|---|
| Occupied I/O points | | | 32 points (I/O assignment: special 32 points) | | 16 points (I/O assignment: intelligent 16 points) | | △ | *1 |
| Number of channels | | | 2 channels | | | | ○ | |
| Counting speed switch settings | | | - | | 10KPPS | | ○ | Set "2" at the intelligent function module switch setting. |
| Performance specifications of 1 channels | Count input signal | Phase | 1-phase input, 2-phase input | | | | ○ | |
| | | Signal level (ϕA, ϕB) | 5VDC / 12VDC / 24VDC } 2 to 5mA | | | | ○ | |
| | Counter | Counting speed (Max.) | 1-phase input | 10KPPS | 1-phase input | 10KPPS | ○ | *2 |
| | | | 2-phase input | 7KPPS | 2-phase input | 7KPPS | | |
| | | Counting range | 24-bit unsigned binary (0 to 16,777,215) | | 32-bit signed binary (-2147483648 to 2147483647) | | △ | On QD62-H02, as the value is used with 32-bit signed binary values, change of sequence program is required. |
| | | Type | UP/DOWN preset counter + ring counter function | | | | ○ | |
| | | Minimum count pulse width (set input rise time to 5μs or less. Duty ratio: 50%) |   | | | | ○ | |
| | Magnitude comparison between CPU and AD61/QD62-H02 | Comparison range | 24-bit unsigned binary | | 32-bit signed binary | | ○ | |
| | | Comparison result | Set value < count value<br>Set value = count value<br>Set value > count value | | | | ○ | |
| | External input | Preset | 12/24VDC, 3/6mA<br>5VDC, 5mA | | 5/12/24VDC, 2 to 5mA | | △ | On QD62-H02, as the external input specifications differ, confirm the external devices specifications. |
| | | Count disable | 12/24VDC, 3/6mA<br>5VDC, 5mA | | - | | | |
| | | Function start | - | | 5/12/24VDC, 2 to 5mA | | | |
| | External output | Coincidence output | Transistor (open collector) output<br>12/24VDC, 0.5A | | Transistor (sink type) output 2 points/channel<br>12/24VDC, 0.5A/point, 2A/common | | ○ | |
| Internal current consumption (5VDC) | | | 0.3A | | 0.3A | | ○ | |
| Weight | | | 0.5kg | | 0.11kg | | ○ | |

*1 I/O numbers of the modules mounted to the right of the QD62-H02 change, because the number of I/O occupied points for the AD61S1 are different from the QD62-H02. Set the start I/O number for the module mounted to the right of the QD62-H02 to the same number for the module before the replacement in the I/O assignment tab of the Q parameter setting window. The program for the module before the replacement can be used.

*2 The rise/fall time of a pulse affects the counting speed. Countable counting speeds are as follows.
Counting a pulse whose rise/fall time is long may result in a miscount.

• For the AD61S1 and QD62-H02

| Rise/fall time | 1-phase input | 2-phase input |
|---|---|---|
| t = 5μs | 10KPPS | 7KPPS |
| t = 500μs | 500PPS | 250PPS |



### 6.3.2 Function comparison

○: With functions, -: Without functions

| Item | Description | AD61S1 | QD62-H02 | Precautions for replacement |
|---|---|---|---|---|
| Preset function | Changes the counter present value to a specified value. | ○ | ○ | |
| Disable function | Terminates counting. | ○ | ○ | |
| Ring counter function | Repeatedly executes counting between user's setting values. | ○ | ○ | On QD62-H02, the setting is carried out using intelligent function module switch setting. |
| Linear counter function | If the count exceeds the range, this function detects an overflow. | - | ○ | |
| Coincidence output function | Outputs signals when user and the present values are matched. | ○ | ○ | No.1 and No.2 coincidence output points can be set for each channel. |
| Coincidence detection interrupt function | Generates an interrupt signal to the programmable controller CPU when coincidence is detected. | - | ○ | |
| Latch counter function | Latches the present value at the time a signal is input. | - | ○ | |
| Sampling counter function | Counts the pulses that are input during the sampling time set. | - | ○ | |
| Periodic pulse counter function | The function allows storing the present value in the periodic pulse count present value and the previous value in the periodic pulse count previous value for each period time set. | - | ○ | |

### 6.3.3 I/O signal comparison to programmable controller CPU

Sequence program change is required as the I/O signals differ.
For details of the I/O signals or sequence program, refer to the High-Speed Counter Module User's Manual.

| AD61S1 | | | | QD62-H02 | | | |
|---|---|---|---|---|---|---|---|
| Device No. | Signal name | Device No. | Signal name | Device No. | Signal name | Device No. | Signal name |
| X0 | CH1 Counter value greater | Y0 | Not used | X0 | Module READY | Y0 | CH1 Coincidence signal No.1 reset command |
| X1 | CH1 Counter value coincidence | Y1 | | X1 | CH1 Counter value large (Point No.1) | Y1 | CH1 Preset command |
| X2 | CH1 Counter value less | Y2 | | X2 | CH1 Counter value coincidence (Point No.1) | Y2 | CH1 Coincidence signal enable command |
| X3 | CH1 External preset request detection | Y3 | | X3 | CH1 Counter value small (Point No.1) | Y3 | CH1 Down count command |
| X4 | CH2 Counter value greater | Y4 | | X4 | CH1 External preset request detection | Y4 | CH1 Count enable command |
| X5 | CH2 Counter value coincidence | Y5 | | X5 | CH1 Counter value large (Point No.2) | Y5 | CH1 External preset detection reset command |
| X6 | CH2 Counter value less | Y6 | | X6 | CH1 Counter value coincidence (Point No.2) | Y6 | CH1 Counter function selection start command |
| X7 | CH2 External preset request detection | Y7 | | X7 | CH1 Counter value small (Point No.2) | Y7 | CH1 Coincidence signal No.2 reset command |
| X8 | Not used | Y8 | | X8 | CH2 Counter value large (Point No.1) | Y8 | CH2 Coincidence signal No.1 reset command |
| X9 | | Y9 | | X9 | CH2 Counter value coincidence (Point No.1) | Y9 | CH2 Preset command |
| XA | | YA | | XA | CH2 Counter value small (Point No.1) | YA | CH2 Coincidence signal enable command |
| XB | | YB | | XB | CH2 External preset request detection | YB | CH2 Down count command |
| XC | | YC | | XC | CH2 Counter value large (Point No.2) | YC | CH2 Count enable command |
| XD | | YD | | XD | CH2 Counter value coincidence (Point No.2) | YD | CH2 External preset detection reset command |
| XE | | YE | | XE | CH2 Counter value small (Point No.2) | YE | CH2 Counter function selection start command |
| XF | | YF | | XF | Fuse broken detection flag | YF | CH2 Coincidence signal No.2 reset command |
| X10 | | Y10 | CH1 Coincidence signal reset command | | | | |
| X11 | | Y11 | CH1 Preset command | | | | |
| X12 | | Y12 | CH1 Coincidence signal output enable command | | | | |
| X13 | | Y13 | CH1 Down count command | | | | |
| X14 | | Y14 | CH1 Count enable | | | | |
| X15 | | Y15 | CH1 Present value read request | | | | |
| X16 | | Y16 | CH1 External preset detection reset command | | | | |
| X17 | | Y17 | CH2 Coincidence signal reset command | | | | |
| X18 | | Y18 | CH2 Preset command | | | | |
| X19 | | Y19 | CH2 Coincidence signal output enable command | | | | |
| X1A | | Y1A | CH2 Down count command | | | | |
| X1B | | Y1B | CH2 Count enable | | | | |
| X1C | | Y1C | CH2 Present value read request | | | | |
| X1D | | Y1D | CH2 External preset detection reset command | | | | |
| X1E | | Y1E | Not used | | | | |
| X1F | | Y1F | | | | | |

### 6.3.4 Buffer memory address comparison

Sequence program change is required as the assignment of buffer memory differs.
For details of the buffer memory or sequence program, refer to the High-Speed Counter Module User's Manual.

| AD61S1 | | | |
|---|---|---|---|
| Address (Dec.) | | Name | Read/write |
| CH1 | CH2 | | |
| 1 | 33 | Preset value write (Lower and middle) | W |
| (2) | (34) | Preset value write (Upper) | |
| 3 | 35 | Mode register | R/W |
| 4 | 36 | Present value read (Lower and middle) | R |
| (5) | (37) | Present value read (Upper) | |
| 6 | 38 | Set value read/write (Lower and middle) | R/W |
| (7) | (39) | Set value read/write (Upper) | |

Address in parentheses in the above table indicates the upper 8 bits of 24-bit data.

| QD62-H02 | | | | |
|---|---|---|---|---|
| Address (Dec.) | | Name | | Read/write |
| CH1 | CH2 | | | |
| 0 | 32 | Preset value setting | (L) | R/W |
| 1 | 33 | | (H) | |
| 2 | 34 | Present value | (L) | R |
| 3 | 35 | | (H) | |
| 4 | 36 | Coincidence output point set No.1 | (L) | R/W |
| 5 | 37 | | (H) | |
| 6 | 38 | Coincidence output point set No.2 | (L) | |
| 7 | 39 | | (H) | |
| 8 | 40 | Overflow detection flag | | R |
| 9 | 41 | Counter function selection setting | | R/W |
| 10 | 42 | Sampling/periodic setting | | |
| 11 | 43 | Sampling/periodic counter flag | | R |
| 12 | 44 | Latch count value | (L) | |
| 13 | 45 | | (H) | |
| 14 | 46 | Sampling count value | (L) | |
| 15 | 47 | | (H) | |
| 16 | 48 | Periodic pulse count previous value | (L) | |
| 17 | 49 | | (H) | |
| 18 | 50 | Periodic pulse count present value | (L) | |
| 19 | 51 | | (H) | |
| 20 | 52 | Ring counter minimum value | (L) | R/W |
| 21 | 53 | | (H) | |
| 22 | 54 | Ring counter maximum value | (L) | |
| 23 | 55 | | (H) | |
| 24 | 56 | System area (Not used) | | - |
| to | to | | | |
| 31 | 63 | | | |

# 7 POSITIONING MODULE REPLACEMENT

## 7.1 List of Positioning Module Alternative Models for Replacement

| Production discontinuation | | Transition to Q series | |
|---|---|---|---|
| Product | Model | Model | Remarks (Restrictions) |
| Positioning module*2 | AD70 | QD73A1 | 1) External wiring : Not changed*3 (An external power supply (±15VDC) is not required. The connector installation direction is reverse.)<br>2) Number of slots : Changed (1 slot → 2 slots)<br>3) Program : Buffer memory assignment and change of the setting method<br>4) Performance specifications change: Upward-compatibility<br>5) Function specifications: Partly changed (LED indication and function setting method) |
| | AD70D | None | Mount AD70D to the QA6□B-type extension base unit.<br>Otherwise, replacing with the QD75M system is recommended. |
| | AD72 | None | Replacing with two QD73A1 modules or QD75 system is recommended. |
| | AD75M1 | QD75M1 | 1) External wiring : Connector and manual pulsar wiring are changed.<br>2) Number of slots : Not changed<br>3) Program : I/O signals, XY assignment, buffer memory assignment and different functions are changed.<br>4) Performance specifications change: Upward-compatibility<br>5) Function specifications: Partly changed |
| | AD75M2 | QD75M2 | 1) External wiring : Connector and manual pulsar wiring are changed.<br>2) Number of slots : Not changed<br>3) Program : I/O signals, XY assignment, buffer memory assignment and different functions are changed.<br>4) Performance specifications change: Upward-compatibility<br>5) Function specifications: Partly changed |
| | AD75M3 | QD75M4 | 1) External wiring : Connector and manual pulsar wiring are changed.<br>2) Number of slots : Not changed<br>3) Program : I/O signals, XY assignment, buffer memory assignment and different functions are changed.<br>4) Performance specifications change: Upward-compatibility<br>5) Function specifications: Partly changed |
| | AD75P1-S3 | QD75P1N*1 (when an open collector is connected)<br>QD75D1N*1 (when a differential driver is connected) | 1) External wiring : Connector and manual pulsar wiring are changed.<br>2) Number of slots : Not changed<br>3) Program : I/O signals, XY assignment, buffer memory assignment and different functions are changed.<br>4) Performance specifications change: Not changed.<br>5) Function specifications: Partly changed |
| | AD75P2-S3 | QD75P2N*1 (when an open collector is connected)<br>QD75D2N*1 (when a differential driver is connected) | 1) External wiring : Connector and manual pulsar wiring are changed.<br>2) Number of slots : Not changed<br>3) Program : I/O signals, XY assignment, buffer memory assignment and different functions are changed.<br>4) Performance specifications change: Not changed.<br>5) Function specifications: Partly changed |

| Production discontinuation | | Transition to Q series | |
|---|---|---|---|
| Positioning module*2 | AD75P3-S3 | QD75P4N*1 (when an open collector is connected) | 1) External wiring : Connector and manual pulsar wiring are changed.<br>2) Number of slots : Not changed<br>3) Program : I/O signals, XY assignment, buffer memory assignment and different functions are changed.<br>4) Performance specifications change: Not changed.<br>5) Function specifications: Partly changed |
| | | QD75D4N*1 (when a differential driver is connected) | |

*1 The QD75P□N and QD75D□N are the upward-compatibility for the QD75P□ and QD75D□ and their programs are the same when they are replaced.
Change the sequence program as necessary with checking the processing timing, because performances such as the starting time and data update cycle are improved.

*2 Production of AD71 (S1/S2/S7) has been discontinued since the end of October 2004.
For details, refer to Technical Bulletin No.T12-0015.

*3 When the AD70 being used in the setting that the negative voltage is output when the positioning address increases is replaced with the QD73A1, the wiring change between the AD70 and an encoder is required. For details, refer to Section 7.6.6.

## 7.2 AD70D

Consider mounting the AD70D on the QA6□B extension base unit or the QD75M system is recommended.

## 7.3 AD72

No Q series alternative model is available.
Consider mounting two QD73A1 modules or the QD75 system is recommended.
When replacing with two QD73A1 modules, the interpolation function cannot be performed.

## 7.4 AD75P1-S3/P2-S3/P3-S3

### 7.4.1 Performance comparison

○: Compatible, △: Partial change required, ×: Incompatible

| Item \ Model | | AD75P1-S3 | AD75P2-S3 | AD75P3-S3 | QD75P1N QD75D1N | QD75P2N QD75D2N | QD75P4N QD75D4N | Compat-ibility | Precautions for replacement |
|---|---|---|---|---|---|---|---|---|---|
| No. of control axes | | 1 | 2 | 3 | 1 | 2 | 4 | ○ | |
| No. of positioning data items | | 600/axis*1 | | | 600/axis | | | ○ | |
| Position control interpolation functions | 2-axis linear interpolation | × | ○ | ○ | × | ○ | ○ (3-/4-axis linear interpolation : available) | ○ | |
| | 2-axis circular interpolation | × | ○ | ○ | × | ○ | ○ | | |
| Positioning system | Position control | ○ | | | ○ | | | ○ | |
| | Speed control | ○ | | | ○ | | | | |
| | Speed-position switching control | ○ | | | ○ | | | | |

○: Compatible, △: Partial change required, ×: Incompatible

| Item \ Model | AD75P1-S3 | AD75P2-S3 | AD75P3-S3 | QD75P1N QD75D1N | QD75P2N QD75D2N | QD75P4N QD75D4N | Compat-ibility | Precautions for replacement |
|---|---|---|---|---|---|---|---|---|
| Positioning range*2 | <Absolute system><br>-214748364.8 to 214748364.7 (μm)<br>/-13421772.8 to 13421772.7 (μm)<br>-21474.83648 to 21474.83647 (inch)<br>/-1342.17728 to 1342.17727 (inch)<br>0 to 359.99999 (degree)<br>/0 to 359.99999 (degree)<br>-2147483648 to 2147483647 (pulse)<br>/-134217728 to 134217727 (pulse)<br><Incremental system><br>-214748364.8 to 214748364.7 (μm)<br>/-13421772.8 to 13421772.7 (μm)<br>-21474.83648 to 21474.83647 (inch)<br>/-1342.17728 to 1342.17727 (inch)<br>-21474.83648 to 21474.83647 (degree)<br>/-1342.17728 to 1342.17727 (degree)<br>-2147483648 to 2147483647 (pulse))<br>/-134217728 to 134217727 (pulse)<br><In speed-position switching control><br>0 to 214748364.7 (μm)<br>/0 to 13421772.7 (μm)<br>0 to 21474.83647 (inch)<br>/0 to 1342.17727 (inch)<br>0 to 21474.83647 (degree)<br>/0 to 1342.17727 (degree)<br>0 to 2147483647 (pulse)<br>/0 to 134217727 (pulse) | | | <Absolute system><br>-214748364.8 to 214748364.7 (μm)<br>-21474.83648 to 21474.83647 (inch)<br>0 to 359.99999 (degree)<br>-2147483648 to 2147483647 (pulse)<br><Incremental system><br>-214748364.8 to 214748364.7 (μm)<br>-21474.83648 to 21474.83647 (inch)<br>-21474.83648 to 21474.83647 (degree)<br>-2147483648 to 2147483647 (pulse)<br><In speed-position switching control (INC mode)/position-speed switching control><br>0 to 214748364.7 (μm)<br>0 to 21474.83647 (inch)<br>0 to 21474.83647 (degree)<br>0 to 2147483647 (pulse)<br><In speed-position switching control (ABS mode)><br>0 to 359.99999 (degree) | | ○ | |
| Speed command range *2 | 0.01 to 6000000.00 (mm/min)<br>/0.01 to 375000.00 (mm/min)<br>0.001 to 600000.000 (inch/min)<br>/0.001 to 37500.000 (inch/min)<br>0.001 to 600000.000 (degree/min)<br>/0.001 to 37500.000 (degree/min)<br>1 to 1000000 (pulse/s)<br>/1 to 62500 (pulse/s) | | | 0.01 to 20000000.00 (mm/min)<br>0.001 to 2000000.000 (inch/min)<br>0.001 to 2000000.000 (degree/min)<br>1 to 1000000 (pulse/s) | | | ○ | |
| Machine OPR function (OPR method) | ○(6 OPR methods) | | | ○(6 OPR methods) | | | ○ | |
| JOG operation | ○ | | | ○ | | | ○ | |

○: Compatible, △: Partial change required, ×: Incompatible

| Item \ Model | | AD75P1-S3 | AD75P2-S3 | AD75P3-S3 | QD75P1N QD75D1N | QD75P2N QD75D2N | QD75P4N QD75D4N | Compat-ibility | Precautions for replacement |
|---|---|---|---|---|---|---|---|---|---|
| Manual pulse generator function | | 1 generator/axis | | | 1 generator/module | | | △ | • On QD75P□N/ QD75D□N, the manual pulse generator cannot be used by each axis independent. When connecting the manual pulse generator for each axis is required, use one axis module.<br>• The manual pulse generator itself can use the same one.<br>• The operation for inputting one pulse differs. Set the parameter so that movement amount may be same. |
| Starting time | | 20ms | | | 1.5 to 2.0ms (when other axes are starting: 1.5 to 2.0ms + 0.1ms to 0.5ms) | | | ○ | The starting time becomes fast. Check the processing timing. |
| Acceleration /deceleration processing | Automatic trapezoidal acceleration/ deceleration | ○ | | | ○ | | | ○ | |
| | S-pattern acceleration/ deceleration | ○ | | | ○ | | | | |
| Acceleration /deceleration time | No. of patterns | Acceleration time and deceleration time can be set independently. (4 patterns each) | | | Acceleration time and deceleration time can be set independently. (4 patterns each) | | | ○ | |
| | Setting range | Changeover between 1 to 65535ms/1 to 8388608ms possible | | | 1 to 8388608ms | | | | |
| | Sudden stop deceleration | Changeover between 1 to 65535ms/1 to 8388608ms possible | | | 1 to 8388608ms | | | ○ | |
| Compensation | | Electronic gears, backlash compensation, near pass*3 | | | Electronic gears, backlash compensation, near pass*3 | | | △ | Refer to *3. |
| Error display | | 17-segment LED | | | Error LED | | | × | For details of diagnostic, use GX Developer. |
| History data storage (Start, error, warning) | | Provided (4 types, 16 items/module) | | | Provided (3 types, 16 items/module) | | | ○ | The start history during error is integrated into the start history. |
| Data storage destination | | Flash ROM (battery-less backup) | | | Flash ROM (battery-less backup) | | | ○ | |

○ : Compatible, △ : Partial change required, ×: Incompatible

| Item \ Model | AD75P1-S3 | AD75P2-S3 | AD75P3-S3 | QD75P1N QD75D1N | QD75P2N QD75D2N | QD75P4N QD75D4N | Compat-ibility | Precautions for replacement |
|---|---|---|---|---|---|---|---|---|
| Connection connector | 10136-3000VE (Soldering type, supplied) | | | A6CON1 (Soldering type, straight-out type, sold separately) | | | × | As the connectors differ, wiring change is required. The connectors of QD75P□N/ QD75D□N are sold separately. |
| | 10136-6000EL (Crimping type, sold separately) | | | A6CON2 (Crimping type, straight-out type, sold separately) | | | | |
| | | | | A6CON4 (Soldering type, straight-out/diagonal-out type, sold separately) | | | | |
| Applicable wire size | 10136-3000VE: 24 to 30 AWG (approx. 0.05 to 0.2 $mm^2$) | | | A6CON1, A6CON4: 0.3$mm^2$ | | | ○ | |
| | 10136-6000EL: 28 AWG (approx. 0.08 $mm^2$) | | | A6CON2: 24 AWG | | | | |
| Command pulse output system | Differential driver/Open collector | | | QD75P□N: Open collector QD75D□N: Differential driver | | | △ | The differential driver and the open collector are separate module. In initial condition, AD75P□-S3 outputs with positive logic, and QD75P□N/ QD75D□N outputs with negative logic. |
| Max. output pulse | When connected to open collector: 200kpps When connected to differential driver: 400kpps | | | When connected to open collector: 200kpps When connected to differential driver: 4Mpps | | | ○ | |
| Max. connection distance between servos | When connected to open collector: 2m When connected to differential driver: 10m | | | When connected to open collector: 2m When connected to differential driver: 10m | | | ○ | |
| Internal current consumption (A) (5VDC) | 0.7A or less | | | QD75P1N: 0.29A | QD75P2N: 0.30A | QD75P4N: 0.36A | ○ | |
| | | | | QD75D1N: 0.43A | QD75D2N: 0.45A | QD75D4N: 0.66A | | |
| Flash ROM write count | Max. 100,000 times | | | Max. 100,000 times | | | ○ | When QD75P□N/ QD75D□N carries out the flash write 26 times from the sequence program, an error occurs. The error reset enables to perform the flash write. |
| Occupied I/O points | 32 points (I/O assignment: special 32 points) | | | 32 points (I/O assignment: intelligent 32 points) | | | ○ | |
| No. of module occupied slots | 1 | | | 1 | | | ○ | |
| Weight | 0.35kg | | | QD75P1N: 0.14kg | QD75P2N: 0.14kg | QD75P4N: 0.16kg | ○ | |
| | | | | QD75D1N: 0.15kg | QD75D2N: 0.15kg | QD75D4N: 0.16kg | | |

○ : Compatible, △ : Partial change required, × : Incompatible

| Item \ Model | | AD75P1-S3 | AD75P2-S3 | AD75P3-S3 | QD75P1N QD75D1N | QD75P2N QD75D2N | QD75P4N QD75D4N | Compat-ibility | Precautions for replacement |
|---|---|---|---|---|---|---|---|---|---|
| I/O signal for external devices | STRT signal | ○(External start signal) | | | × (integrated into CHG) | | | △ | When using both the speed-position switching control and the external start, input the external start signal to the interrupt module, and start using the direct output. |
| | CHG signal | Speed-position switching signal | | | External command signal (External start or speed-position switching selectable with parameters) | | | ○ | |
| | in-Position (INP) | ○(for monitor) | | | × | | | △ | No INP signal. When it is required for monitor, monitor using the input module. |
| | Signal logic switching | Command pulse output signal only | | | ○ | | | ○ | The default logic of pulse output differs. |
| Peripheral devices (data setting, etc.) | Connection with peripheral devices | Direct connection | | | Connection via programmable controller CPU, Q corresponding serial communication module, Q corresponding MELSECNET/H remote I/O module | | | ○ | The connecting shape differs. |
| | AD75TU | ○ | | | × | | | × | AD75TU cannot be used. Use GX Configurator-QP. |
| | GX Configurator | GX Configurator-AP | | | GX Configurator-QP | | | △ | Available GX Configurator differs. |

*1 With AD75P□-S3, Nos.1 to 100 data items/axis of positioning data can be set using the buffer memory and Nos.1 to 600 data/axis can be set with QD75P□N/QD75D□N.
The positioning data in the buffer memory is not backed up.

*2 Indicates the standard mode/stepping motor mode about AD75P□-S3.

*3 The near pass function is valid only during the continuous path control. (AD75P□-S3: Selected with parameters, QD75P□N/QD75D□N: Standard function)
QD75P□N/QD75D□N does not have address pass mode. When being asked for passing the positioning address, continue with continuous running. (However, it will stop once.)

## 7.4.2 Function comparison

### (1) Deleted function from AD75P1-S3/P2-S3/P3-S3

When using the following function on AD75P□-S3, change the program.

| Deleted functions | Precautions for replacement |
|---|---|
| Stepping motor mode | The setting is not required when using stepping motor due to it's performance gain. |
| Fast machine OPR | With the QD75P□N/QD75D□N, there is no possible function for replacement. |
| Special start (stop) | Execute it separately for the start two times. |
| Indirect designation | In the QD75P□N/QD75D□N, the start block area on the buffer memory is expanded to five blocks (0 to 4).<br>Each start block can be directly designated with positioning start No. (7000 to 7004). |
| Block transfer | With the AD75P□-S3, this interface is used to set positioning data Nos. 101 to 600 that do not exist on the buffer memory.<br>Since all positioning data can be set in the buffer memory with the QD75P□N/QD75D□N, this function is deleted. |
| Positioning data I/F | |
| Start history during errors | The contents are the same as the start history.<br>Therefore, the QD75P□N/QD75D□N stores only the start history. |
| System monitor data<br>(Module name, OS type, OS version) | These data were deleted because they can be displayed in system monitor "Module's detailed information" of GX Developer.<br>(Refer to GX Developer Operating Manual.) |

### (2) Changed function from AD75P1-S3/P2-S3/P3-S3

In case of using the following functions with AD75P□-S3, make sure that there is no operation problems when converted to QD75P□N/QD75D□N.

<table>
<tr><th>Changed functions</th><th>Change description</th></tr>
<tr><td>Software stroke limit function</td><td>1. The limit check of arc address is carried out only when a sub point is designated.<br>It is not carried out when a center point is designated.<br>2. The software stroke limit check during speed control is carried out in the following cases:<br>• When the software stroke limit is applied to the current feed value with Pr.14 and the current feed value is updated with Pr.21<br>• When the software stroke limit is applied to the machine feed value<br>3. If an attempt is made to change the current value but the designated address is out of the software stroke limit range, the attempt is considered as an error and the current value is not changed.<br>4. Error code change<br>AD75P□-S3:<br>There are 3 types of errors for each upper and lower stroke limit.<br>(error code 509 to 512)<br>QD75P□N/QD75D□N:<br>Errors for the software stroke upper limit are integrated in to error code 507.<br>Errors for the lower limit are integrated in to error code 508.<br>Error codes 509 to 512 are deleted.</td></tr>
<tr><td>Current value changing M code function</td><td>1. An error occurs when the designated new current value is out of the software stroke limit range.<br>2. The M code setting value is valid during the positioning data current value changing instruction.</td></tr>
<tr><td>Acceleration/deceleration speed control</td><td>1. An error occurs when the command frequency value calculated from the speed limit value exceeds the maximum command frequency of the positioning module being used.<br>2. Only two-word type (1 to 8388608ms) can be used as the setting value for the acceleration/deceleration time.</td></tr>
<tr><td>Stop process and restart after stop positioning operation stop</td><td>1. "Peripheral side (emergency) stop" is deleted from the stop causes of Stop group 2 "sudden stop selection".<br>"Test mode fault" in the stop causes of Stop group 3 "sudden stop selection" is changed to be in the stop causes of Stop group 2 "sudden stop selection".<br>2. "Stop (QD75 peripheral)" is added to the stop causes of Stop group 3 "sudden stop selection".<br>3. Error code 100 (Peripheral device stop during operation) is deleted.<br>4. "Programmable controller CPU error occurrence" is added to the stop causes of Stop group 2 Sudden stop selection.</td></tr>
<tr><td rowspan="3">READY signal (X0)</td><td></td><td>AD75P□-S3</td><td>QD75P□N/QD75D□N</td></tr>
<tr><td>OFF</td><td>Normal (READY)</td><td>Not READY/WDT error</td></tr>
<tr><td>ON</td><td>Not READY/WDT error</td><td>Normal (READY)</td></tr>
<tr><td>Manual pulse generator operation</td><td>The No. of connectable manual pulse generator is changed from 1generator/1axis to 1generator/1 module.</td></tr>
<tr><td>Axis operation status</td><td>"Step stopped" is changed to "Stopped" and "Step error occurring" is changed to "Error occurring".</td></tr>
<tr><td>Continuous path control</td><td>• AD75P□-S3:<br>If the reference axis operates in reverse direction, the control is internally changed into the continuous positioning control. (restart after deceleration stop)<br>• QD75P□N/QD75D□N:<br>Even if the reference axis operates in reverse direction with interpolation, the control remains as the continuous path control.<br>(In single-axis operation, the operation is the same as that of the AD75P□-S3.)</td></tr>
<tr><td>Near pass</td><td>For the continuous path control, only the near pass function is available.<br>Positioning address pass is not conducted.</td></tr>
<tr><td>2-axis interpolation<br>• 2-axis linear interpolation<br>• 2-axis fixed-feed<br>• Circular interpolation</td><td>The interpolation target axis can be randomly set with a positioning identifier.</td></tr>
</table>

<table>
<tr><th>Changed functions</th><th colspan="3">Change description</th></tr>
<tr><td>Step function</td><td colspan="3">1. "Step stopped" is changed to "Stopped" and "Step error occurring" is changed to "Error occurring" in the axis operations status parameters.<br>2. The restart command for step start information (02H) is deleted.<br>3. The step operation is restarted with the restart command.</td></tr>
<tr><td>Command in-position function</td><td colspan="3">The command in-position width is expanded.<br>• AD75P□-S3: 1 to 32767000<br>• QD75P□N/QD75D□N: 1 to 2147483647</td></tr>
<tr><td>Positioning start No.</td><td colspan="3">7004 to 7010 (block start designation) and 8000 to 8049 (indirect designation) are deleted.</td></tr>
<tr><td>block start data</td><td colspan="3">With QD75P□N/QD75D□N, number of blocks has been change to 5 (7000 to 7004).<br>(With the AD75P□-S3, this data is called "Positioning start information".)</td></tr>
<tr><td>Start history</td><td colspan="3">The configuration of "start information" and "start No." is changed so that the start No. can be directly checked.</td></tr>
<tr><td>Basic parameter1<br>"Pr.5 Pulse output mode"</td><td colspan="3">When the programmable controller is turned ON or the programmable controller CPU module is reset, the valid value is only the first value after the programmable controller READY signal (Y0) turns from OFF to ON.</td></tr>
<tr><td rowspan="3">Detailed parameters<br>"Pr.15 Software stroke limit valid/invalid setting"</td><td></td><td>AD75P□-S3</td><td>QD75P□N/QD75D□N</td></tr>
<tr><td>0<br>(Factory setting)</td><td>Software stroke limits invalid for manual operation</td><td>Software stroke limits valid for manual operation</td></tr>
<tr><td>1</td><td>Software stroke limits valid for manual operation</td><td>Software stroke limits invalid for manual operation</td></tr>
</table>

### 7.4.3 I/O signal comparison to programmable controller CPU

Sequence program change is required as the I/O signals differ.
For details of the I/O signals or sequence program, refer to the Type QD75P/QD75D Positioning Module User's Manual.

| Input (X) | | | Output (Y) | | |
|---|---|---|---|---|---|
| Signal name | AD75P□-S3 | QD75P□N/ QD75D□N | Signal name | AD75P□-S3 | QD75P□N/ QD75D□N |
| (QD75/AD75) READY | X00* | X00* | Axis 1 Positioning start | Y10 | Y10 |
| Axis 1 Start complete | X01 | X10 | Axis 2 Positioning start | Y11 | Y11 |
| Axis 2 Start complete | X02 | X11 | Axis 3 Positioning start | Y12 | Y12 |
| Axis 3 Start complete | X03 | X12 | Axis 4 Positioning start | - | Y13 |
| Axis 4 Start complete | - | X13 | Axis 1 Stop | Y13 | Y04 |
| Axis 1 BUSY | X04 | X0C | Axis 2 Stop | Y14 | Y05 |
| Axis 2 BUSY | X05 | X0D | Axis 3 Stop | Y1C | Y06 |
| Axis 3 BUSY | X06 | X0E | Axis 4 Stop | - | Y07 |
| Axis 4 BUSY | - | X0F | Axis 1 Forward run JOG start | Y16 | Y08 |
| Axis 1 Positioning complete | X07 | X14 | Axis 1 Reverse run JOG start | Y17 | Y09 |
| Axis 2 Positioning complete | X08 | X15 | Axis 2 Forward run JOG start | Y18 | Y0A |
| Axis 3 Positioning complete | X09 | X16 | Axis 2 Reverse run JOG start | Y19 | Y0B |
| Axis 4 Positioning complete | - | X17 | Axis 3 Forward run JOG start | Y1A | Y0C |
| Axis 1 Error detection | X0A | X08 | Axis 3 Reverse run JOG start | Y1B | Y0D |
| Axis 2 Error detection | X0B | X09 | Axis 4 Forward run JOG start | - | Y0E |
| Axis 3 Error detection | X0C | X0A | Axis 4 Reverse run JOG start | - | Y0F |
| Axis 4 Error detection | - | X0B | Programmable controller READY | Y1D | Y00 |
| Axis 1 M code ON | X0D | X04 | Axis 1 Execution prohibition flag | - | Y14 |
| Axis 2 M code ON | X0E | X05 | Axis 2 Execution prohibition flag | - | Y15 |
| Axis 3 M code ON | X0F | X06 | Axis 3 Execution prohibition flag | - | Y16 |
| Axis 4 M code ON | - | X07 | Axis 4 Execution prohibition flag | - | Y17 |
| Synchronization flag | - | X01 | Not used | Y00 to Y0F<br>Y1E to Y1F | Y01 to Y03<br>Y18 to Y1F |
| Not used | X10 to X1F | X02, X03<br>X18 to X1F | | | |

* The ON/OFF statuses for READY are different between the QD75P□N/QD75D□N and AD75P□-S3.

| | Not READY/WDT error | READY |
|---|---|---|
| QD75P□N/ QD75D□N | OFF | ON |
| AD75P□-S3 | ON | OFF |

### 7.4.4 Buffer memory address comparison

For details of the buffer memory or sequence program, refer to the Type QD75P/QD75D Positioning Module User's Manual.

area shows the differences between AD75P□-S3 and QD75P□N/QD75D□N.

| Item of AD75P□-S3 | Buffer memory address | | | | | |
|---|---|---|---|---|---|---|
| | AD75P□-S3 | | | QD75P□N/QD75D□N | | |
| | Axis 1 | Axis 2 | Axis 3 | Axis 1 | Axis 2 | Axis 3 |
| Pr.1 Unit setting | 0 | 150 | 300 | 0 | 150 | 300 |
| Pr.2 1 No. of pulses per rotation (Ap) | 1 | 151 | 301 | 1 | 151 | 301 |
| Pr.3 1 Movement amount per rotation (Al) | 2 | 152 | 302 | 2 | 152 | 302 |
| Pr.4 Unit magnification (Am) | 3 | 153 | 303 | 3 | 153 | 303 |
| Pr.5 Pulse output mode | 4 | 154 | 304 | 4 | 154 | 304 |
| Pr.6 Rotation direction setting | 5 | 155 | 305 | 5 | 155 | 305 |
| Pr.7 Speed limit value | 6<br>7 | 156<br>157 | 306<br>307 | 10<br>11 | 160<br>161 | 310<br>311 |
| Pr.8 Acceleration time 0 | 8<br>9 | 158<br>159 | 308<br>309 | 12<br>13 | 162<br>163 | 312<br>313 |
| Pr.9 Deceleration time 0 | 10<br>11 | 160<br>161 | 310<br>311 | 14<br>15 | 164<br>165 | 314<br>315 |
| Pr.10 Bias speed at start | 12<br>13 | 162<br>163 | 312<br>313 | 6<br>7 | 156<br>157 | 306<br>307 |
| Pr.11 Stepping motor mode selection amount | 14 | 164 | 314 | - | - | - |
| Pr.12 Backlash compensation amount | 15 | 165 | 315 | 17 | 167 | 317 |
| Pr.13 Software stroke limit upper limit value | 16<br>17 | 166<br>167 | 316<br>317 | 18<br>19 | 168<br>169 | 318<br>319 |
| Pr.14 Software stroke limit lower limit value | 18<br>19 | 168<br>169 | 318<br>319 | 20<br>21 | 170<br>171 | 320<br>321 |
| Pr.15 Software stroke limit selection | 20 | 170 | 320 | 22 | 172 | 322 |
| Pr.16 Software stroke limit valid/invalid setting | 21 | 171 | 321 | 23 | 173 | 323 |
| Pr.17 Command in-position width | 22<br>23 | 172<br>173 | 322<br>323 | 24<br>25 | 174<br>175 | 324<br>325 |
| Pr.18 Torque limit setting value | 24 | 174 | 324 | 26 | 176 | 326 |
| Pr.19 M code ON signal output timing | 25 | 175 | 325 | 27 | 177 | 327 |
| Pr.20 Speed switching mode | 26 | 176 | 326 | 28 | 178 | 328 |
| Pr.21 Interpolation speed designation method | 27 | 177 | 327 | 29 | 179 | 329 |
| Pr.22 Current feed value during speed control | 28 | 178 | 328 | 30 | 180 | 330 |
| Pr.23 Manual pulse generator selection | 29 | 179 | 329 | - | - | - |
| Pr.24 Logic selection for pulse output to the drive unit | 30 | 180 | 330 | - | - | - |
| Pr.25 Size selection for acceleration/deceleration time | 31 | 181 | 331 | - | - | - |
| Pr.26 Acceleration time 1 | 36<br>37 | 186<br>187 | 336<br>337 | 36<br>37 | 186<br>187 | 336<br>337 |
| Pr.27 Acceleration time 2 | 38<br>39 | 188<br>189 | 338<br>339 | 38<br>39 | 188<br>189 | 338<br>339 |
| Pr.28 Acceleration time 3 | 40<br>41 | 190<br>191 | 340<br>341 | 40<br>41 | 190<br>191 | 340<br>341 |
| Pr.29 Deceleration time 1 | 42<br>43 | 192<br>193 | 342<br>343 | 42<br>43 | 192<br>193 | 342<br>343 |

| Item of AD75P□-S3 | Buffer memory address | | | | | |
|---|---|---|---|---|---|---|
| | AD75P□-S3 | | | QD75P□N/QD75D□N | | |
| | Axis 1 | Axis 2 | Axis 3 | Axis 1 | Axis 2 | Axis 3 |
| Pr.30 Deceleration time 2 | 44<br>45 | 194<br>195 | 344<br>345 | 44<br>45 | 194<br>195 | 344<br>345 |
| Pr.31 Deceleration time 3 | 46<br>47 | 196<br>197 | 346<br>347 | 46<br>47 | 196<br>197 | 346<br>347 |
| Pr.32 JOG Speed limit value | 48<br>49 | 198<br>199 | 348<br>349 | 48<br>49 | 198<br>199 | 348<br>349 |
| Pr.33 JOG operation acceleration time selection | 50 | 200 | 350 | 50 | 200 | 350 |
| Pr.34 JOG operation deceleration time selection | 51 | 201 | 351 | 51 | 201 | 351 |
| Pr.35 Acceleration/deceleration process selection | 52 | 202 | 352 | 52 | 202 | 352 |
| Pr.36 S-pattern proportion | 53 | 203 | 353 | 53 | 203 | 353 |
| Pr.37 Sudden stop deceleration time | 54<br>55 | 204<br>205 | 354<br>355 | 54<br>55 | 204<br>205 | 354<br>355 |
| Pr.38 Stop group 1 sudden stop selection | 56 | 206 | 356 | 56 | 206 | 356 |
| Pr.38 Stop group 2 sudden stop selection | 57 | 207 | 357 | 57 | 207 | 357 |
| Pr.40 Stop group 3 sudden stop selection | 58 | 208 | 358 | 58 | 208 | 358 |
| Pr.41 Positioning complete signal output time | 59 | 209 | 359 | 59 | 209 | 359 |
| Pr.42 Allowable circular interpolation error width | 60<br>61 | 210<br>211 | 360<br>361 | 60<br>61 | 210<br>211 | 360<br>361 |
| Pr.43 External start function selection<br>(QD75P□N/QD75D□N: Pr.42 External command function selection) | 62 | 212 | 362 | 62 | 212 | 362 |
| Pr.44 Near pass mode selection for path control | 66 | 216 | 366 | - | - | - |
| Pr.45 OPR method | 70 | 220 | 370 | 70 | 220 | 370 |
| Pr.46 OPR direction | 71 | 221 | 371 | 71 | 221 | 371 |
| Pr.37 OP address | 72<br>73 | 222<br>223 | 372<br>373 | 72<br>73 | 222<br>223 | 372<br>373 |
| Pr.48 OPR speed | 74<br>75 | 224<br>225 | 374<br>375 | 74<br>75 | 224<br>225 | 374<br>375 |
| Pr.49 Creep speed | 76<br>77 | 226<br>227 | 376<br>377 | 76<br>77 | 226<br>227 | 376<br>377 |
| Pr.50 OPR retry | 78 | 228 | 378 | 78 | 228 | 378 |
| Pr.51 OPR dwell time | 79 | 229 | 379 | 79 | 229 | 379 |
| Pr.52 Setting for the movement amount after near-point dog ON | 80<br>81 | 230<br>231 | 380<br>381 | 80<br>81 | 230<br>231 | 380<br>381 |
| Pr.53 OPR acceleration time selection | 82 | 232 | 382 | 82 | 232 | 382 |
| Pr.54 OPR deceleration time selection | 83 | 233 | 383 | 83 | 233 | 383 |
| Pr.55 OP shift amount | 84<br>85 | 234<br>235 | 384<br>385 | 84<br>85 | 234<br>235 | 384<br>385 |
| Pr.56 OPR torque limit value | 86 | 236 | 386 | 86 | 236 | 386 |
| Pr.57 Speed designation during OP shift | 88 | 238 | 388 | 88 | 238 | 388 |
| Pr.58 Dwell time during OPR retry | 89 | 239 | 389 | 89 | 239 | 389 |

| Item of AD75P□-S3 | | Buffer memory address | |
|---|---|---|---|
| | | AD75P□-S3 | QD75P□N/QD75D□N |
| | | Common for axis 1, 2, 3 | Common for axis 1, 2, 3, 4 |
| Md.1 In test mode flag | | 450 | 1200 |
| Md.2 Module name | | 451 | - |
| Md.3 OS type | | 452 453<br>454 455 | - |
| Md.4 OS version | | 456<br>457 | - |
| Md.5 Clock data (hour: minute) | | 460 | - |
| Md.6 Clock data (second: 100 ms) | | 461 | - |
| (Pointer number) | Start history | (0) to (15) | |
| Md.7 Start axis<br>(QD75P□N/QD75D□N: Md.3 Start information) | Start history | 462 to 537 | 1212 to 1287 |
| Md.8 Operation type<br>(QD75P□N/QD75D□N: Md.4 Start No.) | Start history | 463 to 538 | 1213 to 1288 |
| Md.9 Start Hour: minute<br>(QD75P□N/QD75D□N: Md.5 Start Hour) | Start history | 464 to 539 | 1214 to 1289 |
| Md.10 Start Second: 100 ms<br>(QD75P□N/QD75D□N: Md.6 Start Minute: second) | Start history | 465 to 540 | 1215 to 1290 |
| Md.11 Error judgment | Start history | 466 to 541 | 1216 to 1291 |
| Md.12 Start history pointer | Start history | 542 | 1292 |
| (Pointer number) | Start history during errors | (0) to (15) | - |
| Md.13 Start axis | Start history during errors | 543 to 618 | - |
| Md.14 Operation type | Start history during errors | 544 to 619 | - |
| Md.15 Start Hour: minute | Start history during errors | 545 to 620 | - |
| Md.16 Start Second: 100 ms | Start history during errors | 546 to 621 | - |
| Md.17 Error judgment | Start history during errors | 547 to 622 | - |
| Md.18 Start history storage during error | Start history during errors | 623 | - |
| (Pointer number) | Error history | (0) to (15) | |
| Md.19 Axis in which the error occurred | Error history | 624 to 684 | 1293 to 1353 |
| Md.20 Axis error No. | Error history | 625 to 685 | 1294 to 1354 |
| Md.21 Axis error occurrence Hour: minute<br>(QD75P□N/QD75D□N: Md.11 Axis error occurrence (Hour)) | Error history | 626 to 686 | 1295 to 1355 |
| Md.22 Axis error occurrence Second: 100 ms<br>(QD75P□N/QD75D□N: Md.12 Axis error occurrence (Minutes: second)) | Error history | 627 to 687 | 1296 to 1356 |
| Md.23 Error history pointer | Error history | 688 | 1357 |

| Item of AD75P□-S3 | | Buffer memory address | |
|---|---|---|---|
| | | AD75P□-S3 | QD75P□N/QD75D□N |
| | | Common for axis 1, 2, 3 | Common for axis 1, 2, 3, 4 |
| (Pointer number) | Warning history | (0) to (15) | |
| Md.24 Axis in which the warning occurred | | 689 to 749 | 1358 to 1418 |
| Md.25 Axis warning No. | | 690 to 750 | 1359 to 1419 |
| Md.26 Axis warning occurrence Hour: minutes<br>(QD75P□N/QD75D□N: Md.16 Axis warning occurrence (Hour)) | | 691 to 751 | 1360 to 1420 |
| Md.27 Axis warning occurrence Second: 100 ms<br>(QD75P□N/QD75D□N: Md.17 Axis warning occurrence (Minutes: second)) | | 3692 to 752 | 1361 to 1421 |
| Md.28 Warning history pointer | | 753 | 1422 |

| Item of AD75P□-S3 | Buffer memory address | | | | | |
|---|---|---|---|---|---|---|
| | AD75P□-S3 | | | QD75P□N/QD75D□N | | |
| | Axis 1 | Axis 2 | Axis 3 | Axis 1 | Axis 2 | Axis 3 |
| Md.29 Current feed value | 800<br>801 | 900<br>901 | 1000<br>1001 | 800<br>801 | 900<br>901 | 1000<br>1001 |
| Md.30 Machine feed value | 802<br>803 | 902<br>903 | 1002<br>1003 | 802<br>803 | 902<br>903 | 1002<br>1003 |
| Md.31 Feedrate | 804<br>805 | 904<br>905 | 1004<br>1005 | 804<br>805 | 904<br>905 | 1004<br>1005 |
| Md.32 Valid M code | 806 | 906 | 1006 | 808 | 908 | 1008 |
| Md.33 Axis error No. | 807 | 907 | 1007 | 806 | 906 | 1006 |
| Md.34 Axis warning No. | 808 | 908 | 1008 | 807 | 907 | 1007 |
| Md.35 Axis operation status | 809 | 909 | 1009 | 809 | 909 | 1009 |
| Md.36 Current speed | 810<br>811 | 910<br>911 | 1010<br>1010 | 810<br>811 | 910<br>911 | 1010<br>1011 |
| Md.37 Axis feedrate | 812<br>813 | 912<br>913 | 1012<br>1013 | 812<br>813 | 912<br>913 | 1012<br>1013 |
| Md.38 Speed-position switching control positioning amount | 814<br>815 | 914<br>915 | 1014<br>1015 | 814<br>815 | 914<br>915 | 1014<br>1015 |
| Md.39 External input/output signal | 816 | 916 | 1016 | 816 | 916 | 1016 |
| Md.40 Status | 817 | 917 | 1017 | 817 | 917 | 1017 |
| Md.41 Target value | 818<br>819 | 918<br>919 | 1018<br>1019 | 818<br>819 | 918<br>919 | 1018<br>1019 |
| Md.42 Target speed | 820<br>821 | 920<br>921 | 1020<br>1021 | 820<br>821 | 920<br>921 | 1020<br>1021 |
| Md.43 OP absolute position | 822<br>823 | 922<br>923 | 1022<br>1023 | - | - | - |
| Md.44 Movement amount after near-point dog ON | 824<br>825 | 924<br>925 | 1024<br>1025 | 824<br>825 | 924<br>925 | 1024<br>1025 |
| Md.45 Torque limit stored value | 826 | 926 | 1026 | 826 | 926 | 1026 |
| Md.46 Special start data instruction code setting value | 827 | 927 | 1027 | 827 | 927 | 1027 |
| Md.47 Special start data instruction parameter setting value | 828 | 928 | 1028 | 828 | 928 | 1028 |
| Md.48 Start positioning data No. setting value | 829 | 929 | 1029 | 829 | 929 | 1029 |
| Md.49 In speed control flag | 830 | 930 | 1030 | 830 | 930 | 1030 |
| Md.50 In speed change processing flag | 831 | 931 | 1031 | 831 | 931 | 1031 |
| Md.51 Start data pointer being executed | 832 | 932 | 1032 | 834 | 934 | 1034 |
| Md.52 Last executed positioning data No. | 833 | 933 | 1033 | 837 | 937 | 1037 |
| Md.53 Repetition counter<br>(QD75P□N/QD75D□N: Md.41 Special start repetition counter) | 834 | 934 | 1034 | 832 | 932 | 1032 |
| Md.54 Positioning data No. being executed | 835 | 935 | 1035 | 835 | 935 | 1035 |
| Md.55 Block No. being executed | 836 | 936 | 1036 | 836 | 936 | 1036 |
| Md.56 Positioning data being executed | 838 to 847 | 938 to 947 | 1038 to 1047 | 838 to 847 | 938 to 947 | 1038 to 1047 |
| Deceleration starting flag | - | - | - | 899 | 999 | 1099 |

| Item of AD75P□-S3 | Buffer memory address | | | | | |
|---|---|---|---|---|---|---|
| | AD75P□-S3 | | | QD75P□N/QD75D□N | | |
| | Axis 1 | Axis 2 | Axis 3 | Axis 1 | Axis 2 | Axis 3 |
| Cd.1 Clock data setting (hour) | 1100 | | | - | | |
| Cd.2 Clock data setting (minute, second) | 1101 | | | - | | |
| Cd.3 Clock data writing | 1102 | | | - | | |
| Cd.4 Target axis | 1103 | | | - | | |
| Cd.5 Positioning data No. | 1104 | | | - | | |
| Cd.6 Write pattern | 1105 | | | - | | |
| Cd.7 Read/write request | 1106 | | | - | | |
| Cd.8 Read/write positioning data I/F | 1108 to 1137 | | | - | | |
| Cd.9 Flash ROM write request | 1138 | | | 1900 | | |
| Cd.10 Parameter initialization request | 1139 | | | 1901 | | |
| Cd.11 Positioning start No. | 1150 | 1200 | 1250 | 1500 | 1600 | 1700 |
| Cd.12 Axis error reset | 1151 | 1201 | 1251 | 1502 | 1602 | 1702 |
| Cd.13 Restart command | 1152 | 1202 | 1252 | 1503 | 1603 | 1703 |
| Cd.14 M code OFF request | 1153 | 1203 | 1253 | 1504 | 1604 | 1704 |
| Cd.15 New current value | 1154<br>1155 | 1204<br>1205 | 1254<br>1255 | 1506<br>1507 | 1606<br>1607 | 1706<br>1707 |
| Cd.16 New speed value | 1156<br>1157 | 1206<br>1207 | 1256<br>1257 | 1514<br>1515 | 1614<br>1615 | 1714<br>1715 |
| Cd.17 Speed change request | 1158 | 1208 | 1258 | 1516 | 1616 | 1716 |
| Cd.18 Positioning operation speed override | 1159 | 1209 | 1259 | 1513 | 1613 | 1713 |
| Cd.19 JOG speed | 1160<br>1161 | 1210<br>1211 | 1260<br>1261 | 1518<br>1519 | 1618<br>1619 | 1718<br>1719 |
| Cd.20 Speed-position switching enable flag | 1163 | 1213 | 1263 | 1528 | 1628 | 1728 |
| Cd.21 Speed-position switching control movement amount change register | 1164<br>1165 | 1214<br>1215 | 1264<br>1265 | 1526<br>1527 | 1626<br>1627 | 1726<br>1727 |
| Cd.22 Manual pulse generator enable flag | 1167 | 1217 | 1267 | 1524 | 1624 | 1724 |
| Cd.23 Manual pulse generator 1 pulse input magnification | 1168<br>1169 | 1218<br>1219 | 1268<br>1269 | 1522<br>1523 | 1622<br>1623 | 1722<br>1723 |
| Cd.24 OPR return request flag OFF request | 1170 | 1220 | 1270 | 1521 | 1621 | 1721 |
| Cd.25 External start valid<br>(QD75P□N/QD75D□N: Cd.8 External command valid) | 1171 | 1221 | 1271 | 1505 | 1605 | 1705 |
| Cd.26 Step valid flag | 1172 | 1222 | 1272 | 1545 | 1645 | 1745 |
| Cd.27 Step mode | 1173 | 1223 | 1273 | 1544 | 1644 | 1744 |
| Cd.28 Step start information | 1174 | 1224 | 1274 | 1546 | 1646 | 1746 |
| Cd.29 Skip command | 1175 | 1225 | 1275 | 1547 | 1647 | 1747 |
| Cd.30 New torque value | 1176 | 1226 | 1276 | 1525 | 1625 | 1725 |
| Cd.31 Positioning starting point No. | 1178 | 1228 | 1278 | 1501 | 1601 | 1701 |
| Cd.32 Interrupt request during continuous operation | 1181 | 1231 | 1281 | 1520 | 1620 | 1720 |
| Cd.33 New acceleration time value | 1184<br>1185 | 1234<br>1235 | 1284<br>1285 | 1508<br>1509 | 1608<br>1609 | 1708<br>1709 |
| Cd.34 New deceleration time value | 1186<br>1187 | 1236<br>1237 | 1286<br>1287 | 1510<br>1511 | 1610<br>1611 | 1710<br>1711 |
| Cd.35 Acceleration/deceleration time change during speed change, enable /disable selection | 1188 | 1238 | 1288 | 1512 | 1612 | 1712 |

| Item of AD75P□-S3 | | | Buffer memory address | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | AD75P□-S3 | | | | | | QD75P□N/QD75D□N | | | | | |
| | | | Axis 1 | | Axis 2 | | Axis 3 | | Axis 1 | | Axis 2 | | Axis 3 | |
| Positioning data*1 | Da.1 Operation pattern<br>Da.2 Control system<br>Da.3 Acceleration time No.<br>Da.4 Deceleration time No. | No.1 | 1300 | | 2300 | | 3300 | | 2000 | | 8000 | | 14000 | |
| | Da.5 M code/condition data No. | | 1301 | | 2301 | | 3301 | | 2001 | | 8001 | | 14001 | |
| | Da.8 Dwell time/JUMP destination positioning data No. | | 1302 | | 2302 | | 3302 | | 2002 | | 8002 | | 14002 | |
| | Empty | | 1303 | | 2303 | | 3303 | | 2003 | | 8003 | | 14003 | |
| | Da.7 Command speed | | 1304<br>1305 | | 2304<br>2305 | | 3306<br>3307 | | 2004<br>2005 | | 8004<br>8005 | | 14004<br>14005 | |
| | Da.5 Positioning address/ movement amount | | 1306<br>1307 | | 2306<br>2307 | | 3306<br>3307 | | 2006<br>2007 | | 8006<br>8007 | | 14006<br>14007 | |
| | Da.6 Arc address | | 1308<br>1309 | | 2308<br>2309 | | 3308<br>3309 | | 2008<br>2009 | | 8008<br>8009 | | 14008<br>14009 | |
| | No.2 | | 1310 to 1319 | | 2310 to 2319 | | 3310 to 3319 | | 2010 to 2019 | | 8010 to 8019 | | 14010 to 14019 | |
| | No.3 | | 1320 to 1329 | | 2320 to 2329 | | 3320 to 3329 | | 2020 to 2029 | | 8020 to 8029 | | 14020 to 14029 | |
| | to | | to | | to | | to | | to | | to | | to | |
| | No.100 | | 2290 to 2299 | | 3290 to 3299 | | 4290 to 4299 | | 2990 to 2999 | | 8990 to 8999 | | 14990 to 14999 | |
| Positioning start information*3 | Start block data*2 Da.10 Shape<br>Da.11 Start data No.<br>Da.12 Special start instruction<br>Da.13 Parameter | 1st point | 4300 | 4350 | 4550 | 4600 | 4800 | 4850 | 26000 | 26050 | 27000 | 27050 | 28000 | 28050 |
| | | 2nd point | 4301 | 4351 | 4551 | 4601 | 4801 | 4851 | 26001 | 26051 | 27001 | 27051 | 28001 | 28051 |
| | | 3rd point | 4302 | 4352 | 4552 | 4602 | 4802 | 4852 | 26002 | 26052 | 27002 | 27052 | 28002 | 28052 |
| | | to | to | | to | | to | | to | | to | | to | |
| | | 50th point | 4349 | 4399 | 4599 | 4649 | 4849 | 4899 | 26049 | 26099 | 27049 | 27099 | 28049 | 28099 |
| | Condition data | Da.14 Condition target<br>Da.15 Condition operator | 4400 | | 4650 | | 4900 | | 26100 | | 27100 | | 28100 | |
| | | Da.16 Address | 4402<br>4403 | | 4652<br>4653 | | 4902<br>4903 | | 26102<br>26103 | | 27102<br>27103 | | 28102<br>28103 | |
| | | Da.17 Parameter 1 | 4404<br>4405 | | 4654<br>4655 | | 4904<br>4905 | | 26104<br>26105 | | 27104<br>27105 | | 28104<br>28105 | |
| | | Da.18 Parameter 2 | 4406<br>4407 | | 4656<br>4657 | | 4906<br>4907 | | 26106<br>26107 | | 27106<br>27107 | | 28106<br>28107 | |
| | | No.2 | 4410 to 4419 | | 4660 to 4669 | | 4910 to 4919 | | 26110 to 26119 | | 27110 to 27119 | | 28110 to 28119 | |
| | | No.3 | 4420 to 4429 | | 4670 to 4679 | | 4920 to 4929 | | 26120 to 26129 | | 27120 to 27129 | | 28120 to 28129 | |
| | | to | to | | to | | to | | to | | to | | to | |
| | | No.10 | 4490 to 4499 | | 4740 to 4749 | | 4990 to 4999 | | 26190 to 26199 | | 27190 to 27199 | | 28190 to 28199 | |

*1 With the QD75P□N/QD75D□N, the positioning data buffer memory addresses are Nos. 1 to 600.

*2 With the QD75P□N/QD75D□N, it is called [block start data].

*3 With the QD75P□N/QD75D□N, the [block start data] and [condition data] in the area are called [start block 0]. There are five start blocks: 0 to 4

| Item of AD75P□-S3 | | | Buffer memory address | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | AD75P□-S3 | | | QD75P□N/QD75D□N | | |
| | | | Axis 1 | Axis 2 | Axis 3 | Axis 1 | Axis 2 | Axis 3 |
| Positioning start information | Indirect designation | Start No.8001 | 4500 | 4750 | 5000 | - | - | - |
| | | Start No.8002 | 4501 | 4751 | 5001 | - | - | - |
| | | to | to | to | to | to | to | to |
| | | Start No.8050 | 4549 | 4799 | 5049 | - | - | - |
| Programmable controller CPU memory area | | Condition judgment target data of the condition data | 5050 | | | 30000 | | |
| | | | to | | | to | | |
| | | | 5099 | | | 30099 | | |
| Target axis | | | 5100 | | | - | | |
| Head positioning block No. | | | 5101 | | | - | | |
| No. of read/write data items | | | 5102 | | | - | | |
| Read/write request | | | 5103 | | | - | | |
| Read/write block | | | 5110 to 6109 | | | - | | |

### 7.4.5 Interface specifications comparison with external devices

For the external interface specifications, the following shows the differences between AD75P□-S3 and QD75P□N/QD75D□N.

○ : Compatible, △ : Partial change required

| Item[*1] | | Differences as Interface specifications[*2] | Compat-ibility | Precautions for replacement |
|---|---|---|---|---|
| Input | Drive unit READY | - | ○ | |
| | Upper/lower limit signal | - | ○ | |
| | Stop signal | - | ○ | |
| | Near-point dog signal | Input resistance: 4.7kΩ→4.3kΩ<br>Response time: 4ms → 1ms | △ | <When the machine OPR for the near-point watchdog signal method is used><br>The input response time for the QD75P□N/QD75D□N is shorter than the A1SD75P□-S3.<br>If a sensor, which the chattering time when the near-point watchdog signal is turned on is long, is used, an error may occurs due to the false detection of the ON/OFF status.[*4]<br>Check specifications for the sensor. |
| | Speed-position switching signal | Input resistance: 4.7kΩ→7.7kΩ<br>Response time: 4ms → 1ms | △ | |
| | Zero signal | Input resistance: 3.5kΩ→4.7kΩ (at input of 24V)<br>0.5kΩ→0.62kΩ (at input of 5V)<br>Response time: 0.8ms→1ms[*3]<br>ON voltage : 2.5V→2.0V (at input of 5V) | △ | Including the response time differences, reconfirming is required. |
| | Manual pulse generator | ON current: 3.5mA→2mA | ○ | |
| Output | Pulse | - | ○ | |
| | Deviation counter clear | - | ○ | |

*1 For the external start and in-position signal of which QD75P□N/QD75D□N does not have, they are not described.

*2 The column of interface specifications differences is described as the form, [Specifications of AD75P□-S3] → [Specifications of QD75P□N/QD75D□N].

*3 The response time difference (0.2 ms) of AD75P□-S3 and QD75P□N/QD75D□N is the time difference of 1pls part for creep speed of 5000pps.
When the accuracy is required, it is required for the creep speed to be low enough value.

*4 If the chattering time is long when the near-point watchdog signal is turned on, the OFF status may be detected shortly after the ON status of the signal is detected (under changing into the creep speed). In this case, the QD75P□N/QD75D□N outputs an error and stops the OPR control.

## 7.5 AD75M1/M2/M3

### 7.5.1 Performance comparison

○: Compatible, △: Partial change required, ×: Incompatible

| Item \ Model | | AD75M1 | AD75M2 | AD75M3 | QD75M1 | QD75M2 | QD75M4 | Compatibility | Precautions for replacement |
|---|---|---|---|---|---|---|---|---|---|
| No. of control axes | | 1 | 2 | 3 | 1 | 2 | 4 | ○ | |
| No. of positioning data items | | 600/axis[*1] | | | 600/axis | | | ○ | |
| Position control interpolation functions | 2-axis linear interpolation | × | ○ | ○ | × | ○ | ○ | ○ | |
| | 2-axis circular interpolation | × | ○ | ○ | × | ○ | ○ | | |
| Positioning system | Position control | ○ | | | ○ | | | ○ | |
| | Speed control | ○ | | | ○ | | | | |
| | Speed-position switching control | ○ | | | ○ | | | | |
| | Position-speed switching control | × | | | ○ | | | | |
| Positioning range | | <In Absolute system><br>-214748364.8 to 214748364.7 (μm)<br>-21474.83648 to 21474.83647 (inch)<br>0 to 359.99999 (degree)<br>-2147483648 to 2147483647 (PLS)<br><Incremental system><br>-214748364.8 to 214748364.7 (μm)<br>-21474.83648 to 21474.83647 (inch)<br>-21474.83648 to 21474.83647 (degree)<br>-2147483648 to 2147483647 (PLS)<br><In speed-position switching control><br>0 to 214748364.7 (μm)<br>0 to 21474.83647 (inch)<br>0 to 21474.83647 (degree)<br>0 to 2147483647 (PLS) | | | <In Absolute system><br>-214748364.8 to 214748364.7 (μm)<br>-21474.83648 to 21474.83647 (inch)<br>0 to 359.99999 (degree)<br>-2147483648 to 2147483647 (PLS)<br><Incremental system><br>-214748364.8 to 214748364.7 (μm)<br>-21474.83648 to 21474.83647 (inch)<br>-21474.83648 to 21474.83647 (degree)<br>-2147483648 to 2147483647 (PLS)<br><In speed-position switching control><br>0 to 214748364.7 (μm)<br>0 to 21474.83647 (inch)<br>0 to 21474.83647 (degree)<br>0 to 2147483647 (PLS) | | | ○ | |
| Speed command range | | 0.01 to 6000000.00 (mm/min)<br>0.001 to 600000.000 (inch/min)<br>0.001 to 600000.000 (degree/min)<br>1 to 1000000 (PLS/s) | | | 0.01 to 20000000.00 (mm/min)<br>0.001 to 2000000.000 (inch/min)<br>0.001 to 2000000.000 (degree/min)<br>1 to 10000000 (PLS/s) | | | ○ | |
| Machine OPR function (OPR method) | | ○(6 OPR methods) | | | ○(4 OPR methods) | | | △ | Corresponding to the OP unpassed error is required.<br>Return the motor more than one rotation once at the error and perform the OPR start again. |
| JOG operation | | ○ | | | ○ | | | ○ | |

○ : Compatible, △ : Partial change required, ×: Incompatible

| Item \ Model | AD75M1 | AD75M2 | AD75M3 | QD75M1 | QD75M2 | QD75M4 | Compati-bility | Precautions for replacement |
|---|---|---|---|---|---|---|---|---|
| Manual pulse generator function | 1 generator/axis | | | 1 generator/module | | | △ | • On QD75M□, the manual pulse generator cannot be used by each axis independent. When connecting the manual pulse generator for each axis is required, use one axis module.<br>• The manual pulse generator itself can use the same one.<br>• The operation for inputting one pulse differs. Set the parameter so that movement amount may be same. |
| Acceleration/ deceleration processing | Automatic trapezoidal acceleration/ deceleration | ○ | | ○ | | | ○ | |
| | S-pattern acceleration/ deceleration | ○ | | ○ | | | | |
| Acceleration/ deceleration action time | No. of patterns | Acceleration time and deceleration time can be set independently. (4 patterns each) | | Acceleration time and deceleration time can be set independently. (4 patterns each) | | | ○ | |
| | setting range | 1 to 65535ms/1 to 8388608ms switching is enabled | | 1 to 8388608ms | | | | |
| Compensation | Electronic gears, backlash compensation, near pass*2 | | | Electronic gears, backlash compensation, near pass*2 | | | △ | Refer to *2. |
| Error display | 17-segment LED | | | Error LED | | | × | For details of diagnostic, use GX Developer. |
| History data storage (Start, error, warning) | Provided (4 types, 16 items/module) | | | Provided (3 types, 16 items/module) | | | ○ | The start history during error is integrated into the start history. |
| Data storage destination | Flash ROM (battery-less backup) | | | Flash ROM (battery-less backup) | | | ○ | |
| Connection connector | 10136-3000VE (Soldering type, supplied) | | | A6CON1, A6CON4 (Soldering type, sold separately) | | | × | As the connectors differ, wiring change is required. The connectors of QD75M□ is sold separately. |
| | 10136-6000EL (Crimping type, sold separately) | | | A6CON2 (Crimping type, sold separately) | | | | |
| | - | | | A6CON3 (IDC type, sold separately) | | | | |
| Applicable wire size | 10136-3000VE: 24 to 30 AWG (approx. 0.05 to 0.2mm$^2$) | | | A6CON1, A6CON4: 0.3mm$^2$ | | | ○ | |
| | 10136-6000EL: 28 AWG (approx. 0.08mm$^2$) | | | A6CON2: 24 to 28 AWG | | | | |
| | - | | | A6CON3: 28 AWG (twisted wire), 30 AWG (single wire) | | | | |
| SSCNET connection type | Refer to Section 7.5.5 (3). | | | | | | △ | The connector configuration of bass differs. |
| Maximum extension distance of SSCNET | 30m | | | | | | | |
| Internal current consumption(A) (5VDC) | 0.7A or less | | | QD75M1 : 0.40A | QD75M2 : 0.40A | QD75M4 : 0.40A | ○ | |
| Flash ROM write count | Max. 100,000 times | | | Max. 100,000 times | | | ○ | When QD75M□ carries out the flash write 26 times from the sequence program, an error occurs. The error reset enables to perform the flash write. |

○: Compatible, △: Partial change required, ×: Incompatible

| Item \ Model | | AD75M1 | AD75M2 | AD75M3 | QD75M1 | QD75M2 | QD75M4 | Compatibility | Precautions for replacement |
|---|---|---|---|---|---|---|---|---|---|
| I/O points | | 32 points (I/O assignment: special 32 points) | | | 32 points (I/O assignment: intelligent 32 points) | | | ○ | |
| No. of module occupied slots | | 1 | | | 1 | | | ○ | |
| Weight | | 0.35kg | | | 0.15kg | 0.15kg | 0.16kg | ○ | |
| I/O signal for external devices | START signal | ○ | | | × (integrated into CHG) | | | △ | When using both the speed-position switching control and the external start, input the external start signal to the interrupt module and start using the direct output. |
| | CHG signal | Speed-position switching signal | | | External command signal (External start or speed-position switching selectable with parameters) | | | ○ | |
| peripheral devices (data setting, etc.) | Connection with peripheral devices | Direct connection | | | Connection via programmable controller CPU, Q corresponding serial communication module, Q corresponding MELSECNET/H remote I/O module | | | ○ | The connecting shape differs. |
| | AD75TU | Available | | | Unavailable | | | × | AD75TU cannot be used. Use GX Configurator-QP. |
| | GX Configurator | GX Configurator-AP | | | GX Configurator-QP*3 | | | ○ | Available GX Configurator differs. |

*1 Nos.1 to 100 data items/axis of positioning data can be set using the buffer memory and Nos.1 to 600 data/axis can be set with QD75M□.
The positioning data in the buffer memory is not backed up.

*2 The near pass function is valid only during the continuous path control. (AD75M□: Selected with parameters, QD75M□: Standard function)
QD75M□ does not have address pass mode. If passing the positioning address, continue with continuous operation. (However, it will stop once.)

*3 GX Configurator-QP is available with SW2D5C-QD75P or later version.

### 7.5.2 Function comparison

#### (1) Deleted function from AD75M1/AD75M2/AD75M3

When using the following function on AD75M□ -S3, change the program.

| Deleted functions | Precautions for replacement |
|---|---|
| Creep speed out of range error (error code: 208) | With QD75M□, there is no the error code of the left column. |
| Fast machine OPR | With the Q75M□, there is no possible function for replacement. |
| Special start (stop) | Execute it separately for the start two times. |
| Indirect designation | In the QD75M□, the start block area on the buffer memory is expanded to five blocks (0 to 4). Each start block can be directly designated with positioning start No. (7000 to 7004). |
| Block transfer | With the AD75M□, this interface is used to set positioning data Nos. 101 to 600 that do not exist on the buffer memory. Since all positioning data can be set in the buffer memory with the QD75M□, this function is deleted. |
| Positioning data I/F | |
| Start history during errors | The contents are the same as the start history.<br>Therefore, the QD75M□ stores only the start history. |
| System monitor data (Module name, OS type, OS version) | These data were deleted because they can be displayed in system monitor "Module's detailed information" of GX Developer.<br>(Refer to GX Developer Operating Manual.) |

### (2) Changed function from AD75M1/AD75M2/AD75M3

In case of using the following functions with AD75M□, make sure that there is no operation problems when converted to QD75M□.

<table>
<tr><th>Changed functions</th><th>Change description</th></tr>
<tr><td>Software stroke limit function</td><td>1. The software stroke limit check of arc address is carried out only when a sub point is designated. It is not carried out when a center point is designated.<br>2. The software stroke limit check during speed control is carried out in the following cases:<br>• When the software stroke limit is applied to the current feed value with Pr.14 and the current feed value is updated with Pr.21<br>• When the software stroke limit is applied to the machine feed value<br>3. If an attempt is made to change the current value but the designated address is out of the software stroke limit range, the attempt is considered as an error and the current value is not changed.<br>4. Error code change<br>AD75M□:<br>There are 3 types of errors for each upper and lower stroke limit. (error code 509 to 512)<br>QD75M□:<br>Errors for the software stroke upper limit are integrated in to error code 507.<br>Errors for the lower limit are integrated in to error code 508.<br>Error codes 509 to 512 are deleted.</td></tr>
<tr><td>Current value changing M code function</td><td>1. An error occurs when the designated new current value is out of the software stroke limit range.<br>2. The M code setting value is valid during the positioning data current value changing instruction.</td></tr>
<tr><td>Acceleration/deceleration speed control</td><td>Only two-word type (1 to 8388608ms) can be used as the setting value for the acceleration/deceleration time.</td></tr>
<tr><td>Stop process and restart after stop positioning operation stop</td><td>1. "Peripheral side (emergency) stop" is deleted from the stop causes of Stop group 2 "sudden stop selection".<br>"Test mode fault" in the stop causes of Stop group 3 "sudden stop selection" is changed to be in the stop causes of Stop group 2 "sudden stop selection".<br>2. "Stop (QD75 peripheral)" is added to the stop causes of Stop group 3 "sudden stop selection".<br>3. Error code 100 (Peripheral device stop during operation) is deleted.<br>4. "Programmable controller CPU error occurrence" is added to the stop causes of Stop group 2 "Sudden stop selection".</td></tr>
<tr><td>READY signal (X0)</td><td><table><tr><td></td><td>AD75M□</td><td>QD75M□</td></tr><tr><td>OFF</td><td>Normal (READY)</td><td>Not READY/WDT error</td></tr><tr><td>ON</td><td>Not READY/WDT error</td><td>Normal (READY)</td></tr></table></td></tr>
<tr><td>Manual pulse generator operation</td><td>The No. of connectable manual pulse generator is changed from 1generator/1axis to 1generator/1 module.</td></tr>
<tr><td>Axis operation status</td><td>"Step stopped" is changed to "Stopped" and "Step error occurring" is changed to "Error occurring".</td></tr>
<tr><td>Continuous path control</td><td>• AD75M□:<br>If the reference axis operates in reverse direction, the control is internally changed into the continuous positioning control. (restart after deceleration stop)<br>• QD75M□:<br>Even if the reference axis operates in reverse direction with interpolation, the control remains as the continuous path control.<br>(In single-axis operation, the operation is the same as that of the AD75M□.)</td></tr>
<tr><td>Near pass</td><td>For the continuous path control, only the near pass function is available.<br>Positioning address pass is not conducted.</td></tr>
<tr><td>2-axis interpolation<br>• 2-axis linear interpolation<br>• 2-axis fixed-feed<br>• Circular interpolation</td><td>The interpolation target axis can be randomly set with a positioning identifier.</td></tr>
<tr><td>Step function</td><td>1. "Step stopped" is changed to "Stopped" and "Step error occurring" is changed to "Error occurring" in the axis operations status parameters.<br>2. The restart command for step start information (02H) is deleted.<br>3. The step operation is restarted with the restart command.</td></tr>
</table>

<table>
<tr><th>Changed functions</th><th colspan="3">Change description</th></tr>
<tr><td>Command in-position function</td><td colspan="3">The command in-position width is expanded.<br>• AD75M□: 1 to 32767000<br>• QD75M□: 1 to 2147483647</td></tr>
<tr><td>Positioning start No.</td><td colspan="3">7004 to 7010 (block start designation) and 8000 to 8049 (indirect designation) are deleted.</td></tr>
<tr><td>Block start data</td><td colspan="3">With QD75M□, number of blocks has been change to 5 (7000 to 7004).<br>(With the AD75M□, this data is called "Positioning start information".)</td></tr>
<tr><td>Start history</td><td colspan="3">The configuration of start information and start No. is changed so that the start No. can be directly checked.</td></tr>
<tr><td rowspan="3">Detailed parameters<br>“Pr.15 Software stroke limit valid/ invalid setting”</td><td></td><td>AD75M□</td><td>QD75M□</td></tr>
<tr><td>0<br>(Factory setting)</td><td>Software stroke limits invalid for manual operation</td><td>Software stroke limits valid for manual operation</td></tr>
<tr><td>1</td><td>Software stroke limits valid for manual operation</td><td>Software stroke limits invalid for manual operation</td></tr>
</table>

### 7.5.3 I/O signal comparison to programmable controller CPU

Sequence program change is required as the I/O signals differ.
For details of the I/O signals or sequence program, refer to the Type QD75M Positioning Module User's Manual.

| Input (X) | | | Output (Y) | | |
|---|---|---|---|---|---|
| Signal name | AD75M□ | QD75M□ | Signal name | AD75M□ | QD75M□ |
| (QD75/AD75) READY | X00* | X00* | Axis 1 Positioning start | Y10 | Y10 |
| Axis 1 Start complete | X01 | X10 | Axis 2 Positioning start | Y11 | Y11 |
| Axis 2 Start complete | X02 | X11 | Axis 3 Positioning start | Y12 | Y12 |
| Axis 3 Start complete | X03 | X12 | Axis 4 Positioning start | - | Y13 |
| Axis 4 Start complete | - | X13 | Axis 1 Stop | Y13 | Y04 |
| Axis 1 BUSY | X04 | X0C | Axis 2 Stop | Y14 | Y05 |
| Axis 2 BUSY | X05 | X0D | Axis 3 Stop | Y1C | Y06 |
| Axis 3 BUSY | X06 | X0E | Axis 4 Stop | - | Y07 |
| Axis 4 BUSY | - | X0F | All axes servo ON | Y15 | Y01 |
| Axis 1 Positioning complete | X07 | X14 | Axis 1 Forward run JOG start | Y16 | Y08 |
| Axis 2 Positioning complete | X08 | X15 | Axis 1 Reverse run JOG start | Y17 | Y09 |
| Axis 3 Positioning complete | X09 | X16 | Axis 2 Forward run JOG start | Y18 | Y0A |
| Axis 4 Positioning complete | - | X17 | Axis 2 Reverse run JOG start | Y19 | Y0B |
| Axis 1 Error detection | X0A | X08 | Axis 3 Forward run JOG start | Y1A | Y0C |
| Axis 2 Error detection | X0B | X09 | Axis 3 Reverse run JOG start | Y1B | Y0D |
| Axis 3 Error detection | X0C | X0A | Axis 4 Forward run JOG start | - | Y0E |
| Axis 4 Error detection | - | X0B | Axis 4 Reverse run JOG start | - | Y0F |
| Axis 1 M code ON | X0D | X04 | Programmable controller READY | Y1D | Y00 |
| Axis 2 M code ON | X0E | X05 | Axis 1 Execution prohibition flag | - | Y14 |
| Axis 3 M code ON | X0F | X06 | Axis 2 Execution prohibition flag | - | Y15 |
| Axis 4 M code ON | - | X07 | Axis 3 Execution prohibition flag | - | Y16 |
| Synchronization flag | - | X01 | Axis 4 Execution prohibition flag | - | Y17 |
| Not used | X10 to X1F | X02, X03<br>X18 to X1F | Not used | Y00 to Y0F<br>Y1E to Y1F | Y02, Y03<br>Y18 to Y1F |

* The ON/OFF statuses for READY are different between the QD75M□/ and AD75M□.

| | Not READY/WDT error | READY |
|---|---|---|
| QD75M□ | OFF | ON |
| AD75M□ | ON | OFF |

### 7.5.4 Buffer memory address comparison

Sequence program change is required as the assignment of buffer memory differs.
For details of the buffer memory or sequence program, refer to the Type QD75M Positioning Module User's Manual.
area shows the differences between AD75M□ and QD75M□.

| Item of AD75M□ | Buffer memory address | | | | | |
|---|---|---|---|---|---|---|
| | AD75M□ | | | QD75M□ | | |
| | Axis 1 | Axis 2 | Axis 3 | Axis 1 | Axis 2 | Axis 3 |
| Pr.1 Unit setting | 0 | 150 | 300 | 0 | 150 | 300 |
| Pr.2 No. of pulses per rotation (AP) | 1 | 151 | 301 | 2<br>3 | 152<br>153 | 302<br>303 |
| Pr.3 Movement amount per rotation (AL) | 2 | 152 | 302 | 4<br>5 | 154<br>155 | 304<br>305 |
| Pr.4 Unit magnification (AM) | 3 | 153 | 303 | 1 | 151 | 301 |
| Pr.7 Speed limit value | 6<br>7 | 156<br>157 | 306<br>307 | 10<br>11 | 160<br>161 | 310<br>311 |
| Pr.8 Acceleration time 0 | 8<br>9 | 158<br>159 | 308<br>309 | 12<br>13 | 162<br>163 | 312<br>311 |
| Pr.9 Deceleration time 0 | 10<br>11 | 160<br>161 | 310<br>311 | 14<br>15 | 164<br>165 | 314<br>315 |
| Pr.10 Bias speed at start | 12<br>13 | 162<br>163 | 312<br>313 | 6<br>7 | 156<br>157 | 306<br>307 |
| Pr.12 Backlash compensation amount | 15 | 165 | 315 | 17 | 167 | 317 |
| Pr.13 Software stroke limit upper limit value | 16<br>17 | 166<br>167 | 316<br>317 | 18<br>19 | 168<br>169 | 318<br>319 |
| Pr.14 Software stroke limit lower limit value | 18<br>19 | 168<br>169 | 318<br>319 | 20<br>21 | 170<br>171 | 320<br>321 |
| Pr.15 Software stroke limit selection | 20 | 170 | 320 | 22 | 172 | 322 |
| Pr.16 Software stroke limit valid/invalid setting | 21 | 171 | 321 | 23 | 173 | 323 |
| Pr.17 Command in-position width | 22<br>23 | 172<br>173 | 322<br>323 | 24<br>25 | 174<br>175 | 324<br>325 |
| Pr.18 Torque limit setting value | 24 | 174 | 324 | 26 | 176 | 326 |
| Pr.19 M code ON signal output timing | 25 | 175 | 325 | 27 | 177 | 327 |
| Pr.20 Speed switching mode | 26 | 176 | 326 | 28 | 178 | 328 |
| Pr.21 Interpolation speed designation method | 27 | 177 | 327 | 29 | 179 | 329 |
| Pr.22 Current feed value during speed control | 28 | 178 | 328 | 30 | 180 | 330 |
| Pr.23 Manual pulse generator selection | 29 | 179 | 329 | 33 | - | - |
| Pr.25 Size selection for acceleration/ deceleration time | 31 | 181 | 331 | - | - | - |
| Function selection for speed-positioning | - | - | - | 34 | 184 | 334 |
| Pr.26 Acceleration time 1 | 36<br>37 | 186<br>187 | 336<br>337 | 36<br>37 | 186<br>187 | 336<br>337 |
| Pr.27 Acceleration time 2 | 38<br>39 | 188<br>189 | 338<br>339 | 38<br>39 | 188<br>189 | 338<br>339 |
| Pr.28 Acceleration time 3 | 40<br>41 | 190<br>191 | 340<br>341 | 40<br>41 | 190<br>191 | 340<br>341 |

| Item of AD75M□ | Buffer memory address | | | | | |
|---|---|---|---|---|---|---|
| | AD75M□ | | | QD75M□ | | |
| | Axis 1 | Axis 2 | Axis 3 | Axis 1 | Axis 2 | Axis 3 |
| Pr.29 Deceleration time 1 | 42<br>43 | 192<br>193 | 342<br>343 | 42<br>43 | 192<br>193 | 342<br>343 |
| Pr.30 Deceleration time 2 | 44<br>45 | 194<br>195 | 344<br>345 | 44<br>45 | 194<br>195 | 344<br>345 |
| Pr.31 Deceleration time 3 | 46<br>47 | 196<br>197 | 346<br>347 | 46<br>47 | 196<br>197 | 346<br>347 |
| Pr.32 JOG Speed limit value | 48<br>49 | 198<br>199 | 348<br>349 | 48<br>49 | 198<br>199 | 348<br>349 |
| Pr.33 JOG operation acceleration time selection | 50 | 200 | 350 | 50 | 200 | 350 |
| Pr.34 JOG operation deceleration time selection | 51 | 201 | 351 | 51 | 201 | 351 |
| Pr.35 Acceleration/deceleration process selection | 52 | 202 | 352 | 52 | 202 | 352 |
| Pr.36 S-pattern proportion | 53 | 203 | 353 | 53 | 203 | 353 |
| Pr.37 Sudden stop deceleration time | 54<br>55 | 204<br>205 | 354<br>355 | 54<br>55 | 204<br>205 | 354<br>355 |
| Pr.38 Stop group 1 sudden stop selection | 56 | 206 | 356 | 56 | 206 | 356 |
| Pr.39 Stop group 2 sudden stop selection | 57 | 207 | 357 | 57 | 207 | 357 |
| Pr.40 Stop group 3 sudden stop selection | 58 | 208 | 358 | 58 | 208 | 358 |
| Pr.41 Positioning complete signal output time | 59 | 209 | 359 | 59 | 209 | 359 |
| Pr.42 Allowable circular interpolation error width | 60<br>61 | 210<br>211 | 360<br>361 | 60<br>61 | 210<br>211 | 360<br>361 |
| Pr.43 External start function selection (QD75M□: Pr.42 External command function selection) | 62 | 212 | 362 | 62 | 212 | 362 |
| Pr.150 Restart allowable range when servo OFF to ON | 64<br>65 | 214<br>215 | 364<br>365 | 64<br>65 | 214<br>215 | 364<br>365 |
| Pr.44 Near pass mode selection for path control | 66 | 216 | 366 | - | - | - |
| Pr.45 OPR method | 70 | 220 | 370 | 70 | 220 | 370 |
| Pr.46 OPR direction | 71 | 221 | 371 | 71 | 221 | 371 |
| Pr.47 OP address | 72<br>73 | 222<br>223 | 372<br>373 | 72<br>73 | 222<br>223 | 372<br>373 |
| Pr.48 OPR speed | 74<br>75 | 224<br>225 | 374<br>375 | 74<br>75 | 224<br>225 | 374<br>375 |
| Pr.49 Creep speed | 76<br>77 | 226<br>227 | 376<br>377 | 76<br>77 | 226<br>227 | 376<br>377 |
| Pr.50 OPR retry | 78 | 228 | 378 | 78 | 228 | 378 |
| OPR dwell time | - | - | - | 79 | 229 | 379 |
| Pr.52 Setting for the movement amount after near-point dog ON | 80<br>81 | 230<br>231 | 380<br>381 | 80<br>81 | 230<br>231 | 380<br>381 |
| Pr.53 OPR acceleration time selection | 82 | 232 | 382 | 82 | 232 | 382 |
| Pr.54 OPR deceleration time selection | 83 | 233 | 383 | 83 | 233 | 383 |
| Pr.55 OP shift amount | 84<br>85 | 234<br>235 | 384<br>385 | 84<br>85 | 234<br>235 | 384<br>385 |
| Pr.56 OPR torque limit value | 86 | 236 | 386 | 86 | 236 | 386 |

| Item of AD75M□ | Buffer memory address | | | | | |
|---|---|---|---|---|---|---|
| | AD75M□ | | | QD75M□ | | |
| | Axis 1 | Axis 2 | Axis 3 | Axis 1 | Axis 2 | Axis 3 |
| Pr.57 Speed designation during OP shift | 88 | 238 | 388 | 88 | 238 | 388 |
| Pr.58 Dwell time during OPR retry | 89 | 239 | 389 | 89 | 239 | 389 |
| Pr.59 Absolute position restoration selection | 91 | 241 | 391 | - | - | - |
| Pr.100 Servo series | 100 | 250 | 400 | 30100 | 30200 | 30300 |
| Pr.101 Amplifier setting | 101 | 251 | 401 | 30101 | 30201 | 30301 |
| Pr.102 Regenerative brake resistor | 102 | 252 | 402 | 30102 | 30202 | 30302 |
| Pr.103 Motor type | 103 | 253 | 403 | 30103 | 30203 | 30303 |
| Pr.104 Motor capacity | 104 | 254 | 404 | 30104 | 30204 | 30304 |
| Pr.105 Servo motor speed | 105 | 255 | 405 | 30105 | 30205 | 30305 |
| Pr.106 Feed back pulse | 106 | 256 | 406 | 30106 | 30206 | 30306 |
| Pr.107 Rotation direction selection | 107 | 257 | 407 | 30107 | 30207 | 30307 |
| Pr.108 Auto tuning | 108 | 258 | 408 | 30108 | 30208 | 30308 |
| Pr.109 Servo response | 109 | 259 | 409 | 30109 | 30209 | 30309 |
| Maker setting | - | - | - | 30110 | 30210 | 30310 |
| Maker setting | - | - | - | 30111 | 30211 | 30311 |
| Pr.112 Load inertia ratio | 112 | 262 | 412 | 30112 | 30212 | 30312 |
| Pr.113 Position loop gain 1 | 113 | 263 | 413 | 30113 | 30213 | 30313 |
| Pr.114 Speed loop gain 1 | 114 | 264 | 414 | 30114 | 30214 | 30314 |
| Pr.115 Position loop gain 2 | 115 | 265 | 415 | 30115 | 30215 | 30315 |
| Pr.116 Speed loop gain 2 | 116 | 266 | 416 | 30116 | 30216 | 30316 |
| Pr.117 Speed integral compensation | 117 | 267 | 417 | 30117 | 30217 | 30317 |
| Pr.118 Notch filter selection | 118 | 268 | 418 | 30118 | 30218 | 30318 |
| Pr.119 Feed forward gain | 119 | 269 | 419 | 30119 | 30219 | 30319 |
| Pr.120 In-position range | 120 | 270 | 420 | 30120 | 30220 | 30320 |
| Pr.121 Electromagnetic brake sequence output | 121 | 271 | 421 | 30121 | 30221 | 30321 |
| Pr.122 Analog monitor output | 122 | 272 | 422 | 30122 | 30222 | 30322 |
| Pr.123 Optional function 1 | 123 | 273 | 423 | 30123 | 30223 | 30323 |
| Pr.124 Optional function 2 | 124 | 274 | 424 | 30124 | 30224 | 30324 |
| Pr.125 Adaptive vibration suppression control/ low pass filter | 125 | 275 | 425 | 30125 | 30225 | 30325 |
| Pr.126 Maker setting | - | - | - | 30126 | 30226 | 30326 |
| Pr.127 Monitor output 1 offset | 127 | 277 | 427 | 30127 | 30227 | 30327 |
| Pr.128 Monitor output 2 offset | 128 | 278 | 428 | 30128 | 30228 | 30328 |
| Pr.129 Pre-alarm data selection | 129 | 279 | 429 | 30129 | 30229 | 30329 |
| Pr.130 Zero speed | 130 | 280 | 430 | 30130 | 30230 | 30330 |
| Pr.131 Error excessive alarm level | 131 | 281 | 431 | 30131 | 30231 | 30331 |
| Pr.132 Optional function 5 | 132 | 282 | 432 | 30132 | 30232 | 30332 |
| Pr.133 Optional function 6 | 133 | 283 | 433 | 30133 | 30233 | 30333 |
| Pr.134 PI-PID control switch-over position droop | 134 | 284 | 434 | 30134 | 30234 | 30334 |

| Item of AD75M□ | Buffer memory address | | | | | |
|---|---|---|---|---|---|---|
| | AD75M□ | | | QD75M□ | | |
| | Axis 1 | Axis 2 | Axis 3 | Axis 1 | Axis 2 | Axis 3 |
| Maker setting | - | - | - | 30135 | 30235 | 30335 |
| Pr.136 Speed differential compensation | 136 | 286 | 436 | 30136 | 30236 | 30336 |
| Pr.137 Maker setting | - | - | - | 30137 | 30237 | 30337 |
| Pr.138 Encoder output pulses | 138 | 288 | 438 | 30138 | 30238 | 30338 |
| Pr.149 Servo parameter transmission setting | 149 | 299 | 449 | - | - | - |
| Maker setting | - | - | - | 30139 | 30239 | 30339 |
| Maker setting | - | - | - | 30140 | 30240 | 30340 |
| Maker setting | - | - | - | 30141 | 30241 | 30341 |
| Slight vibration suppression control selection 1 | - | - | - | 30143 | 30243 | 30343 |
| Slight vibration suppression control selection 2 | - | - | - | 30144 | 30244 | 30344 |
| Induction voltage compensation | - | - | - | 30145 | 30245 | 30345 |
| Maker setting | - | - | - | 30146 | 30246 | 30346 |
| Maker setting | - | - | - | 30147 | 30247 | 30347 |
| Maker setting | - | - | - | 30148 | 30248 | 30348 |
| Gain changing selection | - | - | - | 30149 | 30249 | 30349 |
| Gain changing condition | - | - | - | 30150 | 30250 | 30350 |
| Gain changing time constant | - | - | - | 30151 | 30251 | 30351 |
| Ratio of load inertia moment to servomotor inertia moment 2 | - | - | - | 30152 | 30252 | 30352 |
| Position loop gain 2 changing ratio | - | - | - | 30153 | 30253 | 30353 |
| Speed loop gain 2 changing ratio | - | - | - | 30154 | 30254 | 30354 |
| Speed integral compensation changing ratio | - | - | - | 30155 | 30255 | 30355 |
| Maker setting | - | - | - | 30156 | 30256 | 30356 |
| Maker setting | - | - | - | 30157 | 30257 | 30357 |
| Maker setting | - | - | - | 30158 | 30258 | 30358 |
| Maker setting | - | - | - | 30159 | 30259 | 30359 |
| Optional function C | - | - | - | 30160 | 30260 | 30360 |
| Machine resonance suppression filter | - | - | - | 30161 | 30261 | 30361 |
| Maker setting | - | - | - | 30162 | 30262 | 30362 |
| Maker setting | - | - | - | 30163 | 30263 | 30363 |
| Maker setting | - | - | - | 30164 | 30264 | 30364 |
| Maker setting | - | - | - | 30165 | 30265 | 30365 |
| Maker setting | - | - | - | 30166 | 30266 | 30366 |

| Item of AD75M□ | | Buffer memory address | |
|---|---|---|---|
| | | AD75M□ | QD75M□ |
| | | Common for axis 1,2,3 | Common for axis 1,2,3,4 |
| Md.1 In test mode flag | | 450 | 1200 |
| Md.2 Module name | | 451 | - |
| Md.3 OS type | | 452 453<br>454 455 | - |
| Md.4 OS version | | 456<br>457 | - |
| Md.5 Clock data (hour: minute) | | 460 | - |
| Md.6 Clock data (second: 100 ms) | | 461 | - |
| (Pointer number) | Start history | (0) to (15) | |
| Md.7 Start axis<br>(QD75M□: Md.3 Start information) | Start history | 462 to 537 | 1212 to 1287 |
| Md.8 Operation type<br>(QD75M□: Md.4 Start No.) | Start history | 463 to 538 | 1213 to 1288 |
| Md.9 Start Hour: minute<br>(QD75M□: Md.5 Start Hour) | Start history | 464 to 539 | 1214 to 1289 |
| Md.10 Start Second: 100 ms<br>(QD75M□: Md.6 Start Minute: second) | Start history | 465 to 540 | 1215 to 1290 |
| Md.11 Error judgment | Start history | 466 to 541 | 1216 to 1291 |
| Md.12 Start history pointer | Start history | 542 | 1292 |
| (Pointer number) | Start history during errors | (0) to (15) | - |
| Md.13 Start axis | Start history during errors | 543 to 618 | - |
| Md.14 Operation type | Start history during errors | 544 to 619 | - |
| Md.15 Start Hour: minute | Start history during errors | 545 to 620 | - |
| Md.16 Start Second: 100 ms | Start history during errors | 546 to 621 | - |
| Md.17 Error judgment | Start history during errors | 547 to 622 | - |
| Md.18 Start history pointer at error | Start history during errors | 623 | - |
| (Pointer number) | Error history | (0) to (15) | |
| Md.19 Axis in which the error occurred | Error history | 624 to 684 | 1293 to 1353 |
| Md.20 Axis error No. | Error history | 625 to 685 | 1294 to 1354 |
| Md.21 Axis error occurrence Hour: minute<br>(QD75M□: Md.11 Axis error occurrence (Hour)) | Error history | 626 to 686 | 1295 to 1355 |
| Md.22 Axis error occurrence Second: 100 ms<br>(QD75M□: Md.12 Axis error occurrence (Minutes: second)) | Error history | 627 to 687 | 1296 to 1356 |
| Md.23 Error history pointer | Error history | 688 | 1357 |

| Item of AD75M□ | | Buffer memory address | |
|---|---|---|---|
| | | AD75M□ | QD75M□ |
| | | Common for axis 1,2,3 | Common for axis 1,2,3,4 |
| (Pointer number) | Warning history | (0) to (15) | |
| Md.24 Axis in which the warning occurred | | 689 to 749 | 1358 to 1418 |
| Md.25 Axis warning No. | | 690 to 750 | 1359 to 1419 |
| Md.26 Axis warning occurrence Hour: minutes<br>(QD75□: Md.16 Axis warning occurrence (Hour)) | | 691 to 751 | 1360 to 1420 |
| Md.27 Axis warning occurrence Second: 100 ms<br>(QD75M□: Md.17 Axis warning occurrence (Minutes: second)) | | 692 to 752 | 1361 to 1421 |
| Md.28 Warning history pointer | | 753 | 1422 |

| Item of AD75M□ | Buffer memory address | | | | | |
|---|---|---|---|---|---|---|
| | AD75M□ | | | QD75M□ | | |
| | Axis 1 | Axis 2 | Axis 3 | Axis 1 | Axis 2 | Axis 3 |
| Md.29 Current feed value | 800<br>801 | 900<br>901 | 1000<br>1001 | 800<br>801 | 900<br>901 | 1000<br>1001 |
| Md.30 Machine feed value | 802<br>803 | 902<br>903 | 1002<br>1003 | 802<br>803 | 902<br>903 | 1002<br>1003 |
| Pr.31 Feedrate | 804<br>805 | 904<br>905 | 1004<br>1005 | 804<br>805 | 904<br>905 | 1004<br>1005 |
| Md.32 Valid M code | 806 | 906 | 1006 | 808 | 908 | 1008 |
| Md.33 Axis error No. | 807 | 907 | 1007 | 806 | 906 | 1006 |
| Md.34 Axis warning No. | 808 | 908 | 1008 | 807 | 907 | 1007 |
| Md.35 Axis operation status | 809 | 909 | 1009 | 809 | 909 | 1009 |
| Md.36 Current speed | 810 | 910 | 1010 | 810<br>811 | 910<br>911 | 1010<br>1011 |
| Md.37 Axis feedrate | 812<br>813 | 912<br>913 | 1012<br>1013 | 812<br>813 | 912<br>913 | 1012<br>1013 |
| Md.38 Speed-position switching control positioning amount | 814<br>815 | 914<br>915 | 1014<br>1015 | 814<br>815 | 914<br>915 | 1014<br>1015 |
| Md.39 External input/output signal | 816 | 916 | 1016 | 816 | 916 | 1016 |
| Md.40 Status | 817 | 917 | 1017 | 817 | 917 | 1017 |
| Md.41 Target value | 818<br>819 | 918<br>919 | 1018<br>1019 | 818<br>819 | 918<br>919 | 1018<br>1019 |
| Md.42 Target speed | 820<br>821 | 920<br>921 | 1020<br>1021 | 820<br>821 | 920<br>921 | 1020<br>1021 |
| Md.43 OP absolute position | 822<br>823 | 922<br>923 | 1022<br>1023 | - | - | - |
| Md.44 Movement amount after near-point dog ON | 824<br>825 | 924<br>925 | 1024<br>1025 | 824<br>825 | 924<br>925 | 1024<br>1025 |
| Md.45 Torque limit stored value | 826 | 926 | 1026 | 826 | 926 | 1026 |
| Md.46 Special start data instruction code setting value | 827 | 927 | 1027 | 827 | 927 | 1027 |
| Md.47 Special start data instruction parameter setting value | 828 | 928 | 1028 | 828 | 928 | 1028 |
| Md.48 Start positioning data No. setting value | 829 | 929 | 1029 | 829 | 929 | 1029 |
| Md.49 In speed control flag | 830 | 930 | 1030 | 830 | 930 | 1030 |
| Md.50 In speed change processing flag | 831 | 931 | 1031 | 831 | 931 | 1031 |
| Md.51 Start data pointer being executed | 832 | 932 | 1032 | 834 | 934 | 1034 |
| Md.52 Last executed positioning data No. | 833 | 933 | 1033 | 837 | 937 | 1037 |
| Md.53 Repetition counter<br>(QD75M□: Md.41 Special start repetition counter) | 834 | 934 | 1034 | 832 | 932 | 1032 |
| Md.54 Positioning data No. being executed | 835 | 935 | 1035 | 835 | 935 | 1035 |
| Md.55 Block No. being executed | 836 | 936 | 1036 | 836 | 936 | 1036 |
| Md.56 Positioning data being executed | 838 to 847 | 938 to 947 | 1038 to 1047 | 838 to 847 | 938 to 947 | 1038 to 1047 |
| Md.100 OPR re-travel value | 848<br>849 | 948<br>949 | 1048<br>1049 | 848<br>849 | 948<br>949 | 1048<br>1049 |
| Md.101 Real current value | 850<br>851 | 950<br>951 | 1050<br>1051 | 850<br>851 | 950<br>951 | 1050<br>1051 |

| Item of AD75M□ | Buffer memory address | | | | | |
|---|---|---|---|---|---|---|
| | AD75M□ | | | QD75M□ | | |
| | Axis 1 | Axis 2 | Axis 3 | Axis 1 | Axis 2 | Axis 3 |
| Md.102 Deviation counter value | 852<br>853 | 952<br>953 | 1052<br>1053 | 852<br>853 | 952<br>953 | 1052<br>1053 |
| Md.103 Motor rotation | 854<br>855 | 954<br>955 | 1054<br>1055 | 854<br>855 | 954<br>955 | 1054<br>1055 |
| Md.104 Motor current value | 856 | 956 | 1056 | 856 | 956 | 1056 |
| Md.105 Auto tuning | 857 | 957 | 1057 | 857 | 957 | 1057 |
| Md.106 Load inertia ratio | 858 | 958 | 1058 | 858 | 958 | 1058 |
| Md.107 Position loop gain 1 | 859 | 959 | 1059 | 859 | 959 | 1059 |
| Md.108 Speed loop gain 1 | 860 | 960 | 1060 | 860 | 960 | 1060 |
| Md.109 Position loop gain 2 | 861 | 961 | 1061 | 861 | 961 | 1061 |
| Md.110 Speed loop gain 2 | 862 | 962 | 1062 | 862 | 962 | 1062 |
| Pr.111 Speed integral compensation | 863 | 963 | 1063 | 863 | 963 | 1063 |
| Md.112 Servo amplifier software No. | 864 - 869 | 964 - 969 | 1064 - 1069 | 864 - 869 | 964 - 969 | 1064 - 1069 |
| Md.113 Parameter error (No.0 to 15) | 870 | 970 | 1070 | 870 | 970 | 1070 |
| Md.114 Parameter error (No.16 to 31) | 871 | 971 | 1071 | 871 | 971 | 1071 |
| Md.115 Parameter error (No.32 to 47) | 872 | 972 | 1072 | 872 | 972 | 1072 |
| Parameter error (No.48 to 63) | - | | | 873 | 973 | 1073 |
| Parameter error (No.64 to 75) | - | | | 874 | 974 | 1074 |
| Maker setting | - | | | 875<br>876 | 975<br>976 | 1075<br>1076 |
| Md.116 Servo status | 873 | 973 | 1077 | 877 | 977 | 1077 |
| Md.117 Regenerative load ratio | 876 | 976 | 1078 | 878 | 978 | 1078 |
| Md.118 Effective load torque | 877 | 977 | 1079 | 879 | 979 | 1079 |
| Md.119 Peak torque ratio | 878 | 978 | 1080 | 880 | 980 | 1080 |
| Md.121 Absolute position restoration mode | 879 | 979 | 1079 | | | |
| Md.120 FeRAM access count | 880 - 883 | 980 - 983 | 1080 - 1083 | | | |
| Deceleration start flag | - | | | 899 | 999 | 1099 |

| Item of AD75M□ | Buffer memory address | | | | | |
|---|---|---|---|---|---|---|
| | AD75M□ | | | QD75M□ | | |
| | Axis 1 | Axis 2 | Axis 3 | Axis 1 | Axis 2 | Axis 3 |
| Cd.1 Clock data setting (hour) | 1100 | | | - | | |
| Cd.2 Clock data setting (minute, second) | 1101 | | | - | | |
| Cd.3 Clock data writing | 1102 | | | - | | |
| Cd.4 Target axis | 1103 | | | - | | |
| Cd.5 Positioning data No. | 1104 | | | - | | |
| Cd.6 Write pattern | 1105 | | | - | | |
| Cd.7 Read/write request | 1106 | | | - | | |
| Cd.8 Read/write positioning data I/F | 1108 to 1137 | | | - | | |
| Cd.9 Flash ROM write request | 1138 | | | 1900 | | |
| Cd.10 Parameter initialization request | 1139 | | | 1901 | | |
| Cd.11 Positioning start No. | 1150 | 1200 | 1250 | 1500 | 1600 | 1700 |
| Cd.12 Axis error reset | 1151 | 1201 | 1251 | 1502 | 1602 | 1702 |
| Cd.13 Restart command | 1152 | 1202 | 1252 | 1503 | 1603 | 1703 |
| Cd.14 M code OFF request | 1153 | 1203 | 1253 | 1504 | 1604 | 1704 |
| Cd.15 New current value | 1154<br>1155 | 1204<br>1205 | 1254<br>1255 | 1506<br>1507 | 1606<br>1607 | 1706<br>1707 |
| Cd.16 New speed value | 1156<br>1157 | 1206<br>1207 | 1256<br>1257 | 1514<br>1515 | 1614<br>1615 | 1714<br>1715 |
| Cd.17 Speed change request | 1158 | 1208 | 1258 | 1516 | 1616 | 1716 |
| Cd.18 Positioning operation speed override | 1159 | 1209 | 1259 | 1513 | 1613 | 1713 |
| Cd.19 JOG speed | 1160<br>1161 | 1210<br>1211 | 1260<br>1261 | 1518<br>1519 | 1618<br>1619 | 1718<br>1719 |
| Cd.20 Speed-position switching enable flag | 1163 | 1213 | 1263 | 1528 | 1628 | 1728 |
| Cd.21 Speed-position switching control movement amount change register | 1164<br>1165 | 1214<br>1215 | 1264<br>1265 | 1526<br>1527 | 1626<br>1627 | 1726<br>1727 |
| Cd.22 Manual pulse generator enable flag | 1167 | 1217 | 1267 | 1524 | 1624 | 1724 |
| Cd.23 Manual pulse generator 1 pulse input magnification | 1168<br>1169 | 1218<br>1219 | 1268<br>1269 | 1522<br>1523 | 1622<br>1623 | 1722<br>1723 |
| Cd.24 OPR return request flag OFF request | 1170 | 1220 | 1270 | 1521 | 1621 | 1721 |
| Cd.25 External start valid<br>(QD75M□: Cd.8 External command valid) | 1171 | 1221 | 1271 | 1505 | 1605 | 1705 |
| Cd.26 Step valid flag | 1172 | 1222 | 1272 | 1545 | 1645 | 1745 |
| Cd.27 Step mode | 1173 | 1223 | 1273 | 1544 | 1644 | 1744 |
| Cd.28 Step start information | 1174 | 1224 | 1274 | 1546 | 1646 | 1746 |
| Cd.29 Skip command | 1175 | 1225 | 1275 | 1547 | 1647 | 1747 |
| Cd.30 New torque value | 1176 | 1226 | 1276 | 1525 | 1625 | 1725 |
| Cd.31 Positioning starting point No. | 1178 | 1228 | 1278 | 1501 | 1601 | 1701 |
| Cd.100 Servo OFF command | 1179 | 1229 | 1279 | 1551 | 1651 | 1751 |
| Cd.101 Torque output setting value | 1180 | 1230 | 1280 | 1552 | 1652 | 1752 |

| Item of AD75M□ | Buffer memory address | | | | | |
|---|---|---|---|---|---|---|
| | AD75M□ | | | QD75M□ | | |
| | Axis 1 | Axis 2 | Axis 3 | Axis 1 | Axis 2 | Axis 3 |
| Cd.32 Interrupt request during continuous operation | 1181 | 1231 | 1281 | 1520 | 1620 | 1720 |
| Cd.33 New acceleration time value | 1184<br>1185 | 1234<br>1235 | 1284<br>1285 | 1508<br>1509 | 1608<br>1609 | 1708<br>1709 |
| Cd.34 New deceleration time value | 1186<br>1187 | 1236<br>1237 | 1286<br>1287 | 1510<br>1511 | 1610<br>1611 | 1710<br>1711 |
| Cd.35 Acceleration/deceleration time change during speed change, enable/ disable selection | 1188 | 1238 | 1288 | 1512 | 1612 | 1712 |
| Deceleration start flag valid | - | | | 1905 | | |
| Stop command processing for deceleration stop selection | - | | | 1907 | | |
| Servo amplifier data read | - | | | 1553 | 1653 | 1753 |

| Item of AD75M□ | | | | Buffer memory address | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | AD75M□ | | | QD75M□ | | |
| | | | | Axis 1 | Axis 2 | Axis 3 | Axis 1 | Axis 2 | Axis 3 |
| Positioning data*1 | Da.1 Operation pattern<br>Da.2 Control system<br>Da.3 Acceleration time No.<br>Da.4 Deceleration time No. | | No.1 | 1300 | 2300 | 3300 | 2000 | 8000 | 14000 |
| | Da.9 M code/condition data | | | 1301 | 2301 | 3301 | 2001 | 8001 | 14001 |
| | Da.8 Dwell time/JUMP destination positioning data No. | | | 1302 | 2302 | 3302 | 2002 | 8002 | 14002 |
| | Empty | | | 1303 | 2303 | 3303 | 2003 | 8003 | 14003 |
| | Da.7 Command speed | | | 1304<br>1305 | 2304<br>2305 | 3304<br>3305 | 2004<br>2005 | 8004<br>8005 | 14004<br>14005 |
| | Da.5 Positioning address/ movement amount | | | 1306<br>1307 | 2306<br>2307 | 3306<br>3307 | 2006<br>2007 | 8006<br>8007 | 14006<br>14007 |
| | Da.6 Arc address | | | 1308<br>1309 | 2308<br>2309 | 3308<br>3309 | 2008<br>2009 | 8008<br>8009 | 14008<br>14009 |
| | No.2 | | | 1310 to 1319 | 2310 to 2319 | 3310 to 3319 | 2010 to 2019 | 8010 to 8019 | 14010 to 14019 |
| | No.3 | | | 1320 to 1329 | 2320 to 2329 | 3320 to 3329 | 2020 to 2029 | 8020 to 8029 | 14020 to 14029 |
| | to | | | to | to | to | to | to | to |
| | No.100 | | | 2290 to 2299 | 3290 to 3299 | 4290 to 4299 | 2990 to 2999 | 8990 to 8999 | 14990 to 14999 |
| Positioning start information*3 | Start block data*2 | Da.10 Shape<br>Da.11 Start data No.<br>Da.12 Special start instruction<br>Da.13 Parameter | 1st point | 4300 4350 | 4550 4600 | 4800 4850 | 26000 26050 | 27000 27050 | 28000 28050 |
| | | 2nd point | | 4301 4351 | 4551 4601 | 4801 4851 | 26001 26051 | 27001 27051 | 28001 28051 |
| | | 3rd point | | 4302 4352 | 4552 4602 | 4802 4852 | 26002 26052 | 27002 27052 | 28002 28052 |
| | | to | | to | to | to | to | to | to |
| | | 50th point | | 4349 4399 | 4599 4649 | 4849 4899 | 26049 26099 | 27049 27099 | 28049 28099 |
| | Condition data | Da.14 Condition target<br>Da.15 Condition operator | No.1 | 4400 | 4650 | 4900 | 26100 | 27100 | 28100 |
| | | Da.16 Address | | 4402<br>4403 | 4652<br>4653 | 4902<br>4903 | 26102<br>26103 | 27102<br>27103 | 28102<br>28103 |
| | | Da.17 Parameter 1 | | 4404<br>4405 | 4654<br>4655 | 4904<br>4905 | 26104<br>26105 | 27106<br>27107 | 28106<br>28107 |
| | | Da.18 Parameter 2 | | 4406<br>4407 | 4656<br>4657 | 4906<br>4907 | 26106<br>26107 | 27106<br>27107 | 28106<br>28107 |
| | | No.2 | | 4410 to 4419 | 4660 to 4669 | 4910 to 4919 | 26110 to 26119 | 27110 to 27119 | 28110 to 28119 |
| | | No.3 | | 4420 to 4429 | 4670 to 4679 | 4920 to 4929 | 26120 to 26129 | 27120 to 27129 | 28120 to 28129 |
| | | to | | to | to | to | to | to | to |
| | | No.10 | | 4490 to 4499 | 4740 to 4749 | 4990 to 4999 | 26190 to 26199 | 27190 to 27199 | 28190 to 28199 |

*1 With the QD75M□, the positioning data buffer memory addresses are Nos. 1 to 600.

*2 With the QD75M□, it is called "block start data".

*3 With the QD75M□, the [block start data] and [condition data] in the area are called [start block 0]. There are five start blocks: 0 to 4

| Item of AD75M□ | | | Buffer memory address | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | AD75M□ | | | QD75M□ | | |
| | | | Axis 1 | Axis 2 | Axis 3 | Axis 1 | Axis 2 | Axis 3 |
| Positioning start information | Indirect designation | Start No.8001 | 4500 | 4750 | 5000 | - | - | - |
| | | Start No.8002 | 4501 | 4751 | 5001 | - | - | - |
| | | to | to | to | to | to | to | to |
| | | Start No.8050 | 4549 | 4799 | 5049 | - | - | - |
| Programmable controller CPU memory area | | Condition judgment target data of the condition data | 5050 | | | 30000 | | |
| | | | to | | | to | | |
| | | | 5099 | | | 30099 | | |
| Target axis | | | 5100 | | | - | | |
| Head positioning block No. | | | 5101 | | | - | | |
| No. of read/write data items | | | 5102 | | | - | | |
| Read/write request | | | 5103 | | | - | | |
| Read/write block | | | 5110 to 6109 | | | - | | |

### 7.5.5 Interface specifications comparison with external devices

For the external interface specifications, the following shows the differences between AD75M□ and QD75M□.

#### (1) Comparison of electrical specifications

○ : Compatible, △ : Partial change required

| Item | | Differences as Interface specifications* | compati-bility | Precautions for replacement |
|---|---|---|---|---|
| Input | Upper/lower limit signal | OFF current: 1.5mA→1.0mA<br>Input resistance: 4.7kΩ→6.8kΩ | △ | Check whether the OFF current value met satisfied values |
| | Stop signal | OFF current: 1.5mA→1.0mA<br>Input resistance: 4.7kΩ→6.8kΩ | △ | Check whether the OFF current value met satisfied values |
| | Near-point dog signal | OFF current: 1.5mA→1.0mA<br>Input resistance: 4.7kΩ→6.8kΩ<br>Response time: 4ms→1ms | △ | Check whether the OFF current value met satisfied values |
| | Speed-position switching signal | OFF current: 1.5mA→1.0mA<br>Input resistance: 4.7kΩ→6.8kΩ<br>Response time: 4ms→1ms | △ | Check whether the OFF current value met satisfied values |
| | Manual pulse generator | ON current: 3.5mA→1.0mA<br>Input resistance: 1.5k→1.2kΩ | ○ | |

* The column of interface specifications differences is described as the form, [Specifications of AD75M□] → [Specifications of QD75M□].

#### (2) Comparison of connector signal sequence

When using with QD75M□, change the connector and wiring.

| Name | AD75M□ | | QD75M□ | |
|---|---|---|---|---|
| | Logic (Initial setting) | Logic switching by parameter | Logic (Initial setting) | Logic switching by parameter |
| Manual pulse generator A phase<br>Manual pulse generator B phase*1 | Negative logic (multiple of 4) | Not allowed | Negative logic (multiple of 4) | Allowed |
| Near-Point signal | Negative logic | Not allowed | Negative logic | Allowed |
| Stop signal | Negative logic | Not allowed | Negative logic | Allowed |
| Upper limit | Negative logic | Not allowed | Negative logic | Allowed |
| Lower limit | Negative logic | Not allowed | Negative logic | Allowed |
| External start*2 | Negative logic | Not allowed | Negative logic | Allowed |
| Speed-position switching signal*2 | Negative logic | Not allowed | | |

*1 The following shows comparisons about manual pulse generator A phase/B phase.

| | AD75M□ | QD75M□ |
|---|---|---|
| No. of connection | 1 generator/axis | 1 generator/module |
| Mode change (Parameter) | Not allowed | Allowed<br>1 x mode, 2 x mode,<br>4 x mode, PLS/SIGN mode |

*2 With the QD75M□, the "external start signal" and "speed-position switching signal" are combined into the "external command signal/switching signal".

### (3) For corresponding servo amplifier

The following shows corresponding condition to the servo amplifier of QD75M□.

○ : Applicable △ : However, the cable change is required even applicable. × : Not applicable

| Amplifier model name | AD75M□ | QD75M□ | Combination example of the positioning modules and servo amplifiers being replaced (However, the cable change is required even applicable.) |
|---|---|---|---|
| MR-J□-B | ○ | × | (1) QD75M□ + MR-J2S□-B<br>(2) QD75MH□ + MR-J3□-B |
| MR-H□-B | ○ | △ | (1) QD75M□ + MR-J2S□-B<br>(2) QD75MH□ + MR-J3□-B |
| MR-J2□-B | ○ | △ | (1) QD75M□ + MR-J2S□-B<br>(2) QD75MH□ + MR-J3□-B |
| MR-J2S□-B | ○ | ○ | |

## 7.6 AD70

### 7.6.1 Performance specifications comparison

○: Compatible, △: Partial change required, ×: Incompatible

| Item \ Model | | AD70 | QD73A1 | Compat-ibility | Precautions for replacement |
|---|---|---|---|---|---|
| Number of control axes | | 1 axis | 1 axis | ○ | |
| Positioning data | Capacity | 1 data | 1 data | ○ | |
| | Setting method | Sequence program | Sequence program | ○ | |
| Positioning | Mode | Position control mode<br>(Positioning, two-phase trapezoidal positioning)<br>Speed-position control switch mode | Position control mode<br>(Positioning, two-phase trapezoidal positioning)<br>Speed-position control switch mode | ○ | |
| | System | Position control mode:<br>Absolute system/incremental system<br>Speed-position control switch mode:<br>Incremental system | Position control mode:<br>Absolute system/incremental system<br>Speed-position control switch mode:<br>Incremental system | ○ | |
| | Position command | -2147483648 to 2147483647 (pulse)<br>(32-bit signed binary) | -2147483648 to 2147483647 (pulse)<br>(32-bit signed binary) | ○ | |
| | Speed command | 1 to 400,000 (pulse/s) | 1 to 4,000,000 (pulse/s) | ○ | The specification has improved.<br>(Upward-compatibility) |
| | Acceleration/ deceleration | Automatic trapezoidal acceleration/ deceleration | Automatic trapezoidal acceleration/ deceleration | ○ | |
| | Automatic acceleration/ deceleration | Acceleration time: 2 to 9999 (ms)<br>Deceleration time: 2 to 9999 (ms) | Acceleration time: 2 to 9999 (ms)<br>Deceleration time: 2 to 9999 (ms) | ○ | |
| | In-position range | 1 to 2047 pulse | 1 to 20479 pulse | ○ | The specification has improved.<br>(Upward-compatibility) |
| | Backlash compensation | × | × | ○ | |
| | Error correction function | × | × | ○ | |
| Speed command output | | 0 to ±10VDC<br>(Adjustable to set in the range of ±5 to ±10VDC) | 0 to ±10VDC<br>(Adjustable to set in the range of ±5 to ±10VDC) | ○ | |
| Positioning feedback pulse input | Pulse frequency | Open collector : 100kpulse/s<br>TTL: 100kpulse/s<br>Differential output: 100kpulse/s | Open collector: 200kpulse/s<br>TTL: 200kpulse/s<br>Differential output: 1Mpulse/s | ○ | The specification has improved.<br>(Upward-compatibility) |
| | Connectable encoder type | Open collector, TTL, or differential output | Open collector, TTL, or differential output | ○ | |
| | Multiplica-tion setting | The number of input feedback pulses can be multiplied by 4, 2, 1, or 1/2. | The number of input feedback pulses can be multiplied by 4, 2, 1, or 1/2. | ○ | |
| OPR control | | Available (2 method) | Available (2 method) | ○ | The setting method is changed from a hardware switch to PLC parameter of a CPU module. The function is the same though the setting method is changed. |
| JOG operation | | ○ | ○ | ○ | |
| Starting time | | Absolute system: 4.4ms[*1]<br>Incremental system: 4.5ms[*1]<br>JOG operation: 4.3ms<br>OPR (near-point dog method): 4.4ms<br>OPR (count method): 5.1ms | Absolute system: 1.2ms[*1]<br>Incremental system: 1.2ms[*1]<br>JOG operation: 1.2ms<br>OPR (near-point dog method): 1.2ms<br>OPR (count method): 1.2ms | ○ | The specification has improved.<br>(Upward-compatibility) |
| M function | | × | × | ○ | |

○: Compatible, △: Partial change required, ×: Incompatible

| Item \ Model | AD70 | QD73A1 | Compat-ibility | Precautions for replacement |
|---|---|---|---|---|
| Internal current consumption (5VDC) | 5VDC 0.3A | 5VDC 0.52A | △ | The recalculation of internal current consumption (5VDC) is required. |
| External supply voltage/ current terminal block | +15VDC, 0.2A -15VDC, 0.02A | -- | ○ | An external power supply is not required. |
| Number of occupied I/O points | 32 points (Number of I/O slots: 1 slot occupied) (I/O assignment: 32 points, special function module) | 48 points (Number of I/O slots: 2 slots occupied) (I/O assignment: First half 16 points, empty slot, Second half 32 points, intelligent function module) | △ | The number of occupied slots and I/O points are changed.*2 |
| Weight | 0.4kg | 0.2kg | ○ | |

*1 For the AD70, 0.2ms is added to the starting time in two-phase trapezoidal positioning mode. For the QD73A1, an extra time is not added even in two-phase trapezoidal positioning mode.

*2 For the QD73A1, the number of occupied slots is 2 and the number of occupied I/O points is 48.
The program can be utilized easily by setting Empty 0 point to the first half slot of the QD73A1, or by setting the XY address of the AD70 to the second half slot of the QD73A1 at Start XY in I/O assignment of PLC parameter.

## 7.6.2 Function comparison

### (1) Function comparison between the AD70 and the QD73A1

○: Compatible, --: Not available

| Function | | | Description | AD70 | QD73A1 | Precautions for replacement |
|---|---|---|---|---|---|---|
| Major positioning control | Position control mode | Positioning control | Positioning is executed from the current position to a specified position at a specified speed. | ○ | ○ | Refer to Section 7.6.6. |
| | | Two-phase trapezoidal positioning control | Positioning is executed to the address specified in "Da.2 Positioning address P1" at "Da.3 Positioning speed V1", then to the address specified in "Da.4 Positioning address P2" at "Da.5 Positioning speed V2" by one positioning start signal. | ○ | ○ | |
| | Speed-position control switch mode | | Operation starts according to the positioning speed set beforehand by one start signal, then the operation switches to position control by Speed-position switching command signal. If the operation stopped by Stop signal after the input of Speed-position switching command signal, the positioning can be continued by Speed-position mode restart signal. In addition, the positioning address (movement amount) can be changed if it is before the input of Speed-position switching command signal. | ○ | ○ | Refer to Section 7.6.6. |
| JOG operation | | | Positioning is executed in the specified direction at specified speed while a JOG operation command is on. Turning on the signal starts operation at a specified speed and speed control operation is continued until Stop signal is input. | ○ | ○ | |
| OPR control | | | A workpiece is returned to an original point following an OPR start command from a CPU module, and the current value is corrected to an OP address after the completion of OPR. | ○ | ○ | |
| Multiplication setting | | | This function multiplies the feedback pulse frequency from the pulse generator by 4, 2, 1, or 1/2. | ○ | ○ | |
| Electronic gear function | | | This function controls moving distance and speed by multiplying command pulse output. | ○ | ○ | |
| Deviation counter clear function | | | This function clears the accumulated pulses in the deviation counter. When the servomotor power is turned off due to an emergency stop during positioning, clearing the accumulated pulses in the deviation counter prevents servomotor rotation at power recovery. | ○ | ○ | |
| Speed change function | | | This function forces to change speed from a program during positioning control or JOG operation. | ○ | ○ | Refer to Section 7.6.6. |
| Current value change function | | | This function changes the current feed value to a specified value from a sequence program on the condition other than while BUSY. | ○ | ○ | Refer to Section 7.6.6. |
| In-position function | | | This function turns on In-position signal while the accumulated pulse amount in the deviation counter is within the specified in-position range. In-position signal can be used as the signal right before positioning completion. | ○ | ○ | |
| Zero/gain adjustment | | | This function adjusts analog voltage contained in accumulated pulses. | ○ | ○ | Refer to Section 7.6.6. |

Remarks

Positioning execution time (BUSY signal (X14) ON to Positioning complete signal (X15) ON) of the QD73A1 and AD70 may differ because their internal processing methods are different. As a result, the timing when In-position signal (X16) turns on may also vary.
Adjust positioning execution time using the following methods if the difference of the positioning execution time (or the timing when In-position signal (X16) turns on) affects the system.

- Adjusting the QD73A1's positioning parameter, "Pr.6 Acceleration time" or "Pr.7 Deceleration time".
- Increasing gain by changing the accumulated pulse amount setting through the QD73A1's zero/gain adjustment

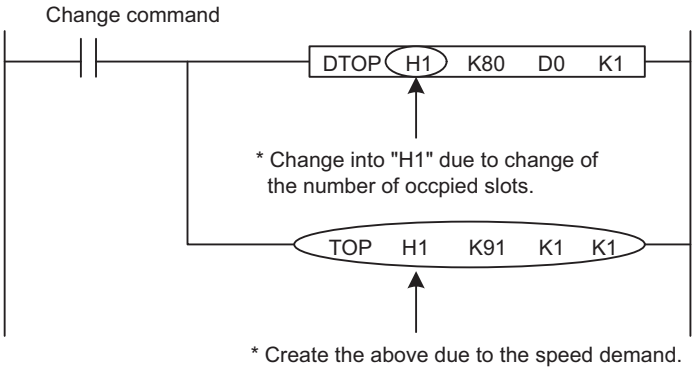
### (2) Changed function from the AD70

Though the functions of the AD70 and the QD73A1 are same, the setting methods and buffer memory addresses for the functions are partly changed.
To use following functions, changes or corrections of the programs or setting methods are required.
For details, refer to the user's manual for the QD73A1.

| Changed function | Change description |
|---|---|
| Major positioning control | Program corrections of the QD73A1 are required because buffer memory addresses for the positioning address, positioning speed, and positioning pattern differ from those of the AD70. |
| Speed-position control switch mode (speed control operation) | • AD70<br>For Velocity/position axis travel distance change area, the value is reflected during speed control.<br>Setting value: 0 to 2147483647 (valid within the stroke range)<br>• QD73A1<br>For New speed-position movement amount, the value is cleared to 0 when the next operation starts and reflected when Speed-position switching command signal is turned on.<br>Setting value: 1 to 2147483647 (valid within the stroke range) |
| Speed change function | • AD70<br>The speed change is requested by writing a new speed value in Velocity change area of the buffer memory.<br>• QD73A1<br>The speed change is requested by writing a new speed value in the buffer memory and writing "1" to Speed change request (buffer memory address: 91).<br>* To use the speed change function, an additional program is required.*1 |
| Current value change function | • AD70<br>The current value is changed by writing a new address in Present value change area of the buffer memory.<br>• QD73A1<br>The current value is changed by writing a new address in New current value of the buffer memory and writing "1" to Current value change request (buffer memory address: 90). |
| Zero/gain adjustment | • AD70<br>The adjustment is performed using the volumes for zero/gain adjustment.<br>• QD73A1<br>The adjustment is performed by either of following methods.<br>1) Using the UP/DOWN switch for zero/gain adjustment<br>The function is the same as the AD70 though the QD73A1 uses the UP/DOWN switch instead of the volumes.<br>2) Using the buffer memory<br>To use the buffer memory for the adjustment, create a program. |

| Changed function | Change description |
|---|---|
| Mode switch | • AD70<br>The setting is configured with slide switches or encoder interface setting pin (hardware setting)<br>1) Slide switches<br>Rotation direction, accumulated pulse, multiplication setting, zero-return direction, zero-return mode, and zero/gain adjustment mode setting/clear<br>2) Encoder interface setting pin<br>Encoder output types<br>• QD73A1<br>The setting is configured with Switch setting in I/O assignment of PLC parameter (GX Developer).<br>When using GX Works2, set it with the intelligent function module switch setting.)<br>* Though the setting method is changed from a hardware switch to parameters of software, the same level of settings are available because the function is upward compatible. |
| LED | Refer to *2. |

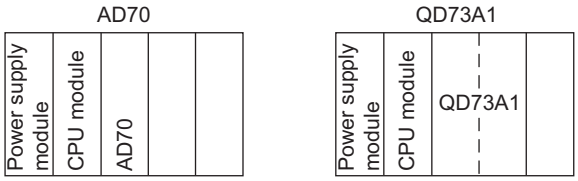
*1 Example of an additional program (using a buffer memory address for the speed change function)




*2 Details of LEDs are shown in the table below.

| LED name | AD70 | QD73A1 | Remarks*3 |
|---|---|---|---|
| RUN | -- | RUN | |
| Minor error | ERR.1 | ERR. | Used for both minor errors and major errors. |
| Major error | ERR.2 | | |
| Encoder phase A | ϕA | ϕA | |
| Encoder phase B | ϕB | ϕB | |
| Encoder phase Z | ϕZ | ϕZ | |
| BUSY | BUSY | BUSY | |
| Zero adjustment status | -- | ZERO | The contents indicated with "ZERO" of the QD73A1 differ from the ones indicated with "ZERO" of the AD70. |
| Gain adjustment status | -- | GAIN | |
| Servo READY | SV RDY | -- | Can be checked with an input signal "X1B". |
| Near-zero point dog | DOG | -- | Can be checked with an input signal "X1C". |
| Stop | STOP | -- | Can be checked with an input signal "X1D". |
| Upper limit LS | FLS | -- | Can be checked with an input signal "X1E". |
| Lower limit LS | RLS | -- | Can be checked with an input signal "X1F". |
| In-Position | IN-POS | -- | Can be checked with an input signal "X16". |
| Error counter polarity | POLE | -- | Can be checked with buffer memory addresses "106, 107". |
| Error counter value | $2^n$ | -- | The LED "POLE" of the AD70 indicates ON when the deviation counter value is "-", and indicates OFF when the deviation counter value is "+". |
| PC READY | PC RDY | -- | Check the on/off status of an output signal "Y2D" with a device monitor. |
| Zero-return request | ZERO | -- | Can be checked with an input signal "X12".<br>The contents indicated with "ZERO" of the AD70 differ from the ones indicated with "ZERO" of the QD73A1. |
| Excessive error | EEX | -- | Can be checked with an input signal "X17". |
| WDT error | WDT ERR | -- | Can be checked with an input signal "X10". |
| During velocity operation | V-MODE | -- | Can be checked with an input signal "X2D". |

*3 The I/O signals shown in the table are the ones when the QD73A1 is mounted on the slots "0, 1" of a main base unit. Note that XY addresses of the QD73A1 are different from the ones of the AD70 because the number of occupied slots differs between the modules as shown below.



### 7.6.3 I/O signals comparison to CPU module

An addition or change of a sequence program is required because the I/O signals partly differ between the modules.
For details of the I/O signals or sequence program, refer to the MELSEC-Q QD73A1 Positioning Module User's Manual.

| Input (X) | | | Output (Y) | | |
|---|---|---|---|---|---|
| Signal name | AD70 | QD73A1 | Signal name | AD70 | QD73A1 |
| Unused (The first half slot is Empty 16 points.)*1 | -- | X00 to X0F | Unused (The first half slot is Empty 16 points.)*1 | -- | Y00 to Y0F |
| WDT error, H/W error | X00 | X10 | Zero/gain adjustment data writing request | -- | Y1A |
| Module READY | X01 | X11 | Zero/gain adjustment change request | -- | Y1B |
| OPR request | X02 | X12 | Set value change request | -- | Y1C |
| OPR complete | X03 | X13 | OPR start | Y10 | Y20 |
| BUSY | X04 | X14 | Absolute positioning start | Y11 | Y21 |
| Positioning complete | X05 | X15 | Forward start | Y12 | Y22 |
| In-position | X06 | X16 | Reverse start | Y13 | Y23 |
| Excessive error | X07 | X17 | Forward JOG start | Y14 | Y24 |
| Error detection | X08 | X18 | Reverse JOG start | Y15 | Y25 |
| Overflow | X09 | X19 | Speed-position mode restart | Y16 | Y26 |
| Underflow | X0A | X1A | Stop | Y17 | Y27 |
| Servo READY | X0B | X1B | Error reset | Y18 | Y28 |
| Near-point dog | X0C | X1C | Overflow reset | Y19 | Y29 |
| External stop | X0D | X1D | Underflow reset | Y1A | Y2A |
| Upper limit signal | X0E | X1E | Speed-position switching enable | Y1C | Y2C |
| Lower limit signal | X0F | X1F | PLC READY | Y1D | Y2D |
| OPR start complete | -- | X20 | Use prohibited*2 | Y00 to Y0F | Y10 to Y19 |
| Absolute positioning start complete | -- | X21 | | | |
| Forward start complete (for the incremental positioning and the speed-position control switching) | -- | X22 | | Y1B | Y1D to Y1F |
| | | | | Y1E, Y1F | |
| Reverse start complete (for the incremental positioning and the speed-position control switching) | -- | X23 | | -- | Y2E, Y2F |
| Synchronization flag | -- | X24 | | | |
| Zero/gain adjustment data writing complete flag | -- | X2A | | | |
| Zero/gain adjustment change complete flag | -- | X2B | | | |
| Set value change complete flag | -- | X2C | | | |
| Operating status of the speed-position control switch mode | -- | X2D | | | |
| Use prohibited*2 | X10 to X1F | X25 to X29 | | | |
| | | X2E, X2F | | | |

*1 The XY number same as the AD70 can be used for the QD73A1 by setting "Empty 0 point" to the "Unused" area of the QD73A1 (first half slot: Empty 16 points) in I/O assignment of PLC parameter.

*2 A "Use prohibited" area is reserved for the system use and cannot be used by a user.
If it is turned on/off through a sequence program, the normal operation of the module cannot be guaranteed.

### 7.6.4 Buffer memory address comparison

Sequence program change is required because the assignment of buffer memory differs between the modules.
For details of the buffer memory or sequence program, refer to the MELSEC-Q QD73A1 Positioning Module User's Manual.
☐ area shows the differences between the AD70 and the QD73A1.

| Item | | | Buffer memory address | |
|---|---|---|---|---|
| | | | AD70 | QD73A1 |
| Fixed parameter | Stroke limit upper limit | | 0<br>1 | 0<br>1 |
| | Stroke limit lower limit | | 2<br>3 | 2<br>3 |
| | Electronic gear | Numerator of command pulse multiplication | 4 | 4 |
| | | Denominator of command pulse multiplication | 5 | 5 |
| Variable parameter | Speed limit value | | 20<br>21 | 20<br>21 |
| | Acceleration time | | 22 | 22 |
| | Deceleration time | | 23 | 23 |
| | In-position range | | 24 | 24 |
| | Positioning mode | | 25 | 25 |
| OPR data | OP address | | 40<br>41 | 40<br>41 |
| | OPR speed | | 42<br>43 | 42<br>43 |
| | Creep speed | | 44<br>45 | 44<br>45 |
| | Setting for the movement amount after near-point dog ON | | 46<br>47 | 46<br>47 |
| Positioning data | Positioning pattern | | 60 | 301 |
| | Positioning address $P_1$ | | 61<br>62 | 302<br>303 |
| | Positioning speed $V_1$ | | 63<br>64 | 304<br>305 |
| | Positioning address $P_2$ | | 65<br>66 | 306<br>307 |
| | Positioning speed $V_2$ | | 67<br>68 | 308<br>309 |
| Control change area | New current value | | 80<br>81 | 80<br>81 |
| | New speed value | | 82<br>83 | 82<br>83 |
| | JOG speed (area) | | 84<br>85 | 84<br>85 |
| | Deviation counter clear command | | 86 | 86 |
| | Analog output adjustment area 1 | | 87 | 87 |
| | New speed-position movement amount | | 88<br>89 | 88<br>89 |
| | Current value change request | | -- | 90 |
| | Speed change request | | -- | 91 |
| | Analog output adjustment area 2 | | -- | 92<br>93 |

| Item | | Buffer memory address | |
|---|---|---|---|
| | | AD70 | QD73A1 |
| Zero/gain adjustment area | Zero/gain adjustment specification | -- | 94 |
| | Zero/gain adjustment value specification | -- | 95 |
| | Factory default zero/gain adjustment value restoration request | -- | 96 |
| Monitor area | Current feed value | 100<br>101 | 100<br>101 |
| | Actual current value | 102<br>103 | 102<br>103 |
| | Error code (ERR.1) | 104 | 104 |
| | Error code (ERR.2) | 105 | 105 |
| | Deviation counter value | 106<br>107 | 116*1<br>117*1 |
| | Deviation counter value (address) | -- | 106*2<br>107*2 |
| | Movement amount after near-point dog ON | 108<br>109 | 108<br>109 |
| | Speed-position switching command | 110 | 110 |
| | Control mode | 111 | 111 |
| | Zero/gain execution status | -- | 112 |
| | Zero/gain adjustment status | -- | 113 |
| | Feedrate | -- | 114<br>115 |
| Error history | (Record 0) Error code | -- | 120 |
| | (Record 0) Error occurrence (Year : Month) | -- | 121 |
| | (Record 0) Error occurrence (Day : Hour) | -- | 122 |
| | (Record 0) Error occurrence (Minute : Second) | -- | 123 |
| | (Record 1 to 15) | -- | 124 to 183 |
| | Error history pointer | -- | 184 |

*1 A value of the same specification as AD70 is stored. The buffer memory address name of the QD73A1 changes Deviation counter value (pulse). Deviation counter value (pulse) supports the QD73A1 whose serial number (first five digits) is "15042" or later.

*2 When electronic gear setting is 1/1, the value will be the same as Deviation counter value (pulse).

### 7.6.5 Interface specifications comparison with external devices

For the external interface specifications, the following shows the differences between the AD70 and the QD73A1.

○: Compatible, △: Partial change required

| Item | | AD70 | QD73A1 | Compati-bility | Precautions for replacement |
|---|---|---|---|---|---|
| External power supply | | +15VDC, 0.2A<br>-15VDC, 0.02A | -- | ○ | An external power supply terminal block is not available because an external power supply is not required. |
| External input signal | Servo READY | ○ | ○ | ○ | |
| | Stop signal | ○ | ○ | ○ | |
| | Near-point dog signal | ○ | ○ | ○ | |
| | Upper limit signal | ○ | ○ | ○ | |
| | Lower limit signal | ○ | ○ | ○ | |
| | Speed-position switching command | ○ | ○ | ○ | |
| Positioning feedback pulse input | | (Pulse frequency)<br>Open collector:<br>100kpulse/s or less<br>TTL: 100kpulse/s or less<br>Differential: 100kpulse/s or less | (Pulse frequency)<br>Open collector:<br>200kpulse/s or less<br>TTL: 200kpulse/s or less<br>Differential: 1Mpulse/s or less | ○ | The specification has improved. (Upward-compatibility) |
| Servo ON | | ○ | ○ | ○ | |
| Speed command (analog signal) | | ○ | ○ | ○ | |

### 7.6.6 Precautions for the replacement of the AD70 by the QD73A1

The following shows precautions for the replacement of the AD70 by the QD73A1.

| Item | AD70 | QD73A1 | Precautions |
|---|---|---|---|
| Number of occupied slots | 1 slot | 2 slots | *1 |
| Number of occupied I/O points | 32 points<br>(I/O assignment: Special function module, 32 points) | 48 points<br>(I/O assignment:<br>First half slot: Empty 16 points<br>Second half slot: Intelli., 32 points) | *2 |
| Buffer memory address | • Addresses are partly changed.<br>• New items are added due to the specification change. | | *3 |
| Mode setting | Hardware switch setting | Parameter setting of a CPU module<br>("I/O assignment" → "Switch setting") | *4 |
| LED | • Items indicated with the LEDs differ between the AD70 and the QD73A1. | | *5 |
| External wiring | • The existing connectors can be used. | | *6*7 |
| Operation of when Servo READY signal is off | The AD70 counts the feedback pulse, and outputs the voltage proportional to the deviation counter. | The QD73A1 clears the deviation counter to 0, and outputs 0V. | *8 |

*1 Note the following because the number of occupied slots increases for the QD73A1.
1) Check that the base unit has empty slots of 1 slot (or more).
If the base unit does not have an empty slot, an additional extension base unit is required.
2) The module occupying 2 slots cannot be mounted on the Q series large type base unit.
Because the same base unit of the existing module is used for the QD73A1, when mounting the QD73A1 on the Q series large type base unit, use 2 base units by adding an extension base unit.

*2 Configure the I/O assignment setting of parameters in either of following ways so that addresses of the QD73A1 remain the same as the AD70 even after the replacement.
1) Set Empty 0 point to the first half slot.
2) Set the same address of the AD70 to the second half slot of the QD73A1 in the start XY setting.

*3 Changes or corrections of the programs are required.
For details, refer to the MELSEC-Q QD73A1 Positioning Module User's Manual.

*4 The method of mode setting, which is required for the positioning, is changed from a hardware switch to the switch setting in I/O assignment of PLC parameter.
Configure the same setting as the AD70 by referring to the MELSEC-Q QD73A1 Positioning Module User's Manual.

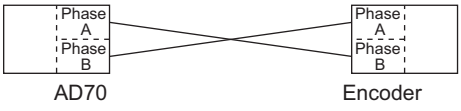
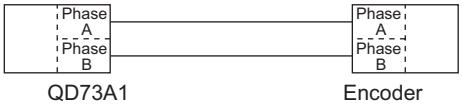
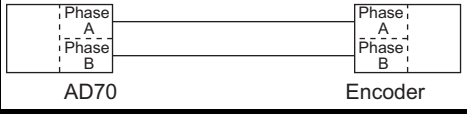
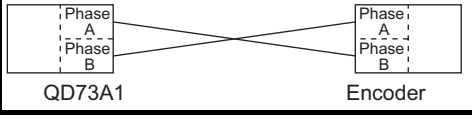
*5 Items indicated with the LEDs can be checked with I/O signals of the QD73A1.
If necessary, install lamps corresponding to the LED indications externally and indicate the on/off status of the I/O signals using a program.

*6 The position where a module is mounted is changed because the dimensions of a base unit of the QD73A1 differ.
Check whether the wiring is enough even after the replacement because the connector position is changed though the existing connectors can be used without the wiring change.

*7 When the AD70 being used in the setting that the positive voltage is output when the positioning address increases (slide switch 1 (rotation direction setting): on) is replaced with the QD73A1, the cables between the AD70 and an encoder can be used.
When the AD70 being used in the setting that the negative voltage is output when the positioning address increases (slide switch 1 (rotation direction setting): off) is replaced with the QD73A1, the wiring change between the AD70 and an encoder is required.
When the AD70 is replaced with the QD73A1 whose serial number (first five digits) is "15042" or later, the cables between the AD70 and the encoder can be used by changing the intelligent function module switch setting.

<Replacement with the QD73A1 whose serial number (first five digits) is "15041" or earlier>

• Change the wiring between the AD70 and the encoder so that each phase A and B is reversed.

| No. | Slide switch 1 of the AD70 (rotation direction setting) | Rotation direction of the motor and encoder | Wiring between the AD70 and encoder | Wiring when the AD70 is replaced to the QD73A1 |
|---|---|---|---|---|
| 1 | OFF | Same direction |  |  |
| 2 | | Reverse direction |  |  |

<Replacement with the QD73A1 whose serial number (first five digits) is "15042" or later>

• Set b0 (switch 3) of the intelligent function module switch to 1.

*8 The operation for the QD73A1 while the signal is off was changed from the operation for the AD70 due to the safety consideration of when Servo READY signal is turned on.
The QD73A1 whose serial number (first five digits) is "15042" or later operates the same as the AD70 by setting b4 (switch 3) of the intelligent function module switch to 1.

# 8 POSITION DETECTION MODULE REPLACEMENT

## 8.1 Position Detection Module Replacement

There are no alternatives for model A61LS, A62LS-S5 and A63LS position detection modules.

## Memo

# 9 EXTERNAL DIMENSIONS

## 9.1 External Dimensions

For external dimensions of modules shown in this handbook, refer to the Use's Manual for each module.
For external dimensions of base units shown in this handbook, refer to the following.

| Handbook | Manual number |
|---|---|
| Transition from MELSEC-A/QnA (Large Type) Series to Q Series Handbook (Fundamentals) | L-08043ENG |

## Memo

# APPENDICES

## Appendix 1 Spare parts storage

**(1) The general specifications of programmable controllers are as follows. Please do not store spare parts under a high temperature or high humidity condition, even within the range guaranteed by the specifications.**

| | |
|---|---|
| Storage ambient temperature | -20 to 75°C |
| Storage ambient humidity | 10 to 90%, no condensation |

**(2) Store in a place avoiding direct sunlight.**

**(3) Store under condition with less dust or no corrosive gas.**

**(4) The battery capacity of a A6BAT battery or a lithium-coin battery (commercially available) for memory card will be decreased by its self-discharging even when not used. Replace it with new one in 5 years as a guideline.**

**(5) For a power supply module, CPU module with built-in power supply, or analog module that use any aluminum electrolytic capacitor, which is indicated in the table below, take the following measures since the characteristics will be deteriorated when the aluminum electrolytic capacitor is left un-energized for a long time.**

| Product | Model |
|---|---|
| CPU module<br>(Power supply built-in type) | A1NCPU, A1NCPUP21, A1NCPUR21, A1NCPUP21-S3, A2CCPU, A2CCPUP21, A2CCPUR21, A2CCPUC24, A2CCPUC24-PRF, A2CJCPU-S3 |
| Power supply module | A61P, A61PEU, A61P-UL, A62P, A62PEU, A63P, A68P, A61RP, A67RP, A2CJ66P |
| Analog module | A62DA, A62DA-S1 |

[Countermeasures for preventing aluminum electrolytic capacitor characteristics deterioration]

Apply the rated voltage to the aluminum electrolytic capacitor for several hours once a year to activate it. Or, rotate products at the periodic inspection (in every 1 year or two).

[Reference]

The life of an aluminum electrolytic capacitor, even if not used, under a normal temperature decreases approximately at 1/4 speed of the case when it is energized.

# Appendix 2 Related Manuals

## Appendix 2.1 Replacement Handbooks

### (1) Transition Guide

| No. | Manual Name | Manual Number | Model Code |
|---|---|---|---|
| 1 | MELSEC-A/QnA Series Transition Guide | L(NA)08077E | – |

### (2) Transition from MELSEC-A/QnA (large type) to Q series handbook

| No. | Manual Name | Manual Number | Model Code |
|---|---|---|---|
| 1 | Transition from MELSEC-A/QnA (Large Type) Series to Q Series Handbook (Fundamentals) | L-08043ENG | – |
| 2 | Transition from MELSEC-A/QnA (Large Type) Series to Q Series Handbook (Intelligent Function Modules) | L-08046ENG | – |
| 3 | Transition from MELSEC-A/QnA (Large Type) Series to Q Series Handbook (Network Modules) | L-08048ENG | – |
| 4 | Transition from MELSEC-A/QnA (Large Type) Series to Q Series Handbook (Communications) | L-08050ENG | – |
| 5 | Transition from MELSEC-A0J2H Series to Q Series Handbook | L-08060ENG | – |
| 6 | Transition from MELSECNET/MINI-S3, A2C(I/O) to CC-Link Handbook | L-08061ENG | – |
| 7 | Transition from MELSEC-I/OLINK to CC-Link/LT Handbook | L-08062ENG | – |
| 8 | Transition from MELSEC-A/QnA Large Type Series to AnS/Q2AS Small Type Series Handbook | L-08064ENG | – |
| 9 | Transition of CPUs in MELSEC Redundant System Handbook (Transition from Q4ARCPU to QnPRHCPU) | L-08117ENG | – |

### (3) Transition Examples

| No. | Manual Name | Manual Number | Model Code |
|---|---|---|---|
| 1 | MELSEC-A/QnA Series Transition Examples | L(NA)08121E | – |

### (4) Others

| No. | Manual Name | Manual Number | Model Code |
|---|---|---|---|
| 1 | Procedures for Replacing Positioning Module AD71 with QD75 | FA-A-0060 | |
| 2 | Precautions for replacing A/QnA (large type) series CPU with Universal model QCPU | FA-A-0068 | – |

## Appendix 2.2 A/QnA series

| No. | Manual name | Manual number | Model code |
|---|---|---|---|
| 1 | MELSEC-QnA/A Catalog | L-174-0-C5177 | – |
| 2 | MELSEC-QnAS/AnS Catalog | L-174-0-C5266 | – |
| 3 | Analog-Digital Converter Module Type A68AD User's Manual | IB-64572 | 13J305 |
| 4 | Analog-Digital Converter Module Type A68AD-S2 User's Manual | IB-68102 | 13J349 |
| 5 | Analog-Digital Converter Module Type A68ADN User's Manual | IB-68219 | 13JA33 |
| 6 | Analog-Digital Converter Module Type A616AD User's Manual | IB-68078 | 13J361 |
| 7 | Digital-Analog Converter Module Type A62DA User's Manual | IB-64573 | 13J306 |
| 8 | Digital-Analog Converter Module Type A62DA-S1 User's Manual | IB-68074 | 13J350 |
| 9 | Digital-Analog Converter Module Type A68DAV/A68DAI(S1) User's Manual | IB-68273 | 13JA35 |
| 10 | Digital-Analog Converter Module Type A616DAV User's Manual | IB-68079 | 13J362 |
| 11 | Digital-Analog Converter Module Type A616DAI User's Manual | IB-68080 | 13J363 |
| 12 | Pt100 Input Module Type A68RD3N/4N, A1S62RD3N/4N User's Manual | SH-080190 | 13JT69 |
| 13 | Temperature-Digital Converter Module Type A616TD User's Manual | IB-68104 | 13J368 |
| 14 | High-Speed Counter Module Type AD61(AD61S1) User's Manual | IB-64576 | 13J307 |
| 15 | Positioning Module Type AD70 User's Manual | IB-68106 | 13J356 |
| 16 | Positioning Module Type AD72 User's Manual | IB-68008 | 13J333 |
| 17 | Positioning Module Type A1SD75P1-S3/P2-S3/P3-S3 AD75P1-S3/P2-S3/P3-S3 User's Manual | SH-3608 | 13JH86 |
| 18 | Positioning Module Type A1SD75M1/M2/M3 AD75M1/M2/M3 User's Manual | IB-66715 | 13JH85 |
| 19 | GX Configurator-AP Version 1 Operating Manual | IB-80031 | 13JN44 |

## Appendix 2.3 Q series

| No. | Manual name | Manual number | Model code |
|---|---|---|---|
| 1 | MELSEC-Q Catalog | L-08033E | – |
| 2 | MELSEC-Q Data Book | L-08029E | – |
| 3 | Analog-Digital Converter Module User's Manual | SH-080055 | 13JR03 |
| 4 | Channel Isolated High Resolution Analog-Digital Converter Module (With Signal Conditioning Function) User's Manual | SH-080277 | 13JR51 |
| 5 | Digital-Analog Converter Module User's Manual | SH-080054 | 13JR02 |
| 6 | Channel Isolated Digital-Analog Converter Module User's Manual | SH-080281 | 13JR52 |
| 7 | Channel Isolated Analog-Digital Converter Module (With Signal Conditioning Function) User's Manual | SH-080647ENG | 13JR96 |
| 8 | Channel Isolated Thermocouple Input Module User's Manual | SH-080795ENG | 13JZ26 |
| 9 | Thermocouple Input Module Channel Isolated Thermocouple/Micro Voltage Input Module User's Manual | SH-080141 | 13JR30 |
| 10 | RTD Input Module Channel Isolated RTD Input Module User's Manual | SH-080142 | 13JR31 |
| 11 | High-Speed Counter Module User's Manual | SH-080036 | 13JL95 |
| 12 | High-Speed Counter Module QD62-H01, QD62-H02 User's Manual | IB-0800421 | 13JY78 |
| 13 | Type QD75P/QD75D Positioning Module User's Manual | SH-080058 | 13JR09 |
| 14 | Type QD75M Positioning Module User's Manual | IB-0300062 | 1CT752 |
| 15 | GX Configurator-QP Version 2 Operating Manual | SH-080172 | 13JU19 |

## Appendix 2.4 Programming tool

| No. | Manual name | Manual number | Model code |
|---|---|---|---|
| 1 | GX Developer Version 8 Operating Manual | SH-080373E | 13JU41 |

## Memo

# WARRANTY

Please confirm the following product warranty details before using this product.

## 1. Gratis Warranty Term and Gratis Warranty Range

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.

[Gratis Warranty Term]

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.

[Gratis Warranty Range]

(1) The range shall be limited to normal use within the usage state, usage methods and usage environment, etc., which follow the conditions and precautions, etc., given in the instruction manual, user's manual and caution labels on the product.

(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.
   4. Failure that could have been avoided if consumable parts (battery, backlight, fuse, etc.) designated in the instruction manual had been correctly serviced or replaced.
   5. Failure caused by external irresistible forces such as fires or abnormal voltages, and Failure caused by force majeure such as earthquakes, lightning, wind and water damage.
   6. Failure caused by reasons unpredictable by scientific technology standards at time of shipment from Mitsubishi.
   7. Any other failure found not to be the responsibility of Mitsubishi or that admitted not to be so by the user.

## 2. Onerous repair term after discontinuation of production

(1) Mitsubishi shall accept onerous product repairs for seven (7) years after production of the product is discontinued.
Discontinuation of production shall be notified with Mitsubishi Technical Bulletins, etc.

(2) Product supply (including repair parts) is not available after production is discontinued.

## 3. Overseas service

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

## 4. Exclusion of loss in opportunity and secondary loss from warranty liability

Regardless of the gratis warranty term, Mitsubishi shall not be liable for compensation of damages caused by any cause found not to be the responsibility of Mitsubishi, loss in opportunity, lost profits incurred to the user by Failures of Mitsubishi products, special damages and secondary damages whether foreseeable or not, compensation for accidents, and compensation for damages to products other than Mitsubishi products, replacement by the user, maintenance of on-site equipment, start-up test run and other tasks.

## 5. Changes in product specifications

The specifications given in the catalogs, manuals or technical documents are subject to change without prior notice.

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Mitsubishi Programmable Controller

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