# MITSUBISHI ELECTRIC

# Programmable Controller

## MELSEC **Q** series

# I/O Module Type Building Block
# User's Manual

| | |
|---|---|
| QX10 | QY10 |
| QX10-TS | QY10-TS |
| QX28 | QY18A |
| QX40 | QY22 |
| QX40-S1 | QY40P |
| QX40-TS | QY40P-TS |
| QX40H | QY41H |
| QX41 | QY41P |
| QX41-S1 | QY42P |
| QX41-S2 | QY50 |
| QX42 | QY68A |
| QX42-S1 | QY70 |
| QX50 | QY71 |
| QX70 | QY80 |
| QX70H | QY80-TS |
| QX71 | QY81P |
| QX72 | QY82P |
| QX80 | QH42P |
| QX80-TS | QX41Y41P |
| QX80H | QX48Y57 |
| QX81 | QI60 |
| QX81-S2 | |
| QX82 | |
| QX82-S1 | |
| QX90H | |
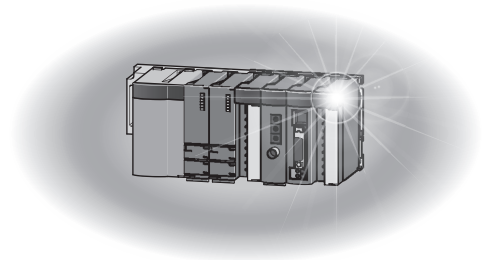
# • SAFETY PRECAUTIONS •

(Read these precautions before using this product.)

Before using this product, please read this manual and the relevant manuals carefully and pay full attention to safety to handle the product correctly.

The precautions given in this manual are concerned with this product only. For the safety precautions of the programmable controller system, refer to the user's manual for the CPU module used.

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 an abnormal condition, it stops the operation and all outputs are:
      (a) Turned off if the overcurrent or overvoltage protection of the power supply module is activated.
      (b) Held or turned off according to the parameter setting if the self-diagnostic function of the CPU module detects an error such as a watchdog timer error.
      Note, however, that AnS series modules on the system turn off all outputs in both cases.
      All outputs may turn 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 the user's manual for the CPU module used.
  (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.<br>• Configure a circuit so that the programmable controller is turned on first and then the external power supply.<br>  If the external power supply is turned on first, an accident may occur due to an incorrect output or malfunction.<br>• For the operating status of each station after a communication failure, refer to relevant manuals for each network.<br>  Incorrect output or malfunction due to a communication failure may result in an accident.<br>• 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, configure an interlock circuit in the sequence program to ensure that the entire system will always operate safely.<br>  For other controls to a running programmable controller (such as program modification or operating status change), read relevant manuals carefully and ensure the safety before the operation.<br>  Especially, in the case of a control from an external device to a remote programmable controller, immediate action cannot be taken for a problem on the programmable controller due to a communication failure.<br>  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. |

# [Design Precautions]

| ⚠ CAUTION |
|---|
| • Do not install the control lines or communication cables together with the main circuit lines or power cables.<br>  Keep a distance of 100mm or more between them.<br>  Failure to do so may result in malfunction due to noise.<br>• 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. |

# [Security Precautions]

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

# [Installation Precautions]

| ⚠ CAUTION |
|---|
| • Use the programmable controller in an environment that meets the general specifications in the user's manual for the CPU module used.<br>Failure to do so may result in electric shock, fire, malfunction, or damage to or deterioration of the product.<br>• 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) in the hole(s) in the base unit and press the module until it snaps into place.<br>Incorrect interconnection may cause malfunction, failure, or drop of the module.<br>When using the programmable controller in an environment of frequent vibrations, fix the module with a screw.<br>Tighten the screw within the specified torque range.<br>Undertightening can cause drop of the screw, short circuit or malfunction.<br>Overtightening can damage the screw and/or module, resulting in drop, short circuit, or malfunction.<br>• When using an extension cable, connect it to the extension cable connector of the base unit securely.<br>Check the connection for looseness.<br>Poor contact may cause incorrect input or output.<br>• When using a memory card, fully insert it into the memory card slot.<br>Check that it is inserted completely.<br>Poor contact may cause malfunction.<br>• Shut off the external power supply for the system in all phases before mounting or removing the module.<br>Failure to do so may result in damage to the product.<br>• Do not touch the module during turning on electricity and immediately after power supply interception. There is fear of a burn.<br>• Do not directly touch any conductive parts and electronic components of the module.<br>Doing so can cause malfunction or failure of the module. |

# [Wiring Precautions]

| ⚠ WARNING |
|---|
| • Shut off the external power supply for the system in all phases before wiring.<br>   Failure to do so may result in electric shock or damage to the product.<br>• After wiring, attach the included terminal cover to the module before turning it on for operation.<br>   Failure to do so may result in electric shock. |

# [Wiring Precautions]

| ⚠ CAUTION |
|---|
| • Individually ground the FG and LG terminals of the programmable controller with a ground resistance of 100 Ω or less.<br>   Failure to do so may result in electric shock or malfunction.<br>• Check the rated voltage and terminal layout before wiring to the module, and connect the cables correctly.<br>   Connecting a power supply with a different voltage rating or incorrect wiring may cause a fire or failure.<br>• Connectors for external devices must be crimped or pressed with the tool specified by the manufacturer, or must be correctly soldered.<br>   Incomplete connections may cause short circuit, fire, or malfunction.<br>• When connecting or removing the connectors for external devices, insert or remove them perpendicularly to the surface.<br>   Pushing in or pulling out them at an angle may cause poor contact due to distorted connector pins, resulting in malfunction.<br>• Tighten the terminal screw within the specified torque range.<br>   Undertightening can cause short circuit, fire, or malfunction.<br>   Overtightening can damage the screw and/or module, resulting in drop, short circuit, or malfunction.<br>• Prevent foreign matter such as dust or wire chips from entering the module.<br>   Such foreign matter can cause a fire, failure, or malfunction.<br>• 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.<br>   Do not remove the film during wiring.<br>   Remove it for heat dissipation before system operation.<br>• Mitsubishi Electric programmable controllers must be installed in control panels.<br>   Connect the main power supply to the power supply module in the control panel through a relay terminal block.<br>   Wiring and replacement of a power supply module must be performed by qualified maintenance personnel with knowledge of protection against electric shock.<br>   (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.<br>    Doing so will cause electric shock.<br>• Correctly connect the battery connector.<br>    Do not charge, disassemble, heat, short-circuit, or solder the battery, or throw it into the fire.<br>    Doing so will cause the battery to produce heat, explode, or ignite, resulting in injury and fire.<br>• Shut off the external power supply for the system in all phases before cleaning the module or<br>    retightening the terminal screws or module fixing screws.<br>    Failure to do so may result in electric shock.<br>    Undertightening the terminal screws can cause short circuit or malfunction.<br>    Overtightening can damage the screw and/or module, resulting in drop, short circuit, or<br>    malfunction. |

## [Startup and Maintenance Precautions]

| ⚠ CAUTION |
|---|
| • Before performing online operations (especially, program modification, forced output, and<br>    operating status change) for the running CPU module from the peripheral device connected,<br>    read relevant manuals carefully and ensure the safety.<br>    Improper operation may damage machines or cause accidents.<br>• Do not disassemble or modify the modules.<br>    Doing so may cause failure, malfunction, injury, or a fire.<br>• Shut off the external power supply for the system in all phases before mounting or removing the<br>    module.<br>    Failure to do so may cause the module to fail or malfunction.<br>• After the first use of the product, do not mount/remove the module to/from the base unit, and the<br>    terminal block to/from the module more than 50 times (IEC 61131-2 compliant) respectively.<br>    Exceeding the limit may cause malfunction.<br>• Before handling the module, touch a grounded metal object to discharge the static electricity<br>    from the human body.<br>    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. |

# • CONDITIONS OF USE FOR THE PRODUCT •

(1) MELSEC programmable controller ("the PRODUCT") shall be used in conditions;

    i) where any problem, fault or failure occurring in the PRODUCT, if any, shall not lead to any major or serious accident; and

    ii) where the backup and fail-safe function are systematically or automatically provided outside of the PRODUCT for the case of any problem, fault or failure occurring in the PRODUCT.

(2) The PRODUCT has been designed and manufactured for the purpose of being used in general industries.

    MITSUBISHI ELECTRIC SHALL HAVE NO RESPONSIBILITY OR LIABILITY (INCLUDING, BUT NOT LIMITED TO ANY AND ALL RESPONSIBILITY OR LIABILITY BASED ON CONTRACT, WARRANTY, TORT, PRODUCT LIABILITY) FOR ANY INJURY OR DEATH TO PERSONS OR LOSS OR DAMAGE TO PROPERTY CAUSED BY the PRODUCT THAT ARE OPERATED OR USED IN APPLICATION NOT INTENDED OR EXCLUDED BY INSTRUCTIONS, PRECAUTIONS, OR WARNING CONTAINED IN MITSUBISHI ELECTRIC USER'S, INSTRUCTION AND/OR SAFETY MANUALS, TECHNICAL BULLETINS AND GUIDELINES FOR the PRODUCT.

    ("Prohibited Application")

    Prohibited Applications include, but not limited to, the use of the PRODUCT in;

    • Nuclear Power Plants and any other power plants operated by Power companies, and/or any other cases in which the public could be affected if any problem or fault occurs in the PRODUCT.

    • Railway companies or Public service purposes, and/or any other cases in which establishment of a special quality assurance system is required by the Purchaser or End User.

    • Aircraft or Aerospace, Medical applications, Train equipment, transport equipment such as Elevator and Escalator, Incineration and Fuel devices, Vehicles, Manned transportation, Equipment for Recreation and Amusement, and Safety devices, handling of Nuclear or Hazardous Materials or Chemicals, Mining and Drilling, and/or other applications where there is a significant risk of injury to the public or property.

    Notwithstanding the above restrictions, Mitsubishi Electric may in its sole discretion, authorize use of the PRODUCT in one or more of the Prohibited Applications, provided that the usage of the PRODUCT is limited only for the specific applications agreed to by Mitsubishi Electric and provided further that no special quality assurance or fail-safe, redundant or other safety features which exceed the general specifications of the PRODUCTs are required. For details, please contact the Mitsubishi Electric representative in your region.

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

REVISIONS

| Print Date | ∗ Manual Number | Revision |
|---|---|---|
| Dec., 1999 | SH(NA)-080042-A | First edition |
| Feb., 2000 | SH(NA)-080042-B | Addition model<br>QH42P, QX48Y57, QX70, QX71, QX72, QY18A<br>Addition<br>Chapter 4<br>Partial correction<br>Section 1.2, Chapter 5, 8.1<br>Chapters 4 to 8 (changed into Chapters 5 to 9) |
| Apr., 2000 | SH(NA)-080042-C | Deletion<br>QY18A |
| Jul., 2000 | SH(NA)-080042-D | Addition model<br>QX28, QX40-S1, QY18A, QY22, QI60<br>Addition<br>Chapter 5<br>Partial correction<br>Section 1.2<br>Chapters 5 to 9 (changed into Chapters 6 to 10) |
| Nov., 2000 | SH(NA)-080042-E | Addition model<br>QY70, QY71<br>Addition<br>Section 1.3<br>Partial correction<br>CONTENTS, Section 3.3, 5.1 |
| Jan., 2001 | SH(NA)-080042-F | Addition model<br>QY68A<br>Addition<br>Section 10.2<br>Partial correction<br>CONTENTS, Section 1.2, 3.3, 5.1, Chapters 7 |
| Mar., 2001 | SH(NA)-080042-G | Partial correction<br>Section 2.4, 8.1 |
| Jul., 2001 | SH(NA)-080042-H | Addition model<br>Q6TE-18S<br>Addition<br>Chapter 9, APP 1.3<br>Partial correction<br>CONTENTS, Section 2.1, 2.2, 2.4, 5.1<br>Chapters 9 to 10 (changed into Chapters 10 to 11) |
| Jul., 2002 | SH(NA)-080042-I | Addition model<br>QX41-S1, QX42-S1, A6CON4 |

| Print Date | ＊ Manual Number | Revision |
|---|---|---|
| Mar., 2003 | SH(NA)-080042-J | Addition model<br>QX82 |
| May, 2003 | SH(NA)-080042-K | Partial correction<br>Section 1.2, 2.2 |
| May, 2003 | SH(NA)-080042-L | Addition model<br>QX82-S1<br>Partial correction<br>Section 1.2, 3.3<br>Addition<br>Section 2.15 |
| Jul., 2004 | SH(NA)-080042-M | Partial correction<br>Section 1.2, 2.1 to 2.15, 3.1 to 3.12, 4.1, 4.2, 5.1, 8.1, 8.2.1, 8.2.2, 10 |
| Jul., 2005 | SH(NA)-080042-N | Partial correction<br>SAFETY PRECAUTIONS, Section 3.3<br>Addition<br>Appendix 1.3 |
| Apr., 2006 | SH(NA)-080042-O | Partial correction<br>SAFETY PRECAUTIONS, Section 4.1, Chapter 6 |
| Sep., 2006 | SH(NA)-080042-P | Partial correction<br>Section 11.1, 11.2, Appendix 1.2, 1.3 |
| Oct., 2006 | SH(NA)-080042-Q | Addition model<br>QX50<br>Partial correction<br>SAFETY PRECAUTIONS, Section 2.10 to 2.16, 3.4 to 3.12, 4.1, 4.2<br>Addition<br>Section 2.9 |
| Sep., 2007 | SH(NA)-080042-R | Addition model<br>QX41Y41P<br>Partial correction<br>Section 1.2, 1.3.3, 2.1 to 2.16, 3.1 to 3.12, 4.1, 4.3, 5.1, 7.1, 8.1, Chapter 10, Section 11.1, 11.2, Appendix 1.2<br>Addition<br>Section 4.2 |
| Jun., 2008 | SH(NA)-080042-S | Addition model<br>QX10-TS, QX40-TS, QX80-TS, QY10-TS, QY40P-TS, QY80-TS<br>Partial correction<br>Section 1.2, 2.3 to 2.19, 3.3 to 3.15, 9.2, Chapter 10<br>Addition<br>Section 2.2, 2.6, 2.16, 3.2, 3.6, 3.14, 9.1, 9.3 |

| Print Date | ＊ Manual Number | Revision |
|---|---|---|
| Oct., 2008 | SH(NA)-080042-T | Addition model<br>QX40-H, QX70-H, QX80-H, QX90-H<br>Partial correction<br>Section 1.2.5, 1.3.1, 2.8 to 2.23, 9.2, Chapter 10<br>Addition<br>Section 2.7, 2.14, 2.19, 2.23 |
| Apr., 2009 | SH(NA)-080042-U | Addition model<br>QX41-S2, QX81-S2<br>Partial correction<br>Section 2.7, 2.11 to 2.25, 5.1, 8.1<br>Addition<br>Section 2.10, 2.22 |
| May, 2010 | SH(NA)-080042-V | External connections are reviewed according to IEC 60617.<br>Addition model<br>QY82P<br>Partial correction<br>SAFETY PRECAUTIONS, Section 1.1, 1.2, Chapter 2 to 4, Chapter 7, Section 8.1, Chapter 10, Section 11.1, 11.2, Appendix 1.1<br>Addition<br>CONDITIONS OF USE FOR THE PRODUCT, Section 3.16 |
| Jul., 2011 | SH(NA)-080042-W | Addition model<br>Q6TE-18SN<br>Partial correction<br>Section 1.2.1, 1.2.2, 1.2.3, 1.2.6, 3.11, Chapter 7, Section 9.1, 9.2, Chapter 10, Section 11.2, Appendix 1.3 |
| Mar., 2012 | SH(NA)-080042-X | Addition model<br>QY41H<br>Partial correction<br>Section 1.2.2, 2.3, 3.8 to 3.17, Chapter 7, Section 8.1<br>Addition<br>Section 3.7 |
| Jun., 2013 | SH(NA)-080042-Y | Partial correction<br>Section 1.2.1, 1.3.1, 2.7, 2.15, 2.20, 2.25, 11.2 |
| Dec., 2013 | SH(NA)-080042-Z | Partial correction<br>Section 2.8, 2.9, 2.10, 2.11, 2.12, 2.16, 2.17, 2.21, 2.22, 2.23, 2.24, 3.7, 3.8, 3.9, 3.13, 3.16, 3.17, 4.1, 4.2, Chapter 7, Appendix 1.2 |
| Oct., 2014 | SH(NA)-080042-AA | Partial correction<br>SAFETY PRECAUTIONS, Section 1.2.2, 3.4, 9.2, 11.2 |

| Print Date | ＊ Manual Number | Revision |
|---|---|---|
| Sep., 2015 | SH(NA)-080042-AB | Partial correction<br><br>Section 1.2.6, Chapter 2, Chapter 3, Section 5.1, Chapter 6, Section 8.1, Section 9.1, Appendix 1.1, Appendix 1.2, Appendix 1.3, Appendix 1.4 |
| Mar., 2017 | SH(NA)-080042-AC | Partial correction<br><br>Section 1.2.2 |
| Feb., 2018 | SH(NA)-080042-AD | Partial correction<br><br>Section 1.2.3, 2.3, 9.1, 9.2 |
| Nov., 2019 | SH(NA)-080042-AE | Partial correction<br><br>Section 2.7, 2.20 |
| Jun., 2021 | SH(NA)-080042-AF | Partial correction<br><br>SAFETY PRECAUTIONS |
| Mar., 2024 | SH(NA)-080042-AG | Partial correction<br><br>SAFETY PRECAUTIONS, CONDITIONS OF USE FOR THE PRODUCT, Chapter 2, 3, 7 |

INTRODUCTION

Thank you for purchasing the Mitsubishi Electric MELSEC-Q series programmable controllers.
Before using this product, please read this manual carefully and develop familiarity with the functions and
performance of the MELSEC-Q series programmable controller to handle the product correctly.

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ABOUT MANUALS

The following manuals are also related to this product.

In necessary, order them by quoting the details in the tables below.

Related Manuals

| Manual Name | Manual Number (Model Code) |
|---|---|
| QCPU User's Manual (Hardware Design/Maintenance and Inspection) <br> This manual provides the specifications of the CPU modules, power supply modules, base units, extension cables, memory cards and others. (Sold separately) | SH-080483ENG (13JR73) |
| QnUCPU User's Manual (Function Explanation/Program Fundamentals) <br> This manual explains the functions, programming methods, devices on necessary to create programs with the QnUCPU. (Sold separately) | SH-080807ENG (13JZ27) |
| Qn(H)/QnPH/QnPRHCPU User's Manual (Function Explanation/Program Fundamentals) <br> This manual explains the functions, programming methods, devices on necessary to create programs with the Qn(H)/QnPH/QnPRHCPU. (Sold separately) | SH-080808ENG (13JZ28) |

COMPLIANCE WITH EMC AND LOW VOLTAGE DIRECTIVES

(1) Method of ensuring compliance

To ensure that Mitsubishi Electric programmable controllers maintain EMC and Low Voltage Directives when incorporated into other machinery or equipment, certain measures may be necessary. Please refer to one of the following manuals.
• QCPU User's Manual (Hardware Design, Maintenance and Inspection)
• Safety Guidelines (This manual is included with the CPU module or base unit.)
The CE mark on the side of the programmable controller indicates compliance with EMC and Low Voltage Directives.

(2) Additional measures

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

# 1. GENERAL SPECIFICATIONS AND PRECAUTIONS FOR USE

This chapter describes the general specifications and precautions for use of the I/O modules.

## 1.1 General Specifications

Refer to the following manual for the general specifications of the I/O modules.
• QCPU User's Manual (Hardware Design, Maintenance and Inspection)

## 1.2 Precautions for Use

### 1.2.1 Input module

(1) Simultaneous ON points
The number of simultaneous on points of input module depends on the input voltage and ambient temperature.
Refer to the derating chart of the input module specifications.

(2) Input response time and pulse width
Input modules may take in noise or the like as an input depending on the pulse width of a signal.
This pulse width has a value as listed below depending on the parameter-set response time. Set input response time while fully consider the operating environment.

| Response time setting value (ms) | Minimum value of pulse width where noise or the like may be taken in as an input (ms) |
|---|---|
| 1 | 0.3 |
| 5 | 3 |
| 10 | 6 |
| 20 | 12 |
| 70 | 45 |

For the setting of input response time values, refer to Section 1.3.1.

1

(3) Precautions for using the DC input module

(a) Measure against back EMF

When an inductive load is connected, connect a diode to the load in parallel.
Use a diode that meets the following conditions.
• Reverse breakdown voltage is 10 times as high as the circuit voltage or more.
• Forward current is twice as high as the load current or more.

| IN | | IN | |
|---|---|---|---|
| Inductive load | Diode | Inductive load | Diode |
| COM | | COM | |
| Positive common | | Negative common | |
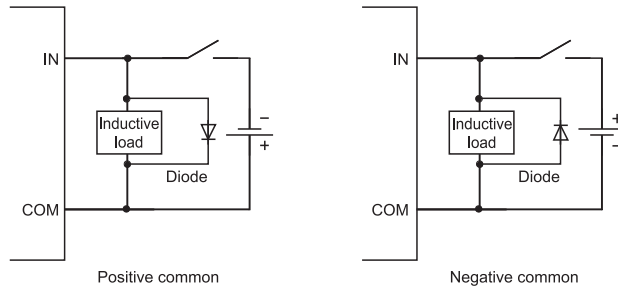
(4) Precautions for using the high-speed input module

Read the following precautions carefully when using the high-speed input modules (QX40H, QX70H, QX80H, and QX90H).

(a) When switching to the high-speed input, the specifications of the high-speed input modules and the input module QX40-S1 are identical. On the other hand, when switching to the interrupt input, the specifications of the high-speed input modules and the interrupt module QI60 are identical too. Therefore, the specifications of the input module (QX40-S1) are construed as the specifications of the high-speed input module switched to the high-speed input. Similarly, the specifications of the interrupt module (QI60) indicated in the manuals other than this manual are construed as the specifications of the high-speed input module switched to the interrupt input.

(b) By using setting switches on the bottom of the module (refer to Chapter 10), the high-speed input module switches module types (high-speed input or interrupt input) for 16 input points all together and between valid and invalid noise filters as shown below.

| Noise filter selector switch (Switch 1) | Function selector switch (Switch 2) | GX Developer setting | | |
|---|---|---|---|---|
| | | Module type | Interrupt operation | Input response time |
| ON | ON | High-speed input[*1] | × | ○ |
| | OFF | Interrupt[*1] | ○ | |
| OFF | ON | High-speed input [*1] | × | ×[*2] |
| | OFF | Interrupt[*1] | ○ | |

○: Settable ×: Not settable

*1: When selecting an improper module type, an error (error code: 2100) occurs.

*2: The input response time value set in GX Developer is ignored.

(c) If the small number of value of input response time is set, the modules tend to have impact of noise. Ensure that the modules do not have impact of noise. For details of the measure against noise, refer to the QCPU User's Manual (Hardware Design, Maintenance and Inspection).

(d) The high-speed input modules connected with electric appliance such as relays may load a chattering as a signal.

(e) To use a high-speed input module as a CE marked product, keep the cable length 3m or less.

## 1.2.2 Output module

(1) Maximum switching frequency when the module drives inductive load
The output must be on for one second or longer and off for one second or longer.

(2) Load for connection
When connecting a counter or timer that has a DC-DC converter as a load, select an output module whose maximum load current is larger than inrush current of the load.
Selecting an output module by average current of the load may cause a failure of the module because inrush current flows at a constant frequency at power-on or during operation due to the connected load.
If an output module needs to be selected by average current of the load, take either of the following actions to reduce an influence from inrush current.
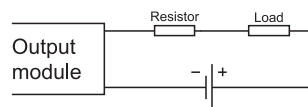


• Connecting a resistor to the load in series
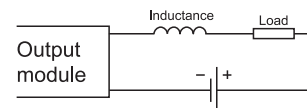


• Connecting an inductor to the load in series

(3) Replacement of fuses
Fuses installed to an output module cannot be replaced.

(4) Built-in fuses
Built-in fuses works to prevent the external cables from being burned when a short circuit occurs in the internal output circuit. For this reason, the output module may not be protected if the fuses blow any other reasons except for a short circuit.

(5) Fuses installed to external terminals

It is recommended to install fuses to each external terminal. These fuses works to prevent the external devices and the module from being burned when a short circuit occurs in the load circuit of the QY22 or QY68A.

The following table lists the fuses whose operations have been checked and ensured by Mitsubishi.

| Module model | QY22[1] | | QY68A[2] | |
|---|---|---|---|---|
| Fuse model | 216 02.5 | 216 002 | 216 3.15 | 312 003 |
| Rated current | 2.5A | 2A | 3.15A | 3A |
| Manufacturer | Littelfuse, Inc | | | |

*1: Fuses that conform to Sheet 1 of IEC60127 are recommended.

*2: Fast blow fuses whose rated current is 3A are recommended.

(6) Precautions for using the transistor output module

(a) Action against reverse current

If a transistor output module is wired as shown below, reverse current flows in an output element, causing a failure of the element.

When wiring a transistor output module, connect a diode as shown below.

• When connecting transistor output modules in parallel



Sink type                                    Source type
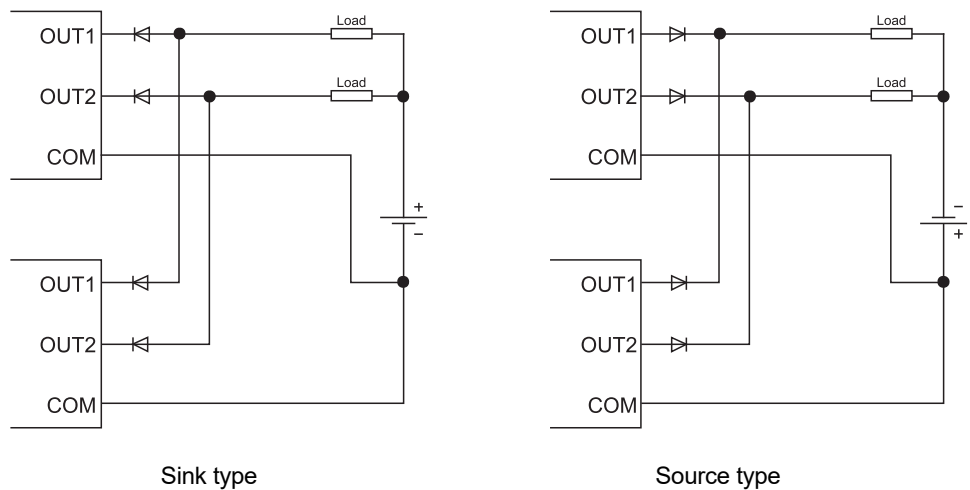
• When incorporating an additional circuit parallel to a transistor output module
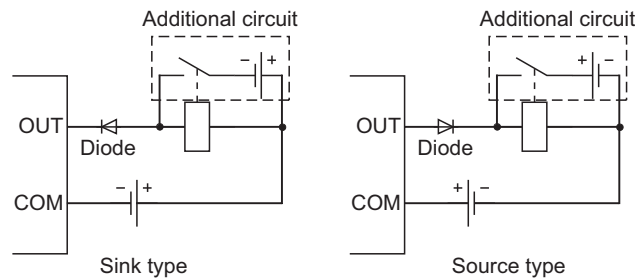


Sink type                    Source type

(b) Measure against back EMF

When an inductive load is connected, connect a diode to the load in parallel.

Use a diode that meets the following conditions.

• Reverse breakdown voltage is 10 times as high as the circuit voltage or more.

• Forward current is twice as high as the load current or more.

| OUT | Inductive load | | |
|---|---|---|---|
| | Diode | + − | |
| COM | | | |

Sink type

| OUT | Inductive load | | |
|---|---|---|---|
| | Diode | − + | |
| COM | | | |

Source type
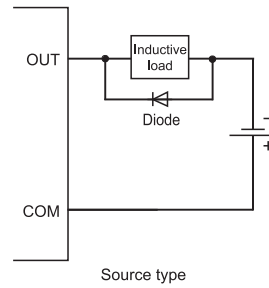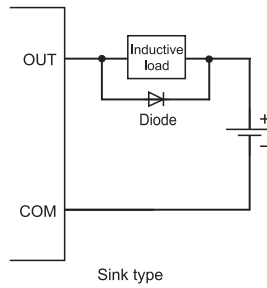
(7) Precautions for using the contact output module
When using the contact output module, consider the following.
• Relay life (contact switching life)
• Effects to relay life due to connected load
• Measures against back EMF

(a) Relay life
Applicable module: QY10, QY10-TS, QY18A
The relay life depends on the operating environment.
Select a module according to the operating environment.
The relay lives shown below are the actual service values, not the guaranteed values. Replace the module well in advance since the actual switching life may be shorter than the one shown below.



$\tau$ (L/R): Time constant
$\cos \phi$ : Power factor

30VDC $\tau$=0ms

100VAC $\cos\phi$=0.7
200VAC $\cos\phi$=0.7

100VAC $\cos\phi$=0.35

200VAC $\cos\phi$=0.35
24VDC $\tau$=7ms

120VAC $\cos\phi$=0.2

240VAC $\cos\phi$=0.2

100VDC $\tau$=7ms

Switching life (10,000 times)

Switching current (A)
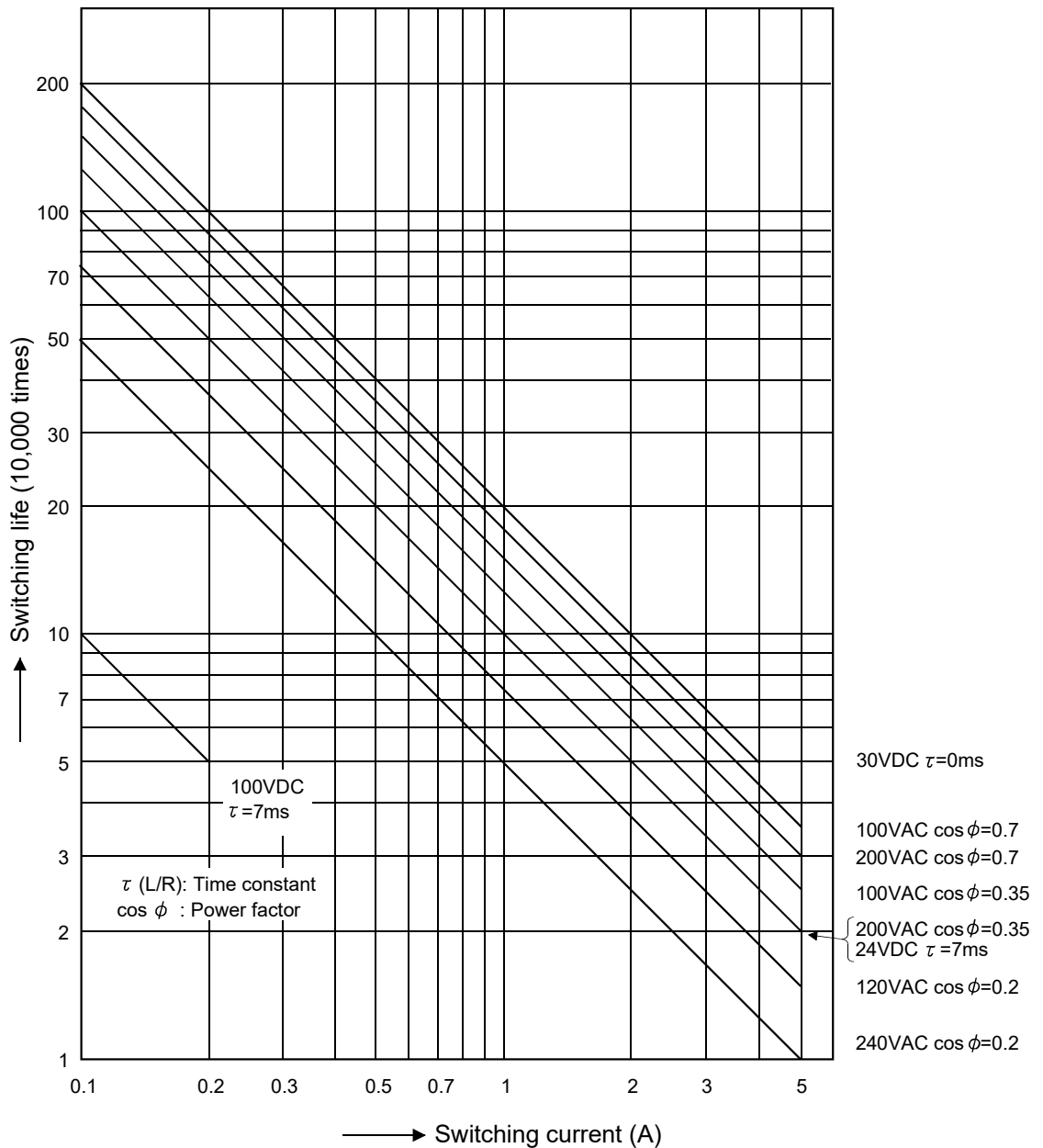
| Operating environment | Switching life |
|---|---|
| Rated switching voltage/current load | 100 thousand times |
| 200VAC 1.5A, 240VAC 1A (COS $\phi$ =0.7) | 100 thousand times |
| 200VAC 0.4A, 240VAC 0.3A (COS $\phi$ =0.7) | 300 thousand times |
| 200VAC 1A, 240VAC 0.5A (COS $\phi$ =0.35) | 100 thousand times |
| 200VAC 0.3A, 240VAC 0.15A (COS $\phi$ =0.35) | 300 thousand times |
| 24VDC 1A, 100VDC 0.1A (L/R=7ms) | 100 thousand times |
| 24VDC 0.3A, 100VDC 0.03A (L/R=7ms) | 300 thousand times |

POINT

When using the module for the application in which the relay contact is frequently switched, the relay life span should be considered. It is recommended to use a triac output module.

(b) Measures against inrush current

The actual relay life may be significantly shortened compared to the one shown in (7)(a), depending on the type of a load connected and the characteristics of inrush current.
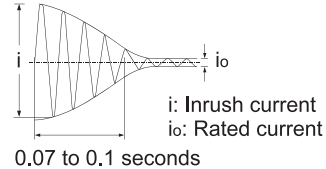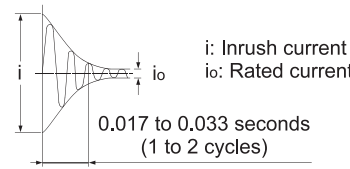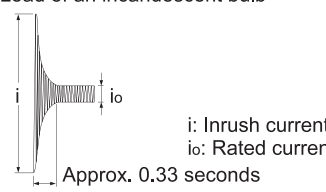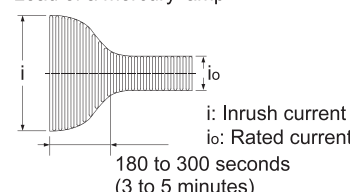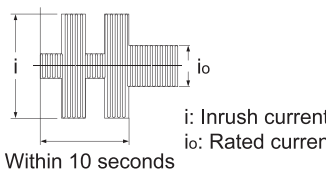
Also, the inrush current may cause contact welding.

Take the following measures to prevent shortening of the relay life and the contact welding.

• Select a load so that the inrush current will be within the rated current of the module.

• Connect an external relay that can withstand the inrush current.
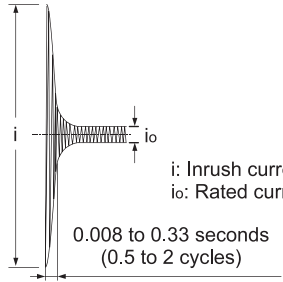
The following table shows the relation between the load and the inrush current. Select a load so that the inrush current (i) and the rated current (io) will be within the rated switching current specified for the output module used.

The inrush current may flow for a longer time depending on the load.

| Load type | Signal waveform diagram | Inrush current(i)/rated current (io) | Signal waveform diagram | Inrush current(i)/rated current (io) |
|---|---|---|---|---|
| Inductive load | Load of a solenoid<br>i: Inrush current<br>io: Rated current<br>0.07 to 0.1 seconds | Approx. 10 to 20 times | Load of an electromagnetic contactor<br>i: Inrush current<br>io: Rated current<br>0.017 to 0.033 seconds (1 to 2 cycles) | Approx. 3 to 10 times |
| Lamp load | Load of an incandescent bulb<br>i: Inrush current<br>io: Rated current<br>Approx. 0.33 seconds | Approx. 3 to 10 times | Load of a mercury lamp<br>i: Inrush current<br>io: Rated current<br>180 to 300 seconds (3 to 5 minutes) | Approx. 3 times[1] |
| | Load of a fluorescent<br>i: Inrush current<br>io: Rated current<br>Within 10 seconds | Approx. 5 to 10 times | — | — |

(To the next page)

*1: Typical electric-discharge lamp circuit includes discharge tubes, transformers, choke coils, and capacitors. Therefore, note that the inrush current may flow 20 to 40 times as large as the rated current in the case of high power factor and low power impedance.

| Load type | Signal waveform diagram | Inrush current(i)/rated current (io) | Signal waveform diagram | Inrush current(i)/rated current (io) |
|---|---|---|---|---|
| Capacitive load | Capacitive load[2]<br><br>i<br>io<br>i: Inrush current<br>io: Rated current<br><br>0.008 to 0.33 seconds<br>(0.5 to 2 cycles) | Approx. 20 to 40 times | — | — |

*2: When the wiring of the circuit is long, take care of the wire capacity.
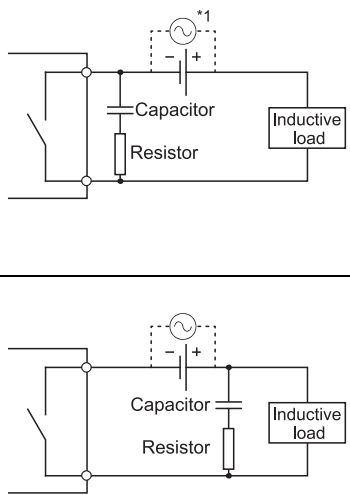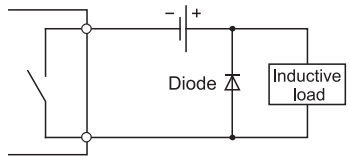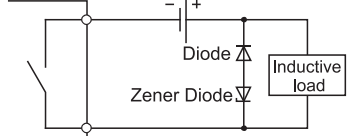
(c) Measures against back EMF

Configure a contact protection circuit for extending the contact life, preventing noise when the contact is cut off, and suppressing the generation of carbide and nitric acid due to arc discharge.

An Incorrect contact protection circuit may cause contact welding.
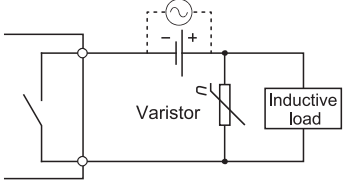
Also, when using the contact protection circuit, the recovery time may be long.

The following table shows the representative examples of the contact protection circuit.

| Circuit example | | Method for selecting elements | Remarks |
|---|---|---|---|
| Capacitor + Resistor method (CR method) |  | Refer to the following for constants of the capacitor and resistor. Note that the following values may differ depending on a nature of the load and a variation of characteristics of it.<br>• Capacitor 0.5 to 1 ($\mu$F) against contact current of 1A<br>• Resistor 0.5 to 1 ($\Omega$)against contact voltage of 1V<br><br>Use a capacitor whose withstand voltage is 200 to 300V. In AC circuit, use a capacitor having no polarity. | If a load is from a relay or solenoid, the recovery time delays.<br>A capacitor suppresses electric discharge while a contact is off, and a resistor restricts a flow of current while a contact is on. |
| Diode method |  | Use a diode whose reverse breakdown voltage is 10 times as high as the circuit voltage or more and whose forward current is twice as high as the load current or more. | The recovery time is later than the CR method. |
| Diode + Zener diode method |  | Use zener voltage for the zener diode equal to or more than the power supply voltage. | The diode method is effective when the recovery time is too late. |

*1: When using AC power, impedance of CR must be larger enough than that of the load. (prevention of a malfunction due to leak current from the CR)
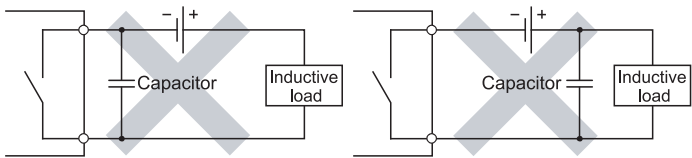
| Circuit example | Method for selecting elements | Remarks |
|---|---|---|
| Varistor method  | Select a cut voltage (Vc) for the varistor to meet the following condition. Multiply the value by root two for use of AC power.<br>Vc > Power supply voltage × 1.5 (V)<br>Note that when selecting an element whose Vc is too high, its effect will weaken. | The recovery time delays slightly. |

POINT

(1) Avoid providing contact protection circuits shown below.
    These circuits are effective for preventing an arc at shut-off. However, the contact welding may occur because the charge current flows to capacitor when the contact turns on or off.
    A DC inductive load is usually harder for switching than a resistor load, but if a proper protection circuit is configured, the performance will be similar to the resistor load.



(2) A protection circuit must be provided closely to a load or contact (module). If their distance is far, the protection circuit may not be effective. Appropriate distance is within 50cm.

(8) Precautions for using the triac output module

Because of characteristics of a triac, a sudden change of voltage or current may cause unstable operations of a triac used for the triac output module.

Whether the voltage or current change causes a problem differs depending on an individual part (each triac), thus check the following when using the triac output module.

(a) Checking of the load current

When the current consumption is equal to or smaller than the minimum load current and the margin is low by using an inductive load such as a solenoid valve, a triac may not turn on or off properly. In that case, an action such as connecting a bleeder resistance is required.

For detail on actions, refer to Section 11.2.

(b) Precautions on a full-wave rectifier load

The load current of a full-wave rectifier load forms waves similar to rectangular waves as shown below.
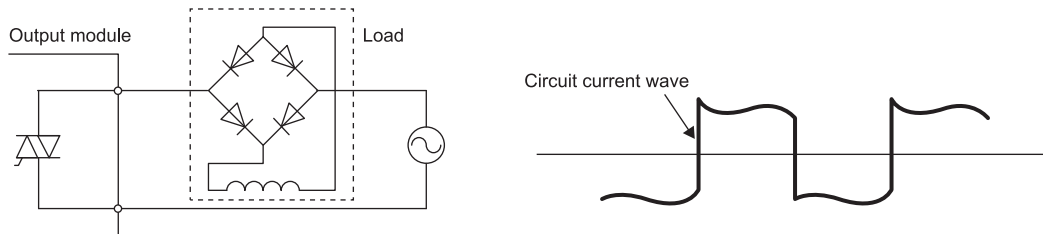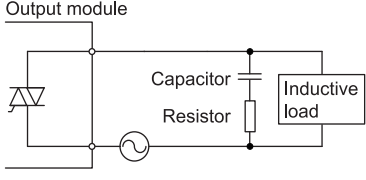


A triac may not operate properly if the current forms rectangular waves associated with sudden current changes. To avoid it, use a load with which the load current does not form rectangular waves.

(c) Measures for connecting an inductive load

To connect an inductive load, take measures to reduce noise to the side where the load is connected as shown below.
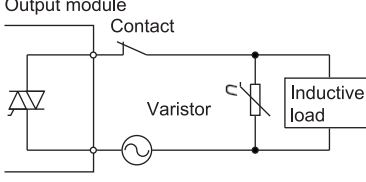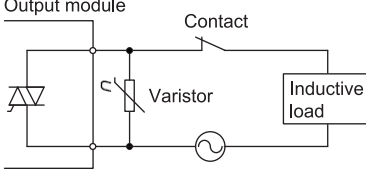
| | Circuit example | Method for selecting elements | Remarks |
|---|---|---|---|
| Varistor method |  | Select a cut voltage (Vc) for the varistor to meet the following condition.<br>• Vc > Power supply voltage $\times$ 1.5(V) $\times$ $\sqrt{2}$<br>This method is not effective when the Vc is too high. | The recovery time delays slightly. |

| Circuit example | Method for selecting elements | Remarks |
|---|---|---|
| Capacitor + Resistor method (CR method) | Refer to the following for constants of the capacitor and resistor. Note that the following values may differ depending on a nature of the load and a variation of characteristics of it.<br>• Capacitor: 0.5 to 1 ($\mu$F) against load current of 1A<br>• Resistor: 0.5 to 1($\Omega$) against power supply voltage of 1V<br>Use a capacitor whose withstand voltage is equal to or more than the rated voltage. Use a capacitor having no polarity. | If a load is a relay or solenoid, the recovery time delays. |

(d) Measures for connecting an inductive load (when installing a contact between the load and the output terminal)
    To install a contact (such as an interlock) between the load and the output terminal, take measures to reduce noise as shown below.
    Though measures (varistor method, capacitor + resistor method) are normally taken to the load side, in some cases, it is more efficient to take the measures to the module side considering the contact effect.

| Circuit example | Method for selecting elements | Remarks |
|---|---|---|
| Varistor method | Select a cut voltage (Vc) for the varistor to meet the following condition.<br>• Vc > Power supply voltage $\times$ 1.5(V) $\times$ $\sqrt{2}$<br>This method is not effective when the Vc is too high. | The recovery time delays slightly. |

## 1.2.3 I/O combined module

(1) I/O numbers of I/O combined modules

There are two types of I/O combined modules:

- Module using same I/O numbers for input and output
Since same number is used for input and output, the I/O numbers to be used can be saved.

- Module using sequential I/O numbers for input and output
Since I/O assignments are the same for A series, it is useful when replacing modules from those of A series.

| | Input (X) | Output (Y) | |
|---|---|---|---|
| 00 | X00 | Y00 | 32 points |
| | ↕ | ↕ | |
| 1F | X1F | Y1F | |
| | | | |

| | Input (X) | Output (Y) | |
|---|---|---|---|
| 00 | X00 | | 32 points |
| | ↕ | Vacant | |
| 1F | X1F | | |
| 20 | | Y20 | 32 points |
| | Vacant | ↕ | |
| 3F | | Y3F | |

Module using same I/O numbers for input and output (QH42P)

Module using sequential I/O numbers for input and output (QX41Y41P)

(2) Configuration of when an I/O combined module is used

For the QH42P, QX41Y41P, and QX48Y57, use them in the configuration below.

| Product | Description | Precautions |
|---|---|---|
| CPU module | The module whose serial number (first 5 digits) is "01112" or later | - |
| GX Developer | SW4D5C-GPPW or earlier | • Use it with "Output" being set to the I/O assignment.<br>• Input response time cannot be set. (fixed at 10ms) |
| | SW5D5C-GPPW or later | Use it with "I/O combined" being set to the I/O assignment. |

For how to check the serial number of the CPU module, refer to the QCPU User's Manual (Hardware Design, Maintenance and Inspection).

## 1.2.4 I/O module with protection function

The overload protection function and overheat protection function of the following modules are explained below.

(1) QY40P, QY41P, QY42P, QX41Y41P, QH42P

| Function | Description |
|---|---|
| Common (Overload and overheat protection functions) | • If an overcurrent due to overload keeps flowing, heat is generated and the overheat protection function is activated.<br>• The functions are provided for protecting only the circuits inside the module.<br>A load error, which causes an increase in temperature within the module, may deteriorate output elements or discolour the module case or printed circuit board. If a load error occurs, turn off the corresponding output immediately and eliminate the error cause. |
| Overload protection function | • The overload protection function is activated in units of 1 point at 1A to 3A/point.<br>• The overload protection function returns to normal operation when the load becomes a rated load. |
| Overheat protection function | • The overheat protection function is activated in units of 1 point.<br>• The overheat protection function automatically returns to normal operation after heat reduces. |

(2) QY81P, QY82P

| Function | Description |
|---|---|
| Common (Overload and overheat protection functions) | • If an overcurrent due to overload keeps flowing, heat is generated and the overheat protection function is activated.<br>• The functions are provided for protecting only the circuits inside the module.<br>A load error, which causes an increase in temperature within the module, may deteriorate output elements or discolour the module case or printed circuit board. If a load error occurs, turn off the corresponding output immediately and eliminate the error cause. |
| Overload protection function | • The overload protective function is activated in units of 1 point at 1A to 3A/point.<br>• The overload protective function returns to normal operation when the load becomes a rated load. |
| Overheat protection function | • The overheat protection function is activated in units of 2 points. (It is activated in units of 2 points of Y0/Y1, Y2/Y3, ..., and when overheat protection is activated, 2 points of them are activated simultaneously. If an overheat status persists, heat is conducted, and which may activate another overheat protection function.)<br>• If an output turns on at the activation of the overheat protection function, the actual output voltage oscillates between 0V and load voltage.<br>At the load voltage of 24V, the average voltage during oscillation is approx. 7V.<br>No oscillation occurs when the output is off at the activation of the overheat protection function.<br>To ensure that the output is turned off at the activation of the overheat protection function, use an external load that turns off at 7V or more.<br>• The overheat protective function automatically returns to normal operation after heat reduces. |

## 1.2.5 Interrupt module

(1) If setting the response time during the interrupt input operation of QI60 or QX40H, QX70H, QX80H, and QX90H, use the module whose contents are shown below. The response time cannot be set with other contents (fixed at 0.2ms.).

| Product | Description |
|---|---|
| CPU module | Product information "021120000000000-B" or later |
| GX Developer | SW6D5C-GPPW or later |

For how to check product information of the CPU module, refer to the QCPU User's Manual (Hardware Design, Maintenance and Inspection).

## 1.2.6 Installation and wiring

(1) Solderless terminal with insulation sleeve
A solderless terminal with insulation sleeve cannot be used for a terminal block.
It is recommended that the junction of a solderless terminal and a cable should be covered up with a cable tag or an insulation tube.

(2) Applicable wire
Use wires of 0.3 to 0.75mm$^2$ core and 2.8mm OD max. to connect to the terminal block. When using a wire whose core is 0.75mm or more, it is preferable to use the spring clamp terminal block (Q6TE-18S, Q6TE-18SN).

(3) Tightening torque range
Tighten screws (such as a module fixing screw) within the following torque range.

| Screw location | Tightening torque range |
|---|---|
| Module fixing screw (M3 $\times$ 12 screw) | 0.36 to 0.48 N•m |
| Terminal block screw (M3 screw) | 0.42 to 0.58 N•m |
| Terminal block mounting screw (M3.5 screw) | 0.66 to 0.89 N•m |
| Connector screw (M2.6 screw) | 0.20 to 0.29 N•m |

## 1.3 Various Settings for I/O Module

Various settings for the I/O module can be made with GX Developer.
This section describes how to make the settings with GX Developer.

### 1.3.1 Setting of I/O response time

Set the I/O response time on the I/O assignment tab of PLC Parameter.

(1) For Input/I/O mix module
Select "Input" or "I/O mix" in "Type" combo box on the I/O assignment tab of PLC parameter. Then, click the "Detailed setting" button, and then select the input response time in "I/O response time" combo box.

Choose Input/I/O mix.                          Choose Detailed setting.
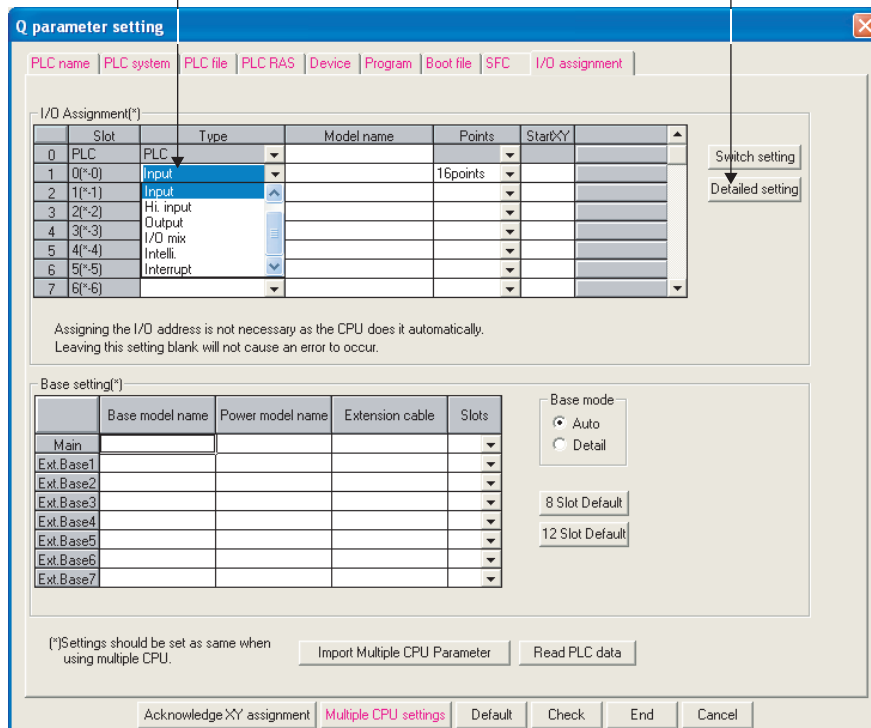


Choose I/O response time
(default: 10ms).
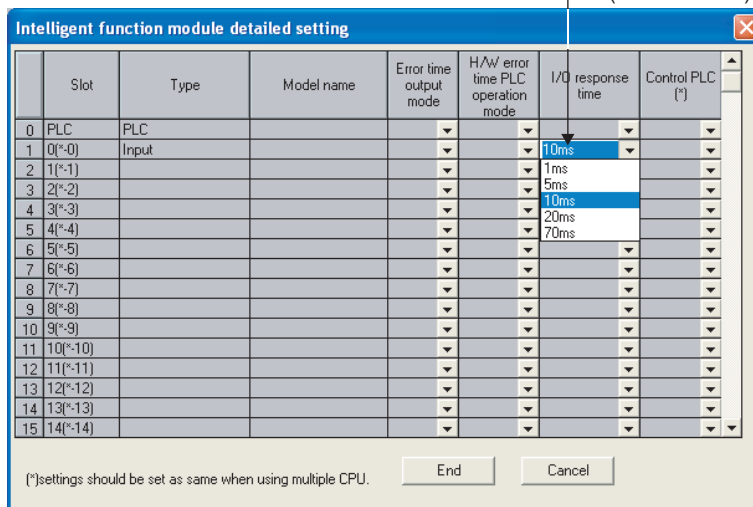
(2) For input module/QX40-S1, QX41-S1, QX42-S1, QX82-S1 and interrupt
module/QI60
Select "Hi. input" or "Interrupt" in "Type" combo box on the I/O assignment tab of
PLC parameter. Then, click the "Detailed setting" button, and then select the input
response time in "I/O response time"[1] combo box.

Choose Hi. input/Interrupt.

Choose Detailed setting.

**Q parameter setting**

PLC name | PLC system | PLC file | PLC RAS | Device | Program | Boot file | SFC | I/O assignment

I/O Assignment(*)

| | Slot | Type | Model name | Points | StartXY | |
|---|---|---|---|---|---|---|
| 0 | PLC | PLC | | | | |
| 1 | 0(*-0) | Hi. input | | 16points | | |
| 2 | 1(*-1) | Input | | | | |
| 3 | 2(*-2) | Hi. input | | | | |
| 4 | 3(*-3) | Output | | | | |
| 5 | 4(*-4) | I/O mix | | | | |
| 6 | 5(*-5) | Intelli. | | | | |
| 7 | 6(*-6) | Interrupt | | | | |

Switch setting

Detailed setting

Assigning the I/O address is not necessary as the CPU does it automatically.
Leaving this setting blank will not cause an error to occur.

Base setting(*)

| | Base model name | Power model name | Extension cable | Slots |
|---|---|---|---|---|
| Main | | | | |
| Ext.Base1 | | | | |
| Ext.Base2 | | | | |
| Ext.Base3 | | | | |
| Ext.Base4 | | | | |
| Ext.Base5 | | | | |
| Ext.Base6 | | | | |
| Ext.Base7 | | | | |

Base mode
◉ Auto
○ Detail

8 Slot Default

12 Slot Default

(*)Settings should be set as same when
using multiple CPU.

Import Multiple CPU Parameter     Read PLC data

Acknowledge XY assignment | Multiple CPU settings | Default | Check | End | Cancel

Choose I/O response time
(default: 0.2ms).

**Intelligent function module detailed setting**

| | Slot | Type | Model name | Error time output mode | H/W error time PLC operation mode | I/O response time | Control PLC (*) |
|---|---|---|---|---|---|---|---|
| 0 | PLC | PLC | | | | | |
| 1 | 0(*-0) | Hi. input | | | | 0.2ms | |
| 2 | 1(*-1) | | | | | 0.1ms | |
| 3 | 2(*-2) | | | | | 0.2ms | |
| 4 | 3(*-3) | | | | | 0.4ms | |
| 5 | 4(*-4) | | | | | 0.6ms | |
| 6 | 5(*-5) | | | | | 1ms | |
| 7 | 6(*-6) | | | | | | |
| 8 | 7(*-7) | | | | | | |
| 9 | 8(*-8) | | | | | | |
| 10 | 9(*-9) | | | | | | |
| 11 | 10(*-10) | | | | | | |
| 12 | 11(*-11) | | | | | | |
| 13 | 12(*-12) | | | | | | |
| 14 | 13(*-13) | | | | | | |
| 15 | 14(*-14) | | | | | | |

(*)settings should be set as same when using multiple CPU.        End       Cancel

*1: When the actual response time differs from the setting value, refer to the specifications of
the relevant input modules.

(3) For high-speed input module/QX40H, QX70H, QX80H, QX90H
Select "Hi.input" or "Interrupt", which is the same module type as the one selected with the high-speed input module switch, in "Type" combo box on the I/O assignment tab of PLC parameter.[1] Then, click the "Detailed setting" button, and then select the input response time in "I/O response time"[2][3] combo box.

Choose Hi. input/Interrupt.

Choose Detailed setting.
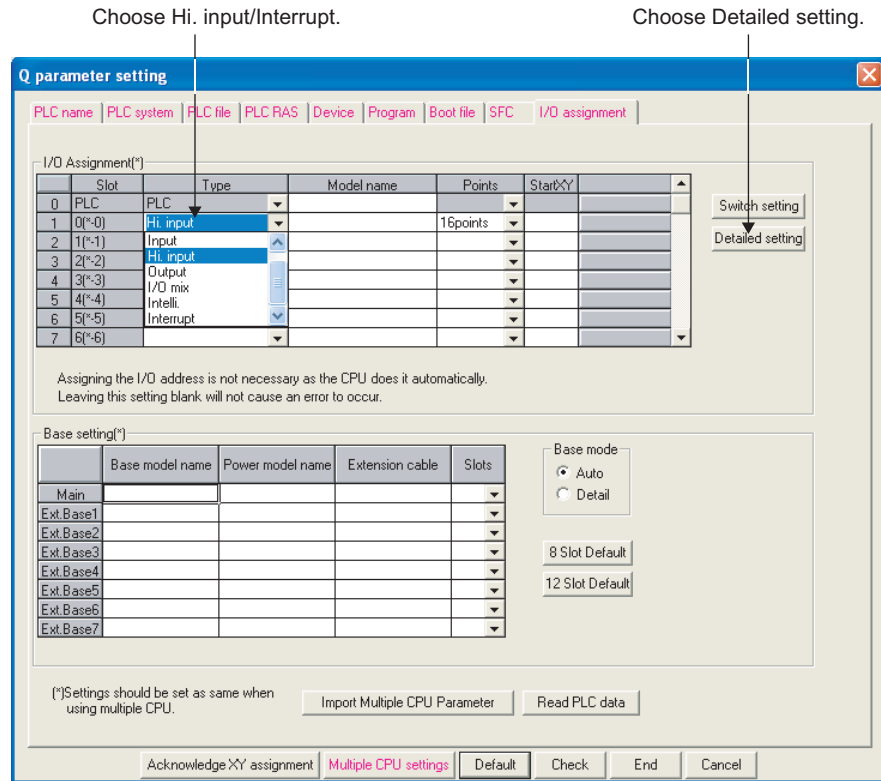


Choose I/O response time (default: 0.2ms).
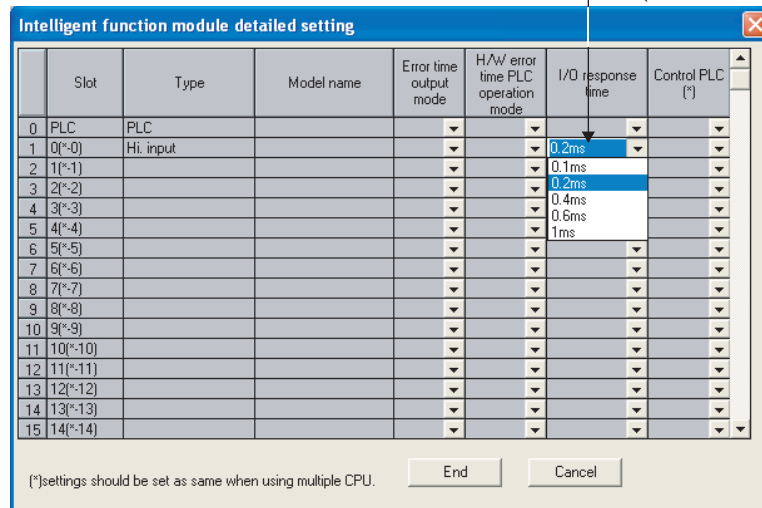


*1: If a different module type from the one selected by the function selector switch (switch 2) of the high-speed input module is selected, an error occurs.

*2: If the noise filter is disabled with the noise filter selector switch (switch 1) of the high-speed input module, the setting value is ignored.

*3: When the actual response time differs from the setting value, refer to the specifications of the relevant input modules.

## 1.3.2 Setting of error-time output mode

Set the error-time output mode on the I/O assignment tab of PLC parameter in GX Developer.
Select "Output" or "I/O mix" in the "Type" combo box on the I/O assignment tab of PLC parameter. Then, click the "Detailed setting" button, and then select "Clear" or "Hold" in the "Error time output mode" combo box.

Choose Output/I/O mix.

Choose Detailed setting.



Choose Clear/Hold (default: Clear).
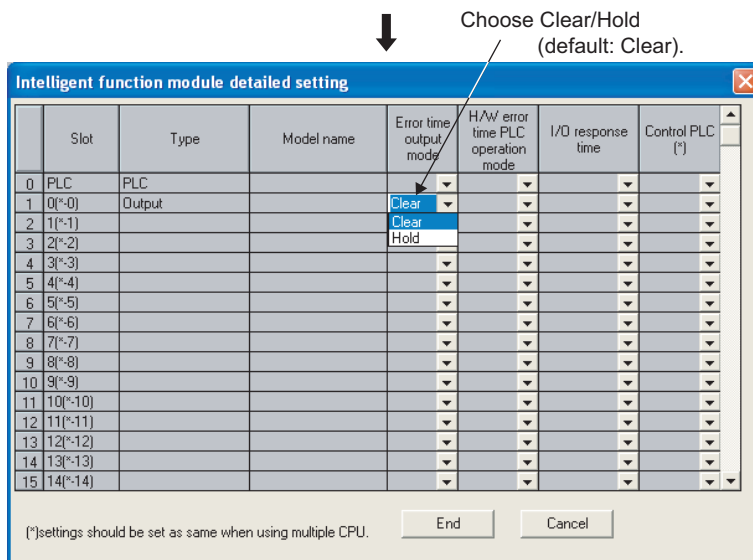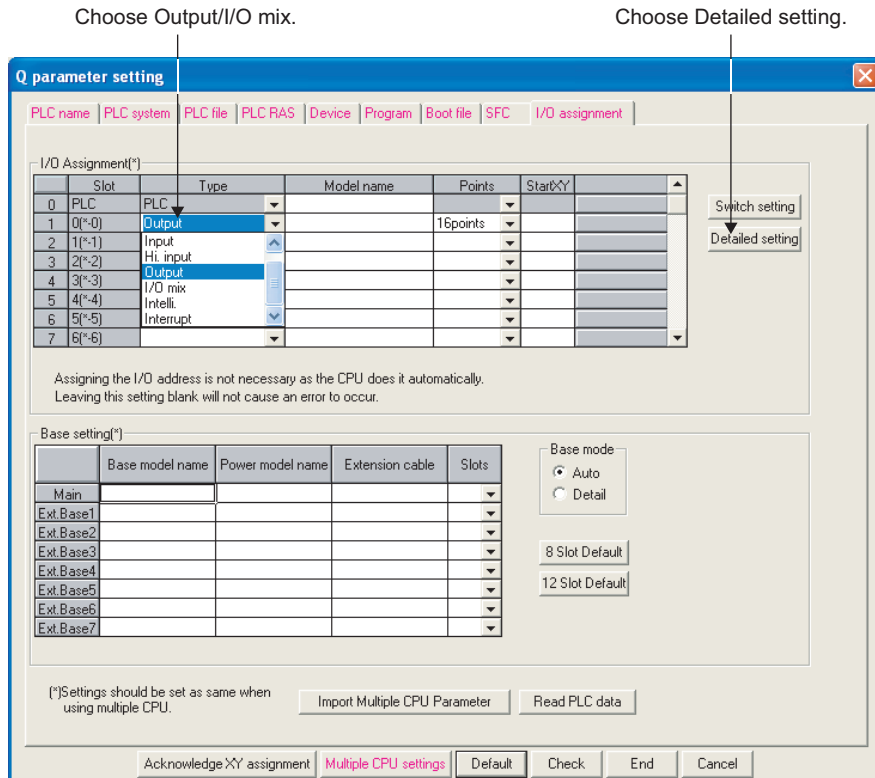
## 1.3.3 Switch setting of interrupt module

Perform the switch setting on the I/O assignment tab of PLC parameter when operating the interrupt input for QI60, QX40H, QX70H, QX80H, or QX90H. Select "Interrupt" in the "Type" combo box on the I/O assignment tab of PLC parameter. Then, click the "Switch setting" button, and then select "HEX" in the "Input format" combo box. Lastly, set 0 (leading edge) or 1 (trailing edge) in the "Switch 1" box for the interrupt processing.

Choose Interrupt.                                        Choose Switch setting.



Choose HEX.
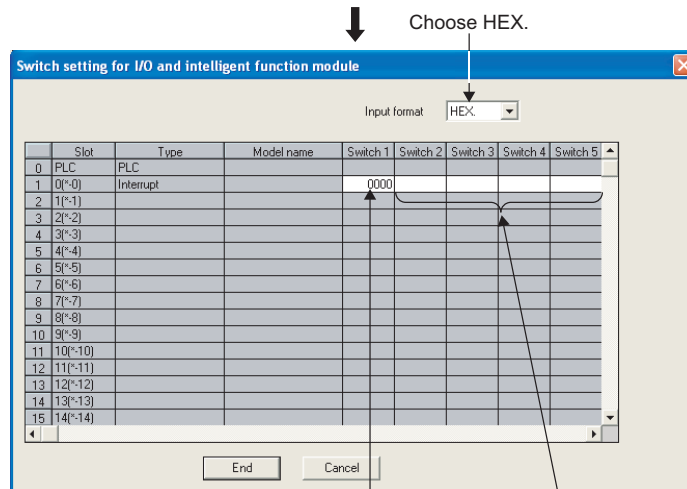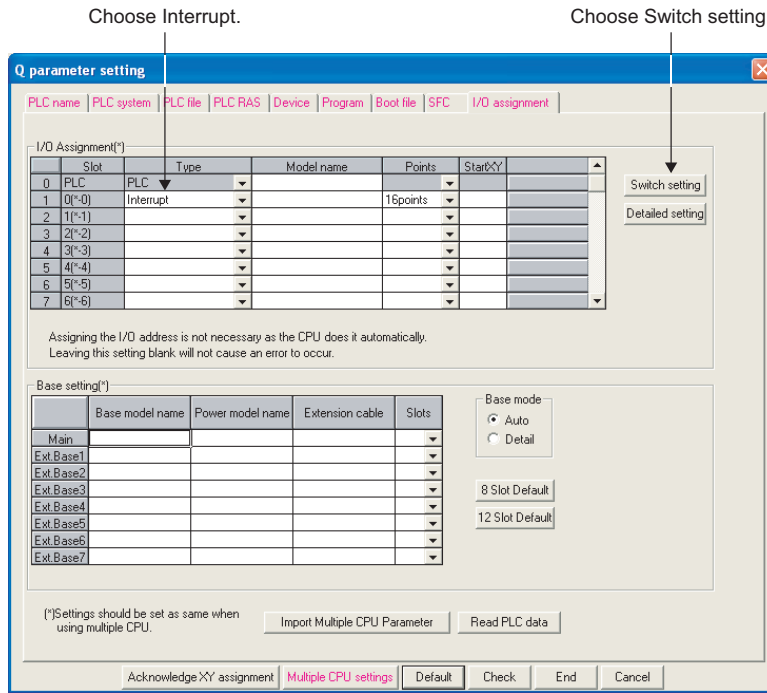


Set the interrupt processing conditions                 Setting inhibited.
(leading edge/trailing edge) of CH1 to CH16.

Set the interrupt processing condition with switch 1. The relationships between bits and inputs are as indicated below.

| b15 | | | | | | to | | | | | | | | | b0 |
|-----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| XF | XE | XD | XC | XB | XA | X9 | X8 | X7 | X6 | X5 | X4 | X3 | X2 | X1 | X0 |
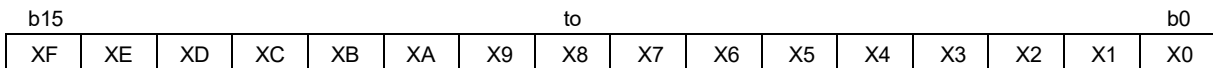
0: Leading edge, 1: Trailing edge

# MEMO

# 2. INPUT MODULE SPECIFICATIONS

## 2.1 QX10 AC Input Module

| Specifications / Type | | AC input module | Appearance |
|---|---|---|---|
| | | QX10 | |
| Number of input points | | 16 points | |
| Isolation method | | Photocoupler | |
| Rated input voltage, frequency | | 100-120VAC (+10/-15%) 50/60Hz (±3Hz) | |
| Input voltage distortion | | Within 5% (Refer to section 1.2) | |
| Rated input current | | Approx. 8mA (100VAC, 60Hz), approx. 7mA (100VAC, 50Hz) | |
| Input derating | | Refer to the derating chart. | |
| Inrush current | | Max. 200mA within 1ms (at 132VAC) | |
| ON voltage/ON current | | 80VAC or higher/5mA or higher (50Hz, 60Hz) | |
| OFF voltage/OFF current | | 30VAC or lower/1.7mA or lower (50Hz, 60Hz) | |
| Input impedance | | Approx. 12kΩ (60Hz), approx. 15kΩ (50Hz) | |
| Response time | OFF to ON | 15ms or less (100VAC 50Hz, 60Hz) | |
| | ON to OFF | 20ms or less (100VAC 50Hz, 60Hz) | |
| Dielectric withstand voltage | | 1780VAC rms/3 cycles (altitude 2000m) | |
| Insulation resistance | | 10MΩ or more by insulation resistance tester | |
| Noise immunity | | By noise simulator of 1500Vp-p noise voltage, 1 $\mu$ s noise width and 25 to 60Hz noise frequency | |
| | | First transient noise IEC61000-4-4: 1kV | |
| Protection degree | | IP1X | |
| Common terminal arrangement | | 16 points/common (common terminal: TB17) | |
| Number of occupied I/O points | | 16 points (I/O assignment is set as a 16-point input module.) | |
| Operation indicator | | ON indication (LED) | |
| External connections | | 18-point terminal block (M3 $\times$ 6 screws) | |
| Applicable wire size | | 0.3 to 0.75mm² core (2.8mm OD max.) | |
| Applicable crimping terminal | | R1.25-3 (Sleeved crimping terminals cannot be used.) | |
| Internal current consumption (5VDC) | | 50mA (TYP. all points ON) | |
| Weight | | 0.17kg | |



Derating chart



External connection



QX10 (16 points)

| Terminal block No. | Signal name | Terminal block No. | Signal name |
|---|---|---|---|
| | | TB1 | X00 |
| TB2 | X01 | TB3 | X02 |
| TB4 | X03 | TB5 | X04 |
| TB6 | X05 | TB7 | X06 |
| TB8 | X07 | TB9 | X08 |
| TB10 | X09 | TB11 | X0A |
| TB12 | X0B | TB13 | X0C |
| TB14 | X0D | TB15 | X0E |
| TB16 | X0F | TB17 | COM |
| TB18 | Vacant | | |

## 2.2 QX10-TS AC Input Module

This module is a spring clamp terminal block type and an input module that has indicators for checking the insertion state of wire.

| Type / Specifications | | AC input module | |
|---|---|---|---|
| | | QX10-TS | Appearance |
| Number of input points | | 16 points | |
| Isolation method | | Photocoupler | |
| Rated input voltage, frequency | | 100-120VAC (+10/-15%) 50/60Hz (±3Hz) | |
| Input voltage distortion | | Within 5% (Refer to section 1.2) | |
| Rated input current | | Approx. 8mA (100VAC, 60Hz), approx. 7mA (100VAC, 50Hz) | |
| Input derating | | Refer to the derating chart. | |
| Inrush current | | Max. 200mA within 1ms (at 132VAC) | |
| ON voltage/ON current | | 80VAC or higher/5mA or higher (50Hz, 60Hz) | |
| OFF voltage/OFF current | | 30VAC or lower/1.7mA or lower (50Hz, 60Hz) | |
| Input impedance | | Approx. 12kΩ (60Hz), approx. 15kΩ (50Hz) | |
| Response time | OFF to ON | 15ms or less (100VAC 50Hz, 60Hz) | |
| | ON to OFF | 20ms or less (100VAC 50Hz, 60Hz) | |
| Dielectric withstand voltage | | 1780VAC rms/3 cycles (altitude 2000m) | |
| Insulation resistance | | 10MΩ or more by insulation resistance tester | |
| Noise immunity | | By noise simulator of 1500Vp-p noise voltage, 1 $\mu$ s noise width and 25 to 60Hz noise frequency | |
| | | First transient noise IEC61000-4-4: 1kV | |
| Protection degree | | IP2X | |
| Common terminal arrangement | | 16 points/common (common terminal: TB17) | |
| Number of occupied I/O points | | 16 points (I/O assignment is set as a 16-point input module.) | |
| Operation indicator | | ON indication (LED) | |
| External connections | | Two-piece spring clamp terminal block | |
| Applicable wire size | | 0.3 to 2.0mm$^2$ core (22 to 15 AWG) | |
| Applicable crimping terminal | | Refer to section 9.1 | |
| Internal current consumption (5VDC) | | 50mA (TYP. all points ON) | |
| Weight | | 0.17kg | |

| Derating chart | QX10-TS (16 points) |
|---|---|



| Terminal block No. | Signal name | Terminal block No. | Signal name |
|---|---|---|---|
| | | TB1 | X00 |
| TB2 | X01 | TB3 | X02 |
| TB4 | X03 | TB5 | X04 |
| TB6 | X05 | TB7 | X06 |
| TB8 | X07 | TB9 | X08 |
| TB10 | X09 | TB11 | X0A |
| TB12 | X0B | TB13 | X0C |
| TB14 | X0D | TB15 | X0E |
| TB16 | X0F | TB17 | COM |
| TB18 | Vacant | | |

**External connection**

## 2.3 QX28 AC Input Module

| Type | AC input module | | Appearance |
|---|---|---|---|
| Specifications | QX28 | | |
| Number of input points | 8 points | | |
| Isolation method | Photocoupler | | |
| Rated input voltage, frequency | 100-240VAC (+10/-15%) 50/60Hz (±3Hz) | | |
| Input voltage distortion | Within 5% (Refer to section 1.2) | | |
| Rated input current | Approx. 17mA (200VAC, 60Hz), approx. 14mA (200VAC, 50Hz) Approx. 8mA (100VAC, 60Hz), approx. 7mA (100VAC, 50Hz) | | |
| Input derating | Refer to the derating chart. | | |
| Inrush current | Max. 950mA within 1ms (at 264VAC) | | |
| ON voltage/ON current | 80VAC or higher/5mA or higher (50Hz, 60Hz) | | |
| OFF voltage/OFF current | 30VAC or lower/1.7mA or lower (50Hz, 60Hz) | | |
| Input impedance | Approx. 12kΩ (60Hz), approx. 15kΩ (50Hz) | | |
| Response time | OFF to ON | 10ms or less (200VAC 50Hz, 60Hz) | |
| | ON to OFF | 20ms or less (200VAC 50Hz, 60Hz) | |
| Dielectric withstand voltage | 2830VAC rms/3 cycles (altitude 2000m) | | |
| Insulation resistance | 10MΩ or more by insulation resistance tester | | |
| Noise immunity | By noise simulator of 1500Vp-p noise voltage, $1\mu$s noise width and 25 to 60Hz noise frequency | | |
| | First transient noise IEC61000-4-4: 1kV | | |
| Protection degree | IP1X | | |
| Common terminal arrangement | 8 points/common (common terminal: TB17) | | |
| Number of occupied I/O points | 16 points (I/O assignment is set as a 16-point input module.) | | |
| Operation indicator | ON indication (LED) | | |
| External connections | 18-point terminal block (M3×6 screws) | | |
| Applicable wire size | 0.3 to 0.75mm$^2$ core (2.8mm OD max.) | | |
| Applicable crimping terminal | R1.25-3 (Sleeved crimping terminals cannot be used.) | | |
| Internal current consumption (5VDC) | 50mA (TYP. all points ON) | | |
| Weight | 0.20kg | | |

| Derating chart | Terminal block No. | Signal name |
|---|---|---|
|  | TB1 | X00 |
| | TB2 | Vacant |
| | TB3 | X01 |
| | TB4 | Vacant |
| | TB5 | X02 |
| | TB6 | Vacant |
| | TB7 | X03 |
| External connection | TB8 | Vacant |
| | TB9 | X04 |
| | TB10 | Vacant |
|  | TB11 | X05 |
| | TB12 | Vacant |
| | TB13 | X06 |
| | TB14 | Vacant |
| | TB15 | X07 |
| | TB16 | Vacant |
| | TB17 | COM |
| | TB18 | Vacant |

## 2.4 QX40 DC Input Module (Positive Common Type)

| Specifications / Type | DC input module (Positive common type) | |
|---|---|---|
| | QX40 | Appearance |
| Number of input points | 16 points | |
| Isolation method | Photocoupler | |
| Rated input voltage | 24VDC (+20/-15%, ripple ratio within 5%) | |
| Rated input current | Approx. 4mA | |
| Input derating | No | |
| ON voltage/ON current | 19V or higher/3mA or higher | |
| OFF voltage/OFF current | 11V or lower/1.7mA or lower | |
| Input impedance | Approx. 5.6kΩ | |
| Response time — OFF to ON | 1ms/5ms/10ms/20ms/70ms or less (configured in PLC parameter) *1 (Default: 10ms) | |
| Response time — ON to OFF | 1ms/5ms/10ms/20ms/70ms or less (configured in PLC parameter) *1 (Default: 10ms) | |
| Dielectric withstand voltage | 560VAC rms/3 cycles (altitude 2000m) | |
| Insulation resistance | 10MΩ or more by insulation resistance tester | |
| Noise immunity | By noise simulator of 500Vp-p noise voltage, 1 $\mu$s noise width and 25 to 60Hz noise frequency | |
| | First transient noise IEC61000-4-4: 1kV | |
| Protection degree | IP2X | |
| Common terminal arrangement | 16 points/common (common terminal: TB17) | |
| Number of occupied I/O points | 16 points (I/O assignment is set as a 16-point input module.) | |
| Operation indicator | ON indication (LED) | |
| External connections | 18-point terminal block (M3 × 6 screws) | |
| Applicable wire size | 0.3 to 0.75mm² core (2.8mm OD max.) | |
| Applicable crimping terminal | R1.25-3 (Sleeved crimping terminals cannot be used.) | |
| Internal current consumption (5VDC) | 50mA (TYP. all points ON) | |
| Weight | 0.16kg | |

QX40
0 1 2 3 4 5 6 7
8 9 A B C D E F

| External connection | QX40 (16 points) | |
|---|---|---|

| Terminal block No. | Signal name |
|---|---|
| TB1 | X00 |
| TB2 | X01 |
| TB3 | X02 |
| TB4 | X03 |
| TB5 | X04 |
| TB6 | X05 |
| TB7 | X06 |
| TB8 | X07 |
| TB9 | X08 |
| TB10 | X09 |
| TB11 | X0A |
| TB12 | X0B |
| TB13 | X0C |
| TB14 | X0D |
| TB15 | X0E |
| TB16 | X0F |
| TB17 | COM |
| TB18 | Vacant |

*1: For the setting method, refer to Section 1.3.1.

## 2.5 QX40-S1 DC Input Module (Positive Common Type)

| Specifications | Type | DC input module (Positive common type) | | | | | Appearance |
|---|---|---|---|---|---|---|---|
| | | QX40-S1 | | | | | |
| Number of input points | | 16 points | | | | | |
| Isolation method | | Photocoupler | | | | | |
| Rated input voltage | | 24VDC (+20/-15%, ripple ratio within 5%) | | | | | |
| Rated input current | | Approx. 6mA | | | | | |
| Input derating | | No | | | | | |
| ON voltage/ON current | | 19V or higher/4.0mA or higher | | | | | |
| OFF voltage/OFF current | | 11V or lower/1.7mA or lower | | | | | |
| Input impedance | | Approx. 3.9kΩ | | | | | |
| Response time | Set value *1 | 0.1 | 0.2 | 0.4 | 0.6 | 1 | |
| | OFF to ON TYP. | 0.05ms | 0.15ms | 0.30ms | 0.55ms | 1.05ms | |
| | OFF to ON MAX. | 0.10ms | 0.20ms | 0.40ms | 0.60ms | 1.20ms | |
| | ON to OFF TYP. | 0.15ms | 0.20ms | 0.35ms | 0.60ms | 1.10ms | |
| | ON to OFF MAX. | 0.20ms | 0.30ms | 0.50ms | 0.70ms | 1.30ms | |
| Dielectric withstand voltage | | 560VAC rms/3 cycles (altitude 2000m) | | | | | |
| Insulation resistance | | 10MΩ or more by insulation resistance tester | | | | | |
| Noise immunity | | By noise simulator of 500Vp-p noise voltage, 1 $\mu$ s noise width and 25 to 60Hz noise frequency | | | | | |
| | | First transient noise IEC61000-4-4: 1kV | | | | | |
| Protection degree | | IP2X | | | | | |
| Common terminal arrangement | | 16 points/common (common terminal: TB17) | | | | | |
| Number of occupied I/O points | | 16 points (I/O assignment is set as a 16-point high-speed input module.) | | | | | |
| Operation indicator | | ON indication (LED) | | | | | |
| External connections | | 18-point terminal block (M3 $\times$ 6 screws) | | | | | |
| Applicable wire size | | 0.3 to 0.75mm$^2$ core (2.8mm OD max.) | | | | | |
| Applicable crimping terminal | | R1.25-3 (Sleeved crimping terminals cannot be used.) | | | | | |
| Internal current consumption (5VDC) | | 60mA (TYP. all points ON) | | | | | |
| Weight | | 0.20kg | | | | | |



| External connection | QX40-S1 (16 points) |
|---|---|



| Terminal block No. | Signal name |
|---|---|
| | TB1 X00 |
| TB2 X01 | |
| | TB3 X02 |
| TB4 X03 | |
| | TB5 X04 |
| TB6 X05 | |
| | TB7 X06 |
| TB8 X07 | |
| | TB9 X08 |
| TB10 X09 | |
| | TB11 X0A |
| TB12 X0B | |
| | TB13 X0C |
| TB14 X0D | |
| | TB15 X0E |
| TB16 X0F | |
| | TB17 COM |
| TB18 Vacant | |

*1: Configured in PLC parameter. (Default: 0.2ms)
  A response time setting value can be changed in GX Developer (SW5D5C-GPPW or later).
  For the setting method, refer to Section 1.3.1.

## 2.6 QX40-TS DC Input Module (Positive Common Type)

This module is a spring clamp terminal block type and an input module that has indicators for checking the insertion state of wire.

| Type / Specifications | | DC input module (Positive common type) | |
|---|---|---|---|
| | | QX40-TS | Appearance |
| Number of input points | | 16 points | |
| Isolation method | | Photocoupler | |
| Rated input voltage | | 24VDC (+20/-15%, ripple ratio within 5%) | |
| Rated input current | | Approx. 4mA | |
| Input derating | | No | |
| ON voltage/ON current | | 19V or higher/3mA or higher | |
| OFF voltage/OFF current | | 11V or lower/1.7mA or lower | |
| Input impedance | | Approx. 5.6kΩ | |
| Response time | OFF to ON | 1ms/5ms/10ms/20ms/70ms or less (configured in PLC parameter) ∗1 (Default: 10ms) | |
| | ON to OFF | 1ms/5ms/10ms/20ms/70ms or less (configured in PLC parameter) ∗1 (Default: 10ms) | |
| Dielectric withstand voltage | | 560VAC rms/3 cycles (altitude 2000m) | |
| Insulation resistance | | 10MΩ or more by insulation resistance tester | |
| Noise immunity | | By noise simulator of 500Vp-p noise voltage, 1$\mu$s noise width and 25 to 60Hz noise frequency | |
| | | First transient noise IEC61000-4-4: 1kV | |
| Protection degree | | IP2X | |
| Common terminal arrangement | | 16 points/common (common terminal: TB17) | |
| Number of occupied I/O points | | 16 points (I/O assignment is set as a 16-point input module.) | |
| Operation indicator | | ON indication (LED) | |
| External connections | | Two-piece spring clamp terminal block | |
| Applicable wire size | | 0.3 to 2.0mm$^2$ core (22 to 15 AWG) | |
| Applicable crimping terminal | | Refer to section 9.1 | |
| Internal current consumption (5VDC) | | 50mA (TYP. all points ON) | |
| Weight | | 0.16kg | |

| External connection | QX40-TS (16 points) | | | |
|---|---|---|---|---|
|  | Terminal block No. | | Signal name | |
| | | | TB1 | X00 |
| | TB2 | X01 | | |
| | | | TB3 | X02 |
| | TB4 | X03 | | |
| | | | TB5 | X04 |
| | TB6 | X05 | | |
| | | | TB7 | X06 |
| | TB8 | X07 | | |
| | | | TB9 | X08 |
| | TB10 | X09 | | |
| | | | TB11 | X0A |
| | TB12 | X0B | | |
| | | | TB13 | X0C |
| | TB14 | X0D | | |
| | | | TB15 | X0E |
| | TB16 | X0F | | |
| | | | TB17 | COM |
| | TB18 | Vacant | | |

∗1: For the setting method, refer to Section 1.3.1.

## 2.7 QX40H DC High-Speed Input Module (Positive Common Type)

| Specifications | | Type | DC high-speed input module (Positive common type) | | | | | | Appearance |
|---|---|---|---|---|---|---|---|---|---|
| | | | QX40H | | | | | | |
| Number of input points | | | 16 points | | | | | | |
| Isolation method | | | Photocoupler | | | | | | |
| Rated input voltage | | | 24VDC (+20/-15%, ripple ratio within 5%) | | | | | | |
| Rated input current | | | Approx. 6mA | | | | | | |
| Input derating | | | Refer to the derating chart. | | | | | | |
| ON voltage/ON current | | | 15V or higher/3mA or higher | | | | | | |
| OFF voltage/OFF current | | | 5V or lower/1.6mA or lower | | | | | | |
| Input impedance | | | Approx. 3.9kΩ | | | | | | |
| Response time | SW1 (noise filter) ＊1 | | OFF | ON | | | | | |
| | Set value ＊2 | | Invalid | 0.1 | 0.2 | 0.4 | 0.6 | 1 | |
| | OFF to ON | TYP. | 0ms ＊3 | 0.04ms | 0.10ms | 0.25ms | 0.50ms | 0.95ms | |
| | | MAX. | - ＊3 | 0.05ms | 0.15ms | 0.30ms | 0.60ms | 1.00ms | |
| | ON to OFF | TYP. | 0ms ＊3 | 0.04ms | 0.10ms | 0.25ms | 0.50ms | 0.95ms | |
| | | MAX. | - ＊3 | 0.05ms | 0.15ms | 0.30ms | 0.60ms | 1.00ms | |
| Function setting | SW2 ＊4 | | OFF: Interrupt, ON: High-speed input | | | | | | |
| Dielectric withstand voltage | | | 560VAC rms/3 cycles (altitude 2000m) | | | | | | |
| Insulation resistance | | | 10MΩ or more by insulation resistance tester | | | | | | |
| Noise immunity ＊5 | | | By noise simulator of 500Vp-p noise voltage, 1μs noise width and 25 to 60Hz noise frequency | | | | | | |
| Protection degree | | | IP2X | | | | | | |
| Common terminal arrangement | | | 8 points/common (common terminal: TB9, TB18) | | | | | | |
| Number of occupied I/O points | | | 16 points (I/O assignment is set as a 16-point high-speed input module or 16-point interrupt module.) ＊4 | | | | | | |
| Interrupt processing condition | | | Set by Switch setting in GX Developer ＊4 ＊6 | | | | | | |
| Operation indicator | | | ON indication (LED) | | | | | | |
| External connections | | | 18-point terminal block (M3×6 screws) | | | | | | |
| Applicable wire size | | | 0.3 to 0.75mm² core (2.8mm OD max.) | | | | | | |
| Applicable crimping terminal | | | R1.25-3 (Sleeved crimping terminals cannot be used.) | | | | | | |
| Internal current consumption (5VDC) | | | 80mA (TYP. all points ON) | | | | | | |
| Weight | | | 0.16kg | | | | | | |

＊1: If the noise filter selector switch (switch 1) on the bottom of the module (refer to Chapter 10) is turned on, the noise filter takes effect.
The off-status noise filter disables I/O response time setting.
After switching on or off the switch 1, reset the power supply of the CPU module.

＊2: Set an input response time in "I/O response time" combo box of PLC parameter in GX Developer. (Default: 0.2ms)
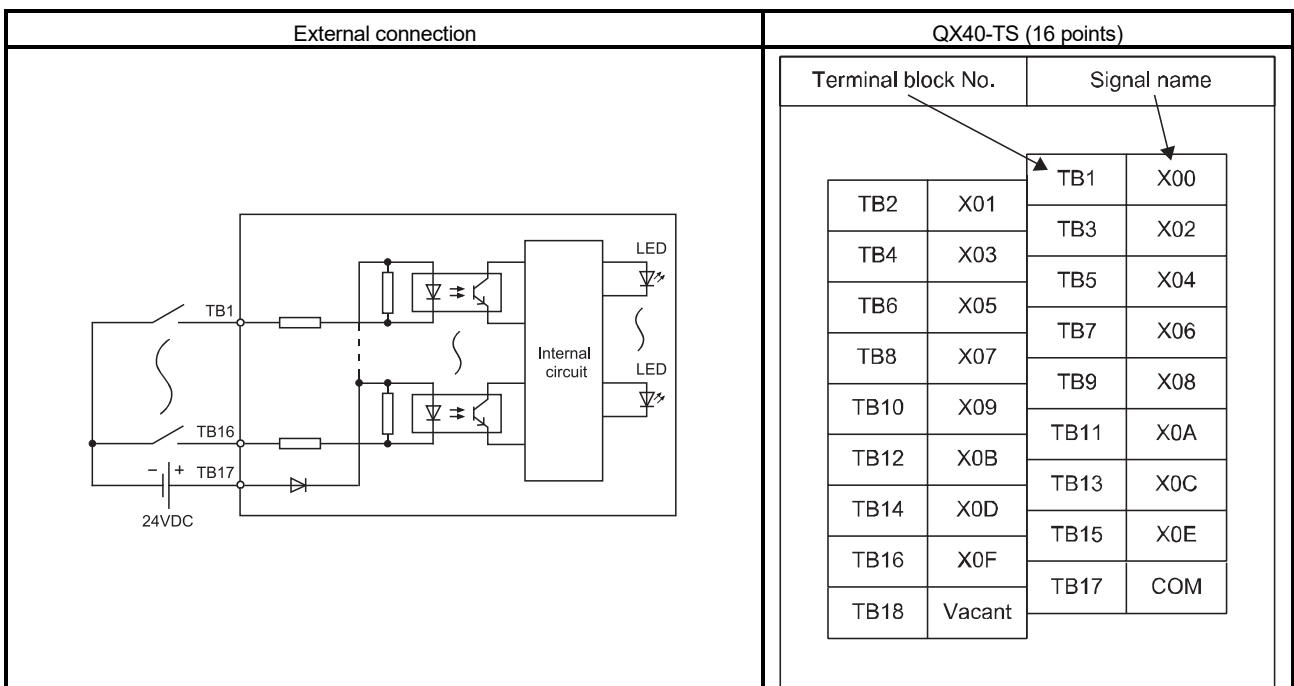A response time setting value can be changed in GX Developer (SW6D5C-GPPW or later).
For the setting details, refer to Section 1.3.1.

＊3: The actual response time is 5μs delay when turning on, 10μs delay when turning off, because the hardware response time is added.
For the details of the CPU overhead time, refer to manuals for the CPU module used (Function Explanation, Program Fundamentals).

＊4: The module function can be changed according to the status of the function selector switch (switch 2) on the bottom of the module (refer to Chapter 10).
ON: High-speed input
OFF: Interrupt
If the function selector switch (switch 2) setting is changed while the CPU module is in RUN, an error (error code: 2100) occurs.

＊5: Indicates the noise immunity when the noise filter takes effect (the noise filter selector switch (switch 1) is turned on).

＊6: For the setting method, refer to Section 1.3.3.

| Derating chart |
|---|



(%)
100
90
80
70
60
50
40

ON ratio/ common

26.4VDC

28.8VDC

0  10  20  30  40  50 55 (℃)
Ambient temperature

| External connection |
|---|



| QX40H (16 points) |
|---|

| Terminal block No. | | Signal name |
|---|---|---|
|  |  | TB1 — X00 |
| TB2 | X01 | TB3 — X02 |
| TB4 | X03 | TB5 — X04 |
| TB6 | X05 | TB7 — X06 |
| TB8 | X07 | TB9 — COM1 |
| TB10 | X08 | TB11 — X09 |
| TB12 | X0A | TB13 — X0B |
| TB14 | X0C | TB15 — X0D |
| TB16 | X0E | TB17 — X0F |
| TB18 | COM2 |  |

## 2.8 QX41 DC Input Module (Positive Common Type)

| Specifications \ Type | DC input module (Positive common type) | |
|---|---|---|
| | QX41 | Appearance |
| Number of input points | 32 points | |
| Isolation method | Photocoupler | |
| Rated input voltage | 24VDC (+20/-15%, ripple ratio within 5%) | |
| Rated input current | Approx. 4mA | |
| Input derating | Refer to the derating chart. | |
| ON voltage/ON current | 19V or higher/3mA or higher | |
| OFF voltage/OFF current | 11V or lower/1.7mA or lower | |
| Input impedance | Approx. 5.6kΩ | |
| Response time — OFF to ON | 1ms/5ms/10ms/20ms/70ms or less (configured in PLC parameter) *1 (Default: 10ms) | |
| Response time — ON to OFF | 1ms/5ms/10ms/20ms/70ms or less (configured in PLC parameter) *1 (Default: 10ms) | |
| Dielectric withstand voltage | 560VAC rms/3 cycles (altitude 2000m) | |
| Insulation resistance | 10MΩ or more by insulation resistance tester | |
| Noise immunity | By noise simulator of 500Vp-p noise voltage, 1μs noise width and 25 to 60Hz noise frequency | |
| | First transient noise IEC61000-4-4: 1kV | |
| Protection degree | IP2X | |
| Common terminal arrangement | 32 points/common (common terminal: B01, B02) | |
| Number of occupied I/O points | 32 points (I/O assignment is set as a 32-point input module.) | |
| Operation indicator | ON indication (LED) | |
| External connections | 40-pin connector | |
| Applicable wire size | 0.088 to 0.3mm² (For A6CON1 or A6CON4) *2 | |
| Applicable connector | A6CON1, A6CON2, A6CON3, A6CON4 (optional) | |
| Applicable connector/terminal block converter module | A6TBXY36, A6TBXY54, A6TBX70 | |
| Internal current consumption (5VDC) | 75mA (TYP. all points ON) (0.08A is shown on the rating plate of the module.) | |
| Weight | 0.15kg | |

Appearance:
QX41
0 1 2 3 4 5 6 7
8 9 A B C D E F
0 1 2 3 4 5 6 7
8 9 A B C D E F
24VDC
4mA
QX41

### Derating chart

ON ratio (%)
100
90
80
70
60
50
40
0 10 20 30 40 50 55 (°C)
Ambient temperature
28.8VDC

### External connection

B20
A05
B01, B02
24VDC
Internal circuit
LED
LED

### Pin-Outs

Module front view

| Pin No. | Signal No. | Pin No. | Signal No. |
|---|---|---|---|
| B20 | X00 | A20 | X10 |
| B19 | X01 | A19 | X11 |
| B18 | X02 | A18 | X12 |
| B17 | X03 | A17 | X13 |
| B16 | X04 | A16 | X14 |
| B15 | X05 | A15 | X15 |
| B14 | X06 | A14 | X16 |
| B13 | X07 | A13 | X17 |
| B12 | X08 | A12 | X18 |
| B11 | X09 | A11 | X19 |
| B10 | X0A | A10 | X1A |
| B09 | X0B | A09 | X1B |
| B08 | X0C | A08 | X1C |
| B07 | X0D | A07 | X1D |
| B06 | X0E | A06 | X1E |
| B05 | X0F | A05 | X1F |
| B04 | Vacant | A04 | Vacant |
| B03 | Vacant | A03 | Vacant |
| B02 | COM | A02 | Vacant |
| B01 | COM | A01 | Vacant |

*1: For the setting method, refer to Section 1.3.1.

*2: When using A6CON2 or A6CON3, refer to Chapter 7.

## 2.9 QX41-S1 DC Input Module (Positive Common Type)

| Type | DC input module (Positive common type) | | | | | |
|---|---|---|---|---|---|---|
| Specifications | QX41-S1 | | | | | Appearance |
| Number of input points | 32 points | | | | | |
| Isolation method | Photocoupler | | | | | |
| Rated input voltage | 24VDC (+20/-15%, ripple ratio within 5%) | | | | | |
| Rated input current | Approx. 4mA | | | | | |
| Input derating | Refer to the derating chart. | | | | | |
| ON voltage/ON current | 19V or higher/3.0mA or higher | | | | | |
| OFF voltage/OFF current | 9.5V or lower/1.5mA or lower | | | | | |
| Input impedance | Approx. 5.6kΩ | | | | | |
| Response time | Set value *1 | 0.1 | 0.2 | 0.4 | 0.6 | 1 |
| | OFF to ON TYP. | 0.05ms | 0.15ms | 0.30ms | 0.55ms | 1.05ms |
| | OFF to ON MAX. | 0.12ms | 0.20ms | 0.40ms | 0.60ms | 1.20ms |
| | ON to OFF TYP. | 0.15ms | 0.20ms | 0.35ms | 0.60ms | 1.10ms |
| | ON to OFF MAX. | 0.20ms | 0.30ms | 0.50ms | 0.70ms | 1.30ms |
| Dielectric withstand voltage | 560VAC rms/3 cycles (altitude 2000m) | | | | | |
| Insulation resistance | 10MΩ or more by insulation resistance tester | | | | | |
| Noise immunity | By noise simulator of 500Vp-p noise voltage, 1μs noise width and 25 to 60Hz noise frequency | | | | | |
| | First transient noise IEC61000-4-4: 1kV | | | | | |
| Protection degree | IP2X | | | | | |
| Common terminal arrangement | 32 points/common (common terminal: B01, B02) | | | | | |
| Number of occupied I/O points | 32 points (I/O assignment is set as a 32-point high-speed input module.) | | | | | |
| Operation indicator | ON indication (LED) | | | | | |
| External connections | 40-pin connector | | | | | |
| Applicable wire size | 0.088 to 0.3mm² (For A6CON1 or A6CON4) *2 | | | | | |
| Applicable connector | A6CON1, A6CON2, A6CON3, A6CON4 (optional) | | | | | |
| Applicable connector/terminal block converter module | A6TBXY36, A6TBXY54, A6TBX70 | | | | | |
| Internal current consumption (5VDC) | 75mA (TYP. all points ON) (0.08A is shown on the rating plate of the module.) | | | | | |
| Weight | 0.15kg | | | | | |

*1: Configured in PLC parameter. (Default: 0.2ms)
　　A response time setting value can be changed in GX Developer (SW5D5C-GPPW or later).
　　For the setting method, refer to Section 1.3.1.
*2: When using A6CON2 or A6CON3, refer to Chapter 7.

| | | | | |
|---|---|---|---|---|
| Derating chart | | Pin-Outs | Pin No. | Signal No. | Pin No. | Signal No. |



Derating chart — ON ratio (%) vs Ambient temperature (°C), 28.8VDC, 100% at 50°C to 55°C.

External connection



Module front view

| Pin No. | Signal No. | Pin No. | Signal No. |
|---|---|---|---|
| B20 | X00 | A20 | X10 |
| B19 | X01 | A19 | X11 |
| B18 | X02 | A18 | X12 |
| B17 | X03 | A17 | X13 |
| B16 | X04 | A16 | X14 |
| B15 | X05 | A15 | X15 |
| B14 | X06 | A14 | X16 |
| B13 | X07 | A13 | X17 |
| B12 | X08 | A12 | X18 |
| B11 | X09 | A11 | X19 |
| B10 | X0A | A10 | X1A |
| B09 | X0B | A09 | X1B |
| B08 | X0C | A08 | X1C |
| B07 | X0D | A07 | X1D |
| B06 | X0E | A06 | X1E |
| B05 | X0F | A05 | X1F |
| B04 | Vacant | A04 | Vacant |
| B03 | Vacant | A03 | Vacant |
| B02 | COM | A02 | Vacant |
| B01 | COM | A01 | Vacant |

## 2.10 QX41-S2 DC Input Module (Positive Common Type)

| Specifications \ Type | DC input module (Positive common type) | |
|---|---|---|
| | QX41-S2 | Appearance |
| Number of input points | 32 points | |
| Isolation method | Photocoupler | |
| Rated input voltage | 24VDC (+20/-15%, ripple ratio within 5%) | |
| Rated input current | Approx. 6mA | |
| Input derating | Refer to the derating chart. | |
| ON voltage/ON current | 15V or higher/3mA or higher | |
| OFF voltage/OFF current | 5V or lower/1.7mA or lower | |
| Input impedance | Approx. 3.6kΩ | |
| Response time — OFF to ON | 1ms/5ms/10ms/20ms/70ms or less (configured in PLC parameter) *1 (Default: 10ms) | |
| Response time — ON to OFF | 1ms/5ms/10ms/20ms/70ms or less (configured in PLC parameter) *1 (Default: 10ms) | |
| Dielectric withstand voltage | 560VAC rms/3 cycles (altitude 2000m) | |
| Insulation resistance | 10MΩ or more by insulation resistance tester | |
| Noise immunity | By noise simulator of 500Vp-p noise voltage, 1μs noise width and 25 to 60Hz noise frequency | |
| | First transient noise IEC61000-4-4: 1kV | |
| Protection degree | IP2X | |
| Common terminal arrangement | 32 points/common (common terminal: B01, B02) | |
| Number of occupied I/O points | 32 points (I/O assignment is set as a 32-point input module.) | |
| Operation indicator | ON indication (LED) | |
| External connections | 40-pin connector | |
| Applicable wire size | 0.088 to 0.3mm² (For A6CON1 or A6CON4) *2 | |
| Applicable connector | A6CON1, A6CON2, A6CON3, A6CON4 (optional) | |
| Applicable connector/terminal block converter module | A6TBXY36, A6TBXY54, A6TBX70 | |
| Internal current consumption (5VDC) | 75mA (TYP. all points ON) (0.08A is shown on the rating plate of the module.) | |
| Weight | 0.15kg | |

Appearance label:
QX41-S2
0 1 2 3 4 5 6 7
8 9 A B C D E F
0 1 2 3 4 5 6 7
8 9 A B C D E F
QX41-S2
24VDC
6mA



| Derating chart / External connection | Pin-Outs | Pin No. | Signal No. | Pin No. | Signal No. |
|---|---|---|---|---|---|
| | | B20 | X00 | A20 | X10 |
| | | B19 | X01 | A19 | X11 |
| | | B18 | X02 | A18 | X12 |
| | | B17 | X03 | A17 | X13 |
| | | B16 | X04 | A16 | X14 |
| | | B15 | X05 | A15 | X15 |
| | | B14 | X06 | A14 | X16 |
| | | B13 | X07 | A13 | X17 |
| | | B12 | X08 | A12 | X18 |
| | | B11 | X09 | A11 | X19 |
| | | B10 | X0A | A10 | X1A |
| | | B09 | X0B | A09 | X1B |
| | | B08 | X0C | A08 | X1C |
| | | B07 | X0D | A07 | X1D |
| | | B06 | X0E | A06 | X1E |
| | | B05 | X0F | A05 | X1F |
| | | B04 | Vacant | A04 | Vacant |
| | | B03 | Vacant | A03 | Vacant |
| | | B02 | COM | A02 | Vacant |
| | | B01 | COM | A01 | Vacant |

Derating chart — ON ratio (%) vs Ambient temperature (°C): (31.25%) 24VDC, (18.75%) 28.8VDC

Module front view

*1: For the setting method, refer to Section 1.3.1.

*2: When using A6CON2 or A6CON3, refer to Chapter 7.

## 2.11 QX42 DC Input Module (Positive Common Type)

| Type Specifications | | DC input module (Positive common type) | |
|---|---|---|---|
| | | QX42 | Appearance |
| Number of input points | | 64 points | |
| Isolation method | | Photocoupler | |
| Rated input voltage | | 24VDC (+20/-15%, ripple ratio within 5%) | |
| Rated input current | | Approx. 4mA | |
| Input derating | | Refer to the derating chart. | |
| ON voltage/ON current | | 19V or higher/3mA or higher | |
| OFF voltage/OFF current | | 11V or lower/1.7mA or lower | |
| Input impedance | | Approx. 5.6kΩ | |
| Response time | OFF to ON | 1ms/5ms/10ms/20ms/70ms or less (configured in PLC parameter) ＊1 (Default: 10ms) | |
| | ON to OFF | 1ms/5ms/10ms/20ms/70ms or less (configured in PLC parameter) ＊1 (Default: 10ms) | |
| Dielectric withstand voltage | | 560VAC rms/3 cycles (altitude 2000m) | |
| Insulation resistance | | 10MΩ or more by insulation resistance tester | |
| Noise immunity | | By noise simulator of 500Vp-p noise voltage, 1μs noise width and 25 to 60Hz noise frequency | |
| | | First transient noise IEC61000-4-4: 1kV | |
| Protection degree | | IP2X | |
| Common terminal arrangement | | 32 points/common (common terminal: 1B01, 1B02, 2B01, 2B02) | |
| Number of occupied I/O points | | 64 points (I/O assignment is set as a 64-point input module.) | |
| Operation indicator | | ON indication (LED), 32 point switch-over using switch | |
| External connections | | 40-pin connector | |
| Applicable wire size | | 0.088 to 0.3mm² (For A6CON1 or A6CON4) ＊2 | |
| Applicable connector | | A6CON1, A6CON2, A6CON3, A6CON4 (optional) | |
| Applicable connector/terminal block converter module | | A6TBXY36, A6TBXY54, A6TBX70 | |
| Internal current consumption (5VDC) | | 90mA (TYP. all points ON) | |
| Weight | | 0.18kg | |

＊1: For the setting method, refer to Section 1.3.1.

＊2: When using A6CON2 or A6CON3, refer to Chapter 7.

| Derating chart | | Pin-Outs | Pin No. *4 | Signal No. | Pin No. *4 | Signal No. | Pin No. *4 | Signal No. | Pin No. *4 | Signal No. |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | 1B20 | X00 | 1A20 | X10 | 2B20 | X20 | 2A20 | X30 |
| | | | 1B19 | X01 | 1A19 | X11 | 2B19 | X21 | 2A19 | X31 |
| | | | 1B18 | X02 | 1A18 | X12 | 2B18 | X22 | 2A18 | X32 |
| | | | 1B17 | X03 | 1A17 | X13 | 2B17 | X23 | 2A17 | X33 |
| | | | 1B16 | X04 | 1A16 | X14 | 2B16 | X24 | 2A16 | X34 |
| | | | 1B15 | X05 | 1A15 | X15 | 2B15 | X25 | 2A15 | X35 |
| | | | 1B14 | X06 | 1A14 | X16 | 2B14 | X26 | 2A14 | X36 |
| | | | 1B13 | X07 | 1A13 | X17 | 2B13 | X27 | 2A13 | X37 |
| | | | 1B12 | X08 | 1A12 | X18 | 2B12 | X28 | 2A12 | X38 |
| | | | 1B11 | X09 | 1A11 | X19 | 2B11 | X29 | 2A11 | X39 |
| | | | 1B10 | X0A | 1A10 | X1A | 2B10 | X2A | 2A10 | X3A |
| | | | 1B09 | X0B | 1A09 | X1B | 2B09 | X2B | 2A09 | X3B |
| | | | 1B08 | X0C | 1A08 | X1C | 2B08 | X2C | 2A08 | X3C |
| | | | 1B07 | X0D | 1A07 | X1D | 2B07 | X2D | 2A07 | X3D |
| | | | 1B06 | X0E | 1A06 | X1E | 2B06 | X2E | 2A06 | X3E |
| | | | 1B05 | X0F | 1A05 | X1F | 2B05 | X2F | 2A05 | X3F |
| | | | 1B04 | Vacant | 1A04 | Vacant | 2B04 | Vacant | 2A04 | Vacant |
| | | | 1B03 | Vacant | 1A03 | Vacant | 2B03 | Vacant | 2A03 | Vacant |
| | | | 1B02 | COM1 | 1A02 | Vacant | 2B02 | COM2 | 2A02 | Vacant |
| | | | 1B01 | COM1 | 1A01 | Vacant | 2B01 | COM2 | 2A01 | Vacant |

Derating chart

ON ratio/common (%)
24VDC, 26.4VDC, 28.8VDC
Ambient temperature (℃)

Pin-Outs

Module front view

B20–B1 / A20–A1

External connection

The above diagram shows the first half of 32 points (F).
The latter half of 32 points (L) are similar.

∗3: Selection of left-hand (F) side provides the first half (X00 to X1F) LED indications, and selection of right-hand (L) side provides the latter half (X20 to X3F) LED indications.

∗4: Pin number of 1☐☐☐ indicates that of the left-hand side connector, and pin number of 2☐☐☐ indicates that of the right-hand side connector.

## 2.12 QX42-S1 DC Input Module (Positive Common Type)

| Type<br>Specifications | | | DC input module (Positive common type) | | | | | Appearance |
|---|---|---|---|---|---|---|---|---|
| | | | QX42-S1 | | | | | Appearance |
| Number of input points | | | 64 points | | | | | |
| Isolation method | | | Photocoupler | | | | | |
| Rated input voltage | | | 24VDC (+20/-15%, ripple ratio within 5%) | | | | | |
| Rated input current | | | Approx. 4mA | | | | | |
| Input derating | | | Refer to the derating chart. | | | | | |
| ON voltage/ON current | | | 19V or higher/3.0mA or higher | | | | | |
| OFF voltage/OFF current | | | 9.5V or lower/1.5mA or lower | | | | | |
| Input impedance | | | Approx. 5.6kΩ | | | | | |
| Response time | Set value ∗1 | | 0.1 | 0.2 | 0.4 | 0.6 | 1 | |
| | OFF to ON | TYP. | 0.05ms | 0.15ms | 0.30ms | 0.55ms | 1.05ms | |
| | | MAX. | 0.12ms | 0.20ms | 0.40ms | 0.60ms | 1.20ms | |
| | ON to OFF | TYP. | 0.15ms | 0.20ms | 0.35ms | 0.60ms | 1.10ms | |
| | | MAX. | 0.20ms | 0.30ms | 0.50ms | 0.70ms | 1.30ms | |
| Dielectric withstand voltage | | | 560VAC rms/3 cycles (altitude 2000m) | | | | | |
| Insulation resistance | | | 10MΩ or more by insulation resistance tester | | | | | |
| Noise immunity | | | By noise simulator of 500Vp-p noise voltage, 1 $\mu$ s noise width and 25 to 60Hz noise frequency | | | | | |
| | | | First transient noise IEC61000-4-4: 1kV | | | | | |
| Protection degree | | | IP2X | | | | | |
| Common terminal arrangement | | | 32 points/common (common terminal: 1B01, 1B02, 2B01, 2B02) | | | | | |
| Number of occupied I/O points | | | 64 points (I/O assignment is set as a 64-point high-speed input module.) | | | | | |
| Operation indicator | | | ON indication (LED), 32 point switch-over using switch | | | | | |
| External connections | | | 40-pin connector | | | | | |
| Applicable wire size | | | 0.088 to 0.3mm2 (For A6CON1 or A6CON4) ∗2 | | | | | |
| Applicable connector | | | A6CON1, A6CON2, A6CON3, A6CON4 (optional) | | | | | |
| Applicable connector/terminal block converter module | | | A6TBXY36, A6TBXY54, A6TBX70 | | | | | |
| Internal current consumption (5VDC) | | | 90mA (TYP. all points ON) | | | | | |
| Weight | | | 0.18kg | | | | | |

∗1: Configured in PLC parameter. (Default: 0.2ms)
    A response time setting value can be changed in GX Developer (SW5D5C-GPPW or later).
    For the setting method, refer to Section 1.3.1.
∗2: When using A6CON2 or A6CON3, refer to Chapter 7.

| | Pin No. ＊4 | Signal No. | Pin No. ＊4 | Signal No. | Pin No. ＊4 | Signal No. | Pin No. ＊4 | Signal No. |
|---|---|---|---|---|---|---|---|---|
| | 1B20 | X00 | 1A20 | X10 | 2B20 | X20 | 2A20 | X30 |
| | 1B19 | X01 | 1A19 | X11 | 2B19 | X21 | 2A19 | X31 |
| | 1B18 | X02 | 1A18 | X12 | 2B18 | X22 | 2A18 | X32 |
| | 1B17 | X03 | 1A17 | X13 | 2B17 | X23 | 2A17 | X33 |
| | 1B16 | X04 | 1A16 | X14 | 2B16 | X24 | 2A16 | X34 |
| | 1B15 | X05 | 1A15 | X15 | 2B15 | X25 | 2A15 | X35 |
| | 1B14 | X06 | 1A14 | X16 | 2B14 | X26 | 2A14 | X36 |
| | 1B13 | X07 | 1A13 | X17 | 2B13 | X27 | 2A13 | X37 |
| | 1B12 | X08 | 1A12 | X18 | 2B12 | X28 | 2A12 | X38 |
| | 1B11 | X09 | 1A11 | X19 | 2B11 | X29 | 2A11 | X39 |
| | 1B10 | X0A | 1A10 | X1A | 2B10 | X2A | 2A10 | X3A |
| | 1B09 | X0B | 1A09 | X1B | 2B09 | X2B | 2A09 | X3B |
| | 1B08 | X0C | 1A08 | X1C | 2B08 | X2C | 2A08 | X3C |
| | 1B07 | X0D | 1A07 | X1D | 2B07 | X2D | 2A07 | X3D |
| | 1B06 | X0E | 1A06 | X1E | 2B06 | X2E | 2A06 | X3E |
| | 1B05 | X0F | 1A05 | X1F | 2B05 | X2F | 2A05 | X3F |
| | 1B04 | Vacant | 1A04 | Vacant | 2B04 | Vacant | 2A04 | Vacant |
| | 1B03 | Vacant | 1A03 | Vacant | 2B03 | Vacant | 2A03 | Vacant |
| | 1B02 | COM1 | 1A02 | Vacant | 2B02 | COM2 | 2A02 | Vacant |
| | 1B01 | COM1 | 1A01 | Vacant | 2B01 | COM2 | 2A01 | Vacant |

### Derating chart

ON ratio/common (%)

100, 90, 80, 70, 60, 50, 40, 30, 20

24VDC
26.4VDC
28.8VDC

Ambient temperature (℃): 0 10 20 30 40 50 55

### External connection

1B20

1A05

24VDC −｜｜+ 1B01,1B02

Internal circuit

LED

Left side (first half)
Right side (latter half) ＊3

Indication selector circuit

The above diagram shows the first half of 32 points (F).
The latter half of 32 points (L) are similar.

### Pin-Outs

B20 A20
B19 A19
B18 A18
B17 A17
B16 A16
B15 A15
B14 A14
B13 A13
B12 A12
B11 A11
B10 A10
B9 A9
B8 A8
B7 A7
B6 A6
B5 A5
B4 A4
B3 A3
B2 A2
B1 A1

Module front view

＊3: Selection of left-hand (F) side provides the first half (X00 to X1F) LED indications, and selection of right-hand (L) side provides the latter half (X20 to X3F) LED indications.

＊4: Pin number of 1 ☐☐☐ indicates that of the left-hand side connector, and pin number of 2 ☐☐☐ indicates that of the right-hand side connector.

## 2.13 QX50 DC (Positive Common/Negative Common Shared Type)/ AC Input Module

| Type / Specifications | DC (positive/negative shared common type)/ AC input module | | Appearance |
|---|---|---|---|
| | QX50 | | |
| | DC Input | AC Input | |
| Number of input points | 16 points | | |
| Isolation method | Photocoupler | | |
| Rated input voltage | 48VDC (+20/-15%, ripple ratio within 5%) | 48VAC (+10/-15%) 50/60Hz (±3Hz) (ripple ratio within 5%) | |
| Rated input current | Approx. 4mA | | |
| Input derating | Refer to the derating chart. | | |
| ON voltage/ON current | 28V or higher/2.5mA or higher | | |
| OFF voltage/OFF current | 10V or lower/1.0mA or lower | | |
| Input impedance | Approx. 11.2kΩ | | |
| Response time [*]1 — OFF to ON | 5ms or less | 15ms or less | |
| Response time [*]1 — ON to OFF | 20ms or less | 20ms or less | |
| Dielectric withstand voltage | 1060VAC rms/3 cycles (altitude 2000m) | | |
| Insulation resistance | 10MΩ or more by insulation resistance tester | | |
| Noise immunity | By noise simulator of 500Vp-p noise voltage, $1\mu s$ noise width and 25 to 60Hz noise frequency | | |
| | First transient noise IEC61000-4-4: 1kV | | |
| Protection degree | IP2X | | |
| Common terminal arrangement | 16 points/common (common terminal: TB17) | | |
| Number of occupied I/O points | 16 points (I/O assignment is set as a 16-point input module.) | | |
| Operation indicator | ON indication (LED) | | |
| External connections | 18-point terminal block (M3 × 6 screws) | | |
| Applicable wire size | 0.3 to 0.75mm$^2$ core (2.8mm OD max.) | | |
| Applicable crimping terminal | R1.25-3 (Sleeved crimping terminals cannot be used.) | | |
| Internal current consumption (5VDC) | 50mA (TYP. all points ON) | | |
| Weight | 0.13kg | | |



Derating chart

QX50 (16 points)

| Terminal block No. | Signal name | Terminal block No. | Signal name |
|---|---|---|---|
| | | TB1 | X00 |
| TB2 | X01 | TB3 | X02 |
| TB4 | X03 | TB5 | X04 |
| TB6 | X05 | TB7 | X06 |
| TB8 | X07 | TB9 | X08 |
| TB10 | X09 | TB11 | X0A |
| TB12 | X0B | TB13 | X0C |
| TB14 | X0D | TB15 | X0E |
| TB16 | X0F | TB17 | COM |
| TB18 | Vacant | | |

External connection
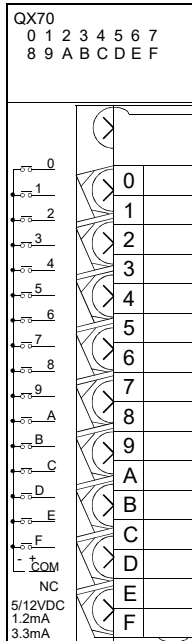
[*]1: Response time cannot be changed. Parameter setting of the CPU module will be invalid.

## 2.14 QX70 DC Input Module (Positive Common/Negative Common Shared Type)

| Type\Specifications | DC input module (Positive/negative shared common type) | | Appearance |
|---|---|---|---|
| | QX70 | | |
| Number of input points | 16 points | | |
| Isolation method | Photocoupler | | |
| Rated input voltage | 5VDC (+20/-10%, ripple ratio within 5%) | 12VDC (+20/-15%, ripple ratio within 5%) | |
| Rated input current | Approx. 1.2mA | Approx. 3.3mA | |
| Input derating | None | | |
| ON voltage/ON current | 3.5V or higher/1mA or higher | | |
| OFF voltage/OFF current | 1V or lower/0.1mA or lower | | |
| Input resistance | Approx. 3.3kΩ | | |
| Response time — OFF to ON | 1ms/5ms/10ms/20ms/70ms or less (configured in PLC parameter) ＊1 (Default: 10ms) | | |
| Response time — ON to OFF | 1ms/5ms/10ms/20ms/70ms or less (configured in PLC parameter) ＊1 (Default: 10ms) | | |
| Dielectric withstand voltage | 560VAC rms/3 cycles (altitude 2000m) | | |
| Insulation resistance | 10MΩ or more by insulation resistance tester | | |
| Noise immunity | By noise simulator of 500Vp-p noise voltage, 1 μs noise width and 25 to 60Hz noise frequency | | |
| | First transient noise IEC61000-4-4: 1kV | | |
| Protection degree | IP2X | | |
| Common terminal arrangement | 16 points/common (common terminal: TB17) | | |
| Number of occupied I/O points | 16 points (I/O assignment is set as a 16-point input module.) | | |
| Operation indicator | ON indication (LED) | | |
| External connections | 18-point terminal block (M3 × 6 screw) | | |
| Applicable wire size | Core cable: 0.3 to 0.75mm$^2$ (Outside diameter: 2.8mm or smaller) | | |
| Applicable crimping terminal | R1.25-3 (Sleeved crimping terminals cannot be used.) | | |
| Internal current consumption (5VDC) | 55mA (TYP, all points ON) (0.06A is shown on the rating plate of the module.) | | |
| Weight | 0.14kg | | |

| External connection | QX70 (16 points) | |
|---|---|---|



| Terminal block No. | | Signal name |
|---|---|---|
| | TB1 | X00 |
| TB2 | | X01 |
| | TB3 | X02 |
| TB4 | | X03 |
| | TB5 | X04 |
| TB6 | | X05 |
| | TB7 | X06 |
| TB8 | | X07 |
| | TB9 | X08 |
| TB10 | | X09 |
| | TB11 | X0A |
| TB12 | | X0B |
| | TB13 | X0C |
| TB14 | | X0D |
| | TB15 | X0E |
| TB16 | | X0F |
| | TB17 | COM |
| TB18 | | Vacant |
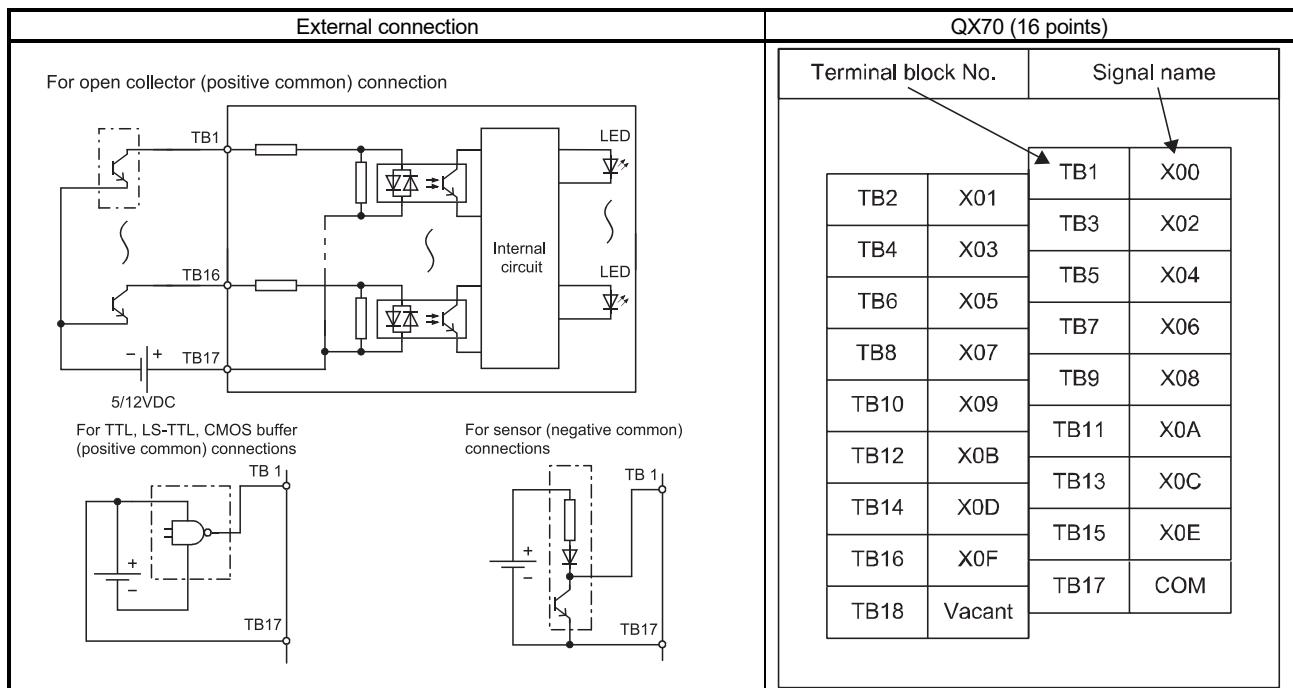
＊1: For the setting method, refer to Section 1.3.1.

## 2.15 QX70H DC High-speed Input Module (Positive Common Type)

| | Type | DC high-speed input module (Positive common type) | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Specifications | | QX70H | | | | | | Appearance |
| Number of input points | | 16 points | | | | | | |
| Isolation method | | Photocoupler | | | | | | |
| Rated input voltage | | 5VDC (+20/-15%, ripple ratio within 5%) | | | | | | |
| Rated input current | | Approx. 6mA | | | | | | |
| Input derating | | None | | | | | | |
| ON voltage/ON current | | 3.5V or higher/3mA or higher | | | | | | |
| OFF voltage/OFF current | | 1V or lower/1mA or lower | | | | | | |
| Input impedance | | Approx. 470Ω | | | | | | |
| Response time | SW1 (noise filter) ✻1 | OFF | ON | | | | | |
| | Set value ✻2 | Invalid | 0.1 | 0.2 | 0.4 | 0.6 | 1 | |
| | OFF to ON TYP. | 0ms ✻3 | 0.04ms | 0.10ms | 0.25ms | 0.50ms | 0.95ms | |
| | OFF to ON MAX. | - ✻3 | 0.05ms | 0.15ms | 0.30ms | 0.60ms | 1.00ms | |
| | ON to OFF TYP. | 0ms ✻3 | 0.04ms | 0.10ms | 0.25ms | 0.50ms | 0.95ms | |
| | ON to OFF MAX. | - ✻3 | 0.05ms | 0.15ms | 0.30ms | 0.60ms | 1.00ms | |
| Function setting | SW2 ✻4 | OFF: Interrupt, ON: High-speed input | | | | | | |
| Dielectric withstand voltage | | 560VAC rms/3 cycles (altitude 2000m) | | | | | | |
| Insulation resistance | | 10MΩ or more by insulation resistance tester | | | | | | |
| Noise immunity ✻5 | | By noise simulator of 500Vp-p noise voltage, 1 $\mu$s noise width and 25 to 60Hz noise frequency | | | | | | |
| Protection degree | | IP2X | | | | | | |
| Common terminal arrangement | | 8 points/common (common terminal: TB9, TB18) | | | | | | |
| Number of occupied I/O points | | 16 points (I/O assignment is set as a 16-point high-speed input module or 16-point interrupt module.) ✻4 | | | | | | |
| Interrupt processing condition | | Set by Switch setting in GX Developer ✻4 ✻6 | | | | | | |
| Operation indicator | | ON indication (LED) | | | | | | |
| External connections | | 18-point terminal block (M3 × 6 screws) | | | | | | |
| Applicable wire size | | 0.3 to 0.75mm$^2$ core (2.8mm OD max.) | | | | | | |
| Applicable crimping terminal | | R1.25-3 (Sleeved crimping terminals cannot be used.) | | | | | | |
| Internal current consumption (5VDC) | | 80mA (TYP. all points ON) | | | | | | |
| Weight | | 0.14kg | | | | | | |

✻1: If the noise filter selector switch (switch 1) on the bottom of the module (refer to Chapter 10) is turned on, the noise filter takes effect.
　　The off-status noise filter disables I/O response time setting.
　　After switching on or off the switch 1, reset the power supply of the CPU module.
✻2: Set an input response time in "I/O response time" combo box of PLC parameter in GX Developer. (Default: 0.2ms)
　　A response time setting value can be changed in GX Developer (SW6D5C-GPPW or later).
　　For the setting details, refer to Section 1.3.1.
✻3: The actual response time is 5 $\mu$s delay when turning on, 10 $\mu$s delay when turning off, because the hardware response time is added.
　　For the details of the CPU overhead time, refer to manuals for the CPU module used (Function Explanation, Program Fundamentals).
✻4: The module function can be changed according to the status of the function selector switch (switch 2) on the bottom of the module (refer to Chapter 10).
　　ON: High-speed input
　　OFF: Interrupt
　　If the function selector switch (switch 2) setting is changed while the CPU module is in RUN, an error (error code: 2100) occurs.
✻5: Indicates the noise immunity when the noise filter takes effect (the noise filter selector switch (switch 1) is turned on).
✻6: For the setting method, refer to Section 1.3.3.

| External connection | QX70H (16 points) |
|---|---|
|  | Terminal block No. / Signal name<br><br>TB1 — X00<br>TB2 — X01<br>TB3 — X02<br>TB4 — X03<br>TB5 — X04<br>TB6 — X05<br>TB7 — X06<br>TB8 — X07<br>TB9 — COM1<br>TB10 — X08<br>TB11 — X09<br>TB12 — X0A<br>TB13 — X0B<br>TB14 — X0C<br>TB15 — X0D<br>TB16 — X0E<br>TB17 — X0F<br>TB18 — COM2 |

## 2.16 QX71 DC Input Module (Positive/Negative Shared Common Type)

| Specifications | Type | DC input module (Positive/negative shared common type) | | |
|---|---|---|---|---|
| | | QX71 | | Appearance |
| Number of input points | | 32 points | | |
| Isolation method | | Photocoupler | | |
| Rated input voltage | | 5VDC (+20/-10%, ripple ratio within 5%) | 12VDC (+20/-15%, ripple ratio within 5%) | |
| Rated input current | | Approx. 1.2mA | Approx. 3.3mA | |
| Input derating | | None | | |
| ON voltage/ON current | | 3.5V or higher/1mA or higher | | |
| OFF voltage/OFF current | | 1V or lower/0.1mA or lower | | |
| Input resistance | | Approx. 3.3kΩ | | |
| Response time | OFF to ON | 1ms/5ms/10ms/20ms/70ms or less (configured in PLC parameter) ＊1 (Default: 10ms) | | |
| | ON to OFF | 1ms/5ms/10ms/20ms/70ms or less (configured in PLC parameter) ＊1 (Default: 10ms) | | |
| Dielectric withstand voltage | | 560VAC rms/3 cycles (altitude 2000m) | | |
| Insulation resistance | | 10MΩ or more by insulation resistance tester | | |
| Noise immunity | | By noise simulator of 500Vp-p noise voltage, 1μs noise width and 25 to 60Hz noise frequency | | |
| | | First transient noise IEC61000-4-4: 1kV | | |
| Protection degree | | IP2X | | |
| Common terminal arrangement | | 32 points/common (common terminal: B01, B02) | | |
| Number of occupied I/O points | | 32 points (I/O assignment is set as a 32-point input module.) | | |
| Operation indicator | | ON indication (LED) | | |
| External connections | | 40-pin connector | | |
| Applicable wire size | | 0.088 to 0.3mm2 (For A6CON1 or A6CON4) ＊2 | | |
| Applicable connector | | A6CON1, A6CON2, A6CON3, A6CON4 (optional) | | |
| Internal current consumption (5VDC) | | 70mA (TYP, all points ON) | | |
| Weight | | 0.12kg | | |

QX71
0 1 2 3 4 5 6 7
8 9 A B C D E F
0 1 2 3 4 5 6 7
8 9 A B C D E F
5/12VDC                QX71
1.2 / 3.3mA

| External connection | Pin-Outs | Pin No. | Signal No. | Pin No. | Signal No. |
|---|---|---|---|---|---|
| | | B20 | X00 | A20 | X10 |
| | | B19 | X01 | A19 | X11 |
| | | B18 | X02 | A18 | X12 |
| | | B17 | X03 | A17 | X13 |
| | | B16 | X04 | A16 | X14 |
| | | B15 | X05 | A15 | X15 |
| | | B14 | X06 | A14 | X16 |
| | | B13 | X07 | A13 | X17 |
| | | B12 | X08 | A12 | X18 |
| | | B11 | X09 | A11 | X19 |
| | | B10 | X0A | A10 | X1A |
| | | B09 | X0B | A09 | X1B |
| | | B08 | X0C | A08 | X1C |
| | | B07 | X0D | A07 | X1D |
| | | B06 | X0E | A06 | X1E |
| | | B05 | X0F | A05 | X1F |
| | | B04 | Vacant | A04 | Vacant |
| | | B03 | Vacant | A03 | Vacant |
| | | B02 | COM | A02 | Vacant |
| | | B01 | COM | A01 | Vacant |

For open collector (positive common) connection

For TTL, LS-TTL, CMOS buffer (positive common) connections

For sensor (negative common) connections

Module front view

＊1: For the setting method, refer to Section 1.3.1.
＊2: When using A6CON2 or A6CON3, refer to Chapter 7.

## 2.17 QX72 DC Input Module (Positive/Negative Shared Common Type)

| Type<br>Specifications | | DC input module (Positive/negative shared common type) | | |
|---|---|---|---|---|
| | | QX72 | | Appearance |
| Number of input points | | 64 points | | |
| Isolation method | | Photocoupler | | |
| Rated input voltage | | 5VDC<br>(+20/-10%, ripple ratio within 5%) | 12VDC<br>(+20/-15%, ripple ratio within 5%) | |
| Rated input current | | Approx. 1.2mA | Approx. 3.3mA | |
| Input derating | | None | | |
| ON voltage/ON current | | 3.5V or higher/3mA or higher | | |
| OFF voltage/OFF current | | 1V or lower/0.1mA or lower | | |
| Input resistance | | Approx. 3.3kΩ | | |
| Response time | OFF to ON | 1ms/5ms/10ms/20ms/70ms or less (configured in PLC parameter) ＊1<br>(Default: 10ms) | | |
| | ON to OFF | 1ms/5ms/10ms/20ms/70ms or less (configured in PLC parameter) ＊1<br>(Default: 10ms) | | |
| Dielectric withstand voltage | | 560VAC rms/3 cycles (altitude 2000m) | | |
| Insulation resistance | | 10MΩ or more by insulation resistance tester | | |
| Noise immunity | | By noise simulator of 500Vp-p noise voltage,<br>1μs noise width and 25 to 60Hz noise frequency | | |
| | | First transient noise IEC61000-4-4: 1kV | | |
| Protection degree | | IP2X | | |
| Common terminal arrangement | | 32 points/common (common terminal: 1B01, 1B02, 2B01, 2B02) | | |
| Number of occupied I/O points | | 64 points (I/O assignment is set as a 64-point input module.) | | |
| Operation indicator | | ON indication (LED), 32-point switchover using switch | | |
| External connections | | 40-pin connector | | |
| Applicable wire size | | 0.088 to 0.3mm2 (For A6CON1 or A6CON4) ＊2 | | |
| Applicable connector | | A6CON1, A6CON2, A6CON3, A6CON4 (optional) | | |
| Internal current consumption (5VDC) | | 85mA (TYP, all points ON)<br>(0.09A is shown on the rating plate of the module.) | | |
| Weight | | 0.13kg | | |
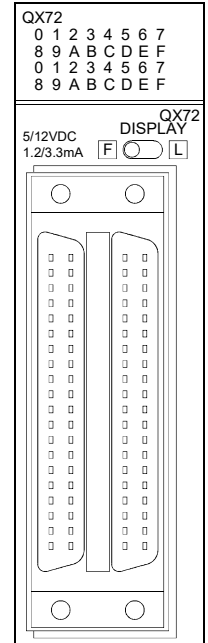
＊1: For the setting method, refer to Section 1.3.1.

＊2: When using A6CON2 and A6CON3, refer to Chapter 7.

For open collector (positive common) connection

For TTL, LS-TTL, CMOS buffer (positive common) connections

For sensor (negative common) connections

The above diagram shows the first half of 32 points (F). The latter half of 32 points (L) are similar.

Module front view

| External connection / Pin-Outs | Pin No. *4 | Signal No. | Pin No. *4 | Signal No. | Pin No. *4 | Signal No. | Pin No. *4 | Signal No. |
|---|---|---|---|---|---|---|---|---|
| | 1B20 | X00 | 1A20 | X10 | 2B20 | X20 | 2A20 | X30 |
| | 1B19 | X01 | 1A19 | X11 | 2B19 | X21 | 2A19 | X31 |
| | 1B18 | X02 | 1A18 | X12 | 2B18 | X22 | 2A18 | X32 |
| | 1B17 | X03 | 1A17 | X13 | 2B17 | X23 | 2A17 | X33 |
| | 1B16 | X04 | 1A16 | X14 | 2B16 | X24 | 2A16 | X34 |
| | 1B15 | X05 | 1A15 | X15 | 2B15 | X25 | 2A15 | X35 |
| | 1B14 | X06 | 1A14 | X16 | 2B14 | X26 | 2A14 | X36 |
| | 1B13 | X07 | 1A13 | X17 | 2B13 | X27 | 2A13 | X37 |
| | 1B12 | X08 | 1A12 | X18 | 2B12 | X28 | 2A12 | X38 |
| | 1B11 | X09 | 1A11 | X19 | 2B11 | X29 | 2A11 | X39 |
| | 1B10 | X0A | 1A10 | X1A | 2B10 | X2A | 2A10 | X3A |
| | 1B09 | X0B | 1A09 | X1B | 2B09 | X2B | 2A09 | X3B |
| | 1B08 | X0C | 1A08 | X1C | 2B08 | X2C | 2A08 | X3C |
| | 1B07 | X0D | 1A07 | X1D | 2B07 | X2D | 2A07 | X3D |
| | 1B06 | X0E | 1A06 | X1E | 2B06 | X2E | 2A06 | X3E |
| | 1B05 | X0F | 1A05 | X1F | 2B05 | X2F | 2A05 | X3F |
| | 1B04 | Vacant | 1A04 | Vacant | 2B04 | Vacant | 2A04 | Vacant |
| | 1B03 | Vacant | 1A03 | Vacant | 2B03 | Vacant | 2A03 | Vacant |
| | 1B02 | COM1 | 1A02 | Vacant | 2B02 | COM2 | 2A02 | Vacant |
| | 1B01 | COM1 | 1A01 | Vacant | 2B01 | COM2 | 2A01 | Vacant |

*3: Selection of left-hand (F) side provides the first half (X00 to X1F) LED indications, and selection of right-hand (L) side provides the latter half (X20 to X3F) LED indications.

*4: Pin number of 1☐☐☐ indicates that of the left-hand side connector, and pin number of 2☐☐☐ indicates that of the right-hand side connector.

## 2.18 QX80 DC Input Module (Negative Common Type)

| | Type | DC input module (Negative common type) | |
|---|---|---|---|
| Specifications | | QX80 | Appearance |
| Number of input points | | 16 points | |
| Isolation method | | Photocoupler | |
| Rated input voltage | | 24VDC (+20/-15%, ripple ratio within 5%) | |
| Rated input current | | Approx. 4mA | |
| Input derating | | No | |
| ON voltage/ON current | | 19V or higher/3mA or higher | |
| OFF voltage/OFF current | | 11V or lower/1.7mA or lower | |
| Input impedance | | Approx. 5.6kΩ | |
| Response time | OFF to ON | 1ms/5ms/10ms/20ms/70ms or less (configured in PLC parameter) ∗1 (Default: 10ms) | |
| | ON to OFF | 1ms/5ms/10ms/20ms/70ms or less (configured in PLC parameter) ∗1 (Default: 10ms) | |
| Dielectric withstand voltage | | 560VAC rms/3 cycles (altitude 2000m) | |
| Insulation resistance | | 10MΩ or more by insulation resistance tester | |
| Noise immunity | | By noise simulator of 500Vp-p noise voltage, 1μs noise width and 25 to 60Hz noise frequency | |
| | | First transient noise IEC61000-4-4: 1kV | |
| Protection degree | | IP2X | |
| Common terminal arrangement | | 16 points/common (common terminal: TB18) | |
| Number of occupied I/O points | | 16 points (I/O assignment is set as a 16-point input module.) | |
| Operation indicator | | ON indication (LED) | |
| External connections | | 18-point terminal block (M3 × 6 screws) | |
| Applicable wire size | | 0.3 to 0.75mm² core (2.8mm OD max.) | |
| Applicable crimping terminal | | R1.25-3 (Sleeved crimping terminals cannot be used.) | |
| Internal current consumption (5VDC) | | 50mA (TYP. all points ON) | |
| Weight | | 0.16kg | |

| External connection | QX80 (16 points) | |
|---|---|---|

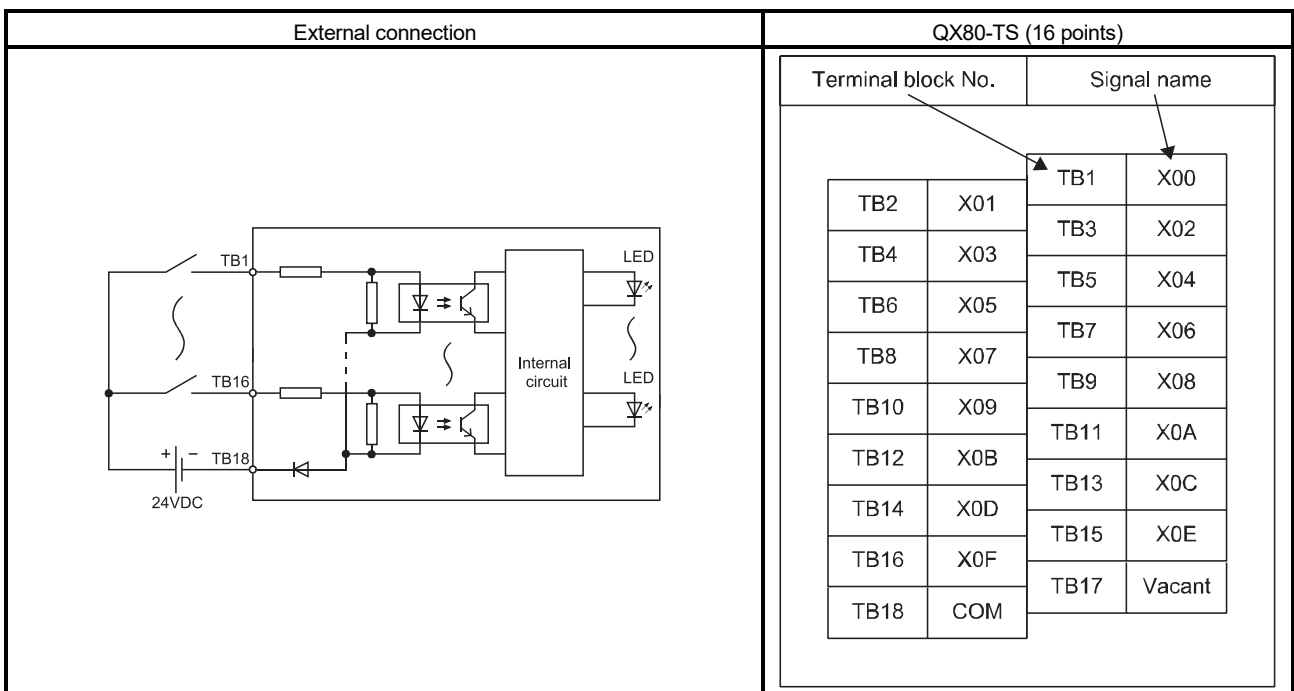| Terminal block No. | Signal name |
|---|---|
| TB1 | X00 |
| TB2 | X01 |
| TB3 | X02 |
| TB4 | X03 |
| TB5 | X04 |
| TB6 | X05 |
| TB7 | X06 |
| TB8 | X07 |
| TB9 | X08 |
| TB10 | X09 |
| TB11 | X0A |
| TB12 | X0B |
| TB13 | X0C |
| TB14 | X0D |
| TB15 | X0E |
| TB16 | X0F |
| TB17 | Vacant |
| TB18 | COM |

∗1: For the setting method, refer to Section 1.3.1.

## 2.19 QX80-TS DC Input Module (Negative Common Type)

This module is a spring clamp terminal block type and an input module that has indicators for checking the insertion state of wire.

| Type<br>Specifications | | DC input module (Negative common type) | |
|---|---|---|---|
| | | QX80-TS | Appearance |
| Number of input points | | 16 points | |
| Isolation method | | Photocoupler | |
| Rated input voltage | | 24VDC (+20/-15%, ripple ratio within 5%) | |
| Rated input current | | Approx. 4mA | |
| Input derating | | No | |
| ON voltage/ON current | | 19V or higher/3mA or higher | |
| OFF voltage/OFF current | | 11V or lower/1.7mA or lower | |
| Input impedance | | Approx. 5.6kΩ | |
| Response time | OFF to ON | 1ms/5ms/10ms/20ms/70ms or less (configured in PLC parameter) ∗1<br>(Default: 10ms) | |
| | ON to OFF | 1ms/5ms/10ms/20ms/70ms or less (configured in PLC parameter) ∗1<br>(Default: 10ms) | |
| Dielectric withstand voltage | | 560VAC rms/3 cycles (altitude 2000m) | |
| Insulation resistance | | 10MΩ or more by insulation resistance tester | |
| Noise immunity | | By noise simulator of 500Vp-p noise voltage, 1 $\mu$s noise width and 25 to 60Hz noise frequency | |
| | | First transient noise IEC61000-4-4: 1kV | |
| Protection degree | | IP2X | |
| Common terminal arrangement | | 16 points/common (common terminal: TB18) | |
| Number of occupied I/O points | | 16 points (I/O assignment is set as a 16-point input module.) | |
| Operation indicator | | ON indication (LED) | |
| External connections | | Two-piece spring clamp terminal block | |
| Applicable wire size | | 0.3 to 2.0mm$^2$ core (22 to 15 AWG) | |
| Applicable crimping terminal | | Refer to section 9.1 | |
| Internal current consumption (5VDC) | | 50mA (TYP. all points ON) | |
| Weight | | 0.16kg | |



| External connection | QX80-TS (16 points) | |
|---|---|---|
| | Terminal block No. | Signal name |



| Terminal block No. | Signal name |
|---|---|
| TB1 | X00 |
| TB2 | X01 |
| TB3 | X02 |
| TB4 | X03 |
| TB5 | X04 |
| TB6 | X05 |
| TB7 | X06 |
| TB8 | X07 |
| TB9 | X08 |
| TB10 | X09 |
| TB11 | X0A |
| TB12 | X0B |
| TB13 | X0C |
| TB14 | X0D |
| TB15 | X0E |
| TB16 | X0F |
| TB17 | Vacant |
| TB18 | COM |

∗1: For the setting method, refer to Section 1.3.1.

## 2.20 QX80H DC High-speed Input Module (Negative Common Type)

| Specifications \ Type | | | DC high-speed input module (Negative common type) | | | | | Appearance |
|---|---|---|---|---|---|---|---|---|
| | | | QX80H | | | | | Appearance |
| Number of input points | | | 16 points | | | | | |
| Isolation method | | | Photocoupler | | | | | |
| Rated input voltage | | | 24VDC (+20/-15%, ripple ratio within 5%) | | | | | |
| Rated input current | | | Approx. 6mA | | | | | |
| Input derating | | | Refer to the derating chart. | | | | | |
| ON voltage/ON current | | | 15V or higher/3mA or higher | | | | | |
| OFF voltage/OFF current | | | 5V or lower/1.6mA or lower | | | | | |
| Input impedance | | | Approx. 3.9kΩ | | | | | |
| Response time | SW1 (noise filter) ＊1 | | OFF | ON | | | | |
| | Set value ＊2 | | Invalid | 0.1 | 0.2 | 0.4 | 0.6 | 1 |
| | OFF to ON | TYP. | 0ms ＊3 | 0.04ms | 0.10ms | 0.25ms | 0.50ms | 0.95ms |
| | | MAX. | - ＊3 | 0.05ms | 0.15ms | 0.30ms | 0.60ms | 1.00ms |
| | ON to OFF | TYP. | 0ms ＊3 | 0.04ms | 0.10ms | 0.25ms | 0.50ms | 0.95ms |
| | | MAX. | - ＊3 | 0.05ms | 0.15ms | 0.30ms | 0.60ms | 1.00ms |
| Function setting | SW2＊4 | | OFF: Interrupt, ON: High-speed input | | | | | |
| Dielectric withstand voltage | | | 560VAC rms/3 cycles (altitude 2000m) | | | | | |
| Insulation resistance | | | 10MΩ or more by insulation resistance tester | | | | | |
| Noise immunity＊5 | | | By noise simulator of 500Vp-p noise voltage, 1μs noise width and 25 to 60Hz noise frequency | | | | | |
| Protection degree | | | IP2X | | | | | |
| Common terminal arrangement | | | 8 points/common (common terminal: TB9, TB18) | | | | | |
| Number of occupied I/O points | | | 16 points (I/O assignment is set as a 16-point high-speed input module or 16-point interrupt module.) ＊4 | | | | | |
| Interrupt processing condition | | | Set by Switch setting in GX Developer ＊4 ＊6 | | | | | |
| Operation indicator | | | ON indication (LED) | | | | | |
| External connections | | | 18-point terminal block (M3 × 6 screws) | | | | | |
| Applicable wire size | | | 0.3 to 0.75mm² core (2.8mm OD max.) | | | | | |
| Applicable crimping terminal | | | R1.25-3 (Sleeved crimping terminals cannot be used.) | | | | | |
| Internal current consumption (5VDC) | | | 80mA (TYP. all points ON) | | | | | |
| Weight | | | 0.16kg | | | | | |

＊1: If the noise filter selector switch (switch 1) on the bottom of the module (refer to Chapter 10) is turned on, the noise filter takes effect.
The off-status noise filter disables I/O response time setting.
After switching on or off the switch 1, reset the power supply of the CPU module.

＊2: Set an input response time in "I/O response time" combo box of PLC parameter in GX Developer. (Default: 0.2ms)
A response time setting value can be changed in GX Developer (SW6D5C-GPPW or later).
For the setting details, refer to Section 1.3.1.

＊3: The actual response time is 5μs delay when turning on, 10μs delay when turning off, because the hardware response time is added.
For the details of the CPU overhead time, refer to manuals for the CPU module used (Function Explanation, Program Fundamentals).

＊4: The module function can be changed according to the status of the function selector switch (switch 2) on the bottom of the module (refer to Chapter 10).
ON: High-speed input
OFF: Interrupt
If the function selector switch (switch 2) setting is changed while the CPU module is in RUN, an error (error code: 2100) occurs.

＊5: Indicates the noise immunity when the noise filter takes effect (the noise filter selector switch (switch 1) is turned on).

＊6: For the setting method, refer to Section 1.3.3.

| Derating chart | QX80H (16 points) |
|---|---|



Derating chart

(%)
ON ratio/common
100, 90, 80, 70, 60, 50, 40

Ambient temperature: 0 10 20 30 40 50 55 (°C)

26.4VDC
28.8VDC

External connection



| Terminal block No. | Signal name |
|---|---|

| Terminal block No. | Signal name | Terminal block No. | Signal name |
|---|---|---|---|
| | | TB1 | X00 |
| TB2 | X01 | TB3 | X02 |
| TB4 | X03 | TB5 | X04 |
| TB6 | X05 | TB7 | X06 |
| TB8 | X07 | TB9 | COM1 |
| TB10 | X08 | TB11 | X09 |
| TB12 | X0A | TB13 | X0B |
| TB14 | X0C | TB15 | X0D |
| TB16 | X0E | TB17 | X0F |
| TB18 | COM2 | | |

## 2.21 QX81 DC Input Module (Negative Common Type)

| Specifications | Type | DC input module (Negative common type) | |
|---|---|---|---|
| | | QX81 | Appearance |
| Number of input points | | 32 points | |
| Isolation method | | Photocoupler | |
| Rated input voltage | | 24VDC (+20/-15%, ripple ratio within 5%) | |
| Rated input current | | Approx. 4mA | |
| Input derating | | Refer to the derating chart. | |
| ON voltage/ON current | | 19V or higher/3mA or higher | |
| OFF voltage/OFF current | | 11V or lower/1.7mA or lower | |
| Input impedance | | Approx. 5.6kΩ | |
| Response time | OFF to ON | 1ms/5ms/10ms/20ms/70ms or less (configured in PLC parameter) *1 (Default: 10ms) | |
| | ON to OFF | 1ms/5ms/10ms/20ms/70ms or less (configured in PLC parameter) *1 (Default: 10ms) | |
| Dielectric withstand voltage | | 560VAC rms/3 cycles (altitude 2000m) | |
| Insulation resistance | | 10MΩ or more by insulation resistance tester | |
| Noise immunity | | By noise simulator of 500Vp-p noise voltage, 1μs noise width and 25 to 60Hz noise frequency | |
| | | First transient noise IEC61000-4-4: 1kV | |
| Protection degree | | IP2X | |
| Common terminal arrangement | | 32 points/common (common terminal: 17, 18, 36) | |
| Number of occupied I/O points | | 32 points (I/O assignment is set as a 32-point input module.) | |
| Operation indicator | | ON indication (LED) | |
| External connections | | 37-pin D-sub connector | |
| Applicable wire size | | 0.088 to 0.3mm² (For A6CON1E) *2 | |
| Applicable connector | | A6CON1E, A6CON2E, A6CON3E (optional) | |
| Applicable connector/terminal block converter module | | A6TBX36-E, A6TBX54-E, A6TBX70-E | |
| Internal current consumption (5VDC) | | 75mA (TYP. all points ON) (0.08A is shown on the rating plate of the module.) | |
| Weight | | 0.16kg | |



QX81
0 1 2 3 4 5 6 7
8 9 A B C D E F
0 1 2 3 4 5 6 7
8 9 A B C D E F
QX81
24VDC
4mA

| Derating chart | Pin-Outs | Pin No. | Signal No. | Pin No. | Signal No. |
|---|---|---|---|---|---|
| | | 1 | X00 | 9 | X10 |
| | | 20 | X01 | 28 | X11 |
| | | 2 | X02 | 10 | X12 |
| | | 21 | X03 | 29 | X13 |
| | | 3 | X04 | 11 | X14 |
| | | 22 | X05 | 30 | X15 |
| | | 4 | X06 | 12 | X16 |
| | | 23 | X07 | 31 | X17 |
| | | 5 | X08 | 13 | X18 |
| | | 24 | X09 | 32 | X19 |
| | | 6 | X0A | 14 | X1A |
| | | 25 | X0B | 33 | X1B |
| | | 7 | X0C | 15 | X1C |
| | | 26 | X0D | 34 | X1D |
| | | 8 | X0E | 16 | X1E |
| | | 27 | X0F | 35 | X1F |
| External connection | Module front view | 17 | COM | 37 | Vacant |
| | | 36 | COM | 19 | Vacant |
| | | 18 | COM | | |



Derating chart — ON ratio (%) vs Ambient temperature (°C), 28.8VDC



External connection diagram, 24VDC, terminals 17,18,36

*1: For the setting method, refer to Section 1.3.1.

*2: When using A6CON2E or A6CON3E, refer to Chapter 7.

## 2.22 QX81-S2 DC Input Module (Negative Common Type)

| Type / Specifications | | DC input module (Negative common type) | |
|---|---|---|---|
| | | QX81-S2 | Appearance |
| Number of input points | | 32 points | |
| Isolation method | | Photocoupler | |
| Rated input voltage | | 24VDC (+20/-15%, ripple ratio within 5%) | |
| Rated input current | | Approx. 6mA | |
| Input derating | | Refer to the derating chart. | |
| ON voltage/ON current | | 15V or higher/3mA or higher | |
| OFF voltage/OFF current | | 5V or lower/1.7mA or lower | |
| Input impedance | | Approx. 3.6kΩ | |
| Response time | OFF to ON | 1ms/5ms/10ms/20ms/70ms or less (configured in PLC parameter) ＊1 (Default: 10ms) | |
| | ON to OFF | 1ms/5ms/10ms/20ms/70ms or less (configured in PLC parameter) ＊1 (Default: 10ms) | |
| Dielectric withstand voltage | | 560VAC rms/3 cycles (altitude 2000m) | |
| Insulation resistance | | 10MΩ or more by insulation resistance tester | |
| Noise immunity | | By noise simulator of 500Vp-p noise voltage, 1μs noise width and 25 to 60Hz noise frequency | |
| | | First transient noise IEC61000-4-4: 1kV | |
| Protection degree | | IP2X | |
| Common terminal arrangement | | 32 points/common (common terminal: 17, 18, 36) | |
| Number of occupied I/O points | | 32 points (I/O assignment is set as a 32-point input module.) | |
| Operation indicator | | ON indication (LED) | |
| External connections | | 37-pin D-sub connector | |
| Applicable wire size | | 0.088 to 0.3mm2 (For A6CON1E) ＊2 | |
| Applicable connector | | A6CON1E, A6CON2E, A6CON3E (optional) | |
| Applicable connector/terminal block converter module | | A6TBX36-E, A6TBX54-E, A6TBX70-E | |
| Internal current consumption (5VDC) | | 75mA (TYP. all points ON) (0.08A is shown on the rating plate of the module.) | |
| Weight | | 0.16kg | |



Derating chart

External connection

Pin-Outs

Module front view

| Pin No. | Signal No. | Pin No. | Signal No. |
|---|---|---|---|
| 1 | X00 | 9 | X10 |
| 20 | X01 | 28 | X11 |
| 2 | X02 | 10 | X12 |
| 21 | X03 | 29 | X13 |
| 3 | X04 | 11 | X14 |
| 22 | X05 | 30 | X15 |
| 4 | X06 | 12 | X16 |
| 23 | X07 | 31 | X17 |
| 5 | X08 | 13 | X18 |
| 24 | X09 | 32 | X19 |
| 6 | X0A | 14 | X1A |
| 25 | X0B | 33 | X1B |
| 7 | X0C | 15 | X1C |
| 26 | X0D | 34 | X1D |
| 8 | X0E | 16 | X1E |
| 27 | X0F | 35 | X1F |
| 17 | COM | 37 | Vacant |
| 36 | COM | 19 | Vacant |
| 18 | COM | | |

＊1: For the setting method, refer to Section 1.3.1.

＊2: When using A6CON2E or A6CON3E, refer to Chapter 7.

## 2.23 QX82 DC Input Module (Negative Common Type)

| Specifications / Type | DC input module (Negative common type) | |
|---|---|---|
| | QX82 | Appearance |
| Number of input points | 64 points | |
| Isolation method | Photocoupler | |
| Rated input voltage | 24VDC (+20/-15%, ripple ratio within 5%) | |
| Rated input current | Approx. 4mA | |
| Input derating | Refer to the derating chart. | |
| ON voltage/ON current | 19V or higher/3mA or higher | |
| OFF voltage/OFF current | 11V or lower/1.7mA or lower | |
| Input impedance | Approx. 5.6kΩ | |
| Response time — OFF to ON | 1ms/5ms/10ms/20ms/70ms or less (configured in PLC parameter) ＊1 (Default: 10ms) | |
| Response time — ON to OFF | 1ms/5ms/10ms/20ms/70ms or less (configured in PLC parameter) ＊1 (Default: 10ms) | |
| Dielectric withstand voltage | 560VAC rms/3 cycles (altitude 2000m) | |
| Insulation resistance | 10MΩ or more by insulation resistance tester | |
| Noise immunity | By noise simulator of 500Vp-p noise voltage, 1 $\mu$ s noise width and 25 to 60Hz noise frequency | |
| | First transient noise IEC61000-4-4: 1kV | |
| Protection degree | IP2X | |
| Common terminal arrangement | 32 points/common (common terminal: 1B01, 1B02, 2B01, 2B02) | |
| Number of occupied I/O points | 64 points (I/O assignment is set as a 64-point input module.) | |
| Operation indicator | ON indication (LED), 32 point switch-over using switch | |
| External connections | 40-pin connector | |
| Applicable wire size | 0.088 to 0.3mm2 (For A6CON1 or A6CON4) ＊2 | |
| Applicable connector | A6CON1, A6CON2, A6CON3, A6CON4 (optional) | |
| Applicable connector/terminal block converter module | ——————— | |
| Internal current consumption (5VDC) | 90mA (TYP. all points ON) | |
| Weight | 0.18kg | |

＊1: For the setting method, refer to Section 1.3.1.
＊2: When using A6CON2 or A6CON3, refer to Chapter 7.

| Derating chart | Pin-Outs | Pin No. *4 | Signal No. | Pin No. *4 | Signal No. | Pin No. *4 | Signal No. | Pin No. *4 | Signal No. |
|---|---|---|---|---|---|---|---|---|---|
| | | 1B20 | X00 | 1A20 | X10 | 2B20 | X20 | 2A20 | X30 |
| | | 1B19 | X01 | 1A19 | X11 | 2B19 | X21 | 2A19 | X31 |
| | | 1B18 | X02 | 1A18 | X12 | 2B18 | X22 | 2A18 | X32 |
| | | 1B17 | X03 | 1A17 | X13 | 2B17 | X23 | 2A17 | X33 |
| | | 1B16 | X04 | 1A16 | X14 | 2B16 | X24 | 2A16 | X34 |
| | | 1B15 | X05 | 1A15 | X15 | 2B15 | X25 | 2A15 | X35 |
| | | 1B14 | X06 | 1A14 | X16 | 2B14 | X26 | 2A14 | X36 |
| | | 1B13 | X07 | 1A13 | X17 | 2B13 | X27 | 2A13 | X37 |
| | | 1B12 | X08 | 1A12 | X18 | 2B12 | X28 | 2A12 | X38 |
| | | 1B11 | X09 | 1A11 | X19 | 2B11 | X29 | 2A11 | X39 |
| | | 1B10 | X0A | 1A10 | X1A | 2B10 | X2A | 2A10 | X3A |
| | | 1B09 | X0B | 1A09 | X1B | 2B09 | X2B | 2A09 | X3B |
| | | 1B08 | X0C | 1A08 | X1C | 2B08 | X2C | 2A08 | X3C |
| | | 1B07 | X0D | 1A07 | X1D | 2B07 | X2D | 2A07 | X3D |
| | | 1B06 | X0E | 1A06 | X1E | 2B06 | X2E | 2A06 | X3E |
| | | 1B05 | X0F | 1A05 | X1F | 2B05 | X2F | 2A05 | X3F |
| | | 1B04 | Vacant | 1A04 | Vacant | 2B04 | Vacant | 2A04 | Vacant |
| | | 1B03 | Vacant | 1A03 | Vacant | 2B03 | Vacant | 2A03 | Vacant |
| | | 1B02 | COM1 | 1A02 | Vacant | 2B02 | COM2 | 2A02 | Vacant |
| | | 1B01 | COM1 | 1A01 | Vacant | 2B01 | COM2 | 2A01 | Vacant |

Derating chart:

(%)
ON ratio/common — 100 90 80 70 60 50 40 30 20
0 10 20 30 40 50 55 (℃)
Ambient temperature
24VDC
26.4VDC
28.8VDC

Pin-Outs — Module front view

B20 A20
B19 A19
B18 A18
B17 A17
B16 A16
B15 A15
B14 A14
B13 A13
B12 A12
B11 A11
B10 A10
B9 A9
B8 A8
B7 A7
B6 A6
B5 A5
B4 A4
B3 A3
B2 A2
B1 A1

External connection

1B20
1A05
+ − 1B01, 1B02
24VDC
Internal circuit
LED
Left side (first half)
Right side (latter half)
*3
Indication selector circuit

The above diagram shows the first half of 32 points (F).
The latter half of 32 points (L) are similar.

*3: Selection of left-hand (F) side provides the first half (X00 to X1F) LED indications, and selection of right-hand (L) side provides the latter half (X20 to X3F) LED indications.
*4: Pin number of 1 ☐☐☐ indicates that of the left-hand side connector, and pin number of 2 ☐☐☐ indicates that of the right-hand side connector.

## 2.24 QX82-S1 DC Input Module (Negative Common Type)

| Type Specifications | | | DC input module (Negative common type) | | | | | Appearance |
|---|---|---|---|---|---|---|---|---|
| | | | QX82-S1 | | | | | |
| Number of input points | | | 64 points | | | | | |
| Isolation method | | | Photocoupler | | | | | |
| Rated input voltage | | | 24VDC (+20/-15%, ripple ratio within 5%) | | | | | |
| Rated input current | | | Approx. 4mA | | | | | |
| Input derating | | | Refer to the derating chart. | | | | | |
| ON voltage/ON current | | | 19V or higher/3.0mA or higher | | | | | |
| OFF voltage/OFF current | | | 9.5V or lower/1.5mA or lower | | | | | |
| Input impedance | | | Approx. 5.6kΩ | | | | | |
| Response time | Set value ∗1 | | 0.1 | 0.2 | 0.4 | 0.6 | 1 | |
| | OFF to ON | TYP. | 0.05ms | 0.15ms | 0.30ms | 0.55ms | 1.05ms | |
| | | MAX. | 0.12ms | 0.20ms | 0.40ms | 0.60ms | 1.20ms | |
| | ON to OFF | TYP. | 0.15ms | 0.20ms | 0.35ms | 0.60ms | 1.10ms | |
| | | MAX. | 0.20ms | 0.30ms | 0.50ms | 0.70ms | 1.30ms | |
| Dielectric withstand voltage | | | 560VAC rms/3 cycles (altitude 2000m) | | | | | |
| Insulation resistance | | | 10MΩ or more by insulation resistance tester | | | | | |
| Noise immunity | | | By noise simulator of 500Vp-p noise voltage, 1 μs noise width and 25 to 60Hz noise frequency | | | | | |
| | | | First transient noise IEC61000-4-4: 1kV | | | | | |
| Protection degree | | | IP2X | | | | | |
| Common terminal arrangement | | | 32 points/common (common terminal: 1B01, 1B02, 2B01, 2B02) | | | | | |
| Number of occupied I/O points | | | 64 points (I/O assignment is set as a 64-point high-speed input module.) | | | | | |
| Operation indicator | | | ON indication (LED), 32 point switch-over using switch | | | | | |
| External connections | | | 40-pin connector | | | | | |
| Applicable wire size | | | 0.088 to 0.3mm2 (For A6CON1 or A6CON4) ∗2 | | | | | |
| Applicable connector | | | A6CON1, A6CON2, A6CON3, A6CON4 (optional) | | | | | |
| Applicable connector/terminal block converter module | | | ———— | | | | | |
| Internal current consumption (5VDC) | | | 90mA (TYP. all points ON) | | | | | |
| Weight | | | 0.18kg | | | | | |

∗1: Configured in PLC parameter. (Default: 0.2ms)
　　A response time setting value can be changed in GX Developer (SW5D5C-GPPW or later).
　　For the setting method, refer to Section 1.3.1.
∗2: When using A6CON2 or A6CON3, refer to Chapter 7.

| Derating chart | | Pin-Outs | Pin No. *4 | Signal No. | Pin No. *4 | Signal No. | Pin No. *4 | Signal No. | Pin No. *4 | Signal No. |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | 1B20 | X00 | 1A20 | X10 | 2B20 | X20 | 2A20 | X30 |
| | | | 1B19 | X01 | 1A19 | X11 | 2B19 | X21 | 2A19 | X31 |
| | | | 1B18 | X02 | 1A18 | X12 | 2B18 | X22 | 2A18 | X32 |
| | | | 1B17 | X03 | 1A17 | X13 | 2B17 | X23 | 2A17 | X33 |
| | | | 1B16 | X04 | 1A16 | X14 | 2B16 | X24 | 2A16 | X34 |
| | | | 1B15 | X05 | 1A15 | X15 | 2B15 | X25 | 2A15 | X35 |
| | | | 1B14 | X06 | 1A14 | X16 | 2B14 | X26 | 2A14 | X36 |
| | | | 1B13 | X07 | 1A13 | X17 | 2B13 | X27 | 2A13 | X37 |
| | | | 1B12 | X08 | 1A12 | X18 | 2B12 | X28 | 2A12 | X38 |
| | | | 1B11 | X09 | 1A11 | X19 | 2B11 | X29 | 2A11 | X39 |
| | | | 1B10 | X0A | 1A10 | X1A | 2B10 | X2A | 2A10 | X3A |
| | | | 1B09 | X0B | 1A09 | X1B | 2B09 | X2B | 2A09 | X3B |
| | | | 1B08 | X0C | 1A08 | X1C | 2B08 | X2C | 2A08 | X3C |
| | | | 1B07 | X0D | 1A07 | X1D | 2B07 | X2D | 2A07 | X3D |
| | | | 1B06 | X0E | 1A06 | X1E | 2B06 | X2E | 2A06 | X3E |
| | | | 1B05 | X0F | 1A05 | X1F | 2B05 | X2F | 2A05 | X3F |
| | | | 1B04 | Vacant | 1A04 | Vacant | 2B04 | Vacant | 2A04 | Vacant |
| | | | 1B03 | Vacant | 1A03 | Vacant | 2B03 | Vacant | 2A03 | Vacant |
| | | | 1B02 | COM1 | 1A02 | Vacant | 2B02 | COM2 | 2A02 | Vacant |
| | | | 1B01 | COM1 | 1A01 | Vacant | 2B01 | COM2 | 2A01 | Vacant |

**Derating chart**

ON ratio/common (%): 100, 90, 80, 70, 60, 50, 40, 30, 20

Ambient temperature: 0 10 20 30 40 50 55 (°C)

24VDC, 26.4VDC, 28.8VDC

**Pin-Outs**

B20 A20, B19 A19, B18 A18, B17 A17, B16 A16, B15 A15, B14 A14, B13 A13, B12 A12, B11 A11, B10 A10, B9 A9, B8 A8, B7 A7, B6 A6, B5 A5, B4 A4, B3 A3, B2 A2, B1 A1

Module front view

**External connection**

1B20

1A05

+ − 1B01, 1B02

24VDC

Internal circuit

LED

Left side (first half)
Right side (latter half) *3

Indication selector circuit

The above diagram shows the first half of 32 points (F).
The latter half of 32 points (L) are similar.

* 3: Selection of left-hand (F) side provides the first half (X00 to X1F) LED indications, and selection of right-hand (L) side provides the latter half (X20 to X3F) LED indications.

* 4: Pin number of 1 ☐ ☐ ☐ indicates that of the left-hand side connector, and pin number of 2 ☐ ☐ ☐ indicates that of the right-hand side connector.

## 2.25 QX90H DC High-speed Input Module (Negative Common Type)

| Specifications | Type | | | DC high-speed input module (Negative common type) | | | | | Appearance |
|---|---|---|---|---|---|---|---|---|---|
| | | | | QX90H | | | | | |
| Number of input points | | | | 16 points | | | | | |
| Isolation method | | | | Photocoupler | | | | | |
| Rated input voltage | | | | 5VDC (+20/-15%, ripple ratio within 5%) | | | | | |
| Rated input current | | | | Approx. 6mA | | | | | |
| Input derating | | | | None | | | | | |
| | | | | | | | | | |
| ON voltage/ON current | | | | 3.5V or higher/3mA or higher | | | | | |
| OFF voltage/OFF current | | | | 1V or lower/1mA or lower | | | | | |
| Input impedance | | | | Approx. 470Ω | | | | | |
| Response time | SW1 (noise filter) ＊1 | | OFF | ON | | | | | |
| | Set value ＊2 | | Invalid | 0.1 | 0.2 | 0.4 | 0.6 | 1 | |
| | OFF to ON | TYP. | 0ms ＊3 | 0.04ms | 0.10ms | 0.25ms | 0.50ms | 0.95ms | |
| | | MAX. | - ＊3 | 0.05ms | 0.15ms | 0.30ms | 0.60ms | 1.00ms | |
| | ON to OFF | TYP. | 0ms ＊3 | 0.04ms | 0.10ms | 0.25ms | 0.50ms | 0.95ms | |
| | | MAX. | - ＊3 | 0.05ms | 0.15ms | 0.30ms | 0.60ms | 1.00ms | |
| Function setting | SW2＊4 | | OFF: Interrupt, ON: High-speed input | | | | | | |
| Dielectric withstand voltage | | | | 560VAC rms/3 cycles (altitude 2000m) | | | | | |
| Insulation resistance | | | | 10MΩ or more by insulation resistance tester | | | | | |
| Noise immunity＊5 | | | | By noise simulator of 500Vp-p noise voltage, 1μs noise width and 25 to 60Hz noise frequency | | | | | |
| Protection degree | | | | IP2X | | | | | |
| Common terminal arrangement | | | | 8 points/common (common terminal: TB9, TB18) | | | | | |
| Number of occupied I/O points | | | | 16 points (I/O assignment is set as a 16-point high-speed input module or 16-point interrupt module.) ＊4 | | | | | |
| Interrupt processing condition | | | | Set by Switch setting in GX Developer ＊4 ＊6 | | | | | |
| Operation indicator | | | | ON indication (LED) | | | | | |
| External connections | | | | 18-point terminal block (M3×6 screws) | | | | | |
| Applicable wire size | | | | 0.3 to 0.75mm² core (2.8mm OD max.) | | | | | |
| Applicable crimping terminal | | | | R1.25-3 (Sleeved crimping terminals cannot be used.) | | | | | |
| Internal current consumption (5VDC) | | | | 80mA (TYP. all points ON) | | | | | |
| Weight | | | | 0.14kg | | | | | |

＊1: If the noise filter selector switch (switch 1) on the bottom of the module (refer to Chapter 10) is turned on, the noise filter takes effect.
   The off-status noise filter disables I/O response time setting.
   After switching on or off the switch 1, reset the power supply of the CPU module.
＊2: Set an input response time in "I/O response time" combo box of PLC parameter in GX Developer. (Default: 0.2ms)
   A response time setting value can be changed in GX Developer (SW6D5C-GPPW or later).
   For the setting details, refer to Section 1.3.1.
＊3: The actual response time is 5μs delay when turning on, 10μs delay when turning off, because the hardware response time is added.
   For the details of the CPU overhead time, refer to manuals for the CPU module used (Function Explanation, Program Fundamentals).
＊4: The module function can be changed according to the status of the function selector switch (switch 2) on the bottom of the module (refer to Chapter 10).
   ON: High-speed input
   OFF: Interrupt
   If the function selector switch (switch 2) setting is changed while the CPU module is in RUN, an error (error code: 2100) occurs.
＊5: Indicates the noise immunity when the noise filter takes effect (the noise filter selector switch (switch 1) is turned on).
＊6: For the setting method, refer to Section 1.3.3.

| External connection | QX90H (16 points) |
|---|---|



| Terminal block No. | Signal name | | Terminal block No. | Signal name |
|---|---|---|---|---|
| | | | TB1 | X00 |
| TB2 | X01 | | TB3 | X02 |
| TB4 | X03 | | TB5 | X04 |
| TB6 | X05 | | TB7 | X06 |
| TB8 | X07 | | TB9 | COM1 |
| TB10 | X08 | | TB11 | X09 |
| TB12 | X0A | | TB13 | X0B |
| TB14 | X0C | | TB15 | X0D |
| TB16 | X0E | | TB17 | X0F |
| TB18 | COM2 | | | |

# MEMO

# 3. OUTPUT MODULE SPECIFICATIONS

## 3.1 QY10 Contact Output Module

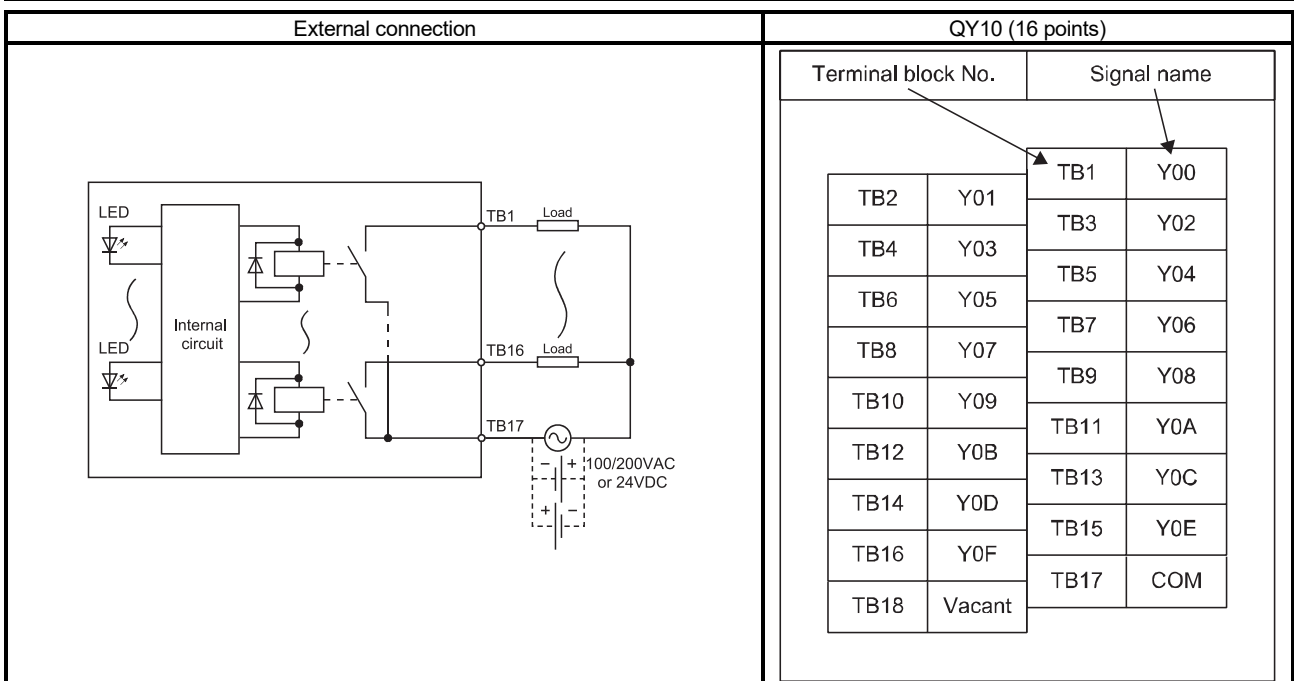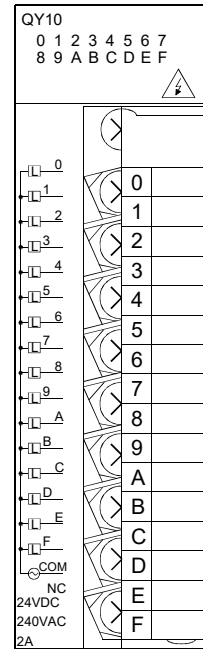| Specifications \ Type | | Contact output module | |
|---|---|---|---|
| | | QY10 | Appearance |
| Number of output points | | 16 points | |
| Isolation method | | Relay | |
| Rated switching voltage, current | | 24VDC 2A (resistive load) 240VAC 2A (cos $\phi$ =1) /point, 8A/common | |
| Minimum switching load | | 5VDC 1mA | |
| Maximum switching load | | 264VAC 125VDC | |
| Response time | OFF to ON | 10ms or less | |
| | ON to OFF | 12ms or less | |
| Life | Mechanical | 20 million times or more | |
| | Electrical | Rated switching voltage/current load 100 thousand times or more | |
| | | 200VAC 1.5A, 240VAC 1A (COS $\phi$ =0.7) 100 thousand times or more 200VAC 0.4A, 240VAC 0.3A (COS $\phi$ =0.7) 300 thousand times or more | |
| | | 200VAC 1A, 240VAC 0.5A (COS $\phi$ =0.35) 100 thousand times or more 200VAC 0.3A, 240VAC 0.15A (COS $\phi$ =0.35) 300 thousand times or more | |
| | | 24VDC 1A, 100VDC 0.1A (L/R=7ms) 100 thousand times or more 24VDC 0.3A, 100VDC 0.03A (L/R=7ms) 300 thousand times or more | |
| Maximum switching frequency | | 3600 times/hour | |
| Surge suppressor | | No | |
| Fuse | | No | |
| Dielectric withstand voltage | | 2830VAC rms/3 cycles (altitude 2000m) | |
| Insulation resistance | | 10MΩ or more by insulation resistance tester | |
| Noise immunity | | By noise simulator of 1500Vp-p noise voltage, 1 $\mu$ s noise width and 25 to 60Hz noise frequency | |
| | | First transient noise IEC61000-4-4: 1kV | |
| Protection degree | | IP1X | |
| Common terminal arrangement | | 16 points/common (common terminal: TB17) | |
| Number of occupied I/O points | | 16 points (I/O assignment is set as a 16-point output module.) | |
| Operation indicator | | ON indication (LED) | |
| External connections | | 18-point terminal block (M3 $\times$ 6 screws) | |
| Applicable wire size | | 0.3 to 0.75mm $^2$ core (2.8mm OD max.) | |
| Applicable crimping terminal | | R1.25-3 (Sleeved crimping terminals cannot be used.) | |
| Internal current consumption (5VDC) | | 430mA (TYP. all points ON) | |
| Weight | | 0.22kg | |

| External connection | QY10 (16 points) | |
|---|---|---|

| Terminal block No. | | Signal name | |
|---|---|---|---|
| | | TB1 | Y00 |
| TB2 | Y01 | | |
| | | TB3 | Y02 |
| TB4 | Y03 | | |
| | | TB5 | Y04 |
| TB6 | Y05 | | |
| | | TB7 | Y06 |
| TB8 | Y07 | | |
| | | TB9 | Y08 |
| TB10 | Y09 | | |
| | | TB11 | Y0A |
| TB12 | Y0B | | |
| | | TB13 | Y0C |
| TB14 | Y0D | | |
| | | TB15 | Y0E |
| TB16 | Y0F | | |
| | | TB17 | COM |
| TB18 | Vacant | | |

## 3.2 QY10-TS Contact Output Module

This module is a spring clamp terminal block type and an output module that has indicators for checking the insertion state of wire.

| | Type | Contact output module | |
|---|---|---|---|
| Specifications | | QY10-TS | Appearance |
| Number of output points | | 16 points | |
| Isolation method | | Relay | |
| Rated switching voltage, current | | 24VDC 2A (resistive load) 240VAC 2A (cos $\phi$ =1) /point, 8A/common | |
| Minimum switching load | | 5VDC 1mA | |
| Maximum switching load | | 264VAC 125VDC | |
| Response time | OFF to ON | 10ms or less | |
| | ON to OFF | 12ms or less | |
| Life | Mechanical | 20 million times or more | |
| | Electrical | Rated switching voltage/current load 100 thousand times or more | |
| | | 200VAC 1.5A, 240VAC 1A (COS $\phi$ =0.7) 100 thousand times or more 200VAC 0.4A, 240VAC 0.3A (COS $\phi$ =0.7) 300 thousand times or more | |
| | | 200VAC 1A, 240VAC 0.5A (COS $\phi$ =0.35) 100 thousand times or more 200VAC 0.3A, 240VAC 0.15A (COS $\phi$ =0.35) 300 thousand times or more | |
| | | 24VDC 1A, 100VDC 0.1A (L/R=7ms) 100 thousand times or more 24VDC 0.3A, 100VDC 0.03A (L/R=7ms) 300 thousand times or more | |
| Maximum switching frequency | | 3600 times/hour | |
| Surge suppressor | | No | |
| Fuse | | No | |
| Dielectric withstand voltage | | 2830VAC rms/3 cycles (altitude 2000m) | |
| Insulation resistance | | 10MΩ or more by insulation resistance tester | |
| Noise immunity | | By noise simulator of 1500Vp-p noise voltage, 1 $\mu$ s noise width and 25 to 60Hz noise frequency | |
| | | First transient noise IEC61000-4-4: 1kV | |
| Protection degree | | IP2X | |
| Common terminal arrangement | | 16 points/common (common terminal: TB17) | |
| Number of occupied I/O points | | 16 points (I/O assignment is set as a 16-point output module.) | |
| Operation indicator | | ON indication (LED) | |
| External connections | | Two-piece spring clamp terminal block | |
| Applicable wire size | | 0.3 to 2.0mm2 core (22 to 15 AWG) | |
| Applicable crimping terminal | | Refer to section 9.1 | |
| Internal current consumption (5VDC) | | 430mA (TYP. all points ON) | |
| Weight | | 0.22kg | |

| External connection | QY10-TS (16 points) |
|---|---|
|  | |

| Terminal block No. | | Signal name | |
|---|---|---|---|
| | | TB1 | Y00 |
| TB2 | Y01 | | |
| | | TB3 | Y02 |
| TB4 | Y03 | | |
| | | TB5 | Y04 |
| TB6 | Y05 | | |
| | | TB7 | Y06 |
| RB8 | Y07 | | |
| | | TB9 | Y08 |
| RB10 | Y09 | | |
| | | TB11 | Y0A |
| TB12 | Y0B | | |
| | | TB13 | Y0C |
| TB14 | Y0D | | |
| | | TB15 | Y0E |
| TB16 | Y0F | | |
| | | TB17 | COM |
| TB18 | Vacant | | |

## 3.3 QY18A Contact Output Module (All Points Independent)

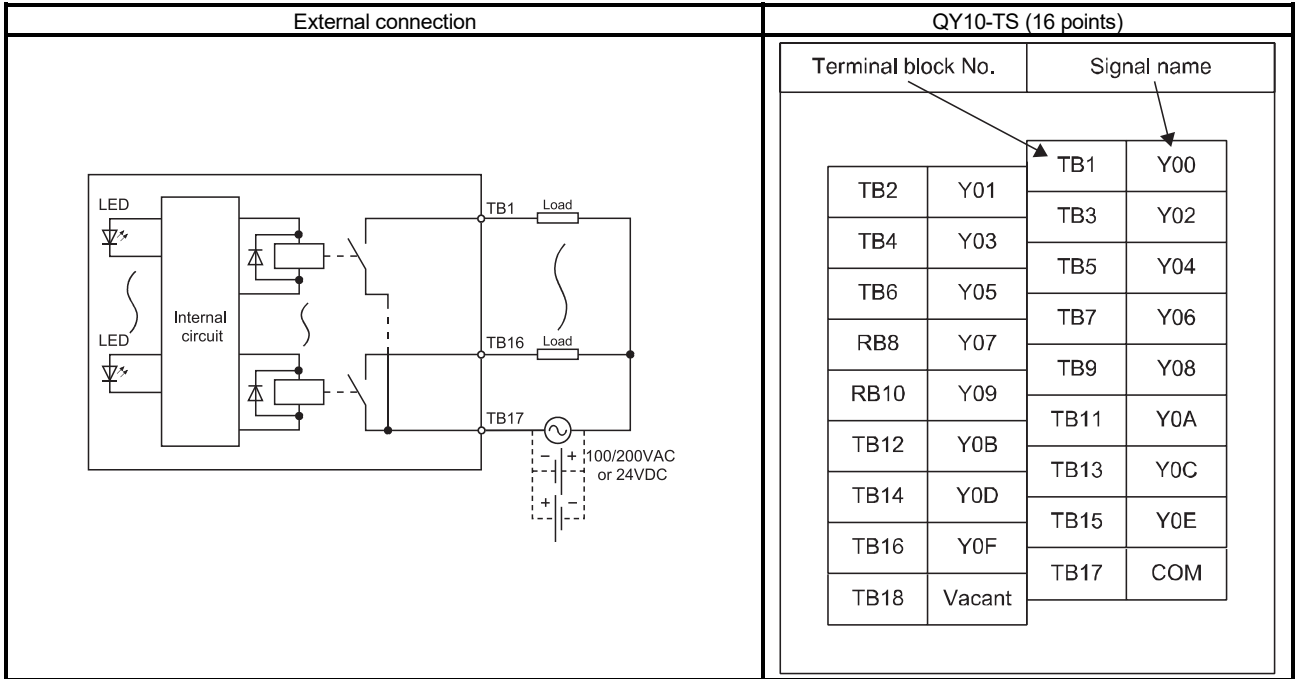| Specifications / Type | | Contact output module (All points independent) | |
|---|---|---|---|
| | | QY18A | Appearance |
| Number of output points | | 8 points | |
| Isolation method | | Relay isolation | |
| Rated switching voltage/current | | 24VDC 2A (resistive load) 240VAC 2A (cos $\phi$ =1) /point, 8A/unit | |
| Minimum switching load | | 5VDC 1mA | |
| Maximum switching load | | 264VAC 125VDC | |
| Response time | OFF to ON | 10ms or shorter | |
| | ON to OFF | 12ms or shorter | |
| Life | Mechanical | 20 million cycles or more | |
| | Electrical | Rated switching voltage/current load: 100 thousand cycles or more | |
| | | 200VAC 1.5A, 240VAC 1A (COS $\phi$ =0.7) 100 thousand cycles or more 200VAC 0.4A, 240VAC 0.3A (COS $\phi$ =0.7) 300 thousand cycles or more | |
| | | 200VAC 1A, 240VAC 0.5A (COS $\phi$ =0.35) 100 thousand cycles or more 200VAC 0.3A, 240VAC 0.15A (COS $\phi$ =0.35) 300 thousand cycles or more | |
| | | 24VDC 1A, 100VDC 0.1A (L/R=7ms) 100 thousand cycles or more 24VDC 0.3A, 100VDC 0.03A (L/R=7ms) 300 thousand cycles or more | |
| Maximum switching frequency | | 3600 cycles/hour | |
| Surge suppressor | | None | |
| Fuse | | None | |
| Dielectric withstand voltage | | 2830VAC rms/3 cycles (altitude 2000m) | |
| Insulation resistance | | 10MΩ or more by insulation resistance tester | |
| Noise immunity | | By noise simulator of 1500Vp-p noise voltage, 1 $\mu$ s noise width and 25 to 60Hz noise frequency | |
| | | First transient noise IEC61000-4-4: 1kV | |
| Protection degree | | IP1X | |
| Number of occupied I/O points | | 16 points (I/O assignment is set as a 16-point output module.) | |
| Operation indicator | | ON indication (LED) | |
| External connections | | 18-point terminal block (M3 $\times$ 6 screws) | |
| Applicable wire size | | Core cable: 0.3 to 0.75mm2 (Outside diameter: 2.8mm or smaller) | |
| Applicable crimping terminal | | R1.25-3 (Sleeved crimping terminals cannot be used.) | |
| Internal current consumption (5VDC) | | 240mA (TYP. all points ON) | |
| Weight | | 0.22kg | |

| External connection | Terminal block No. | Signal name |
|---|---|---|
| | TB1 | Y00 |
| | TB2 | |
| | TB3 | Y01 |
| | TB4 | |
| | TB5 | Y02 |
| | TB6 | |
| | TB7 | Y03 |
| | TB8 | |
| | TB9 | Y04 |
| | TB10 | |
| | TB11 | Y05 |
| | TB12 | |
| | TB13 | Y06 |
| | TB14 | |
| | TB15 | Y07 |
| | TB16 | |
| | TB17 | Vacant |
| | TB18 | Vacant |

## 3.4 QY22 TRIAC Output Module

| Specifications \ Type | TRIAC output module | |
|---|---|---|
| | QY22 | Appearance |
| Number of output points | 16 points | |
| Isolation method | Photocoupler | |
| Rated load voltage | 100 to 240VAC 50/60Hz ± 5% | |
| Load voltage distortion rate | Within 5% | |
| Maximum load voltage | 264VAC | |
| Maximum load current | 0.6A/point, 4.8A/common | |
| Minimum load voltage/current | 24VAC 100mA, 100VAC 25mA, 240VAC 25mA | |
| Maximum rush current | 20A/cycle or less | |
| Leakage current at OFF | 3mA or lower (for 240V, 60Hz), 1.5mA or lower (for 120V, 60Hz) | |
| Maximum voltage drop at ON | 1.5V or lower | |
| Response time — OFF to ON | 1ms + 0.5 cycles or less | |
| Response time — ON to OFF | 1ms + 0.5 cycles or less (rated load, resistance load) | |
| Surge suppressor | CR absorber | |
| Fuse | None (Attaching a fuse to each external wiring is recommended. Refer to Section 1.2) | |
| Dielectric withstand voltage | 2830VAC rms/3 cycles (altitude 2000m) | |
| Insulation resistance | 10MΩ or higher by insulation resistance meter | |
| Noise immunity | By noise simulator of 1.5kVp-p noise voltage, 1 μs noise width and 25 to 60Hz noise frequency | |
| | First transient noise IEC61000-4-4: 1kV | |
| Protection degree | IP1X | |
| Common terminal arrangement | 16 points/common (common terminal: TB17) | |
| Number of occupied I/O points | 16 points (I/O assignment is set as a 16-point output module.) | |
| Operation indicator | ON indication (LED) | |
| External connections | 18-point terminal block (M3 × 6 screws) | |
| Applicable wire size | Core cable: 0.3 to 0.75mm2 (Outside diameter: 2.8mm or smaller) | |
| Applicable crimping terminal | R1.25-3 (Sleeved crimping terminals cannot be used.) | |
| Internal current consumption (5VDC) | 250mA (Max., all points ON) | |
| Weight | 0.40kg | |

| External connection | QY22 (16 points) |
|---|---|

External connection diagram showing LED, Internal circuit, TB1 Load, TB16 Load, TB17, 100 to 240VAC.

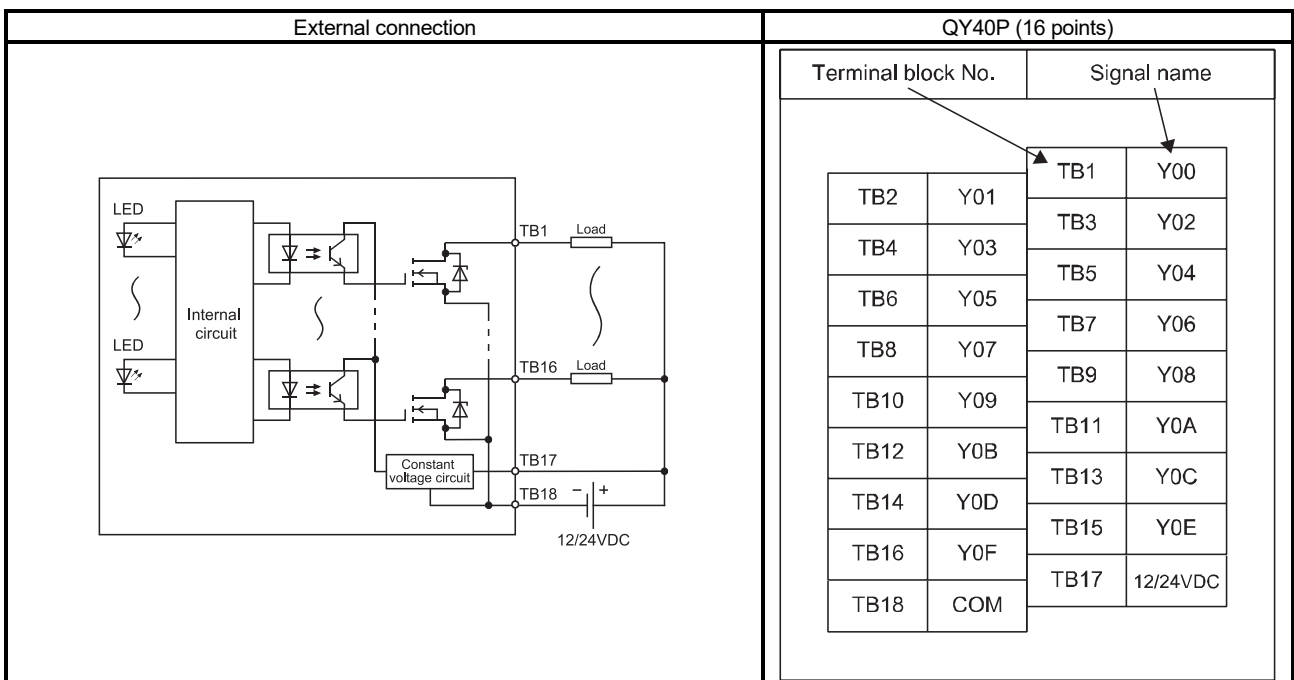| Terminal block No. | Signal name | Terminal block No. | Signal name |
|---|---|---|---|
| | | TB1 | Y00 |
| TB2 | Y01 | TB3 | Y02 |
| TB4 | Y03 | TB5 | Y04 |
| TB6 | Y05 | TB7 | Y06 |
| TB8 | Y07 | TB9 | Y08 |
| TB10 | Y09 | TB11 | Y0A |
| TB12 | Y0B | TB13 | Y0C |
| TB14 | Y0D | TB15 | Y0E |
| TB16 | Y0F | TB17 | COM |
| TB18 | Vacant | | |
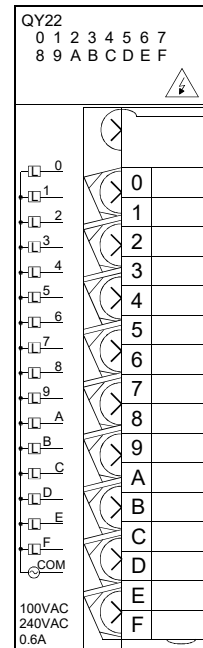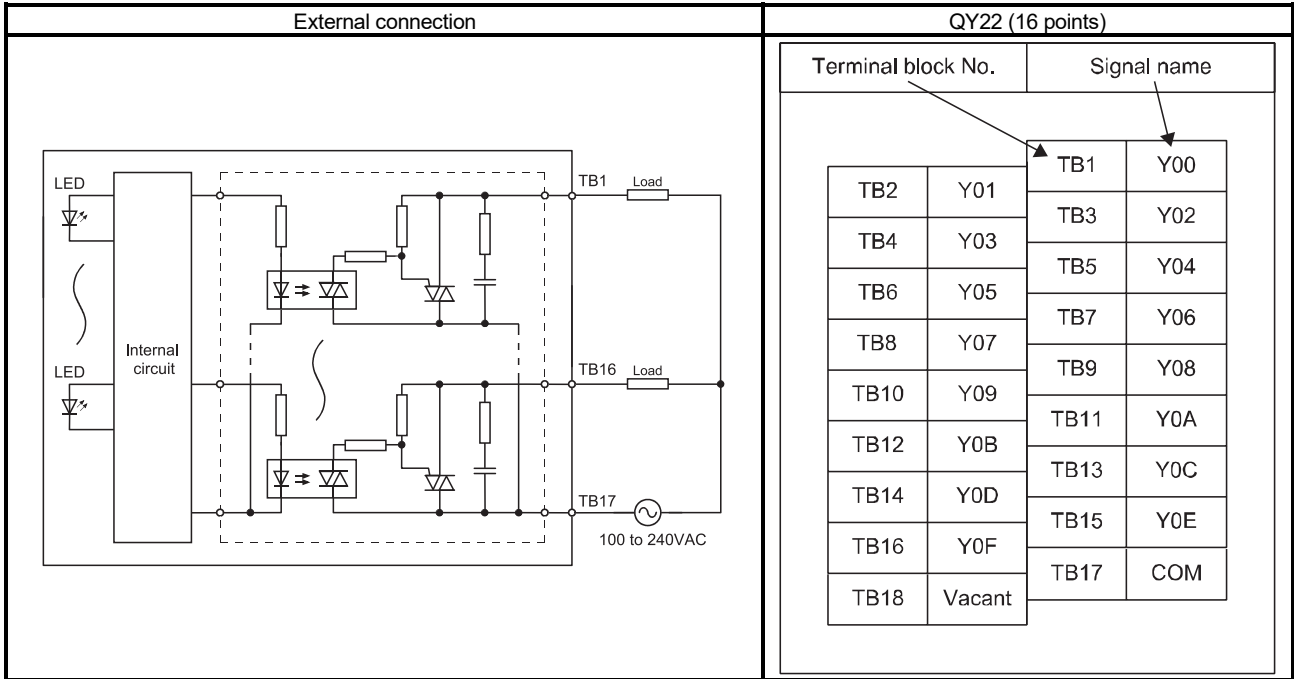
POINT

Do not touch the module during turning on electricity and immediately after power supply interception. There is fear of a burn.
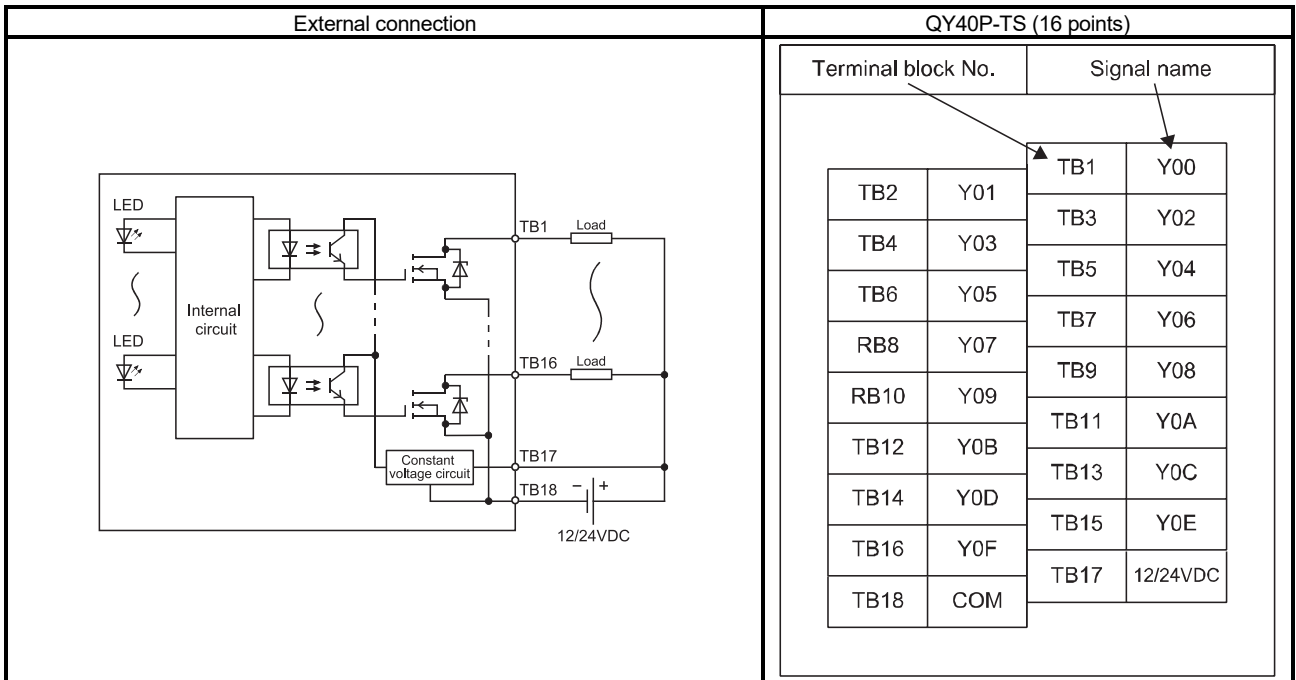
## 3.5 QY40P Transistor Output Module (Sink Type)

| Type / Specifications | | Transistor output module (Sink type) | |
|---|---|---|---|
| | | QY40P | Appearance |
| Number of output points | | 16 points | |
| Isolation method | | Photocoupler | |
| Rated load voltage | | 12-24VDC (+20/-15%) | |
| Maximum load current | | 0.1A/point, 1.6A/common | |
| Maximum inrush current | | 0.7A, 10ms or less | |
| Leakage current at OFF | | 0.1mA or less | |
| Maximum voltage drop at ON | | 0.1VDC (TYP.) 0.1A, 0.2VDC (MAX.) 0.1A | |
| Response time | OFF to ON | 1ms or less | |
| | ON to OFF | 1ms or less (rated load, resistive load) | |
| Surge suppressor | | Zener diode | |
| Fuse | | No | |
| External supply power | Voltage | 12-24VDC (+20/-15%) (ripple ratio within 5%) | |
| | Current | MAX. 10mA (when 24VDC and all points are ON) | |
| Dielectric withstand voltage | | 560VAC rms/3 cycles (altitude 2000m) | |
| Insulation resistance | | 10MΩ or more by insulation resistance tester | |
| Noise immunity | | By noise simulator of 500Vp-p noise voltage, 1 $\mu$ s noise width and 25 to 60Hz noise frequency | |
| | | First transient noise IEC61000-4-4: 1kV | |
| Protection degree | | IP2X | |
| Common terminal arrangement | | 16 points/common (common terminal: TB18) | |
| Number of occupied I/O points | | 16 points (I/O assignment is set as a 16-point output module.) | |
| Protection function | | Yes (overload protection function, overheat protection function) • Overheat protection function is activated in increments of 1 point. • Overload protection function is activated in increments of 1 point. | |
| Operation indicator | | ON indication (LED) | |
| External connections | | 18-point terminal block (M3 $\times$ 6 screws) | |
| Applicable wire size | | 0.3 to 0.75mm$^2$ core (2.8mm OD max.) | |
| Applicable crimping terminal | | R1.25-3 (Sleeved crimping terminals cannot be used.) | |
| Internal current consumption (5VDC) | | 65mA (TYP. all points ON) (0.07A is shown on the rating plate of the module.) | |
| Weight | | 0.16kg | |

| External connection | QY40P (16 points) | |
|---|---|---|



| Terminal block No. | | Signal name |
|---|---|---|
| | TB1 | Y00 |
| TB2 | Y01 | |
| | TB3 | Y02 |
| TB4 | Y03 | |
| | TB5 | Y04 |
| TB6 | Y05 | |
| | TB7 | Y06 |
| TB8 | Y07 | |
| | TB9 | Y08 |
| TB10 | Y09 | |
| | TB11 | Y0A |
| TB12 | Y0B | |
| | TB13 | Y0C |
| TB14 | Y0D | |
| | TB15 | Y0E |
| TB16 | Y0F | |
| | TB17 | 12/24VDC |
| TB18 | COM | |

## 3.6 QY40P-TS Transistor Output Module (Sink Type)

This module is a spring clamp terminal block type and an output module that has indicators for checking the insertion state of wire.

| Specifications / Type | | Transistor output module (Sink type) | |
|---|---|---|---|
| | | QY40P-TS | Appearance |
| Number of output points | | 16 points | |
| Isolation method | | Photocoupler | |
| Rated load voltage | | 12-24VDC (+20/-15%) | |
| Maximum load current | | 0.1A/point, 1.6A/common | |
| Maximum inrush current | | 0.7A, 10ms or less | |
| Leakage current at OFF | | 0.1mA or less | |
| Maximum voltage drop at ON | | 0.1VDC (TYP.) 0.1A, 0.2VDC (MAX.) 0.1A | |
| Response time | OFF to ON | 1ms or less | |
| | ON to OFF | 1ms or less (rated load, resistive load) | |
| Surge suppressor | | Zener diode | |
| Fuse | | No | |
| External supply power | Voltage | 12-24VDC (+20/-15%) (ripple ratio within 5%) | |
| | Current | MAX. 10mA (when 24VDC and all points are ON) | |
| Dielectric withstand voltage | | 560VAC rms/3 cycles (altitude 2000m) | |
| Insulation resistance | | 10MΩ or more by insulation resistance tester | |
| Noise immunity | | By noise simulator of 500Vp-p noise voltage, $1\mu$s noise width and 25 to 60Hz noise frequency | |
| | | First transient noise IEC61000-4-4: 1kV | |
| Protection degree | | IP2X | |
| Common terminal arrangement | | 16 points/common (common terminal: TB18) | |
| Number of occupied I/O points | | 16 points (I/O assignment is set as a 16-point output module.) | |
| Protection function | | Yes (overload protection function, overheat protection function)<br>• Overheat protection function is activated in increments of 1 point.<br>• Overload protection function is activated in increments of 1 point. | |
| Operation indicator | | ON indication (LED) | |
| External connections | | Two-piece spring clamp terminal block | |
| Applicable wire size | | 0.3 to 2.0mm$^2$ core (22 to 15 AWG) | |
| Applicable crimping terminal | | Refer to section 9.1 | |
| Internal current consumption (5VDC) | | 65mA (TYP. all points ON)<br>(0.07A is shown on the rating plate of the module.) | |
| Weight | | 0.16kg | |

| External connection | QY40P-TS (16 points) |
|---|---|



| Terminal block No. | | Signal name |
|---|---|---|
| | | TB1 | Y00 |
| TB2 | Y01 | TB3 | Y02 |
| TB4 | Y03 | TB5 | Y04 |
| TB6 | Y05 | TB7 | Y06 |
| RB8 | Y07 | TB9 | Y08 |
| RB10 | Y09 | TB11 | Y0A |
| TB12 | Y0B | TB13 | Y0C |
| TB14 | Y0D | TB15 | Y0E |
| TB16 | Y0F | TB17 | 12/24VDC |
| TB18 | COM | | |

## 3.7 QY41H Transistor High-speed Output Module (Sink Type)

| | Type | Transistor high-speed output module (Sink type) | |
|---|---|---|---|
| Specifications | | QY41H | Appearance |
| Number of output points | | 32 points | |
| Isolation method | | Photocoupler | |
| Rated load voltage | | 5-24VDC (+20/-15%) | |
| Maximum load current | | 0.2A/point, 2A/common | |
| Maximum inrush current | | 0.7A, 10ms or less | |
| Leakage current at OFF | | 0.1mA or less | |
| Maximum voltage drop at ON | | 0.1VDC (TYP.) 0.1A, 0.2VDC (MAX.) 0.1A | |
| Response time | OFF to ON | $2\mu$s or less | |
| | ON to OFF | $2\mu$s or less (rated load, resistive load) | |
| Surge suppressor | | Zener diode | |
| Fuse | | None (Attaching a fuse to external wiring is recommended.) | |
| Dielectric withstand voltage | | 560VAC rms/3 cycles (altitude 2000m) | |
| Insulation resistance | | 10MΩ or more by insulation resistance tester | |
| Noise immunity | | By noise simulator of 500Vp-p noise voltage, 1$\mu$s noise width and 25 to 60Hz noise frequency | |
| | | First transient noise IEC61000-4-4: 1kV | |
| Protection degree | | IP2X | |
| Common terminal arrangement | | 32 points/common (common terminal: A01, A02) | |
| Number of occupied I/O points | | 32 points (I/O assignment is set as a 32-point output module.) | |
| Operation indicator | | ON indication (LED) | |
| External connections | | 40-pin connector | |
| Applicable wire size | | 0.088 to 0.3mm$^2$ (For A6CON1 or A6CON4) ＊1 | |
| Applicable connector | | A6CON1, A6CON2, A6CON3, A6CON4 (optional) | |
| Applicable connector/terminal block converter module | | A6TBXY36, A6TBXY54 | |
| Internal current consumption (5VDC) | | 370mA (TYP. all points ON) | |
| Weight | | 0.10kg | |

| External connection | Pin-Outs | Pin No. | Signal No. | Pin No. | Signal No. |
|---|---|---|---|---|---|
| | | B20 | Y00 | A20 | Y10 |
| | | B19 | Y01 | A19 | Y11 |
| | | B18 | Y02 | A18 | Y12 |
| | | B17 | Y03 | A17 | Y13 |
| | | B16 | Y04 | A16 | Y14 |
| | | B15 | Y05 | A15 | Y15 |
| | | B14 | Y06 | A14 | Y16 |
| | | B13 | Y07 | A13 | Y17 |
| | | B12 | Y08 | A12 | Y18 |
| | | B11 | Y09 | A11 | Y19 |
| | | B10 | Y0A | A10 | Y1A |
| | | B09 | Y0B | A09 | Y1B |
| | | B08 | Y0C | A08 | Y1C |
| | | B07 | Y0D | A07 | Y1D |
| | | B06 | Y0E | A06 | Y1E |
| | | B05 | Y0F | A05 | Y1F |
| | | B04 | Vacant | A04 | Vacant |
| | | B03 | Vacant | A03 | Vacant |
| | | B02 | Vacant | A02 | COM |
| | | B01 | Vacant | A01 | COM |



Module front view

＊1: When using A6CON2 or A6CON3, refer to Chapter 7.

## 3.8 QY41P Transistor Output Module (Sink Type)

| Specifications / Type | | Transistor output module (Sink type) | |
|---|---|---|---|
| | | QY41P | Appearance |
| Number of output points | | 32 points | |
| Isolation method | | Photocoupler | |
| Rated load voltage | | 12-24VDC (+20/-15%) | |
| Maximum load current | | 0.1A/point, 2A/common | |
| Maximum inrush current | | 0.7A, 10ms or less | |
| Leakage current at OFF | | 0.1mA or less | |
| Maximum voltage drop at ON | | 0.1VDC (TYP.) 0.1A, 0.2VDC (MAX.) 0.1A | |
| Response time | OFF to ON | 1ms or less | |
| | ON to OFF | 1ms or less (rated load, resistive load) | |
| Surge suppressor | | Zener diode | |
| Fuse | | No | |
| External supply power | Voltage | 12-24VDC (+20/-15%) (ripple ratio within 5%) | |
| | Current | 20mA (at 24VDC) | |
| Dielectric withstand voltage | | 560VAC rms/3 cycles (altitude 2000m) | |
| Insulation resistance | | 10MΩ or more by insulation resistance tester | |
| Noise immunity | | By noise simulator of 500Vp-p noise voltage, 1$\mu$s noise width and 25 to 60Hz noise frequency | |
| | | First transient noise IEC61000-4-4: 1kV | |
| Protection degree | | IP2X | |
| Common terminal arrangement | | 32 points/common (common terminal: A01, A02) | |
| Number of occupied I/O points | | 32 points (I/O assignment is set as a 32-point output module.) | |
| Protection function | | Yes (overheat protection function, overload protection function) • Overheat protection function is activated in increments of 1 point. • Overload protection function is activated in increments of 1 point. | |
| Operation indicator | | ON indication (LED) | |
| External connections | | 40-pin connector | |
| Applicable wire size | | 0.088 to 0.3mm$^2$ (For A6CON1 or A6CON4) ＊1 | |
| Applicable connector | | A6CON1, A6CON2, A6CON3, A6CON4 (optional) | |
| Applicable connector/terminal block converter module | | A6TBXY36, A6TBXY54 | |
| Internal current consumption (5VDC) | | 105mA (TYP. all points ON) (0.11A is shown on the rating plate of the module.) | |
| Weight | | 0.15kg | |

QY41P
0 1 2 3 4 5 6 7
8 9 A B C D E F
0 1 2 3 4 5 6 7
8 9 A B C D E F
12/24VDC 0.1A   QY41P

| Pin No. | Signal No. | Pin No. | Signal No. |
|---|---|---|---|
| B20 | Y00 | A20 | Y10 |
| B19 | Y01 | A19 | Y11 |
| B18 | Y02 | A18 | Y12 |
| B17 | Y03 | A17 | Y13 |
| B16 | Y04 | A16 | Y14 |
| B15 | Y05 | A15 | Y15 |
| B14 | Y06 | A14 | Y16 |
| B13 | Y07 | A13 | Y17 |
| B12 | Y08 | A12 | Y18 |
| B11 | Y09 | A11 | Y19 |
| B10 | Y0A | A10 | Y1A |
| B09 | Y0B | A09 | Y1B |
| B08 | Y0C | A08 | Y1C |
| B07 | Y0D | A07 | Y1D |
| B06 | Y0E | A06 | Y1E |
| B05 | Y0F | A05 | Y1F |
| B04 | Vacant | A04 | Vacant |
| B03 | Vacant | A03 | Vacant |
| B02 | 12/24 VDC | A02 | COM |
| B01 | 12/24 VDC | A01 | COM |

External connection



Pin-Outs

Module front view

＊1: When using A6CON2 or A6CON3, refer to Chapter 7.

## 3.9 QY42P Transistor Output Module (Sink Type)

| Specifications | Type | Transistor output module (Sink type) | |
|---|---|---|---|
| | | QY42P | Appearance |
| Number of output points | | 64 points | |
| Isolation method | | Photocoupler | |
| Rated load voltage | | 12-24VDC (+20/-15%) | |
| Maximum load current | | 0.1A/point, 2A/common | |
| Maximum inrush current | | 0.7A, 10ms or less | |
| Leakage current at OFF | | 0.1mA or less | |
| Maximum voltage drop at ON | | 0.1VDC (TYP.) 0.1A, 0.2VDC (MAX.) 0.1A | |
| Response time | OFF to ON | 1ms or less | |
| | ON to OFF | 1ms or less (rated load, resistive load) | |
| Surge suppressor | | Zener diode | |
| Fuse | | No | |
| External supply power | Voltage | 12-24VDC (+20/-15%) (ripple ratio within 5%) | |
| | Current | 20mA (at 24VDC)/common | |
| Dielectric withstand voltage | | 560VAC rms/3 cycles (altitude 2000m) | |
| Insulation resistance | | 10MΩ or more by insulation resistance tester | |
| Noise immunity | | By noise simulator of 500Vp-p noise voltage, 1 $\mu$ s noise width and 25 to 60Hz noise frequency | |
| | | First transient noise IEC61000-4-4: 1kV | |
| Protection degree | | IP2X | |
| Common terminal arrangement | | 32 points/common (common terminal: 1A01, 1A02, 2A01, 2A02) | |
| Number of occupied I/O points | | 64 points (I/O assignment is set as a 64-point output module.) | |
| Protection function | | Yes (overheat protection function, overload protection function) • Overheat protection function is activated in increments of 1 point. • Overload protection function is activated in increments of 1 point. | |
| Operation indicator | | ON indication (LED), 32 point switch-over using switch | |
| External connections | | 40-pin connector | |
| Applicable wire size | | 0.088 to 0.3mm$^2$ (For A6CON1 or A6CON4) ＊3 | |
| Applicable connector | | A6CON1, A6CON2, A6CON3, A6CON4 (optional) | |
| Applicable connector/terminal block converter module | | A6TBXY36, A6TBXY54 | |
| Internal current consumption (5VDC) | | 150mA (TYP. all points ON) | |
| Weight | | 0.17kg | |



| External connection | Pin-Outs | Pin No. ＊1 | Signal No. | Pin No. ＊1 | Signal No. | Pin No. ＊1 | Signal No. | Pin No. ＊1 | Signal No. |
|---|---|---|---|---|---|---|---|---|---|
| | | 1B20 | Y00 | 1A20 | Y10 | 2B20 | Y20 | 2A20 | Y30 |
| | | 1B19 | Y01 | 1A19 | Y11 | 2B19 | Y21 | 2A19 | Y31 |
| | | 1B18 | Y02 | 1A18 | Y12 | 2B18 | Y22 | 2A18 | Y32 |
| | | 1B17 | Y03 | 1A17 | Y13 | 2B17 | Y23 | 2A17 | Y33 |
| | | 1B16 | Y04 | 1A16 | Y14 | 2B16 | Y24 | 2A16 | Y34 |
| | | 1B15 | Y05 | 1A15 | Y15 | 2B15 | Y25 | 2A15 | Y35 |
| | | 1B14 | Y06 | 1A14 | Y16 | 2B14 | Y26 | 2A14 | Y36 |
| | | 1B13 | Y07 | 1A13 | Y17 | 2B13 | Y27 | 2A13 | Y37 |
| | | 1B12 | Y08 | 1A12 | Y18 | 2B12 | Y28 | 2A12 | Y38 |
| | | 1B11 | Y09 | 1A11 | Y19 | 2B11 | Y29 | 2A11 | Y39 |
| | | 1B10 | Y0A | 1A10 | Y1A | 2B10 | Y2A | 2A10 | Y3A |
| | | 1B09 | Y0B | 1A09 | Y1B | 2B09 | Y2B | 2A09 | Y3B |
| | | 1B08 | Y0C | 1A08 | Y1C | 2B08 | Y2C | 2A08 | Y3C |
| | | 1B07 | Y0D | 1A07 | Y1D | 2B07 | Y2D | 2A07 | Y3D |
| | | 1B06 | Y0E | 1A06 | Y1E | 2B06 | Y2E | 2A06 | Y3E |
| | | 1B05 | Y0F | 1A05 | Y1F | 2B05 | Y2F | 2A05 | Y3F |
| | | 1B04 | Vacant | 1A04 | Vacant | 2B04 | Vacant | 2A04 | Vacant |
| | | 1B03 | Vacant | 1A03 | Vacant | 2B03 | Vacant | 2A03 | Vacant |
| | Module front view | 1B02 | 12/24VDC | 1A02 | COM1 | 2B02 | 12/24VDC | 2A02 | COM2 |
| | | 1B01 | 12/24VDC | 1A01 | COM1 | 2B01 | 12/24VDC | 2A01 | COM2 |

The above diagram shows the first half of 32 points (F).
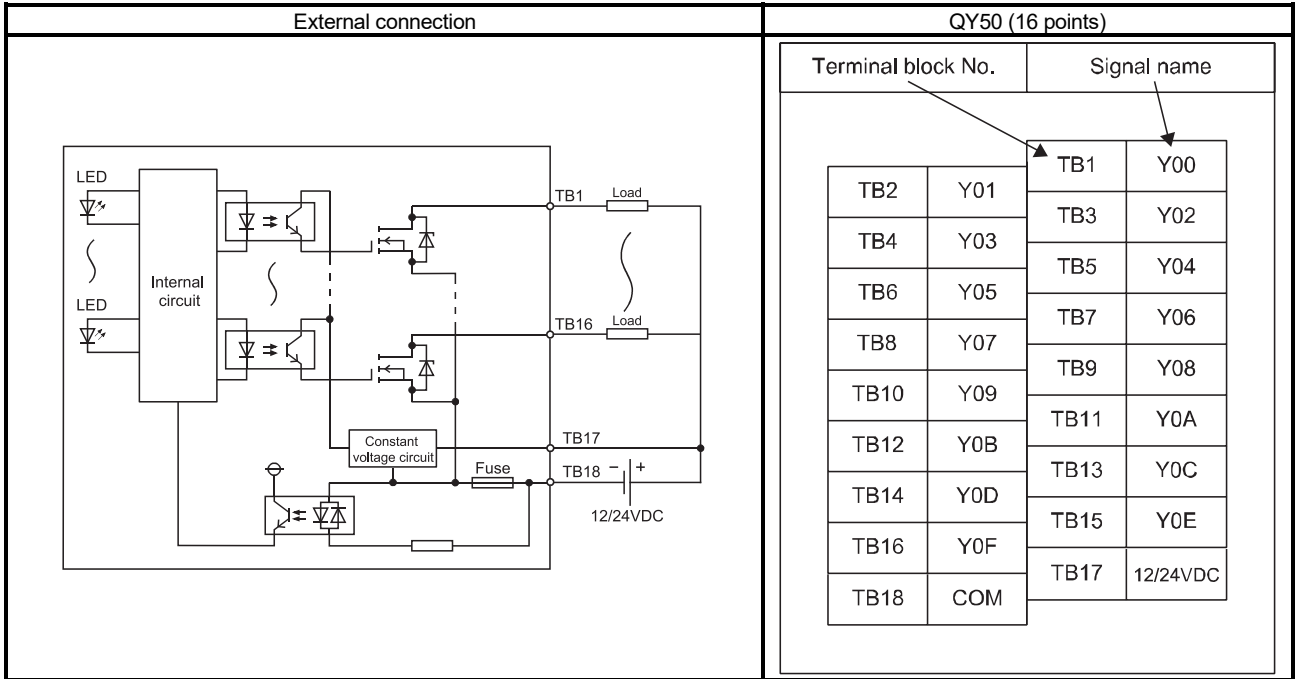The latter half of 32 points (L) are similar.

＊1: Pin number of 1 □ □ □ indicates that of the left-hand side connector, and pin number of 2 □ □ □ indicates that of the right-hand side connector.

＊2: Selection of left-hand (F) side provides the first half (Y00 to Y1F) LED indications, and selection of right-hand (L) side provides the latter half (Y20 to Y3F) LED indications.

＊3: When using A6CON2 or A6CON3, refer to Chapter 7.

## 3.10 QY50 Transistor Output Module (Sink Type)

| Specifications \ Type | | Transistor output module (Sink type) | |
|---|---|---|---|
| | | QY50 | Appearance |
| Number of output points | | 16 points | |
| Isolation method | | Photocoupler | |
| Rated load voltage | | 12-24VDC (+20/-15%) | |
| Maximum load current | | 0.5A/point, 4A/common | |
| Maximum inrush current | | 4A, 10ms or less | |
| Leakage current at OFF | | 0.1mA or less | |
| Maximum voltage drop at ON | | 0.2VDC (TYP.) 0.5A, 0.3VDC (MAX.) 0.5A | |
| Response time | OFF to ON | 1ms or less | |
| | ON to OFF | 1ms or less (rated load, resistive load) | |
| Surge suppressor | | Zener diode | |
| Fuse | | 6.7A (unchangeable) (fuse capacity: 50A) | |
| Fuse blow indication | | Provided (When a fuse blows, LED turns on and a signal is output to the CPU module.) ＊1 | |
| External supply power | Voltage | 12-24VDC (+20/-15%) (ripple ratio within 5%) | |
| | Current | 20mA (at 24VDC) | |
| Dielectric withstand voltage | | 560VAC rms/3 cycles (altitude 2000m) | |
| Insulation resistance | | 10MΩ or more by insulation resistance tester | |
| Noise immunity | | By noise simulator of 500Vp-p noise voltage, 1$\mu$s noise width and 25 to 60Hz noise frequency | |
| | | First transient noise IEC61000-4-4: 1kV | |
| Protection degree | | IP2X | |
| Common terminal arrangement | | 16 points/common (common terminal: TB18) | |
| Number of occupied I/O points | | 16 points (I/O assignment is set as a 16-point output module.) | |
| Operation indicator | | ON indication (LED) | |
| External connections | | 18-point terminal block (M3×6 screws) | |
| Applicable wire size | | 0.3 to 0.75mm$^2$ core (2.8mm OD max.) | |
| Applicable crimping terminal | | R1.25-3 (Sleeved crimping terminals cannot be used.) | |
| Internal current consumption (5VDC) | | 80mA (TYP. all points ON) | |
| Weight | | 0.17kg | |

＊1: Fuse blown is not detected when the external power supply is shut off.

| External connection | QY50 (16 points) |
|---|---|



| Terminal block No. | | Signal name | |
|---|---|---|---|
| | | TB1 | Y00 |
| TB2 | Y01 | TB3 | Y02 |
| TB4 | Y03 | TB5 | Y04 |
| TB6 | Y05 | TB7 | Y06 |
| TB8 | Y07 | TB9 | Y08 |
| TB10 | Y09 | TB11 | Y0A |
| TB12 | Y0B | TB13 | Y0C |
| TB14 | Y0D | TB15 | Y0E |
| TB16 | Y0F | TB17 | 12/24VDC |
| TB18 | COM | | |

## 3.11 QY68A Transistor Output Module (All Points Independent, Sink/Source Type)

| Type / Specifications | | Transistor output module (All points independent, sink/source type) | |
|---|---|---|---|
| | | QY68A | Appearance |
| Number of output points | | 8 points | |
| Isolation method | | Photocoupler | |
| Rated load voltage | | 5-24VDC (+20/-10%) | |
| Maximum load current | | 2A/point, 8A/unit | |
| Maximum inrush current | | 8A, 10ms or less | |
| Leakage current at OFF | | 0.1mA or less | |
| Maximum voltage drop at ON | | 0.3VDC (MAX.) 2A | |
| Response time | OFF to ON | 3ms or less | |
| | ON to OFF | 10ms or less (resistive load) | |
| Surge suppressor | | Zener diode | |
| Fuse | | None (Attaching a fuse to external wiring is recommended. Refer to Section 1.2) | |
| External supply power | | None | |
| Dielectric withstand voltage | | 560VAC rms/3 cycles (altitude 2000m) | |
| Insulation resistance | | 10MΩ or more by insulation resistance tester | |
| Noise immunity | | By noise simulator of 500Vp-p noise voltage, $1\mu$s noise width and 25 to 60Hz noise frequency | |
| | | First transient noise IEC61000-4-4: 1kV | |
| Protection degree | | IP2X | |
| Common terminal arrangement | | All points Independent | |
| Number of occupied I/O points | | 16 points (I/O assignment is set as a 16-point output module.) | |
| Operation indicator | | ON indication (LED) | |
| External connections | | 18-point terminal block (M3 × 6 screws) | |
| Applicable wire size | | 0.3 to 0.75mm² core (2.8mm OD max.) | |
| Applicable crimping terminal | | R1.25-3 (Sleeved crimping terminals cannot be used.) | |
| Internal current consumption (5VDC) | | 110mA (TYP. all points ON) | |
| Weight | | 0.14kg | |

| External connection | Terminal block No. | Signal name |
|---|---|---|
| | TB1 | Y00 |
| | TB2 | |
| | TB3 | Y01 |
| | TB4 | |
| | TB5 | Y02 |
| | TB6 | |
| | TB7 | Y03 |
| | TB8 | |
| | TB9 | Y04 |
| | TB10 | |
| | TB11 | Y05 |
| | TB12 | |
| | TB13 | Y06 |
| | TB14 | |
| | TB15 | Y07 |
| | TB16 | |
| | TB17 | Vacant |
| | TB18 | Vacant |

## 3.12 QY70 Transistor Output Module (Sink Type)

| Type / Specifications | | Transistor output module (Sink type) | Appearance |
|---|---|---|---|
| | | QY70 | |
| Number of output points | | 16 points | |
| Isolation method | | Photocoupler | |
| Rated load voltage | | 5/12VDC (+25/-10%) | |
| Maximum load current | | 16mA/point, 256mA/common | |
| Maximum inrush current | | 40mA, 10ms or less | |
| Output voltage at OFF | | $V_{OH}$: 3.5VDC ($V_{CC}$=5VDC, $I_{OH}$=0.4mA) | |
| Maximum voltage drop at ON | | $V_{OL}$: 0.3VDC | |
| Response time | OFF to ON | 0.5ms or less | |
| | ON to OFF | 0.5ms or less (resistive load) | |
| Surge suppressor | | None | |
| Fuse | | 1.6A (unchangeable) (fuse capacity: 50A) | |
| Fuse blown indicator | | Provided (When a fuse blows, LED turns on and a signal is output to the CPU module.) ＊1 | |
| External supply power | Voltage | 5 to 12VDC (+25/-10%) (ripple ratio within 5%) | |
| | Current | MAX. 90mA (when 12VDC and all points are ON) | |
| Dielectric withstand voltage | | 560VAC rms/3 cycles (altitude 2000m) | |
| Insulation resistance | | 10MΩ or more by insulation resistance tester | |
| Noise immunity | | By noise simulator of 500Vp-p noise voltage, 1 $\mu$s noise width and 25 to 60Hz noise frequency | |
| | | First transient noise IEC61000-4-4: 1kV | |
| Protection degree | | IP2X | |
| Common terminal arrangement | | 16 points/common (common terminal: TB18) | |
| Number of occupied I/O points | | 16 points (I/O assignment is set as a 16-point output module.) | |
| Operation indicator | | ON indication (LED) | |
| External connections | | 18-point terminal block (M3×6 screws) | |
| Applicable wire size | | 0.3 to 0.75mm² core (2.8mm OD max.) | |
| Applicable crimping terminal | | R1.25-3 (Sleeved crimping terminals cannot be used.) | |
| Internal current consumption (5VDC) | | 95mA (TYP. all points ON) (0.10A is shown on the rating plate of the module.) | |
| Weight | | 0.14kg | |

＊1: Fuse blown is not detected when the external power supply is shut off.

| External connection | QY70 (16 points) |
|---|---|



| Terminal block No. | Signal name | Terminal block No. | Signal name |
|---|---|---|---|
| | | TB1 | Y00 |
| TB2 | Y01 | TB3 | Y02 |
| TB4 | Y03 | TB5 | Y04 |
| TB6 | Y05 | TB7 | Y06 |
| TB8 | Y07 | TB9 | Y08 |
| TB10 | Y09 | TB11 | Y0A |
| TB12 | Y0B | TB13 | Y0C |
| TB14 | Y0D | TB15 | Y0E |
| TB16 | Y0F | TB17 | 5/12VDC |
| TB18 | COM | | |

## 3.13 QY71 Transistor Output Module (Sink Type)

| Specifications | Type | Transistor output module (Sink type) | |
|---|---|---|---|
| | | QY71 | Appearance |
| Number of output points | | 32 points | |
| Isolation method | | Photocoupler | |
| Rated load voltage | | 5/12VDC (+25/-10%) | |
| Maximum load current | | 16mA/point, 512mA/common | |
| Maximum inrush current | | 40mA, 10ms or less | |
| Output voltage at OFF | | $V_{OH}$: 3.5VDC ($V_{CC}$=5VDC, $I_{OH}$=0.4mA) | |
| Maximum voltage drop at ON | | $V_{OL}$: 0.3VDC | |
| Response time | OFF to ON | 0.5ms or less | |
| | ON to OFF | 0.5ms or less (resistive load) | |
| Surge suppressor | | None | |
| Fuse | | 1.6A (unchangeable) (fuse capacity: 50A) | |
| Fuse blown indicator | | Provided (When a fuse blows, LED turns on and a signal is output to the CPU module.) ＊1 | |
| External supply power | Voltage | 5 to 12VDC (+25/-10%) (ripple ratio within 5%) | |
| | Current | MAX. 170mA (when 12VDC and all points are ON) | |
| Dielectric withstand voltage | | 560VAC rms/3 cycles (altitude 2000m) | |
| Insulation resistance | | 10MΩ or more by insulation resistance tester | |
| Noise immunity | | By noise simulator of 500Vp-p noise voltage, 1$\mu$s noise width and 25 to 60Hz noise frequency | |
| | | First transient noise IEC61000-4-4: 1kV | |
| Protection degree | | IP2X | |
| Common terminal arrangement | | 32 points/common (common terminal: A01, A02) | |
| Number of occupied I/O points | | 32 points (I/O assignment is set as a 32-point output module.) | |
| Operation indicator | | ON indication (LED) | |
| External connections | | 40-pin connector | |
| Applicable wire size | | 0.088 to 0.3mm$^2$ (For A6CON1 or A6CON4) ＊2 | |
| Applicable connector | | A6CON1, A6CON2, A6CON3, A6CON4 (optional) | |
| Internal current consumption (5VDC) | | 150mA (TYP. all points ON) | |
| Weight | | 0.14kg | |



| External connection | Pin-Outs | Pin No. | Signal No. | Pin No. | Signal No. |
|---|---|---|---|---|---|
| | | B20 | Y00 | A20 | Y10 |
| | | B19 | Y01 | A19 | Y11 |
| | | B18 | Y02 | A18 | Y12 |
| | | B17 | Y03 | A17 | Y13 |
| | | B16 | Y04 | A16 | Y14 |
| | | B15 | Y05 | A15 | Y15 |
| | | B14 | Y06 | A14 | Y16 |
| | | B13 | Y07 | A13 | Y17 |
| | | B12 | Y08 | A12 | Y18 |
| | | B11 | Y09 | A11 | Y19 |
| | | B10 | Y0A | A10 | Y1A |
| | | B09 | Y0B | A09 | Y1B |
| | | B08 | Y0C | A08 | Y1C |
| | | B07 | Y0D | A07 | Y1D |
| | | B06 | Y0E | A06 | Y1E |
| | | B05 | Y0F | A05 | Y1F |
| | | B04 | Vacant | A04 | Vacant |
| | | B03 | Vacant | A03 | Vacant |
| | | B02 | 5/12 VDC | A02 | COM |
| | | B01 | 5/12 VDC | A01 | COM |

＊1: Fuse blown is not detected when the external power supply is shut off.
＊2: When using A6CON2 or A6CON3, refer to Chapter 7.

## 3.14 QY80 Transistor Output Module (Source Type)

| Specifications \ Type | | Transistor output module (Source Type) | |
|---|---|---|---|
| | | QY80 | Appearance |
| Number of output points | | 16 points | |
| Isolation method | | Photocoupler | |
| Rated load voltage | | 12-24VDC (+20/-15%) | |
| Maximum load current | | 0.5A/point, 4A/common | |
| Maximum inrush current | | 4A, 10ms or less | |
| Leakage current at OFF | | 0.1mA or less | |
| Maximum voltage drop at ON | | 0.2VDC (TYP.) 0.5A, 0.3VDC (MAX.) 0.5A | |
| Response time | OFF to ON | 1ms or less | |
| | ON to OFF | 1ms or less (rated load, resistive load) | |
| Surge suppressor | | Zener diode | |
| Fuse | | 6.7A (unchangeable) (fuse capacity: 50A) | |
| Fuse blown indicator | | Provided (When a fuse blows, LED turns on and a signal is output to the CPU module.) ＊1 | |
| External supply power | Voltage | 12-24VDC (+20/-15%) (ripple ratio within 5%) | |
| | Current | 20mA (at 24VDC) | |
| Dielectric withstand voltage | | 560VAC rms/3 cycles (altitude 2000m) | |
| Insulation resistance | | 10MΩ or more by insulation resistance tester | |
| Noise immunity | | By noise simulator of 500Vp-p noise voltage, 1 $\mu$ s noise width and 25 to 60Hz noise frequency | |
| | | First transient noise IEC61000-4-4: 1kV | |
| Protection degree | | IP2X | |
| Common terminal arrangement | | 16 points/common (common terminal: TB17) | |
| Number of occupied I/O points | | 16 points (I/O assignment is set as a 16-point output module.) | |
| Operation indicator | | ON indication (LED) | |
| External connections | | 18-point terminal block (M3 × 6 screws) | |
| Applicable wire size | | 0.3 to 0.75mm² core (2.8mm OD max.) | |
| Applicable crimping terminal | | R1.25-3 (Sleeved crimping terminals cannot be used.) | |
| Internal current consumption (5VDC) | | 80mA (TYP. all points ON) | |
| Weight | | 0.17kg | |

＊1: Fuse blown is not detected when the external power supply is shut off.

| External connection | QY80 (16 points) |
|---|---|

**External connection**

LED

Internal circuit

LED

Constant voltage circuit

TB1 — Load
TB16 — Load
TB17 + −
Fuse
TB18
12/24VDC

**QY80 (16 points)**

| Terminal block No. | Signal name | Terminal block No. | Signal name |
|---|---|---|---|
| | | TB1 | Y00 |
| TB2 | Y01 | TB3 | Y02 |
| TB4 | Y03 | TB5 | Y04 |
| TB6 | Y05 | TB7 | Y06 |
| TB8 | Y07 | TB9 | Y08 |
| TB10 | Y09 | TB11 | Y0A |
| TB12 | Y0B | TB13 | Y0C |
| TB14 | Y0D | TB15 | Y0E |
| TB16 | Y0F | TB17 | COM |
| TB18 | 0VDC | | |

## 3.15 QY80-TS Transistor Output Module (Source Type)

This module is a spring clamp terminal block type and an output module that has indicators for checking the insertion state of wire.

| | Type | Transistor output module (Source Type) | |
|---|---|---|---|
| Specifications | | QY80-TS | Appearance |
| Number of output points | | 16 points | |
| Isolation method | | Photocoupler | |
| Rated load voltage | | 12-24VDC (+20/-15%) | |
| Maximum load current | | 0.5A/point, 4A/common | |
| Maximum inrush current | | 4A, 10ms or less | |
| Leakage current at OFF | | 0.1mA or less | |
| Maximum voltage drop at ON | | 0.2VDC (TYP.) 0.5A, 0.3VDC (MAX.) 0.5A | |
| Response time | OFF to ON | 1ms or less | |
| | ON to OFF | 1ms or less (rated load, resistive load) | |
| Surge suppressor | | Zener diode | |
| Fuse | | 6.7A (unchangeable) (fuse capacity: 50A) | |
| Fuse blown indicator | | Provided (When a fuse blows, LED turns on and a signal is output to the CPU module.) ＊1 | |
| External supply power | Voltage | 12-24VDC (+20/-15%) (ripple ratio within 5%) | |
| | Current | 20mA (at 24VDC) | |
| Dielectric withstand voltage | | 560VAC rms/3 cycles (altitude 2000m) | |
| Insulation resistance | | 10MΩ or more by insulation resistance tester | |
| Noise immunity | | By noise simulator of 500Vp-p noise voltage, $1\mu$s noise width and 25 to 60Hz noise frequency | |
| | | First transient noise IEC61000-4-4: 1kV | |
| Protection degree | | IP2X | |
| Common terminal arrangement | | 16 points/common (common terminal: TB17) | |
| Number of occupied I/O points | | 16 points (I/O assignment is set as a 16-point output module.) | |
| Operation indicator | | ON indication (LED) | |
| External connections | | Two-piece spring clamp terminal block | |
| Applicable wire size | | 0.3 to 2.0mm2 core (22 to 15 AWG) | |
| Applicable crimping terminal | | Refer to section 9.1 | |
| Internal current consumption (5VDC) | | 80mA (TYP. all points ON) | |
| Weight | | 0.17kg | |

＊1: Fuse blown is not detected when the external power supply is shut off.

| External connection | QY80-TS (16 points) |
|---|---|
|  |  |

## 3.16 QY81P Transistor Output Module (Source Type)

| | Type | Transistor output module (Source type) | |
|---|---|---|---|
| Specifications | | QY81P | Appearance |
| Number of output points | | 32 points | |
| Isolation method | | Photocoupler | |
| Rated load voltage | | 12-24VDC (+20/-15%) | |
| Maximum load current | | 0.1A/1point, Pilot Duty, 2A/common | |
| Maximum inrush current | | 0.7A, 10ms or less | |
| Leakage current at OFF | | 0.1mA or less | |
| Maximum voltage drop at ON | | 0.1VDC (TYP.) 0.1A, 0.2VDC (MAX.) 0.1A | |
| Response time | OFF to ON | 1ms or less | |
| | ON to OFF | 1ms or less (rated load, resistive load) | |
| Surge suppressor | | Zener diode | |
| Fuse | | No | |
| External supply power | Voltage | 12-24VDC (+20/-15%) (ripple ratio within 5%) | |
| | Current | 40mA (at 24VDC) | |
| Dielectric withstand voltage | | 560VAC rms/3 cycles (altitude 2000m) | |
| Insulation resistance | | 10MΩ or more by insulation resistance tester | |
| Noise immunity | | By noise simulator of 500Vp-p noise voltage, $1\mu s$ noise width and 25 to 60Hz noise frequency | |
| | | First transient noise IEC61000-4-4: 1kV | |
| Protection degree | | IP2X | |
| Common terminal arrangement | | 32 points/common (common terminal: 17, 18, 36) | |
| Number of occupied I/O points | | 32 points (I/O assignment is set as a 32-point output module.) | |
| Protection function | | Yes (overheat protection function, overload protection function) <br> • Overheat protection function is activated in increments of 2 points. <br> • Overload protection function is activated in increments of 1 point. | |
| Operation indicator | | ON indication (LED) | |
| External connections | | 37-pin D-sub connector | |
| Applicable wire size | | 0.088 to 0.3mm² (For A6CON1E) ＊1 | |
| Applicable connector | | A6CON1E, A6CON2E, A6CON3E (optional) | |
| Applicable connector/terminal block converter module | | A6TBY36-E, A6TBY54-E | |
| Internal current consumption (5VDC) | | 95mA (TYP. all points ON) <br> (0.10A is shown on the rating plate of the module.) | |
| Weight | | 0.15kg | |



| External connection | Pin-Outs | Pin No. | Signal No. | Pin No. | Signal No. |
|---|---|---|---|---|---|
| | | 1 | Y00 | 9 | Y10 |
| | | 20 | Y01 | 28 | Y11 |
| | | 2 | Y02 | 10 | Y12 |
| | | 21 | Y03 | 29 | Y13 |
| | | 3 | Y04 | 11 | Y14 |
| | | 22 | Y05 | 30 | Y15 |
| | | 4 | Y06 | 12 | Y16 |
| | | 23 | Y07 | 31 | Y17 |
| | | 5 | Y08 | 13 | Y18 |
| | | 24 | Y09 | 32 | Y19 |
| | | 6 | Y0A | 14 | Y1A |
| | | 25 | Y0B | 33 | Y1B |
| | | 7 | Y0C | 15 | Y1C |
| | | 26 | Y0D | 34 | Y1D |
| | | 8 | Y0E | 16 | Y1E |
| | | 27 | Y0F | 35 | Y1F |
| | Module front view | 17 | COM | 37 | 0V |
| | | 36 | COM | 19 | 0V |
| | | 18 | COM | | |

＊1: When using A6CON2E or A6CON3E, refer to Chapter 7.

## 3.17 QY82P Transistor Output Module (Source Type)

| | Type | Transistor Output Module (Source Type) | |
|---|---|---|---|
| Specifications | | QY82P | Appearance |
| Number of output points | | 64 points | |
| Isolation method | | Photocoupler | |
| Rated load voltage | | 12-24VDC (+20/-15%) | |
| Maximum load current | | 0.1A/1point, Pilot Duty, 2A/common | |
| Maximum inrush current | | 0.7A, 10ms or less | |
| Leakage current at OFF | | 0.1mA or less | |
| Maximum voltage drop at ON | | 0.1VDC (TYP.) 0.1A, 0.2VDC (MAX.) 0.1A | |
| Response time | OFF to ON | 1ms or less | |
| | ON to OFF | 1ms or less (rated load, resistive load) | |
| Surge suppressor | | Zener diode | |
| Fuse | | No | |
| External supply power | Voltage | 12-24VDC (+20/-15%) (ripple ratio within 5%) | |
| | Current | 40mA (at 24VDC)/common | |
| Dielectric withstand voltage | | 560VAC rms/3 cycles (altitude 2000m) | |
| Insulation resistance | | 10MΩ or more by insulation resistance tester | |
| Noise immunity | | By noise simulator of 500Vp-p noise voltage, 1 $\mu$ s noise width and 25 to 60Hz noise frequency | |
| | | First transient noise IEC61000-4-4: 1kV | |
| Protection degree | | IP2X | |
| Common terminal arrangement | | 32 points/common (common terminal: 1B01, 1B02, 2B01, 2B02) | |
| Number of occupied I/O points | | 64 points (I/O assignment is set as a 64-point output module.) | |
| Protection function | | Yes (overheat protection function, overload protection function) • Overheat protection function is activated in increments of 2 points. • Overload protection function is activated in increments of 1 point. | |
| Operation indicator | | ON indication (LED), 32 point switch-over using switch | |
| External connections | | 40-pin connector | |
| Applicable wire size | | 0.088 to 0.3mm² (For A6CON1 or A6CON4) ＊ 3 | |
| Applicable connector | | A6CON1, A6CON2, A6CON3, A6CON4 (optional) | |
| Applicable connector/terminal block converter module | | A6TBXY36, A6TBXY54 | |
| Internal current consumption (5VDC) | | 160mA (TYP. all points ON) | |
| Weight | | 0.17kg | |



External connection

The above diagram shows the first half of 32 points (F).
The latter half of 32 points (L) are similar.

Pin-Outs

Module front view

| Pin No. ＊1 | Signal No. | Pin No. ＊1 | Signal No. | Pin No. ＊1 | Signal No. | Pin No. ＊1 | Signal No. |
|---|---|---|---|---|---|---|---|
| 1B20 | Y00 | 1A20 | Y10 | 2B20 | Y20 | 2A20 | Y30 |
| 1B19 | Y01 | 1A19 | Y11 | 2B19 | Y21 | 2A19 | Y31 |
| 1B18 | Y02 | 1A18 | Y12 | 2B18 | Y22 | 2A18 | Y32 |
| 1B17 | Y03 | 1A17 | Y13 | 2B17 | Y23 | 2A17 | Y33 |
| 1B16 | Y04 | 1A16 | Y14 | 2B16 | Y24 | 2A16 | Y34 |
| 1B15 | Y05 | 1A15 | Y15 | 2B15 | Y25 | 2A15 | Y35 |
| 1B14 | Y06 | 1A14 | Y16 | 2B14 | Y26 | 2A14 | Y36 |
| 1B13 | Y07 | 1A13 | Y17 | 2B13 | Y27 | 2A13 | Y37 |
| 1B12 | Y08 | 1A12 | Y18 | 2B12 | Y28 | 2A12 | Y38 |
| 1B11 | Y09 | 1A11 | Y19 | 2B11 | Y29 | 2A11 | Y39 |
| 1B10 | Y0A | 1A10 | Y1A | 2B10 | Y2A | 2A10 | Y3A |
| 1B09 | Y0B | 1A09 | Y1B | 2B09 | Y2B | 2A09 | Y3B |
| 1B08 | Y0C | 1A08 | Y1C | 2B08 | Y2C | 2A08 | Y3C |
| 1B07 | Y0D | 1A07 | Y1D | 2B07 | Y2D | 2A07 | Y3D |
| 1B06 | Y0E | 1A06 | Y1E | 2B06 | Y2E | 2A06 | Y3E |
| 1B05 | Y0F | 1A05 | Y1F | 2B05 | Y2F | 2A05 | Y3F |
| 1B04 | Vacant | 1A04 | Vacant | 2B04 | Vacant | 2A04 | Vacant |
| 1B03 | Vacant | 1A03 | Vacant | 2B03 | Vacant | 2A03 | Vacant |
| 1B02 | COM1 | 1A02 | 0V | 2B02 | COM2 | 2A02 | 0V |
| 1B01 | COM1 | 1A01 | 0V | 2B01 | COM2 | 2A01 | 0V |

＊1: Pin number of 1 □□□ indicates that of the left-hand side connector, and pin number of 2 □□□ indicates that of the right-hand side connector.

＊2: Selection of left-hand (F) side provides the first half (Y00 to Y1F) LED indications, and selection of right-hand (L) side provides the latter half (Y20 to Y3F) LED indications.

＊3: When using A6CON2 or A6CON3, refer to Chapter 7.

# 4. I/O COMBINED MODULE

## 4.1 QH42P I/O Combined Module

- When using the module, configure the system according to Section 1.2.3 (2).
- The module uses same I/O numbers for input and output.
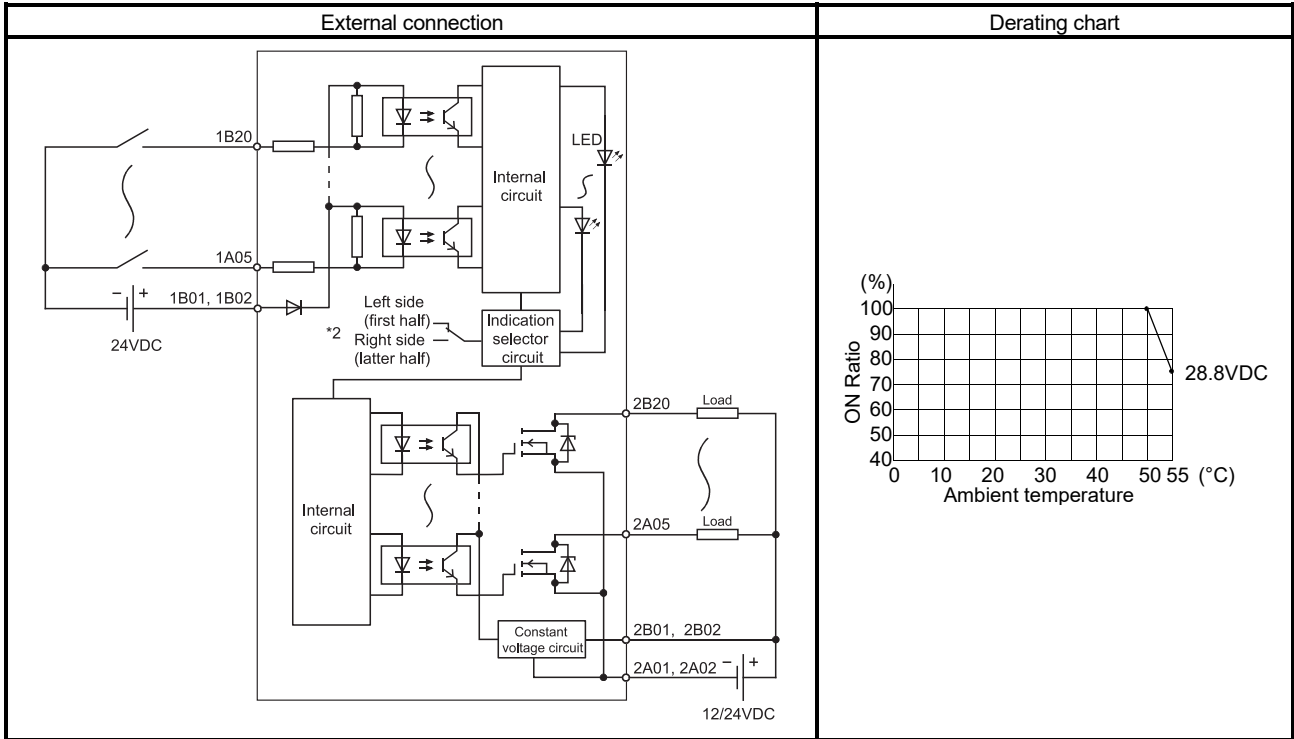  For I/O numbers of I/O combined modules, refer to Section 1.2.3.

### (1) DC input specifications (positive common type)

| Specifications ╲ Type | | QH42P I/O combined module (input specifications) |
|---|---|---|
| Number of input points | | 32 points |
| Isolation method | | Photocoupler |
| Rated input voltage | | 24VDC (+20/-15%, ripple ratio within 5%) |
| Rated input current | | Approx. 4mA |
| Input derating | | See the derating chart. |
| ON voltage/ON current | | 19V or higher/3mA or higher |
| OFF voltage/OFF current | | 11V or lower/1.7mA or lower |
| Input resistance | | Approx. 5.6kΩ |
| Response time | OFF→ON | 1ms/5ms/10ms/20ms/70ms or less (configured in PLC parameter)＊1 (Default: 10ms) |
| | ON→OFF | 1ms/5ms/10ms/20ms/70ms or less (configured in PLC parameter)＊1 (Default: 10ms) |
| Dielectric withstand voltage | | 560VAC rms/3 cycles (altitude 2000m) |
| Insulation resistance | | 10MΩ or more by insulation resistance tester |
| Noise immunity | | By noise simulator of 500Vp-p noise voltage, 1μs noise width and 25 to 60Hz noise frequency |
| | | First transient noise IEC61000-4-4: 1kV |
| Protection degree | | IP2X |
| Common terminal arrangement | | 32 points/common (common terminal: 1B01, 1B02) |
| Number of occupied I/O points | | 32 points (I/O assignment is set as a 32-point I/O combined module.) |
| Operation indicator | | ON indication (LED), 32-point switchover using switch＊2 |
| External connections | | 40-pin connector |
| Applicable wire size | | 0.088 to 0.3mm² (For A6CON1 or A6CON4)＊3 |
| Applicable connector | | A6CON1, A6CON2, A6CON3, A6CON4 (optional) |
| Applicable connector/terminal block converter module | | A6TBXY36, A6TBXY54, A6TBX70 |
| Internal current consumption (5VDC) | | 130mA (TYP, all points ON) |
| Weight | | 0.20kg |

＊1: For the setting method, refer to the Section 1.3.1.
＊2: Selection of left-hand (F) side provides the first half (X00 to X1F) LED indications, and selection of right-hand (L) side provides the
    latter half (Y00 to Y1F) LED indications.
＊3: When using A6CON2 or A6CON3, refer to Chapter 7.

| External connection | Derating chart |
| --- | --- |



∗2: Selection of left-hand (F) side provides the first half (X00 to X1F) LED indications, and selection of right-hand (L) side provides the latter half (Y00 to Y1F) LED indications.

## (2) Transistor output specifications (sink type)

| Type / Specifications | | QH42P I/O combined module (output specifications) | Appearance |
|---|---|---|---|
| Number of output points | | 32 points | |
| Isolation method | | Photocoupler | |
| Rated load voltage | | 12-24VDC (+20/-15%) | |
| Maximum load current | | 0.1A/point, 2A/common | |
| Maximum inrush current | | 0.7A/10ms or less | |
| Leakage current at OFF | | 0.1mA or lower | |
| Maximum voltage drop at ON | | 0.1VDC (TYP.) 0.1A, 0.2VDC (MAX.) 0.1A | |
| Response time | OFF→ON | 1ms or shorter | |
| | ON→OFF | 1ms or shorter (rated load, resistance load) | |
| Surge suppressor | | Zener diode | |
| Fuse | | None | |
| External power supply | Voltage | 12-24VDC (+20/-15%) (ripple ratio within 5%) | |
| | Current | MAX. 15mA /common (when 24VDC and all points are ON) | |
| Common terminal arrangement | | 32 points/common (common terminal: 2A01, 2A02) | |
| Protection function | | Provided (overheat protection function, overload protection function)<br>• Overheat protection function operate independently of each other.<br>• Overload protection function operate independently of each other. | |

| Pin-Outs | Pin No. *4 | Signal No. | Pin No. *4 | Signal No. | Pin No. *4 | Signal No. | Pin No. *4 | Signal No. |
|---|---|---|---|---|---|---|---|---|
| | 1B20 | X00 | 1A20 | X10 | 2B20 | Y00 | 2A20 | Y10 |
| | 1B19 | X01 | 1A19 | X11 | 2B19 | Y01 | 2A19 | Y11 |
| | 1B18 | X02 | 1A18 | X12 | 2B18 | Y02 | 2A18 | Y12 |
| | 1B17 | X03 | 1A17 | X13 | 2B17 | Y03 | 2A17 | Y13 |
| | 1B16 | X04 | 1A16 | X14 | 2B16 | Y04 | 2A16 | Y14 |
| | 1B15 | X05 | 1A15 | X15 | 2B15 | Y05 | 2A15 | Y15 |
| | 1B14 | X06 | 1A14 | X16 | 2B14 | Y06 | 2A14 | Y16 |
| | 1B13 | X07 | 1A13 | X17 | 2B13 | Y07 | 2A13 | Y17 |
| | 1B12 | X08 | 1A12 | X18 | 2B12 | Y08 | 2A12 | Y18 |
| | 1B11 | X09 | 1A11 | X19 | 2B11 | Y09 | 2A11 | Y19 |
| | 1B10 | X0A | 1A10 | X1A | 2B10 | Y0A | 2A10 | Y1A |
| | 1B09 | X0B | 1A09 | X1B | 2B09 | Y0B | 2A09 | Y1B |
| | 1B08 | X0C | 1A08 | X1C | 2B08 | Y0C | 2A08 | Y1C |
| | 1B07 | X0D | 1A07 | X1D | 2B07 | Y0D | 2A07 | Y1D |
| | 1B06 | X0E | 1A06 | X1E | 2B06 | Y0E | 2A06 | Y1E |
| | 1B05 | X0F | 1A05 | X1F | 2B05 | Y0F | 2A05 | Y1F |
| | 1B04 | Vacant | 1A04 | Vacant | 2B04 | Vacant | 2A04 | Vacant |
| | 1B03 | Vacant | 1A03 | Vacant | 2B03 | Vacant | 2A03 | Vacant |
| | 1B02 | COM1 | 1A02 | Vacant | 2B02 | 12/24 VDC | 2A02 | COM2 |
| | 1B01 | COM1 | 1A01 | Vacant | 2B01 | 12/24 VDC | 2A01 | COM2 |

Module front view

*4: Pin number of 1▯▯▯ indicates that of the left-hand side connector, and pin number of 2▯▯▯ indicates that of the right-hand side connector.
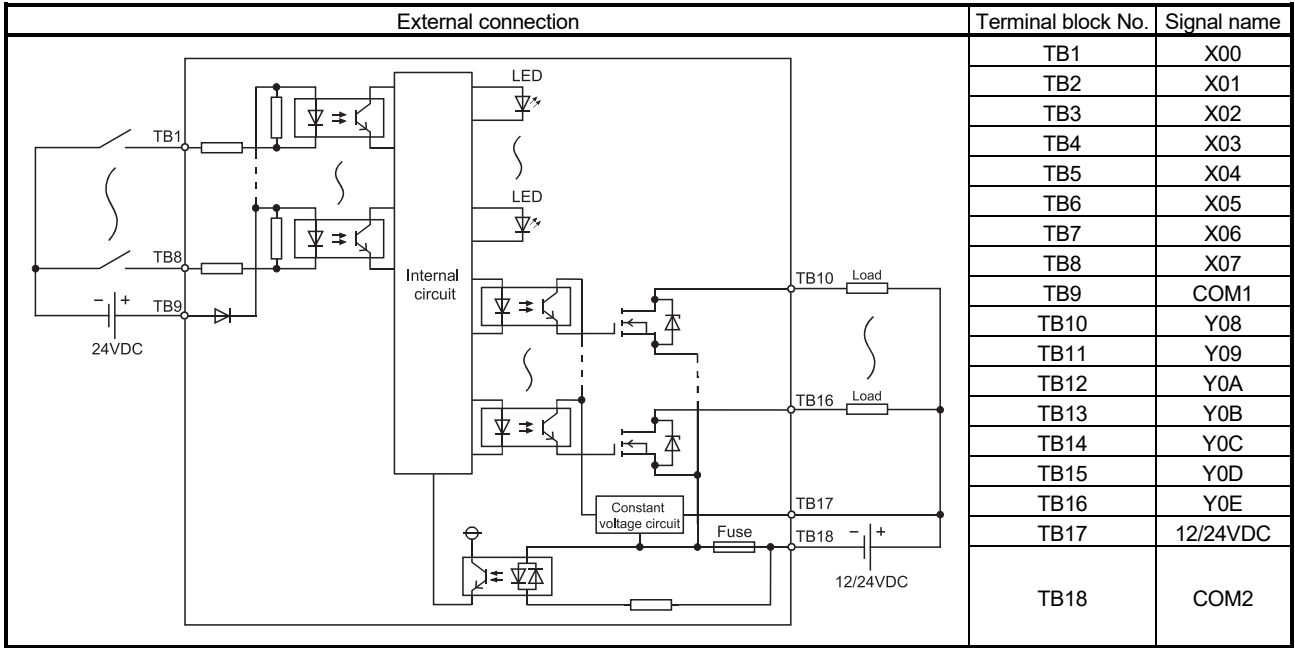
## 4.2 QX41Y41P I/O Combined Module

- When using the module, configure the system according to Section 1.2.3 (2).
- The module uses sequential I/O numbers for input and output.
  For I/O numbers of I/O combined modules, refer to Section 1.2.3.

### (1) DC input specifications (positive common type)

| Specifications \ Type | | QX41Y41P I/O combined module (input specifications) |
|---|---|---|
| Number of input points | | 32 points |
| Isolation method | | Photocoupler |
| Rated input voltage | | 20.4 to 28.8VDC (ripple ratio within 5%) |
| Rated input current | | Approx. 4mA |
| Input derating | | See the derating chart. |
| ON voltage/ON current | | 19V or higher/3mA or higher |
| OFF voltage/OFF current | | 11V or lower/1.7mA or lower |
| Input resistance | | Approx. 5.6kΩ |
| Response time | OFF→ON | 1ms/5ms/10ms/20ms/70ms or less (configured in PLC parameter) ＊1 (Default: 10ms) |
| | ON→OFF | 1ms/5ms/10ms/20ms/70ms or less (configured in PLC parameter) ＊1 (Default: 10ms) |
| Dielectric withstand voltage | | 560VAC rms/3 cycles (altitude 2000m) |
| Insulation resistance | | 10MΩ or more by insulation resistance tester |
| Noise immunity | | By noise simulator of 500Vp-p noise voltage, 1μs noise width and 25 to 60Hz noise frequency |
| | | First transient noise IEC61000-4-4: 1kV |
| Protection degree | | IP2X |
| Common terminal arrangement | | 32 points/common (common terminal: 1B01, 1B02) |
| Number of occupied I/O points | | 64 points (I/O assignment is set as a 64-point I/O combined module.) |
| Operation indicator | | ON indication (LED), 32-point switchover using switch ＊2 |
| External connections | | 40-pin connector |
| Applicable wire size | | 0.088 to 0.3mm² (For A6CON1 or A6CON4) ＊3 |
| Applicable connector | | A6CON1, A6CON2, A6CON3, A6CON4 (optional) |
| Applicable connector/terminal block converter module | | A6TBXY36, A6TBXY54, A6TBX70 |
| Internal current consumption (5VDC) | | 130mA (TYP, all points ON) |
| Weight | | 0.20kg |

＊1: For the setting method, refer to the Section 1.3.1.
＊2: Selection of left-hand (F) side provides the first half (X00 to X1F) LED indications, and selection of right-hand (L) side provides the latter half (Y20 to Y3F) LED indications.
＊3: When using A6CON2 or A6CON3, refer to Chapter 7.

| External connection | Derating chart |
| --- | --- |



1B20
1A05
1B01, 1B02
24VDC
LED
Internal circuit
*2
Left side (first half)
Right side (latter half)
Indication selector circuit
2B20    Load
2A05    Load
Internal circuit
Constant voltage circuit
2B01, 2B02
2A01, 2A02
12/24VDC

(%)
ON Ratio
100
90
80
70
60
50
40
0    10    20    30    40    50 55  (°C)
Ambient temperature
28.8VDC

✳ 2: Selection of left-hand (F) side provides the first half (X00 to X1F) LED indications, and selection of right-hand (L) side provides the latter half (Y20 to Y3F) LED indications.

## (2) Transistor output specifications (sink type)

| Specifications \ Type | | QX41Y41P I/O combined module (output specifications) | Appearance |
|---|---|---|---|
| Number of output points | | 32 points | QX41Y41P<br>0 1 2 3 4 5 6 7<br>8 9 A B C D E F<br>0 1 2 3 4 5 6 7<br>8 9 A B C D E F |
| Isolation method | | Photocoupler | |
| Rated load voltage | | 12-24VDC (+20/-15%) | |
| Maximum load current | | 0.1A/point, 2A/common | |
| Maximum inrush current | | 0.7A/10ms or less | 24VDC4mA   QX41Y41P<br>12/24VDC   DISPLAY<br>0.1A      [F] ◯ [L] |
| Leakage current at OFF | | 0.1mA or lower | |
| Maximum voltage drop at ON | | 0.1VDC (TYP.) 0.1A, 0.2VDC (MAX.) 0.1A | |
| Response time | OFF→ON | 1ms or shorter | |
| | ON→OFF | 1ms or shorter (rated load, resistance load) | |
| Surge suppressor | | Zener diode | |
| Fuse | | None | |
| External power supply | Voltage | 12-24VDC (+20/-15%) (ripple ratio within 5%) | |
| | Current | MAX. 15mA /common (when 24VDC and all points are ON) | |
| Common terminal arrangement | | 32 points/common (common terminal: 2A01, 2A02) | |
| Protection function | | Provided (overheat protection function, overload protection function)<br>• Overheat protection function operate independently of each other.<br>• Overload protection function operate independently of each other. | |

| Pin-Outs | Pin No. *4 | Signal No. | Pin No. *4 | Signal No. | Pin No. *4 | Signal No. | Pin No. *4 | Signal No. |
|---|---|---|---|---|---|---|---|---|
| | 1B20 | X00 | 1A20 | X10 | 2B20 | Y20 | 2A20 | Y30 |
| | 1B19 | X01 | 1A19 | X11 | 2B19 | Y21 | 2A19 | Y31 |
| | 1B18 | X02 | 1A18 | X12 | 2B18 | Y22 | 2A18 | Y32 |
| | 1B17 | X03 | 1A17 | X13 | 2B17 | Y23 | 2A17 | Y33 |
| | 1B16 | X04 | 1A16 | X14 | 2B16 | Y24 | 2A16 | Y34 |
| | 1B15 | X05 | 1A15 | X15 | 2B15 | Y25 | 2A15 | Y35 |
| | 1B14 | X06 | 1A14 | X16 | 2B14 | Y26 | 2A14 | Y36 |
| | 1B13 | X07 | 1A13 | X17 | 2B13 | Y27 | 2A13 | Y37 |
| | 1B12 | X08 | 1A12 | X18 | 2B12 | Y28 | 2A12 | Y38 |
| | 1B11 | X09 | 1A11 | X19 | 2B11 | Y29 | 2A11 | Y39 |
| | 1B10 | X0A | 1A10 | X1A | 2B10 | Y2A | 2A10 | Y3A |
| | 1B09 | X0B | 1A09 | X1B | 2B09 | Y2B | 2A09 | Y3B |
| | 1B08 | X0C | 1A08 | X1C | 2B08 | Y2C | 2A08 | Y3C |
| | 1B07 | X0D | 1A07 | X1D | 2B07 | Y2D | 2A07 | Y3D |
| | 1B06 | X0E | 1A06 | X1E | 2B06 | Y2E | 2A06 | Y3E |
| | 1B05 | X0F | 1A05 | X1F | 2B05 | Y2F | 2A05 | Y3F |
| | 1B04 | Vacant | 1A04 | Vacant | 2B04 | Vacant | 2A04 | Vacant |
| | 1B03 | Vacant | 1A03 | Vacant | 2B03 | Vacant | 2A03 | Vacant |
| | 1B02 | COM1 | 1A02 | Vacant | 2B02 | 12/24VDC | 2A02 | COM2 |
| | 1B01 | COM1 | 1A01 | Vacant | 2B01 | 12/24VDC | 2A01 | COM2 |

```
B20  o  o  A20
B19  o  o  A19
B18  o  o  A18
B17  o  o  A17
B16  o  o  A16
B15  o  o  A15
B14  o  o  A14
B13  o  o  A13
B12  o  o  A12
B11  o  o  A11
B10  o  o  A10
B9   o  o  A9
B8   o  o  A8
B7   o  o  A7
B6   o  o  A6
B5   o  o  A5
B4   o  o  A4
B3   o  o  A3
B2   o  o  A2
B1   o  o  A1
```

Module front view

*4: Pin number of 1 ☐☐☐ indicates that of the left-hand side connector, and pin number of 2 ☐☐☐ indicates that of the right-hand side connector.

## 4.3 QX48Y57 I/O Combined Module

• When using the module, configure the system according to Section 1.2.3 (2).
• The module uses sequential I/O numbers for input and output.
  For I/O numbers of I/O combined modules, refer to Section 1.2.3.

### (1) DC input specifications (positive common type)

| Specifications / Type | | QX48Y57 I/O combined module (input specifications) | Appearance |
|---|---|---|---|
| Number of input points | | 8 points | |
| Isolation method | | Photocoupler | |
| Rated input voltage | | 24VDC (+20/-15%, ripple ratio within 5%) | |
| Rated input current | | Approx. 4mA | |
| Input derating | | None | |
| ON voltage/ON current | | 19V or higher/3mA or higher | |
| OFF voltage/OFF current | | 11V or lower/1.7mA or lower | |
| Input resistance | | Approx. 5.6kΩ | |
| Response time | OFF→ON | 1ms/5ms/10ms/20ms/70ms or less (configured in PLC parameter)＊1 (Default: 10ms) | |
| | ON→OFF | 1ms/5ms/10ms/20ms/70ms or less (configured in PLC parameter)＊1 (Default: 10ms) | |
| Dielectric withstand voltage | | 560VAC rms/3 cycles (altitude 2000m) | |
| Insulation resistance | | 10MΩ or more by insulation resistance tester | |
| Noise immunity | | By noise simulator of 500Vp-p noise voltage, 1$\mu$s noise width and 25 to 60Hz noise frequency | |
| | | First transient noise IEC61000-4-4: 1kV | |
| Protection degree | | IP2X | |
| Common terminal arrangement | | 8 points/common (common terminal: TB9) | |
| Number of occupied I/O points | | 16 points (I/O assignment is set as a 16-point I/O combined module.) | |
| Operation indicator | | ON indication (LED) | |
| External connections | | 18-point terminal block (M3 $\times$ 6 screw) | |
| Applicable wire size | | Core cable: 0.3 to 0.75mm$^2$ (Outside diameter: 2.8mm or smaller) | |
| Applicable crimping terminal | | R1.25-3 (Sleeved crimping terminals cannot be used.) | |
| Internal current consumption (5VDC) | | 80mA (TYP, all points ON) | |
| Weight | | 0.20kg | |

＊1: For the setting method, refer to the Section 1.3.1.

| External connection | | Terminal block No. | Signal name |
|---|---|---|---|
| | | TB1 | X00 |
| | | TB2 | X01 |
| | | TB3 | X02 |
| | | TB4 | X03 |
| | | TB5 | X04 |
| | | TB6 | X05 |
| | | TB7 | X06 |
| | | TB8 | X07 |
| | | TB9 | COM1 |
| | | TB10 | Y08 |
| | | TB11 | Y09 |
| | | TB12 | Y0A |
| | | TB13 | Y0B |
| | | TB14 | Y0C |
| | | TB15 | Y0D |
| | | TB16 | Y0E |
| | | TB17 | 12/24VDC |
| | | TB18 | COM2 |

## (2) Transistor output specifications (sink type)

| Specifications　＼　Type | | QX48Y57 I/O combined module (output specifications) |
|---|---|---|
| Number of output points | | 7 points |
| Isolation method | | Photocoupler |
| Rated load voltage | | 12-24VDC (+20/-15%) |
| Maximum load current | | 0.5A/point, 2A/common |
| Maximum inrush current | | 4A/10ms or less |
| Leakage current at OFF | | 0.1mA or lower |
| Maximum voltage drop at ON | | 0.2VDC (TYP.) 0.5A, 0.3VDC (MAX.) 0.5A |
| Response time | OFF→ON | 1ms or shorter |
| | ON→OFF | 1ms or shorter (rated load, resistance load) |
| Surge suppressor | | Zener diode |
| Fuse | | 4A (Not replaceable) (Fuse capacity: 50A) |
| Fuse blown indicator | | Provided (When a fuse blows, LED turns on and a signal is output to the CPU module) ＊2 |
| External power supply | Voltage | 12-24VDC (+20/-15%) (ripple ratio within 5%) |
| | Current | 10mA (at 24VDC) |
| Common terminal arrangement | | 7 points/common (common terminal: TB18) |

＊2: Fuse blown is not detected when the external power supply is shut off.

# 5. INTERRUPT MODULE

## 5.1 QI60 Interrupt Module

For usage of this module, refer to the User's Manual (Function Explanation, Program Fundamentals) for the CPU module used.

| Specifications \ Type | Interrupt module | | | | | Appearance |
|---|---|---|---|---|---|---|
| | QI60 | | | | | |
| Number of input points | 16 points | | | | | |
| Isolation method | Photocoupler | | | | | |
| Rated input voltage | 24VDC (+20/-15%, ripple ratio within 5%) | | | | | |
| Rated input current | Approx. 6mA | | | | | |
| Input derating | No | | | | | |
| ON voltage/ON current | 19V or higher/4.0mA or higher | | | | | |
| OFF voltage/OFF current | 11V or lower/1.7mA or lower | | | | | |
| Input impedance | Approx. 3.9kΩ | | | | | |
| Response time — Set value *1 | 0.1 | 0.2 | 0.4 | 0.6 | 1 | |
| OFF to ON — TYP. | 0.05ms | 0.15ms | 0.30ms | 0.55ms | 1.05ms | |
| OFF to ON — MAX. | 0.10ms | 0.20ms | 0.40ms | 0.60ms | 1.20ms | |
| ON to OFF — TYP. | 0.15ms | 0.20ms | 0.35ms | 0.60ms | 1.10ms | |
| ON to OFF — MAX. | 0.20ms | 0.30ms | 0.50ms | 0.70ms | 1.30ms | |
| Dielectric withstand voltage | 560VAC rms/3 cycles (altitude 2000m) | | | | | |
| Insulation resistance | 10MΩ or more by insulation resistance tester | | | | | |
| Noise immunity | By noise simulator of 500Vp-p noise voltage, 1 $\mu$ s noise width and 25 to 60Hz noise frequency | | | | | |
| | First transient noise IEC61000-4-4: 1kV | | | | | |
| Protection degree | IP2X | | | | | |
| Common terminal arrangement | 16 points/common (common terminal: TB17) | | | | | |
| Number of occupied I/O points | 16 points (I/O assignment is set as a 16-point interrupt module.) *3 | | | | | |
| Interrupt processing condition | Set by Switch setting in GX Developer. *2 | | | | | |
| Operation indicator | ON indication (LED) | | | | | |
| External connections | 18-point terminal block (M3 × 6 screws) | | | | | |
| Applicable wire size | 0.3 to 0.75mm$^2$ core (2.8mm OD max.) | | | | | |
| Applicable crimping terminal | R1.25-3 (Sleeved crimping terminals cannot be used.) | | | | | |
| Internal current consumption (5VDC) | 60mA (TYP. all points ON) | | | | | |
| Weight | 0.20kg | | | | | |

| External connection | Terminal block No. | Signal name |
|---|---|---|
| | TB1 | X00 |
| | TB2 | X01 |
| | TB3 | X02 |
| | TB4 | X03 |
| | TB5 | X04 |
| | TB6 | X05 |
| | TB7 | X06 |
| | TB8 | X07 |
| | TB9 | X08 |
| | TB10 | X09 |
| | TB11 | X0A |
| | TB12 | X0B |
| | TB13 | X0C |
| | TB14 | X0D |
| | TB15 | X0E |
| | TB16 | X0F |
| | TB17 | COM |
| | TB18 | Vacant |

*1: Select the value in PLC parameter. (Default: 0.2ms). Refer to Section 1.3.1 for the setting method.
    For the CPU modules (Q series) and GX Developer where the response time can be set, refer to Section 1.2.5.
*2: For the setting method, refer to the section 1.3.3.
*3: When making settings with an SW5D5C-GPPW or earlier GX Developer, select "16 point intelligent Module."

# MEMO

# 6. BLANK COVER MODULE

This chapter provides the specifications of the blank cover module used to protect the vacant slot (between I/O modules) of the base unit from dust.

Table 6.1 Blank Cover Module Specifications

| Item \ Type | | QG60 |
|---|---|---|
| Number of occupied I/O points | | Default: 16 points<br>(Can be changed to 0, 16, 32, 48, 64, 128, 256, 512, 1024 points by "PLC system" of "PLC parameter".) |
| Application | | Used as a dustproof cover for a slot not loaded with an I/O module (especially a vacant slot between modules). |
| External dimensions | H | 98mm |
| | W | 27.4mm |
| | D | 90mm |
| Weight | | 0.07 kg |

＊ Load the blank cover module with the connector cover of the base unit fitted.

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# MEMO

# 7. CONNECTORS

The 40-pin connectors and 37-pin D-sub connectors used with the input and output modules are to be user-prepared.
The following tables list the connector types and applicable models, and introduce crimp-contact and pressure-displacement tools.

## (1) 40-pin connectors
### (a) 40-pin connectors

| Type | Model name | Applicable wire size | Applicable model |
|---|---|---|---|
| Soldering type connector (straight out type) | A6CON1[*1] | 0.088 to 0.3mm$^2$ (28 to 22 AWG) (stranded wire) | QX41, QX41-S1, QX41-S2, QX42, QX42-S1, QX71, QX72, QX82, QY41H, QY41P, QY42P, QY71, QY82P, QH42P, QX41Y41P |
| Crimp-contact type connector (straight out type) | A6CON2 | 0.088mm$^2$ to 0.24mm$^2$ (28 to 24 AWG) (stranded wire) | |
| Pressure-displacement type connector (straight out type) | A6CON3 | 28 AWG (stranded wire) 30 AWG (single wire) Flat cable 1.27mm pitch | |
| Soldering type connector (both for straight out and 45-degree types) | A6CON4[*1] | 0.088 to 0.3mm$^2$ (28 to 22 AWG) (stranded wire) | |

*1: Use cables with outside diameter of 1.3mm or shorter to connect 40 cables to the connector. In addition, consider the amount of current to be used and select appropriate cables.

### (b) 40-pin connector crimp-contact and pressure-displacement tools

| Type | Model name | Contact |
|---|---|---|
| Crimp-contact tool | N363TT005H | OTAX Corporation |
| Pressure-displacement tool | N367TT012H (locator plate) | |
| | N707TT001H (cable cutter) | |
| | N707TT101H (hand press) | |

(2) 37-pin D-sub connectors
(a) 37-pin D-sub connectors

| Type | Model name | Applicable wire size | Applicable model |
|---|---|---|---|
| Soldering type connector (straight out type) | A6CON1E[*1] | 0.088 to 0.3mm$^2$ (28 to 22 AWG) (stranded wire) | QX81, QX81-S2, QY81P |
| Crimp-contact type connector (straight out type) | A6CON2E | 24 to 20 AWG (stranded wire) | |
| Pressure-displacement type connector (straight out type) | A6CON3E | 28 AWG (stranded wire) 30 AWG (single wire) | |

*1: Use cables with outside diameter of 1.3mm or shorter to connect 37 cables to the connector. In addition, consider the amount of current to be used and select appropriate cables.

(b) 37-pin D-sub connector crimp-contact and pressure-displacement tools

| Type | Model name | Contact |
|---|---|---|
| Crimp-contact tool | 91503-1 | Tyco Electronics AMP K.K. |
| Pressure-displacement tool | 768349-1 (die set) 768338-1 | |
| | 91220-1 (cable cutter) | |
| | 91085-2 (hand mini-press) | |

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# 8. SPECIFICATIONS OF CONNECTOR/TERMINAL BLOCK CONVERTER MODULES

## 8.1 Specifications of Connector/Terminal Block Converter Modules

This chapter explains the specifications of connector/terminal block converter modules.

### (1) Connector/terminal block converter module

| Type | Details | Weight | Applicable wire size | Applicable crimping terminal | Applicable Models |
|---|---|---|---|---|---|
| A6TBXY36 | For positive common type input modules and sink type output modules (standard type) | 0.4kg | 0.75 to 2mm$^2$ | 1.25-3.5(JIS) 1.25-YS3A V1.25-M3 V1.25-YS3A 2-3.5(JIS) 2-YS3A V2-S3 V2-YS3A | Q series:    QX41, QX41-S1, QX41-S2, QX42, QX42-S1, QY41H, QY41P, QY42P, QY82P, QH42P, QX41Y41P |
| A6TBXY54 | For positive common type input modules and sink type output modules (2-wire type) | 0.5kg | | | AnS series: A1SX41, A1SX41-S1, A1SX41-S2, A1SX42, A1SX42-S1, A1SX42-S2, A1SX82-S1, A1SY41, A1SY41P, A1SY42, A1SY42P, A1SY82, A1SH42, A1SH42P, A1SH42-S1, A1SH42P-S1
A series:    AX42, AX42-S1, AY42, AY42-S1, AY42-S3, AY42-S4, AH42
CC-Link:    AJ65SBTCF1-32D, AJ65SBTCF1-32T, AJ65BTC1-32D, AJ65BTC1-32T
MELSECNET-MINI: AJ35TC1-32D, AJ35TC1-32T |
| A6TBX70 | For positive common type input modules (3-wire type) | 0.6kg | | | Q series:    QX41, QX41-S1, QX41-S2, QX42, QX42-S1, QH42P, QX41Y41P
AnS series: A1SX41, A1SX41-S1, A1SX41-S2, A1SX42, A1SX42-S1, A1SX42-S2, A1SX82-S1, A1SH42, A1SH42P, A1SH42-S1, A1SH42P-S1
A series:    AX42, AX42-S1, AH42
CC-Link:    AJ65SBTCF1-32D, AJ65BTC1-32D
MELSECNET-MINI: AJ35TC1-32D |
| A6TBX36-E | For negative common type input modules (standard type) | 0.4kg | | | Q series:    QX81, QX81-S2
AnS series: A1SX81, A1SX81-S2
A series:    AX82 |
| A6TBX54-E | For negative common type input modules (2-wire type) | 0.5kg | | | |
| A6TBX70-E | For negative common type input modules (3-wire type) | 0.6kg | | | |
| A6TBY36-E | For source type output modules (standard type) | 0.4kg | | | Q series:    QY81P
AnS series: A1SY81
A series:    AY82EP |
| A6TBY54-E | For source type output modules (2-wire type) | 0.5kg | | | |

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> **POINT**
>
> (1) The number of connectable I/O points is 32 for all connector/terminal block converter modules.
>     Two connector/terminal block converter modules and two cables for connector/terminal block converter modules are required for 64-point I/O modules.
>
> (2) Though the A1SX81(S2) is used either as a sink or source type, use the A6TBX36-E, A6TBX54-E or A6TBX70-E.
>     The A6TBXY36, A6TBXY54 or A6TBX70 cannot be used.
>
> (3) Though the A1SX82-S1 is used either as a sink or source type, the A6TBXY36/XY54/X70 may be used only when the A1SX82-S1 is used as a sink type.
>     When it is used as a source type, the A6TBXY36/XY54/X70 cannot be used.
>
> (4) Though the A1SY82 and QY82P are source type output modules, use the A6TBXY36 or A6TBXY54. The A6TBY36-E or A6TBY54-E cannot be used.
>
> (5) In the A series, the positive common input module is separately labeled as a sink type input module, and the negative common input module is separately labeled as a source type input module.
>
> (6) When using the A6TBX70 as I/O combined module, use at the input side.
>
> (7) Tighten the module terminal screws to the following torque.
>     Terminal screw (M3.5 screw): Tightening torque 0.78N•m

## (2) Cable

| Type | Details | Weight | Applicable Models |
|------|---------|--------|-------------------|
| AC05TB | 0.5 m, for sink modules | 0.17kg | A6TBXY36 A6TBXY54 A6TBX70 |
| AC10TB | 1 m, for sink modules | 0.23kg | |
| AC20TB | 2 m, for sink modules | 0.37kg | |
| AC30TB | 3 m, for sink modules | 0.51kg | |
| AC50TB | 5 m, for sink modules | 0.76kg | |
| AC80TB | 8 m, for sink modules (common current not exceeding 0.5 A) | 1.2kg | |
| AC100TB | 10 m, for sink modules (common current not exceeding 0.5 A) | 1.5kg | |
| AC05TB-E | 0.5 m, for source modules | 0.17kg | A6TBX36-E A6TBY36-E A6TBX54-E A6TBY54-E A6TBX70-E |
| AC10TB-E | 1 m, for source modules | 0.23kg | |
| AC20TB-E | 2 m, for source modules | 0.37kg | |
| AC30TB-E | 3 m, for source modules | 0.51kg | |
| AC50TB-E | 5 m, for source modules | 0.76kg | |

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## 8.2 Connector/terminal block converter module connection diagrams

### 8.2.1 A6TBXY36

(1) When connecting an input
    module

(2) When connecting an
    output module
    (a) Sink type

    (b) Source type

### 8.2.2 A6TBXY54

(1) When connecting an input
    module

(2) When connecting an
    output module
    (a) Sink type

    (b) Source type
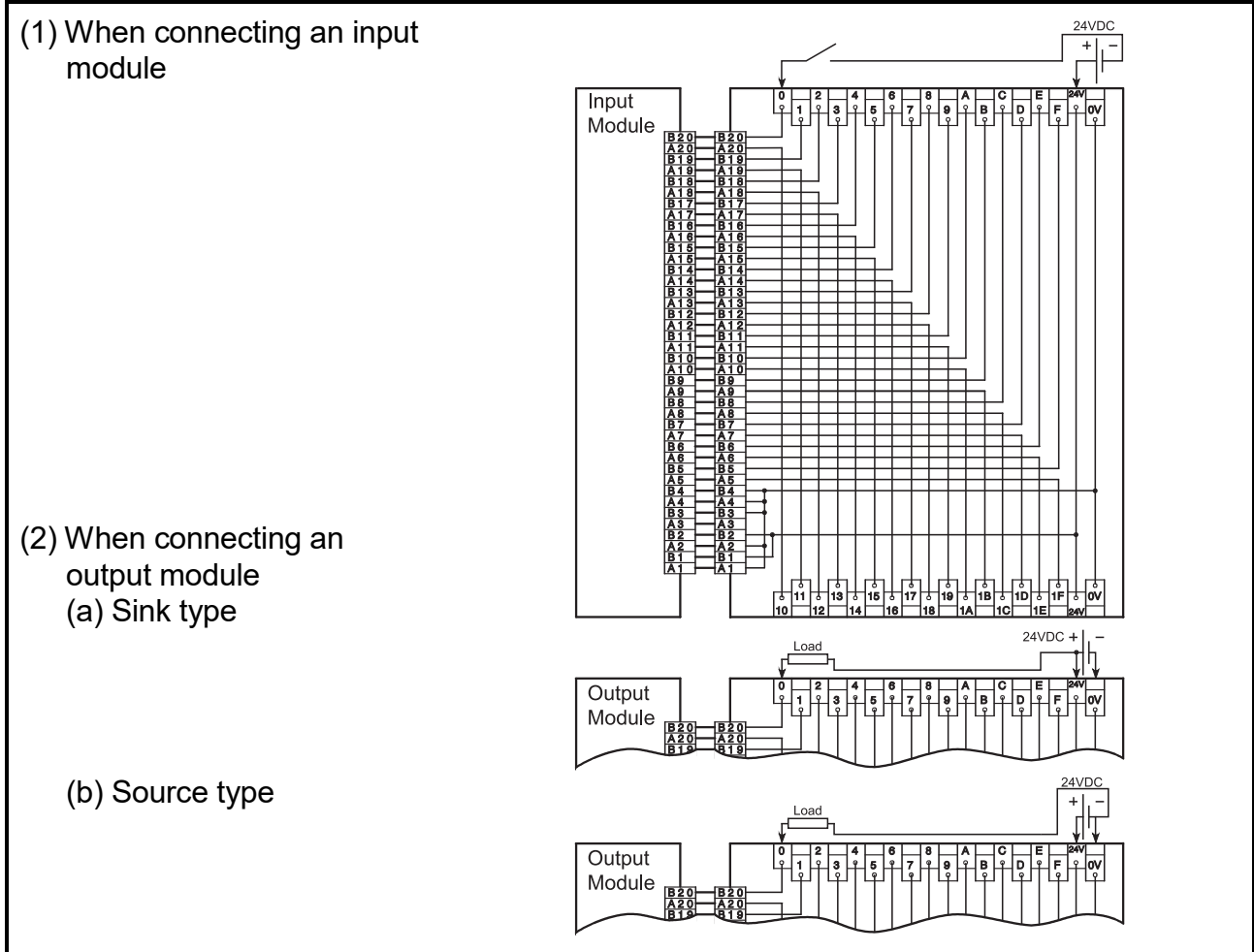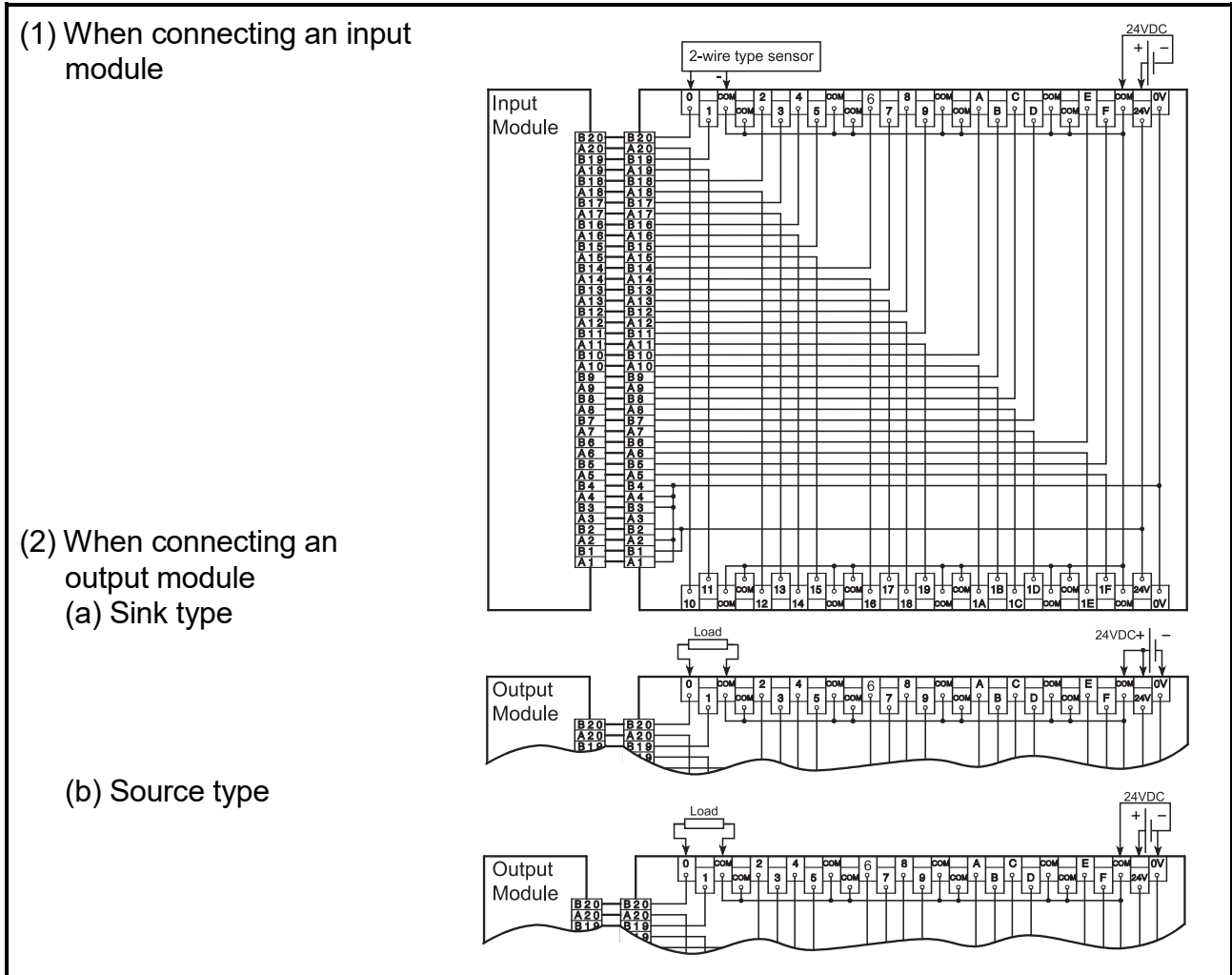
## 8.2.3 A6TBX70
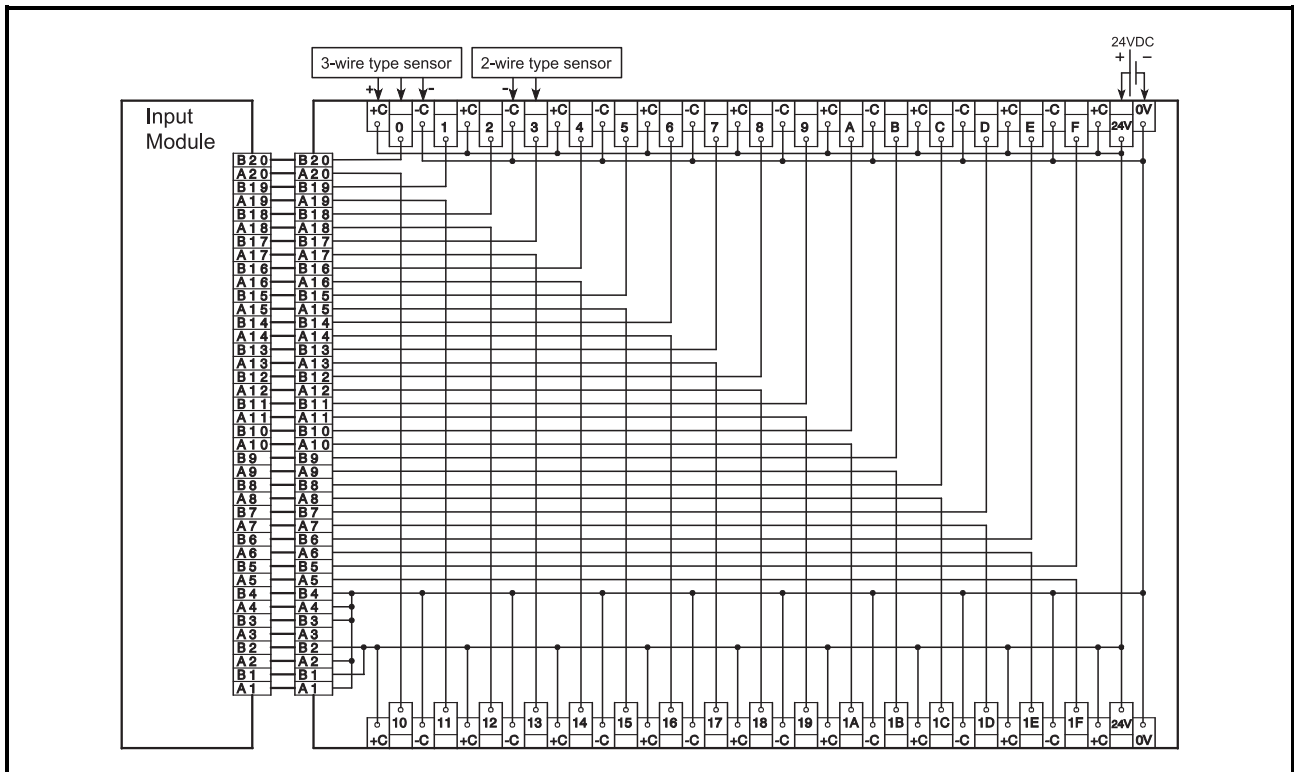


## 8.2.4 A6TBX36-E
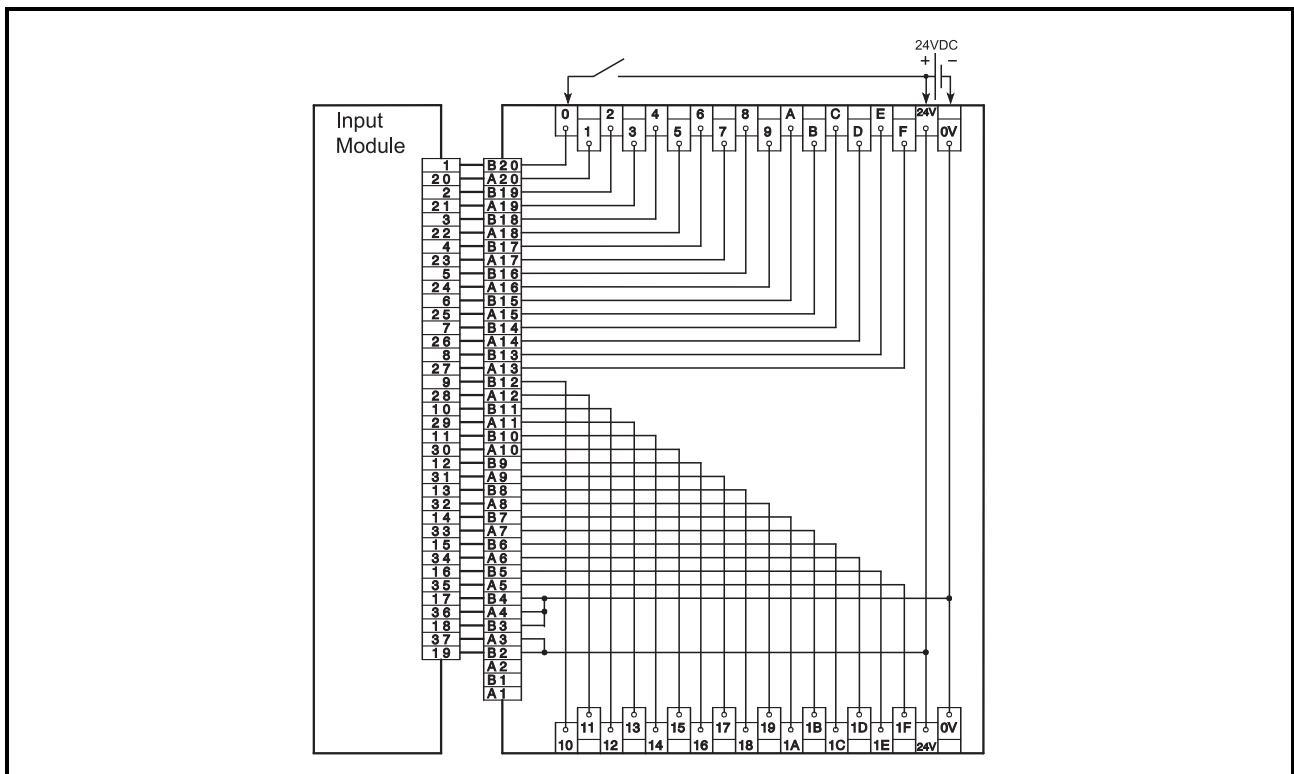
## 8.2.5 A6TBY36-E
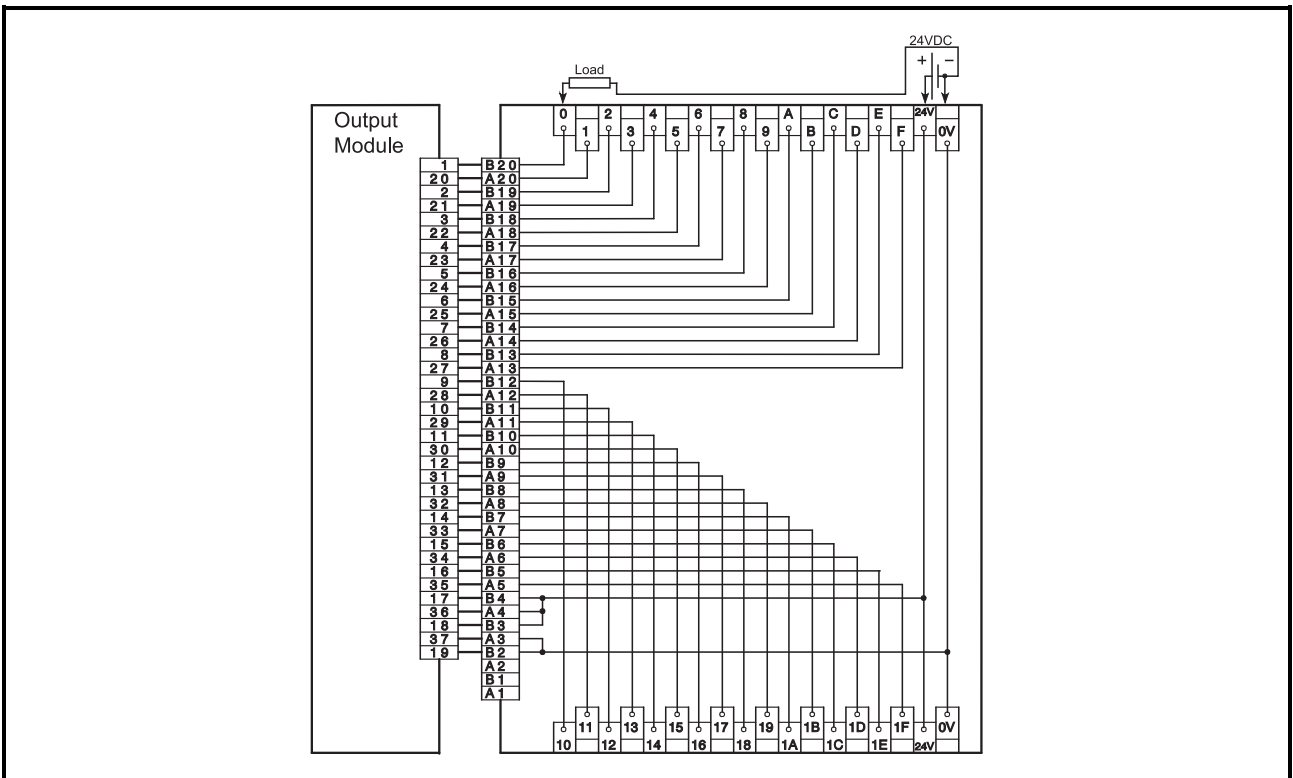


## 8.2.6 A6TBX54-E
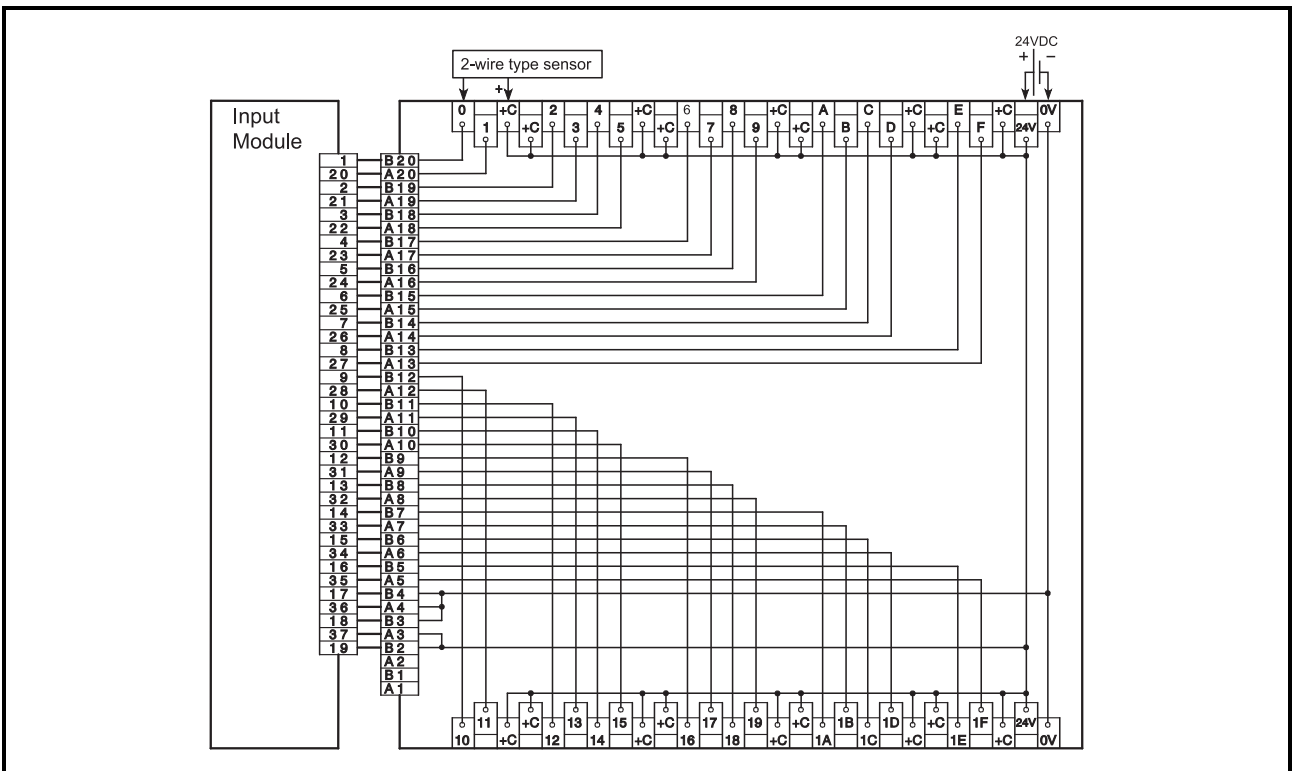
## 8.2.7 A6TBY54-E
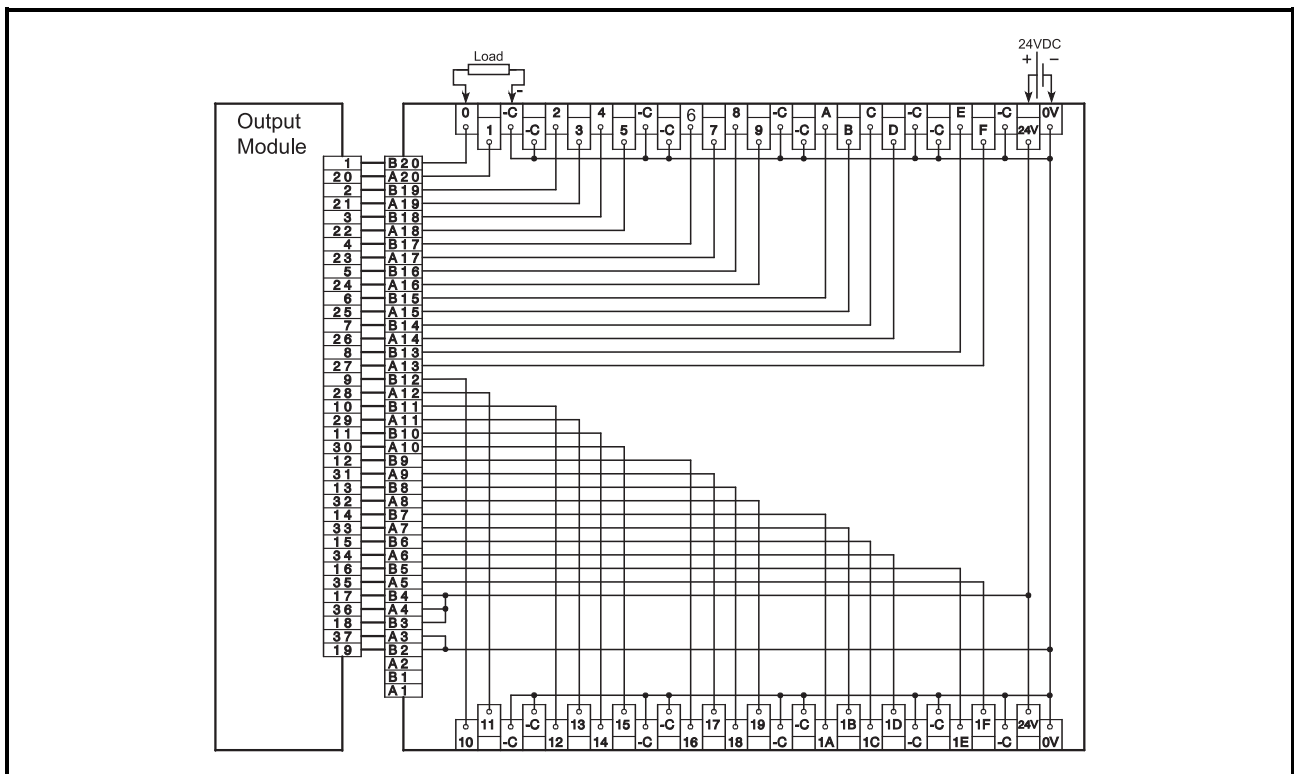


## 8.2.8 A6TBX70-E

# 9. SPRING CLAMP TERMINAL BLOCK

9 - 1
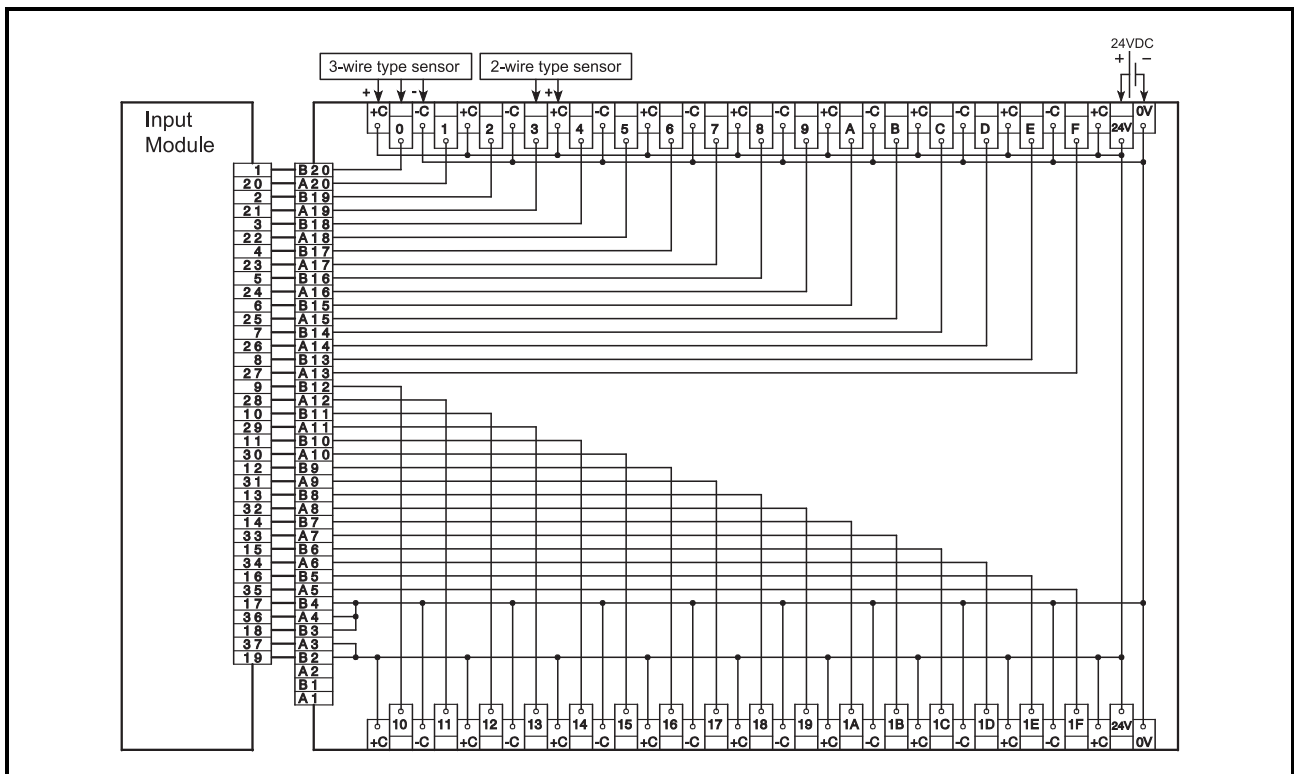
This chapter describes a spring clamp terminal block.

## 9.1 Spring Clamp Terminal Block I/O Module

The spring clamp terminal block I/O module is an I/O module of spring clamp terminal block type.
Since this module uses a spring clamp it does not require screw tightening, which greatly reduces the number of wiring procedures.

### (1)   Model name

The model name of spring clamp terminal block I/O module is described below.

| Model type | Model name | | |
|---|---|---|---|
| I/O module | QX10-TS | QX40-TS | QX80-TS |
| | QY10-TS | QY40P-TS | QY80-TS |

| POINT |
|---|
| • Use bar solderless terminals for wiring this module. |
| • For the signal names corresponding to the terminal numbers when connected to an external device, refer to Chapter 2 and 3 in this manual. |

9

(2)   Connecting a cable
Strip off about 6.5mm of the cable tip to install the bar solderless terminal to the stripped part.
Connect the cable either by the (a) method or by the (b) method described below.

(a)   Connection by inserting the cable
Insert the bar solderless terminal into the circular shaped hole and then force the wire into the hole until the connection check indicator comes out.[1]
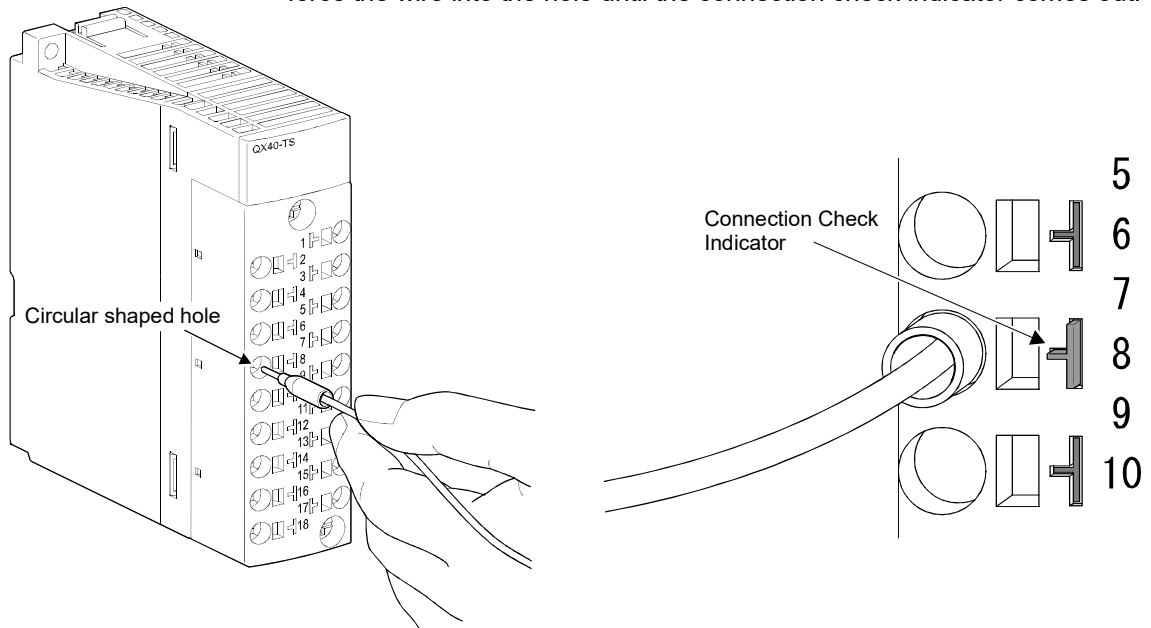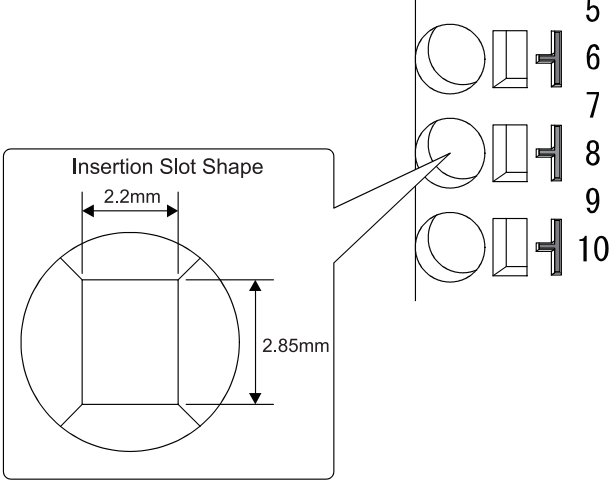
Circular shaped hole

Connection Check Indicator

5
6
7
8
9
10

*1: If the connection check indicator does not come out, the bar solderless terminal is not connected to the module properly.
Insert the bar solderless terminal until the connection check indicator comes out.

9

(b)   Use of spring clamp terminal block tool
1)   Insert the tool all the way inside the square shaped hole of the terminal block.
2)   Insert the bar solderless terminal into the circular shaped hole until the connection check indicator comes out, and remove the tool from the hole.
3)   Check that the connection check indicator is sticking out. [1]
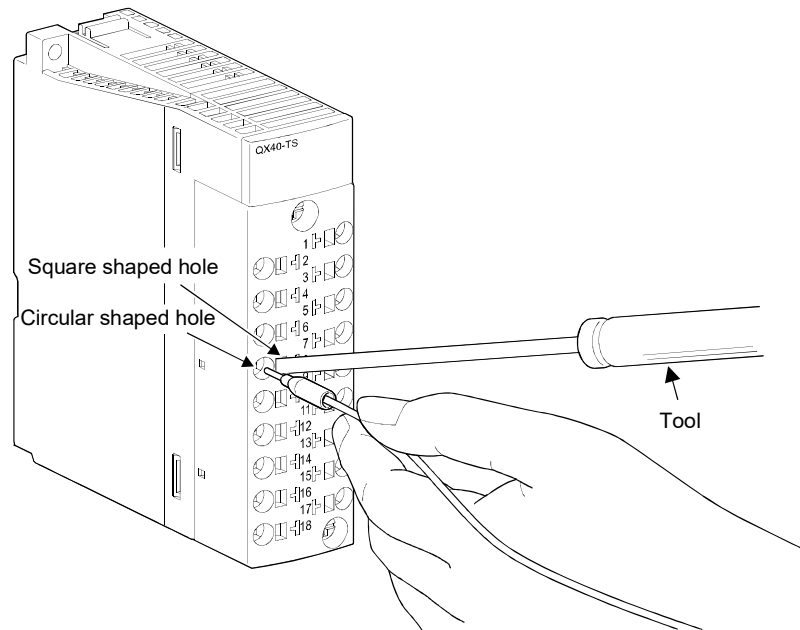


*1: If the connection check indicator does not come out, the bar solderless terminal is not connected to the module properly. Insert the terminal until the connection check indicator comes out.

POINT

• If the stripped wire is inserted into the corresponding hole without installing the bar solderless terminal, the connection check indicator does not come out. Do not use the stripped wire without installing the bar solderless terminal.
• The wire strip length must follow the specification of the bar solderless terminal. Also, use a crimp tool when installing the bar solderless terminal to the wire.
• Before inserting the bar solderless terminal, check the corresponding circular shaped hole and the bar solderless terminal. Before inserting, pay attention to the angle of bar solderless terminal.
  If a bar solderless terminal, which is bigger than the insertion slot, is inserted, the terminal block may be damaged.

Insertion Slot Shape
2.2mm
2.85mm

5
6
7
8
9
10

(3)  Disconnecting a cable
    (a) Insert the tool all the way inside the square shaped hole of the spring clamp terminal block.
    (b) Pull the bar solderless terminal out of the hole.

(4) List of introductory products

The tools and the bar solderless terminals used for wiring the spring clamp terminal block I/O module are listed below.

| Manufacturer | Name of product | Model name | Applicable wire size |
|---|---|---|---|
| Mitsubishi Electric System & Service Co., Ltd. | Spring clamp terminal block tool | KD-5339 | — |
| Nichifu Co.,Ltd. | Bar solderless terminal | TE 0.5-8<br>TE 0.5-10 | 0.3 to 0.5 mm$^2$<br>(22 AWG) |
| | | TE 0.75-8<br>TE 0.75-10 | 0.75 mm$^2$<br>(20 AWG) |
| | | TE 1.0-8<br>TE 1.0-10 | 1.0 mm$^2$<br>(18 AWG) |
| | | TE 1.5-8<br>TE 1.5-10 | 1.5 mm$^2$<br>(16 AWG) |
| | Bar solderless terminal tool | NH79 | — |
| Phoenix Contact Co.,Ltd. | Bar solderless terminal | AI 0.34-8TQ | 0.34 mm$^2$ |
| | | AI 0.5-8WH<br>AI 0.5-10WH | 0.5 mm$^2$ |
| | | AI 0.75-8GY<br>AI 0.75-10GY | 0.75 mm$^2$ |
| | | AI 1-8RD<br>AI 1-10RD | 1.0 mm$^2$ |
| | | AI 1.5-8BK<br>AI 1.5-10BK | 1.5 mm$^2$ |
| | | AI 2.5-8BU<br>AI 2.5-10BU | 2.0 to 2.5 mm$^2$ |
| | Bar solderless terminal tool | CRIMPFOX ZA 3 | — |

## 9.2 Spring Clamp Terminal Block (Q6TE-18S, Q6TE-18SN)

The Q6TE-18S and Q6TE-18SN (hereafter abbreviated as Q6TE-18S(N)) shall be used attached to a Q Series terminal block type I/O module or an intelligent function module.
Since the Q6TE-18S(N) uses a spring clamp it does not require screw tightening, which greatly reduces the number of wiring procedures.

(1)  Applicable modules
    For the modules that can be used with the Q6TE-18S and Q6TE-18SN, refer to the user's manuals included with the terminal blocks.

(2)  Specifications
    The Q6TE-18S(N) specification is explained.

| Item | Specifications |
|---|---|
| Applicable wire size | 0.3 to 1.5 mm$^2$ (22 to 16 AWG) |
| Maximum rated voltage, maximum rated current | 264VAC<br>125VDC<br>8A (terminal number: 17)<br>4A (terminal number: 1 to 16, 18) |
| Wire strip length | 8 to 11 mm |
| Mounting screw tightening torque range | 0.66 to 0.89 N•m |
| Weight | 0.07kg |

(3)  Removing a terminal block

Unscrew the two terminal block mounting screws situated at the top and bottom of the terminal block and take them off.



Module

Terminal block mounting screw
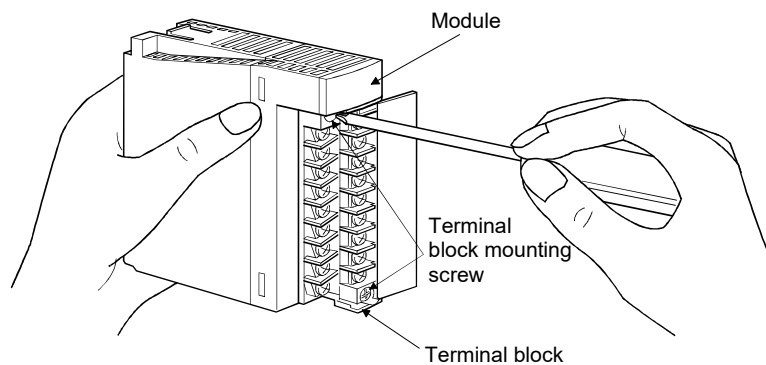
Terminal block

(4)   Installing the Q6TE-18S(N)

(a) Remove the protection cap from the Q6TE-18S(N). [*1]

(b) Mount the Q6TE-18S(N) onto the module and tighten the terminal block mounting screws within the specified torque range.
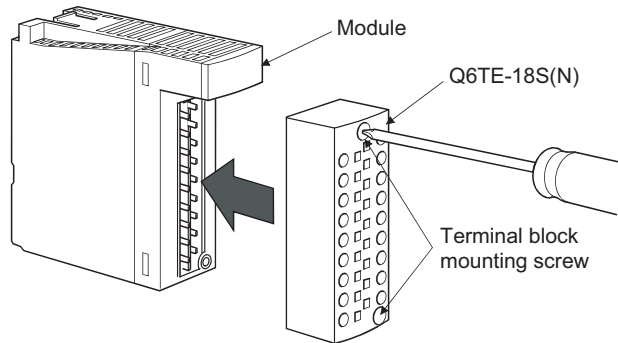


*1: Keep the protection cap after removing it.
When the Q6TE-18S(N) is not used, attach the cap to protect the terminal area.

(5)   Precaution for connecting or disconnecting cables

(a) When connecting a wire to the circular shaped hole of the Q6TE-18S(N), insert only one wire to a terminal. Two or more wires cannot be connected to one terminal. Inserting multiple wires may result in a poor contact to the spring clamp terminal part.

(b) Strip the wire according to the specification. If the wire strip length is too long, the exposed conductive part may cause electric shock or short circuit. If the wire strip length is too short, it may result in a poor contact to the spring clamp terminal part.

(c) When using a spring clamp terminal block tool, follow the instruction below. Failure to do so may cause damage of the spring clamp terminal part or the terminal block resin part.
   • Use a dedicated tool for a spring clamp terminal block.
   • Do not insert the bar solderless terminal or the wire before inserting the tool into the square shaped hole.
   • Insert the tool vertically into the hole.

(6)   Connecting a cable

(a) When using the bar solderless terminal, correctly connect a wire to the solderless terminal according to the directions for the solderless terminal. When using a wire (single wire or stranded wire), strip the wire to meet the strip length of the specifications.

(b) Insert the tool vertically all the way inside the square shaped hole of the Q6TE-18S(N).

(c) Insert the bar solderless terminal or the wire into the circular shaped hole, and remove the tool from the hole.

(d) After the connection is completed, check that the bar solderless terminal or the wire is firmly clamped by pulling it lightly.
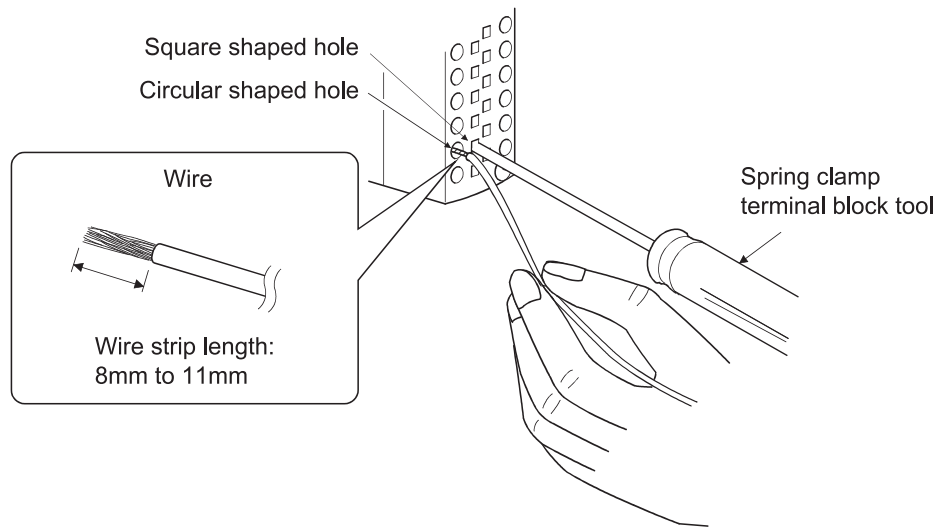


(7)   Disconnecting a cable

(a) Insert the tool vertically all the way inside the square shaped hole of the Q6TE-18S(N).

(b) Pull the bar solderless terminal or the wire out of the hole.

### (8)   List of introductory products

The tools and the bar solderless terminal used for wiring the spring clamp terminal block I/O module are listed below.

| Manufacturer | Name of product | Model name | Applicable wire size |
|---|---|---|---|
| Mitsubishi Electric System & Service Co., Ltd. | Spring clamp terminal block tool | KD-5339 | — |
| Nichifu Co.,Ltd. | Bar solderless terminal [1] | TE 0.5-8 | 0.3 to 0.5 mm$^2$ |
| | | TE 0.5-10 | (22 AWG) |
| | | TE 0.75-8 | 0.75 mm$^2$ |
| | | TE 0.75-10 | (20 AWG) |
| | | TE 1.0-8 | 1.0 mm$^2$ |
| | | TE 1.0-10 | (18 AWG) |
| | | TE 1.5-8 | 1.5 mm$^2$ |
| | | TE 1.5-10 | (16 AWG) |
| | Bar solderless terminal tool | NH79 | — |

[1]: Use this product when doing the terminal treatment of the wire and inserting it into the spring clamp terminal block.

# 10. PART NAMES

This chapter explains the part names of I/O modules.

18-point screw terminal block type (other than high-speed input module)

40-pin connector type



| No. | Name | Description |
|---|---|---|
| 1) | Module fixing hook | Hook used to fix the module to the base unit. (Single-motion installation) |
| 2) | I/O indicator LED | Used to indicate the I/O status (on/off). The corresponding LED turns on when the I/O status is on. |
| 3) | Terminal block | A 18-point terminal block for connecting a power line and I/O signal lines |
| 4) | Terminal cover | Terminal cover with recording paper |
| 5) | 40-pin connector | Designed for 32- or 64-point module and used to connect power and I/O signal wires. |
| 6) | Indication selector switch [*1] | Used to switch the LED indications between the first-half 32 points and latter-half 32 points of a 64-point module. |
| 7) | Module loading lever | Used to mount the module on the base unit. |

*1: Operate the indication selector switch with your fingertip.
   Do not use a screwdriver or similar tool as it may damage the switch.

10

## 37-pin D-sub connector type
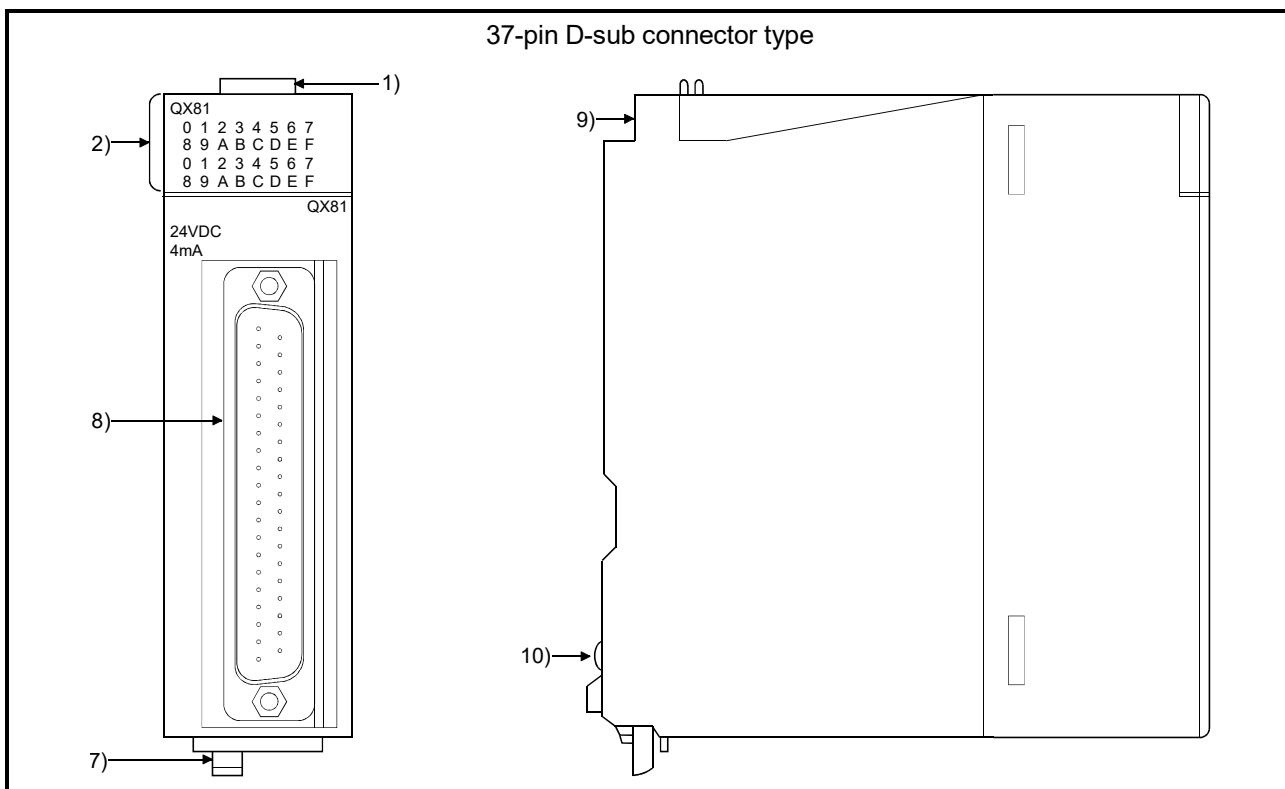


| No. | Name | Description |
|-----|------|-------------|
| 8) | 37-pin D-sub connector | Designed for 32 points and used to connect power and I/O signal wires. |
| 9) | Module fixing screw hole | Used to fix the module to the base unit. |
| 10) | Metal fitting | Do not touch as this may be deformed. |

10

18-point screw terminal block type (high-speed input module)



View A (enlarged view)

| No. | Name | Description |
|---|---|---|
| 1) | Module fixing hook | Hook used to fix the module to the base unit. (Single-motion installation) |
| 2) | I/O indicator LED | Used to indicate the I/O status (on/off). The corresponding LED turns on when the I/O status is on. |
| 3) | Terminal block | A 18-point terminal block for connecting a power line and I/O signal lines |
| 4) | Terminal cover | Terminal cover with recording paper |
| 5) | Module mounting lever | Used to mount the module into the base unit. |
| 6) | Module fixing screw hole | Used to fix the module to the base unit. |
| 7) | Metal fitting | Do not touch as this may be deformed. |
| 8) | Noise filter selector switch (Switch 1)[1] | Used to set valid/invalid noise filters. On: Valid (at the factory default) Off: Invalid |
| 9) | Function selector switch (Switch 2)[1] | Used to switch the module function. On: High-speed input module (at the factory default) Off: Interrupt module |

[1]: Operate the switch with an industrial tool such as a driver, because the switch is placed beyond your reach.
Operate the switch carefully. Failure to do so may result in damage to the switch.
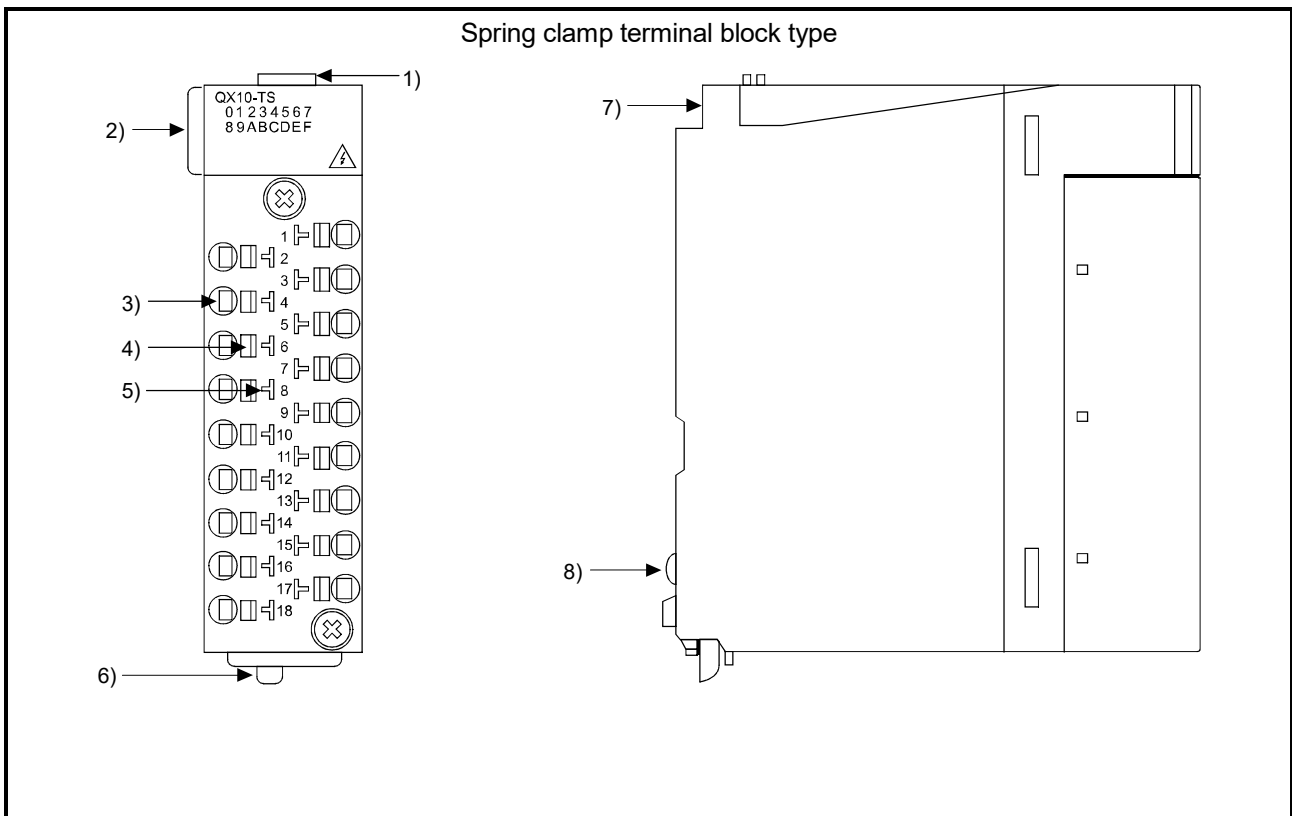
Spring clamp terminal block type



| No. | Name | Description |
|-----|------|-------------|
| 1) | Module fixing hook | Hook used to fix the module to the base unit. (Single-motion installation) |
| 2) | I/O indicator LED | Used to indicate the I/O status (on/off). The corresponding LED turns on when the I/O status is on. |
| 3) | Wire insertion slot | Hole inserted a wire to in wiring (Circular hole) |
| 4) | Tool insertion slot | Hole inserted a spring clamp terminal block tool to in wiring (Square hole) |
| 5) | Connection check indicator | Comes out if a wire is inserted in wiring |
| 6) | Module loading lever | Used to load the module into the base unit |
| 7) | Module fixing screw hole | Used to fix the module to the base unit. |
| 8) | Metal fitting | Do not touch as this may be deformed. |

A6TB □ 36 □



A6TB □ 54 □



| No. | Name | Description |
|---|---|---|
| 1) | Panel mounting hole | Used for mounting to panel (for M4 screw). |
| 2) | Terminal block | Used to connect power and signal wires. |
| 3) | 40-pin connector | Designed for 32-point module and used to connect power and I/O signal wires. |
| 4) | Module fixing hook | Used for mounting onto DIN rail. |

| | A6TBX70 ☐ | |



| No. | Name | Description |
|---|---|---|
| 1) | Panel mounting hole | Used for mounting to panel (for M4 screw). |
| 2) | Terminal block | Used to connect power and signal wires. |
| 3) | 40-pin connector | Designed for 32-point module and used to connect power and I/O signal wires. |
| 4) | Module fixing hook | Used for mounting onto DIN rail. |

| | Q6TE-18S(N) | |



| No. | Name | Description |
|---|---|---|
| 1) | Terminal block mounting screw | Used to fix the Q6TE-18S(N) to a module. |
| 2) | Circular shaped hole | Hole for inserting wire when wiring |
| 3) | Square shaped hole | Hole for inserting a tool when wiring |

# 11. I/O MODULE TROUBLESHOOTING

11
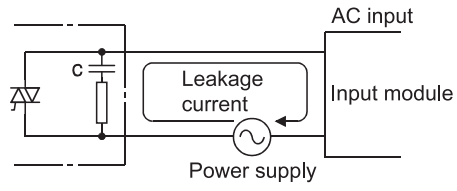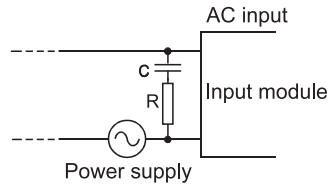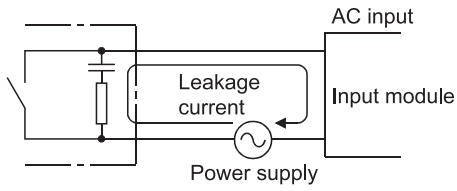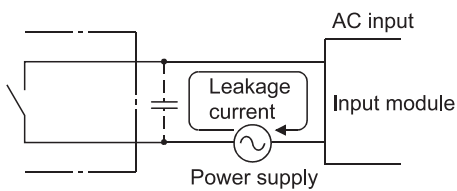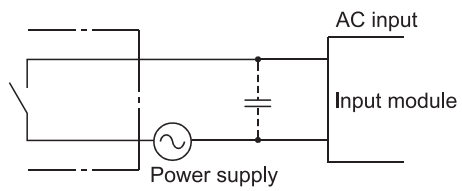
This chapter explains possible problems with I/O circuits and their corrective actions.

## 11.1 Input Circuit Troubleshooting
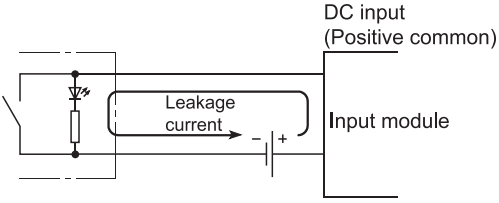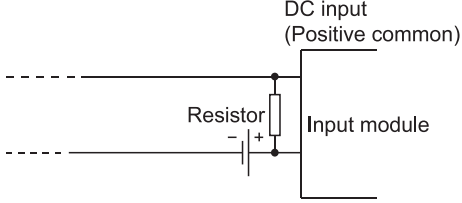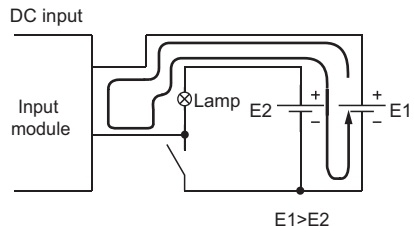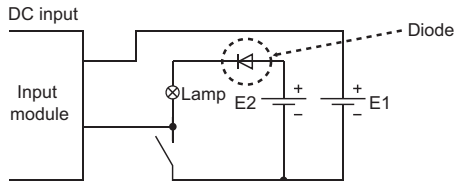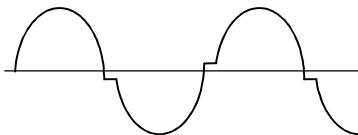
This section describes possible problems with input circuits and their corrective actions.

Table 11.1 Input Circuit Problems and Corrective Actions

| | Condition | Cause | Corrective action |
|---|---|---|---|
| Example 1 | An input signal does not turn off. | • Leakage current of input switch (e.g. drive by non-contact switch).<br><br>AC input / Leakage current / Input module / Power supply | Connect an appropriate resistor so that the voltage across the terminals of the input module will be less than the off voltage.<br><br>AC input / Input module / Power supply<br><br>It is recommended to use 0.1 to 0.47 $\mu$F + 47 to 120Ω (1/2W) for the CR constant. |
| Example 2 | An input signal does not turn off. | • Drive by a limit switch with neon lamp.<br><br>AC input / Leakage current / Input module / Power supply | • Same as Example 1.<br>• Or make up another independent display circuit. |
| Example 3 | An input signal does not turn off. | • Leakage current due to line capacity of wiring cable.<br>(Line capacity C of twisted pair wire is approx. 100 pF/m).<br><br>AC input / Leakage current / Input module / Power supply | • Same as Example 1.<br>• However, leakage current is not generated when the power supply is located in the input equipment side as shown below.<br><br>AC input / Input module / Power supply |

Table 11.1 Input Circuit Problems and Corrective Actions (Continued)

| | Condition | Cause | Corrective action |
|---|---|---|---|
| Example 4 | An input signal does not turn off. | • Drive by switch with LED indicator.  | Connect an appropriate resistor so that the current flow within the module will be less than the off current. <br><br>✳ A calculation example of a value for a connected resistor is given on the following page. |
| Example 5 | An input signal does not turn off. | • Current flow in the opposite direction due to the use of two power supplies  | • Use only one power supply.<br>• Connect a diode so that current flows only in one direction. (Figure below)  |
| Example 6 | An input signal does not turn on (AC input module). | Stepwise distortion as shown below appears to the zero cross voltage of input signal (AC).  | Improve input signal waveform by using the uninterruptible power system etc. |
| Example 7 | False input due to noise | Noise has been taken as input data. | Change the response time setting value.[1]<br>  Example<br>  1ms → 5ms<br>If this action is not effective, take the following measures.<br>• To prevent excessive noise, avoid installing power cables together with I/O cables.<br>• Take noise reduction measures. (Example: Connect surge absorbers to noise-generating devices such as relays and contactors using the same power supply.) |

*1: If excessive noise is periodically generated, setting a shorter response time value may be effective.

MELSEC-Q

11   I/O MODULE TROUBLESHOOTING

<Calculation example of Example 4>
Connecting a switch with LED display, in which a maximum 2.33mA leakage current flows when 24VDC is supplied to the QX40.
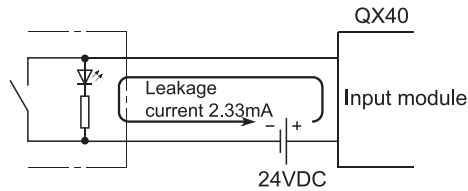


(1) In this case, the circuit does not satisfy the condition that the OFF current of the QX40 is 1.7mA or less.
    Connect a resistance as follows.
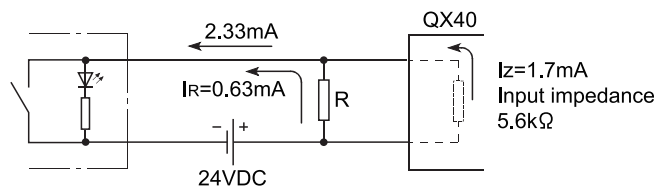


(2) In order to satisfy the condition that the OFF current of the QX40 is 1.7mA or less, the resistance R, in which a 0.63mA or more current flows, shall be connected. Calculating with the formula,

$I_R$: $I_Z$≒Z (Input impedance): R

$$R \leqq \frac{I_Z}{I_R} \times Z \text{ (Input impedance)} = \frac{1.7}{0.63} \times 5.6 = 15.11 [k\Omega]$$

the resistance R will be R<15.11kΩ.
Consequently, if the resistance R is set to 12kΩ, the electric power W of the resistance R will be calculated in the following formula,
W= (Input voltage)$^2$/R=28.8$^2$/12000=0.069[W].

(3) Since the resistance requires the electric power which is 3 to 5 times of the power actually consumed, the resistance to be connected to the corresponding terminal shall be 12.0kΩ and 1/4 to 1[W].

(4) The OFF voltage of the QX40 when the resistance R calculated above is connected will be 8.90[V].
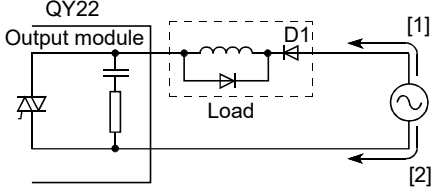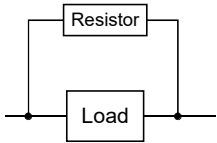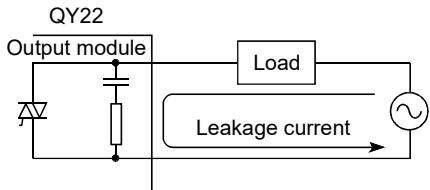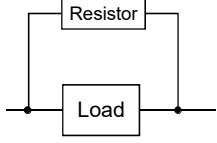
$$\frac{1}{\frac{1}{12.0[k\Omega]} + \frac{1}{5.6[k\Omega]}} \times 2.33[mA] = 8.90[V]$$

This also satisfies the condition that the OFF voltage of the QX40 is 11V or less.

11 - 3                                                                                                11 - 3

## 11.2 Output Circuit Troubleshooting
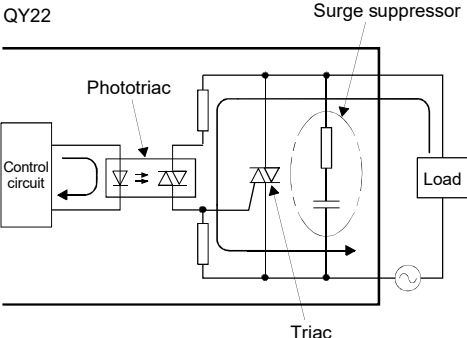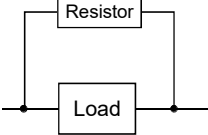
This section describes possible problems with output circuits and their corrective actions.

Table 11.2 Output Circuit Problems and Corrective Actions

| | Condition | Cause | Corrective action |
|---|---|---|---|
| Example 1 | When the output is off, excessive voltage is applied to the load. | • Load is half-wave rectified inside (in some cases, this is true of a solenoid).<br><br>QY22<br>Output module    D1    [1]<br>Load<br>[2]<br><br>• When the polarity of the power supply is as shown in [1], C is charged. When the polarity is as shown in [2], the voltage charged in C plus the line voltage are applied across D1. Max. voltage is approx. 2.2E.<br>(If a circuit is used in this way, it does not pose a problem to the output element. But it may cause the diode, which is built into the load, to deteriorate, resulting in a fire, etc.) | • Connect a resistor several tens to hundreds of kΩ across the load.<br><br>Resistor<br>Load |
| Example 2 | The load does not turn off. (triac output) | • Leakage current due to built-in surge suppressor.<br><br>QY22<br>Output module    Load<br>Leakage current | • Connect a resistor across the load.<br>(When the wiring distance from the output module to the load is long, there may be a leakage current due to the line capacity.)<br><br>Resistor<br>Load |
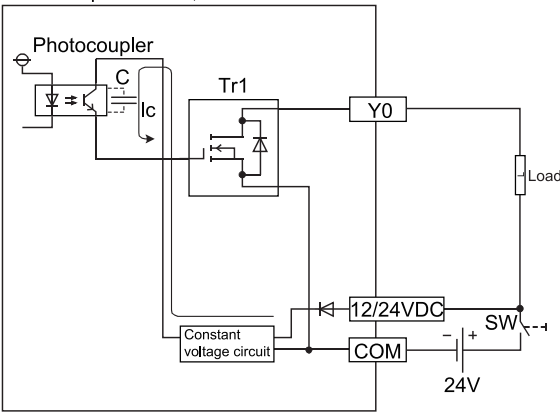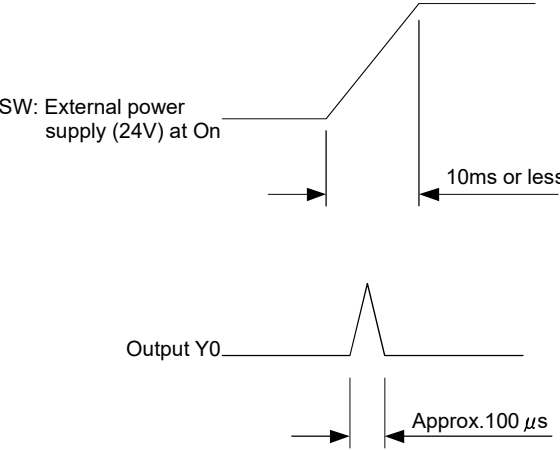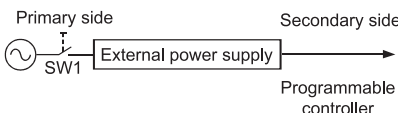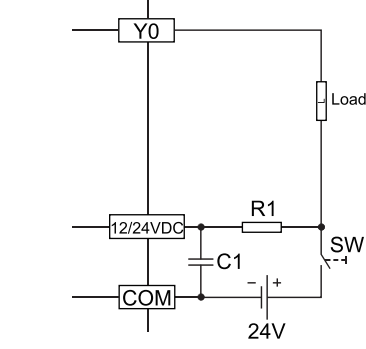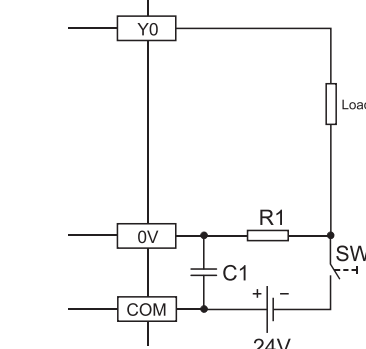
Table 11.2 Output Circuit Problems and Corrective Actions (Continued)

| | Condition | Cause | Corrective action |
|---|---|---|---|
| Example 3 | The load does not turn off. (triac output) | • If the load current is insufficient (lower than 25mA), the triac does not operate, causing the load current to flow into a phototriac as shown below.<br>If an inductive load is connected in this condition, the load may not turn off because surge at the time of off is applied to the phototriac.<br><br> | • Connect a resistor to both ends of the load so that the load current of approx. 100mA flows and the triac operation is stable.<br>Resistance value ≤ Voltage across the load / 100mA<br><br><br><br>(Example)<br>When using 100VAC (output voltage), for instance, calculate the resistance value from the formula below.<br>100VAC / 100mA = 1kΩ<br>Resistance value = 1kΩ |

Table 11.2 Output Circuit Problems and Corrective Actions (Continued)

| | Condition | Cause | Corrective action |
|---|---|---|---|
| Example 4 | When the external power supply turns on, the load turns on for a moment. (transistor output) | Erroneous output due to the stray capacitance (C) between collector and emitter of photocoupler. ( There is no erroneous output at normal load. An erroneous output may occur at high sensitivity load (such as solid state relay) )<br><br><br><br>(1) If the external power supply is turned on precipitously, Ic current flows due to the stray capacitance (C) between collector and emitter of photocoupler.<br>(2) Ic current flows to the next stage of transistor Tr1 gate and Y0 output turns on by 100 $\mu$s.<br><br> | (1) To turn on or off the external power supply, check that the external power supply rising edge must be 10ms or more, and switch the SW1 to the primary side of external power supply.<br><br><br><br>(2) When switching to the secondary side of the external power supply is required, the external power supply rising edge connected a condenser and a resistor must be slow, and measured 10ms or more.<br>Sink output<br><br>Source output<br><br>* The measures are ineffective in the following modules due to the characteristic of the external power supply circuit<br>• QY81P<br>• QY82P<br>R1: Several tens of ohms<br>Power capacity $\geqq$ (external power supply current[*1])$^2$ $\times$ resistance value $\times$ (3 to 5)[*2]<br>C1: several hundreds of microfarads 50V<br>*1 Refer to current consumption of the external power supply for modules used in this manual.<br>*2 Select the power capacity of resistance to be 3 to 5 times larger than the actual power consumption.<br>(Example)<br>R1=40$\Omega$, C1=300$\mu$F<br>Use the below expression to calculate a time constant<br>C1 $\times$ R1=300 $\times$ 10$^{-6}$ $\times$ 40<br>=12 $\times$ 10$^{-3}$s=12ms |
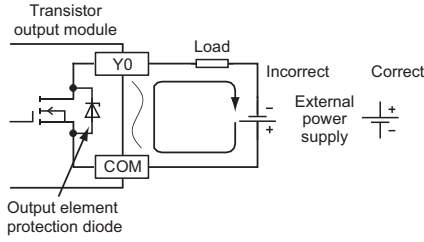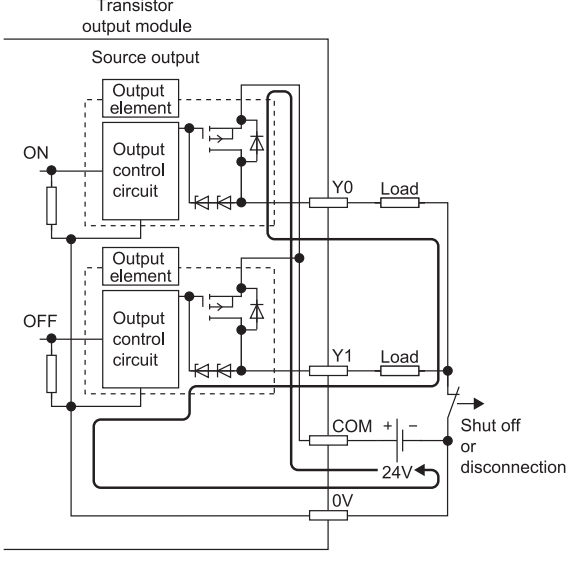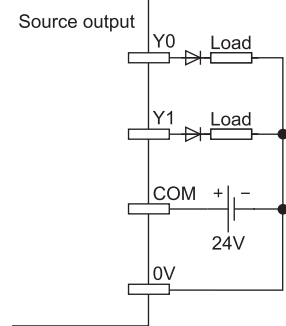
(To the next page)

Table 11.2 Output Circuit Problems and Corrective Actions (Continued)

| | Condition | Cause | Corrective action |
|---|---|---|---|
| Example 5 | The load momentarily turns on when the system is powered off (transistor output). | If an inductive load is connected, the load may turn on from off ([2]) due to back electromotive force at the time of power-off ([1]).<br><br>**Output module, I/O combined module**<br>Source output<br>Back electromotive force [3]<br>ON — Y0 — Load<br>[2]<br>OFF — Y1 — Load<br>[1] Shut off<br>COM<br>0V<br><br>**Output module, I/O combined module**<br>Sink output<br>Back electromotive force [3]<br>ON — Y0 — Load<br>[2]<br>OFF — Y1 — Load<br>[1] Shut off<br>COM<br>12/24VDC | Take one of the following actions.<br>(1) To suppress back electromotive force, connect a diode in parallel with the load where the back electromotive force has been generated.<br>Source output [3]<br>Back electromotive force<br>Load<br><br>Sink output [3]<br>Back electromotive force<br>Load<br><br>(2) Configure another current path by connecting a diode across positive and negative of the external power supply.<br>When the corrective action described in the example 4 is taken at the same time, connect a diode in parallel with C1 and R1.<br><br>Source output<br>Back electromotive force [3]<br>ON — Y0 — Load<br>[2]<br>OFF — Y1 — Load<br>[1] Shut off<br>COM — C1 R1 D1<br>0V<br>Example 4<br><br>* The measures are ineffective in the following modules due to the characteristic of the external power supply circuit<br>• QY81P<br>• QY82P<br><br>Sink output<br>Back electromotive force [3]<br>ON — Y0 — Load<br>[2]<br>OFF — Y1 — Load<br>[1] Shut off<br>COM — C1 R1 D1<br>12/24VDC<br>Example 4<br><br>D1: Reverse voltage VR(VRM) ⋯ *1,<br>  Forward current IF(IFM) ⋯ *2<br>*1 Approximately 10 times higher than the rated voltage in the specifications<br>  Example: 24 VDC → Approximately 200V<br>*2 Two times or more as much as the maximum load current (common) in the specifications<br>  Example: 2A/1 common → 4A or more |

(To the next page)

Table 11.2 Output Circuit Problems and Corrective Actions (Continued)

| | Condition | Cause | Corrective action |
|---|---|---|---|
| Example 6 | The load operates only by powering on the external power supply. (transistor output) | The polarity to connect the external power supply is reverse.<br><br>If the external power supply is connected with wrong polarity, current may flow across an output element protection diode to the load. | Connect the external power supply with correct polarity. |
| Example 7 | When an output is turned on, a load connected to the other output is also turned on. (transistor output (source type)) | If the wire connecting 0V of an external power supply and a common of a load is cut off or disconnected, a current flows to the load that is off due to a parasitic circuit of the output element that is off.<br><br>If a current keeps flowing under the above condition, a failure may occur. | Connect the external power supply and loads correctly.<br>To prevent the condition described on the left, connect a diode to each output terminal as shown below.<br> |

## APPENDICES

Appendix 1 External Dimensions

Appendix 1.1 I/O modules and blank cover module

(1) Terminal block connector type
(a) Other than QY22
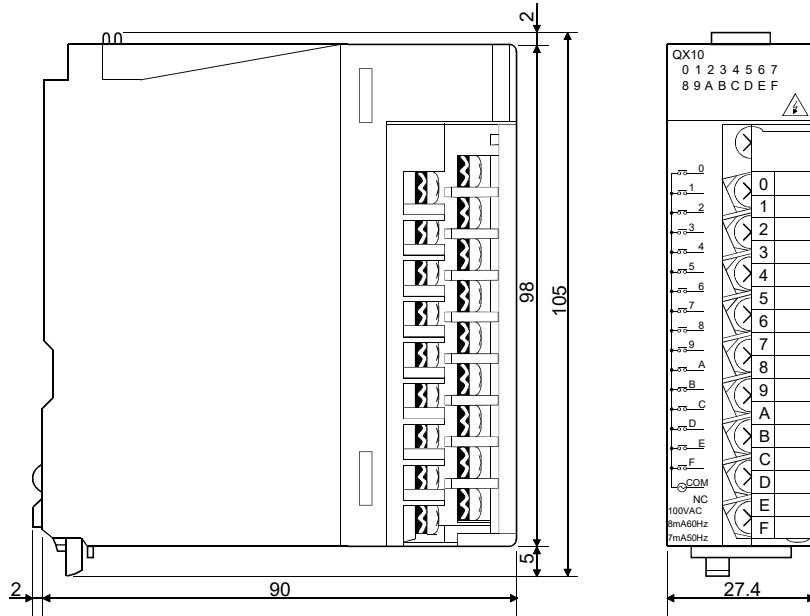


Unit: mm

(b) QY22 triac output module
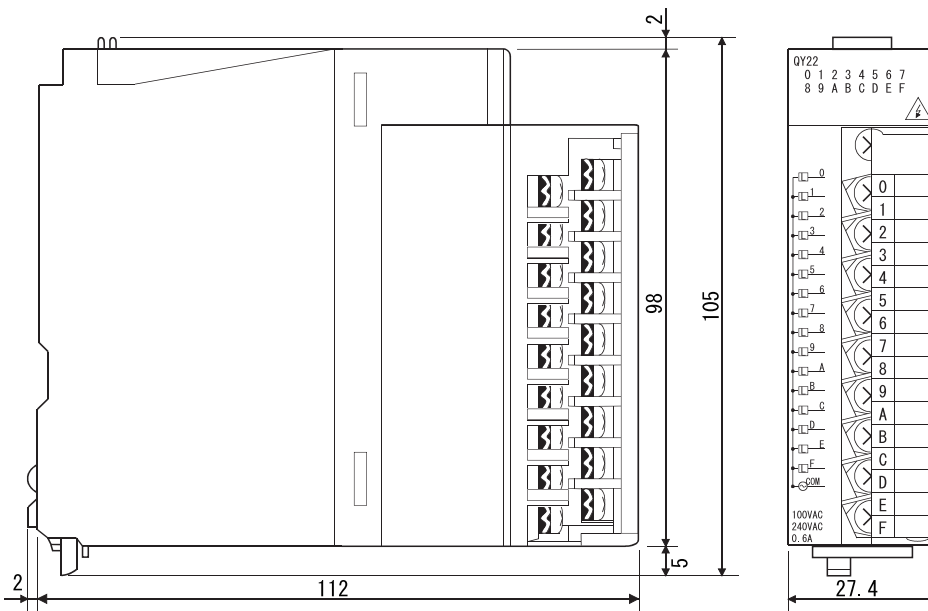


Unit: mm

(2) Spring clamp terminal block type
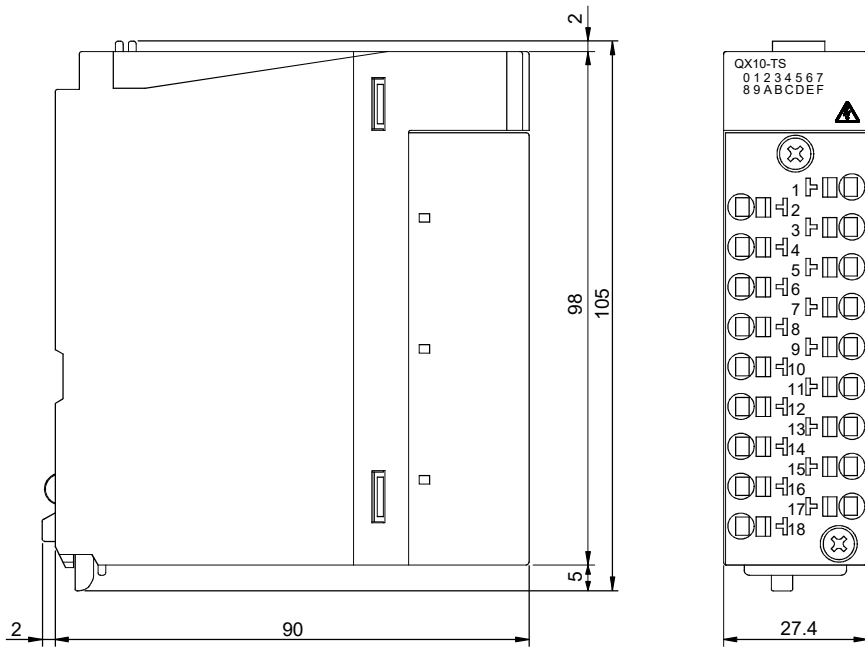


Unit: mm

(3) 40-pin connector type
(a) 32-point I/O module
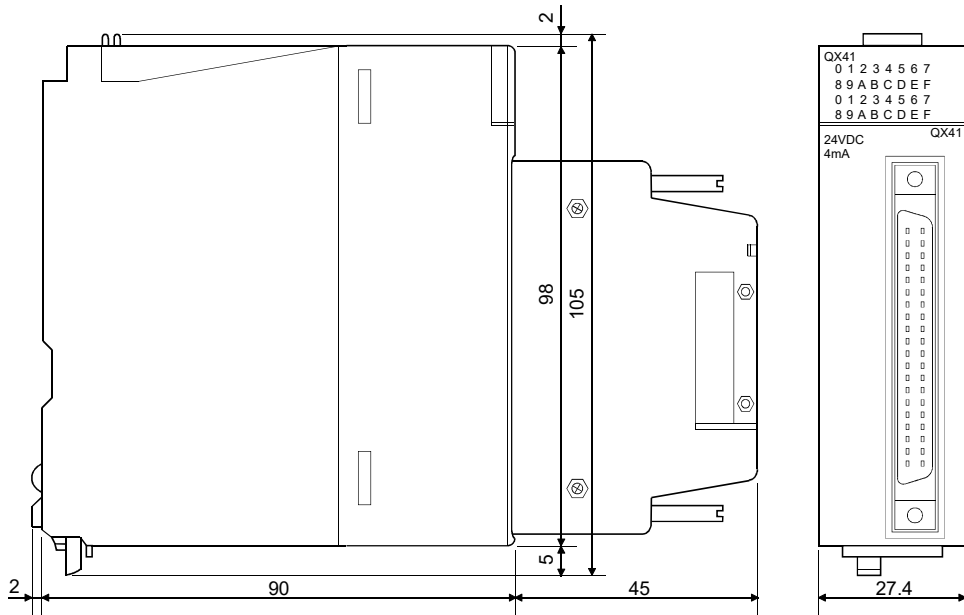


Unit: mm

(b) 64-point I/O module
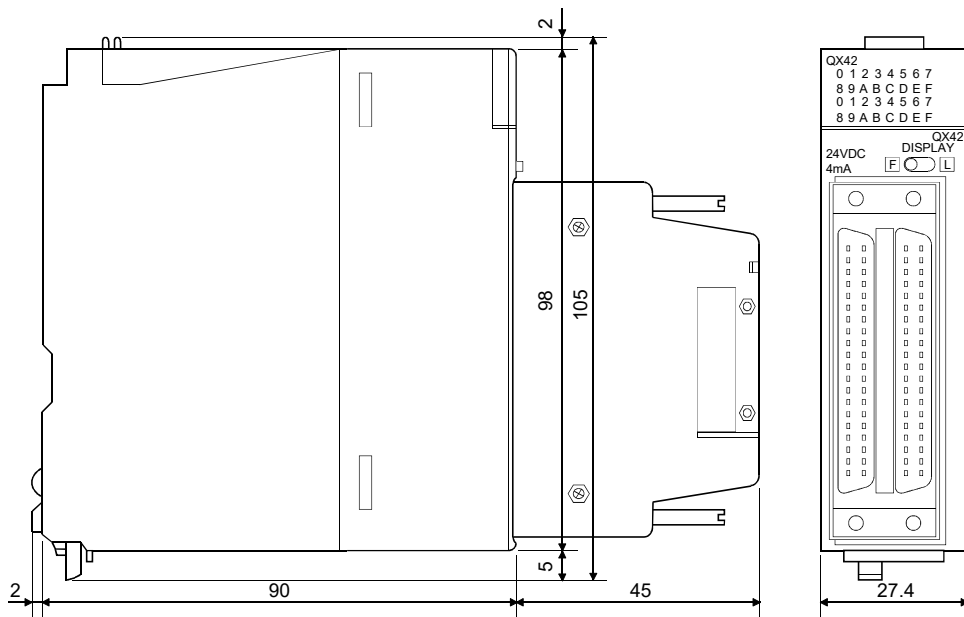


Unit: mm

(4) 37-pin D-sub connector type 32-point I/O module
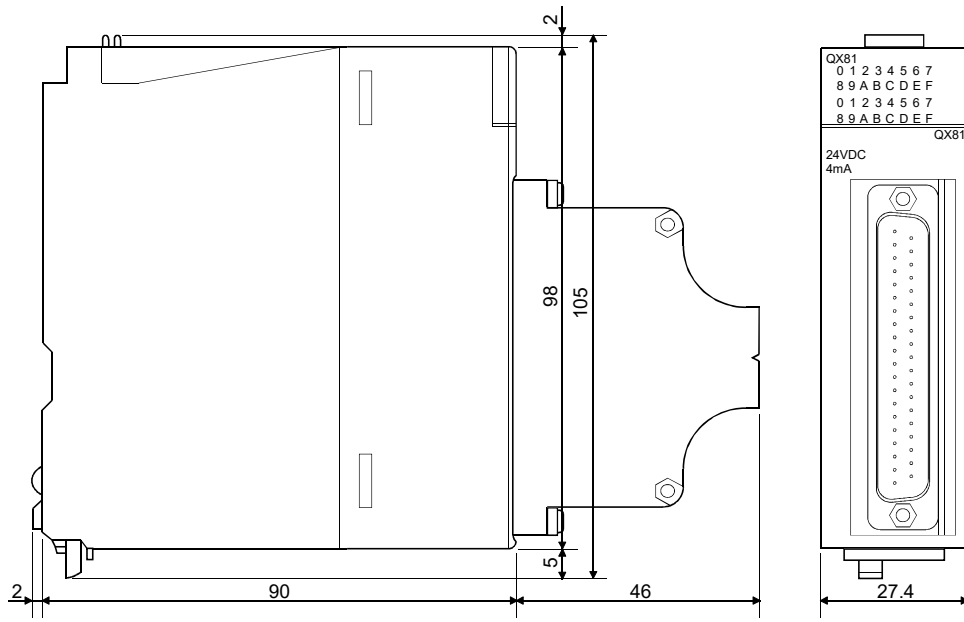


Unit: mm

(5) Blank cover module
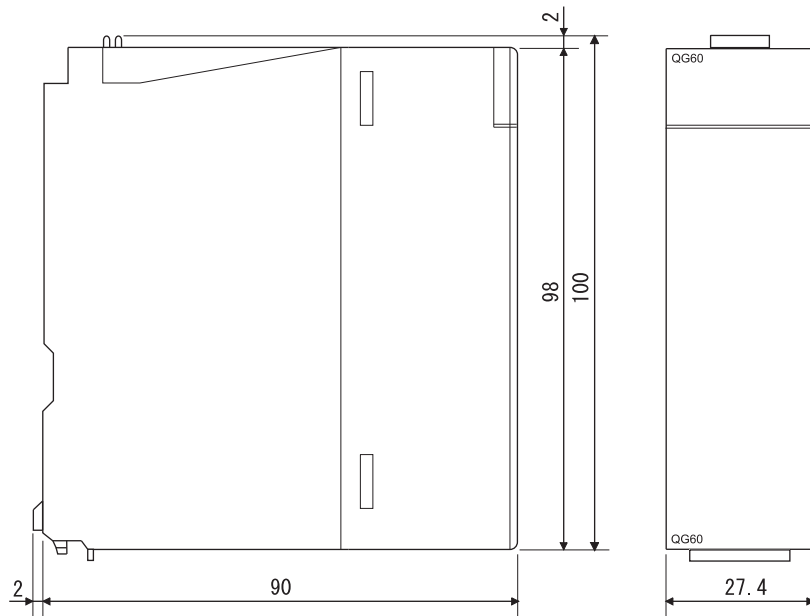


Unit: mm

Appendix 1.2 Connectors, connector/terminal block converter modules

(1) 40-pin connectors
(a) A6CON1 soldering type, A6CON2 crimp-contact type 40-pin connector



14 or less

46

72.72

*1

R4

6.9

8

6

14
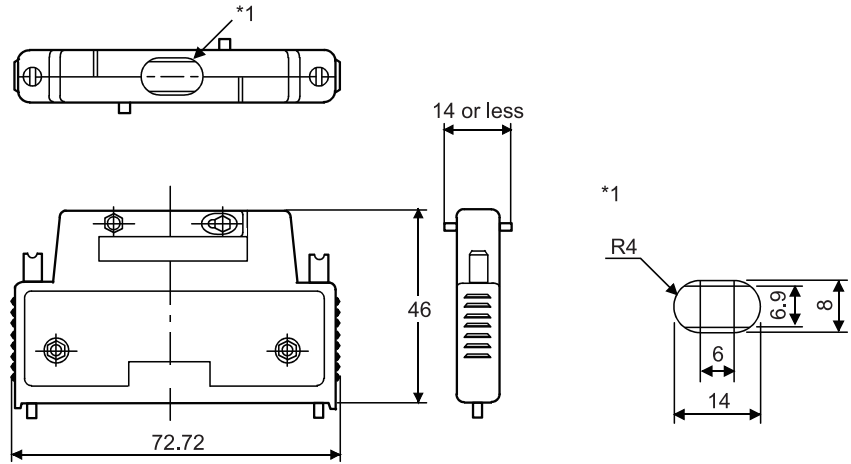
Unit: mm

(b) A6CON3 pressure-displacement type 40-pin connector



69.48

8.25

22.5

10
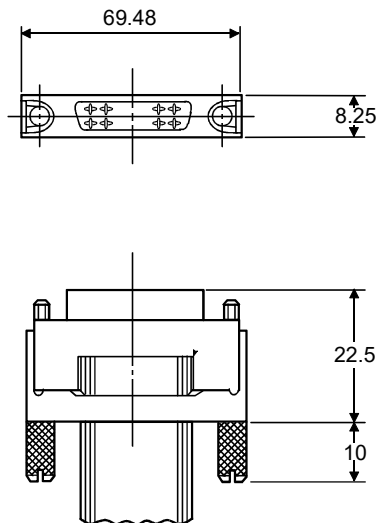
∗ Flat cable arrangement is in the following sequence.
A1 → B1 → A2…

Unit: mm

(c) A6CON4 soldering type
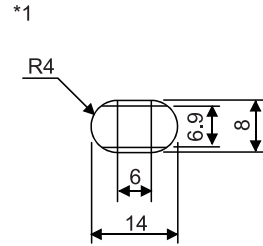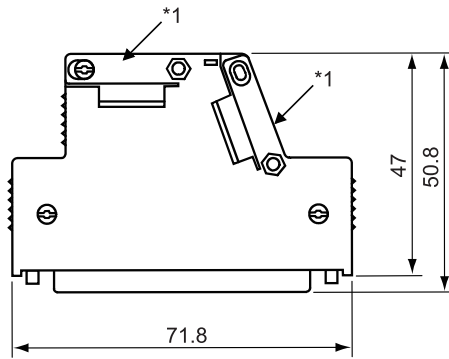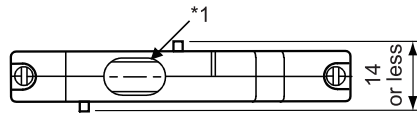


Unit: mm

If the cable diameter is thinner than the clamp portion, wind tape, etc. to secure the cable so that it will not come off the cable clamp portion.
If the cable is made of slippery material, it is recommended to take anti-slip measures by winding rubber-based tape, etc.

(2) 37-pin D-sub connectors
 (a) A6CON1E soldering type 37-pin D sub-connector
   (straight out type)
   A6CON2E crimp-contact-type 37-pin D sub-connector
   (straight out type)
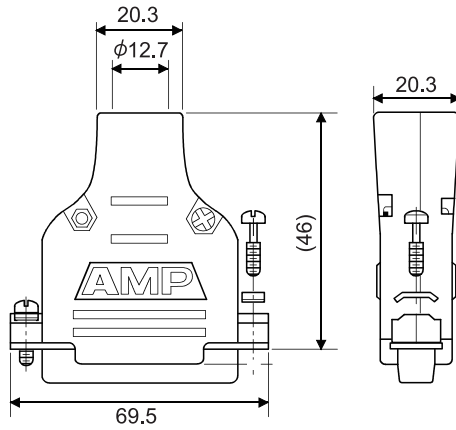


Unit: mm

 (b) A6CON3E pressure-displacement type 37-pin D-sub connector
   (flat cable type)
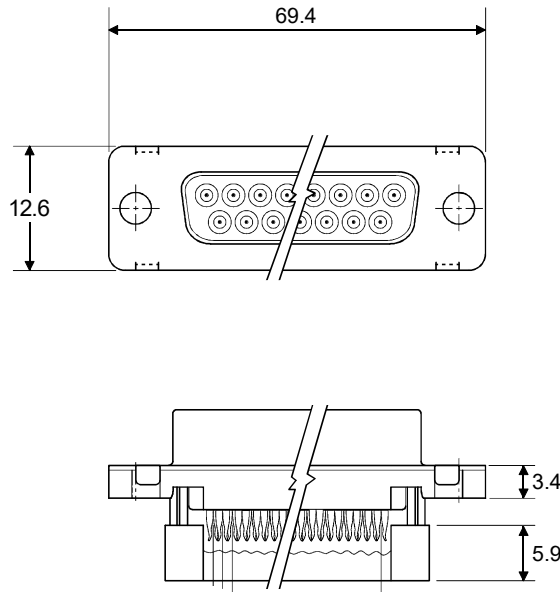


Unit: mm

(3) A6TB□36□ connector/terminal block converter module



2-φ4.5 mounting hole (M4×25)
M3.5 screw
44
78.5
17.3
89.6
5.5
120
48
52
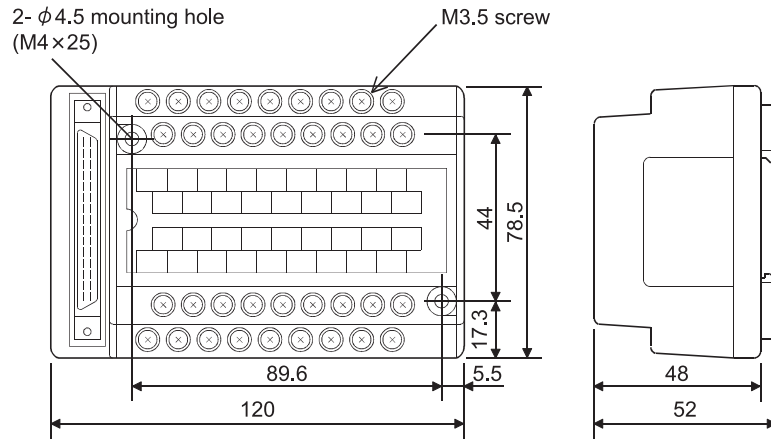
Unit: mm

(4) A6TB□54□ connector/terminal block converter module



2-φ4.5 mounting hole (M4×25)
M3.5 screw
44
78.5
17.3
124.6
5.5
155
48
52
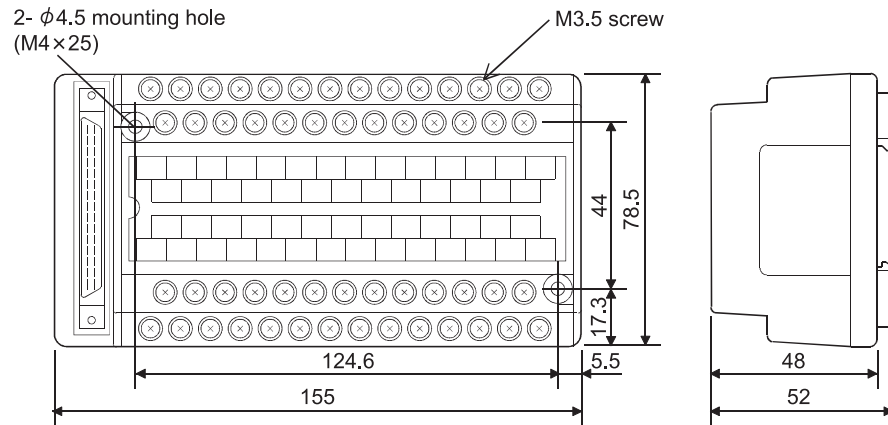
Unit: mm

(5) A6TBX70□ connector/terminal block converter module



2-φ4.5 mounting hole (M4×25)
M3.5 screw
44
78.5
17.3
159.6
5.5
190
48
52
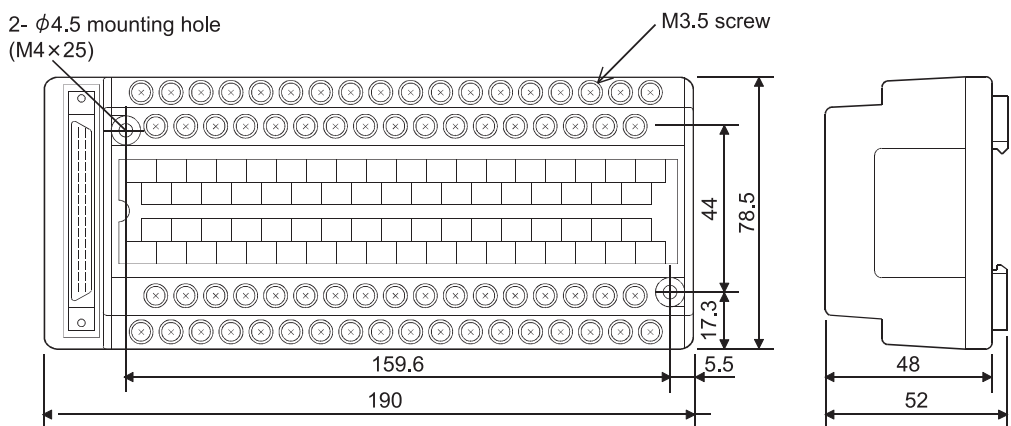
Unit: mm

Appendix 1.3 Connector/terminal block converter module cable

(1)   AC □ □ TB
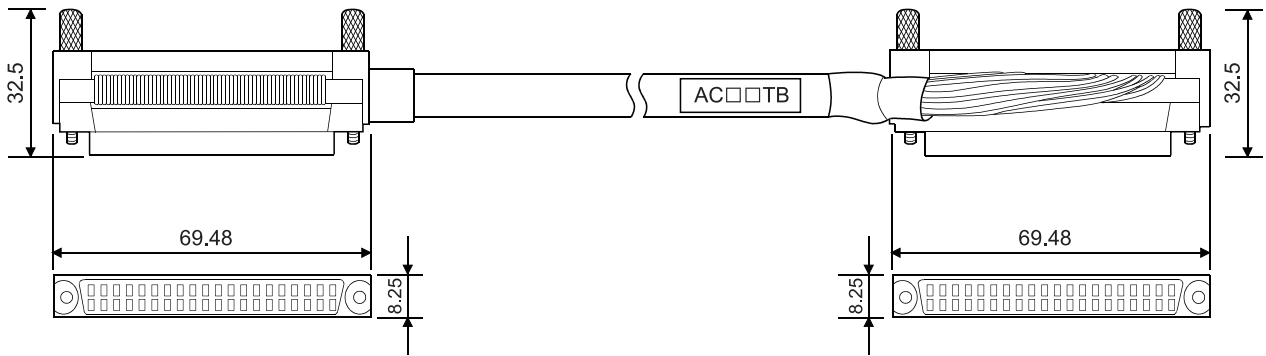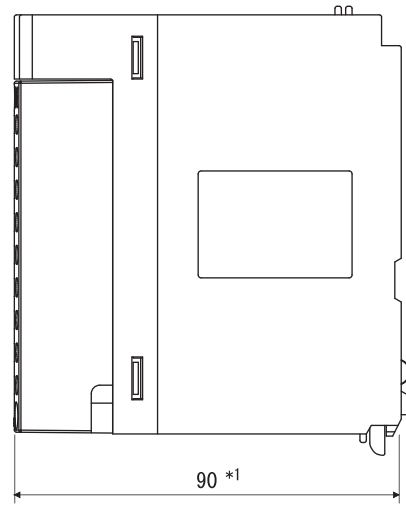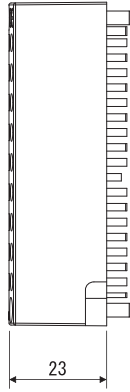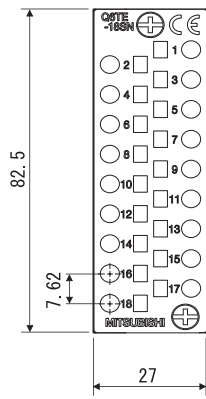


Unit: mm

(2)   AC □ □ TB-E
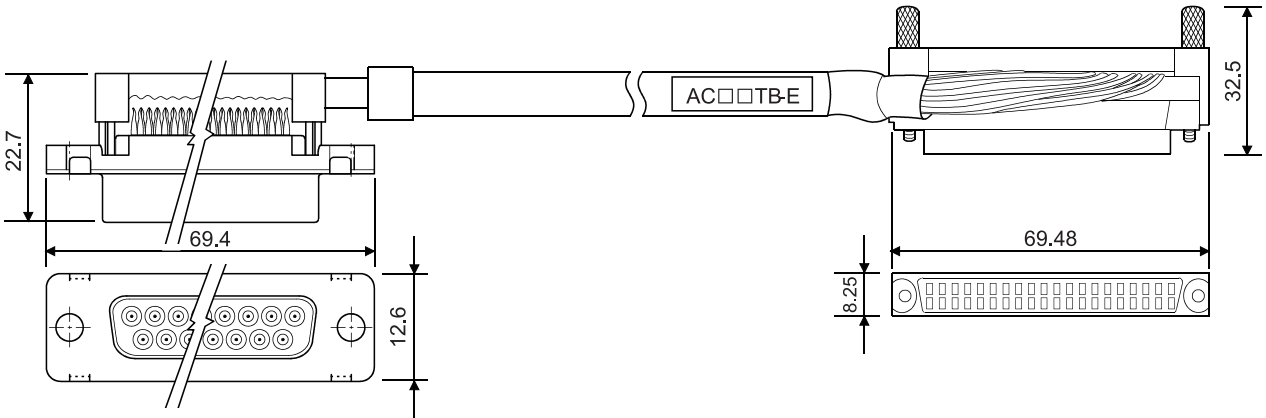


Unit: mm

Appendix 1.4 Spring clamp terminal block

(1) Q6TE-18S(N)            Installed on a module (Example: QX10)



Unit: mm

*1: The depth of the module installed with the Q6TE-18S(N) is equivalent with the factory default dimensions for that module.

Appendix 2 Compatibility with MELSEC-AnS Series I/O Modules

Note that the MELSEC-Q series I/O modules and MELSEC-AnS series I/O modules are different in external terminal block configuration.
Differences in terminal block configuration are indicated below.

(1) Input modules

| Terminal Block Number | QX10, QX40 | QX80 | A1SX10, A1SX40, A1SX80 |
|---|---|---|---|
| TB9 | X08 | X08 | COM |
| TB10 | X09 | X09 | X08 |
| TB11 | X0A | X0A | X09 |
| • | • | • | • |
| • | • | • | • |
| • | • | • | • |
| TB16 | X0F | X0F | X0E |
| TB17 | COM | NC | X0F |
| TB18 | NC | COM | COM |
| TB19 | — | — | NC |
| TB20 | — | — | NC |

(2) Output modules

| Terminal Block Number | QY10 | QY40P | A1SY10 | A1SY40 |
|---|---|---|---|---|
| TB9 | Y08 | Y08 | COM1 | 12/24VDC |
| TB10 | Y09 | Y09 | Y08 | COM1 |
| TB11 | Y0A | Y0A | Y09 | Y08 |
| • | • | • | • | • |
| • | • | • | • | • |
| • | • | • | • | • |
| TB16 | Y0F | Y0F | Y0E | Y0D |
| TB17 | COM | 12/24VDC | Y0F | Y0E |
| TB18 | NC | COM | COM2 | Y0F |
| TB19 | — | — | 24VDC | 12/24VDC |
| TB20 | — | — | 0V | COM2 |

| Terminal Block Number | QY50 | A1SY50 |
|---|---|---|
| TB9 | Y08 | 12/24VDC |
| TB10 | Y09 | COM1 |
| TB11 | Y0A | Y08 |
| • | • | • |
| • | • | • |
| • | • | • |
| TB16 | Y0F | Y0D |
| TB17 | 12/24VDC | Y0E |
| TB18 | COM | Y0F |
| TB19 | — | 12/24VDC |
| TB20 | — | COM2 |

| Terminal Block Number | QY80 | A1SY80 |
|---|---|---|
| TB9 | Y08 | COM1 |
| TB10 | Y09 | 0V |
| TB11 | Y0A | Y08 |
| • | • | • |
| • | • | • |
| • | • | • |
| TB16 | Y0F | Y0D |
| TB17 | COM | Y0E |
| TB18 | 0V | Y0F |
| TB19 | — | COM2 |
| TB20 | — | 0V |

| POINT |
|---|
| The 40-pin connector used with the MELSEC-AnS series I/O module can be used intact with the MELSEC-Q series I/O module. |
| The 37-pin D-sub connector used with the MELSEC-AnS series I/O module is the same in wiring as, but opposite in cable pulling direction to, the MELSEC-Q series I/O module. (The conventional cable for A6TB cannot be used.) |

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 to:

(1) Damages caused by any cause found not to be the responsibility of Mitsubishi.

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

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

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

## 5. Changes in product specifications

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

# MITSUBISHI ELECTRIC CORPORATION

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Ministry of Economy, Trade and Industry for service transaction permission.

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